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7	Cooling
8A	Audio/Video
8B	Chime/Buzzer
8C	Clock
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8H	Horn
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8N	Power Systems
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8P	Speed Control
8Q	Vehicle Theft Security
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BODY CODE PLATE

DESCRIPTION

The Body Code Plate (Fig. 1) is located in the engine compartment on the right headlamp mounting bracket. There are seven lines of information on the body code plate. Lines 4, 5, 6, and 7 are not used to define service information. Information reads from left to right, starting with line 3 in the center of the plate to line 1 at the bottom of the plate.

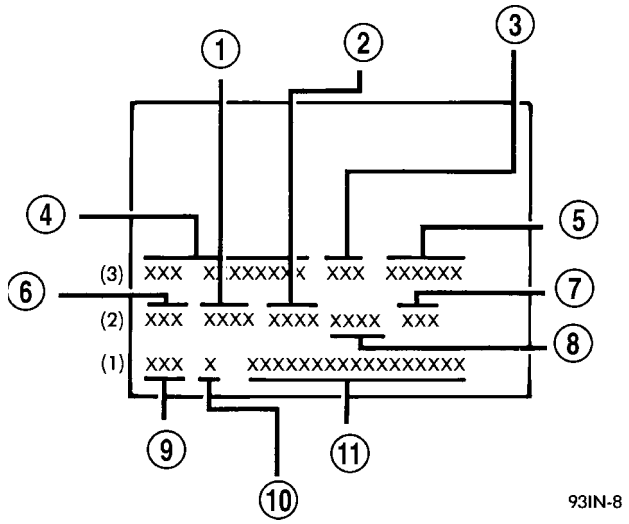


Fig. 1 BODY CODE PLATE

1 - PRIMARY PAINT
2 - SECONDARY PAINT
3 - VINYL ROOF
4 - VEHICLE ORDER NUMBER
5 - CAR LINE SHELL
6 - PAINT PROCEDURE
7 - ENGINE
8 - TRIM
9 - TRANSMISSION
10 - MARKET
11 - VIN

BODY CODE PLATE – LINE 3

DIGITS 1 THROUGH 12
Vehicle Order Number

DIGITS 13 THROUGH 17
Open Space

DIGITS 18 AND 19
Vehicle Shell Line
- CS

DIGIT 20
Carline
- Chrysler

FWD
- M = Pacifica

AWD
- F = Pacifica

DIGIT 21
Price Class
- 5 = P (Premium)
- 6 = S (Sport)

DIGITS 22 AND 23
Body Type
- 8 = Sport Utility 4 Door

BODY CODE PLATE LINE 2

DIGITS 1, 2 AND 3
Paint Procedure

DIGIT 4
Open Space

BODY CODE PLATE (Continued)

DIGITS 5 THROUGH 7

Primary Paint (Refer to 23 - BODY/PAINT - SPECIFICATIONS).

DIGIT 8 AND 9

Open Space

DIGITS 10 THROUGH 12

Secondary Paint

DIGIT 13 AND 14

Open Space

DIGITS 15 THROUGH 18

Interior Trim Code

DIGIT 19

Open Space

DIGITS 20, 21, AND 22

Engine Code

- EGN = 3.5L 6 Cyl. 24 Valve Gasoline (MPI)

DIGIT 23

Open Space

BODY CODE PLATE LINE 1

DIGITS 1, 2, AND 3

Transaxle Codes

- DGB = 4-Speed Automatic Transaxle
- DGL = 41AE/TE 4-Speed Electronic Automatic

DIGIT 4

Open Space

DIGIT 5

Market Code

- C = Canada
- B = International
- M = Mexico
- U = United States

DIGIT 6

Open Space

DIGITS 7 THROUGH 23

Vehicle Identification Number

- Refer to Vehicle Identification Number (VIN) paragraph for proper breakdown of VIN code.

IF TWO BODY CODE PLATES ARE REQUIRED

The last code shown on either plate will be followed by END. When two plates are required, the last code space on the first plate will indicate (CTD)

When a second plate is required, the first four spaces of each line will not be used due to overlap of the plates.

FASTENER IDENTIFICATION

DESCRIPTION

The SAE bolt strength grades range from grade 2 to grade 8. The higher the grade number, the greater the bolt strength. Identification is determined by the line marks on the top of each bolt head. The actual bolt strength grade corresponds to the number of line marks plus 2. The most commonly used metric bolt strength classes are 9.8 and 10.9. The metric strength class identification number is imprinted on the head of the bolt. The higher the class number, the greater the bolt strength. Some metric nuts are imprinted with a single-digit strength class on the nut face. Refer to the Fastener Identification and Fastener Strength Charts.

BOLT MARKINGS AND TORQUES - METRIC

Bolt Markings	8.8/8.9		10.9		12.9	
Bolt Dia.	N·m	Ft. Lbs.	N·m	Ft. Lbs.	N·m	Ft. Lbs.
6	12	105*	14	120*	16	12
8	25	250*	32	23	38	28
10	54	40	60	45	74	55
12	95	70	108	80	135	100
14	155	115	175	130	216	160
16	243	180	324	210	324	240
* Inch Lbs.						

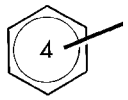
FASTENER IDENTIFICATION (Continued)

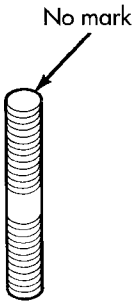
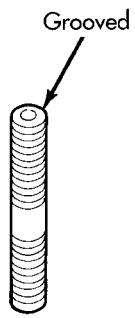
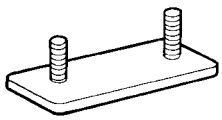
BOLT MARKINGS AND TORQUES - U. S. CUSTOMARY

Bolt Markings	Grade 5		Grade 8	
Bolt Dia.	N·m	Ft. Lbs	N·m	Ft. Lbs
1/4 - 20	10	95*	14	125*
1/4 - 28	10	95*	17	150*
5/16 - 18	22	200*	30	270*
5/16 - 24	26	240*	33	300*
3/8 - 16	40	30	55	40
3/8 - 24	47	35	60	45
7/16 - 14	68	50	88	65
7/16 - 20	74	55	95	70
1/2 - 13	101	75	135	100
1/2 -20	115	85	150	110
9/16 - 12	135	105	182	135
9/16 - 18	155	115	202	150
5/8 - 11	202	150	263	195
5/8 - 18	215	160	284	210
3/4 - 10	230	170	297	220
3/4 - 16	236	175	304	225
7/8 - 14	405	300	540	400
* Inch Lbs.				

FASTENER IDENTIFICATION (Continued)

HOW TO DETERMINE BOLT STRENGTH

	Mark	Class
Hexagon head bolt	 Bolt head No. 4 — 4T; 5 — 5T; 6 — 6T; 7 — 7T; 8 — 8T; 9 — 9T; 10 — 10T; 11 — 11T	
	 No mark	4T
Hexagon flange bolt w/washer hexagon bolt	 No mark	4T
Hexagon head bolt	 Two protruding lines	5T
Hexagon flange bolt w/washer hexagon bolt	 Two protruding lines	6T
Hexagon head bolt	 Three protruding lines	7T
Hexagon head bolt	 Four protruding lines	8T

	Mark	Class
Stud bolt		4T
		6T
Welded bolt		4T

95IN-4

FASTENER USAGE

DESCRIPTION

DESCRIPTION - FASTENER USAGE

WARNING: USE OF AN INCORRECT FASTENER MAY RESULT IN COMPONENT DAMAGE OR PERSONAL INJURY.

Fasteners and torque specifications references in this Service Manual are identified in metric and SAE format.

During any maintenance or repair procedures, it is important to salvage all fasteners (nuts, bolts, etc.) for reassembly. If the fastener is not salvageable, a fastener of equivalent specification must be used.

DESCRIPTION - THREADED HOLE REPAIR

Most stripped threaded holes can be repaired using a Helicoil®. Follow the vehicle or Helicoil® recommendations for application and repair procedures.

INTERNATIONAL SYMBOLS

DESCRIPTION

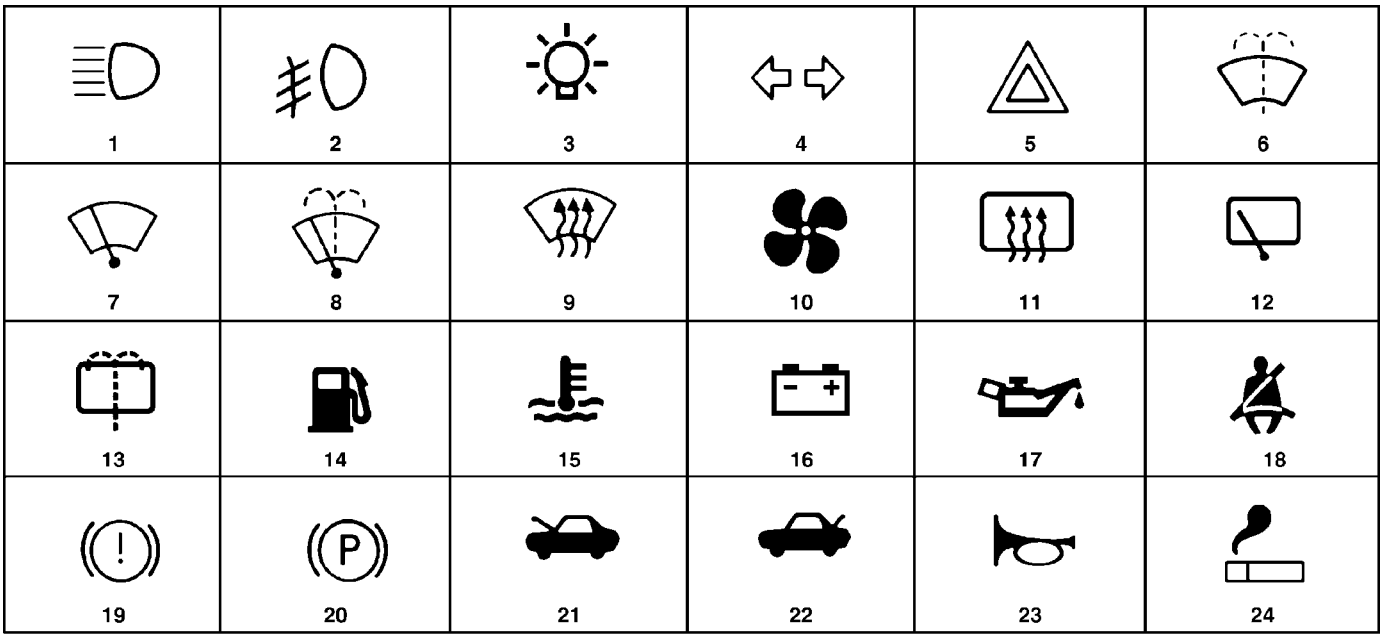
The graphic symbols illustrated in the following International Control and Display Symbols Chart (Fig. 2) are used to identify various instrument controls. The symbols correspond to the controls and displays that are located on the instrument panel.

METRIC SYSTEM

DESCRIPTION

The metric system is based on quantities of one, ten, one hundred, one thousand and one million.

The following chart will assist in converting metric units to equivalent English and SAE units, or vise versa.



80be4788

Fig. 2 INTERNATIONAL CONTROL AND DISPLAY SYMBOLS

1	High Beam	13	Rear Window Washer
2	Fog Lamps	14	Fuel
3	Headlamp, Parking Lamps, Panel Lamps	15	Engine Coolant Temperature
4	Turn Warning	16	Battery Charging Condition
5	Hazard Warning	17	Engine Oil
6	Windshield Washer	18	Seat Belt
7	Windshield Wiper	19	Brake Failure
8	Windshield Wiper and Washer	20	Parking Brake
9	Windscreen Demisting and Defrosting	21	Front Hood
10	Ventilating Fan	22	Rear hood (Decklid)
11	Rear Window Defogger	23	Horn
12	Rear Window Wiper	24	Lighter

METRIC SYSTEM (Continued)

CONVERSION FORMULAS AND EQUIVALENT VALUES

MULTIPLY	BY	TO GET	MULTIPLY	BY	TO GET
in-lbs	x 0.11298	= Newton Meters (N·m)	N·m	x 8.851	= in-lbs
ft-lbs	x 1.3558	= Newton Meters (N·m)	N·m	x 0.7376	= ft-lbs
Inches Hg (60° F)	x 3.377	= Kilopascals (kPa)	kPa	x 0.2961	= Inches Hg
psi	x 6.895	= Kilopascals (kPa)	kPa	x 0.145	= psi
Inches	x 25.4	= Millimeters (mm)	mm	x 0.03937	= Inches
Feet	x 0.3048	= Meters (M)	M	x 3.281	= Feet
Yards	x 0.9144	= Meters	M	x 1.0936	= Yards
mph	x 1.6093	= Kilometers/Hr. (Km/h)	Km/h	x 0.6214	= mph
Feet/Sec	x 0.3048	= Meters/Sec (M/S)	M/S	x 3.281	= Feet/Sec
mph	x 0.4470	= Meters/Sec (M/S)	M/S	x 2.237	= mph
Kilometers/Hr. (Km/h)	x 0.27778	= Meters/Sec (M/S)	M/S	x 3.600	Kilometers/Hr. (Km/h)

COMMON METRIC EQUIVALENTS

1 inch = 25 Millimeters	1 Cubic Inch = 16 Cubic Centimeters
1 Foot = 0.3 Meter	1 Cubic Foot = 0.03 Cubic Meter
1 Yard = 0.9 Meter	1 Cubic Yard = 0.8 Cubic Meter
1 Mile = 1.6 Kilometers	

Refer to the Metric Conversion Chart to convert torque values listed in metric Newton- meters (N·m). Also, use the chart to convert between millimeters (mm) and inches (in.) (Fig. 3).

METRIC SYSTEM (Continued)

in-lbs to N•m

in- lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m
2	.2260	42	4.7453	82	9.2646	122	13.7839	162	18.3032
4	.4519	44	4.9713	84	9.4906	124	14.0099	164	18.5292
6	.6779	46	5.1972	86	9.7165	126	14.2359	166	18.7552
8	.9039	48	5.4232	88	9.9425	128	14.4618	168	18.9811
10	1.1298	50	5.6492	90	10.1685	130	14.6878	170	19.2071
12	1.3558	52	5.8751	92	10.3944	132	14.9138	172	19.4331
14	1.5818	54	6.1011	94	10.6204	134	15.1397	174	19.6590
16	1.8077	56	6.3270	96	10.8464	136	15.3657	176	19.8850
18	2.0337	58	6.5530	98	11.0723	138	15.5917	178	20.1110
20	2.2597	60	6.7790	100	11.2983	140	15.8176	180	20.3369
22	2.4856	62	7.0049	102	11.5243	142	16.0436	182	20.5629
24	2.7116	64	7.2309	104	11.7502	144	16.2696	184	20.7889
26	2.9376	66	7.4569	106	11.9762	146	16.4955	186	21.0148
28	3.1635	68	7.6828	108	12.2022	148	16.7215	188	21.2408
30	3.3895	70	7.9088	110	12.4281	150	16.9475	190	21.4668
32	3.6155	72	8.1348	112	12.6541	152	17.1734	192	21.6927
34	3.8414	74	8.3607	114	12.8801	154	17.3994	194	21.9187
36	4.0674	76	8.5867	116	13.1060	156	17.6253	196	22.1447
38	4.2934	78	8.8127	118	13.3320	158	17.8513	198	22.3706
40	4.5193	80	9.0386	120	13.5580	160	18.0773	200	22.5966

N•m to in-lbs

N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb
.2	1.7702	4.2	37.1747	8.2	72.5792	12.2	107.9837	16.2	143.3882
.4	3.5404	4.4	38.9449	8.4	74.3494	12.4	109.7539	16.4	145.1584
.6	5.3107	4.6	40.7152	8.6	76.1197	12.6	111.5242	16.6	146.9287
.8	7.0809	4.8	42.4854	8.8	77.8899	12.8	113.2944	16.8	148.6989
1	8.8511	5	44.2556	9	79.6601	13	115.0646	17	150.4691
1.2	10.6213	5.2	46.0258	9.2	81.4303	13.2	116.8348	17.2	152.2393
1.4	12.3916	5.4	47.7961	9.4	83.2006	13.4	118.6051	17.4	154.0096
1.6	14.1618	5.6	49.5663	9.6	84.9708	13.6	120.3753	17.6	155.7798
1.8	15.9320	5.8	51.3365	9.8	86.7410	13.8	122.1455	17.8	157.5500
2	17.7022	6	53.1067	10	88.5112	14	123.9157	18	159.3202
2.2	19.4725	6.2	54.8770	10.2	90.2815	14.2	125.6860	18.5	163.7458
2.4	21.2427	6.4	56.6472	10.4	92.0517	14.4	127.4562	19	168.1714
2.6	23.0129	6.6	58.4174	10.6	93.8219	14.6	129.2264	19.5	172.5970
2.8	24.7831	6.8	60.1876	10.8	95.5921	14.8	130.9966	20	177.0225
3	26.5534	7	61.9579	11	97.3624	15	132.7669	20.5	181.4480
3.2	28.3236	7.2	63.7281	11.2	99.1326	15.2	134.5371	21	185.8736
3.4	30.0938	7.4	65.4983	11.4	100.9028	15.4	136.3073	22	194.7247
3.6	31.8640	7.6	67.2685	11.6	102.6730	15.6	138.0775	23	203.5759
3.8	33.6342	7.8	69.0388	11.8	104.4433	15.8	139.8478	24	212.4270
4	35.4045	8	70.8090	12	106.2135	16	141.6180	25	221.2781

ft-lbs to N•m

ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m
1	1.3558	21	28.4722	41	55.5885	61	82.7049	81	109.8212
2	2.7116	22	29.8280	42	56.9444	62	84.0607	82	111.1770
3	4.0675	23	31.1838	43	58.3002	63	85.4165	83	112.5328
4	5.4233	24	32.5396	44	59.6560	64	86.7723	84	113.8888
5	6.7791	25	33.8954	45	61.0118	65	88.1281	85	115.2446
6	8.1349	26	35.2513	46	62.3676	66	89.4840	86	116.6004
7	9.4907	27	36.6071	47	63.7234	67	90.8398	87	117.9562
8	10.8465	28	37.9629	48	65.0793	68	92.1956	88	119.3120
9	12.2024	29	39.3187	49	66.4351	69	93.5514	89	120.6678
10	13.5582	30	40.6745	50	67.7909	70	94.9073	90	122.0236
11	14.9140	31	42.0304	51	69.1467	71	96.2631	91	123.3794
12	16.2698	32	43.3862	52	70.5025	72	97.6189	92	124.7352
13	17.6256	33	44.7420	53	71.8583	73	98.9747	93	126.0910
14	18.9815	34	46.0978	54	73.2142	74	100.3316	94	127.4468
15	20.3373	35	47.4536	55	74.5700	75	101.6862	95	128.8026
16	21.6931	36	48.8094	56	75.9258	76	103.0422	96	130.1586
17	23.0489	37	50.1653	57	77.2816	77	104.3980	97	131.5144
18	24.4047	38	51.5211	58	78.6374	78	105.7538	98	132.8702
19	25.7605	39	52.8769	59	79.9933	79	107.1196	99	134.2260
20	27.1164	40	54.2327	60	81.3491	80	108.4654	100	135.5820

N•m to ft-lbs

N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
1	.7376	21	15.9888	41	30.2400	61	44.9913	81	59.7425
2	1.4751	22	16.2264	42	30.9776	62	45.7289	82	60.4801
3	2.2127	23	16.9639	43	31.7152	63	46.4664	83	61.2177
4	2.9502	24	17.7015	44	32.4527	64	47.2040	84	61.9552
5	3.6878	25	18.4391	45	33.1903	65	47.9415	85	62.6928
6	4.4254	26	19.1766	46	33.9279	66	48.6791	86	63.4303
7	5.1629	27	19.9142	47	34.6654	67	49.4167	87	64.1679
8	5.9005	28	20.6517	48	35.4030	68	50.1542	88	64.9545
9	6.6381	29	21.3893	49	36.1405	69	50.8918	89	65.6430
10	7.3756	30	22.1269	50	36.8781	70	51.6293	90	66.3806
11	8.1132	31	22.8644	51	37.6157	71	52.3669	91	67.1181
12	8.8507	32	23.6020	52	38.3532	72	53.1045	92	67.8557
13	9.5883	33	24.3395	53	39.0908	73	53.8420	93	68.5933
14	10.3259	34	25.0771	54	39.8284	74	54.5720	94	69.3308
15	11.0634	35	25.8147	55	40.5659	75	55.3172	95	70.0684
16	11.8010	36	26.5522	56	41.3035	76	56.0547	96	70.8060
17	12.5386	37	27.2898	57	42.0410	77	56.7923	97	71.5435
18	13.2761	38	28.0274	58	42.7786	78	57.5298	98	72.2811
19	14.0137	39	28.7649	59	43.5162	79	58.2674	99	73.0187
20	14.7512	40	29.5025	60	44.2537	80	59.0050	100	73.7562

in. to mm

in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
.01	.254	.21	5.334	.41	10.414	.61	15.494	.81	20.574
.02	.508	.22	5.588	.42	10.668	.62	15.748	.82	20.828
.03	.762	.23	5.842	.43	10.922	.63	16.002	.83	21.082
.04	1.016	.24	6.096	.44	11.176	.64	16.256	.84	21.336
.05	1.270	.25	6.350	.45	11.430	.65	16.510	.85	21.590
.06	1.524	.26	6.604	.46	11.684	.66	16.764	.86	21.844
.07	1.778	.27	6.858	.47	11.938	.67	17.018	.87	22.098
.08	2.032	.28	7.112	.48	12.192	.68	17.272	.88	22.352
.09	2.286	.29	7.366	.49	12.446	.69	17.526	.89	22.606
.10	2.540	.30	7.620	.50	12.700	.70	17.780	.90	22.860
.11	2.794	.31	7.874	.51	12.954	.71	18.034	.91	23.114
.12	3.048	.32	8.128	.52	13.208	.72	18.288	.92	23.368
.13	3.302	.33	8.382	.53	13.462	.73	18.542	.93	23.622
.14	3.556	.34	8.636	.54	13.716	.74	18.796	.94	23.876
.15	3.810	.35	8.890	.55	13.970	.75	19.050	.95	24.130
.16	4.064	.36	9.144	.56	14.224	.76	19.304	.96	24.384
.17	3.318	.37	9.398	.57	14.478	.77	19.558	.97	24.638
.18	4.572	.38	9.652	.58	14.732	.78	19.812	.98	24.892
.19	4.826	.39	9.906	.59	14.986	.79	20.066	.99	25.146
.20	5.080	.40	10.160	.60	15.240	.80	20.320	1.00	25.400

mm to in.

mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
.01	.00039	.21	.00827	.41	.01614	.61	.02402	.81	.03189
.02	.00079	.22	.00866	.42	.01654	.62	.02441	.82	.03228
.03	.00118	.23	.00906	.43	.01693	.63	.02480	.83	.03268
.04	.00157	.24	.00945	.44	.01732	.64	.02520	.84	.03307
.05	.00197	.25	.00984	.45	.01772	.65	.02559	.85	.03346
.06	.00236	.26	.01024	.46	.01811	.66	.02598	.86	.03386
.07	.00276	.27	.01063	.47	.01850	.67	.02638	.87	.03425
.08	.00315	.28	.01102	.48	.01890	.68	.02677	.88	.03465
.09	.00354	.29	.01142	.49	.01929	.69	.02717	.89	.03504
.10	.00394	.30	.01181	.50	.01969	.70	.02756	.90	.03543
.11	.00433	.31	.01220	.51	.02008	.71	.02795	.91	.03583
.12	.00472	.32	.01260	.52	.02047	.72	.02835	.92	.03622
.13	.00512	.33	.01299	.53	.02087	.73	.02874	.93	.03661
.14	.00551	.34	.01339	.54	.02126	.74	.02913	.94	.03701
.15	.00591	.35	.01378	.55	.02165	.75	.02953	.95	.03740
.16	.00630	.36	.01417	.56	.02205	.76	.02992	.96	.03780
.17	.00669	.37	.01457	.57	.02244	.77	.03032	.97	.03819
.18	.00709	.38	.01496	.58	.02283	.78	.03071	.98	.03858
.19	.00748	.39	.01535	.59	.02323	.79	.03110	.99	.03898
.20	.00787	.40	.01575	.60	.02362	.80	.03150	1.00	.03937

J901N-10

Fig. 3 METRIC CONVERSION CHART

TORQUE REFERENCES

DESCRIPTION

Individual Torque Charts appear within many or the Groups. Refer to the Standard Torque Specifications Chart for torque references not listed in the individual torque charts (Fig. 4).

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N•m	kgf-cm	ft-lbf	N•m	kgf-cm	ft-lbf
4T	6	1	5	55	48 in.-lbf	6	60	52 in.-lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	—	—	—
5T	6	1	6.5	65	56 in.-lbf	7.5	75	65 in.-lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	—	—	—
6T	6	1	8	80	69 in.-lbf	9	90	78 in.-lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	—	—	—
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	—	—	—
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

Fig. 4 TORQUE SPECIFICATIONS

VECI LABEL

DESCRIPTION

All models have a Vehicle Emission Control Information (VECI) Label. DaimlerChrysler permanently attaches the label in the engine compartment. It cannot be removed without defacing information and destroying the label.

The label contains the vehicle's emission specifications and vacuum hose routings. All hoses must be connected and routed according to the label.

VEHICLE IDENTIFICATION NUMBER

DESCRIPTION

The Vehicle Identification Number (VIN) can be viewed through the windshield at the upper left corner of the instrument panel, near the left windshield pillar (Fig. 5). The VIN consists of 17 characters in a combination of letters and numbers that provide specific information about the vehicle. Refer to VIN Code Breakdown Chart for decoding information.

To protect the consumer from theft and possible fraud the manufacturer is required to include a Check Digit at the ninth position of the vehicle identification number. The check digit is used by the manufacturer and government agencies to verify the authenticity of the vehicle and official documentation. The formula to use the check digit is not released to the general public.

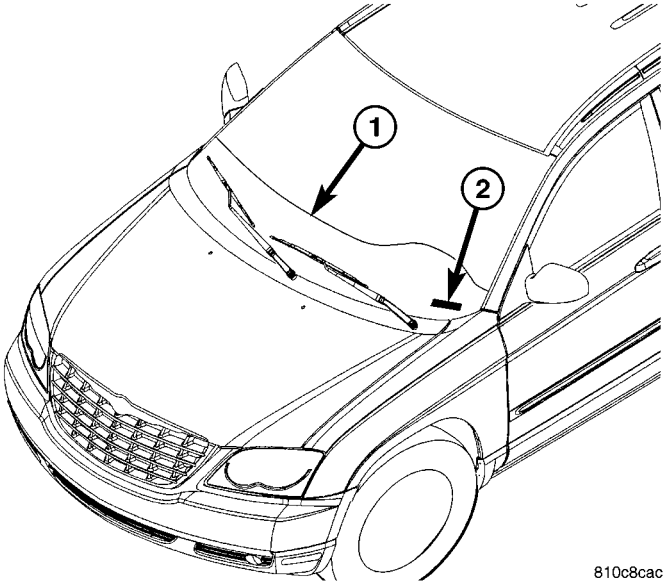


Fig. 5 VEHICLE IDENTIFICATION NUMBER (VIN)

1 - INSTRUMENT PANEL
2 - VEHICLE IDENTIFICATION NUMBER (VIN)

VIN CODE BREAKDOWN CHART

POSITION	INTERPRETATION	CODE = DESCRIPTION
1	Country of Origin	1 = Manufactured by DaimlerChrysler Corporation 2 = Manufactured by DaimlerChrysler Canada Inc.
2	Make	C = Chrysler
3	Vehicle Type	4 = Multipurpose Passenger Vehicle Less Side Airbags 8 = Multipurpose Passenger Vehicle With Side Airbags
4	Gross Vehicle Weight Rating	F = 1815 - 2267 kg. (4001 - 5000 lbs.) G = 2268 - 2721 kg. (5001 - 6000)
5	Car Line	F = Pacifica - AWD M = Pacifica - FWD
6	Series	5 = Premium 6 = Sport
7	Body Style	8 = Sport Utility 4 Door
8	Engine	4 = 3.5L V6 cyl. 24 - Valve Gasoline (MPI) L = 3.8L V6 cyl. Gasline (SMPI)
9	Check Digit	See explanation in this section.
10	Model Year	5 = 2005
11	Assembly Plant	R = Windsor Assembly
12 through 17	Sequence Number	A six digit number assigned by assembly plant.

VEHICLE CERTIFICATION LABEL

DESCRIPTION

A vehicle certification label is attached to the rear shutface of the driver's door (Fig. 6). This label indicates date of manufacture (month and year), Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating (GAWR) front, Gross Axle Weight Rating (GAWR) rear and the Vehicle Identification Number (VIN). The Month, Day and Hour of manufacture is also included.

All communications or inquiries regarding the vehicle should include the Month-Day-Hour and Vehicle Identification Number.

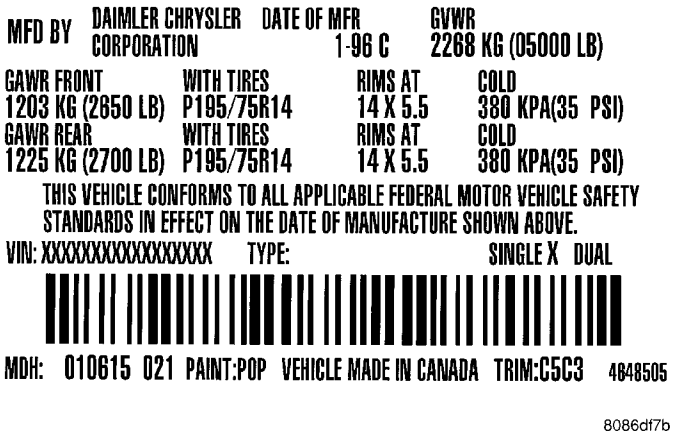


Fig. 6 VEHICLE CERTIFICATION LABEL - TYPICAL

LUBRICATION & MAINTENANCE

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INTERNATIONAL SYMBOLS

DESCRIPTION

DaimlerChrysler Corporation uses international symbols to identify engine compartment lubricant and fluid inspection and fill locations (Fig. 1).

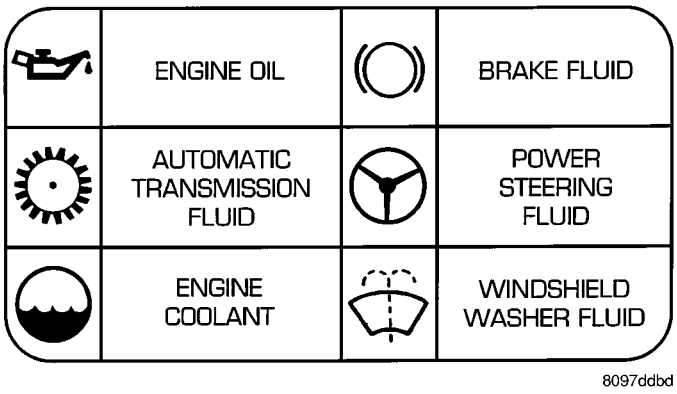


Fig. 1 INTERNATIONAL SYMBOLS

PARTS & LUBRICANT RECOMMENDATION

DESCRIPTION

LUBRICANT RECOMMENDATIONS

Chassis

Component	Fluid, Lubricant, or Genuine Part
Steering Gear & Linkage, Ball Joints, Prop Shafts & Yokes, Wheel Bearings	Mopar® Multi-Purpose Lubricant NLGI Grade 2 EP, GC-LB

PARTS & LUBRICANT RECOMMENDATION (Continued)

Body

Component	Fluid, Lubricant, and Genuine Part
Hinges:	
Door & Hood	Mopar® Engine Oil
Swing Gate	Mopar® Multi-Purpose Lube NLGI Grade 2 EP, GC-LB
Latches: Door, Hood/Safety Catch, Swing Gate	Mopar® Multi-Purpose Lube NLGI Grade 2 EP, GC-LB
Seat Regulator & Track	Mopar® Multi-Purpose Lube NLGI Grade 2 EP, GC-LB
Lock Cylinders	Mopar® Lock Cylinder Lube

FLUID TYPES

When service is required, DaimlerChrysler Corporation recommends that only Mopar® brand parts, lubricants and chemicals be used. Mopar® provides the best engineered products for servicing DaimlerChrysler Corporation vehicles.

Only lubricants bearing designations defined by the following organization should be used to service a Chrysler Corporation vehicle.

- Society of Automotive Engineers (SAE)
- American Petroleum Institute (API) (Fig. 2)
- National Lubricating Grease Institute (NLGI)

API QUALITY CLASSIFICATION



9400-9

Fig. 2 API Symbol

This symbol on the front of an oil container means that the oil has been certified by the American Petroleum Institute (API) to meet all the lubrication requirements specified by DaimlerChrysler Corporation.

GEAR LUBRICANTS

SAE ratings also apply to multigrade gear lubricants. In addition, API classification defines the lubricants usage. Such as API GL-5 and SAE 75W-90.

FLUID TYPES

DESCRIPTION

ENGINE OIL

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

When service is required, DaimlerChrysler Corporation recommends that only Mopar® brand parts, lubricants and chemicals be used. Mopar® provides the best engineered products for servicing DaimlerChrysler Corporation vehicles.

Only lubricants bearing designations defined by the following organization should be used.

- Society of Automotive Engineers (SAE)
- American Petroleum Institute (API)
- National Lubricating Grease Institute (NLGI)
- Association des Constructeurs Européens d' Automobiles (European Automobile Manufacturers Association) (ACEA)

API SERVICE GRADE CERTIFIED

Use an engine oil that is API Certified (GF-3). Mopar® provides engine oils, meeting Material Standard MS-6395, that meet or exceed this requirement.

SAE VISCOSITY

An SAE viscosity grade is used to specify the viscosity of engine oil. Use only engine oils with multiple viscosities such as 5W-30 or 10W-30. These are specified with a dual SAE viscosity grade which indicates the cold-to-hot temperature viscosity range. Select an engine oil that is best suited to your particular temperature range and variation (Fig. 3).

ACEA CATEGORIES

For countries that use the ACEA European Oil Categories for service fill oils, use engine oils that meet the requirements of ACEA A1/B1, A2/B2, or A3/B3.

FLUID TYPES (Continued)

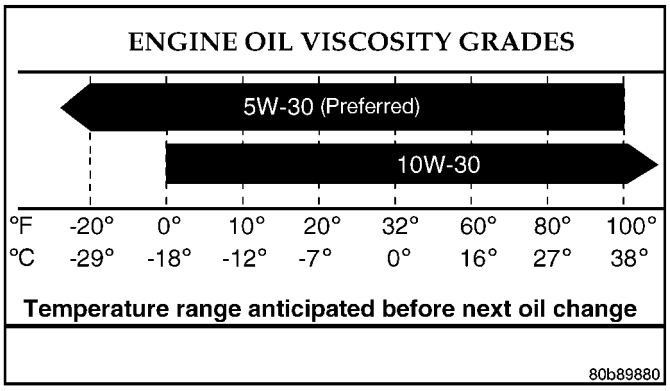


Fig. 3 Temperature/Engine Oil Viscosity

ENERGY CONSERVING OIL

An Energy Conserving type oil is recommended for gasoline engines. The designation of ENERGY CONSERVING is located on the label of an engine oil container.

CONTAINER IDENTIFICATION

Standard engine oil identification notations have been adopted to aid in the proper selection of engine oil. The identifying notations are located on the front label of engine oil plastic bottles and the top of engine oil cans (Fig. 4).

This symbol means that the oil has been certified by the American Petroleum Institute (API). Diamler-Chrysler only recommends API Certified (GF-3) engine oils that meet the requirements of Material Standard MS-6395. Use Mopar® or an equivalent oil meeting the specification MS-6395.



9400-9

Fig. 4 API Certification Mark

SYNTHETIC ENGINE OILS

There are a number of engine oils being promoted as either synthetic or semi-synthetic. If you chose to use such a product, use **only** those oils that meet the American Petroleum Institute (API) and SAE viscosity standard. Follow the service schedule that describes your driving type.

ENGINE OIL ADDITIVES/SUPPLEMENTS

The manufacturer **does not recommend** the addition of any engine oil additives/supplements to the specified engine oil. Engine oil additives/supplements should not be used to enhance engine oil performance. Engine oil additives/supplements should not be used to extend engine oil change intervals. No additive is known to be safe for engine durability and can degrade emission components. Additives can contain undesirable materials that harm the long term durability of engines by:

- Doubling the level of Phosphorus in the engine oil. The ILSAC (International Lubricant Standard Approval Committee) GF-2 and GF-3 standards require that engine oil contain no more than 0.10% Phosphorus to protect the vehicles emissions performance. Addition of engine oil additives/supplements can poison, from the added sulfur and phosphorus, catalysts and hinder efforts to guarantee emissions performance to 80,000 miles.
- Altering the viscosity characteristics of the engine oil so that it no longer meets the requirements of the specified viscosity grade.
- Creating potential for an undesirable additive compatibility interaction in the engine crankcase. Generally it is not desirable to mix additive packages from different suppliers in the crankcase; there have been reports of low temperature engine failures caused by additive package incompatibility with such mixtures.

ENGINE COOLANT

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASE COOLANT PROPERLY, CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE, PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED, PERSONAL INJURY CAN RESULT.

CAUTION: Use of Propylene Glycol based coolants is not recommended, as they provide less freeze protection and less boiling protection.

The cooling system is designed around the coolant. The coolant must accept heat from engine metal, in the cylinder head area near the exhaust valves and

engine block. Then coolant carries the heat to the radiator where the tube/fin radiator can transfer the heat to the air.

The use of aluminum cylinder blocks, cylinder heads, and water pumps requires special corrosion protection. Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769), or the equivalent ethylene glycol base coolant with hybrid organic corrosion inhibitors (called HOAT, for Hybrid Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% Ethylene Glycol and 50% distilled water to obtain a freeze point of -37°C (-35°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

The green coolant **MUST NOT BE MIXED** with the orange or magenta coolants. When replacing coolant the complete system flush must be performed before using the replacement coolant.

CAUTION: Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769) may not be mixed with any other type of antifreeze. Doing so will reduce the corrosion protection and may result in premature water pump seal failure. If non-HOAT coolant is introduced into the cooling system in an emergency, it should be replaced with the specified coolant as soon as possible.

FLEXIBLE FUEL ENGINE OIL

The information in this section is for Flexible Fuel Vehicles (FFV) only. These vehicles can be identified by the unique Fuel Filler Door Label that states Ethanol (E-85) or Unleaded Gasoline Only. This section only covers those subjects that are unique to these vehicles. Please refer to the other sections of this manual for information on features that are common between Flexible Fuel and gasoline only powered vehicles.

ETHANOL FUEL (E-85)

E-85 is a mixture of approximately 85% fuel ethanol and 15% unleaded gasoline.

WARNING: Ethanol vapors are extremely flammable and could cause serious personal injury. Never have any smoking materials lit in or near the vehicle when removing the fuel filler tube cap (gas cap) or filling the tank. Do not use E-85 as a cleaning agent and never use it near an open flame.

FUEL REQUIREMENTS

The vehicle will operate on both unleaded gasoline with an octane rating of 87, or E-85 fuel, or any mixture of these two.

For best results, a refueling pattern that alternates between E-85 and unleaded gasoline should be avoided. When you do switch fuels, it is recommended that

- you do not switch when the fuel gauge indicates less than 1/4 full
- you do not add less than 5 gallons when refueling
- you operate the vehicle immediately after refueling for a period of at least 5 minutes

Observing these precautions will avoid possible hard starting and/or significant deterioration in driveability during warm up.

FFV STARTING

The characteristics of E-85 fuel make it unsuitable for use when ambient temperatures fall below 0°F. In the range of 0°F to 32°F, you may experience an increase in the time it takes for your engine to start, and a deterioration in driveability (sags and/or hesitations) until the engine is fully warmed up.

Engine Operating on E-85 Fuel

If vehicle operates on E-85 fuel either full or part-time, use only Mopar® Flexible Fuel 5W-30 engine oil or an equivalent that meets DaimlerChrysler Standard MS-9214. Equivalent commercial Flexible Fuel engine oils may be labeled as Multi-Fuel, Variable Fuel, Flexible Fuel, etc. These engine oils may be satisfactory if they meet the DaimlerChrysler Standard.

SAE 5W-30 engine oil is preferred for use in Flexible Fuel engines.

CAUTION: If Flexible Fuel engine oil is not used when using E-85 fuel, engine wear or damage may result.

CRUISING RANGE

Because E-85 fuel contains less energy per gallon than gasoline, you will experience an increase in fuel consumption. You can expect your MPG and your driving range to decrease by about 30% compared to gasoline operation.

AUTOMATIC TRANSAXLE FLUID

NOTE: Refer to the maintenance schedules for the recommended maintenance (fluid/filter change) intervals for these transaxles.

FLUID TYPES (Continued)

NOTE: All transaxles have a common transmission and differential sump. Filling the transaxle accommodates the differential as well.

TRANSMISSION FLUID

Mopar® ATF+4 (Automatic Transmission Fluid) is required in the 41TE automatic transaxles. Substitute fluids can induce transmission problems and/or failure.

Mopar® ATF+4 (Automatic Transmission Fluid) when new is red in color. The ATF is dyed red so it can be identified from other fluids used in the vehicle such as engine oil or antifreeze. The red color is not permanent and is not an indicator of fluid condition. As the vehicle is driven, the ATF will begin to look darker in color and may eventually become brown. **This is normal.** ATF+4 also has a unique odor that may change with age. Consequently, **odor and color cannot be used to indicate the fluid condition or the need for a fluid change.**

FLUID ADDITIVES

DaimlerChrysler strongly recommends against the addition of any fluids to the transmission, other than those automatic transmission fluids listed above. Exceptions to this policy are the use of special dyes to aid in detecting fluid leaks.

Various “special” additives and supplements exist that claim to improve shift feel and/or quality. These additives and others also claim to improve converter clutch operation and inhibit overheating, oxidation, varnish, and sludge. These claims have not been supported to the satisfaction of DaimlerChrysler and these additives **must not be used.** The use of transmission “sealers” should also be avoided, since they may adversely affect the integrity of transmission seals.

FUEL REQUIREMENTS

Your engine is designed to meet all emissions regulations and provide excellent fuel economy and performance when using high quality unleaded gasoline having an octane rating of 87. The use of premium gasoline is not recommended. The use of premium gasoline will provide no benefit over high quality regular gasoline, and in some circumstances may result in poorer performance.

Light spark knock at low engine speeds is not harmful to your engine. However, continued heavy spark knock at high speeds can cause damage and immediate service is required. Engine damage resulting from operation with a heavy spark knock may not be covered by the new vehicle warranty.

Poor quality gasoline can cause problems such as hard starting, stalling and hesitations. If you experience these symptoms, try another brand of gasoline before considering service for the vehicle.

Over 40 auto manufacturers world-wide have issued and endorsed consistent gasoline specifications (the Worldwide Fuel Charter, WWFC) to define fuel properties necessary to deliver enhanced emissions, performance and durability for your vehicle. We recommend the use of gasolines that meet the WWFC specifications if they are available.

REFORMULATED GASOLINE

Many areas of the country require the use of cleaner burning gasoline referred to as “reformulated” gasoline. Reformulated gasoline contain oxygenates, and are specifically blended to reduce vehicle emissions and improve air quality.

We strongly support the use of reformulated gasoline. Properly blended reformulated gasoline will provide excellent performance and durability for the engine and fuel system components.

GASOLINE/OXYGENATE BLENDS

Some fuel suppliers blend unleaded gasoline with oxygenates such as 10% ethanol, MTBE, and ETBE. Oxygenates are required in some areas of the country during the winter months to reduce carbon monoxide emissions. Fuels blended with these oxygenates may be used in your vehicle.

CAUTION: DO NOT use gasoline containing METHANOL. Gasoline containing methanol may damage critical fuel system components.

MMT IN GASOLINE

MMT is a manganese-containing metallic additive that is blended into some gasoline to increase octane. Gasoline blended with MMT provide no performance advantage beyond gasoline of the same octane number without MMT. Gasoline blended with MMT reduce spark plug life and reduce emission system performance in some vehicles. We recommend that gasoline free of MMT be used in your vehicle. The MMT content of gasoline may not be indicated on the gasoline pump; therefore, you should ask your gasoline retailer whether or not his/her gasoline contains MMT.

It is even more important to look for gasoline without MMT in Canada because MMT can be used at levels higher than allowed in the United States. MMT is prohibited in Federal and California reformulated gasoline.

SULFUR IN GASOLINE

If you live in the northeast United States, your vehicle may have been designed to meet California low emission standards with Cleaner-Burning Cali-

fornia reformulated gasoline with low sulfur. If such fuels are not available in states adopting California emission standards, your vehicles will operate satisfactorily on fuels meeting federal specifications, but emission control system performance may be adversely affected. Gasoline sold outside of California is permitted to have higher sulfur levels which may affect the performance of the vehicle's catalytic converter. This may cause the Malfunction Indicator Lamp (MIL), Check Engine or Service Engine Soon light to illuminate. We recommend that you try a different brand of unleaded gasoline having lower sulfur to determine if the problem is fuel related prior to returning your vehicle to an authorized dealer for service.

CAUTION: If the Malfunction Indicator Lamp (MIL), Check Engine or Service Engine Soon light is flashing, immediate service is required; see on-board diagnostics system section.

MATERIALS ADDED TO FUEL

All gasoline sold in the United States and Canada are required to contain effective detergent additives. Use of additional detergents or other additives is not needed under normal conditions.

FUEL SYSTEM CAUTIONS

CAUTION: Follow these guidelines to maintain your vehicle's performance:

- The use of leaded gas is prohibited by Federal law. Using leaded gasoline can impair engine performance, damage the emission control system, and could result in loss of warranty coverage.
- An out-of-tune engine, or certain fuel or ignition malfunctions, can cause the catalytic converter to overheat. If you notice a pungent burning odor or some light smoke, your engine may be out of tune or malfunctioning and may require immediate service. Contact your dealer for service assistance.
- When pulling a heavy load or driving a fully loaded vehicle when the humidity is low and the temperature is high, use a premium unleaded fuel to help prevent spark knock. If spark knock persists, lighten the load, or engine piston damage may result.
- The use of fuel additives which are now being sold as octane enhancers is not recommended. Most of these products contain high concentrations of methanol. Fuel system damage or vehicle performance problems resulting from the use of such fuels or additives is not the responsibility of DaimlerChrysler Corporation and may not be covered under the new vehicle warranty.

NOTE: Intentional tampering with emissions control systems can result in civil penalties being assessed against you.

AWD REAR DRIVELINE MODULE FLUIDS

The AWD Rear Driveline Module Assembly consists of two subassemblies, the Overrunning Clutch Housing (front) and the Differential Carrier (rear).

The recommended lubricant for the Overrunning Clutch Housing is Mopar® ATF+4. The recommended lubricant for the Differential Carrier is Mopar® 75W-90 Gear and Axle Lubricant.

AWD POWER TRANSFER UNIT

The recommended lubricant for the AWD Power Transfer Unit is Mopar® 75W-90 Gear and Axle Lubricant.

BRAKE FLUID

The brake fluid used in this vehicle must conform to DOT 3 specifications and SAE J1703 standards. No other type of brake fluid is recommended or approved for usage in the vehicle brake system. Use only Mopar® Brake Fluid or equivalent from a tightly sealed container.

CAUTION: Never use reclaimed brake fluid or fluid from an container which has been left open. An open container of brake fluid will absorb moisture from the air and contaminate the fluid.

CAUTION: Never use any type of a petroleum-based fluid in the brake hydraulic system. Use of such type fluids will result in seal damage of the vehicle brake hydraulic system causing a failure of the vehicle brake system. Petroleum based fluids would be items such as engine oil, transmission fluid, power steering fluid, etc.

POWER STEERING FLUID

The recommended fluid for the power steering system is Mopar® ATF+4 Automatic Transmission Fluid (MS-9602).

Mopar® ATF+4, when new, is red in color. ATF+4 is dyed red so it can be identified from other fluids used in the vehicle such as engine oil or antifreeze. The red color is not permanent and is not an indicator of fluid condition. As the vehicle is driven, ATF+4 will begin to look darker in color and may eventually become brown. **THIS IS NORMAL.** ATF+4 also has a unique odor that may change with age. Consequently, odor and color cannot be used to indicate the fluid condition or the need for a fluid change.

FLUID CAPACITIES

SPECIFICATIONS - FLUID CAPACITIES

DESCRIPTION	SPECIFICATION
Fuel Tank (Gas)	87 L (23 gal.)
Engine Oil* - 3.5 L	5.2 L (5.5 qts.)
Engine Oil* - 3.8 L	4.7 L (5.0 qts.)
Cooling System** - 3.5 L	9.9 L (10.5 qts.)
Cooling System** - 3.8 L	9.9 L (10.5 qts.)
Automatic 4-Speed Service Fill	3.8 L (4.0 qts.)
Automatic Transmission 41TE/41AE Overhaul Fill	9.2 L (9.7 qts.)
AWD Power Transfer Unit	1.0 L (2.1 pts.)
Power Steering	1.2 L (2.5 pts.)
AWD Bi-directional Overrunning Clutch	0.575 L (1.22 pts.)
AWD Rear Carrier	0.7 L (1.48 pts.)
* (includes oil filter)	
** (includes heater and recovery/reserve bottle filled to MAX level)	

FLUID FILL/CHECK LOCATIONS

DESCRIPTION

The fluid check/fill point locations are located in each applicable service manual section.

LUBRICATION POINTS

DESCRIPTION

Lubrication point locations are located in each applicable Sections.

MAINTENANCE SCHEDULES

DESCRIPTION

MAINTENANCE SCHEDULES

There are two maintenance schedules that show the **required** service for your vehicle.

First is Schedule **"B"**. It is for vehicles that are operated under the conditions that are listed below and at the beginning of the schedule.

- Day or night temperatures are below 32° F (0° C).
- Stop and go driving.
- Extensive engine idling.
- Driving in dusty conditions.
- Short trips of less than 10 miles (16 km).
- More than 50% of your driving is at sustained high speeds during hot weather, above 90° F (32° C).
- Trailer towing.◊
- Taxi, police, or delivery service (commercial service).◊
- Off-road or desert operation.

NOTE: If ANY of these apply to you then change your engine oil every 3,000 miles (5 000 km) or 3 months, whichever comes first and follow schedule "B" of the ″Maintenance Schedules″ section of this manual.

NOTE: Most vehicles are operated under the conditions listed for Schedule ″B″.

Second is Schedule **"A"**. It is for vehicles that are not operated under any of the conditions listed under Schedule ″B″.

Use the schedule that best describes your driving conditions. Where time and mileage are listed, follow the interval that occurs first.

NOTE: Under no circumstances should oil change intervals exceed 6000 miles (10 000 km) or 6 months whichever comes first.

CAUTION: Failure to perform the required maintenance items may result in damage to the vehicle.

At Each Stop for Fuel

- Check the engine oil level about 5 minutes after a fully warmed engine is shut off. Checking the oil level while the vehicle is on level ground will improve the accuracy of the oil level reading. Add oil only when the level is at or below the ADD or MIN mark.
- Check the windshield washer solvent and add if required.

Once a Month

- Check tire pressure and look for unusual wear or damage.
- Inspect the battery and clean and tighten the terminals as required.
- Check the fluid levels of coolant bottle, brake master cylinder and transmission, add as needed.
- Check all lights and all other electrical items for correct operation.

MAINTENANCE SCHEDULES (Continued)

At Each Oil Change

- Change the engine oil filter.
- Inspect the exhaust system.
- Inspect the brake hoses.
- Inspect the CV joints and front suspension components.
- Check the automatic transmission fluid level.
- Check the coolant level, hoses, and clamps.

SCHEDULE B

Follow schedule "B" if you usually operate your vehicle under one or more of the following conditions. Change the automatic transmission fluid and filter every 60,000 miles (96 000 km) if the vehicle is usually operated under one or more of the conditions marked with an ◇.

- Day or night temperatures are below 32° F (0° C).
- Stop and go driving.
- Extensive engine idling.
- Driving in dusty conditions.
- Short trips of less than 10 miles (16 km).
- More than 50% of your driving is at sustained high speeds during hot weather, above 90° F (32° C).
- Trailer towing.◇
- Taxi, police, or delivery service (commercial service).◇
- Off-road or desert operation.

NOTE: If ANY of these apply to you then change your engine oil every 3,000 miles (5 000 km) or 3 months, whichever comes first and follow schedule "B" of the ″Maintenance Schedules″ section of this manual.

If none of these apply to you, then change your engine oil at every interval shown on schedule ″A″ of the ″Maintenance Schedules″ section of this manual.

Miles (Kilometers)	**3, 000 (5 000)**	**6, 000 (10 000)**	**9, 000 (14 000)**	**12, 000 (19 000)**	**15, 000 (24 000)**	**18, 000 (29 000)**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires		X		X		X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X	X		X
Replace the **engine air cleaner filter.** *					X	
Change the All Wheel Drive (AWD) power transfer unit fluid. (See note at the end of this chart)					X	
Replace the air conditioning filter.				X		

MAINTENANCE SCHEDULES (Continued)

Miles (Kilometers)	**21, 000 (34 000)**	**24, 000 (38 000)**	**27, 000 (43 000)**	**30, 000 (48 000)**	**33, 000 (53 000)**	**36, 000 (58 000)**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires		X		X		X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X		X	X
Replace the **engine air cleaner filter.**				X		
Inspect the tie rod ends and boot seals. (Front & Rear)				X		
Inspect the **PCV valve** and replace as necessary.*				X		
Change the All Wheel Drive (AWD) power transfer unit fluid. (See note at the end of this chart)				X		
Change the All Wheel Drive (AWD) overrunning clutch and rear carrier fluid. (See the note at the end of this chart)	X					
Replace the air conditioning filter.		X				X

Miles (Kilometers)	**39, 000 (62 000)**	**42, 000 (67 000)**	**45, 000 (72 000)**	**48, 000 (77 000)**	**51, 000 (82 000)**	**54, 000 (86 000)**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires		X		X		X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X	X		X	X	X
Replace the **engine air cleaner filter.** *			X			
Change the All Wheel Drive power transfer unit fluid. (See the note at the end of this chart.)			X			
Change the All Wheel Drive (AWD) overrunning clutch and rear carrier fluid. (See note at the end of this chart)		X				
Replace the air conditioning filter.				X		

MAINTENANCE SCHEDULES (Continued)

Miles (Kilometers)	**57, 000 (91 000)**	**60, 000 (96 000)**	**63, 000 (101 000)**	**66, 000 (106 000)**	**69, 000 (110 000)**	**72, 000 (115 000)**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires		X		X		X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X		X	X	X	X
Replace the **engine air cleaner filter.**		X				
Inspect the tie rod ends and boot seals. (Front & Rear)		X				
Inspect the **PCV valve** and replace if necessary.*		X				
Inspect the serpentine drive belt, replace if necessary. ‡		X				
Change the automatic transmission fluid and filter.		X				
Change the All Wheel Drive (AWD) power transfer unit fluid. (See note at the end of this chart)		X		X		
Change the All Wheel Drive (AWD) overrunning clutch and rear carrier fluid. (See note at the end of this chart)			X			
Replace the air conditioning filter.		X				X

Miles (Kilometers)	**75, 000 (120 000)**	**78, 000 (125 000)**	**81, 000 (130 000)**	**84, 000 (134 000)**	**87, 000 (139 000)**	**90, 000 (144 000)**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires		X		X		X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *		X	X	X	X	
Replace the **engine air cleaner filter**	X					X
Replace the **spark plugs.**	X					
Inspect the tie rod ends and boot seals. (Front & Rear)						X
Check the **PCV valve** and replace if necessary. Not required if previously changed.*						X
Inspect the serpentine drive belt, replace if necessary. ‡	X					X
Change the All Wheel Drive power transfer unit fluid. (See the note at the end of this chart.)	X					X
Change the All Wheel Drive (AWD) overrunning clutch and rear carrier fluid. (See note at the end of this chart)				X		
Replace the air conditioning filter.				X		

MAINTENANCE SCHEDULES (Continued)

Miles (Kilometers)	**93, 000 (149 000)**	**96, 000 (154 000)**	**99, 000 (158 000)**	**100, 000 (160 000)**	**102, 000 (163 000)**	**105, 000 (168 000)**
Change engine oil and engine oil filter.	X	X	X		X	X
Rotate Tires		X			X	
Inspect the brake linings.			X			
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X	X	X	
Replace the **engine air cleaner filter** *						X
Replace engine timing belt.						X
Change the All Wheel Drive (AWD) power transfer unit fluid. (See note at the end of this chart)						X
Change the All Wheel Drive (AWD) overrunning clutch and rear carrier fluid. (See note at the end of this chart)						X
Inspect the serpentine drive belt, replace if necessary. ‡						X
Flush and replace the engine coolant at 60 months or 100,000 miles.				X		
Replace the air conditioning filter.		X				

Miles (Kilometers)	**108, 000 (173 000)**	**111, 000 (178 000)**	**114, 000 (182 000)**	**117, 000 (187 000)**	**120, 000 (192 000)**
Change engine oil and engine oil filter.	X	X	X	X	X
Rotate Tires	X		X		X
Inspect the brake linings.	X			X	
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X	X	
Replace the **engine air cleaner filter.**					X
Inspect the tie rod ends and boot seals. (Front & Rear)					X
Inspect the **PCV valve** and replace as necessary.*					X
Inspect the serpentine drive belt, replace if necessary. ‡					X
Change the automatic transmission fluid and filter.					X
Change the All Wheel Drive (AWD) power transfer unit fluid. (See note at the end of this chart)					X
Replace the air conditioning filter.	X				X

* This maintenance is recommended by the manufacture to the owner but is not required to maintain the emissions warranty.

‡ This maintenance is not required if previously replaced.

Inspection and service should also be performed anytime a malfunction is observed or suspected. Retain all receipts.

NOTE: The AWD power transfer unit fluid and the AWD overrunning clutch/ rear carrier fluid must be changed at the more frequent intervals shown in schedule B if the vehicle is operated under any of the conditions noted by a diamond (◇) at the beginning of the schedule.

MAINTENANCE SCHEDULES (Continued)

SCHEDULE A

Miles **(Kilometers)** **[Months]**	**6, 000** **(10 000)** **[6]**	**12, 000** **(19 000)** **[12]**	**18, 000** **(29 000)** **[18]**	**24, 000** **(38 000)** **[24]**	**30, 000** **(48 000)** **[30]**	**36, 000** **(58 000)** **[36]**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires	X	X	X	X	X	X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X	X		X
Replace the **engine air cleaner filter.**					X	
Inspect the tie rod ends and boot seals. (Front & Rear)					X	
Replace the air conditioning filter.		X		X		X

Miles **(Kilometers)** **[Months]**	**42, 000** **(67 000)** **[42]**	**48, 000** **(77 000)** **[48]**	**54, 000** **(86 000)** **[54]**	**60, 000** **(96 000)** **[60]**	**66, 000** **(106 000)** **[66]**	**72, 000** **(115 000)** **[72]**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires	X	X	X	X	X	X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X		X	X
Replace the **engine air cleaner filter.**				X		
Inspect the tie rod ends and boot seals. (Front & Rear)				X		
Check the **PCV valve** and replace, if necessary.*				X		
Inspect the serpentine drive belt, replace if necessary. ‡				X		X
Flush and replace the engine coolant at 60 months, regardless of mileage.				X		
Replace the air conditioning filter.		X		X		X

MAINTENANCE SCHEDULES (Continued)

Miles (Kilometers) [Months]	**78, 000 (125 000) [78]**	**84, 000 (134 000) [84]**	**90, 000 (144 000) [90]**	**96, 000 (154 000) [96]**	**100, 000 (160 000)**
Change engine oil and engine oil filter.	X	X	X	X	
Rotate Tires	X	X	X	X	
Inspect the brake linings.			X		
Inspect the engine air cleaner filter, replace if necessary. *	X	X		X	X
Replace the **engine air cleaner filter.**			X		
Inspect the tie rod ends and boot seals. (Front & Rear)			X		
Check and replace the **PCV valve**, if necessary.*			X		
Inspect the serpentine drive belt, replace if necessary. ‡			X		
Replace the **spark plugs.**					X
Flush and replace the engine coolant at 100,000 miles, if not done at 60 months.					X
Replace the air conditioning filter.		X		X	

Miles (Kilometers) [Months]	**102, 000 (163 000) [102]**	**108, 000 (173 000) [108]**	**114, 000 (182 000) [114]**	**120, 000 (192 000) [120]**
Change engine oil and engine oil filter.	X	X	X	X
Rotate Tires	X	X	X	X
Inspect the brake linings.		X		
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X	
Replace the **engine air cleaner filter.**				X
Replace engine timing belt.	X			
Inspect the tie rod ends and boot seals. (Front & Rear)				X
Check the **PCV valve** and replace, if necessary.*				X
Inspect the serpentine drive belt, replace if necessary. ‡	X			X
Flush and replace the engine coolant at 120 months, if not done at 100,000 miles (160 000 km).				X
Replace the air conditioning filter.		X		X

* This maintenance is recommended by the manufacture to the owner but is not required to maintain the emissions warranty.

‡ This maintenance is not required if previously replaced.

Inspection and service should also be performed anytime a malfunction is observed or suspected. Retain all receipts.

WARNING: You can be badly injured working on or around a motor vehicle. Do only that service work for which you have the knowledge and the right equipment. If you have any doubt about your ability to perform a service job, take your vehicle to a competent mechanic.

MAINTENANCE SCHEDULES (Continued)

MAINTENANCE SCHEDULES - EXPORT

There are two maintenance schedules that show the **required** service for your vehicle.

First is Schedule **"A"**. It is for vehicles that are not operated under any of the conditions listed under Schedule ″B″.

Second is Schedule **"B"**. It is for vehicles that are operated under the conditions that are listed below and at the beginning of the schedule.

- Day or night temperatures are below 0° C (32° F).
- Stop and go driving.
- Extensive engine idling.
- Driving in dusty conditions.
- Short trips of less than 16 km (10 miles).
- More than 50% of your driving is at sustained high speeds during hot weather, above 32° C (90° F). ◇
- Trailer towing. ◇
- Taxi, police, or delivery service (commercial service). ◇
- Off-road or desert operation.

NOTE: If ANY of these apply to you then change your engine oil every 5 000 km (3,000 miles) or 3 months, whichever comes first and follow schedule "B" of the ″Maintenance Schedules″ section of this manual.

NOTE: Most vehicles are operated under the conditions listed for Schedule ″B″.

Use the schedule that best describes your driving conditions. Where time and mileage are listed, follow the interval that occurs first.

CAUTION: Failure to perform the required maintenance items may result in damage to the vehicle.

At Each Stop for Fuel

- Check the engine oil level about 5 minutes after a fully warmed engine is shut off. Checking the oil level while the vehicle is on level ground will improve the accuracy of the oil level reading. Add oil only when the level is at or below the ADD or MIN mark.
- Check the windshield washer solvent and add if required.

Once a Month

- Check tire pressure and look for unusual wear or damage.
- Inspect the battery and clean and tighten the terminals as required.
- Check the fluid levels of coolant bottle, brake master cylinder and transmission, add as needed.
- Check all lights and all other electrical items for correct operation.

At Each Oil Change

- Change the engine oil filter.
- Inspect the exhaust system.
- Inspect the brake hoses.
- Inspect the CV joints and front suspension components.
- Check the automatic transmission fluid level.
- Check the coolant level, hoses, and clamps.

SCHEDULE A - EXPORT ONLY

Kilometers (Miles) [Months]	**12 000 (7,500) [6]**	**24 000 (15,000) [12]**	**36 000 (22,500 [18]**	**48 000 (30,000) [24]**	**60 000 (37,500) [30]**	**72 000 (45,000) [36]**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires.	X	X	X	X	X	X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X		X	X
Replace the **engine air cleaner filter.**				X		
Inspect the tie rod ends and boot seals. (Front & Rear)				X		
Replace the air conditioning filter.		X		X		X

MAINTENANCE SCHEDULES (Continued)

Kilometers	**84 000**	**96 000**	**108 000**	**120 000**	**132 000**	**144 000**
(Miles)	**(52,500)**	**(60,000)**	**(67,500)**	**(75,000)**	**(82,500)**	**(90,000)**
[Months]	**[42]**	**[48]**	**[54]**	**[60]**	**[66]**	**[72]**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires.	X	X	X	X	X	X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X		X	X	X	
Replace the **engine air cleaner filter.**		X				X
Inspect the tie rod ends and boot seals. (Front & Rear)		X				X
Check the **PCV valve** and replace, if necessary.*		X				X
Inspect the serpentine drive belt, replace if necessary. ‡		X		X		X
Flush and replace the engine coolant at 60 months, regardless of mileage.				X		
Replace the air conditioning filter.		X		X		X

Kilometers	**156 000**	**160 000**	**168 000**	**180 000**	**192 000**
(Miles)	**(97,500)**	**(100,000)**	**(105,000)**	**(112,500)**	**(120,000)**
[Months]	**[78]**		**[84]**	**[90]**	**[96]**
Change engine oil and engine oil filter.	X		X	X	X
Rotate Tires.	X	X	X	X	X
Inspect the brake linings.				X	
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X	X	
Replace the **engine air cleaner filter.**					X
Inspect the tie rod ends and boot seals. (Front & Rear)					X
Check and replace the **PCV valve**, if necessary.*					X
Inspect the serpentine drive belt, replace if necessary. ‡			X		X
Replace the **spark plugs** 3.5 liter engines.		X			
Flush and replace the engine coolant at 100,000 miles, if not done at 60 months.		X			
Replace the air conditioning filter.		X			

* This maintenance is recommended by the manufacture to the owner but is not required to maintain the emissions warranty.

‡ This maintenance is not required if previously replaced.

Inspection and service should also be performed anytime a malfunction is observed or suspected. Retain all receipts.

MAINTENANCE SCHEDULES (Continued)

SCHEDULE B - EXPORT ONLY

Follow schedule "B" if you usually operate your vehicle under one or more of the following conditions. Change the automatic transmission fluid and filter every 96 000 km (60,000 miles) if the vehicle is usually operated under one or more of the conditions marked with an ◇.

- Day or night temperatures are below 0° C (32° F).
- Stop and go driving.
- Extensive engine idling.
- Driving in dusty conditions.
- Short trips of less than 16 km (10 miles).
- More than 50% of your driving is at sustained high speeds during hot weather, above 32° C (90° F). ◇
- Trailer towing. ◇
- Taxi, police, or delivery service (commercial service). ◇
- Off-road or desert operation.

NOTE: If ANY of these apply to you then change your engine oil every 5 000 km (3,000 miles) or 3 months, whichever comes first and follow schedule "B" of the ″Maintenance Schedules″ section of this manual.

If none of these apply to you, then change your engine oil at every interval shown on schedule ″A″ of the ″Maintenance Schedules″ section of this manual.

Kilometers	**5 000**	**10 000**	**14 000**	**19 000**	**24 000**	**29 000**
(Miles)	**(3,000)**	**(6,000)**	**(9,000)**	**(12,000)**	**(15,000)**	**(18,000)**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires.		X		X		X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X	X		X
Replace the **engine air cleaner filter.** *					X	
Change the All Wheel Drive (AWD) power transfer unit fluid. (See note at the end of this chart)					X	
Replace the air conditioning filter.					X	

Kilometers	**34 000**	**38 000**	**43 000**	**48 000**	**53 000**	**58 000**
(Miles)	**(21,000)**	**(24,000)**	**(27,000)**	**(30,000)**	**(33,000)**	**(36,000)**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires.		X		X		X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X		X	X
Replace the **engine air cleaner filter.**				X		
Inspect the tie rod ends and boot seals. (Front & Rear)				X		
Inspect the **PCV valve**and replace as necessary.*				X		
Change the All Wheel Drive (AWD) power transfer unit fluid. (See note at the end of this chart)				X		
Change the All Wheel Drive (AWD) overrunning clutch and rear carrier fluid. (See the note at the end of this chart)	X					
Replace the air conditioning filter.				X		

MAINTENANCE SCHEDULES (Continued)

Kilometers	**62 000**	**67 000**	**72 000**	**77 000**	**82 000**	**86 000**
(Miles)	**(39,000)**	**(42,000)**	**(45,000)**	**(48,000)**	**(51,000)**	**(54,000)**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires.		X		X		X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X	X		X	X	X
Replace the **engine air cleaner filter.** *			X			
Change the All Wheel Drive power transfer unit fluid. (See the note at the end of this chart.)			X			
Change the All Wheel Drive (AWD) overrunning clutch and rear carrier fluid. (See note at the end of this chart)		X				
Replace the air conditioning filter.			X			

Kilometers	**91 000**	**96 000**	**101 000**	**106 000**	**110 000**	**115 000**
(Miles)	**(57,000)**	**(60,000)**	**(63,000)**	**(66,000)**	**(69,000)**	**(72,000)**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires.		X		X		X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *	X		X	X	X	X
Replace the **engine air cleaner filter.**		X				
Inspect the tie rod ends and boot seals. (Front & Rear)		X				
Inspect the **PCV valve** and replace if necessary.*		X				
Change the automatic transmission fluid and filter.		X				
Inspect the serpentine drive belt, replace if necessary.		X				
Change the All Wheel Drive (AWD) power transfer unit fluid. (See note at the end of this chart)		X		X		
Change the All Wheel Drive (AWD) overrunning clutch and rear carrier fluid. (See note at the end of this chart)			X			
Replace the air conditioning filter.		X				

MAINTENANCE SCHEDULES (Continued)

Kilometers	**120 000**	**125 000**	**130 000**	**134 000**	**139 000**	**144 000**
(Miles)	**(75,000)**	**(78,000)**	**(81,000)**	**(84,000)**	**(87,000)**	**(90,000)**
Change engine oil and engine oil filter.	X	X	X	X	X	X
Rotate Tires.		X		X		X
Inspect the brake linings.			X			X
Inspect the engine air cleaner filter, replace if necessary. *		X	X	X	X	
Replace the **engine air cleaner filter**	X					X
Replace the **spark plugs** on 3.5 liter engines.	X					
Inspect the tie rod ends and boot seals. (Front & Rear)						X
Inspect the serpentine drive belt, replace if necessary. ‡	X					X
Check the **PCV valve** and replace if necessary. Not required if previously changed.*						X
Change the All Wheel Drive power transfer unit fluid. (See the note at the end of this chart.)	X					X
Change the All Wheel Drive (AWD) overrunning clutch and rear carrier fluid. (See note at the end of this chart)				X		
Replace the air conditioning filter.	X					X

Kilometers	**149 000**	**154 000**	**158 000**	**160 000**	**163 000**	**168 000**
(Miles)	**(93,000)**	**(96,000)**	**(99,000)**	**(100,000)**	**(102,000)**	**(105,000)**
Change engine oil and engine oil filter.	X	X	X		X	X
Rotate Tires.		X		X		X
Inspect the brake linings.			X			
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X	X	X	
Replace the **engine air cleaner filter** *						X
Inspect serpentine drive belt, replace if necessary. ‡						X
Change the All Wheel Drive (AWD) power transfer unit, overrunning clutch and rear carrier fluid. (See note at the end of this chart)						X
Flush and replace the engine coolant at 60 months or 100,000 miles.				X		
Replace the air conditioning filter.						X

MAINTENANCE SCHEDULES (Continued)

Kilometers	**173 000**	**178 000**	**182 000**	**187 000**	**192 000**
(Miles)	**(108,000)**	**(111,000)**	**(114,000)**	**(117,000)**	**(120,000)**
Change engine oil and engine oil filter.	X	X	X	X	X
Rotate Tires.	X		X		X
Inspect the brake linings.	X			X	
Inspect the engine air cleaner filter, replace if necessary. *	X	X	X	X	
Replace the **engine air cleaner filter.**					X
Inspect serpentine drive belt, replace if necessary. ‡					X
Inspect the tie rod ends and boot seals. (Front & Rear)					X
Inspect the **PCV valve** and replace as necessary.*					X
Change the automatic transmission fluid and filter.					X
Change the All Wheel Drive (AWD) power transfer unit fluid. (See note at the end of this chart)					X
Replace the air conditioning filter.					X

* This maintenance is recommended by the manufacture to the owner but is not required to maintain the emissions warranty.

‡ This maintenance is not required if previously replaced.

Inspection and service should also be performed anytime a malfunction is observed or suspected. Retain all receipts.

NOTE: The AWD power transfer unit fluid and the AWD overrunning clutch/ rear carrier fluid must be changed at the more frequent intervals shown in schedule B if the vehicle is operated under any of the conditions noted by a diamond at the beginning of the schedule.

WARNING: You can be badly injured working on or around a motor vehicle. Do only that service work for which you have the knowledge and the right equipment. If you have any doubt about your ability to perform a service job, take your vehicle to a competent mechanic.

JUMP STARTING

STANDARD PROCEDURE - JUMP STARTING

WARNING: REVIEW ALL SAFETY PRECAUTIONS AND WARNINGS. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE).

- **DO NOT JUMP START A FROZEN BATTERY, PERSONAL INJURY CAN RESULT.**
- **DO NOT ALLOW JUMPER CABLE CLAMPS TO TOUCH EACH OTHER WHEN CONNECTED TO A BOOSTER SOURCE.**
- **DO NOT USE OPEN FLAME NEAR BATTERY**
- **REMOVE METALLIC JEWELRY WORN ON HANDS OR WRISTS TO AVOID INJURY BY ACCIDENTAL ARCING OF BATTERY CURRENT.**
- **WHEN USING A HIGH OUTPUT BOOSTING DEVICE, DO NOT ALLOW BATTERY VOLTAGE TO EXCEED 16 VOLTS.**
- **REFER TO INSTRUCTIONS PROVIDED WITH DEVICE BEING USED.**

CAUTION: DO NOT ATTEMPT TO PUSH OR TOW THE VEHICLE TO START IT. THE VEHICLE CANNOT BE STARTED THIS WAY. PUSHING WITH ANOTHER VEHICLE MAY DAMAGE THE TRANSAXLE OR THE REAR OF THE VEHICLE.

(1) Raise hood on disabled vehicle and visually inspect engine compartment for:

- Battery cable clamp condition, clean if necessary.
- Frozen battery.
- Clear or bright color test indicator, if equipped.
- Generator drive belt condition and tension.
- Fuel fumes or leakage, correct if necessary.

CAUTION: If the cause of starting problem on disabled vehicle is severe, damage to booster vehicle charging system can result.

(2) When using another vehicle as a booster source, park the booster vehicle within cable reach. Turn off all accessories, set the parking brake, place the automatic transmission in PARK or the manual transmission in NEUTRAL and turn the ignition OFF.

(3) On disabled vehicle, place gear selector in park or neutral and set park brake. Turn off all accessories.

(4) Connect jumper cables to booster battery. RED clamp to positive terminal (+). BLACK clamp to negative terminal (-). DO NOT allow clamps at opposite end of cables to touch, electrical arc will result. Review all warnings in this procedure.

(5) On disabled vehicle, connect RED jumper cable clamp to positive (+) terminal. Connect BLACK jumper cable clamp to engine ground as close to the ground cable attaching point as possible (Fig. 5). (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE).

(6) Start the engine in the vehicle which has the booster battery, let the engine idle a few minutes, then start the engine in the vehicle with the discharged battery.

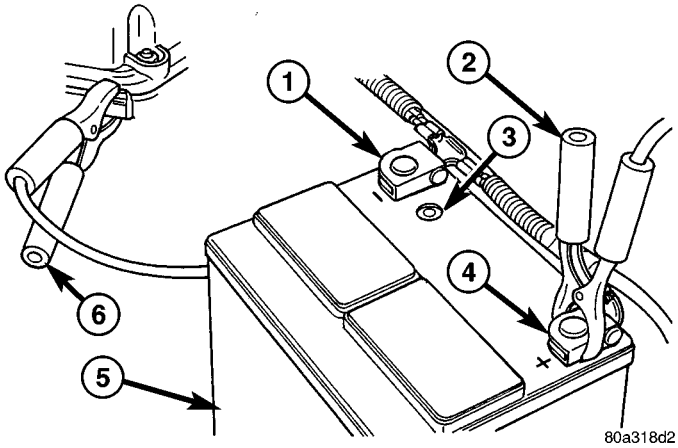


Fig. 5 Jumper Cable Clamp Connections

1 - BATTERY NEGATIVE TERMINAL
2 - POSITIVE JUMPER CABLE
3 - TEST INDICATOR (IF EQUIPPED)
4 - BATTERY POSITIVE TERMINAL
5 - BATTERY
6 - NEGATIVE JUMPER CABLE

CAUTION: Do not crank starter motor on disabled vehicle for more than 15 seconds, starter may overheat and could fail.

(7) If engine does not start within 15 seconds, stop cranking engine and allow starter to cool (2 minutes), before cranking again.

DISCONNECT CABLE CLAMPS AS FOLLOWS:

- Disconnect BLACK cable clamp from engine ground on disabled vehicle.
- When using a Booster vehicle, disconnect BLACK cable clamp from battery negative terminal. Disconnect RED cable clamp from battery positive terminal.
- Disconnect RED cable clamp from battery positive terminal on disabled vehicle.

HOISTING

STANDARD PROCEDURE - HOISTING

Refer to Owner's Manual provided with vehicle for proper emergency jacking procedures.

WARNING: THE HOISTING AND JACK LIFTING POINTS PROVIDED ARE FOR A COMPLETE VEHICLE. WHEN THE ENGINE OR REAR SUSPENSION IS REMOVED FROM A VEHICLE, THE CENTER OF GRAVITY IS ALTERED MAKING SOME HOISTING CONDITIONS UNSTABLE. PROPERLY SUPPORT OR SECURE VEHICLE TO HOISTING DEVICE WHEN THESE CONDITIONS EXIST.

CAUTION: Do not position hoisting device on any suspension component, including the front or rear suspension crossmembers. Do not hoist on the front and rear bumpers, the lower liftgate crossmember, the lower radiator crossmember, or the front engine mount.

FOR PROPER HOIST PLACEMENT REFER TO (Fig. 6).

The front hoisting points for frame contact hoists are on the down standing sill flanges, approximately 200 mm behind the front wheel opening and 150 mm forward of the rear wheel opening. Under no circumstances are the front lower radiator support to be used as lift points. Wheel lifts are acceptable.

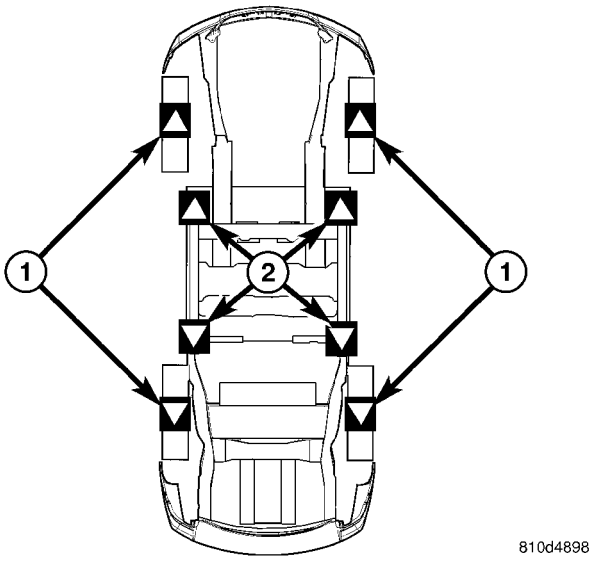


Fig. 6 HOISTING AND JACKING POINTS

1 - DRIVE ON LIFT
2 - FRAME CONTACT LIFT (SINGLE POST)
2 - CHASSIS LIFT (DUAL POST)
2 - OUTBOARD LIFT (DUAL LIFT)
2 - FLOOR JACK

TOWING

STANDARD PROCEDURE - TOWING

WARNINGS AND CAUTIONS

WARNING: DO NOT ALLOW TOWING ATTACHMENT DEVICES TO CONTACT THE FUEL TANK OR LINES, FUEL LEAK CAN RESULT.
DO NOT LIFT OR TOW VEHICLE BY FRONT OR REAR BUMPER.
DO NOT GO UNDER A LIFTED VEHICLE IF NOT SUPPORTED PROPERLY ON SAFETY STANDS.
DO NOT ALLOW PASSENGERS TO RIDE IN A TOWED VEHICLE.
USE A SAFETY CHAIN THAT IS INDEPENDENT FROM THE TOWING ATTACHMENT DEVICE.

CAUTION: Do not damage brake lines, exhaust system, shock absorbers, sway bars, or any other under vehicle components when attaching towing device to vehicle.
Do not secure vehicle to towing device by the use of front or rear suspension or steering components.
Remove or secure loose or protruding objects from a damaged vehicle before towing.
Refer to state and local rules and regulations before towing a vehicle.
Do not allow weight of towed vehicle to bear on lower fascia, air dams, or spoilers.

RECOMMENDED TOWING EQUIPMENT

- FWD vehicles, use of a flat bed towing device or a wheel lift is recommended (Fig. 7).
- AWD vehicles, a flat bed towing device is recommended (Fig. 7) or (Fig. 8).

When using a wheel lift towing device, be sure the disabled vehicle has at least 100 mm (4 in.) ground clearance. If minimum ground clearance cannot be reached, use a towing dolly. If a flat bed device is used, the approach angle should not exceed 15 degrees.

CAUTION:

- **Do not attempt to tow this vehicle from the front with sling type towing equipment. Damage to the front fascia and air dams will result.**
- **The only approved method of towing is with a flat bed truck.**
- **Do not tow the vehicle from the rear. Damage to the rear sheet metal, liftgate and fascia will occur.**
- **Do not push or tow this vehicle with another vehicle as damage to the bumper fascia and transmission may result.**

TOWING (Continued)

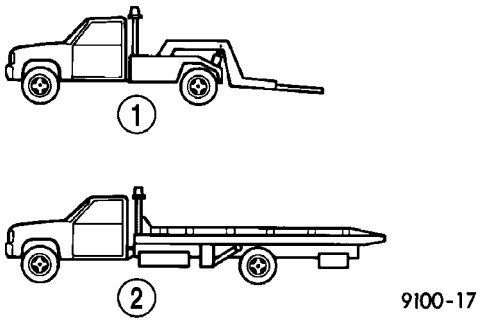


Fig. 7 Recommended Towing Devices

1 - WHEEL LIFT
2 - FLAT BED CARRIER

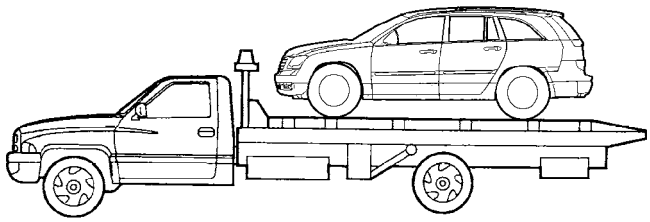


Fig. 8 FLAT BED CARRIER

GROUND CLEARANCE

CAUTION: If vehicle is towed with wheels removed, install lug nuts to retain brake drums or rotors.

A towed vehicle should be raised until the lifted wheels are a minimum 100 mm (4 in.) from the ground. Be sure there is at least 100 mm (4 in.) clearance between the tail pipe and the ground. If necessary, remove the wheels from the front end of the vehicle and lower the front end closer to the ground, to increase the ground clearance at the rear of the vehicle. Install lug nuts on wheel attaching studs to retain brake rotors.

LOCKED VEHICLE TOWING

When a locked vehicle must be towed with the front wheels on the ground, use a towing dolly or flat bed hauler.

FLAT BED TOWING TIE DOWNS

CAUTION: Do not tie vehicle down by attaching chains or cables to suspension components or engine mounts, damage to vehicle can result.

The vehicle can be tied to a flat bed device using the pair of front transportation slots on the bottom surface of the rails, behind the front wheels. The rear transportation slots are on the bottom of the left bumper extension and in the bracket extending inboard of the right bumper extension.

TOWING – FRONT WHEEL DRIVE

Your vehicle may be towed under the following conditions: The gear selector must be in NEUTRAL, the distance to be traveled must not exceed 100 miles (160 km), and the towing speed must not exceed 44 mph (72 km/h). Exceeding these towing limits may cause a transmission gear train failure. If the transmission is not operative, or if the vehicle is to be towed more than 100 miles (160 km), the vehicle must be towed with the front wheels off the ground.

TOWING – ALL WHEEL DRIVE

Your vehicle may be towed under the following conditions: The gear selector must be in NEUTRAL, the distance to be traveled must not exceed 100 miles (160 km), the towing speed must not exceed 44 mph (72 km/h), and both front and rear wheels must be on the ground. If your vehicle must be towed farther or at a higher rate of speed, it must be transported on a flat bed truck.

ALL TRANSMISSIONS

- Do not attempt to tow this vehicle from the front with sling type towing equipment. Damage to the front fascia will result.
- The only approved method of towing is with a flat bed truck.
- Do not tow the vehicle from the rear. Damage to the rear sheet metal, liftgate and fascia will occur.
- Do not push or tow this vehicle with another vehicle as damage to the bumper fascia and transmission may result.

If it is necessary to use the accessories while being towed (wipers, defrosters, etc.), the key must be in the ON position, not the ACCESSORY position. Make certain the transmission remains in NEUTRAL.

WITHOUT THE IGNITION KEY

Special care must be taken when the vehicle is towed with the ignition in the LOCK position. The only approved method of towing with out the ignition key is with a flat bed truck. Proper towing equipment is necessary to prevent damage to the vehicle.

TOWING (Continued)

TOWING THIS VEHICLE BEHIND ANOTHER VEHICLE (Flat towing with all four wheels on the ground)

Flat towing of vehicles equipped with an automatic transmission, is only permitted within the limitations described in this section.

FLAT TOWING WITH TOW BAR

- Four speed electronic automatic transaxle vehicles can be flat towed at speeds not to exceed 72 km/h (44 mph) for not more than 160 km (100 miles). The steering column must be unlocked and gear selector in neutral.
- AWD models should not be flat towed. For additional information, refer to **RECOMMENDED TOWING EQUIPMENT** in this section.

TOWING THIS VEHICLE BEHIND ANOTHER VEHICLE WITH A TOW DOLLEY

The manufacture **does not recommend** that you tow an All-Wheel Drive (AWD) or front wheel drive vehicle on a tow dolley. Vehicle damage may occur.

VEHICLE STORAGE

STANDARD PROCEDURE

If you are leaving your vehicle dormant for more than 21 days you may want to take steps to protect your battery. You may:

- Rotate the holder and 30 Amp fuse in the Integrated Power Module labeled Ignition-Off Draw (IOD) 180 degrees.
- Or, disconnect the negative cable from the battery.
- Anytime you store your vehicle, or keep it out of service (i.e. vacation) for two weeks or more, run the air conditioning system at idle for about five minutes in the fresh air and high blower setting. This will insure adequate system lubrication to minimize the possibility of compressor damage when the system is started again.

SUSPENSION

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SUSPENSION

STANDARD PROCEDURE - LUBRICATION

There are no serviceable lubrication points on the front suspension. The ball joints are sealed-for-life and require no maintenance. The lower ball joints have special grease fitting caps that prevent normal grease gun attachment. This has been done to eliminate the possibility of over-filling, damaging the non-vented seal. Do not attempt to remove the special grease fitting cap and replace it with a normal grease zirc fitting.

CAUTION: No attempt should be made to replace the ball joint grease fitting cap with a normal zirc fitting or fill the ball joint with grease. Damage to the grease seal can result.

FRONT SUSPENSION

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FRONT SUSPENSION

DESCRIPTION

This vehicle is equipped with a MacPherson Strut type front suspension. The front suspension consists of the following major components:

- Hub And Bearing
- Knuckle
- Lower Control Arm
- Stabilizer Bar
- Strut Assembly

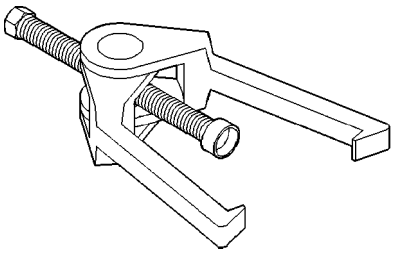
SPECIFICATIONS

FRONT SUSPENSION FASTENER TORQUE

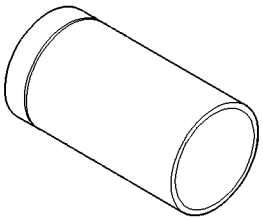
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Ball Joint Nut	81 + 90° turn	60 + 90° turn	—
Brake Caliper Adapter Mounting Bolts	169	125	—
Engine Cradle Mounting Bolts	163	120	—
Hub And Bearing Mounting Bolts	65	45	—
Hub And Bearing Axle Hub Nut	244	180	—
Lower Control Arm Frame Bolts	163	120	—
Stabilizer Bar Cushion Retainer Bolts	54	40	—
Stabilizer Bar Link Nuts	88	65	—
Strut Body/Tower Mounting Nuts	28	21	250
Strut Clevis-to-Knuckle Nuts	88 + 90° turn	65 + 90° turn	—
Strut Shaft Nut	100	75	—
Tie Rod Adjuster Jam Nut	75	55	—
Tie Rod Steering Arm Nut	47 + 180° turn	35 + 180° turn	—
Wheel Mounting (Lug) Nuts	135	100	—

SPECIAL TOOLS

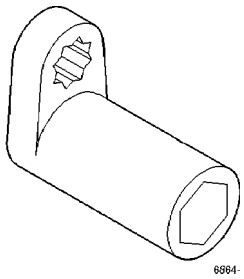
FRONT SUSPENSION



Puller, Tie Rod C-3894-A



Installer, Ball Joint 6758



Wrench, Strut Rod Nut 6864

HUB / BEARING

DIAGNOSIS AND TESTING - HUB AND BEARING

The condition of the front hub and bearing assembly is diagnosed using the inspection and testing procedure detailed below.

The bearing contained in the Unit III front hub/bearing assembly will produce noise and vibration when worn or damaged. The noise will generally change when the bearings are loaded. A road test of the vehicle is normally required to determine the location of a worn or damaged bearing.

Find a smooth level road surface and bring the vehicle up to a constant speed. When vehicle is at a constant speed, swerve the vehicle back and forth from the left and to the right. This will load and unload the bearings and change the noise level. When bearing damage is slight, the noise is sometimes noticeable at lower speeds and at other times

HUB / BEARING (Continued)

is more noticeable at speeds above 105 km/h (65 mph).

REMOVAL

NOTE: Replacement of front hub and bearing assembly can normally be done without having to remove steering knuckle from vehicle. In event that hub/bearing is frozen in steering knuckle and cannot be removed by hand, it will have to be pressed out of steering knuckle. Steering knuckle will then require removal before hub and bearing can be pressed out. (Refer to 2 - SUSPENSION/FRONT/ KNUCKLE - REMOVAL)

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove tire and wheel assembly.

(3) Remove cotter pin, nut lock and spring washer from halfshaft stub shaft (Fig. 1).

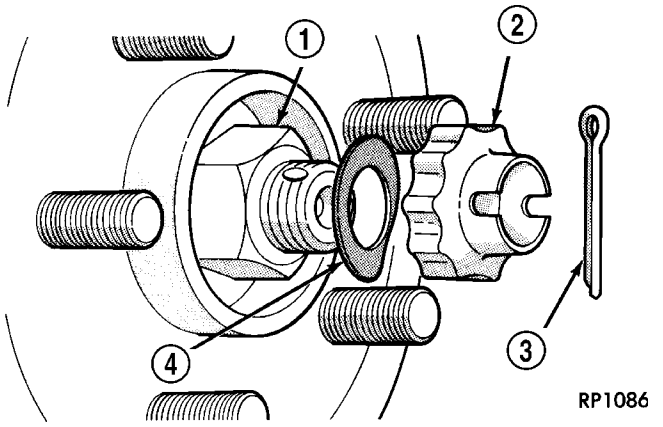


Fig. 1 Cotter Pin, Nut Lock, And Spring Washer

1 - HUB NUT
2 - NUT LOCK
3 - COTTER PIN
4 - SPRING WASHER

(4) With aid of a helper applying brakes to keep front hub from turning, remove hub nut (Fig. 1).

(5) Access and remove front brake rotor. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - REMOVAL)

(6) Disconnect vehicle wiring harness from wheel speed sensor connector (Fig. 2).

(7) Unclip wheel speed sensor connector and routing clip from frame rail outer reinforcement (Fig. 2).

(8) Remove screw fastening wheel speed sensor routing bracket to strut assembly (Fig. 3).

(9) Open routing clip at knuckle and remove wheel speed sensor cable (Fig. 4).

(10) Push in on end of halfshaft stub shaft, pushing its splines out of hub splines.

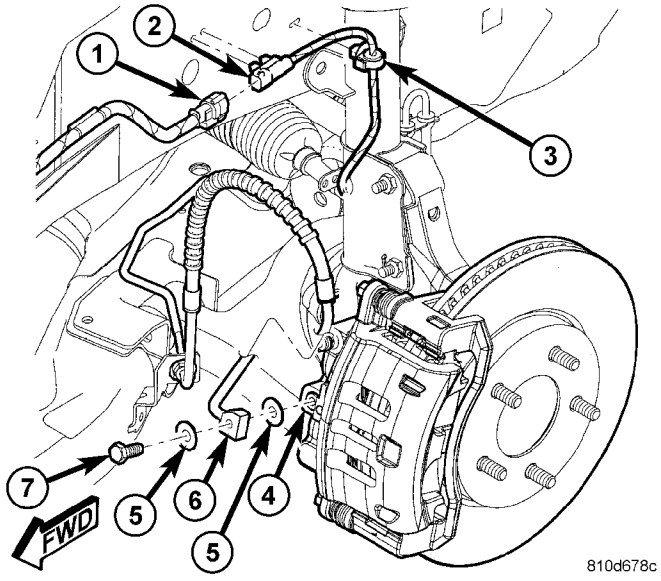


Fig. 2 Brake Hose And Wheel Speed Sensor Connections

1 - WIRING HARNESS CONNECTOR
2 - WHEEL SPEED SENSOR CONNECTOR
3 - ROUTING CLIP
4 - PORT ON BRAKE CALIPER
5 - COPPER SEALING WASHER
6 - BRAKE HOSE BANJO FITTING
7 - BANJO BOLT

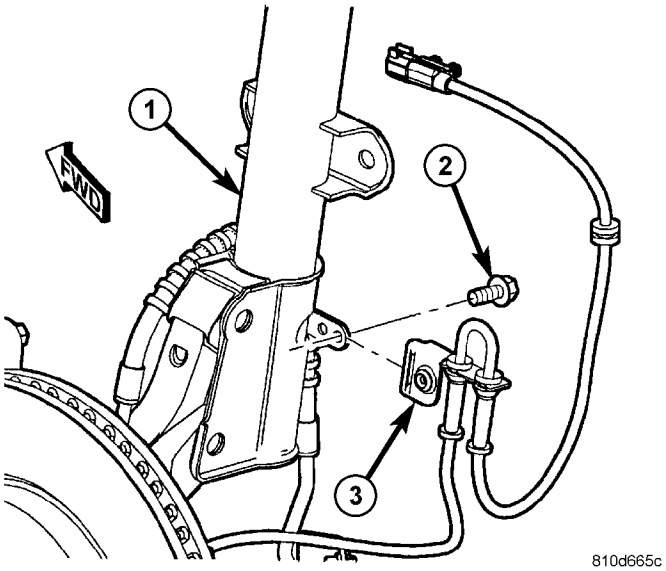


Fig. 3 Wheel Speed Sensor Mounting To Strut

1 - STRUT ASSEMBLY
2 - SCREW
3 - WHEEL SPEED SENSOR ROUTING BRACKET

(11) Remove four hub and bearing mounting bolts from rear of steering knuckle (Fig. 5).

(12) Remove hub and bearing with wheel speed sensor from steering knuckle.

HUB / BEARING (Continued)

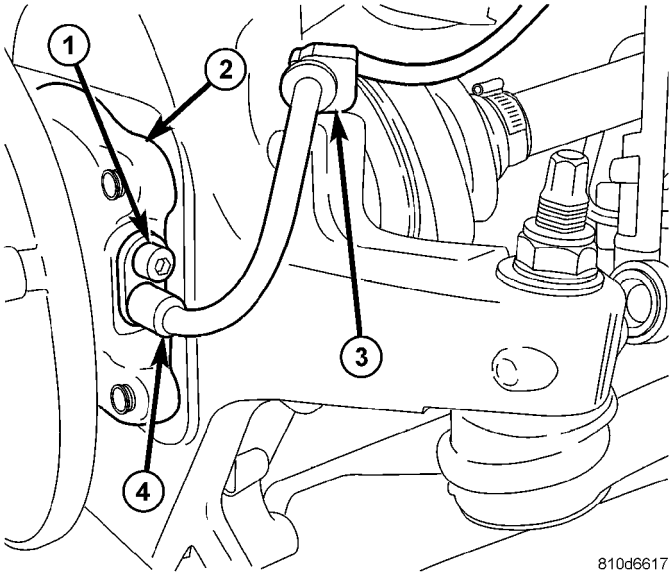


Fig. 4 Sensor Mounting To Front Hub And Bearing

1 - MOUNTING SCREW
2 - HUB AND BEARING
3 - ROUTING CLIP
4 - FRONT WHEEL SPEED SENSOR

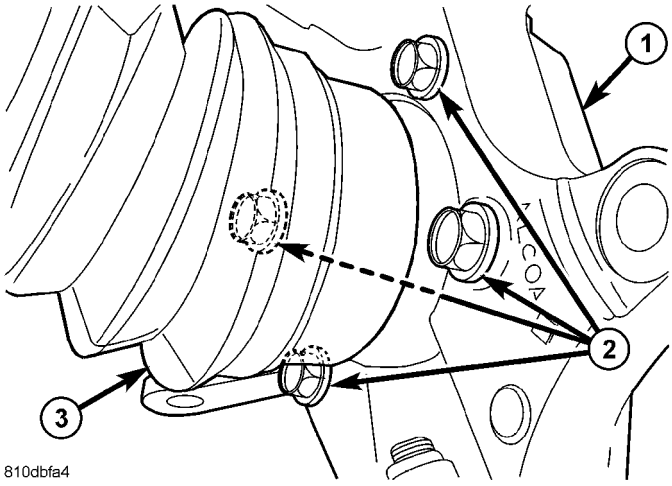


Fig. 5 Hub And Bearing Mounting Bolts

1 - KNUCKLE
2 - HUB AND BEARING MOUNTING BOLTS
3 - HALFSHAFT

INSTALLATION

CAUTION: Hub and bearing mounting surfaces on steering knuckle and stub shaft (Fig. 6) must be smooth and completely free of foreign material or nicks prior to installing hub and bearing assembly.

(1) Install hub and bearing onto halfshaft stub shaft and into steering knuckle until squarely seated on face of steering knuckle.

(2) Install four hub and bearing mounting bolts from rear of knuckle. Progressively and equally tighten all four mounting bolts using a criss-cross pattern. Tighten mounting bolts to 65 N·m (45 ft. lbs.) torque.

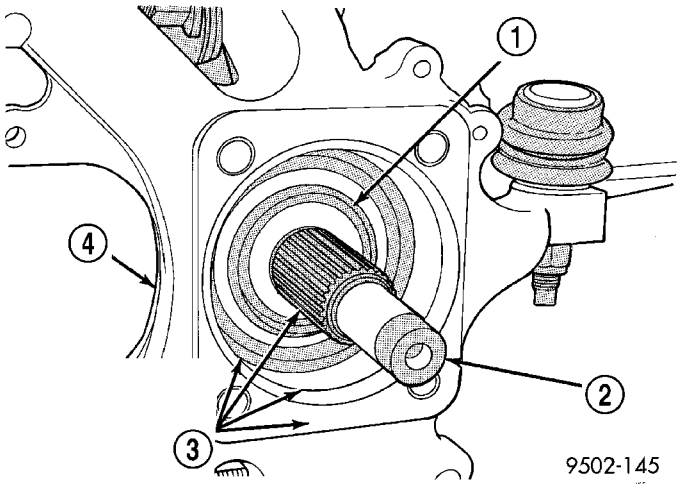


Fig. 6 Hub And Bearing Assembly (Typical)

1 - HALFSHAFT OUTER C/V JOINT
2 - STUB SHAFT
3 - THESE SURFACES MUST BE CLEAN AND FREE OF NICKS BEFORE INSTALLING BEARING ASSEMBLY
4 - STEERING KNUCKLE

(3) Place wheel speed sensor cable grommet in clip at knuckle (Fig. 4). Close clip.

(4) Attach wheel speed sensor routing bracket to strut assembly (Fig. 3). Tighten screw to 13 N·m (115 in. lbs.) torque.

(5) Clip wheel speed sensor connector and routing clip to frame rail outer reinforcement (Fig. 2).

(6) Connect vehicle wiring harness to wheel speed sensor connector (Fig. 2).

(7) Install brake rotor, then install disc brake caliper and adapter assembly. (Refer to 5 - BRAKES/ HYDRAULIC/MECHANICAL/ROTOR - INSTALLATION)

(8) Verify that wheel speed sensor is not routed improperly allowing cable to come in contact with brake rotor or other moving parts.

(9) Install washer and hub nut on end of halfshaft stub shaft (Fig. 1). With aid of a helper applying brakes to keep front hub from turning, tighten hub nut to 244 N·m (180 ft. lbs.) torque.

(10) Install spring washer and hub nut lock over hub nut and stub shaft. Install a NEW cotter pin securing nut lock in place and tightly wrap cotter pin prongs around nut lock.

(11) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to a torque of 135 N·m (100 ft. lbs.).

(12) Lower vehicle.

(13) Pump brake pedal several times to ensure vehicle has a firm brake pedal before moving vehicle.

HUB / BEARING (Continued)

(14) Check and adjust brake fluid level as necessary.

(15) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

KNUCKLE

DESCRIPTION

The steering knuckle is a single **aluminum** casting with legs machined for attachment of the strut assembly, steering linkage, disc brake caliper adapter, lower control arm ball joint and steering linkage. The hub and bearing assembly is mounted in the center of the steering knuckle using 4 bolts. The driveshaft's constant velocity (C/V) stub shaft is splined through the center of the hub and bearing and is held in place using a nut, nut lock and cotter pin.

Service replacement of the front hub and bearing assembly can be done with the steering knuckle remaining on the vehicle.

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove wheel and tire assembly.

(3) Remove cotter pin, nut lock and spring washer from end of halfshaft stub shaft and hub nut (Fig. 1).

(4) With aid of a helper applying brakes to keep front hub from turning, remove hub nut (Fig. 1).

(5) Access and remove front brake rotor. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - REMOVAL)

(6) Disconnect vehicle wiring harness from wheel speed sensor connector (Fig. 2).

(7) Unclip wheel speed sensor connector and routing clip from frame rail outer reinforcement (Fig. 2).

(8) Remove screw fastening wheel speed sensor routing bracket to strut assembly (Fig. 3).

(9) Open routing clip at knuckle and remove wheel speed sensor cable (Fig. 4).

(10) Push in on end of halfshaft stub shaft, pushing its splines out of hub splines.

(11) Remove nut attaching outer tie rod to steering knuckle (Fig. 7) by holding outer tie rod stud stationary while loosening and removing nut with a wrench.

(12) Remove tie rod from steering knuckle using Remover, Special Tool C-3894-A (Fig. 8).

(13) Remove two bolts attaching strut clevis to steering knuckle (Fig. 9) (Fig. 10).

(14) Tip knuckle outward at top and remove halfshaft stub shaft from hub and bearing. Suspend driveshaft straight outward using a bungee cord or wire. **Do not allow driveshaft to hang by inner joint.**

(15) Remove ball joint nut using a power impact wrench. **Because tapered stud is held sufficiently in knuckle at this time, it is not necessary to hold stud stationary to remove nut.**

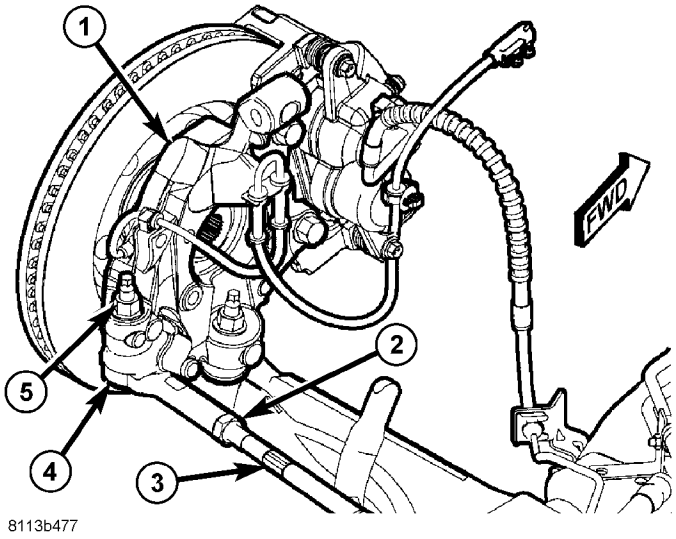


Fig. 7 Tie Rod Attachment

1 - STEERING KNUCKLE
2 - JAM NUT (TIE ROD ADJUSTMENT)
3 - INNER TIE ROD SERRATIONS
4 - OUTER TIE ROD
5 - NUT

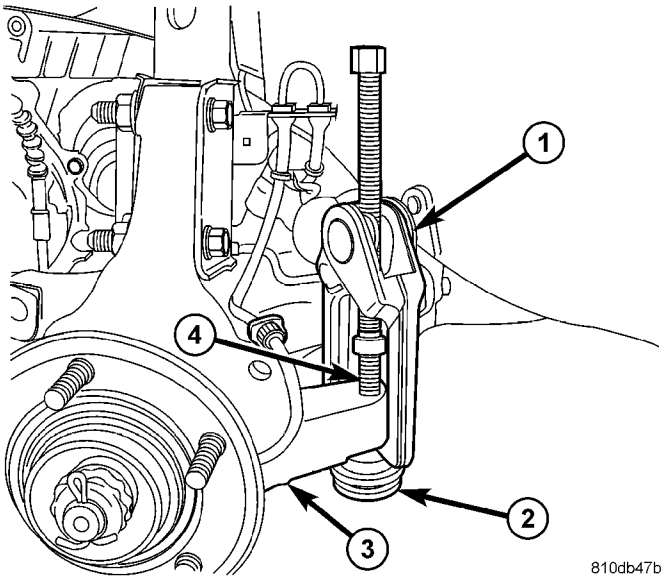


Fig. 8 Using C-3894-A To Release Tie Rod

1 - PULLER C-3894-A
2 - OUTER TIE ROD
3 - STEERING KNUCKLE
4 - TIE ROD STUD

KNUCKLE (Continued)

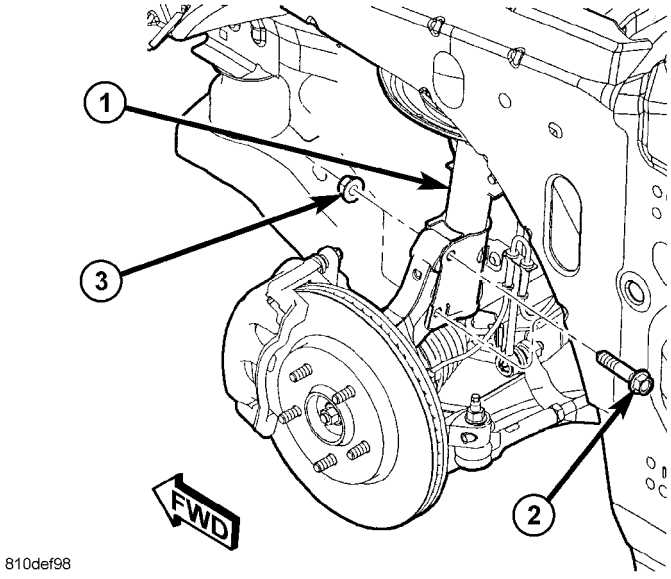


Fig. 9 Left Side Correctly Oriented Mounting Bolts

1 - STRUT
2 - BOLT
3 - NUT

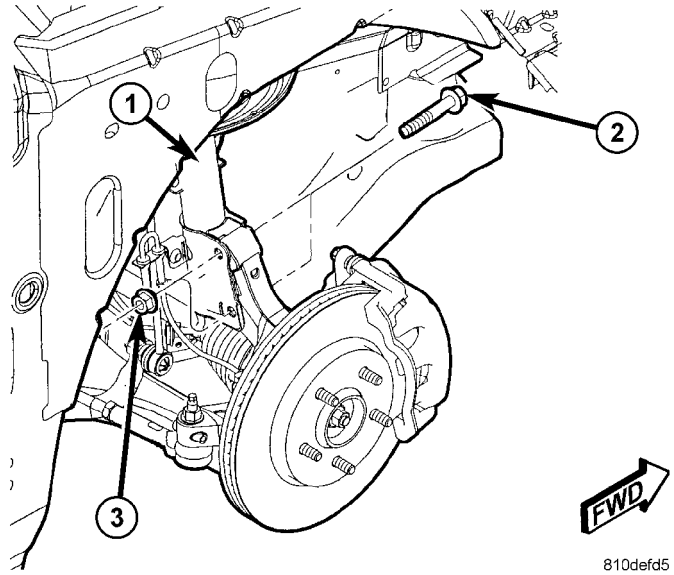


Fig. 10 Right Side Correctly Oriented Mounting Bolts

1 - STRUT
2 - BOLT
3 - NUT

(16) Reinstall ball joint nut until top of nut is even with top of ball joint stud. **This action will keep stud from distorting while stud is released from knuckle in following step.**

CAUTION: Do not remove ball joint stud from steering knuckle using a hammer. Damage to Aluminum knuckle, ball joint or control arm will result.

NOTE: Lubricate Remover, Special Tool C-4150A, screw-drive threads before use to ease use and promote tool longevity.

(17) Place Remover, Special Tool C-4150A, over ball joint stud and nut as shown (Fig. 11). Release ball joint stud from steering knuckle by tightening tool screw-drive. **To ease Remover installation and use, it may help to rotate knuckle around so inside of knuckle faces outward.**

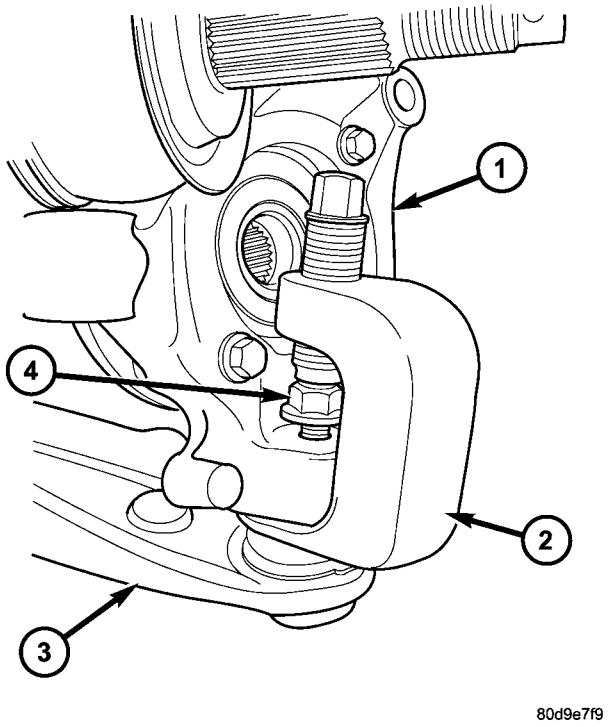


Fig. 11 Using C-4150A To Release Ball Joint

1 - ALUMINUM KNUCKLE
2 - SPECIAL TOOL C-4150A
3 - LOWER CONTROL ARM
4 - NUT INSTALLED ON BALL JOINT STEM

(18) Remove tool and nut from top of ball joint stud.

(19) Remove steering knuckle from vehicle.

(20) If hub and bearing needs to be transferred, remove four bolts attaching hub and bearing to knuckle, then remove hub and bearing.

INSPECTION

Inspect the knuckle for the following:

- Cracks or breaks
- Dents or damage
- Stress marks indicating a bend

The front suspension knuckle is not a repairable component of the vehicles front suspension. If bent, broken or damaged in any way, do not attempt to

KNUCKLE (Continued)

straighten or repair the steering knuckle. It must be replaced.

If inspection leads to the hub and bearing, (Refer to 2 - SUSPENSION/FRONT/HUB / BEARING - DIAGNOSIS AND TESTING)

INSTALLATION

(1) If hub and bearing needs to be installed in knuckle, place hub and bearing squarely into center hole of knuckle with wheel speed sensor positioned toward trailing end of knuckle. Align threaded mounting holes of hub and bearing with mounting holes in steering knuckle, then install four mounting bolts. Progressively tighten mounting bolts in a criss-cross pattern. Tighten mounting bolts to 65 N·m (45 ft. lbs.) torque.

CAUTION: Before installing knuckle on ball joint stud, wipe ball joint stud and knuckle contact area free of any grease or debris, otherwise damage to knuckle can occur. Use a clean shop cloth with Mopar® Brake Parts Cleaner applied to it for proper cleaning. Do not spray stud directly.

(2) Place knuckle on ball joint stud.

(3) Install a NEW steering knuckle to ball joint stud nut. Tighten nut by holding ball joint stud with hex wrench while turning nut with a wrench (Fig. 12). Using a crowfoot wrench on a torque wrench, tighten nut to 81 N·m (60 ft. lbs.) torque. Then, tighten nut an additional 1/4 (90°) turn after that torque is met.

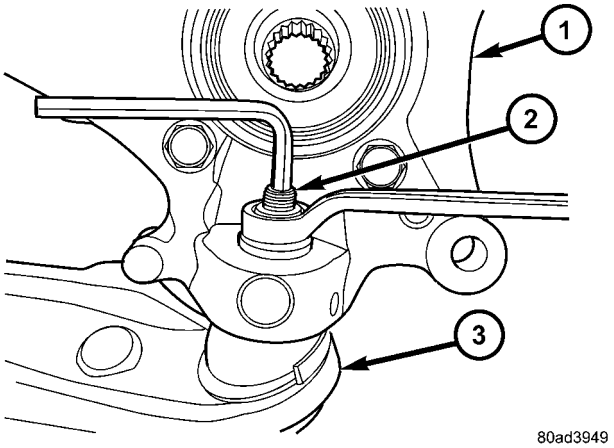


Fig. 12 Ball Joint Nut Installation

1 - KNUCKLE
2 - BALL JOINT STUD
3 - LOWER CONTROL ARM

(4) Slide halfshaft stub shaft into hub and bearing assembly.

CAUTION: The steering knuckle to strut assembly attaching bolts are serrated and must not be turned during installation. Install nuts while holding bolts stationary in steering knuckle.

CAUTION: If vehicle being serviced is equipped with eccentric cam strut attaching bolts, eccentric cam bolt must be installed in bottom (slotted) hole on strut clevis bracket (Fig. 13).

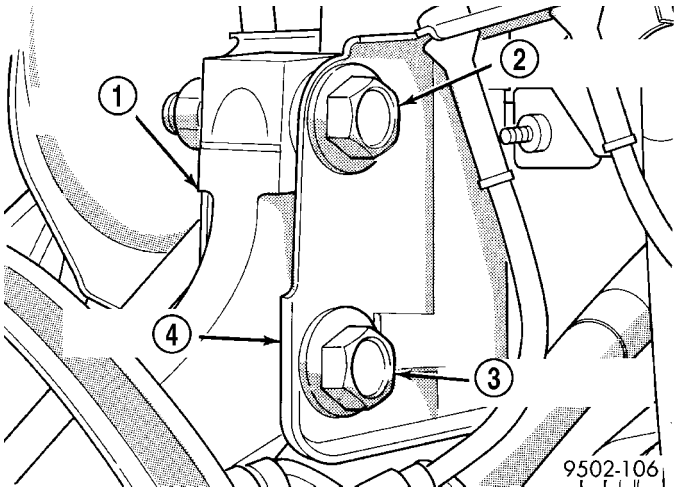


Fig. 13 Package Bolts Correctly Installed (Left Side Shown)

1 - STEERING KNUCKLE
2 - FLANGED BOLT IN TOP HOLE
3 - CAM BOLT IN BOTTOM HOLE
4 - STRUT CLEVIS BRACKET

NOTE: The strut clevis-to-steering knuckle bolts are installed differently on each side. Left hand side bolts are to be installed from vehicle rear to front (Fig. 9). Right side bolts are to be installed from vehicle front to rear (Fig. 10).

(5) Align steering knuckle in clevis bracket of strut. Install strut clevis-to-steering knuckle attaching bolts (Fig. 9) (Fig. 10). Install nuts on ends of bolts and tighten to 81 N·m (60 ft. lbs.) torque. Then, tighten nuts an additional 1/4 (90°) turn after that torque is met.

CAUTION: Before installing tie rod stud in knuckle steering arm, wipe stud and knuckle contact area free of any grease or debris, otherwise damage to knuckle can occur. Use a clean shop cloth with Mopar® Brake Parts Cleaner applied to it for proper cleaning. Do not spray stud directly.

(6) Install outer tie rod stud into knuckle steering arm from bottom (Fig. 7). Start nut onto tie rod stud. While holding stud stationary using a socket, tighten nut using a wrench. Using a crowfoot wrench on a torque wrench, tighten nut to 47 N·m (35 ft. lbs.)

KNUCKLE (Continued)

torque. Then, tighten nut an additional 1/2 (180°) turn after that torque is met.

(7) Place wheel speed sensor cable grommet in clip at knuckle (Fig. 4). Close clip.

(8) Attach wheel speed sensor routing bracket to strut assembly (Fig. 3). Tighten screw to 13 N·m (115 in. lbs.) torque.

(9) Clip wheel speed sensor connector and routing clip to frame rail outer reinforcement (Fig. 2).

(10) Connect vehicle wiring harness to wheel speed sensor connector (Fig. 2).

(11) Install brake rotor, then install disc brake caliper and adapter assembly. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - INSTALLATION)

(12) Verify that wheel speed sensor is not routed improperly allowing cable to come in contact with brake rotor or other moving parts.

(13) Install washer and hub nut on end of halfshaft stub shaft (Fig. 1). With aid of a helper applying brakes to keep front hub from turning, tighten hub nut to 244 N·m (180 ft. lbs.) torque.

(14) Install spring washer and hub nut lock over hub nut and stub shaft. Install a NEW cotter pin securing nut lock in place and tightly wrap cotter pin prongs around nut lock.

(15) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to a torque of 135 N·m (100 ft. lbs.).

(16) Lower vehicle.

(17) Pump brake pedal several times to ensure vehicle has a firm brake pedal before moving vehicle.

(18) Check and adjust brake fluid level as necessary.

(19) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

LOWER BALL JOINT

DIAGNOSIS AND TESTING - LOWER BALL JOINT

With the weight of the vehicle resting on the road wheels, grasp the special fitting cap on the bottom of the ball joint and with no mechanical assistance or added force, attempt to rotate the grease fitting.

If the ball joint is worn, the grease fitting will rotate easily. If movement is noted, replacement of the control arm is recommended.

LOWER BALL JOINT SEAL BOOT

REMOVAL

(1) Remove steering knuckle from vehicle. (Refer to 2 - SUSPENSION/FRONT/KNUCKLE - REMOVAL)

(2) Using a screwdriver or other suitable tool, pry seal boot off of ball joint (Fig. 14).

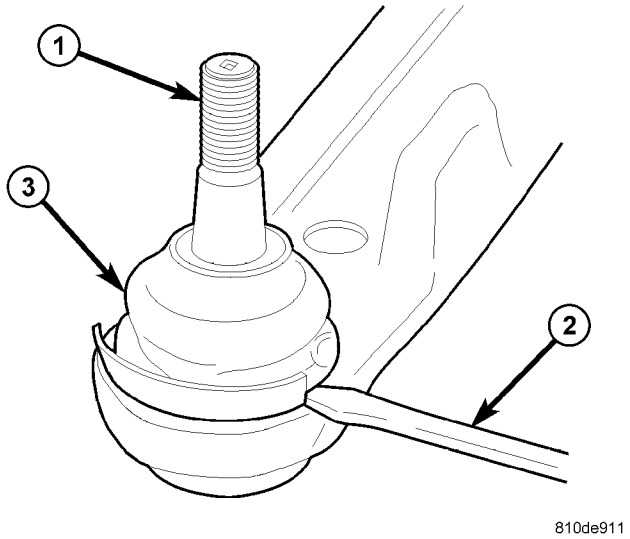


Fig. 14 Ball Joint Seal Boot Removal

1 - BALL JOINT STUD
2 - SCREWDRIVER
3 - SEAL BOOT

(3) Inspect ball joint for evidence of dirt or water intrusion and wipe clean as necessary. If dirt or water intrusion is extreme and joint cannot be properly cleaned, lower control arm will need to be replaced. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - REMOVAL)

INSTALLATION

(1) Place a liberal dab of Mopar® Wheel Bearing Grease (No more than 10g) around base of ball joint stud at socket.

(2) Install a **NEW** seal boot by hand as far as possible on ball joint. Ensure seal boot shield is positioned outward from control arm as shown (Fig. 15).

CAUTION: Do not use an arbor press to install seal boot on ball joint. Damage to seal boot will occur if excessive pressure is applied while it is being installed.

(3) Place Installer, Special Tool 6758, over top of seal boot and squarely align it with bottom edge of seal boot (Fig. 16). Apply hand pressure (or gently

LOWER BALL JOINT SEAL BOOT (Continued)

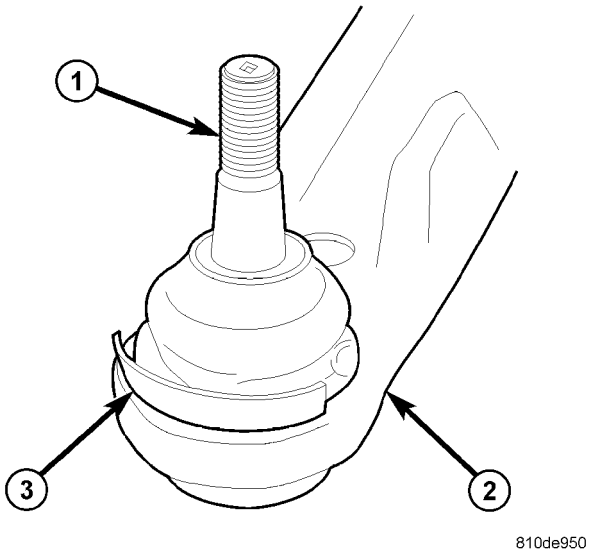


Fig. 15 Ball Joint Seal Boot Installed Position

1 - BALL JOINT STUD
2 - LOWER CONTROL ARM
3 - SEAL BOOT SHIELD

tap with a hammer if necessary) to top of Installer until seal boot is pressed squarely down against top surface of lower control arm.

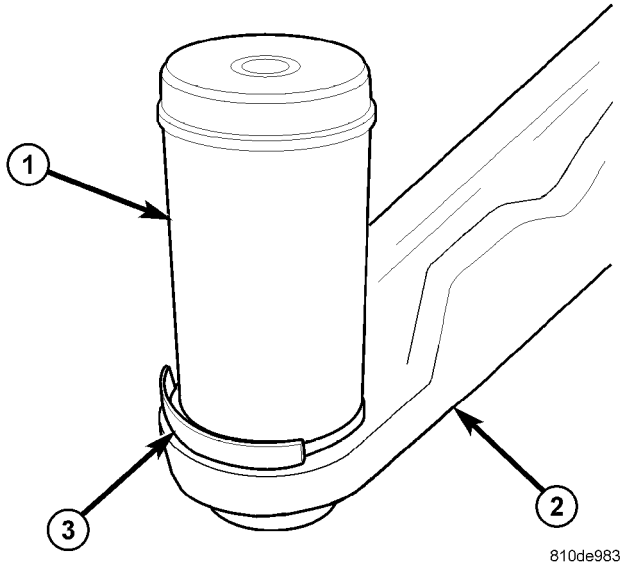


Fig. 16 Installer Positioned On Ball Joint Seal Boot

1 - INSTALLER 6758
2 - LOWER CONTROL ARM
3 - SEAL BOOT SHIELD

(4) Wipe any grease off ball joint stem using a clean shop towel with Mopar® Brake Parts Cleaner applied to it.

CAUTION: Do not attempt to install a normal grease zirc in ball joint in an effort to lubricate joint through zirc fitting.

(5) Install steering knuckle on vehicle. (Refer to 2 - SUSPENSION/FRONT/KNUCKLE - INSTALLATION)

LOWER CONTROL ARM

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove wheel and tire assembly.

(3) Remove steering knuckle. (Refer to 2 - SUSPENSION/FRONT/KNUCKLE - REMOVAL)

(4) Remove bolts and nuts (with flags if equipped) attaching lower control arm to engine cradle (Fig. 17).

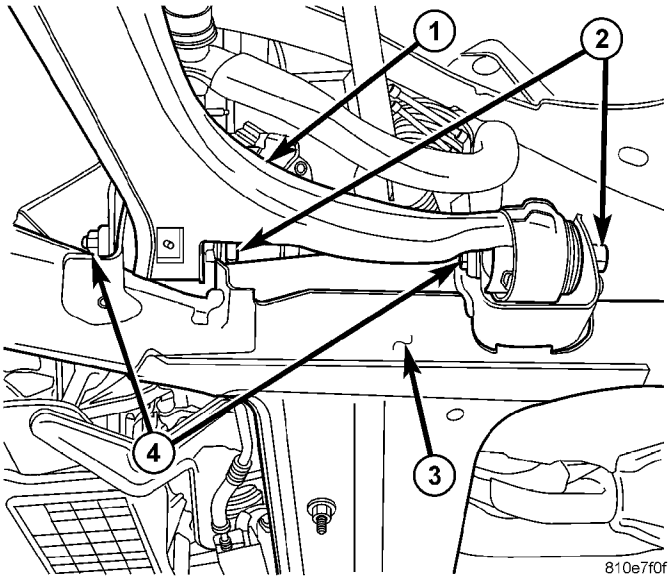


Fig. 17 Control Arm Mounting Bolts At Engine Cradle

1 - LOWER CONTROL ARM
2 - MOUNTING BOLTS
3 - ENGINE CRADLE
4 - FLAG NUTS

(5) Remove lower control arm.

INSPECTION

Inspect lower control arm for signs of damage from contact with the ground or road debris. If lower control arm shows any sign of damage, inspect lower control arm for distortion. Do not attempt to repair or straighten a broken or bent lower control arm. If damaged, the lower control arm is serviced only as a complete assembly.

LOWER CONTROL ARM (Continued)

Inspect both lower control arm isolator bushings for severe deterioration, and replace as required. If a bushing fails, the lower control arm must be replaced.

Inspect and test the ball joint per the procedure listed in Lower Ball Joint. (Refer to 2 - SUSPENSION/FRONT/LOWER BALL JOINT - DIAGNOSIS AND TESTING)

INSTALLATION

(1) Position lower control arm into brackets on engine cradle (Fig. 17).

NOTE: If equipped with flag nuts, when installing lower control arm-to-cradle REAR mounting bolts, ensure flags on mounting nuts are positioned as follows to avoid contact with lower control arm (LCA) once bolts are tightened:

- **Left LCA rear flag nut – flag positioned upward (above LCA)**
- **Right LCA rear flag nut – flag positioned downward (below LCA)**

Flags on front mounting nuts are self explanatory.

(2) Install NEW bolts attaching lower control arm bushings to engine cradle (Fig. 17). Install bolts from rear as shown. Thread bolts into properly positioned nuts (with flags if equipped. **See preceding note)**. **Do not tighten bolts at this time.**

(3) Install steering knuckle, brake rotor and caliper. (Refer to 2 - SUSPENSION/FRONT/KNUCKLE - INSTALLATION)

(4) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(5) Lower vehicle.

(6) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access mounting bolts.

(7) Tighten lower control arm frame mounting bolts to 163 N·m (120 ft. lbs.) torque.

(8) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

STABILIZER BAR

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove both front wheel and tire assemblies.

(3) Remove nut attaching outer tie rod to steering knuckle by holding rod end stud stationary while loosening and removing nut with a wrench.

(4) Remove tie rod end from steering knuckle using Remover, Special Tool C-3894-A (Fig. 18).

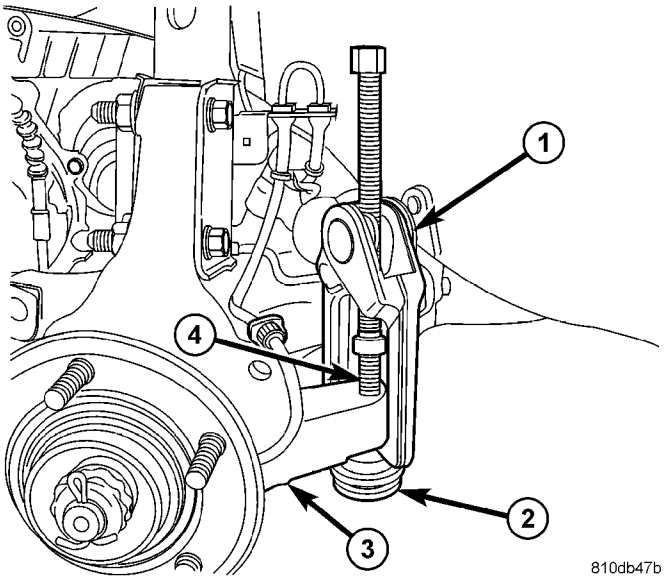


Fig. 18 Using C-3894-A To Release Tie Rod

1 - PULLER C-3894-A
2 - OUTER TIE ROD
3 - STEERING KNUCKLE
4 - TIE ROD STUD

CAUTION: When removing nut from stud of stabilizer bar link, do not allow stud to rotate in it's socket. Hold stud from rotating by placing an open-end wrench on flat machined into stud (Fig. 19).

(5) Remove stabilizer bar links from each end of stabilizer bar (Fig. 19). To do so, place an open-end wrench on flat machined into link's mounting stud, then remove nut while holding wrench in place. Push each stud out of hole in stabilizer bar.

(6) Remove stabilizer bar cushion retainers as follows (Fig. 20):

(a) Loosen front bolts at each retainer (Do not remove). An open-end wrench works best, but a socket may be used if correct length extension is used.

(b) Remove rear bolts at each retainer.

(c) Slide stabilizer toward rear of vehicle.

(d) Remove both retainers and cushions from bar.

(7) Remove stabilizer bar out through right wheel opening by carefully rotating bar up-and-down, and back-and-forth as necessary.

INSPECTION

Inspect for broken or distorted stabilizer bar bushings (cushions), bushing retainers, and worn or damaged stabilizer bar links. Also inspect retainers for damaged heat shields and missing or damaged rivets.

STABILIZER BAR (Continued)

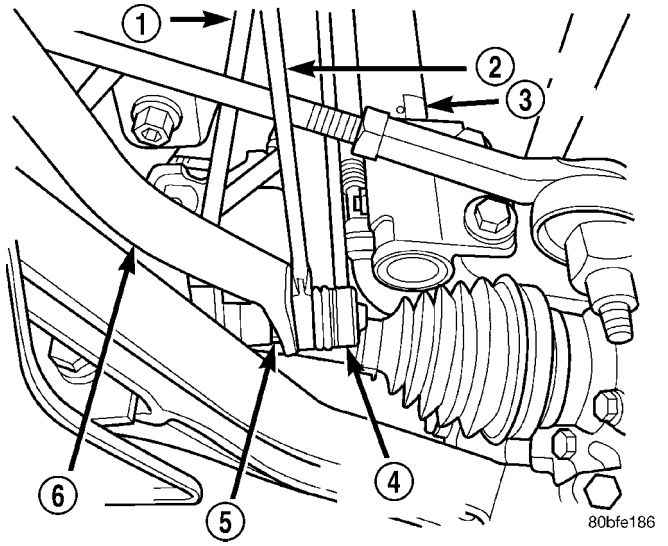


Fig. 19 Stabilizer Bar Link To Stabilizer Bar Attachment

1 - RATCHET
2 - WRENCH
3 - STRUT
4 - STABILIZER BAR LINK
5 - NUT
6 - STABILIZER BAR

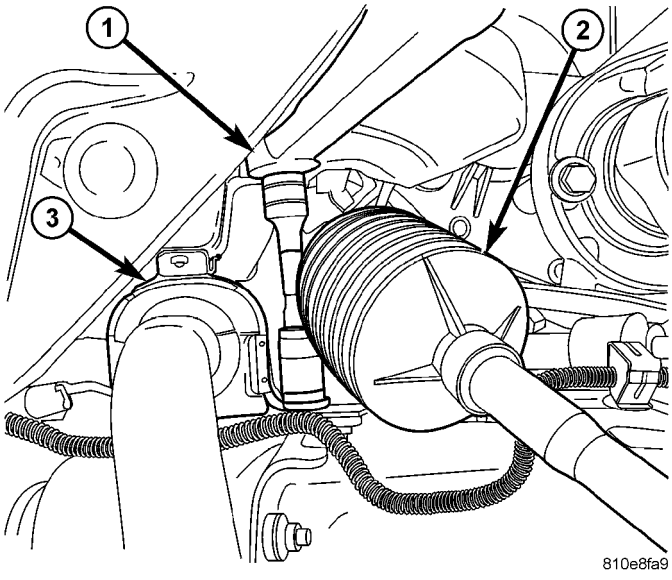


Fig. 20 Accessing Stabilizer Bar Cushion Retainer Bolts (Right shown - Left Typical)

1 - RATCHET/TORQUE WRENCH WITH EXTENSION AND SOCKET
2 - POWER STEERING GEAR BOOT
3 - CUSHION RETAINER

INSTALLATION

NOTE: When installing stabilizer bar, make sure it installed so that bar curves upward at ends to meet stabilizer links (Fig. 21).

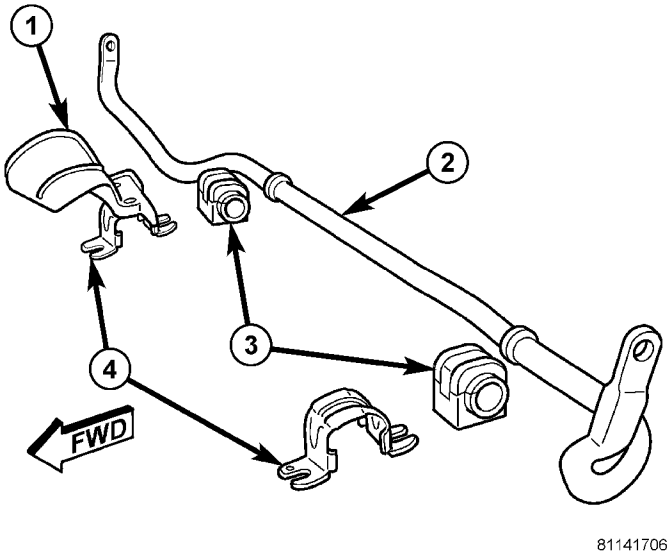


Fig. 21 Front Stabilizer Bar

1 - SHIELD (MOUNTED TO RIGHT RETAINER)
2 - STABILIZER BAR
3 - CUSHIONS
4 - RETAINERS

(1) Insert stabilizer bar over cradle through right front wheel opening in reverse direction it was removed in. **Ensure bar gets routed in front of brake tubes on cradle.**

NOTE: When installing cushion retainers, make sure shielded retainer is installed on right side with shield pointing forward.

(2) Install cushions on stabilizer bar utilizing slits in cushions. Install each cushion so its slit faces forward and flat side is positioned toward cradle once installed (Fig. 21).

(3) Install retainers on cushions. Make sure retainer with shield is placed over right cushion with shield facing forward.

(4) Slide stabilizer bar forward engaging slotted holes on retainers with retainer mounting bolts in cradle.

(5) Install rear retainer mounting bolts.

(6) Tighten all four retainer mounting bolts to 54 N·m (40 ft. lbs.) torque (Fig. 20).

NOTE: Once retainer bolts are tightened, make sure heat shields are not bent or mis-positioned.

(7) Install each stabilizer bar link mounting stud through hole in each end of stabilizer bar.

CAUTION: When installing nut on mounting stud of stabilizer bar link, do not allow stud to rotate in it's socket. Hold stud stationary by placing an open-end wrench on flat machined into stud (Fig. 19).

STABILIZER BAR (Continued)

(8) Hand-thread nut on end of each stabilizer bar link studs. Then hold studs from turning by placing an open-end wrench on flat machined into each link's mounting stud, then tighten each nut (Fig. 19). Tighten each nut to 88 N·m (65 ft. lbs.) torque.

(9) Install outer tie rods to steering knuckles. Start NEW nut onto stud of each outer tie rod. Start nut onto tie rod stud. While holding stud stationary using a socket, tighten nut using a wrench. Using a crowfoot wrench on a torque wrench, tighten nut to 47 N·m (35 ft. lbs.) torque. Then, tighten nut an additional 1/2 (180°) turn after that torque is met.

(10) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(11) Lower vehicle.

STRUT ASSEMBLY

DESCRIPTION

A Macpherson type strut assembly is used in place of a conventional front suspension's upper control arm and upper ball joint. The bottom of the strut mounts directly to the steering knuckle using two bolts and nuts going through the strut clevis bracket and steering knuckle. The top of the strut mounts directly to the strut tower of the vehicle using the threaded studs on the strut assemblies upper mount.

The strut assembly includes the components listed in the figure (Fig. 22).

Each component is serviced by removing the strut assembly from the vehicle and disassembling it.

Left and right springs must not be interchanged. Coil springs are rated separately for each corner or side of the vehicle depending on optional equipment and type of vehicle service. If the coil springs require replacement, be sure that the springs are replaced with springs meeting the correct load rating and spring rate for the vehicle and its specific options.

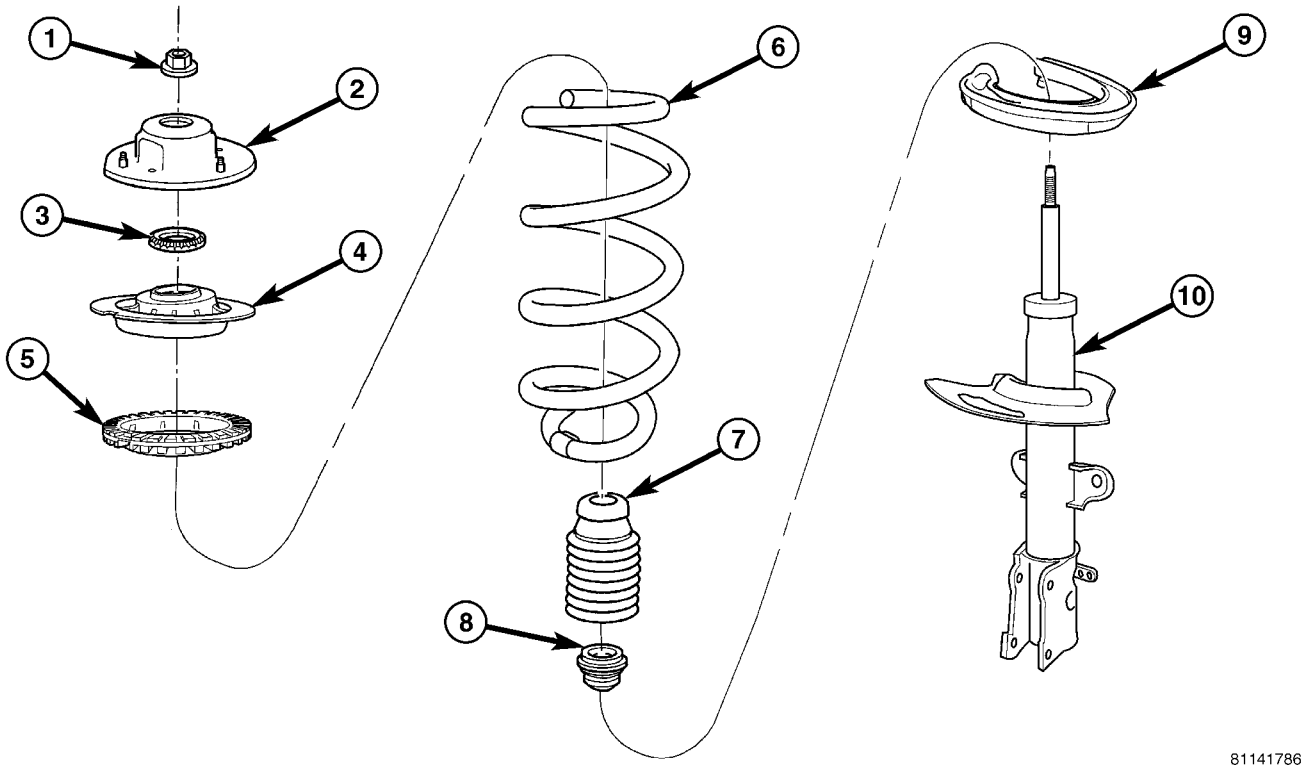


Fig. 22 Strut Assembly

1 - NUT
2 - UPPER MOUNT
3 - PIVOT BEARING
4 - UPPER SPRING SEAT
5 - UPPER SPRING ISOLATOR
6 - COIL SPRING
7 - DUST SHIELD
8 - JOUNCE BUMPER
9 - LOWER SPRING ISOLATOR
10 - STRUT (DAMPER)

STRUT ASSEMBLY (Continued)

DIAGNOSIS AND TESTING - STRUT ASSEMBLY

(1) Inspect for a damaged or broken coil spring.

(2) Inspect for torn or damaged dust boot (Fig. 23).

(3) Inspect jounce bumper for signs of damage or deterioration.

(4) Inspect coil spring isolator on lower spring seat for any signs of damage or deterioration.

(5) Lift dust boot (Fig. 23) and inspect strut (damper) for evidence of fluid running from upper end of fluid reservoir. (Actual leakage will be a stream of fluid running down the side and dripping off lower end of unit). A slight amount of seepage between the strut shaft and strut shaft seal is not unusual and does not affect performance of the strut assembly (Fig. 23).

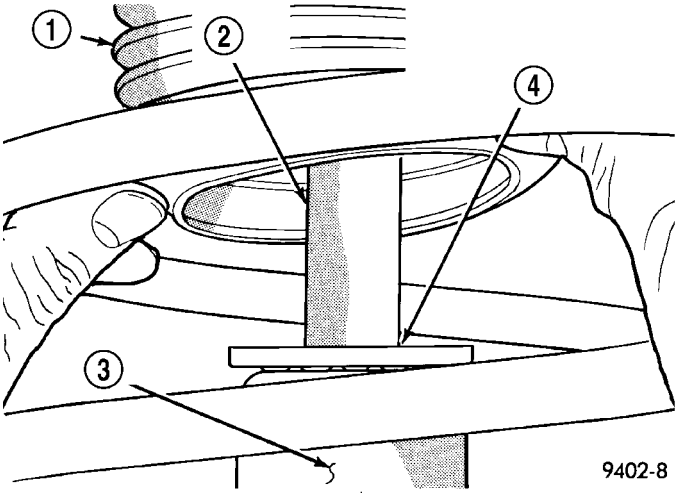


Fig. 23 Strut Assembly Leakage Inspection (Typical)

1 - DUST BOOT
2 - STRUT SHAFT
3 - STRUT FLUID RESERVOIR
4 - INSPECT THIS AREA FOR EVIDENCE OF EXCESSIVE FLUID LEAKAGE

REMOVAL

WARNING: DO NOT REMOVE NUT FROM STRUT ROD WHILE STRUT ASSEMBLY IS INSTALLED IN VEHICLE OR BEFORE STRUT ASSEMBLY SPRING IS COMPRESSED.

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove wheel and tire assembly.

(3) If both strut assemblies are to be removed, mark strut assemblies right or left according to which side of vehicle they were removed from.

(4) Remove screw fastening wheel speed sensor routing bracket to strut assembly (Fig. 24).

CAUTION: When removing nut from stud of stabilizer bar link, do not allow stud to rotate in it's socket. Hold stud from rotating by placing an open-end wrench on flat machined into stud (Fig. 25).

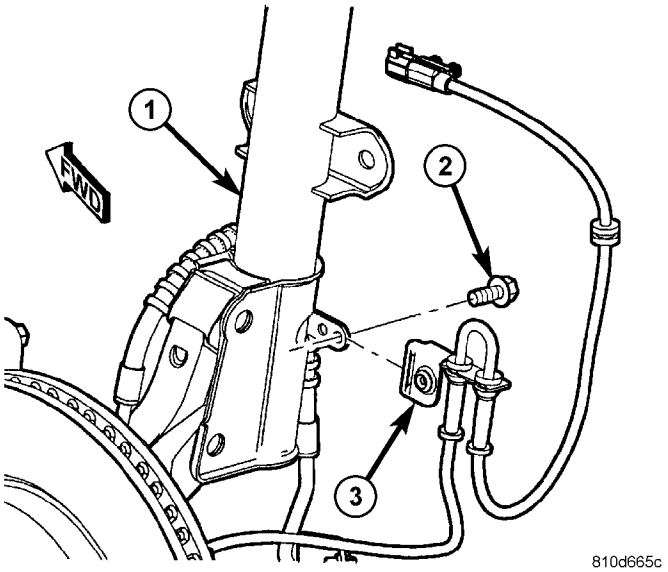


Fig. 24 Wheel Speed Sensor Mounting To Strut

1 - STRUT ASSEMBLY
2 - SCREW
3 - WHEEL SPEED SENSOR ROUTING BRACKET

(5) Remove stabilizer bar link from bracket on strut assembly (Fig. 25). To do so, place an open-end wrench on flat machined into link's mounting stud, then remove nut while holding wrench in place. Push stud out of bracket.

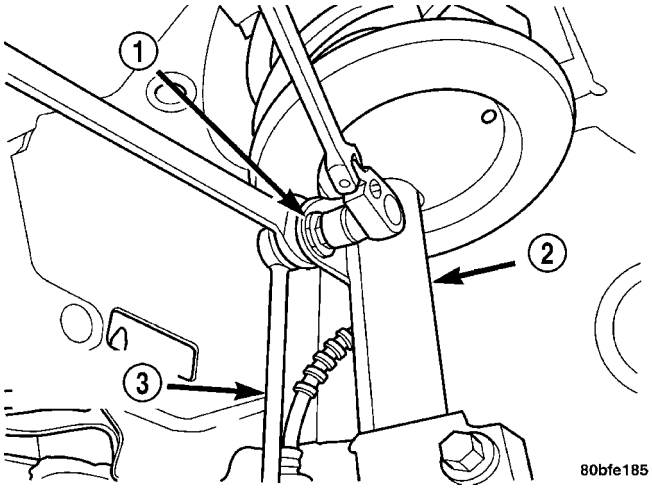


Fig. 25 Stabilizer Bar Link To Strut

1 - NUT
2 - STRUT
3 - STABILIZER BAR LINK

CAUTION: The steering knuckle to strut assembly attaching bolts are serrated and must not be turned during removal. Remove nuts while holding bolts stationary in steering knuckles.

STRUT ASSEMBLY (Continued)

(6) Remove two bolts and nuts attaching strut clevis to steering knuckle (Fig. 26) (Fig. 27).

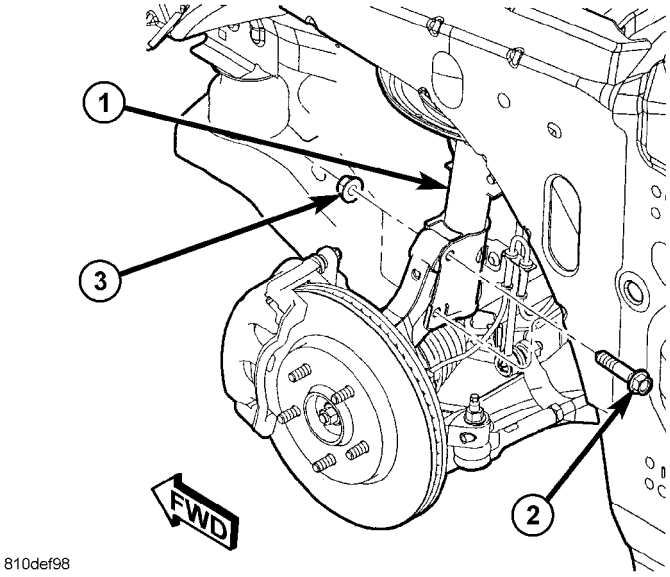


Fig. 26 Left Side Correctly Oriented Mounting Bolts

1 - STRUT
2 - BOLT
3 - NUT

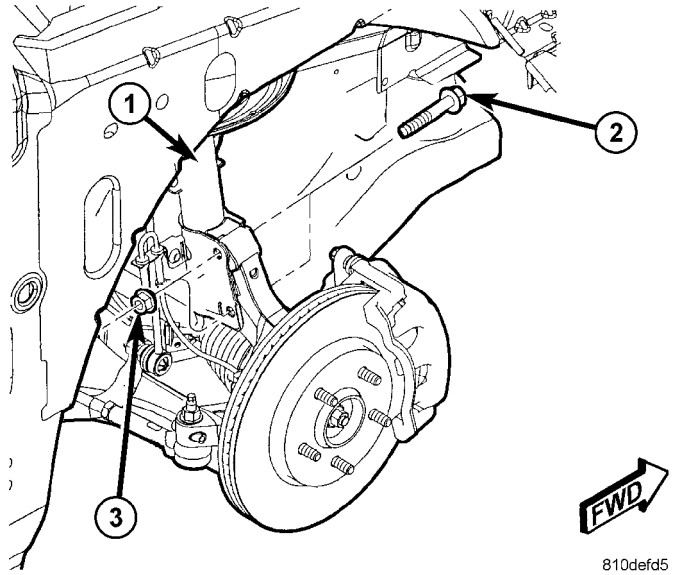


Fig. 27 Right Side Correctly Oriented Mounting Bolts

1 - STRUT
2 - BOLT
3 - NUT

(7) If servicing left strut assembly, remove nuts fastening coolant recovery bottle in place and reposition bottle with hoses attached out of way. (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - REMOVAL)

(8) Remove three nuts attaching strut assembly upper mount to strut tower (Fig. 28), then remove strut assembly from vehicle.

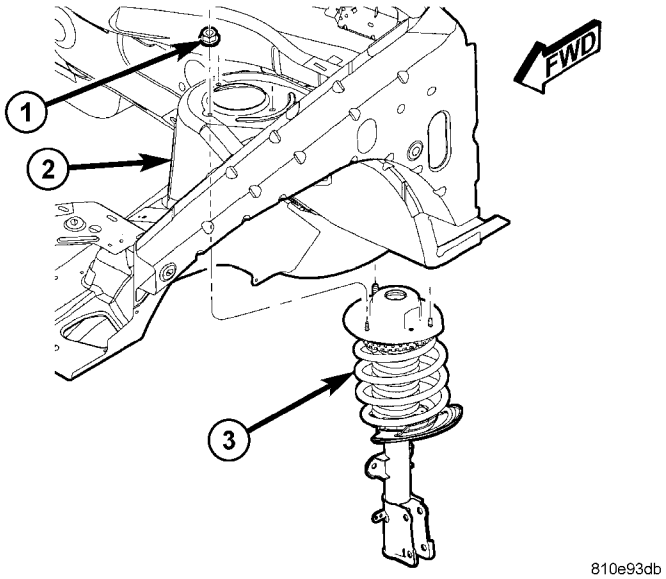


Fig. 28 Attachment To Strut Tower

1 - NUT
2 - STRUT TOWER
3 - STRUT ASSEMBLY

(9) To disassemble strut assembly, (Refer to 2 - SUSPENSION/FRONT/STRUT - DISASSEMBLY).

DISASSEMBLY

The strut assembly must be removed from vehicle for it to be disassembled and assembled.

For disassembly and assembly of strut assembly, use of Strut Spring Compressor, Pentastar Service Equipment (PSE) tool W-7200, or equivalent, is recommended to compress coil spring. Follow manufacturer's instructions closely.

WARNING: DO NOT REMOVE STRUT SHAFT NUT BEFORE COIL SPRING IS COMPRESSED. COIL SPRING IS HELD UNDER PRESSURE AND MUST BE COMPRESSED, REMOVING SPRING TENSION FROM UPPER MOUNT AND PIVOT BEARING, BEFORE SHAFT NUT IS REMOVED.

(1) Position strut assembly in strut coil spring compressor following manufacturers instructions (Fig. 29). Position lower hooks on coil spring first, then uppers.

(2) Compress coil spring until all coil spring tension is removed from upper mount.

(3) Install Strut Nut Wrench, Special Tool 6864, on strut shaft retaining nut (Fig. 30). Next, install a 10 mm socket onto hex located on end of strut shaft. While holding strut shaft from turning, remove nut from strut shaft.

STRUT ASSEMBLY (Continued)

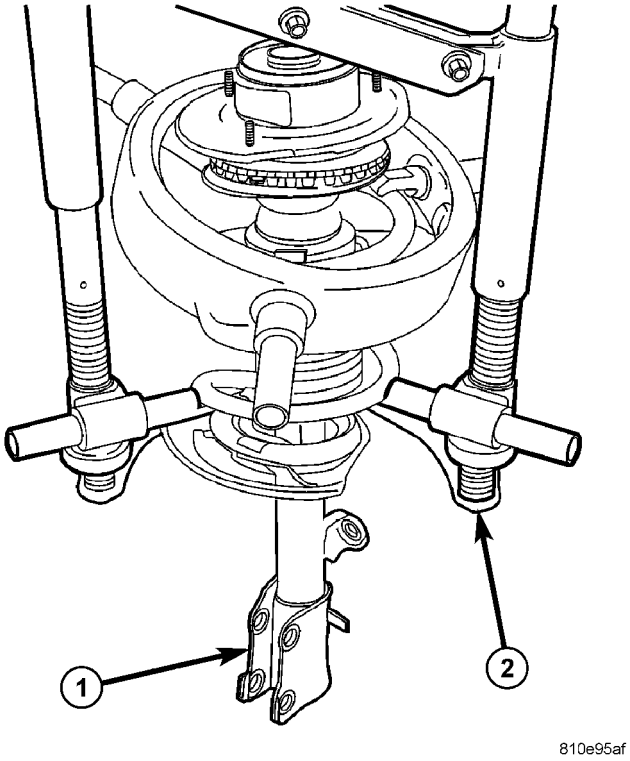


Fig. 29 Strut Assembly Positioned In Compressor

1 - STRUT ASSEMBLY
2 - STRUT SPRING COMPRESSOR

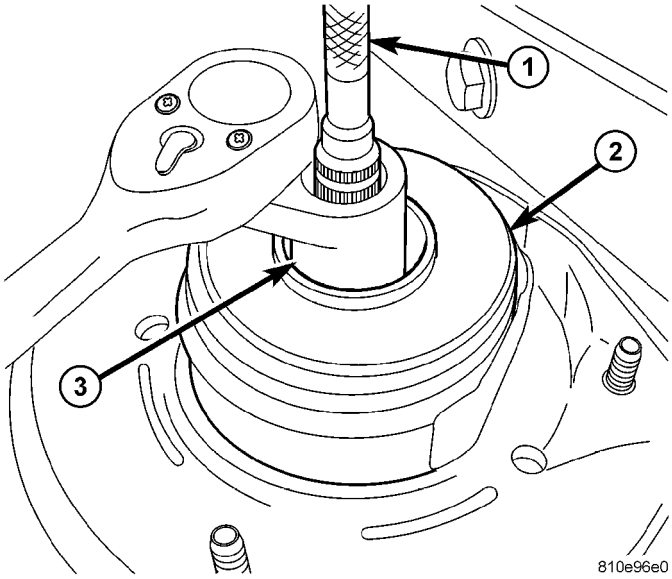


Fig. 30 Retaining Nut Removal/Installation

1 - RATCHET EXTENSION WITH SOCKET
2 - UPPER MOUNT
3 - WRENCH 6864

(4) Remove upper mount from strut shaft (Fig. 22).

(5) If pivot bearing needs to be serviced, remove it from top of upper seat by pulling it up off seat (Fig. 31).

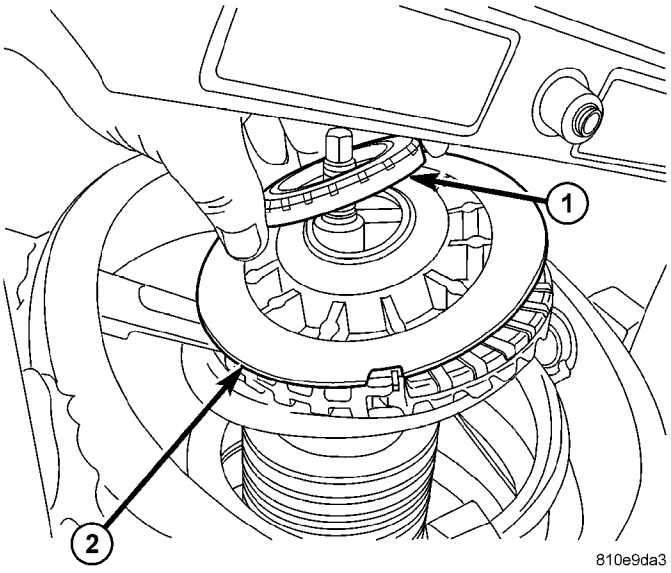


Fig. 31 Pivot Bearing Removal/Installation

1 - PIVOT BEARING
2 - UPPER SEAT

(6) If upper spring seat or isolator need to be serviced, remove them from top of coil spring pulling both up off spring, then removing isolator from seat.

(7) Remove clamp from bottom of coil spring and remove strut out through bottom of coil spring.

NOTE: If coil spring needs to be serviced, proceed with next step, otherwise, proceed with step 10.

(8) If not previously removed, lift pivot bearing, upper spring seat or isolator off coil spring (Fig. 22).

NOTE: Prior to removing spring from compressor, note location of lower spring coil end in relationship to compressor to ease assembly of components later.

(9) Release tension from coil spring by backing off compressor drive fully. Push back compressor upper hooks and remove coil spring from spring compressor.

(10) Remove dust shield and jounce bumper as an assembly from strut shaft by pulling both straight up and off strut shaft (Fig. 22). Dust shield cannot be separated from jounce bumper until after it is removed from strut shaft.

(11) Remove jounce bumper from dust shield. Jounce bumper is removed from dust shield by collapsing dust shield until jounce bumper can be pulled free from dust boot.

(12) Remove spring isolator from lower spring seat on strut (Fig. 22).

(13) Inspect strut assembly components for following and replace as necessary:

STRUT ASSEMBLY (Continued)

- Inspect strut for any condition of shaft binding over full stroke of shaft.
- Check upper mount for cracks and distortion and its retaining studs for any sign of damage.
- Check upper seat for stress cracks and wear.
- Check upper spring isolator for severe deterioration.
- Check for binding of strut assembly pivot bearing.
- Inspect dust shield for rips and deterioration.
- Inspect jounce bumper for cracks and signs of deterioration.

ASSEMBLY

CAUTION: Use care not to damage coil spring coating during spring assembly. Damage to coating will jeopardize its corrosion protection.

NOTE: Left and right springs must not be interchanged.

NOTE: If coil spring has been removed from spring compressor, proceed with next step, otherwise, proceed with step 4.

(1) Place coil spring **(part number tag end downward)** in compressor lower hooks following manufacturers instructions. To ease strut reassembly, rotate coil spring around until lower coil end is in same location as it was upon disassembly. Proper orientation of spring to strut (once installed) is necessary.

(2) Position compressor upper hooks over coil spring following manufacturers instructions.

(3) Compress coil spring far enough to allow strut installation.

(4) If separated, install isolator onto upper seat (Fig. 22). Be sure to match master notches built into each up to one another (Fig. 32).

(5) Install upper isolator and upper seat on top of coil spring if previously removed (Fig. 22).

(6) If pivot bearing has been removed from upper seat, install pivot bearing on top of upper spring seat (Fig. 31). Bearing must be installed on upper seat with smaller diameter side of pivot bearing toward spring seat. Be sure pivot bearing is sitting flat on spring seat once mounted.

(7) Install spring lower isolator on lower spring seat of strut matching isolator alignment pin with hole in strut (Fig. 22).

(8) Install jounce bumper on strut shaft with small end pointing downward (Fig. 22).

(9) Install dust shield on strut shaft. Collapse and stretch dust shield down over top of jounce bumper until dust shield snaps into slot on jounce bumper. jounce bumper will be at top of inner dust boot. Return dust shield to its fully extended length.

(10) Install strut through bottom of coil spring until lower spring seat contacts lower end of coil spring. Match step built into strut lower seat and isolator to lower coil end, then install clamp to hold strut and coil spring together.

(11) Install strut mount over strut shaft and onto top of pivot bearing and upper seat (Fig. 22). Loosely install retaining nut on strut shaft.

(12) Install Strut Nut Wrench (on end of a torque wrench), Special Tool 6864, on strut shaft retaining nut (Fig. 30). Next, install a 10 mm socket onto hex on end of strut shaft. While holding strut shaft from turning, tighten strut shaft retaining nut to a torque of 115 N·m (85 ft. lbs.).

NOTE: Before releasing tension compressor has on spring, using following figure as reference (Fig. 32), rotate upper spring seat and upper isolator (notches in each) to line up with hole in strut and clevis bracket (within 5° of one another).

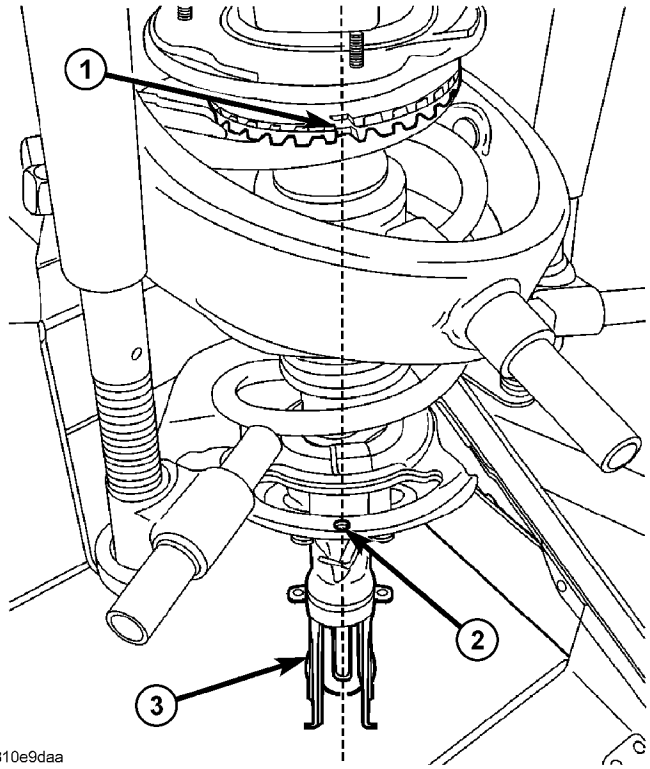


Fig. 32 Strut Components Lined Up

1 - NOTCHES IN UPPER SEAT AND ISOLATOR
2 - HOLE IN STRUT LOWER SEAT
3 - STRUT CLEVIS BRACKET

(13) Slowly release tension from coil spring by backing off compressor drive fully. As tension is relieved, make sure upper mount, pivot bearing and upper seat are align properly.

STRUT ASSEMBLY (Continued)

(14) Remove clamp from lower end of coil spring and strut. Push back spring compressor upper and lower hooks, then remove strut assembly from spring compressor.

(15) Install strut assembly on vehicle. (Refer to 2 - SUSPENSION/FRONT/STRUT - INSTALLATION)

INSTALLATION

CAUTION: When installing a strut assembly, make sure strut being installed has correct coil spring for that side of vehicle. Do not interchange two sides.

(1) Install strut assembly into strut tower, aligning and installing three studs on upper strut mount into holes in tower. Install three mounting nut/washer assemblies (Fig. 28). Tighten nuts to 28 N·m (250 in. lbs.) torque.

(2) If servicing left strut assembly, place coolant recovery bottle in its normal mounted position and install nuts fastening it in place. (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - INSTALLATION)

CAUTION: Steering knuckle to strut assembly attaching bolts are serrated and must not be turned during installation. Install nuts while holding bolts stationary in steering knuckle.

CAUTION: If strut being serviced is equipped with a slotted lower clevis bracket mounting hole and eccentric cam strut attaching bolt, eccentric cam bolt must be installed in lower (slotted) hole in strut clevis bracket (Fig. 33).

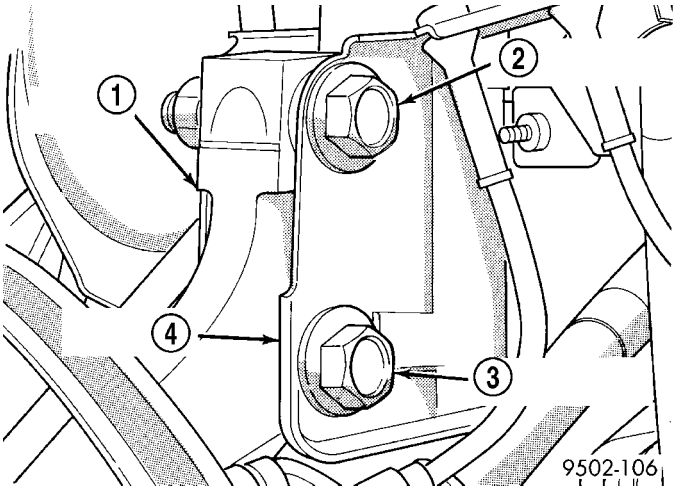


Fig. 33 Package Bolts Correctly Installed (Left Side Shown)

1 - STEERING KNUCKLE
2 - FLANGED BOLT IN TOP HOLE
3 - CAM BOLT IN BOTTOM HOLE
4 - STRUT CLEVIS BRACKET

NOTE: Strut clevis-to-steering knuckle bolts are installed differently on each side. Left hand side bolts are to be installed from vehicle rear to front (Fig. 26). Right side bolts are to be installed from vehicle front to rear (Fig. 27).

(3) Align steering knuckle in clevis bracket of strut. Install strut clevis-to-steering knuckle attaching bolts (Fig. 26) (Fig. 27). Install nuts on ends of bolts and tighten to 81 N·m (60 ft. lbs.) torque. Then, tighten nuts an additional 1/4 (90°) turn after that torque is met.

(4) Install stabilizer bar link mounting stud through rearmost hole in bracket on strut assembly.

CAUTION: When installing nut on mounting stud of stabilizer bar link, do not allow stud to rotate in it's socket. Hold stud from rotating by placing an open-end wrench on flat machined into stud (Fig. 25).

(5) Hand thread nut on end of stabilizer bar link stud. Hold stud from turning by placing an open-end wrench on flat machined into link's mounting stud, then tighten nut while holding wrench in place (Fig. 25). Tighten nut to 88 N·m (65 ft. lbs.) torque.

(6) Attach wheel speed sensor routing bracket to strut assembly (Fig. 24). Tighten screw to 13 N·m (115 in. lbs.) torque.

(7) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to a torque of 135 N·m (100 ft. lbs.).

(8) Lower vehicle.

(9) Perform wheel alignment as necessary. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

REAR SUSPENSION

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REAR SUSPENSION

DESCRIPTION

This vehicle utilizes a five-link rear suspension including the following major components (Fig. 1):

- Camber Link
- Compression Link
- Spring Link
- Tension Link
- Toe Link
- Coil Spring
- Crossmember
- Hub And Bearing
- Knuckle
- Shock Absorber (Load-Leveling)
- Stabilizer Bar

The knuckle, camber link, compression link and tension link are **aluminum** castings. Extra care needs to be taken when servicing these components.

Service Procedures for the crossmember can be found in Frame And Bumpers. (Refer to 13 - FRAME & BUMPERS/FRAME/REAR CROSSMEMBER - REMOVAL)

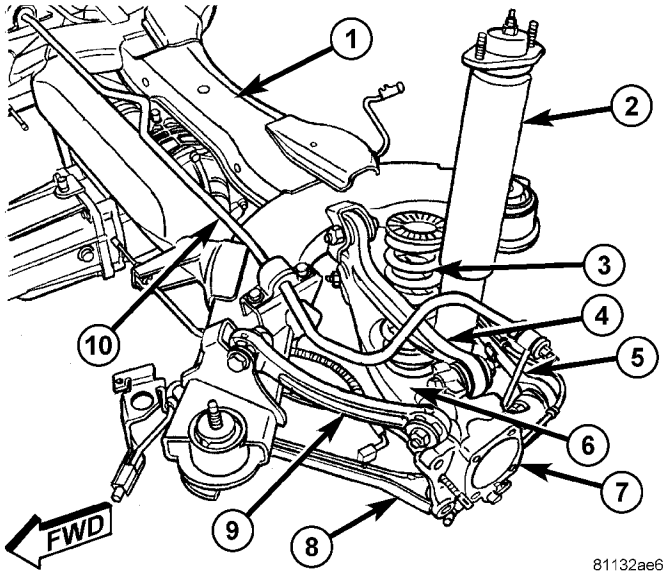


Fig. 1 Rear Suspension

1 - CROSSMEMBER
2 - SHOCK ABSORBER (LOAD-LEVELING)
3 - COIL SPRING
4 - CAMBER LINK
5 - TOE LINK
6 - SPRING LINK
7 - KNUCKLE
8 - COMPRESSION LINK
9 - TENSION LINK
10 - STABILIZER BAR

REAR SUSPENSION (Continued)

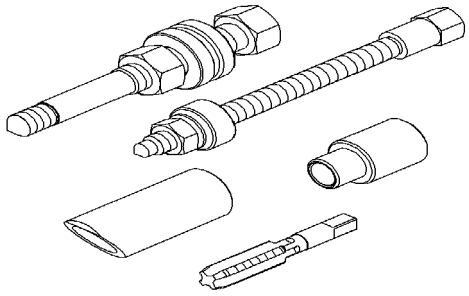
SPECIFICATIONS

REAR SUSPENSION FASTENER TORQUE

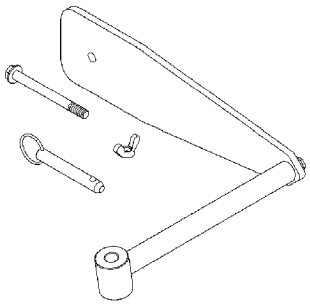
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Brake Caliper Adapter Knuckle Bolts	115	85	—
Camber Link Crossmember Bolt	68	50	—
Camber Link Knuckle Bolt	95	70	—
Compression Link Crossmember Bolt	68	50	—
Compression Link Knuckle Bolt	81	60	—
Crossmember Mounting Bolts	163	120	—
Hub And Bearing Mounting Bolts	81	60	—
Hub Nut	244	180	—
Shock Absorber Mounting Bolts - Upper	61	45	—
Shock Absorber Mounting Bolt Nut - Lower	102	75	—
Spring Link Crossmember Bolt	108	80	—
Spring Link Knuckle Nut	129	95	—
Stabilizer Bar Cushion Retainer Bolts	61	45	—
Stabilizer Link Nuts	61	45	—
Tension Link Crossmember Bolt	68	50	—
Tension Link Knuckle Bolt	119	88	—
Toe Link Crossmember Nut	172	127	—
Toe Link Knuckle Bolt	108	80	—

SPECIAL TOOLS

REAR SUSPENSION



Remover/Installer, Sleeve 9050A



Gage, Curb Height 9094

HUB / BEARING

REMOVAL

NOTE: Before proceeding, (Refer to 2 - SUSPENSION/REAR - WARNING).

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)
(2) Remove tire and wheel assembly.
(3) If equipped with AWD:
(a) Remove cotter pin, nut lock and spring washer from half shaft (Fig. 2).
(b) While a helper applies brakes to keep hub from turning, remove hub nut (Fig. 2).
(4) Remove brake caliper and rotor from hub and bearing assembly. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - REMOVAL)
(5) Disconnect vehicle wiring harness from wheel speed sensor connector (Fig. 3).
(6) Unclip wheel speed sensor connector from spare tire mounting support (Fig. 3).
(7) Disconnect two sensor cable routing clips on rear suspension crossmember (Fig. 3).
(8) Disconnect two sensor cable routing clips along toe link (Fig. 3).

HUB / BEARING (Continued)

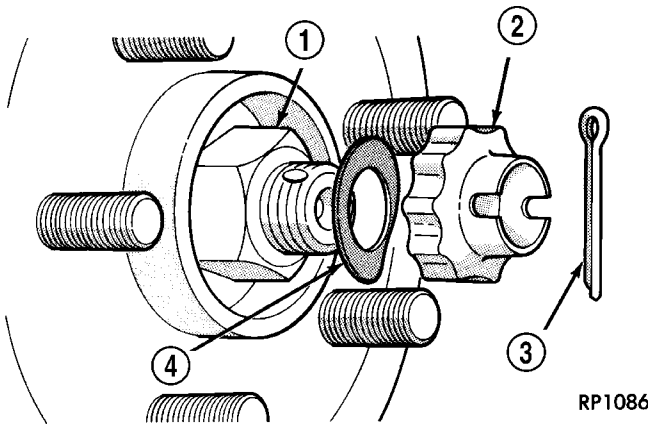


Fig. 2 Hub Nut And Lock

1 - HUB NUT
2 - NUT LOCK
3 - COTTER PIN
4 - SPRING WASHER

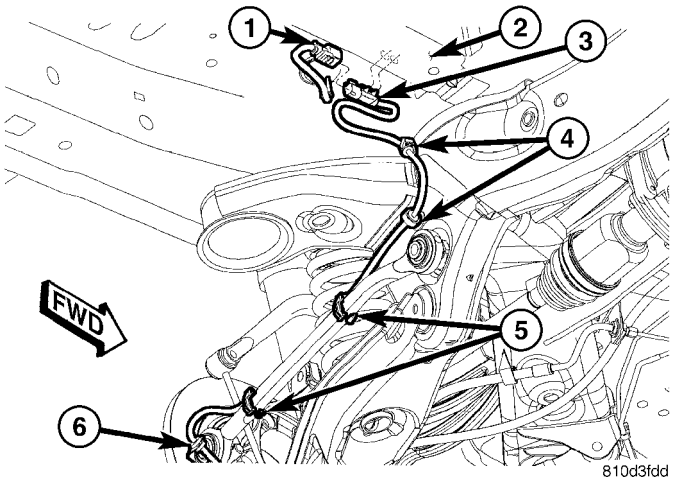


Fig. 3 Rear Wheel Speed Sensor Cable Routing

1 - WIRING HARNESS CONNECTOR
2 - SPARE TIRE MOUNTING SUPPORT
3 - WHEEL SPEED SENSOR CONNECTOR
4 - ROUTING CLIPS
5 - ROUTING CLIPS
6 - ROUTING BRACKET ON BRAKE SUPPORT

(9) Disconnect sensor cable from bracket on brake support (Fig. 3).

(10) Completely loosen, but do not remove four bolts fastening hub and bearing in place (Fig. 4). Once loosened from threads in hub and bearing, push bolts up against rear of hub and bearing to keep brake support plate in place when hub and bearing is removed.

(11) Pull hub and bearing off knuckle and half shaft (if equipped with AWD), then thread wheel speed sensor cable through hole in brake support plate as it is removed with hub and bearing (Fig. 5).

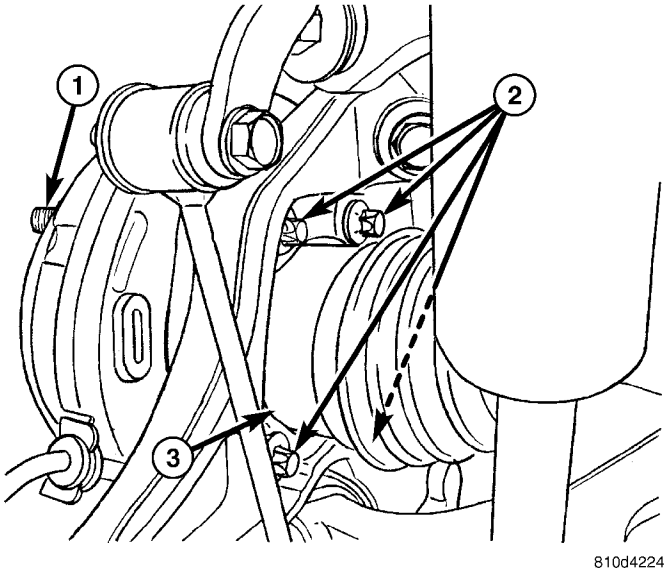


Fig. 4 Hub And Bearing Mounting Bolts

1 - HUB AND BEARING
2 - MOUNTING BOLTS
3 - HALF SHAFT (IF EQUIPPED)

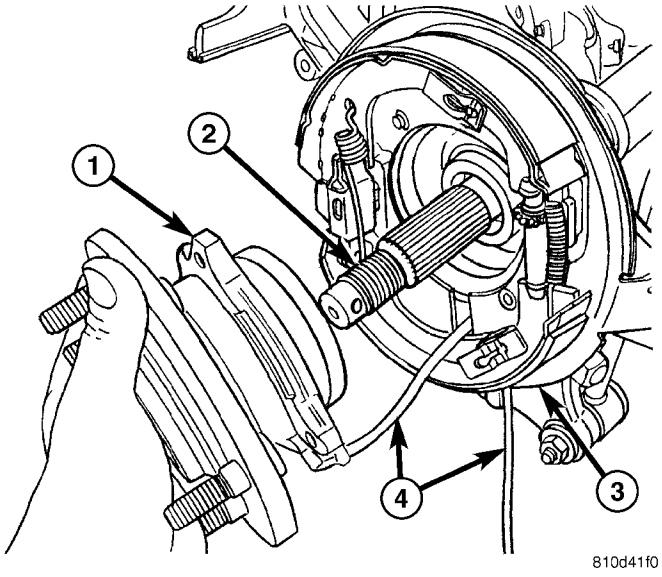


Fig. 5 Hub And Bearing Removal/Installation

1 - HUB AND BEARING
2 - HALF SHAFT (IF EQUIPPED)
3 - BRAKE SUPPORT PLATE
4 - WHEEL SPEED SENSOR CABLE

INSTALLATION

(1) Position hub and bearing bolts though rear of knuckle and parking brake support just enough to hold support in place as hub and bearing is installed.

(2) Install hub and bearing by first feeding end of wheel speed sensor cable through hole in bottom of parking brake support (Fig. 5). As this is being done, if equipped with AWD, slide hub and bearing onto

HUB / BEARING (Continued)

half shaft. Place hub and bearing through brake support, onto knuckle, lining up mounting bolt holes with bolts and placing wheel speed sensor head at bottom.

(3) Install four bolts fastening hub and bearing in place (Fig. 4). Tighten mounting bolts to 81 N·m (60 ft. lbs.) torque.

(4) Place wheel speed sensor cable routing grommet into bracket on parking brake support (Fig. 3).

(5) Route wheel speed sensor cable along toe link and rear suspension crossmember connecting routing clips where shown (Fig. 3).

(6) Clip wheel speed sensor connector to spare tire mounting support (Fig. 3).

(7) Connect vehicle wiring harness to wheel speed sensor connector (Fig. 3).

(8) Install brake rotor and caliper. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - INSTALLATION)

(9) If equipped with AWD:

(a) Install hub nut on end of half shaft. (Fig. 2).

(b) While a helper applies brakes to keep hub from turning, tighten hub nut to 244 N·m (180 ft. lbs.) torque.

(c) Install spring washer, nut lock and cotter pin on end of half shaft (Fig. 2).

(10) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(11) Verify proper adjustment of the parking brake shoes and adjust as necessary. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - ADJUSTMENT)

(12) Lower vehicle.

(13) Pump brake pedal several times to ensure vehicle has a firm brake pedal before moving vehicle.

(14) Road test vehicle and make several stops to wear off any foreign material on brakes and to seat brake shoes.

KNUCKLE

REMOVAL

(1) Lock out automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Remove parking brake cable bolt at knuckle (Fig. 6).

(4) Access and remove rear hub and bearing. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - REMOVAL)

(5) Remove parking brake shoe return spring (Fig. 7).

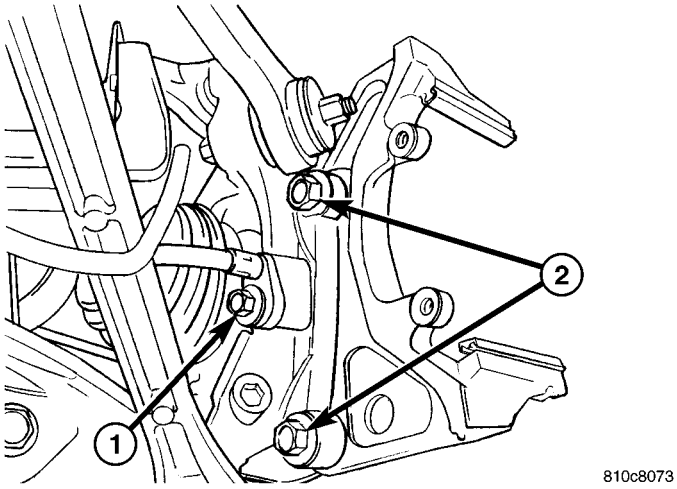


Fig. 6 Brake Fasteners On Rear Of Knuckle

1 - PARKING BRAKE CABLE MOUNTING BOLT
2 - BRAKE CALIPER MOUNTING BOLT

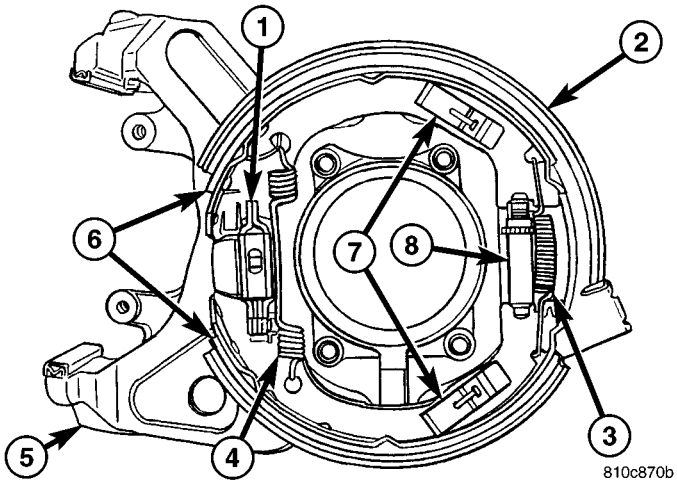


Fig. 7 Parking Brake Shoes

1 - ACTUATOR
2 - SUPPORT
3 - ADJUSTER SPRING
4 - RETURN SPRING
5 - CALIPER ADAPTER
6 - SHOES
7 - HOLD-DOWN CLIPS AND PINS
8 - ADJUSTER

(6) Remove shoe actuator from between parking brake shoes and end of cable (Fig. 8).

(7) Remove support and parking brake shoes from knuckle.

(8) Remove brake caliper adapter mounting bolts (Fig. 6). Remove adapter.

(9) Position under-hoist utility jack or jack stand under spring link. Raise jack head to contact spring link at shock mount secure in place.

(10) Remove spring link-to-knuckle nut and bolt (Fig. 9).

KNUCKLE (Continued)

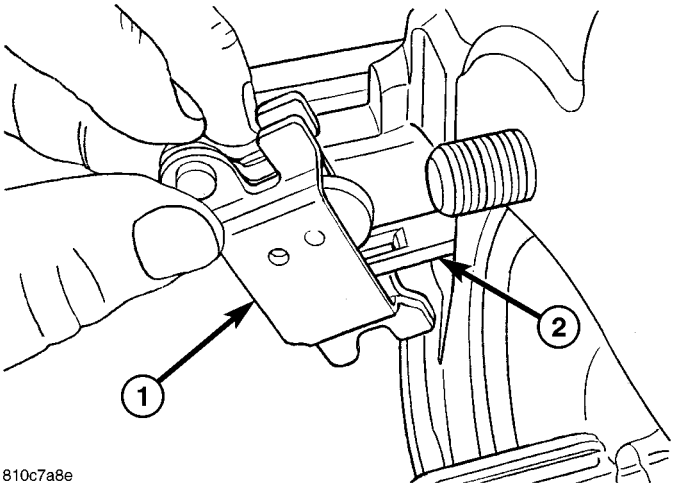


Fig. 8 Actuator Removal/Installation

1 - PARKING BRAKE SHOE ACTUATOR
2 - CABLE END

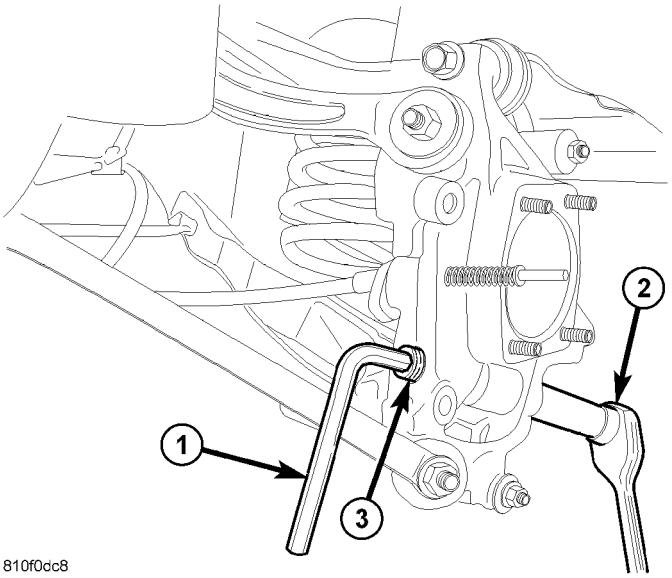


Fig. 9 Spring Link-To-Knuckle Nut And Bolt Removal/Installation

1 - HEX WRENCH
2 - RATCHET AND SOCKET ON NUT
3 - BOLT HEAD

CAUTION: It is important to use Guide, Special Tool 9050A-2, when tapping sleeve to help keep Tap, Special Tool 9050A-1, straight during use or damage to Tap may occur.

(11) Place Guide 9050A-2 against sleeve in knuckle as shown (Fig. 10).

(12) Insert Tap 9050A-1, on an appropriate handle, through Guide and into sleeve (Fig. 10). Cut threads approximately halfway through bushing (or about six complete threads). **It is important to back Tap out often and clean out burrs that can build up inside Guide. Keep Tap well lubricated to avoid damaging it.**

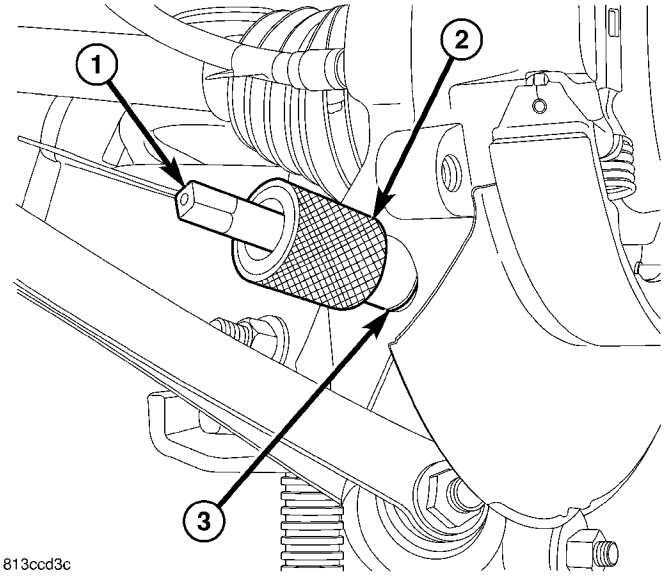


Fig. 10 Using Tap 9050A-1 And Guide 9050A-2

1 - TAP 9050A-1
2 - GUIDE 9050A-2
3 - SLEEVE IN KNUCKLE

NOTE: Prior to using Remover, Special Tool 9050A, lubricate Bolt threads to provide ease of use and promote tool longevity.

(13) Assemble Remover 9050A as shown (Fig. 11).

NOTE: When installing thrust bearing on Remover, be sure to place hardened side toward nut.

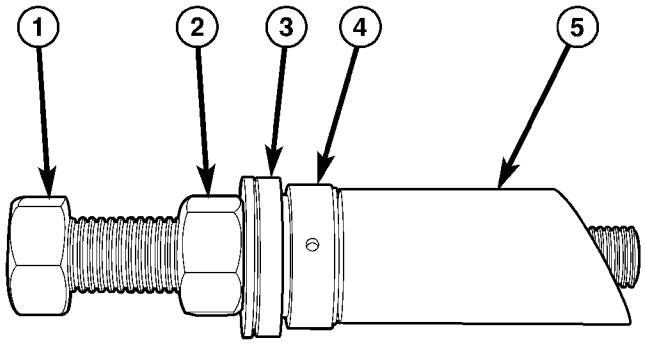


Fig. 11 Sleeve Remover 9050A Assembled

1 - BOLT 9050A-3
2 - NUT
3 - SPHERICAL WASHER
4 - THRUST BUSHING
5 - SLEEVE 9050A-5

KNUCKLE (Continued)

(14) Remove sleeve retaining spring link ball joint in knuckle as follows (Fig. 12):

(a) Hand thread assembled Remover 9050A into tapped knuckle sleeve until it stops.

(b) Rotate Nut down, matching Sleeve 9050A-5 angled end with angled face of knuckle.

(c) Continue to rotate Nut until knuckle sleeve is removed from knuckle. **Discard knuckle sleeve; replace it with new upon installation.**

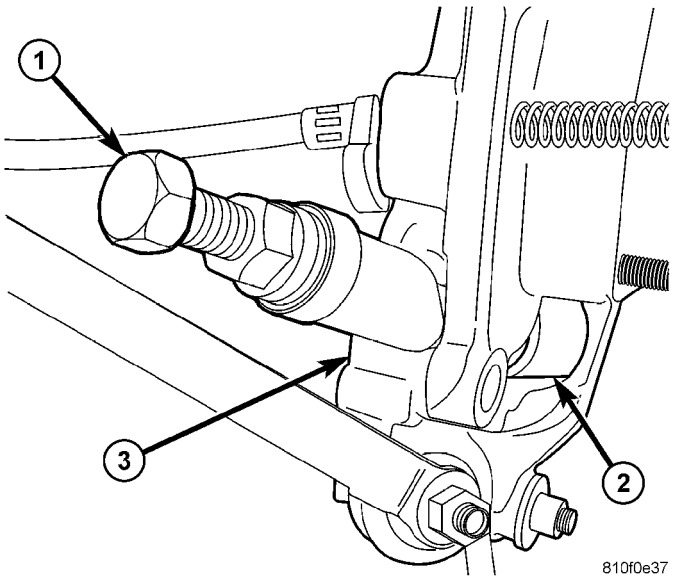


Fig. 12 Remover 9050A Positioned For Sleeve Removal

1 - REMOVER 9050A
2 - SPRING LINK BALL JOINT
3 - KNUCKLE

(15) Remove bolt and nut fastening compression link to knuckle (Fig. 19).

(16) Remove bolt fastening toe link to knuckle (Fig. 13).

(17) Remove nut and bolt fastening stabilizer link to knuckle.

(18) Remove nut and bolt fastening tension link to knuckle (Fig. 17).

(19) Remove nut and bolt fastening camber link to knuckle (Fig. 17).

(20) Remove knuckle.

(21) Remove hub mounting bolts from knuckle.

INSTALLATION

(1) Install four hub mounting bolts through knuckle from inboard side allowing ends to protrude from opposite side.

(2) Slide parking brake cable though mounting hole in rear of knuckle, then position knuckle over outer ends of links.

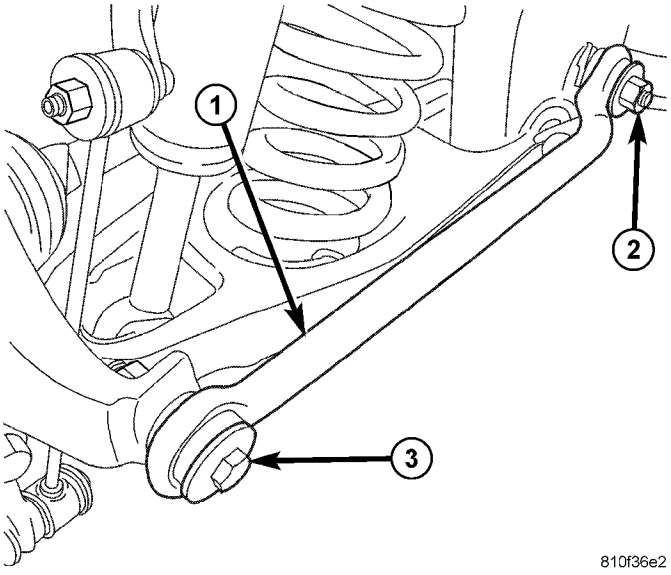


Fig. 13 Toe Link Mounting

1 - TOE LINK
2 - MOUNTING NUT AT CROSSMEMBER
3 - MOUNTING BOLT AT KNUCKLE

(3) Install bolt and nut fastening camber link to knuckle as shown (Fig. 17). **Do not tighten bolt at this time.**

(4) Install bolt and nut fastening tension link to knuckle as shown (Fig. 17). **Do not tighten bolt at this time.**

(5) Install bolt and nut fastening stabilizer link to knuckle. **Do not tighten bolt at this time.**

(6) Install bolt fastening toe link to knuckle (Fig. 13). **Do not tighten bolt at this time.**

(7) Install bolt and nut fastening compression link to knuckle (Fig. 19). **Do not tighten bolt at this time.**

NOTE: Prior to using Special Tool 9050A, lubricate Bolt threads to provide ease of use and promote tool longevity.

(8) Place new knuckle sleeve onto Installer Bolt, Special Tool 9050-4, and slide it up to Bolt's head. (Fig. 14)

(9) Install NEW sleeve in knuckle as follows:

(a) Slide Installer Bolt 9050A-4 (with sleeve) through knuckle and spring link ball joint starting from knuckle forward end (Fig. 15).

(b) Install thrust bearing and nut on end of Bolt (Fig. 15). **When installing thrust bearing on Installer Bolt, be sure to place hardened side toward nut.**

(c) While holding Bolt head stationary, rotate Nut (using hand tools) installing sleeve in knuckle. Install sleeve until Nut can no longer be turned. **Do not overtighten Nut.**

KNUCKLE (Continued)

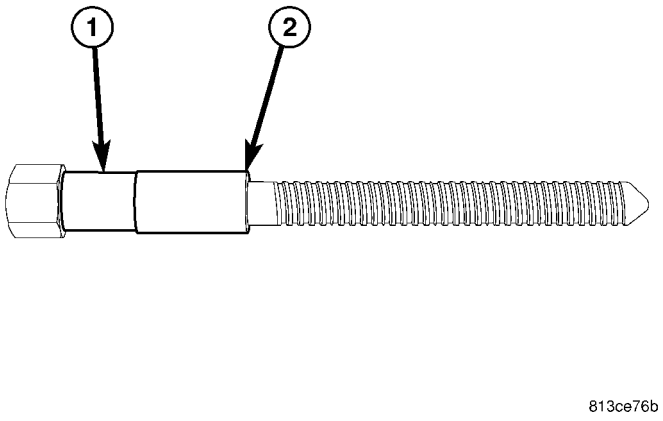


Fig. 14 Installer 9050A-4 And Knuckle Sleeve

1 - INSTALLER BOLT 9050A-4
2 - KNUCKLE SLEEVE

(d) Remove tool.

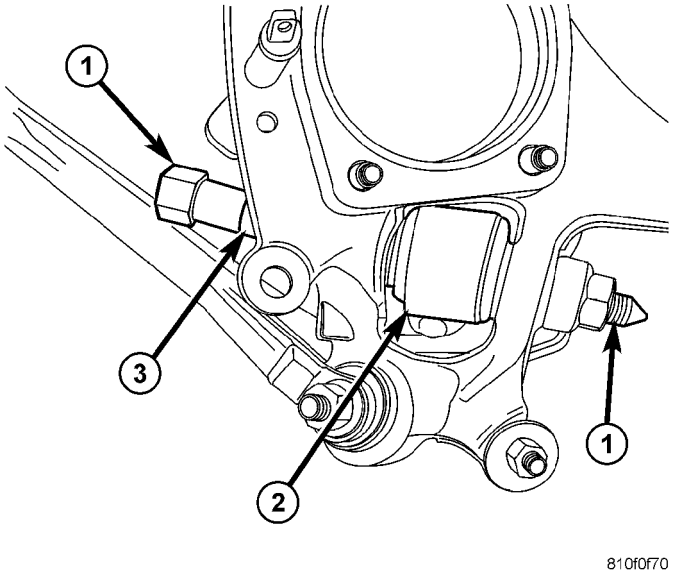


Fig. 15 Tool 9050 Positioned For Sleeve Installation

1 - BOLT 9050-4 WITH THRUST BEARING AND NUT
2 - SPRING LINK BALL JOINT
3 - SLEEVE

(10) Install spring link-to-knuckle bolt and nut as shown (Fig. 9). While holding bolt head stationary, tighten nut to 129 N·m (95 ft. lbs.) torque.

(11) Remove under-hoist utility jack or jack stand from under spring link.

(12) Install brake caliper adapter. (Fig. 6). Install and tighten mounting bolts to 115 N·m (85 ft. lbs.) torque.

(13) Install shoe support with parking brake shoes over hub mounting bolts on knuckle.

(14) Install shoe actuator on end of parking brake cable between parking brake shoes (Fig. 8). Make sure actuator is positioned with word “UP” facing outward (Fig. 16).

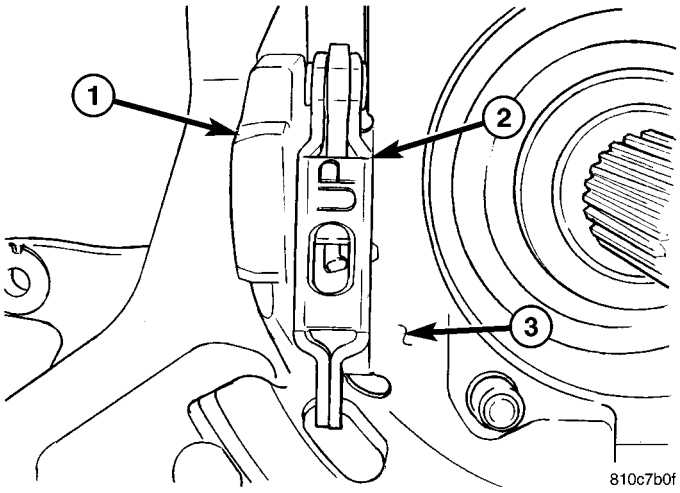


Fig. 16 Actuator Positioned On Support

1 - CALIPER ADAPTER
2 - SHOE ACTUATOR
3 - SHOE SUPPORT

(15) Properly align shoes with actuator, then install parking brake shoe return spring (Fig. 7).

(16) Install bolt securing parking brake cable to knuckle (Fig. 6). Tighten bolt to 28 N·m (21 ft. lbs.) torque.

(17) Install hub and bearing with wheel speed sensor as well as all components necessary to access it. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - INSTALLATION)

(18) Lower vehicle.

(19) Unlock automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(20) Adjust parking brake shoes as necessary. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - ADJUSTMENTS)

(21) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access mounting bolts.

(22) Tighten fasteners at knuckle (vehicle at curb height) as follows:

- Camber Link – 95 N·m (70 ft. lbs.) torque.
- Compression Link – 81 N·m (60 ft. lbs.) torque.
- Stabilizer Link – 61 N·m (45 ft. lbs.) torque.
- Tension Link – 119 N·m (88 ft. lbs.) torque.
- Toe Link – 108 N·m (80 ft. lbs.) torque.

(23) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

CAMBER LINK

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Access and remove rear shock absorber. (Refer to 2 - SUSPENSION/REAR/SHOCK - REMOVAL)

NOTE: Repair-side of crossmember must be lowered from body approximately three inches in order to properly access link mounting bolts at crossmember. Do not lower crossmember any further than necessary.

(3) Remove nut and bolt mounting link to knuckle (Fig. 17).

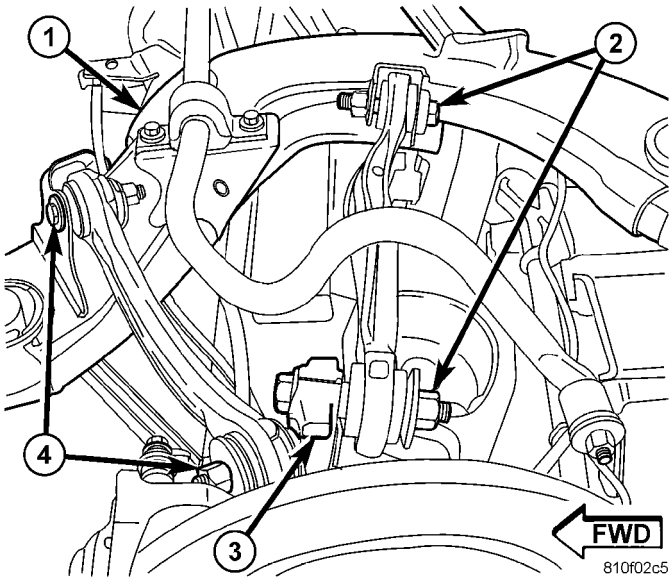


Fig. 17 Camber Link And Tension Link Mounting

1 - REAR SUSPENSION CROSSMEMBER
2 - CAMBER LINK MOUNTING BOLTS
3 - KNUCKLE
4 - TENSION LINK MOUNTING BOLTS

(4) Remove nut and bolt mounting link to crossmember (Fig. 17).

(5) Remove link.

INSTALLATION

NOTE: When installing link, ensure the following to avoid misinstallation:

- **Heavier, thicker end goes toward crossmember.**
- **Fore-or-aft bow faces forward (curves around coil spring).**
- **Up-or-down bow faces downward.**

(1) Place link in bracket on crossmember. Install bolt and nut as shown (Fig. 17). **Do not tighten bolt at this time.**

(2) Install bolt and nut mounting link to knuckle as shown (Fig. 17). **Do not tighten bolt at this time.**

(3) Set repair-side of rear suspension to curb height using following tools:

(a) Place Receiver, Special Tool 9031-3, cup-side-down over top of crossmember rear mount bushing (Fig. 18).

(b) Place Curb Height Gage, Special Tool 9094, into shock absorber pocket in spring link and opposite end of tool over Receiver, Special Tool 9031-3 (Fig. 18).

(c) Install bolt through crossmember rear mount bushing, Receiver, Special Tool 9031-3, and Curb Height Gage, Special Tool 9094. Install wing nut, hand tightening it tools in place (Fig. 18).

(d) Move spring link up or down as necessary aligning shock mounting bolt hole with Curb Height Gage hole, then insert pin through both (Fig. 18).

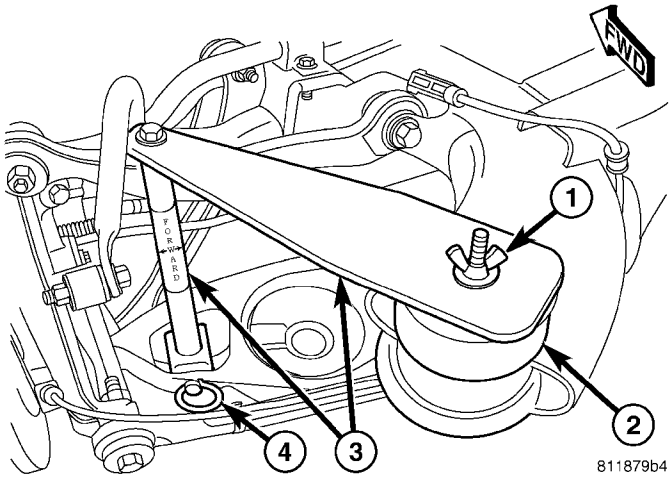


Fig. 18 Curb Height Gage Mounted In Place

1 - WING NUT AND BOLT
2 - RECEIVER 9031-3
3 - GAGE 9094
4 - PIN

(4) Tighten camber link mounting bolts to:

- Bolt at crossmember – 68 N·m (50 ft. lbs.) torque.
- Bolt at knuckle – 95 N·m (70 ft. lbs.) torque.

(5) Remove special tools.

(6) Install rear shock absorber and components removed to access it. (Refer to 2 - SUSPENSION/REAR/SHOCK - INSTALLATION)

(7) Lower vehicle.

(8) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

COMPRESSION LINK

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove tire and wheel assembly.

(3) Remove bolt and nut mounting link at knuckle (Fig. 19).

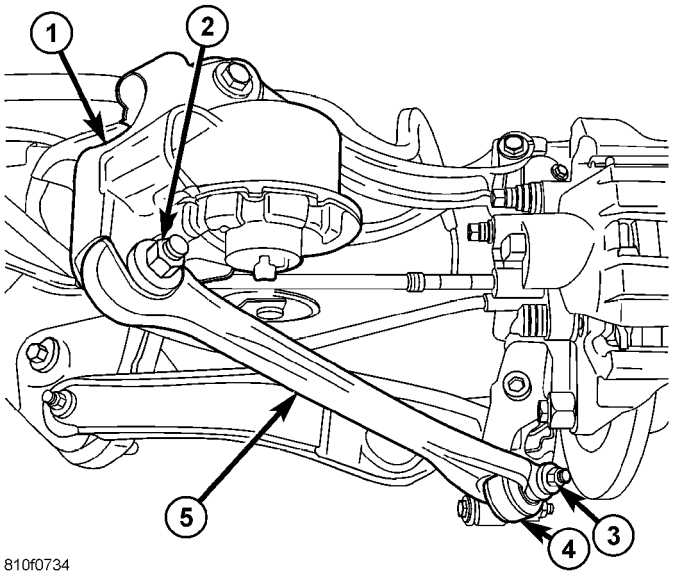


Fig. 19 Compression Link Mounting

1 - REAR SUSPENSION CROSSMEMBER
2 - MOUNTING BOLT AND NUT
3 - MOUNTING BOLT AND NUT
4 - KNUCKLE
5 - COMPRESSION LINK

(4) Remove bolt and nut mounting link at crossmember (Fig. 19).

(5) Remove link.

INSTALLATION

NOTE: Although the compression link is different end-to-end, there is no top and bottom.

(1) Position link and install bolt and nut mounting link at crossmember (Fig. 19). **Do not tighten bolt at this time.**

(2) Install bolt and nut mounting link at knuckle (Fig. 19). **Do not tighten bolt at this time.**

(3) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(4) Lower vehicle.

(5) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access link fasteners.

(6) Tighten compression link fasteners to:

- Bolt at crossmember – 68 N·m (50 ft. lbs.) torque.
- Bolt at knuckle – 81 N·m (60 ft. lbs.) torque.

(7) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

SPRING LINK

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Access and remove rear spring. (Refer to 2 - SUSPENSION/REAR/SPRING - REMOVAL)

(3) Remove spring link-to-knuckle nut and bolt (Fig. 20).

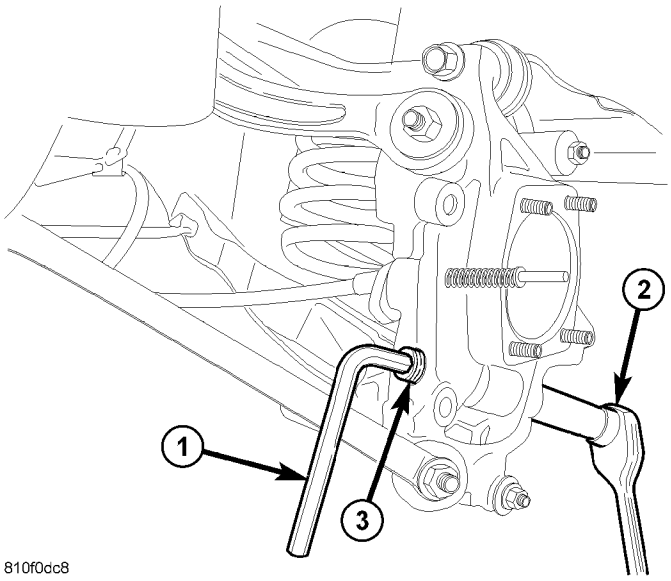


Fig. 20 Spring Link-To-Knuckle Nut And Bolt Removal/Installation

1 - HEX WRENCH
2 - RATCHET AND SOCKET ON NUT
3 - BOLT HEAD

CAUTION: It is important to use Guide, Special Tool 9050A-2, when tapping sleeve to help keep Tap, Special Tool 9050A-1, straight during use or damage to Tap may occur.

(4) Place Guide 9050A-2 against sleeve in knuckle as shown (Fig. 21).

(5) Insert Tap 9050A-1, on an appropriate handle, through Guide and into sleeve (Fig. 21). Cut threads approximately halfway through bushing (or about six complete threads). **It is important to back Tap out often and clean out burrs that can build up inside Guide. Keep Tap well lubricated to avoid damaging it.**

SPRING LINK (Continued)

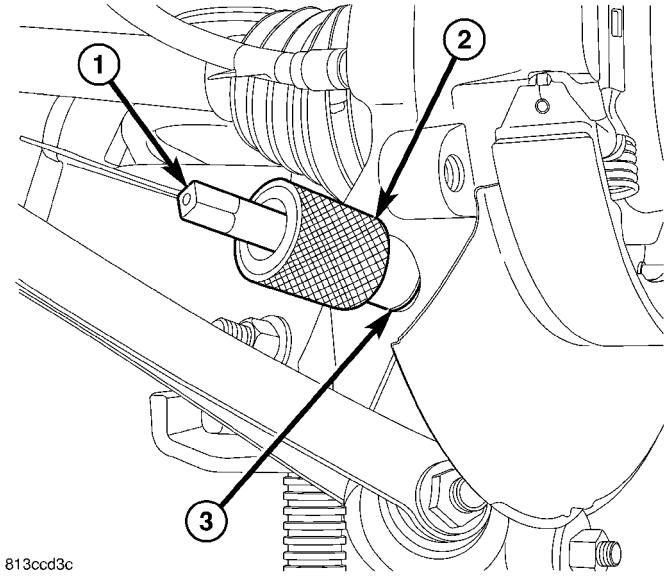


Fig. 21 Using Tap 9050A-1 And Guide 9050A-2

1 - TAP 9050A-1
2 - GUIDE 9050A-2
3 - SLEEVE IN KNUCKLE

NOTE: Prior to using Remover, Special Tool 9050A, lubricate Bolt threads to provide ease of use and promote tool longevity.

(6) Assemble Remover 9050A as shown (Fig. 22).

NOTE: When installing thrust bearing on Remover, be sure to place hardened side toward nut.

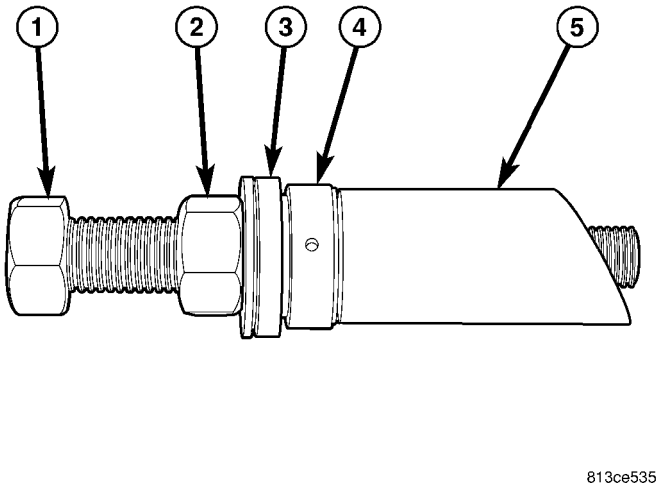


Fig. 22 Sleeve Remover 9050A Assembled

1 - BOLT 9050A-3
2 - NUT
3 - SPHERICAL WASHER
4 - THRUST BUSHING
5 - SLEEVE 9050A-5

(7) Remove sleeve retaining spring link ball joint in knuckle as follows (Fig. 23):

(a) Hand thread assembled Remover 9050A into tapped knuckle sleeve until it stops.

(b) Rotate Nut down, matching Sleeve 9050A-5 angled end with angled face of knuckle.

(c) Continue to rotate Nut until knuckle sleeve is removed from knuckle. **Discard knuckle sleeve; replace it with new upon installation.**

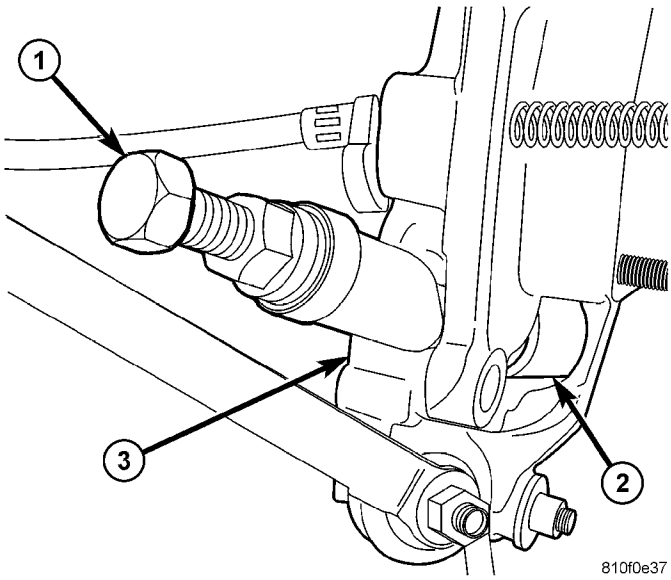


Fig. 23 Remover 9050A Positioned For Sleeve Removal

1 - REMOVER 9050A
2 - SPRING LINK BALL JOINT
3 - KNUCKLE

(8) Remove bolt and nut fastening spring link to crossmember (Fig. 24).

(9) Remove spring link.

INSTALLATION

(1) Guide ball joint end of spring link into mounting pocket of knuckle, then swing opposite end up to bushing in crossmember and install bolt and nut fastening spring link to crossmember (Fig. 24). **Do not tighten bolt at this time.**

NOTE: Prior to using Special Tool 9050A, lubricate Bolt threads to provide ease of use and promote tool longevity.

(2) Place new knuckle sleeve onto Installer Bolt, Special Tool 9050-4, and slide it up to Bolt's head (Fig. 25).

(3) Install NEW sleeve in knuckle as follows:

(a) Slide Installer Bolt 9050A-4 (with sleeve) through knuckle and spring link ball joint starting from knuckle forward end (Fig. 26).

SPRING LINK (Continued)

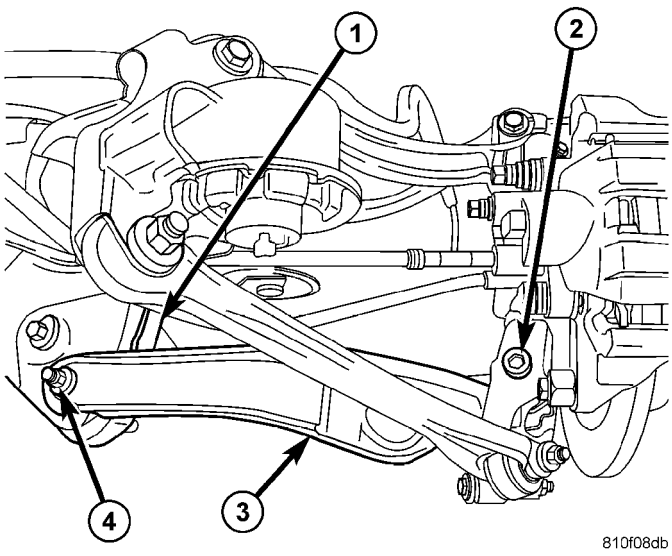


Fig. 24 Spring Link Mounting

1 - CROSSMEMBER
2 - MOUNTING BOLT AND NUT
3 - SPRING LINK
4 - MOUNTING BOLT AND NUT

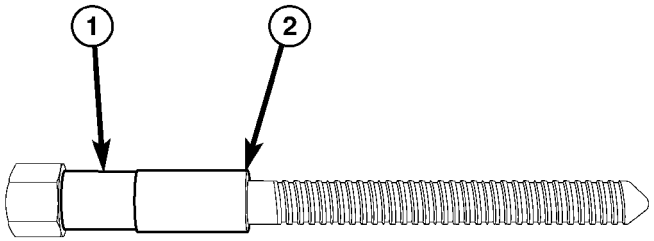


Fig. 25 Installer 9050A-4 And Knuckle Sleeve

1 - INSTALLER BOLT 9050A-4
2 - KNUCKLE SLEEVE

(b) Install thrust bearing and nut on end of Bolt (Fig. 26). **When installing thrust bearing on Installer Bolt, be sure to place hardened side toward nut.**

(c) While holding Bolt head stationary, rotate Nut (using hand tools) installing sleeve in knuckle. Install sleeve until Nut can no longer be turned. **Do not overtighten Nut.**

(d) Remove tool.

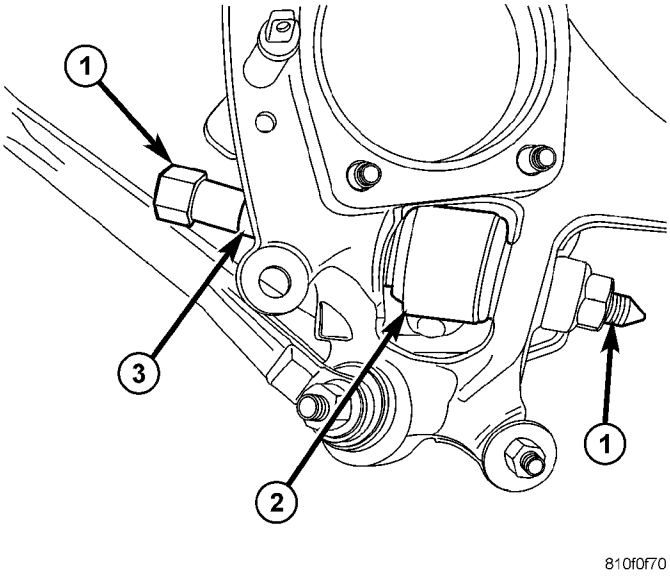


Fig. 26 Tool 9050 Positioned For Sleeve Installation

1 - BOLT 9050-4 WITH THRUST BEARING AND NUT
2 - SPRING LINK BALL JOINT
3 - SLEEVE

(4) Install spring link-to-knuckle bolt and nut as shown (Fig. 20). While holding bolt head stationary, tighten nut to 129 N·m (95 ft. lbs.) torque.

(5) Install rear spring as well as all components necessary to access it. (Refer to 2 - SUSPENSION/ REAR/HUB / BEARING - INSTALLATION)

(6) Lower vehicle.

(7) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access mounting bolt.

(8) Tighten spring link bolt at crossmember to 108 N·m (80 ft. lbs.) torque.

(9) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

TENSION LINK

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Access and remove rear shock absorber. (Refer to 2 - SUSPENSION/REAR/SHOCK - REMOVAL)

NOTE: Repair-side of crossmember must be lowered from body approximately three inches in order to properly access link mounting bolts at crossmember.

(3) Remove nut and bolt mounting link to knuckle (Fig. 27).

TENSION LINK (Continued)

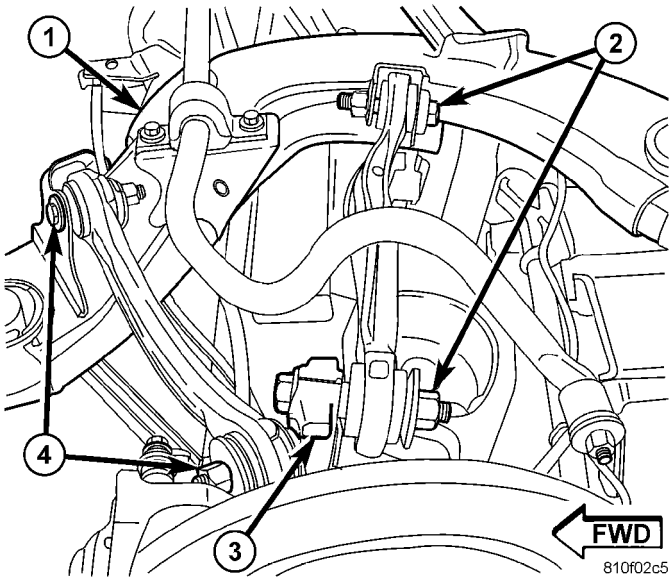


Fig. 27 Camber Link And Tension Link Mounting

1 - REAR SUSPENSION CROSSMEMBER
2 - CAMBER LINK MOUNTING BOLTS
3 - KNUCKLE
4 - TENSION LINK MOUNTING BOLTS

(4) Remove nut and bolt mounting link to crossmember (Fig. 27).

(5) Remove link.

INSTALLATION

NOTE: When installing link, although the link is the same end-to-end, ensure that the center bow faces downward.

(1) Place link in bracket on crossmember. Install bolt and nut as shown (Fig. 27). **Do not tighten bolt at this time.**

(2) Install bolt and nut mounting link to knuckle as shown (Fig. 27). **Do not tighten bolt at this time.**

(3) Set repair-side of rear suspension to curb height using following tools:

(a) Place Receiver, Special Tool 9031-3, cup-side-down over top of crossmember rear mount bushing (Fig. 28).

(b) Place Curb Height Gage, Special Tool 9094, into shock absorber pocket in spring link and opposite end of tool over Receiver, Special Tool 9031-3 (Fig. 28).

(c) Install bolt through crossmember rear mount bushing, Receiver, Special Tool 9031-3, and Curb Height Gage, Special Tool 9094. Install wing nut, hand tightening it tools in place (Fig. 28).

(d) Move spring link up or down as necessary aligning shock mounting bolt hole with Curb Height Gage hole, then insert pin through both (Fig. 28).

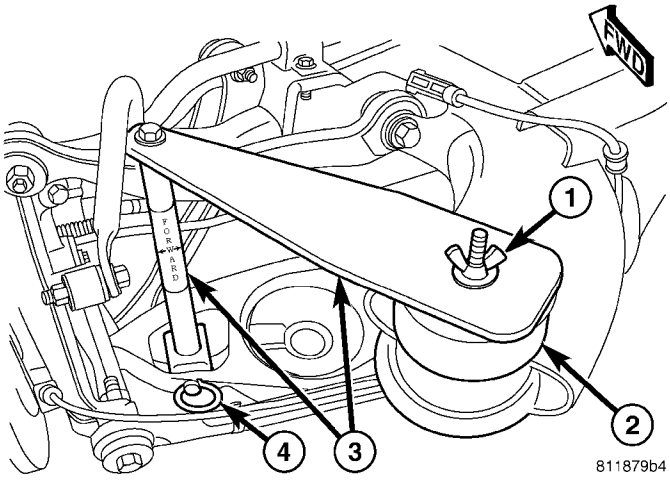


Fig. 28 Curb Height Gage Mounted In Place

1 - WING NUT AND BOLT
2 - RECEIVER 9031-3
3 - GAGE 9094
4 - PIN

(4) Tighten tension link mounting bolts to:

- Bolt at crossmember – 68 N·m (50 ft. lbs.) torque.
- Bolt at knuckle – 119 N·m (88 ft. lbs.) torque.

(5) Remove special tools.

(6) Install rear shock absorber and components removed to access it. (Refer to 2 - SUSPENSION/REAR/SHOCK - INSTALLATION)

(7) Lower vehicle.

(8) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

TOE LINK

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove tire and wheel assembly.

(3) Right side link only – Move rear exhaust out of way as necessary to access toe link mounting nut at crossmember.

(4) Unclip wheel speed sensor cable from toe link (Fig. 29).

(5) While holding toe adjustment cam bolt from rotating (Fig. 30), remove nut securing toe link at crossmember (Fig. 31).

(6) Remove bolt and nut at knuckle (Fig. 31).

(7) Remove link.

TOE LINK (Continued)

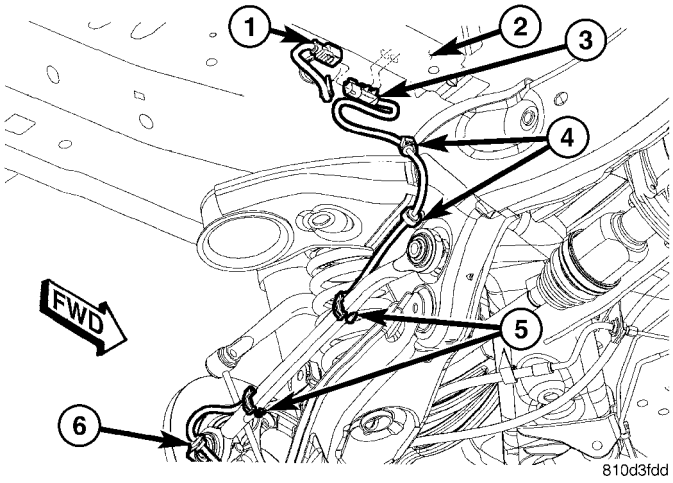


Fig. 29 Rear Wheel Speed Sensor Cable Routing

1 - WIRING HARNESS CONNECTOR
2 - SPARE TIRE MOUNTING SUPPORT
3 - WHEEL SPEED SENSOR CONNECTOR
4 - ROUTING CLIPS
5 - ROUTING CLIPS
6 - ROUTING BRACKET ON BRAKE SUPPORT

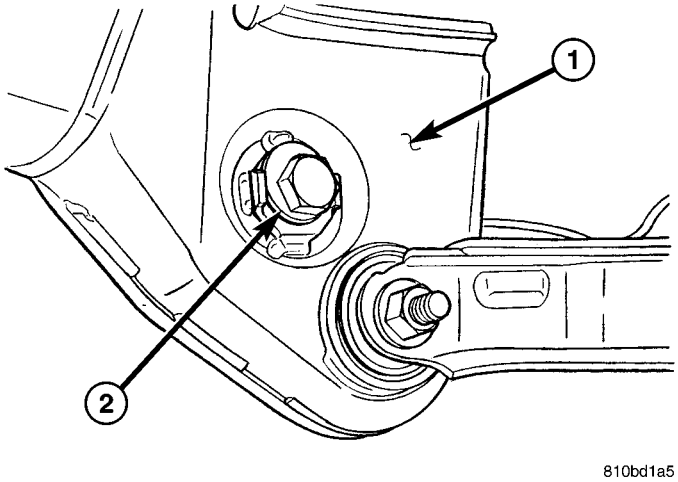


Fig. 30 Cam Bolt Securing Toe Link - Front View

1 - CAM BOLT (TOE ADJUSTMENT)
2 - FRONT OF REAR CROSSMEMBER

INSTALLATION

NOTE: Make sure cam washer is installed on end of cam bolt before installing toe link on cam bolt.

(1) Slide offset end of toe link over cam bolt at crossmember.

(2) Install bolt and nut securing link to knuckle (Fig. 31). **Do not tighten bolt at this time.**

(3) While holding toe adjustment cam bolt from rotating (cam facing upward) (Fig. 30), Install nut securing toe link at crossmember (Fig. 31). **Do not tighten nut at this time.**

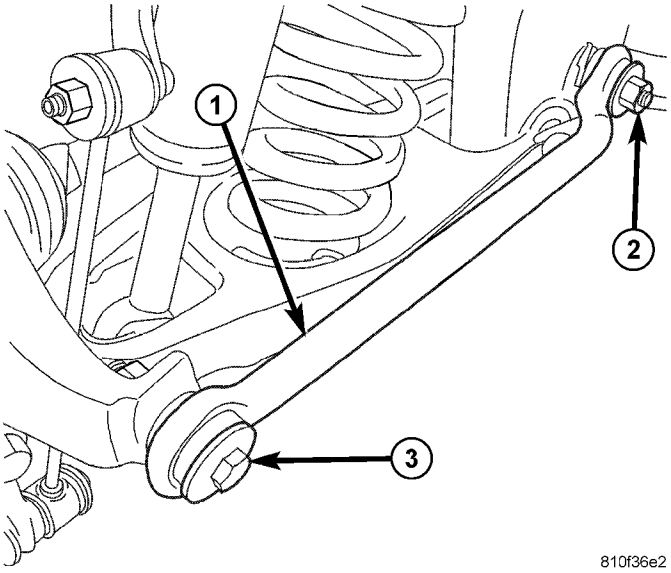


Fig. 31 Toe Link Mounting

1 - TOE LINK
2 - MOUNTING NUT AT CROSSMEMBER
3 - MOUNTING BOLT AT KNUCKLE

(4) Clip wheel speed sensor cable along top of toe link at flats machined into link (Fig. 29).

(5) Right side link only – Install rear exhaust as necessary.

(6) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(7) Lower vehicle.

(8) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access mounting bolts.

(9) Tighten toe link fasteners to:

- Nut at crossmember – 172 N·m (127 ft. lbs.) torque (This nut may be tightened after rear wheel alignment toe is set).
- Bolt at knuckle – 108 N·m (80 ft. lbs.) torque.

(10) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

SHOCK ABSORBER

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove wheel and tire assembly. (Refer to 22 - TIRES/WHEELS - REMOVAL)

(3) Position an extra pair of jack stands under and support forward end of engine cradle to help stabilize vehicle during rear suspension removal/installation.

SHOCK ABSORBER (Continued)

(4) Position under-hoist utility jack or transmission jack under center of rear suspension crossmember (without AWD) or rear driveline module (with AWD) (Fig. 34). Raise jack head to contact driveline module/suspension crossmember and secure in place.

(5) Remove two shock absorber upper mounting bolts (Fig. 32).

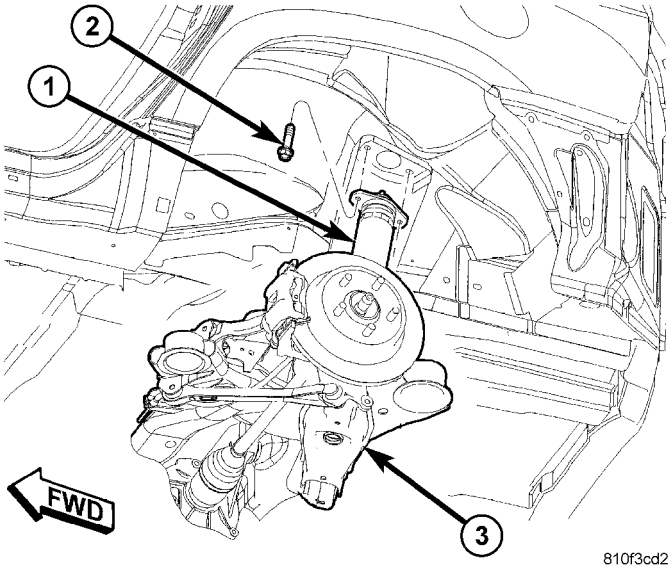


Fig. 32 Shock Absorber Mounting - Upper

1 - SHOCK ABSORBER
2 - MOUNTING BOLTS
3 - SPRING LINK

(6) Remove shock absorber lower mounting bolt and nut (Fig. 33).

CAUTION: When removing crossmember mounting bolts it is important NOT to loosen or remove crossmember mounting bolts on opposite side of vehicle. Doing so will require rear wheel alignment following reinstallation to ensure proper thrust angle.

(7) Remove both front and rear crossmember mounting bolts on repair-side of vehicle (Fig. 35).

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to remove shock absorber or coil spring.

(8) **Slowly** lower jack allowing repair-side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow top of shock absorber to clear body flange.

(9) Remove shock absorber by tipping top outward and lifting lower end out of pocket in spring link (Fig. 36).

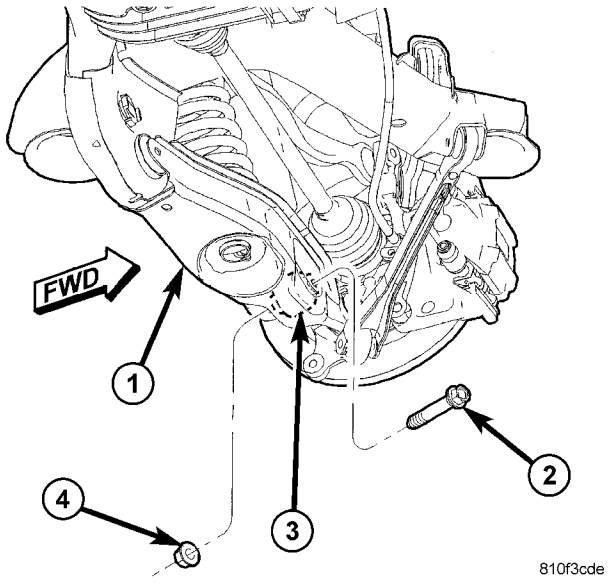


Fig. 33 Shock Absorber Mounting - Lower

1 - SPRING LINK
2 - BOLT
3 - SHOCK ABSORBER
4 - NUT

INSTALLATION

(1) Install shock absorber by setting lower end into pocket in spring link (Fig. 36), then tipping top inward until aligned with mounting holes (Fig. 32).

(2) Start shock absorber upper mounting bolts (Fig. 32), **but do not tighten at this time**.

NOTE: In case coil spring has shifted during shock absorber service, verify that isolator is in place and spring lower end coil is correctly placed against abutment built into spring link.

(3) Carefully raise jack, guiding coil spring and lower end of shock absorber into mounted positions. Once shock absorber lower mounting hole lines up with hole in spring link, stop jacking.

(4) Install lower shock mounting bolt (Fig. 33). **Do not tighten at this time.**

(5) Continue to raise crossmember with jack until two crossmember mounting bolts can be installed and tightened (Fig. 35). Tighten bolts to 163 N·m (120 ft. lbs.) torque.

(6) Tighten shock absorber upper mounting bolts to 61 N·m (45 ft. lbs.) torque.

(7) Lower and remove jack.

(8) Install wheel and tire assembly. (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten the wheel nuts in the proper sequence to 135 N·m (100 ft. lbs.) torque.

(9) Lower vehicle.

SHOCK ABSORBER (Continued)

(10) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access mounting bolt.

(11) Tighten shock absorber lower mounting bolt to 102 N·m (75 ft. lbs.) torque.

SPRING

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove wheel and tire assembly. (Refer to 22 - TIRES/WHEELS - REMOVAL)

(3) Position an extra pair of jack stands under and support forward end of engine cradle to help stabilize vehicle during rear suspension removal/installation.

(4) Position under-hoist utility jack or transmission jack under center of rear suspension crossmember (without AWD) or rear driveline module (with AWD) (Fig. 34). Raise jack head to contact driveline module/suspension crossmember and secure in place.

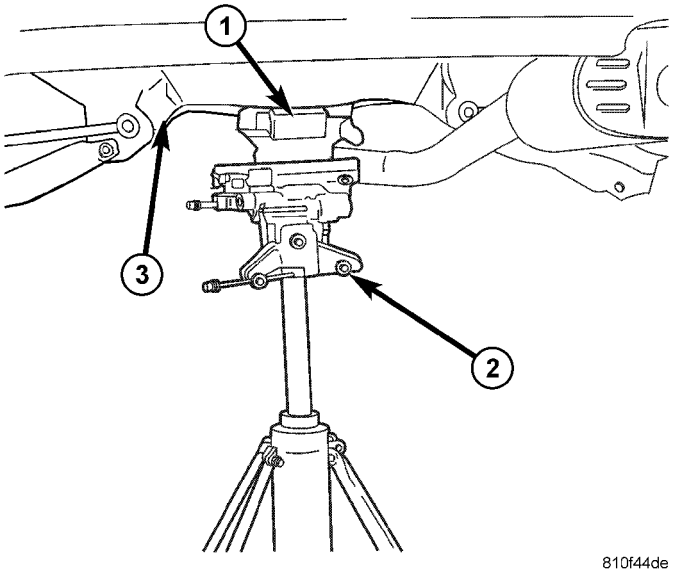


Fig. 34 Support Using Transmission Jack

1 - REAR DRIVELINE MODULE
2 - JACK
3 - REAR SUSPENSION CROSSMEMBER

(5) Remove two shock absorber upper mounting bolts (Fig. 32).

(6) Remove shock absorber lower mounting bolt and nut (Fig. 33).

CAUTION: When removing crossmember mounting bolts it is important NOT to loosen or remove crossmember mounting bolts on opposite side of vehicle. Doing so will require rear wheel alignment following reinstallation to ensure proper thrust angle.

(7) Remove both front and rear crossmember mounting bolts on repair-side of vehicle (Fig. 35).

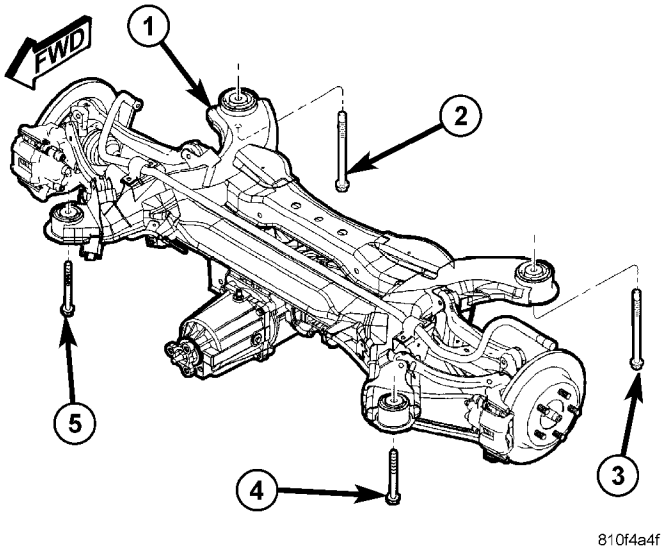


Fig. 35 Rear Crossmember Mounting Bolts

1 - REAR SUSPENSION CROSSMEMBER
2 - RIGHT REAR MOUNTING BOLT
3 - LEFT REAR MOUNTING BOLT
4 - LEFT FRONT MOUNTING BOLT
5 - RIGHT FRONT MOUNTING BOLT

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to remove shock absorber or coil spring.

(8) **Slowly** lower jack allowing repair-side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow top of shock absorber to clear body flange.

(9) Remove shock absorber by tipping top outward and lifting lower end out of pocket in spring link (Fig. 36).

(10) Remove coil spring and isolator (Fig. 36), lower end first. It may be necessary to lower jack a little further to allow spring removal; **do not lower jack any further than necessary.**

INSTALLATION

NOTE: Rear coil springs are interchangeable, but there is a designated top and bottom to each spring. A factory installed tag displaying "THIS END UP"is located near the top of each spring.

(1) Place coil spring isolator on top of coil spring (Fig. 36).

(2) Install coil spring, top end first. Match lower end coil against abutment built into spring link.

SPRING (Continued)

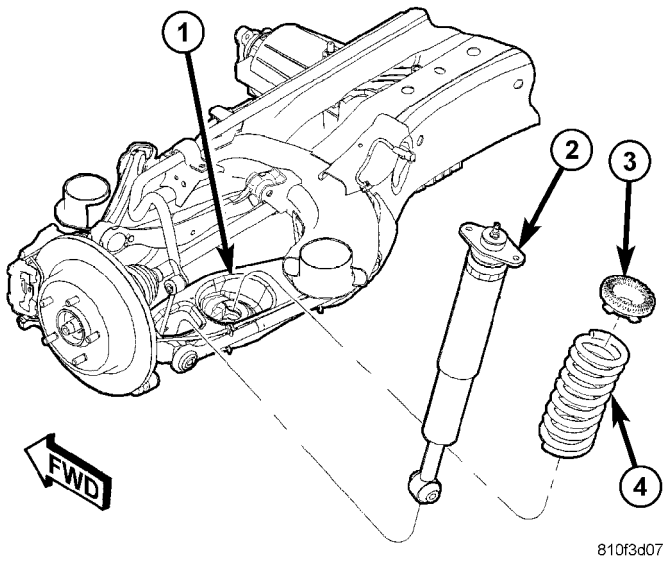


Fig. 36 Coil Spring And Shock Absorber

1 - SPRING LINK
2 - SHOCK ABSORBER
3 - ISOLATOR
4 - COIL SPRING

(3) Install shock absorber by setting lower end into pocket in spring link (Fig. 36), then tipping top inward until aligned with mounting holes (Fig. 32).

(4) Start shock absorber upper mounting bolts (Fig. 32), **but do not tighten at this time**.

(5) Carefully raise jack, guiding coil spring and lower end of shock absorber into mounted positions. Once shock absorber lower mounting hole lines up with hole in spring link, stop jacking.

(6) Install lower shock mounting bolt (Fig. 33). **Do not tighten at this time.**

(7) Continue to raise crossmember with jack until two crossmember mounting bolts can be installed and tightened (Fig. 35). Tighten bolts to 163 N·m (120 ft. lbs.) torque.

(8) Tighten shock absorber upper mounting bolts to 61 N·m (45 ft. lbs.) torque.

(9) Lower and remove jack.

(10) Install wheel and tire assembly. (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten the wheel nuts in the proper sequence to 135 N·m (100 ft. lbs.) torque.

(11) Lower vehicle.

(12) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access mounting bolt.

(13) Tighten shock absorber lower mounting bolt to 102 N·m (75 ft. lbs.) torque.

STABILIZER BAR

REMOVAL

(1) Disconnect and isolate battery negative cable from battery post.

(2) If vehicle is not equipped with All Wheel Drive (AWD), remove spare tire.

(3) Lock out automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(4) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Position an extra pair of jack stands under and support forward end of engine cradle to help stabilize vehicle during rear suspension removal/installation.

(6) Remove both rear wheel and tire assemblies. (Refer to 22 - TIRES/WHEELS - REMOVAL)

(7) Remove rear half of exhaust system. (Refer to 11 - EXHAUST SYSTEM - REMOVAL)

NOTE: It may be necessary to back off parking brake shoe adjustment to allow sufficient slack to disengage cable buttons from connectors in following two steps.

(8) Slide left rear parking brake cable button inboard and remove from equalizer (Fig. 37).

(9) While holding parking brake cable connector on end of front cable secure with a pair of pliers at the front cable button, slide right rear parking brake cable button inboard and remove from cable connector (Fig. 37).

(10) Remove screw mounting left rear brake hose routing bracket to front of rear crossmember (Fig. 38).

(11) Remove screw mounting right rear brake hose routing bracket to front of rear crossmember (Fig. 38).

NOTE: In some cases, it may be necessary to retract caliper piston in its bore a small amount in order to provide sufficient clearance between shoes and rotor to easily remove caliper from knuckle. This can usually be accomplished before guide pin bolts are removed, by grasping rear of caliper and pulling outward working with guide pins, thus retracting piston. Never push on piston directly as it may get damaged.

(12) Remove each rear caliper from its mount and support as follows:

(a) Remove two caliper guide pin bolts (Fig. 39).

(b) Remove caliper assembly from brake adapter by first rotating bottom of caliper away from rotor, then lifting caliper (with shoes) away from upper adapter abutment (Fig. 40).

STABILIZER BAR (Continued)

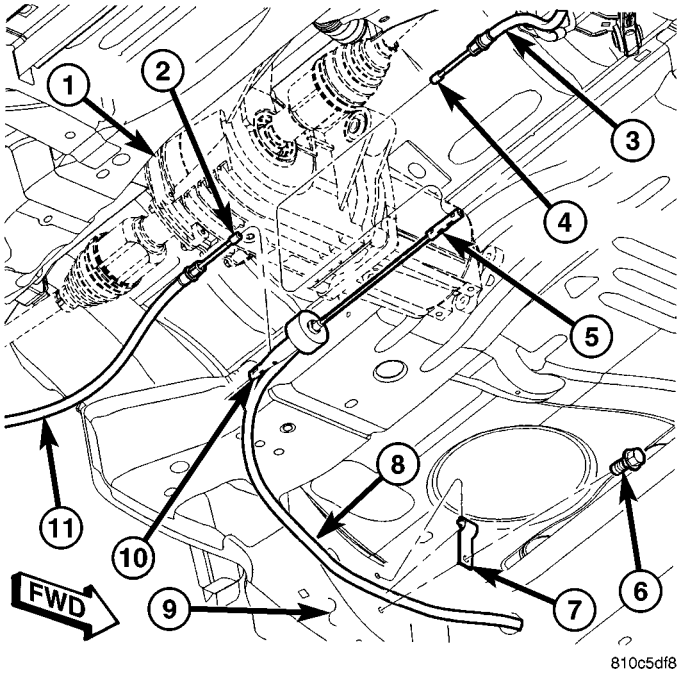


Fig. 37 Cable Routing And Connections

1 - REAR DRIVELINE MODULE (AWD MODELS ONLY)
2 - LEFT REAR CABLE END BUTTON
3 - RIGHT REAR CABLE
4 - RIGHT REAR CABLE END BUTTON
5 - CONNECTOR ON END OF FRONT CABLE
6 - SCREW
7 - FRONT CABLE ROUTING CLAMP
8 - FRONT CABLE
9 - LEFT FRAME RAIL
10 - EQUALIZER
11 - LEFT REAR CABLE

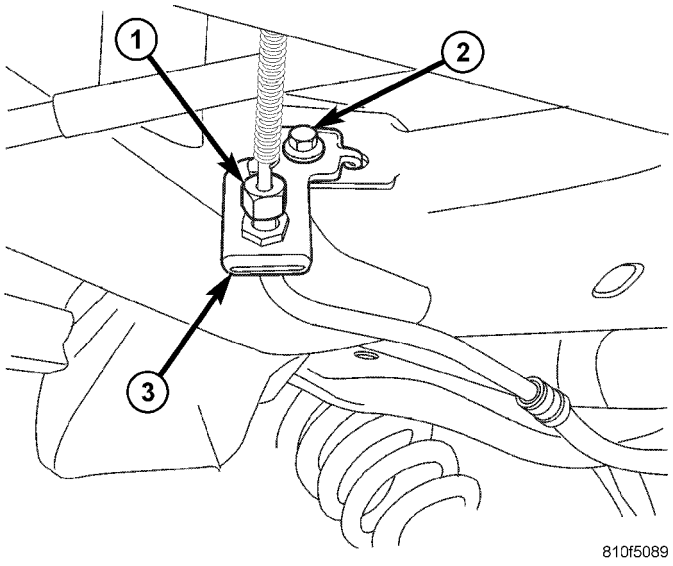


Fig. 38 Brake Hose Bracket At Crossmember

1 - CHASSIS BRAKE TUBE NUT
2 - SCREW
3 - BRACKET

(c) To prevent weight of caliper from overextending and damaging brake hose and tubing while caliper is off mount, hang brake caliper from vehicle using wire or cord (Fig. 41). **Be sure to hang caliper and brake hose far enough forward on body, away from crossmember, to allow sufficient room to lower crossmember without interference.**

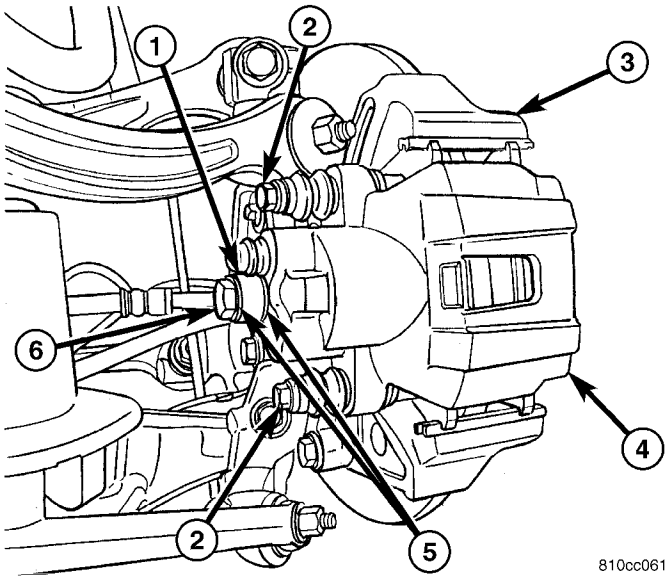


Fig. 39 Rear Brake Caliper Mounting

1 - BRAKE HOSE BANJO FITTING
2 - CALIPER GUIDE PIN BOLT
3 - CALIPER ADAPTER
4 - DISC BRAKE CALIPER
5 - COPPER SEAL WASHERS
6 - BANJO BOLT

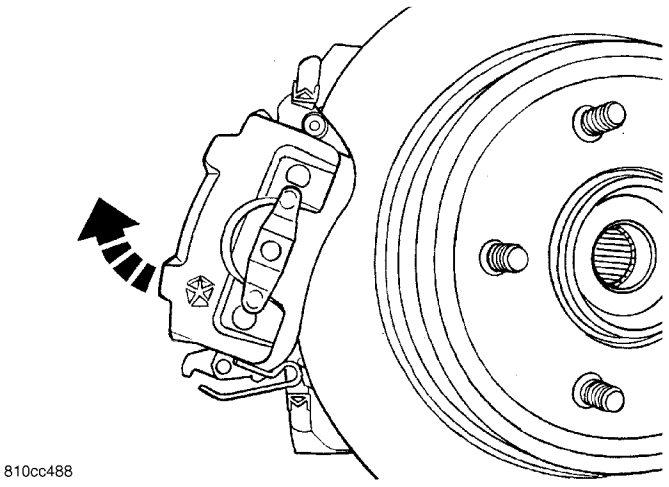


Fig. 40 Rear Caliper Removal

(13) Disconnect vehicle wiring harness from each rear wheel speed sensor connector (Fig. 42).

(14) Unclip each rear wheel speed sensor connector from spare tire mounting support (Fig. 42).

(15) If equipped with AWD:

STABILIZER BAR (Continued)

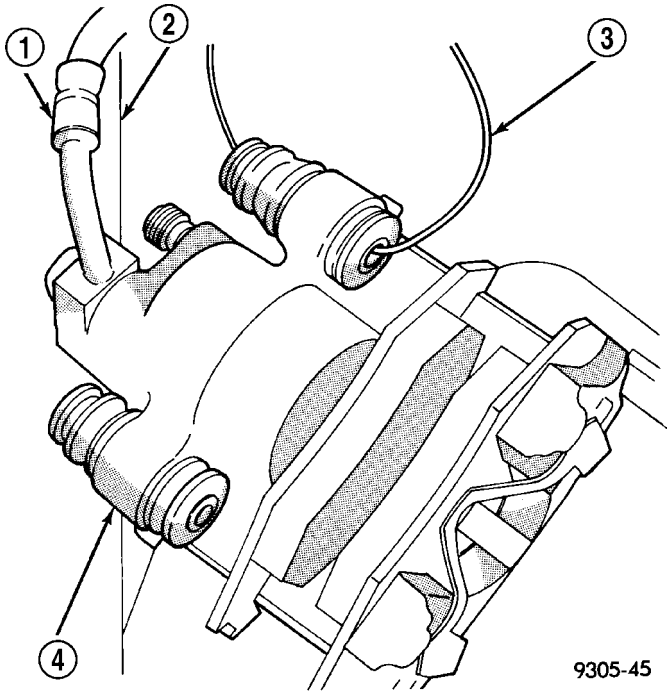


Fig. 41 Supporting Caliper

1 - BRAKE HOSE
2 - SUSPENSION
3 - WIRE HANGER (HANG TO VEHICLE/SUSPENSION)
4 - BRAKE CALIPER

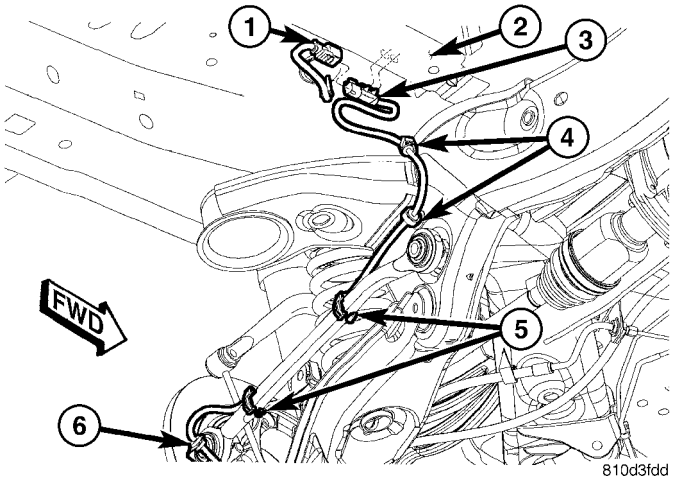


Fig. 42 Rear Wheel Speed Sensor Cable Routing

1 - WIRING HARNESS CONNECTOR
2 - SPARE TIRE MOUNTING SUPPORT
3 - WHEEL SPEED SENSOR CONNECTOR
4 - ROUTING CLIPS
5 - ROUTING CLIPS
6 - ROUTING BRACKET ON BRAKE SUPPORT

(a) Reference mark propeller shaft-to-rear driveline module input flange connection.

(b) Remove three propeller shaft-to-rear driveline module mounting bolts. Do not attempt removal of shaft from module at this time due to alignment pin interference. Removal happens as crossmember is lowered in a later step.

(16) Carefully mark location of rear crossmember on body at all four mount (bushing) locations using a marker or crayon (Fig. 43). **Do not use a scratch awl to mark location.**

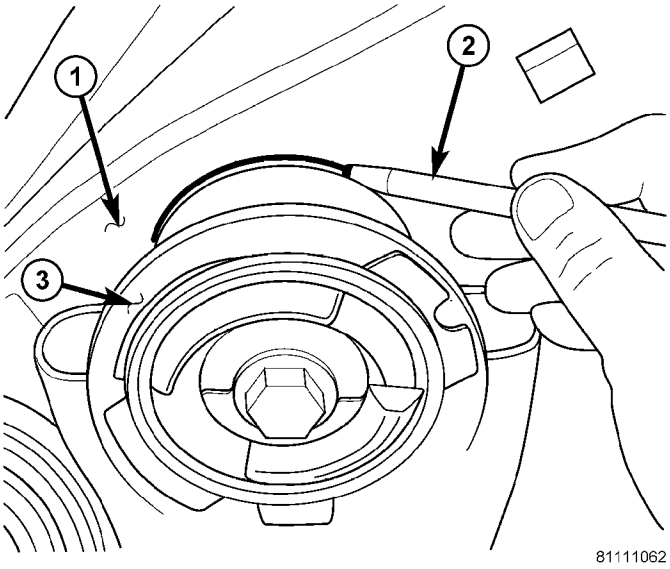


Fig. 43 Marking Location Of Crossmember Mount To Body

1 - BODY
2 - MARKER (OR CRAYON)
3 - CROSSMEMBER BUSHING FLANGE

(17) Position under-hoist utility jack or transmission jack under center of rear suspension crossmember (without AWD) or rear driveline module (with AWD) (Fig. 34). Raise jack head to contact driveline module/suspension crossmember and secure in place.

(18) Remove lower mounting bolt and nut at each rear shock absorber (Fig. 33).

(19) Remove both front and rear crossmember mounting bolts on **left** side of vehicle (Fig. 35).

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to remove coil spring.

(20) **Slowly** lower jack allowing left side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring removal. **Do not lower jack any further than necessary.**

(21) Remove coil spring and isolator (Fig. 36), lower end first.

(22) Raise left side of crossmember back into mounted position and install previously removed mounting bolts. It is not necessary to tighten bolts at this point.

(23) Remove both front and rear crossmember mounting bolts on **right** side of vehicle (Fig. 35).

STABILIZER BAR (Continued)

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to remove coil spring.

(24) **Slowly** lower jack allowing right side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring removal. **Do not lower jack any further than necessary.**

(25) Remove coil spring and isolator (Fig. 36), lower end first.

(26) Raise right side of crossmember back into mounted position. It is not necessary to install mounting bolts.

(27) Remove both front and rear crossmember mounting bolts previously removed on **left** side of crossmember (Fig. 35).

(28) **Slowly** lower jack. **Do not lower jack at a fast rate.** As jack is lowered, remove propeller shaft from alignment pin on end of rear driveline module input flange and support it with a bungee or cord, keeping it at its normal height. **Do not allow propeller shaft to hang on its own.**

(29) Continue to lower jack until crossmember is at a comfortable working level to access stabilizer bar fasteners.

(30) Remove bolt and nut fastening stabilizer bar to each stabilizer link (Fig. 44).

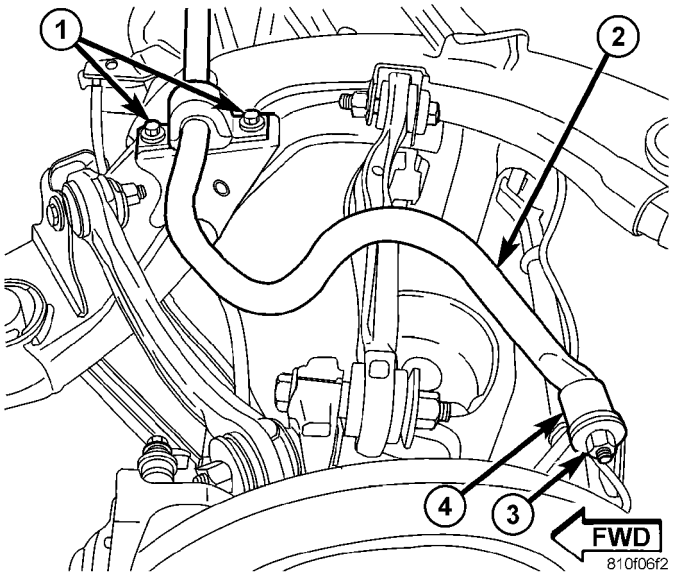


Fig. 44 Rear Stabilizer Bar Mounting

1 - RETAINER BOLTS
2 - STABILIZER BAR
3 - MOUNTING BOLT AND NUT
4 - STABILIZER LINK

(31) Remove bolts fastening each stabilizer bar cushion retainer to crossmember (Fig. 44).

(32) Remove stabilizer bar with cushions and retainers.

(33) Remove retainers from cushions.

(34) Remove cushions from stabilizer bar utilizing slits in bushings.

INSTALLATION

(1) Install cushions on stabilizer bar utilizing slits in bushings. Install each cushion so its slit faces forward and flat side is positioned toward crossmember once installed.

(2) Install retainers on cushions.

(3) Install stabilizer bar with cushions and retainers on crossmember.

(4) Install cushion retainer mounting bolts (Fig. 44). **Do not tighten at this time.**

(5) Install bolt and nut fastening stabilizer bar to each stabilizer link (Fig. 44). **Do not tighten at this time.**

(6) Tighten cushion retainer mounting bolts to 61 N·m (45 ft. lbs.) torque.

(7) Raise crossmember to body mounting points. As crossmember is raised, slide propeller shaft onto alignment pin on end of rear driveline module input flange and align shocks with pockets in spring links.

(8) Continue to raise crossmember with jack until two crossmember mounting bolts can be installed (Fig. 35). Install left side crossmember mounting bolts, but not the right side bolts (Fig. 35). It is not necessary to tighten bolts at this point.

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to install coil spring.

(9) **Slowly** lower jack allowing right side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring Installation. **Do not lower jack any further than necessary.**

(10) Install coil spring and isolator (Fig. 36), top end first.

NOTE: Verify spring lower end coil is correctly placed against abutment built into spring link.

(11) Carefully raise jack, guiding coil spring and lower end of shock absorber into mounted positions. Once shock absorber lower mounting hole lines up with hole in spring link, stop jacking.

(12) Install lower shock mounting bolt (Fig. 33). **Do not tighten at this time.**

(13) Raise right side of crossmember into mounted position. Install right side crossmember mounting bolts (Fig. 35). **Snug, but do not fully tighten bolts at this time.**

(14) Remove both front and rear crossmember mounting bolts on **left** side of vehicle (Fig. 35).

STABILIZER BAR (Continued)

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to install coil spring.

(15) **Slowly** lower jack allowing left side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring installation. **Do not lower jack any further than necessary.**

(16) Install coil spring and isolator (Fig. 36), top end first.

NOTE: Verify spring lower end coil is correctly placed against abutment built into spring link.

(17) Carefully raise jack, guiding coil spring and lower end of shock absorber into mounted positions. Once shock absorber lower mounting hole lines up with hole in spring link, stop jacking.

(18) Install lower shock mounting bolt (Fig. 33). **Do not tighten at this time.**

(19) Raise left side of crossmember into mounted position and install previously removed mounting bolts (Fig. 35). **Snug, but do not fully tighten bolts at this time.**

(20) Shift crossmember as necessary to line up mounts with location marks drawn in before removal (Fig. 43).

(21) Once mounts are lined up with location marks, tighten all four crossmember mounting bolts to 163 N·m (120 ft. lbs.) torque.

(22) Remove jack from under rear driveline module/crossmember.

(23) If equipped with AWD, line up location reference marks and install propeller shaft-to-rear driveline module mounting bolts. Tighten mounting bolts to 54 N·m (40 ft. lbs.) torque.

(24) Clip each wheel speed sensor connector to spare tire mounting support (Fig. 42).

(25) Connect vehicle wiring harness to each wheel speed sensor connector (Fig. 42).

(26) Install each rear brake caliper on its mount as follows:

(a) Make sure abutment shims are in place on both slide abutments of caliper adapter.

CAUTION: Use care when installing brake caliper onto adapter so guide pin bushings and sleeves do not get damaged by mounting bosses on adapter.

(b) Retract caliper guide pins to clear mounting bosses on caliper adapter when installing caliper.

(c) Install brake caliper in opposite way it was removed. Starting with upper end, carefully position caliper and brake shoes over brake rotor and align outboard shoe's upper edge with caliper slide abutment. Rotate lower end of caliper into mounting position on adapter.

CAUTION: Extreme caution should be taken not to crossthread caliper guide pin bolts when they are installed.

(d) Carefully install caliper guide pin bolts (Fig. 39). Tighten bolts to 23 N·m (200 in. lbs.) torque.

(27) Install screw mounting right rear brake hose routing bracket to front of rear crossmember (Fig. 38).

(28) Install screw mounting left rear brake hose routing bracket to front of rear crossmember (Fig. 38).

(29) While holding cable connector on end of front cable secure with a pair of pliers at the front cable button, Place right rear cable button into cable connector (Fig. 37). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(30) Place left rear parking brake cable button into equalizer (Fig. 37). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(31) Install rear half of exhaust system. (Refer to 11 - EXHAUST SYSTEM - INSTALLATION)

(32) Install tire and wheel assemblies (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(33) Lower vehicle.

(34) Unlock automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(35) Connect battery negative cable to battery post.

(36) If vehicle is not equipped with All Wheel Drive (AWD), Install spare tire under vehicle.

(37) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access mounting bolts.

(38) Tighten shock absorber lower mounting bolts to 102 N·m (75 ft. lbs.) torque.

(39) Tighten stabilizer link fasteners to 61 N·m (45 ft. lbs.) torque.

(40) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

WHEEL ALIGNMENT

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WHEEL ALIGNMENT

DESCRIPTION - WHEEL ALIGNMENT

Vehicle wheel alignment is the positioning of all interrelated front and rear suspension angles. These angles affect the handling and steering of the vehicle when it is in motion. Proper wheel alignment is essential for efficient steering, good directional stability, and proper tire wear.

The method of checking a vehicle's front and rear wheel alignment varies depending on the manufacturer and type of equipment used. The manufacturer's instructions should always be followed to ensure accuracy of the alignment, except when DaimlerChrysler Corporation's wheel alignment specifications differ.

On this vehicle, the suspension angles that can be adjusted are as follows:

FRONT:

- Camber (with camber bolt package and standard procedure)
- Toe

REAR:

- Toe

Check the wheel alignment and make all wheel alignment adjustments with the vehicle standing at its proper curb height specification. Curb height is the normal riding height of the vehicle. It is measured from a certain point on the vehicle to the ground or a designated area while the vehicle is sitting on a flat, level surface. Refer to Curb Height Measurement in this section for additional information.

Typical wheel alignment angles and measurements are described in the following paragraphs.

CAMBER

Camber is the inward or outward tilt of the top of the tire and wheel assembly (Fig. 1). Camber is measured in degrees of angle relative to a true vertical line. Camber is a tire wearing angle.

- Excessive negative camber will cause tread wear at the inside of the tire.
- Excessive positive camber will cause tread wear on the outside of the tire.

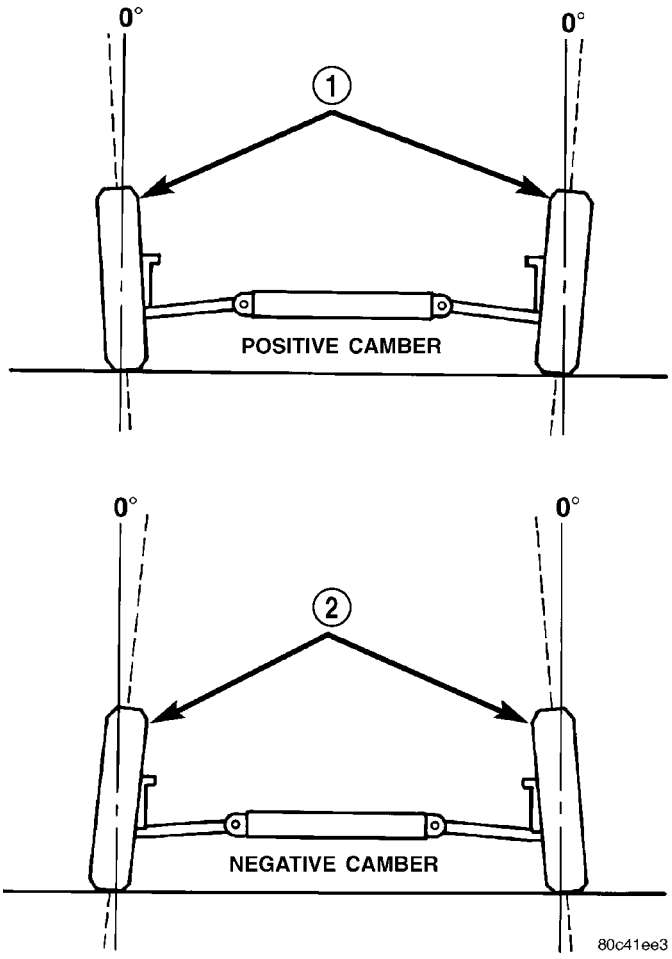


Fig. 1 Camber

1 - WHEELS TILTED OUT AT TOP
2 - WHEELS TILTED IN AT TOP

WHEEL ALIGNMENT (Continued)

CROSS CAMBER

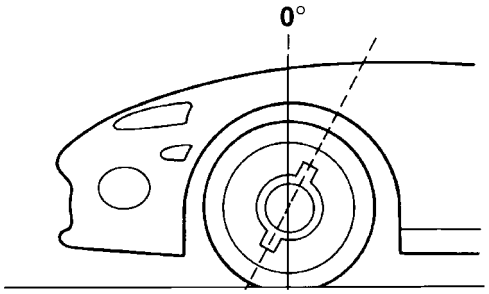
Cross camber is the difference between left and right camber. To achieve the cross camber reading, subtract the right side camber reading from the left. For example, if the left camber is +0.3° and the right camber is 0.0°, the cross camber would be +0.3°.

CASTER

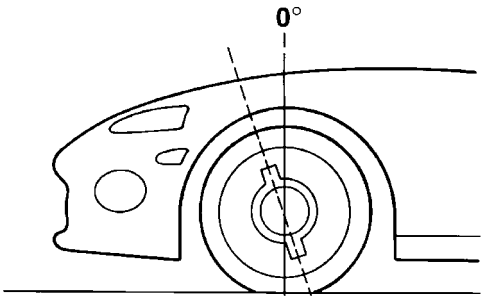
Caster is the forward or rearward tilt of the steering knuckle in reference to the position of the upper and lower ball joints. Caster is measured in degrees of angle relative to a true vertical center line. This line is viewed from the side of the tire and wheel assembly (Fig. 2).

- Forward tilt (upper ball joint ahead of lower) results in a negative caster angle.
- Rearward tilt (upper ball joint trailing lower) results in a positive caster angle.

Although caster does not affect tire wear, a caster imbalance between the two front wheels may cause the vehicle to lead to the side with the least positive caster.



POSITIVE CASTER



NEGATIVE CASTER

80c41ee4

Fig. 2 Caster

CROSS CASTER

Cross caster is the difference between left and right caster.

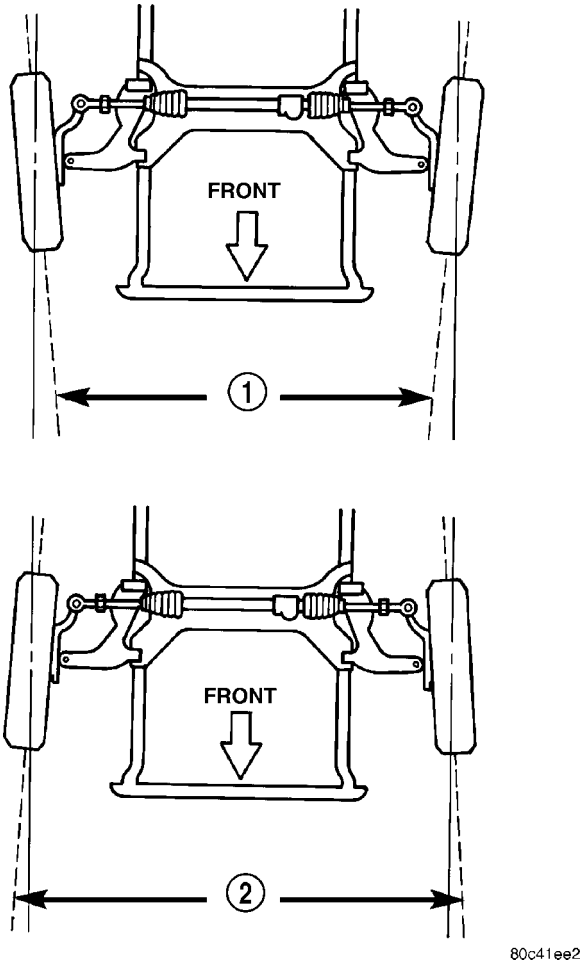
TOE

Toe is the inward or outward angle of the wheels as viewed from above the vehicle (Fig. 3).

- Toe-in is produced when the front edges of the wheels on the same axle are closer together than the rear edges.
- Toe-out is produced when the front edges of the wheels on the same axle are farther apart than the rear edges.

Toe-in and toe-out can occur at the front wheels and the rear wheels.

Toe is measured in degrees or inches. The measurement identifies the amount that the front of the wheels point inward (toe-in) or outward (toe-out). Toe is measured at the spindle height. Zero toe means the front and rear edges of the wheels on the same axle are equally distant.



80c41ee2

Fig. 3 Toe

1 - TOE-IN
2 - TOE-OUT

TOE-OUT ON TURNS

Toe-out on turns is the relative positioning of the front wheels while steering through a turn (Fig. 4). This compensates for each front wheel's turning radius. As the vehicle encounters a turn, the outboard wheel must travel in a larger radius circle than the inboard wheel. The steering system is

designed to make each wheel follow its particular radius circle. To accomplish this, the front wheels must progressively toe outward as the steering is turned from center. This eliminates tire scrubbing and undue tire wear when steering a vehicle through a turn.

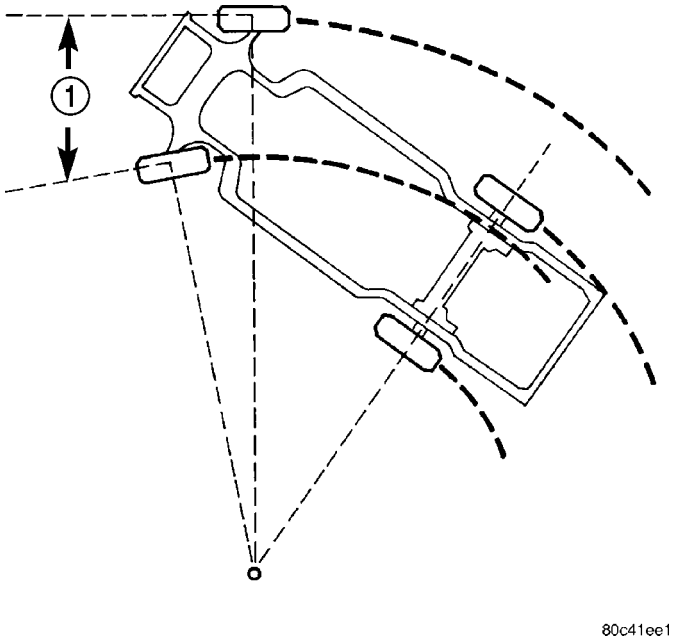


Fig. 4 Toe-Out On Turns

1 - TOE-OUT ON TURNS

DYNAMIC TOE PATTERN

Dynamic toe pattern is the inward and outward toe movement of the front and rear tires through the suspension's jounce and rebound travel. As the vehicle's suspension moves up and down, the toe pattern varies. Toe pattern is critical in controlling the directional stability of the vehicle while in motion. Front and rear dynamic toe pattern is preset by the factory at the time the vehicle is assembled.

It is not necessary to check or adjust front or rear dynamic toe pattern when doing a normal wheel alignment. The only time dynamic toe pattern needs to be checked or adjusted is if the frame of the vehicle has been damaged.

STEERING AXIS INCLINATION (S. A. I.)

Steering axis inclination is the angle between a true vertical line starting at the center of the tire at the road contact point and a line drawn through the center of the upper ball joint (or strut) and the lower ball joint (Fig. 5). S.A.I. is built into the vehicle and is not an adjustable angle. If S.A.I. is not within specifications, a bent or damaged suspension component may be the cause.

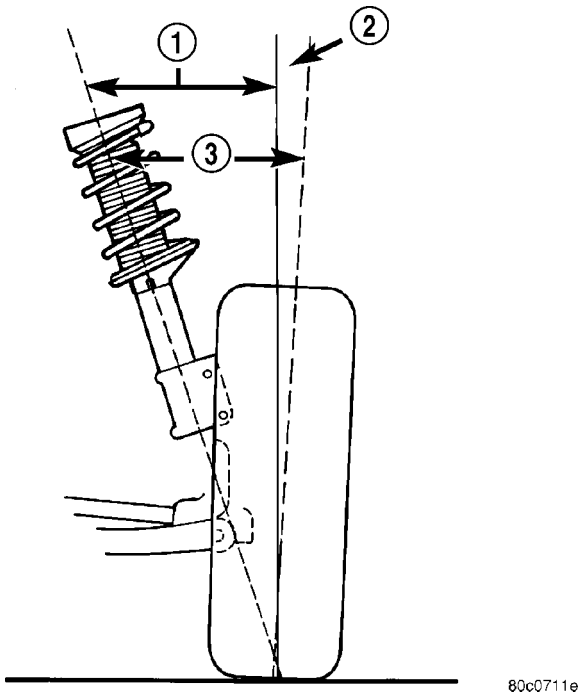


Fig. 5 S.A.I. and I.A.

1 - S.A.I.
2 - CAMBER
3 - I.A.

INCLUDED ANGLE (I. A.)

Included angle is the sum of the S.A.I. angle plus or minus the camber angle, depending on whether or not the wheel has positive or negative camber (Fig. 5). If camber is positive, add the camber angle to the S.A.I. angle. If camber is negative, subtract the camber angle from the S.A.I. angle. Included angle is not adjustable, but can be used to diagnose a frame misalignment or bent suspension component (spindle, strut).

THRUST ANGLE

Thrust angle is the averaged direction the rear wheels are pointing in relation to the vehicle's center line (Fig. 6). The presence of negative or positive thrust angle causes the rear tires to track improperly to the left or right of the front tires (dog tracking).

- Negative thrust angle means the rear tires are tracking to the left of the front tires.
- Positive thrust angle means the rear tires are tracking to the right of the front tires.

Improper tracking can cause undue tire wear, a lead or pull and a crooked steering wheel. Excessive thrust angle can usually be corrected by adjusting the rear wheel toe so that each wheel has one-half of the total toe measurement.

WHEEL ALIGNMENT (Continued)

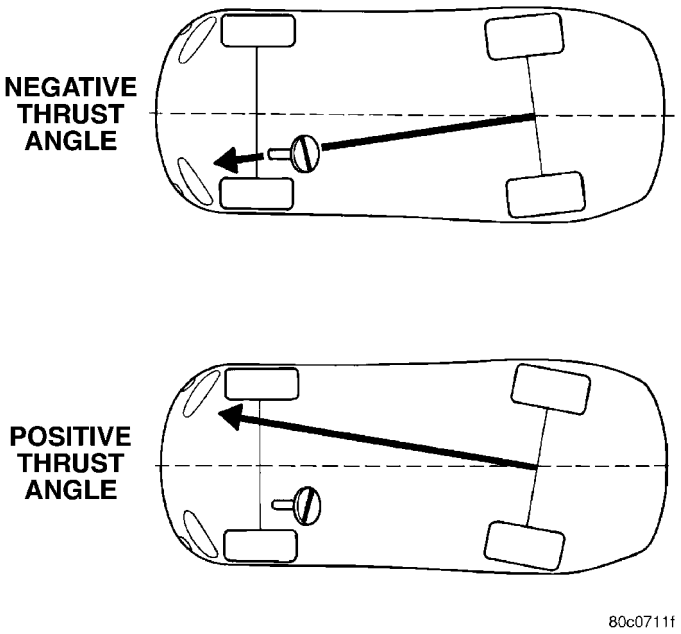


Fig. 6 Thrust Angle

DIAGNOSIS AND TESTING - SUSPENSION AND STEERING

CONDITION	POSSIBLE CAUSES	CORRECTION
Front End Whine On Turns	1. Defective wheel bearing	1. Replace hub and bearing
	2. Incorrect wheel alignment	2. Check and reset wheel alignment
	3. Worn tires	3. Replace tires
Front End Growl Or Grinding On Turns	1. Defective wheel bearing	1. Replace hub and bearing
	2. Engine mount grounding	2. Check for motor mount hitting frame rail and reposition engine as required
	3. Worn or broken C/V joint	3. Replace C/V joint
	4. Loose wheel lug nuts	4. Verify wheel lug nut torque
	5. Incorrect wheel alignment	5. Check and reset wheel alignment
	6. Worn tires	6. Replace tires
	7. Front strut pin in upper strut mount	7. Replace the front strut upper mount and bearing

WHEEL ALIGNMENT (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
Front End Clunk Or Snap On Turns	1. Loose lug nuts	1. Verify wheel lug nut torque
	2. Worn or broken C/V joint	2. Replace C/V joint
	3. Worn or loose tie rod	3. Tighten or replace tie rod end
	4. Worn or loose ball joint	4. Tighten or replace ball joint
	5. Worn/loose control arm bushing	5. Replace control arm
	6. Loose stabilizer bar.	6. Tighten stabilizer bar to specified torque
	7. Loose strut mount to body attachment	7. Tighten strut attachment to specified torque
	8. Loose crossmember bolts	8. Tighten crossmember bolts to specified torque
Front End Whine With Vehicle Going Straight At A Constant Speed	1. Defective wheel bearing	1. Replace wheel bearing
	2. Incorrect wheel alignment	2. Check and reset wheel alignment
	3. Worn tires	3. Replace tires
	4. Worn or defective transaxle gears or bearings	4. Replace transaxle gears or bearings
Front End Growl Or Grinding With Vehicle Going Straight At A Constant Speed	1. Engine mount grounding	1. Reposition engine as required
	2. Worn or broken C/V joint	2. Replace C/V joint
Front End Whine When Accelerating Or Decelerating	1. Worn or defective transaxle gears or bearings	1. Replace transaxle gears or bearings
Front End Clunk When Accelerating Or Decelerating	1. Worn or broken engine mount	1. Replace engine mount
	2. Worn or defective transaxle gears or bearings	2. Replace transaxle gears or bearings
	3. Loose lug nuts	3. Verify wheel lug nut torque
	4. Worn or broken C/V joint	4. Replace C/V joint
	5. Worn or loose ball joint	5. Tighten or replace ball joint
	6. Worn or loose control arm bushing	6. Replace control arm
	7. Loose crossmember bolts	7. Tighten crossmember bolts to specified torque
	8. Worn tie rod end	8. Replace tie rod end
Road Wander	1. Incorrect tire pressure	1. Inflate tires to recommended pressure
	2. Incorrect front or rear wheel toe	2. Check and reset wheel toe
	3. Worn wheel bearings	3. Replace wheel bearing
	4. Worn control arm bushings	4. Replace control arm bushing
	5. Excessive friction in steering gear	5. Replace steering gear
	6. Excessive friction in steering shaft coupling	6. Replace steering coupler
	7. Excessive friction in strut upper bearing	7. Replace strut bearing

WHEEL ALIGNMENT (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
Lateral Pull	1. Unequal tire pressure	1. Inflate all tires to recommended pressure
	2. Radial tire lead	2. Perform lead correction procedure
	3. Incorrect front wheel camber	3. Check and reset front wheel camber
	4. Power steering gear imbalance	4. Replace power steering gear
	5. Wheel braking	5. Correct braking condition causing lateral pull
Excessive Steering Free Play	1. Incorrect Steering Gear Adjustment	1. Adjust Or Replace Steering Gear
	2. Worn or loose tie rod ends	2. Replace or tighten tie rod ends
	3. Loose steering gear mounting bolts	3. Tighten steering gear bolts to specified torque
	4. Loose or worn steering shaft coupler	4. Replace steering shaft coupler
Excessive Steering Effort	1. Low tire pressure	1. Inflate all tires to recommended pressure
	2. Lack of lubricant in steering gear	2. Replace steering gear
	3. Low power steering fluid level	3. Fill power steering fluid reservoir to correct level
	4. Loose power steering pump drive belt	4. Correctly adjust power steering pump drive belt
	5. Lack of lubricant in ball joints	5. Lubricate or replace ball joints
	6. Steering gear malfunction	6. Replace steering gear
	7. Lack of lubricant in steering coupler	7. Replace steering coupler

STANDARD PROCEDURE

STANDARD PROCEDURE - WHEEL ALIGNMENT

PRE-WHEEL ALIGNMENT INSPECTION

Before any attempt is made to change or correct the wheel alignment, the following inspection and necessary corrections must be made to ensure proper alignment.

(1) Verify that the fuel tank is full of fuel. If the tank is not full, the reduction in weight will affect the curb height of the vehicle and the alignment angles.

(2) The passenger and luggage compartments of the vehicle should be free of any load that is not factory equipment.

(3) Check the tires on the vehicle. All tires must be the same size and in good condition with approximately the same amount of tread wear. Inflate all the tires to the recommended air pressure.

(4) Check the front wheel and tire assemblies for excessive radial runout.

(5) Inspect lower ball joints and all steering linkage for looseness, binding, wear or damage. Repair as necessary.

(6) Check suspension fasteners for proper torque and retighten as necessary.

(7) Inspect all suspension component rubber bushings for signs of wear or deterioration. Replace any faulty bushings or components before aligning the vehicle.

(8) Check the vehicle's curb height to verify it is within specifications. (Refer to 2 - SUSPENSION/ WHEEL ALIGNMENT - STANDARD PROCEDURE - CURB HEIGHT MEASUREMENT)

WHEEL ALIGNMENT SETUP

(1) Position the vehicle on an alignment rack.

(2) Install all required alignment equipment on the vehicle per the alignment equipment manufacturer's instructions. On this vehicle, a four-wheel alignment is recommended.

WHEEL ALIGNMENT (Continued)

NOTE: Prior to reading the vehicle's alignment readouts, the front and rear of vehicle should be jounced. Induce jounce (rear first, then front) by grasping the center of the bumper and jouncing each end of vehicle an equal number of times. The bumper should always be released when vehicle is at the bottom of the jounce cycle.

(3) Read the vehicle's current front and rear alignment settings. Compare the vehicle's current alignment settings to the vehicle specifications for camber, caster and toe-in. (Refer to 2 - SUSPENSION/ WHEEL ALIGNMENT - SPECIFICATIONS)

(4) If front camber and caster are not within specifications, proceed to CAMBER AND CASTER below. If caster and camber are within specifications, proceed to TOE which can be found following CAMBER AND CASTER. Rear camber and caster are not adjustable. If found not to be within specifications, reinspect for damaged suspension or body components and replace as necessary. If rear toe is not within specifications, adjust rear toe before proceeding to adjust front toe.

CAMBER AND CASTER

Camber and caster settings on this vehicle are determined at the time the vehicle is designed, by the location of the vehicle's suspension components. This is referred to as NET BUILD. The result is no required adjustment of camber and caster after the vehicle is built or when servicing the suspension components. Thus, when performing a wheel alignment, caster and camber are not normally considered adjustable angles. Camber and caster should be checked to ensure they meet vehicle specifications.

If front camber is found not to meet alignment specifications, it can be adjusted using an available camber adjustment bolt package. Before installing a camber adjustment bolt package on a vehicle found to be outside the specifications, inspect the suspension components for any signs of damage or bending.

CAUTION: Do not attempt to adjust the vehicles wheel alignment by heating, bending or by performing any other modification to the vehicle's front suspension components or body.

If front camber readings are not within specifications, use the following procedure to install a camber adjustment bolt package, then adjust front camber.

CAMBER ADJUSTMENT BOLT PACKAGE INSTALLATION

The camber adjustment bolt package contains 2 flange bolts, 2 cam bolts, 2 dog bone washers, and 4 nuts. This package services both sides of the vehicle. Use the package to attach the strut clevis bracket to the steering knuckle after the strut clevis bracket has been modified. To install and adjust the camber adjustment bolt package, follow the procedure below.

(1) Raise the vehicle until its tires are not supporting the weight of the vehicle.

(2) Remove the front tire and wheel assemblies.

CAUTION: When removing the steering knuckle from the strut clevis bracket, do not put a strain on the brake flex hose. Also, do not let the weight of the steering knuckle assembly be supported by the brake flex hose when removed from the strut assembly. If necessary use a wire hanger to support the steering knuckle assembly or if required remove the brake flex hose from the caliper assembly.

CAUTION: The knuckle to strut assembly attaching bolt shanks are serrated and must not be turned during removal. Remove the nuts while holding the bolts stationary.

(3) Remove the top and bottom strut clevis bracket-to-steering knuckle attaching bolts (Fig. 7)and discard. Separate the steering knuckle from the strut clevis bracket and position steering knuckle so it is out of the way of the strut.

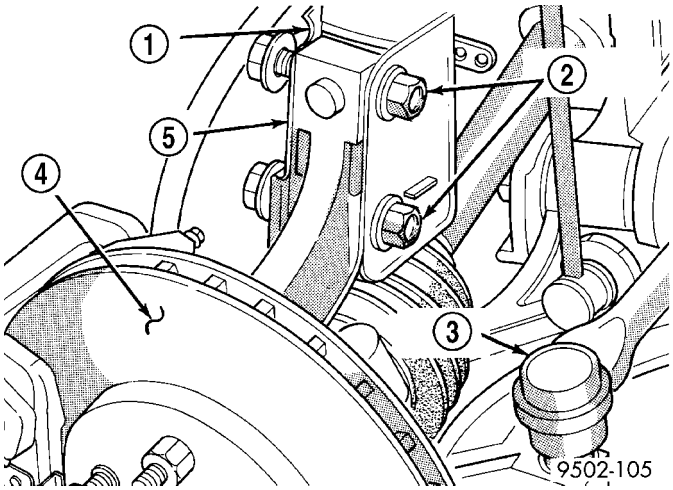


Fig. 7 Clevis Bracket To Steering Knuckle Attaching Bolts

1 - STRUT CLEVIS BRACKET
2 - ATTACHING BOLTS
3 - TIE ROD END
4 - ROTOR
5 - STEERING KNUCKLE

CAUTION: When slotting the bottom mounting hole on the strut clevis bracket, do not enlarge the hole beyond the indentations on the sides of the strut clevis bracket (Fig. 8).

WHEEL ALIGNMENT (Continued)

(4) Using an appropriate grinder and grinding wheel, slot the bottom hole in both sides of the strut clevis bracket (Fig. 8).

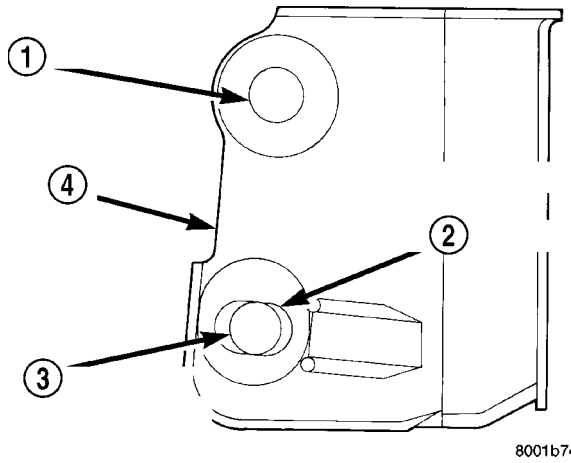


Fig. 8 Strut Clevis Bracket Bolt Hole Grinding Area

1 - UPPER STRUT TO STEERING KNUCKLE ATTACHING HOLE
2 - CAMBER ADJUSTMENT SLOT INDENTATION AREA ON CLEVIS BRACKET
3 - LOWER STRUT TO STEERING KNUCKLE ATTACHING HOLE
4 - STRUT CLEVIS BRACKET

CAUTION: After slotting the strut clevis bracket hole, do not install the original attaching bolts when assembling the steering knuckle to the strut assembly. Only the flange bolts, cam bolts, and dog bone washers from the service package must be used to attach the steering knuckle to the strut after the mounting hole is slotted.

NOTE: The strut clevis-to-knuckle bolts are installed differently on each side of the vehicle. Left-hand-side bolts are installed from vehicle rear to front (Fig. 9). Right-hand-side bolts are installed from vehicle front to rear (Fig. 10).

(5) Position the knuckle back into the strut clevis bracket. Using the direction indicated in the above note, install a flanged bolt from the service package into the upper mounting hole. Using the direction indicated in the above note, install a cam bolt into the bottom mounting hole (Fig. 11).

(6) Install a dog bone washer on the steering knuckle to strut clevis bracket attaching bolts, then install the nuts onto the bolts from the service package (Fig. 12). Tighten the bolts just enough to hold the steering knuckle in position when adjusting camber, while still allowing the steering knuckle to move in clevis bracket.

(7) Repeat the procedure to the other side strut clevis bracket.

(8) Reinstall both front tire and wheel assemblies and tighten to specifications.

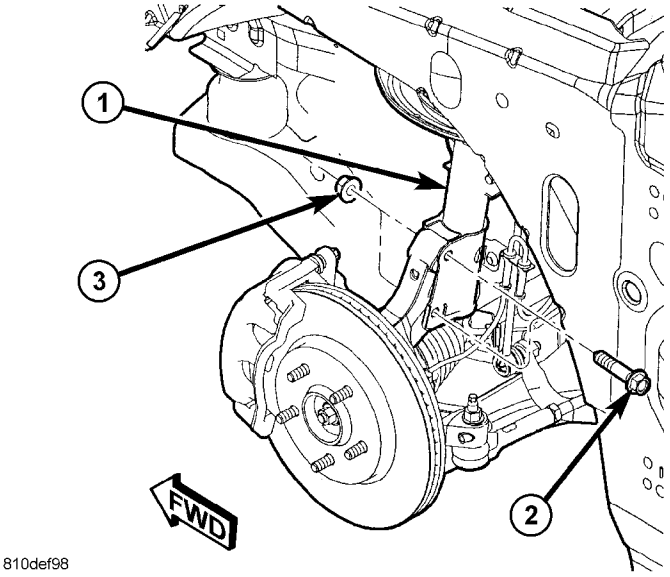


Fig. 9 Left Side Correctly Oriented Mounting Bolts

1 - STRUT
2 - BOLT
3 - NUT

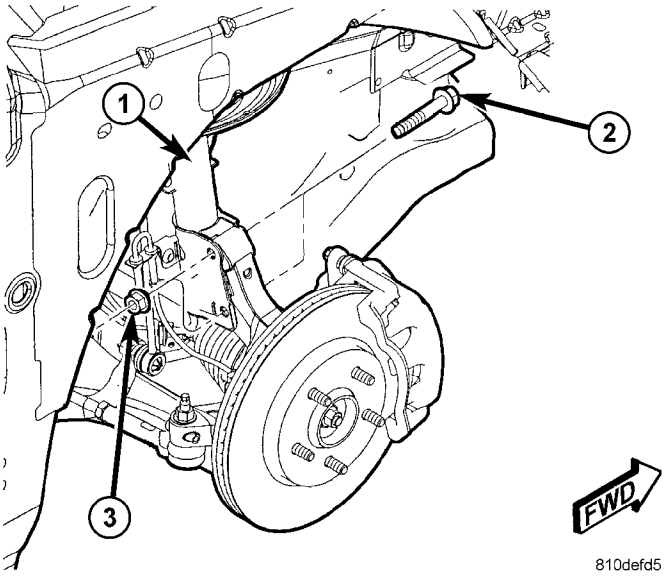


Fig. 10 Right Side Correctly Oriented Mounting Bolts

1 - STRUT
2 - BOLT
3 - NUT

(9) Lower the vehicle. Jounce the front and rear of vehicle an equal amount of times.

(10) Adjust front camber to the preferred setting by rotating the lower eccentric cam bolt against the cam stop areas on the strut clevis bracket (Fig. 13). When camber is set, tighten the upper strut clevis bracket bolt and lower cam bolt. Again jounce front and rear of vehicle an equal amount of times and

WHEEL ALIGNMENT (Continued)

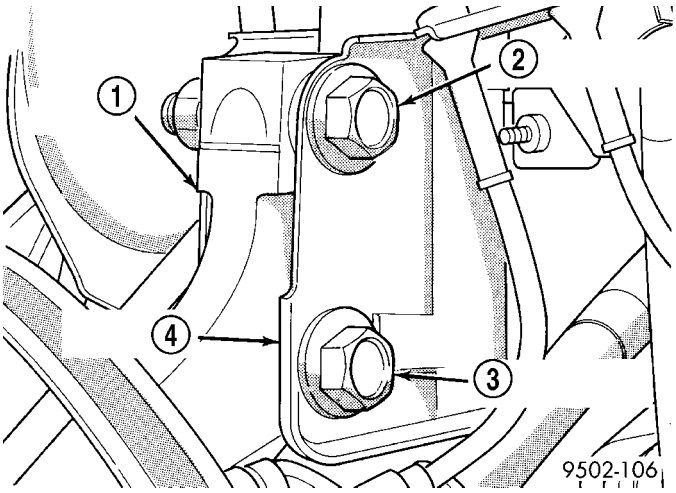


Fig. 11 Package Bolts Correctly Installed

1 - STEERING KNUCKLE
2 - FLANGED BOLT IN TOP HOLE
3 - CAM BOLT IN BOTTOM HOLE
4 - STRUT CLEVIS BRACKET

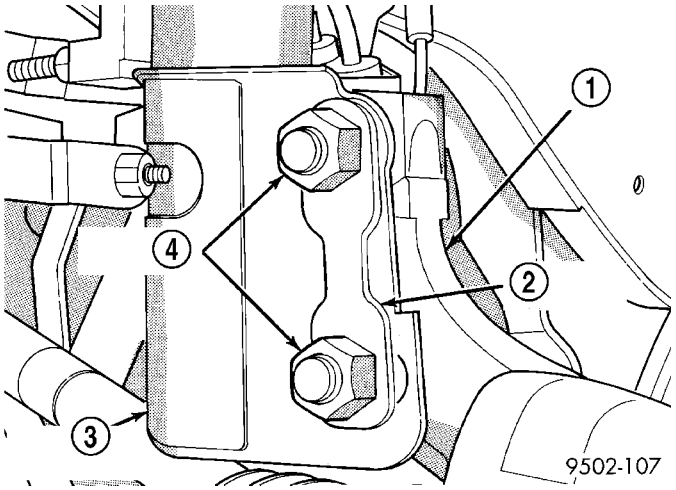


Fig. 12 Dog Bone Washer And Nuts Installed

1 - STEERING KNUCKLE
2 - DOG BONE WASHER
3 - STRUT CLEVIS BRACKET
4 - ATTACHING NUTS

verify front camber setting. Torque both front strut to steering knuckle attaching bolts to 88 N·m (65 ft. lbs.) plus an additional 1/4 (90°) turn after the required torque is met.

(11) If the toe readings obtained are not within the required specification range, adjust toe to meet the preferred specification setting. Proceed to TOE below to set the vehicle's toe.

TOE

(1) Center the steering wheel and lock in place using a steering wheel clamp.

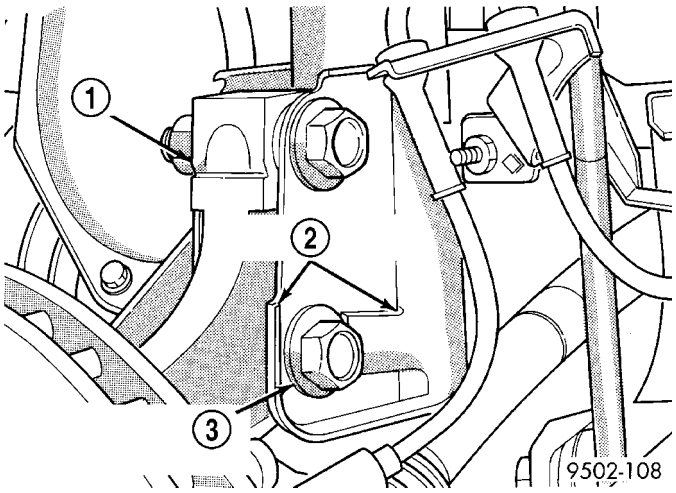


Fig. 13 Camber Adjustment Cam Bolt

1 - STEERING KNUCKLE
2 - CLEVIS BRACKET CAM STOP AREAS
3 - LOWER ECCENTRIC CAMBER ADJUSTMENT BOLT

NOTE: When performing the toe adjustment procedure, set rear toe to specifications before setting front toe.

REAR TOE

NOTE: Perform the following procedure to each side of the vehicle as necessary.

(1) Loosen the cam bolt nut securing the toe link to the rear crossmember just enough to rotate the cam bolt (Fig. 14).

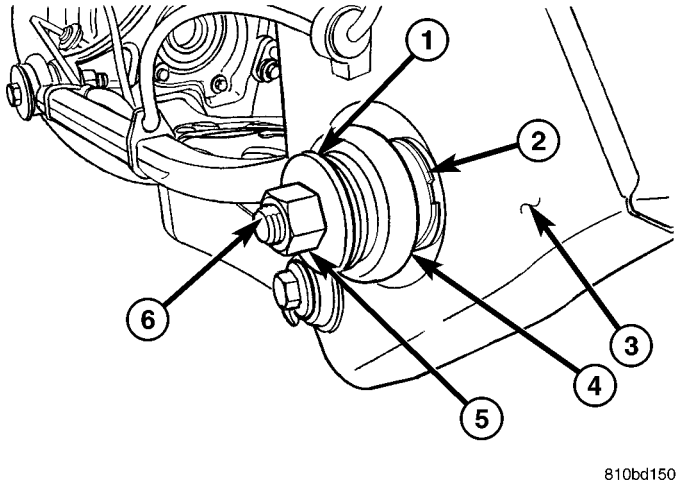


Fig. 14 Cam Bolt Securing Toe Link - Rear View

1 - WASHER
2 - CAM WASHER (TOE ADJUSTMENT)
3 - REAR OF REAR CROSSMEMBER
4 - TOE LINK
5 - NUT
6 - FLAT ON CAM BOLT

WHEEL ALIGNMENT (Continued)

NOTE: When adjusting rear toe, the eccentric lobes on the toe adjustment cam bolts and washers are not to be facing downward. The lobes should only be facing upward or up to 90° to one side or the other from the 12 O'clock position.

(2) Rotate the cam bolt head on the opposite side (front) of the crossmember in either direction until the preferred specification is obtained (Fig. 15). (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - SPECIFICATIONS)

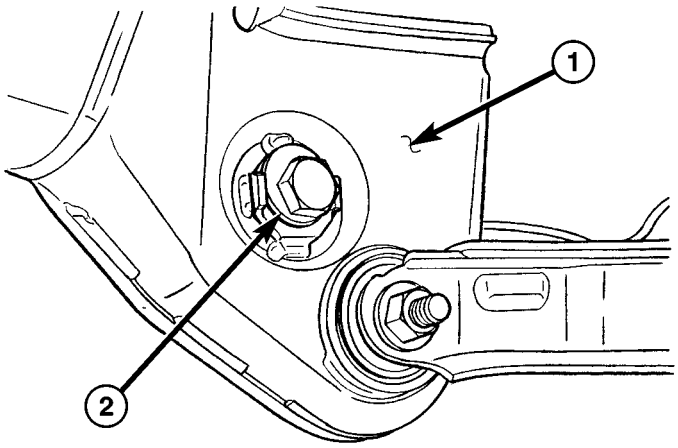


Fig. 15 Cam Bolt Securing Toe Link - Front View

1 - CAM BOLT (TOE ADJUSTMENT)
2 - FRONT OF REAR CROSSMEMBER

(3) While holding the cam bolt from turning, tighten the cam bolt nut to specifications.

(4) Adjust rear toe on opposite side of vehicle using above procedure as necessary.

(5) Once rear toe is set, proceed to FRONT TOE to set the vehicle's front toe.

FRONT TOE

NOTE: Perform the following procedure to each side of the vehicle as necessary.

CAUTION: Do not twist inner tie rod-to-steering gear boots during front wheel Toe adjustment. Remove boot clamps at the inner tie rods and make sure boots moves freely on inner tie rod.

(1) Loosen jam nut at inner-to-outer tie rod connection (Fig. 16).

(2) Grasp inner tie rod at serrations (Fig. 16) and rotate as necessary to adjust front toe to preferred toe specification. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - SPECIFICATIONS)

(3) Tighten tie rod jam nut to specifications.

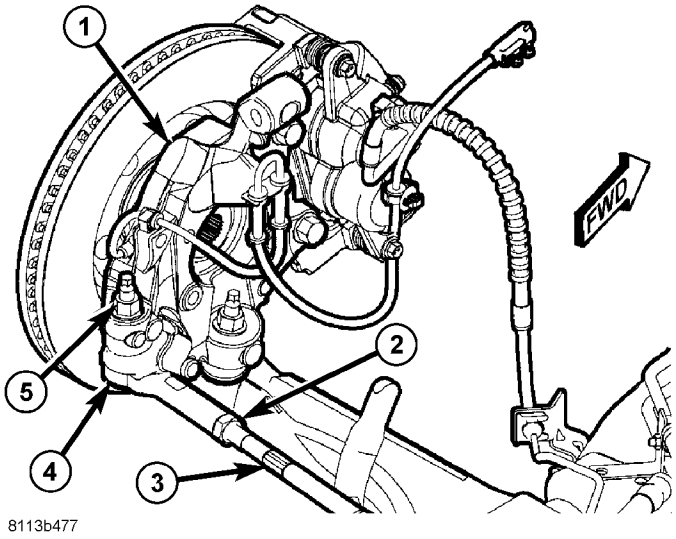


Fig. 16 Tie Rod Attachment

1 - STEERING KNUCKLE
2 - JAM NUT (TIE ROD ADJUSTMENT)
3 - INNER TIE ROD SERRATIONS
4 - OUTER TIE ROD
5 - NUT

(4) Make sure inner tie rod-to-steering gear boot is not twisted, then reinstall boot clamp at inner tie rod.

(5) Adjust front toe on opposite side of vehicle using above procedure as necessary.

(2) Remove steering wheel clamp.

(3) Remove alignment equipment.

(4) Road test vehicle to verify steering wheel is straight and vehicle does not wander or pull.

STANDARD PROCEDURE - CURB HEIGHT MEASUREMENT

The wheel alignment is to be checked and all alignment adjustments made with the vehicle at its required curb height specification.

Vehicle height is to be checked with the vehicle on a flat, level surface, preferably a vehicle alignment rack. The tires are to be inflated to the recommended pressure. All tires are to be the same size as standard equipment. Vehicle height is checked with the fuel tank full of fuel, and no passenger or luggage compartment load.

Vehicle height is not adjustable. If the measurement is not within specifications, inspect the vehicle for bent or weak suspension components. Compare the parts tag on the suspect coil spring(s) to the parts book and the vehicle sales code, checking for a match. Once removed from the vehicle, compare the coil spring height to a correct new or known good coil spring. The heights should vary if the suspect spring is weak.

WHEEL ALIGNMENT (Continued)

(1) Measure from the inboard edge of the wheel opening fender lip directly above the wheel center (spindle), to the floor or alignment rack surface.

(2) When measuring, the maximum left-to-right differential is not to exceed 12.5 mm (0.5 in.).

(3) Compare the measurements to the specifications listed in the following Curb Height Specifications chart.

CURB HEIGHT SPECIFICATIONS

TIRE SALES CODE/TIRE SIZE	FRONT	REAR
ALL	798 mm ± 10 mm 31.42 in. ± 0.39 in	813 mm ± 10 mm 32.00 in. ± 0.39 in.

SPECIFICATIONS

WHEEL ALIGNMENT

NOTE: All wheel alignments are to be set at curb height. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

NOTE: All specifications are given in degrees.

FRONT WHEEL ALIGNMENT	PREFERRED SETTING	ACCEPTABLE RANGE
CAMBER	−0.20°	−0.60° to +0.20°
Cross-Camber (Maximum side-to-side difference)	0.00°	0.50°
CASTER*	+4.50°	+4.00° to +5.00°
Cross-Caster (Maximum side-to-side difference)	0.00°	1.00°
TOTAL TOE**	+0.10°	−0.10° to +0.30°
Maximum side-to-side difference	0.00°	0.06°
REAR WHEEL ALIGNMENT	**PREFERRED SETTING**	**ACCEPTABLE RANGE**
CAMBER*	−0.40°	−0.90° to +0.10°
Cross-Camber (Maximum side-to-side difference)	0.00°	0.50°
TOTAL TOE**	0.10°	−0.02° to +0.22°
THRUST ANGLE	0.0°	−0.20° to +0.20°

Notes:

* For reference only. These are non-adjustable angles.

** TOTAL TOE is the sum of both left and right wheel toe settings. TOTAL TOE must be equally split between each front wheel to ensure the steering wheel is centered after setting toe. Positive toe is toe-in and negative toe is toe-out

DIFFERENTIAL & DRIVELINE

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HALF SHAFT - FRONT

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HALF SHAFT - FRONT

DESCRIPTION

All vehicles use an unequal length half shaft system (Fig. 1).

The left half shaft uses a tuned rubber damper weight. When replacing the left half shaft, be sure the replacement half shaft has the same damper weight as the original.

All half shaft assemblies use the same type of inner and outer joints. The inner joint of both half shaft assemblies is a tripod joint, and the outer joint of both half shaft assemblies is a Rzeppa joint. Both tripod joints and Rzeppa joints are true constant velocity (CV) joint assemblies. The inner tripod joint allows for the changes in half shaft length through the jounce and rebound travel of the front suspension.

The inner tripod joint of both half shafts is splined into the transaxle side gears. The inner tripod joints are retained in the side gears of the transaxle using a snap ring located in the stub shaft of the tripod joint. The outer CV joint has a stub shaft that is splined into the wheel hub and retained by a steel hub nut.

DIAGNOSIS AND TESTING - HALF SHAFT

VEHICLE INSPECTION

(1) Check for grease in the vicinity of the inboard tripod joint and outboard CV joint; this is a sign of inner or outer joint seal boot or seal boot clamp damage.

NOISE AND/OR VIBRATION IN TURNS

A clicking noise and/or a vibration in turns could be caused by one of the following conditions:

- Damaged outer CV or inner tripod joint seal boot or seal boot clamps. This will result in the loss and/or contamination of the joint grease, resulting in inadequate lubrication of the joint.
- Noise may also be caused by another component of the vehicle coming in contact with the half shafts.

CLUNKING NOISE DURING ACCELERATION

This noise may be a result of one of the following conditions:

- A torn seal boot on the inner or outer joint of the half shaft assembly.
- A loose or missing clamp on the inner or outer joint of the half shaft assembly.
- A damaged or worn half shaft CV joint.

HALF SHAFT - FRONT (Continued)

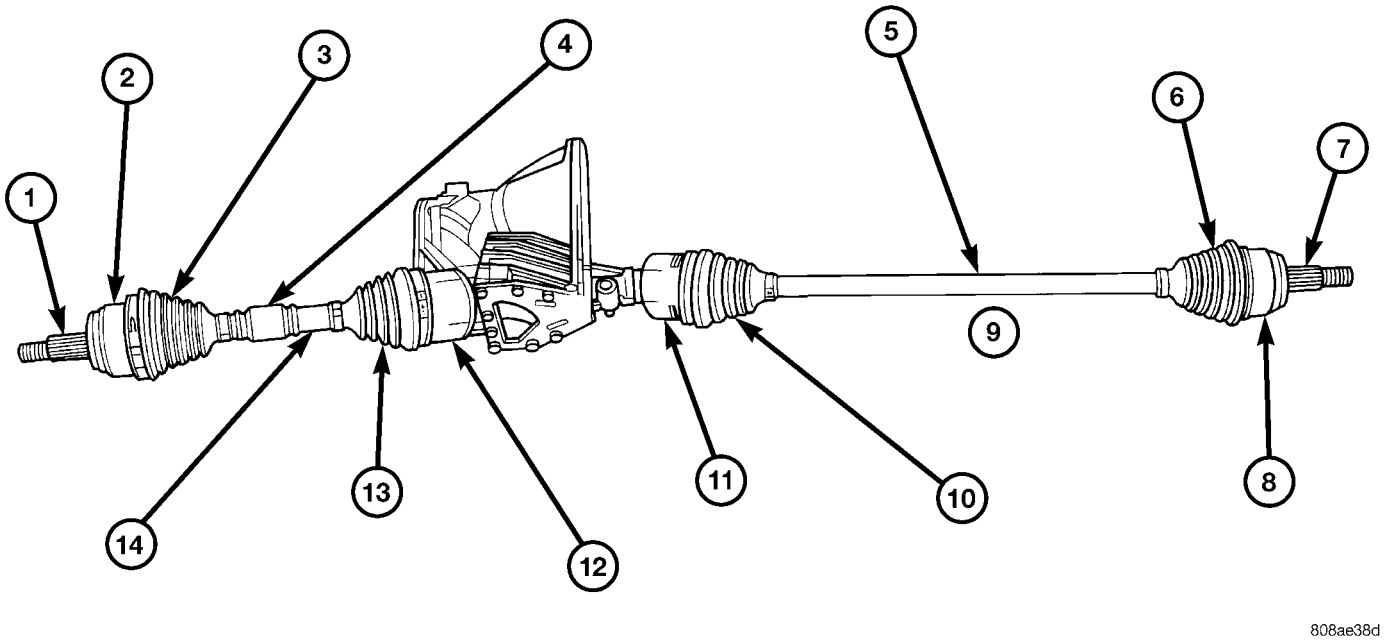


Fig. 1 Unequal Length Half Shaft System

1 - STUB AXLE
2 - OUTER C/V JOINT
3 - OUTER C/V JOINT BOOT
4 - TUNED RUBBER DAMPER WEIGHT
5 - INTERCONNECTING SHAFT
6 - OUTER C/V JOINT BOOT
7 - STUB AXLE
8 - OUTER C/V JOINT
9 - RIGHT HALFSHAFT
10 - INNER TRIPOD JOINT BOOT
11 - INNER TRIPOD JOINT
12 - INNER TRIPOD JOINT
13 - INNER TRIPOD JOINT BOOT
14 - INTERCONNECTING SHAFT LEFT HALFSHAFT

CLICKING/POPPING NOISE DURING SHIFT (R-to-D or D-to-R)

This noise may be caused by a lack of lubrication at halfshaft-to-hub splines and abutment face.

SHUDDER OR VIBRATION DURING ACCELERATION

This problem could be a result of:

- A worn or damaged half shaft inner tripod joint.
- A sticking tripod joint spider assembly (inner tripod joint only).
- Improper wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

VIBRATION AT HIGHWAY SPEEDS

This problem could be a result of:

- Foreign material (mud, etc.) packed on the backside of the wheel(s).
- Out of balance tires or wheels. (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE)
- Improper tire and/or wheel runout. (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING)

REMOVAL

(1) Raise vehicle.

(2) Remove the cotter pin and nut lock (Fig. 2) from the end of the half shaft.

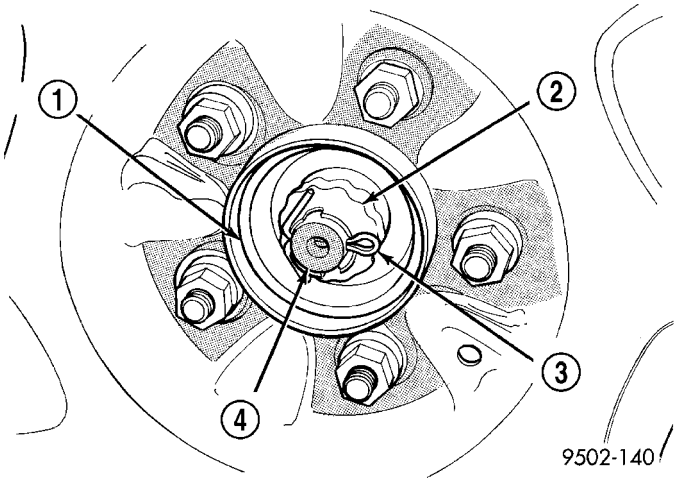


Fig. 2 Half Shaft Retaining Nut

1 - HUB/BEARING
2 - NUT LOCK
3 - COTTER PIN
4 - STUB AXLE

(3) Remove the wheel and tire assembly from the vehicle. (Refer to 22 - TIRES/WHEELS - REMOVAL)

HALF SHAFT - FRONT (Continued)

(4) Remove the wave washer (Fig. 3) from the end of the half shaft.

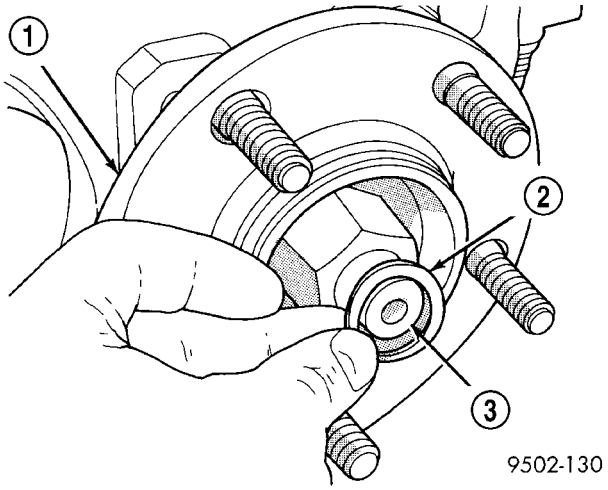


Fig. 3 Wave Washer

1 - HUB/BEARING ASSEMBLY
2 - WAVE WASHER
3 - STUB AXLE

(5) With the vehicle's brakes applied to keep hub from turning, **loosen and remove** the half shaft nut.

(6) Remove the two front disc brake caliper adapter to steering knuckle attaching bolts (Fig. 4).

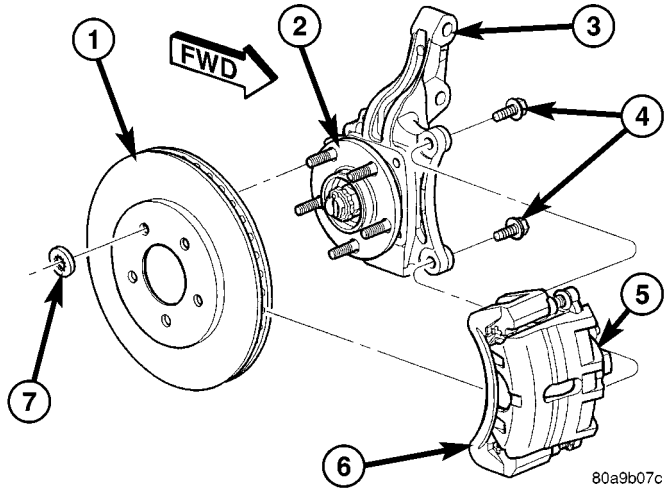


Fig. 4 Front Brake Mounting

1 - BRAKE ROTOR
2 - HUB AND BEARING
3 - STEERING KNUCKLE
4 - ADAPTER MOUNTING BOLTS
5 - BRAKE CALIPER
6 - ADAPTER
7 - CLIP

(7) Remove the disc brake caliper assembly from the steering knuckle. Caliper assembly is removed by first rotating top of caliper assembly away from steering knuckle and then removing bottom of assembly out from under machined abutment on steering knuckle.

(8) Support disc brake caliper assembly by using a wire hook and suspending it from the strut assembly (Fig. 5). **Do not allow the brake caliper assembly to hang by the brake flex hose.**

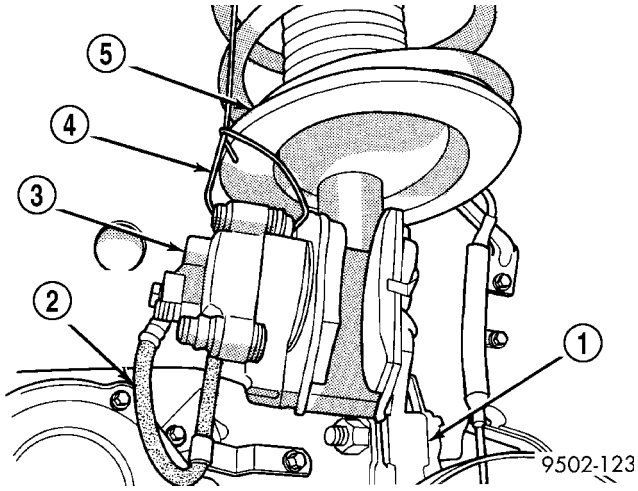


Fig. 5 Properly Supported Disc Brake Caliper - Typical

1 - STEERING KNUCKLE
2 - BRAKE FLEX HOSE
3 - CALIPER ASSEMBLY
4 - WIRE HANGER
5 - STRUT ASSEMBLY

(9) Remove the brake rotor from the hub and bearing assembly.

(10) Remove the steering knuckle-to-strut attachment bolts (Fig. 6) from the steering knuckle.

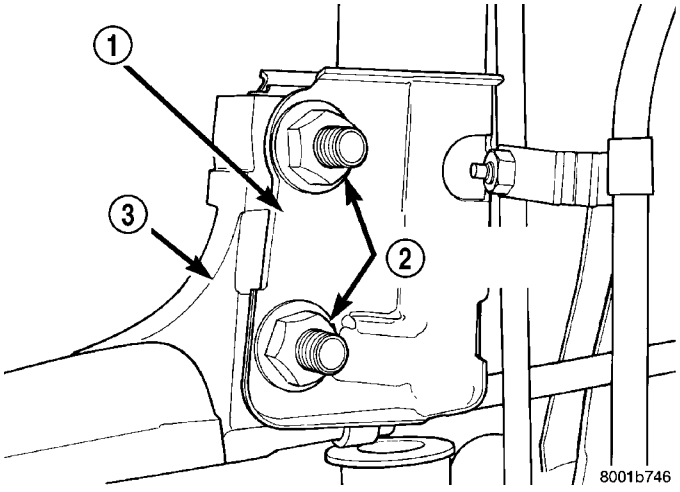


Fig. 6 Strut To Steering Knuckle Attaching Bolts

1 - STRUT CLEVIS BRACKET
2 - NUTS AND BOLTS
3 - STEERING KNUCKLE

(11) Pull the steering knuckle from the strut clevis bracket.

HALF SHAFT - FRONT (Continued)

NOTE: Care must be taken not to separate the inner C/V joint during this operation. Do not allow half shaft to hang by inner C/V joint after removing outer C/V Joint from the hub/bearing assembly in steering knuckle, end of half shaft must be supported.

(12) Pull steering knuckle assembly down and away from the outer C/V joint of the half shaft assembly while pulling the joint out of the hub bearing.

(13) Support the outer end of the half shaft assembly. Insert a pry bar between inner tripod joint and transaxle case (Fig. 7). Pry against inner tripod joint, until tripod joint retaining snap-ring is disengaged from transaxle side gear.

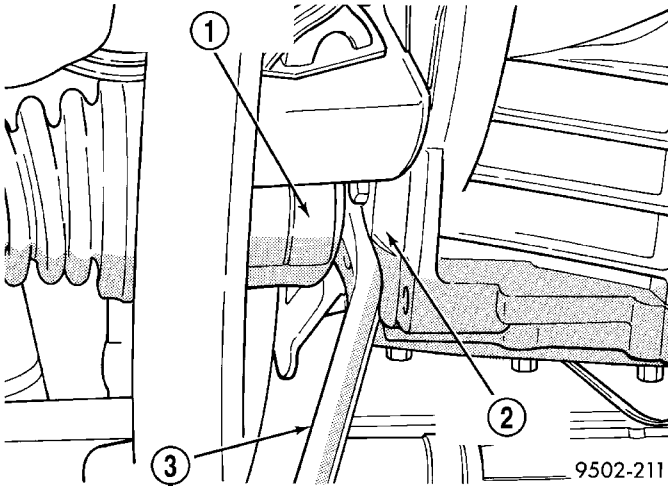


Fig. 7 Disengaging Inner Tripod Joint From Transaxle

1 - INNER TRIPOD JOINT
2 - TRANSAXLE CASE
3 - PRY BAR

(14) Hold inner tripod joint and interconnecting shaft of half shaft assembly. Remove inner tripod joint from transaxle, by pulling it straight out of transaxle side gear and transaxle oil seal (Fig. 8). **When removing tripod joint, do not let spline or snap-ring drag across sealing lip of the transaxle to tripod joint oil seal.**

INSTALLATION

(1) Thoroughly clean spline and oil seal sealing surface, on tripod joint. Lightly lubricate oil seal sealing surface on tripod joint with fresh clean transmission lubricant.

(2) Holding half shaft assembly by tripod joint and interconnecting shaft, install tripod joint into transaxle side gear as far as possible by hand (Fig. 8). Be sure to engage splines prior to applying force.

(3) Grasp inner tripod joint an interconnecting shaft. Forcefully push the tripod joint into side gear

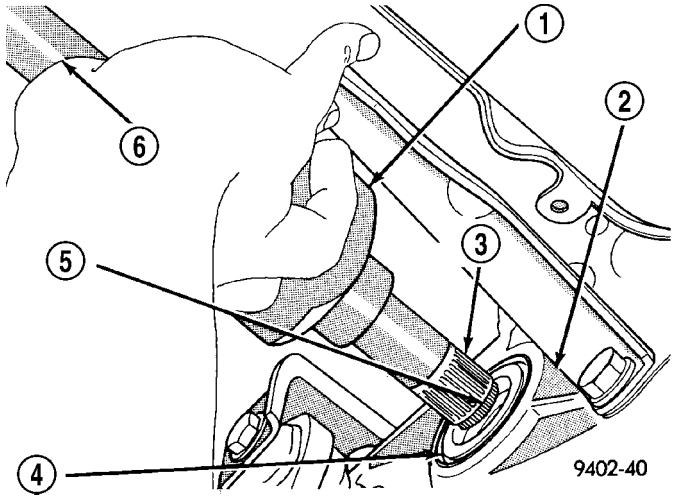


Fig. 8 Tripod Joint Removal from Transaxle

1 - INNER TRIPOD JOINT
2 - TRANSAXLE
3 - SPLINE
4 - OIL SEAL
5 - SNAP-RING
6 - INTERCONNECTING SHAFT

of transaxle, until snap-ring is engaged with transaxle side gear. **Test that snap-ring is fully engaged with side gear by attempting to remove tripod joint from transaxle by hand. If snap-ring is fully engaged with side gear, tripod joint will not be removable by hand.**

(4) Clean all debris and moisture out of steering knuckle, in the area were outer CV joint will be installed into steering knuckle.

(5) Ensure that front of outer CV joint which fits against the face of the hub and bearing is free of debris and moisture before installing outer CV joint into hub and bearing assembly (Fig. 9).

(6) Slide half shaft back into front hub and bearing assembly.

CAUTION: The steering knuckle to strut assembly attaching bolts are serrated and must not be turned during installation. Install nuts while holding bolts stationary in the steering knuckle.

CAUTION: If the vehicle being serviced is equipped with eccentric strut assembly attaching bolts, the eccentric bolt must be installed in the bottom (slotted) hole on the strut clevis bracket (Fig. 10).

(7) Install steering knuckle in clevis bracket of strut damper assembly. Install the strut damper to steering knuckle attaching bolts. Tighten both bolts to a torque of 88 N·m (65 ft. lbs.) plus an additional 1/4 turn.

(8) Install braking disc on hub and bearing assembly.

HALF SHAFT - FRONT (Continued)

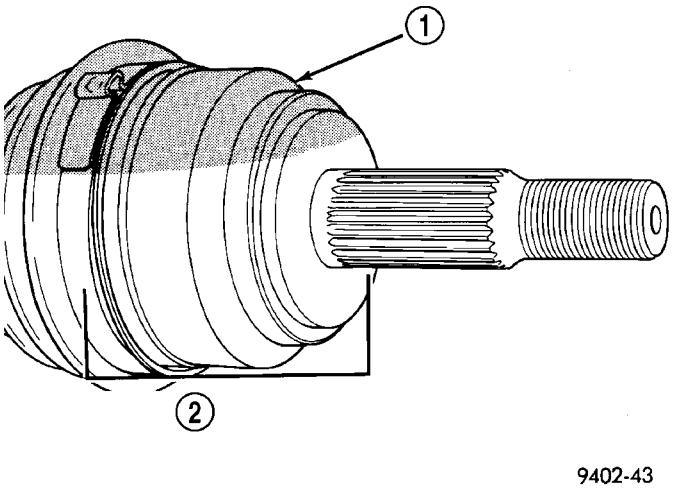


Fig. 9 Outer CV Joint Inspection

1 - OUTER C/V JOINT
2 - THIS AREA OF OUTER C/V JOINT MUST BE FREE OF ALL DEBRIS AND MOISTURE, BEFORE INSTALLATION INTO STEERING KNUCKLE.

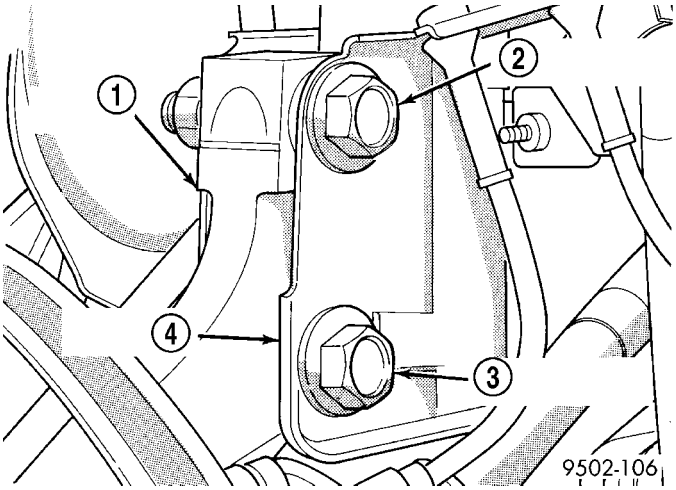


Fig. 10 Correctly Installed Eccentric Attaching Bolt

1 - STEERING KNUCKLE
2 - FLANGED BOLT IN TOP HOLE
3 - CAM BOLT IN BOTTOM HOLE
4 - STRUT CLEVIS BRACKET

(9) Install disc brake caliper assembly on steering knuckle. Caliper is installed by first sliding bottom of caliper assembly under abutment on steering knuckle, and then rotating top of caliper against top abutment.

(10) Install disc brake caliper adapter to steering knuckle attaching bolts (Fig. 4). Tighten the disc brake caliper adapter attaching bolts to a torque of 169 N·m (125 ft. lbs.).

(11) Clean all foreign matter from the threads of the outer CV joint. Install the washer and half shaft to hub/bearing assembly nut on half shaft and securely tighten nut.

(12) Install front wheel and tire assembly. Install and tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half the required specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(13) Lower vehicle.

(14) With the vehicle's brakes applied to keep hub from turning, tighten the hub nut to a torque of 244 N·m (180 ft. lbs.) (Fig. 11).

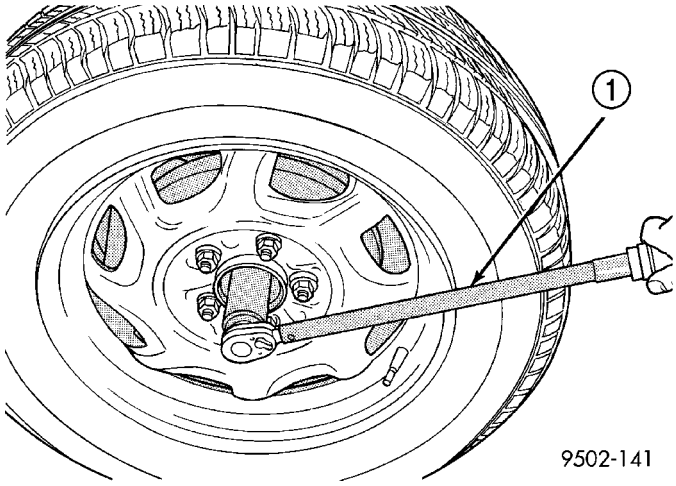


Fig. 11 Torquing Front Half Shaft To Hub Nut

1 - TORQUE WRENCH

(15) Install the spring wave washer on the end of the half shaft.

(16) Install the hub nut lock, and a **new** cotter pin (Fig. 2). Wrap cotter pin prongs tightly around the hub nut lock as shown in (Fig. 2).

(17) Check for correct fluid level in transaxle assembly. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/FLUID - STANDARD PROCEDURE)

HALF SHAFT - FRONT (Continued)

SPECIFICATIONS - HALF SHAFT - FRONT

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolts, Caliper Adapter to Knuckle	169	125	-
Nut, Hub	244	180	-
Nuts, Front Wheel Lug	135	100	-
Nut, Tie Rod End to Knuckle	75	55	-
Nut, Strut Clevis to Knuckle	88 +90°	65 +90°	-

CV BOOT - INNER

REMOVAL

(1) Remove the half shaft requiring boot replacement from the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(2) Remove large boot clamp which retains inner tripod joint sealing boot to tripod joint housing and discard.

(3) Remove small clamp which retains inner tripod joint sealing boot to interconnecting shaft and discard.

(4) Remove the sealing boot from the tripod housing and slide it down the interconnecting shaft.

(5) Slide the tripod joint housing off the spider assembly and the interconnecting shaft (Fig. 12).

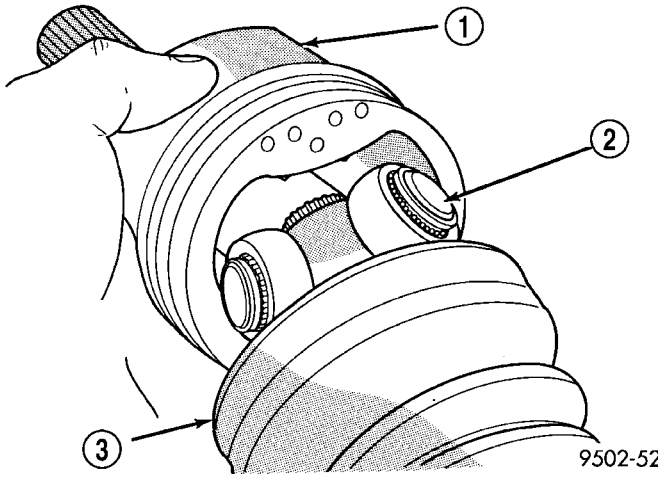


Fig. 12 Spider Assembly Removal from Tripod Joint Housing

1 - TRIPOD JOINT HOUSING
2 - SPIDER ASSEMBLY
3 - SEALING BOOT

(6) Remove snap-ring which retains spider assembly to interconnecting shaft (Fig. 13). **Do not hit the outer tripod bearings in an attempt to remove spider assembly from interconnecting shaft.**

(7) Remove the spider assembly from interconnecting shaft. If spider assembly will not come off interconnecting shaft by hand, it can be removed by tapping spider assembly with a brass drift (Fig. 14).

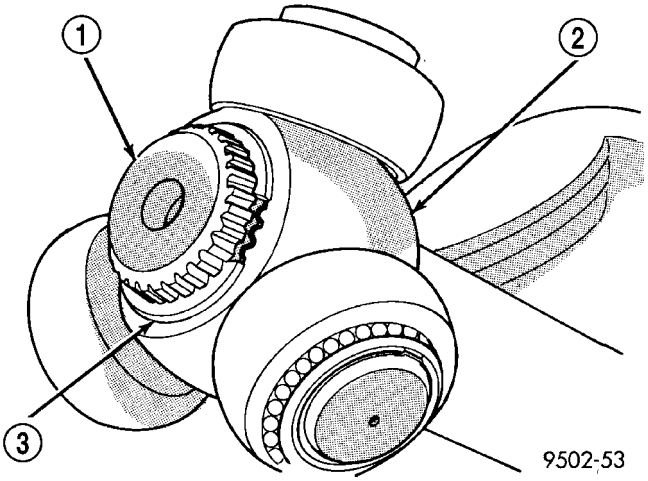


Fig. 13 Spider Assembly Retaining Snap-Ring

1 - INTERCONNECTING SHAFT
2 - SPIDER ASSEMBLY
3 - RETAINING SNAP-RING

(8) Slide sealing boot off interconnecting shaft.

(9) Thoroughly clean and inspect spider assembly, tripod joint housing, and interconnecting shaft for any signs of excessive wear. **If any parts show signs of excessive wear, the half shaft assembly will require replacement. Component parts of these half shaft assemblies are not serviceable.**

CV BOOT - INNER (Continued)

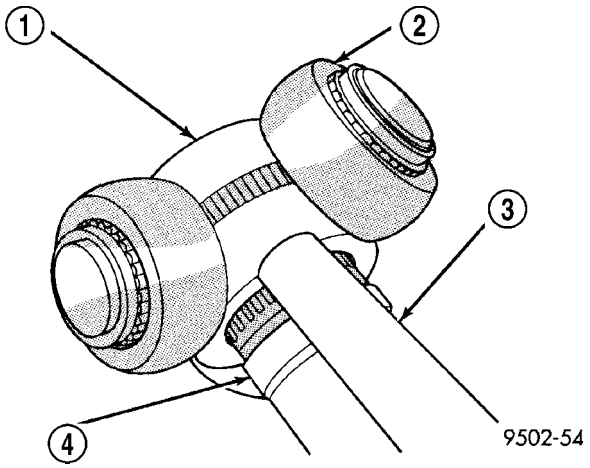


Fig. 14 Spider Assembly Removal from Interconnecting Shaft

1 - SPIDER ASSEMBLY
2 - DO NOT HIT SPIDER ASSEMBLY BEARINGS WHEN REMOVING SPIDER ASSEMBLY
3 - BRASS DRIFT
4 - INTERCONNECTING SHAFT

INSTALLATION

(1) Slide inner CV joint seal boot retaining clamp, onto the interconnecting shaft. Then, slide the replacement inner CV joint sealing boot onto the interconnecting shaft. **Inner CV joint seal boot MUST be positioned on interconnecting shaft so the raised bead on the inside of the small diameter end of the seal boot is in mating groove on interconnecting shaft (Fig. 15).**

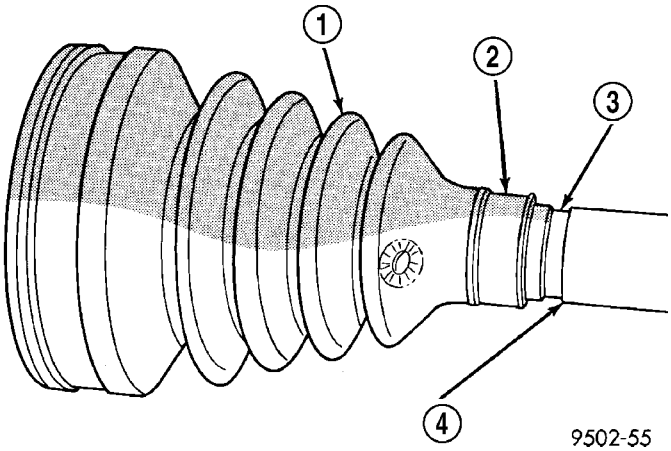


Fig. 15 Sealing Boot Installation on Interconnecting Shaft

1 - SEALING BOOT
2 - RAISED BEAD IN THIS AREA OF SEALING BOOT
3 - GROOVE
4 - INTERCONNECTING SHAFT

(2) Install spider assembly onto interconnecting shaft (Fig. 16). Spider assembly must be installed on interconnecting shaft far enough to fully install spider retaining snap-ring. If the spider assembly will not fully install on interconnecting shaft by hand, it can be installed by tapping the spider body with a brass drift (Fig. 17). **Do not hit the outer tripod bearings in an attempt to install spider assembly on interconnecting shaft.**

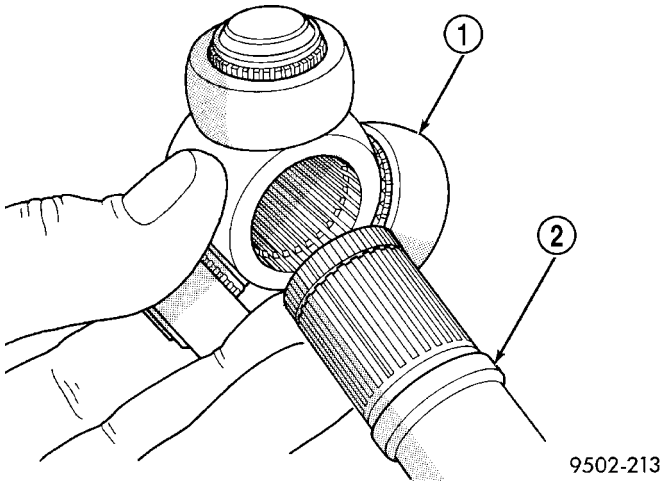


Fig. 16 Spider Assembly Installation on Interconnecting Shaft

1 - SPIDER ASSEMBLY
2 - INTERCONNECTING SHAFT

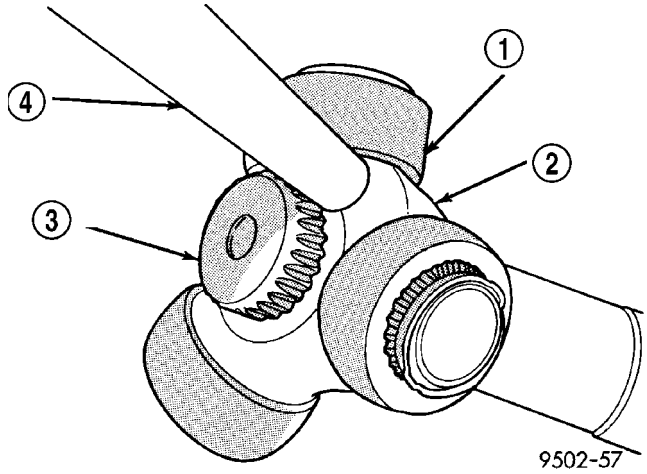


Fig. 17 Installing Spider Assembly on Interconnecting Shaft

1 - DO NOT HIT BEARINGS WHEN INSTALLING THE SPIDER ASSEMBLY
2 - SPIDER ASSEMBLY
3 - INTERCONNECTING SHAFT
4 - BRASS DRIFT

(3) Install the spider assembly to interconnecting shaft retaining snap-ring into groove on end of interconnecting shaft (Fig. 18). Be sure the snap-ring is fully seated into groove on interconnecting shaft.

CV BOOT - INNER (Continued)

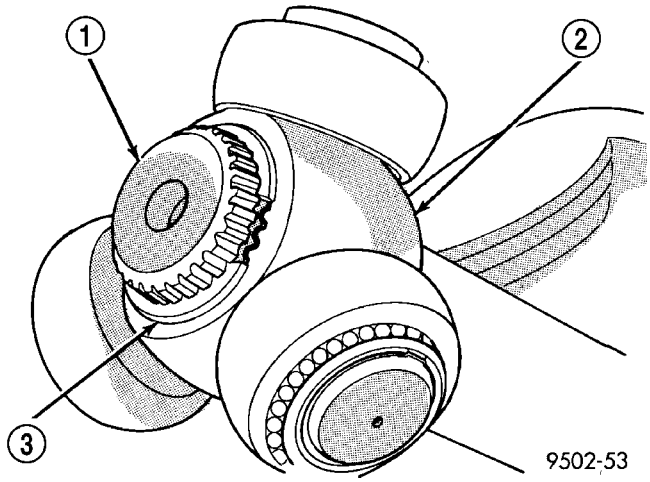


Fig. 18 Spider Assembly Retaining Snap-Ring Installed

1 - INTERCONNECTING SHAFT
2 - SPIDER ASSEMBLY
3 - RETAINING SNAP-RING

(4) Distribute 1/2 the amount of grease provided in the seal boot service package (DO NOT USE ANY OTHER TYPE OF GREASE) into tripod housing. Put the remaining amount into the sealing boot.

(5) Align tripod housing with spider assembly and then slide tripod housing over spider assembly and interconnecting shaft (Fig. 19).

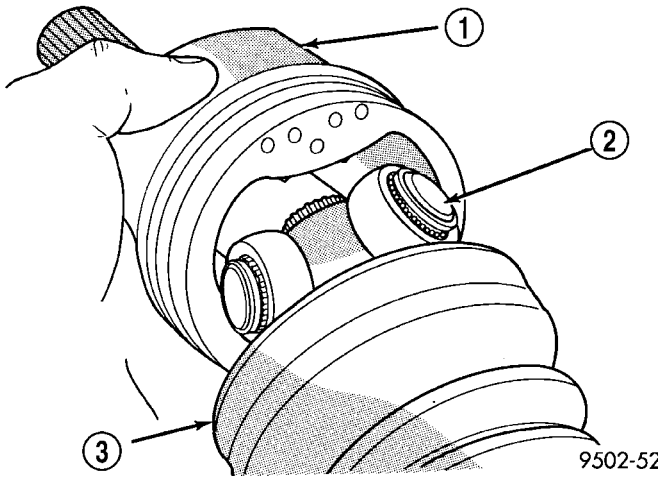


Fig. 19 Installing Tripod Housing on Spider Assembly

1 - TRIPOD JOINT HOUSING
2 - SPIDER ASSEMBLY
3 - SEALING BOOT

(6) Install inner CV joint seal boot to interconnecting shaft clamp evenly on sealing boot.

(7) Place crimping tool C-4975-A over bridge of clamp (Fig. 20).

(8) Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 21).

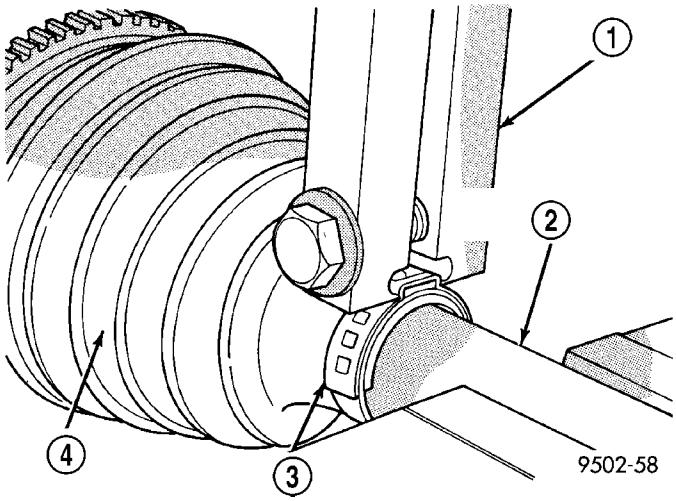


Fig. 20 Crimping Tool Installed on Sealing Boot Clamp - Typical

1 - SPECIAL TOOL C-4975-A
2 - INTERCONNECTING SHAFT
3 - CLAMP
4 - SEALING BOOT

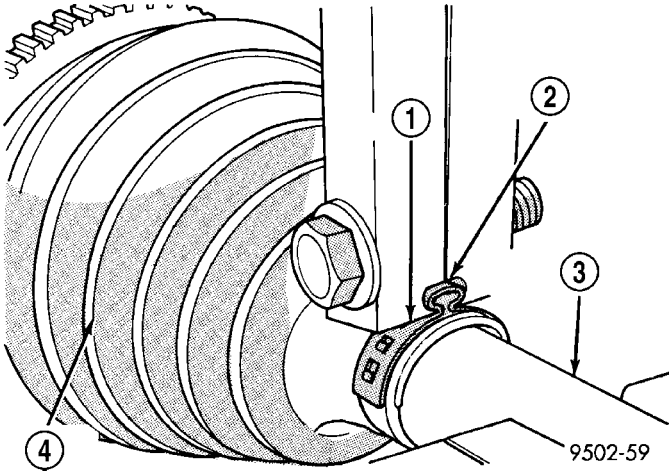


Fig. 21 Sealing Boot Retaining Clamp Installed - Typical

1 - CLAMP
2 - JAWS OF SPECIAL TOOL C-4975-A MUST BE CLOSED COMPLETELY TOGETHER HERE
3 - INTERCONNECTING SHAFT
4 - SEALING BOOT

CAUTION: Seal boot must not be dimpled, stretched or out of shape in any way. If seal boot is NOT shaped correctly, equalize pressure in seal and shape it by hand.

(9) Position sealing boot into the tripod housing retaining groove. Install seal boot retaining clamp evenly on sealing boot.

CV BOOT - INNER (Continued)

(10) Position trilobal boot to interface with the tripod housing. The lobes of the boot must be properly aligned with the recess's of the tripod housing.

CAUTION: The following positioning procedure determines the correct air pressure inside the inner CV joint assembly prior to clamping the sealing boot to inner CV joint housing. If this procedure is not done prior to clamping sealing boot to CV joint housing sealing boot durability can be adversely affected.

CAUTION: When venting the inner CV joint assembly, use care so that the inner CV sealing boot does not get punctured, or in any other way damaged. If sealing boot is punctured, or damaged in any way while being vented, the sealing boot can not be used.

(11) Insert a trim stick between the CV joint housing and the sealing boot insert to vent inner CV joint assembly (Fig. 22). **When inserting trim stick between tripod housing and sealing boot ensure trim stick is held flat and firmly against the tripod housing. If this is not done damage to the sealing boot can occur.**

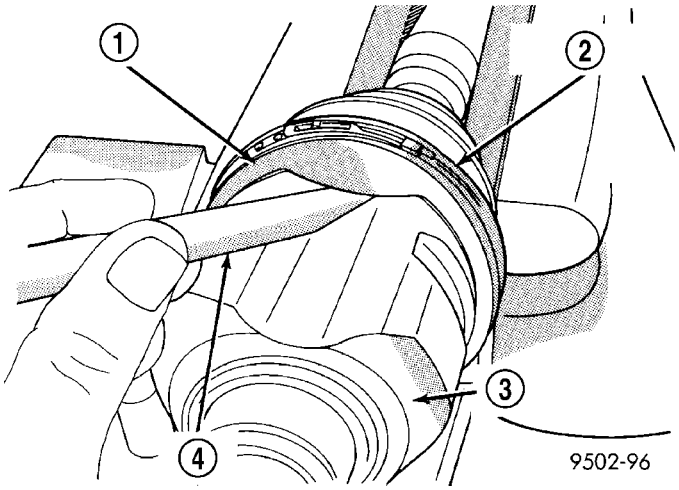


Fig. 22 Trim Stick Inserted for Venting CV Joint

1 - INNER CV JOINT SEALING BOOT
2 - SEALING BOOT CLAMP
3 - INNER CV JOINT HOUSING
4 - TRIM STICK

(12) With trim stick inserted between sealing boot insert and the CV joint housing, position the interconnecting shaft so it is at the center of its travel in the tripod joint housing. Remove the trim stick from between the sealing boot insert and the CV joint housing. **This procedure will equalize the air pressure in the CV joint, preventing premature sealing boot failure.**

(13) Clamp CV joint sealing boot to CV joint, using required procedure for type of boot clamp application.

CRIMP TYPE BOOT CLAMP

If seal boot uses crimp type boot clamp, use the following procedure to install the retaining clamp.

(1) Place crimping tool C-4975-A over bridge of clamp (Fig. 23).

(2) Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 24).

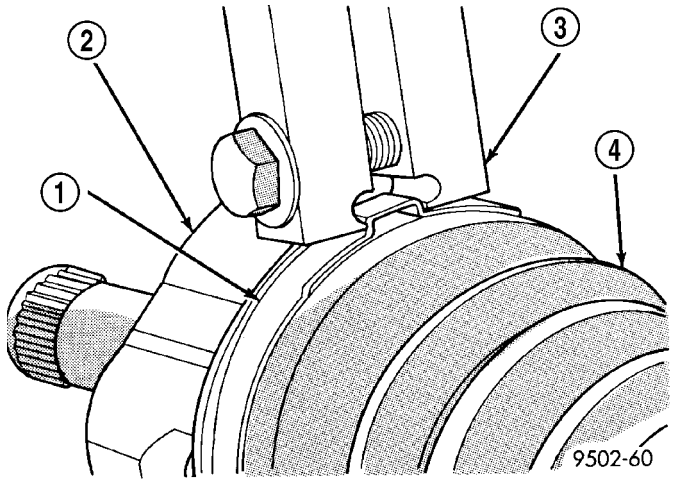


Fig. 23 Crimping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - TRIPOD JOINT HOUSING
3 - SPECIAL TOOL C-4975-A
4 - SEALING BOOT

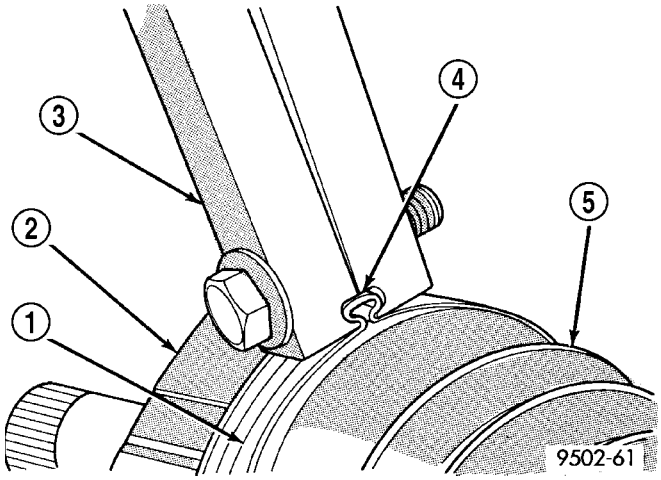


Fig. 24 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - TRIPOD HOUSING
3 - SPECIAL TOOL C-4975-A
4 - JAWS OF SPECIAL TOOL C-4975-A MUST BE CLOSED COMPLETELY TOGETHER HERE
5 - SEALING BOOT

CV BOOT - INNER (Continued)

LATCHING TYPE BOOT CLAMP

If seal boot uses low profile latching type boot clamp, use the following procedure to install the retaining clamp.

(1) Place prongs of clamp locking tool in the holes of the clamp (Fig. 25).

(2) Squeeze tool together until top band of clamp is latched behind the two tabs on lower band of clamp (Fig. 26).

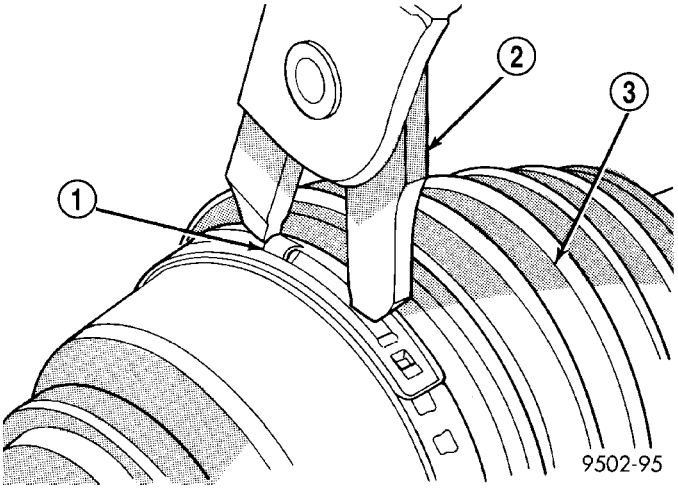


Fig. 25 Clamping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - TOOL YA3050, OR EQUIVALENT
3 - SEALING BOOT

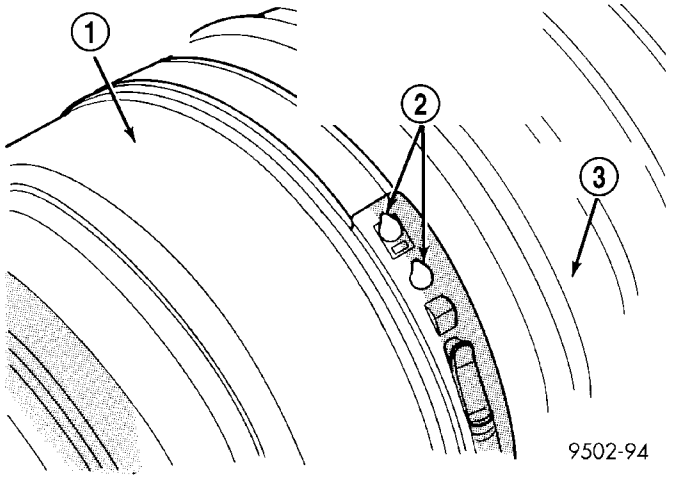


Fig. 26 Sealing Boot Clamp Correctly Installed

1 - INNER TRIPOD JOINT HOUSING
2 - TOP BAND OF CLAMP MUST BE RETAINED BY TABS AS SHOWN HERE TO CORRECTLY LATCH BOOT CLAMP
3 - SEALING BOOT

(14) Install the half shaft back into the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

CV BOOT - OUTER

REMOVAL

(1) Remove halfshaft assembly requiring boot replacement from vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(2) Remove large boot clamp retaining C/V joint sealing boot to C/V joint housing (Fig. 27) and discard. Remove small clamp that retains outer C/V joint sealing boot to interconnecting shaft and discard. Remove sealing boot from outer C/V joint housing and slide it down interconnecting shaft.

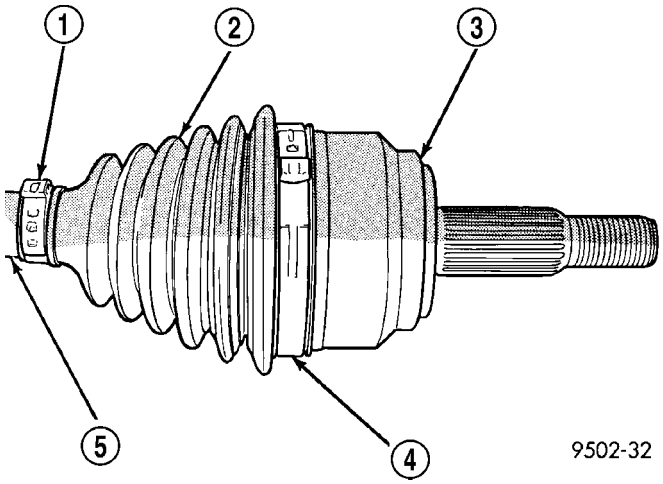


Fig. 27 Outer C/V Joint Seal Boot Clamps

1 - SMALL CLAMP
2 - SEALING BOOT
3 - OUTER C/V JOINT HOUSING
4 - LARGE CLAMP
5 - INTERCONNECTING SHAFT

(3) Wipe away grease to expose outer C/V joint and interconnecting shaft.

(4) Remove outer C/V joint from interconnecting shaft using the following procedure: Support interconnecting shaft in a vise equipped with protective caps on jaws of vise to prevent damage to interconnecting shaft. Then, using a soft–faced hammer, sharply hit the end of the C/V joint housing to dislodge housing from internal circlip on interconnecting shaft (Fig. 28). Then slide outer C/V joint off end of interconnecting shaft, joint may have to be tapped off shaft using a **soft–faced** hammer.

(5) Remove large circlip (Fig. 29) from the interconnecting shaft before attempting to remove outer C/V joint sealing boot.

CV BOOT - OUTER (Continued)

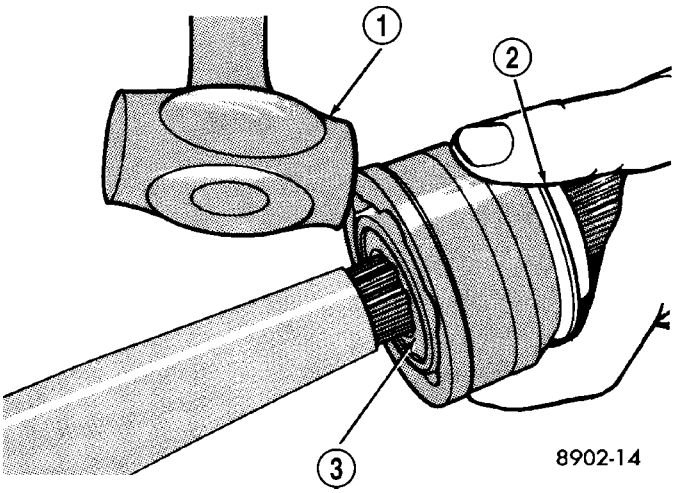


Fig. 28 Outer C/V Joint Removal from Interconnecting Shaft

1 - SOFT HAMMER (TAP INNER RACE ONLY)
2 - WEAR SLEEVE
3 - CIRCLIP (OUTER END OF SHAFT)

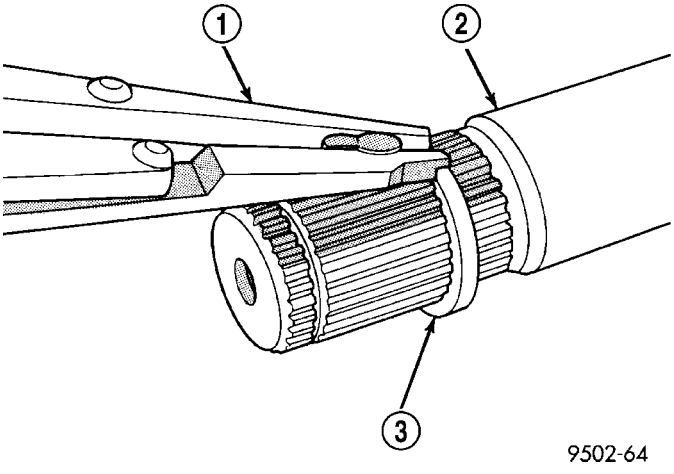


Fig. 29 Circlip Removal from Interconnecting Shaft

1 - SNAP RING PLIERS
2 - INTERCONNECTING SHAFT
3 - CIRCLIP

(6) Slide sealing boot off interconnecting shaft.

(7) Thoroughly clean and inspect outer C/V joint assembly and interconnecting joint for any signs of excessive wear. **If any parts show signs of excessive wear, the halfshaft assembly will require replacement. Component parts of these halfshaft assemblies are not serviceable.**

INSTALLATION

(1) Slide new sealing boot to interconnecting shaft retaining clamp onto interconnecting shaft. Slide the outer C/V joint assembly sealing boot onto the interconnecting shaft (Fig. 30). **Seal boot MUST be positioned on interconnecting shaft so the raised bead on the inside of the seal boot is in groove on interconnecting shaft.**

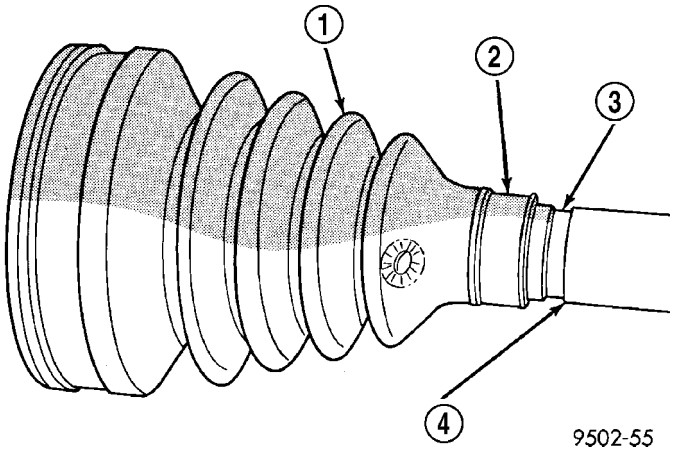


Fig. 30 Sealing Boot Installation on Interconnecting Shaft

1 - SEALING BOOT
2 - RAISED BEAD IN THIS AREA OF SEALING BOOT
3 - GROOVE
4 - INTERCONNECTING SHAFT

(2) Align splines on interconnecting shaft with splines on cross of outer C/V joint assembly and start outer C/V joint onto interconnecting shaft.

(3) Install outer C/V joint assembly onto interconnecting shaft by using a **soft–faced** hammer and tapping end of stub axle (with hub nut installed) until outer C/V joint is fully seated on interconnecting shaft (Fig. 31).

(4) Outer C/V joint assembly must be installed on interconnecting shaft until cross of outer C/V joint assembly is seated against circlip on interconnecting shaft (Fig. 32).

(5) Distribute 1/2 the amount of grease provided in seal boot service package (DO NOT USE ANY OTHER TYPE OF GREASE) into outer C/V joint assembly housing. Put the remaining amount into the sealing boot.

(6) Install outer C/V joint sealing boot to interconnecting shaft clamp evenly on sealing boot.

CV BOOT - OUTER (Continued)

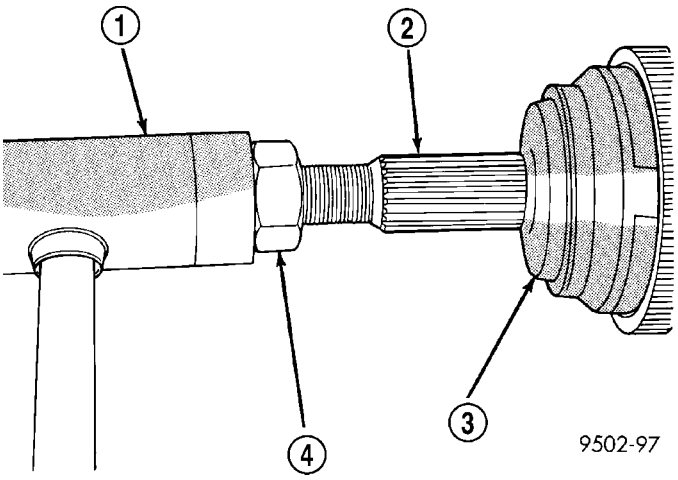


Fig. 31 Outer C/V Joint Installation on Interconnecting

1 - SOFT FACED HAMMER
2 - STUB AXLE
3 - OUTER C/V JOINT
4 - HUB NUT

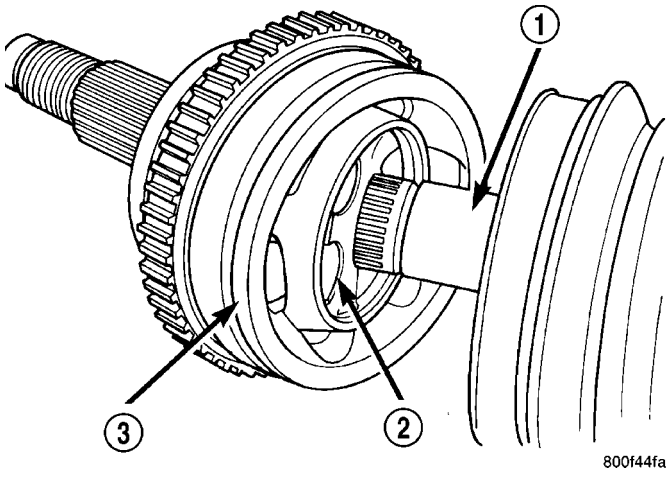


Fig. 32 Outer C/V Joint Correctly Installed on Interconnecting Shaft

1 - INTERCONNECTING SHAFT
2 - CROSS
3 - OUTER C/V JOINT ASSEMBLY

(7) Clamp sealing boot onto interconnecting shaft using crimper, Special Tool C-4975-A and the following procedure. Place crimping tool C-4975-A over bridge of clamp (Fig. 33). Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 34).

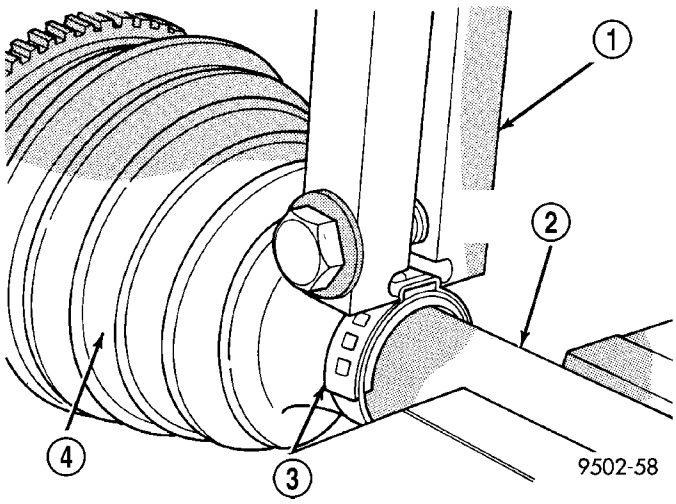


Fig. 33 Crimping Tool Installed on Sealing Boot Clamp

1 - SPECIAL TOOL C-4975A
2 - INTERCONNECTING SHAFT
3 - CLAMP
4 - SEALING BOOT

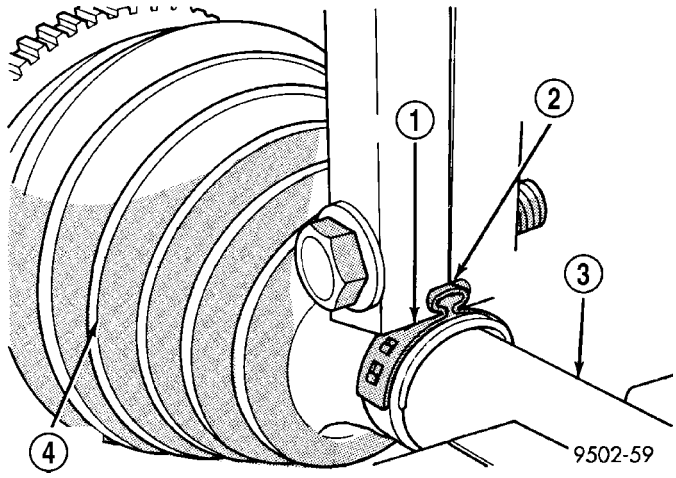


Fig. 34 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
3 - INTERCONNECTING SHAFT
4 - SEALING BOOT

CAUTION: Seal must not be dimpled, stretched, or out–of–shape in any way. If seal is NOT shaped correctly, equalize pressure in seal and shape it by hand.

CV BOOT - OUTER (Continued)

(8) Position outer C/V joint sealing boot into its retaining groove on outer C/V joint housing. Install sealing boot to outer C/V joint retaining clamp evenly on sealing boot.

(9) Clamp sealing boot onto outer C/V joint housing using Crimper, Special Tool C-4975-A and the following procedure. Place crimping tool C-4975-A over bridge of clamp (Fig. 35). Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 36).

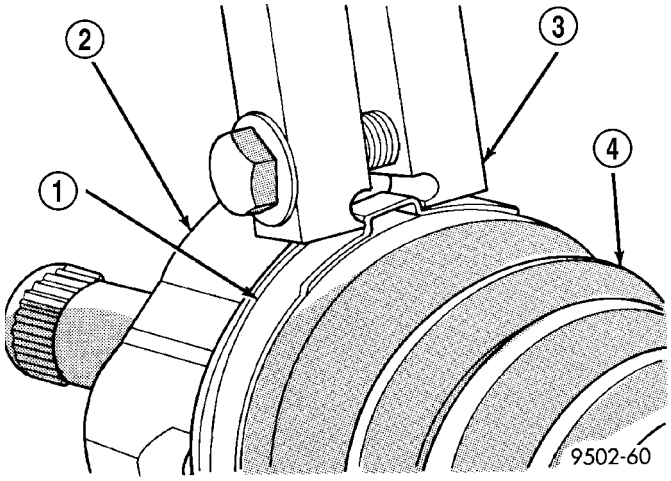


Fig. 35 Crimping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - TRIPOD JOINT HOUSING
3 - SPECIAL TOOL C-4975A
4 - SEALING BOOT

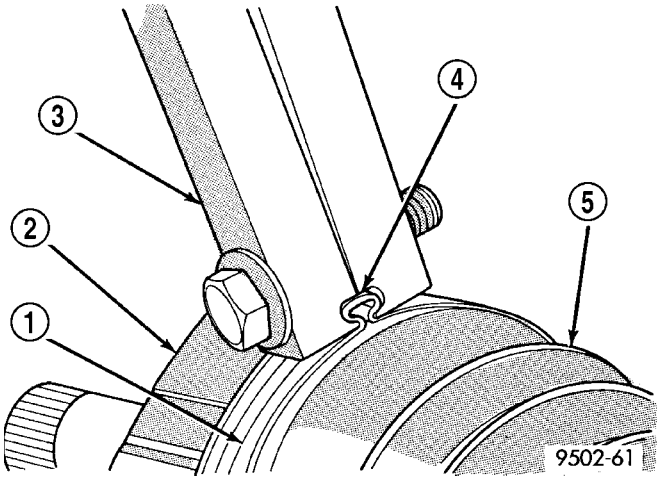


Fig. 36 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - TRIPOD HOUSING
3 - SPECIAL TOOL C-4975A
4 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
5 - SEALING BOOT

(10) Install the halfshaft requiring boot replacement back on the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

HALF SHAFT - REAR

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HALF SHAFT - REAR

DESCRIPTION

The inner joints of both half shaft assemblies are tripod joints. The outer joints of both assemblies are Rzeppa Joints. The tripod joints are true constant velocity (CV) joint assemblies, which allow for the changes in half shaft length through the jounce and rebound travel of the rear suspension.

The inner tripod joint of both half shafts is splined into the rear differential assembly and retained by a snap ring. The outer CV joint has a stub shaft that is splined into the wheel hub and retained by a steel hub nut.

DIAGNOSIS AND TESTING - HALF SHAFT

VEHICLE INSPECTION

(1) Check for grease in the vicinity of the inboard tripod joint and outboard CV joint; this is a sign of inner or outer joint seal boot or seal boot clamp damage.

NOISE AND/OR VIBRATION IN TURNS

A clicking noise and/or a vibration in turns could be caused by one of the following conditions:

- Damaged outer CV or inner tripod joint seal boot or seal boot clamps. This will result in the loss and/or contamination of the joint grease, resulting in inadequate lubrication of the joint.
- Noise may also be caused by another component of the vehicle coming in contact with the half shafts.

CLUNKING NOISE DURING ACCELERATION

This noise may be a result of one of the following conditions:

- A torn seal boot on the inner or outer joint of the half shaft assembly.
- A loose or missing clamp on the inner or outer joint of the half shaft assembly.
- A damaged or worn half shaft CV joint.

CLICKING/POPPING NOISE DURING SHIFT (R-to-D or D-to-R)

This noise may be caused by a lack of lubrication at halfshaft-to-hub splines and abutment face.

SHUDDER OR VIBRATION DURING ACCELERATION

This problem could be a result of:

- A worn or damaged half shaft inner tripod joint.
- A sticking tripod joint spider assembly (inner tripod joint only).
- Improper wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

VIBRATION AT HIGHWAY SPEEDS

This problem could be a result of:

- Foreign material (mud, etc.) packed on the backside of the wheel(s).
- Out of balance tires or wheels. (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE)
- Improper tire and/or wheel runout. (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING)

REMOVAL

NOTE: Rear suspension and drivetrain design require this procedure to be performed on a “drive-on” hoist, as the front and rear suspension needs to be compressed to ride height to facilitate rear halfshaft removal.

(1) Place vehicle on drive-on hoist in Park.
(2) Remove rear wheel center cap.
(3) Remove cotter pin, nut lock, and spring washer (Fig. 1).
(4) Remove hub nut and washer.
(5) Raise vehicle on hoist.
(6) Remove exhaust system center hanger (at propeller shaft bearing/support).
(7) Disconnect exhaust system at rear-most hanger and lower.

HALF SHAFT - REAR (Continued)

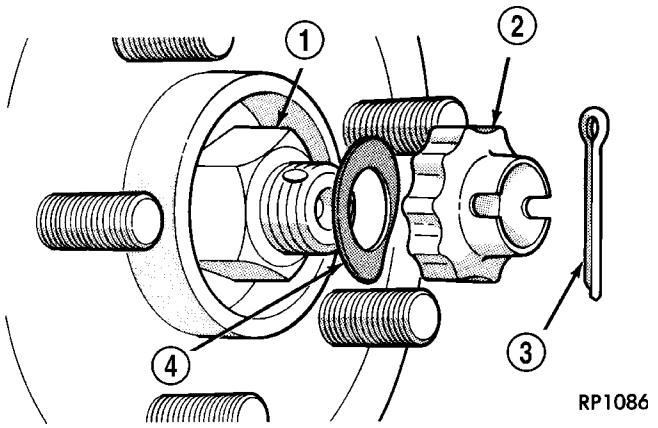


Fig. 1 Cotter Pin, Nut Lock, And Spring Washer

1 - HUB NUT
2 - NUT LOCK
3 - COTTER PIN
4 - SPRING WASHER

(8) Lower exhaust system at least 254 mm (10 in.). Support system with suitable wire or rope.

(9) Index propeller shaft and rear driveline module flanges using paint mark, chalk, etc. for installation reference.

(10) Remove three (3) propeller shaft-to-driveline module bolts. Do not attempt to disconnect shaft from module, as it will be disconnected upon lowering driveline module.

(11) Support driveline module with transmission jack (or equivalent) (Fig. 2).

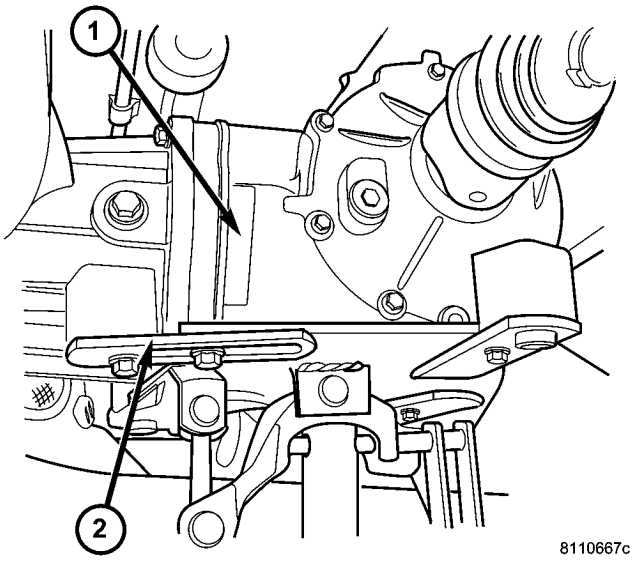


Fig. 2 Support Module with Jack

1 - DRIVELINE MODULE
2 - TRANSMISSION JACK

(12) Using suitable screwdriver, partially dislodge halfshaft (side being removed) from differential. Install Tool 9099 to protect seal upon disassembly (Fig. 3).

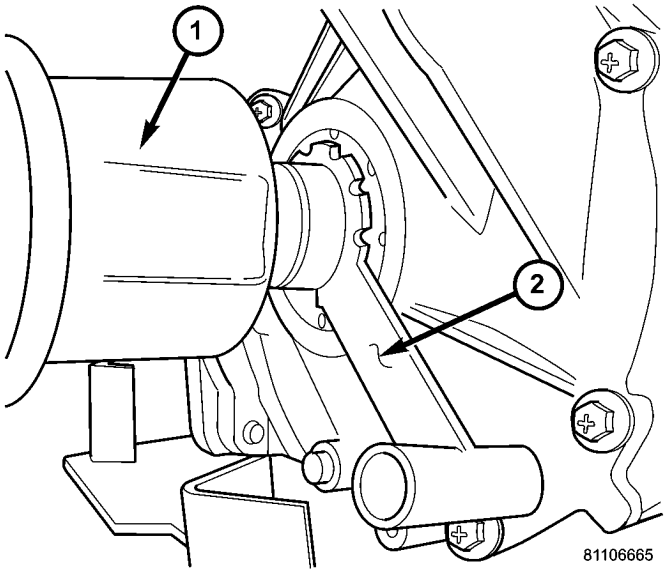


Fig. 3 Install Seal Protector

1 - HALFSHAFT
2 - SEAL PROTECTOR

(13) Remove three (3) rear driveline module-to-crossmember bolts (Fig. 4) (Fig. 5).

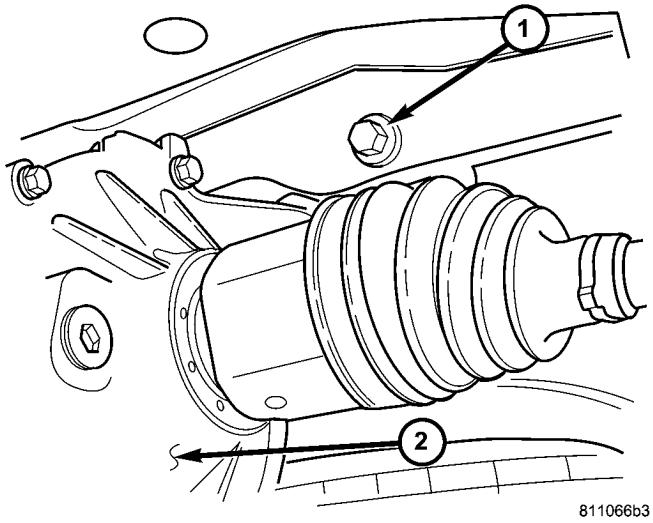


Fig. 4 Module Mounting Bolt

1 - BOLT
2 - DRIVELINE MODULE

(14) Lower driveline module assembly just enough to facilitate removal of shaft from differential. Make sure Tool 9099 engages seal.

(15) Disconnect propeller shaft from driveline module and secure to exhaust system (Fig. 6).

HALF SHAFT - REAR (Continued)

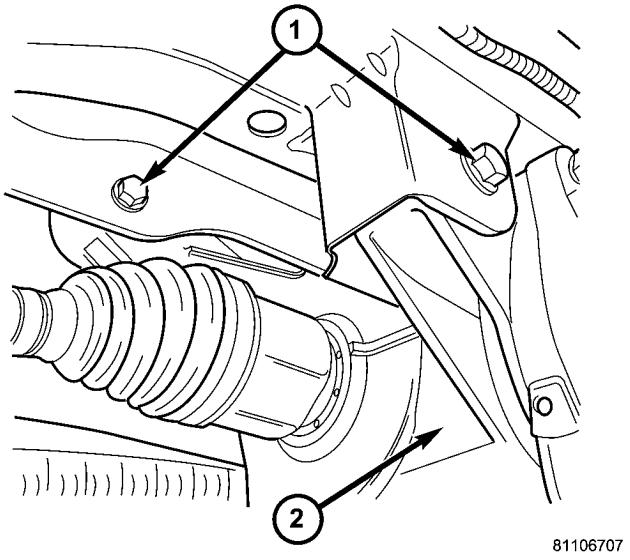


Fig. 5 Module Mounting Bolts

1 - BOLT (2)
2 - DRIVELINE MODULE

CAUTION: Do not allow the propeller shaft to hang from the vehicle unsupported. Damage may occur to the joint, boot, and center bearing from over-angulation.

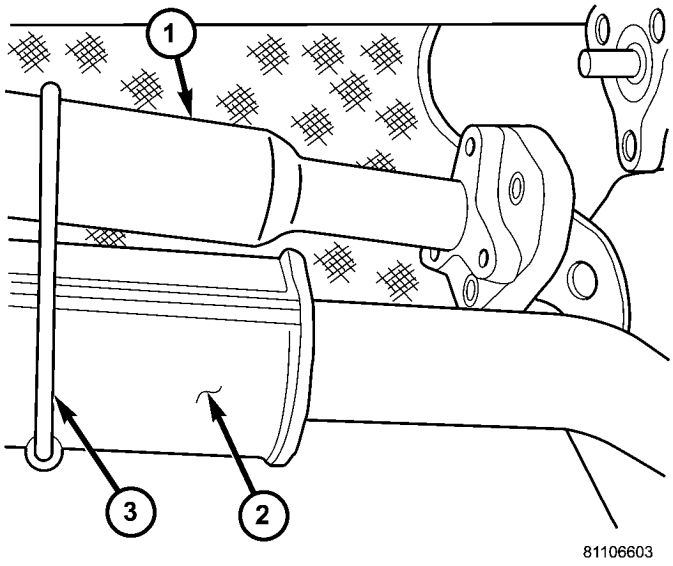


Fig. 6 Secure Propeller Shaft to Exhaust

1 - PROPELLER SHAFT
2 - EXHAUST SYSTEM
3 - STRAP

(16) Remove halfshaft from hub/bearing assembly.

INSTALLATION

(1) Install halfshaft to hub/bearing assembly. Install hub nut and washer but do not tighten at this time.

(2) Using Tool 9099, install halfshaft to differential assembly (Fig. 7).

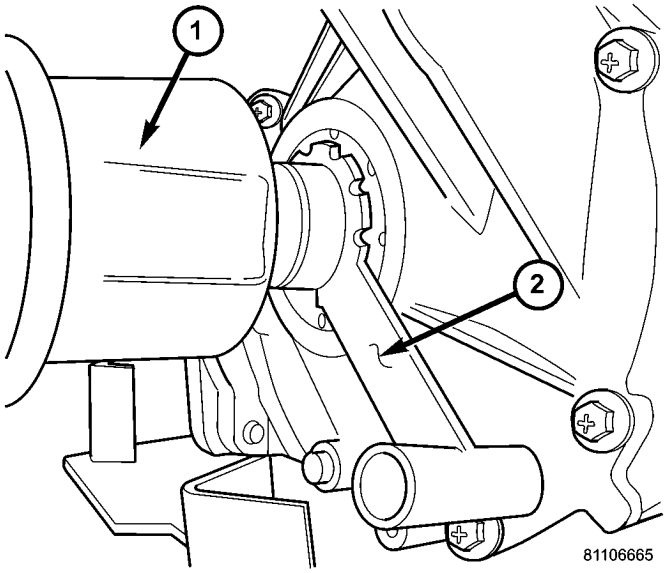


Fig. 7 Install Seal Protector

1 - HALFSHAFT
2 - SEAL PROTECTOR

(3) Index and install propeller shaft to driveline module flange. Install, but do not tighten, three (3) propeller shaft-to-driveline module bolts.

(4) Raise driveline module into position. Install and torque module-to-cradle bolts to 102 N·m (75 ft. lbs.) (Fig. 8) (Fig. 9).

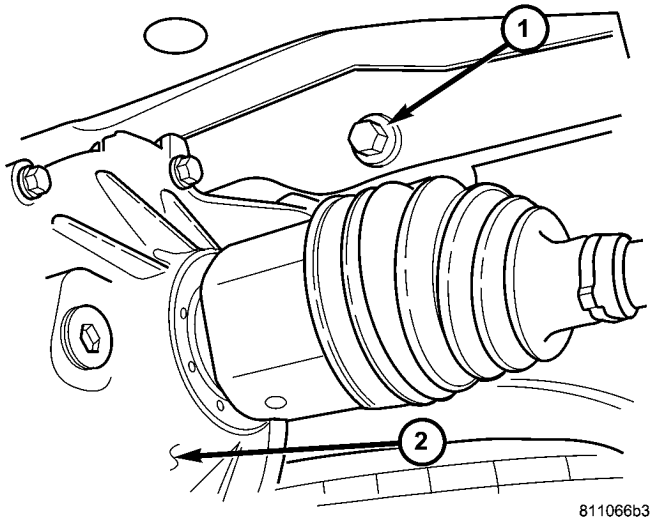


Fig. 8 Module Mounting Bolt

1 - BOLT
2 - DRIVELINE MODULE

(5) Torque propeller shaft-to-driveline module bolts to 54 N·m (40 ft.lbs.)

HALF SHAFT - REAR (Continued)

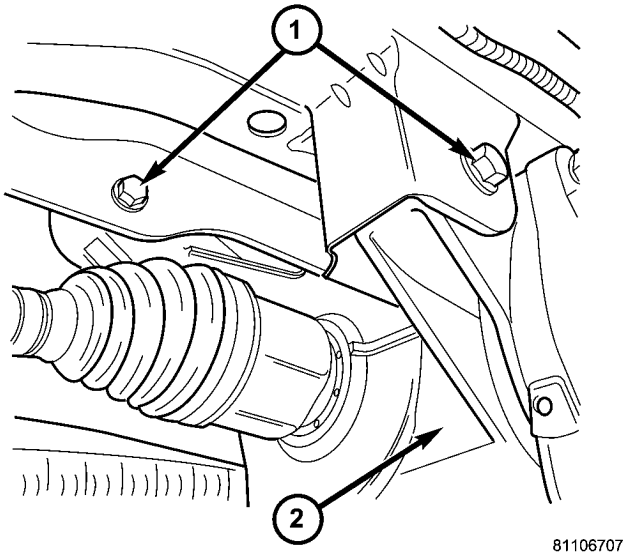


Fig. 9 Module Mounting Bolts

1 - BOLT (2)
2 - DRIVELINE MODULE

(6) Torque the halfshaft/hub nut to 244 N·m (180 ft.lbs.).

(7) Install the spring washer, nut lock, and a new cotter pin (Fig. 10).

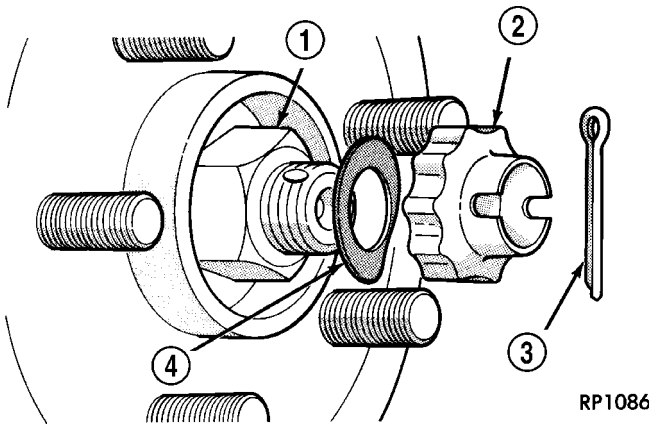


Fig. 10 Cotter Pin, Nut Lock, And Spring Washer

1 - HUB NUT
2 - NUT LOCK
3 - COTTER PIN
4 - SPRING WASHER

(8) Install wheel center cap.

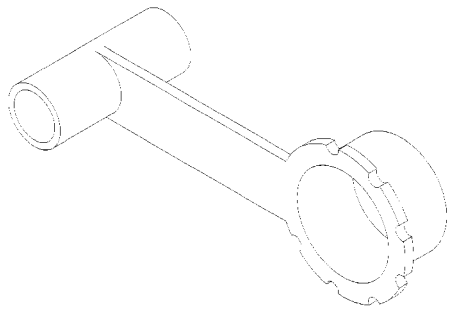
(9) Check and adjust differential fluid level. (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR DRIVELINE MODULE/FLUID - STANDARD PROCEDURE)

SPECIFICATIONS - HALF SHAFT - REAR

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, Propeller Shaft-to-Driveline Module	55	40	—
Bolt/Nut, Driveline Module-to-Cradle	102	75	—
Nut, Hub	244	180	—
Nuts, Rear Wheel Lug	135	100	—

SPECIAL TOOLS



Protector, 9099

CV BOOT - INNER

REMOVAL

(1) Remove the half shaft requiring boot replacement from the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(2) Remove large boot clamp which retains inner tripod joint sealing boot to tripod joint housing and discard.

(3) Remove small clamp which retains inner tripod joint sealing boot to interconnecting shaft and discard.

(4) Remove the sealing boot from the tripod housing and slide it down the interconnecting shaft.

CV BOOT - INNER (Continued)

(5) Slide the tripod joint housing off the spider assembly and the interconnecting shaft (Fig. 11).

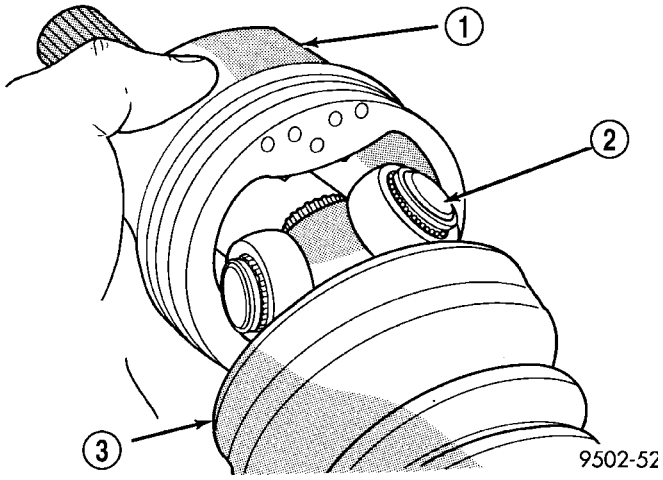


Fig. 11 Spider Assembly Removal from Tripod Joint Housing

1 - TRIPOD JOINT HOUSING
2 - SPIDER ASSEMBLY
3 - SEALING BOOT

(6) Remove snap-ring which retains spider assembly to interconnecting shaft (Fig. 12). **Do not hit the outer tripod bearings in an attempt to remove spider assembly from interconnecting shaft.**

(7) Remove the spider assembly from interconnecting shaft. If spider assembly will not come off interconnecting shaft by hand, it can be removed by tapping spider assembly with a brass drift (Fig. 13).

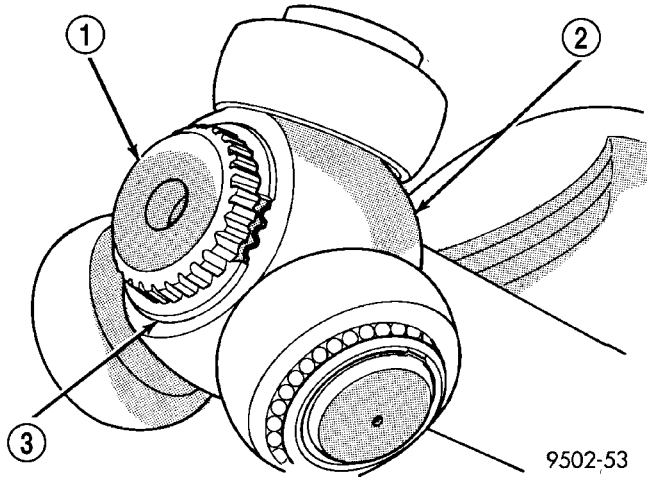


Fig. 12 Spider Assembly Retaining Snap-Ring

1 - INTERCONNECTING SHAFT
2 - SPIDER ASSEMBLY
3 - RETAINING SNAP-RING

(8) Slide sealing boot off interconnecting shaft.

(9) Thoroughly clean and inspect spider assembly, tripod joint housing, and interconnecting shaft for any signs of excessive wear. **If any parts show signs of excessive wear, the half shaft assembly will require replacement. Component parts of these half shaft assemblies are not serviceable.**

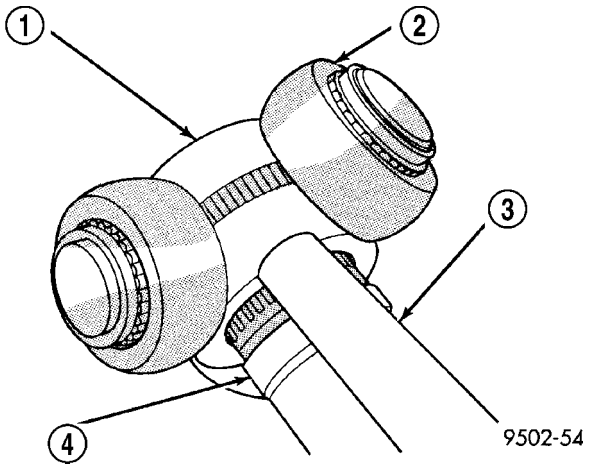


Fig. 13 Spider Assembly Removal from Interconnecting Shaft

1 - SPIDER ASSEMBLY
2 - DO NOT HIT SPIDER ASSEMBLY BEARINGS WHEN REMOVING SPIDER ASSEMBLY
3 - BRASS DRIFT
4 - INTERCONNECTING SHAFT

INSTALLATION

(1) Slide inner CV joint seal boot retaining clamp, onto the interconnecting shaft. Then, slide the replacement inner CV joint sealing boot onto the interconnecting shaft. **Inner CV joint seal boot MUST be positioned on interconnecting shaft so the raised bead on the inside of the small diameter end of the seal boot is in mating groove on interconnecting shaft (Fig. 14).**

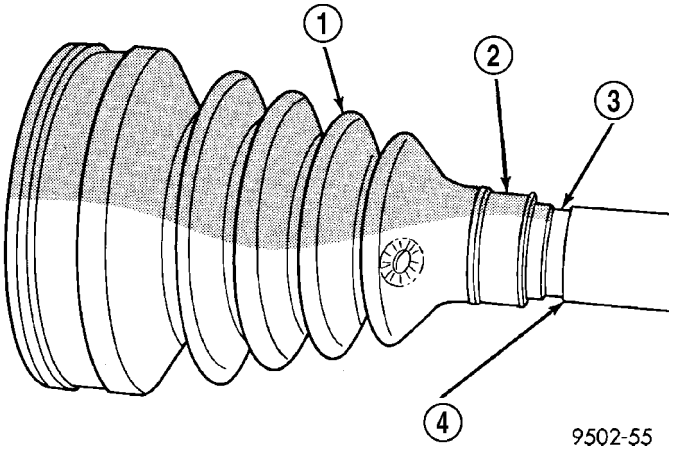


Fig. 14 Sealing Boot Installation on Interconnecting Shaft

1 - SEALING BOOT
2 - RAISED BEAD IN THIS AREA OF SEALING BOOT
3 - GROOVE
4 - INTERCONNECTING SHAFT

CV BOOT - INNER (Continued)

(2) Install spider assembly onto interconnecting shaft (Fig. 15). Spider assembly must be installed on interconnecting shaft far enough to fully install spider retaining snap-ring. If the spider assembly will not fully install on interconnecting shaft by hand, it can be installed by tapping the spider body with a brass drift (Fig. 16). **Do not hit the outer tripod bearings in an attempt to install spider assembly on interconnecting shaft.**

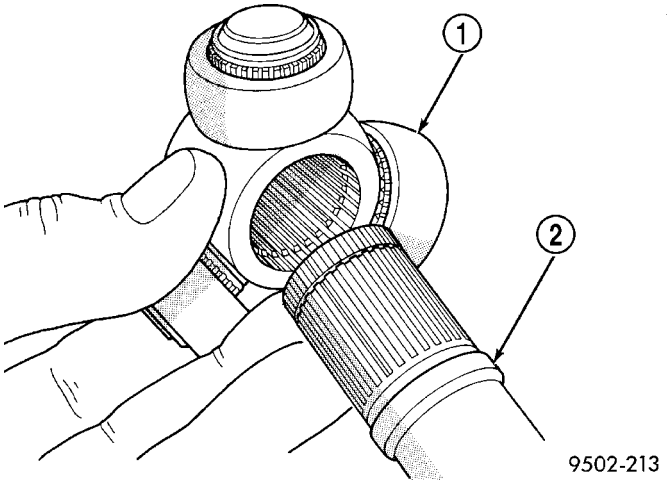


Fig. 15 Spider Assembly Installation on Interconnecting Shaft

1 - SPIDER ASSEMBLY
2 - INTERCONNECTING SHAFT

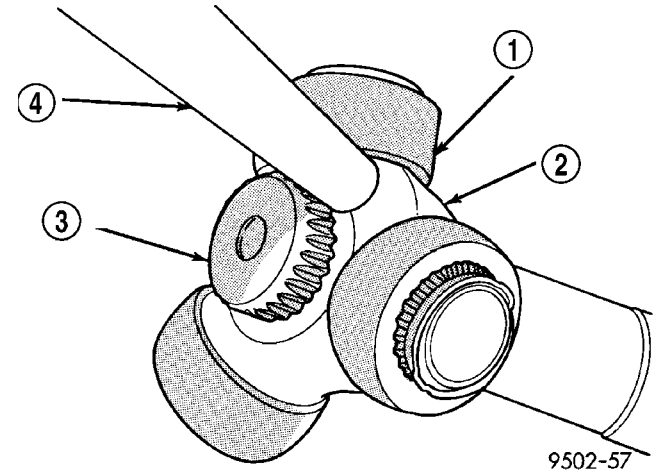


Fig. 16 Installing Spider Assembly on Interconnecting Shaft

1 - DO NOT HIT BEARINGS WHEN INSTALLING THE SPIDER ASSEMBLY
2 - SPIDER ASSEMBLY
3 - INTERCONNECTING SHAFT
4 - BRASS DRIFT

(3) Install the spider assembly to interconnecting shaft retaining snap-ring into groove on end of interconnecting shaft (Fig. 17). Be sure the snap-ring is fully seated into groove on interconnecting shaft.

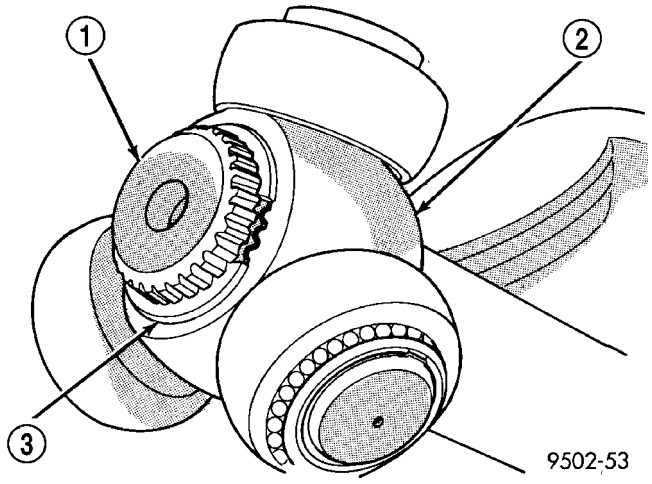


Fig. 17 Spider Assembly Retaining Snap-Ring Installed

1 - INTERCONNECTING SHAFT
2 - SPIDER ASSEMBLY
3 - RETAINING SNAP-RING

(4) Distribute 1/2 the amount of grease provided in the seal boot service package (DO NOT USE ANY OTHER TYPE OF GREASE) into tripod housing. Put the remaining amount into the sealing boot.

(5) Align tripod housing with spider assembly and then slide tripod housing over spider assembly and interconnecting shaft (Fig. 18).

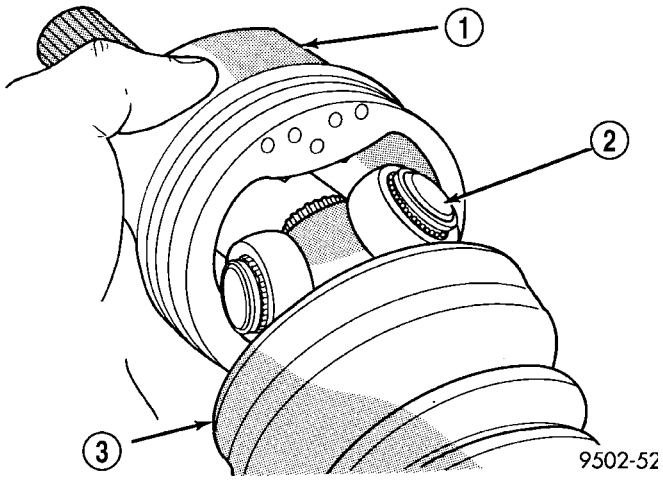


Fig. 18 Installing Tripod Housing on Spider Assembly

1 - TRIPOD JOINT HOUSING
2 - SPIDER ASSEMBLY
3 - SEALING BOOT

(6) Install inner CV joint seal boot to interconnecting shaft clamp evenly on sealing boot.

(7) Place crimping tool C-4975-A over bridge of clamp (Fig. 19).

CV BOOT - INNER (Continued)

(8) Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 20).

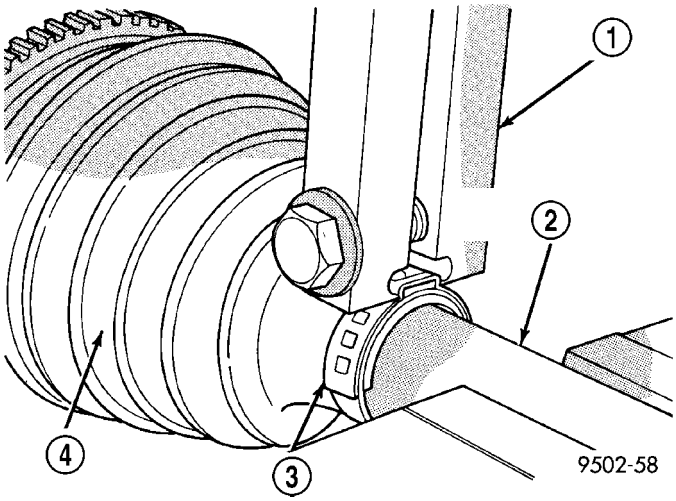


Fig. 19 Crimping Tool Installed on Sealing Boot Clamp - Typical

1 - SPECIAL TOOL C-4975-A
2 - INTERCONNECTING SHAFT
3 - CLAMP
4 - SEALING BOOT

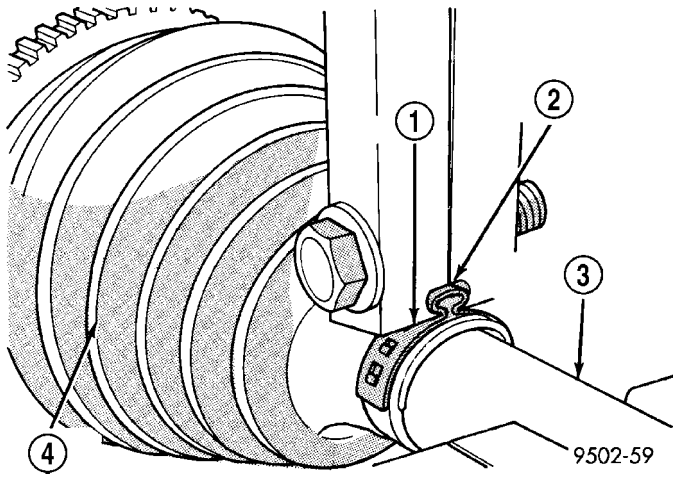


Fig. 20 Sealing Boot Retaining Clamp Installed - Typical

1 - CLAMP
2 - JAWS OF SPECIAL TOOL C-4975-A MUST BE CLOSED COMPLETELY TOGETHER HERE
3 - INTERCONNECTING SHAFT
4 - SEALING BOOT

CAUTION: Seal boot must not be dimpled, stretched or out of shape in any way. If seal boot is NOT shaped correctly, equalize pressure in seal and shape it by hand.

(9) Position sealing boot into the tripod housing retaining groove. Install seal boot retaining clamp evenly on sealing boot.

(10) Position trilobal boot to interface with the tripod housing. The lobes of the boot must be properly aligned with the recess's of the tripod housing.

CAUTION: The following positioning procedure determines the correct air pressure inside the inner CV joint assembly prior to clamping the sealing boot to inner CV joint housing. If this procedure is not done prior to clamping sealing boot to CV joint housing sealing boot durability can be adversely affected.

CAUTION: When venting the inner CV joint assembly, use care so that the inner CV sealing boot does not get punctured, or in any other way damaged. If sealing boot is punctured, or damaged in any way while being vented, the sealing boot can not be used.

(11) Insert a trim stick between the CV joint housing and the sealing boot insert to vent inner CV joint assembly (Fig. 21). **When inserting trim stick between tripod housing and sealing boot ensure trim stick is held flat and firmly against the tripod housing. If this is not done damage to the sealing boot can occur.**

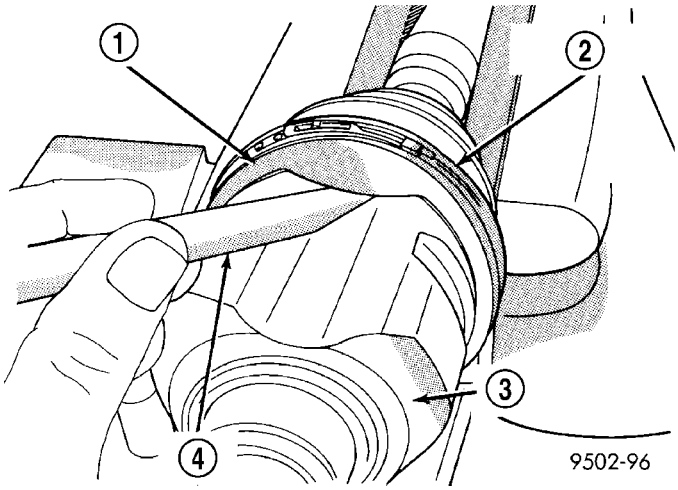


Fig. 21 Trim Stick Inserted for Venting CV Joint

1 - INNER CV JOINT SEALING BOOT
2 - SEALING BOOT CLAMP
3 - INNER CV JOINT HOUSING
4 - TRIM STICK

(12) With trim stick inserted between sealing boot insert and the CV joint housing, position the interconnecting shaft so it is at the center of its travel in the tripod joint housing. Remove the trim stick from between the sealing boot insert and the CV joint housing. **This procedure will equalize the air pressure in the CV joint, preventing premature sealing boot failure.**

CV BOOT - INNER (Continued)

(13) Clamp CV joint sealing boot to CV joint, using required procedure for type of boot clamp application.

CRIMP TYPE BOOT CLAMP

If seal boot uses crimp type boot clamp, use the following procedure to install the retaining clamp.

(1) Place crimping tool C-4975-A over bridge of clamp (Fig. 22).

(2) Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 23).

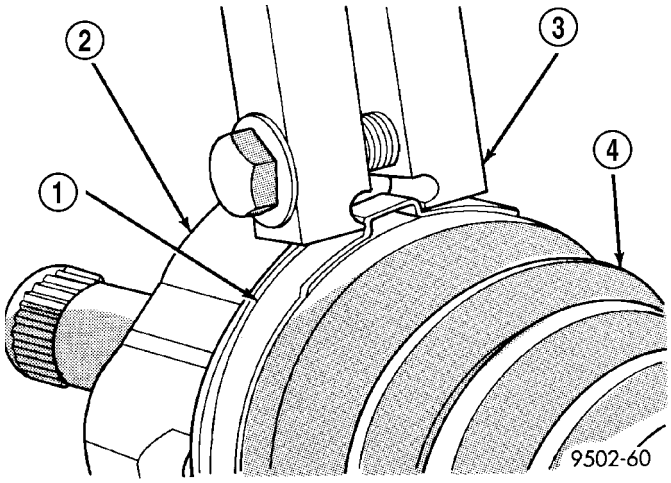


Fig. 22 Crimping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - TRIPOD JOINT HOUSING
3 - SPECIAL TOOL C-4975-A
4 - SEALING BOOT

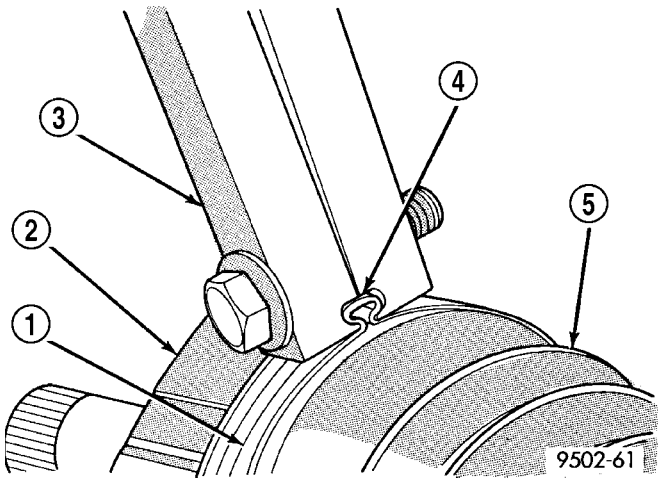


Fig. 23 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - TRIPOD HOUSING
3 - SPECIAL TOOL C-4975-A
4 - JAWS OF SPECIAL TOOL C-4975-A MUST BE CLOSED COMPLETELY TOGETHER HERE
5 - SEALING BOOT

LATCHING TYPE BOOT CLAMP

If seal boot uses low profile latching type boot clamp, use the following procedure to install the retaining clamp.

(1) Place prongs of clamp locking tool in the holes of the clamp (Fig. 24).

(2) Squeeze tool together until top band of clamp is latched behind the two tabs on lower band of clamp (Fig. 25).

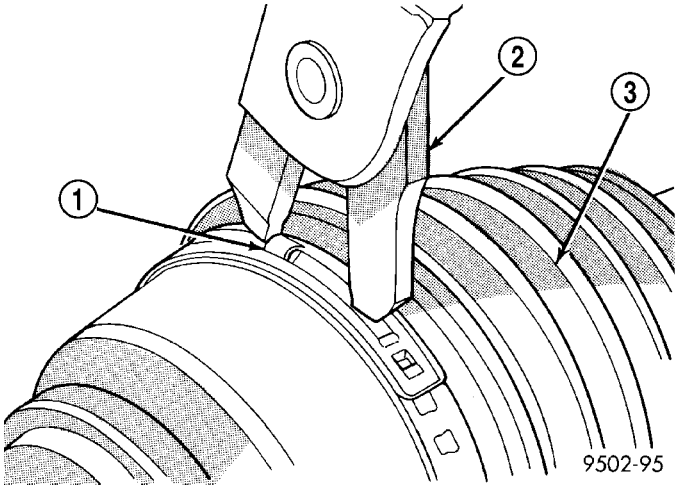


Fig. 24 Clamping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - TOOL YA3050, OR EQUIVALENT
3 - SEALING BOOT

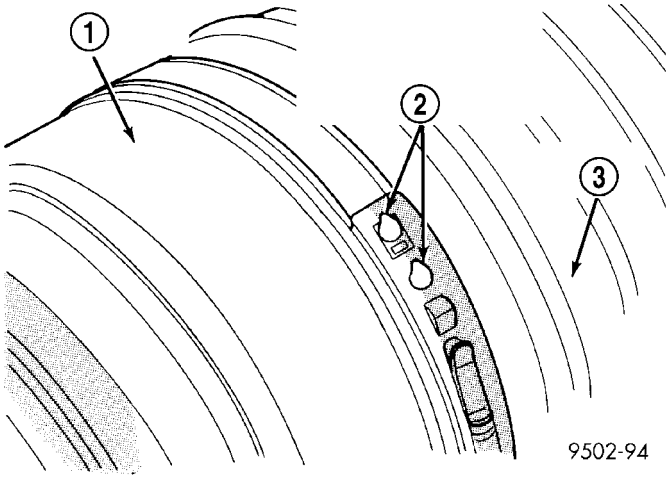


Fig. 25 Sealing Boot Clamp Correctly Installed

1 - INNER TRIPOD JOINT HOUSING
2 - TOP BAND OF CLAMP MUST BE RETAINED BY TABS AS SHOWN HERE TO CORRECTLY LATCH BOOT CLAMP
3 - SEALING BOOT

(14) Install the half shaft back into the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

CV BOOT - OUTER

REMOVAL

(1) Remove halfshaft assembly requiring boot replacement from vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(2) Remove large boot clamp retaining C/V joint sealing boot to C/V joint housing (Fig. 26) and discard. Remove small clamp that retains outer C/V joint sealing boot to interconnecting shaft and discard. Remove sealing boot from outer C/V joint housing and slide it down interconnecting shaft.

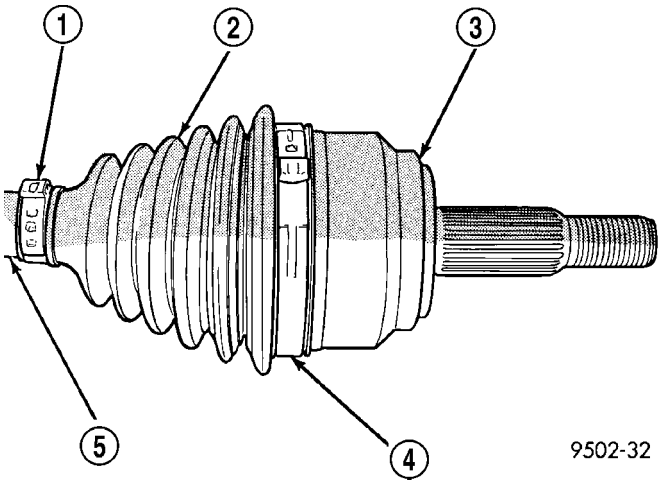


Fig. 26 Outer C/V Joint Seal Boot Clamps

1 - SMALL CLAMP
2 - SEALING BOOT
3 - OUTER C/V JOINT HOUSING
4 - LARGE CLAMP
5 - INTERCONNECTING SHAFT

(3) Wipe away grease to expose outer C/V joint and interconnecting shaft.

(4) Remove outer C/V joint from interconnecting shaft using the following procedure: Support interconnecting shaft in a vise equipped with protective caps on jaws of vise to prevent damage to interconnecting shaft. Then, using a soft–faced hammer, sharply hit the end of the C/V joint housing to dislodge housing from internal circlip on interconnecting shaft (Fig. 27). Then slide outer C/V joint off end of interconnecting shaft, joint may have to be tapped off shaft using a **soft–faced** hammer.

(5) Remove large circlip (Fig. 28) from the interconnecting shaft before attempting to remove outer C/V joint sealing boot.

(6) Slide sealing boot off interconnecting shaft.

(7) Thoroughly clean and inspect outer C/V joint assembly and interconnecting joint for any signs of excessive wear. **If any parts show signs of excessive wear, the halfshaft assembly will require replacement. Component parts of these halfshaft assemblies are not serviceable.**

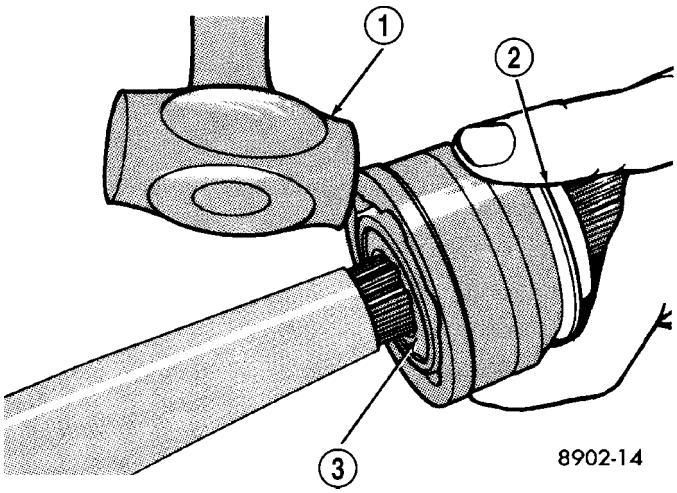


Fig. 27 Outer C/V Joint Removal from Interconnecting Shaft

1 - SOFT HAMMER (TAP INNER RACE ONLY)
2 - WEAR SLEEVE
3 - CIRCLIP (OUTER END OF SHAFT)

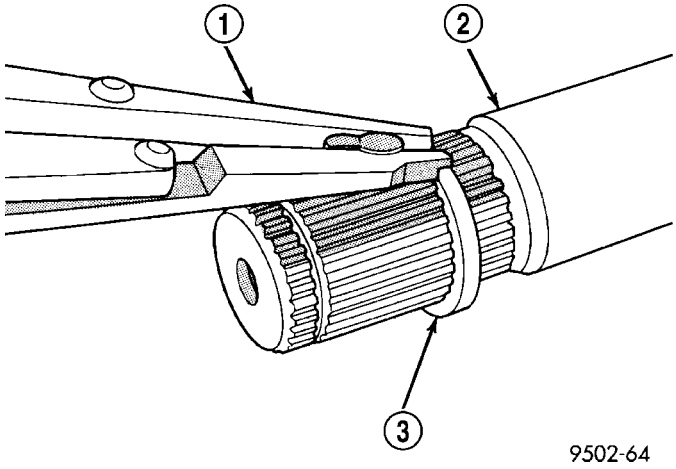


Fig. 28 Circlip Removal from Interconnecting Shaft

1 - SNAP RING PLIERS
2 - INTERCONNECTING SHAFT
3 - CIRCLIP

INSTALLATION

(1) Slide new sealing boot to interconnecting shaft retaining clamp onto interconnecting shaft. Slide the outer C/V joint assembly sealing boot onto the interconnecting shaft (Fig. 29). **Seal boot MUST be positioned on interconnecting shaft so the raised bead on the inside of the seal boot is in groove on interconnecting shaft.**

(2) Align splines on interconnecting shaft with splines on cross of outer C/V joint assembly and start outer C/V joint onto interconnecting shaft.

CV BOOT - OUTER (Continued)

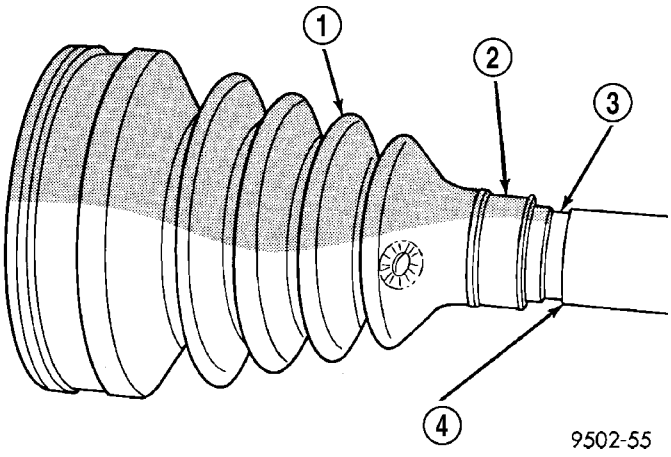


Fig. 29 Sealing Boot Installation on Interconnecting Shaft

1 - SEALING BOOT
2 - RAISED BEAD IN THIS AREA OF SEALING BOOT
3 - GROOVE
4 - INTERCONNECTING SHAFT

(3) Install outer C/V joint assembly onto interconnecting shaft by using a **soft–faced** hammer and tapping end of stub axle (with hub nut installed) until outer C/V joint is fully seated on interconnecting shaft (Fig. 30).

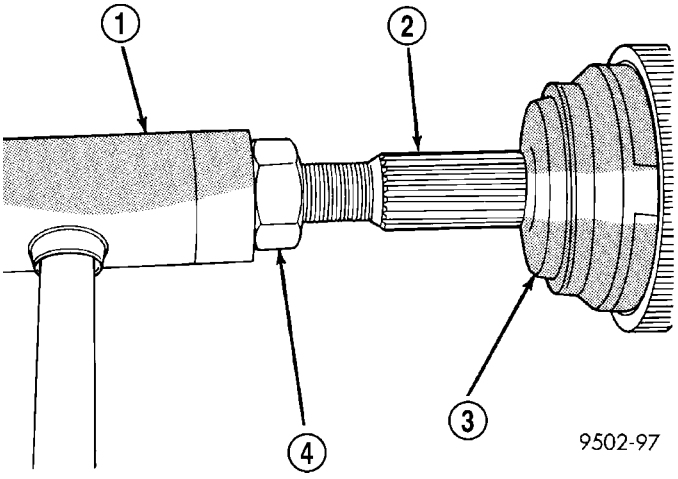


Fig. 30 Outer C/V Joint Installation on Interconnecting

1 - SOFT FACED HAMMER
2 - STUB AXLE
3 - OUTER C/V JOINT
4 - HUB NUT

(4) Outer C/V joint assembly must be installed on interconnecting shaft until cross of outer C/V joint assembly is seated against circlip on interconnecting shaft (Fig. 31).

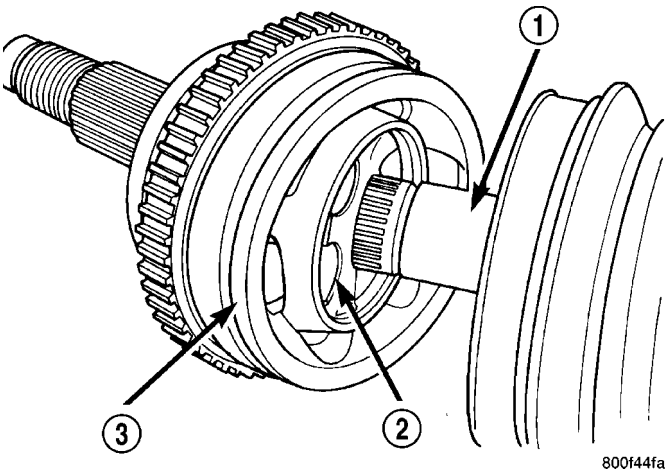


Fig. 31 Outer C/V Joint Correctly Installed on Interconnecting Shaft

1 - INTERCONNECTING SHAFT
2 - CROSS
3 - OUTER C/V JOINT ASSEMBLY

(5) Distribute 1/2 the amount of grease provided in seal boot service package (DO NOT USE ANY OTHER TYPE OF GREASE) into outer C/V joint assembly housing. Put the remaining amount into the sealing boot.

(6) Install outer C/V joint sealing boot to interconnecting shaft clamp evenly on sealing boot.

(7) Clamp sealing boot onto interconnecting shaft using crimper, Special Tool C-4975-A and the following procedure. Place crimping tool C-4975-A over bridge of clamp (Fig. 32). Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 33).

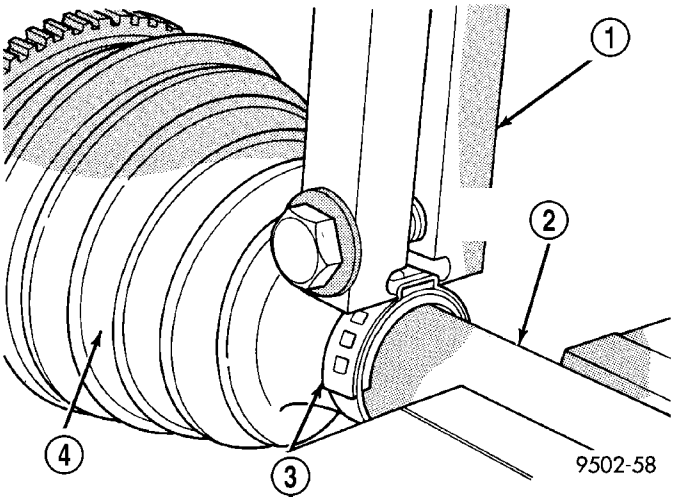


Fig. 32 Crimping Tool Installed on Sealing Boot Clamp

1 - SPECIAL TOOL C-4975A
2 - INTERCONNECTING SHAFT
3 - CLAMP
4 - SEALING BOOT

CV BOOT - OUTER (Continued)

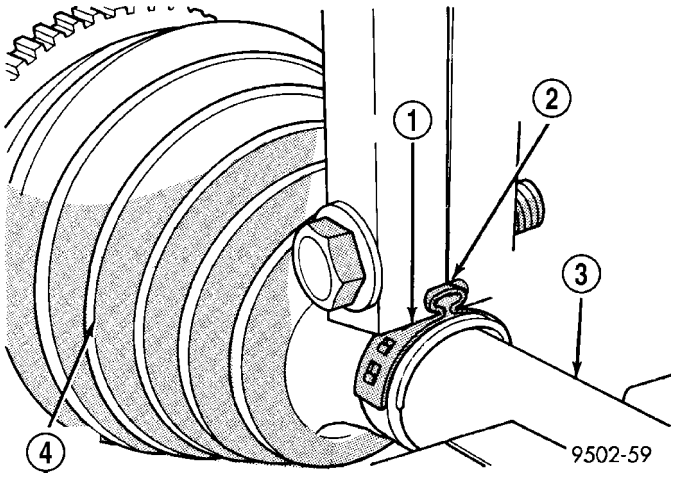


Fig. 33 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
3 - INTERCONNECTING SHAFT
4 - SEALING BOOT

CAUTION: Seal must not be dimpled, stretched, or out–of–shape in any way. If seal is NOT shaped correctly, equalize pressure in seal and shape it by hand.

(8) Position outer C/V joint sealing boot into its retaining groove on outer C/V joint housing. Install sealing boot to outer C/V joint retaining clamp evenly on sealing boot.

(9) Clamp sealing boot onto outer C/V joint housing using Crimper, Special Tool C-4975-A and the following procedure. Place crimping tool C-4975-A over bridge of clamp (Fig. 34). Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 35).

(10) Install the halfshaft requiring boot replacement back on the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

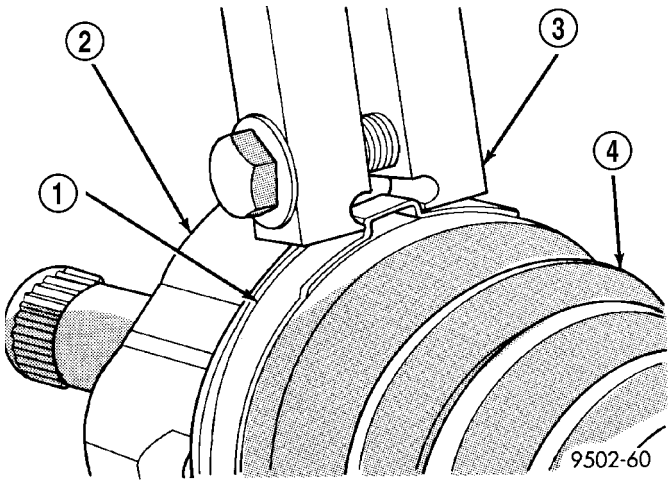


Fig. 34 Crimping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - TRIPOD JOINT HOUSING
3 - SPECIAL TOOL C-4975A
4 - SEALING BOOT

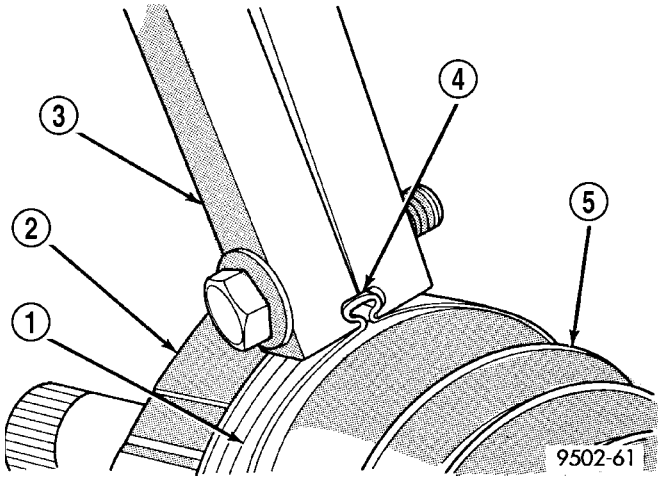


Fig. 35 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - TRIPOD HOUSING
3 - SPECIAL TOOL C-4975A
4 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
5 - SEALING BOOT

PROPELLER SHAFT

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PROPELLER SHAFT

DESCRIPTION

WARNING: Due to propeller shaft imbalance concerns, the propeller shaft can only be serviced as an assembly.

AWD models utilize a “three-piece” propeller shaft (Fig. 1) to transmit torque to the rear driveline module assembly. This three-piece design consists of:

- Front, center, and rear shaft segments.
- Plunging front CV joint
- Center support bearings (2)
- Rubber coupler at driveline module flange

The front shaft segment utilizes a plunging CV joint at the power transfer unit connection. The center and rear shaft segments utilize a support bearing/bracket assembly. The rear shaft segment uses a rubber coupler at the driveline module flange.

OPERATION

The propeller shaft (Fig. 1) is used to transmit torque from the transaxle power transfer unit (PTU) to the rear driveline module of AWD equipped models.

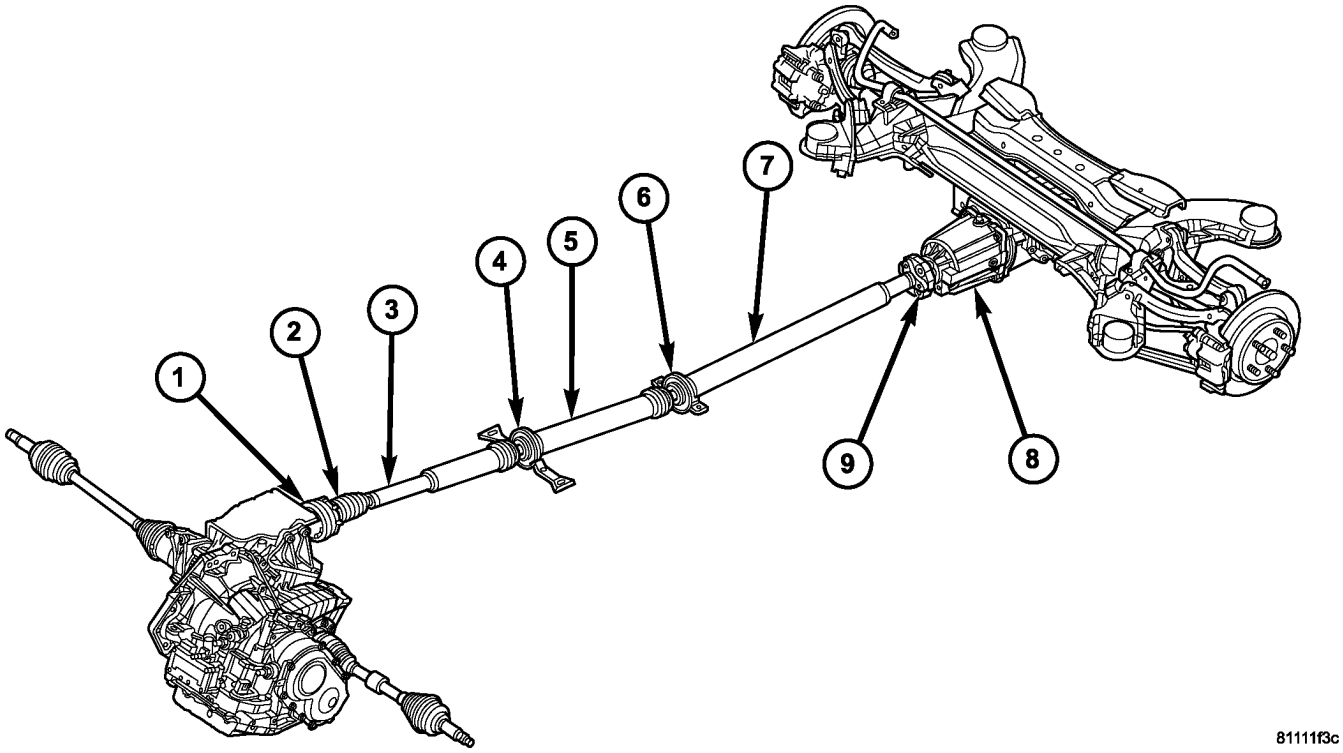


Fig. 1 AWD Driveline

1 - PTU FLANGE
2 - PLUNGING CV JOINT
3 - FRONT SEGMENT
4 - BEARING/SUPPORT
5 - CENTER SEGMENT
6 - BEARING/SUPPORT
7 - REAR SEGMENT
8 - REAR DRIVELINE MODULE
9 - RUBBER COUPLER

PROPELLER SHAFT (Continued)

The propeller shaft front segment utilizes a plunging CV joint at the PTU flange, and a plunging CV joint at the center bearing location. These joints are flexible, allowing for torsional movement of the powertrain.

The propeller shaft center and rear segments utilize a support bearing/bracket, which support this three-piece assembly and isolates driveline vibrations from the body. The rubber coupler at the driveline module flange dampens out propeller shaft torsional vibrations, as the driveline module it connects to is fastened to the rear suspension crossmember.

REMOVAL

CAUTION: Propeller shaft removal is a two-man operation. Never allow propeller shaft to hang from the center bearing, or while only connected to power transfer unit (PTU) or rear driveline module flanges. A helper is required. If a propshaft section is hung unsupported, damage may occur to the joint, boot, and/or center bearing from over-angulation. This may result in driveline vibrations.

(1) Raise vehicle on hoist.
(2) Remove hanger at rear muffler.
(3) Remove exhaust system center hanger brackets (Fig. 3) and support exhaust system with screw jack.
(4) Make sure transaxle is in neutral (N). Using chalk, mark propeller shaft flanges at PTU and rear driveline module for installation reference.
(5) Remove six propeller shaft-to-power transfer unit bolts (Fig. 2), but do not remove from PTU at this time.

NOTE: Rubber coupler is part of the propeller shaft assembly. Removing coupler from propeller shaft will result in vibration/balance issues.

(6) Remove three propeller shaft rubber coupler-to-driveline module bolts, but do not remove from driveline module at this time.
(7) Have helper support front segment by hand while removing center segment bearing/support-to-body bolts. Support front and center segments by hand (Fig. 3).
(8) While manually supporting front and center segments, have helper support rear segment while removing rear segment bearing/support (Fig. 3).
(9) Lower propeller shaft assembly to ground, using care not to damage fore and aft flanges (Fig. 3).

INSTALLATION

CAUTION: Propeller shaft installation is a two-man operation. Never allow propeller shaft to hang while connected to power transfer unit (PTU), rear driveline module flanges or center bearings. If propeller shaft section is hung unsupported, damage may occur to joint, boot and/or center bearing from over-angulation. This may result in vibration/balance issues. A helper is required.

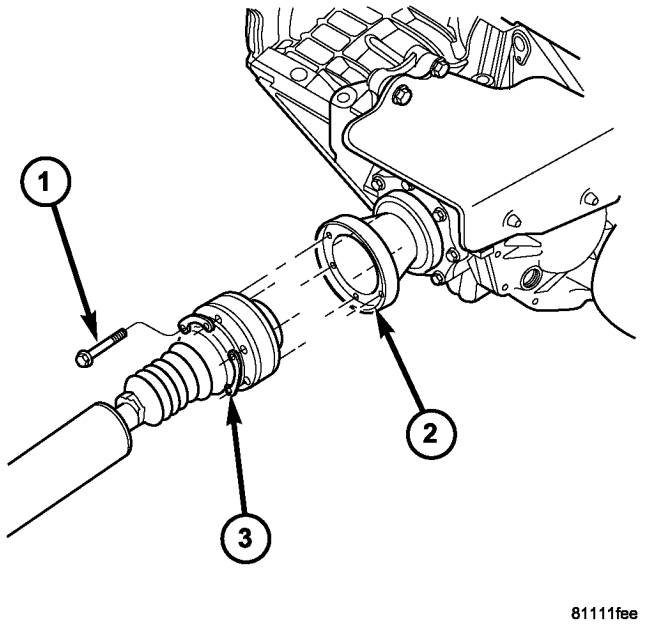


Fig. 2 Propeller Shaft at PTU

1 - BOLT (6)
2 - PTU FLANGE
3 - PROPELLER SHAFT

(1) Make sure transaxle is in Neutral (N) position.
(2) Obtain a helper and lift propeller shaft assembly into position (Fig. 3). Load shaft to driveline module first, and then PTU flange.
(3) Install center and rear support bearing/bracket assemblies into position. Install bolts hand-tight.
(4) Align paint index marks at driveline module flange and install three propeller shaft rubber coupler-to-rear driveline module bolts by hand. Torque propeller shaft rubber coupler-to-rear driveline module assembly bolts to 54 N·m (40 ft. lbs.).
(5) Align chalk index marks at PTU flange. Install six propeller shaft-to-PTU flange bolts (Fig. 2) and torque to 30 N·m (22 ft. lbs.). Torque bolts alternately to ensure proper flange mating.
(6) Place center and rear bearing/supports into position. Install and torque support/bearing-to-body bolts to 54 N·m (40 ft. lbs.).
(7) Raise exhaust system into position. Install muffler rear hanger. Remove support stand.
(8) Install exhaust system center hanger
(9) Lower vehicle.

PROPELLER SHAFT (Continued)

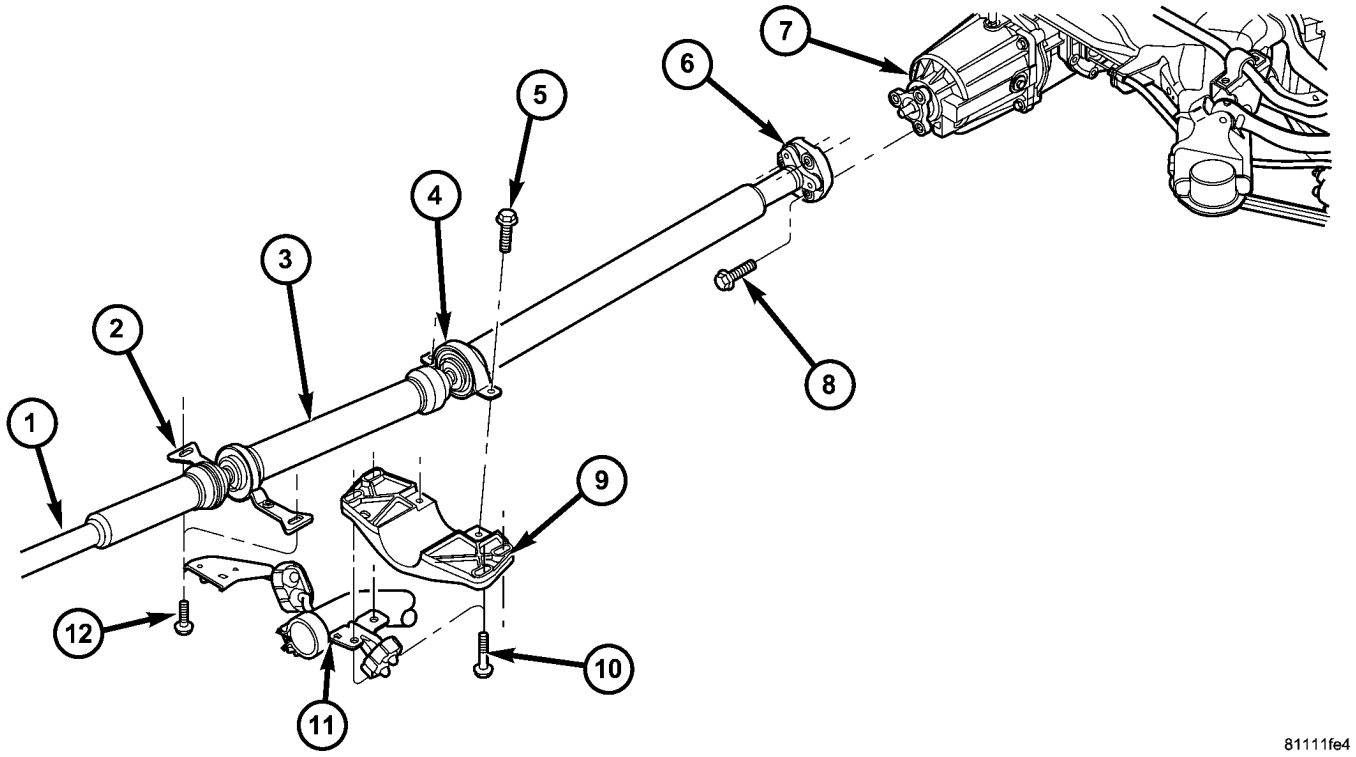


Fig. 3 Propeller Shaft at Body and Driveline Module

1 - FRONT SEGMENT
2 - CENTER SUPPORT/BEARING
3 - CENTER SEGMENT
4 - REAR SUPPORT/BEARING
5 - BOLT (2)
6 - RUBBER COUPLER
7 - REAR DRIVELINE MODULE
8 - BOLT (3)
9 - SUPPORT BRACKET
10 - BOLT (4)
11 - EXHAUST/HANGER
12 - BOLT (2)

SPECIFICATIONS - PROPELLER SHAFT

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, Propeller Shaft Front Flange-to-PTU Flange	30	22	—
Bolt, Propeller Shaft Rear Flange-to-Driveline Module Flange	54	40	—
Bolt, Support/Bearing-to-Body	54	40	—

REAR DRIVELINE MODULE

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REAR DRIVELINE MODULE

DESCRIPTION

The rear driveline module assembly (Fig. 1) consists of three main components:

- Bi-Directional Overrunning Clutch (BOC)
- Viscous Coupling
- Differential Assembly

The viscous coupling and bi-directional overrunning clutch are contained within an overrunning clutch housing, which fastens to the differential assembly. The overrunning clutch housing and differential assembly have unique fluid sumps, each requiring their own type and capacity of fluid. The overrunning clutch housing requires Mopar® ATF+4. The differential assembly requires Mopar® 75W-90 Gear and Axle Lubricant.

Driveline module service is limited to the following components:

- Differential Assembly (serviced only as assembly)
- Viscous Coupling
- Bi-Directional Overrunning Clutch (BOC)
- Overrunning Clutch Housing
- Seals (Input Shaft, Output Shaft, Overrunning Clutch Housing O-rings)
- Input Flange/Shield
- Vents
- Fasteners

OPERATION

The primary benefits of All Wheel Drive are:

- Superior straight line acceleration, and cornering on all surfaces
- Better traction and handling under adverse conditions, resulting in improved hill climbing ability and safer driving.

The heart of the system is an inter-axle viscous coupling. The vehicle retains predominantly front-wheel drive characteristics, but the All Wheel Drive capability takes effect when the front wheels start to slip. Under normal level road, straight line driving, 100% of the torque is allocated to the front wheels. The viscous coupling controls and distributes torque/power to the rear wheels. The viscous coupling transmits torque to the rear wheels in proportion of the amount of the slippage at the front wheels. This variable torque distribution is automatic with no driver inputs required. The coupling is similar to a multiplate clutch. It consists of a series of closely spaced discs, which are alternately connected to the front and rear drive units. The unit is totally sealed and partially filled with silicone fluid. There is no adjustment, maintenance or fluid checks required during the life of the unit.

The overrunning clutch allows the rear wheels to overrun the front wheels during a rapid front wheel lock braking maneuver. The overrunning action prevents any feed-back of front wheel braking torque to

REAR DRIVELINE MODULE (Continued)

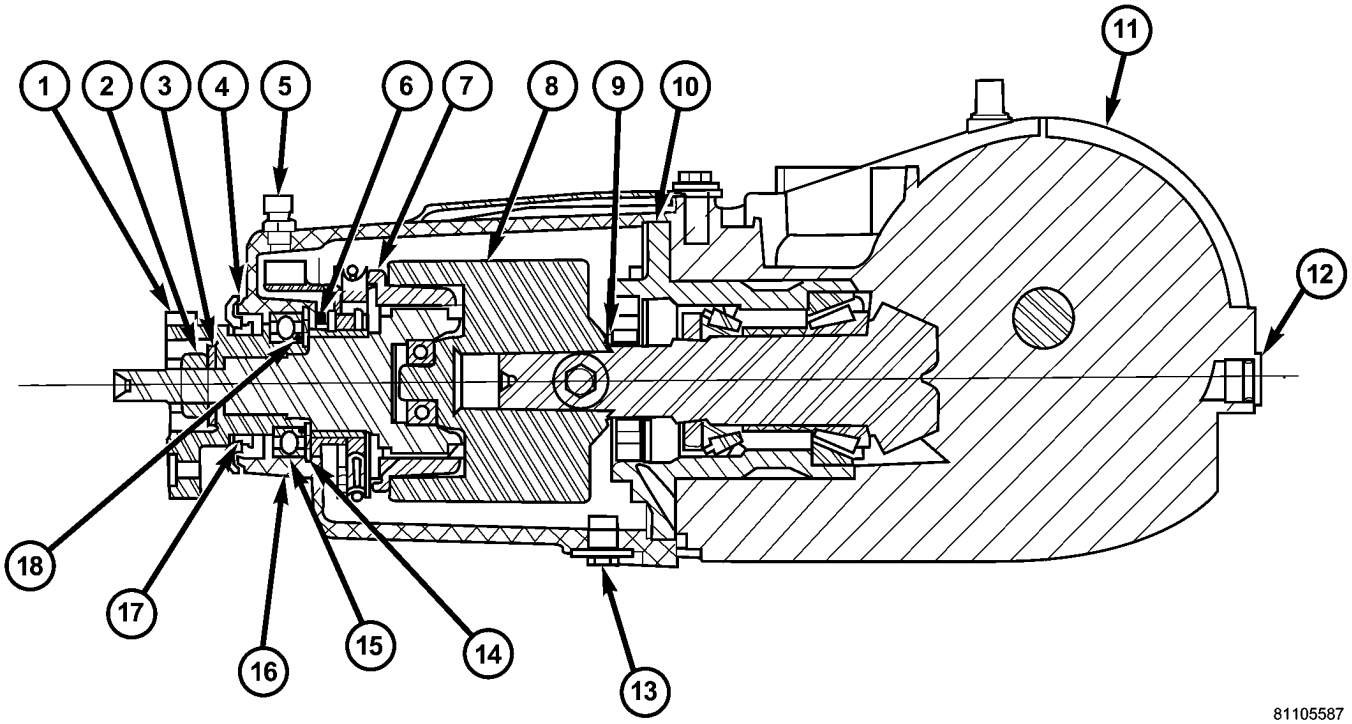


Fig. 1 Driveline Module Section

1 - INPUT FLANGE	7 - BI-DIRECTIONAL OVERRUNNING CLUTCH (BOC)	13 - PLUG-OVERRUNNING CLUTCH HOUSING DRAIN
2 - FLANGE NUT	8 - VISCOUS COUPLER	14 - SNAP RING
3 - WASHER	9 - SHIM (SELECT)	15 - BEARING
4 - SHIELD	10 - O-RING	16 - OVERRUNING CLUTCH HOUSING
5 - VENT	11 - DIFFERENTIAL ASSEMBLY	17 - SEAL-INPUT FLANGE
6 - WASHER	12 - PLUG-DIFFERENTIAL FILL	18 - O-RING

the rear wheels. It also allows the braking system to control the braking behavior as a two wheel drive (2WD) vehicle.

The overrunning clutch housing has a separate oil sump and is filled independently from the differential. The fill plug is located on the side of the overrunning clutch case. When filling the overrunning clutch with lubricant use Mopar® ATF+4.

The differential assembly contains a conventional open differential with hypoid ring gear and pinion gear set. The hypoid gears are lubricated by SAE 75W-90 Mopar® Gear and Axle Lubricant.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - REAR DRIVELINE MODULE NOISE

Different sources can be the cause of noise that the rear driveline module assembly is suspected of making. Refer to the following causes for noise diagnosis.

DRIVELINE MODULE ASSEMBLY NOISE

The most important part of driveline module service is properly identifying the cause of failures and noise complaints. The cause of most driveline module failures is relatively easy to identify. The cause of driveline module noise is more difficult to identify.

If vehicle noise becomes intolerable, an effort should be made to isolate the noise. Many noises that are reported as coming from the driveline module may actually originate at other sources. For example:

- Tires
- Road surfaces
- Wheel bearings
- Engine
- Transmission
- Exhaust
- Propeller shaft (vibration)
- Vehicle body (drumming)

Driveline module noises are normally divided into two categories: gear noise or bearing noise. A thorough and careful inspection should be completed to determine the actual source of the noise before replacing the driveline module.

REAR DRIVELINE MODULE (Continued)

The rubber mounting bushings help to dampen-out driveline module noise when properly installed. Inspect to confirm that no metal contact exists between the driveline module case and the body or suspension cradle. The complete isolation of noise to one area requires expertise and experience. Identifying certain types of vehicle noise baffles even the most capable technicians. Often such practices as:

- Increase tire inflation pressure to eliminate tire noise.
- Listen for noise at varying speeds with different driveline load conditions
- Swerving the vehicle from left to right to detect wheel bearing noise.

All driveline module assemblies produce noise to a certain extent. Slight carrier noise that is noticeable only at certain speeds or isolated situations should be considered normal. Carrier noise tends to peak at a variety of vehicle speeds. Noise is **NOT ALWAYS** an indication of a problem within the carrier.

TIRE NOISE

Tire noise is often mistaken for driveline module noise. Tires that are unbalanced, worn unevenly or are worn in a saw-tooth manner are usually noisy. They often produce a noise that appears to originate in the driveline module.

Tire noise changes with different road surfaces, but driveline module noise does not. Inflate all four tires with approximately 20 psi (138 kPa) more than the recommended inflation pressure (for test purposes only). This will alter noise caused by tires, but will not affect noise caused by the differential. Rear axle noise usually ceases when coasting at speeds less than 30 mph (48 km/h); however, tire noise continues, but at a lower frequency, as the speed is reduced.

After test has been completed lower tire pressure back to recommended pressure.

GEAR NOISE (DRIVE PINION AND RING GEAR)

Abnormal gear noise is rare and is usually caused by scoring on the ring gear and drive pinion. Scoring is the result of insufficient or incorrect lubricant in the carrier housing.

Abnormal gear noise can be easily recognized. It produces a cycling tone that will be very pronounced within a given speed range. The noise can occur during one or more of the following drive conditions:

- Drive
- Road load
- Float
- Coast

Abnormal gear noise usually tends to peak within a narrow vehicle speed range or ranges. It is usually more pronounced between 30 to 40 mph (48 to 64 km/h) and 50 to 60 mph (80 to 96 km/h). When objectionable gear noise occurs, note the driving conditions and the speed range.

BEARING NOISE (DRIVE PINION AND DIFFERENTIAL)

Defective bearings produce a rough growl that is constant in pitch and varies with the speed of vehicle. Being aware of this will enable a technician to separate bearing noise from gear noise.

Drive pinion bearing noise that results from defective or damaged bearings can usually be identified by its constant, rough sound. Drive pinion front bearing is usually more pronounced during a coast condition. Drive pinion rear bearing noise is more pronounced during a drive condition. The drive pinion bearings are rotating at a higher rate of speed than either the differential side bearings or the axle shaft bearing.

Differential side bearing noise will usually produce a constant, rough sound. The sound is much lower in frequency than the noise caused by drive pinion bearings.

Bearing noise can best be detected by road testing the vehicle on a smooth road (black top). However, it is easy to mistake tire noise for bearing noise. If a doubt exists, the tire treads should be examined for irregularities that often causes a noise that resembles bearing noise.

ENGINE AND TRANSMISSION NOISE

Sometimes noise that appears to be in the driveline module assembly is actually caused by the engine or the transmission. To identify the true source of the noise, note the approximate vehicle speed and/or RPM when the noise is most noticeable. Stop the vehicle next to a flat brick or cement wall (this will help reflect the sound). Place the transaxle in **NEUTRAL**. Accelerate the engine slowly up through the engine speed that matches the vehicle speed noted when the noise occurred. If the same noise is produced, it usually indicates that the noise is being caused by the engine or transaxle.

DIAGNOSIS AND TESTING - REAR DRIVELINE MODULE OPERATION

Driveline module operation requires relatively straight-forward diagnosis. Refer to the following chart:

REAR DRIVELINE MODULE (Continued)

DRIVELINE MODULE DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
Rear wheels not overrunning	1) Bi-directional overrunning clutch failure	1) Replace overrunning clutch components as required
No AWD in forward or reverse directions, propeller shaft turning	1) Bi-directional overrunning clutch failure	1) Replace overrunning clutch components as required
	2) Viscous coupling failure	2) Replace viscous coupling
	3) Rear differential failure	3) Replace the rear differential assembly
No AWD in forward or reverse directions, propeller shaft not turning	1) Power transfer unit failure.	1) Replace power transfer unit components as necessary
Vibration at all speeds, continuous torque transfer	1) Mis-matched tires, worn tires on front axle.	1) Replace worn or incorrect (mis-matched) tires with same make and size

REMOVAL

NOTE: Rear suspension and drivetrain design require this procedure to be performed on a "drive-on" hoist, as the front and rear suspension needs to be compressed to ride height to facilitate rear halfshaft removal.

(1) Raise vehicle on hoist.

(2) Drain differential lubricant to prevent fluid spillage upon removal.(Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR DRIVELINE MODULE/ FLUID - STANDARD PROCEDURE). If disassembly of driveline module is taking place, drain overrunning clutch housing fluid as well.(Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR DRIVELINE MODULE/FLUID - STANDARD PROCEDURE)

(3) Place vehicle on drive-on hoist in Park.

(4) Remove exhaust system center hanger (at propeller shaft bearing/support).

(5) Disconnect exhaust system at rear-most hanger and lower.

(6) Lower exhaust system at least 254 mm (10 in.). Support system with suitable wire or rope.

(7) Index propeller shaft and rear driveline module flanges using paint mark, chalk, etc. for installation reference.

(8) Remove three (3) propeller shaft-to-driveline module bolts. Do not attempt to disconnect shaft from module, as it will be disconnected upon driveline module removal.

(9) Support driveline module with transmission jack (or equivalent). (Fig. 2)

(10) Using suitable screwdriver, partially dislodge halfshafts from differential. Install Tool 9099 to protect seal upon disassembly (Fig. 3).

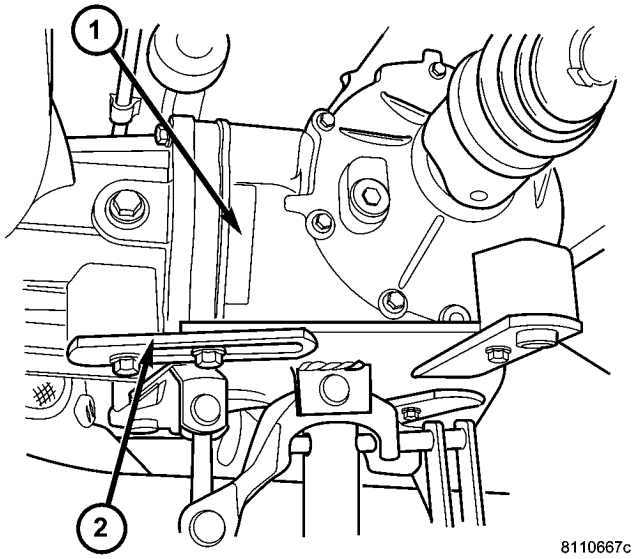


Fig. 2 Support Module with Jack

1 - DRIVELINE MODULE
2 - TRANSMISSION JACK

(11) Remove three (3) rear driveline module-to-crossmember bolts (Fig. 4) (Fig. 5).

(12) Lower driveline module assembly just enough to facilitate removal of halfshafts from differential. Make sure Tool 9099 engages seal.

(13) Disconnect propeller shaft from driveline module and secure to exhaust system or support with jack stand (Fig. 6).

CAUTION: Do not allow the propeller shaft to hang from the vehicle unsupported. Damage may occur to the joint, boot, and center bearing from over-angulation.

REAR DRIVELINE MODULE (Continued)

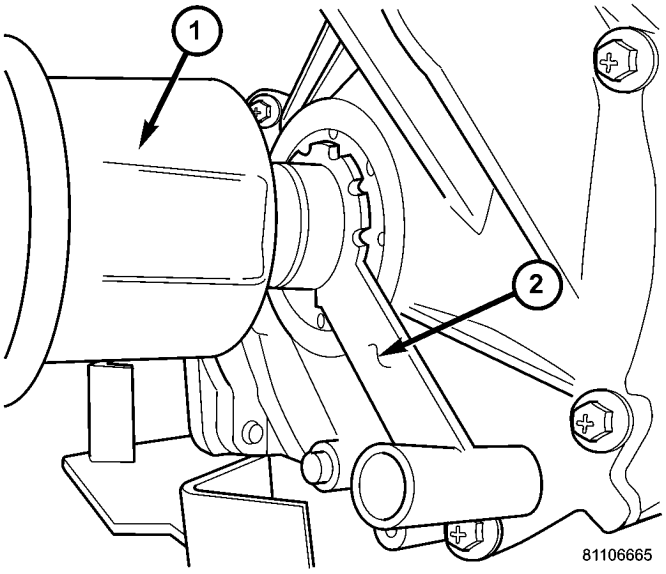


Fig. 3 Install Seal Protector

1 - HALFSHAFT
2 - SEAL PROTECTOR

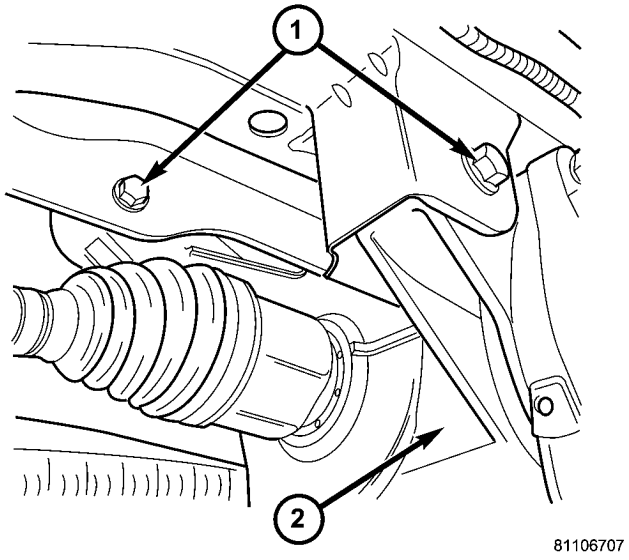


Fig. 5 Module Mounting Bolts

1 - BOLT (2)
2 - DRIVELINE MODULE

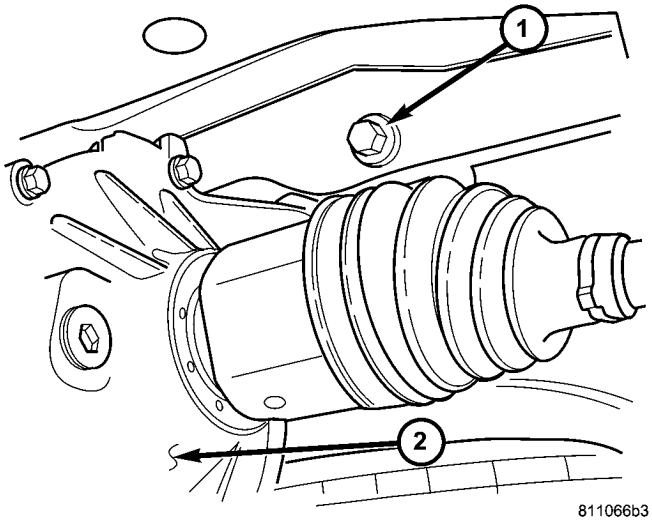


Fig. 4 Module Mounting Bolt

1 - BOLT
2 - DRIVELINE MODULE

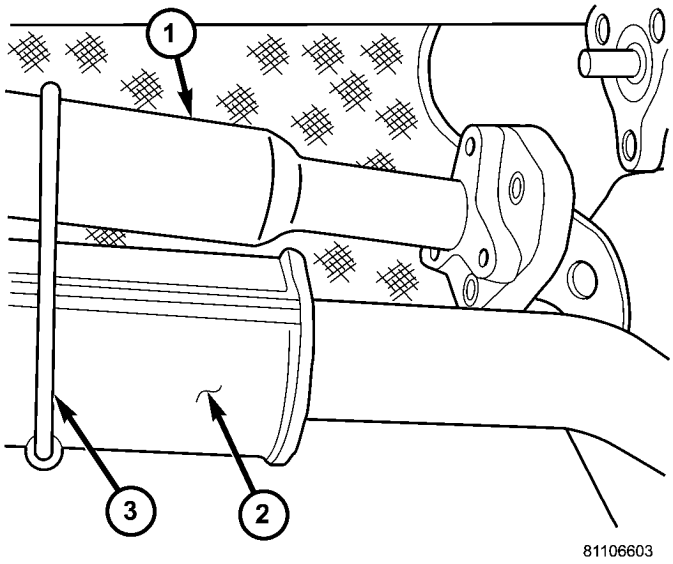


Fig. 6 Secure Propeller Shaft to Exhaust

1 - PROPELLER SHAFT
2 - EXHAUST SYSTEM
3 - STRAP

(14) Remove driveline module assembly.

REAR DRIVELINE MODULE (Continued)

DISASSEMBLY

WARNING: Differential is only to be serviced as an assembly, and no disassembly is required.

(1) Loosen input flange nut and washer using Tool 6958 and a breaker bar (Fig. 7).

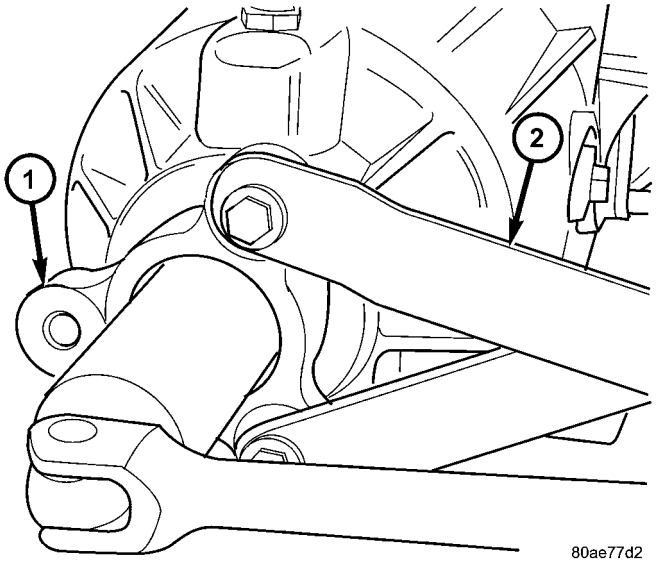


Fig. 7 Input Flange Nut

1 - INPUT FLANGE
2 - TOOL 6958

(2) Remove input flange nut (Fig. 8).

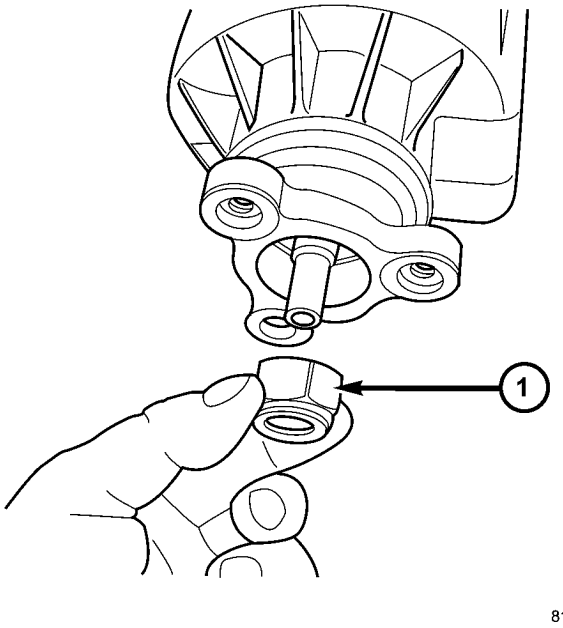


Fig. 8 Input Flange Nut Removal/Installation

1 - NUT

(3) Remove input flange and washer (Fig. 9) (Fig. 10).

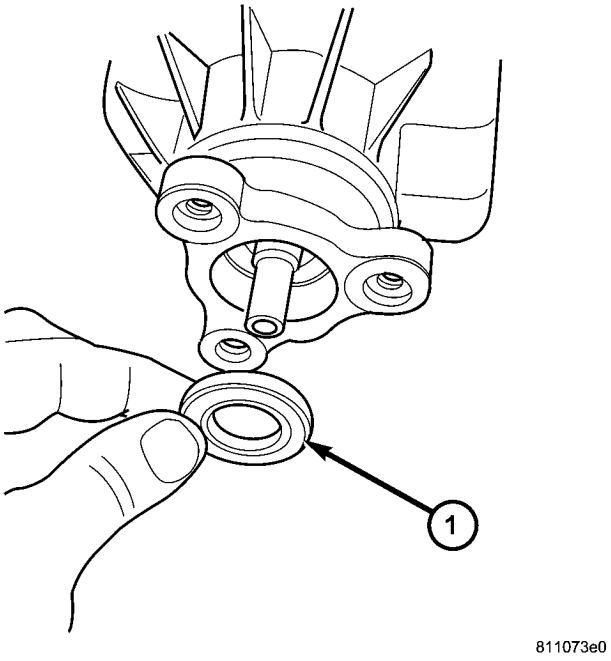


Fig. 9 Input Flange Washer

1 - WASHER

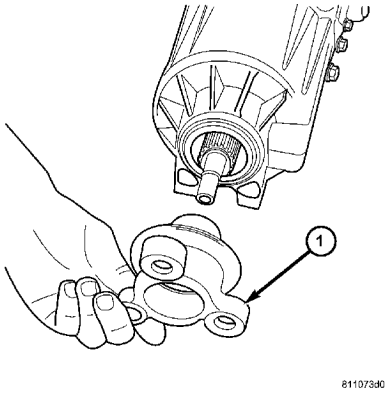


Fig. 10 Input Flange Removal/Installation

1 - INPUT FLANGE

REAR DRIVELINE MODULE (Continued)

(4) Remove input flange seal from overrunning clutch housing using suitable screwdriver (Fig. 11).

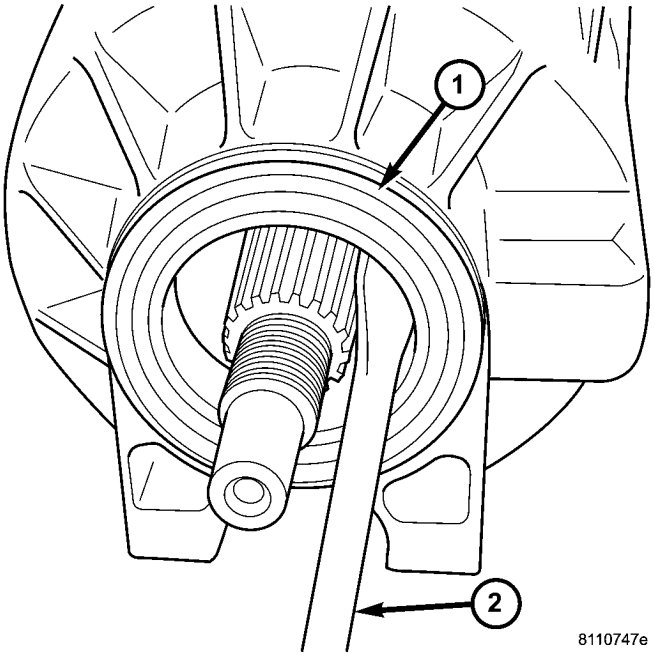


Fig. 11 Input Flange Seal Removal

1 - SEAL
2 - SCREWDRIVER

(5) Remove four overrunning clutch housing-to-differential assembly bolts and remove housing (Fig. 12) (Fig. 13).

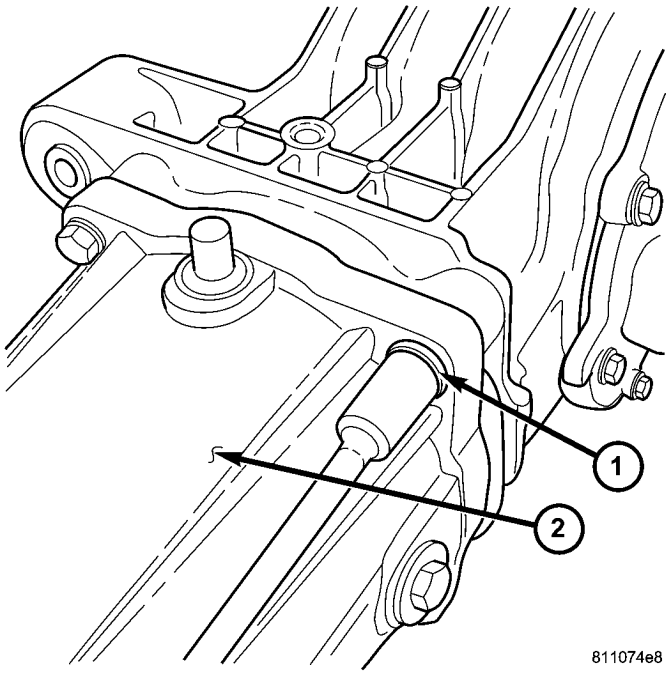


Fig. 12 Overrunning Clutch Housing Bolts

1 - BOLT (4)
2 - HOUSING

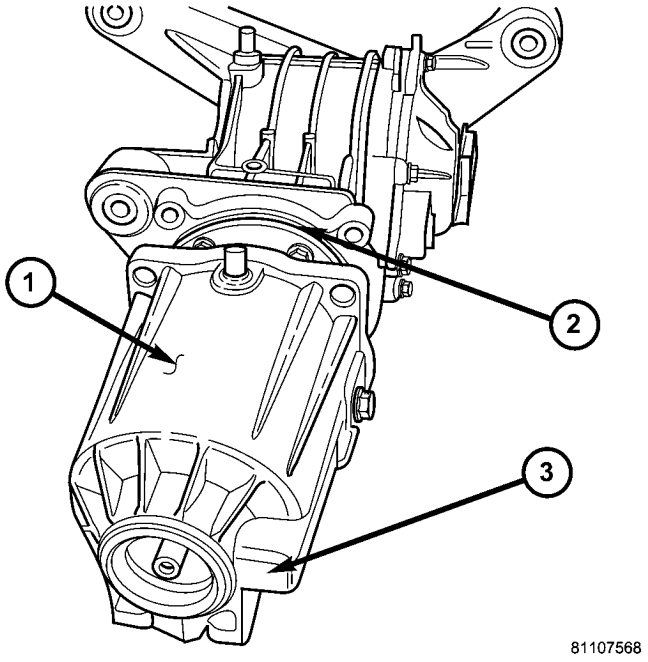


Fig. 13 Overrunning Clutch Housing

1 - HOUSING
2 - O-RING
3 - RELIEF

(6) Remove front bearing snap ring (Fig. 20).
(7) Remove front bearing (Fig. 20).
(8) Remove o-ring and washer from overrunning clutch assembly (Fig. 14) (Fig. 15).

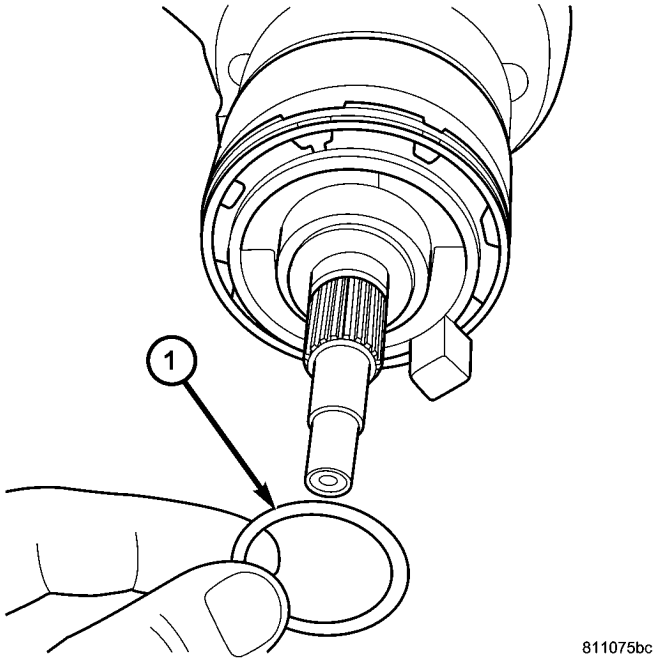


Fig. 14 Input Flange O-ring Seal

1 - O-RING

REAR DRIVELINE MODULE (Continued)

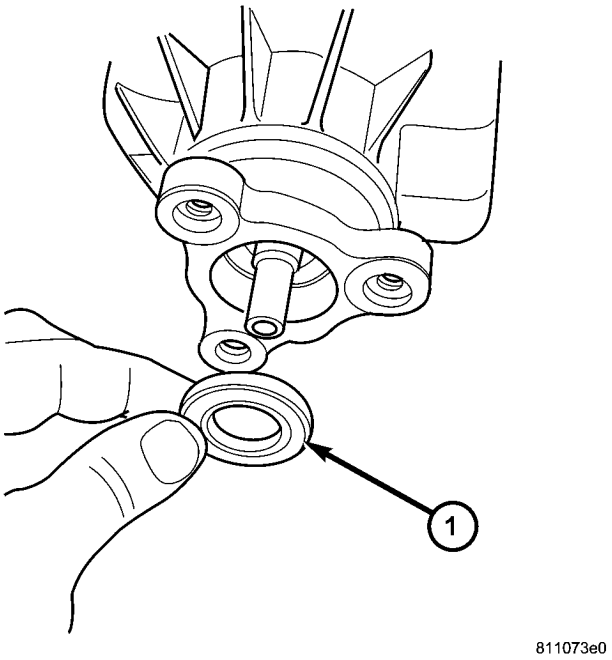


Fig. 15 Input Flange Washer

1 - WASHER

(9) Remove overrunning clutch assembly from viscous coupler (Fig. 16).

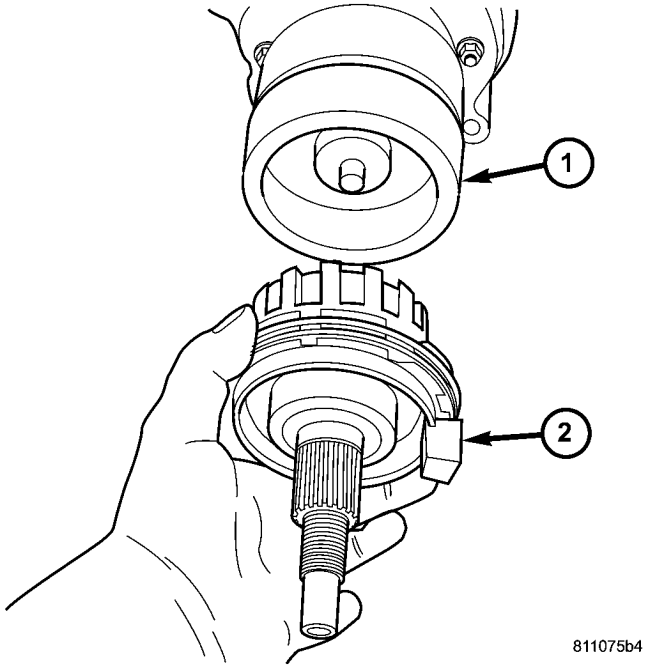


Fig. 16 Overrunning Clutch Assembly

1 - VISCOUS COUPLER
2 - OVERRUNNING CLUTCH ASSEMBLY

(10) Remove viscous coupler from differential pinion shaft (Fig. 17).

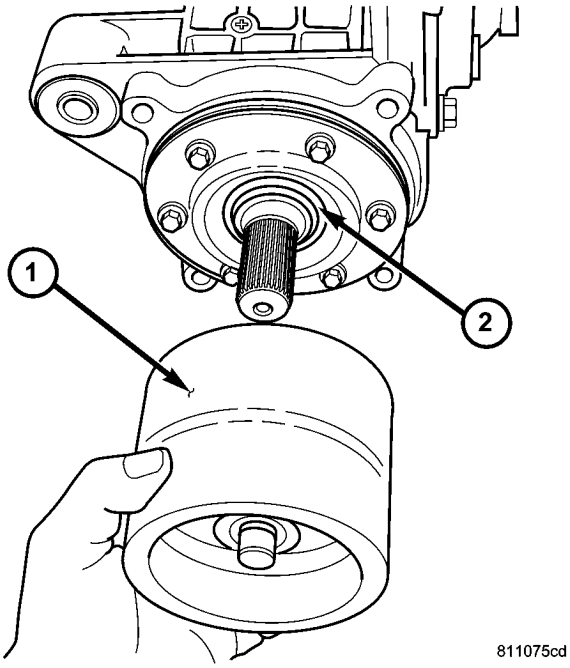


Fig. 17 Viscous Coupler Removal/Installation

1 - VISCOUS COUPLER
2 - SHIM (SELECT)

(11) Remove shim (select) from differential pinion gear (Fig. 18). Verify shim thickness when removed and be sure to use shim of same thickness.

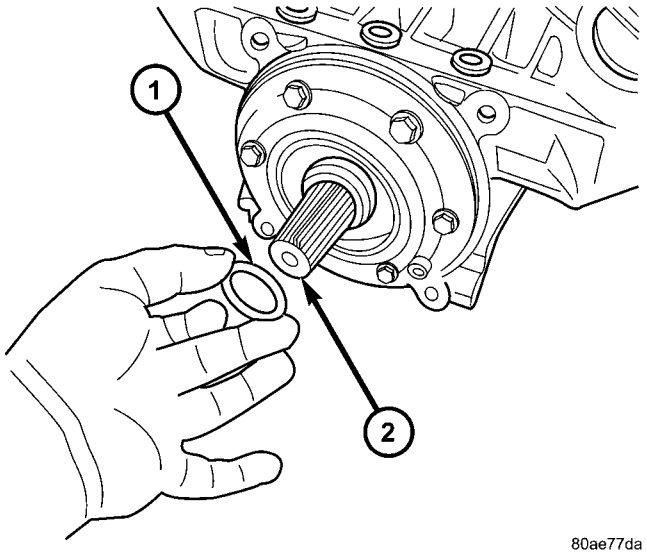


Fig. 18 Shim (Select)

1 - SHIM (SELECT)
2 - DIFFERENTIAL PINION

(12) Remove overrunning clutch housing large o-ring from differential assembly (Fig. 20).

(13) Remove output flange seals (Fig. 19).

REAR DRIVELINE MODULE (Continued)

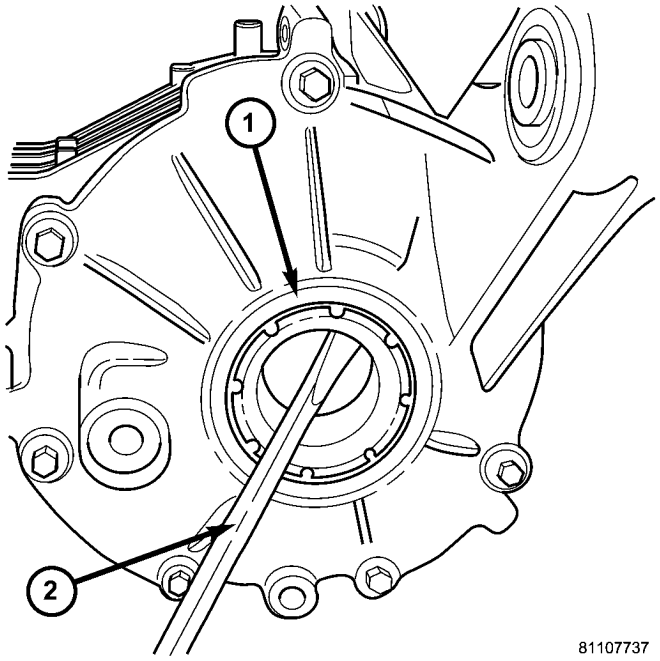


Fig. 19 Axle Seal Removal

1 - SEAL
2 - SCREWDRIVER

ASSEMBLY

(1) Install axle seals using tools C4171 and 8493 (Fig. 21).

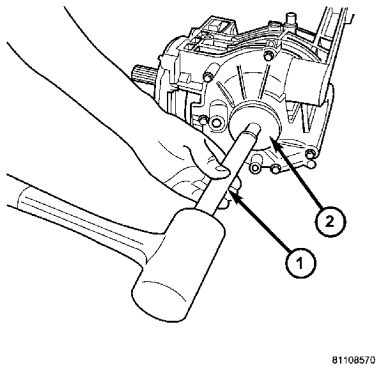


Fig. 21 Axle Seal Installation

1 - TOOL C-4171
2 - TOOL 8493

(2) Install large overrunning clutch housing o-ring to differential assembly (Fig. 22). Lube o-ring with ATF.

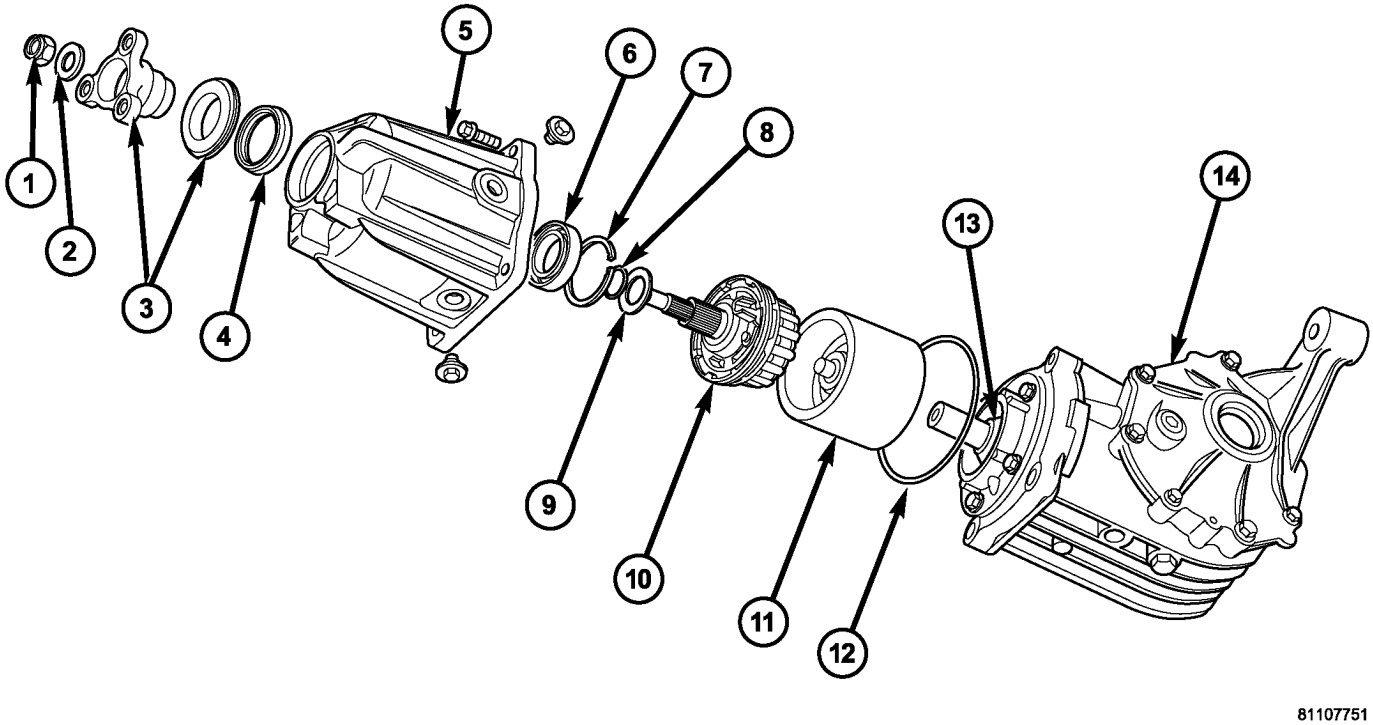


Fig. 20 Drive Line Module

1 - NUT, INPUT FLANGE
2 - WASHER, INPUT FLANGE NUT
3 - INPUT FLANGE/SHIELD
4 - SEAL, INPUT FLANGE
5 - OVERRUNNING CLUTCH HOUSING
6 - BEARING, FRONT
7 - SNAP RING, BEARING RETAINER
8 - O-RING
9 - WASHER
10 - BI-DIRECTIONAL OVERRUNNING CLUTCH
11 - VISCOUS COUPLER
12 - O-RING, OVERRUNNING CLUTCH HOUSING
13 - SHIM (SELECT)
14 - DIFFERENTIAL ASSEMBLY

REAR DRIVELINE MODULE (Continued)

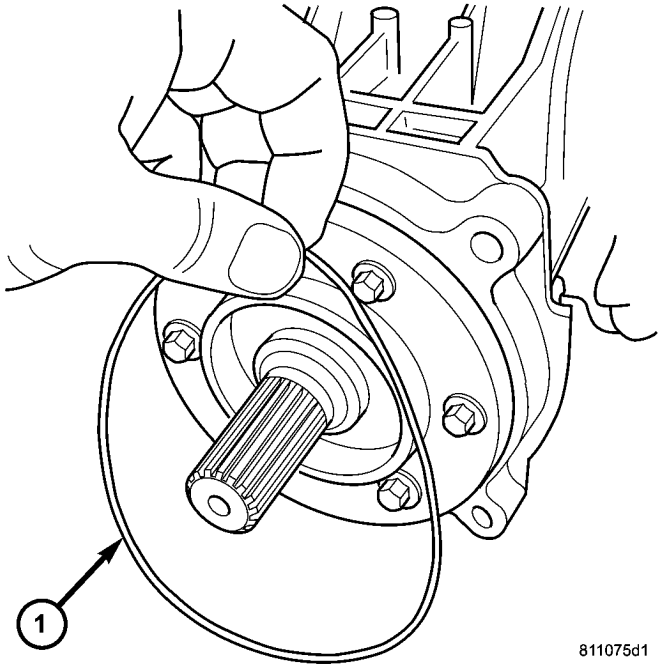


Fig. 22 ORC Housing-to-Differential O-Ring Seal

1 - O-RING

(3) Install shim to differential pinion shaft (Fig. 23). Be sure to use shim of same thickness as removed.

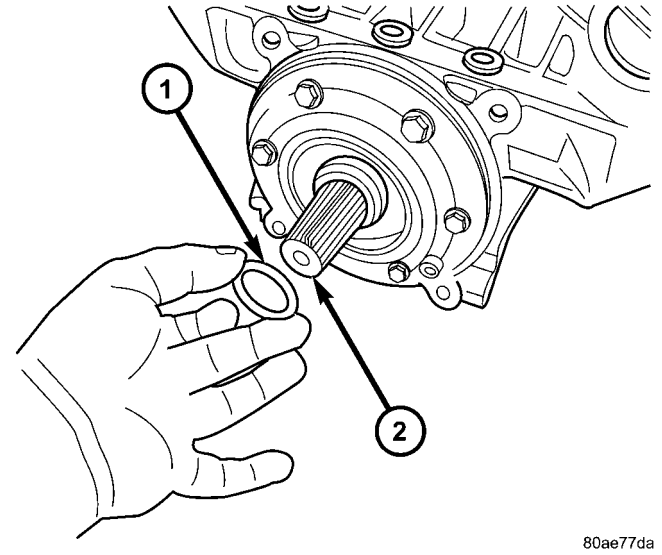


Fig. 23 Shim (Select)

1 - SHIM (SELECT)
2 - DIFFERENTIAL PINION

(4) Install viscous coupler to differential pinion shaft (Fig. 24).

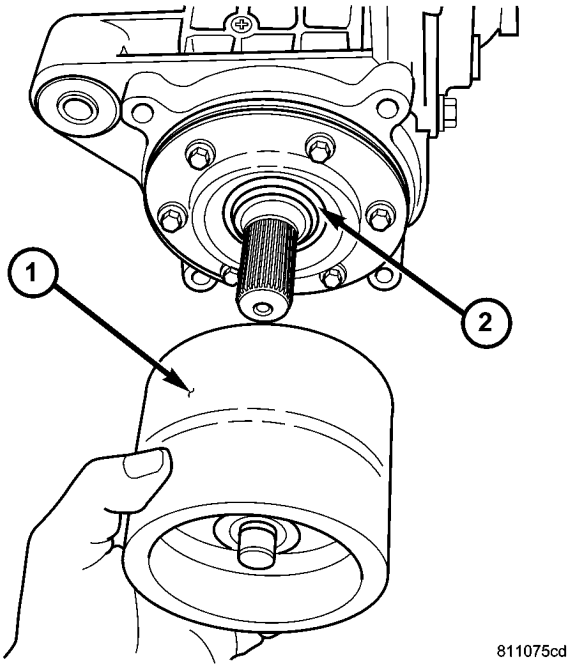


Fig. 24 Viscous Coupler Removal/Installation

1 - VISCOUS COUPLER
2 - SHIM (SELECT)

(5) Install overrunning clutch assembly to viscous coupler (Fig. 25).

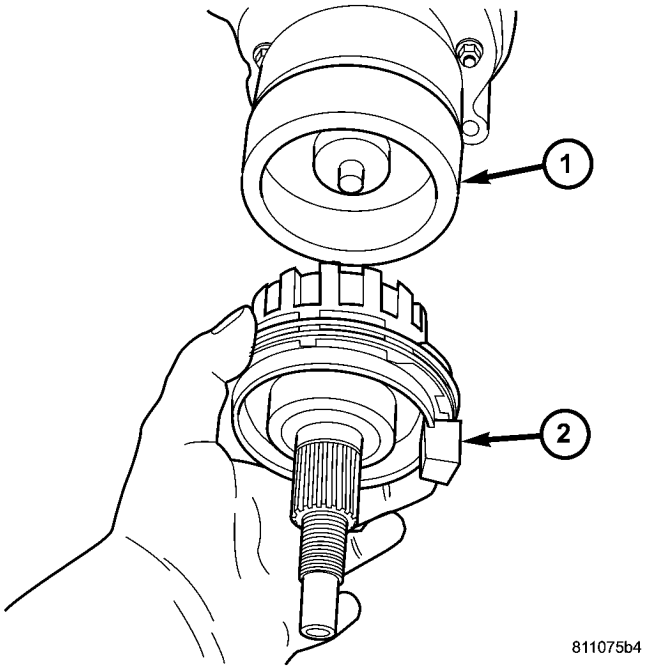


Fig. 25 Overrunning Clutch Assembly

1 - VISCOUS COUPLER
2 - OVERRUNNING CLUTCH ASSEMBLY

REAR DRIVELINE MODULE (Continued)

(6) Install washer to overrunning clutch (Fig. 26).

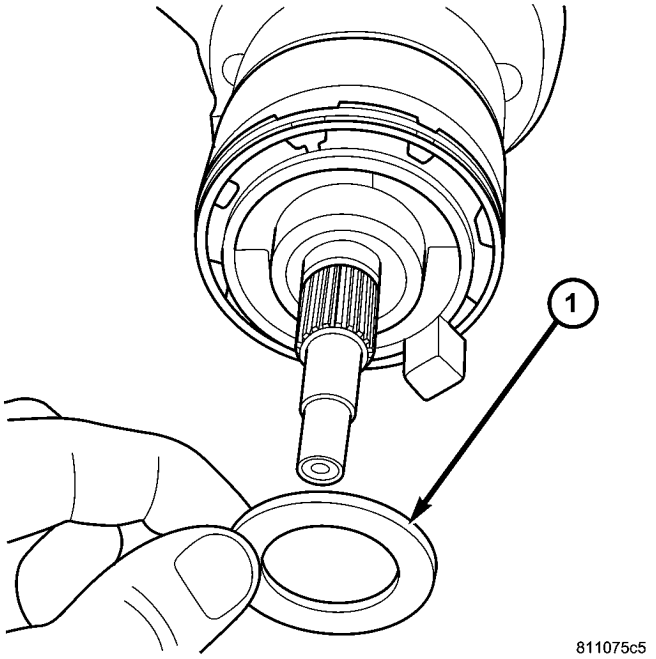


Fig. 26 Flange Bottoming Washer

1 - WASHER

(7) Install o-ring to overrunning clutch (Fig. 27) (Fig. 28).

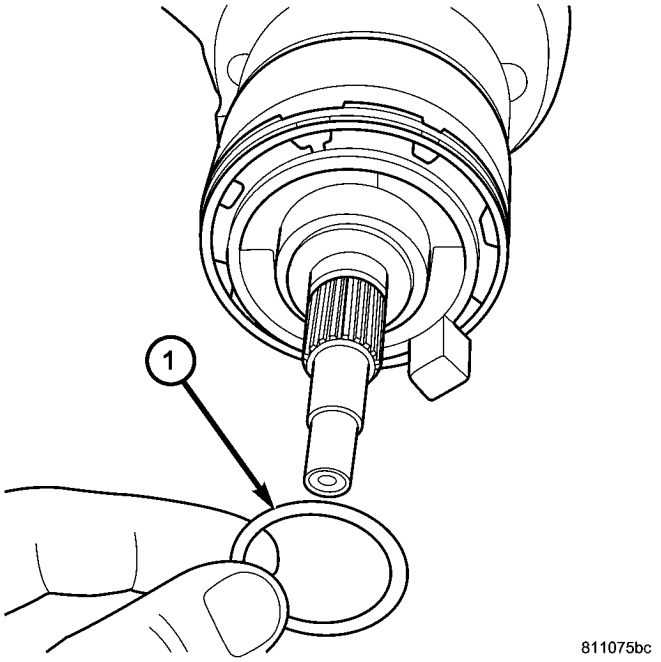


Fig. 27 Input Flange O-ring Seal

1 - O-RING

(8) Align overrunning clutch ground tab to 3 o'clock position (Fig. 29).

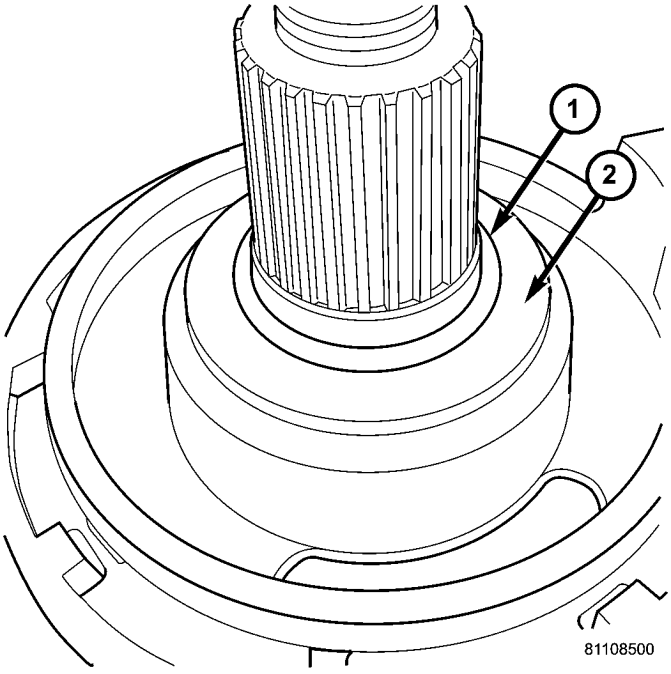


Fig. 28 Proper O-ring and Washer Installation

1 - O-RING
2 - WASHER

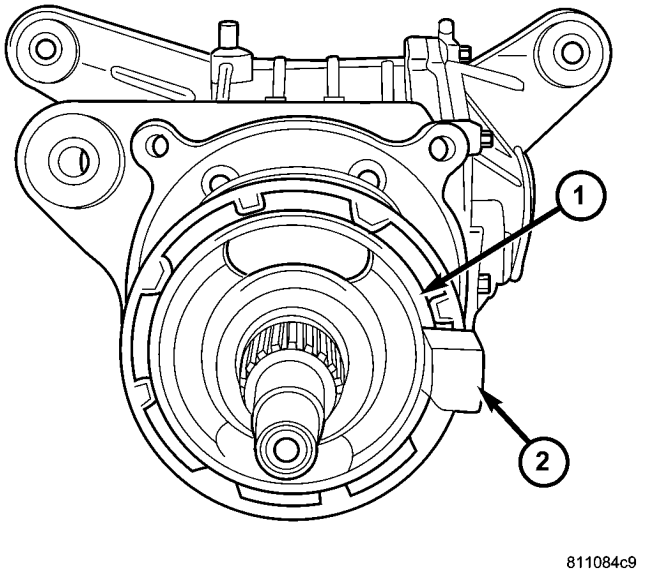


Fig. 29 Overrunning Clutch Orientation

1 - OVERRUNNING CLUTCH ASSEMBLY
2 - TAB AT 3 O'CLOCK

(9) Install overrunning clutch housing into position, making sure ground tab engages with notch in housing (Fig. 30).

REAR DRIVELINE MODULE (Continued)

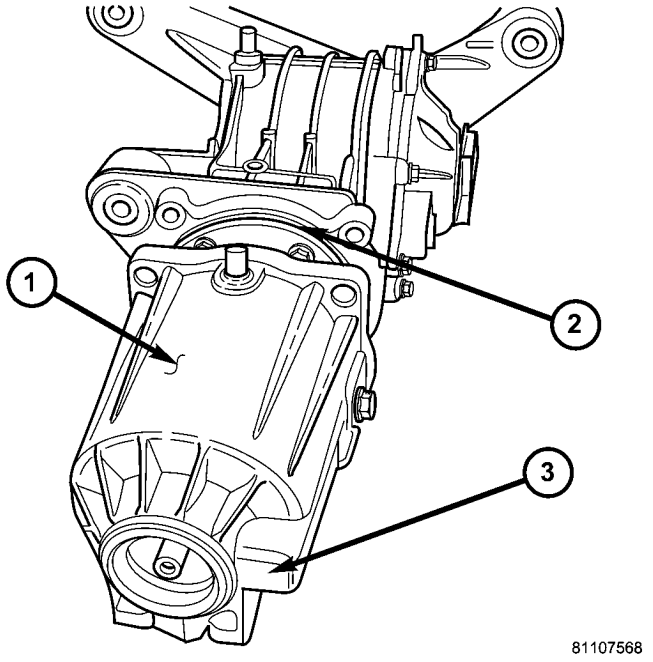


Fig. 30 Overrunning Clutch Housing

1 - HOUSING
2 - O-RING
3 - RELIEF

(10) Install and torque overrunning clutch housing-to-differential assembly bolts (Fig. 31) to 60 N·m (44 ft. lbs.).

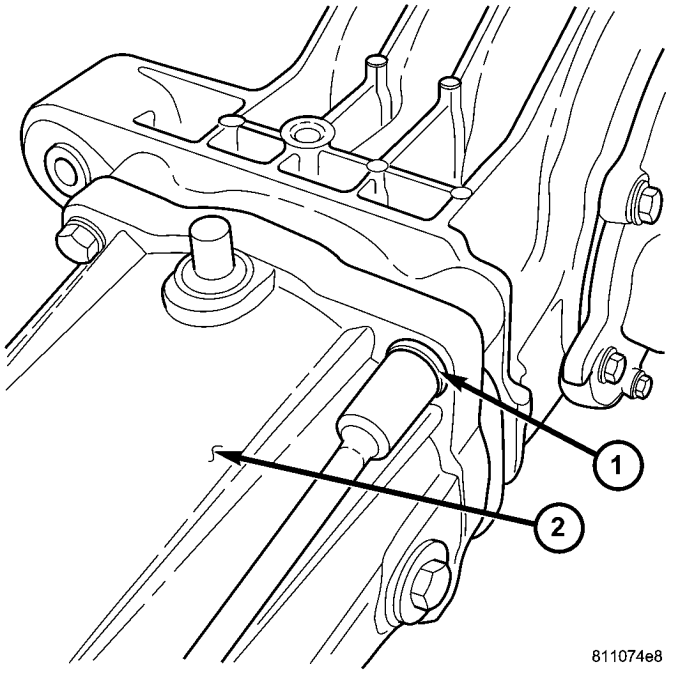


Fig. 31 Overrunning Clutch Housing Bolts

1 - BOLT (4)
2 - HOUSING

(11) Install input flange seal using tool 8802 (Fig. 32).

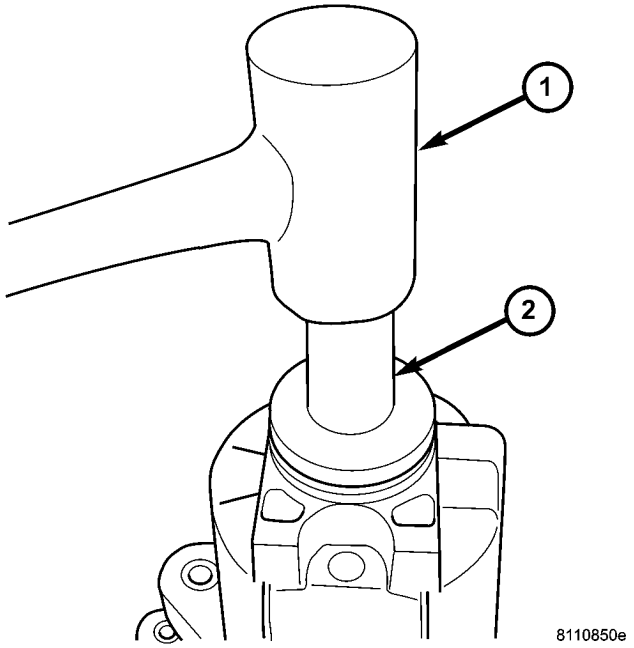


Fig. 32 Input Seal Installation

1 - HAMMER
2 - TOOL 8802

(12) Install flange/shield assembly (Fig. 33).

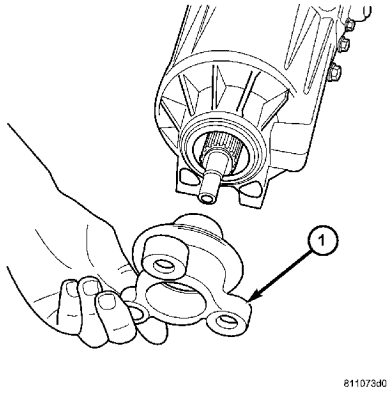


Fig. 33 Input Flange Removal/Installation

1 - INPUT FLANGE

REAR DRIVELINE MODULE (Continued)

(13) Install input flange washer and nut (Fig. 34) (Fig. 35).

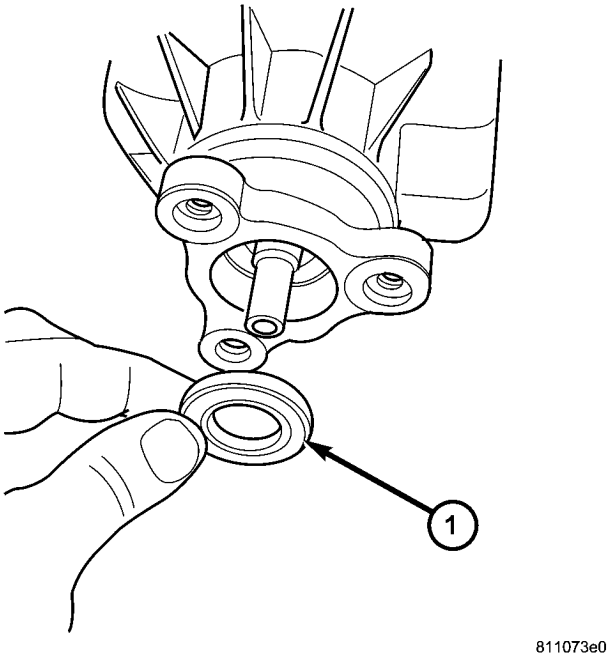


Fig. 34 Input Flange Washer

1 - WASHER

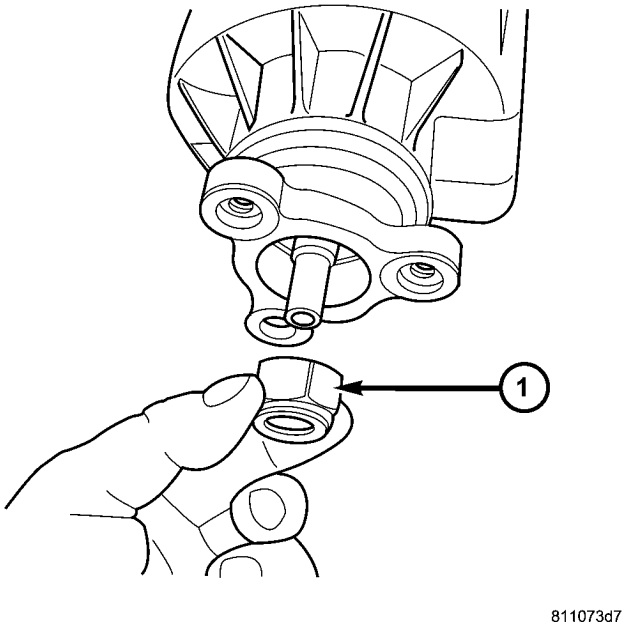


Fig. 35 Input Flange Nut Removal/Installation

1 - NUT

(14) Using tool 6958 (Fig. 36), torque nut to 135 N·m (100 ft. lbs.).

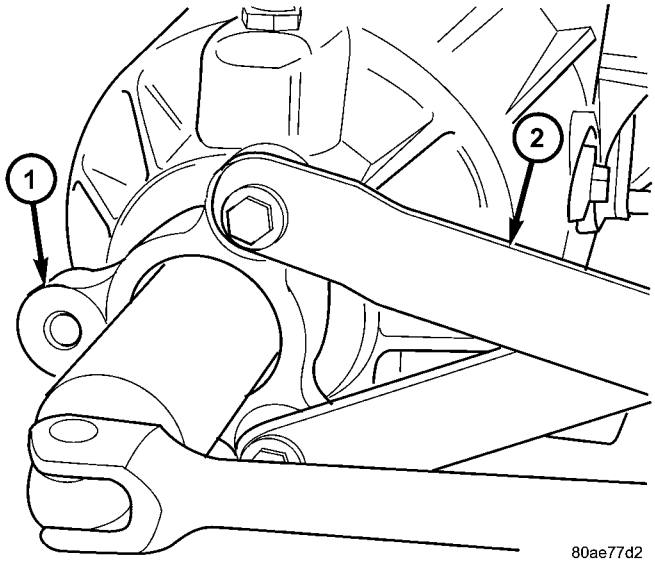


Fig. 36 Input Flange Nut

1 - INPUT FLANGE
2 - TOOL 6958

INSTALLATION

(1) Install driveline module to transmission jack. Secure module to jack.

(2) Using Tool 9099, load halfshafts to differential, one side at a time (Fig. 37).

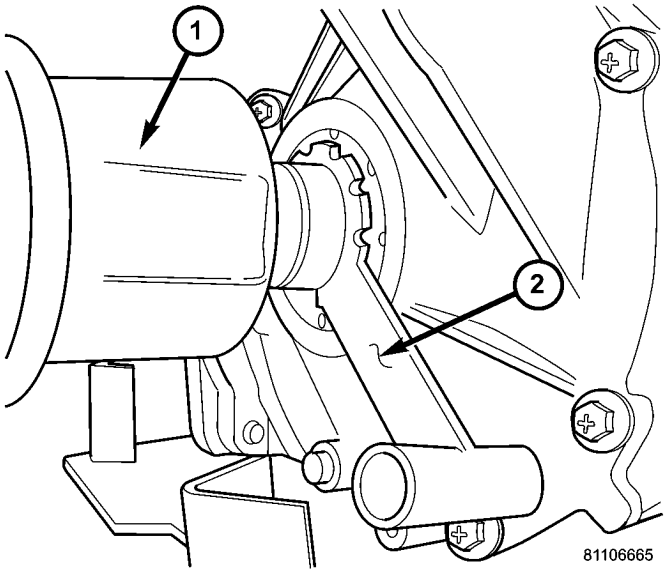


Fig. 37 Install Seal Protector

1 - HALFSHAFT
2 - SEAL PROTECTOR

(3) Index and install propeller shaft to driveline module flange. Install, but do not tighten, three (3) propeller shaft-to-driveline module bolts.

(4) Raise driveline module into position (Fig. 38).

REAR DRIVELINE MODULE (Continued)

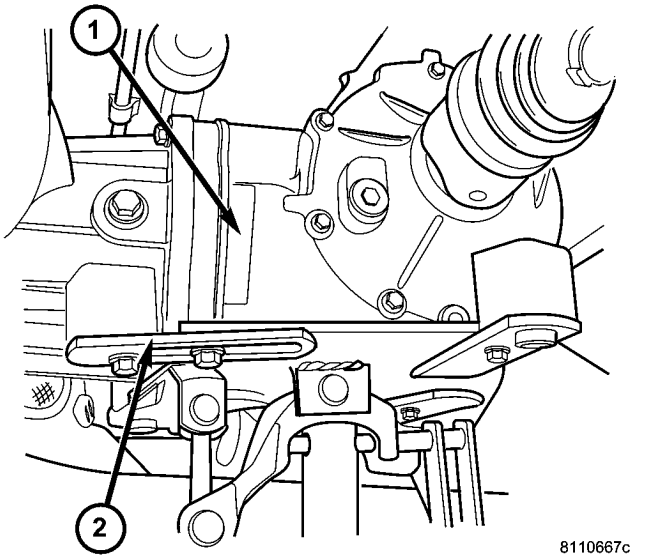


Fig. 38 Support Module with Jack

1 - DRIVELINE MODULE
2 - TRANSMISSION JACK

(5) Install and torque module-to-cradle bolts to 102 N·m (75 ft. lbs.) (Fig. 39) (Fig. 40).

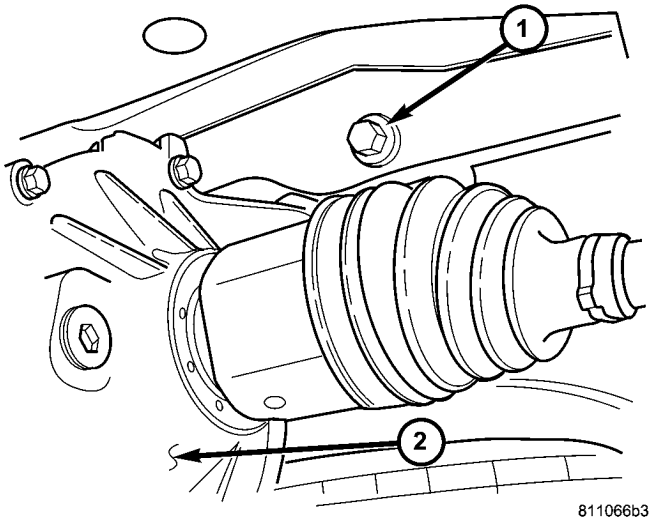


Fig. 39 Module Mounting Bolt

1 - BOLT
2 - DRIVELINE MODULE

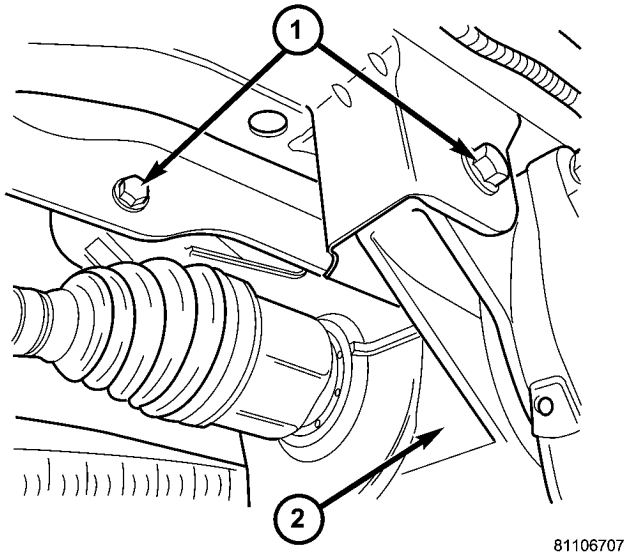


Fig. 40 Module Mounting Bolts

1 - BOLT (2)
2 - DRIVELINE MODULE

(6) Torque propeller shaft-to-driveline module bolts to 54 N·m (40 ft.lbs.)

(7) Raise exhaust system into position and install hanger/brackets.

(8) Fill differential with 0.7L (0.74 qts.) of Mopar® Gear and Axle Lubricant (75W-90). (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR DRIVELINE MODULE/FLUID - STANDARD PROCEDURE)

(9) Fill overrunning clutch housing with 0.58L (0.61 qts.) of Mopar® ATF+4. (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR DRIVELINE MODULE/FLUID - STANDARD PROCEDURE)

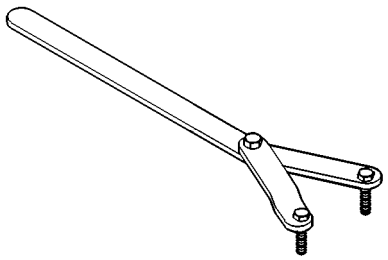
REAR DRIVELINE MODULE (Continued)

SPECIFICATIONS - REAR DRIVELINE MODULE

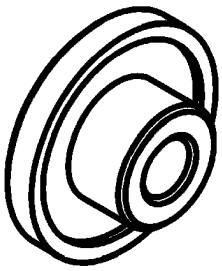
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, Driveline Module-to-Body	54	40	—
Bolt, Overrunning Clutch Housing-to-Differential	60	44	—
Nut, Input Flange	135	100	—
Plug, Differential Drain/Fill	35	26	—
Plug, Overrunning Clutch Housing Drain/Fill	30	22	—
Vent, Differential/ Overrunning Clutch Housing	12	—	110

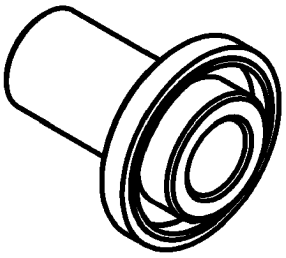
SPECIAL TOOLS



Tool 6958



Tool 8493



Tool 8802

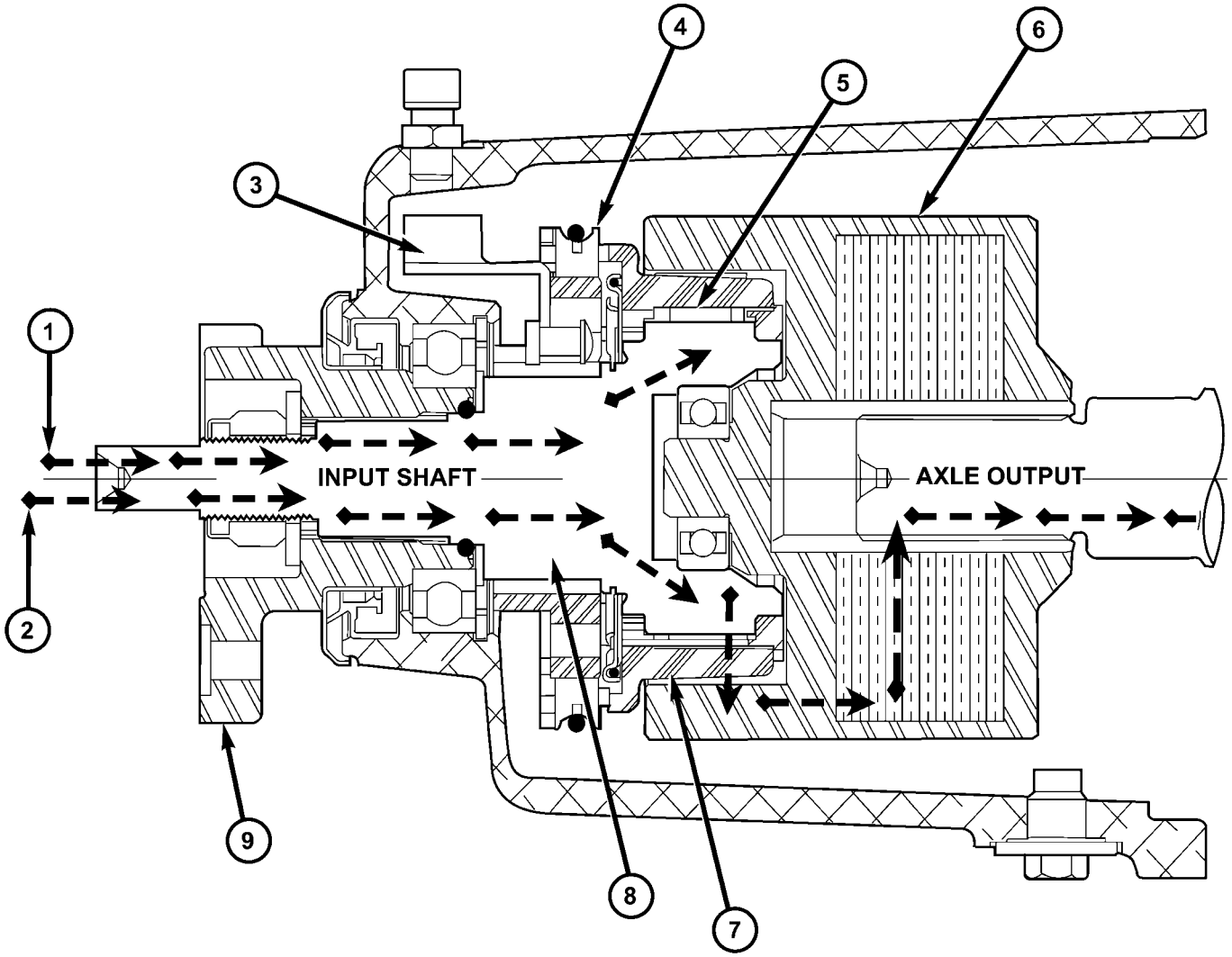
BI-DIRECTIONAL OVERRUNNING CLUTCH

DESCRIPTION

The bi-directional overrunning clutch (BOC) (Fig. 41) works as a mechanical disconnect between the front and rear axles, preventing torque from being transferred from the rear axle to the front. The BOC is a simply an overrunning clutch which works in both clockwise and counter-clockwise rotations. This means that when the output (the rear axle) is rotating faster in one direction than the input (front axle), there is no torque transmission. But when the input speed is equal to the output speed, the unit becomes locked. The BOC provides significant benefits regarding braking stability, handling, and driveline durability. Disconnecting the front and the rear driveline during braking helps to maintain the braking stability of an AWD vehicle. In an ABS/braking event, the locking of the rear wheels must be avoided for stability reasons. Therefore brake systems are designed to lock the front wheels first. Any torque transfer from the rear axle to the front axle disturbs the ABS/braking system and causes potential instabilities on a slippery surface. The BOC de-couples the rear driveline as soon the rear wheels begin to spin faster than the front wheels (front wheels locked) in order to provide increased braking stability. Furthermore the BOC also reduces the likelihood of throttle off over-steer during cornering. In a throttle off maneuver, the BOC once again de-couples the rear driveline forcing all the engine brake torque to the front wheels. This eliminates the chance of lateral slip on the rear axle and increases it on the front. The vehicle will therefore tend to understeer, a situation

BI-DIRECTIONAL OVERRUNNING CLUTCH (Continued)

which is considered easier to manage in most circumstances. During this maneuver, and during the ABS braking event, the BOC does not transmit torque through to the rear wheels. The rear driveline module, with the BOC, will perform the same as a front wheel drive vehicle during these events. The gear ratio offset between the front and rear differentials force the BOC into the overrunning mode most of the time. This allows BOC to significantly reduce the rolling resistance of the vehicle, which improves fuel consumption, allows the downsizing of the driveline components, and prevents the PTU and propshaft joints from overheating.



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Fig. 41 Bi-directional Overrunning Clutch and Viscous Coupler

1 - POWERFLOW - BOC OVERUNNING
2 - POWERFLOW - BOC LOCKED
3 - BOC GROUND TAB
4 - FRICTION BRAKE SHOES
5 - BOC ROLLERS
6 - VISCOUS COUPLER
7 - BOC ROLLER CAGE
8 - BOC INPUT SHAFT
9 - INPUT FLANGE

BI-DIRECTIONAL OVERRUNNING CLUTCH (Continued)

OPERATION

In order to achieve all-wheel drive operation in reverse, the overrunning clutch locking functional direction must be reversible. The bi-directional overrunning clutch (BOC) changes the operational mode direction depending on the propeller shaft direction. The propeller shaft rotates in the clockwise (when viewed from the front) direction when the vehicle is moving forward, which indexes the BOC to the forward overrunning position. When the vehicle is in reverse, the propeller shaft will rotate counter-clockwise and index the BOC to the reverse overrunning position.

The BOC acts as a mechanical stator. It is active (transmitting torque), or it is not active and in overrunning mode (not transmitting torque). This "all or nothing" approach to torque transfer would cause a sudden application of all available power to the rear wheels, which is not desirable. Therefore it is run in series with a viscous coupler to smooth, dampen, and limit the transmission of torque to the rear axle and to prevent a step style torque input to the rear axle.

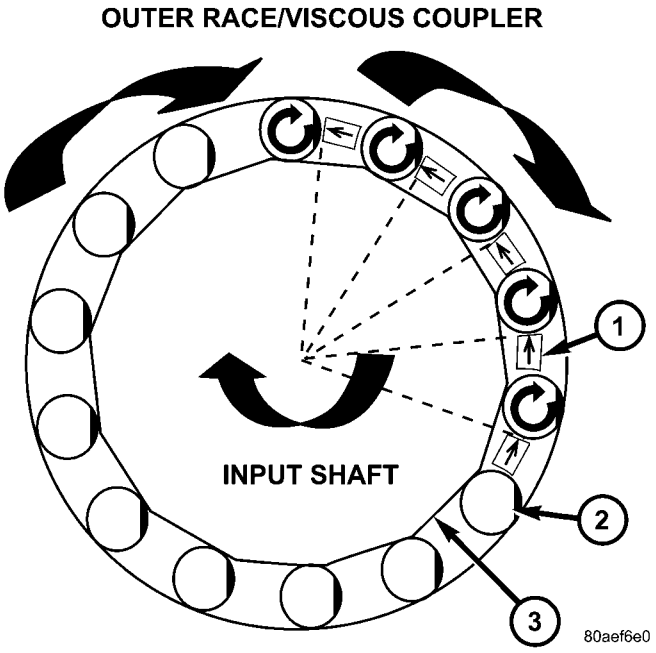


Fig. 42 BOC Operation at Low Speeds With No Front Wheel Slip

1 - CAGE
2 - ROLLER
3 - INPUT SHAFT

STEADY STATE, LOW TO MODERATE SPEED, NO FRONT WHEEL SLIP, FORWARD DIRECTION

During normal driving conditions, (no wheel slip), the inner shaft (front axle) and outer race (viscous coupler) are running at different speeds due to the different gear ratios between the front and rear differentials. In this condition, the outer race is always spinning faster (overdriving between 5-32 rpm) than the inner shaft. When the BOC (Fig. 42) is running under these conditions, at low vehicle speeds the drag shoes and the cage keep the rollers up on the left side (forward side) of the inner shaft flats. This is what is known as "overrunning mode." Notice that when the clutch is in overrunning mode, the rollers are spinning clockwise and with the outer race, thus no torque is being transferred.

NOTE: Low speed, forward and reverse operation is identical, just in opposite directions. (Fig. 42) shows forward direction in reverse the rollers are on the other side of the flats due to a reversal of the cage force.

TRANSIENT CONDITION (BOC LOCKED), FRONT WHEEL SLIP, FORWARD DIRECTION

When the front wheels lose traction and begin to slip, the propeller shaft and rear axle pinion speed difference decreases to zero. At this point the input shaft (cam) becomes the driving member of the BOC (Fig. 43), compressing the rollers against the outer race. This locks the input shaft with the outer race and transmits torque to the housing of the viscous coupler, that in turn transmits torque to the rear axle pinion. It should also be noted that when the device is locked, the inner shaft and the outer race are rotating at the same speed. The rollers are pinched at this point and will stay locked until a torque reversal (no front wheel slip) occurs. When locked, the viscous coupler slips during the torque transfer and the amount of torque transferred is dependent on the coupling characteristic and the amount of front wheel slip.

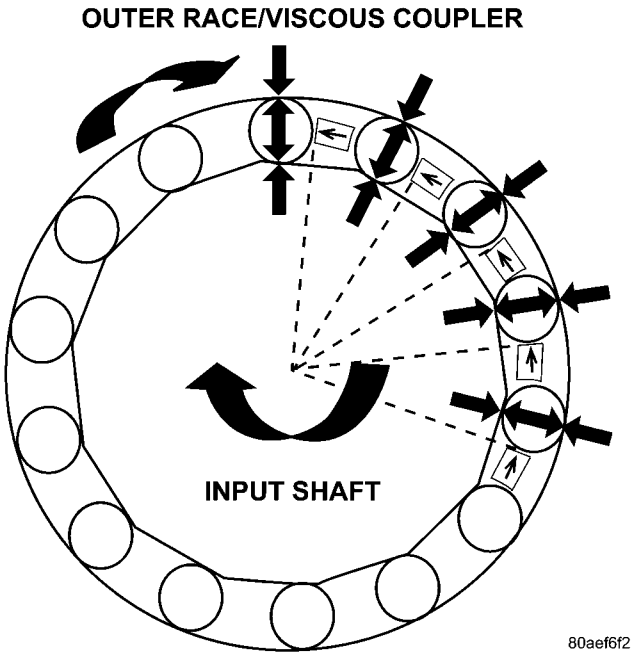


Fig. 43 BOC Operation with Front Wheel Slip

BI-DIRECTIONAL OVERRUNNING CLUTCH (Continued)

STEADY STATE, HIGH SPEED, NO WHEEL SLIP

The roller cage positions the rollers on the input shaft flats during low and high speed overrunning and during initial BOC lockup. The roller cage is rotating at input shaft (propeller shaft) speed at all times. At low speeds, the friction shoes (Fig. 44) are pressed against the friction ground via the garter spring (Fig. 45), creating a drag force on the roller cage. The drag force positions the cage, which in turn positions the rollers to one side of the flat. The direction of this drag force (position of the roller) is dependent on the input (propeller shaft) rotational direction. Since the rollers are always in contact with the outer race, due to centrifugal forces, the rollers want to follow the outer race due to drag. During overrunning operation, the outer race is rotating faster than the input; causing the rollers to want to traverse the flat from one side to the other. During low speeds, the brake shoes counteract this effect. To avoid excessive wear, the ground shoes are designed to lift off from the friction ground due to centrifugal forces at higher rotational speeds.

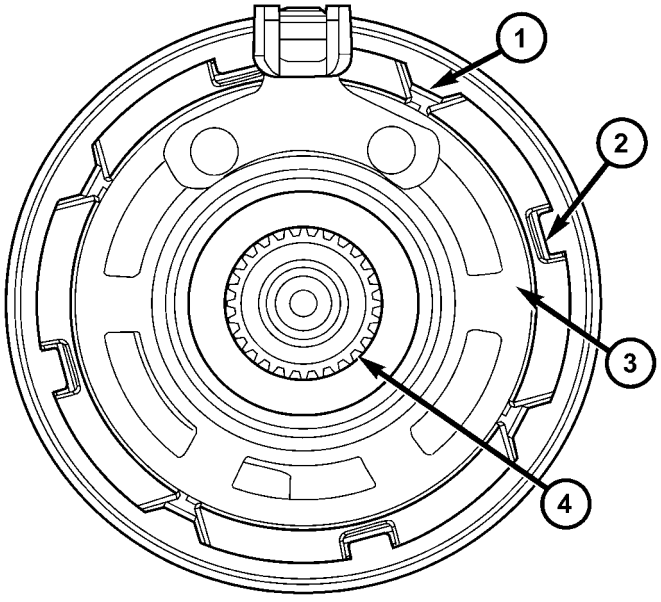


Fig. 44 Front View of BOC

1 - GARTER SPRING
2 - FRICTION BRAKE SHOES
3 - FRICTION GROUND CONNECTED TO GROUND TAB
4 - INPUT SHAFT

To keep the rollers in the overrunning position and avoid undesired ″high speed lockup″, a high speed latch (Fig. 46) positions the cage before the ground shoes lift off. A further explanation of the high speed effects follows as well. Utilizing only the friction shoes approach means that at high speed the required ground shoe drag torque would cause excessive brake shoe wear or the roller will begin to migrate to the opposite side of the flat due to the drag force of the outer race. This would result in system lock-up. (Fig. 47) shows the BOC as it crosses the speed where the brake shoe force is overcome by the roller drag on the outer race. Notice that the roller is locking up on the opposite side of the flat and the cage supplies no force on the rollers.

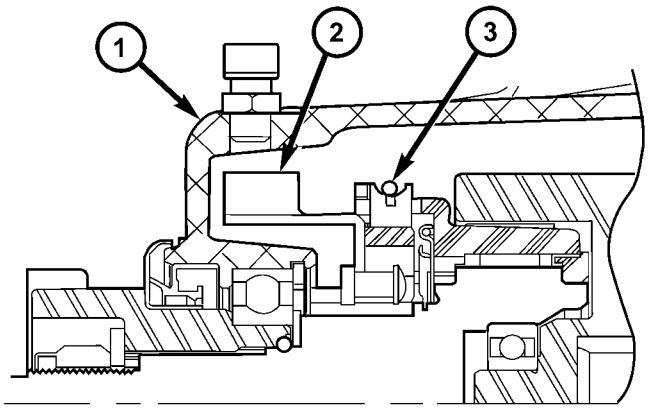


Fig. 45 Location of the Grounding Element

1 - DIFFERENTIAL HOUSING
2 - GROUND TAB
3 - GARTER SPRING

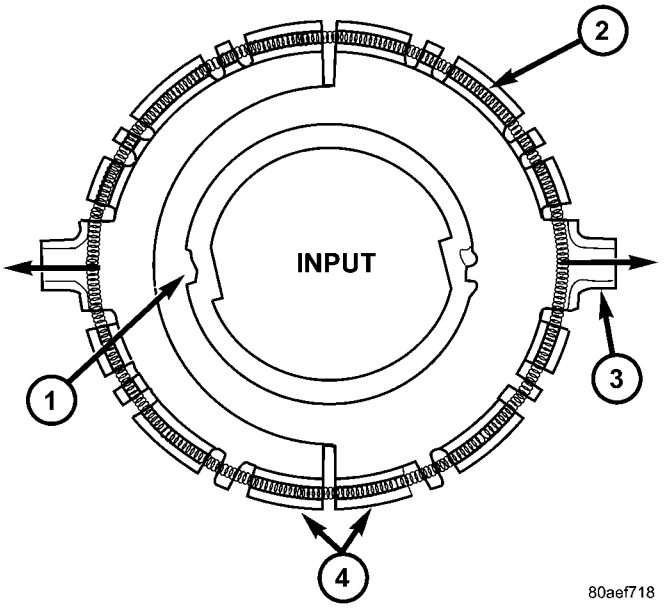


Fig. 46 BOC High Speed Latch (Not Engaged)

1 - TOOTH (TWO PLACES)
2 - GARTER SPRING
3 - TABS AT BOTH ENDS FIT INTO SLOTS IN CAGE
4 - TWO PART DESIGN

BI-DIRECTIONAL OVERRUNNING CLUTCH (Continued)

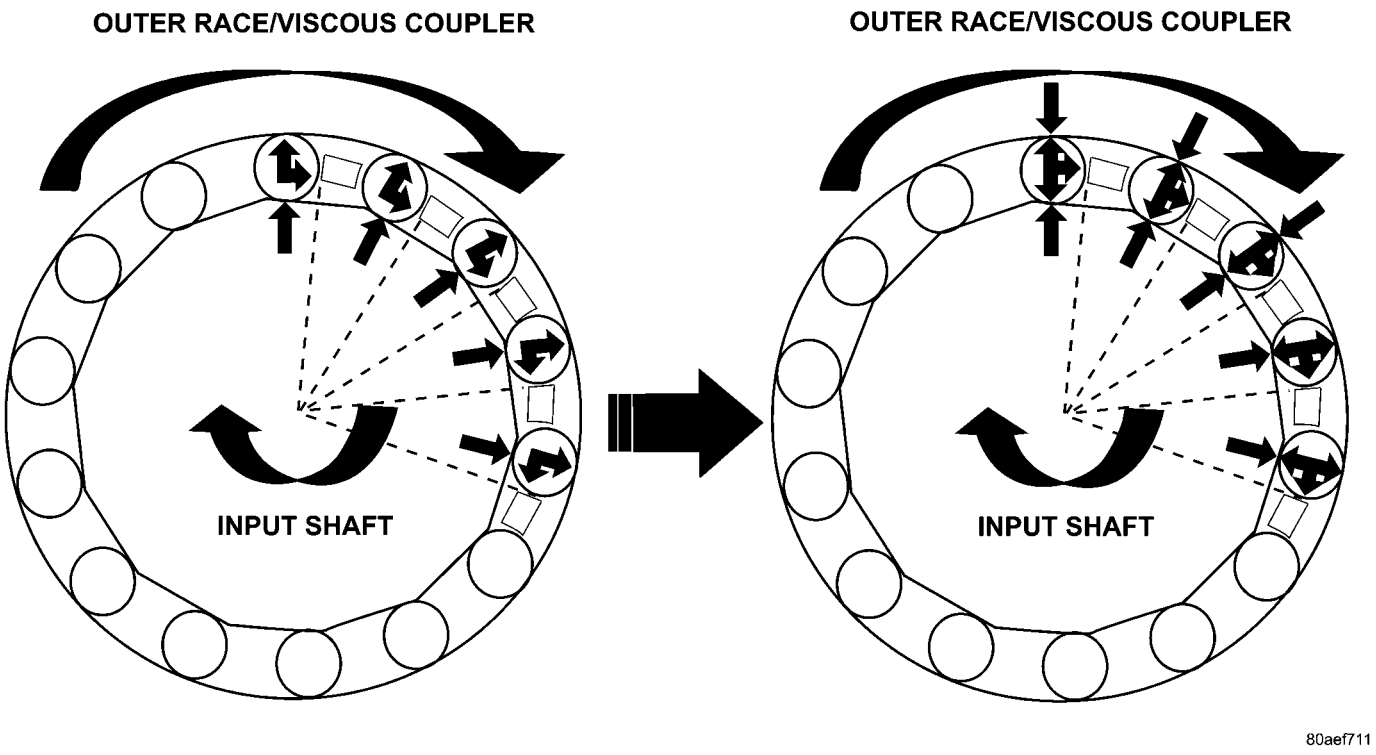


Fig. 47 BOC Operation During High Speed Lock-up Without High Speed Latch

This lock-up is not desired, and requires the use of another mechanism to prevent the lock-up. The device that prevents undesired high-speed lock-up is called a ″high speed latch″.

Similar to the friction shoes, the two-piece high-speed latch will separate from each other at high rotational speeds due to centrifugal effects. (Fig. 48) shows the high speed latch engaged. The gap ″x″ increases with speed, eventually locking into one of the slots in the BOC shaft. When the high-speed latch is activated (propeller shaft speed reaches X amount), the cage is partially fixed, and cannot lock on the wrong side of the flat as shown (Fig. 47). The high speed latch is a one way device and does not prevent high-speed lockup in the reverse direction. At high speeds, the BOC provides the same function as low speeds, transferring torque to the viscous coupler only when front wheel slip overcomes the axle ratio offset.

At high speed, the rollers are forced outward to the outer race because of centrifugal force. At high speeds, the friction shoes can no longer prevent lock-up. When the teeth on the high-speed latch engage into the input shaft, it keeps the rollers centered above the flats because the tabs on the latch are locked into the cage. (Fig. 49) shows the roller configuration with the High-Speed Latch engaged.

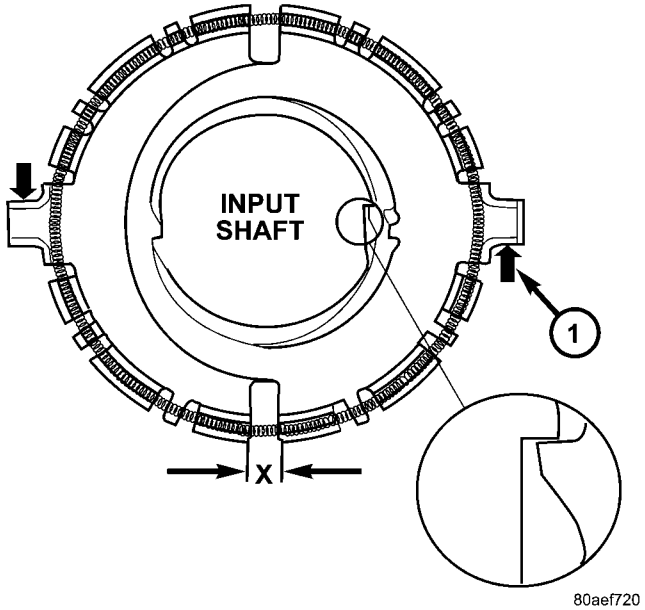


Fig. 48 High Speed Latch Engaged

1 - CAGE FORCE EXERTED BY ROLLERS AT HIGH SPEED

BI-DIRECTIONAL OVERRUNNING CLUTCH (Continued)

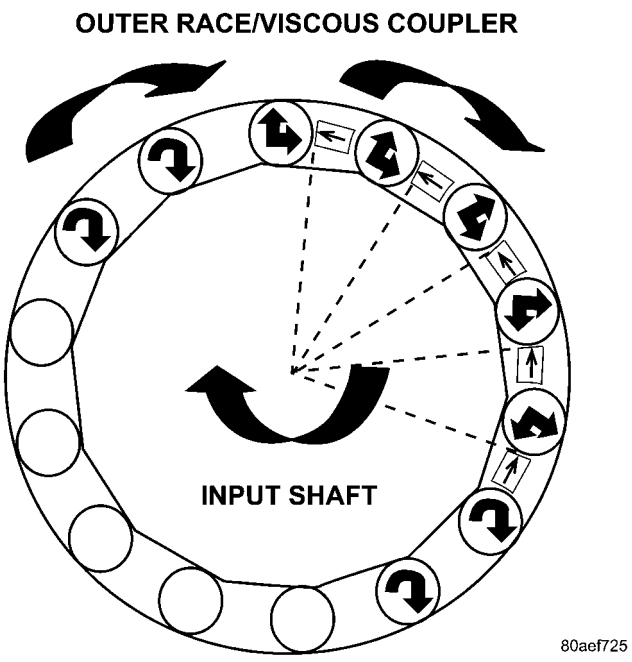


Fig. 49 BOC Operation at High Speed with High Speed Latch

On the BOC shaft, the high speed latch teeth lock up in the grooved areas, shown in (Fig. 50), when the turning speed reaches the critical value. (Fig. 50) also shows the outer race/viscous coupler. Notice the surface (outer race) the rollers mate against when transferring torque.

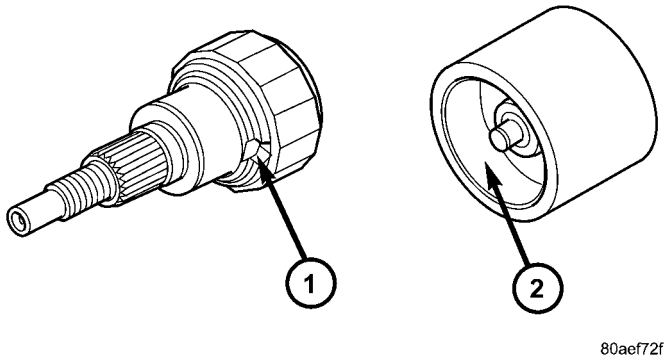


Fig. 50 BOC Input Shaft

1 - GROOVED AREA (2 LOCATIONS)
2 - ROLLER MATING SURFACE

DIFFERENTIAL ASSEMBLY

DESCRIPTION

The differential gear system divides the torque between the axle shafts. It allows the axle shafts to rotate at different speeds when turning corners.

Each differential side gear is splined to an axle shaft. The pinion gears are mounted on a pinion mate shaft and are free to rotate on the shaft. The pinion gear is fitted in a bore in the differential case and is positioned at a right angle to the axle shafts.

OPERATION

In operation, power flow occurs as follows:

- The pinion gear rotates the ring gear
- The ring gear (bolted to the differential case) rotates the case
- The differential pinion gears (mounted on the pinion mate shaft in the case) rotate the side gears
- The side gears (splined to the axle shafts) rotate the shafts

During straight-ahead driving, the differential pinion gears do not rotate on the pinion mate shaft. This occurs because input torque applied to the gears is divided and distributed equally between the two side gears. As a result, the pinion gears revolve with the pinion mate shaft but do not rotate around it (Fig. 51).

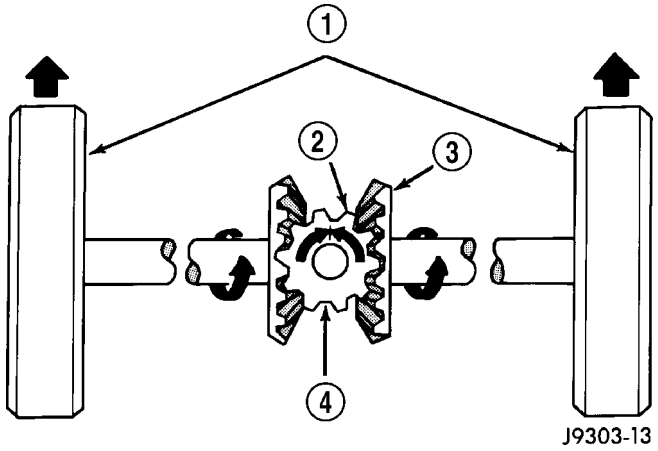


Fig. 51 Differential Operation—Straight Ahead Driving

1 - IN STRAIGHT AHEAD DRIVING EACH WHEEL ROTATES AT 100% OF CASE SPEED
2 - PINION GEAR
3 - SIDE GEAR
4 - PINION GEARS ROTATE WITH CASE

DIFFERENTIAL ASSEMBLY (Continued)

When turning corners, the outside wheel must travel a greater distance than the inside wheel to complete a turn. The difference must be compensated for to prevent the tires from scuffing and skidding through turns. To accomplish this, the differential allows the axle shafts to turn at unequal speeds (Fig. 52). In this instance, the input torque applied to the pinion gears is not divided equally. The pinion gears now rotate around the pinion mate shaft in opposite directions. This allows the side gear and axle shaft attached to the outside wheel to rotate at a faster speed.

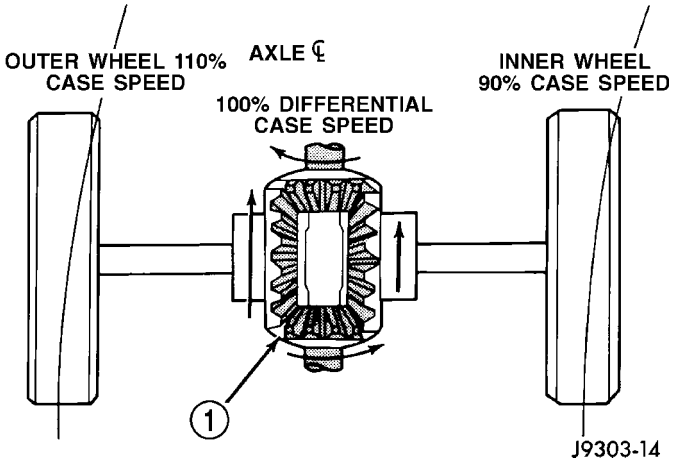


Fig. 52 Differential Operation—On Turns

1 - PINION GEARS ROTATE ON PINION SHAFT

FLUID - DIFFERENTIAL ASSEMBLY

STANDARD PROCEDURE - DIFFERENTIAL ASSEMBLY FLUID CHANGE

The drain plug (Fig. 53) for the differential assembly is located in the bottom of the differential assembly case, toward the rear of the unit.

The fill plug (Fig. 54) for the differential assembly is located on the rear of the assembly case.

The correct fill level is to the bottom of the fill plug hole. Be sure the vehicle is on a level surface, or is hoisted in a level manner, in order to obtain the correct fill level.

(1) Raise the vehicle on a hoist.

(2) Position a drain pan under the differential drain plug (Fig. 53).

(3) Remove the drain plug and allow the fluid to drain into the pan.

(4) Install the drain plug and torque to 35 N·m (26 ft. lbs.).

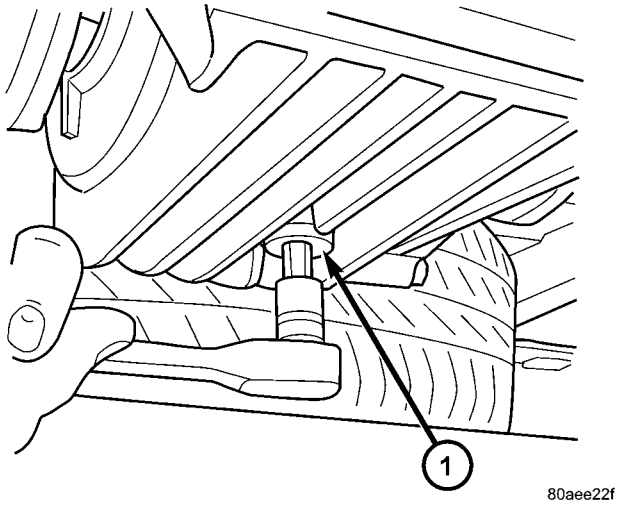


Fig. 53 Differential Drain Plug

1 - DIFFERENTIAL DRAIN PLUG

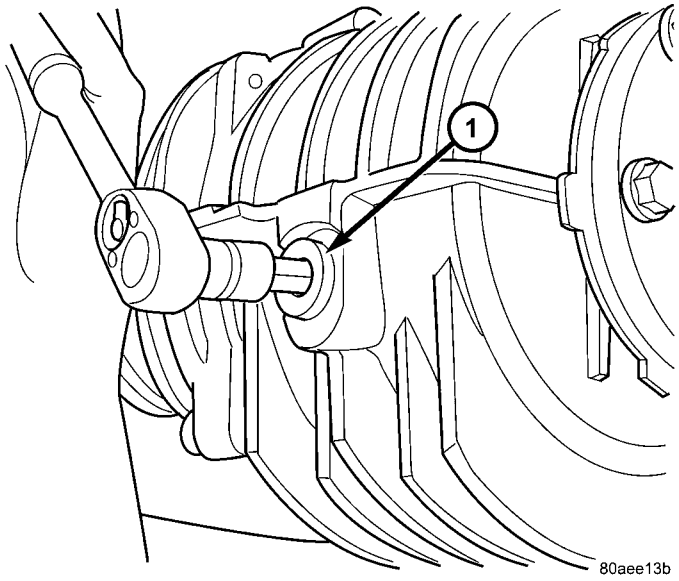


Fig. 54 Differential Fill Plug

1 - DIFFERENTIAL FILL PLUG

(5) Re-position the drain pan under the differential fill plug.

(6) Remove the differential fill plug (Fig. 54).

(7) Using a suction gun (Fig. 55) or equivalent, fill the differential assembly with 0.7 L (0.74 Qts.) of Mopar® Gear and Axle Lubricant (75W-90).

(8) Install the fill plug and torque to 35 N·m (26 ft. lbs.).

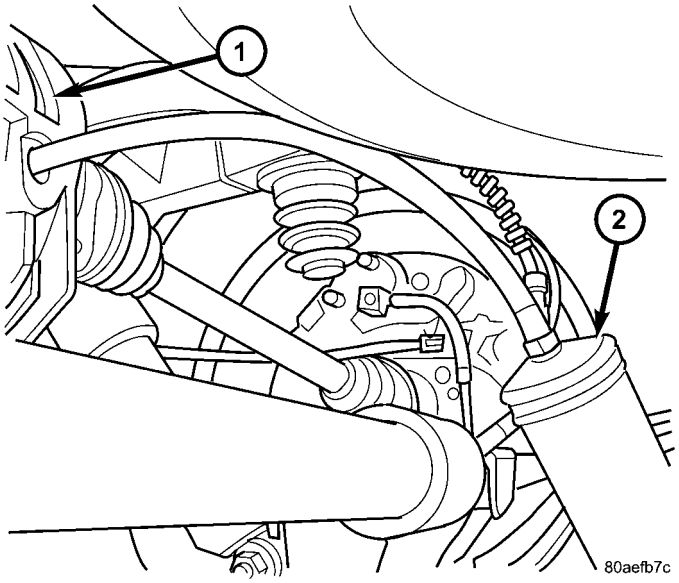


Fig. 55 Filling Differential

1 - DIFFERENTIAL ASSEMBLY
2 - SUCTION GUN

FLUID - OVERRUNNING CLUTCH HOUSING

STANDARD PROCEDURE - OVERRUNNING CLUTCH HOUSING FLUID CHANGE

(1) Raise vehicle on hoist.

(2) Position a drain pan under overrunning clutch housing drain plug.

(3) Remove overrunning clutch housing drain plug and drain fluid (Fig. 56).

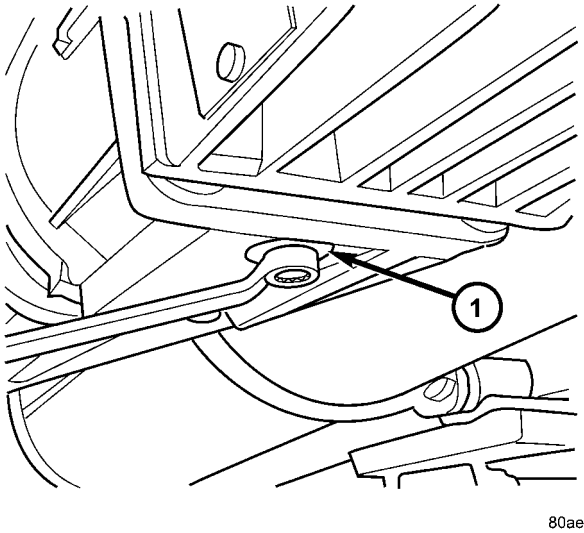


Fig. 56 Overrunning Clutch Case Drain Plug

1 - OVERRUNNING CLUTCH HOUSING DRAIN PLUG

(4) Install the drain plug and torque to 30 N·m (22 ft. lbs.).

(5) Re-position the drain pan under the overrunning clutch housing fill plug.

(6) Remove fill plug (Fig. 57).

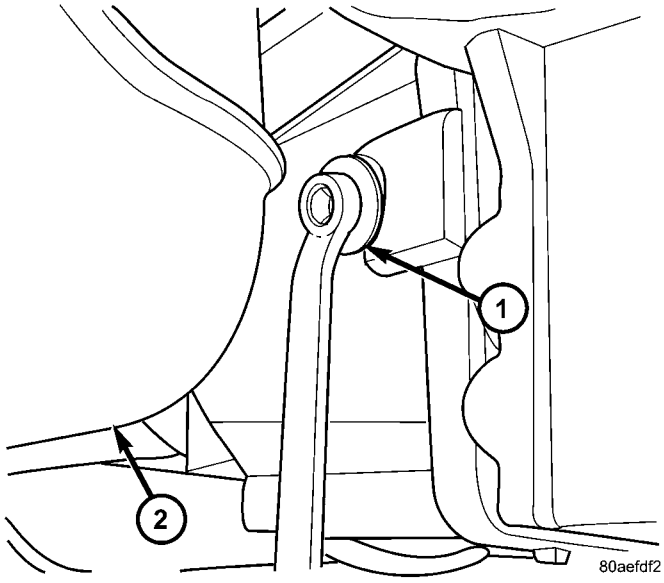


Fig. 57 Overrunning Clutch Housing Fill Plug

1 - OVERRUNNING CLUTCH HOUSING FILL PLUG
2 - FUEL TANK

(7) Using a suction gun (Fig. 58), add 0.58 L (1.22 pts.) of Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602).

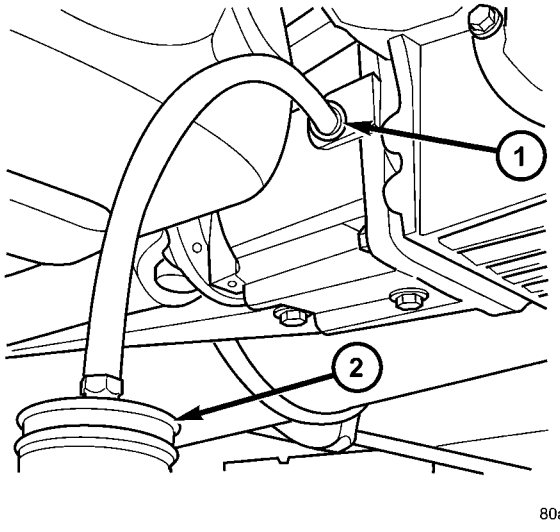


Fig. 58 Filling Overrunning Clutch Case

1 - OVERRUNNING CLUTCH HOUSING FILL HOLE
2 - SUCTION GUN

(8) Install fill plug and torque to 30 N·m (22 ft. lbs.).

INPUT FLANGE SEAL

REMOVAL

(1) Raise vehicle on hoist.
(2) Remove propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT - REMOVAL)
(3) Using tool 6958, loosen input flange nut (Fig. 59).

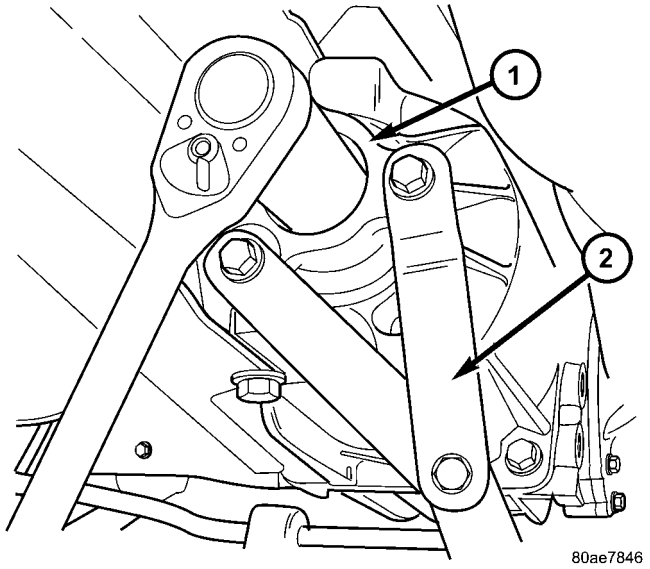


Fig. 59 Input Flange Nut

1 - INPUT FLANGE
2 - TOOL 6958

(4) Remove input flange nut and washer (Fig. 60) (Fig. 61).
(5) Remove input flange (Fig. 62).
(6) Using suitable screwdriver, remove input flange seal from overrunning clutch housing (Fig. 63).

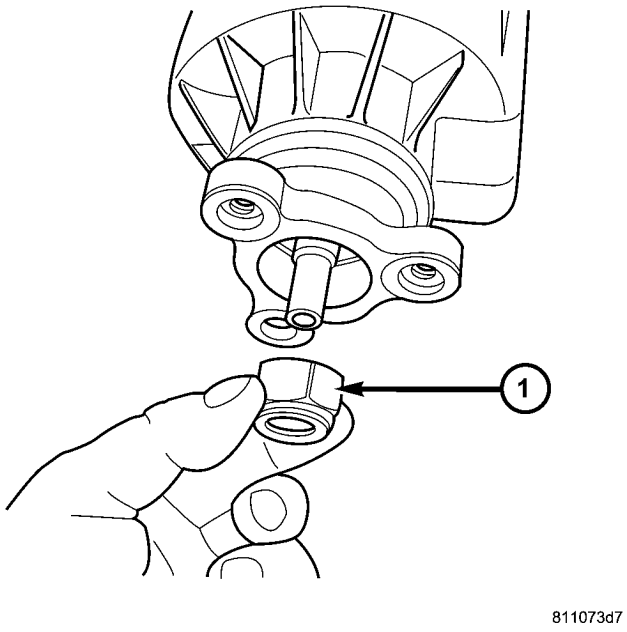


Fig. 60 Input Flange Nut Removal/Installation

1 - NUT

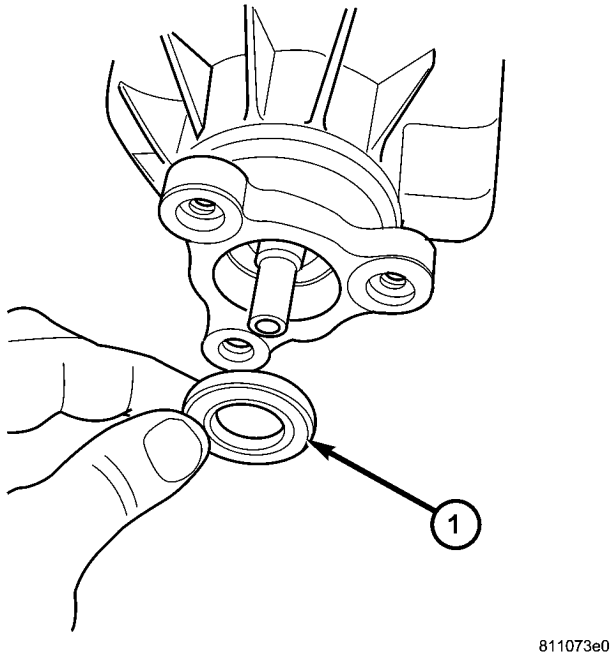


Fig. 61 Input Flange Washer

1 - WASHER

INPUT FLANGE SEAL (Continued)

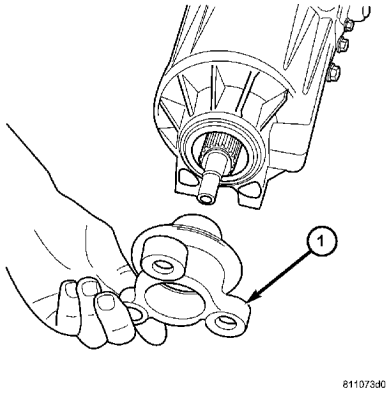


Fig. 62 Input Flange Removal/Installation

1 - INPUT FLANGE

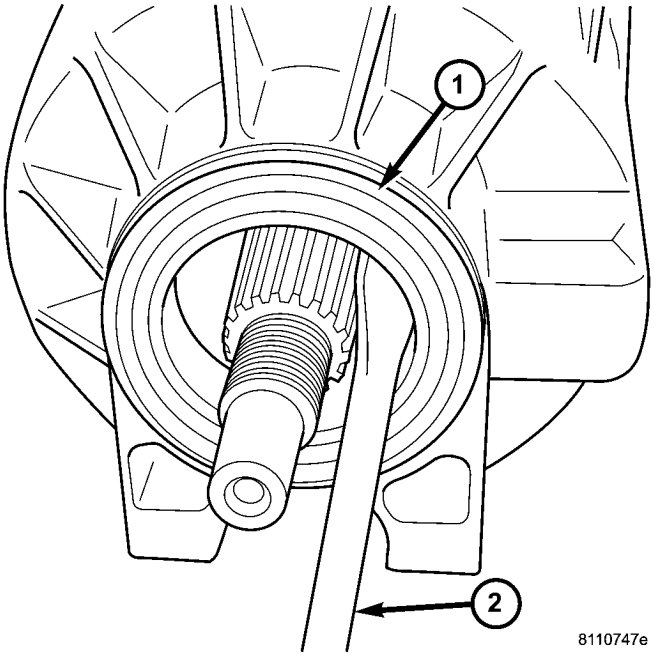


Fig. 63 Input Flange Seal Removal

1 - SEAL
2 - SCREWDRIVER

INSTALLATION

(1) Using tool 8802, install input flange seal to overrunning clutch case (Fig. 64).

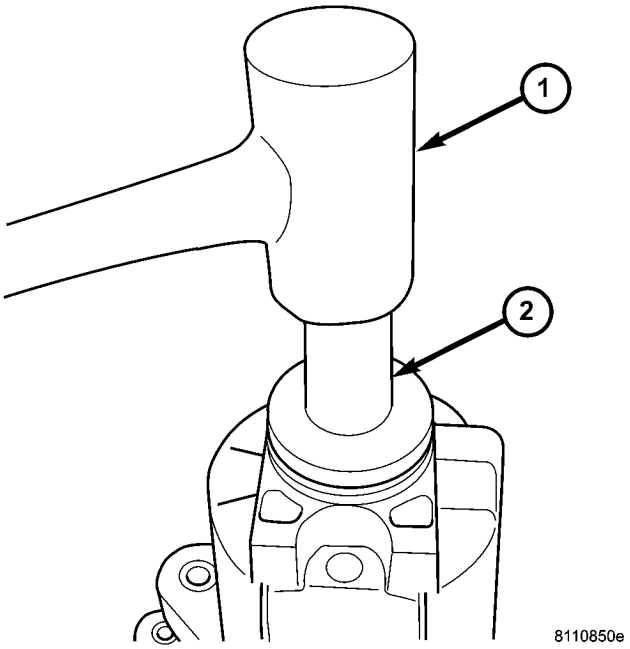


Fig. 64 Input Seal Installation

1 - HAMMER
2 - TOOL 8802

(2) Install input flange (Fig. 65).

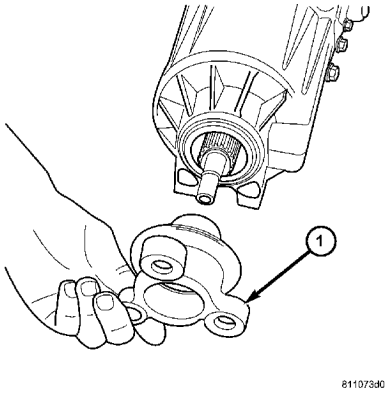


Fig. 65 Input Flange Removal/Installation

1 - INPUT FLANGE

INPUT FLANGE SEAL (Continued)

(3) Install flange washer and nut (Fig. 66) (Fig. 67).

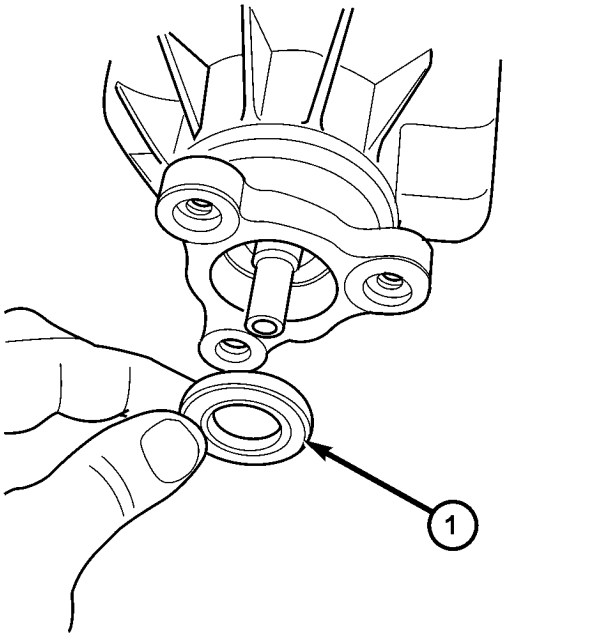


Fig. 66 Input Flange Washer

1 - WASHER

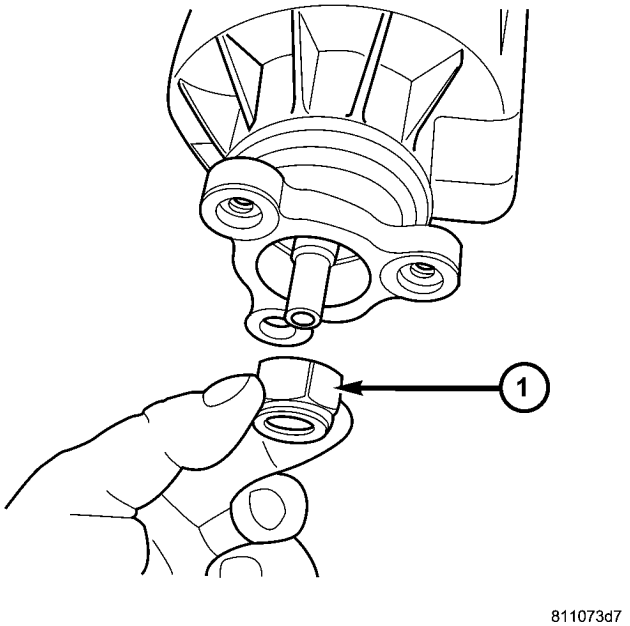


Fig. 67 Input Flange Nut Removal/Installation

1 - NUT

(4) Using tool 6958, torque flange nut to 135 N·m (100 ft. lbs.) (Fig. 68).

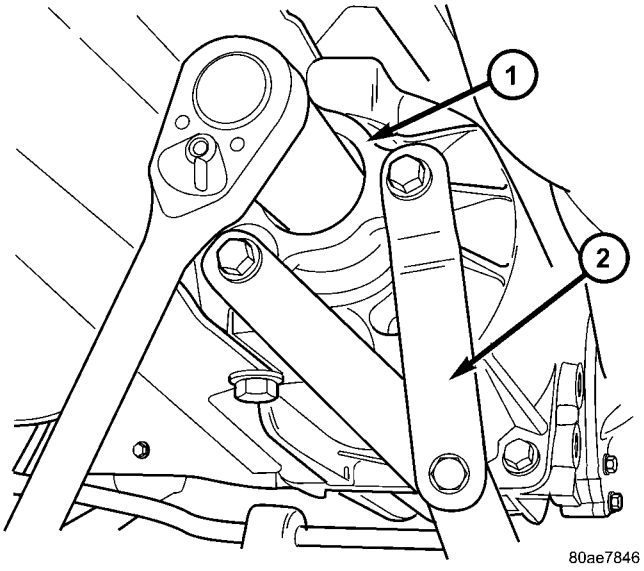


Fig. 68 Input Flange Nut

1 - INPUT FLANGE
2 - TOOL 6958

(5) Install propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT - INSTALLATION)

(6) Lower vehicle.

OUTPUT SEAL

REMOVAL

(1) Raise vehicle on hoist.
(2) Remove rear driveline module. (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR DRIVELINE MODULE - REMOVAL)
(3) Use suitable screwdriver to remove output seal (Fig. 69).

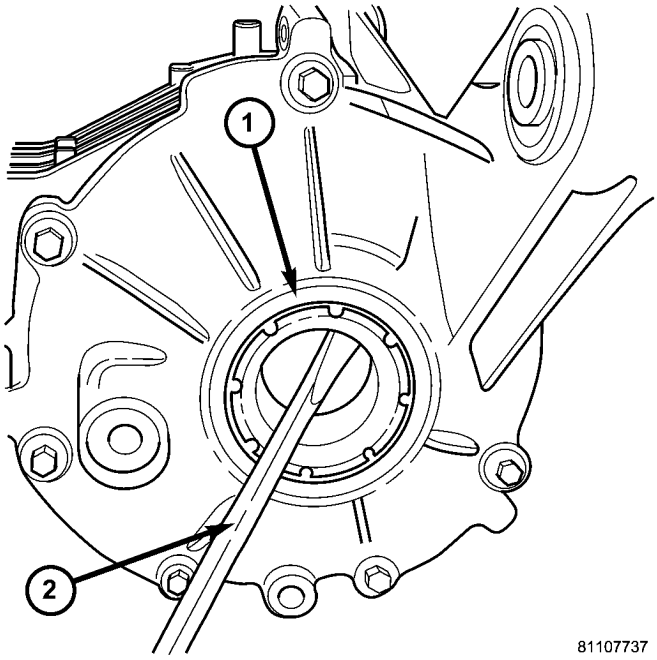


Fig. 69 Axle Seal Removal

1 - SEAL
2 - SCREWDRIVER

INSTALLATION

(1) Install output flange seal to differential housing using tool C4171A and 8493 (Fig. 70).

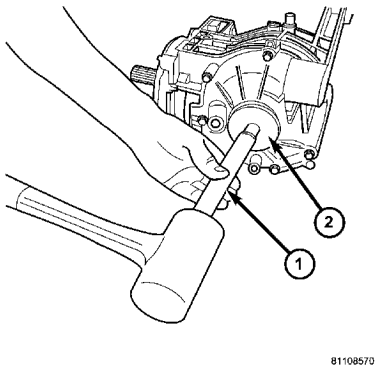


Fig. 70 Axle Seal Installation

1 - TOOL C-4171
2 - TOOL 8493

(2) Install rear driveline module. (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR DRIVELINE MODULE - INSTALLATION)
(3) Check differential assembly fluid level and adjust as required. (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR DRIVELINE MODULE/FLUID - STANDARD PROCEDURE)

VISCOUS COUPLER

DESCRIPTION

The heart of the all-wheel drive system is the inter-axle viscous coupling and bi-directional overrunning clutch. Under normal driving the vehicle retains predominantly front wheel drive characteristics. The all-wheel drive takes effect when the front wheels start to slip. Under normal level road, straight line driving, 100% of the torque is allocated to the front wheels. The viscous coupler allows more torque to the rear wheels in accordance with the amount of slippage at the front wheels. The variable torque distribution is automatic with no driver inputs required.

OPERATION

The viscous coupler (Fig. 71) is a housing nearly filled with a high viscosity silicone liquid and thin metal plates alternately splined to an inner and outer drum. The viscous coupler provides torque in the following modes:

- Shear mode (normal operation)
- Hump mode (locked mode)

The inner plates are slotted around the radius and the outer plates have holes in them. In the shear mode (normal operation), the plates are evenly spaced and the torque is created by the shearing of the plates through the fluid and 90-100% of the torque is applied to the rear axle. During the shear mode, a fluid flow pattern is created from this design (holes and slots). This fluid flow causes high pressure on each side of each pair of plates and low pressure between each pair of plates.

When a high speed difference (shear) occurs because of loss of traction (one axle spinning faster than the other), the silicone fluid expands as it heats from this shearing. When the silicone expands to fill the viscous coupler completely, this pressure difference is high enough to squeeze each pair of plates together. The resulting hump torque is up to 8 times higher than the shear torque. When the viscous coupler is in the hump mode, it does not lock the axles (undifferentiated 4-Wheel Drive). It controls the amount of slippage while delivering maximum power to the axle having greatest traction. Once the speed difference equalizes the fluid and plates cool down and the viscous coupler goes back to the shear mode.

VISCOUS COUPLER (Continued)

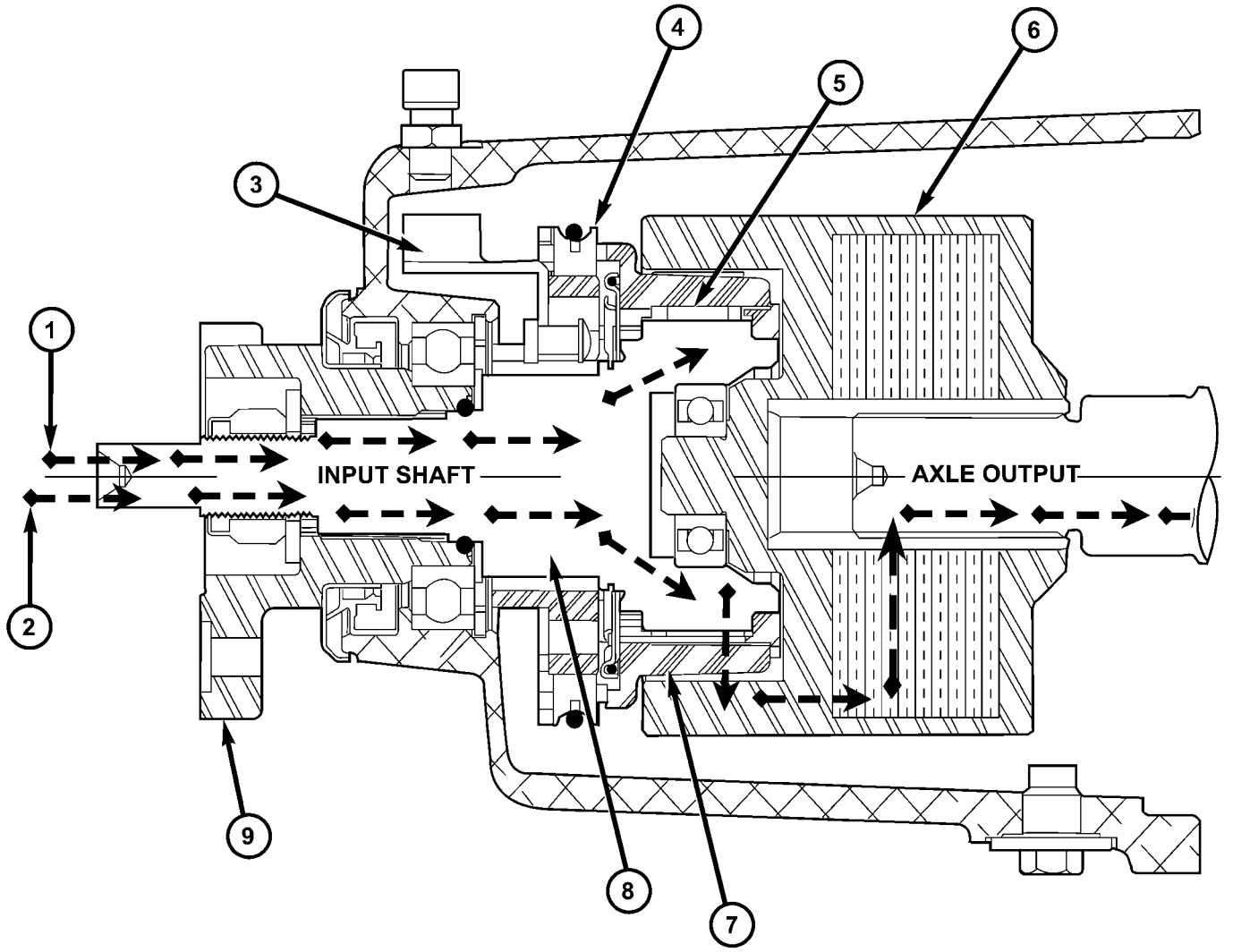


Fig. 71 Bi-directional Overrunning Clutch (BOC) and Viscous Coupler Powerflow

1 - POWERFLOW - BOC OVERUNNING
2 - POWERFLOW - BOC LOCKED
3 - BOC GROUND TAB
4 - FRICTION BRAKE SHOES
5 - BOC ROLLERS
6 - VISCOUS COUPLER
7 - BOC ROLLER CAGE
8 - BOC INPUT SHAFT
9 - INPUT FLANGE

BRAKES

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BRAKES - BASE

DESCRIPTION - BASE BRAKES

The base brake system consists of the following components:

- Brake pedal (adjustable)
- Power brake booster
- Master cylinder
- Brake tubes and hoses
- Disc brakes (4-wheel)
- Brake lamp switch
- Brake fluid level switch
- Parking brakes

Antilock brakes are standard equipment on this vehicle. Refer to ABS section.

For information on the brake lamp switch, (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - DESCRIPTION)

Vehicles equipped with the optional antilock brake system (ABS) use a system that is available with or without traction control. This system shares most base brake hardware used on vehicles without ABS. ABS components are described in detail in ANTILOCK BRAKE SYSTEM.

WARNING

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

CAUTION

CAUTION: During service procedures, grease or any other foreign material must be kept off brake shoes and braking surfaces of brake rotor or drum, and external surfaces of hub and bearing assembly.

CAUTION: Brake rotor and caliper handling must be done in such a way as to avoid damage to the rotor, especially the machined surfaces, and scratching or nicking of the brake linings.

CAUTION: Only the recommended jacking or hoisting procedures for this vehicle are to be used whenever it is necessary to lift a vehicle. Failure to raise a vehicle utilizing the recommended lift points can result in damage to the vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

BRAKES - BASE (Continued)

DIAGNOSIS AND TESTING - BASE BRAKE SYSTEM

NOTE: There are three diagnosis charts following that cover the RED BRAKE WARNING INDICATOR LAMP, BRAKE NOISE and OTHER BRAKE CONDITIONS.

RED BRAKE WARNING INDICATOR LAMP

CONDITION	POSSIBLE CAUSES	CORRECTION
RED BRAKE WARNING LAMP ON	1. Parking brake lever not fully released.	1. Release parking brake lever.
	2. Parking brake warning lamp switch on parking brake lever.	2. Inspect and replace switch as necessary.
	3. Brake fluid level low in reservoir.	3. Fill reservoir. Check entire system for leaks. Repair or replace as required.
	4. Brake fluid level switch.	4. Disconnect switch wiring connector. If lamp goes out, replace switch.
	5. Mechanical instrument cluster (MIC) problem.	5. Refer to appropriate Diagnostic information.
	6. Amber ABS Warning Indicator Lamp also illuminated.	6. Refer to appropriate Diagnostic information.

BRAKE NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
CLICK OR SQUAWK ON PEDAL APPLICATION	1. Brake lamp switch.	1. Replace switch.
	2. Brake Transmission Shift Interlock Linkage.	2. Lubricate BTSI linkage.
	3. Pedal pivot bushings	3. Lubricate pivot bushings. Replace if necessary.
DISC BRAKE CHIRP	1. Excessive brake rotor runout.	1. Follow brake rotor diagnosis and testing. Correct as necessary.
	2. Lack of lubricant on brake caliper slides.	2. Lubricate brake caliper slides.
	3. Caliper/shoes not fully seated.	3. Reseat caliper/shoes.
DISC BRAKE RATTLE OR CLUNK	1. Broken or missing anti-rattle spring clips.	1. Replace anti-rattle spring clips.
	2. Caliper guide pins/bolts loose.	2. Tighten guide pins/bolts.
DISC BRAKE SQUEAK AT LOW SPEED (WHILE APPLYING LIGHT BRAKE PEDAL EFFORT)	1. Brake shoe linings.	1. Replace brake shoes.

BRAKES - BASE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SCRAPING (METAL-TO-METAL).	1. Foreign object interference with brakes. 2. Brake shoes worn out.	1. Inspect brakes and remove foreign object. 2. Replace brake shoes. Inspect rotors. Reface or replace as necessary.

OTHER BRAKE CONDITIONS

CONDITION	POSSIBLE CAUSES	CORRECTION
BRAKES CHATTER	1. Disc brake rotor has excessive thickness variation.	1. Isolate condition as rear or front. Reface or replace brake rotors as necessary.
BRAKES DRAG (FRONT OR ALL)	1. Contaminated brake fluid. 2. Binding caliper pins or bushings. 3. Binding master cylinder. 4. Binding brake pedal. 5. Brake lamp switch not adjusted properly and mounting bracket is bent.	1. Check for swollen seals. Replace all system components containing rubber. 2. Replace pins and bushings. 3. Replace master cylinder. 4. Replace brake pedal. 5. Straighten mounting bracket and replace brake lamp switch.
BRAKES DRAG (REAR ONLY)	1. Parking brake cables binding or froze up. 2. Parking brake cable return spring not returning shoes. 3. Rear disc brake parking brake not properly adjusted.	1. Check cable routing. Replace cables as necessary. 2. Replace cables as necessary. 3. Adjust parking brake shoes.
BRAKES GRAB	1. Contaminated brake shoe linings. 2. Improper power brake booster assist.	1. Inspect and clean, or replace shoes. Repair source of contamination. 2. Refer to power brake booster diagnosis and testing.
EXCESSIVE PEDAL EFFORT	1. Obstruction of brake pedal. 2. Low power brake booster assist (vacuum leak). 3. Glazed brake linings. 4. Brake shoe lining transfer to brake rotor.	1. Inspect, remove or move obstruction. 2. Refer to power brake booster diagnosis and testing. 3. Reface or replace brake rotors as necessary. Replace brake shoes. 4. Reface or replace brake rotors as necessary. Replace brake shoes.
EXCESSIVE PEDAL TRAVEL (VEHICLE STOPS OK)	1. Air in brake lines.	1. Bleed brakes.
EXCESSIVE PEDAL TRAVEL (ONE FRONT WHEEL LOCKS UP DURING HARD BRAKING)	1. One of the two hydraulic circuits to the front brakes is malfunctioning.	1. Inspect system for leaks. Check master cylinder for internal malfunction.

BRAKES - BASE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
PEDAL PULSATES/ SURGES DURING BRAKING	1. Disc brake rotor has excessive thickness variation.	1. Isolate condition as rear or front. Reface or replace brake rotors as necessary.
PEDAL IS SPONGY	1. Air in brake lines. 2. Power brake booster runout (vacuum assist).	1. Bleed brakes. 2. Check booster vacuum hose and engine tune for adequate vacuum supply. Refer to power brake booster diagnosis and testing.
PREMATURE REAR WHEEL LOCKUP	1. Contaminated brake shoe linings. 2. Inoperative proportioning valve (non-ABS vehicles). 3. Improper power brake booster assist.	1. Inspect and clean, or replace shoes. Repair source of contamination. 2. Refer to proportioning valve diagnosis and testing. Replace valve as necessary. 3. Refer to power brake booster in the diagnosis and testing section.
STOP/BRAKE LAMPS STAY ON	1. Brake lamp switch out of adjustment. 2. Brake pedal binding. 3. Obstruction in pedal linkage. 4. Power Brake Booster not allowing pedal to return completely.	1. Replace brake lamp switch. 2. Inspect and replace as necessary. 3. Remove obstruction. 4. Replace power brake booster.
VEHICLE PULLS TO RIGHT OR LEFT ON BRAKING	1. Frozen brake caliper piston. 2. Contaminated brake shoe lining. 3. Pinched brake lines. 4. Leaking piston seal. 5. Suspension problem.	1. Replace frozen piston or caliper. Bleed brakes. 2. Inspect and clean, or replace shoes. Repair source of contamination. 3. Replace pinched line. 4. Replace piston seal or brake caliper. 5. Refer to the Suspension group.
PARKING BRAKE - EXCESSIVE LEVER TRAVEL	1. Rear disc brake parking brake shoes out of adjustment.	1. Adjust parking brake shoes.

STANDARD PROCEDURE - BASE BRAKE BLEEDING

NOTE: This bleeding procedure is only for the vehicle's base brakes hydraulic system. For bleeding the antilock brakes hydraulic system, (Refer to 5 - BRAKES - ABS - STANDARD PROCEDURE)

CAUTION: Before removing the master cylinder cover, thoroughly clean the cover and master cylinder fluid reservoir to prevent dirt and other foreign matter from dropping into the master cylinder fluid reservoir.

NOTE: The following wheel sequence should be used when bleeding the brake hydraulic system. The use of this wheel sequence will ensure adequate removal of all trapped air from the brake hydraulic system.

- Left Rear Wheel
- Right Front Wheel
- Right Rear Wheel
- Left Front Wheel

NOTE: When bleeding the brake system, some air may be trapped in the brake lines or valves far upstream, as much as ten feet from the bleeder screw (Fig. 1). Therefore, it is essential to have a fast flow of a large volume of brake fluid when bleeding the brakes to ensure all the air gets out.

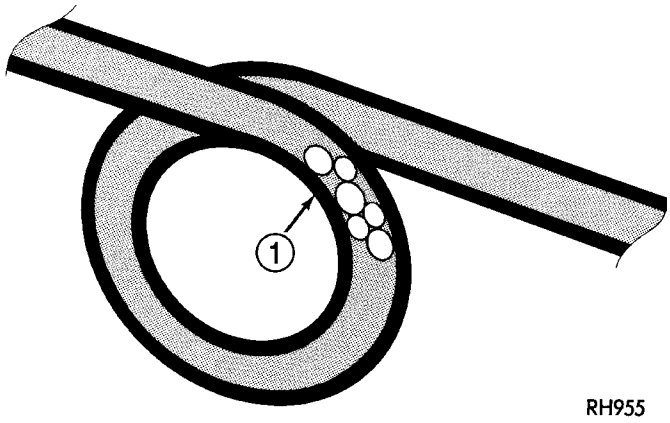


Fig. 1 Trapped Air In Brake Fluid Line

1 - TRAPPED AIR

The brakes may be manually bled or pressure bled. Refer to the appropriate following procedure.

MANUAL BLEEDING PROCEDURE

NOTE: Correct manual bleeding of the brakes hydraulic system will require the aid of a helper.

NOTE: To adequately bleed the brakes using the manual bleeding procedure the rear brakes must be correctly adjusted. Prior to the manual bleeding of the brake hydraulic system, correctly adjust the rear brakes.

(1) Pump the brake pedal three or four times and hold it down before the bleeder screw is opened.

(2) Push the brake pedal toward the floor and hold it down. Then open the left rear bleeder screw at least 1 full turn. When the bleeder screw opens the brake pedal will drop all the way to the floor.

CAUTION: "Just cracking" the bleeder screw often restricts fluid flow, allowing only a slow, weak fluid discharge of fluid. This practice will NOT get all the air out. Make sure the bleeder is opened at least 1 full turn when bleeding.

(3) Release the brake pedal only **after** the bleeder screw is closed.

(4) Repeat steps 1 through 3, four or five times, at each bleeder screw in the proper sequence. This should pass a sufficient amount of fluid to expel all the trapped air from the brake system. Be sure to monitor the fluid level in the master cylinder, so it stays at a proper level so air will not enter the brake system through the master cylinder.

(5) Check pedal travel. If pedal travel is excessive or has not been improved, enough fluid has not passed through the system to expel all the trapped air. Continue to bleed system as necessary.

(6) Perform a final adjustment of the rear brake shoes (when applicable), then test drive vehicle to be sure brakes are operating correctly and that pedal is solid.

PRESSURE BLEEDING PROCEDURE

CAUTION: Use bleeder tank Special Tool C-3496-B or equivalent with Adapter, Special Tool 6921, to pressurize the hydraulic system for bleeding.

Follow pressure bleeder manufacturer's instructions for use of pressure bleeding equipment.

(1) Install the Adapter Master Cylinder Pressure Bleed Cap, Special Tool 6921 on the fluid reservoir of the master cylinder (Fig. 2). Attach the fluid hose from the pressure bleeder to the fitting on Special Tool 6921.

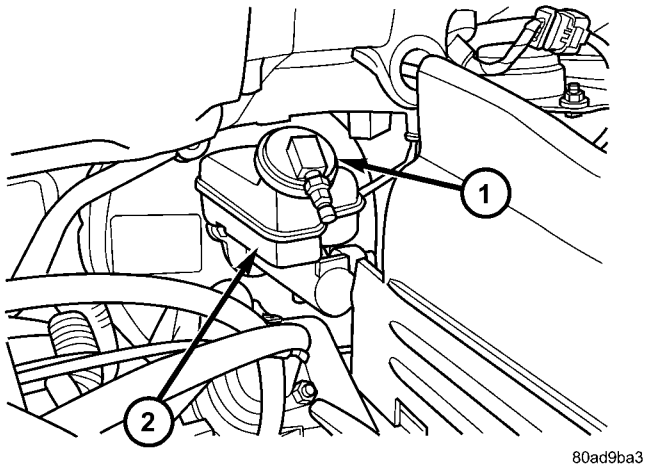


Fig. 2 Tool 6921 Installed On Master Cylinder

1 - SPECIAL TOOL 6921
2 - FLUID RESERVOIR

(2) Attach a clear plastic hose to the bleeder screw at one wheel and feed the hose into a clear jar containing fresh brake fluid.

(3) Open the left rear wheel bleeder screw at least **one full turn** or more to obtain an adequate flow of brake fluid.

CAUTION: "Just cracking" the bleeder screw often restricts fluid flow, allowing only a slow, weak fluid discharge of fluid. This practice will NOT get all the air out. Make sure the bleeder is opened at least 1 full turn when bleeding.

(4) After 4 to 8 ounces of brake fluid has been bled through the hydraulic system, and an air-free flow is maintained in the hose and jar, this will indicate a good bleed of the hydraulic system has been obtained.

(5) Repeat the procedure at all the other remaining bleeder screws.

(6) Check pedal travel. If pedal travel is excessive or has not been improved, enough fluid has not passed through the system to expel all the trapped air. Be sure to monitor the fluid level in the pressure bleeder, so it stays at a proper level so air will not enter the brake system through the master cylinder.

(7) Perform a final adjustment of the rear brake shoes (when applicable), then test drive vehicle to be sure brakes are operating correctly and that pedal is solid.

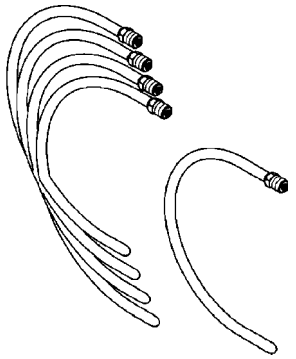
SPECIFICATIONS

BRAKE FASTENER TORQUE

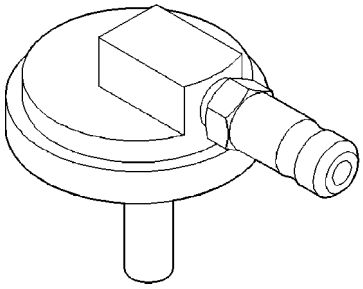
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
ABS ICU Mounting Bolts To Bracket	11	—	97
ABS ICU Mounting Bracket-To-Cradle Bolts	28	21	250
ABS ICU Mounting Bracket-To-Frame Bolts	14	18	216
ABS ABM-To-HCU Mounting Screws	2	—	17
ABS CAB-To-HCU Mounting Screws	2	—	17
ABS Wheel Speed Sensor Head Mounting Bolt	20	15	180
Adjustable Pedal Position Sensor Mounting Screws	7.5	66	—
Adjustable Pedal Mounting Nuts	28	21	250
Brake Tube Nuts	14	—	120
Brake Hose Bracket Bolt	18	—	160
Brake Hose Caliper Banjo Bolt	47	35	—
Disc Brake Caliper Adapter Mounting Bolts - Front	169	125	—
Disc Brake Caliper Adapter Mounting Bolts - Rear	115	85	—
Disc Brake Caliper Guide Pin Bolts - Front	43	32	—
Disc Brake Caliper Guide Pin Bolts - Rear	23	17	200
Disc Brake Caliper Bleeder Screw	15	10	125
Master Cylinder Mounting Nuts	25	19	225
Power Brake Booster Mounting Nuts	28	21	250
Parking Brake Cable Knuckle Mounting Bolt	28	21	250
Parking Brake Front Cable Guide Mounting Screw	17	13	150
Parking Brake Lever (Pedal) Mounting Bolts And Nut	28	21	250
Wheel Mounting (Lug) Nuts	135	100	—

SPECIAL TOOLS

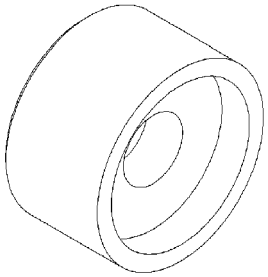
BASE BRAKE SYSTEM



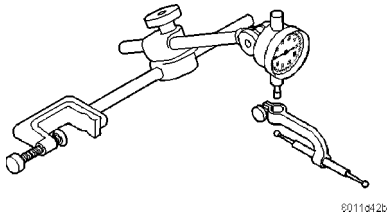
Tubes, Master Cylinder Bleed 8358



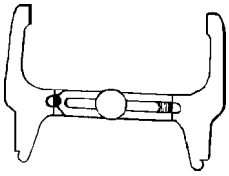
Adapter, Master Cylinder Pressure Bleed Cap 6921



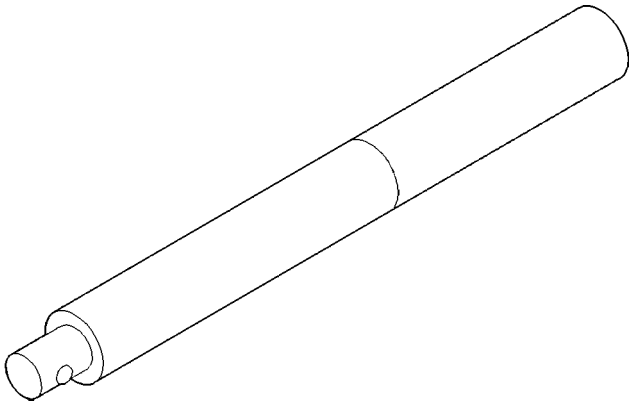
Installer, Dust Boot 9089



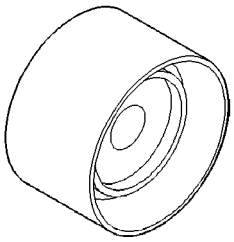
Dial Indicator, C-3339



Gauge, Brake Shoe C-3919



Handle, Universal C–4171



Installer L-4410

BRAKE FLUID LEVEL SWITCH

REMOVAL

(1) Remove wiring harness connector from brake fluid reservoir level switch (Fig. 3).

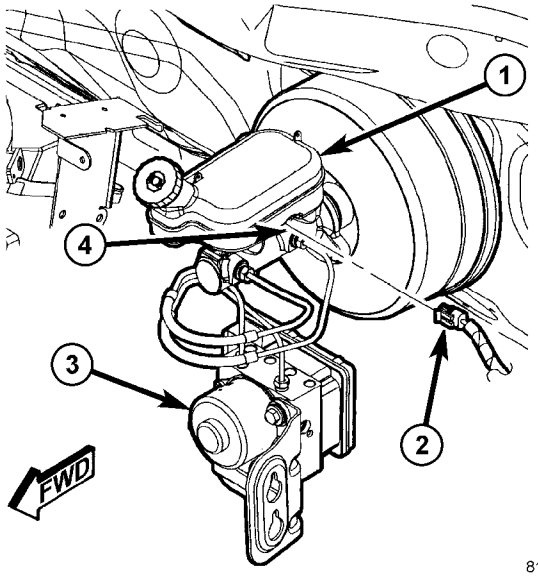


Fig. 3 Brake Fluid Level Switch Connector

1 - MASTER CYLINDER RESERVOIR
2 - WIRING CONNECTOR
3 - ABS ICU
4 - BRAKE FLUID LEVEL SWITCH

(2) Using fingers, compress the retaining tabs on the opposite end of brake fluid level switch.

(3) With retaining tabs compressed, grasp the connector end of brake fluid level switch and pull it out of master cylinder brake fluid reservoir.

INSTALLATION

(1) Insert brake fluid level switch into left side of brake fluid reservoir. Be sure switch is pushed in until retaining tabs lock it to brake fluid reservoir.

(2) Connect vehicle wiring harness connector to brake fluid level switch (Fig. 3).

PEDAL POSITION SENSOR - BRAKE

REMOVAL

(1) Remove battery ground (-) cable from battery negative post and isolate.

(2) Remove two mounting screws securing pedal position sensor in place (Fig. 4).

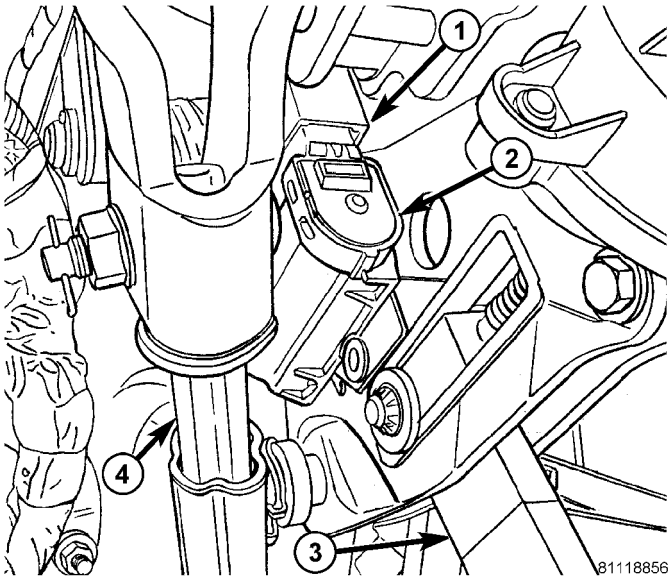


Fig. 4 Brake Pedal Position Sensor

1 - WIRING CONNECTOR
2 - BRAKE PEDAL POSITION SENSOR
3 - BRAKE PEDAL
4 - STEERING INTERMEDIATE SHAFT

(3) Remove pedal position sensor from pedals bracket.

(4) Disconnect wiring connector and remove pedal position sensor.

INSTALLATION

(1) Connect wiring connector to brake pedal position sensor.

NOTE: Make sure pin in pedal assembly fits into slot in sensor carriage when installing sensor.

(2) Place sensor against mounting bracket and into brake pedal (Fig. 4). Move carriage as necessary to align slot with pin. Install two mounting screws. Tighten screws to 7.5 N·m (66 in. lbs.) torque.

(3) Connect ground (-) cable to negative post of battery.

BRAKE LINES

DESCRIPTION

The brake tubes are steel with a corrosion-resistant nylon coating applied to the external surfaces.

The flex hoses used at each wheel brake are made of reinforced rubber with fittings at each end. The fitting at each brake caliper is the banjo-type and requires a special banjo bolt and copper washers.

OPERATION - BRAKE TUBES AND HOSES

The purpose of the chassis brake tubes and flex hoses is to transfer the pressurized brake fluid developed by the master cylinder to the wheel brakes of the vehicle. The flex hoses are made of rubber to allow for the movement of the vehicle's suspension.

INSPECTION

Brake tubing should be inspected periodically for evidence of physical damage or contact with moving or hot components.

Flexible rubber hose is used at both the front and rear wheel brakes. Inspection of the flexible brake hoses should be performed whenever the brake system is serviced and every 7,500 miles or 12 months, whichever comes first. Inspect hydraulic brake hoses for surface cracking, scuffing, or worn spots. If the fabric casing of the hose becomes exposed due to cracks or abrasions in the hose cover, the hose should be replaced immediately. Eventual deterioration of the hose can take place with possible burst failure. Faulty installation can cause twisting, resulting in wheel, tire, or chassis interference.

BRAKE PADS/SHOES - FRONT

REMOVAL

NOTE: Before proceeding, (Refer to 5 - BRAKES - WARNING) (Refer to 5 - BRAKES - CAUTION).

(1) Remove master cylinder fluid reservoir cap.

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

NOTE: Perform Step 3 through Step 9 on each side of vehicle.

(3) Remove tire and wheel assembly.

(4) Place an appropriately sized C-Clamp over brake caliper as shown (Fig. 5), placing screw-drive head against outboard shoe and hook against rear of caliper. Slowly tighten screw-drive retracting caliper pistons into bores and breaking outboard brake shoe

free from caliper fingers. **Do not overtighten C-Clamp.** Remove C-Clamp.

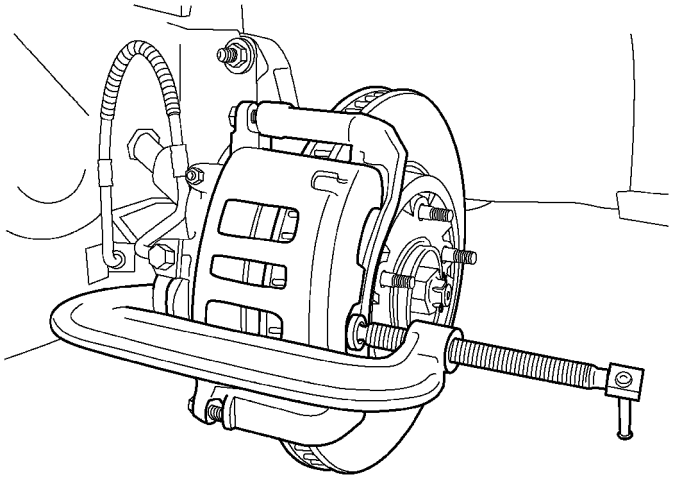


Fig. 5 C-Clamp On Caliper

(5) Once outboard shoe is free from caliper fingers, slide caliper inboard on guides providing clearance between the rotor and inboard brake shoe.

(6) Slide an appropriate prying tool though center opening in top of caliper behind inboard brake shoe between two caliper pistons. **Use care not to come in contact with pistons or dust boots potentially damaging them.** Pry against rear of inboard brake shoe breaking it free from caliper pistons.

(7) Remove two brake caliper guide pin bolts (Fig. 6).

(8) Remove disc brake caliper from brake adapter and hang out of way using wire or a bungee cord. Use care not to overextend brake hose when doing this.

(9) Remove brake shoes from disc brake caliper adapter (Fig. 7).

(10) Install master cylinder fluid reservoir cap.

INSTALLATION

NOTE: Perform Step 1 through Step 6 on each side of vehicle.

(1) Place brake shoes in anti-rattle clips on adapter (Fig. 7). Make sure clips are properly installed (Fig. 8).

(2) If applied, remove protective paper from noise suppression gasket on rear of both inner and outer brake shoes.

(3) Completely retract caliper piston back into bore of caliper.

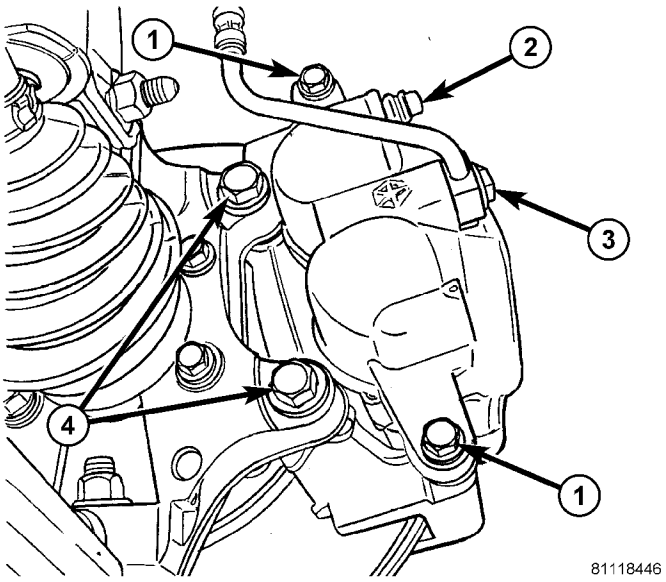


Fig. 6 Front Caliper And Adapter Mounting

1 - CALIPER GUIDE PIN BOLTS
2 - BLEEDER SCREW
3 - BRAKE HOSE BANJO BOLT
4 - CALIPER ADAPTER MOUNTING BOLTS

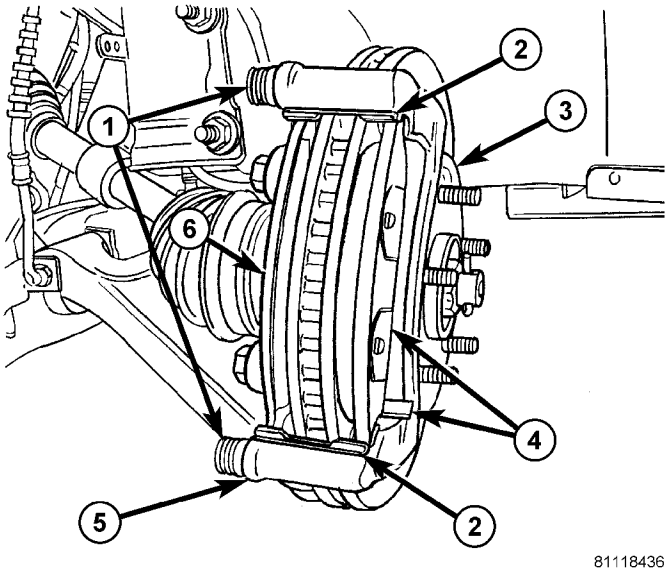


Fig. 7 Front Brake Shoes Installed

1 - CALIPER GUIDE PINS AND BOOTS
2 - ANTI-RATTLE CLIPS
3 - BRAKE ROTOR
4 - OUTBOARD SHOE (PAD) WITH AUDIBLE WEAR INDICATOR
5 - CALIPER ADAPTER
6 - INBOARD BRAKE SHOE (PAD)

CAUTION: Use care when installing caliper onto disc brake adapter to avoid damaging boots on caliper guide pins.

(4) Install disc brake caliper over brake shoes on brake caliper adapter.

BRAKE PADS/SHOES - FRONT (Continued)

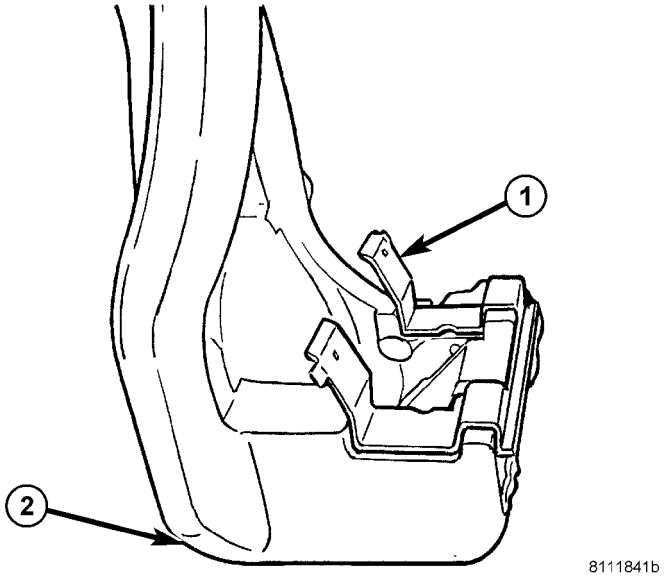


Fig. 8 Anti-Rattle Clip - Lower (Upper - Typical)

1 - ANTI-RATTLE CLIP
2 - CALIPER ADAPTER

(5) Align caliper guide pin bolt holes with guide pins, then install caliper guide pin bolts (Fig. 6). Tighten upper (closest to bleeder screw) bolt to 43 N·m (32 ft. lbs.) torque, then tighten lower bolt to 43 N·m (32 ft. lbs.) torque.

(6) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(7) Lower vehicle.

(8) Pump brake pedal several times to set shoes to caliper and brake rotor.

(9) Check and adjust brake fluid level as necessary.

(10) Road test vehicle making several stops to wear off any foreign material on brakes and to seat brake shoes.

BRAKE PADS/SHOES - REAR

REMOVAL

NOTE: Before proceeding, (Refer to 5 - BRAKES - WARNING) (Refer to 5 - BRAKES - CAUTION).

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove both rear tire and wheel assemblies from vehicle.

NOTE: Perform Step 3 through Step 7 on each side of vehicle to complete shoe set removal.

NOTE: In some cases, it may be necessary to retract caliper piston in its bore a small amount in order to provide sufficient clearance between shoes and rotor to easily remove caliper from knuckle. This can usually be accomplished before guide pin bolts are removed, by grasping rear of caliper and pulling outward working with guide pins, thus retracting piston. Never push on piston directly as it may get damaged.

(3) Remove two caliper guide pin bolts (Fig. 9).

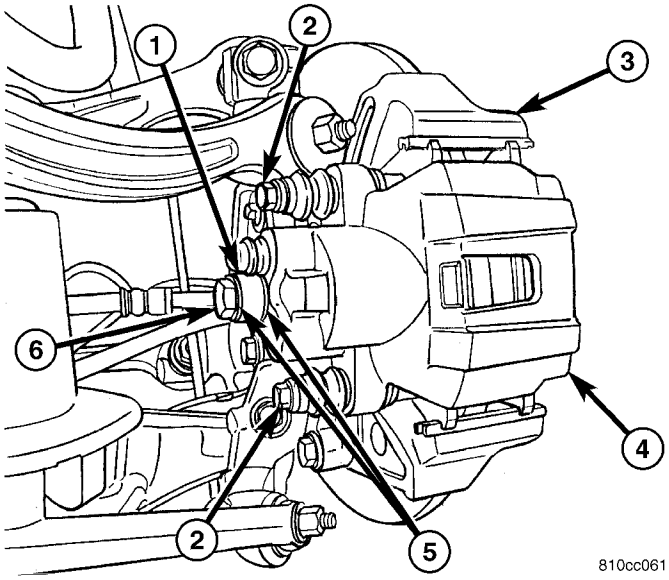


Fig. 9 Rear Brake Caliper Mounting

1 - BRAKE HOSE BANJO FITTING
2 - CALIPER GUIDE PIN BOLT
3 - CALIPER ADAPTER
4 - DISC BRAKE CALIPER
5 - COPPER SEAL WASHERS
6 - BANJO BOLT

(4) Remove caliper assembly from brake adapter by first rotating bottom of caliper away from rotor, then lifting caliper (with shoes) away from upper adapter abutment (Fig. 10).

(5) To prevent weight of caliper from overextending and damaging brake hose while caliper is off mount, hang brake caliper from vehicle using wire or cord (Fig. 11).

(6) Remove outboard brake shoe by pushing shoe away from caliper fingers, dislocating locating pins built into shoe backing plate from holes in caliper fingers, then sliding brake shoe down and off of brake caliper (Fig. 12).

(7) Pull inboard brake shoe away from caliper piston, dislocating retaining clip from cavity in piston. Remove inboard shoe.

BRAKE PADS/SHOES - REAR (Continued)

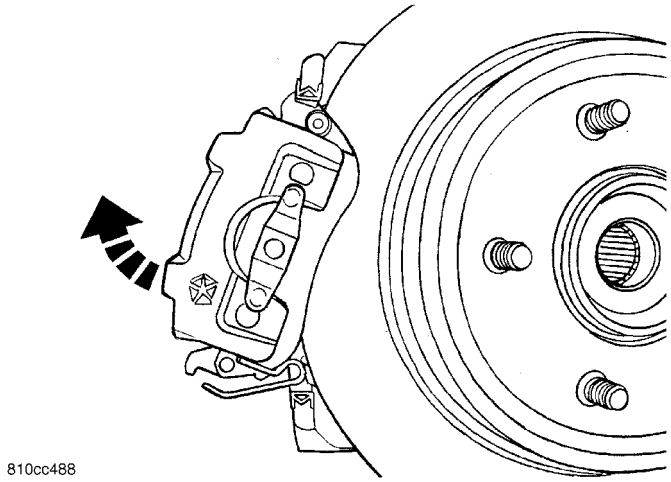


Fig. 10 Rear Caliper Removal

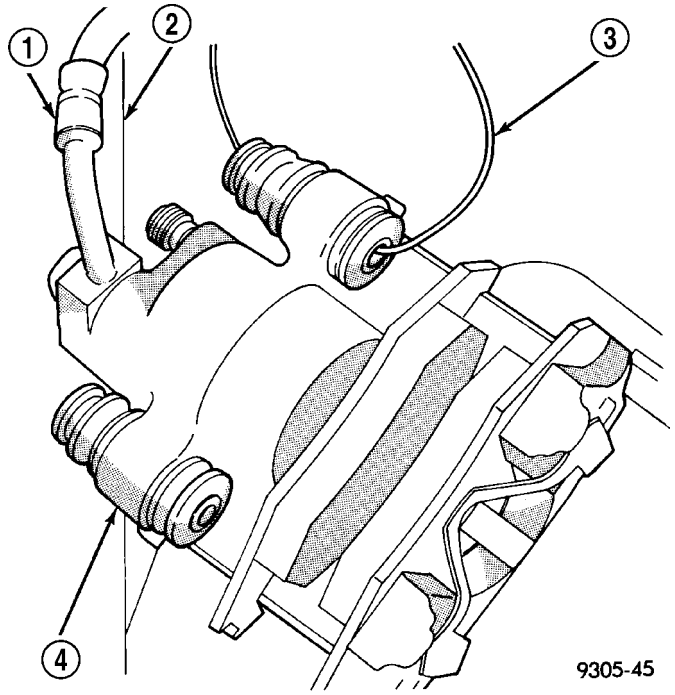


Fig. 11 Supporting Caliper

1 - BRAKE HOSE
2 - SUSPENSION
3 - WIRE HANGER (HANG TO VEHICLE/SUSPENSION)
4 - BRAKE CALIPER

INSTALLATION

NOTE: Perform Step 1 through Step 8 on each side of vehicle to complete shoe set installation, then proceed to Step 9.

(1) Completely retract caliper piston back into caliper piston bore. This is required to gain necessary shoe-to-rotor clearance for caliper installation onto knuckle.

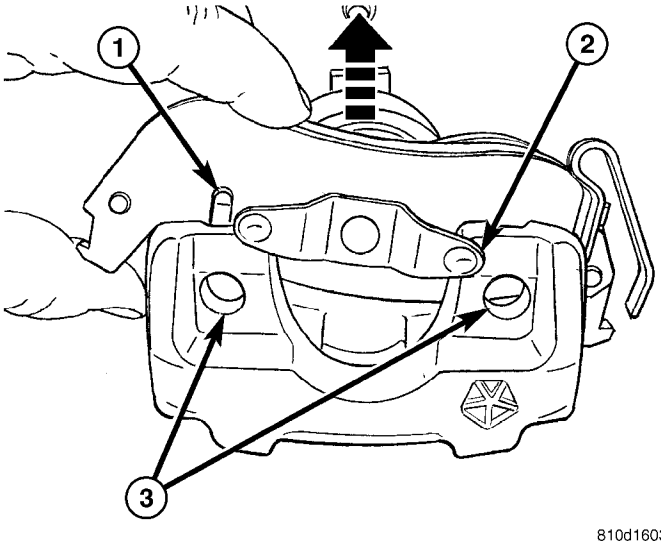


Fig. 12 Outboard Shoe Removal

1 - LOCATING PIN
2 - RETAINING CLIP
3 - HOLES

(2) Position inboard shoe retainer clip against piston cavity (Fig. 13). Firmly press against shoe lining by hand until retainer clip seats itself in piston cavity groove. Be sure inboard brake shoe backing plate is flush against caliper piston.

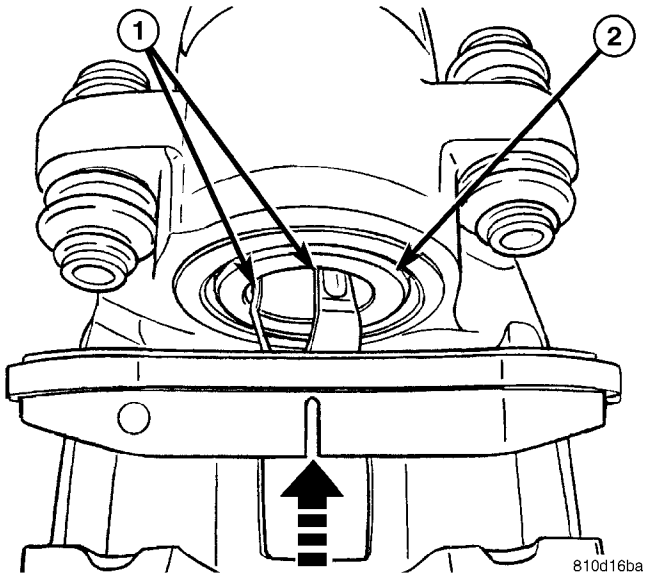


Fig. 13 Inboard Shoe Installation

1 - RETAINER CLIP
2 - PISTON

CAUTION: Outboard brake shoes are side oriented. Make sure spring clip on each shoe is installed so it is positioned downward once caliper is installed.

BRAKE PADS/SHOES - REAR (Continued)

(3) Position outboard brake shoe locating pins against ramps built into caliper fingers (Fig. 14). Slide shoe onto caliper. Be sure locating pins on rear of shoe are squarely seated into holes in caliper and shoe is flat against caliper fingers.

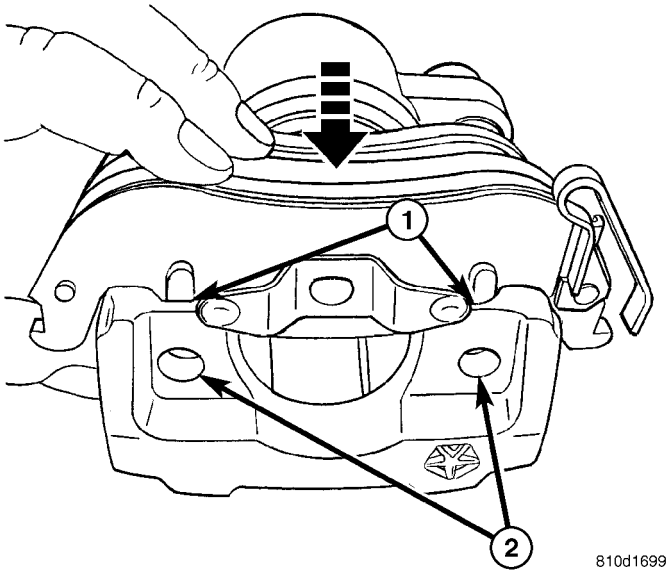


Fig. 14 Outboard Shoe Installation

1 - LOCATING PINS POSITIONED AGAINST RAMPS
2 - HOLES

(4) Make sure abutment shims are in place on both slide abutments of caliper adapter.

CAUTION: Use care when installing caliper assembly onto adapter so guide pin bushings and sleeves do not get damaged by mounting bosses on adapter.

(5) Retract caliper guide pins to clear mounting bosses on caliper adapter when installing caliper.

(6) Install brake caliper in opposite way it was removed. Starting with upper end, carefully position caliper and brake shoes over brake rotor and align outboard shoe's upper edge with caliper slide abutment. Rotate lower end of caliper into mounting position on adapter.

CAUTION: Extreme caution should be taken not to crossthread caliper guide pin bolts when they are installed.

(7) Carefully install caliper guide pin bolts (Fig. 9). Tighten bolts to 23 N·m (200 in. lbs.) torque.

(8) Install tire and wheel assembly. Tighten wheel mounting nuts to a torque of 135 N·m (100 ft. lbs.).

(9) Lower vehicle.

(10) Pump brake pedal several times to ensure vehicle has a firm brake pedal before moving vehicle.

(11) Road test vehicle and make several stops to wear off any foreign material on brakes and to seat brake shoes.

DISC BRAKE CALIPER - FRONT

REMOVAL

NOTE: Before proceeding, (Refer to 5 - BRAKES - WARNING) (Refer to 5 - BRAKES - CAUTION).

(1) Disconnect and isolate battery negative cable from battery post.

(2) Using a brake pedal holding tool as shown (Fig. 15), depress brake pedal past its first inch of travel and hold it in this position. Holding pedal in this position will isolate master cylinder from hydraulic brake system and will not allow brake fluid to drain out of brake fluid reservoir while brake lines are open.

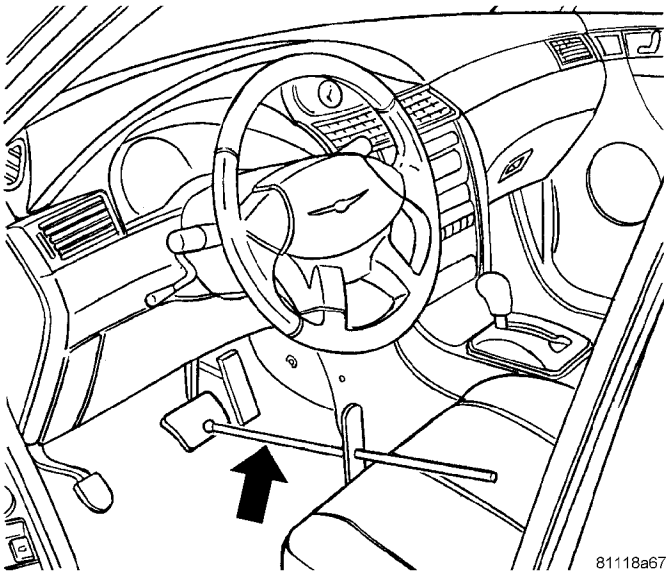


Fig. 15 Brake Pedal Holding Tool

(3) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(4) Remove tire and wheel assembly.

(5) Remove banjo bolt connecting brake hose to caliper (Fig. 16). There are two sealing washers (one one each side of hose fitting) that will come off when bolt is removed. Discard these washers; install new washers on installation.

(6) Place an appropriately sized C-Clamp over brake caliper as shown (Fig. 5), placing screw-drive head against outboard shoe and hook against rear of caliper. Slowly tighten screw-drive retracting caliper pistons into bores and breaking outboard brake shoe

DISC BRAKE CALIPER - FRONT (Continued)

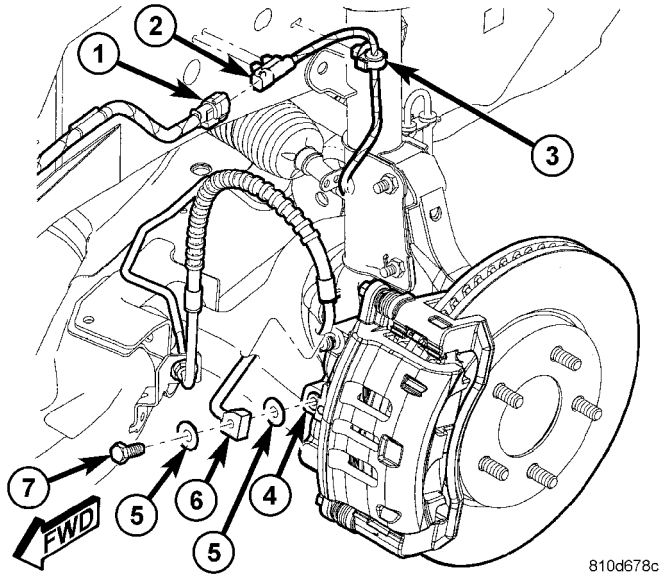


Fig. 16 Brake Hose And Wheel Speed Sensor Connections

1 - WIRING HARNESS CONNECTOR
2 - WHEEL SPEED SENSOR CONNECTOR
3 - ROUTING CLIP
4 - PORT ON BRAKE CALIPER
5 - COPPER SEALING WASHER
6 - BRAKE HOSE BANJO FITTING
7 - BANJO BOLT

free from caliper fingers. **Do not overtighten C-Clamp.** Remove C-Clamp.

(7) Once outboard shoe is free from caliper fingers, slide caliper inboard on guides providing clearance between the rotor and inboard brake shoe.

(8) Slide an appropriate prying tool though center opening in top of caliper behind inboard brake shoe between two caliper pistons. **Use care not to come in contact with pistons or dust boots potentially damaging them.** Pry against rear of inboard brake shoe breaking it free from caliper pistons.

(9) Remove two brake caliper guide pin bolts (Fig. 6).

(10) Slide disc brake caliper off pads and remove from brake caliper adapter.

DISASSEMBLY

NOTE: Before disassembling the brake caliper, clean and inspect it. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPER - CLEANING) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPER - INSPECTION)

WARNING: UNDER NO CONDITION SHOULD HIGH PRESSURE AIR EVER BE USED TO REMOVE A PISTON FROM A CALIPER BORE. PERSONAL INJURY COULD RESULT FROM SUCH PRACTICE.

(1) Drain brake fluid from caliper.

CAUTION: Do not use excessive force when clamping caliper in vise. Excessive vise pressure will cause bore distortion.

(2) Mount caliper in vise equipped with protective jaws.

(3) C-clamp a block of wood over one piston (Fig. 17).

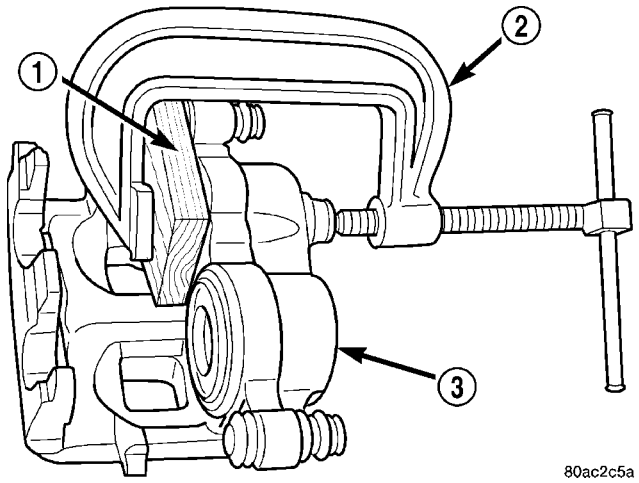


Fig. 17 C-Clamp One Piston

1 - BLOCK OF WOOD
2 - C-CLAMP
3 - CALIPER

(4) Take another piece of wood and pad it with one-inch thickness of shop towels. Place this piece in outboard shoe side of caliper in front of other piston. This will cushion and protect caliper piston during removal (Fig. 18).

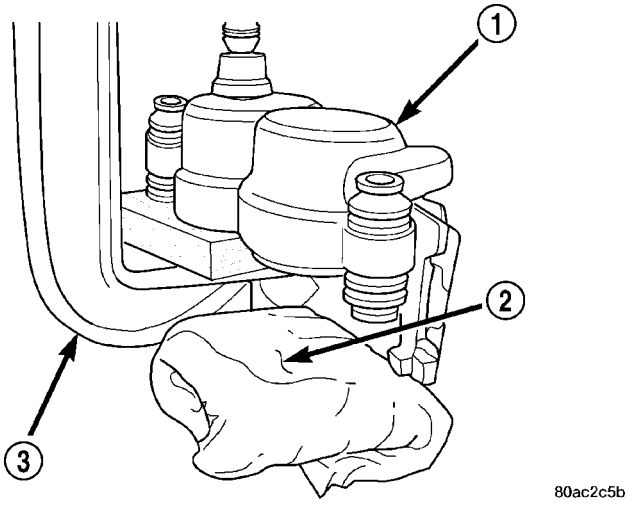


Fig. 18 Protect Caliper Piston

1 - CALIPER
2 - PADDED BLOCK OF WOOD
3 - C-CLAMP

DISC BRAKE CALIPER - FRONT (Continued)

WARNING: DO NOT PLACE FACE OR HANDS NEAR CALIPER AND PISTON IF USING COMPRESSED AIR TO REMOVE PISTON. DO NOT USE HIGH PRESSURE.

WARNING: NEVER ATTEMPT TO CATCH PISTON AS IT LEAVES BORE. THIS COULD RESULT IN PERSONAL INJURY.

CAUTION: Do not blow piston out of bore with sustained air pressure. This could result in a cracked piston. Use only short spurts of air.

(5) Apply **short spurts of low pressure air** with a rubber tipped blow gun through caliper brake hose port. Use only enough air pressure to ease piston out.

(6) Remove C-clamp and block of wood from caliper and clamp it over dust boot of first piston removed. This will seal empty piston bore.

(7) Move padded piece of wood in front of piston yet to be removed.

(8) Remove second piston using same procedure with **short spurts of low pressure air**.

(9) Remove C-clamp and block of wood from caliper.

(10) Remove piston dust boots with an appropriate pry tool (Fig. 19).

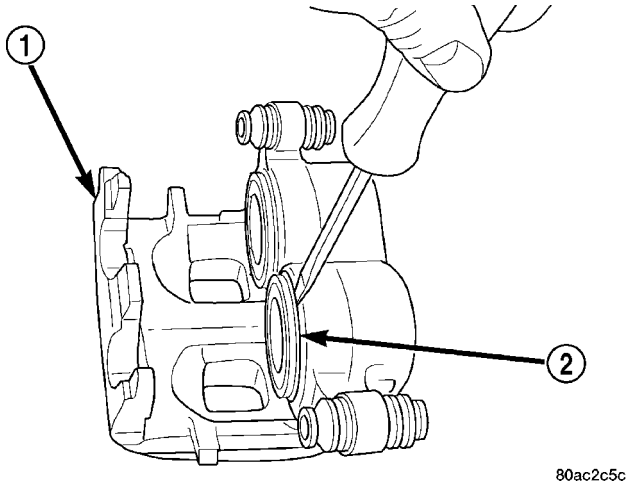


Fig. 19 Piston Dust Boot Removal

1 - CALIPER
2 - DUST BOOT

CAUTION: Use an appropriate tool to remove piston seals to avoid scratching piston bore. Do not use a screwdriver or other metal tool to remove seals.

(11) Remove piston seals from caliper (Fig. 20).

(12) Remove caliper bleeder screw.

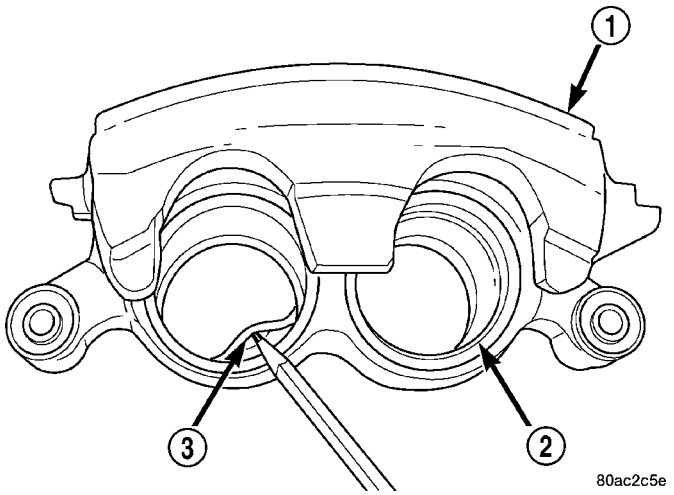


Fig. 20 Piston Seal

1 - CALIPER
2 - PISTON BORE
3 - PISTON SEAL

(13) Clean piston bore and drilled passage ways with alcohol or a suitable solvent. Wipe it dry using only a lint-free cloth.

(14) Inspect both piston and bore for scoring or pitting. Bores that show light scratches or corrosion can usually be cleared of light scratches or corrosion using crocus cloth.

CLEANING - DISC BRAKE CALIPER

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

DISC BRAKE CALIPER - FRONT (Continued)

To clean or flush the internal passages of the brake caliper, use fresh brake fluid or Mopar® Non-Chlorinated Brake Parts Cleaner. Never use gasoline, kerosene, alcohol, oil, transmission fluid or any fluid containing mineral oil to clean the caliper. These fluids will damage rubber cups and seals.

INSPECTION - DISC BRAKE CALIPER

Inspect the disc brake caliper for the following:

- Brake fluid leaks in and around piston boot area
- Ruptures, brittleness or damage to the piston dust boot

If caliper fails inspection, disassemble and recondition caliper, replacing the seals and dust boots.

ASSEMBLY

CAUTION: Dirt, oil, and solvents can damage caliper seals. Ensure assembly area is clean and dry.

NOTE: Always use new, clean Mopar® DOT 3 Motor Vehicle Brake Fluid when assembling brake caliper.

NOTE: Never use old piston seals or boots.

(1) Lubricate caliper pistons, piston seals and piston bores with clean, fresh brake fluid.

(2) Install NEW piston seals into caliper piston bores (Fig. 21).

NOTE: Verify seal is fully seated and not twisted.

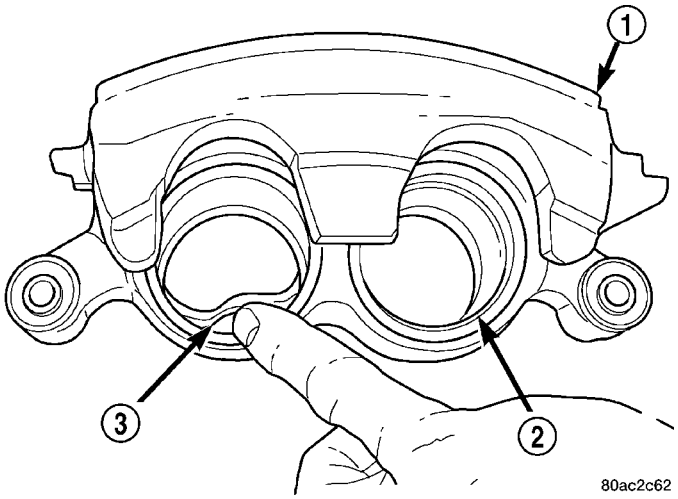


Fig. 21 Piston Seal Installation

1 - CALIPER
2 - PISTON BORE
3 - PISTON SEAL

(3) Install NEW boot on each piston and work boot lip into groove at top of piston. Stretch boot rearward straightening boot folds, then move boot forward as necessary until folds snap into place.

(4) Install first piston into caliper piston bore, pressing piston down to bottom of bore using hand-pressure (Fig. 22). Using a piece of wood or wooden hammer handle may also suffice as long as piston and boot damage is avoided.

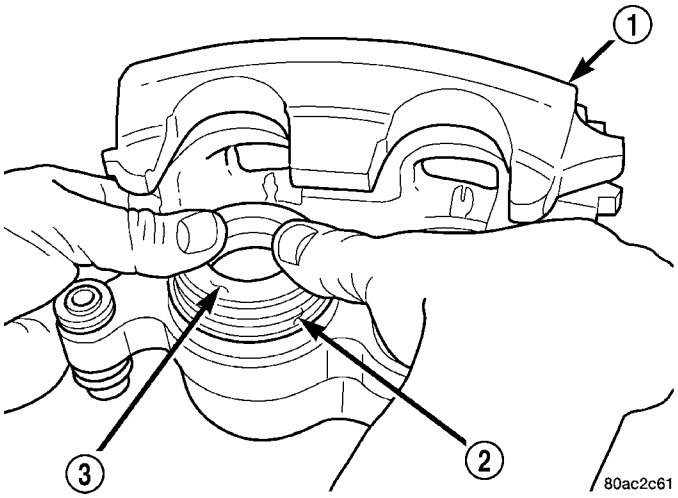


Fig. 22 Caliper Piston Installation

1 - CALIPER
2 - DUST BOOT
3 - PISTON

(5) Seat dust boot in caliper counterbore using Installer, Special Tool L-4410, with Handle, Special Tool C-4171. Install dust boot until it bottoms (Fig. 23). Do not over-seat dust boot.

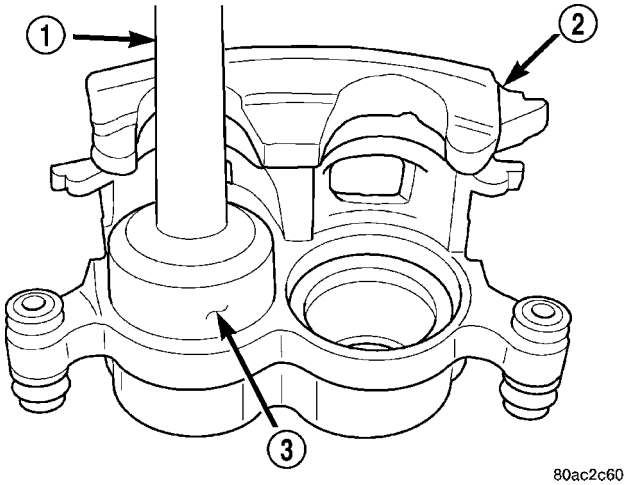


Fig. 23 Seating Dust Boot

1 - HANDLE
2 - CALIPER
3 - DUST BOOT INSTALLER

(6) Install second piston and dust boot using same procedure as first.

(7) Install caliper bleeder screw.

DISC BRAKE CALIPER - FRONT (Continued)

(8) Install caliper on vehicle. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPER - INSTALLATION)

INSTALLATION

CAUTION: If adhesive is missing from noise suppression gasket on rear of either inner and outer brake shoes or if gasket is damaged, replace brake shoes. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - REMOVAL)

CAUTION: Use care when installing caliper onto disc brake adapter to avoid damaging boots on caliper guide pins.

(1) Install disc brake caliper over brake shoes on brake caliper adapter.

CAUTION: To avoid possible noise or roughness concerns, it is crucial that upper caliper guide pin bolt (closest to bleeder screw) be tighten to specifications first before tightening lower guide pin bolt.

(2) Align caliper guide pin bolt holes with guide pins, then install caliper guide pin bolts (Fig. 6). Tighten upper (closest to bleeder screw) bolt to 43 N·m (32 ft. lbs.) torque, then tighten lower bolt to 43 N·m (32 ft. lbs.) torque.

(3) Install banjo bolt attaching brake hose to caliper (Fig. 16). Install NEW washers on each side of hose fitting as banjo bolt is placed through fitting. Thread banjo bolt into caliper and tighten to 47 N·m (35 ft. lbs.) torque.

(4) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(5) Lower vehicle.

(6) Remove brake pedal holding tool.

(7) Connect battery negative cable to battery post.

(8) Bleed base brake hydraulic system as necessary. (Refer to 5 - BRAKES - STANDARD PROCEDURE)

(9) Road test vehicle making several stops to wear off any foreign material on brakes and to seat brake shoes.

DISC BRAKE CALIPER - REAR

REMOVAL

NOTE: Before proceeding, (Refer to 5 - BRAKES - WARNING) (Refer to 5 - BRAKES - CAUTION).

(1) Disconnect and isolate battery negative cable from battery post.

(2) Using a brake pedal holding tool as shown (Fig. 15), depress brake pedal past its first inch of travel and hold it in this position. Holding pedal in this position will isolate master cylinder from hydraulic brake system and will not allow brake fluid to drain out of brake fluid reservoir while brake lines are open.

(3) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(4) Remove wheel and tire assembly.

(5) Remove banjo bolt connecting brake hose to caliper (Fig. 24). There are two sealing washers (one one each side of hose fitting) that will come off when bolt is removed. Discard these washers; install new washers on installation.

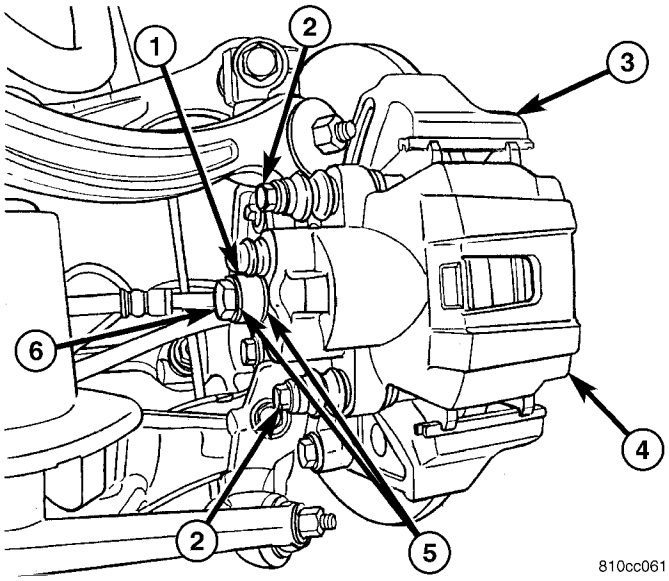


Fig. 24 Rear Brake Caliper Mounting

1 - BRAKE HOSE BANJO FITTING
2 - CALIPER GUIDE PIN BOLT
3 - CALIPER ADAPTER
4 - DISC BRAKE CALIPER
5 - COPPER SEAL WASHERS
6 - BANJO BOLT

(6) Remove disc brake caliper guide pin bolts (Fig. 24).

(7) Remove caliper assembly from brake adapter by first rotating bottom of caliper away from rotor, then lifting caliper (with shoes) away from upper adapter abutment (Fig. 25).

(8) Remove outboard brake shoe by pushing shoe away from caliper fingers, dislocating locating pins built into shoe backing plate from holes in caliper fingers, then sliding brake shoe down and off of brake caliper (Fig. 26).

(9) Pull inboard brake shoe away from caliper piston, dislocating retaining clip from cavity in piston. Remove inboard shoe.

DISC BRAKE CALIPER - REAR (Continued)

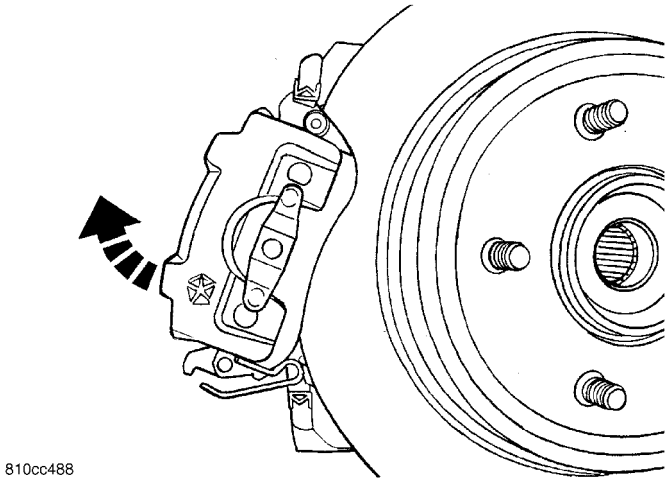


Fig. 25 Rear Caliper Removal

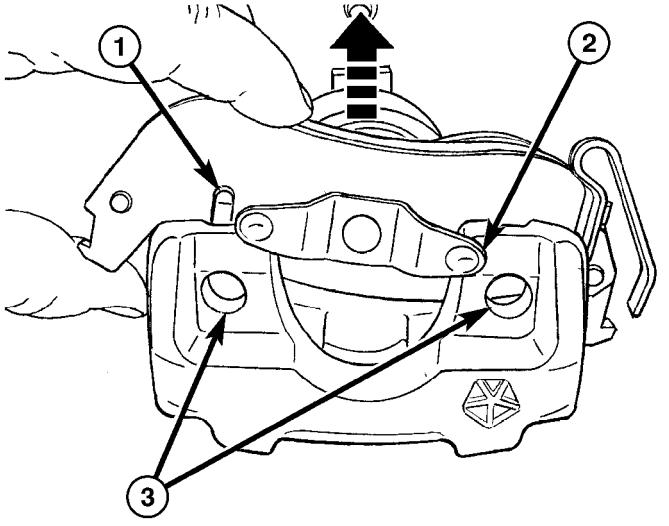


Fig. 26 Outboard Shoe Removal

1 - LOCATING PIN
2 - RETAINING CLIP
3 - HOLES

DISASSEMBLY

DISASSEMBLY - CALIPER GUIDE PIN BUSHINGS

NOTE: Before disassembling brake caliper, clean and inspect it. (Refer to 5 - BRAKES/HYDRAULIC/ MECHANICAL/DISC BRAKE CALIPER - CLEANING) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ DISC BRAKE CALIPER - INSPECTION)

(1) With one hand, push guide pin bushing sleeve towards rear of caliper, and at same time, pull sleeve out rear of caliper and bushing (Fig. 27).

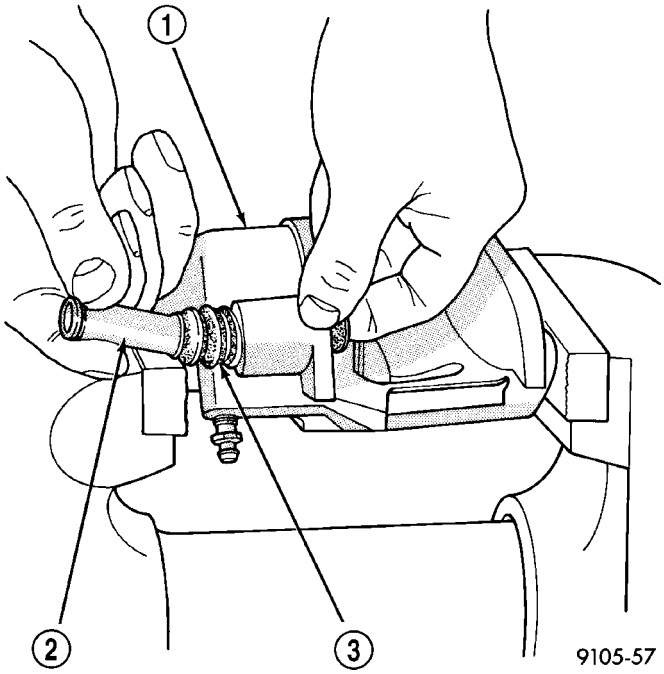


Fig. 27 Removing Sleeve From Bushing

1 - CALIPER
2 - SLEEVE
3 - BUSHING

(2) Using fingers, collapse one side of rubber guide pin bushing. Pull guide pin bushing out other side of brake caliper mounting boss (Fig. 28).

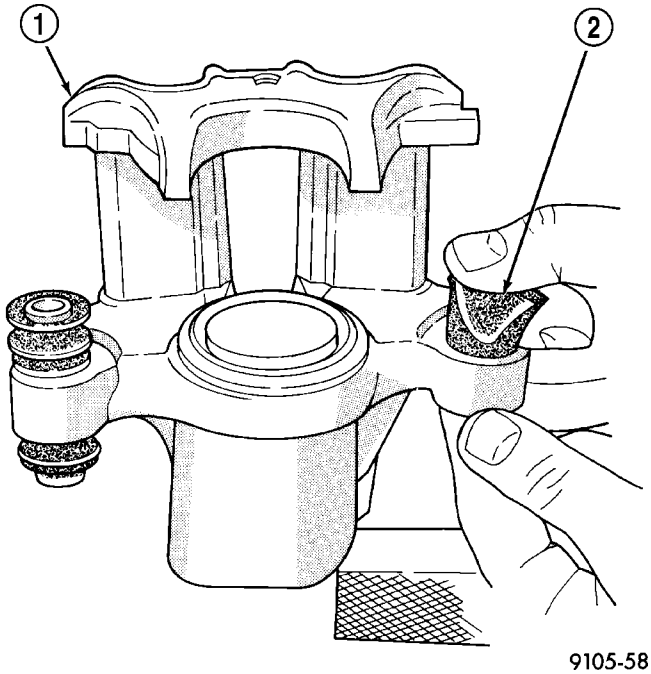


Fig. 28 Removing Bushing From Caliper

1 - CALIPER
2 - BUSHING

DISC BRAKE CALIPER - REAR (Continued)

DISASSEMBLY - CALIPER PISTON AND SEAL

NOTE: Before disassembling brake caliper, clean and inspect it. (Refer to 5 - BRAKES/HYDRAULIC/ MECHANICAL/DISC BRAKE CALIPER - CLEANING) (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ DISC BRAKE CALIPER - INSPECTION)

WARNING: UNDER NO CONDITION SHOULD HIGH PRESSURE AIR EVER BE USED TO REMOVE A PISTON FROM A CALIPER BORE. PERSONAL INJURY COULD RESULT FROM SUCH A PRACTICE.

CAUTION: Do not use excessive force when clamping caliper in vise. Excessive vise pressure will cause bore distortion.

(1) Mount caliper in a vise equipped with protective jaws.

(2) Place a wooden block in caliper as shown (Fig. 29). Block should be sized to allow piston to push out of bore far enough to be removed by hand after being loosened by air pressure, yet large enough keep piston from coming completely out utilizing air pressure.

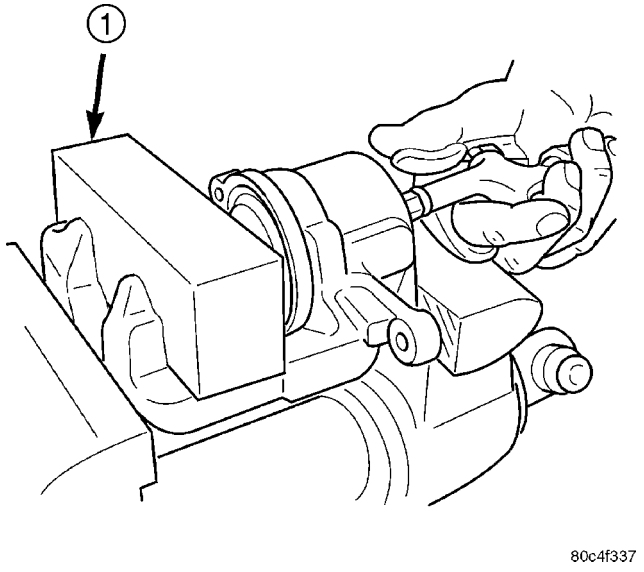


Fig. 29 Piston Removal Using Air Pressure

1 - WOOD BLOCK

WARNING: DO NOT PLACE FACE OR HANDS NEAR CALIPER AND PISTON IF USING COMPRESSED AIR PRESSURE TO REMOVE PISTON. DO NOT USE HIGH PRESSURE.

(3) Apply low pressure compressed air to caliper fluid inlet in **short spurts** to ease piston out of bore.

(4) Remove piston from caliper.

(5) Remove dust boot and discard it (Fig. 30).

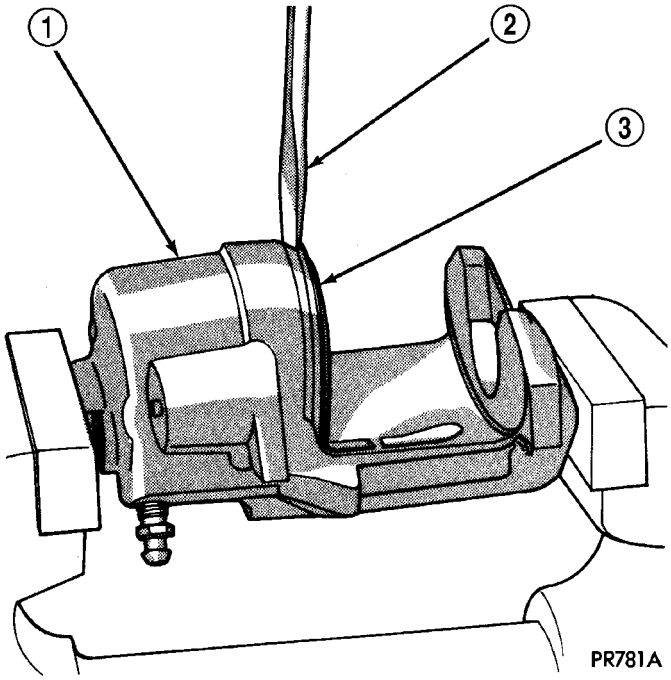


Fig. 30 Removing Caliper/Piston Dust Boot

1 - CALIPER
2 - SCREWDRIVER
3 - BOOT

CAUTION: Do not use a screw driver or other metal tool for seal removal. Using such tools can scratch bore or leave burrs on seal groove edges.

(6) Using a soft tool such as a plastic trim stick, work piston seal out of its groove in caliper piston bore (Fig. 31). Discard old seal.

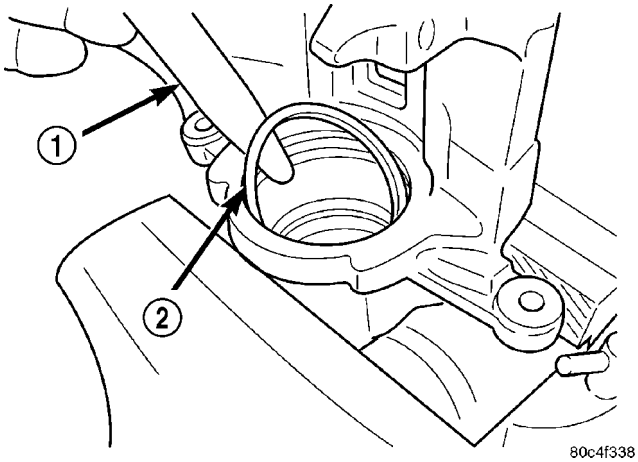


Fig. 31 Piston Seal Removal

1 - TRIM STICK
2 - SEAL

(7) Remove caliper bleeder screw.

(8) Clean piston bore and drilled passage ways with alcohol or a suitable solvent. Wipe it dry using only a lint-free cloth.

DISC BRAKE CALIPER - REAR (Continued)

(9) Inspect both piston and bore for scoring or pitting. Bores that show light scratches or corrosion can usually be cleared of light scratches or corrosion using crocus cloth.

CLEANING - CALIPER

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

To clean or flush the internal passages of the brake caliper, use fresh brake fluid or Mopar® Non-Chlorinated Brake Parts Cleaner. Never use gasoline, kerosene, alcohol, oil, transmission fluid or any fluid containing mineral oil to clean the caliper. These fluids will damage rubber cups and seals.

INSPECTION - CALIPER

Inspect the disc brake caliper for the following:

- Brake fluid leaks in and around boot area and inboard lining
- Ruptures, brittleness or damage to the piston dust boot
- Damaged, dry or brittle guide pin dust boots

If caliper fails inspection, disassemble and recondition caliper, replacing the seals and dust boots.

ASSEMBLY

ASSEMBLY - CALIPER GUIDE PIN BUSHINGS

(1) Fold guide pin bushing in half lengthwise at solid middle section (Fig. 32).

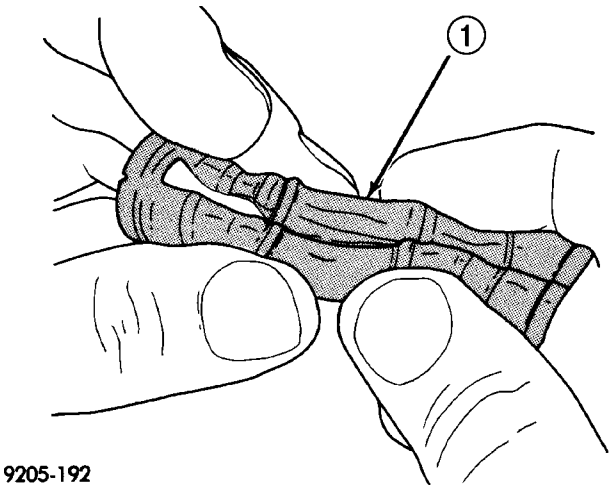


Fig. 32 Folded Caliper Guide Pin Bushing

1 - CALIPER GUIDE PIN BUSHING

NOTE: To avoid damage to bushing, do not use a sharp object to install guide pin bushing.

(2) Insert folded bushing into caliper mounting boss using fingers (Fig. 33).

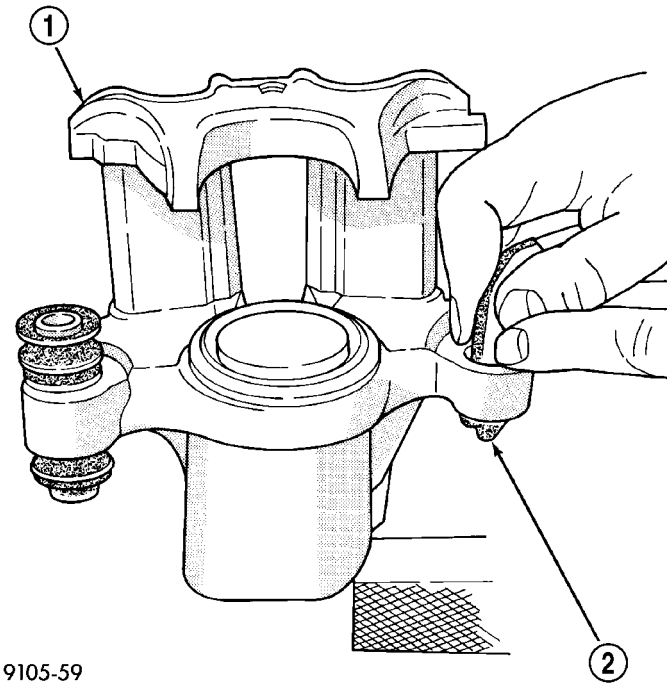


Fig. 33 Installing Caliper Guide Pin Bushing

1 - CALIPER
2 - BUSHING

(3) Unfold bushing using fingers or a wooden dowel until bushing is fully seated into caliper housing. Bushing flanges should be seated evenly on both sides of bushing hole (Fig. 34).

(4) Lubricate inside surfaces of bushing using Mopar Dielectric Grease or an equivalent.

DISC BRAKE CALIPER - REAR (Continued)

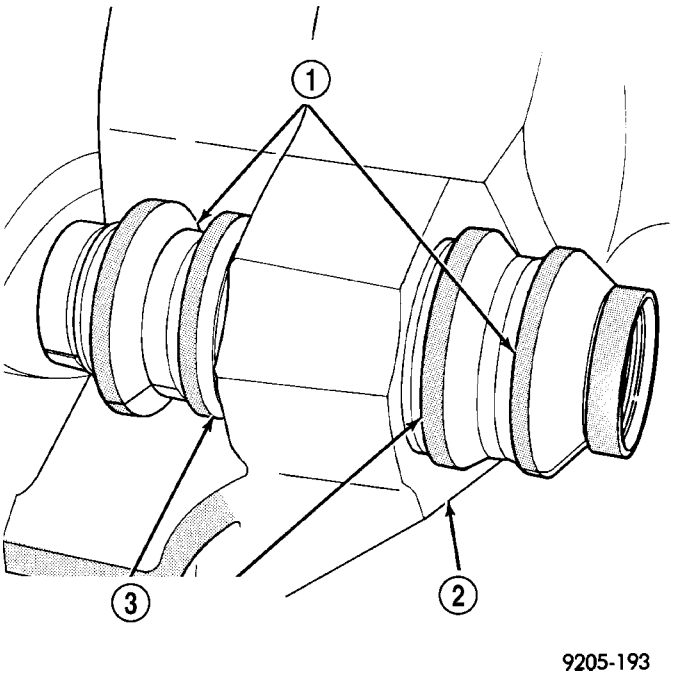


Fig. 34 Bushing Correctly Installed In Caliper

1 - BUSHING
2 - CALIPER
3 - BE SURE BOTH BUSHING FLANGES ARE FULLY SEATED AROUND CALIPER BUSHING BORES.

(5) Install guide pin sleeve into one end of bushing until seal area of bushing is past seal groove in sleeve (Fig. 35).

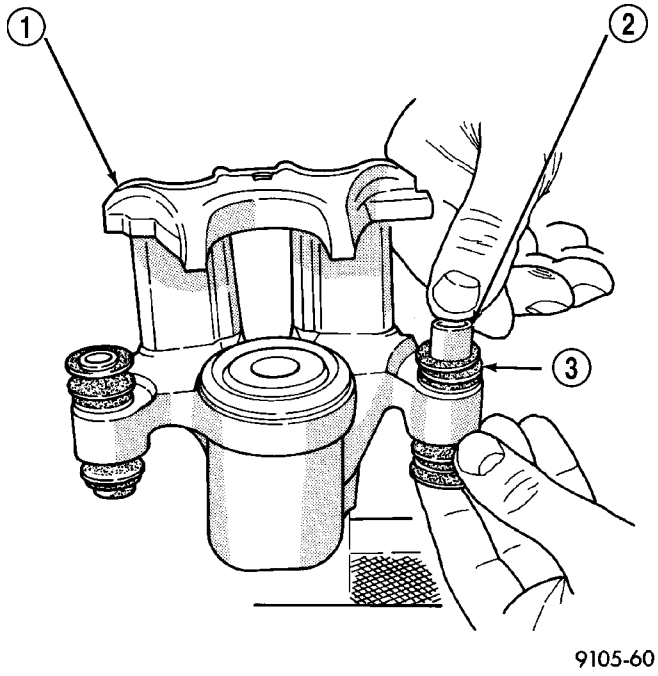


Fig. 35 Installing Sleeve In Bushing

1 - CALIPER
2 - SLEEVE
3 - BUSHING

(6) While holding convoluted boot on opposite end of bushing, push steel sleeve through bushing until bushing boot is fully seated into seal groove on that end of sleeve (Fig. 35). Install other end bushing boot into groove on that end of bushing sleeve.

(7) Verify both ends of bushing are seated in sleeve groves (Fig. 36). When sleeve is seated properly into bushing, sleeve/bushing can be held between fingers and easily slid back and forth without bushing unseating from sleeve groove.

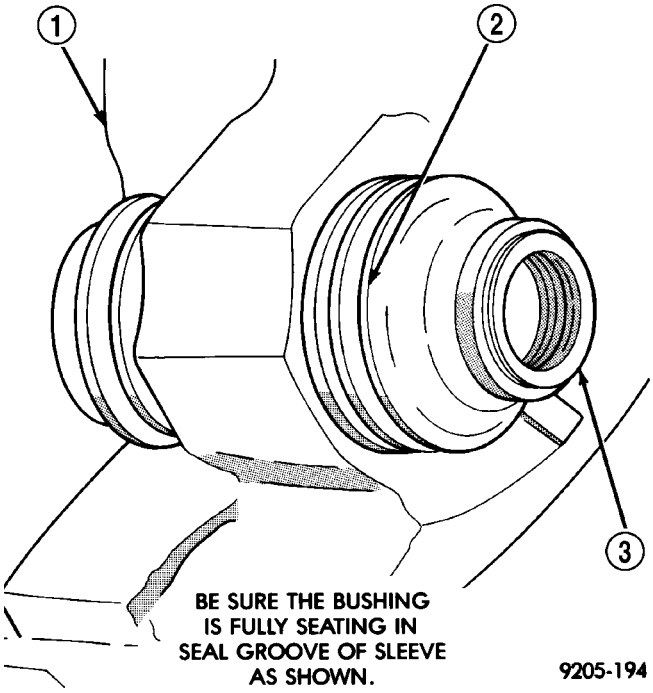


Fig. 36 Correctly Installed Guide Pin Sleeve And Bushing

1 - CALIPER
2 - BUSHING
3 - SLEEVE

ASSEMBLY - CALIPER PISTON AND SEAL

CAUTION: Dirt, oil, and solvents can damage caliper seals. Ensure assembly area is clean and dry.

NOTE: Always use new, clean Mopar® DOT 3 Motor Vehicle Brake Fluid when assembling brake caliper.

NOTE: Never use old piston seals or boots.

(1) Lubricate caliper pistons, piston seals and piston bores with clean, fresh brake fluid.

(2) Install piston seal in groove of caliper bore. Seal should be started at one area of groove and gently worked around and into the groove using only your clean fingers to seat it (Fig. 37).

DISC BRAKE CALIPER - REAR (Continued)

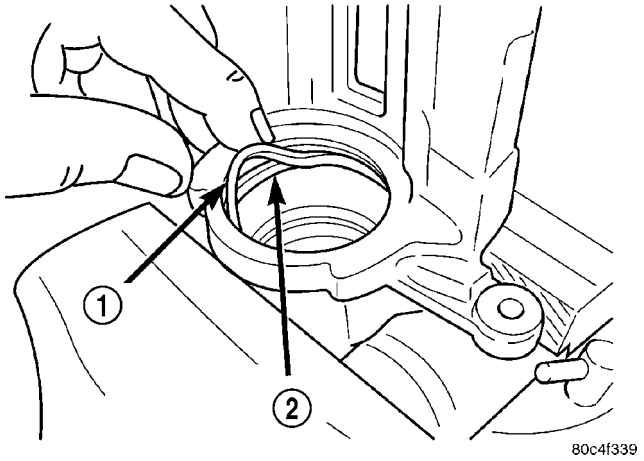


Fig. 37 New Piston Seal Installation

1 - SEAL
2 - GROOVE

(3) Install NEW boot on piston and work boot lip into groove at top of piston. Stretch boot rearward straightening boot folds, then move boot forward as necessary until folds snap into place.

(4) Install piston into caliper piston bore, pressing piston down to bottom of bore using hand-pressure. Using a piece of wood or wooden hammer handle may also suffice as long as piston and boot damage is avoided.

(5) Seat dust boot in caliper counterbore using Installer, Special Tool 9089, with Handle, Special Tool C-4171 (Fig. 38). Install dust boot until it bottoms. Do not over-seat dust boot or damage will occur.

(6) Install bleeder screw.

(7) Install caliper on vehicle. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPER - INSTALLATION)

INSTALLATION

(1) Completely retract caliper piston back into bore of caliper. Use hand pressure or a C-clamp may be used to retract piston, first placing a wood block over piston before installing C-clamp to avoid damaging piston.

(2) Position inboard shoe retainer clip against piston cavity (Fig. 39). Firmly press against shoe lining by hand until retainer clip seats itself in piston cavity groove. Be sure inboard brake shoe backing plate is flush against caliper piston.

CAUTION: Outboard brake shoes are side oriented. Make sure spring clip on each shoe is installed so it is positioned downward once caliper is installed.

(3) Position outboard brake shoe locating pins against ramps built into caliper fingers (Fig. 40). Slide shoe onto caliper. Be sure locating pins on rear of shoe are squarely seated into holes in caliper and shoe is flat against caliper fingers.

(4) Make sure abutment shims are in place on both slide abutments of caliper adapter.

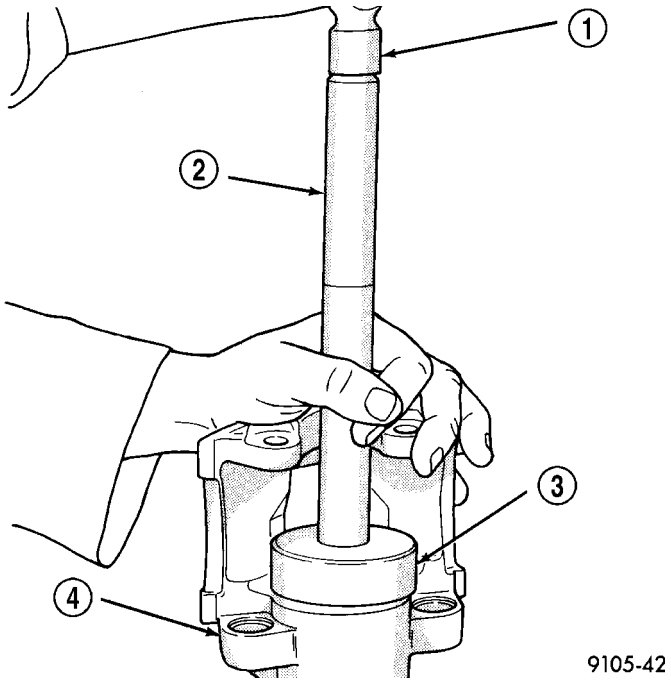


Fig. 38 Installing Dust Boot In Caliper Counterbore

1 - HAMMER
2 - HANDLE
3 - INSTALLER
4 - CALIPER

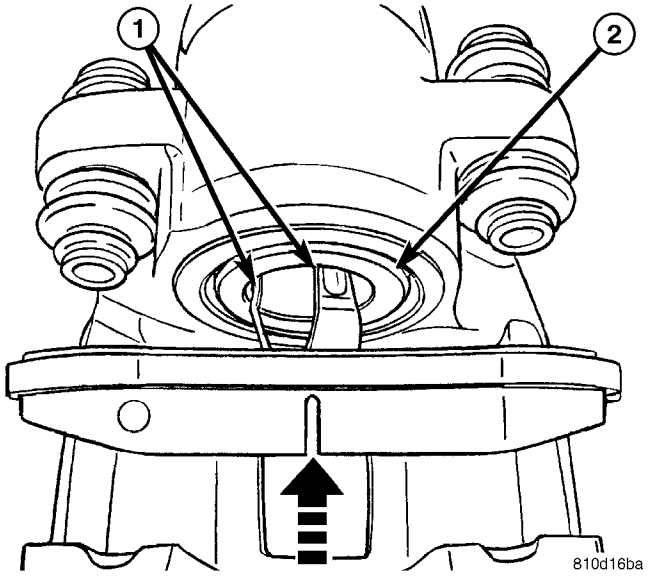


Fig. 39 Inboard Shoe Installation

1 - RETAINER CLIP
2 - PISTON

DISC BRAKE CALIPER - REAR (Continued)

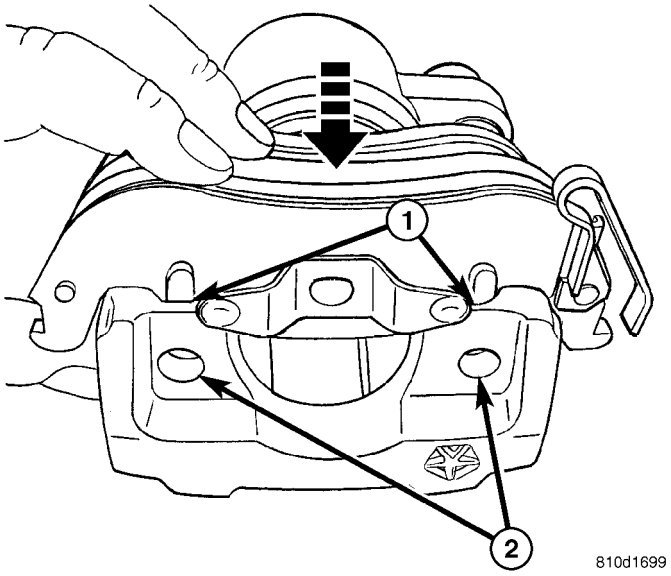


Fig. 40 Outboard Shoe Installation

1 - LOCATING PINS POSITIONED AGAINST RAMPS
2 - HOLES

CAUTION: Use care when installing caliper onto disc brake adapter to avoid damaging boots on caliper guide pins.

(5) Retract caliper guide pins to clear mounting bosses on caliper adapter when installing caliper.

(6) Install brake caliper in opposite way it was removed. Starting with upper end, carefully position caliper and brake shoes over brake rotor and align outboard shoe's upper edge with caliper slide abutment. Rotate lower end of caliper into mounting position on adapter.

CAUTION: Extreme caution should be taken not to crossthread caliper guide pin bolts when they are installed.

(7) Carefully install caliper guide pin bolts (Fig. 24). Tighten bolts to 23 N·m (200 in. lbs.) torque.

(8) Install banjo bolt attaching brake hose to caliper (Fig. 24). Install NEW washers on each side of hose fitting as banjo bolt is placed through fitting. Thread banjo bolt into caliper and tighten to 47 N·m (35 ft. lbs.) torque.

(9) Install tire and wheel assembly. Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque. (Refer to 22 - TIRES/WHEELS - INSTALLATION)

(10) Lower vehicle.

(11) Remove brake pedal holding tool.

(12) Connect battery negative cable to battery post.

(13) Bleed base brake hydraulic system as necessary. (Refer to 5 - BRAKES - STANDARD PROCEDURE)

(14) Road test vehicle making several stops to wear off any foreign material on brakes and to seat brake shoes.

DISC BRAKE CALIPER ADAPTER - FRONT

REMOVAL

(1) Access and remove front brake caliper and shoes. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - REMOVAL)

(2) Remove shoe anti-rattle clips from adapter (Fig. 41).

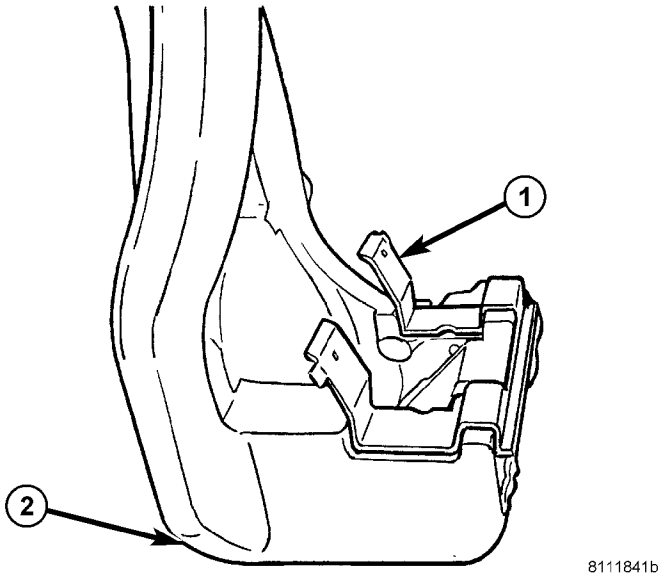


Fig. 41 Anti-Rattle Clip - Lower (Upper - Typical)

1 - ANTI-RATTLE CLIP
2 - CALIPER ADAPTER

(3) Remove two bolts securing caliper adapter to steering knuckle (Fig. 42).

(4) Remove caliper adapter.

INSTALLATION

NOTE: Brake caliper adapters are side-oriented. Left adapters are marked with an "L" while right adapters are marked with an "R" where shown (Fig. 43).

(1) Install disc brake caliper adapter on steering knuckle.

(2) Install two bolts securing caliper adapter to steering knuckle (Fig. 42). Tighten bolts to 169 N·m (125 ft. lbs.) torque.

(3) Attach two brake shoe anti-rattle clips to adapter matching contour of each clip to adapter's upper and lower caliper abutments (Fig. 41).

DISC BRAKE CALIPER ADAPTER - FRONT (Continued)

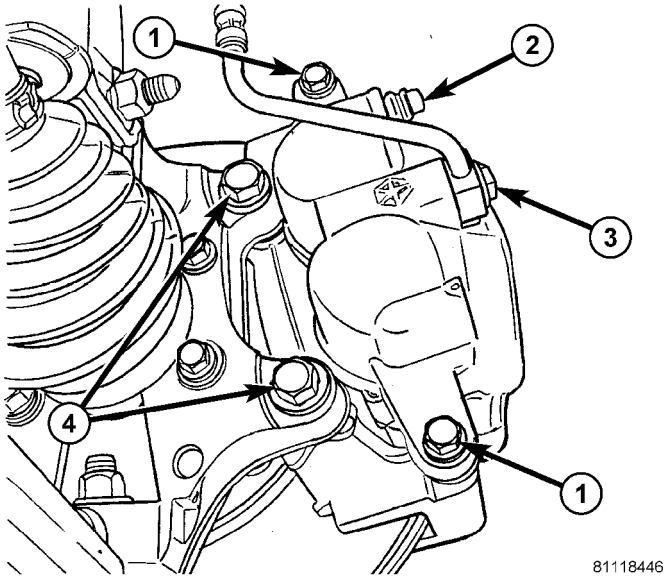


Fig. 42 Front Caliper And Adapter Mounting

1 - CALIPER GUIDE PIN BOLTS
2 - BLEEDER SCREW
3 - BRAKE HOSE BANJO BOLT
4 - CALIPER ADAPTER MOUNTING BOLTS

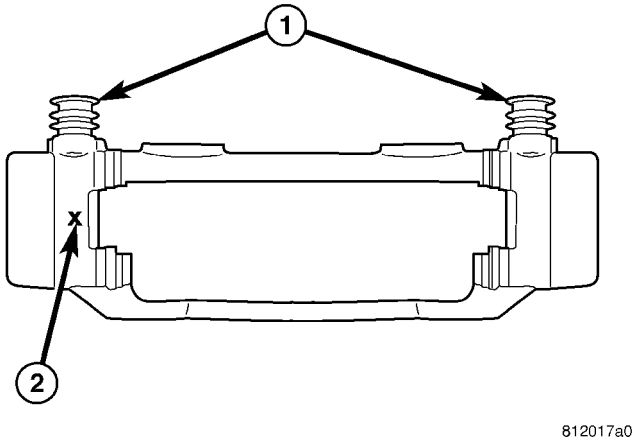


Fig. 43 Brake Caliper Adapter

1 - GUIDE PINS AND BOOTS
2 - ″L″ OR ″R″ INDICATING LEFT OR RIGHT SIDE OF VEHICLE

(4) Install NEW brake shoes as well as all components necessary to access them. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - INSTALLATION)

(5) Lower vehicle.

(6) Road test vehicle making several stops to wear off any foreign material on brakes and to seat brake shoes.

DISC BRAKE CALIPER GUIDE PINS - FRONT

REMOVAL

NOTE: Before proceeding, (Refer to 5 - BRAKES - WARNING) (Refer to 5 - BRAKES - CAUTION).

(1) Remove master cylinder fluid reservoir cap.

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Remove tire and wheel assembly.

(4) Place an appropriately sized C-Clamp over brake caliper as shown (Fig. 44), placing screw-drive head against outboard shoe and hook against rear of caliper. Slowly tighten screw-drive retracting caliper pistons into bores and breaking outboard brake shoe free from caliper fingers. **Do not overtighten C-Clamp.** Remove C-Clamp.

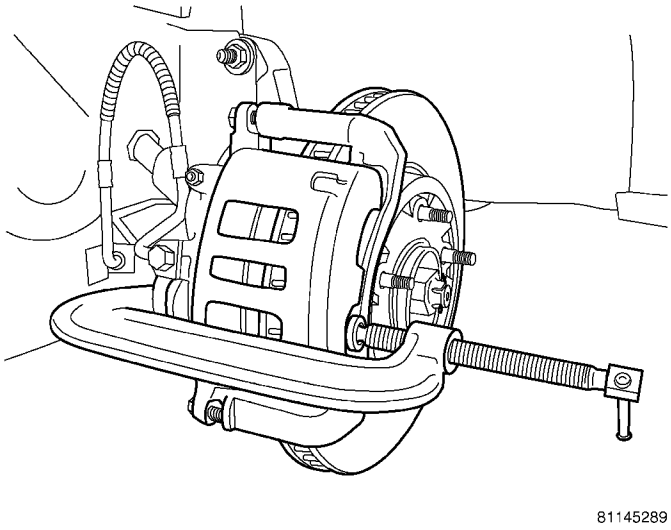


Fig. 44 C-Clamp On Caliper

(5) Once outboard shoe is free from caliper fingers, slide caliper inboard on guides providing clearance between the rotor and inboard brake shoe.

(6) Slide an appropriate prying tool though center opening in top of caliper behind inboard brake shoe between two caliper pistons. **Use care not to come in contact with pistons or dust boots potentially damaging them.** Pry against rear of inboard brake shoe breaking it free from caliper pistons.

(7) Install master cylinder fluid reservoir cap.

(8) Remove two brake caliper guide pin bolts (Fig. 45).

(9) Remove disc brake caliper from brake adapter and hang out of way using wire or a bungee cord.

DISC BRAKE CALIPER GUIDE PINS - FRONT (Continued)

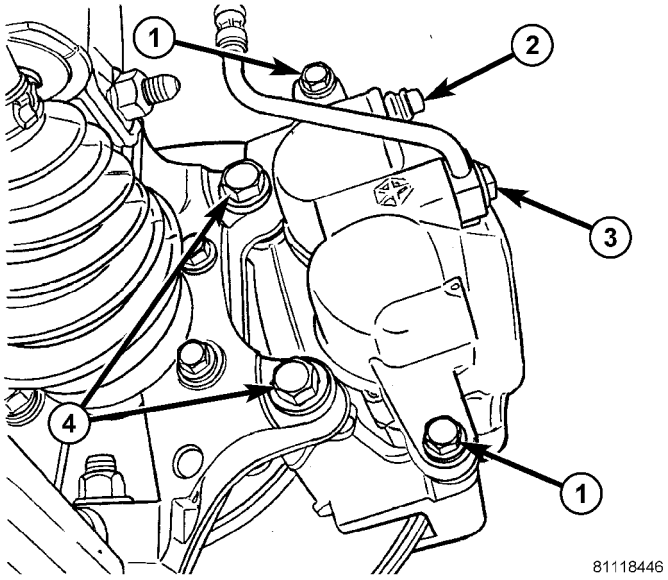


Fig. 45 Front Caliper And Adapter Mounting

1 - CALIPER GUIDE PIN BOLTS
2 - BLEEDER SCREW
3 - BRAKE HOSE BANJO BOLT
4 - CALIPER ADAPTER MOUNTING BOLTS

Use care not to overextend brake hose when doing this.

(10) Remove guide pins and boots from adapter as shown (Fig. 46).

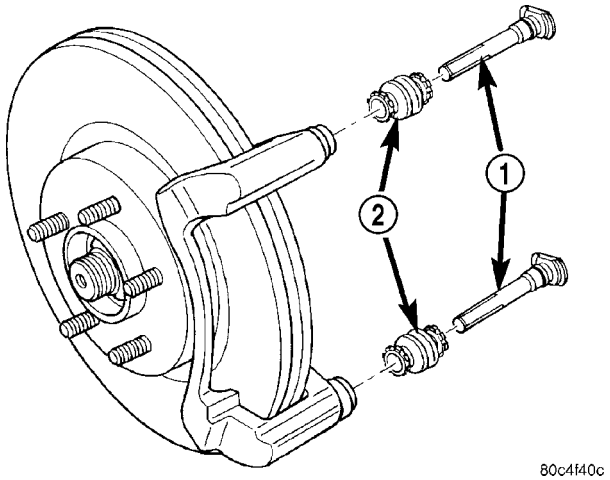


Fig. 46 Guide Pins And Boots

1 - PINS
2 - BOOTS

INSTALLATION

(1) Lubricate guide pins and inside boots with packet supplied with service kit, Sythesco GLK-1 lubricant or equivalent.

(2) Install guide pins and boots in adapter as shown (Fig. 46). The boots have grooves built into their inner lips to fit onto pins and adapter.

CAUTION: If adhesive is missing from noise suppression gasket on rear of either inner and outer brake shoes or if gasket is damaged, replace brake shoes. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - REMOVAL)

CAUTION: Use care when installing caliper onto disc brake adapter to avoid damaging boots on caliper guide pins.

(3) Install disc brake caliper over brake shoes on brake caliper adapter.

(4) Align caliper guide pin bolt holes with guide pins, then install caliper guide pin bolts (Fig. 45). Tighten upper (closest to bleeder screw) bolt to 43 N·m (32 ft. lbs.) torque, then tighten lower bolt to 43 N·m (32 ft. lbs.) torque.

(5) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(6) Lower vehicle.

(7) Pump brake pedal several times to set shoes to brake rotor.

(8) Check and adjust brake fluid level as necessary.

(9) Road test vehicle making several stops to wear off any foreign material on brakes and to seat brake shoes.

FLUID

DIAGNOSIS AND TESTING - BRAKE FLUID CONTAMINATION

Indications of fluid contamination are swollen or deteriorated rubber parts.

Swollen rubber parts indicate the presence of petroleum in the brake fluid.

To test for contamination, put a small amount of drained brake fluid in clear glass jar. If fluid separates into layers, there is mineral oil or other fluid contamination of the brake fluid.

If brake fluid is contaminated, drain and thoroughly flush system. Replace master cylinder, proportioning valve, caliper seals, wheel cylinder seals, Antilock Brake hydraulic unit and all hydraulic fluid hoses.

STANDARD PROCEDURE - BRAKE FLUID LEVEL CHECKING

Check master cylinder reservoir fluid level a minimum of twice annually.

Fluid reservoirs are marked with the words FULL and ADD to indicate proper brake fluid fill level of the master cylinder.

FLUID (Continued)

If necessary, add brake fluid to bring the level to the bottom of the FULL mark on the side of the master cylinder fluid reservoir.

Use only Mopar® brake fluid or equivalent from a sealed container. Brake fluid must conform to DOT 3 specifications.

DO NOT use brake fluid with a lower boiling point, as brake failure could result during prolonged hard braking.

Use only brake fluid that was stored in a tightly-sealed container.

DO NOT use petroleum-based fluid because seal damage will result. Petroleum based fluids would be items such as engine oil, transmission fluid, power steering fluid etc.

SPECIFICATIONS

BRAKE FLUID

The brake fluid used in this vehicle must conform to DOT 3 specifications and SAE J1703 standards. No other type of brake fluid is recommended or approved for usage in the vehicle brake system. Use only Mopar® Brake Fluid or equivalent from a tightly sealed container.

CAUTION: Never use reclaimed brake fluid or fluid from an container which has been left open. An open container of brake fluid will absorb moisture from the air and contaminate the fluid.

CAUTION: Never use any type of a petroleum-based fluid in the brake hydraulic system. Use of such type fluids will result in seal damage of the vehicle brake hydraulic system causing a failure of the vehicle brake system. Petroleum based fluids would be items such as engine oil, transmission fluid, power steering fluid, etc.

MASTER CYLINDER

STANDARD PROCEDURE - MASTER CYLINDER BLEEDING

CAUTION: When clamping master cylinder in vise, only clamp master cylinder by its mounting flange. Do not clamp master cylinder piston rod, reservoir, seal or body.

(1) Clamp master cylinder in a vise.

NOTE: Use correct bleeder tubes when bleeding master cylinder. Master cylinder outlet ports vary in size and type depending on whether master cylinder is for a vehicle equipped with traction control or not. Traction control equipped master cylinders require the additional use of ISO style flare adapters supplied in Special Tool Package 8822 to be used in conjunction with Bleeder Tubes, Special Tool Package 8358.

(2) Attach special tools for bleeding master cylinder in the following fashion:

(a) **For non-traction control equipped master cylinders**, thread a Bleeder Tube, Special Tool 8358–1, into each outlet port. Tighten each tube to 17 N·m (145 in. lbs.) torque. Flex bleeder tubes and place open ends into mouth of fluid reservoir as far down as possible (Fig. 47).

(b) **For traction control equipped master cylinders**, thread one Adapter, Special Tool 8822–2, in each outlet port. Tighten Adapters to 17 N·m (145 in. lbs.) torque. Next, thread a Bleeder Tube, Special Tool 8358–1, into each Adapter. Tighten each tube to 17 N·m (145 in. lbs.) torque. Flex bleeder tubes and place open ends into mouth of fluid reservoir as far down as possible (Fig. 47).

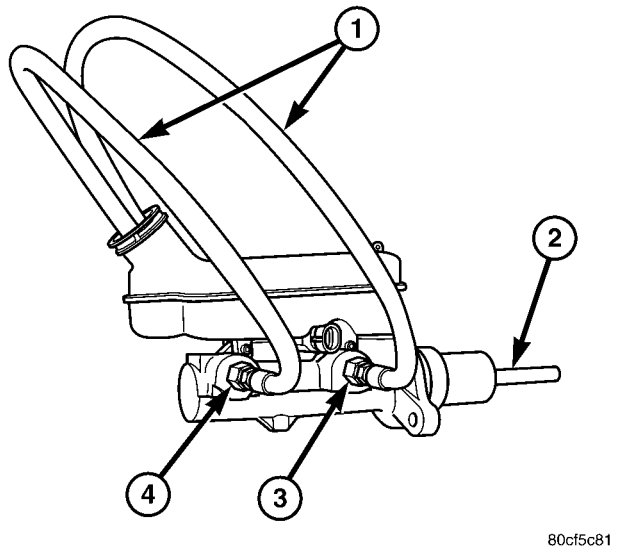


Fig. 47 Master Cylinder Set Up For Bleeding

1 - BLEEDER TUBES 8358
2 - WOODEN DOWEL
3 - ADAPTER 8822-2 (USE ONLY ON TRACTION CONTROL EQUIPPED MASTER CYLINDERS)
4 - ADAPTER 8822-2 (USE ONLY ON TRACTION CONTROL EQUIPPED MASTER CYLINDERS)

NOTE: Make sure open ends of bleeder tubes stay below surface of brake fluid once reservoir is filled to proper level.

(3) Fill brake fluid reservoir with Mopar® brake fluid or equivalent conforming to DOT 3 (DOT 4 and DOT 4+ are acceptable) specifications. Make sure

MASTER CYLINDER (Continued)

fluid level is above tips of bleeder tubes in reservoir to ensure no air is ingested during bleeding.

(4) Using a wooden dowel as a pushrod (Fig. 47), slowly depress master cylinder pistons, then release pressure, allowing pistons to return to released position. Repeat several times until all air bubbles are expelled. Make sure fluid level stays above tips of bleeder tubes in reservoir while bleeding.

(5) Remove bleeder tubes from master cylinder outlet ports, then plug outlet ports and install fill cap on reservoir.

(6) Remove master cylinder from vise.

(7) Install master cylinder on vehicle. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/MASTER CYLINDER - INSTALLATION)

REMOVAL

CAUTION: Vacuum in power brake booster must be pumped down (removed) before removing master cylinder from power brake booster. This is necessary to prevent power brake booster from sucking in any contamination as master cylinder is removed. This can be done simply by pumping brake pedal, with vehicle's engine not running, until a firm feeling brake pedal is achieved.

(1) With engine not running, pump brake pedal until a firm pedal is achieved (4-5 strokes).

(2) Disconnect negative battery cable from battery post and isolate.

(3) Thoroughly clean all surfaces of brake fluid reservoir and master cylinder. Use only Mopar® Brake Parts Cleaner or equivalent.

(4) Disconnect wiring harness connector from brake fluid level switch in master cylinder brake fluid reservoir (Fig. 48).

(5) Disconnect primary and secondary brake tubes from master cylinder (Fig. 49). Install sealing plugs in open brake tube outlet ports.

CAUTION: Before removing master cylinder from power brake vacuum booster, master cylinder and vacuum booster must be thoroughly cleaned. This must be done to prevent dirt particles from falling into power brake vacuum booster.

(6) Clean area where master cylinder assembly attaches to power brake booster. Use only Mopar® Brake Parts Cleaner or equivalent.

(7) Remove two nuts attaching master cylinder to power brake booster (Fig. 49).

(8) Slide master cylinder straight out of power brake booster.

CAUTION: Seal on rear of master cylinder is used to create seal for holding vacuum in power brake vacuum booster. Vacuum seal on master cylinder MUST be replaced whenever master cylinder is removed from power brake vacuum booster.

(9) Remove vacuum seal located on mounting flange of master cylinder. Vacuum seal is removed

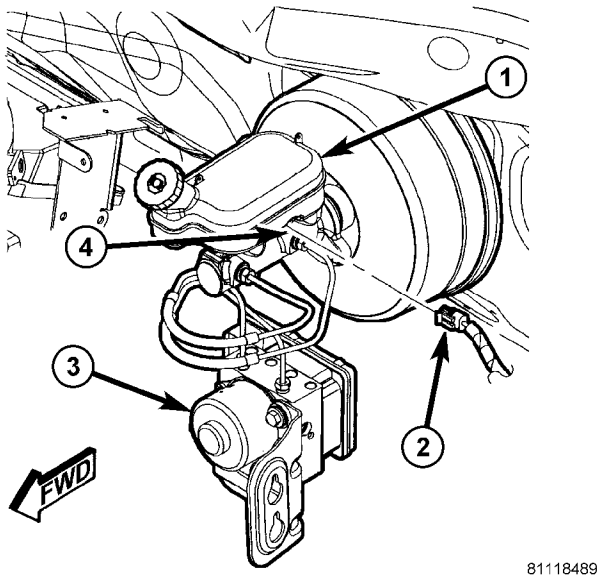


Fig. 48 Brake Fluid Level Switch Connector

1 - MASTER CYLINDER RESERVOIR
2 - WIRING CONNECTOR
3 - ABS ICU
4 - BRAKE FLUID LEVEL SWITCH

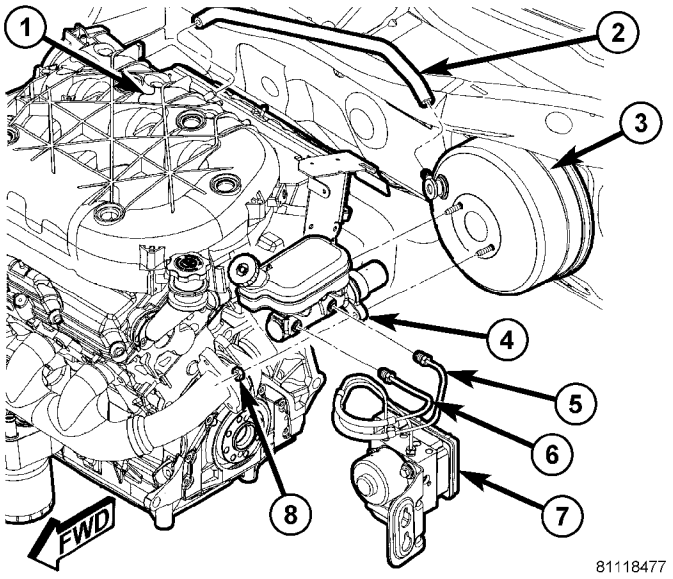


Fig. 49 Master Cylinder Mounting

1 - ENGINE INTAKE MANIFOLD
2 - BOOSTER VACUUM HOSE
3 - POWER BRAKE BOOSTER
4 - MASTER CYLINDER
5 - PRIMARY BRAKE TUBE
6 - SECONDARY BRAKE TUBE
7 - ABS ICU
8 - MASTER CYLINDER MOUNTING NUT (2)

MASTER CYLINDER (Continued)

from master cylinder by **carefully** pulling it off rear of master cylinder. **Do not attempt to pry seal off master cylinder by inserting a sharp tool between seal and master cylinder casting.**

DISASSEMBLY - MASTER CYLINDER (FLUID RESERVOIR)

(1) Clean master cylinder housing and brake fluid reservoir. Use only a solvent such as Mopar Brake Parts Cleaner or an equivalent.

(2) Remove brake fluid reservoir cap. Using a syringe or equivalent type tool empty as much brake fluid as possible from the reservoir.

CAUTION: When removing fluid reservoir from the master cylinder, do not pry off using any type of tool. This can damage the fluid reservoir or master cylinder housing.

(3) Remove the master cylinder assembly from the power brake vacuum booster. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/MASTER CYLINDER - REMOVAL).

(4) Mount the master cylinder in a vise using the master cylinder mounting flange.

(5) Using correct size pin punch, remove the two retaining pins between the fluid reservoir and master cylinder housing (Fig. 50).

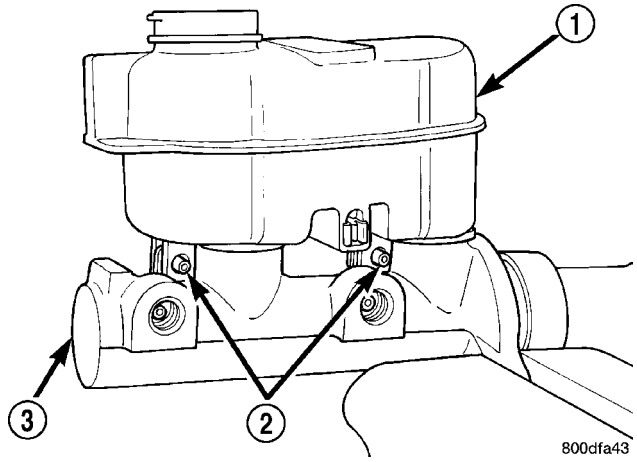


Fig. 50 Fluid Reservoir Retaining Pins (Typical)

1 - FLUID RESERVOIR
2 - RETAINING PINS
3 - MASTER CYLINDER

(6) Rock the brake fluid reservoir from side to side while pulling up to remove it from the seal grommets in master cylinder housing.

(7) Remove the two master cylinder housing to brake fluid reservoir seal grommets (Fig. 51).

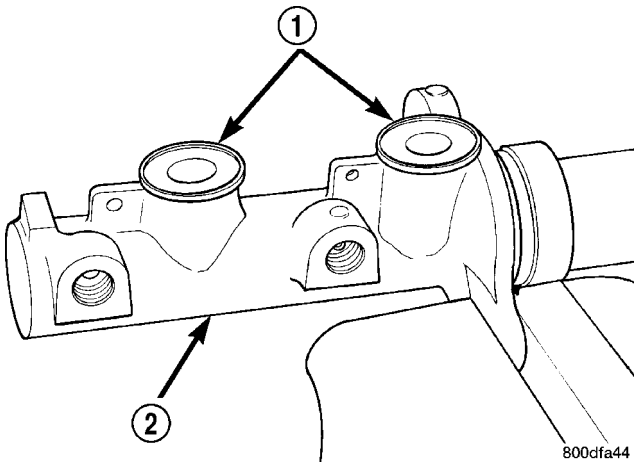


Fig. 51 Master Cylinder To Fluid Reservoir Seal Grommets

1 - SEAL GROMMETS
2 - MASTER CYLINDER

ASSEMBLY - MASTER CYLINDER (FLUID RESERVOIR)

(1) Install new master cylinder housing to brake fluid reservoir sealing grommets in master cylinder housing (Fig. 51).

(2) Lubricate reservoir mounting area with fresh clean brake fluid. Place reservoir in position over sealing grommets. Seat reservoir into sealing grommets using a rocking motion while firmly pressing down on fluid reservoir.

(3) Be sure fluid reservoir is positioned properly on master cylinder. **Bottom of fluid reservoir is to be touching the top of both sealing grommets when properly installed on master cylinder housing.**

(4) Install the two fluid reservoir to master cylinder retaining pins (Fig. 50).

(5) Install the master cylinder assembly on the power brake booster. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/MASTER CYLINDER - INSTALLATION)

(6) Fill fluid reservoir to its proper level as indicated on the side of the fluid reservoir.

INSTALLATION

(1) Thoroughly bleed master cylinder before installing it on vehicle. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/MASTER CYLINDER - STANDARD PROCEDURE)

CAUTION: When replacing master cylinder on vehicle, a NEW vacuum seal MUST be installed on master cylinder.

MASTER CYLINDER (Continued)

(2) Install NEW vacuum seal on rear of master cylinder making sure seal fits squarely in mounting groove.

(3) Position master cylinder on studs of power brake booster (Fig. 49), aligning booster push rod with master cylinder piston.

(4) Install two master cylinder mounting nuts (Fig. 49). Tighten both mounting nuts to a torque of 25 N·m (225 in. lbs.).

CAUTION: When tightening primary and secondary brake tube nuts at master cylinder, be sure brake tubes do not contact any other components within vehicle and that there is slack in flexible sections of tubes. This is required due to movement between ABS ICU and master cylinder while vehicle is in motion.

(5) Thread primary and secondary brake tubes into master cylinder primary and secondary ports (Fig. 49). Brake tubes must be held securely when tightened to control orientation of flex section. Tighten tube nuts to 14 N·m (120 in. lbs.) torque.

(6) Connect wiring harness connector to brake fluid level switch mounted in brake fluid reservoir (Fig. 48).

(7) Connect negative battery cable to battery post.

(8) Fill master cylinder with clean, fresh Mopar® Brake Fluid or equivalent.

WARNING: BE CERTAIN A FIRM BRAKE PEDAL IS ACHIEVED PRIOR TO ATTEMPTING VEHICLE OPERATION. IF A FIRM BRAKE PEDAL CANNOT BE ACHIEVED, BLEED ENTIRE BRAKE HYDRAULIC SYSTEM AND CHECK FOR LEAKS. (Refer to 5 - BRAKES - STANDARD PROCEDURE)

(9) Road test vehicle to ensure proper operation of brakes.

PEDALS - ADJUSTABLE

REMOVAL

(1) Move driver's seat to full rearward position.

(2) Disconnect negative battery cable from battery post and isolate.

(3) Remove engine appearance cover.

(4) Remove throttle cable from throttle body lever.

(5) Access and remove knee blocker airbag. (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - REMOVAL)

(6) Place front wheels and steering wheel in the STRAIGHT-AHEAD position. Lock steering wheel in place using steering wheel holder (Fig. 52).

(7) Disconnect steering column coupling at intermediate shaft. To do so:

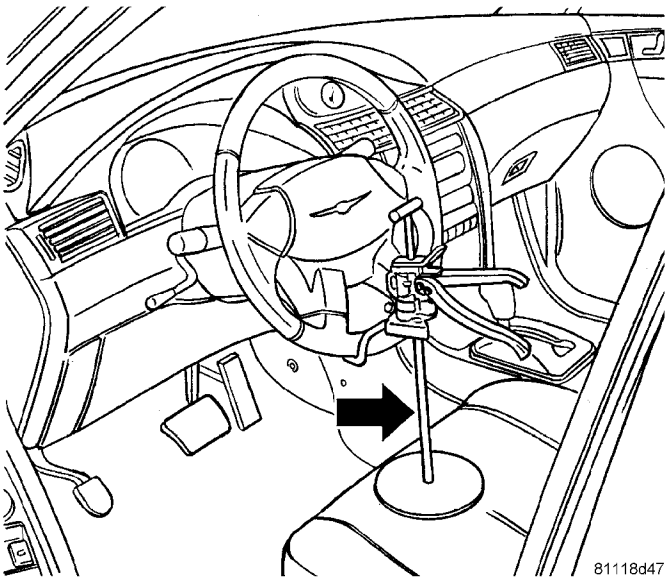


Fig. 52 Steering Wheel Holder

(a) Remove hair pin at end of coupling pinch bolt.

(b) Loosen nut and remove pinch bolt.

(c) Remove intermediate shaft from coupling.

(8) Remove four screws securing instrument panel lower left reinforcement. Remove reinforcement.

(9) Remove booster push rod from pin on brake pedal (Fig. 53). To do so:

(a) Position small screwdriver between center tang on power brake booster brake pedal pin retaining clip.

(b) Rotate screwdriver enough to allow retaining clip center tang to pass over end of brake pedal pin, then slide retaining clip off brake pedal pin.

(c) **Discard retaining clip. It is not to be reused. Install NEW retaining clip when assembling.**

(10) Slide booster push rod off brake pedal pin.

(11) Remove clip disconnecting throttle cable from accelerator pedal.

(12) Remove and discard brake lamp switch. **Do not reuse switch; install NEW switch on Installation.** (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - REMOVAL)

(13) Disconnect wiring connectors at brake pedal position sensor and adjustable pedal motor.

(14) Remove four power brake booster mounting nuts (Fig. 53).

(15) Remove two nuts fastening pedal bracket to upper dash panel bracket.

(16) Remove adjustable pedals assembly.

PEDALS - ADJUSTABLE (Continued)

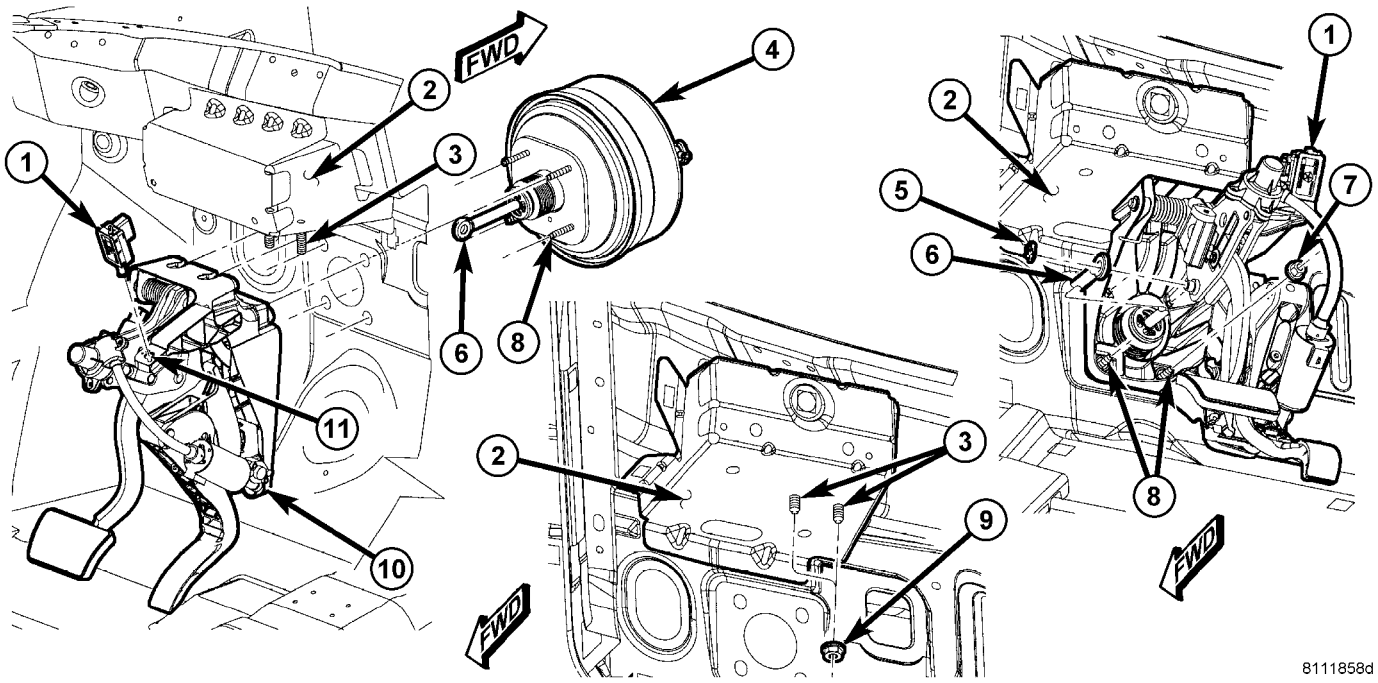


Fig. 53 Adjustable Pedals And Booster Mounting

1 - BRAKE LAMP SWITCH
2 - DASH PANEL BRACKET
3 - PEDAL MOUNTING STUDS
4 - POWER BRAKE BOOSTER
5 - RETAINING CLIP
6 - BOOSTER PUSH ROD
7 - BOOSTER MOUNTING NUT
8 - BOOSTER MOUNTING STUDS
9 - PEDAL BRACKET MOUNTING NUT
10 - ADJUSTABLE PEDALS ASSEMBLY
11 - BRAKE LAMP SWITCH MOUNT

INSTALLATION

(1) Install adjustable pedals assembly under instrument panel and slide onto power brake booster studs.

(2) Install two nuts fastening pedal bracket to upper dash panel bracket (Fig. 53). Tighten nuts to 28 N·m (21 ft. lbs.) torque.

(3) Install four power brake booster mounting nuts (Fig. 53). Tighten nuts to 28 N·m (21 ft. lbs.) torque.

(4) Connect wiring connectors at brake pedal position sensor and adjustable pedal motor.

(5) Install clip connecting throttle cable to accelerator pedal.

(6) Slide booster push rod onto brake pedal pin (Fig. 53). Install NEW retaining clip securing push rod to brake pedal.

(7) Install and adjust NEW brake lamp switch (Fig. 53). (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - INSTALLATION)

(8) Connect steering column coupling to intermediate shaft. To do so:

(a) Match intermediate shaft to coupling pinch loop.

(b) Install coupling pinch bolt. Tighten to 28 N·m (21 ft. lbs.) torque.

(c) Install hair pin at end of pinch bolt.

(9) Install instrument panel lower left reinforcement.

(10) Remove steering wheel holder.

(11) Install knee blocker airbag as well as all components necessary to access it. (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - INSTALLATION)

(12) Install throttle cable onto throttle body lever.

(13) Install engine appearance cover.

(14) Connect negative battery cable to battery post.

(15) Test operation of adjustable pedals.

(16) Road test vehicle testing operation of steering, brakes and accelerator.

POWER BRAKE BOOSTER

REMOVAL

(1) Move driver's seat to full rearward position.

(2) Disconnect negative (-) battery cable from battery post and isolate.

(3) Remove battery from vehicle. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - REMOVAL)

POWER BRAKE BOOSTER (Continued)

CAUTION: Vacuum in power brake booster must be pumped down (removed) before removing master cylinder from power brake booster. This is necessary to prevent power brake booster from sucking in any contamination as master cylinder is removed. This can be done simply by pumping brake pedal, with vehicle's engine not running, until a firm feeling brake pedal is achieved.

(4) With engine not running, pump brake pedal until a firm pedal is achieved (4-5 strokes).

(5) Remove nuts fastening coolant recovery bottle in place and reposition bottle with hoses attached out of way. (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - REMOVAL)

CAUTION: Before removing master cylinder from power brake vacuum booster, master cylinder and vacuum booster must be thoroughly cleaned. This must be done to prevent dirt particles from falling into power brake vacuum booster.

(6) Thoroughly clean all surfaces of brake fluid reservoir and master cylinder, paying special attention to area where master cylinder attaches to power brake booster. Use only Mopar® Brake Parts Cleaner or equivalent.

(7) Disconnect wiring harness connector from brake fluid level switch in master cylinder brake fluid reservoir (Fig. 48).

(8) Disconnect primary and secondary brake tubes coming from master cylinder at ABS ICU (Fig. 54). Cap off brake tubes and install sealing plugs in open brake tube outlet ports of ICU.

(9) Remove two nuts attaching master cylinder to power brake booster (Fig. 49).

(10) Slide master cylinder straight out of power brake booster.

CAUTION: Seal on rear of master cylinder is used to create seal for holding vacuum in power brake vacuum booster. Vacuum seal on master cylinder MUST be replaced whenever master cylinder is removed from power brake vacuum booster.

(11) Remove vacuum seal located on mounting flange of master cylinder. Vacuum seal is removed from master cylinder by **carefully** pulling it off rear of master cylinder. **Do not attempt to pry seal off master cylinder by inserting a sharp tool between seal and master cylinder casting.**

(12) Loosen 2 bolts fastening ABS ICU bracket to frame rail (Fig. 55).

(13) Lift ICU off frame rail bolts and lower ICU onto top of transaxle.

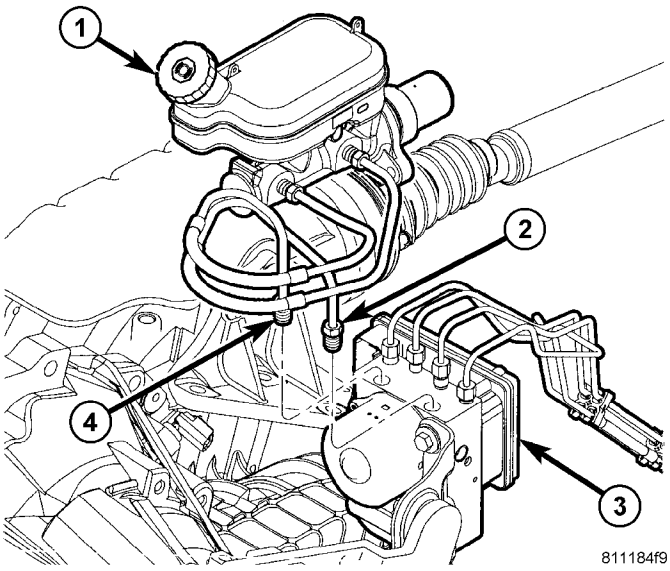


Fig. 54 Primary and secondary brake tubes at ICU

1 - MASTER CYLINDER
2 - PRIMARY BRAKE TUBE NUT
3 - ABS ICU
4 - SECONDARY BRAKE TUBE NUT

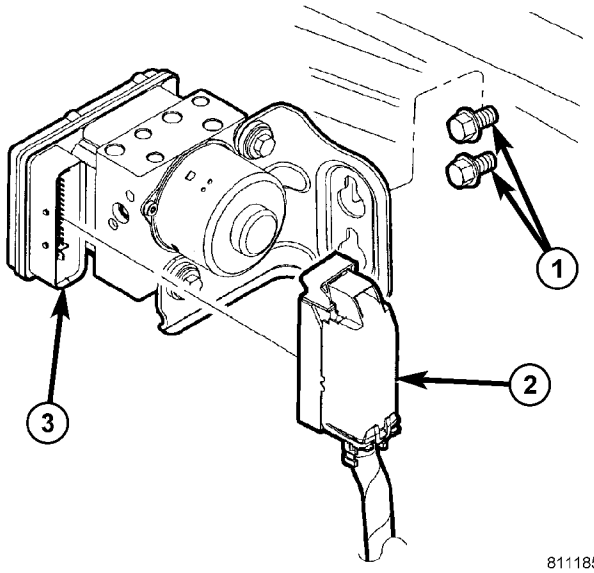


Fig. 55 CAB Wiring Connector

1 - ICU MOUNTING BOLTS ON FRAME RAIL
2 - HARNESS (CAB) WIRING CONNECTOR
3 - CAB MOUNTED TO ICU

(14) Disconnect vacuum hose from check valve on face of booster. **Do not remove check valve from booster.**

(15) Access and remove knee blocker airbag. (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - REMOVAL)

(16) Remove booster push rod from pin on brake pedal (Fig. 53). To do so:

(a) Position small screwdriver between center tang on power brake booster brake pedal pin retaining clip.

(b) Rotate screwdriver enough to allow retaining clip center tang to pass over end of brake pedal pin, then slide retaining clip off brake pedal pin.

(c) **Discard retaining clip. It is not to be reused. Install NEW retaining clip when assembling.**

(17) Slide booster push rod off brake pedal pin.

(18) Remove and discard brake lamp switch (Fig. 53). **Do not reuse switch; install NEW switch on Installation.** (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - REMOVAL)

(19) Remove four power brake booster mounting nuts (Fig. 53).

(20) Slide power brake booster forward and remove through engine compartment.

INSTALLATION

NOTE: Before installing booster, make sure there is a NEW booster seal placed over push rod and mounting studs on rear of booster.

(1) Install power brake booster through engine compartment, guiding push rod and mounting studs through dash panel.

(2) Install four power brake booster mounting nuts (Fig. 53). Tighten nuts to 28 N·m (21 ft. lbs.) torque.

(3) Slide booster push rod onto brake pedal pin (Fig. 53). Install NEW retaining clip securing push rod to brake pedal.

(4) Install and adjust NEW brake lamp switch (Fig. 53). (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - INSTALLATION)

(5) Install knee blocker airbag as well as all components necessary to access it. (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - INSTALLATION)

(6) Lift ABS ICU up and place mounting bracket over two mounting bolts in frame rail (Fig. 55). Tighten bolts to 24 N·m (18 ft. lbs.) torque.

CAUTION: When replacing master cylinder on vehicle, a NEW vacuum seal MUST be installed on master cylinder.

(7) Install NEW vacuum seal on rear of master cylinder making sure seal fits squarely in mounting groove.

(8) Position master cylinder on studs of power brake booster (Fig. 49), aligning booster push rod with master cylinder piston.

(9) Install two master cylinder mounting nuts (Fig. 49). Tighten both mounting nuts to 25 N·m (225 in. lbs.) torque.

(10) Thread primary and secondary brake tubes into ICU ports as shown (Fig. 49). Brake tubes must be held securely when tightened to control orientation of flex section. Tighten tube nuts to 14 N·m (120 in. lbs.) torque.

(11) Connect wiring harness connector to brake fluid level switch mounted in brake fluid reservoir (Fig. 48).

(12) Place coolant recovery bottle in its normal mounted position and install nuts fastening it in place. (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - INSTALLATION)

(13) Install battery and connect battery cables to battery. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - INSTALLATION)

(14) Fill master cylinder with clean, fresh Mopar® Brake Fluid or equivalent, then bleed brakes. (Refer to 5 - BRAKES - STANDARD PROCEDURE)

(15) Road test vehicle to ensure proper operation of brakes.

ROTOR

DIAGNOSIS AND TESTING - BRAKE ROTOR

Any servicing of the rotor requires extreme care to maintain the rotor within service tolerances to ensure proper brake action.

Excessive runout or wobble in a rotor can increase pedal travel due to piston knock-back. This increases guide pin sleeve wear due to the tendency of the caliper to follow the rotor wobble.

When diagnosing a brake noise or pulsation, the machined disc braking surface should be checked and inspected.

BRAKING SURFACE INSPECTION

Light braking surface scoring and wear is acceptable. If heavy scoring or warping is evident, the rotor must be refaced or replaced. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - STANDARD PROCEDURE).

Excessive wear and scoring of the rotor can cause improper lining contact on the rotor's braking surface. If the ridges on the rotor are not removed before new brake shoes are installed, improper wear of the shoes will result.

If a vehicle has not been driven for a period of time, the rotor's braking surface will rust in the areas not covered by the brake shoes at that time. Once the vehicle is driven, noise and chatter from

ROTOR (Continued)

the disc brakes can result when the brakes are applied.

Some discoloration or wear of the rotor surface is normal and does not require resurfacing when linings are replaced. If cracks or burned spots are evident, the rotor must be replaced.

ROTOR MINIMUM THICKNESS

Measure rotor thickness at the center of the brake shoe contact surface. Replace the rotor if it is worn below minimum thickness or if machining the rotor will cause its thickness to fall below specifications.

CAUTION: Do not machine the rotor if it will cause the rotor to fall below minimum thickness.

Minimum thickness specifications are cast on the rotor's unmachined surface (Fig. 56). Limits can also be found in this section's specification table. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - SPECIFICATIONS)

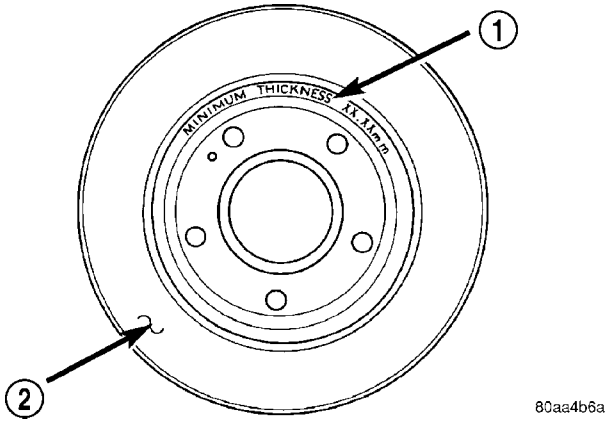


Fig. 56 Minimum Brake Rotor Thickness Markings (Typical)

1 - ROTOR MINIMUM THICKNESS MARKING
2 - ROTOR

ROTOR THICKNESS VARIATION

Thickness variation in a rotor's braking surface can result in pedal pulsation, chatter and surge. This can also be caused by excessive runout in the rotor or the hub.

Rotor thickness variation measurements should be made in conjunction with measuring runout. Measure thickness of the brake rotor at 12 equal points around the rotor braking surface with a micrometer at a radius approximately 25 mm (1 inch) from edge of rotor (Fig. 57). If thickness measurements vary beyond the specification listed in the specification table (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - SPECIFICATIONS), the rotor should be refaced or replaced. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - STANDARD PROCEDURE).

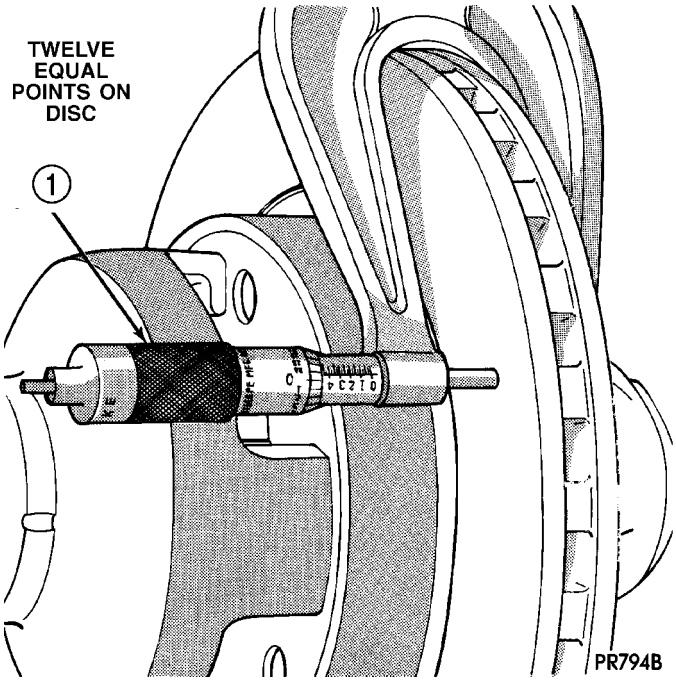


Fig. 57 Checking Rotor For Thickness

1 - CALIPER

ROTOR RUNOUT

On-vehicle rotor runout is the combination of the individual runout of the hub face and the runout of the rotor. (The hub and rotor runouts are separable). To measure rotor runout on the vehicle, first remove the tire and wheel assembly. Reinstall the wheel mounting nuts on the studs, tightening the rotor to the hub. Mount the Dial Indicator, Special Tool C-3339, with Mounting Adaptor, Special Tool SP-1910 on steering arm. The dial indicator plunger should contact braking surface of rotor approximately ten millimeters from edge of rotor (Fig. 58). Check lateral runout on both sides of the rotor, marking the low and high spots on both. Runout limits can be found in the specification table in this section. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - SPECIFICATIONS)

If runout is in excess of the specification, check the lateral runout of the hub face. Before removing the rotor from the hub, place a chalk mark across both the rotor and the one wheel stud closest to where the high runout measurement was taken. This way, the original mounting spot of the rotor on the hub is indexed (Fig. 59).

Remove the rotor from the hub.

NOTE: Clean the hub face surface before checking runout. This provides a clean surface to get an accurate indicator reading.

ROTOR (Continued)

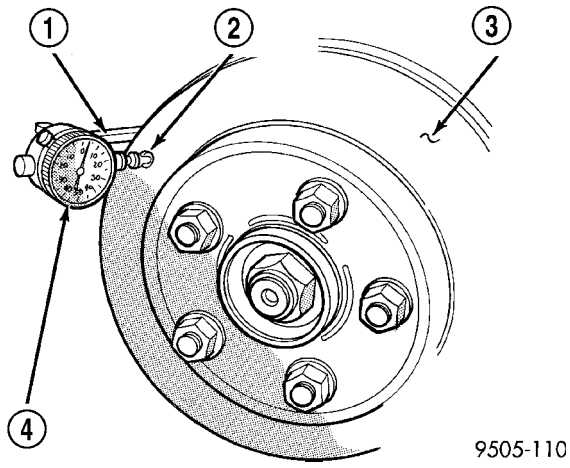


Fig. 58 Checking Rotor Runout

1 - SPECIAL TOOL SP-1910
2 - 10 MILLIMETERS FROM EDGE
3 - DISC SURFACE
4 - SPECIAL TOOL C-3339

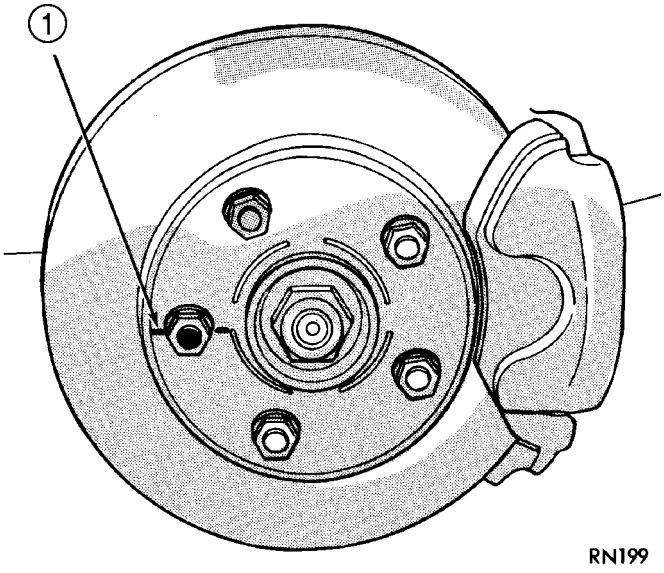


Fig. 59 Marking Rotor and Wheel Stud

1 - CHALK MARK

Mount Dial Indicator, Special Tool C-3339, and Mounting Adaptor, Special Tool SP-1910, to the steering knuckle. Position the indicator stem so it contacts the hub face near the outer diameter. Care must be taken to position stem outside of the stud circle, but inside of the chamfer on the hub rim (Fig. 60).

Hub runout should not exceed 0.01 mm (0.0004 inch). If runout exceeds this specification, the hub must be replaced. (Refer to 2 - SUSPENSION/FRONT/HUB / BEARING - REMOVAL) (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - REMOVAL)

If the hub runout does not exceed this specification, install the rotor back on the hub, aligning the chalk marks on the rotor with a wheel mounting

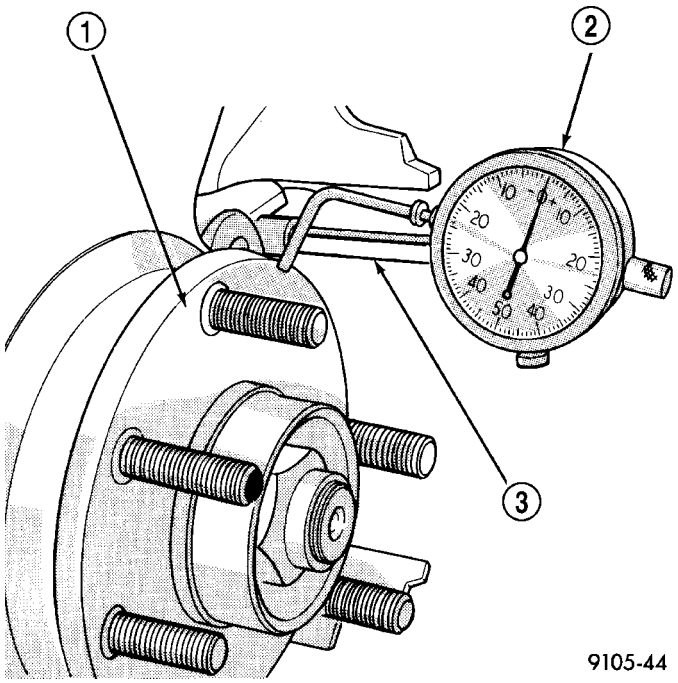


Fig. 60 Checking Hub Runout

1 - HUB SURFACE
2 - SPECIAL TOOL C-3339
3 - SPECIAL TOOL SP-1910

stud, two studs apart from the original stud (Fig. 61). Tighten nuts in the proper sequence and torque to specifications.

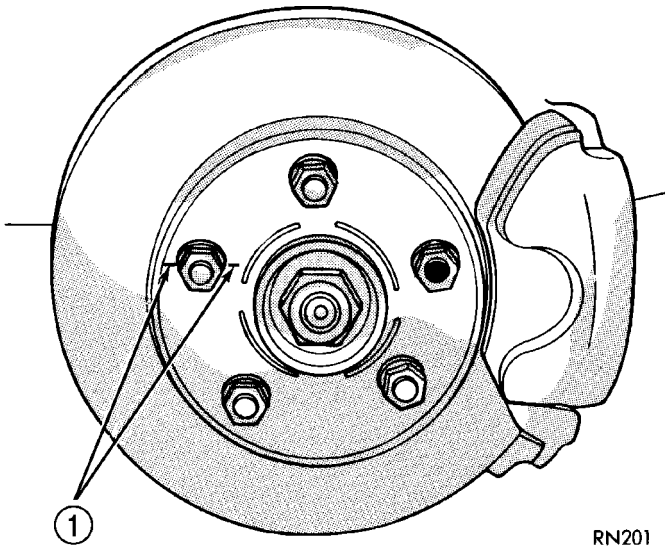


Fig. 61 Index Rotor And Wheel Stud

1 - CHALK MARK

Recheck brake rotor runout to see if the runout is now within specifications. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - SPECIFICATIONS)

If runout is not within specifications, reface or replace the brake rotor. (Refer to 5 - BRAKES/HY-

ROTOR (Continued)

DRAULIC/MECHANICAL/ROTORS - STANDARD PROCEDURE)

STANDARD PROCEDURE - BRAKE ROTOR MACHINING

NOTE: Refacing the rotor is not required each time the brake pads are replaced, only when the need is foreseen.

Any servicing of the rotor requires extreme care to maintain the rotor within service tolerances to ensure proper brake action.

If the rotor surface is deeply scored or warped, or there is a complaint of brake roughness or brake pedal pulsation, the rotor should be refaced using a hub-mounted on-car brake lathe (Fig. 62), or replaced.

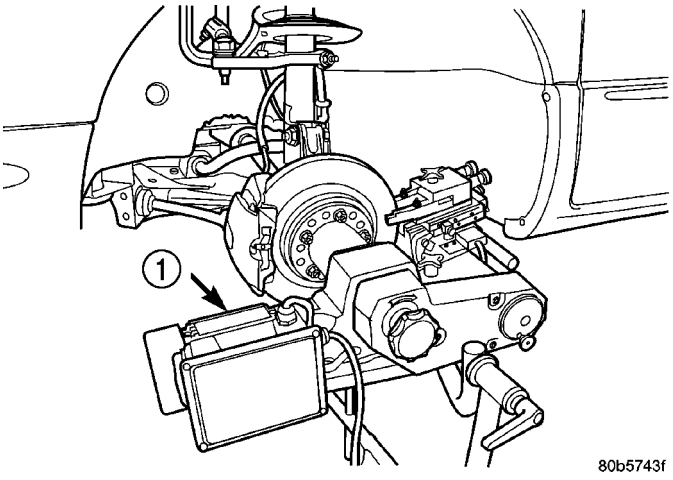


Fig. 62 On-Car Brake Lathe

1 - ON-CAR BRAKE LATHE

The use of a hub-mounted on-car brake lathe is highly recommended to eliminate the possibility of excessive runout. It trues the brake rotor to the vehicle's hub and bearing.

NOTE: All rotors have markings for minimum allowable thickness cast on an un-machined surface of the rotor (Fig. 63) or stamped into the hat section. Minimum thickness specifications can also be found in the specification table in this section. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ ROTOR - SPECIFICATIONS)

Minimum allowable thickness is the minimum thickness which the brake rotor machined surface may be cut to.

CAUTION: Do not machine the rotor if it will cause the rotor to fall below minimum thickness.

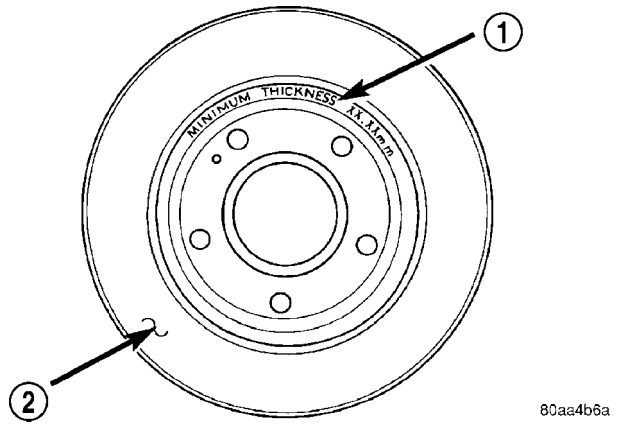


Fig. 63 Minimum Brake Rotor Thickness (Typical)

1 - ROTOR MINIMUM THICKNESS MARKING
2 - ROTOR

Before lathe installation, verify the brake rotor face and the hub adapters are free of any chips, rust, or contamination.

When mounting and using the brake lathe, strict attention to the brake lathe manufacturer's operating instructions is required.

Machine both sides of the brake rotor at the same time. Cutting both sides at the same time minimizes the possibility of a tapered or uneven cut.

When refacing a rotor, the required TIR (Total Indicator Reading) and thickness variation limits MUST BE MAINTAINED. Extreme care in the operation of rotor turning equipment is required. Specifications for brake rotor machining can be found in this sections specification table. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - SPECIFICATIONS)

REMOVAL

REMOVAL - FRONT

NOTE: Before proceeding, (Refer to 5 - BRAKES - WARNING) (Refer to 5 - BRAKES - CAUTION).

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove tire and wheel assembly.

ROTOR (Continued)

NOTE: In some cases, it may be necessary to retract caliper piston in its bore a small amount in order to provide sufficient clearance between shoes and rotor to easily remove caliper from knuckle. This can usually be accomplished before mounting bolts are removed, by grasping rear of caliper and pulling outward working with guide pins, thus retracting piston. Never push on piston directly as it may get damaged.

(3) Remove two bolts securing disc brake caliper adapter to steering knuckle (Fig. 64).

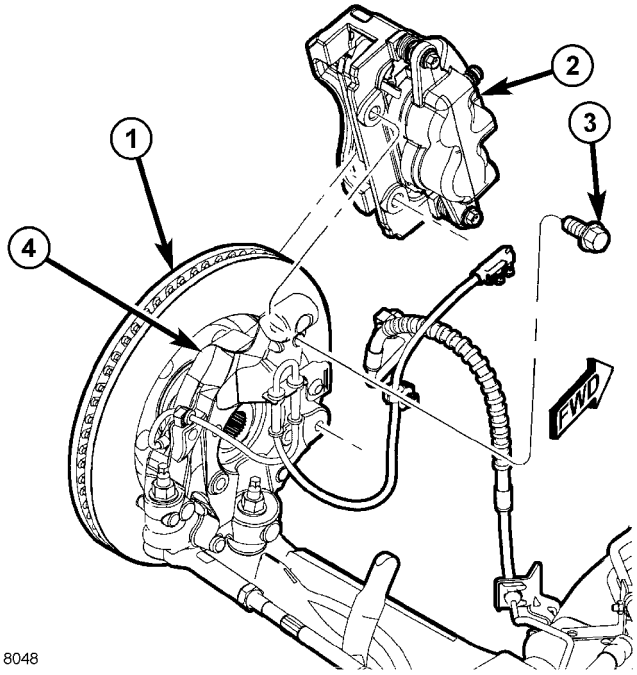


Fig. 64 Front Caliper With Adapter Mounting To Knuckle

1 - BRAKE ROTOR
2 - BRAKE CALIPER/ADAPTER ASSEMBLY
3 - MOUNTING BOLT
4 - KNUCKLE

(4) Remove disc brake caliper and adapter from knuckle as an assembly (Fig. 64). Hang assembly out of way using wire or a bungee cord. Use care not to overextend brake hose when doing this.

(5) Remove clips retaining brake rotor to wheel studs (Fig. 65).

(6) Remove brake rotor (Fig. 65).

REMOVAL - REAR

NOTE: Before proceeding, (Refer to 5 - BRAKES - WARNING) (Refer to 5 - BRAKES - CAUTION).

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

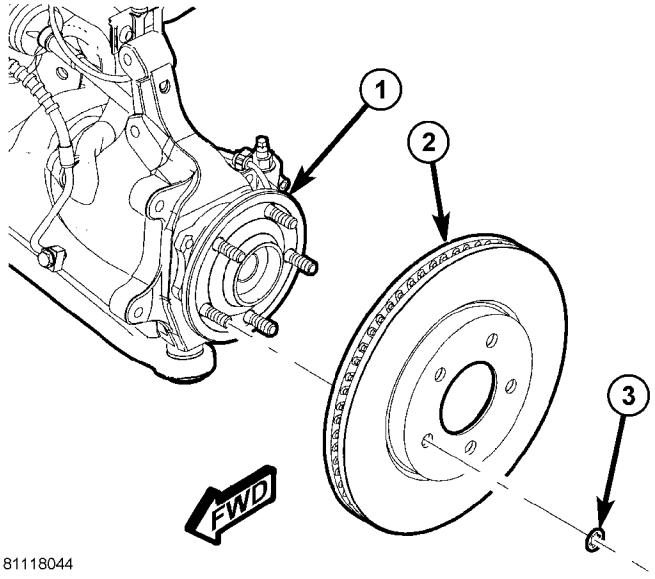


Fig. 65 Front Brake Rotor Mounting

1 - HUB AND BEARING
2 - BRAKE ROTOR
3 - CLIP

(2) Remove tire and wheel assembly.

NOTE: In some cases, it may be necessary to retract caliper piston in its bore a small amount in order to provide sufficient clearance between shoes and rotor to easily remove caliper from knuckle. This can usually be accomplished before guide pin bolts are removed, by grasping rear of caliper and pulling outward working with guide pins, thus retracting piston. Never push on piston directly as it may get damaged.

(3) Remove two caliper guide pin bolts (Fig. 66).

(4) Remove caliper assembly from brake adapter by first rotating bottom of caliper away from rotor, then lifting caliper (with shoes) away from upper adapter abutment (Fig. 67).

(5) To prevent weight of caliper from overextending and damaging brake hose while caliper is off mount, hang brake caliper from vehicle using wire or cord (Fig. 68).

(6) Remove any clips retaining brake rotor to wheel mounting studs (Fig. 69).

(7) Remove brake rotor from hub (Fig. 69).

INSTALLATION

INSTALLATION - FRONT

NOTE: Inspect brake shoes before installation. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ BRAKE PADS/SHOES - INSPECTION)

ROTOR (Continued)

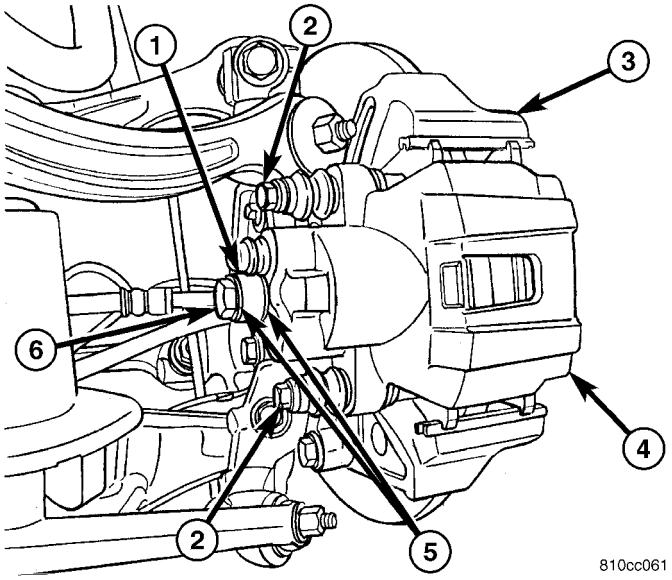


Fig. 66 Rear Brake Caliper Mounting

1 - BRAKE HOSE BANJO FITTING
2 - CALIPER GUIDE PIN BOLT
3 - CALIPER ADAPTER
4 - DISC BRAKE CALIPER
5 - COPPER SEAL WASHERS
6 - BANJO BOLT

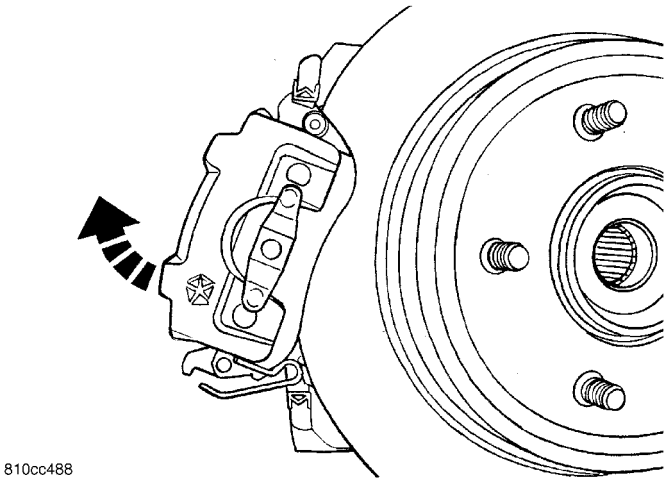


Fig. 67 Rear Caliper Removal

(1) Clean hub face to remove any dirt or corrosion where rotor mounts.

(2) Install brake rotor over studs on hub and bearing (Fig. 65).

(3) Install disc brake caliper and adapter assembly over brake rotor (Fig. 64).

(4) Install mounting bolts securing caliper adapter to steering knuckle (Fig. 64). Tighten bolts to 169 N·m (125 ft. lbs.) torque.

(5) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to a torque of 135 N·m (100 ft. lbs.).

(6) Lower vehicle.

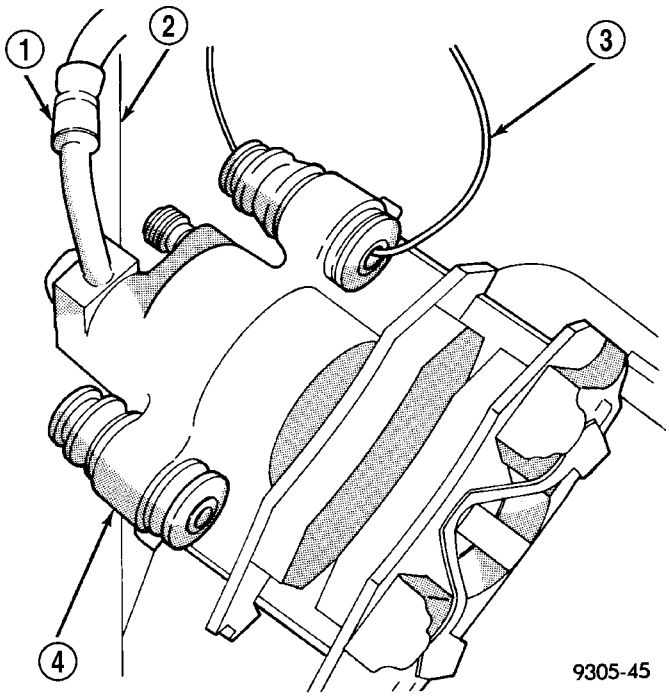


Fig. 68 Supporting Caliper

1 - BRAKE HOSE
2 - SUSPENSION
3 - WIRE HANGER (HANG TO VEHICLE/SUSPENSION)
4 - BRAKE CALIPER

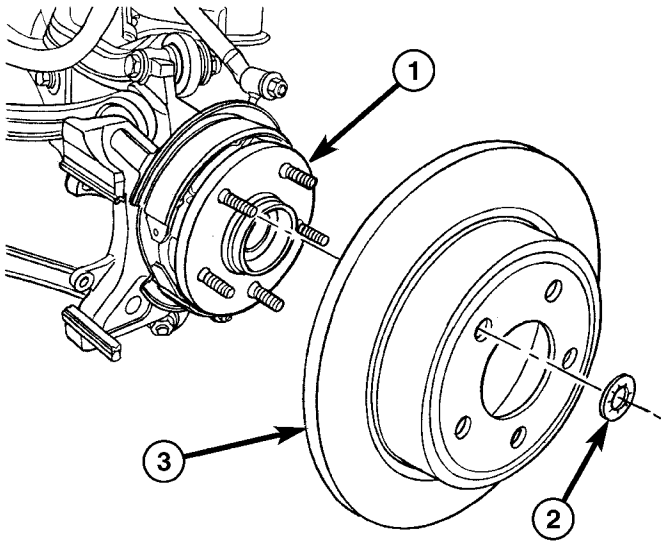


Fig. 69 Rear Brake Rotor Mounting

1 - HUB
2 - RETAINER CLIP
3 - BRAKE ROTOR

(7) Pump brake pedal several times to ensure vehicle has a firm brake pedal before moving vehicle.

(8) Check and adjust brake fluid level as necessary.

ROTOR (Continued)

(9) Road test vehicle and make several stops to wear off any foreign material on brakes and to seat brake shoes.

INSTALLATION - REAR

NOTE: Inspect disc brake shoes and parking brake shoes before installation. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - INSPECTION)

(1) Clean hub face to remove any dirt or corrosion where rotor mounts.
(2) Install brake rotor over wheel mounting studs and onto hub (Fig. 69).
(3) Make sure abutment shims are in place on both slide abutments of caliper adapter.

CAUTION: Use care when installing caliper assembly onto adapter so guide pin bushings and sleeves do not get damaged by mounting bosses on adapter.

(4) Retract caliper guide pins to clear mounting bosses on caliper adapter when installing caliper.
(5) Install brake caliper in opposite way it was removed. Starting with upper end, carefully position caliper and brake shoes over brake rotor and align outboard shoe's upper edge with caliper slide abutment. Rotate lower end of caliper into mounting position on adapter.

CAUTION: Extreme caution should be taken not to crossthread caliper guide pin bolts when they are installed.

(6) Carefully install caliper guide pin bolts (Fig. 66). Tighten bolts to 23 N·m (200 in. lbs.) torque.
(7) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to a torque of 135 N·m (100 ft. lbs.).
(8) Lower vehicle.
(9) Pump brake pedal several times to ensure vehicle has a firm brake pedal before moving vehicle.
(10) Check and adjust brake fluid level as necessary.
(11) Road test vehicle and make several stops to wear off any foreign material on brakes and to seat brake shoes.

SPECIFICATIONS

BRAKE ROTOR

NOTE: When refacing a rotor, the required TIR (Total Indicator Reading) and thickness variation limits MUST BE MAINTAINED. Extreme care in the operation of rotor turning (machining) equipment is required.

LIMITS/SPECIFICATIONS

Brake Rotor	Rotor Thickness	Minimum Rotor Thickness	Rotor Thickness Variation	Rotor Runout *
Front	27.87-28.13 mm 1.097-1.107 in.	26.5 mm 1.040 in	0.009 mm 0.0004 in.	0.035 mm 0.0014 in.
Rear	13.87-14.13 mm 0.546-0.556 in.	12.5 mm 0.492 in.	0.009 mm 0.0004 in.	0.14 mm 0.0055 in.
* TIR Total Indicator Reading (Measured On Vehicle)				

PARKING BRAKE

STANDARD PROCEDURE

STANDARD PROCEDURE - AUTOMATIC ADJUSTER LOCKING OUT

(1) Place an assistant inside passenger compartment with pin (pin punch or drill bit) to be used in Step 5.
(2) Place parking brake lever in "released" position.
(3) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)
(4) Grasp exposed section of parking brake cable at cable connector (front-to-right rear cable) (Fig. 70)and pull outward on front cable. Pull on cable until it stops and hold it in this position.
(5) Have assistant inside passenger compartment insert pin punch (locking pin or drill bit) into hole in lever and foot pedal, past tang on adjuster mechanism, and through hole in backing plate of lever (Fig. 71) (Fig. 72). Hold pin in place. This pin will lock

PARKING BRAKE (Continued)

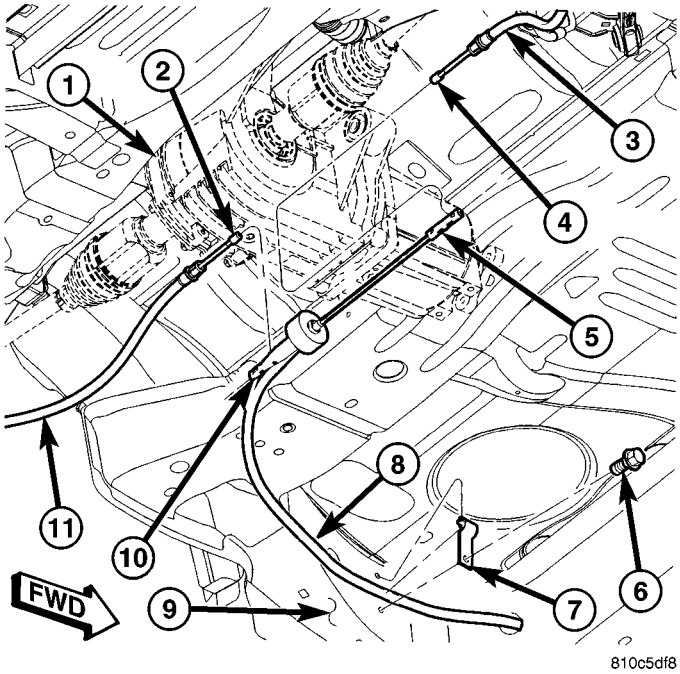


Fig. 70 Cable Routing And Connections

1 - REAR DRIVELINE MODULE (AWD MODELS ONLY)
2 - LEFT REAR CABLE END BUTTON
3 - RIGHT REAR CABLE
4 - RIGHT REAR CABLE END BUTTON
5 - CONNECTOR ON END OF FRONT CABLE
6 - SCREW
7 - FRONT CABLE ROUTING CLAMP
8 - FRONT CABLE
9 - LEFT FRAME RAIL
10 - EQUALIZER
11 - LEFT REAR CABLE

automatic adjuster spring out once technician under vehicle releases grasp on cables and will allow safe removal of cables and lever as necessary.

WARNING: DO NOT RELEASE THE AUTOMATIC ADJUSTER LOCKOUT DEVICE UNLESS THE PARKING BRAKE CABLES AND EQUALIZER ARE CONNECTED. KEEP HANDS OUT OF AUTOMATIC ADJUSTER SECTOR AND PAWL AREA. FAILURE TO OBSERVE CAUTION IN HANDLING THIS MECHANISM COULD LEAD TO SERIOUS INJURY.

(6) Release grasp on cable underneath vehicle.
(7) Lower vehicle and remove assistant from passenger compartment.

STANDARD PROCEDURE - AUTOMATIC ADJUSTER UNLOCKING

(1) Assure that all cables are connected properly.

WARNING: DO NOT RELEASE THE AUTOMATIC ADJUSTER LOCKOUT DEVICE UNLESS THE PARKING BRAKE CABLES AND EQUALIZER ARE CONNECTED. KEEP HANDS OUT OF AUTOMATIC ADJUSTER SECTOR AND PAWL AREA. FAILURE TO OBSERVE CAUTION IN HANDLING THIS MECHANISM COULD LEAD TO SERIOUS INJURY.

(2) Keeping hands clear of automatic adjuster sector and pawl area, firmly grasp pin punch (drill bit, or locking pin if a new lever has been installed) installed in lever mechanism (Fig. 71), then quickly remove it from parking brake lever mechanism. This action allows parking brake lever mechanism to automatically take up any slack.

(3) Cycle parking brake lever once to position parking brake cables, then return lever its released position.

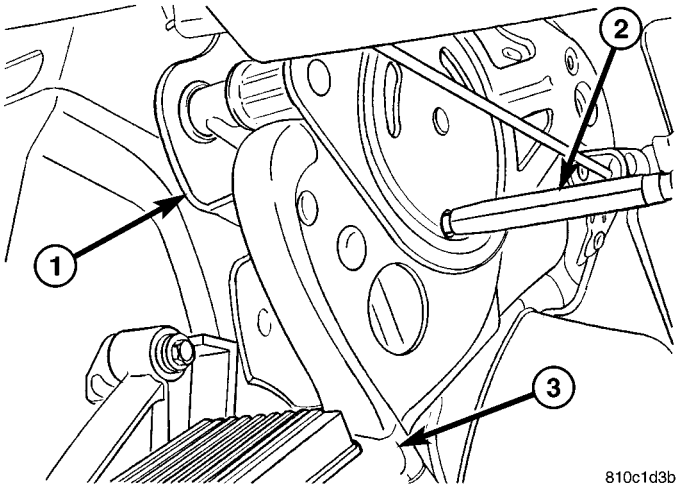


Fig. 71 Pin Inserted Into Parking Brake Lever

1 - PARKING BRAKE LEVER
2 - PIN PUNCH (SUBSTITUTE LOCKING PIN OR APPROPRIATE SIZE DRILL BIT)
3 - FOOT PEDAL

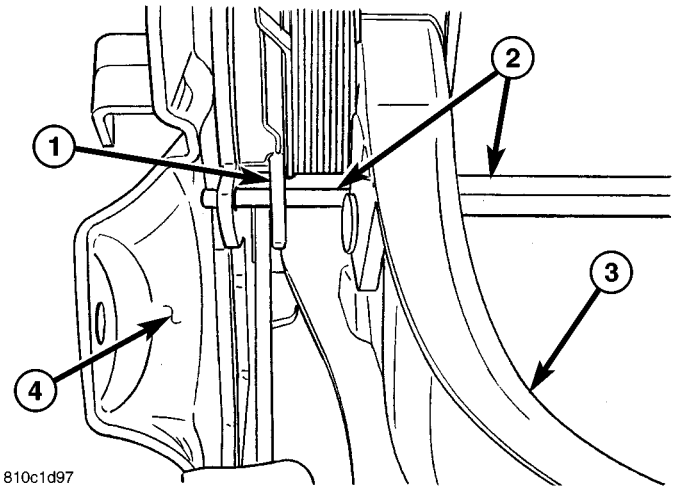


Fig. 72 Pin Inserted Locking Out Adjuster Spring

1 - TANG
2 - PIN PUNCH
3 - FOOT PEDAL
4 - BACKING PLATE

PARKING BRAKE (Continued)

(4) Raise vehicle far enough for rear wheels to clear floor. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Check rear wheels of vehicle. They should rotate freely without dragging with lever in released position.

(6) Lower vehicle.

PARKING BRAKE CABLE - FRONT

REMOVAL

(1) Disconnect and isolate battery negative cable from battery post.

(2) Lock out automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(3) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

NOTE: It may be necessary to back off parking brake shoe adjustment to allow sufficient slack to disengage cable buttons from connectors in following two steps.

(4) Slide left rear cable button inboard and remove from equalizer (Fig. 70).

(5) While holding cable connector on end of front cable secure with a pair of pliers at the front cable button, slide right rear cable button inboard and remove from cable connector (Fig. 70).

(6) Slide equalizer off front cable housing and remove (Fig. 73).

(7) Remove cable guide screw securing front parking brake cable to left body rail (Fig. 70).

(8) Lower vehicle.

(9) Roll vehicle off hoist as necessary to open left side doors.

(10) Remove left front and left rear door opening sill scuff plates.

(11) Remove left front and left rear door weather strips.

(12) Remove lower cowl trim.

(13) Remove left front seat belt anchor bolt at B-pillar.

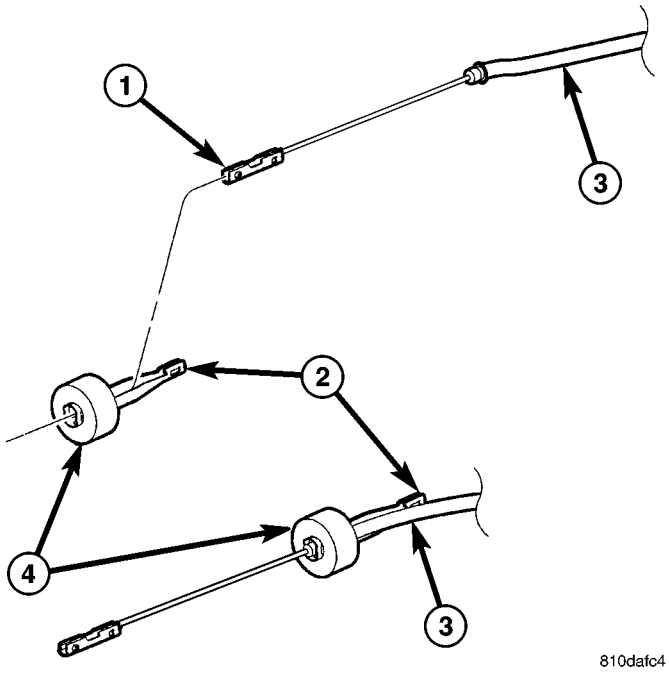


Fig. 73 Front Cable Installation Into Equalizer

1 - CABLE END CONNECTOR
2 - EQUALIZER
3 - PARKING BRAKE CABLE HOUSING
4 - ISOLATOR

(14) Remove left B-pillar trim panel.

(15) Remove cable routing clips from studs under left side carpet (Fig. 74).

(16) Release grommet in floor pan and pull cable into passenger compartment (Fig. 74).

(17) Disconnect release rod at parking brake lever.

(18) Disconnect wiring connector at parking brake indicator lamp switch (Fig. 75).

(19) Remove body control module. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL/CENTRAL TIMER MODUL - REMOVAL)

(20) Remove three mounting nuts and two wiring routing clips, then remove body control module mounting bracket.

(21) Remove 2 mounting bolts and one nut (Fig. 76), then remove parking brake lever from cowl and place it on driver's floor.

PARKING BRAKE CABLE - FRONT (Continued)

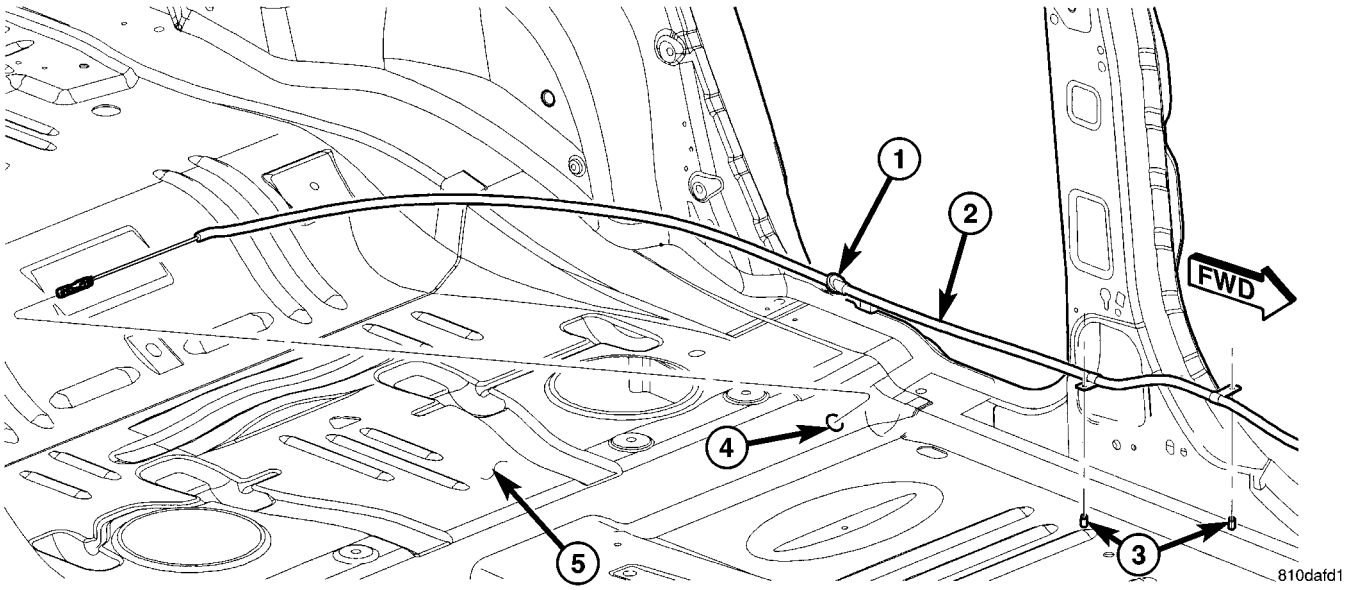


Fig. 74 Front Cable Routing Through Interior

1 - GROMMET
2 - FRONT PARKING BRAKE CABLE
3 - ROUTING CLIP STUDS
4 - CABLE ACCESS HOLE
5 - FLOOR PAN

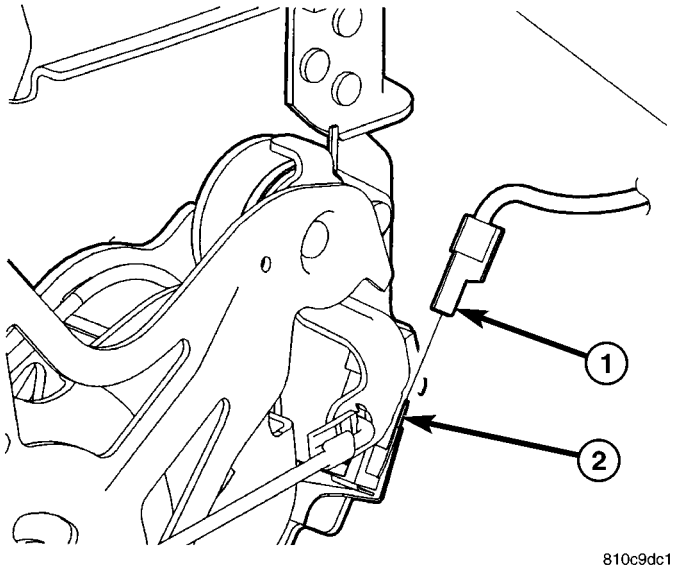


Fig. 75 Indicator Switch Wiring Connection

1 - WIRING CONNECTOR
2 - PARKING BRAKE INDICATOR SWITCH

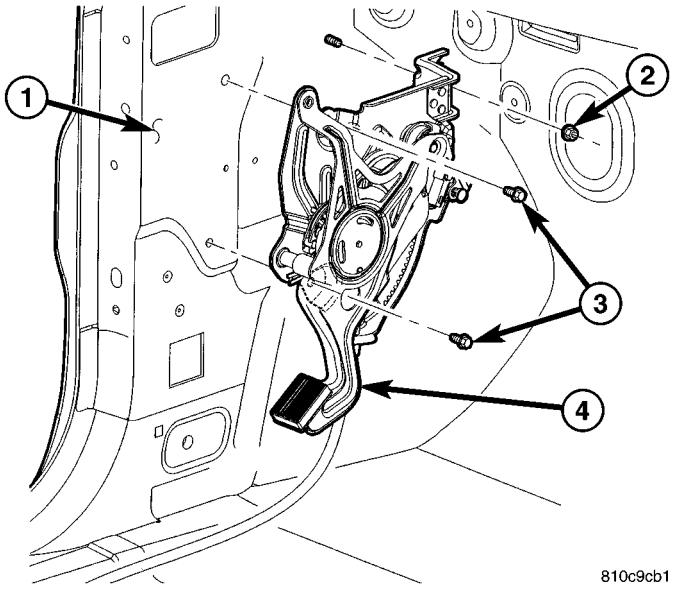


Fig. 76 Parking Brake Lever Mounting

1 - COWL
2 - MOUNTING NUT
3 - MOUNTING BOLTS
4 - PARKING BRAKE LEVER

NOTE: Prior to removing cable from lever, note cable routing through lever for ease in reassembly.

(22) Remove front cable button from lever take-up reel (Fig. 77).

(23) Remove cable from cam on lever and slide it down into the cable housing until the cable end button contacts the housing.

(24) Place a 13 mm 12-point box wrench over cable retainer on end of cable housing and collapse retainer fingers (Fig. 78).

(25) Separate front parking brake cable from lever and remove.

PARKING BRAKE CABLE - FRONT (Continued)

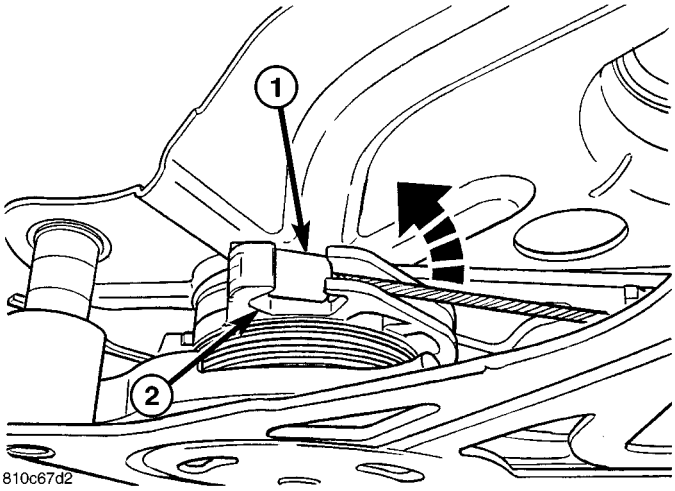


Fig. 77 Cable Removal From Lever Take-Up Reel

1 - FRONT CABLE BUTTON
2 - TAKE-UP REEL

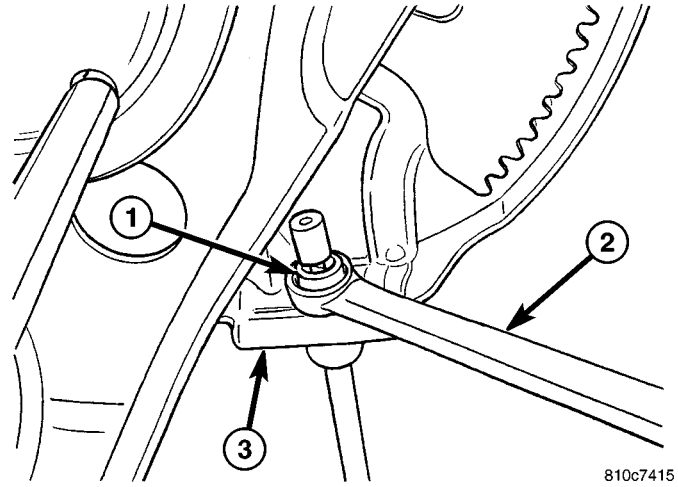


Fig. 78 Wrench Positioned To Release Cable Retainer

1 - CABLE RETAINER
2 - 12-POINT BOX END WRENCH
3 - LEVER

INSTALLATION

(1) Slide leading end of front parking brake cable into hole in flange of lever. Slide cable retainer on end of cable housing into hole until retainer fingers click into place.

(2) Remove front cable button from lever take-up reel (Fig. 77).

(3) Pull button on end of cable strand out of housing and route around lever cam up to take-up reel.

(4) Install front cable button into lever take-up reel as shown (Fig. 79).

(5) Slide any extra cable back into housing.

(6) Position lever against left lower cowl and install 2 mounting bolts and one nut (Fig. 76). Tighten all three fasteners to 28 N·m (21 ft. lbs.) torque.

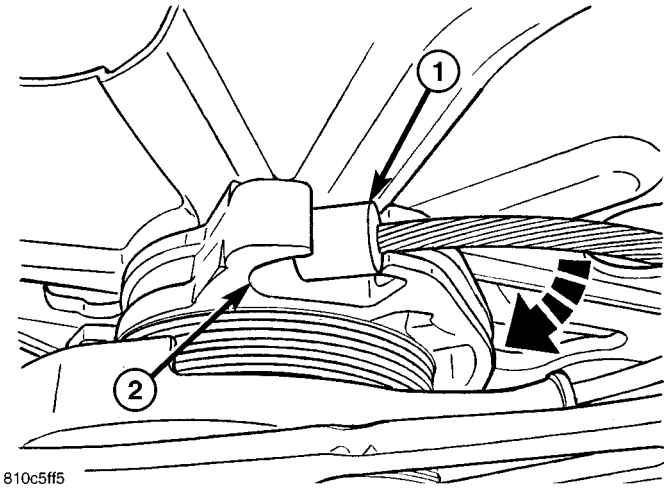


Fig. 79 Cable Installation Into Lever Take-Up Reel

1 - FRONT CABLE BUTTON
2 - TAKE-UP REEL

(7) Install body control module mounting bracket. Install three mounting nuts and two wiring routing clips. Tighten all three fasteners to 14 N·m (125 in. lbs.) torque.

(8) Install body control module. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL/CENTRAL TIMER MODUL - INSTALLATION)

(9) Connect wiring connector at parking brake indicator lamp switch (Fig. 75).

(10) Connect parking brake release rod at parking brake lever.

(11) Route front cable along left side of floor pan blow carpet (Fig. 74).

(12) Slide trailing end of front cable through hole in floor pan (Fig. 74).

(13) Install cable routing clips over studs on floor pan under left side carpet (Fig. 74).

(14) Install cable grommet in floor pan (Fig. 74).

(15) Position carpet into place.

(16) Install left B-pillar trim panel.

(17) Install left front seat belt anchor bolt at B-pillar.

(18) Install lower cowl trim.

(19) Install left front and left rear door weather strips.

(20) Install left front and left rear door opening sill scuff plates.

(21) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(22) Install cable guide attaching front cable to left body rail (Fig. 70). Install screw and tighten to 17 N·m (150 in. lbs.) torque.

PARKING BRAKE CABLE - FRONT (Continued)

(23) Slide equalizer onto front cable housing as shown (Fig. 73).

(24) Route front cable above left rear brake tube and rear driveline module (if equipped with AWD) to right rear parking brake cable.

(25) While holding cable connector on end of front cable secure with a pair of pliers at the front cable button, Place right rear cable button into cable connector (Fig. 70). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(26) Place left rear parking brake cable button into equalizer (Fig. 70). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(27) Lower vehicle.

(28) Unlock automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(29) Connect battery negative cable to battery post.

(30) Adjust parking brake shoes. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - ADJUSTMENTS)

PARKING BRAKE CABLE - LEFT REAR

REMOVAL

(1) Lock out automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

NOTE: It may be necessary to back off parking brake shoe adjustment to allow sufficient slack to disengage cable buttons from connectors in following step.

(3) Slide left rear cable button inboard and remove from equalizer (Fig. 70).

(4) Access and remove rear hub and bearing. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - REMOVAL)

(5) Remove parking brake cable bolt at knuckle (Fig. 80).

(6) Remove parking brake shoes from support. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - REMOVAL)

(7) Remove shoe actuator from end of cable and support (Fig. 81).

(8) Pull cable out of support plate and knuckle.

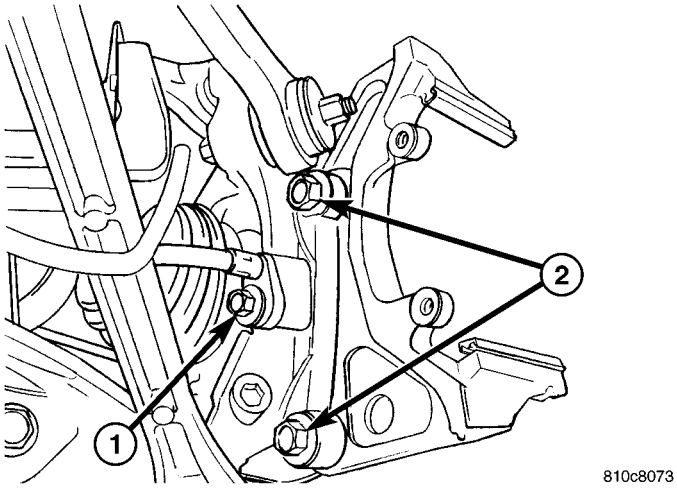


Fig. 80 Brake Fasteners On Rear Of Knuckle

1 - PARKING BRAKE CABLE MOUNTING BOLT
2 - BRAKE CALIPER MOUNTING BOLT

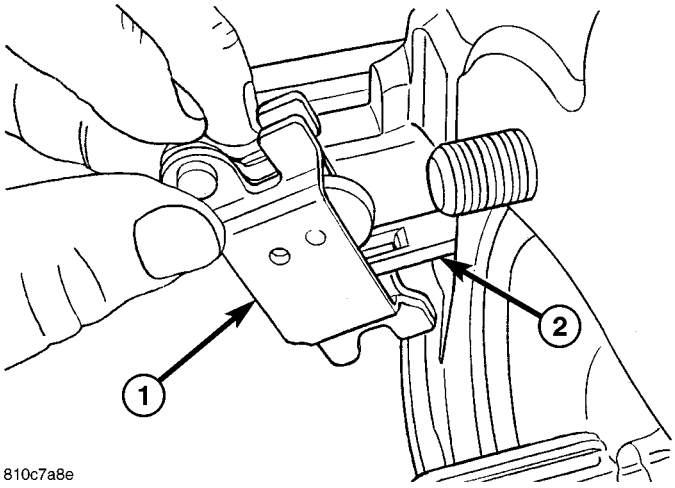


Fig. 81 Actuator Removal/Installation

1 - PARKING BRAKE SHOE ACTUATOR
2 - CABLE END

(9) Place a 13 mm 12-point box wrench over cable retainer on end of cable housing at crossmember and collapse retainer fingers (Fig. 82).

(10) Remove cable.

INSTALLATION

(1) Slide leading end of parking brake cable into hole in flange of crossmember. Slide cable retainer on end of cable housing into hole until retainer fingers click into place.

(2) Slide other end of cable through knuckle and shoe support.

(3) Install shoe actuator on end of parking brake cable between parking brake shoes (Fig. 81). Make sure actuator is positioned with word “UP” facing outward (Fig. 83).

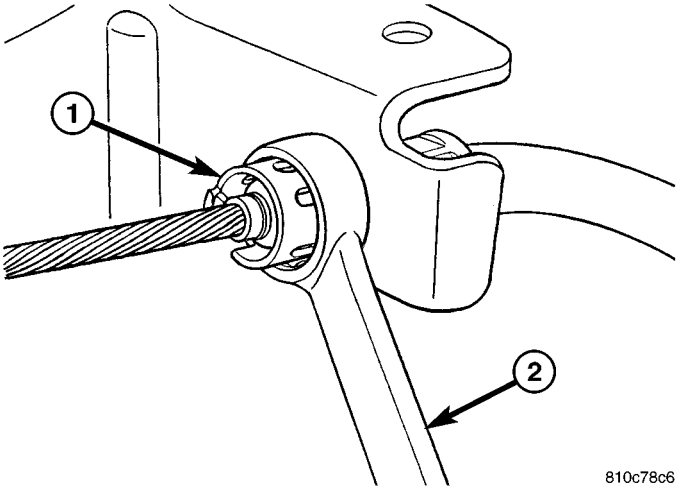


Fig. 82 Wrench Positioned To Release Cable Retainer

1 - CABLE RETAINER
2 - 12-POINT BOX END WRENCH

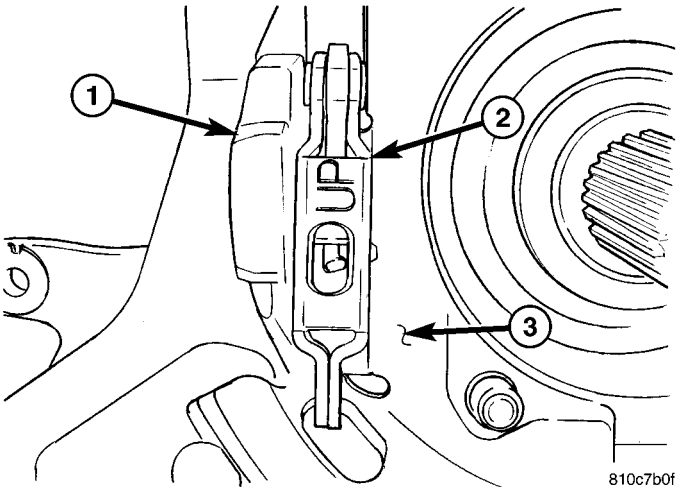


Fig. 83 Actuator Positioned On Support

1 - CALIPER ADAPTER
2 - SHOE ACTUATOR
3 - SHOE SUPPORT

(4) Install parking brake shoes on support. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - INSTALLATION)

(5) Install bolt securing parking brake cable to knuckle (Fig. 80). Tighten bolt to 28 N·m (21 ft. lbs.) torque.

(6) Install hub and bearing with wheel speed sensor as well as all components necessary to access it. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - INSTALLATION)

(7) Place left rear parking brake cable button into equalizer (Fig. 70). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(8) Lower vehicle.

(9) Unlock automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(10) Adjust parking brake shoes as necessary. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - ADJUSTMENTS)

PARKING BRAKE CABLE - RIGHT REAR

REMOVAL

(1) Lock out automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

NOTE: It may be necessary to back off parking brake shoe adjustment to allow sufficient slack to disengage cable buttons from connectors in following two steps.

(3) Slide left rear cable button inboard and remove from equalizer (Fig. 70).

(4) While holding cable connector on end of front cable secure with a pair of pliers at the front cable button, slide right rear cable button inboard and remove from cable connector (Fig. 70).

(5) Access and remove rear hub and bearing. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - REMOVAL)

(6) Remove parking brake cable bolt at knuckle (Fig. 80).

(7) Remove parking brake shoes from support. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - REMOVAL)

(8) Remove shoe actuator from end of cable and support (Fig. 81).

(9) Pull cable out of support plate and knuckle.

(10) Place a 13 mm 12-point box wrench over cable retainer on end of cable housing at crossmember and collapse retainer fingers (Fig. 82).

(11) Remove cable.

INSTALLATION

(1) Slide leading end of parking brake cable into hole in flange of crossmember. Slide cable retainer on end of cable housing into hole until retainer fingers click into place.

(2) Slide other end of cable through knuckle and shoe support.

(3) Install shoe actuator on end of parking brake cable between parking brake shoes (Fig. 81). Make

PARKING BRAKE CABLE - RIGHT REAR (Continued)

sure actuator is positioned with word “UP” facing outward (Fig. 83).

(4) Install parking brake shoes on support. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - INSTALLATION)

(5) Install bolt securing parking brake cable to knuckle (Fig. 80). Tighten bolt to 28 N·m (21 ft. lbs.) torque.

(6) Install hub and bearing with wheel speed sensor as well as all components necessary to access it. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - INSTALLATION)

(7) While holding cable connector on end of front cable secure with a pair of pliers at the front cable button, Place right rear cable button into cable connector (Fig. 70). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(8) Place left rear parking brake cable button into equalizer (Fig. 70). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(9) Lower vehicle.

(10) Unlock automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(11) Adjust parking brake shoes as necessary. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - ADJUSTMENTS)

PARKING BRAKE LEVER

REMOVAL

(1) Disconnect and isolate battery negative cable from battery post.

(2) Lock out automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(3) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

NOTE: It may be necessary to back off parking brake shoe adjustment to allow sufficient slack to disengage cable buttons from connectors in following two steps.

(4) Slide left rear cable button inboard and remove from equalizer (Fig. 70).

(5) While holding cable connector on end of front cable secure with a pair of pliers at front cable button, slide right rear cable button inboard and remove from cable connector (Fig. 70).

(6) Lower vehicle.

(7) Roll vehicle off hoist as necessary to open left front door.

(8) Remove left front door opening sill scuff plate.

(9) Remove left front door weather strip.

(10) Remove lower cowl trim.

(11) Disconnect parking brake release rod at parking brake lever.

(12) Disconnect wiring connector at parking brake indicator lamp switch (Fig. 75).

(13) Remove body control module. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL/CENTRAL TIMER MODUL - REMOVAL)

(14) Remove three mounting nuts and two wiring routing clips, then remove body control module mounting bracket.

(15) Remove two mounting bolts and one nut (Fig. 76), then remove parking brake lever from cowl and place it on driver’s floor.

NOTE: Prior to removing cable from lever, note cable routing through lever for ease in reassembly.

(16) Remove front cable button from lever take-up reel (Fig. 77).

(17) Remove cable from around cam on lever and slide it down into the cable housing until the cable end button contacts the housing.

(18) Place a 13 mm 12-point box wrench over cable retainer on end of cable housing and collapse retainer fingers (Fig. 78).

(19) Separate front parking brake cable from lever and remove lever.

INSTALLATION

(1) Slide leading end of front parking brake cable into hole in flange of lever. Slide cable retainer on end of cable housing into hole until retainer fingers click into place.

(2) Remove front cable button from lever take-up reel (Fig. 77).

(3) Pull button on end of cable strand out of housing and route around lever cam up to take-up reel.

(4) Install front cable button into lever take-up reel as shown (Fig. 79).

(5) Slide any extra cable back into housing.

(6) Position lever against left lower cowl and install 2 mounting bolts and one nut (Fig. 76). Tighten all three fasteners to 28 N·m (21 ft. lbs.) torque.

(7) Install body control module mounting bracket. Install three mounting nuts and two wiring routing clips. Tighten all three fasteners to 14 N·m (125 in. lbs.) torque.

(8) Install body control module. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL/CENTRAL TIMER MODUL - INSTALLATION)

PARKING BRAKE LEVER (Continued)

(9) Connect wiring connector at parking brake indicator lamp switch (Fig. 75).

(10) Connect parking brake release rod at parking brake lever.

(11) Position carpet into place.

(12) Install lower cowl trim.

(13) Install left front door weather strip.

(14) Install left front door opening sill scuff plate.

(15) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(16) Route front cable above left rear brake tube and rear driveline module (if equipped with AWD) to right rear parking brake cable.

(17) While holding cable connector on end of front cable secure with a pair of pliers at the front cable button, Place right rear cable button into cable connector (Fig. 70). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(18) Place left rear parking brake cable button into equalizer (Fig. 70). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(19) Lower vehicle.

(20) Unlock automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(21) Connect battery negative cable to battery post.

(22) Adjust parking brake shoes. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - ADJUSTMENTS)

PARKING BRAKE SHOES

REMOVAL

NOTE: The following procedure may be used to remove shoes on either side of the vehicle.

(1) Lock out automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Access and remove rear hub and bearing. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - REMOVAL)

(4) Remove parking brake cable bolt at knuckle (Fig. 80).

(5) Completely back off parking brake shoe adjustment.

(6) Remove parking brake shoe adjuster spring (Fig. 84).

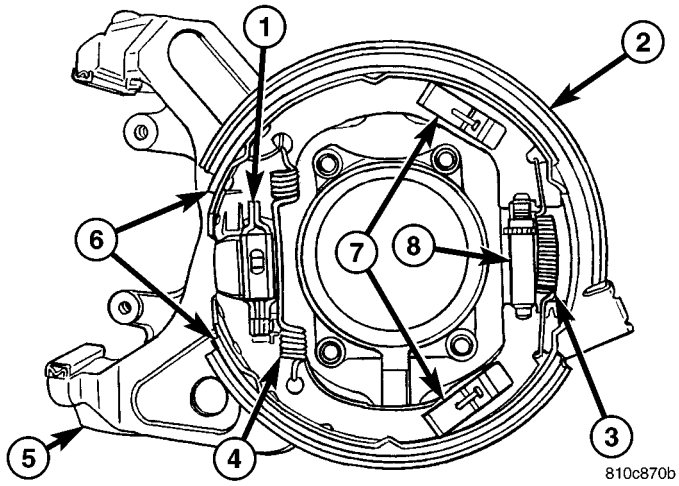


Fig. 84 Parking Brake Shoes

1 - ACTUATOR
2 - SUPPORT
3 - ADJUSTER SPRING
4 - RETURN SPRING
5 - CALIPER ADAPTER
6 - SHOES
7 - HOLD-DOWN CLIPS AND PINS
8 - ADJUSTER

(7) Remove shoe adjuster (Fig. 84).

(8) Remove upper brake shoe hold-down clip and pin (Fig. 84).

(9) Remove lower brake shoe hold-down clip and pin (Fig. 84).

(10) Remove upper and lower shoes with return spring from shoe actuator.

(11) Remove return spring from shoes.

INSTALLATION

NOTE: The following procedure may be used to install shoes on either side of the vehicle.

(1) Install return spring between upper and lower shoes.

NOTE: Before installing shoes on actuator, make sure actuator hooked to rear cable is positioned with word “UP” facing outward (Fig. 83).

(2) Install upper and lower shoes with return spring on shoe actuator located on parking brake cable (Fig. 84).

(3) Install lower brake shoe hold-down pin through rear of support and lower shoe, then install hold-down clip (Fig. 84).

(4) Install upper brake shoe hold-down pin through rear of support and upper shoe, then install hold-down clip (Fig. 84).

(5) Install shoe adjuster (Fig. 84). Place end of adjuster with star wheel upward.

PARKING BRAKE SHOES (Continued)

(6) Install parking brake shoe adjuster spring (Fig. 84).

(7) Install bolt securing parking brake cable to knuckle (Fig. 80). Tighten bolt to 28 N·m (21 ft. lbs.) torque.

(8) Using Brake Shoe Gauge, Special Tool C-3919, or equivalent, measure inside diameter of parking brake drum portion of rotor (Fig. 85).

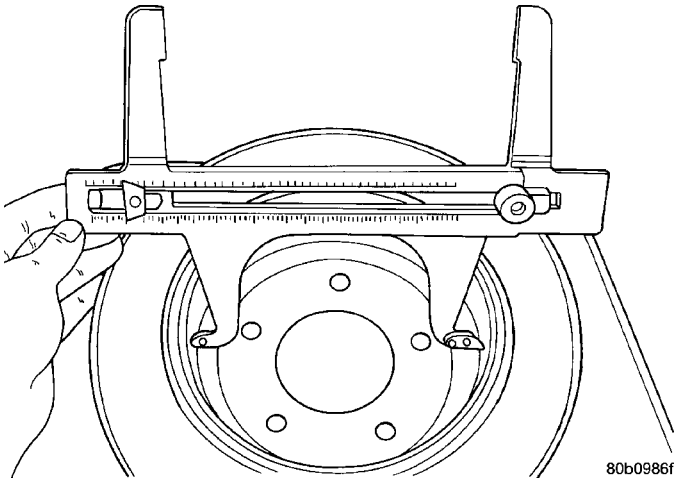


Fig. 85 Measuring Parking Brake Drum Diameter

(9) Place Gauge over parking brake shoes at widest point (Fig. 86).

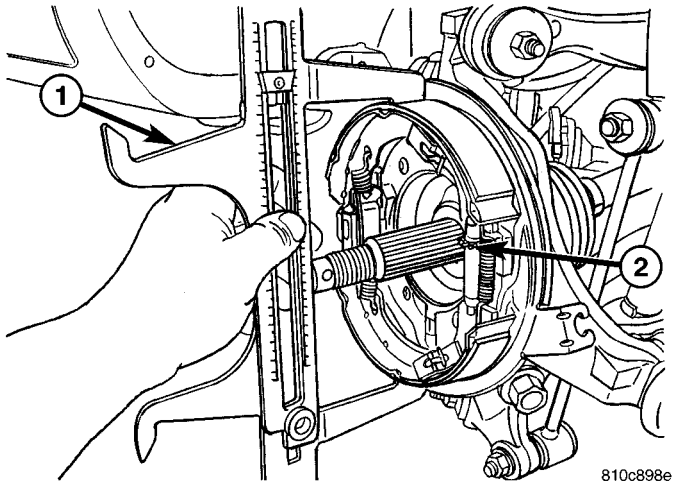


Fig. 86 Measuring Parking Brake Shoes

1 - BRAKE SHOE GAUGE
2 - ADJUSTER STAR WHEEL

(10) Using adjuster star wheel (Fig. 86), adjust parking brake shoes until linings on both park brake shoes just touch jaws on gauge. This will give a good preliminary adjustment of parking brake shoes, before a final adjustment is made at end of this procedure.

(11) Install hub and bearing with wheel speed sensor as well as all components necessary to access it. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - INSTALLATION)

(12) Lower vehicle.

(13) Unlock automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(14) Perform final adjustment of parking brake shoes. (Refer to 5 - BRAKES/PARKING BRAKE/ SHOES - ADJUSTMENTS)

ADJUSTMENTS

ADJUSTMENT - PARKING BRAKE SHOES

(1) Place parking brake lever in “full released” position.

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Remove plug in parking brake shoe support to access adjuster star-wheel (Fig. 87).

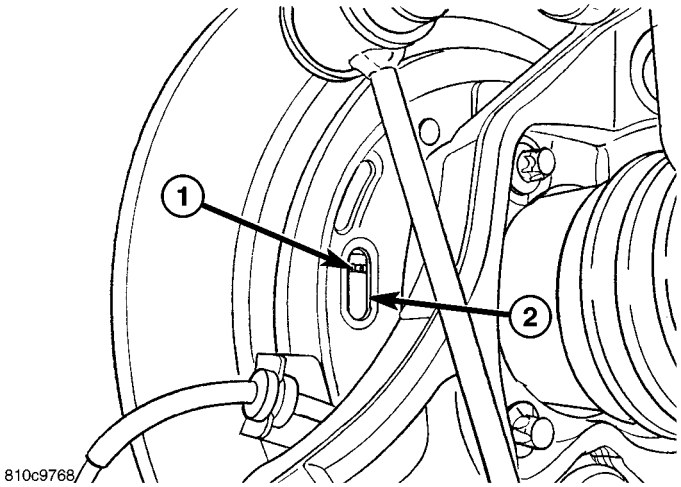


Fig. 87 Access To Shoe Adjuster Star-Wheel

1 - ADJUSTER STAR WHEEL
2 - ACCESS HOLE

NOTE: Through the access hole, rotate the adjuster star wheel in the following direction to expand the shoes outward against the drum.

- **Left brake – Rotate star-wheel toward rear of vehicle.**
- **Right brake – Rotate star-wheel toward front of vehicle.**

(4) Using an appropriate tool, turn adjuster star wheel until wheel will not rotate (dead lock).

(5) Back off adjuster six detents (teeth).

(6) Rotate wheel, checking for light drag. If drag is too heavy, continue to back off adjuster one detent at a time until light drag is present. **Do not back off**

PARKING BRAKE SHOES (Continued)

star-wheel more than 17 detents from wheel lock.

(7) Install access plug.

(8) Adjust opposite wheel parking brake shoes using same method.

(9) Lower vehicle.

(10) Apply and release parking brake lever once to ensure proper operation of parking brakes.

BRAKES - ABS

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BRAKES - ABS

DESCRIPTION

DESCRIPTION - ANTILOCK BRAKE SYSTEM

Early production vehicles feature an Antilock Brake System (ABS) designated MK25. Later production vehicles feature an Antilock Brake System (ABS) designated MK25e. For additional information on the individual ABS system components, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - DESCRIPTION).

The purpose of the antilock brake system (ABS) is to prevent wheel lockup under braking conditions on virtually any type of road surface. Antilock braking is desirable because a vehicle that is stopped without locking the wheels retains directional stability and some steering capability. This allows the driver to retain greater control of the vehicle during braking.

DESCRIPTION - ELECTRONIC VARIABLE BRAKE PROPORTIONING

Vehicles equipped with ABS use electronic variable brake proportioning (EVBP) to balance front-to-rear braking. The EVBP is used in place of a rear proportioning valve. The EVBP system uses the ABS system to control the slip of the rear wheels in partial braking range. The braking force of the rear wheels is controlled electronically by using the inlet and outlet valves located in the integrated control unit (ICU).

EVBP activation is invisible to the customer since there is no pump motor noise or brake pedal feedback.

DESCRIPTION - TRACTION CONTROL SYSTEM

Traction control reduces wheel slip and maintains traction at the driving wheels at speeds below 64 km/h (40 mph) when road surfaces are slippery. The traction control system reduces wheel slip by braking the wheel that is losing traction.

The traction control system may be turned off (or back on) by depressing the traction control OFF

switch button located on the center console next to the ash tray.

OPERATION

OPERATION - ANTILOCK BRAKE SYSTEM

There are a few performance characteristics of the Antilock Brake System that may at first seem abnormal, but in fact are normal. These characteristics are described below.

NORMAL BRAKING

Under normal braking conditions, the ABS functions the same as a standard base brake system with a diagonally split master cylinder and conventional vacuum assist.

ABS BRAKING

ABS operation is available at all vehicle speeds above 3–5 mph. If a wheel locking tendency is detected during a brake application, the brake system enters the ABS mode. During ABS braking, hydraulic pressure in the four wheel circuits is modulated to prevent any wheel from locking. Each wheel circuit is designed with a set of electric solenoids to allow modulation, although for vehicle stability, both rear wheel solenoids receive the same electrical signal. Wheel lockup may be perceived at the very end of an ABS stop and is considered normal.

During an ABS event, the integrated control unit (ICU) regulates hydraulic pressure at all four of the vehicle's wheels.

The hydraulic pressure at each front wheel is controlled independently (relative to the amount of slip at each wheel) in order to maximize the braking force generated by the front brakes. The rear wheels are controlled such that the hydraulic pressure at either rear wheel does not exceed that of the highest slip rear wheel in order to maintain vehicle stability.

The system can build and release pressure at each wheel, depending on signals generated by the wheel speed sensors (WSS) at each wheel and received at the Controller Antilock Brake (MK25) or the Antilock Brake Module (MK25e).

NOISE AND BRAKE PEDAL FEEL

During ABS braking, some brake pedal movement may be felt. In addition, ABS braking will create ticking, popping, or groaning noises heard by the driver. This is normal and is due to pressurized fluid being transferred between the master cylinder and the brakes. If ABS operation occurs during hard braking, some pulsation may be felt in the vehicle body due to fore and aft movement of the suspension as brake pressures are modulated.

At the end of an ABS stop, ABS is turned off when the vehicle is slowed to a speed of 3–4 mph. There may be a slight brake pedal drop anytime that the ABS is deactivated, such as at the end of the stop when the vehicle speed is less than 3 mph or during an ABS stop where ABS is no longer required. These conditions exist when a vehicle is being stopped on a road surface with patches of ice, loose gravel, or sand on it. Also, stopping a vehicle on a bumpy road surface activates ABS because of the wheel hop caused by the bumps.

TIRE NOISE AND MARKS

Although the ABS system prevents complete wheel lockup, some wheel slip is desired in order to achieve optimum braking performance. Wheel slip is defined as follows: 0 percent slip means the wheel is rolling freely and 100 percent slip means the wheel is fully locked. During brake pressure modulation, wheel slip is allowed to reach up to 25–30 percent. This means that the wheel rolling velocity is 25–30 percent less than that of a free rolling wheel at a given vehicle speed. This slip may result in some tire chirping, depending on the road surface. This sound should not be interpreted as total wheel lockup.

Complete wheel lockup normally leaves black tire marks on dry pavement. The ABS will not leave dark black tire marks since the wheel never reaches a fully locked condition. However, tire marks may be noticeable as light patched marks.

START-UP CYCLE

When the ignition is turned on, a popping sound and a slight brake pedal movement may be noticed. The ABS warning lamp will also be on for up to 5 seconds after the ignition is turned on. When the vehicle is first driven off, a humming may be heard or felt by the driver at approximately 20–40 kph (12–25 mph). All of these conditions are a normal function of ABS as the system is performing a diagnosis check.

PREMATURE ABS CYCLING

Symptoms of premature ABS cycling include: clicking sounds from the solenoid valves; pump/motor running; and pulsations in the brake pedal. Premature ABS cycling can occur at any braking rate of the vehicle and on any type of road surface.

Premature ABS cycling is a condition that needs to be correctly assessed when diagnosing problems with the antilock brake system. It may be necessary to use a scan tool to detect and verify premature ABS cycling.

Check the following common causes when diagnosing premature ABS cycling: damaged wheel bearings (causing tone wheel issues); damaged wheel bearing

housings where wheel speed sensors mount; and loose wheel speed sensor mounting bolts.

After diagnosing the defective component, repair or replace it as required. When the component repair or replacement is completed, test drive the vehicle to verify that premature ABS cycling has been corrected.

OPERATION - ELECTRONIC VARIABLE BRAKE PROPORTIONING

Upon entry into EVBP the inlet valve for the rear brake circuit is switched on so that the fluid supply from the master cylinder is shut off. In order to decrease the rear brake pressure, the outlet valve for the rear brake circuit is pulsed. This allows fluid to enter the low pressure accumulator (LPA) in the hydraulic control unit (HCU) resulting in a drop in fluid pressure to the rear brakes. In order to increase the rear brake pressure, the outlet valve is switched off and the inlet valve is pulsed. This increases the pressure to the rear brakes. This back-and-forth process will continue until the required slip difference is obtained. At the end of EVBP braking (brakes released) the fluid in the LPA drains back to the master cylinder by switching on the outlet valve and draining through the inlet valve check valve. At the same time the inlet valve is switched on in case of another brake application.

The EVBP will remain functional during many ABS fault modes. If both the red BRAKE and amber ABS warning indicators are illuminated, the EVBP may not be functioning.

OPERATION - TRACTION CONTROL SYSTEM

The CAB (MK25) or ABM (MK25e) monitors wheel speed. During acceleration, if the CAB or ABM detects front (drive) wheel slip and the brakes are not applied, it enters traction control mode. Traction control operation proceeds in the following order:

(1) Close the normally open traction control (TC) valves.

(2) Start the pump/motor and supply volume and pressure to the front (drive) hydraulic circuit. The pump/motor runs continuously during traction control operation.

(3) Open and close the build and decay solenoid valves to maintain minimum wheel slip and maximum traction.

The cycling of the build and decay valves during traction control is similar to that during antilock braking, except the valves work to control wheel spin by applying the brakes, whereas the ABS function is to control wheel skid by releasing the brakes.

Two pressure relief shuttle valves allow pressure and volume to return to the master cylinder reservoir when not consumed by the build and decay valves. These valves are necessary because the pump/motor supplies more volume than the system requires.

If the brakes are applied at anytime during a traction control cycle, the brake lamp switch triggers the control module to switch off traction control.

The traction control function indicator in the instrument panel illuminates during a traction control cycle.

The traction control system is enabled at each ignition cycle. It may be turned off by depressing the traction control OFF switch button. The traction control function indicator illuminates immediately upon depressing the button. Pressing this button again or turning off and restarting the vehicle will enable the traction control system.

CAUTION

The ABS uses an electronic control module. This module is designed to withstand normal current draws associated with vehicle operation. Care must be taken to avoid overloading the circuits.

CAUTION: In testing for open or short circuits, do not ground or apply voltage to any of the circuits unless instructed to do so for a diagnostic procedure.

CAUTION: These circuits should only be tested using a high impedance multi-meter or the designated scan tool as described in this section. Power should never be removed or applied to any control module with the ignition in the ON position. Before removing or connecting battery cables, fuses, or connectors, always turn the ignition to the OFF position.

CAUTION: The CAB (MK25) 47-way connector should never be connected or disconnected with the ignition switch in the ON position.

CAUTION: The ABM (MK25e) 47-way connector should never be connected or disconnected with the ignition switch in the ON position.

CAUTION: This vehicle utilizes active wheel speed sensors. Do not apply voltage to wheel speed sensors at any time.

CAUTION: Use only factory wiring harnesses. Do not cut or splice wiring to the brake circuits. The addition of aftermarket electrical equipment (car phone, radar detector, citizen band radio, trailer lighting, trailer brakes, etc.) on a vehicle equipped with antilock brakes may affect the function of the antilock brake system.

CAUTION: When performing any service procedure on a vehicle equipped with ABS, do not apply a 12-volt power source to the ground circuit of the pump motor in the HCU. Doing this will damage the pump motor and will require replacement of the entire HCU.

CAUTION: An attempt to remove or disconnect certain system components may result in improper system operation. Only those components with approved removal and installation procedures in this manual should be serviced.

CAUTION: If welding work is to be performed on the vehicle using an electric arc welder, the CAB (MK25) or ABM (MK25e) connector should be disconnected during the welding operation.

CAUTION: Many components of the ABS System are not serviceable and must be replaced as an assembly. Do not disassemble any component which is not designed to be serviced.

CAUTION: Only the recommended jacking or hoisting positions for this vehicle are to be used whenever it is necessary to lift a vehicle. Failure to raise a vehicle from the recommended locations could result in lifting a vehicle by the hydraulic control unit mounting bracket. Lifting a vehicle by the hydraulic control unit mounting bracket will result in damage to the mounting bracket and the hydraulic control unit.

CAUTION: Brake fluid will damage painted surfaces. If brake fluid is spilled on any painted surface, wash off with water immediately.

STANDARD PROCEDURE - ANTILOCK BRAKE SYSTEM BLEEDING

The base brake's hydraulic system must be bled anytime air enters the hydraulic system. The ABS though, particularly the ICU (HCU), should only need to be bled when the HCU is replaced or removed from the vehicle. The ABS must always be bled anytime it is suspected that the HCU has ingested air. Under most circumstances that require the bleeding of the brakes hydraulic system, only the base brake hydraulic system needs to be bled.

When bleeding the ABS system, the following bleeding sequence must be followed to insure complete and adequate bleeding.

(1) Make sure all hydraulic fluid lines are installed and properly torqued.

(2) Connect the scan tool to the Data Link Connector. The connector is located under the lower steering column cover to the left of the steering column.

(3) Using the scan tool, check to make sure the CAB (MK25) or ABM (Mk25e) does not have any fault codes stored. If it does, clear them using the scan tool.

WARNING: WHEN BLEEDING THE BRAKE SYSTEM WEAR SAFETY GLASSES. A CLEAR BLEED TUBE MUST BE ATTACHED TO THE BLEEDER SCREWS AND SUBMERGED IN A CLEAR CONTAINER FILLED PART WAY WITH CLEAN BRAKE FLUID. DIRECT THE FLOW OF BRAKE FLUID AWAY FROM YOURSELF AND THE PAINTED SURFACES OF THE VEHICLE. BRAKE FLUID AT HIGH PRESSURE MAY COME OUT OF THE BLEEDER SCREWS WHEN OPENED.

(4) Bleed the base brake system using the standard pressure or manual bleeding procedure. (Refer to 5 - BRAKES - BASE - STANDARD PROCEDURE)

(5) Using the scan tool, select ANTILOCK BRAKES, followed by MISCELLANEOUS, then BLEED BRAKES. Follow the instructions displayed. When the scan tool displays TEST COMPLETED, disconnect the scan tool and proceed.

(6) Bleed the base brake system a second time. Check brake fluid level in the reservoir periodically to prevent emptying, causing air to enter the hydraulic system.

(7) Fill the master cylinder reservoir to the full level.

(8) Test drive the vehicle to be sure the brakes are operating correctly and that the brake pedal does not feel spongy.

SPECIFICATIONS

ABS FASTENER TORQUE

Refer to BRAKE FASTENER TORQUE. (Refer to 5 - BRAKES - BASE - SPECIFICATIONS)

TONE WHEEL

DESCRIPTION

The ABS tone wheel for both front and rear wheels is integrated into the hub and bearing assembly and is not serviced separately.

WHEEL SPEED SENSOR - FRONT

REMOVAL

(1) Access and remove front brake rotor. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - REMOVAL)

(2) Disconnect vehicle wiring harness from wheel speed sensor connector (Fig. 1).

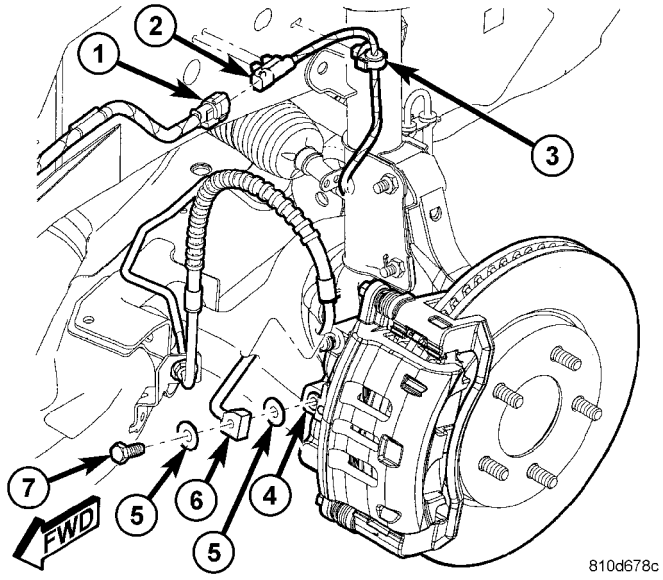


Fig. 1 Brake Hose And Wheel Speed Sensor Connections

1 - WIRING HARNESS CONNECTOR
2 - WHEEL SPEED SENSOR CONNECTOR
3 - ROUTING CLIP
4 - PORT ON BRAKE CALIPER
5 - COPPER SEALING WASHER
6 - BRAKE HOSE BANJO FITTING
7 - BANJO BOLT

(3) Unclip wheel speed sensor connector from frame rail outer reinforcement, then open routing clip on reinforcement and remove cable (Fig. 1).

(4) Remove screw fastening wheel speed sensor routing bracket to strut assembly (Fig. 2).

(5) Open routing clip at knuckle and remove wheel speed sensor cable (Fig. 3).

CAUTION: Prior to removal, clean area around sensor head to help prevent contaminants from entering bearing when sensor head is removed.

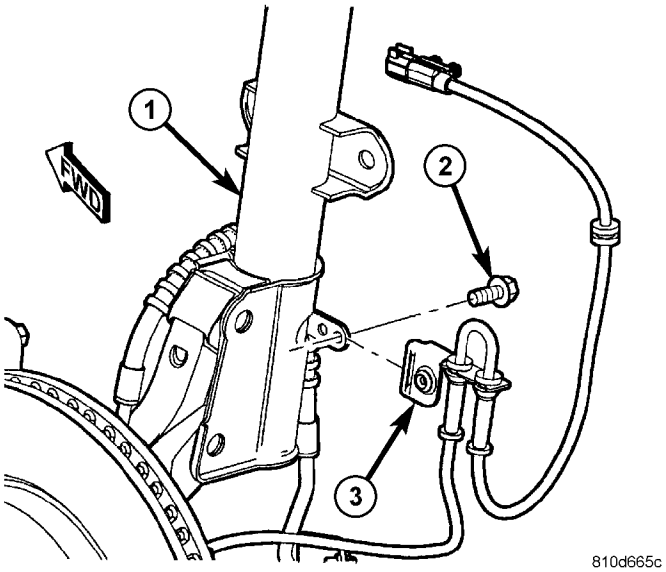


Fig. 2 Wheel Speed Sensor Mounting To Strut

1 - STRUT ASSEMBLY
2 - SCREW
3 - WHEEL SPEED SENSOR ROUTING BRACKET

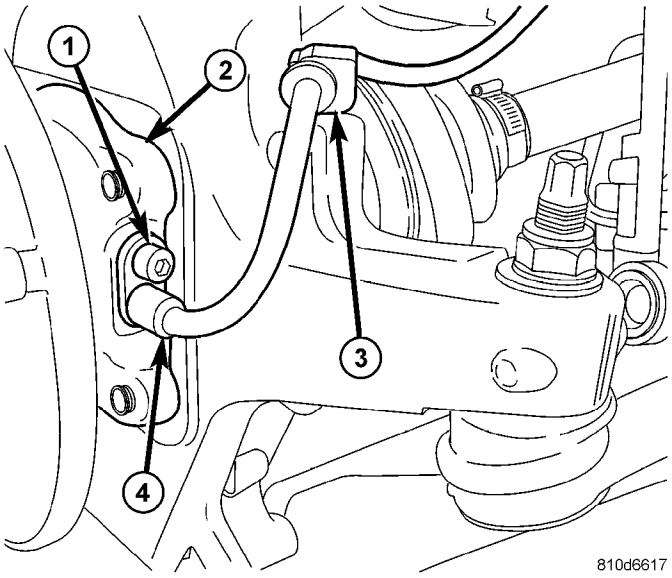


Fig. 3 Sensor Mounting To Front Hub And Bearing

1 - MOUNTING SCREW
2 - HUB AND BEARING
3 - ROUTING CLIP
4 - FRONT WHEEL SPEED SENSOR

(6) Remove screw fastening speed sensor head to hub and bearing (Fig. 3).

(7) Remove wheel speed sensor from hub and bearing.

INSTALLATION

(1) Apply bearing grease (supplied with part) to sensor head shaft and O-ring.

WHEEL SPEED SENSOR - FRONT (Continued)

CAUTION: Ensure that sensor mounting surface on bearing is clean before sensor installation.

(2) Push sensor head into mounting hole in hub and bearing and align mounting screw hole.
(3) Install NEW mounting screw (Fig. 3). Tighten mounting screw to 20 N·m (15 ft. lbs.) torque.
(4) Place wheel speed sensor cable grommet into routing clip at knuckle and close clip (Fig. 3).
(5) Attach wheel speed sensor routing bracket to strut assembly (Fig. 2). Tighten screw to 13 N·m (115 in. lbs.) torque.
(6) Clip wheel speed sensor connector and routing clip to frame rail outer reinforcement (Fig. 1).
(7) Connect vehicle wiring harness to wheel speed sensor connector (Fig. 1).
(8) Install brake rotor as well as all components necessary to access it. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - INSTALLATION)
(9) Verify that wheel speed sensor cable is properly routed and not coming into contact with rotor or other moving parts.
(10) Road test vehicle to ensure proper operation of the base brakes and ABS.

WHEEL SPEED SENSOR - REAR

REMOVAL

(1) Access and remove rear hub and bearing from vehicle. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - REMOVAL)

CAUTION: Prior to removal, clean area around sensor head to help prevent contaminants from entering bearing when sensor head is removed.

(2) Remove screw fastening speed sensor head to hub and bearing (Fig. 4).
(3) Remove wheel speed sensor from hub and bearing.

INSTALLATION

(1) Apply bearing grease (supplied with part) to sensor head shaft and O-ring.

CAUTION: Ensure that sensor mounting surface on bearing is clean before sensor installation.

(2) Push sensor head into mounting hole in hub and bearing and align mounting screw hole.
(3) Install NEW mounting screw (Fig. 4). Tighten mounting screw to 20 N·m (15 ft. lbs.) torque.
(4) Install hub and bearing with wheel speed sensor as well as all components necessary to access it.

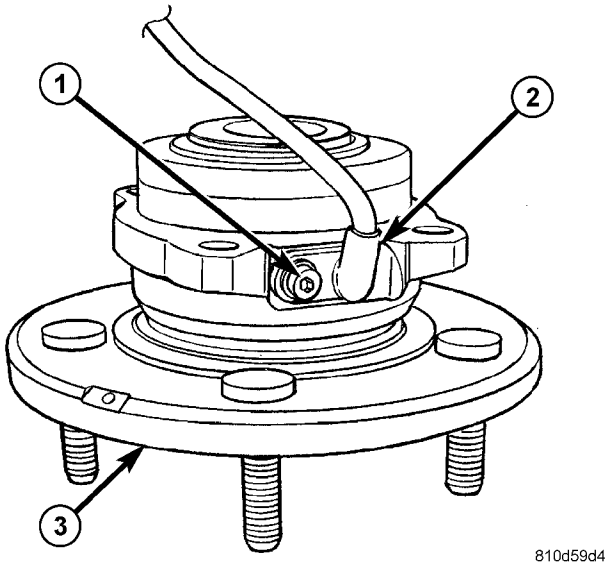


Fig. 4 Rear Hub And Bearing With Wheel Speed Sensor

1 - SCREW
2 - WHEEL SPEED SENSOR
3 - HUB AND BEARING

(Refer to 2 - SUSPENSION/REAR/HUB / BEARING - INSTALLATION)
(5) Road test vehicle to ensure proper operation of the base brakes and ABS.

HYDRAULIC CONTROL UNIT

DESCRIPTION

DESCRIPTION - MK25

The hydraulic control unit (HCU) is mounted to the CAB as part of the ICU (Fig. 10). The HCU controls the flow of brake fluid to the brakes using a series of valves and accumulators. A pump/motor is mounted on the HCU to supply build pressure to the brakes during an ABS stop.
For more information, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - DESCRIPTION)

DESCRIPTION - MK25E

The Hydraulic Control Unit (HCU) is mounted to the Antilock Brake Module (ABM) as part of the Integrated Control Unit (ICU) (Fig. 18). The HCU controls the flow of brake fluid to the brakes using a series of valves and accumulators. A pump/motor is mounted on the HCU to supply build pressure to the brakes during an ABS stop.

HYDRAULIC CONTROL UNIT (Continued)

For more information, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - DESCRIPTION)

OPERATION - HYDRAULIC CIRCUITS AND VALVES

NOTE: The following applies for both MK25 and MK25e ABS.

The hydraulic fluid control valves within the HCU control the flow of pressurized brake fluid to the wheel brakes during the different modes of ABS braking and traction control. The following paragraphs explain how this works. **For purposes of explanation only, the following diagrams show only one hydraulic circuit, the Right Front wheel braking circuit.**

NORMAL BRAKING HYDRAULIC CIRCUIT AND SOLENOID VALVE FUNCTION (ABS WITHOUT TRACTION CONTROL)

The hydraulic diagram shows the vehicle in the normal braking mode of the base brake hydraulic system (Fig. 5). The diagram shows no wheel spin or slip occurring relative to the speed of the vehicle. The driver is applying the brake pedal which builds pressure in the brake hydraulic system to engage the brakes and stop the vehicle.

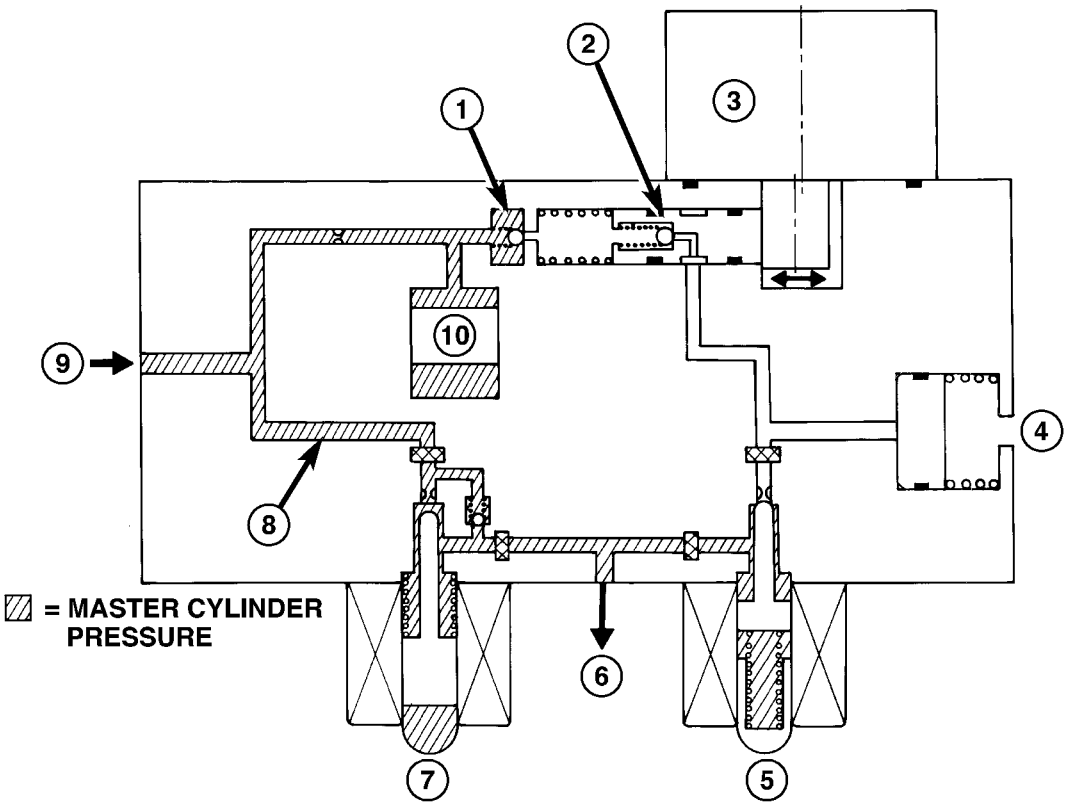


Fig. 5 Hydraulic Circuit - Normal Braking Mode (Without Traction Control)

1 - OUTLET VALVE
2 - PUMP PISTON
3 - PUMP/MOTOR
4 - LOW PRESSURE ACCUMULATOR
5 - NORMALLY CLOSED VALVE (OFF)
6 - TO WHEEL BRAKE
7 - NORMALLY OPEN VALVE (OFF)
8 - MASTER CYLINDER PRESSURE
9 - FROM MASTER CYLINDER
10 - NOISE DAMPER CHAMBER

HYDRAULIC CONTROL UNIT (Continued)

ABS HYDRAULIC CIRCUIT AND SOLENOID VALVE FUNCTION (ABS WITHOUT TRACTION CONTROL)

The hydraulic diagram shows the vehicle in the ABS braking mode (Fig. 6). The diagram shows one wheel is slipping because the driver is attempting to stop the vehicle at a faster rate than is allowed by the surface on which the tires are riding.

- The normally open and normally closed valves modulate (build/decay) the brake hydraulic pressure as required.
- The pump/motor is switched on so that the brake fluid from the low pressure accumulators is returned to the master cylinder circuits.
- The brake fluid is routed to either the master cylinder or the wheel brake depending on the position of the normally open valve.

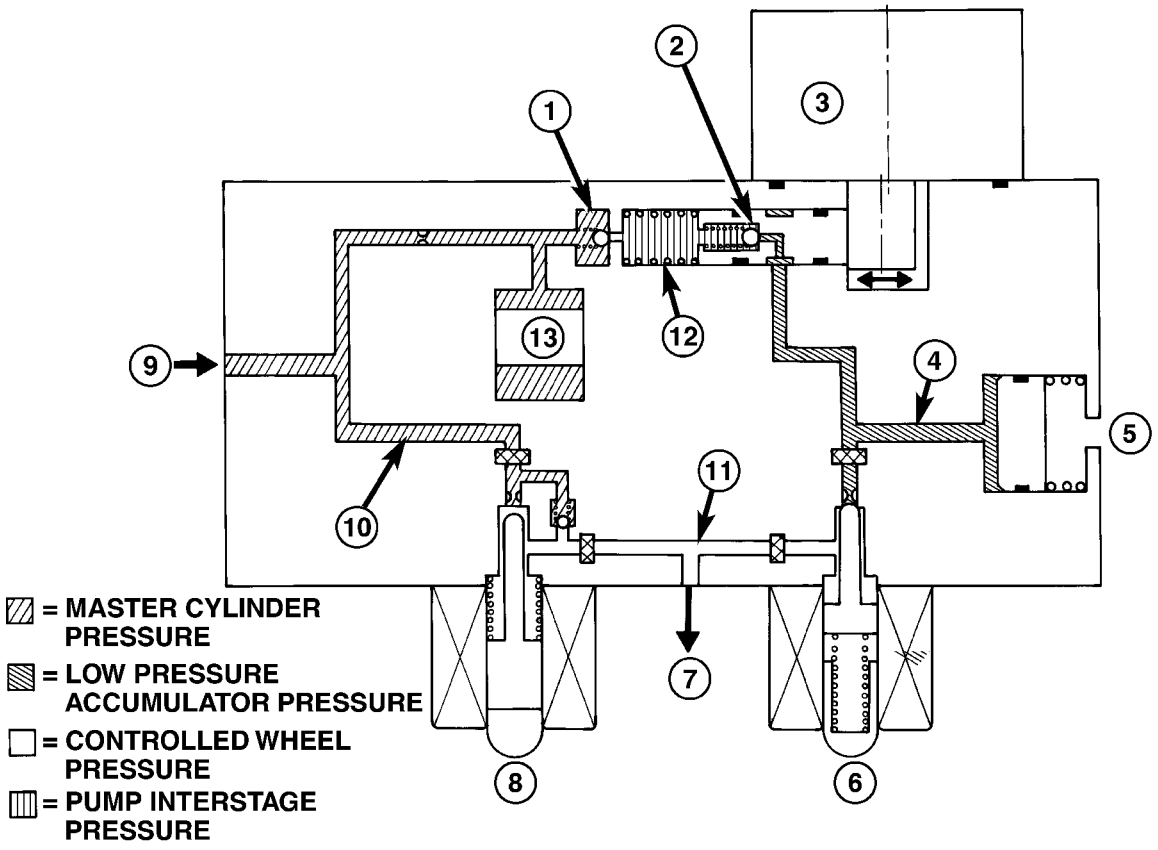


Fig. 6 Hydraulic Circuit - ABS Braking Mode (Without Traction Control)

1 - OUTLET VALVE
2 - PUMP PISTON
3 - PUMP/MOTOR (ON)
4 - LOW PRESSURE ACCUMULATOR PRESSURE
5 - LOW PRESSURE ACCUMULATOR
6 - NORMALLY CLOSED VALVE (MODULATING)
7 - TO WHEEL BRAKE
8 - NORMALLY OPEN VALVE (MODULATING)
9 - FROM MASTER CYLINDER
10 - MASTER CYLINDER PRESSURE
11 - CONTROLLED WHEEL PRESSURE
12 - PUMP INTERSTAGE PRESSURE
13 - NOISE DAMPER CHAMBER

HYDRAULIC CONTROL UNIT (Continued)

NORMAL BRAKING HYDRAULIC CIRCUIT, SOLENOID VALVE, AND SHUTTLE VALVE FUNCTION (ABS WITH TRACTION CONTROL)

The hydraulic diagram shows a vehicle with traction control in the normal braking mode (Fig. 7). The diagram shows no wheel spin or slip occurring relative to the speed of the vehicle. The driver is applying the brake pedal which builds pressure in the brake hydraulic system to engage the brakes and stop the vehicle. The hydraulic shuttle valve closes with every brake pedal application so pressure is not created at the inlet to the pump/motor.

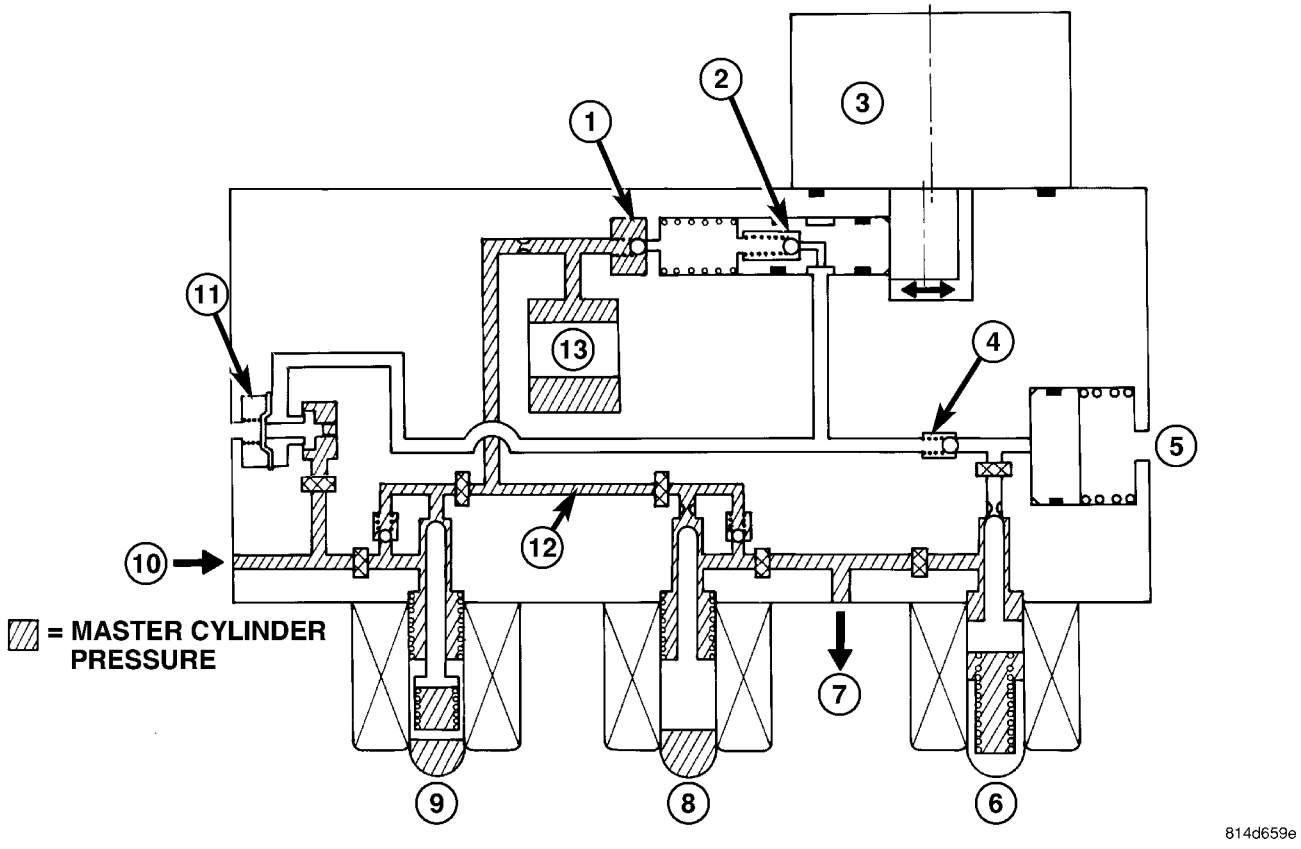


Fig. 7 Hydraulic Circuit - Normal Braking Mode (With Traction Control)

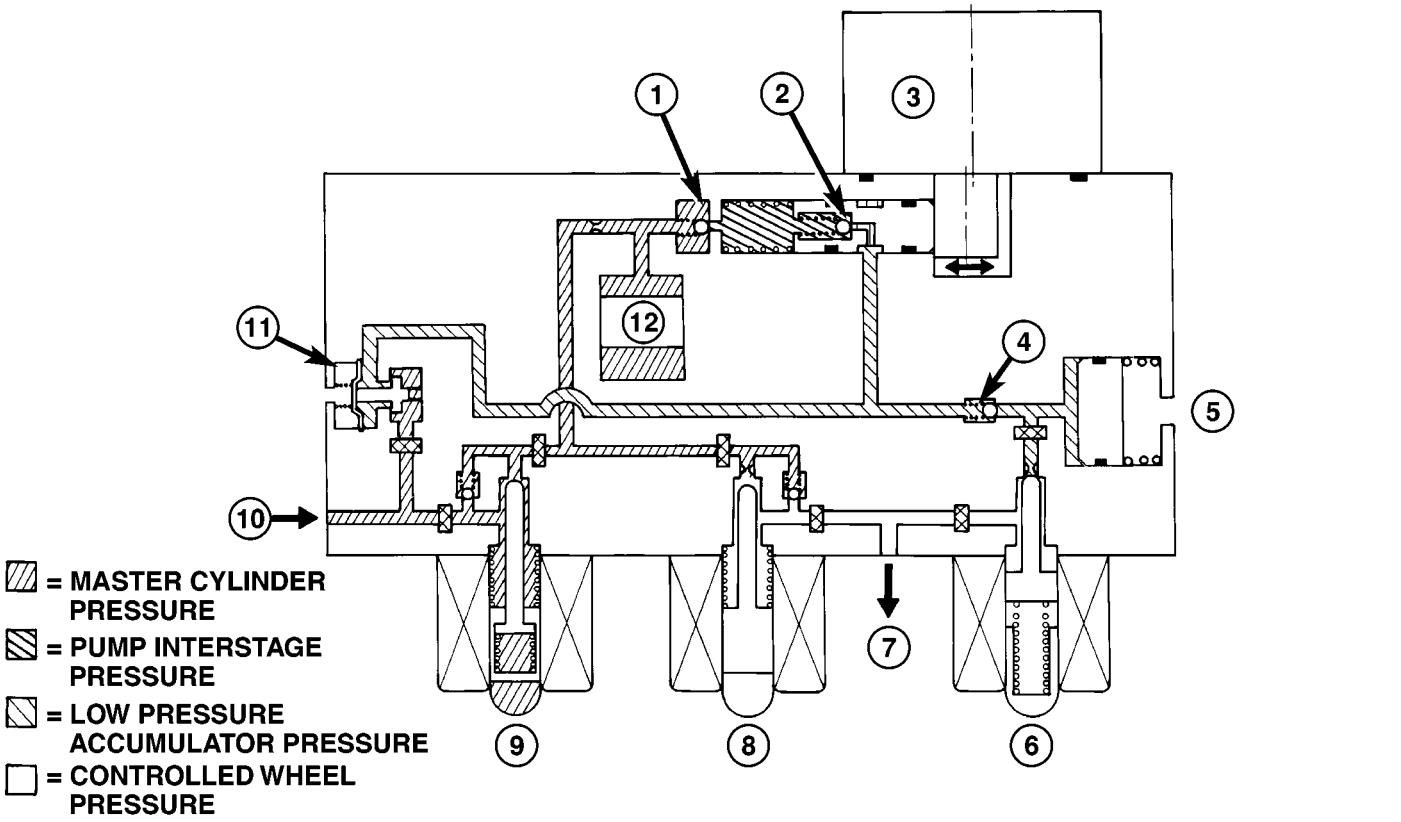
1 - OUTLET VALVE
2 - PUMP PISTON
3 - PUMP/MOTOR (OFF)
4 - SUCTION VALVE
5 - LOW PRESSURE ACCUMULATOR
6 - NORMALLY CLOSED VALVE (OFF)
7 - TO WHEEL BRAKE
8 - NORMALLY OPEN VALVE (OFF)
9 - NORMALLY OPEN TC (ASR) VALVE (OFF)
10 - FROM MASTER CYLINDER
11 - HYDRAULIC SHUTTLE VALVE
12 - MASTER CYLINDER PRESSURE
13 - NOISE DAMPER CHAMBER

HYDRAULIC CONTROL UNIT (Continued)

ABS BRAKING HYDRAULIC CIRCUIT, SOLENOID VALVE, AND SHUTTLE VALVE FUNCTION (ABS WITH TRACTION CONTROL)

The hydraulic diagram shows the vehicle in the ABS braking mode (Fig. 8). The diagram shows one wheel is slipping because the driver is attempting to stop the vehicle at a faster rate than is allowed by the surface on which the tires are riding.

- The hydraulic shuttle valve closes upon brake application so that the pump/motor cannot siphon brake fluid from the master cylinder.
- The normally open and normally closed valves modulate (build/decay) the brake hydraulic pressure as required.
- The pump/motor is switched on so that the brake fluid from the low pressure accumulators is returned to the master cylinder circuits.
- The brake fluid is routed to either the master cylinder or the wheel brake depending on the position of the normally open valve.



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Fig. 8 Hydraulic Circuit - ABS Braking Mode (With Traction Control)

1 - OUTLET VALVE
2 - PUMP PISTON
3 - PUMP/MOTOR
4 - SUCTION VALVE
5 - LOW PRESSURE ACCUMULATOR
6 - NORMALLY CLOSED VALVE (MODULATING)
7 - TO WHEEL BRAKE
8 - NORMALLY OPEN VALVE (MODULATING)
9 - NORMALLY OPEN TC (ASR) VALVE (OFF)
10 - FROM MASTER CYLINDER
11 - HYDRAULIC SHUTTLE VALVE
12 - NOISE DAMPER CHAMBER

HYDRAULIC CONTROL UNIT (Continued)

ABS TRACTION CONTROL HYDRAULIC CIRCUIT, SOLENOID VALVE, AND SHUTTLE VALVE FUNCTION (ABS WITH TRACTION CONTROL)

The hydraulic diagram shows the vehicle in the traction control (TC) mode (Fig. 9). The diagram shows a drive wheel is spinning and brake pressure is required to reduce its speed.

- The normally open TC (ASR) valve is energized to isolate the brake fluid being pumped from the master cylinder and to isolate the driven wheel.
- The normally open TC (ASR) valve bypasses the pump output back to the master cylinder at a fixed pressure setting.
- The normally open and normally closed valves modulate (build/decay) the brake pressure as required to the spinning wheel.

INTEGRATED CONTROL UNIT - MK25

DESCRIPTION

The hydraulic control unit (HCU) and the controller antilock brake (CAB) used with this antilock brake system are combined (integrated) into one unit, which is called the integrated control unit (ICU) (Fig. 10). The ICU is located below the master cylinder in the engine compartment. It is mounted to the left frame rail.

The ABS ICU consists of the following components: the CAB, eight (build/decay) solenoid valves (four inlet valves and four outlet valves) and one hydraulic pump motor.

The ABS ICU with traction control consists of the following components: the CAB, eight (build/decay)

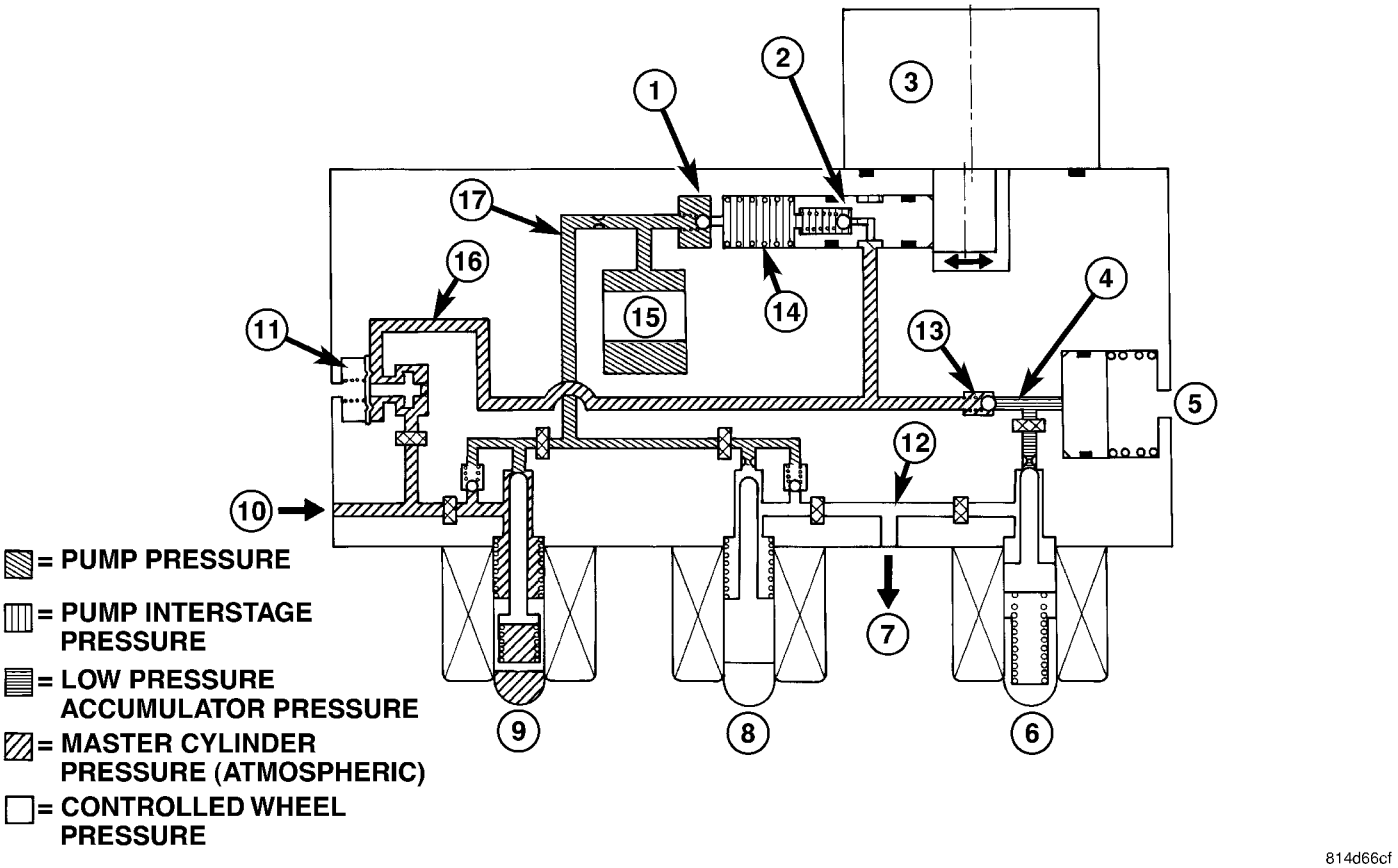


Fig. 9 Hydraulic Circuit - Traction Control Mode

1 - OUTLET VALVE
2 - PUMP PISTON
3 - PUMP/MOTOR (ON)
4 - LOW PRESSURE ACCUMULATOR PRESSURE
5 - LOW PRESSURE ACCUMULATOR
6 - NORMALLY CLOSED VALVE (MODULATING)
7 - TO WHEEL BRAKE (WHEEL SPINNING)
8 - NORMALLY OPEN VALVE (MODULATING)
9 - NORMALLY OPEN TC (ASR) VALVE ON (REGULATING)
10 - FROM MASTER CYLINDER
11 - HYDRAULIC SHUTTLE VALVE
12 - CONTROLLED WHEEL PRESSURE
13 - SUCTION VALVE
14 - PUMP INTERSTAGE PRESSURE
15 - NOISE DAMPER CHAMBER
16 - MASTER CYLINDER PRESSURE
17 - PUMP PRESSURE

INTEGRATED CONTROL UNIT - MK25 (Continued)

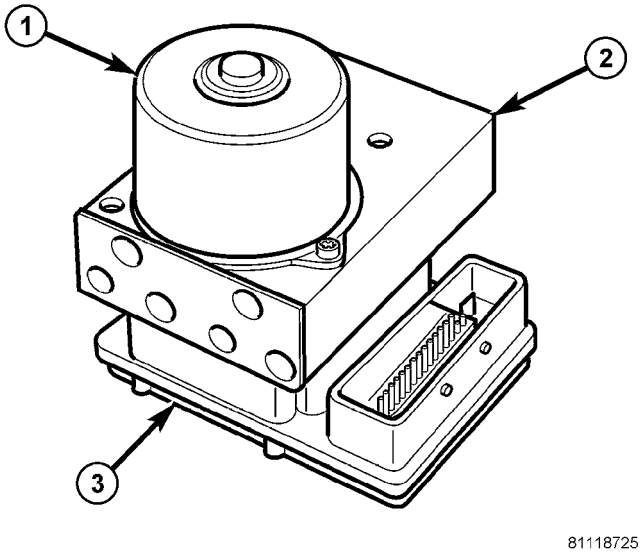


Fig. 10 Integrated Control Unit (ICU)

1 - PUMP/MOTOR
2 - HCU
3 - CAB

solenoid valves (four inlet valves and four outlet valves), two master cylinder isolation valves, two low pressure feed valves and one hydraulic pump motor.

The replaceable components of the ICU are the HCU and the CAB. No attempt should be made to service any individual components of the HCU or CAB. For information on the CAB, (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/CONTROLLER ANTILOCK BRAKE - DESCRIPTION).

REMOVAL

(1) Disconnect negative (-) battery cable from battery post and isolate.

CAUTION: Vacuum in power brake booster must be pumped down (removed) before removing master cylinder from power brake booster. This is necessary to prevent power brake booster from sucking in any contamination as master cylinder is removed. This can be done simply by pumping brake pedal, with vehicle's engine not running, until a firm feeling brake pedal is achieved.

(2) With engine not running, pump brake pedal until a firm pedal is achieved (4-5 strokes).

(3) Remove nuts fastening coolant recovery bottle in place and reposition bottle with hoses attached out of way. (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - REMOVAL)

CAUTION: Before removing master cylinder from power brake vacuum booster, master cylinder and vacuum booster must be thoroughly cleaned. This must be done to prevent dirt particles from falling into power brake vacuum booster.

(4) Thoroughly clean all surfaces of brake fluid reservoir and master cylinder, paying special attention to area where master cylinder attaches to power brake booster. Use only Mopar® Brake Parts Cleaner or equivalent.

(5) Disconnect wiring harness connector from brake fluid level switch in master cylinder brake fluid reservoir (Fig. 11).

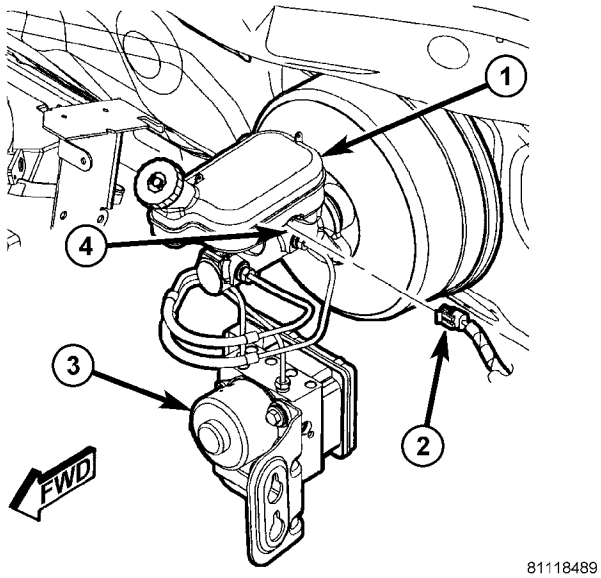


Fig. 11 Brake Fluid Level Switch Connector

1 - MASTER CYLINDER RESERVOIR
2 - WIRING CONNECTOR
3 - ABS ICU
4 - BRAKE FLUID LEVEL SWITCH

(6) Disconnect primary and secondary brake tubes coming from master cylinder at ABS ICU (Fig. 12). Cap off brake tubes and install sealing plugs in open brake tube outlet ports of ICU.

(7) Remove two nuts attaching master cylinder to power brake booster (Fig. 13).

(8) Slide master cylinder straight out of power brake booster.

CAUTION: Seal on rear of master cylinder is used to create seal for holding vacuum in power brake vacuum booster. Vacuum seal on master cylinder MUST be replaced whenever master cylinder is removed from power brake vacuum booster.

(9) Remove vacuum seal located on mounting flange of master cylinder. Vacuum seal is removed from master cylinder by **carefully** pulling it off rear of master cylinder. **Do not attempt to pry seal off master cylinder by inserting a sharp tool between seal and master cylinder casting.**

INTEGRATED CONTROL UNIT - MK25 (Continued)

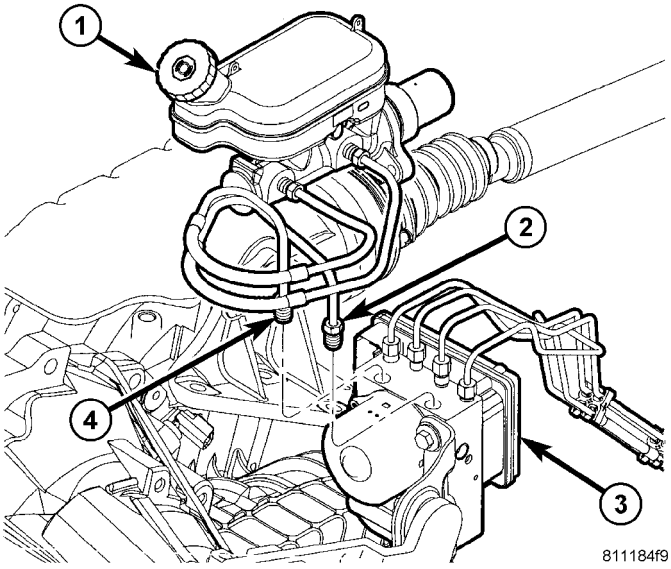


Fig. 12 Primary and secondary brake tubes at ICU

1 - MASTER CYLINDER
2 - PRIMARY BRAKE TUBE NUT
3 - ABS ICU
4 - SECONDARY BRAKE TUBE NUT

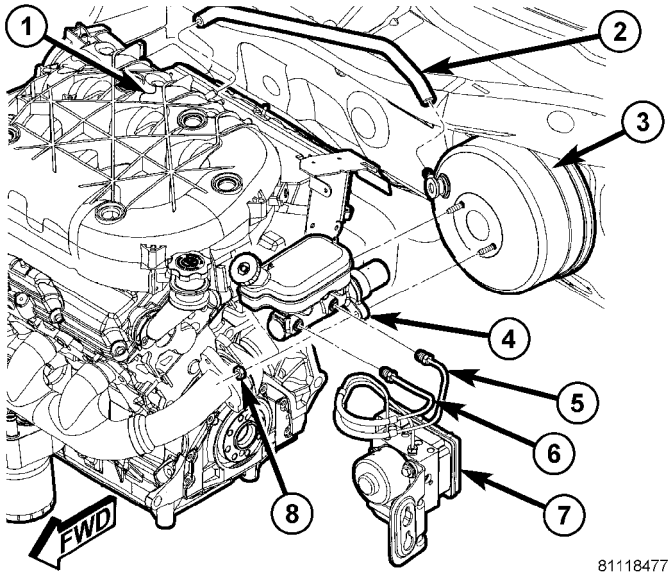


Fig. 13 Master Cylinder Mounting

1 - ENGINE INTAKE MANIFOLD
2 - BOOSTER VACUUM HOSE
3 - POWER BRAKE BOOSTER
4 - MASTER CYLINDER
5 - PRIMARY BRAKE TUBE
6 - SECONDARY BRAKE TUBE
7 - ABS ICU
8 - MASTER CYLINDER MOUNTING NUT (2)

(10) Disconnect four Chassis brake tubes at ABS ICU (Fig. 14). Cap off brake tubes and install sealing plugs in open brake tube outlet ports of ICU.

(11) Disconnect 47-way wiring connector at CAB (Fig. 15).

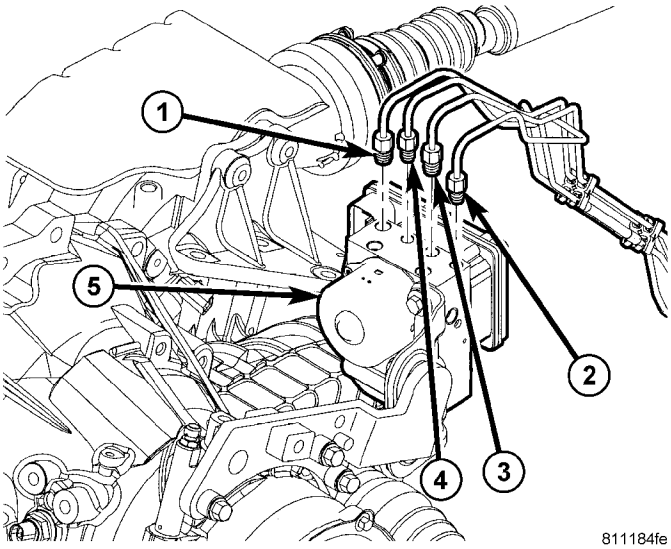


Fig. 14 Chassis Brake Tubes At ICU

1 - L.F. BRAKE TUBE NUT
2 - R.F. BRAKE TUBE NUT
3 - L.R. BRAKE TUBE NUT
4 - R.R. BRAKE TUBE NUT
5 - ICU

(12) Loosen 2 bolts fastening ABS ICU bracket to frame rail (Fig. 15).

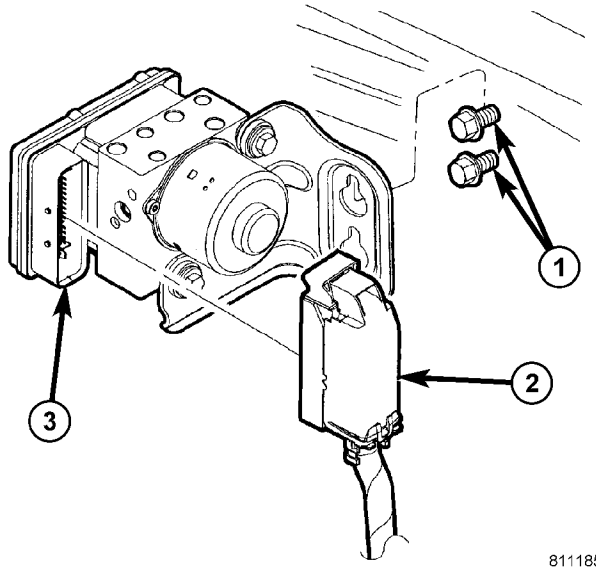


Fig. 15 CAB Wiring Connector

1 - ICU MOUNTING BOLTS ON FRAME RAIL
2 - HARNESS (CAB) WIRING CONNECTOR
3 - CAB MOUNTED TO ICU

(13) Lift ICU off frame rail bolts and remove from vehicle.

(14) If CAB and HCU need to be separated, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - DISASSEMBLY)

INTEGRATED CONTROL UNIT - MK25 (Continued)

DISASSEMBLY

(1) Remove 3 screws attaching CAB to HCU (Fig. 16).

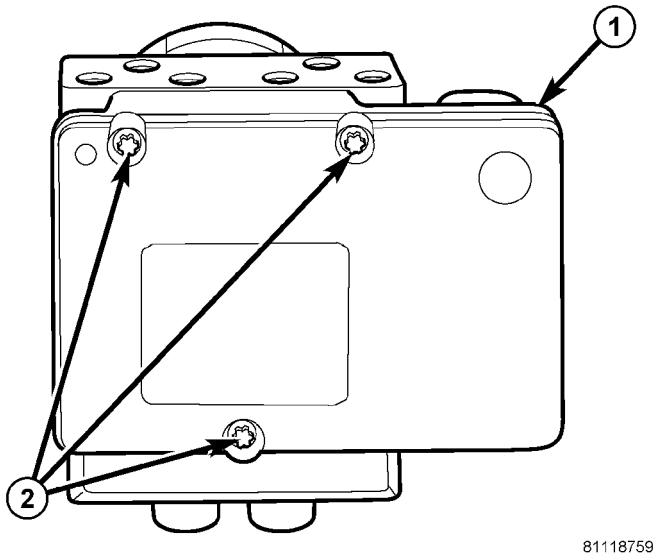


Fig. 16 CAB Attaching Screws

1 - CAB
2 - MOUNTING SCREWS

(2) Remove CAB from HCU (Fig. 17).

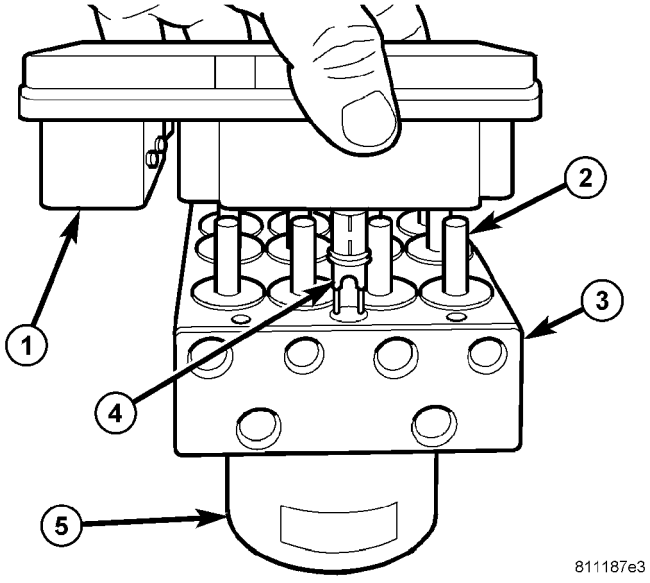


Fig. 17 CAB Removal/Installation

1 - CAB
2 - VALVES
3 - HCU
4 - PUMP/MOTOR WIRING CONNECTOR
5 - PUMP/MOTOR

ASSEMBLY

(1) Align CAB solenoids and pump/motor wiring connector with HCU valves and connector passage (Fig. 17). Slide CAB onto HCU.

(2) Install 3 screws mounting CAB to HCU (Fig. 16). Tighten CAB mounting screws to 2 N·m (17 in. lbs.) torque.

(3) Install ICU in vehicle. (Refer to 5 - BRAKES/ HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - INSTALLATION)

INSTALLATION

(1) Place ICU with mounting bracket over two mounting bolts in frame rail (Fig. 15). Tighten bolts to 24 N·m (18 ft. lbs.) torque.

(2) Connect 47-way wiring connector at CAB (Fig. 15).

NOTE: When installing chassis brake tubes on ICU, install and tighten two center tube nuts before installing the outer tubes. This action makes it easier to fit a crowfoot wrench and torque wrench in to tighten center brake tube nuts.

(3) Connect four Chassis brake tubes to outlet ports of ICU (Fig. 14). Tighten brake tube nuts to 14 N·m (120 in. lbs.) torque.

CAUTION: When installing master cylinder on vehicle, a NEW vacuum seal MUST be installed on master cylinder.

(4) Install NEW vacuum seal on rear of master cylinder making sure seal fits squarely in mounting groove.

(5) Position master cylinder on studs of power brake booster (Fig. 13), aligning booster push rod with master cylinder piston.

(6) Install two master cylinder mounting nuts (Fig. 13). Tighten both mounting nuts to 25 N·m (225 in. lbs.) torque.

(7) Thread primary and secondary brake tubes into ICU ports as shown (Fig. 12). Brake tubes must be held securely when tightened to control orientation of flex section. Tighten tube nuts to 14 N·m (120 in. lbs.) torque.

(8) Connect wiring harness connector to brake fluid level switch mounted in brake fluid reservoir (Fig. 11).

(9) Place coolant recovery bottle in its normal mounted position and install nuts fastening it in place. (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - INSTALLATION)

(10) Connect negative battery cable to battery post.

(11) Hook up DRBIII® to initialize CAB.

(12) Fill master cylinder with clean, fresh Mopar® Brake Fluid or equivalent, then bleed base brakes and ABS. (Refer to 5 - BRAKES - STANDARD PROCEDURE)

(13) Road test vehicle to ensure proper operation of brakes.

INTEGRATED CONTROL UNIT - MK25E

DESCRIPTION

The Hydraulic Control Unit (HCU) and the Antilock Brake Module (ABM) used with this antilock brake system are combined (integrated) into one unit, which is called the Integrated Control Unit (ICU) (Fig. 18). The ICU is located below the master cylinder in the engine compartment. It is mounted to the left frame rail.

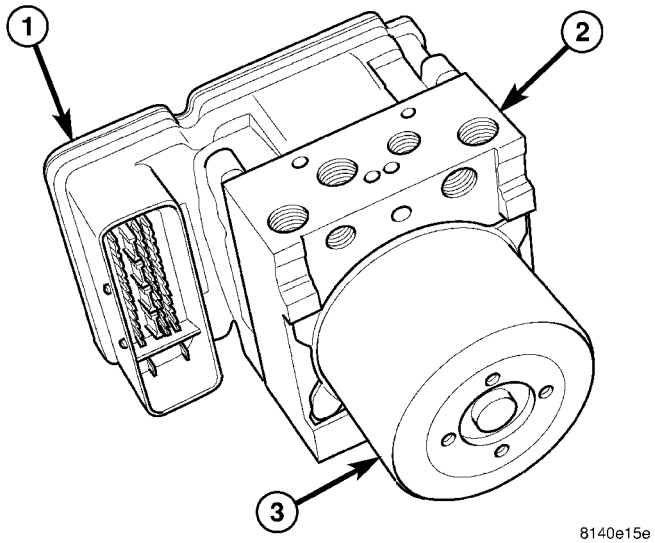


Fig. 18 Integrated Control Unit

1 - ANTILOCK BRAKE MODULE (ABM)
2 - HYDRAULIC CONTROL UNIT (HCU)
3 - PUMP/MOTOR

The ABS ICU consists of the following components: the ABM, eight (build/decay) solenoid valves (four inlet valves and four outlet valves) and one hydraulic pump motor.

The ABS ICU with traction control consists of the following components: the ABM, eight (build/decay) solenoid valves (four inlet valves and four outlet valves), two master cylinder isolation valves, two low pressure feed valves and one hydraulic pump motor.

The replaceable components of the ICU are the HCU and the ABM. No attempt should be made to service any individual components of the HCU or ABM. For information on the ABM, (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ANTILOCK BRAKE MODULE - DESCRIPTION).

REMOVAL

(1) Disconnect negative (-) battery cable from battery post and isolate.

CAUTION: Vacuum in power brake booster must be pumped down (removed) before removing master cylinder from power brake booster. This is necessary to prevent power brake booster from sucking in any contamination as master cylinder is removed. This can be done simply by pumping brake pedal, with vehicle's engine not running, until a firm feeling brake pedal is achieved.

(2) With engine not running, pump brake pedal until a firm pedal is achieved (4-5 strokes).

(3) Remove nuts fastening coolant recovery bottle in place and reposition bottle with hoses attached out of way. (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - REMOVAL)

CAUTION: Before removing master cylinder from power brake vacuum booster, master cylinder and vacuum booster must be thoroughly cleaned. This must be done to prevent dirt particles from falling into power brake vacuum booster.

(4) Thoroughly clean all surfaces of brake fluid reservoir and master cylinder, paying special attention to area where master cylinder attaches to power brake booster. Use only Mopar® Brake Parts Cleaner or equivalent.

(5) Disconnect wiring harness connector from brake fluid level switch in master cylinder brake fluid reservoir (Fig. 19).

(6) Disconnect primary and secondary brake tubes coming from master cylinder at ABS ICU (Fig. 20). Cap off brake tubes and install sealing plugs in open brake tube outlet ports of ICU.

(7) Remove two nuts attaching master cylinder to power brake booster (Fig. 19).

(8) Slide master cylinder straight out of power brake booster and remove (Fig. 19).

INTEGRATED CONTROL UNIT - MK25E (Continued)

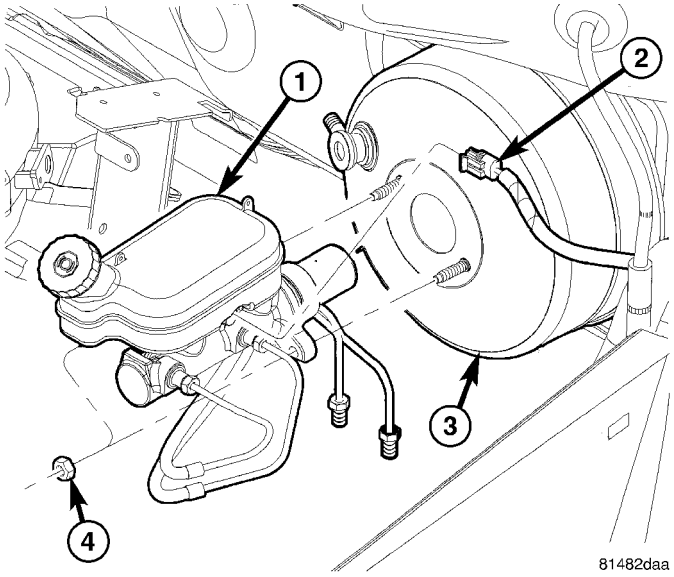


Fig. 19 Master Cylinder Mounting

1 - MASTER CYLINDER
2 - SENSOR WIRING HARNESS CONNECTOR
3 - BOOSTER
4 - MOUNTING NUT

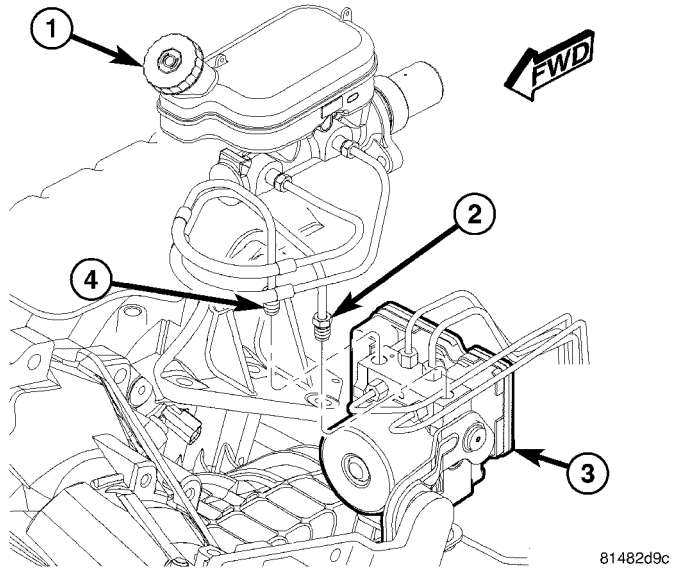


Fig. 20 Primary And Secondary Brake Tubes At ICU

1 - MASTER CYLINDER
2 - PRIMARY BRAKE TUBE
3 - ICU
4 - SECONDARY BRAKE TUBE

(9) Disconnect four Chassis brake tubes at ABS ICU (Fig. 21). Cap off brake tubes and install sealing plugs in open brake tube outlet ports of ICU.

(10) Disconnect the 47-way connector from the antilock brake module (ABM) by depressing the tabs on each side of the connector cover (Fig. 22), then pulling outward and upward on the lower half of the cover until it locks into position pointing straight

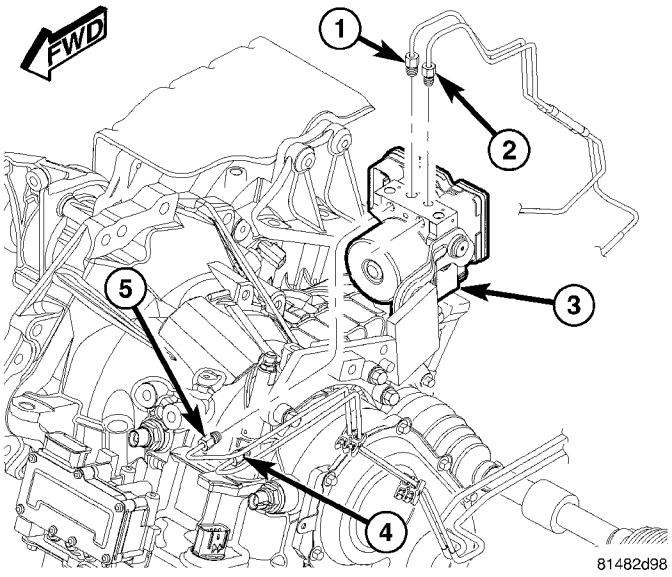


Fig. 21 Chassis Brake Tubes At ICU

1 - LEFT FRONT CHASSIS BRAKE TUBE
2 - RIGHT FRONT CHASSIS BRAKE TUBE
3 - ICU
4 - LEFT REAR CHASSIS BRAKE TUBE
5 - RIGHT REAR CHASSIS BRAKE TUBE

outward. The connector can then be pulled straight outward off the ABM (Fig. 23).

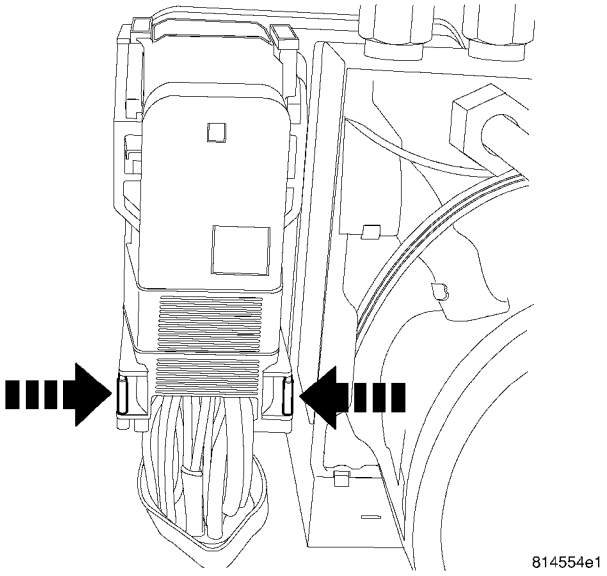


Fig. 22 ABM Connector Release Tabs

(11) Loosen 2 bolts fastening ABS ICU bracket to frame rail (Fig. 24).

(12) Lift ICU off frame rail bolts and remove from vehicle.

(13) If ABM and HCU need to be separated, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - DISASSEMBLY)

INTEGRATED CONTROL UNIT - MK25E (Continued)

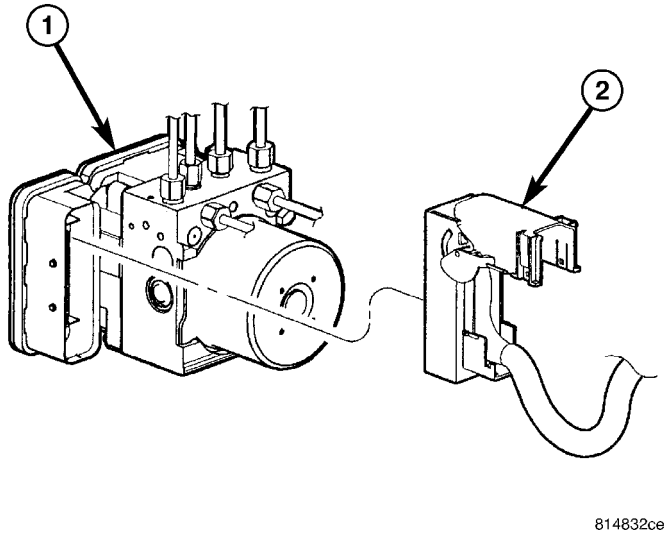


Fig. 23 Wiring Harness Connector At ABM

1 - ABM (PART OF ICU)
2 - WIRING HARNESS CONNECTOR

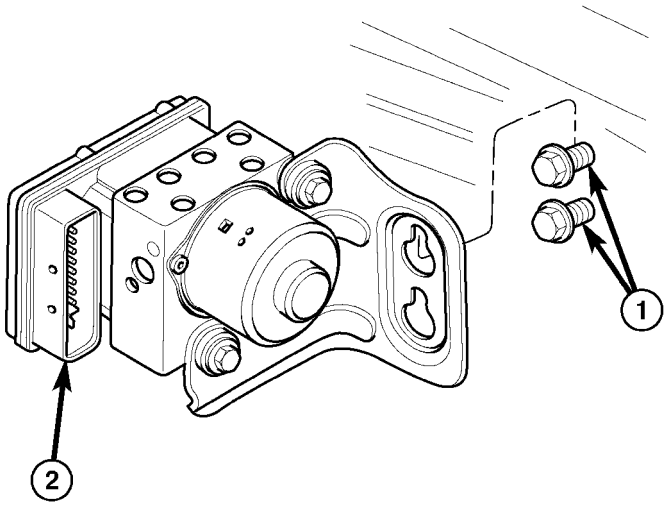


Fig. 24 ICU Mounting

1 - MOUNTING BOLTS
2 - ICU

DISASSEMBLY

(1) If the mounting bracket needs to be removed from the ICU, remove the single mounting bolt (Fig. 25), then slide the ICU's mounting pins out of the grommets in the bracket. Remove the mounting pins from the ICU as necessary.

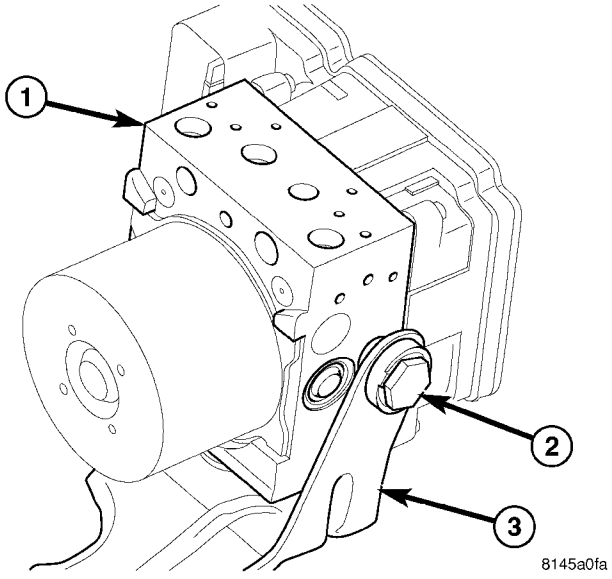


Fig. 25 ICU Mounting Bolt

1 - ICU
2 - MOUNTING BOLT
3 - MOUNTING BRACKET

(2) If not equipped with traction control, remove the three screws attaching the ABM to the HCU (Fig. 26).

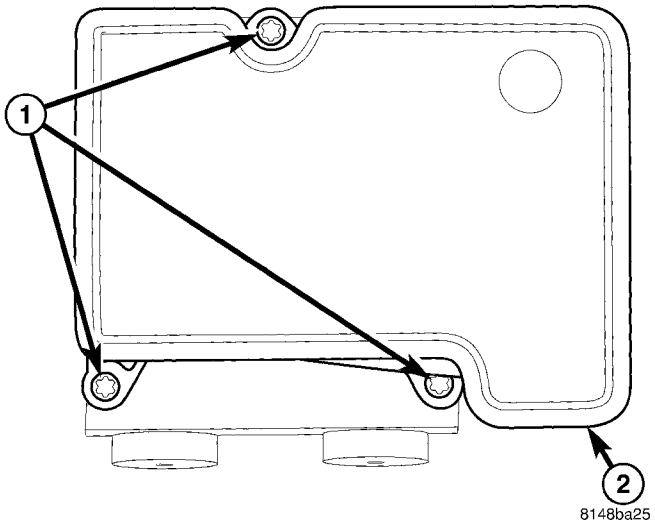


Fig. 26 ABM Mounting Screws - Without Traction Control

1 - MOUNTING SCREWS
2 - ABM

(3) If equipped with traction control, remove the four screws attaching the ABM to the HCU (Fig. 27).

(4) Separate the ABM from the HCU (Fig. 28).

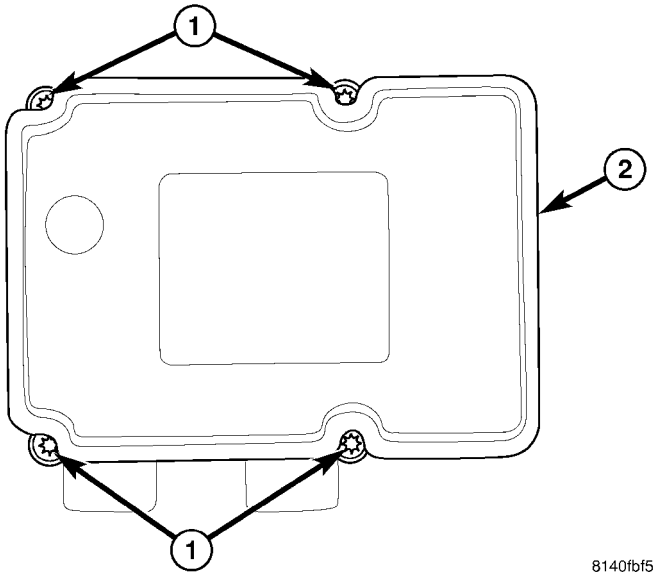


Fig. 27 ABM Mounting Screws - With Traction Control

1 - MOUNTING SCREWS
2 - ABM

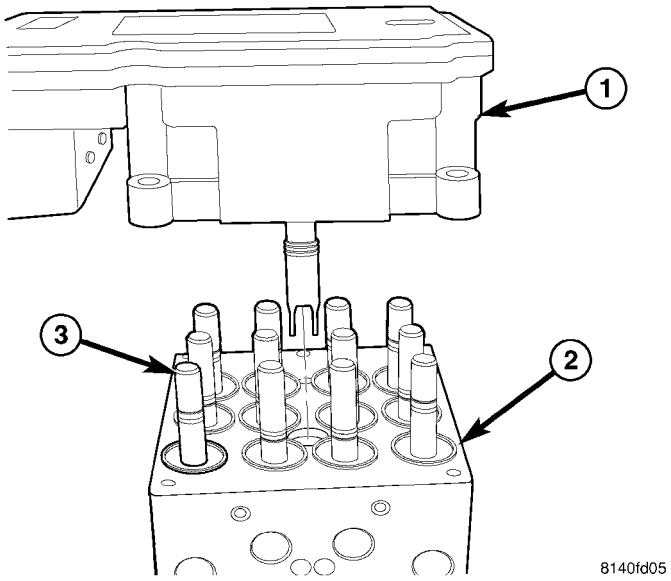


Fig. 28 ABM Assembly To HCU

1 - ABM
2 - HCU
3 - SOLENOID VALVE STEM

ASSEMBLY

(1) Clean any debris off the mating surfaces of the HCU and ABM.

CAUTION: When installing new O-rings or solenoid valve stem seals, do not use any type of lubricant.

(2) If the seals on the components are not new, they must be replaced. Each of the solenoid valve stem seals must be replaced (Fig. 29); **do not reuse solenoid valve stem seals**. The pump/motor connector O-ring should also be replaced if not new (Fig. 30).

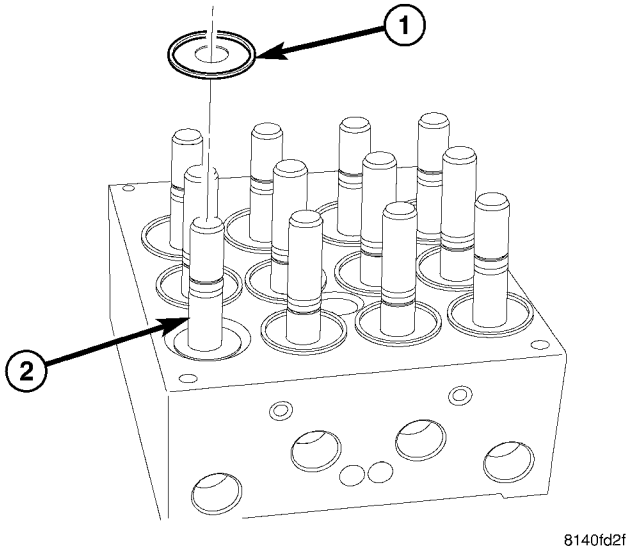


Fig. 29 Solenoid Valve Seal

1 - SEAL
2 - SOLENOID VALVE STEM

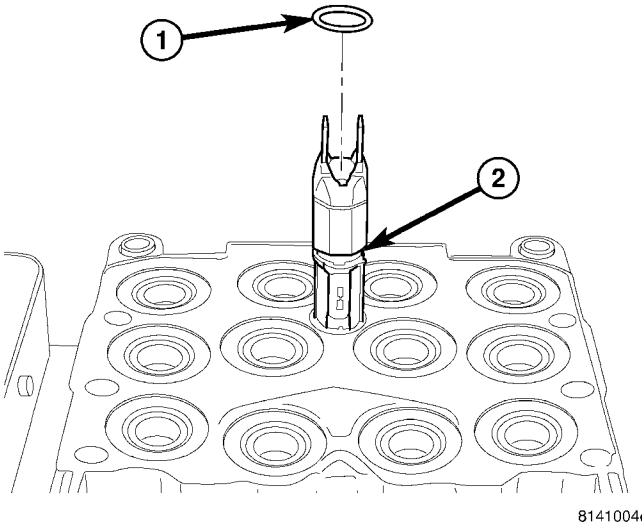


Fig. 30 Internal Pump Connector O-Ring

1 - O-RING
2 - O-RING MOUNTING GROOVE

(3) Align components and install the ABM on the HCU (Fig. 28).

(4) If not equipped with traction control, install the three screws attaching the ABM to the HCU (Fig. 26). Tighten the mounting screws to 2 N·m (17 in. lbs.) torque.

(5) If equipped with traction control, install the four screws attaching the ABM to the HCU (Fig. 27). Tighten the mounting screws to 2 N·m (17 in. lbs.) torque.

(6) If the mounting bracket needs to be installed, install the mounting pins in the ICU as necessary and tighten to 11 N·m (97 in. lbs.) torque. Insert the mounting pins into the grommets mounted in the bracket, then install the single mounting bolt (Fig. 25). Tighten the mounting bolt to 11 N·m (97 in. lbs.) torque.

(7) Install the ICU in the vehicle. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - INSTALLATION)

INSTALLATION

(1) Place ICU with mounting bracket over two mounting bolts in frame rail (Fig. 24). Tighten bolts to 24 N·m (18 ft. lbs.) torque.

(2) With connector cover completely open (Fig. 23), install 47-way wiring connector into socket of the ABM and close cover, locking connector in place.

(3) Install four Chassis brake tubes into outlet ports of ICU (Fig. 21). Tighten brake tube nuts to 14 N·m (120 in. lbs.) torque.

CAUTION: Seal on rear of master cylinder is used to create seal for holding vacuum in power brake vacuum booster. Vacuum seal on master cylinder MUST be replaced whenever master cylinder is removed from power brake vacuum booster.

(4) Remove vacuum seal located on mounting flange of master cylinder. Vacuum seal is removed from master cylinder by **carefully** pulling it off rear of master cylinder. **Do not attempt to pry seal off master cylinder by inserting a sharp tool between seal and master cylinder casting.**

(5) Install NEW vacuum seal on rear of master cylinder making sure seal fits squarely in mounting groove.

(6) Position master cylinder on studs of power brake booster (Fig. 19), aligning booster push rod with master cylinder piston.

(7) Install two master cylinder mounting nuts (Fig. 19). Tighten both mounting nuts to 25 N·m (225 in. lbs.) torque.

(8) Thread primary and secondary brake tubes into ICU ports as shown (Fig. 20). Brake tubes must be held securely when tightened to control orientation of flex section. Tighten tube nuts to 14 N·m (120 in. lbs.) torque.

(9) Connect wiring harness connector to brake fluid level switch mounted in brake fluid reservoir (Fig. 19).

(10) Place coolant recovery bottle in its normal mounted position and install nuts fastening it in place. (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - INSTALLATION)

(11) Connect negative battery cable to battery post.

(12) Hook up scan tool to initialize ABM.

(13) Fill master cylinder with clean, fresh Mopar® Brake Fluid or equivalent, then bleed base brakes and ABS. (Refer to 5 - BRAKES - STANDARD PROCEDURE)

(14) Road test vehicle to ensure proper operation of brakes.

COOLING

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COOLING

DESCRIPTION

DESCRIPTION - COOLING SYSTEM

The cooling system components consist of a radiator, electric fan motors, shroud, pressure cap, thermostat, transmission oil cooler, water pump, hoses, clamps, coolant, and a coolant pressure container to complete the circuit.

DESCRIPTION - HOSE CLAMPS

The cooling system uses spring type hose clamps. If a spring type clamp replacement is necessary, replace with the original Mopar® equipment spring type clamp.

CAUTION: A number or letter is stamped into the tongue of constant tension clamps. If replacement is necessary, use only a original equipment clamp with matching number or letter (Fig. 1).

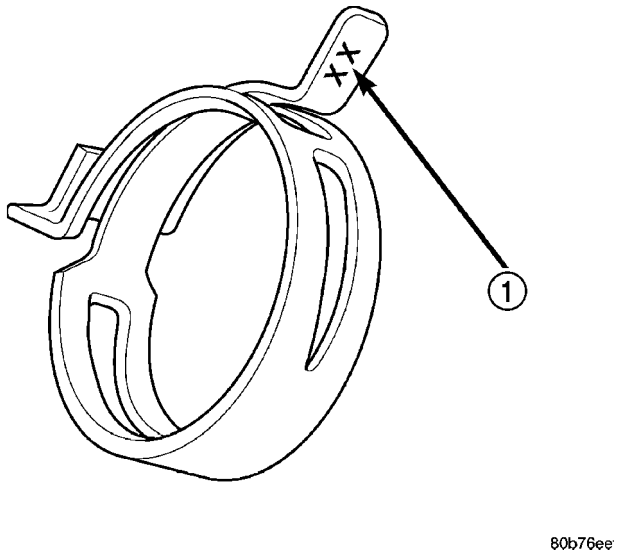


Fig. 1 Spring Clamp Size Location

1 - SPRING CLAMP SIZE LOCATION

OPERATION - COOLING SYSTEM

The engine cooling systems primary purpose is to maintain engine temperature in a range that will provide satisfactory engine performance and emission levels under all expected driving conditions. It also provides hot water (coolant) for heater performance and cooling for automatic transmission oil. It does this by transferring heat from engine metal to coolant, moving this heated coolant to the radiator, and then transferring this heat to the ambient air.

- When engine is cold: thermostat is closed, cooling system has no flow through the radiator. The coolant bypass flows through the engine only.
- When engine is warm: thermostat is open, cooling system has bypass flow and coolant flow through radiator.

COOLING (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - COOLING SYSTEM LEAK TEST

WARNING: THE WARNING WORDS "DO NOT OPEN HOT" ON THE RADIATOR PRESSURE CAP IS A SAFETY PRECAUTION. WHEN HOT, PRESSURE BUILDS UP IN COOLING SYSTEM. TO PREVENT SCALDING OR INJURY, THE RADIATOR CAP SHOULD NOT BE REMOVED WHILE THE SYSTEM IS HOT OR UNDER PRESSURE.

With engine not running, remove coolant pressure container cap and wipe the filler neck sealing seat clean.

Attach the Cooling System Tester 7700 or equivalent to the radiator, as shown in (Fig. 2) and apply 104 kPa (15 psi) pressure. If the pressure drops more than 13.8 kPa (2 psi) in 2 minutes, inspect all points for external leaks.

All radiator and heater hoses should be shaken while at 104 kPa (15 psi), since some leaks occur only while driving due to engine movement.

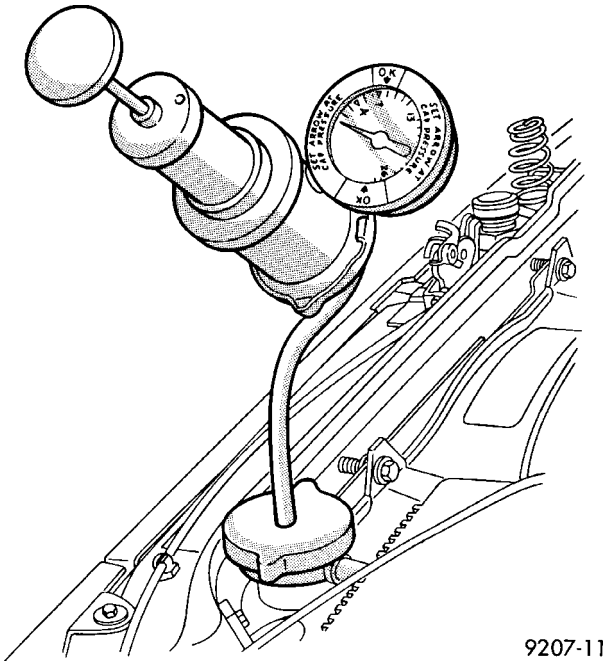


Fig. 2 Pressure Testing - Typical

If there are no external leaks, after the gauge dial shows a drop in pressure, detach the tester. Start engine and run until the thermostat opens, allowing the coolant to expand. Reattach the cooling system tester. If the needle on the dial fluctuates it indicates a combustion leak, usually a head gasket leak.

WARNING: WITH TOOL IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

If the needle on the dial does not fluctuate, raise the engine rpm a few times. If an abnormal amount of coolant or steam emits from the tailpipe, it may indicate a coolant leak caused by a faulty head gasket, cracked engine block, or cracked cylinder head.

There may be internal leaks that can be determined by removing the oil dipstick. If water globules appear intermixed with the oil it will indicate an internal leak in the engine. If there is an internal leak, the engine must be disassembled for repair.

DIAGNOSIS AND TESTING - COOLING SYSTEM FLOW CHECK

To determine whether coolant is flowing through the cooling system, use the following procedure:

WARNING: DO NOT REMOVE THE COOLING SYSTEM PRESSURE CAP OR ANY HOSE WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

- If engine is cold, idle engine until normal operating temperature is reached. Feel the upper radiator hose. If it is hot, coolant is circulating.

DIAGNOSIS AND TESTING - COOLING SYSTEM AERATION

Low coolant level in a cross flow radiator will equalize in both tanks with engine off. With engine at running and at operating temperature, the high pressure inlet tank runs full and the low pressure outlet tank drops, resulting in cooling system aeration. Aeration will draw air into the water pump resulting in the following:

- High reading shown on the temperature gauge.
- Loss of coolant flow through the heater core.
- Corrosion in the cooling system.
- Water pump seal may run dry, increasing the risk of premature seal failure.
- Combustion gas leaks into the coolant can also cause the above problems.

DIAGNOSIS AND TESTING - COOLING SYSTEM DEAERATION

Air can only be removed from the system by gathering under the pressure cap. On the next heat up it will be pushed past the pressure cap into the coolant recovery bottle by thermal expansion of the coolant. It then escapes to the atmosphere in the coolant recovery bottle and is replaced with coolant on cool down.

To effectively deaerate the system, multiple thermal cycles of the system may be required.

COOLING (Continued)

NOTE: Deaeration does not occur at engine idle—higher engine speeds are required. Normal driving will deaerate cooling system.

STANDARD PROCEDURE

STANDARD PROCEDURE - COOLING SYSTEM DRAINING

WARNING: DO NOT REMOVE OR LOOSEN THE COOLANT PRESSURE CAP, CYLINDER BLOCK DRAIN PLUGS, OR THE DRAINCOCK WHEN THE SYSTEM IS HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM THE COOLANT CAN OCCUR.

(1) **Without removing pressure cap and with system not under pressure**, open the draincock. The draincock is located on the lower left side of radiator (Fig. 3).

(2) After the coolant pressure container is empty, then remove coolant pressure cap.

(3) Remove the cylinder block drain plug(s).

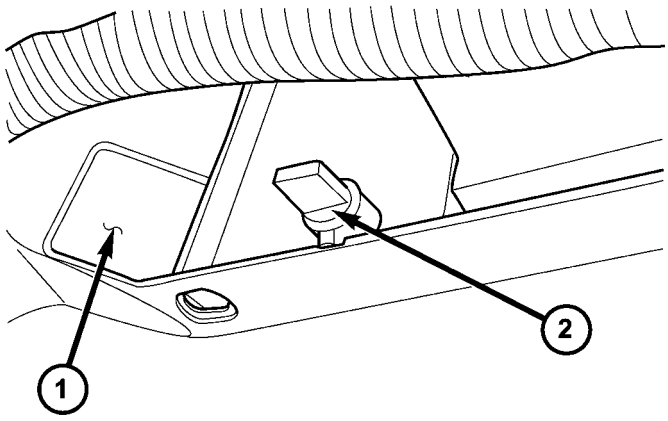


Fig. 3 Draincock Location

1 - LEFT SIDE FRAME RAIL
2 - DRAINCOCK

STANDARD PROCEDURE - COOLING SYSTEM FILLING

Remove pressure cap and fill system, using a 50/50 mix of Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula and distilled water.

Continue filling system until full. **Be careful not to spill coolant on drive belts or the generator.** For cooling system capacity, (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - SPECIFICATIONS).

Fill coolant pressure container to at least the MAX mark with 50/50 solution. It may be necessary to add coolant to the coolant pressure container after three or four warm up/cool down cycles to maintain coolant level between the MAX and MIN mark. This will allow trapped air to be removed from the system.

STANDARD PROCEDURE - ADDING ADDITIONAL COOLANT

The radiator cap should not be removed. When additional coolant is needed to maintain this level, it should be added to the coolant recovery/reserve container. Use only 50/50 mix of ethylene glycol type antifreeze and distilled water. For the recommeded antifreeze/coolant type (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - SPECIFICATIONS).

CAUTION: Do not use well water, or suspect water supply in cooling system. A 50/50 ethylene glycol and distilled water mix is recommended. For the recommeded antifreeze/coolant type (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION).

STANDARD PROCEDURE - COOLANT LEVEL CHECK

NOTE: Do not remove pressure cap for routine coolant level inspections.

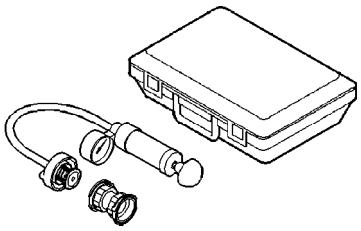
The coolant reserve system provides a quick visual method for determining the coolant level without removing the radiator cap. **With the engine cold and not running,** simply observe the level of the coolant in the coolant pressure container. The coolant level should be between the MIN and MAX marks.

COOLING (Continued)

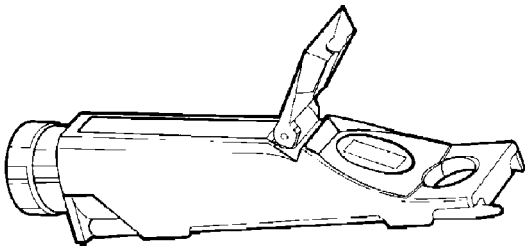
SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Accessory Drive Belt Tensioner Assembly —Bolt	28	—	250
Engine Coolant Temperature Sensor	7	—	60
Generator & A/C Compressor Drive Belt Tensioner Assembly —Bolt	54	40	—
Coolant Outlet Connector/ Thermostat Housing—Bolts	28	—	250
Water Pump	12	—	105
Water Pump Inlet Tube —Bolts	12	—	105
Water Pump Inlet Tube —Bolts	28	—	250
Water Pump Pulley —Bolts	28	—	250
Radiator to A/C Condenser—Screws	5	—	45
Radiator Fan—Screws	5	—	45
Radiator Mounting (Upper Bracket)—Nuts	12	—	105



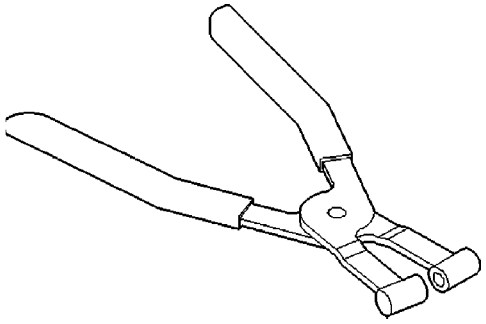
Cooling System Tester 7700



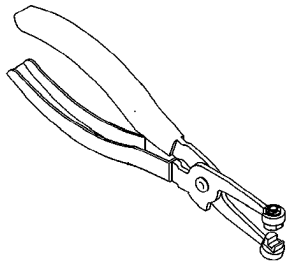
Coolant Refractometer 8286

SPECIAL TOOLS

COOLING SYSTEM



Pliers 6094



Hose Clamp Pliers 8495

ACCESSORY DRIVE

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BELT TENSIONERS

REMOVAL

(1) Raise vehicle on hoist.
(2) Remove the drive belt shield.
(3) Remove the drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
(4) Remove the belt tensioner (Fig. 1).

INSTALLATION

(1) Install the belt tensioner and bolt. Tighten bolt to 28 N·m (250 in. lbs.).
(2) Install the drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
(3) Install the drive belt shield.
(4) Lower the vehicle.

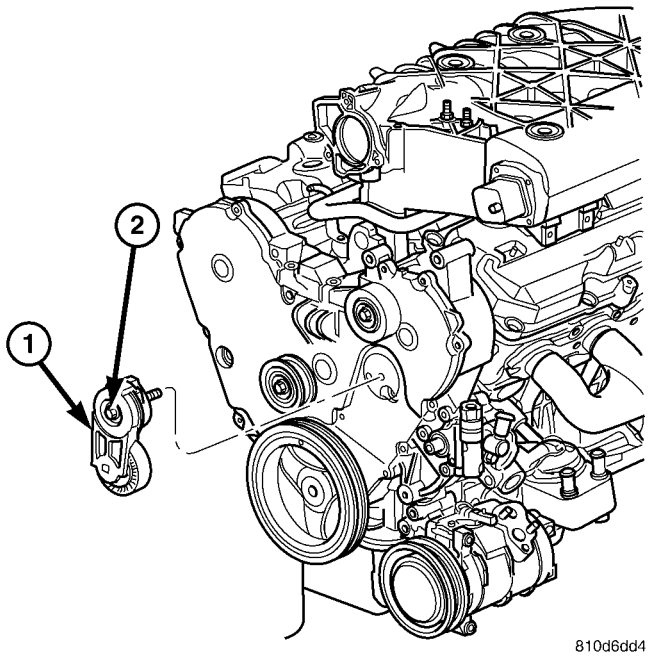


Fig. 1 BELT TENSIONER

1 - BELT TENSIONER
2 - BOLT

DRIVE BELTS

DIAGNOSIS AND TESTING - ACCESSORY DRIVE BELT

CONDITION	POSSIBLE CAUSES	CORRECTIONS
INSUFFICIENT ACCESSORY OUTPUT DUE TO BELT SLIPPAGE	1. Belt too loose	1. Replace belt
	2. Belt excessively glazed or worn	2. Replace and tighten as specified
BELT SQUEAL WHEN ACCELERATING ENGINE	1. Belts too loose	1. Replace tensioner
	2. Belt glazed	2. Replace belts
BELT SQUEAK AT IDLE	1. Belts too loose	1. Replace tensioner
	2. Dirt or paint imbedded in belt	2. Replace belt
	3. Non-uniform belt	3. Replace belt
	4. Misaligned pulleys	4. Align accessories
	5. Non-uniform groove or eccentric pulley	5. Replace pulley
BELT ROLLED OVER IN GROOVE OR BELT JUMPS OFF	1. Broken cord in belt	1. Replace belt
	2. Belt too loose, or too tight	2. Replace tensioner
	3. Misaligned pulleys	3. Align accessories
	4. Non-uniform groove or eccentric pulley	4. Replace pulley

REMOVAL

(1) Raise vehicle on hoist.
(2) Remove the drive belt shield (Fig. 2).

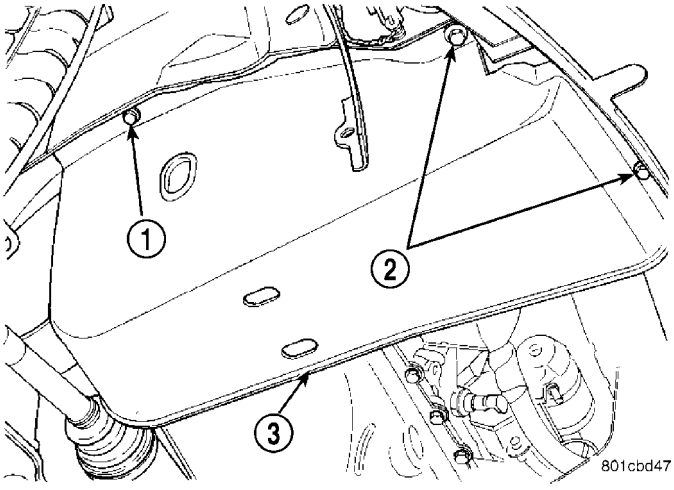


Fig. 2 Accessory Drive Belt Splash Shield

1 - ATTACHING SCREW
2 - ATTACHING SCREWS
3 - SPLASH SHIELD

WARNING: DO NOT ALLOW DRIVE BELT TENSIONER TO SNAP BACK, AS DAMAGE TO TENSIONER AND/OR PERSONAL INJURY COULD RESULT.

(3) Position a wrench on the belt tensioner lug (Fig. 3).
(4) Release belt tension by rotating the tensioner counterclockwise (Fig. 3).
(5) Remove the drive belt.
(6) Carefully return tensioner to its relaxed position.

CLEANING

Clean all foreign debris from belt pulley grooves. The belt pulleys must be free of oil, grease, and coolants before installing the drive belt.

INSPECTION

Belt replacement under any or all of the following conditions is required:

- Excessive wear
- Frayed cords
- Severe glazing

DRIVE BELTS (Continued)

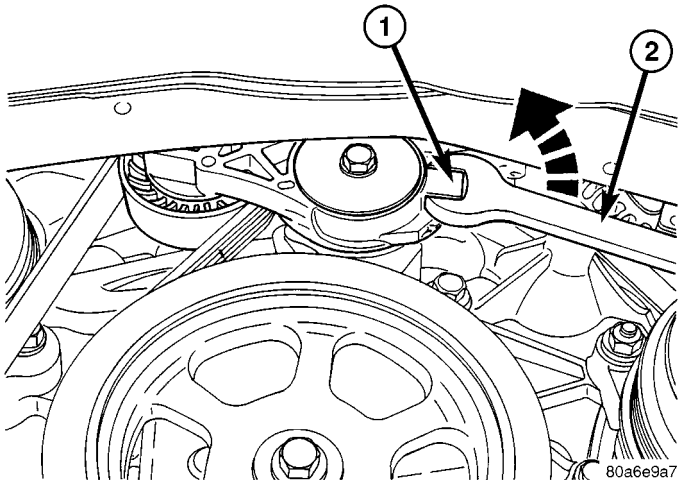


Fig. 3 DRIVE BELT TENSION RELEASE

1 - BELT TENSIONER LUG
2 - WRENCH

Poly-V Belt system may develop minor cracks across the ribbed side (due to reverse bending). These minor cracks are considered normal and acceptable. Parallel cracks are not (Fig. 4).

NOTE: Do not use any type of belt dressing or restorer on Poly-V Belts.

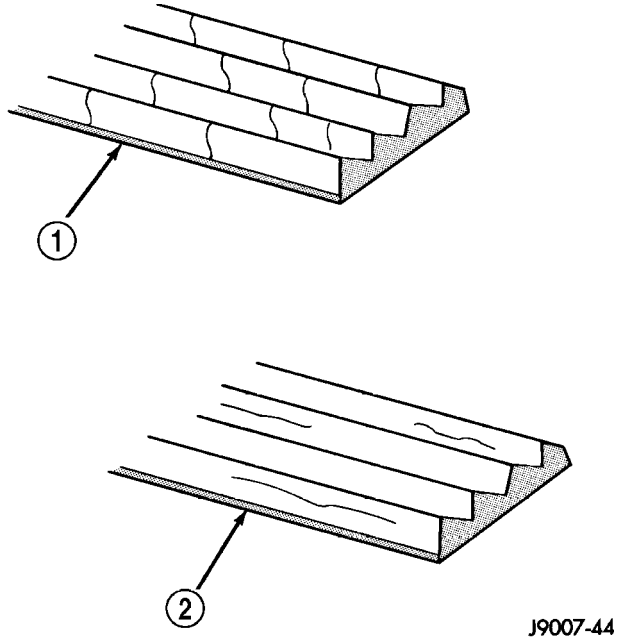


Fig. 4 Drive Belt Inspection

1 - NORMAL CRACKS - BELT OK
2 - NOT NORMAL CRACKS - REPLACE BELT

INSTALLATION

(1) Route and position the drive belt onto all pulleys, except for the crankshaft (Fig. 5).

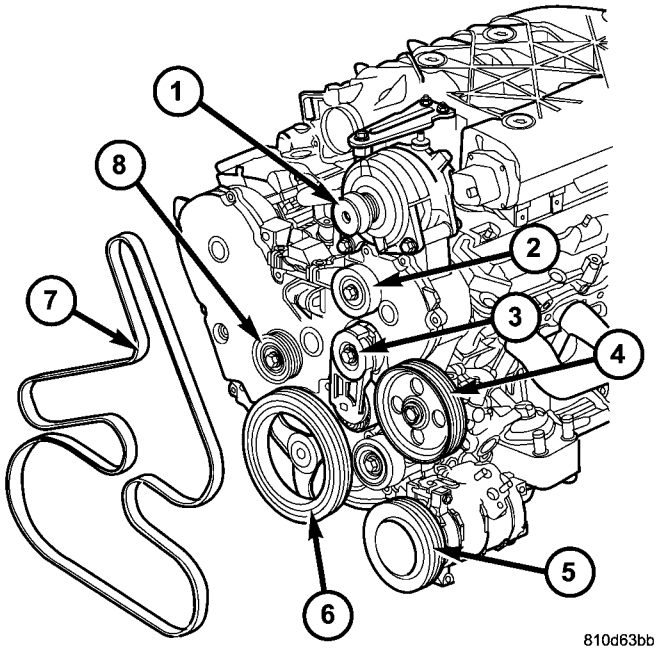


Fig. 5 ACCESSORY DRIVE BELT

1 - GENERATOR
2 - IDLER PULLEY
3 - AUTOMATIC BELT TENIONER
4 - POWER STEERING PUMP PULLEY
5 - AIR CONDITIONING COMPRESSOR PULLEY
6 - CRANKSHAFT PULLEY
7 - ACCESSORY DRIVE BELT
8 - IDLER PULLEY

DRIVE BELTS (Continued)

(2) Rotate belt tensioner counterclockwise until belt can be installed onto the crankshaft pulley (Fig. 3). Slowly release belt tensioner.

(3) Verify belt is properly routed and engaged on all pulleys (Fig. 6).

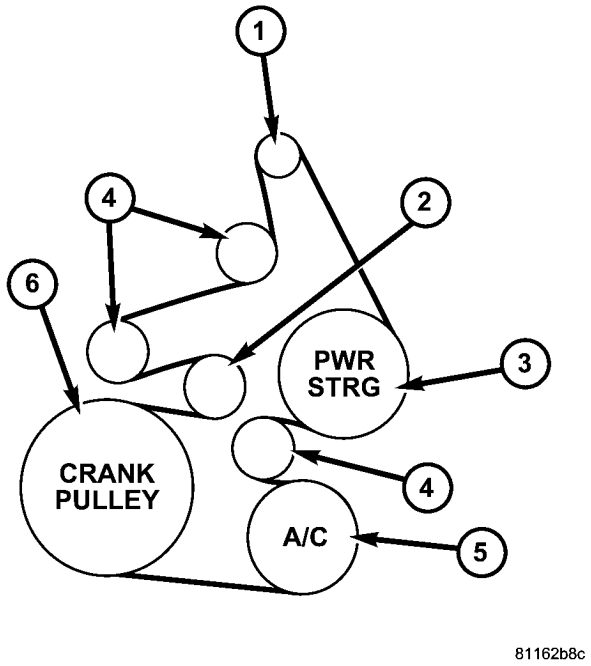


Fig. 6 Accessory Drive Belt Routing

1 - GENERATOR
2 - AUTOMATIC TENSIONER
3 - POWER STEERING PUMP
4 - IDLER PULLEY
5 - A/C COMPRESSOR
6 - CRANKSHAFT PULLEY

(4) Install drive belt shield and lower vehicle.

IDLER PULLEY

REMOVAL

(1) Remove the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(2) Remove the bolt and the upper idler pulley.

(3) Remove the bolt and the lower idler pulley (Fig. 7).

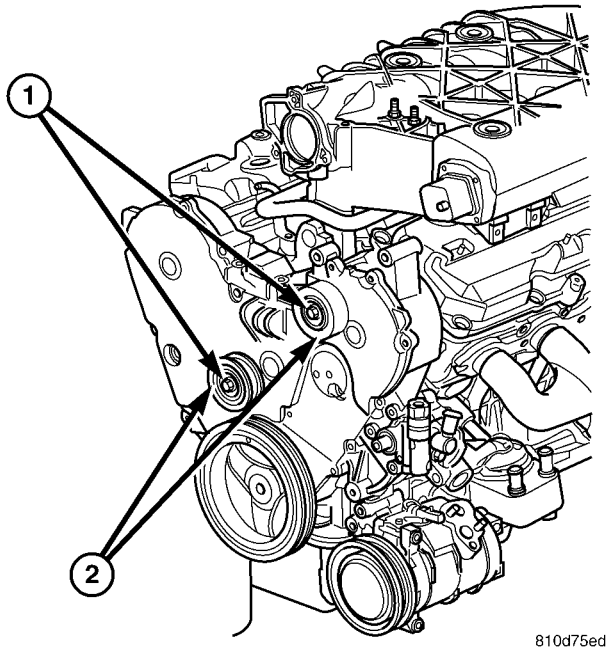


Fig. 7 Idler Pulleys

1 - BOLT
2 - IDLER PULLEY

INSTALLATION

(1) Install bolt and loweridler pulley.

(2) Install bolt and upper idler pulley

(3) Install the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

ENGINE

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ENGINE

DIAGNOSIS AND TESTING - ENGINE COOLING SYSTEM

Establish what driving condition caused the cooling system complaint. The problem may be caused by an abnormal load on the system such as the following: prolonged idle, very high ambient temperature, slight tail wind at idle, slow traffic speed, traffic jam, high speed, steep grade.

DRIVING TECHNIQUES

To avoid overheating the cooling system:

(1) Idle with A/C off when temperature gauge is at end of normal range.

(2) Do not increase engine speed for more air flow and coolant flow because the electric motor fan systems are not responsive to engine RPM. The added cooling from higher coolant flow rate is more than offset by increased heat rejection (engine heat added to coolant).

TRAILER TOWING

Consult the owner's manual under Trailer Towing and do not exceed specified limits.

ENGINE (Continued)

VISUAL INSPECTION

If the cooling system problem is not caused by a driving condition, perform a visual inspection to determine if there was a recent service or accident repair, including the following:

- Loose/damaged water pump drive belt
- Incorrect cooling system refilling (trapped air or low level)
- Brakes possibly dragging
- Damaged hoses
- Loose/damaged hose clamps
- Damaged/incorrect engine thermostat
- Damaged cooling fan motor, fan blade and fan shroud
- Damaged head gasket
- Damaged water pump
- Damaged radiator
- Damaged coolant recovery system
- Damaged heater core
- Open/shorted electrical circuits

If the visual inspection reveals none of the above as cause for a cooling system complaint, refer to the following diagnostic charts.

COOLING SYSTEM DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
PRESSURE CAP IS BLOWING OFF STEAM AND/OR COOLANT. TEMPERATURE GAUGE READING MAY BE ABOVE NORMAL BUT NOT HIGH. COOLANT LEVEL MAY BE HIGH IN COOLANT RESERVE/ OVERFLOW TANK.	1. Pressure relief valve in pressure cap is defective, or was not properly seated.	1. Check condition of pressure cap and cap seal. (Refer to 7 - COOLING/ENGINE/RADIATOR PRESSURE CAP - DIAGNOSIS AND TESTING) Replace cap as necessary.
	2. Incorrect cap was installed.	2. Replace cap as necessary.
	3. Incorrect coolant mixture.	3. Check concentration level of the coolant. (Refer to 7 - COOLING/ ENGINE/COOLANT - DIAGNOSIS AND TESTING) Adjust the ethylene glycol-to-water ratio as required.
COOLANT LOSS TO THE GROUND WITHOUT PRESSURE CAP BLOWOFF. GAUGE IS READING HIGH OR HOT.	1. Coolant leaks in radiator, cooling system hoses, water pump or engine.	1. Pressure test and repair as necessary. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING)
DETONATION OR PRE-IGNITION (NOT CAUSED BY IGNITION SYSTEM). GAUGE MAY NOT BE READING HIGH.	1. Engine overheating.	1. Check reason for overheating and repair as necessary.
	2. Freeze point of coolant not correct. Mixture too concentrated or too diluted.	2. Check concentration level of the coolant. (Refer to 7 - COOLING/ ENGINE/COOLANT - DIAGNOSIS AND TESTING) Adjust the ethylene glycol-to-water ratio as required.
	3. Incorrect cooling system pressure cap.	3. Install correct pressure cap.
HOSE(S) COLLAPSE AS ENGINE COOLS DOWN.	1. Vacuum created in cooling system on engine cool-down is not being relieved through coolant recovery system.	1. (a) Pressure cap relief valve stuck. (Refer to 7 - COOLING/ ENGINE/RADIATOR PRESSURE CAP - DIAGNOSIS AND TESTING) Replace as necessary. (b) Hose between the radiator and overflow container is plugged or pinched. Clean and repair as necessary.

ENGINE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
		(c) Vent at coolant pressure container is plugged. Clean vent and repair as necessary. (d) Pressure container is internally blocked. Clean and repair as necessary.
INADEQUATE AIR CONDITIONER PERFORMANCE (COOLING SYSTEM SUSPECTED).	1. Radiator and/or A/C condenser is restricted, obstructed, or dirty (insects, leaves, etc.). 2. Electrical radiator fan not operating when A/C is operated. 3. Engine is overheating (heat may be transferred from radiator to A/C condenser). High underhood temperatures due to engine overheating may also transfer heat to A/C components. 4. All models are equipped with air seals at the radiator and/or A/C condenser. If these seals are missing or damaged, not enough air flow will be pulled through the radiator and A/C condenser.	1. Remove restriction and/or clean as necessary. 2. For test procedure (Refer to appropriate Diagnostic Information). Repair as necessary. 3. Correct overheating condition. 4. Check for missing or damaged air seals and repair as necessary.
INADEQUATE HEATER PERFORMANCE.	1. Check for a Diagnostic trouble code (DTC). 2. Coolant level low. 3. Obstructions in heater hose fitting at engine or at heater core. 4. Heater hose kinked. 5. Water pump is not pumping coolant to heater core. 6. Air trapped in heater core.	1. For procedures, (Refer to appropriate Diagnostic Information). Repair as necessary. 2. (Refer to 7 - COOLING - STANDARD PROCEDURE) Repair as necessary. 3. Remove heater hoses at both ends and check for obstructions. Repair as necessary. 4. Locate kinked area and repair as necessary. 5. When the engine is fully warmed up, both heater hoses should be hot to the touch. If only one of the hoses is hot, the water pump may not be operating correctly. Replace components as necessary. 6. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING)
HEAT ODOR	1. Various heat shields are used at certain driveline components. One or more of these shields may be missing.	1. Locate missing shields and replace or repair as necessary.

ENGINE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	2. Temperature gauge reading above the normal range. 3. Radiator fan operating incorrectly. 4. Undercoating been applied to an unnecessary component. 5. Engine may be running rich, causing the catalytic converter to overheat	2. Refer to Gauge Is Reading High in Temperature Gauge Indicatication Diagnosis Chart. 3. (Refer to 7 - COOLING/ENGINE/ RADIATOR FAN - OPERATION) Repair as necessary. 4. Clean undercoating as necessary. 5. (Refer to Appropriate Diagnostic Information) Repair as necessary.
POOR DRIVEABILITY (THERMOSTAT POSSIBLY STUCK OPEN). GAUGE MAY BE READING LOW.	1. The engine thermostat must be operating correctly for proper driveability, clean vehicle emissions, and the prevention of sludge buildup in the engine oil. Check for a diagnostic trouble code.	1. (Refer to Appropriate Diagnostic Information) Replace thermostat, if necessary.
STEAM IS COMING FROM FRONT OF VEHICLE NEAR GRILL AREA WHEN WEATHER IS WET, ENGINE WARMED UP AND RUNNING WITH VEHICLE STATIONARY, OR JUST SHUT OFF. TEMPERATURE GAUGE IS NORMAL.	1. During wet weather, moisture (snow, ice, rain, or condensation) on the radiator will evaporate when the thermostat opens. The thermostat opening allows heated coolant into the radiator. When the moisture contacts the hot radiator, steam may be emitted. This usually occurs in cold weather with no fan or air flow to blow it away.	1. Occasional steam emitting from this area is normal. No repair is necessary.
COOLANT COLOR	1. Coolant color is not necessarily an indication of adequate corrosion or temperature protection. Do not rely on coolant color for determining condition of coolant.	1. Check the freeze point of the coolant. (Refer to 7 - COOLING/ ENGINE/COOLANT - DIAGNOSIS AND TESTING) Adjust the ethylene glycol-to-water ratio as necessary.
COOLANT LEVEL CHANGES IN COOLANT BOTTLE. TEMPERATURE GAUGE IS IN NORMAL RANGE.	1. Level changes are to be expected as coolant volume fluctuates with engine temperature. The coolant level will also drop as the system removes air from a recent filling.	1. A normal condition. No repair is necessary.

Refer to (Fig. 1) when using the TEMPERATURE GAUGE INDICATION DIAGNOSIS CHART.

ENGINE (Continued)

TEMPERATURE GAUGE INDICATION DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
TEMPERATURE GAUGE READING IS INCONSISTENT (FLUCTUATES, CYCLES OR IS ERRATIC).	1. Normal reaction to fan and/or thermostat cycle (Fig. 1), Examples B and C. During cold weather operation with the heater blower in the high position, the gauge reading may drop slightly (Fig. 1), Example D. Fluctuation is also influenced by outside temperature and heavy loads (Fig. 1), Example E.	1. A normal condition. No correction is necessary.
	2. Gauge reading rises when vehicle is brought to a stop after heavy use (engine still running) (Fig. 1), Example F.	2. A normal condition. No correction is necessary. Gauge reading should return to normal range (Fig. 1), Example A, after vehicle is driven.
	3. Gauge reading high after restarting a warmed-up (hot) engine.	3. A normal condition. No correction is necessary. The gauge should return to normal range (Fig. 1), Example A, after a few minutes of engine operation.
	4. Temperature gauge or engine coolant temperature sensor defective or shorted. Also, corroded or loose wiring in the electrical circuit.	4. Check operation of gauge or engine coolant temperature sensor and repair, if necessary.

CLEANING

Drain cooling system and refill with clean water. Refer to drain and fill procedures in this section. Run engine with radiator cap installed until upper radiator hose is hot. Stop engine and drain water from system. If water is dirty; fill, run, and drain system again, until water runs clear. Refill cooling system with a 50/50 mixture of the recommended ethylene glycol and distilled water (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION).

INSPECTION

After performing a cleaning/flush procedure, inspect all hoses, clamps and connections for deterioration and leaks. Inspect radiator and heater core for leaks.

COOLANT

DESCRIPTION - ENGINE COOLANT

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASE COOLANT PROPERLY, CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE, PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED, PERSONAL INJURY CAN RESULT.

CAUTION: Use of Propylene Glycol based coolants is not recommended, as they provide less freeze protection and less boiling protection.

The cooling system is designed around the coolant. The coolant must accept heat from engine metal, in the cylinder head area near the exhaust valves and engine block. Then coolant carries the heat to the radiator where the tube/fin radiator can transfer the heat to the air.

COOLANT (Continued)

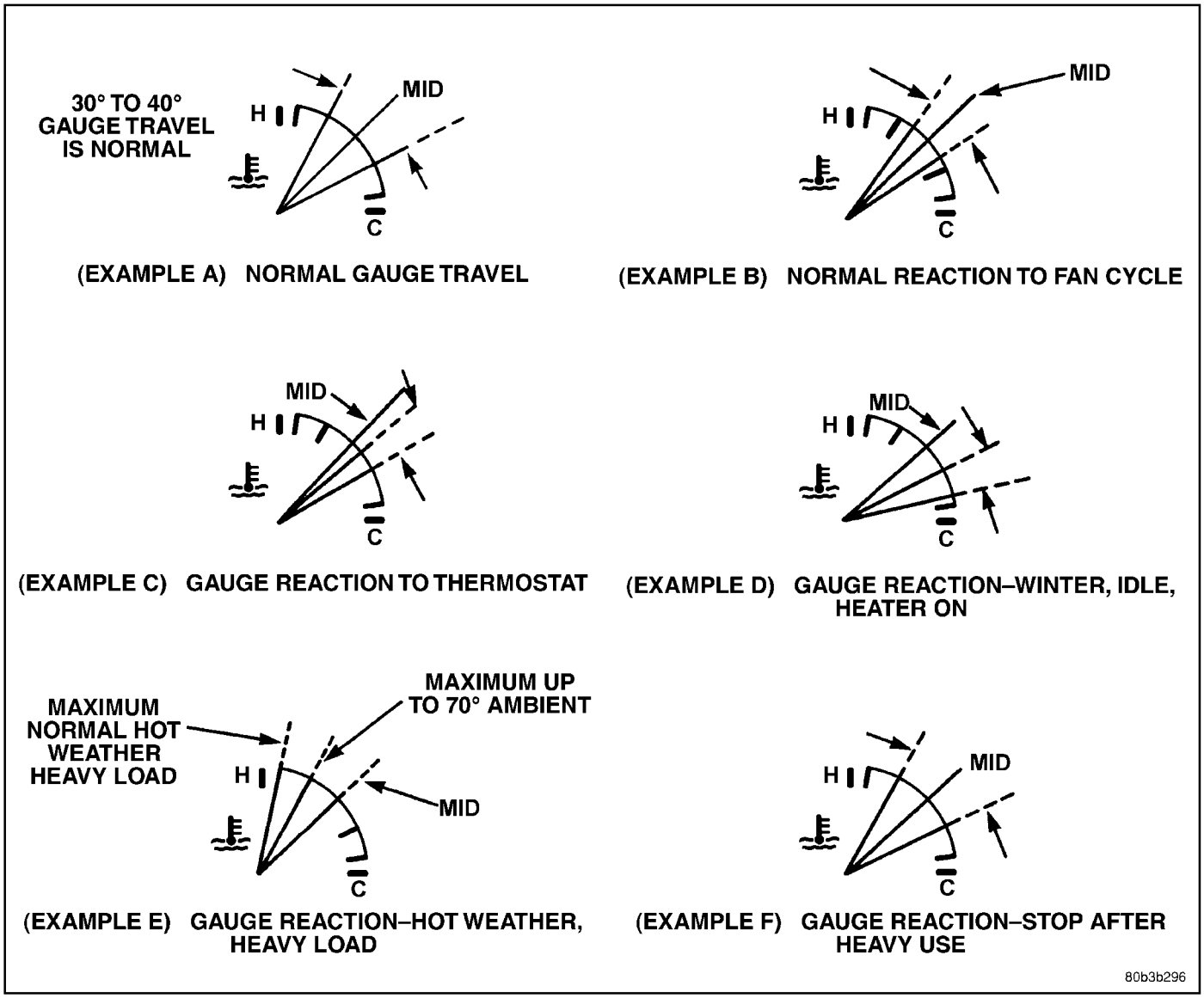


Fig. 1 Temperature Gauge Indications

The use of aluminum cylinder blocks, cylinder heads, and water pumps requires special corrosion protection. Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769), or the equivalent ethylene glycol base coolant with hybrid organic corrosion inhibitors (called HOAT, for Hybrid Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% Ethylene Glycol and 50% distilled water to obtain a freeze point of -37°C (-35°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

The green coolant **MUST NOT BE MIXED** with the orange or magenta coolants. When replacing coolant the complete system flush must be performed before using the replacement coolant.

CAUTION: Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769) may not be mixed with any other type of antifreeze. Doing so will reduce the corrosion protection and may result in premature water pump seal failure. If non-HOAT coolant is introduced into the cooling system in an emergency, it should be replaced with the specified coolant as soon as possible.

DIAGNOSIS AND TESTING - COOLANT CONCENTRATION TESTING

Coolant concentration should be checked when any additional coolant was added to system or after a coolant drain, flush and refill. The coolant mixture offers optimum engine cooling and protection against corrosion when mixed to a freeze point of -37°C (-34°F) to -46°C (-50°F). The use of a hydrometer or a

refractometer can be used to test coolant concentration.

A hydrometer will test the amount of glycol in a mixture by measuring the specific gravity of the mixture. The higher the concentration of ethylene glycol, the larger the number of balls that will float, and higher the freeze protection (up to a maximum of 60% by volume glycol).

A refractometer (Special Tool 8286) (Refer to 7 - COOLING - SPECIAL TOOLS) will test the amount of glycol in a coolant mixture by measuring the amount a beam of light bends as it passes through the fluid.

Some coolant manufactures use other types of glycols into their coolant formulations. Propylene glycol is the most common new coolant. However, propylene glycol based coolants do not provide the same freezing protection and corrosion protection and is not recommended.

CAUTION: Do not mix types of coolant—corrosion protection will be severely reduced.

STANDARD PROCEDURE - COOLANT SERVICE

For engine coolant recommended service schedule, (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION).

COOLANT RECOVERY PRESS CONTAINER

DESCRIPTION

The coolant recovery/reserve system container is mounted in the engine compartment. The container is made of plastic.

OPERATION

The coolant recovery system works with the pressure cap to use thermal expansion and contraction of the coolant to keep the coolant free of trapped air. Provides a convenient and safe method for checking coolant level and adjusting level at atmospheric pressure without removing the pressure cap. It also provides some reserve coolant to cover deaeration, evaporation, or boiling losses.

REMOVAL

(1) Disconnect two recovery hoses from the coolant recovery container (Fig. 2).

(2) Remove the lower attaching nuts (Fig. 2).

(3) Remove the upper attaching nut (Fig. 2).

(4) Remove the recovery container.

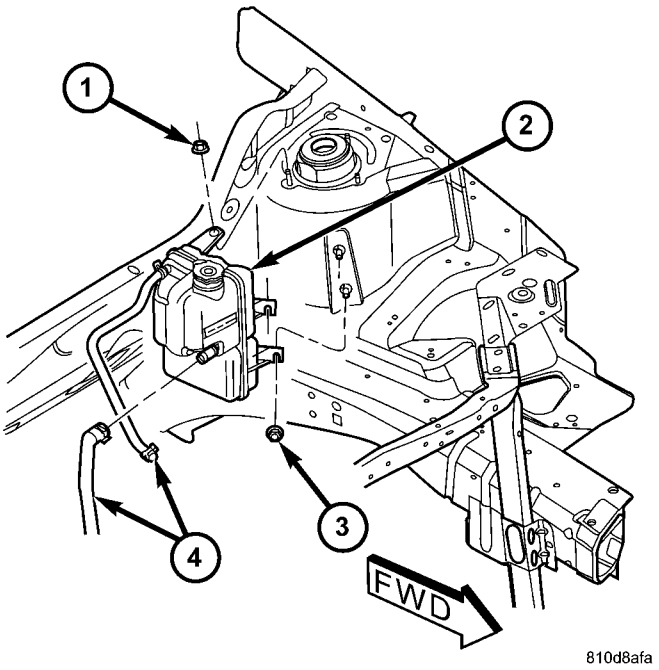


Fig. 2 COOLANT RECOVERY CONTAINER

1 - UPPER RETAINING NUT
2 - COOLANT RECOVERY CONTAINER
3 - LOWER RETAINING NUTS
4 - RECOVERY HOSE

INSTALLATION

(1) Connect the recovery hose to container.

(2) Position the recovery container on the frame rail (Fig. 2).

(3) Install the upper attaching screw and tighten to 7 N·m (60 in. lbs.).

(4) Raise the vehicle on hoist.

(5) Install the lower attaching screws and tighten to 8.5 N·m (75 in. lbs.).

(6) Lower the vehicle.

(7) Add coolant to container as necessary (Refer to 7 - COOLING - STANDARD PROCEDURE).

RADIATOR FAN

OPERATION

RADIATOR FAN OPERATION CHART

COOLANT TEMPERATURE			A/C PRESSURE		TRANSAXLE OIL TEMPERATURE	
Fan Operation Speeds:	Initial	Max	Initial	Max	Initial	Max
Fan On:	104°C (220°F)	110°C (230°F) Fan Speed Duty-Cycles (Ramps-up) from 50% to 99%	1,724 Kpa (250 psi)	2,068 Kpa (300 psi) Fan Speed Duty-Cycles (Ramps-up) from 50% to 99%	98°C (208°F)	109°C (228°F) Fan Speed Duty Cycles (Ramps-up) from 50% to 99%
Fan Off:	101°C (214°F)	Fan Speed Duty-Cycles (Ramps-down) from 99% to 50%	1,379 Kpa (200 psi)	Fan Speed Duty-Cycles (Ramps-down) from 99% to 50%	89°C (192°F)	Fan Speed Duty Cycles (Ramps-down) from 99% to 50%

DIAGNOSIS AND TESTING - RADIATOR FAN MOTOR

RADIATOR FAN DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY RADIATOR FAN	1. Fan blade loose.	1. Replace fan assembly. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)
	2. Fan blade striking a surrounding object.	2. Locate point of fan blade contact and repair as necessary.
	3. Air obstructions at radiator or A/C condenser.	3. Remove obstructions and/or clean debris.
	4. Electric fan motor defective.	4. Replace fan assembly. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)
ELECTRIC FAN MOTOR DOES NOT OPERATE	1. Fan relay, powertrain control module (PCM), coolant temperature sensor, or wiring defective.	1. (Refer to Appropriate Diagnostic Information) Repair as necessary.
	2. Defective A/C pressure transducer.	2. (Refer to Appropriate Diagnostic Information) Repair as necessary.
ELECTRIC RADIATOR FAN OPERATES ALL THE TIME	1. Fan relay, powertrain control module (PCM), coolant temperature sensor or wiring defective.	1. (Refer to Appropriate Diagnostic Information) Repair as necessary.
	2. Check for low coolant level.	2. Add coolant as necessary.
	3. Defective A/C pressure transducer.	3. (Refer to Appropriate Diagnostic Information) Repair as necessary.

RADIATOR FAN (Continued)

REMOVAL

There are no repairs to be made to the fan or shroud assembly. If the fan is warped, cracked, or otherwise damaged, it must be replaced as an assembly (Fig. 3).

(1) Remove the fron fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).

(2) Disconnect the radiator fan electrical connectors.

(3) Remove radiator fan(s) retaining screw (Fig. 3).

(4) Remove the radiator fan(s) by lifting upward to release from mounts.

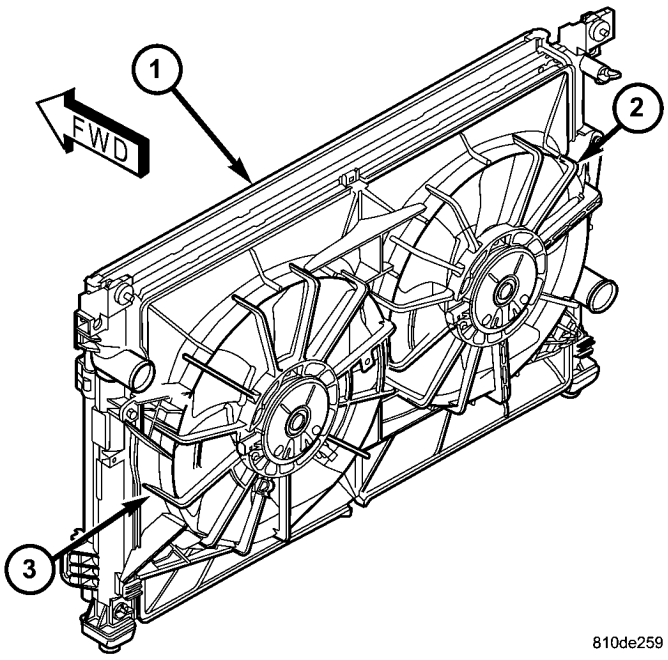


Fig. 3 RADIATOR FANS

1 - RADIATOR
2 - RADIATOR FAN - LEFT
3 - RADIATOR FAN - RIGHT

INSTALLATION

(1) Install the radiator fan(s) into mounts and attaching clips on the radiator.

(2) Install radiator fan(s) attaching screws (Fig. 3). Tighten to 5 N·m (45 in. lbs.).

(3) Connect the radiator fan(s) electrical connectors.

(4) Install the front fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).

(5) Install the upper radiator mounts to the crossmember bolts, if removed. Tighten to 8 N·m (70 in. lbs.).

ENGINE BLOCK HEATER

DESCRIPTION

The engine block heater is available as an optional accessory on all models. The heater is operated by ordinary house current (110 Volt A.C.) through a power cord located behind the radiator grille. This provides easier engine starting and faster warm-up when vehicle is operated in areas having extremely low temperatures. The heater is mounted in a core hole (in place of a core hole plug) in the engine block, with the heating element immersed in coolant.

OPERATION

The block heater element is submerged in the cooling system's coolant. When electrical power (110 volt A.C.) is applied to the element, it creates heat. This heat is transferred to the engine coolant. This provides easier engine starting and faster warm-up when vehicle is operated in areas having extremely low temperatures.

REMOVAL

(1) Drain coolant from radiator and cylinder block (Refer to 7 - COOLING - STANDARD PROCEDURE).

(2) Disconnect the power cord plug from heater.

(3) Loosen bolt. Remove the block heater assembly (Fig. 4).

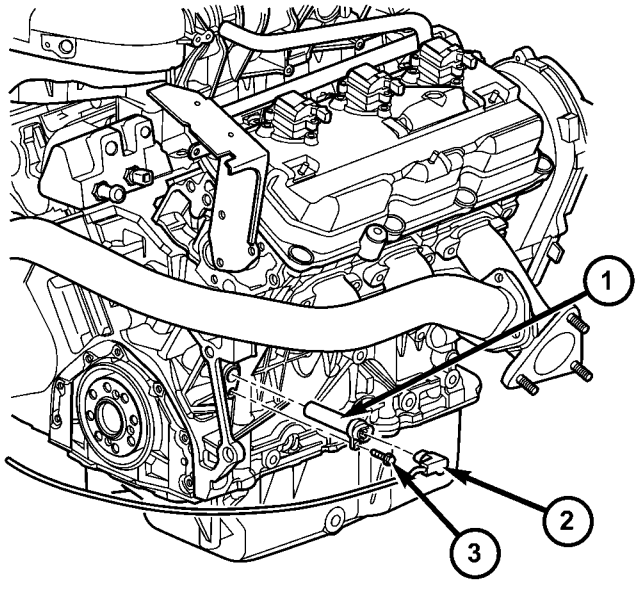


Fig. 4 Block Heater

1 - BLOCK HEATER1
2 - ELECTRICAL CONNECTOR
2 - BOLT

ENGINE BLOCK HEATER (Continued)

INSTALLATION

(1) Clean block core hole and heater seat.
(2) Insert heater assembly with element loop positioned **upward.**
(3) With heater seated, tighten center screw securely to assure a positive seal.
(4) Install power cord plug to heater.
(5) Fill cooling system with coolant to the proper level (Refer to 7 - COOLING - STANDARD PROCEDURE).

ENGINE COOLANT TEMP SENSOR

DESCRIPTION

The engine coolant temperature sensor threads into a coolant passage on lower intake manifold near the thermostat. New sensors have sealant applied to the threads (Fig. 5).

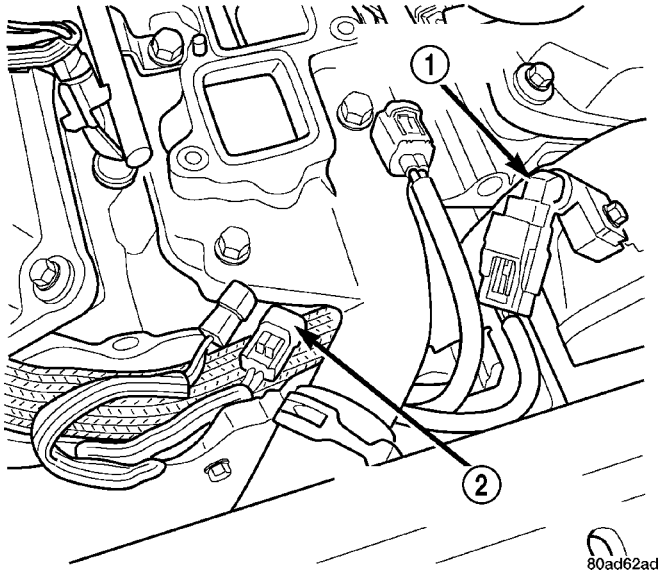


Fig. 5 ENGINE COOLANT TEMPERATURE SENSOR - 3.5L

1 - CAMSHAFT POSITION SENSOR
2 - ENGINE COOLANT TEMPERATURE SENSOR

REMOVAL

WARNING: HOT, PRESSURIZED COOLANT CAN CAUSE INJURY BY SCALDING. COOLING SYSTEM MUST BE PARTIALLY DRAINED BEFORE REMOVING THE COOLANT TEMPERATURE SENSOR.

(1) Drain cooling system below engine coolant temperature sensor level (Refer to 7 - COOLING - STANDARD PROCEDURE).
(2) Disconnect negative cable from remote jumper terminal (Fig. 5)
(3) With the engine cold, disconnect coolant sensor electrical connector.
(4) Remove sensor.

INSTALLATION

(1) Install engine coolant temperature sensor (Fig. 5). Tighten sensor to 7 N·m (60 in. lbs.).
(2) Connect electrical connector to sensor.
(3) Fill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

ENGINE COOLANT THERMOSTAT

REMOVAL

WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(1) Disconnect negative cable from remote jumper terminal.
(2) Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
(3) Raise vehicle on hoist.
(4) Disconnect electrical connectors from engine oil and power steering pressure switches.
(5) Disconnect radiator and heater hoses from thermostat housing.
(6) Remove thermostat housing bolts (Fig. 6).
(7) Remove housing, thermostat, and gasket.

NOTE: The OEM thermostat is staked in place at the factory. To ensure proper seating of replacement thermostat, carefully remove the bulged metal from the thermostat housing using a suitable hand held grinder. It is not necessary to restake the replacement thermostat into the thermostat housing.

INSTALLATION

NOTE: The OEM thermostat is staked in place at the factory. To ensure proper seating of replacement thermostat, carefully remove the bulged metal from the thermostat housing using a suitable hand held grinder. It is not necessary to restake the replacement thermostat into the thermostat housing.

(1) Clean gasket sealing surfaces.
(2) Install thermostat and gasket into thermostat housing. For ease of installation, install bolts in housing for thermostat and gasket retention.
(3) Install thermostat and housing to cylinder block (Fig. 6). Tighten bolts to 12 N·m (105 in. lbs.).

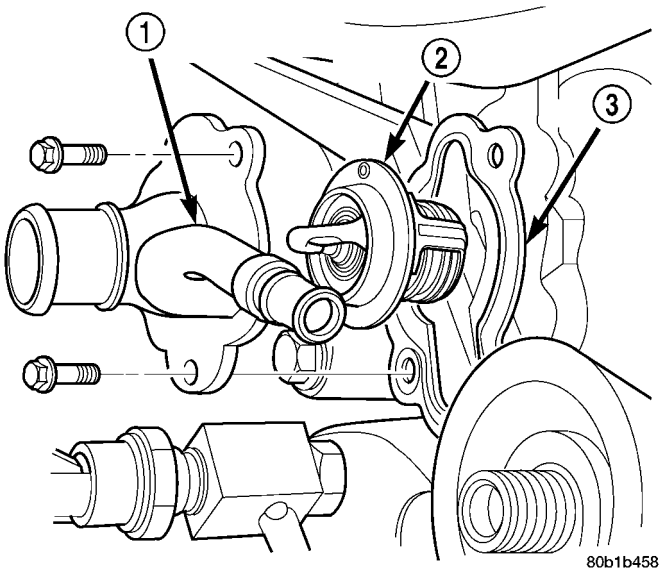


Fig. 6 Thermostat and Housing - 3.5L Engines

1 - THERMOSTAT HOUSING/COOLANT INLET
2 - THERMOSTAT
3 - GASKET

(4) Connect heater and radiator hoses and install hose clamps.

(5) Connect electrical connectors to engine oil and power steering pressure switches.

(6) Lower vehicle and connect negative cable to remote jumper terminal.

(7) Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(8) Connect negative cable to remote jumper terminal.

HEATER SUPPLY TUBE

REMOVAL

WARNING: DO NOT REMOVE PRESSURE CAP WITH SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(1) Drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE).

(2) Remove upper and lower intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(3) Position lower intake manifold upside down on bench and remove the tube retaining bolt (Fig. 7).

(4) Remove tube from manifold and discard O-ring.

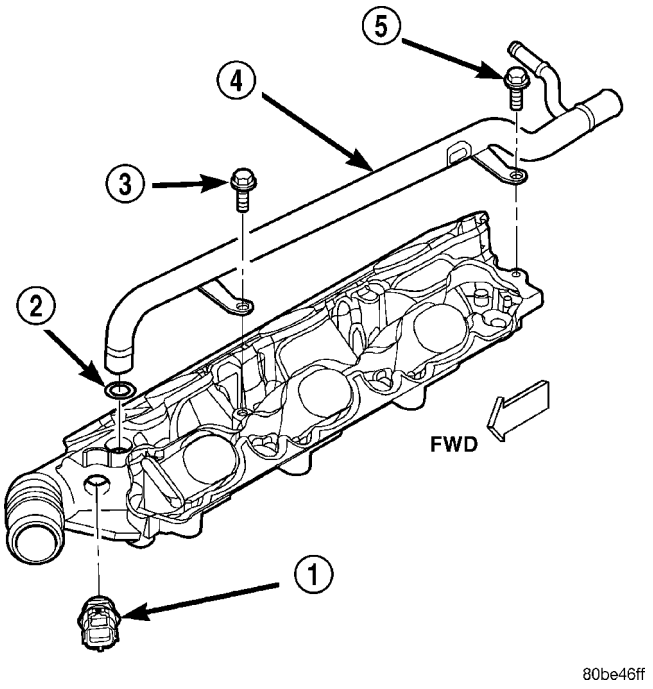


Fig. 7 Heater Supply Tube - 3.5L

1 - COOLANT TEMPERATURE SENSOR
2 - O-RING
3 - BOLT
4 - HEATER SUPPLY TUBE
5 - BOLT

INSTALLATION

(1) Clean heater tube sealing surfaces.

(2) Inspect heater tube O-ring. Replace as necessary.

(3) Lubricate O-ring with a silicone type grease such as Mopar® Dielectric Grease (Fig. 7).

(4) Install O-ring on heater tube.

(5) Install heater tube on manifold.

(6) Install retaining bolts and tighten to 12 N·m (105 in. lbs.).

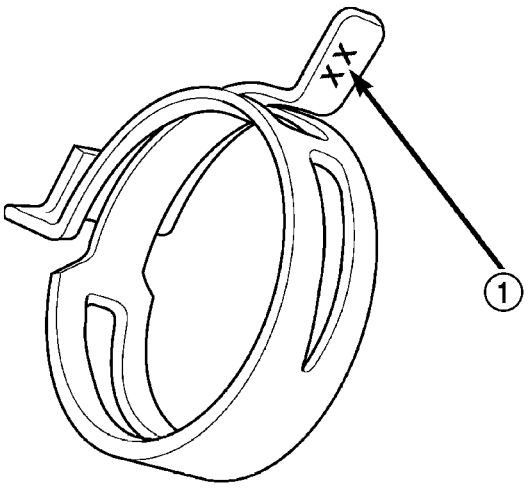
(7) Install lower and upper intake manifolds (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(8) Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

HOSE CLAMPS

DESCRIPTION

The cooling system utilizes both worm drive and spring type hose clamps. If a spring type clamp replacement is necessary, replace with the original Mopar® equipment spring type clamp. To identify size of spring hose clamps, the size in millimeters has been stamped on each clamp (Fig. 8).



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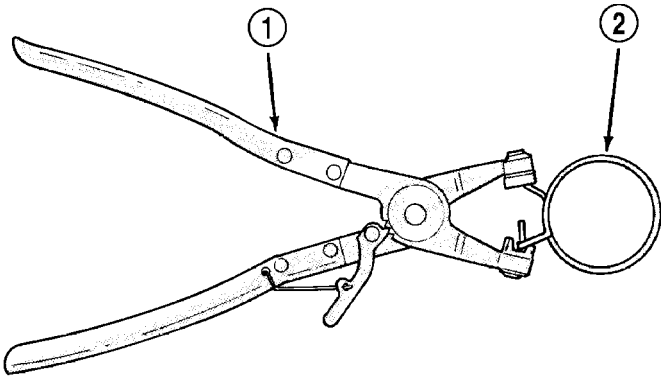
Fig. 8 Spring Clamp Size Location

1 - SPRING CLAMP SIZE LOCATION

OPERATION

The worm type hose clamp uses a specified torque value to maintain proper tension on a hose connection.

The spring type hose clamp applies constant tension on a hose connection. To remove a spring type hose clamp, use Special Tool 6094 or equivalent, constant tension clamp pliers (Fig. 9) to compress the hose clamp.



J9207-36

Fig. 9 Hose Clamp Tool

1 - HOSE CLAMP TOOL 6094
2 - HOSE CLAMP

RADIATOR

REMOVAL

(1) Disconnect negative cable from battery.

(2) Discardge the A/C system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE)

(3) Remove the fron fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).

WARNING: DO NOT REMOVE THE CYLINDER BLOCK PLUG OR THE RADIATOR DRAINCOCK WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(4) Drain the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE).

(5) Disconnect the radiator fan electrical connectors.

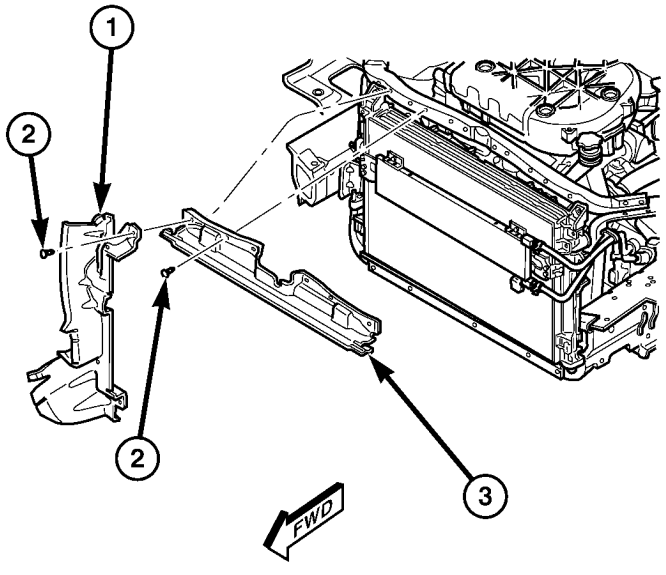
(6) Disconnect coolant reserve/recovery hose.

(7) Remove A/C lines (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C CONDENSER - REMOVAL).

(8) Remove the auxiliary transmission cooler hoses.

(9) Remove the pushpins and the upper radiator seal.

(10) Remove the pushpins and the LH and RH radiator seal (Fig. 10).



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Fig. 10 Radiator Seals

1 - RH RADIATOR SEAL
2. - PUSHPIN
3 - UPPER RADIATOR SEAL

RADIATOR (Continued)

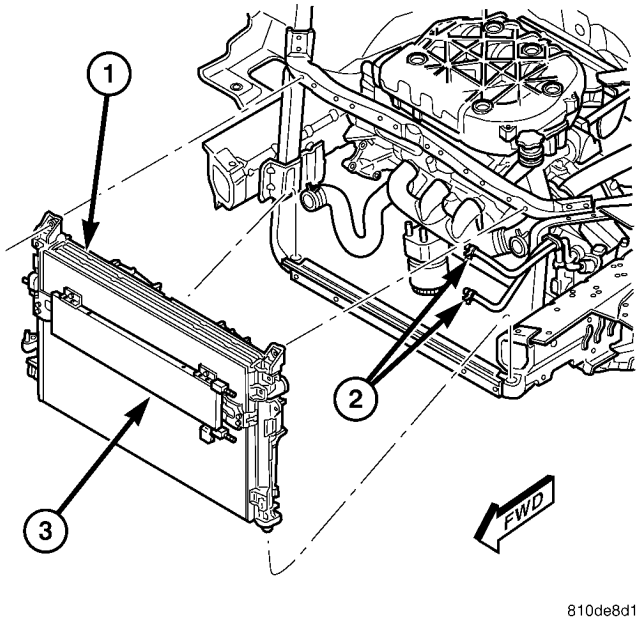


Fig. 11 Radiator Module

1 - RADIATOR MODULE
2 - AUXILIARY TRANSMISSION COOLER HOSES
2 - AUXILIARY TRANSMISSION COOLER

(11) Remove the A/C condenser side brackets to radiator attaching screws (Fig. 12). Separate the condenser from the radiator by lifting upward to disengage from lower mounts (Fig. 12). Allow the condenser to rest in front of radiator.

(12) Remove the upper and lower radiator hoses.

(13) Radiator can now be lifted free from engine compartment. **Care should be taken not to damage radiator cooling fins or water tubes during removal. (Fig. 11)**

(14) Remove the auxiliary transmission from the radiator module.

(15) Remove the cooling fan assembly from the radiator module.

INSTALLATION

(1) Install A/C condenser, (if removed) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/ A/C CONDENSER - INSTALLATION).

(2) Install radiator fan assemble, if removed (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).

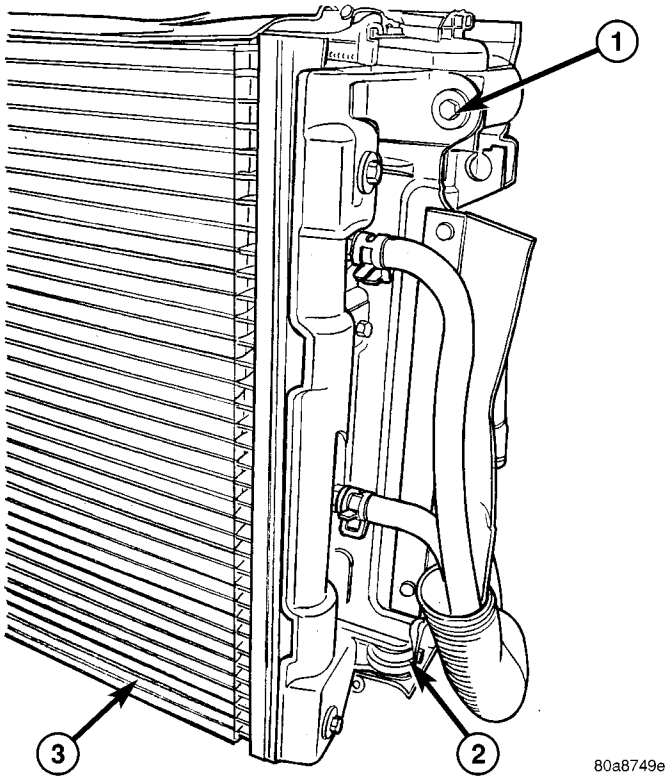


Fig. 12 A/C CONDENSER TO RADIATOR

1 - SCREW - A/C CONDENSER SIDE BRACKET TO RADIATOR
2 - LOWER MOUNT
3 - A/C CONDENSER

(3) Install auxiliary transmission cooler, if removed.

(4) Slide radiator down into position. Seat the radiator with the rubber isolators into the mounting holes provided, with a 10 lbs. force.

(5) Install mounting screws.

(6) Connect the cooling fan electrical connector.

(7) Install the radiator upper and lower hoses

(8) In the LH and RH radiator seals.

(9) Install the upper radiator seal.

(10) Install the auxiliary transmission coole hoses.

(11) Connect the coolant reserve/recovery hose.

(12) Install the front fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).

(13) Fill the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(14) Connect negative cable to battery.

RADIATOR DRAINCOCK

REMOVAL

WARNING: DO NOT REMOVE THE CYLINDER BLOCK PLUG OR THE RADIATOR DRAINCOCK WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

CAUTION: Use of pliers on draincock is not recommended. Damage may occur to part. Draincock should not be removed unless leakage is observed.

(1) Drain the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(2) Turn the draincock stem counterclockwise 180 degrees to the 9:00 o'clock position.

(3) With the stem at the 9:00 o'clock position, pull the draincock assembly from the radiator tank (Fig. 13).

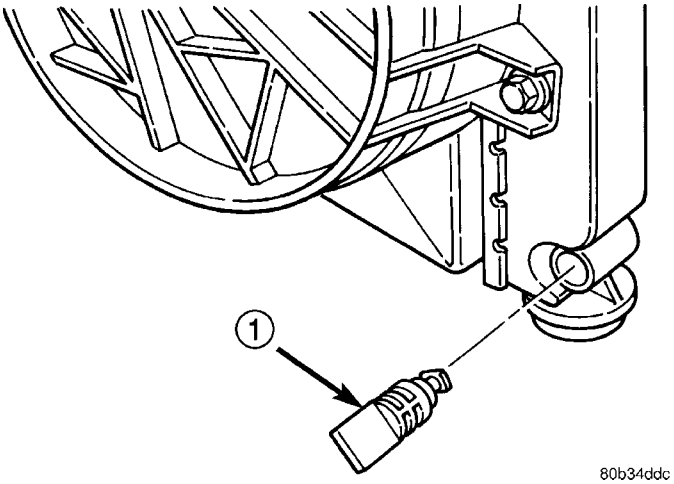


Fig. 13 Draincock

1 - DRAINCOCK ASSEMBLY

INSTALLATION

(1) Inspect the draincock body and O-ring for damage. Replace as necessary.

(2) Position the draincock assembly horizontally to the tank opening with the manufactures identification mark facing down.

(3) Push the draincock assembly into the tank opening while rotating clockwise until it snaps into place.

(4) Close the draincock stem by turning clockwise until it stops at the horizontal position.

(5) Fill the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

PRESSURE CAP

DESCRIPTION

The cooling system pressure cap is located on the collant pressure container. The cap construction includes; stainless steel swivel top, rubber seals, and retainer, main spring, and a spring loaded valve (Fig. 14).

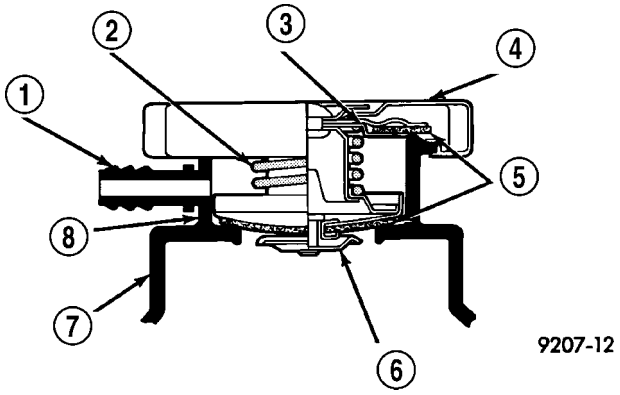


Fig. 14 Cooling System Pressure Cap Filler Neck

1 - OVERFLOW NIPPLE
2 - MAIN SPRING
3 - GASKET RETAINER
4 - STAINLESS-STEEL SWIVEL TOP
5 - RUBBER SEALS
6 - VENT VALVE
7 - COOLANT PRESSURE CONTAINER
8 - FILLER NECK

OPERATION

The cooling system is equipped with a pressure cap that releases excessive pressure; maintaining a range of 97-124 kPa (14-18 psi).

The cooling system will operate at higher than atmospheric pressure. The higher pressure raises the coolant boiling point thus, allowing increased radiator cooling capacity.

There is also a vent valve in the center of the cap. This valve also opens when coolant is cooling and contracting, allowing the coolant to return to cooling system from coolant reserve system tank by vacuum through a connecting hose. **If valve is stuck shut, or the coolant recovery hose is pinched, the radiator hoses will be collapsed on cool down. Clean the vent valve (Fig. 14) and inspect coolant recovery hose routing, to ensure proper sealing when boiling point is reached.**

The gasket in the cap seals the filler neck, so that vacuum can be maintained, allowing coolant to be drawn back into the radiator from the reserve tank. **If the gasket is dirty or damaged, a vacuum may not be achieved, resulting is loss of coolant and eventual overheating due to low coolant level in radiator and engine.**

PRESSURE CAP (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - COOLING SYSTEM PRESSURE CAP TESTING

Dip the pressure cap in water. Clean any deposits off the vent valve or its seat and apply cap to end of the Pressure Cap Test Adaptor that is included with the Cooling System Tester 7700 (Fig. 15). Working the plunger, bring the pressure to 104 kPa (15 psi) on the gauge. If the pressure cap fails to hold pressure of at least 97 kPa (14 psi), replace the pressure cap.

CAUTION: The Cooling System Tester Tool is very sensitive to small air leaks that will not cause cooling system problems. A pressure cap that does not have a history of coolant loss should not be replaced just because it leaks slowly when tested with this tool. Add water to the tool. Turn tool upside down and recheck pressure cap to confirm that cap is bad.

If the pressure cap tests properly while positioned on Cooling System Tester (Fig. 15), but will not hold pressure or vacuum when positioned on the filler neck. Inspect the filler neck and cap top gasket for irregularities that may prevent the cap from sealing properly.

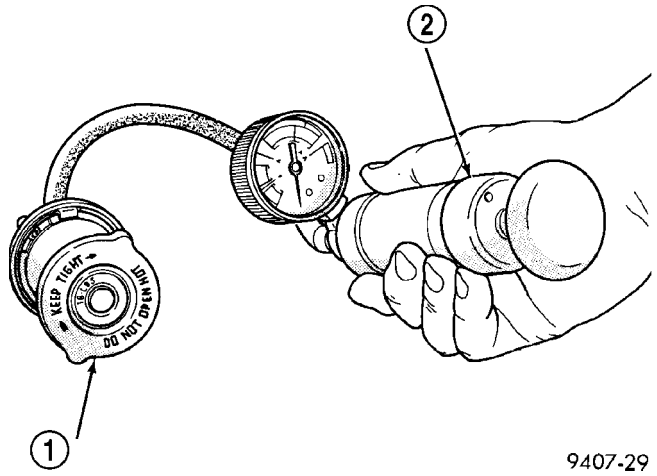


Fig. 15 Pressure Testing Radiator Cap

1 - PRESSURE CAP
2 - PRESSURE TESTER

DIAGNOSIS AND TESTING - PRESSURE CAP TO FILLER NECK SEAL

The pressure cap upper gasket (seal) pressure relief can be checked by removing the overflow hose at the radiator filler neck nipple (Fig. 16). Attach the Radiator Pressure Tool to the filler neck nipple and pump air into the system. Pressure cap upper gasket should relieve at 69-124 kPa (10-18 psi) and hold pressure at 55 kPa (8 psi) minimum.

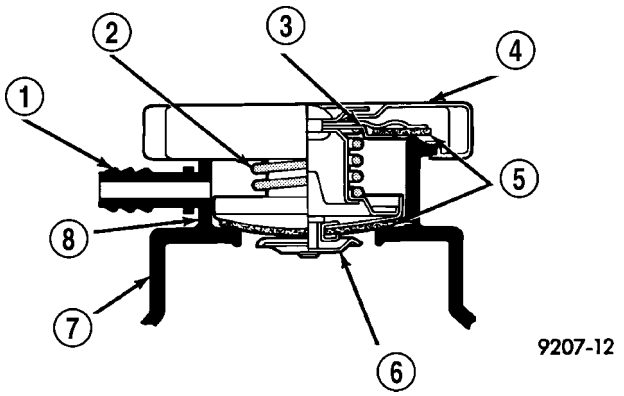


Fig. 16 Cooling System Pressure Cap Filler Neck

1 - OVERFLOW NIPPLE
2 - MAIN SPRING
3 - GASKET RETAINER
4 - STAINLESS-STEEL SWIVEL TOP
5 - RUBBER SEALS
6 - VENT VALVE
7 - COOLANT PRESSURE CONTAINER
8 - FILLER NECK

WARNING: THE WARNING WORDS "DO NOT OPEN HOT" ON THE PRESSURE CAP IS A SAFETY PRECAUTION. WHEN HOT, PRESSURE BUILDS UP IN COOLING SYSTEM. TO PREVENT SCALDING OR INJURY, THE RADIATOR CAP SHOULD NOT BE REMOVED WHILE THE SYSTEM IS HOT OR UNDER PRESSURE.

There is no need to remove the radiator cap at any time **except** for the following purposes:

(1) Check and adjust coolant freeze point.
(2) Refill system with new coolant.
(3) Conducting service procedures.
(4) Checking for vacuum leaks.

WARNING: IF VEHICLE HAS BEEN RUN RECENTLY, WAIT 15 MINUTES BEFORE REMOVING CAP. THEN PLACE A SHOP TOWEL OVER THE CAP AND WITHOUT PUSHING DOWN ROTATE COUNTERCLOCKWISE TO THE FIRST STOP. ALLOW FLUIDS TO ESCAPE THROUGH THE OVERFLOW TUBE AND WHEN THE SYSTEM STOPS PUSHING COOLANT AND STEAM INTO THE CRS TANK AND PRESSURE DROPS PUSH DOWN AND REMOVE THE CAP COMPLETELY. SQUEEZING THE RADIATOR INLET HOSE WITH A SHOP TOWEL (TO CHECK PRESSURE) BEFORE AND AFTER TURNING TO THE FIRST STOP IS RECOMMENDED.

CLEANING

Use only a mild soap to clean the pressure cap.

PRESSURE CAP (Continued)

INSPECTION

Hold the cap in your hand, **right side up** (Fig. 17). The vent valve at the bottom of the cap should be normally closed. The vent valve should open with a slight pull with your finger nail. Replace the pressure cap for any of the following:

- Rubber gasket has swollen, preventing the valve from opening, replace the cap.
- ANy light can be seen between the vent valve and the rubber gasket.**Use only a replacement cap that has a spring to hold the valve shut**.
- Gasket on the bottom of the cal shows noticable thinning.
- Cap has been through more then one engine overheat.

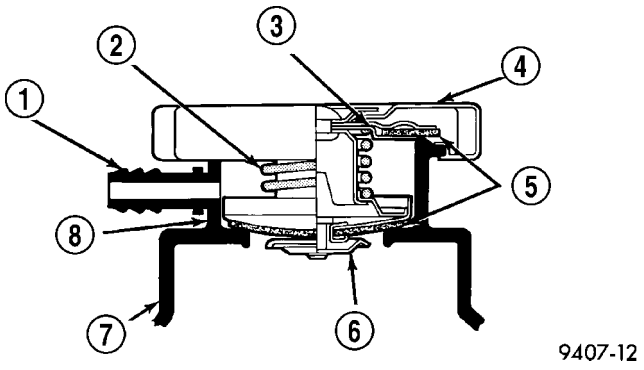


Fig. 17 Cooling System Pressure Cap

1 - OVERFLOW NIPPLE
2 - MAIN SPRING
3 - GASKET RETAINER
4 - STAINLESS-STEEL SWIVEL TOP
5 - RUBBER SEALS
6 - VENT VALVE
7 - COOLANT PRESSURE CONTAINER
8 - FILLER NECK

RADIATOR FAN RELAY

DESCRIPTION

The radiator fan relay is a solid state type and is located on the back of the bumper beam. Refer to WIRING DIAGRAMS for a circuit schematic.

OPERATION

The solid state radiator fan relay is controlled by the Powertrain Control Module (PCM) by way of a Pulse Width Modulated (PWM) signal. The relay control circuit supplies a 12 volt signal to the PCM. The PCM then pulses the ground circuit to achieve fan on time. The relay provides a voltage to the fan motors which is proportional to the pulse width it receives from the PCM. The duty cycle ranges from 50% for low speed operation, then ramps-up to 100% for high speed operation. This fan control system provides infinitely variable fan speeds, allowing for improved fan noise, A/C performance, better engine cooling, and additional vehicle power.

To control operation of the relay, the PCM looks at inputs from:

- Engine coolant temperature
- A/C pressure transducer
- Ambient temperature from the body controller
- Vehicle speed
- Transmission oil temperature

The PCM uses these inputs to determine when the fan should operate and at what speed.

REMOVAL

(1) Open hood.

(2) Disconnect and isolate the battery negative cable.

(3) Partiacially remove the front fascia to gain access to the radiator fan relay (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).

(4) Disconnect the relay electrical connector (Fig. 18).

(5) Remove the rivet attaching the relay to the front bumper beam (Fig. 18).

(6) Remove the relay.

RADIATOR FAN RELAY (Continued)

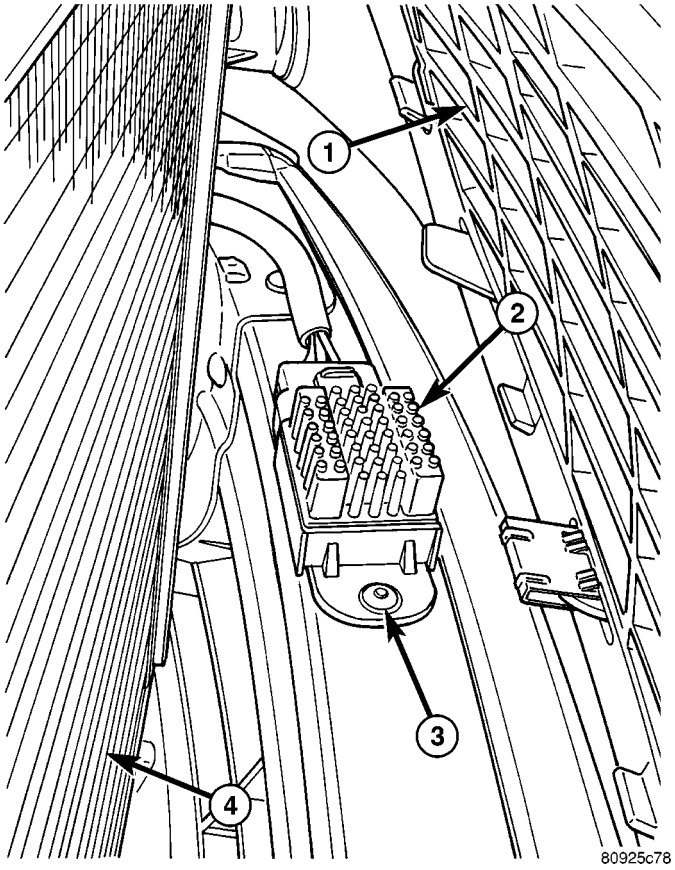


Fig. 18 RADIATOR FAN RELAY

1 - FRONT FASCIA
2 - FAN RELAY
3 - RIVET
4 - A/C CONDENSER (FRONT SIDE)

INSTALLATION

CAUTION: The relay mounting location is designed to dissipate heat. Ensure the relay is securely attached to prevent relay "thermal" shutdown and relay damage, resulting in possible engine overheating.

(1) Position relay and install a new rivet (Fig. 18).
(2) Connect electrical connector to relay.
(3) Install fron facia (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).
(4) Connect negative cable to battery.

WATER PUMP

DESCRIPTION

The 3.5L water pump has a die cast aluminum housing and a plastic swept vane impeller. It bolts directly to the right rear timing belt cover using an O-ring for sealing (Fig. 20). The water pump is driven by the engine timing belt.

REMOVAL

The water pump on all models can be replaced without discharging the air conditioning system.

WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain on water pump body). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of engine coolant is evident on water pump body from the weep hole (shaft seal failure). Be sure to perform a thorough analysis before replacing water pump.

(1) Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

NOTE: The water pump is driven by the timing belt.

(2) Remove engine timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).
(3) Remove water pump mounting bolts (Fig. 19). Note position of longer bolt for proper re-installation.
(4) Remove water pump body from engine (Fig. 19).

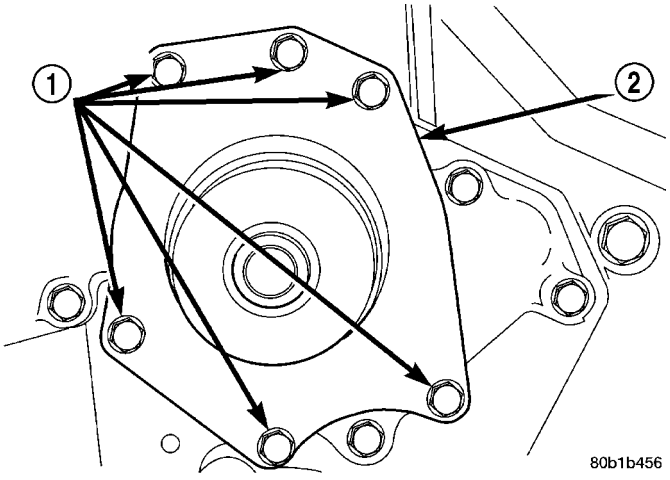


Fig. 19 Water Pump - 3.5L Engine

1 - SCREWS
2 - WATER PUMP BODY

INSPECTION

Inspect and replace the water pump if it has any of the following defects:
(1) Damage or cracks on the pump body.

WATER PUMP (Continued)

(2) Coolant leaks; if the seal is leaking, this will be evident by traces of thick deposits of dried glycol running down the pump body and components below. A thin black stain below pump weep hole/passage is considered normal operation.

(3) Impeller rubs inside of the rear timing belt cover.

(4) Excessively loose or rough turning bearing.

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain on water pump body). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of engine coolant is evident on water pump body. This indicates a shaft seal failure and pump must be replaced. Be sure to perform a thorough analysis before replacing water pump.

INSTALLATION

(1) Clean all O-ring surfaces on pump and cover.

(2) Apply Mopar® Dielectric Grease or the equivalent silicone grease to the O-ring to facilitate assembly. Install new O-ring on water pump (Fig. 20).

(3) Position water pump to engine.

(4) Install mounting bolts and tighten to 12 N·m (105 in. lbs.).

(5) Install timing belt (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

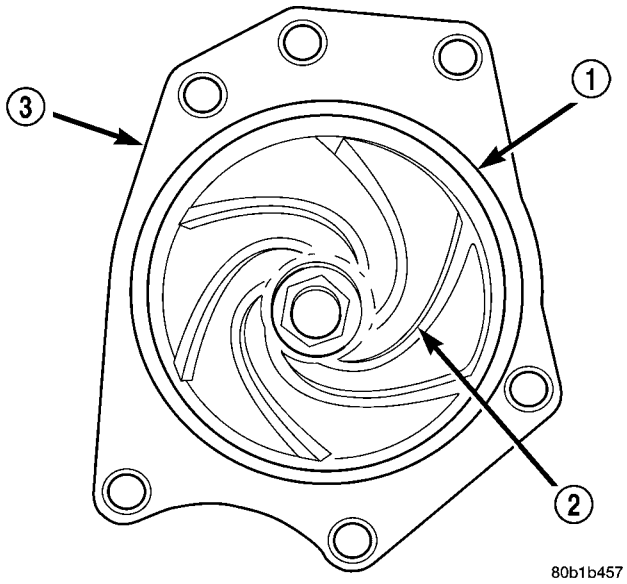


Fig. 20 Water Pump - 3.5L Engine

1 - O-RING
2 - IMPELLER
3 - WATER PUMP BODY

(6) Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

TRANSMISSION

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TRANSMISSION

DESCRIPTION

The transmission oil cooler is an oil-to-air type cooler that is mounted on the front of the radiator and in front of the of the A/C condenser.The transmission oil cooler is equipped with quick connect fittings for the transmission oil cooler lines. Use only approved transmission oil cooler hoses that are molded to fit the space available (Fig. 1).

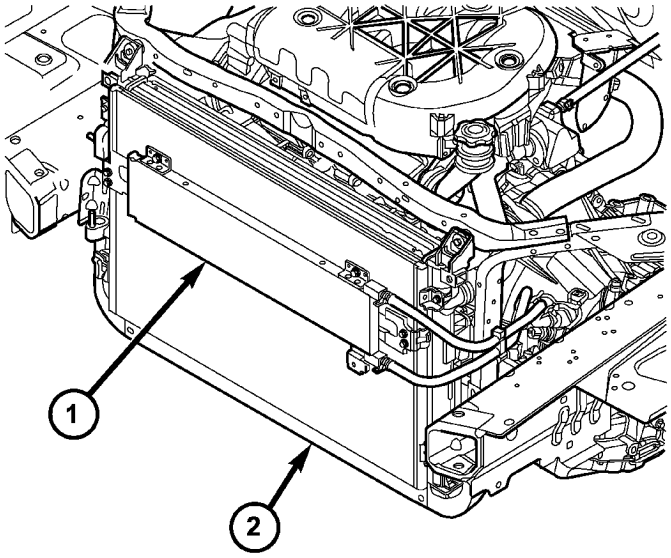


Fig. 1 Auxiliary Transmission Oil Cooler

1 - TRANSMISSION OIL COOLER
2 - COOLING MODULE

OPERATION

Transmission oil is supplied to the oil-to-air- transmission cooler mounted on front side of the radiator. Oil is then returned to the transmission from the external oil cooler (Fig. 1).

STANDARD PROCEDURE - TRANSMISSION COOLER LINE QUICK CONNECT FITTING DISASSEMBLY/ASSEMBLY

DISCONNECT

(1) Remove dust cap by pulling it straight back off of quick connect fitting. (Fig. 2)

(2) Place disconnect tool Special Tool 8875A onto transmission cooler line with the fingers of the tool facing the quick connect fitting.

(3) Slide disconnect tool down the transmission line and engage the fingers of the tool into the retaining clip. When properly engaged in the clip, the tool will fit flush against the quick connect fitting.

(4) Rotate the disconnect tool 60° to expand the retaining clip.

(5) While holding the disconnect tool against the quick connect fitting, pull back on the transmission cooler line to remove.

CONNECT

(1) Align transmission cooler line with quick connect fitting while pushing straight into the fitting.

(2) Push in on transmission cooler line until a “click” is heard or felt (Fig. 3).

(3) Slide dust cap down the transmission cooler line and snap it over the quick connect fitting until it is fully seated and rotates freely (Fig. 3). Dust cap will only snap over quick connect fitting when the transmission cooler line is properly installed.

NOTE: If dust cap will not snap into place, repeat assembly step #2.

INSPECTION

Inspect all hoses, tubes, clamps and connections for leaks, cracks, or damage. Replace as necessary. Use only approved transmission oil cooler hoses that are molded to fit the space available.

TRANSMISSION (Continued)

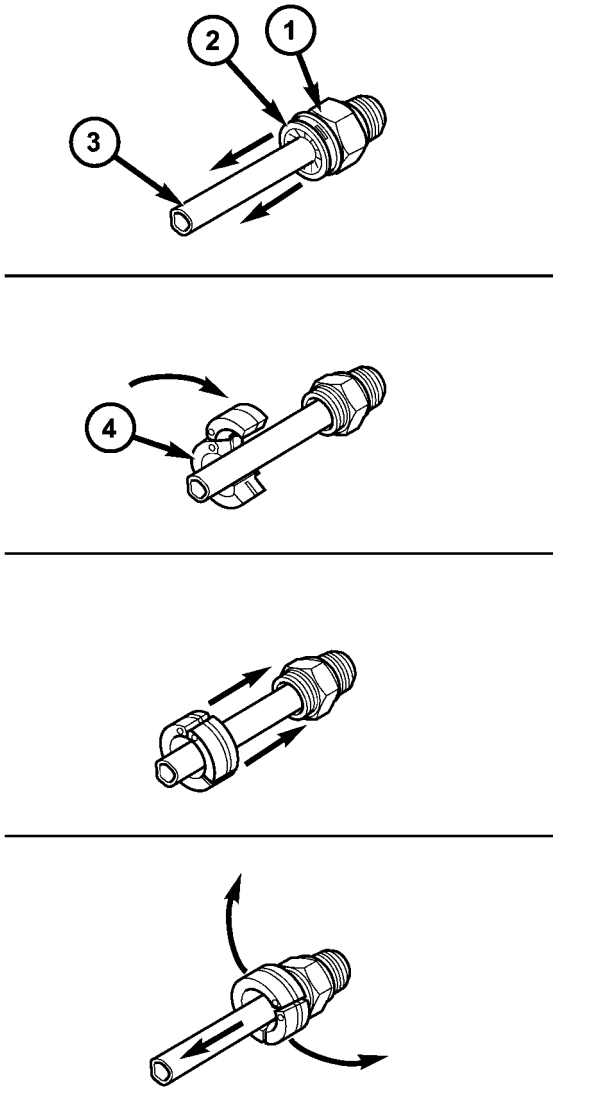


Fig. 2 Oil Cooler Line Quick Connect Fitting - Disassembly

1 - QUICK CONNECT FITTING
2 - DUST CAP
3 - OIL COOLER LINE
4 - SPECIAL TOOL 8875A

Inspect the air-to-oil cooler for leaks, loose mounts, or damage. Replace as necessary.

TRANS COOLER

REMOVAL

(1) Remove the upper radiator closure panel (Refer to 23 - BODY/EXTERIOR/CLOSURE PANEL - REMOVAL).

(2) Disconnect lines from oil cooler (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE).

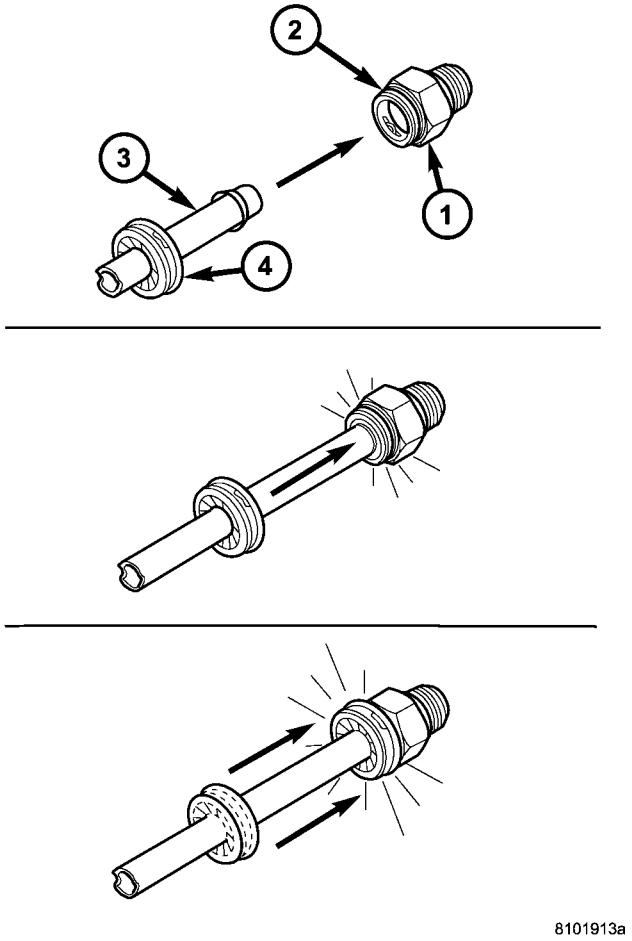


Fig. 3 Oil Cooler Line Quick Connect Fitting - Assembly

1 - QUICK CONNECT FITTING
2 - CLIP
3 - OIL COOLER LINE
4 - DUST CAP

(3) Remove oil cooler attaching screws.

(4) Remove the oil cooler.

INSTALLATION

(1) Position the tranmission cooler on the radiator and install the mounting bolts.Tighten to 5 N·m (45 in. lbs.)

(2) Connect the cooler hoses to the transmission cooler (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE).

(3) Install the cowl plenum grille (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - INSTALLATION).

(4) Start engine and check transmission oil level. Adjust level as necessary.

AUDIO/VIDEO

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AUDIO/VIDEO

DESCRIPTION

An audio system is standard equipment. A rear seat video system is an available option. Two radio receivers are offered. The audio/video system uses an ignition switched source of battery current so that the system will only operate when the ignition switch is in the RUN or ACCESSORY/ACCESSORY DELAY positions.

The audio/video system includes the following components:

- Amplifier
- Antenna integral to the right quarter glass
- CD/DVD changer (if equipped)
- Radio noise suppression components
- Radio receiver
- Speakers
- Video screen (if equipped)

Certain functions and features of the audio/video system rely upon resources shared with other electronic modules in the vehicle over the Programmable Communication Interface (PCI) bus network. The data bus network allows the sharing of sensor information. For diagnosis of these electronic modules or

of the data bus network, the use of a DRB III® scan tool and the proper Diagnostic Procedures manual are recommended.

For complete circuit diagrams, refer to the appropriate wiring information.

WARNING

WARNING:: THIS VEHICLE CONTAINS MERCURY ADDED DEVICES ADDED BY THE MANUFACTURER: REAR SEAT VIDEO DISPLAY. REMOVE DEVICES BEFORE VEHICLE DISPOSAL. UPON REMOVAL OF DEVICES, PLEASE REUSE, RECYCLE, OR DISPOSE OF AS HAZARDOUS WASTE.

DIAGNOSIS AND TESTING - AUDIO/VIDEO

Any diagnosis of the Audio system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

AUDIO SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
NO AUDIO.	1. FUSE INOPERATIVE.	1. CHECK RADIO FUSES IN INTEGRATED POWER MODULE (IPM). REPLACE FUSES, IF REQUIRED.
	2. RADIO CONNECTOR DAMAGED.	2. CHECK FOR LOOSE OR CORRODED RADIO CONNECTOR. REPAIR, IF REQUIRED.
	3. WIRING DAMAGED.	3. CHECK FOR BATTERY VOLTAGE AT RADIO CONNECTOR. REPAIR WIRING, IF REQUIRED.
	4. GROUND DAMAGED.	4. CHECK FOR CONTINUITY BETWEEN RADIO CHASSIS AND A KNOWN GOOD GROUND. THERE SHOULD BE CONTINUITY. REPAIR GROUND, IF REQUIRED.
	5. RADIO INOPERATIVE.	5. EXCHANGE OR REPLACE RADIO, IF REQUIRED.
	6. AMPLIFIER INOPERATIVE.	6. PERFORM DIAGNOSIS ON AMPLIFIER. REPLACE AS NECESSARY.
NO DISPLAY.	1. FUSE INOPERATIVE.	1. CHECK RADIO FUSES. REPLACE FUSES, IF REQUIRED.
	2. RADIO CONNECTOR DAMAGED.	2. CHECK FOR LOOSE OR CORRODED RADIO CONNECTOR. REPAIR, IF REQUIRED.
	3. WIRING DAMAGED.	3. CHECK FOR BATTERY VOLTAGE AT RADIO CONNECTOR. REPAIR WIRING, IF REQUIRED.
	4. GROUND DAMAGED.	4. CHECK FOR CONTINUITY BETWEEN RADIO CHASSIS AND A KNOWN GOOD GROUND. THERE SHOULD BE CONTINUITY. REPAIR GROUND, IF REQUIRED.
	5. RADIO INOPERATIVE.	5. EXCHANGE OR REPLACE RADIO, IF REQUIRED.

AUDIO/VIDEO (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
NO MEMORY.	1. FUSE INOPERATIVE.	1. CHECK IGNITION-OFF DRAW FUSE. REPLACE FUSE, IF REQUIRED.
	2. RADIO CONNECTOR DAMAGED.	2. CHECK FOR LOOSE OR CORRODED RADIO CONNECTOR. REPAIR, IF REQUIRED.
	3. WIRING DAMAGED.	3. CHECK FOR BATTERY VOLTAGE AT RADIO CONNECTOR. REPAIR WIRING, IF REQUIRED.
	4. GROUND DAMAGED.	4. CHECK FOR CONTINUITY BETWEEN RADIO CHASSIS AND A KNOWN GOOD GROUND. THERE SHOULD BE CONTINUITY. REPAIR GROUND, IF REQUIRED.
	5. RADIO INOPERATIVE.	5. EXCHANGE OR REPLACE RADIO, IF REQUIRED.
POOR RADIO RECEPTION.	1. ANTENNA OR CABLE DAMAGED OR INOPERATIVE.	1. REFER TO ANTENNA DIAGNOSIS. REPAIR OR REPLACE ANTENNA, IF REQUIRED.
	2. GROUND DAMAGED.	2. CHECK FOR CONTINUITY BETWEEN RADIO CHASSIS AND A KNOWN GOOD GROUND. THERE SHOULD BE CONTINUITY. REPAIR GROUND, IF REQUIRED.
	3. RADIO INOPERATIVE.	3. EXCHANGE OR REPLACE RADIO, IF REQUIRED.
	4. POOR ANTENNA CONNECTION AT RADIO OR IN LINE.	4. VERIFY PROPER CONNECTION.
SOUND DISTORTION (VIBRATION FROM SPEAKER AREA, BUZZING - HUMMING	1. DOOR TRIM PANEL LOOSE OR MISSING FASTENERS.	1. INSPECT DOOR TRIM PANEL AND CORRECT AS NECESSARY. REPLACE ANY MISSING FASTENERS.
	2. WATER SHIELD LOOSE OR MISALIGNED.	2. INSPECT WATER SHIELD AND ADJUST AS REQUIRED.
	3. ITEMS PLACED IN DOOR TRIM PANEL MAP POCKETS VIBRATING OR MOVING FROM SIDE TO SIDE.	3. REMOVE ITEMS FROM DOOR TRIM PANEL. ENSURE THAT VIBRATION IS NO LONGER PRESENT.
NO/POOR TAPE OPERATION.	1. TAPE DAMAGED.	1. INSERT KNOWN GOOD TAPE AND TEST OPERATION.
	2. FOREIGN OBJECTS BEHIND TAPE DOOR.	2. REMOVE FOREIGN OBJECTS AND TEST OPERATION.
	3. DIRTY CASSETTE TAPE HEAD.	3. CLEAN HEAD WITH MOPAR CASSETTE HEAD CLEANER.
	4. RADIO INOPERATIVE.	4. EXCHANGE OR REPLACE RADIO, IF REQUIRED.

AUDIO/VIDEO (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
NO COMPACT DISC OPERATION	1. CD DAMAGED.	1. INSERT KNOWN GOOD CD AND TEST OPERATION.
	2. FOREIGN MATERIAL ON CD.	2. CLEAN CD AND TEST OPERATION.
	3. CONDENSATION ON CD OR OPTICS.	3. ALLOW TEMPERATURE OF VEHICLE INTERIOR TO STABILIZE AND TEST OPERATION.
	4. RADIO INOPERATIVE.	4. EXCHANGE OR REPLACE RADIO, IF REQUIRED.
HEADPHONES WILL NOT HOLD A CHANNEL OR HAVE STATIC	1. WEAK BATTERIES IN THE HEADPHONES.	1. REPLACE BATTERIES.
	2. CLOSENESS TO RADIO TRANSMITTER SUCH AS A RADIO TOWER, AIRPORT TRANSMITTER OR SOME MOBILE RADIOS.	2. MOVE TO AN AREA AWAY FROM THESE CONDITIONS.
REMOTE CONTROL INOPERATIVE	1. WEAK BATTERIES IN THE REMOTE CONTROL.	1. REPLACE BATTERIES.

AUDIO/VIDEO (Continued)

VIDEO SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
NO VIDEO (DVD PLAYER WILL NOT LOAD OR EJECT)	1. FUSE INOPERATIVE.	1. CHECK FUSES. REPLACE FUSES IF REQUIRED.
	2. LOOSE OR DAMAGED DVD PLAYER CONNECTOR	2. CHECK FOR LOOSE OR CORRODED DVD PLAYER CONNECTOR (16 PIN). REPAIR OR REPLACE AS REQUIRED.
	3. LOOSE OR DAMAGED WIRING/DVD PLAYER INOPERATIVE	3. CHECK PIN 1 (B+) AND PIN 9 (GROUND) OF THE 16 PIN CONNECTOR, THEN CHECK PIN 1 (B+) AND PIN 7 (GROUND) OF THE 12 PIN CONNECTOR. IF THE 16 PIN CONNECTOT DOES NOT SHOW VOLTAGE, THE 12 PIN CONNECTOR WILL NOT SHOW VOLTAGE (THE 12 PIN IS FED FROM THE 16 PIN). IF VOLTAGE IS OK ON THE 16 PIN, BUT NOT PRESENT ON THE 12 PIN, UNPLUG THE 12 PIN HARNESS FROM THE PLAYER AND CHECK THE CONNECTOR PINSON THE BACK OF THE PLAYER. IF VOLTAGE IS PRESENT ON THE 12 PIN CONNECTOR, THE SCREEN OR THE 12 PIN HARNESS SHOULD BE REPLACED. IF THERE IS STILL NO VOLTAGE ON THE 12 PIN CONNECTOR, THE DVD PLAYER SHOULD BE REPLACED.
	4. GROUND CONNECTION DAMAGED	4. CHECK FOR CONTINUITY BETWEEN DVD PLAYER AND A KNOWN GOOD GROUND. THERE SHOULD BE CONTINUITY. REPAIR GROUND IF REQUIRED.
	5. DVD PLAYER DAMAGED	5. EXCHANGE OR REPLACE DVD PLAYER IF REQUIRED.
	6. DVD DAMAGED. AVOID USING CD'S OR DVD'S THAT HAVE ADHESIVE TYPE LABELS, AS THEY MAY CAUSE THE DISC TO BECOME JAMMED.	6. INSERT KNOWN GOOD DVD AND TEST OPERATION.

AUDIO/VIDEO (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO DISPLAY. AUDIO HEARD THROUGH SPEAKERS	1. LOOSE OR DAMAGED CONNECTORS	1. CHECK FOR LOOSE OR CORRODED DVD PLAYER CONNECTOR (12 PIN). CHECK FOR LOOSE OR CORRODED VIDEO SCREEN CONNECTOR. REPAIR IF REQUIRED. CHECK FOR LOOSE OR DAMAGED IN-LINE CONNECTOR.
	2. WIRING DAMAGED	2. WITH HARNESS CONNECTED, CHECK FOR VIDEO SIGNAL VOLTAGE AT DVD PLAYER AND AT VIDEO SCREEN HARNESS. PLACE KNOWN GOOD DVD INTO DVD PLAYER. PLACE POSITIVE LEAD OF VOLTMETER ON PIN 5 (VIDEO SIGNAL) OF THE 12 PIN CONNECTOR. PLACE NEGATIVE LEAD ON PIN 6 (VIDEO GROUND). READINGS SHOULD BE BETWEEN 0.1V TO 2V DC.
	3. VIDEO SCREEN DAMAGED	3. EXCHANGE OR REPLACE VIDEO SCREEN IF REQUIRED.
WHITE DISPLAY	1. LOW VOLTAGE	1. CHECK FOR BATTERY VOLTAGE (9V-16V) AT DVD PLAYER 12 PIN CONNECTOR (PIN 1-BATTERY, PIN 7-GROUND). DISPLAY WILL BE WHITE IF VOLTAGE DROPS BELOW 6V.
	2. VIDEO SCREEN DAMAGED	2. EXCHANGE OR REPLACE VIDEO SCREEN IF REQUIRED.
DARK OR BRIGHT SPOTS ON SCREEN	1. BRIGHTNESS SETTING REQUIRES ADJUSTMENT.	1. ADJUST BRIGHTNESS SETTING OF VIDEO SCREEN BY PRESSING BUTTONS ON SIDE OF VIDEO SCREEN UNTIL DESIRED LEVEL IS REACHED. START WITH A BLACK SCREEN, THEN PRESS BUTTON UP 16-20 TIMES. THERE ARE 64 TOTAL STEPS OF BRIGHTNESS.

AUDIO/VIDEO (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
BRIGHT OR DARK DISPLAY	1. VIDEO SCREEN DISPLAY PIXEL DEFECT.	1. THE ACCEPTABLE LEVEL OF DOTS ON THE SCREEN IS (GREEN-1, RED-2) OR A TOTAL (GREEN+RED+BLUE+ WHITE+BLACK) = 8. REPLACE OR EXCHANGE VIDEO SCREEN IF NECESSARY.
VIDEO SELECTIONS DO NOT APPEAR FULL SCREEN WIDTH	1. ASPECT RATIO IS SET INCORRECTLY.	1. USING MODE BUTTON, ADJUST UNTIL VIDEO APPEARS CORRECTLY.
	2. SOME DVD'S ARE TWO SIDED. ONE SIDE IS WIDE SCREEN FORMAT AND THE OTHER IS FULL SCREEN OR THERE MAY BE A WIDE SCREEN OR STANDARD SCREEN FORMAT ON THE DISC.	2. ENSURE THAT DVD IS INSERTED CORRECTLY.
BUTTONS ON VIDEO SCREEN INOPERATIVE	1. VIDEO SCREEN DAMAGED.	1. PLACE KNOWN GOOD DVD INTO DVD PLAYER. ONCE IMAGE APPEARS ON VIDEO SCREEN, PRESS TOP BUTTON ON SIDE OF VIDEO SCREEN TO ADJUST WIDTH OF DISPLAY. PRESS BOTTOM BUTTONS TO ADJUST BRIGHTNESS. ONCE DVD MENU APPEARS ON VIDEO SCREEN, PRESS MIDDLE BUTTON ON VIDEO SCREEN. HIGHLIGHTED SELECTION WILL BEGIN TO PLAY. IF ANY OF THE BUTTONS DO NOT FUNCTION, REPLACE OR EXCHANGE VIDEO SCREEN.

AMPLIFIER

DESCRIPTION

All vehicles are equipped with Infinity speaker systems. The base system has seven speakers and a six channel amplifier with maximum power output of 200W. The Intermezzo system has the same door and instrument panel speakers as the base system plus a dual voice coil (2 channel) subwoofer and a surround sound amplifier with maximum power output of 385W. The amplifiers are powered by dual 12V feeds from a single Integrated Power Module (IPM) fuse and are energized by a combination of ignition line status and PCI bus messaging from the radio.

OPERATION

The amplifiers receive right and left channel audio inputs from the radio receiver. The base amplifier sends audio outputs to five channels, the Intermezzo outputs to seven channels. These amplifiers also receive audio inputs from the navigation unit and hands free phone module when so equipped.

DIAGNOSIS AND TESTING - AMPLIFIER

Any diagnosis of the Audio system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

The power amplifier unit should be checked if there is no sound output noted from the speakers. For diagnosis of the speakers, (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - DIAGNOSIS AND TESTING).

AMPLIFIER (Continued)

REMOVAL

BASE

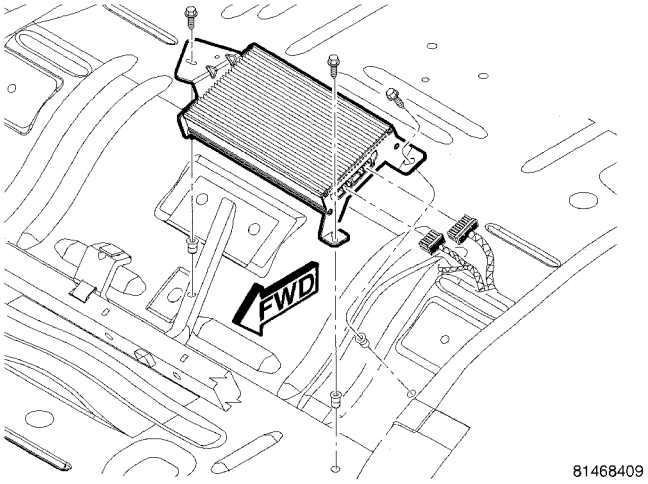


Fig. 1 AMPLIFIER - BASE

(1) Disconnect and isolate the battery negative cable.
(2) Fold the left rear seat flat.
(3) Lift up the door covering the jack and amplifier.
(4) Remove the mounting fasteners.
(5) Disconnect the electrical harness connectors and remove amplifier (Fig. 1).

INTERMEZZO

(1) Remove the rear floor stowage tray.
(2) Remove the three mounting fasteners (Fig. 2).
(3) Disconnect wire harness connectors and remove amplifier (Fig. 2).

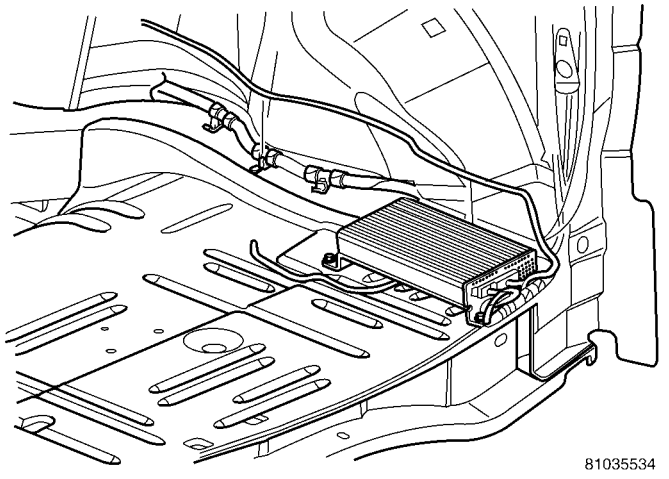


Fig. 2 AMPLIFIER - INTERMEZZO

INSTALLATION

BASE

(1) Connect electrical harness connectors and position amplifier.
(2) Install and tighten mounting fasteners.
(3) Close door covering jack and amplifier.
(4) Raise seat into position.
(5) Connect battery negative cable.

INTERMEZZO

(1) Connect electrical harness connectors and install amplifier.
(2) Install and tighten mounting fasteners.
(3) Install the rear floor stowage tray (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).
(4) Connect the battery negative cable.

ANTENNA CABLE

REMOVAL

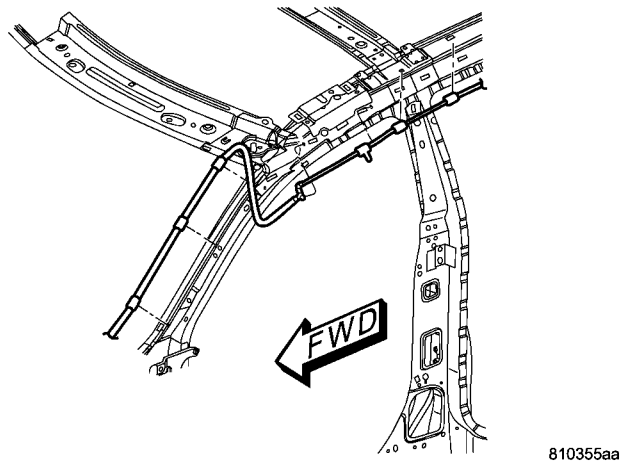


Fig. 3 ANTENNA CABLE MOUNTING

(1) Disconnect and isolate the battery negative cable.
(2) Remove right side A-pillar trim (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL).
(3) Remove headliner to access antenna cable (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
(4) Disconnect electrical harness connector and antenna from antenna module (Fig. 3).
(5) Remove antenna cable from roof panel.
(6) Under the right side of the instrument panel, disconnect the electrical harness connector and antenna cable from the instrument panel antenna cable (Fig. 4).
(7) Remove antenna cable from vehicle.

ANTENNA CABLE (Continued)

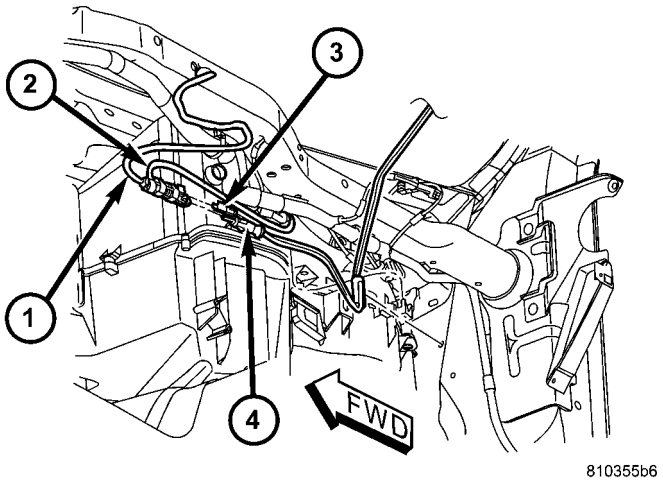


Fig. 4 ANTENNA CABLE CONNECTION

INSTALLATION

(1) Position antenna cable in vehicle.
(2) Install antenna cable to roof panel.
(3) Connect electrical harness connector and antenna to antenna module.
(4) Route cable under instrument panel. Connect electrical harness connector and antenna cable to instrument panel cable and connector.
(5) Install headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
(6) Install A-pillar trim (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - INSTALLATION).
(7) Connect battery negative cable.

ANTENNA MODULE

DESCRIPTION

The antenna module is an electromagnetic circuit component designed to capture and enhance RF (Radio Frequency) signals in both the AM and FM broadcast bands. The antenna module is mounted to the right rear roof rail under the headliner. The module is grounded through the mounting bracket and fastener. The module has a two wire electrical connector that connects to the integral radio antenna, located on the right rear quarter glass. There is also an electrical connector for battery voltage and a coax cable connector.

OPERATION

The antenna module receives both AM and FM radio signals supplied by the side window integral radio antenna system and selectively amplifies them. The amplified signal is then sent through the body length coax cable to the radio input.

DIAGNOSIS AND TESTING - ANTENNA MODULE

CONDITION	POSSIBLE CAUSES	CORRECTION
NO AM RECEPTION, WEAK FM RECEPTION	1. Antenna module to antenna connector open or disconnected.	1. Repair open, reconnect antenna module connector to glass mounted antenna.
	2. Coax open or disconnected.	2. Repair open, reconnect coax.
	3. No battery power at antenna module.	3. Check fuse. if okay, repair open in battery voltage circuit.
	4. Antenna module disconnected from glass.	4. Connect module connector to glass.
NO AM OR FM RECEPTION	1. Coax disconnected at radio.	1. Reconnect coax.
	2. Coax shorted to ground.	2. Replace coax
WEAK OR NO AM/FM RECEPTION	1. Antenna Module inoperative.	1. Replace antenna module

ANTENNA MODULE (Continued)

REMOVAL

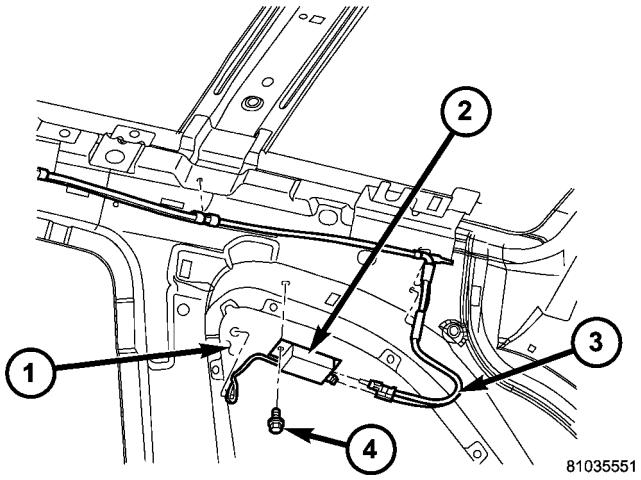


Fig. 5 ANTENNA MODULE MOUNTING

(1) Disconnect and isolate the battery negative cable.
(2) Remove headliner to access antenna module (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
(3) Disconnect antenna coax cable lead and electrical harness connector from antenna module.
(4) Disconnect the antenna module connector from the quarter glass.
(5) Remove the mounting screw and the antenna module (Fig. 5).

INSTALLATION

(1) Install the antenna module and the mounting fastener. Tighten to 8.5 N·m (75 in. lbs.).
(2) Connect the antenna connector to the quarter glass.
(3) Connect the antenna lead and electrical connector to the antenna module.
(4) Install headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
(5) Connect the battery negative cable.

ANTENNA-SATELLITE RADIO

DESCRIPTION

The satellite radio antenna is secured by a bolt and two retainers which protrude through a hole in the roof panel. Two antenna cables from the antenna are connected to the satellite receiver.

OPERATION

The satellite radio antenna receives signals from orbiting satellites and sends these signals to the satellite receiver module. The satellite radio antenna must have open space in which to operate. Items carried on the roof, parking inside etc. can have an effect on the antenna's ability to receive signals.

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove the headliner.
(3) Disconnect the antenna cables from the antenna.

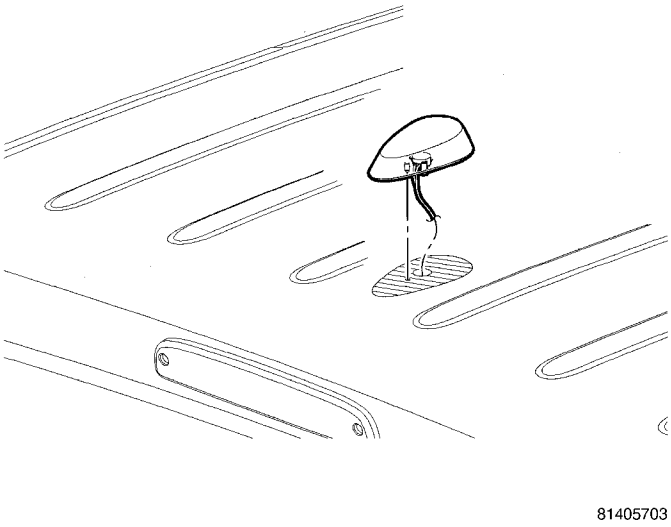


Fig. 6 SATELLITE RADIO ANTENNA

(4) Remove the retaining fastener.
(5) From inside the vehicle, and using a flat bladed tool, depress one of the retaining tabs on the antenna. Push up the one side of the antenna connector through the roof panel. Depress the other side of the connector and remove the antenna (Fig. 6).

INSTALLATION

(1) Insert wire harness through hole in roof panel. Press antenna into position until both retainers snap into place.
(2) Install and tighten mounting fastener.
(3) Connect antenna cable connectors to antenna.
(4) Install headliner.
(5) Connect battery negative cable.

CD/DVD CHANGER

DESCRIPTION

The 6 Disc In-Dash CD/DVD Changer (if equipped) is located in the instrument panel below the radio. The remote changer does not use a cartridge or magazine for the CD/DVD's. Up to 6 CD/DVD's can be directly loaded into this unit. Three RCA jacks on the

CD/DVD CHANGER (Continued)

front of the unit allow the use of MP3 players, video game systems, camcorders etc.

OPERATION

Due to its compact design, the CD/DVD changer can carry out only one operation at a time. For example, you can not load a new disc while playing another at the same time. Each operation happens sequentially.

The radio unit provides control over all features of the CD/DVD changer with the exception of the CD/DVD load and eject functions, which are controlled by buttons located on the front of the CD/DVD changer. All features you would expect, such as Disc Up/Down, Track Up/Down, Random and Scan are controlled by the radio, which also displays all relevant CD/DVD changer information on the radio display.

The CD/DVD changer contains a Eject button, six disc buttons, an indicator LED for each of the six disc positions as well as an illuminated disc opening. The individual LED indicates whether a CD/DVD is currently loaded in that particular chamber of the CD/DVD changer. Pressing the individual button for a particular chamber, then the Eject button will eject a disc currently present in that chamber. If the chamber is currently empty, actuating the individual button will position that chamber to receive and load a new disc in that chamber, once the load light stops flashing.

REMOVAL

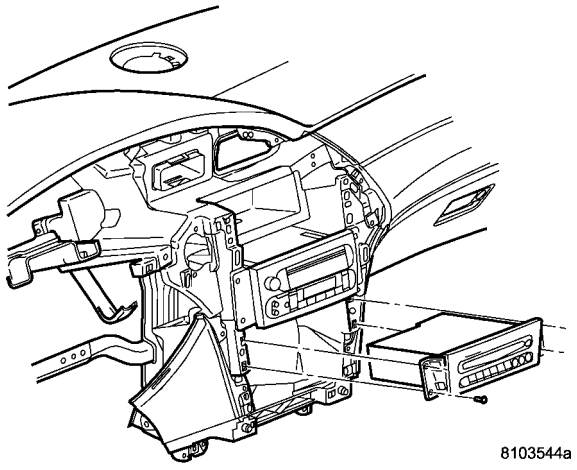


Fig. 7 CD/DVD PLAYER

(1) Disconnect and isolate the battery negative cable.

(2) Remove instrument panel center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).

(3) Remove screws holding CD/DVD changer (Fig. 7).

(4) Disconnect the wire harness connector from the back of the CD/DVD changer.

(5) Remove the CD/DVD changer from the vehicle.

INSTALLATION

(1) Connect the wire connector to the CD/DVD changer.

(2) Insert the CD/DVD changer into the instrument panel.

NOTE: Use care when inserting CD/DVD changer so that cable is not pinched or trapped against instrument panel.

(3) Install CD/DVD changer mounting fasteners. Tighten to 2 N·m (22 in. lbs.).

(4) Install instrument panel center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

(5) Connect the battery negative cable.

INSTRUMENT PANEL ANTENNA CABLE

REMOVAL

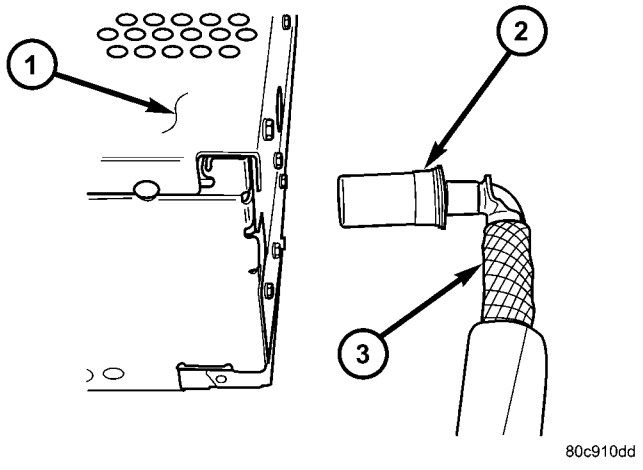


Fig. 8 ANTENNA CABLE CONNECTION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove glove box.
(3) Disconnect instrument panel antenna cable from antenna cable.
(4) Disconnect cable hanger clip from HVAC unit.
(5) Remove radio (Refer to 8 - ELECTRICAL/AUDIO/RADIO - REMOVAL).

CAUTION: Pulling the antenna cable straight out of the radio without pulling on the locking antenna connector could damage the cable or radio.

(6) Disconnect the antenna cable by pulling the locking antenna connector away from the radio (Fig. 8).
(7) Remove cable from vehicle.

INSTALLATION

(1) Install instrument panel antenna cable to vehicle.
(2) Connect cable to back of radio.
(3) Install radio (Refer to 8 - ELECTRICAL/AUDIO/RADIO - INSTALLATION).
(4) Connect cable hanger clip to HVAC unit.
(5) Connect instrument panel antenna cable to antenna cable.
(6) Install glove box.
(7) Connect the battery negative cable.

QUARTER GLASS INTEGRAL ANTENNA

DESCRIPTION

The quarter glass integral antenna element is bonded to the right rear quarter glass and is replaced with the glass assembly only.

OPERATION

The integral antenna receives radio frequencies and sends them to the antenna module for amplification.

DIAGNOSIS AND TESTING - QUARTER GLASS INTEGRAL ANTENNA

The antenna grid pattern is divided into two separate patterns. Each terminal connects to a separate grid pattern, one for AM and the other for FM.

For circuit descriptions and diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds. To detect breaks in the integral antenna elements, the following procedure is required:

(1) Disconnect the antenna module connector from the antenna terminals on the glass.
(2) Using an ohmmeter, place a lead on one of the terminals and check each end of the grid pattern connected to this terminal for continuity. If continuity is not present, move one lead through the grid in progression starting at the terminal with the other lead on the terminal until continuity is lost. Repeat procedure for the other terminal. A break in the antenna grid can be repaired using a Mopar Rear Window Defogger Repair Kit or equivalent.

RADIO

DESCRIPTION

Available radio receivers include:
- AM/FM/MP3/CD with CD/DVD changer control (RAH sales code)
- AM/FM/MP3/cassette/CD/equalizer with CD/DVD changer control feature (RBP sales code)

OPERATION

The radio receiver operates on ignition switched battery current that is available only when the ignition switch is in the On or Accessory/Accessory Delay positions.

REMOVAL

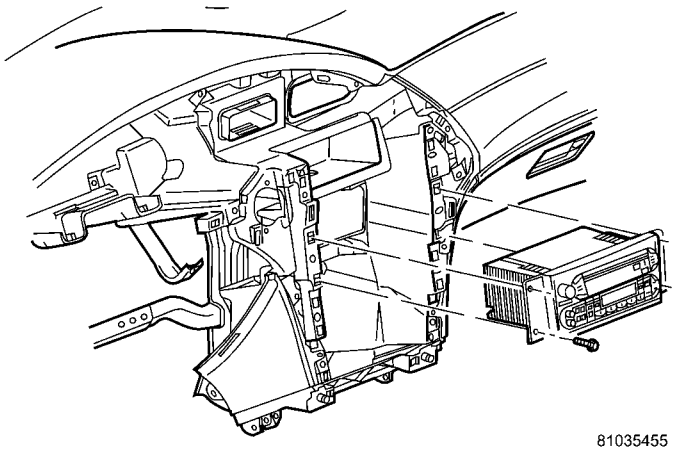


Fig. 9 RADIO

(1) Disconnect and isolate the battery negative cable.
(2) Remove instrument panel center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).
(3) Remove radio mounting screws (Fig. 9).
(4) Pull radio rearward to gain access to the back of radio.

RADIO (Continued)

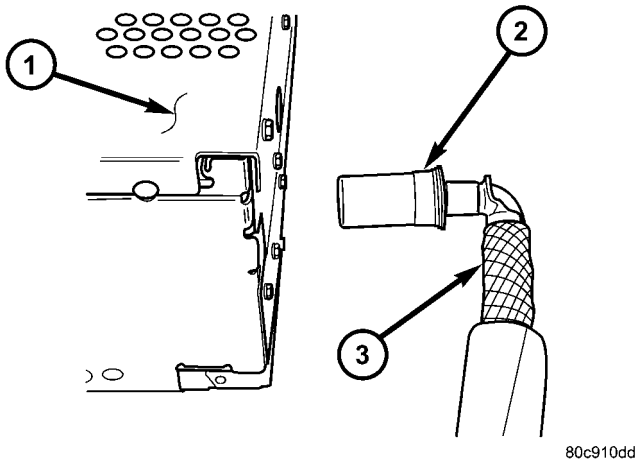


Fig. 10 ANTENNA CABLE CONNECTION

CAUTION: Pulling the antenna cable straight out of the radio without pulling on the locking antenna connector could damage the cable or radio.

(5) Disconnect the antenna cable by pulling the locking antenna connector away from the radio (Fig. 10).

(6) Disconnect the wire harness connectors from the back of the radio.

INSTALLATION

(1) Connect wire harness connector and antenna cable to back of radio.

(2) Position radio into instrument panel.

(3) Install mounting screws. Tighten to 2 N·m (22 in. lbs.).

(4) Install instrument panel center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

(5) Connect battery negative cable.

RADIO NOISE SUPPRESSION COMPONENTS

DESCRIPTION

Radio noise suppression devices are factory-installed standard equipment on this vehicle. Radio Frequency Interference (RFI) and ElectroMagnetic Interference (EMI) can be produced by any on-board or external source of electromagnetic energy. These electromagnetic energy sources can radiate electromagnetic signals through the air, or conduct them through the vehicle electrical system.

When the audio system converts RFI or EMI to an audible acoustic wave form, it is referred to as radio noise. This undesirable radio noise is generally manifested in the form of “buzzing,” “hissing,” “popping,” “clicking,” “crackling,” and/or “whirring” sounds. In most cases, RFI and EMI radio noise can be suppressed using a combination of vehicle and component grounding, filtering and shielding techniques. This vehicle is equipped with factory-installed radio noise suppression devices that were designed to minimize exposure to typical sources of RFI and EMI; thereby, minimizing radio noise complaints.

Factory-installed radio noise suppression is accomplished primarily through circuitry or devices that are integral to the factory-installed radios, audio power amplifiers and other on-board electrical components such as generators, wiper motors, blower motors, and fuel pumps that have been found to be potential sources of RFI or EMI. External radio noise suppression devices that are used on this vehicle to control RFI or EMI, and can be serviced, include the following:

- **Cylinder head-to-cover ground strap** - This length of braided ground strap (2) has an eyelet terminal connector crimped to each end. One end is secured to the engine cylinder head(s). The other is secured to the valve cover.
- **Resistor-type spark plugs** - This type of spark plug has an internal resistor connected in series between the spark plug terminal and the center electrode to help reduce the production of electromagnetic radiation that can result in radio noise.

OPERATION

There are two common strategies that can be used to suppress Radio Frequency Interference (RFI) and ElectroMagnetic Interference (EMI) radio noise. The first suppression strategy involves preventing the production of RFI and EMI electromagnetic signals at their sources. The second suppression strategy involves preventing the reception of RFI and EMI electromagnetic signals by the audio system components.

The use of braided ground straps in key locations is part of the RFI and EMI prevention strategy. These ground straps ensure adequate ground paths, particularly for high current components such as many of those found in the starting, charging, ignition, engine control and transmission control systems. An insufficient ground path for any of these high current components may result in radio noise caused by induced voltages created as the high current seeks alternative ground paths through components or circuits intended for use by, or in close proximity to the audio system components or circuits.

Preventing the reception of RFI and EMI is accomplished by ensuring that the audio system components are correctly installed in the vehicle. Loose, corroded or improperly soldered wire harness connections, improperly routed wiring and inadequate audio system component grounding can all contribute to

RADIO NOISE SUPPRESSION COMPONENTS (Continued)

the reception of RFI and EMI. A properly grounded antenna body and radio chassis, as well as a shielded antenna coaxial cable with clean and tight connections will each help reduce the potential for reception of RFI and EMI.

REMOVAL

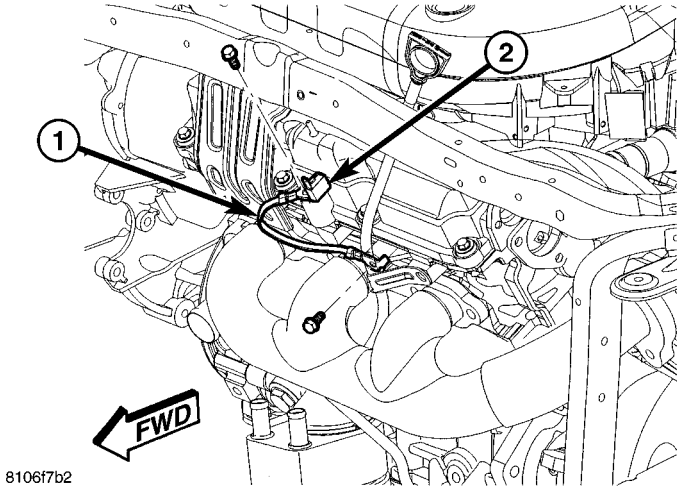


Fig. 11 GROUND STRAP

(1) Disconnect and isolate the battery negative cable.
(2) Remove the mounting fasteners (Fig. 11).
(3) Remove the ground strap.

INSTALLATION

(1) Position ground strap and install mounting fasteners.
(2) Connect battery negative cable.

RECEIVER-SATELLITE

REMOVAL

NOTE:
If the owner's satellite service was active before the satellite receiver was replaced the new satellite receiver will have to be activated. The existing satellite receiver will have to be deactivated before the replacement satellite receiver can be activated.
To activate Sirius satellite radio service, call Sirius at their toll-free number. Please have the following information available when activating a system:

- **Electronic Serial Number / Sirius Identification Number (ESN/SID) of the unit to be replaced**
- **ESN/SID of the replacement receiver**
- **Vehicle Owner's name and address**
- **VIN**

The ESN/SID number can be obtained through the radio display by following the steps in the satellite radio owners manual.
The vehicle must be outside with the audio system powered on, in the satellite radio mode, to receive the activation signal.

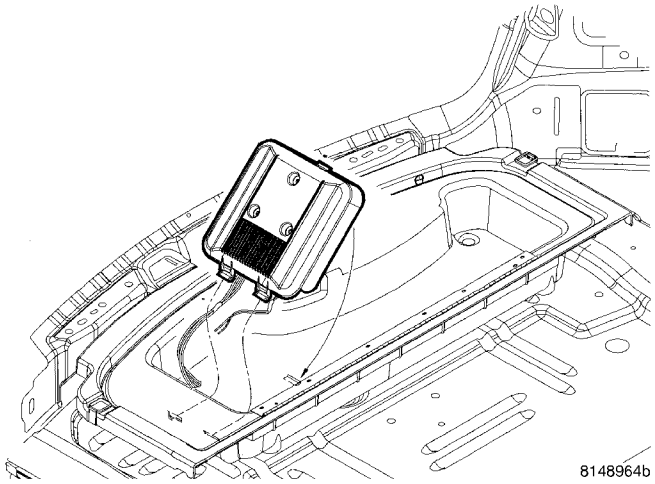


Fig. 12 SATELLITE RECEIVER

(1) Disconnect and isolate the battery negative cable.
(2) Lift the lid on the rear storage bin.
(3) Depress the inboard retaining tab on the module cover and pull up (Fig. 12).
(4) Disconnect electrical harness connectors.
(5) Disconnect antenna harness connectors.
(6) Remove mounting fasteners and module.

INSTALLATION

NOTE:
If the owner's satellite service was active before the satellite receiver was replaced the new satellite receiver will have to be activated. The existing satellite receiver will have to be deactivated before the replacement satellite receiver can be activated.
To activate Sirius satellite radio service, call Sirius at their toll-free number. Please have the following information available when activating a system:

- **Electronic Serial Number / Sirius Identification Number (ESN/SID) of the unit to be replaced**
- **ESN/SID of the replacement receiver**
- **Vehicle Owner's name and address**
- **VIN**

The ESN/SID number can be obtained through the radio display by following the steps in the satellite radio owners manual.
The vehicle must be outside with the audio system powered on, in the satellite radio mode, to receive the activation signal.

(1) Position module to cover.
(2) Install and tighten mounting fasteners.
(3) Connect antenna harness connectors.
(4) Connect electrical harness connectors.

RECEIVER-SATELLITE (Continued)

(5) Snap cover into place.
(6) Connect battery negative cable.

REMOTE SWITCHES

DESCRIPTION

Two rocker-type switches (if equipped) are mounted on the back (instrument panel side) of the steering wheel spokes. The switch on the left spoke is the seek switch and has seek up, seek down, and preset station advance functions. The switch on the right spoke is the volume control switch and has volume up, and volume down functions. The switch on the right spoke also includes a “mode” control that allows the driver to sequentially select AM radio, FM radio, cassette player, CD player or CD changer (if equipped).

OPERATION

These switches are resistor multiplexed units that are hard-wired to the Body Control Module (BCM) through the clockspring. The BCM sends the proper messages on the Programmable Communications Interface (PCI) data bus network to the radio receiver. For diagnosis of the BCM or the PCI data bus, the use of a DRB III® scan tool and the proper Diagnostic Procedures manual are recommended. For more information on the operation of the remote radio switch controls, refer to the owner’s manual in the vehicle glove box.

DIAGNOSIS AND TESTING - REMOTE SWITCHES

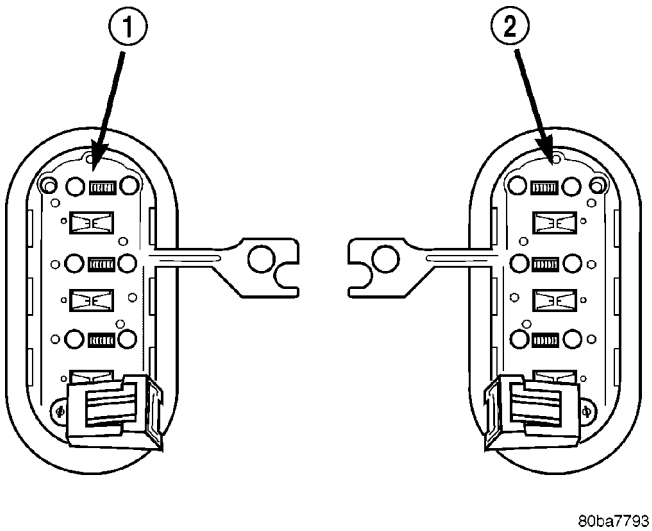


Fig. 13

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

Any diagnosis of the Audio system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the remote radio switch(es) from the steering wheel. (Refer to 8 - ELECTRICAL/AUDIO/ REMOTE SWITCHES - REMOVAL).

(3) Use an ohmmeter to check the switch resistance as shown in the Remote Radio Switch Test table (Fig. 13).

REMOTE RADIO SWITCH TEST

Switch	Switch Position	Resistance
Right (White)	Volume Up	1.210 Kilohms
Right (White)	Volume Down	3.010 Kilohms
Right (White)	Mode Advance	0.0511 Kilohms
Left (Black)	Seek Up	0.261 Kilohms
Left (Black)	Seek Down	0.681 Kilohms
Left (Black)	Pre-Set Station Advance	0.162 Kilohms

NOTE: The right remote radio switch back is white in color. The left switch back is black in color. The right/left remote radio switch orientation is with the steering wheel installed, and driver in drivers seat.

(4) If the switch resistance checks OK, go to Step 5. If not OK, replace the faulty switch.

(5) Check for continuity between the ground circuit cavity of the switch wire harness connector and a good ground. There should be continuity. If OK, go to Step 6. If not OK, repair the open circuit as required.

(6) Unplug the 24-way white wire harness connector from the Body Control Module (BCM). Check for continuity between the radio control circuit cavity of the remote radio switch wire harness connector and a good ground. There should be no continuity. If OK, go

REMOTE SWITCHES (Continued)

to Step 7. If not OK, repair the short circuit as required.

(7) Check for continuity between the radio control circuit cavities of the remote radio switch wire harness connector and the BCM wire harness connector. There should be continuity. If OK, refer to the proper Diagnostic Procedures manual to test the BCM and the PCI data bus. If not OK, repair the open circuit as required.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the driver side airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

(3) Remove the steering wheel (Refer to 19 - STEERING/COLUMN/STEERING WHEEL - REMOVAL).

(4) Unplug the wire harness connector from the remote radio switch (s).

(5) Remove steering wheel rear cover.

(6) Remove the remote radio switch from the steering wheel by depressing tabs on each side of each switch.

NOTE: The right remote radio switch back is white in color. The left switch back is black in color. The right/left remote radio switch orientation is with the steering wheel installed, and driver in drivers seat.

INSTALLATION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Install remote radio switch to the steering wheel.

(2) Install steering wheel rear cover.

(3) Connect the wire harness to the remote radio switch.

(4) Install the steering wheel (Refer to 19 - STEERING/COLUMN/STEERING WHEEL - INSTALLATION).

(5) Install the driver side airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

(6) Connect the battery negative cable.

SPEAKER

DESCRIPTION

INFINITY

The Infinity speaker system includes seven speakers in five locations. One 8.8 centimeter (3.5 inch) speaker located in the center of the instrument panel. One 16.5 centimeter (6.5 inch) speaker and one 2.5 centimeter (1 inch) tweeter is located in each front door. There is also one 16.5 centimeter (6.5 inch) diameter speaker located in each rear door.

INFINITY INTERMEZZO

The optional Infinity Intermezzo speaker system features eight speakers in six locations. One 8.8 centimeter (3.5 inch) speaker located in the center of the instrument panel. One 16.5 centimeter (6.5 inch) speaker and one 2.5 centimeter (1 inch) tweeter is located in each front door. There is also one 16.5 centimeter (6.5 inch) diameter speaker located in each rear door. The premium speaker system also includes a 20 centimeter (8 inch) subwoofer located in the rear of the vehicle.

OPERATION

Two wires connected to each speaker, one feed circuit (+) and one return circuit (–), allow the audio output signal electrical current to flow through the voice coil.

For complete circuit diagrams, refer to the appropriate wiring information.

DIAGNOSIS AND TESTING - SPEAKER

Any diagnosis of the Audio system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

SPEAKER (Continued)

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

CAUTION: The speaker output of the radio is a "floating ground" system. Do not allow any speaker lead to short to ground, as damage to the radio and/or amplifier may result.

(1) If all speakers are inoperative, check the fuses in the Integrated Power Module (IPM). If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Check the amplifier fuse (if equipped) in the IPM. If OK, go to Step 3. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(3) Turn the ignition switch to the ON position. Turn the radio receiver ON. Adjust the balance and fader control controls to check the performance of each individual speaker. Note the speaker locations that are not performing correctly. If all speakers have no output, check amplifier power and ground. Check radio audio output to amplifier. Go to Step 4.

(4) Turn the radio receiver OFF. Turn the ignition OFF. Disconnect and isolate the battery negative cable. Disconnect wire harness connector at output side of amplifier. Go to Step 5.

(5) Check both the speaker feed (+) circuit and return (-) circuit cavities for the inoperative speaker at the amplifier wire harness connector for continuity to ground. There should be no continuity. If OK, go to Step 6. If not OK, repair the shorted speaker feed (+) and/or return (-) circuits(s) to the speaker as required.

(6) Disconnect wire harness connector at the inoperative speaker. Check for continuity between the speaker feed (+) circuit cavities of the amplifier wire harness connector and the speaker wire harness connector. Repeat the check between the speaker return (-) circuit cavities of the radio receiver wire harness connector and the speaker wire harness connector. In each case, there should be continuity. If OK, replace the faulty speaker. If not OK, repair the open speaker feed (+) and/or return (-) circuits(s) as required.

REMOVAL

FRONT DOOR SPEAKER

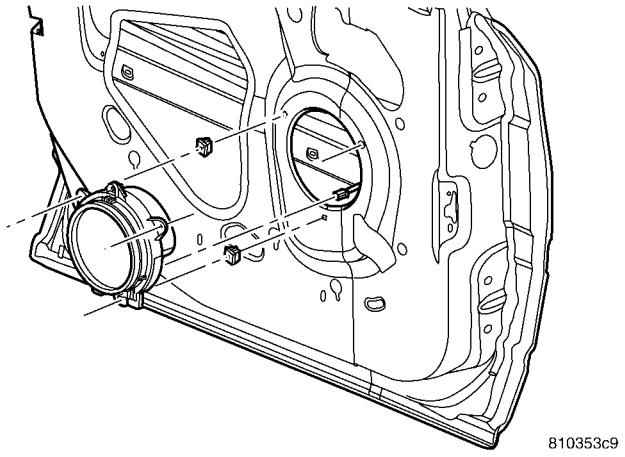


Fig. 14 FRONT DOOR SPEAKER

(1) Disconnect and isolate the battery negative cable.

(2) Remove the front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Remove the mounting fasteners.

(4) Disconnect the electrical harness connector and remove speaker (Fig. 14).

INSTRUMENT PANEL SPEAKER

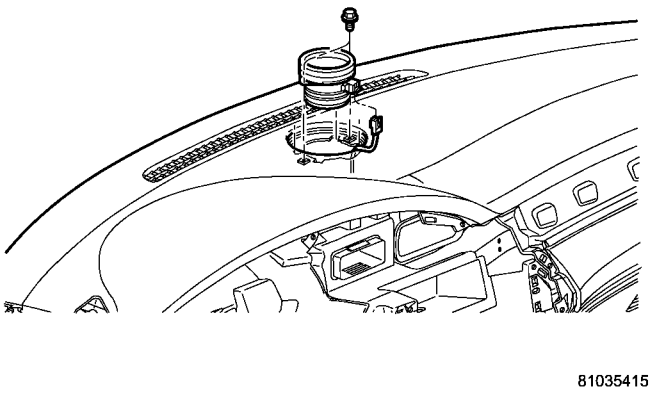


Fig. 15 INSTRUMENT PANEL SPEAKER

(1) Disconnect and isolate the battery negative cable.

(2) Remove speaker grill from instrument panel.

(3) Remove mounting fasteners.

(4) Disconnect the electrical harness connector and remove speaker (Fig. 15).

SPEAKER (Continued)

REAR DOOR SPEAKER

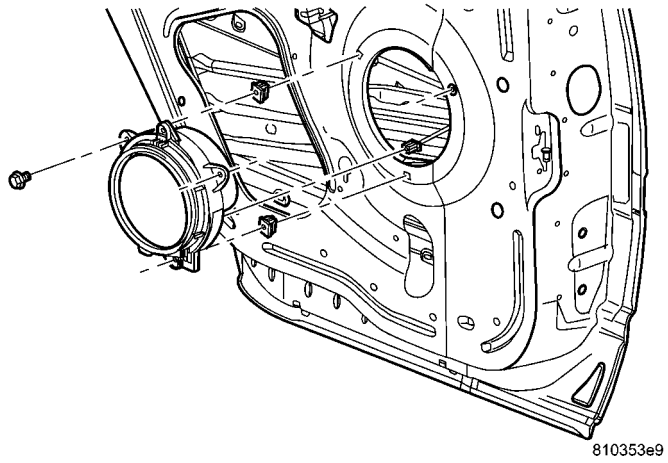


Fig. 16 REAR DOOR SPEAKER

(1) Disconnect and isolate the battery negative cable.
(2) Remove the rear door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).
(3) Remove the mounting fasteners.
(4) Disconnect the electrical harness connector and remove speaker (Fig. 16).

SUBWOOFER

(1) Disconnect and isolate the battery negative cable.
(2) Using a trim stick (Special tool C-4755) or equivalent, carefully pry at the rear of the speaker grille and remove.
(3) Remove mounting fasteners.
(4) Disconnect wire harness connectors and remove speaker.

TWEETER

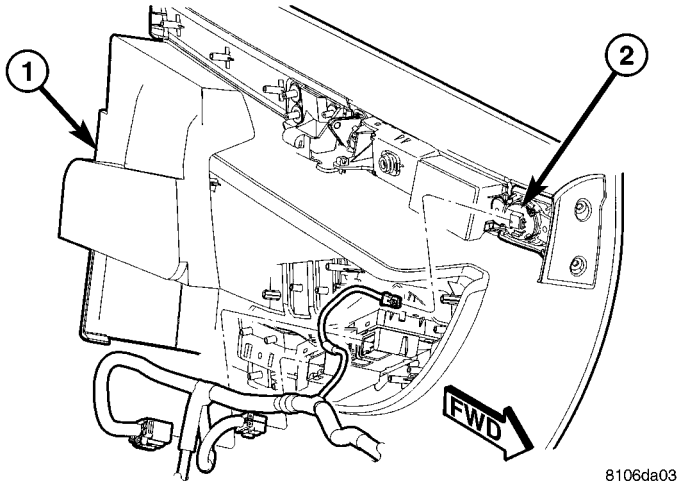


Fig. 17 TWEETER

(1) Disconnect and isolate the battery negative cable.
(2) Remove the front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
(3) Remove mounting fasteners.
(4) Disconnect wire harness connector and remove speaker (Fig. 17).

INSTALLATION

FRONT DOOR SPEAKER

(1) Connect electrical harness connector and position speaker to door.
(2) Install mounting fasteners. Tighten to 3 N·m (28 in. lbs.).
(3) Install front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).
(4) Connect battery negative cable.

INSTRUMENT PANEL SPEAKER

(1) Connect electrical harness connector and position speaker to instrument panel.
(2) Install mounting fasteners. Tighten to 3 N·m (28 in. lbs.).
(3) Install speaker grill.
(4) Connect battery negative cable.

REAR DOOR SPEAKER

(1) Connect electrical harness connector and position speaker to door.
(2) Install mounting fasteners. Tighten to 3 N·m (28 in. lbs.).
(3) Install rear door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).
(4) Connect battery negative cable.

SUBWOOFER

(1) Connect wire harness connectors and install speaker.
(2) Install mounting fasteners. Tighten to 3 N·m (28 in. lbs.).
(3) Install speaker grille.
(4) Connect battery negative cable.

TWEETER

(1) Install tweeter to door trim panel.
(2) Install mounting fasteners. Tighten to 3 N·m (28 in. lbs.).
(3) Install front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).
(4) Connect battery negative cable.

VIDEO SCREEN

DESCRIPTION

WARNING: THIS VEHICLE CONTAINS MERCURY ADDED DEVICES ADDED BY THE MANUFACTURER: NAVIGATION DISPLAY. REMOVE DEVICES BEFORE VEHICLE DISPOSAL. UPON REMOVAL OF DEVICES, PLEASE REUSE, RECYCLE, OR DISPOSE OF AS HAZARDOUS WASTE.

The video screen (if equipped) is mounted on the headliner behind the driver and front passenger seat. Pressing the release button will allow the screen to be opened.

REMOVAL

WARNING: THIS VEHICLE CONTAINS MERCURY ADDED DEVICES ADDED BY THE MANUFACTURER: NAVIGATION DISPLAY. REMOVE DEVICES BEFORE VEHICLE DISPOSAL. UPON REMOVAL OF DEVICES, PLEASE REUSE, RECYCLE, OR DISPOSE OF AS HAZARDOUS WASTE.

(1) Disconnect and isolate the battery negative battery cable.
(2) Open the video screen.
(3) Remove the mounting fasteners (Fig. 18).

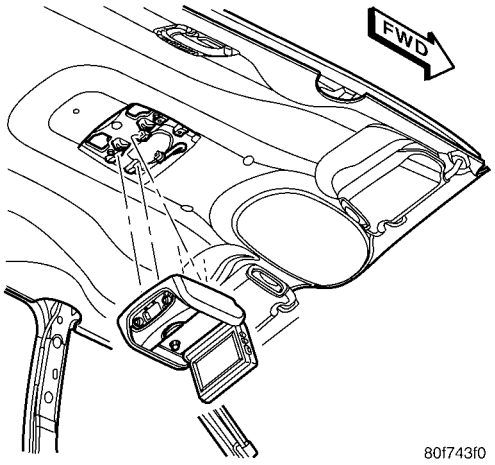


Fig. 18 VIDEO SCREEN

(4) Disconnect wire harness connector and remove video screen.

INSTALLATION

(1) Connect wire harness connector and place video screen into position.
(2) Install mounting fasteners. Tighten to 5 N·m (47 in. lbs.).
(3) Connect the battery negative cable.

CHIME/BUZZER

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CHIME/BUZZER

DESCRIPTION

The cluster monitors the Programmable Communication Interface (PCI) data bus for requests from various modules to display messages and under certain conditions sound a chime or series or chimes.

The chime system provides the Driver with warning chimes for:

- Seat Belt
- Exterior Lights On
- Key-In Ignition
- Key-In Accessory
- Engine Temperature Critical
- Low Washer Fluid
- Turn Signals On
- Low Oil Pressure
- Any Warning Lamp Announcement

The output sound intensity of the chime is approximately 62 to 78 decibels.

PARK ASSIST SYSTEM

The Park Assist System is an electronic parking aid that alerts the driver to obstacles which are located immediately behind the vehicle. Objects are sensed using ultrasonic sound waves. When an object is detected, the system will give the driver visual and audible warnings. The system is customer programmable through the Electronic Vehicle Information Center (EVIC) but will be enabled from the factory as a default.

The major components of the park assist system are:

- **Park Assist Module** - supplies voltage to the object detection sensors and park assist display. It triggers the sensors, analyzes the echo delay times and calculates obstacle distances. It sends display information to the park assist display, performs system diagnostics, and communicates via the Programmable Communication Interface (PCI) date bus network.
- **Park Assist Sensors** - there are four sensors located in the rear bumper that generate ultrasonic pulses when triggered by the park assist module. The sensors signal the park assist module when reflected ultrasonic pulses are received.
- **Park Assist Display** - there are sixteen Light Emitting Diode (LED) indicators which provide indication of relative distance to obstacles. When the system is engaged and no obstacles are detected, the two outermost yellow LED's are lit at reduced brightness to show the system is working. As the distance to a detected obstacle decreases, more yellow LED's towards the center of the display illuminate.

For diagnosis and testing of the park assist system, use a scan tool and the appropriate body diagnostic information.

OPERATION

CHIME PRIORITY

The following list indicates the priority of the chime when more than one chime is active at the same time:

- Seat Belt Warning
- Door Ajar
- Turn Signal On
- Chime Request
- Power Liftgate

The cluster is responsible to set priority on all warning lamp announcement chimes.

CHIME/BUZZER (Continued)

CHIME ON CONDITIONS

DRIVER'S SEAT BELT UNBUCKLED

There are two different Fasten Seat Belt Reminder announcements incorporated into the cluster's logic, a Non-enhanced announcement and an Enhanced announcement.

When the Enhanced announcement is DISABLED:

- The cluster will chime five times (not greater than six seconds) and illuminate the Seat Belt Lamp after turning the ignition to the run/start position if the driver seat belt is unbuckled.

When the Enhanced announcement is ENABLED;

- The cluster will chime continuously at a slow rate for a period of 6 seconds and illuminate the Seat Belt Lamp after turning the ignition to the run/start position if the driver seat belt is unbuckled. After 6 seconds the chime will stop, but the Seat Belt Lamp will stay illuminated. If the ignition is in the run position for a period greater than 60 seconds, and the driver seat belt is unbuckled, and the vehicle's speed is greater than 5 mph (8 km/h) in a forward gear, the Enhanced Fasten Seat Belt Reminder will activate. This will cause the Seat Belt Lamp to blink and a slow continuous chime to sound for 5 seconds. After 5 seconds, the chime will stop, but the lamp will remain illuminated for an additional 3 seconds. The Enhanced Seat Belt Reminder cycles for a total of 12 times (96 seconds). After the 12th time, the Seat Belt Lamp will remain on without any chime. Buckling the driver seat belt at anytime will cancel the Fasten Seat Belt Reminder announcement.

EXTERIOR LIGHTS ON

Chime sounds if the ignition is in the lock position, the drivers door is ajar, and the headlight switch is in any position other than auto or off. The chime will continue to sound until anyone of the above conditions change or the battery protection time of 3 minutes expires.

KEY-IN IGNITION

Chime sounds if the key is in the ignition, the ignition is in the lock position, and the drivers door is ajar. The chime will continue to sound until anyone of the above conditions change or the battery protection time of 15 minutes expires.

TURN SIGNAL ON

If the BCM detects a turn signal input continuously for 1.0 mile (0.6 km) and the vehicle speed is greater than 15 mph (24 km/h), the cluster will chime continuously and display an EVIC warning message, until the turn signal is cancelled.

LOW OIL PRESSURE

Chime sounds when the engine is operating and the oil pressure drops below 4 psi/27.5 kPa.

ENGINE TEMPERATURE CRITICAL

Chime sounds when the engine is operating and the coolant temperature exceeds 252°F (122°C). The chime is continuous at 257°F (125°C) and will chime for 4 minutes and stop if the temperature drops below 243°F (117°C).

LOW WASHER FLUID

Chime sounds when the washer fluid drops below a specific level.

WARNING LAMP ANNOUNCEMENT

Chime sounds to alert the driver to scan the EVIC (in the cluster) to see which EVIC warning message displayed. The door/liftgate ajar warning message will display (without a chime) if the vehicle is running and a door or the liftgate is open. A chime will sound if the door or liftgate is still open when vehicle speed is greater than 1 mph (1.6 km/h).

WARNING LAMP ANNOUNCEMENT

LOW FUEL LAMP

The cluster will sound a single chime, illuminate an amber lamp, and display an EVIC warning message after illuminating the indicator.

VOLT LAMP

The cluster will sound a single chime after illuminating the indicator.

OIL PRESSURE LAMP

The cluster will sound a single chime after illuminating the indicator above 450 rpm vehicle operation.

FASTEN SEAT BELT LAMP

There are two different Fasten Seat Belt Reminder announcements incorporated into the cluster's logic, a Non-enhanced announcement and an Enhanced announcement.

When the Enhanced announcement is DISABLED:

- The cluster will chime five times (not greater than six seconds) and illuminate the Seat Belt Lamp after turning the ignition to the run/start position if the driver seat belt is unbuckled.

When the Enhanced announcement is ENABLED:

- The cluster will chime continuously at a slow rate for a period of 6 seconds and illuminate the Seat Belt Lamp after turning the ignition to the run/start position if the driver seat belt is unbuckled. After 6 seconds the chime will stop, but the Seat Belt Lamp will stay illuminated. If the ignition is in the run position for a period greater than 60 seconds, and the

driver seat belt is unbuckled, and the vehicle's speed is greater than 5 mph (8 km/h) in a forward gear, the Enhanced Fasten Seat Belt Reminder will activate. This will cause the Seat Belt Lamp to blink and a slow continuous chime to sound for 5 seconds. After 5 seconds, the chime will stop, but the lamp will remain illuminated for an additional 3 seconds. The Enhanced Seat Belt Reminder cycles for a total of 12 times (96 seconds). After the 12th time, the Seat Belt Lamp will remain on without any chime. Buckling the driver seat belt at anytime will cancel the Fasten Seat Belt Reminder announcement.

CHECK ENGINE LAMP

The cluster will sound a single chime after illuminating the indicator.

ENGINE TEMPERATURE LAMP

The cluster will sound a single chime when the indicator first illuminates at 252°F (122°C).

TRACTION CONTROL LAMP

The cluster will sound a chime, illuminate a red priority indicator lamp, and display an EVIC warning message after illuminating the indicator if the traction control system:

- is active.
- is suspended.
- needs service.
- is disabled by the driver.

TURN SIGNAL ON

If the BCM detects a turn signal input continuously for 1.0 mile (0.6 km) and the vehicle speed is greater than 15 mph (24 km/h), the cluster will chime continuously, illuminate an amber message indicator lamp, and display an EVIC warning message, until the turn signal is cancelled.

OTHER CHIME ON CONDITIONS

BULB CHECK

The chime will sound one time during bulb check.

BRAKE LAMP

The cluster will sound a chime, illuminate a red brake lamp, and display an EVIC warning message if the:

- Park brake is engaged and the vehicle speed exceeds 1 mph (1.61 km/h).
- Brake fluid is low.

MEMORY

The cluster will sound a chime and display an EVIC message when:

- Memory position #1 is set.
- Memory position #2 is set.
- The vehicle is out of park and a memory recall is selected.
- A memory recall is activated while the seat is in motion during another memory recall.

SERVICE

The cluster will sound a chime, illuminate an amber message indicator lamp, and display an EVIC message when the vehicle reaches the time to perform service.

REMOTE KEYLESS ENTRY

The cluster will sound a chime and display an EVIC message upon activation of:

- The key fob with a low battery.
- An invalid key fob and key.

SERVICE IMMOBILIZER

The cluster will sound a chime and display an EVIC message when there is a problem with the SKREEM Module.

POWER LIFTGATE

The cluster will sound a chime and display an EVIC message when there is a power liftgate actuation with the:

- Overhead console or RKE and the doors are locked.
- Overhead console and the vehicle is not in park.
- Overhead console or RKE and the temperature is too cold for actuation.
- Overhead console or RKE and the temperature is too hot for actuation.

TIRE PRESSURE MONITOR SYSTEM

The tire pressure monitoring system will request:

- A chime, illuminate an amber TPM lamp, and display an EVIC message when the system senses that there is a low tire pressure problem.
- Three fast chimes, illuminate an amber TPM lamp, and display an EVIC message when the system senses that one of the four original tires on the vehicle has been changed.
- A chime, illuminate an amber TPM lamp, and display an EVIC message if the system does not sense any tire pressure.
- A chime, illuminate an amber TPM lamp, and display an EVIC message when the tire system needs service.

PARK ASSIST SYSTEM

The Park Assist System display activates an audible tone that changes from intermittent to continuous as the final two Light Emitting Diodes (LED's) are illuminated on one side or both sides of the display.

CHIME/BUZZER (Continued)

The system detection length from the rear of the vehicle is 0.3 meters to 1.5 meters. This area extends around the rear side of the vehicle. The system detection height from the ground is 0.2 meters to about 1.5 meters. The radio mutes when the system activates its audible tone.

When the driver selects Reverse, the system scans for objects behind the vehicle using four sensors located in the rear bumper. A warning display above the rear window provides both visible and audible warnings indicating the range of the object.

The system is active only when the transmission gear selector is in reverse for vehicle speeds less than 16 Km/h (10 mph). If the vehicle's Parking/Emergency Brake is applied, the system is deactivated.

The display contains two sets of yellow and red Light Emitting Diode's (LED's) that the driver can see as they look over their shoulder while backing up. Each side of the vehicle has its own warning LED's. The system provides a visual warning by illuminating one or more yellow LED's as the vehicle gets closer to the object. As the vehicle continues to approach the object, one red LED is illuminated and the system emits a series of short beeps. The tone will remain constant and both red LED's are illuminated once the vehicle is within 12 inches (30.5 cm) of the object.

The system can be turned ON or OFF through the Electronic Vehicle Information Center (EVIC) when the vehicle is in PARK. If the park assist system is turned OFF, a single chime will sound and the EVIC will display the following message "REAR PARK ASSIST OFF", when the vehicle is in reverse.

- Ensure that the rear bumper is free of dirt and debris to keep the system operating properly.
- Jackhammers, large trucks, and other vibrations could affect the performance of the system.
- Ensure that the parking brake is not applied.

If "Service Park Assist System" appears in the EVIC after making sure the rear bumper is clean, proceed to diagnose the system using a scan tool and the appropriate diagnostic information.

PARK ASSIST DISPLAY

DESCRIPTION

The Park Assist Display (Fig. 1) is a molded plastic unit housing Light Emitting Diodes (LED's) and a chime module. Located in the rear of the vehicle for easy visual reference when the driver is backing up.

The display is used to alert the driver of any obstacles detected in the rear of the vehicle (Fig. 2). The chime or audible signal also comes from the display unit.

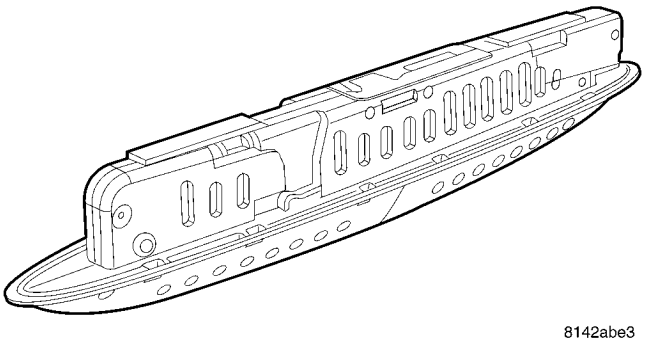


Fig. 1 PARK ASSIST DISPLAY

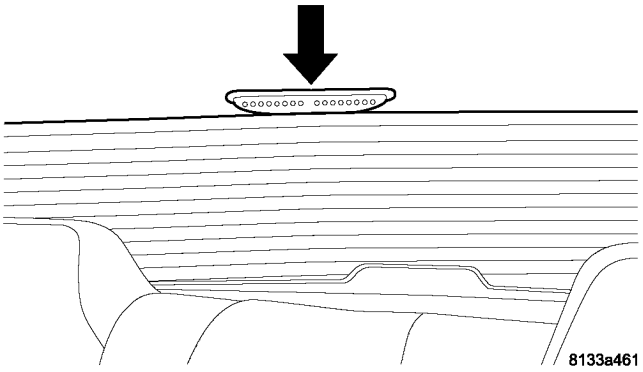


Fig. 2 PARK ASSIST DISPLAY LOCATION

The Park Assist Display is located in the rear of vehicle, over the rear window in the headliner (Fig. 2).

OPERATION

When the ignition is put in the RUN position, all the Light Emitting Diodes (LED's) will illuminate for approximately one second. This will be interrupted if the system senses an obstacle.

The ready status will be sensed by the outermost two yellow LED's being illuminated at 50% intensity. As the obstacle is sensed, the yellow LED's will start illuminating inward until the object in approximately 40 cm (16 in.) away and then the inner red LED will light.

The display is sensitive to which side of the rear of the vehicle that the object is detected. If on the left rear, the left segments will light and the same for the right side of the vehicle.

PARK ASSIST DISPLAY (Continued)

CORRELATION OF LED SEGMENTS TO DISTANCE

DISPLAY LED	DISTANCE		LED COLOR	AUDIBLE SIGNAL
	REAR CORNERS	REAR CENTER		
1st LED		150 cm (59 in.)	Yellow	None
2nd LED		120 cm (47 in.)	Yellow	None
3rd LED		100 cm (39 in.)	Yellow	None
4th LED	80 cm (31.5 in.)	80 cm (31.5 in.)	Yellow	None
5th LED	65 cm (25.5 in.)	65 cm (25.5 in.)	Yellow	None
6th LED	50 cm (20 in.)	50 cm (20 in.)	Yellow	None
7th LED	40 cm (16 in.)	40 cm (16 in.)	Red	40 cm (16 in.) Intermittant
8th LED	15 cm (6 in.)	30 cm (12 in.)	Red	30 cm (12 in.) Continuous

There will be an audible tone when the object gets within 40 cm (16 in.) from the rear of the vehicle.

To diagnose and test the Park Assist System, use a scan tool and the appropriate diagnostic information.

REMOVAL

(1) Open hood.

(2) Disconnect and isolate the battery negative cable.

(3) Open liftgate.

(4) Lower the headliner in the rear of the vehicle in the liftgate opening. Follow the headliner removal procedure for the rear of the headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(5) Bend the retaining tabs upwards to allow the park assist display to drop out of the headliner opening (Fig. 3).

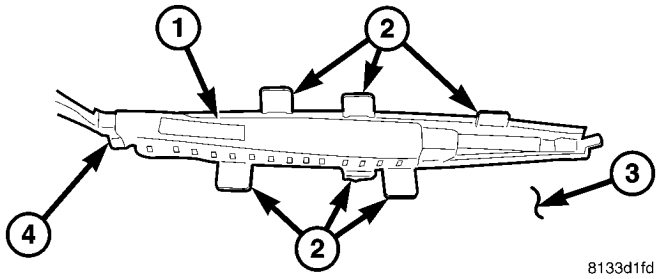


Fig. 3 PARK ASSIST DISPLAY - REMOVE/INSTALL

1 - PARK ASSIST DISPLAY
2 - DISPLAY RETAINING TABS
3 - HEADLINER
4 - DISPLAY ELECTRICAL CONNECTOR

(6) Disconnect the display electrical connector (Fig. 3) and remove from vehicle.

INSTALLATION

(1) Position the Park Assist Display in headliner opening and connect the display electrical connector (Fig. 3).

(2) Bend the retaining tabs down behind the headliner (Fig. 3).

(3) Raise the headliner in the rear of the vehicle in the liftgate opening (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).

PARK ASSIST MODULE

DESCRIPTION

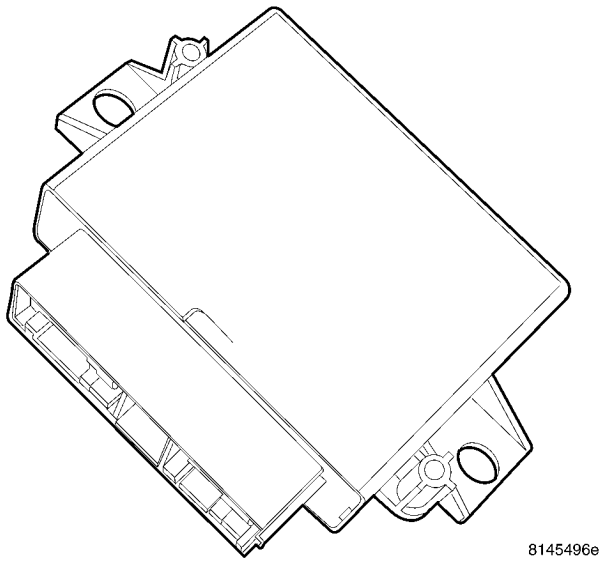


Fig. 4 PARK ASSIST MODULE

The Park Assist Module (Fig. 4) is located on the left side of the vehicle, behind the quarter trim panel, just in front of the D-pillar. It is has a molded

PARK ASSIST MODULE (Continued)

plastic housing which housing internal circuitry and one electrical connector. There are two mounting tabs that affix the module to the left inner quarter panel with two screws.

The module has a number of functions:

- Supply voltage to the sensors and display.
- Disconnection of the display with bus idle and over voltage Vmax.
- Triggering the sensors.
- Analyze echo delay times and calculate obstacle distances.
- Bi-directional data communication to the display for diagnosis.
- System diagnostics - diagnosis and error handling (sensors, display, module).
- Data exchange over the Programmable Communication Interface (PCI) data bus.

OPERATION

The module has a number of functions:

- Supply voltage to the sensors and display.
- Disconnection of the display with bus idle and over voltage Vmax.
- Triggering the sensors.
- Analyze echo delay times and calculate obstacle distances.
- Bi-directional data communication to the display for diagnosis.
- System diagnostics - diagnosis and error handling (sensors, display, module).
- Data exchange over the Programmable Communication Interface (PCI) data bus.

The system detection length from the rear of the vehicle is 0.3 meters to 1.5 meters. This area extends around the rear side of the vehicle. The system detection height from the ground is 0.2 meters to about 1.5 meters. The radio mutes when the system activates its audible tone.

When the driver selects Reverse, the system scans for objects behind the vehicle using four sensors located in the rear bumper. Objects can be detected from up to 1.5 meters. A warning display above the rear window provides both visible and audible warnings indicating the range of the object.

The system is active only when the vehicle is in reverse for vehicle speeds less than 16 Km/h (10 mph). If the vehicles Parking/Emergency Brake is applied, the system is deactivated.

The display contains two sets of yellow and red Light Emitting Diode's (LED's) that the driver can see as they look over their shoulder while backing up. Each side of the vehicle has its own warning LED's. The system provides a visual warning by illuminating one or more yellow LED's as the vehicle gets closer to the object. As the vehicle continues to approaches the object, one red LED is illuminated and the system emits a series of short beeps. The tone will remain constant and both red LED's are illuminated once the vehicle is within 12 inches (30.5 cm) of the object.

The system can be turned ON or OFF through the Electronic Vehicle Information Center (EVIC) when the vehicle is in PARK. If the park assist system is turned OFF, a single chime will sound and the EVIC will display the following message “REAR PARK ASSIST OFF”, when the vehicle is in reverse.

- Ensure that the rear bumper is free of dirt and debris to keep the system operating properly.
- Jackhammers, large trucks, and other vibrations could affect the performance of the system.
- Ensure that the parking brake is not applied.

If “Service Park Assist System” appears in the EVIC after making sure the rear bumper is clean, proceed to diagnose the system using a scan tool and the appropriate diagnostic information.

To diagnose the Park Assist Module, use a scan tool and the appropriate body diagnostic information.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the left quarter trim panel (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).

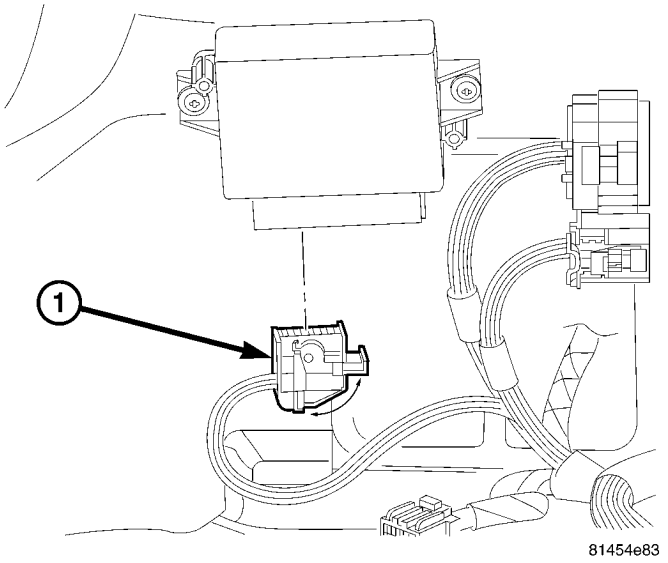


Fig. 5 PARK ASSIST MODULE CONNECTOR

1 - PARK ASSIST CONNECTOR

(3) Disconnect the Park Assist Module electrical connector (Fig. 5).

(4) Remove the two attaching screws (Fig. 6) and separate the module from vehicle.

PARK ASSIST MODULE (Continued)

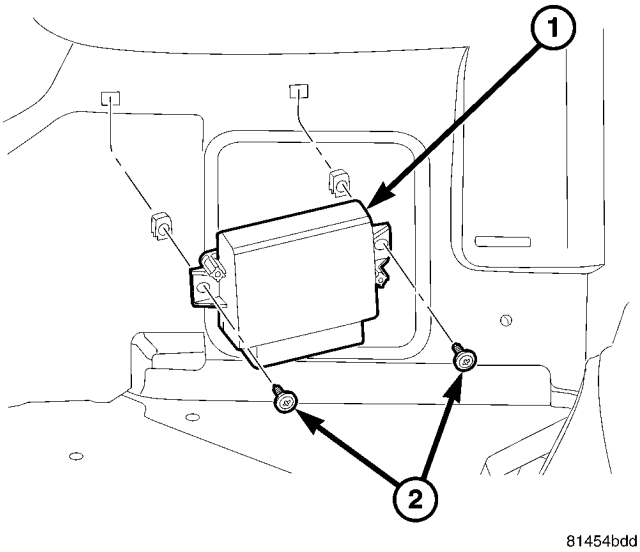


Fig. 6 PARK ASSIST MODULE REMOVE/INSTALL

1 - PARK ASSIST MODULE
2 - MOUNTING SCREWS

INSTALLATION

(1) Position the Park Assist Module and install the two attaching screws (Fig. 6). Torque screws to 3.5 N·m (30 in. lbs.).

(2) Connect the Park Assist Module electrical connector (Fig. 5).

(3) Install the left quarter trim panel (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).

(4) Connect the battery negative cable.

PARK ASSIST SENSOR

DESCRIPTION

The Park Assist Sensors (Fig. 7) generate ultrasonic pulses when triggered by the park assist module when an obstacle is detected. The sensors then signal the module when reflected ultrasonic pulses are received. The sensors detect objects with an ultrasonic pulse that reflects off the object and then is sent to the module to determine the distance of the object.

The Park Assist Sensors are located in the rear bumper fascia mounted equally apart (Fig. 8).

OPERATION

The Park Assist Sensors:

- Generate ultrasonic pulses when triggered by the Park Assist Module.
- Reception/filtering of ultrasonic energy received.
- Signalling the module of received ultrasonic pulses that meet threshold criteria.

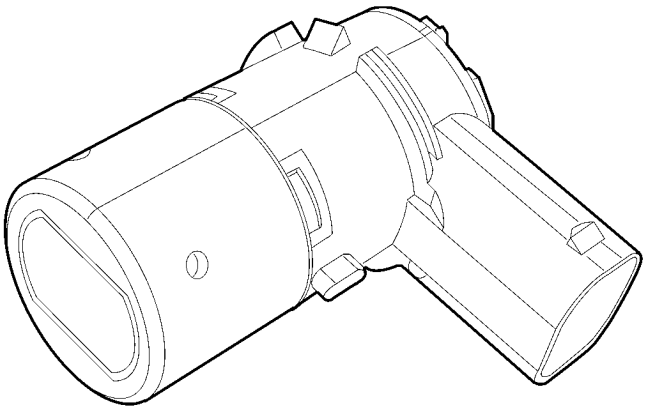


Fig. 7 PARK ASSIST SENSOR

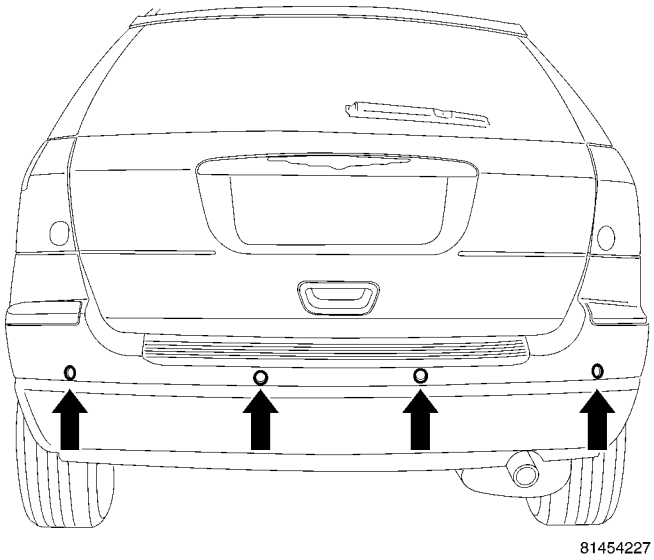


Fig. 8 PARK ASSIST SENSOR LOCATION

The sensors are supplied power by the module. The sensor supply is enabled when the sensor function is necessary.

The sensors detection length from the rear of the vehicle is 0.3 meters to 1.5 meters. This area extends around the rear side of the vehicle. The sensor detection height from the ground is 0.2 meters to about 1.5 meters.

- Ensure that the rear bumper (sensors) is free of dirt and debris to keep the system operating properly.
- Jackhammers, large trucks, and other vibrations could affect the performance of the system.
- Ensure that the parking brake is not applied.

If “Service Park Assist System” appears in the EVIC after making sure the rear bumper is clean,

PARK ASSIST SENSOR (Continued)

proceed to diagnose the system using a scan tool and the appropriate diagnostic information.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove rear fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - REMOVAL).

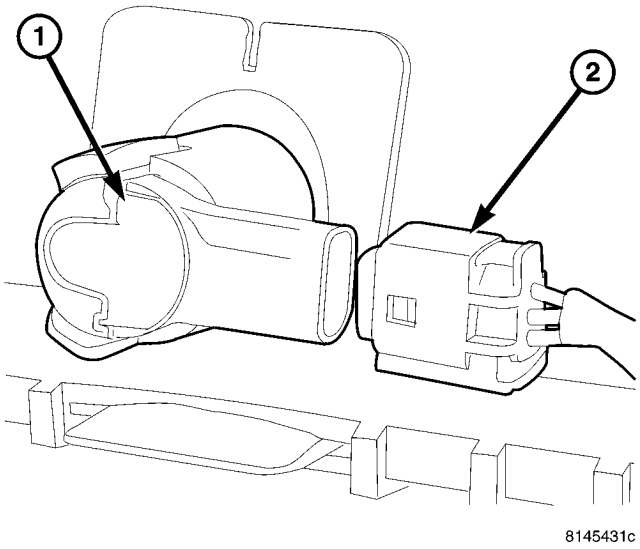


Fig. 9 PARK ASSIST SENSOR CONNECTOR

1 - PARK ASSIST SENSOR
2 - ELECTRICAL CONNECTOR

(3) Disconnect the sensor electrical connector (Fig. 9).

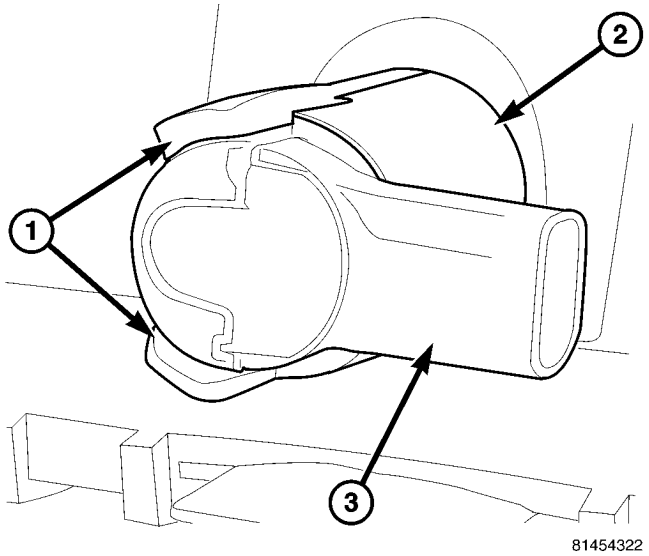


Fig. 10 PARK ASSIST SENSOR REMOVE/INSTALL

1 - SENSOR RETAINING TABS
2 - SENSOR RETAINING BEZEL
3 - PARK ASSIST SENSOR

(4) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on the two retaining tabs and pull the sensor straight out of the retaining bezel (Fig. 10).

INSTALLATION

(1) Position the Park Assist Sensor over the retaining bezel and firmly snap into place (Fig. 10).

(2) Connect the electrical connector (Fig. 9).

(3) Install the rear fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - INSTALLATION).

(4) Connect the battery negative cable.

PARK ASSIST SENSOR BEZEL

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove rear fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - REMOVAL).

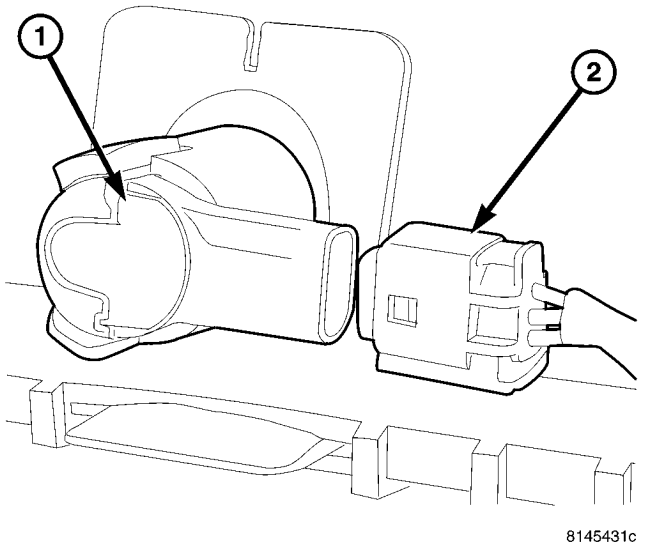


Fig. 11 PARK ASSIST SENSOR CONNECTOR

1 - PARK ASSIST SENSOR
2 - ELECTRICAL CONNECTOR

(3) Disconnect the sensor electrical connector (Fig. 11).

(4) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on the two retaining tabs and pull the sensor straight out of the retaining bezel (Fig. 12).

(5) If the bezel (Fig. 13) is either damaged or broken during removal of the sensor, gently press in on the bezel retaining tabs and then push bezel out of fascia.

PARK ASSIST SENSOR BEZEL (Continued)

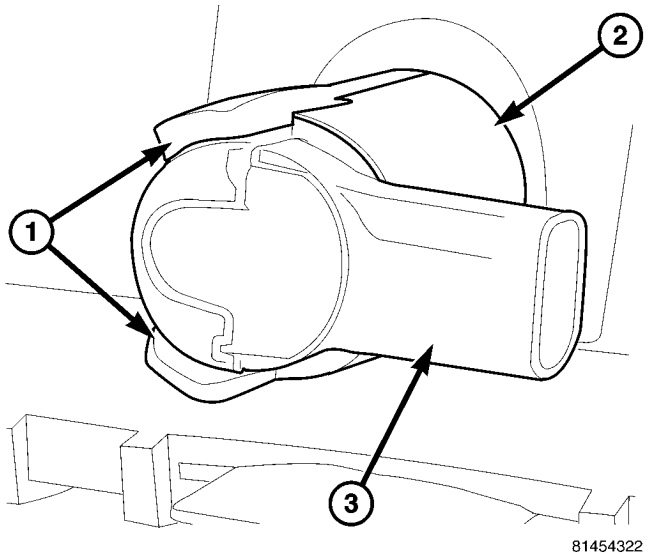


Fig. 12 PARK ASSIST SENSOR REMOVE/INSTALL

1 - SENSOR RETAINING TABS
2 - SENSOR RETAINING BEZEL
3 - PARK ASSIST SENSOR

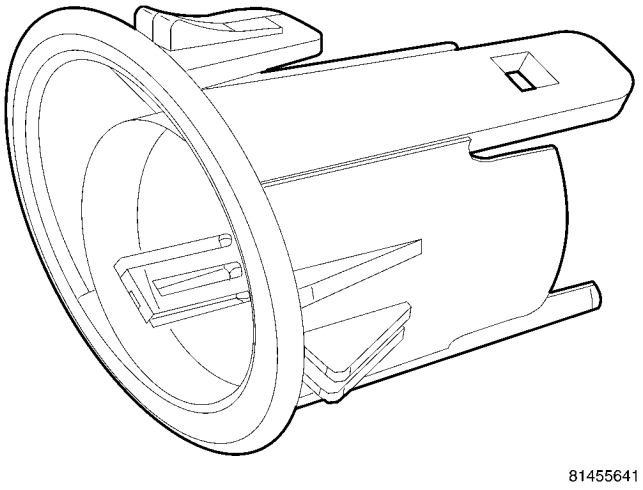


Fig. 13 PARK ASSIST SENSOR BEZEL

INSTALLATION

(1) If bezel (Fig. 13) was damaged and replaced, align over hole in fascia and firmly snap into place.

(2) Position the Park Assist Sensor over the retaining bezel and firmly snap into place (Fig. 12).

(3) Connect the electrical connector (Fig. 11).

(4) Install the rear fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - INSTALLATION).

(5) Connect the battery negative cable.

CLOCK

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CLOCK

DESCRIPTION

The Analog Clock is located in the Instrument Panel Switch Pod within the instrument cluster bezel, just to the right of the instrument cluster (Fig. 1). It is of analog type and has one adjustment button that will forward the clocks hand position.

The clock is not serviced separately from the instrument panel switch pod. If found defective, the entire switch assembly must be replaced (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/INSTRUMENT PANEL SWITCH POD - REMOVAL).

OPERATION

To set the analog clock, at the top center of the instrument panel, press and hold the button (Fig. 2) until the setting is correct.

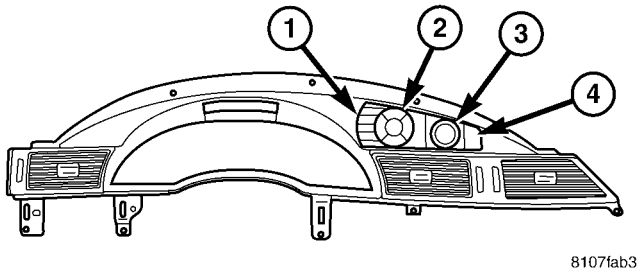


Fig. 1 CLOCK LOCATION

1 - EVIC CONTROLS
2 - NAVIGATION CONTROLS
3 - CLOCK
4 - HAZARD SWITCH

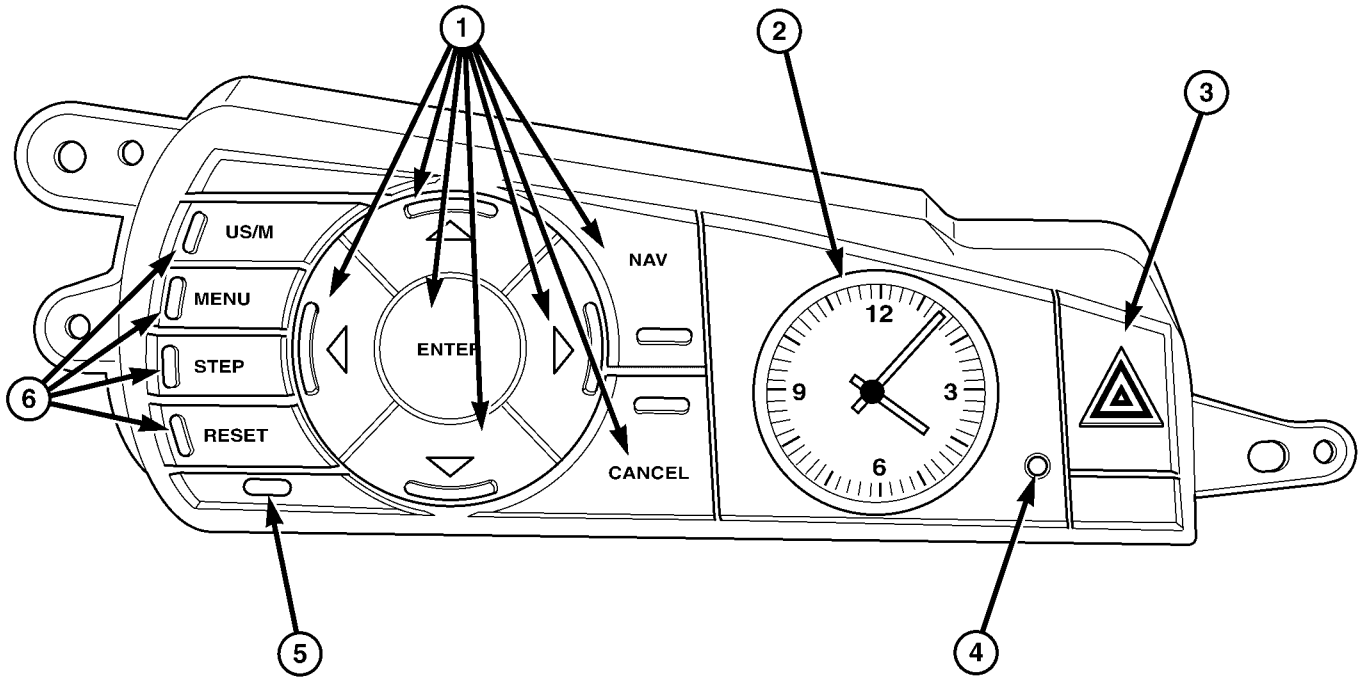


Fig. 2 CLOCK SETTING BUTTON

1 - NAVIGATION CONTROLS
2 - ANALOG CLOCK
3 - HAZARD SWITCH
4 - CLOCK SETTING BUTTON
5 - VTSS/SKIS LED
6 - EVIC CONTROLS

CLOCK (Continued)

DIAGNOSIS AND TESTING - CLOCK

Refer to Wiring for the appropriate wiring information and connector views. Check for 12v battery power and ground at the instrument panel connector end of the instrument panel switch pod. If both are present, replace instrument panel switch pod (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/INSTRUMENT PANEL SWITCH POD - REMOVAL). If one or both are not present, repair short/open wire.

ELECTRONIC CONTROL MODULES

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BODY CONTROL MODULE

DESCRIPTION

CAUTION: Do not swap BCM's between vehicles or with BCM's off the shelf.

The Body Control Module (BCM) is located on the bulkhead left side, underneath the instrument panel (Fig. 1). The BCM utilizes integrated circuitry and information carried on the Programmable Communications Interface (PCI) data bus network along with many hard wired inputs to monitor many sensor and switch inputs throughout the vehicle. In response to those inputs, the internal circuitry and programming of the BCM allow it to control and integrate many electronic functions and features of the vehicle through both hard wired outputs and the transmission of electronic message outputs to other electronic modules in the vehicle over the PCI data bus.

OPERATION

The Body Control Module (BCM) is operational when supplied with 12v battery power. The BCM controls various vehicle functions. It also supplies information to the instrument cluster to provide visual and audible information to the vehicle occupants. To provide and receive information, the module interfaces with the vehicle's Programmable Communication Interface (PCI) data bus network. This network consists of the:

- **Integrated Power Module (IPM)** - which incorporates the Power Distribution Center (PDC) and the Front Control Module (FCM) into one assembly.
- **Next Generation Controller (NGC)** - which incorporates the Powertrain Control Module (PCM) and the Transmission Control Module (TCM) into one module.
- **Instrument Cluster (IC)**

BODY CONTROL MODULE (Continued)

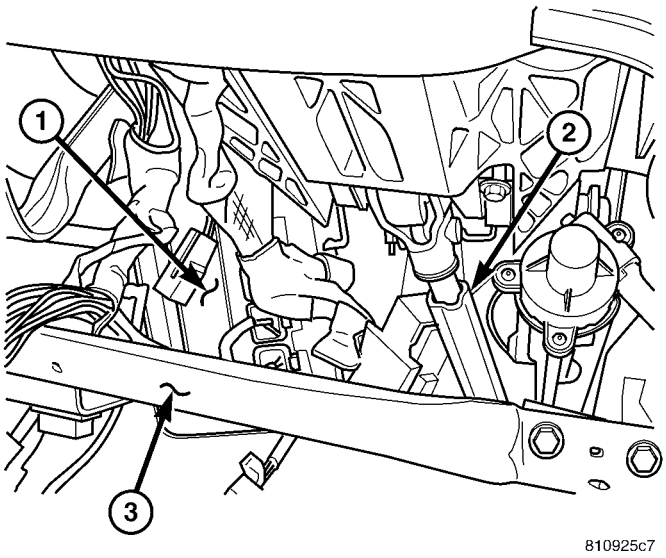


Fig. 1 BCM LOCATION

1 - BODY CONTROL MODULE
2 - LOWER STEERING SHAFT
3 - REINFORCEMENT BRACKET

- **Electronic Vehicle Information Center (EVIC)**
- **Occupant Restraint Controller (ORC)**
- **Compass/Mini-Trip Computer (CMTC)**
- **Overhead Console**
- **Controller Antilock Brake (CAB)**
- **Automatic Temperature Control Module (ATC)**
- **Power Liftgate Module (PLGM)**
- **Audio system**
- **Memory/Heated Seat Adjustable Pedal Module**
- **Sentry Key Remote Entry Module (SKREEM)** - which performs the functions of the previous two modules - Remote Keyless Entry (RKE) and Sentry Key Immobilizer Module (SKIM).
- **Driver Door Module (DDM) and the Passenger Door Module (PDM)**

The BCM provides:

- A battery protection feature. - The BCM will send a message to the IPM to turn off all exterior lamps after 3 minutes and all interior lamps after 15 minutes after the ignition is turned off, if they are not turned off by the driver.
- Compass/Minitrip support.
- Interior lighting (courtesy/reading lamps).
- Diagnostic reporting.
- Electronic liftgate release (with power door locks).
- Exterior lighting.
- Headlamp time delay (with/without auto headlamps).
- Automatic headlamps (with electrochromatic mirror).
- Illuminated entry.
- A fade to off feature. - This feature dims the interior lighting (courtesy lamps) gradually if the BCM does not receive any new input that would cause the interior lamps to remain on.
- Pulse Width Modulated (PWM) instrument panel dimming.
- Power liftgate switch input. - The BCM has 1 Liftgate switch input located in the overhead console.
- All stalk switch inputs including wipers and light switches.
- Seat belt position input, indicating a buckled or unbuckled seat belt.
- Turn signal operation.
- Fuel Level inputs.
- Monitors rear-door ajar switches, liftgate ajar switches, multi-function switches, multi-function headlight switch, ignition switch, PCI Bus, and diagnostic tool. Based on input from these components, the BCM will send requests over the PCI Bus to have the Instrument Cluster perform various chime operations.

The BCM has internal diagnostic capabilities that assist in diagnosing the vehicle's body system. When an ″Open″ or a ″Short″ circuit exists, the DRBIII® scan tool can read the stored BCM Diagnostic Trouble Codes (DTC's). The DTC's are very descriptive in identifying the appropriate feature that has faulted.

Refer to the appropriate Body Diagnostic Procedures manual for Diagnosis and Testing.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the lower instrument panel silencer.

(3) Remove the knee blocker airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - REMOVAL).

(4) Unclip the 72-way bulkhead connector from the Body Control Module (BCM) mounting assembly.

(5) Move bulkhead wiring aside.

(6) Disconnect the five wire connectors from the BCM.

(7) Remove the four screws holding the BCM to the bulkhead (Fig. 2).

(8) Remove the BCM from the mounting bracket.

BODY CONTROL MODULE (Continued)

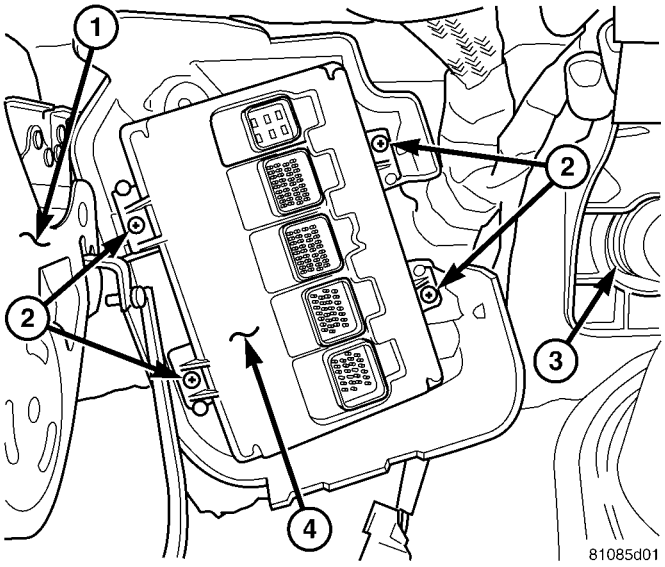


Fig. 2 BCM MOUNTING

1 - PARKING BRAKE ASSEMBLY
2 - BCM MOUNTING SCREWS
3 - LOWER STEERING COLUMN
4 - BODY CONTROL MODULE

INSTALLATION

(1) Place the BCM onto the mounting bracket.

(2) Install the four screws holding the BCM to the bulkhead (Fig. 2).

(3) Connect the five wire connectors to the BCM.

(4) Attach the 72-way bulkhead connector onto the Body Control Module (BCM) mounting assembly.

(5) Install the knee blocker airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - INSTALLATION).

(6) Install the lower instrument panel silencer.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(7) Verify vehicle and system operation.

COMMUNICATION

DESCRIPTION

The Programmable Communication Interface (PCI) data bus is a single wire multiplexed network capable of supporting binary encoded messages shared between multiple modules. The PCI Bus circuit is identified as D25 and is white with a violet tracer. Additional tracer colors may be added to the violet in order to distinguish between different module connections. The modules are wired in parallel. Connections are made in the harness using splices.

The modules used include:

- Body Control Module
- Integrated Power Module (IPM)
- Next Generation Controller (NGC)
- Instrument Cluster (IC)
- Electronic Vehicle Information Center (EVIC)
- Occupant Restraint Controller (ORC)
- Compass/Mini-Trip (CMTC)
- Overhead Console
- Controller Antilock Brake (CAB)
- Automatic Temperature Control Module (ATC)
- Power Liftgate Module (PLGM)
- Radio
- CD Changer
- Memory/Heated Seat Adjustable Pedal Module
- Sentry Key RemotE Entry Module (SKREEM)
- Driver Door Module (DDM)
- Passenger Door Module (PDM)

Each module provides its own bias and termination in order to transmit and receive messages. The bus voltage is at zero volts when no modules are transmitting and is pulled up to about seven and a half volts when modules are transmitting.

OPERATION

The PCI bus messages are transmitted at a rate averaging 10800 bits per second. Since there is only voltage present when the modules transmit and the message length is only about 500 milliseconds, it is ineffective to try and measure the bus activity with a conventional voltmeter. The preferred method is to use the DRBIII® scan tool. The 12v square wave selection on the 20-volt scale provides a good view of the bus activity. Voltage on the bus should pulse between zero and about seven and a half volts.

The PCI Bus failure modes are broken down into two categories. Complete PCI Bus Communication Failure and individual module no response. Causes of complete PCI Bus Communication Failure include a short to ground or battery on the PCI circuit. Individual module no response can be caused by an open circuit at the module, or an open battery or ground circuit to the affected module.

Symptoms of a complete PCI Bus Communication Failure would include but are not limited to:

- All gauges on the cluster stay at zero
- All telltales on cluster illuminate
- cluster backlighting at full intensity
- No response received from any module on the PCI Bus (except the NGC)
- No start (if equipped with Sentry Key Immobilizer)

Symptoms of Individual module failure could include any one or more of the above. The difference

COMMUNICATION (Continued)

would be that at least one or more modules would respond to the DRBIII®.

Diagnosis starts with symptom identification. If a complete PCI Bus Communication Failure is suspected, begin by identifying which modules the vehicle is equipped with and then attempt to get a response from the modules with the DRBIII®. If any modules are responding, the failure is not related to the total bus, but can be caused by one or more modules PCI circuit or power supply and ground circuits. The DRBIII® may display ″BUS +/- SIGNAL OPEN″ or ″NO RESPONSE″ to indicate a communication problem. These same messages will be displayed if the vehicle is not equipped with that particular module. The CCD error message is a default message used by the DRBIII® and in no way indicates whether or not the PCI Bus is operational. The message is only an indication that a module is either not responding or the vehicle is not equipped.

ANTILOCK BRAKE MODULE (MK25E)

DESCRIPTION

The Antilock Brake Module (ABM) is a microprocessor-based device which monitors the antilock brake system (ABS) during normal braking and controls it when the vehicle is in an ABS stop or when in a traction control situation. The ABM utilizes a 47-way electrical connector on the vehicle wiring harness. The power source for the ABM is through the ignition switch in the RUN or ON position.

The ABM is mounted to the HCU as part of the Integrated Control Unit (ICU) (Fig. 3). The ICU is located in the engine compartment on the inboard side of the left body frame rail. For information on the ICU, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - DESCRIPTION).

OPERATION

The primary functions of the Antilock Brake Module (ABM) are to:

- Monitor the antilock brake system for proper operation.
- Detect wheel locking or wheel slipping tendencies by monitoring the speed of all four wheels of the vehicle.
- Control fluid modulation to the wheel brakes while the system is in ABS or traction control mode.
- Store diagnostic information.
- Provide communication to the scan tool while in diagnostic mode.

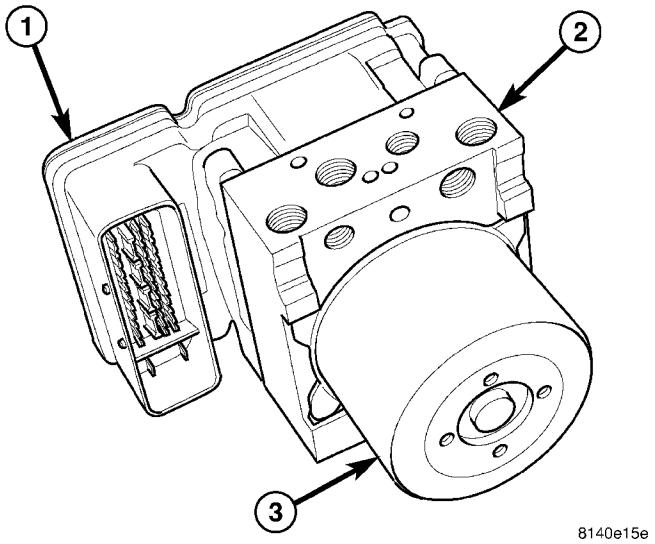


Fig. 3 Mk25e ICU

1 - ANTILOCK BRAKE MODULE (ABM)
2 - HYDRAULIC CONTROL UNIT (HCU)
3 - PUMP/MOTOR

- Illuminate the amber ABS warning indicator lamp.
- (With traction control only) Illuminate the TRAC ON lamp in the message center on the instrument panel when a traction control event occurs.
- (with traction control only) Illuminate the TRAC OFF lamp when the amber ABS warning indicator lamp illuminates.

The ABM constantly monitors the antilock brake system for proper operation. If the ABM detects a fault, it will turn on the amber ABS warning indicator lamp and disable the antilock braking system. The normal base braking system will remain operational.

NOTE: If the vehicle is equipped with traction control, the TRAC OFF lamp will illuminate anytime the amber ABS warning indicator lamp illuminates.

The ABM continuously monitors the speed of each wheel through the signals generated by the wheel speed sensors to determine if any wheel is beginning to lock. When a wheel locking tendency is detected, the ABM commands the ABM solenoid coils to actuate. The coils then open and close the valves in the HCU that modulate brake fluid pressure in some or all of the hydraulic circuits. The ABM continues to control pressure in individual hydraulic circuits until a locking tendency is no longer present.

ANTILOCK BRAKE MODULE (MK25E) (Continued)

The ABM contains a self-diagnostic program that monitors the antilock brake system for system faults. When a fault is detected, the amber ABS warning indicator lamp is turned on and the fault diagnostic trouble code (DTC) is then stored in a diagnostic program memory. A latched fault will disable certain system functionality for the current ignition cycle. An unlatched fault will disable certain system functionality until the fault condition disappears. These DTC's will remain in the ABM memory even after the ignition has been turned off. The DTC's can be read and cleared from the ABM memory by a technician using the DRBIII® scan tool. If not cleared with a scan tool, the fault occurrence and DTC will be automatically cleared from the ABM memory after the identical fault has not been seen during the next 3,500 miles. Drive-off may be required for the amber ABS warning indicator lamp to go out on the next ignition cycle.

ABM INPUTS

- Wheel speed sensors (four)
- Brake lamp switch
- Ignition switch
- System and pump voltage
- Ground
- Traction control switch (if equipped)
- Diagnostic communication (PCI)

ABM OUTPUTS

- Amber ABS warning indicator lamp actuation (via BUS)
- Red BRAKE warning indicator lamp actuation (via BUS)
- Instrument cluster and EVIC communication (PCI)
- Traction control lamps (if equipped)
- Diagnostic communication (PCI, via BUS)

REMOVAL

(1) Disconnect negative (-) battery cable from battery post and isolate.

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) If not equipped with traction control, remove three screws attaching the antilock brake module (ABM) to the HCU (Fig. 4).

(4) If equipped with traction control, remove four screws attaching antilock brake module (ABM) to HCU (Fig. 5).

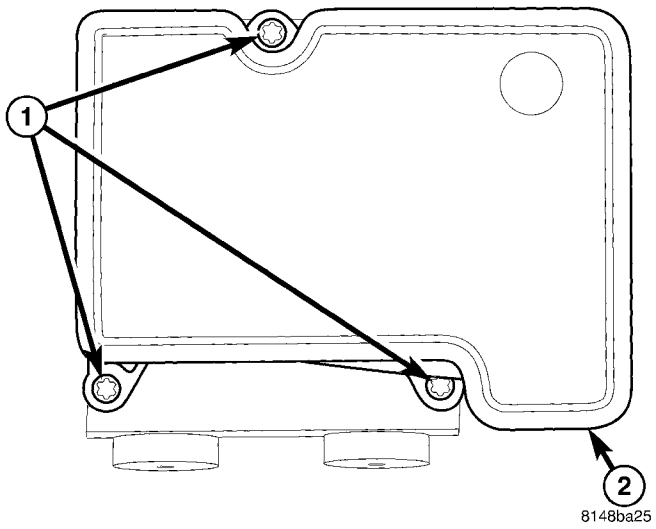


Fig. 4 ABM Mounting Screws - Without Traction Control

1 - MOUNTING SCREWS
2 - ABM

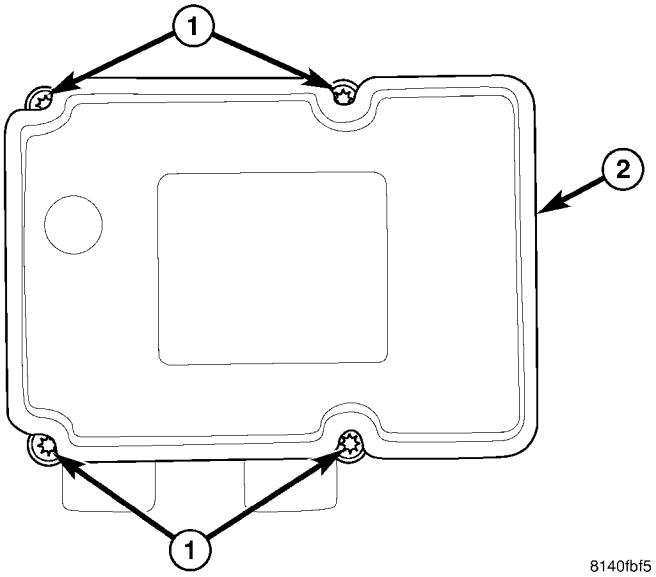


Fig. 5 ABM Mounting Screws - With Traction Control

1 - MOUNTING SCREWS
2 - ABM

ANTILOCK BRAKE MODULE (MK25E) (Continued)

(5) Slide ABM off HCU (Fig. 6).

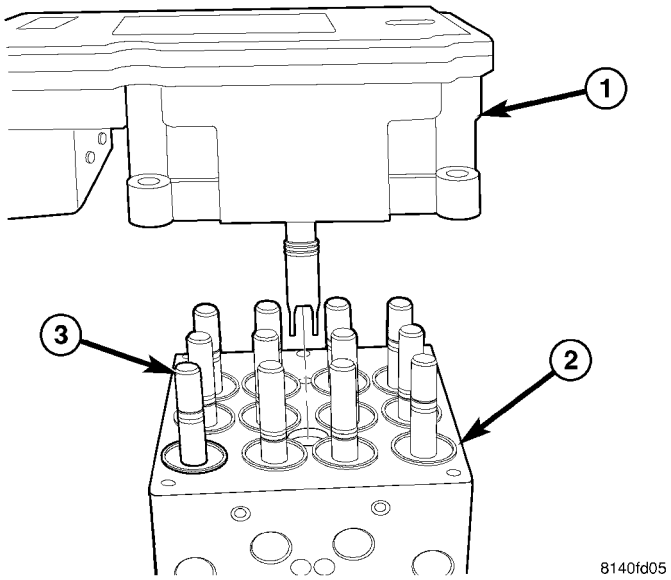


Fig. 6 ABM Assembly To HCU

1 - ABM
2 - HCU
3 - SOLENOID VALVE STEM

(6) Disconnect the 47-way connector from the ABM by depressing the tabs on each side of the connector cover (Fig. 7), then pulling outward and upward on the lower half of the cover until it locks into position pointing straight outward. The connector can then be pulled straight outward off the ABM (Fig. 8).

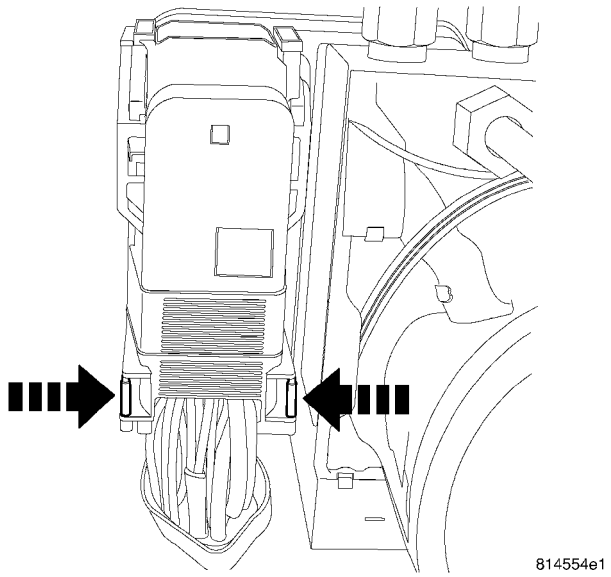


Fig. 7 ABM Connector Release Tabs

(7) Remove ABM from vehicle.

INSTALLATION

(1) Clean any debris off the mating surfaces of the HCU and ABM.

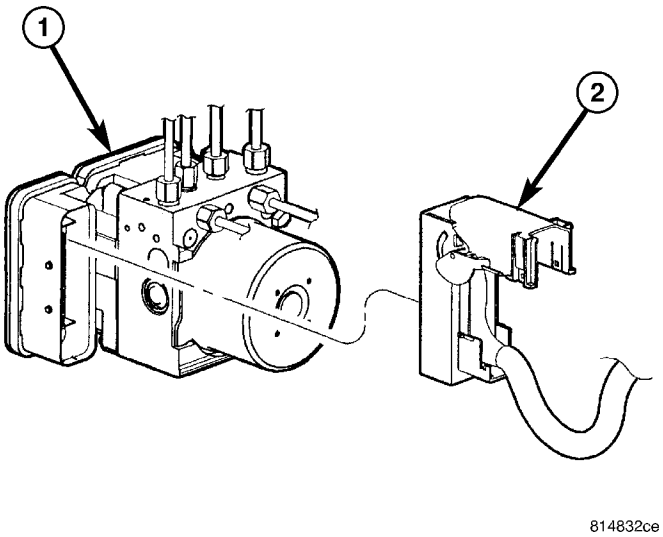


Fig. 8 Wiring Harness Connector At ABM

1 - ABM (PART OF ICU)
2 - WIRING HARNESS CONNECTOR

CAUTION: Do not reuse internal pump connector O-ring or solenoid valve stem seals. They must be replaced to ensure proper sealing.

CAUTION: When installing new O-rings or solenoid valve stem seals, do not use any type of lubricant.

(2) Replace solenoid valve stem seals (Fig. 9). These seals can be easily removed and installed by hand. Do not use any type of sharp instrument or damage to the components may occur.

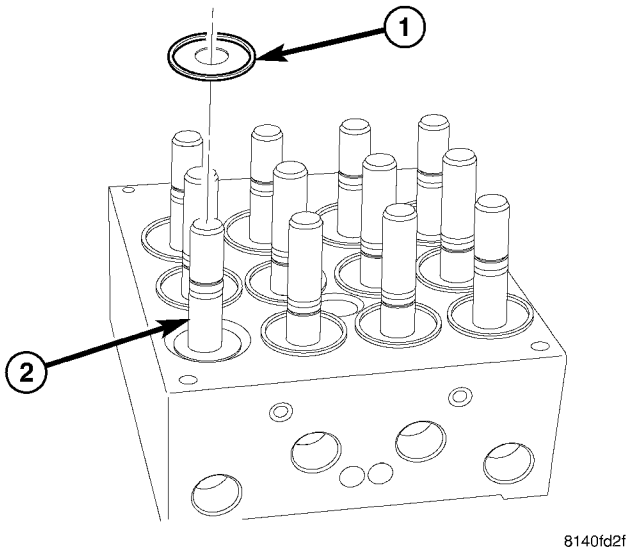


Fig. 9 Solenoid Valve Seal

1 - SEAL
2 - SOLENOID VALVE STEM

ANTILOCK BRAKE MODULE (MK25E) (Continued)

(3) Replace pump/motor connector O-ring if not new (Fig. 10).

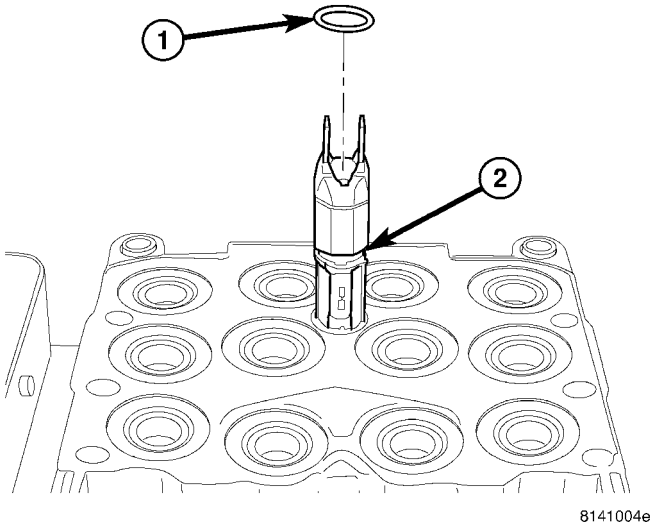


Fig. 10 Internal Pump Connector O-Ring

1 - O-RING
2 - O-RING MOUNTING GROOVE

(4) With connector cover completely open (Fig. 8), install 47-way wiring connector into socket of the ABM and close cover, locking connector in place.

(5) Align ABM solenoids and pump/motor wiring connector with HCU valves and connector passage (Fig. 6). Slide ABM onto HCU.

(6) If not equipped with traction control, install three screws attaching the ABM to the HCU (Fig. 4). Tighten mounting screws to 2 N·m (17 in. lbs.) torque.

(7) If equipped with traction control, install four screws attaching ABM to HCU (Fig. 5). Tighten mounting screws to 2 N·m (17 in. lbs.) torque.

(8) Lower vehicle.

(9) Connect negative battery cable to battery post.

(10) Hook up scan tool to initialize ABM. Check and clear any faults.

CONTROLLER ANTILOCK BRAKE (MK25)

DESCRIPTION

The controller antilock brake (CAB) is a microprocessor-based device which monitors the antilock brake system (ABS) during normal braking and controls it when the vehicle is in an ABS stop. The CAB is mounted to the HCU as part of the integrated control unit (ICU) (Fig. 11). The CAB uses a 47-way connector on the vehicle wiring harness. The power source for the CAB is through the ignition switch in the RUN or ON position. The CAB is on the PCI bus.

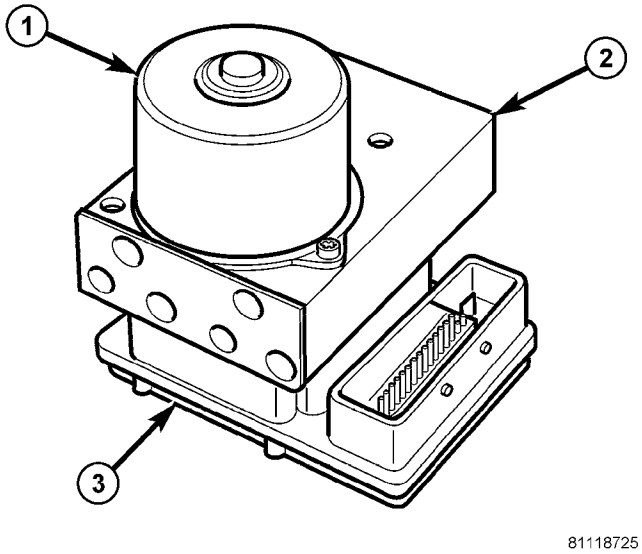


Fig. 11 Integrated Control Unit (ICU)

1 - PUMP/MOTOR
2 - HCU
3 - CAB

OPERATION

The primary functions of the controller antilock brake (CAB) are to:

- Monitor the antilock brake system for proper operation.
- Detect wheel locking or wheel slipping tendencies by monitoring the speed of all four wheels of the vehicle.
- Control fluid modulation to the wheel brakes while the system is in ABS or traction control mode.
- Store diagnostic information.
- Provide communication to the DRBIII® scan tool while in diagnostic mode.
- Illuminate the amber ABS warning indicator lamp.
- (With traction control only) Illuminate the TRAC ON lamp in the message center on the instrument panel when a traction control event occurs.
- (with traction control only) Illuminate the TRAC OFF lamp when the amber ABS warning indicator lamp illuminates.

The CAB constantly monitors the antilock brake system for proper operation. If the CAB detects a fault, it will turn on the amber ABS warning indicator lamp and disable the antilock braking system. The normal base braking system will remain operational.

CONTROLLER ANTILOCK BRAKE (MK25) (Continued)

NOTE: If the vehicle is equipped with traction control, the TRAC OFF lamp will illuminate anytime the amber ABS warning indicator lamp illuminates.

The CAB continuously monitors the speed of each wheel through the signals generated by the wheel speed sensors to determine if any wheel is beginning to lock. When a wheel locking tendency is detected, the CAB commands the CAB solenoid coils to actuate. The coils then open and close the valves in the HCU that modulate brake fluid pressure in some or all of the hydraulic circuits. The CAB continues to control pressure in individual hydraulic circuits until a locking tendency is no longer present.

The CAB contains a self-diagnostic program that monitors the antilock brake system for system faults. When a fault is detected, the amber ABS warning indicator lamp is turned on and the fault diagnostic trouble code (DTC) is then stored in a diagnostic program memory. A latched fault will disable certain system functionality for the current ignition cycle. An unlatched fault will disable certain system functionality until the fault condition disappears. These DTC's will remain in the CAB memory even after the ignition has been turned off. The DTC's can be read and cleared from the CAB memory by a technician using the DRBIII® scan tool. If not cleared with a DRBIII® scan tool, the fault occurrence and DTC will be automatically cleared from the CAB memory after the identical fault has not been seen during the next 3,500 miles. Drive-off may be required for the amber ABS warning indicator lamp to go out on the next ignition cycle.

CAB INPUTS

- Wheel speed sensors (four)
- Brake lamp switch
- Ignition switch
- System and pump voltage
- Ground
- Traction control switch (if equipped)
- Diagnostic communication (PCI)

CAB OUTPUTS

- Amber ABS warning indicator lamp actuation (via BUS)
- Red BRAKE warning indicator lamp actuation (via BUS)
- Instrument cluster and EVIC communication (PCI)
- Traction control lamps (if equipped)
- Diagnostic communication (PCI, via BUS)

REMOVAL

(1) Disconnect negative (-) battery cable from battery post and isolate.

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Remove 3 screws attaching CAB to HCU (Fig. 12).

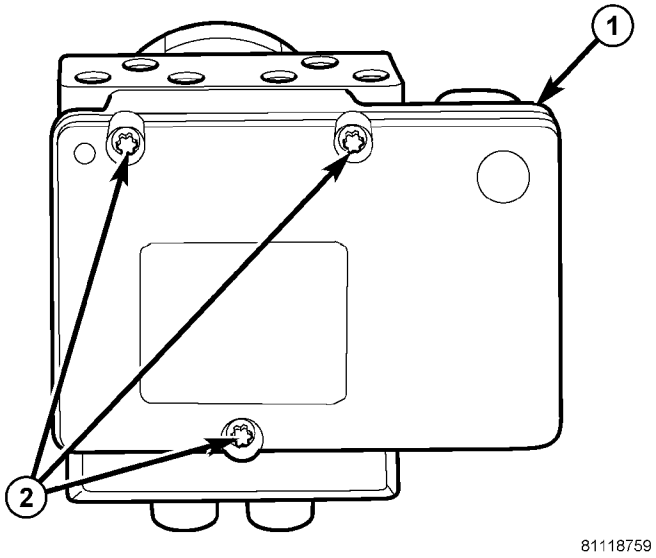


Fig. 12 CAB Attaching Screws

1 - CAB
2 - MOUNTING SCREWS

(4) Slide CAB off HCU (Fig. 14).

(5) Disconnect 47-way wiring connector at CAB (Fig. 13).

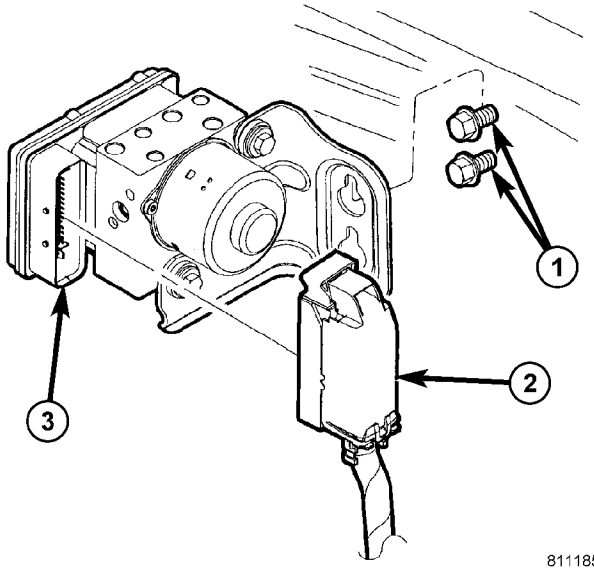


Fig. 13 CAB Wiring Connector

1 - ICU MOUNTING BOLTS ON FRAME RAIL
2 - HARNESS (CAB) WIRING CONNECTOR
3 - CAB MOUNTED TO ICU

(6) Remove CAB.

CONTROLLER ANTILOCK BRAKE (MK25) (Continued)

INSTALLATION

(1) Connect 47-way wiring connector at CAB (Fig. 13).

(2) Align CAB solenoids and pump/motor wiring connector with HCU valves and connector passage (Fig. 14). Slide CAB onto HCU.

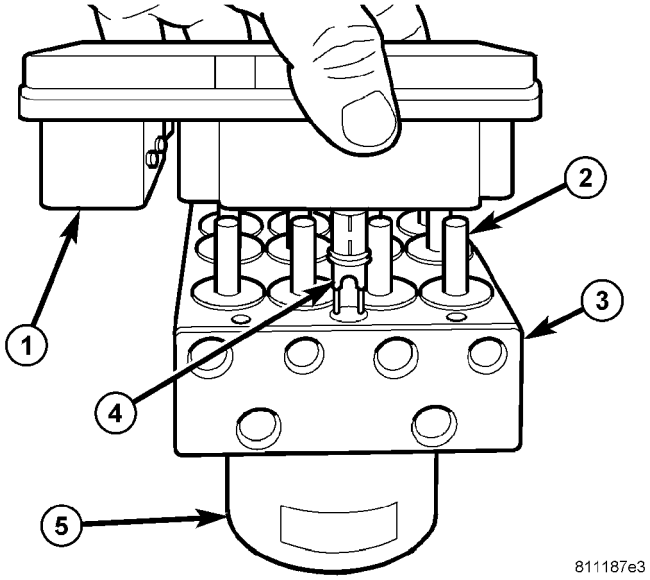


Fig. 14 CAB Removal/Installation

1 - CAB
2 - VALVES
3 - HCU
4 - PUMP/MOTOR WIRING CONNECTOR
5 - PUMP/MOTOR

(3) Install 3 screws mounting CAB to HCU (Fig. 12). Tighten CAB mounting screws to 2 N·m (17 in. lbs.) torque.

(4) Lower vehicle.

(5) Connect negative battery cable to battery post.

(6) Hook up DRBIII® to initialize CAB. Check and clear any faults.

DOOR MODULE

DESCRIPTION

A door module is located behind the trim panel of each front door. The module on the driver side is referred to as the Driver Door Module (DDM), while the module on the passenger side is the Passenger Door Module (PDM). Each door module houses both the front power lock and power window switches. In addition to the power window and power lock switches for its own door, the DDM also houses individual switches for each passenger door power window, a power window lockout switch and the power mirror switch.

The DDM and PDM each utilize integrated circuitry and information carried on the Programmable Communications Interface (PCI) data bus network along with many hard wired inputs to monitor many sensor and switch inputs throughout the vehicle. The DDM and PDM control and integrate many functions and features of the vehicle through both hard wired outputs and messages over the PCI data bus. The functions and features of the DDM include the following:

- **Auto unlock**
- **Automatic (Rolling Door Locks)**
- **Central lock from the key cylinder (driver door only)**
- **Central unlock from key cylinder and auto unlock on exit (driver door only)**
- **Driver front window and driver rear window, including express down for both**
- **Driver memory mirror**
- **Driver power mirror**
- **Driver heated mirror**
- **Door key cylinder disarm on central unlock (driver door only)**
- **Door lock inhibit**
- **Memory system master - Sends a PCI bus message to the radio, MHSAPM, and PDM to tell them to set (store) a memory location or to recall a memory location.**
- **Power door lock**
- **Switch learning features**
- **Window lockout feature for all passenger power windows**

The functions and features of the PDM include the following:

- **Power door locks**
- **Passenger front and rear window including express down for both**
- **Passenger memory mirror**
- **Passenger power mirror**
- **Passenger heated mirror**

The door modules are serviced only as complete units. If a door module is damaged or faulty, the entire door module unit must be replaced.

OPERATION

The microprocessor-based DDM and PDM hardware and software monitors integral and hard wired external switch inputs as well as those resources it shares with other electronic modules in the vehicle through its communication over the PCI data bus network. The internal programming and all of these inputs allow the DDM or PDM microprocessor to determine the tasks it needs to perform and their priorities, as well as both the standard and optional features that it should provide.

DOOR MODULE (Continued)

DIAGNOSIS AND TESTING - DOOR MODULE

Any diagnosis of the door module should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the trim panel from the front door (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Remove the mounting fasteners.

(4) Remove the door module from the front door trim panel.

INSTALLATION

(1) Position the door module onto the front door trim panel.

(2) Install the door module to the back of the front door trim panel. Tighten the screws to 2.2 N·m (20 in. lbs.).

(3) Install the trim panel onto the front door (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

(4) Connect the battery negative cable.

POWERTRAIN CONTROL MODULE

DESCRIPTION

DESCRIPTION

The Powertrain Control Module (PCM) is a digital computer containing a microprocessor (Fig. 15). The PCM receives input signals from various switches and sensors referred to as Powertrain Control Module Inputs. Based on these inputs, the PCM adjusts various engine and vehicle operations through devices referred to as Powertrain Control Module Outputs.

NOTE: PCM Inputs:

- Air Conditioning Pressure Transducer
- Ambient temperature Sensor
- ASD Relay
- Battery Temperature Sensor (NGC)
- Battery Voltage
- Brake Switch
- Camshaft Position Sensor

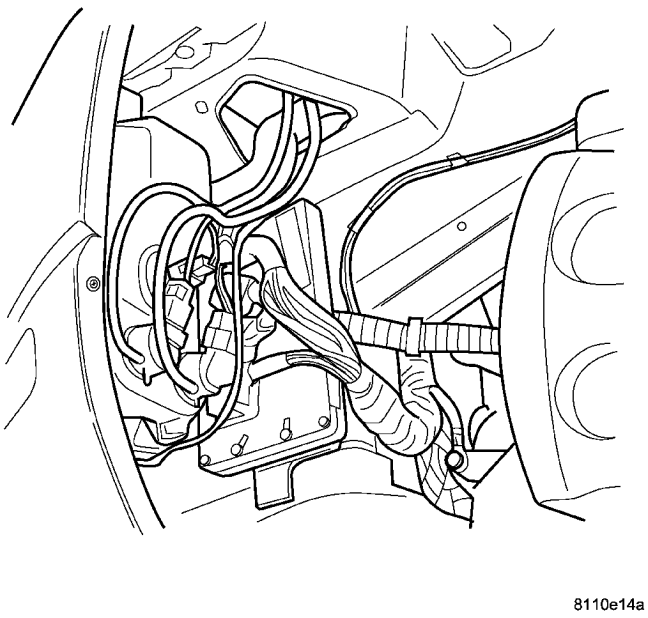


Fig. 15 PCM LOCATION

- Crankshaft Position Sensor
- EGR Position Feedback
- Engine Coolant Temperature Sensor
- Heated Oxygen Sensors
- Ignition sense
- Intake Air Temperature Sensor
- Knock Sensor
- NVLD Assembly
- Manifold Absolute Pressure (MAP) Sensor
- Park/Neutral
- PCI Bus
- Power Steering Pressure Switch
- EVAP Purge Return
- SCI Receive
- Speed Control
- Throttle Position Sensor
- Transmission Control Relay (Switched B+)
- Transmission Pressure Switches
- Transmission Temperature Sensor
- Transmission Input Shaft Speed Sensor
- Transmission Output Shaft Speed Sensor
- Transaxle Gear Engagement
- Vehicle Speed

NOTE: PCM Outputs:

- Air Conditioning Clutch Relay
- Automatic Shut Down (ASD) and Fuel Pump Relays
- Data Link Connector (PCI and SCI Transmit)
- Double Start Override
- EGR Solenoid
- Fuel Injectors

POWERTRAIN CONTROL MODULE (Continued)

- Generator Field
- High Speed Fan Relay
- Idle Air Control Motor
- Ignition Coils
- NVLD Assembly
- Low Speed Fan Relay
- MTV Actuator
- EVAP Purge
- SRV Valve
- Speed Control Vent Solenoid
- Speed Control Vacuum Solenoid
- 5 Volt Output
- Torque Reduction Request
- Transmission Control Relay
- Transmission Solenoids
- Vehicle Speed

Based on inputs it receives, the powertrain control module (PCM) adjusts fuel injector pulse width, idle speed, ignition timing, and canister purge operation. The PCM regulates the cooling fans, air conditioning and speed control systems. The PCM changes generator charge rate by adjusting the generator field.

The PCM adjusts injector pulse width (air-fuel ratio) based on the following inputs.

- Battery Voltage
- Intake Air Temperature Sensor
- Engine Coolant Temperature
- Engine Speed (crankshaft position sensor)
- Exhaust Gas Oxygen Content (heated oxygen sensors)
- Manifold Absolute Pressure
- Throttle Position

The PCM adjusts engine idle speed through the idle air control motor based on the following inputs.

- Brake Switch
- Engine Coolant Temperature
- Engine Speed (crankshaft position sensor)
- Park/Neutral
- Transaxle Gear Engagement
- Throttle Position
- Vehicle Speed

The PCM adjusts ignition timing based on the following inputs.

- Intake Air Temperature
- Engine Coolant Temperature
- Engine Speed (crankshaft position sensor)
- Knock Sensor
- Manifold Absolute Pressure
- Park/Neutral
- Transaxle Gear Engagement
- Throttle Position

The automatic shut down (ASD) and fuel pump relays are mounted externally, but turned on and off by the powertrain control module through the same circuit.

The camshaft and crankshaft signals are sent to the powertrain control module. If the PCM does not receive both signals within approximately one second of engine cranking, it deactivates the ASD and fuel pump relays. When these relays are deactivated, power is shut off to the fuel injectors, ignition coils, fuel pump and the heating element in each oxygen sensor.

The PCM engine control strategy prevents reduced idle speeds until after the engine operates for 320 km (200 miles). If the PCM is replaced after 320 km (200 miles) of usage, update the mileage in new PCM. Use the DRBIII® scan tool to change the mileage in the PCM. Refer to the appropriate Powertrain Diagnostic Manual and the DRBIII® scan tool.

POWERTRAIN CONTROL MODULE (Continued)

TRANSMISSION CONTROL

CLUTCH VOLUME INDEX (CVI)

An important function of the PCM is to monitor Clutch Volume Index (CVI). CVIs represent the volume of fluid needed to compress a clutch pack.

The PCM monitors gear ratio changes by monitoring the Input and Output Speed Sensors. The Input, or Turbine Speed Sensor sends an electrical signal to the PCM that represents input shaft rpm. The Output Speed Sensor provides the PCM with output shaft speed information.

By comparing the two inputs, the PCM can determine transaxle gear ratio. This is important to the CVI calculation because the PCM determines CVIs by monitoring how long it takes for a gear change to occur (Fig. 16).

Gear ratios can be determined by using the DRB Scan Tool and reading the Input/Output Speed Sensor values in the “Monitors” display. Gear ratio can be obtained by dividing the Input Speed Sensor value by the Output Speed Sensor value.

For example, if the input shaft is rotating at 1000 rpm and the output shaft is rotating at 500 rpm, then the PCM can determine that the gear ratio is 2:1. In direct drive (3rd gear), the gear ratio changes to 1:1. The gear ratio changes as clutches are applied and released. By monitoring the length of time it takes for the gear ratio to change following a shift request, the PCM can determine the volume of fluid used to apply or release a friction element.

The volume of transmission fluid needed to apply the friction elements are continuously updated for adaptive controls. As friction material wears, the volume of fluid need to apply the element increases.

Certain mechanical problems within the clutch assemblies (broken return springs, out of position snap rings, excessive clutch pack clearance, improper assembly, etc.) can cause inadequate or out-of-range clutch volumes. Also, defective Input/Output Speed Sensors and wiring can cause these conditions. The following chart identifies the appropriate clutch volumes and when they are monitored/updated:

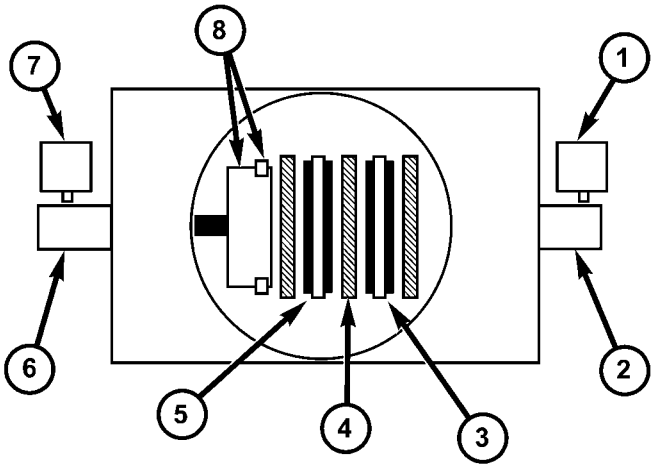


Fig. 16 Example of CVI Calculation

1 - OUTPUT SPEED SENSOR
2 - OUTPUT SHAFT
3 - CLUTCH PACK
4 - SEPARATOR PLATE
5 - FRICTION DISCS
6 - INPUT SHAFT
7 - INPUT SPEED SENSOR
8 - PISTON AND SEAL

CLUTCH VOLUMES				
Clutch	When Updated			Proper Clutch Volume
	Shift Sequence	Oil Temperature	Throttle Angle	
L/R	2-1 or 3-1 coast downshift	> 70°	< 5°	35 to 83
2/4	1-2 shift	> 110°	5 - 54°	20 to 77
OD	2-3 shift			48 to 150
UD	4-3 or 4-2 shift		> 5°	24 to 70

POWERTRAIN CONTROL MODULE (Continued)

SHIFT SCHEDULES

As mentioned earlier, the PCM has programming that allows it to select a variety of shift schedules. Shift schedule selection is dependent on the following:

- Shift lever position
- Throttle position
- Engine load
- Fluid temperature
- Software level

As driving conditions change, the PCM appropriately adjusts the shift schedule. Refer to the following chart to determine the appropriate operation expected, depending on driving conditions.

Schedule	Condition	Expected Operation
Extreme Cold	Oil temperature at start-up below -16° F	Park, Reverse, Neutral and 2nd gear only (prevents shifting which may fail a clutch with frequent shifts)
Cold	Oil temperature at start-up above -12° F and below 36° F	– Delayed 2-3 upshift (approximately 22-31 mph) – Delayed 3-4 upshift (45-53 mph) – Early 4-3 costdown shift (approximately 30 mph) – Early 3-2 coastdown shift (approximately 17 mph) – High speed 4-2, 3-2, 2-1 kickdown shifts are prevented – No EMCC
Warm	Oil temperature at start-up above 36° F and below 80 degree F	– Normal operation (upshift, kickdowns, and coastdowns) – No EMCC
Hot	Oil temperature at start-up above 80° F	– Normal operation (upshift, kickdowns, and coastdowns) – Full EMCC, no PEMCC except to engage FEMCC (except at closed throttle at speeds above 70-83 mph)
Overheat	Oil temperature above 240° F or engine coolant temperature above 244° F	– Delayed 2-3 upshift (25-32 mph) – Delayed 3-4 upshift (41-48 mph) – 3rd gear FEMCC from 30-48 mph – 3rd gear PEMCC from 27-31 mph
Super Overheat	Oil temperature above 260° F	– All ″Overheat″ shift schedule features apply – 2nd gear PEMCC above 22 mph – Above 22 mph the torque converter will not unlock unless the throttle is closed or if a wide open throttle 2nd PEMCC to 1 kickdown is made

DATA BUS COMMUNICATION RECEIVE - PCM INPUT

The PCM uses the SCI communication bus to preform engine diagnostics and flash operations. The transmission side of the PCM uses the SCI communication bus to flash new software. However, diagnostics is performed via the vehicles J1850 bus for the transmission side of the PCM.

PCM GROUND

Ground is provided through multiple pins of the PCM connector. Depending on the vehicle there may be as many as two different ground pins. There are power grounds and sensor grounds.

The power grounds are used to control the ground side relays, solenoids, ignition coil or injectors. The signal ground is used for any input that uses sensor return for ground, and the ground side of any internal processing component.

The PCM case is shielded to prevent RFI and EMI. The PCM case is grounded and must be firmly attached to a good, clean body ground.

Internally all grounds are connected together, however there is noise suppression on the sensor ground. For EMI and RFI protection the housing and cover are also grounded separately from the ground pins.

OPERATION

5 VOLT SUPPLY - PCM OUTPUT

The PCM supplies 5 volts to the following sensors:

- A/C pressure transducer
- Ambient Temperature sensor
- Battery temperature
- Camshaft Position Sensor (NGC)
- Crankshaft Position Sensor (NGC)
- Engine coolant temperature sensor
- Inlet Air Temperature Sensor
- Knock sensor
- Linear EGR solenoid (if equipped)
- Manifold absolute pressure sensor
- Oil Pressure Switch
- Throttle position sensor

STANDARD PROCEDURE

STANDARD PROCEDURE - OBTAINING DIAGNOSTIC TROUBLE CODES

BULB CHECK

Key on: Bulb illuminated until vehicle starts, as long as all once per trip (readiness) monitors completed. If monitors have **not** been completed, then: Key on: bulb check for about 5 to 8 seconds, lamp then flashes if once per trip (readiness) monitors have **not** been completed until vehicle is started, then MIL is extinguished.

OBTAINING DTC'S USING SCAN TOOL

(1) Connect the scan tool to the data link (diagnostic) connector. This connector is located in the passenger compartment; at the lower edge of instrument panel; near the steering column.

(2) Turn the ignition switch on and access the "Read Fault" screen.

(3) Record all the DTC's and "freeze frame" information shown on the scan tool.

(4) To erase DTC's, use the "Erase Trouble Code" data screen on the scan tool. **Do not erase any DTC's until problems have been investigated and repairs have been performed.**

STANDARD PROCEDURE - PINION FACTOR SETTING

NOTE: This procedure must be performed if the PCM has been replaced with a NEW or replacement unit. Failure to perform this procedure will result in an inoperative or improperly calibrated speedometer.

The vehicle speed readings for the speedometer are taken from the output speed sensor. The PCM must be calibrated to the different combinations of equipment (final drive and tires) available. Pinion Factor allows the technician to set the Powertrain Control Module initial setting so that the speedometer readings will be correct. To properly read and/or reset the Pinion Factor, it is necessary to use a scan tool.

(1) Plug the scan tool into the diagnostic connector located under the instrument panel.

(2) Select the Transmission menu.

(3) Select the Miscellaneous menu.

(4) Select Pinion Factor. Then follow the instructions on the scan tool screen.

STANDARD PROCEDURE - QUICK LEARN PROCEDURE

The quick learn procedure requires the use of the DRBIII® scan tool. This program allows the PCM to recalibrate itself. This will provide the best possible transaxle operation.

NOTE: The quick learn procedure should be performed if any of the following procedures are performed:

- Transaxle Assembly Replacement
- Powertrain Control Module Replacement
- Solenoid/Pressure Switch Assembly Replacement

POWERTRAIN CONTROL MODULE (Continued)

- Clutch Plate and/or Seal Replacement
- Valve Body Replacement or Recondition

To perform the Quick Learn Procedure, the following conditions must be met:

- The brakes must be applied
- The engine speed must be above 500 rpm
- The throttle angle (TPS) must be less than 3 degrees
- The shift lever position must stay until prompted to shift to overdrive
- The shift lever position must stay in overdrive after the Shift to Overdrive prompt until the DRBIII® indicates the procedure is complete
- The calculated oil temperature must be above 60° and below 200°

(1) Plug the DRBIII® scan tool into the diagnostic connector. The connector is located under the instrument panel.
(2) Go to the Transmission screen.
(3) Go to the Miscellaneous screen.
(4) Select Quick Learn Procedure. Follow the instructions of the DRBIII® to perform the Quick Learn Procedure.

REMOVAL

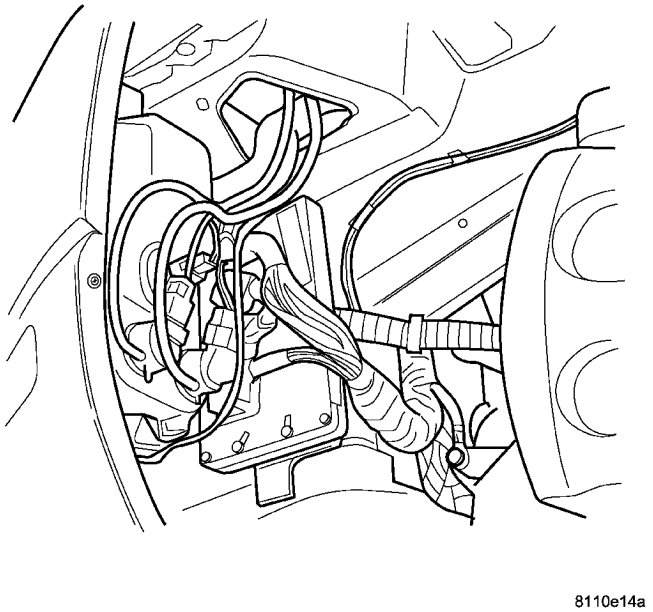


Fig. 17 PCM LOCATION

(1) Disconnect the negative battery cable.
(2) Raise vehicle and support.
(3) Remove the left front wheel.
(4) Remove the left front splash shield.
(5) Unlock and remove the 4 connectors (Fig. 17).
(6) Remove the 3 mounting screws (Fig. 18).
(7) Remove the PCM.

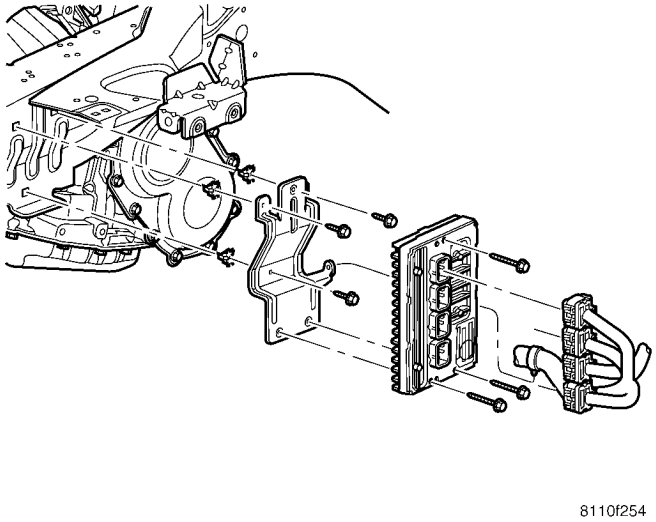


Fig. 18 PCM ASSEMBLY

INSTALLATION

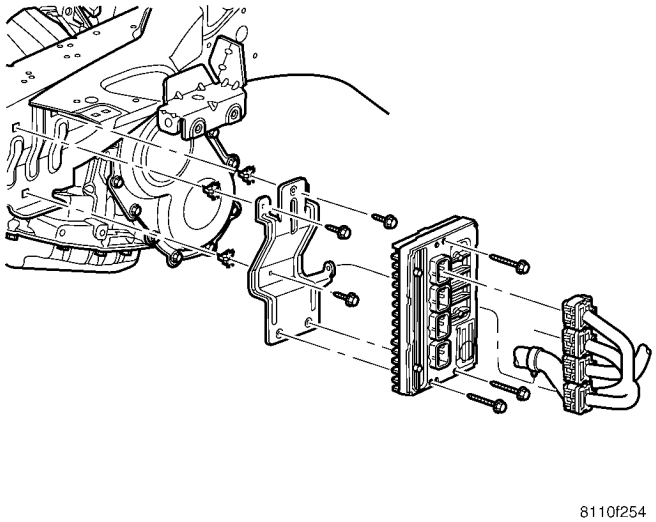


Fig. 19 PCM ASSEMBLY

(1) Install the PCM.
(2) Install the 3 mounting screws (Fig. 19).
(3) Tighten screws.

NOTE: The PCM connectors are color coded.

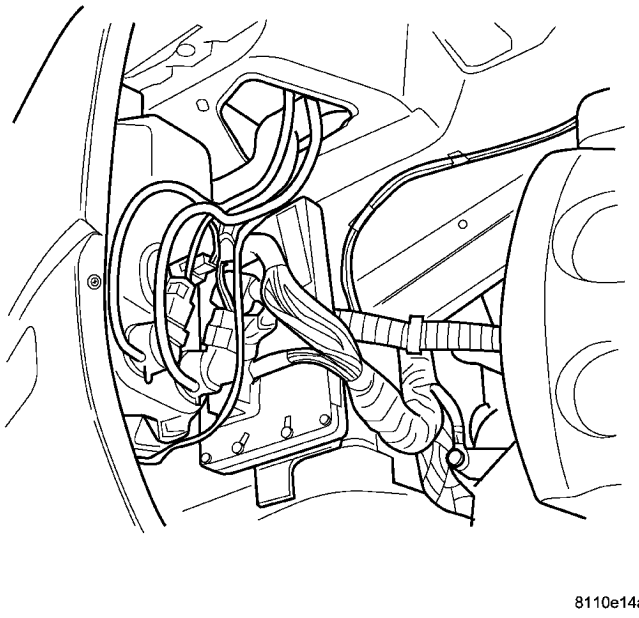


Fig. 20 PCM LOCATION

(4) Install and lock the 4 electrical connectors (Fig. 20).
(5) Install the left front splash shield.
(6) Install the left front wheel.
(7) Lower vehicle.
(8) Connect the negative battery cable.

MEMORY/HEATED SEAT ADJUSTABLE PEDAL MODULE

DESCRIPTION

A Memory Heated Seat/Adjustable Pedal Module (MHSAPM) is used on vehicles that are equipped with the heated seat system option. A Memory Seat/ Adjustable Pedal Module (MSAPM) is used on vehicles that are not equipped with the heated seat system option. This module contains all the software and control logic for the front memory/heated and power seat systems, as well as the adjustable foot pedal system. The memory heated seat/adjustable pedal module contains a central processing unit and interfaces with the Programmable Communications Interface (PCI) data bus circuit. Refer to the **Heated Seat System** section for more information on the heated seat system. Refer to the **Power Seat System** section for more information on the power/memory seat system.

The module is packaged in a black molded plastic case which is mounted under the edge of the driver side front seat cushion. This location makes it somewhat difficult to access because it sits between the power seat track and the seat cushion frame. Refer to the following procedure in this section for detailed removal and installation instructions.

For diagnosis of the MHSAPM or the PCI data bus, a DRB III® scan tool and the Diagnostic Procedures Manual are recommended. The Memory Heated Seat/Adjustable Pedal Module cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

The Memory Heated Seat/Adjustable Pedal Module controls the heated, power and memory seat systems as well as the adjustable foot pedal system. However different, these systems share some software inside the module. Refer to the following text which explains how the different systems are controlled by the memory heated seat/adjustable pedal module.

FRONT HEATED SEAT SYSTEM OPERATION

When either of the front heated seat switches are depressed a resistor multi-plexed signal is sent to the corresponding door module (Driver or Passenger). The applicable Door Module then sends a message via the Programmable Communications Interface (PCI) data bus network to the Memory Heated Seat Adjustable Pedal Module (MHSAPM), signaling the module to energize the heating element for the selected seat. Light Emitting Diodes (LEDS) in each switch indicate the level of heat in use. The switch LEDs are controlled by the applicable Door Module.

The MHSAPM energizes an integral solid-state relay, which supplies battery current to the seat heating elements. When high-temperature heating is selected, the heaters provide a boosted heat level during the first four minutes of operation after heating is activated. The heat output then drops to the normal selected-temperature level. If high-level heating is selected, the control system will automatically switch to the low level after two hours of continuous operation. Operation on the low setting turns off only when the ignition switch is turned off or the heated seat switch is pressed a second time indicating an off command.

MEMORY SEAT SYSTEM OPERATION

Depressing any of the drivers front door trim panel mounted, memory seat switches sends a hardwired, resistor multi-plexed signal to the drivers door module. The door module then sends a PCI data bus message to the Memory Heated Seat/Adjustable Pedal Module (MHSAPM). The module detects the memory seat switch status via the PCI data bus circuit and energizes the appropriate power seat motors. The programmed software in the MHSAPM allows it to know the location of the seat track by a resistance value generated from the seat track mounted poten-

tiometers. When the correct preset location is achieved the module will de-energize the power seat track motors. The MHSAPM will prevent the seat memory recall function from being initiated if the transmission gear selector lever is not in the Park or Neutral positions, or if the vehicle is moving. These inputs are monitored over the PCI data bus circuit.

ADJUSTABLE FOOT PEDAL SYSTEM OPERATION

Depressing the adjustable foot pedal switch sends a hardwired, resistor multi-plexed signal to the drivers door module. The door module then sends a PCI data bus message to the Memory Heated Seat/Adjustable Pedal Module (MHSAPM). The module detects the adjustable pedal switch status via the PCI data bus circuit and energizes the appropriate foot pedal motor. When the foot pedal switch is released the module will stop the motor.

Depressing the memory switch will signal the module to move the pedal assembly to the preprogrammed position. The programmed software in the MHSAPM allows it to know the location of the foot pedal assembly by a resistance value generated from the pedal assembly mounted potentiometer. When the correct preset location is achieved the module will de-energize the foot pedal motor. The MHSAPM will prevent the adjustable foot pedal function from being initiated if the transmission gear selector lever is not in the Park or Neutral positions, or if the vehicle is moving. These inputs are monitored over the PCI data bus circuit also.

DIAGNOSIS AND TESTING - MEMORY HEATED SEAT ADJUSTABLE PEDAL MODULE

In order to obtain conclusive testing of the memory heated seat adjustable pedal module, the Programmable Communications Interface (PCI) data bus circuit and any components that provide inputs to the module must be checked.

The most reliable, efficient, and accurate means to diagnose the module requires the use of a DRB III® scan tool and the Service and Body Diagnostic Procedures Manuals. The DRB III® scan tool can provide vital information to the technician trying to find a problem with the module. Diagnostic logic software is built into the memory heated seat adjustable pedal module to help the person trying to locate the problem by the most efficient means possible. Anytime a problem is suspected, a DRB III® scan tool should be obtained and used to retrieve any stored fault codes in the memory heated seat adjustable pedal module. If diagnostic fault codes are present in the module, record them on a piece of paper immediately before proceeding any further. Then, use these fault codes to identify the problem by verifying the fault code. Example, If the module records “DRIVER SEAT HEAT OUTPUT OPEN” fault, locate the diagnostic procedure for this code in the appropriate Body Diagnostic Procedures Manual and follow the flow chart until the specific problem is located and resolved. Once the problem is corrected, erase the stored fault code using the DRB III® scan tool and verify correct heated seat system operation. If the heated seat system appears to be functioning correctly, verify that there are no other stored codes in the module and return the vehicle to service.

If the fault code could not be verified, such as not finding anything wrong when following the diagnostic flow chart in the Body Diagnostic Procedures Manual. This is a good indication that a INTERMITTENT problem may be present. You must than attempt to find the intermittent problem, such as moving the heating element within the seat while testing continuity or wiggling the wire harness’s/electrical connectors under the seat while testing continuity. Always, eliminate all other potential problems before attempting to replace the memory heated seat adjustable pedal module.

For complete circuit wiring diagrams, refer to **Wiring**.

PRELIMINARY TEST

Before testing the individual components in the suspect system, check the following:

(1) Using the DRB III® scan tool, check the memory heated seat adjustable pedal module (MHSAPM) for any stored fault codes. Record these codes on paper for reference and resolve using the appropriate Body Diagnostic Procedures Manual.

(2) Check the vehicles battery open-circuit voltage and charging system performance. If the vehicles electrical system is defective or weak it may not be suppling sufficient voltage to operate the system in question.

REMOVAL

(1) Position the drivers seat as far upward and rearward as possible.

(2) Open hood, disconnect and isolate the negative battery cable.

(3) Remove the memory heated seat adjustable pedal module attaching screws.

(4) Disconnect the module electrical connectors.

(5) Remove the module from under drivers seat.

INSTALLATION

(1) Position the memory heated seat adjustable pedal module under the drivers seat.

(2) Connect the module electrical connectors.

(3) Install the module attaching screws.

(4) Connect the negative battery cable.

(5) Position the drivers seat in its original position.

(6) Verify correct system operation.

ENGINE SYSTEMS

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BATTERY SYSTEM

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BATTERY SYSTEM

DESCRIPTION

A single 12-volt battery is standard factory-installed equipment on this model. All of the components of the battery system are located within the engine compartment of the vehicle. The battery system is comprised of the following related components, which are covered in further detail later in this section of the service manual:

- **Battery** - The maintenance-free 12 volt automotive battery provides a reliable means of storing a renewable source of electrical energy within the vehicle.
- **Battery Cables** - The color-coded positive and negative battery cables connect the positive and negative battery terminal posts to the vehicle electrical system.
- **Battery Holddown** - The battery holddown secures the battery in the battery tray.
- **Battery Thermowrap** - The battery thermowarp insulates the battery from engine compartment temperature extremes.
- **Battery Tray** - The battery tray provides a secure mounting location in the engine compartment

for the battery and an anchor point for the battery holddown.

For battery maintenance schedules and jump starting procedure, see the owner's manual in the vehicle glove box. Optionally, refer to the Lubrication and Maintenance section of this manual for the battery maintenance schedules and proper battery jump starting procedure. While battery charging can be considered a maintenance procedure, the battery charging procedure and related information are located later in this section.

OPERATION

The battery system is designed to provide a safe, efficient and reliable means of delivering and storing electrical energy. This electrical energy is required to operate the engine starting system, as well as to operate many of the other vehicle accessory systems for limited durations while the engine and/or charging system are not operating. The battery system is also designed to provide a reserve of electrical energy to supplement the charging system for short durations while the engine is running and the electrical current demands of the vehicle exceed the output of the charging system. In addition to delivering, and storing electrical energy for the vehicle, the battery system serves as a capacitor and voltage stabilizer for the vehicle electrical system. It absorbs most abnormal or transient voltages caused by the switching ON/OFF of any of the electrical components or circuits in the vehicle.

DIAGNOSIS AND TESTING - BATTERY SYSTEM

The battery, starting, and charging systems in the vehicle operate with one another and must be tested as a complete system. In order for the engine to start and the battery to maintain its charge properly, all of the components that are used in these systems must perform within specifications. It is important that the battery, starting, and charging systems be thoroughly tested and inspected any time a battery needs to be charged or replaced. The cause of abnormal battery discharge, overcharging or early battery failure must be diagnosed and corrected before a battery is replaced and before a vehicle is returned to service. The service information for these systems has been separated within this service manual to make it easier to locate the specific information you are seeking. However, when attempting to diagnose any of these systems, it is important that you keep their interdependency in mind.

The diagnostic procedures used for the battery, starting, and charging systems include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM). Use of an induction-type milliampere ammeter, a volt/ohmmeter, a battery charger, a carbon pile rheostat (load tester) and a 12-volt test lamp may be required. All OBD-sensed systems are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for any failure it detects. Refer to Charging System for the proper charging system onboard diagnostic test procedures.

MICRO 420 BATTERY TESTER

The Micro 420 automotive battery tester is a special service tool, designed to help the dealership technician diagnose the cause of a defective battery. Follow the instruction manual supplied with the tester to properly diagnose a vehicle. If the instruction manual is not available refer to the standard procedure in this section, which includes the directions for using the Micro 420 battery tester.

BATTERY SYSTEM (Continued)

BATTERY SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
THE BATTERY SEEMS WEAK OR DEAD WHEN ATTEMPTING TO START THE ENGINE.	1. The electrical system ignition-off draw is excessive.	1. Refer to the IGNITION-OFF DRAW TEST Standard Procedure for the proper test procedures. Repair the excessive ignition-off draw, as required.
	2. The charging system is faulty.	2. Determine if the charging system is performing to specifications. Refer to Charging System for additional charging system diagnosis and testing procedures. Repair the faulty charging system, as required.
	3. The battery is discharged.	3. Determine the battery state-of-charge using the Micro 420 battery tester. Refer to the Standard Procedures in this section for additional test procedures. Charge the faulty battery, as required.
	4. The battery terminal connections are loose or corroded.	4. Refer to Battery Cables for the proper battery cable diagnosis and testing procedures. Check and clean and tighten the battery terminal connections, as required.
	5. The battery has an incorrect size or rating for this vehicle.	5. Refer to Battery System Specifications for the proper size and rating. Replace an incorrect battery, as required.
	6. The battery is faulty.	6. Test the battery using the Micro 420 battery tester. Refer to the Standard Procedures in this section for additional test procedures. Replace the faulty battery, as required.
	7. The starting system is faulty.	7. Determine if the starting system is performing to specifications. Refer to Starting System for the proper starting system diagnosis and testing procedures. Repair the faulty starting system, as required.
	8. The battery is physically damaged.	8. Inspect the battery for loose terminal posts or a cracked and leaking case. Replace the damaged battery, as required.

BATTERY SYSTEM (Continued)

BATTERY SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
THE BATTERY STATE OF CHARGE CANNOT BE MAINTAINED.	1. The battery has an incorrect size or rating for this vehicle.	1. Refer to Battery System Specifications for the proper specifications. Replace an incorrect battery, as required.
	2. The battery terminal connections are loose or corroded.	2. Refer to Battery Cable for the proper cable diagnosis and testing procedures. Clean and tighten the battery terminal connections, as required.
	3. The electrical system ignition-off draw is excessive.	3. Refer to the IGNITION-OFF DRAW TEST Standard Procedure for the proper test procedures. Repair the faulty electrical system, as required.
	4. The battery is faulty.	4. Test the battery using the Micro 420 battery tester. Refer to Standard Procedures for additional test procedures. Replace the faulty battery, as required.
	5. The starting system is faulty.	5. Determine if the starting system is performing to specifications. Refer to Starting System for the proper starting system diagnosis and testing procedures. Repair the faulty starting system, as required.
	6. The charging system is faulty.	6. Determine if the charging system is performing to specifications. Refer to Charging System for charging system diagnosis and testing procedures. Repair the faulty charging system, as required.
	7. Electrical loads exceed the output of the charging system.	7. Inspect the vehicle for aftermarket electrical equipment which might cause excessive electrical loads.
	8. Slow driving or prolonged idling with high-amperage draw loads in use.	8. Advise the vehicle operator, as required.
THE BATTERY WILL NOT ACCEPT A CHARGE.	1. The battery is faulty.	1. Test the battery using the Micro 420 battery tester.. Charge or replace the faulty battery, as required.

ABNORMAL BATTERY DISCHARGING

Any of the following conditions can result in abnormal battery discharging:

1. A faulty or incorrect charging system component. Refer to Charging System for additional charging system diagnosis and testing procedures.
2. A faulty or incorrect battery. Use Micro 420 tester and refer to Standard Procedures for additional battery diagnosis and testing procedures.
3. A faulty circuit or component causing excessive ignition-off draw.
4. Electrical loads that exceed the output of the charging system. This can be due to equipment installed after manufacture, or repeated short trip use.
5. A faulty or incorrect starting system component. Refer to Starting System for the proper starting system diagnosis and testing procedures.
6. Corroded or loose battery terminals.
7. Slow driving speeds (heavy traffic conditions) or prolonged idling, with high-amperage draw loads in use.

CLEANING

The following information details the recommended cleaning procedures for the battery and related components. In addition to the maintenance schedules

BATTERY SYSTEM (Continued)

found in this service manual and the owner's manual, it is recommended that these procedures be performed any time the battery or related components must be removed for vehicle service.

(1) Clean the battery cable terminal clamps of all corrosion. Remove any corrosion using a wire brush or a post and terminal cleaning tool, and a sodium bicarbonate (baking soda) and warm water cleaning solution (Fig. 1).

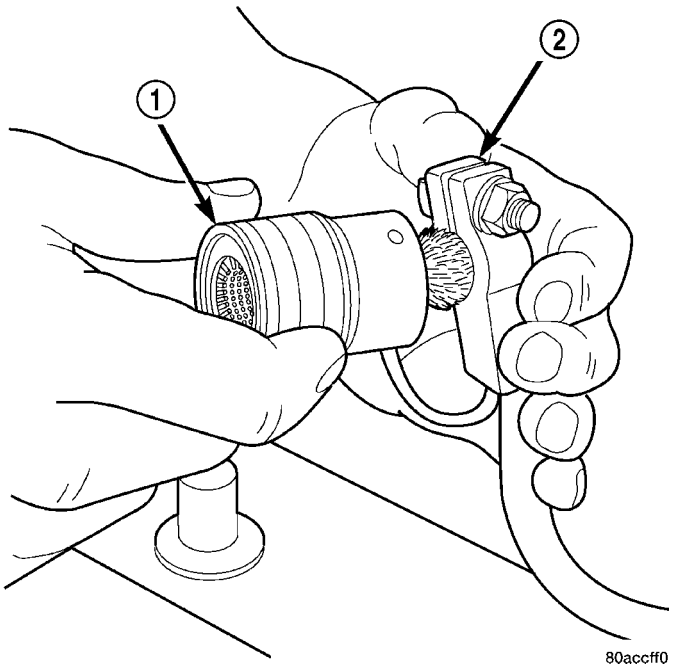


Fig. 1 Cleaning Battery Cable Terminal Clamp - Typical

1 - Terminal Brush
2 - Battery Cable

(2) Clean the battery tray and battery holddown hardware of all corrosion. Remove any corrosion using a wire brush and a sodium bicarbonate (baking soda) and warm water cleaning solution. Paint any exposed bare metal.

(3) If the removed battery is to be reinstalled, clean the outside of the battery case and the top cover with a sodium bicarbonate (baking soda) and warm water cleaning solution using a stiff bristle parts cleaning brush to remove any acid film (Fig. 2). Rinse the battery with clean water. Ensure that the cleaning solution does not enter the battery cells through the vent holes.

(4) Clean the battery thermowrap with a sodium bicarbonate (baking soda) and warm water cleaning solution using a soft bristle parts cleaning brush to remove any acid film.

(5) Clean any corrosion from the battery terminal posts with a wire brush or a post and terminal cleaner, and a sodium bicarbonate (baking soda) and warm water cleaning solution (Fig. 3).

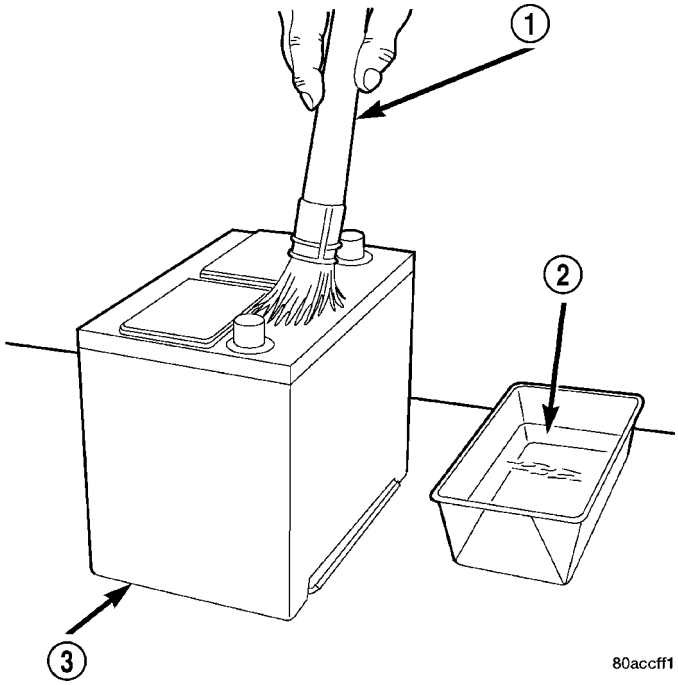


Fig. 2 Cleaning Battery - Typical

1 - Cleaning Brush
2 - Warm Water and Baking Soda Solution
3 - Battery

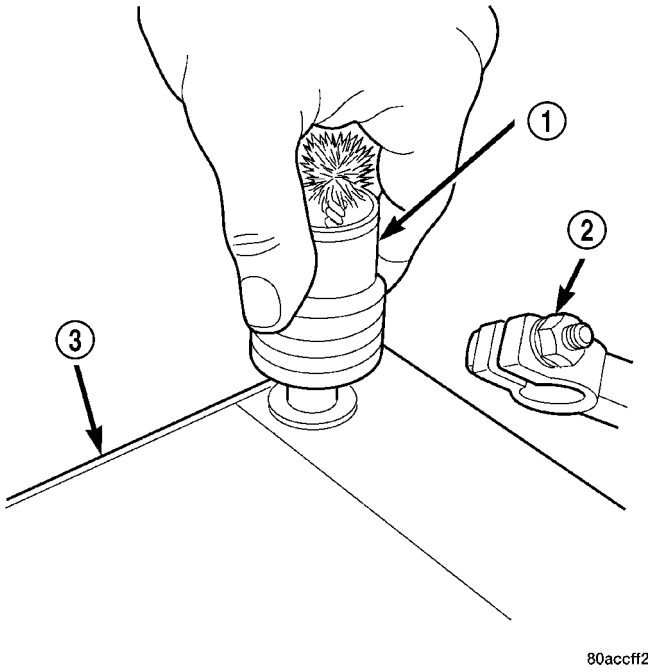


Fig. 3 Cleaning Battery Terminal Post - Typical

1 - Terminal Brush
2 - Battery Cable
3 - Battery

INSPECTION

The following information details the recommended inspection procedures for the battery and related

components. In addition to the maintenance schedules found in this service manual and the owner's manual, it is recommended that these procedures be performed any time the battery or related components must be removed for vehicle service.

(1) Inspect the battery cable terminal clamps for damage. Replace any battery cable that has a damaged or deformed terminal clamp.

(2) Inspect the battery tray and battery holddown hardware for damage. Replace any damaged parts.

(3) Slide the thermowrap off of the battery case. Inspect the battery case for cracks or other damage that could result in electrolyte leaks. Also, check the battery terminal posts for looseness. Batteries with damaged cases or loose terminal posts must be replaced.

(4) Inspect the battery thermowrap for tears, cracks, deformation or other damage. Replace any battery thermal guard that has been damaged.

(5) Inspect the battery built-in test indicator sight glass(if equipped) for an indication of the battery condition. If the battery is discharged, charge as required. Refer to Standard Procedures for the proper battery built-in indicator test procedures. Also refer to Standard Procedures for the proper battery charging procedures.

SPECIFICATIONS

The battery Group Size number, the Cold Cranking Amperage (CCA) rating, and the Reserve Capacity (RC) rating or Ampere-Hours (AH) rating can be found on the original equipment battery label. Be certain that a replacement battery has the correct Group Size number, as well as CCA, and RC or AH ratings that equal or exceed the original equipment specification for the vehicle being serviced. Battery sizes and ratings are discussed in more detail below.

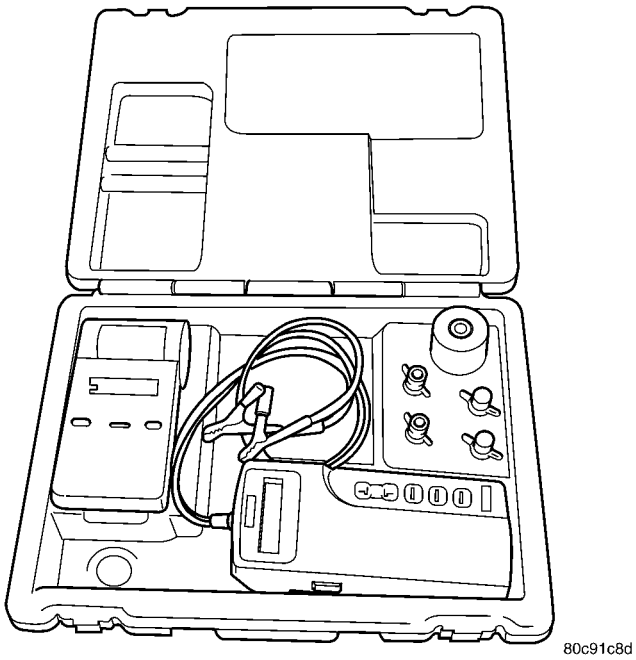
- **Group Size** - The outside dimensions and terminal placement of the battery conform to standards established by the Battery Council International (BCI). Each battery is assigned a BCI Group Size number to help identify a correctly-sized replacement.
- **Cold Cranking Amperage** - The Cold Cranking Amperage (CCA) rating specifies how much current (in amperes) the battery can deliver for thirty seconds at -18° C (0° F). Terminal voltage must not fall below 7.2 volts during or after the thirty second discharge period. The CCA required is generally higher as engine displacement increases, depending also upon the starter current draw requirements.
- **Reserve Capacity** - The Reserve Capacity (RC) rating specifies the time (in minutes) it takes for battery terminal voltage to fall below 10.5 volts, at a discharge rate of 25 amperes. RC is determined with the battery fully-charged at 26.7° C (80° F). This rating estimates how long the battery might last after a charging system failure, under minimum electrical load.
- **Ampere-Hours** - The Ampere-Hours (AH) rating specifies the current (in amperes) that a battery can deliver steadily for twenty hours, with the voltage in the battery not falling below 10.5 volts. This rating is also sometimes identified as the twenty-hour discharge rating.

BATTERY CLASSIFICATIONS & RATINGS					
Part Number	BCI Group Size Classification	Cold Cranking Amperage	Reserve Capacity	Ampere - Hours	Load Test Amperage
4686158AD	34	500	110 Minutes	60	250

BATTERY SYSTEM (Continued)

SPECIAL TOOLS

BATTERY SYSTEM SPECIAL TOOLS



Micro 420 Battery Tester

BATTERY

DESCRIPTION

Maintenance-free batteries are standard factory-installed equipment on this model. Male post type terminals made of a soft lead material protrude from the top of the molded plastic battery case (Fig. 4) to provide the means for connecting the battery to the vehicle electrical system. The battery positive terminal post is visibly larger in diameter than the negative terminal post. The letters **POS** and **NEG** are also molded into the top of the battery case adjacent to their respective positive and negative terminal posts for additional identification confirmation.

This battery is designed to provide a safe, efficient and reliable means of storing electrical energy in a chemical form. This means of energy storage allows the battery to produce the electrical energy required to operate the engine starting system, as well as to operate many of the other vehicle accessory systems for limited durations while the engine and/or the charging system are not operating. The battery is made up of six individual cells that are connected in series. Each cell contains positively charged plate groups that are connected with lead straps to the positive terminal post, and negatively charged plate groups that are connected with lead straps to the negative terminal post. Each plate consists of a stiff mesh framework or grid coated with lead dioxide

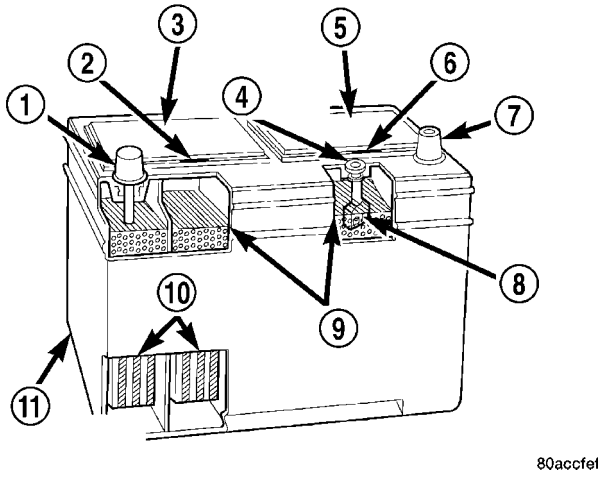


Fig. 4 Maintenance-Free Battery

1 - Positive Post
2 - Vent
3 - Cell Cap
4 - Vent
5 - Cell Cap
6 - Vent
7 - Negative Post
8 - Indicator Eye (if equipped)
9 - Electrolyte Level
10 - Plate Groups
11 - Maintenance-Free Battery

(positive plate) or sponge lead (negative plate). Insulators or plate separators made of a non-conductive material are inserted between the positive and negative plates to prevent them from contacting or shorting against one another. These dissimilar metal plates are submerged in a sulfuric acid and water solution called electrolyte.

The chemical composition of the metal coated plates within the low-maintenance battery reduces battery gassing and water loss, at normal charge and discharge rates. Therefore, the battery should not require additional water in normal service. However, rapid loss of electrolyte can be caused by an overcharging condition. Be certain to diagnose the charging system after replacing the battery for a low electrolyte condition and before returning the vehicle to service. Refer to **Charging** for additional information.

The battery Group Size number, the Cold Cranking Amperage (CCA) rating, and the Reserve Capacity (RC) rating or Ampere-Hours (AH) rating can be found on the original equipment battery label. Be certain that a replacement battery has the correct Group Size number, as well as CCA, and RC or AH ratings that equal or exceed the original equipment specification for the vehicle being serviced. Refer to **Battery Specifications** in this group for the proper factory-installed battery specifications.

BATTERY (Continued)

OPERATION

The battery is designed to store electrical energy in a chemical form. When an electrical load is applied to the terminals of the battery, an electrochemical reaction occurs. This reaction causes the battery to discharge electrical current from its terminals. As the battery discharges, a gradual chemical change takes place within each cell. The sulfuric acid in the electrolyte combines with the plate materials, causing both plates to slowly change to lead sulfate. At the same time, oxygen from the positive plate material combines with hydrogen from the sulfuric acid, causing the electrolyte to become mainly water. The chemical changes within the battery are caused by the movement of excess or free electrons between the positive and negative plate groups. This movement of electrons produces a flow of electrical current through the load device attached to the battery terminals.

As the plate materials become more similar chemically, and the electrolyte becomes less acid, the voltage potential of each cell is reduced. However, by charging the battery with a voltage higher than that of the battery itself, the battery discharging process is reversed. Charging the battery gradually changes the sulfated lead plates back into sponge lead and lead oxide, and the water back into sulfuric acid. This action restores the difference in the electron charges deposited on the plates, and the voltage potential of the battery cells. For a battery to remain useful, it must be able to produce high-amperage current over an extended period. A battery must also be able to accept a charge, so that its voltage potential may be restored.

The battery is vented to release excess hydrogen gas that is created when the battery is being charged or discharged. However, even with these vents, hydrogen gas can collect in or around the battery. If hydrogen gas is exposed to flame or sparks, it may ignite.

DIAGNOSIS AND TESTING - BATTERY

The battery must be completely charged and the terminals should be properly cleaned and inspected before diagnostic procedures are performed. Refer to Battery System Cleaning for the proper cleaning procedures, and Battery System Inspection for the proper battery inspection procedures. Refer to Standard Procedures for the proper battery charging procedures.

MICRO 420 BATTERY TESTER

The Micro 420 automotive battery tester is designed to help the dealership technicians diagnose the cause of a defective battery. Follow the instruction manual supplied with the tester to properly diagnose a vehicle. If the instruction manual is not available refer to the standard procedure in this section, which includes the directions for using the Micro 420 battery tester.

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING OR LOOSE POSTS, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

A battery that will not accept a charge is faulty, and must be replaced. Further testing is not required. A fully-charged battery must be tested to determine its condition. A battery that is fully-charged, but does not pass the load test or Micro 420 test, is faulty and must be replaced.

NOTE: Completely discharged batteries may take several hours to accept a charge.

STANDARD PROCEDURE

STANDARD PROCEDURE - CONVENTIONAL BATTERY CHARGING

Battery charging is the means by which the battery can be restored to its full voltage potential. A battery is fully-charged when:

- Micro 420 battery tester indicates battery is OK.
- Three hydrometer tests, taken at one-hour intervals, indicate no increase in the temperature-corrected specific gravity of the battery electrolyte.
- Passes Load Test
- Open-circuit voltage of the battery is 12.64 volts or above.

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING, LOOSE POSTS, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

BATTERY (Continued)

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

WARNING: IF THE BATTERY IS EQUIPPED WITH REMOVABLE CELL CAPS, BE CERTAIN THAT EACH OF THE CELL CAPS IS IN PLACE AND TIGHT BEFORE THE BATTERY IS RETURNED TO SERVICE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT FROM LOOSE OR MISSING CELL CAPS.

CAUTION: Always disconnect and isolate the battery negative cable before charging a battery. Do not exceed sixteen volts while charging a battery. Damage to the vehicle electrical system components may result.

CAUTION: Battery electrolyte will bubble inside the battery case during normal battery charging. Electrolyte boiling or being discharged from the battery vents indicates a battery overcharging condition. Immediately reduce the charging rate or turn off the charger to evaluate the battery condition. Damage to the battery may result from overcharging.

CAUTION: The battery should not be hot to the touch. If the battery feels hot to the touch, turn off the charger and let the battery cool before continuing the charging operation. Damage to the battery may result.

After the battery has been charged to 12.4 volts or greater, retest the battery with the Micro 420 tester or perform a load test to determine the battery cranking capacity.

Clean and inspect the battery hold downs, tray, terminals, posts, and top before completing battery service. Refer to Battery System Cleaning for the proper battery cleaning procedures, and Battery System Inspection for the proper battery inspection procedures.

CHARGING A COMPLETELY DISCHARGED BATTERY

The following procedure should be used to recharge a completely discharged battery. Unless this procedure is properly followed, a good battery may be needlessly replaced.

(1) Measure the voltage at the battery posts with a voltmeter, accurate to 1/10 (0.10) volt (Fig. 5). If the reading is below ten volts, the battery charging current will be low. It could take some time before the battery accepts a current greater than a few milliamperes. Such low current may not be detectable on the ammeters built into many battery chargers.

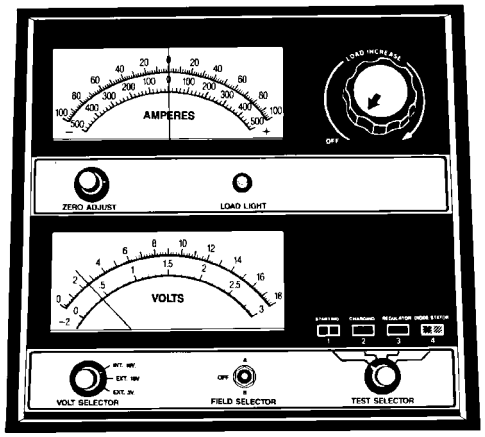


Fig. 5 Voltmeter Accurate to 1/10 Volt (Connected)

(2) Disconnect and isolate the battery negative cable. Connect the battery charger leads. Some battery chargers are equipped with polarity-sensing circuitry. This circuitry protects the battery charger and the battery from being damaged if they are improperly connected. If the battery state-of-charge is too low for the polarity-sensing circuitry to detect, the battery charger will not operate. This makes it appear that the battery will not accept charging current. See the instructions provided by the manufacturer of the battery charger for details on how to bypass the polarity-sensing circuitry.

(3) Battery chargers vary in the amount of voltage and current they provide. The amount of time required for a battery to accept measurable charging current at various voltages is shown in the Charge Rate Table. If the charging current is still not measurable at the end of the charging time, the battery is faulty and must be replaced. If the charging current is measurable during the charging time, the battery may be good and the charging should be completed in the normal manner.

BATTERY (Continued)

CHARGE RATE TABLE	
Voltage	Minutes
16.0 volts maximum	up to 10 min.
14.0 to 15.9 volts	up to 20 min.
13.9 volts or less	up to 30 min.

CHARGING TIME REQUIRED

The time required to charge a battery will vary, depending upon the following factors:

- **Battery Capacity** - A completely discharged heavy-duty battery requires twice the charging time of a small capacity battery.
- **Temperature** - A longer time will be needed to charge a battery at -18° C (0° F) than at 27° C (80° F). When a fast battery charger is connected to a cold battery, the current accepted by the battery will be very low at first. As the battery warms, it will accept a higher charging current rate (amperage).
- **Charger Capacity** - A battery charger that supplies only five amperes will require a longer charging time. A battery charger that supplies twenty amperes or more will require a shorter charging time.
- **State-Of-Charge** - A completely discharged battery requires more charging time than a partially discharged battery. Electrolyte is nearly pure water in a completely discharged battery. At first, the charging current (amperage) will be low. As the battery charges, the specific gravity of the electrolyte will gradually rise.

The Conventional Battery Charging Time Table gives an indication of the time required to charge a typical battery at room temperature based upon the battery state-of-charge and the charger capacity.

CONVENTIONAL BATTERY CHARGING TIME TABLE			
Charging Amperage	5 Amps	10 Amps	20 Amps
Open Circuit Voltage	Hours Charging @ 21° C (70° F)		
12.25 to 12.49	6 hours	3 hours	1.5 hours
12.00 to 12.24	10 hours	5 hours	2.5 hours
10.00 to 11.99	14 hours	7 hours	3.5 hours
Below 10.00	18 hours	9 hours	4.5 hours

STANDARD PROCEDURE - OPEN-CIRCUIT VOLTAGE TEST

A battery open-circuit voltage test will show the approximate state-of-charge of a battery. This test can be used if no other battery tester is available.

Before proceeding with this test, completely charge the battery. Refer to Standard Procedures for the proper battery charging procedures.

(1) Before measuring the open-circuit voltage, the surface charge must be removed from the battery. Turn on the headlamps for fifteen seconds, then allow up to five minutes for the battery voltage to stabilize.

(2) Disconnect and isolate both battery cables, negative cable first.

(3) Using a voltmeter connected to the battery posts (see the instructions provided by the manufacturer of the voltmeter), measure the open-circuit voltage (Fig. 6).

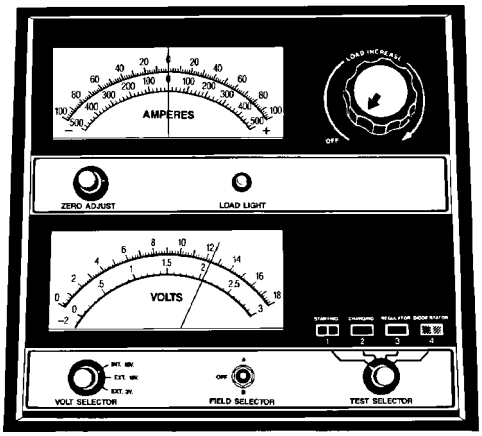


Fig. 6 Testing Open Circuit Voltage

See the Open-Circuit Voltage Table. This voltage reading will indicate the battery state-of-charge, but will not reveal its cranking capacity. If a battery has an open-circuit voltage reading of 12.4 volts or greater, it may be tested to reveal its cranking capacity. Refer to Standard Procedures for the proper Micro 420 battery test procedures.

OPEN CIRCUIT VOLTAGE TABLE	
Open Circuit Voltage	Charge Percentage
11.7 volts or less	0%
12.0 volts	25%
12.2 volts	50%
12.45 volts	75%
12.65 volts or more	100%

BATTERY (Continued)

STANDARD PROCEDURE - IGNITION-OFF DRAW TEST

The term Ignition-Off Draw (IOD) identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. A normal vehicle electrical system will draw from five to forty-five milliamperes (0.005 to 0.045 ampere) with the ignition switch in the Off position, and all non-ignition controlled circuits in proper working order. Up to forty-five milliamperes are needed to enable the memory functions for the Powertrain Control Module (PCM), radio, and other modules which may vary with the vehicle equipment.

A vehicle that has not been operated for approximately twenty-one days, may discharge the battery to an inadequate level. When a vehicle will not be used for twenty-one days or more (stored), remove the IOD fuse from the Integrated Power Module (IPM). This will reduce battery discharging.

Excessive IOD can be caused by:

- Electrical items left on.
- Faulty or improperly adjusted switches.
- Faulty or shorted electronic modules and components.
- An internally shorted generator.
- Intermittent shorts in the wiring.

If the IOD is over forty-five milliamperes, the problem must be found and corrected before replacing a battery. In most cases, the battery can be charged and returned to service after the excessive IOD condition has been corrected.

(1) Verify that all electrical accessories are off. Turn off all lamps, remove the ignition key, and close all doors. If the vehicle is equipped with an illuminated entry system or an electronically tuned radio, allow the electronic timer function of these systems to automatically shut off (time out). This may take up to twenty minutes.

(2) Disconnect the battery negative cable.

(3) Set an electronic digital multi-meter to its highest amperage scale. Connect the multi-meter between the disconnected battery negative cable terminal clamp and the battery negative terminal post. Make sure that the doors remain closed so that the illuminated entry system is not activated. The multi-meter amperage reading may remain high for up to three minutes, or may not give any reading at all while set in the highest amperage scale, depending upon the electrical equipment in the vehicle. The multi-meter leads must be securely clamped to the battery negative cable terminal clamp and the battery negative terminal post. If continuity between the battery negative terminal post and the negative cable terminal clamp is lost during any part of the IOD test, the electronic timer function will be activated and all of the tests will have to be repeated.

(4) After about three minutes, the high-amperage IOD reading on the multi-meter should become very low or nonexistent, depending upon the electrical equipment in the vehicle. If the amperage reading remains high, remove and replace each fuse or circuit breaker in the Integrated Power Module (IPM), one at a time until the amperage reading becomes very low, or nonexistent. Refer to the appropriate wiring information in this service manual for complete Integrated Power Module fuse, circuit breaker, and circuit identification. This will isolate each circuit and identify the circuit that is the source of the high-amperage IOD. If the amperage reading remains high after removing and replacing each fuse and circuit breaker, disconnect the wire harness from the generator. If the amperage reading now becomes very low or nonexistent, refer to Charging System for the proper charging system diagnosis and testing procedures. After the high-amperage IOD has been corrected, switch the multi-meter to progressively lower amperage scales and, if necessary, repeat the fuse and circuit breaker remove-and-replace process to identify and correct all sources of excessive IOD. It is now safe to select the lowest milliampere scale of the multi-meter to check the low-amperage IOD.

CAUTION: Do not open any doors, or turn on any electrical accessories with the lowest milliampere scale selected, or the multi-meter may be damaged.

(5) Allow twenty minutes for the IOD to stabilize and observe the multi-meter reading. The low-amperage IOD should not exceed forty-five milliamperes (0.045 ampere). If the current draw exceeds forty-five milliamperes, isolate each circuit using the fuse and circuit breaker remove-and-replace process in Step 4. The multi-meter reading will drop to within the acceptable limit when the source of the excessive current draw is disconnected. Repair this circuit as required; whether a wiring short, incorrect switch adjustment, or a component failure is at fault.

REMOVAL - BATTERY

WARNING: A SUITABLE PAIR OF HEAVY DUTY RUBBER GLOVES AND SAFETY GLASSES SHOULD BE WORN WHEN REMOVING OR SERVICING A BATTERY.

WARNING: REMOVE METALLIC JEWELRY TO AVOID INJURY BY ACCIDENTAL ARCING OF BATTERY CURRENT.

(1) Verify that the ignition switch and all accessories are OFF.

BATTERY (Continued)

(2) Disconnect the battery cables from the battery posts, negative first (Fig. 7).

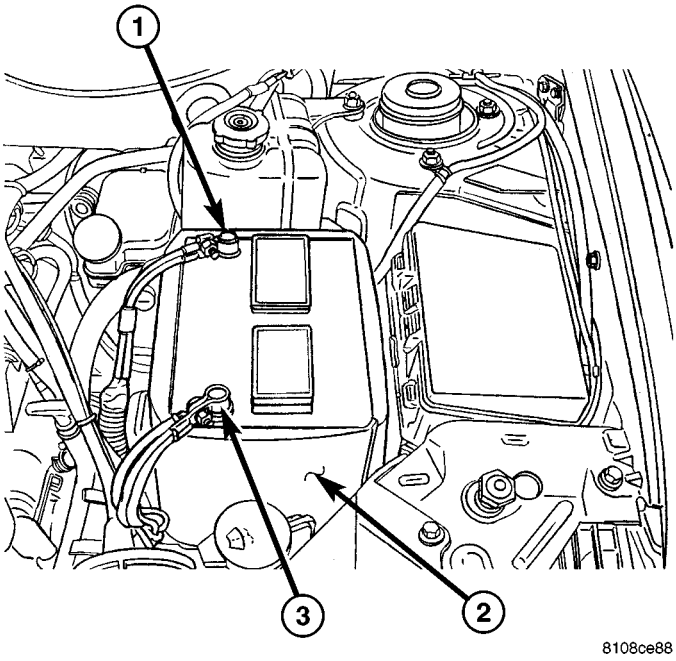


Fig. 7 CS Battery/Thermowrap

1 - Positive Battery Cable
2 - Thermowrap
3 - Negative Battery Cable

(3) Remove the battery hold down retaining nut.
(4) Remove the battery hold down bracket.
(5) Remove the thermowrap from the battery by sliding straight up and off (Fig. 7).
(6) Remove the battery from the vehicle.

INSTALLATION

(1) Position the battery in the battery tray.
(2) Install the battery hold down bracket and retaining nut. Torque the nut to 20 N·m (180 in. lbs.).
(3) Connect the battery cables to the battery posts, positive cable first. Torque terminal fasteners to 40 in. lbs.

BATTERY HOLDDOWN

DESCRIPTION

The battery hold down hardware consists of a molded plastic lip that is integral to the outboard edge of the battery tray and support unit, a molded steel hold down bracket and a single hex nut with a coned washer.

When installing a battery into the battery tray, be certain that the hold down hardware is properly installed and that the fasteners are tightened to the proper specifications. Improper hold down fastener tightness, whether too loose or too tight, can result in damage to the battery, the vehicle or both.

OPERATION

The battery holddown secures the battery in the battery tray. This holddown is designed to prevent battery movement during the most extreme vehicle operation conditions. Periodic removal and lubrication of the battery holddown hardware is recommended to prevent hardware seizure at a later date.

NOTE: Never operate a vehicle without a battery holddown device properly installed. Damage to the vehicle, components and battery could result.

REMOVAL

(1) Turn the ignition switch to the Off position. Be certain that all electrical accessories are turned off.
(2) Remove the negative battery cable from the negative battery post.
(3) Remove the nut that secures the battery hold down bracket to the battery tray.
(4) Remove the battery hold down bracket from the battery tray.

INSTALLATION

(1) Install the battery hold down bracket in the battery tray. Be certain the battery and battery hold down are properly positioned.
(2) Install the nut that secures the battery hold down bracket to the battery tray. Torque to 20 N·m (180 in. lbs.).
(3) Connect the negative battery cable. Torque to 40 in. lbs.

BATTERY CABLES

DESCRIPTION

The battery cables are large gauge, stranded copper wires sheathed within a heavy plastic or synthetic rubber insulating jacket. The wire used in the battery cables combines excellent flexibility and reliability with high electrical current carrying capacity.

A clamping type female battery terminal made of stamped metal is attached to one end of the battery cable wire. A pinch-bolt and hex nut are installed at the open end of the female battery terminal clamp. Large eyelet type terminals are crimped onto the opposite end of the battery cable wire and then solder-dipped. The battery positive cable wires have a red insulating jacket to provide visual identification and feature a larger female battery terminal clamp to allow connection to the larger battery positive terminal post. The battery negative cable wires have a

BATTERY CABLES (Continued)

black insulating jacket and a slightly smaller female battery terminal clamp.

Both the battery positive and negative cables are available for service replacement only as a unit with the battery wire harness, which may include portions of the wiring circuits for the generator and other components on some models. Refer to **Wiring** for the location of more information on the various wiring circuits included in the battery wire harness for the vehicle being serviced.

OPERATION

The battery cables connect the battery terminal posts to the vehicle electrical system. These cables also provide a path back to the battery for electrical current generated by the charging system to restore the voltage potential of the battery. The female battery terminal clamps on the ends of the battery cable wires provide a strong and reliable connection of the battery cable to the battery terminal posts. The terminal pinch bolts allow the female terminal clamps to be tightened around the male terminal posts on the top of the battery. The eyelet terminals secured to the opposite ends of the battery cable wires from the female battery terminal clamps provide secure and reliable connection of the battery cables to the vehicle electrical system.

The positive battery cable wire has an eyelet terminal that connects to the B(+) terminal stud of the Integrated Power Module (IPM), and an eyelet terminal that connects the battery positive cable to the B(+) terminal stud of the engine starter motor solenoid. The battery negative cable terminal clamp is attached to the ends of two wires. One wire has an eyelet terminal that connects the battery negative cable to the vehicle powertrain through a stud on the engine cylinder block. The other wire has an eyelet terminal that connects the battery negative cable to the vehicle body through a ground screw in the engine compartment.

DIAGNOSIS AND TESTING - BATTERY CABLE

A voltage drop test will determine if there is excessive resistance in the battery cable terminal connections or the battery cable. If excessive resistance is found in the battery cable connections, the connection point should be disassembled, cleaned of all corrosion or foreign material, then reassembled. Following reassembly, check the voltage drop for the battery cable connection and the battery cable again to confirm repair.

When performing the voltage drop test, it is important to remember that the voltage drop is giving an indication of the resistance between the two points at which the voltmeter probes are attached. **EXAMPLE:** When testing the resistance of the battery positive cable, touch the voltmeter leads to the battery positive cable terminal clamp and to the battery positive cable eyelet terminal at the starter solenoid B(+) terminal stud. If you probe the battery positive terminal post and the battery positive cable eyelet terminal at the starter solenoid B(+) terminal stud, you are reading the combined voltage drop in the battery positive cable terminal clamp-to-terminal post connection and the battery positive cable.

VOLTAGE DROP TEST

The following operation will require a voltmeter accurate to 1/10 (0.10) volt. Before performing this test, be certain that the following procedures are accomplished:

- The battery is fully-charged and tested. Refer to Standard Procedures for the proper battery charging and test procedures.
- Fully engage the parking brake.
- Place the gearshift selector lever in the Park position.
- Verify that all lamps and accessories are turned off.
- To prevent the engine from starting, remove the Automatic Shut Down (ASD) relay. The ASD relay is located in the Intelligent Power Module (IPM), in the engine compartment. See the fuse and relay layout label affixed to the underside of the IPM cover for ASD relay identification and location.

(1) Connect the positive lead of the voltmeter to the battery negative terminal post. Connect the negative lead of the voltmeter to the battery negative cable terminal clamp (Fig. 8). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If voltage is detected, correct the poor connection between the battery negative cable terminal clamp and the battery negative terminal post.

BATTERY CABLES (Continued)

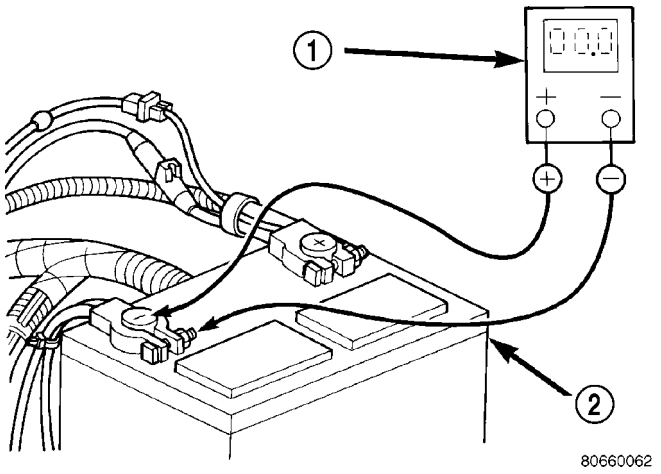


Fig. 8 Test Battery Negative Connection Resistance - Typical

1 - Voltmeter
2 - Battery

(2) Connect the positive lead of the voltmeter to the battery positive terminal post. Connect the negative lead of the voltmeter to the battery positive cable terminal clamp (Fig. 9). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If voltage is detected, correct the poor connection between the battery positive cable terminal clamp and the battery positive terminal post.

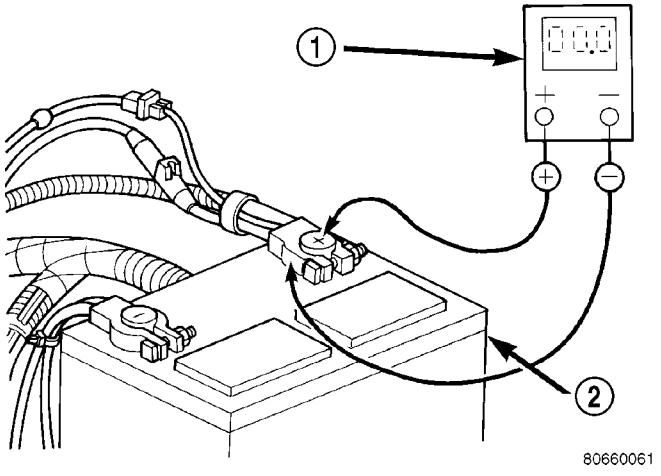


Fig. 9 Test Battery Positive Connection Resistance - Typical

1 - Voltmeter
2 - Battery

(3) Connect the voltmeter to measure between the battery positive cable terminal clamp and the starter solenoid B(+) terminal stud (Fig. 10). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If the reading is above 0.2 volt, clean and tighten the battery positive cable eyelet terminal connection at the starter solenoid B(+) terminal stud. Repeat the test. If the reading is still above 0.2 volt, replace the faulty battery positive cable.

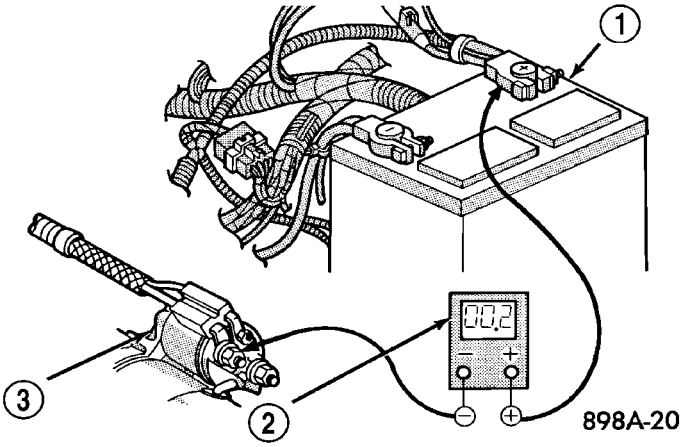


Fig. 10 Test Battery Positive Cable Resistance - Typical

1 - Battery
2 - Voltmeter
3 - Starter Motor

(4) Connect the voltmeter to measure between the battery negative cable terminal clamp and a good clean ground on the engine block (Fig. 11). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If the reading is above 0.2 volt, clean and tighten the battery negative cable eyelet terminal connection to the engine block. Repeat the test. If the reading is still above 0.2 volt, replace the faulty battery negative cable.

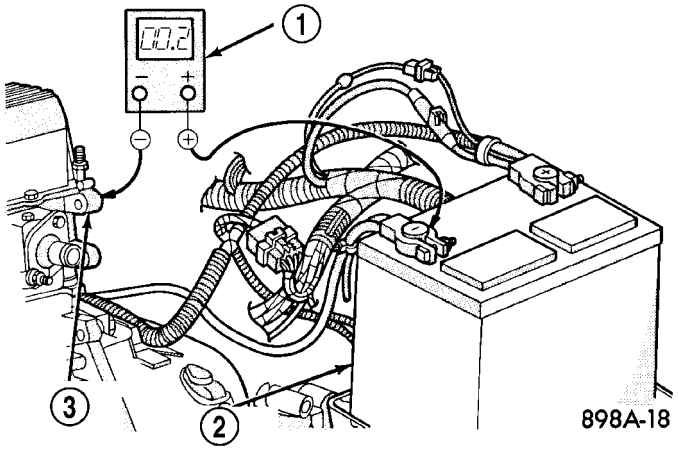


Fig. 11 Test Ground Circuit Resistance - Typical

1 - Voltmeter
2 - Battery
3 - Engine Ground

REMOVAL

The battery cables on this model may include portions of wiring circuits for the generator and other components on the vehicle. If battery cable replacement is required, it will be necessary to extract the

BATTERY CABLES (Continued)

cables out of the engine wire harness assembly. Use care not to damage the other wires and circuits which are also packaged into the engine wire harness assembly.

(1) Turn the ignition switch to the Off position. Be certain that all electrical accessories are turned off.

(2) Disconnect and isolate the negative battery cable terminal.

(3) Remove the tape from the engine wire harness assembly, to access the desired battery cable.

(4) One at a time, trace and disconnect the battery cable retaining fasteners and routing clips until the desired cable is free from the vehicle.

(5) Feed the battery cable out of the vehicle.

INSTALLATION

(1) Position the battery cable in the vehicle.

(2) One at a time, trace and install the battery cable retaining fasteners and routing clips until the desired cable is properly installed in the engine wire harness assembly.

(3) Install the tape on the engine wire harness assembly.

(4) Connect the positive battery cable terminal. Torque to 40 in. lbs.

(5) Connect the negative battery cable terminal. Torque to 40 in. lbs.

BATTERY TRAY

DESCRIPTION

The battery is mounted in a molded plastic battery tray and support unit located in the left front corner of the engine compartment. The battery tray and support unit is secured with three fasteners, Two are located directly under the battery and the other is located on the right side of the tray.

The battery tray and support unit also includes a drainage hose, located in the front of the unit.

OPERATION

The battery tray provides a secure mounting location and supports the battery. The battery tray also provides the anchor point for the battery holddown hardware. The battery tray and the battery holddown hardware combine to secure and stabilize the battery in the engine compartment, which prevents battery movement during vehicle operation. Unrestrained battery movement during vehicle operation could result in damage to the vehicle, the battery, or both.

The battery tray used on this model also includes a drainage hose, which provides means for any liquid that might collect in the bottom of the battery tray to drain under the vehicle.

REMOVAL

(1) Disconnect and isolate the negative battery cable.

(2) Remove the battery from the vehicle. Refer to the procedure in this section.

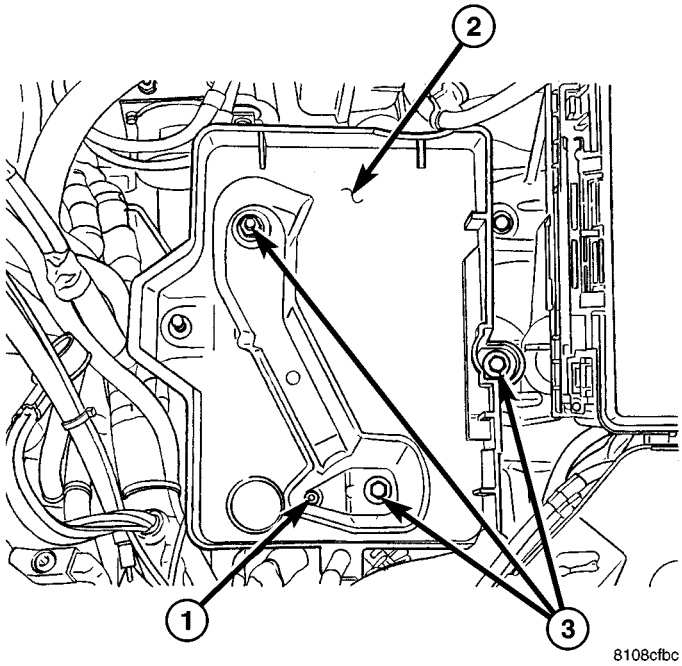


Fig. 12 CS Battery Tray

1 - Battery Tray Drain Hole/Hose Attachment
2 - Battery Tray
3 - Retaining Fasteners

(3) Remove the battery tray retaining fasteners (Fig. 12).

(4) Pull battery tray up far enough to disconnect the drain hose assembly.

(5) Remove the battery tray from the vehicle.

INSTALLATION

(1) Position the battery tray in the vehicle.

(2) Position drainage hose and install the battery tray retaining fasteners.

(3) Install the battery in the vehicle. Refer to the procedure in this section.

(4) Connect the negative battery cable.

THERMOWRAP

DESCRIPTION

A one-piece slip-on thermowrap unit shields the battery case from engine compartment heat. The thermowrap slips over the battery case (Fig. 13) and acts like a protective jacket.

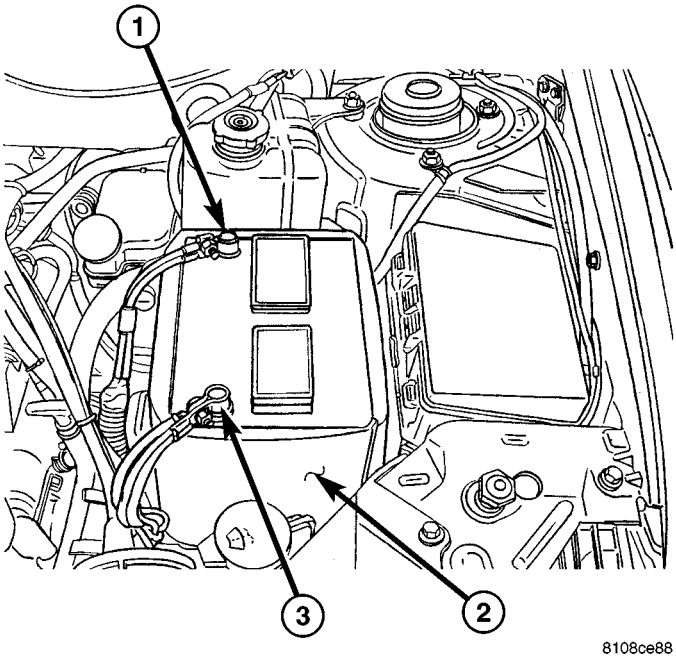


Fig. 13 CS Battery/Thermowrap

1 - Positive Battery Cable
2 - Thermowrap
3 - Negative Battery Cable

OPERATION

The thermowrap protects the battery from engine compartment temperature extremes. The temperature of the battery can affect battery life. The air trapped in the padded material of the thermowrap creates a dead air space, which helps to insulate the sides of the battery case from the air temperature found in the surrounding engine compartment.

REMOVAL

(1) Disconnect and isolate the negative battery cable.
(2) Disconnect the positive battery cable.
(3) Lift the battery thermowrap straight up to remove from the battery.

INSTALLATION

(1) Position the thermowrap on the battery.
(2) Connect the positive then, negative battery cables. Torque to 40 in. lbs.

CHARGING

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CHARGING

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Generator Mounting Bolts	54.2	40	
Generator Upper Bracket Bolts	28.2	20.8	250
Generator Decoupler	110	81	
Generator B+ Nut	12.5		110
Battery Clamps	4.5		40
Battery Hold Down	20.3		180

BATTERY TEMPERATURE SENSOR

REMOVAL

(1) Disconnect and isolate the battery negative cable then the positive cable.

(2) Remove battery from battery tray.

(3) Disconnect the Battery Temperature Sensor electrical connector (Fig. 1).

(4) Unsnap the Battery Temperature Sensor from the battery tray and remove the sensor by pushing in the snap fits and pushing up out of tray (Fig. 2).

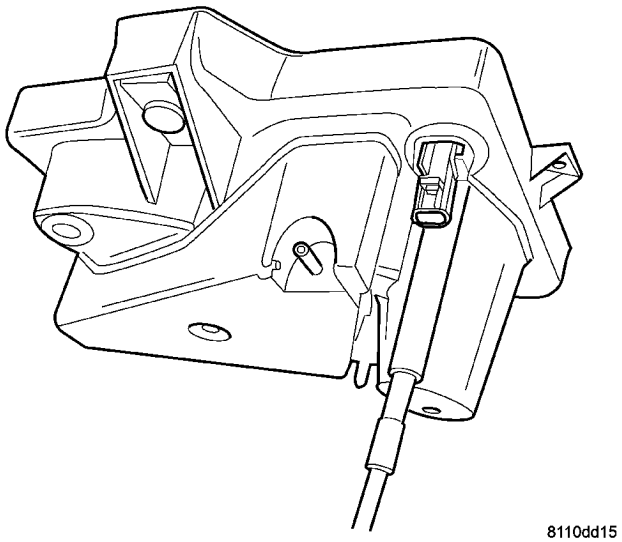


Fig. 1 VACUUM RESERVOIR/BATTERY TEMPERATURE SENSOR

BATTERY TEMPERATURE SENSOR (Continued)

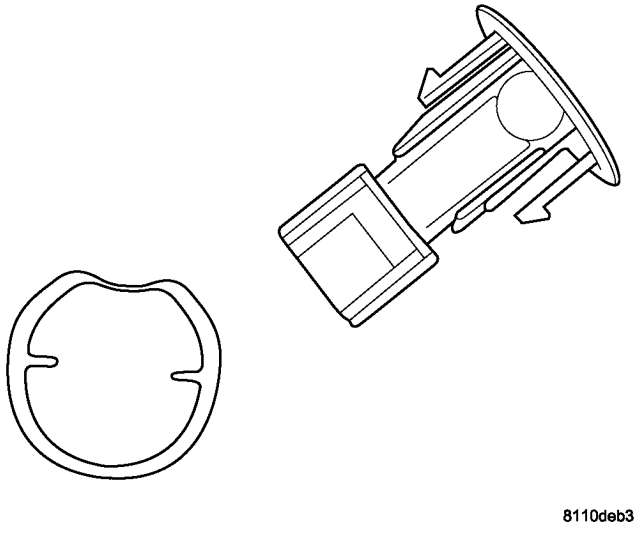


Fig. 2 BATTERY TEMPERATURE SENSOR & SPRING WASHER

INSTALLATION

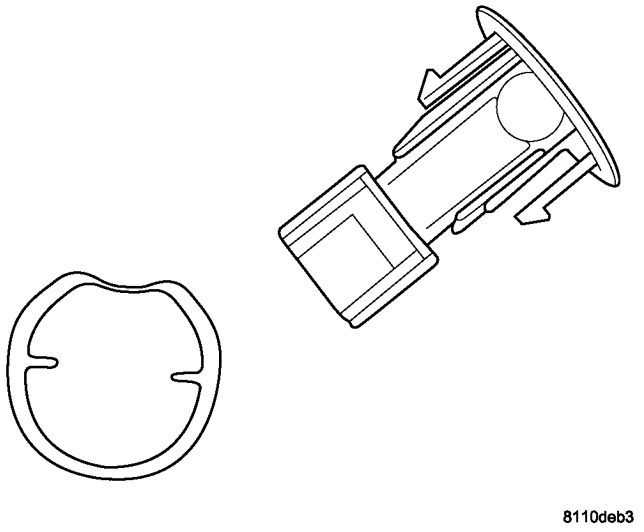


Fig. 3 BATTERY TEMPERATURE SENSOR & SPRING WASHER

(1) Install the Battery Temperature Sensor to the battery tray. Make sure that the spring is installed with the sensor (Fig. 3).

(2) Connect the Battery Temperature Sensor electrical connector (Fig. 4).

(3) Make sure that the sensor moves vertically in the battery tray by pushing on the sensor. The sensor should move with each push and return to the orignal location after pressure is removed.

(4) Install battery to battery tray.

(5) Connect the battery positive cable then the negative cable.

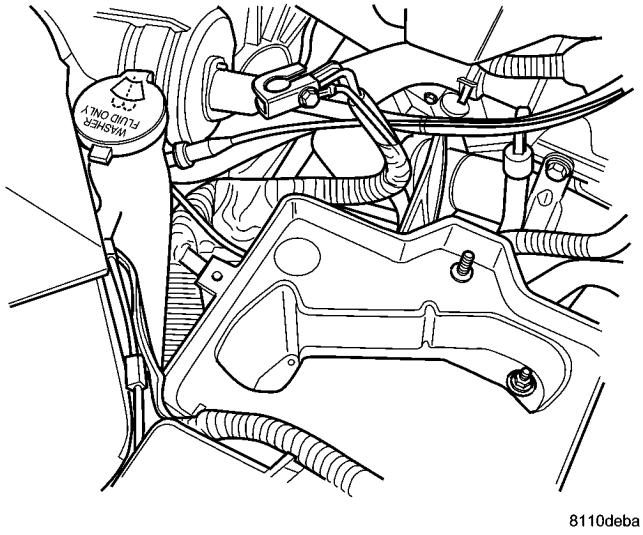


Fig. 4 SENSOR IN BATTERY TRAY

GENERATOR

DESCRIPTION - CHARGING SYSTEM

The charging system consists of:

- Generator
- Decoupler Pulley (If equipped)
- Electronic Voltage Regulator (EVR) circuitry within the Powertrain Control Module (PCM)
- Ignition switch (refer to the Ignition System section for information)
- Battery (refer to the Battery section for information)
- Ambient Air Temperature (If equipped)
- Inlet Air Temperature (calculated battery temperature)(If equipped)
- Voltmeter (refer to the Instrument Cluster section for information if equipped)
- Wiring harness and connections (refer to the Wiring section for information)
- Accessory drive belt (refer to the Cooling section for more information)
- Battery Temperature sensor (if equipped)

OPERATION - CHARGING SYSTEM

The charging system is turned on and off with the ignition switch. The system is on when the engine is running and the ASD relay is energized. The ASD relay is energized when the PCM grounds the ASD control circuit. This voltage is connected through the PCM or IPM (intelligent power module) (if equipped) and supplied to one of the generator field terminals (Gen. Source +) at the back of the generator.

The generator is driven by the engine through a serpentine belt and pulley or decoupler pulley arrangement.

GENERATOR (Continued)

The amount of DC current produced by the generator is controlled by the EVR (field control) circuitry contained within the PCM. This circuitry is connected in series with the second rotor field terminal and ground.

An Battery temperature sensor is used to calculate the temperature near the battery. This temperature data, along with data from monitored line voltage (battery voltage sense circuit), is used by the PCM to vary the battery charging rate. This is done by cycling the ground path to control the strength of the rotor magnetic field. The PCM then compensates and regulates generator current output accordingly to maintain system voltage at the targeted system voltage based on battery temperature.

All vehicles are equipped with On-Board Diagnostics (OBD). All OBD-sensed systems, including EVR (field control) circuitry, are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for certain failures it detects and illuminate the (MIL) lamp. Refer to On-Board Diagnostics in the Electronic Control Modules (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION) section for more DTC information.

The Charging system “Battery” light indicates problems with the charging system (voltage too high/low, generator failure, etc.). If an extreme condition is indicated, the lamp will be illuminated. The signal to activate the lamp is sent via the PCI bus circuits. The lamp is located on the instrument panel. Refer to the Instrument Cluster section for additional information.

The PCM uses the Battery temperature sensor to control the charge system voltage. This temperature, along with data from monitored line voltage, is used by the PCM to vary the battery charging rate. The system voltage is higher at cold temperatures and is gradually reduced as the calculated battery temperature increases.

The ambient temperature sensor is used to control the battery voltage based upon ambient temperature (approximation of battery temperature). The PCM maintains the optimal output of the generator by monitoring battery voltage and controlling it to a range of 13.5 - 14.7 volts based on battery temperature.

REMOVAL

3.5L

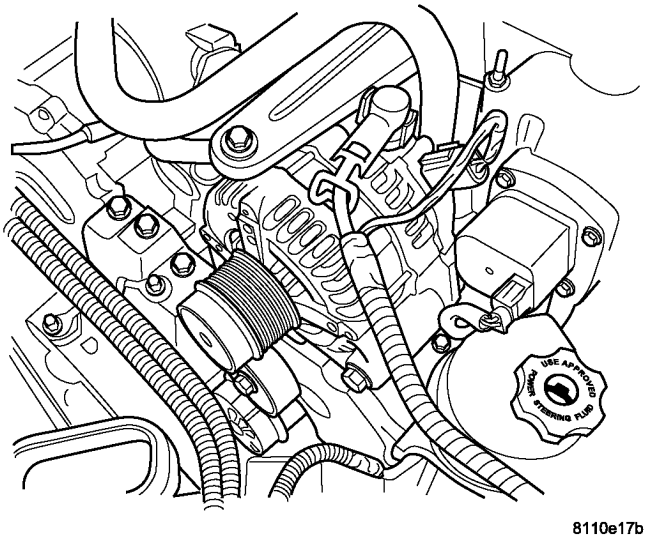


Fig. 5 POSITIVE BATTERY CABLE & FIELD CONNECTOR

(1) Disconnect battery negative cable.
(2) Remove the engine cover.
(3) Remove the generator drive belt.
(4) Remove the B+ terminal nut and wire (Fig. 5).
(5) Disconnect the generator field circuit wiring connector (Fig. 5). Push the **RED** locking tab to release.

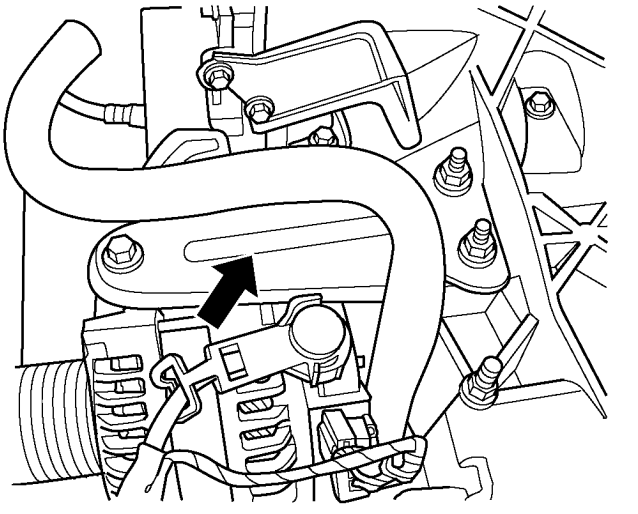


Fig. 6 UPPER MOUNTING BRACKET

GENERATOR (Continued)

(6) Remove the upper mounting bracket (Fig. 6).

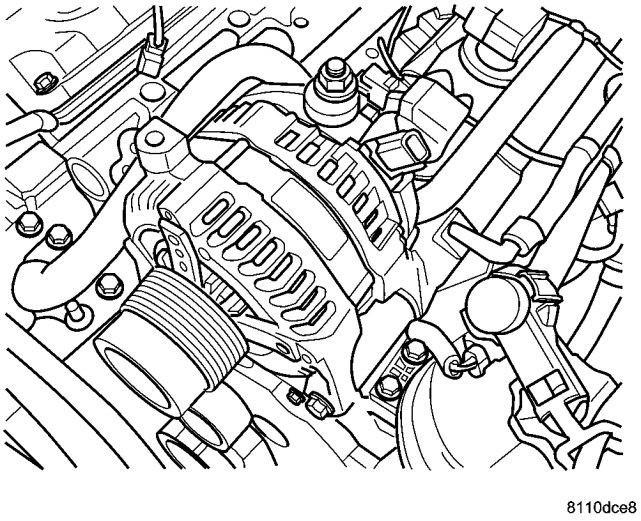


Fig. 7 GENERATOR

(7) Remove the 2 lower mounting bolts (Fig. 7).
(8) Remove generator.

3.8L

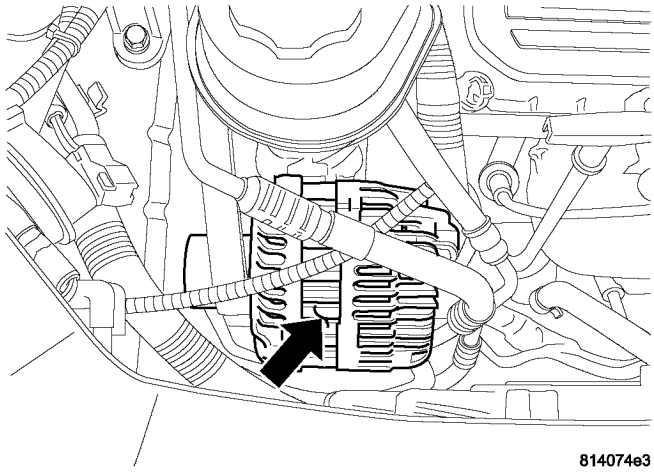


Fig. 8 GENERATOR LOCATION

(1) Disconnect negative battery cable.
(2) Remove the air box assembly, refer to (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).
(3) Generator location (Fig. 8).

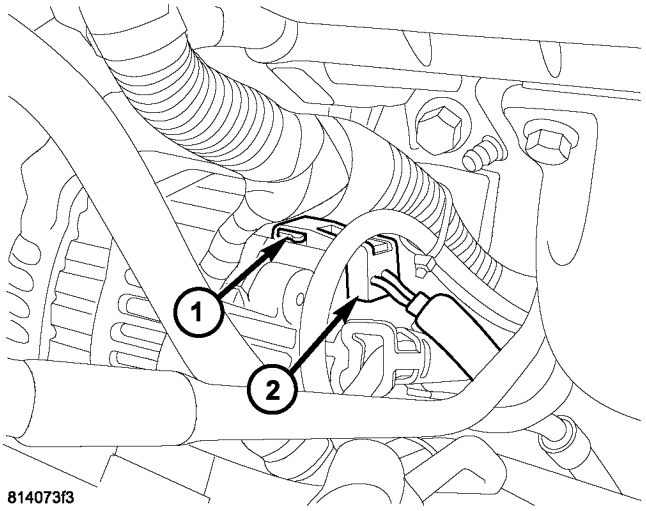


Fig. 9 GENERATOR FIELD CONNECTOR

1 - Connector Lock
2 - Field Connector

(4) Unlock the field electrical connector (Fig. 9).

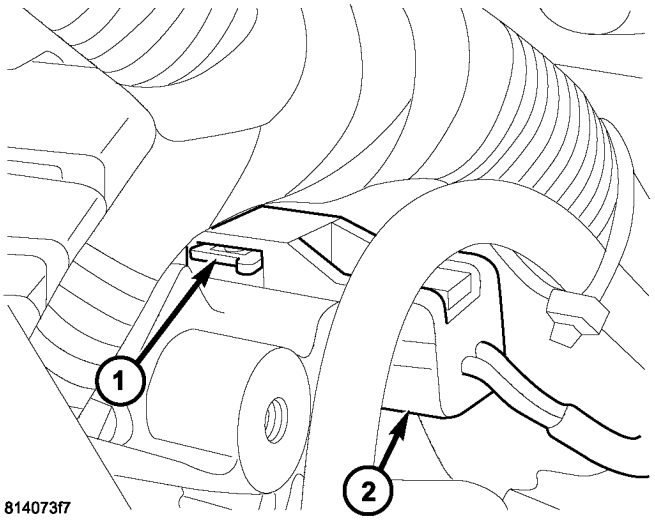


Fig. 10 ELECTRICAL CONNECTOR LOCK

1 - Connector Lock
2 - Field Connector

(5) Disconnect the field electrical connector from rear of generator (Fig. 10).

GENERATOR (Continued)

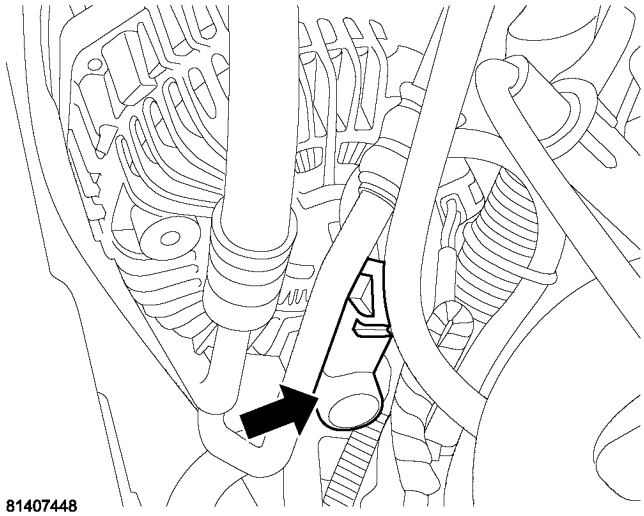


Fig. 11 GENERATOR BATTERY CONNECTION COVER

(6) Remove cover from battery cable on rear of generator (Fig. 11).

(7) Remove the positive battery cable from rear of generator.

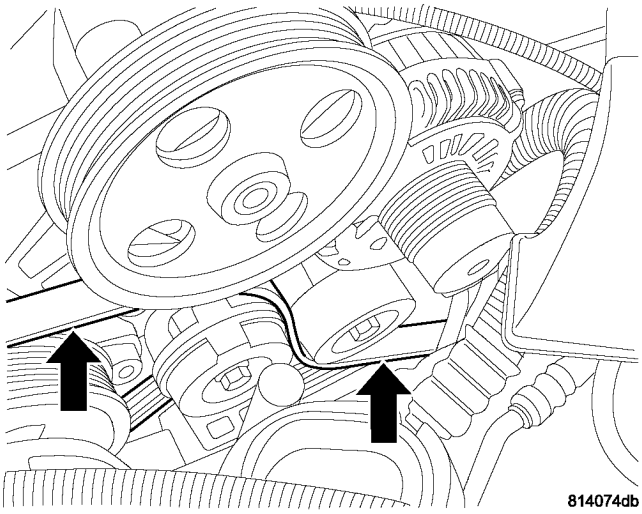


Fig. 12 DRIVE BELT REMOVED

(8) Remove the accessory drive belt (Fig. 12), refer to (Refer to 7 - COOLING/ACCESSORY DRIVE/ DRIVE BELTS - REMOVAL).

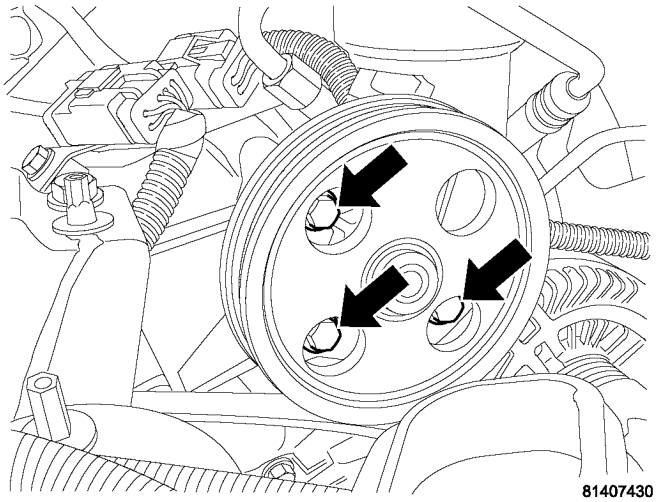


Fig. 13 POWER STEERING PUMP MOUNTING BOLTS

(9) Remove the 3 mounting bolts for the power steering assembly (Fig. 13).

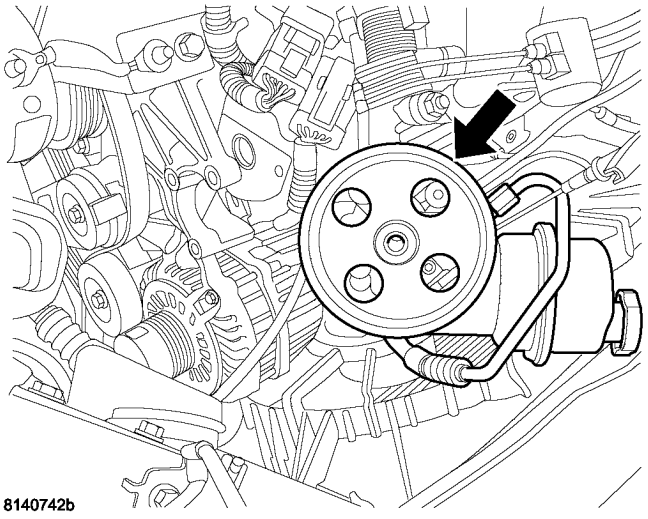


Fig. 14 POWER STEERING PUMP RELOCATION

(10) Relocate the power steering assembly (Fig. 14).

GENERATOR (Continued)

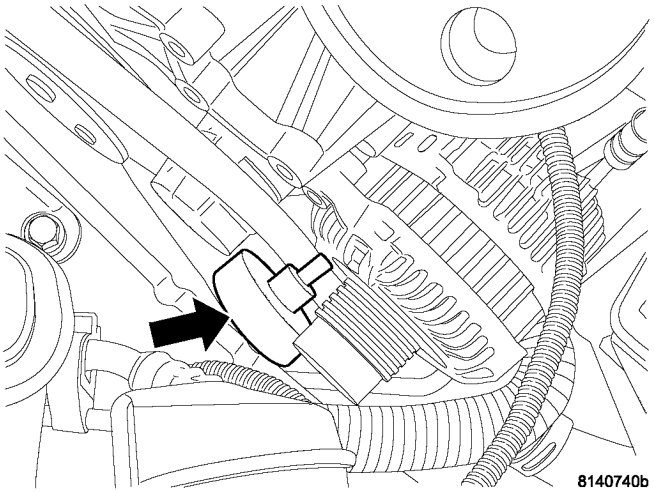


Fig. 15 IDLER PULLEY

(11) Remove the idler pulley/lower mounting bolt for generator (Fig. 15). This will be removed with generator assembly.

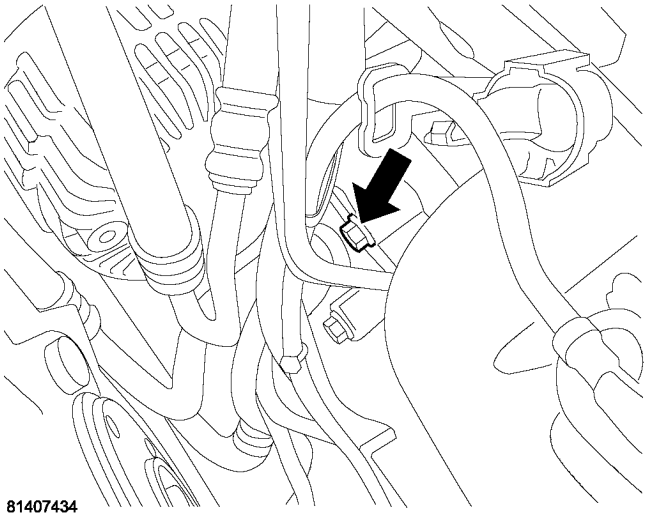


Fig. 16 GENERATOR REAR MOUNTING BOLT

(12) Remove the rear mounting bolt (Fig. 16).

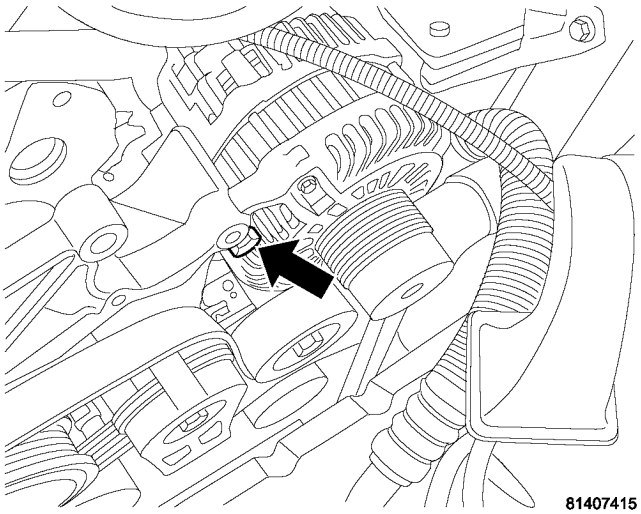


Fig. 17 UPPER MOUNTING BOLT

(13) Remove the upper mounting bolt (Fig. 17).

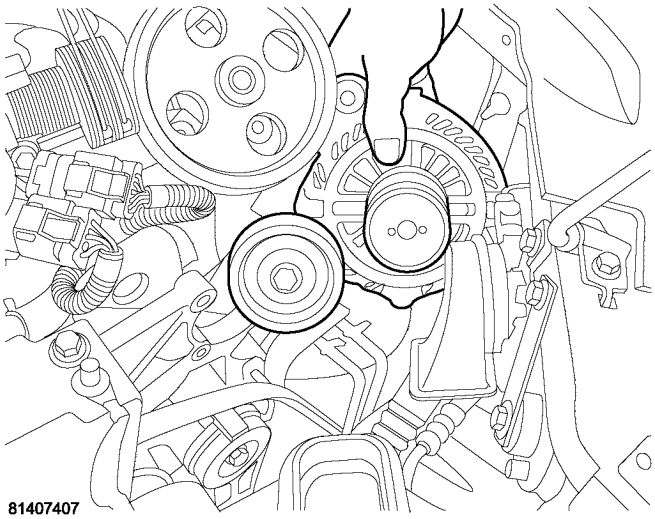


Fig. 18 GENERATOR REMOVE/INSTALL

(14) Remove generator and idler pulley (Fig. 18).

GENERATOR (Continued)

INSTALLATION

3.5L

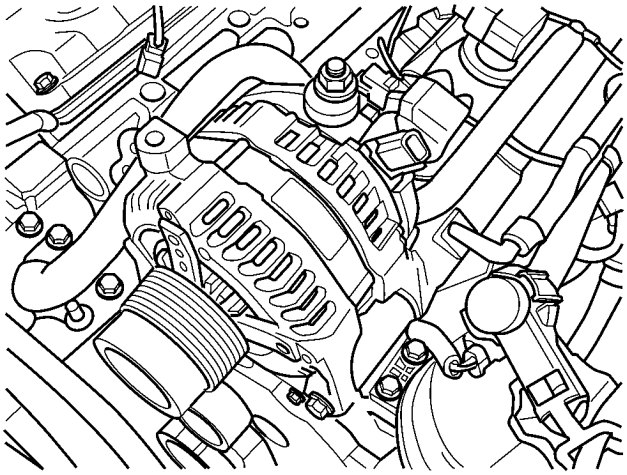


Fig. 19 GENERATOR

(1) Install generator.
(2) Install the 2 lower mounting bolts (Fig. 19).

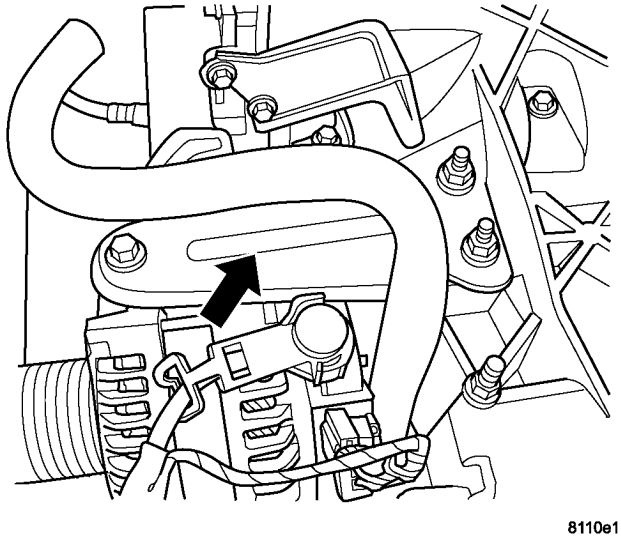


Fig. 20 UPPER MOUNTING BRACKET

(3) Install the upper mounting bracket (Fig. 20).
(4) Tighten the 2 lower bolts first, tighten bolts to 54.2 N·m (40 ft. lbs.) then tighten the 2 upper bolts, tighten bolts to 28.2 N·m (20.8 ft. lbs.)
(5) Connect the generator field circuit wiring connector (Fig. 21). Push the **RED** locking tab to lock connector.
(6) Install the B+ terminal nut and wire making sure the terminal is properly oriented with the anti-rotation tab (Fig. 5).

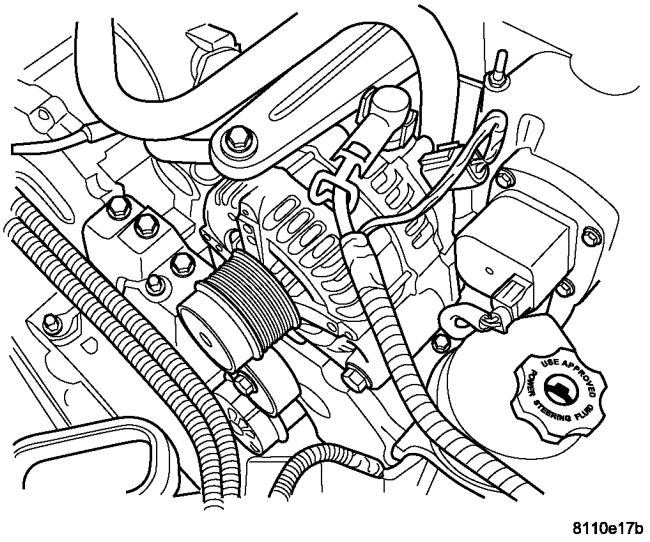


Fig. 21 POSITIVE BATTERY CABLE & FIELD CONNECTOR

(7) Tighten nut to 12.5 N·m (110 in. lbs.).
(8) Install the generator drive belt, refer to (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
(9) Install the engine cover.
(10) Connect battery negative cable.

3.8L

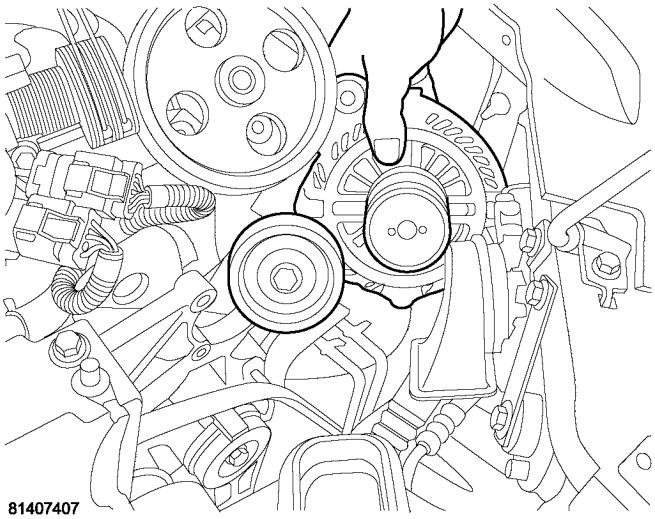


Fig. 22 GENERATOR REMOVE/INSTALL

(1) Install idler pulley to generator (Fig. 22).
(2) Install assembly to vehicle.

GENERATOR (Continued)

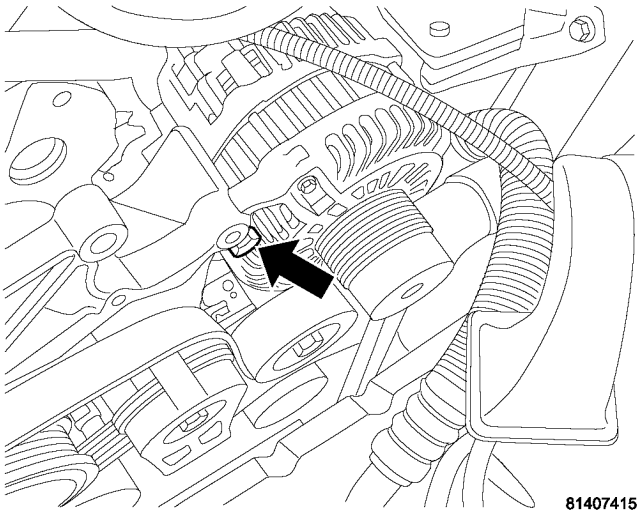


Fig. 23 UPPER MOUNTING BOLT

(3) Loose install upper mounting bolt (Fig. 23).

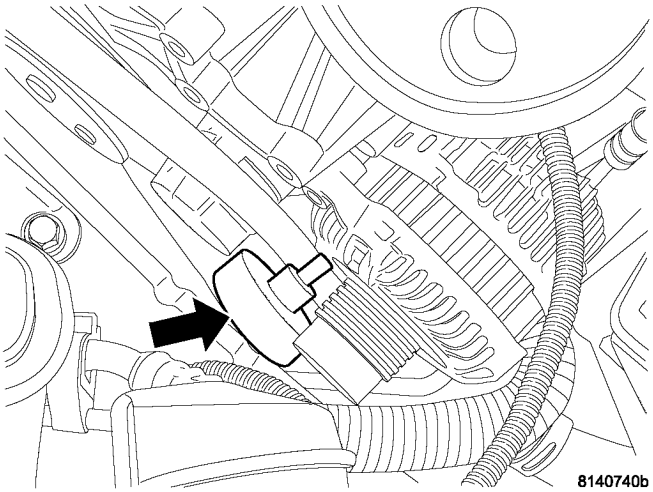


Fig. 25 IDLER PULLEY

(5) Loose install the lower mounting bolt (Fig. 25).

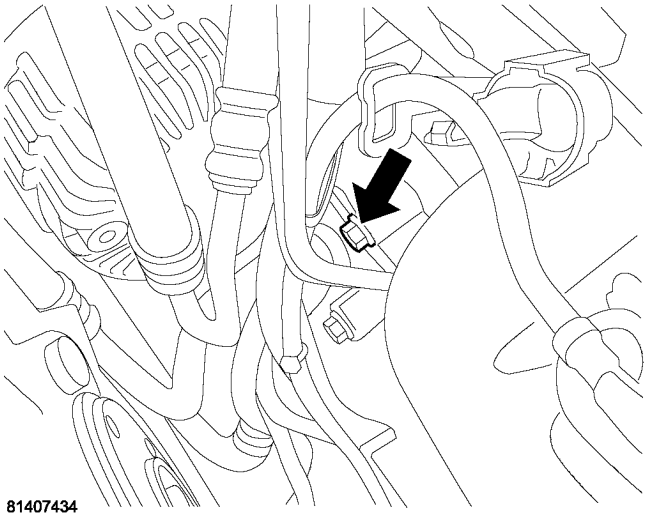


Fig. 24 GENERATOR REAR MOUNTING BOLT

(4) Loose install rear mounting bolt (Fig. 24).

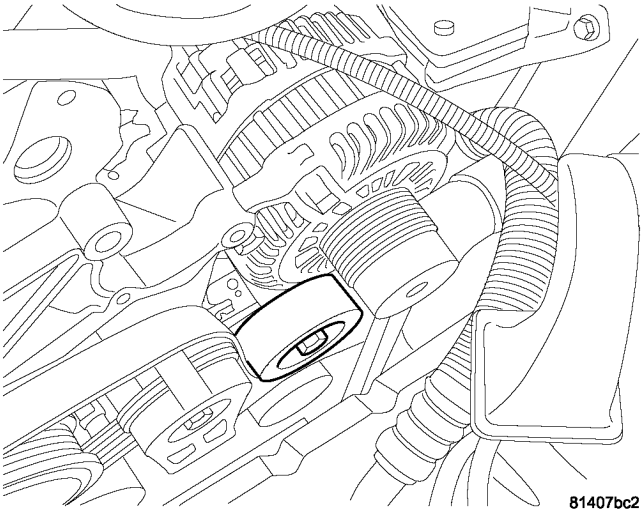


Fig. 26 IDLER PULLEY INSTALLED

(6) Idler pulley installed (Fig. 26).
(7) Tighten bolts to 54.2 N·m (40 ft. lbs.).

GENERATOR (Continued)

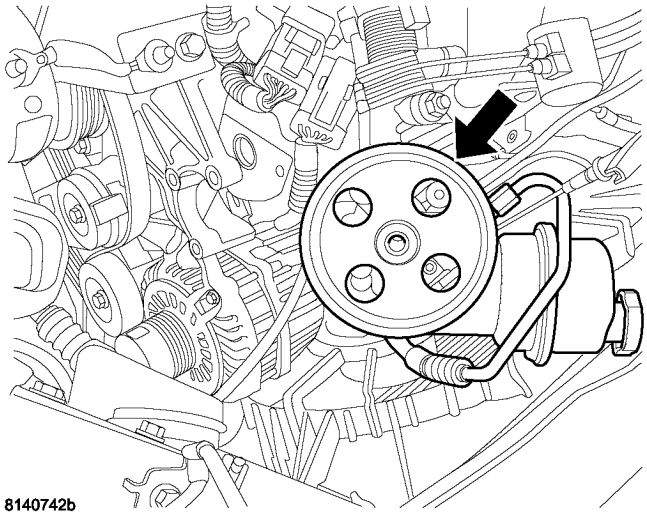


Fig. 27 POWER STEERING PUMP RELOCATION

(8) Relocate the power steering pump assembly (Fig. 27).

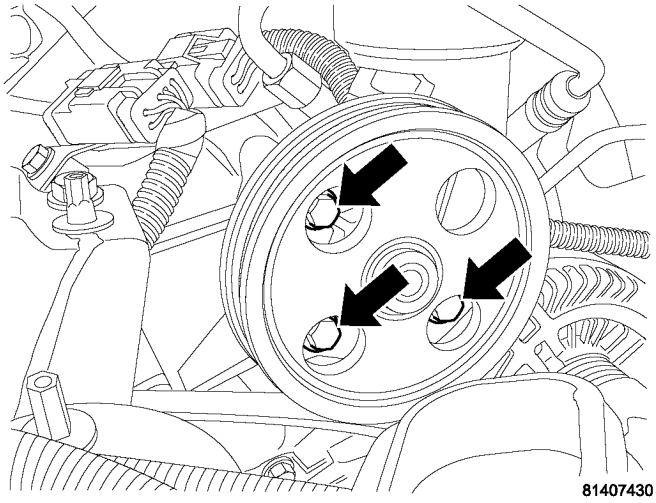


Fig. 28 POWER STEERING PUMP MOUNTING BOLTS

(9) Install the 3 mounting bolts and tighten to 23 N·m (200 in. lbs.) (Fig. 28).

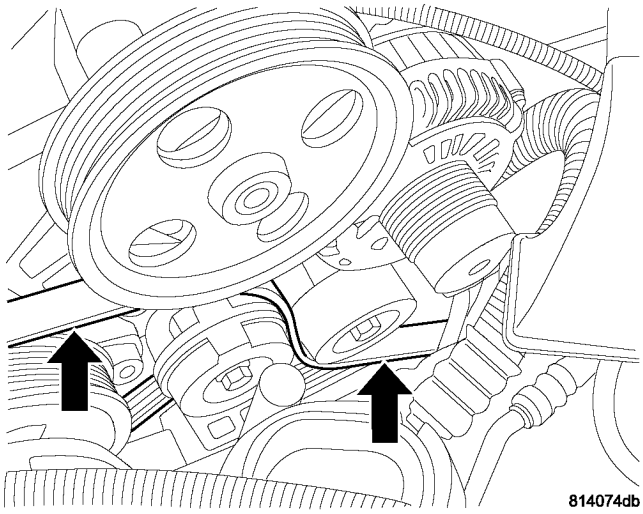


Fig. 29 DRIVE BELT REMOVED

(10) Install the accessory drive belt (Fig. 29), refer to (Refer to 7 - COOLING/ACCESSORY DRIVE/ DRIVE BELTS - INSTALLATION).

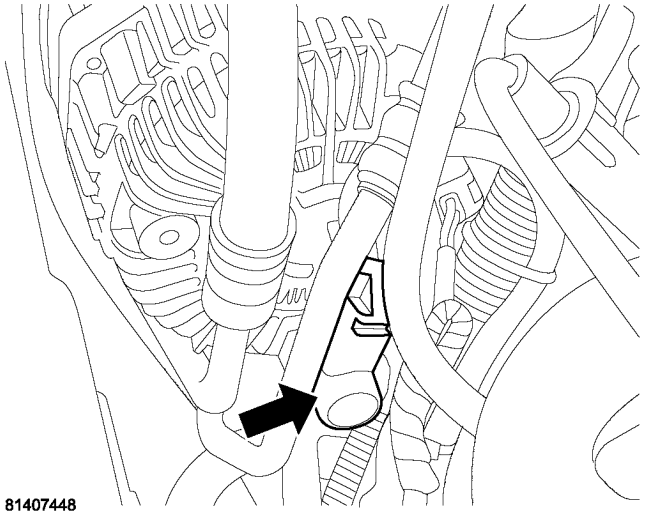


Fig. 30 GENERATOR BATTERY CONNECTION COVER

(11) Connect the battery cable to generator (Fig. 30).

(12) Tighten nut to N·m 12.5 (110 in. lbs.).

(13) Snap cable cover back into place.

GENERATOR (Continued)

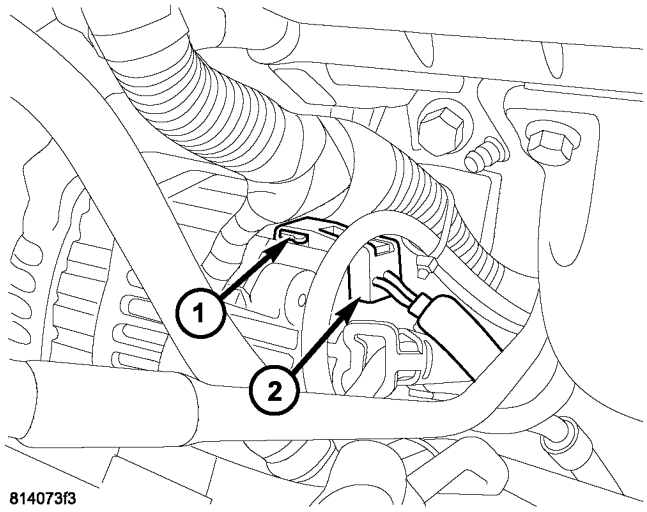


Fig. 31 GENERATOR FIELD CONNECTOR

1 - Connector Lock
2 - Field Connector

(14) Connect the field connector (2) (Fig. 31).

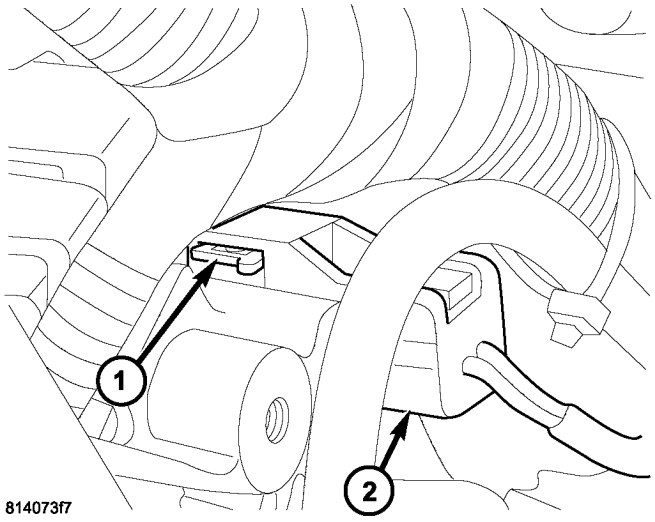


Fig. 32 ELECTRICAL CONNECTOR LOCK

1 - Connector Lock
2 - Field Connector

(15) Lock connector (1) (Fig. 32).
(16) Connect negative battery cable.
(17) Install the air box assembly, refer to (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).

STARTING

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STARTING

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Front Mount to Cradle	101.6	75	
Front Bracket to Engine Block	67.8	50	
Front Bracket to Transmission	67.8	50	
Front Bracket to Starter	47.4	35	
Starter Mounting Bolts	47.4	35 ±10	
Starter B+ Nut	11.3		100 ±10
Battery Clamp	4.5		40

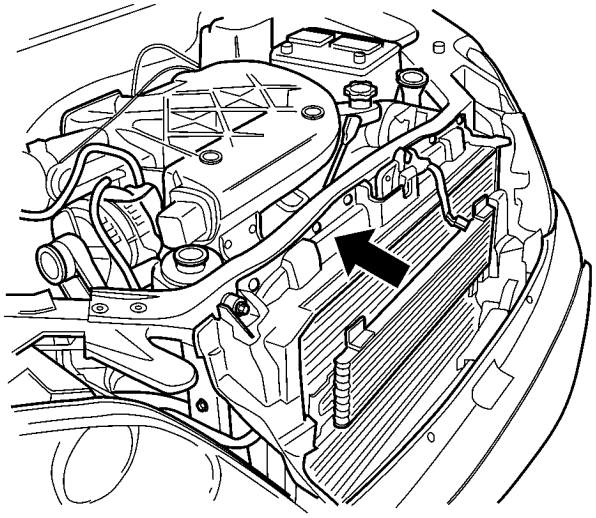
STARTER MOTOR

REMOVAL

3.5L

(1) Disconnect the negative battery cable.

(2) Remove (Fig. 1) and relocate (Fig. 2) the upper radiator crossmember, (Refer to 23 - BODY/EXTERIOR/RADIATOR CROSSMEMBER - REMOVAL).



810d6721

Fig. 1 UPPER RADIATOR CROSS MEMBER

STARTER MOTOR (Continued)

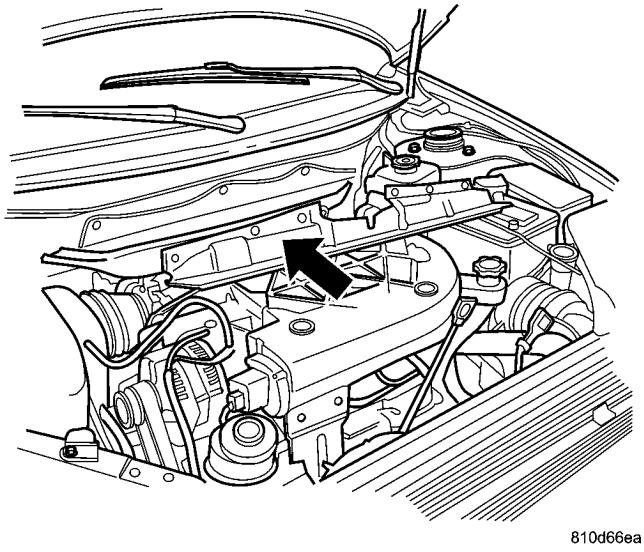


Fig. 2 UPPER RADIATOR CROSS MEMBER REMOVED

(3) Remove the radiator fan module (Fig. 3) (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).

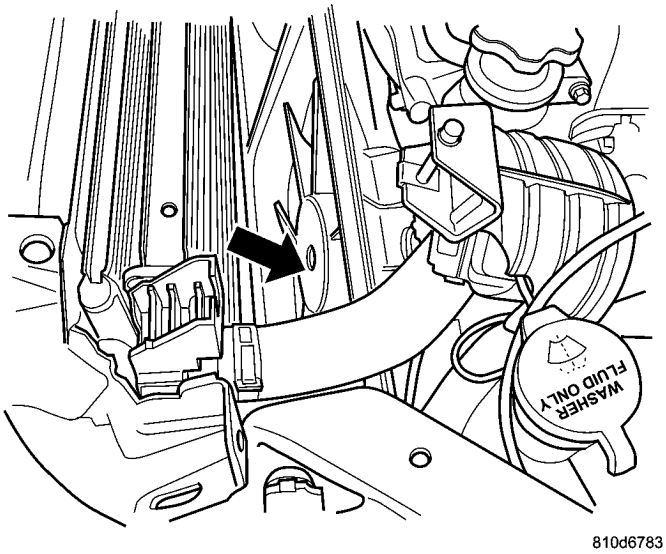


Fig. 3 FAN MODULE IN VEHICLE

(4) Remove the wiring harness clip from front mount.

(5) Remove the coolant line clamp bolt (Fig. 4).

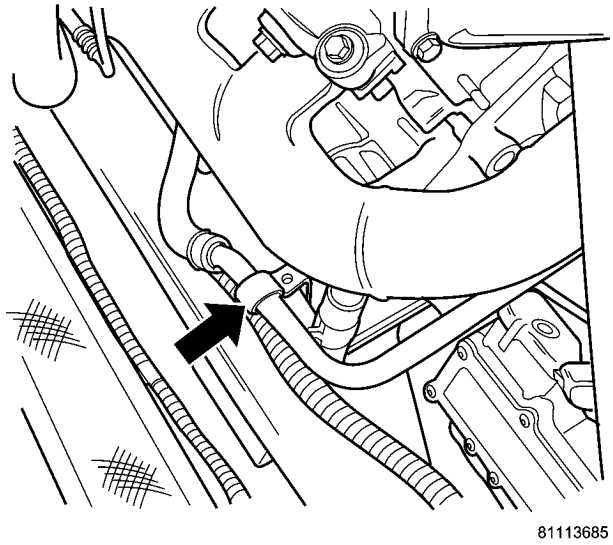


Fig. 4 COOLANT LINE BRACKET

(6) Remove the upper nut from the front mount (Fig. 5).

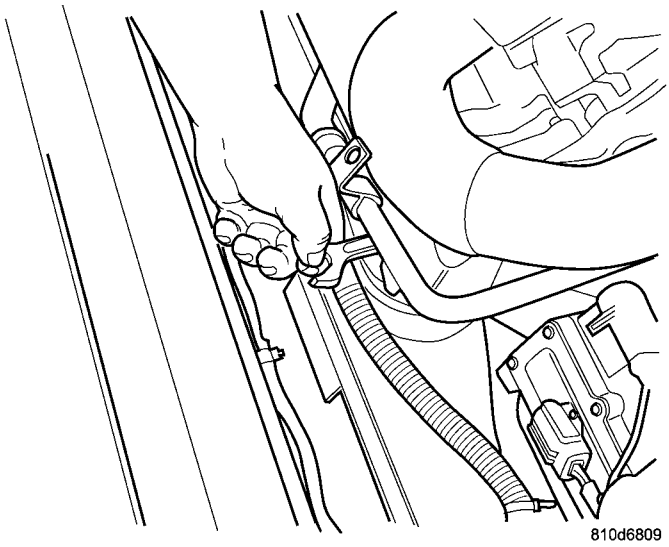


Fig. 5 FRONT RUBBER MOUNT UPPER NUT

(7) Remove the upper starter mounting bolt (Fig. 6).

STARTER MOTOR (Continued)

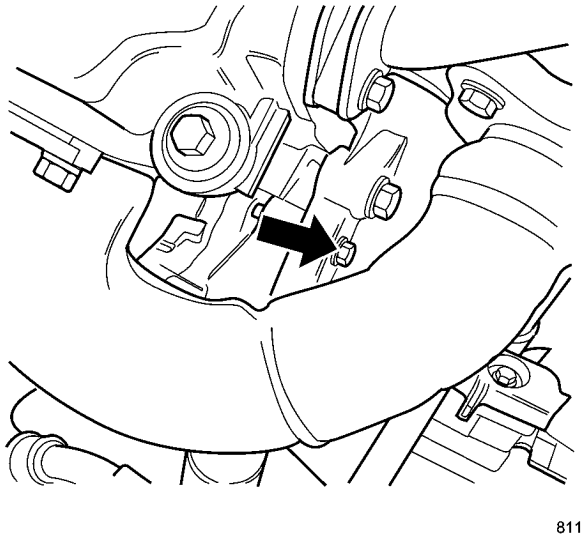


Fig. 6 UPPER STARTER BOLT

(8) Remove the middle starter bolt (Fig. 7).

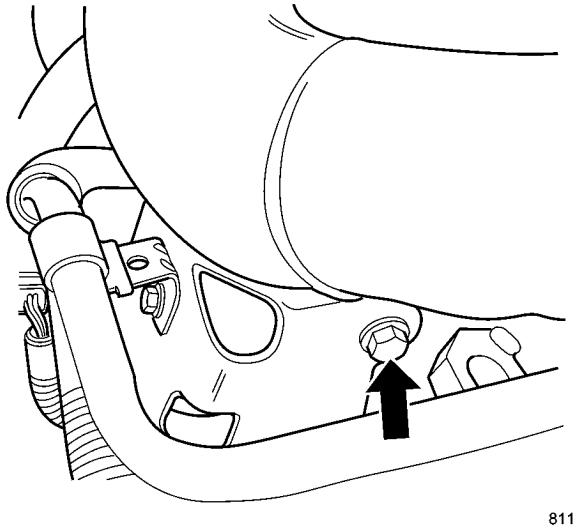


Fig. 7 MIDDLE STARTER BOLT

(9) Raise vehicle and support.
(10) Remove the lower front mount nut (Fig. 8).

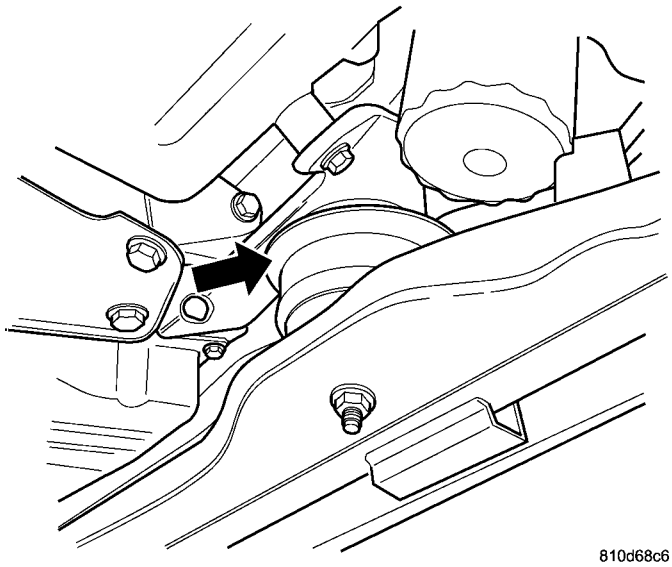


Fig. 8 FRONT RUBBER MOUNT IN POSITION

(11) Raise and support engine (Fig. 9).

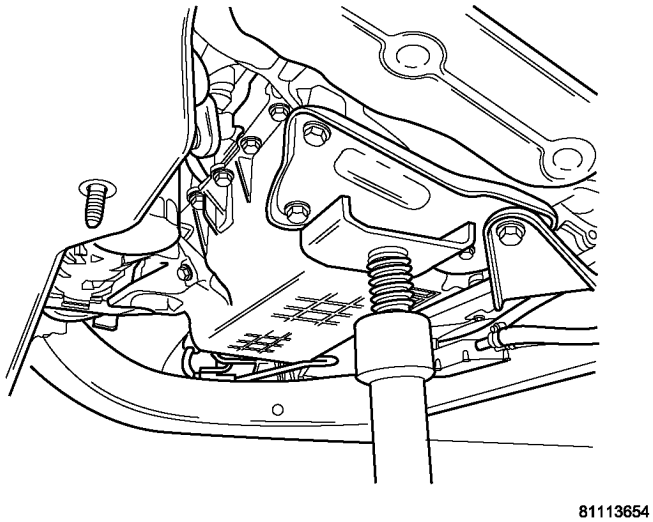


Fig. 9 SUPPORT ENGINE

(12) Remove the lower bracket bolt to transmission (Fig. 10).

STARTER MOTOR (Continued)

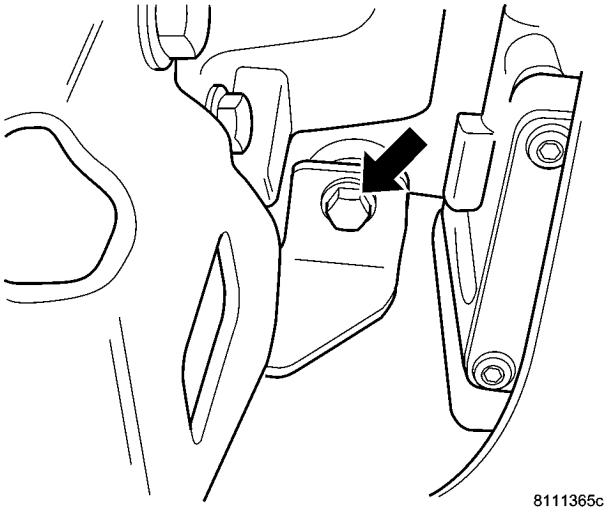


Fig. 10 BRACKET TRANS BOLT

(13) Remove the lower bracket bolt to engine block (Fig. 11).

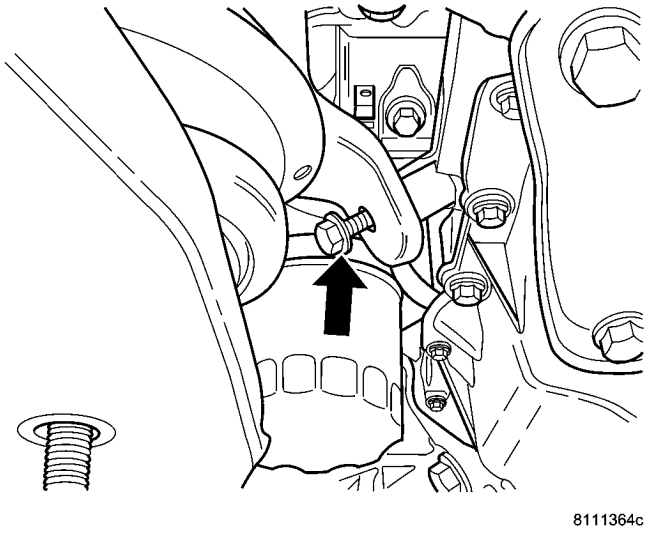


Fig. 11 BRACKET ENGINE BLOCK BOLT

(14) Relocate the front mount and bracket.

(15) Disconnect the positive battery cable from starter

(16) Disconnect the solenoid connector from starter.

(17) Remove the lower starter bolt (Fig. 12).

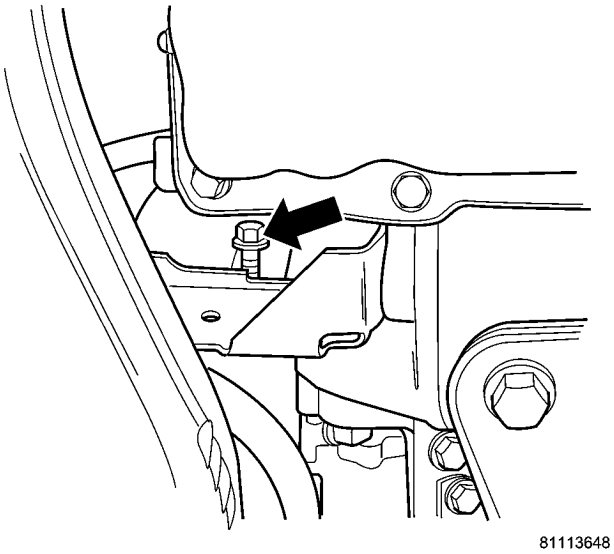


Fig. 12 STARTER LOWER BOLT

(18) Remove starter from vehicle.

3.8L

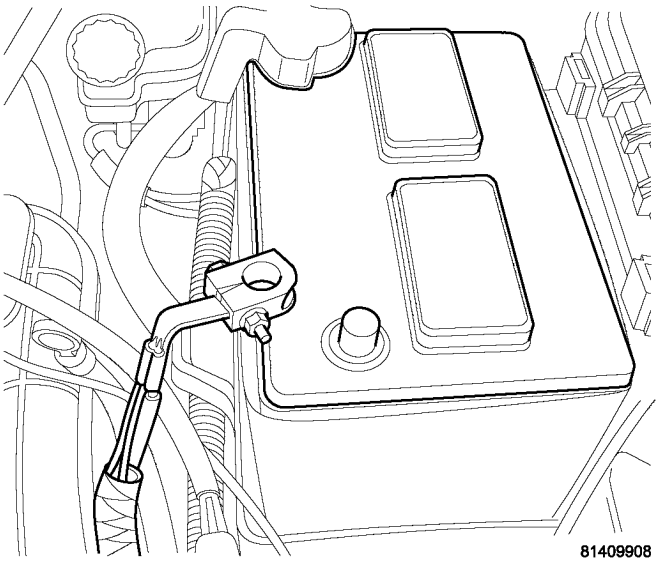


Fig. 13 BATTERY CONNECTION

(1) Disconnect negative battery cable (Fig. 13).

STARTER MOTOR (Continued)

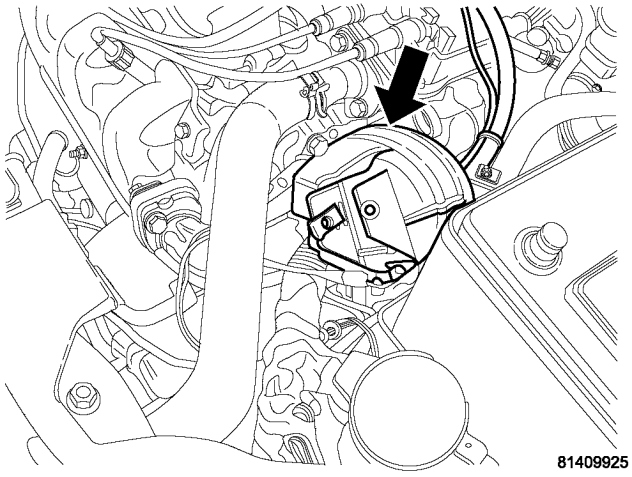


Fig. 14 SPEED CONTROL SERVO

(2) Remove and relocate the speed control servo (Fig. 14)

(3) Unlock the electrical connector and disconnect the vacuum hose from servo.

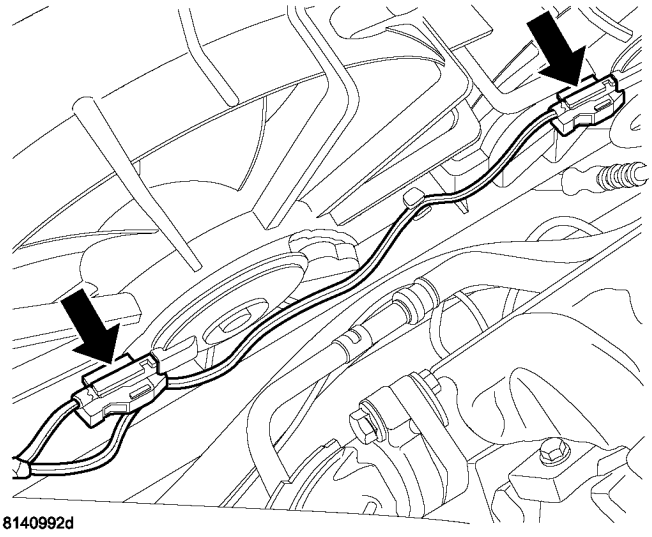


Fig. 15 FAN MODULE CONNECTORS

(4) Unlock and disconnect the electrical connectors from the cooling module (Fig. 15).

(5) Disconnect the wiring clips from cooling module.

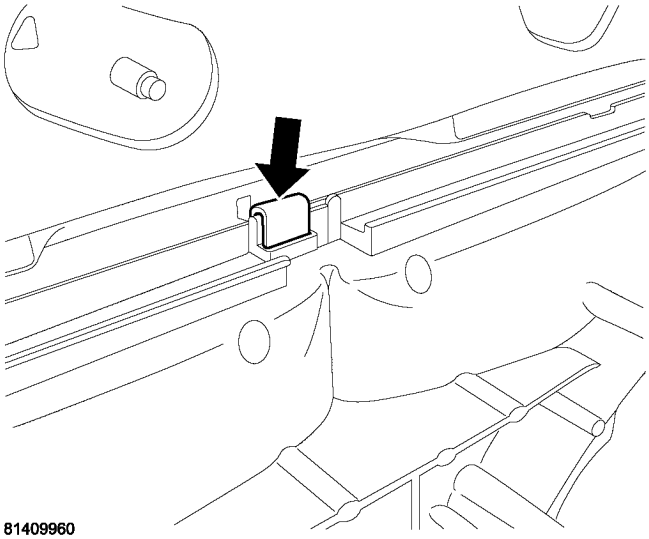


Fig. 16 MODULE RETAINING CLIP

(6) Remove the retaining clip from the top of the cooling module (Fig. 16).

(7) Remove 2 fasteners and remove fan module from vehicle.

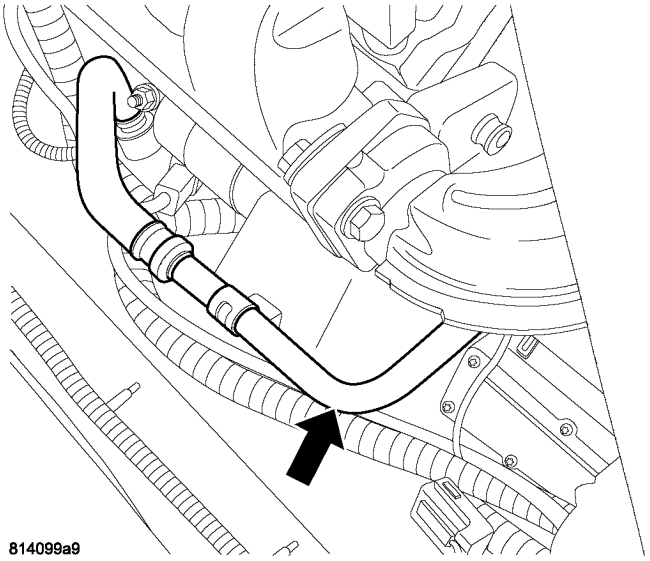


Fig. 17 OIL COOLER LINE

(8) Remove bolt from oil cooler line bracket in front motor mount (Fig. 17).

STARTER MOTOR (Continued)

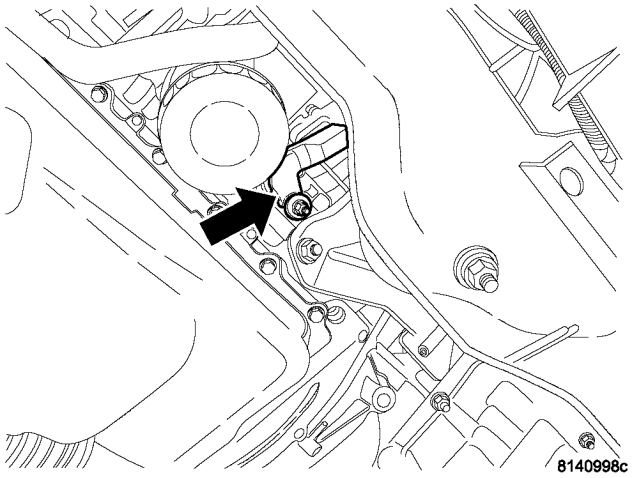


Fig. 18 STARTER BATTERY CONNECTION

(9) Remove the battery positive cable from starter motor (Fig. 18).

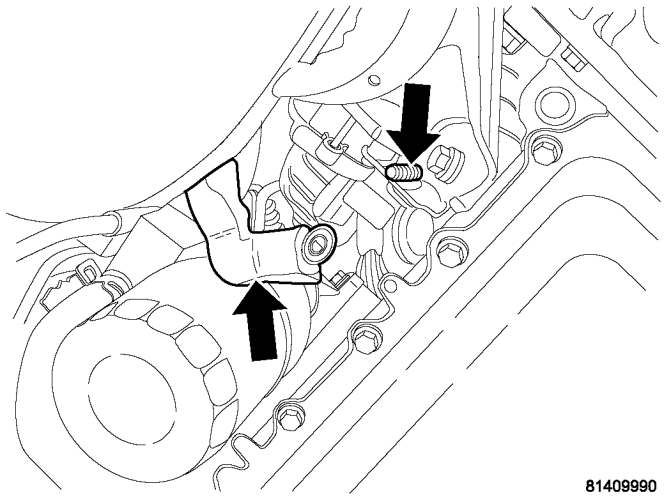


Fig. 19 STARTER BATTERY CONNECTION REMOVED

(10) Battery cable removed from starter (Fig. 19).

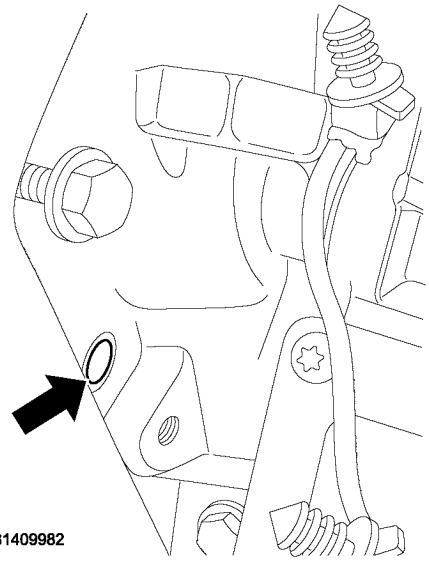


Fig. 20 LOWER BOLT REMOVED

(11) Remove the lower starter bolt (Fig. 20).

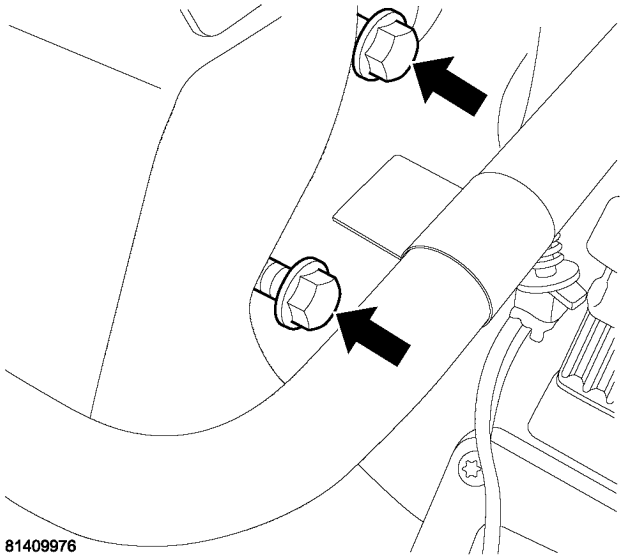


Fig. 21 STARTER UPPER & MIDDLE BOLT

(12) Remove the middle starter bolt (Fig. 21).
(13) Remove the upper starter bolt.

STARTER MOTOR (Continued)

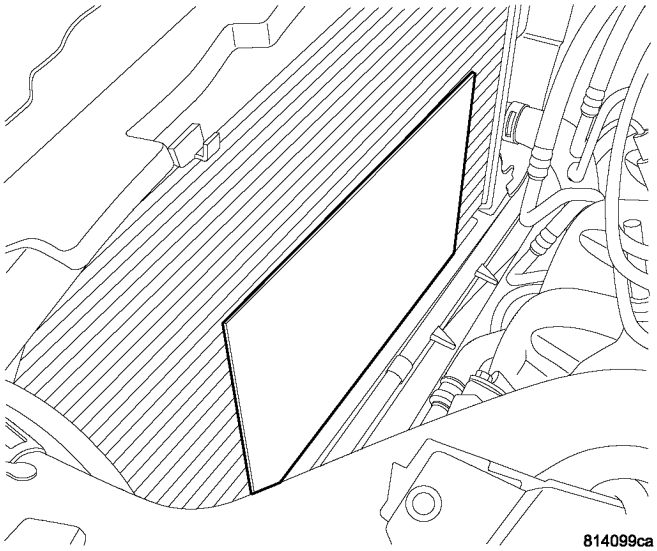


Fig. 22 CARDBOARD INSTALLED

(14) Place a piece of cardboard in front radiator core, to keep from damaging the radiator (Fig. 22).

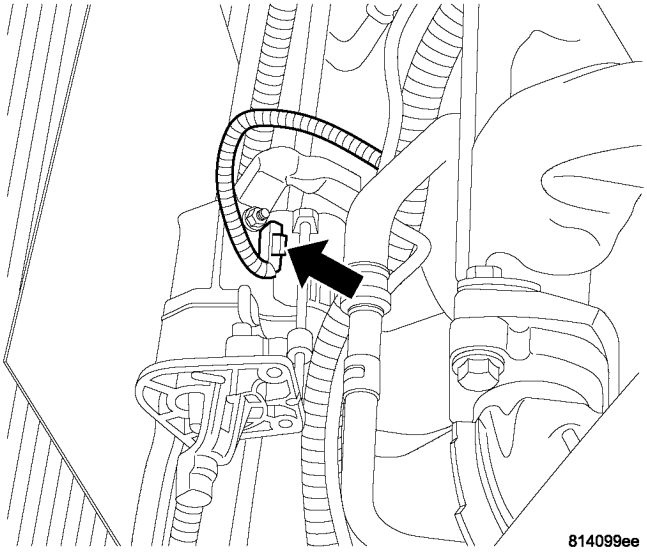


Fig. 23 SOLENOID CONNECTOR

(15) Remove starter, and disconnect the solenoid wire from starter (Fig. 23).

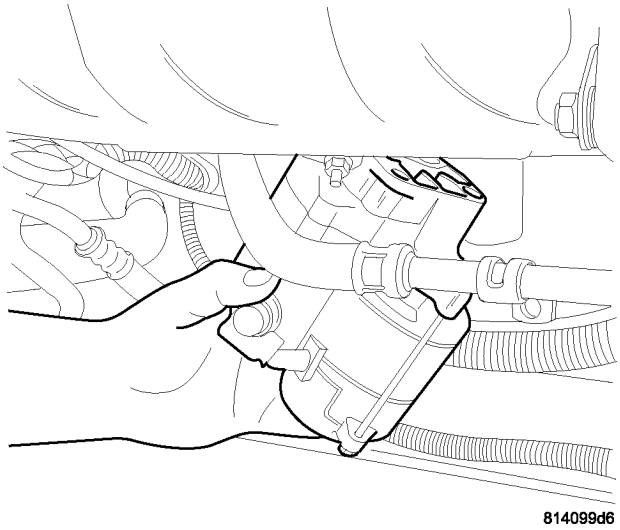


Fig. 24 REMOVE/INSTALL STARTER

(16) Remove starter from vehicle (Fig. 24).

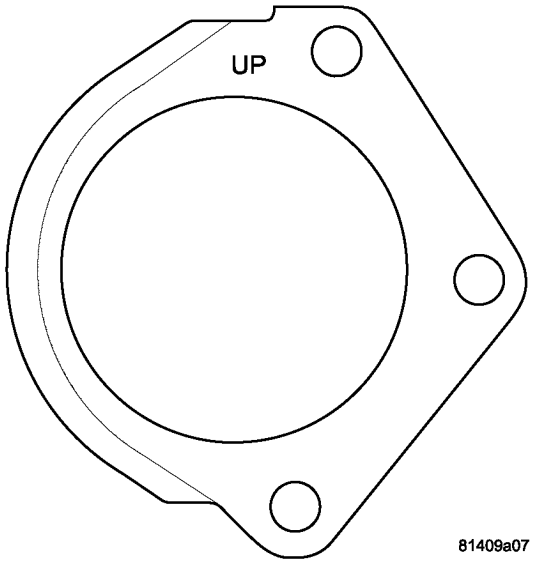


Fig. 25 DUST SHIELD

(17) Remove the starter dust shield from vehicle (Fig. 25).

INSTALLATION

3.5L

(1) Install starter and shield to vehicle (Fig. 26).

STARTER MOTOR (Continued)

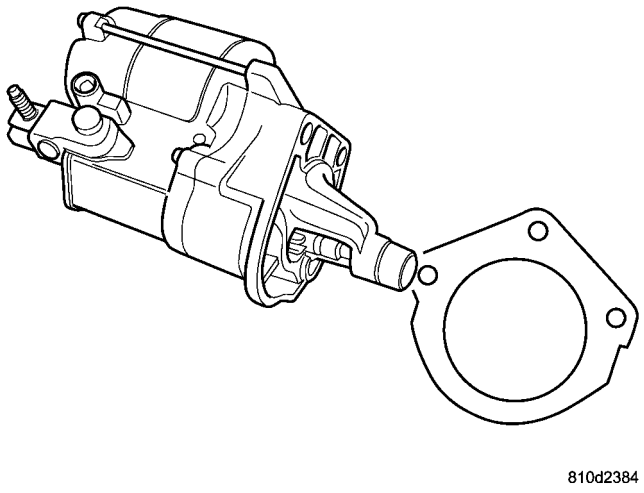


Fig. 26 STARTER AND SHIELD

(2) Start the lower starter bolt (Fig. 12).
(3) Connect the solenoid connector to starter.
(4) Connect the positive battery cable to starter
(5) Relocate the front mount and bracket.

NOTE: The front mount has an alignment pin (Fig. 27), make sure that the mount and bracket line up together. The alignment pin goes toward the front of vehicle.

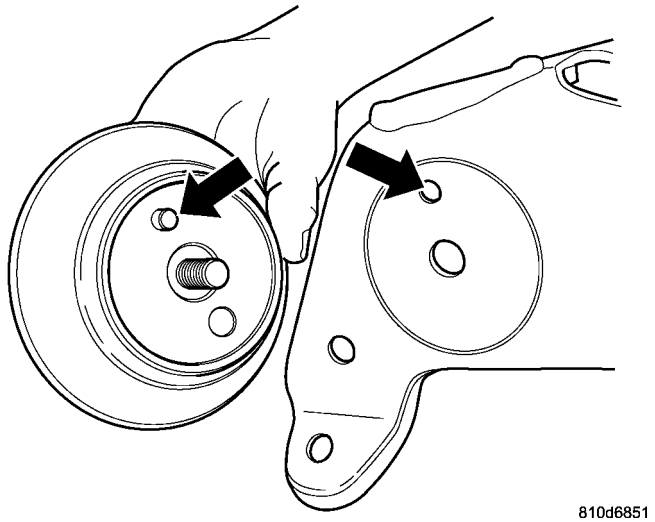


Fig. 27 MOUNT ALIGNMENT PIN

NOTE: Make sure that the wire harness is in front of the front mount.

(6) Start the middle starter bolt
(7) Install the lower bracket bolt to engine block (Fig. 11).
(8) Install the lower bracket bolt to transmission.
(9) Tighten both lower bracket bolts.
(10) Lower engine (Fig. 9).
(11) Install the lower front mount nut and tighten (Fig. 8).
(12) install and tighten the middle starter bolt (Fig. 7).
(13) Install and tighten the upper starter mounting bolt (Fig. 6).
(14) Lower vehicle.
(15) Install the upper nut to the front mount and tighten (Fig. 5).
(16) Install the coolant line clamp bolt (Fig. 4).
(17) Install the wiring harness clip to front mount.
(18) Install the radiator fan module (Fig. 3), (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
(19) Relocate and install (Fig. 1) and (Fig. 2) the upper radiator crossmember, (Refer to 23 - BODY/ EXTERIOR/RADIATOR CROSSMEMBER - INSTALLATION).
(20) Connect the negative battery cable.

3.8L

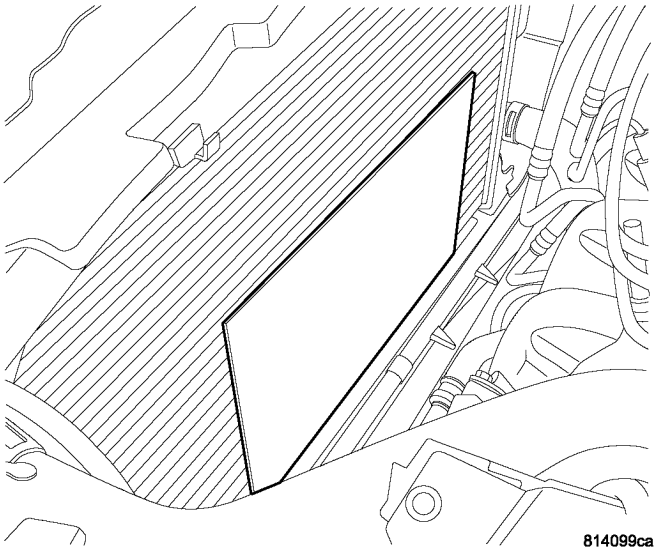


Fig. 28 CARDBOARD INSTALLED

(1) Place a piece of cardboard in front radiator core, to keep from damaging the radiator (Fig. 28).

STARTER MOTOR (Continued)

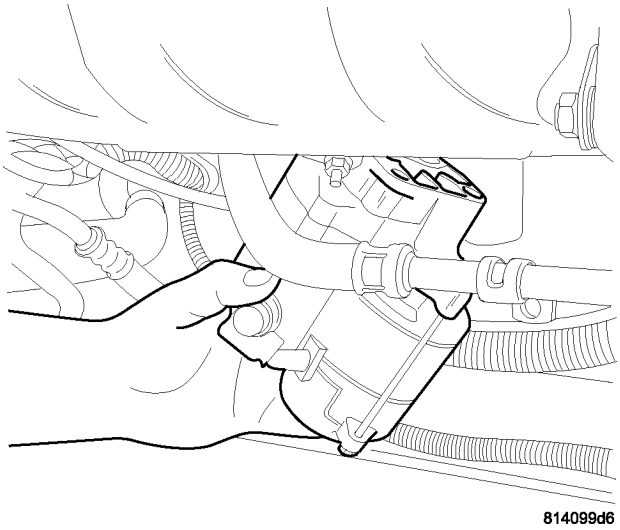


Fig. 29 REMOVE/INSTALL STARTER

(2) Place starter on lower crossmember (Fig. 29).

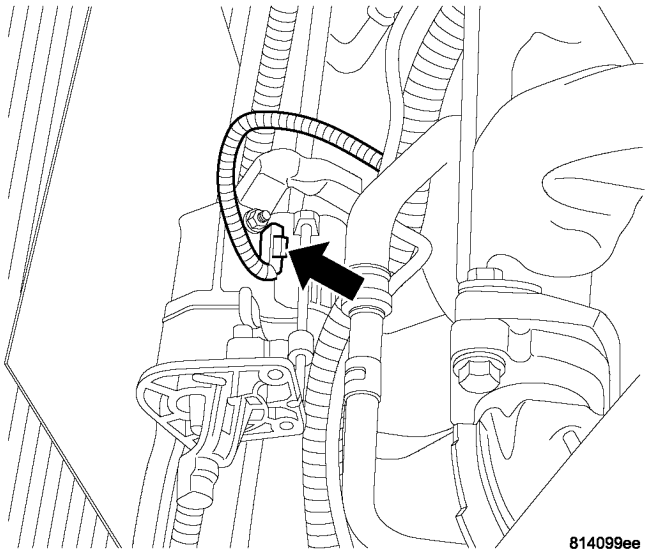


Fig. 30 SOLENOID CONNECTOR

(3) Connect the starter solenoid connector to starter (Fig. 30).

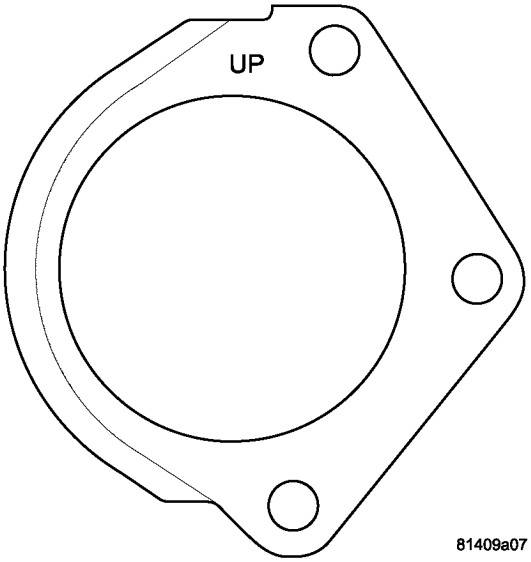


Fig. 31 DUST SHIELD

(4) Install dust shield on nose of starter, make sure of proper orientation (Fig. 31).

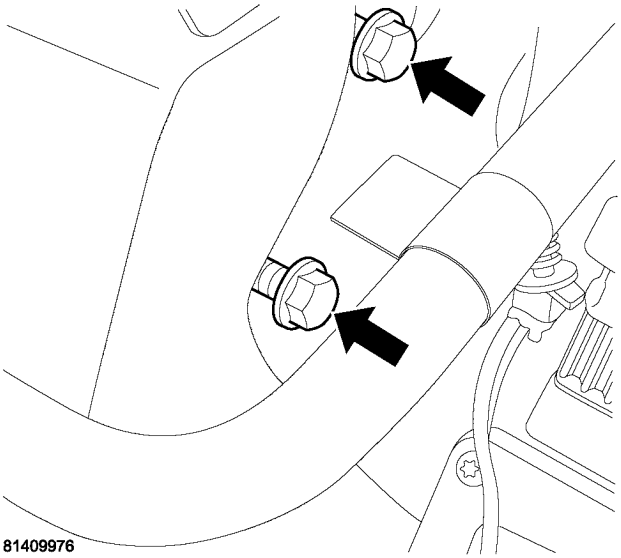


Fig. 32 STARTER UPPER & MIDDLE BOLT

(5) Loose install the upper mounting bolt.
(6) Loose install the middle starter bolt (Fig. 32).

STARTER MOTOR (Continued)

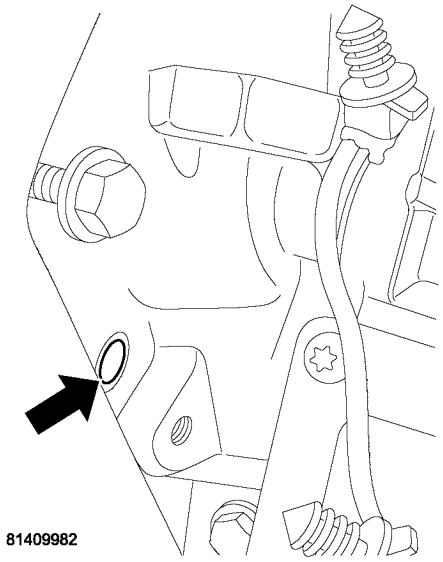


Fig. 33 LOWER BOLT REMOVED

(7) Loose install the lower starter bolt (Fig. 33), tighten 3 bolts to 47 N·m (35 ft. lbs.).

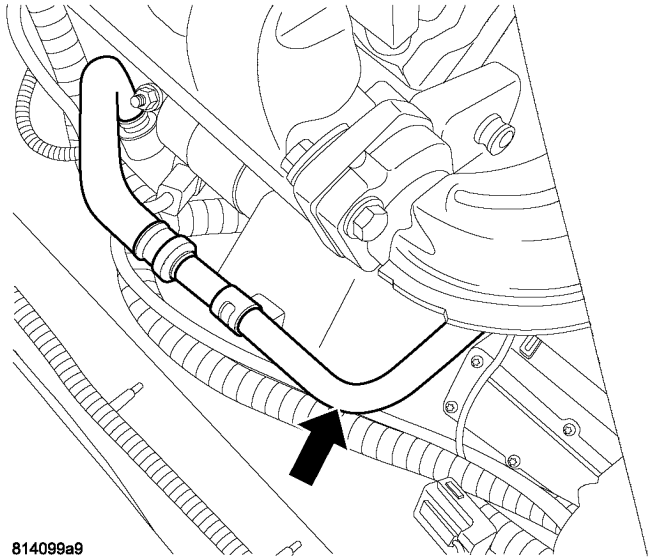


Fig. 34 OIL COOLER LINE

(8) Install oil cooler bracket bolt and tighten (Fig. 34).

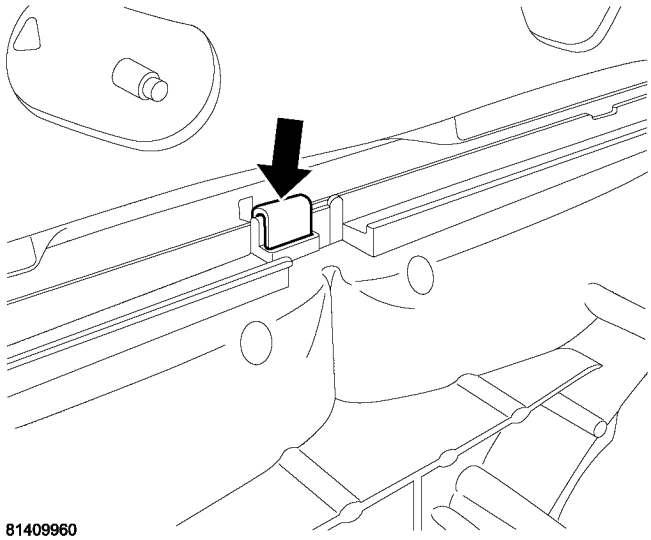


Fig. 35 MODULE RETAINING CLIP

(9) Install fan module.
(10) Install fan module clip (Fig. 35).

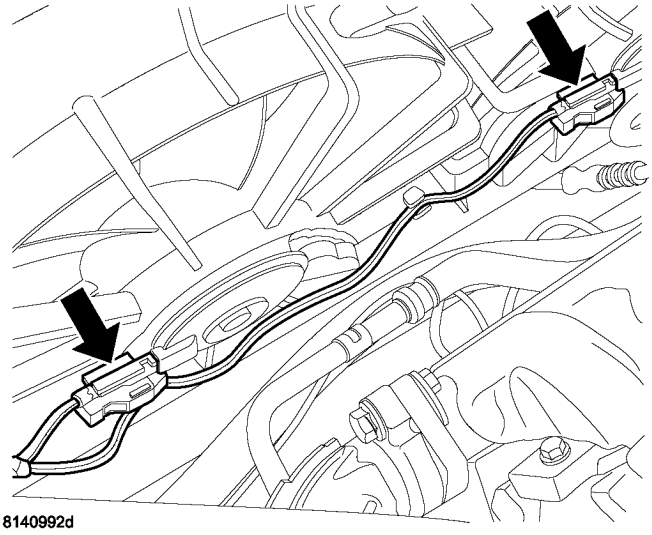


Fig. 36 FAN MODULE CONNECTORS

(11) Connect and lock electrical connectors to fans.
(12) Install wiring clips (Fig. 36).

STARTER MOTOR (Continued)

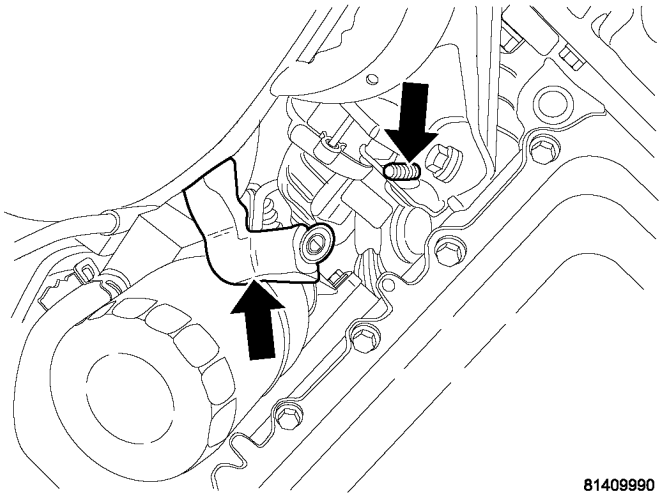


Fig. 37 STARTER BATTERY CONNECTION REMOVED

(13) Install battery connector to starter (Fig. 37).

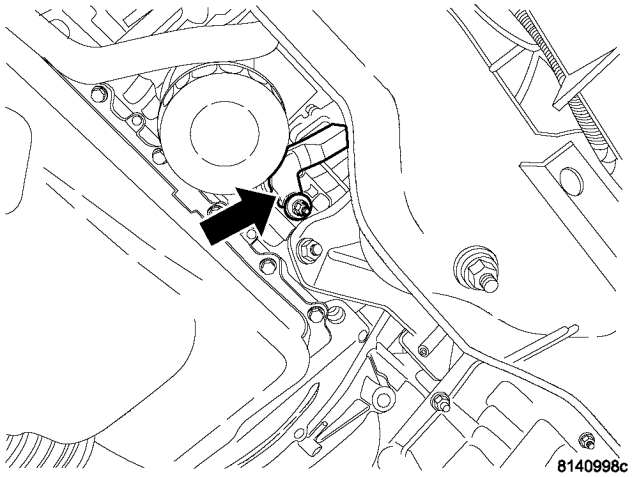


Fig. 38 STARTER BATTERY CONNECTION

(14) Tighten cable nut (Fig. 38) to 11.3 N·m (100 ins. lbs.).

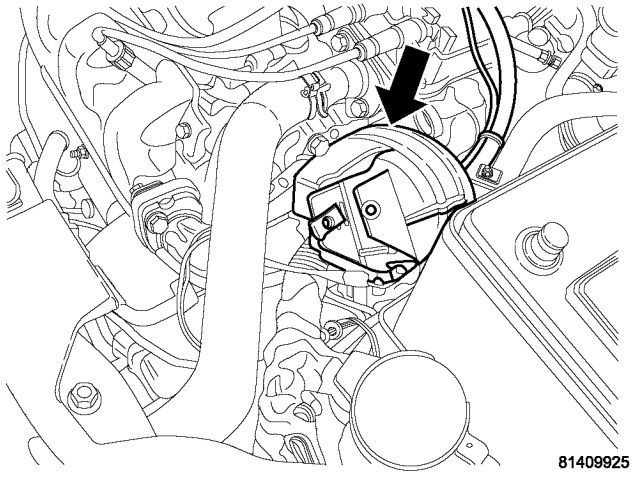


Fig. 39 SPEED CONTROL SERVO

(15) Connect the electrical connector and lock connector to servo.

(16) Connect vacuum line to servo.

(17) Install servo to crossmember and tighten bolt (Fig. 39).

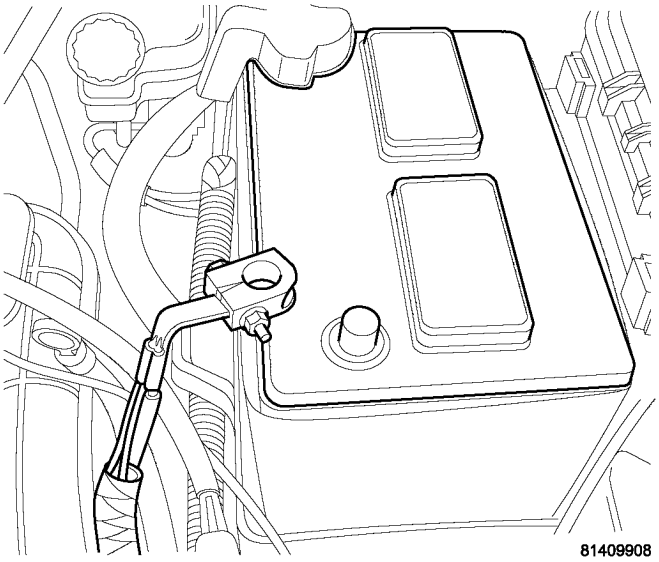


Fig. 40 BATTERY CONNECTION

(18) Connect negative battery cable (Fig. 40).

HEATED SYSTEMS

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HEATED GLASS

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HEATED GLASS

DESCRIPTION

CAUTION: Grid lines can be damaged or scraped off with sharp instruments. Care should be taken in cleaning glass or removing foreign materials, decals or stickers. Normal glass cleaning solvents or hot water used with rags or toweling is recommended.

The rear window defogger system, also known as electric backlight (EBL), consists of two vertical bus bars linked by a series of grid lines fired onto the inside surface of the rear window (Fig. 1).

The EBL system is turned On or Off by a switch in the A/C-heater control located at the center of the instrument panel and by a rear window defogger timing circuit integral to the integrated power module (IPM).

Circuit protection is provided by a 40 amp fuse located in the IPM.

OPERATION

The electric backlight (EBL) system is controlled by a momentary switch located in the A/C-heater control on the instrument panel (Fig. 2). When the rear window defogger switch is pressed to the On position, the integrated power module (IPM) energizes the rear window defogger (EBL) relay and battery current is then directed through the relay and to the rear defogger grid lines and the heated side view mirrors (when equipped). The grid lines heat the

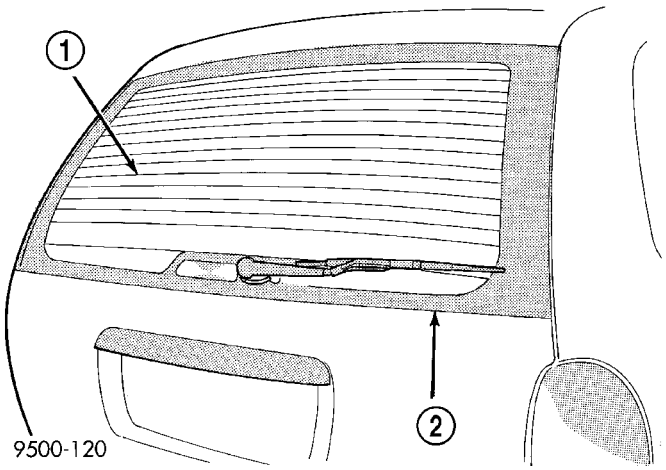


Fig. 1 Rear Window Defogger - Typical

1 - REAR DEFOGGER GRID
2 - REAR WINDOW

glass to help clear the rear window and side mirror surfaces of fog or frost.

An amber indicator in the rear window defogger switch will illuminate to indicate when the EBL system is turned on. The IPM contains the EBL system control circuitry including the timer logic.

NOTE: The EBL system turns off automatically after 10 minutes of initial operation. Each following activation cycle of the EBL system will last five minutes.

The EBL system will be automatically turned off after an initial programmed time interval of about ten minutes. After the initial time interval has expired, if the rear window defogger switch is turned on again during the same ignition cycle, the EBL system will automatically turn off after about five minutes. The EBL system will automatically shut off if the ignition switch is turned to the Off position, or it can be turned off manually by pressing the rear window defogger switch a second time.

Repair of the rear window defogger grid lines, bus bars, terminals or pigtail wires can be accomplished using the Mopar Rear Window Defogger Repair Kit (Part Number 04549275) or equivalent (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER GRID - STANDARD PROCEDURE - GRID LINE AND TERMINAL REPAIR).

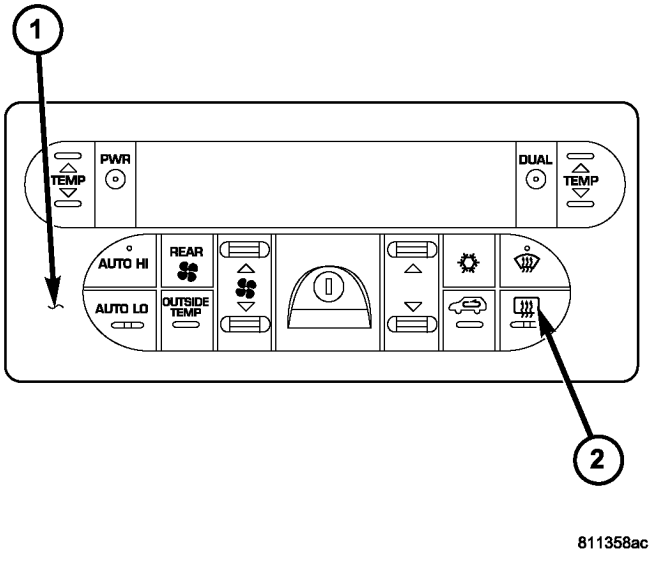


Fig. 2 Rear Window Defogger Switch

1 - A/C-HEATER CONTROL
2 - REAR WINDOW DEFOGGER (EBL) SWITCH

DIAGNOSIS AND TESTING

ELECTRIC BACKLIGHT (EBL) SYSTEM

NOTE: Illumination of the defogger switch indicator lamp means that there is electrical current available at the output of the rear window defogger logic circuitry, but does not confirm that the electrical current is reaching the rear glass heating grid lines.

NOTE: For circuit descriptions and diagrams of the rear window defogger system, refer to 8W - WIRING DIAGRAM INFORMATION.

Operation of the electrical backlight (EBL) system can be confirmed by the following:

(1) Turn the ignition switch to the On position. Set the defogger switch in the On position. The rear window defogger operation can be checked by feeling the rear window glass. A distinct difference in temperature between the grid lines and the adjacent clear glass can be detected within three to four minutes of operation.

(2) If a temperature difference is not detected, use a 12-volt DC voltmeter and contact the rear glass heating grid terminal B with the negative lead, and terminal A with the positive lead (Fig. 3). The voltmeter should read battery voltage. If the voltmeter does not read battery voltage, check the following:

- Confirm that the ignition switch is ON.
- Make sure that the rear glass heating grid feed wire and ground wire are connected to the terminals. Confirm that the ground wire has continuity to ground.
- Check that fuse 5 (40 amp) in the integrated power module (IPM) is OK. The fuse must be tight in it's receptacle and all electrical connections must be secure.

(3) When the above steps have been completed and the rear glass heating grid is still inoperative, one or more of the following is faulty. It may be necessary to connect a DRBIII® scan tool to perform further diagnostics. Refer to Body Diagnostic Procedures.

- Rear window defogger switch in the A/C-heater control.
- J1850 bus communication between the A/C-heater control and the IPM.
- Rear window defogger (EBL) relay in the IPM.
- Rear window defogger (EBL) relay control circuity in the IPM.
- Check for a loose wire connector or a wire pushed out of a connector.
- Rear window grid lines (all grid lines would have to be broken, or the power feed or ground wire not connected, for the entire heating grid to be inoperative).

HEATED GLASS (Continued)

(4) If the system operation has been verified but defogger switch LED indicator does not illuminate, replace the A/C-heater control.

(5) If broken defogger grid lines are suspected, use a 12-volt DC voltmeter and contact terminal B with the negative lead and each rear glass heating grid line at it's mid-point with the positive lead. The voltmeter should read approximately 6 volts at each grid line mid-point C. If the voltmeter does not read approximately 6 volts, repair the open grid line(s) (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER GRID - STANDARD PROCEDURE).

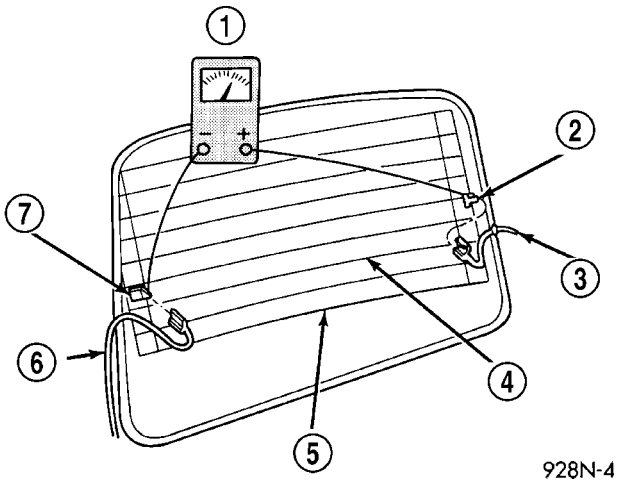


Fig. 3 Grid Line Test

1 - VOLTMETER
2 - VOLTAGE FEED (A)
3 - FEED WIRE
4 - MID-POINT (C)
5 - HEATED WINDOW GRID
6 - GROUND WIRE
7 - GROUND (B)

REAR WINDOW DEFOGGER RELAY

DESCRIPTION

The rear window defogger (EBL) relay (Fig. 4) is a International Standards Organization (ISO)-type relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal functions and patterns. The EBL relay is a electromechanical device that switches battery current through a fuse in the integrated power module (IPM) to the rear window defogger grid, the light-emitting diode (LED) indicator of the defogger switch and to the outside mirror heating grids (when equipped with heated mirrors). The EBL relay is energized when the relay coil is provided a ground path by the control circuitry within the IPM.

The rear window defogger relay is located in the IPM in the engine compartment.

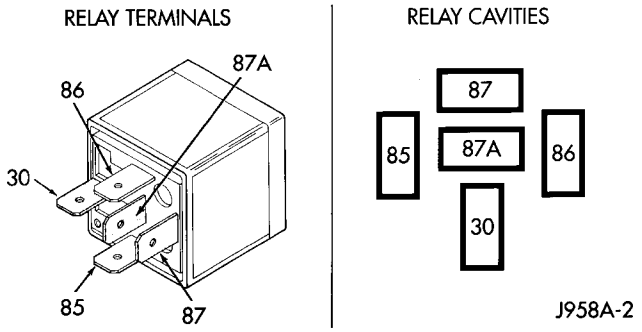


Fig. 4 Rear Window Defogger (EBL) Relay

30	COMMON FEED
85	COIL BATTERY
86	COIL GROUND
87	NORMALLY OPEN
87A	NORMALLY CLOSED

OPERATION

The ISO-standard rear window defogger (EBL) relay is an electromechanical switch that uses a low current input controlled by the integrated power module (IPM) to control the high current output to the rear window defogger grid lines The movable, common feed relay contact is held against the fixed, normally closed relay contact by spring pressure. When the electromagnetic relay coil is energized, it draws the movable common feed relay contact away from the fixed, normally closed relay contact and, holds it against the fixed, normally open relay contact. This action allows high current to flow to the rear window defogger grid lines.

When the relay coil is de-energized, spring pressure returns the movable relay contact back against the fixed, normally closed contact point. The resistor or diode is connected in parallel with the relay coil, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The EBL relay cannot be repaired and, if faulty or damaged, it must be replaced. Refer to the appropriate wiring information for diagnosis and testing of the ISO-standard relay and for complete rear window defogger (EBL) wiring diagrams.

REMOVAL

(1) Disconnect and isolate the negative battery cable.

(2) Remove the cover from the integrated power module (IPM) (Fig. 5) located in the engine compartment.

REAR WINDOW DEFOGGER RELAY (Continued)

NOTE: Refer to the fuse and relay layout map on the inside of the IPM cover for EBL relay location.

(3) Remove the EBL relay from the IPM.

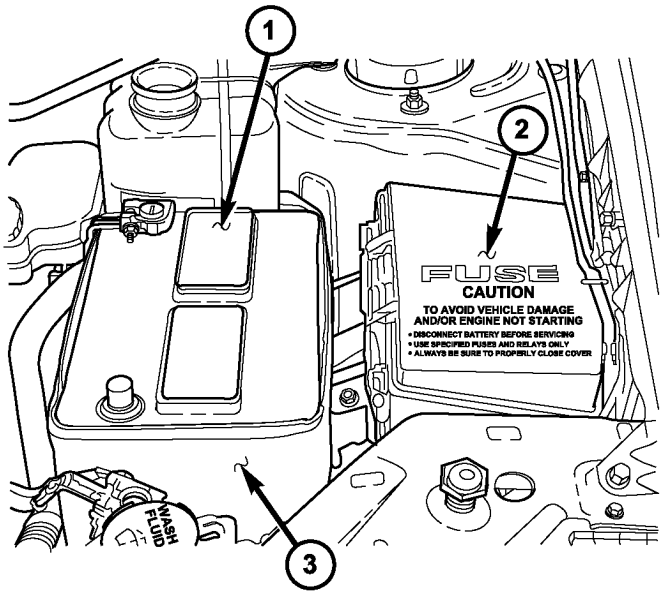


Fig. 5 Integrated Power Module

1 - BATTERY
2 - INTEGRATED POWER MODULE (IPM)
3 - BATTERY THERMAL GUARD

INSTALLATION

NOTE: Refer to the fuse and relay layout map on the inside of the IPM cover for EBL relay location.

(1) Position the EBL relay into the proper receptacle of the integrated power module (IPM).

(2) Align the EBL relay terminals with the terminal cavities in the IPM receptacle and push down firmly on the relay until the terminals are fully seated.

(3) Install the cover onto the IPM.

(4) Reconnect the negative battery cable.

REAR WINDOW DEFOGGER SWITCH

DESCRIPTION

The switch for the rear window defogger (EBL) system is integrated into the A/C-heater control, which is located in the center of the instrument panel (Fig. 6). When the rear window defogger switch is activated, the A/C-heater control requests the integrated power module (IPM) to operate the rear window defogger (EBL) relay.

When the EBL relay is activated, current is directed to the rear defogger grid lines and the heated side view mirrors (if equipped). The grid lines heat the glass to help clear the surface of fog or frost.

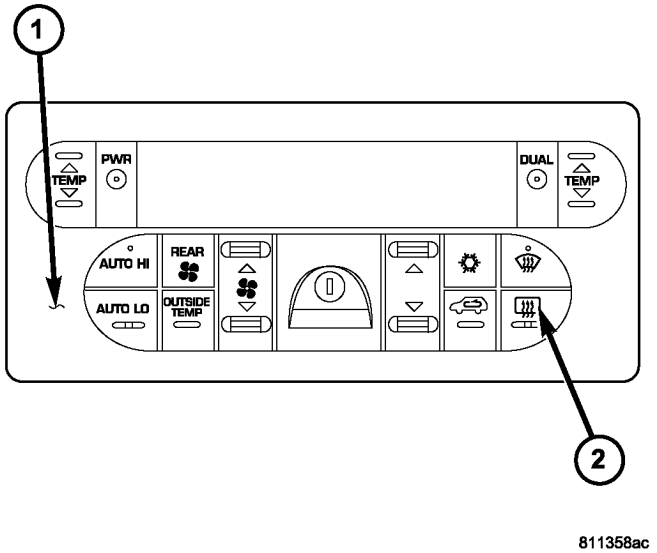


Fig. 6 Rear Window Defogger Switch

1 - A/C-HEATER CONTROL
2 - REAR WINDOW DEFOGGER (EBL) SWITCH

OPERATION

An LED indicator will illuminate when the rear window defogger switch is activated. When the switch is activated, the A/C-heater control requests the integrated power module (IPM) to operate the rear window defogger (EBL) relay. The EBL relay controls the current flow to the grids of the rear window defogger and to the heated side view mirrors, when equipped.

NOTE: The EBL system turns off automatically after 10 minutes of initial operation. Each following activation cycle of the EBL system will last five minutes.

The EBL system will initially be on for approximately ten minutes or until the rear window defogger switch or the ignition switch is turned off. After the initial time interval has expired, if the defogger switch is turned On again during the same ignition cycle, the EBL system will automatically turn off after about five minutes.

The rear window defogger switch and the rear window defogger LED indicator cannot be repaired and, if faulty or damaged, the A/C-heater control must be replaced (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - REMOVAL).

REAR WINDOW DEFOGGER GRID

STANDARD PROCEDURE

GRID LINE AND TERMINAL REPAIR

WARNING: Materials contained in the Repair Kit (Part Number 04549275) may cause skin or eye irritation. The kit contains epoxy resin and amine type hardener, which are harmful if swallowed. Avoid contact with the skin and eyes. For skin contact, wash the affected areas with soap and water. For contact with the eyes, flush with plenty of water. Do not take internally. If taken internally, induce vomiting and call a physician immediately. Use with adequate ventilation. Do not use near fire or flame. Contains flammable solvents. Keep out of the reach of children. Failure to follow the warnings could result in possible personal injury or death.

Repair of the rear glass heating grid lines, bus bars or terminals can be accomplished using the Mopar® Rear Window Defogger Repair Kit (Part Number 04549275) or equivalent.

(1) Mask the repair area with masking tape so that the conductive epoxy can be applied neatly (Fig. 7). Extend the epoxy application onto the grid line or the bus bar on each side of the break.

(2) Follow the instructions in the repair kit for preparing the damaged area.

(3) Remove the package separator clamp and mix the two conductive epoxy components thoroughly within the packaging. Fold the package in half and cut the center corner to dispense the epoxy.

(4) For grid line repairs, mask the area to be repaired with masking tape or use a template.

(5) Apply the epoxy through the slit in the masking tape or template. Overlap both ends of the break by at least 19 millimeters (0.75 inch).

(6) For a terminal replacement, mask the adjacent areas so the epoxy can be extended onto the adjacent grid line as well as the bus bar. Apply a thin layer of epoxy to the area where the terminal was fastened and onto the adjacent grid line.

(7) Apply a thin layer of conductive epoxy to the terminal and place it in the proper location on the bus bar. To prevent the terminal from moving while the epoxy is curing, it must be wedged or clamped.

(8) Carefully remove the masking tape or template.

CAUTION: Do not allow the glass surface to exceed 204° C (400° F) when using a heat gun, or the glass may fracture.

(9) Allow the epoxy to cure 24 hours at room temperature, or carefully use a heat gun for fifteen minutes. When using a heat gun, hold it approximately 25.4 centimeters (10 inches) from the repair and do not allow the glass surface to exceed 204° C (400° F).

NOTE: Do not attach the wire harness connectors to the terminals until the curing process is complete.

(10) After the conductive epoxy is properly cured, remove the wedge or clamp from the terminal.

(11) Connect the wire harness leads to the grid terminals and verify EBL operation.

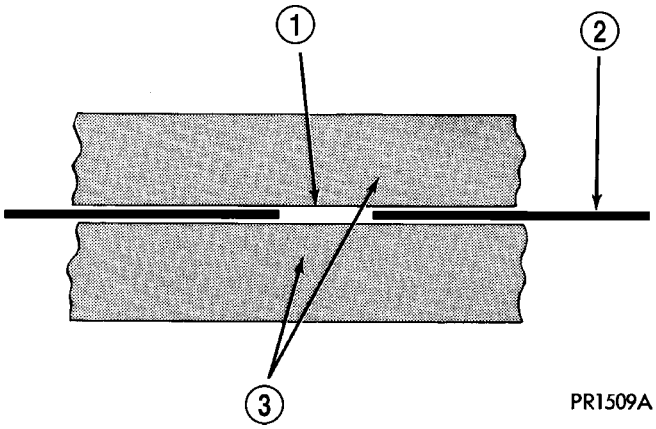


Fig. 7 Grid Line Repair

1 - BREAK
2 - GRID LINE
3 - MASKING TAPE

HEATED MIRRORS

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HEATED MIRRORS

DESCRIPTION

The optional heated mirror system is controlled by the momentary rear window defogger switch which is integral to the A/C-heater control (Fig. 1). An amber indicator lamp in the switch will illuminate to indicate when the rear window defogger (EBL) system is turned on.

The heated mirror system only operates in concert with the EBL system, and will be automatically shut off after a programmed time interval of about 10 minutes. After the initial time interval has expired, if the defogger switch is turned on again during the same ignition cycle, the heated mirror system will automatically shut off after about 5 minutes.

The heated mirror system will automatically shut off if the ignition switch is turned to the Off position, or it can be shut off manually by pressing the rear window defogger switch a second time.

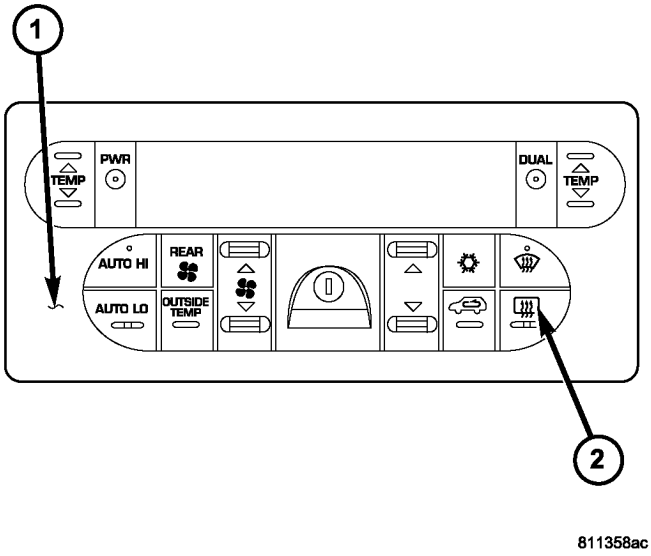


Fig. 1 Rear Window Defogger Switch

1 - A/C-HEATER CONTROL
2 - REAR WINDOW DEFOGGER (EBL) SWITCH

OPERATION

When the rear window defogger switch is pressed, the rear window defogger (EBL) system becomes activated and an electric heater grid located behind the glass of each of the outside rear view mirrors is energized. When energized, each of these heater grids produce heat to help clear the outside rear view mirrors of ice, snow, or fog.

If the outside mirror heating grids are both inoperative, refer to 8 - ELECTRICAL/HEATED GLASS - DIAGNOSIS AND TESTING in this group. If only one of the outside mirror heating grids is inoperative, refer to 8 - ELECTRICAL/POWER MIRRORS - DIAGNOSIS AND TESTING.

The heating grid behind each outside mirror glass cannot be repaired and, if faulty or damaged, the entire power mirror assembly must be replaced.

HEATED SEAT SYSTEM

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HEATED SEAT SYSTEM

DESCRIPTION

Vehicles with the heated seat option can be visually identified by the two heated seat switches located in the front door trim panels. A second set of heated seat switches are located in the rear seat center console. The front door trim panel mounted switches control the front seats, while the rear console mounted switches control the second row seats. The heated seat system allows the driver, front seat passenger and 2nd row seat passengers to select from two different levels of electrical seat heating (HI/LO). The heated seat system for this vehicle includes the following major components, which are described in further detail later in this section:

- **Heated Seat Elements** - Eight heated seat elements are used per vehicle, two for each heated seat. Two heated seat elements are integral to each seat, one in the seat back and the other in the seat cushion. The rear heated seat cushion elements contain integral heated seat sensors.
- **Heated Seat Modules** - Two heated seat modules are used per vehicle. A Memory Heated Seat Adjustable Pedal Module (MHSAPM) is mounted under the drivers seat cushion pan. This module controls the two front heated seats as well as other vehicle functions. A second heated seat module is located in the 2nd row seat center console and it is used to control the 2nd row heated seats. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ MEM/HEAT SEAT ADJ PEDAL MODULE - DESCRIPTION) for additional information.
- **Rear Heated Seat Sensors** - Two heated seat sensors are used per vehicle, one for each rear heated seat. The heated seat sensors are integral to the rear heated seat cushion elements. (Refer to 8 - ELECTRICAL/HEATED SEATS/HEATED SEAT SENSOR - DESCRIPTION) for additional information.
- **Heated Seat Switches** - Four heated seat switches are used per vehicle, one for each heated seat. One switch assembly is mounted in each of the front door trim panels. The driver side switch assembly is used to control the driver heated seat, power/ memory seat and adjustable foot pedal systems. The passenger side switch assembly is used to control the

passenger heated seat and power seat systems. The 2nd row heated seat switches are mounted in the 2nd row seat center console. The 2nd row switches are used to control the 2nd row heated seat system only. Refer to heated seat switches later in this section for additional information. Refer to driver and passenger seat switches in the Power Seat section for additional information.

- **Door Modules** - A door module is concealed behind the trim panel of each front door. The module on the driver side is referred to as the Driver Door Module (DDM), while the module on the passenger side is the Passenger Door Module (PDM). The DDM and PDM each utilize integrated circuitry and information carried on the Programmable Communications Interface (PCI) data bus network. In regards to the front seat heated seat system, the door modules communicate between the front seat heated seat switch assemblies and the memory heated seat adjustable pedal module. The door modules are not used in the 2nd row heated seat system. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/DOOR MODULE - DESCRIPTION) for additional information.

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

OPERATION

FRONT SEAT HEATED SEAT SYSTEM OPERATION

The front heated seat system operates on battery current received through a fuse in the Integrated Power Module (IPM). Fused ignition switch output (run-acc) circuits are used, so that the systems will only operate when the ignition switch is in the On or Accessory positions. The heated seat system will turn Off automatically whenever the ignition switch is turned to any position except On or Accessory. The Low heat position set point is about 36° C (97° F), and the High heat position set point is about 41° C (105° F).

When either of the front heated seat switches are depressed a resistance signal is sent to the applicable Door Module (Driver or Passenger). The applicable Door Module then sends a message via the Programmable Communications Interface (PCI) data bus network to the Memory Heated Seat Adjustable Pedal Module (MHSAPM), signaling the module to energize the heating element for the selected seat. Light Emitting Diodes (LEDS) in each switch indicate the level of heat in use. The switch LEDs are controlled by the applicable Door Module.

The MHSAPM energizes an integral solid-state relay, which supplies battery current to the seat heating elements. When high-temperature heating is selected, the heaters provide a boosted heat level during the first four minutes of operation after heating is activated. The heat output then drops to the normal selected-temperature level. If high-level heating is selected, the control system will automatically switch to the low level after two hours of continuous operation. Operation on the low setting turns off only when the ignition switch is turned off or the heated seat switch is pressed a second time indicating an off command.

The module will automatically turn off the heating elements if it detects an OPEN or LOW short in the heating element circuit.

2ND ROW HEATED SEAT SYSTEM OPERATION

The 2nd row heated seat system operates independently from the front heated seat system. The 2nd row heated seat module receives fused battery current through the Integrated Power Module only when the ignition switch is in the ON position. The heated seat module shares a common ground circuit with each of the heated seat elements. The heated seat system will only operate when the surface temperature of the seat cushion is below the designed temperature set points of the system. The Low heat position set point is 35° C (95° F), and the High heat position set point is 40° C (104° F).

A separate heated seat module contains the control logic for the 2nd row heated seat system. The module responds to the heated seat switch status, ignition switch status, and the heated seat element sensor inputs by controlling the output to the 2nd row seat heating elements through integral solid-state relays.

When either of the 2nd row seat heated seat switches are depressed a resistance signal is sent to the heated seat module, signaling the module to energize the heating element for the selected seat.

The heated seat sensor provides the heated seat module with a low-voltage input indicating the surface temperature of the seat cushion. If the surface temperature is below the temperature set point for the selected Low or High heated seat switch position, the module energizes the integral solid-state relay, which supplies battery current to the heating elements. When the sensor input indicates the correct temperature set point has been achieved, the module de-energizes the solid-state relay. The module will continue to cycle the solid-state relay as needed to maintain the temperature set point.

The heated seat system will automatically turn off whenever the ignition switch is turned to any posi-

tion except On. If the ignition switch is turned to the Off position while a heated seat is ON, the heated seat will remain Off after the engine is restarted until a 2nd row seat heated seat switch is depressed again. This prevents the vehicles battery from being drained by the heated seat system.

The 2nd row heated seat module also controls the heated seat LED indicator lamps, located in both of the 2nd row heated seat switches. The module is programmed to provide self-diagnostics, if a problem with the 2nd row heated seat system is detected. If the module detects faults within the heated seat system, it will provide a visual indication of the failure by flashing the indicator lamps in the appropriate heated seat switch.

The module will automatically turn off the heating elements if it detects an OPEN or HI/LOW short in the sensor circuit, or an OPEN or LOW short in the heating element circuit. See the owner's manual in the vehicle glove box for more information on the features, use and operation of the front seat heated seat system.

DIAGNOSIS AND TESTING - HEATED SEAT SYSTEM

FRONT SEAT HEATED SEAT SYSTEM DIAGNOSIS

In order to obtain conclusive testing of the front seat heated seat system, the Programmable Communications Interface (PCI) data bus circuit must be checked.

The most reliable, efficient, and accurate means to diagnose the front seat heated seat system requires the use of a DRB III® scan tool and the Appropriate Diagnostic Information. The DRB III® scan tool can provide vital information to the technician trying to find a problem with the heated seat system. Diagnostic logic is built into the Memory Heated Seat Adjustable Pedal Module (MHSAPM) and both door modules to help locate the problem by the most efficient means possible. Anytime a problem is suspected, a DRB III® scan tool should be obtained and used to retrieve any stored fault codes in the MHSAPM and door modules. If the front heated seat lights blink the MHSAPM did not respond to the door modules command to turn on the heated seats.

If diagnostic fault codes are present in the module, record them on a piece of paper immediately before proceeding any further. Then, use these fault codes to identify the problem by verifying the fault code. Example, If the module records "DRIVER SEAT HEAT OUTPUT OPEN" fault code, locate the diagnostic procedure for this code in the Appropriate Diagnostic Information and follow the flow chart until the specific problem is located and resolved. Once the problem is thought to be corrected, erase the stored fault code using the DRB III® scan tool and verify correct system operation. If the front seat heated seat system is functioning correctly, verify that there are no other stored codes in the module and return the vehicle to service.

If the fault code could not be verified, this is a good indication that a INTERMITTENT problem may be present. You must than attempt to find the intermittent problem, such as moving the heating element within the seat while testing continuity or wiggling the wire harness/electrical connectors under the seat while testing continuity. Always, eliminate all other potential problems before attempting to replace the MHSAPM or door modules.

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

PRELIMINARY TEST

Before testing the individual components in the heated seat system, check the following:

- Using the DRB III® scan tool, check the memory heated seat adjustable pedal module (MHSAPM) for any stored fault codes. Record these codes on paper for reference and resolve using the Appropriate Diagnostic Information.
- Check the vehicles battery open-circuit voltage and charging system performance. If the vehicles electrical system is defective or weak it may not be suppling sufficient energy to operate the heated seat system.
- If the heated seat switch backlighting does not light with the ignition switch in the On position, check the fused ignition switch fuse in the integrated power module. If OK, refer to **Heated Seat Switch Diagnosis and Testing** in this section. If not OK, repair the shorted circuit or component as required and replace the faulty fuse or repair the open ground circuit as required.
- If the heated seat switch HI/LO LED indicators do not light with the ignition switch in the On position and the heated seat switch in the Low or High position, check the fused ignition switch fuse in the integrated power module. If OK, refer to **Heated Seat Switch Diagnosis and Testing** in this section. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

2ND ROW HEATED SEAT SYSTEM DIAGNOSIS

The 2nd row heated seat system is capable of performing some self-diagnostics. The following table depicts the various monitored faults which will be

reported to the vehicle operator or technician by flashing the individual heated seat switch Light Emitting Diode (LED) indicator lamps. Refer to the HEATED SEAT SYSTEM SELF-DIAGNOSIS table below for failure identification. The left side heated seat switch indicator lamps will flash if a failure occurs in the left rear heated seat, and the right side heated seat switch indicator lamps will flash for a right rear heated seat failure. If a monitored heated seat system fault occurs, the switch indicator lamps will flash at a pulse rate of one-half second on, followed by one-half second off for a duration of one minute after the switch for the faulty heated seat is depressed in either the Low or High direction. This process will repeat every time the faulty heated seat switch is actuated until the problem has been corrected.

HEATED SEAT SYSTEM SELF-DIAGNOSIS

Monitored Failure	Switch HI Indicator Lamp	Switch LO Indicator Lamp
Heated Seat Element Shorted	Flashing	Flashing
Heated Seat Element Open	Flashing	Off
Heated Seat Sensor Value Out of Range	Off	Flashing

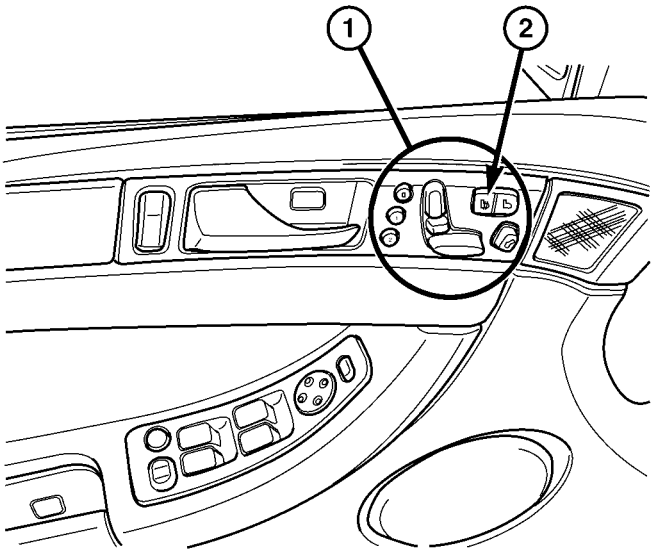
Diagnostic logic is built into the 2nd row heated seat module to help the person trying to locate the problem by the most efficient means possible. Anytime a problem is suspected, locate the diagnosis and testing procedure for the component in question and follow the steps until the specific problem is located and resolved. Always eliminate problems in this order; sensors, wiring, element, switch, switch wiring, heated seat module. Once the problem is thought to be corrected, verify correct system operation. If the heated seat system is functioning correctly return the vehicle to service.

If a problem could not be verified such as not finding anything wrong when following the diagnostic procedure, this is a good indication that a INTERMITTENT problem may be present. You must then attempt to find the intermittent problem, such as moving the heating element within the seat while testing continuity or wiggling the wire harness's/electrical connectors under the seat while testing continuity.

FRONT HEATED SEAT SWITCH

DESCRIPTION

The heated seat switch assemblies are mounted in the left and right side front door trim panels. One switch assembly is used for each front heated seat. The two momentary position switches, are incorporated into one large switch assembly that also includes other switches. The drivers side switch assembly (Fig. 1) includes the memory, heat and power seat switches as well as the adjustable foot pedal switch. The passenger side switch assembly includes the power seat and heated seat switches only. The heated seat switches provide a resistive multiplexed signal to the appropriate Door Module through separate hard wired circuits. Each switch has an Low and High position so that both the driver and the front seat passenger can select a preferred seat heating level. Each switch has two Light-Emitting Diodes (LED) which light to indicate that the heater for the seat is turned on.



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Fig. 1 CS Driver Heated Seat Switch

1 - Switch Assembly
2 - Driver Heated Seat Switch

The heated seat switches and their LEDs cannot be repaired. If either switch or LED is faulty or damaged, the entire switch assembly must be replaced.

FRONT HEATED SEAT SWITCH (Continued)

OPERATION

There are two momentary positions that can be selected with each of the heated seat switches, Low and High. When the switch closest to the driver/passenger is depressed, the Low position is selected and the "LO" position LED indicator illuminates. When the switch farthest from the driver/passenger is depressed, the High position is selected and the "HI" position LED indicator illuminates. If the switch is depressed a second time in the same direction, Off is selected and both LED indicators are extinguished.

Both heated seat switch assemblies provide separate resistive multiplexed inputs to the appropriate door module. The Door Module then sends a PCI Data Bus message to the Memory Heated Seat Adjustable Pedal Module (MHSAPM) to indicate the selected switch position. The module responds to the heated seat switch messages by controlling the 12v output to the front seat heating elements. The Low heat position set point is about 35° C (97° F), and the High heat position set point is about 40° C (105° F).

DIAGNOSIS AND TESTING - DRIVER HEATED SEAT SWITCH

For complete circuit diagrams, refer to **Wiring**.

CHECKING SWITCH SIGNAL AND WIRING AT THE DOOR MODULE

(1) Disconnect and isolate the battery negative cable.

(2) Access and disconnect the connector from the driver door module. Visually inspect wiring terminals for damage that would prevent positive connection. If not OK, repair or replace the necessary components.

(3) Reconnect the negative battery cable and the driver door module. Turn heated seat ON in the LO position. Using an Ohmmeter, check the resistance between the driver heated seat switch mux circuit and fused ignition switch output circuit. Resistance should be about 8 kiloohms (8020 ohms ±4%). If not OK, check resistance directly at switch. If OK, go to Step 4. If NOT OK replace the switch or faulty wiring.

(4) Turn heated seat ON in the HI position. Using an Ohmmeter, check the resistance between the driver heated seat switch mux circuit and fused ignition switch output circuit. Resistance should be about 2.4 kiloohms (2400 ohms ±4%). If not OK, check resistance directly at switch. If OK, go to Step 5. If NOT OK replace the switch or faulty wiring.

(5) With the system ON in the HI position, Check for proper battery voltage and ground at the appropriate cavities. If OK, test heated seat element. If NOT OK, repair open or wiring short.

CHECKING SWITCH ONLY

(1) The heated seat switch assembly used on CS vehicles includes other switches. (Refer to 8 - ELECTRICAL/POWER SEATS/DRIVER SEAT SWITCH - DIAGNOSIS AND TESTING)

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the front door trim panel. Refer to Front Door Trim Panel Removal in the Body section for the procedure.

(3) Disconnect the harness from the door module.

(4) Remove the heated seat switch assembly by pressing in the four clips.

INSTALLATION

(1) Install the heated seat switch assembly.

(2) Connect the harness to the door module.

(3) Install the front door trim panel. Refer to the Body section for the procedure.

(4) Reconnect the battery negative cable.

HEATED SEAT ELEMENTS

DESCRIPTION

The heated seat system utilizes two heated seat elements in each seat, one for the seat cushion (Fig. 2) and the other for the seat back. Although two different heated seat systems are used for the front and 2nd row rear seats, the heated seat elements function the same way. The two elements for each 2nd row rear seat are connected in series with the 2nd row Heated Seat Module (HSM). The two elements for each front seat are connected in parallel with the Memory Heated Seat Adjustable Pedal Module (MHSAPM). One temperature sensor is used for each rear seat only, and it is located in the rear seat cushion heated seat element. The front heated seat system does not utilize a temperature sensor the heated seat elements. The heated seat temperature sensor is a Negative Temperature Coefficient (NTC) thermistor. (Refer to 8 - ELECTRICAL/HEATED SEATS/HEATED SEAT SENSOR - DESCRIPTION) for more information on the rear heated seat sensor.

The heated seat elements are glued onto the seat cushion and seat back cushion foam. The heated seat elements and the temperature sensor cannot be adjusted or repaired and, if faulty or damaged, the heated seat element assembly must be replaced. Refer to the procedure later in this section.

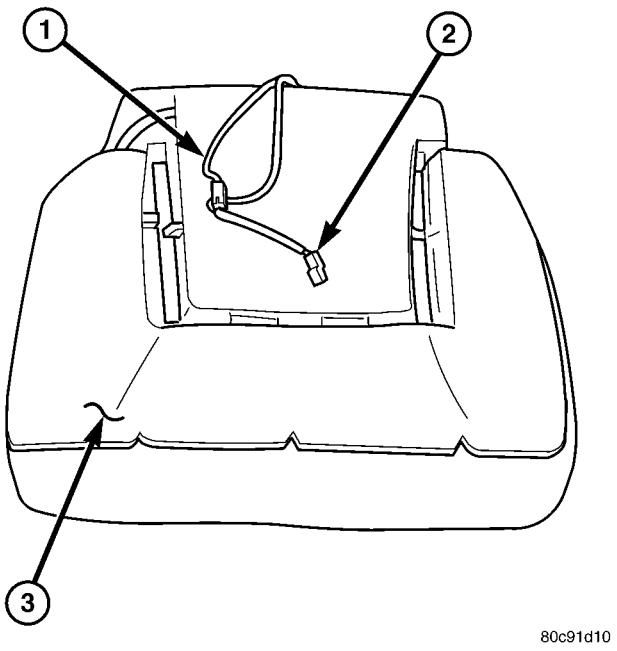


Fig. 2 Heated Seat Element - Typical

1 - Seat Back Wire Harness
2 - Heated Seat Wire Harness Connector
3 - Heated Seat Cushion Element

OPERATION

The heated seat elements resist the flow of electrical current. When battery current is passed through the elements, the energy lost by the resistance of the elements is released in the form of heat.

The rear heated seat temperature sensor is a Negative Temperature Coefficient (NTC) thermistor. When the temperature of the rear seat cushion cover rises, the resistance of the sensor decreases. The rear heated seat module supplies five-volts to one side of each sensor, and monitors the voltage drop through the sensor on a dedicated hardwired return circuit. The module uses this temperature sensor input to monitor the temperature of the seat cushion, and regulates the 12v current flow to the heated seat elements accordingly.

DIAGNOSIS AND TESTING - HEATED SEAT ELEMENTS

The wire harness connectors for the heating elements are located under the seat. For circuit descriptions and diagrams, refer to section 8W, Wiring.

NOTE: When checking heated seat elements for continuity, be certain to move the heating element being checked. Moving the element, such as would occur by sitting in the seat, will check for the possibility of an intermittent open in the element which would only be evident if the element was in a certain position. Failure to check the element in various positions could result in an incomplete test.

FRONT SEAT SYSTEM

(1) Locate the memory heated seat adjustable pedal module. Disconnect the appropriate connector from the module. Refer to the wiring section for details.

(2) Check for continuity between the two wires leading to and out of the appropriate heated seat element. There should be continuity. Less than 6 ohms. If OK, refer to Memory Heated Seat Adjustable Pedal Module (MHSAPM) Diagnosis and Testing in the Electronic Control Modules section of the service manual for complete system testing procedures. If not OK, install a replacement heated seat element. Refer to the procedure in this section.

2ND ROW SEAT SYSTEM

(1) Locate the heated seat element connector, located under the seat. Disconnect the appropriate connector. Refer to the wiring section for details.

(2) Check for continuity between the two wires leading to and out of the appropriate heated seat element. There should be continuity. Less than 6 ohms. If OK, refer to Heated Seat Module Diagnosis and Testing in this section for complete system testing procedures. If not OK, install a replacement heated seat cushion element. Refer to the procedure in this section.

REMOVAL

NOTE: Do not remove the factory installed heating elements from the seat or seat back cushions. The original element is permanently attached and cannot be removed without permanent damage. The replacement heating element is designed to be applied directly on top of the factory installed heating element.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the appropriate seat cushion or seat back trim cover.

(3) Disconnect the inoperative heated seat cushion or seat back element electrical connectors (Fig. 3).

(4) Locate the wires leading from the inoperative heating element and cut them off flush with the edge of the original heating element.

INSTALLATION

(1) Peel off the adhesive backing on the back of the replacement heating element and stick directly on top of the factory installed heating element (Fig. 4).

HEATED SEAT ELEMENTS (Continued)

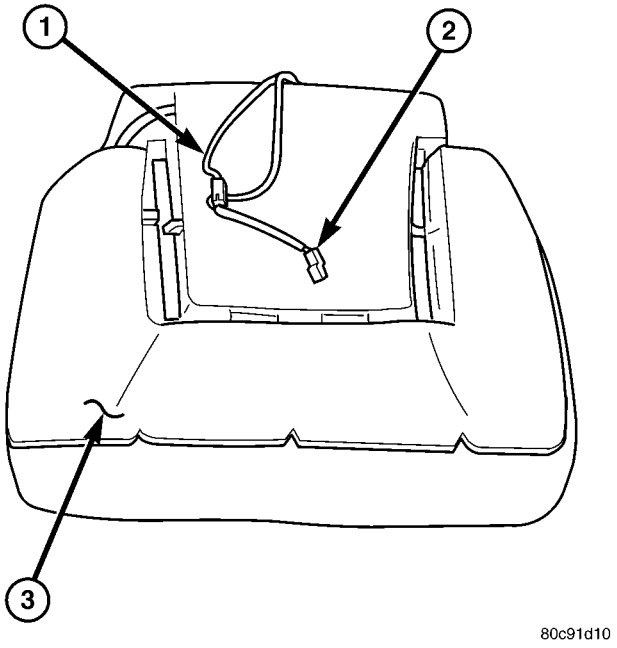


Fig. 3 HEATING ELEMENT INSTALLED

1 - SEAT BACK WIRE HARNESS
2 - HEATED SEAT WIRE HARNESS CONNECTOR
3 - HEATED SEAT CUSHION ELEMENT

CAUTION: During the installation of the replacement heating element, be careful not to fold or crease the element assembly. Folds or creases will cause premature failure.

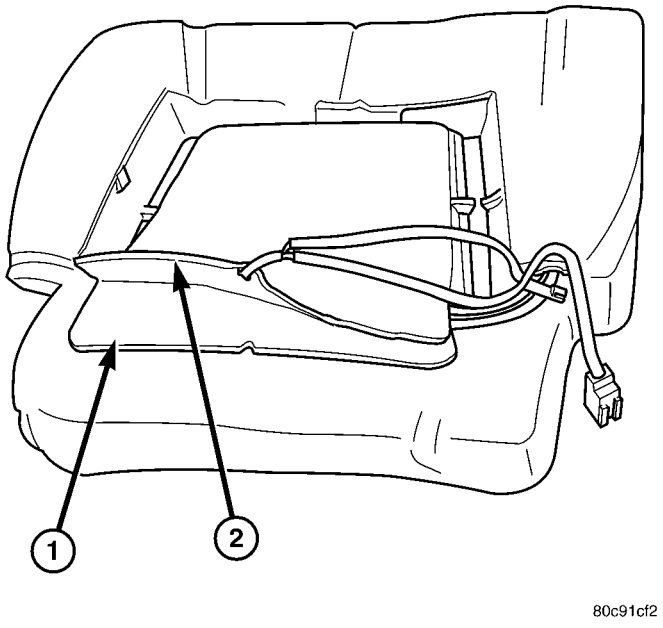


Fig. 4 HEATING ELEMENT INSTALLATION

1 - ORIGINAL (INOPERATIVE) HEATING ELEMENT
2 - REPLACEMENT HEATING ELEMENT

(2) Connect the new heating element electrical connectors (Fig. 5). **Passenger seat shown, driver seat similar.**

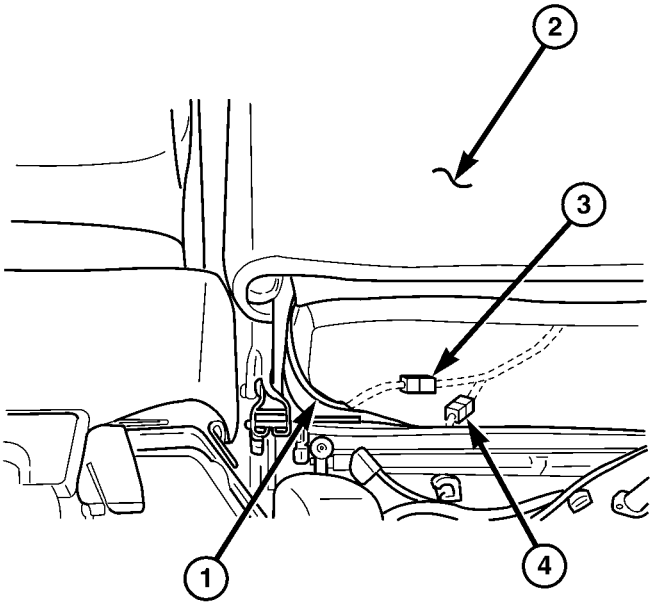


Fig. 5 HEATED SEAT WIRE HARNESS ROUTING

1 - SEAT BACK HEATED SEAT WIRE HARNESS
2 - PASSENGER SEAT BACK
3 - SEAT BACK ELEMENT CONNECTOR
4 - SEAT CUSHION ELEMENT CONNECTOR

(3) Connect the battery negative cable.
(4) Verify heated seat system operation.
(5) Install the appropriate seat cushion or seat back trim cover.

NOTE: Make certain the seat wire harness is correctly routed through the seat and seat back. The excess wire between the cushion and back elements should be securely tucked between the rear of the cushion foam and the rear carpet flap of the trim cover.

HEATED SEAT SENSOR - 2ND ROW SEATS

DESCRIPTION

Two heated seat sensors are used per vehicle. One sensor is located in each heated seat cushion. The heated seat temperature sensors are Negative Temperature Coefficient (NTC) thermistors. The 2nd row seat heated seat sensors are hardwired to the rear heated seat module, located in the 2nd row center console.

The heated seat sensors cannot be repaired or adjusted and if found to be faulty, the complete heated seat cushion element must be replaced.

OPERATION

The heated seat temperature sensor is a NTC thermistor. When the temperature of the seat cushion cover rises, the resistance of the sensor decreases. The heated seat module supplies five-volts to one side of each sensor, and monitors the voltage drop through the sensor on a dedicated return circuit. The module uses this temperature sensor input to monitor the temperature of the seat and regulate the 12v current flow to the heated seat elements accordingly.

DIAGNOSIS AND TESTING - HEATED SEAT SENSOR - 2ND ROW SEATS

For complete circuit diagrams, refer to **WIRING**.

(1) Locate the 2nd row seat heated seat module. Refer to Heated Seat Module in this section for information.

(2) Back-probe the heated seat module wire harness connector, do not disconnect. With the heated seat system “ON”, check the heated seat temperature sensor input cavity for a range in voltage from approx. 1.72 – 3.0 volts. It should be within this range, If OK go to Step 3. If NOT OK, check for the proper 5 volt supply to the heated seat sensor, from the module. Refer to the Wiring section for specific information. If the module has the proper 12v and ground supply and 5 volts is not being supplied to the sensor from the module, replace the heated seat module.

(3) Test the seat wire harness between the module connector and the heated seat element wire harness connector for shorted or open circuits. If OK, refer to Diagnosis and Testing the Heated Seat Element, for the proper heated seat element diagnosis and testing procedures. If not OK, repair the shorted or open heated seat wire harness as required.

HEATED SEAT MODULE - FRONT SEATS

DESCRIPTION

A Memory Heated Seat/Adjustable Pedal Module (MHSAPM) is used on vehicles that are equipped with the heated seat system option. A Memory Seat/ Adjustable Pedal Module (MSAPM) is used on vehicles that are not equipped with the heated seat system option. This module contains all the software and control logic for the front memory/heated and power seat systems, as well as the adjustable foot pedal system. The memory heated seat/adjustable pedal module contains a central processing unit and interfaces with the Programmable Communications Interface (PCI) data bus circuit. Refer to the **Heated Seat System** section for more information on the heated seat system. Refer to the **Power Seat System** section for more information on the power/memory seat system.

The module is packaged in a black molded plastic case which is mounted under the edge of the driver side front seat cushion. This location makes it somewhat difficult to access because it sits between the power seat track and the seat cushion frame. Refer to the following procedure in this section for detailed removal and installation instructions.

For diagnosis of the MHSAPM or the PCI data bus, a DRB III® scan tool and the Diagnostic Procedures Manual are recommended. The Memory Heated Seat/Adjustable Pedal Module cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

The Memory Heated Seat/Adjustable Pedal Module controls the heated, power and memory seat systems as well as the adjustable foot pedal system. However different, these systems share some software inside the module. Refer to the following text which explains how the different systems are controlled by the memory heated seat/adjustable pedal module.

FRONT HEATED SEAT SYSTEM OPERATION

When either of the front heated seat switches are depressed a resistor multi-plexed signal is sent to the corresponding door module (Driver or Passenger). The applicable Door Module then sends a message via the Programmable Communications Interface (PCI) data bus network to the Memory Heated Seat Adjustable Pedal Module (MHSAPM), signaling the module to energize the heating element for the selected seat. Light Emitting Diodes (LEDS) in each switch indicate the level of heat in use. The switch LEDs are controlled by the applicable Door Module.

The MHSAPM energizes an integral solid-state relay, which supplies battery current to the seat heating elements. When high-temperature heating is selected, the heaters provide a boosted heat level during the first four minutes of operation after heating is activated. The heat output then drops to the normal selected-temperature level. If high-level heating is selected, the control system will automatically switch to the low level after two hours of continuous operation. Operation on the low setting turns off only when the ignition switch is turned off or the heated seat switch is pressed a second time indicating an off command.

HEATED SEAT MODULE - FRONT SEATS (Continued)

MEMORY SEAT SYSTEM OPERATION

Depressing any of the drivers front door trim panel mounted, memory seat switches sends a hardwired, resistor multi-plexed signal to the drivers door module. The door module then sends a PCI data bus message to the Memory Heated Seat/Adjustable Pedal Module (MHSAPM). The module detects the memory seat switch status via the PCI data bus circuit and energizes the appropriate power seat motors. The programmed software in the MHSAPM allows it to know the location of the seat track by a resistance value generated from the seat track mounted potentiometers. When the correct preset location is achieved the module will de-energize the power seat track motors. The MHSAPM will prevent the seat memory recall function from being initiated if the transmission gear selector lever is not in the Park or Neutral positions, or if the vehicle is moving. These inputs are monitored over the PCI data bus circuit.

ADJUSTABLE FOOT PEDAL SYSTEM OPERATION

Depressing the adjustable foot pedal switch sends a hardwired, resistor multi-plexed signal to the drivers door module. The door module then sends a PCI data bus message to the Memory Heated Seat/Adjustable Pedal Module (MHSAPM). The module detects the adjustable pedal switch status via the PCI data bus circuit and energizes the appropriate foot pedal motor. When the foot pedal switch is released the module will stop the motor.

Depressing the memory switch will signal the module to move the pedal assembly to the preprogrammed position. The programmed software in the MHSAPM allows it to know the location of the foot pedal assembly by a resistance value generated from the pedal assembly mounted potentiometer. When the correct preset location is achieved the module will de-energize the foot pedal motor. The MHSAPM will prevent the adjustable foot pedal function from being initiated if the transmission gear selector lever is not in the Park or Neutral positions, or if the vehicle is moving. These inputs are monitored over the PCI data bus circuit also.

DIAGNOSIS AND TESTING - HEATED SEAT MODULE - FRONT SEATS

In order to obtain conclusive testing of the memory heated seat adjustable pedal module, the Programmable Communications Interface (PCI) data bus circuit and any components that provide inputs to the module must be checked.

The most reliable, efficient, and accurate means to diagnose the module requires the use of a DRB III® scan tool and the Service and Body Diagnostic Procedures Manuals. The DRB III® scan tool can provide vital information to the technician trying to find a problem with the module. Diagnostic logic software is built into the memory heated seat adjustable pedal module to help the person trying to locate the problem by the most efficient means possible. Anytime a problem is suspected, a DRB III® scan tool should be obtained and used to retrieve any stored fault codes in the memory heated seat adjustable pedal module. If diagnostic fault codes are present in the module, record them on a piece of paper immediately before proceeding any further. Then, use these fault codes to identify the problem by verifying the fault code. Example, If the module records “DRIVER SEAT HEAT OUTPUT OPEN” fault, locate the diagnostic procedure for this code in the appropriate Body Diagnostic Procedures Manual and follow the flow chart until the specific problem is located and resolved. Once the problem is corrected, erase the stored fault code using the DRB III® scan tool and verify correct heated seat system operation. If the heated seat system appears to be functioning correctly, verify that there are no other stored codes in the module and return the vehicle to service.

If the fault code could not be verified, such as not finding anything wrong when following the diagnostic flow chart in the Body Diagnostic Procedures Manual. This is a good indication that a INTERMITTENT problem may be present. You must than attempt to find the intermittent problem, such as moving the heating element within the seat while testing continuity or wiggling the wire harness’s/electrical connectors under the seat while testing continuity. Always, eliminate all other potential problems before attempting to replace the memory heated seat adjustable pedal module.

For complete circuit wiring diagrams, refer to **Wiring**.

PRELIMINARY TEST

Before testing the individual components in the suspect system, check the following:

(1) Using the DRB III® scan tool, check the memory heated seat adjustable pedal module (MHSAPM) for any stored fault codes. Record these codes on paper for reference and resolve using the appropriate Body Diagnostic Procedures Manual.

(2) Check the vehicles battery open-circuit voltage and charging system performance. If the vehicles electrical system is defective or weak it may not be suppling sufficient voltage to operate the system in question.

REMOVAL

(1) Position the drivers seat as far upward and rearward as possible.

(2) Open hood, disconnect and isolate the negative battery cable.

(3) Remove the memory heated seat adjustable pedal module attaching screws.
(4) Disconnect the module electrical connectors.
(5) Remove the module from under drivers seat.

INSTALLATION

(1) Position the memory heated seat adjustable pedal module under the drivers seat.
(2) Connect the module electrical connectors.
(3) Install the module attaching screws.
(4) Connect the negative battery cable.
(5) Position the drivers seat in its original position.
(6) Verify correct system operation.

HEATED SEAT MODULE - 2ND ROW SEATS

DESCRIPTION

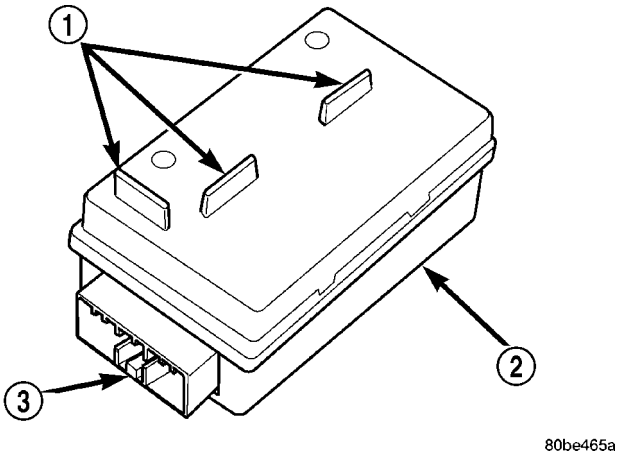


Fig. 6 Heated Seat Module - 2nd Row Seat

1 - MOUNTING TABS (NOT USED ON CS)
2 - HEATED SEAT MODULE
3 - ELECTRICAL CONNECTOR RECEPTACLE

The 2nd row seat heated seat module (Fig. 6) is located in the rear seat center console, where it is secured by two retaining fasteners. The heated seat module has a single electrical connector receptacle that connects all of the inputs and outputs through the seat and body wire harnesses.

The heated seat module is an electronic microprocessor controlled device designed and programmed to use inputs from the battery, the two heated seat switches and the two heated seat sensors to operate and control the 2nd row seat heated seat system. The module is also designed to provide outputs to the heated seat elements in both 2nd row seats and the two heated seat indicator lamp Light-Emitting Diodes (LEDs) in each 2nd row heated seat switch. The heated seat module is able to perform some self-diagnosis of certain heated seat system faults and provide feedback of that diagnosis through the heated seat switch indicator lamps.

The heated seat module cannot be repaired. If the heated seat module is damaged or faulty, the entire module must be replaced.

OPERATION

When a 2nd row heated seat switch is depressed a resistance (ohms) signal is sent to the heated seat module, the module energizes the proper indicator LED (Low or High) in the switch by grounding the indicator lamp circuit to indicate that the heated seat system is operating. At the same time, the heated seat module energizes the selected heated seat sensor circuit and the sensor provides the module with an input indicating the surface temperature of the seat cushion.

The Low heat set point is about 35° C (95° F), and the High heat set point is about 40° C (104° F). If the heated seat sensor temperature input is below the temperature set point for the selected temperature setting, the heated seat module energizes an N-channel Field Effect Transistor (N-FET) within the module which energizes the heated seat elements in the selected seat cushion and back. When the sensor input to the module indicates the correct temperature set point has been achieved, the module de-energizes the N-FET which de-energizes the heated seat elements. The heated seat module will continue to cycle the N-FET as needed to maintain the selected temperature set point. The 2nd row heated seat module operates on fused battery current received from the integrated power module.

If the heated seat module detects a heated seat sensor value input that is out of range or a shorted or open heated seat element circuit, it will notify the vehicle operator or the repair technician of this condition by flashing the High and/or Low indicator lamps in the affected heated seat switch. Refer to **Diagnosis and Testing Heated Seat System** in the Heated Seat System section for flashing LED diagnosis and testing procedures. Refer to **Diagnosis and Testing Heated Seat Module** in the Electronic Control Module section for heated seat module diagnosis and testing procedures.

DIAGNOSIS AND TESTING - HEATED SEAT MODULE - 2ND ROW SEATS

If a heated seat fails to heat and one or both of the indicator lamps on a heated seat switch flash, refer to **Diagnosis and Testing Heated Seat System** in the Heated Seat section for the location of flashing LED heated seat system diagnosis and testing procedures. If a heated seat heats but one or both indicator lamps on the heated seat switch fail to operate, test the heated seat switch. Refer to **Diagnosis and**

HEATED SEAT MODULE - 2ND ROW SEATS (Continued)

Testing Heated Seat Switch in Heated Seats for heated seat switch diagnosis and testing procedures. If the heated seat switch checks OK, proceed as follows.

(1) Check the heated seat element (Refer to 8 - ELECTRICAL/HEATED SEATS/HEATED SEAT ELEMENT - DIAGNOSIS AND TESTING).

(2) Check the heated seat sensor (Refer to 8 - ELECTRICAL/HEATED SEATS/HEATED SEAT SENSOR - DIAGNOSIS AND TESTING).

(3) Check the heated seat switch (Refer to 8 - ELECTRICAL/HEATED SEATS/DRIVER HEATED SEAT SWITCH - DIAGNOSIS AND TESTING).

NOTE: Refer to the Wiring section for the location of complete heated seat system wiring diagrams and connector pin-out information.

(4) Using a voltmeter, backprobe the heated seat module connector, do not disconnect. Check for voltage at the appropriate pin cavities. 12v should be present. If OK go to Step 5, if Not, Repair the open or shorted voltage supply circuit as required.

(5) Using a ohmmeter, backprobe the heated seat module connector, do not disconnect. Check for proper continuity to ground on the ground pin cavities. Continuity should be present. If OK replace the heated seat module with a known good unit and retest system, if Not OK, Repair the open or shorted ground circuit as required.

REMOVAL

(1) Disconnect and isolate the negative battery cable.

(2) Remove the 2nd row seat center console. Refer to the Body section for the procedure.

(3) Disconnect the wire harness connector from the heated seat module. Depress the connector retaining tab and pull straight apart.

(4) Remove the heated seat module retaining fasteners and remove.

INSTALLATION

(1) Position the heated seat module and install retaining fasteners.

(2) Connect the wire harness connector on the heated seat module.

(3) Install the 2nd row seat center console. Refer to the Body section for the procedure.

(4) Connect the negative battery cable.

(5) Verify correct 2nd row heated seat system operation.

HEATED SEAT SWITCHES - 2ND ROW SEATS

DESCRIPTION

The two momentary, bidirectional rocker-type heated seat switches (Fig. 7) provide a resistive multi-plexed signal to the heated seat module via a hard-wired mux circuit. Each switch has a center neutral position and Low and High position so that both 2nd row seat passengers can select a preferred level of seat heating. Each heated seat switch has two Light-Emitting Diode (LED) indicator lamps, which indicate the selected mode (Low or High) of the system. These indicator lamps also provide diagnostic feedback for the 2nd row heated seat system. Each switch also contains an incandescent bulb, which provides back lighting of the switch when the headlamps or park lamps are on.

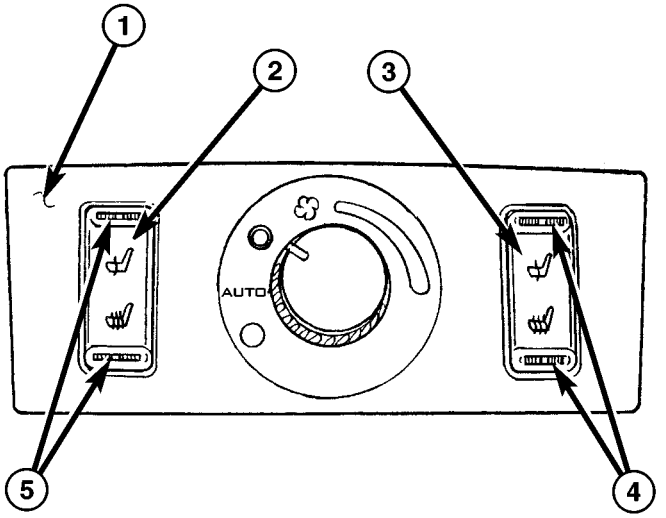


Fig. 7 2nd Row Heated Seat Switches and Bezel

1 - Switch Bezel
2 - Left 2nd Row Seat Switch
3 - Right 2nd Row Seat Switch
4 - Right LED Indicator Lamps
5 - Left LED Indicator Lamps

The heated seat switches are both mounted in the 2nd row seat center console. The two switches are snapped into mounting holes in the console switch bezel (Fig. 7). The heated seat switches are differentiated by the keyway in the electrical connector receptacle on the backs of the switches and a keyway on the switch housing. The wire harness connectors for the heated seat switches are keyed to match the connector receptacles on the switches so that the two

heated seat switches can only be connected to the proper heated seat electrical.

The two LED indicator lamps and the incandescent bulb in each heated seat switch cannot be repaired. If the indicator lamps or back lighting bulb are faulty or damaged, the individual heated seat switch must be replaced.

OPERATION

The 2nd row heated seat switches receive battery current through a fused ignition switch output (run) circuit when the ignition switch is in the On position. Depressing the heated seat switch rocker to its High or Low position provides a hard-wired resistance signal to the heated seat module. This signals the module to energize the heated seat element of the selected seat and maintain the requested temperature setting. If the heated seat switch is depressed to a different position (Low or High) than the currently selected state, the heated seat module will change states to support the new selection. If a heated seat switch is depressed a second time, the heated seat module interprets the second input as a request to turn the seat heater OFF.

The ground side of each LED indicator lamp is controlled by the heated seat module. This control of the switch indicator lamps also allows the module to provide diagnostic feedback to the vehicle operator or technician to indicate heated seat system faults by flashing the indicator lamps on and off. Refer to Heated Seat System Diagnosis and Testing for more information.

DIAGNOSIS AND TESTING - HEATED SEAT SWITCHES - 2ND ROW SEATS

Refer to Wiring for connector pin-outs and the location of complete heated seat system wiring diagrams.

(1) Disconnect and isolate the battery negative cable. Remove the 2nd row seat center console to access the heated seat switch. Disconnect the heated seat switch to be tested. Check for continuity between the ground circuit cavity of the heated seat switch and a good ground. There should be continuity. If OK, go to Step 2. If not OK, repair the open ground circuit as required.

(2) Reconnect the battery negative cable. Turn the park lamps “ON”. Check for battery voltage at the fused panel lamps dimmer circuit cavity of the heated seat switch. If OK, go to Step 3. If not OK, repair the open fused panel lamps dimmer circuit as required.

(3) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition feed circuit cavity of the heated seat switch. If OK, go to Step 4. If not OK, repair the open fused ignition feed circuit as required.

(4) Check the continuity and resistance values of the heated seat switch in the Neutral, Low and High positions as shown in the Heated Seat Switch Continuity chart. If OK, refer to Step 5. If not OK, replace the faulty heated seat switch.

TESTING HEATED SEAT SWITCH

Switch Position	Continuity Between	Resistance ± 4%
Neutral	4 & 6	2.2 Kilohms (2200 Ohms)
Low	4 & 6	.415 Kilohms (415 Ohms)
High	4 & 6	33 Ohms

(5) Replace the inoperative heated seat switch with a known good unit and test the operation of the system and switch indicator lamps. If OK, discard the faulty heated seat switch. If not OK, refer to Diagnosis and Testing Heated Seat Module - 2nd Row Seats.

REMOVAL

(1) Disconnect and isolate the negative battery cable.

(2) Remove the rear floor console (Refer to 23 - BODY/INTERIOR/REAR FLOOR CONSOLE - REMOVAL).

(3) Remove the rear floor console switch bezel by releasing the retaining tab located at each end of the switch bezel and pushing it out through the front surface of the console (Fig. 8).

(4) Disconnect the heated seat switch wire harness connector and from the back of the rear floor console switch bezel, gently pry the switch free from the bezel (Fig. 9).

HEATED SEAT SWITCHES - 2ND ROW SEATS (Continued)

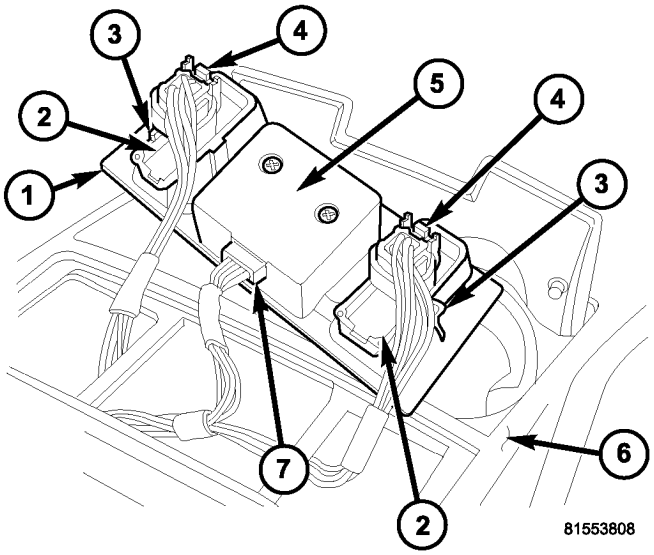


Fig. 8 Rear Floor Console Switch Bezel

1 - REAR FLOOR CONSOLE SWITCH BEZEL
2 - REAR HEATED SEAT SWITCH (2)
3 - SWITCH BEZEL RETAINING TAB (2)
4 - HEATED SEAT SWITCH WIRE CONNECTOR (2)
5 - REAR BLOWER SWITCH (INTEGRAL TO BEZEL)
6 - REAR FLOOR CONSOLE
7 - REAR BLOWER SWITCH WIRE CONNECTOR

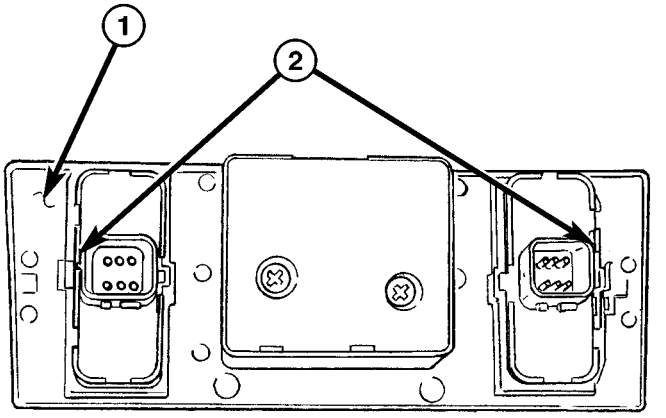


Fig. 9 Removing 2nd Row Heated Seat Switches

1 - REAR FLOOR CONSOLE SWITCH BEZEL
2 - INSERT FLAT BLADED TOOL HERE

INSTALLATION

(1) Install the rear heated switches into the back of the rear floor console switch bezel as required. Make sure that the switch retaining tabs are fully engaged to the bezel.

(2) Connect the wire harness connectors to the rear heated seat switches.

(3) Install the rear floor console switch bezel into the rear floor console by pushing it in through the front surface of the console. Make sure that the bezel retaining tabs are fully engaged to the console.

(4) Install the rear floor console (Refer to 23 - BODY/INTERIOR/REAR FLOOR CONSOLE - INSTALLATION).

(5) Reconnect the negative battery cable.

(6) Verify 2nd row heated seat system operation.

HORN

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HORN SYSTEM

DESCRIPTION

The dual-note horn system features two electromagnetic horn units. The horn system includes the following major components:

- **Horn** - The two horns are located on the right side of the engine compartment near the right side headlamp.
- **Horn Switch** - The horn switch is located in the driver airbag cushion pocket, under the airbag trim cover.

OPERATION

The horn system operates on battery current received through a fuse in the Integrated Power Module (IPM). The horn system circuit is designed so that the system will remain operational, regardless of the ignition switch position.

DIAGNOSIS AND TESTING - HORN SYSTEM

Any diagnosis of the Horn system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

In most cases, any problem involving continually sounding horns can be quickly alleviated by removing the horn fuse from the Integrated Power Module (IPM).

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

HORN

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the mounting fasteners (Fig. 1).

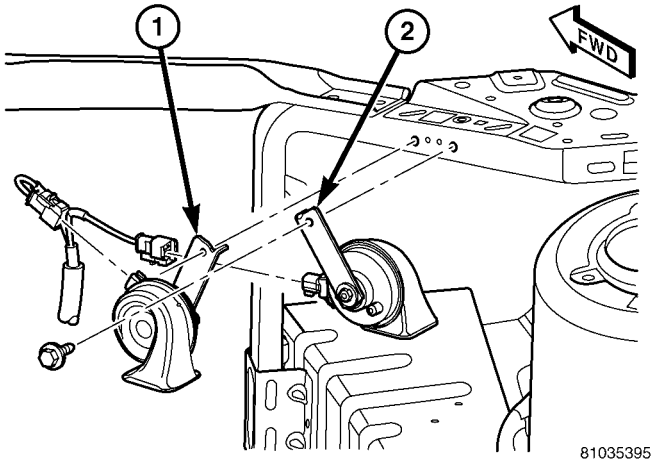


Fig. 1 HORNS

1 - LOW NOTE HORN
2 - HIGH NOTE HORN

(3) Disconnect the wire harness connectors.

INSTALLATION

(1) Position horns and install mounting fasteners.
(2) Connect wire harness connectors to horns.
(3) Connect battery negative cable.

HORN SWITCH

DIAGNOSIS AND TESTING - HORN SWITCH

Any diagnosis of the Horn system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

REMOVAL

WARNING: THIS SYSTEM IS A SENSITIVE, COMPLEX UNIT. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE BEFORE BEGINNING AIRBAG SYSTEM COMPONENT REMOVAL OR INSTALLATION PROCEDURES. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.
ALLOW SYSTEM CAPACITOR TO DISCHARGE FOR TWO MINUTES BEFORE REMOVING AIRBAG COMPONENTS.
DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A SOLID SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED AND COULD RESULT IN PERSONAL INJURY. WHEN CARRYING OR HANDLING AN UNDEPLOYED AIRBAG, THE TRIM SIDE OF THE AIRBAG SHOULD BE POINTING TOWARDS THE BODY TO MINIMIZE POSSIBILITY OF INJURY IF ACCIDENTAL DEPLOYMENT OCCURS.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the driver's side airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

(3) Remove the airbag trim cover (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

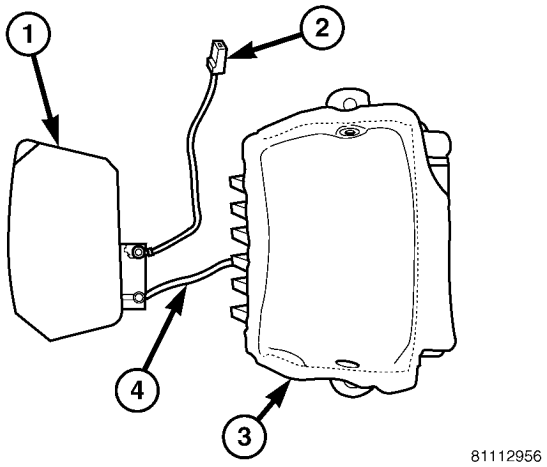


Fig. 2 HORN SWITCH

1 - HORN SWITCH
2 - POWER FEED (RED WIRE)
3 - DRIVER AIRBAG
4 - GROUND WIRE (BLACK WIRE)

(4) Disconnect the black wire from the air bag.

(5) Remove only the thin membrane switch from the airbag. Do not remove the hard backer plate from the airbag (Fig. 2).

INSTALLATION

(1) Install the horn switch to the backer plate.

(2) Connect the black wire to the airbag.

(3) Install the airbag trim cover (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

(4) Install the driver's airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

(5) Connect the battery negative cable.

IGNITION CONTROL

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IGNITION CONTROL

DESCRIPTION - IGNITION SYSTEM

NOTE: All engines use a fixed ignition timing system. Basic ignition timing is not adjustable. All spark advance is determined by the Powertrain Control Module (PCM).

The ignition system used on these engines is referred to as the Direct Ignition System (DIS). The system's four main components are the coils, crankshaft position sensor, spark plugs, and camshaft position sensor. If equipped with the coil on plug ignition system it utilizes an ignition coil for every cylinder and is mounted directly over the each spark plug.

OPERATION - IGNITION SYSTEM

The crankshaft position sensor and camshaft position sensor are hall effect devices. The camshaft position sensor and crankshaft position sensor generate pulses that are inputs to the PCM. The PCM determines engine position from these sensors. The PCM calculates injector sequence and ignition timing from crankshaft & camshaft position. For a description of both sensors, refer to Camshaft Position Sensor and Crankshaft Position Sensor.

IGNITION CONTROL (Continued)

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
SKREEM Module Screws	1.8	-	16
Ignition Switch Mounting Nuts	3.4	-	30
Spark Plug 3.5l	28	20	-
Spark Plug 3.8L	17.5	13	-
Ignition Coils 3.5L	6.7	-	60
Ignition Coil Nuts 3.8L	11.8	-	105
Camshaft Position Sensor Bolt 3.5L	12	-	106
Camshaft Position Sensor Bolt 3.8L	14.1	-	125
Knock Sensor 3.5L	20	15.2	-
Knock Sensor 3.8L	10	7	-

SPARK PLUG

Engine	Spark Plug	Gap	Thread Size
3.5L	ZFR5LP-13G	0.048 TO 0.053	14mm (3/4 in.) reach
3.8L	re14PLP5	0.048 TO 0.053	14mm (3/4 in.) reach

SPARK PLUG CABLE RESISTANCE

3.8L

CABLE	Maximum Resistance
#1	22.5K ohms
#2	22.8K ohms
#3	19.3K ohms
#4	19.3K ohms
#5	13.6K ohms
#6	16.4K ohms

CAMSHAFT POSITION SENSOR

OPERATION

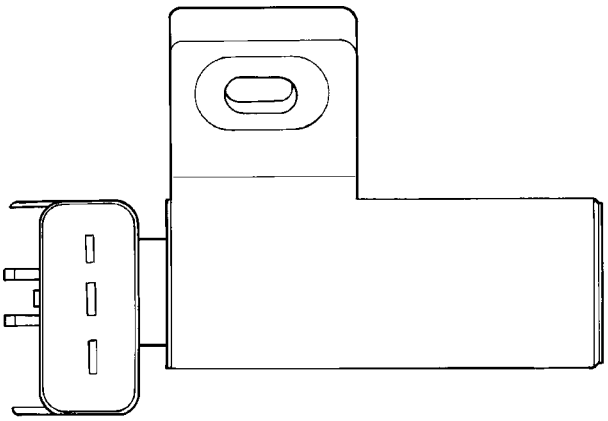


Fig. 1 Camshaft Position Sensor—3.5L

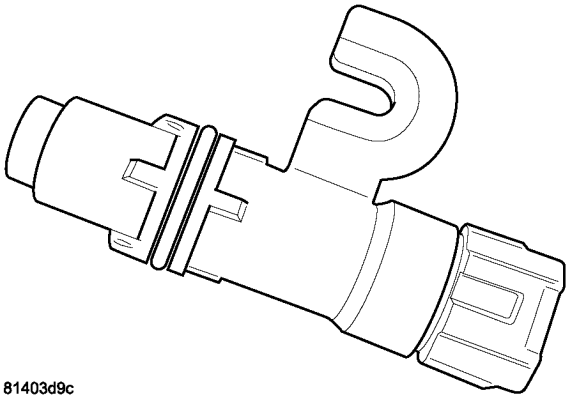


Fig. 2 CAMSHAFT POSITION SENSOR — 3.8L

The camshaft position sensor contains a hall effect device that provides cylinder identification to the Powertrain Control Module (PCM) (1) (Fig. 1) and (Fig. 2). The sensor generates pulses as groups of notches on the camshaft sprocket pass underneath it. The PCM keeps track of crankshaft rotation and identifies each cylinder by the pulses generated by the notches on the camshaft sprocket.

When metal aligns with the sensor, voltage goes low (less than 0.3 volts). When a notch aligns with the sensor, voltage spikes high (5.0 volts). As a group of notches pass under the sensor, the voltage switches from low (metal) to high (notch) then back to low. The number of notches determine the amount of pulses. If available, an oscilloscope can display the square wave patterns of each timing event.

REMOVAL

3.5L

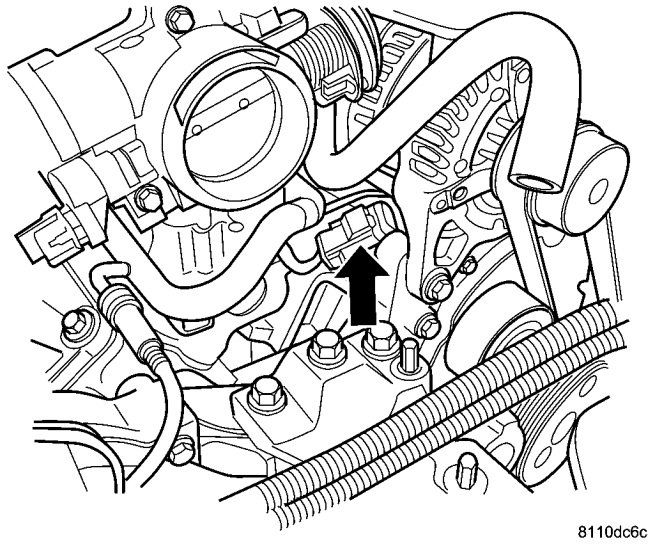


Fig. 3 CAM SENSOR LOCATION

(1) Disconnect the negative battery cable.
(2) Remove air cleaner box.
(3) Unlock the camshaft sensor electrical connector (Fig. 3).

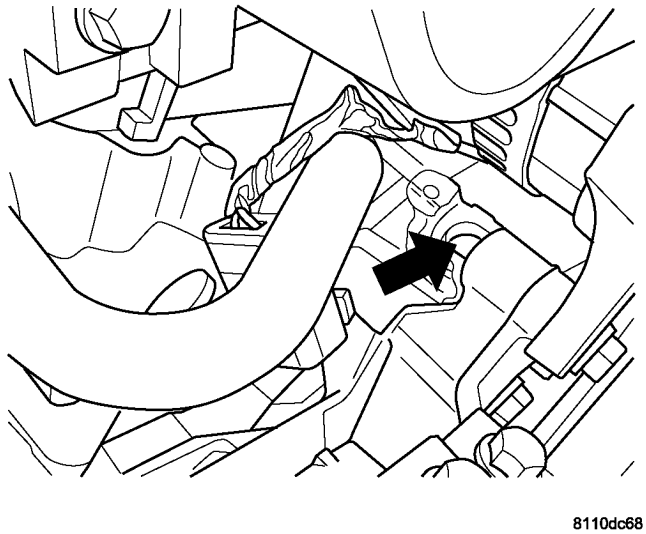


Fig. 4 CAM SENSOR REMOVED

(4) Disconnect the electrical connectors to the camshaft sensor.
(5) Remove the mounting bolts.

CAMSHAFT POSITION SENSOR (Continued)

(6) Remove camshaft sensor (Fig. 4).

3.8L

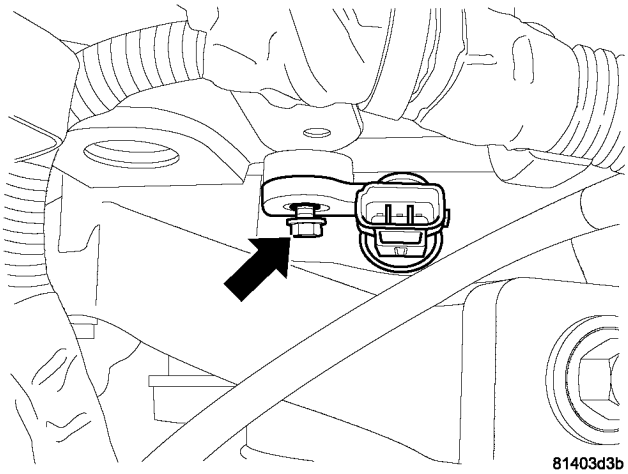


Fig. 5 MOUNTING BOLT LOOSE

(1) Disconnect the negative battery cable.
(2) Unlock the camshaft sensor electrical connector.
(3) Disconnect the electrical connectors to the camshaft sensor (Fig. 5).

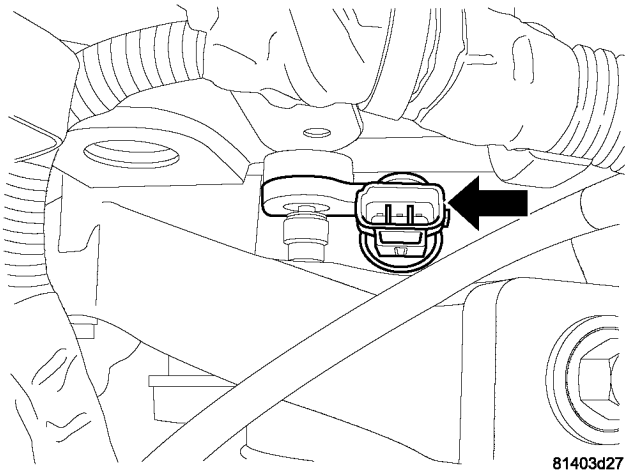


Fig. 6 CAMSHAFT POSITION SENSOR LOCATION

(4) Loosen the mounting bolts (Fig. 6).
(5) Remove camshaft sensor (Fig. 7).
(6) Camshaft Position Sensor removed (Fig. 8).

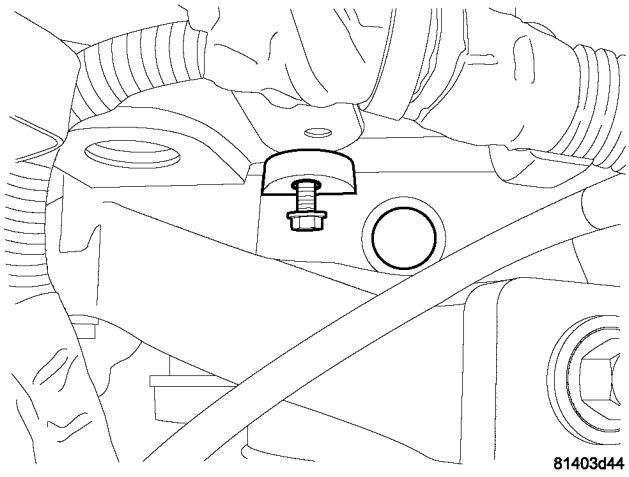


Fig. 7 SENSOR REMOVED

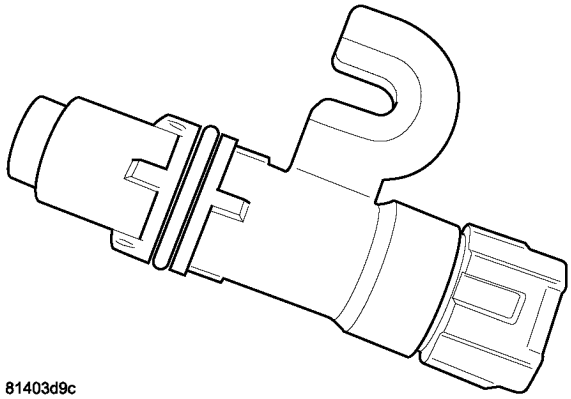


Fig. 8 CAMSHAFT POSITION SENSOR

CAMSHAFT POSITION SENSOR (Continued)

INSTALLATION

3.5L

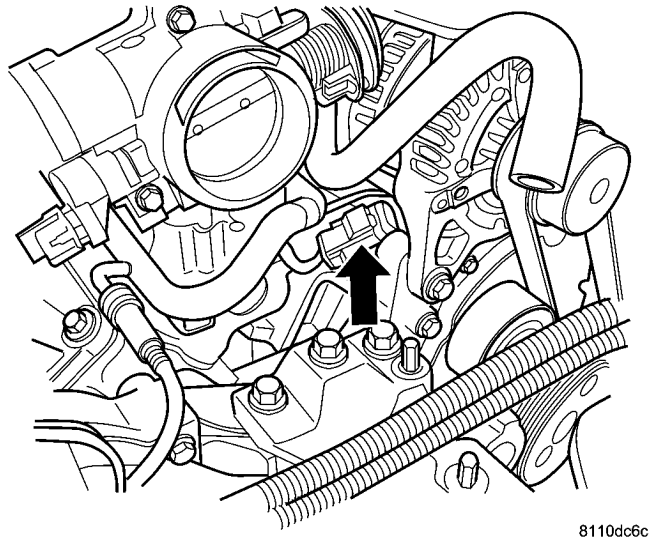


Fig. 9 CAM SENSOR LOCATION

(1) Install camshaft sensor (Fig. 9).
(2) Install the mounting bolts and tighten, refer to the torque chart for value.
(3) Install and lock the camshaft sensor electrical connector.
(4) Install air cleaner box.
(5) Connect the negative battery cable.

3.8L

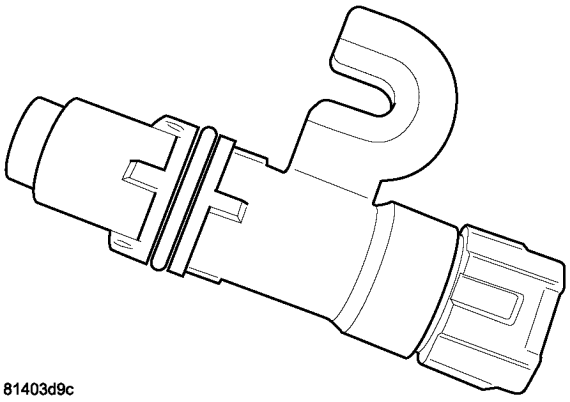


Fig. 10 CAMSHAFT POSITION SENSOR

(1) Camshaft Position Sensor (Fig. 10).
(2) Install camshaft position sensor (Fig. 11).

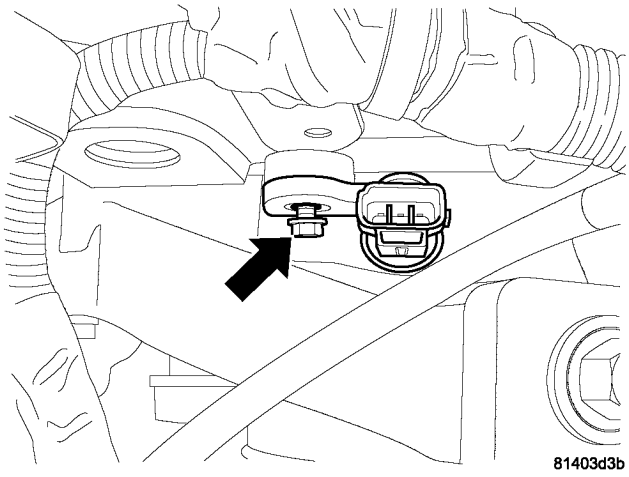


Fig. 11 MOUNTING BOLT LOOSE

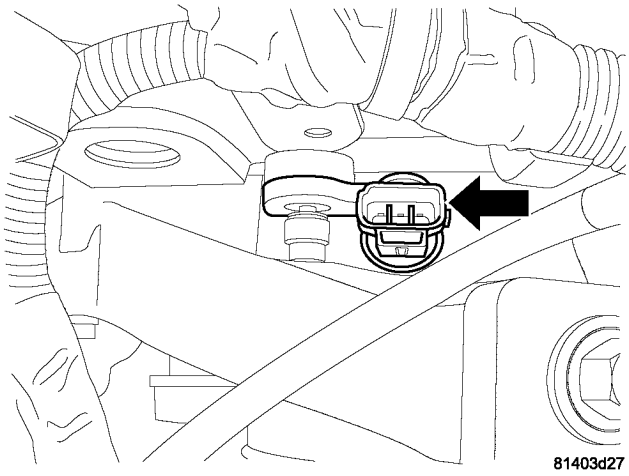


Fig. 12 CAMSHAFT POSITION SENSOR LOCATION

(3) Tighten the mounting bolt to N·m 12 (106 in. lbs.) (Fig. 12).
(4) Install and lock the camshaft sensor electrical connector.
(5) Connect the negative battery cable.

IGNITION COIL

REMOVAL

3.5L - FRONT

(1) Remove the electrical connector from the ignition coil (Fig. 13).

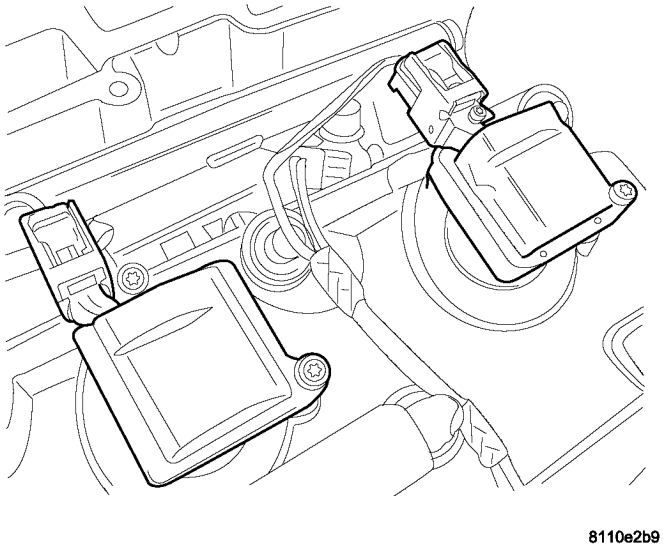


Fig. 13 IGNITION COILS

(2) Disconnect the negative battery cable.

(3) Remove the upper intake manifold, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

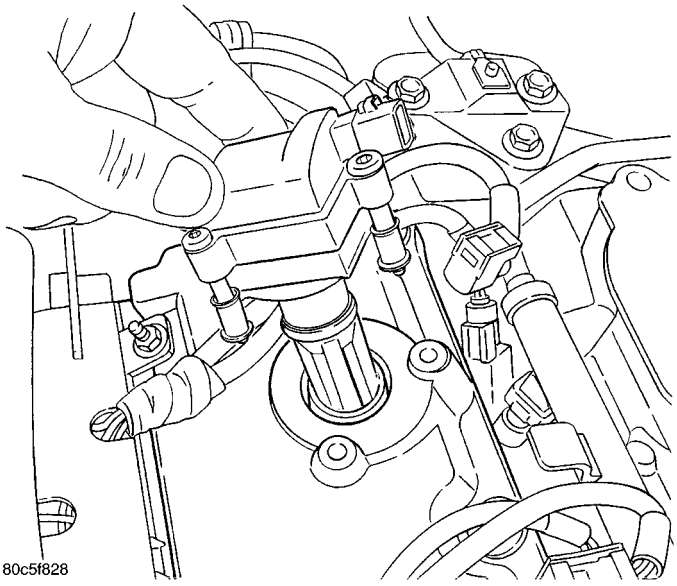


Fig. 14 IGNITION COIL REMOVAL/INSTALLATION

(4) Prior to removing the ignition coils, spray compressed air around the coil area and spark plug.

On 3.5L engines, it is necessary to loosen the screws by alternating back and forth. Do not lose the spacers under the coil when loosening the screws.

(5) Remove the ignition coil (Fig. 14).

3.5L - REAR

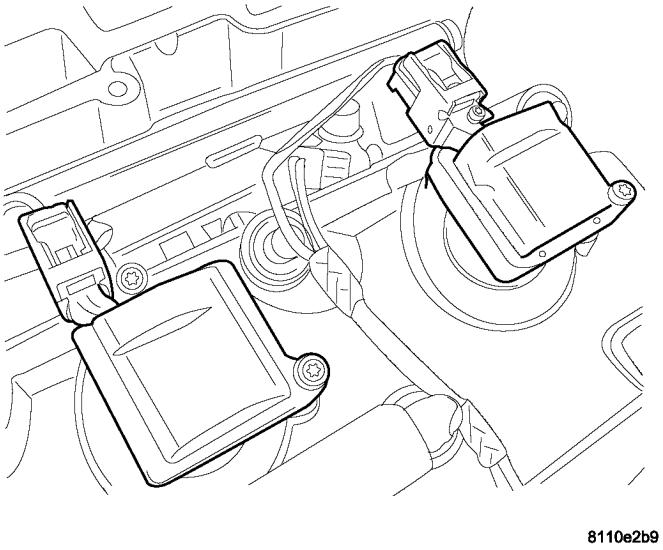


Fig. 15 IGNITION COILS

(1) Disconnect the negative battery cable.

(2) Remove the electrical connector from the ignition coil (Fig. 15).

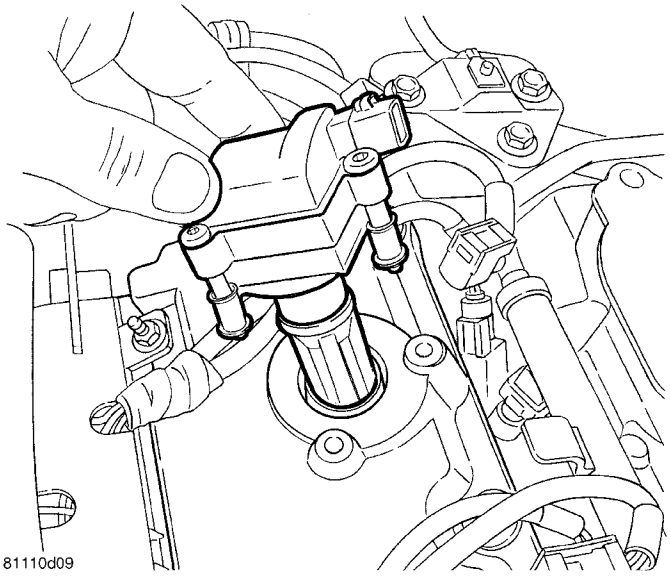


Fig. 16 IGNITION COIL REMOVAL/INSTALLATION

(3) Prior to removing the ignition coils, spray compressed air around the coil area and spark plug.

It is necessary to loosen the screws by alternating back and forth. Do not lose the spacers under the coil when loosening the screws.

(4) Remove the ignition coil (Fig. 16).

IGNITION COIL (Continued)

3.8L

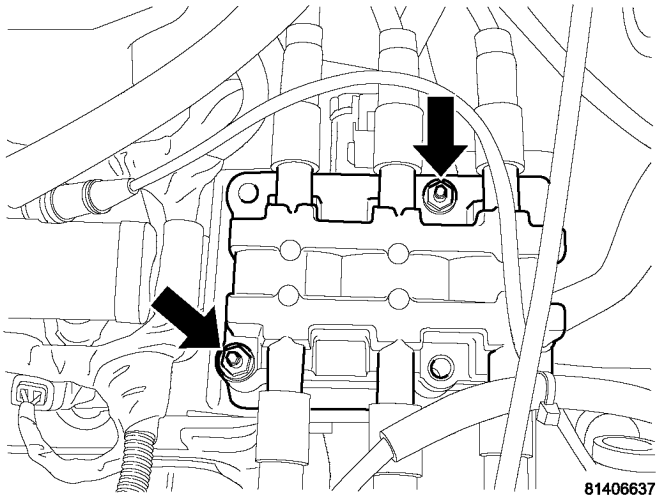


Fig. 17 IGNITION COIL

(1) Disconnect negative battery cable.
(2) Unlock and disconnect the electrical connector from ignition coil (Fig. 17).
(3) Grasping the spark plug cable, twist the assembly 1/2 turn and pull the cable from the ignition coil.
(4) Remove the nuts from the mounting studs.
(5) Pull coil assembly straight up and off of mounting studs.

INSTALLATION

3.5L - FRONT

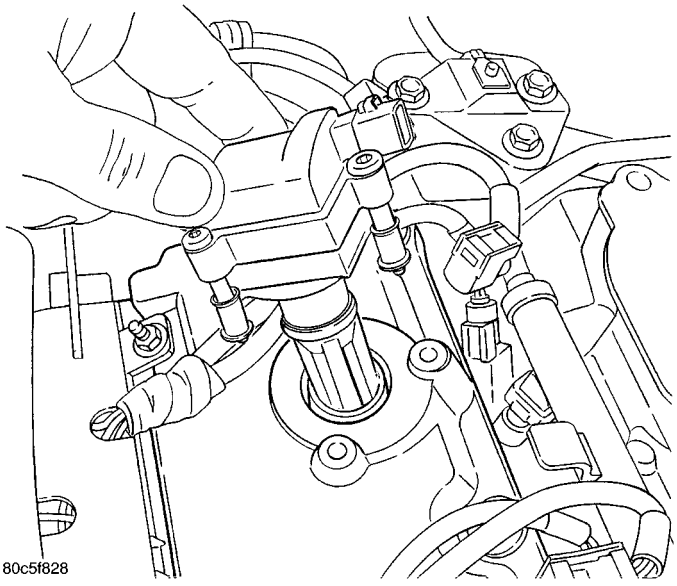


Fig. 18 IGNITION COIL REMOVAL/INSTALLATION

(1) Install the ignition coil (Fig. 18).
(2) Hand tighten coil screws and tighten to N·m 6.7 (60 in. lbs.)..

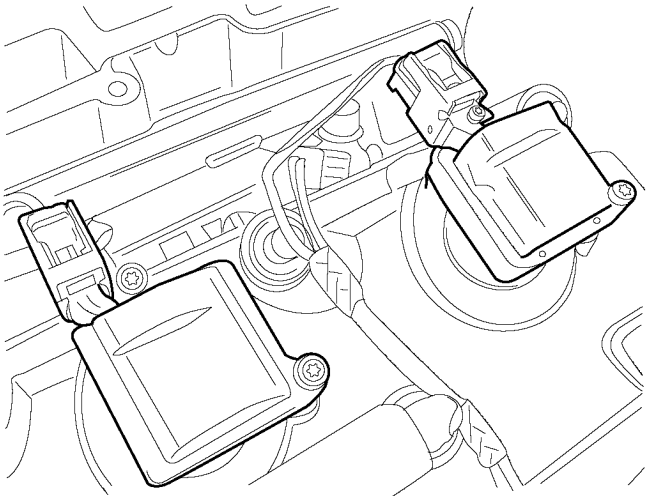


Fig. 19 IGNITION COILS

(3) Install and lock the electrical connector to the ignition coil (Fig. 19).
(4) Install the upper intake manifold, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)
(5) Connect the negative battery cable.

3.5L - REAR

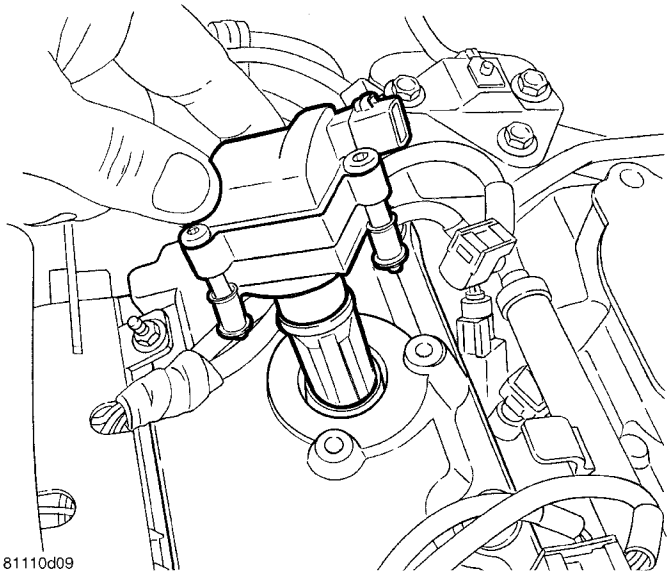


Fig. 20 IGNITION COIL REMOVAL/INSTALLATION

(1) Install the ignition coil (Fig. 20).
(2) Hand tighten coil screws and tighten to N·m 6.7 (60 in. lbs.)..
(3) Install and lock the electrical connector to the ignition coil (Fig. 21).

IGNITION COIL (Continued)

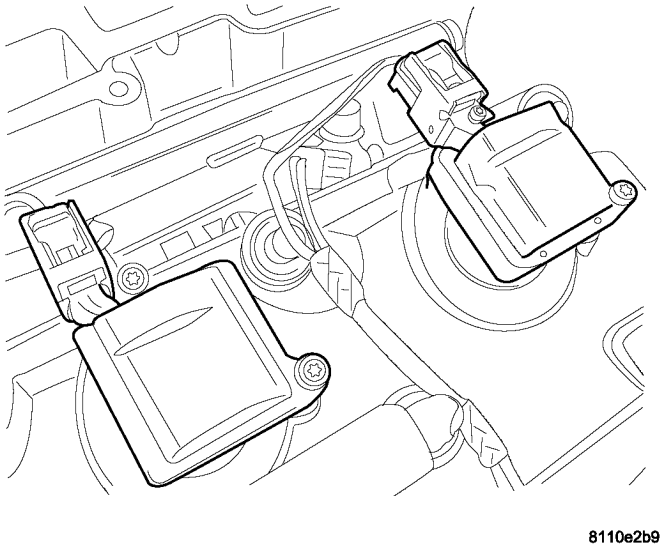


Fig. 21 IGNITION COILS

(4) Connect the negative battery cable.

3.8L

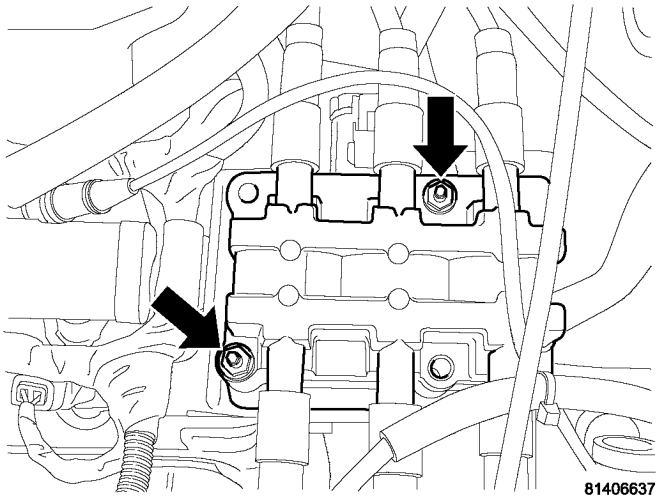


Fig. 22 IGNITION COIL

(1) Install ignition coil over mounting studs (Fig. 22)

(2) Connect and lock the electrical connector to ignition coil.

(3) Install mounting nutsand tighten to N·m 11.5 (105 in. lbs.).

(4) Install ignition cables to coil assembly.

(5) Connect negative battery cable.

IGNITION COIL CAPACITOR

DESCRIPTION

The coil capacitor is used for radio noise suppression

REMOVAL

(1) Disconnect the negative battery cable.

(2) Remove the electrical connector from capacitor.

(3) Remove the bolt from capacitor (Fig. 23).

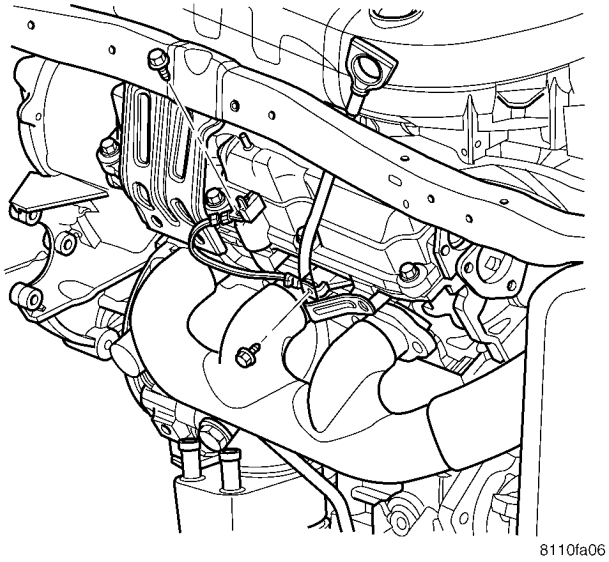


Fig. 23 CAPACITOR ASSEMBLY

(4) Remove capacitor.

INSTALLATION

(1) Install the bolt to capacitor (Fig. 23). Make sure that the ground strap is in place.

(2) Tighten bolt.

(3) Install the electrical connector to capacitor.

(4) Connect the negative battery cable.

KNOCK SENSOR

DESCRIPTION

The knock sensor is attached to the cylinder block. The knock sensor is designed to detect engine vibration that is caused by detonation.

OPERATION

When the knock sensor detects a knock in one of the cylinders, it sends an input signal to the PCM. In response, the PCM retards ignition timing for all cylinders by a scheduled amount.

Knock sensors contain a piezoelectric material which constantly vibrates and sends an input voltage (signal) to the PCM while the engine operates. As the

KNOCK SENSOR (Continued)

intensity of the crystal's vibration increases, the knock sensor output voltage also increases.

The voltage signal produced by the knock sensor increases with the amplitude of vibration. The PCM receives as an input the knock sensor voltage signal. If the signal rises above a predetermined level, the PCM will store that value in memory and retard ignition timing to reduce engine knock. If the knock sensor voltage exceeds a preset value, the PCM retards ignition timing for all cylinders. It is not a selective cylinder retard.

The PCM ignores knock sensor input during engine idle conditions. Once the engine speed exceeds a specified value, knock retard is allowed.

Knock retard uses its own short term and long term memory program.

Long term memory stores previous detonation information in its battery-backed RAM. The maximum authority that long term memory has over timing retard can be calibrated.

Short term memory is allowed to retard timing up to a preset amount under all operating conditions (as long as rpm is above the minimum rpm) except WOT. The PCM, using short term memory, can respond quickly to retard timing when engine knock is detected. Short term memory is lost any time the ignition key is turned off.

NOTE: Over or under tightening affects knock sensor performance, possibly causing improper spark control.

REMOVAL

3.5L

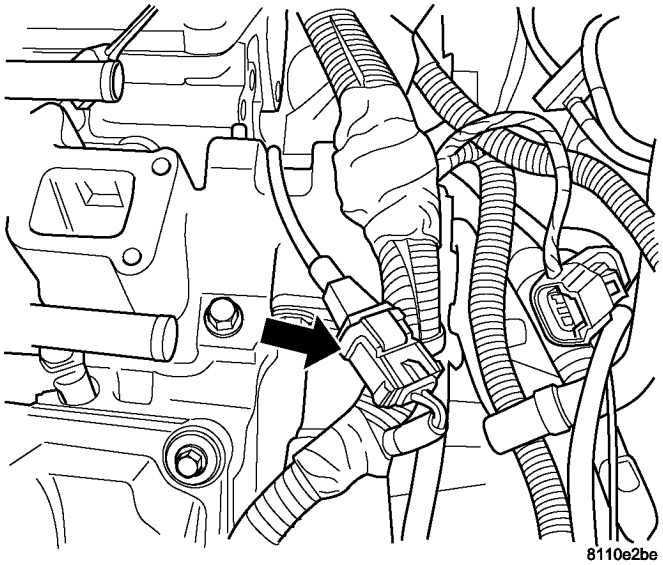


Fig. 24 KNOCK SENSOR CONNECTOR

(1) Disconnect the negative battery cable.
(2) Remove the upper intake manifold, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)
(3) Disconnect the electrical connector (Fig. 24).

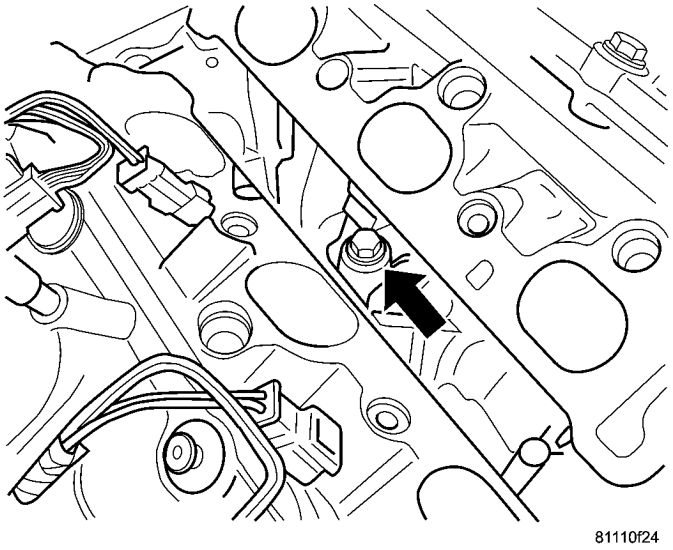


Fig. 25 KNOCK SENSOR LOCATION

(4) Remove the knock sensor (Fig. 25).

3.8L

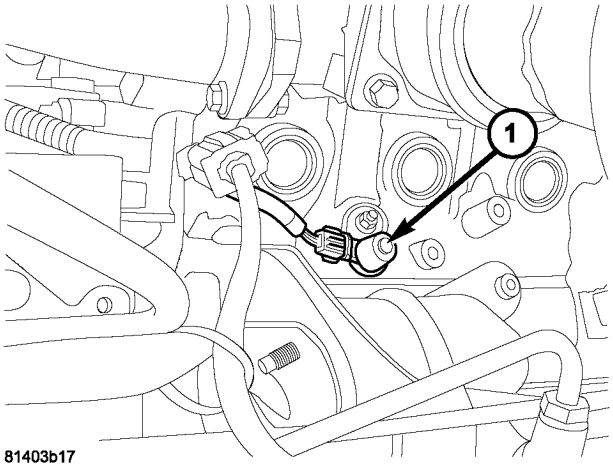


Fig. 26 KNOCK SENSOR - 3.8L

(1) Disconnect the negative battery cable.
(2) Raise vehicle and support.
(3) Disconnect the electrical connector.
(4) Remove mounting bolt (1) (Fig. 26).
(5) Remove sensor.

KNOCK SENSOR (Continued)

INSTALLATION

3.5L

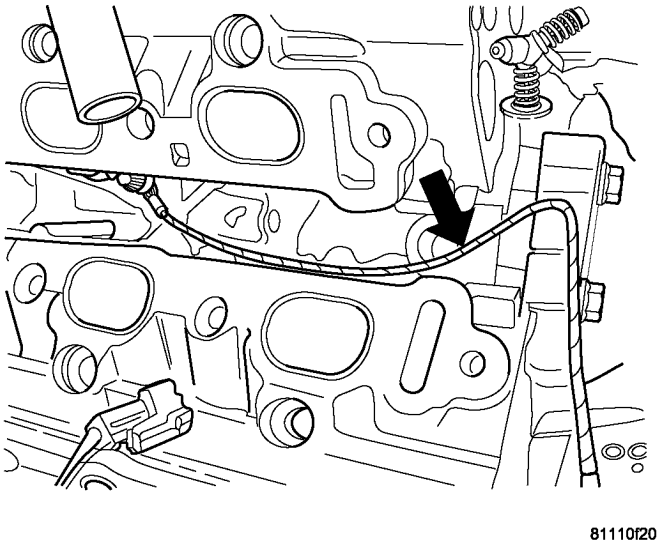


Fig. 27 KNOCK SENSOR WIRE ROUTE

(1) Install knock sensor. Tighten knock sensor to 20 N·m (15.2 in. lbs.) torque. **Over or under tightening effects knock sensor performance, possibly causing improper spark control.**

(2) Route the knock sensor wire in the proper location (Fig. 27).

(3) Install the upper intake manifold, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

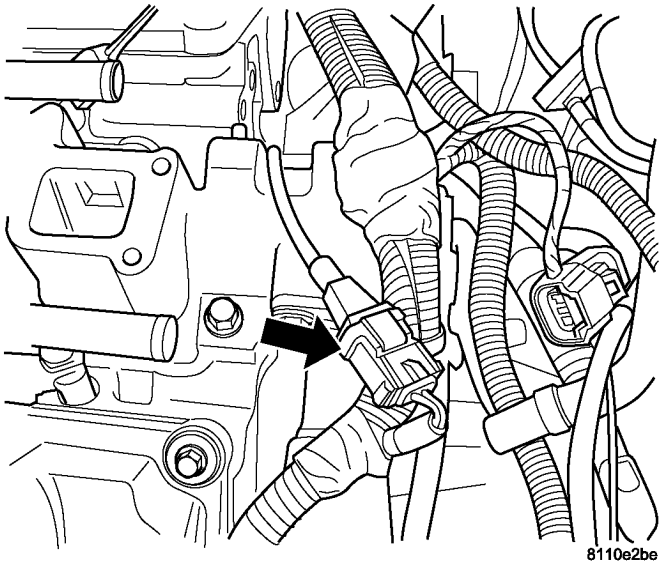


Fig. 28 KNOCK SENSOR CONNECTOR

(4) Connect the electrical connector (Fig. 28).

(5) Connect the negative battery cable.

3.8L

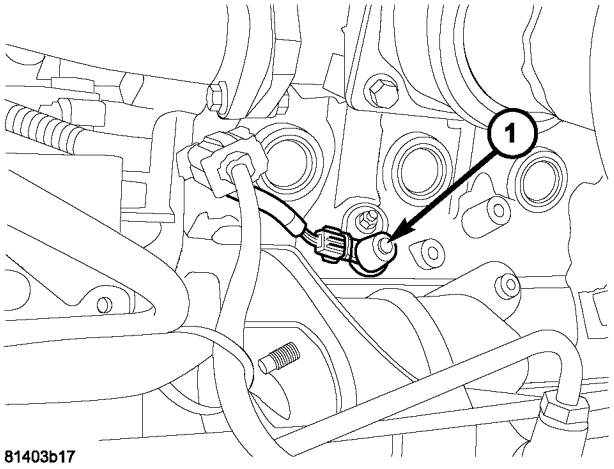


Fig. 29 KNOCK SENSOR - 3.8L

(1) Install knock sensor. Tighten knock sensor to 20 N·m (15.2 in. lbs.) torque (1). **Over or under tightening effects knock sensor performance, possibly causing improper spark control.**

(2) Route the knock sensor wire in the proper location (Fig. 29).

(3) Connect the electrical connector.

(4) Lower vehicle.

(5) Connect the negative battery cable.

SPARK PLUG

DESCRIPTION - PLATINUM PLUGS

The V6 engines use platinum resistor spark plugs. They have resistance values of 6,000 to 20,000 ohms when checked with at least a 1000 volt tester. For spark plug identification and specifications, Refer to the Specifications section.

Do not use an ohm meter to check the resistance of the spark plugs. This will give an inaccurate reading.

When the spark plug has a single or double platinum tip, the recommended service life for normal driving conditions per schedule A in this manual is 100,000 miles. The spark plugs have a recommended service life of 75,000 miles for severe driving conditions per schedule B in this manual. A thin platinum pad is welded to both or just the center electrode end(s) as shown in (Fig. 30). Extreme care must be used to prevent spark plug cross threading, mis-gapping (Fig. 31) and ceramic insulator damage during plug removal and installation.

SPARK PLUG (Continued)

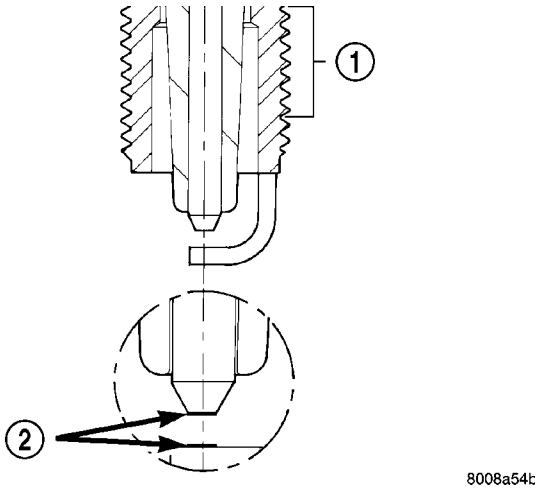


Fig. 30 Platinum Pads

1 - APPLY ANTI-SEIZE COMPOUND HERE ONLY
2 - PLATINUM SPARK SURFACE

CAUTION: Cleaning of the platinum plug may damage the platinum tip.

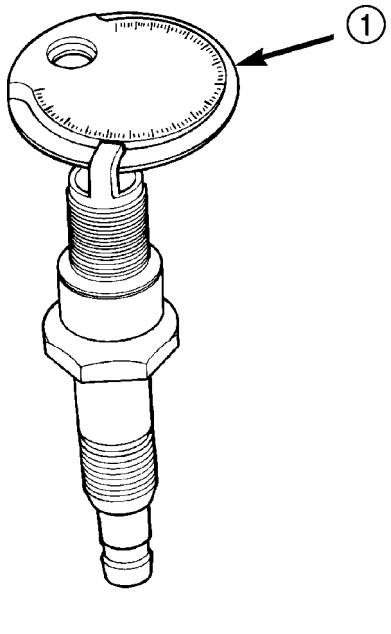


Fig. 31 Setting Spark Plug Electrode Gap

1 - TAPER GAUGE

REMOVAL

3.8L

When replacing the spark plugs and spark plug cables, route the cables correctly and secure them in the appropriate retainers. Failure to route the cables properly can cause the radio to reproduce ignition noise, cross ignition of the spark plugs or **short circuit the cables to ground.**

Always remove cables by grasping at the boot, rotating the boot 1/2 turn, and pulling straight back in a steady motion.

(1) Prior to removing the spark plug, spray compressed air around the spark plug hole and the area around the spark plug.

(2) Remove the spark plug using a quality socket with a foam insert.

(3) Inspect the spark plug condition.

3.5L

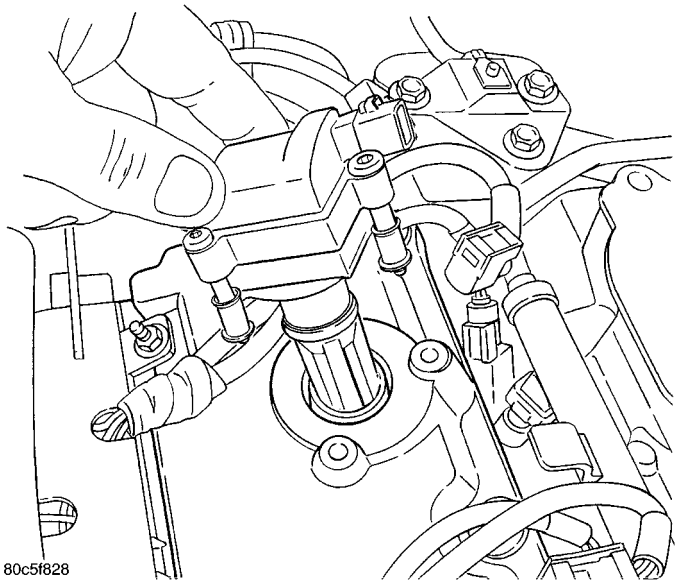


Fig. 32 IGNITION COIL REMOVAL/INSTALLATION

Always remove the ignition coil assembly by grasping at the spark plug boot, turning the assembly 1/2 turn and pulling straight back in a steady motion.

(1) Disconnect the negative battery cable.

(2) **Front Plugs -** Remove the intake manifold, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(3) Remove the ignitions coil (Fig. 32).

(4) Prior to removing the ignition coils, spray compressed air around the coil area and spark plug.

On 3.5L engines, it is necessary to loosen the screws by alternating back and forth. Do not lose the spacers under the coil when loosening the screws.

(5) Remove spark plug.

INSTALLATION

3.8L

When replacing the spark plugs and spark plug cables, route the cables correctly and secure them in the appropriate retainers. Failure to route the cables properly can cause the radio to reproduce ignition noise, cross ignition of the spark plugs or **short circuit the cables to ground.**

SPARK PLUG (Continued)

(1) Coat threads of spark plug with anti-seize. Be sure not to get anti-seize **ANYWHERE BUT ON THE THREADS OF THE SPARK PLUG as shown in.**.

(2) To avoid cross threading, start the spark plug into the cylinder head by hand.

(3) Tighten spark plugs to 17.5 N·m (13 ft. lbs.) torque.

(4) Install spark plug cables over spark plugs. A click will be heard and felt when the cable properly attaches to the spark plug.

3.5L

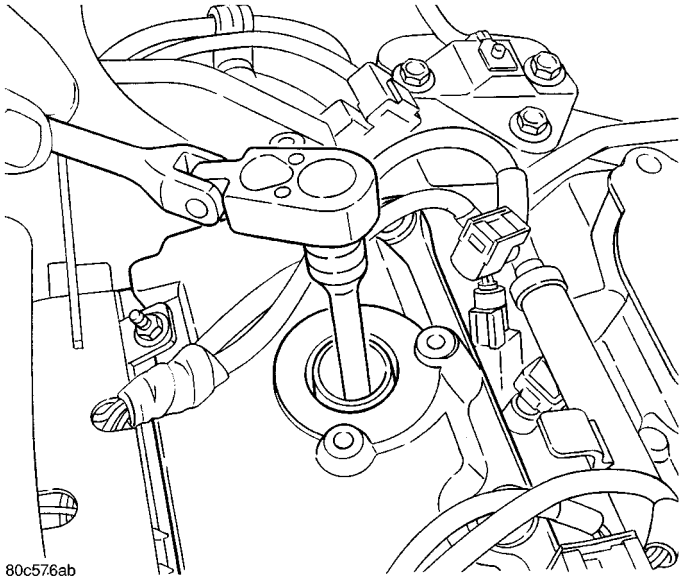


Fig. 33 SPARK PLUG REMOVAL/INSTALLATION

(1) To avoid cross threading, start the spark plug into the cylinder head by hand.

(2) Tighten spark plugs (Fig. 33) to 17 N·m (13 ft. lbs.).

(3) Install ignition coil assembly onto spark plug (Fig. 34).

(4) Hand tighten coil screws and tighten to 6.7 N·m (60 in. lbs.).

(5) Connect and lock the electrical connector.

(6) **Front Plugs -** Install the intake manifold, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(7) Connect the negative battery cable.

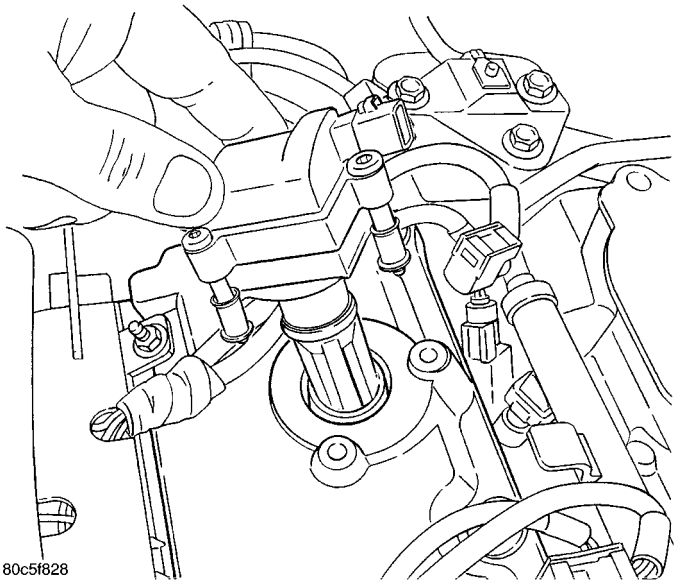


Fig. 34 IGNITION COIL REMOVAL/INSTALLATION

SPARK PLUG CABLE

REMOVAL

Failure to route the cables properly could cause the radio to reproduce ignition noise, cross ignition of the spark plugs or short circuit the cables to ground.

Remove spark plug cable from coil first.

Always remove the spark plug cable by grasping the top of the spark plug insulator, turning the boot 1/2 turn and pulling straight up in a steady motion.

INSTALLATION

Failure to route the cables properly could cause the radio to reproduce ignition noise, cross ignition of the spark plugs or short circuit the cables to ground. Install spark plug insulators over spark plugs. Ensure the top of the spark plug insulator covers the upper end of the spark plug tube, then connect the other end to coil pack.

IGNITION SWITCH

REMOVAL

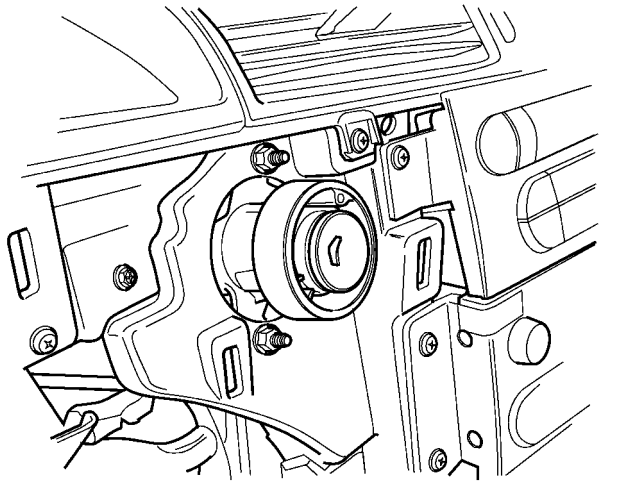
The ignition switch attaches to the lock cylinder housing on the end opposite the lock cylinder. For ignition switch terminal and circuit identification, refer to the Wiring Diagrams section.

(1) Disconnect negative cable from battery.

(2) Remove the Knee Blocker Airbag, (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - REMOVAL).

(3) Remove the Instrument Panel Center Bezel, (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL)

(4) Remove the 2 switch mounting nuts (Fig. 35).



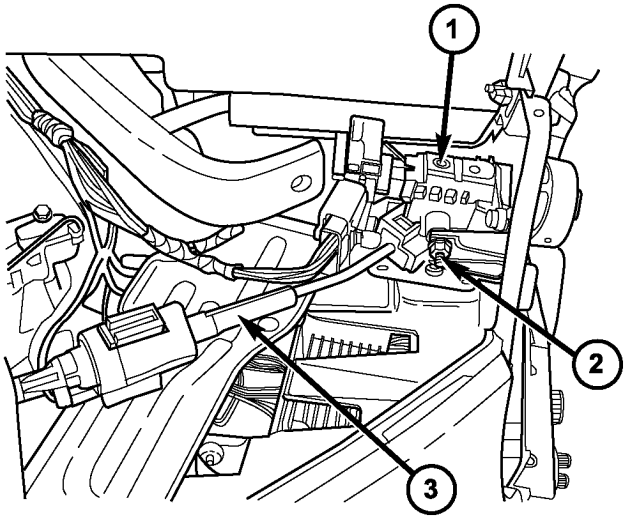
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Fig. 35 SWITCH IN DASH

(5) Loosen the rear mounting nut (Fig. 36).

(6) Slide the assembly rearward.

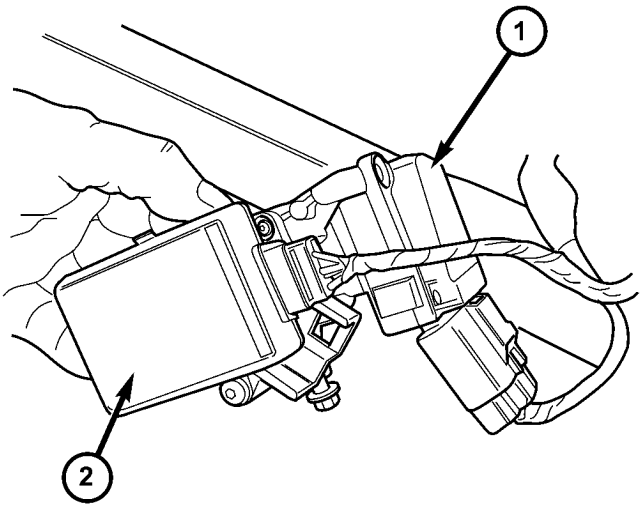
(7) Disconnect the electrical connector from the ignition Switch and SKREEM Module (Fig. 37).



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Fig. 36 IGNITION SWITCH ASSEMBLY

1 - Switch Assembly
2 - Rear Mounting Nut
3 - Interlock Cable



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Fig. 37 SKREEM MODULE

1 - SKREAM Module
2 - Ignition Switch

IGNITION SWITCH (Continued)

(8) Remove the interlock cable by depressing the locking tab and pulling straight out (Fig. 38).

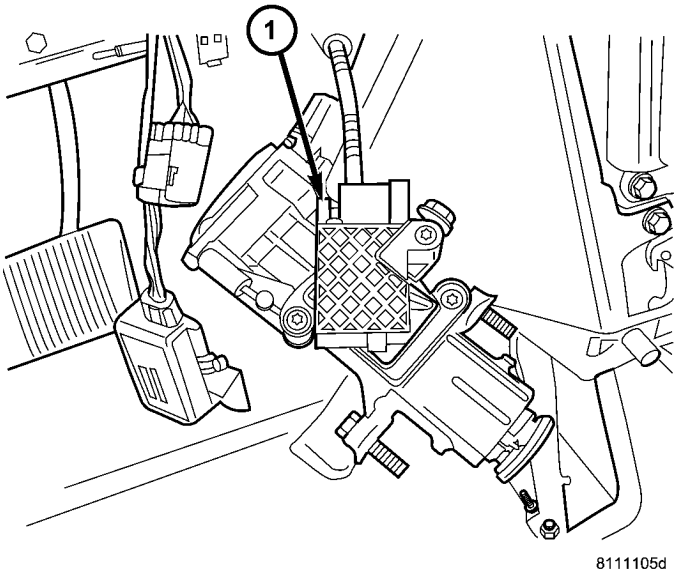


Fig. 38 INTERLOCK CABLE

1 - Retaining Tab for Cable

(9) Interlocking cable removed (Fig. 39).

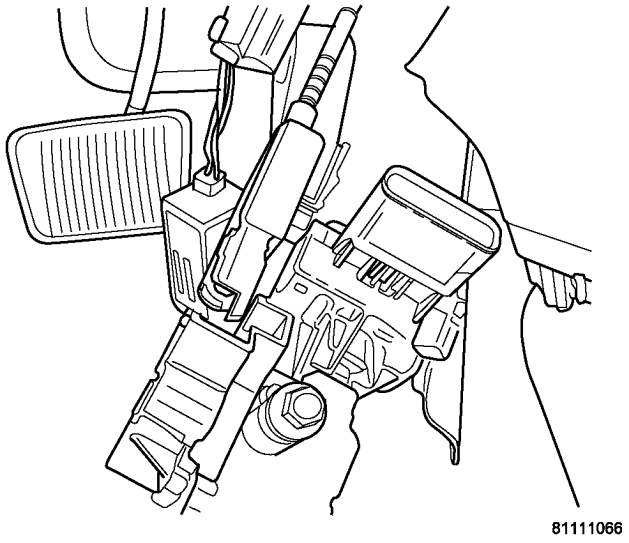


Fig. 39 INTERLOCK CABLE

(10) Remove ignition switch mounting screw (Fig. 40).

(11) Squeeze the 2 locking tabs to remove ignition switch from the lockhousing (Fig. 40).

INSTALLATION

The ignition switch attaches to the lock cylinder housing on the end opposite the lock cylinder. For ignition switch terminal and circuit identification, refer to the Wiring Diagrams section.

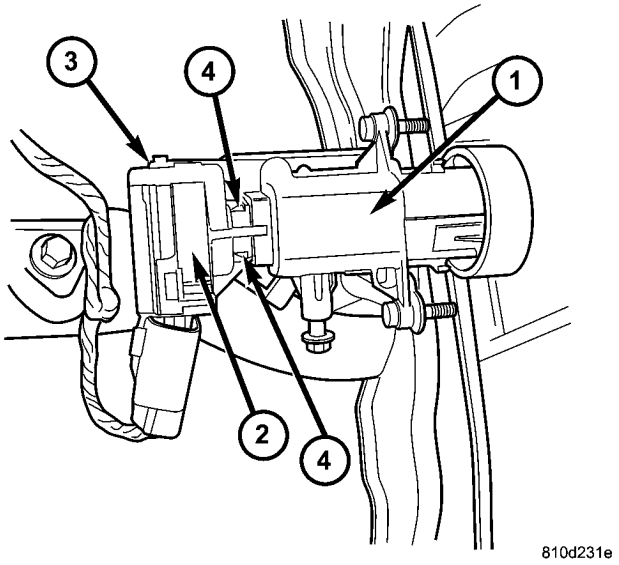


Fig. 40 IGNITION KEY HOUSING AND SWITCH

1 - Ignition Key Housing
2 - Ignition Switch
3 - Ignition Switch Mounting Screws
4 - Locking Tabs

(1) A tab on the ignition switch indexes to a notch in the lock cylinder housing. Also, a slot in the end of the ignition switch fits over the shaft in the end of the lock cylinder housing. Use the ignition key to rotate the lock cylinder to align the ignition switch with lock cylinder housing.

(2) Tighten the mounting screw, refer to the torque chart for specification.

(3) Attach electrical connector to SKREEM Module.

(4) Attach electrical connector to ignition switch.

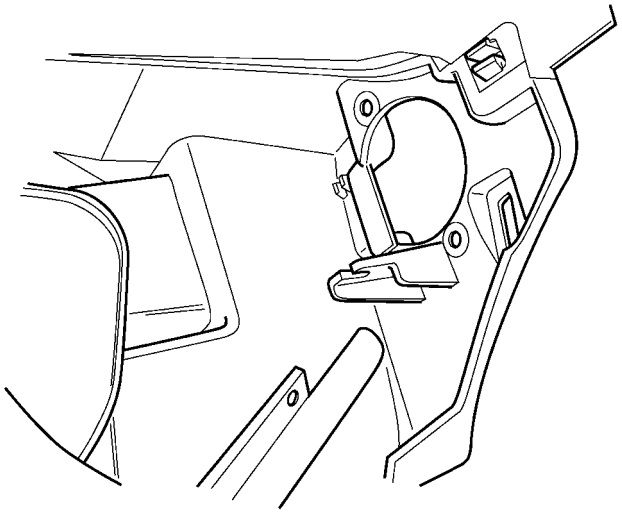


Fig. 41 DASH MOUNTING

IGNITION SWITCH (Continued)

(5) Install the interlock cable into the switch assembly (Fig. 38).

(6) Install switch assembly into Instrument Panel (Fig. 41). Make sure that the rear mounting nut is in the correct position (Fig. 35) and (Fig. 36).

(7) Tighten the 3 mounting nuts, refer to the torque chart for torque specification.

(8) Install the Instrument Panel Center Bezel, (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

(9) Install the Knee Blocker Airbag, (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - INSTALLATION).

(10) Connect the negative cable.

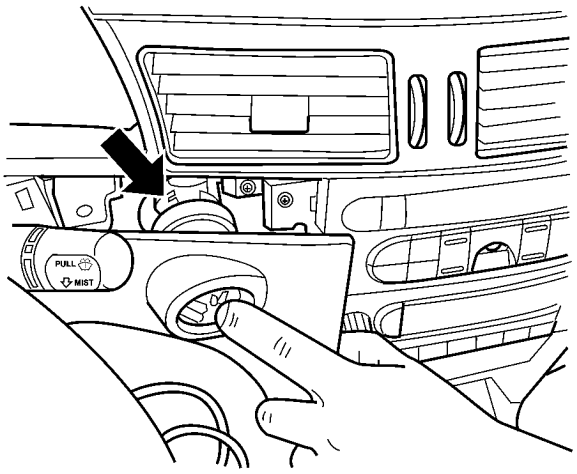
KEY/LOCK CYLINDER

REMOVAL

(1) Disconnect the negative battery cable.

(2) Remove bezel ignition switch ring.

(3) Pull center console bezel loose from instrument panel (Fig. 42).



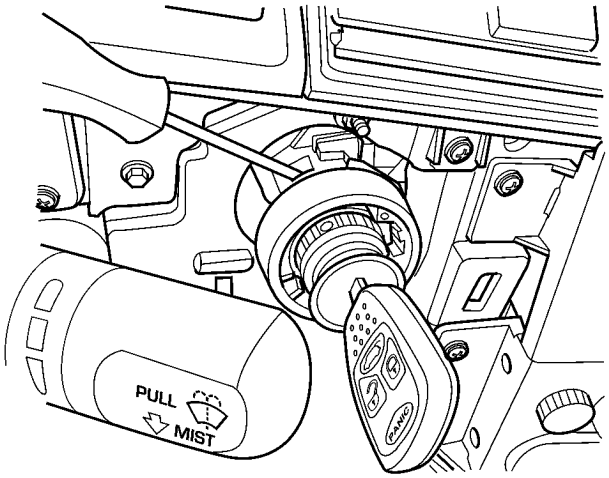
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Fig. 42 TAB LOCATION WITH BEZEL IN PLACE

(4) Insert ignition key and turn to the “ON” position.

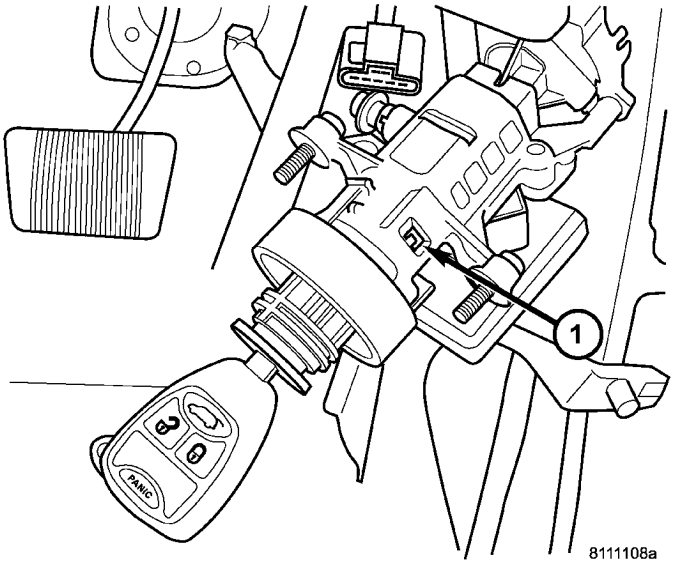
(5) Depress the locking tab on the ignition switch housing (Fig. 43).

(6) Pull the key cylinder from the ignition switch housing (Fig. 44).



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Fig. 43 DEPRESSING TAB WITHOUT BEZEL



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Fig. 44 REMOVE/INSTALL KEY CYLINDER

1 - Locking Tab Location

KEY/LOCK CYLINDER (Continued)

INSTALLATION

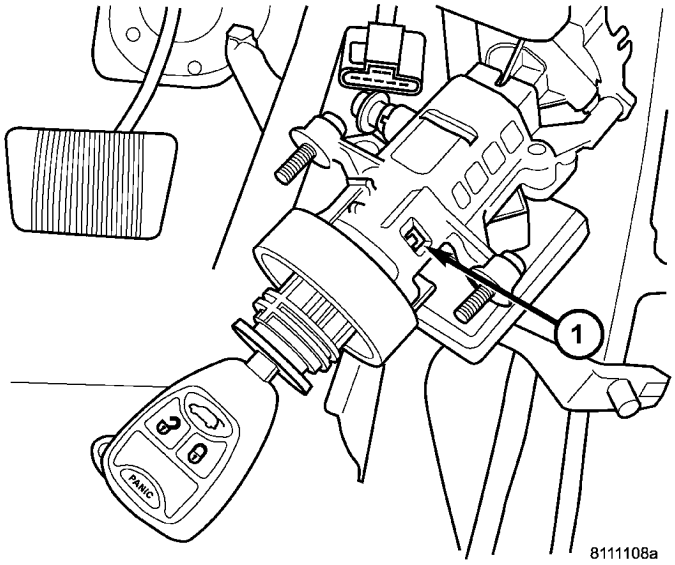


Fig. 45 REMOVE/INSTALL KEY CYLINDER

1 - Locking Tab Location

(1) Install key in lock cylinder. Turn key to “ON” position (retaining tab on lock cylinder can be depressed) (Fig. 45).

(2) The shaft at the end of the lock cylinder aligns with the socket in the end of the housing. To align the socket with the lock cylinder, ensure the socket is in the “ON” position.

(3) Align the lock cylinder with the grooves in the housing. Slide the lock cylinder into the housing until the tab sticks through the opening in the housing.

(4) Turn key to Off position and remove key (Fig. 46).

(5) Install center console bezel to instrument panel (Fig. 47).

(6) Install bezel ignition switch ring.

(7) Connect the negative battery cable.

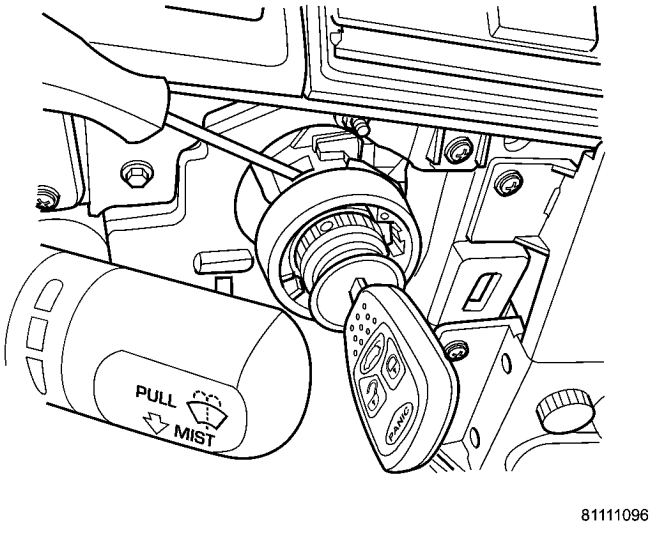


Fig. 46 DEPRESSING TAB WITHOUT BEZEL

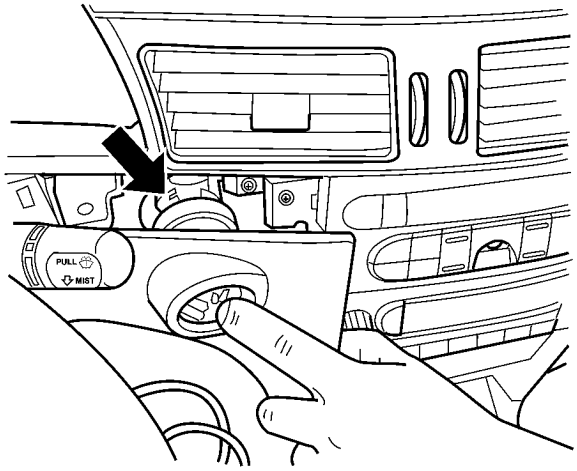


Fig. 47 TAB LOCATION WITH BEZEL IN PLACE

INSTRUMENT CLUSTER

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INSTRUMENT CLUSTER

DESCRIPTION

The Instrument Cluster (IC) (Fig. 1) is located in the instrument panel and provides the driver with vehicle speed (speedometer), engine speed (tachometer), fuel level (fuel gauge), engine temperature (temperature gauge), gear position (PRNDL), odometer and two trip odometers with Mi or Km unit displayed and compass mini trip information. The instrument cluster displays various status and warning messages using a reconfigurable Vacuum Fluorescent (VF) display. Fixed ISO indicators and the fixed VF displays provide the following status and warning indicators using hard indicators:

- Low Fuel (Amber LED)
- High Engine Temperature (Red LED)
- Right and Left Turn Signals (Green LED's)
- ABS (Amber LED)
- Traction Control or Acceleration Skid Control (ASR) - (Amber LED)
- Brake (Red LED)
- Seat Belt (Red LED)
- Airbag (Red LED)
- Battery Charging Failure (Red LED)
- High Beam (Blue LED)
- Oil Pressure (Red LED)
- Malfunction Indicator Lamp (MIL) (Amber LED)
- Front Fog lamps (Green LED)
- Cruise Set (Right VF Display)
- Overdrive Off (Right VF Display)
- AutoStick (Right VF Display)
- Tire Pressure Monitoring (Amber LED)
- EVIC Display (Left VF Display)

The cluster Thin Filmed Transistor (TFT) screen (if so equipped) shall have the capability to display vehicle navigation information (such as maps and turn-by-turn direction) as input by the navigation module.

ELECTRONIC VEHICLE INFORMATION CENTER

The Electronic Vehicle Information Center (EVIC) is part of the instrument cluster. The EVIC display screen is located in the left lower corner of the cluster.

The EVIC portion of the instrument cluster contains a central processing unit that interfaces with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus circuit. The PCI data bus circuit allows the sharing of sensor information.

The EVIC “Menu” push button provides the vehicle operator with a user interface, which allows the selection of several optional customer programmable electronic features to suit individual preferences. Refer to the owners manual for more information on the customer programmable feature options. Data input for all EVIC functions is received through the PCI data bus circuit. The EVIC uses its internal programming and all of its data inputs to calculate and display the requested data.

The EVIC cannot be repaired. If found defective, the entire cluster must be replaced.

INSTRUMENT CLUSTER (Continued)

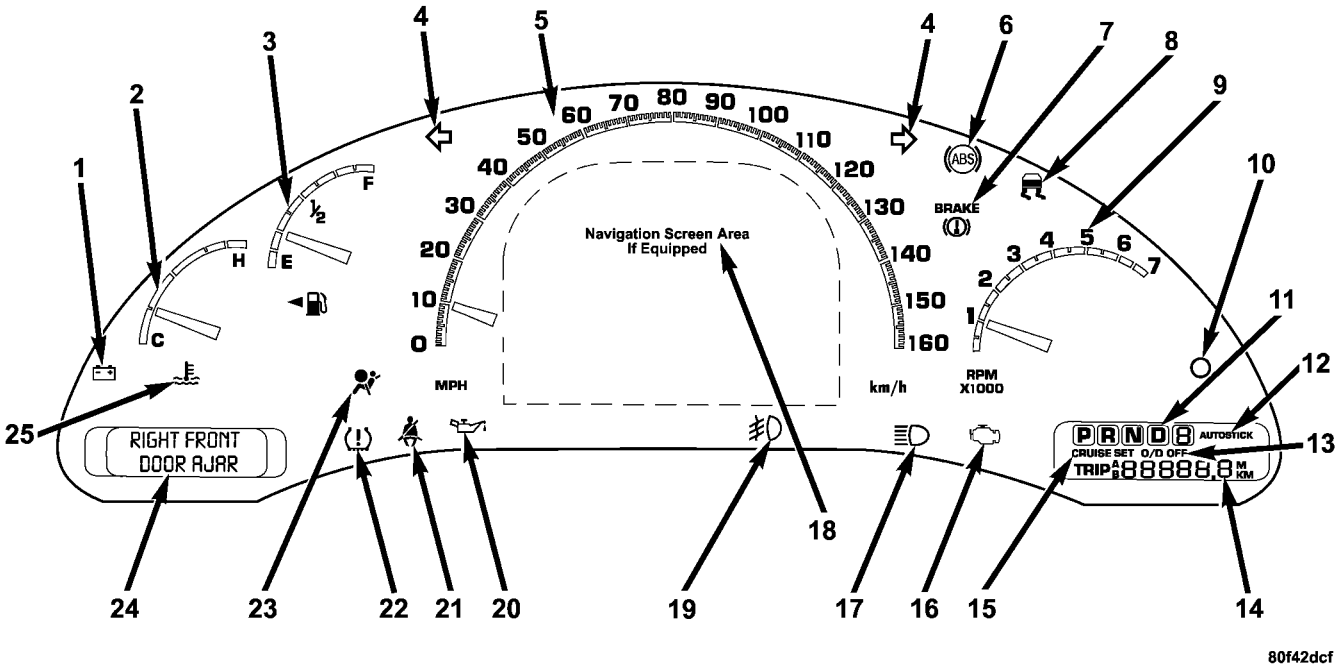


Fig. 1 INSTRUMENT CLUSTER

1 - CHARGING SYSTEM INDICATOR
2 - TEMPERATURE GAUGE
3 - FUEL GAUGE
4 - LEFT/RIGHT TURN SIGNAL INDICATOR
5 - SPEEDOMETER
6 - ABS INDICATOR
7 - BRAKE INDICATOR
8 - TRACTION CONTROL (ASR) INDICATOR
9 - TACHOMETER
10 - TRIP ODOMETER BUTTON
11 - PRND8
12 - AUTOSTICK INDICATOR
13 - OVERDRIVE OFF INDICATOR
14 - ODOMETER
15 - CRUISE SET INDICATOR
16 - MALFUNCTION INDICATOR LAMP
17 - HIGH BEAM INDICATOR
18 - NAVIGATION SCREEN
19 - FRONT FOG LAMPS INDICATOR
20 - LOW OIL PRESSURE INDICATOR
21 - SEAT BELT INDICATOR
22 - TIRE PRESSURE MONITORING SYSTEM INDICATOR
23 - AIRBAG SYSTEM INDICATOR
24 - EVIC DISPLAY
25 - ENGINE TEMPERATURE INDICATOR

OPERATION

The Instrument Cluster (IC) receives and sends messages via the Programmable Communication Interface (PCI) data bus. The indicator lamps will illuminate briefly for a bulb check when the ignition is turned from off to run. All of the gauges receive their information via the PCI Bus from the Next Generation Controller (NGC) and the Body Control Module (BCM).

The Customer Information System (CIS) main control module is the cluster. The cluster uses a microprocessor to process information to/from the PCI data bus and direct hard wired inputs from the Park Brake Switch, EVIC, Turn Signals, and optional NAV buttons. The Pulse Width Modulated (PWM) Dimming hard wired signal is provided by the cluster, to modules and lamps that require PWM Dimming. The PWM Dimming hard wired Signal is created from the Dimming PCI bus message sent by the BCM. The cluster will receive a ″Wake-up″ signal from the BCM and a ″battery″ feed from the Integrated Power Module (IPM) for power control/supply. cluster PCI data bus communicate with the Controller Anti-Lock Brake (CAB), Body Control Module (BCM), Electronic Vehicle Information Center (EVIC), Driver Door Module (DDM), Intelligent Power Module (IPM), Navigation Module (NAV), Next Generation Controller (NGC combines former Powertrain Control Module and Transmission Control Module functions), Occupant Restraint Controller (ORC), Passenger Door Module (PDM), Sentry Key Remote Entry Module (SKREEM), and the DRBIII® scan tool (via the data link connector).

Red-Green-Blue (RGB) Video data will be received from the Navigation module, for display on the Thin Filmed Transistor (TFT) screen (if equipped).

The Instrument Panel Switch Pod is the secondary part of the CIS. The switch pod will contain an Analog Clock (w/time adjust button), Hazard Switch, EVIC and NAV (optional) controls, and Vehicle Theft Security System (VTSS) LED.

INSTRUMENT CLUSTER (Continued)

The Instrument Cluster has four gauges: Speedometer, tachometer, fuel, and temperature. The gauges and the LED's are not individually replaceable thereby requiring complete replacement of the Instrument Cluster if a repair is necessary. In the event that the Instrument Cluster loses communication with other modules on the PCI Bus, the cluster will display ″no bus″ in the VF display.

The Trip/Reset button is used to switch the display from trip to total mileage. Holding the button when the display is in the trip mode will reset the trip mileage. This button is also used to put the cluster into self-diagnostic mode. The odometer display uses blue-green vacuum fluorescent digital characters. The Instrument Cluster uses a vacuum-fluorescent shift indicator (PRND8) with auto stick.

CHARGING SYSTEM INDICATOR (Fig. 2) - This Light Emitting Diode (LED) indicator monitors the electrical system voltage. The LED should turn on momentarily as the engine is started. If the LED stays on or turns on while driving, it indicates a problem with the charging system. Immediate service should be obtained.



Fig. 2 CHARGING SYSTEM INDICATOR

AIRBAG INDICATOR (Fig. 3) - This Light Emitting Diode (LED) turns on and remains on for 6 to 8 seconds as a bulb check when the ignition switch is first turned ON. If the light is not on during starting, stays on, or turns on while driving, refer to the appropriate Body Diagnostic Procedures manual.



Fig. 3 AIRBAG INDICATOR

LOW FUEL INDICATOR (Fig. 4) - This Light Emitting Diode (LED) indicator will illuminate when the fuel level reaches a predetermined low level of fuel and a chime will sound. It will stay lit until the fuel level is raised.



Fig. 4 LOW FUEL INDICATOR

BRAKE WARNING INDICATOR (Fig. 5) - This Light Emitting Diode (LED) indicator monitors various brake functions, including brake fluid level and parking brake application. If the LED turns on, it may indicate that the parking brake is applied or there is a low brake fluid level. The dual brake system provides a reserve braking capacity in the event of a failure to a portion of the hydraulic system. Failure of either half of the dual brake system is indicated by the Brake Warning Indicator which will turn on when the brake fluid level in the master cylinder has dropped below a specified level. The LED will remain on until the cause is corrected. The LED may flash momentarily during sharp cornering maneuvers which change fluid level conditions. The vehicle should have service performed. If brake failure is indicated, immediate repair is necessary. Vehicles equipped with Anti-Lock brakes (ABS), are also equipped with Electronic Brake Force Distribution (EBD). In the event of an EBD failure, the Brake Warning Indicator will turn on along with the ABS Indicator. Immediate repair to the ABS system is required. The operation of the Brake Warning Indicator can be checked by turning the ignition switch from the OFF position to the ON position. The LED should illuminate for approximately two seconds. The LED should then turn off unless the parking brake is applied or a brake fault is detected. If the LED does not illuminate, refer to the appropriate Body Diagnostic Procedures manual. The LED also will turn on when the parking brake is applied with the ignition switch in the ON position. This LED shows only that the parking brake is applied. It does not show the degree of brake application.



Fig. 5 BRAKE WARNING INDICATOR

FRONT FOG LAMP INDICATOR (Fig. 6) - This Light Emitting Diode (LED) indicator shows the front fog lights are ON.



Fig. 6 FRONT FOG LAMP INDICATOR

HIGH BEAM INDICATOR (Fig. 7) - This Light Emitting Diode (LED) shows that the headlights are on high beam. Pull the Multi-Function lever towards the steering wheel to switch the headlights from high or low beam.



Fig. 7 HIGH BEAM INDICATOR

INSTRUMENT CLUSTER (Continued)

HIGH ENGINE TEMPERATURE INDICATOR (Fig. 8) - This Light Emitting Diode (LED) warns of an overheated engine condition. If this LED is accompanied by a continuous chime, the engine temperature is critically hot, and the vehicle should be turned off immediately. The vehicle should be serviced as soon as possible.



Fig. 8 HIGH ENGINE TEMPERATURE INDICATOR

ABS INDICATOR (Fig. 9) - This Light Emitting Diode (LED) monitors the Anti-Lock Brake System. The LED will turn on when the ignition switch is turned to the ON position and may stay on for as long as four seconds. If the ABS indicator remains on or turns on while driving, it indicates that the Anti-Lock portion of the brake system is not functioning and that service is required. However, the conventional brake system will continue to operate normally if the BRAKE warning indicator is not on. If the ABS indicator is on, the brake system should be serviced as soon as possible to restore the benefits of Anti-Lock brakes. If the ABS indicator does not turn on when the Ignition switch is turned to the ON position, refer to the appropriate Body Diagnostic Procedures manual.



Fig. 9 ABS INDICATOR

MALFUNCTION INDICATOR (Fig. 10) - This Light Emitting Diode (LED) indicator is part of an onboard diagnostic system called OBD that monitors engine and automatic transmission control systems. The indicator will illuminate when the key is in the ON position before engine start. If the LED does not come on when turning the key from OFF to ON, have the condition checked promptly. Certain conditions such as a loose or missing gas cap, poor fuel quality, etc. may illuminate the indicator after engine start. The vehicle should be serviced if the indicator stays on through several of your typical driving cycles. In most situations the vehicle will drive normally and will not require towing. The Malfunction Indicator flashes to alert you to serious conditions that could lead to immediate loss of power or severe catalytic converter damage. The vehicle should be serviced as soon as possible if this occurs.



Fig. 10 MALFUNCTION INDICATOR

LOW OIL PRESSURE INDICATOR (Fig. 11) - This Light Emitting Diode (LED) shows low engine oil pressure. The LED should turn on momentarily when the engine is started. If the LED turns on while driving, stop the vehicle and shut off the engine as soon as possible. A continuous chime will sound when this LED turns on. Do not operate the vehicle until the cause is corrected. This LED does not show how much oil is in the engine. The engine oil level must be checked under the hood.



Fig. 11 LOW OIL PRESSURE INDICATOR

SEAT BELT INDICATOR (Fig. 12) - The Light Emitting Diode (LED will turn on when the ignition switch is turned to the ON position as a reminder to “buckle up”. The LED will remain on until the driver's seat belt is buckled. The chime will sound for 6 seconds, or until the seat belt is buckled.



Fig. 12 SEAT BELT INDICATOR

TIRE PRESSURE MONITOR SYSTEM INDICATOR (Fig. 13) - This Light Emitting Diode (LED) will turn on when there is a low tire pressure condition. The LED will also turn on if a problem exist with any tire sensor. The LED will remain on until the tire pressure is properly set or the problem with the sensor is corrected. This LED will turn on monetarily as a bulb check when the engine is started.



Fig. 13 TIRE PRESSURE MONITOR SYSTEM INDICATOR

TRACTION CONTROL OR ACCELERATION SKID CONTROL (ASR) INDICATOR (Fig. 14) - This Light Emitting Diode (LED) indicator illuminates momentarily as a bulb check when the ignition switch is first turned ON. Extended heavy use of Traction Control/ASR may cause the system to deactivate and turn on the Traction Control/ASR Indicator. This is to prevent overheating of the brake system and is a normal condition. The system will remain disabled for about 4 minutes until the brakes have cooled. The system will automatically reactivate and turn off the Traction Control/ASR Indicator. The traction control/ASR indicator will turn on if:

- The traction control/ASR system is in use.
- The Traction Control/ASR switch has been used to turn the system OFF.
- There is a Traction Control/ASR System malfunction.

INSTRUMENT CLUSTER (Continued)

• The system has been deactivated to prevent damage to the brake system due to overheated brake temperatures.



Fig. 14 TRACTION CONTROL OR ACCELERATION SKID CONTROL (ASR) INDICATOR

TURN SIGNAL INDICATORS (Fig. 15) - The arrow will flash with the exterior turn signal when the turn signal lever is operated. If the vehicle electronics sense that the vehicle has traveled about one mile with the turn signals on, a chime will sound to alert you to turn the signals off. If either indicator flashes at a rapid rate, check for a defective outside light bulb.



Fig. 15 TURN SIGNAL INDICATOR

TEMPERATURE GAUGE (Fig. 1) - This Light Emitting Diode (LED) monitors the electrical system voltage. The LED should turn on momentarily as the engine is started. If the LED stays on or turns on while driving, it indicates a problem with the charging system. Immediate service should be obtained. The gauge pointer will likely indicate a higher temperature when driving in hot weather, up mountain grades, or when towing a trailer. It should not be allowed to exceed the upper limits of the normal operating range.

FUEL GAUGE (Fig. 1) - The pointer shows the level of fuel in the fuel tank when the ignition switch is in the ON position.

SPEEDOMETER (Fig. 1) - Indicates vehicle speed.

TACHOMETER (Fig. 1) - The red segments indicate the maximum permissible engine revolutions-per-minute (r.p.m. x 1000) for each gear range. Before reaching the red area, ease up on the accelerator.

TRANSMISSION RANGE INDICATOR (Fig. 1) - This Vacuum Fluorescent (VF) display indicator shows the automatic transmission gear selection.

AUTOSTICK INDICATOR - This Vacuum Fluorescent (VF) display indicator illuminates when the gearshift lever is moved to the AutoStick position.

ODOMETER/TRIP ODOMETER (Fig. 1) - The odometer shows the total distance the vehicle has been driven. It is a Vacuum Fluorescent (VF) display. The two trip odometers show individual trip mileage. To switch from odometer to trip odometers, press and release the Trip Odometer button. To reset a trip odometer, display the desired trip odometer to be reset then push and hold the button until the display resets (approximately 2 seconds).

TRIP ODOMETER BUTTON (Fig. 1) - Press this button to change the display from odometer to either of the two trip odometer settings. The word TRIP and either “A” or “B” will appear when in the trip odometer mode. Push in and hold the button for two seconds to reset the trip odometer to 0 miles or kilometers. The odometer must be in trip mode to reset.

CRUISE INDICATOR (Fig. 1) - This Vacuum Fluorescent (VF) display indicator shows that the Speed Control System is ON.

NAVIGATION SCREEN (Fig. 1) - Displays the current navigation system functions.

ELECTRONIC VEHICLE INFORMATION CENTER (EVIC) DISPLAY (Fig. 1) - When the appropriate conditions exist, this Vacuum Fluorescent (VF) display shows the Electronic Vehicle Information Center (EVIC) messages.

ELECTRONIC VEHICLE INFORMATION CENTER

The EVIC has access to both non-switched and ignition switched sources of battery current so that some of its features remain operational at any time, while others may only operate with the ignition switch in the ON position. When the ignition switch is turned to the ON position, the EVIC display will return to the last function being displayed before the ignition was turned to the OFF position.

For more information on the features, control functions and setting procedures for the EVIC, see the owner's manual in the vehicle glove box.

WARNING

This vehicle contains mercury added devices added by the manufacturer: navigation display within the instrument cluster. Remove devices before vehicle disposal. Upon removal of devices, please reuse, recycle, or dispose of as hazardous waste.

The instrument cluster produces 230 volts. Proper care should be taken when working around, near, or with the instrument cluster. Follow steps outlined in the body diagnostic information when testing. Failure to follow safety procedures could result in personal injury or death.

Always disconnect and isolate the battery negative cable prior to any airbag system, instrument panel, steering column, or cluster removal. Wait two minutes to allow the airbag system reserve capacitor to discharge before beginning service. Failure to do so could result in personal injury or death.

INSTRUMENT CLUSTER (Continued)

DIAGNOSIS AND TESTING - ELECTRONIC VEHICLE INFORMATION CENTER

A DRB III® scan tool is required for checking the PCI Data Bus circuit and the EVIC.

(1) Remove the instrument cluster. Check for battery voltage at the fused B(+) circuit cavity of the cluster. If OK, go to Step 2. If not OK, repair the open fused B(+) circuit as required.

(2) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Check for continuity between the ground circuit cavity of the cluster and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open ground circuit as required.

(3) Connect negative battery cable. Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run/start) circuit cavity of the cluster. If OK, the voltage and ground supply to the cluster is OK at this time. If not OK, repair the open fused ignition switch output (run/start) circuit as required.

STANDARD PROCEDURE - INSTRUMENT CLUSTER SELF-TEST

The Instrument Cluster will illuminate all indicators and step the gauges through several calibration points. Also, the odometer will display any stored codes that may have set.

(1) With the ignition OFF, Depress and hold the Odometer Reset button for 10 seconds.

(2) Release the Odometer reset button.

REMOVAL

(1) Remove cluster bezel (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - REMOVAL).

(2) Remove four nuts to the column and lower to the seat.

(3) Remove the two electrical connectors from the bottom of the cluster accessed from underneath instrument panel (Fig. 16).

(4) Remove the four retaining screws to the cluster (Fig. 17).

(5) Pull cluster straight out of the instrument panel opening (Fig. 18). Be careful not to scratch the cluster face.

INSTALLATION

(1) Place cluster straight into cluster opening in instrument panel (Fig. 18). Be careful not to scratch the cluster face.

(2) Install the four retaining screws to the cluster (Fig. 17).

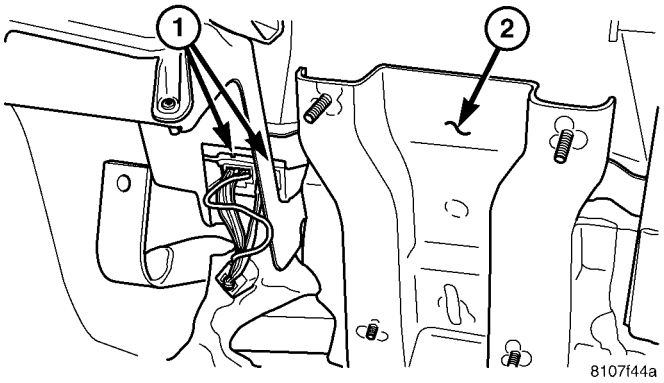


Fig. 16 CLUSTER CONNECTORS

1 - CLUSTER ELECTRICAL CONNECTORS
2 - BRAKE PEDAL SUPPORT BRACKET

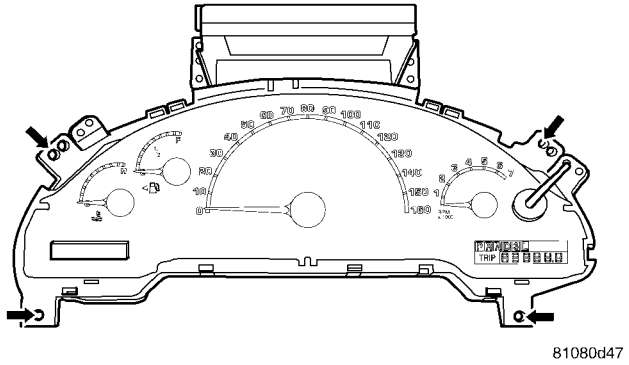


Fig. 17 CLUSTER SCREW MOUNTING LOCATION

(3) Install the two electrical connectors to the bottom of the cluster accessed from underneath instrument panel (Fig. 16).

(4) Raise the column and install four nuts.

(5) Install the cluster bezel (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN PERSONAL INJURY OR DEATH.

(6) Verify vehicle and system operation.

INSTRUMENT CLUSTER (Continued)

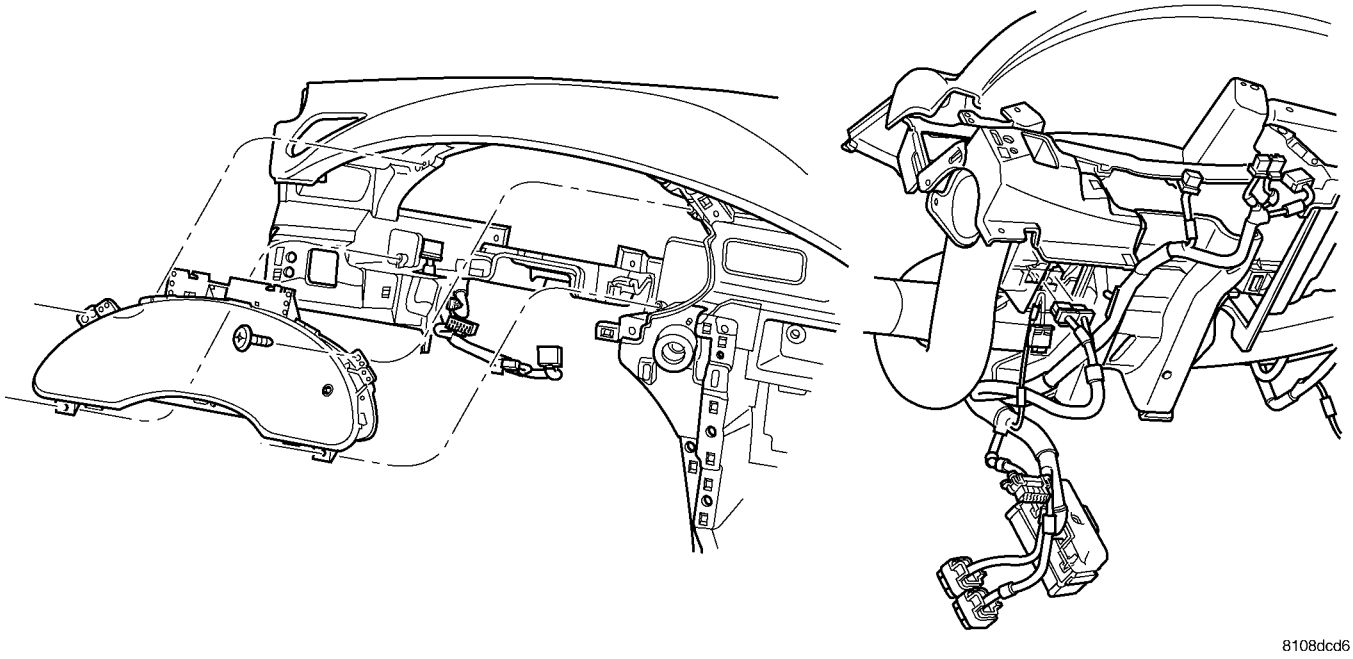


Fig. 18 INSTRUMENT CLUSTER - REMOVE/INSTALL

CLUSTER LENS

REMOVAL

(1) Remove instrument cluster (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

(2) Remove two screws retaining the mask/lens to the cluster housing (Fig. 19).

(3) Using a trim stick (special tool #C-4755) or equivalent, depress the retaining tabs along the edge of the cluster housing (Fig. 19), pulling up as you move around the perimeter.

(4) Pull the lens from the mask and cluster housing carefully.

INSTALLATION

(1) Align the tabs over the retaining slots of the cluster housing. Be careful to align the trip odometer button through the cluster lens.

(2) Firmly push down until you seat all the retaining tabs.

(3) Install the two screws retaining the mask/lens to the cluster housing (Fig. 19).

(4) Install the instrument cluster (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).

(5) Verify vehicle and system operation.

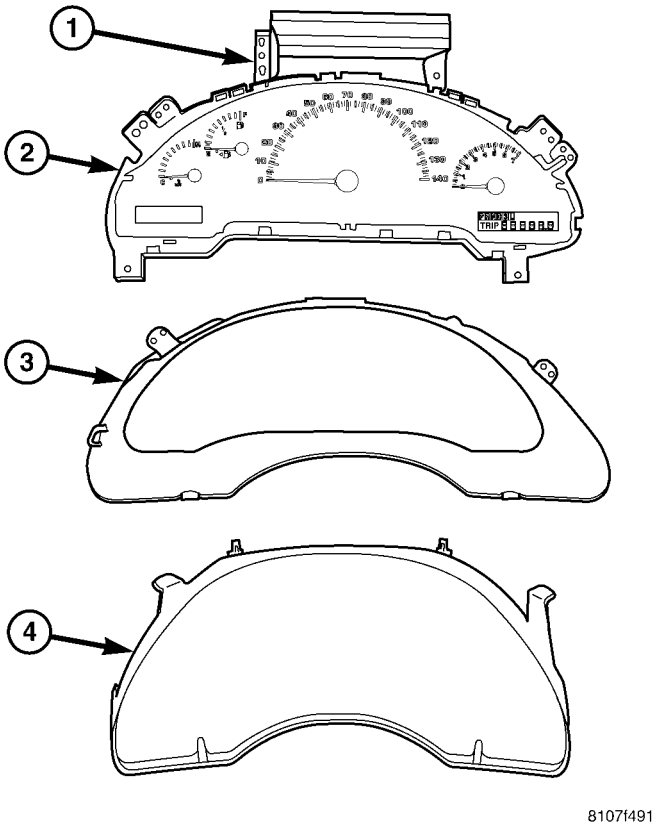


Fig. 19 CLUSTER COMPONENTS

1 - NAVIGATION DISPLAY UNIT
2 - INSTRUMENT CLUSTER
3 - INSTRUMENT CLUSTER MASK
4 - INSTRUMENT CLUSTER LENS

INSTRUMENT PANEL SWITCH POD

DESCRIPTION

The Instrument Panel Switch Pod is a Multiplexed (MUX) switch assembly also containing the clock and hazard switch. It is located within the instrument cluster switch bezel just to the right of the instrument cluster. The switch pod is hard wired to other vehicle modules (Body Control Module (BCM), Electronic Vehicle Information Center Module (EVIC), Navigation Module (NAV), and Instrument Cluster (IC).

The EVIC function buttons are labeled US/M, MENU, STEP, and RESET (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/COMPASS/MINI-TRIP COMPUTER - DESCRIPTION). The Navigation function buttons are labeled NAV, CANCEL, ENTER, scroll left, scroll up, scroll right, and scroll down (Refer to 8 - ELECTRICAL/NAVIGATION/TELECOMMUNICATION - DESCRIPTION). The Analog Clock consists of an hour and minute hand with one time adjust button (Refer to 8 - ELECTRICAL/CLOCK - DESCRIPTION). The Hazard Switch is designated with a red triangle and is a push ON/push OFF switch (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HAZARD SWITCH - DESCRIPTION). The Passenger Airbag Disabled (PAD) Indicator is an amber Light Emitting Diode (LED) that illuminates when the passenger airbag and seat belt tensioner are disabled due to the Occupant Classification System (OCS) (Refer to 8 - ELECTRICAL/RESTRAINTS/PASS AIRBAG ON/OFF INDICATOR - DESCRIPTION). The VTSS/SKIS Indicator is used to telltale the two systems (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/SKIS INDICATOR LAMP - DESCRIPTION).

The switch pod is available in different configurations:

- **Base Switch Pod** - US/Metric button, Hazard Switch, PAD Indicator (if equipped with OCS), and VTSS/SKIS Indicator Lamp (if equipped) (Fig. 20).

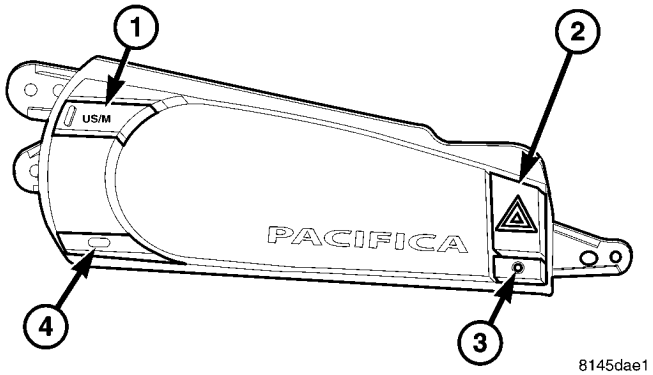


Fig. 20 BASE SWITCH POD

1 - US/METRIC BUTTON
2 - HAZARD SWITCH
3 - PAD INDICATOR
4 - VTSS/SKIS INDICATOR

- **Switch Pod without Navigation** - EVIC, Clock, Hazard Switch, PAD Indicator (if equipped with OCS), and VTSS/SKIS Indicator Lamp (if equipped) (Fig. 21).
- **Switch Pod with Navigation** - EVIC, Navigation, Clock, Hazard Switch, PAD Indicator (if equipped with OCS), and VTSS/SKIS Indicator Lamp (if equipped) (Fig. 22).

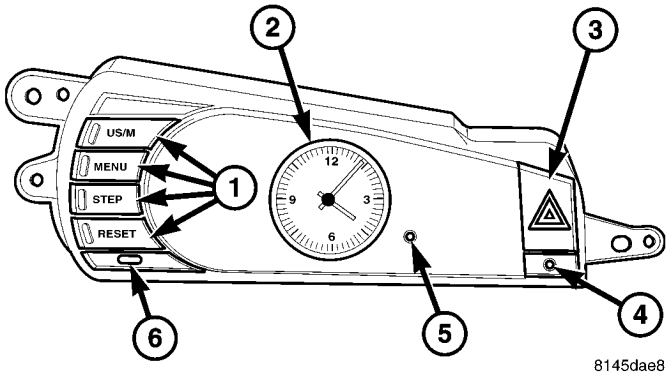


Fig. 21 SWITCH POD WITHOUT NAVIGATION

1 - EVIC BUTTONS
2 - CLOCK
3 - HAZARD SWITCH
4 - PAD INDICATOR
5 - CLOCK SET BUTTON
6 - VTSS/SKIS INDICATOR

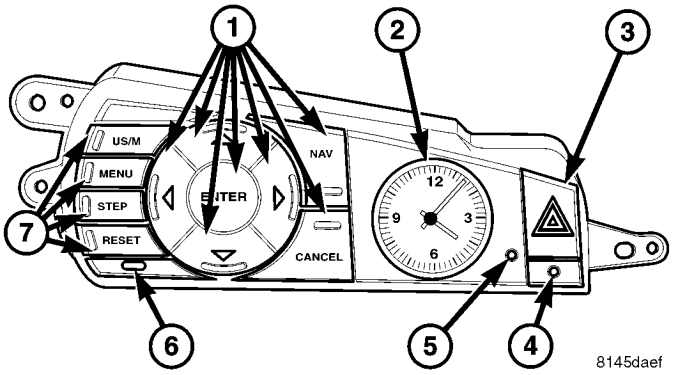


Fig. 22 SWITCH POD WITH NAVIGATION

1 - NAVIGATION BUTTONS
2 - CLOCK
3 - HAZARD SWITCH
4 - PAD INDICATOR
5 - CLOCK SET BUTTON
6 - VTSS.SKIS INDICATOR
7 - EVIC BUTTONS

OPERATION

For operation of the individual components located within the instrument panel switch pod, (Refer to 8 - ELECTRICAL/COMPASS/MINI-TRIP COMPUTER - OPERATION), (Refer to 8 - ELECTRICAL/NAVIGATION/TELECOMMUNICATION - OPERATION), (Refer to 8 - ELECTRICAL/CLOCK - OPERATION), and (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HAZARD SWITCH - OPERATION).

INSTRUMENT PANEL SWITCH POD (Continued)

DIAGNOSIS AND TESTING - INSTRUMENT PANEL SWITCH POD

ELECTRONIC VEHICLE INFORMATION CENTER AND NAVIGATION CONTROLS

Refer to the appropriate wiring information for connector views and pin-outs. Check fuses first that supply power to the switch pod (IOD fuse). If OK, continue. If not OK, repair as necessary to continue.

Remove the instrument panel switch pod for testing. First of all check for 12v battery power at terminal 1 of the instrument panel harness connector. Then check for ground at terminal 12 of the instrument panel harness connector. If OK, continue. If not OK, repair wire as necessary to continue.

Each EVIC button press and the open Circuit State will provide a unique resistance, with respect to the EVIC/NAV Button Analog Common circuit. Refer to the INSTRUMENT PANEL SWITCH POD RESISTANCE table.

The unique EVIC/NAV button press resistances are:

INSTRUMENT PANEL SWITCH POD RESISTANCE

BUTTON	RESISTANCE
EVIC CONTROLS	
OPEN CIRCUIT	10210 Ω ± 8 %
US/M	4010 Ω ± 8 %
STEP	2010 Ω ± 8 %
MENU	1010 Ω ± 8 %
RESET	390 Ω ± 8 %
NAVIGATION CONTROLS	
OPEN CIRCUIT	16130 Ω ± 8 %
UP CURSOR	7030 Ω ± 8 %
DOWN CURSOR	4030 Ω ± 8 %
LEFT CURSOR	2530 Ω ± 8 %
RIGHT CURSOR	1620 Ω ± 8 %
ENTER	1000 Ω ± 8 %
NAV	570 Ω ± 8 %
CANCEL	240 Ω ± 8 %

If any of the resistances are not within the specifications, the entire switch pod needs to be replaced (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/INSTRUMENT PANEL SWITCH POD - REMOVAL).

CLOCK

For clock diagnosis, check for 12v battery power and ground at the instrument panel connector end of the instrument panel switch pod (terminal 1 - 12v, and terminal 12 - ground). If power and ground are present and the clock doesn't work, replace switch pod.

If the set button is inoperative, the complete switch pod must be replaced.

HAZARD SWITCH

A low side (ground) signal will be provided from the Instrument Panel Switch Pod to the BCM to indicate that the Hazard button has been enabled (circuit closed) by a vehicle occupant.

With the switch removed, check continuity between the hazard switch input and the ground terminal when the switch is enabled. If continuity is present, switch is OK. If no continuity, replace complete instrument panel switch pod.

REMOVAL

(1) Remove the cluster bezel (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - REMOVAL).

(2) Remove the three retaining screws holding the switch pod to the cluster bezel (Fig. 23).

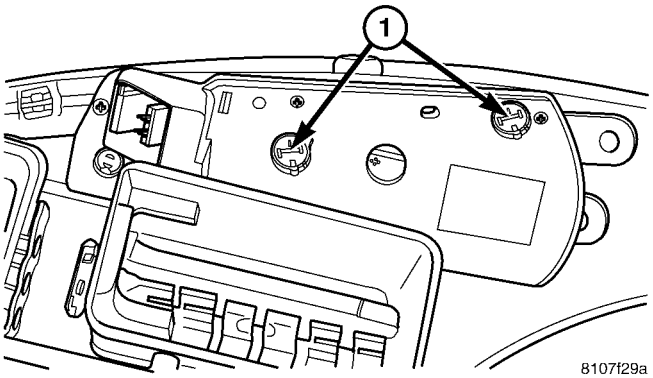


Fig. 23 INSTRUMENT PANEL SWITCH POD - REMOVE/INSTALL

1 - INSTRUMENT PANEL SWITCH POD ILLUMINATION

INSTALLATION

(1) Install the three retaining screws holding the switch pod to the cluster bezel.

(2) Install the cluster bezel (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST.

(3) Verify vehicle and system operation.

LAMPS

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LAMPS/LIGHTING - EXTERIOR

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LAMPS/LIGHTING - EXTERIOR

DESCRIPTION

LAMP SYSTEMS

Lighting circuits are protected by fuses. Lighting circuits require an overload protected power and high side drivers source, ON/OFF device, lamps and body grounds to operate properly. Plastic lamps require a wire in the harness to supply body ground to the lamp socket. Replace sockets and bulbs that are corroded.

Some of the interior and exterior lighting functions are governed by the Body Control Module (BCM). The headlamp, dome, and the door ajar switches provide signals to the BCM. The BCM in turn sends a Programmable Communication Interface (PCI) bus message to the Integrated Power Module (IPM) to enable the necessary drivers to set the required illumination configuration.

Wire connectors can make intermittent contact or become corroded. Before coupling wire connectors, inspect the terminals inside the connector. Male terminals should not be bent or disengaged from the insulator. Female terminals should not be sprung open or disengaged from the insulator. Bent and sprung terminals can be repaired using needle nose pliers and pick tool. Corroded terminals appear chalky or green. Corroded terminals should be replaced to avoid recurrence of the problem symptoms.

This model may be equipped with Auto Headlamps, Headlamps On With Windshield Wipers customer programmable feature, Daytime Running Lamps (DRL - Canada Only), and High Intensity Discharge (HID) Headlamps.

HEADLAMP SYSTEM

The configuration of the headlamp system of headlamps, park lamps and fog lamps is determined by the BCM. The BCM determines the lighting configuration as a result of the inputs from the ignition switch, headlamp switch and multi-function switch. A PCI bus is transmitted from the BCM to the IPM to enable the necessary drivers to set the illumination configuration. Eight wires are connected between the headlamp switch and the BCM. The first wire contains information regarding the position of the headlamp switch (Off, Automatic Headlamps, Automatic Headlamp switch fog, Park with Fog, Head, or Head with Fog Lamps). The second wire contains information regarding the position of the dimmer switch (Dome Lamp, Daytime Brightness, Dimming Level or Off). The third wire is a dedicated signal return (ground) wire. The fourth wire provides power to the front fog lamp indicator. The fifth wire contains information regarding the Optical Horn. The sixth wire contains information regarding the High Beam Signal. The seventh wire contains information regarding the Right Turn Input. The eighth wire contains information regarding the Left Turn Input.

HEADLAMP TIME DELAY SYSTEM

The headlamp time delay system is controlled by the Body Control Module (BCM) via a PCI bus message transmitted by the BCM to the IPM to turn off the headlamps.

AUTOMATIC HEADLAMP SYSTEM

The Automatic Headlamp system turns the instrumentation and exterior illumination lamps ON when the ambient light levels are Night and the engine RPM is 450 or above, and OFF when light levels are Day.

DAYTIME RUNNING LAMPS

Operating the high-beam headlamps at reduced power provides daytime running lamps, which are required on all new Canadian vehicles.

HEADLAMPS ON WITH WINDSHIELD WIPERS

For vehicles equipped with the Automatic Headlamp System, the instrumentation and exterior illumination lamps will be turned ON when the headlamp switch is in the AUTO position, RPM > 450 and the windshield wipers have been in the intermittent, low or high mode of operation for more than ten seconds. When the windshield wipers are turned OFF the Body Control Module will determine if the instrumentation and exterior illumination lamps should remain ON base upon the current ambient light level.

OPERATION

HEADLAMP POWER

The headlamp switch is a direct input to the Body Control Module (BCM). The BCM sends a Programmable Communication Interface (PCI) data bus message to the Integrated Power Module (IPM) informing it of a headlamp switch status change. The IPM then turns on power to the headlamps through four ″fuseless″ circuits. These circuits are electronically controlled and continuously monitored for malfunctions. Power is supplied to each filament in a separate circuit. On vehicles with HID lamps for low beam, the IPM provides power to the HID module which in turn, turns the lamps on. For vehicles equipped with Daytime Running Lamps (DRL), the IPM electronically steps down the headlamp voltage to provide the desired illumination. The DRL's will automatically extinguish when the blinker or hazards are activated and will come back on when the blinker or hazards are deactivated.

LAMPS/LIGHTING - EXTERIOR (Continued)

HEADLAMP SYSTEM

The headlamp system will default to headlamps ON position when ignition switch is ON and when an open or short circuit failure occurs on the headlamp switch input or PCI data bus communication between the BCM and the IPM fails. The system will return to normal operation when the open or short is repaired. A fault will be reported by the BCM when a failure occurs on the dimmer or headlamp switch input.

If the exterior lamps are ON and the headlamp switch is in any position other than OFF or AUTO and with the ignition switch OFF (LOCK) after 3 minutes the BCM sends a message via the PCI bus to the IPM informing the IPM to turn off the headlamps, park lamps and fog lamps. This feature prevents the vehicle battery from being discharged when the vehicle lights have been left ON.

OPTICAL HORN/HIGH BEAMS

When the multi-function switch is pulled to the first detent (optical horn) with the headlamps ON and the key-in the ignition, the BCM shall send a message via PCI bus to the IPM to turn on the headlamps drivers to illuminate all four filaments (Low and High beams). When the multi-function switch is pulled to the second detent (high beam) signal and the headlamps are ON, the BCM shall send a message via PCI bus to the IPM to turn on the headlamps drivers. The High Beams and Low Beams are illuminated and the Fog Lamps (if ON) are extinguished. If the headlamps were in the high beam configuration when power was removed from the headlamps, the headlamps will be configured as low beam the next time they are activated.

HEADLAMP SWITCH

The Headlamp Switch uses a multiplexed (MUX) circuit to the Body Control Module (BCM). The Headlamp Switch controls the Fog lamp relay, Park lamps and the Low and High beam headlamps. The BCM then sends a signal through the PCI data bus line to the IPM as to what state the switch has selected. The IPM energizes the high side output drivers to turn ON the desired lamps.

FRONT PARK and SIDE MARKER LAMPS

The park lamp switch is a direct input to the BCM. The BCM sends a PCI data bus message to the IPM informing it to turn on the park and side marker lamps. The park lamp relay is then powered through low side control of the IPM. This circuit is electronically controlled and continuously monitored for malfunctions. The IPM provides power through a high side driver.

HEADLAMP TIME DELAY SYSTEM

The headlamp time delay system is activated by turning the headlamps ON (high or low beam) while the engine is running, turning the ignition switch OFF, and then turning the headlamp switch OFF within 45 seconds. The system will not activate if more than 45 seconds elapse between ignition switch OFF and headlamp switch OFF. The BCM will allow the headlamps to remain ON for 90 seconds (configurable) before they automatically turn off (if the key is in the ignition during the headlamp time delay mode, then both the headlamps and park lamps (including panel dimming) will be ON).

If the headlamp switch is in the Auto Headlamp Position, the headlamps are ON due to the night signal from the CMTC and the ignition switch is in any position other than run/start, the BCM shall enter a 90 second (configurable) Auto Headlamps time delay mode. If the key is in the ignition during the headlamp time delay mode, then both the headlamps and park lamps (including panel dimming) will be ON. If the key is not in the ignition, then only the headlamps will be ON. The BCM will allow the headlamps to remain ON for 90 seconds before they automatically turn OFF.

FRONT FOG LAMP

The fog lamp switch is a direct input to the BCM. The BCM sends a PCI data bus message to the IPM informing it to turn on the fog lamps. This circuit is electronically controlled and continuously monitored for malfunctions. Fog lamp functionality is not equipped on all vehicles. The IPM ″learns″ that the vehicle is equipped with fog lamps by reading the BCM data bus message. The Fog lamps can only be ON when the park and low beams are ON. If the high beams are switched ON then the Fog lamps will be automatically turned OFF.

EXTERIOR LIGHTING BATTERY SAVER

The BCM monitors the status of the control of the Park Lamps, Headlamps and Fog Lamps. If any exterior lamps are left ON after the ignition is turned OFF, the BCM will send this information to the IPM which will then turn the drivers OFF after 3 minutes.

AUTOMATIC HEADLAMPS

Automatic headlamps are controlled by the Body Control Module (BCM). With the headlamp switch in the AUTO position, the BCM will control the headlamp, parking, side marker, tail and instrumentation lamps based on ambient light levels. Ambient light levels are monitored by the BCM using the Day/Night signal and Electrochromatic Mirror (ECM) present from the Compass Mini Trip (CMTC) located

on the front windshield in front of the rear view mirror ECM. Ambient light readings are averaged to limit cycling the lamps ON and OFF when passing through areas with varying light levels. The automatic headlamps will only function when the engine is running with RPM > 450. When the headlamp switch is in the AUTO position (Automatic mode), the Headlamp Time Delay system will function when the ignition switch is placed in any position other than run/start.

DAYTIME RUNNING LAMPS

Power is reduced using pulse-width modulation (PWM) to the high beams, where by the power is switched on and off rapidly instead of remaining on continuously. The duration and interval of the power pulses is programmed into the IPM.

WARNING

WARNING: EYE PROTECTION SHOULD BE USED WHEN SERVICING GLASS COMPONENTS. PERSONAL INJURY OR DEATH COULD RESULT.
THIS VEHICLE CONTAINS MERCURY ADDED DEVICES ADDED BY THE MANUFACTURER: HIGH INTENSITY DISCHARGE (H.I.D.) HEADLAMPS. REMOVE DEVICES BEFORE VEHICLE DISPOSAL. UPON REMOVAL OF DEVICES, PLEASE REUSE, RECYCLE, OR DISPOSE OF AS HAZARDOUS WASTE.
DO NOT BACK PROBE ANY CONNECTORS OR PIERCE ANY WIRING TO THE HID HEADLAMP SYSTEM. HIGH VOLTAGE (AC VOLTAGE) IS USED IN THIS SYSTEM AND COMPONENT AND PERSONAL INJURY OR DEATH COULD RESULT. FOLLOW PROCEDURES OUTLINED IN THE DIAGNOSIS AND TESTING - HEADLAMPS PORTION OF THIS MANUAL (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP - DIAGNOSIS AND TESTING - HID HEADLAMPS).
DO NOT POWER UP THE HEADLAMP ASSEMBLY WITH THE HEADLAMP ACCESS COVER OFF. A HIGH VOLTAGE AC (ALTERNATING CURRENT) SHOCK MAY OCCUR CAUSING PERSONAL INJURY OR DEATH.
ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY OR DEATH.

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result. Do not use bulbs other than those indicated in the Bulb Application table. Damage to lamp and/or Daytime Running Lamp Module can result. Do not use fuses, circuit breakers or relays having greater amperage value than indicated on the fuse panel or in the Owners Manual.

CAUTION: Do not use bulbs other than those listed in the Bulb Application Table. Damage to lamp can result. Do not touch halogen bulbs with fingers or other oily surfaces. Bulb life will be reduced.

DIAGNOSIS AND TESTING - LAMPS/LIGHTING - EXTERIOR

The lighting on the interior and exterior of the vehicle is used for illuminating and indicating purposes. Lighting circuits are protected by fuses and circuit protection in the Body Control Module (BCM). Lighting circuits require an overload protected power source, ON/OFF device, lamps and good body ground to operate properly. Plastic lamps require a wire in the harness to supply body ground to the lamp socket. Lamp sockets that are exposed to moisture should be coated with Mopar® Multi-purpose Grease or equivalent to avoid corrosion. If a socket has become corroded, clean socket and bulb base with abrasive fiber sanding pad or metallic bristle brush. Replace sockets and bulbs that are deformed from corrosion that could prevent continuous body ground.

Wire connectors can make intermittent contact or become corroded. Before coupling wire connectors, inspect the terminals inside the connector. Male terminals should not be bent or disengaged from the insulator. Female terminals should not be sprung open or disengaged from the insulator. Bent and sprung terminals can be repaired using needle nose pliers and pick tool. Corroded terminals appear chalky or green. Corroded terminals should be replaced to avoid recurrence of the problem symptoms. Wire connector terminals should be coated with Mopar® Multi- purpose Grease or equivalent to avoid corrosion.

Begin any electrical system failure diagnosis by testing all related fuses in the Integrated Power Module (IPM). Verify that bulbs are in good condition and test continuity of the circuit ground. Refer to the appropriate wiring information and Body Diagnostic Procedures manual.

LAMPS/LIGHTING - EXTERIOR (Continued)

SPECIFICATIONS - EXTERIOR LAMPS

CAUTION: Do not use bulbs that have a higher candle power than the bulb listed in the chart below. Damage to lamp can result.

CAUTION: Do not touch halogen/High Intensity Discharge bulbs with fingers or other oily surfaces. Bulb life will be reduced.

BULB APPLICATION TABLE

LAMP	BULB
BACK-UP	921
CHMSL	LED-REPLACE AS UNIT
FOG LAMP	880L
FRONT SIDE MARKER	194
FRONT TURN SIGNAL	3157
HEADLAMP (STANDARD HALOGEN)	H7
HEADLAMP (HID)	D2S
LICENSE LAMP	168
PARK/TURN SIGNAL	3157
REAR SIDE MARKER	168
REAR STOP, TURN SIGNAL	3157

BACK UP LAMP

REMOVAL

(1) Remove the tail lamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP UNIT - REMOVAL).

(2) Twist counterclockwise and pull out lamp from tail lamp unit (Fig. 1).

(3) Pull lamp straight out of lamp socket.

INSTALLATION

(1) Push lamp straight into lamp socket.

(2) Place lamp into tail lamp unit and then twist clockwise until lamp stops (about 1/4 turn).

(3) Install the tail lamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP UNIT - INSTALLATION).

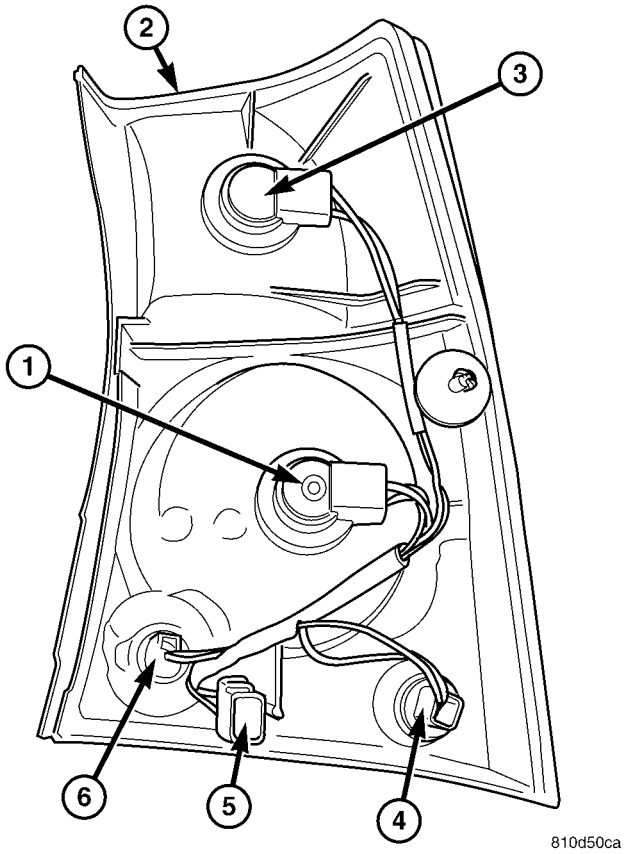


Fig. 1 LAMP LOCATION

1 - BRAKE/STOP LAMP
2 - TAIL LAMP UNIT
3 - TURN SIGNAL LAMP
4 - SIDE MARKER LAMP
5 - TAIL LAMP UNIT ELECTRICAL CONNECTOR
6 - BACK UP LAMP

BRAKE LAMP SWITCH

DESCRIPTION

The brake lamp switch is located under the instrument panel, at the brake pedal arm (Fig. 4). It has three internal switches controlling various functions of the vehicle. It's main function is to control operation of the vehicle's brake lamps. Other functions include speed control deactivation, brake sense for the antilock brake system and brake sense for the brake transmission shift interlock.

CAUTION: The switch can only be adjusted once. That is during initial installation of the switch. If the switch is not adjusted properly or has been removed for some service, a new switch must be installed and adjusted.

BRAKE LAMP SWITCH (Continued)

OPERATION

When the brake pedal is pressed, the plunger on the outside of the brake lamp switch extends outward. This action opens or closes the contacts of the three switches inside the brake lamp switch.

With the brake pedal pressed down (plunger extended), the switch for terminals 1 and 2 is closed completing the circuit. The switch for terminals 3 and 4 is open and so is the switch for terminals 5 and 6.

When the brake pedal is released (plunger pushed in), the three switches assume the opposite positions. The switch for terminals 1 and 2 is now open while the other two switches are now closed, completing their circuits.

A lever on the back of the switch is used to set the switch into the "adjusted" position. A non-adjusted switch will have the lever set to the diagonal position in relation to the switch housing. The plunger can be moved in and out, but the states of the internal switches will not change.

CAUTION: Never move the adjustment lever of the new brake lamp switch without it being properly installed in the vehicle first. Such action will render the switch unusable and the switch must be discarded.

Once installed in the vehicle as described in the brake lamp switch installation procedure (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ BRAKE LAMP SWITCH - INSTALLATION), the new switch's adjustment lever is rotated to the adjusted position as indicated (Fig. 5). This action locks the plunger to the internal switches. **Once in this position the switch is permanently adjusted (or locked) and cannot be readjusted or released even if the lever is moved back.**

DIAGNOSIS AND TESTING - BRAKE LAMP SWITCH

NOTE: Before proceeding with this diagnostic test, verify the adjustment lever on the back of the switch is in the adjusted position. If the lever is in the non-adjusted (diagonal) position it may have never been adjusted (Refer to 8 - ELECTRICAL/ LAMPS/LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - OPERATION). For adjustment, (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ BRAKE LAMP SWITCH - INSTALLATION)

If the electrical circuit has been tested and the brake lamp switch is suspected of being faulty, it can be tested using the following method.

(1) Remove the switch from the vehicle. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ BRAKE LAMP SWITCH - REMOVAL)

(2) With the switch in the released position (plunger extended), use an ohmmeter to test each of the three internal switches as shown (Fig. 2). You should achieve the results as listed in the figure.

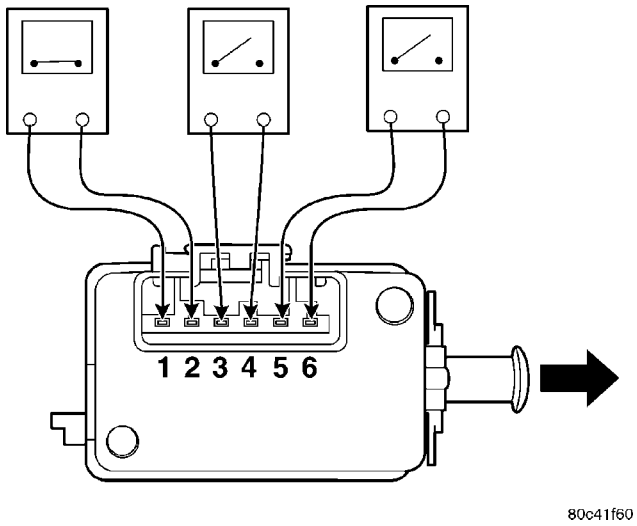


Fig. 2 SWITCH TEST - RELEASED POSITION

(3) Gently push the plunger on the brake lamp switch in until it stops.

(4) With the switch in this depressed position (plunger pushed in), use an ohmmeter to test each of the three internal switches as shown (Fig. 3). You should achieve the results as listed in the figure.

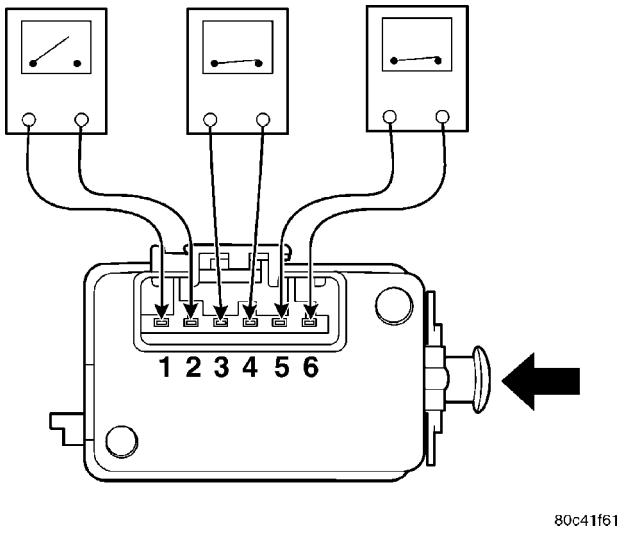


Fig. 3 SWITCH TEST - DEPRESSED POSITION

BRAKE LAMP SWITCH (Continued)

If you do not achieve the results as listed in both figures, the switch is faulty and must be replaced. Refer to Removal And Installation in this section.

If the switch is found to be operating properly, it may be misadjusted. Do not reinstall the switch, replace it. (Refer to 8 - ELECTRICAL/LAMPS/ LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - INSTALLATION)

CAUTION: The switch can only be adjusted once. That is during initial installation of the switch. If the switch is not adjusted properly or has been removed for any reason, a new switch must be installed and adjusted.

REMOVAL

(1) Disconnect and isolate the battery negative cable from its post on the battery.

(2) Remove the brake lamp switch by rotating the switch in a **clockwise** direction approximately 30 degrees and pulling it out of the mount (Fig. 4).

(3) Release the locking tab and disconnect the wiring connector from the switch.

(4) Discard the brake lamp switch. It must not be reused.

INSTALLATION

CAUTION: Do not reuse the original brake lamp switch. The switch can only be adjusted once. That is during initial installation of the switch. If the switch is not adjusted properly or has been removed for some service, a new switch must be installed and adjusted.

(1) Mount and adjust the NEW brake lamp switch using the following procedure:

(a) Connect the wiring connector to the switch and latch the locking tab.

(b) Install the switch in its bracket by aligning the index tab on the switch with the slot in the mounting bracket (Fig. 4).

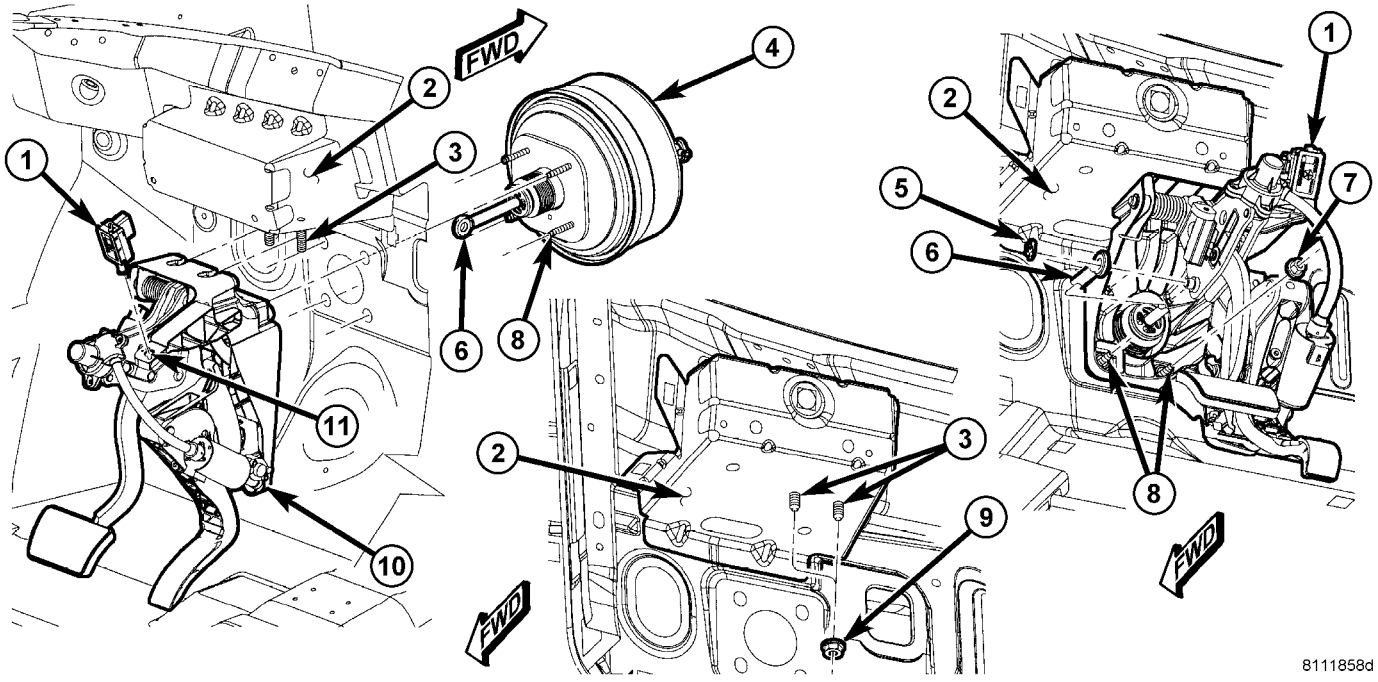


Fig. 4 Adjustable Pedals And Booster Mounting

1 - BRAKE LAMP SWITCH
2 - DASH PANEL BRACKET
3 - PEDAL MOUNTING STUDS
4 - POWER BRAKE BOOSTER
5 - RETAINING CLIP
6 - BOOSTER PUSH ROD
7 - BOOSTER MOUNTING NUT
8 - BOOSTER MOUNTING STUDS
9 - PEDAL BRACKET MOUNTING NUT
10 - ADJUSTABLE PEDALS ASSEMBLY
11 - BRAKE LAMP SWITCH MOUNT

BRAKE LAMP SWITCH (Continued)

(c) When the switch is fully seated in its mount, rotate the switch counterclockwise approximately 30° to lock the switch into place.

(d) With the brake pedal in the fully released position, move the lever on the back of the brake lamp switch from the angled non-adjusted position to the full vertical position as shown (Fig. 5). This will adjust the brake lamp switch to the vehicle.

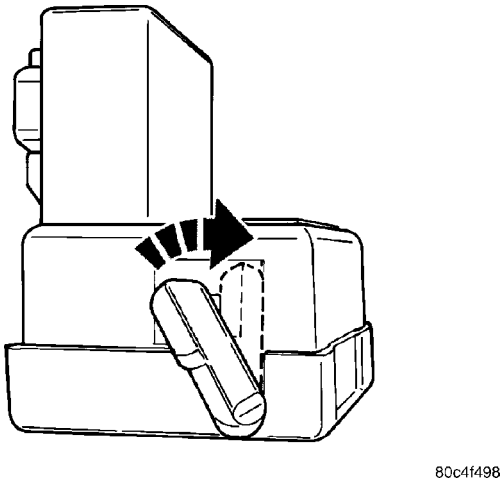


Fig. 5 Adjustment Lever Movement

(2) Reconnect the battery negative terminal.

(3) Check the stop lamps to verify they are operating properly and not staying on when the pedal is in the released position.

(4) Road test the vehicle to ensure proper operation of the brakes including ABS and speed control.

CENTER HIGH MOUNTED STOP LAMP UNIT

REMOVAL

The Center High Mounted Stop Lamp (CHMSL) is a Light Emitting Diode (LED) unit and must be replaced as such. There are no serviceable lamps on the CHMSL. If found defective, replace the entire unit.

(1) Remove the liftgate spoiler (Refer to 23 - BODY/EXTERIOR/SPOILER - REMOVAL).

(2) Separate the CHMSL from the spoiler by removing the fasteners.

INSTALLATION

(1) Place the CHMSL into position and install the fasteners.

(2) Install the liftgate spoiler (Refer to 23 - BODY/EXTERIOR/SPOILER - INSTALLATION).

(3) Verify vehicle and system operation.

FOG LAMP

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Reach up behind the front fascia and disconnect the fog lamp electrical connector (Fig. 6).

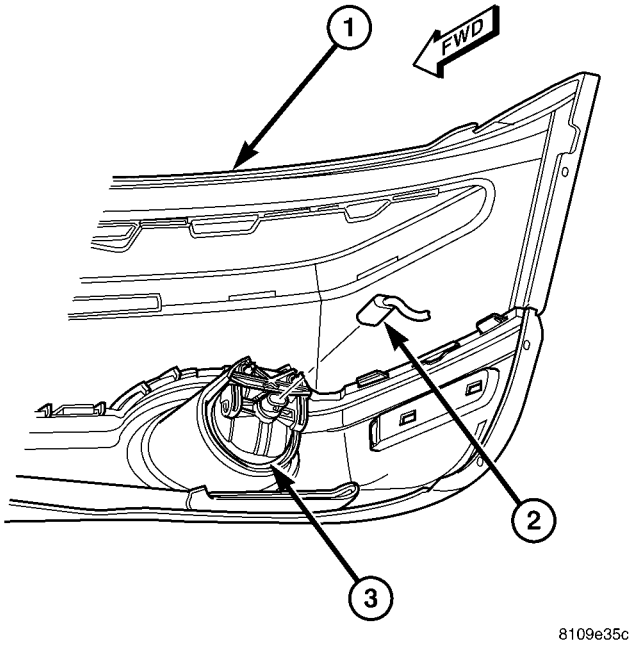


Fig. 6 FOG LAMP ELECTRICAL CONNECTION

1 - FRONT FASCIA
2 - FOG LAMP ELECTRICAL CONNECTOR
3 - FOG LAMP UNIT

(3) Twist the fog lamp 1/4 turn counterclockwise and pull rearward from fog lamp unit.

INSTALLATION

(1) Place the fog lamp into fog lamp unit and twist the fog lamp 1/4 turn clockwise until it hits its stop.

(2) Connect the fog lamp electrical connector (Fig. 6).

(3) Connect the battery negative cable.

(4) Verify vehicle and system operation.

(5) Close hood.

FOG LAMP UNIT

STANDARD PROCEDURE - FOG LAMP UNIT ALIGNMENT

FOG LAMP UNIT ALIGNMENT

Prepare an alignment screen (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - STANDARD PROCEDURE). A properly aligned fog lamp will project a pattern on the alignment screen 100 mm (4 in.) below the fog lamp center line and straight ahead (Fig. 7). To improve visual interpretation of the fog lamp pattern on the alignment screen, the headlamps should be in the "OFF" position.

The fog lamps are adjusted vertically by a adjustment screw located just above the fog lamp unit in the front.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the one retaining screw from the underside of the fascia in the fog lamp opening (Fig. 8).

(3) Pull fog lamp unit straight out of front fascia.

(4) Disconnect the electrical connection to the fog lamp and separate from vehicle.

If replacing fog lamp unit with new, the fog lamp must be transferred to the new unit.

INSTALLATION

If replacing fog lamp unit with new, the fog lamp must be transferred to the new unit.

CAUTION: Do not touch the glass of fog lamps with fingers or other possibly oily surface. Reduced lamp life will result.

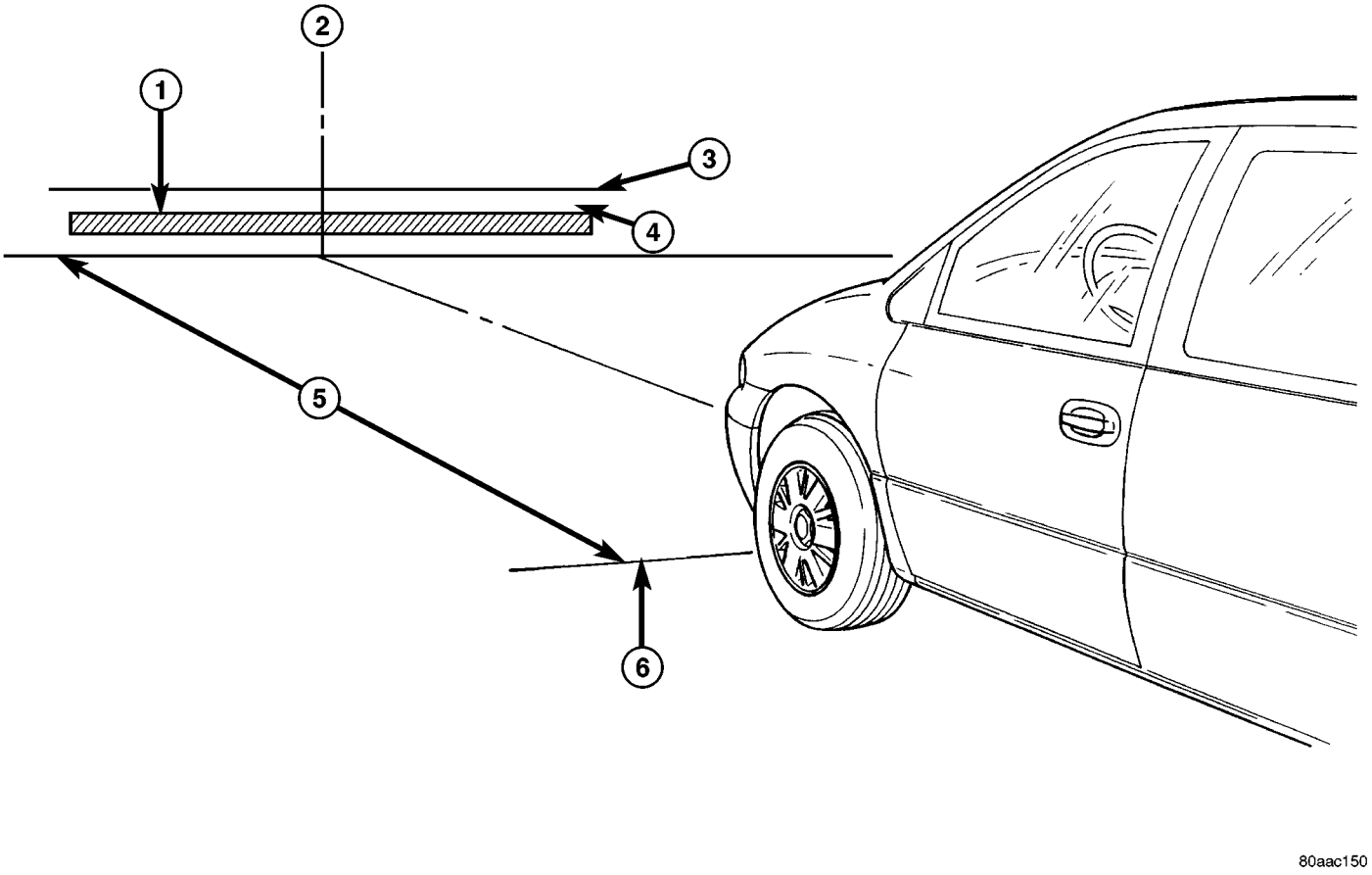


Fig. 7 FRONT FOG LAMP UNIT ALIGNMENT

1 - HIGH INTENSITY AREA
2 - CENTER OF VEHICLE
3 - HORIZONTAL CENTER OF FOG LAMP
4 - 100MM (4 IN.)
5 - 7.62 METERS (25 FT.)
6 - FRONT OF FOG LAMP

FOG LAMP UNIT (Continued)

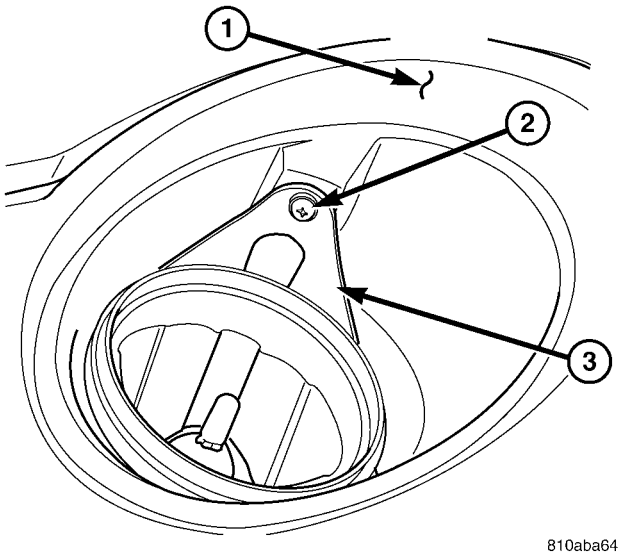


Fig. 8 FOG LAMP UNIT - REMOVE/INSTALL

1 - FRONT FASCIA
2 - FOG LAMP UNIT RETAINING SCREW
3 - FOG LAMP UNIT

(1) Connect the electrical connection to the fog lamp.

(2) Make sure as you install the fog lamp unit into the fascia, the rear indexing dowels are properly lined up (Fig. 9).

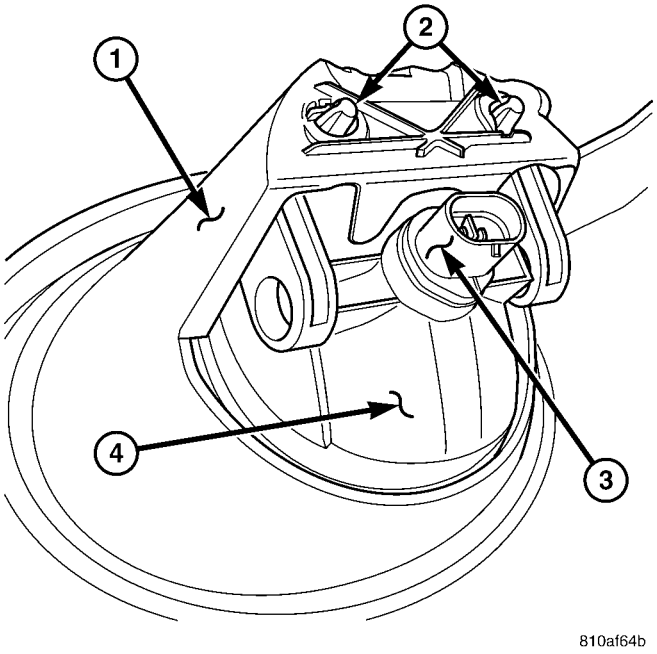


Fig. 9 FRONT FOG LAMP REAR INDEXING

1 - BACK OF FRONT FASCIA
2 - FOG LAMP UNIT ALIGNMENT DOWELS
3 - FOG LAMP
4 - FOG LAMP UNIT

(3) Push the fog lamp unit straight into the front fascia.

(4) Install one retaining screw to the underside of the fascia in the fog lamp opening (Fig. 8).

(5) Connect the battery negative cable.

(6) Verify vehicle and system operation

(7) Close hood.

FRONT SIDE MARKER LAMP

REMOVAL

(1) Remove headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(2) Twist the front side marker lamp counterclockwise and pull straight out of headlamp unit (Fig. 17).

(3) Pull front side marker lamp straight out of lamp socket.

INSTALLATION

(1) Push front side marker lamp straight into the lamp socket.

(2) Place the front side marker lamp into headlamp unit and twist clockwise (Fig. 17).

(3) Install the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

(4) Verify vehicle and system operation.

HAZARD SWITCH

DESCRIPTION

The Hazard Switch is part to the instrument panel switch pod located in the instrument cluster bezel, just to the right of the cluster (Fig. 10).

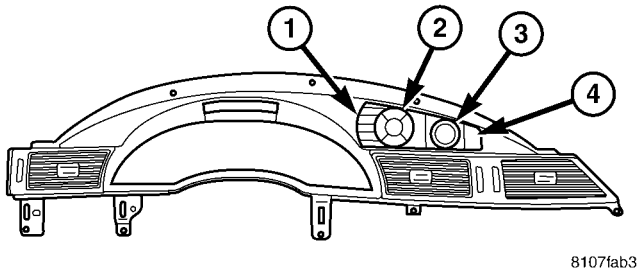


Fig. 10 HAZARD SWITCH LOCATION

1 - EVIC CONTROLS
2 - NAVIGATION CONTROLS
3 - CLOCK
4 - HAZARD SWITCH

If found to be faulty or defective, the entire instrument panel switch pod must be replaced (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/INSTRUMENT PANEL SWITCH POD - REMOVAL).

HAZARD SWITCH (Continued)

OPERATION

The hazard warning push button is pressed down to activate the hazard warning system, and pressed down again to turn the system off. The switch provides a ground to the hazard warning sense input of the instrument panel switch pod to control activation of the hazard warning lamps.

HEADLAMP

DESCRIPTION

Quad headlamps are standard equipment on this model. They are halogen headlamps, both low and high beams.

This vehicle may be equipped with optional **High Intensity Discharge (HID)** (Fig. 11) low beams. The HID type lamp is used in place of the conventional halogen low beam lamp. High beam lamps remain the same halogen type.

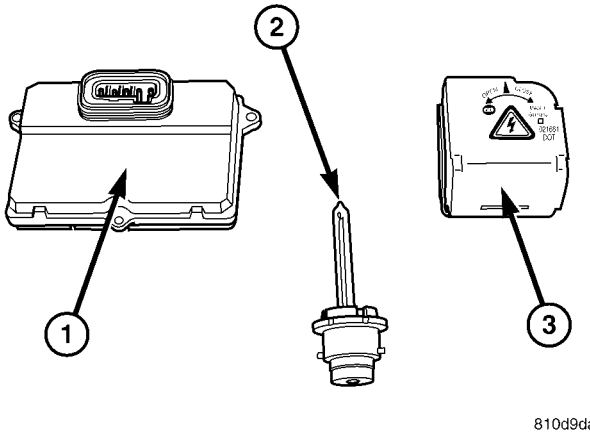


Fig. 11 HID SYSTEM COMPONENTS

1 - BALLAST MODULE
2 - LAMP
3 - LAMP IGNITER

HID lamps get their name from the intense white light produced by the electrical discharge. The light produced by the HID lamps appears as a white color as opposed to the yellow color of the standard halogen lamps.

HID lighting provides about three times the light output of standard halogen lamps while using less energy. The lamps are also designed to last 10 times longer than standard halogen lamps.

OPERATION

To turn on the headlamps, turn the left end of the Multi-Function Lever to the first detent for parking lamp and instrument panel lamp operation. Turn to the second detent for headlamp, park lamp and instrument panel lamp operation.

High Intensity Discharge Headlamps (HID) rely on an AC (alternating current) electrical charge to ignite xenon gas contained in a sealed beam lamp. The HID lamps are similar in operation to common vapor filled street headlamps. Instead of using a filament to produce light, the gas inside the lamp is ignited by creating an arc between two electrodes.

The color of the light source is classified as its color temperature. As the color temperature increases, the color of the light moves from yellow to blue-white to white. The light produced by the HID lamps appears as a white color as opposed to the yellow color of the standard (halogen) lamps. HID lamps provide light as a higher color temperature than standard halogen lamps.

For the color temperature of different lamp types, refer to the COLOR TEMPERATURE table. As a point of reference, typical sunlight at noon has a color temperature of 4977° C (8990° F).

COLOR TEMPERATURE

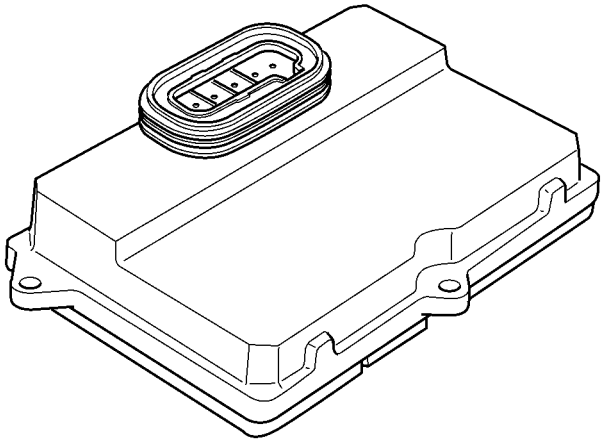
LAMP	TEMPERATURE
INCANDESCENT LAMPS	2527° C (4580° F)
HALOGEN LAMPS	2927° C (5300° F)
HID LAMPS	3827° C (6920° F)

There are three components to each of the HID headlamps:

- **Ballast Module** - The 12 volt Direct Current (DC) power supplied by the low beam relay is converted to Alternating Current (AC) power by the ballast module (Fig. 12). Each lamp requires its own ballast module. The ballast converts and steps up the low beam relay output to 800 volts AC, and supplies the lamp assembly via a cable connected to the igniter.
- **Igniter** - The igniter (Fig. 14) controls the voltage applied to the lamp electrodes. The igniter uses the voltage supplied by the ballast module and momentarily steps up the voltage to 25,000 volts to start the lamp. Once ignited, it will reduce the voltage to 85 volts.

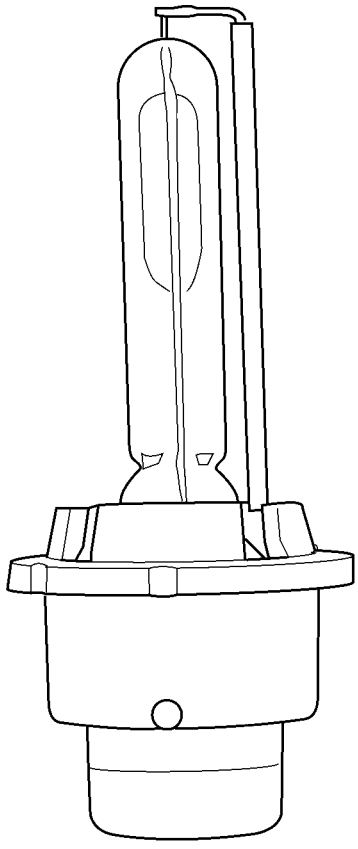
HEADLAMP (Continued)

- **Lamp** - The lamp (Fig. 13) contains electrodes and xenon gas. The lamp takes about 10-15 seconds of warm-up time to reach full operation. The light appears blue during warm-up and then turns to white.



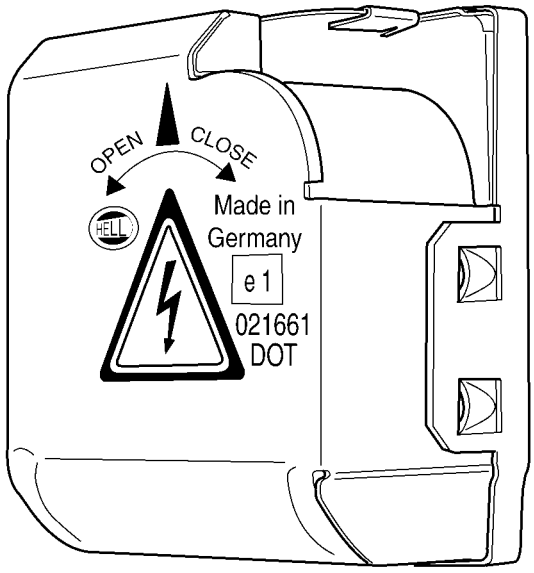
810d9dbc

Fig. 12 BALLAST MODULE



810d9db5

Fig. 13 HID LOW BEAM LAMP



810d9dc4

Fig. 14 HID LAMP IGNITER

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HEADLAMP

When a vehicle experiences problems with the headlamp system, verify the condition of the battery connections, fuses, charging system, headlamp bulbs, wire connectors, relay, high beam switch, dimmer switch, and headlamp switch. Refer to the appropriate wiring information.

Each vehicle is equipped with various lamp assemblies. A good ground is necessary for proper lighting operation. Grounding is provided by the lamp socket when it comes in contact with the metal body, or through a separate ground wire.

When changing lamp bulbs check the socket for corrosion. If corrosion is present, clean it with a wire brush.

When it is necessary to remove components to service another, it should not be necessary to apply excessive force or bend a component to remove it. Before damaging a trim component, verify hidden fasteners or captured edges are not holding the component in place.

HEADLAMP (Continued)

HEADLAMP DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMPS ARE DIM WITH ENGINE IDLING OR IGNITION TURNED OFF.	1. Loose or corroded battery cables.	1. Clean and secure battery cable clamps and posts.
	2. Loose or worn generator drive belt.	2. Adjust or replace generator drive belt.
	3. Charging system output too low.	3. Test and repair charging system, refer to Electrical, Charging
	4. Battery has insufficient charge.	4. Test battery state-of-charge (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - DIAGNOSIS AND TESTING).
	5. Battery is sulfated or shorted.	5. Load test battery (Refer to 8 - ELECTRICAL/ BATTERY SYSTEM - DIAGNOSIS AND TESTING).
	6. Poor lighting circuit Z343/Z344-ground.	6. Test for voltage drop across Z343/Z344-ground locations, refer to Electrical, Wiring Diagrams.
HEADLAMP BULBS BURN OUT FREQUENTLY.	1. Integrated Power Module (IPM) not controlling voltage.	1. Test and repair Integrated Power Module.
	2. Loose or corroded terminals or splices in circuit.	2. Inspect and repair all connectors and splices. Refer to Electrical, Wiring Diagrams.
HEADLAMPS ARE DIM WITH ENGINE RUNNING ABOVE IDLE.	1. Charging system output too low.	1. Test and repair charging system, refer to Electrical, Wiring Diagrams.
	2. Poor lighting circuit Z343/Z344-ground.	2. Test for voltage drop across Z343/Z344-ground locations, refer to Electrical, Wiring Diagrams.
	3. High resistance in headlamp circuit.	3. Test amperage draw of headlamp circuit.
HEADLAMPS FLASH RANDOMLY	1. Poor lighting circuit Z343/Z344-ground.	1. Test for voltage drop across Z343/Z344-ground locations, refer to Electrical, Wiring Diagrams.
	2. Variable resistance in headlamp circuit.	2. Test amperage draw of headlamp circuit.
	3. Loose or corroded terminals or splices in circuit.	3. Inspect and repair all connectors and splices, refer to Electrical, Wiring Diagrams.
	4. Faulty headlamp switch.	4. Replace headlamp switch.

HEADLAMP (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMPS DO NOT ILLUMINATE.	1. No voltage to headlamps.	1. Repair open headlamp circuit, refer to Electrical, Wiring Diagrams.
	2. No Z343/Z344-ground at headlamps.	2. Repair circuit ground, refer to Electrical, Wiring Diagrams.
	3. Broken connector terminal or wire splice in headlamp circuit.	3. Repair connector terminal or wire splice.
	4. Faulty or burned out bulb.	4. Replace headlamp bulb(s).
	5. Body Control Module malfunction.	5. Refer to appropriate Body Control Module diagnostics.
	6. PCI Bus Communication	6. Verify messages being transmitted by BCM and received by IPM.
	7. IPM Malfunction.	7. Refer to appropriate IPM diagnostics.
HEADLAMPS ON WITH IGNITION IN RUN, WITH HEADLAMP SWITCH OFF.	1. Faulty headlamp switch.	1. Replace headlamp switch (review BCM logged faults).
	2. Diagnostic tool indicates (4.7 - 5.0V) on headlamp switch input to BCM.	2. Inspect and repair terminals, connectors and open circuits.
	3. PCI Bus Communication.	3. Verify messages being transmitted by BCM and received by IPM.

DIAGNOSIS AND TESTING - HIGH INTENSITY DISCHARGE HEADLAMPS

The High Intensity Discharge (HID) headlamps are supplied B+ voltage and ground, the same as normal halogen low beam lamps. The low beam system is different from there forward. The ballast module is mounted to the bottom of the headlamp unit. The ballast module has internal circuit protection to prevent module damage in case of an open or shorted circuit. The module has overcharge and undercharge circuit protection. If either is sensed, the module will not illuminate the headlamps for that key cycle or until the fault is corrected. Recycle the ignition and headlamp switch if both headlamps do not illuminate. Before determining the headlamp assembly is faulty, check the connector at the headlamp and check if there is voltage coming from the IPM pin providing the power to the respective headlamp (F2-25 left low headlamp, F2-16 right low headlamp, F2-22 right high beam, F2-18 left high beam). If the module senses a short or open circuit condition, it will not operate the lamp/igniter.

WARNING: THE HEADLAMP UNIT MUST BE REMOVED TO PERFORM THESE TESTS (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ HEADLAMP UNIT - REMOVAL). FAILURE TO DO SO COULD RESULT IN PERSONAL INJURY OR DEATH.

(1) Inspect lamp for a burned out lamp. If lamp is burned out it will appear black or smoky, similar to a normal halogen bulb. If lamp looks OK, go to Step 2.

(2) Check for B+ battery voltage at the connector going into the ballast module. Refer to Wiring Diagrams for connector location. If battery voltage and a good ground are present, go to Step 3. If B+ voltage and a good ground are not present, refer to Wiring Diagrams for circuit and connector locations to find short or open circuit.

(3) Plug in a known good ballast module and check for lamp operation. If lamp lights, replace ballast module. If lamp still fails to light, replace igniter assembly.

HEADLAMP (Continued)

REMOVAL

HALOGEN HEADLAMP

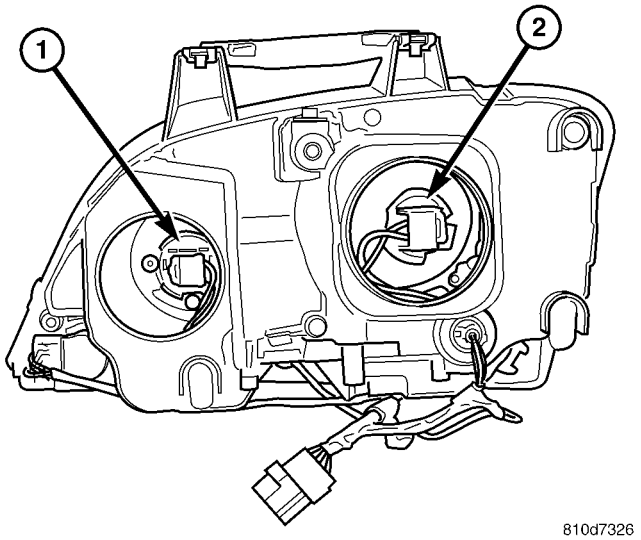


Fig. 15 HALOGEN HEADLAMP UNIT

1 - HEADLAMP HIGH BEAM
2 - HEADLAMP LOW BEAM

(1) Remove the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(2) Disconnect the lamp electrical connector (Fig. 16).

(3) Remove the rubber boots/seals protecting the lamp from the elements.

(4) Twist lamp socket out of headlamp housing.

HIGH INTENSITY DISCHARGE (HID) HEADLAMPS (IF EQUIPPED) - LOW BEAM

HEADLAMP

(1) Remove the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(2) Remove the rubber boots/seals protecting the lamp/igniter from the elements.

(3) Grab the igniter and twist counterclockwise approximately 1/4 turn. There is an arrow pointing which direction to turn (Fig. 17). The igniter electrical connector will disengage when this happens, unlocking the igniter from the HID lamp.

(4) Pull the igniter straight out of the headlamp unit.

(5) Pull lamp straight out of igniter.

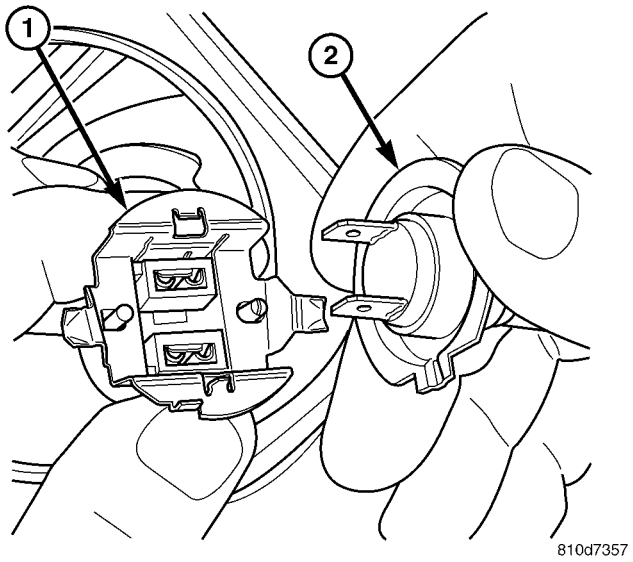


Fig. 16 HALOGEN LAMP FROM CONNECTOR

1 - HEADLAMP ELECTRICAL CONNECTOR (HALOGEN LAMPS)
2 - HALOGEN LAMP

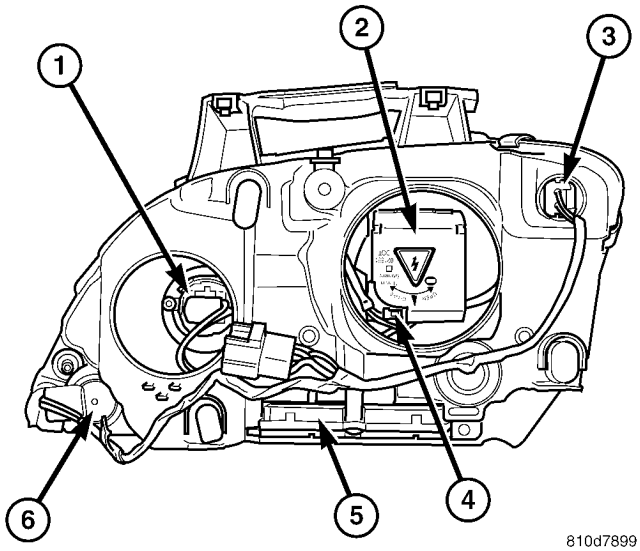


Fig. 17 HID HEADLAMP UNIT

1 - HEADLAMP HIGH BEAM
2 - HID HEADLAMP LOW BEAM
3 - SIDE MARKER LAMP
4 - HID IGNITER ELECTRICAL CONNECTOR
5 - HID BALLAST MODULE
6 - TURN SIGNAL LAMP

HEADLAMP (Continued)

IGNITER

(1) Remove the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(2) Remove the rubber boots/seals protecting the lamp/igniter from the elements.

(3) Grab the igniter and twist counterclockwise approximately 1/4 turn. There is an arrow pointing which direction to turn (Fig. 17). The igniter electrical connector will disengage when this happens, unlocking the igniter from the HID lamp.

(4) Pull the igniter straight out of the headlamp unit.

BALLAST MODULE

(1) Remove the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(2) Remove the three retaining screws (Fig. 18).

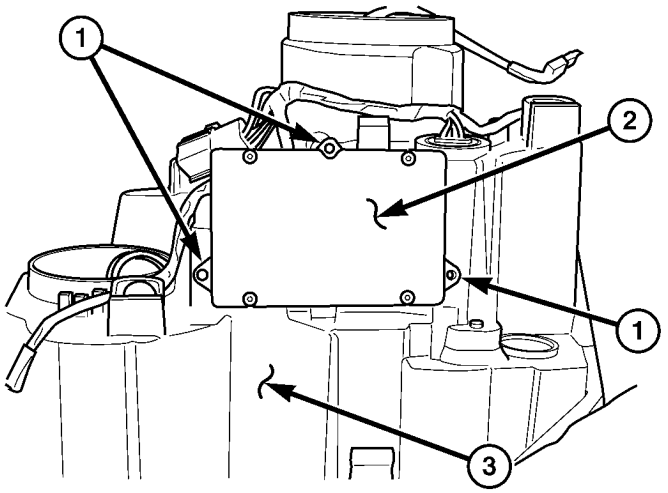


Fig. 18 BALLAST MODULE MOUNTING

1 - BALLAST MODULE RETAINING SCREWS
2 - BALLAST MODULE
3 - HID HEADLAMP UNIT

(3) Remove the ballast module from headlamp unit (Fig. 19).

INSTALLATION

CAUTION: Do not touch the glass of HID or halogen lamps with fingers or other possibly oily surface. Reduced lamp life will result.

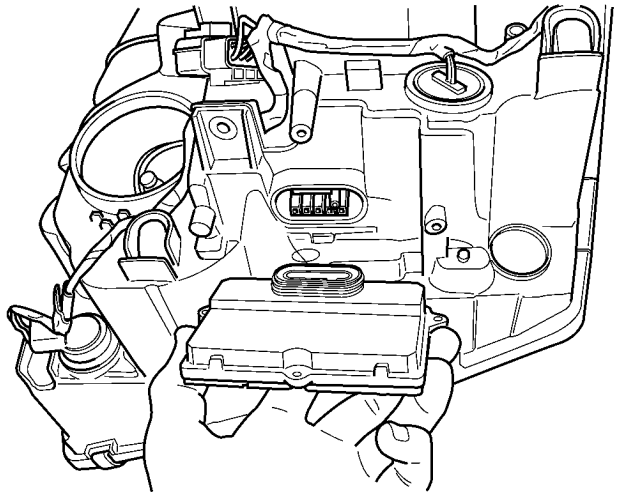


Fig. 19 BALLAST MODULE - REMOVE/INSTALL

HALOGEN HEADLAMP

(1) Place the headlamp in the lamp socket, being careful to align the lamp with the socket index.

(2) Place lamp socket into the headlamp housing (Fig. 15).

(3) Connect the lamp electrical connector (Fig. 16).

(4) Install the rubber boots/seals protecting the lamp from the elements.

(5) Install the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

HIGH INTENSITY DISCHARGE (HID) HEADLAMPS (IF EQUIPPED) - LOW BEAM

HEADLAMP

(1) Place the headlamp into the lamp opening of headlamp unit, being careful to align the lamp to the indexes.

Make sure the slots on the igniter are lined up. If not, use a small screwdriver to align them (Fig. 20).

(2) Place the igniter on the HID lamp. Do not at this time connect the igniter electrical connector. It will make it unable to twist the igniter to the closed position.

(3) Twist the igniter clockwise to close/lock it into place.

(4) Position the igniter electrical connector and firmly snap into place (Fig. 21).

(5) Install the rubber boots/seals protecting the lamp/igniter from the elements.

(6) Install the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

HEADLAMP (Continued)

IGNITER

Make sure the slots on the igniter are lined up. If not, use a small screwdriver to align them (Fig. 20).

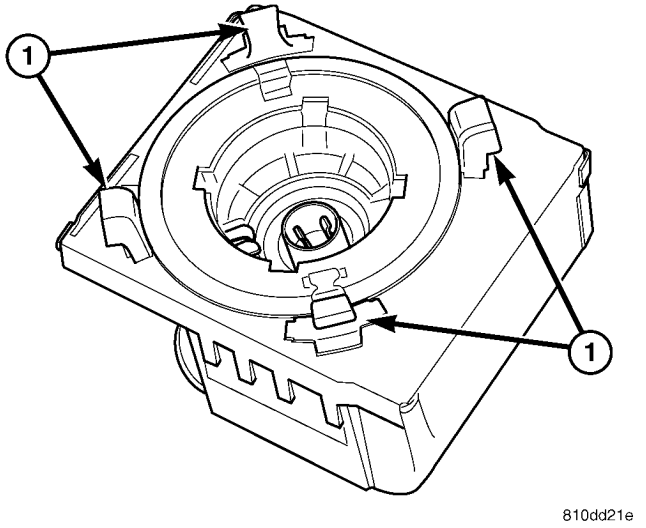


Fig. 20 IGNITER UNDERSIDE

1 - IGNITER RETAINING HOOKS

(1) Place the igniter on the HID lamp. Do not at this time connect the igniter electrical connector. It will make it unable to twist the igniter to the closed position.

(2) Twist the igniter clockwise to close/lock it into place.

(3) Position the igniter electrical connector and firmly snap into place (Fig. 21).

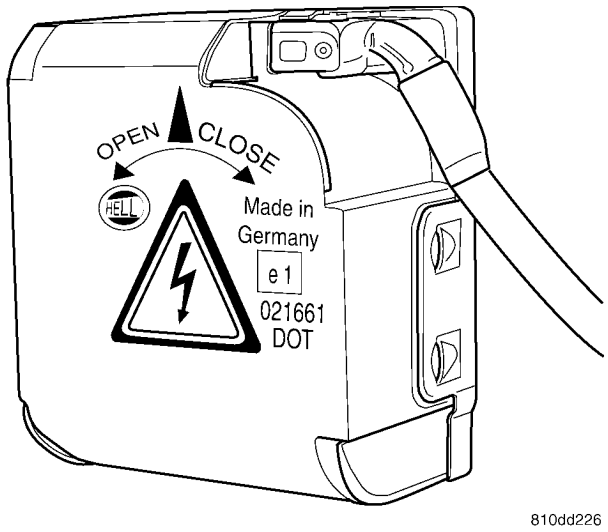


Fig. 21 IGNITER ELECTRICAL CONNECTION

(4) Install the rubber boots/seals protecting the lamp/igniter from the elements.

(5) Install the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

BALLAST MODULE

(1) Place the ballast module on the headlamp unit (Fig. 19).

(2) Install the three retaining screws (Fig. 18)

(3) Install the headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

HEADLAMP UNIT

STANDARD PROCEDURE - HEADLAMP UNIT ALIGNMENT

HEADLAMP UNIT ALIGNMENT PREPARATION

(1) Verify headlamp dimmer switch and high beam indicator operation.

(2) Inspect and correct damaged or defective components that could interfere with proper headlamp alignment.

(3) Verify proper tire inflation.

(4) Clean headlamp lenses.

(5) Verify that luggage area is loaded as the vehicle is routinely used.

(6) Vehicles equipped with automatic load leveling suspension should be driven normally for approximately 5 km (3 miles) before attempting a proper headlamp unit alignment.

(7) Fuel tank should be FULL. Add 2.94 kg (6.5 lbs.) of weight over the fuel tank for each estimated gallon of missing fuel.

HEADLAMP UNIT (Continued)

ALIGNMENT SCREEN PREPARATION

(1) Position vehicle on a level surface perpendicular to a flat wall 7.62 meters (25 ft.) away from front of headlamp lens (Fig. 22).

(2) If necessary, tape a line on the floor 7.62 meters (25 ft.) away from and parallel to the wall.

(3) Rock vehicle side-to-side three times and allow suspension to stabilize.

(4) Jounce front suspension three times by pushing downward on front bumper and releasing.

(5) Measure the distance from the center of headlamp lens to the floor. Transfer measurement to the alignment screen (with tape). Use this line for up/down adjustment reference.

HEADLAMP UNIT ADJUSTMENT

The low beam headlamp will project on the screen upper edge of the beam (cut-off) at the horizontal lamp centerline ± 50 mm (2 in.). Horizontal aim is preset and can not be adjusted. The high beam pattern should be correct when the low beams are aligned properly. To adjust headlamp vertical alignment, rotate adjustment screw to achieve the specified low beam cut-off location (Fig. 23).

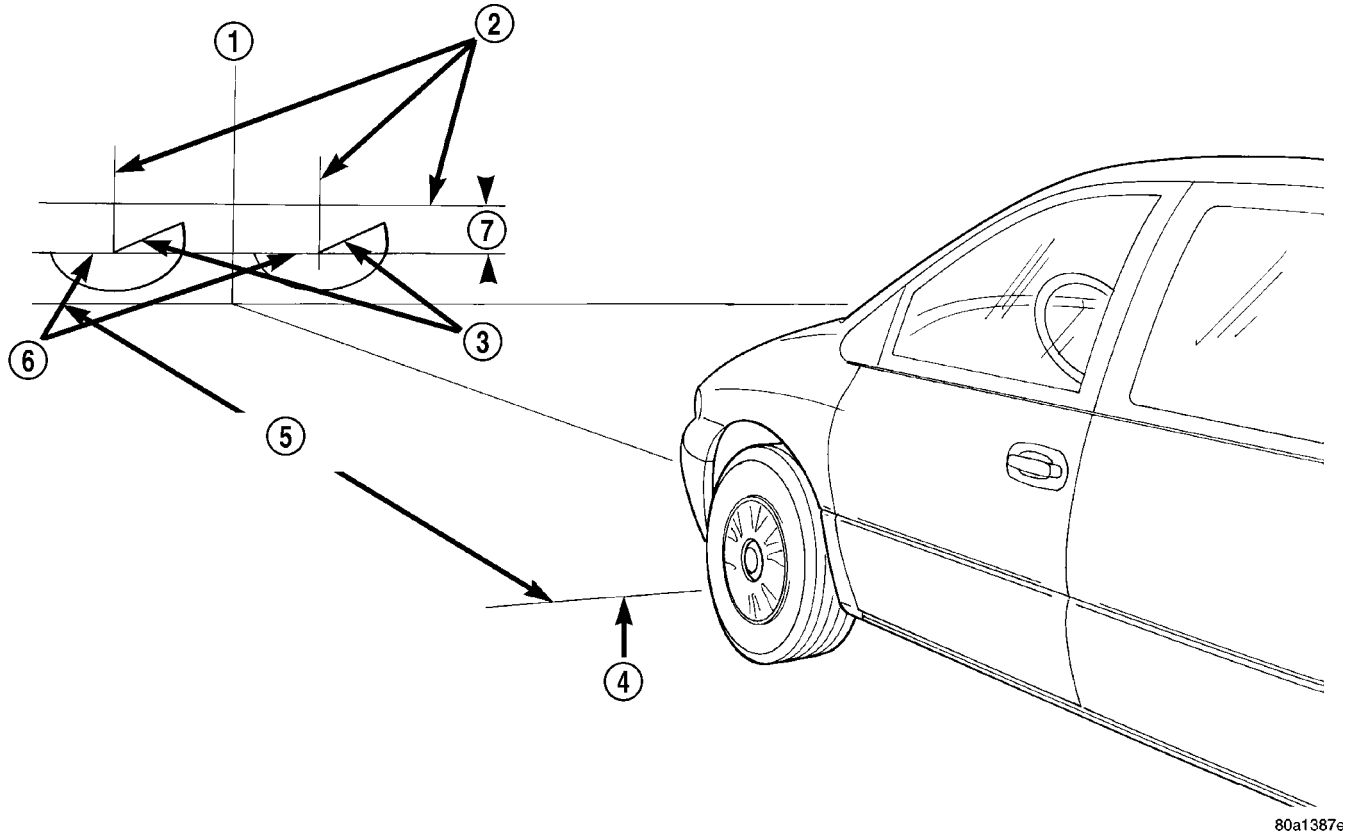


Fig. 22 HEADLAMP UNIT ALIGNMENT SCREEN

1 - CENTER OF VEHICLE
2 - CENTER OF HEADLAMPS
3 - 15° CUT-OFF LINE
4 - FRONT OF HEADLAMP
5 - 7.62 METERS (25 FT.)
6 - HORIZONTAL CUT-OFF LINE
7 - 53 mm (2.1 in.)

HEADLAMP UNIT (Continued)

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Remove the two headlamp unit retaining screws (Fig. 23).

(3) Gently pull headlamp unit forward, unsnapping it from the lower retaining clip (Fig. 24). Be careful not to damage lower retaining clip upon removal.

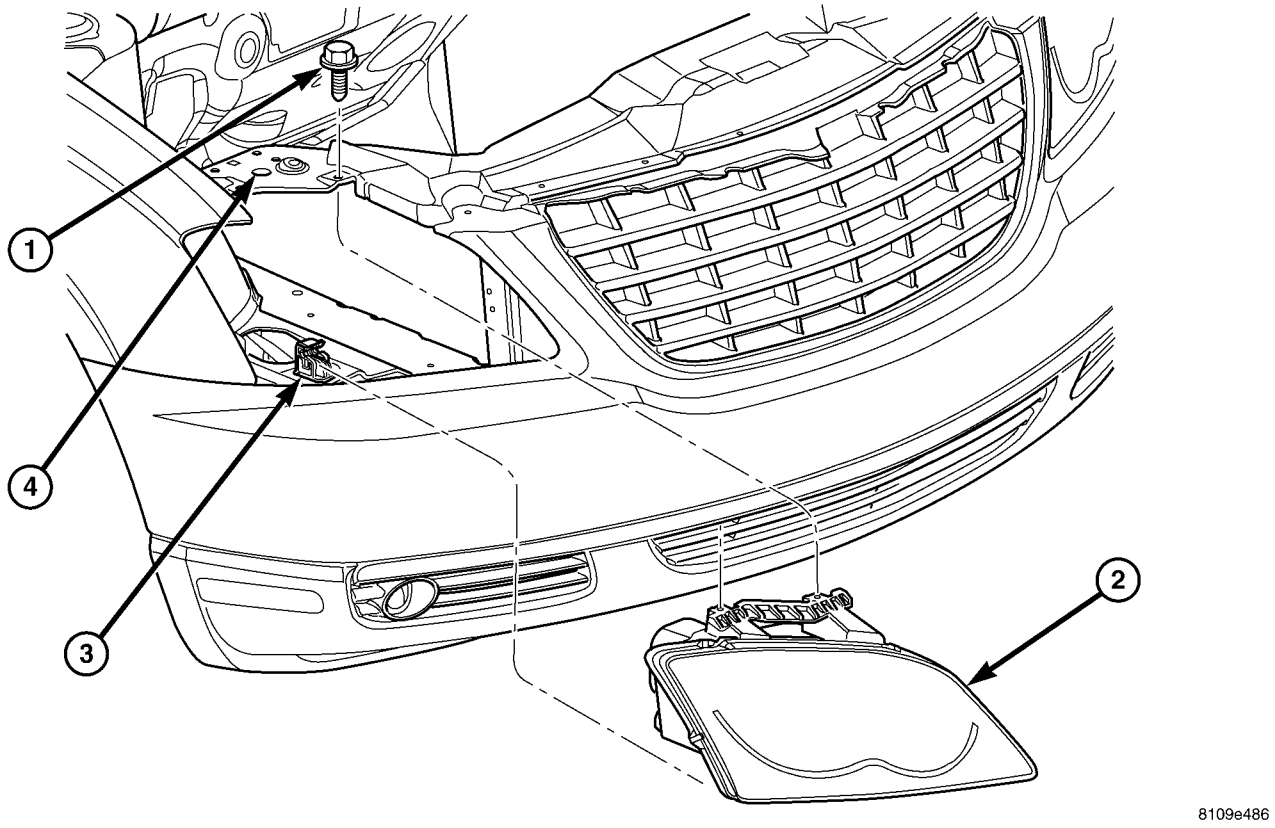


Fig. 23 HEADLAMP UNIT MOUNTING - REMOVE/INSTALL

1 - HEADLAMP UNTI RETAINING SCREW
2 - HEADLAMP UNIT
3 - LOWER HEADLAMP UNIT RETAINING CLIP
4 - VERTICAL HEADLAMP ADJUSTMENT SCREW

HEADLAMP UNIT (Continued)

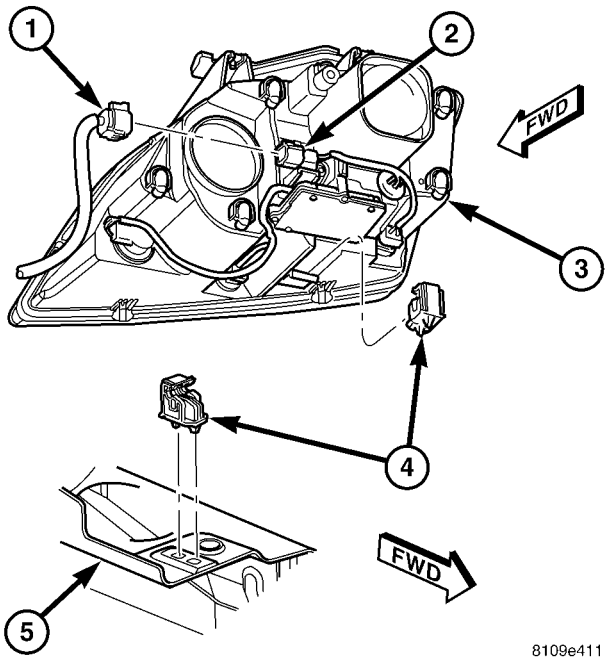


Fig. 24 HEADLAMP UNIT LOWER ATTACHMENT

1 - HEADLAMP UNIT BODY HARNESS CONNECTOR
2 - HEADLAMP UNIT ELECTRICAL CONNECTOR
3 - HEADLAMP UNIT
4 - LOWER HEADLAMP UNIT RETAINING CLIP
5 - HEADLAMP UNIT BODY OPENING

(4) Disconnect the headlamp unit electrical connector (Fig. 24).

(5) Transfer the lamps to the new headlamp unit if replacing.

INSTALLATION

(1) Transfer the lamps to the new headlamp unit if replacing.

(2) Connect the headlamp unit electrical connector (Fig. 24).

(3) Gently place the headlamp unit into the body opening. Make sure the lower retaining clip is placed on the retaining bar on the bottom of the headlamp unit (Fig. 24). Be careful not to damage lower retaining clip upon installation.

(4) Install the two headlamp unit retaining screws (Fig. 23).

(5) Connect the battery negative cable.

(6) Verify vehicle and system operation.

(7) Close hood.

LEFT MULTI-FUNCTION SWITCH

DESCRIPTION

The left (lighting) multi-function switch is secured to the left side of the multi-function switch mounting housing at the top of the steering column, just below the steering wheel (Fig. 25). The only visible component of the left multi-function switch is the control stalk that extends through a dedicated opening in the left side of the steering column shrouds. The remainder of the left multi-function switch is concealed beneath the steering column shrouds. The switch is secured to the multi-function switch mounting housing near the top of the steering column by two screws.

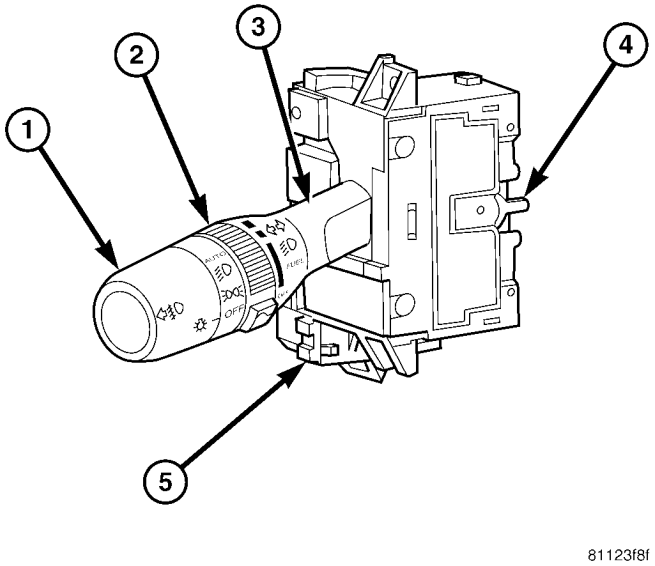


Fig. 25 LEFT (LIGHTING) MULTI-FUNCTION SWITCH

1 - EXTERIOR LIGHTING CONTROL
2 - INTERIOR LIGHTING CONTROL
3 - CONTROL STALK
4 - CANCEL ACTUATOR
5 - LEFT (LIGHTING) MULTI-FUNCTION SWITCH

LEFT MULTI-FUNCTION SWITCH (Continued)

The control stalk has a control knob on its end with a knurled face to allow it to be easily rotated. Just below the control knob is a knurled control sleeve. The left multi-function switch is the primary control for the interior and exterior lighting systems, and contains switches and circuitry to provide signals to the Body Control Module (BCM).

The left (lighting) multi-function switch cannot be adjusted or repaired. If any function of the switch is faulty, or if the switch is damaged, the entire switch unit must be replaced.

A single connector with eleven terminal pins is located on the back of the switch housing and connects the switch to the vehicle electrical system. The left multi-function switch supports the following exterior lighting functions:

- Auto Headlamps
- Front Fog Lamps
- Headlamps
- Headlamp Beam Selection
- Headlamp Optical Horn
- Park Lamps
- Turn Signal Control

The left multi-function switch also supports the following interior lighting functions:

- Panel Lamps Dimming
- Interior Lamps Defeat
- Interior Lamps On
- Parade Mode

OPERATION

The left multi-function switch uses a combination of resistor multiplexed and conventionally switched outputs to control the many functions and features it provides using a minimal number of hard wired circuits. The switch is grounded to the chassis. The left multi-function switch operates to control the many exterior lighting functions and features it provides:

- **Auto Headlamps** - The automatic headlamps feature is provided by the Body Control Module (BCM), which monitors an input from a photodiode sensor located in the Electrocromatic Mirror (ECM) to detect ambient light levels whenever the ignition switch is in the ON position. Based upon the multiplexed input from the left multi-function switch and the input of the photodiode sensor, the BCM provides a message to the IPM to illuminate or extinguish all exterior lighting.
- **Front Fog Lamps** - The Body Control Module (BCM) monitors the left multi-function switch then, based upon that switched ground input, provides a message to the IPM to illuminate or extinguish the front fog lamps.
- **Headlamps** - The Body Control Module (BCM) monitors the left multi-function switch then, provides a message to the IPM to illuminate or extinguish the headlamps.
- **Headlamp Beam Selection** - The Body Control Module (BCM) monitors the left multi-function switch then, based upon that switched ground input, provides a message to the IPM to activate the selected headlamp beam.
- **Headlamp Optical Horn** - The Body Control Module (BCM) monitors the left multi-function switch then, based upon that switched ground input, provides a message to the IPM to activate the headlamp high beams.
- **Park Lamps** - The Body Control Module (BCM) monitors the left multi-function switch then, based upon that multiplexed input, provides a message to the IPM to illuminate or extinguish the parking lamps.
- **Turn Signal Control** - The left multi-function switch control stalk actuates the turn signal switch. The Body Control Module (BCM) monitors the left multi-function switch then, based upon that multiplexed input, provides a variable voltage output to control the lighting of the turn signals.

The left multi-function switch operates to control the many interior lighting functions and features it provides:

- **Panel Lamps Dimming** - The Body Control Module (BCM) monitors the left multi-function switch then, based upon that multiplexed input, provides a variable voltage output through several panel lamps driver circuits to control the lighting of many incandescent panel lamps. The BCM also sends panel lamps dimming messages over the Programmable Communications Interface (PCI) data bus to other modules to control Display lighting levels in those modules.
- **Interior Lamps Defeat** - The Body Control Module (BCM) monitors the left multi-function switch then, based upon that multiplexed input, internally disables the function the BCM normally provides to control the illumination of the interior lamps.
- **Interior Lamps On** - The Body Control Module (BCM) monitors the left multi-function switch then, based upon that multiplexed input, provides a control output to activate all of the interior lamp circuits.
- **Parade Mode** - The Body Control Module (BCM) monitors the left multi-function switch then, based upon that multiplexed input, provides a voltage output through several panel lamps driver circuits to control the lighting of many incandescent panel lamps. The BCM also sends panel lamps dimming messages over the Programmable Communications Interface (PCI) data bus to other modules on the bus to control lighting levels in those modules.

LEFT MULTI-FUNCTION SWITCH (Continued)

DIAGNOSIS AND TESTING - LEFT MULTI-FUNCTION SWITCH

Refer to the appropriate wiring information.

(1) Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector from the multi-function switch connector.

(2) Using an ohmmeter, perform the continuity and resistance tests at the terminals in the left multi-function switch connector (refer to wiring for appropriate connector views) as shown in the LEFT MULTI-FUNCTION SWITCH CONTINUITY/RESISTANCE TEST table.

LEFT MULTI-FUNCTION SWITCH CONTINUITY/RESISTANCE TEST

TURN SIGNAL SWITCH			
SWITCH POSITION		**CONTINUITY BETWEEN**	
Neutral		No Related Continuity	
Left		Pins 2 & 8	
Right		Pins 2 & 7	
Neutral		Pins 2 & 9	
EXTERIOR LIGHTING SWITCH			
SWITCH POSITION	**CONTINUITY BETWEEN**	**RESISTANCE BETWEEN**	**RESISTANCE**
Off	-	Pins 4 & 11	3743 - 3824 Ω
Park Lamps On	-	Pins 4 & 11	901 - 926 Ω
Head Lamps On	-	Pins 4 & 11	345 - 358 Ω
Auto Headlamps On	-	Pins 4 & 11	74 - 81 Ω
Fog Lamps	Pins 1 & 4	-	-
Optical Horn	Pins 2 & 5	-	-
High Beam	Pins 2 & 6	-	-
INTERIOR LIGHTING SWITCH			
Dome Lamp Disable On	-	Pins 4 & 10	63 - 70 Ω
Panel Lamps Dimming Position 1	-	Pins 4 & 10	198 - 208 Ω
Dimming Position 2	-	Pins 4 & 10	551 - 569 Ω
Dimming Position 3	-	Pins 4 & 10	905 - 929 Ω
Dimming Position 4	-	Pins 4 & 10	1258 - 1290 Ω
Dimming Position 5	-	Pins 4 & 10	1611 - 1651 Ω
Dimming Position 6	-	Pins 4 & 10	1965 - 2011 Ω
Parade Mode On	-	Pins 4 & 10	3534 - 3611 Ω
Dome Lamp Enable On	-	Pins 4 & 10	7811 - 7974 Ω

(3) If the left multi-function switch fails any of the continuity or resistance tests, replace the switch (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - REMOVAL).

LEFT MULTI-FUNCTION SWITCH (Continued)

REMOVAL

LEFT MULTI-FUNCTION SWITCH

(1) Disconnect and isolate the battery negative cable.

(2) Remove the lower steering column shroud (Refer to 19 - STEERING/COLUMN/LOWER SHROUD - REMOVAL).

(3) Remove the upper steering column shroud (Refer to 19 - STEERING/COLUMN/UPPER SHROUD - REMOVAL).

(4) Disconnect the instrument panel wire harness connector from the switch.

(5) Remove the two screws that secure the left multi-function switch to the housing.

(6) Remove the left multi-function switch from column and vehicle.

MULTI-FUNCTION SWITCH MOUNTING HOUSING

NOTE: Before starting this procedure, be certain to turn the steering wheel until the front wheels are in the straight-ahead position.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the clock spring from the multi-function switch mounting housing. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCK SPRING - REMOVAL).

(3) Remove the left multi-function switch from the multi-function switch mounting housing (refer to above procedure).

(4) Remove the right multi-function switch from the multi-function switch mounting housing. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/RIGHT MULTI-FUNCTION SWITCH - REMOVAL).

(5) Remove the screw that secures the multi-function switch mounting housing to the steering column housing (Fig. 26).

(6) Remove the multi-function switch mounting housing (Fig. 27) and (Fig. 28).

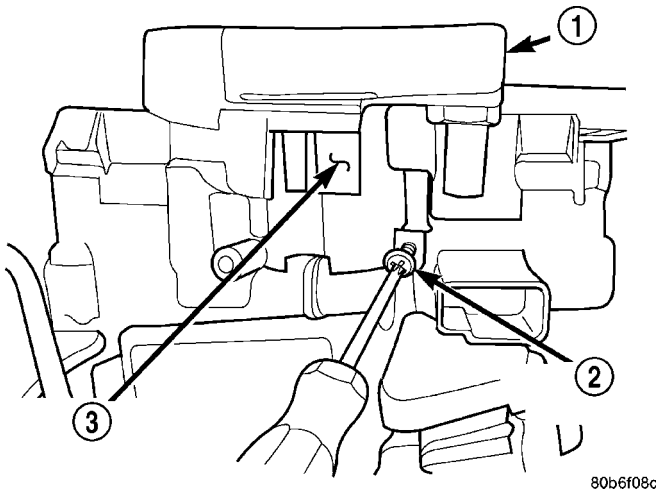


Fig. 26 MULTI-FUNCTION SWITCH MOUNTING HOUSING SCREW - REMOVE/INSTALL

1 - CLOCK SPRING
2 - SCREW
3 - MULTI-FUNCTION SWITCH MOUNTING HOUSING

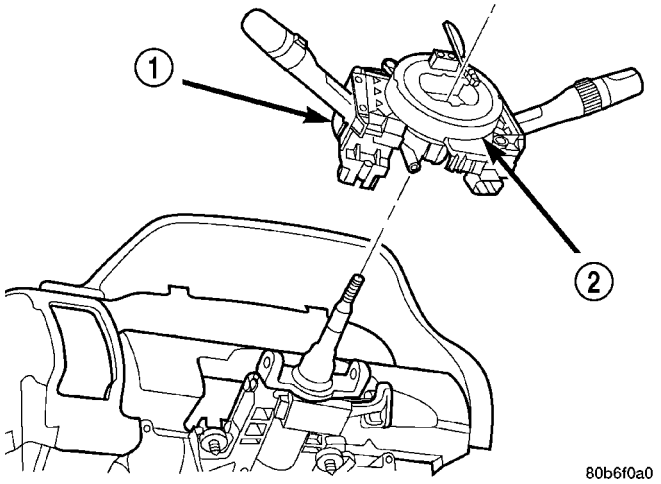


Fig. 27 MULTI-FUNCTION SWITCH MOUNTING HOUSING - REMOVE/INSTALL

1 - MULTI-FUNCTION SWITCH ASSEMBLY
2 - CLOCK SPRING

INSTALLATION

LEFT MULTI-FUNCTION SWITCH

(1) Position the left multi-function switch onto the housing.

(2) Install the two screws to the left multi-function switch. Torque the screws to 2.5 N·m (22 in. lbs.).

(3) Reconnect the instrument panel wire harness connector to the switch.

(4) Install the lower steering column shroud (Refer to 19 - STEERING/COLUMN/LOWER SHROUD - INSTALLATION).

(5) Install the upper steering column shroud (Refer to 19 - STEERING/COLUMN/UPPER SHROUD - INSTALLATION). Torque screws to 1.9 N·m (17 in. lbs.).

(6) Reconnect the battery negative cable.

(7) Verify vehicle and system operation.

MULTI-FUNCTION SWITCH MOUNTING HOUSING

NOTE: Before starting this procedure, be certain that the front wheels are still in the straight-ahead position.

(1) Rotate the turn signal cancel cam in the multi-function switch housing until the alignment hole in the one cam lobe is aligned with the alignment hole

LEFT MULTI-FUNCTION SWITCH (Continued)

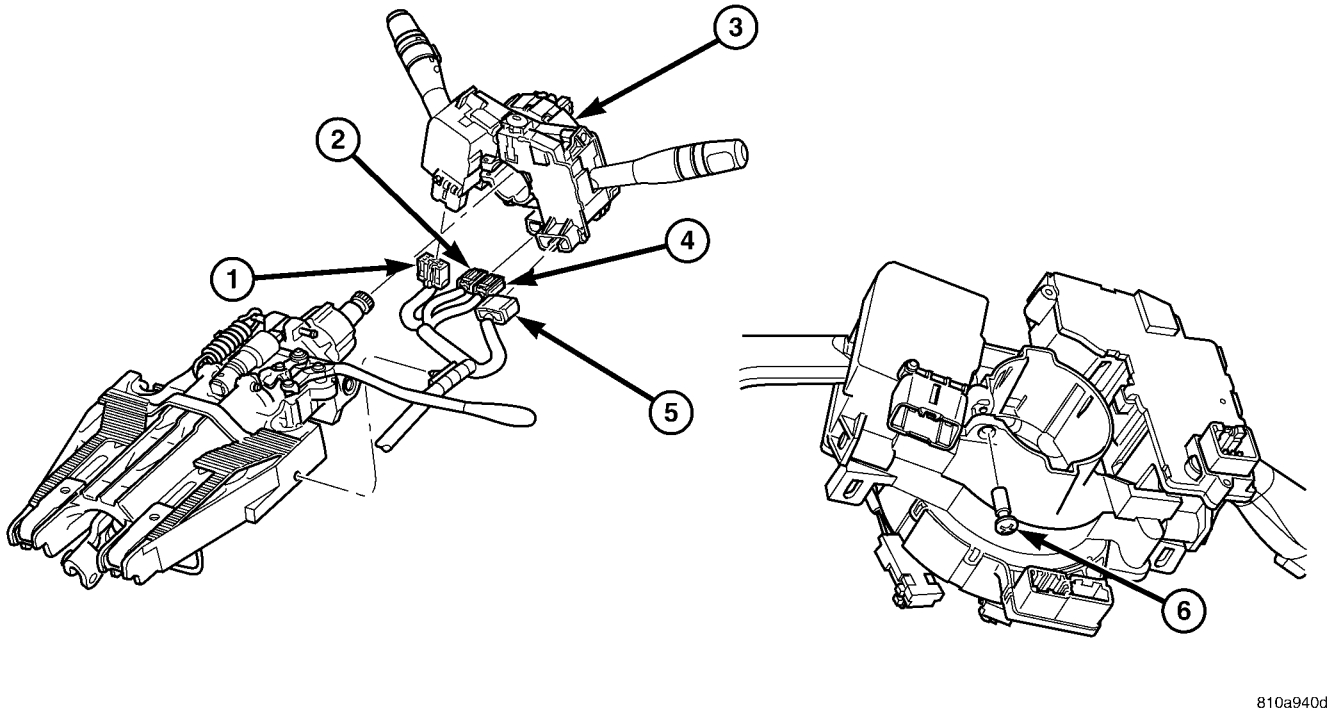


Fig. 28 MULTI-FUNCTION SWITCH - REMOVE/INSTALL

1 - RIGHT MULTI-FUNCTION SWITCH CONNECTOR
2 - CLOCK SPRING AIRBAG CONNECTORS
3 - MULTI-FUNCTION SWITCH ASSEMBLY W/CLOCK SPRING
4 - CLOCK SPRING RADIO, SPEED CONTROL, AND HORN CONNECTOR
5 - LEFT MULTI-FUNCTION SWITCH CONNECTOR
6 - MULTI-FUNCTION SWITCH MOUNTING HOUSING RETAINING SCREW

in the back of the housing. The oblong hole in the hub of the cam should now be at the top, and the locating tab in the hub of the cam should be at the bottom (Fig. 29).

(2) Position the multi-function switch housing onto the top of the steering column. The locating tab in the hub of the turn signal cancel cam must be engaged with the alignment groove in the bottom of the upper steering column shaft.

(3) Install and tighten the screw that secures the multi-function switch housing to the top of the column housing (Fig. 26). Torque screw to 1.9 N·m (17 in. lbs.).

(4) Install the right multi-function switch onto the multi-function switch housing. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/RIGHT MULTI-FUNCTION SWITCH - INSTALLATION).

(5) Install the left multi-function switch onto the multi-function switch housing (refer to above procedure).

(6) Install the clock spring onto the multi-function switch housing. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCK SPRING - INSTALLATION).

(7) Connect the battery negative cable.

(8) Verify vehicle and system operation.

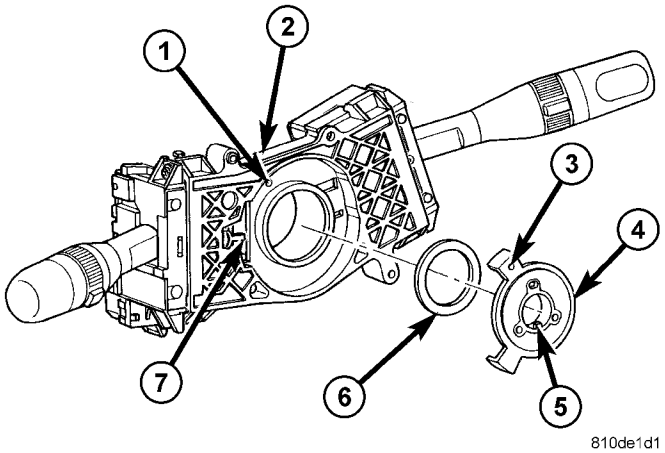


Fig. 29 TURN SIGNAL CANCELLING CAM ALIGNMENT

1 - ALIGNMENT HOLE
2 - MULTI-FUNCTION SWITCH MOUNTING HOUSING
3 - ALIGNMENT HOLE
4 - TURN SIGNAL CANCEL CAM
5 - LOCATING TAB
6 - WASHER
7 - TURN SIGNAL SWITCH CANCEL ACTUATOR

LICENSE PLATE LAMP

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Using a trim stick (special tool #C-4755) or equivalent, gently pry in and then down on the left side of the lamp cover (Fig. 30) (shown reversed) and (Fig. 31).

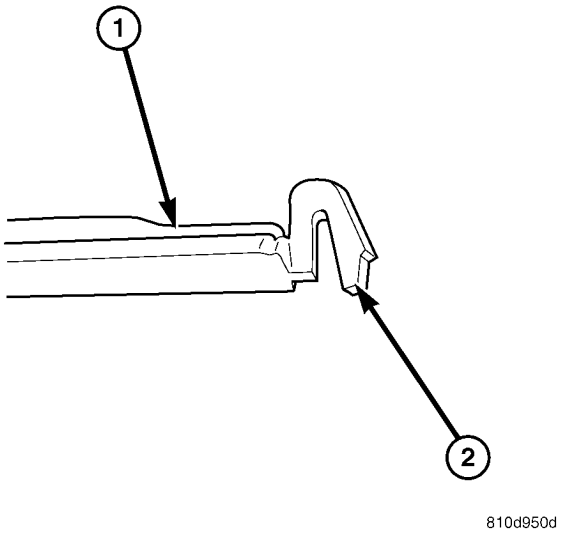


Fig. 30 LICENSE PLATE LAMP COVER LATCH

1 - LICENSE PLATE LAMP COVER
2 - PLACE TOOL HERE TO PRY

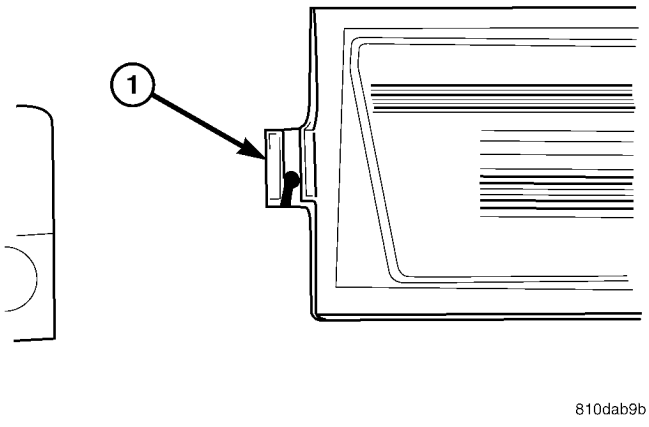


Fig. 31 LICENSE PLATE LAMP COVER - REMOVAL

1 - INSERT HERE TO PRY OFF LICENSE PLATE LAMP COVER

(3) Pull license lamp out of liftgate light bar and remove.

NOTE: If the license plate lamp unit, located within the liftgate light bar needs replacing, (Refer to 23 - BODY/LIFTGATE/LIFTGATE LIGHT BAR - REMOVAL).

INSTALLATION

(1) Align lamp with slot in socket and firmly push straight in.

(2) Position the lamp cover over retaining slots and firmly snap into place (Fig. 31).

(3) Connect the battery negative cable.

(4) Verify vehicle and system operation.

(5) Close hood.

REAR SIDE MARKER LAMP

REMOVAL

(1) Remove the tail lamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP UNIT - REMOVAL).

(2) Twist counterclockwise and pull out lamp from tail lamp unit.

(3) Pull lamp straight out of lamp socket.

INSTALLATION

(1) Push lamp straight into lamp socket.

(2) Place lamp into tail lamp unit and then twist clockwise until lamp stops (about 1/4 turn).

(3) Install the tail lamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP UNIT - INSTALLATION).

TAIL LAMP

REMOVAL

(1) Remove the tail lamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP UNIT - REMOVAL).

(2) Twist counterclockwise and pull out lamp from tail lamp unit.

(3) Pull lamp straight out of lamp socket.

INSTALLATION

(1) Push lamp straight into lamp socket.

(2) Place lamp into tail lamp unit and then twist clockwise until lamp stops (about 1/4 turn).

(3) Install the tail lamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP UNIT - INSTALLATION).

TAIL LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Open liftgate, remove two hex head bolts in inner D-pillar (Fig. 32).
(3) Rotate lamp outboard away from vehicle to remove tail lamp forward stud from grommet.
(4) Disconnect electrical connector.
(5) If replacing the tail lamp unit, transfer lamps to new unit.

INSTALLATION

(1) If replacing the tail lamp unit, transfer lamps to new unit.
(2) Connect electrical connector.
(3) Place tail lamp unit over retaining clip and push to seat in clip until you hear a snap (Fig. 32).
(4) Install the hex head nut into the D-Pillar (Fig. 32).
(5) Connect the battery negative cable.
(6) Verify vehicle and system operation.
(7) Close liftgate.

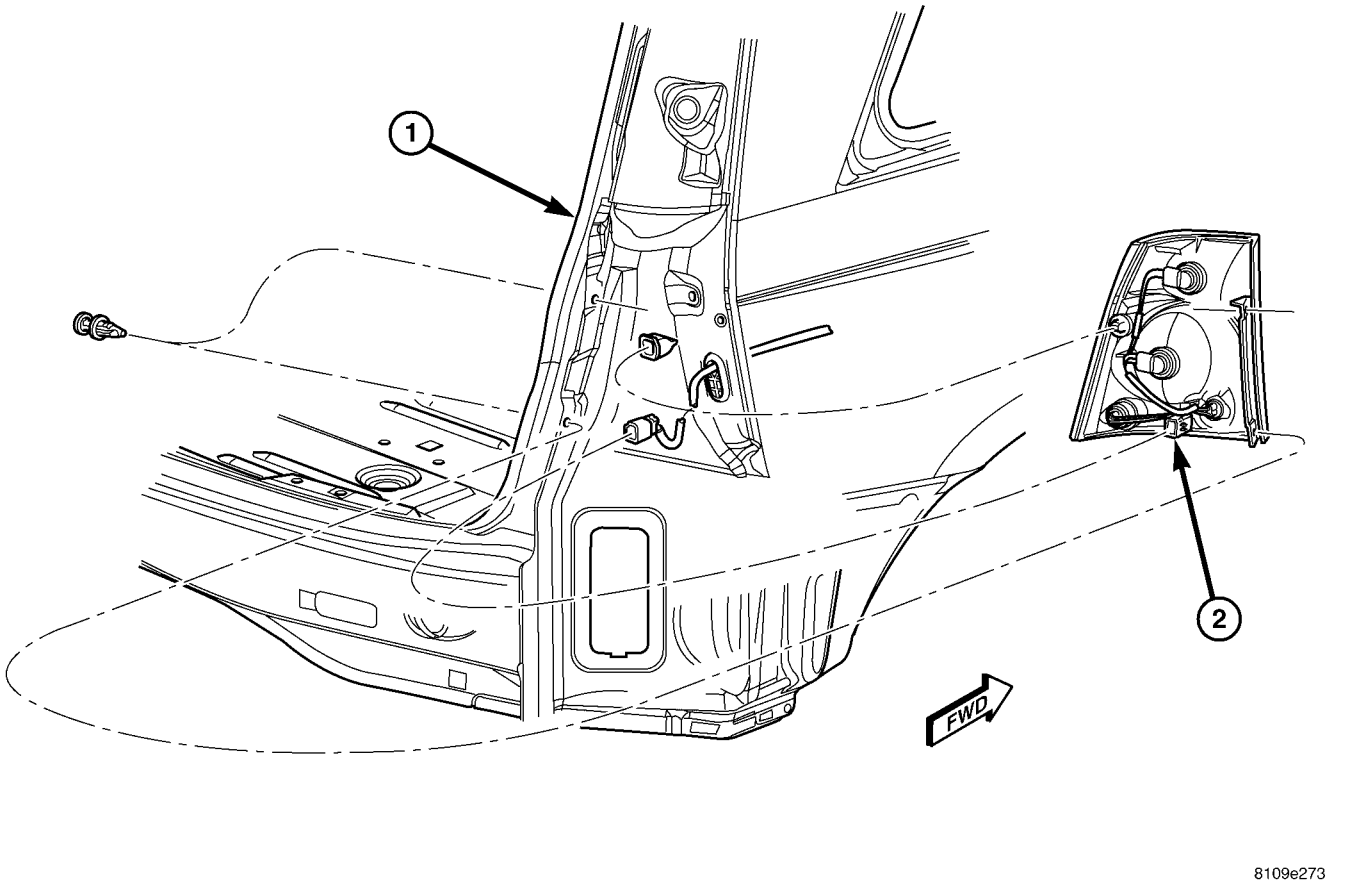


Fig. 32 TAIL LAMP UNIT - REMOVE/INSTALL

1 - REAR LIFTGATE OPENING
2 - REAR TAIL LAMP UNIT

LAMPS/LIGHTING - INTERIOR

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LAMPS/LIGHTING - INTERIOR

DESCRIPTION

COURTESY LAMP CONTROL

The Body Control Module (BCM) has direct control over all of the vehicle's courtesy lamps except for the driver and passenger front courtesy lamps. The Driver Door Module (DDM) and the Passenger Door Module (PDM) turn these lamps on based on requests sent over the PCI Bus from the BCM. The courtesy lamps will illuminate if:

- Any door is ajar and the courtesy lamp switch on the headlamp switch is not in the dome OFF position.
- The courtesy lamp switch on the headlamp switch is in the dome ON position.
- A Remote Keyless Entry unlock message is received.
- The operator unlocks the driver door with the key (with VTSS only).

ILLUMINATED ENTRY

Illuminated entry will be initiated when the customer enters the vehicle by unlocking the doors with the key fob, or with the key if the vehicle is equipped with vehicle theft security. Upon exiting the vehicle, if the lock button is pressed with a door open, illuminated entry will cancel when the door closes. If the doors are closed and the ignition switch is turned ON, the illuminated entry also cancels. The illuminated entry feature will not operate if the courtesy lamp switch is in the dome OFF position.

INTERIOR LIGHTING BATTERY SAVER

If any of the interior lamps are left ON after the ignition is turned OFF, the BCM will turn them OFF after fifteen minutes. To return to normal operation, the courtesy lamps will operate after the dome lamp switch or door ajar switch changes state. The reading lamps and glove box lamp operate under the same conditions as the courtesy lamps.

SPECIFICATIONS - INTERIOR LAMPS

BULB APPLICATION TABLE

LAMP	BULB
CENTER AND REAR READING LAMP	578
FRONT DOOR COURTESY LAMP	578
LIFTGATE LAMP	578
OVERHEAD CONSOLE READING LAMPS	578
VISOR VANITY LAMPS	V26377

DOOR COURTESY LAMP

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Open door.

(3) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on door courtesy lamp lens and remove from trim panel (Fig. 1).

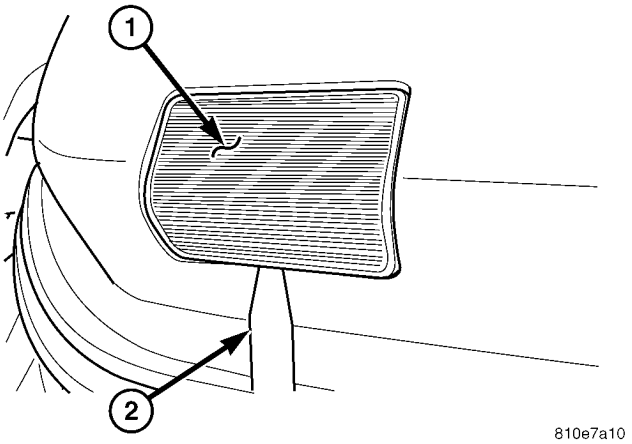


Fig. 1 DOOR COURTESY LAMP LENS - REMOVAL

1 - DOOR COURTESY LAMP LENS
2 - TRIM STICK (SPECIAL TOOL #C-4755)

(4) Gently pry up on one end of the door courtesy lamp and pull out of lamp unit (Fig. 2).

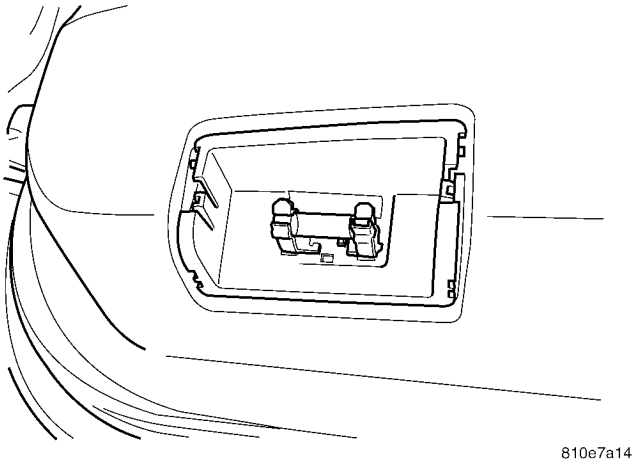


Fig. 2 DOOR COURTESY LAMP - REMOVAL

INSTALLATION

(1) Place lamp over retaining clips in door courtesy lamp unit retaining clips and firmly snap into place (Fig. 2).

(2) Place the door courtesy lamp lens over the retaining pins making sure that they are lined up and them firmly snap into place (Fig. 1).

(3) Close door.

(4) Connect the battery negative cable.

(5) Verify vehicle and system operation.

DOOR COURTESY LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL) and (Fig. 3).

(3) With the trim panel on the bench, push in on the side retaining clips of the door courtesy lamp unit and push through trim panel to remove (Fig. 4).

INSTALLATION

(1) Align the door courtesy lamp unit in the door trim panel opening and firmly snap into place (Fig. 4).

(2) Install the front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION) and (Fig. 3).

DOOR COURTESY LAMP UNIT (Continued)

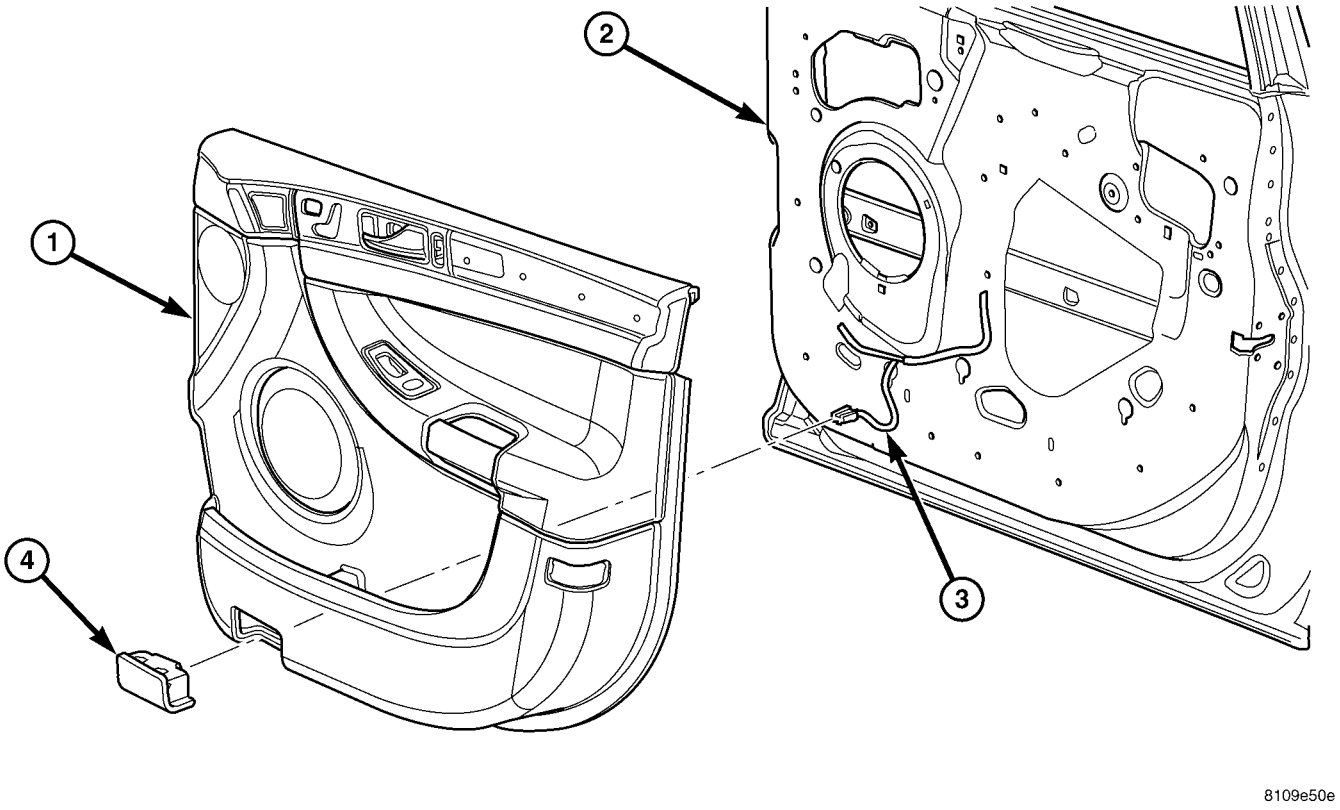


Fig. 3 DOOR COURTESY LAMP UNIT - FRONT - REMOVE/INSTALL

1 - FRONT DOOR TRIM PANEL
2 - FRONT DOOR PANEL
3 - DOOR COURTESY LAMP UNIT CONNECTOR
4 - DOOR COURTESY LAMP UNIT

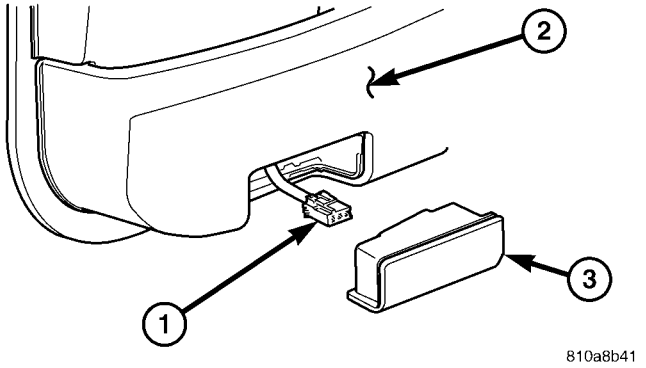


Fig. 4 DOOR COURTESY LAMP UNIT - REMOVE/INSTALL

1 - DOOR COURTESY LAMP UNIT CONNECTOR
2 - FRONT DOOR TRIM PANEL
3 - DOOR COURTESY LAMP UNIT

(3) Connect the battery negative cable.
(4) Verify vehicle and system operation.

GLOVE BOX LAMP SWITCH

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.
(2) Open right door.
(3) Open glove box.
(4) Reach up behind instrument panel and disconnect the glove box lamp switch electrical connector.
(5) Using a trim stick (special tool #C-4755) or equivalent, gently pry out glove box lamp switch from glove box opening surround (Fig. 5).
(6) If replacing the lamp, pull straight out of glove box lamp switch.

GLOVE BOX LAMP SWITCH (Continued)

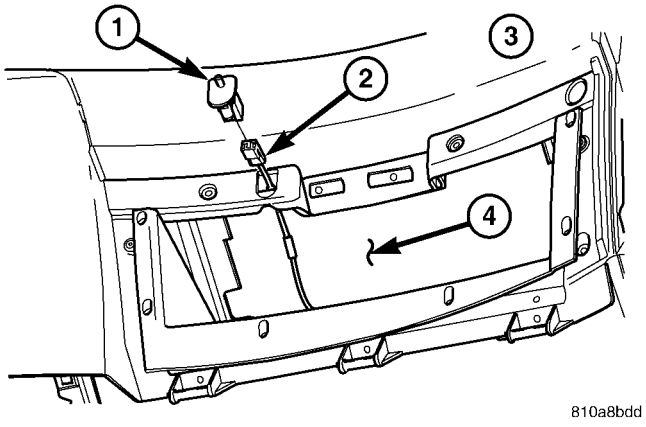


Fig. 5 GLOVE BOX LAMP SWITCH - REMOVE/ INSTALL

1 - GLOVE BOX LAMP SWITCH
2 - GLOVE BOX LAMP SWITCH CONNECTOR
3 - INSTRUMENT PANEL
4 - GLOVE BOX OPENING

INSTALLATION

(1) If replacing the lamp, push straight into glove box lamp switch.

(2) Position lamp switch over retaining hole and firmly snap into place (Fig. 5).

(3) Reach up behind instrument panel, and connect the electrical connector.

(4) Close glove box.

(5) Close right door.

(6) Connect the battery negative cable.

(7) Close hood.

(8) Verify vehicle and system operation.

ILLUMINATION LAMPS

REMOVAL

The Instrument Panel Switch Pod has two illumination lamps (Fig. 6). If found to be faulty, the entire cluster bezel must be removed. The Light Emitting Diodes (LED's) are serviceable by turning 1/4 turn counterclockwise to remove. The cluster bezel must first be removed to service the LED's (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - REMOVAL).

INSTALLATION

(1) Place Light Emitting Diode (LED) into lamp opening in instrument panel switch pod.

(2) Turn 1/4 turn clockwise.

(3) Install Cluster bezel (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - INSTALLATION).

(4) Verify vehicle and system operation.

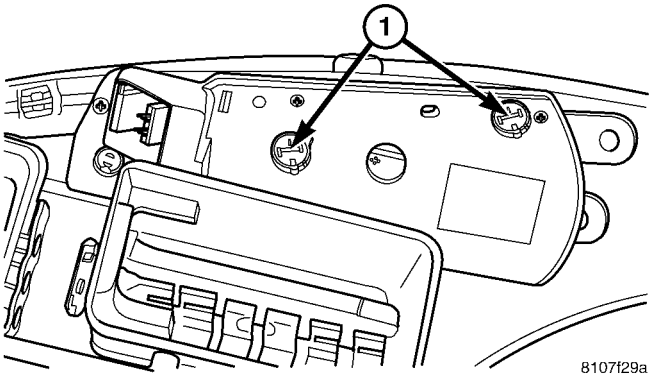


Fig. 6 INSTRUMENT PANEL SWITCH POD ILLUMINATION

1 - INSTRUMENT PANEL SWITCH POD ILLUMINATION

LIFTGATE LAMP

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Open liftgate.

(3) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on door courtesy lamp lens and remove from trim panel (Fig. 7).

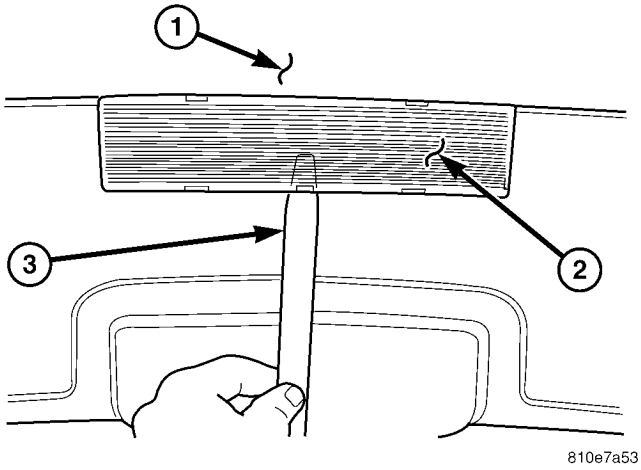


Fig. 7 LIFTGATE LAMP LENS - REMOVAL

1 - LIFTGATE TRIM PANEL
2 - LIFTGATE LAMP UNIT LENS
3 - TRIM STICK (SPECIAL TOOL #C-4755)

(4) Gently pry up on the edge of the lamp and pull out of the liftgate lamp unit to remove (Fig. 8).

LIFTGATE LAMP (Continued)

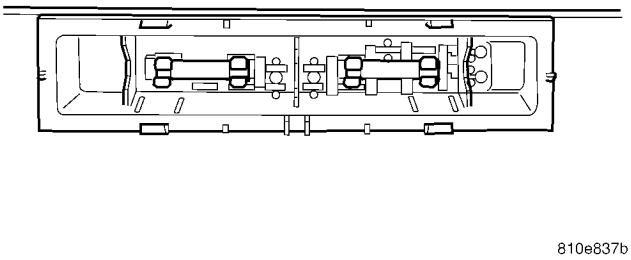


Fig. 8 LIFTGATE LAMP - REMOVAL

INSTALLATION

(1) Place lamp over retaining clips in liftgate lamp unit retaining clips and firmly snap into place (Fig. 8).

(2) Place the liftgate lamp lens over the retaining pins making sure that they are lined up and them firmly snap into place (Fig. 7).

(3) Close liftgate.

(4) Connect the battery negative cable.

(5) Close hood.

(6) Verify vehicle and system operation.

LIFTGATE LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the liftgate trim panel (Refer to 23 - BODY/INTERIOR/INTERIOR TRIM PANELS - REMOVAL) and (Fig. 9).

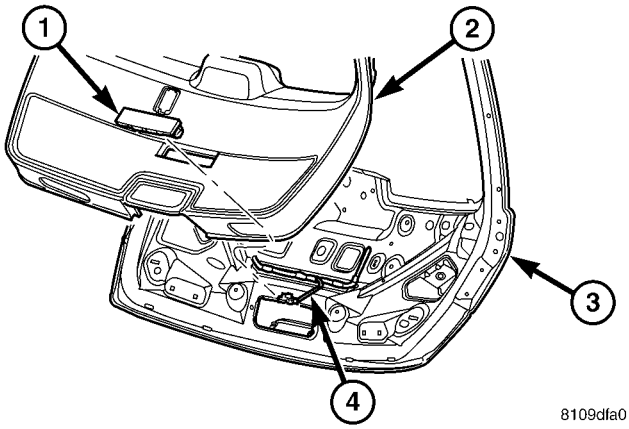


Fig. 9 LIFTGATE TRIM PANEL - REMOVE/INSTALL

1 - LIFTGATE LAMP UNIT
2 - LIFTGATE TRIM PANEL
3 - LIFTGATE PANEL
4 - LIFTGATE LAMP UNIT CONNECTOR

(3) With the trim panel on the bench, push in on the side retaining clips of the liftgate lamp unit and push through trim panel to remove (Fig. 10).

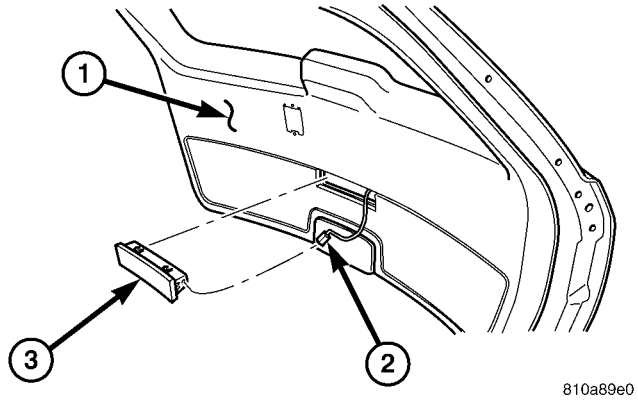


Fig. 10 LIFTGATE LAMP UNIT - REMOVE/INSTALL

1 - LIFTGATE TRIM PANEL
2 - LIFTGATE LAMP UNIT CONNECTOR
3 - LIFTGATE LAMP UNIT

INSTALLATION

(1) Align the liftgate lamp unit in the liftgate door trim panel opening and firmly snap into place (Fig. 10).

(2) Install the liftgate trim panel (Refer to 23 - BODY/INTERIOR/INTERIOR TRIM PANELS - INSTALLATION) and (Fig. 9).

(3) Connect the battery negative cable.

(4) Verify vehicle and system operation.

READING LAMPS

REMOVAL

FRONT READING LAMP

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Open door.

(3) Using a trim stick (special tool #4755) or equivalent, gently pry out from the bottom of the lamp lens to remove (Fig. 11).

(4) Gently pry up on the edge of the lamp and pull out of the overhead console to remove.

READING LAMPS (Continued)

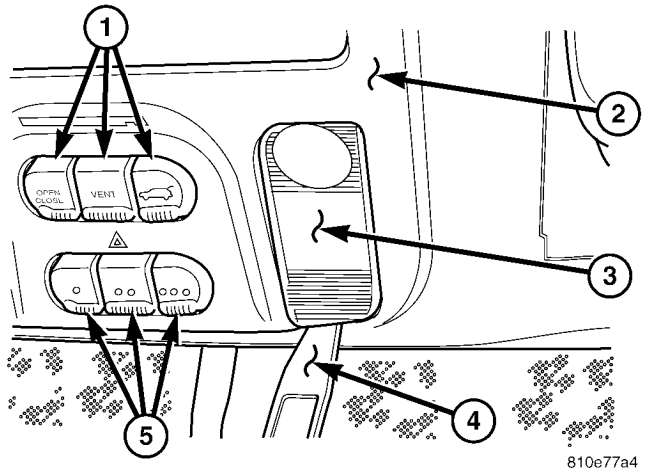


Fig. 11 FRONT READING LAMP LENS - REMOVAL

1 - POWER LIFTGATE, SUN ROOF CONTROLS (IF EQUIPPED)
2 - OVERHEAD CONSOLE
3 - FRONT READING LAMP LENS
4 - TRIM STICK (SPECIAL TOOL #C-4755)
5 - UNIVERSAL TRANSMITTER

REAR READING LAMPS - 2ND AND 3RD ROWS

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Open door.

(3) Using a trim stick (special tool #4755) or equivalent, gently pry out from the side or bottom of the lamp lens to remove (Fig. 12).

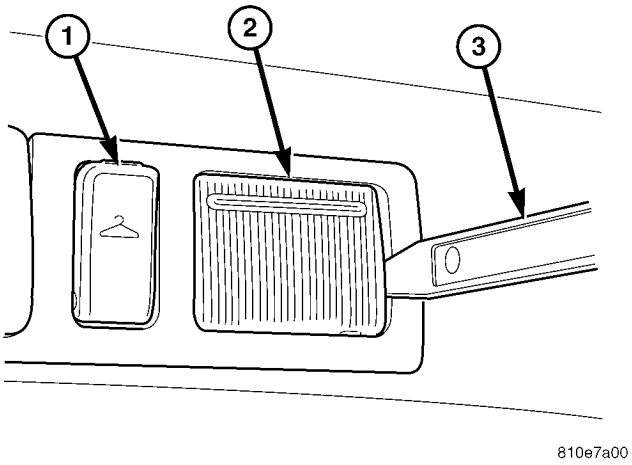


Fig. 12 REAR READING LAMP LENS - REMOVAL

1 - COAT HOOK
2 - REAR READING LAMP LENS
3 - TRIM STICK (SPECIAL TOOL #C-4755)

(4) Gently pry up on the edge of the lamp and pull out of the overhead console to remove (Fig. 13).

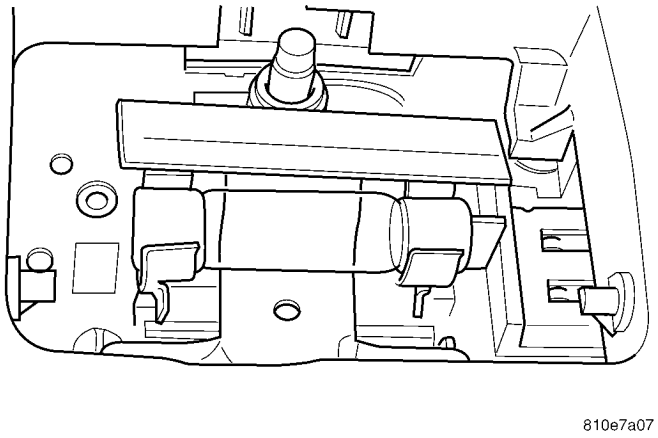


Fig. 13 REAR READING LAMP - REMOVAL

INSTALLATION

FRONT READING LAMP

(1) Place lamp over retaining clips in overhead console retaining clips and firmly snap into place.

(2) Place the front reading lamp lens over the retaining pins making sure that they are lined up and them firmly snap into place (Fig. 11).

(3) Connect the battery negative cable.

(4) Close hood.

(5) Verify vehicle and system operation.

(6) Close front door.

REAR READING LAMP - 2ND AND 3RD ROWS

(1) Place lamp over retaining clips in rear reading lamp unit retaining clips and firmly snap into place (Fig. 13).

(2) Place the rear reading lamp lens over the retaining pins making sure that they are lined up and them firmly snap into place (Fig. 12).

(3) Connect the battery negative cable.

(4) Close hood.

(5) Verify vehicle and system operation.

(6) Close front door.

VANITY LAMP

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Open door.

(3) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on vanity lamp lens and remove from the vanity (Fig. 14).

(4) Gently pry up on the edge of the lamp and pull out of the vanity unit to remove (Fig. 15).

VANITY LAMP (Continued)

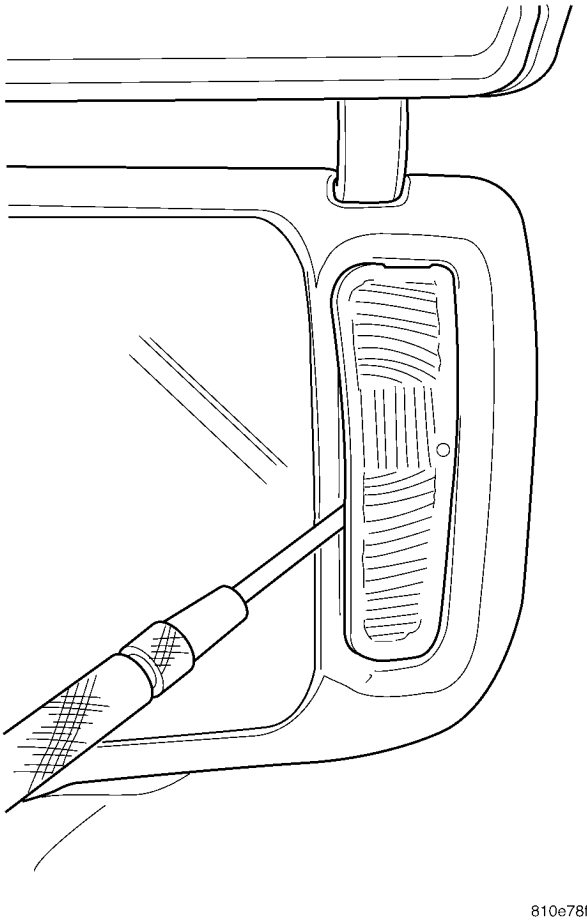


Fig. 14 VANITY LAMP LENS - REMOVAL

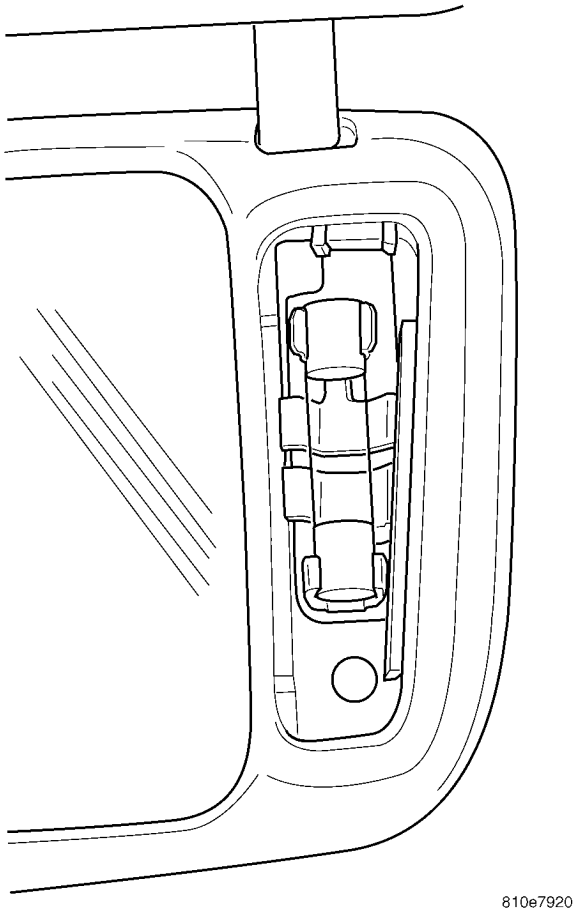


Fig. 15 VANITY LAMP - REMOVAL

INSTALLATION

(1) Place lamp over retaining clips in vanity unit retaining clips and firmly snap into place (Fig. 15).

(2) Place the vanity lamp lens over the retaining slots making sure that they are lined up and them firmly snap into place (Fig. 14).

(3) Connect the battery negative cable.
(4) Close hood.
(5) Verify vehicle and system operation.
(6) Close door.

MESSAGE SYSTEMS

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OVERHEAD CONSOLE

DESCRIPTION

Four different overhead console options are available on the CS model. The base overhead console includes a universal transmitter and push buttons. Option two includes the universal transmitter and power liftgate push buttons (Fig. 1). Option three includes the universal transmitter and power sunroof push buttons. The final option includes all of the features mentioned, universal transmitter, power liftgate and power sunroof push buttons. All overhead consoles are equipped with a internal Compass Mini-Trip Computer (CMTC) module, two reading/courtesy lamps and a storage bin. The overhead console is mounted with one screw and two snap clips to a molded plastic retainer bracket located above the headliner.

The overhead console CMTC module display and Electronic Vehicle Information Center (EVIC) is built in to the instrument cluster on this model. The instrument panel switch pod contains the US/M, MENU, STEP and RESET push buttons used to control the CMTC and EVIC displays. Refer to Instrument Cluster and Instrument Panel Switch Pod for more information.

DESCRIPTION - COMPASS

When in the compass/temperature mode, the cluster will display the direction in which the vehicle is pointed using the eight major compass headings (Examples: north is N, northeast is NE). The CMTC module contains a self-calibrating compass that requires no adjusting in normal use. The only calibration that may prove necessary is to drive the vehicle in three complete circles at 5 to 8 kilometers-per-hour (3 to 5 miles-per-hour), on level ground, in not less than forty-eight seconds. This will reorient the compass to its vehicle.

The compass will compensate for magnetism the body of the vehicle may acquire during normal use. However, avoid placing anything magnetic directly on the roof of the vehicle. Magnetic mounts for an antenna, a repair order hat, or a funeral procession flag can exceed the compensating ability of the compass unit if placed on the roof panel. Magnetic bit drivers used on the fasteners that hold the overhead console assembly to the roof header can also affect compass operation. If the vehicle roof should become magnetized, the demagnetizing and calibration proce-

OVERHEAD CONSOLE (Continued)

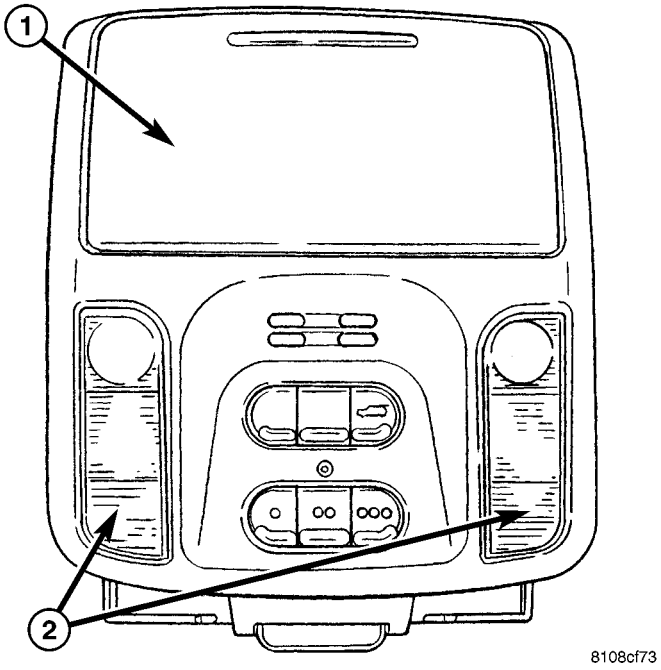


Fig. 1 CS Overhead Console

1 - Storage Bin Door
2 - Reading/Courtesy Lamps

dures found in this section may be required to restore proper compass operation.

Following are general descriptions of the major components used in the overhead console. Refer to Instrument Cluster for more information.

DIAGNOSIS AND TESTING - OVERHEAD CONSOLE

The most reliable, efficient, and accurate means to diagnose the overhead console or related system requires the use of a DRB III® scan tool and the Service and Body Diagnostic Procedures Manuals. The DRB III® scan tool can provide vital information to the technician trying to find a problem with a overhead console component. Diagnostic logic is built into the overhead console mounted module to help the person trying to locate the problem by the most efficient means possible. Anytime a problem is suspected, a DRB III® scan tool must be obtained and used to retrieve any stored fault codes in the module. If diagnostic fault codes are present in the module, record them on a piece of paper immediately before proceeding any further. Then, use these fault codes to identify the problem by verifying the fault code. Example, If the module records "**TIRE PRESSURE N/A**" fault, locate the diagnostic procedure for this code in the appropriate Body Diagnostic Procedures Manual and follow the flow chart until the specific problem is located and resolved. Once the problem is thought to be corrected, erase the stored fault code using the DRB III® scan tool and verify correct system operation. If the tire pressure monitoring system is functioning correctly, verify that there are no other stored codes in the module and return the vehicle to service.

If the fault code could not be verified, such as not finding anything wrong when following the diagnostic flow chart in the Body Diagnostic Procedures Manual. This is a good indication that a INTERMITTENT problem may be present. You must than attempt to find the intermittent problem, such as running a tire pressure monitoring system self test. Refer to the Tires/Wheels section for more information. Always, eliminate all other potential problems before attempting to replace the module.

TESTING VOLTAGE AND GROUND SUPPLY TO OVERHEAD CONSOLE

(1) Remove the overhead console from the headliner (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL) Disconnect the overhead console electrical connector. Check the fused B(+) circuit in the overhead console electrical connector. If OK, go to Step 2. If not OK, repair the open circuit or component as required. Refer to the Wiring section for detailed schematics.

(2) Check the IGN RUN B(+) circuit in the overhead console electrical connector. If OK, go to Step 3. If not OK, repair the open IGN RUN B(+) circuit as required.

(3) Check the Ground circuit in the overhead console electrical connector. If OK, go to Step 4. If not OK, repair the open ground circuit as required.

(4) If the tire pressure monitoring system is not operating properly, replace the module with a known good unit and retest the system. Refer to the Tires/Wheels section for more information on the tire pressure monitoring system.

NOTE: If the compass functions, but accuracy is suspect, it may be necessary to perform a variation adjustment. This procedure allows the compass unit to accommodate variations in the earth's magnetic field strength, based on geographic location. Refer to Compass Variation Adjustment in the Standard Procedures section of this group.

NOTE: If the compass reading displays dashes, and only "CAL" appears in the display, demagnetizing may be necessary to remove excessive residual magnetic fields from the vehicle. Refer to Compass Demagnetizing in the Standard Procedures section of this group.

OVERHEAD CONSOLE (Continued)

STANDARD PROCEDURE

STANDARD PROCEDURE - COMPASS CALIBRATION

CAUTION: Do not place any external magnets, such as magnetic roof mount antennas, in the vicinity of the compass. Do not use magnetic tools when servicing the overhead console.

The electronic compass unit features a self-calibrating design, which simplifies the calibration procedure. This feature automatically updates the compass calibration while the vehicle is being driven. This allows the compass unit to compensate for small changes in the residual magnetism that the vehicle may acquire during normal use. If the compass readings appear to be erratic or out of calibration, perform the following calibration procedure. Also, new CMTC Modules must have their compass calibrated using this procedure. Do not attempt to calibrate the compass near large metal objects such as other vehicles, large buildings, or bridges; or, near overhead or underground power lines.

NOTE: Whenever the compass is calibrated manually, the variance number must also be reset. Refer to Compass Variation Adjustment in this group.

Calibrate the compass manually as follows:

(1) Turn the ignition switch to the On position. If the compass/thermometer data is not currently being displayed, momentarily depress and release the STEP push button to reach the compass/thermometer display.

(2) Depress the Reset push button and hold the button down until “CAL” appears in the cluster display. This takes about ten seconds, and appears about five seconds after “VAR = XX” is displayed.

(3) Release the push button(s).

(4) Drive the vehicle on a level surface, away from large metal objects and power lines, through three or more complete circles at between five and eight kilometers-per-hour (three and five miles-per-hour) in not less than 48 seconds. The “CAL” message will disappear from the display to indicate that the compass is now calibrated.

NOTE: If the “CAL” message remains in the display, either there is excessive magnetism near the compass, or the unit is faulty. Repeat the calibration procedure one more time.

NOTE: If the wrong direction is still indicated in the compass display, the area selected for calibration may be too close to a strong magnetic field. Repeat the calibration procedure in another location.

STANDARD PROCEDURE - COMPASS DEMAGNETIZING

A degaussing tool (Special Tool 6029) is used to demagnetize, or degauss, the overhead console forward mounting screw and the roof panel above the overhead console. Equivalent units must be rated as continuous duty for 110/115 volts and 60 Hz. They must also have a field strength of over 350 gauss at 7 millimeters (0.25 inch) beyond the tip of the probe.

To demagnetize the roof panel and the overhead console forward mounting screw, proceed as follows:

(1) Be certain that the ignition switch is in the Off position, before you begin the demagnetizing procedure.

(2) Connect the degaussing tool (Fig. 2) to an electrical outlet, while keeping the tool at least 61 centimeters (2 feet) away from the compass unit.

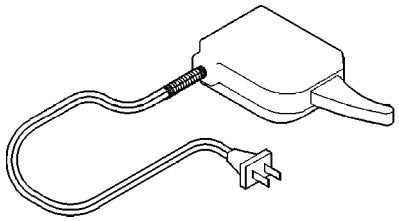


Fig. 2 Degaussing Tool 6029

(3) Slowly approach the head of the overhead console forward mounting screw with the degaussing tool connected.

(4) Contact the head of the screw with the plastic coated tip of the degaussing tool for about two seconds.

(5) With the degaussing tool still energized, slowly back it away from the screw. When the tip of the tool is at least 61 centimeters (2 feet) from the screw head, disconnect the tool.

(6) Place a piece of paper approximately 22 by 28 centimeters (8.5 by 11 inches), oriented on the vehicle lengthwise from front to rear, on the center line of the roof at the windshield header (Fig. 3). The purpose of the paper is to protect the roof panel from scratches, and to define the area to be demagnetized.

(7) Connect the degaussing tool to an electrical outlet, while keeping the tool at least 61 centimeters (2 feet) away from the compass unit.

(8) Slowly approach the center line of the roof panel at the windshield header, with the degaussing tool connected.

(9) Contact the roof panel with the plastic coated tip of the degaussing tool. Be sure that the template is in place to avoid scratching the roof panel. Using a slow, back-and-forth sweeping motion, and allowing 13 millimeters (0.50 inch) between passes, move the

OVERHEAD CONSOLE (Continued)

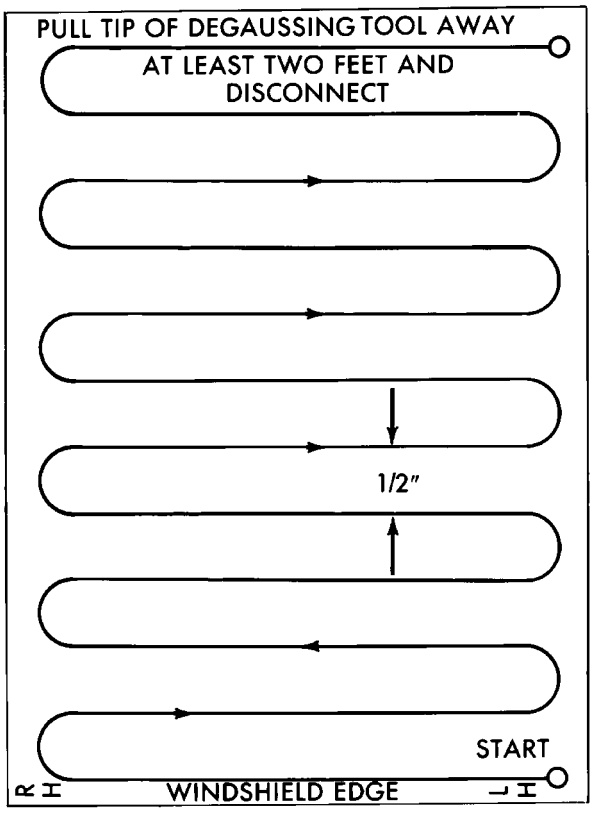


Fig. 3 Roof Demagnetizing Pattern

tool at least 11 centimeters (4 inches) to each side of the roof center line, and 28 centimeters (11 inches) back from the windshield header.

(10) With the degaussing tool still energized, slowly back it away from the roof panel. When the tip of the tool is at least 61 centimeters (2 feet) from the roof panel, disconnect the tool.

(11) Calibrate the compass and adjust the compass variance. Refer to procedure in this section for detailed instructions.

STANDARD PROCEDURE - COMPASS VARIATION ADJUSTMENT

Compass variance, also known as magnetic declination, is the difference in angle between magnetic north and true geographic north. In some geographic locations, the difference between magnetic and geographic north is great enough to cause the compass to give false readings. If this problem occurs, the compass variance setting may need to be changed.

To set the compass variance:

(1) Using the Variance Settings map, find your geographic location and note the zone number (Fig. 4).

(2) Turn the ignition switch to the On position. If the compass/thermometer data is not currently being displayed, momentarily depress and release the STEP push button to reach the compass/thermometer display.

(3) Depress the Reset push button and hold the button down until "VAR = XX" appears in the display. This takes about five seconds.

(4) Release the push button(s). "VAR =XX " will remain in the display. "XX" equals the current variance zone setting.

(5) Momentarily depress and release the **STEP** push button to step through the zone numbers, until the zone number for your geographic location appears in the display.

(6) Momentarily depress and release the **RESET** push button to enter the displayed zone number into the module memory.

(7) Confirm that the correct directions are now indicated by the compass.

REMOVAL - OVERHEAD CONSOLE

(1) Disconnect and isolate the negative battery cable.

(2) Open the storage bin and remove the T10 overhead console retaining screw.

(3) Using your fingertips, grasp the sides of the overhead console and pull down and rearward evenly to disengage the unit.

(4) Lower the overhead console far enough to access the wire harness connectors.

(5) Disconnect the electronic module and the reading/courtesy lamps electrical connector.

(6) Remove the overhead console from the vehicle.

DISASSEMBLY

(1) Remove the overhead console from the vehicle (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(2) Remove the two module retaining screws (Fig. 5).

(3) Disconnect the module electrical connector. Depress the connector retaining tab and pull straight apart.

(4) Remove the module from the overhead console.

ASSEMBLY

(1) Connect the module electrical connector.

(2) Position the module and install the two module retaining screws.

(3) Install the overhead console in the vehicle.

INSTALLATION

(1) Position the overhead console in the vehicle.

(2) Connect the electronic module and the reading/courtesy lamps electrical connector.

OVERHEAD CONSOLE (Continued)

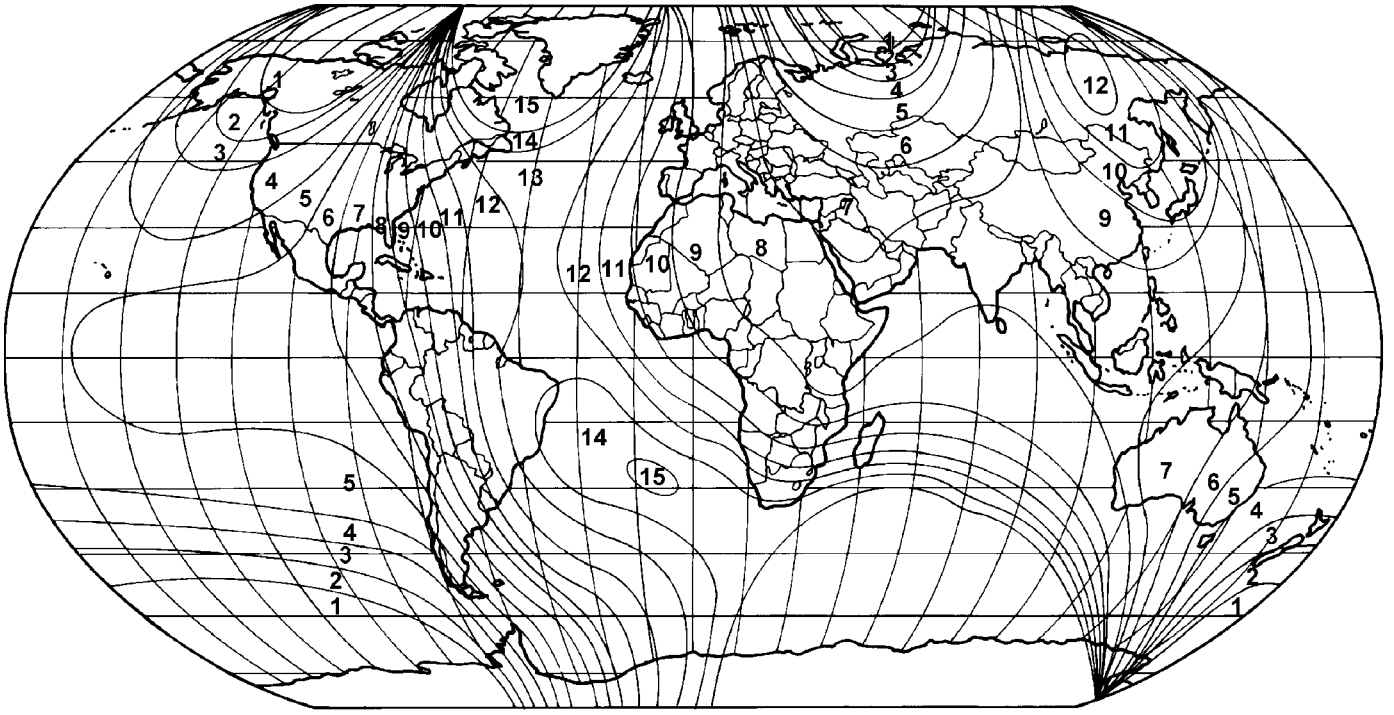


Fig. 4 Variance Settings

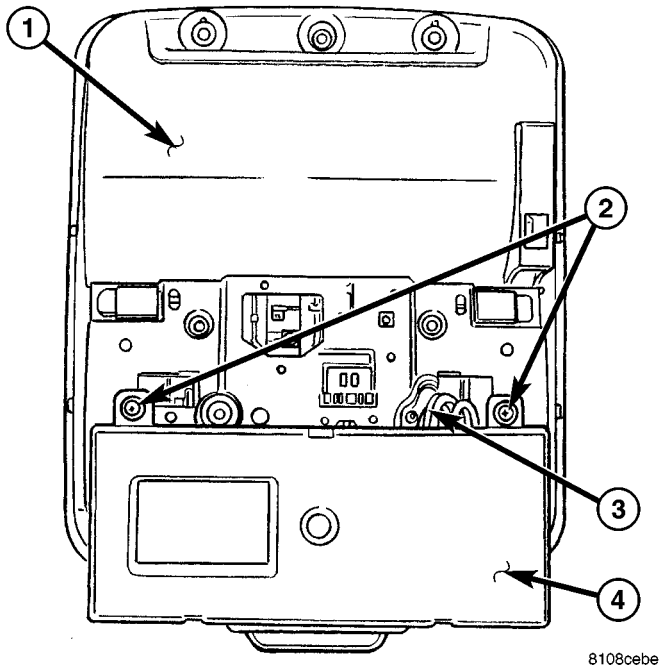


Fig. 5 Top View Of CS Overhead Console

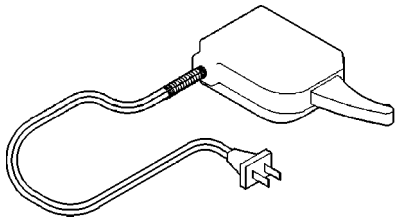
1 - Overhead Console Housing
2 - CMTC Module Retaining Screws
3 - Module Electrical Connector
4 - CMTC Module

(3) Position the overhead console and install the overhead console retaining screw, located in the storage bin. Torque the screw to 1.2 N·m (10 in. lbs.).

(4) Connect the negative battery cable.

SPECIAL TOOLS

OVERHEAD CONSOLE



Degaussing Tool 6029

AMBIENT TEMP SENSOR

DESCRIPTION

Ambient air temperature is monitored through ambient temperature messages received from the Front Control Module (FCM) over the Programmable Communications Interface (PCI) data bus circuit. The FCM receives a hard wired input from the ambient temperature sensor. The ambient temperature sensor (Fig. 6) is a variable resistor mounted to a bracket that is secured with a screw to the left side of the cooling module, behind the front grille.

For more information on the Front Control Module refer to the Electronic Control Modules section. The ambient temperature sensor cannot be adjusted or

AMBIENT TEMP SENSOR (Continued)

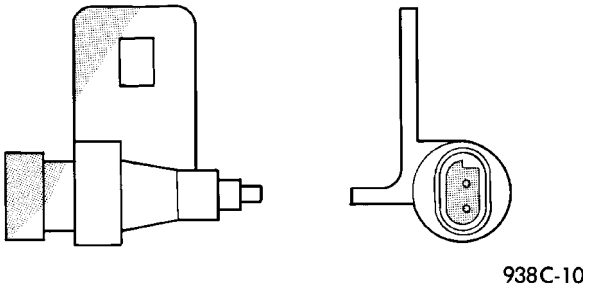


Fig. 6 Ambient Temperature Sensor

repaired and, if faulty or damaged, it must be replaced.

OPERATION

The ambient temperature sensor is a variable resistor. A five-volt reference signal is sent to the sensor by the Front Control Module. The front control module monitors the return signal voltage on a dedicated temperature sensor signal circuit. Based upon the resistance in the sensor, the Front Control Module is programmed to correspond to a specific temperature. The Front Control Module then sends the proper ambient temperature messages over the PCI data bus circuit.

The HVAC temperature display function is supported by the ambient temperature sensor, a wiring circuit, the Front Control Module and the Programmable Communications Interface (PCI) data bus. If any portion of the ambient temperature sensor circuit fails, the Front Control Module should self-diagnose the circuit.

DIAGNOSIS AND TESTING - AMBIENT TEMPERATURE SENSOR

(1) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the ambient temperature sensor wire harness connector. Refer to the removal procedure in this section.

(2) Using an ohm meter, measure the resistance through the ambient temperature sensor. At room temperature (approx. 68°F), the sensor resistance should be between 9-11 kilohms (9000 – 11000 ohms). The sensor resistance should read between these two values. If OK, the sensor is OK at this time. If not OK, replace the faulty ambient temperature sensor.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the front grille assembly from the vehicle. Refer to the Body section for the procedure.

(3) Disconnect the sensor electrical connector. Depress the connector retaining tab and pull the connector straight off the ambient temperature sensor.

(4) Remove the sensor retaining screw and remove the sensor from the vehicle.

INSTALLATION

(1) Install the sensor and connect the sensor electrical connector.

(2) Install the front grille assembly on the vehicle. Refer to the Body section for the procedure.

(3) Connect the battery negative cable.

COMPASS MINI-TRIP COMPUTER

DESCRIPTION

The Compass Mini-Trip Computer (CMTC) is a module located in the overhead console. On CS vehicle's the CMTC module display screen is located in the instrument cluster.

The Compass Mini-Trip Computer module contains a central processing unit and interfaces with other electronic modules in the vehicle over the Programmable Communications Interface PCI data bus circuit.

The CMTC module uses its internal programming and all of its data inputs to calculate the requested data. This data includes the Tire Pressure Monitoring, Compass information, Universal Transmitter, Average Fuel Economy (AFE), Distance To Empty (DTE) and Distance To Service (DTS).

The compass mini-trip computer module cannot be repaired, and is available for service only as a unit. This unit includes the plastic module. If the CMTC module is faulty or damaged, the complete module must be replaced.

OPERATION

The Compass Mini-Trip Computer is wired to both non-switched and ignition switched sources of battery current so that some of its features remain operational at any time, while others may only operate with the ignition switch in the On position. Information collected in the CMTC module is sent to the instrument cluster display via the PCI data bus circuit.

The information collected or generated in the compass mini-trip computer module includes tire pressure monitoring, compass and universal transmitter information.

COMPASS MINI-TRIP COMPUTER (Continued)

DIAGNOSIS AND TESTING - COMPASS MINI-TRIP COMPUTER

A DRB III® scan tool is required for checking the PCI Data Bus circuit and the compass mini-trip computer.

(1) Remove the overhead console from the headliner. Check for battery voltage at the fused B(+) circuit cavity of the CMTC module. If OK, go to Step 2. If not OK, repair the open fused B(+) circuit as required.

(2) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Check for continuity between the ground circuit cavity of the CMTC module and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open ground circuit as required.

(3) Connect negative battery cable. Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run/start) circuit cavity of the CMTC module. If OK, the voltage and ground supply to the module is OK at this time. If not OK, repair the open fused ignition switch output (run/start) circuit as required.

NOTE: If the compass functions, but accuracy is suspect, it may be necessary to perform a variation adjustment. This procedure allows the compass unit to accommodate variations in the earth's magnetic field strength, based on geographic location. Refer to Compass Variation Adjustment in the Standard Procedures section of this group.

NOTE: If the compass reading displays a blank, and only "CAL" appears in the display, demagnetizing may be necessary to remove excessive residual magnetic fields from the vehicle. Refer to Compass Demagnetizing in the Standard Procedures section of this group.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove overhead console. Refer to Overhead Console Removal and Installation in this section(Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(3) Remove the screws holding the compass mini-trip computer (CMTC) module in the overhead console.

(4) Disconnect the CMTC module electrical connector.

(5) Remove CMTC module from console assembly.

NOTE: If the CMTC module is being replaced, the tire pressure monitoring system must be retrained. Refer to the Tires/Wheels section for detailed instructions.

INSTALLATION

(1) Position the CMTC module in the overhead console and connect the electrical connector.

(2) Install the screws holding the CMTC module in the overhead console.

(3) Install the overhead console (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - INSTALLATION).

(4) Connect the battery negative cable.

NOTE: If the CMTC module is being replaced, the tire pressure monitoring system must be retrained. Refer to the Tires/Wheels section for detailed instructions.

NOTE: If a new CMTC module has been installed, the compass will have to be calibrated and the variance set. Refer to compass variation adjustment and compass calibration in standard procedures.

UNIVERSAL TRANSMITTER

DESCRIPTION

On CS models, a Universal Transmitter transceiver is standard factory-installed equipment. The universal transmitter transceiver is integral to the overhead console mounted CMTC module. The only visible component of the universal transmitter are the three transmitter push buttons centered in the overhead console. The three universal transmitter push buttons are identified with one, two or three light indicators and raised buttons so that they be easily identified by sight or by feel.

Each of the three universal transmitter push buttons controls an independent radio transmitter channel. Each of these three channels can be trained to transmit a different radio frequency signal for the remote operation of garage door openers, motorized gate openers, home or office lighting, security systems or just about any other device that can be equipped with a radio receiver in the 286 to 399 MegaHertz (MHz) frequency range for remote operation. The universal transmitter is capable of operating systems using either rolling code or non-rolling code technology.

The universal transmitter cannot be repaired or adjusted and if the transmitter is faulty or damaged, the complete CMTC module must be replaced. If the universal transmitter push buttons are faulty or damaged the complete overhead console housing assembly must be replaced.

UNIVERSAL TRANSMITTER (Continued)

OPERATION

The universal transmitter operates on a non-switched source of battery current so the unit will remain functional, regardless of the ignition switch position. For more information on the features, programming procedures and operation of the universal transmitter, see the owner's manual in the vehicle glove box.

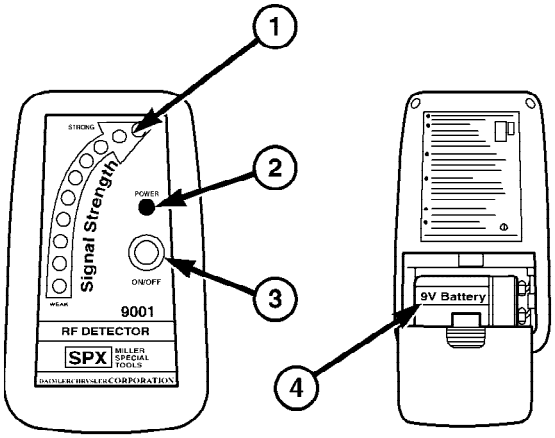
DIAGNOSIS AND TESTING - UNIVERSAL TRANSMITTER

If the Universal Transmitter is inoperative, but the tire pressure monitoring system and compass are operating normally, refer to setting transmitter codes in this section. Retrain the Transmitter with a known good transmitter and test the Transmitter operation again. If the Universal Transmitter, Tire Pressure monitoring and compass are inoperative, refer to **Overhead Console Diagnosis and Testing** in this group for diagnosis. For complete circuit diagrams, refer to **Wiring**. If the universal transmitter is inoperative, test the transmitter with special tool Radio Frequency Detector (Fig. 7). Procedure is as follows:

(1) Turn the Radio Frequency Detector ON. A "chirp" will sound and the green power LED will light. If the green LED does not light, replace the battery.

(2) Hold the RF detector within one inch of the TRAINED universal transmitter and press any of the transmitters buttons.

(3) The red signal detection LEDs will light and the tool will beep if a radio signal is detected. Repeat this test three times.



80f230cb

Fig. 7 Radio Frequency Detector

1 - Signal Detection LED's
2 - Power LED
3 - ON/OFF Switch
4 - 9V Battery

STANDARD PROCEDURE

STANDARD PROCEDURE - SETTING TRANSMITTER CODES

(1) Turn off the engine.

(2) Erase the codes by pressing the two outside buttons labeled with one (·) and three (···) dots. Release the buttons when the display confirms the operation (about 20 seconds).

(3) Choose one of the three buttons to train. Place the hand-held transmitter within one inch of the universal transmitter and push the buttons on both transmitters.

(4) Release both buttons. Your universal transmitter is now "trained". To train the other buttons, repeat Step 3 and Step 4. Be sure to keep your hand-held transmitter in case you need to retrain the universal transmitter.

NOTE: For more detailed instructions refer to the owners manual procedure in the vehicles glove box.

STANDARD PROCEDURE - ERASING TRANSMITTER CODES

To erase the universal transmitter codes, simply hold down the two outside buttons labeled with one (·) and three (···) dots until the display confirms the operation.

NOTE: Individual channels cannot be erased. Erasing the transmitter codes will erase ALL programmed codes.

POWER SYSTEMS

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POWER LIFTGATE SYSTEM

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POWER LIFTGATE SYSTEM

DESCRIPTION

Some vehicles are equipped with an automatic opening and closing power liftgate. The power liftgate system is a complex system consisting of many components. Refer to the following list for component reference:

Drive Unit Components

- Liftgate Motor
- Clutch
- Channel, Bracket, Rack and Yoke Assembly
- Full Open Switch
- Optical Sensor
- Link Rod

Power Liftgate System Components

- Power Latch and Actuator
- Liftgate Power Module
- Pinch Sensor
- Overhead Console and Key Fob Command Switches
- Chime/Thermistor Assembly

The power liftgate system utilizes its own liftgate control module. This power liftgate module contains all the solid state hardware and software used to control the power liftgate system. For specific component information refer to the individual component descriptions later in this section.

Safety is of the utmost concern with the power liftgate system. Software technology has enabled the power liftgate module to detect resistance to liftgate travel. This allows the power liftgate module to control liftgate direction anytime an obstruction is detected. The power liftgate can be operated manually using the liftgate outside handle switch.

The power liftgate module communicates on the Programmable Communication Interface (PCI) Bus Circuit. Therefore, the power liftgate module can generate and store its own Diagnostic Trouble Codes (DTC's). The Body Control Module (BCM) sends and receives messages to the power liftgate control module via the PCI bus circuit. A diagnostic scan tool, such as the DRB III® is used to read and troubleshoot these Diagnostic Trouble Codes. Refer to the Body Diagnostic Information for a list of diagnostic procedures.

For a complete wiring schematic of the power liftgate system, refer to the Wiring section of this manual. For system operation instructions refer to the vehicles owner manual. Refer to the Body Section of this manual for additional information on liftgate components such as the prop rods, hinges, door alignment and striker alignment.

The power liftgate system is designed with a number of system inhibitors. These inhibitors are necessary for safety and/or feasibility of the power liftgate system. Refer to power liftgate system inhibitors noted below:

POWER LIFTGATE SYSTEM INHIBITORS

- The Power Liftgate module will inhibit operation of the power liftgate in extreme temperatures. These temperatures will be approximately -22° F (-33° C) and 149° F (65° C). A chime/thermister assembly in the rear light bar assembly monitors the outside temperature.
- The vehicle's transmission must be in park or neutral for the power liftgate to operate.
- The vehicle's speed must be zero for the power liftgate to operate.
- The vehicle's electrical system voltage must be within specification for the power liftgate system to operate. A low-voltage cut-off is built into the power liftgate system to prevent the vehicle's battery from discharging to the point were the vehicle cannot be operated.
- If the vehicle's ignition switch is in the "START" position, the power liftgate will pause.
- If multiple obstacles are detected during the same power open or close cycle, the liftgate will temporarily go into full manual operation.
- If severe Diagnostic Trouble Codes (DTC's) are stored in the power liftgate control module the system may not operate.

POWER LIFTGATE SYSTEM WARNINGS

WARNING: ALWAYS DISCONNECT THE NEGATIVE BATTERY CABLE BEFORE ATTEMPTING ANY POWER LIFTGATE SYSTEM SERVICE.

WARNING: THERE IS A SMALL AREA ON BOTH SIDES OF THE LOWER POWER LIFTGATE WHICH ARE NOT PROTECTED BY PINCH SENSORS. EXTREME CAUTION MUST BE TAKEN TO PREVENT OBJECTS FROM ENTERING THIS AREA ONCE THE LIFTGATE REACHES THE SECONDARY LATCH CONTACT (APPROXIMATELY 1/2 INCH BEFORE FULLY CLOSED). PERSONAL INJURY MAY RESULT.

WARNING: NEVER ATTEMPT TO ENTER OR EXIT THE VEHICLE WITH THE LIFTGATE IN MOTION. YOU COULD DAMAGE THE POWER LIFTGATE SYSTEM AND/OR COMPONENTS AND/OR CAUSE PERSONAL INJURY.

POWER LIFTGATE SYSTEM (Continued)

WARNING: NEVER STICK OBJECTS IN THE POWER LIFTGATE WHEN CINCHING CLOSED. YOU COULD DAMAGE THE POWER LIFTGATE SYSTEM AND/OR COMPONENTS AND/OR CAUSE PERSONAL INJURY.

OPERATION

Battery voltage is supplied to the power liftgate system through a 40 amp fuse, located in the Integrated Power Module (IPM) assembly. With the push of a power liftgate open/close command switch (key fob or overhead console mounted), a signal is sent out on the PCI Data Bus circuit. This signal is detected at the Body Control Module (BCM). The BCM then adds system status and sends a signal out on the PCI Data Bus circuit to the power liftgate control module. The power liftgate control module then interprets the information to confirm safety requirements are met before applying power to the power liftgate motor to start a power cycle.

During a power liftgate open or close cycle, if the power liftgate control module detects sufficient resistance to liftgate travel, such as an obstruction in the liftgate's path. The control module will immediately stop liftgate movement and reverse the direction of travel to the full open or closed position. The ability for the power liftgate control module to detect resistance to liftgate travel is accomplished by the optical and pinch sensors.

The power liftgate control module has the ability to relearn. After 8 miles have been recorded on the odometer, anytime the liftgate is fully opened and fully closed using the automatic system, the module will learn from its cycle. If a replacement power liftgate component is installed or a liftgate adjustment is made, the module will relearn the effort and/or time required to open or close the liftgate. This learn cycle can be performed with a Diagnostic Scan Tool, such as the DRB III® or with a complete cycle of the liftgate, using either one of the command switches. Refer to Standard Procedures in this section for detailed instructions.

DIAGNOSIS AND TESTING - POWER LIFTGATE SYSTEM

The power liftgate system is a complex system containing many components involving at least two electronic control modules. In order to perform conclusive testing, the Programmable Communications Interface PCI data bus circuit and the electronic modules that provide inputs to, or receive outputs from the power liftgate control module must be checked.

The most reliable, efficient, and accurate means to diagnose the power liftgate system requires the use of a DRB III® scan tool and the proper Body Diagnostic Information. The DRB III® can be used to observe current switch status recorded in the power liftgate control module to help the technician diagnose a defective switch. The DRB III® can also be used to actuate various components throughout the power liftgate system to help the technician diagnose a defective component.

Before any testing of the power liftgate system is attempted, the battery should be fully charged, all power liftgate system inhibitors read and understood (Refer to power liftgate system description for list).

Following are quick reference diagnostic tables to help when diagnosing and testing the power liftgate system.

LIFTGATE SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
Liftgate opens unexpectedly	Accidental activation or Failure of open/close command switch	Check for shorted or defective switch
	Failure of latch assembly	Check wiring connections
		Check for trouble codes, replace latch if necessary
	Failure of Power Liftgate or Body Control module	Disconnect then reconnect battery to reset module, function liftgate, if no function exists check for loose wire connections, see Body Diagnostic Information for detailed procedures
Liftgate will not open/close automatically	Not in Park/Neutral or false indication	Check switch status with DRB III scan tool
	Battery voltage too low	Check for proper battery/ system voltage

POWER LIFTGATE SYSTEM (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	Blown fuse	Check for blown fuse
	Gas prop rod failure	Check condition of liftgate prop rods
	BCM, NGC, or power liftgate module critical fault codes	Check code status with DRB III scan tool
	Failure of latch assembly	Check wire connections and for blown fuse
		Cycle latch with DRB III and Check for foreign matter preventing the operation of latch assembly Troubleshoot using Body Diagnostic Information Replace latch assembly, if necessary
	Extreme Temperatures	No repair, Refer to power liftgate system inhibitors
	Vehicle speed greater than zero	Test for proper operation with vehicle stopped.
	Pinch Sensor activated or open circuit	Check pinch sensor status with Scan Tool.
	Wiring problems (system or vehicle)	Troubleshoot using electrical schematics. Refer to wiring diagrams
Power loss during Liftgate operation	Wiring problems (system or vehicle)	Troubleshoot using electrical schematics. Refer to wiring diagrams
	Low battery voltage	Charge battery
	Failure of Power Liftgate or Body Control Module	Check for diagnostic trouble codes with DRB III.
	Failure of motor assembly	Test motor assembly
No automatic latching in primary and/or secondary positions	Failure of latch assembly	Check wire connections and for blown fuse
		Check for diagnostic trouble codes and cycle with DRB III Troubleshoot using Body Diagnostic Information. Replace latch assembly, if necessary
	Binding or sticking of components	Establish location of binding and replace necessary components
	Failure of Power Liftgate or Body Control Module	Check for diagnostic trouble codes with DRB III
	Door seal force too high	Inspect seals for damage, mis-assembly, foreign matter or other possible obstruction
	Failure of motor assembly	Check for no drive condition
	Pinch Sensor activated or open/short circuit	Check pinch sensor status with Scan Tool.
	Foreign material in latch	Check and clean latch
	Blown Fuse	Check fuse and replace if required
Latch will not release from primary position	Not in Park/Neutral, vehicle speed greater than zero or false indication	Check switch status with DRB III

POWER LIFTGATE SYSTEM (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	Vehicle doors locked	Unlock doors
	Low battery voltage	Check battery system voltage
	Blown fuse	Check fuse and replace if required
	Failure of latch assembly	Check ratchet and pawl switch status with DRB III
		Check for foreign matter or damaged components preventing the operation of latch assembly
		Troubleshoot using body diagnostic information. Replace latch assembly, if necessary
	Failure of outside handle switch	Check for diagnostic trouble codes and cycle with DRB III
	Failure of Power Liftgate or Body Control Module	Check for diagnostic trouble codes and cycle with DRB III
	Wiring problems (system or vehicle)	Troubleshoot using electrical schematics. Refer to wiring diagrams
	Binding or sticking of components	Establish location of binding and replace necessary components
Liftgate does not stay open	Failure of liftgate prop rods	Replace prop rods
	Excessive cold or weight on liftgate	Check for added weight or extreme cold climate
High opening effort	Failure of liftgate prop rods	Replace prop rods
		Check for broken attachments
	Drive unit jamed or did not disengage	Troubleshoot using Body Diagnostic Information Replace components, if necessary
	Binding or sticking of components	Establish location of binding and replace necessary components
Liftgate continues to cinch closed during power mode	Failure of Power Liftgate Module	Check for diagnostic trouble codes and cycle with DRB III, see Body Diagnostic Information for detailed procedures
	Wiring problems (system or vehicle)	Troubleshoot using electrical schematics. Refer to wiring diagrams
Liftgate continues to open during power mode (runaway motor)	Failure of Power Liftgate Module	Check for diagnostic trouble codes and cycle with DRB III, see Body Diagnostic Information for detailed procedures
	Failure of full open switch	Check switch status with DRB III
		Replace switch, if necessary
	Failure of motor assembly	Check for continuous drive condition
	Wiring problems (system or vehicle)	Troubleshoot using electrical schematics. Refer to Wiring Diagrams
Liftgate opens very slowly	Low battery voltage	Check battery electrical system voltage
	Failure of liftgate prop rods	Replace prop rods, if necessary

POWER LIFTGATE SYSTEM (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	Binding or sticking of components	Establish location of binding and replace necessary components
	Wiring problems (system or vehicle)	Troubleshoot using electrical schematics. Refer to Wiring Diagrams
	Grade of vehicle too steep for power operation	Operate liftgate manually
	Failure of liftgate motor assembly	Replace motor assembly, if necessary
Squeaks, Noises and rattles	Foreign material in door compartment	Remove foreign material
	Worn/Loose components	Check and tighten/replace loose components
Power liftgate drive unit overtravel in closed direction	Liftgate linkrod not attached to drive unit and liftgate	Check for damage and replace components if necessary / connect linkrod

STANDARD PROCEDURE

STANDARD PROCEDURE - LIFTGATE ADJUSTMENT

In order for the power liftgate system to function properly the liftgate must move freely and smoothly. The power liftgate system can accommodate for some minor changes in the effort required to move the liftgate. However, in extreme conditions the liftgate may need to be mechanically adjusted for proper fit and finish. Refer to the Liftgate Adjustment procedure in the Body section of the service manual for detailed instructions.

If a problem exists with the power liftgate and it is suspected to be extreme effort, check the liftgate prop rods and hinges for free movement. Use a known good vehicle for liftgate effort comparison.

STANDARD PROCEDURE - POWER LIFTGATE LEARN CYCLE

Any time a power liftgate component is removed, replaced or a liftgate adjustment is performed, a learn cycle must be performed. This learn cycle enables the power liftgate control module to learn or relearn information (travel limits, resistance to door travel, etc.) which allows it to perform properly and safely. To perform a learn cycle do the following:

(1) Obtain a DRB III® scan tool.

(2) Connect the DRB III® to the vehicle and check for any power liftgate system stored trouble codes, correct and erase any stored codes.

(3) Close liftgate.

(4) Using the DRB III®, Reset module, Go into Test Routine Menu and select the power open command.

(5) Select the power close command.

(6) The liftgate learn cycle is complete.

If a DRB III® scan tool is not available the learn cycle can be performed by actuating the liftgate by using any of the normal command switches. Be certain to cycle the liftgate through several complete open and close cycle before returning the vehicle to service.

NOTE: If the power liftgate will not complete a full cycle a problem exists with the power liftgate system.

STANDARD PROCEDURE - LIFTGATE SERVICE RELEASE

The CS utilizes an electronic liftgate release system. In the unlikely event that the vehicle losses power or the electric release system fails the following procedure can be used to open the rear liftgate.

(1) Obtain a large flat-bladed screwdriver, enter the vehicle and approach the liftgate.

(2) On the lower portion of the liftgate trim panel you will find a 25mm plastic plug. Remove the plug from the trim panel by gently prying out.

(3) Insert the screwdriver through the access hole and find the slot in the beige release lever. Rotate the release lever up and to the right (when facing rearward), Hold the release lever until the latch has cleared the striker.

POWER LIFTGATE SYSTEM (Continued)

SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

COMPONENT TORQUE SPECIFICATIONS

DESCRIPTION	N·m	In. Lbs.
Drive Unit to D-pillar	28	250 ±50
Motor to Clutch	5.5	50
Pinch Sensor	N/A	25
Link Rod Bracket to Liftgate	28	250 ±50
Liftgate Latch	10	90

CHIME/THERMISTOR

DESCRIPTION

Vehicles equipped with a power liftgate utilize a chime/thermistor assembly. The chime/thermistor assembly is a small cylindrical shaped electrical component mounted in the rear license plate lamp housing assembly. The chime portion of the component produces the audible chime sound heard at the rear of the vehicle at the start of a power cycle. The thermistor is a temperature sensor used by the power liftgate control module to enable proper liftgate operation in extreme climate conditions.

The chime/thermistor cannot be adjusted or repaired and if damaged it must be replaced. Consult your Mopar™ parts catalog for a specific part number.

OPERATION

The chime function is activated by a hardwired connection to the power liftgate module. The thermistor provides a outside temperature signal to the power liftgate control module. As the outside temperature increases the resistance reading decreases, as temperature decreases the resistance reading increases.

REMOVAL

(1) Open the liftgate.

(2) Disconnect and isolate the negative battery cable.

(3) Remove the rear light bar assembly from the vehicle. Refer to the Body section for the procedure.

(4) Using your hands, grasp the light bar at its sides next to chime/thermistor assembly and gently pull the two sides of the light bar apart until the chime/thermistor can be removed.

CAUTION: Locate the wires coming from the chime/thermistor. On a piece of paper, note the wire color and cavity the wires are currently installed in on both the component and connector side of the harness. This will prove helpful later.

(5) Locate the wires going to the chime/thermistor. Cut the tie strap and trace the wires to the electrical connector and back the wires out of the connector. Refer to the Wiring section of the service information for detailed instructions.

INSTALLATION

(1) Snap the chime/thermistor assembly into the light bar.

(2) Locate the wires going to the chime/thermistor. Install the wires in the connector. Secure with a tie strap. Refer to the Wiring section for detailed instructions.

NOTE: Be certain the wires are reinstalled in the correct wire cavities. Failure to do so could result in damage to the chime/thermistor assembly. Refer to Wiring Diagrams if uncertain.

(3) Install the rear light bar assembly on the vehicle. Refer to the Body section for the procedure.

(4) Connect the negative battery cable.

DRIVE UNIT

DESCRIPTION

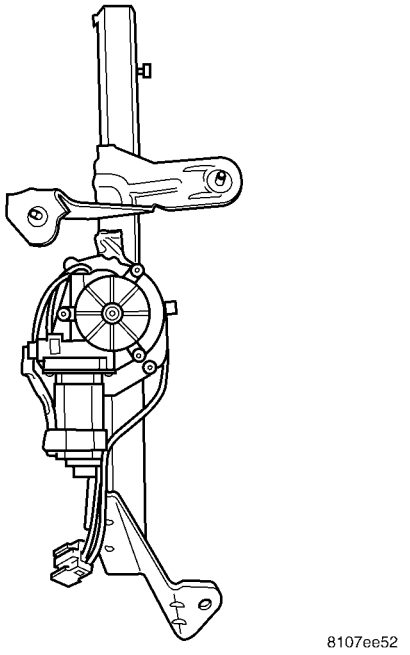


Fig. 1 Power Liftgate Drive Unit

Vehicles equipped with a power liftgate, utilize a power liftgate drive unit. The drive unit assembly (Fig. 1) consists of a DC motor, optical sensor, clutch, full-open switch, rack, housing/bracket assembly and wire harness. The clutch and motor portion (Fig. 2) of the assembly provides the power and torque required to open or close the liftgate under the worst case conditions. The optical sensor is used to provide the liftgate control module with a clutch/motor speed signal. This speed signal is used to monitor any resistance of liftgate travel and allows the liftgate control module to detect obstructions and control the liftgate accordingly. The clutch assembly is used to allow automatic power open/close mode and/or full manual operation, if desired. The full-open switch is used to let the liftgate control module know when the liftgate is approaching the full open position.

Replaceable components of the power liftgate drive unit assembly are the complete unit, motor alone, optical sensor, full-open switch, link rod, channel/brackets/clutch/rack and shoes/yoke assembly. Refer to additional information in this group for more component details.

The drive unit and components cannot be adjusted or repaired and if damaged they must be replaced. Consult your Mopar™ parts catalog for a specific part number.

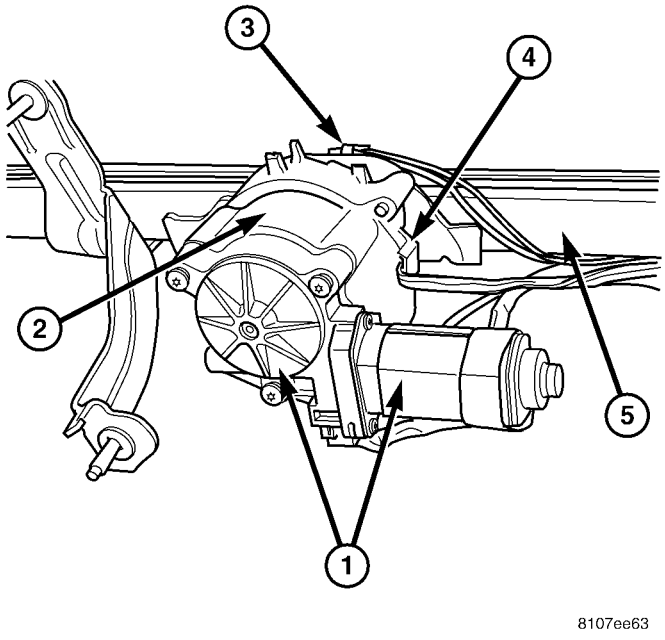


Fig. 2 CS Drive Unit Components

1 - Motor Assembly
2 - Clutch Housing
3 - Full Open Switch
4 - Optical Sensor
5 - Channel/Bracket Assembly

OPERATION

LIFTGATE IS CLOSED

Depressing either of the power liftgate open/close command switches, sends a PCI data bus signal to the power liftgate control module. The control module will then signal the door mounted latch assembly to release the door from its primary closed and latched position to the ajar and movable position. The liftgate motor then takes over to move the liftgate into the full open position.

LIFTGATE IS OPEN

Depressing either of the power liftgate open/close command switches, sends a PCI data bus signal to the power liftgate control module. The control module will then signal the liftgate motor to move the liftgate into the closed position. Once the door mounted latch reaches the body mounted striker assembly, the power latch takes over to cinch the door to the fully closed and latched position.

If a obstacle is encountered during a power open or close cycle, the power liftgate control module will automatically reverse direction of the liftgate to prevent vehicle damage or personal injury. Refer to the owners manual for additional information.

DRIVE UNIT (Continued)

REMOVAL

(1) Open the liftgate.
(2) Disconnect and isolate the negative battery cable.
(3) Remove the link rod assembly from the liftgate attachment point. Refer to Link Rod removal procedure in this section.
(4) Remove the left rear D-pillar trim panel from the vehicle. Refer to the Body section for the procedure.
(5) Disconnect the wire harness connector from the power liftgate drive unit assembly. Compress the locking tab until the two connector halves can be pulled straight apart.

CAUTION: Do not let the drive unit bolt retainers drop into the body cavity. Rattles and customer complaints could result.

(6) Remove the power drive unit retaining bolts.
(7) Unhook the drive unit assembly from the D-pillar and remove the unit from the vehicle.

INSTALLATION

(1) Install the drive unit assembly on the D-pillar.
(2) Install the power drive unit retaining bolts. Torque the bolts to 250 in. lbs. (28 N·m).
(3) Connect the wire harness connector on the power liftgate drive unit assembly.
(4) Install the link rod assembly on the drive unit attachment point. Refer to the Link Rod installation procedure in this section.
(5) Install the left rear D-pillar trim panel on the vehicle. Refer to the Body section for the procedure.
(6) Install the link rod assembly on the liftgate attachment point. Refer to the Link Rod installation procedure in this section.
(7) Connect the negative battery cable.
(8) Using an appropriate scan tool, check and erase any power liftgate control module diagnostic trouble codes related to the door motor assembly.
(9) Verify power liftgate system operation. Cycle the power liftgate through one complete open and close cycle, this will allow the power liftgate control module to relearn its cycle with the new components.

EXTERIOR HANDLE SWITCH

DESCRIPTION

All Pacifica vehicles are equipped with a exterior liftgate handle switch. The exterior handle contains an electronic release switch. The liftgate handle switch is primarily used for manual opening of the liftgate. Activation of the handle switch during a automatic power close cycle will cause the liftgate to reverse direction. Activation of the handle switch during an power open cycle will cause the power liftgate to disengage, allowing full manual operation.

The exterior handle switch cannot be adjusted or repaired and if damaged it must be replaced. Consult your Mopar™ parts catalog for a specific part number.

OPERATION

When the exterior liftgate handle switch is depressed a hard-wired signal is detected by the Body Control Module (BCM). The Body Control Module then sends a PCI data bus message to the power liftgate control module. The BCM message includes lock status, which the power liftgate module interprets. If operating conditions are met, the power liftgate module then applies power to the latch mounted actuator, which moves the liftgate from the primary closed and latched position to the open and movable position.

If the liftgate is not pulled open within a few seconds, once the latch releases, the latch will automatically cinch closed.

REMOVAL

(1) Open the liftgate.
(2) Disconnect and isolate the negative battery cable.
(3) Open the liftgate and remove the liftgate trim panel. Refer to the Body section for the procedure.
(4) Disconnect the handle switch electrical connector.
(5) Remove the liftgate handle assembly from the vehicle. Refer to the Body section for the procedure.
(6) Depress the two exterior handle switch retaining tabs and roll the switch out of the handle assembly.

INSTALLATION

(1) Install the handle switch in the handle assembly.
(2) Install the liftgate handle. Refer to the Body section for the procedure.
(3) Connect the liftgate handle electrical connector.
(4) Install the liftgate trim panel. Refer to the Body section for the procedure.
(5) Connect the negative battery cable.
(6) Using an appropriate scan tool, check and erase any power liftgate module diagnostic trouble codes.
(7) Verify power liftgate system and handle switch operation. Cycle the power liftgate through one complete open and close cycle, this will allow the power liftgate module to relearn its cycle with the new components.

FULL OPEN SWITCH

DESCRIPTION

Vehicles equipped with a power liftgate utilize a full open switch. The full open switch is comprised of two main components, the micro-switch and plastic bracket (Fig. 3). The full open switch and bracket assembly are located on the drive unit channel and is used to signal the power liftgate control module when the liftgate is approaching the full open position. Two wires connect the full open switch to the drive unit's main electrical connector.

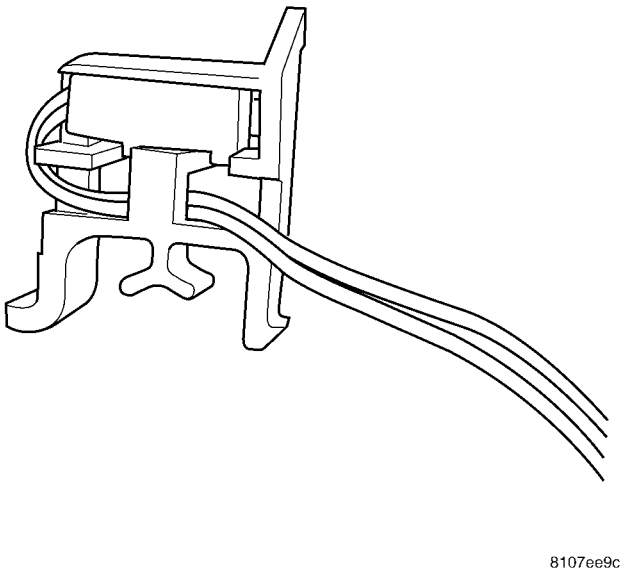


Fig. 3 Power Liftgate Full Open Switch

The full open switch cannot be adjusted or repaired and if found to be faulty, must be replaced. Consult your Mopar parts catalog for a specific part number.

OPERATION

When the power liftgate is approaching the full open position, the full open switch's contact arm leaves contact with the moving rack assembly. This releases the switch and closes the circuit supplied to the power liftgate module. This signals the module that the liftgate is reaching the full open position. The full open switch is a normally closed circuit micro-switch.

DIAGNOSIS AND TESTING - FULL OPEN SWITCH

The full open switch is a normally closed micro-switch. To test proper operation of the full open switch proceed as follows;

(1) Using an ohmmeter, test continuity of the switch with the liftgate in the full open position. Continuity should be present. If OK go to Step 2. If not OK, replace the switch.

(2) Test continuity of the switch while depressing the full open switch contact arm. Continuity should **not** be present. If not OK, replace the switch.

REMOVAL

(1) Open the liftgate.

(2) Disconnect and isolate the negative battery cable.

(3) Remove the left rear D-pillar trim panel from the vehicle. Refer to the Body section of this manual for the procedure.

CAUTION: Locate the two wires coming from the full open switch. On a piece of paper, note the wire color and cavity the wires are currently installed in on both the switch and connector side of the harness. This will prove helpful later.

(4) Cut the two wires leading to the full open switch and back the wires out of the drive unit's main electrical connector. Refer to the Wiring section of the service manual for instructions.

(5) Using needle nose pliers, depress the full open switch's plastic retaining tabs and remove the full open switch from the drive unit assembly.

INSTALLATION

NOTE: Be certain the wires are reinstalled in the correct wire cavities. Failure to do so could result in damage to components. Refer to Wiring Diagrams if uncertain.

(1) Perform a wiring repair on the full open switch wires, or install new terminals on the wire ends and reinstall in the main drive unit electrical connector. Be certain to follow the approved procedure in the Wiring section.

(2) Install the full open switch on the drive unit assembly.

(3) Connect the negative battery cable.

(4) Using an appropriate scan tool, check and erase any power liftgate control module diagnostic trouble codes.

(5) Verify power liftgate system and full open switch operation. Cycle the power liftgate through one complete open and close cycle, this will allow the power liftgate control module to relearn its cycle with the new components.

(6) Install the left rear D-pillar trim panel on the vehicle. Refer to the Body section for the procedure.

LIFTGATE DRIVE UNIT MOTOR

DESCRIPTION

Vehicles equipped with a power liftgate, utilize a liftgate motor (Fig. 4). The liftgate motor is a simple DC motor that can be operated in forward or reverse, depending on the voltage polarity supplied by the power liftgate control module. The clutch and motor portion of the drive unit provides the power and torque required to open or close the liftgate. Refer to Drive Unit in this section for a complete description of the entire drive unit assembly and components.

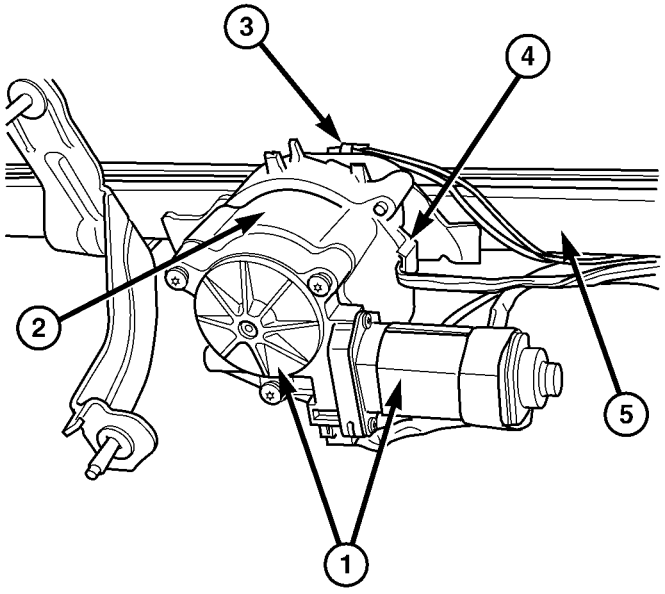


Fig. 4 CS Drive Unit Components

1 - Motor Assembly
2 - Clutch Housing
3 - Full Open Switch
4 - Optical Sensor
5 - Rack/Bracket Assembly

The power liftgate motor cannot be repaired or adjusted, and if found to be defective the motor must be replaced. Refer to the procedure in this section for detailed instructions.

OPERATION

LIFTGATE IS CLOSED

Depressing either of the power liftgate open/close command switches, sends a PCI data bus signal to the power liftgate control module. The control module will then signal the door mounted latch assembly to release the door from its primary closed and latched position to the ajar and movable position. Once the liftgate control module detects “liftgate ajar”, the control module will provide 12v power to the liftgate motor and clutch to move the liftgate into the full open position.

LIFTGATE IS OPEN

Depressing either of the power liftgate open/close command switches, sends a PCI data bus signal to the power liftgate control module. The control module will then provide 12v power to the liftgate motor and clutch to move the liftgate into the closed position.

If a obstacle is encountered during a power open or close cycle, the power liftgate control module will automatically reverse direction of the liftgate to prevent vehicle damage or personal injury. Refer to Power Liftgate System description/operation for additional information.

DIAGNOSIS AND TESTING - LIFTGATE MOTOR

(1) Open liftgate and remove D-pillar trim to access the power liftgate motor. Refer to the Body section for the procedure.

(2) Using a DRB III® scan tool, actuate the drive unit motor to check operation. If a DRB III® scan tool is not available, disconnect the vehicle battery and power liftgate module, connect a 12 volt power and ground source jumper wires to the wires coming from the DC motor. If the motor rotates in both directions when the polarity is reversed, the motor is OK at this time.

REMOVAL

(1) Open the liftgate.

(2) Disconnect and isolate the negative battery cable.

(3) Remove the left rear D-pillar trim panel from the vehicle. Refer to the Body section for the procedure.

(4) Remove the power liftgate drive unit assembly from the vehicle. Refer to the procedure in this section.

(5) Disconnect the wire harness connector from the motor assembly. Gently pry the retaining tabs apart until the connector comes free from the motor.

(6) Remove the three T25 motor retaining screws (Fig. 5) and remove the motor from the drive unit.

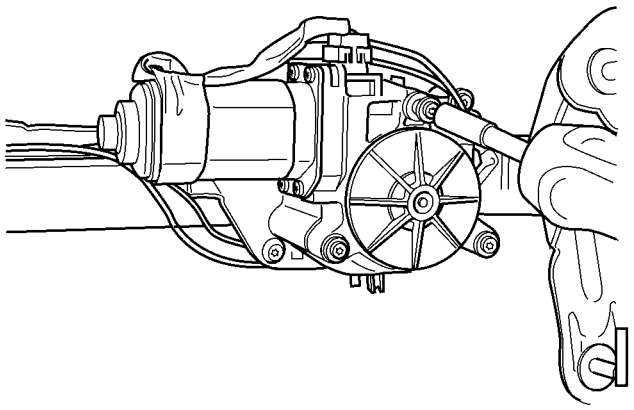
INSTALLATION

(1) Carefully line-up the motor with the clutch mounted gear (Fig. 6) and slide the motor assembly on the clutch. Be certain the gears are properly meshed.

(2) Install the three T25 motor retaining screws. Torque the screws to 50 in. lbs.

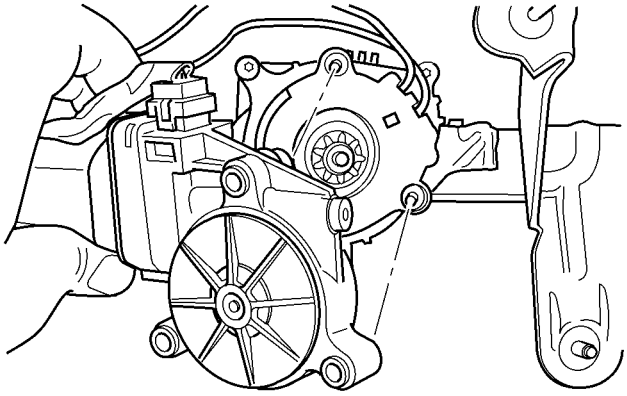
(3) Connect the wire harness on the motor assembly.

LIFTGATE DRIVE UNIT MOTOR (Continued)



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Fig. 5 Removing Power Liftgate Motor Retaining Screws



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Fig. 6 Installing Power Liftgate Motor

(4) Install the power liftgate drive unit assembly on the vehicle. Refer to the procedure in this section.

(5) Install the left rear D-pillar trim panel on the vehicle. Refer to the Body section for the procedure.

(6) Connect the negative battery cable.

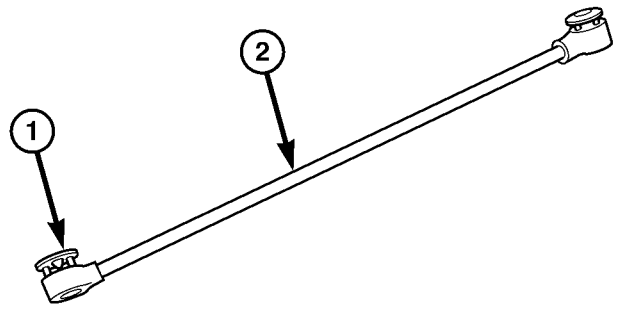
(7) Using an appropriate scan tool, check and erase any power liftgate control module diagnostic trouble codes related to the drive unit assembly.

(8) Verify power liftgate system operation. Cycle the power liftgate through one complete open and close cycle, this will allow the power liftgate control module to relearn its cycle with the new components.

LINK ROD

DESCRIPTION

Vehicles equipped with a power liftgate utilize a link rod assembly. This link rod (Fig. 7) is located in the left rear of the vehicle and is visible without removing the D-pillar trim. The link rod attaches the liftgate to the power liftgate drive unit assembly. The link rod consists of a steel shaft, equipped with two spherical rod end receptacles at each end. The weight of the liftgate is not supported by the link rod, the liftgate prop rods are designed to support the liftgate.



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Fig. 7 CS Link Rod

1 - Link Rod Retainer
2 - Link Rod Assembly

The link rod cannot be adjusted or repaired and if damaged, must be replaced. Consult your Mopar™ parts catalog for a specific part number.

OPERATION

One end of the link rod assembly is attached to the liftgate, the other attached to the lift rack of the drive unit. When the lift rack is driven by the liftgate motor assembly the liftgate is moved to the open or closed position.

REMOVAL

(1) Open the liftgate.

(2) Using a small flat-bladed screwdriver, pry the plastic retainer up to release the locking mechanism

LINK ROD (Continued)

from the mounting sphere. Do not try to remove the retainer, it is not designed to be removed.

(3) Remove the link rod from the liftgate mounting sphere by gently pulling off.

(4) Remove the D-pillar trim from the vehicle. Refer to the Body section for the procedure.

(5) Remove the link rod from the drive unit mounting sphere by gently pulling off.

INSTALLATION

(1) Install the drive unit end of the link rod on its mounting sphere by gently pushing straight on.

(2) Push the plastic retainer down to lock the mechanism in position.

(3) Install the D-pillar trim on the vehicle. Refer to the Body section for the procedure.

(4) Install the liftgate end of the link rod on its mounting sphere by gently pushing straight on.

(5) Push the plastic retainer down to lock the mechanism in position.

(6) Close the liftgate and check for proper power liftgate operation.

POWER LATCH

DESCRIPTION

Vehicles equipped with a power liftgate, utilize a power cinch/release latch. This latch performs the same function as a manual liftgate latch as well as the power cinch/release capability. A second type of power latch can also be found on some models, this latch is designed to perform a power release only. The power cinch and release capability is accomplished by an actuator mounted to the top of the latch assembly. The latch is located in the lower center of the liftgate assembly and contains integral switches. These switches act as a liftgate ajar switch.

The power latch cannot be adjusted or repaired. The power latch assembly can be replaced as a complete assembly, latch without actuator or just the actuator. Consult your Mopar parts catalog for specific part numbers.

OPERATION

Operating on hardwired inputs from the power liftgate control module, the latch mounted actuator (cinch/release motor) provides the torque required to close the liftgate from the secondary to the primary closed and latched position. The actuator also releases the liftgate from the primary closed and latched position to the fully unlatched and movable position.

NOTE: Power latch “Cinching” will become disabled if the pinch sensors are inoperable or damaged.

REMOVAL

(1) Open the liftgate.

(2) Open the hood, disconnect and isolate the negative battery cable.

(3) Remove the liftgate trim panel. Refer to the Body section for the procedure.

(4) Disconnect the power latch electrical connector.

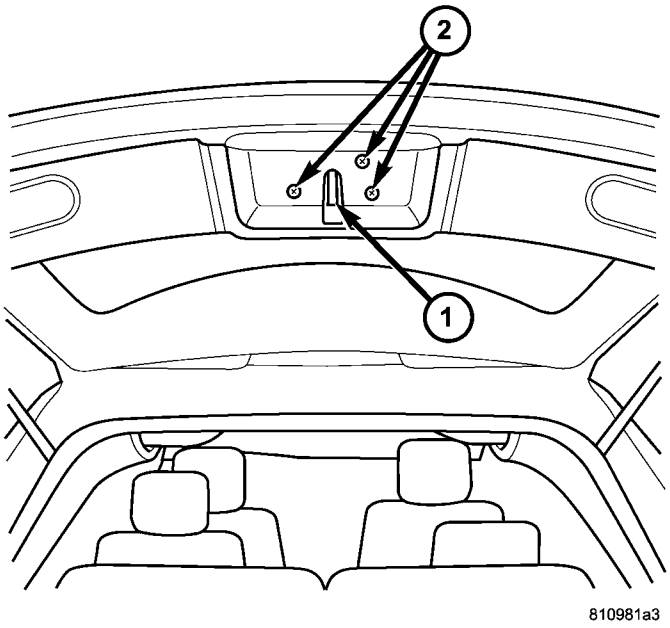


Fig. 8 CS Power Latch Retaining Bolts

1 - Latch Assembly
2 - Latch Retaining Bolts

(5) Remove the power latch retaining bolts (Fig. 8) and remove the latch assembly from the liftgate.

INSTALLATION

(1) Install the power latch retaining bolts. Torque to 11 N·m (95 in. lbs.).

(2) Connect the power latch electrical connector and secure the wire harness push pin retainers.

(3) Connect the negative battery cable.

(4) Using an appropriate scan tool, check and erase any power liftgate control module diagnostic trouble codes related to the power latch.

(5) Verify power liftgate system and power cinch / release latch operation. Cycle the power liftgate through one complete open and close cycle, this will allow the power liftgate control module to relearn its cycle with the new components.

(6) Verify power liftgate manual operation. Pull door open using exterior liftgate handle switch.

(7) Install the liftgate trim panel. Refer to the Body section for the procedure.

LATCH ACTUATOR

DESCRIPTION

The power cinch/release latch function is made possible by a latch actuator attached to the top of the liftgate latch assembly. This latch actuator contains a small drive gear that meshes with the latch assemblies internal gears to perform the power cinch/release function. The latch actuator is controlled by the power liftgate control module, which controls the cinch function and limits actuator current draw to protect the assembly. Refer to the Latch in this section for additional information.

The power cinch/release latch actuator cannot be adjusted or repaired and if damaged the actuator must be replaced. Consult your Mopar™ parts catalog for specific part numbers.

OPERATION

During a power close cycle, the latch actuator provides the torque required to close the power liftgate from the secondary to the primary closed and latched position. During a power open cycle, the latch actuator releases the liftgate from the primary closed and latched position to the fully unlatched and movable position. The power liftgate control module controls the latch actuator via hard-wired inputs. Refer to Latch in this section for additional information.

REMOVAL

(1) Open the liftgate.

(2) Disconnect and isolate the negative battery cable.

(3) Remove the liftgate trim panel. Refer to the Body section for the procedure.

(4) Disconnect the power latch electrical connector.

(5) Remove the latch retaining bolts and remove the latch assembly from the liftgate.

(6) Place the latch assembly on a bench and locate the three wires leading from the actuator portion of the latch assembly.

(7) Disengage the main connector retaining push pins from the latch actuator housing.

CAUTION: Locate the wires coming from the actuator portion of the latch assembly. On a piece of paper, note the wire color and cavity the wires are currently installed in on both the actuator and connector side of the harness. This will prove helpful later.

(8) Back the three wires out of the main latch electrical connector. Refer to the wiring section for detailed instructions.

(9) Flip the latch assembly over and remove the latch actuator retaining screw(s).

(10) Remove the latch actuator from the latch assembly.

INSTALLATION

(1) Install the latch actuator on the latch assembly.

(2) Install the latch actuator retaining screws. Torque the screws to 4 in. lbs.

(3) Install the three wires in the main latch electrical connector. Refer to the wiring section for detailed instructions.

NOTE: Be certain the actuator wires are reinstalled in the correct wire cavities. Failure to do so could result in damage to components. Refer to Wiring Diagrams if previous notes were not made.

(4) Secure the main connector wire harness retaining push pins on the latch actuator housing.

(5) Position the latch and install the latch retaining bolts. Torque to 11 N·m (95 in. lbs.).

(6) Connect the power latch electrical connector.

(7) Connect the negative battery cable.

(8) Using an appropriate scan tool, check and erase any power liftgate control module diagnostic trouble codes related to the power latch.

(9) Verify power liftgate system and power cinch / release latch operation. Cycle the power liftgate through one complete open and close cycle, this will allow the power liftgate control module to relearn its cycle with the new components.

(10) Verify power liftgate manual operation. Pull door open using exterior liftgate handle switch.

(11) Install the liftgate trim panel. Refer to the Body section for the procedure.

OPTICAL SENSOR

DESCRIPTION

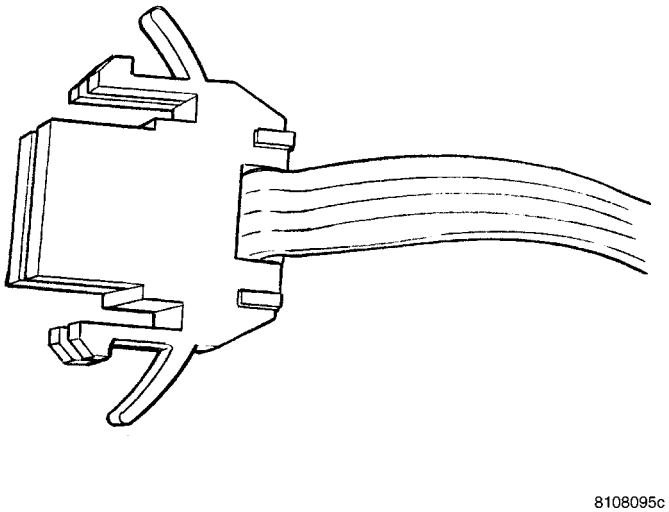


Fig. 9 CS Power Liftgate Optical Sensor

Vehicles equipped with a power liftgate utilize a optical sensor (Fig. 9). This sensor is located on the drive unit clutch housing and is used to supply the power liftgate control module with the motor/clutch speed. This speed signal helps the control module detect obstacles in the power liftgates path or liftgate system component failure. Four wires connect the optical sensor to the drive unit's main electrical connector.

The optical sensor cannot be adjusted or repaired and if found to be faulty, must be replaced. Consult your Mopar parts catalog for a specific part number.

OPERATION

The optical sensor provides a speed/time signal to the power liftgate control module. The speed signal is generated from a trigger wheel, located inside the clutch housing of the drive unit assembly. When the optical sensor is installed in the clutch housing properly, the trigger wheel is positioned in the optical sensor. Hard-wired inputs to and from the liftgate control module are used to monitor the speed/time of the liftgate motor and clutch assembly.

REMOVAL

(1) Open the liftgate.

(2) Disconnect and isolate the negative battery cable.

(3) Remove the left rear D-pillar trim panel from the vehicle. Refer to the Body section for the procedure.

CAUTION: Locate the wires coming from the optical sensor. On a piece of paper, note the wire location and cavity the wires are currently installed in on both the sensor and connector side of the harness. This will prove helpful later.

(4) Cut the wires leading to the optical sensor and back the wires out of the drive unit's main electrical connector. Refer to the Wiring section for instructions.

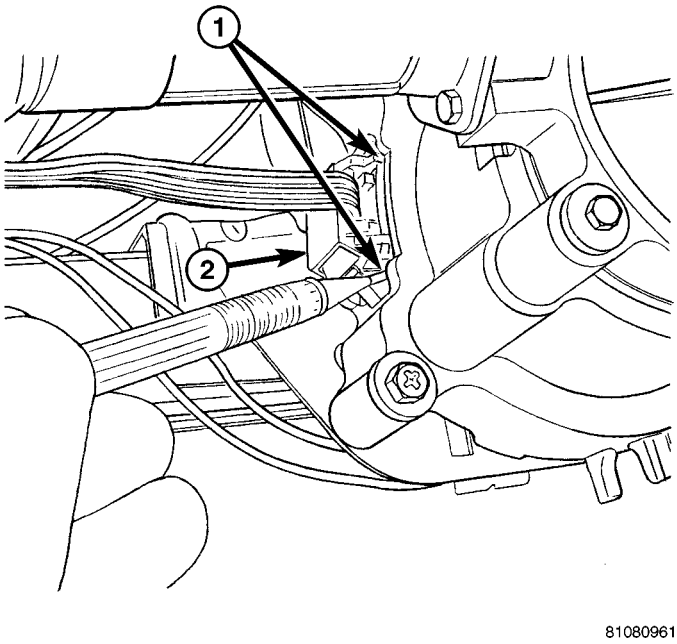


Fig. 10 Removing Optical Sensor

1 - Optical Sensor Retaining Tabs
2 - Optical Sensor

(5) Using a small flat-bladed tool, depress one of the optical sensor's plastic retaining tabs (Fig. 10) to unhook the optical sensor from the clutch housing assembly.

INSTALLATION

NOTE: Be certain the optical sensor wires are reinstalled in the correct wire cavities. Failure to do so could result in damage to components. Refer to Wiring Diagrams if previous notes were not made.

(1) Perform a wiring repair on the optical sensor wires, or install new terminals on the wire ends and reinstall in the drive unit electrical connector. Be certain to follow the approved procedure in the Wiring section.

(2) Install the optical sensor on the clutch housing assembly.

(3) Connect the negative battery cable.

OPTICAL SENSOR (Continued)

(4) Using an appropriate scan tool, check and erase any power liftgate module diagnostic trouble codes.

(5) Verify power liftgate system and optical sensor operation. Cycle the power liftgate through one complete open and close cycle, this will allow the power liftgate module to relearn its cycle with the new components.

(6) Install the left rear D-pillar trim panel on the vehicle. Refer to the Body section for the procedure.

PINCH SENSOR

DESCRIPTION

Vehicles equipped with a power liftgate utilize two pinch sensors. One pinch sensor is located on each side of the liftgate. These sensors look like weatherstrips, however they consist of pieces of electrically conductive rubber (tapeswitch), wires, resistor, double sided tape, and a plastic carrier. Pinch sensors are used to provide additional protection against vehicle damage or personal injury caused by an obstacle being “pinched” between the liftgate and the liftgate opening of the vehicle.

The pinch sensors are wired in series with the power liftgate control module. If one pinch sensor becomes defective the module will act as though both sensors are defective. The power latch “Cinching” operation will be disabled if a problem is detected by the control module.

OPERATION

During a power liftgate close cycle, if either of the two pinch sensors detect a obstruction or “Pinched” condition a hardwired signal is sent to the power liftgate control module. The power liftgate control module will stop the direction of the liftgate immediately and return it to the full open position. The conductive rubber strips incorporated into the sensors provide the mechanical means for this sensor function.

DIAGNOSIS AND TESTING - PINCH SENSOR

To verify power liftgate system and pinch sensor operation.

(1) Cycle the power liftgate through two complete open and close cycles, during each of the final close cycles, **with the liftgate in mid-travel**, depress each of the pinch sensors to verify the power liftgate control module detects an obstruction and returns to the open position. If OK, pinch sensors and module are OK at this time. If NOT OK, go to Step 2

(2) Remove the liftgate trim panel to access the inoperable pinch sensor’s electrical connector. Using an ohmmeter, check for continuity on the two wires leading from the pinch sensor. While depressing the pinch sensor, continuity should be 300 ohms max. While NOT depressing the pinch sensor, continuity should be 10,000 ohms min. If OK, pinch sensor is OK at this time. If NOT OK, replace the pinch sensor.

REMOVAL

(1) Open the liftgate.

(2) Disconnect and isolate the negative battery cable.

(3) Remove the trim panel from liftgate. Refer to the Body section for the procedure.

(4) Disconnect the pinch sensor wire harness connector.

(5) Remove the screws holding the pinch sensor to liftgate.

(6) Feed the pinch sensor wire harness out of the liftgate and remove the sensor from the vehicle.

INSTALLATION

(1) Position the pinch sensor and install screws holding the sensor to the liftgate, third one down first. Torque screws to 25 in. lbs.

(2) Install wire harness grommet in liftgate flange and route, connect the pinch sensor wire harness connector.

(3) Install the trim panel on the liftgate. Refer to the Body section for the procedure.

(4) Connect the negative battery cable.

(5) Using an appropriate scan tool, check and erase any power liftgate control module diagnostic trouble codes related to the pinch sensor.

(6) Verify power liftgate system and pinch sensor operation. Cycle the power liftgate through one complete open and close cycle, during the final close cycle press the pinch sensor to verify the power liftgate detects an obstruction and returns to the full open position.

WARNING: USE EXTREME CAUTION WHEN TESTING PINCH SENSOR OPERATION. PERSONAL INJURY MAY RESULT.

POWER LOCKS

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POWER LOCKS

DESCRIPTION

POWER LOCKS

The power lock system allows all of the doors to be locked or unlocked electrically by operating a switch on either front door trim panel. The power lock system receives non-switched battery current through a fuse in the Integrated Power Module (IPM), so that the power locks remain operational, regardless of the ignition switch position.

The Driver and Passenger Door Modules (DDM and PDM) lock the doors automatically when the vehicle is driven beyond the speed of 25.7 Km/h (15 mph), all doors are closed, the accelerator pedal is depressed and the door lock actuation had not been previously activated. The rolling door lock feature is customer programmable.

This vehicle also offers several customer programmable features, which allows the selection of several optional electronic features to suit individual preferences.

The power lock system for this vehicle can also be operated remotely using the available Remote Keyless Entry (RKE) system radio frequency transmitters, if equipped.

AUTOMATIC DOOR LOCKS

When enabled, this feature will lock all of the door locks if all of the doors are closed and the vehicle speed goes above 25.7 km/h (15 mph). If a door unlock has occurred, then the DDM/PDM will perform another auto lock, if the doors did not electrically unlock, another auto lock will not occur.

DOOR LOCK INHIBIT

When the key is in the ignition (in any switch position) and either front door is opened, the door lock switches LOCK functions are disabled. The UN-LOCK functions are still functional. This protects against locking the vehicle with the key still in the ignition. The RKE key fob will still lock the doors. After the key is removed from the ignition or the doors are closed, the power door locks will operate normally.

REMOTE KEYLESS ENTRY

The Remote Keyless Entry (RKE) system allows the use of a remote battery-powered radio transmitter to communicate with the RKE receiver to actuate the power lock system. The RKE receiver operates on non-switched battery current through a fuse in the Integrated Power Module (IPM), so that the system remains operational, regardless of the ignition switch position.

The RKE transmitters are also equipped with a Panic button. If the Panic button on the RKE transmitter is depressed, the horn will sound and the exterior lights will flash on the vehicle for about three minutes, or until the Panic button is depressed a second time. Pressing the Panic button also activates the courtesy lamps. Pressing the Panic button again stops the exterior lamps from flashing and the horn from sounding. However, the courtesy lamps will remain illuminated until either the BCM times out lamp operation or until the turning of the igni-

tion. The panic feature will operate if the ignition is ON, but only if the Panic button is pressed prior to starting the vehicle. A vehicle speed of about 25.7 km/h (15 miles-per-hour) will also cancel the panic event.

The RKE system can also perform other functions on this vehicle. If the vehicle is equipped with the optional Vehicle Theft Security System (VTSS), the RKE transmitter will arm the VTSS when the Lock button is depressed, and disarm the VTSS when the Unlock button is depressed.

The RKE system includes two transmitters when the vehicle is shipped from the factory, but the system can retain the vehicle access codes of up to a total of eight transmitters. The transmitter codes are retained in the RKE module memory, even if the battery is disconnected. If an RKE transmitter is faulty or lost, new transmitter vehicle access codes can be programmed into the system using a DRB III® scan tool.

This vehicle also offers several customer programmable features, which allows the selection of several optional electronic features to suit individual preferences. Customer programmable feature options affecting the RKE system include:

- **Automatic Door Lock** - Customer programmable feature that allows the DDM/PDM to perform an automatic door lock if the vehicle speed is above 25.7 km/h (15 miles-per-hour).
- **Automatic Door Unlock On Exit** - Customer programmable feature that allows the DDM/PDM to perform an automatic door unlock if the vehicle speed is 0, vehicle in park and driver door is opened.
- **Flash Lights with Lock and Unlock** - Allows the option of having the park lamps flash as an optical verification that the RKE system received a valid Lock request or Unlock request from the RKE transmitter, or having no optical verification.
- **Programming Additional Transmitters** - Allows up to a total of four transmitter vehicle access codes to be stored in the receiver memory.
- **Remote Unlock Sequence** - Allows the option of having only the driver side front door unlock when the RKE transmitter Unlock button is depressed the first time. The remaining doors unlock when the button is depressed a second time within 5 seconds of the first unlock press. Another option is having all doors unlock upon the first depression of the RKE transmitter Unlock button.
- **RKE Linked to Memory** - Allows the RKE transmitter to be linked to the memory system. The RKE transmitter can be linked to either position 1 or position 2. This allows the operator to have the vehicle move the mirrors, seat, pedals and radio stations upon a depress of the unlock switch on the transmitter.
- **Sound Horn on Lock** - Allows the option of having the horn sound a short chirp as an audible verification that the RKE system received a valid Lock request from the RKE transmitter, or having no audible verification.

OPERATION

POWER LOCKS

The Driver Door Module (DDM) and Passenger Door Module (PDM) locks or unlocks the doors when an actuation input signal from a door lock switch, Central Lock key cylinder (if equipped), or Remote Keyless Entry Module (RKE) is received. The DDM and PDM turn on the output drivers and provides a voltage level to the door lock motor for a specified time.

REMOTE KEYLESS ENTRY

The RKE transmitter uses radio frequency signals to communicate with the SKREEM module. The SKREEM is on the PCI bus. When the operator presses a button on the transmitter, it sends a specific request to the SKREEM. In turn, the SKREEM sends the appropriate request over the PCI bus to the following:

- **Driver Door Module (DDM)** - to control the driver front door lock and unlock functions, the arming and disarming of the Vehicle Theft Alarm (VTA) if equipped, and the activation of illuminated entry.
- **Integrated Power Module (IPM)** - to activate the park lamps, the headlamps and the horn for the horn chirp.
- **Passenger Door Module (PDM)** - to control the passenger front, rear driver and rear passenger door lock and unlock functions and activation of the passenger door courtesy lamp.
- **Power Liftgate Module (PLGM)** - to control the liftgate lock and unlock functions.

After pressing the lock button on the RKE transmitter, all of the door locks will lock, the illuminated entry will turn off (if all doors are closed) and the vehicle theft security system (if equipped) will arm.

Pressing the unlock button one time will unlock the driver door, or all doors based on the customer programmable feature enabled, the illuminated entry will turn on the courtesy lamps and the vehicle theft security system (if equipped) will disarm. Pressing the unlock button a second time, the remaining door locks will unlock.

If the vehicle is equipped with the memory system, the memory message will identify which transmitter (1 or 2) sent the signal.

POWER LOCKS (Continued)

ROLLING CODE

The rolling code feature changes part of the transmitter message each time that it is used. The transmitter message and the receiver message increment together. Under certain conditions with a rolling code system, such as pressing a button on the RKE transmitter over 255 times outside of receiver range or replacing the battery, the receiver and transmitter can fall out of synchronization. To re-synchronize, press and release the UNLOCK button on the RKE transmitter repeatedly (it may take up to eight cycles) while listening carefully for the power door locks in the vehicle to cycle, indicating that resynchronization has occurred.

The lock function works from the RKE transmitter even in an out of synchronization condition, therefore it could be verified by pressing the LOCK button on the RKE key fob.

DIAGNOSIS AND TESTING - POWER LOCKS

Any diagnosis of the power lock system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

DOOR LOCK MOTOR

DIAGNOSIS AND TESTING - DOOR LOCK MOTOR

Any diagnosis of the power lock system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

Verify battery condition before testing door lock motor(s).

To determine which motor is faulty, check each individual door for electrical lock and unlock or disconnect the motor connectors one at a time, while operating the door lock switch. In the event that none of the motors work, the problem may be caused by a shorted motor or a faulty switch. Disconnecting the faulty motor will allow the others to work.

To test an individual door lock motor, disconnect the electrical connector from the motor. To lock the door, connect a fused 12 volt power source to the positive pin of the lock motor and a ground wire to the other pin. To unlock the door reverse the wire connections at the motor pin terminals. If these results are not obtained, replace the door latch.

DRIVER CYLINDER LOCK SWITCH

DESCRIPTION

The Door Cylinder Lock Switch (if equipped) is used to:

- Unlock/Lock all the doors via the Central Locking feature.
- Arm/Disarm the Vehicle Theft Security System.
- Trigger the Illuminated Entry feature.

The door cylinder lock switch is mounted to the rear of the driver door lock cylinder. When installed on the rear of the cylinder, there is an anti-rotating device on the lock cylinder that aligns with the switch to prevent it from turning. The door cylinder lock switch is a one time use switch. Once it is removed from the rear of the door lock cylinder, it may not be reinstalled and a new switch must be used.

OPERATION

When the Door Cylinder Lock Switch (if equipped) is turned either way using the door key cylinder, the Driver Door Module (DDM) reads a direct message signal from the switch.

Turning the key cylinder once, toward the front of the vehicle, will:

(1) Mechanically unlock the door lock.

(2) Disarm the Vehicle Theft Security System (if equipped).

(3) Turn on the Illuminated Entry (if equipped) for approximately 30 seconds.

If the key cylinder is turned to the unlock position (toward the front of vehicle) twice within two seconds, all the doors and liftgate will unlock (if equipped with the central locking feature).

To lock the vehicle using the door cylinder lock switch, turn the key cylinder toward the rear of the vehicle once. This will lock the door that you are using the key on. If equipped with the central locking feature, this will lock all the other doors and liftgate, arm the vehicle theft security system and turn off the illuminated entry.

DIAGNOSIS AND TESTING - DRIVER CYLINDER LOCK SWITCH

(1) Visually inspect the switch for proper installation. Make sure it is seated on the rear of the key cylinder, with the tab of the door key cylinder properly aligned with the slot on the door cylinder lock switch.

(2) Disconnect the switch at the harness connector and check the resistance in each switch position.

DRIVER CYLINDER LOCK SWITCH (Continued)

CAUTION: Do not disconnect the switch from the rear of the door key cylinder. This switch is a one time use switch. Once it is removed from the rear of the switch, it is not reusable and must be replaced. Test the switch at the harness connector.

DRIVER CYLINDER LOCK SWITCH RESISTANCE

SWITCH POSITION	RESISTANCE VALUE
COUNTERCLOCKWISE (UNLOCK)	750 OHMS
CLOCKWISE (LOCK)	1.8K OHMS

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Peel back the water deflector to expose switch.

(4) Close the door window.

(5) Disconnect the door cylinder lock switch wire connector from the door harness, and wiring clip from the security shield.

(6) Remove the switch from the key cylinder in the door handle and remove from vehicle.

INSTALLATION

(1) Install the switch on the key cylinder in the door handle. Ensure that switch is in 12 O'clock position.

(2) Route wire down through link rods.

(3) Install three clips to security shield.

(4) Connect wire harness connector.

(5) Install the door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

(6) Connect the battery negative cable.

(7) Verify system operation.

REMOTE KEYLESS ENTRY TRANSMITTER

DIAGNOSIS AND TESTING - REMOTE KEYLESS ENTRY TRANSMITTER

Using special tool 9001, first test to ensure that the transmitter is functioning. Typical testing distance is 2.5 centimeters (1 inch) for Asian transmitters and 30.5 centimeters (12 inches) for all others. To test, position the transmitter as shown (Fig. 1). Press any transmitter button, then test each button individually. The tool will beep if a radio signal strength that lights five or more LED's is detected. Repeat this test three times. If transmitter fails any of the test, refer to the Diagnostic Procedures manual.

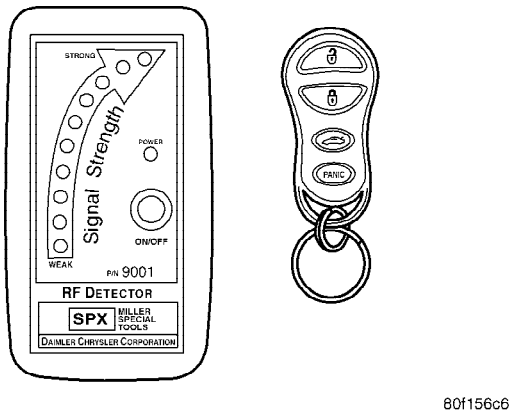


Fig. 1 TRANSMITTER DIAGNOSIS - TYPICAL

STANDARD PROCEDURE

STANDARD PROCEDURE - HORN CHIRP PREFERENCE

DISABLING

The horn chirp can be toggled using a DRB III® or by using a programmed Remote Keyless Entry (RKE) transmitter.

To DISABLE (cancelling) the horn chirp feature, press and hold the transmitter LOCK button for a minimum of five seconds. While pressing the LOCK button in, press the UNLOCK button. The horn chirp feature will not function until the above procedure is repeated.

ENABLING

The horn chirp can be toggled using a DRB III® or by using the Remote Keyless Entry (RKE) transmitter.

To ENABLE (reinstate) the horn chirp feature, use any one of the four programmed key fob transmitters and reverse the above procedures. It will ENABLE the horn chirp feature for all transmitters.

STANDARD PROCEDURE - BATTERY REPLACEMENT

(1) With the transmitter buttons facing down, use a coin to pry the two halves of the transmitter apart. Make sure not to damage the rubber gasket during separation of the housing halves.

(2) Remove the battery from the transmitter back housing holder.

(3) Replace the batteries. Avoid touching the new batteries with your fingers, Skin oils may cause bat-

tery deterioration. If you touch a battery, clean it off with rubbing alcohol.

(4) To assemble the transmitter case, snap the two halves together.

STANDARD PROCEDURE - REMOTE KEYLESS ENTRY TRANSMITTER PROGRAMMING

(Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/TRANSPONDER KEY - STANDARD PROCEDURE) for programming procedure.

SPECIFICATIONS

SPECIFICATIONS - TRANSMITTER RANGE

Normal operation range is up to a distance of 7 meters (23 ft.) of the vehicle. Range may be better or worse depending on the environment around the vehicle.

SPECIFICATIONS - BATTERY

The batteries can be removed without special tools and are readily available at local retail stores. The recommended battery is Duracell DL 2016 or equivalent, TWO cells are required. Battery life is about three years minimum.

CAUTION: Do not touch the battery terminals or handle the batteries any more than necessary. Hands must be clean and dry.

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POWER MIRRORS

DESCRIPTION

The control switch for the power mirrors is located on the drivers door trim panel.

OPERATION

The power mirrors are connected to battery feed at all times. Each mirror head contains two electric motors, two drive mechanisms, an electric heating element, and the mirror glass. If the vehicle is equipped with the optional memory system, each mirror also contains both a horizontal and a vertical motor position sensor. One motor and drive controls mirror up-and-down movement, and the other controls right-and-left movement.

An optional driver side outside electrochromic mirror is able to automatically change its reflectance level. This mirror is controlled by the circuitry of the automatic day/night inside rear view mirror. A thin layer of electrochromic material between two pieces of conductive glass make up the face of the mirror. Two photocell sensors on the inside rear view mirror are used to monitor light levels and adjust the reflectance of both the inside and driver side outside mirrors. This change in reflectance helps to reduce the glare of headlamps approaching the vehicle from the rear.

The motors which operate the mirrors are part of the mirror assembly and cannot be serviced separately.

DIAGNOSIS AND TESTING - POWER MIRRORS

Any diagnosis of the power mirror system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

AUTOMATIC DAY / NIGHT MIRROR

DESCRIPTION

An automatic dimming inside day/night rear view mirror and an automatic dimming driver side outside rear view mirror is an available option.

The automatic day/night mirror is able to automatically change its reflectance. A thin layer of electrochromic material between two pieces of conductive glass make up the face of the mirror. Two photocell sensors are used to monitor light levels and adjust the reflectance of the mirror to reduce the glare of headlamps approaching the vehicle from the rear.

OPERATION

The ambient photocell sensor faces forward, to detect the outside light levels. A second sensor faces rearward to detect the light level received through the vehicles back window. When the difference between the two light levels becomes too great (the light level received at the rear of the mirror is much higher than that at the front of the mirror), the mirror begins to darken.

The mirror switch allows the driver a manual control of whether the automatic dimming feature is operational. When AUTO is selected a small Light-Emitting Diode (LED), to the right of the mirror switch, is illuminated. The automatic dimming feature will only operate when the ignition switch is in the On position. The mirror also senses the backup lamp circuit, and will automatically disable its self-dimming feature whenever the transmission gear selector is in the Reverse position.

NOTE: The mirror always defaults to an ON state upon ignition.

The driver side automatic dimming mirror is standard with the automatic dimming inside mirror. The

signal to control the dimming of that mirror is generated by the automatic day/night inside rear view mirror circuitry. That signal is then delivered to the driver side outside rear view mirror on a hard wired circuit.

The automatic day/night mirror cannot be repaired. If faulty or damaged, the entire inside rear view mirror assembly must be replaced.

DIAGNOSIS AND TESTING - AUTOMATIC DAY / NIGHT MIRROR

For complete circuit diagrams, refer to the appropriate wiring information.

(1) Check the fuse in the Integrated Power Module (IPM). If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Turn the ignition switch to the ON position. Check for battery voltage at the fuse in the IPM. If OK, go to Step 3. If not OK, repair the open circuit to the ignition switch as required.

(3) Unplug the wire harness connector from the automatic day/night mirror. Check for battery voltage at the fused ignition switch output circuit cavity of the automatic day/night mirror wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit to the junction block as required.

(4) Turn the ignition switch to the Off position. Check for continuity between the ground circuit cavity of the automatic day/night mirror wire harness connector and a good ground. There should be continuity. If OK, go to Step 5. If not OK, repair the circuit to ground as required.

(5) Turn the ignition switch to the On position. Set the parking brake. Place the transmission gear selector lever in the Reverse position. Check for battery voltage at the backup lamp switch output circuit cavity of the automatic day/night mirror wire harness connector. If voltage is present, reinstall the automatic day/night mirror wire harness connector and go to Step 6. If not OK, repair the open circuit as required.

(6) Place the transmission gear selector lever in the Neutral position. Place the automatic day/night mirror switch in the On (LED in the switch is lighted) position. Cover the forward facing ambient photocell sensor to keep out any ambient light.

NOTE: The ambient photocell sensor must be covered completely, so that no light reaches the sensor. Use a finger pressed tightly against the sensor, or cover the sensor completely with electrical tape.

(7) Shine a light into the rearward facing headlamp photocell sensor. The automatic day/night mirror should darken. The automatic day/night mirror should darken within 2 minutes if testing for the first time. For immediate response, turn the vehicle OFF and back ON with the forward-facing light sensor still covered. This defeats the day-detect logic. If OK, go to Step 8. If not OK, replace the faulty mirror unit.

(8) With the mirror darkened, place the transmission gear selector lever in the Reverse position. The automatic day/night mirror should return to its normal reflectance. If not OK, replace the faulty mirror unit.

POWER MIRROR SWITCH

DESCRIPTION

Both the right and left power outside mirrors are controlled by a single multi-function switch unit located on the driver side front door trim panel. The power mirror switch unit includes a three-position rocker selector switch and one momentary multi-directional platform rocker switch.

The power mirror switch is integral to the Driver Door Module (DDM). The power mirror switch cannot be repaired or adjusted and, if inoperative or damaged, the entire DDM unit must be replaced.

OPERATION

The power mirror selector switch is moved right (right mirror control), left (left mirror control), or center to turn the power outside mirror system off. When the selector switch is in the right mirror control or left mirror control position, the platform rocker switch will activate the mirror in the up , down, left or right positions based on the corresponding actuation. When the selector switch is in the Off position, depressing any of the directional switches will not change either mirror position. This feature protects against any inadvertent mirror actuation.

POWER SEAT SYSTEM

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POWER SEAT SYSTEM

DESCRIPTION

DESCRIPTION

The power seat system option allows the driver and front seat passenger to electrically adjust their seating positions for optimum control and comfort. Power seat switches are used to position the seats in the desired location and are located on each of the front door trim panels. The driver power front seat can be adjusted in ten different directions including, up, down, front up, front down, rear up, rear down, forward, rearward, recliner forward, recliner rearward and lumbar in and out. The passenger power front seat can be adjusted in four different directions including, forward, rearward, recliner forward and recliner rearward.

The power seat system is also available with a memory system that automatically positions the drivers power seat for two different drivers. Refer to the following Memory System Description for more information on the memory system.

The power seat system utilizes the following major components:

- Power Seat Switch Assemblies
- Power Seat Track and Motors
- Power Seat Recliners and Motors
- Memory Heated Seat Adjustable Pedal Module
- Driver and Passenger Door Modules

- Programmable Communications Interface (PCI) data bus circuit
- Circuit breaker

The memory seat system utilizes all the components listed above and the following major components:

- Memory Set Switch Assembly
- Electronic Vehicle Information Center (EVIC)
- Power Seat Track and Potentiometers

Refer to Wiring for complete circuit diagrams. Following are general descriptions and operations for the major components in the power seat and memory seat systems.

DESCRIPTION - MEMORY SYSTEM

The memory system is capable of storing two different position settings for the outside rearview mirrors, driver seat and foot pedals and up to twenty (ten AM and ten FM) radio station presets. The driver door module (DDM) is the memory system master, it lets the other modules in the vehicle know if the vehicle is equipped with the memory system. It also makes the requests to the other modules to set or recall their specific settings. The driver door module stores and recalls the driver outside mirror position. The PDM stores and recalls the passenger outside mirror position. The radio stores and recalls the preset stations and the memory heated seat adjustable pedal module (MHSAPM) stores and recalls the adjustable pedals and driver seat positions.

The memory system will automatically recall all of the previously set “positions” when the corresponding numbered one (1) and two (2) buttons of the memory switch are depressed, or when the doors are unlocked using the Remote Keyless Entry (RKE) transmitter. If the remote link to memory feature is enabled through the EVIC, and the key fob has been linked (pressing SET then one (1) or two (2) on the door followed by depressing the lock switch on the key fob) depressing the unlock switch on the RKE fob will move the seats, pedals, mirrors and radio stations to the linked position. The Body Control Module enables the customer programmable features that are displayed on the EVIC display, in the cluster.

The memory system also has a customer programmable easy exit feature that will move the driver seat rearward 55 millimeters (two inches) or to the end of its travel, whichever occurs first, when the key is removed from the ignition switch lock cylinder.

Certain functions of the memory system rely upon resources shared with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus network. The PCI data bus network allows the sharing of sensor information. This system provides increased reliability, enhanced diagnostics, and allows the addition of new feature capabilities. For diagnosis of the electronic modules or of the PCI data bus network, the use of a DRB III® scan tool and the proper Diagnostic Procedures manual are recommended.

Electronic modules that may affect memory system operation are as follows:

- **Memory Seat Adjustable Pedal Module (MSAPM) or Memory Heated Seat Adjustable Pedal Module (MHSAPM)** - Refer to Memory (Heated) Seat Adjustable Pedal Module in the Electronic Control Module section for more information.
- **Body Control Module (BCM)** - Refer to Body Control Module in the Electronic Control Module section for more information.
- **Driver Door Module (DDM)** - Refer to Driver Door Module in the Electronic Control Module section for more information.
- **Passenger Door Module (PDM)** - Refer to Passenger Door Module in the Electronic Control Module section for more information.
- **Electronic Vehicle Information Center (EVIC)** - Refer to Electronic Vehicle Information Center in the Overhead Console System section for more information.
- **Powertrain Control Module (PCM)** - Refer to Powertrain Control Module in the Electronic Control Module section for more information.
- **Radio Receiver** - Refer to Radio Receiver in the Audio System section for more information.

Refer to Remote Keyless Entry System in the Power Locks section for more information on the RKE system.

OPERATION

OPERATION - POWER SEAT SYSTEM

The power seat system receives battery current through a circuit breaker, located in the Integrated Power Module. The power seat system is designed to function regardless of the ignition switch position.

A low-voltage cut-off feature is designed into the power seat system. If the vehicle battery voltage drops below a certain set-point (approx. 11.5v), the power seats will not operate. This is necessary to prevent the vehicles battery from being discharged to the point that the vehicle may not start and run. Under normal conditions this feature will be transparent.

When a power seat switch control knob(s) is actuated, a hard-wired resistance signal is sent to the appropriate door module. The door module then sends the request to the Memory Heated Seat Adjustable Pedal Module (MHSAPM) via the PCI data bus circuit. The MHSAPM is responsible for controlling the 12v battery feed and ground path to the selected

seat track motor to move the adjuster through its drive unit until the switch is released, or until the travel limit of the adjuster is reached. The Memory Heated Seat Adjustable Pedal Module (MHSAPM) is the main control module for the power, memory and heated seat systems. The module will drive a maximum of 3 motors at a time in a given direction.

No power seat switch should be held applied in any direction after the seat track has reached its travel limit. The power seat track motors each contain a self-resetting circuit breaker to protect them from overload. However, consecutive or frequent resetting of the circuit breaker must not be allowed to continue, or the motor may be damaged. Refer to the owner's manual in the vehicle glove box for more information on the features, use and operation of the power seat system.

OPERATION - MEMORY SYSTEM

When a memory switch button is actuated, a hard-wired resistance signal is sent to the driver door module. The driver door module then sends the request to the Memory Heated Seat Adjustable Pedal Module (MHSAPM) for the driver seat and pedals. The driver door module would also send the request to the radio for the preset stations. The passenger door module would send the request to the MHSAPM for the passenger outside mirror via the PCI data bus circuit. The driver door module would send the request to the MHSAPM for the driver outside mirror. The MHSAPM is responsible for controlling the 12v battery feed and ground path to the selected adjuster motor to move the seat track or pedal assembly through its drive unit until the preset location is reached.

The Memory Heated Seat Adjustable Pedal Module is the main control module for the power, memory seat and heated seat systems. The module will drive a maximum of 3 motors at a time in a given direction. The software in the module allows it to know where the seat and foot pedal assembly are located in its designed travel by a resistance reading generated from the seat track motor or pedal mounted potentiometers.

The module will prevent the seat memory recall function from being initiated, if the transmission gear selector lever is not in the Park or Neutral positions, or if the vehicle is moving. These inputs are monitored over the PCI data bus circuit by the MHSAPM.

ELECTRONIC VEHICLE INFORMATION CENTER

The Electronic Vehicle Information Center (EVIC) module serves as the user interface for the memory system. It displays memory system messages in the cluster display and provides the vehicle operator with a means for enabling and disabling the customer programmable features available in the system.

Refer to **Electronic Vehicle Information Center** in Overhead Console for more information on the EVIC module. See the owner's manual in the vehicle glove box for more information on the features, use and operation of the memory system.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER SEAT SYSTEM

The most reliable, efficient, and accurate means to diagnose the power seat system requires the use of a DRB III® scan tool and the proper Diagnostic Procedures information. The DRB III® scan tool can provide confirmation that the PCI data bus is functional, that all of the electronic modules are sending and receiving the proper messages on the PCI data bus network, and that the memory system is receiving the proper hard wired inputs and relaying the proper hard wired outputs to perform its power seat system functions. The scan tool is used to retrieve any diagnostic trouble codes (DTC's) that could be related to the power seat system.

Following are tests that will help to diagnose the hard wired components and circuits of the power seat system.

PRELIMINARY TESTS

(1) If any power seat is not operational in any direction, check the power seat circuit breaker, located in the Integrated Power Module. If OK, go to Step 2. Refer to the Power Distribution section for circuit breaker diagnosis and testing procedure.

(2) Check for proper battery or electrical system voltage. The CS is equipped with a low-voltage cut-off feature. If the electrical system voltage drops below a predetermined set-point (approx. 11.5v), the power seat system will not function until the proper system voltage has been restored. If OK, go to Step 3. Refer to the Battery System and/or Charging System section for testing instructions.

(3) Obtain a DRB III® scan tool and check for any stored diagnostic trouble codes recorded in the memory heated seat adjustable pedal module. Follow the procedures called out in the proper diagnostic procedures manual to resolve if codes are present.

(4) Using a DRB III® scan tool, energize each seat track motor axis one at a time. If any axis stops without hitting the end of travel, the potentiometer signal for that axis may have an open, short or be mis-wired. Check the wiring to that axis (module to motor). Fix any wiring problems and retry that axis.

POWER SEAT SYSTEM (Continued)

DIAGNOSIS AND TESTING - MEMORY SYSTEM

The most reliable, efficient, and accurate means to diagnose the memory system requires the use of a DRB III® scan tool and the proper Diagnostic Procedures information. In order to obtain conclusive testing of the memory system, the Programmable Communications Interface (PCI) data bus network and all of the electronic modules that provide inputs to, or receive outputs from the memory system components must be checked. The DRB III® scan tool can provide confirmation that the PCI data bus is functional, that all of the electronic modules are sending and receiving the proper messages on the PCI data bus, and that the memory system is receiving the proper hard wired inputs and relaying the proper hard wired outputs to perform its functions. The scan tool is used to retrieve any diagnostic trouble codes (DTC's) that could be related to the memory system.

Following are tests that will help to diagnose the hard wired components and circuits of the memory system.

PRELIMINARY TESTS

(1) If any power seat is not operational in any direction, check the power seat circuit breaker, located in the Integrated Power Module. If OK, go to Step 2. Refer to the Power Distribution section for circuit breaker diagnosis and testing procedure.

(2) Check for proper battery or electrical system voltage. The CS is equipped with a low-voltage cut-off feature. If the electrical system voltage drops below a predetermined set-point (approx. 11.5v), the power seat system will not function until the proper system voltage has been restored. If OK, go to Step 3. Refer to the Battery System and/or Charging System section for testing instructions.

(3) Obtain a DRB III® scan tool and check for any stored diagnostic trouble codes recorded in the memory heated seat adjustable pedal module. Follow the procedures called out in the proper diagnostic procedures manual to resolve if codes are present.

(4) To check the memory heated seat adjustable pedal module for proper output, obtain a DRB III® scan tool, energize each seat track motor axis one at a time. If any axis stops without hitting the end of travel, the potentiometer signal for that axis may have an open, short or be mis-wired. Check the wiring to that axis (module to motor). Fix any wiring problems and retry that axis.

DRIVER SEAT SWITCH

DESCRIPTION

The driver seat switch assembly includes up to eight separate switches ganged together in one compact switch assembly (Fig. 1). The switch is located on the drivers front door trim panel. The driver seat switch assembly can provide up to six major resistive multiplexed inputs into the driver door module. The inputs can include memory, heated seat, power seat, and foot pedal system requests, depending on how the vehicle is equipped. All inputs are hardwired resistive mux to the driver door module to decode axis direction or seat heat level. Refer to Driver Door or Memory Heated Seat Adjustable Pedal Modules in the Electronic Control Modules section for additional information.

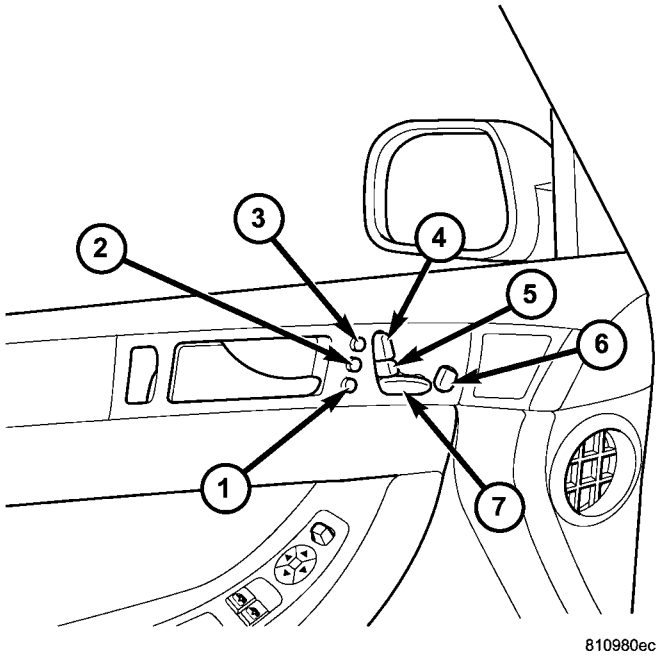


Fig. 1 CS Driver Seat Switch Assembly

1 - Memory Position #2
2 - Memory Position #1
3 - Memory Set Switch
4 - Power Seat Recline Switch
5 - Power Lumbar Switch
6 - Adjustable Foot Pedal Switch
7 - Power Seat Cushion Switch

The switch is secured to the back of the front door trim panel with four clips. The seat switch assembly cannot be adjusted or repaired. If one switch is damaged or faulty, the entire seat switch assembly must be replaced.

OPERATION

The heated seat button is back-lit with Light-Emitting Diodes (LED) for easy visibility. The memory set button blinks red when depressed until one of the position buttons (1 or 2) are pushed. When any of the switches are depressed, a resistance signal is sent to the Driver Door Module via hard wired connections. The driver door module then sends the request to the

DRIVER SEAT SWITCH (Continued)

Memory Heated Seat Adjustable Pedal Module (MHSAPM) via the PCI data bus circuit. The MHSAPM is responsible for controlling the 12v battery feed and ground path to the seat heating elements or power seat track/foot pedal mounted motors to control the seat accordingly.

Any seat/pedal axis or seat heat inputs can be activated at the same time (except contradictory inputs). The driver door module has two outputs to the seat switch to indicate heat level (HI/LO). The power seat system is operational in any ignition switch position. When the memory system enters "set" mode a chime will be generated by the body control module. See the owner's manual in the vehicle glove box for more information on the seat switch functions and the seat adjusting procedures.

DIAGNOSIS AND TESTING - DRIVER SEAT SWITCH

(1) Remove the driver seat switch assembly, refer to following removal procedure in this section.

(2) Using an ohmmeter, check the appropriate ground circuit cavity of the driver seat switch connector for continuity to ground. It should be present, If OK go to Step 3 , If NOT OK repair the open ground circuit as required.

(3) Using an voltmeter, check the appropriate 12v circuit cavity of the power seat switch connector for approx. 12v. It should be present, If OK go to Step 4 , If NOT OK repair the open voltage supply circuit as required.

(4) Using an ohmmeter, verify the Seat Switch resistance values, using the seat switch connector receptacle. If the values are not within spec. replace the driver seat switch.

DRIVER SEAT SWITCH TESTING

MEMORY SWITCH TESTING	SWITCH RESISTANCE ±4% PIN's 11-4
1	8000 Ohms (8 Kohms)
SET	4815 Ohms (4.815 Kohms)
SET & 1	3420 Ohms (3.420 Kohms)
2	2410 Ohms (2.410 Kohms)
SET & 2	1730 Ohms (1.730 Kohms)
HEATED SEAT SWITCH TESTING	**PIN's 10-4**
LO	8010 Ohms (8.010 Kohms)
HI	2415 Ohms (2.415 Kohms)
POWER SEAT/ ADJUSTABLE PEDAL SWITCH TESTING	**PIN's 9-4**
SEAT CUSHION FRONT DOWN	8005 Ohms (8.005 Kohms)
SEAT CUSHION FRONT UP	2405 Ohms (2.405 Kohms)
PEDALS FORWARD	4810 Ohms (4.810 Kohms)
SEAT CUSHION FRONT DOWN & PEDALS FWD	3415 Ohms (3.415 Kohms)
SEAT CUSHION FRONT UP & PEDALS FWD	1725 Ohms (1.725 Kohms)
	PIN's 12-4
SEAT CUSHION REAR DOWN	8025 Ohms (8.025 Kohms)
SEAT CUSHION REAR UP	2400 Ohms (2.4 Kohms)
PEDALS REARWARD	4805 Ohms (4.805 Kohms)
SEAT CUSHION REAR DOWN & PEDALS BACK	3410 Ohms (3.410 Kohms)
SEAT CUSHION REAR UP & PEDALS BACK	1720 Ohms (1.720 Kohms)
	PIN's 8-4
SEAT CUSHION REARWARD	8020 Ohms (8.020 Kohms)
LUMBAR OUT	4820 Ohms (4.820 Kohms)
SEAT CUSHION REARWARD & LUMBAR OUT	3425 Ohms (3.425 Kohms)
SEAT CUSHION FORWARD	2420 Ohms (2.420 Kohms)
SEAT CUSHION FORWARD & LUMBAR OUT	1735 Ohms (1.735 Kohms)
	PIN's 7-4
RECLINER BACK	8030 Ohms (8.030 Kohms)
LUMBAR IN	4825 Ohms (4.825 Kohms)
RECLINER BACK & LUMBAR IN	3430 Ohms (3.430 Kohms)
RECLINER FORWARD	2425 Ohms (2.425 Kohms)
RECLINER FORWARD & LUMBAR IN	1715 Ohms (1.715 Kohms)

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the front door trim panel. Refer to the Body section for the procedure.

(3) Disconnect the wire harness connector from the door module. Depress the retaining tab and pull straight apart.

(4) Press in the four clips that secure the seat switch to the door trim panel.

(5) Remove the power seat switch from the trim panel.

DRIVER SEAT SWITCH (Continued)

INSTALLATION

(1) Position the seat switch onto the door trim panel. Press into place ensuring all four clips are engaged.

(2) Reconnect the wire harness connector to the door module.

(3) Install the front door trim panel. Refer to the Body section for the procedure.

(4) Reconnect the battery negative cable.

DRIVER POWER SEAT TRACK

DESCRIPTION

The power seat option includes a electrically operated power seat track and motor assembly. One seat track assembly is located under each front seat. The driver side power seat track also provides the mounting location for the memory heated seat adjustable pedal module on this vehicle. The lower half of the power seat track is secured to the floor panel via four studs and nuts that must be accessed from the underside of the vehicle. Four bolts secure the bottom of the seat cushion pan to the upper half of the power seat track unit. Four additional bolts secure the seat back frame to the power seat track unit.

The power seat track unit includes four reversible electric motors that are secured to the upper half of the track unit. Each motor moves the seat track through a combination of worm-drive gearboxes and screw-type drive units. Each of the power seat track motors incorporates a integral position potentiometer, which allows the memory heated seat adjustable pedal module to monitor the motor position. This enables the memory system to function by referencing the motor positions programmed into the module.

The front and rear of the seat are operated by two separate vertical adjustment motors. These motors can be operated independently of each other, tilting the entire seat assembly forward or rearward; or, they can be operated in unison by selecting the proper power seat switch functions, which will raise or lower the entire seat assembly. A third motor is the horizontal adjustment motor, which moves the seat track in the forward and rearward directions. The forth motor is the recliner adjustment motor, which moves the seat back in the forward and rearward directions.

The power seat track unit cannot be repaired, and is serviced only as a complete unit. If any component in this unit is faulty or damaged, the entire power seat track unit must be replaced.

OPERATION

When a power seat switch control knob is actuated, a resistance signal is sent to the Driver Door Module via hard wired connections. The driver door module then sends the request to the Memory Heated Seat Adjustable Pedal Module (MHSAPM) via the PCI data bus circuit. The MHSAPM is responsible for the 12v battery feed and ground path to the power seat track adjuster motor. The selected adjuster motor operates to move the seat track or recliner through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached.

DIAGNOSIS AND TESTING - DRIVER POWER SEAT TRACK

The most reliable, efficient, and accurate means to diagnose the power seat track requires the use of a DRB III® scan tool and the Diagnostic Procedures information. The DRB III® scan tool can provide confirmation that the PCI data bus is functional, that all of the electronic modules are sending and receiving the proper messages on the PCI data bus network, and that the power seat system is receiving the proper hard wired inputs and relaying the proper hard wired outputs to perform its functions.

Following are tests that will help to diagnose the hard wired components and circuits of the power seat system.

PRELIMINARY TESTS

(1) Obtain a DRB III® scan tool and check for any stored diagnostic trouble codes recorded in the memory heated seat adjustable pedal module. Follow the procedures called out in the proper diagnostic procedures manual to resolve if codes are present.

(1) If any power seat is not operational in any direction, check the power seat circuit breaker, located in the Integrated Power Module. If OK, go to Step 2. Refer to the Power Distribution section for circuit breaker diagnosis and testing procedure.

(2) Check for proper battery or electrical system voltage. The CS is equipped with a low-voltage cut-off feature. If the electrical system voltage drops below a predetermined set-point (approx. 11.5v), the power seat system will not function until the proper system voltage has been restored. If OK, go to Step 4. Refer to the Battery System and/or Charging System section for testing instructions.

(3) Obtain a DRB III® scan tool and energize each seat track motor axis one at a time. If any axis stops without hitting the end of travel, the potentiometer signal for that axis may have an open, short or be mis-wired. Check the wiring to that axis (module to motor). Fix any wiring problems and retry that axis. If a certain seat track motor is inoperational, apply 12v and a good ground source to the inop motor. If the motor does not operate in either direction replace

DRIVER POWER SEAT TRACK (Continued)

the power seat track assembly. Refer to Wiring for complete circuit diagrams.

REMOVAL

(1) Remove the drivers seat from the vehicle and place it on a clean work surface (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).

(2) Remove the memory heated seat adjustable pedal module retaining screws.

(3) Disconnect the module electrical connectors and remove the module from the power seat track.

(4) Remove the rear fabric blocker trim panel from the rear of the front seat.

(5) Remove the seat side cover assembly (Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE COVERS - REMOVAL).

(6) Disconnect all electrical connectors connecting the power seat track to the seat assembly.

(7) Pull the seat back trim cover up slightly to access and remove the two seat back frame mounting bolts and also remove two seat back recliner bolts.

(8) Remove four seat track mounting bolts from the seat cushion pan.

(9) Remove the power seat track from the seat.

INSTALLATION

(1) Position the seat cushion on the seat track.

(2) Install the four seat track retaining bolts in the seat cushion pan. Torque the bolts to 28.5 N·m.

(3) Position the seat back and install the two seat back frame mounting bolts and the two seat back recliner bolts. Torque the bolts to 55 N·m.

(4) Route and connect the electrical connectors between the power seat track and the seat assembly.

(5) Install the seat side cover assembly (Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE COVERS - INSTALLATION).

(6) Install the rear fabric blocker trim panel on the rear of the front seat.

(7) Position the memory heated seat adjustable pedal module and connect the module electrical connectors.

(8) Install the memory heated seat adjustable pedal module retaining screws.

(9) Install the seat assembly in the vehicle (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

LUMBAR MOTOR

DESCRIPTION

The power seat system includes an electrically operated lumbar support mechanism. The power lumbar adjuster and motor are concealed beneath the seat back trim cover and padding, where they are secured to the seat back frame.

The power lumbar adjuster mechanism includes a reversible electric motor that is secured to the inboard side of the seat back frame and is connected to cable. The motor driven cable operates the lumbar adjuster mechanism in the center of the seat back by extending and retracting the lumbar mechanism. This action compresses or relaxes a grid of flexible slats. The more this grid is compressed, the more the slats bow outward against the center of the seat back padding, providing additional lumbar support.

The power lumbar motor and adjuster cannot be repaired, and is serviced only as a complete unit. If the power lumbar motor or adjuster are damaged or faulty, the entire lumbar mechanism must be replaced.

OPERATION

When the lumbar switch control knob is actuated, a resistance signal is sent to the Driver Door Module via hard wired connections. The driver door module then sends the request to the Memory Heated Seat Adjustable Pedal Module (MHSAPM) via the PCI data bus circuit. The MHSAPM is responsible for the 12v battery feed and ground path to the power seat lumbar adjuster motor. The lumbar adjuster motor operates to move the cable and lumbar mechanism through its travel until the switch is released, or until the travel limit of the adjuster is reached.

DIAGNOSIS AND TESTING - LUMBAR MOTOR

The most reliable, efficient, and accurate means to diagnose the power seat system requires the use of a DRB III® scan tool and the proper Diagnostic Procedures information. The DRB III® scan tool can provide confirmation that the PCI data bus is functional, that the electronic modules are sending and receiving the proper messages on the PCI data bus network, and that the power seat system is receiving the proper hard wired inputs and relaying the proper hard wired outputs to perform system functions.

Following are tests that will help to diagnose the components and circuits in the power seat system. However, these tests may not prove conclusive. In order to obtain conclusive testing of the power seat system, the Programmable Communications Interface (PCI) data bus network must be checked.

PRELIMINARY TESTS

(1) Obtain a DRB III® scan tool and check for any stored diagnostic trouble codes recorded in the memory heated seat adjustable pedal module. Follow the procedures called out in the proper diagnostic procedures manual to resolve if codes are present.

(1) If any power seat is not operational in any direction, check the power seat circuit breaker, located in the Integrated Power Module. If OK, go to

LUMBAR MOTOR (Continued)

Step 2. Refer to the Power Distribution section for circuit breaker diagnosis and testing procedure.

(2) Check for proper battery or electrical system voltage. The CS is equipped with a low-voltage cut-off feature. If the electrical system voltage drops below a predetermined set-point (approx. 11.5v), the power seat system will not function until the proper system voltage has been restored. If OK, go to Step 4. Refer to the Battery System and/or Charging System section for testing instructions.

(3) Obtain a DRB III® scan tool and energize each seat track motor axis one at a time. If any axis stops without hitting the end of travel, the potentiometer signal for that axis may have an open, short or be mis-wired. Check the wiring to that axis (module to motor). Fix any wiring problems and retry that axis. If a lumbar motor is inoperational, apply 12v and a good ground source to the inop motor. If the motor does not operate in either direction replace the power lumbar assembly. Refer to Wiring for complete circuit diagrams.

REMOVAL

(1) Disconnect and isolate the negative battery cable.

(2) Remove the drivers seat from the vehicle. Refer to the Body section for detailed instructions.

(3) Remove the seat back trim cover and foam. Refer to the Body section for detailed instructions.

(4) Disconnect the lumbar motor electrical connector.

(5) Unhook the top of the lumbar mechanism assembly from the seat back frame.

(6) Unhook the bottom of the lumbar mechanism assembly from the seat back frame and remove the lumbar motor and lumbar mechanism as an assembly.

INSTALLATION

(1) Hook the bottom of the lumbar mechanism assembly on the seat back frame.

(2) Hook the top of the lumbar mechanism assembly on the seat back frame.

(3) Connect the lumbar motor electrical connector.

(4) Install the seat back foam and trim cover. Refer to the Body section for detailed instructions.

(5) Install the drivers seat in the vehicle. Refer to the Body section for detailed instructions.

(6) Connect the negative battery cable.

(7) Verify correct seat lumbar operation.

LUMBAR CONTROL SWITCH

DESCRIPTION

The lumbar control switch is one of eight separate switches ganged together in driver seat switch assembly. The switch is located on the drivers front door trim panel (Fig. 2). The driver seat switch assembly can provide up to six resistive multiplexed inputs into the driver door module. The inputs can include memory, heated seat, power seat, and foot pedal system requests. All inputs are hardwired resistive mux to the driver door module to decode axis direction or seat heat level. Refer to Driver Door or Memory Heated Seat Adjustable Pedal Modules in the Electronic Control Modules section for additional information.

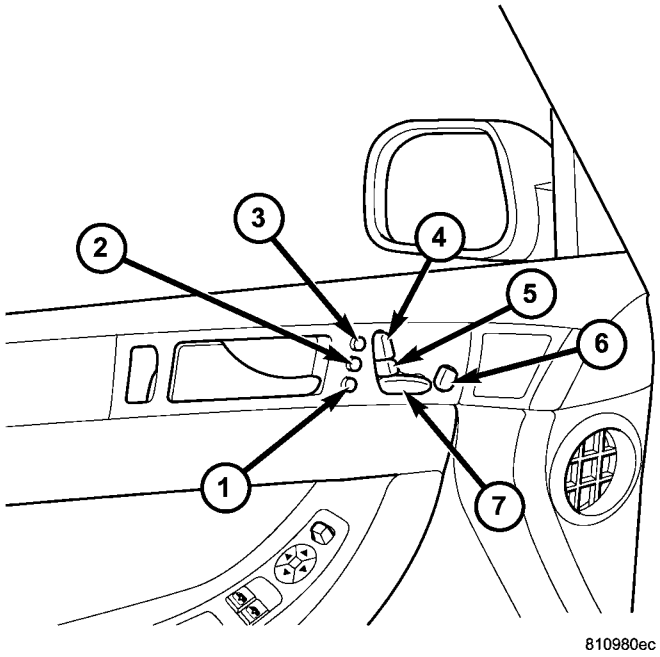


Fig. 2 CS Driver Seat Switch Assembly

1 - Memory Position #2
2 - Memory Position #1
3 - Memory Set Switch
4 - Power Seat Recline Switch
5 - Power Lumbar Switch
6 - Adjustable Foot Pedal Switch
7 - Power Seat Cushion Switch

The power lumbar switch cannot be adjusted or repaired and, if faulty or damaged, the complete driver seat switch assembly must be replaced.

OPERATION

When the lumbar control switch is moved forward or rearward, a resistance signal is sent to the Driver Door Module via hard wired connections. The driver door module then sends the request to the Memory Heated Seat Adjustable Pedal Module (MHSAPM)

LUMBAR CONTROL SWITCH (Continued)

via the PCI data bus circuit. The MHSAPM is responsible for controlling the 12v battery feed and ground path to the lumbar motor to control the seat back power lumbar mechanism accordingly.

DIAGNOSIS AND TESTING - LUMBAR CONTROL SWITCH

(1) The lumbar control switch used on CS vehicles is incorporated into the driver seat switch assembly. For diagnostic routine (Refer to 8 - ELECTRICAL/ POWER SEATS/DRIVER SEAT SWITCH - DIAGNOSIS AND TESTING).

MEMORY SET SWITCH

DESCRIPTION

The memory set switch is one of eight separate switches ganged together in driver seat switch assembly. The switch is located on the drivers front door trim panel (Fig. 3). The memory set switch will flash red when pressed until a position button is pressed or it times out. The driver seat switch assembly can provide up to six major resistive multiplexed inputs into the driver door module. The inputs can include memory, heated seat, seat front up/down and foot pedal forward, seat rear up/down and pedal backwards, seat forward/backward and lumbar aft., recline forward/backward and lumbar backwards. All inputs are hardwired resistive mux to the driver door module to decode axis direction or seat heat level. Refer to Driver Door or Memory Heated Seat Adjustable Pedal Modules in the Electronic Control Modules section for additional information.

The memory set switch cannot be adjusted or repaired and, if faulty or damaged, the complete driver seat switch assembly must be replaced.

OPERATION

When any of the memory switches are depressed, a resistance signal is sent to the Driver Door Module via hard wired connections. The memory set switch LED will flash red when pressed until a position button is pressed or the system times out. The driver door module then sends the request to the Memory

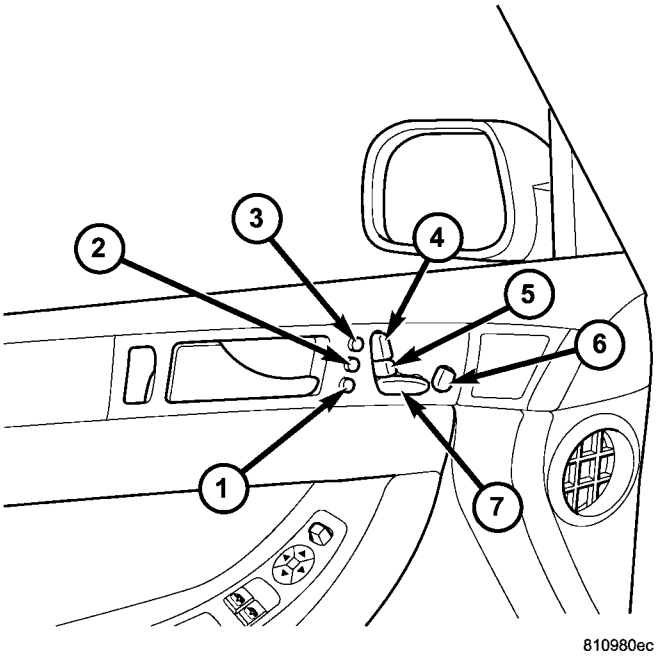


Fig. 3 CS Driver Seat Switch Assembly

1 - Memory Position #2
2 - Memory Position #1
3 - Memory Set Switch
4 - Power Seat Recline Switch
5 - Power Lumbar Switch
6 - Adjustable Foot Pedal Switch
7 - Power Seat Cushion Switch

Heated Seat Adjustable Pedal Module (MHSAPM) via the PCI data bus circuit. The MHSAPM is responsible for controlling the 12v battery feed and ground path to the power seat track or adjustable pedal motor(s) to control the seat or pedal assembly accordingly.

DIAGNOSIS AND TESTING - MEMORY SET SWITCH

(1) The memory set switch used on CS vehicles is incorporated into the driver seat switch assembly. For diagnostic routine (Refer to 8 - ELECTRICAL/ POWER SEATS/DRIVER SEAT SWITCH - DIAGNOSIS AND TESTING).

PASSENGER SEAT SWITCH

DESCRIPTION

The passenger seat switch assembly includes up to three switches ganged together in one compact switch assembly. The switch is located on the passengers front door trim panel. This seat switch assembly can provide up to three resistive multiplexed inputs into the passenger door module. These inputs control the heated seat and power seat system functions, depending on how the vehicle is equipped. All inputs are hardwired resistive mux to the passenger door module to decode axis direction or seat heat level. The passenger door module sends out the system requests over the Programmable Communications Interface (PCI) data bus circuit. Refer to Passenger Door Module or Memory Heated Seat Adjustable Pedal Module in the Electronic Control Modules section for additional information on these modules.

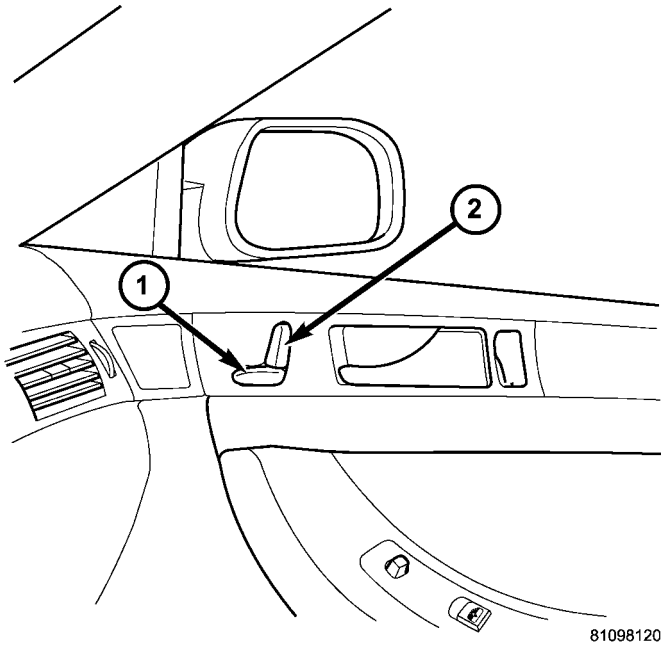


Fig. 4 CS Passenger Seat Switch

1 - Seat Cushion Adjuster
2 - Seat Back Adjuster

The switch assembly is secured to the back of the front door trim panel (Fig. 4) with clips.

The switch assembly cannot be adjusted or repaired. If one switch is damaged or faulty, the entire seat switch assembly must be replaced.

OPERATION

The passenger seat switch has up to three momentary switch buttons. The heated seat switch portion of the switch is back-lit with Light-Emitting Diodes (LED) for easy visibility. When any of the switch buttons are depressed, a resistance signal is sent to the Passenger Door Module (PDM) via hard wired connections. The passenger door module then sends the request to the Memory Heated Seat Adjustable Pedal Module (MHSAPM) via the PCI data bus circuit. The MHSAPM is responsible for controlling the 12volt battery source and ground path to the seat heating elements or power seat track mounted motors to control the seat accordingly.

Any seat axis or seat heat inputs can be activated at the same time (except contradictory inputs). The passenger door module has two outputs to the seat switch to indicate heat level (HI/LO). The power seat system is operational in any ignition switch position. The heated seat system only operates with the ignition on. See the owner's manual in the vehicle glove box for more information on the seat switch functions and the seat adjusting procedures.

DIAGNOSIS AND TESTING - PASSENGER SEAT SWITCH

(1) Remove the passenger seat switch, refer to the following Switch Removal procedure in this section.

(2) Using an ohmmeter, check the appropriate ground circuit cavity of the power seat switch connector for continuity to ground. It should be present, If OK go to Step 3 , If NOT OK repair the open ground circuit as required.

(3) Using an voltmeter, check the appropriate 12v circuit cavity of the power seat switch connector for approx. 12v. It should be present, If OK go to Step 4 , If NOT OK repair the open voltage supply circuit as required.

PASSENGER SEAT SWITCH (Continued)

(4) Using an ohmmeter, check the Seat Switch resistance values. If the values are not within spec, replace the seat switch.

HEATED SEAT SWITCH TESTING	SWITCH RESISTANCE ±4% PINS 10-4
LO	8010 Ohms (8.010 Kohms)
HI	2415 Ohms (2.415 Kohms)
POWER SEAT SWITCH TESTING	**PINS 8-4**
SEAT CUSHION REARWARD	8020 Ohms (8.020 Kohms)
SEAT CUSHION FORWARD	2420 Ohms (2.420 Kohms)
POWER SEAT SWITCH TESTING	**PINS 7-4**
RECLINER BACK	8030 Ohms (8.030 Kohms)
RECLINER FORWARD	2425 Ohms (2.425 Kohms)

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the front door trim panel. Refer to the Body section for the procedure.

(3) Disconnect the wire harness connector from the door module. Depress the retaining tab and pull straight apart.

(4) Press in the four clips that secure the seat switch to the door trim panel.

(5) Remove the power seat switch from the trim panel.

INSTALLATION

(1) Position the seat switch onto the door trim panel. Press into place ensuring all four clips are engaged.

(2) Reconnect the wire harness connector to the door module.

(3) Install the front door trim panel. Refer to the Body section for the procedure.

(4) Reconnect the battery negative cable.

PASSENGER POWER SEAT TRACK

DESCRIPTION

The power seat option includes a electrically operated power seat track and motor assembly unit located under each front seat. The lower half of the power seat track is secured to the floor panel via four studs and nuts that must be accessed from the underside of the vehicle. Four bolts secure the bottom of the seat cushion frame to the upper half of the power seat track unit. Four additional bolts secure the seat back frame to the power seat track unit.

The power seat track unit includes two reversible electric motors that are secured to the upper half of the track unit. Each motor moves the seat adjuster through a combination of worm-drive gearboxes and screw-type drive units. The CS passenger seat base and seat back recliner can be adjusted forward and backward.

One motor is the horizontal adjustment motor, which moves the seat track in the forward and rearward directions. The second motor is the recliner adjustment motor, which moves the seat back in the forward and rearward directions.

The power seat track unit cannot be repaired, and is serviced only as a complete unit. If any component in this unit is faulty or damaged, the entire power seat track unit must be replaced.

OPERATION

When a power seat switch control knob is actuated, a resistance signal is sent to the Passenger Door Module via hard wired connections. The door module then sends the request to the Memory Heated Seat Adjustable Pedal Module (MHSAPM) via the PCI data bus circuit. The MHSAPM is responsible for the 12v battery feed and ground path to the power seat track adjuster motor. The selected adjuster motor operates to move the seat track or recliner through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached.

DIAGNOSIS AND TESTING - PASSENGER POWER SEAT TRACK

The most reliable, efficient, and accurate means to diagnose the power seat system requires the use of a DRB III® scan tool and the proper Diagnostic Procedures information. The DRB III® scan tool can provide confirmation that the PCI data bus is functional, that all of the electronic modules are sending and receiving the proper messages on the PCI data bus network, and that the power seat system is receiving the proper hard wired inputs and relaying the proper hard wired outputs to perform its system functions.

Following are tests that will help to diagnose the hard wired components and circuits of the power seat system. However, these tests may not prove conclusive. In order to obtain conclusive testing of the power seat system, the Programmable Communications Interface (PCI) data bus network and all of the

PASSENGER POWER SEAT TRACK (Continued)

electronic modules that provide inputs to, or receive outputs from the system components must be checked.

PRELIMINARY TESTS

(1) Obtain a DRB III® scan tool and check for any stored diagnostic trouble codes recorded in the memory heated seat adjustable pedal module. Follow the procedures called out in the proper diagnostic procedures manual to resolve if codes are present.

(1) If any power seat is not operational in any direction, check the power seat circuit breaker, located in the Integrated Power Module. If OK, go to Step 2. Refer to the Power Distribution section for circuit breaker diagnosis and testing procedure.

(2) Check for proper battery or electrical system voltage. The CS is equipped with a low-voltage cut-off feature. If the electrical system voltage drops below a predetermined set-point (approx. 11.5v), the power seat system will not function until the proper system voltage has been restored. If OK, go to Step 4. Refer to the Battery System and/or Charging System section for testing instructions.

(3) Obtain a DRB III® scan tool and energize each seat track motor axis one at a time. If any axis stops without hitting the end of travel, the potentiometer signal for that axis may have an open, short or be mis-wired. Check the wiring to that axis (module to motor). Fix any wiring problems and retry that axis. If a certain seat track motor is inoperational, apply 12v and a good ground source to the inop motor. If the motor does not operate in either direction replace the power seat track assembly. Refer to Wiring for complete circuit diagrams.

REMOVAL

(1) Remove the passenger seat from the vehicle (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).

(2) Remove the rear fabric blocker trim panel from the rear of the front seat.

(3) Remove the seat side cover assembly (Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE COVERS - REMOVAL).

(4) Disconnect all electrical connectors connecting the power seat track to the seat assembly.

(5) Pull the seat back trim cover up slightly to access and remove the two seat back frame mounting bolts and seat back recliner bolts.

(6) Remove four seat track mounting bolts from the seat cushion pan.

(7) Remove the power seat track from the seat.

INSTALLATION

(1) Position the seat cushion on the seat track.

(2) Install the four seat track retaining bolts in the seat cushion pan. Torque the bolts to 28.5 N·m.

(3) Position the seat back and install the two seat back frame mounting bolts and the two seat back recliner bolts. Torque the bolts to 55 N·m.

(4) Route and connect the electrical connectors between the power seat track and the seat assembly.

(5) Install the seat side cover assembly (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION).

(6) Install the rear fabric blocker trim panel on the rear of the front seat.

(7) Install the seat assembly in the vehicle (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

RECLINER MOTOR

DESCRIPTION

The power seat option includes an electrically operated power seat back recliner mechanism. The power seat recliner switch is integral to the power seat switch assembly, but is actuated with a separate switch knob.

The power seat recliner motor assembly is mounted in the place of a seat hinge on the outboard side of the seat (Fig. 5). The upper hinge plate of the power seat recliner mechanism is secured with two screws to the seat back frame and is concealed beneath the seat back trim cover and padding. The lower hinge plate and the motor and drive unit of the power seat recliner mechanism is secured with two screws to the seat cushion frame, and is concealed by the outboard seat cushion side shield.

The power seat recliner motor cannot be repaired. If the unit is faulty or damaged, it must be replaced.

OPERATION

When the recliner switch control knob is actuated, a resistance signal is sent to the appropriate Door Module via hard wired connections. The door module then sends the request to the Memory Heated Seat Adjustable Pedal Module (MHSAPM) via the PCI data bus circuit. The MHSAPM is responsible for the 12v battery feed and ground path to the power seat recliner adjuster motor. The adjuster motor operates to move the recliner mechanism through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached.

The driver side power seat recliner motor used on models equipped with the memory system also has a position potentiometer integral to the motor assembly, which electronically monitors the motor position.

DIAGNOSIS AND TESTING - RECLINER MOTOR

The most reliable, efficient, and accurate means to diagnose the power seat system requires the use of a

RECLINER MOTOR (Continued)

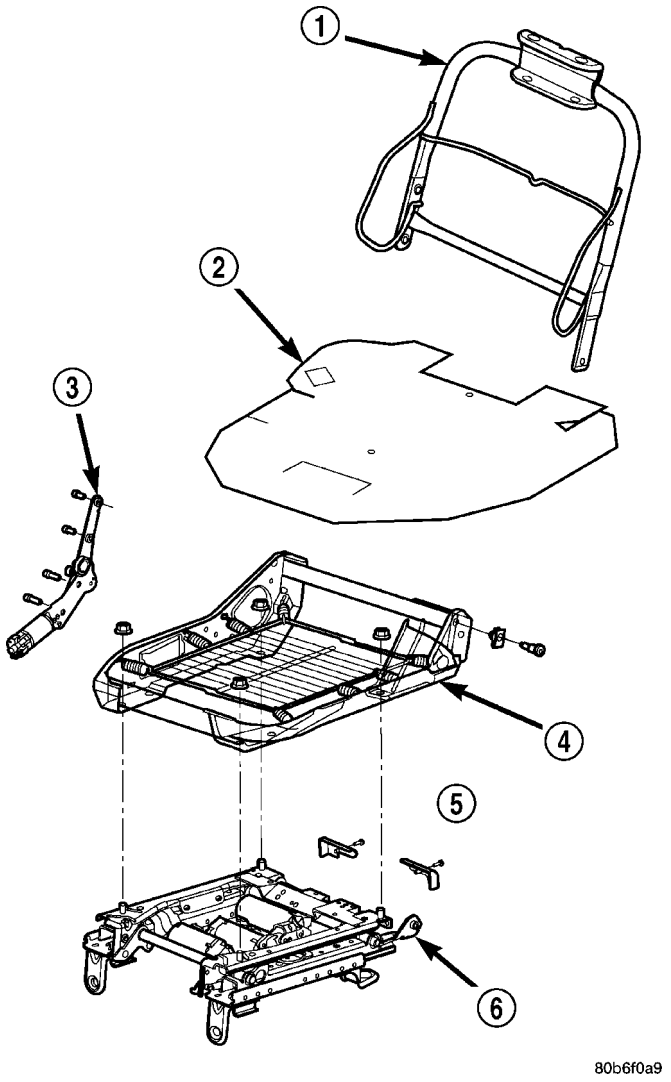


Fig. 5 Power Seat Recliner and Track - Typical

1 - Seat Back Frame
2 - Seat Cushion Foam
3 - Recliner Motor
4 - Seat Cushion Frame
5 - Shield
6 - Power Seat Track

DRB III® scan tool and the proper Diagnostic Procedures manual. The DRB III® scan tool can provide confirmation that the PCI data bus is functional, that the electronic modules are sending and receiving the proper messages on the PCI data bus network, and that the power seat system is receiving the proper hard wired inputs and relaying the proper hard wired outputs to perform system functions.

Following are tests that will help to diagnose the components and circuits in the power seat system. However, these tests may not prove conclusive. In order to obtain conclusive testing of the power seat system, the Programmable Communications Interface (PCI) data bus network must be checked.

PRELIMINARY TESTS

(1) Obtain a DRB III® scan tool and check for any stored diagnostic trouble codes recorded in the memory (heated) seat adjustable pedal module. Follow the procedures called out in the proper diagnostic procedures manual to resolve if codes are present.

(1) If any power seat is not operational in any direction, check the power seat circuit breaker, located in the Integrated Power Module. If OK, go to Step 2. Refer to the Power Distribution section for circuit breaker diagnosis and testing procedure.

(2) Check for proper battery or electrical system voltage. The CS is equipped with a low-voltage cut-off feature. If the electrical system voltage drops below a predetermined set-point (approx. 11.5v), the power seat system will not function until the proper system voltage has been restored. If OK, go to Step 4. Refer to the Battery System and/or Charging System section for testing instructions.

(3) Obtain a DRB III® scan tool and energize the recliner motor. If the motor stops without hitting the end of travel, the potentiometer signal for that axis may have an open, short or be mis-wired. Check the wiring to that axis (module to motor). Fix any wiring problems and retry that axis. If the recliner motor is inoperational, apply 12v and a good ground source to the inop motor. If the motor does not operate in either direction replace the recliner motor assembly. Refer to Wiring for complete circuit diagrams.

REMOVAL

(1) Remove the seat back. Refer to the Body section for the procedure.

(2) Disengage J-strap at base of seat cushion.

(3) Roll seat cushion cover upward to access bolts attaching recliner to seat back frame.

(4) Remove bolts attaching recliner to seat back frame.

(5) Separate recliner from seat.

INSTALLATION

(1) Position recliner assembly on seat frame.

(2) Install bolts attaching recliner to seat back frame and tighten to 28 N·m (20 ft. lbs.).

(3) Roll seat cover downward.

(4) Engage J-strap at base of seat cushion.

(5) Install the seat back. Refer to the Body section for the procedure.

POWER TOP - SUNROOF

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POWER TOP - SUNROOF

DESCRIPTION

WARNING: Keep fingers and other body parts out of sunroof opening at all times.

The power sunroof system allows the sunroof to be opened, closed or placed in the vent position electrically by actuating a switch in the overhead console. The sunroof system receives battery feed through a fuse in the Integrated Power Module (IPM), when the ignition switch is in the RUN and ACCESSORY positions. The sunroof will continue to operate normally with the key in the OFF position or with the key removed while the Accessory Delay System is active.

The sunroof glass panel tilts upward at the rear for ventilation and slides rearward under the roof when open. The panel seals flush with the roof in the closed position to eliminate wind noise. The sunroof includes a manual-sliding sunshade to cover the deep-tinted glass panel.

The main components of the power sunroof system are:

- The motor/module assembly
- The power sunroof glass
- The U-Frame assembly
- The power sunroof switch
- The manual-sliding sunshade

OPERATION

This vehicle has a vent, tilt and slide power sunroof system with express (one-touch) open feature. The sunroof system receives battery feed through a fuse in the Integrated Power Module (IPM), when the ignition switch is in the RUN and ACCESSORY positions. The sunroof will operate normally with the key in any position while the Accessory Delay system is active.

The sunroof is electrically operated from a switch located in the overhead console. The switch is a combination rocker/push button style design that will operate the sunroof. When pressing and releasing the open button once, the sunroof will express open to the comfort stop and the wind deflector will raise. If the button is pressed a second time, the sunroof will continue to open to full travel unless the button is released, at which time it will stop in that position. Pressing and holding the close button will close the sunroof. If the close button is released before the glass fully closes, the sunroof will stop in that position. Pressing and holding the vent button will cause the sunroof glass panel to tilt upward at the rear into the “VENT” position.

DIAGNOSIS AND TESTING

SUNROOF

Refer to SUNROOF DIAGNOSIS CHART for possible causes. Before beginning sunroof diagnostics verify that all other power accessories are in proper operating condition. If not, a common electrical problem may exist.

Check the condition of the circuit protection and inspect all wiring connector pins for proper engagement and continuity. For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

POWER TOP - SUNROOF (Continued)

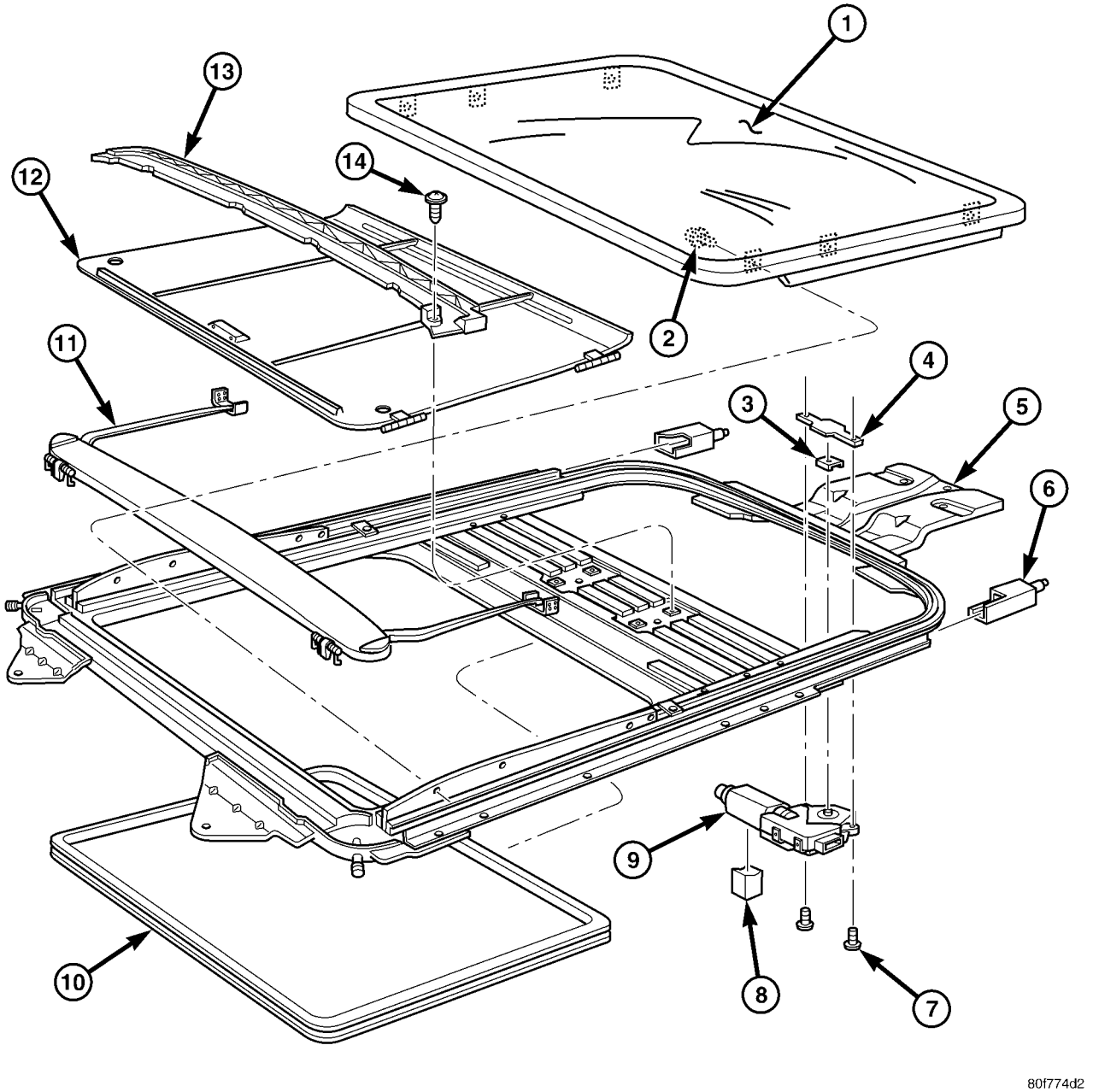


Fig. 1 SUN ROOF ASSEMBLY

1 - Glass Assembly
2 - Screw(s)
3 - Motor Clip
4 - Motor Cover
5 - U-Frame Assembly
6 - Rear Drain Covers
7 - Screw(s)
8 - Insulator
9 - Motor/Module
10 - Lace
11 - Wind Deflector
12 - Sun Shade
13 - Water Channel
14 - Screw(s)

SUNROOF DIAGNOSIS CHART

POWER TOP - SUNROOF (Continued)

SYMPTOM	POSSIBLE CAUSE	CORRECTION
Sunroof completely inoperative.	Inoperative control switch.	Perform sunroof switch diagnostics, (Refer to 8 - ELECTRICAL/POWER TOP/SWITCH - DIAGNOSIS AND TESTING).
	Inoperative circuit ground between sunroof motor/module, control switch, and body harness.	Inspect ground connections and wiring. Repair as necessary.
	Inoperative power circuit between sunroof motor/module, control switch, and body harness.	Check the condition of the circuit protection and inspect all wiring. Repair as necessary.
	Inoperative sunroof motor/module.	Replace the sunroof motor/module, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - REMOVAL).
Audible whine when switch is depressed, sunroof does not operate.	Inoperative sunroof motor/module.	Replace the sunroof motor/module, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - REMOVAL).
	Binding cable.	Repair or replace binding cable as necessary.
Audible clicking or ratcheting when switch is pressed, sunroof does not operate.	Broken or worn drive cable.	Repair or replace binding cable as necessary.
	Worn drive motor gear.	Replace the sunroof motor/module, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - REMOVAL).
	Mechanisms not synchronized.	Synchronize mechanisms, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - STANDARD PROCEDURE - SUNROOF MOTOR/MODULE CALIBRATION).
Sunroof vents and opens, but does not close.	Broken or disengaged trough guide.	Repair trough guide as necessary.
	Binding cable.	Repair or replace binding cable as necessary.
	Inoperative sunroof ″CLOSE″ circuit.	Check the condition of the circuit, connections and wiring. Repair as necessary.
	Inoperative control switch.	Perform sunroof switch diagnostics, (Refer to 8 - ELECTRICAL/POWER TOP/SWITCH - DIAGNOSIS AND TESTING).
	Inoperative sunroof motor/module.	Replace the sunroof motor/module, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - REMOVAL).

POWER TOP - SUNROOF (Continued)

SYMPTOM	POSSIBLE CAUSE	CORRECTION
Sunroof vents, but does not open.	Binding cable or mechanism.	Repair or replace binding cable as necessary.
	Inoperative sunroof ″OPEN″ circuit.	Check the condition of the circuit, connections and wiring. Repair as necessary.
	Inoperative control switch.	Perform sunroof switch diagnostics, (Refer to 8 - ELECTRICAL/POWER TOP/SWITCH - DIAGNOSIS AND TESTING).
	Inoperative sunroof motor/module.	Replace the sunroof motor/module, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - REMOVAL).
Sunroof does not vent	Binding cable or mechanism.	Repair or replace binding cable as necessary.
	Inoperative sunroof ″VENT″ circuit.	Check the condition of the circuit, connections and wiring. Repair as necessary.
	Inoperative control switch.	Perform sunroof switch diagnostics, (Refer to 8 - ELECTRICAL/POWER TOP/SWITCH - DIAGNOSIS AND TESTING).
	Inoperative sunroof motor/module.	Replace the sunroof motor/module, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - REMOVAL).
Glass movement not consistant or glass does not operate smoothly	Glass and Track timing. Glass and Track alignment. Cables and Guide alignment.	Perform the necessary adjustments, (Refer to 23 - BODY/SUNROOF/ GLASS PANEL - ADJUSTMENTS).

MOTOR/MODULE - SUNROOF

DIAGNOSIS AND TESTING -

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

If the power top is completely inoperative perform the following diagnostic steps.

(1) Check the B+ 40 amp fuse in the Integrated Power Module (IPM). If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the inoperative fuse.

(2) Check the Accessory delay 20 amp fuse in the IPM. If OK, go to Step 3. If not OK, repair the shorted circuit or component as required and replace the inoperative fuse.

(3) Partially remove the headliner to access the sunroof motor/module.

(4) Disconnect the motor/module electrical connector. Using a voltmeter check for Battery voltage at the B+ terminal of the harness connector. If OK, go to Step 5. If not OK, repair the B+ circuit as necessary.

(5) With the ignition switch in the “RUN” position check for Battery voltage at the Accessory Relay Output terminal of the harness connector. If OK , go to Step 6. If not OK repair the Accessory Relay Output circuit as necessary.

(6) Using an ohmmeter test for continuity between the harness connector ground circuit and a known good ground. Continuity should be present. If OK go to Step 7. If not OK, repair the open ground circuit as necessary.

(7) Turn the ignition switch to the “OFF” position. Reconnect the motor/module electrical connector. With the ignition switch in the “RUN” position check for battery voltage on the “VENT”, “CLOSE” and “OPEN” circuits at the back side of the motor/module connector. If OK, go to Step 8. If not OK replace the motor/module assembly, (Refer to 8 - ELECTRICAL/ POWER TOP/MOTOR - REMOVAL).

MOTOR/MODULE - SUNROOF (Continued)

(8) Turn the ignition switch to the "OFF" position. Disconnect the motor/module and sunroof switch electrical connectors. Using an ohmmeter check for continuity on the "VENT", "CLOSE" and "OPEN" circuits between the motor/module and sunroof switch. Continuity should be present. If OK, (Refer to 8 - ELECTRICAL/POWER TOP/SWITCH - DIAGNOSIS AND TESTING) for diagnosis of the sunroof switch. If not OK, repair the control circuits as necessary.

STANDARD PROCEDURE

SUNROOF MOTOR/MODULE CALIBRATION

CAUTION: THERE IS NO ADJUSTMENT AVAILABLE FOR A NORMALLY OPERATING SUNROOF. THIS PROCEDURE IS USED TO SET SUNROOF MOTOR/MODULE TO SUNROOF ASSEMBLY TIMING.

(1) Manually push the sunroof guide assembly to the full forward position until it is locked into position. This is verified by attempting to push the guide assembly rearward (Fig. 2).

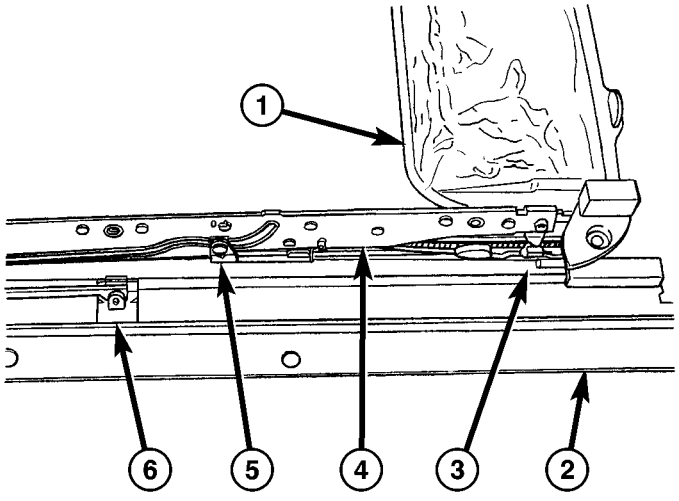


Fig. 2 SUNROOF GUIDE LOCK POSITION

1 - SUN SHADE
2 - U - FRAME
3 - U- FRAME SLOT
4 - GUIDE RAIL
5 - GUIDE RAIL PIVIOT
6 - WIND DEFLECTOR

NOTE: The guide rail will be raised above the U-frame assembly when in the lock position.

(2) Remove the sunroof glass (Refer to 23 - BODY/SUNROOF/GLASS PANEL - REMOVAL).

(3) Manually move the guide pivot inside the guide rail cam slot until it is centered between the etched timing marks on both rails (Fig. 3).

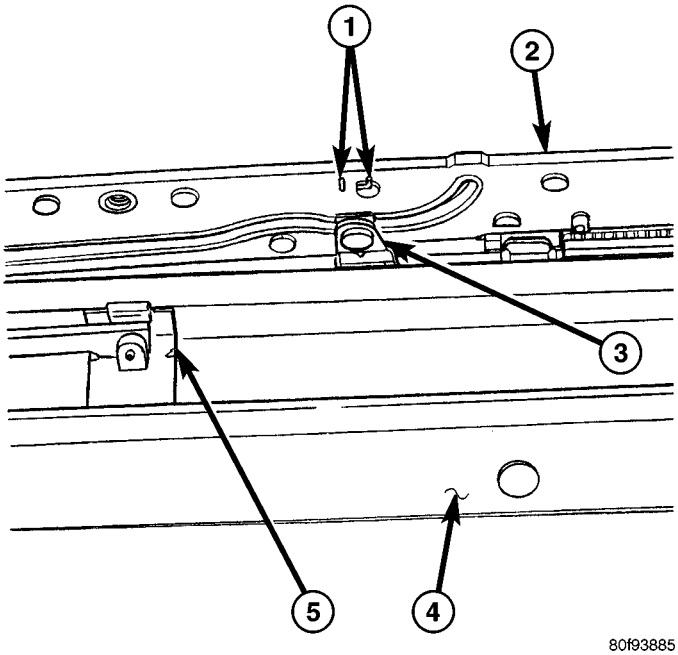


Fig. 3 SUNROOF GUIDE PIVOT

1 - TIMING MARKS
2 - GUIDE RAIL
3 - GUIDE RAIL PIVIOT
4 - U-FRAME
5 - WIND DEFLECTOR

(4) Verify that the white marking is visible in the new motor/module window. If the mark is not visible, connect a power source to the motor/module and cycle the switch until the motor/module is in the closed position (white mark in window) (Fig. 4).

(5) Install the sunroof motor/module and verify proper sunroof operation, (Refer to 8 - ELECTRICAL/POWER TOP/MOTOR - INSTALLATION).

(6) Install the sunroof glass, leaving the retaining bolts loose.

(7) Install the sunroof assembly into the vehicle (Refer to 23 - BODY/SUNROOF/MODULE ASSEMBLY - INSTALLATION).

(8) Flush the sunroof glass into the vehicle roof opening and check sunroof glass alignment (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS).

REMOVAL

(1) Remove the sunroof assembly, (Refer to 23 - BODY/SUNROOF/MODULE ASSEMBLY - REMOVAL).

MOTOR/MODULE - SUNROOF (Continued)

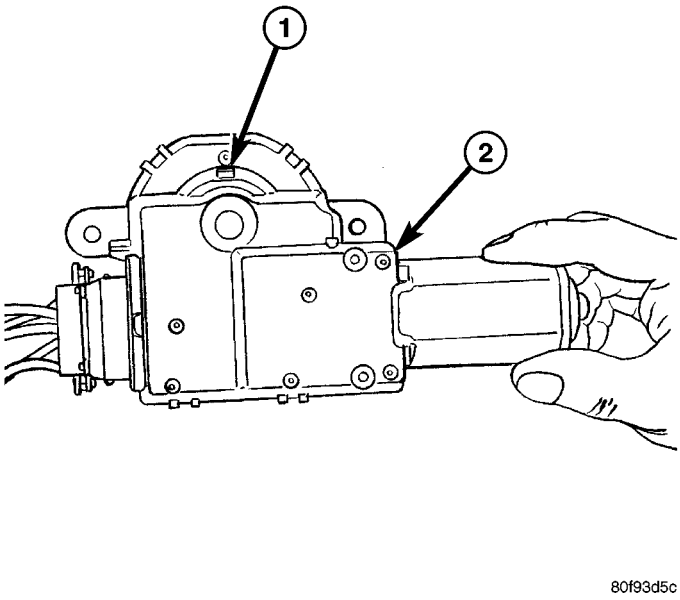


Fig. 4 SUNROOF MOTOR/MODULE

1 - SUNROOF MOTOR/MODULE TIMING WINDOW
2 - SUNROOF MOTOR/MODULE

(2) Remove the sunroof motor/module retaining bolts and remove the motor/module from the vehicle.

INSTALLATION

CAUTION: THE SUNROOF MOTOR/MODULE MUST BE TIMED WITH THE SUNROOF ASSEMBLY. FAILURE TO DO SO WILL RESULT IN IMPROPER SUNROOF OPERATION AND POSSIBLE LEAKAGE OR DAMAGE TO THE ASSEMBLY.

(1) Assure proper sunroof motor/module timing before installation, (Refer to 8 - ELECTRICAL/ POWER TOP/MOTOR - STANDARD PROCEDURE - SUNROOF MOTOR/MODULE CALIBRATION).

(2) Position the sunroof motor/module to the sunroof assembly and install the retaining bolts. Tighten sunroof motor/module retaining bolts to 4.2Nm (40 lbs.in.).

(3) Connect the timed sunroof assembly to a power source and assure proper operation before installing the sunroof assembly into the vehicle.

(4) Install the sunroof assembly in the vehicle, (Refer to 23 - BODY/SUNROOF/MODULE ASSEMBLY - INSTALLATION).

SWITCH - SUNROOF

DESCRIPTION

The power sunroof switch is a combination push-button and rocker switch mounted in the overhead console, (Fig. 5). The sunroof switch is a direct contact unit that is directly wired to the sunroof motor/ module assembly. The sunroof switch performs the following functions:

- Power sunroof open
- Power sunroof closed
- Power sunroof vent

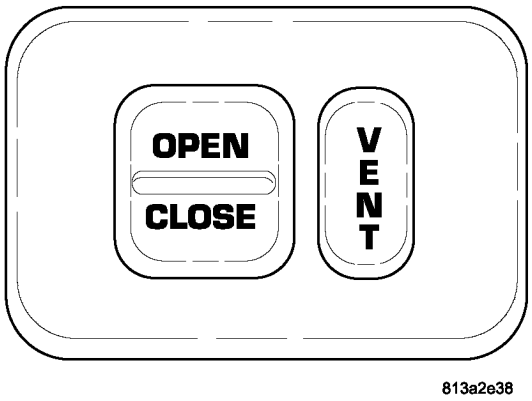


Fig. 5 POWER SUNROOF SWITCH

OPERATION

The sunroof is electrically operated from two switches located on the windshield header, rearward of the map lamp. The “VENT” switch is a push button type switch and opens the sunroof to the vent position only. The other switch “OPEN/CLOSED” is a rocker type switch for opening and closing the sunroof. Pressing and releasing the open button once, the sunroof will express open and the wind deflector will raise. If the button is pressed a second time the sunroof will stop in that position. Pressing and holding the close button will close the sunroof. If the close button is released the sunroof will stop in that position.

The switch is grounded at on terminal and receives a 12 volt signal from the sunroof motor/module on the remaining three terminals. The switch pulls down the 12 volt reference voltage from the motor/ module signaling it to perform the desired function.

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness

SWITCH - SUNROOF (Continued)

routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

DIAGNOSIS AND TESTING

SUNROOF SWITCH

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds. Perform the following test prior to switch replacement.

(1) Remove the overhead console, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(2) Disconnect the power sunroof switch wire harness connector.

(3) With the ignition key in the “RUN” position check for battery voltage on the “OPEN”, “CLOSE” and “VENT” circuits of the sunroof switch harness connector. If OK, go to Step 4. If not OK, inspect the wiring harness and connectors between the motor/module and switch for damage and repair as necessary.

(4) With the ignition key in the “OFF” position check for continuity between the ground circuit of the sunroof switch harness connector and a known good ground. Continuity should be present. If OK, go to Step 5. If not OK, inspect the wiring harness and connector and repair the ground circuit as necessary.

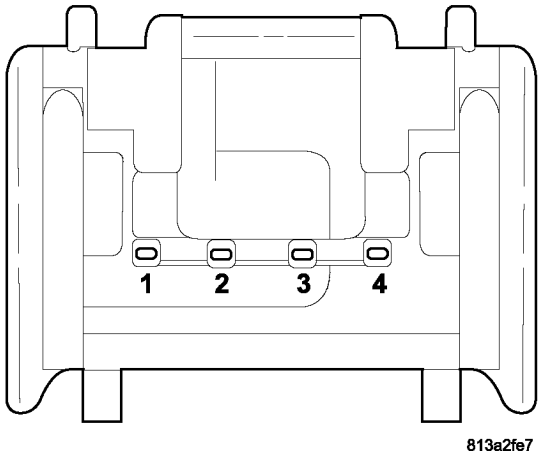


Fig. 6 SUNROOF SWITCH PINOUT

(5) Using an ohmmeter, test the continuity of the power sunroof switch (Fig. 6) in each switch position. Refer to the POWER SUNROOF SWITCH CONTINUITY TABLE. If OK, inspect the wiring harness and connectors for damage and repair as necessary. If not OK, replace the power sunroof switch, (Refer to 8 - ELECTRICAL/POWER TOP/SWITCH - REMOVAL).

POWER SUNROOF SWITCH CONTINUITY TABLE

SWITCH POSITION	CONTINUITY BETWEEN PINS
OFF	NO CONTINUITY
SUNROOF OPEN	3 & 1
SUNROOF CLOSED	3 & 4
SUNROOF VENT	3 & 2

REMOVAL

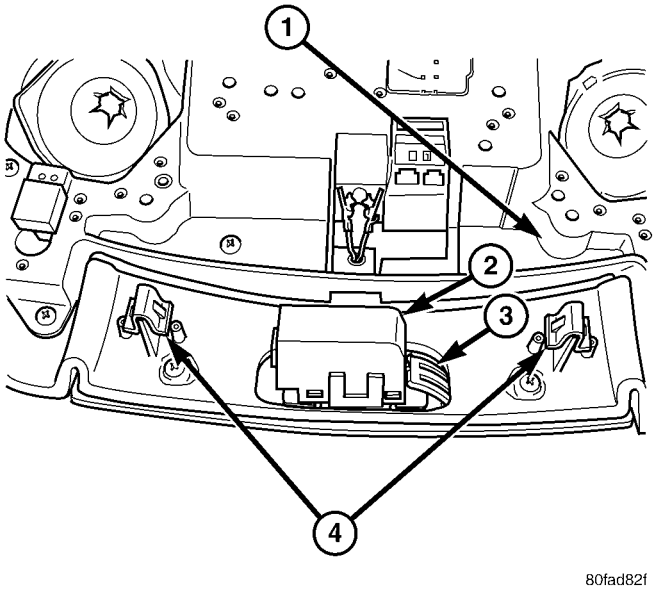


Fig. 7 OVERHEAD CONSOLE

1 - OVERHEAD CONSOLE
2 - POWER SUNROOF SWITCH
3 - SUNROOF SWITCH RETAINING CLIP (PART OF CONSOLE)
4 - OVERHEAD CONSOLE RETAINING CLIPS

(1) Disconnect and isolate the battery negative cable.

(2) Separate the overhead console from the headliner, by carefully pulling down on the front portion, toward the windshield, to release the retaining clips (Fig. 7).

(3) Release the sunroof switch retaining tab, disconnect the electrical connector and remove the switch from the overhead console (Fig. 7).

SWITCH - SUNROOF (Continued)

INSTALLATION

(1) Position the sunroof switch against the overhead console and push the switch to properly seat in retaining clip (Fig. 8).

(2) Install the overhead console assembly, (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - INSTALLATION).

(3) Connect the battery negative cable.

(4) Confirm proper sunroof system operation.

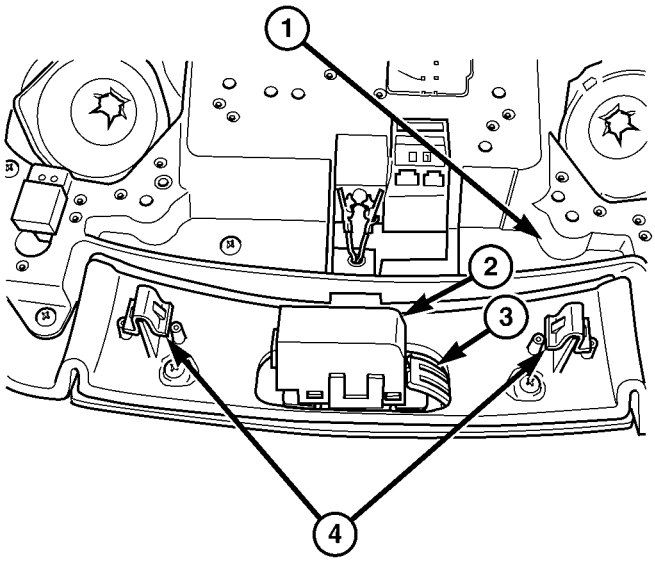


Fig. 8 OVERHEAD CONSOLE

1 - OVERHEAD CONSOLE
2 - POWER SUNROOF SWITCH
3 - SUNROOF SWITCH RETAINING CLIP (PART OF CONSOLE)
4 - OVERHEAD CONSOLE RETAINING CLIPS

POWER WINDOWS

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POWER WINDOWS

DESCRIPTION

The power window system allows each of the door windows to be raised and lowered electrically by actuating a switch on each door panel. A master switch on the drivers door allows the driver to raise or lower each of the passenger door windows and to lock out the individual switches on the passenger doors from operation. The power window system receives battery feed through a fuse in the Integrated Power Module (IPM) only when the ignition switch is in the RUN or ACCESSORY/ACCESSORY DELAY position.

OPERATION

WINDOW SWITCH

The Driver Door Module (DDM) or Passenger Door Module (PDM) control the battery and ground feeds to the power window motors. The driver and front passenger door power window switches are integral to the DDM or PDM. The rear passenger switches are inputs to the DDM or PDM. When the power window lockout switch is depressed it will toggle between window lockout enabled (illuminated red) and window lockout disabled (illuminated emerald green). When the window lockout is enabled, the switch illuminates red and extinguishes the illumination in the passenger window lift switches indicating that they are disabled and will not activate their corresponding window. When window lockout is enabled the DDM will still be able to actuate all of the windows. When the window lockout is disabled, the window lockout switch will illuminate emerald green and again allow the passenger window lift switches to activate their corresponding window and return illumination to the passenger window switches.

WINDOW MOTOR

Window motors use permanent type magnets. The B+ and ground applied at the motor terminal pins will cause the motor to rotate in one direction. Reversing current through the motor terminals will cause the motor to rotate in the opposite direction.

DIAGNOSIS AND TESTING - POWER WINDOWS

Any diagnosis of the power window system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

For complete circuit diagrams, refer to the appropriate wiring information.

POWER WINDOW SWITCH

DESCRIPTION

The power window motors are controlled by a four-way momentary switch (up/down/express down/off) mounted on the trim panel of each passenger door, and four four-way momentary switches on the driver side front door trim panel. The driver side front door trim panel also has a two-position power window lockout switch. Each power window switch, including the lockout switch, is illuminated by a Light-Emitting Diode (LED) that is integral to the switch paddle.

The front door power window switches and the power window lockout switch are integral to the Driver Door Module (DDM) and Passenger Door Module (PDM). The front door power window switches and their LEDs cannot be adjusted or repaired and, if inoperative or damaged, the entire DDM or PDM unit must be replaced. Before a rear window switch or PDM is replaced due to lighting,

ensure the window lockout switch on the DDM is illuminated emerald green and not red. The rear door power window switches and their lamps cannot be adjusted or repaired. If inoperative or damaged, only the affected rear door power window switch must be replaced.

OPERATION

The front door power window switches provide an up or down (or lock and unlock signal in the case of the lockout switch) to the door module circuitry. The Driver Door Module (DDM) circuitry controls the output to the driver side front and rear door power window motors, and supplies electrical current as required to the driver side rear door power window switch. The Passenger Door Module (PDM) circuitry controls the output to the passenger side front and rear door power window motors, and supplies electrical current as required to the passenger side rear door power window switch.

When a DDM-integrated master power window switch for a passenger side window is actuated, or when the power window lockout switch is actuated to disable the passenger door power windows, the DDM circuitry sends a message to the PDM over the Programmable Communications Interface (PCI) data bus to control the output to that power window motor(s).

All window switches have two detent positions in the Down direction. The first detent provides normal power window down operation. If this switch is depressed to the second detent, the Auto Down circuitry is activated. The Auto-Down circuitry will automatically move the window to its fully lowered position, even if the power window switch is released. The Auto-Down event will be cancelled and the window movement stopped if the power window switch is pulled in the UP direction.

Each power window switch, including the lockout switch, is illuminated by a Light-Emitting Diode (LED) when the ignition switch is turned to the On position. However, when the lockout switch is placed in the Lock position, the LED for the locked-out front and rear passenger door power window switches is turned off. **When the lockout switch is enabled (lit red) the window switches on the DDM still operate their corresponding passenger window.**

DIAGNOSIS AND TESTING - POWER WINDOW SWITCH

Any diagnosis of the power window system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

The diagnosis found here applies only to the rear door power window switches. If the problem being diagnosed is an inoperative power window switch illumination lamp, but the power window switch operates as designed, replace the faulty rear door power window switch **(verify the power lockout switch is not actuated)**.

For complete circuit diagrams, refer to the appropriate wiring information.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the power window switch from the rear door trim panel (Refer to 8 - ELECTRICAL/ POWER WINDOWS/POWER WINDOW SWITCH - REMOVAL).

(3) Check the rear door power window switch continuity as shown in the power window switch test chart (Fig. 1). If OK, (Refer to 8 - ELECTRICAL/ POWER WINDOWS - DIAGNOSIS AND TESTING).

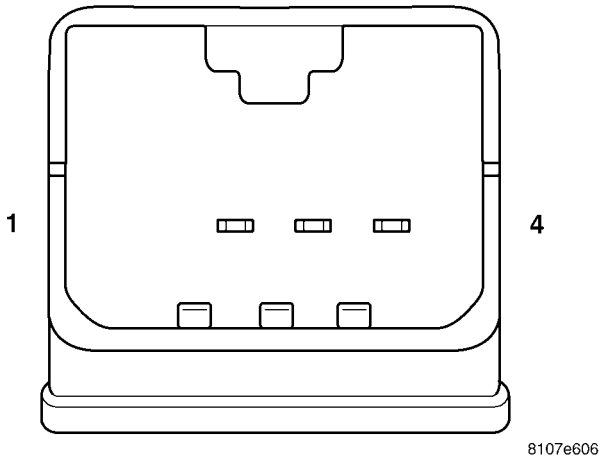


Fig. 1 REAR POWER WINDOW SWITCH

POWER WINDOW SWITCH TEST

SWITCH POSITION	PINS	RESISTANCE VALUE
DIAGNOSTIC/ OFF	2 AND 4	16K OHM ± 5 %
UP	2 AND 4	6K OHM ±5 %
DOWN	2 AND 4	1.36K OHM ±5 %
EXPRESS DOWN	2 AND 4	.45K OHM ± 5 %

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the rear door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).

(3) Remove the mounting fasteners and power window switch.

POWER WINDOW SWITCH (Continued)

INSTALLATION

(1) Position the power window switch to the rear door trim panel.
(2) Install the mounting fasteners.
(3) Install the rear door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).
(4) Connect the battery negative cable.

WINDOW MOTOR

REMOVAL

FRONT DOOR

NOTE: Secure window in the UP position before removing motor.

(1) Disconnect and isolate the battery negative cable.
(2) Remove the front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
(3) Remove the front door speaker (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - REMOVAL).
(4) Remove the watershield.
(5) Disconnect electrical harness wire connector from the motor.
(6) Remove mounting fasteners and motor.

REAR DOOR

NOTE: Secure window in the UP position before removing motor.

(1) Disconnect and isolate the battery negative cable.
(2) Remove the rear door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).
(3) Remove the rear door speaker (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - REMOVAL).
(4) Remove the watershield.
(5) Disconnect electrical harness wire connector from the motor.
(6) Loosen window regulator mounting fasteners (do not remove).
(7) Remove mounting fasteners and motor.

INSTALLATION

FRONT DOOR

(1) Install motor and mounting fasteners to regulator.
(2) Connect electrical harness connector.
(3) Install front door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).
(4) Connect battery negative cable.

REAR DOOR

(1) Install motor and mounting fasteners to regulator.
(2) Install window regulator (Refer to 23 - BODY/DOORS - REAR/WINDOW REGULATOR - INSTALLATION).
(3) Connect electrical harness connector.
(4) Install rear door trim panel (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).
(5) Connect battery negative cable.

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RESTRAINTS

DESCRIPTION

The occupant restraints for this model include both active and passive types. Active restraints are those which require the vehicle occupants to take some action to employ, such as fastening a seat belt; while passive restraints require no action by the vehicle occupants to be employed.

ACTIVE RESTRAINTS

The active restraints include:

- **Front Seat Belts** - Both front seating positions are equipped with three-point seat belt systems employing a lower B-pillar mounted inertia latch-

type retractor, height-adjustable upper B-pillar mounted turning loops, a fixed lower seat belt anchor secured to the lower B-pillar, and a traveling end-release buckle secured to the inboard side of the seat cushion frame. The driver side front seat belt buckle includes an integral Hall-effect seat belt switch that detects whether the driver side front seat belt has been fastened.

- **Rear Seat Belts** - Both outboard rear second and third seating positions are equipped with three-point seat belt systems. The outboard seating position belts employ a lower C or D-pillar mounted inertia latch-type retractor, a fixed position upper C or D-pillar mounted turning loop, and a fixed lower seat belt anchor secured to the inboard side of the seat cushion frame.
- **Child Restraint Anchors** - Also equipped in this vehicle are two, fixed-position, child seat upper tether anchors located on the lower seat cushion, in the rear of the lower seat cushion. There is one anchor integral to the back of the third row seat back panel, one on each seat back panel. Two lower second row anchors are also provided for each rear outboard seating position. The lower anchors are integral to the seat cushion frame and are accessed from the front of the second row seat where the seat back meets the seat cushion.

PASSIVE RESTRAINTS

The passive restraints available for this model include the following:

- **Dual Front Airbags** - Multistage driver. front passenger, and driver knee blocker airbags are available for this model. This airbag system is a passive, inflatable, Supplemental Restraint System (SRS) and vehicles with this equipment can be readily identified by the “SRS - AIRBAG” logo molded into the driver airbag trim cover in the center of the steering wheel and also into the passenger airbag door on the instrument panel above the glove box. Vehicles with the airbag system can also be identified by the airbag indicator, which will illuminate in the instrument cluster for about seven seconds as a bulb test each time the ignition switch is turned to the ON position. A pyrotechnic-type seat belt tensioner is integral to the driver and passenger front seat belt retractor of all models equipped with dual front airbags.
- **Occupant Classification System** - These vehicles also include an Occupant Classification System (OCS) with components that are located on or in the passenger front seat cushion. These components include an Occupant Classification Module (OCM) and a seat weight bladder and pressure sensor assembly. In addition, this system includes a belt tension sensor integral to the lower anchor of the passenger side front seat belt. Vehicles equipped with the OCS can be readily identified by a Passenger Airbag Disabled (PAD) indicator (Fig. 1) located in the instrument panel switch pod, below the hazard switch, above the center stack a/c outlets.
- **Curtain Airbags** - Curtain airbags are available for this model when it is also equipped with dual front airbags. This airbag system is a passive, inflatable, Supplemental Restraint System (SRS) and vehicles with this equipment can be readily identified by a molded identification trim button with the “SRS - AIRBAG” logo (Fig. 2) located on the headliner above each B-pillar.

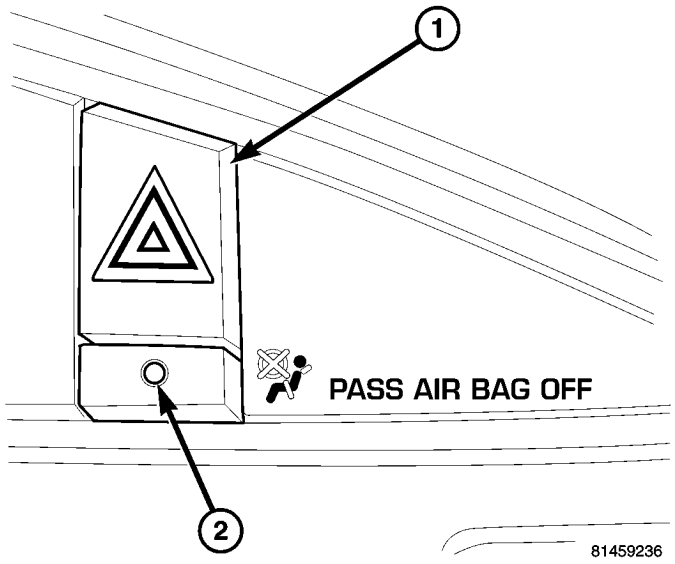


Fig. 1 PAD INDICATOR

1 - HAZARD SWITCH
2 - PAD INDICATOR



Fig. 2 SRS LOGO

This vehicle is equipped with a Frontal Impact Airbag System, which utilizes the driver/passenger airbags, driver knee blocker airbag, and seat belt tensioners. This system is designed to protect occu-

pants in the event of a front impact collision. These airbags and seat belt tensioners are all serviceable parts. If these pyrotechnics are deployed or defective, they must be replaced, as well as the Occupant Restraint Controller (ORC) must be diagnosed following procedures outlined in the diagnostic information.

The Driver and Passenger Airbag System was designed to reduce the likelihood of injury or death in frontal collisions. Each separate system is supplemental (Fig. 2) or **Passive** to the primary restraint device, which are the seat belts.

- **Airbag Indicator** - The airbag indicator is integral to the Instrument Cluster, which is located on the instrument panel in front of the driver.
- **Belt Tension Sensor** - Vehicles equipped with the Occupant Classification System (OCS) include a belt tension sensor. This sensor is integral to the passenger side front seat belt lower anchor which is secured to the lower B-pillar, out board and rear of the front passenger seat, concealed beneath an access cover on the seat belt assembly.
- **Clockspring** - The clockspring is located near the top of the steering column, directly beneath the steering wheel (Fig. 3).
- **Curtain Airbag** - A side curtain airbag is located on each inside roof side rail above the headliner, and extends from the A-pillar to just beyond the D-pillar.
- **Driver Airbag** - The driver airbag is located in the center of the steering wheel, beneath the driver airbag trim cover (Fig. 3).
- **Front Impact Sensor** - Two front impact sensors are used on vehicles equipped with dual front airbags, one left side and one right side. The sensors are located on the rail tips, rearward of the bumper attachments.
- **Knee Blocker Airbag** - The driver knee blocker airbag is secured to the instrument panel behind the steering column opening cover (Fig. 3).
- **Occupant Classification Module** - Vehicles equipped with the Occupant Classification System (OCS) include an Occupant Classification Module (OCM) which is secured to a stamped steel mounting bracket on the underside of the passenger side front seat cushion frame.
- **Occupant Restraint Controller** - The Occupant Restraint Controller (ORC) is also sometimes referred to as the Airbag Control Module (ACM). The

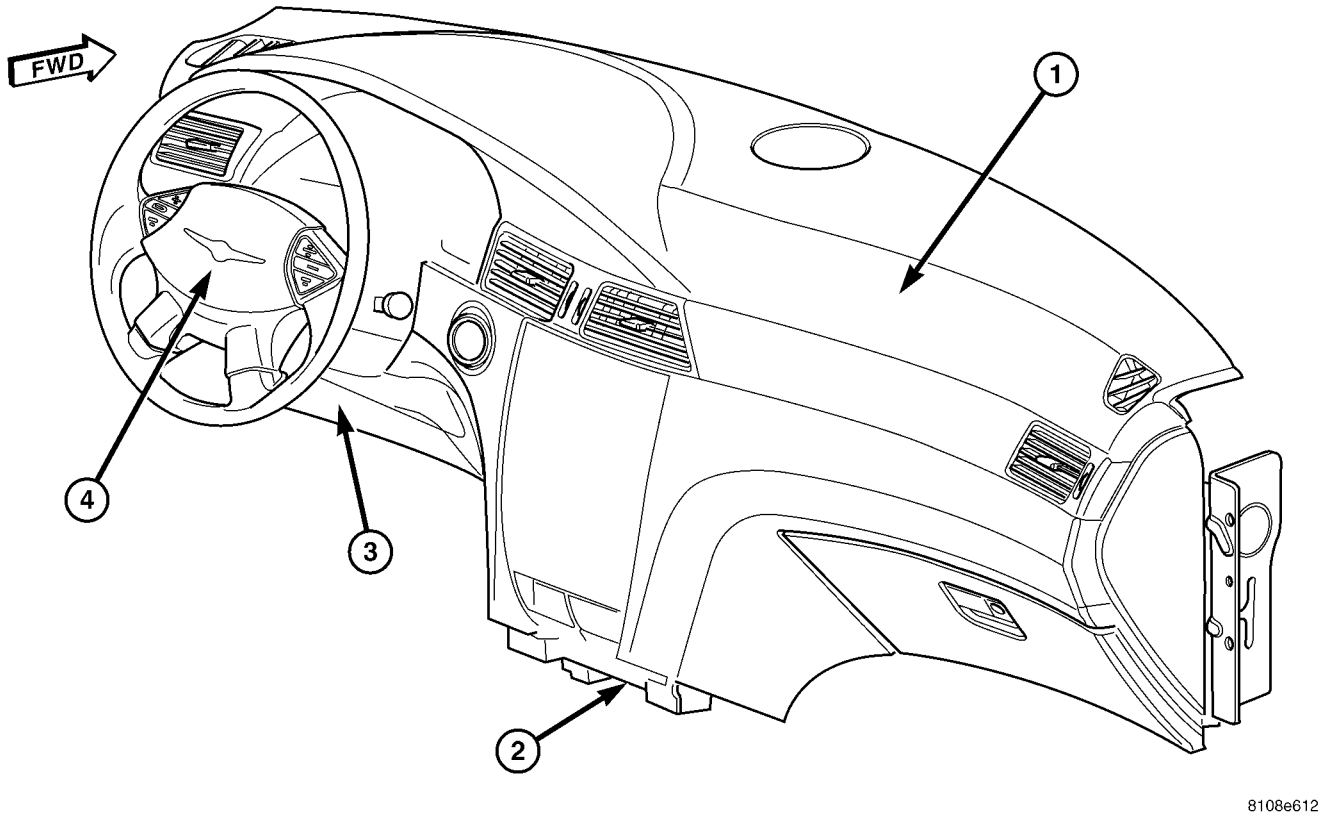


Fig. 3 AIRBAG COMPONENT LOCATION - INSTRUMENT PANEL

1 - PASSENGER AIRBAG
2 - OCCUPANT RESTRAINT CONTROLLER (ORC)
3 - KNEE BLOCKER AIRBAG
4 - DRIVER AIRBAG

ORC is located on a mount on the floor transmission tunnel just underneath the instrument panel center stack (Fig. 3).

- **Passenger Airbag** - The passenger airbag is located on the instrument panel, beneath the instrument panel top pad and above the glove box on the passenger side of the vehicle (Fig. 3).
- **Passenger Airbag Disabled (PAD) Indicator** - Vehicles equipped with the Occupant Classification System (OCS) include a passenger airbag disabled (PAD) indicator which is located in the instrument panel switch pod, next to the cluster (Fig. 3).
- **Passenger Knee Blocker** - The passenger knee blocker is a structural reinforcement that is integral to and concealed within the glove box door (Fig. 3).
- **Seat Belt Tensioner** - A seat belt tensioner is integral to both front seat belt retractors. The seat belt retractors are secured to the lower B-pillars.
- **Seat Weight Bladder and Pressure Sensor Assembly** - Vehicles equipped with the Occupant Classification System (OCS) include a seat weight bladder that is sandwiched between an insulator pad on the top of the passenger side front seat pan and the seat cushion foam padding. A short hose connects the bladder to a pressure sensor which is secured to the Occupant Classification Module (OCM) mounting bracket on the underside of the passenger side front seat cushion frame.
- **Side Impact Sensors** - Six side impact sensors are used on vehicles equipped with the curtain airbags, three left side and three right side. The first row side impact sensor is located in the B-pillar, just above the front seat belt retractor. The second row side impact sensor is located in the sliding side door track opening, just in front of the C-pillar. The third row side impact sensor is located behind the quarter trim panel, above the rear tire wheel well, between the C and D-pillars.

The ORC, the OCM, and the cluster each contain a microprocessor and programming that allow them to communicate with each other using the Programmable Communications Interface (PCI) data bus network. This method of communication is used by the ORC for control of the airbag indicators.

OPERATION

The primary passenger restraints in this are the seat belts and child restraint anchors. Seat belts and child restraint anchors are referred to as an **Active Restraint** because the vehicle occupants are required to physically fasten and properly adjust these restraints in order to benefit from them.

ACTIVE RESTRAINTS

The primary passenger restraints in this or any other vehicle are the seat belts and child restraint anchors. Seat belts and child restraint anchors are referred to as an active restraint because the vehicle occupants are required to physically fasten and properly adjust these restraints in order to benefit from them. See the owner's manual in the vehicle glove box for more information on the features, use and operation of all of the active restraints.

LAP/SHOULDER BELTS

All the seats are equipped with Lap/Shoulder Belts.

The belt webbing retractor is designed to lock during very sudden stops or collisions. This feature allows the shoulder part of the belt to move freely with you under normal conditions. But in a collision, the belt will lock and reduce the risk of your striking the inside of the vehicle or being thrown out.

(1) Enter the vehicle and close the door. Sit back and adjust the seat.

(2) The seat belt latch plate is near the seat back of the front seats and next to your arm in the rear seats. Grasp the latch plate and pull out the belt. Slide the latch plate up the webbing as far as necessary to allow the belt to go around your lap.

(3) When the belt is long enough to fit, insert the latch plate into the buckle until you hear a “click”.

(4) Position the lap belt across your thighs, below your abdomen. To remove slack in the lap belt portion, pull up on the shoulder belt. To loosen the lap belt if it is too tight, tilt the latch plate and pull on the lap belt. A snug belt reduces the risk of sliding under the belt in a collision.

(5) Position the shoulder belt on your chest so that it is comfortable and not resting on your neck. The retractor will withdraw any slack in the belt.

(6) To release the belt, push the red button on the buckle. The belt will automatically retract to its stowed position. If necessary, slide the latch plate down the webbing to allow the belt to retract fully.

FRONT SEAT BELT HEIGHT ADJUSTER

In the front seats, the shoulder belt anchorage can be adjusted upward or downward to help position the belt away from your neck. Press the button to release the anchorage, and then move it up or down to the position that serves you best.

As a guide, if you are shorter than average, you will prefer a lower position, and if you are taller than average, you'll prefer a higher position. When you release the anchorage, try to move it up or down to make sure that it is locked in position.

SEAT BELT TENSIONERS

The seat belts for both front seating positions are equipped with tensioning devices that are designed to remove slack from the seat belt in the event of a collision. These devices improve the performance of

the seat belt by assuring that the belt is tight about the occupant early in a collision. Tensioners are designed to work for all size occupants.

These devices are not a substitute for proper seat belt placement by the occupant. The seat belt still must be worn snugly and positioned properly.

The tensioners are triggered by the Occupant Restraint Controller (ORC). Like the front airbags, the tensioners are single use items. After a collision that is severe enough to deploy the airbags and tensioners, both must be replaced.

PASSIVE RESTRAINTS - AIRBAG SYSTEM

The Passive Restraints are referred to as a supplemental restraint system because they were designed and are intended to enhance the protection for the occupants of the vehicle **ONLY** when used in conjunction with the seat belts or active restraints. They are referred to as passive restraints because the vehicle occupants are not required to do anything to make them operate; however, the vehicle occupants must be wearing their seat belts in order to obtain the maximum safety benefit from the supplemental restraint system.

The supplemental restraint system electrical circuits are continuously monitored and controlled by a microprocessor and software contained within the Occupant Restraint Controller (ORC). An airbag indicator in the Instrument Cluster illuminates for about seven seconds as a bulb test each time the ignition switch is turned to the ON or START positions. Following the bulb test, the airbag indicator is turned ON or OFF by the ORC to indicate the status of the supplemental restraint system. If the airbag indicator comes on at any time other than during the bulb test, it indicates that there is a problem in the supplemental restraint system electrical circuits. Such a problem may cause airbags not to deploy when required, or to deploy when not required.

Deployment of the supplemental restraints depends upon the angle and severity of an impact. Deployment is not based upon vehicle speed; rather, deployment is based upon the rate of deceleration as measured by the forces of gravity (G force) upon the impact sensors. When an impact is severe enough, the microprocessor in the ORC signals the inflator of the appropriate airbag units to deploy their airbag cushions. The front seat belt tensioners are provided with a deployment signal by the ORC in conjunction with the front airbags and driver knee blocker airbag. During a frontal vehicle impact, the knee blockers work in concert with properly fastened and adjusted seat belts to restrain both the driver and the front seat passenger in the proper position for an airbag deployment. The knee blockers also absorb and distribute the crash energy from the driver and the front seat passenger to the structure of the instrument panel. The seat belt tensioner removes the slack from the front seat belts to provide further assurance that the driver and front seat passenger are properly positioned and restrained for an airbag deployment.

When the ORC monitors a problem in any of the airbag system circuits or components, including the seat belt tensioners, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit and sends an electronic message to the cluster to turn on the airbag indicator. Proper testing of the airbag system components, the Programmable Communications Interface (PCI) data bus, the electronic message inputs to and outputs from the cluster or the ORC, as well as the retrieval or erasure of a DTC from the ORC or cluster requires the use of a DRBIII® scan tool. Refer to the appropriate Body Diagnostic Procedures manual.

The ORC determines if an impact is severe enough to require the airbags to inflate. Based on the level of collision severity, the ORC determines the proper rate of inflation. The front airbag inflators are designed to provide different rates of airbag inflation. The ORC will not detect roll over collisions.

The ORC also monitors the readiness of the electronic parts of the system whenever the ignition switch is in the START or ON positions. If the key is in the OFF position, in the ACC position, or not in the ignition switch, the front airbags are not on and will not inflate.

The ORC sends a message to the cluster to turn on the AIRBAG light in the instrument panel for 6 to 8 seconds when the ignition switch is first turned ON, then turns the light OFF. If the ORC detects a malfunction in any part of the system, the airbag light will turn ON either momentarily or continuously.

When the ORC detects a collision requiring the **Front Airbags**, it signals the inflator units. A large quantity of nontoxic gas is generated to inflate the front airbags. Different front airbag inflation rates are possible, these rates are determined by the ORC based on collision severity. The front airbag covers separate and fold out of the way as the front airbags inflate to their full size. The front airbags fully inflate in about 50 milliseconds. This is only about half of the time it takes you to blink your eyes. The front airbags then quickly deflate while helping to restrain the driver and front passenger. The driver's and passenger's front airbag gas is vented through the airbag material and small vent openings towards the instrument panel. In this way the front airbags do not interfere with your control of the vehicle.

The **Supplemental Curtain Airbags** are designed to activate only in certain side collisions. When the ORC detects a collision requiring the cur-

tain airbags to inflate, it signals the inflators on the crash side of the vehicle. A quantity of nontoxic gas is generated to inflate the curtain airbag. The inflating curtain airbag pushes the outside edge of the headliner out of the way and inflates (in about the same time it takes to blink your eyes). A properly belted and seated occupant is less likely to be injured by the force of the airbag or crash event. Items that are positioned in the area where the curtain airbag inflates can reduce the effectiveness of the airbag and also increase the likelihood of injuries to the occupants, this especially applies to children. The curtain airbag is about 4 inches (10 cm) thick when it is inflated.

When the ORC detects a collision requiring the **Knee Blocker Airbag**, it signals the inflator unit. A quantity of nontoxic gas is generated to inflate the Knee Blocker Airbag. The Knee Blocker Airbag inflates rearward towards the driver's knees to help protect the knees and position the driver for the best interaction with the front airbag. The Knee Blocker Airbag fully inflates in about 50 milliseconds, this is only about half of the time it takes you to blink your eyes. It then quickly deflates while helping to protect the driver's knees.

Knee Impact Blockers - Help protect the knees and position you for the best interaction with the front airbags.

Enhanced Accident Response - If the airbags and seat belt tensioners deploy after an impact and the electrical system remains functional, vehicles equipped with power door locks will unlock automatically. In addition, approximately 5 seconds after the vehicle has stopped moving, the interior lights will illuminate until the ignition switch is turned off.

WARNINGS

This system is a sensitive, complex unit. Disconnect and isolate the battery negative cable before beginning airbag system component service procedures. Allow system capacitor to discharge for two minutes before removing airbag components. This will disable the airbag system. Failure to disconnect the battery could result in accidental airbag deployment and possible personal injury or death.

Do not place an intact undeployed airbag face down on a solid surface, the airbag will propel into the air if accidentally deployed and could result in personal injury or death. When carrying or handling an undeployed airbag, the trim side of the airbag should be pointing towards the body to minimize possibility of personal injury or death if accidental deployment occurs.

Replace airbag system components with Mopar® replacement parts. Substitute parts may appear interchangeable, but internal differences may result in inferior occupant protection, personal injury or death.

Wear safety glasses, rubber gloves, and long sleeved clothing when cleaning powder residue from vehicle after airbag deployment. Powder residue emitted from a deployed airbag can cause skin irritation. Flush affected area with cool water if irritation is experienced. If nasal or throat irritation is experienced, exit the vehicle for fresh air until the irritation ceases. If irritation continues, see a physician.

Do not use a replacement airbag that is not in the original packaging. Improper deployment and occupant personal injury or death could result.

The factory installed fasteners, screws and bolts used to fasten airbag components are specifically designed for the airbag system. Do not use substitute fasteners, use only original equipment fasteners listed in the parts catalog when fastener replacement is required. Failure to do so could result in occupant personal injury or death.

Airbags should be stored in a cool dry location away from excessive heat and static electrical activity with the fabric airbag facing up, a premature deployment could result causing personal injury or death.

Deployed and nondeployed airbags may or may not have live pyrotechnic material within the airbag inflator. Do not dispose of airbags unless you are sure of complete deployment. Please refer to the Hazardous Substance Control System for proper disposal. Dispose of deployed airbags in a manner consistent with state, provincial, local, and federal regulations.

During, and following, any child restraint anchor service, due to an impact event or vehicle repair, carefully inspect all mounting hardware, tether straps and anchors for proper installation, operation, or damage. If a child restraint anchor is found damaged in any way, the anchor must be replaced. Failure to do so could result in occupant personal injury or death.

After any airbag component testing or service, do not connect the battery negative cable (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM). Personal injury or death may result if the system test is not performed first.

If the vehicle is equipped with the Occupant Classification System (OCS), do not connect the

battery negative cable before performing the OCS Verification Test using the scan tool and the appropriate diagnostic information. Personal injury or death may result if the system test is not performed properly.

Never replace both the Occupant Restraint Controller (ORC) and the Occupant Classification Module (OCM) at the same time. If both require replacement, replace one, then perform the Airbag System test (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) before replacing the other. Both the ORC and the OCM store Occupant Classification System (OCS) calibration data, which they transfer to one another when one of them is replaced. If both are replaced at the same time, an irreversible fault will be set in both modules and the OCS may malfunction and cause personal injury or death.

DIAGNOSIS AND TESTING - AIRBAG SYSTEM

(1) With the battery negative remote cable disconnected, connect the scan tool to the Data Link Connector (DLC).

(2) Turn the ignition key to the ON position, then exit vehicle with the scan tool.

(3) After checking that no one is inside the vehicle, connect the battery negative remote terminal.

(4) Read and record the **ACTIVE** Diagnostic Trouble Code (DTC) data.

(5) Read and record any **STORED** DTC's.

(6) Refer to the proper diagnostic information if any DTC's are found in Step 4 and Step 5.

(7) If the airbag warning lamp either fails to light, or goes ON and stays ON, there is a system malfunction. To test the airbag warning lamp (bulb) operation in the cluster (Refer to 8 - ELECTRICAL/ INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). Refer to the proper diagnostic information for any other system problems.

STANDARD PROCEDURE - SERVICE AFTER AN AIRBAG DEPLOYMENT

DRIVER AIRBAG

After a Driver Airbag has been deployed due to a collision, the following **MUST** be replaced:

- Driver Airbag
- Driver Airbag Trim Cover
- Clock Spring Assembly
- Steering Wheel
- Complete Steering Column Assembly w/Lower Steering Column Coupler

All other airbag and vehicle components should be closely inspected following any airbag deployment, and should be replaced when visible damage is incurred.

WARNING: Do not connect the battery negative cable (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM). Personal injury or death may result if the system test is not performed first.

PASSENGER AIRBAG

After a Passenger Airbag has been deployed due to a collision. the following **MUST** be replaced:

- Passenger Airbag
- Instrument Panel and Pad Assembly

All other airbag and vehicle components should be closely inspected following any airbag deployment, and should be replaced when visible damage is incurred.

WARNING: Do not connect the battery negative cable (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM). Personal injury or death may result if the system test is not performed first.

KNEE BLOCKER AIRBAG

After a Knee Blocker Airbag has been deployed due to a collision. the following **MUST** be replaced:

- Knee Blocker Airbag
- Instrument Panel and Pad Assembly

All other airbag and vehicle components should be closely inspected following any airbag deployment, and should be replaced when visible damage is incurred.

WARNING: Do not connect the battery negative cable (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM). Personal injury or death may result if the system test is not performed first.

CURTAIN AIRBAG

After a Curtain Airbag has been deployed due to a collision. the following **MUST** be replaced:

- Curtain Airbag Assembly
- Headliner
- A, B, and C-Pillar Trim on deployed side.

All other airbag and vehicle components should be closely inspected following any airbag deployment, and should be replaced when visible damage is incurred.

RESTRAINTS (Continued)

WARNING: Do not connect the battery negative cable (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM). Personal injury or death may result if the system test is not performed first.

OCCUPANT CLASSIFICATION SYSTEM (OCS)

After an impact event, either front, rear, or side, the OCS system components need to be inspected and replaced if found to be damaged.

This includes:

- Belt Tension Sensor
- Occupant Classification Module (OCM)
- Passenger Airbag Disabled Indicator
- Seat Weight Bladder and Sensor

WARNING: Never replace both the Occupant Restraint Controller (ORC) and the Occupant Classification Module (OCM) at the same time. If both require replacement, replace one, then perform the Airbag System test (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) before replacing the other. Both the ORC and the OCM store Occupant Classification System (OCS) calibration data, which they transfer to one another when one of them is replaced. If both are replaced at the same time, an irreversible fault will be set in both modules and the OCS may malfunction and result in personal injury or death.

Whether replaced or not, the OCS must be re-zeroed to make sure that the system in within proper parameters to sense the occupants weight correctly.

WARNING: Do not connect the battery negative cable (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM). Personal injury or death may result if the system test is not performed first.

WARNING: Following successful completion of the Airbag System test procedure, the Occupant Classification System Verification Test must be done using a scan tool and the appropriate diagnostic information. Personal injury or death may result if the system test is not performed.

SEAT BELTS AND TENSIONERS

After a frontal impact where an airbag has been deployed due to a collision. the following **MUST** be replaced:

- Front Seat Belt and Retractor (driver and passenger) with integral Tensioners.

All other seat belts should be closely inspected for cuts, tears, fraying, or damage in any way following any frontal impact or airbag deployment. The other seat belts are to be replaced when visible damage is incurred. Inspect the Lower Anchors and Tether for CHildren (LATCH) child restraint anchors for damage after an impact event and replace as needed.

WARNING: Do not connect the battery negative cable (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM). Personal injury or death may result if the system test is not performed first.

CLEAN UP PROCEDURE

Roll or fold the airbag towards its mounting point (i.e. instrument panel, steering wheel, or roof rail). Then tape the ripped cover over the deployed airbag if applicable.

Use a vacuum cleaner to remove any residual powder from the vehicle interior. Work from the outside in to avoid kneeling or sitting in a contaminated area. Vacuum the heater and A/C outlets as well (Fig. 4). If the heater or air conditioner was in RECIRC mode at time of airbag deployment, operate blower motor on low speed and vacuum powder residue expelled from the heater and A/C outlets. Multiple vacuum cleaning may be necessary to decontaminate the interior of the vehicle.

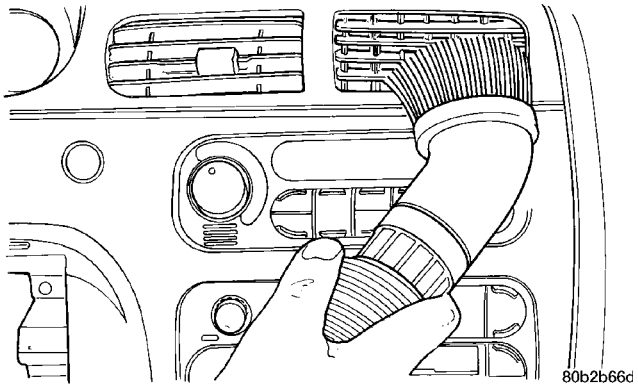


Fig. 4 VACUUM HEATER AND A/C OUTLETS - TYPICAL

BELT TENSION SENSOR

DESCRIPTION

Vehicles equipped with the Occupant Classification System (OCS) include a belt tension sensor (Fig. 5). This sensor is integral to the passenger side front seat belt lower anchor which is secured to the lower B-pillar, on the passenger side (Fig. 5). The belt tension sensor consists of a molded plastic housing, a metal seat belt anchor loop, and a short pigtail wire. The electronic circuitry of the belt tension sensor is concealed and protected within the molded plastic housing.

BELT TENSION SENSOR (Continued)

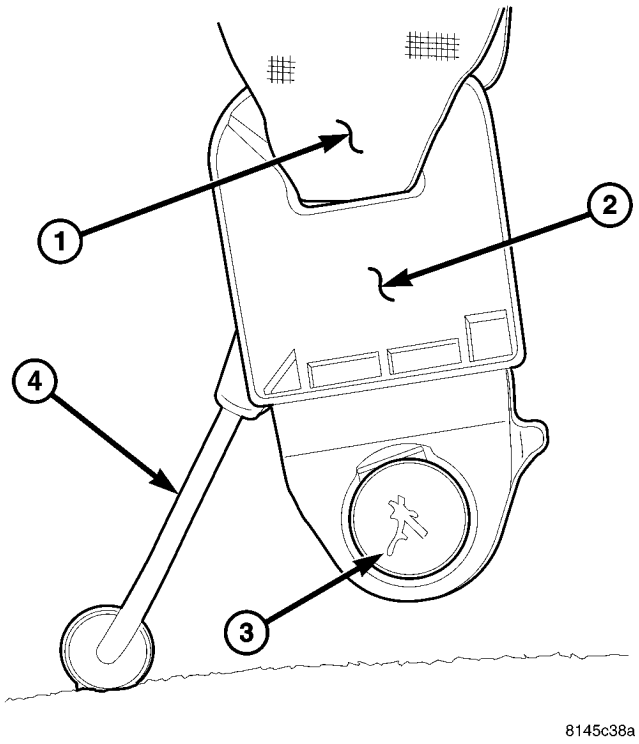


Fig. 5 BELT TENSION SENSOR COMP VIEW

1 - SEAT BELT WEBBIING
2 - BELT TENSION SENSOR
3 - SEAT BELT LOWER ANCHOR
4 - ELECTRICAL HARNESS

The belt tension sensor cannot be repaired and, if faulty or damaged, the entire passenger side front seat belt and retractor unit must be replaced (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT OUTBOARD FRONT - REMOVAL).

OPERATION

The belt tension sensor is designed to sense the relative cinch load applied to the passenger side front seat belt, which provides a logic input to the microprocessor of the Occupant Classification Module (OCM). When a load is applied to the seat belt, the changes in the load are measured by the belt tension sensor through the seat belt lower anchor. As the load changes, the circuitry of the belt tension sensor changes the output voltage of the sensor.

The belt tension sensor receives a nominal five volts and a ground from the OCM. The OCM then monitors the belt tension sensor output voltage.

WARNING: Do not connect the battery before performing the OCS Verification Test using the scan tool and the appropriate diagnostic information. Personal injury or death may occur.

For further diagnosis and testing of the belt tension sensor, the OCM, and related occupant classification system components, use a scan tool and the appropriate diagnostic information.

CHILD RESTRAINT ANCHOR

DESCRIPTION

This vehicle is equipped with a Lower Anchors and Tether for CHildren, or LATCH child restraint anchorage system. The LATCH system provides for the installation of suitable child restraints in certain seating positions without using the standard equipment seat belt provided for that seating position. The second seat in these models are equipped with a fixed-position child restraint upper tether anchor and child restraint lower anchors. The third seat is equipped with only a fixed-position child restraint upper tether anchor.

There are two lower anchors for each rear second row seating position (Fig. 6). These anchors are welded to the seat cushion frame. They are each accessed from the front of their respective seats, at each side where the seat back meets the seat cushion. These lower anchors cannot be adjusted or repaired and, if faulty or damaged, the seat must be replaced as a unit. Each second row seating position has a child restraint upper tether anchor as well. It is located in the middle of the seat cushion in the rear of the seat (Fig. 7). The left third row seating position has an integral upper tether anchor in the middle rear seat back (Fig. 8). If any of these are damaged during an impact event, the affected seat component (seat back or seat cushion) must be replaced. They are not serviceable.

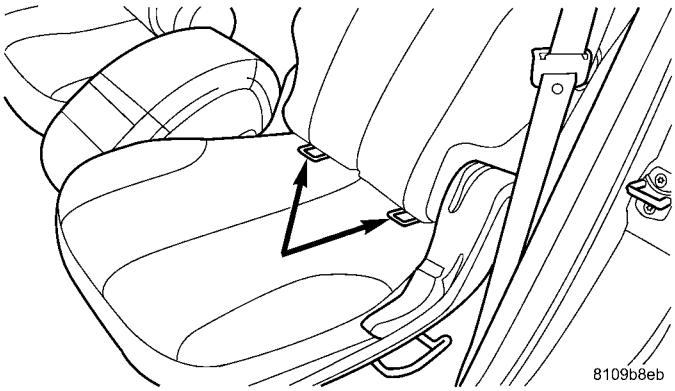


Fig. 6 CHILD RESTRAINT LOWER ANCHORS SECOND ROW - LOCATION - TYPICAL

CHILD RESTRAINT ANCHOR (Continued)

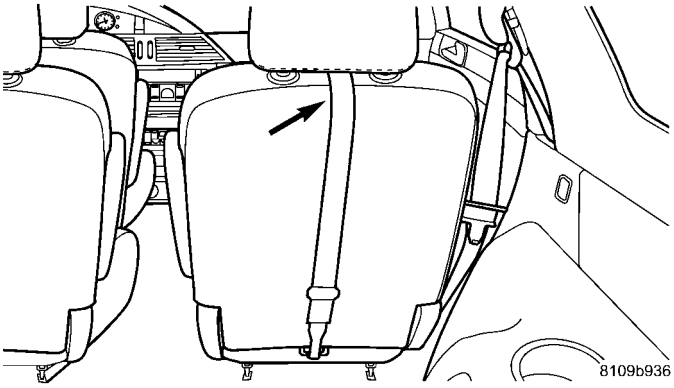


Fig. 7 CHILD RESTRAINT UPPER TETHER/ANCHOR - 2ND ROW - TYPICAL

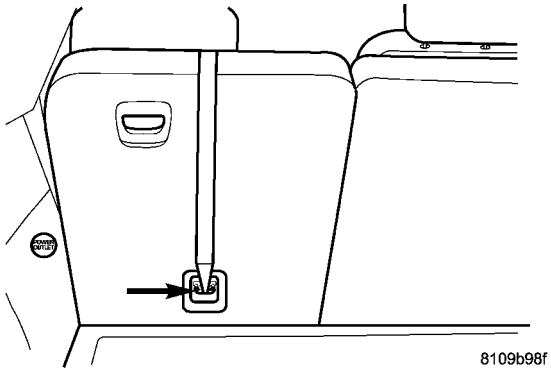


Fig. 8 CHILD RESTRAINT UPPER TETHER/ANCHOR - 3RD ROW

WARNING: DURING, AND FOLLOWING, ANY CHILD RESTRAINT ANCHOR SERVICE, DUE TO IMPACT EVENT OR VEHICLE REPAIR, CAREFULLY INSPECT ALL MOUNTING HARDWARE, TETHER STRAPS AND ANCHORS FOR PROPER INSTALLATION, OPERATION, OR DAMAGE. IF A CHILD RESTRAINT ANCHOR IS FOUND DAMAGED IN ANY WAY, THE ANCHOR MUST BE REPLACED WITH THE SEAT ASSEMBLY. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

OPERATION

LOWER ANCHORS AND TETHER FOR CHILDREN (LATCH)

Each vehicle, is equipped with two child restraint anchorage systems called LATCH, which stands for Lower Anchors and Tether for CHildren. The LATCH child restraint anchorage systems are installed on all second-row seats.

The lower anchor bars of the LATCH System are located where the seat back meets the seat cushion.

The tether anchors are located on the rear surface of the seat back.

Child restraint systems designed to be compatible with the vehicles LATCH System are now available. LATCH child restraints make installation into the vehicle simple and convenient.

When using the LATCH System, always follow the child restraint manufactures installation instructions.

TETHER ANCHORS

There are tether strap anchorages behind all second row seating positions and the driver's side third row seating position. The tether anchors are located in the rear surface of the seat back. When using the tether anchorages in the second row seating position, ensure that the strap is routed over the top of the seat back and under the head restraint between the head restraint posts.

When the tether anchorage is used in the third row seating position, the strap should be positioned straight over the top of the seat back.

The passenger seat belts are equipped with cinching latch plates, which are designed to keep the lap portion tight around the child restraint so that it is not necessary to use a locking clip. Pulling up on the shoulder portion of the lap/shoulder belt will tighten the belt. The cinching latch plate will keep the belt tight, however, any seat belt system will loosen with time, so check the belt occasionally and pull it tight if necessary.

CLOCKSPRING

DESCRIPTION

The clockspring assembly is secured with two screws to the multi-function switch mounting housing near the top of the steering column behind the steering wheel (Fig. 9). The clockspring consists of a flat, round molded plastic case with a stubby tail that hangs below the steering column (Fig. 10). The tail contains two connector receptacles that face toward the instrument panel. Within the plastic case is a spool-like molded plastic rotor with a large exposed hub. The upper surface of the rotor hub has a large center hole, two large flats, an index hole, two short pigtail wires with connectors, and two connector receptacles that face toward the steering wheel.

The lower surface of the rotor hub has three pins, two round and one oblong. These pins index the clockspring to the turn signal cancel cam unit in the multi-function switch mounting housing. Within the plastic case and wound around the rotor spool is a long ribbon-like tape that consists of several thin copper wire leads sandwiched between two thin plastic membranes. The outer end of the tape terminates at

CLOCKSPRING (Continued)

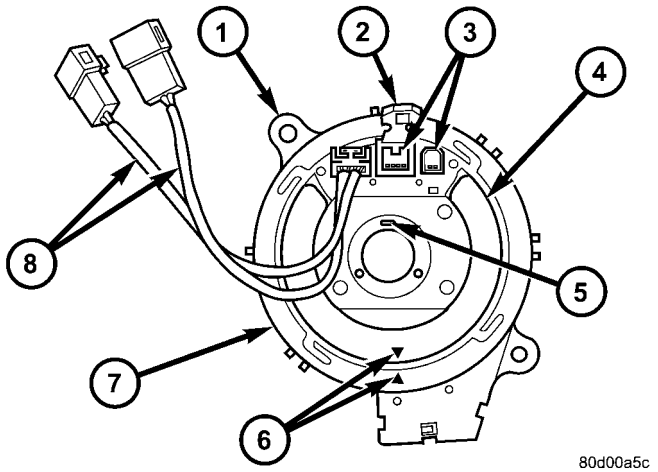


Fig. 9 CLOCKSPRING UPPER VIEW

1 - MOUNTING EAR (2)
2 - LOCKING PIN
3 - UPPER CONNECTOR RECEPTACLE (2)
4 - LABEL
5 - OBLONG PIN
6 - ALIGNMENT ARROWS
7 - CASE
8 - PIGTAIL WIRE (2)

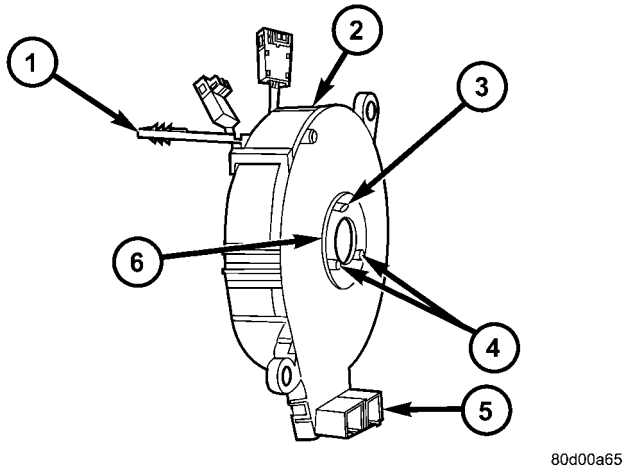


Fig. 10 CLOCKSPRING LOWER VIEW

1 - LOCKING PIN
2 - CASE
3 - OBLONG PIN
4 - ROUND PIN (2)
5 - LOWER CONNECTOR RECEPTACLE (2)
6 - ROTOR

the connector receptacles that face the instrument panel, while the inner end of the tape terminates at the pigtail wires and connector receptacles on the hub of the clockspring rotor that face the steering wheel.

Service replacement clocksprings are shipped precentered and with a molded plastic locking pin installed. The locking pin secures the centered clockspring rotor to the clockspring case during shipment and handling, but must be removed from the clockspring after it and the multi-function switch mounting housing are installed on the steering column. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE - CLOCKSPRING CENTERING).

The clockspring cannot be repaired. If the clockspring is faulty, damaged, or if the driver airbag has been deployed, the clockspring must be replaced. Refer to the proper Body Diagnostic Procedures manual for diagnosis and testing.

OPERATION

The clockspring is a mechanical electrical circuit component that is used to provide continuous electrical continuity between the fixed instrument panel wire harness and the electrical components mounted on or in the rotating steering wheel. On this model the rotating electrical components include the driver airbag, the horn switch, the speed control switches, and the remote radio switches, if the vehicle is so equipped. The clockspring case is positioned and secured to the multi-function switch mounting housing near the top of the steering column. The connector receptacles on the tail of the fixed clockspring case connect the clockspring to the vehicle electrical system through two take outs with connectors from the instrument panel wire harness.

The clockspring rotor is movable and is keyed to the hub of the steering wheel by two large flats that are molded into the rotor hub. The three pins (two round and one oblong) on the lower surface of the clockspring rotor hub engage and index the clockspring rotor to the turn signal cancel cam. The turn signal cancel cam is integral to the multi-function switch mounting housing and is keyed to the upper steering column shaft. Two short, yellow-sleeved pigtail wires on the upper surface of the clockspring rotor connect the clockspring to the driver airbag, while a steering wheel wire harness connects the two connector receptacles on the upper surface of the clockspring rotor to the horn switch, the two speed control switches and, if the vehicle is so equipped, to the optional remote radio switches on the steering wheel.

Like the clockspring in a timepiece, the clockspring tape has travel limits and can be damaged by being wound too tightly during full stop-to-stop steering wheel rotation. To prevent this from occurring, the clockspring is centered when it is installed on the steering column. Centering the clockspring indexes the clockspring tape to the movable steering components so that the tape can operate within its designed travel limits. However, if the clockspring is removed from the steering column or if the steering shaft is disconnected from the steering gear, the

CLOCKSPRING (Continued)

clockspring spool can change position relative to the movable steering components and must be re-centered following completion of the service or the tape may be damaged.

Service replacement clocksprings are shipped pre-centered and with a locking pin installed. This locking pin should not be removed until the clockspring has been installed on the steering column. If the locking pin is removed before the clockspring is installed on a steering column, the clockspring centering procedure must be performed. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCK PRING - STANDARD PROCEDURE - CLOCKSPRING CENTERING).

STANDARD PROCEDURE - CLOCKSPRING CENTERING

The clockspring is designed to wind and unwind when the steering wheel is rotated, but is only designed to rotate the same number of turns (about five complete rotations) as the steering wheel can be turned from stop to stop. Centering the clockspring indexes the clockspring tape to other steering components so that it can operate within its designed travel limits. The rotor of a centered clockspring can be rotated two and one-half turns in either direction from the centered position, without damaging the clockspring tape.

However, if the clockspring is removed for service or if the steering column is disconnected from the steering gear, the clockspring tape can change position relative to the other steering components. The clockspring must then be re-centered following completion of such service or the clockspring tape may be damaged. Service replacement clocksprings are shipped pre-centered and with a molded plastic locking pin installed. This locking pin should not be removed until the clockspring has been installed on the steering column. If the locking pin is removed before the clockspring is installed on a steering column, the clockspring centering procedure must be performed.

NOTE: Before starting this procedure, be certain to turn the steering wheel until the front wheels are in the straight-ahead position.

(1) Place the front wheels in the straight-ahead position.

(2) Remove the clockspring from the steering column. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - REMOVAL).

(3) Hold the clockspring case in one hand so that it is oriented as it would be when it is installed on the steering column (Fig. 9).

(4) Use your other hand to rotate the clockspring rotor clockwise to the end of its travel. **Do not apply excessive torque.**

(5) From the end of the clockwise travel, rotate the rotor about two and one-half turns counterclockwise, until the arrows on the clockspring rotor label and the clockspring case are aligned. The uppermost pin on the lower surface of the clockspring rotor should now be the oblong pin.

(6) The clockspring is now centered. Secure the clockspring rotor to the clock spring case to maintain clockspring centering until it is reinstalled on the steering column.

(7) The front wheels should still be in the straight-ahead position. Reinstall the clockspring onto the steering column. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - INSTALLATION).

REMOVAL

NOTE: Before starting this procedure, be certain to turn the steering wheel until the front wheels are in the straight-ahead position.

(1) Place the front wheels in the straight ahead position.

(2) Remove the driver airbag from the steering wheel (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

(3) Remove the steering wheel from the steering column. (Refer to 19 - STEERING/COLUMN/STEERING WHEEL - REMOVAL).

(4) Remove the upper and lower steering column shrouds (Refer to 19 - STEERING/COLUMN/UPPER SHROUD - REMOVAL) and (Refer to 19 - STEERING/COLUMN/LOWER SHROUD - REMOVAL) and (Fig. 11)

(5) Disconnect the two instrument panel wire harness connectors for the clockspring from the two connector receptacles below the steering column on the back of the clockspring case.

(6) Remove the two screws that secure the clockspring case to the multi-function switch mounting housing (Fig. 12).

(7) Remove the clockspring from the multi-function switch mounting housing. The clockspring cannot be repaired. It must be replaced if faulty or damaged, or if the driver airbag has been deployed.

(8) If the removed clockspring is to be reused, be certain to secure the clockspring rotor to the clockspring case to maintain clockspring centering until it is reinstalled on the steering column. If clockspring centering is not maintained, the clockspring must be centered again before it is reinstalled. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE - CLOCKSPRING CENTERING).

CLOCKSPRING (Continued)

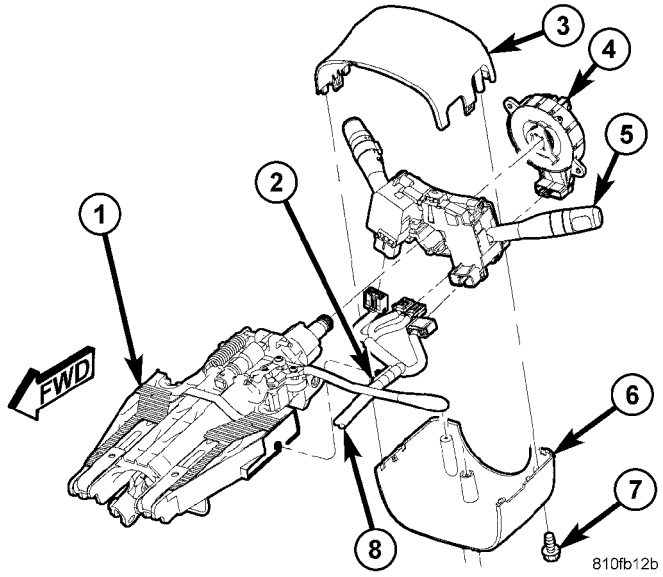


Fig. 11 STEERING COLUMN SHROUDS - REMOVE/ INSTALL

1 - STEERING COLUMN
2 - WIRING HARNESS CLIP
3 - UPPER SHROUD
4 - CLOCKSPRING
5 - SWITCH MODULE
6 - LOWER SHROUD
7 - SHROUD MOUNTING SCREW
8 - WIRING HARNESS

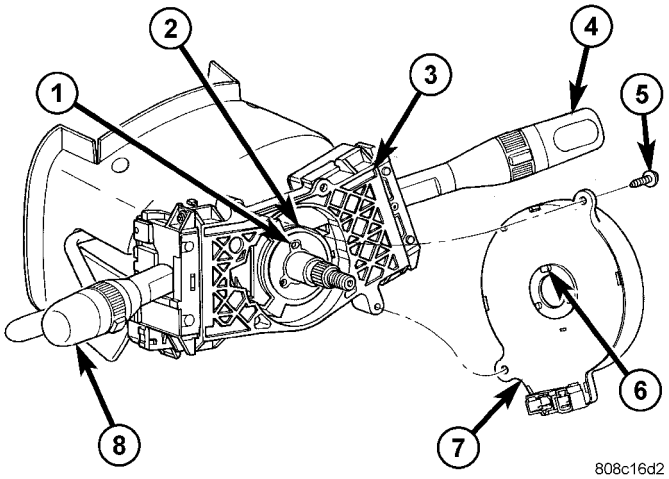


Fig. 12 CLOCK SPRING - REMOVE/INSTALL

1 - OBLONG HOLE
2 - TURN SIGNAL CANCEL CAM
3 - MULTI-FUNCTION SWITCH MOUNTING HOUSING
4 - RIGHT MULTI-FUNCTION SWITCH
5 - SCREW (2)
6 - OBLONG PIN
7 - CLOCK SPRING
8 - LEFT MULTI-FUNCTION SWITCH

INSTALLATION

NOTE: Before starting this procedure, be certain that the front wheels are in the straight-ahead position.

(1) While holding the centered clockspring rotor (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE - CLOCKSPRING CENTERING) and case stationary in relation to each other, carefully slide the clockspring down over the steering column upper shaft.

(2) Align and seat the three pins on the lower surface of the clockspring rotor hub with the three holes in the hub of the turn signal cancel cam (Fig. 12). It should be noted that when the clockspring is properly centered the uppermost pin on the clockspring rotor hub is the oblong pin, and it will only fit in the oblong hole in the hub of the turn signal cancel cam.

(3) Align and seat the one pin and the two mounting ears on the clockspring case to their respective holes in the multi-function switch mounting housing.

(4) Install and tighten the two clockspring mounting screws. Torque the screws to 2.5 N·m (22 in. lbs.).

(5) Connect the two instrument panel wire harness connectors for the clockspring to the two connector receptacles below the steering column on the back of the clockspring housing.

(6) Install the upper and lower steering column shrouds (Refer to 19 - STEERING/COLUMN/UPPER SHROUD - INSTALLATION) and (Refer to 19 - STEERING/COLUMN/LOWER SHROUD - INSTALLATION) and (Fig. 11).

(7) Install and tighten the screw that secures the lower tilting steering column shroud to the multi-function switch mounting housing. Torque the screw to 2 N·m (17 in. lbs.).

(8) If a new clockspring has been installed, remove the plastic locking pin that secures the clockspring rotor to the clockspring case to maintain clock spring centering.

(9) Install the steering wheel onto the steering column. (Refer to 19 - STEERING/COLUMN/STEERING WHEEL - INSTALLATION).

(10) Install the driver airbag onto the steering wheel. (Refer to 8 - ELECTRICAL/RESTRAINTS/ DRIVER AIRBAG - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(11) Verify vehicle and system operation.

(12) Close hood.

CURTAIN AIRBAG

DESCRIPTION

Curtain Airbags (Fig. 13) are available for this model when it is also equipped with dual front airbags. These airbags are passive, inflatable, Supplemental Restraint System (SRS) components, and vehicles with this equipment can be readily identified by a molded identification trim button with the “SRS - AIRBAG” logo (Fig. 2) located on the headliner above each B-pillar. This system is designed to reduce injuries to the vehicle occupants in the event of a side impact collision.

Curtain airbags have two individually controlled curtain airbag units. These airbag units are concealed and mounted above the headliner where they are each secured to one of the roof side rails (Fig. 14). Each folded airbag cushion is contained within a fabric wrap that extends along the roof rail from the A-pillar at the front of the vehicle to just behind the D-pillar at the rear of the vehicle. One tether extends down the A-pillar from the front of the airbag cushion, and a second tether extends to the roof rail above the D-pillar. The end of the A-pillar tether is secured to a slot in the sheet metal with a metal hook retained by a plastic anchor clip. The D-pillar break-away tether is attached to the curtain airbag tabs.

The hybrid-type inflator for each airbag is secured to the roof rail just in front of the C-pillar, and is connected to the airbag cushion by a long tubular manifold. The inflator bracket and the extruded airbag cushion channel are secured with both plastic push-in fasteners and screws to the roof rail. A short pigtail wire and connector connect the airbag inflator to a dedicated take out and connector of the body wire harness.

The curtain airbag cannot be adjusted or repaired and must be replaced if deployed, faulty, or in any way damaged. Once a curtain airbag has been deployed, the complete airbag unit, the headliner, the upper A, B, C, and D-pillar trim, and all other visibly damaged components must be replaced. Refer to the proper Body Diagnostic Procedures manual for diagnosis and testing.

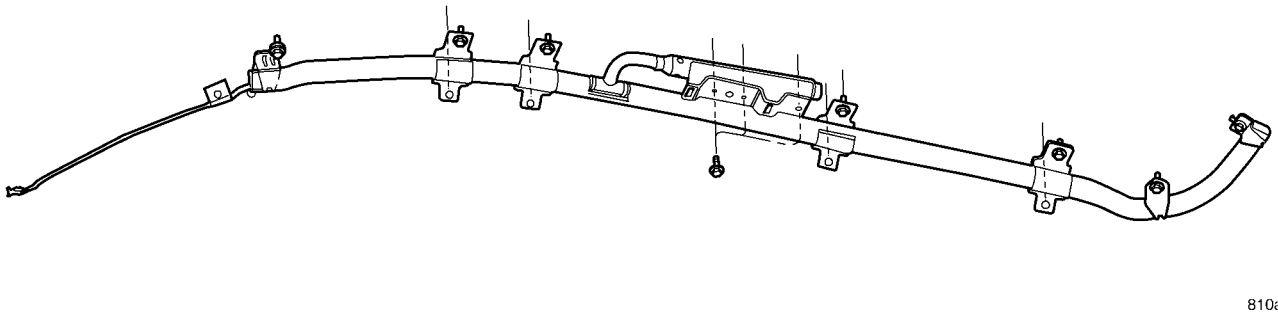


Fig. 13 CURTAIN AIRBAG

CURTAIN AIRBAG (Continued)

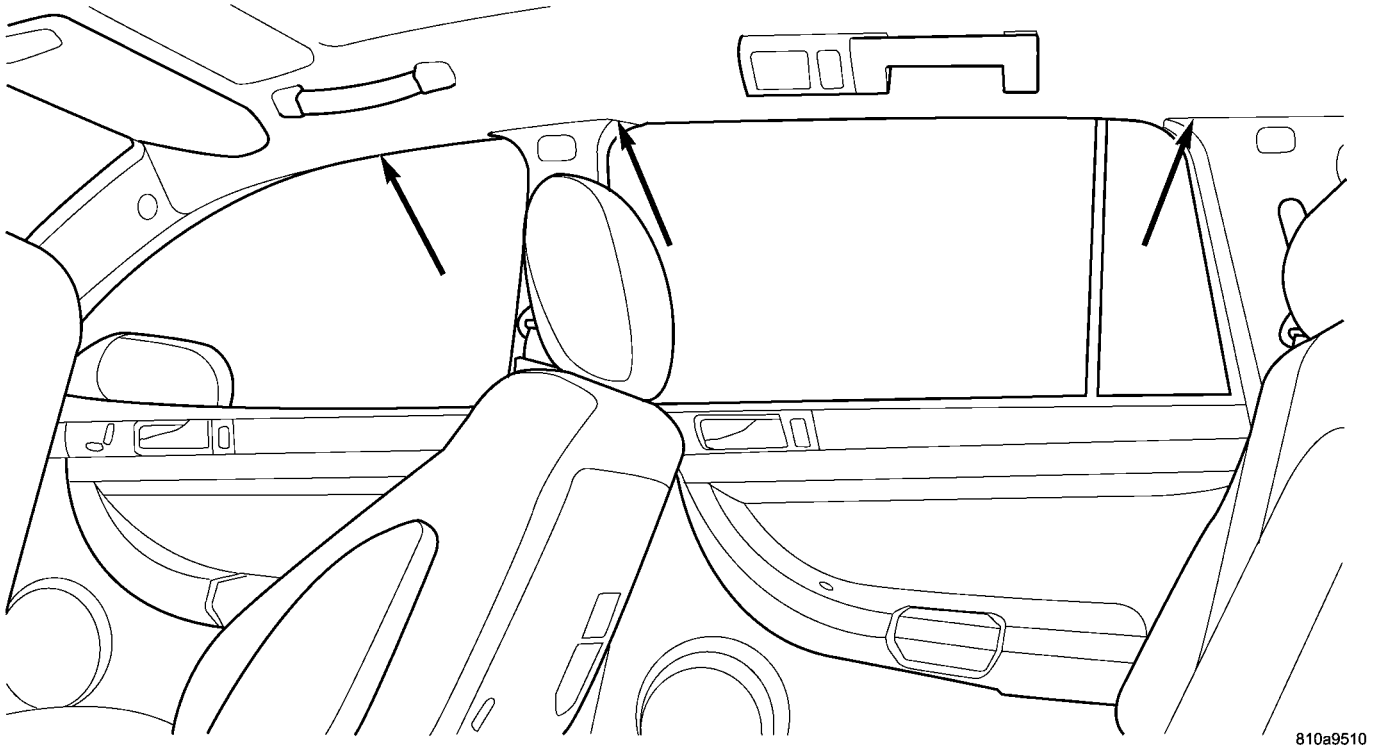


Fig. 14 CURTAIN AIRBAG LOCATION

OPERATION

Each curtain airbag is deployed individually by an electrical signal generated by the Occupant Restraint Controller (ORC) to which it is connected through left or right curtain airbag line 1 and line 2 (or squib) circuits. The hybrid-type inflator assembly for each airbag contains a small canister of highly compressed inert gas. When the ORC sends the proper electrical signal to the airbag inflator, the electrical energy creates enough heat to ignite chemical pellets within the inflator. Once ignited, these chemicals burn rapidly and produce the pressure necessary to rupture a containment disk in the inert gas canister. The inflator and inert gas canister are sealed and connected to a tubular manifold so that all of the released gas is directed into the folded curtain airbag cushion, causing the cushion to inflate.

As the airbag cushion inflates it will drop down from the roof rail between the edge of the headliner and the side glass/body pillars to form a curtain-like cushion to protect the vehicle occupants during a side impact collision. The front and rear tethers keep the side curtain bag taut, thus ensuring that the bag will deploy in the proper position. Following the airbag deployment, the airbag cushion quickly deflates by venting the inert gas through the loose weave of the cushion fabric, and the deflated cushion hangs down loosely from the roof rail.

CURTAIN AIRBAG (Continued)

REMOVAL

CURTAIN AIRBAG

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove the headliner from the vehicle (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(4) Remove the screws that secure the curtain airbag to the spring nuts in the roof side rail (Fig. 15) and (Fig. 16).

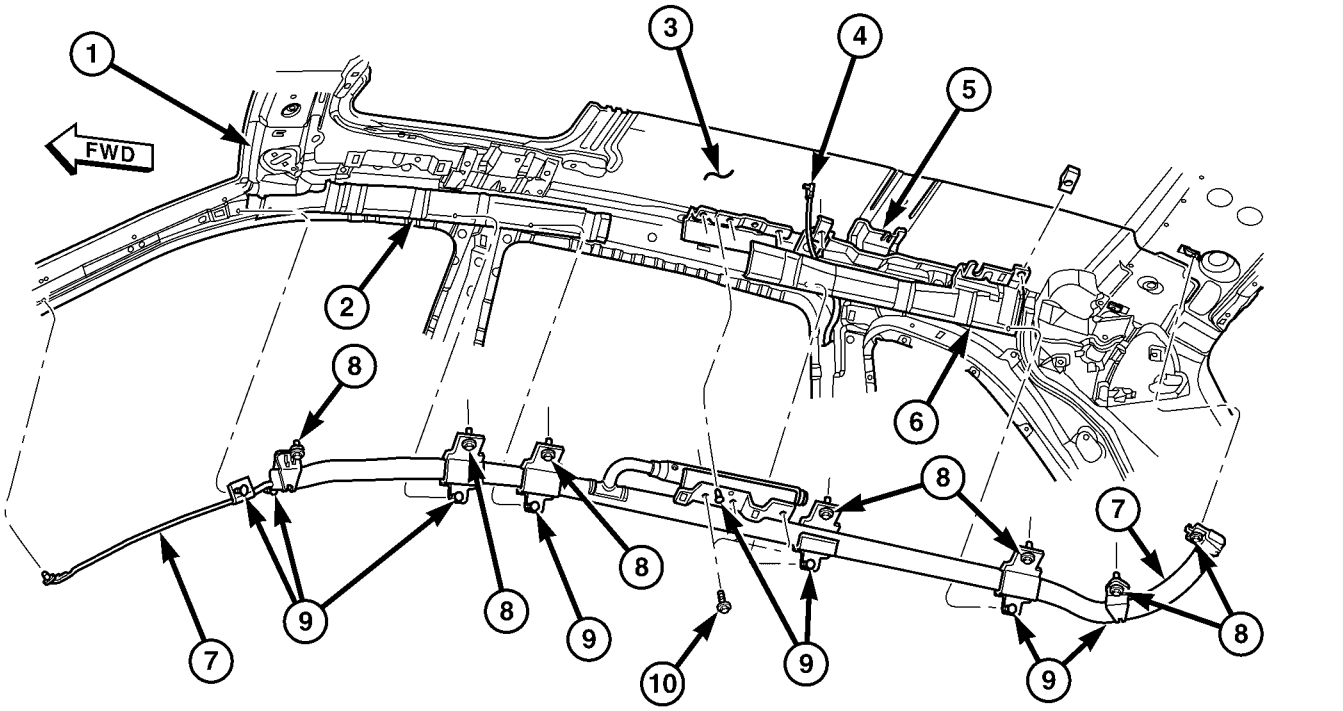


Fig. 15 CURTAIN AIRBAG - REMOVE/INSTALL

1 - REINFORCEMENT BRACKET A-PILLAR
2 - HEAD IMPACT COUNTER MEASURE RAIL FRONT
3 - ROOF ASSEMBLY
4 - SQUIB CONNECTOR
5 - C-PILLAR REINFORCEMENT BRACKET
6 - HEAD IMPACT COUNTER MEASURE RAIL CENTER
7 - CURTAIN AIRBAG
8 - CURTAIN AIRBAG RETAINING SCREWS
9 - PUSH PIN FASTENERS
10 - INFLATOR ASSEMBLY RETAINING SCREWS

CURTAIN AIRBAG (Continued)

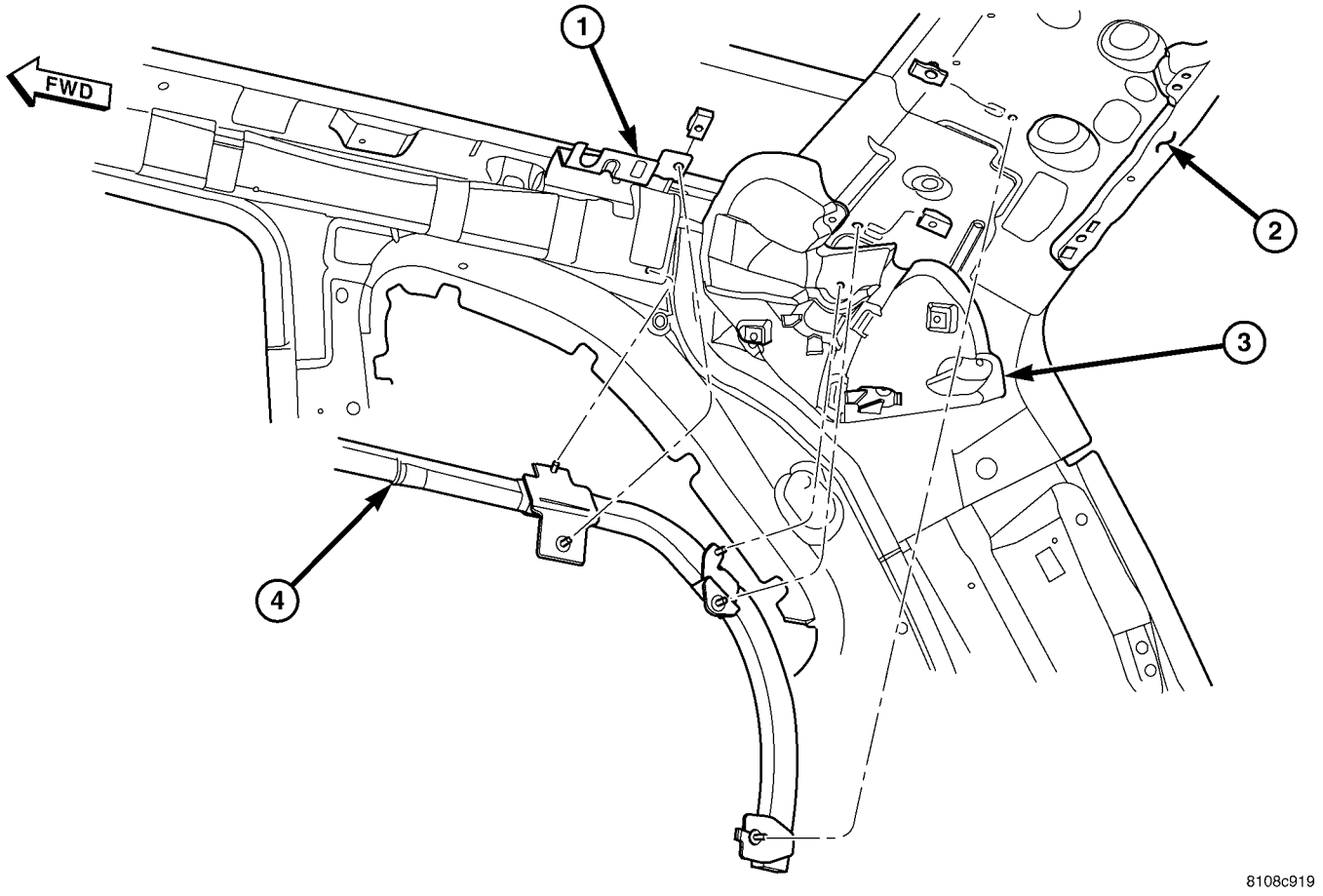


Fig. 16 CURTAIN AIRBAG - D-PILLAR - REMOVE/INSTALL

1 - COAT HOOK ASSEMBLY BRACKET
2 - D-PILLAR UPPER/INNER REINFORCEMENT PANEL
3 - HEAD IMPACT COUNTER MEASURES REAR D-PILLAR
4 - CURTAIN AIRBAG

CURTAIN AIRBAG (Continued)

(5) Disconnect the curtain airbag squib connector (Fig. 15).

(6) Disengage the side curtain airbag front tether plastic retainer from the hole in the upper A-pillar (Fig. 17).

(7) Grasp the extruded curtain airbag firmly and pull it straight away from the body far enough to disengage all the plastic push-in fasteners that secure it to the locating holes in the roof side rail (Fig. 15).

(8) Remove the curtain airbag from the vehicle as a unit.

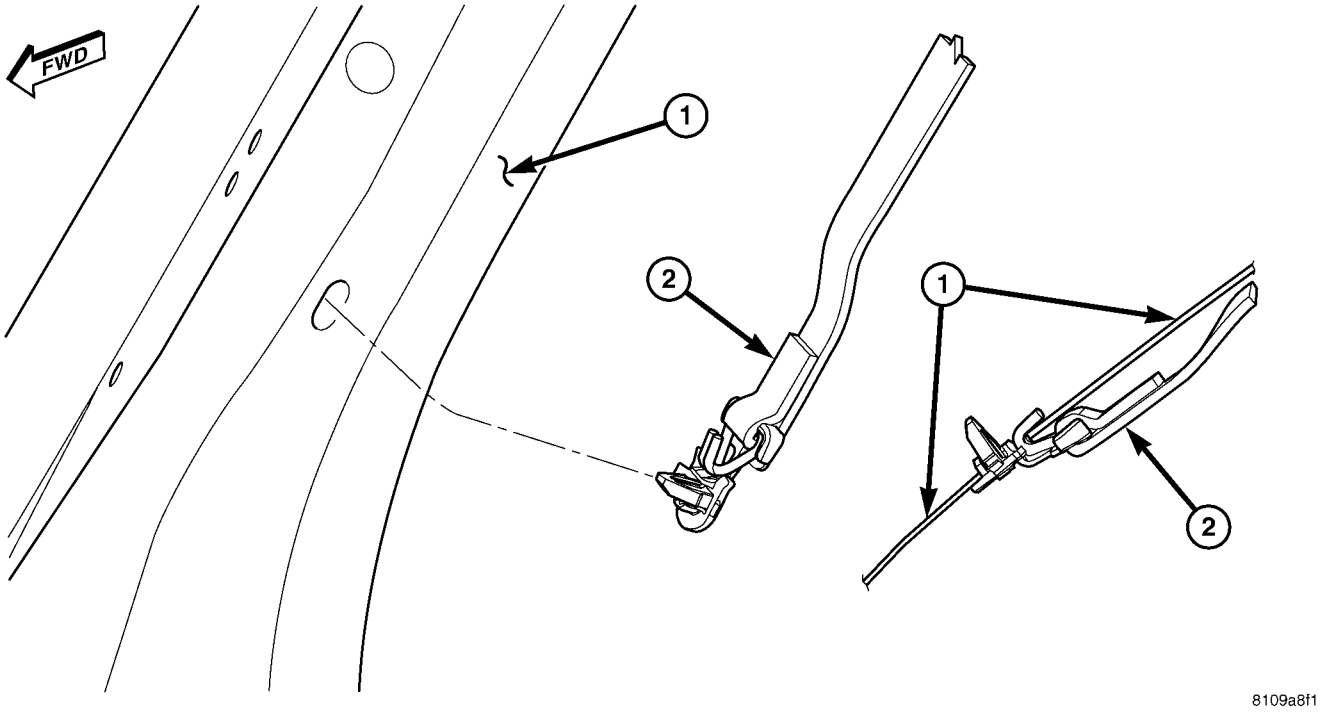


Fig. 17 CURTAIN AIRBAG FRONT ATTACHMENT

1 - A-PILLAR
2 - FRONT CURTAIN AIRBAG TETHER

CURTAIN AIRBAG (Continued)

HEAD IMPACT COUNTER MEASURES

(1) Disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove the headliner from the vehicle (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(4) Remove the curtain airbag. Refer to above procedure (Refer to 8 - ELECTRICAL/RESTRAINTS/ CURTAIN AIRBAG - REMOVAL).

(5) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on the counter measure rail to be removed (Fig. 18).

(6) Remove head impact counter measure rail from vehicle (Fig. 18).

INSTALLATION

CURTAIN AIRBAG

(1) Position curtain airbag over retaining holes in roof rail and firmly snap into place (Fig. 15).

(2) Engage the side curtain airbag front tether plastic retainer to the hole in the upper A-pillar (Fig. 17).

(3) Connect the curtain airbag squib connector (Fig. 15).

(4) Install the screws that secure the curtain airbag to the spring nuts in the roof side rail (Fig. 15) and (Fig. 16).

(5) Install the headliner into the vehicle (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).

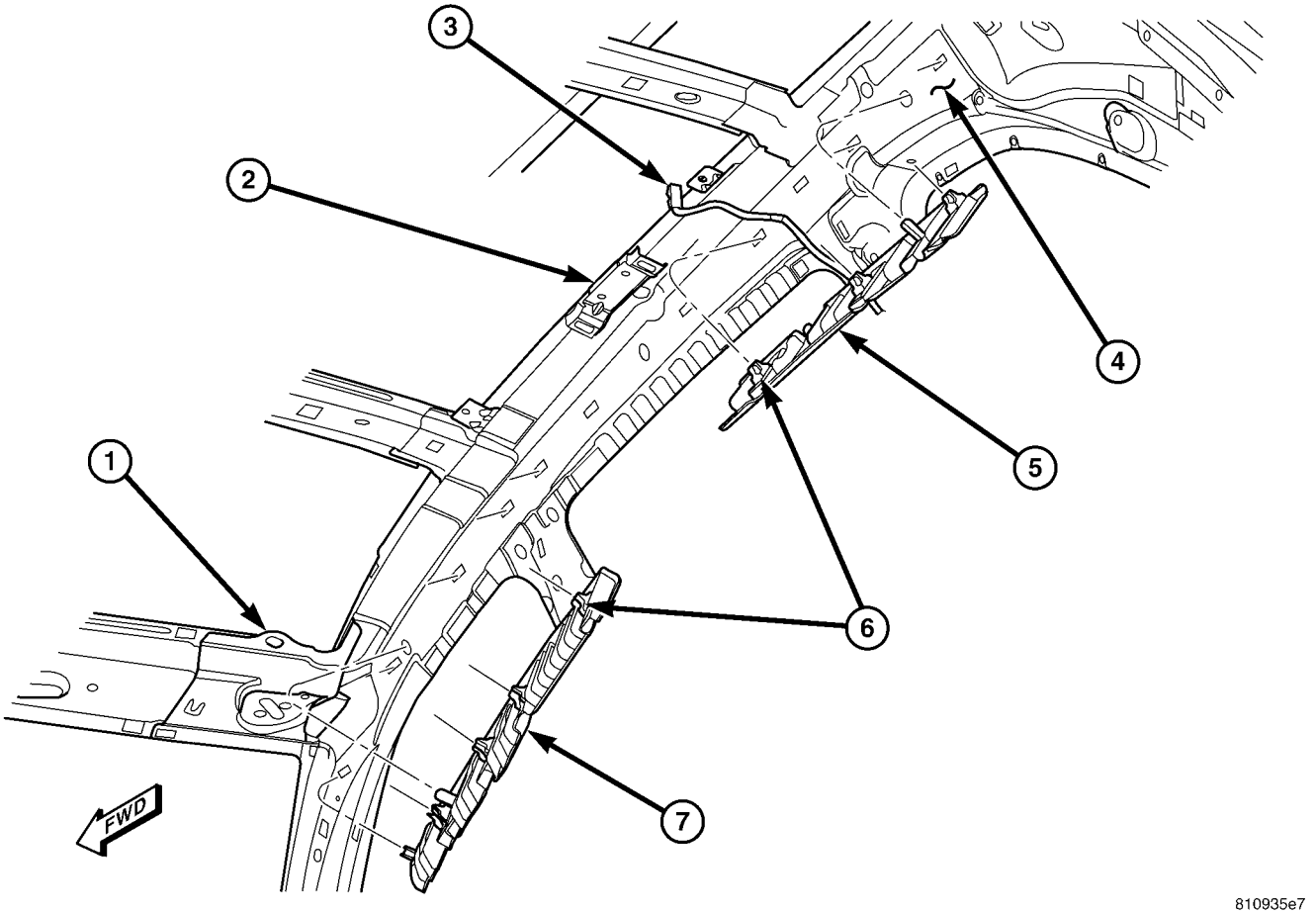


Fig. 18 SIDE RAIL HEAD IMPACT COUNTER MEASURE - REMOVE/INSTALL

1 - A-PILLAR REINFORCEMENT BRACKET
2 - CURTAIN AIRBAG INFLATOR REINFORCEMENT BRACKET
3 - CURTAIN AIRBAG SQUIB CONNECTOR
4 - ROOF ASSEMBLY
5 - HEAD IMPACT COUNTER MEASURE RAIL CENTER
6 - HEAD IMPACT COUNTER MEASURE RAIL RETAINING CLIPS
7 - HEAD IMPACT COUNTER MEASURE RAIL FRONT

CURTAIN AIRBAG (Continued)

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(6) Verify vehicle and system operation.
(7) Close hood.

HEAD IMPACT COUNTER MEASURES

(1) Position the head impact counter measure rail over retaining slots and firmly snap into place (Fig. 18).
(2) Install the curtain airbag. Refer to above procedure (Refer to 8 - ELECTRICAL/RESTRAINTS/ CURTAIN AIRBAG - INSTALLATION).
(3) Install the headliner into the vehicle (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(4) Verify vehicle and system operation.
(5) Close hood.

DRIVER AIRBAG

DESCRIPTION

The driver airbag protective trim cover is the most visible part of the driver airbag. The driver airbag is located in the center of the steering wheel (Fig. 3), where it is secured with two bolts to the two horizontal spokes of the four-spoke steering wheel armature. Concealed beneath the driver airbag trim cover are the horn switch, the folded airbag cushion, the airbag cushion retainer, the airbag housing, the airbag inflator, and the retainers that secure the inflator to the airbag housing.

The resistive membrane-type horn switch is secured within a plastic tray that is inserted in a pocket or pouch sewn onto the airbag cushion retainer strap, between the trim cover and the folded airbag cushion. The horn switch ground pigtail wire has an eyelet terminal connector that is attached to the inflator mounting stud.

The airbag is a multistage, Next Generation-type that deploys with less force than those used in some prior models. A radial deploying fabric airbag cushion with internal tethers is used. The airbag inflator is a dual-initiator, non-azide, pyrotechnic-type unit. Two color-coded connector receptacles on the driver airbag inflator connect the two inflator initiators to the vehicle electrical system through two yellow-jacketed, two-wire pigtail harnesses of the clock spring. The driver airbag cannot be repaired, and must be replaced if deployed or in any way damaged. The driver airbag trim cover and the horn switch are available for individual service replacement. Refer to the proper Body Diagnostic Procedures manual for diagnosis and testing.

OPERATION

The multistage driver airbag is deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the driver airbag squib 1 and squib 2 circuits to the two initiators in the airbag inflator. By using two initiators, the airbag can be deployed at multiple levels of force. The force level is controlled by the ORC to suit the monitored impact conditions by providing one of four delay intervals between the electrical signals provided to the two initiators. The longer the delay between these signals, the less forcefully the airbag will deploy.

When the ORC sends the proper electrical signals to each initiator, the electrical energy generates enough heat to initiate a small pyrotechnic charge which, in turn ignites chemical pellets within the inflator. Once ignited, these chemical pellets burn rapidly and produce a large quantity of inert gas. The inflator is sealed to the back of the airbag housing and a diffuser in the inflator directs all of the inert gas into the airbag cushion, causing the cushion to inflate. As the cushion inflates, the driver airbag trim cover will split at predetermined breakout lines, then fold back out of the way along with the horn switch and tray unit. Following an airbag deployment, the airbag cushion quickly deflates by venting the inert gas towards the instrument panel through vent holes within the fabric used to construct the back (steering wheel side) panel of the airbag cushion.

Some of the chemicals used to create the inert gas may be considered hazardous while in their solid state before they are burned, but they are securely sealed within the airbag inflator. Typically, both initiators are used and all potentially hazardous chemicals are burned during an airbag deployment event.

The inert gas that is produced when the chemicals are burned is harmless. However, a small amount of residue from the burned chemicals may cause some temporary discomfort if it contacts the skin, eyes, or breathing passages. If skin or eye irritation is noted, rinse the affected area with plenty of cool, clean water. If breathing passages are irritated, move to another area where there is plenty of clean, fresh air

DRIVER AIRBAG (Continued)

to breath. If the irritation is not alleviated by these actions, contact a physician.

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove the two retaining screws to the driver airbag from the rear of the steering wheel (Fig. 19).

(4) Disconnect the two squib connectors from the back of the driver airbag (Fig. 19).

(5) Remove driver airbag from vehicle.

When replacing a driver airbag, the new airbag will come with the trim cover and horn included. If undeployed, they need not be transferred to the new airbag.

INSTALLATION

When replacing a driver airbag, the new airbag will come with the trim cover and horn included. If undeployed, they need not be transferred to the new airbag.

(1) Connect the two squib connectors to the back of the driver airbag (Fig. 19).

(2) Install the driver airbag into the steering wheel cavity.

(3) Install the two retaining screws to the driver airbag in the rear of the steering wheel (Fig. 19).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(4) Verify vehicle and system operation.

(5) Close hood.

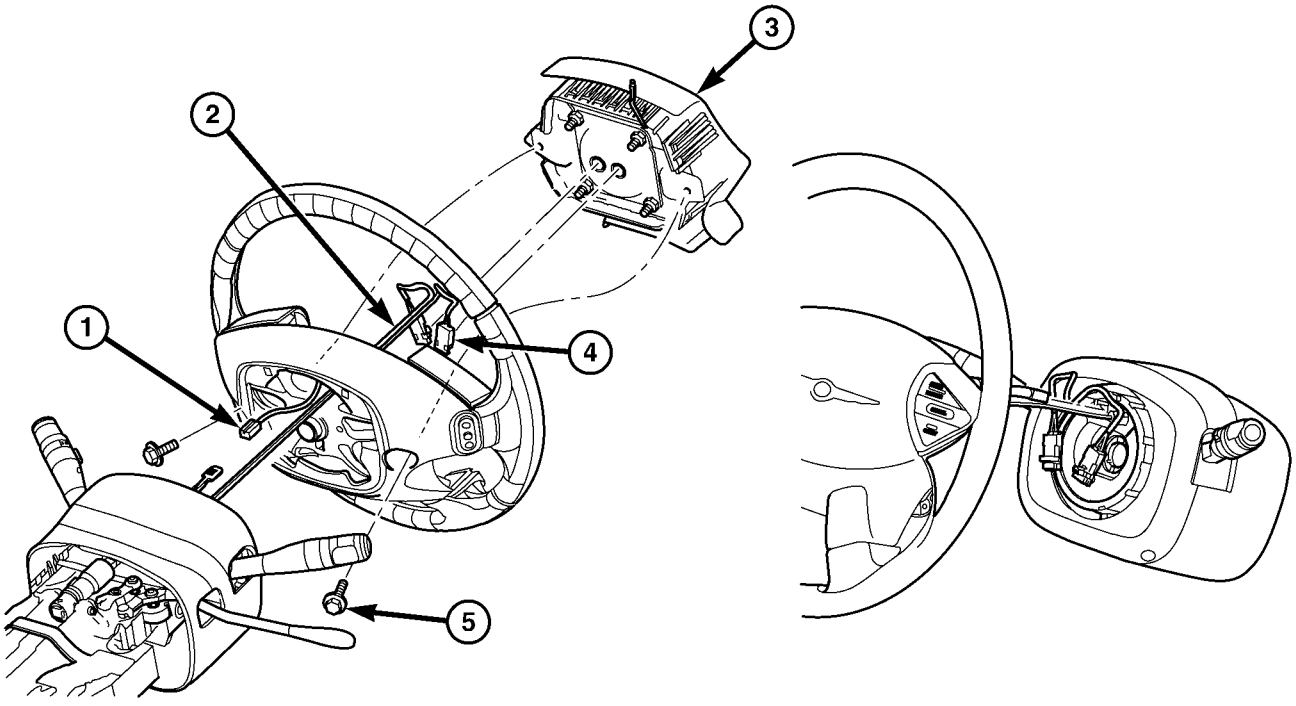
DRIVER AIRBAG TRIM COVER

REMOVAL

(1) Open hood.

(2) Disconnect and isolate the battery negative cable.

(3) Wait two minutes for the system reserve capacitor to discharge before servicing any airbag components.



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Fig. 19 DRIVER AIRBAG - REMOVE/INSTALL

1 - HORN CONNECTOR
2 - DRIVER AIRBAG SQUIB CONNECTOR
3 - DRIVER AIRBAG
4 - DRIVER AIRBAG SQUIB CONNECTOR
5 - DRIVER AIRBAG RETAINING SCREWS

DRIVER AIRBAG TRIM COVER (Continued)

(4) Remove the driver airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

(5) With driver airbag removed, pick a corner and push down on the inflator or latch hook mounting plate until the latch hooks push out of the driver airbag cover (Fig. 20) and (Fig. 21).

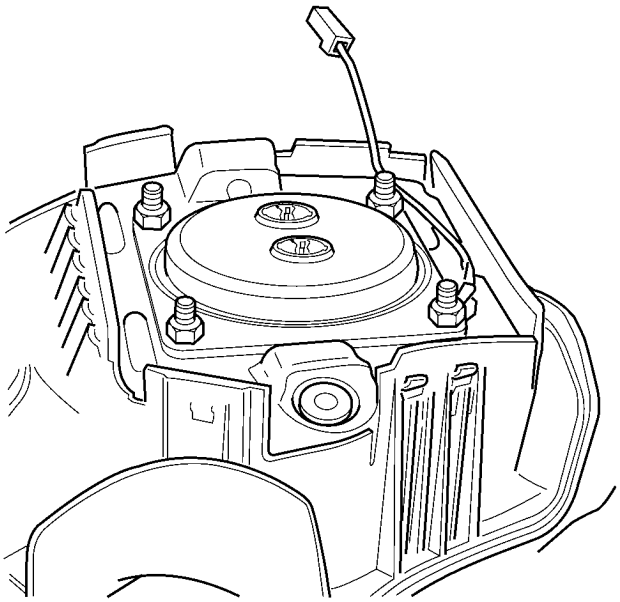


Fig. 20 DRIVER AIRBAG TRIM COVER LATCH HOOKS

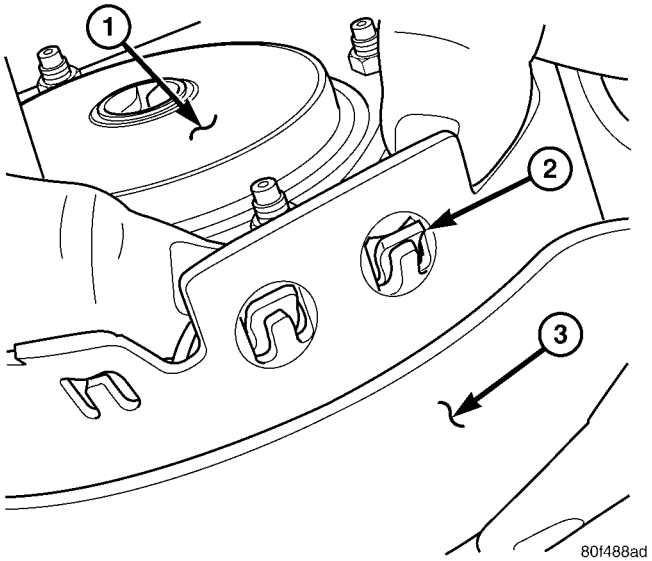


Fig. 21 UNLATCH DAB TRIM COVER - TYPICAL

1 - INFLATOR OR LATCH HOOK MOUNTING PLATE
2 - LATCH HOOK
3 - DRIVER AIRBAG COVER

(6) Remove driver airbag from driver airbag cover (Fig. 22).

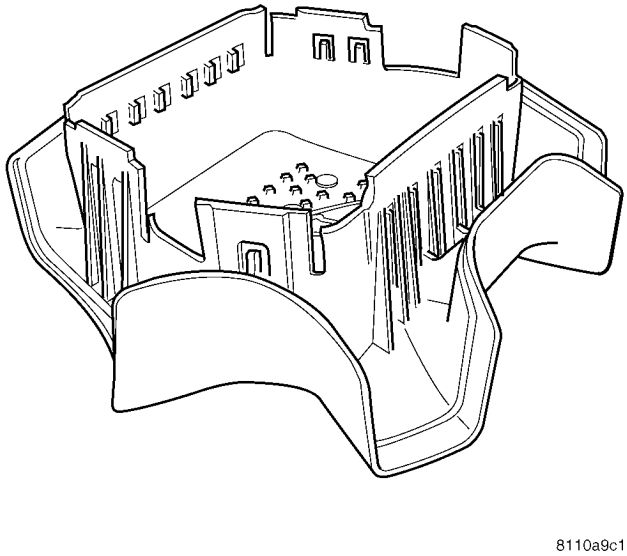


Fig. 22 DRIVER AIRBAG TRIM COVER

INSTALLATION

(1) Place driver airbag into new driver airbag trim cover. Be careful not to pinch airbag cushion between latch hook mounting plate and cover.

(2) Push down on the latch hook mounting plate and guide the latch hooks into the slots on the driver airbag trim cover.

(3) Make sure that the horn wire leads are properly routed (Fig. 23).

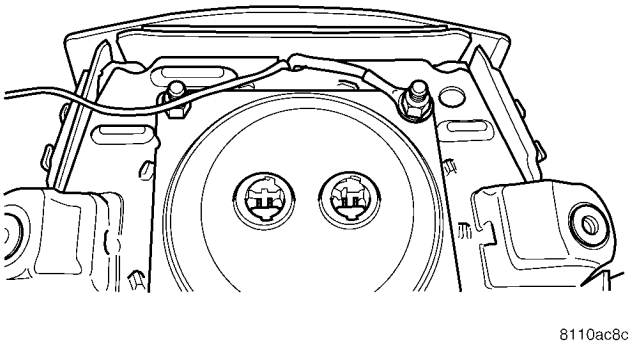


Fig. 23 HORN WIRE ROUTING

(4) Once all the latch hooks have been started, grasp the driver airbag with both hands. Apply pressure with thumbs on front of airbag and with fingertips grasping the sides of the airbag trim cover, push thumbs while pulling fingertips, seating the latch hooks in the latch windows (Fig. 24).

DRIVER AIRBAG TRIM COVER (Continued)

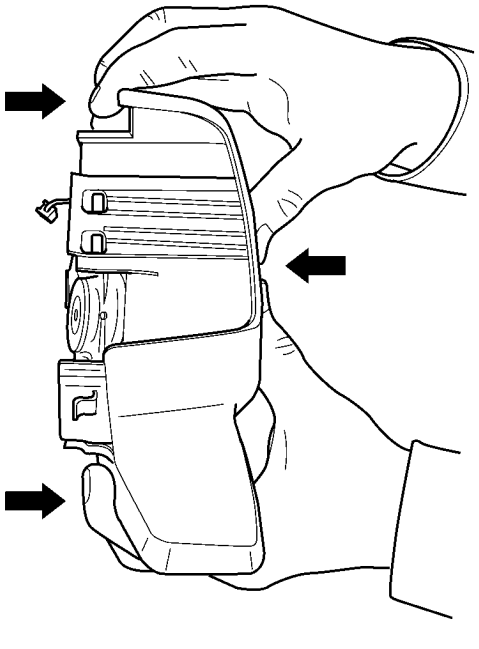


Fig. 24 SECURE AIRBAG TRIM COVER LATCH HOOKS

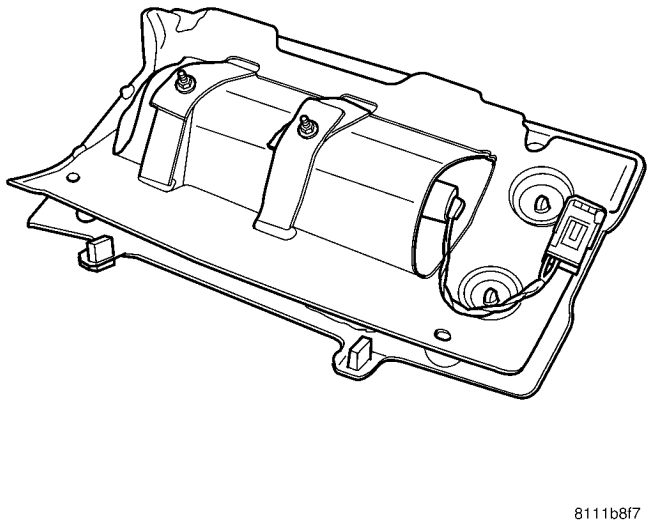


Fig. 25 KNEE BLOCKER AIRBAG - REAR

(5) Install the driver airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

KNEE BLOCKER AIRBAG

DESCRIPTION

The Knee Blocker Airbag (Fig. 25) and (Fig. 26) is located on the driver side of the vehicle beneath the instrument panel steering column outer cover (Fig. 27).

The knee blocker airbag includes one reaction plate and one load plate, within which the cushion and inflator are mounted and sealed. Following a knee blocker airbag deployment, the knee blocker airbag and instrument panel assembly must be replaced. Refer to the proper Body Diagnostic Procedures manual for diagnosis and testing.

OPERATION

The knee blocker airbag is equipped with a single inflator. When the ORC sends the proper electrical signals to the initiator, the electrical energy generates enough heat to initiate a small pyrotechnic charge which, in turn ignites chemical pellets within the inflator. Once ignited, these chemical pellets burn rapidly and produce a large quantity of inert gas. The inflator is sealed to the back of the airbag housing and a diffuser in the inflator directs all of the inert gas into the airbag cushion, causing the cushion to inflate. As the cushion inflates, the knee blocker airbag trim deploy. Following an airbag deployment, the airbag cushion quickly deflates by venting the

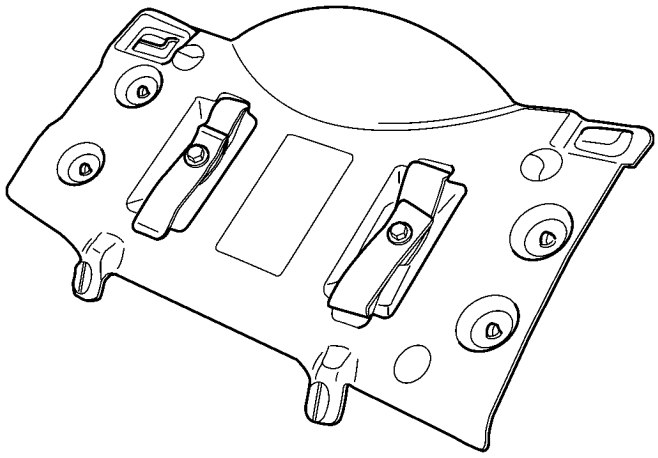


Fig. 26 KNEE BLOCKER AIRBAG - FRONT

KNEE BLOCKER AIRBAG (Continued)

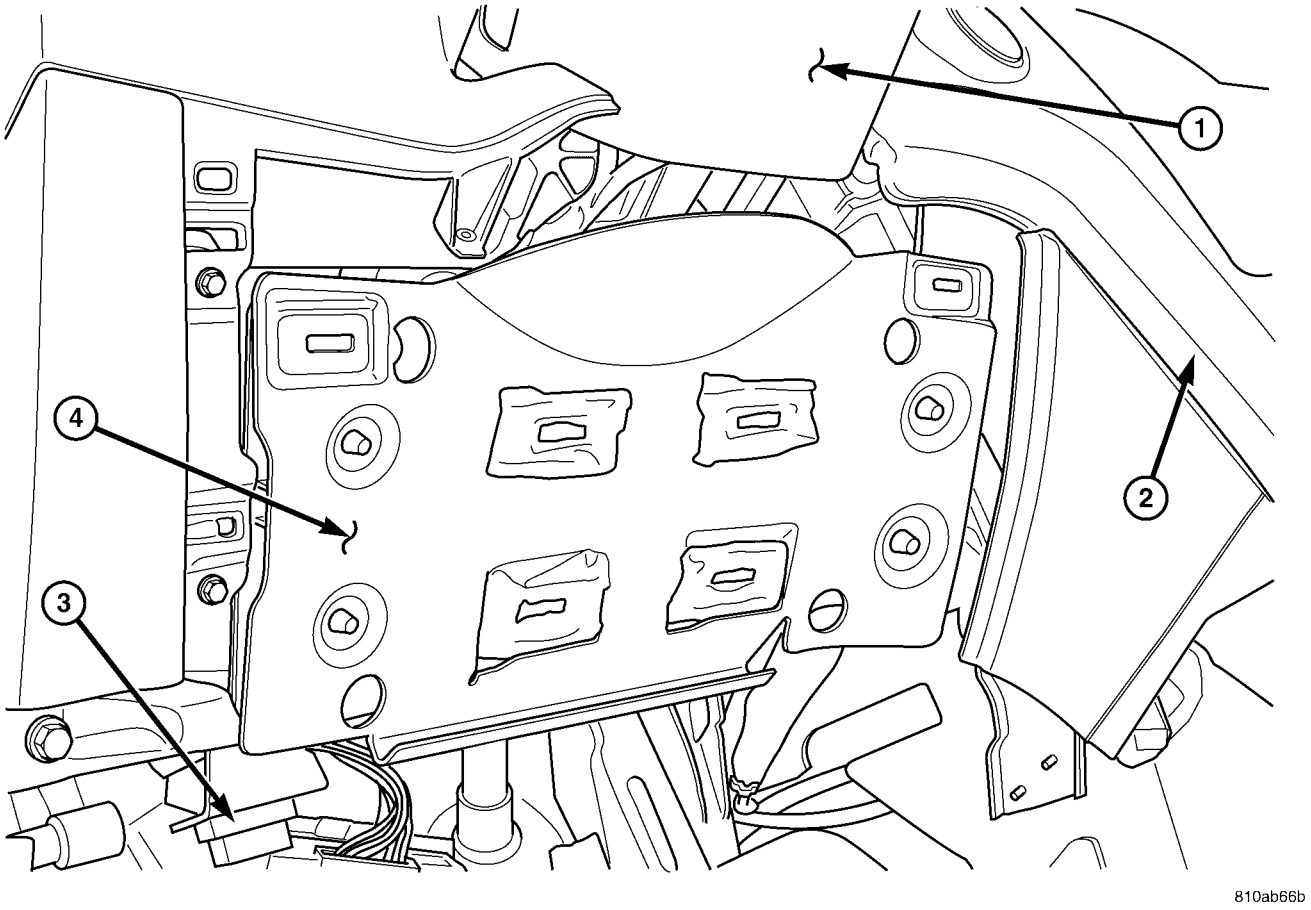


Fig. 27 KNEE BLOCKER AIRBAG - LOCATION

1 - STEERING COLUMN
2 - INSTRUMENT PANEL CENTER STACK
3 - DATA LINK CONNECTOR
4 - KNEE BLOCKER AIRBAG

inert gas towards the instrument panel through vent holes within the fabric used to construct the back panel of the airbag cushion.

Some of the chemicals used to create the inert gas may be considered hazardous while in their solid state before they are burned, but they are securely sealed within the airbag inflator. Typically, the potentially hazardous chemicals are burned during an airbag deployment event.

The inert gas that is produced when the chemicals are burned is harmless. However, a small amount of residue from the burned chemicals may cause some temporary discomfort if it contacts the skin, eyes, or breathing passages. If skin or eye irritation is noted, rinse the affected area with plenty of cool, clean water. If breathing passages are irritated, move to another area where there is plenty of clean, fresh air to breath. If the irritation is not alleviated by these actions, contact a physician.

KNEE BLOCKER AIRBAG (Continued)

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove the steering column opening cover two retaining screws (Fig. 28) and unsnap cover from instrument panel.

(4) Remove four knee blocker airbag retaining bolts from airbag (Fig. 29).

(5) Pull down knee blocker airbag and disconnect the one electrical connector (Fig. 29).

(6) Remove knee blocker airbag from vehicle.

INSTALLATION

(1) Place the knee blocker airbag into position in the instrument panel opening.

(2) Connect the one electrical connector (Fig. 29).

(3) Install the four knee blocker airbag retaining bolts into the airbag (Fig. 29).

(4) Position the steering column opening cover over retaining slots and firmly snap into place. Install the two retaining screws (Fig. 28).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(5) Verify vehicle and system operation.

(6) Close hood.

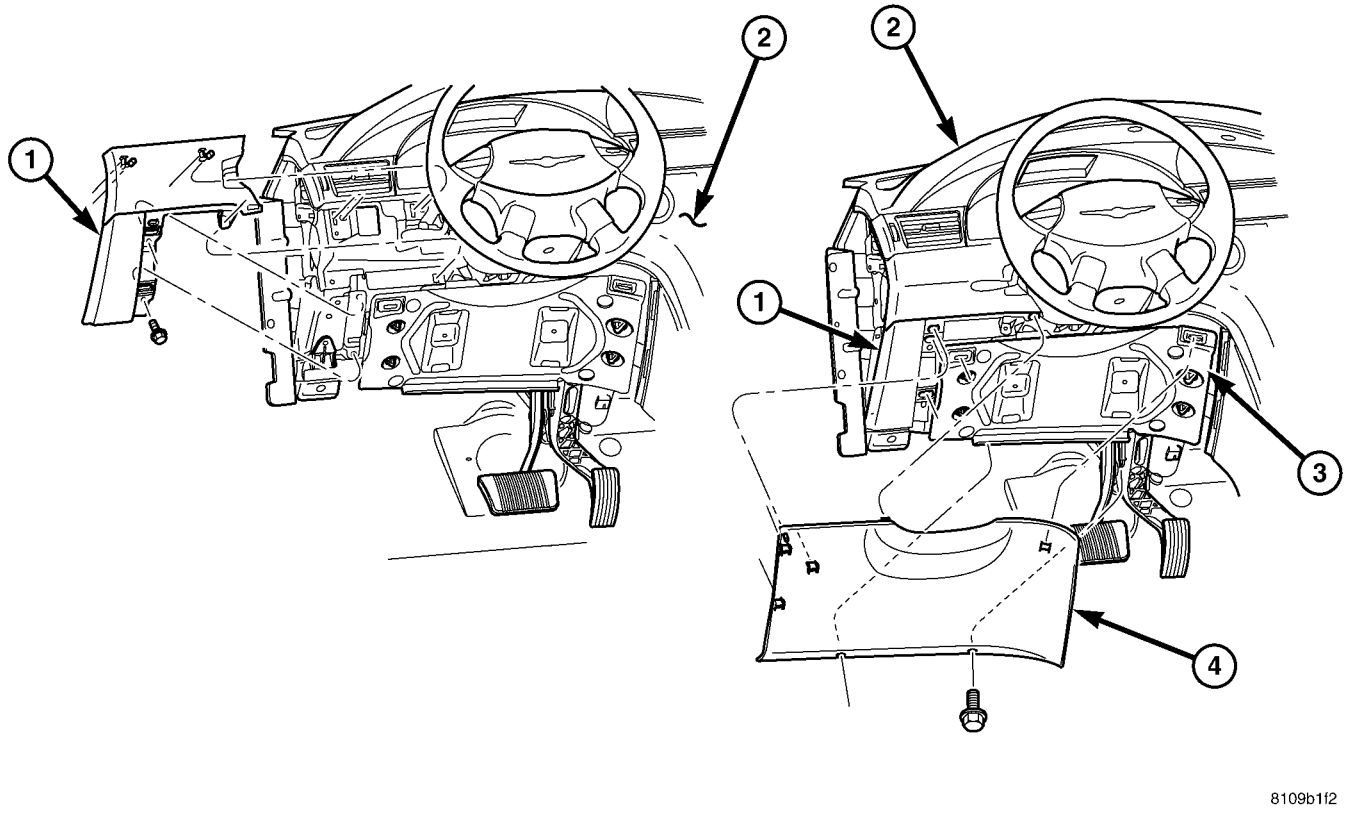


Fig. 28 INSTRUMENT PANEL TRIM - REMOVE/INSTALL

1 - LEFT INSTRUMENT PANEL TRIM
2 - INSTRUMENT PANEL ASSEMBLY
3 - KNEE BLOCKER AIRBAG
4 - INSTRUMENT PANEL STEERING COLUMN OUTER COVER

KNEE BLOCKER AIRBAG (Continued)

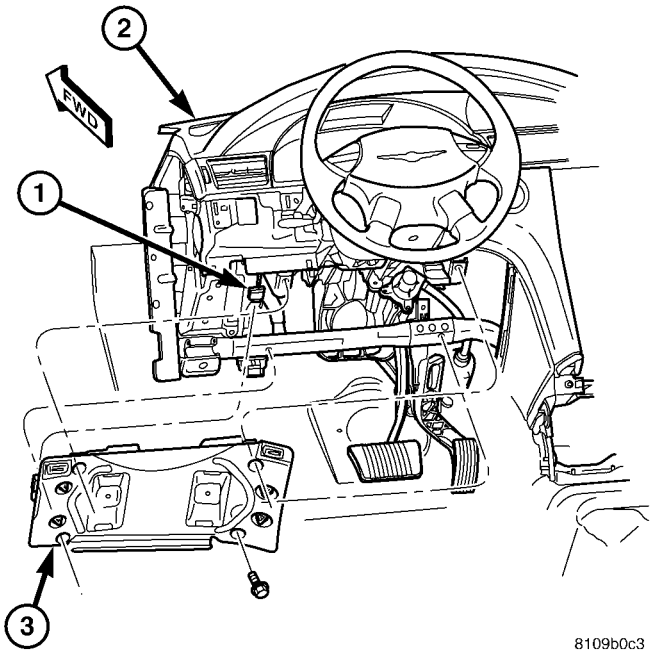


Fig. 29 KNEE BLOCKER AIRBAG - REMOVE/ INSTALL

1 - KNEE BLOCKER AIRBAG ELECTRICAL CONNECTOR
2 - INSTRUMENT PANEL ASSEMBLY
3 - KNEE BLOCKER AIRBAG

IMPACT SENSOR

DESCRIPTION

FRONT IMPACT SENSORS

There are two front impact sensors, one each for the left and right sides of the vehicle. These sensors are mounted remotely from the impact sensor that is internal to the Occupant Restraint Controller (ORC). The right and left front and side impact sensors are identical in construction and calibration and each front impact sensor is secured with two screws. The front impact sensors are secured with two screws to the outboard sides of the right and left vertical members of the radiator support within the engine compartment (Fig. 30).

The impact sensor housing has an integral connector receptacle and two integral mounting ears, each with a metal sleeve to provide crush protection. A cavity in the center of the molded black plastic impact sensor housing contains the electronic circuitry of the sensor which includes an electronic communication chip and an electronic impact sensor. Potting material fills the cavity to seal and protect the internal electronic circuitry and components. The front impact sensors are each connected to the vehicle electrical system through a dedicated take out and connector of the right or left headlamp and dash wire harnesses.

The front impact sensors cannot be repaired or adjusted and, if damaged or faulty, they must be replaced. If a front impact sensor is faulty, only the sensor needs to be replaced. If the sensor is damaged or faulty, or if proper tightening torque of the screws that secure the sensor to the bracket cannot be achieved, the sensor and bracket unit must be replaced. Refer to the proper Body Diagnostic Procedures manual for diagnosis and testing.

SIDE IMPACT SENSORS

Three side impact sensors are used on each side of the vehicle. These sensors are mounted remotely from the bi-directional safing sensor that is internal to the Occupant Restraint Controller (ORC). The side and front impact sensors are identical in construction and calibration and each impact sensor is secured with two screws. Each side impact sensor is secured with two screws. The first row side impact sensor is located in the B-pillar, just above the front seat belt retractor (Fig. 31). The second row side impact sensor is located in the C-pillar, just in front of the second row seat belt retractor (Fig. 32). The third row side impact sensor is located behind the quarter trim panel, above the rear tire wheel well, between the C and D-pillars (Fig. 33).

The impact sensor housing has an integral connector receptacle. A cavity in the center of the molded black plastic impact sensor housing contains the electronic circuitry of the sensor which includes an electronic communication chip and an electronic impact sensor. Potting material fills the cavity to seal and protect the internal electronic circuitry and components. The side impact sensors are each connected to the vehicle electrical system through a dedicated take out and connector of the airbag overlay wire harness.

The side impact sensors cannot be repaired or adjusted and, if damaged or faulty, they must be replaced. Refer to the proper Body Diagnostic Procedures manual for diagnosis and testing.

REMOVAL

FRONT IMPACT SENSOR

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove the headlamp unit of the side in which you are replacing the sensor (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

IMPACT SENSOR (Continued)

(4) Through the headlamp opening, remove the two mounting screws retaining the front impact sensor (Fig. 30).

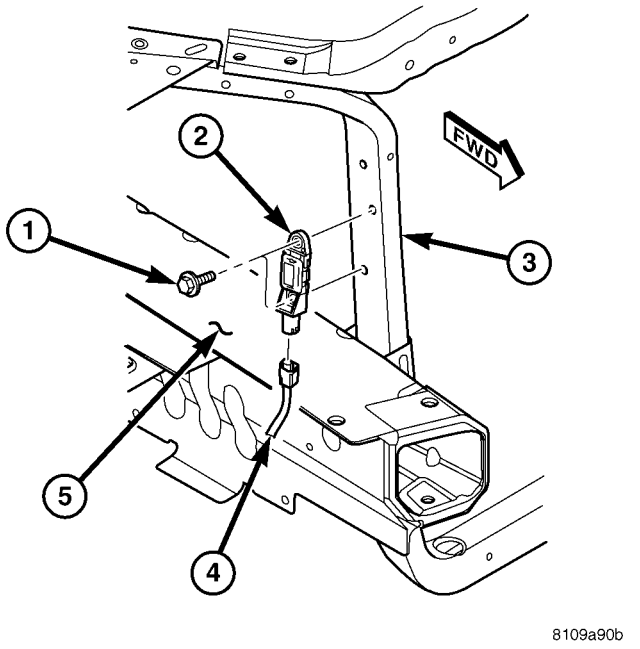


Fig. 30 FRONT IMPACT SENSOR - REMOVE/INSTALL

1 - FRONT IMPACT SENSOR RETAINING SCREWS
2 - FRONT IMPACT SENSOR
3 - CROSSMEMBER LOWER RADIATOR SUPPORT
4 - FRONT IMPACT SENSOR ELECTRICAL CONNECTOR
5 - FRAME RAIL RIGHT SIDE FRONT

(5) Disconnect electrical connector.
(6) Remove sensor from vehicle.

SIDE IMPACT SENSORS

B-PILLAR MOUNTED

(1) Open hood, disconnect and isolate the battery negative cable.
(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.
(3) Remove the B-pillar lower trim for the side of the vehicle that you are replacing the side impact sensor (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - REMOVAL).
(4) Remove the two retaining screws to the impact sensor (Fig. 31).
(5) Disconnect the electrical connector from the impact sensor and remove from vehicle (Fig. 31).

C-PILLAR MOUNTED

(1) Open hood, disconnect and isolate the battery negative cable.

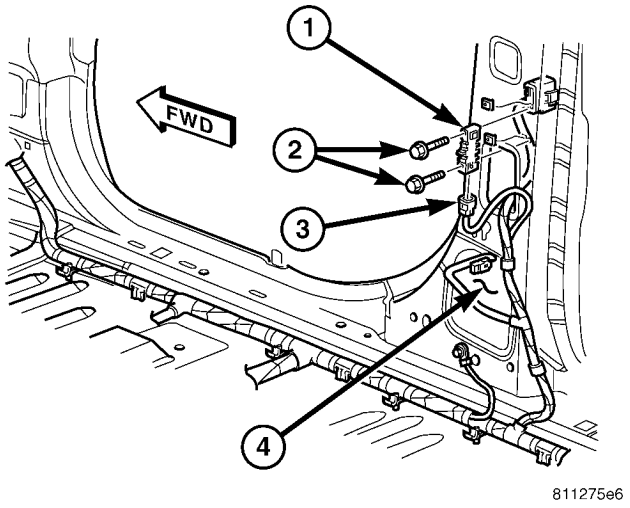


Fig. 31 FIRST ROW SIDE IMPACT SENSOR - REMOVE/INSTALL

1 - FIRST ROW SIDE IMPACT SENSOR
2 - SIDE IMPACT SENSOR MOUNTING SCREWS
3 - SIDE IMPACT SENSOR ELECTRICAL CONNECTOR
4 - B-PILLAR

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.
(3) Remove the quarter trim panel for the side of the vehicle that you are replacing the side impact sensor (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).
(4) Remove the two retaining screws to the impact sensor (Fig. 32).

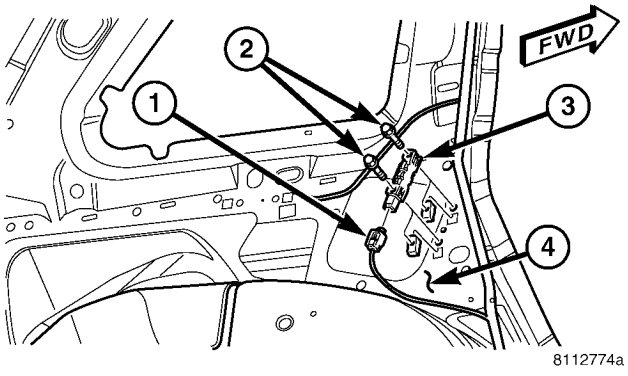


Fig. 32 SECOND ROW SIDE IMPACT SENSOR - REMOVE/INSTALL

1 - SIDE IMPACT SENSOR ELECTRICAL CONNECTOR
2 - SIDE IMPACT SENSOR MOUNTING SCREWS
3 - SECOND ROW SIDE IMPACT SENSOR
4 - C-PILLAR

(5) Disconnect the electrical connector from the impact sensor and remove from vehicle (Fig. 32).

IMPACT SENSOR (Continued)

QUARTER PANEL MOUNTED

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove the quarter trim panel for the side of the vehicle that you are replacing the side impact sensor (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).

(4) Remove the two retaining screws to the impact sensor (Fig. 33).

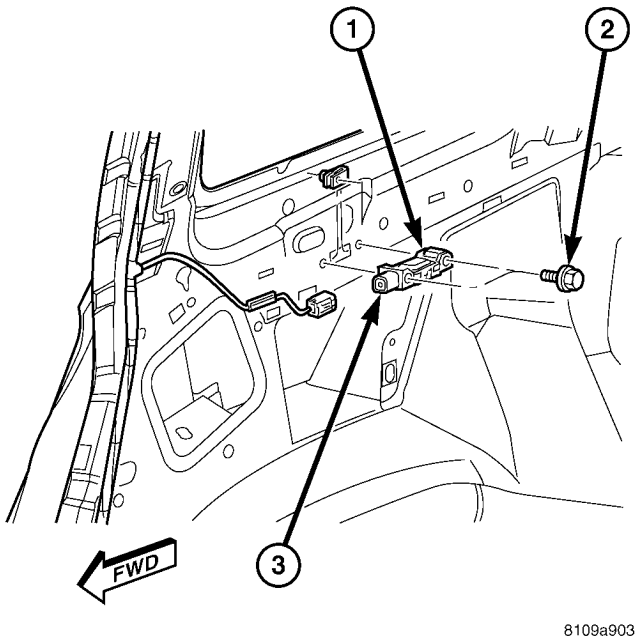


Fig. 33 THIRD ROW SIDE IMPACT SENSOR - REMOVE/INSTALL

1 - SIDE IMPACT SENSOR (QUARTER PANEL MOUNTED)
2 - SIDE IMPACT SENSOR (QUARTER PANEL MOUNTED) RETAINING SCREWS
3 - SIDE IMPACT SENSOR (QUARTER PANEL MOUNTED) ELECTRICAL CONNECTOR

(5) Disconnect the electrical connector from the impact sensor and remove from vehicle (Fig. 33).

INSTALLATION

FRONT IMPACT SENSOR

(1) Position sensor in vehicle.

(2) Connect electrical connector.

(3) Through the headlamp opening, install the two mounting screws retaining the front impact sensor (Fig. 30). Torque screws to 8.5 N·m (75 in. lbs.).

(4) Install the headlamp unit of the side in which you are replacing the sensor (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(5) Verify vehicle and system operation.

(6) Close hood.

SIDE IMPACT SENSORS

B-PILLAR MOUNTED

(1) Position sensor in vehicle.

(2) Connect the electrical connector (Fig. 31).

(3) Install the two retaining screws to the impact sensor (Fig. 31). Torque screws to 7 N·m (62 in. lbs.).

(4) Install the B-pillar lower trim for the side of the vehicle that you are replacing the side impact sensor (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(5) Verify vehicle and system operation.

(6) Close hood.

C-PILLAR MOUNTED

(1) Position sensor in vehicle.

(2) Connect the electrical connector (Fig. 32).

(3) Install the two retaining screws to the impact sensor (Fig. 32). Torque screws to 7.3 N·m (65 in. lbs.).

(4) Install the quarter trim panel for the side of the vehicle that you are replacing the side impact sensor (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(5) Verify vehicle and system operation.

(6) Close hood.

QUARTER PANEL MOUNTED

(1) Position sensor in vehicle.

(2) Connect electrical connector (Fig. 33).

IMPACT SENSOR (Continued)

(3) Install the two retaining screws to the impact sensor (Fig. 33). Torque screws to 7.3 N·m (65 in. lbs.).

(4) Install the quarter trim panel for the side of the vehicle that you are replacing the side impact sensor (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(5) Verify vehicle and system operation.

(6) Close hood.

OCCUPANT CLASSIFICATION MODULE

DESCRIPTION

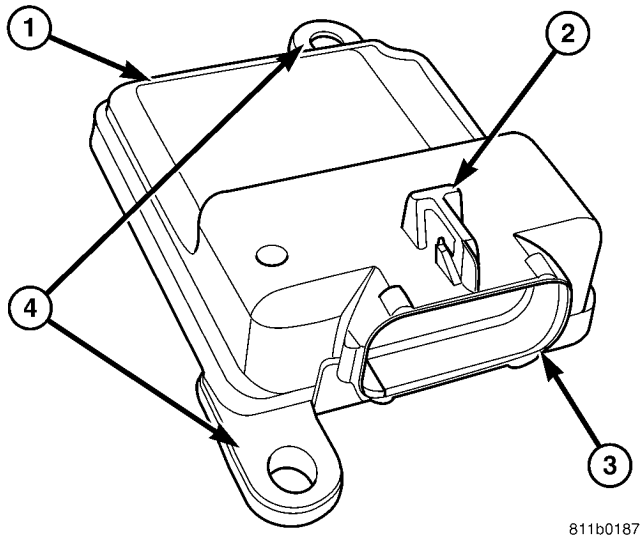


Fig. 34 OCCUPANT CLASSIFICATION MODULE (OCM) - TYPICAL

1 - OCCUPANT CLASSIFICATION MODULE
2 - CONNECTOR LOCK TOWER
3 - CONNECTOR RECEPTACLE
4 - MOUNTING TAB (2)

The Occupant Classification Module (OCM) (Fig. 34) is secured with two screws to a stamped steel mounting bracket welded onto the underside of the passenger front seat cushion frame near the inboard front corner (Fig. 35). Concealed within a hollow in the center of the molded plastic OCM housing is a microprocessor and the other electronic circuitry of the module. The module housing is sealed to enclose and protect the internal electronic circuitry. The OCM software is flash programmable.

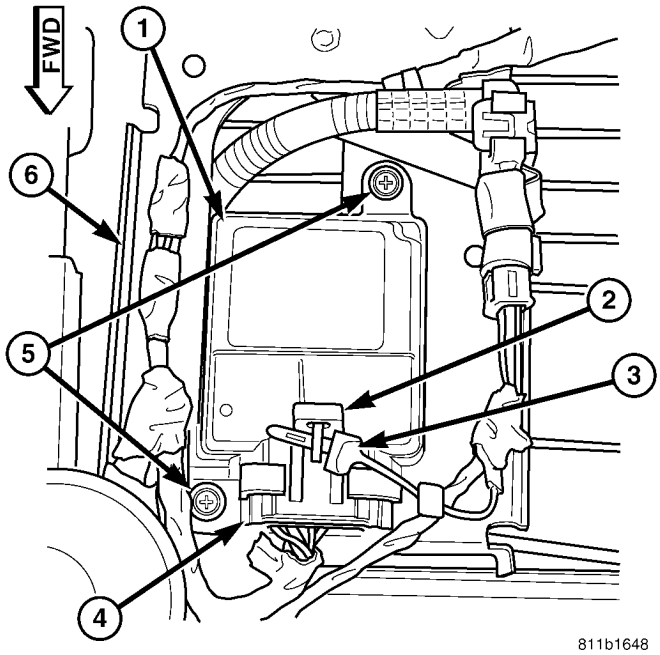


Fig. 35 OCM LOCATION

1 - OCCUPANT CLASSIFICATION MODULE (OCM)
2 - LOCK TOWER
3 - LOCK PIN
4 - CONNECTOR
5 - SCREW (2)
6 - BRACKET

A non-calibrated OCM is the only component of the Occupant Classification System (OCS) that is available for separate service replacement. The OCS components of the passenger side front seat cushion including the cushion frame, insulator pad, seat weight bladder and pressure sensor, seat cushion foam, wiring harness and the OCM are a factory-calibrated and assembled unit. Once this unit is connected to a vehicle electrically, the calibration settings are uploaded from the calibrated OCM and stored in the memory of the Occupant Restraint Controller (ORC). If only the OCM is subsequently replaced, the new, non-calibrated OCM learns the proper calibration settings from the ORC after it is connected to the vehicle electrically.

The OCM cannot be adjusted or repaired and, if damaged or faulty, it must be replaced. The components of the passenger front seat cushion are serviced only as a factory-calibrated, assembled and tamper-evident unit. Only the OCM and the seat cushion trim are available for separate service replacement. Once a service replacement package has been installed in a vehicle, the OCM can thereafter be serviced only by replacing the entire passenger

OCCUPANT CLASSIFICATION MODULE (Continued)

front seat cushion with another complete service replacement package.

OPERATION

The microprocessor in the Occupant Classification Module (OCM) contains the Occupant Classification System (OCS) logic circuits. The OCM uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with a scan tool using the Programmable Communications Interface (PCI) data bus network. This method of communication is also used for OCS diagnosis and testing through the 16-way Data Link Connector (DLC), located on the driver side lower edge of the instrument panel.

The OCM provides a nominal five volts to both the pressure sensor of the seat weight bladder beneath the passenger front seat cushion and to the belt tension sensor on the passenger front seat belt lower anchor. The OCM then monitors the return voltage from each of the sensors. The bladder pressure sensor input allows the OCM to determine whether the passenger front seat is occupied and the relative size of the occupant by providing a weight-sensing reference to the load on the seat cushion. The belt tension sensor provides an additional logic input to the OCM microprocessor that allows it to distinguish between the lower seat belt cinch loads of a belted occupant and the higher loads associated with a belted child seat.

Pre-programmed decision algorithms and OCS calibration allow the OCM microprocessor to determine when the seat cushion load as signaled by the bladder pressure sensor and the seat belt cinch load as signaled by the belt tension sensor indicate that passenger airbag protection is appropriate. When the programmed conditions are met, the OCM sends the proper electronic occupant classification messages over the PCI data bus to the Occupant Restraint Controller (ORC), and the ORC enables or disables the deployment circuits for the passenger front supplemental restraints. The ORC also provides a control output for the Passenger Airbag Disabled (PAD) indicator in the instrument panel center stack, based upon the electronic occupant classification messages it receives from the OCM.

The OCM microprocessor continuously monitors all of the OCS electrical circuits and components to determine the system readiness. If the OCM detects a monitored system fault, it sets an active and stored Diagnostic Trouble Code (DTC) and sends the appropriate electronic messages to the ORC over the PCI data bus. Then the ORC sets a DTC and sends messages to control the airbag indicator operation accordingly. An active fault only remains for the duration of the fault, or in some cases for the duration of the current ignition switch cycle, while a stored fault causes a DTC to be stored in memory by the OCM and the ORC. For some DTC's, if a fault does not recur for a number of ignition cycles, the OCM will automatically erase the stored DTC. For other internal faults, the stored DTC is latched forever.

The OCM receives battery current from an IPM high side driver (Run/Start). The OCM receives ground through a ground circuit of the body wire harness, which it shares with the ORC. These connections allow the OCM to be operational whenever the ignition switch is in the Start or ON positions.

To diagnose and test the OCS, use a scan tool and the appropriate diagnostic information.

REMOVAL

Once any of the original factory-installed components except the Occupant Classification Module (OCM) have been replaced with the service replacement package components, the OCM can only be serviced by replacing the entire passenger front seat cushion unit with another complete service replacement package (Refer to 23 - BODY/SEATS/SEAT CUSHION - FRONT - REMOVAL).

WARNING: Never replace both the Occupant Restraint Controller (ORC) and the Occupant Classification Module (OCM) at the same time. If both require replacement, replace one, then perform the Airbag System test (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) before replacing the other. Both the ORC and the OCM store Occupant Classification System (OCS) calibration data, which they transfer to one another when one of them is replaced. If both are replaced at the same time, an irreversible fault will be set in both modules and the OCS may malfunction and result in personal injury or death.

(1) Disconnect and isolate the battery negative cable.

WARNING: Wait two minutes for the airbag system reserve capacitor to discharge before beginning any airbag system or component service. Failure to do so may result in accidental airbag deployment, personal injury or death.

(2) Reach under the front edge of the passenger side front seat cushion to access and remove the lock pin from the connector lock tower on the Occupant Classification Module (OCM) (Fig. 36).

(3) Disconnect the passenger front seat wire harness connector for the OCM.

(4) Remove the two screws that secure the OCM to the OCM bracket.

OCCUPANT CLASSIFICATION MODULE (Continued)

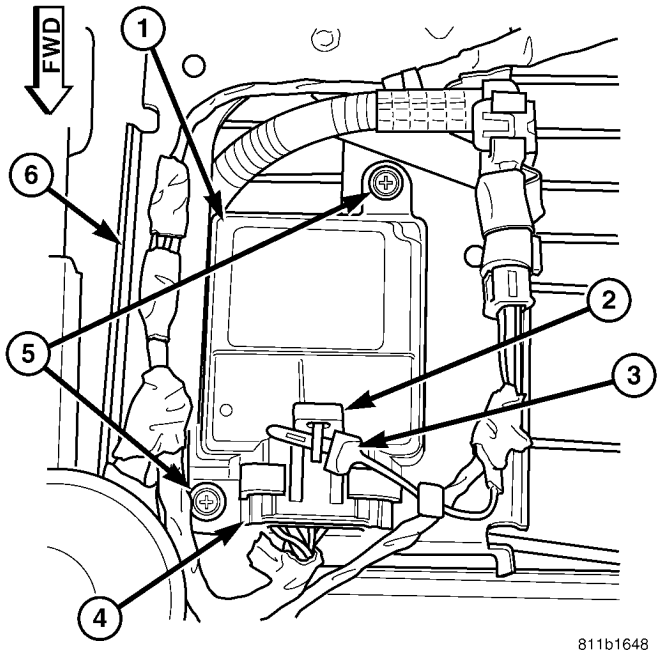


Fig. 36 OCM - REMOVE/INSTALL

1 - OCCUPANT CLASSIFICATION MODULE (OCM)
2 - LOCK TOWER
3 - LOCK PIN
4 - CONNECTOR
5 - SCREW (2)
6 - BRACKET

(5) Remove the OCM from under the passenger front seat.

INSTALLATION

WARNING: To avoid personal injury or death on vehicles equipped with the Occupant Classification System (OCS), only the Occupant Classification Module (OCM) and the seat cushion trim may be serviced separately. All other components of the passenger front seat cushion must be serviced only as a complete factory-calibrated, assembled and tamper-evident service replacement package.

Once any of the original factory-installed components except the OCM have been replaced with the service replacement package components, the OCM can only be serviced by replacing the entire passenger side front seat cushion unit with another complete service replacement package. (Refer to 23 - BODY/SEATS/SEAT CUSHION - FRONT - REMOVAL).

WARNING: Never replace both the Occupant Restraint Controller (ORC) and the Occupant Classification Module (OCM) at the same time. If both require replacement, replace one, then perform the Airbag System test (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) before replacing the other. Both the ORC and the OCM store Occupant Classification System (OCS) calibration data, which they transfer to one another when one of them is replaced. If both are replaced at the same time, an irreversible fault will be set in both modules and the OCS may malfunction may result in personal injury or death.

(1) Carefully position the Occupant Classification Module (OCM) to the OCM bracket (Fig. 36). When the OCM is correctly positioned, the connector on the module will be pointed to right side of the vehicle.

(2) Install the two screws to the OCM. Torque the screws to 2 N·m (20 in. lbs.).

(3) Connect the seat wire harness connector for the OCM. Be certain that the latches on the connector are each fully engaged.

(4) Install the lock pin into the connector lock tower on the OCM.

WARNING: Do not connect the battery negative cable (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM). Personal injury or death may result if the system test is not performed first.

WARNING: Following successful completion of the Airbag System test procedure, the Occupant Classification System Verification Test must be done using a scan tool and the appropriate diagnostic information.

(5) Verify vehicle and system operation.

(6) Close hood.

OCCUPANT RESTRAINT CONTROLLER

DESCRIPTION

The Occupant Restraint Controller (ORC) is also sometimes referred to as the Airbag Control Module (ACM) (Fig. 37). The ORC is concealed beneath the instrument panel center stack, just in front of the floor console, where it is secured by three screws to a stamped steel mounting bracket welded onto the top of the floor tunnel in the passenger compartment of the vehicle. Concealed within a hollow in the center of the die cast aluminum ORC housing is the electronic circuitry of the ORC which includes a microprocessor, an electronic impact sensor, an electronic safing sensor, and an energy storage capacitor. A stamped metal cover plate is secured to the bottom of the ORC housing with four screws to enclose and protect the internal electronic circuitry and components.

OCCUPANT RESTRAINT CONTROLLER (Continued)

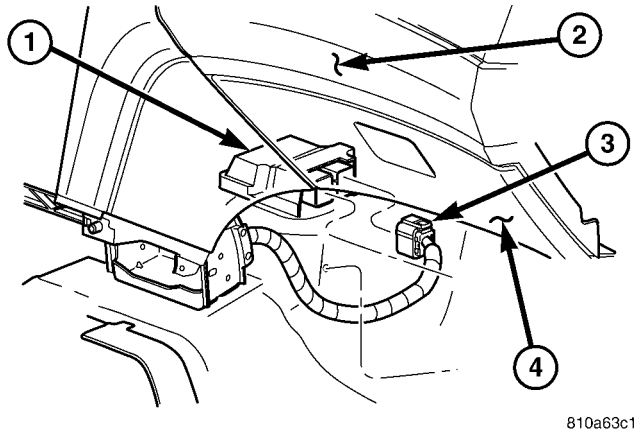


Fig. 37 ORC - LOCATION

1 - OCCUPANT RESTRAINT CONTROLLER (ORC)
2 - INSTRUMENT PANEL/PASSENGER AIRBAG
3 - ORC ELECTRICAL CONNECTORS
4 - GLOVE BOX ASSEMBLY

An arrow printed on the label on the top of the ORC housing provides a visual verification of the proper orientation of the unit, and should always be pointed toward the front of the vehicle. Two molded plastic electrical connector receptacles exit the right side of the ORC housing. These two receptacles connect the ORC to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness, and a dedicated take out and connector of the airbag overlay wire harness. The ORC contains a second bi-directional safing sensor for the curtain airbags.

The impact sensor and safing sensor internal to the ORC are calibrated for the specific vehicle, and are only serviced as a unit with the ORC. The ORC cannot be repaired or adjusted and, if damaged or faulty, it must be replaced. Refer to the proper Body Diagnostic Procedures manual for diagnosis and testing.

OPERATION

The microprocessor in the Occupant Restraint Controller (ORC) contains the supplemental restraint system logic circuits and controls all of the supplemental restraint system components. The ORC uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with the DRBIII® scan tool using the Programmable Communications Interface (PCI) data bus network. This method of communication is used for control of the airbag indicator in the Instrument Cluster and for supplemental restraint system diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel.

The ORC microprocessor continuously monitors all of the supplemental restraint system electrical circuits to determine the system readiness. If the ORC detects a monitored system fault, it sets an active and stored Diagnostic Trouble Code (DTC) and sends electronic messages to the cluster over the PCI data bus to turn on the airbag indicator. An active fault only remains for the duration of the fault or in some cases the duration of the current ignition switch cycle, while a stored fault causes a DTC to be stored in memory by the ORC. For some DTC's, if a fault does not recur for a number of ignition cycles, the ORC will automatically erase the stored DTC. For other internal faults, the stored DTC is latched forever.

The ORC receives battery current through two circuits; on a fused ignition switch output (RUN) circuit through a fuse in the Integrated Power Module (IPM), and on a fused ignition switch output (START/RUN) circuit through a second fuse in the IPM. The ORC is grounded through a ground circuit and take out of the instrument panel floor wire harness. These connections allow the ORC to be operational whenever the ignition switch is in the START or ON positions.

The ORC also contains an energy-storage capacitor. When the ignition switch is in the START or ON positions, this capacitor is continually being charged with enough electrical energy to deploy the supplemental restraint components for up to one second following a battery disconnect or failure. The purpose of the capacitor is to provide backup supplemental restraint system protection in case there is a loss of battery current supply to the ORC during an impact.

Two sensors are contained within the ORC, an electronic impact sensor and a safing sensor. The ORC also monitors inputs from two remote front impact sensors located on brackets on the outboard sides of the right and left vertical members of the radiator support near the front of the vehicle. The electronic impact sensors are accelerometers that sense the rate of vehicle deceleration, which provide verification of the direction and severity of an impact. The ORC also monitors inputs from six additional remote side impact sensors, located in the B and C-pillars and over the rear wheelhouse, to control the deployment of the curtain airbag units.

The safing sensor is an electronic accelerometer sensor within the ORC that provides an additional logic input to the ORC microprocessor. The safing sensor is used to verify the need for a supplemental restraint deployment by detecting impact energy of a lesser magnitude than that of the primary electronic impact sensors, and must exceed a safing threshold in order for the airbags to deploy. Because of the side curtain airbags feature, a second safing sensor within

OCCUPANT RESTRAINT CONTROLLER (Continued)

the ORC is to provide confirmation to the ORC of side impact forces. This second safing sensor is a bi-directional unit that detects impact forces from either side of the vehicle.

Pre-programmed decision algorithms in the ORC microprocessor determine when the deceleration rate as signaled by the impact sensors and the safing sensors indicate an impact that is severe enough to require supplemental restraint system protection and, based upon the severity of the monitored impact, determines the level of front airbag deployment force required for each front seating position. When the programmed conditions are met, the ORC sends the proper electrical signals to deploy the dual multistage front airbags at the programmed force levels and; if the vehicle is so equipped, knee blocker airbag, and the front seat belt tensioners and either curtain airbag.

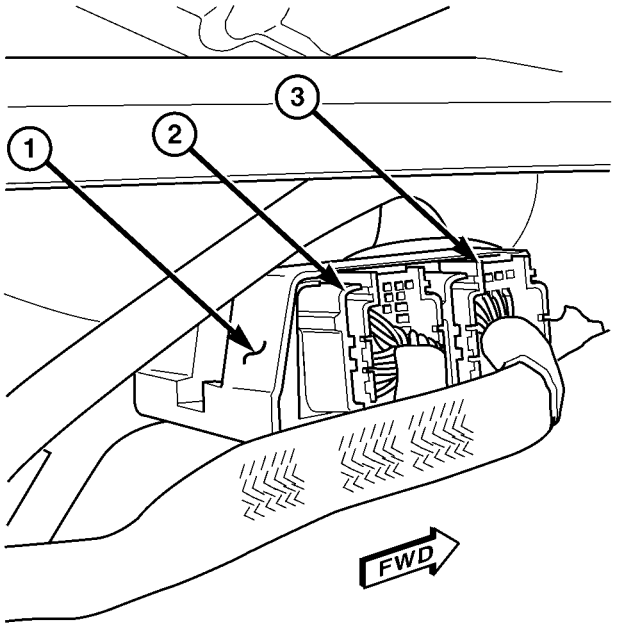


Fig. 39 ORC CONNECTORS

1 - OCCUPANT RESTRAINT CONTROLLER (ORC)
2 - BODY HARNESS ORC CONNECTOR
3 - INSTRUMENT PANEL HARNESS ORC CONNECTOR

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove the left and right forward console closeout panels (Fig. 38).

(4) From the right side of the vehicle, disconnect the two ORC electrical connectors (Fig. 39).

(5) Remove the three retaining screws to the ORC. One on the left side of the floor tunnel, and one in front of (toward bulkhead) and behind (toward vehicle rear) the ORC unit (Fig. 40).

(6) Remove ORC from vehicle.

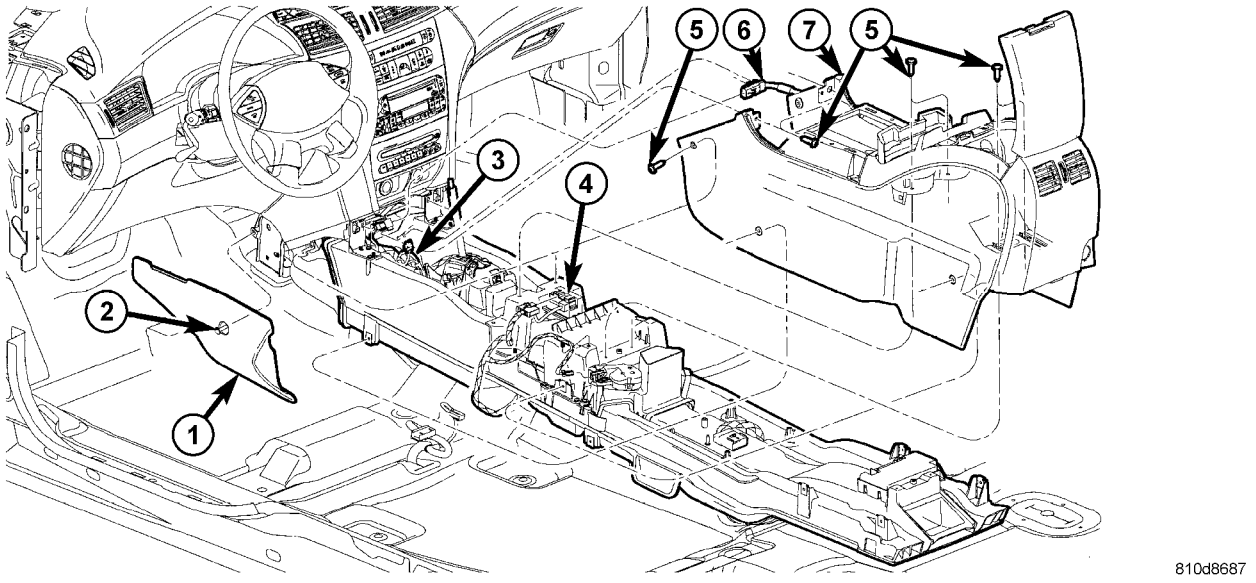


Fig. 38 FRONT FLOOR CONSOLE

1 - FORWARD CONSOLE CLOSEOUT PANEL
2 - CLOSEOUT PANEL PUSH PIN RETAINER
3 - INSTRUMENT PANEL WIRING
4 - FLOOR CONSOLE BASE
5 - FRONT FLOOR CONSOLE ATTACHING SCREWS TO BASE
6 - FRONT FLOOR CONSOLE WIRING CONNECTOR
7 - FRONT FLOOR CONSOLE

OCCUPANT RESTRAINT CONTROLLER (Continued)

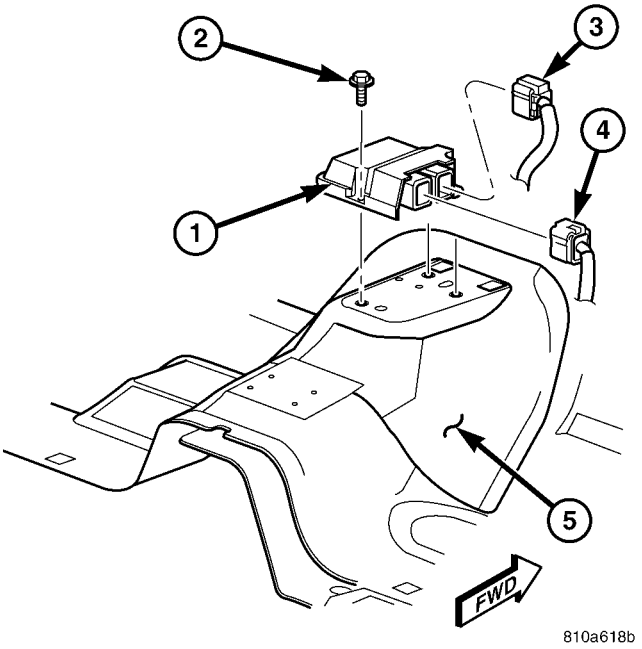


Fig. 40 ORC - REMOVE/INSTALL

1 - OCCUPANT RESTRAINT CONTROLLER (ORC)
2 - ORC RETAINING SCREWS (3)
3 - INSTRUMENT PANEL HARNESS ORC CONNECTOR
4 - BODY HARNESS ORC CONNECTOR
5 - FLOOR TUNNEL

INSTALLATION

(1) Position ORC in vehicle.

(2) Install the three retaining screws to the ORC. One on the left side of the floor tunnel, and one in front of (toward bulkhead) and behind (toward vehicle rear) the ORC unit (Fig. 40). Torque screws to 14.5 N·m (128 in. lbs.).

(3) From the right side of the vehicle, connect the two ORC electrical connectors (Fig. 39).

(4) Install the left and right forward console closeout panels (Fig. 38).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(5) Verify vehicle and system operation.

(6) Close hood.

PASSENGER AIRBAG DISABLED INDICATOR

DESCRIPTION

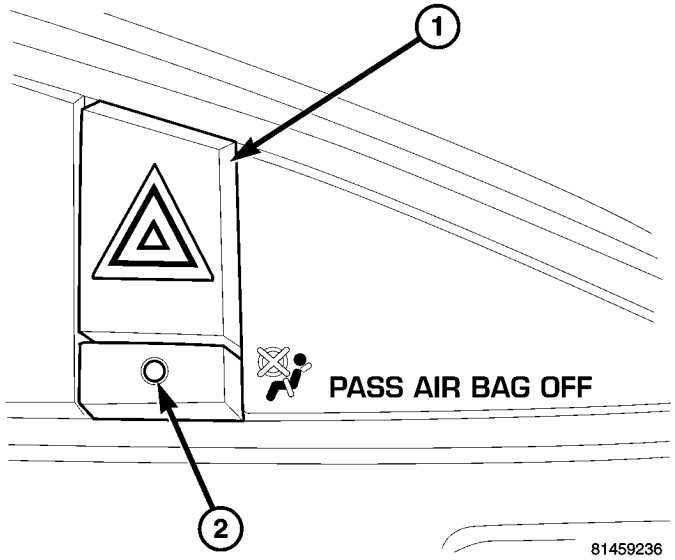


Fig. 41 PASSENGER AIRBAG DISABLED (PAD) INDICATOR

1 - HAZARD SWITCH
2 - PAD INDICATOR

Vehicles equipped with the Occupant Classification System (OCS) include a Passenger Airbag Disabled (PAD) indicator (Fig. 41) which is located in the instrument panel switch pod, just to the right of the cluster, clock, navigation and EVIC buttons. The PAD indicator is present only in vehicles equipped with the OCS. The PAD indicator is an amber Light Emitting Diode (LED) that is only serviced with the instrument panel switch pod.

OPERATION

In vehicles equipped with the Occupant Classification System (OCS), the Passenger Airbag Disabled (PAD) indicator gives an indication when the passenger airbag and seat belt tensioner deployment circuits are disabled by the Occupant Restraint Controller (ORC). The PAD indicator is controlled by a transistor within the ORC through a hard wired output based upon ORC programming and electronic occupant classification messages received by the ORC over the Programmable Communications Interface (PCI) data bus from the Occupant Classification Module (OCM). The PAD indicator Light Emitting Diode (LED) is completely controlled by the ORC. The LED receives a battery current input on the fused ignition switch output (RUN/START) circuit. Therefore, the LED will always be OFF when the

PASSENGER AIRBAG DISABLED INDICATOR (Continued)

ignition switch is in any position except ON or START. The LED only illuminates when it is provided a path to ground by the ORC transistor. The ORC will turn on the PAD indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the ON position the PAD indicator is illuminated for about six seconds.
- **Child Seat Detected Occupant Classification Message** - Each time the ORC receives a message from the OCM indicating a child seat has been detected in the passenger front seat, the passenger airbag and seat belt tensioner deployment circuits are deactivated and the PAD indicator will be illuminated. The indicator remains illuminated until the ORC receives an occupant classification message indicating that:
  - The passenger front seat is empty.
  - The seat is occupied by a load equal to or greater than a fifth percentile female.
  - **OR,** Until the ignition switch is turned to the OFF position, whichever of these three occurs first.
- **Load Less Than Fifth Percentile Female Occupant Classification Message** - Each time the ORC receives a message from the OCM indicating that a load less than a fifth percentile female has been detected in the passenger front seat, the passenger airbag and seat belt tensioner deployment circuits are deactivated and the PAD indicator will be illuminated. The indicator remains illuminated until:
  - The ORC receives an occupant classification message indicating that the passenger front seat is empty.
  - The seat is occupied by a load equal to or greater than a fifth percentile female.
  - **OR**, until the ignition switch is turned to the OFF position, whichever of these three occurs first.
- **Load Undetermined Occupant Classification Message** - Each time the ORC receives a message from the OCM indicating that a load cannot be determined in the passenger front seat, the passenger airbag and seat belt tensioner deployment circuits are deactivated and the PAD indicator will be illuminated. The indicator remains illuminated until:
  - The ORC receives an occupant classification message indicating that the passenger front seat is empty.
  - The seat is occupied by a load equal to or greater than a fifth percentile female.
  - **OR**, until the ignition switch is turned to the OFF position, whichever of these three occurs first.
- **Communication Error** - If the ORC receives invalid occupant classification messages or no messages from the OCM, the PAD indicator is illuminated. The indicator remains illuminated until:
  - The ORC receives an occupant classification message indicating that the passenger front seat is empty.
  - The seat is occupied by a load equal to or greater than a fifth percentile female.
  - **OR**, until the ignition switch is turned to the OFF position, whichever of these three occurs first.

The ORC continually monitors the occupant classification messages from the OCM to decide whether the passenger airbag and seat belt tensioner deployment circuits should be activated or deactivated. Note that there may be several seconds of delay between changes in the detected occupant status and PAD indications. This is a programmed feature of the OCM used to prevent a flashing indicator condition resulting from the normal shifting of occupant weight on the passenger seat cushion. The ORC then provides the proper control output to turn the PAD indicator ON or OFF.

The ORC will store a Diagnostic Trouble Code (DTC) for any malfunction it detects. For proper diagnosis of the OCM, the ORC, the PCI data bus, or the electronic message inputs to the ORC that control the PAD indicator, use a scan tool and the appropriate diagnostic information.

PASSENGER AIRBAG

DESCRIPTION

The rearward facing surface of the instrument panel top pad above the glove box is the most visible part of the passenger airbag (Fig. 3). The passenger airbag door is concealed behind the instrument panel top pad and above the glove box opening on the instrument panel in front of the front seat passenger (Fig. 42). The passenger airbag door is secured on the back of the instrument panel top pad armature.

Located behind the passenger airbag door is the passenger airbag (Fig. 43). The passenger airbag is secured by a screw on each side to the instrument panel structural duct and two screws to the crosscar beam. A short four-wire pigtail harness with a keyed, yellow connector insulator connects the two inflator initiators to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness.

The passenger airbag is a multistage airbag. It consists of a magnesium housing, the rectangular fabric airbag cushion, and the airbag inflator. The airbag housing contains the airbag inflator, while the inner cover contains the folded airbag cushion. The inner cover completely encloses the airbag cushion and is permanently retained to the housing. The airbag cushion is constructed of a nylon fabric. The air-

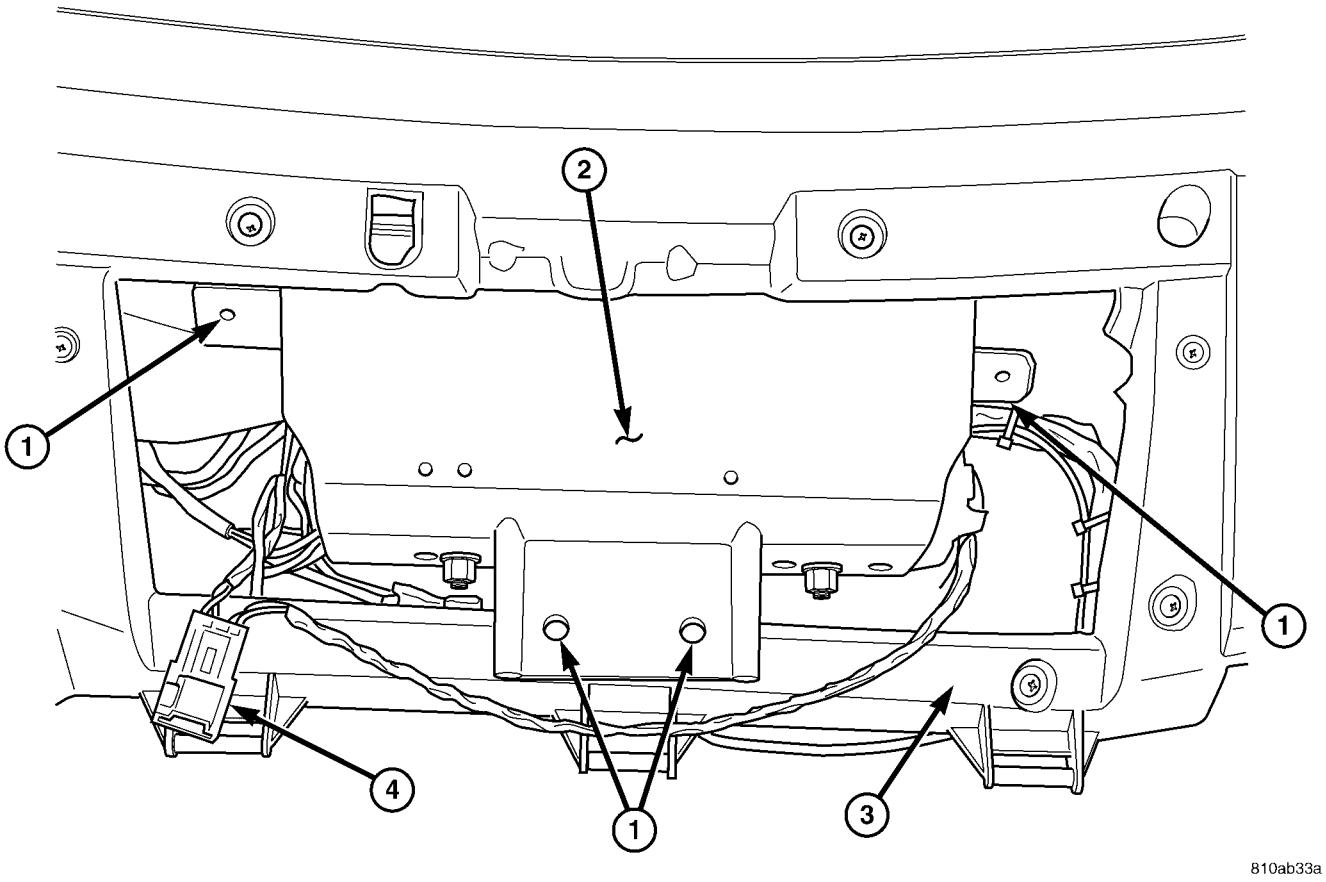


Fig. 42 PASSENGER AIRBAG - LOCATION

1 - PASSENGER AIRBAG ATTACHMENT POINTS
2 - PASSENGER AIRBAG
3 - INSTRUMENT PANEL/GLOVE BOX OPENING
4 - PASSENGER AIRBAG CONNECTOR

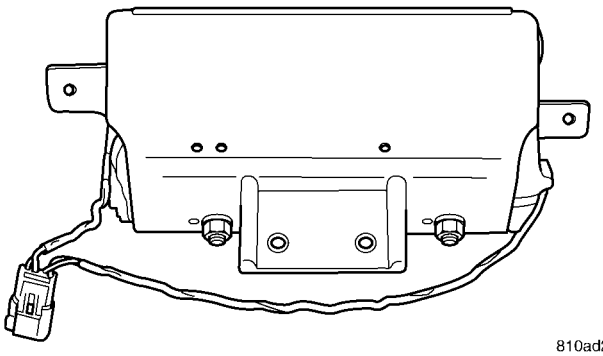


Fig. 43 PASSENGER AIRBAG

bag inflator is a dual-initiator, hybrid-type unit that is secured to and sealed within the airbag housing.

The passenger airbag cannot be repaired, and must be replaced if deployed, faulty, or in any way damaged. The passenger airbag door is serviced only as a unit with the instrument panel. If the passenger airbag is deployed, the instrument panel must also be replaced. Refer to the proper Body Diagnostic Procedures manual for diagnosis and testing.

OPERATION

The multistage passenger airbag is deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the passenger airbag squib 1 and squib 2 circuits to the two initiators in the airbag inflator. By using two initiators, the airbag will have multiple deployment levels. The deployment level is controlled by the ORC to suit the monitored impact conditions by providing one of four delay intervals between the electrical signals provided to the two initiators. The longer the delay between these signals, the deployment level will be less.

The hybrid-type inflator assembly includes a small canister of highly compressed gas. When the ORC sends the proper electrical signal to the airbag initiator, the initiator generates enough heat to ignite

PASSENGER AIRBAG (Continued)

chemical pellets within the inflator. Once ignited, these chemical pellets burn rapidly and produce the pressure necessary to rupture a containment disk in the pressurized gas canister. The inflator and gas canister are sealed to the airbag cushion so that all of the released inert gas is directed into the airbag cushion, causing the cushion to inflate. As the cushion inflates, the passenger airbag door will bend back the instrument panel top pad at the predetermined hinge line, then fold back over the top of the instrument panel and out of the way. Following a passenger airbag deployment, the airbag cushion quickly deflates by venting the inert gas through vent holes within the fabric used to construct the sides of the airbag cushion.

Some of the chemicals used to create the inert gas may be considered hazardous while in their solid state before they are burned, but they are securely sealed within the airbag inflator. Typically, both initiators are used and all potentially hazardous chemicals are burned during an airbag deployment event.

The inert gas that is produced when the chemicals are burned is harmless. However, a small amount of residue from the burned chemicals may cause some temporary discomfort if it contacts the skin, eyes, or breathing passages. If skin or eye irritation is noted, rinse the affected area with plenty of cool, clean water. If breathing passages are irritated, move to another area where there is plenty of clean, fresh air to breath. If the irritation is not alleviated by these actions, contact a physician.

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove the glove box assembly (Refer to 23 - BODY/INSTRUMENT PANEL/GLOVE BOX - REMOVAL).

(4) Using a long screwdriver or equivalent, reach up on both sides of the passenger airbag to remove the screws that secure it to the instrument panel pad and door (Fig. 42).

(5) Remove the two lower screws attaching the passenger airbag to the crosscar beam (Fig. 42).

(6) Disconnect the passenger airbag electrical connector (Fig. 42) located on the inboard side of the passenger airbag, attached to the instrument panel steel reinforcement.

(7) Pull the passenger airbag rearward and down. Maneuver it enough to clear all obstacles and remove through the glove box opening (Fig. 42).

INSTALLATION

(1) Position the passenger airbag in the glove box opening and maneuver it enough to clear all obstacles and push it up into the opening in the instrument panel (Fig. 42). Once it is far enough up in the instrument panel it should rest on the crosscar beam.

(2) Using a long screwdriver or equivalent, reach up on both sides of the passenger airbag to install the screws that secure the passenger airbag to the instrument panel pad and door (Fig. 42). Torque screws to 2.5 ± .5 N·m (24 ± 5 in. lbs.).

(3) Connect the passenger airbag electrical connector (Fig. 42) located on the inboard side of the passenger airbag, attached to the instrument panel steel reinforcement.

(4) Install the two lower screws attaching the passenger airbag to the crosscar beam (Fig. 42). Torque screws to 10 ± 2 N·m (90 ± 15 in. lbs.).

(5) Install the glove box assembly (Refer to 23 - BODY/INSTRUMENT PANEL/GLOVE BOX - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(6) Verify vehicle and system operation.

(7) Close hood.

SEAT BELT & RETRACTOR

REMOVAL

SEAT BELT WEB STOP BUTTON

The only component of the seat belt and retractor that is available for individual service replacement is the plastic web stop button that prevents the latch plate from falling to the floor while in the stored position. Refer to the instructions supplied with the service kit for the proper web stop button replacement procedures.

SEAT BELT AND RETRACTOR - FRONT

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove lower seat belt anchor bolt cover and lower seat belt anchor bolt from lower B-pillar (Fig. 44).

SEAT BELT & RETRACTOR (Continued)

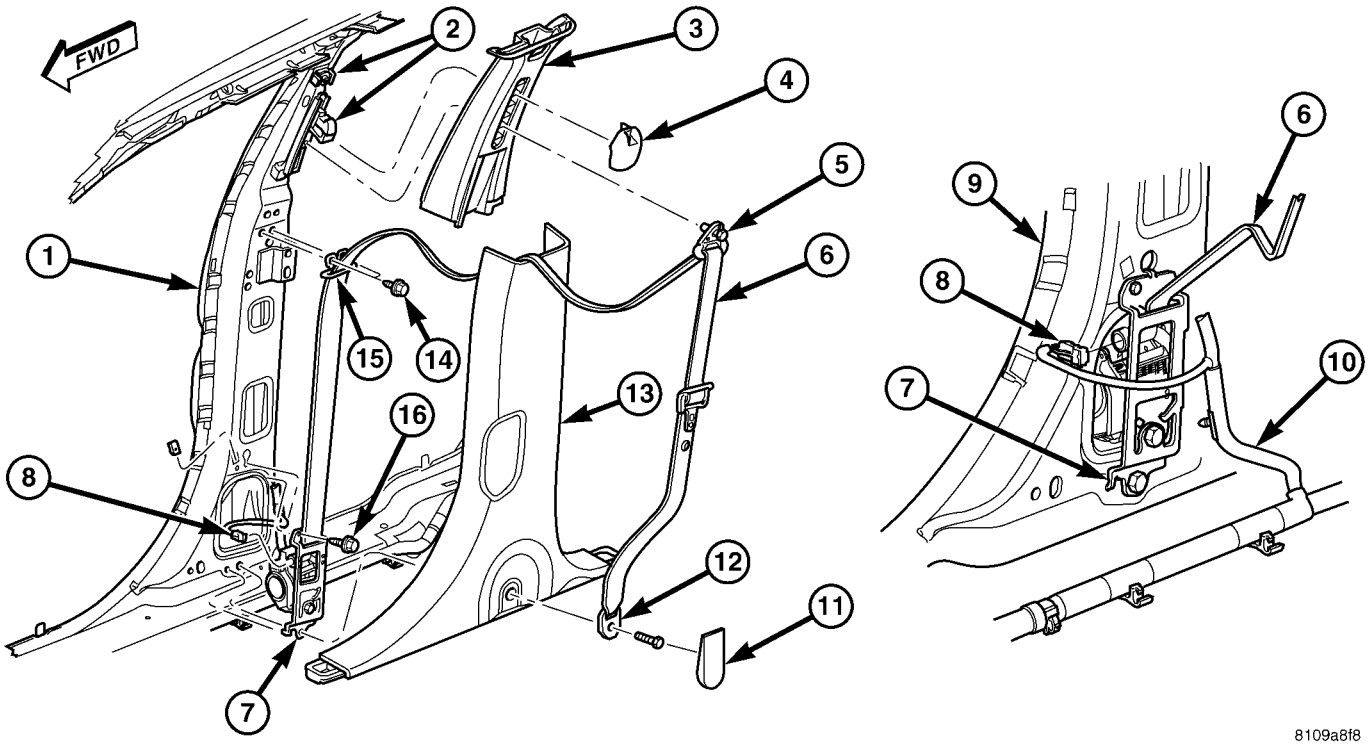


Fig. 44 SEAT BELT & RETRACTOR - FRONT - REMOVE/INSTALL

1 - B-PILLAR
2 - FRONT SEAT BELT HEIGHT ADJUSTER
3 - UPPER B-PILLAR
4 - SEAT BELT HEIGHT ADJUSTER KNOB COVER
5 - SEAT BELT TURNING LOOP
6 - SEAT BELT WEBBING
7 - SEAT BELT AND RETRACTOR - FRONT ASSEMBLY
8 - SEAT BELT AND RETRACTOR - FRONT ELECTRICAL CONNECTOR
9 - B-PILLAR
10 - BODY WIRING HARNESS
11 - SEAT BELT LOWER ANCHOR BOLT COVER
12 - SEAT BELT LOWER ANCHOR BRACKET
13 - LOWER B-PILLAR TRIM
14 - SEAT BELT B-PILLAR RETAINING RING SCREWS
15 - SEAT BELT B-PILLAR RETAINING RING
16 - SEAT BELT RETRACTOR -FRONT MOUNTING BOLTS

(4) If equipped with Occupant Classification System (OCS), there will be a harness pigtail attached to the lower anchor bolt (Fig. 45). Take care not to damage this while removing the lower B-pillar trim.

(5) Remove the lower B-pillar trim (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - REMOVAL).

(6) Disconnect the retractor electrical connector (Fig. 44).

(7) Remove the two B-pillar seat belt retaining ring mounting screws and then retaining ring from seat belt webbing (Fig. 44).

(8) Remove the two seat belt retractor mounting bolts (Fig. 44).

(9) Grasp the height adjuster knob cover and gently pull inward, separating it from the seat belt height adjuster.

(10) Remove the turning loop retaining bolt from the seat belt height adjuster (Fig. 44).

(11) Remove seat belt and retractor from vehicle.

SEAT BELT AND RETRACTOR - SECOND ROW

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove the second and third row seats from side of vehicle that the seat belt and retractor are being serviced.

(4) Remove second and third row lower seat belt anchor bolt covers and lower seat belt anchor bolts from the lower quarter trim panel at the C (Fig. 46) and D-pillars (Fig. 47).

(5) Remove lower quarter trim panel (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).

(6) Remove the two seat belt retractor mounting bolts (Fig. 46).

(7) Remove the turning loop cover and retaining bolt from the upper quarter panel (Fig. 46).

(8) Remove seat belt and retractor from vehicle.

SEAT BELT & RETRACTOR (Continued)

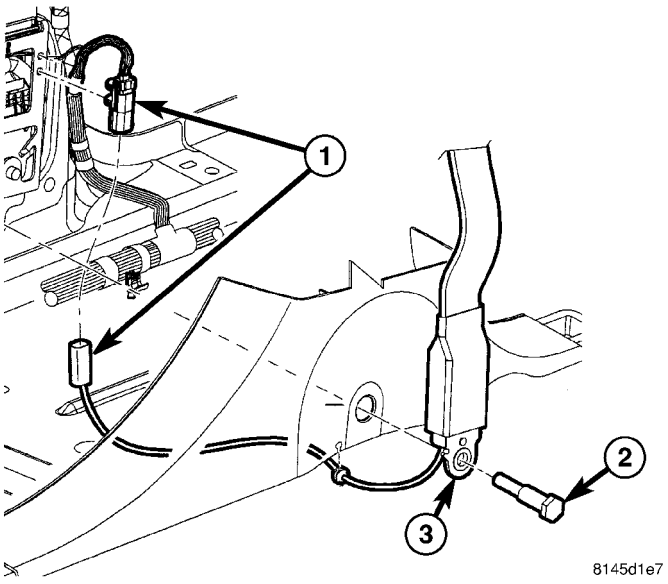


Fig. 45 SEAT BELT TENSION SENSOR/LOWER ANCHOR BOLT

1 - ELECTRICAL CONNECTOR
2 - LOWER SEAT BELT ANCHOR BOLT
3 - SEAT BELT TENSION SENSOR

SEAT BELT AND RETRACTOR - THIRD ROW

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove the second and third row seats from side of vehicle that the seat belt and retractor are being serviced.

(4) Remove second and third row lower seat belt anchor bolt covers and lower seat belt anchor bolts from the lower quarter trim panel at the C (Fig. 46) and D-pillars (Fig. 47).

(5) Remove lower quarter trim panel (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).

(6) Remove the upper D-pillar trim (Refer to 23 - BODY/INTERIOR/D-PILLAR TRIM - REMOVAL).

(7) Remove the two B-pillar seat belt retaining ring mounting screws and then retaining ring from seat belt webbing (Fig. 47).

(8) Remove the two seat belt retractor mounting bolts (Fig. 47).

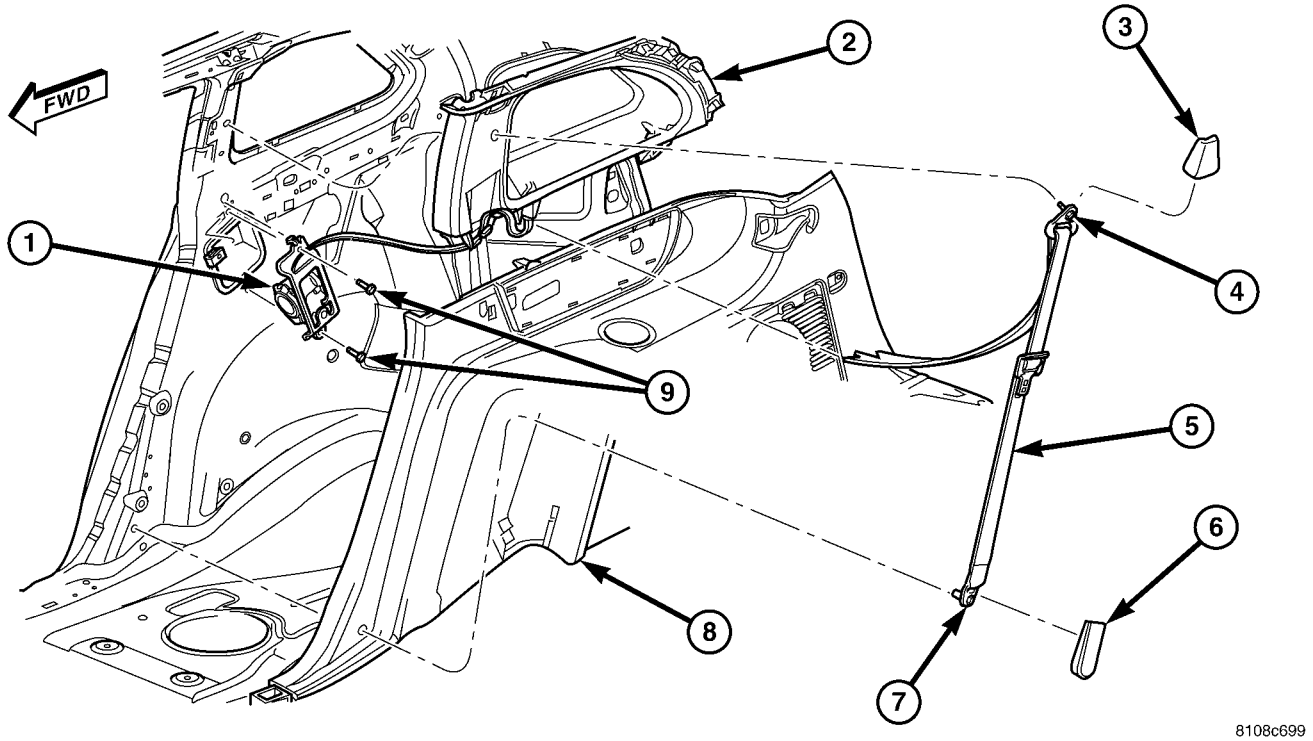


Fig. 46 SEAT BELT & RETRACTOR - 2ND ROW - REMOVE/INSTALL

1 - SEAT BELT RETRACTOR - SECOND ROW
2 - UPPER QUARTER TRIM PANEL
3 - SEAT BELT - SECOND ROW TURNING LOOP COVER
4 - SEAT BELT - SECOND ROW TURNING LOOP AND BOLT
5 - SEAT BELT WEBBING
6 - SEAT BELT - SECOND ROW LOWER ANCHOR COVER
7 - SEAT BELT - SECOND ROW LOWER ANCHOR BOLT
8 - QUARTER TRIM PANEL
9 - SEAT BELT RETRACTOR - SECOND ROW MOUNTING BOLTS

SEAT BELT & RETRACTOR (Continued)

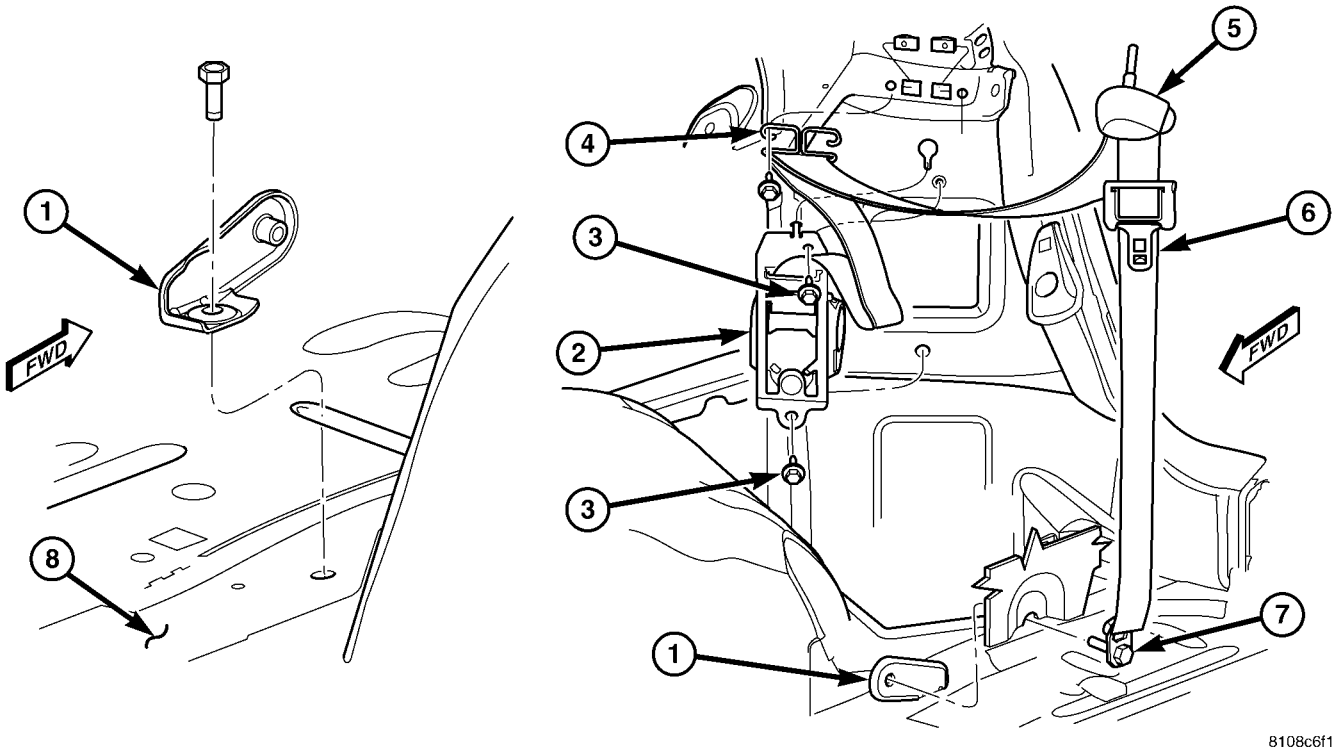


Fig. 47 SEAT BELT & RETRACTOR - 3RD ROW - REMOVE/INSTALL

1 - SEAT BELT - THIRD ROW LOWER ANCHOR BRACKET
2 - SEAT BELT RETRACTOR - THIRD ROW
3 - SEAT BELT RETRACTOR - THIRD ROW MOUNTING BOLTS
4 - SEAT BELT D-PILLAR RETAINING RING
5 - SEAT BELT TURNING LOOP, BOLT, AND COVER
6 - SEAT BELT WEBBING
7 - SEAT BELT - THIRD ROW ANCHOR BOLT
8 - LOWER QUARTER PANEL

(9) Remove the turning loop cover and bolt from D-pillar (Fig. 48).

(10) Remove seat belt and retractor from vehicle.

INSTALLATION

SEAT BELT WEB STOP BUTTON

The only component of the seat belt and retractor that is available for individual service replacement is the plastic web stop button that prevents the latch plate from falling to the floor while in the stored position. Refer to the instructions supplied with the service kit for the proper web stop button replacement procedures.

SEAT BELT AND RETRACTOR - FRONT

(1) Position seat belt and retractor in vehicle.

(2) Install the turning loop retaining bolt in the seat belt height adjuster (Fig. 44). Torque bolt to 40 N·m (30 ft. lbs.) and install seat belt turning loop cover.

(3) Position the height adjuster knob cover onto the height adjuster knob and firmly snap into place.

(4) Install the two seat belt retractor mounting bolts (Fig. 44). Torque bolts to 40 N·m (30 ft. lbs.).

(5) Slip the B-pillar seat belt retaining ring onto the seat belt webbing and then install the two B-pillar seat belt retaining ring mounting screws (Fig. 44).

(6) Connect the retractor electrical connector (Fig. 44).

(7) If equipped with Occupant Classification System (OCS), connect the harness connector to the belt tension sensor prior to installing the B-pillar trim (Fig. 45).

(8) Install the lower B-pillar trim (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION).

(9) Install the lower seat belt anchor bolt and lower seat belt anchor bolt cover through lower B-pillar (Fig. 44). Torque bolt to 40 N·m (30 ft. lbs.).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

(10) Verify vehicle and system operation.

(11) Close hood.

SEAT BELT & RETRACTOR (Continued)

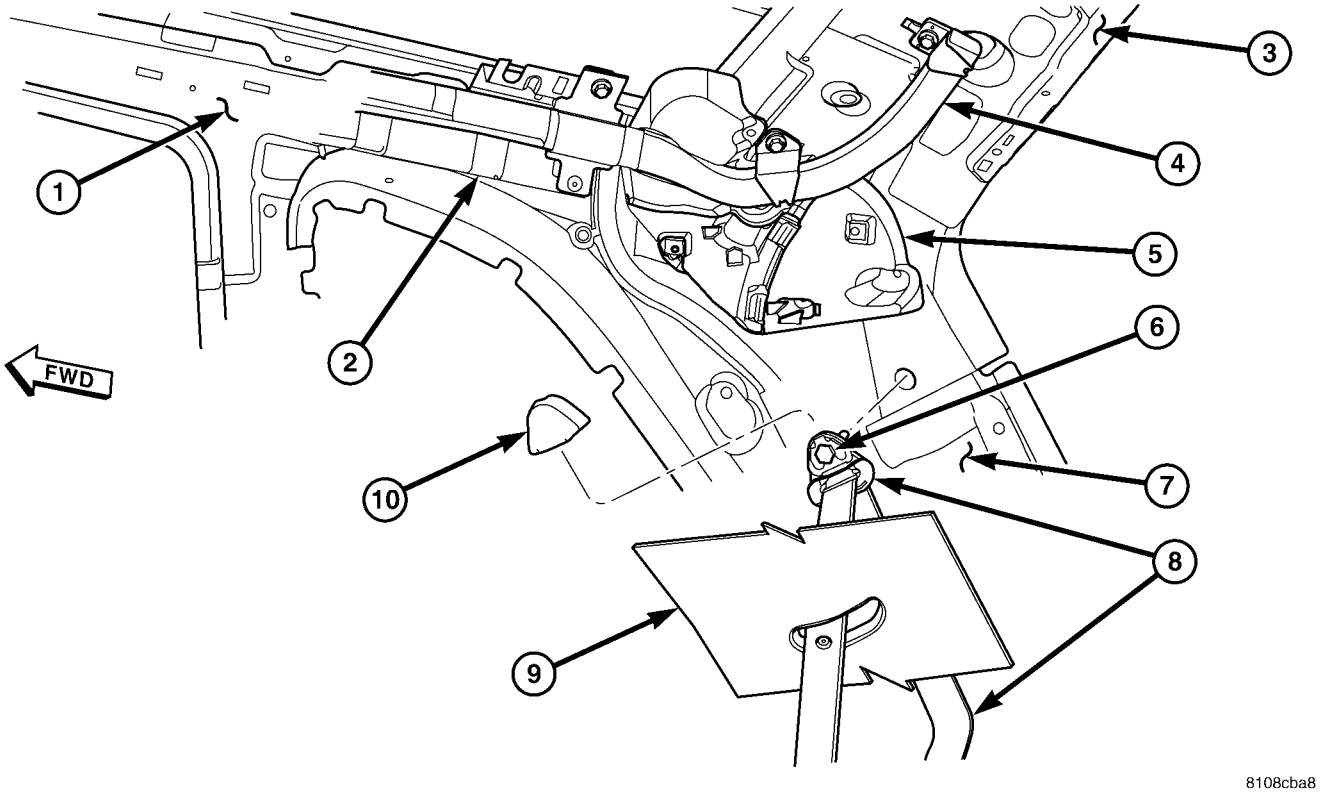


Fig. 48 SEAT BELT & RETRACTOR - 3RD ROW - UPPER - REMOVE/INSTALL

1 - UPPER QUARTER PANEL
2 - HEAD IMPACT COUNTER MEARURE RAIL - REAR
3 - UPPER LIFTGATE OPENING
4 - CURTAIN AIRBAG
5 - HEAD IMPACT COUNTER MEASURE D-PILLAR
6 - TURNING LOOP BOLT
7 - D-PILLAR
8 - TURNING LOOP AND SEAT BELT WEBBING
9 - UPPER D-PILLAR TRIM PANEL
10 - TURNING LOOP COVER

SEAT BELT AND RETRACTOR - SECOND ROW

(1) Position seat belt and retractor in vehicle.

(2) Install the turning loop retaining bolt into the C-pillar (Fig. 46). Torque bolt to 40 N·m (30 ft. lbs.) and install seat belt turning loop cover.

(3) Install the two seat belt retractor mounting bolts (Fig. 46). Torque bolts to 40 N·m (30 ft. lbs.).

(4) Install the lower quarter trim panel (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).

(5) Install the second and third row lower seat belt anchor bolts (Fig. 46) and (Fig. 47). Torque bolts to 40 N·m (30 ft. lbs.) and then install lower anchor bolt covers.

(6) Install the second and third row seats into vehicle on the side that the seat belt and retractor are being serviced.

(7) Connect the battery negative cable.

(8) Verify vehicle and system operation.

(9) Close hood.

SEAT BELT AND RETRACTOR - THIRD ROW

(1) Position seat belt and retractor in vehicle.

(2) Install the turning loop retaining bolt in the D-pillar (Fig. 48). Torque bolt to 40 N·m (30 ft. lbs.) and install seat belt turning loop cover.

(3) Install the two seat belt retractor mounting bolts (Fig. 44). Torque bolts to 40 N·m (30 ft. lbs.).

(4) Install the B-pillar seat belt retaining ring onto the seat belt webbing and then the retaining ring screws to the D-pillar (Fig. 47).

(5) Install the upper D-pillar trim (Refer to 23 - BODY/INTERIOR/D-PILLAR TRIM - INSTALLATION).

(6) Install the lower quarter trim panel (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).

(7) Install the second and third row lower seat belt anchor bolts and covers to the lower quarter trim panel at the C (Fig. 46) and D-pillars (Fig. 47).

SEAT BELT & RETRACTOR (Continued)

(8) Install the second and third row seats to the side of vehicle that the seat belt and retractor are being serviced.
(9) Connect the battery negative cable.
(10) Verify vehicle and system operation.
(11) Close hood.

SEAT BELT BUCKLE

REMOVAL

SEAT BELT BUCKLE - FRONT

It may be necessary to remove the front seat to remove buckle off mounting stud. If so, (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).
(1) Move seat to rearward most position.
(2) Remove buckle half retaining nut (Fig. 49).

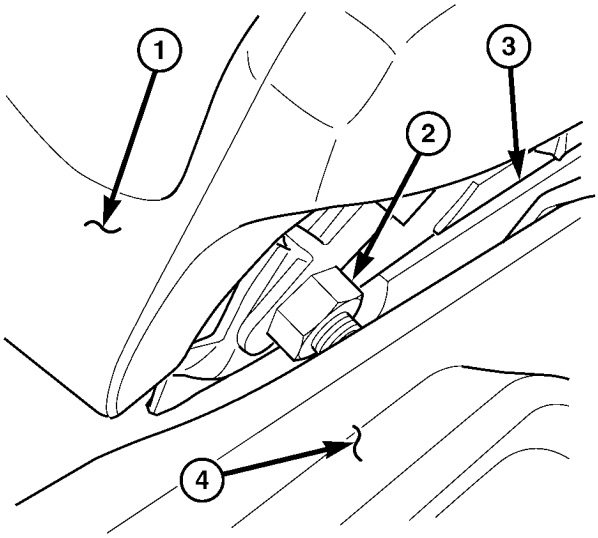


Fig. 49 SEAT BELT BUCKLE - FRONT

1 - SEAT ADJUSTER TRIM
2 - SEAT BELT BUCKLE RETAINING NUT
3 - SEAT ADJUSTER
4 - REAR FLOOR CONSOLE

(3) Carefully slide the buckle half off mounting stud.
(4) Slide buckle half up through side cushion trim and remove from seat.

SEAT BELT BUCKLE - SECOND ROW

(1) Remove second row seat from vehicle (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).
(2) Separate seat riser/base from seat cushion (Refer to 23 - BODY/SEATS/SEAT RISER - REMOVAL).
(3) The second row seat belt buckle is placed in between the seat riser and the cushion.

SEAT BELT BUCKLE - THIRD ROW

(1) Remove one screw to trim cover and remove cover.
(2) Reach down between seats and remove the buckle half retaining nut from the seat cushion frame (Fig. 50).

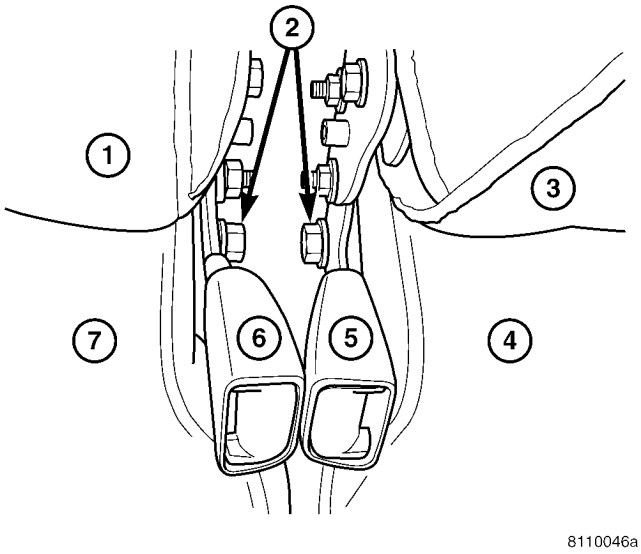


Fig. 50 SEAT BELT BUCKLE - LOCATION

1 - RIGHT SEAT BACK
2 - SEAT BELT BUCKLE RETAINING NUTS
3 - LEFT SEAT BACK
4 - LEFT SEAT CUSHION
5 - LEFT SEAT BELT BUCKLE
6 - RIGHT SEAT BELT BUCKLE
7 - RIGHT SEAT CUSHION

(3) Slide the seat belt buckle off the mounting stud and remove from vehicle (Fig. 51).

INSTALLATION

SEAT BELT BUCKLE - FRONT

(1) Slide buckle half down through side cushion trim and onto the mounting stud.

WARNING: A thread locking compound is applied to the threads at the factory. Once the retaining nut is removed a thread locking compound should be reapplied during installation.

(2) Install the buckle half retaining nut (Fig. 49). Torque nut to 40 N·m (30 ft. lbs.).
(3) Move seat to original customer position.
It may have been necessary to remove the front seat to remove buckle off mounting stud. If so, (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

SEAT BELT BUCKLE - SECOND ROW

(1) The second row seat belt buckle is placed in between the seat riser and the cushion.

SEAT BELT BUCKLE (Continued)

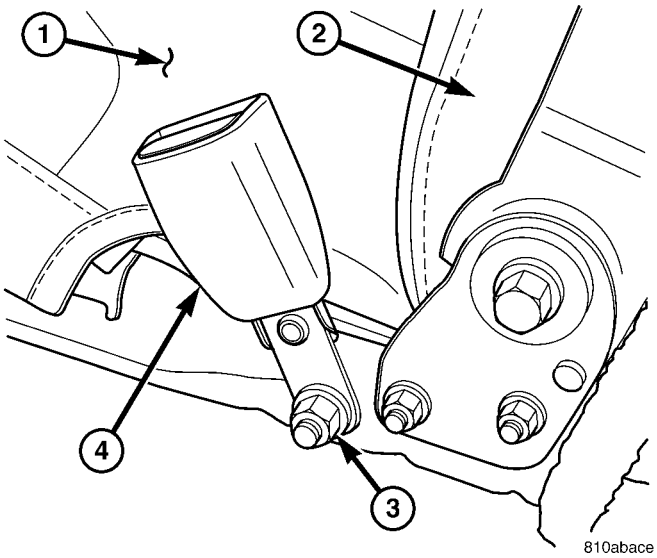


Fig. 51 SEAT BELT BUCKLE - THIRD SEAT - REMOVE/INSTALL

1 - SEAT CUSHION
2 - SEAT BACK
3 - SEAT BELT BUCKLE RETAINING NUT
4 - SEAT BELT BUCKLE

(2) Install the seat riser/base onto the seat cushion (Refer to 23 - BODY/SEATS/SEAT RISER - INSTALLATION).

(3) Install the second row seat into vehicle (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

SEAT BELT BUCKLE - THIRD ROW

(1) Slide the seat belt buckle onto the mounting stud (Fig. 51).

WARNING: A thread locking compound is applied to the threads at the factory. Once the retaining nut is removed a thread locking compound should be reapplied during installation.

(2) Reach down between seats and install the buckle half retaining nut onto the seat cushion frame (Fig. 50). Torque nut to 40 N·m (30 ft. lbs.).

(3) Install trim cover and retaining screw.

SEAT BELT HEIGHT ADJUSTER

REMOVAL

(1) Gently pull inward on height adjuster knob cover on the side of the vehicle that you wish to remove the height adjuster.

(2) Remove upper B-pillar trim (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - REMOVAL).

(3) Remove turning loop to height adjuster retaining bolt.

(4) Remove two mounting bolts to height adjuster and remove from vehicle (Fig. 52).

INSTALLATION

(1) Position height adjuster in place and install the two mounting bolts (Fig. 52).

(2) Install the turning loop to height adjuster retaining bolt. Torque bolt to 40 N·m (30 ft. lbs.).

(3) Install the upper B-pillar trim (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - INSTALLATION).

(4) Position the height adjuster knob cover onto the height adjuster knob and firmly snap into place.

(5) Verify system operation.

SEAT BELT HEIGHT ADJUSTER (Continued)

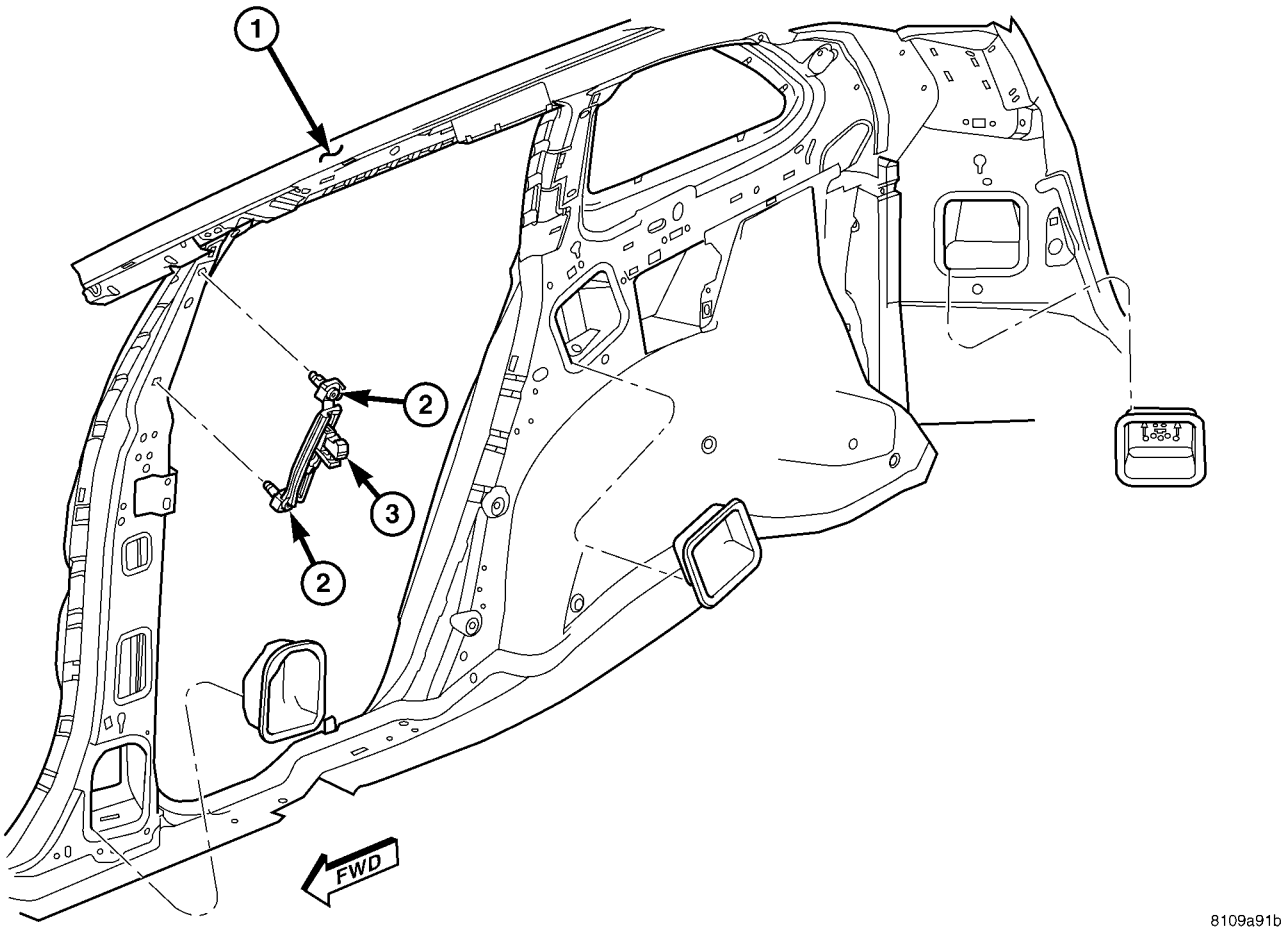


Fig. 52 SEAT BELT HEIGHT ADJUSTER - REMOVE/INSTALL

1 - ROOF RAIL ASSEMBLY
2 - SEAT BELT HEIGHT ADJUSTER MOUNTING BOLTS
3 - SEAT BELT HEIGHT ADJUSTER

SEAT BELT HEIGHT ADJUSTER KNOB COVER

REMOVAL

(1) Grasp the height adjuster knob cover and gently pull inward, separating it from the seat belt height adjuster.

INSTALLATION

(1) Position the height adjuster knob cover onto the height adjuster knob and firmly snap into place.
(2) Verify system operation.

SEAT BELT SWITCH

DESCRIPTION

The seat belt switch a Hall Effect-type sensor. This sensor consists of a fixed-position, Hall Effect Integrated Circuit chip and a small permanent magnet that is integral to the driver side front seat belt buckle. The seat belt switch is connected to the vehicle electrical system through a two-lead pigtail wire and connector on the driver side front seat belt buckle-half, which is connected to a wire harness connector and take out of the body wire harness on vehicles with manual seat adjusters, or to a connector and take out of the power seat wire harness on vehicles with power seat adjusters. A radio noise suppression capacitor is connected in parallel with the integrated circuit where the two pigtail wire leads connect to the integrated circuit pins.

The seat belt switch cannot be adjusted or repaired and, if faulty or damaged, the entire driver side front seat belt buckle-half must be replaced.

OPERATION

The seat belt switch is designed to provide a status signal to the seat belt switch sense input of the Occupant Restraint Controller (ORC) indicating whether the driver side front seat belt is fastened. The ORC

SEAT BELT SWITCH (Continued)

uses the seat belt switch input to determine the status of the driver side front seat belt. The ORC then sends electronic messages to the Instrument Cluster to control the seat belt indicator based upon the status of the seat belt switch input.

A spring-loaded slide with a small window-like opening is integral to the buckle latch mechanism. When a seat belt tip-half is inserted and latched into the seat belt buckle, the slide is pushed downward and the window of the slide exposes the Hall Effect Integrated Circuit chip within the buckle. The field of the permanent magnet induces a current within the chip. The chip provides this induced current as an output to the ORC, which monitors the current to determine the status of the driver side front seat belt. When the seat belt is unbuckled, the spring-loaded slide moves upward and shields the Integrated Circuit from the field of the permanent magnet, causing the output current from the seat belt switch to be reduced.

The seat belt switch receives a supply current from the ORC, and the ORC senses the status of the driver side front seat belt through its pigtail wire connection to the airbag overlay wire harness. The ORC also monitors the condition of the seat belt switch circuit and will illuminate the airbag indicator in the cluster then store a Diagnostic Trouble Code (DTC) for any fault that is detected in the seat belt switch circuit. For proper diagnosis of the seat belt switch, a DRBIII® scan tool is required and the appropriate Body Diagnostic Procedures manual.

SEAT BELT TENSIONER

DESCRIPTION

Seat Belt Tensioners supplement the dual front airbags. The seat belt tensioners are integral to the front seat belt retractors, which are secured to the inner B-pillar on the right and left sides of the vehicle. The retractor is concealed beneath the lower B-pillar trim. The seat belt tensioner consists primarily of a sprocket/pinion, a steel tube, a cast metal housing, numerous steel balls, a stamped metal ball trap, a torsion bar, a small pyrotechnically activated gas generator, and a short pigtail wire. All of these components are located on one side of the retractor spool on the outside of the retractor housing except for the torsion bar, which serves as the spindle upon which the retractor spool rides. The seat belt tensioners are controlled by the Occupant Restraint Controller (ORC) and are connected to the vehicle electrical system through a dedicated take out of the body wire harness by a keyed and latching yellow molded plastic connector insulator to ensure a secure connection.

The seat belt tensioners cannot be repaired and, if faulty or damaged, the entire front seat belt and retractor unit must be replaced. If the front airbags have been deployed, the seat belt tensioners have also been deployed. The seat belt tensioners are not intended for reuse and must be replaced following any front airbag deployment. A growling or grinding sound while attempting to operate the seat belt retractor is a sure indication that the seat belt tensioner has been deployed and requires replacement. Refer to the proper Body Diagnostic Procedures manual for diagnosis and testing.

OPERATION

The seat belt tensioners are deployed in conjunction with the front airbags by a signal generated by the Occupant Restraint Controller (ORC) through the driver or passenger seat belt tensioner line 1 and line 2 (or squib) circuits. When the ORC sends the proper electrical signal to the tensioners, the electrical energy generates enough heat to initiate a small pyrotechnic gas generator. The gas generator is installed in one end of a steel tube that contains numerous steel balls. As the gas expands, it pushes the steel balls through the tube into a cast metal housing, where a ball guide directs the balls into engagement with the teeth of a sprocket that is geared to one end of the retractor spool. As the balls drive past the sprocket, the sprocket turns and drives the seat belt retractor spool causing the slack to be removed from the front seat belts. The ball trap captures the balls as they leave the sprocket and are expelled from the housing.

Removing excess slack from the front seat belts not only keeps the occupants properly positioned for an airbag deployment following a frontal impact of the vehicle, but also helps to reduce injuries that the occupant might experience in these situations as a result of harmful contact with the steering wheel, steering column, instrument panel and/or windshield. Also, the seat belt tensioner torsion bar that the retractor spool rides upon is designed to deform in order to control the loading being applied to the occupants by the seat belts during a frontal impact, further reducing the potential for occupant injuries.

The ORC monitors the condition of the seat belt tensioners through circuit resistance, and will illuminate the airbag indicator in the instrument cluster and store a Diagnostic Trouble Code (DTC) for any fault that is detected. For proper diagnosis of the seat belt tensioners, a DRBIII® scan tool is required and the appropriate Body Diagnostic Procedures manual.

SPEED CONTROL

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SPEED CONTROL

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Servo Mounting Bolt	5.6		50
Servo Bracket Nuts	6.8		60

CABLE

REMOVAL

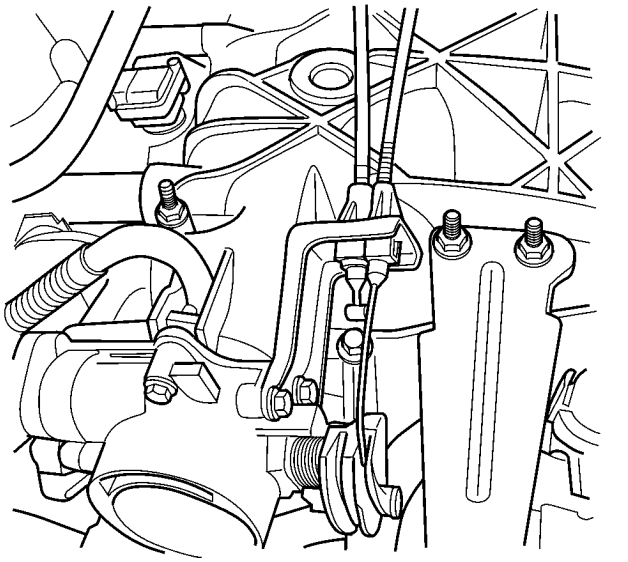


Fig. 1 CABLE ROUTING

(1) Disconnect the negative battery cable.
(2) Remove the servo bracket bolt.
(3) Remove speed control cable from throttle cam by sliding clasp out hole used for throttle cable (Fig. 1).
(4) Remove the throttle cable (with retaining tab) and then slide cable speed control cable out from bracket.

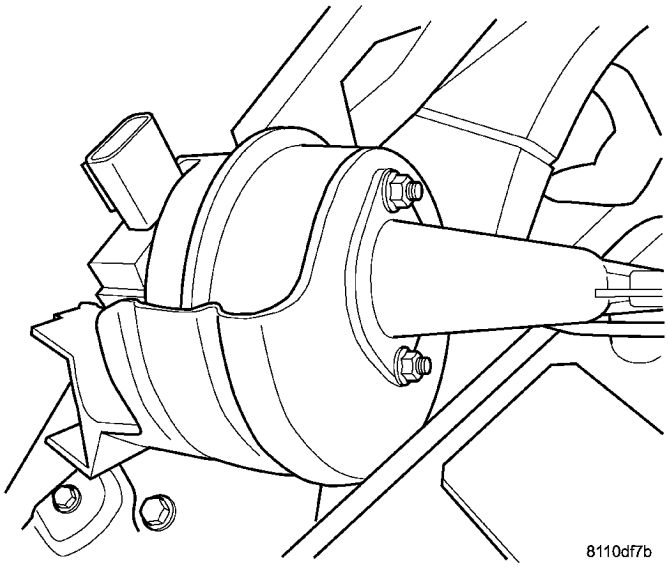


Fig. 2 CABLE TO SERVO MOUNTING

(5) Disconnect electrical connectors and vacuum hose.
(6) Remove two nuts attaching mounting bracket and speed control cable to servo (Fig. 2).

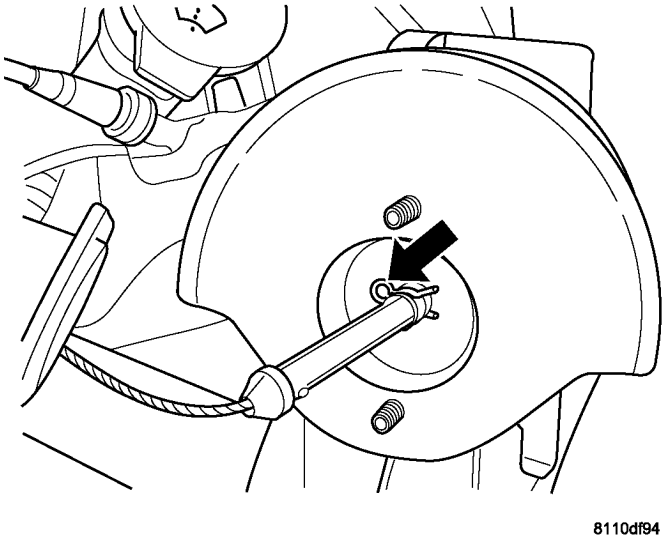


Fig. 3 CABLE CLIP

(7) Pull cable away from servo to expose retaining clip and remove clip attaching cable to servo (Fig. 3).
(8) Disconnect the vacuum line connection at intake manifold.
(9) Remove cable.

INSTALLATION

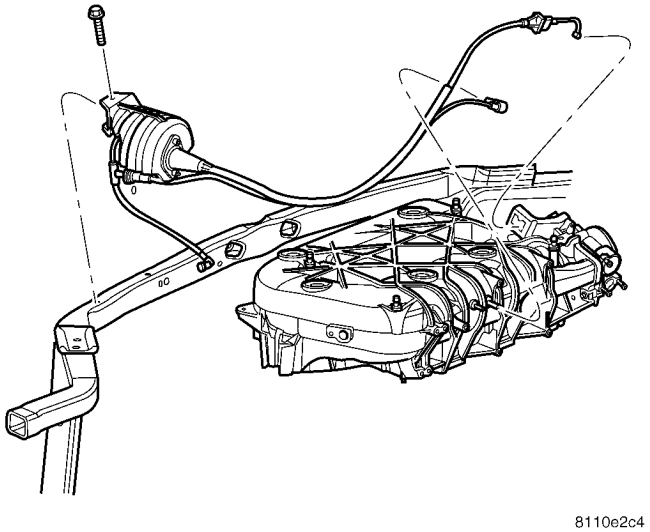


Fig. 4 CABLE ROUTING

(1) Route cable (Fig. 4).
(2) Slide speed control cable into bracket.
(3) Connect the vacuum line connection at rear of intake manifold.

CABLE (Continued)

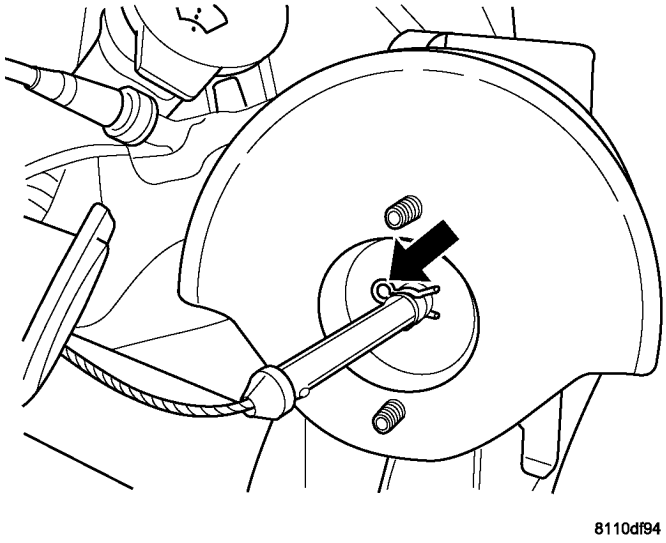


Fig. 5 CABLE CLIP

(4) Install clip attaching cable to servo (Fig. 5).

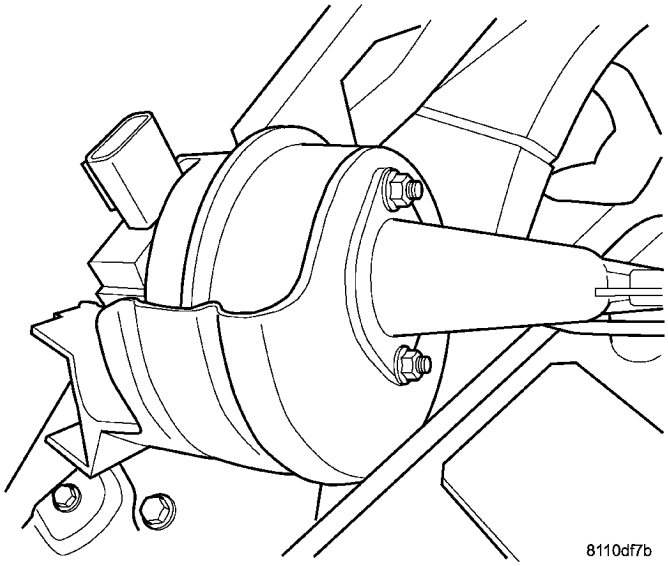


Fig. 6 CABLE TO SERVO MOUNTING

(5) Install two nuts attaching mounting bracket and speed control cable to servo (Fig. 6).
(6) Tighten nuts to 6.8 N·m (60 in. lbs.).
(7) Connect electrical connectors and vacuum hose.
(8) Install speed control cable to throttle cam by sliding clasp into hole (Fig. 1).
(9) Install the servo bracket bolt.
(10) Tighten bolt to 5.6 N·m (50 in. lbs.).
(11) Connect negative battery cable.

SERVO

REMOVAL

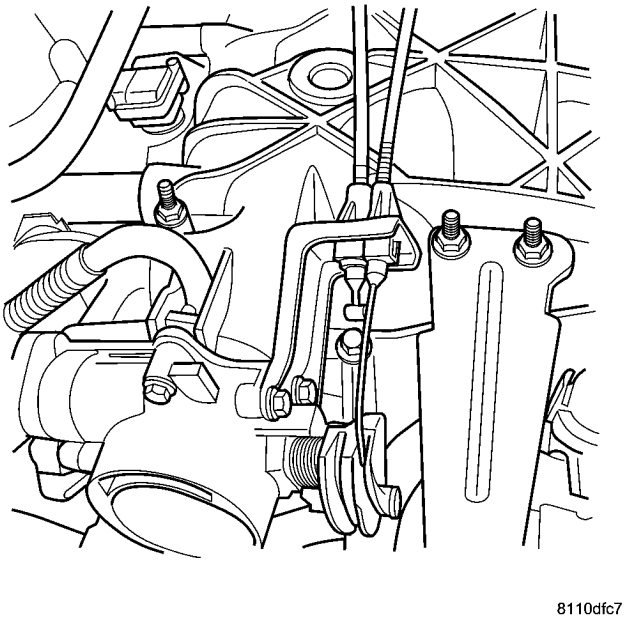


Fig. 7 CABLE ROUTING

(1) Disconnect the negative battery cable.
(2) Remove the servo bracket bolt.
(3) Remove speed control cable from throttle cam by sliding clasp out hole used for throttle cable (Fig. 7).

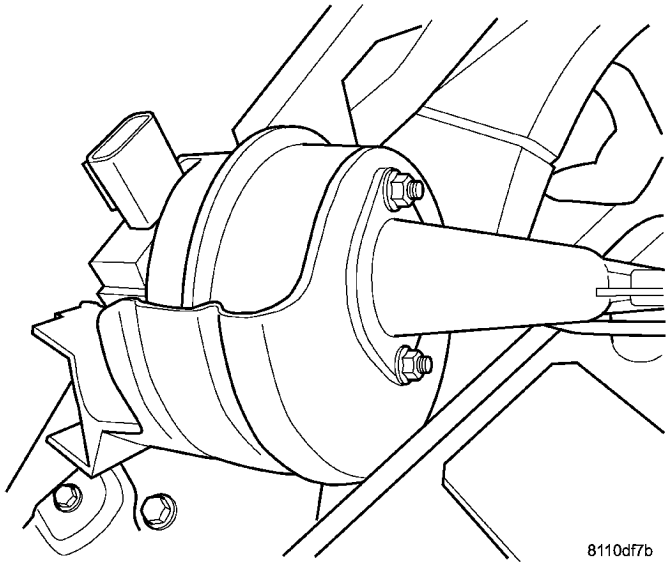


Fig. 8 CABLE TO SERVO MOUNTING

(4) Disconnect electrical connectors and vacuum hose.
(5) Remove two nuts attaching mounting bracket and speed control cable to servo (Fig. 8).

SERVO (Continued)

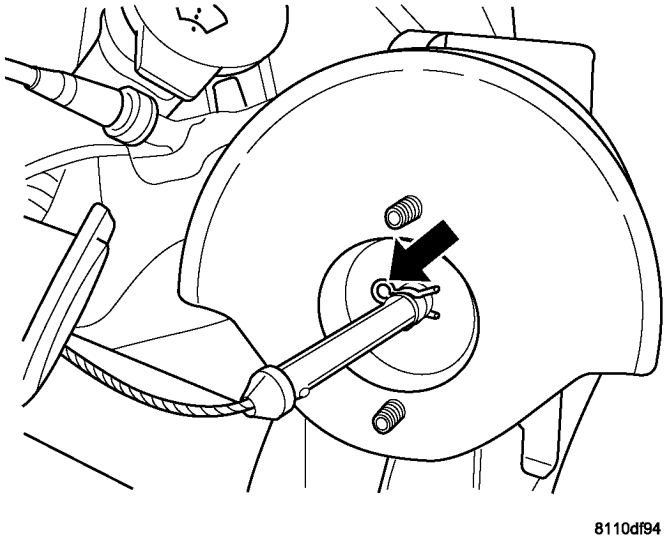


Fig. 9 CABLE CLIP

(6) Pull cable away from servo to expose retaining clip and remove clip attaching cable to servo (Fig. 9).
(7) Remove the servo.

INSTALLATION

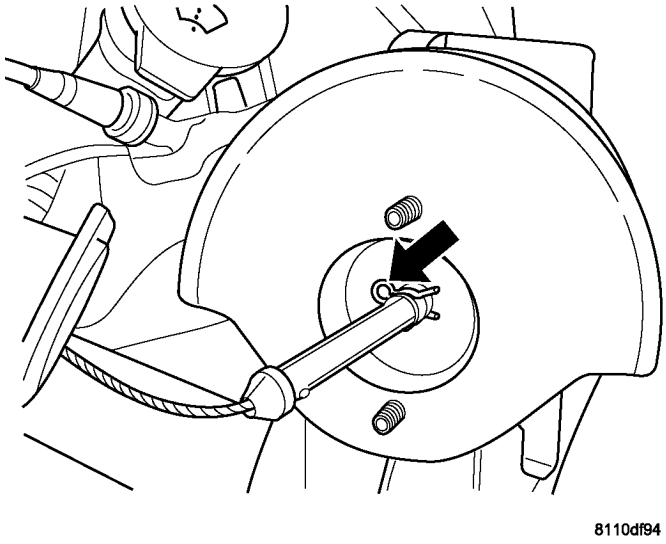


Fig. 10 CABLE CLIP

(1) Install clip attaching cable to servo (Fig. 10).

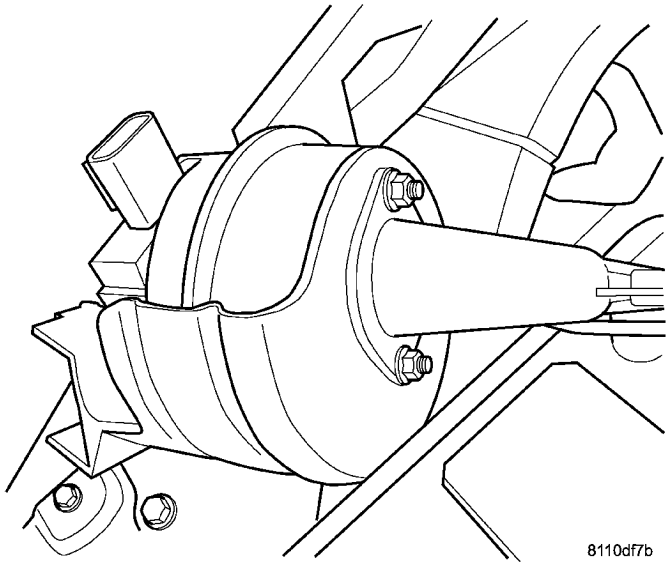


Fig. 11 CABLE TO SERVO MOUNTING

(2) Install two nuts attaching mounting bracket and speed control cable to servo (Fig. 11).
(3) Tighten nuts to 6.8 N·m (60 in. lbs.).

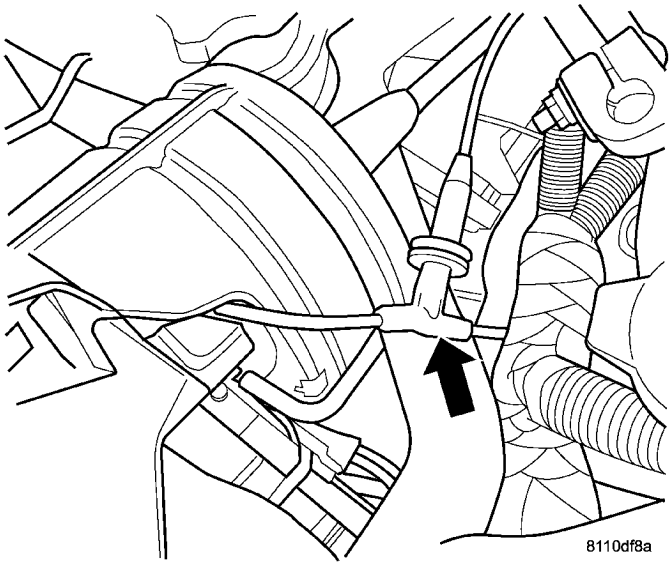


Fig. 12 VACUUM HOSE

(4) Connect electrical connectors and vacuum hose (Fig. 12).

SERVO (Continued)

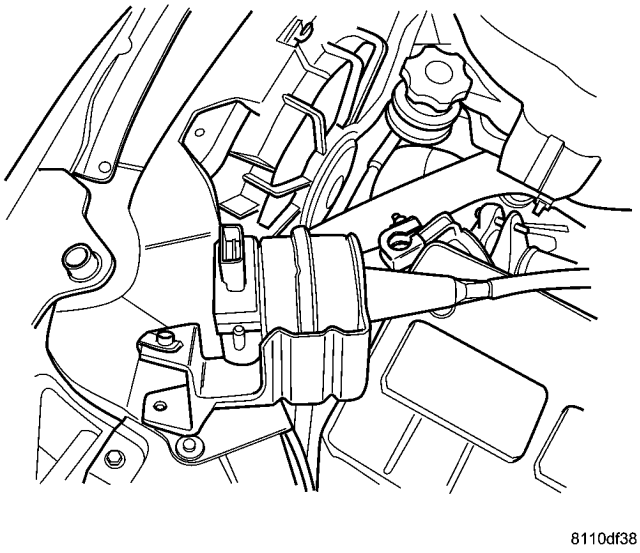


Fig. 13 SERVO & BRACKET

(5) Install the servo bracket bolt (Fig. 13)
(6) Tighten bolt to 5.6 N·m (50 in. lbs.).
(7) Connect the negative battery cable.

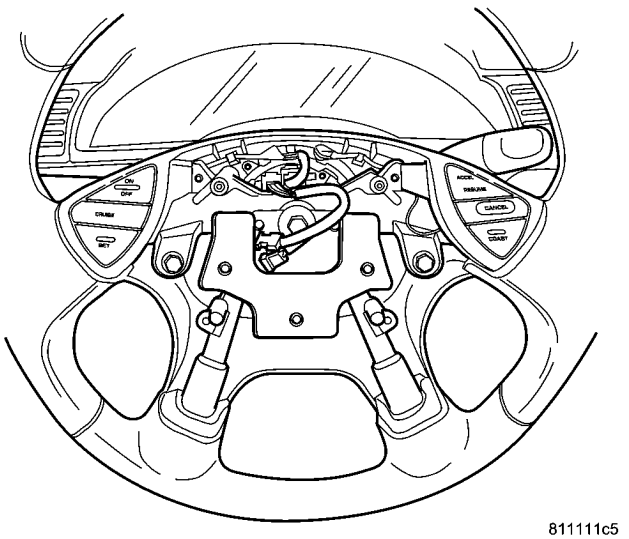
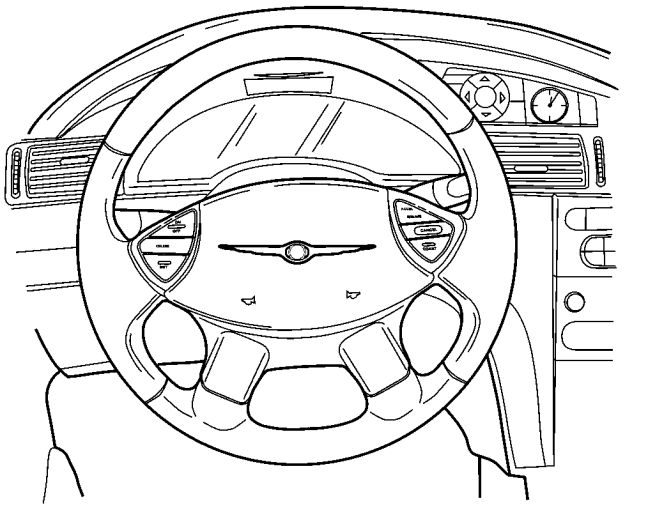


Fig. 14 AIRBAG REMOVED

(2) Remove the Driver side Airbag (Fig. 14), (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

SWITCH

REMOVAL



STEERING WHEEL & SWITCHES

(1) Disconnect the negative battery cable.

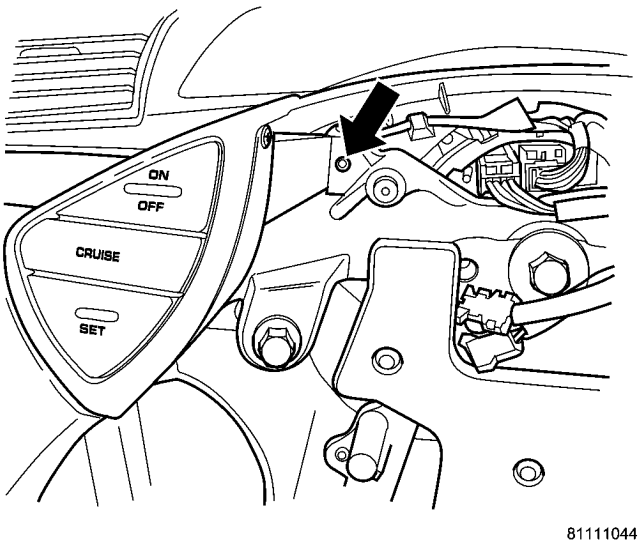


Fig. 15 SWITCH MOUNTING SCREW

(3) Remove the speed control switch mounting screw (Fig. 15).
(4) Disconnect the electrical connector from switch.
(5) Remove switch.

SWITCH (Continued)

INSTALLATION

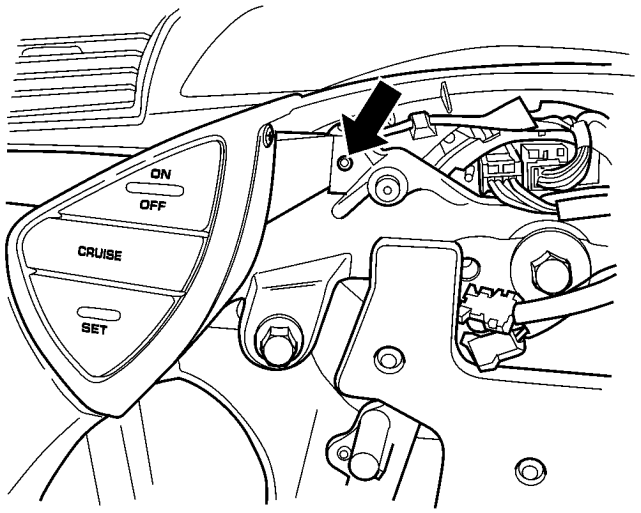


Fig. 16 SWITCH MOUNTING SCREW

(1) Connect the electrical connector to switch.
(2) Install switch.
(3) Install the speed control switch mounting screw (Fig. 16).
(4) Tighten Screw.

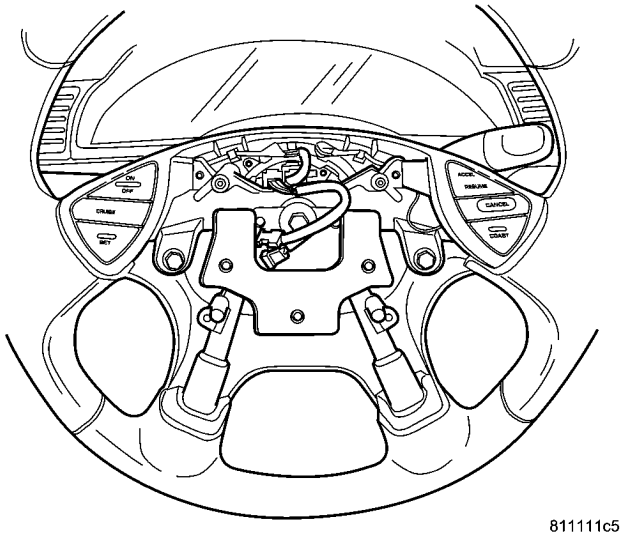


Fig. 17 AIRBAG REMOVED

(5) Install the Driver side Airbag (Fig. 17), (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

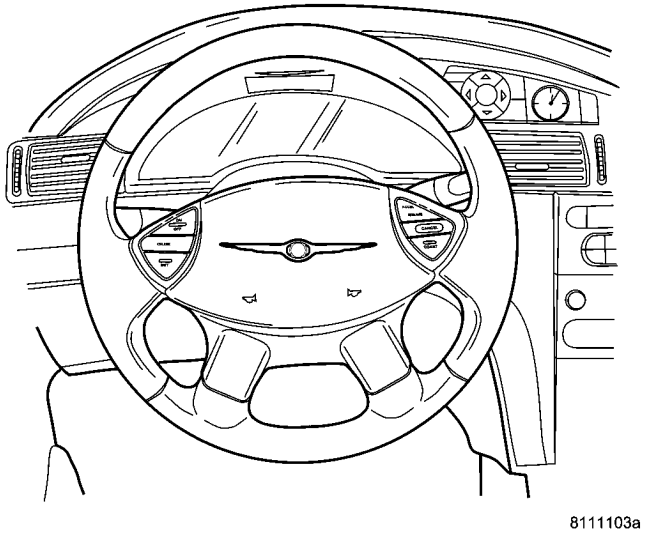


Fig. 18 STEERING WHEEL & SWITCHES

(6) Connect the negative battery cable (Fig. 18).

VACUUM RESERVOIR

REMOVAL

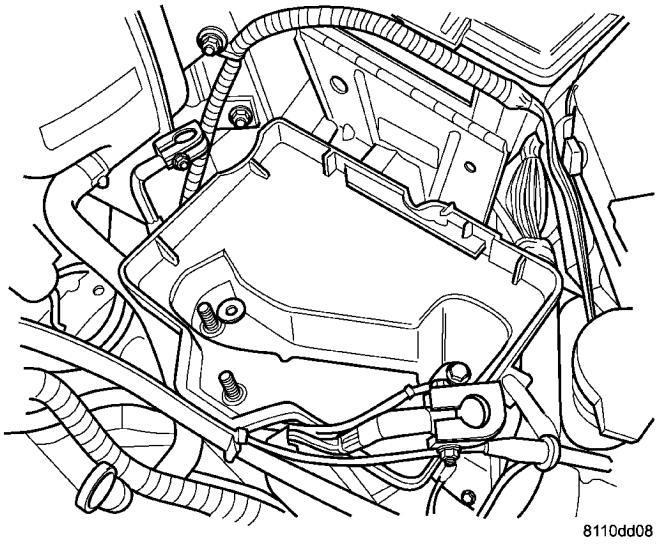


Fig. 19 BATTERY TRAY/ VACUUM RESERVOIR

(1) Disconnect the negative and then the positive battery cable.
(2) Remove battery.
(3) Disconnect the wiring harness from battery tray (Fig. 19).

VACUUM RESERVOIR (Continued)

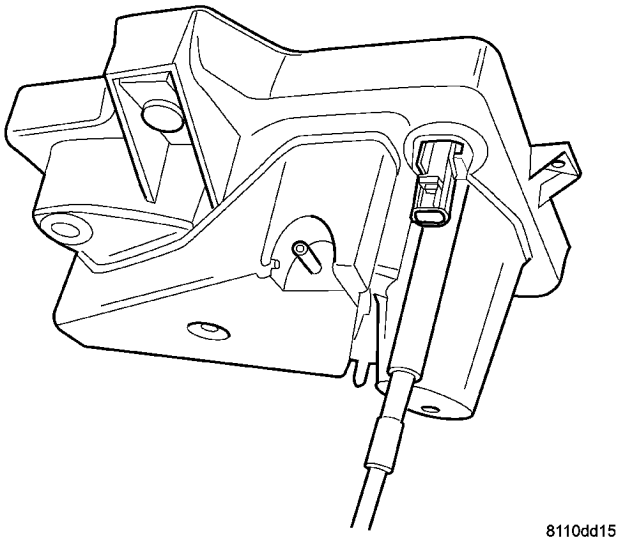


Fig. 20 VACUUM RESERVOIR/BATTERY TEMPERATURE SENSOR

(4) Remove the battery tray.

(5) Disconnect the vacuum line from battery tray/ vacuum reservoir (Fig. 20).

INSTALLATION

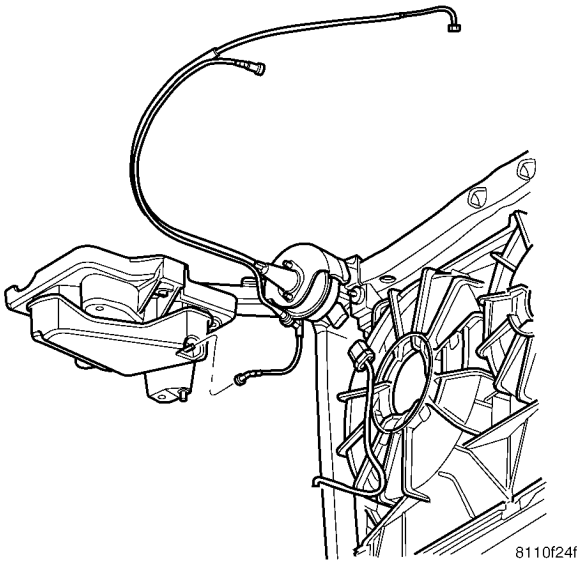


Fig. 21 VACUUM & ELECTRICAL CONNECTION

(1) Connect the vacuum line to battery tray/vacuum reservoir (Fig. 21).

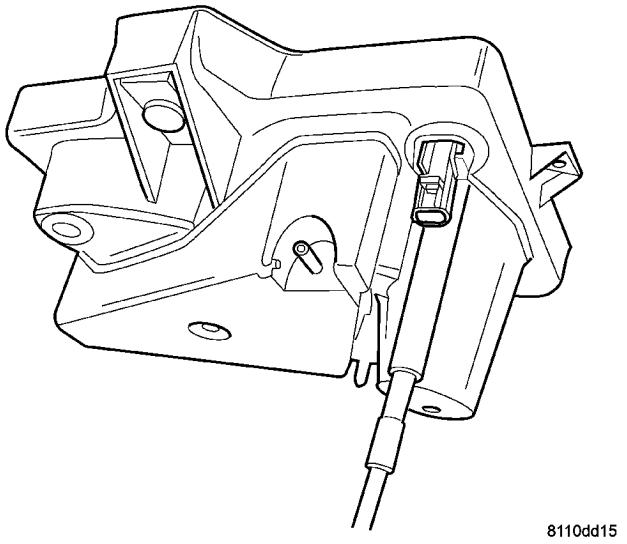


Fig. 22 VACUUM RESERVOIR/BATTERY TEMPERATURE SENSOR

(2) Install the battery tray (Fig. 22).

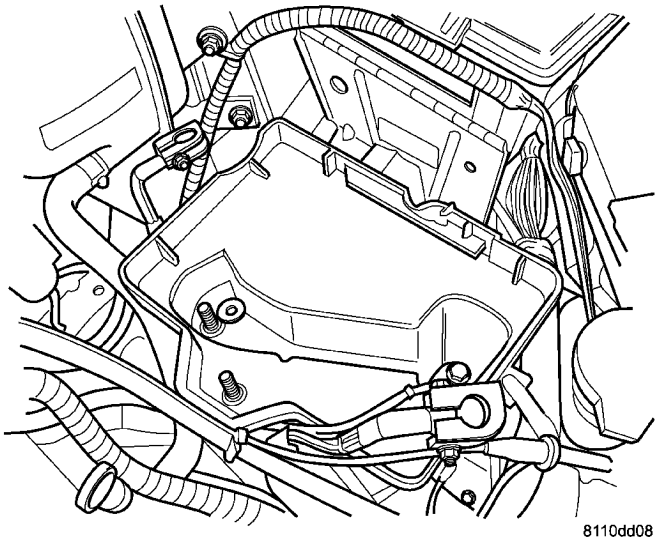


Fig. 23 BATTERY TRAY/ VACUUM RESERVOIR

(3) Connect the wiring harness to battery tray (Fig. 23).

(4) Install battery.

(5) Connect the positive and then the negative battery cable.

VEHICLE THEFT SECURITY

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VEHICLE THEFT SECURITY

DESCRIPTION

VEHICLE THEFT SECURITY SYSTEM

The Vehicle Theft Security System (VTSS) is designed to protect against whole vehicle theft. The system monitors vehicle doors, and ignition action for unauthorized operation.

The alarm activates:

- Sounding of the horn
- Flashing of the headlamps/park/tail lamps
- An engine kill feature (with SKIS)

SENTRY KEY IMMOBILIZER SYSTEM

The Sentry Key Immobilizer System (SKIS) is designed to provide passive protection against unauthorized vehicle use by disabling the engine, after two (2) seconds of running, whenever an invalid key is used to start the vehicle. The SKIS is active whenever the ignition is on and does not require any customer intervention. The primary components of the system are the Sentry Key Remote Entry Module (SKREEM), Sentry Key (ignition key with a transponder molded into the head), indicator light, Body Control Module (BCM), and the Next Generation Controller (NGC). The SKREEM is mounted on the ignition switch/lock cylinder assembly with the molded, integral antenna mounted around the ignition housing. The indicator light, is located instrument panel switch pod, just to the right of the instrument cluster.

OPERATION

VEHICLE THEFT SECURITY SYSTEM

Upon failure of proper SKREEM communication to the Next Generation Controller (NGC), the NGC will shut off fuel after two seconds of run time. The engine will not re-crank on the key cycle that the failure occurred, a full key down sequence must be performed for the engine to crank again. After six consecutive fuel shut-offs, the engine will no longer crank on subsequent key cycles. The failure must be corrected and a valid communication process between the SKREEM and the NGC must occur for the engine to crank and start again.

The electronics for the VTSS are part of the Body Control Module (BCM). The system is armed when the vehicle is locked using the:

- Power door lock switches (with any door ajar)
- Remote Keyless Entry transmitter.
- Door Cylinder Lock Switches.

For vehicles equipped with SKIS, the doors do not have to be locked to enable the fuel shut off feature.

After the vehicle is locked and the last door is closed, the set LED indicator in the instrument panel switch pod will flash quickly for 16 seconds, indicating that arming is in progress. If no monitored systems are activated during this period, the system will arm and the LED will flash at a .5 Hertz (Hz) rate. If the liftgate is open, the LED will change its flash rate.

This indicates that the system is armed. If fault is detected on the driver key cylinder input, the indicator LED will remain solid during the arming process, although the system will still arm. If the indicator LED does not illuminate at all upon door closing it indicates that the system is not arming.

VEHICLE THEFT SECURITY (Continued)

Passive disarming occurs upon normal vehicle entry by unlocking either door with the ignition key/ remote transmitter. This disarming will also halt the alarm once it has been activated.

A tamper alert exists to notify the driver that the VTSS had been activated. This alert consists of 3 horn pulses when the vehicle is disarmed.

NOTE: The VTSS will not arm by pushing down the door lock mechanism. This will manually override the system.

For Door Cylinder Lock Switch service, (Refer to 8 - ELECTRICAL/POWER LOCKS/DOOR CYLINDER LOCK/UNLOCK SWITCH - REMOVAL).

If the VTSS is triggered, the horn will pulse, headlamps/marker lamps will flash, and the VTSS warning lamp will flash. If BCM determines the threat to be false and the VTSS is not triggered again, the system will shut down and rearm itself after three minutes. If a trigger is still active, the alarm will continue for an additional 15 minutes without the horn. The VTSS monitors the passenger compartment.

NOTE: System will not arm if passenger compartment is not secure.

ARMING THE VTSS - METHOD A

(1) With the key removed from the ignition lock and any door open (excluding liftgate), actuate one of the following:

- Power door lock button to LOCK,
- Key fob LOCK button
- Driver door lock key cylinder to locked position.

(2) Close all opened doors. Liftgate can remain open.

(3) After the last door is closed, an arming time-out period of sixteen seconds will start, then the VTSS will become armed.

ARMING THE VTSS - METHOD B

Actuating the key fob transmitter LOCK button, key locking the front doors with the doors closed and the ignition locked will begin the arming time-out period. If method A, 16 second time-out sequence was in process when method B was actuated, the 16 second time-out will restart from the time of the second actuation.

If the security lamp does not illuminate at all upon final door closure, it indicates that the system is not arming.

The current VTSS status armed or disarmed shall be maintained in memory to prevent battery disconnects from disarming the system.

TRIGGERING THE VTSS

After the VTSS is armed, the following actions will trigger the alarm:

- Opening any door (excluding liftgate).
- Turning the ignition to the RUN position.

NOTE: When the VTSS is ARMED, the interior power door lock switch "UNLOCK" will be disabled until the vehicle is disarmed.

CAUTION: The VTSS indicator LED will trigger and engine will continue to run if the vehicle is equipped with SKIS and the proper key is used to start the vehicle. This condition will occur if the VTSS has been triggered. If valid key is used, VTSS will disarm.

CENTRAL LOCKING/UNLOCKING

This vehicle theft security system feature allows you lock all the doors with the key by using the drivers door lock cylinder.

All vehicle doors and liftgate are locked with the first turn of the key to the LOCK position from the drivers door. A double activation feature of central unlocking requires you to turn the key in the door lock cylinder to the unlock position two times within two seconds to UNLOCK all vehicle doors at once.

The first turn of the key in the door lock cylinder will disarm the system (the driver door cylinder lock switch connected to the back of the driver door lock cylinder) and unlock your drivers door. The second actuation within two seconds will then unlock all doors and the liftgate.

SENTRY KEY IMMOBILIZER SYSTEM

The SKIS includes keys from the factory which are pre-programmed. Each SKIM will recognize a maximum of eight Sentry Keys. If the customer would like to own additional keys other than those provided with the vehicle, they can be purchased from any authorized dealer. These keys must be programmed to the SKREEM on the vehicle in order for the system to recognize them as valid keys. This can be done by the dealer with a DRB III® scan tool or by a customer if this feature is available in their market and they have two (2) valid keys already available to them. The SKIS performs a self-test each time the ignition switch is turned to the ON position and will store Diagnostic Trouble Codes (DTC's) if a system malfunction is detected. The SKIS can be diagnosed and any stored DTC's can be retrieved using a DRB III® scan tool as described in the appropriate Body Diagnostic Procedures manual.

VEHICLE THEFT SECURITY (Continued)

DIAGNOSIS AND TESTING - VEHICLE THEFT SECURITY SYSTEM/SENTRY KEY IMMOBILIZER SYSTEM

Use a DRBIII® scan tool and the proper Body Diagnostic Procedures information for diagnosis and testing.

SENTRY KEY REMOTE ENTRY MODULE

DESCRIPTION

The Sentry Key Remote Entry Module (SKREEM) (Fig. 1) and (Fig. 2) performs the functions of what used to be the Sentry Key Immobilizer Module (SKIM), the Remote Keyless Entry (RKE) Module, and the Tire Pressure Monitoring (TPM) System (formerly located within the Compass Mini-Trip Computer (CMTC).

NOTE: On EARLY BUILD vehicles, the SKREEM controls the functions of the SKIM and RKE modules. On NORMAL BUILD vehicles, the SKREEM controls the functions of the SKIM, RKE module and TPM system. If diagnosing the TPM, use the DRBIII® scan tool to determine if the SKREEM includes TPM system functionality.

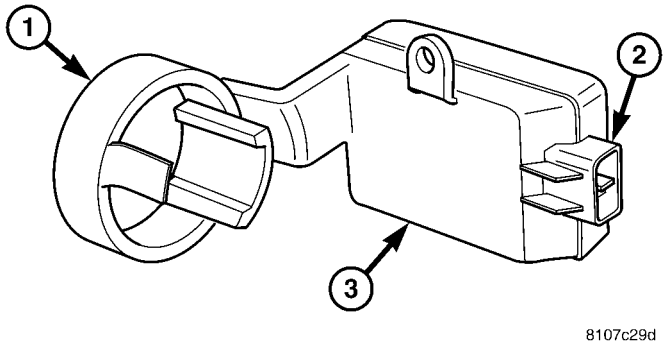


Fig. 1 SENTRY KEY REMOTE ENTRY MODULE (SKREEM)

1 - ANTENNA RING
2 - SKREEM ELECTRICAL CONNECTOR
3 - SKREEM

SENTRY KEY IMMOBILIZER

The Sentry Key Immobilizer System (SKIS) authenticates an electronically coded Transponder Key placed into the ignition and sends a valid/invalid key message to the Powertrain Control Module (PCM) based upon the results. The “VALID/INVALID KEY” message communication is performed using a rolling code algorithm via the Programmable Communication Interface (PCI) data bus. A “VALID KEY” message must be sent to the Powertrain Control Module (PCM) within two seconds of ignition ON to free the engine from immobilization.

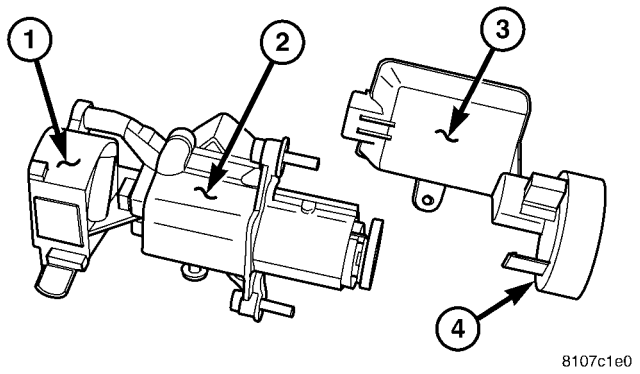


Fig. 2 SKREEM POSITIONING

1 - IGNITION SWITCH
2 - IGNITION CYLINDER ASSEMBLY
3 - SKREEM
4 - SKREEM ANTENNA RING

REMOTE KEYLESS ENTRY (RKE)

The RKE transmitter uses radio frequency signals to communicate with the SKREEM module. The SKREEM is on the PCI bus. When the operator presses a button on the transmitter, it sends a specific request to the SKREEM. In turn the SKREEM sends the appropriate request over the PCI Bus to the:

- Driver Door Module (DDM) to control the driver front door lock and unlock functions, the arming and disarming of the Vehicle Theft Security System (VTSS) (if equipped), and the activation of illuminated entry.
- Integrated Power Module (IPM) to activate the park lamps, the headlamps, and the horn for horn chirp. If requested, the DDM sends a request over the PCI Bus to the:
- Passenger Door Module (PDM) to control the passenger front, rear driver, and rear passenger door lock and unlock functions.
- Power Liftgate Module (PLGM) to control the liftgate lock and unlock functions.

SENTRY KEY REMOTE ENTRY MODULE (Continued)

TIRE PRESSURE MONITORING (TPM) - NORMAL BUILD VEHICLES

If equipped with the Tire Pressure Monitoring (TPM) System, each of the vehicles four wheels will have a valve stem with a pressure sensor and radio transmitter built in. Signals from the tire pressure sensor/transmitter are received and interpreted by the SKREEM.

A sensor/transmitter in a mounted wheel will broadcast its detected pressure once per minute when the vehicle is moving faster than 15 mph (24 km/h). Each sensor/transmitter's broadcast is uniquely coded so that the SKREEM can determine the location.

OPERATION

NOTE: On EARLY BUILD vehicles, the SKREEM controls the functions of the SKIM and RKE modules. On NORMAL BUILD vehicles, the SKREEM controls the functions of the SKIM, RKE module and TPM system. If diagnosing the TPM, use the DRBIII® scan tool to determine if the SKREEM includes TPM system functionality.

SENTRY KEY IMMOBILIZER

The Sentry Key Remote Entry Module (SKREEM) receives an encrypted Radio Frequency (RF) signal from the transponder key. The SKREEM then decrypts the signal and broadcasts the requested remote commands to the appropriate modules in the vehicle over the Programmable Communication Interface (PCI) data bus. A valid transponder key ID must be incorporated into the RF signal in order for the SKREEM to pass the message on to the appropriate modules.

Automatic transponder key synchronization is done by the SKREEM if a valid transponder key is inserted into the ignition cylinder, and the ignition is turned ON. This provides a maximum operation window for RKE functions.

Each Sentry Key Remote Entry System (SKREES) consists of a SKREEM and a transponder key. Each system has a secret key code unique to that system. The secret key is electronically coded in the SKREEM and in all programmed transponder keys. It is used for immobilization and RKE functions for data security. In addition, each transponder key will have a unique identification.

REMOTE KEYLESS ENTRY

After pressing the lock button on the RKE transmitter, all of the door locks will lock, the illuminated entry will turn off (providing all doors are closed), and the VTSS (if equipped) will arm. After pressing the unlock button, on the RKE transmitter, one time, the driver door lock will unlock, the illuminated entry will turn on the courtesy lamps, and the VTSS (if equipped) will disarm. After pressing the unlock button a second time, the remaining door locks will unlock. The Electronic Vehicle Information Center (EVIC) or the DRBIII® scan tool can reprogram this feature to unlock all of the door locks with one press of the unlock button. If the vehicle is equipped with the memory system, the memory message will identify which transmitter (1 or 2) sent the signal.

The SKREEM is capable of retaining up to 8 individual access codes (8 transmitters). If the PRNDL is in any position except park, the SKREEM will disable the RKE. The 4 button transmitter uses 1-CR2032 battery. The minimum battery life is approximately 4.7 years based on 20 transmissions a day at 84°F (25°C). Use the DRBIII® scan tool or the Miller Tool 9001 RF Detector to test the RKE transmitter. Use the DRBIII® or the customer programming method to program the RKE system. However, the SKREEM will only allow RKE programming when the ignition is in the ON position, the PRNDL is in park position, and the VTSS (if equipped) is disarmed.

TIRE PRESSURE MONITORING (TPM) - NORMAL BUILD VEHICLES

The SKREEM monitors the signals from the tire pressure sensor/transmitters and determines if any tire has gone below the low pressure threshold LOW TIRE PRESSURE THRESHOLDS table.

LOW TIRE PRESSURE THRESHOLDS

SYSTEM STATUS INDICATOR	TIRE PRESSURE
ON	172 kPa (25 PSI)
OFF	207 kPa (30 PSI)

CRITICAL AND NON-CRITICAL SYSTEM ALERTS

CRITICAL: A critical alert will be triggered when a tire pressure has gone below a set threshold pressure. The SKREEM will display "X TIRE(S) LOW PRESSURE". "X" will be the number of tires reporting low pressure. The message will display for the duration of the current ignition cycle or until an EVIC button is pressed. If the display is removed without correcting the condition, it will reappear 300 seconds to warn the driver of the low pressure condition.

SENTRY KEY REMOTE ENTRY MODULE (Continued)

NON-CRITICAL: A non-critical alert will be triggered when no signal is received from a sensor/transmitter or when a sensor/transmitter low battery condition is detected. The EVIC will display "SERVICE TIRE PRESS. SYSTEM."

DIAGNOSIS AND TESTING - SENTRY KEY REMOTE ENTRY MODULE

NOTE: On EARLY BUILD vehicles, the SKREEM controls the functions of the SKIM and RKE modules. On NORMAL BUILD vehicles, the SKREEM controls the functions of the SKIM, RKE module and TPM system. If diagnosing the TPM, use the DRBIII® scan tool to determine if the SKREEM includes TPM system functionality.

For proper diagnosis and testing of the Sentry Key Remote Entry Module (SKREEM), use a DRBlll® and refer to the proper Body Diagnostic Procedures information.

REMOVAL

NOTE: On EARLY BUILD vehicles, the SKREEM controls the functions of the SKIM and RKE modules. On NORMAL BUILD vehicles, the SKREEM controls the functions of the SKIM, RKE module and TPM system. If diagnosing the TPM, use the DRBIII® scan tool to determine if the SKREEM includes TPM system functionality.

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Wait two minutes for the system reserve capacitor to discharge before beginning any system or component service.

(3) Remove knee blocker airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - REMOVAL).

(4) Unsnap instrument panel center stack left bezel from instrument panel assembly (Fig. 3).

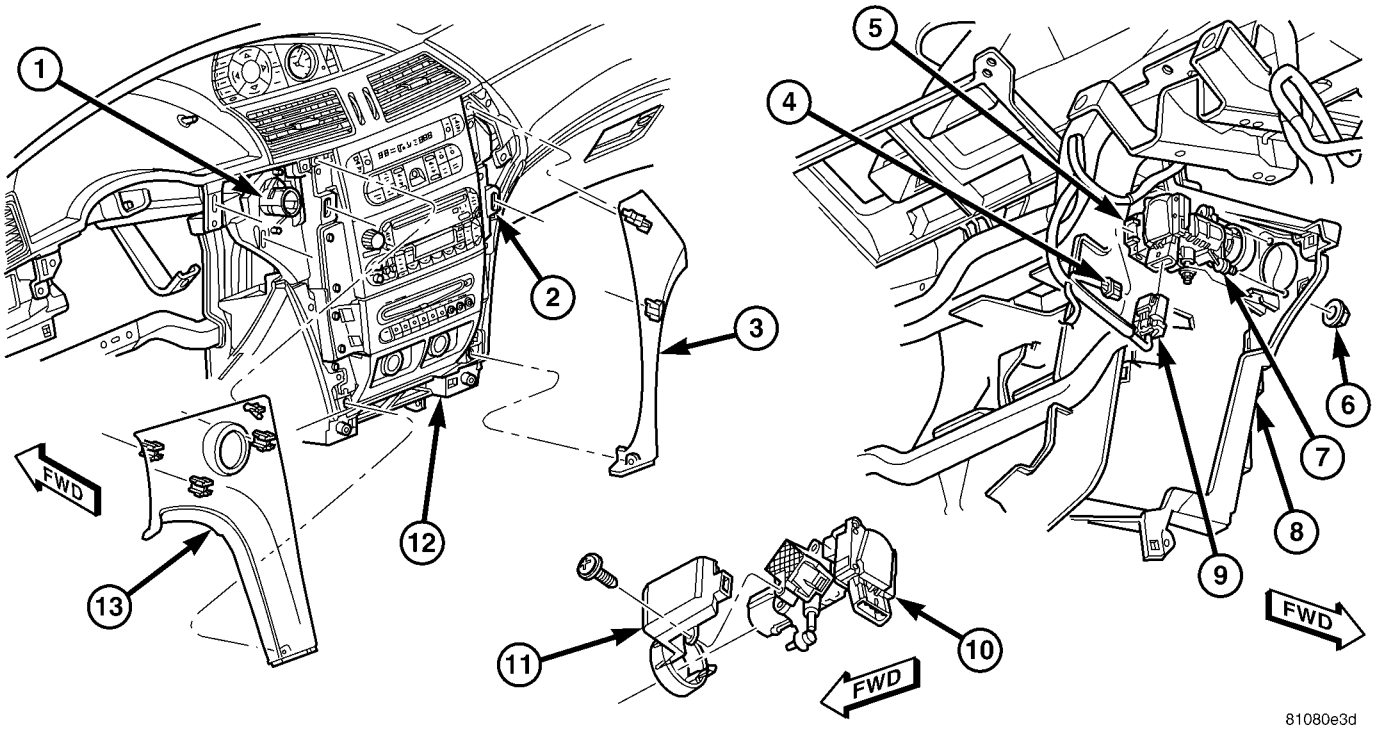


Fig. 3 SKREEM - REMOVE/INSTALL

1 - IGNITION SWITCH ASSEMBLY
2 - INSTRUMENT PANEL CENTER STACK
3 - INSTRUMENT PANEL CENTER STACK RIGHT BEZEL
4 - SKREEM ELECTRICAL CONNECTOR
5 - SKREEM
6 - IGNITION SWITCH ASSEMBLY MOUNTING NUTS
7 - IGNITION SWITCH ASSEMBLY
8 - INSTRUMENT PANEL CENTER STACK
9 - IGNITION SWITCH ELECTRICAL CONNECTOR
10 - IGNITION SWITCH
11 - SKREEM
12 - INSTRUMENT PANEL ASSEMBLY
13 - INSTRUMENT PANEL CENTER STACK LEFT BEZEL

(5) Reach up behind the left side of the center stack and disconnect the ignition switch and SKREEM electrical connectors (Fig. 4).

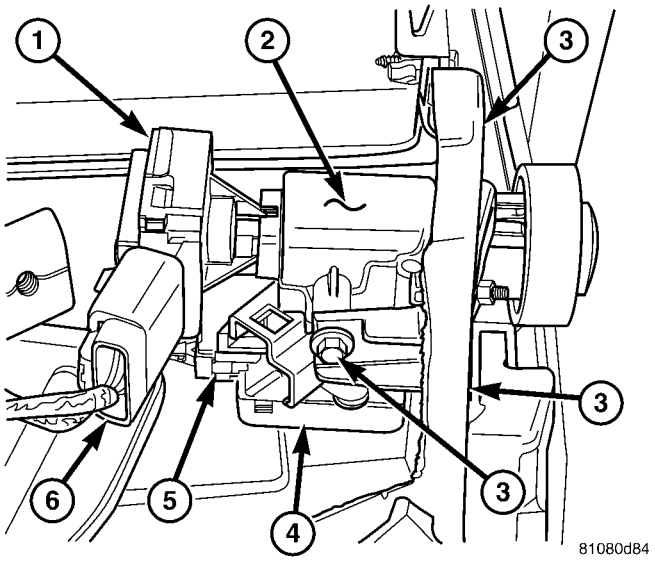


Fig. 4 IGNITION SWITCH/SKREEM ELECTRICAL CONNECTOR - REMOVE/INSTALL

1 - IGNITION SWITCH
2 - IGNITION CYLINDER ASSEMBLY
3 - IGNITION CYLINDER ASSEMBLY MOUNTING NUTS/SCREW
4 - SKREEM
5 - SKREEM ELECTRICAL CONNECTOR
6 - IGNITION SWITCH ELECTRICAL CONNECTOR

(6) From underneath the ignition switch/lock assembly, loosen the lower retaining screw (Fig. 5).

(7) Remove the two mounting nuts from the front of the instrument panel (Fig. 5).

(8) Push the ignition switch/lock assembly inward toward the bulkhead (Fig. 5).

(9) Remove the SKREEM mounting screw on the ignition lock assembly and separate the SKREEM from the ignition lock assembly (Fig. 6)

INSTALLATION

(1) Position the SKREEM on the ignition lock housing and install the retaining screw (Fig. 6)

(2) Position the ignition switch/lock assembly up in behind the instrument panel and push rearward (Fig. 5).

(3) Install the two mounting nuts to the front of the instrument panel (Fig. 5).

(4) From underneath the ignition switch/lock assembly, tighten the lower retaining screw (Fig. 5).

(5) Reach up behind the left side of the center stack and connect the ignition switch and SKREEM electrical connectors (Fig. 4).

(6) Position the instrument panel center stack left bezel over retaining slots and firmly snap into place (Fig. 3).

(7) Install the knee blocker airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - INSTALLATION).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST. FAILURE TO DO SO COULD RESULT IN OCCUPANT PERSONAL INJURY OR DEATH.

SENTRY KEY REMOTE ENTRY MODULE (Continued)

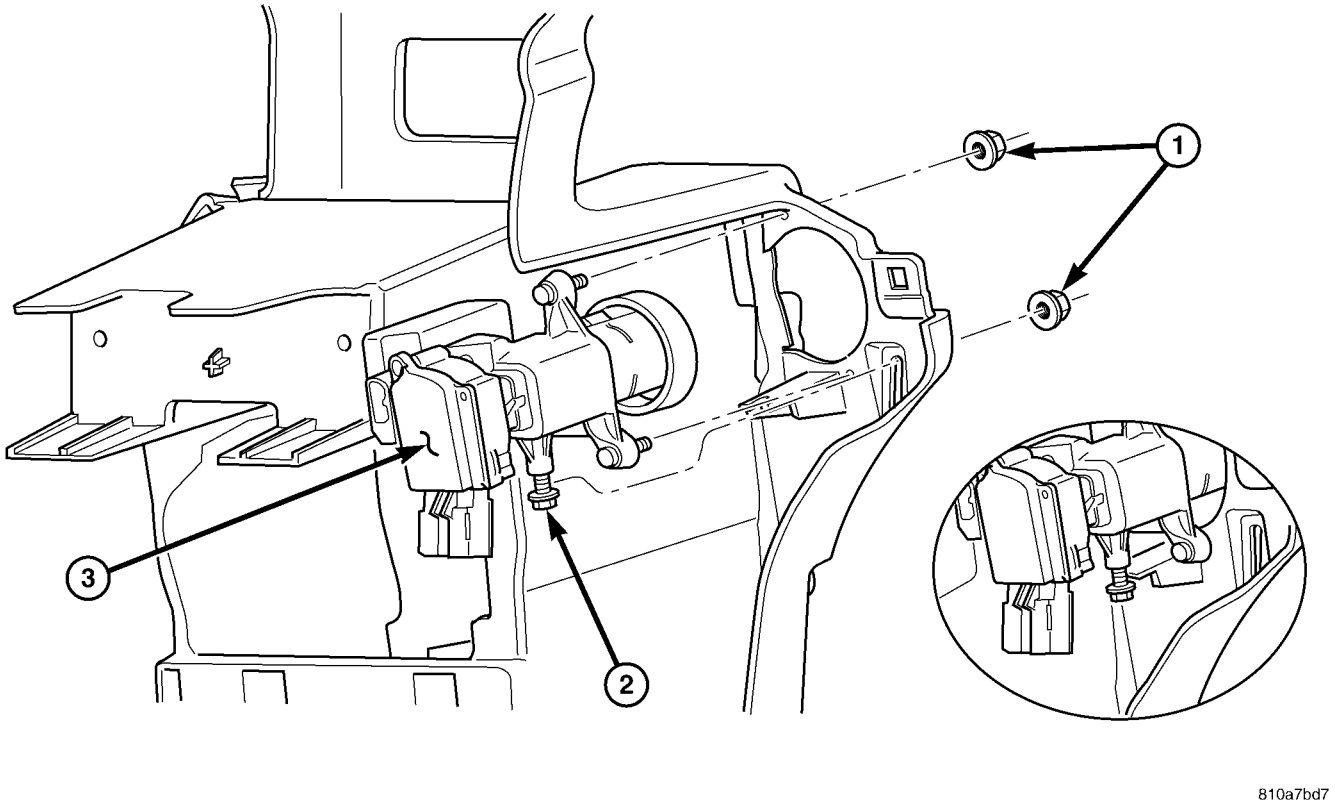


Fig. 5 SKREEM/IGNITION CYLINDER MOUNTING

1 - IGNITION SWITCH/LOCK ASSEMBLY MOUNTING NUTS
2 - IGNITION SWITCH/LOCK ASSEMBLY LOWER MOUNTING SCREW
3 - IGNITION SWITCH/LOCK ASSEMBLY

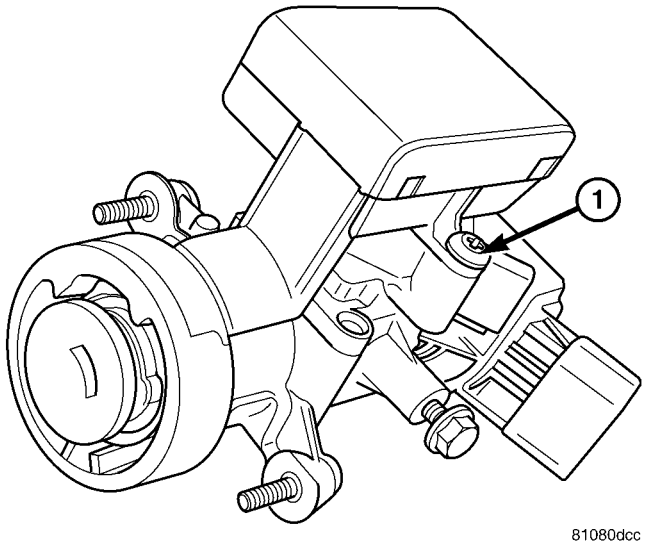


Fig. 6 SKREEM FROM IGNITION CYLINDER ASSEMBLY

1 - SKREEM TO IGNITION CYLINDER HOUSING MOUNTING SCREW

(8) Verify vehicle and system operation.
(9) Close hood.

TRANSPONDER KEY

DESCRIPTION

The Sentry Key Immobilizer System (SKIS) uses a transponder chip that is integral to each ignition key to communicate with the Sentry Key Remote Entry Module (SKREEM). Ignition keys are supplied with the vehicle when it is shipped from the factory.

OPERATION

Each Sentry Key has a unique transponder identification code permanently programmed into it by the manufacturer. Likewise, the SKREEM has a unique ″Secret Key″ code programmed into it by the manufacturer as well. When a Sentry Key is programmed into the memory of the SKREEM, the SKREEM stores the transponder identification code from the Sentry Key, and the Sentry Key learns the ″Secret Key″ code from the SKREEM. Once the Sentry Key

learns the ″Secret Key″ code of the SKREEM, it is also permanently programmed into the transponder's memory. Therefore, blank keys for the SKIS must be programmed by the SKREEM in addition to being cut to match the mechanical coding of the ignition lock cylinder (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/TRANSPONDER KEY - STANDARD PROCEDURE).

The Sentry Key's transponder is within the range of the SKREEM's transceiver antenna ring when it is inserted into the ignition lock cylinder. When the ignition switch is turned to the ON position, the SKREEM communicates with the Sentry Key via a radio frequency (RF) signal. The SKREEM determines if a valid key is present based on the information it receives from the Sentry Key. If a valid key is detected, that fact is communicated to the PCM via the PCI bus and the vehicle is allowed to continue running. If an invalid key is received by the PCM or no status at all is communicated, the vehicle will stall after two (2) seconds of running. The indicator light will be flashing at this point. The Sentry Key's transponder can not be repaired. If it is faulty or damaged, it must be replaced.

Common communication problems:

- Two transponder keys too close together.
- Speed Pass too close to transponder key.

Solid indicator that there is a system failure.

- Loss of PCM communication.
- Failed antenna circuit.

STANDARD PROCEDURE - TRANSPONDER PROGRAMMING

USING A DRB III® SCAN TOOL

All Sentry Keys included with the vehicle are preprogrammed to work with the Sentry Key Immobilizer System (SKIS) when it is shipped from the factory. The Sentry Key Remote Entry Module (SKREEM) can be programmed to recognize up to a total of eight Sentry Keys. When programming a blank Sentry Key transponder, the key must first be cut to match the ignition lock cylinder of the vehicle for which it will be used. The vehicle's four digit PIN code will be required to complete this task since you will need it to enter the Secured Access Mode in the SKREEM. The following steps must be completed using a DRB III® scan tool:

(1) Insert the blank key into the ignition and turn it to the RUN position.

(2) Using a DRB III® scan tool, select ″Theft Alarm,″ ″SKREEM,″ ″Miscellaneous,″ and then ″Program New Key.″

(3) Enter the four digit PIN code using the DRB III® scan tool. When programming is completed, the SKREEM will exit Secured Access Mode and the DRB III® scan tool will display the results of your attempt to program the key. One of five distinct results may be displayed. All five are listed below:

- **″Programming Successful″** is displayed if the Sentry Key programming is successful.
- **″Learned Key in Ignition″** is displayed if the key in the ignition has already been programmed into that vehicle's SKREEM.
- **″Eight Keys Already Learned (At The Maximum) Programming Not Done″** is displayed if eight keys have already been programmed into the SKREEM. In this case, if a new key needs to be added due to a lost or defective key, the ″Erase All Keys″ command (which requires entering the Secured Access Mode) has to be performed. Following the ″Erase All Keys″ command, all keys that will be used to operate the vehicle **MUST** be reprogrammed to the SKREEM.
- **″Programming Not Attempted″** is displayed after an ″Erase All Keys″ function is executed.
- **″Programming Key Failed″** is displayed if further diagnosis is required.

To learn additional keys, turn the ignition OFF, remove the learned key, insert the next new blank key, and repeat the steps from the beginning.

“CUSTOMER LEARN” MODE

This procedure requires access to at least two valid Sentry Keys. If two valid Sentry Keys are not available, Sentry Key programming will require the use of a DRB III® scan tool.

The steps required to program Sentry Keys with two valid Sentry Keys follows:

(1) Obtain the blank Sentry Key(s) that need to be programmed. Cut the keys to match the ignition lock cylinder mechanical key codes.

(2) Insert one of the two valid Sentry Keys into the ignition switch and turn the ignition switch to the ON position.

(3) After the ignition switch has been in the ON position for longer than three seconds, but no more than fifteen seconds, cycle the ignition switch back to the OFF position. Replace the first valid Sentry Key in the ignition lock cylinder with the second valid Sentry Key and turn the ignition switch back to the ON position. The second valid Sentry Key must be inserted within 15 seconds of removing the first valid Sentry key.

TRANSPONDER KEY (Continued)

(4) About ten seconds after the completion of Step 3, the indicator light will start to flash and a single audible chime tone will sound to indicate that the system has entered the ″Customer Learn″ programming mode.

(5) Within sixty seconds of entering the ″Customer Learn″ programming mode, turn the ignition switch to the OFF position, replace the valid Sentry Key with a blank Sentry Key transponder, and turn the ignition switch back to the ON position.

(6) About ten seconds after the completion of Step 5, a single audible chime tone will sound and the indicator light will stop flashing and stay on solid for three seconds and then turn off to indicate that the blank Sentry Key has been successfully programmed. The SKIS will immediately exit the ″Customer Learn″ programming mode and the vehicle may be started using the newly programmed Sentry Key.

These steps must be completed in their entirety for each additional Sentry Key to be programmed. If any of the above steps are not completed in the given sequence, or within the allotted time, the SKIS will exit the ″Customer Learn″ programming mode and the programming will be unsuccessful. The SKIS will also automatically exit the ″Customer Learn″ programming mode if:

- It sees a non-blank Sentry Key when it should see a blank.
- If it has already programmed eight (8) valid Sentry Keys.
- If the ignition switch is turned to the OFF position for more than about fifty (50) seconds.

NOTE: If you attempt to start the vehicle while in “Customer Learn” mode (LED flashing), the vehicle will behave as though an invalid key is being used (i.e. the engine will stall after two (2) seconds of running). No faults will be logged.

NOTE: Once a Sentry Key has been programmed to a particular vehicle, it cannot be used on any other vehicle.

VTSS/SKIS INDICATOR LAMP

DESCRIPTION

The Sentry Key Immobilizer System (SKIS) uses an indicator light to convey information on the status of the system to the customer. This light is shared with the Vehicle Theft Security System (VTSS). The light is located in the instrument panel switch pod, just to the right of the cluster. The indicator light is controlled by the Body Control Module (BCM), via Programmable Communication Interface (PCI) data bus communication with the cluster, based upon messages it receives from the Sentry Key Remote Entry Module (SKREEM) on the PCI data bus, and is hard wired to the cluster.

OPERATION

The VTSS/SKIS lamp is controlled according to Sentry Key Remote Entry (SKREEM) messages. Then, the SKREEM sends messages to the BCM to operate the light based upon the results of the SKIS self tests. The light may be actuated in two possible ways, flashing or on solid. If the light comes on and stays on solid after a power-up test, this indicates that the SKREEM has detected a system malfunction. If the SKREEM detects an invalid key when the ignition switch is moved to the ON position, it sends a message on the PCI bus to the BCM, to flash the light. The SKREEM can also send a message to flash the light and generate a single audible chime at the same time. These two events occurring simultaneously indicate that the SKIS has been placed into the ″Customer Learn″ mode (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY/TRANSPONDER KEY - STANDARD PROCEDURE). If the light comes on and stays on after the power-up test, diagnosis of the SKIS should be performed using a DRBIII® scan tool and the appropriate Body Diagnostic Procedures manual. The light is not a serviceable component.

WIPERS/WASHERS

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WIPERS/WASHERS

DESCRIPTION

FRONT WIPER AND WASHER SYSTEM

A front wiper and washer system is standard factory-installed safety equipment on this model. The front wiper and washer system is an electrically operated intermittent system that utilizes major components:

- **Body Control Module** - The Body Control Module (BCM) is located on the bulkhead under the driver side end of the instrument panel. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL MODULE - DESCRIPTION).
- ″ **Integrated Power Module** - The Integrated Power Module (IPM) is located in the engine compartment on the driver side next to the battery. The IPM receives messages over the Progammable Communication Interface (PCI) bus from the BCM and uses the information to appropriately control the front wiper functions and both the front and rear washer motors. The IPM does not control the rear wiper functions except for the rear washer pump motor.
- **Front Check Valve** - The front washer system check valve is integral to the wye (Y) fitting located on the underside of the hood panel.
- **Front Washer Nozzle** - Two fluidic front washer nozzles are secured with integral snap features to dedicated openings in the hood panel, toward the rearward edge.
- **Front Washer Plumbing** - The plumbing for the front washer system consists of rubber hoses and molded plastic fittings. The plumbing is routed along the right side of the engine compartment from the washer reservoir, and up to the hood panel to the front washer nozzle fittings.
- **Front Washer Pump/Motor** - The front washer pump/motor unit is located in a dedicated hole on the lower outboard side of the washer reservoir, behind the inner fender liner ahead of the left front wheel.
- **Front Wiper Arm** - The two front wiper arms are secured with nuts to the threaded studs on the ends of the two wiper pivot shafts, which extend through the cowl plenum cover/grille panel located near the base of the windshield.

- **Front Wiper Blade** - The two front wiper blades are secured to the two front wiper arms with an integral latch, and are parked on the glass near the bottom of the windshield when the front wiper system is not in operation.
- **Front Wiper Module** - The front wiper pivot shafts are the only visible components of the front wiper module. The remainder of the module is concealed within the cowl plenum beneath the cowl plenum cover/grille panel. The front wiper module includes the wiper module bracket, four rubber-isolated wiper module mounts, the front wiper motor, the wiper motor crank arm, the two wiper drive links, and the two front wiper pivots.
- **Right Multi-Function Switch** - The right (wiper) multi-function switch is secured to the right side of the multi-function switch mounting housing near the top of the steering column, just below the steering wheel. Only the control stalk for the right multi-function switch is visible, while the remainder of the switch is concealed beneath the steering column shrouds. The right multi-function switch contains all of the switches and control circuitry for both the front and rear wiper and washer systems.
- **Washer Reservoir** - The washer reservoir is concealed between the left inner fender shield and the left outer fender panel, behind the inner fender liner and ahead of the left front wheel. The washer reservoir filler neck is the only visible portion of the reservoir, and it is accessed from the left front corner of the engine compartment.

OPERATING MODES

The components of the front wiper and washer system are designed to provide the following operating modes:

- **Continuous Wipe Mode** - The control knob on the control stalk of the right (wiper) multi-function switch has two continuous wipe positions, Low and High. When selected, these switch positions will provide input to the BCM which will in turn send a bus message to the IPM to operate the two-speed front wiper motor to operate in a continuous low or high speed cycle.
- **Headlamps On With Wipers Mode** - The BCM provides an automatic headlamps on with wipers feature. This is a customer programmable feature. If this feature is enabled, the headlamps will turn on automatically whenever the windshield wipers are turned on; and, if the headlamps were turned on automatically when the wipers were turned on, they will also turn off automatically when the wipers are turned off. If this feature is enabled, when the automatic wiper mode is selected the headlamps will turn on automatically only after the wipers complete three automatic wipe cycles within about thirty seconds, and they will turn off automatically after three minutes elapse without any automatic wipe cycles (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE/ELECTRONIC VEHICLE INFO CENTER - STANDARD PROCEDURE - ELECTRONIC VEHICLE INFORMATION CENTER PROGRAMMING).
- **Mist Wipe Mode** - The control stalk of the right (wiper) multi-function switch has a momentary Mist position. When selected, this switch position will provide input to the BCM which will in turn send a bus message to the IPM to operate the front wipers in a low speed continuous cycle for as long as the switch is held closed, then will complete the current wipe cycle and park the front wiper blades near the base of the windshield when the switch is released.
- **Speed Sensitive Intermittent Wipe Mode** - The internal circuitry of both the right (wiper) multi-function switch, the BCM and the IPM provide an intermittent wipe mode with five delay interval selections. When this mode is selected, the BCM sends a bus message to the IPM to automatically adjusts each of the five manually selected delay intervals between complete wipe cycles to compensate for vehicle speed.
- **Washer Mode** - When the momentary front wash position of the control stalk for the right (wiper) multi-function switch is selected with the front wiper system operating in a continuous wipe mode, washer fluid will be dispensed onto the windshield glass through the washer nozzles for as long as the washer switch is held closed. When the front washer switch is actuated with the front wiper system operating in an intermittent wipe mode, washer fluid is still dispensed until the switch is released; however, the front wipers will operate in a low speed continuous cycle from the time the washer switch is closed until several wipe cycles after the switch is released, before returning to the selected intermittent wipe mode.
- **Wipe-After-Wash Mode** - When the momentary front wash position of the control stalk for the right (wiper) multi-function switch is selected with the front wiper system turned OFF, the BCM provides a message to the IPM to operate the wipe-after-wash feature. When selected, this feature will operate the front washer pump/motor and the front wipers for as long as the front washer switch is held closed, then provide several additional wipe cycles after the switch is released before parking the front wiper blades near the base of the windshield.

REAR WIPER AND WASHER SYSTEM

An electrically operated fixed interval intermittent rear wiper and washer system includes major components:

WIPERS/WASHERS (Continued)

- **Rear Washer Nozzle** - The rear washer nozzle is secured by a snap fit into a mounting hole in the liftgate spoiler assembly, above the liftgate glass. The check valve is mounting in line between the liftgate opening and liftgate.
- **Rear Washer Plumbing** - The plumbing for the rear washer system consists of rubber hoses and molded plastic fittings. The plumbing is routed along the left side of the engine compartment from the washer reservoir, through the dash into the passenger compartment, down the right side, up the right D-pillar, to the rear roof header. The plumbing is then routed through grommets in the rear roof header and the liftgate inner panel, then into the liftgate spoiler assembly to the fitting for the rear washer nozzle.
- **Rear Washer Pump/Motor** - The rear washer pump/motor is located in a dedicated hole on the lower outboard side of the washer reservoir, ahead of the left front wheel housing. The rear washer pump mounting hole is located higher on the reservoir than the front washer pump mounting hole.
- **Rear Wiper Arm** - The single rear wiper arm is secured by a nut directly to the rear wiper motor output shaft, which extends through the center of the liftgate outer panel near the base of the liftgate glass.
- **Rear Wiper Blade** - The single rear wiper blade is secured to the rear wiper arm with an integral latch, and is parked off of the liftgate flip-up glass when the rear wiper system is not in operation.
- **Rear Wiper Motor** - The rear wiper motor output shaft is the only visible component of the rear wiper motor. The remainder of the motor is concealed within the liftgate.
- **Right Multi-Function Switch** - The right (wiper) multi-function switch is secured to the right side of the multi-function switch mounting housing near the top of the steering column, just below the steering wheel. Only the control stalk for the right multi-function switch is visible. The remainder of the switch is concealed beneath the steering column shrouds. The right multi-function switch control stalk is dedicated to providing all of the driver controls for both the front and rear wiper and washer systems.
- **Washer Reservoir** - The rear washer system shares a single reservoir with the front washer system, but has its own dedicated washer pump/motor and plumbing. The washer reservoir is concealed between the left inner fender shield and the left outer fender panel, behind the inner fender liner and ahead of the left front wheel. The washer reservoir filler neck is the only visible portion of the reservoir, and it is accessed from the left front corner of the engine compartment.

OPERATING MODES

The components of the rear wiper and washer system are designed to work in concert to provide the following operating modes:

- **Continuous Wipe Mode** - When the right multi-function switch control sleeve is moved to the On position, the rear wiper will be operated at a fixed speed, continual wipe cycle until the switch sleeve is moved to the Delay or Off positions or until the ignition switch is turned to the Off position.
- **Intermittent Wipe Mode** - When the right multi-function switch control sleeve is moved to the Delay position, the rear wiper will be operated in a fixed interval, intermittent wipe cycle until the switch sleeve is moved to the On or Off positions, until the ignition switch is turned to the Off position, or until the right multi-function switch control stalk is pushed forward to activate the rear washer system. The intermittent wipe mode delay time has a fixed delay interval of about five to eight seconds between sweeps.
- **Washer Mode** - When the right multi-function switch control stalk is pushed forward to activate the rear washer system, the BCM will send a bus message to the IPM to turn on the rear washer pump motor and washer fluid will be dispensed from the washer reservoir onto the liftgate glass through the rear washer nozzle and the rear wiper will operate in a fixed cycle (not intermittent) for as long as the rear washer pump/motor unit remains energized.
- **Wipe-After-Wash Mode** - When the right multi-function switch control stalk is released from the momentary Wash position, the wipe-after-wash feature will continue to operate the rear wiper at a fixed cycle for about three additional wiper sweeps before returning to the previously selected mode.

OPERATION

FRONT WIPER/WASHER SYSTEM

The vehicle operator initiates all front wiper and washer system functions with the control stalk of the right (wiper) multi-function switch that extends from the right side of the steering column, just below the steering wheel. Rotating the control knob on the end of the control stalk selects the Off, Delay, Low, or High front wiper system operating modes. In the Delay mode, the control knob also allows the vehicle operator to select from one of five intermittent wipe Delay intervals. Pulling the right control stalk downwards actuates the momentary front wiper system Mist mode switch, while pulling the right control stalk towards the steering wheel actuates the momentary front washer system switch. The right multi-function switch provides hard wired resistor multiplexed inputs to the Body Control Module

(BCM) for all of the front wiper system functions, as well as separate hard wired sense inputs to the BCM for the high speed continuous wipe and front washer system functions. The BCM in turn sends a bus message to the IPM to activate the front wiper low speed, high speed , 5 intermittent wipe delays, wipe after wash, mist function and the washer pumps for both the front and rear wiper systems.

The front wiper and washer system will only operate when the ignition switch is in the Accessory or On positions. Battery current is directed from a B(+) fuse in the Integrated Power Module (IPM) to the wiper and washer system fused ignition switch output (run-acc) circuit. The right multi-function switch circuitry uses this battery feed to send a PCI data bus message to the BCM which will then pass it on the IPM to energize the front wipers/washers.

When diagnosing the front wiper/washer system, use of a DRBIII® scan tool and refer to the appropriate Body Diagnostic Procedures manual.

FRONT WIPER/WASHER OPERATING MODES

CONTINUOUS WIPE MODE

When the Low position of the control knob on the control stalk of the right (wiper) multi-function switch is selected, the Body Control Module (BCM) sends a PCI data bus message to the IPM to energize the wiper motor. This directs battery current through low speed brush of the front wiper motor, causing the front wipers to cycle at low speed. When the High position of the control knob is selected, the BCM sends a PCI data bus message to the IPM to energize the wiper motor. This directs battery current through the high speed brush of the front wiper motor, causing the front wipers to cycle at high speed.

When the Off position of the control knob is selected, the BCM sends a PCI data bus message to the IPM to de-energize the wiper motor, then one of two events will occur. The event that will occur depends upon the position of the wiper blades on the windshield at the moment that the control knob Off position is selected. If the wiper blades are in the down position on the windshield when the Off position is selected, the park switch that is integral to the front wiper motor is closed to ground and the wiper motor ceases to operate.

If the wiper blades are not in the down position on the windshield at the moment the Off position is selected, the park switch is closed to battery current from the fused ignition switch output (run-acc) circuit of the front wiper motor. The park switch directs this battery current to the low speed brush of the wiper motor through the wiper park switch sense circuit. This causes the wiper motor to continue running at low speed until the wiper blades are in the down position on the windshield and the park switch is again closed to ground.

INTERMITTENT WIPE MODE

When the control knob on the control stalk of the right (wiper) multi-function switch is moved to one of the five Delay interval positions, the BCM electronic intermittent wipe logic circuit responds by calculating the correct length of time between wiper sweeps based upon the selected delay interval input. The BCM monitors the changing state of the wiper motor park switch through a hard wired front wiper park switch sense circuit input. This input allows the BCM to determine the proper intervals at which to send the PCI data bus message to the IPM to energize and de-energize the front wiper motor intermittently for one low speed cycle at a time.

The BCM logic is also programmed to provide an immediate wipe cycle and begin a new delay interval timing cycle each time a shorter delay interval is selected, and to add the remaining delay timing interval to the new delay interval timing before the next wipe cycle occurs each time a longer delay interval is selected. The intermittent wipe mode delay times are speed sensitive. The BCM monitors vehicle speed messages received from the Powertrain Control Module (PCM) over the PCI data bus in order to provide the speed sensitive delay intervals. Above about sixteen kilometers-per-hour (ten miles-per-hour) the delay is driver adjustable from about one-half second to about eighteen seconds. Below about sixteen kilometers-per-hour (ten miles-per-hour) the delay times are doubled, from about one second to about thirty-six seconds.

MIST WIPE MODE

When the control stalk of the right (wiper) multi-function switch is moved to the momentary Mist position, the BCM sends a bus message to the IPM to energizes the wiper on/off relay for as long as the Mist switch is held closed, then de-energizes the relay when the state of the Mist switch input changes to open. The BCM can operate the front wiper motor in this mode for only one low speed cycle at a time, or for an indefinite number of sequential low speed cycles, depending upon how long the Mist switch is held closed.

WASH MODE

When the control stalk of the right (wiper) multi-function switch is moved to the momentary front Wash position while the control knob is in the Low or High positions, the BCM receives this information and sends a bus message to the IPM to turn on the front washer pump/motor unit. This will cause the front washer pump/motor unit to be energized for as

long as the front Wash switch is held closed, and to de-energize when the front Wash switch is released.

When the control stalk of the right (wiper) multi-function switch is moved to the momentary front Wash position while the control knob is in one of the Delay interval or Auto sensitivity positions, the front washer pump/motor operation is the same. However, the BCM sends a bus message to the IPM to energizes the wiper on/off relay to override the selected delay interval or auto sensitivity level and operate the front wiper motor in a continuous low speed mode for as long as the front Wash switch is held closed, then de-energizes the relay and reverts to the selected delay mode interval or auto sensitivity level several wipe cycles after the front Wash switch is released. The BCM detects the front Wash switch state through a hard wired washer pump motor switch output circuit input from the right multi-function switch.

WIPE-AFTER-WASH MODE

When the control stalk of the right (wiper) multi-function switch is moved to the momentary front Wash position while the control knob is in the Off position, the BCM detects that switch state through a hard wired washer pump motor switch output circuit input from the right multi-function switch. The BCM responds to this input by sending a PCI data bus message to the IPM to energize the washer pump as long as the Wash switch is held closed, then de-energizes the washer pump several wipe cycles after the front Wash switch is released. The BCM monitors the changing state of the wiper motor park switch through a hard wired front wiper park switch sense circuit input. This input allows the BCM to count the number of wipe cycles that occur after the front Wash switch state changes to open, and to determine the proper interval at which to sends a PCI data bus message to the IPM to de-energize the washer pump to complete the wipe-after-wash mode cycle.

REAR WIPER/WASHER SYSTEM

The vehicle operator initiates all rear wiper and washer system functions with the control stalk of the right multi-function switch that extends from the right side of the steering column, just below the steering wheel. Rotating the control sleeve on the control stalk to a detent position selects the rear wiper system operating mode. Moving the switch control stalk forward actuates the momentary rear washer system switch. The right multi-function switch provides hard wired outputs to the rear wiper motor and the rear washer pump/motor for all rear wiper and washer system functions.

The rear wiper and washer system will only operate when the ignition switch is in the Accessory or On positions. When the ignition switch is in the Accessory or On positions, battery current from a fuse in the IPM is provided to the right multi-function switch through a fused ignition switch output (run-acc) circuit. The internal circuitry of the right (wiper) control stalk of the right multi-function switch then provides battery current signals through a rear wiper motor control circuit and a rear wiper motor delay control circuit to the rear wiper motor. The multi-function switch circuitry also uses this battery current input to directly control the operation of the rear washer pump/motor unit.

When diagnosing the rear wiper/washer system, use of a DRBIII® scan tool and refer to the appropriate Body Diagnostic Procedures manual.

REAR WIPER/WASHER OPERATING MODES

CONTINUOUS WIPE MODE

When the On position of the control sleeve on the right (wiper) multi-function switch control stalk is selected, the multi-function switch circuitry directs a battery current signal to the rear wiper motor through the rear wiper motor control circuit, causing the rear wiper to cycle continuously at a fixed speed.

INTERMITTENT WIPE MODE

When the Delay position of the control sleeve on the right (wiper) multi-function switch control stalk is selected, the multi-function switch circuitry directs a battery current signal to the rear wiper motor through the rear wiper motor delay control circuit, causing the rear wiper to cycle intermittently at a fixed delay interval.

WASH MODE

When the control stalk of the right (wiper) multi-function switch is moved to the momentary Wash position, the multi-function switch circuitry directs battery current to the rear washer pump/motor through the rear washer pump motor control circuit, and battery current signals are also provided to the rear wiper motor on both the rear wiper motor control circuit and the rear wiper motor delay control circuit. This will cause the rear washer pump/motor to be energized and the rear wiper to cycle continuously at a fixed speed for as long as the rear Wash switch is held closed.

WIPE-AFTER-WASH MODE

When the control stalk of the right (wiper) multi-function switch is released from the momentary Wash position, the rear washer pump/motor is de-energized, but the circuitry within the rear wiper motor will provide several additional wipe cycles to complete the wipe-after-wash mode cycle.

FRONT WASHER NOZZLE

REMOVAL

(1) Open hood.

(2) Disconnect the washer hose the replacing nozzle.

(3) Push in on the sides of the nozzle (Fig. 1) and push through hood panel to remove.

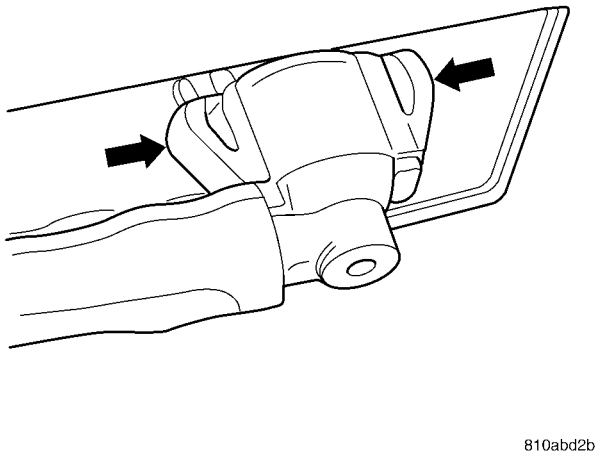


Fig. 1 FRONT WASHER NOZZLE - REMOVE/ INSTALL

INSTALLATION

(1) Position nozzle in hood panel and firmly push down through panel until snap is heard (Fig. 1).

(2) Connect washer hose (Fig. 1).

(3) Verify vehicle and system operation.

FRONT WIPER ARMS

STANDARD PROCEDURE - FRONT WIPER ARM ALIGNMENT

(1) Verify wiper blade element condition and wiper arm spring tension. Run wipers in low speed mode while applying water to the windshield. Observe the wiper blade that is chattering or skipping across the windshield. If the wiper element is not rolling over when the wiper direction reverses, align the wiper arm. The extension bar portion of the wiper arm must be twisted in the proper direction to allow the wiper element to roll over when the direction reverses.

(2) Place two small adjustable wrenches placed 50 mm (2 in.) apart on the wiper arm extension rod.

(3) Twist the extension rod slightly in the opposite direction that the element is laying on the windshield while holding the wrench closest to the pivot stationary.

(4) Repeat Step 1, and align as necessary until wiper stops chattering and wipes the windshield clear.

REMOVAL

(1) Using a trim stick (special tool #C-4755) or equivalent, gently pry the arm retaining nut cap off.

(2) Remove the nut holding wiper arm to the wiper pivot.

(3) Using a suitable two jaw puller, separate the wiper arm from the wiper pivot (Fig. 2).

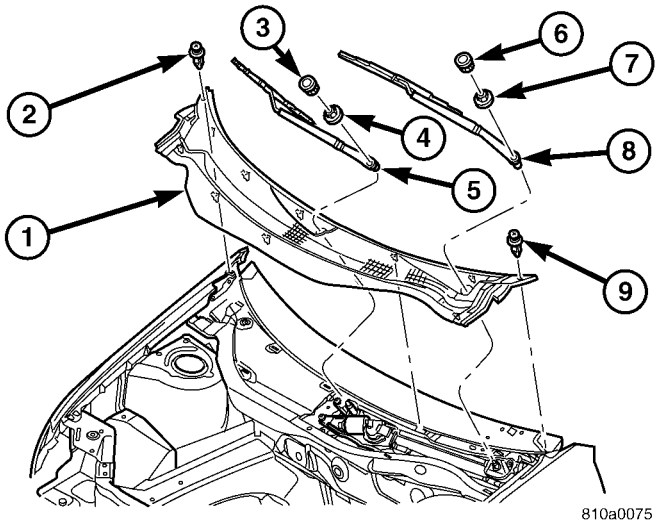


Fig. 2 FRONT WIPER ARM - REMOVE/INSTALL

1 - COWL PANEL
2 - COWL PANEL RETAINERS
3 - RIGHT WIPER ARM RETAINING NUT COVER
4 - RIGHT WIPER ARM RETAINING NUTS
5 - RIGHT WIPER ARM
6 - LEFT WIPER ARM RETAINING NUT COVER
7 - LEFT WIPER ARM RETAINING NUT
8 - LEFT WIPER ARM
9 - COWL PANEL RETAINERS

INSTALLATION

(1) Position the wiper arm onto the wiper arm pivot (Fig. 2) in approximate position with the tips of the wiper blades on the tick marks at the bottom of the windshield.

(2) Install the nut holding wiper arm to the wiper pivot.

(3) Install the retaining nut cover by firmly pressing down on cover over wiper pivot.

(4) Check wiper arm adjustment (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - STANDARD PROCEDURE).

(5) Verify vehicle and system operation.

FRONT WIPER MODULE

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cowl plenum grille (Refer to 23 - BODY/EXTERIOR/COWL PLENUM GRILLE - REMOVAL).

(3) Disconnect the wiper motor electrical connector (Fig. 3).

(4) Remove the four retaining bolts to the wiper module (Fig. 3).

(5) Remove wiper module from vehicle.

INSTALLATION

(1) Place wiper module into position in vehicle.

(2) Install the four retaining bolts to the wiper module (Fig. 3).

(3) Connect the wiper motor electrical connector (Fig. 3).

(4) Install the cowl plenum grille (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - INSTALLATION).

(5) Connect the battery negative cable

(6) Verify vehicle and system operation.

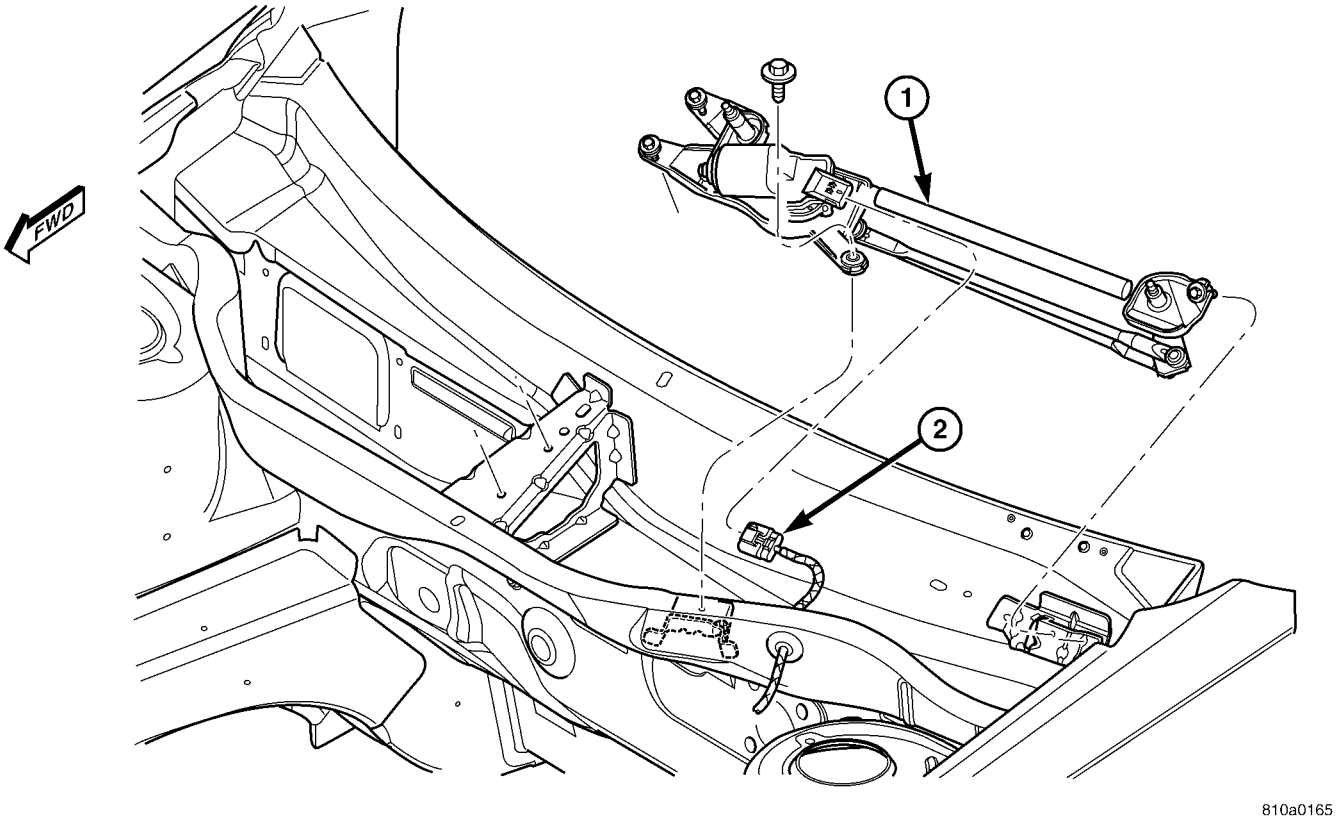


Fig. 3 FRONT WIPER MODULE - REMOVE/INSTALL

1 - FRONT WIPER MODULE
2 - FRONT WIPER MOTOR ELECTRICAL CONNECTOR

FRONT WIPER MOTOR

DIAGNOSIS AND TESTING - WIPER MOTOR

Whenever a wiper motor malfunction occurs, disconnect motor wire harness and clean the terminals. Ensure the wire harness is properly connected before starting diagnosis and repair procedures. Refer to WIPER MOTOR TEST table and the appropriate Body Diagnostic Procedures manual.

WIPER MOTOR TEST

CONDITION	POSSIBLE CAUSE	CORRECTION
WIPER OPERATES IN LOW SPEED OR INTERMITTENT ONLY.	1. HI/LO RELAY DEFECTIVE.	1. CHECK HI/LO RELAY WITH KNOWN GOOD RELAY. IF NOT OK, REPLACE HI/LO RELAY.
	2. OPEN OR DEFECTIVE CONTROL CIRCUIT IN BCM.	2. OPEN OR DEFECTIVE CIRCUIT BETWEEN HI/LO RELAY CAVITY ″C″ AND BCM CONNECTOR TERMINAL #12C. DEFECTIVE BCM. IF NOT OK, REPAIR CIRCUIT OR REFER TO BCM DIAGNOSTIC PROCEDURES.
	3. DEFECTIVE WIPER SWITCH.	3. REFER TO WIPER SWITCH DIAGNOSTIC PROCEDURES.
	4. OPEN HIGH SPEED CIRCUIT.	4. OPEN OR DEFECTIVE CIRCUIT BETWEEN HI/LO RELAY CAVITY ″D″ AND WIPER MOTOR CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT.
	5. DEFECTIVE MOTOR.	5. APPLY BATTERY JUMPER OVER TO WIPER TERMINAL #1 AND GROUND TERMINAL #5. IF NOT OK, REPLACE MOTOR.
WIPER OPERATES IN INTERMITTENT MODE ONLY.	1. DEFECTIVE WIPER SWITCH.	1. REFER TO WIPER SWITCH DIAGNOSTIC PROCEDURES.
WIPER OPERATES IN HIGH SPEED ONLY.	1. DEFECTIVE HI/LO RELAY.	1. CHECK WIPER HI/LO RELAY WITH KNOWN GOOD RELAY. REPLACE IF NOT OK.
	2. DEFECTIVE CONTROL CIRCUIT TO BCM.	2. CONTINUOUS SHORT BETWEEN HI/LO RELAY CAVITY ″C″ AND BCM CONNECTOR TERMINAL #12C. IF NOT OK, REPAIR CIRCUIT.
	3. DEFECTIVE BCM.	3. REFER TO BCM DIAGNOSTIC PROCEDURES.
	4. OPEN LOW SPEED CIRCUIT.	4. OPEN OR DEFECTIVE CIRCUIT BETWEEN HI/LO RELAY CAVITY ″E″ AND WIPER MOTOR CONNECTOR TERMINAL #2. IF NOT OK, REPAIR CIRCUIT.
	5. DEFECTIVE MOTOR.	5. APPLY BATTERY JUMPER POWER TO WIPER TERMINAL #2 AND GROUND TERMINAL #5. IF NOT OK, REPLACE MOTOR.
WIPER OPERATION SWITCHES BETWEEN LOW AND HIGH SPEED OPERATION.	1. DEFECTIVE CONTROL CIRCUIT TO BCM.	1. INTERMITTENT SHORT BETWEEN HI/LO RELAY CAVITY ″C″ AND BCM CONNECTOR TERMINAL #12C, IF NOT OK, REPAIR CIRCUIT.
	2. DEFECTIVE BCM.	2. REFER TO BCM DIAGNOSTIC PROCEDURES.

FRONT WIPER MOTOR (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
WIPER WILL NOT PARK.	1. OPEN WIPER MOTOR PARK CIRCUIT.	1. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER MOTOR CONNECTOR TERMINAL #4 AND BCM TERMINAL #3C. IF NOT OK, REPAIR CIRCUIT.
	2. DEFECTIVE BCM.	2. REFER TO BCM DIAGNOSTIC PROCEDURES.
	3. DEFECTIVE WIPER MOTOR.	3. APPLY BATTERY JUMPER POWER TO WIPER TERMINAL #2 (LOW SPEED) AND GROUND TERMINAL #5 (COMMON GROUND). POSITION AN OHMMETER ACROSS MOTOR PARK TERMINAL #4 AND COMMON GROUND. THE OHMMETER MUST INDICATE ONE SHORT, ONCE EVERY MOTOR REVOLUTION. OR WITH MOTOR IN ″PARK″ POSITION, CHECK FOR CONTINUITY BETWEEN MOTOR TERMINAL #4 AND 5. IF NOT OK, REPLACE MOTOR.
WIPER WILL NOT RUM TO PARK AFTER IGNITION OFF.	1. DEFECTIVE BCM.	1. REFER TO BCM DIAGNOSTIC PROCEDURES.
WIPER RUNS THRU PARK POSITION ON WINDSHIELD.	1. DEFECTIVE ON/OFF RELAY.	1. CHECK WIPER ON/OFF RELAY WITH KNOWN GOOD RELAY. IF NOT OK, REPLACE RELAY.
	2. OPEN ON/OFF RELAY GROUND CIRCUIT.	2. OPEN OR DEFECTIVE CIRCUIT BETWEEN ON/OFF RELAY CAVITY ″E″ AND LEFT HEADLAMP GROUND #5 OR ENGINE GROUND #1 OR 2.
WIPER RUNS CONTINUOUSLY OR INTERMITTENTLY IN LOW SPEED WITH IGNITION OR ACCESSORY ON AND WIPER SWITCH OFF.	1. DEFECTIVE ON/OFF RELAY.	1. CHECK WIPER ON/OFF RELAY WITH KNOWN GOOD RELAY. IF NOT OK, REPLACE RELAY.
	2. DEFECTIVE CONTROL CIRCUIT TO BCM.	2. INTERMITTENT OR CONTINUOUS SHORT BETWEEN ON/OFF RELAY CAVITY ″C″ AND BCM CONNECTOR TERMINAL #4C. IF NOT OK, REPAIR CIRCUIT.
	3. DEFECTIVE BCM.	3. REFER TO BCM DIAGNOSTIC PROCEDURES.
WIPER MOTOR POWER FEED FUSE OPEN.	1. POWER DISTRIBUTION CENTER (PDC) FUSE ″M″ DEFECTIVE.	1. CHECK FUSE ″M″. IF NOT OK, REPLACE FUSE.
WIPER SWITCH POWER FEED FUSE OPEN.	1. JUNCTION BLOCK FUSE #5 DEFECTIVE.	1. CHECK FUSE #5. IF NOT OK, REPLACE FUSE.

FRONT WIPER MOTOR (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
WIPER SYSTEM WILL NOT RUN.	1. PDC FUSE ″M″ BLOWN.	1. SHORT CIRCUIT BETWEEN PDC FUSE ″M″ AND ON/OFF RELAY CAVITY ″A″ OR ″D″ OR HI/LO RELAY CAVITY ″A″. SHORT CIRCUIT IN ON/OFF RELAY OR HI/LO RELAY. SHORT CIRCUIT BETWEEN ON/OFF RELAY CAVITY ″B″ AND HI/LO RELAY CAVITY ″B″. IF NOT OK, REPLACE ON/OFF RELAY OR REPAIR CIRCUIT(S).
	2. JUNCTION BLOCK FUSE #5 BLOWN.	2. SHORT CIRCUIT BETWEEN JUNCTION BLOCK FUSE #5 AND WIPER SWITCH TERMINAL #1. SHORT IN WIPER SWITCH. IF NOT OK, REPAIR CIRCUIT OR REFER TO WIPER SWITCH DIAGNOSTIC PROCEDURES.
	3. ON/OFF RELAY DEFECTIVE.	3. CHECK WITH A KNOWN GOOD RELAY. IF NOT OK, REPLACE RELAY.
	4. MOTOR CONNECTOR DEFECTIVE (LOOSE, BENT OR CORRODED).	4. CHECK MOTOR CONNECTOR FOR BENT, LOOSE, OR CORRODED CONNECTOR.
	5. OPEN POWER CIRCUIT TO MOTOR.	5. OPEN OR DEFECTIVE CIRCUIT BETWEEN PDC FUSE ″M″ AND ON/OFF RELAY CAVITY ″A″ OR ″D″. OPEN OR DEFECTIVE CIRCUIT BETWEEN ON/OFF RELAY CAVITY ″B″ AND HI/LO RELAY CAVITY ″B″. IF NOT OK, REPLACE ON/OFF RELAY OR REPAIR CIRCUIT(S).
	6. BCM CONNECTORS ″B″ AND ″C″ (LOOSE, BENT OR CORRODED).	6. CHECK BCM CONNECTORS ″B″ AND ″C″ FOR BENT, LOOSE, OR CORRODED CONNECTORS.
	7. OPEN OR DEFECTIVE CONTROL CIRCUIT TO BCM.	7. OPEN OR DEFECTIVE CIRCUIT BETWEEN ON/OFF RELAY CAVITY ″C″ AND BCM CONNECTOR TERMINAL #4C. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER SWITCH TERMINAL #5 AND BCM CONNECTOR TERMINAL #5B. DEFECTIVE BCM. IF NOT OK, REPAIR CIRCUIT(S) OR REFER TO BCM DIAGNOSTIC PROCEDURES.
	8. OPEN OR DEFECTIVE MOTOR GROUND CIRCUIT.	8. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER MOTOR CONNECTOR GROUND TERMINAL #5 AND LEFT HEADLAMP GROUND #5 OR ENGINE GROUND #1 OR 2.
	9. OPEN CIRCUIT IN MOTOR.	9. CHECK FOR OPEN CIRCUIT IN MOTOR BETWEEN LO SPEED TERMINAL #2 AND GROUND TERMINAL #5 OR BETWEEN HI SPEED TERMINAL #1 AND GROUND TERMINAL #5. IF NOT OK, REPLACE WIPER MOTOR.
	10. STRIPPED GEARS IN MOTOR.	10. APPLY BATTERY VOLTAGE TO MOTOR HI SPEED OR LO SPEED CIRCUIT. IF MOTOR RUNS AND OUTPUT CRANK RUNS INTERMITTENTLY OR DOES NOT RUN, REPLACE MOTOR.
	11. SEIZED MOTOR BEARINGS.	11. APPLY BATTERY VOLTAGE TO MOTOR HI SPEED OR LO SPEED CIRCUIT. IF MOTOR DOES NOT RUN, REPLACE MOTOR.

FRONT WIPER MOTOR (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
WIPER SYSTEM MAKES REVERSAL NOISE.	1. LOOSE ARM TO BLADE CONNECTION.	1. INSPECT CONNECTION FOR DAMAGE, BENDING, EXCESSIVE WARE. REPLACE ARM OR BLADE IF NOT OK.
	2. LOOSE MASTER LINK.	2. REPLACE MASTER LINK IF NOT OK.
	3. LOOSE SLAVE LINK.	3. REPLACE SLAVE LINK IF NOT OK.
	4. LOOSE LINKAGE PIVOT(S).	4. REPLACE LINKAGE FRAME IF NOT OK.
	5. LOOSE MOTOR CRANK.	5. TIGHTEN CRANK NUT TO SPECIFICATION.
	6. EXCESSIVE MOTOR GEARBOX ″BACKLASH″ OR LOOSE ARMATURE.	6. REPLACE WIPER MOTOR.
WIPER ARM(S) CHATTER ON WINDSHIELD.	1. PERMANENT HI OR LO TEMPERATURE SET OF BLADE ELEMENT EDGE.	1. INSPECT RUBBER ELEMENT FOR PERMANENT SET. IF NOT OK, REPLACE RUBBER ELEMENT.
	2. BENT OR DAMAGED BLADE STRUCTURE.	2. INSPECT BLADE. IF NOT OK, REPLACE BLADE.
	3. BENT OR DAMAGED ARM.	3. INSPECT ARM. IF NOT OK, REPLACE ARM.
DRIVER AND/OR PASSENGER ARM WILL NOT CYCLE (OPERATE).	1. LOOSE ARM TO PIVOT SHAFT.	1. CHECK ARM TO PIVOT SHAFT CONNECTION FOR LOOSENESS. TORQUE NUT TO SPECIFICATION.
	2. STRIPPED ARM TO PIVOT SHAFT.	2. CHECK ARM TO PIVOT SHAFT FOR STRIPPING. TORQUE NUT TO SPECIFICATION. IF NOT OK, REPLACE ARM.
DRIVER AND/OR PASSENGER ARM OR BLADE HITS COWL SCREEN OR WINDSHIELD MOLDINGS.	1. ARM(S) OUT OF POSITION.	1. REMOVE ARM OFF PIVOT SHAFT, CYCLE MODULE TO PARK. REPOSITION ARM/BLADE TO LOCATION MARKS ON WINDSHIELD. SECURE ARM TO PIVOT SHAFT AND TORQUE TO SPECIFICATION.
WIPER BLADE(S) STREAK.	1. CONTAMINATION ON BLADE ELEMENT OR WINDSHIELD.	1. CLEAN BLADE ELEMENT EDGE WITH MILD SOAP OR ALCOHOL AND WATER. CLEAN WINDSHIELD WITH MILD SOAP OR NON-ABRASIVE CLEANSER AND WATER. CHECK FOR PROPER WIPE QUALITY. IF NOT OK, REPLACE BLADE ELEMENT.
	2. BLADE ELEMENT DAMAGED.	2. REPLACE BLADE ELEMENT.

FRONT WIPER MOTOR (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
POOR COLD TEMPERATURE WIPE QUALITY.	1. NO WASHER FLUID FOR WASH/WIPE CYCLE.	1. ADD WASHER FLUID TO RESERVOIR.
	2. POOR WINDSHIELD DEFROST PERFORMANCE.	2. CHECK WINDSHIELD DEFROSTER FOR PROPER FUNCTION AND PERFORMANCE.
	3. PERMANENT HI OR LO TEMPERATURE SET OF BLADE ELEMENT EDGE.	3. INSPECT RUBBER ELEMENT FOR PERMANENT SET. IF NOT OK, REPLACE RUBBER ELEMENT.
	4. LOW ARM FORCE	4. CHECK FOR PROPER ARM FORCE. IF NOT OK, REPLACE ARM.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the wiper module (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER MODULE - REMOVAL) and (Fig. 4).

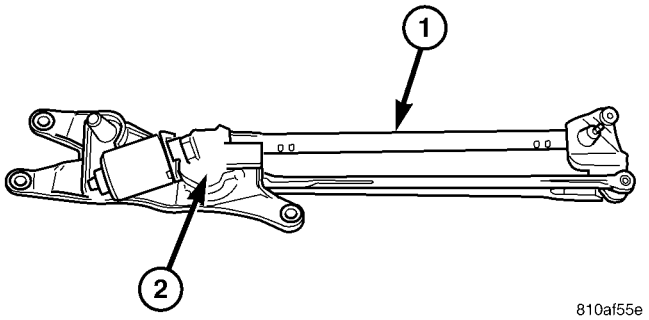


Fig. 4 FRONT WIPER MODULE- REMOVE/INSTALL

1 - FRONT WIPER MODULE
2 - FRONT WIPER MOTOR

(3) With wiper module on bench, pry apart the socket and ball joint at the end of the bell crank (Fig. 5).

(4) Remove the three front wiper motor mounting bolts (Fig. 5) and remove motor from module/linkage.

INSTALLATION

(1) Position the wiper motor into wiper module and install the three front wiper motor mounting bolts (Fig. 5).

(2) Press the socket and ball joint together on end of bell crank (Fig. 5).

(3) Install the wiper module (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER MODULE - INSTALLATION) and (Fig. 4).

(4) Connect the battery negative cable.

(5) Verify vehicle and system operation.

(6) Close hood.

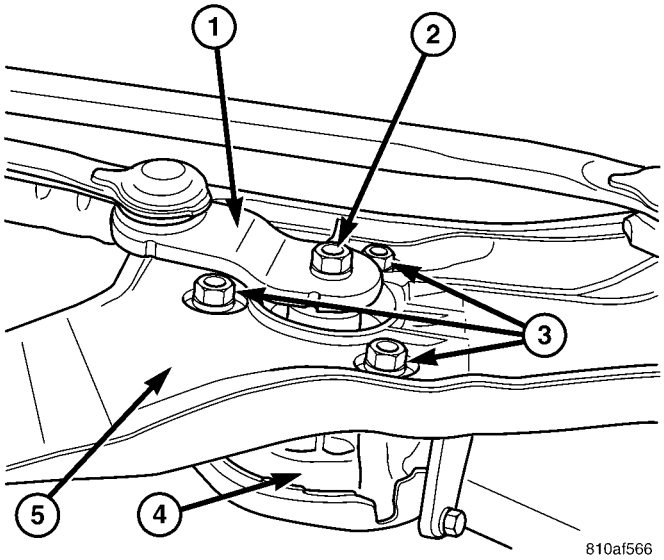


Fig. 5 FRONT WIPER MOTOR MOUNTING

1 - WIPER LINKAGE BELL CRANK
2 - BELL CRANK TO OUTPUT SHAFT RETAINING NUT
3 - FRONT WIPER MOTOR MOUNTING BOLTS
4 - FRONT WIPER MOTOR
5 - FRONT WIPER MODULE/LINKAGE

REAR WIPER ARM

REMOVAL

(1) Lift up the wiper arm nut cover by pivoting out of the way (Fig. 6).

(2) Remove the rear wiper arm retaining nut (Fig. 6).

(3) Lift rear wiper arm off the rear window and gently rock the arm back and forth until it comes off (Fig. 6). Or, use an appropriate battery terminal puller to pull arm off rear motor shaft.

REAR WIPER ARM (Continued)

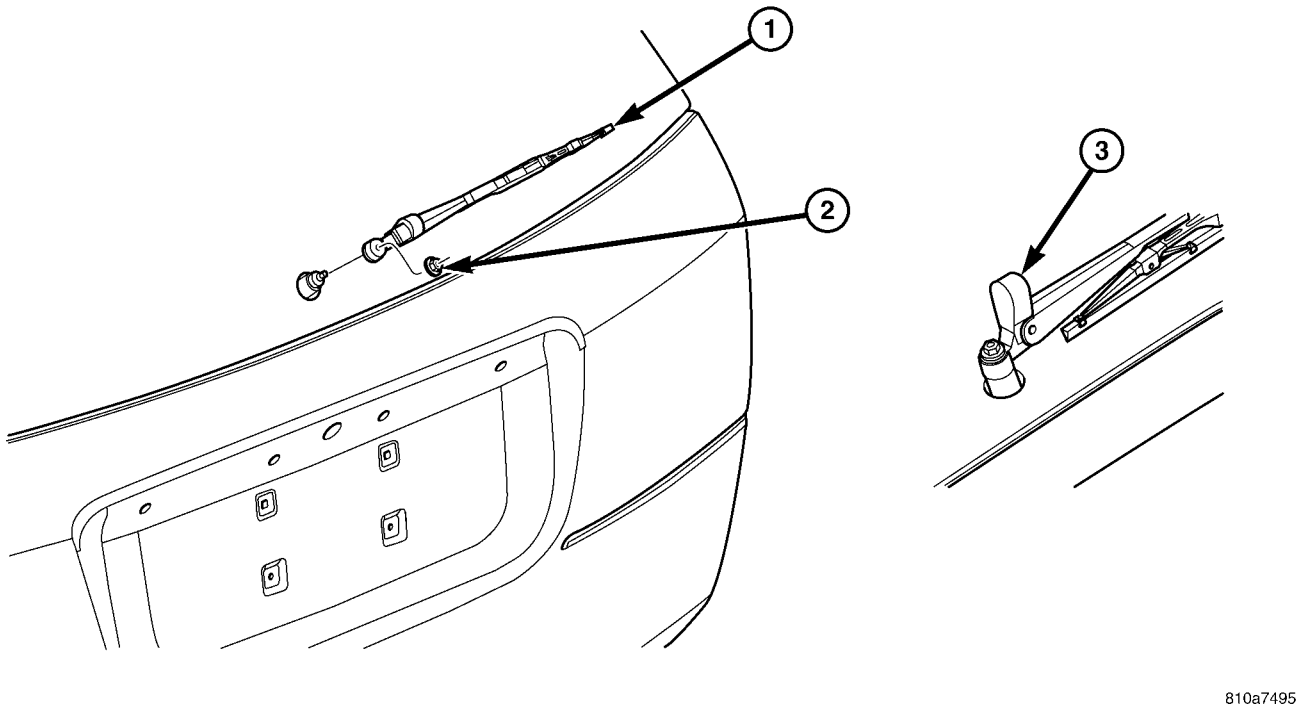


Fig. 6 REAR WIPER ARM - REMOVE/INSTALL

1 - REAR WIPER ARM
2 - REAR WIPER ARM RETAINING NUT
3 - REAR WIPER ARM RETAINING NUT COVER

INSTALLATION

(1) Place the rear wiper arm on the rear wiper motor shaft. align the wiper blade with lower EBL line.

(2) Install the rear wiper am retaining nut (Fig. 6). Torque nut to 9 ± 1.5 N·m (80 ± 15 in. lbs.).

(3) Flip down the rear wiper arm nut cover. (Fig. 6).

(4) Verify wiper arm position. Adjust as necessary.

REAR WIPER MOTOR

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove rear wiper arm (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/REAR WIPER ARM - REMOVAL).

(3) Open liftgate, remove liftgate trim panel (Refer to 23 - BODY/INTERIOR/LIFTGATE TRIM PANEL - REMOVAL).

(4) Disconnect the rear wiper motor electrical connector (Fig. 7).

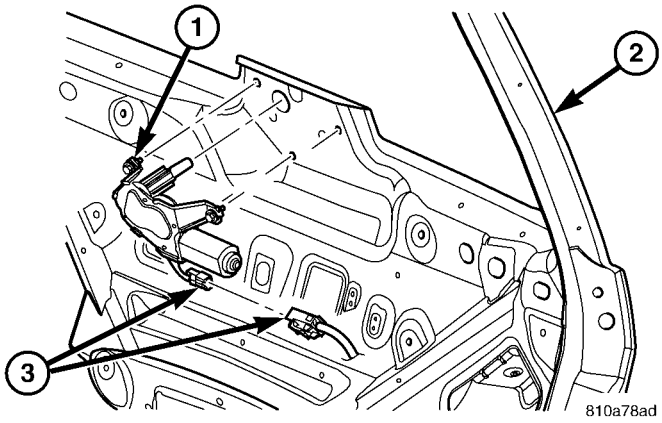


Fig. 7 REAR WIPER MOTOR ELECTRICAL CONNECTOR

1 - REAR WIPER MOTOR MOUNTING SCREW
2 - LIFTGATE
3 - REAR WIPER MOTOR ELECTRICAL CONNECTOR

(5) Remove the three rear wiper motor mounting screws (Fig. 8).

(6) Remove rear wiper motor from liftgate/vehicle.

REAR WIPER MOTOR (Continued)

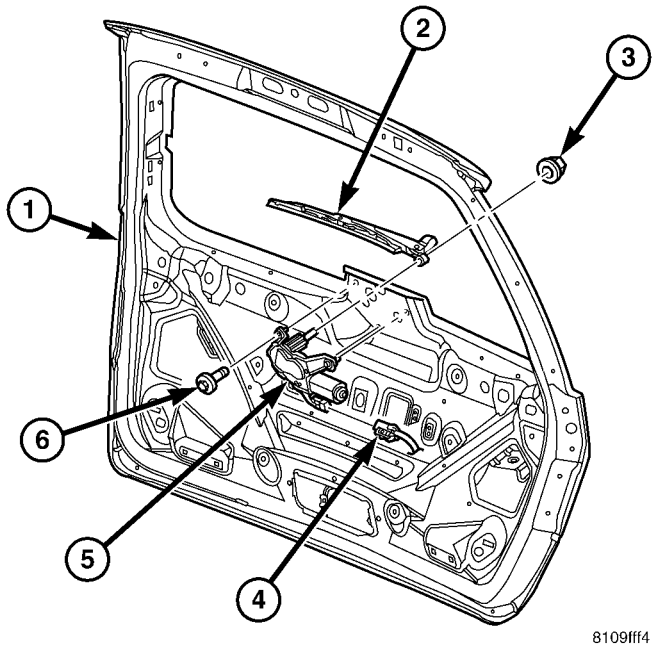


Fig. 8 REAR WIPER MOTOR - REMOVE/INSTALL

1 - LIFTGATE
2 - REAR WIPER BLADE/ARM
3 - REAR WIPER ARM RETAINING NUT
4 - REAR WIPER MOTOR ELECTRICAL CONNECTOR
5 - REAR WIPER MOTOR
6 - REAR WIPER MOTOR MOUNTING SCREWS

INSTALLATION

(1) Position the rear wiper motor into position on the liftgate and install the three rear wiper motor mounting screws (Fig. 8). Torque screws to 6 ± 1 N·m (55 ± 10 in. lbs.).

(2) Connect the rear wiper motor electrical connector (Fig. 7).

(3) Install the liftgate trim panel (Refer to 23 - BODY/INTERIOR/LIFTGATE TRIM PANEL - INSTALLATION).

(4) Install the rear wiper arm (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/REAR WIPER ARM - INSTALLATION).

(5) Connect the battery negative cable.

(6) Verify vehicle and system operation.

RIGHT MULTI-FUNCTION SWITCH

DESCRIPTION

The right (wiper) multi-function switch is secured to the right side of the multi-function switch mounting housing at the top of the steering column, just below the steering wheel (Fig. 9). The only visible component of the right multi-function switch is the control stalk that extends through a dedicated opening in the right side of the steering column shrouds. The remainder of the right multi-function switch is concealed beneath the steering column shrouds. The switch is secured to the multi-function switch mounting housing near the top of the steering column by two screws.

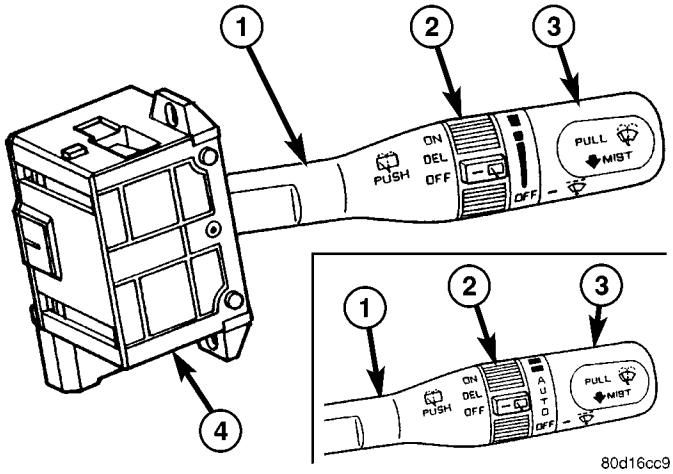


Fig. 9 RIGHT (WIPER) MULTI-FUNCTION SWITCH - TYPICAL

1 - CONTROL STALK
2 - REAR WIPER CONTROL SLEEVE
3 - FRONT WIPER CONTROL KNOB
4 - RIGHT (WIPER) MULTI-FUNCTION SWITCH

The control stalk has a control knob on its end with a flattened face to allow it to be easily rotated. Just below the control knob is a knurled control sleeve. The right multi-function switch is the primary control for the front and rear wiper and washer systems, and contains switches and circuitry to provide signals to the Body Control Module (BCM) and the rear wiper motor.

The right (wiper) multi-function switch cannot be adjusted or repaired. If any function of the switch is faulty, or if the switch is damaged, the entire switch unit must be replaced.

The right (wiper) multi-function switch supports:

- **Continuous Front Wipe Modes** - The internal circuitry and hardware of the right (wiper) multi-function switch control knob provide two continuous front wipe switch positions, low speed or high speed.
- **Continuous Rear Wipe Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control sleeve provides one continuous rear wipe switch position.
- **Front Washer Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control stalk provide front washer system operation.
- **Front Wipe-After-Wash Mode** - The internal circuitry and hardware of the right (wiper) multi-

RIGHT MULTI-FUNCTION SWITCH (Continued)

function switch control stalk provide a wipe-after-wash mode.

- **Front Wiper Mist Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control stalk provide a front wiper system mist mode.
- **Intermittent Front Wipe Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control knob provide an intermittent front wipe mode with five delay interval positions, except on models equipped with the optional automatic wiper system.
- **Intermittent Rear Wipe Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control ring provide one fixed interval intermittent rear wipe mode switch position.
- **Rear Washer Mode** - The internal circuitry and hardware of the right (wiper) multi-function switch control stalk provide rear washer system operation.

OPERATION

The right (wiper) multi-function switch uses a combination of resistor multiplexed and conventionally switched outputs to control the many functions and features it provides. The switch receives battery current on a fused ignition switch output (run-acc) circuit from a fuse in the Integrated Power Module (IPM) whenever the ignition switch is in the On or Accessory positions, and receives ground from the Body Control Module (BCM) on a windshield wiper switch return circuit. The right (wiper) multi-function switch may be diagnosed using conventional diagnostic tools and methods.

- **Continuous Front Wipe Modes** - The control knob on the end of the right (wiper) multi-function switch control stalk is rotated to an intermediate detent that is one detent rearward (counterclockwise) from the full forward (clockwise) detent to select the low speed continuous front wiper mode, or to its full forward (clockwise) detent to select the high speed continuous front wiper mode. For the low speed mode, the multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a windshield wiper switch mux circuit, and the BCM responds by sending a bus message to the IPM to energize the wiper on/off relay in the IPM for the front low speed continuous wipe mode. For the high speed mode, the multi-function switch provides the same resistor multiplexed output to the BCM on the windshield wiper switch mux circuit as the low speed mode, but also provides a ground output to the BCM on a wiper high control circuit. The BCM responds to these inputs by sending a bus message to the IPM to energize the wiper on/off relay and the wiper high/low relay in the IPM for the front high speed continuous wipe mode.
- **Continuous Rear Wipe Mode** - The control ring on the right (wiper) multi-function switch control stalk is rotated to the most forward (clockwise) detent to select the continuous rear wiper mode. The multi-function switch provides a battery current output to the rear wiper motor on a rear wiper motor control circuit to signal the rear wiper module to operate the rear wiper motor in the continuous wipe mode.
- **Front Washer Mode** - The control stalk of the right (wiper) multi-function switch is pulled toward the steering wheel to momentarily activate the front washer pump/motor in the front washer mode. The front washer pump will continue to operate in the front washer mode until the control stalk is released. The right (wiper) multi-function switch provides a battery current output to the BCM which will in turn send a buss message to the IPM to provide power to the washer pump motor to energize the front washer pump in the front washer mode.
- **Front Wiper Mist Mode** - The control stalk of the right (wiper) multi-function switch is pushed towards the floor to momentarily activate the front wiper motor in the mist mode. The front wiper motor will continue to operate in the mist mode until the control stalk is released. The right (wiper) multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a windshield wiper switch mux circuit, and the BCM responds sending a bus message to the IPM to energize the wiper on/off relay in the IPM to operate the front wiper motor momentarily at low speed to provide the front wiper mist mode.
- **Intermittent Front Wipe Mode** - The control knob on the end of the right (wiper) multi-function switch control stalk is rotated to one of five minor intermediate detents to select the desired intermittent front wipe delay interval. The control knob is rotated rearward (counterclockwise) to increase the delay, or forward (clockwise) to decrease the delay. The right (wiper) multi-function switch provides a resistor multiplexed output to the Body Control Module (BCM) on a windshield wiper switch mux circuit. The BCM responds by monitoring electronic vehicle speed messages received from the Next Generation Controller (NGC) over the Programmable Communications Interface (PCI) data bus, then sends a bus message to the IPM to energize the wiper on/off relay in the IPM to operate the front wiper motor at the proper delay intervals.
- **Intermittent Rear Wipe Mode** - The control ring on the right (wiper) multi-function switch control stalk is rotated to the center detent to select the intermittent rear wiper mode. The right (wiper) multi-function switch provides a battery current output to the rear wiper motor on a rear wiper motor

RIGHT MULTI-FUNCTION SWITCH (Continued)

delay control circuit to signal the rear wiper module to operate the rear wiper in the intermittent wipe mode.

- **Rear Washer Mode** - The right (wiper) multi-function switch control stalk is pushed forward toward the instrument panel to a momentary positions to activate the rear washer pump/motor in the rear washer mode. The rear washer pump will continue to operate in the rear washer mode until the control stalk is released. The right (wiper) multi-function switch outputs information to the BCM which will in turn send a bus message to the IPM to energize the rear washer pump motor in the rear washer mode.

DIAGNOSIS AND TESTING - RIGHT MULTI-FUNCTION SWITCH

(1) Disconnect and isolate the battery negative cable.

(2) Remove the right multi-function switch from the steering column and disconnect the instrument panel wire harness connector for the switch from the switch connector (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/RIGHT MULTI-FUNCTION SWITCH - REMOVAL).

(3) Using an ohmmeter, check the right multi-function switch continuity and resistances at the switch terminals as shown in the RIGHT (WIPER) MULTI-FUNCTION SWITCH CONTINUITY/RESISTANCE.

RIGHT (WIPER) MULTI-FUNCTION SWITCH CONTINUITY/RESISTANCE

FRONT WIPER/WASHER SWITCH			
SWITCH POSITION	**CONTINUITY BETWEEN**	**RESISTANCE BETWEEN**	**RESISTANCE**
Off	-	Pins 7 & 8	4286-4379 Ω
Intermittent Wipe 1	-	Pins 7 & 8	1445-1480 Ω
Intermittent Wipe 2	-	Pins 7 & 8	847-870 Ω
Intermittent Wipe 3	-	Pins 7 & 8	556-573 Ω
Intermittent Wipe 4	-	Pins 7 & 8	367-380 Ω
Intermittent Wipe 5	-	Pins 7 & 8	218-229 Ω
Low Speed	-	Pins 7 & 8	99-106 Ω
High Speed	Pins 7 & 9	Pins 7 & 8	99-106 Ω
Mist	-	Pins 7 & 8	49-56 Ω
Wash	Pins 1 & 3	-	-
REAR WIPER/WASHER SWITCH			
Off	-	-	-
Delay	Pins 1 & 6	-	-
On	Pins 1 & 5	-	-
Wash	Pins 1 & 5 & 6 & 2	-	-

(4) If the right multi-function switch fails any of the continuity or resistance tests, replace the faulty right multi-function switch as required.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Wait two minutes for the airbag system reserve capacitor to discharge before beginning any steering column service.

(3) Remove the upper and lower steering column shrouds (Fig. 10)(Refer to 19 - STEERING/COLUMN/UPPER SHROUD - REMOVAL) and (Refer to 19 - STEERING/COLUMN/LOWER SHROUD - REMOVAL).

(4) Disconnect the instrument panel wire harness connector for the right multi-function switch.

(5) Remove the two screws that secure the right multi-function switch to the multi-function switch mounting housing (Fig. 11).

(6) Remove the right multi-function switch from the multi-function switch mounting housing.

RIGHT MULTI-FUNCTION SWITCH (Continued)

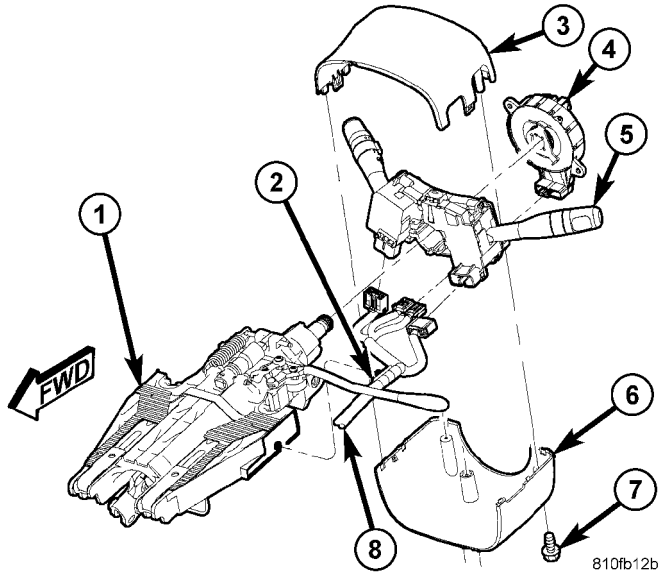


Fig. 10 UPPER/LOWER SHROUDS - REMOVE/INSTALL

1 - STEERING COLUMN
2 - WIRING HARNESS CLIP
3 - UPPER SHROUD
4 - CLOCKSPRING
5 - SWITCH MODULE
6 - LOWER SHROUD
7 - SHROUD MOUNTING SCREW
8 - WIRING HARNESS

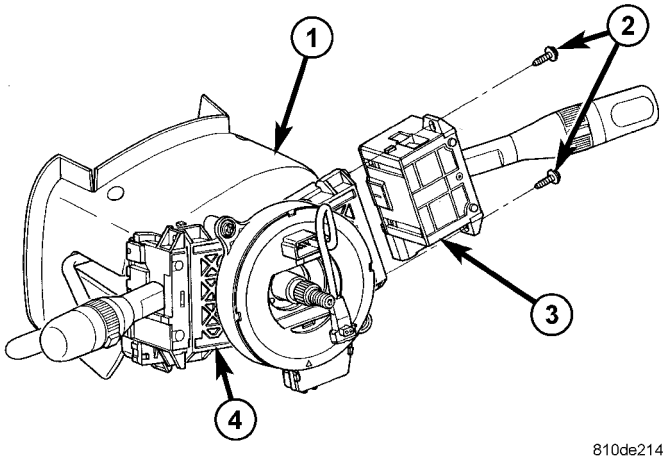


Fig. 11 RIGHT MULTI-FUNCTION SWITCH - REMOVE/INSTALL

1 - STEERING COLUMN
2 - SCREWS (2)
3 - RIGHT MULTI-FUNCTION SWITCH
4 - MULTI-FUNCTION SWITCH MOUNTING HOUSING

INSTALLATION

(1) Position the right multi-function switch onto the multi-function switch mounting housing (Fig. 11).

(2) Install the two screws that secure the right multi-function switch to the multi-function switch mounting housing. Torque the screws to 2.5 N·m (22 in. lbs.).

(3) Connect the instrument panel wire harness connector to the right multi-function switch.

(4) Install the upper and lower steering column shrouds (Fig. 10) (Refer to 19 - STEERING/COLUMN/UPPER SHROUD - INSTALLATION) and (Refer to 19 - STEERING/COLUMN/LOWER SHROUD - INSTALLATION). Torque the screws to 2 N·m (17 in. lbs.).

(5) Connect the battery negative cable.

(6) Verify vehicle and system operation.

WASHER FLUID LEVEL SWITCH

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Hoist vehicle.

(3) Turn the front of the left wheel inward.

(4) Loosen inner splash shield enough to gain access to the washer reservoir.

(5) Disconnect the electrical connector to the washer fluid level switch.

(6) Pull the washer fluid level switch from the reservoir (Fig. 17).

NOTE: Make sure to use a new grommet when installing a new switch, or even reinstalling the old switch back into the reservoir.

INSTALLATION

NOTE: Make sure to use a new grommet when installing a new switch, or even reinstalling the old switch back into the reservoir.

(1) With grommet installed, position the washer fluid level switch in grommet and firmly snap into place (Fig. 17).

(2) Connect the washer fluid level switch electrical connector.

(3) Install inner splash shield.

(4) Lower vehicle from hoist.

(5) Connect the battery negative cable.

(6) Top off washer fluid reservoir.

(7) Close hood.

(8) Verify vehicle and system operation.

WASHER HOSES

REMOVAL

(1) Remove components as necessary to access/replace washer hose(s). Refer to (Fig. 12), (Fig. 13), (Fig. 14), (Fig. 15), and (Fig. 16).

INSTALLATION

(1) Install components that were necessary to remove to access washer hose. Refer to (Fig. 12), (Fig. 13), (Fig. 14), (Fig. 15), and (Fig. 16).

(2) Verify vehicle and system operation.

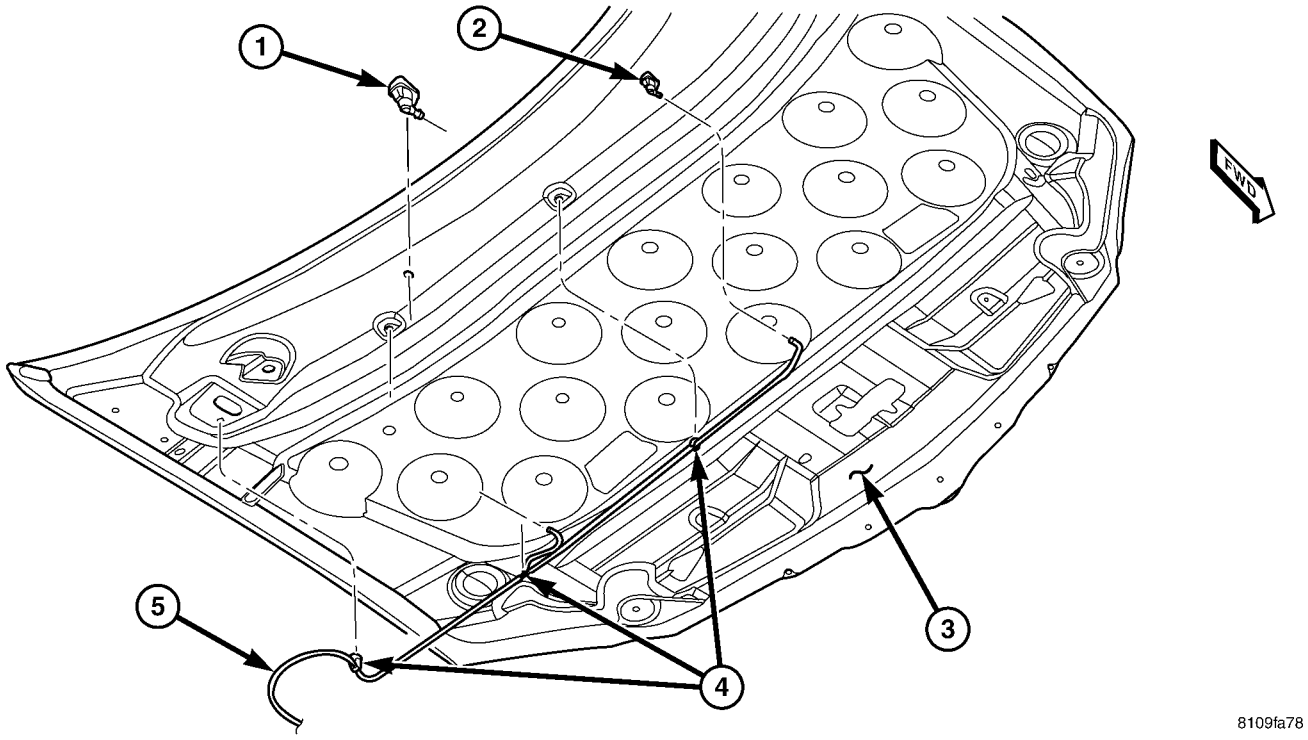


Fig. 12 HOOD HOSE ROUTING/WASHER NOZZLES

1 - FRONT WASHER NOZZLE
2 - FRONT WASHER NOZZLE INSTALLED POSITION
3 - INNER HOOD PANEL
4 - INNER HOOD PANEL HOSE RETAINING CLIPS
5 - WINDSHIELD WASHER HOSE

WASHER HOSES (Continued)

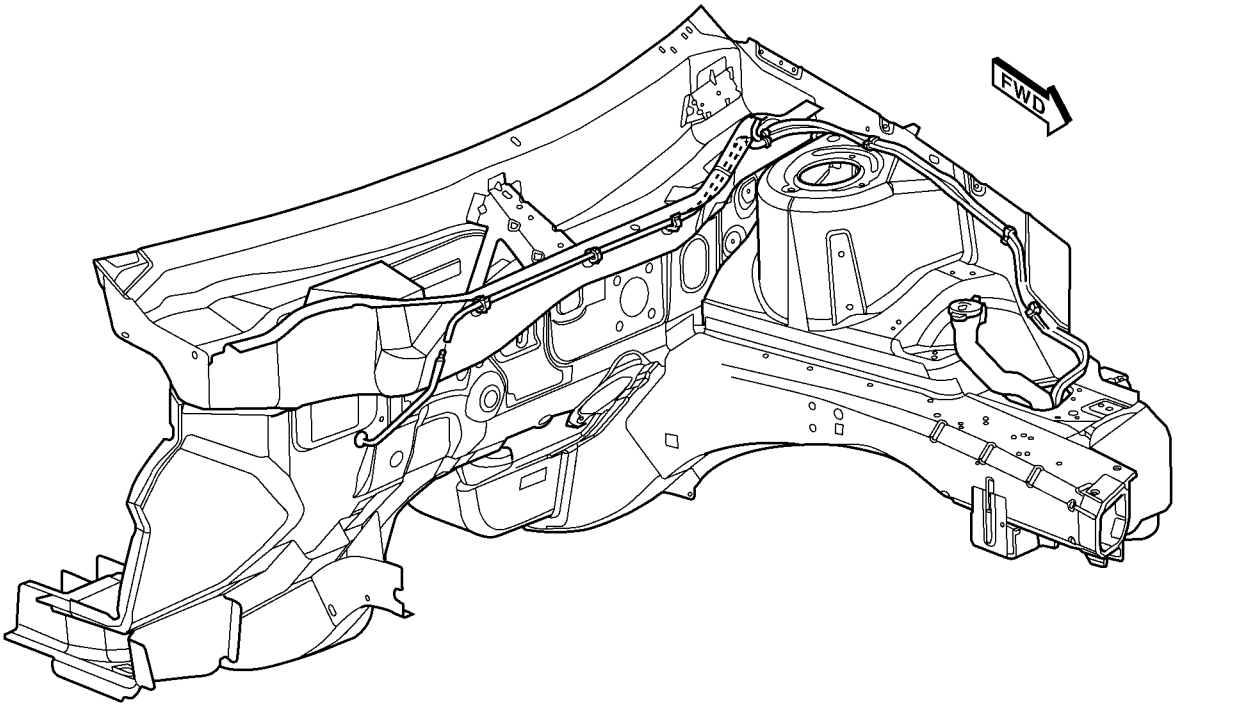


Fig. 13 ENGINE COMPARTMENT HOSE ROUTING

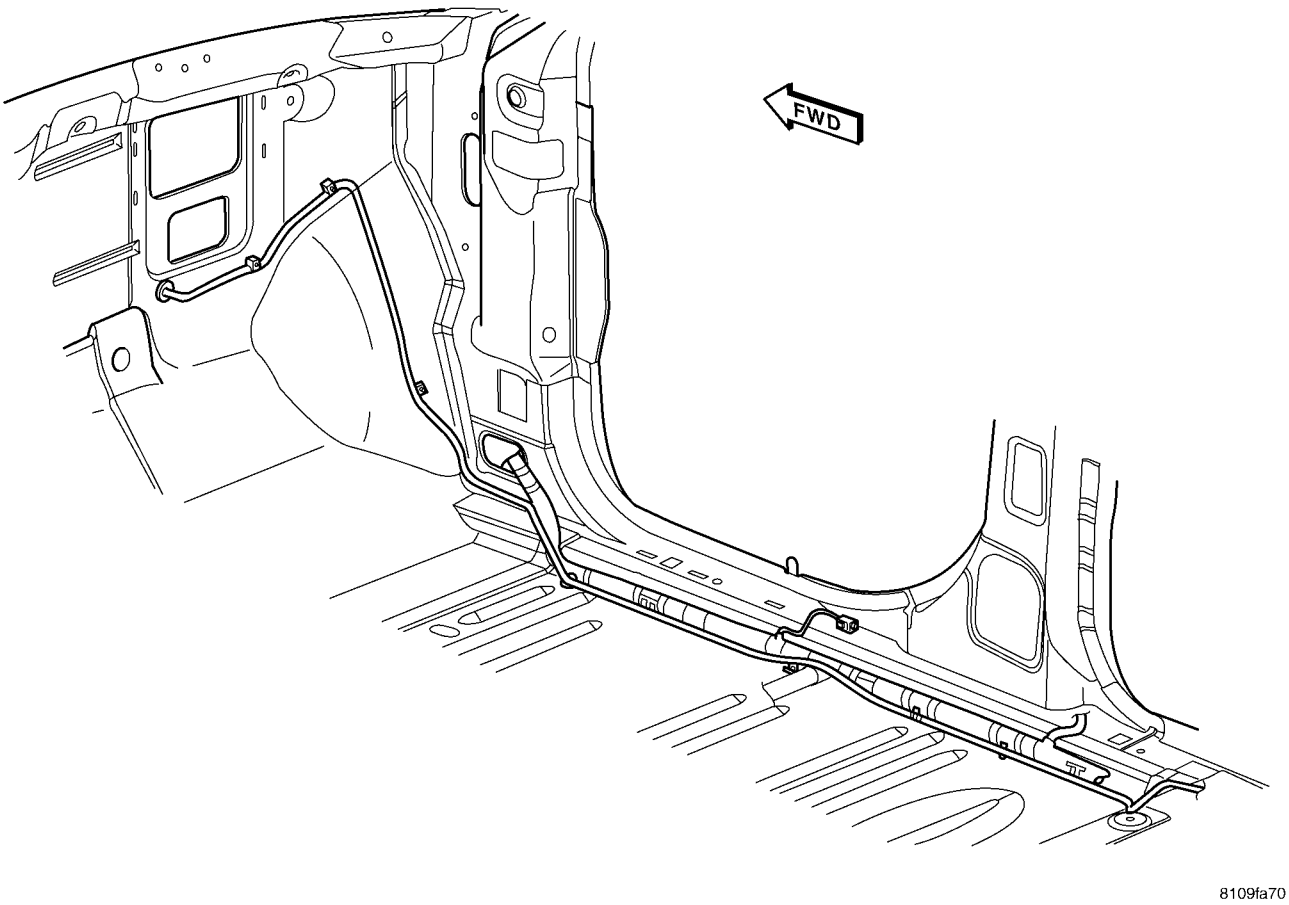


Fig. 14 BULKHEAD TO B-PILLAR HOSE ROUTING

WASHER HOSES (Continued)

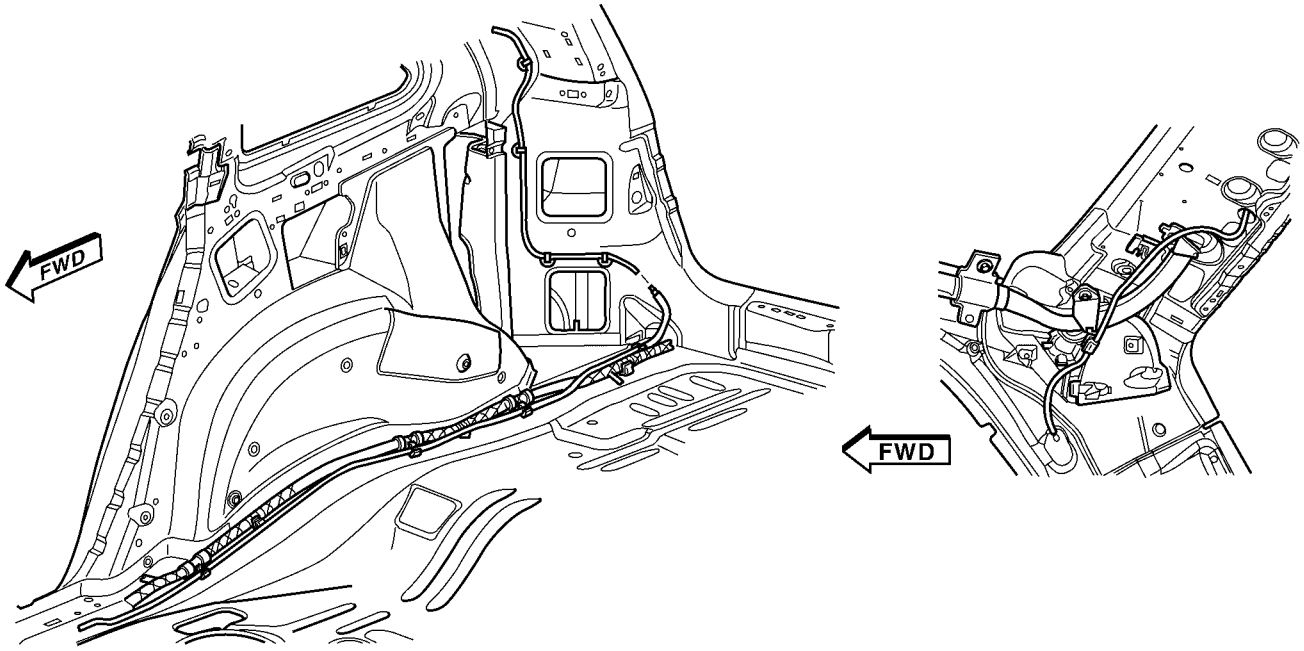


Fig. 15 C/D-PILLAR BODY HOSE ROUTING

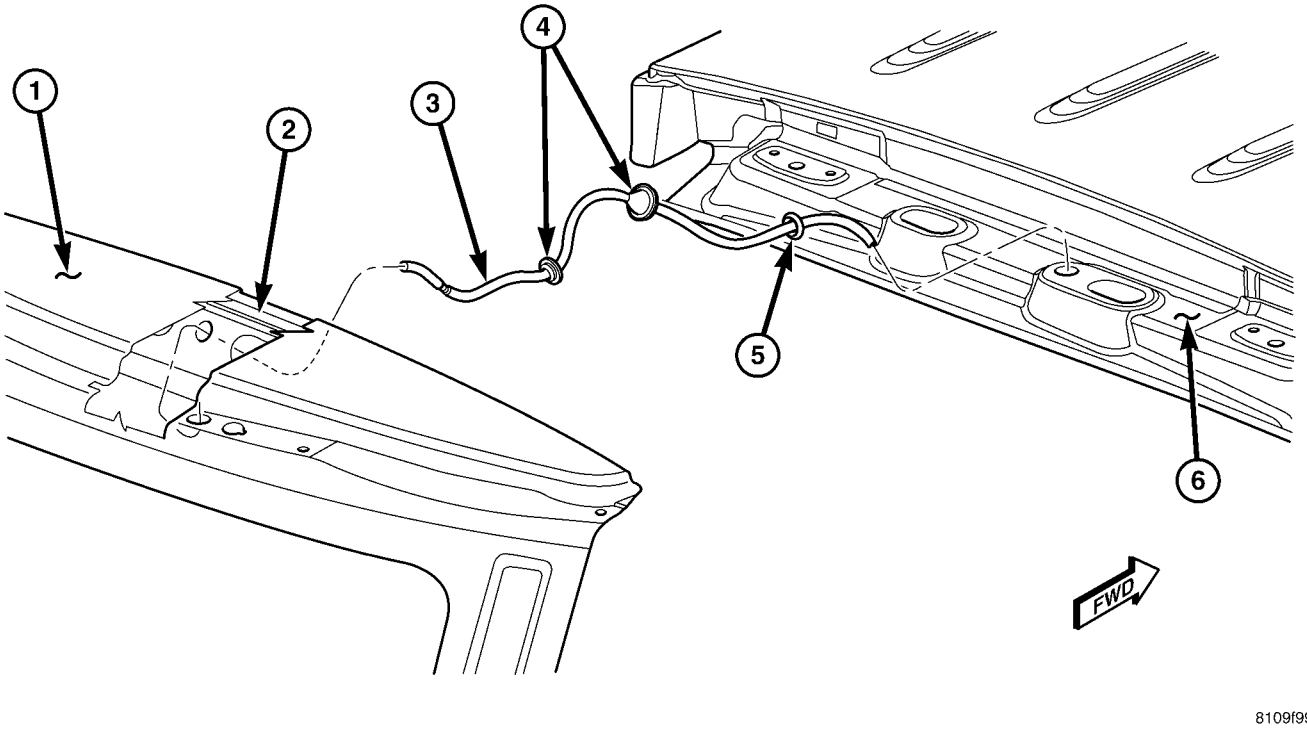


Fig. 16 BODY TO LIFTGATE HOSE ROUTING

1 - LIFTGATE SPOILER
2 - LIFTGATE INNER PANEL
3 - LIFTGATE GROMMET AND HOSE ASSEMBLY
4 - LIFTGATE GROMMET/CHECK VALVE
5 - REAR HOSE BODY GROMMET
6 - LIFTGATE OPENING REINFORCEMENT

WASHER PUMP MOTOR

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.
(2) Hoist vehicle.
(3) Turn the front of the left wheel inward.
(4) Loosen inner splash shield enough to gain access to the washer reservoir.
(5) Disconnect the electrical connector to the washer pump motor.
(6) Disconnect the washer hose to the washer pump.
(7) Pull the washer pump motor from the reservoir (Fig. 17).

NOTE: Make sure to use a new grommet when installing a new pump, or even reinstalling the old pump back into the reservoir.

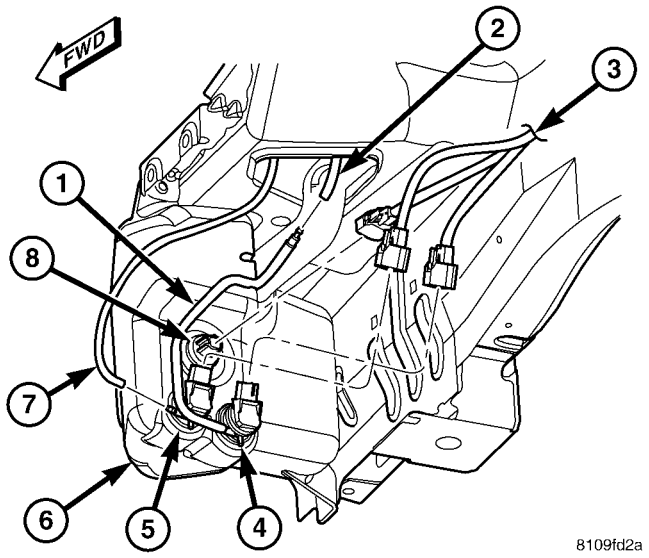


Fig. 17 WASHER PUMP MOTOR AND WASHER FLUID LEVEL SWITCH - REMOVE/INSTALL

1 - FLOOR PAN HOSE AND CONNECTOR ASSEMBLY
2 - FLOOR PAN HOSE AND CONNECTOR ASSEMBLY
3 - FRONT END LIGHTING
4 - REAR WASHER PUMP MOTOR
5 - FRONT WASHER PUMP MOTOR
6 - WASHER RESERVOIR
7 - WINDSHIELD WASHER HOSE
8 - WASHER FLUID LEVEL SWITCH

INSTALLATION

NOTE: Make sure to use a new grommet when installing a new pump, or even reinstalling the old pump back into the reservoir.

(1) With new grommet installed, position the washer pump motor in grommet and firmly snap into place (Fig. 17).
(2) Connect the washer pump motor electrical connector.
(3) Connect the washer hose to the washer pump motor.
(4) Install inner splash shield.
(5) Lower vehicle from hoist.
(6) Connect the battery negative cable.
(7) Top off washer fluid reservoir.
(8) Close hood.
(9) Verify vehicle and system operation.

WASHER RESERVOIR

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Hoist vehicle.
(3) Remove screws at the left wheel opening splash shield.
(4) Remove the lower fascia push pins.
(5) Remove upper bolts at ends (ears).
(6) Disengage lower fascia to grille clips.
(7) Pull away fascia as necessary to access reservoir.
(8) Disconnect the hoses and electrical connectors from the reservoir.
(9) Remove three retaining bolts (Fig. 18).
(10) Pull reservoir from filler tube.
(11) Transfer pumps. Make sure to use a new grommet.
(12) Transfer sensor. Make sure to use a new grommet.
(13) Drain fluid into new reservoir.

INSTALLATION

(1) Drain fluid into new reservoir.
(2) Transfer sensor. Make sure to use a new grommet.
(3) Transfer pumps. Make sure to use a new grommet.
(4) Slip reservoir onto filler tube.
(5) Install the three reservoir mounting bolts (Fig. 18).
(6) Connect the hoses and electrical connectors to the reservoir.
(7) Engage lower fascia to grille clips.
(8) Install the upper bolts at ends (ears).
(9) Install the lower fascia push pins.
(10) Install the screws at the left wheel opening splash shield.
(11) Remove vehicle off of hoist.
(12) Connect the battery negative cable.
(13) Verify vehicle and system operation.
(14) Top off washer fluid.
(15) Close hood.

WASHER RESERVOIR (Continued)

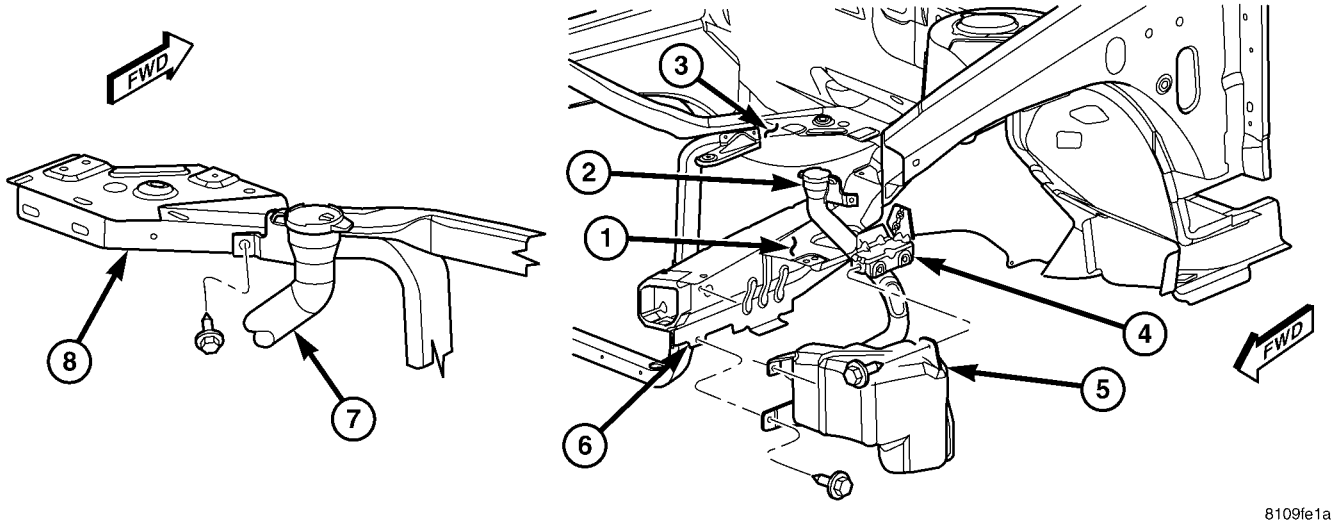


Fig. 18 FILLER TUBE AND WASHER RESERVOIR - REMOVE/INSTALL

1 - FRONT FENDER SIDE SHIELD PANEL
2 - RESERVOIR ASSEMBLY W/FILLER
3 - LOWER RADIATOR SUPPORT CROSSMEMBER
4 - FRONT FENDER REINFORCEMENT BRACKET
5 - RESERVOIR ASSEMBLY W/FILLER
6 - SIDE FRONT RAIL REINFORCEMENT
7 - RESERVOIR FILLER TUBE
8 - LOWER RADIATOR CROSSMEMBER

WASHER RESERVIOR FILLER TUBE

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Hoist vehicle.
(3) Remove screws at the left wheel opening splash shield.
(4) Remove the lower fascia push pins.
(5) Remove upper bolts at ends (ears).
(6) Disengage lower fascia to grille clips.
(7) Pull away fascia as necessary to access reservoir.
(8) Remove three reservoir retaining bolts (Fig. 18).
(9) Lower reservoir from filler tube.
(10) Remove the one retaining bolt at upper filler tube (Fig. 18).
(11) Maneuver tube from engine compartment.

INSTALLATION

(1) Maneuver tube into mounting location within engine compartment.
(2) Install the one retaining bolt at upper filler tube (Fig. 18).
(3) Slip reservoir up into filler tube.
(4) Install the three reservoir mounting bolts (Fig. 18).
(5) Engage lower fascia to grille clips.
(6) Install the upper bolts at ends (ears).
(7) Install the lower fascia push pins.
(8) Install the screws at the left wheel opening splash shield.
(9) Remove vehicle off of hoist.
(10) Connect the battery negative cable.
(11) Verify vehicle and system operation.
(12) Top off washer fluid.
(13) Close hood.

NAVIGATION/TELECOMMUNICATION

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NAVIGATION/ TELECOMMUNICATION

DESCRIPTION

WARNING: THIS VEHICLE CONTAINS MERCURY ADDED DEVICES ADDED BY THE MANUFACTURER: NAVIGATION DISPLAY. REMOVE DEVICES BEFORE VEHICLE DISPOSAL. UPON REMOVAL OF DEVICES, PLEASE REUSE, RECYCLE, OR DISPOSE OF AS HAZARDOUS WASTE.

NAVIGATION

A navigation system with a screen located in the instrument cluster is an available option on this model.

A five inch (127 mm) Thin Film Transistor (TFT) screen mounted in the instrument cluster projects color navigation information into the center of the speedometer. The information includes maps, turn identification, selection menus and instructions. The system includes a variety of choices for selecting destinations and routes.

The navigation system is operated using push-buttons located in the instrument panel switch pod. The seven push-buttons have the following labels: NAV, ENTER, CANCEL and four scroll arrows (left, right, up and down). For a description of the instrument panel switch pod (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/INSTRUMENT PANEL SWITCH POD - DESCRIPTION).

The information is displayed in map format, as turn-by–turn instruction or a combination of the two. The system also provides audio prompts for turns through the vehicle's audio system, overriding all other audio outputs (except hands free cellular system) to the front speakers that are active at the same time. Spoken prompts are recordings of a human voice.

For diagnostic information on the instrument panel switch pod (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/INSTRUMENT PANEL SWITCH POD - DIAGNOSIS AND TESTING).

TELECOMMUNICATIONS

A hands-free cellular system is an available option on this vehicle. It uses Bluetooth™ technology to provide wireless communication between the operator's compatible cellular telephone and the vehicle's on-board receiver.

The system uses voice recognition technology to control operation. The incoming voice is broadcast through the vehicle's radio speakers, automatically overriding any other audio signals on the speakers when the hands-free system is in use. A microphone in the rearview mirror picks up vehicle occupant's voices. If a call is in progress when the ignition is switched off, the hands-free system will continue to operate for up to 45 seconds as part of the Accessory Relay Delay function. Thereafter, the call can continue on the hand-held telephone.

The center console front storage compartment includes a cellular telephone holder, but the system will communicate with a telephone that is anywhere within the vehicle. However, covering the hand held phone or the hands-free phone module with a metal object may block the signal. The system will recognize up to seven telephones, each of which is given a spoken identification by the user during the setup

process. The system includes Spanish voice recognition in addition to English.

Two buttons on the rearview mirror, identified with ISO icons, control the system: A ″phone″ button turns the system on and off; a ″voice recognition″ (or voice command) button prompts the hands-free system to listen for a voice command.

OPERATION

NAVIGATION

The Navigation System uses a Global Positioning System (GPS) antenna mounted under the instrument panel to collect satellite data to compute the position of the vehicle. A navigation unit uses the satellite data to translate the vehicle location to latitude and longitude coordinates. It combines the latitude and longitude with proprietary map data from a DVD unit to perform all system calculations and display formatting. A single DVD disc contains map information for the entire United States. The DVD unit is mounted in the covered underfloor storage compartment at the rear of the vehicle. The map database information works with the application software to perform the following operations:

- Map Guidance
- Vehicle Positioning
- Address Retrieval

The system provides the following additional capabilities:

- Increase or decrease map scale using ENTER and direction arrows
- Scroll through map to a desired destination and press ENTER to begin routing
- Cancel route guidance
- Change language via the EVIC system using the MENU and STEP buttons
- Change display measurement units using the US/M button (Changes units for all displays in the vehicle)

TELECOMMUNICATION

Two buttons on the rearview mirror, identified with ISO icons, control the system: A ″phone″ button turns the system on and off; a ″voice recognition″ (or voice command) button prompts the hands-free system to listen for a voice command. The system includes the following features:

- Phonebook - Stores telephone numbers for later recall by name or other verbal identification, called a voice tag, and memory location.
- Four memory locations - Home, Work, Mobile and Pager. A maximum of 32 unique names or voice tags may be stored at the same time, with a different number in each of the four memory locations.
- Voice tag dialing - Dials the number associated with a voice tag and memory location.
- Digit dialing - Dials the telephone number by recognizing the names of the digits as they are spoken.
- Receiving calls - A voice prompt notifies the user of an incoming call. Pressing the “phone” button answers the call.
- Privacy Mode - Switches the call to the handheld telephone and the hands-free system and back again using the “voice recognition” (or “voice command”) button and a voice command, if desired.

DIAGNOSIS AND TESTING - TELECOMMUNICATION

Any diagnosis of the Telecommunication system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Information.

For complete circuit diagrams, refer to the appropriate wiring information.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

NAVIGATION/TELECOMMUNICATION (Continued)

TELECOMMUNICATION SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
Phone Not Available	1. Bluetooth phone not paired to the system.	1. Ensure that phone(s) are paired to the system.
	2. Bluetooth phone not present or turned OFF.	2. Make sure paired phone is present, turned ON and that the Bluetooth option is enabled on the phone.
	3. Bluetooth phone has low battery.	3. At low battery levels, some phones will turn off Bluetooth functionality. Ensure cellular phone is charged to an adequate level.
Phone Pairing Failed	1. Phone does not support Hands Free Profile	1. The Telecommunication system requires the cellular phone to be Bluetooth™ enabled, as well as supporting the Hands Free Profile. The customer will have to upgrade their phone to one supporting Hands Free Profile. A list of suggested phones is available at: http://www.chrysler.com/uconnect.
	2. Phone not Bluetooth enabled.	2. The Telecommunication system requires the cellular phone to be Bluetooth™ enabled. A list of suggested phones is available at: http://www.chrysler.com/uconnect.
	3. PIN entered on the phone is not the same as PIN spoken to the system.	3. The PIN spoken to the system must be the same PIN entered into the phone.
	4. Phone has reached maximum number of allowed devices paired.	4. Remove one of the previously paired devices from it's list.
Poor Voice Recognition	1. Microphone failure	1. Using a scan tool, check for microphone fault codes.
	2. Customer not waiting for the beep before speaking.	2. Ensure customer is waiting for the system ″beep″ prior to beginning the speech to be recognized.
	3. Customer not speaking in a smooth normal manner.	3. Verify that the customer is attempting to use the system with a smooth consistent voice. The system is designed to accept normal speech spoken at a normal tone, some people tend to speak to a computer loud and slow, which results in reduced performance.
	4. Rear view mirror not properly attached to mounting.	4. Mirror must be firmly mounted to the mounting location. Ensure that mirror is tightened to the specified torque.
	5. High levels of noise in vehicle compartment	5. System performance is increased when noise conditions in the vehicle are lowered. Ideal conditions include windows closed.
	6. Object interfering with microphone input	6. Verify that there is no object, hanging from the mirror, that could be obstructing the microphone.
	7. User not saying ″send″ after a pager dialing request	7. User must say ″send″ at the end of a Pager Dialing request.
	8. Other passengers talking while customer is attempting to use the system	8. Although designed for primary use by the driver, the microphone will pick up passengers in any seat of the vehicle. System performance is increased in low noise environments.

NAVIGATION/TELECOMMUNICATION (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
Phonebook names not recognized consistently	1. Phonebook names recorded in high noise conditions	1. For increased system performance, it is recommended that the phone book entries are recorded in a low noise environment. That is, vehicle in park, with windows up.
	2. Phonebook name(s) short	2. For increased performance it is recommended that the user use both first and last name as a phonebook entry. Example ″ Tom Smith″ as opposed to ″Tom″.
	3. Phonebook names recorded by another user	3. It is recommended that each user of the system record their own phonebook entries. This will increase the recognition performance.
	4. Similar names in phonebook	4. For increased system performance it is recommended that the user do not enter similar sounding names in the phonebook.
	5. Object interfering with microphone input	5. Object interfering with microphone input.
Poor Phone audio quality.	1. Microphone failure	1. Use a scan tool, and check for Microphone faults.
	2. Rear view mirror not properly fixed to mounting button	2. Mirror must be firmly mounted to the mounting location. Tighten mirror to the specified torque.
	3. System being used in high noise conditions	3. System performance is increased when noise conditions in the vehicle are lowered. Ideal conditions include windows closed.
No Phone Audio	1. Phone setting cause phone audio to be routed to handset.	1. Route audio to ″Hands free″ device.

ANTENNA - NAVIGATION

DESCRIPTION

The navigation antenna is mounted on top of the instrument panel below a trim panel on the left side. The antenna is secured with two fasteners. The antenna cable is routed along the instrument panel wire harness from the left side to the right side of the vehicle and has a connector located near the front passenger door.

OPERATION

The navigation antenna receives signals from orbiting satellites and sends these signals to the navigation unit located in the rear of the vehicle. The navigation antenna must have open space in which to operate. items placed over the antenna, parking inside etc. can have an effect on the antenna's ability to receive signals.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument panel top cover (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).

(3) Remove the mounting fasteners (Fig. 1).

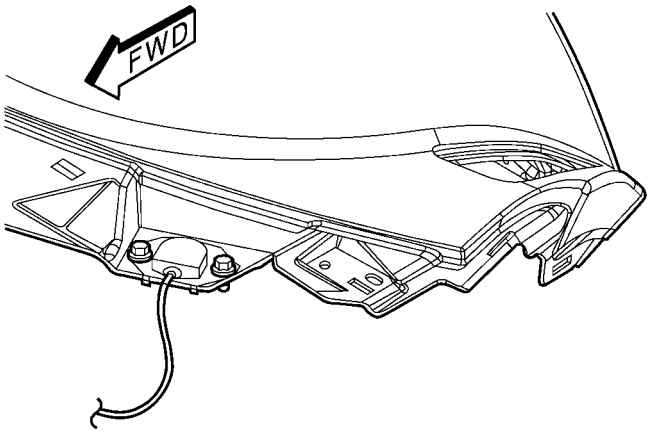


Fig. 1 ANTENNA MOUNTING

(4) Disconnect the antenna connector located near the front passenger side door (Fig. 2).

(5) Cut both ends of the cable, leaving the remaining cable in the harness.

INSTALLATION

(1) Position the replacement cable and route under the top cover, down to the right side and connect to the antenna cable.

(2) Install mounting fasteners.

(3) Install the instrument panel top cover (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - INSTALLATION).

(4) Connect the battery negative cable.

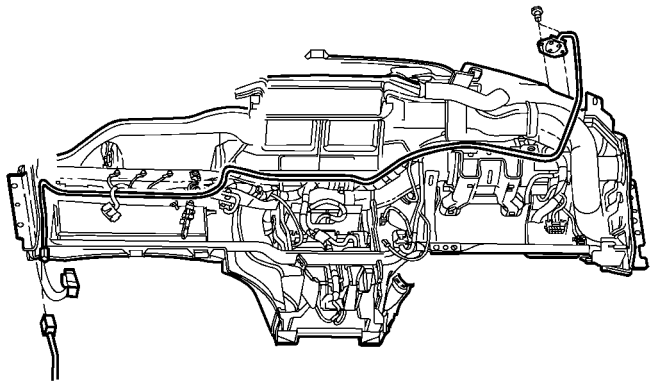


Fig. 2 ANTENNA ROUTING

ANTENNA CABLE - NAVIGATION

DESCRIPTION

The navigation antenna cable connects the instrument panel mounted antenna to the navigation unit. It connects to the antenna at the lower right side of the instrument panel. It is then routed below both door openings, along the quarter panel and around the rear of the vehicle. The other end connects to the navigation unit located in the left rear area of the vehicle.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove right side cowl trim (Refer to 23 - BODY/INTERIOR/SIDE COWL TRIM - REMOVAL).

(3) Remove right side front and rear sill scuff plates (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - REMOVAL).

(4) Remove right side quarter trim panel (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).

(5) Remove liftgate scuff plate (Refer to 23 - BODY/INTERIOR/LIFTGATE SCUFF PLATE - REMOVAL).

(6) Remove navigation unit (Refer to 8 - ELECTRICAL/NAVIGATION/TELECOMMUNICATION/NAVIGATION UNIT - REMOVAL).

(7) Disconnect antenna cable at instrument panel. Remove cable from retainers on floor. Disconnect antenna cable from navigation unit.

INSTALLATION

(1) Connect antenna cable at instrument panel. Install cable to retainers on floor. Connect antenna cable to navigation unit.

ANTENNA CABLE - NAVIGATION (Continued)

(2) Install navigation unit (Refer to 8 - ELECTRICAL/NAVIGATION/TELECOMMUNICATION/NAVIGATION UNIT - INSTALLATION).
(3) Install liftgate scuff plate (Refer to 23 - BODY/INTERIOR/LIFTGATE SCUFF PLATE - INSTALLATION).
(4) Install quarter trim panel (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).
(5) Install front and rear scuff plates (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - INSTALLATION).
(6) Install side cowl trim (Refer to 23 - BODY/INTERIOR/SIDE COWL TRIM - INSTALLATION).
(7) Connect battery negative cable.

HANDS FREE MODULE

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove the center console between the second row seats.
(3) Remove the mounting fasteners (Fig. 3).

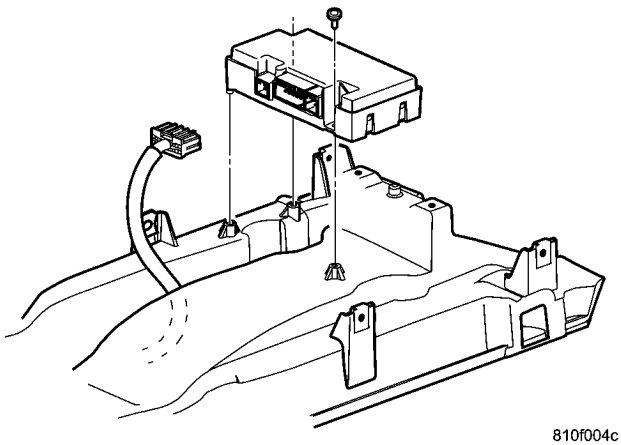


Fig. 3 HANDS FREE MODULE

(4) Disconnect the electrical harness connector and remove module.

INSTALLATION

(1) Connect electrical harness connector and position module.
(2) Install mounting fasteners.
(3) Install center console.
(4) Connect battery negative cable.

NAVIGATION UNIT

DESCRIPTION

The navigation unit is mounted to the floor panel below the rear stowage area on the left side of the vehicle.

OPERATION

The navigation unit receives signals from the instrument panel mounted antenna. Using a DVD-ROM inserted into the navigation unit, information is processed and sent to the display screen in the instrument cluster.

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove rear floor stowage tray (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - REMOVAL).
(3) Remove mounting fasteners (Fig. 4).

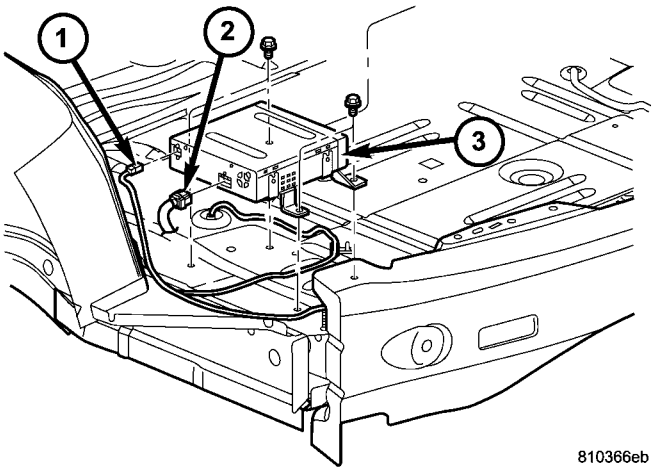


Fig. 4 NAVIGATION UNIT

1 - ANTENNA CABLE - NAVIGATION
2 - ELECTRICAL HARNESS CONNECTOR
3 - NAVIGATION UNIT

(4) Disconnect electrical harness connector and antenna cable from navigation unit.
(5) Remove navigation unit from mounting bracket.

INSTALLATION

(1) Install navigation unit to mounting bracket.
(2) Connect electrical harness connector and antenna cable to navigation unit.
(3) Position navigation unit and install mounting fasteners.
(4) Install rear floor stowage tray (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).
(5) Connect battery negative cable.

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WIRING DIAGRAM INFORMATION

DESCRIPTION

DESCRIPTION - HOW TO USE WIRING DIAGRAMS

DaimlerChrysler Corporation wiring diagrams are designed to provide information regarding the vehicles wiring content. In order to effectively use the wiring diagrams to diagnose and repair DaimlerChrysler Corporation vehicles, it is important to understand all of their features and characteristics.

Diagrams are arranged such that the power (B+) side of the circuit is placed near the top of the page, and the ground (B-) side of the circuit is placed near the bottom of the page (Fig. 1).

All switches, components, and modules are shown in the at rest position with the doors closed and the key removed from the ignition (Fig. 2).

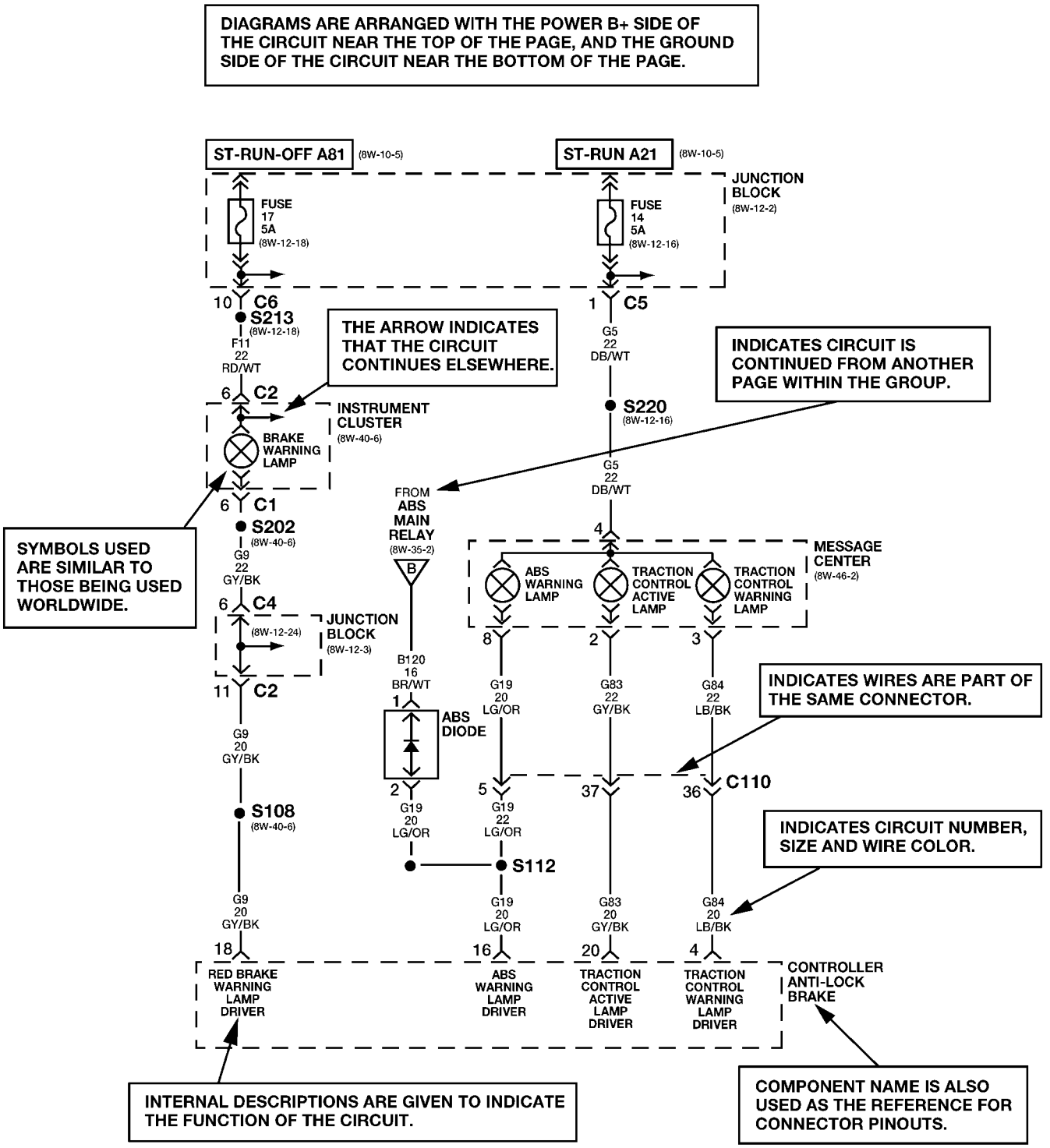
Components are shown two ways. A solid line around a component indicates that the component is complete. A dashed line around the component indicates that the component is being shown is not complete. Incomplete components have a reference number to indicate the page where the component is shown complete.

It is important to realize that no attempt is made on the diagrams to represent components and wiring as they appear on the vehicle. For example, a short piece of wire is treated the same as a long one. In addition, switches and other components are shown as simply as possible, with regard to function only.

SYMBOLS

International symbols are used throughout the wiring diagrams. These symbols are consistent with those being used around the world (Fig. 3).

WIRING DIAGRAM INFORMATION (Continued)

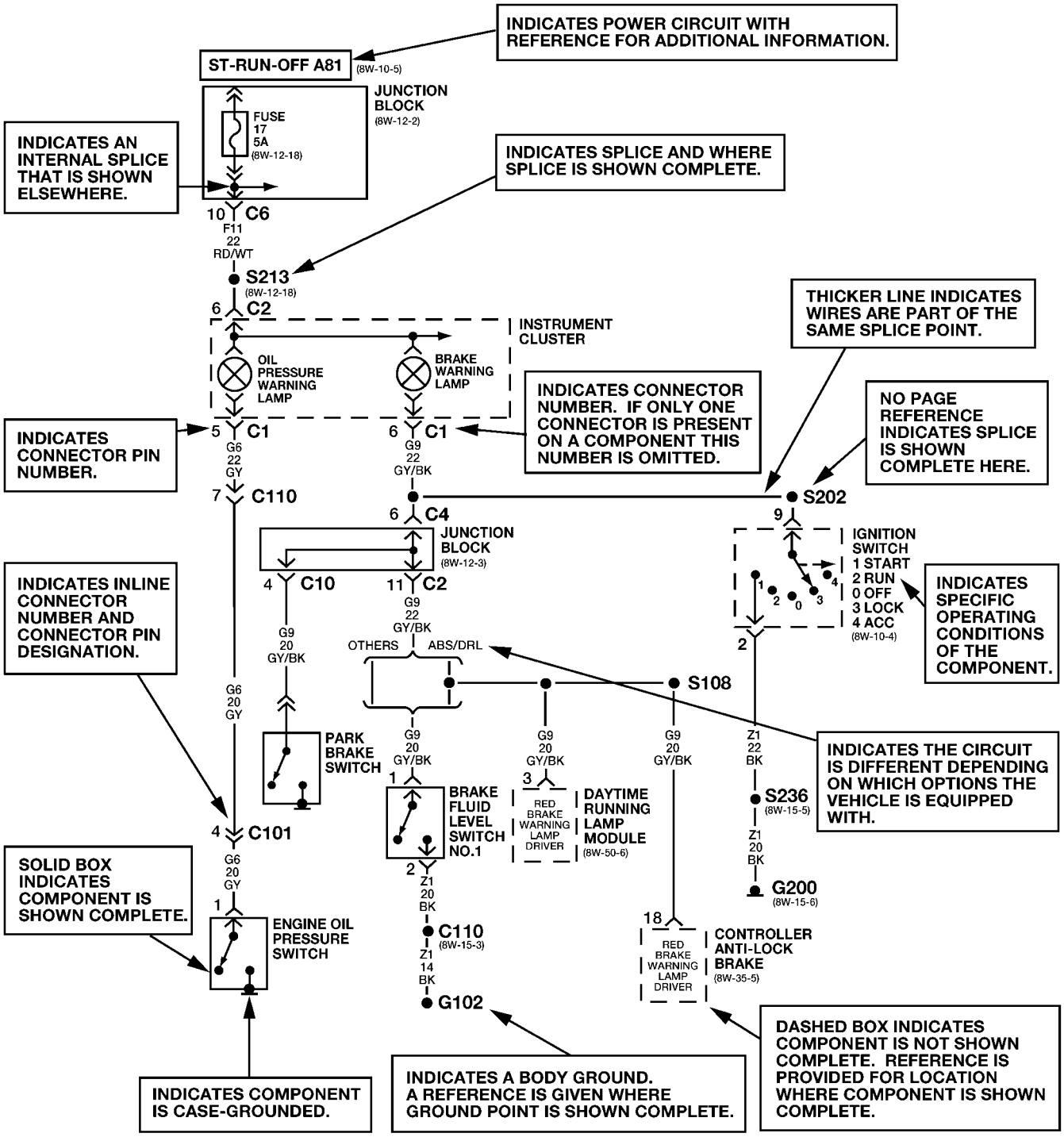


The System shown here is an EXAMPLE ONLY. It does not represent the actual circuit shown in the WIRING DIAGRAM SECTION.

80c06a01

Fig. 1 WIRING DIAGRAM EXAMPLE 1

WIRING DIAGRAM INFORMATION (Continued)



The System shown here is an EXAMPLE ONLY. It does not represent the actual circuit shown in the WIRING DIAGRAM SECTION.

80c06d02

Fig. 2 WIRING DIAGRAM EXAMPLE 2

WIRING DIAGRAM INFORMATION (Continued)

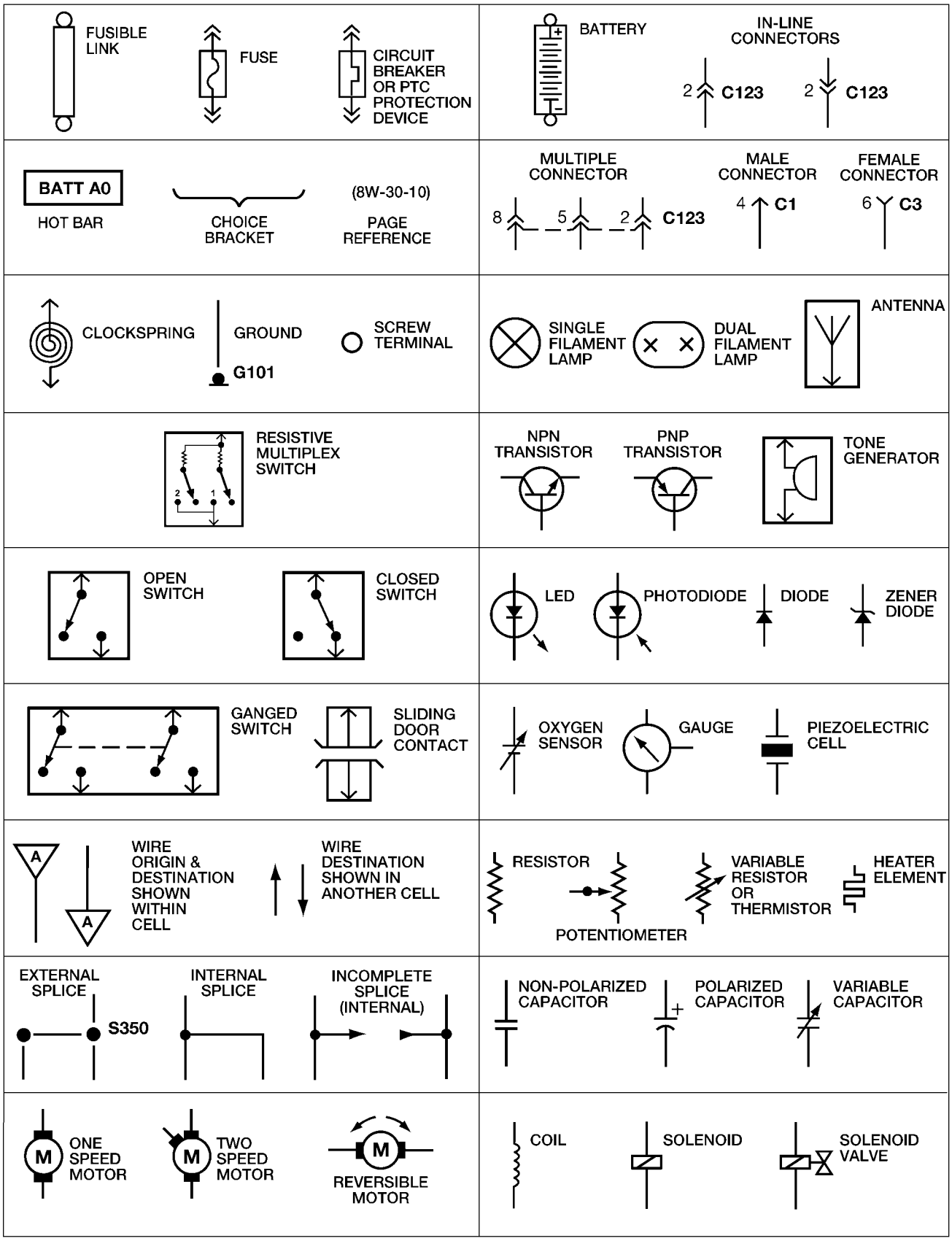


Fig. 3 WIRING DIAGRAM SYMBOLS

WIRING DIAGRAM INFORMATION (Continued)

TERMINOLOGY

This is a list of terms and definitions used in the wiring diagrams.

LHD . . . . . Left Hand Drive Vehicles
RHD . . . . . Right Hand Drive Vehicles
ATX . . Automatic Transmissions-Front Wheel Drive
MTX . . . Manual Transmissions-Front Wheel Drive
AT . . . . Automatic Transmissions-Rear Wheel Drive
MT . . . . . Manual Transmissions-Rear Wheel Drive
SOHC . . . . . Single Over Head Cam Engine
DOHC . . . . . Double Over Head Cam Engine
Export . . Vehicles Built For Sale In Markets Other Than North America
Except Export . . . . Vehicles Built For Sale In North America

DESCRIPTION - CIRCUIT INFORMATION

Each wire shown in the diagrams contains a code which identifies the main circuit, part of the main circuit, gage of wire, and color (Fig. 4).

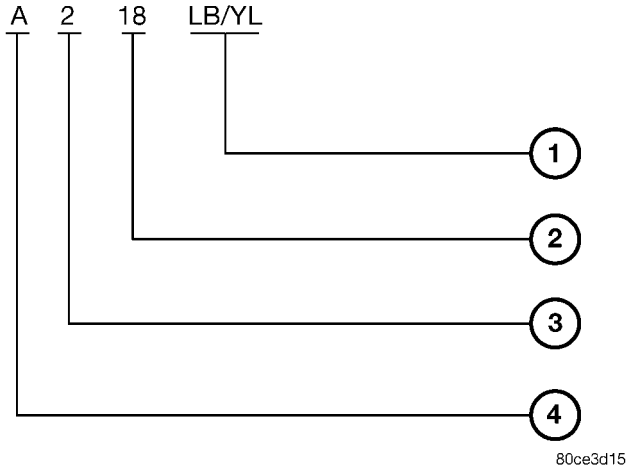


Fig. 4 WIRE CODE IDENTIFICATION

1 - COLOR OF WIRE (LIGHT BLUE WITH YELLOW TRACER
2 - GAGE OF WIRE (18 GAGE)
3 - PART OF MAIN CIRCUIT (VARIES DEPENDING ON EQUIPMENT)
4 - MAIN CIRCUIT IDENTIFICATION

WIRE COLOR CODE CHART

COLOR CODE	COLOR
BL	BLUE
BK	BLACK
BR	BROWN
DB	DARK BLUE
DG	DARK GREEN
GY	GRAY
LB	LIGHT BLUE
LG	LIGHT GREEN
OR	ORANGE
PK	PINK
RD	RED
TN	TAN
VT	VIOLET
WT	WHITE
YL	YELLOW
*	WITH TRACER

WIRING DIAGRAM INFORMATION (Continued)

DESCRIPTION - CIRCUIT FUNCTIONS

All circuits in the diagrams use an alpha/numeric code to identify the wire and it's function. To identify which circuit code applies to a system, refer to the Circuit Identification Code Chart. This chart shows the main circuits only and does not show the secondary codes that may apply to some models.

CIRCUIT IDENTIFICATION CODE CHART

CIRCUIT	FUNCTION
A	BATTERY FEED
B	BRAKE CONTROLS
C	CLIMATE CONTROLS
D	DIAGNOSTIC CIRCUITS
E	DIMMING ILLUMINATION CIRCUITS
F	FUSED CIRCUITS
G	MONITORING CIRCUITS (GAUGES)
H	MULTIPLE
I	NOT USED
J	OPEN
K	POWERTRAIN CONTROL MODULE
L	EXTERIOR LIGHTING
M	INTERIOR LIGHTING
N	MULTIPLE
O	NOT USED
P	POWER OPTION (BATTERY FEED)
Q	POWER OPTIONS (IGNITION FEED)
R	PASSIVE RESTRAINT
S	SUSPENSION/STEERING
T	TRANSMISSION/TRANSAXLE/ TRANSFER CASE
U	OPEN
V	SPEED CONTROL, WIPER/ WASHER
W	WIPERS
X	AUDIO SYSTEMS
Y	OPEN
Z	GROUNDS

DESCRIPTION - SECTION IDENTIFICATION AND INFORMATION

The wiring diagrams are grouped into individual sections. If a component is most likely found in a particular group, it will be shown complete (all wires, connectors, and pins) within that group. For example, the Auto Shutdown Relay is most likely to be found in Group 30, so it is shown there complete. It can, however, be shown partially in another group if it contains some associated wiring.

Splice diagrams in Section 8W-70 show the entire splice and provide references to other sections the splices serves. Section 8W-70 only contains splice diagrams that are not shown in their entirety somewhere else in the wiring diagrams.

Section 8W-80 shows each connector and the circuits involved with that connector. The connectors are identified using the name/number on the diagram pages.

WIRING SECTION CHART

GROUP	TOPIC
8W-01 thru 8W-09	General information and Diagram Overview
8W-10 thru 8W-19	Main Sources of Power and Vehicle Grounding
8W-20 thru 8W-29	Starting and Charging
8W-30 thru 8W-39	Powertrain/Drivetrain Systems
8W-40 thru 8W-49	Body Electrical items and A/C
8W-50 thru 8W-59	Exterior Lighting, Wipers and Trailer Tow
8W-60 thru 8W-69	Power Accessories
8W-70	Splice Information
8W-80	Connector Pin Outs
8W-91	Connector, Ground and Splice Locations

WIRING DIAGRAM INFORMATION (Continued)

DESCRIPTION - CONNECTOR, GROUND AND SPLICE INFORMATION

CAUTION: Not all connectors are serviced. Some connectors are serviced only with a harness. A typical example might be the Supplemental Restraint System connectors. Always check parts availability before attempting a repair.

IDENTIFICATION

In-line connectors are identified by a number, as follows:

- In-line connectors located in the engine compartment are C100 series numbers
- In-line connectors located in the Instrument Panel area are C200 series numbers.
- In-line connectors located in the body are C300 series numbers.
- Jumper harness connectors are C400 series numbers.
- Grounds and ground connectors are identified with a “G” and follow the same series numbering as the in-line connectors.
- Splices are identified with an “S” and follow the same series numbering as the in-line connectors.
- Component connectors are identified by the component name instead of a number. Multiple connectors on a component use a C1, C2, etc. identifier.

LOCATIONS

Section 8W-91 contains connector/ground/splice location illustrations. The illustrations contain the connector name (or number)/ground number/splice number and component identification. Connector/ground/splice location charts in section 8W-91 reference the figure numbers of the illustrations.

The abbreviation T/O is used in the component location section to indicate a point in which the wiring harness branches out to a component. The abbreviation N/S means Not Shown in the illustrations

WARNINGS - GENERAL

WARNINGS provide information to prevent personal injury and vehicle damage. Below is a list of general warnings that should be followed any time a vehicle is being serviced.

WARNING: ALWAYS WEAR SAFETY GLASSES FOR EYE PROTECTION.

WARNING: USE SAFETY STANDS ANYTIME A PROCEDURE REQUIRES BEING UNDER A VEHICLE.

WARNING: BE SURE THAT THE IGNITION SWITCH ALWAYS IS IN THE OFF POSITION, UNLESS THE PROCEDURE REQUIRES IT TO BE ON.

WARNING: SET THE PARKING BRAKE WHEN WORKING ON ANY VEHICLE. AN AUTOMATIC TRANSMISSION SHOULD BE IN PARK. A MANUAL TRANSMISSION SHOULD BE IN NEUTRAL.

WARNING: OPERATE THE ENGINE ONLY IN A WELL-VENTILATED AREA.

WARNING: KEEP AWAY FROM MOVING PARTS WHEN THE ENGINE IS RUNNING, ESPECIALLY THE FAN AND BELTS.

WARNING: TO PREVENT SERIOUS BURNS, AVOID CONTACT WITH HOT PARTS SUCH AS THE RADIATOR, EXHAUST MANIFOLD(S), TAIL PIPE, CATALYTIC CONVERTER AND MUFFLER.

WARNING: DO NOT ALLOW FLAME OR SPARKS NEAR THE BATTERY. GASES ARE ALWAYS PRESENT IN AND AROUND THE BATTERY.

WARNING: ALWAYS REMOVE RINGS, WATCHES, LOOSE HANGING JEWELRY AND AVOID LOOSE CLOTHING.

DIAGNOSIS AND TESTING - WIRING HARNESS

TROUBLESHOOTING TOOLS

When diagnosing a problem in an electrical circuit there are several common tools necessary. These tools are listed and explained below.

- Jumper Wire - This is a test wire used to connect two points of a circuit. It can be used to bypass an open in a circuit.

WARNING: NEVER USE A JUMPER WIRE ACROSS A LOAD, SUCH AS A MOTOR, CONNECTED BETWEEN A BATTERY FEED AND GROUND.

- Voltmeter - Used to check for voltage on a circuit. Always connect the black lead to a known good ground and the red lead to the positive side of the circuit.

CAUTION: Most of the electrical components used in today’s vehicles are Solid State. When checking voltages in these circuits, use a meter with a 10 - megohm or greater impedance rating.

WIRING DIAGRAM INFORMATION (Continued)

• Ohmmeter - Used to check the resistance between two points of a circuit. Low or no resistance in a circuit means good continuity.

CAUTION: Most of the electrical components used in today's vehicles are Solid State. When checking resistance in these circuits use a meter with a 10 - megohm or greater impedance rating. In addition, make sure the power is disconnected from the circuit. Circuits that are powered up by the vehicle's electrical system can cause damage to the equipment and provide false readings.

• Probing Tools - These tools are used for probing terminals in connectors (Fig. 5). Select the proper size tool from Special Tool Package 6807, and insert it into the terminal being tested. Use the other end of the tool to insert the meter probe.

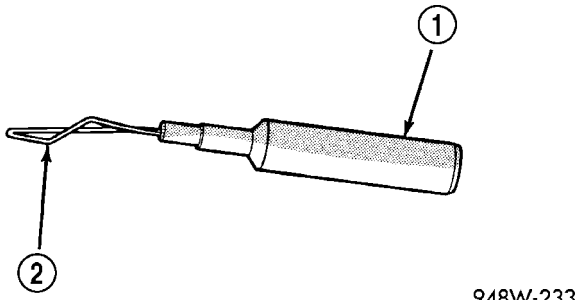


Fig. 5 PROBING TOOL

1 - SPECIAL TOOL 6801
2 - PROBING END

INTERMITTENT AND POOR CONNECTIONS

Most intermittent electrical problems are caused by faulty electrical connections or wiring. It is also possible for a sticking component or relay to cause a problem. Before condemning a component or wiring assembly, check the following items.

- Connectors are fully seated
- Spread terminals, or terminal push out
- Terminals in the wiring assembly are fully seated into the connector/component and locked into position
- Dirt or corrosion on the terminals. Any amount of corrosion or dirt could cause an intermittent problem
- Damaged connector/component casing exposing the item to dirt or moisture
- Wire insulation that has rubbed through causing a short to ground
- Some or all of the wiring strands broken inside of the insulation
- Wiring broken inside of the insulation

TROUBLESHOOTING WIRING PROBLEMS

When troubleshooting wiring problems there are six steps which can aid in the procedure. The steps are listed and explained below. Always check for non-factory items added to the vehicle before doing any diagnosis. If the vehicle is equipped with these items, disconnect them to verify these add-on items are not the cause of the problem.

(1) Verify the problem.

(2) Verify any related symptoms. Do this by performing operational checks on components that are in the same circuit. Refer to the wiring diagrams.

(3) Analyze the symptoms. Use the wiring diagrams to determine what the circuit is doing, where the problem most likely is occurring and where the diagnosis will continue.

(4) Isolate the problem area.

(5) Repair the problem area.

(6) Verify the proper operation. For this step, check for proper operation of all items on the repaired circuit. Refer to the wiring diagrams.

STANDARD PROCEDURE

STANDARD PROCEDURE - ELECTROSTATIC DISCHARGE (ESD) SENSITIVE DEVICES

All ESD sensitive components are solid state and a symbol (Fig. 6) is used to indicate this. When handling any component with this symbol, comply with the following procedures to reduce the possibility of electrostatic charge build up on the body and inadvertent discharge into the component. If it is not known whether the part is ESD sensitive, assume that it is.

(1) Always touch a known good ground before handling the part. This should be repeated while handling the part and more frequently after sliding across a seat, sitting down from a standing position, or walking a distance.

(2) Avoid touching electrical terminals of the part, unless instructed to do so by a written procedure.

(3) When using a voltmeter, be sure to connect the ground lead first.

(4) Do not remove the part form it's protective packing until it is time to install the part.

(5) Before removing the part from it's pakage, ground the pakage to a known good ground on the vehicle.

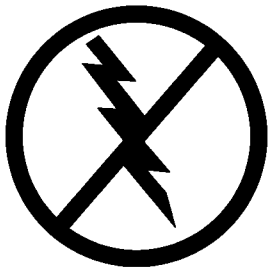


Fig. 6 ELECTROSTATIC DISCHARGE SYMBOL

WIRING DIAGRAM INFORMATION (Continued)

STANDARD PROCEDURE - TESTING OF VOLTAGE POTENTIAL

(1) Connect the ground lead of a voltmeter to a known good ground (Fig. 7).

(2) Connect the other lead of the voltmeter to the selected test point. The vehicle ignition may need to be turned ON to check voltage. Refer to the appropriate test procedure.

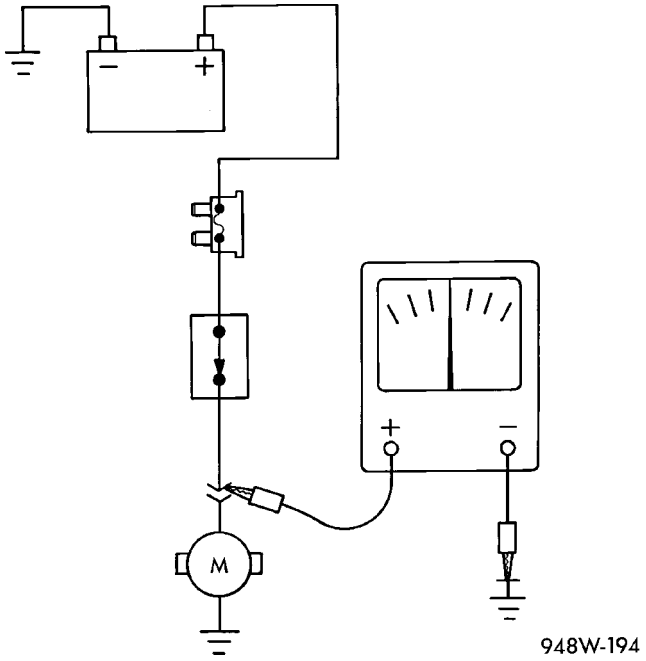


Fig. 7 TESTING FOR VOLTAGE POTENTIAL

STANDARD PROCEDURE - TESTING FOR CONTINUITY

(1) Remove the fuse for the circuit being checked or, disconnect the battery.

(2) Connect one lead of the ohmmeter to one side of the circuit being tested (Fig. 8).

(3) Connect the other lead to the other end of the circuit being tested. Low or no resistance means good continuity.

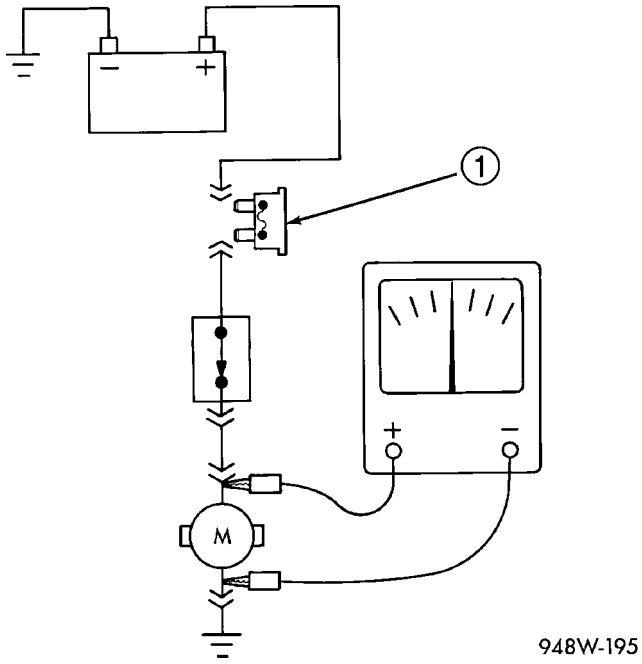


Fig. 8 TESTING FOR CONTINUITY

1 - FUSE REMOVED FROM CIRCUIT

STANDARD PROCEDURE - TESTING FOR A SHORT TO GROUND

(1) Remove the fuse and disconnect all items involved with the fuse.

(2) Connect a test light or a voltmeter across the terminals of the fuse.

(3) Starting at the fuse block, wiggle the wiring harness about six to eight inches apart and watch the voltmeter/test lamp.

(4) If the voltmeter registers voltage or the test lamp glows, there is a short to ground in that general area of the wiring harness.

WIRING DIAGRAM INFORMATION (Continued)

STANDARD PROCEDURE - TESTING FOR A SHORT TO GROUND ON FUSES POWERING SEVERAL LOADS

(1) Refer to the wiring diagrams and disconnect or isolate all items on the suspected fused circuits.
(2) Replace the blown fuse.
(3) Supply power to the fuse by turning ON the ignition switch or re-connecting the battery.
(4) Start connecting or energizing the items in the fuse circuit one at a time. When the fuse blows the circuit with the short to ground has been isolated.

STANDARD PROCEDURE - TESTING FOR A VOLTAGE DROP

(1) Connect the positive lead of the voltmeter to the side of the circuit closest to the battery (Fig. 9).
(2) Connect the other lead of the voltmeter to the other side of the switch, component or circuit.
(3) Operate the item.
(4) The voltmeter will show the difference in voltage between the two points.

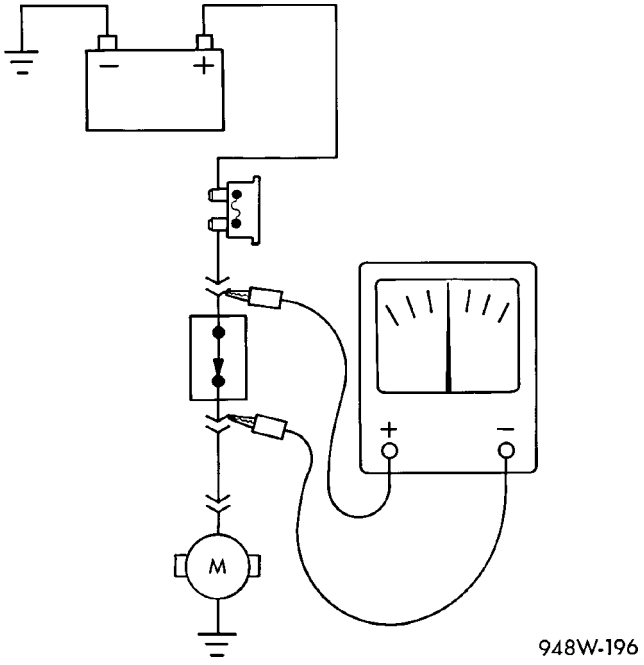
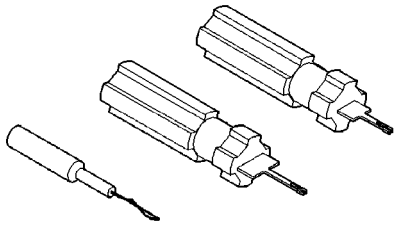


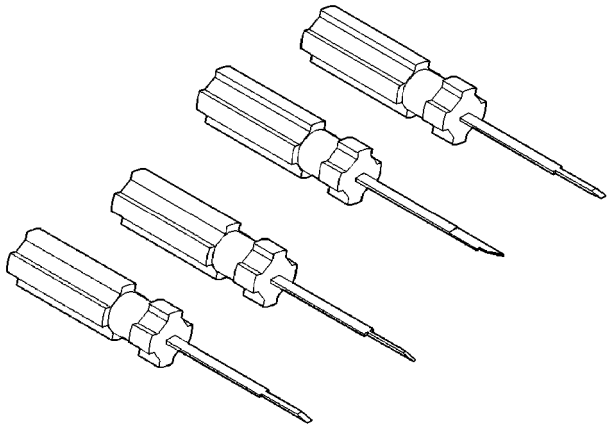
Fig. 9 TESTING FOR VOLTAGE DROP

SPECIAL TOOLS

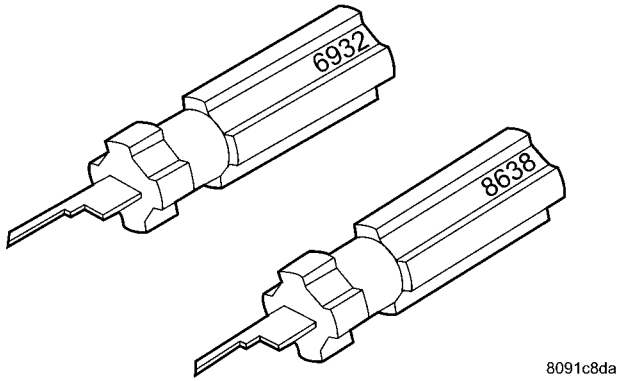
WIRING/TERMINAL



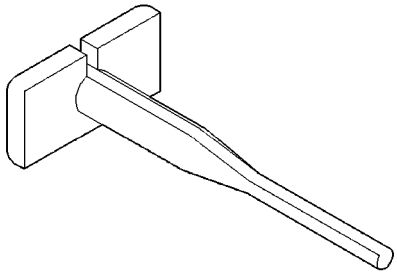
PROBING TOOL PACKAGE 6807



TERMINAL PICK TOOL SET 6680



TERMINAL REMOVING TOOLS 6932 AND 8638



TERMINAL REMOVING TOOL 6934

CONNECTOR

REMOVAL

(1) Disconnect battery.
(2) Release Connector Lock (Fig. 10).
(3) Disconnect the connector being repaired from its mating half/component.
(4) Remove the dress cover (if applicable) (Fig. 10).

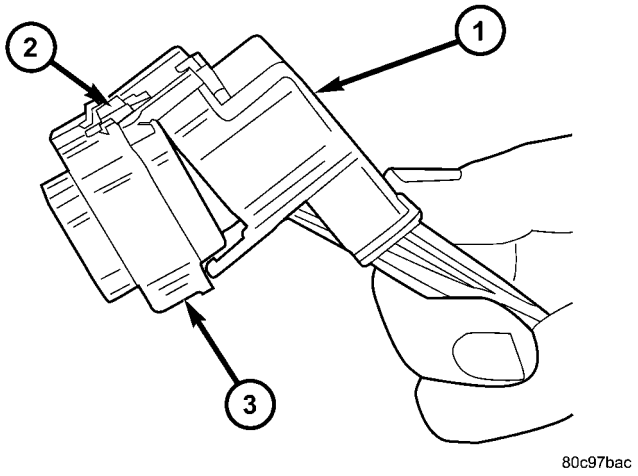


Fig. 10 REMOVAL OF DRESS COVER

1 - DRESS COVER
2 - CONNECTOR LOCK
3 - CONNECTOR

(5) Release the Secondary Terminal Lock, if required (Fig. 11).
(6) Position the connector locking finger away from the terminal using the proper special tool. Pull on the wire to remove the terminal from the connector (Fig. 12).

INSTALLATION

(1) Insert the removed terminal in the same cavity on the repair connector.
(2) Repeat steps for each terminal in the connector, being sure that all wires are inserted into the proper cavities. For additional connector pin-out identification, refer to the wiring diagrams.
(3) When the connector is re-assembled, the secondary terminal lock must be placed in the locked position to prevent terminal push out.
(4) Replace dress cover (if applicable).
(5) Connect connector to its mating half/component.
(6) Connect battery and test all affected systems.

CONNECTOR (Continued)

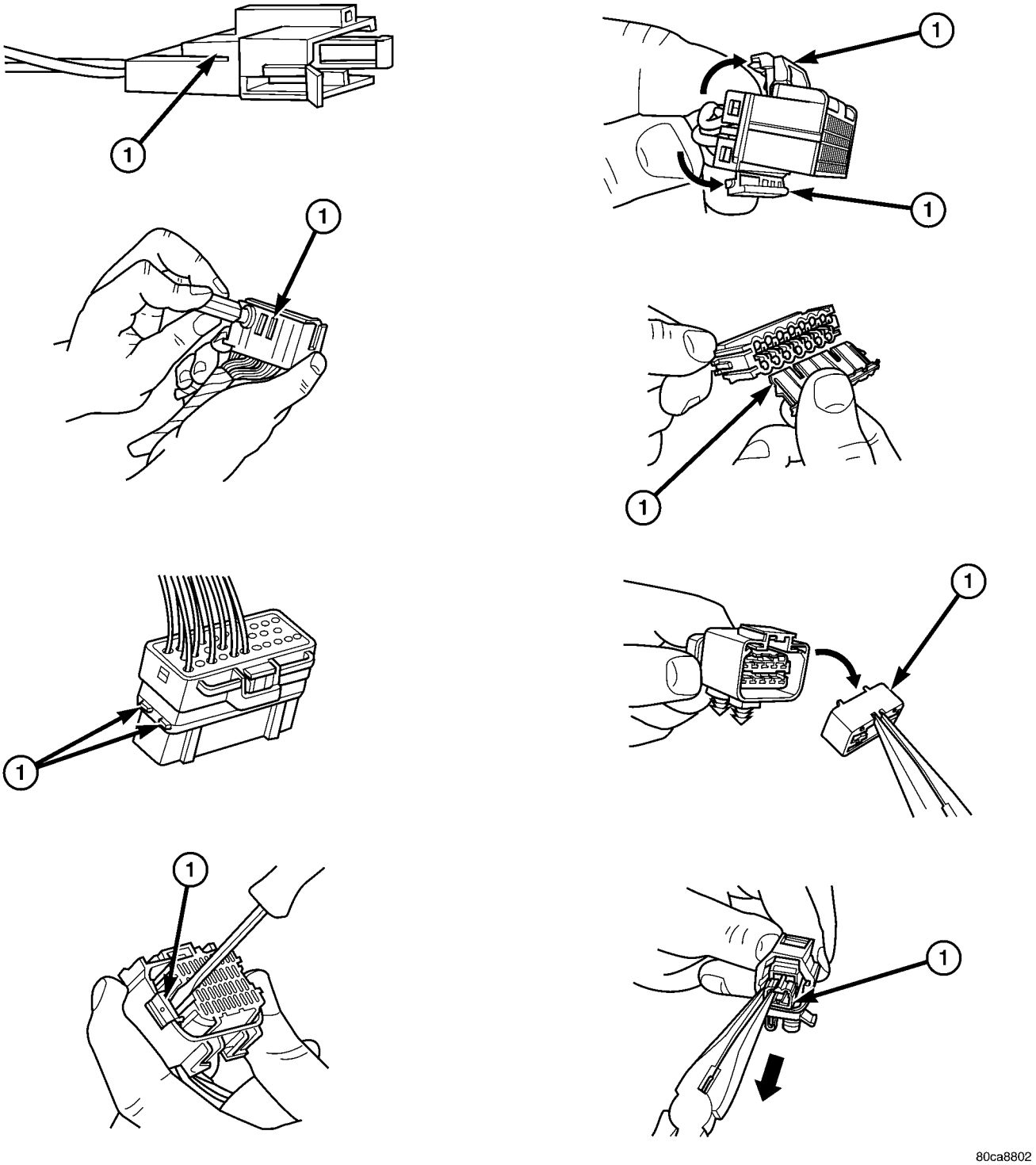


Fig. 11 EXAMPLES OF CONNECTOR SECONDARY TERMINAL LOCKS

1 - Secondary Terminal Lock

CONNECTOR (Continued)

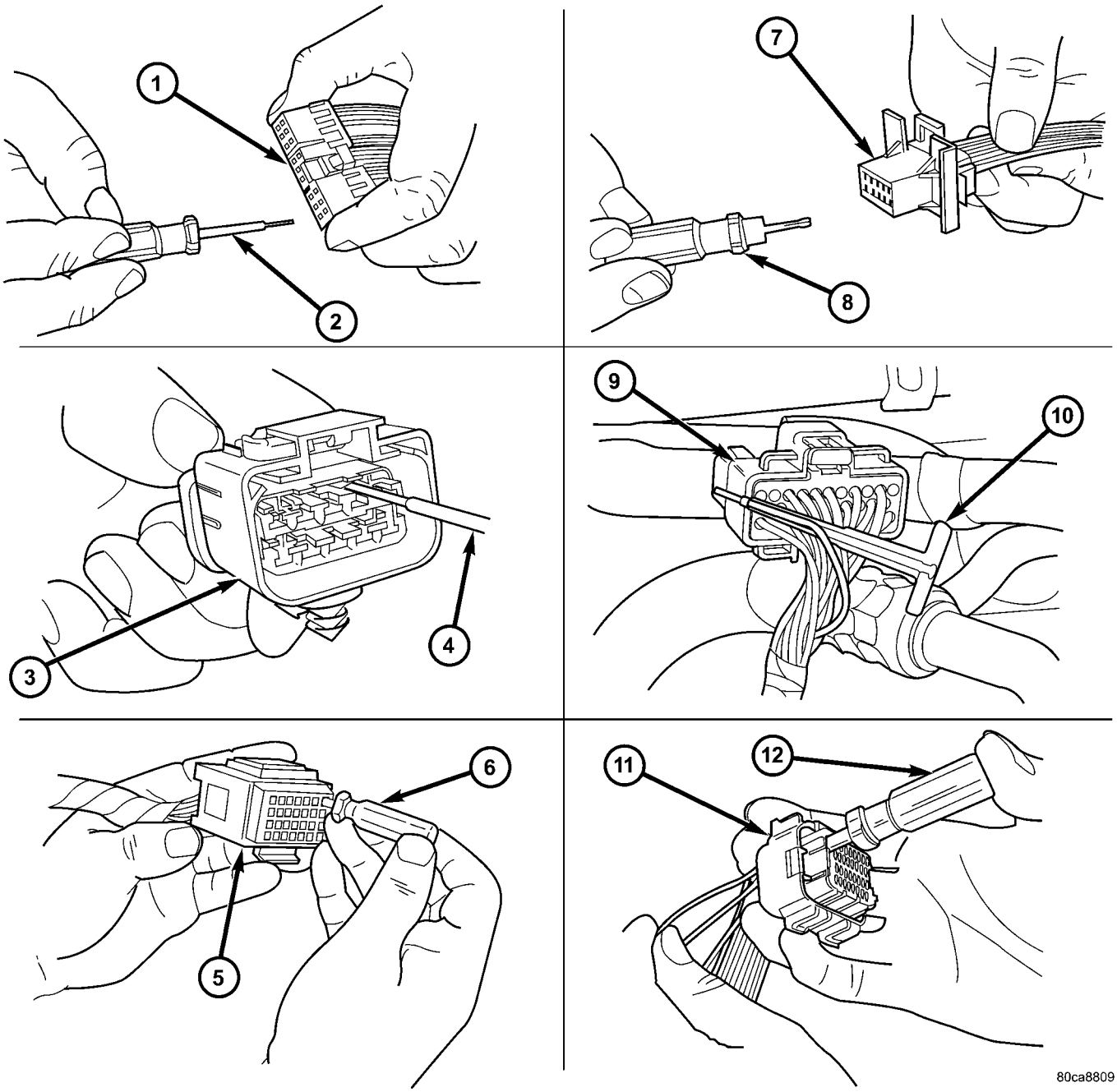


Fig. 12 TERMINAL REMOVAL

1 - TYPICAL CONNECTOR
2 - PICK FROM SPECIAL TOOL KIT 6680
3 - APEX CONNECTOR
4 - PICK FROM SPECIAL TOOL KIT 6680
5 - AUGAT CONNECTOR
6 - SPECIAL TOOL 6932
7 - MOLEX CONNECTOR
8 - SPECIAL TOOL 6742
9 - THOMAS AND BETTS CONNECTOR
10 - SPECIAL TOOL 6934
11 - TYCO CONNECTOR
12 - SPECIAL TOOL 8638

DIODE

REMOVAL

(1) Disconnect the battery.

(2) Locate the diode in the harness, and remove the protective covering.

(3) Remove the diode from the harness, pay attention to the current flow direction (Fig. 13).

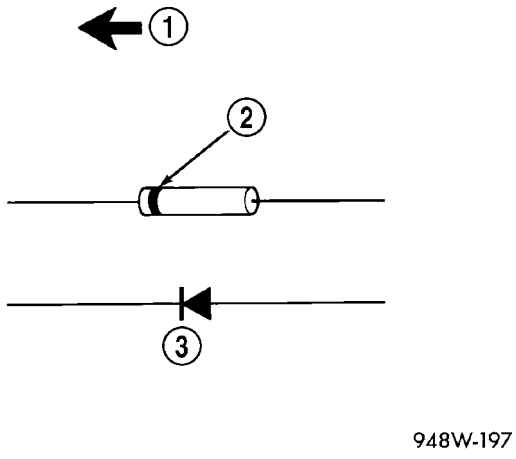


Fig. 13 DIODE IDENTIFICATION

1 - CURRENT FLOW
2 - BAND AROUND DIODE INDICATES CURRENT FLOW
3 - DIODE AS SHOWN IN THE DIAGRAMS

INSTALLATION

(1) Remove the insulation from the wires in the harness. Only remove enough insulation to solder in the new diode.

(2) Install the new diode in the harness, making sure current flow is correct. If necessary, refer to the appropriate wiring diagram for current flow (Fig. 13).

(3) Solder the connection together using rosin core type solder only. **Do not use acid core solder.**

(4) Tape the diode to the harness using electrical tape. Make sure the diode is completely sealed from the elements.

(5) Re-connect the battery and test affected systems.

TERMINAL

REMOVAL

(1) Follow steps for removing terminals described in the connector removal section.

(2) Cut the wire 6 inches from the back of the connector.

INSTALLATION

(1) Select a wire from the terminal repair kit that best matches the color and gage of the wire being repaired.

(2) Cut the repair wire to the proper length and remove one–half (1/2) inch of insulation.

(3) Splice the repair wire to the wire harness (see wire splicing procedure) .

(4) Insert the repaired wire into the connector.

(5) Install the connector locking wedge, if required, and reconnect the connector to its mating half/component.

(6) Re-tape the wire harness starting at 1–1/2 inches behind the connector and 2 inches past the repair.

(7) Connect battery and test all affected systems.

WIRE

STANDARD PROCEDURE - WIRE SPLICING

When splicing a wire, it is important that the correct gage be used as shown in the wiring diagrams.

(1) Remove one-half (1/2) inch of insulation from each wire that needs to be spliced.

(2) Place a piece of adhesive lined heat shrink tubing on one side of the wire. Make sure the tubing will be long enough to cover and seal the entire repair area.

(3) Place the strands of wire overlapping each other inside of the splice clip (Fig. 14).

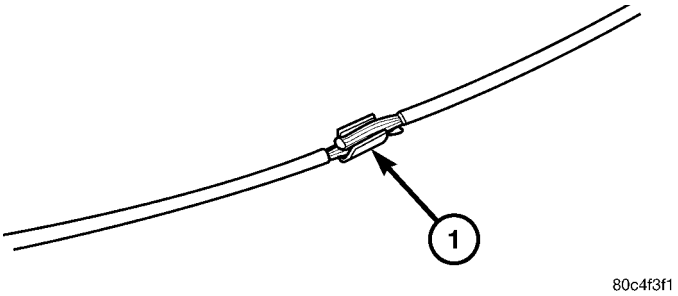


Fig. 14 SPLICE BAND

1 - SPLICE BAND

(4) Using crimping tool, Mopar p/n 05019912AA, crimp the splice clip and wires together (Fig. 15).

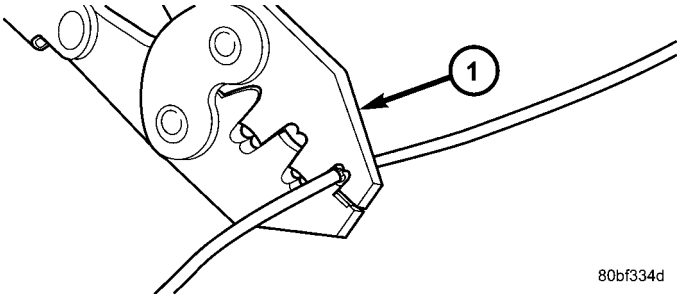


Fig. 15 CRIMPING TOOL

1 - CRIMPING TOOL

(5) Solder the connection together using rosin core type solder only (Fig. 16).

CAUTION: DO NOT USE ACID CORE SOLDER.

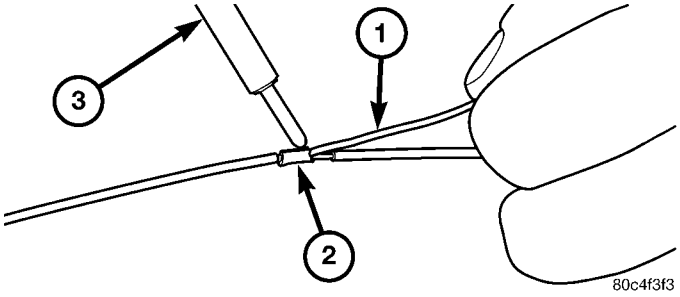


Fig. 16 SOLDER SPLICE

1 - SOLDER
2 - SPLICE BAND
3 - SOLDERING IRON

(6) Center the heat shrink tubing over the joint and heat using a heat gun. Heat the joint until the tubing is tightly sealed and sealant comes out of both ends of the tubing (Fig. 17).

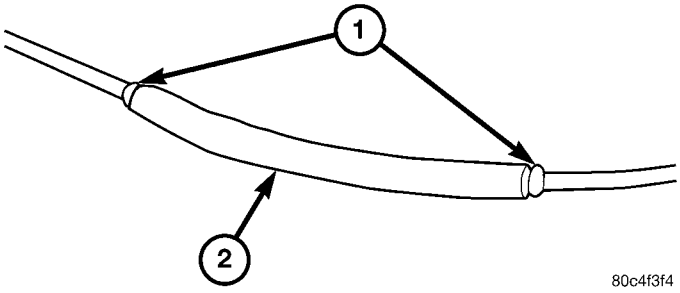


Fig. 17 HEAT SHRINK TUBE

1 - SEALANT
2 - HEAT SHRINK TUBE

8W-02 COMPONENT INDEX

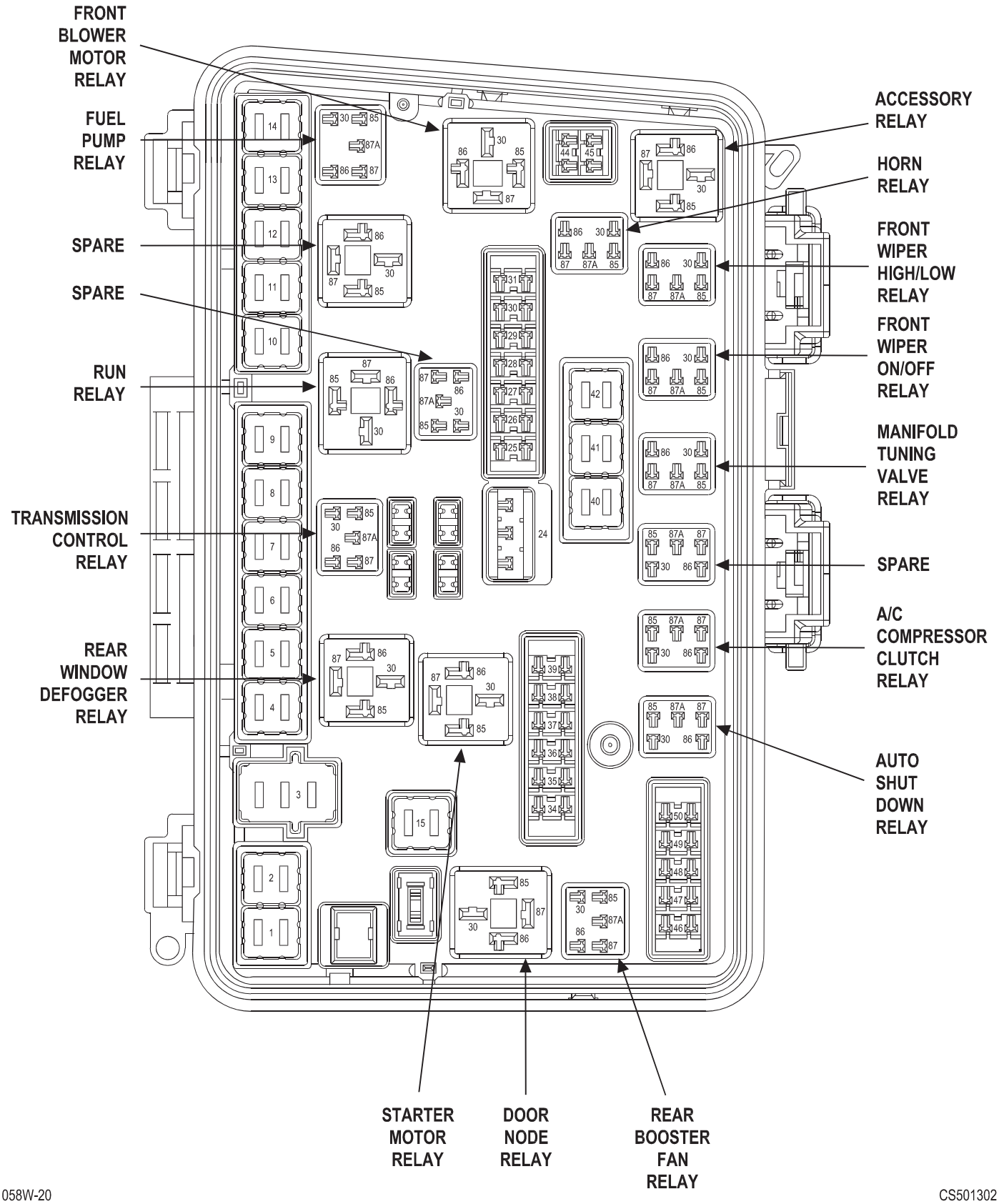
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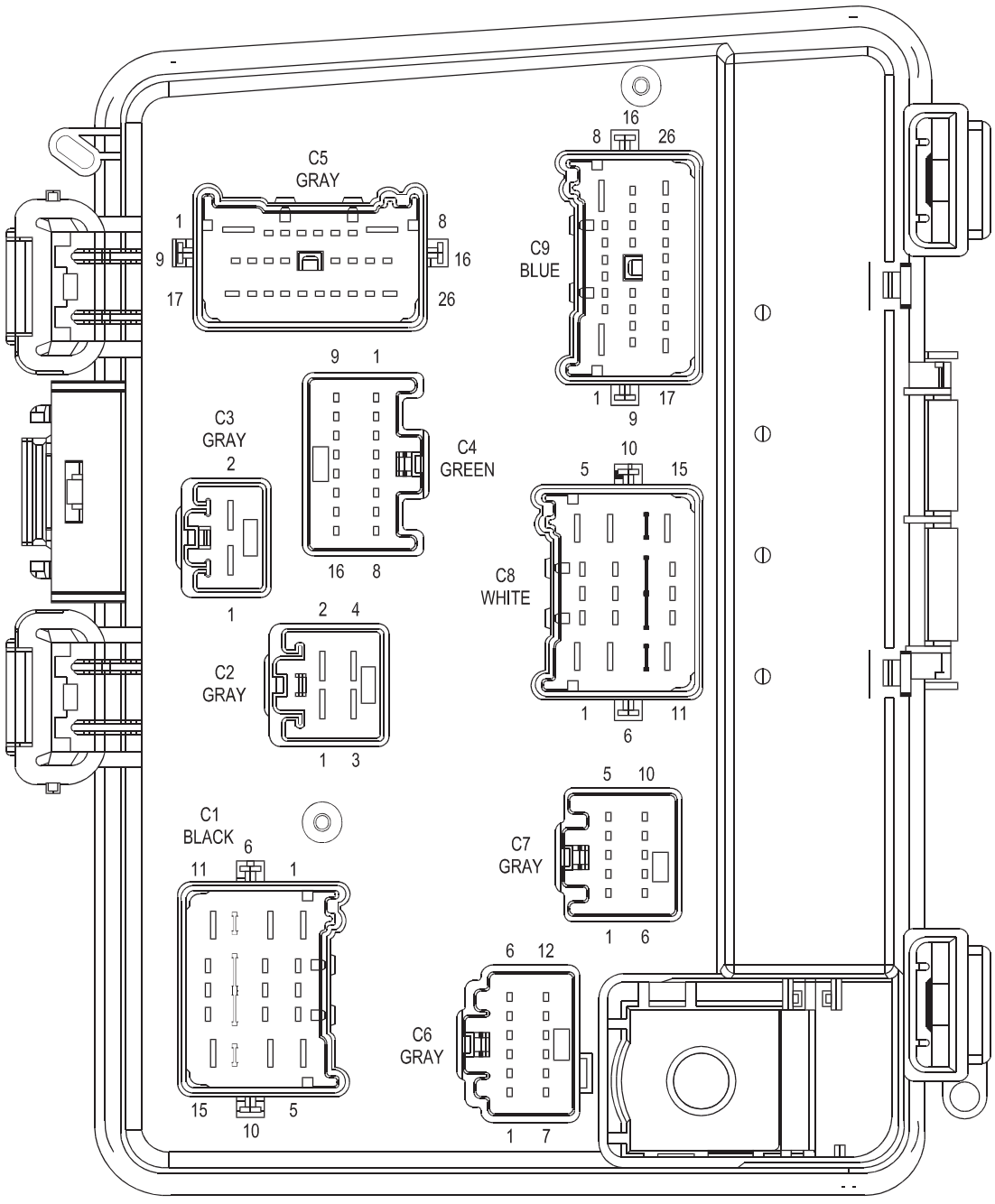
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INTEGRATED POWER MODULE
(FRONT VIEW)



INTEGRATED POWER MODULE
(REAR VIEW)



FUSES

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	A107 12TN/RD	FUSED B(+)
2	-	-	-
3	30A	INTERNAL	FUSED B(+) (I.O.D.)
4	40A	A101 12VT/RD	FUSED B(+)
5	40A	INTERNAL	FUSED B(+)
6	30A	INTERNAL	FUSED B(+)
7	40A	INTERNAL	FUSED B(+)
8	40A	A110 12DG/RD	FUSED B(+)
9	40A	A130 12VT/RD □□	FUSED B(+)
10	30A	A100 16RD/VT	FUSED B(+)
11	40A	A115 12YL/RD □	FUSED B(+)
12	-	-	-
13	40A	A112 12OR/RD	FUSED B(+)
14	-	-	-
15	40A	A111 12DG/RD	FUSED B(+)
24	20A	F307 16LB/PK	FUSED ACCESSORY RELAY OUTPUT
25	15A	F316 20PK/OR	FUSED ACCESSORY RELAY OUTPUT
26	20A	F306 16DB/PK	FUSED ACCESSORY RELAY OUTPUT
27	-	-	-
28	25A	INTERNAL	FUSED B(+)

□ POWER LIFTGATE
□□ POWER SUNROOF

FUSES
(CONTINUED)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
29	20A	A108 18LG/RD	FUSED B(+)
30	10A	A106 20LB/RD	FUSED B(+)
31	20A	A701 18BR/RD	FUSED B(+)
34	10A	C51 18LB/BR	FUSED REAR BOOSTER FAN RELAY OUTPUT
35	-	-	-
36	20A	INTERNAL	FUSED B(+)
37	25A	INTERNAL	FUSED B(+)
38	20A	INTERNAL	FUSED B(+)
39	20A	A109 18OR/RD	FUSED B(+)
40	40A	F515 12PK/LB	FUSED DOOR NODE RELAY OUTPUT
41	40A	F516 12PK	FUSED DOOR NODE RELAY OUTPUT
42	40A	C7 12DB	FUSED FRONT BLOWER MOTOR RELAY OUTPUT
44	25A	F525 16TN/PK ▵▵	FUSED RUN RELAY OUTPUT
45	10A	INTERNAL	FUSED RUN RELAY OUTPUT
46	20A	A214 18RD/LB	FUSED B(+)
47	20A	A215 18RD/LG	FUSED B(+)
48	15A	A114 20GY/RD	FUSED B(+)
49	25A	A116 16YL/RD	FUSED B(+)
50	15A	A118 20RD/OR	FUSED B(+)

▵▵ MIDDLE ROW HEATED SEATS

POSITIVE TEMPERATURE COEFFICIENTS

PTC NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	13A	A105 18DB/RD	FUSED B(+)

RELAYS

A/C COMPRESSOR CLUTCH RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	F202 20PK/GY	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	C13 20LB/OR	A/C CLUTCH RELAY CONTROL
87	C3 18DB/YL	A/C COMPRESSOR CLUTCH RELAY OUTPUT
87A	-	-

ACCESSORY RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	B(+)
85	INTERNAL	B(+)
86	INTERNAL	ACCESSORY RELAY CONTROL
87	INTERNAL	FUSED ACCESSORY RELAY OUTPUT
87A	-	-

AUTO SHUT DOWN RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	FUSED B(+)
86	K51 18BR/GY	AUTOMATIC SHUT DOWN RELAY CONTROL
87	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
87A	-	-

DOOR NODE RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	B(+)
85	INTERNAL	B(+)
86	INTERNAL	DOOR NODE RELAY CONTROL
87	INTERNAL	DOOR NODE RELAY OUTPUT
87A	-	-

FRONT BLOWER MOTOR RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	B(+)
85	INTERNAL	B(+)
86	INTERNAL	FRONT BLOWER MOTOR RELAY CONTROL
87	C7 12DB	FUSED FRONT BLOWER MOTOR RELAY OUTPUT
87A	-	-

FRONT WIPER HIGH/LOW RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	FUSED B(+)
86	INTERNAL	FRONT WIPER HIGH/LOW RELAY CONTROL
87	W4 12BR/OR	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
87A	W3 12BR/WT	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT

FRONT WIPER ON/OFF RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	FUSED B(+)
86	INTERNAL	FRONT WIPER ON/OFF RELAY CONTROL
87	INTERNAL	FUSED B(+)
87A	INTERNAL	GROUND

FUEL PUMP RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
86	K31 20BR	FUEL PUMP RELAY CONTROL
87	N1 16DB/OR	FUEL PUMP RELAY OUTPUT
87A	-	-

HORN RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	FUSED B(+)
86	INTERNAL	HORN RELAY CONTROL
87	X2 16DG/OR	HORN RELAY OUTPUT
87A	-	-

MANIFOLD TUNING VALVE RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	GROUND
86	K36 20DB/YL	MTV CONTROL
87	K136 18BR	MANIFOLD TUNING VALVE RELAY OUTPUT
87A	-	-

REAR BOOSTER FAN RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	B(+)
85	INTERNAL	B(+)
86	INTERNAL	REAR BOOSTER FAN RELAY CONTROL
87	C51 18LB/BR	FUSED REAR BOOSTER FAN RELAY OUTPUT
87A	-	-

REAR WINDOW DEFOGGER RELAY

CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	INTERNAL	FUSED B(+)
86	INTERNAL	REAR WINDOW DEFOGGER RELAY CONTROL
87	C15 12DB/WT	REAR WINDOW DEFOGGER RELAY OUTPUT
87A	-	-

RUN RELAY

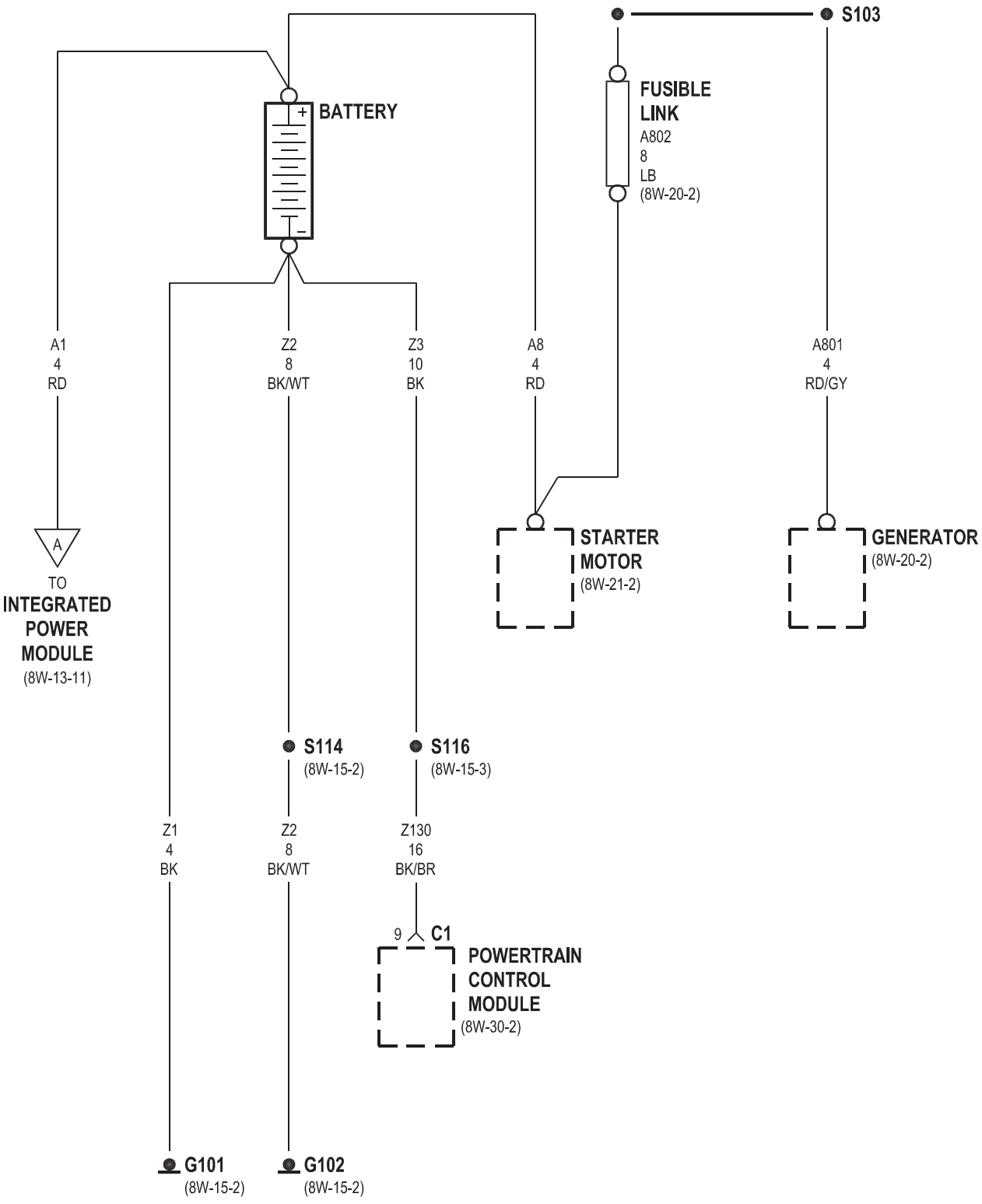
CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	B(+)
85	INTERNAL	B(+)
86	INTERNAL	RUN RELAY CONTROL
87	INTERNAL	FUSED RUN RELAY OUTPUT
87A	-	-

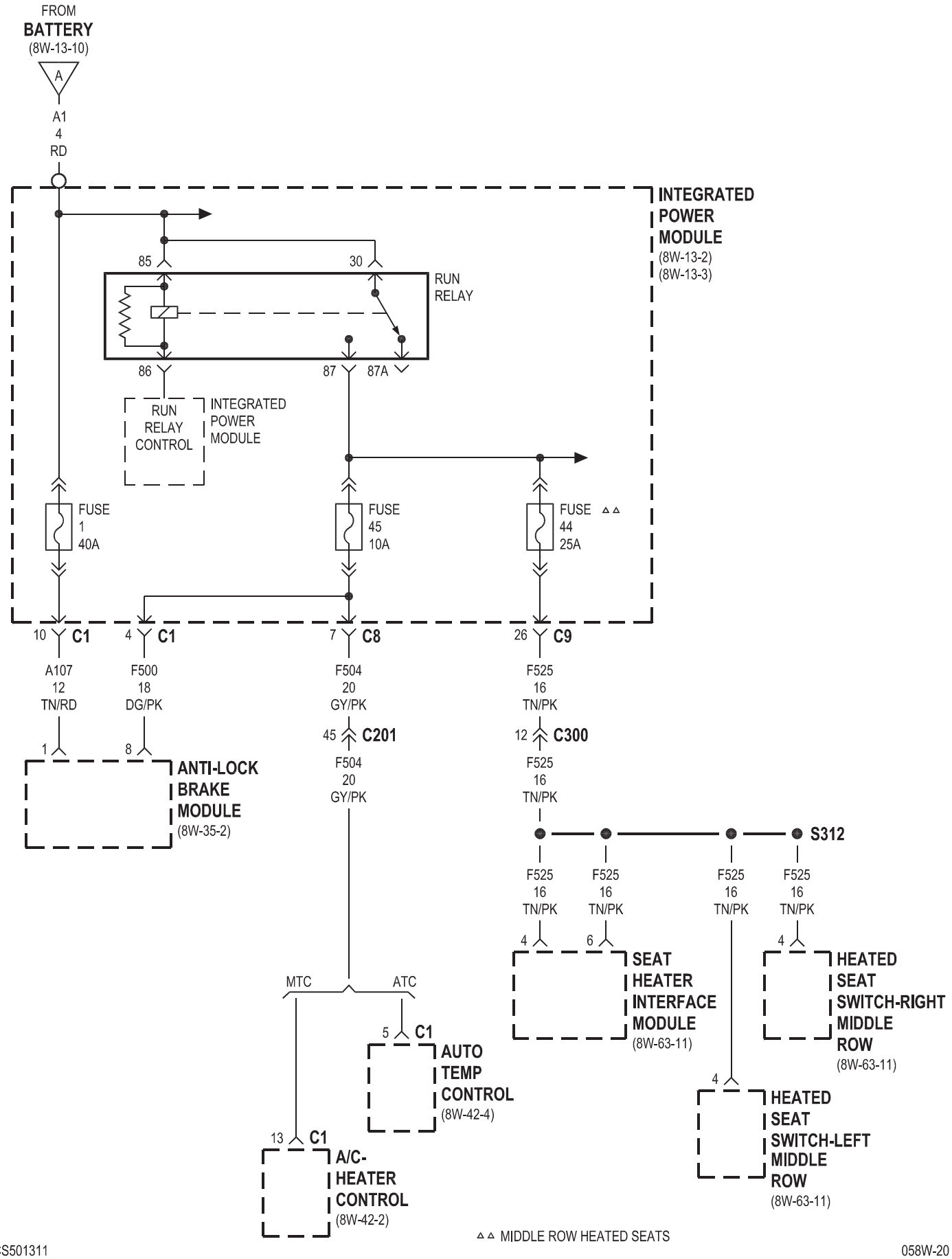
STARTER MOTOR RELAY

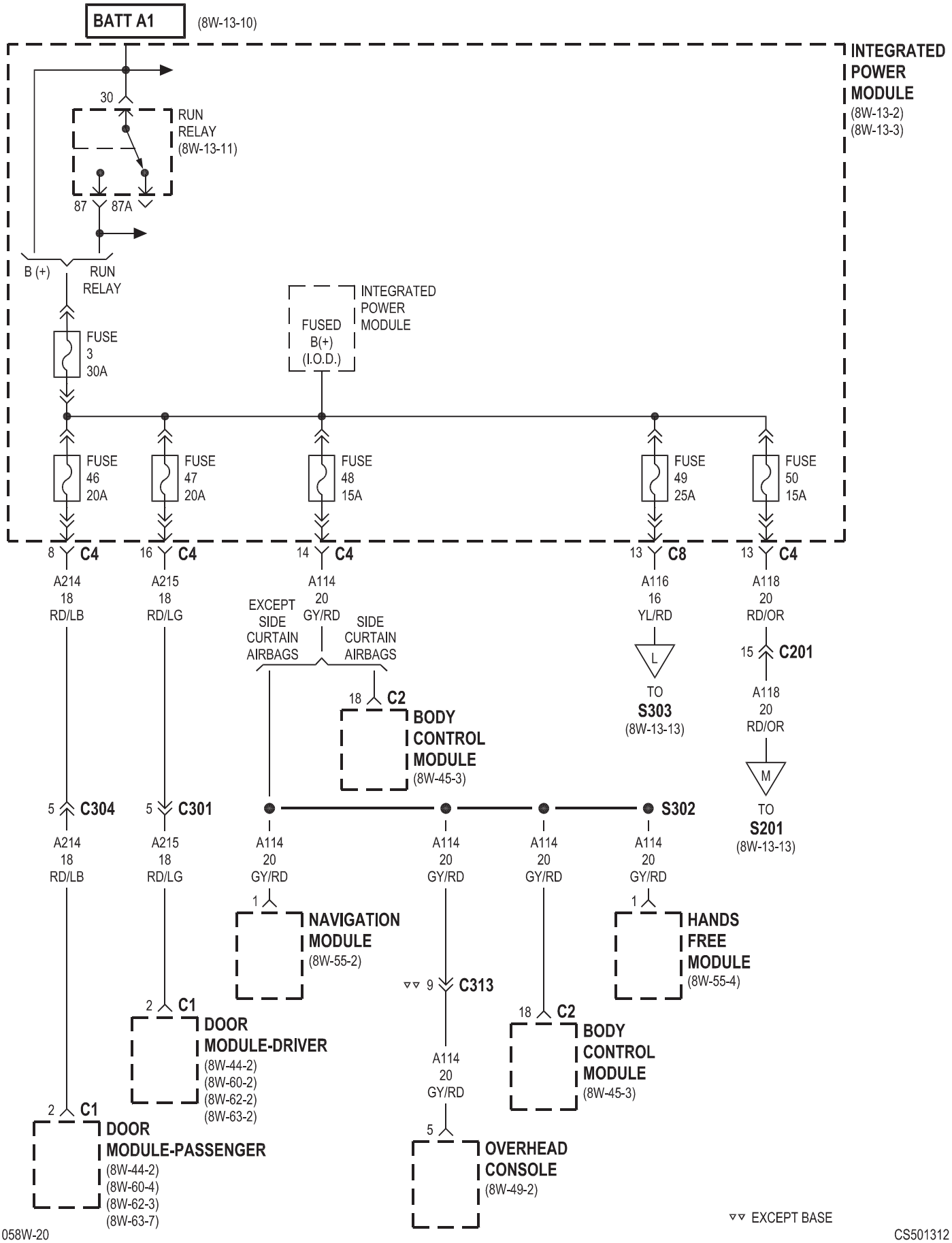
CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	T751 20YL	IGNITION SWITCH OUTPUT (START)
86	T752 20DG/OR	STARTER RELAY CONTROL
87	T750 12YL/GY	STARTER MOTOR RELAY OUTPUT
87A	-	-

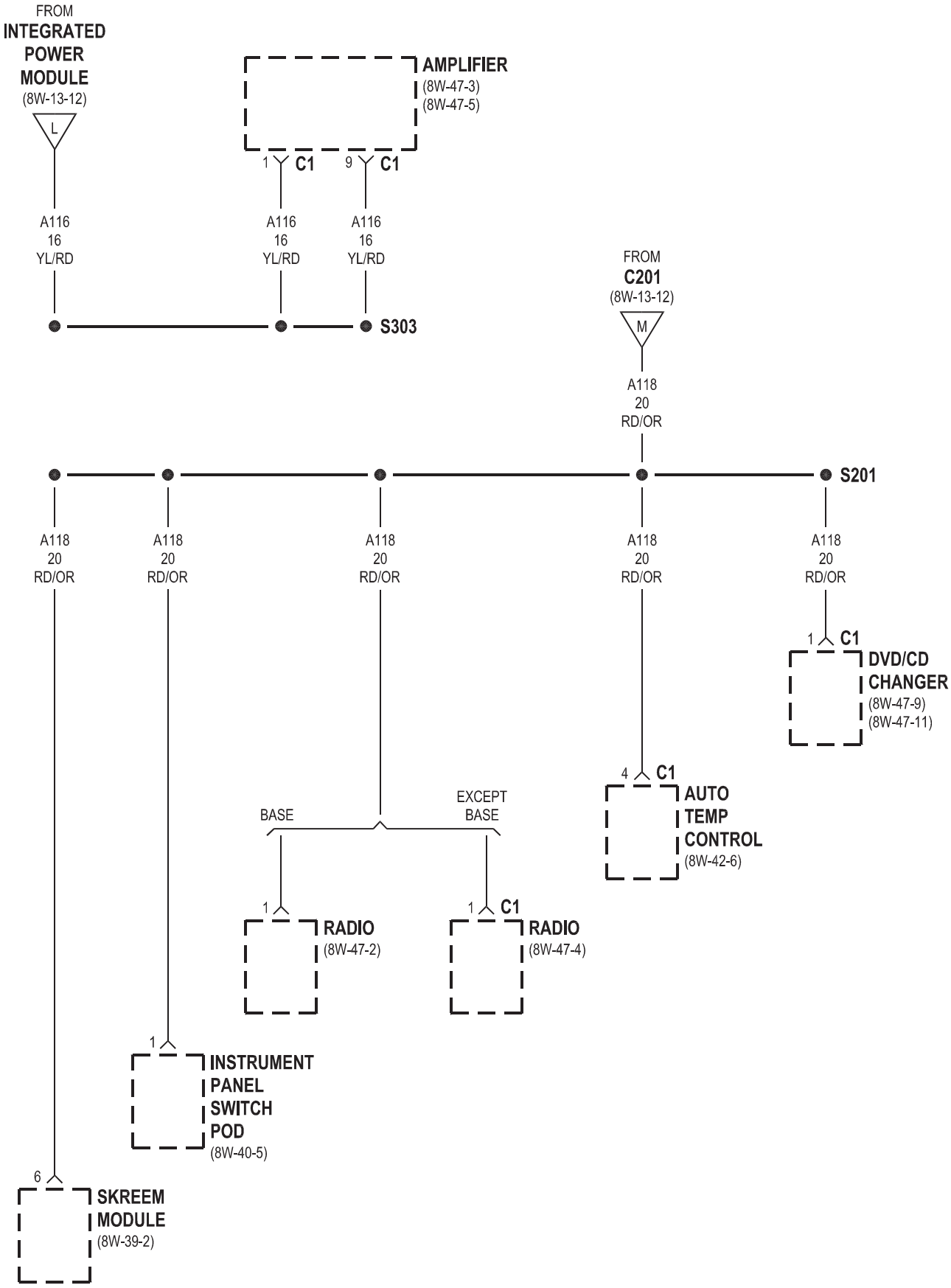
TRANSMISSION CONTROL RELAY

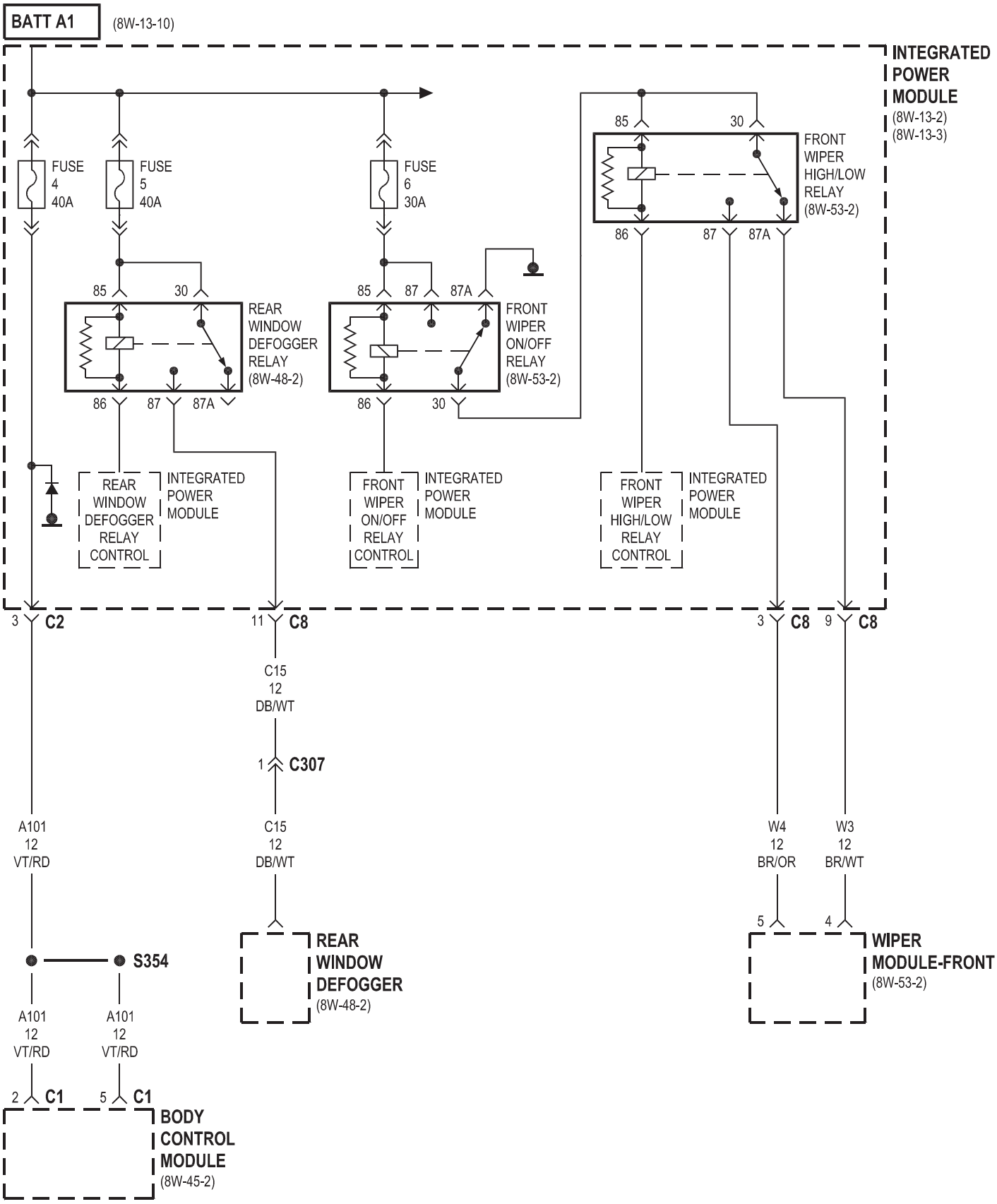
CAVITY	CIRCUIT	FUNCTION
30	INTERNAL	FUSED B(+)
85	T15 20YL/BR	TRANSMISSION CONTROL RELAY CONTROL
86	Z115 18BK/OR	GROUND
87	T16 16YL/OR	TRANSMISSION CONTROL RELAY OUTPUT
87A	-	-

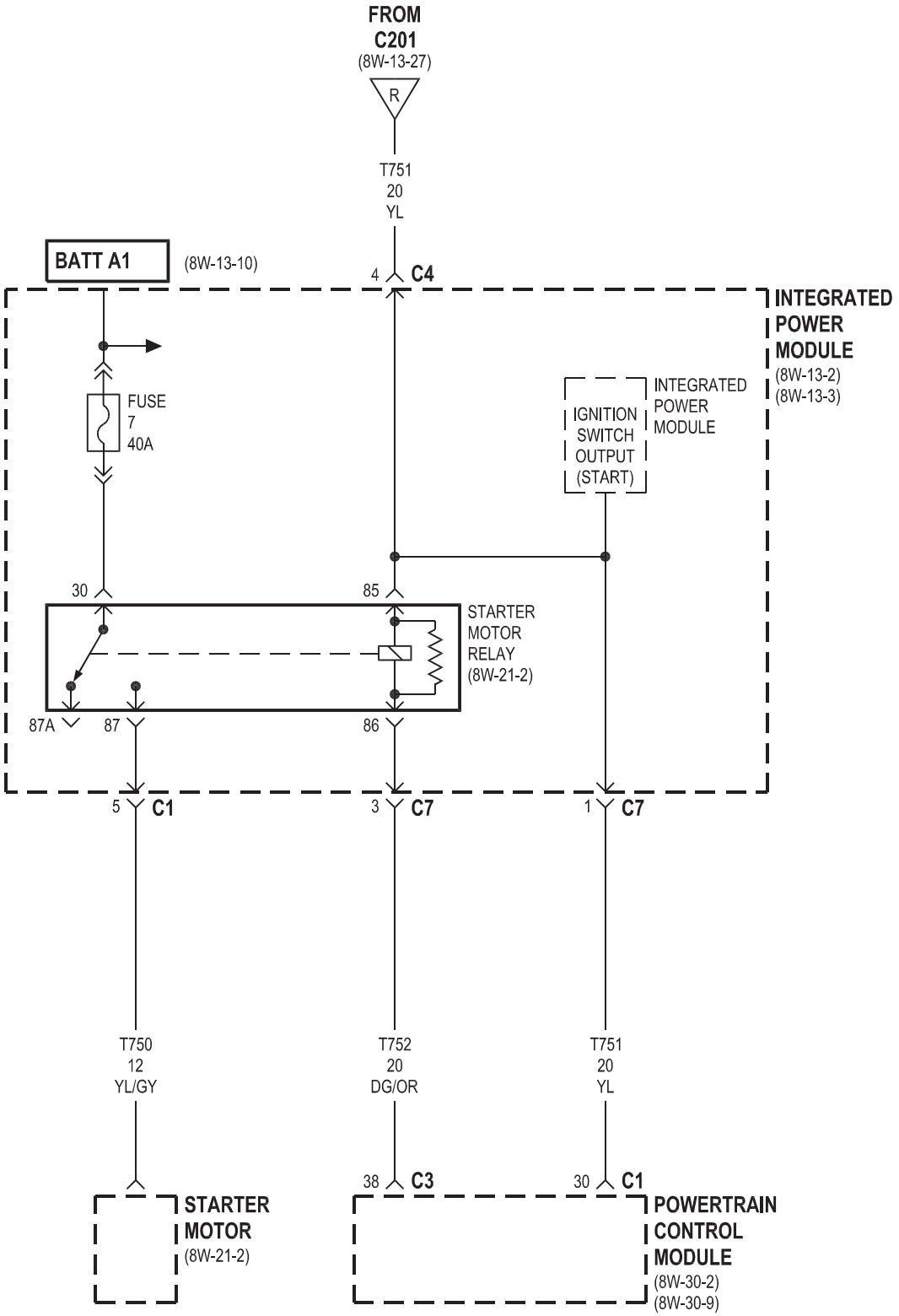

S103
FUSIBLE LINK
A802
8
LB
(8W-20-2)
BATTERY
+
–
A1
4
RD
Z2
8
BK/WT
Z3
10
BK
A8
4
RD
A801
4
RD/GY
A
TO
INTEGRATED POWER MODULE
(8W-13-11)
STARTER MOTOR
(8W-21-2)
GENERATOR
(8W-20-2)
S114
(8W-15-2)
S116
(8W-15-3)
Z1
4
BK
Z2
8
BK/WT
Z130
16
BK/BR
9
C1
POWERTRAIN CONTROL MODULE
(8W-30-2)
G101
(8W-15-2)
G102
(8W-15-2)

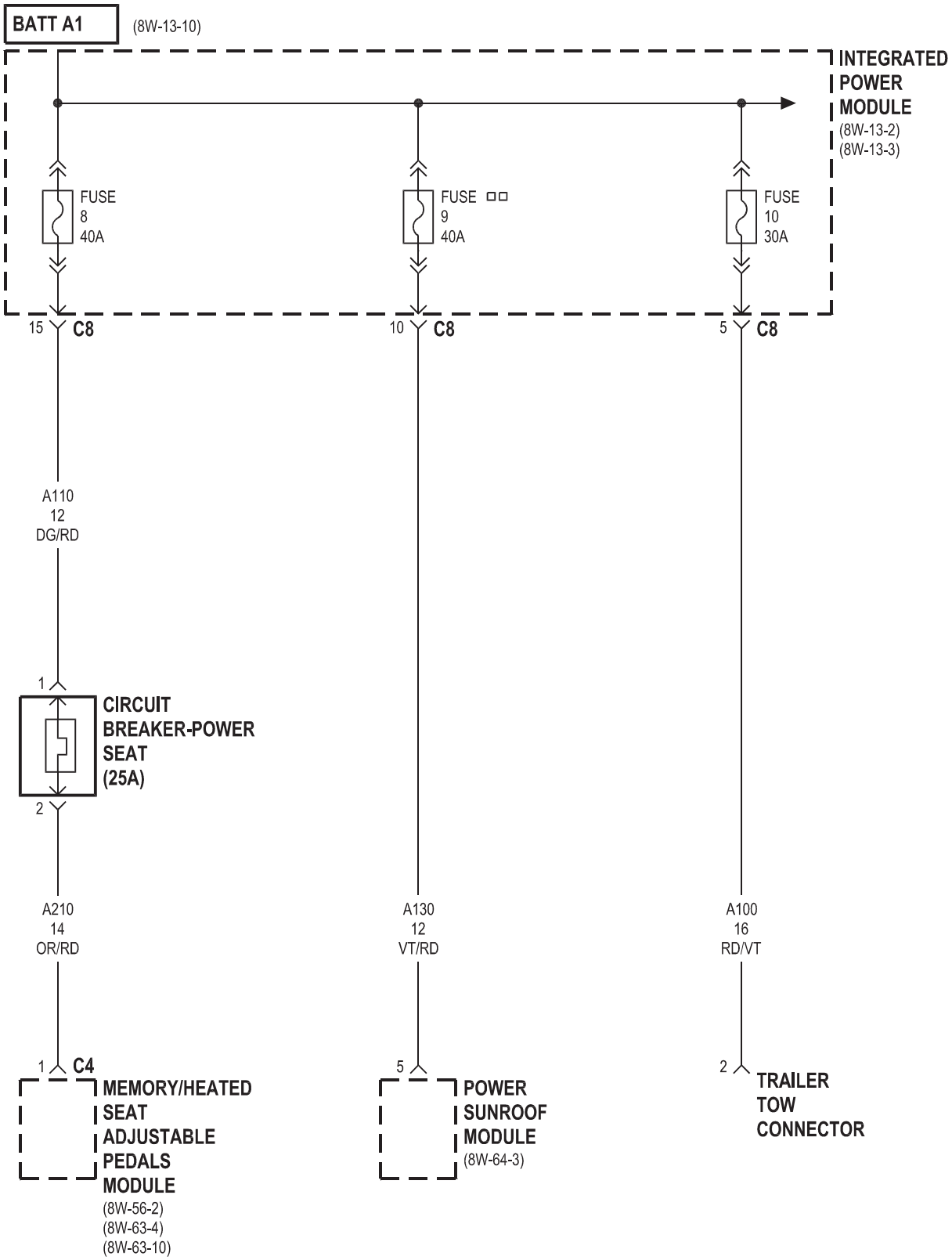

FROM
BATTERY
(8W-13-10)
A
A1
4
RD
INTEGRATED
POWER
MODULE
(8W-13-2)
(8W-13-3)
85
30
RUN
RELAY
86
87
87A
RUN
RELAY
CONTROL
INTEGRATED
POWER
MODULE
FUSE
1
40A
FUSE
45
10A
FUSE
44
25A
△△
10
C1
4
C1
7
C8
26
C9
A107
12
TN/RD
F500
18
DG/PK
F504
20
GY/PK
F525
16
TN/PK
1
8
45
C201
12
C300
ANTI-LOCK
BRAKE
MODULE
(8W-35-2)
F504
20
GY/PK
F525
16
TN/PK
S312
F525
16
TN/PK
F525
16
TN/PK
F525
16
TN/PK
F525
16
TN/PK
4
6
4
4
SEAT
HEATER
INTERFACE
MODULE
(8W-63-11)
HEATED
SEAT
SWITCH-RIGHT
MIDDLE
ROW
(8W-63-11)
MTC
ATC
5
C1
AUTO
TEMP
CONTROL
(8W-42-4)
4
HEATED
SEAT
SWITCH-LEFT
MIDDLE
ROW
(8W-63-11)
13
C1
A/C-
HEATER
CONTROL
(8W-42-2)
△△ MIDDLE ROW HEATED SEATS


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
B (+)
RUN RELAY
FUSE 3 30A
FUSED B(+) (I.O.D.)
INTEGRATED POWER MODULE
FUSE 46 20A
FUSE 47 20A
FUSE 48 15A
FUSE 49 25A
FUSE 50 15A
8 C4
16 C4
14 C4
13 C8
13 C4
A214 18 RD/LB
A215 18 RD/LG
A114 20 GY/RD
A116 16 YL/RD
A118 20 RD/OR
EXCEPT SIDE CURTAIN AIRBAGS
SIDE CURTAIN AIRBAGS
18 C2
BODY CONTROL MODULE
(8W-45-3)
L
TO S303
(8W-13-13)
15 C201
A118 20 RD/OR
M
TO S201
(8W-13-13)
5 C304
5 C301
S302
A214 18 RD/LB
A215 18 RD/LG
A114 20 GY/RD
A114 20 GY/RD
A114 20 GY/RD
A114 20 GY/RD
1
NAVIGATION MODULE
(8W-55-2)
1
HANDS FREE MODULE
(8W-55-4)
2 C1
DOOR MODULE-DRIVER
(8W-44-2)
(8W-60-2)
(8W-62-2)
(8W-63-2)
▿▿ 9 C313
18 C2
BODY CONTROL MODULE
(8W-45-3)
2 C1
DOOR MODULE-PASSENGER
(8W-44-2)
(8W-60-4)
(8W-62-3)
(8W-63-7)
A114 20 GY/RD
5
OVERHEAD CONSOLE
(8W-49-2)
▿▿ EXCEPT BASE

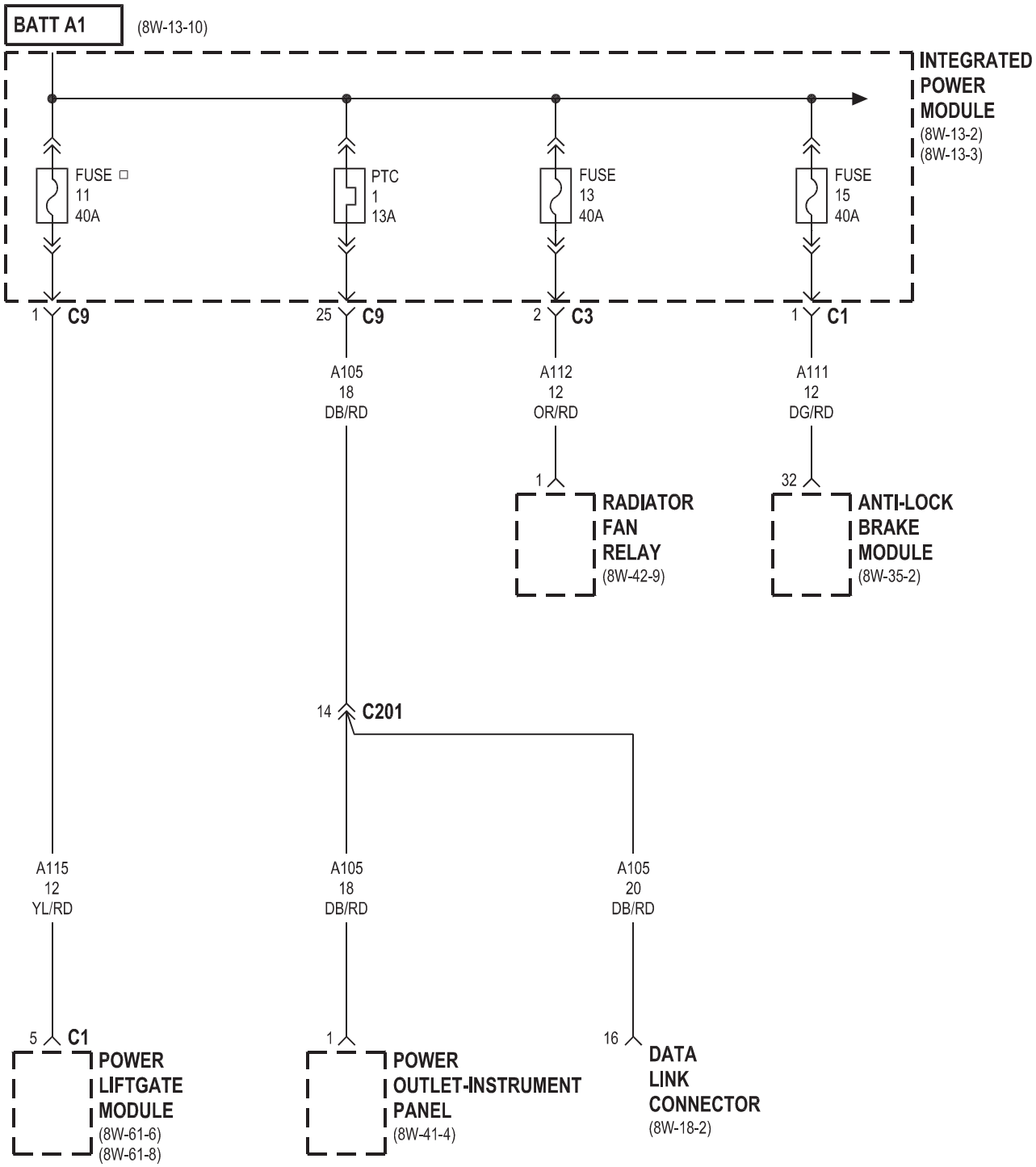

FROM
INTEGRATED
POWER
MODULE
(8W-13-12)
L
A116
16
YL/RD
AMPLIFIER
(8W-47-3)
(8W-47-5)
1 C1
9 C1
A116
16
YL/RD
A116
16
YL/RD
S303
FROM
C201
(8W-13-12)
M
A118
20
RD/OR
S201
A118
20
RD/OR
A118
20
RD/OR
A118
20
RD/OR
A118
20
RD/OR
A118
20
RD/OR
1 C1
DVD/CD
CHANGER
(8W-47-9)
(8W-47-11)
4 C1
AUTO
TEMP
CONTROL
(8W-42-6)
BASE
EXCEPT
BASE
1
RADIO
(8W-47-2)
1 C1
RADIO
(8W-47-4)
1
INSTRUMENT
PANEL
SWITCH
POD
(8W-40-5)
6
SKREEM
MODULE
(8W-39-2)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 4 40A
FUSE 5 40A
FUSE 6 30A
85
30
REAR WINDOW DEFOGGER RELAY
(8W-48-2)
86
87
87A
85
87
87A
FRONT WIPER ON/OFF RELAY
(8W-53-2)
86
30
85
30
FRONT WIPER HIGH/LOW RELAY
(8W-53-2)
86
87
87A
REAR WINDOW DEFOGGER RELAY CONTROL
INTEGRATED POWER MODULE
FRONT WIPER ON/OFF RELAY CONTROL
INTEGRATED POWER MODULE
FRONT WIPER HIGH/LOW RELAY CONTROL
INTEGRATED POWER MODULE
3 C2
11 C8
3 C8
9 C8
C15
12
DB/WT
1 C307
A101
12
VT/RD
C15
12
DB/WT
W4
12
BR/OR
W3
12
BR/WT
5
4
S354
REAR WINDOW DEFOGGER
(8W-48-2)
WIPER MODULE-FRONT
(8W-53-2)
A101
12
VT/RD
A101
12
VT/RD
2 C1
5 C1
BODY CONTROL MODULE
(8W-45-2)

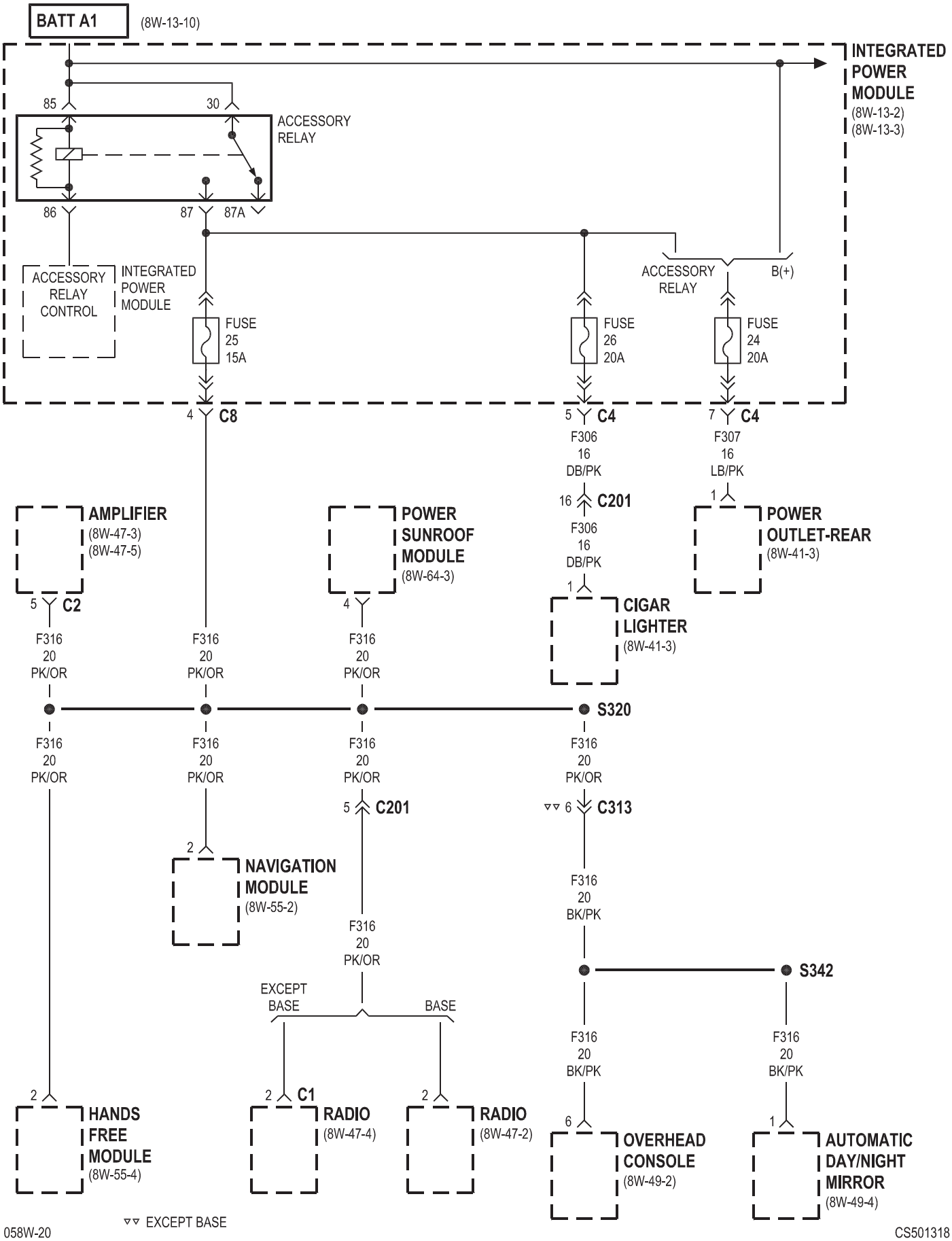

FROM
C201
(8W-13-27)
R
T751
20
YL
BATT A1
(8W-13-10)
4
C4
INTEGRATED
POWER
MODULE
(8W-13-2)
(8W-13-3)
FUSE
7
40A
IGNITION
SWITCH
OUTPUT
(START)
INTEGRATED
POWER
MODULE
30
85
STARTER
MOTOR
RELAY
(8W-21-2)
87A
87
86
5
C1
3
C7
1
C7
T750
12
YL/GY
T752
20
DG/OR
T751
20
YL
38
C3
30
C1
STARTER
MOTOR
(8W-21-2)
POWERTRAIN
CONTROL
MODULE
(8W-30-2)
(8W-30-9)

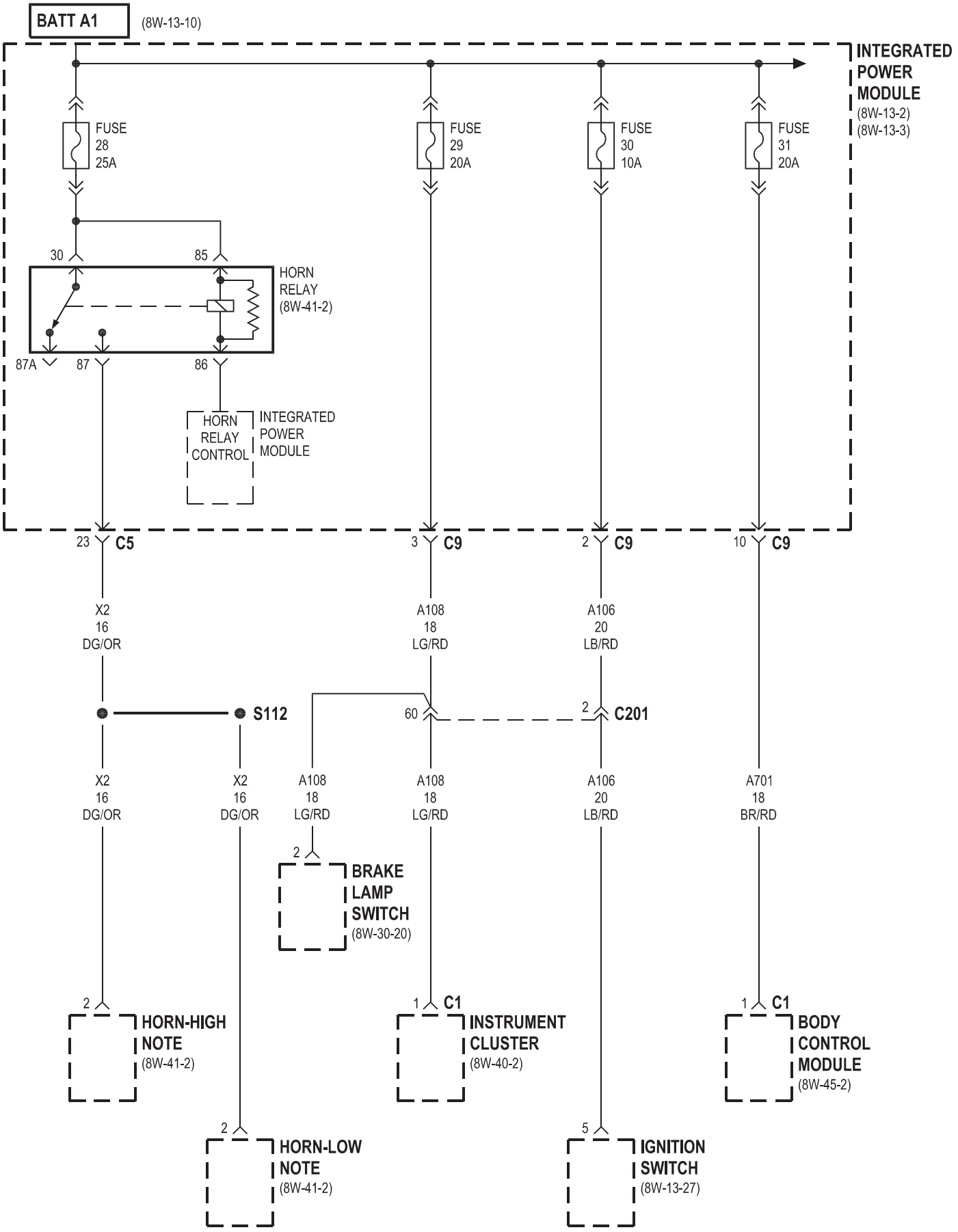


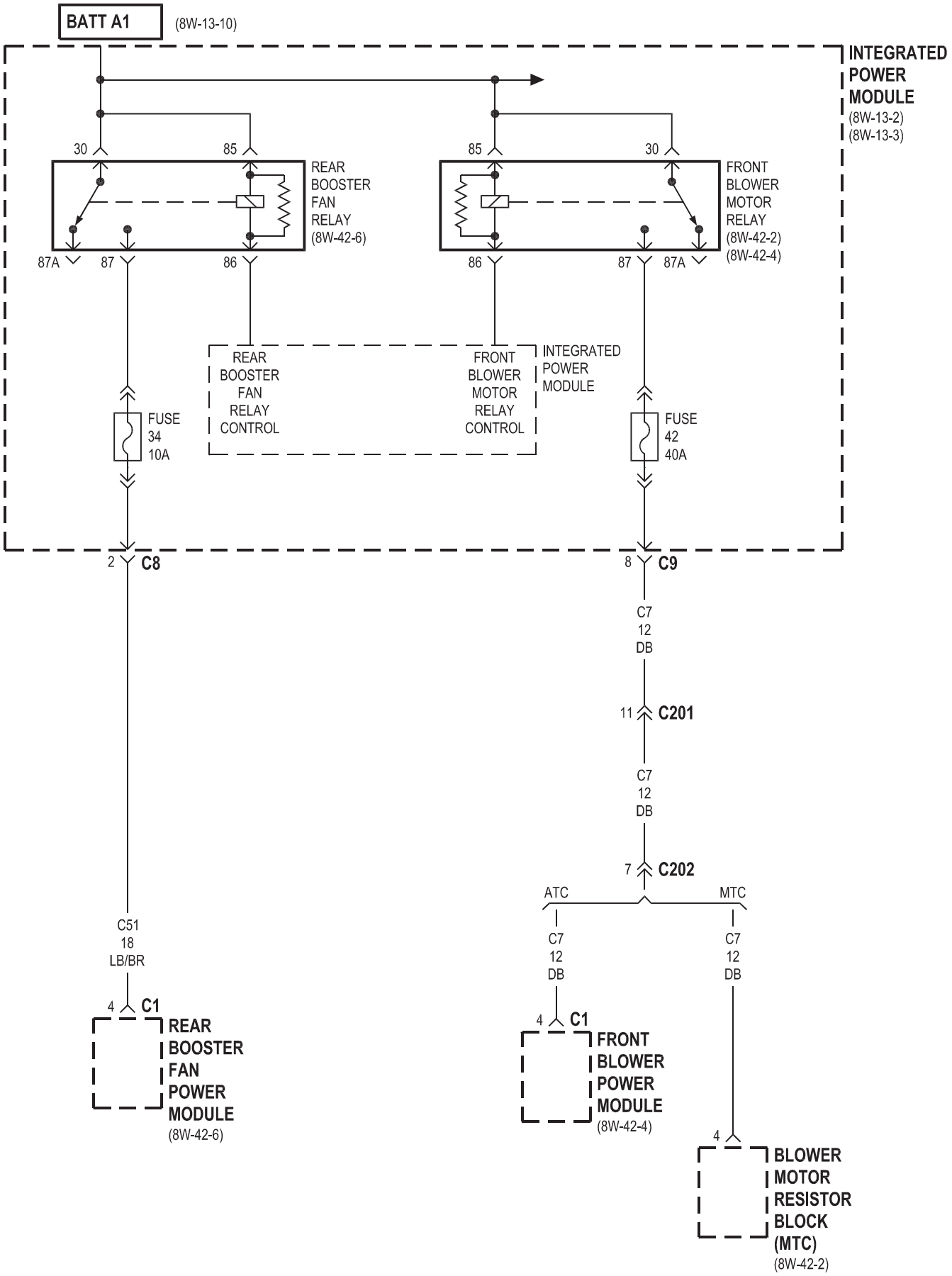
□□ POWER SUNROOF

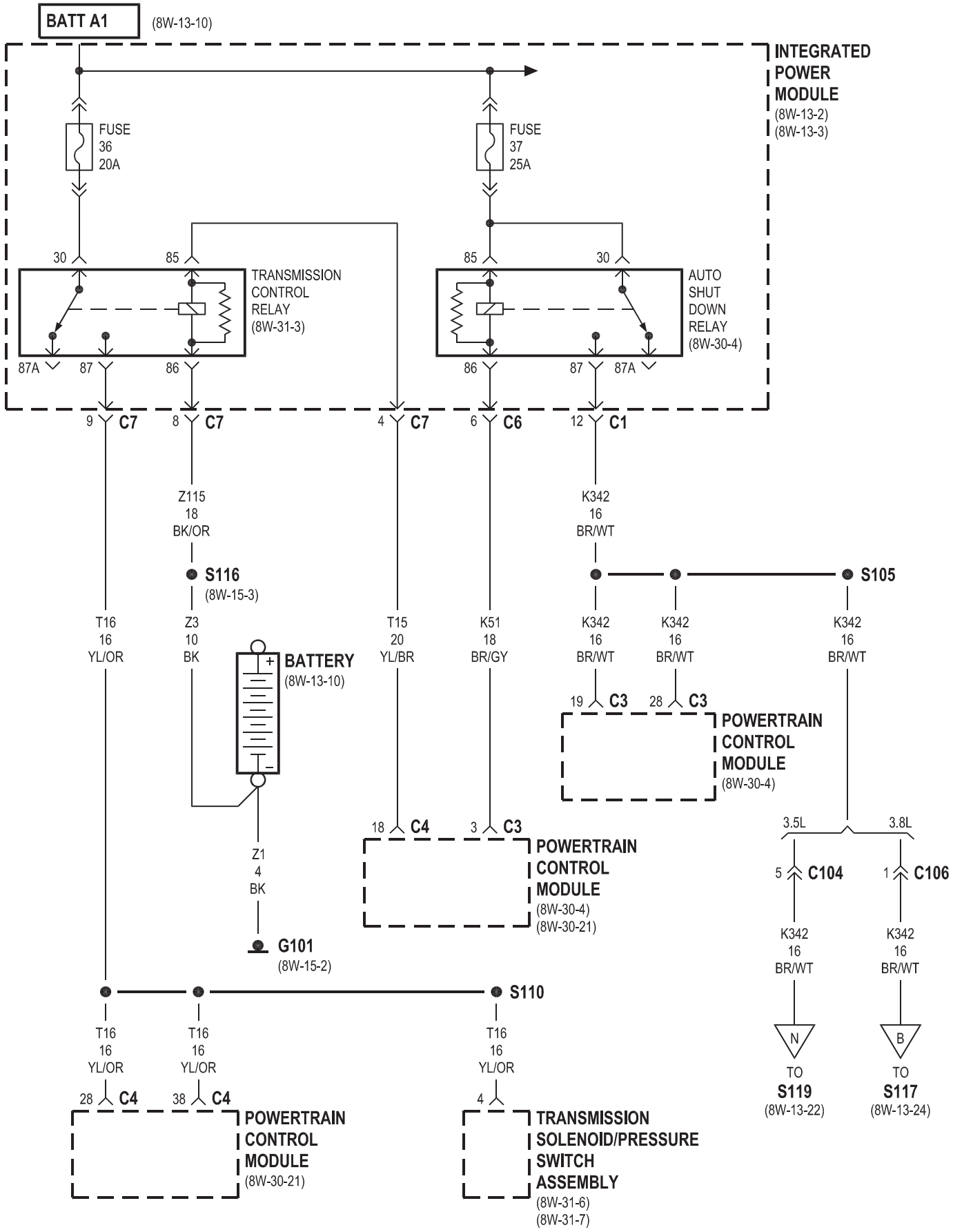


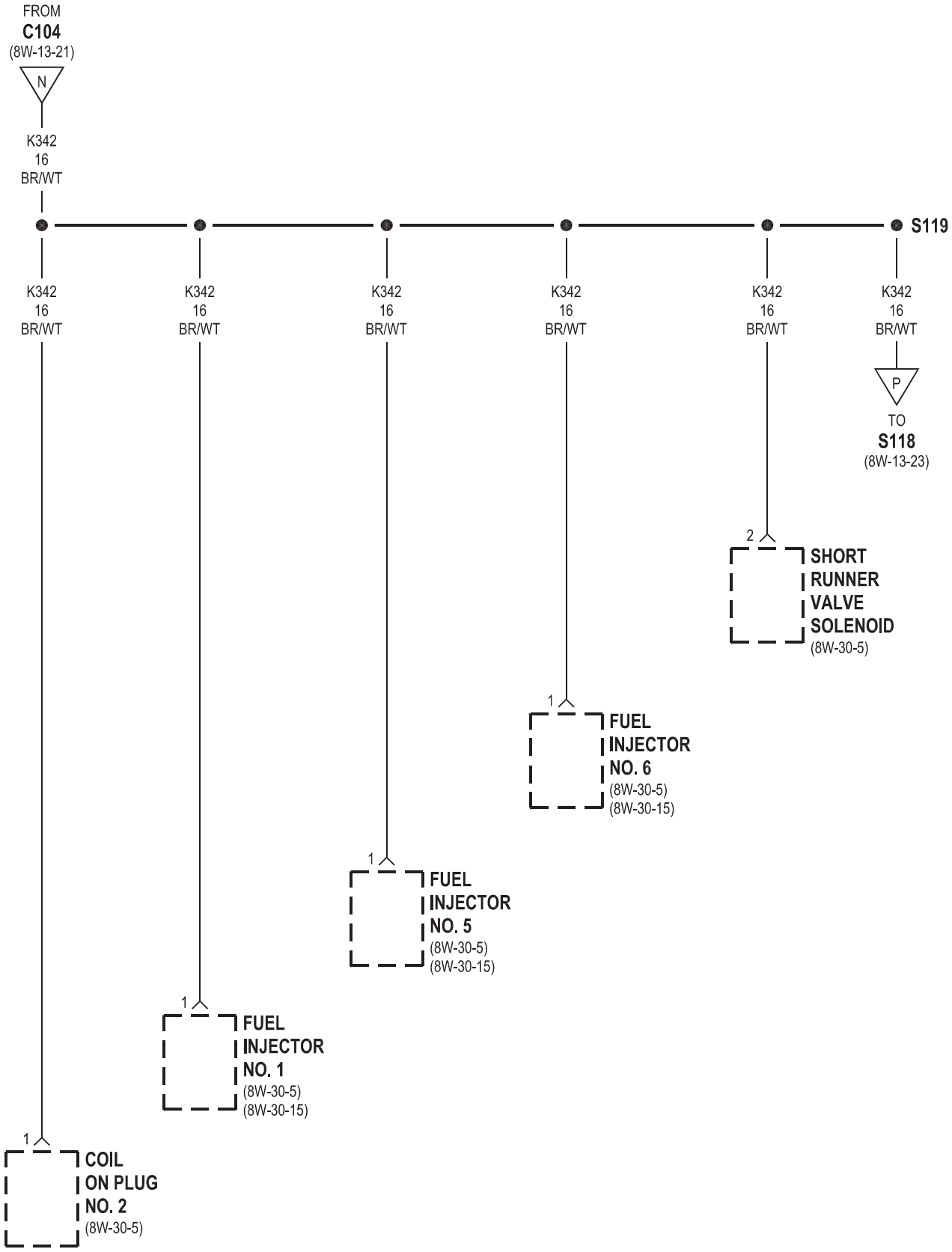
□ POWER LIFTGATE

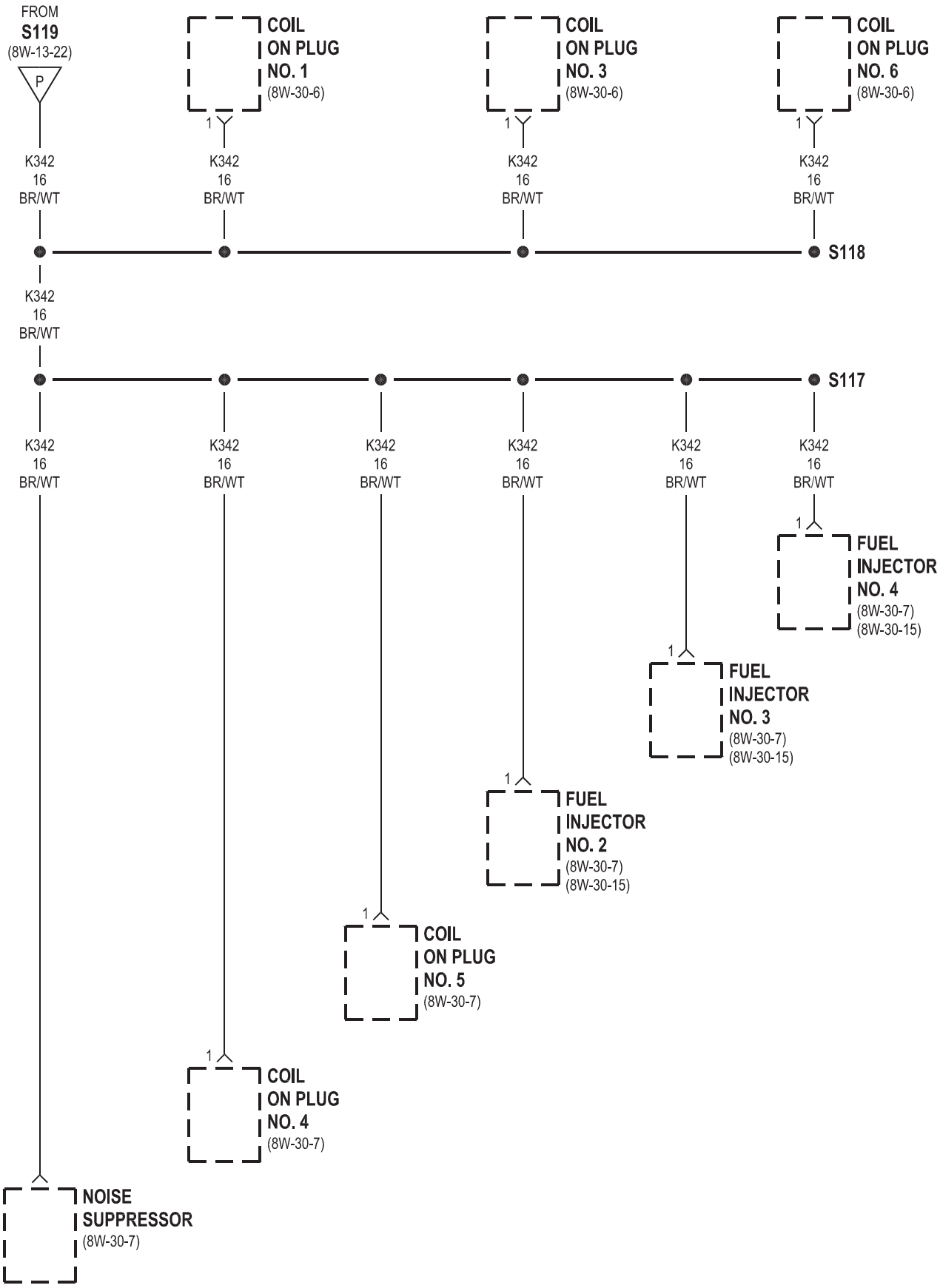

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
85
30
ACCESSORY RELAY
86
87
87A
ACCESSORY RELAY CONTROL
INTEGRATED POWER MODULE
FUSE 25 15A
FUSE 26 20A
FUSE 24 20A
ACCESSORY RELAY
B(+)
4 C8
5 C4
7 C4
F306 16 DB/PK
F307 16 LB/PK
16 C201
F306 16 DB/PK
1
AMPLIFIER
(8W-47-3)
(8W-47-5)
POWER SUNROOF MODULE
(8W-64-3)
POWER OUTLET-REAR
(8W-41-3)
5 C2
4
1
CIGAR LIGHTER
(8W-41-3)
F316 20 PK/OR
S320
F316 20 BK/PK
5 C201
6 C313
2
NAVIGATION MODULE
(8W-55-2)
EXCEPT BASE
BASE
S342
2 C1
2
2
6
1
HANDS FREE MODULE
(8W-55-4)
RADIO
(8W-47-4)
RADIO
(8W-47-2)
OVERHEAD CONSOLE
(8W-49-2)
AUTOMATIC DAY/NIGHT MIRROR
(8W-49-4)
▽▽ EXCEPT BASE

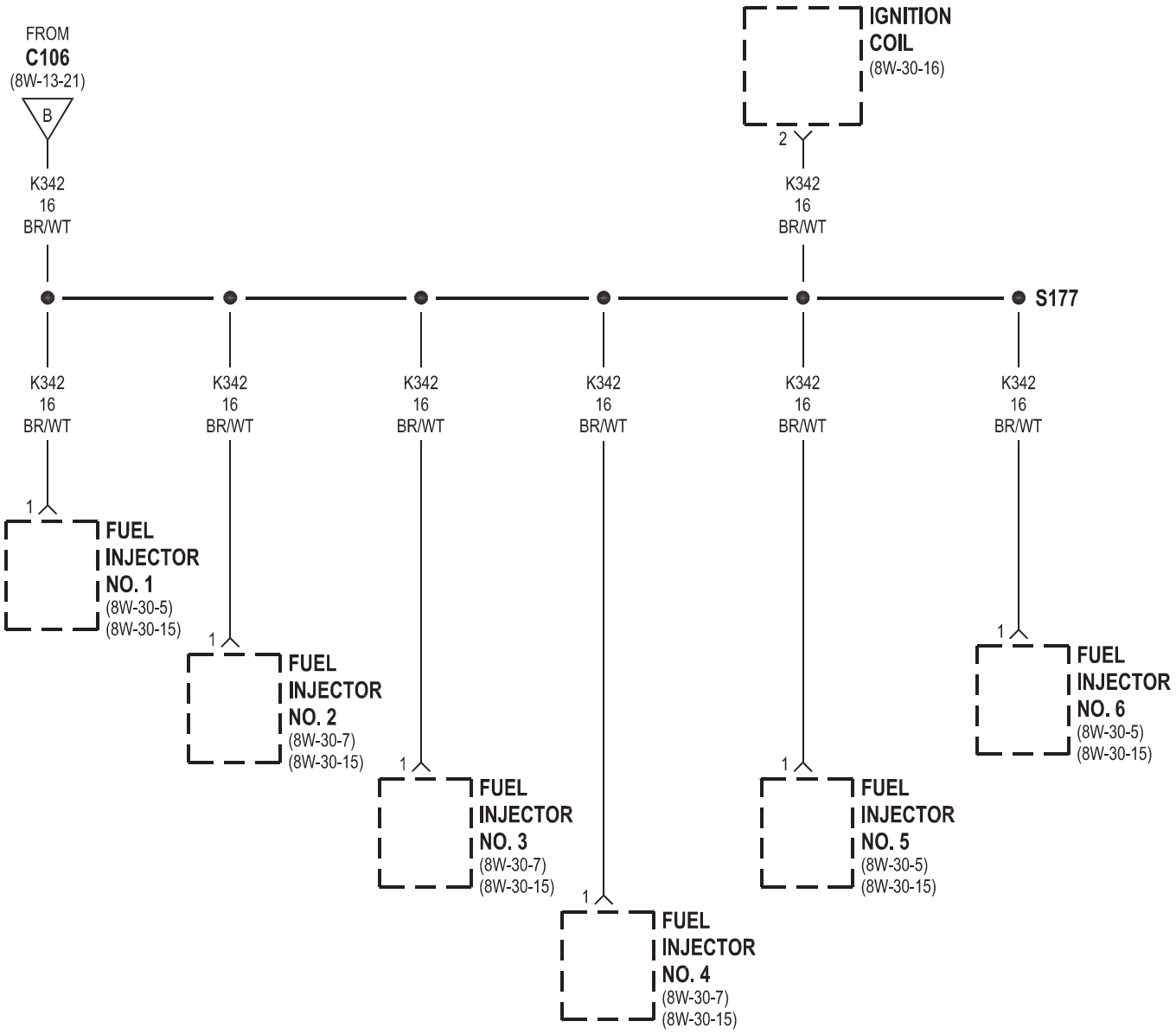

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 28 25A
FUSE 29 20A
FUSE 30 10A
FUSE 31 20A
30
85
HORN RELAY
(8W-41-2)
87A
87
86
HORN RELAY CONTROL
INTEGRATED POWER MODULE
23 C5
3 C9
2 C9
10 C9
X2 16 DG/OR
A108 18 LG/RD
A106 20 LB/RD
S112
60
2 C201
X2 16 DG/OR
X2 16 DG/OR
A108 18 LG/RD
A108 18 LG/RD
A106 20 LB/RD
A701 18 BR/RD
2
BRAKE LAMP SWITCH
(8W-30-20)
2
HORN-HIGH NOTE
(8W-41-2)
1 C1
INSTRUMENT CLUSTER
(8W-40-2)
1 C1
BODY CONTROL MODULE
(8W-45-2)
2
HORN-LOW NOTE
(8W-41-2)
5
IGNITION SWITCH
(8W-13-27)

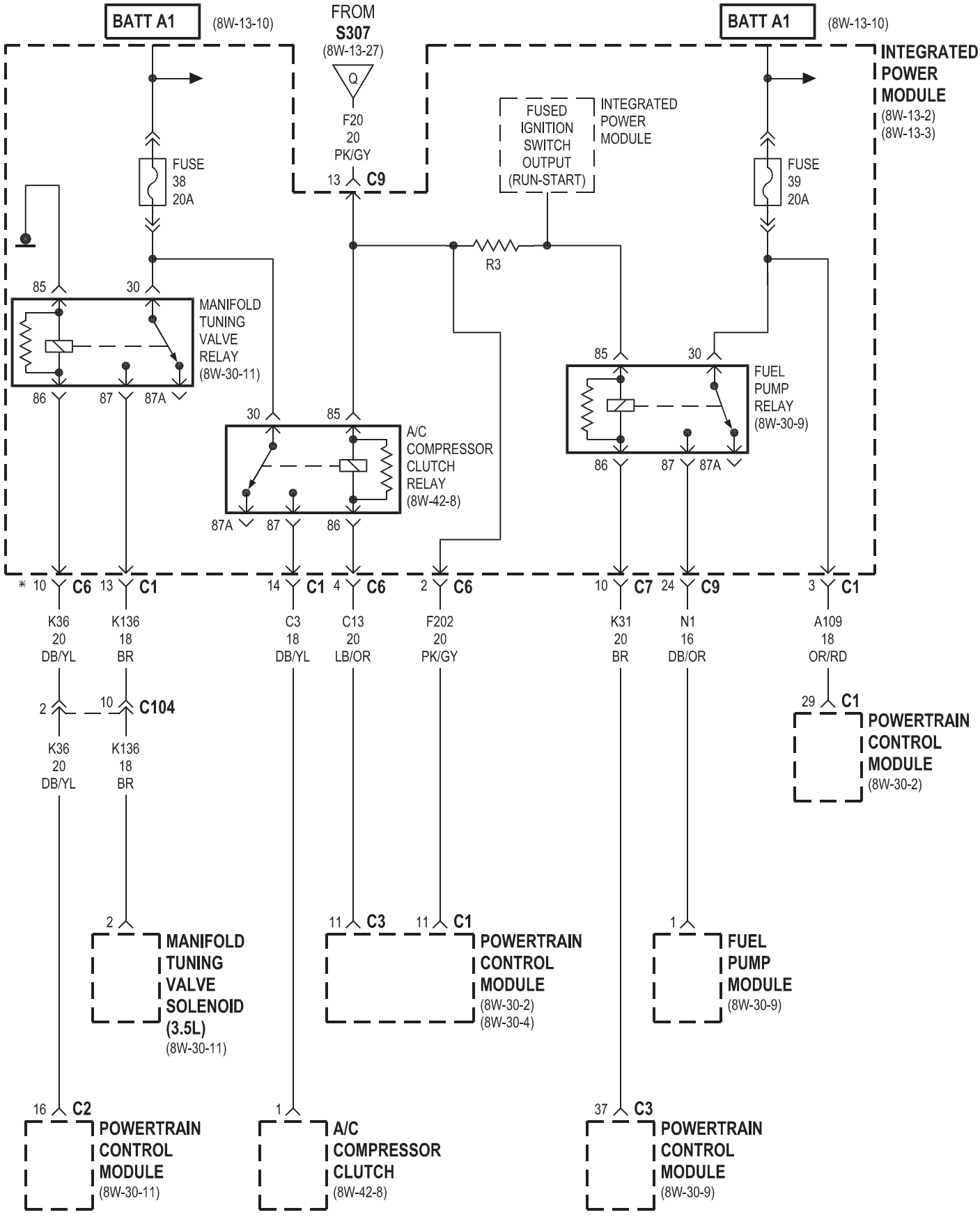

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
85
REAR BOOSTER FAN RELAY
(8W-42-6)
87A
87
86
85
30
FRONT BLOWER MOTOR RELAY
(8W-42-2)
(8W-42-4)
86
87
87A
REAR BOOSTER FAN RELAY CONTROL
FRONT BLOWER MOTOR RELAY CONTROL
INTEGRATED POWER MODULE
FUSE 34 10A
FUSE 42 40A
2 C8
8 C9
C7 12 DB
11 C201
C7 12 DB
7 C202
ATC
MTC
C7 12 DB
C7 12 DB
C51 18 LB/BR
4 C1
REAR BOOSTER FAN POWER MODULE
(8W-42-6)
4 C1
FRONT BLOWER POWER MODULE
(8W-42-4)
4
BLOWER MOTOR RESISTOR BLOCK (MTC)
(8W-42-2)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 36 20A
FUSE 37 25A
30
85
85
30
TRANSMISSION CONTROL RELAY
(8W-31-3)
AUTO SHUT DOWN RELAY
(8W-30-4)
87A
87
86
86
87
87A
9 C7
8 C7
4 C7
6 C6
12 C1
Z115 18 BK/OR
K342 16 BR/WT
S116
(8W-15-3)
S105
T16 16 YL/OR
Z3 10 BK
T15 20 YL/BR
K51 18 BR/GY
K342 16 BR/WT
K342 16 BR/WT
K342 16 BR/WT
BATTERY
(8W-13-10)
19 C3
28 C3
POWERTRAIN CONTROL MODULE
(8W-30-4)
18 C4
3 C3
POWERTRAIN CONTROL MODULE
(8W-30-4)
(8W-30-21)
3.5L
3.8L
Z1 4 BK
5 C104
1 C106
G101
(8W-15-2)
K342 16 BR/WT
K342 16 BR/WT
S110
N
B
T16 16 YL/OR
T16 16 YL/OR
T16 16 YL/OR
TO S119
(8W-13-22)
TO S117
(8W-13-24)
28 C4
38 C4
4
POWERTRAIN CONTROL MODULE
(8W-30-21)
TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY
(8W-31-6)
(8W-31-7)

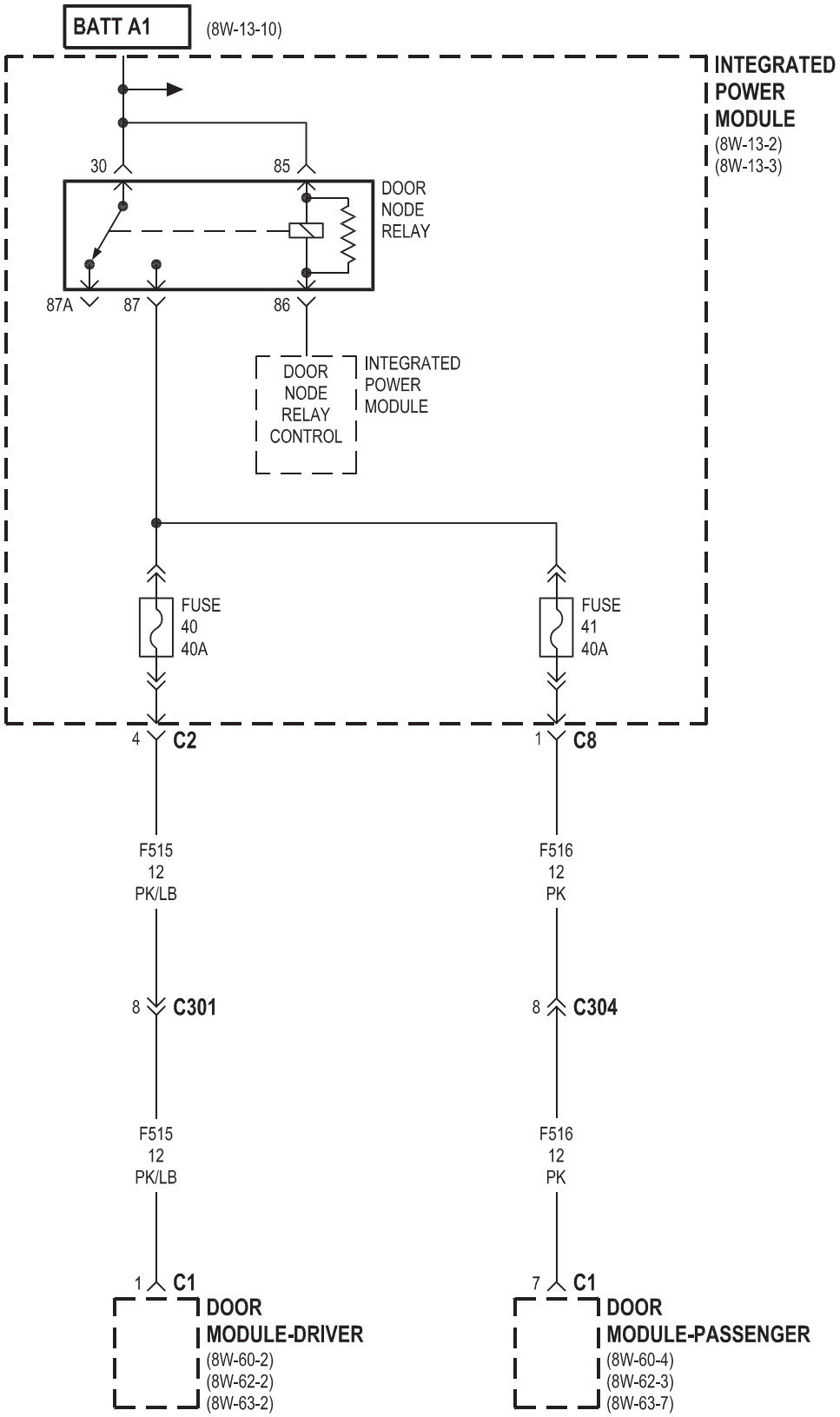

FROM
C104
(8W-13-21)
N
K342
16
BR/WT
S119
K342
16
BR/WT
P
TO
S118
(8W-13-23)
2
SHORT
RUNNER
VALVE
SOLENOID
(8W-30-5)
1
FUEL
INJECTOR
NO. 6
(8W-30-5)
(8W-30-15)
FUEL
INJECTOR
NO. 5
(8W-30-5)
(8W-30-15)
FUEL
INJECTOR
NO. 1
(8W-30-5)
(8W-30-15)
COIL
ON PLUG
NO. 2
(8W-30-5)

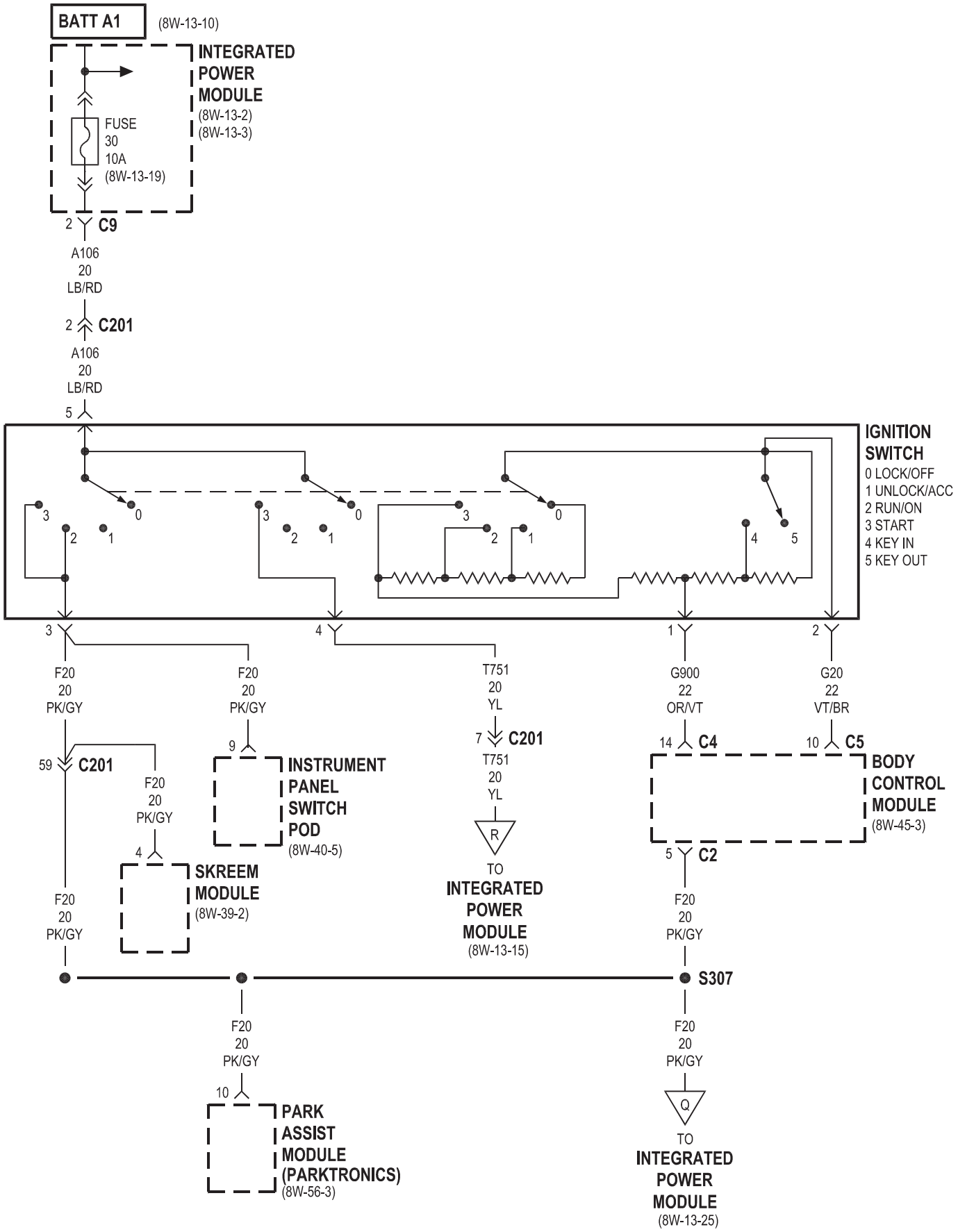

FROM
S119
(8W-13-22)
P
K342
16
BR/WT
COIL
ON PLUG
NO. 1
(8W-30-6)
COIL
ON PLUG
NO. 3
(8W-30-6)
COIL
ON PLUG
NO. 6
(8W-30-6)
S118
S117
FUEL
INJECTOR
NO. 4
(8W-30-7)
(8W-30-15)
FUEL
INJECTOR
NO. 3
(8W-30-7)
(8W-30-15)
FUEL
INJECTOR
NO. 2
(8W-30-7)
(8W-30-15)
COIL
ON PLUG
NO. 5
(8W-30-7)
COIL
ON PLUG
NO. 4
(8W-30-7)
NOISE
SUPPRESSOR
(8W-30-7)

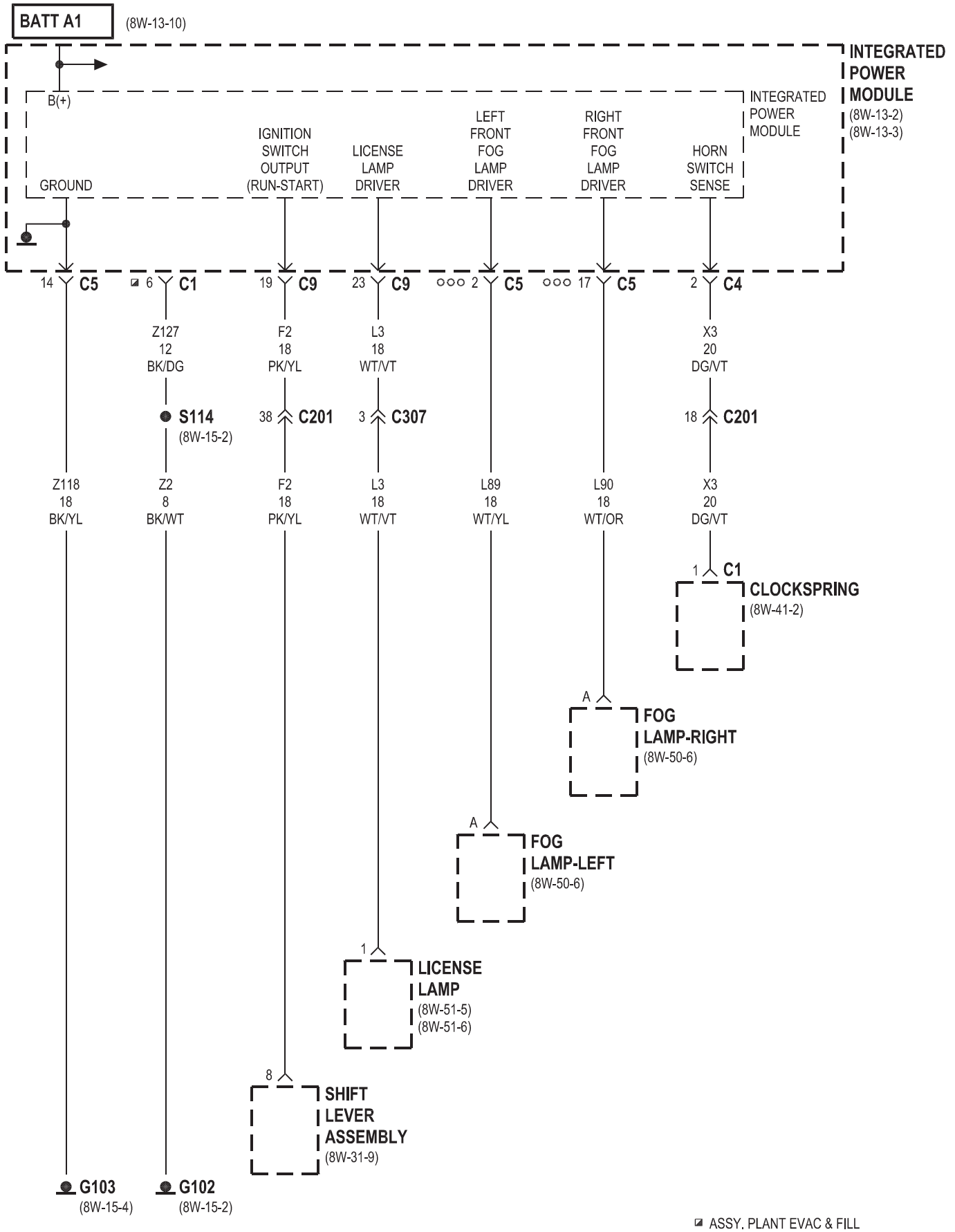

FROM
C106
(8W-13-21)
B
K342
16
BR/WT
IGNITION
COIL
(8W-30-16)
2
K342
16
BR/WT
S177
K342
16
BR/WT
1
FUEL
INJECTOR
NO. 1
(8W-30-5)
(8W-30-15)
K342
16
BR/WT
1
FUEL
INJECTOR
NO. 2
(8W-30-7)
(8W-30-15)
K342
16
BR/WT
1
FUEL
INJECTOR
NO. 3
(8W-30-7)
(8W-30-15)
K342
16
BR/WT
1
FUEL
INJECTOR
NO. 4
(8W-30-7)
(8W-30-15)
K342
16
BR/WT
1
FUEL
INJECTOR
NO. 5
(8W-30-5)
(8W-30-15)
K342
16
BR/WT
1
FUEL
INJECTOR
NO. 6
(8W-30-5)
(8W-30-15)

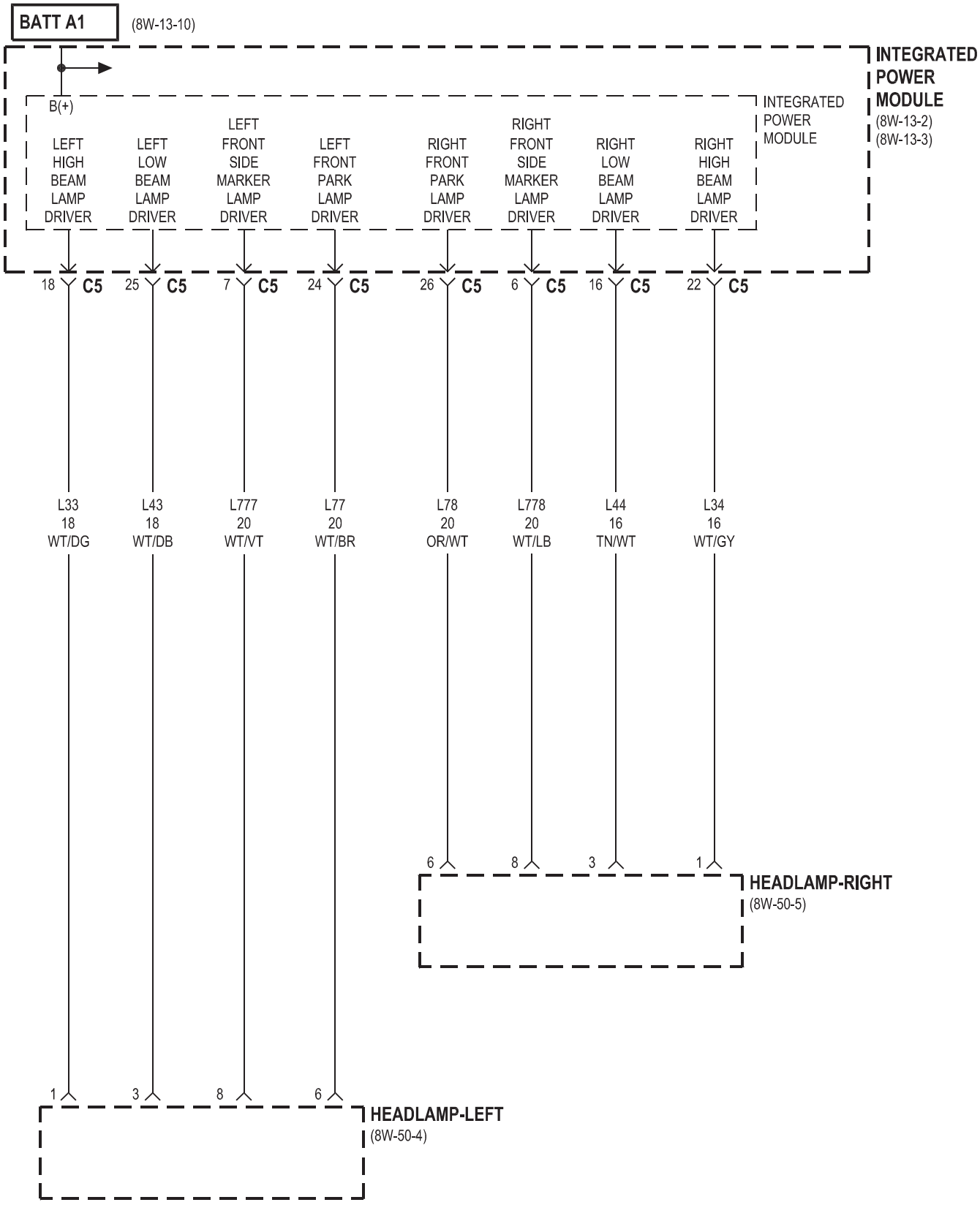

BATT A1
(8W-13-10)
FROM
S307
(8W-13-27)
Q
F20
20
PK/GY
13 C9
BATT A1
(8W-13-10)
INTEGRATED
POWER
MODULE
(8W-13-2)
(8W-13-3)
FUSED
IGNITION
SWITCH
OUTPUT
(RUN-START)
INTEGRATED
POWER
MODULE
FUSE
38
20A
FUSE
39
20A
R3
85
30
MANIFOLD
TUNING
VALVE
RELAY
(8W-30-11)
86
87
87A
30
85
A/C
COMPRESSOR
CLUTCH
RELAY
(8W-42-8)
87A
87
86
85
30
FUEL
PUMP
RELAY
(8W-30-9)
86
87
87A
* 10 C6
13 C1
14 C1
4 C6
2 C6
10 C7
24 C9
3 C1
K36
20
DB/YL
K136
18
BR
C3
18
DB/YL
C13
20
LB/OR
F202
20
PK/GY
K31
20
BR
N1
16
DB/OR
A109
18
OR/RD
2
10 C104
K36
20
DB/YL
K136
18
BR
29 C1
POWERTRAIN
CONTROL
MODULE
(8W-30-2)
2
MANIFOLD
TUNING
VALVE
SOLENOID
(3.5L)
(8W-30-11)
11 C3
11 C1
POWERTRAIN
CONTROL
MODULE
(8W-30-2)
(8W-30-4)
1
FUEL
PUMP
MODULE
(8W-30-9)
16 C2
POWERTRAIN
CONTROL
MODULE
(8W-30-11)
1
A/C
COMPRESSOR
CLUTCH
(8W-42-8)
37 C3
POWERTRAIN
CONTROL
MODULE
(8W-30-9)

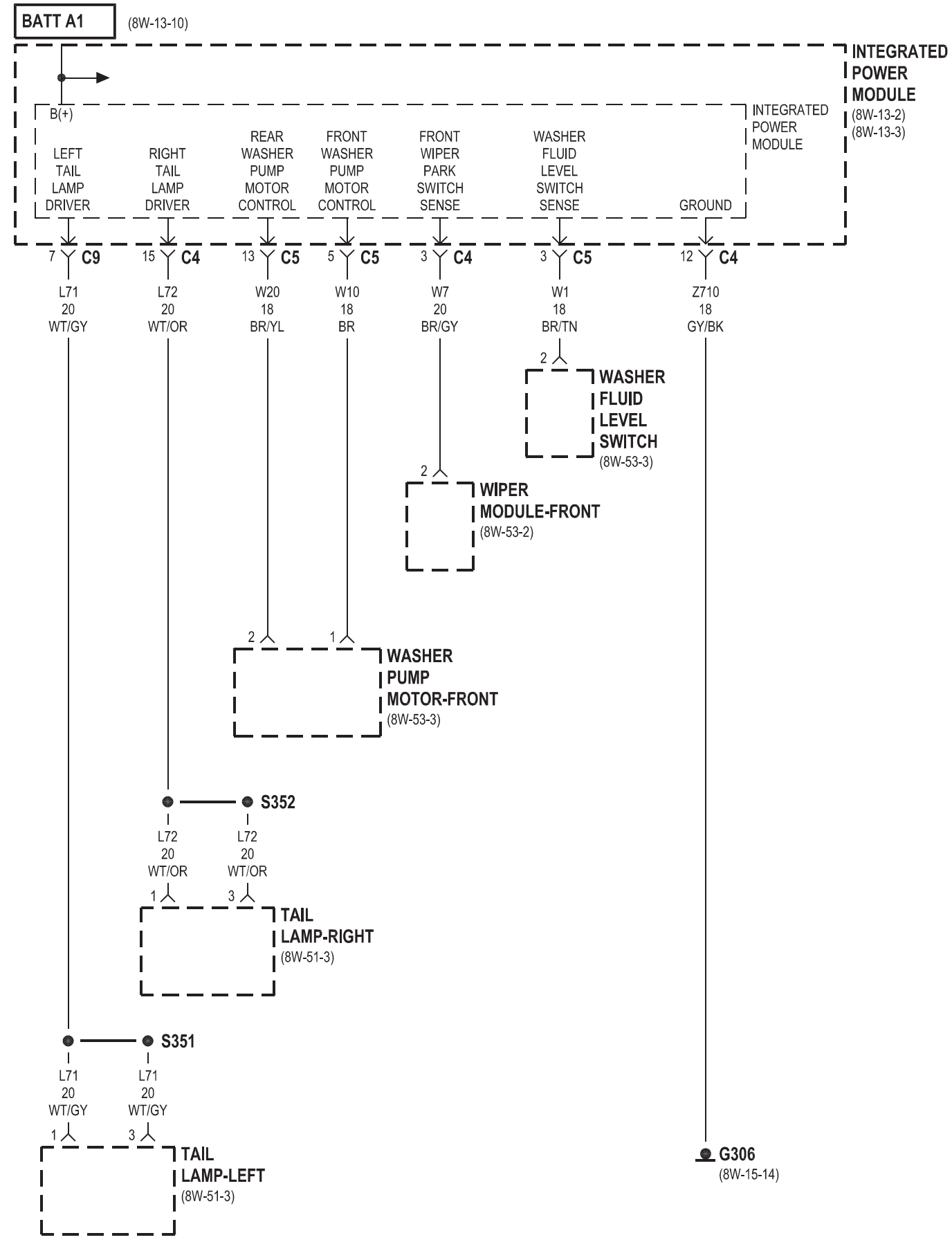
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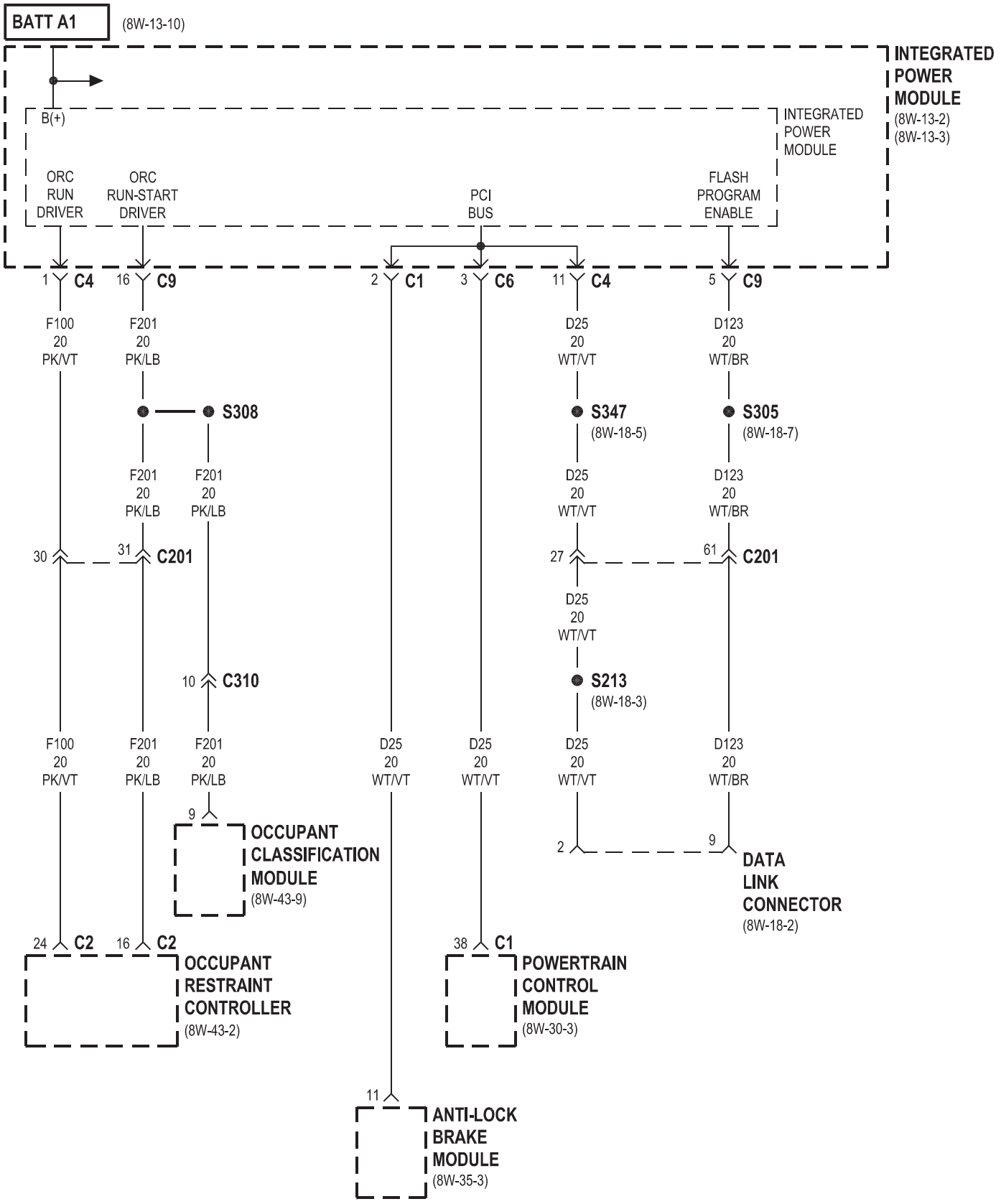

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
85
DOOR NODE RELAY
87A
87
86
DOOR NODE RELAY CONTROL
INTEGRATED POWER MODULE
FUSE 40 40A
FUSE 41 40A
4
C2
1
C8
F515 12 PK/LB
F516 12 PK
8
C301
8
C304
F515 12 PK/LB
F516 12 PK
1
C1
7
C1
DOOR MODULE-DRIVER
(8W-60-2)
(8W-62-2)
(8W-63-2)
DOOR MODULE-PASSENGER
(8W-60-4)
(8W-62-3)
(8W-63-7)

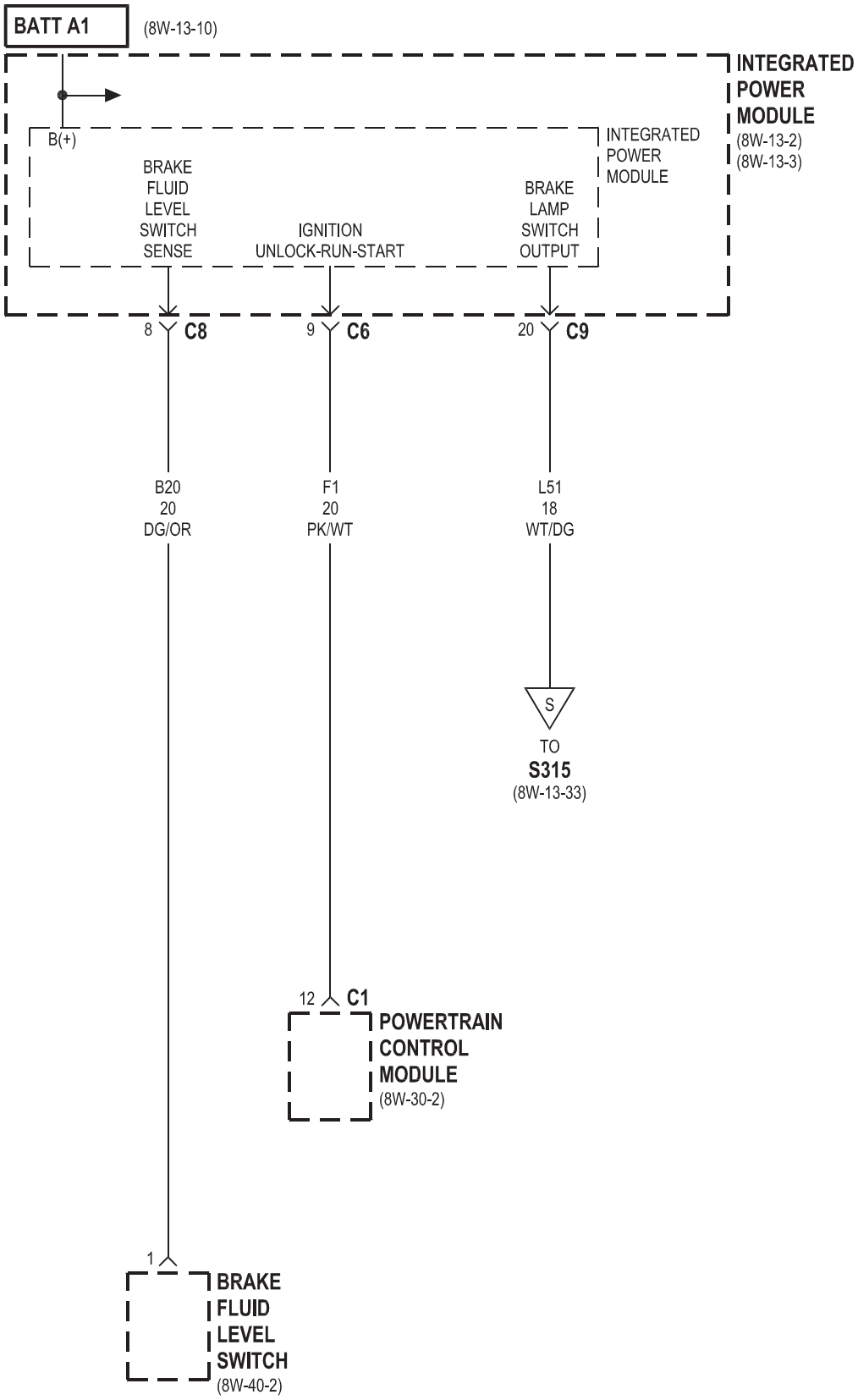

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 30 10A
(8W-13-19)
2 C9
A106 20 LB/RD
2 C201
A106 20 LB/RD
5
IGNITION SWITCH
0 LOCK/OFF
1 UNLOCK/ACC
2 RUN/ON
3 START
4 KEY IN
5 KEY OUT
3
4
1
2
F20 20 PK/GY
F20 20 PK/GY
T751 20 YL
G900 22 OR/VT
G20 22 VT/BR
59 C201
9
7 C201
T751 20 YL
R
TO INTEGRATED POWER MODULE
(8W-13-15)
14 C4
10 C5
BODY CONTROL MODULE
(8W-45-3)
5 C2
F20 20 PK/GY
INSTRUMENT PANEL SWITCH POD
(8W-40-5)
4
SKREEM MODULE
(8W-39-2)
S307
10
PARK ASSIST MODULE (PARKTRONICS)
(8W-56-3)
Q
TO INTEGRATED POWER MODULE
(8W-13-25)

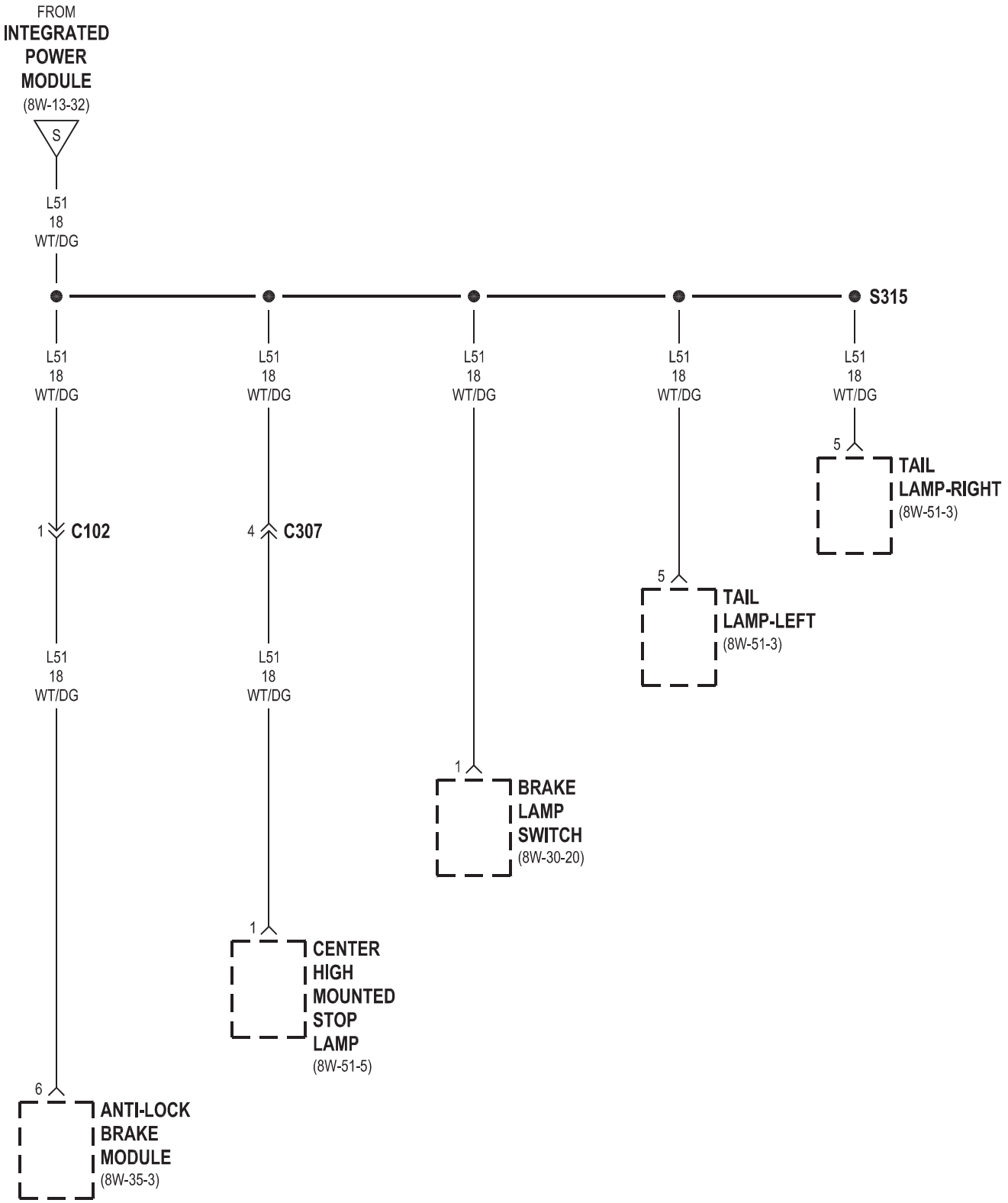

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
B(+)
INTEGRATED POWER MODULE
GROUND
IGNITION SWITCH OUTPUT (RUN-START)
LICENSE LAMP DRIVER
LEFT FRONT FOG LAMP DRIVER
RIGHT FRONT FOG LAMP DRIVER
HORN SWITCH SENSE
14 C5
6 C1
19 C9
23 C9
2 C5
17 C5
2 C4
Z127 12 BK/DG
F2 18 PK/YL
L3 18 WT/VT
X3 20 DG/VT
S114
(8W-15-2)
38 C201
3 C307
18 C201
Z118 18 BK/YL
Z2 8 BK/WT
F2 18 PK/YL
L3 18 WT/VT
L89 18 WT/YL
L90 18 WT/OR
X3 20 DG/VT
1 C1
CLOCKSPRING
(8W-41-2)
A
FOG LAMP-RIGHT
(8W-50-6)
A
FOG LAMP-LEFT
(8W-50-6)
1
LICENSE LAMP
(8W-51-5)
(8W-51-6)
8
SHIFT LEVER ASSEMBLY
(8W-31-9)
G103
(8W-15-4)
G102
(8W-15-2)
ASSY. PLANT EVAC & FILL
FOG LAMPS


BATT A1
(8W-13-10)
B(+)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
LEFT HIGH BEAM LAMP DRIVER
LEFT LOW BEAM LAMP DRIVER
LEFT FRONT SIDE MARKER LAMP DRIVER
LEFT FRONT PARK LAMP DRIVER
RIGHT FRONT PARK LAMP DRIVER
RIGHT FRONT SIDE MARKER LAMP DRIVER
RIGHT LOW BEAM LAMP DRIVER
RIGHT HIGH BEAM LAMP DRIVER
18 C5
25 C5
7 C5
24 C5
26 C5
6 C5
16 C5
22 C5
L33 18 WT/DG
L43 18 WT/DB
L777 20 WT/VT
L77 20 WT/BR
L78 20 OR/WT
L778 20 WT/LB
L44 16 TN/WT
L34 16 WT/GY
6
8
3
1
HEADLAMP-RIGHT
(8W-50-5)
1
3
8
6
HEADLAMP-LEFT
(8W-50-4)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
B(+)
INTEGRATED POWER MODULE
LEFT TAIL LAMP DRIVER
RIGHT TAIL LAMP DRIVER
REAR WASHER PUMP MOTOR CONTROL
FRONT WASHER PUMP MOTOR CONTROL
FRONT WIPER PARK SWITCH SENSE
WASHER FLUID LEVEL SWITCH SENSE
GROUND
7 C9
15 C4
13 C5
5 C5
3 C4
3 C5
12 C4
L71 20 WT/GY
L72 20 WT/OR
W20 18 BR/YL
W10 18 BR
W7 20 BR/GY
W1 18 BR/TN
Z710 18 GY/BK
2
WASHER FLUID LEVEL SWITCH
(8W-53-3)
2
WIPER MODULE-FRONT
(8W-53-2)
2
1
WASHER PUMP MOTOR-FRONT
(8W-53-3)
S352
L72 20 WT/OR
L72 20 WT/OR
1
3
TAIL LAMP-RIGHT
(8W-51-3)
S351
L71 20 WT/GY
L71 20 WT/GY
1
3
TAIL LAMP-LEFT
(8W-51-3)
G306
(8W-15-14)

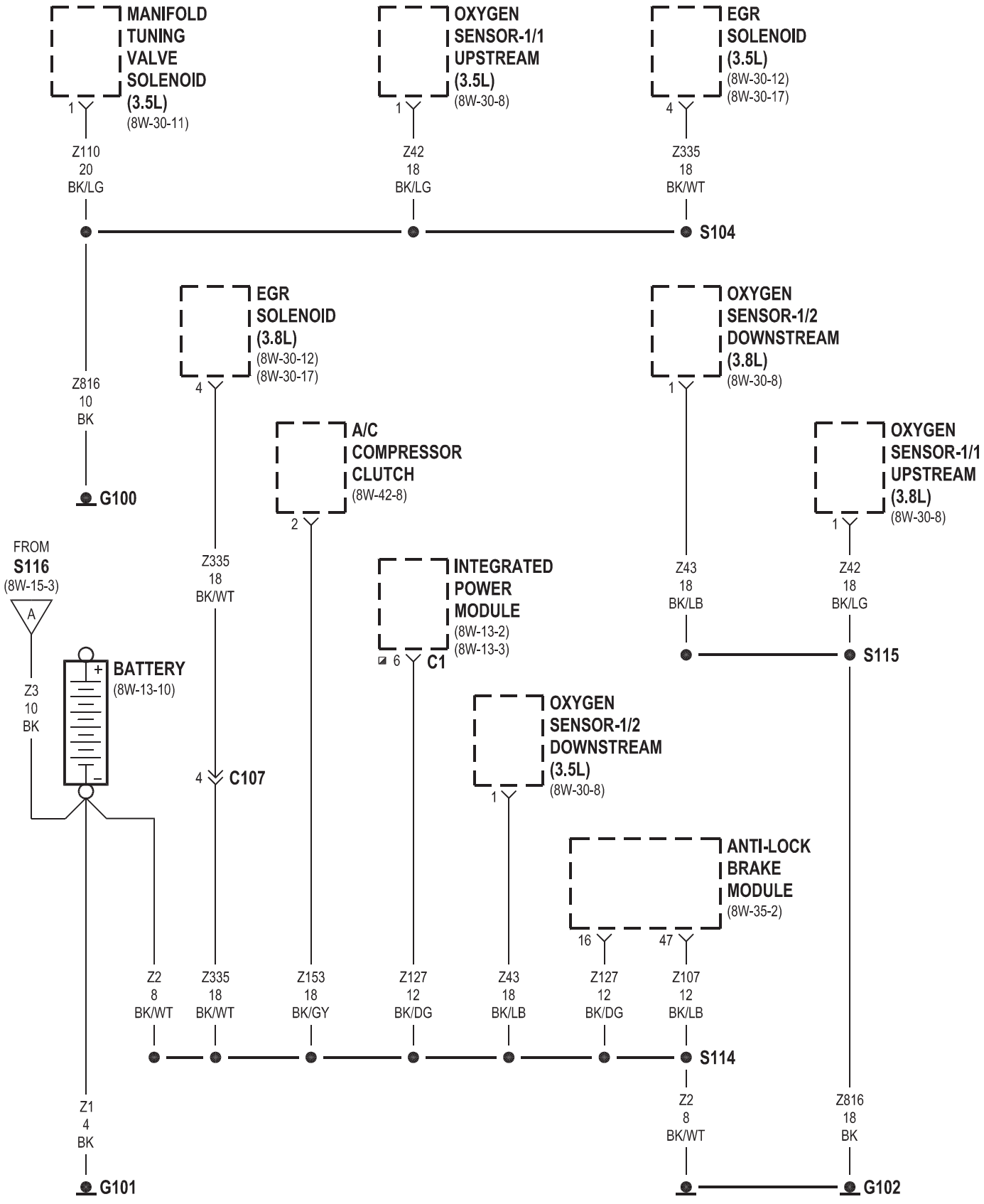

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
B(+)
INTEGRATED POWER MODULE
ORC RUN DRIVER
ORC RUN-START DRIVER
PCI BUS
FLASH PROGRAM ENABLE
1 C4
16 C9
2 C1
3 C6
11 C4
5 C9
F100 20 PK/VT
F201 20 PK/LB
D25 20 WT/VT
D123 20 WT/BR
S308
S347
(8W-18-5)
S305
(8W-18-7)
F201 20 PK/LB
F201 20 PK/LB
D25 20 WT/VT
D123 20 WT/BR
30
31 C201
27
61 C201
D25 20 WT/VT
10 C310
S213
(8W-18-3)
F100 20 PK/VT
F201 20 PK/LB
F201 20 PK/LB
D25 20 WT/VT
D25 20 WT/VT
D25 20 WT/VT
D123 20 WT/BR
9
OCCUPANT CLASSIFICATION MODULE
(8W-43-9)
2
9
DATA LINK CONNECTOR
(8W-18-2)
24 C2
16 C2
OCCUPANT RESTRAINT CONTROLLER
(8W-43-2)
38 C1
POWERTRAIN CONTROL MODULE
(8W-30-3)
11
ANTI-LOCK BRAKE MODULE
(8W-35-3)

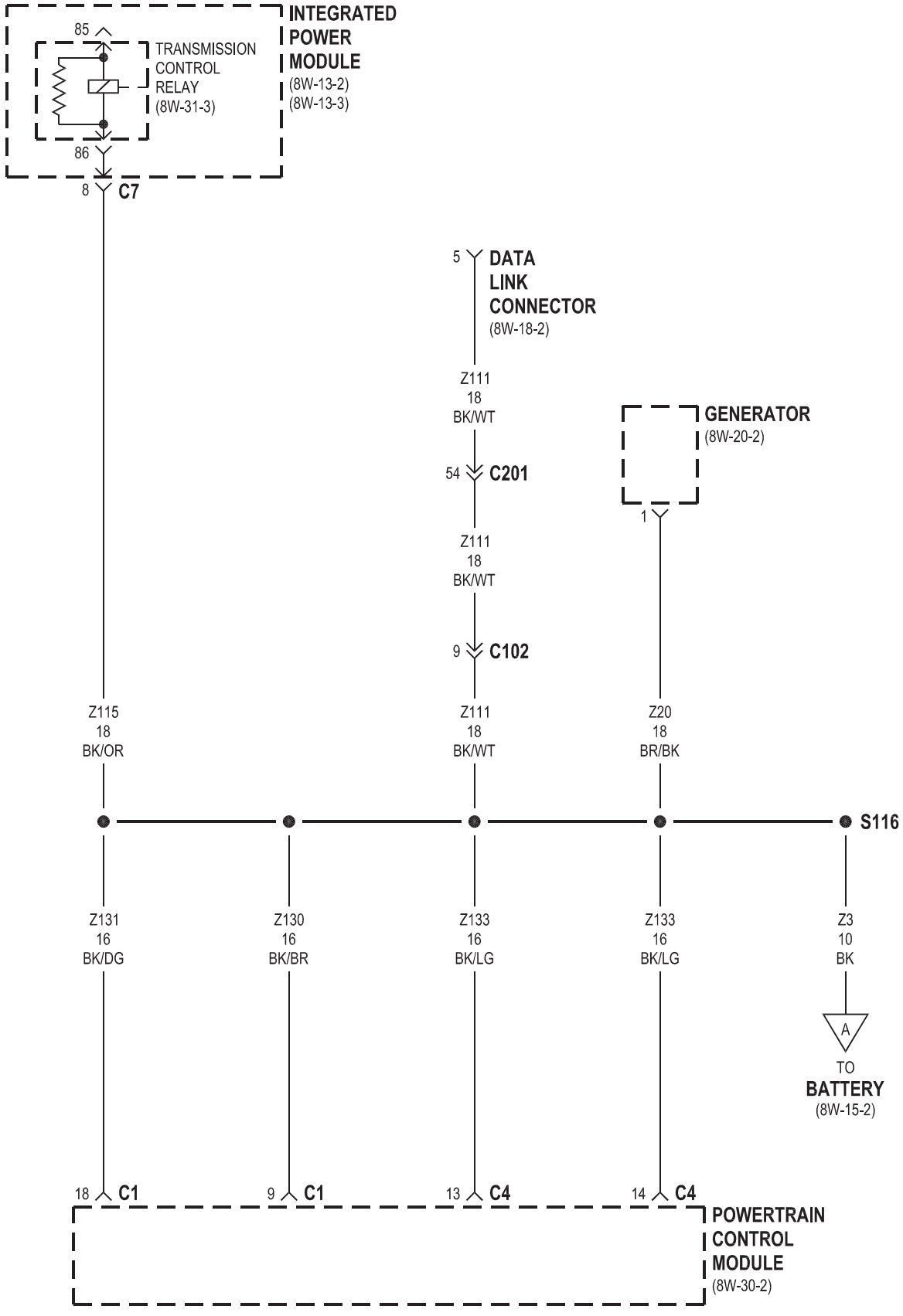

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
B(+)
INTEGRATED POWER MODULE
BRAKE FLUID LEVEL SWITCH SENSE
IGNITION UNLOCK-RUN-START
BRAKE LAMP SWITCH OUTPUT
8 C8
9 C6
20 C9
B20
20
DG/OR
F1
20
PK/WT
L51
18
WT/DG
S
TO
S315
(8W-13-33)
12 C1
POWERTRAIN CONTROL MODULE
(8W-30-2)
1
BRAKE FLUID LEVEL SWITCH
(8W-40-2)

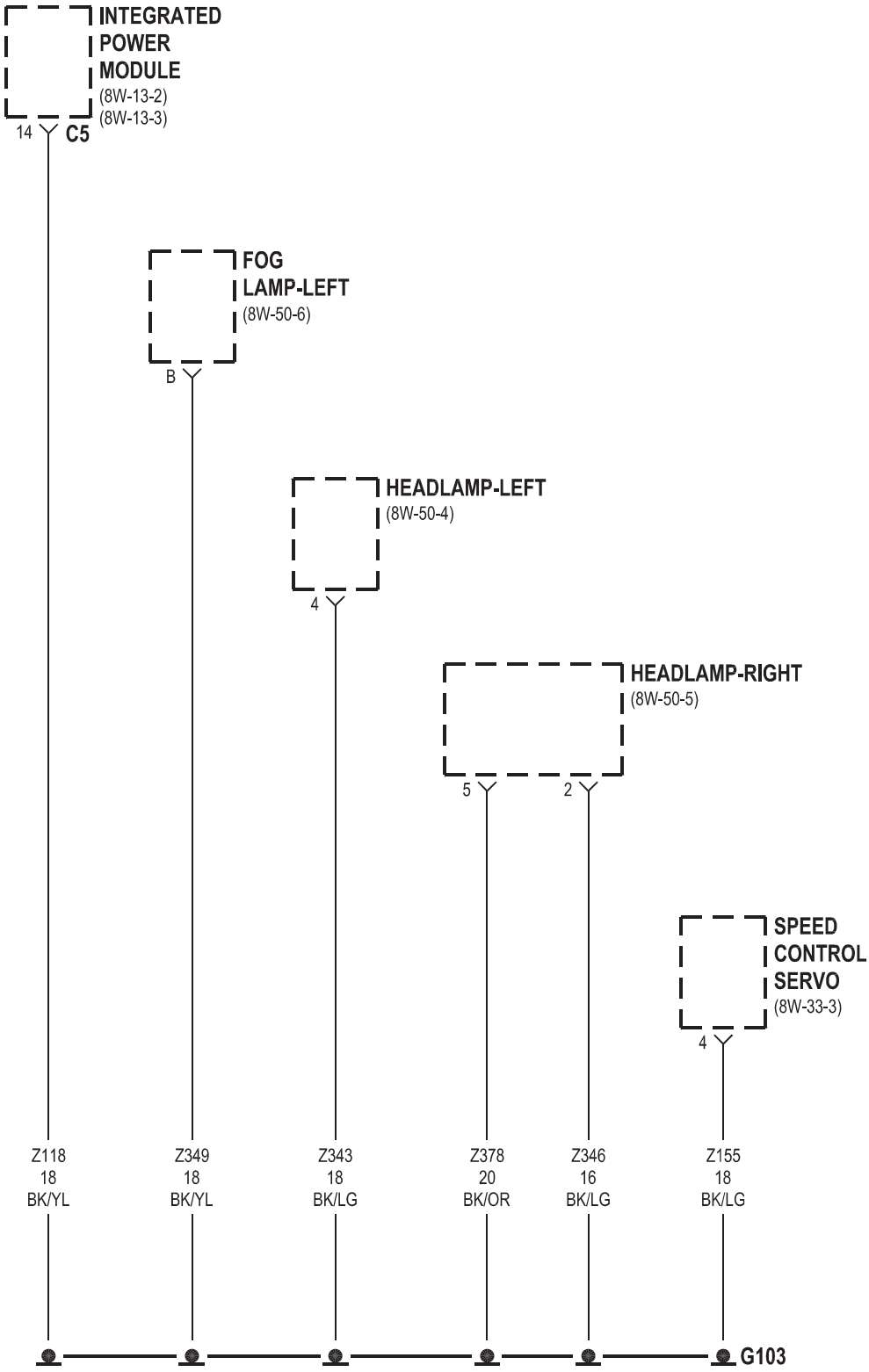

FROM
INTEGRATED
POWER
MODULE
(8W-13-32)
S
L51
18
WT/DG
S315
L51
18
WT/DG
1
C102
4
C307
5
TAIL
LAMP-RIGHT
(8W-51-3)
5
TAIL
LAMP-LEFT
(8W-51-3)
1
BRAKE
LAMP
SWITCH
(8W-30-20)
1
CENTER
HIGH
MOUNTED
STOP
LAMP
(8W-51-5)
6
ANTI-LOCK
BRAKE
MODULE
(8W-35-3)

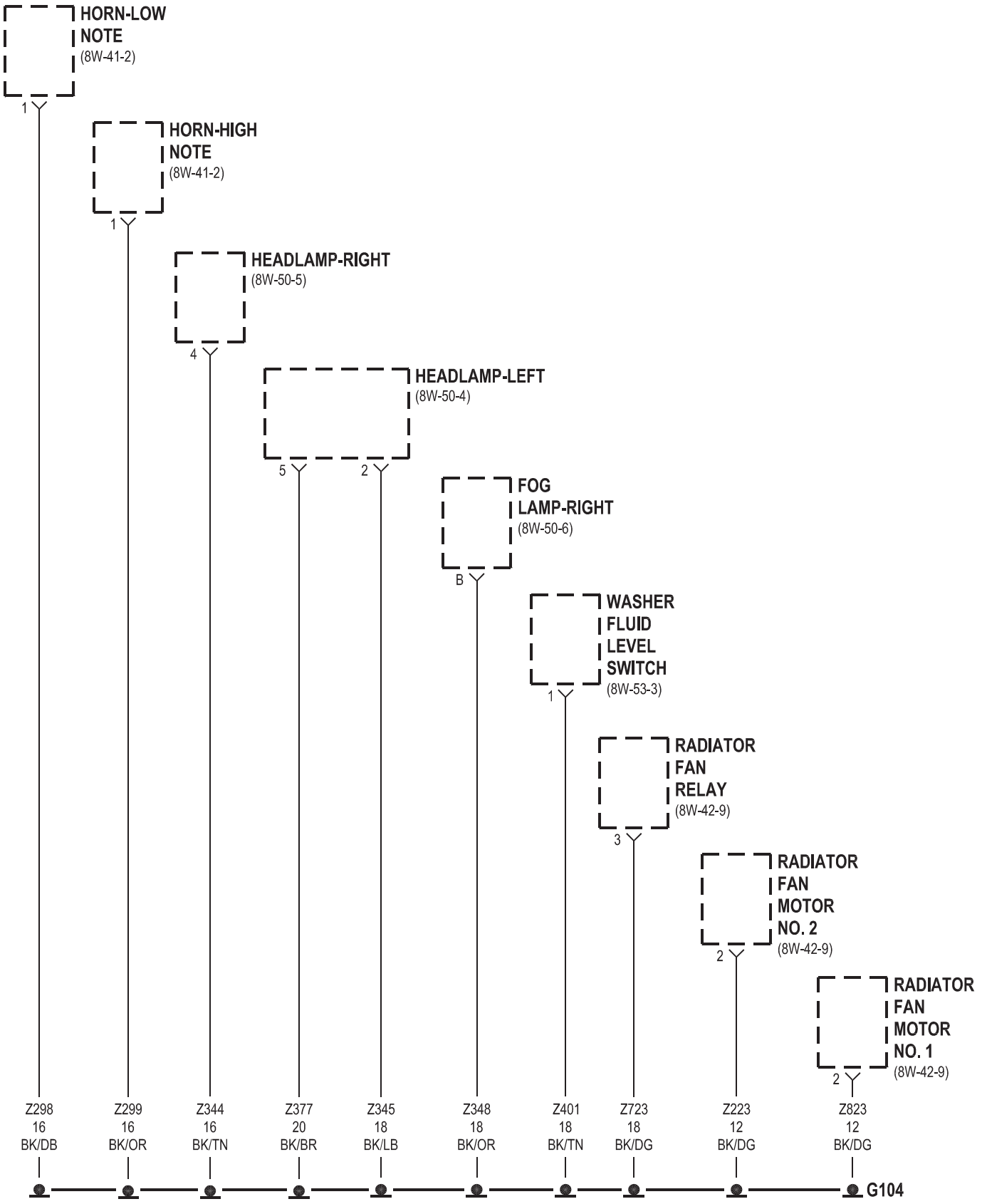
8W-15 GROUND DISTRIBUTION

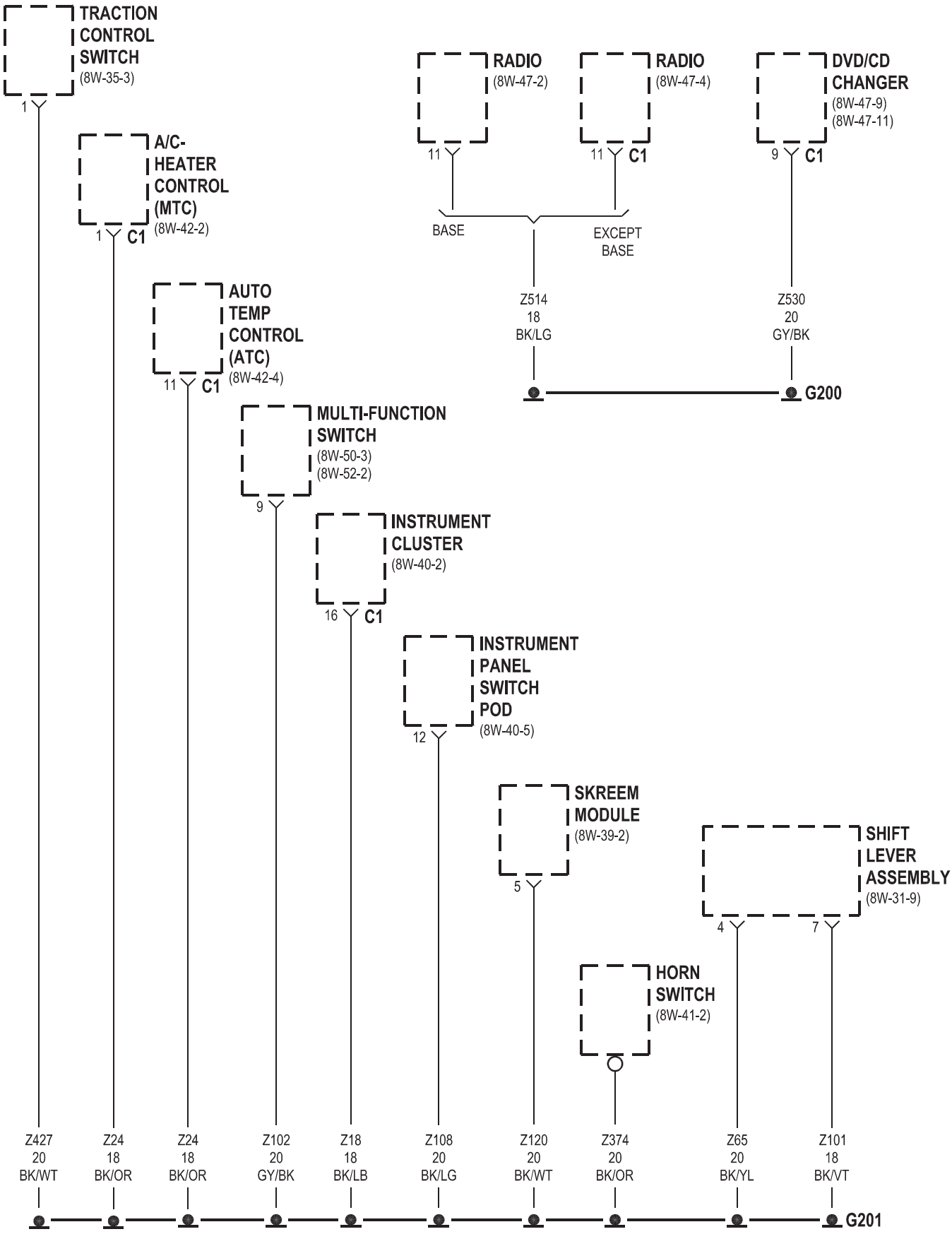
Component	Page
A/C-Heater Control	8W-15-6, 7
Amplifier	8W-15-15
Anti-Lock Brake Module	8W-15-2
Auto Temp Control	8W-15-6
Automatic Day/Night Mirror	8W-15-15
Battery	8W-15-2, 3
Body Control Module	8W-15-15
Brake Fluid Level Switch	8W-15-16
Brake Lamp Switch	8W-15-16
Center High Mounted Stop Lamp	8W-15-12
Cigar Lighter	8W-15-7
Courtesy Lamp-Driver	8W-15-9
Courtesy Lamp-Passenger	8W-15-11
DVD/CD Changer	8W-15-6
Data Link Connector	8W-15-3, 7
Dome Lamp	8W-15-8
Door Lock Motor/Ajar Switch-Driver	8W-15-9
Door Lock Motor/Ajar Switch-Passenger	8W-15-11
Door Module-Driver	8W-15-9
Door Module-Passenger	8W-15-11
EGR Solenoid	8W-15-2
Fog Lamp-Left	8W-15-4
Fog Lamp-Right	8W-15-5
Front Blower Power Module	8W-15-7
Fuel Pump Module	8W-15-11, 16
G100	8W-15-2
G101	8W-15-2
G102	8W-15-2
G103	8W-15-4
G104	8W-15-5
G200	8W-15-6
G201	8W-15-6
G202	8W-15-7
G203	8W-15-7
G204	8W-15-7
G300	8W-15-9
G301	8W-15-10, 11
G302	8W-15-12, 13, 14
G303	8W-15-14
G304	8W-15-15
G305	8W-15-15, 16
G306	8W-15-14
Generator	8W-15-3
Glove Box Lamp	8W-15-7
Hands Free Module	8W-15-16
Headlamp-Left	8W-15-4, 5
Headlamp-Right	8W-15-4, 5
Heated Seat Switch-Left Middle Row	8W-15-10
Heated Seat Switch-Right Middle Row	8W-15-10
Heated Seat-Left Middle Row	8W-15-10
Heated Seat-Right Middle Row	8W-15-10
Horn Switch	8W-15-6
Horn-High Note	8W-15-5
Horn-Low Note	8W-15-5
Instrument Cluster	8W-15-6
Instrument Panel Switch Pod	8W-15-6
Integrated Power Module	8W-15-2, 3, 4, 14
License Lamp	8W-15-13
Liftgate Cinch/Release Motor	8W-15-13
Liftgate Flood Lamp	8W-15-12
Liftgate Handle Switch	8W-15-13
Manifold Tuning Valve Solenoid	8W-15-2
Memory/Heated Seat Adjustable Pedals Module	8W-15-11
Multi-Function Switch	8W-15-6
Natural Vacuum Leak Detection Assembly	8W-15-11
Navigation Module	8W-15-16
Occupant Classification Module	8W-15-7
Occupant Restraint Controller	8W-15-7
Overhead Console	8W-15-15
Oxygen Sensor-1/1 Upstream	8W-15-2
Oxygen Sensor-1/2 Downstream	8W-15-2
Park Assist Module	8W-15-16
Power Liftgate Drive Unit	8W-15-14
Power Liftgate Module	8W-15-14
Power Outlet-Front Console	8W-15-7
Power Outlet-Instrument Panel	8W-15-7
Power Outlet-Rear	8W-15-14
Power Seat Switch-Driver	8W-15-9
Power Seat Switch-Passenger	8W-15-11
Power Sunroof Module	8W-15-14
Powertrain Control Module	8W-15-3
Radiator Fan Motor No. 1	8W-15-5
Radiator Fan Motor No. 2	8W-15-5
Radiator Fan Relay	8W-15-5
Radio	8W-15-6
Reading Lamp-Front	8W-15-8, 9
Reading/Courtesy Lamp-Left Middle	8W-15-8
Reading/Courtesy Lamp-Left Rear	8W-15-8
Reading/Courtesy Lamp-Right Middle	8W-15-8
Reading/Courtesy Lamp-Right Rear	8W-15-8
Rear Booster Fan Power Module	8W-15-11
Rear Booster Fan Rear Control Switch	8W-15-10
Rear Window Defogger	8W-15-12
Seat Belt Switch-Driver	8W-15-15
Seat Heater Interface Module	8W-15-10
Shift Lever Assembly	8W-15-6, 7
Skreem Module	8W-15-6
Speed Control Servo	8W-15-4
Tail Lamp-Left	8W-15-14
Tail Lamp-Right	8W-15-15
Traction Control Switch	8W-15-6
Transmission Control Relay	8W-15-3
Visor/Vanity Lamp-Left	8W-15-8
Visor/Vanity Lamp-Right	8W-15-8
Washer Fluid Level Switch	8W-15-5
Wiper Module-Front	8W-15-14
Wiper Module-Rear	8W-15-12

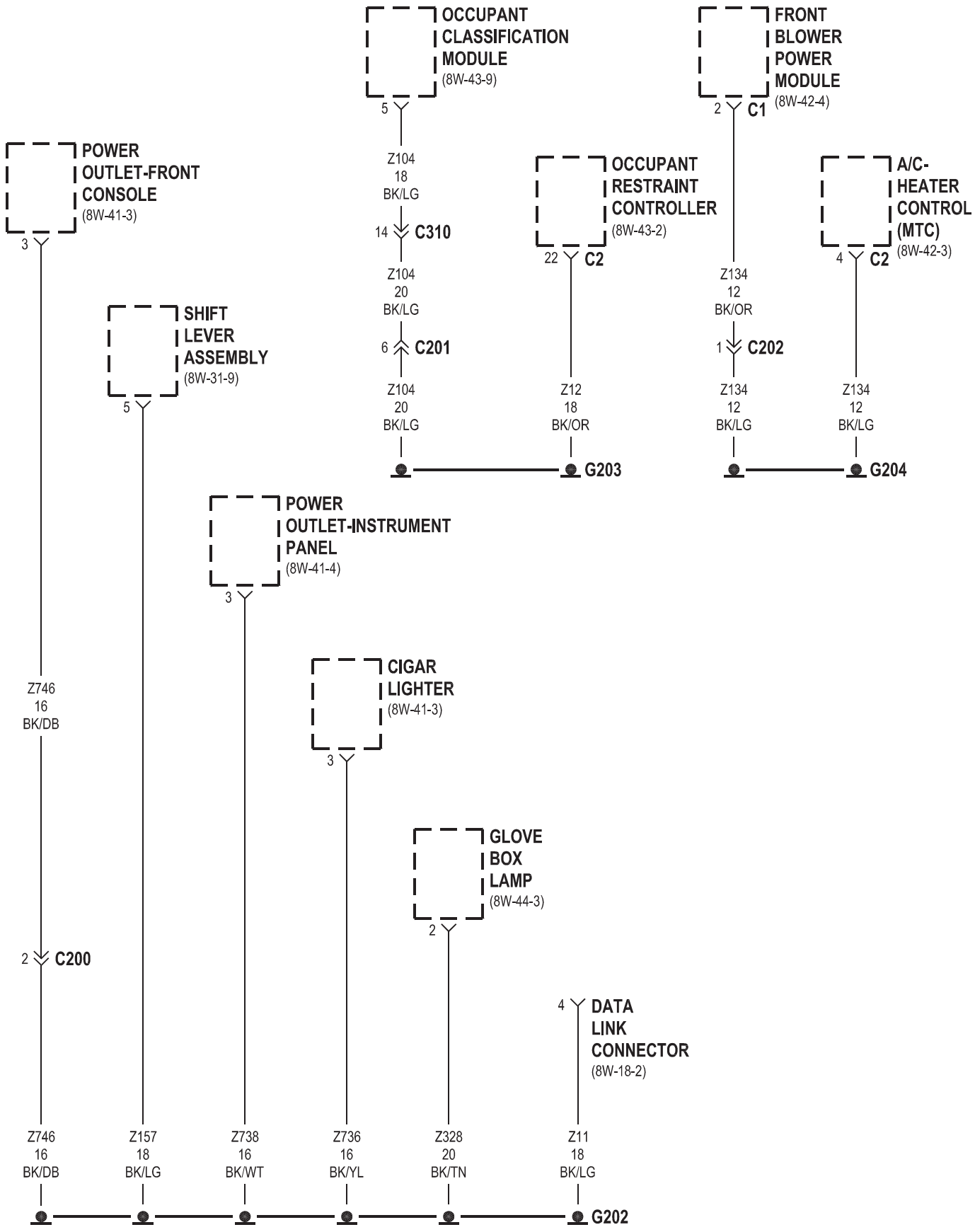

MANIFOLD TUNING VALVE SOLENOID (3.5L) (8W-30-11)
OXYGEN SENSOR-1/1 UPSTREAM (3.5L) (8W-30-8)
EGR SOLENOID (3.5L) (8W-30-12) (8W-30-17)
Z110 20 BK/LG
Z42 18 BK/LG
Z335 18 BK/WT
S104
EGR SOLENOID (3.8L) (8W-30-12) (8W-30-17)
OXYGEN SENSOR-1/2 DOWNSTREAM (3.8L) (8W-30-8)
Z816 10 BK
G100
A/C COMPRESSOR CLUTCH (8W-42-8)
OXYGEN SENSOR-1/1 UPSTREAM (3.8L) (8W-30-8)
FROM S116 (8W-15-3)
Z335 18 BK/WT
INTEGRATED POWER MODULE (8W-13-2) (8W-13-3)
Z43 18 BK/LB
Z42 18 BK/LG
S115
BATTERY (8W-13-10)
Z3 10 BK
C107
C1
OXYGEN SENSOR-1/2 DOWNSTREAM (3.5L) (8W-30-8)
ANTI-LOCK BRAKE MODULE (8W-35-2)
Z2 8 BK/WT
Z335 18 BK/WT
Z153 18 BK/GY
Z127 12 BK/DG
Z43 18 BK/LB
Z127 12 BK/DG
Z107 12 BK/LB
S114
Z1 4 BK
G101
Z2 8 BK/WT
Z816 18 BK
G102
ASSY. PLANT EVAC & FILL

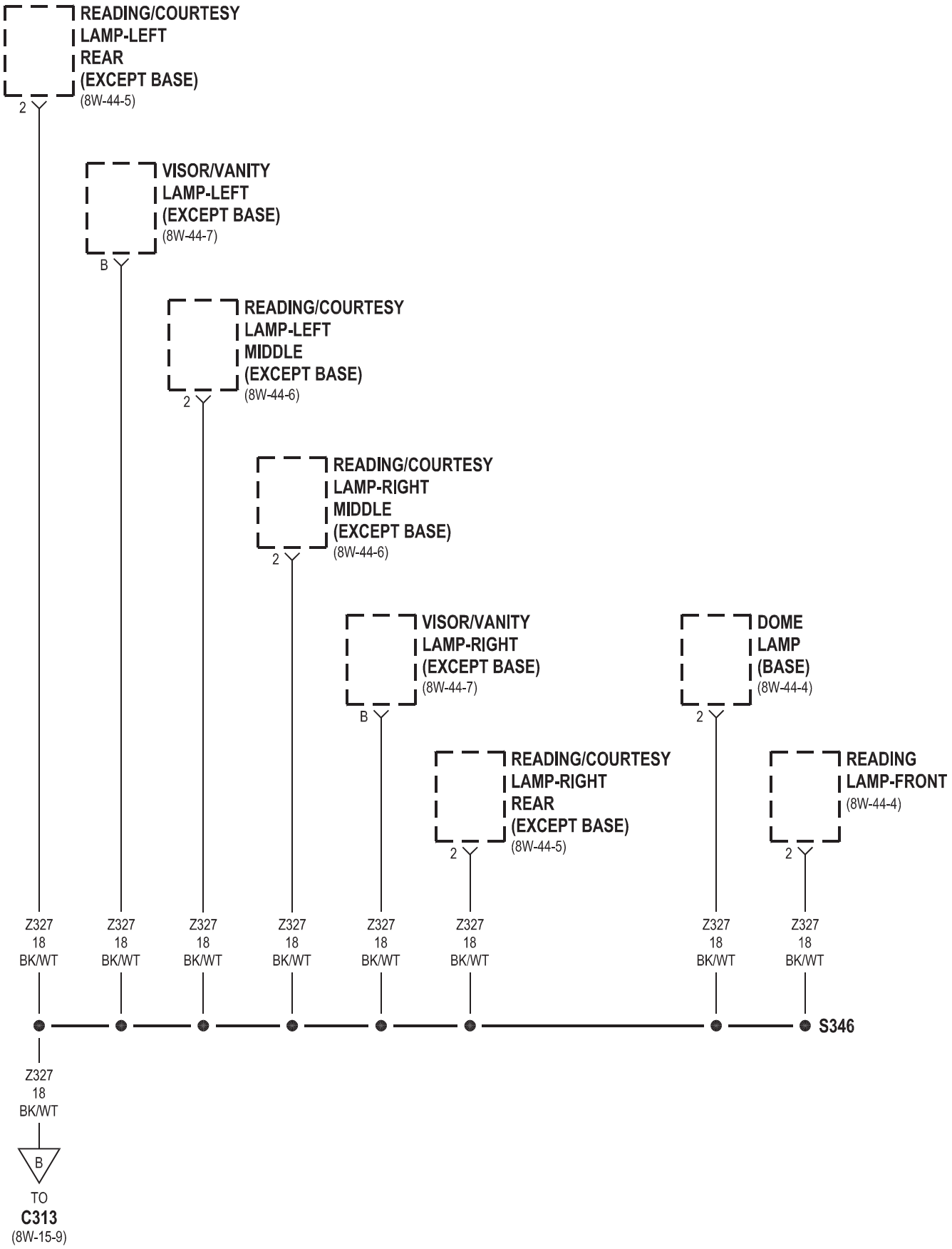

INTEGRATED
POWER
MODULE
(8W-13-2)
(8W-13-3)
85
TRANSMISSION
CONTROL
RELAY
(8W-31-3)
86
8
C7
5
DATA
LINK
CONNECTOR
(8W-18-2)
Z111
18
BK/WT
54
C201
Z111
18
BK/WT
9
C102
GENERATOR
(8W-20-2)
1
Z115
18
BK/OR
Z111
18
BK/WT
Z20
18
BR/BK
S116
Z131
16
BK/DG
Z130
16
BK/BR
Z133
16
BK/LG
Z133
16
BK/LG
Z3
10
BK
A
TO
BATTERY
(8W-15-2)
18
C1
9
C1
13
C4
14
C4
POWERTRAIN
CONTROL
MODULE
(8W-30-2)

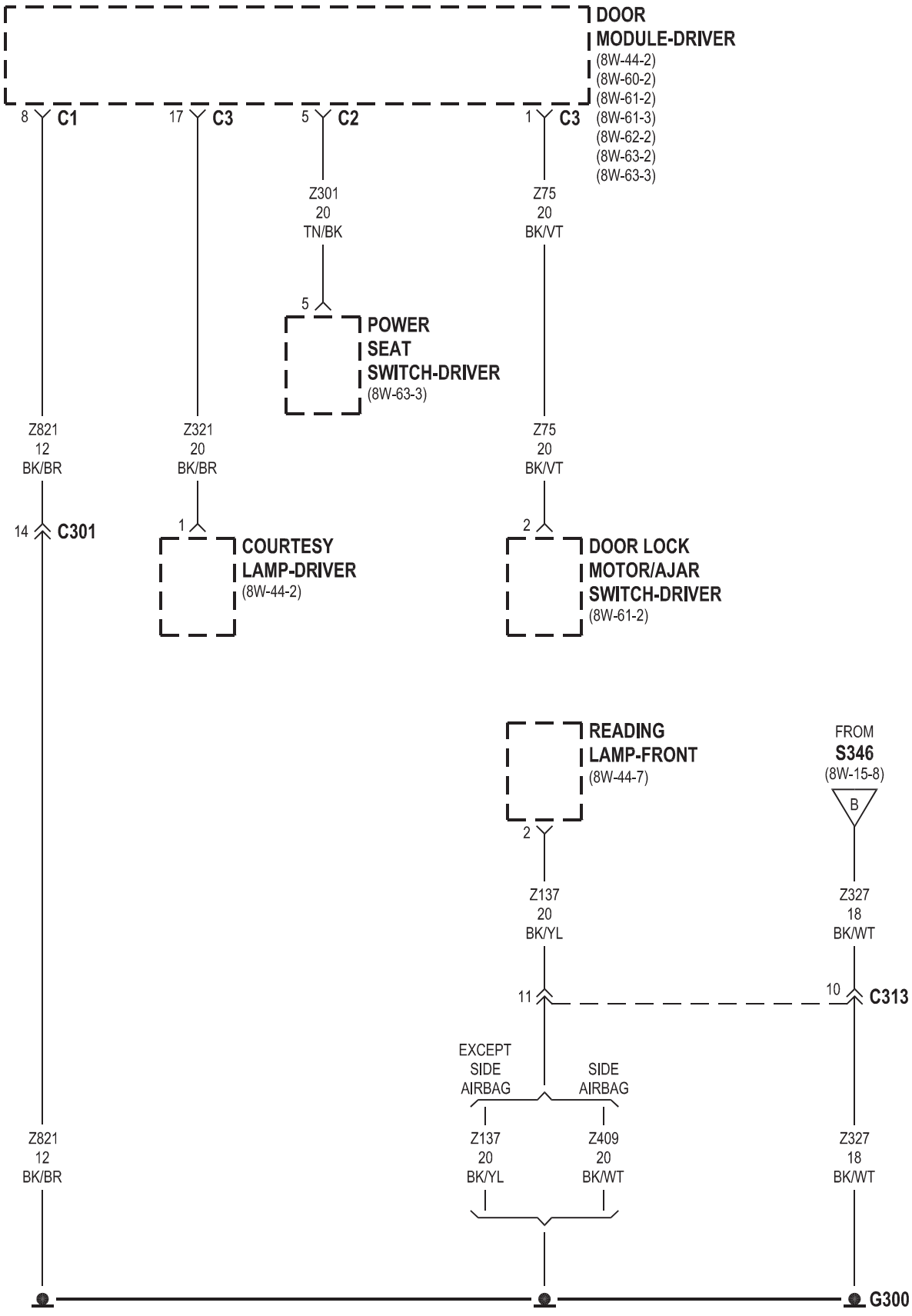

INTEGRATED
POWER
MODULE
(8W-13-2)
(8W-13-3)
14
C5
FOG
LAMP-LEFT
(8W-50-6)
B
HEADLAMP-LEFT
(8W-50-4)
4
HEADLAMP-RIGHT
(8W-50-5)
5
2
SPEED
CONTROL
SERVO
(8W-33-3)
4
Z118
18
BK/YL
Z349
18
BK/YL
Z343
18
BK/LG
Z378
20
BK/OR
Z346
16
BK/LG
Z155
18
BK/LG
G103

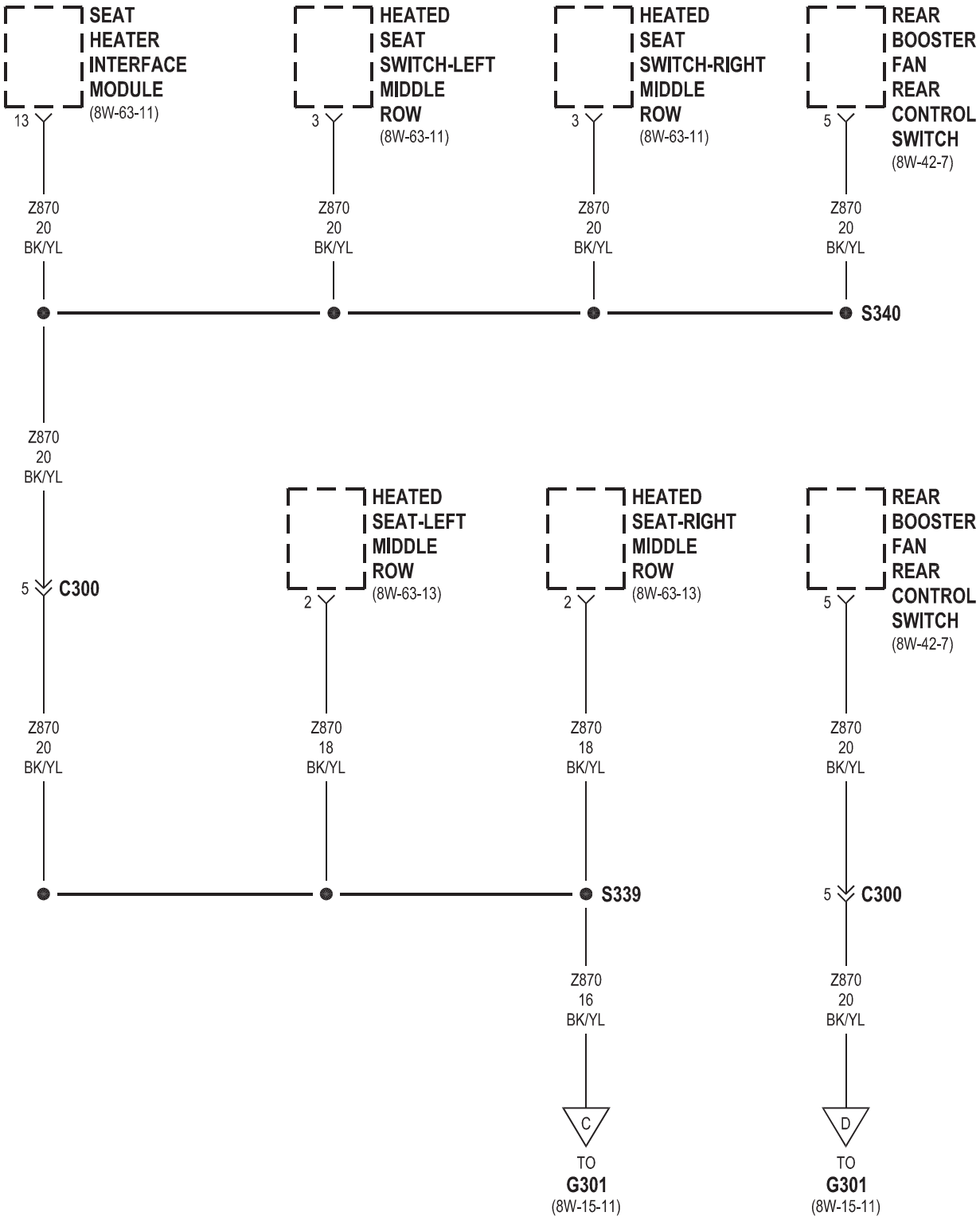

HORN-LOW
NOTE
(8W-41-2)
1
HORN-HIGH
NOTE
(8W-41-2)
1
HEADLAMP-RIGHT
(8W-50-5)
4
HEADLAMP-LEFT
(8W-50-4)
5
2
FOG
LAMP-RIGHT
(8W-50-6)
B
WASHER
FLUID
LEVEL
SWITCH
(8W-53-3)
1
RADIATOR
FAN
RELAY
(8W-42-9)
3
RADIATOR
FAN
MOTOR
NO. 2
(8W-42-9)
2
RADIATOR
FAN
MOTOR
NO. 1
(8W-42-9)
2
Z298
16
BK/DB
Z299
16
BK/OR
Z344
16
BK/TN
Z377
20
BK/BR
Z345
18
BK/LB
Z348
18
BK/OR
Z401
18
BK/TN
Z723
18
BK/DG
Z223
12
BK/DG
Z823
12
BK/DG
G104

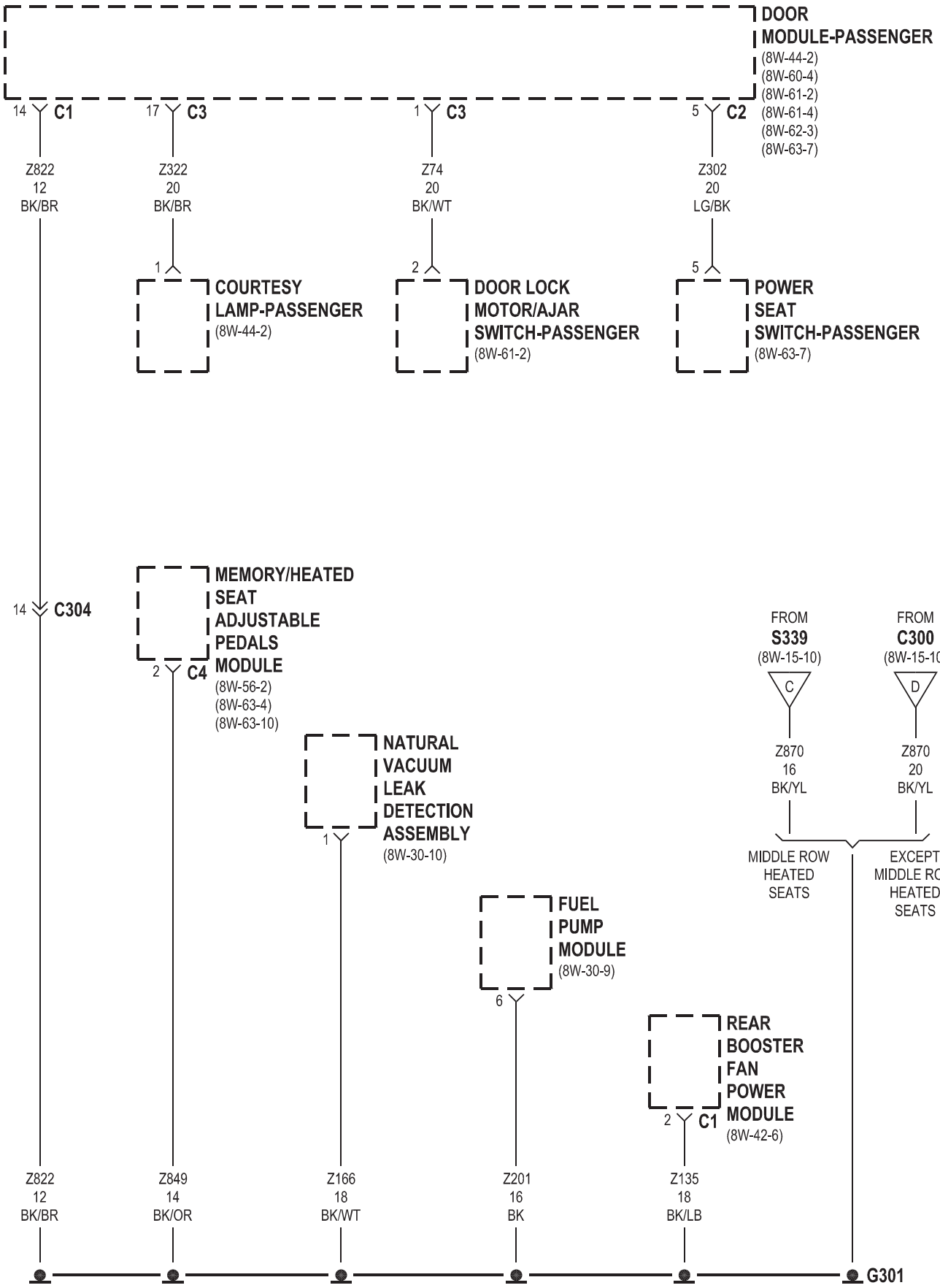

TRACTION CONTROL SWITCH
(8W-35-3)
1
A/C-HEATER CONTROL (MTC)
(8W-42-2)
1 C1
AUTO TEMP CONTROL (ATC)
(8W-42-4)
11 C1
MULTI-FUNCTION SWITCH
(8W-50-3)
(8W-52-2)
9
INSTRUMENT CLUSTER
(8W-40-2)
16 C1
INSTRUMENT PANEL SWITCH POD
(8W-40-5)
12
SKREEM MODULE
(8W-39-2)
5
HORN SWITCH
(8W-41-2)
SHIFT LEVER ASSEMBLY
(8W-31-9)
4
7
RADIO
(8W-47-2)
11
RADIO
(8W-47-4)
11 C1
DVD/CD CHANGER
(8W-47-9)
(8W-47-11)
9 C1
BASE
EXCEPT BASE
Z514
18
BK/LG
Z530
20
GY/BK
G200
Z427
20
BK/WT
Z24
18
BK/OR
Z24
18
BK/OR
Z102
20
GY/BK
Z18
18
BK/LB
Z108
20
BK/LG
Z120
20
BK/WT
Z374
20
BK/OR
Z65
20
BK/YL
Z101
18
BK/VT
G201

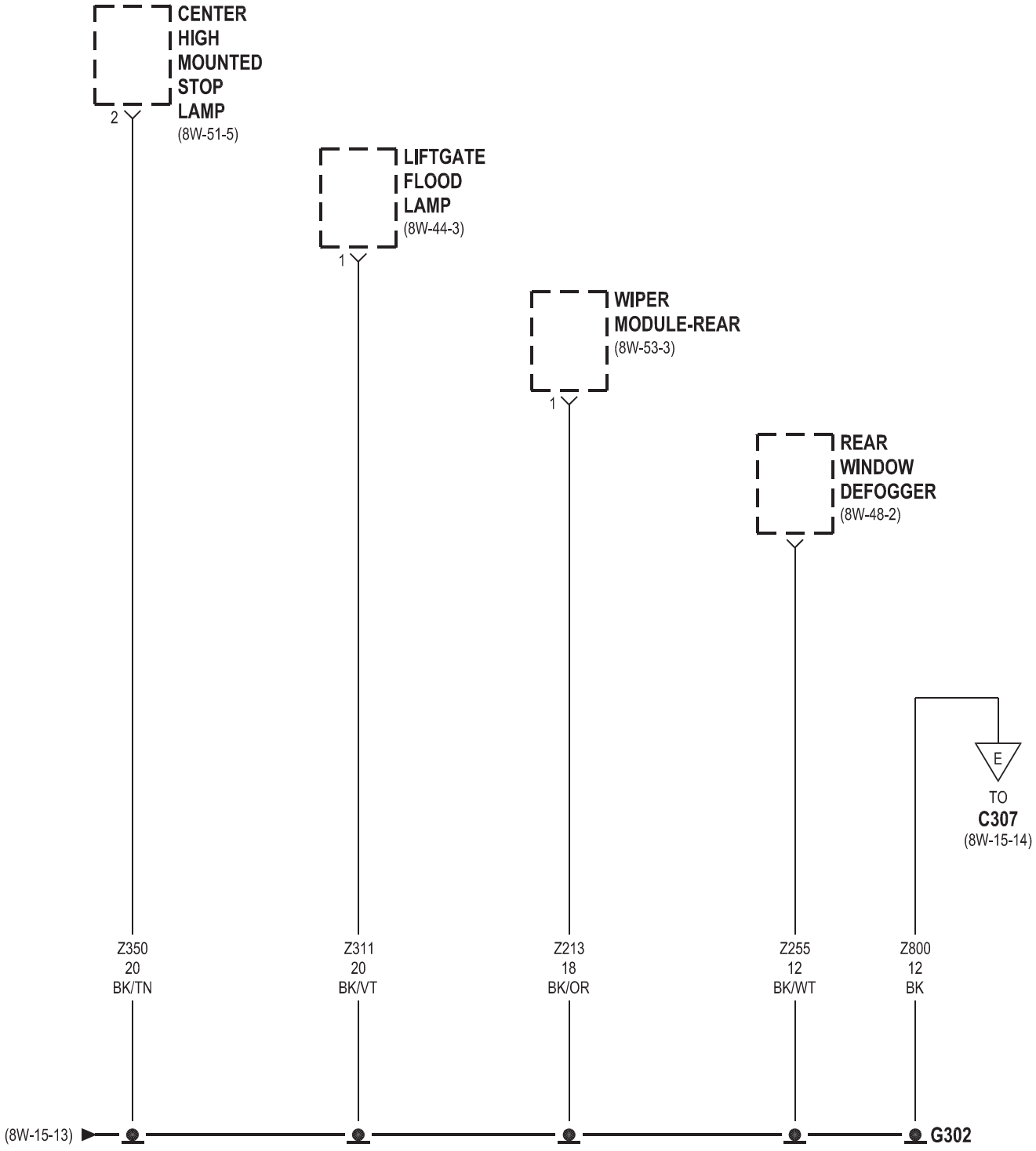

OCCUPANT CLASSIFICATION MODULE (8W-43-9)
5
Z104 18 BK/LG
14 C310
Z104 20 BK/LG
6 C201
Z104 20 BK/LG
FRONT BLOWER POWER MODULE (8W-42-4)
2 C1
Z134 12 BK/OR
1 C202
Z134 12 BK/LG
OCCUPANT RESTRAINT CONTROLLER (8W-43-2)
22 C2
Z12 18 BK/OR
A/C-HEATER CONTROL (MTC) (8W-42-3)
4 C2
Z134 12 BK/LG
G203
G204
POWER OUTLET-FRONT CONSOLE (8W-41-3)
3
SHIFT LEVER ASSEMBLY (8W-31-9)
5
POWER OUTLET-INSTRUMENT PANEL (8W-41-4)
3
CIGAR LIGHTER (8W-41-3)
3
GLOVE BOX LAMP (8W-44-3)
2
DATA LINK CONNECTOR (8W-18-2)
4
Z746 16 BK/DB
2 C200
Z746 16 BK/DB
Z157 18 BK/LG
Z738 16 BK/WT
Z736 16 BK/YL
Z328 20 BK/TN
Z11 18 BK/LG
G202

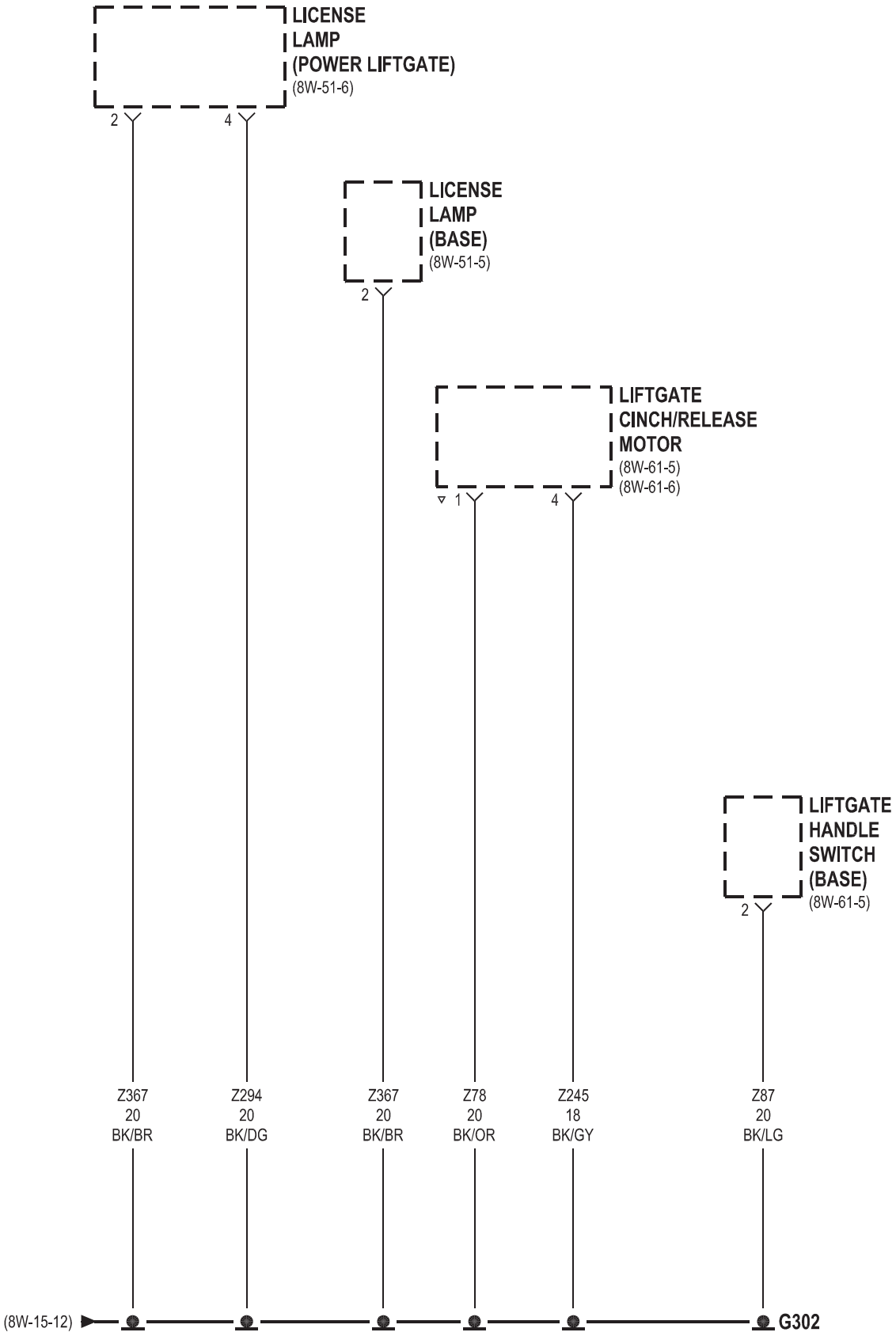

READING/COURTESY LAMP-LEFT REAR (EXCEPT BASE)
(8W-44-5)
2
VISOR/VANITY LAMP-LEFT (EXCEPT BASE)
(8W-44-7)
B
READING/COURTESY LAMP-LEFT MIDDLE (EXCEPT BASE)
(8W-44-6)
2
READING/COURTESY LAMP-RIGHT MIDDLE (EXCEPT BASE)
(8W-44-6)
2
VISOR/VANITY LAMP-RIGHT (EXCEPT BASE)
(8W-44-7)
B
READING/COURTESY LAMP-RIGHT REAR (EXCEPT BASE)
(8W-44-5)
2
DOME LAMP (BASE)
(8W-44-4)
2
READING LAMP-FRONT
(8W-44-4)
2
Z327 18 BK/WT
Z327 18 BK/WT
Z327 18 BK/WT
Z327 18 BK/WT
Z327 18 BK/WT
Z327 18 BK/WT
Z327 18 BK/WT
Z327 18 BK/WT
S346
Z327 18 BK/WT
B
TO
C313
(8W-15-9)


DOOR
MODULE-DRIVER
(8W-44-2)
(8W-60-2)
(8W-61-2)
(8W-61-3)
(8W-62-2)
(8W-63-2)
(8W-63-3)
8 C1
17 C3
5 C2
1 C3
Z301
20
TN/BK
Z75
20
BK/VT
5
POWER
SEAT
SWITCH-DRIVER
(8W-63-3)
Z821
12
BK/BR
Z321
20
BK/BR
Z75
20
BK/VT
14 C301
1
COURTESY
LAMP-DRIVER
(8W-44-2)
2
DOOR LOCK
MOTOR/AJAR
SWITCH-DRIVER
(8W-61-2)
READING
LAMP-FRONT
(8W-44-7)
FROM
S346
(8W-15-8)
B
2
Z137
20
BK/YL
Z327
18
BK/WT
11
10 C313
EXCEPT
SIDE
AIRBAG
SIDE
AIRBAG
Z821
12
BK/BR
Z137
20
BK/YL
Z409
20
BK/WT
Z327
18
BK/WT
G300

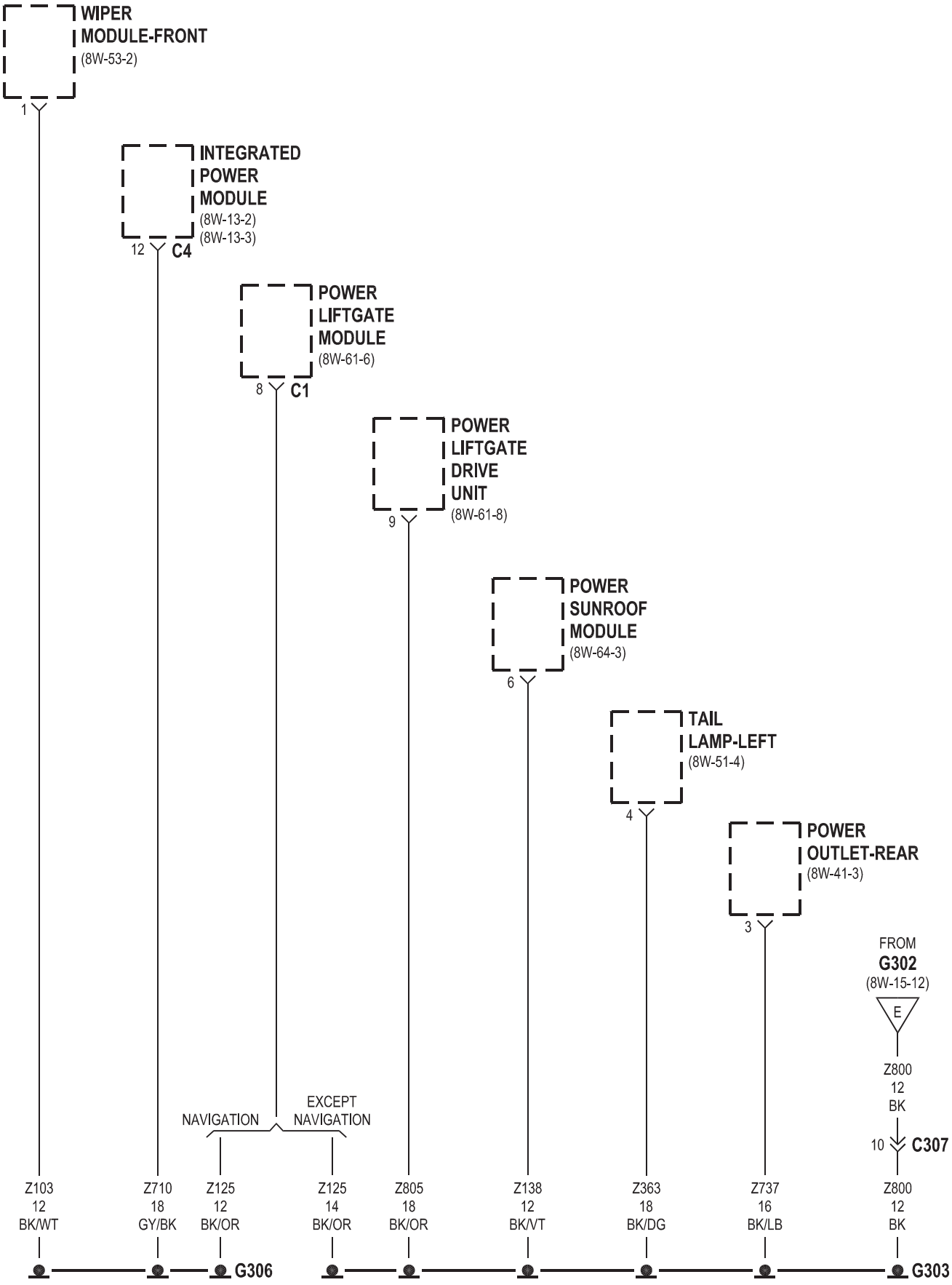

SEAT HEATER INTERFACE MODULE
(8W-63-11)
13
HEATED SEAT SWITCH-LEFT MIDDLE ROW
(8W-63-11)
3
HEATED SEAT SWITCH-RIGHT MIDDLE ROW
(8W-63-11)
3
REAR BOOSTER FAN REAR CONTROL SWITCH
(8W-42-7)
5
Z870
20
BK/YL
S340
5
C300
HEATED SEAT-LEFT MIDDLE ROW
(8W-63-13)
2
HEATED SEAT-RIGHT MIDDLE ROW
(8W-63-13)
2
REAR BOOSTER FAN REAR CONTROL SWITCH
(8W-42-7)
5
Z870
18
BK/YL
S339
Z870
16
BK/YL
C
TO
G301
(8W-15-11)
D
TO
G301
(8W-15-11)

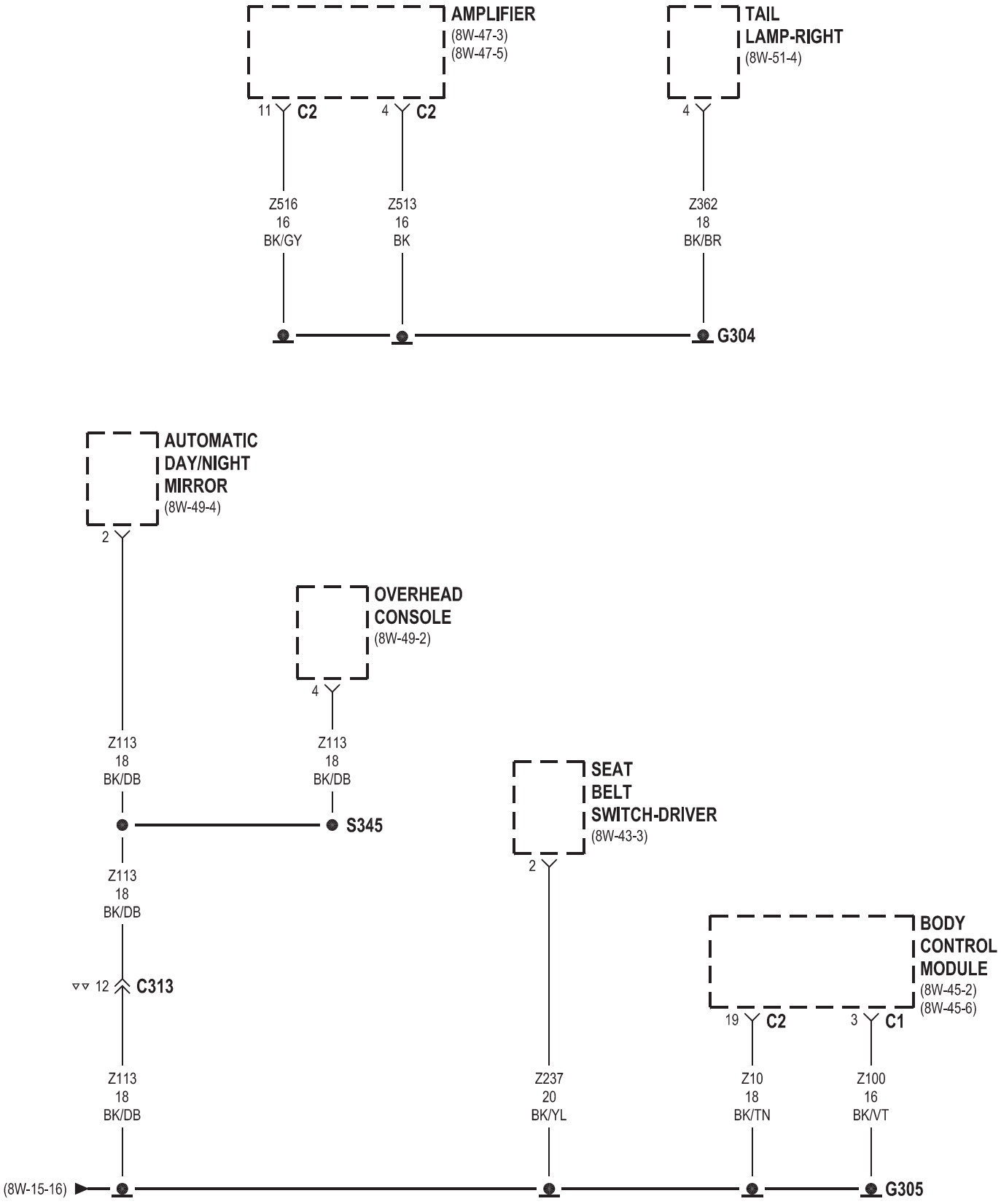

DOOR MODULE-PASSENGER
(8W-44-2)
(8W-60-4)
(8W-61-2)
(8W-61-4)
(8W-62-3)
(8W-63-7)
14 C1
17 C3
1 C3
5 C2
Z822 12 BK/BR
Z322 20 BK/BR
Z74 20 BK/WT
Z302 20 LG/BK
1
2
5
COURTESY LAMP-PASSENGER
(8W-44-2)
DOOR LOCK MOTOR/AJAR SWITCH-PASSENGER
(8W-61-2)
POWER SEAT SWITCH-PASSENGER
(8W-63-7)
14 C304
MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE
2 C4
(8W-56-2)
(8W-63-4)
(8W-63-10)
NATURAL VACUUM LEAK DETECTION ASSEMBLY
1
(8W-30-10)
FUEL PUMP MODULE
(8W-30-9)
6
REAR BOOSTER FAN POWER MODULE
2 C1
(8W-42-6)
FROM S339
(8W-15-10)
C
FROM C300
(8W-15-10)
D
Z870 16 BK/YL
Z870 20 BK/YL
MIDDLE ROW HEATED SEATS
EXCEPT MIDDLE ROW HEATED SEATS
Z822 12 BK/BR
Z849 14 BK/OR
Z166 18 BK/WT
Z201 16 BK
Z135 18 BK/LB
G301


CENTER HIGH MOUNTED STOP LAMP
(8W-51-5)
2
LIFTGATE FLOOD LAMP
(8W-44-3)
1
WIPER MODULE-REAR
(8W-53-3)
1
REAR WINDOW DEFOGGER
(8W-48-2)
E
TO
C307
(8W-15-14)
Z350
20
BK/TN
Z311
20
BK/VT
Z213
18
BK/OR
Z255
12
BK/WT
Z800
12
BK
(8W-15-13)
G302

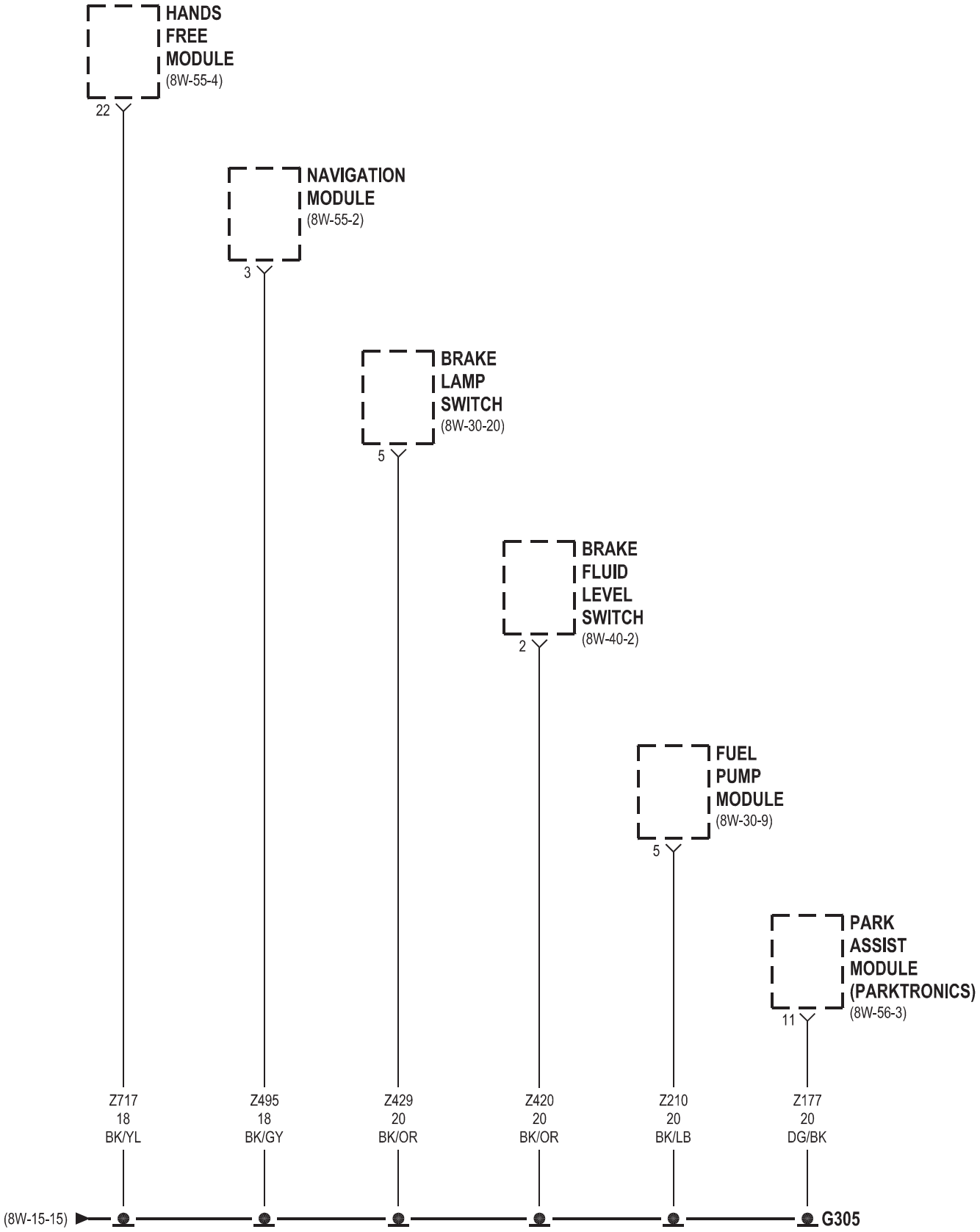

LICENSE LAMP (POWER LIFTGATE)
(8W-51-6)
2
4
LICENSE LAMP (BASE)
(8W-51-5)
2
LIFTGATE CINCH/RELEASE MOTOR
(8W-61-5)
(8W-61-6)
▽ 1
4
LIFTGATE HANDLE SWITCH (BASE)
(8W-61-5)
2
Z367 20 BK/BR
Z294 20 BK/DG
Z367 20 BK/BR
Z78 20 BK/OR
Z245 18 BK/GY
Z87 20 BK/LG
(8W-15-12)
G302

▽ BASE


WIPER
MODULE-FRONT
(8W-53-2)
1
INTEGRATED
POWER
MODULE
(8W-13-2)
(8W-13-3)
12
C4
POWER
LIFTGATE
MODULE
(8W-61-6)
8
C1
POWER
LIFTGATE
DRIVE
UNIT
(8W-61-8)
9
POWER
SUNROOF
MODULE
(8W-64-3)
6
TAIL
LAMP-LEFT
(8W-51-4)
4
POWER
OUTLET-REAR
(8W-41-3)
3
FROM
G302
(8W-15-12)
E
Z800
12
BK
10
C307
NAVIGATION
EXCEPT
NAVIGATION
Z103
12
BK/WT
Z710
18
GY/BK
Z125
12
BK/OR
Z125
14
BK/OR
Z805
18
BK/OR
Z138
12
BK/VT
Z363
18
BK/DG
Z737
16
BK/LB
Z800
12
BK
G306
G303

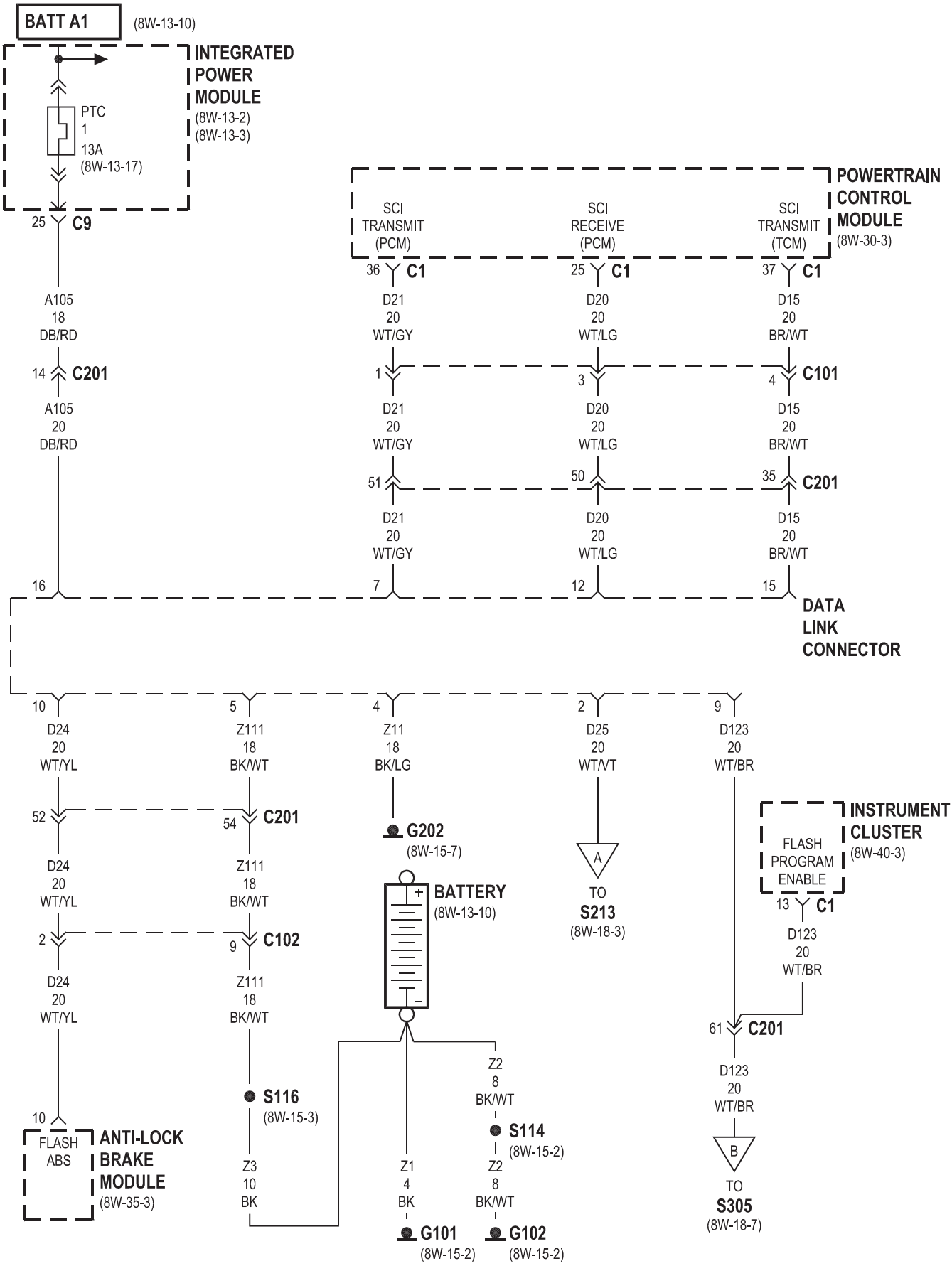

AMPLIFIER
(8W-47-3)
(8W-47-5)
11 C2
4 C2
TAIL
LAMP-RIGHT
(8W-51-4)
4
Z516
16
BK/GY
Z513
16
BK
Z362
18
BK/BR
G304
AUTOMATIC
DAY/NIGHT
MIRROR
(8W-49-4)
2
OVERHEAD
CONSOLE
(8W-49-2)
4
Z113
18
BK/DB
Z113
18
BK/DB
S345
SEAT
BELT
SWITCH-DRIVER
(8W-43-3)
2
Z113
18
BK/DB
▿▿ 12 C313
BODY
CONTROL
MODULE
(8W-45-2)
(8W-45-6)
19 C2
3 C1
Z113
18
BK/DB
Z237
20
BK/YL
Z10
18
BK/TN
Z100
16
BK/VT
(8W-15-16)
G305

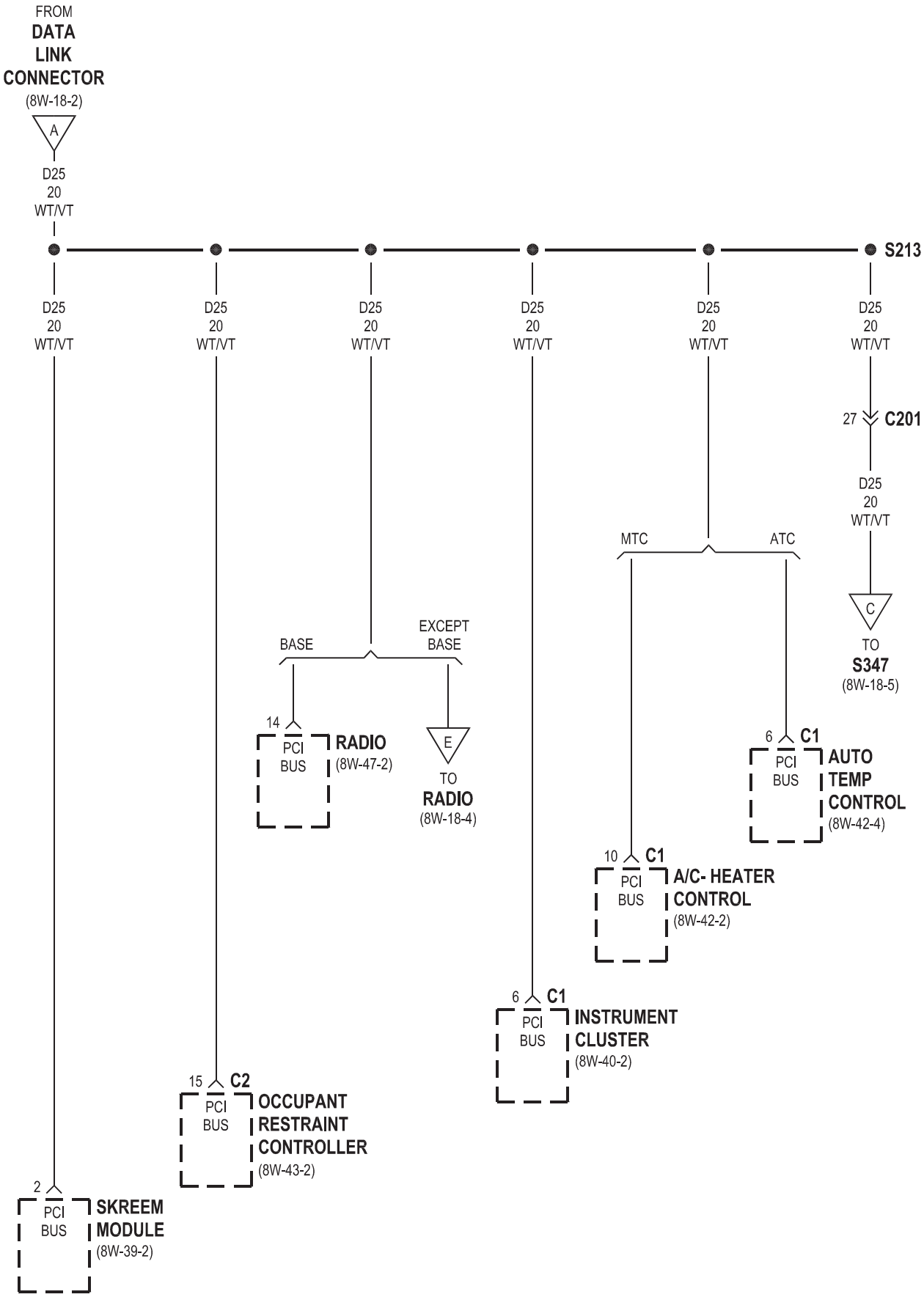
▿▿ EXCEPT BASE

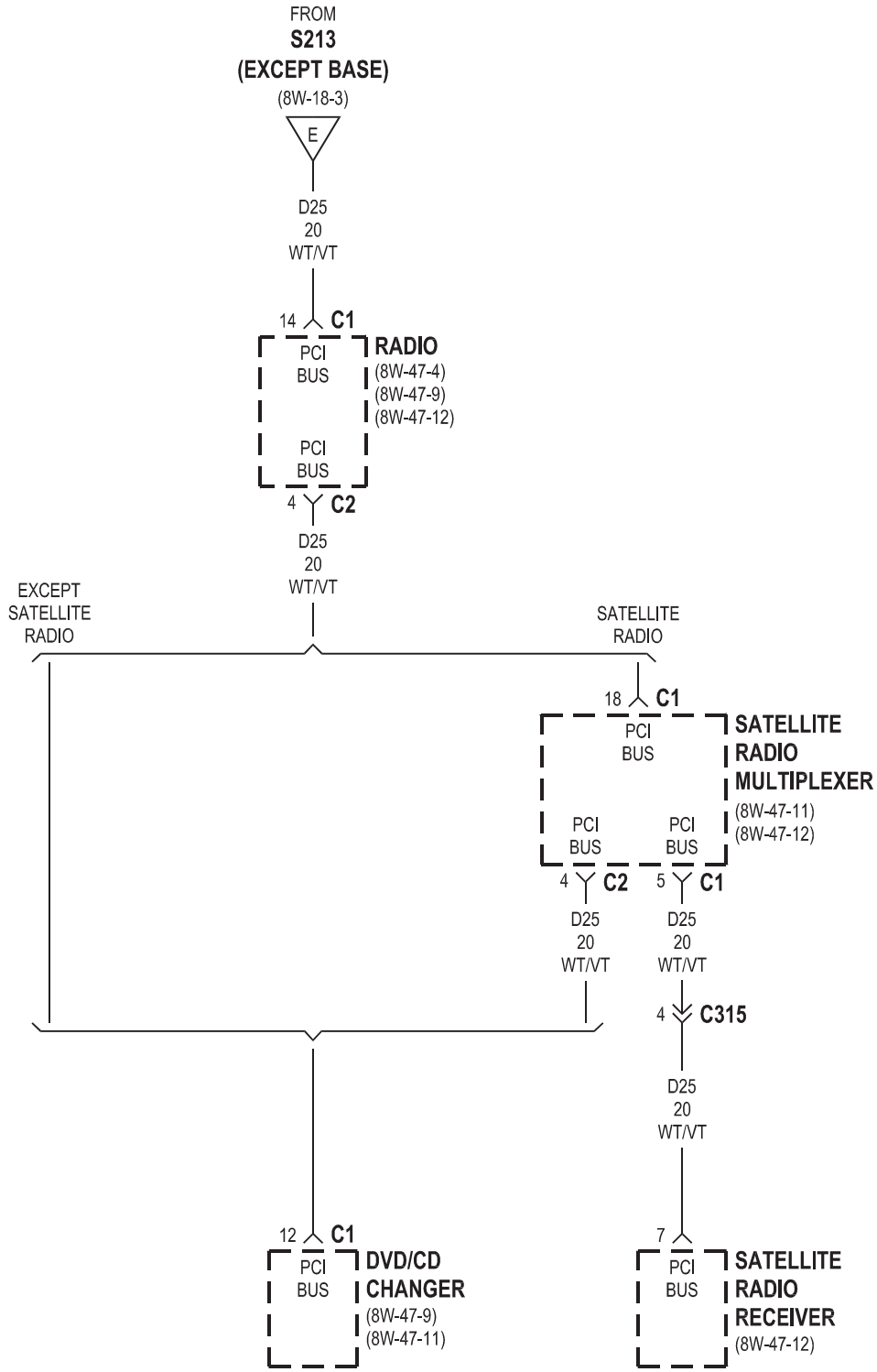

HANDS FREE MODULE
(8W-55-4)
22
NAVIGATION MODULE
(8W-55-2)
3
BRAKE LAMP SWITCH
(8W-30-20)
5
BRAKE FLUID LEVEL SWITCH
(8W-40-2)
2
FUEL PUMP MODULE
(8W-30-9)
5
PARK ASSIST MODULE (PARKTRONICS)
(8W-56-3)
11
Z717
18
BK/YL
Z495
18
BK/GY
Z429
20
BK/OR
Z420
20
BK/OR
Z210
20
BK/LB
Z177
20
DG/BK
(8W-15-15)
G305

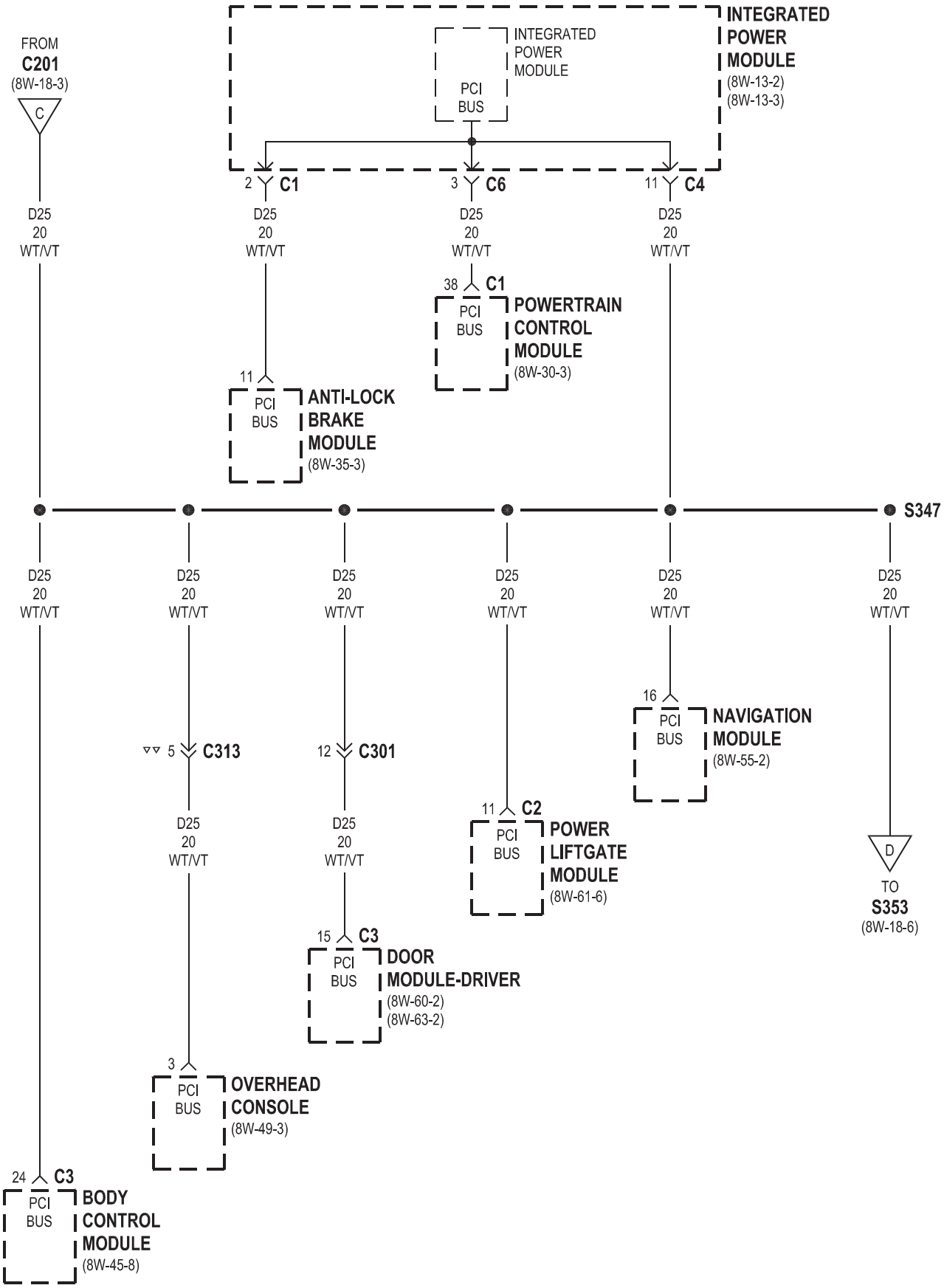
8W-18 BUS COMMUNICATIONS

Component	Page
Amplifier	8W-18-6
Anti-Lock Brake Module	8W-18-2, 5
Auto Temp Control	8W-18-3
Battery	8W-18-2
Body Control Module	8W-18-5, 7
DVD/CD Changer	8W-18-4
Data Link Connector	8W-18-2, 3
Door Module-Driver	8W-18-5, 7
Door Module-Passenger	8W-18-6, 7
G101	8W-18-2
G102	8W-18-2
G202	8W-18-2
Hands Free Module	8W-18-6
Instrument Cluster	8W-18-2, 3
Integrated Power Module	8W-18-2, 5, 7
Memory/Heated Seat Adjustable Pedals Module	8W-18-6
Navigation Module	8W-18-5
Occupant Restraint Controller	8W-18-3
Overhead Console	8W-18-5
PTC 1	8W-18-2
Park Assist Module	8W-18-6
Power Liftgate Module	8W-18-5
Powertrain Control Module	8W-18-2, 5, 7
Radio	8W-18-3, 4
SKREEM Module	8W-18-3
Satellite Radio Multiplexer	8W-18-4
Satellite Radio Receiver	8W-18-4


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
PTC
1
13A
(8W-13-17)
25 C9
POWERTRAIN CONTROL MODULE
(8W-30-3)
SCI TRANSMIT (PCM)
SCI RECEIVE (PCM)
SCI TRANSMIT (TCM)
36 C1
25 C1
37 C1
A105 18 DB/RD
14 C201
A105 20 DB/RD
D21 20 WT/GY
D20 20 WT/LG
D15 20 BR/WT
1
3
4 C101
51
50
35 C201
7
12
15
16
DATA LINK CONNECTOR
10 D24 20 WT/YL
52
2 D24 20 WT/YL
10
FLASH ABS
ANTI-LOCK BRAKE MODULE
(8W-35-3)
5 Z111 18 BK/WT
54 C201
9 C102
Z111 18 BK/WT
S116
(8W-15-3)
Z3 10 BK
4 Z11 18 BK/LG
G202
(8W-15-7)
BATTERY
(8W-13-10)
Z1 4 BK
G101
(8W-15-2)
Z2 8 BK/WT
S114
(8W-15-2)
Z2 8 BK/WT
G102
(8W-15-2)
2 D25 20 WT/VT
A
TO S213
(8W-18-3)
9 D123 20 WT/BR
INSTRUMENT CLUSTER
(8W-40-3)
FLASH PROGRAM ENABLE
13 C1
D123 20 WT/BR
61 C201
D123 20 WT/BR
B
TO S305
(8W-18-7)


FROM
DATA
LINK
CONNECTOR
(8W-18-2)
A
D25
20
WT/VT
S213
D25
20
WT/VT
27
C201
C
TO
S347
(8W-18-5)
MTC
ATC
BASE
EXCEPT
BASE
E
TO
RADIO
(8W-18-4)
14
PCI
BUS
RADIO
(8W-47-2)
6
C1
AUTO
TEMP
CONTROL
(8W-42-4)
10
C1
A/C- HEATER
CONTROL
(8W-42-2)
6
C1
INSTRUMENT
CLUSTER
(8W-40-2)
15
C2
OCCUPANT
RESTRAINT
CONTROLLER
(8W-43-2)
2
SKREEM
MODULE
(8W-39-2)

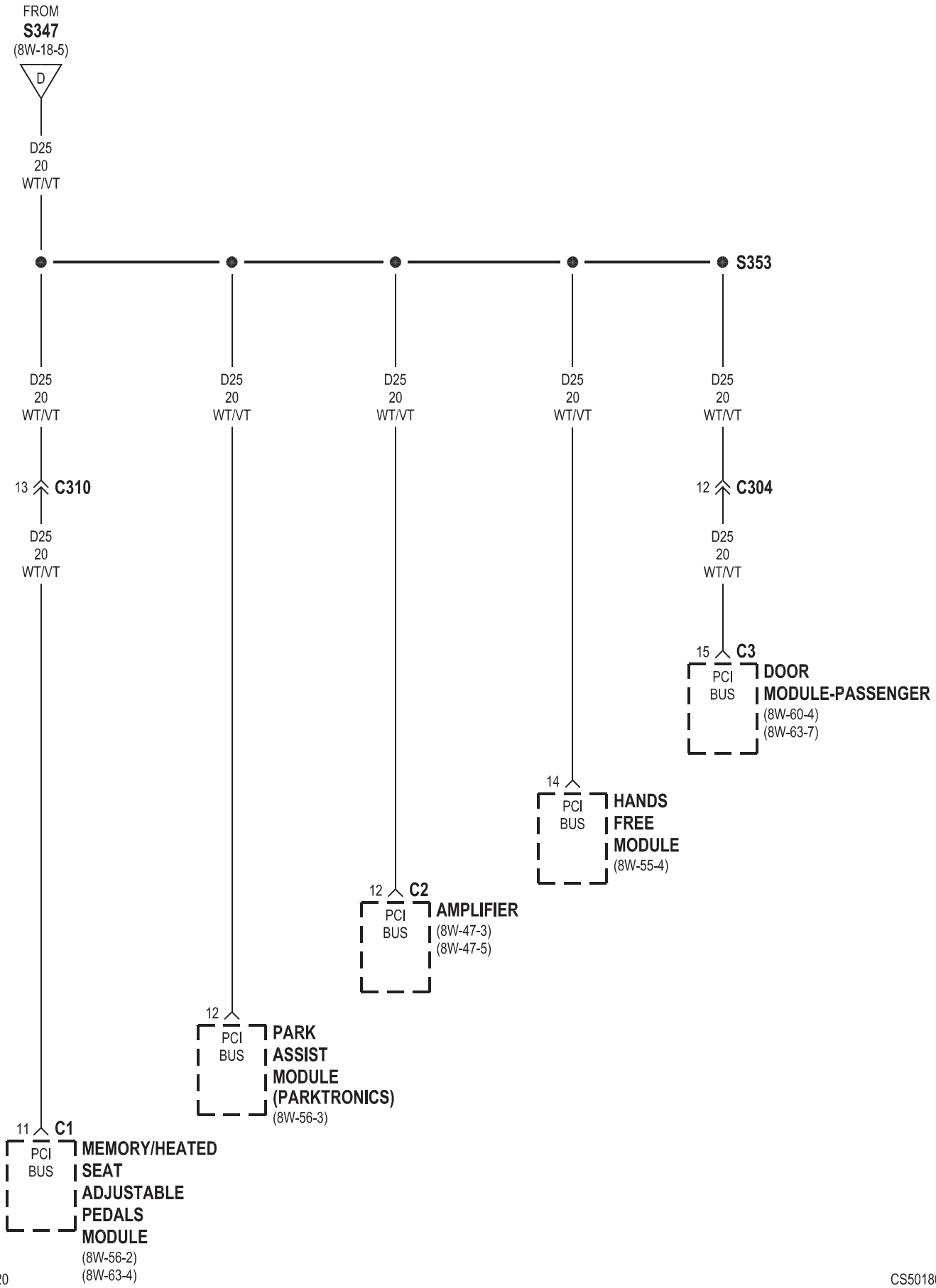

FROM
S213
(EXCEPT BASE)
(8W-18-3)
E
D25
20
WT/VT
14
C1
PCI
BUS
RADIO
(8W-47-4)
(8W-47-9)
(8W-47-12)
PCI
BUS
4
C2
D25
20
WT/VT
EXCEPT
SATELLITE
RADIO
SATELLITE
RADIO
18
C1
PCI
BUS
SATELLITE
RADIO
MULTIPLEXER
(8W-47-11)
(8W-47-12)
PCI
BUS
PCI
BUS
4
C2
5
C1
D25
20
WT/VT
D25
20
WT/VT
4
C315
D25
20
WT/VT
12
C1
PCI
BUS
DVD/CD
CHANGER
(8W-47-9)
(8W-47-11)
7
PCI
BUS
SATELLITE
RADIO
RECEIVER
(8W-47-12)

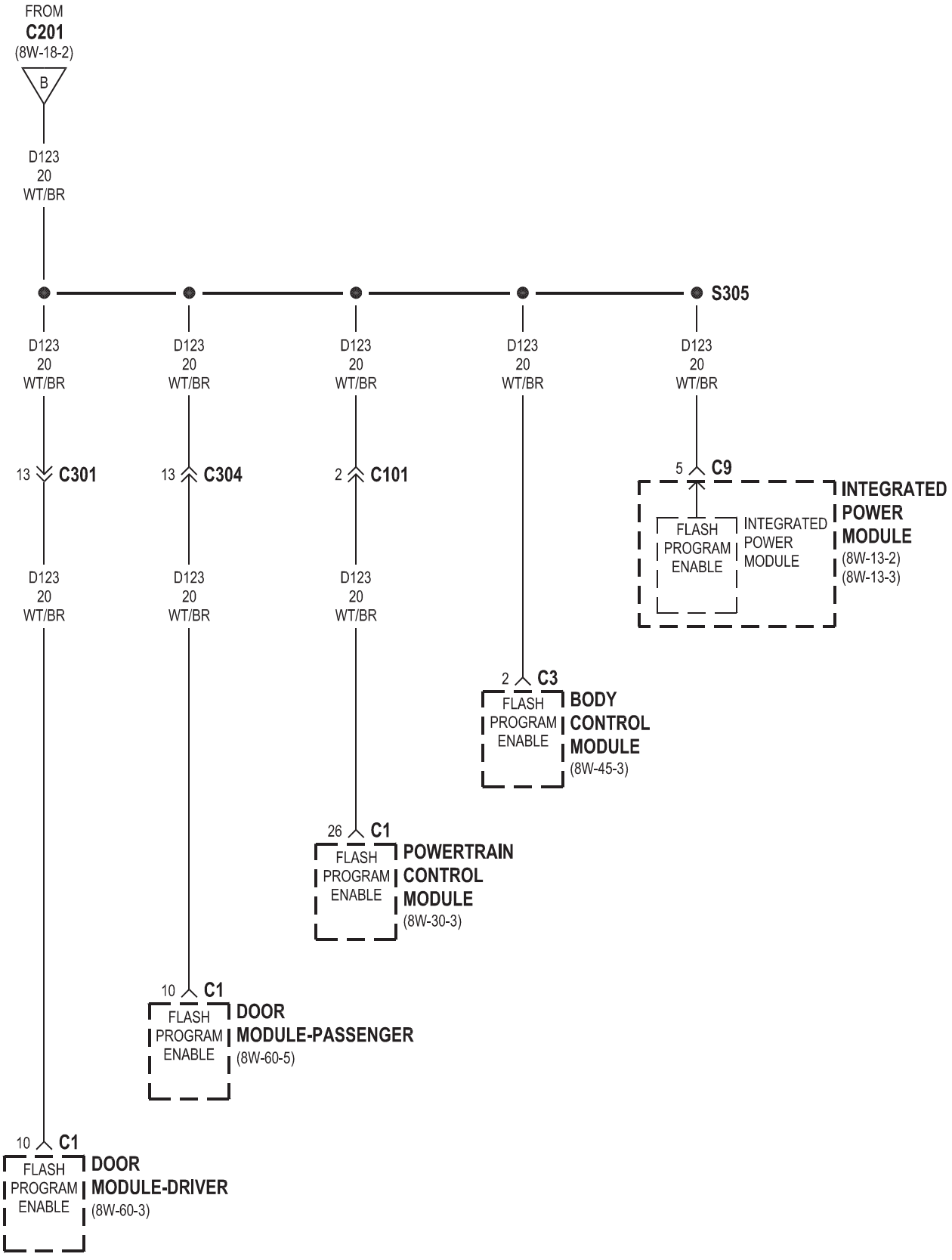


CS501805

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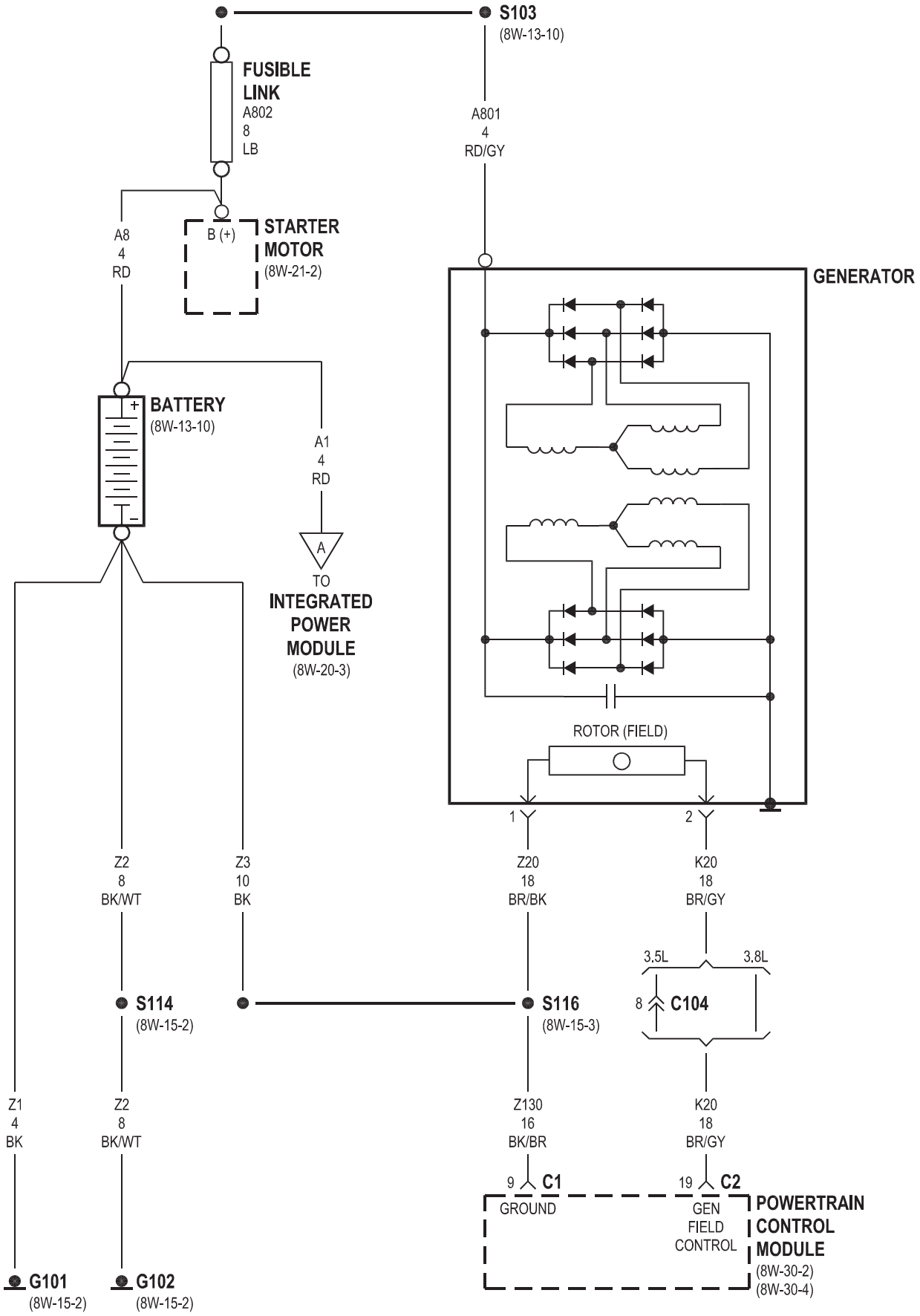
058W-20

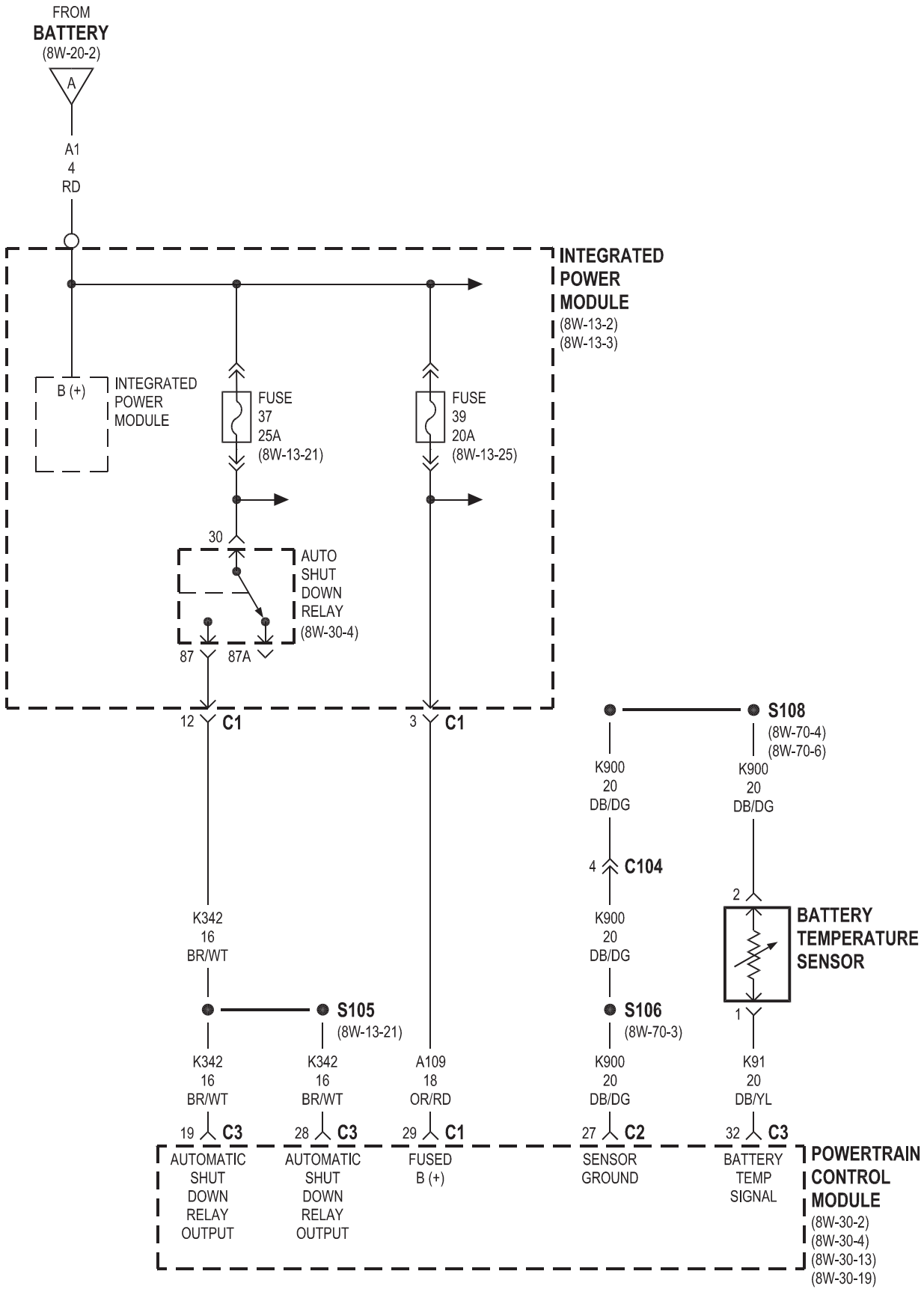

FROM
S347
(8W-18-5)
D
D25
20
WT/VT
S353
D25
20
WT/VT
13 C310
12 C304
15 C3
PCI
BUS
DOOR
MODULE-PASSENGER
(8W-60-4)
(8W-63-7)
14
HANDS
FREE
MODULE
(8W-55-4)
12 C2
AMPLIFIER
(8W-47-3)
(8W-47-5)
12
PARK
ASSIST
MODULE
(PARKTRONICS)
(8W-56-3)
11 C1
MEMORY/HEATED
SEAT
ADJUSTABLE
PEDALS
MODULE
(8W-56-2)
(8W-63-4)


FROM
C201
(8W-18-2)
B
D123
20
WT/BR
S305
13 C301
13 C304
2 C101
5 C9
INTEGRATED
POWER
MODULE
(8W-13-2)
(8W-13-3)
FLASH
PROGRAM
ENABLE
INTEGRATED
POWER
MODULE
2 C3
BODY
CONTROL
MODULE
(8W-45-3)
26 C1
POWERTRAIN
CONTROL
MODULE
(8W-30-3)
10 C1
DOOR
MODULE-PASSENGER
(8W-60-5)
10 C1
DOOR
MODULE-DRIVER
(8W-60-3)

8W-20 CHARGING SYSTEM

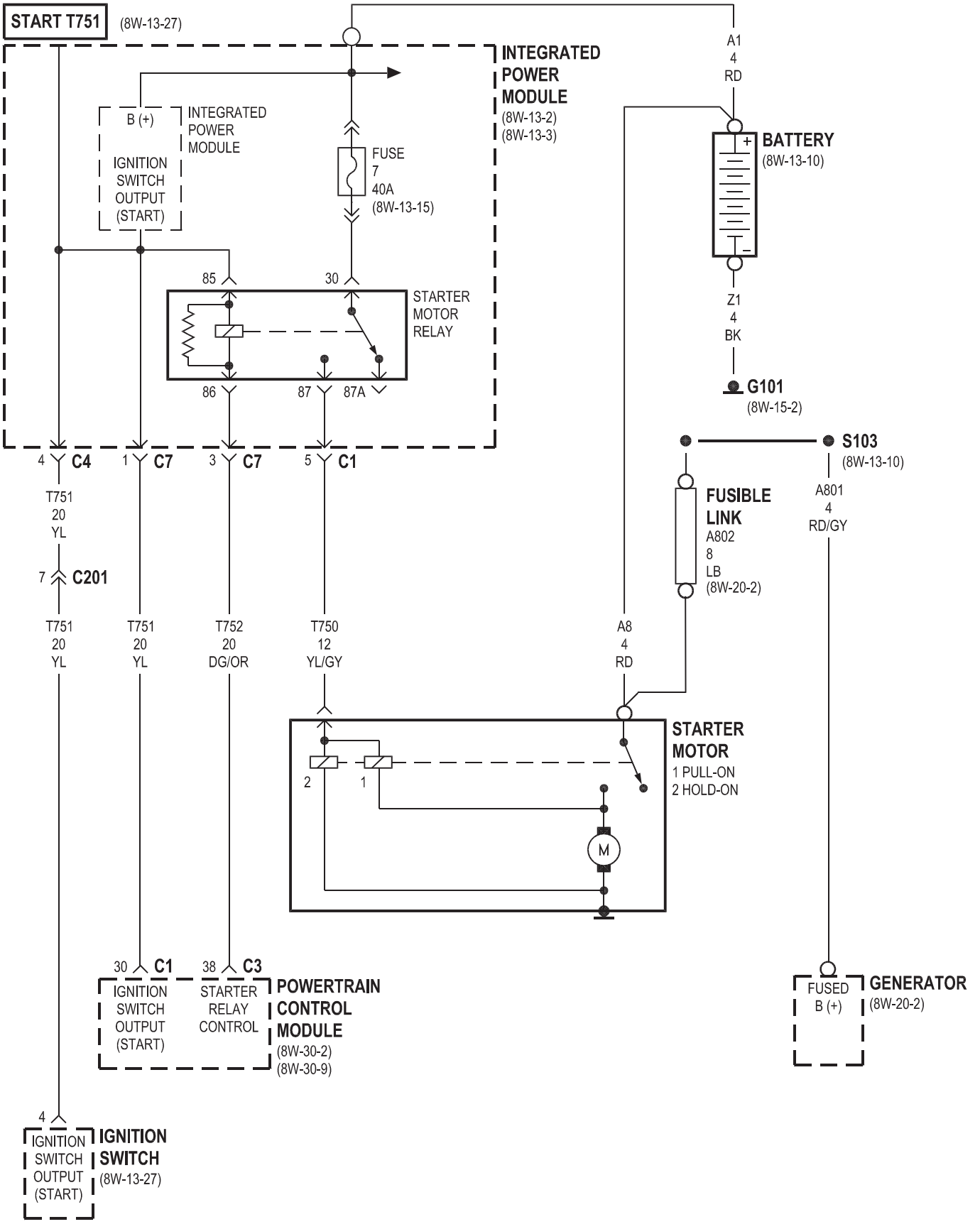
Component	Page
Auto Shut Down Relay	8W-20-3
Battery	8W-20-2, 3
Battery Temperature Sensor	8W-20-3
Fuse 37	8W-20-3
Fuse 39	8W-20-3
Fusible Link	8W-20-2
G101	8W-20-2
G102	8W-20-2
Generator	8W-20-2
Integrated Power Module	8W-20-2, 3
Powertrain Control Module	8W-20-2, 3
Starter Motor	8W-20-2


S103
(8W-13-10)
FUSIBLE LINK
A802
8
LB
A801
4
RD/GY
A8
4
RD
B (+)
STARTER MOTOR
(8W-21-2)
GENERATOR
BATTERY
(8W-13-10)
A1
4
RD
A
TO
INTEGRATED POWER MODULE
(8W-20-3)
ROTOR (FIELD)
1
2
Z2
8
BK/WT
Z3
10
BK
Z20
18
BR/BK
K20
18
BR/GY
3.5L
3.8L
8
C104
S114
(8W-15-2)
S116
(8W-15-3)
Z1
4
BK
Z2
8
BK/WT
Z130
16
BK/BR
K20
18
BR/GY
9
C1
GROUND
19
C2
GEN FIELD CONTROL
POWERTRAIN CONTROL MODULE
(8W-30-2)
(8W-30-4)
G101
(8W-15-2)
G102
(8W-15-2)


FROM
BATTERY
(8W-20-2)
A
A1
4
RD
INTEGRATED
POWER
MODULE
(8W-13-2)
(8W-13-3)
B (+)
INTEGRATED
POWER
MODULE
FUSE
37
25A
(8W-13-21)
FUSE
39
20A
(8W-13-25)
30
AUTO
SHUT
DOWN
RELAY
(8W-30-4)
87
87A
12 C1
3 C1
S108
(8W-70-4)
(8W-70-6)
K900
20
DB/DG
K900
20
DB/DG
4 C104
2
BATTERY
TEMPERATURE
SENSOR
K342
16
BR/WT
K900
20
DB/DG
1
S105
(8W-13-21)
S106
(8W-70-3)
K342
16
BR/WT
K342
16
BR/WT
A109
18
OR/RD
K900
20
DB/DG
K91
20
DB/YL
19 C3
28 C3
29 C1
27 C2
32 C3
AUTOMATIC
SHUT
DOWN
RELAY
OUTPUT
AUTOMATIC
SHUT
DOWN
RELAY
OUTPUT
FUSED
B (+)
SENSOR
GROUND
BATTERY
TEMP
SIGNAL
POWERTRAIN
CONTROL
MODULE
(8W-30-2)
(8W-30-4)
(8W-30-13)
(8W-30-19)

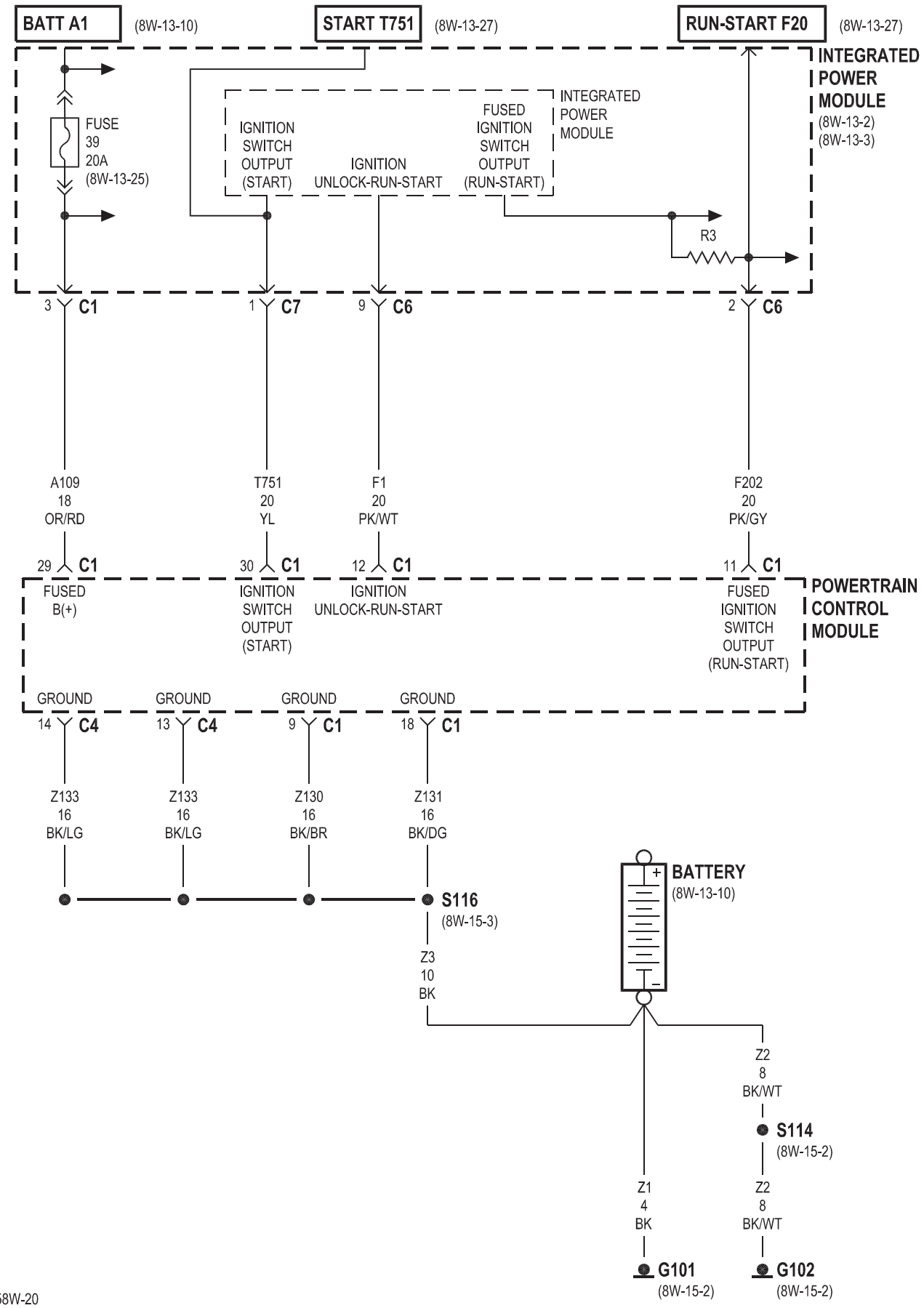
8W-21 STARTING SYSTEM

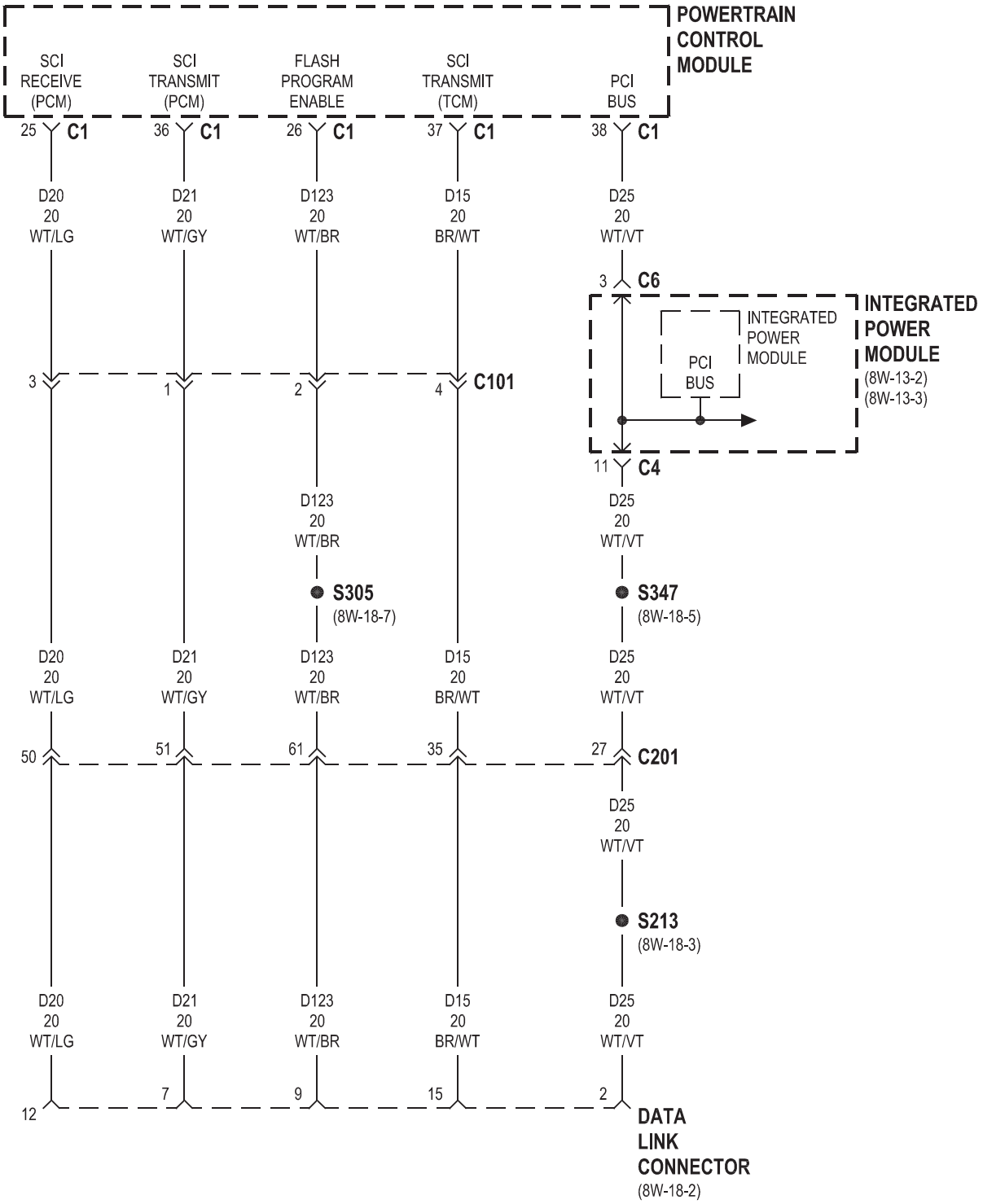
Component	Page
Battery	8W-21-2
Fuse 7	8W-21-2
Fusible Link	8W-21-2
G101	8W-21-2
Generator	8W-21-2
Ignition Switch	8W-21-2
Integrated Power Module	8W-21-2
Powertrain Control Module	8W-21-2
Starter Motor	8W-21-2
Starter Motor Relay	8W-21-2

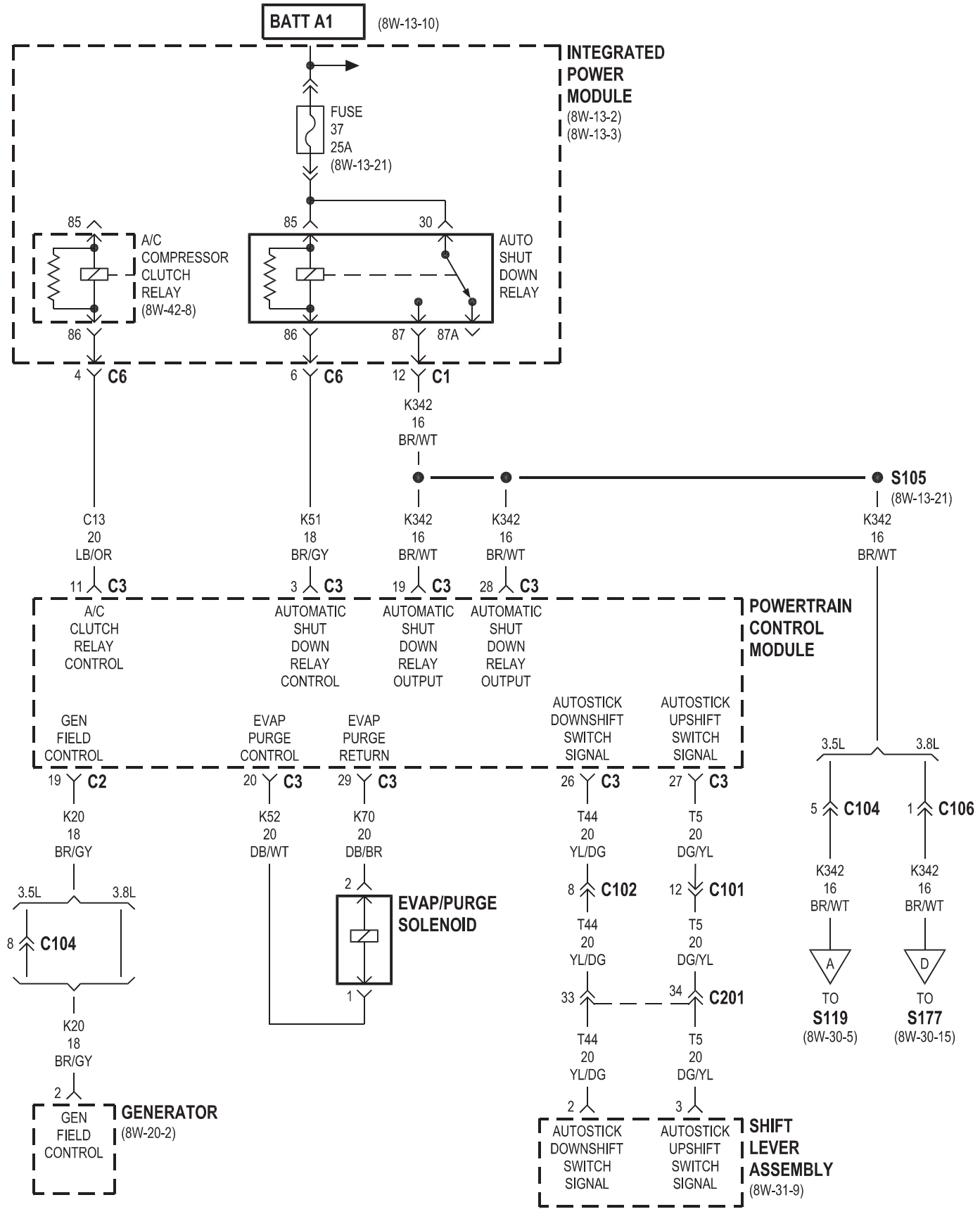

START T751
(8W-13-27)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
B (+)
INTEGRATED POWER MODULE
IGNITION SWITCH OUTPUT (START)
FUSE 7 40A
(8W-13-15)
85
30
STARTER MOTOR RELAY
86
87
87A
A1 4 RD
BATTERY
(8W-13-10)
Z1 4 BK
G101
(8W-15-2)
S103
(8W-13-10)
A801 4 RD/GY
FUSIBLE LINK A802 8 LB
(8W-20-2)
4 C4
1 C7
3 C7
5 C1
T751 20 YL
7 C201
T751 20 YL
T751 20 YL
T752 20 DG/OR
T750 12 YL/GY
A8 4 RD
STARTER MOTOR
1 PULL-ON
2 HOLD-ON
2
1
M
30 C1
38 C3
IGNITION SWITCH OUTPUT (START)
STARTER RELAY CONTROL
POWERTRAIN CONTROL MODULE
(8W-30-2)
(8W-30-9)
FUSED B (+)
GENERATOR
(8W-20-2)
4
IGNITION SWITCH OUTPUT (START)
IGNITION SWITCH
(8W-13-27)

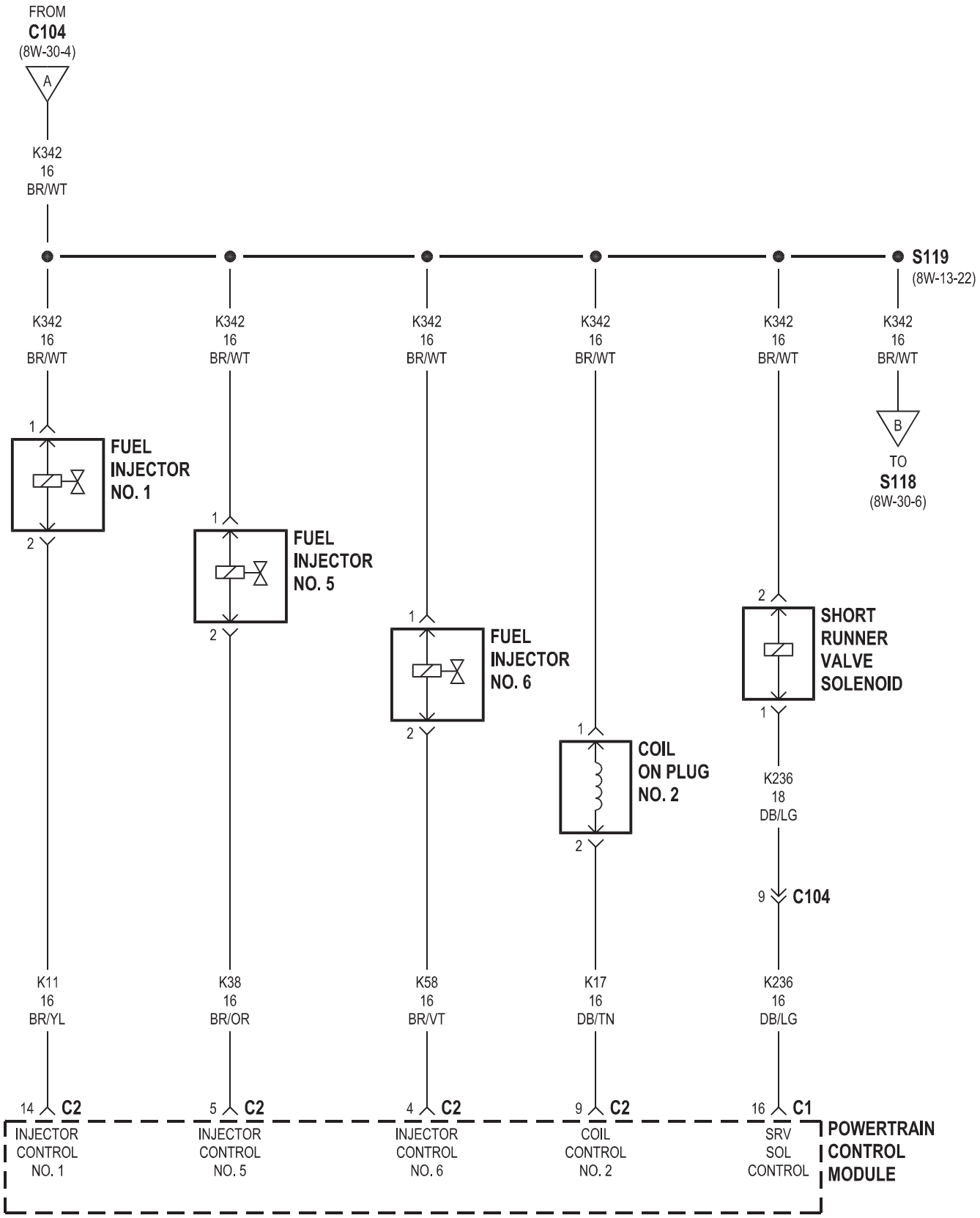
8W-30 FUEL/IGNITION SYSTEM

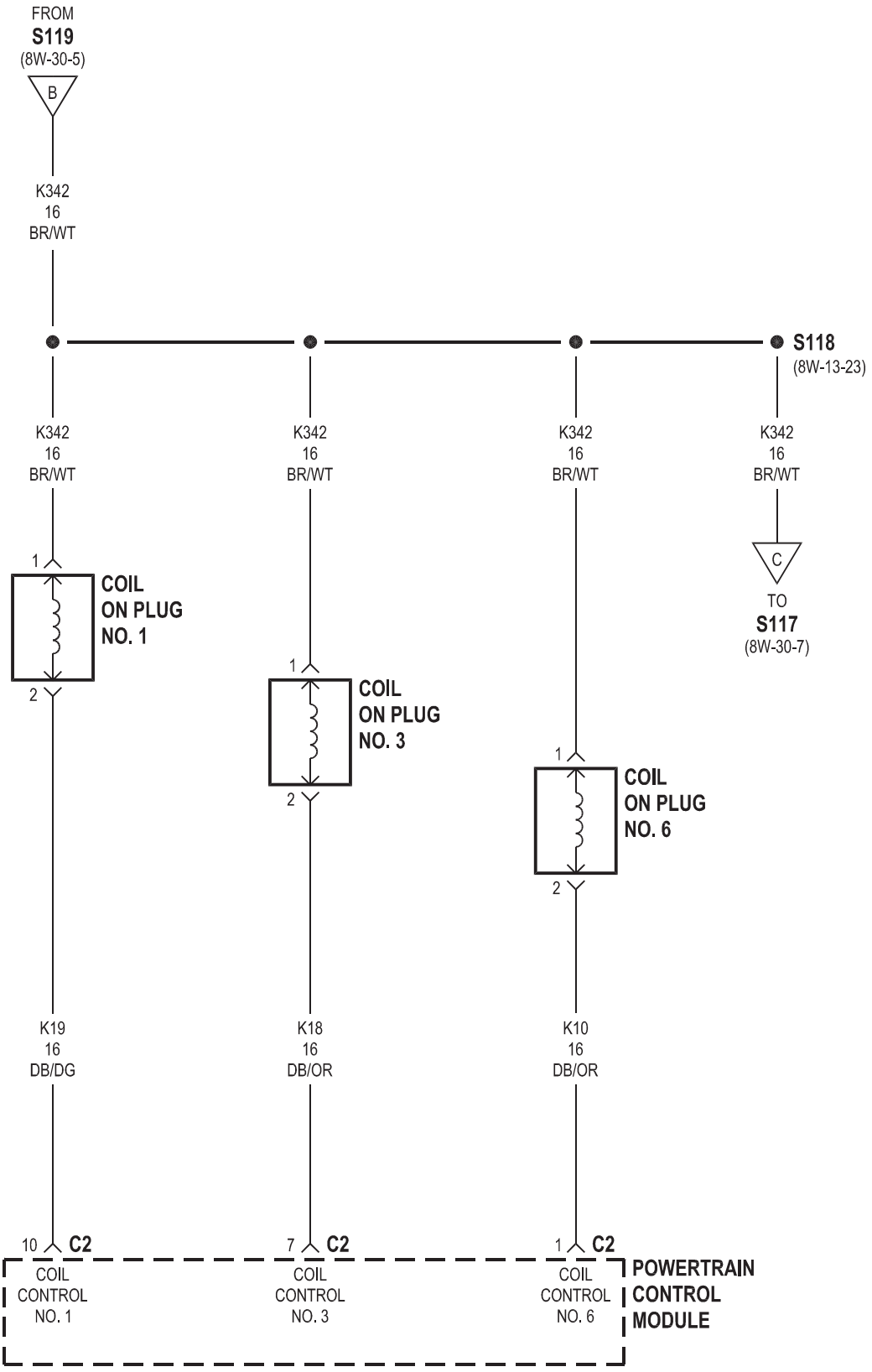
Component	Page
A/C Compressor Clutch Relay	8W-30-4
A/C Pressure Transducer	8W-30-10
Ambient Temperature Sensor	8W-30-13, 19
Auto Shut Down Relay	8W-30-4
Battery	8W-30-2, 21
Battery Temperature Sensor	8W-30-13, 19
Body Control Module	8W-30-9
Brake Lamp Switch	8W-30-20
Camshaft Position Sensor	8W-30-14, 18
Clockspring	8W-30-9
Coil On Plug No. 1	8W-30-6
Coil On Plug No. 2	8W-30-5
Coil On Plug No. 3	8W-30-6
Coil On Plug No. 4	8W-30-7
Coil On Plug No. 5	8W-30-7
Coil On Plug No. 6	8W-30-6
Crankshaft Position Sensor	8W-30-13, 19
Data Link Connector	8W-30-3
EGR Solenoid	8W-30-12, 17
Engine Coolant Temperature Sensor	8W-30-12, 17
Engine Oil Pressure Switch	8W-30-10
EVAP/Purge Solenoid	8W-30-4
Fuel Injector No. 1	8W-30-5, 15
Fuel Injector No. 2	8W-30-7, 15
Fuel Injector No. 3	8W-30-7, 15
Fuel Injector No. 4	8W-30-7, 15
Fuel Injector No. 5	8W-30-5, 15
Fuel Injector No. 6	8W-30-5, 15
Fuel Pump Module	8W-30-9
Fuel Pump Relay	8W-30-9
Fuse 29	8W-30-20
Fuse 36	8W-30-21
Fuse 37	8W-30-4
Fuse 38	8W-30-11
Fuse 39	8W-30-2, 9
G100	8W-30-8, 11, 12
G101	8W-30-2, 21
G102	8W-30-2, 8, 17
G103	8W-30-20
G301	8W-30-9, 10
G305	8W-30-9, 20
Generator	8W-30-4
Idle Air Control Motor	8W-30-11
Ignition Coil	8W-30-15, 16
Instrument Cluster	8W-30-20
Intake Air Temperature Sensor	8W-30-14, 18
Integrated Power Module	8W-30-2, 3, 4, 9, 11, 20, 21
Knock Sensor	8W-30-11
Manifold Absolute Pressure Sensor	8W-30-12, 17
Manifold Tuning Valve Relay	8W-30-11
Manifold Tuning Valve Solenoid	8W-30-11
Natural Vacuum Leak Detection Assembly	8W-30-10
Noise Suppressor	8W-30-7
Oxygen Sensor-1/1 Upstream	8W-30-8
Oxygen Sensor-1/2 Downstream	8W-30-8
Powertrain Control Module	8W-30-2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
Radiator Fan Relay	8W-30-10
Shift Lever Assembly	8W-30-4
Short Runner Valve Solenoid	8W-30-5
Speed Control Servo	8W-30-20
Speed Control Switch-Left	8W-30-9
Speed Control Switch-Right	8W-30-9
Speed Sensor-Input	8W-30-21
Speed Sensor-Output	8W-30-21
Starter Motor Relay	8W-30-9
Throttle Position Sensor	8W-30-14, 18
Transmission Control Relay	8W-30-21
Transmission Range Sensor	8W-30-22
Transmission Solenoid/Pressure Switch Assembly	8W-30-21, 22

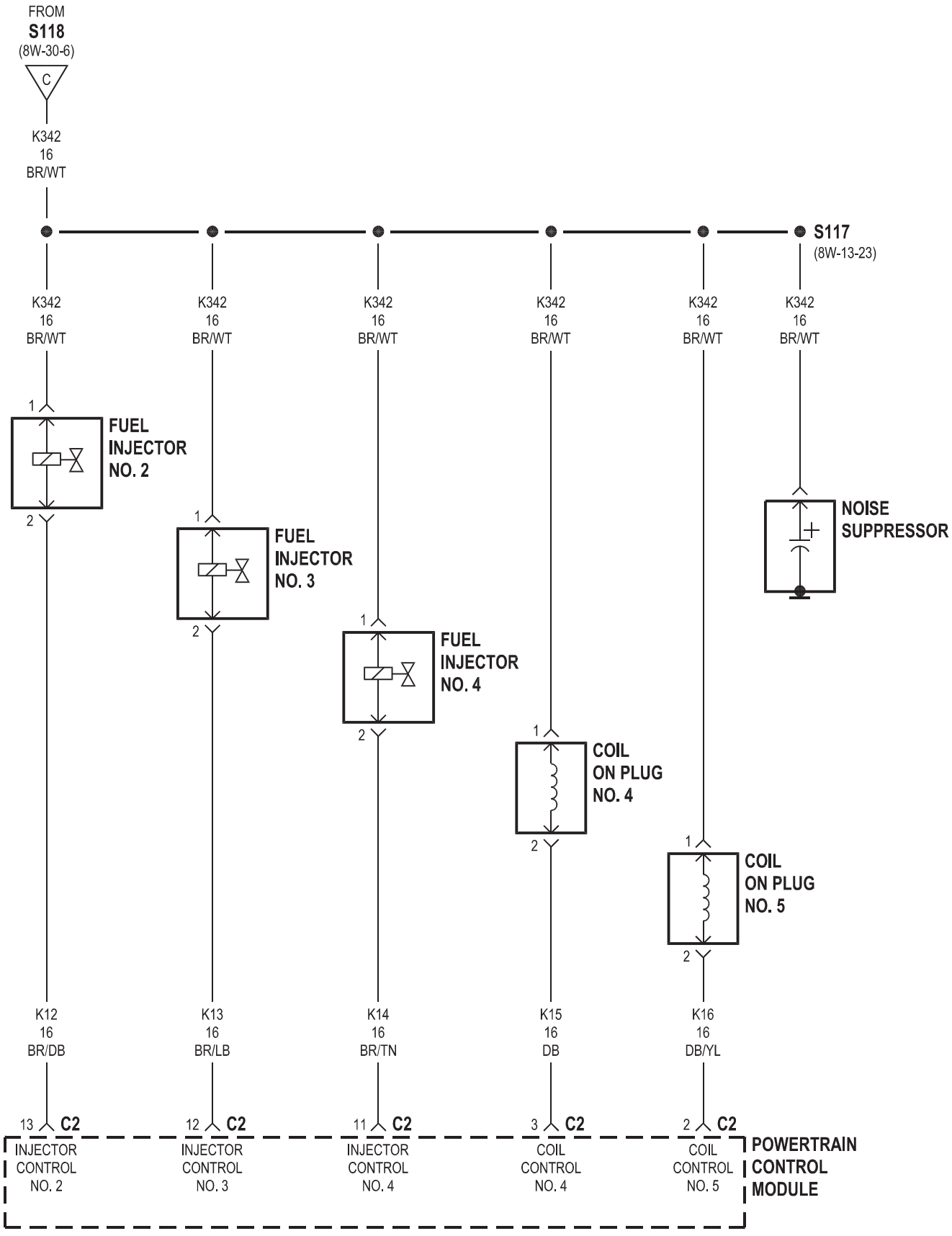

BATT A1
(8W-13-10)
START T751
(8W-13-27)
RUN-START F20
(8W-13-27)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
FUSE 39 20A (8W-13-25)
IGNITION SWITCH OUTPUT (START)
IGNITION UNLOCK-RUN-START
FUSED IGNITION SWITCH OUTPUT (RUN-START)
R3
3 C1
1 C7
9 C6
2 C6
A109 18 OR/RD
T751 20 YL
F1 20 PK/WT
F202 20 PK/GY
29 C1
30 C1
12 C1
11 C1
FUSED B(+)
IGNITION SWITCH OUTPUT (START)
IGNITION UNLOCK-RUN-START
FUSED IGNITION SWITCH OUTPUT (RUN-START)
POWERTRAIN CONTROL MODULE
GROUND
GROUND
GROUND
GROUND
14 C4
13 C4
9 C1
18 C1
Z133 16 BK/LG
Z133 16 BK/LG
Z130 16 BK/BR
Z131 16 BK/DG
S116
(8W-15-3)
Z3 10 BK
BATTERY
(8W-13-10)
Z2 8 BK/WT
S114
(8W-15-2)
Z1 4 BK
Z2 8 BK/WT
G101
(8W-15-2)
G102
(8W-15-2)

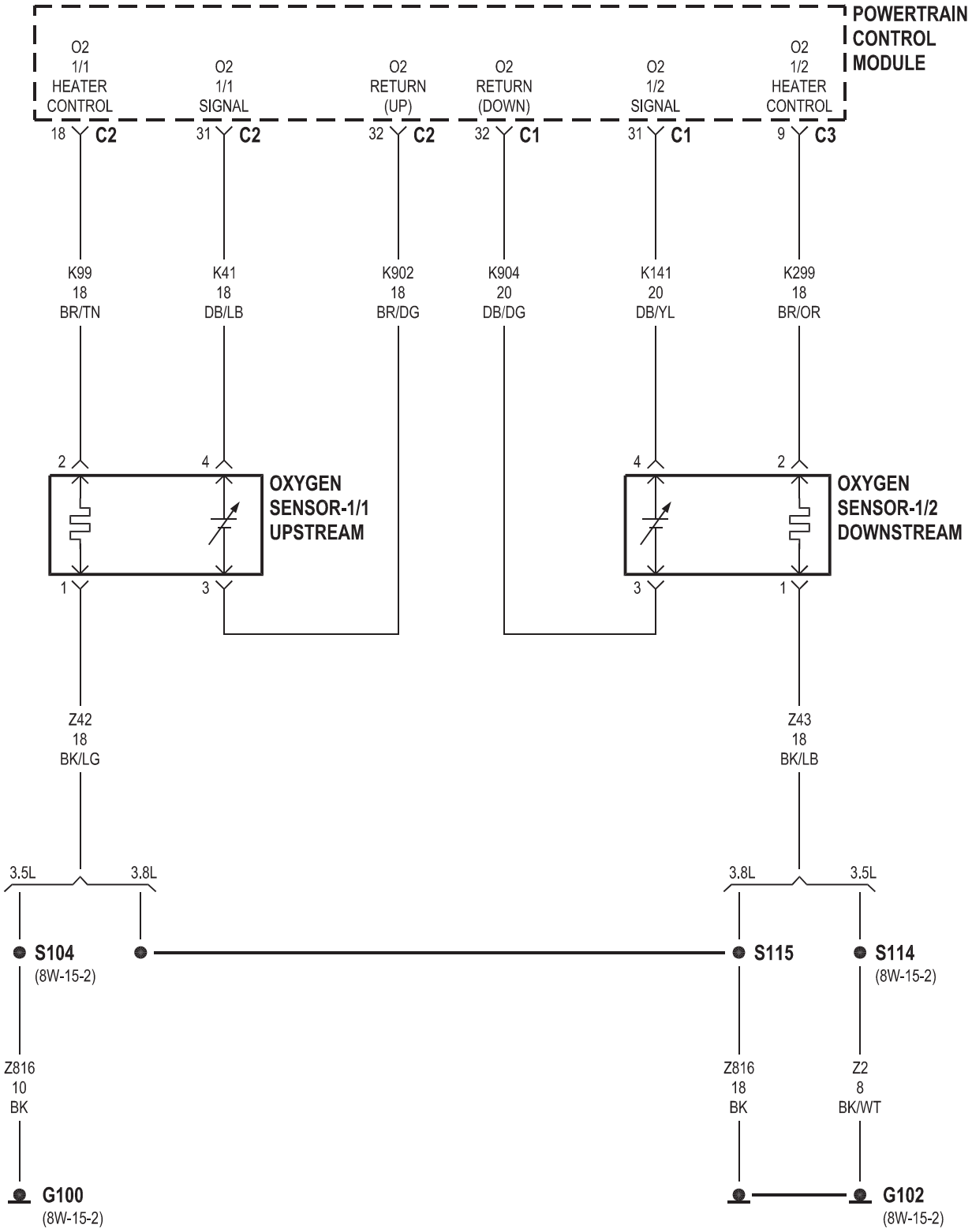

POWERTRAIN CONTROL MODULE
SCI RECEIVE (PCM)
SCI TRANSMIT (PCM)
FLASH PROGRAM ENABLE
SCI TRANSMIT (TCM)
PCI BUS
25 C1
36 C1
26 C1
37 C1
38 C1
D20 20 WT/LG
D21 20 WT/GY
D123 20 WT/BR
D15 20 BR/WT
D25 20 WT/VT
3 C6
INTEGRATED POWER MODULE
PCI BUS
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
3
1
2
4 C101
11 C4
D123 20 WT/BR
D25 20 WT/VT
S305
(8W-18-7)
S347
(8W-18-5)
D20 20 WT/LG
D21 20 WT/GY
D123 20 WT/BR
D15 20 BR/WT
D25 20 WT/VT
50
51
61
35
27 C201
D25 20 WT/VT
S213
(8W-18-3)
D20 20 WT/LG
D21 20 WT/GY
D123 20 WT/BR
D15 20 BR/WT
D25 20 WT/VT
12
7
9
15
2
DATA LINK CONNECTOR
(8W-18-2)

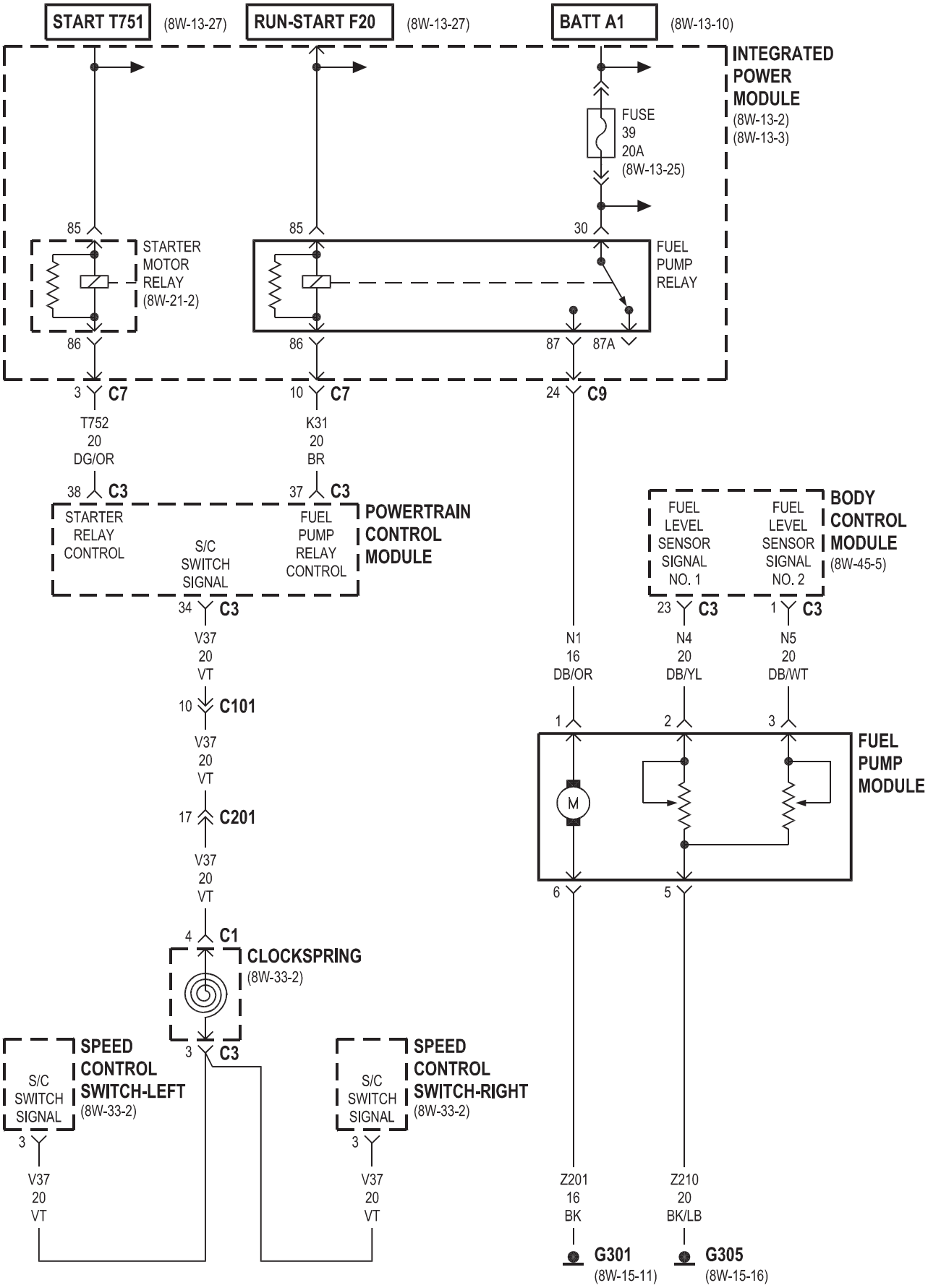

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 37 25A
(8W-13-21)
85
30
86
87
87A
A/C COMPRESSOR CLUTCH RELAY
(8W-42-8)
AUTO SHUT DOWN RELAY
4 C6
6 C6
12 C1
K342 16 BR/WT
S105
(8W-13-21)
C13 20 LB/OR
K51 18 BR/GY
K342 16 BR/WT
K342 16 BR/WT
K342 16 BR/WT
11 C3
3 C3
19 C3
28 C3
A/C CLUTCH RELAY CONTROL
AUTOMATIC SHUT DOWN RELAY CONTROL
AUTOMATIC SHUT DOWN RELAY OUTPUT
AUTOMATIC SHUT DOWN RELAY OUTPUT
POWERTRAIN CONTROL MODULE
GEN FIELD CONTROL
EVAP PURGE CONTROL
EVAP PURGE RETURN
AUTOSTICK DOWNSHIFT SWITCH SIGNAL
AUTOSTICK UPSHIFT SWITCH SIGNAL
19 C2
20 C3
29 C3
26 C3
27 C3
K20 18 BR/GY
K52 20 DB/WT
K70 20 DB/BR
T44 20 YL/DG
T5 20 DG/YL
3.5L
3.8L
8 C104
2
EVAP/PURGE SOLENOID
1
8 C102
12 C101
T44 20 YL/DG
T5 20 DG/YL
33
34 C201
T44 20 YL/DG
T5 20 DG/YL
K20 18 BR/GY
2
GEN FIELD CONTROL
GENERATOR
(8W-20-2)
2
3
AUTOSTICK DOWNSHIFT SWITCH SIGNAL
AUTOSTICK UPSHIFT SWITCH SIGNAL
SHIFT LEVER ASSEMBLY
(8W-31-9)
3.5L
3.8L
5 C104
1 C106
K342 16 BR/WT
K342 16 BR/WT
A
D
TO S119
(8W-30-5)
TO S177
(8W-30-15)

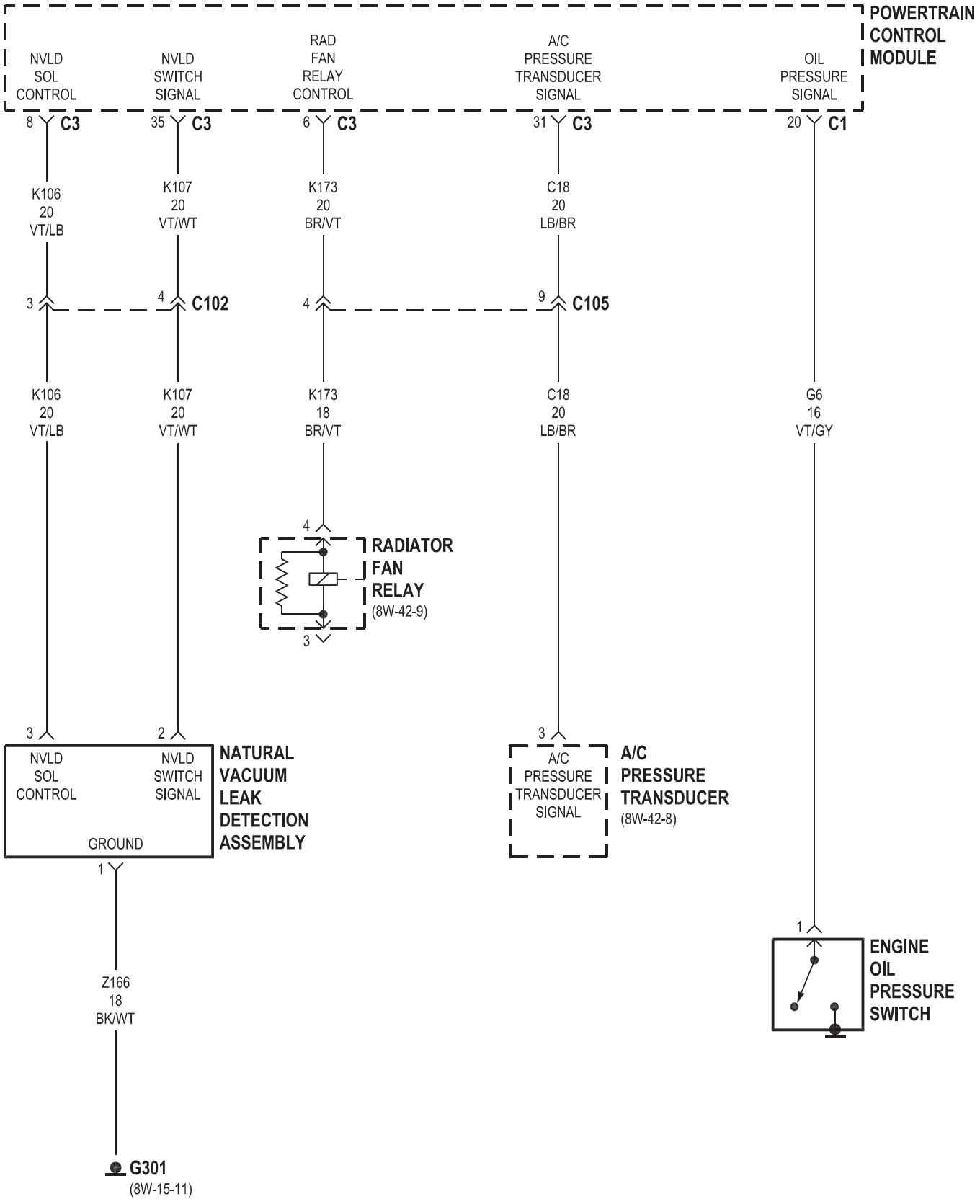

FROM
C104
(8W-30-4)
A
K342
16
BR/WT
S119
(8W-13-22)
B
TO
S118
(8W-30-6)
FUEL
INJECTOR
NO. 1
FUEL
INJECTOR
NO. 5
FUEL
INJECTOR
NO. 6
COIL
ON PLUG
NO. 2
SHORT
RUNNER
VALVE
SOLENOID
K236
18
DB/LG
9 C104
K11
16
BR/YL
K38
16
BR/OR
K58
16
BR/VT
K17
16
DB/TN
K236
16
DB/LG
14 C2
5 C2
4 C2
9 C2
16 C1
INJECTOR
CONTROL
NO. 1
INJECTOR
CONTROL
NO. 5
INJECTOR
CONTROL
NO. 6
COIL
CONTROL
NO. 2
SRV
SOL
CONTROL
POWERTRAIN
CONTROL
MODULE

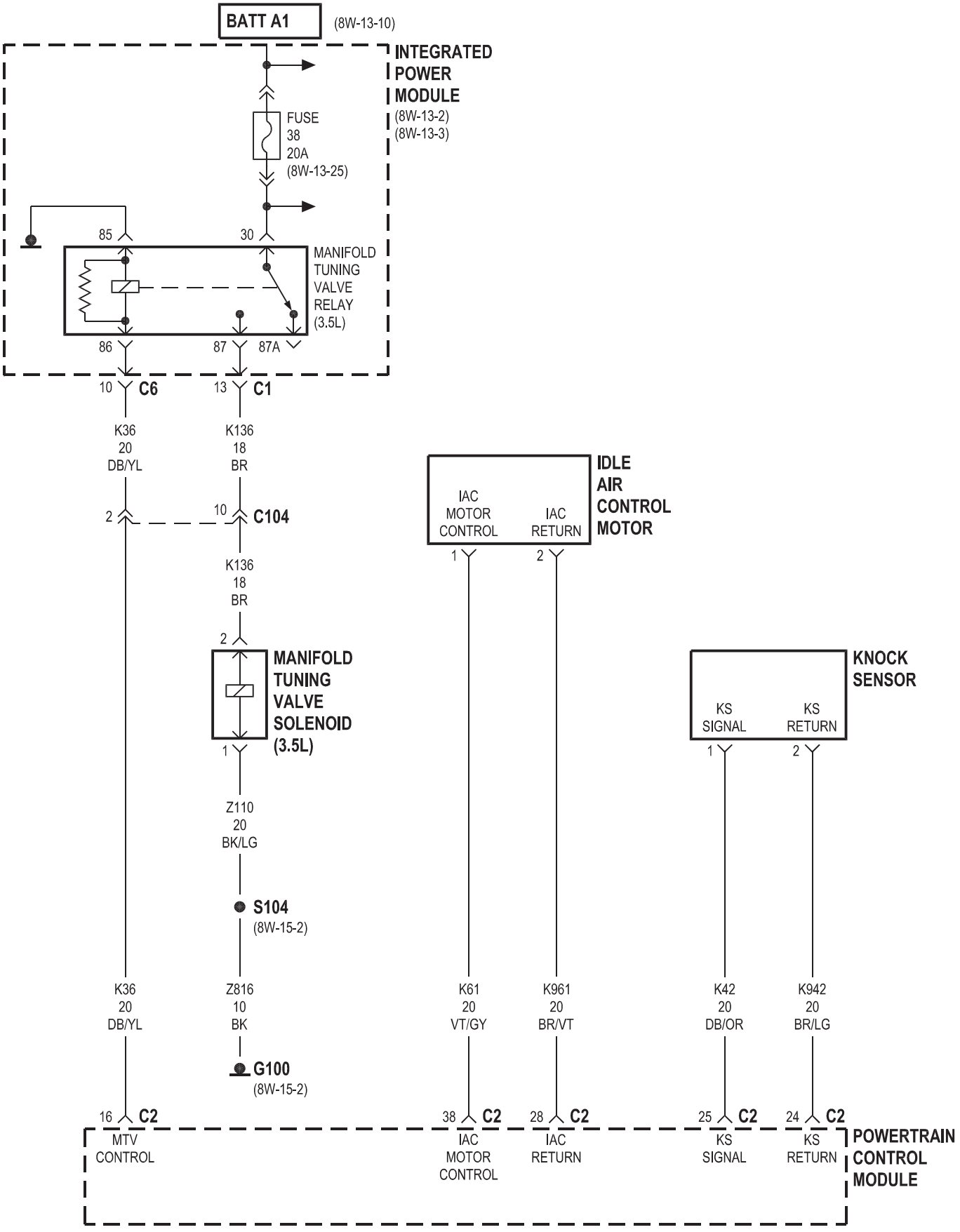

FROM
S119
(8W-30-5)
B
K342
16
BR/WT
S118
(8W-13-23)
K342
16
BR/WT
K342
16
BR/WT
K342
16
BR/WT
K342
16
BR/WT
C
TO
S117
(8W-30-7)
1
COIL
ON PLUG
NO. 1
2
1
COIL
ON PLUG
NO. 3
2
1
COIL
ON PLUG
NO. 6
2
K19
16
DB/DG
K18
16
DB/OR
K10
16
DB/OR
10 C2
COIL
CONTROL
NO. 1
7 C2
COIL
CONTROL
NO. 3
1 C2
COIL
CONTROL
NO. 6
POWERTRAIN
CONTROL
MODULE

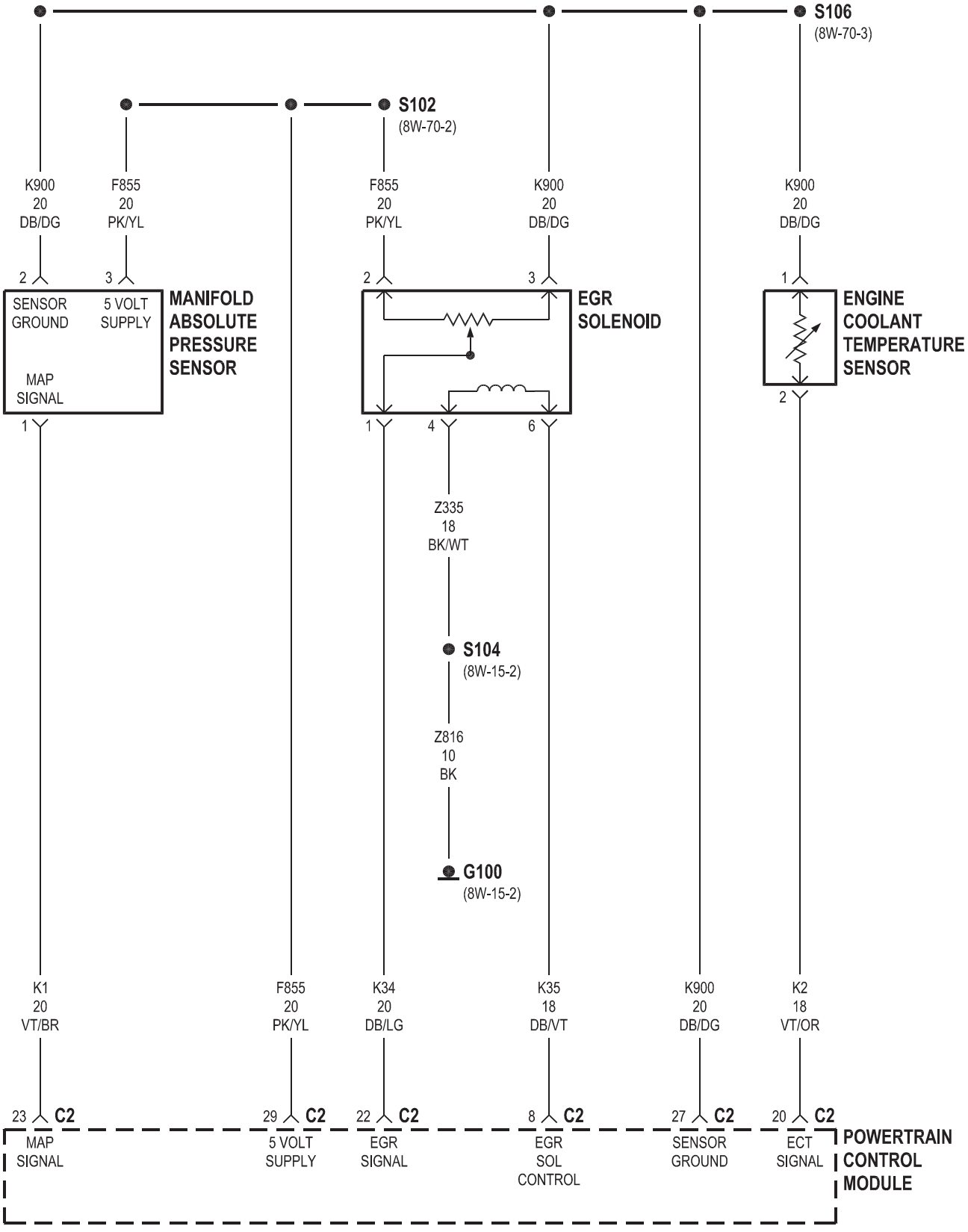

FROM
S118
(8W-30-6)
C
K342
16
BR/WT
S117
(8W-13-23)
FUEL
INJECTOR
NO. 2
FUEL
INJECTOR
NO. 3
FUEL
INJECTOR
NO. 4
COIL
ON PLUG
NO. 4
COIL
ON PLUG
NO. 5
NOISE
SUPPRESSOR
K12
16
BR/DB
K13
16
BR/LB
K14
16
BR/TN
K15
16
DB
K16
16
DB/YL
13 C2
12 C2
11 C2
3 C2
2 C2
INJECTOR
CONTROL
NO. 2
INJECTOR
CONTROL
NO. 3
INJECTOR
CONTROL
NO. 4
COIL
CONTROL
NO. 4
COIL
CONTROL
NO. 5
POWERTRAIN
CONTROL
MODULE

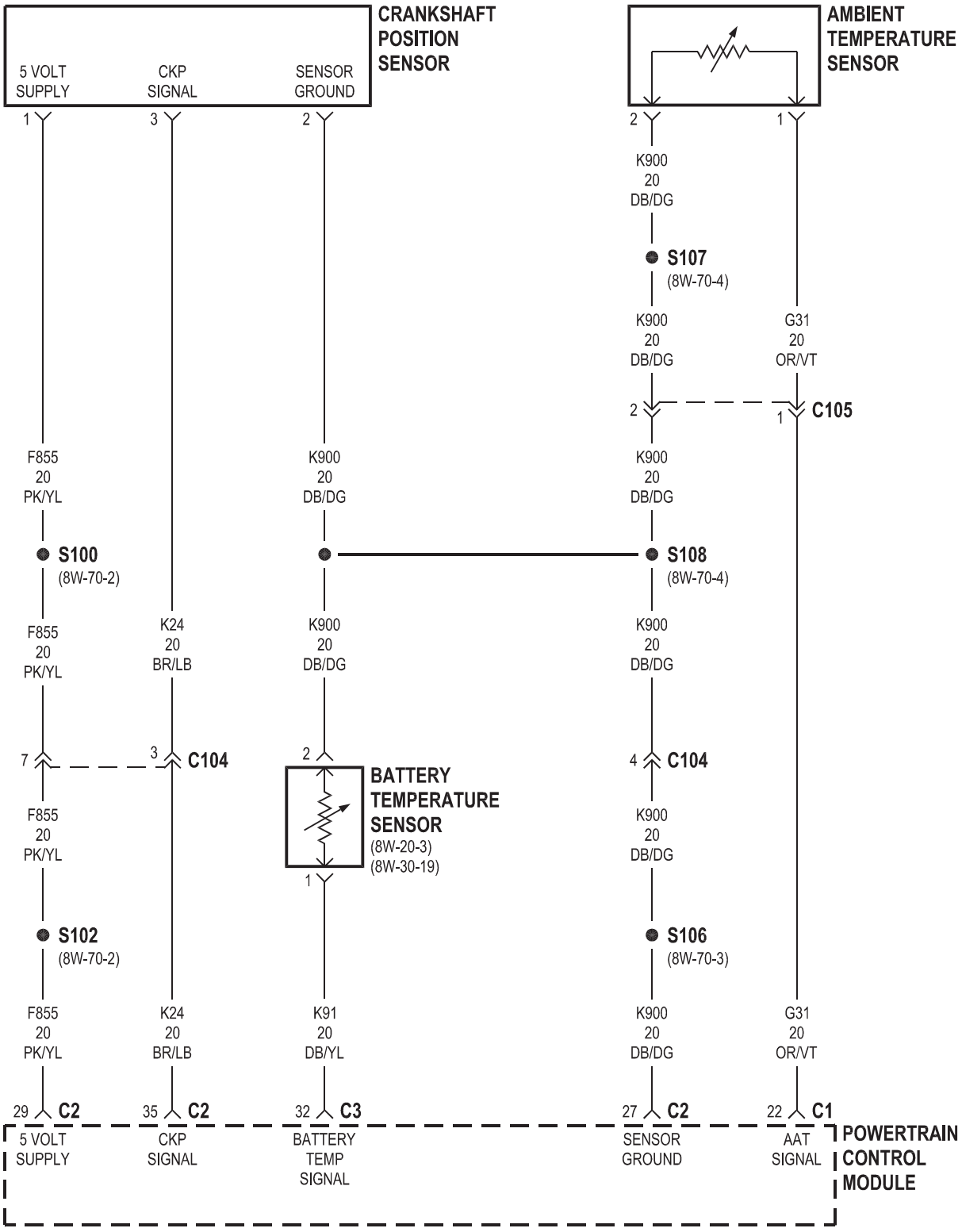

POWERTRAIN CONTROL MODULE
O2 1/1 HEATER CONTROL
O2 1/1 SIGNAL
O2 RETURN (UP)
O2 RETURN (DOWN)
O2 1/2 SIGNAL
O2 1/2 HEATER CONTROL
18 C2
31 C2
32 C2
32 C1
31 C1
9 C3
K99 18 BR/TN
K41 18 DB/LB
K902 18 BR/DG
K904 20 DB/DG
K141 20 DB/YL
K299 18 BR/OR
OXYGEN SENSOR-1/1 UPSTREAM
OXYGEN SENSOR-1/2 DOWNSTREAM
Z42 18 BK/LG
Z43 18 BK/LB
3.5L
3.8L
3.8L
3.5L
S104 (8W-15-2)
S115
S114 (8W-15-2)
Z816 10 BK
Z816 18 BK
Z2 8 BK/WT
G100 (8W-15-2)
G102 (8W-15-2)

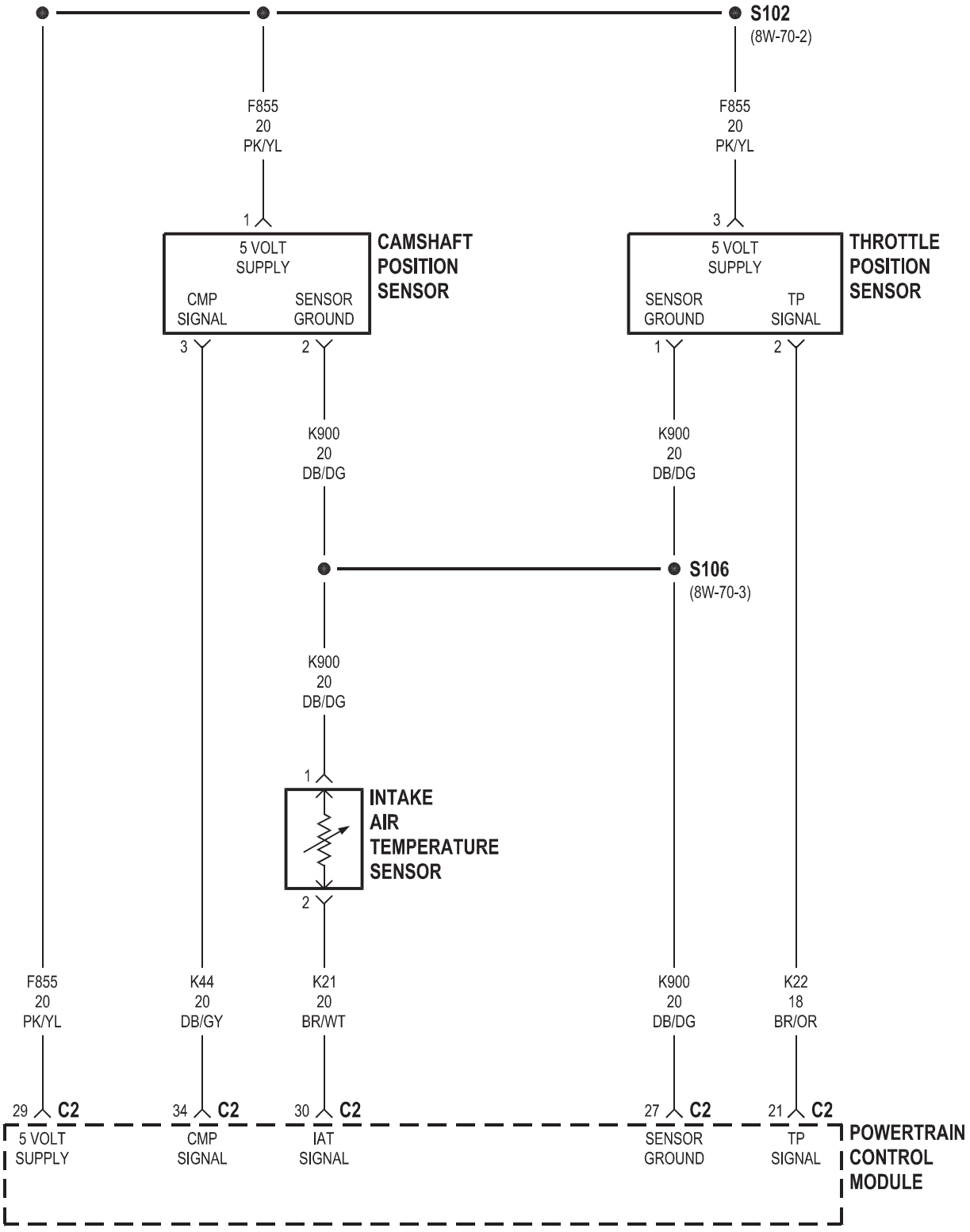

START T751
(8W-13-27)
RUN-START F20
(8W-13-27)
BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 39 20A
(8W-13-25)
85
30
STARTER MOTOR RELAY
(8W-21-2)
FUEL PUMP RELAY
86
87
87A
3 C7
10 C7
24 C9
T752 20 DG/OR
K31 20 BR
38 C3
37 C3
STARTER RELAY CONTROL
FUEL PUMP RELAY CONTROL
S/C SWITCH SIGNAL
POWERTRAIN CONTROL MODULE
FUEL LEVEL SENSOR SIGNAL NO. 1
FUEL LEVEL SENSOR SIGNAL NO. 2
BODY CONTROL MODULE
(8W-45-5)
34 C3
23 C3
1 C3
V37 20 VT
N1 16 DB/OR
N4 20 DB/YL
N5 20 DB/WT
10 C101
17 C201
1
2
3
M
FUEL PUMP MODULE
4 C1
CLOCKSPRING
(8W-33-2)
6
5
SPEED CONTROL SWITCH-LEFT
(8W-33-2)
SPEED CONTROL SWITCH-RIGHT
(8W-33-2)
Z201 16 BK
Z210 20 BK/LB
G301
(8W-15-11)
G305
(8W-15-16)

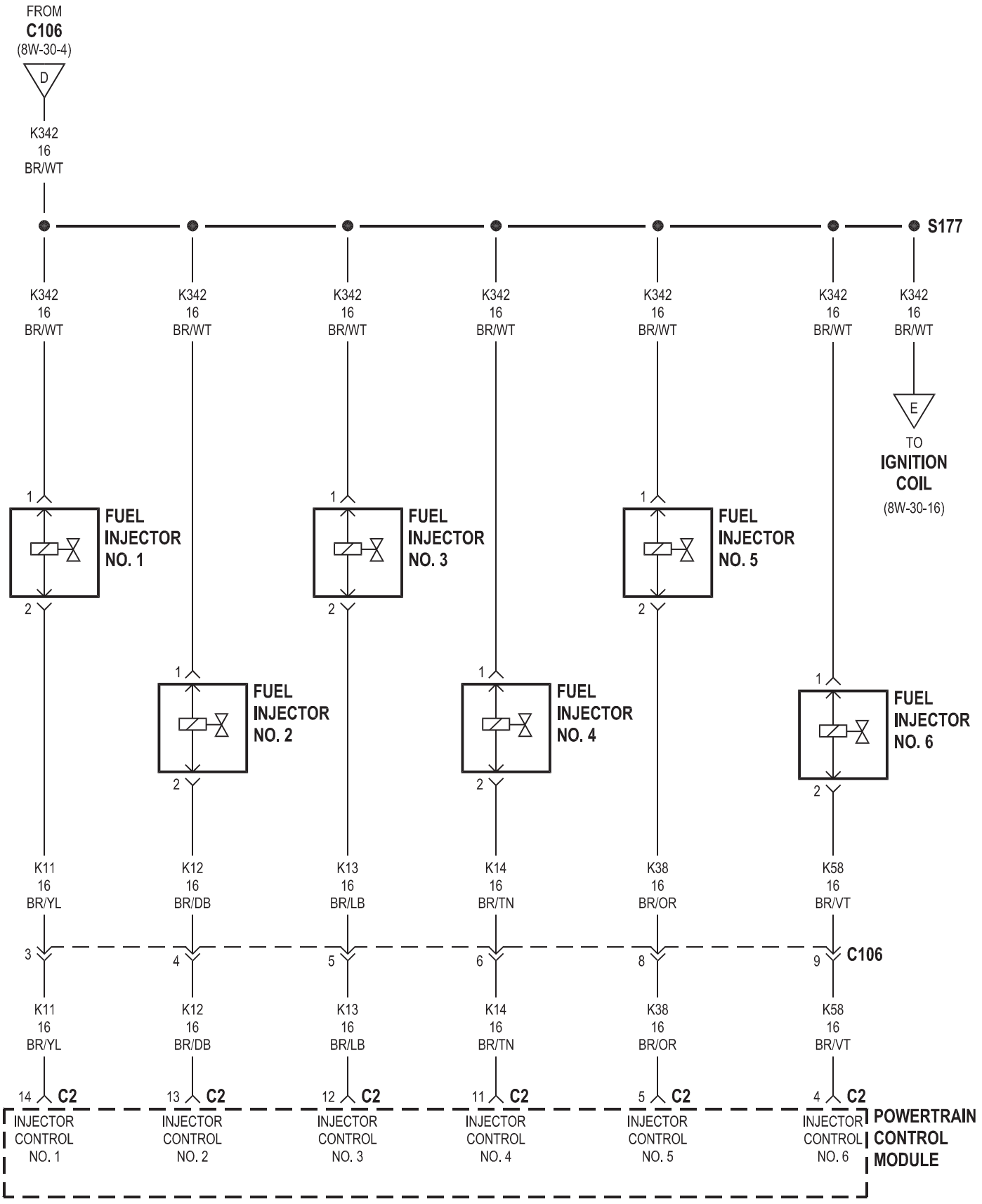

POWERTRAIN CONTROL MODULE
NVLD SOL CONTROL
NVLD SWITCH SIGNAL
RAD FAN RELAY CONTROL
A/C PRESSURE TRANSDUCER SIGNAL
OIL PRESSURE SIGNAL
8 C3
35 C3
6 C3
31 C3
20 C1
K106 20 VT/LB
K107 20 VT/WT
K173 20 BR/VT
C18 20 LB/BR
3
4 C102
4
9 C105
K106 20 VT/LB
K107 20 VT/WT
K173 18 BR/VT
C18 20 LB/BR
G6 16 VT/GY
4
RADIATOR FAN RELAY
(8W-42-9)
3
3
2
3
1
NVLD SOL CONTROL
NVLD SWITCH SIGNAL
GROUND
NATURAL VACUUM LEAK DETECTION ASSEMBLY
A/C PRESSURE TRANSDUCER SIGNAL
A/C PRESSURE TRANSDUCER
(8W-42-8)
1
ENGINE OIL PRESSURE SWITCH
Z166 18 BK/WT
G301
(8W-15-11)

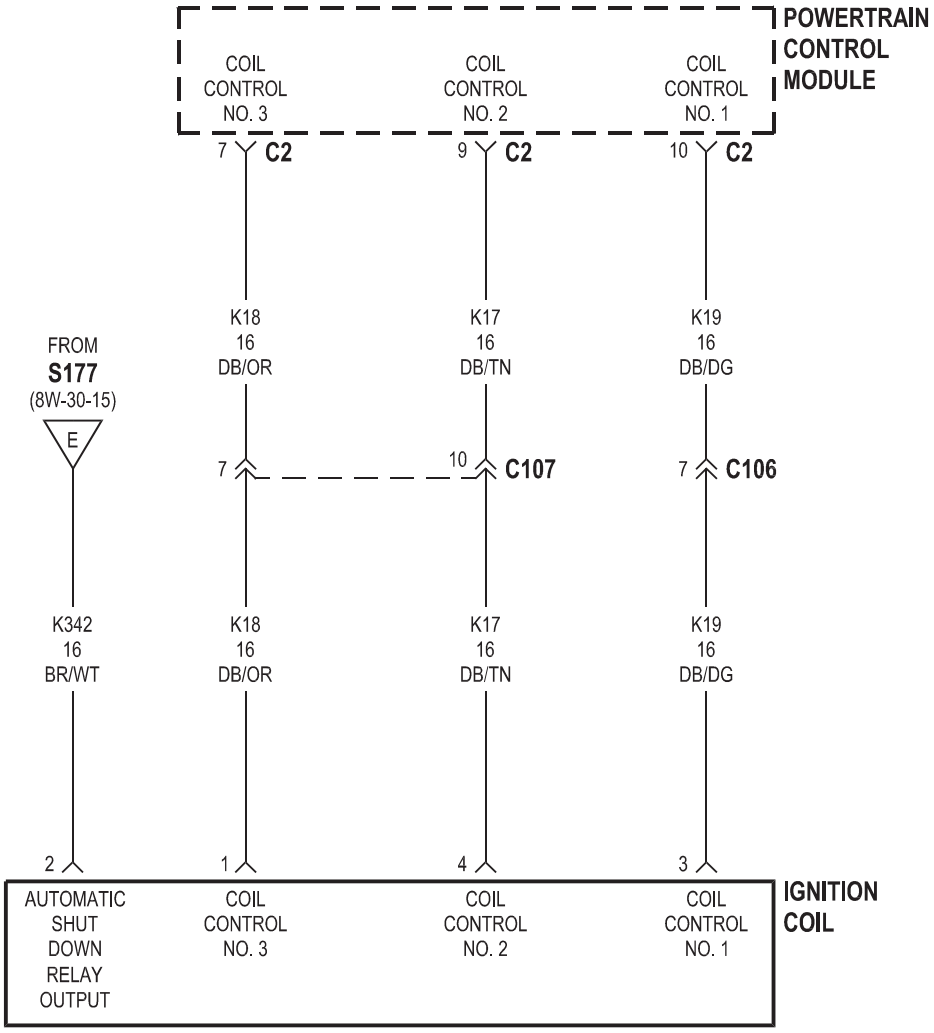

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 38 20A
(8W-13-25)
85
30
MANIFOLD TUNING VALVE RELAY (3.5L)
86
87
87A
10 C6
13 C1
K36 20 DB/YL
K136 18 BR
2
10 C104
K136 18 BR
2
MANIFOLD TUNING VALVE SOLENOID (3.5L)
1
Z110 20 BK/LG
S104
(8W-15-2)
K36 20 DB/YL
Z816 10 BK
G100
(8W-15-2)
IDLE AIR CONTROL MOTOR
IAC MOTOR CONTROL
IAC RETURN
1
2
K61 20 VT/GY
K961 20 BR/VT
KNOCK SENSOR
KS SIGNAL
KS RETURN
1
2
K42 20 DB/OR
K942 20 BR/LG
16 C2
MTV CONTROL
38 C2
IAC MOTOR CONTROL
28 C2
IAC RETURN
25 C2
KS SIGNAL
24 C2
KS RETURN
POWERTRAIN CONTROL MODULE

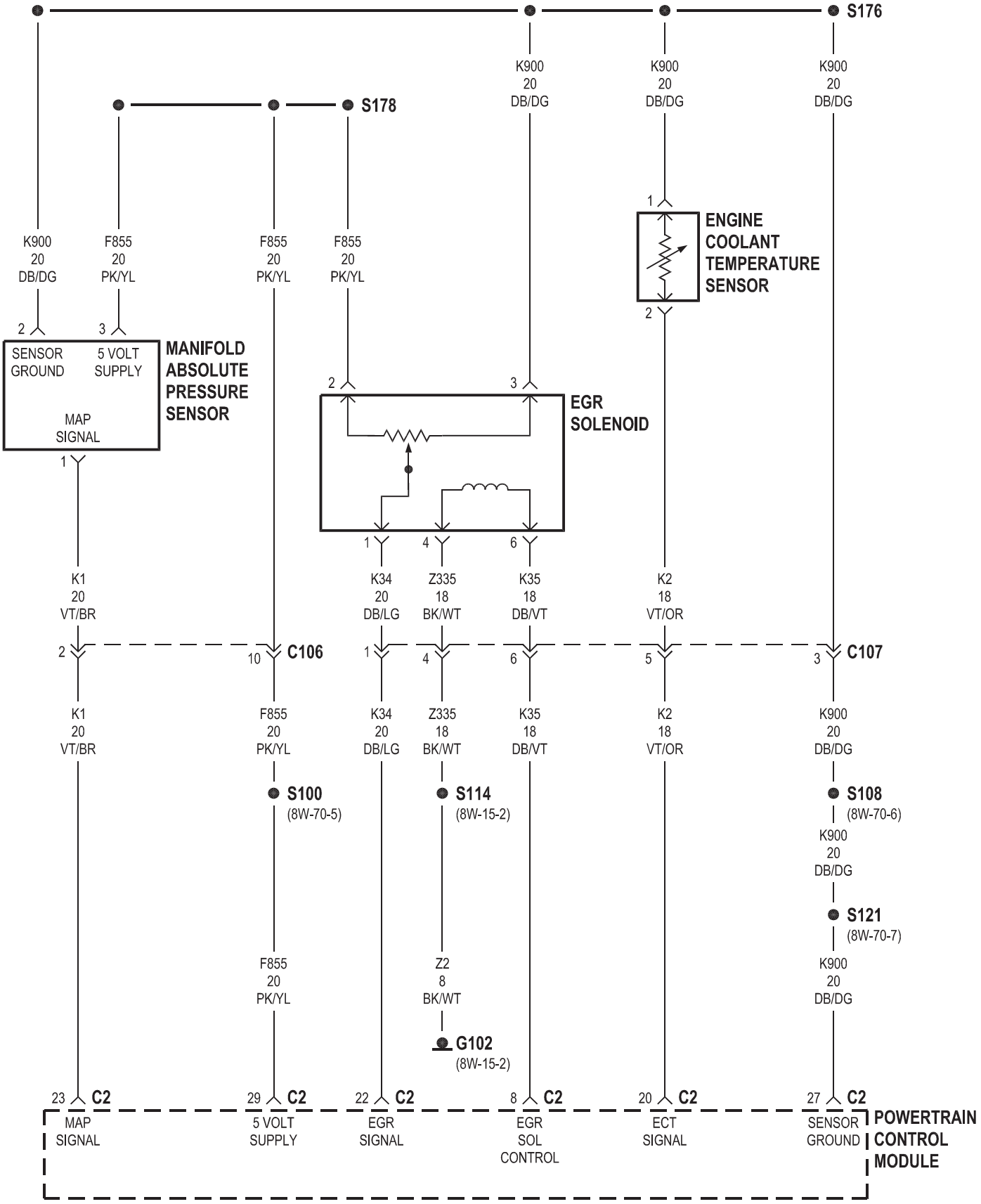

S106
(8W-70-3)
S102
(8W-70-2)
K900
20
DB/DG
F855
20
PK/YL
F855
20
PK/YL
K900
20
DB/DG
K900
20
DB/DG
2
3
2
3
1
SENSOR
GROUND
5 VOLT
SUPPLY
MAP
SIGNAL
MANIFOLD
ABSOLUTE
PRESSURE
SENSOR
EGR
SOLENOID
ENGINE
COOLANT
TEMPERATURE
SENSOR
1
1
4
6
2
Z335
18
BK/WT
S104
(8W-15-2)
Z816
10
BK
G100
(8W-15-2)
K1
20
VT/BR
F855
20
PK/YL
K34
20
DB/LG
K35
18
DB/VT
K900
20
DB/DG
K2
18
VT/OR
23 C2
29 C2
22 C2
8 C2
27 C2
20 C2
MAP
SIGNAL
5 VOLT
SUPPLY
EGR
SIGNAL
EGR
SOL
CONTROL
SENSOR
GROUND
ECT
SIGNAL
POWERTRAIN
CONTROL
MODULE

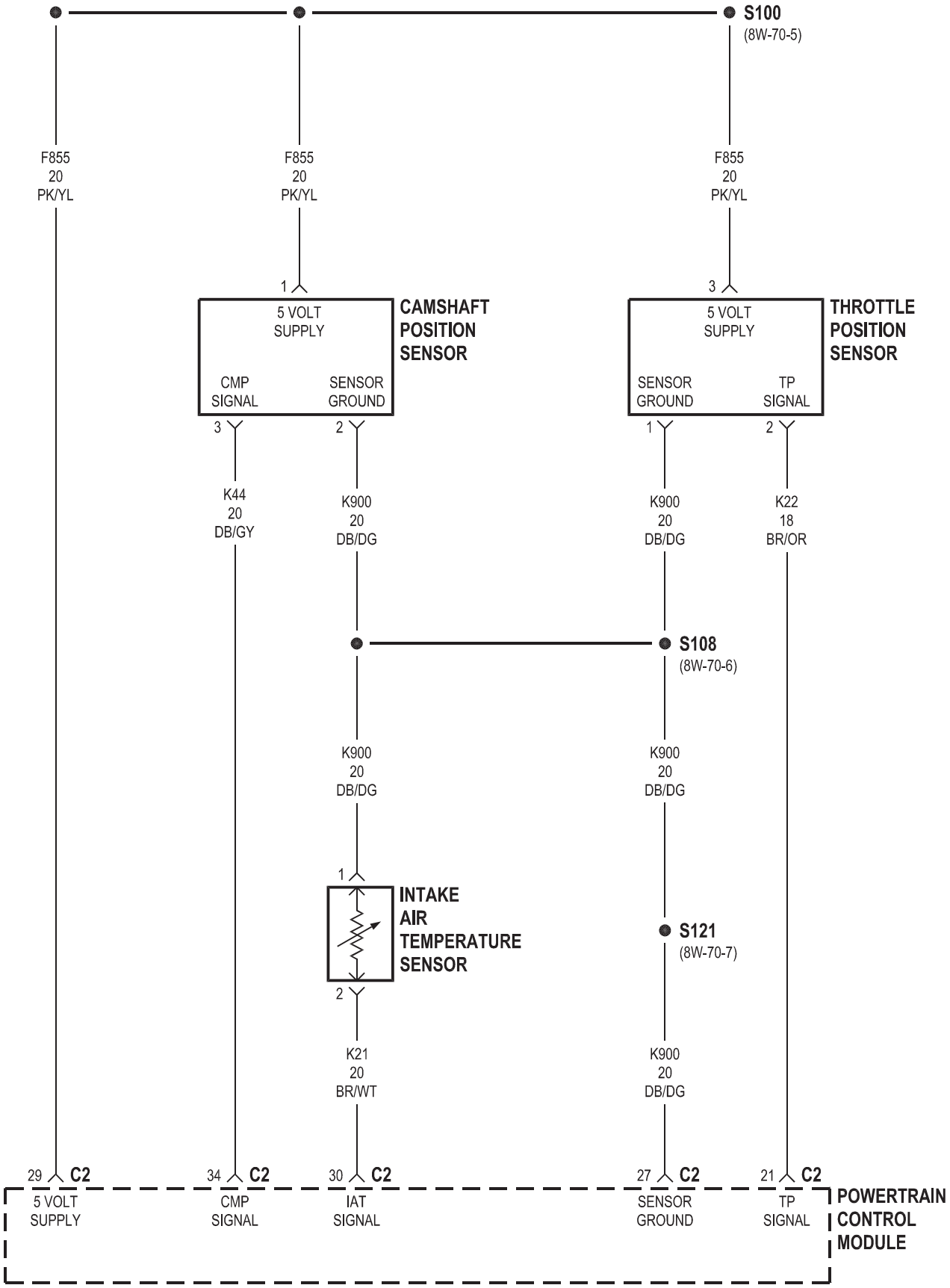

CRANKSHAFT POSITION SENSOR
5 VOLT SUPPLY
CKP SIGNAL
SENSOR GROUND
1
3
2
AMBIENT TEMPERATURE SENSOR
2
1
K900 20 DB/DG
S107
(8W-70-4)
K900 20 DB/DG
G31 20 OR/VT
2
C105
1
F855 20 PK/YL
K900 20 DB/DG
K900 20 DB/DG
S100
(8W-70-2)
S108
(8W-70-4)
F855 20 PK/YL
K24 20 BR/LB
K900 20 DB/DG
K900 20 DB/DG
7
3
C104
2
4
C104
BATTERY TEMPERATURE SENSOR
(8W-20-3)
(8W-30-19)
1
F855 20 PK/YL
K900 20 DB/DG
S102
(8W-70-2)
S106
(8W-70-3)
F855 20 PK/YL
K24 20 BR/LB
K91 20 DB/YL
K900 20 DB/DG
G31 20 OR/VT
29
C2
35
C2
32
C3
27
C2
22
C1
5 VOLT SUPPLY
CKP SIGNAL
BATTERY TEMP SIGNAL
SENSOR GROUND
AAT SIGNAL
POWERTRAIN CONTROL MODULE

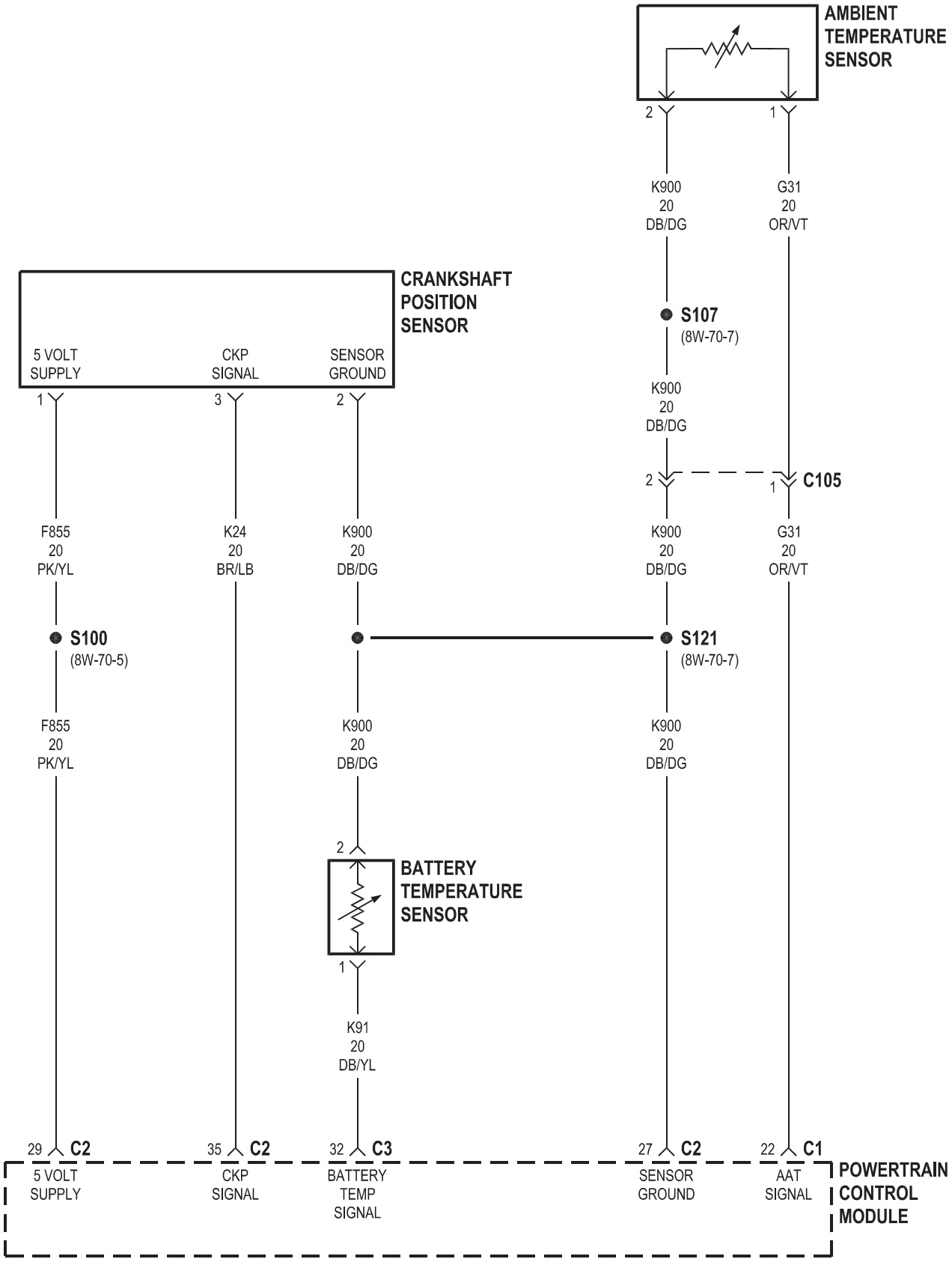

S102
(8W-70-2)
F855
20
PK/YL
F855
20
PK/YL
1
3
5 VOLT
SUPPLY
CMP
SIGNAL
SENSOR
GROUND
CAMSHAFT
POSITION
SENSOR
5 VOLT
SUPPLY
SENSOR
GROUND
TP
SIGNAL
THROTTLE
POSITION
SENSOR
3
2
1
2
K900
20
DB/DG
K900
20
DB/DG
S106
(8W-70-3)
K900
20
DB/DG
1
INTAKE
AIR
TEMPERATURE
SENSOR
2
F855
20
PK/YL
K44
20
DB/GY
K21
20
BR/WT
K900
20
DB/DG
K22
18
BR/OR
29 C2
34 C2
30 C2
27 C2
21 C2
5 VOLT
SUPPLY
CMP
SIGNAL
IAT
SIGNAL
SENSOR
GROUND
TP
SIGNAL
POWERTRAIN
CONTROL
MODULE

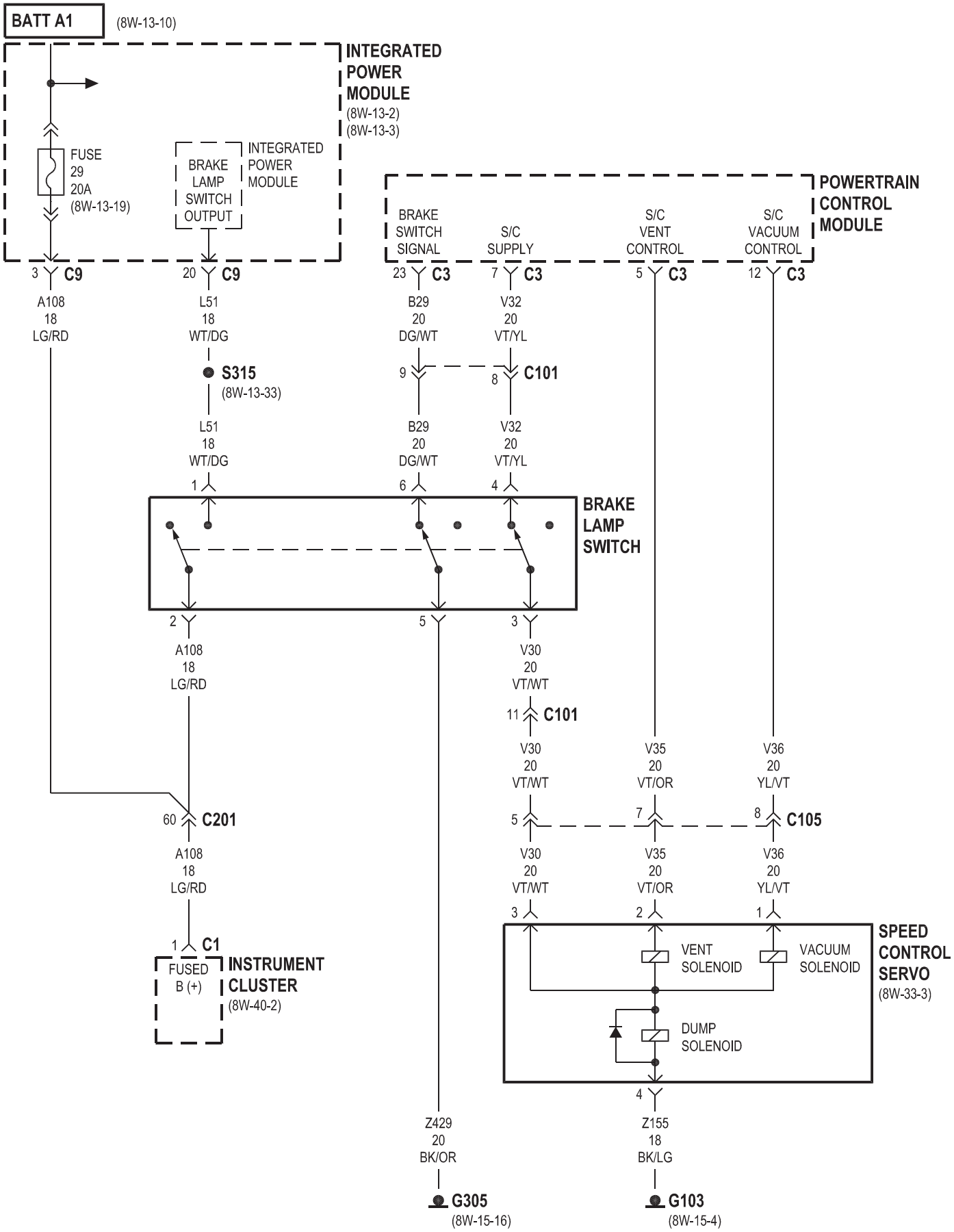

FROM
C106
(8W-30-4)
D
K342
16
BR/WT
S177
E
TO
IGNITION
COIL
(8W-30-16)
FUEL
INJECTOR
NO. 1
FUEL
INJECTOR
NO. 2
FUEL
INJECTOR
NO. 3
FUEL
INJECTOR
NO. 4
FUEL
INJECTOR
NO. 5
FUEL
INJECTOR
NO. 6
K11
16
BR/YL
K12
16
BR/DB
K13
16
BR/LB
K14
16
BR/TN
K38
16
BR/OR
K58
16
BR/VT
C106
C2
INJECTOR
CONTROL
NO. 1
INJECTOR
CONTROL
NO. 2
INJECTOR
CONTROL
NO. 3
INJECTOR
CONTROL
NO. 4
INJECTOR
CONTROL
NO. 5
INJECTOR
CONTROL
NO. 6
POWERTRAIN
CONTROL
MODULE

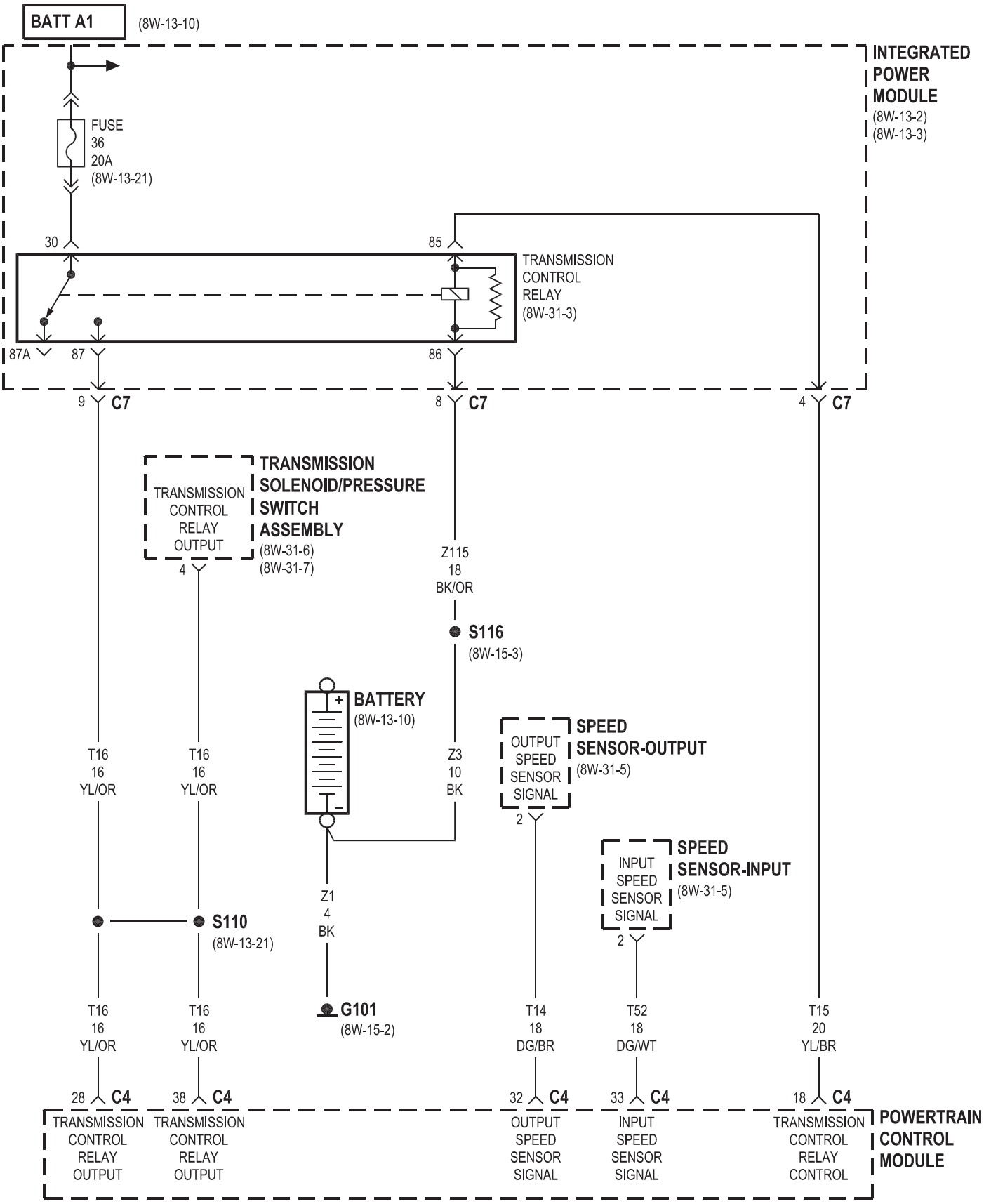

POWERTRAIN CONTROL MODULE
COIL CONTROL NO. 3
COIL CONTROL NO. 2
COIL CONTROL NO. 1
7 C2
9 C2
10 C2
K18 16 DB/OR
K17 16 DB/TN
K19 16 DB/DG
FROM S177 (8W-30-15)
E
7
10 C107
7 C106
K342 16 BR/WT
K18 16 DB/OR
K17 16 DB/TN
K19 16 DB/DG
2
1
4
3
AUTOMATIC SHUT DOWN RELAY OUTPUT
COIL CONTROL NO. 3
COIL CONTROL NO. 2
COIL CONTROL NO. 1
IGNITION COIL

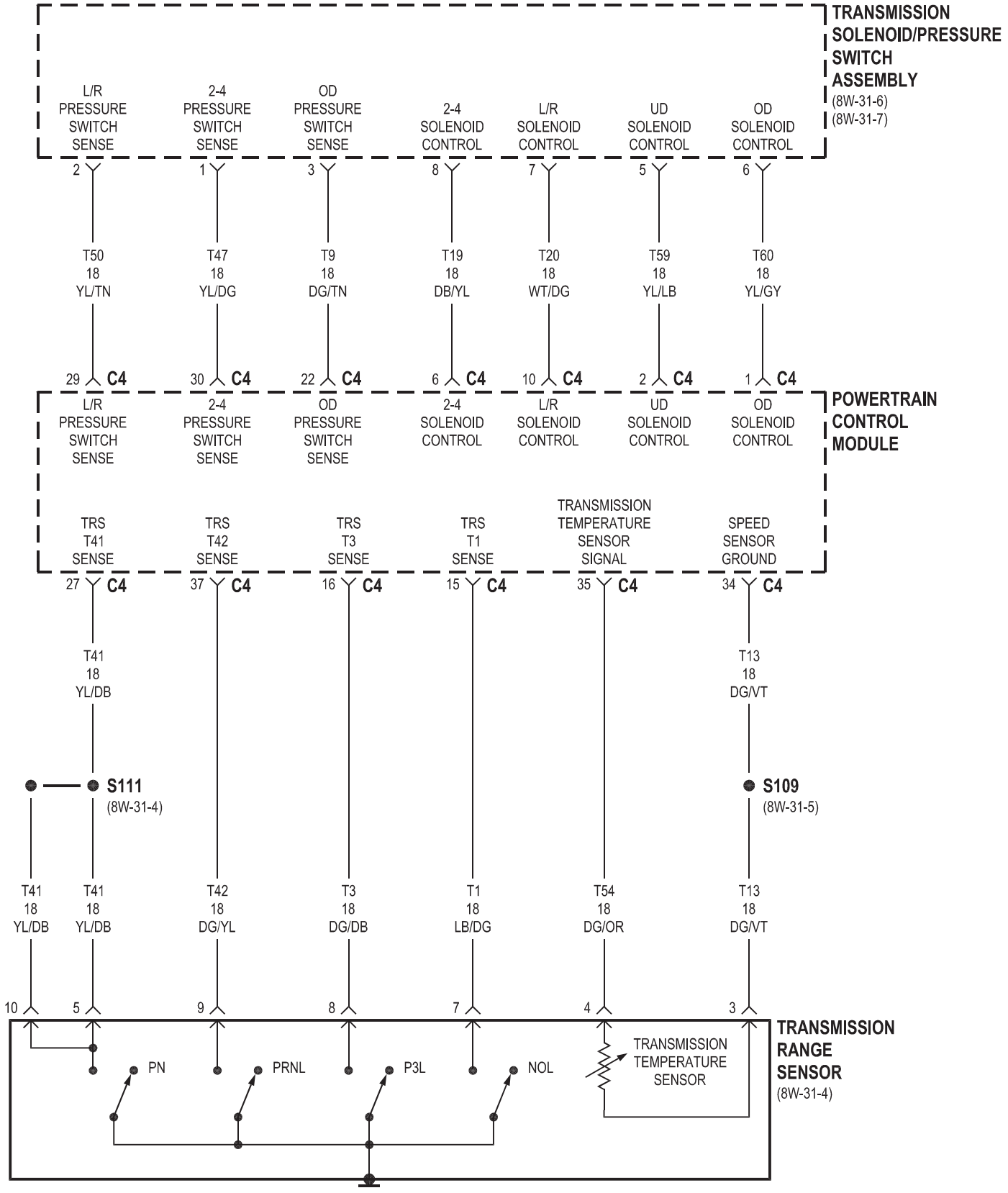

S176
K900 20 DB/DG
K900 20 DB/DG
K900 20 DB/DG
S178
K900 20 DB/DG
F855 20 PK/YL
F855 20 PK/YL
F855 20 PK/YL
1
ENGINE COOLANT TEMPERATURE SENSOR
2
2
3
SENSOR GROUND
5 VOLT SUPPLY
MAP SIGNAL
MANIFOLD ABSOLUTE PRESSURE SENSOR
1
2
3
EGR SOLENOID
1
4
6
K1 20 VT/BR
K34 20 DB/LG
Z335 18 BK/WT
K35 18 DB/VT
K2 18 VT/OR
2
10
C106
1
4
6
5
3
C107
K1 20 VT/BR
F855 20 PK/YL
K34 20 DB/LG
Z335 18 BK/WT
K35 18 DB/VT
K2 18 VT/OR
K900 20 DB/DG
S100
(8W-70-5)
S114
(8W-15-2)
S108
(8W-70-6)
K900 20 DB/DG
S121
(8W-70-7)
F855 20 PK/YL
Z2 8 BK/WT
K900 20 DB/DG
G102
(8W-15-2)
23
C2
29
C2
22
C2
8
C2
20
C2
27
C2
MAP SIGNAL
5 VOLT SUPPLY
EGR SIGNAL
EGR SOL CONTROL
ECT SIGNAL
SENSOR GROUND
POWERTRAIN CONTROL MODULE


S100
(8W-70-5)
F855
20
PK/YL
F855
20
PK/YL
F855
20
PK/YL
1
3
5 VOLT
SUPPLY
CAMSHAFT
POSITION
SENSOR
CMP
SIGNAL
SENSOR
GROUND
5 VOLT
SUPPLY
THROTTLE
POSITION
SENSOR
SENSOR
GROUND
TP
SIGNAL
3
2
1
2
K44
20
DB/GY
K900
20
DB/DG
K900
20
DB/DG
K22
18
BR/OR
S108
(8W-70-6)
K900
20
DB/DG
K900
20
DB/DG
1
INTAKE
AIR
TEMPERATURE
SENSOR
S121
(8W-70-7)
2
K21
20
BR/WT
K900
20
DB/DG
29 C2
34 C2
30 C2
27 C2
21 C2
5 VOLT
SUPPLY
CMP
SIGNAL
IAT
SIGNAL
SENSOR
GROUND
TP
SIGNAL
POWERTRAIN
CONTROL
MODULE


AMBIENT TEMPERATURE SENSOR
2
1
K900 20 DB/DG
G31 20 OR/VT
S107
(8W-70-7)
K900 20 DB/DG
2
1
C105
CRANKSHAFT POSITION SENSOR
5 VOLT SUPPLY
CKP SIGNAL
SENSOR GROUND
1
3
2
F855 20 PK/YL
K24 20 BR/LB
K900 20 DB/DG
K900 20 DB/DG
G31 20 OR/VT
S100
(8W-70-5)
S121
(8W-70-7)
F855 20 PK/YL
K900 20 DB/DG
K900 20 DB/DG
2
BATTERY TEMPERATURE SENSOR
1
K91 20 DB/YL
29 C2
35 C2
32 C3
27 C2
22 C1
5 VOLT SUPPLY
CKP SIGNAL
BATTERY TEMP SIGNAL
SENSOR GROUND
AAT SIGNAL
POWERTRAIN CONTROL MODULE

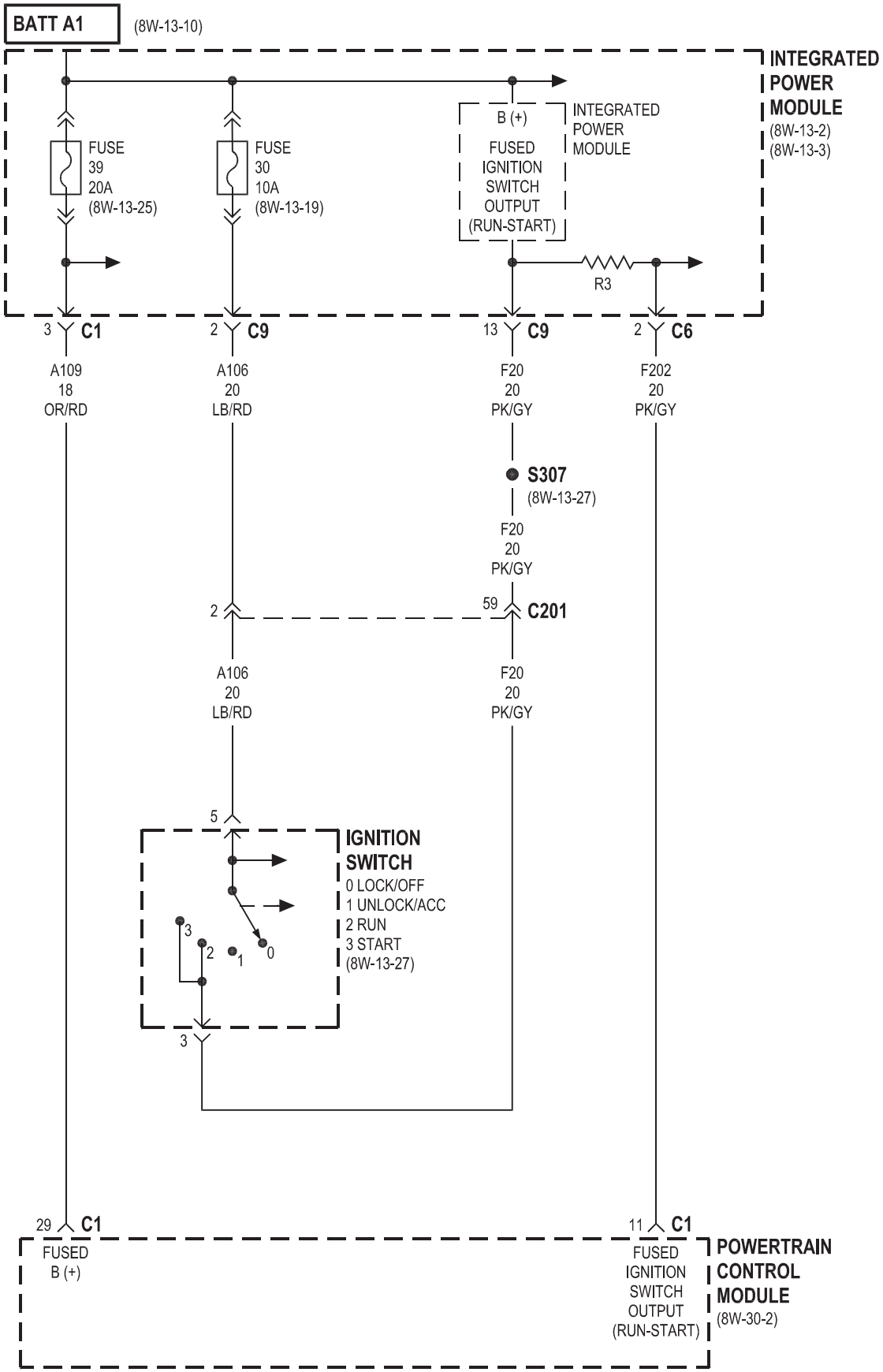

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 29 20A
(8W-13-19)
BRAKE LAMP SWITCH OUTPUT
INTEGRATED POWER MODULE
POWERTRAIN CONTROL MODULE
BRAKE SWITCH SIGNAL
S/C SUPPLY
S/C VENT CONTROL
S/C VACUUM CONTROL
3 C9
20 C9
23 C3
7 C3
5 C3
12 C3
A108 18 LG/RD
L51 18 WT/DG
B29 20 DG/WT
V32 20 VT/YL
S315
(8W-13-33)
9
8 C101
BRAKE LAMP SWITCH
1
6
4
2
5
3
V30 20 VT/WT
11 C101
V35 20 VT/OR
V36 20 YL/VT
60 C201
7
8 C105
1 C1
FUSED B (+)
INSTRUMENT CLUSTER
(8W-40-2)
SPEED CONTROL SERVO
(8W-33-3)
VENT SOLENOID
VACUUM SOLENOID
DUMP SOLENOID
Z429 20 BK/OR
Z155 18 BK/LG
G305
(8W-15-16)
G103
(8W-15-4)

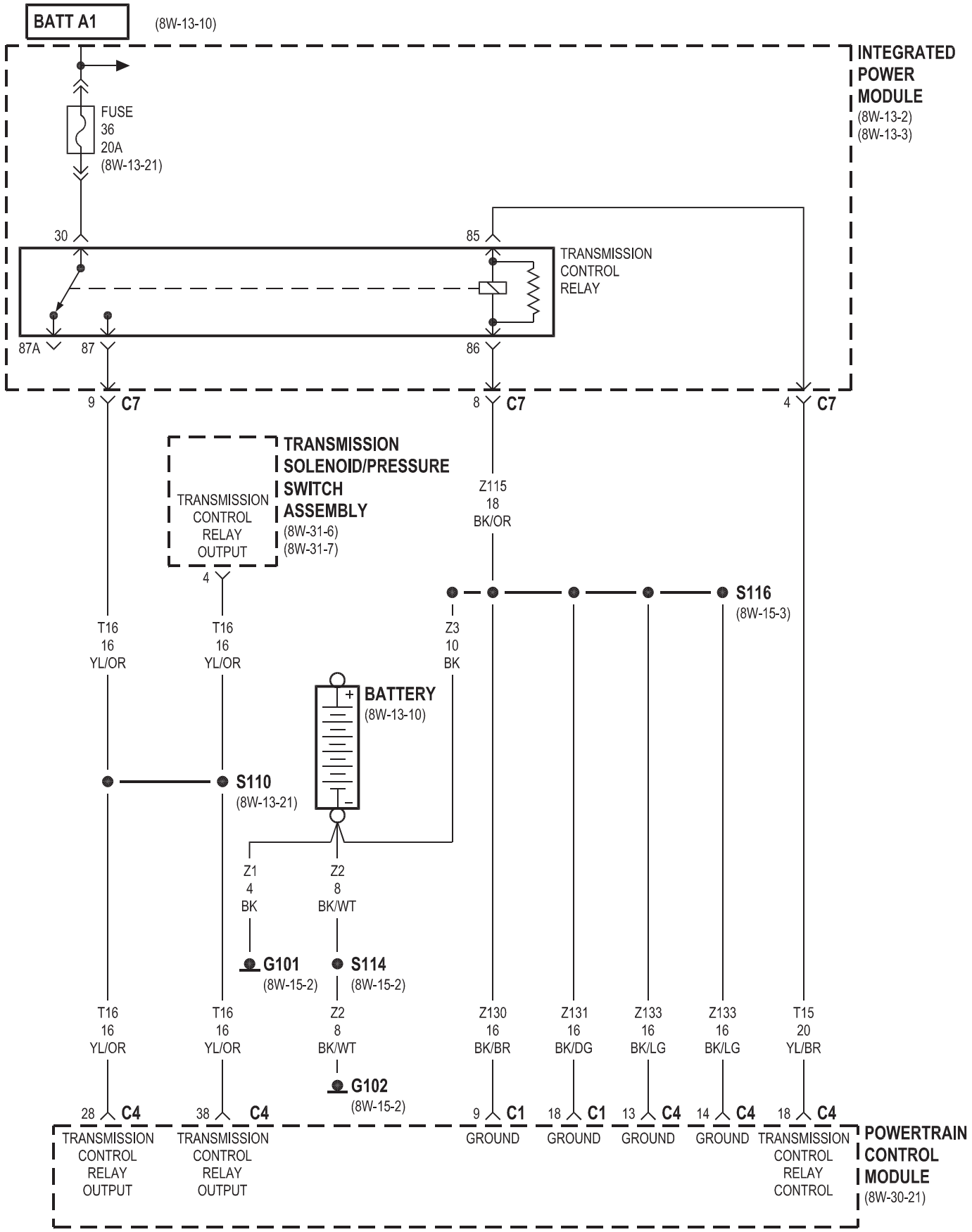

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE
36
20A
(8W-13-21)
30
85
TRANSMISSION CONTROL RELAY
(8W-31-3)
87A
87
86
9 C7
8 C7
4 C7
TRANSMISSION CONTROL RELAY OUTPUT
4
TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY
(8W-31-6)
(8W-31-7)
Z115
18
BK/OR
S116
(8W-15-3)
BATTERY
(8W-13-10)
OUTPUT SPEED SENSOR SIGNAL
2
SPEED SENSOR-OUTPUT
(8W-31-5)
INPUT SPEED SENSOR SIGNAL
2
SPEED SENSOR-INPUT
(8W-31-5)
T16
16
YL/OR
T16
16
YL/OR
Z3
10
BK
S110
(8W-13-21)
Z1
4
BK
G101
(8W-15-2)
T14
18
DG/BR
T52
18
DG/WT
T15
20
YL/BR
T16
16
YL/OR
T16
16
YL/OR
28 C4
38 C4
32 C4
33 C4
18 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
OUTPUT SPEED SENSOR SIGNAL
INPUT SPEED SENSOR SIGNAL
TRANSMISSION CONTROL RELAY CONTROL
POWERTRAIN CONTROL MODULE

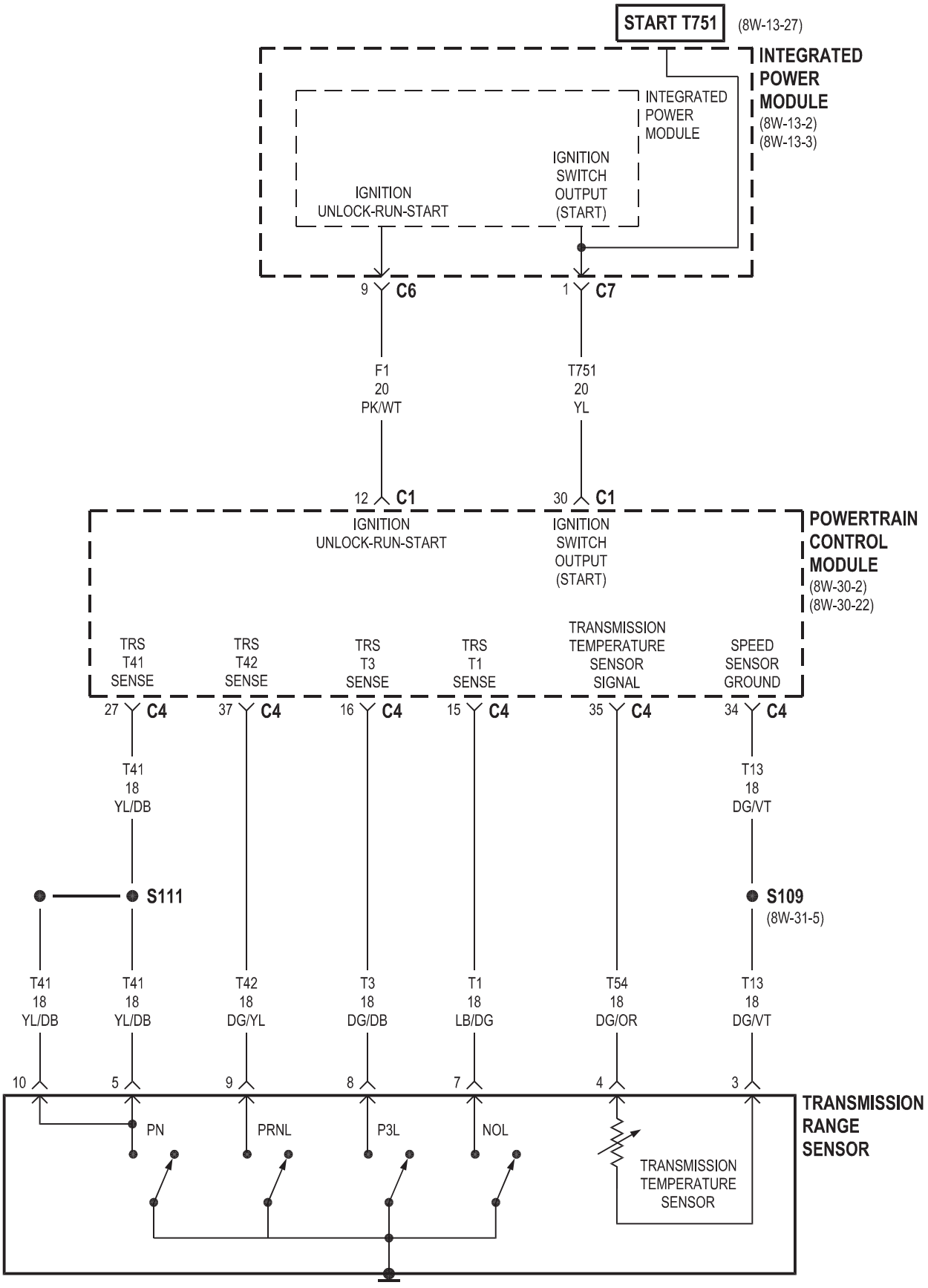

TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY
(8W-31-6)
(8W-31-7)
L/R PRESSURE SWITCH SENSE
2-4 PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
2-4 SOLENOID CONTROL
L/R SOLENOID CONTROL
UD SOLENOID CONTROL
OD SOLENOID CONTROL
2
1
3
8
7
5
6
T50 18 YL/TN
T47 18 YL/DG
T9 18 DG/TN
T19 18 DB/YL
T20 18 WT/DG
T59 18 YL/LB
T60 18 YL/GY
29 C4
30 C4
22 C4
6 C4
10 C4
2 C4
1 C4
POWERTRAIN CONTROL MODULE
TRS T41 SENSE
TRS T42 SENSE
TRS T3 SENSE
TRS T1 SENSE
TRANSMISSION TEMPERATURE SENSOR SIGNAL
SPEED SENSOR GROUND
27 C4
37 C4
16 C4
15 C4
35 C4
34 C4
T41 18 YL/DB
T13 18 DG/VT
S111
(8W-31-4)
S109
(8W-31-5)
T41 18 YL/DB
T41 18 YL/DB
T42 18 DG/YL
T3 18 DG/DB
T1 18 LB/DG
T54 18 DG/OR
T13 18 DG/VT
10
5
9
8
7
4
3
PN
PRNL
P3L
NOL
TRANSMISSION TEMPERATURE SENSOR
TRANSMISSION RANGE SENSOR
(8W-31-4)

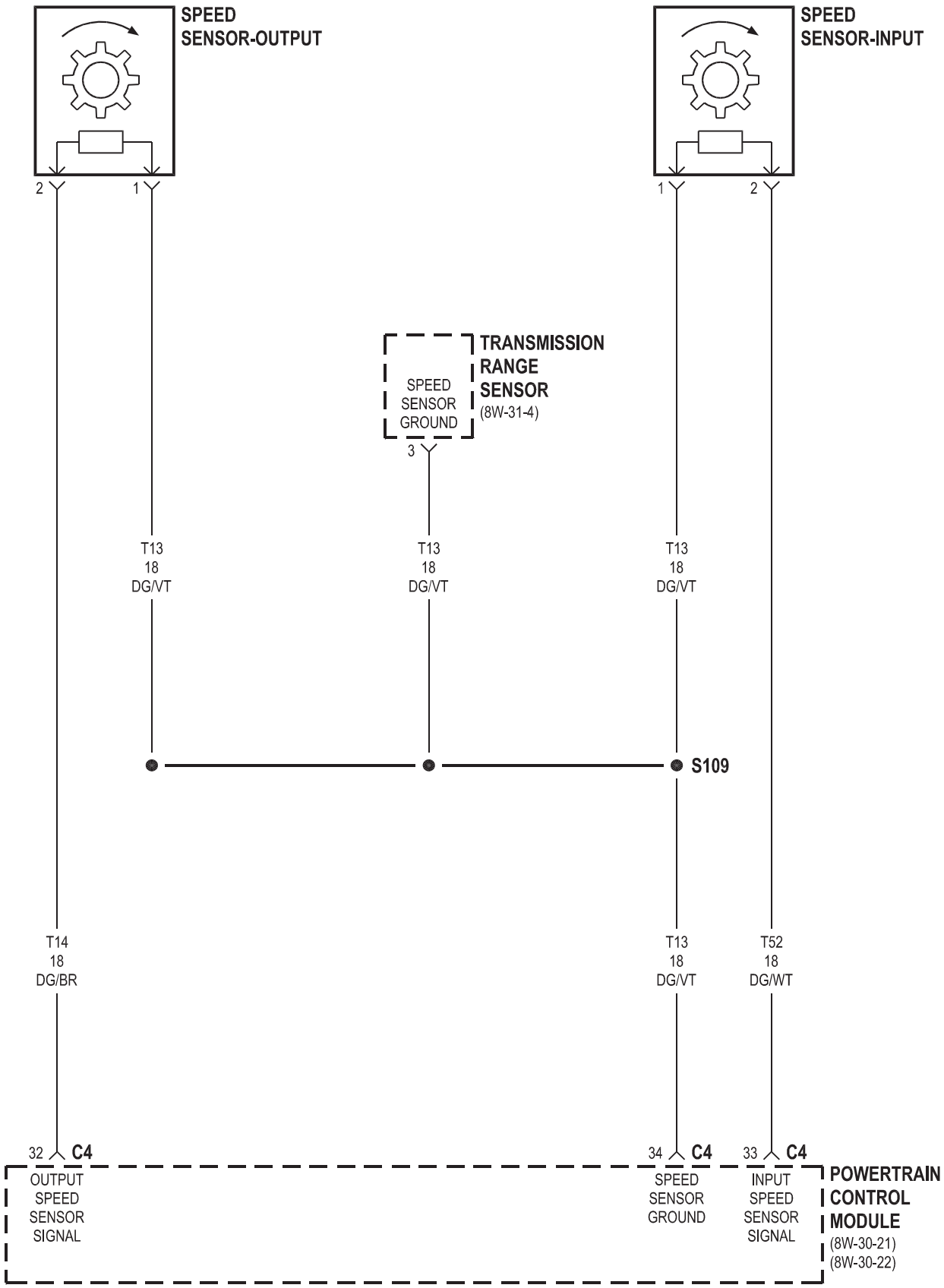
8W-31 TRANSMISSION CONTROL SYSTEM

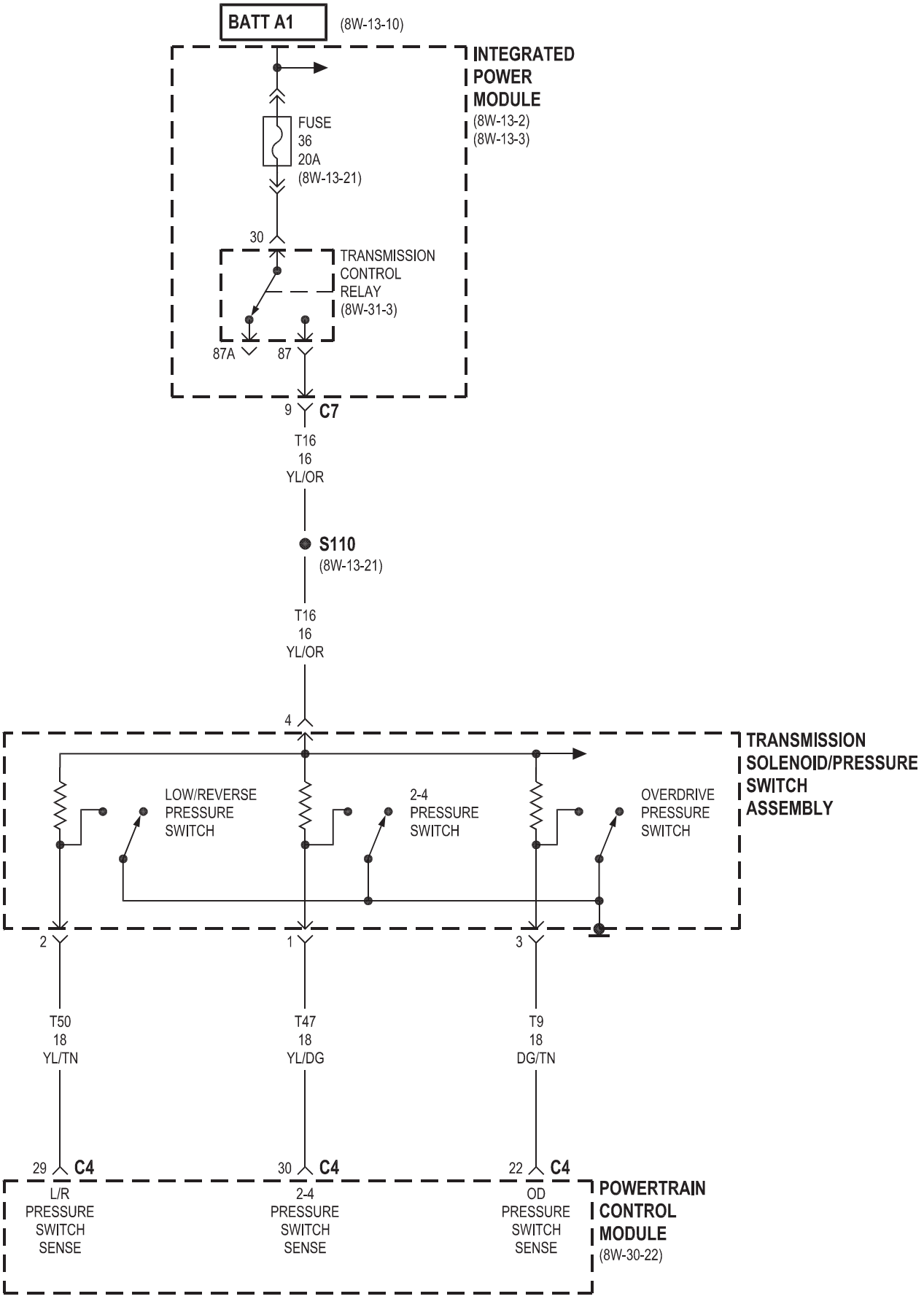
Component	Page
Battery	8W-31-3
Data Link Connector	8W-31-8
Fuse 30	8W-31-2
Fuse 36	8W-31-3, 6, 7
Fuse 39	8W-31-2
G101	8W-31-3
G102	8W-31-3
G201	8W-31-9
G202	8W-31-9
Ignition Switch	8W-31-2
Instrument Cluster	8W-31-9
Integrated Power Module	8W-31-2, 3, 4, 6, 7, 8, 9
Powertrain Control Module	8W-31-2, 3, 4, 5, 6, 7, 8, 9
Shift Lever Assembly	8W-31-9
Speed Sensor-Input	8W-31-5
Speed Sensor-Output	8W-31-5
Transmission Control Relay	8W-31-3, 6, 7
Transmission Range Sensor	8W-31-4, 5
Transmission Solenoid/Pressure Switch Assembly	8W-31-3, 6, 7

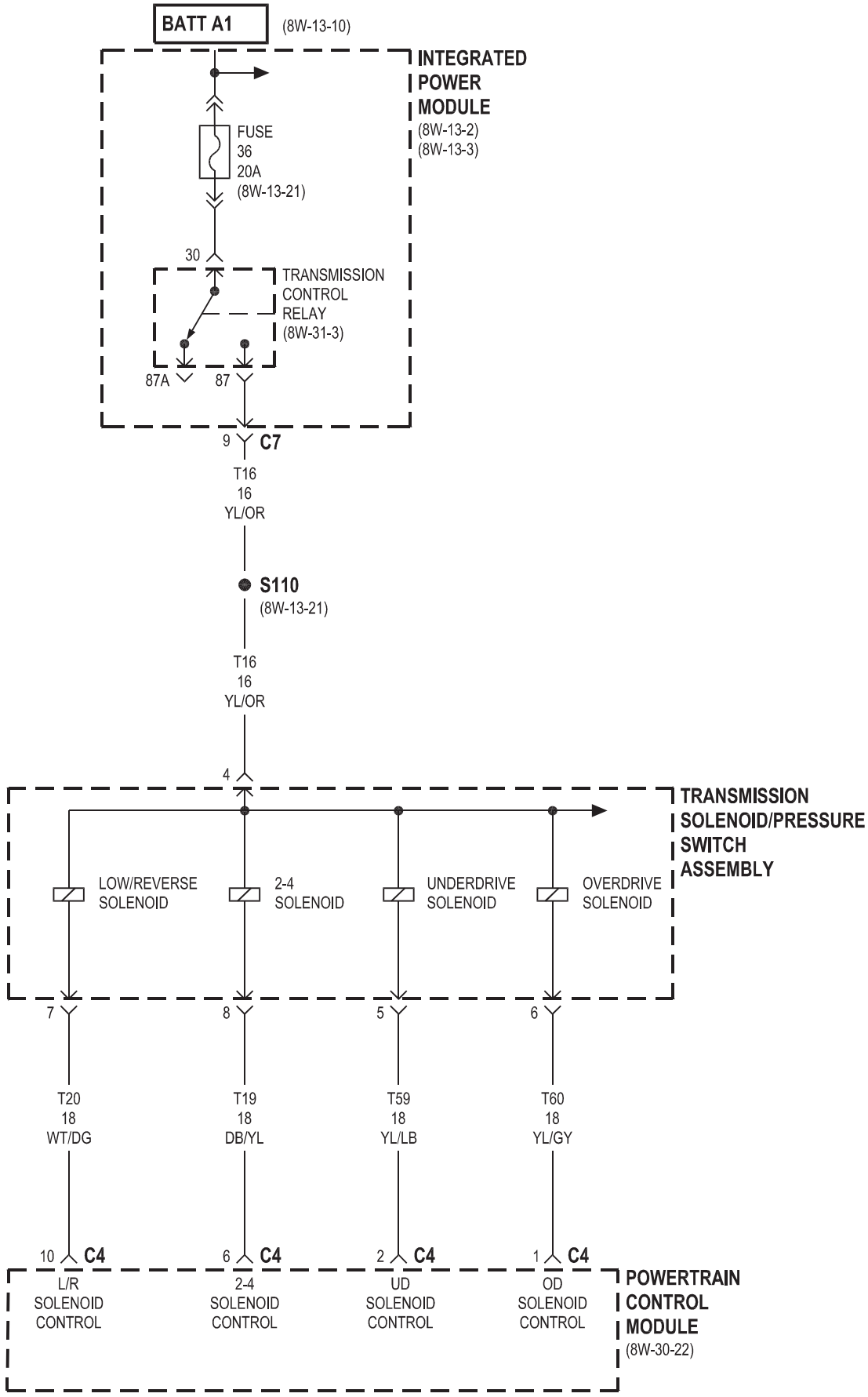

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 39 20A (8W-13-25)
FUSE 30 10A (8W-13-19)
B (+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
INTEGRATED POWER MODULE
R3
3 C1
2 C9
13 C9
2 C6
A109 18 OR/RD
A106 20 LB/RD
F20 20 PK/GY
F202 20 PK/GY
S307
(8W-13-27)
F20 20 PK/GY
59 C201
2
A106 20 LB/RD
F20 20 PK/GY
5
IGNITION SWITCH
0 LOCK/OFF
1 UNLOCK/ACC
2 RUN
3 START
(8W-13-27)
3
29 C1
FUSED B (+)
11 C1
FUSED IGNITION SWITCH OUTPUT (RUN-START)
POWERTRAIN CONTROL MODULE
(8W-30-2)

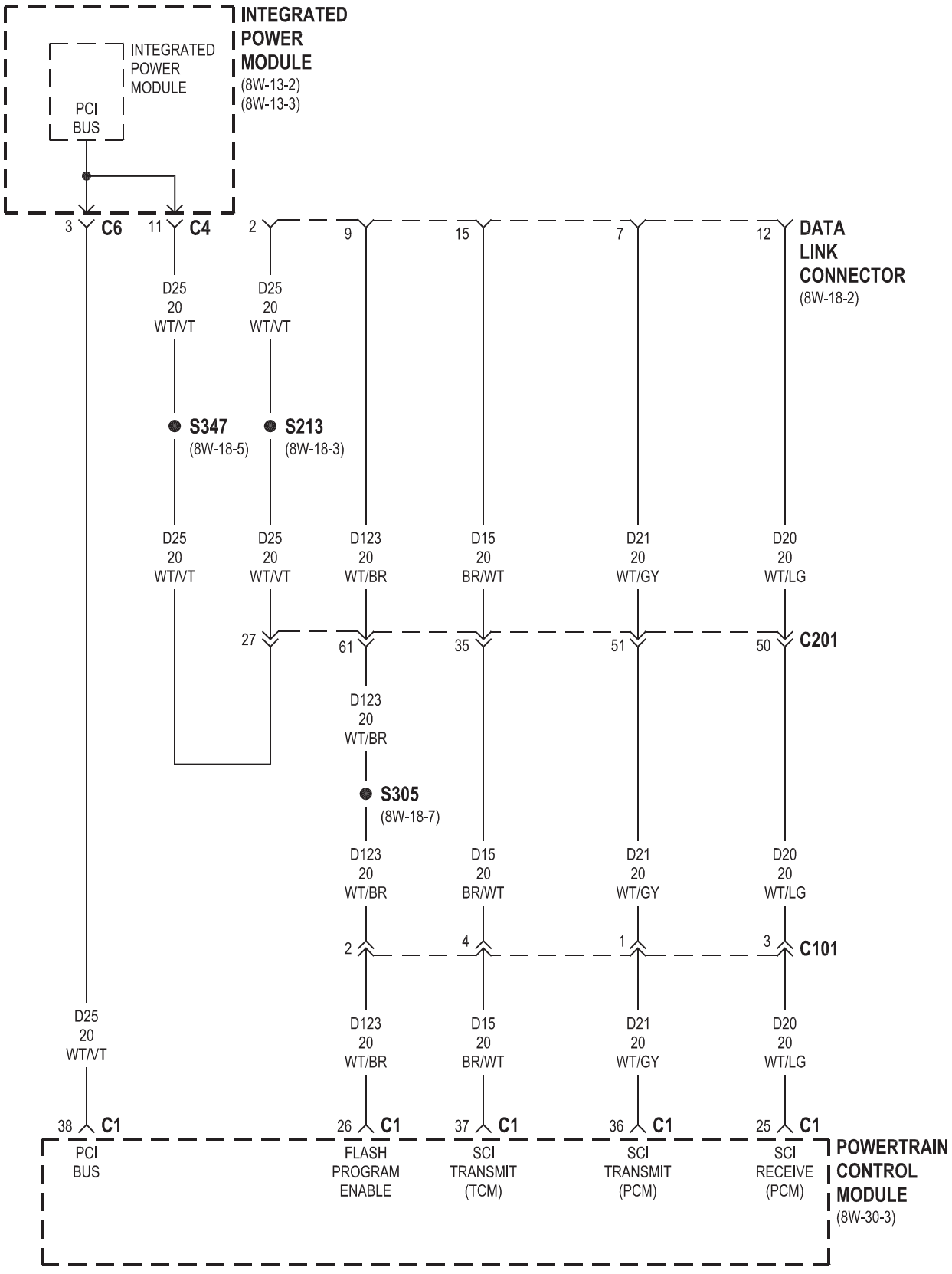

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE
36
20A
(8W-13-21)
30
85
TRANSMISSION CONTROL RELAY
87A
87
86
9 C7
8 C7
4 C7
TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY
(8W-31-6)
(8W-31-7)
TRANSMISSION CONTROL RELAY OUTPUT
4
Z115
18
BK/OR
S116
(8W-15-3)
T16
16
YL/OR
T16
16
YL/OR
Z3
10
BK
BATTERY
(8W-13-10)
S110
(8W-13-21)
Z1
4
BK
Z2
8
BK/WT
G101
(8W-15-2)
S114
(8W-15-2)
T16
16
YL/OR
T16
16
YL/OR
Z2
8
BK/WT
Z130
16
BK/BR
Z131
16
BK/DG
Z133
16
BK/LG
Z133
16
BK/LG
T15
20
YL/BR
G102
(8W-15-2)
28 C4
38 C4
9 C1
18 C1
13 C4
14 C4
18 C4
TRANSMISSION CONTROL RELAY OUTPUT
TRANSMISSION CONTROL RELAY OUTPUT
GROUND
GROUND
GROUND
GROUND
TRANSMISSION CONTROL RELAY CONTROL
POWERTRAIN CONTROL MODULE
(8W-30-21)

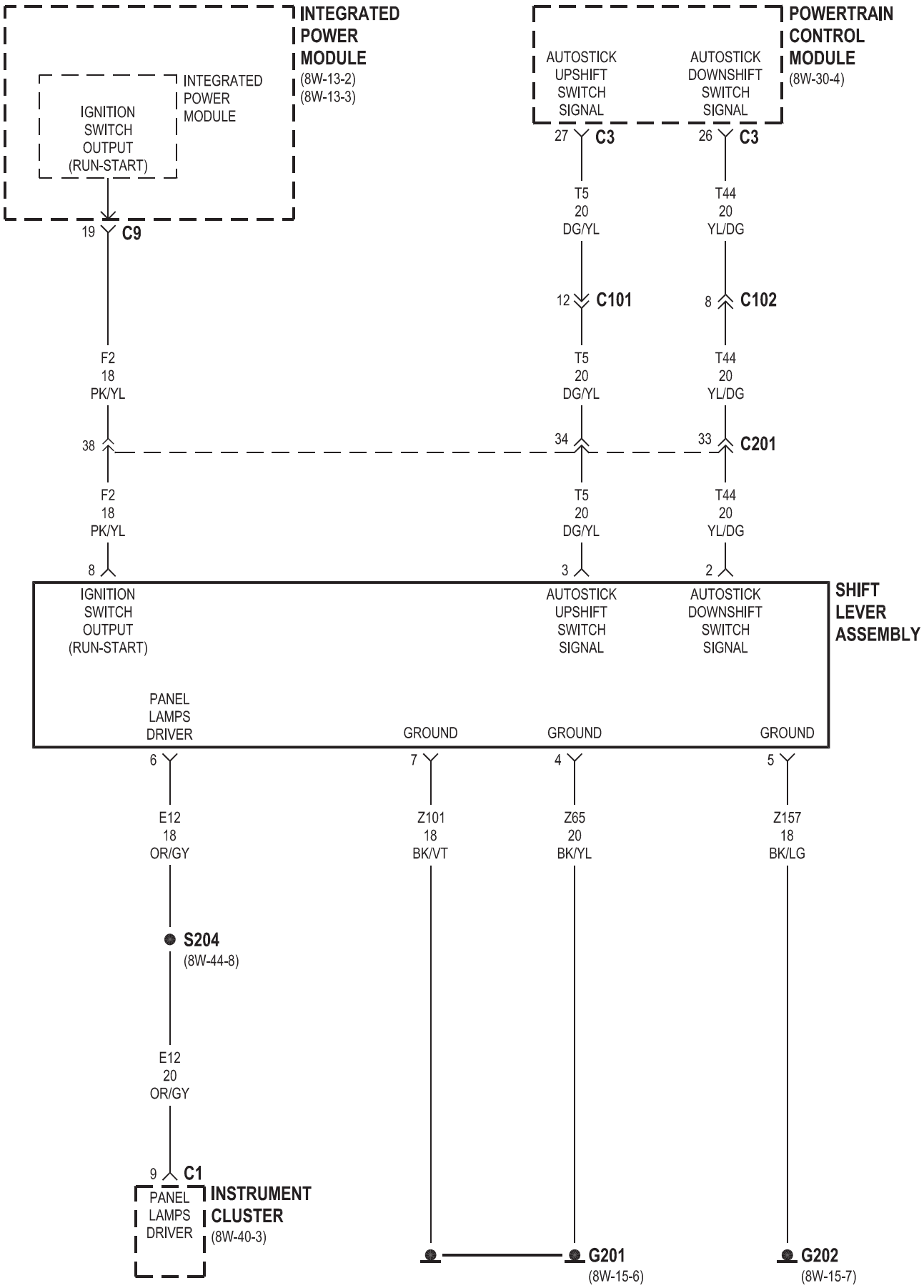

START T751
(8W-13-27)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
IGNITION UNLOCK-RUN-START
IGNITION SWITCH OUTPUT (START)
9 C6
1 C7
F1
20
PK/WT
T751
20
YL
12 C1
30 C1
IGNITION UNLOCK-RUN-START
IGNITION SWITCH OUTPUT (START)
POWERTRAIN CONTROL MODULE
(8W-30-2)
(8W-30-22)
TRS T41 SENSE
TRS T42 SENSE
TRS T3 SENSE
TRS T1 SENSE
TRANSMISSION TEMPERATURE SENSOR SIGNAL
SPEED SENSOR GROUND
27 C4
37 C4
16 C4
15 C4
35 C4
34 C4
T41
18
YL/DB
T13
18
DG/VT
S111
S109
(8W-31-5)
T41
18
YL/DB
T41
18
YL/DB
T42
18
DG/YL
T3
18
DG/DB
T1
18
LB/DG
T54
18
DG/OR
T13
18
DG/VT
10
5
9
8
7
4
3
PN
PRNL
P3L
NOL
TRANSMISSION TEMPERATURE SENSOR
TRANSMISSION RANGE SENSOR


SPEED
SENSOR-OUTPUT
SPEED
SENSOR-INPUT
2
1
1
2
TRANSMISSION
RANGE
SENSOR
(8W-31-4)
SPEED
SENSOR
GROUND
3
T13
18
DG/VT
T13
18
DG/VT
T13
18
DG/VT
S109
T14
18
DG/BR
T13
18
DG/VT
T52
18
DG/WT
32 C4
34 C4
33 C4
OUTPUT
SPEED
SENSOR
SIGNAL
SPEED
SENSOR
GROUND
INPUT
SPEED
SENSOR
SIGNAL
POWERTRAIN
CONTROL
MODULE
(8W-30-21)
(8W-30-22)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE
36
20A
(8W-13-21)
30
TRANSMISSION CONTROL RELAY
(8W-31-3)
87A
87
9
C7
T16
16
YL/OR
S110
(8W-13-21)
T16
16
YL/OR
4
TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY
LOW/REVERSE PRESSURE SWITCH
2-4 PRESSURE SWITCH
OVERDRIVE PRESSURE SWITCH
2
1
3
T50
18
YL/TN
T47
18
YL/DG
T9
18
DG/TN
29
C4
30
C4
22
C4
L/R PRESSURE SWITCH SENSE
2-4 PRESSURE SWITCH SENSE
OD PRESSURE SWITCH SENSE
POWERTRAIN CONTROL MODULE
(8W-30-22)

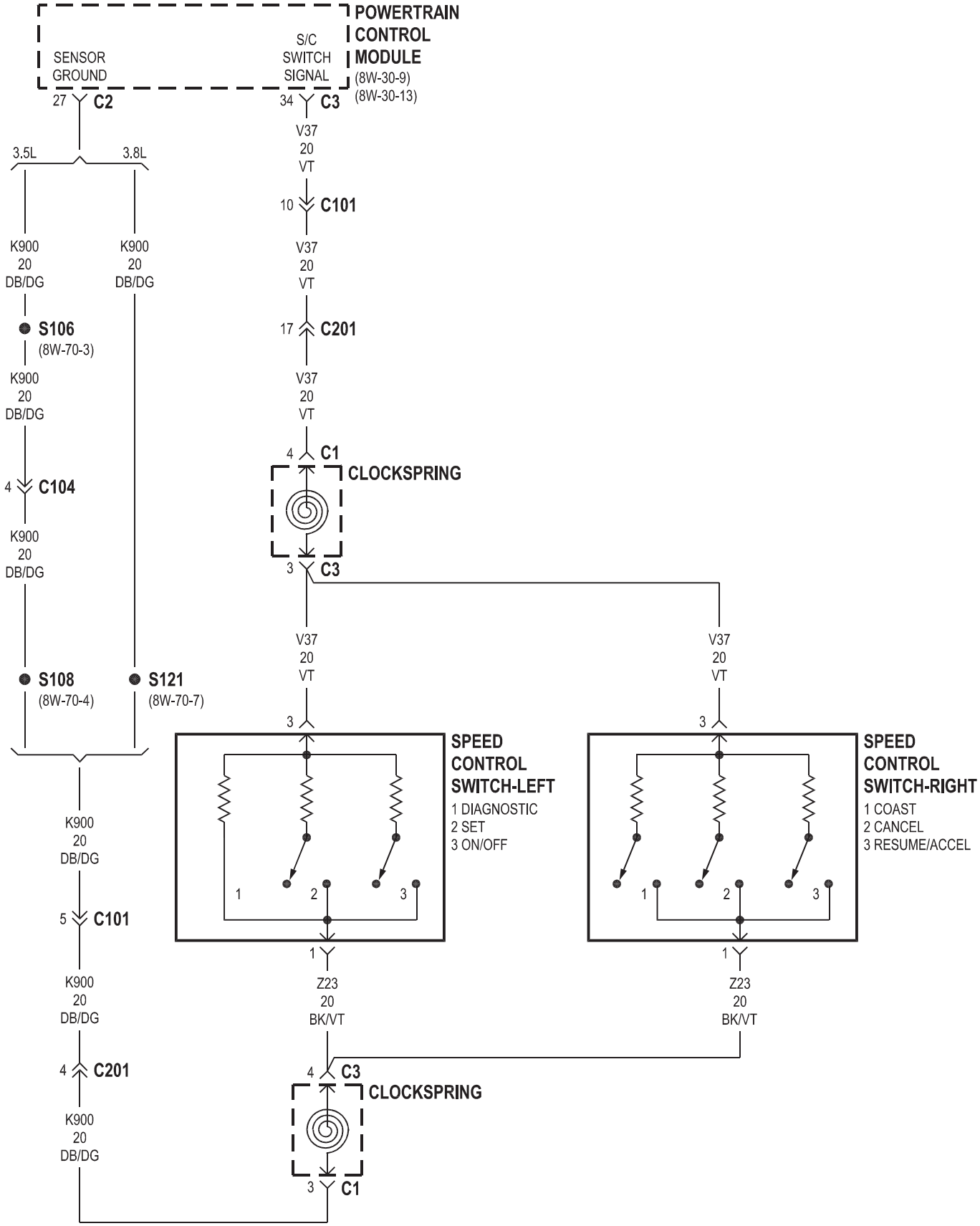

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 36 20A
(8W-13-21)
30
TRANSMISSION CONTROL RELAY
(8W-31-3)
87A
87
9
C7
T16 16 YL/OR
S110
(8W-13-21)
T16 16 YL/OR
4
TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY
LOW/REVERSE SOLENOID
2-4 SOLENOID
UNDERDRIVE SOLENOID
OVERDRIVE SOLENOID
7
8
5
6
T20 18 WT/DG
T19 18 DB/YL
T59 18 YL/LB
T60 18 YL/GY
10 C4
6 C4
2 C4
1 C4
L/R SOLENOID CONTROL
2-4 SOLENOID CONTROL
UD SOLENOID CONTROL
OD SOLENOID CONTROL
POWERTRAIN CONTROL MODULE
(8W-30-22)

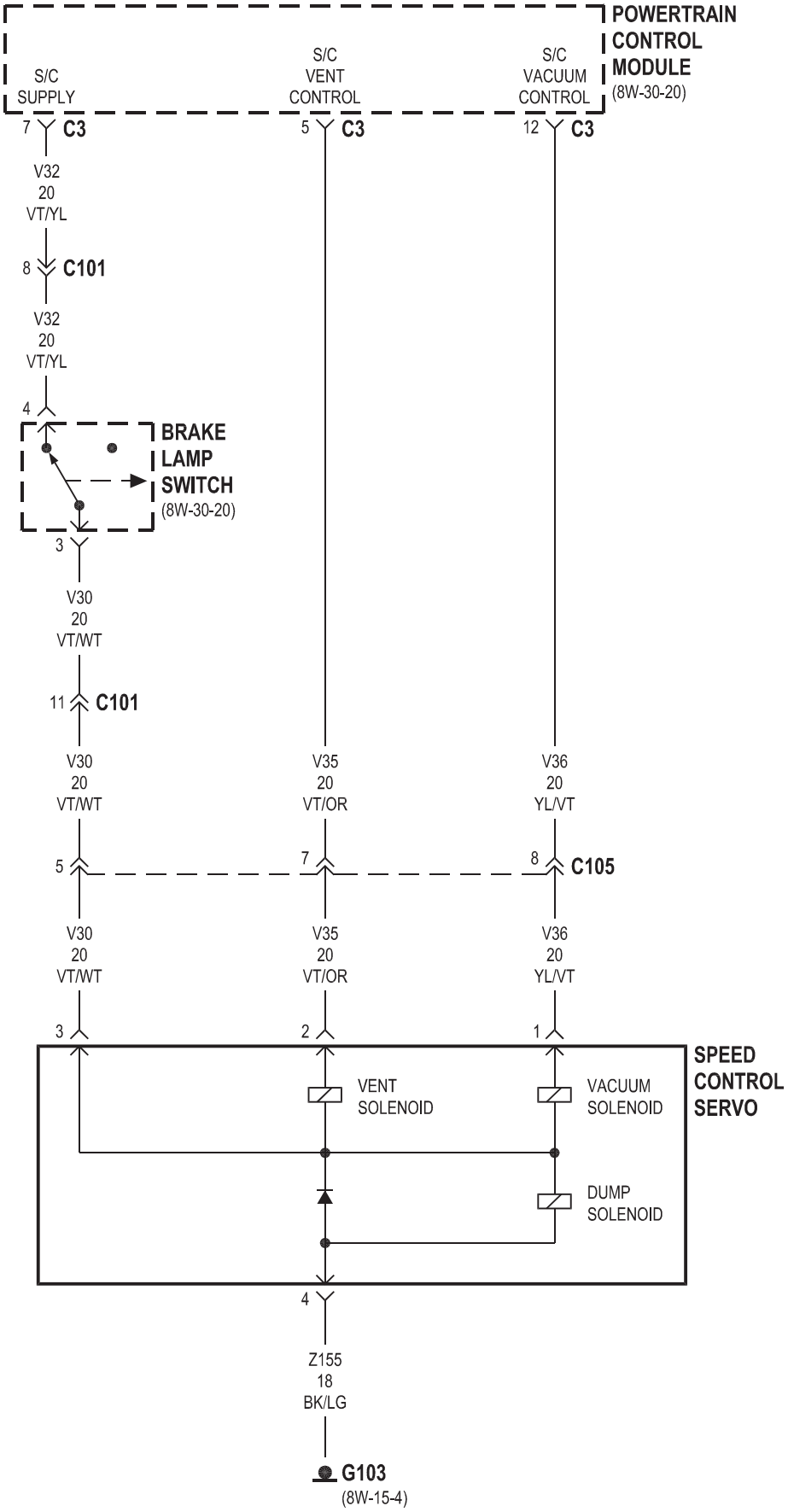

INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
PCI BUS
3 C6
11 C4
2
9
15
7
12
DATA LINK CONNECTOR
(8W-18-2)
D25 20 WT/VT
D25 20 WT/VT
S347
(8W-18-5)
S213
(8W-18-3)
D25 20 WT/VT
D25 20 WT/VT
D123 20 WT/BR
D15 20 BR/WT
D21 20 WT/GY
D20 20 WT/LG
27
61
35
51
50 C201
D123 20 WT/BR
S305
(8W-18-7)
D123 20 WT/BR
D15 20 BR/WT
D21 20 WT/GY
D20 20 WT/LG
2
4
1
3 C101
D25 20 WT/VT
D123 20 WT/BR
D15 20 BR/WT
D21 20 WT/GY
D20 20 WT/LG
38 C1
26 C1
37 C1
36 C1
25 C1
PCI BUS
FLASH PROGRAM ENABLE
SCI TRANSMIT (TCM)
SCI TRANSMIT (PCM)
SCI RECEIVE (PCM)
POWERTRAIN CONTROL MODULE
(8W-30-3)

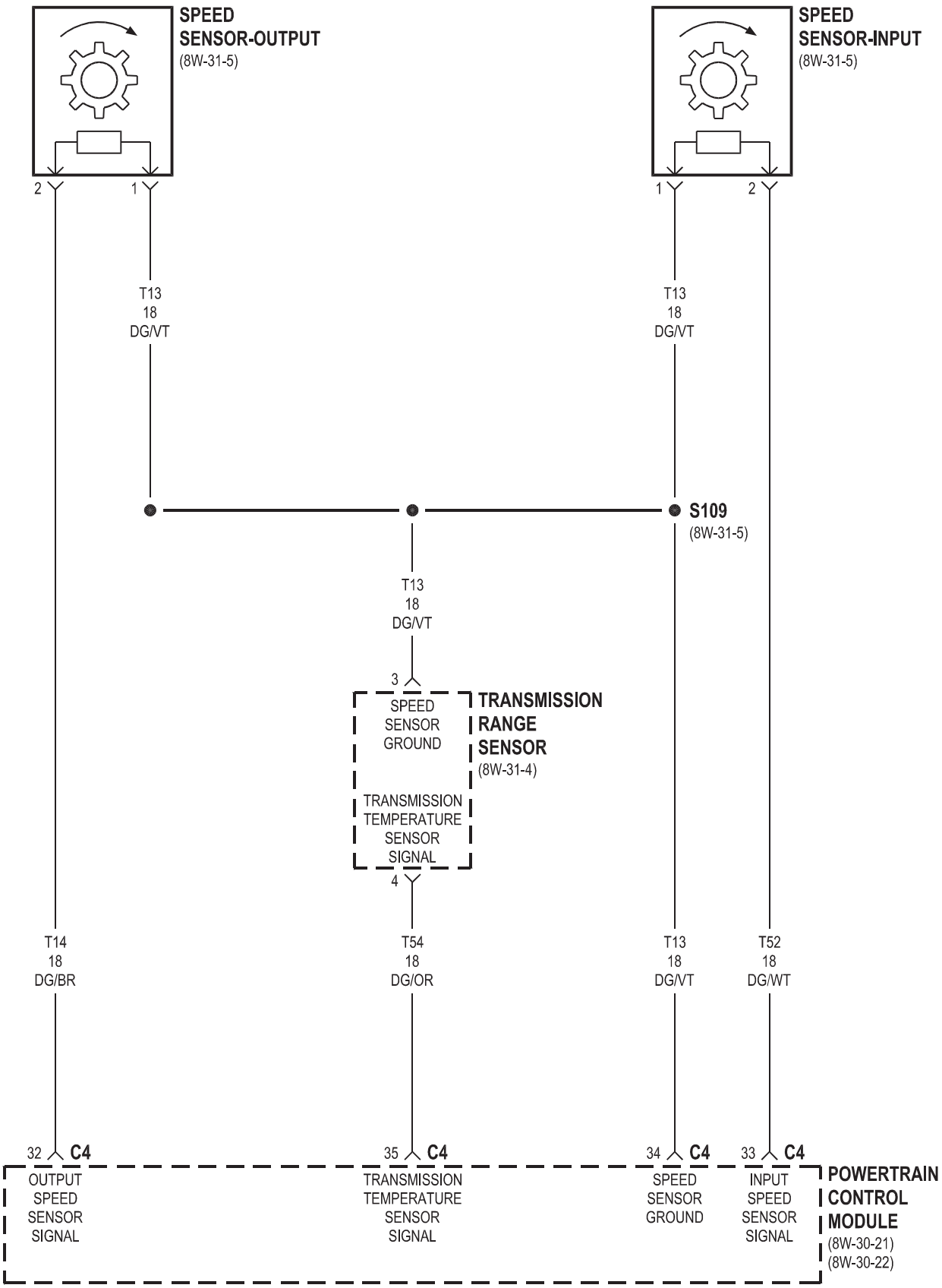

INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
IGNITION SWITCH OUTPUT (RUN-START)
19 C9
POWERTRAIN CONTROL MODULE
(8W-30-4)
AUTOSTICK UPSHIFT SWITCH SIGNAL
AUTOSTICK DOWNSHIFT SWITCH SIGNAL
27 C3
26 C3
T5 20 DG/YL
T44 20 YL/DG
12 C101
8 C102
F2 18 PK/YL
38
34
33 C201
8
3
2
SHIFT LEVER ASSEMBLY
IGNITION SWITCH OUTPUT (RUN-START)
AUTOSTICK UPSHIFT SWITCH SIGNAL
AUTOSTICK DOWNSHIFT SWITCH SIGNAL
PANEL LAMPS DRIVER
GROUND
GROUND
GROUND
6
7
4
5
E12 18 OR/GY
Z101 18 BK/VT
Z65 20 BK/YL
Z157 18 BK/LG
S204
(8W-44-8)
E12 20 OR/GY
9 C1
INSTRUMENT CLUSTER
(8W-40-3)
PANEL LAMPS DRIVER
G201
(8W-15-6)
G202
(8W-15-7)

8W-33 VEHICLE SPEED CONTROL

Component	Page
Brake Lamp Switch	8W-33-3
Clockspring	8W-33-2
G103	8W-33-3
Powertrain Control Module	8W-33-2, 3, 4
Speed Control Servo	8W-33-3
Speed Control Switch-Left	8W-33-2
Speed Control Switch-Right	8W-33-2
Speed Sensor-Input	8W-33-4
Speed Sensor-Output	8W-33-4
Transmission Range Sensor	8W-33-4

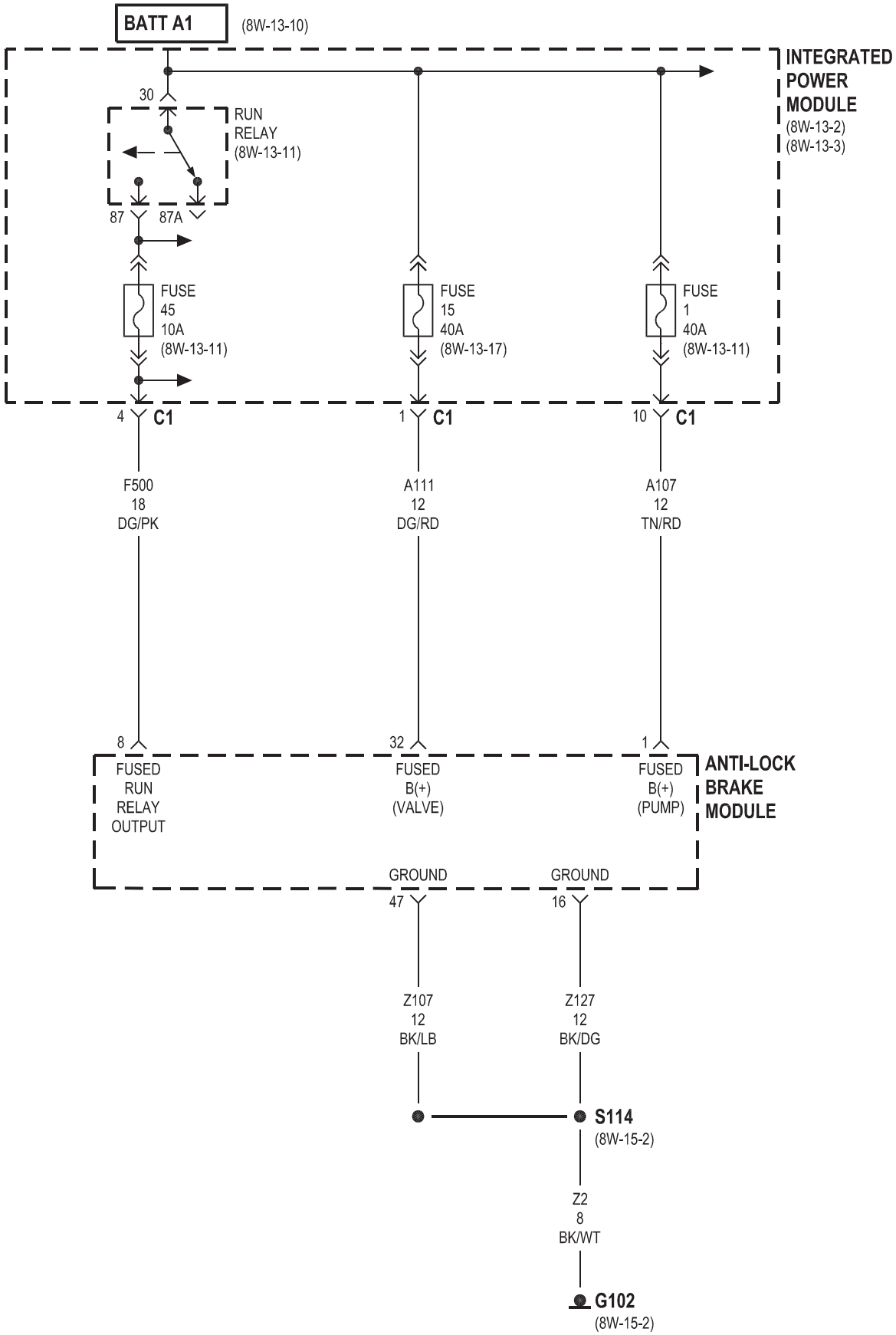

POWERTRAIN CONTROL MODULE
(8W-30-9)
(8W-30-13)
SENSOR GROUND
S/C SWITCH SIGNAL
27 C2
34 C3
3.5L
3.8L
K900 20 DB/DG
S106
(8W-70-3)
K900 20 DB/DG
4 C104
K900 20 DB/DG
S108
(8W-70-4)
S121
(8W-70-7)
K900 20 DB/DG
5 C101
K900 20 DB/DG
4 C201
K900 20 DB/DG
V37 20 VT
10 C101
V37 20 VT
17 C201
V37 20 VT
4 C1
CLOCKSPRING
3 C3
V37 20 VT
3
SPEED CONTROL SWITCH-LEFT
1 DIAGNOSTIC
2 SET
3 ON/OFF
1 2 3
1
Z23 20 BK/VT
V37 20 VT
3
SPEED CONTROL SWITCH-RIGHT
1 COAST
2 CANCEL
3 RESUME/ACCEL
1 2 3
1
Z23 20 BK/VT
4 C3
CLOCKSPRING
3 C1

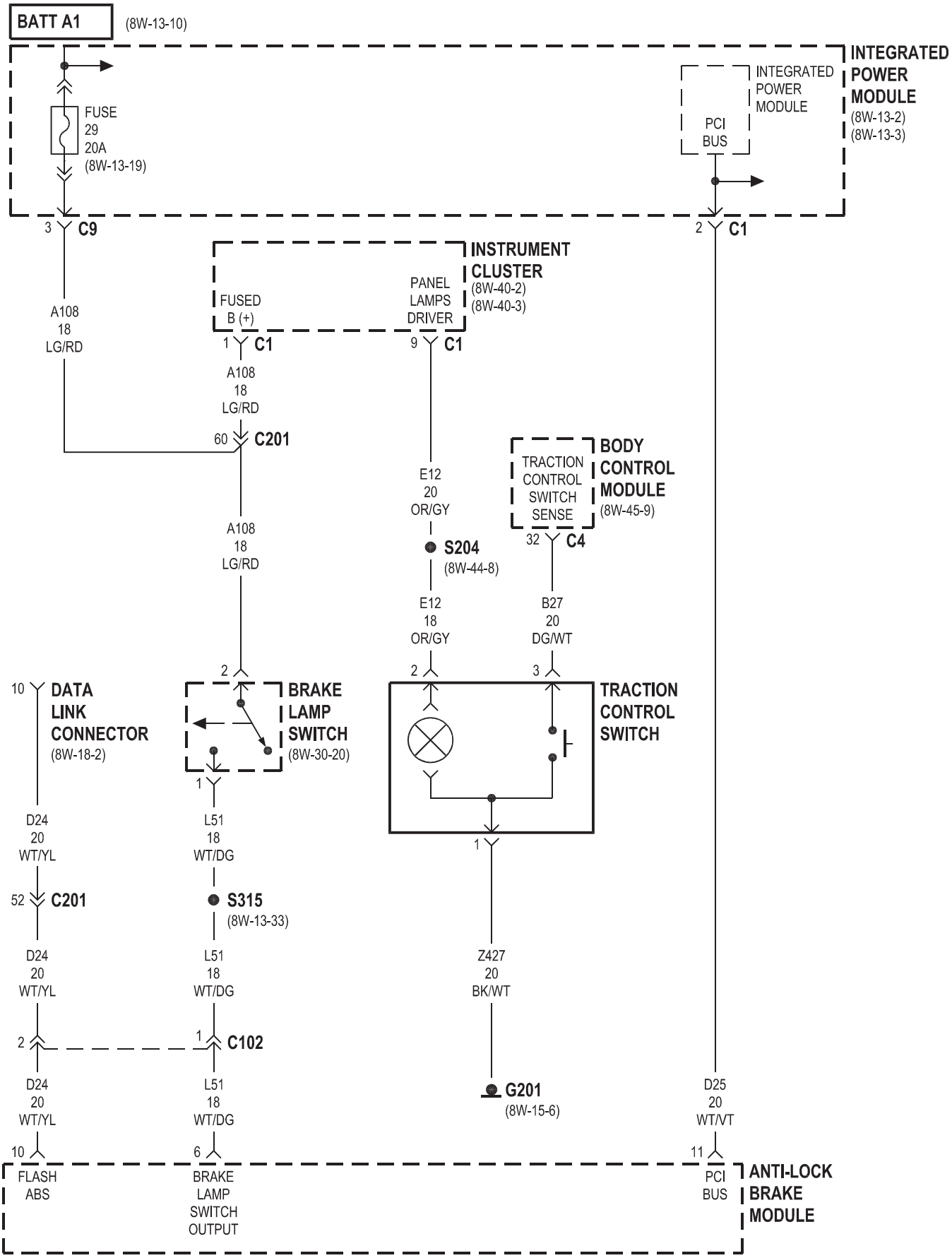

POWERTRAIN CONTROL MODULE
(8W-30-20)
S/C SUPPLY
S/C VENT CONTROL
S/C VACUUM CONTROL
7 C3
5 C3
12 C3
V32 20 VT/YL
8 C101
V32 20 VT/YL
4
BRAKE LAMP SWITCH
(8W-30-20)
3
V30 20 VT/WT
11 C101
V30 20 VT/WT
V35 20 VT/OR
V36 20 YL/VT
5
7
8 C105
V30 20 VT/WT
V35 20 VT/OR
V36 20 YL/VT
3
2
1
SPEED CONTROL SERVO
VENT SOLENOID
VACUUM SOLENOID
DUMP SOLENOID
4
Z155 18 BK/LG
G103
(8W-15-4)

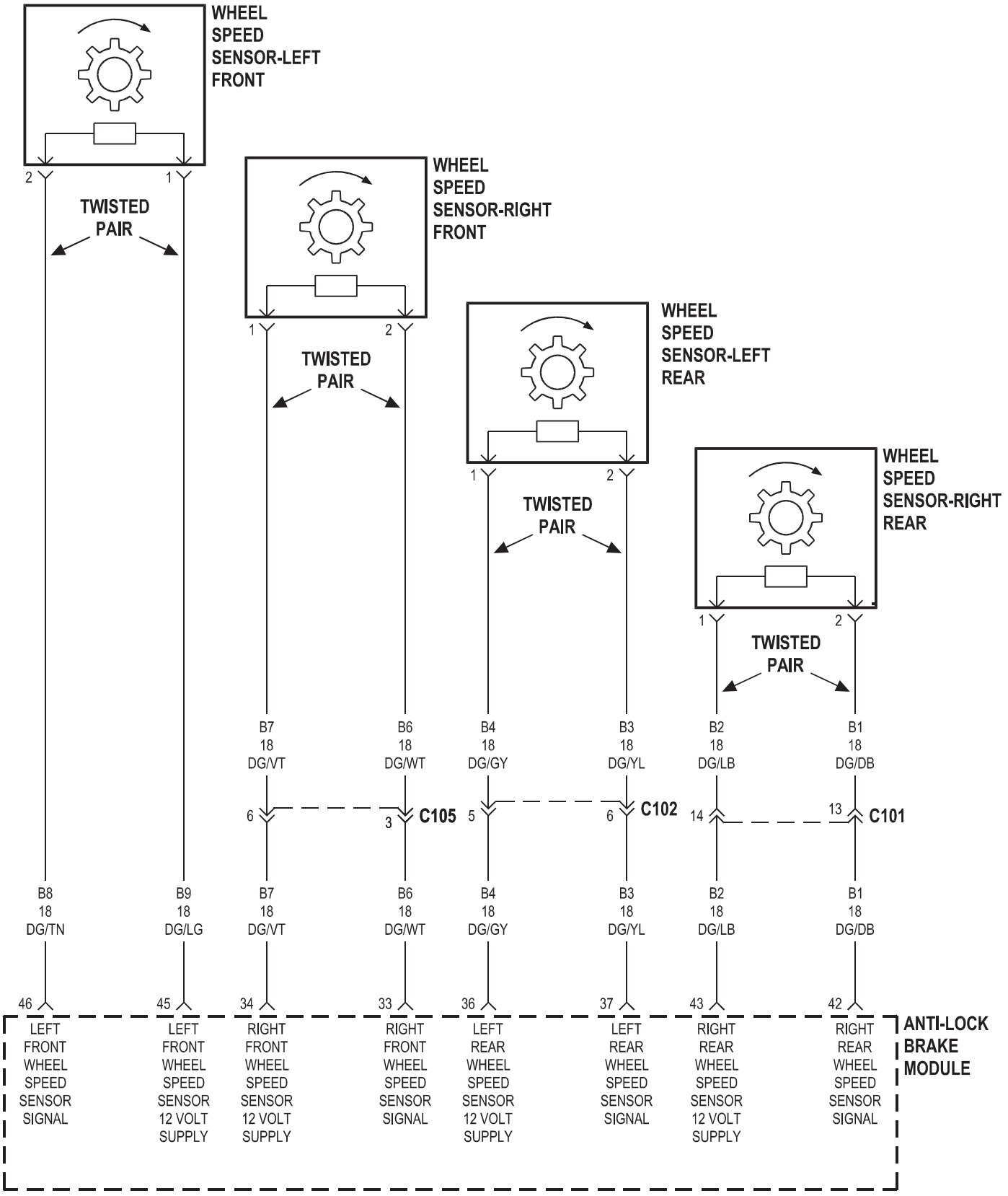

SPEED
SENSOR-OUTPUT
(8W-31-5)
SPEED
SENSOR-INPUT
(8W-31-5)
2
1
1
2
T13
18
DG/VT
T13
18
DG/VT
S109
(8W-31-5)
T13
18
DG/VT
3
SPEED
SENSOR
GROUND
TRANSMISSION
TEMPERATURE
SENSOR
SIGNAL
TRANSMISSION
RANGE
SENSOR
(8W-31-4)
4
T14
18
DG/BR
T54
18
DG/OR
T13
18
DG/VT
T52
18
DG/WT
32 C4
35 C4
34 C4
33 C4
OUTPUT
SPEED
SENSOR
SIGNAL
TRANSMISSION
TEMPERATURE
SENSOR
SIGNAL
SPEED
SENSOR
GROUND
INPUT
SPEED
SENSOR
SIGNAL
POWERTRAIN
CONTROL
MODULE
(8W-30-21)
(8W-30-22)

8W-35 ANTILOCK BRAKES

Component	Page
Anti-Lock Brake Module	8W-35-2, 3, 4
Body Control Module	8W-35-3
Brake Lamp Switch	8W-35-3
Data Link Connector	8W-35-3
Fuse 1	8W-35-2
Fuse 15	8W-35-2
Fuse 29	8W-35-3
Fuse 45	8W-35-2
G102	8W-35-2
G201	8W-35-3
Instrument Cluster	8W-35-3
Integrated Power Module	8W-35-2, 3
Run Relay	8W-35-2
Traction Control Switch	8W-35-3
Wheel Speed Sensor-Left Front	8W-35-4
Wheel Speed Sensor-Left Rear	8W-35-4
Wheel Speed Sensor-Right Front	8W-35-4
Wheel Speed Sensor-Right Rear	8W-35-4

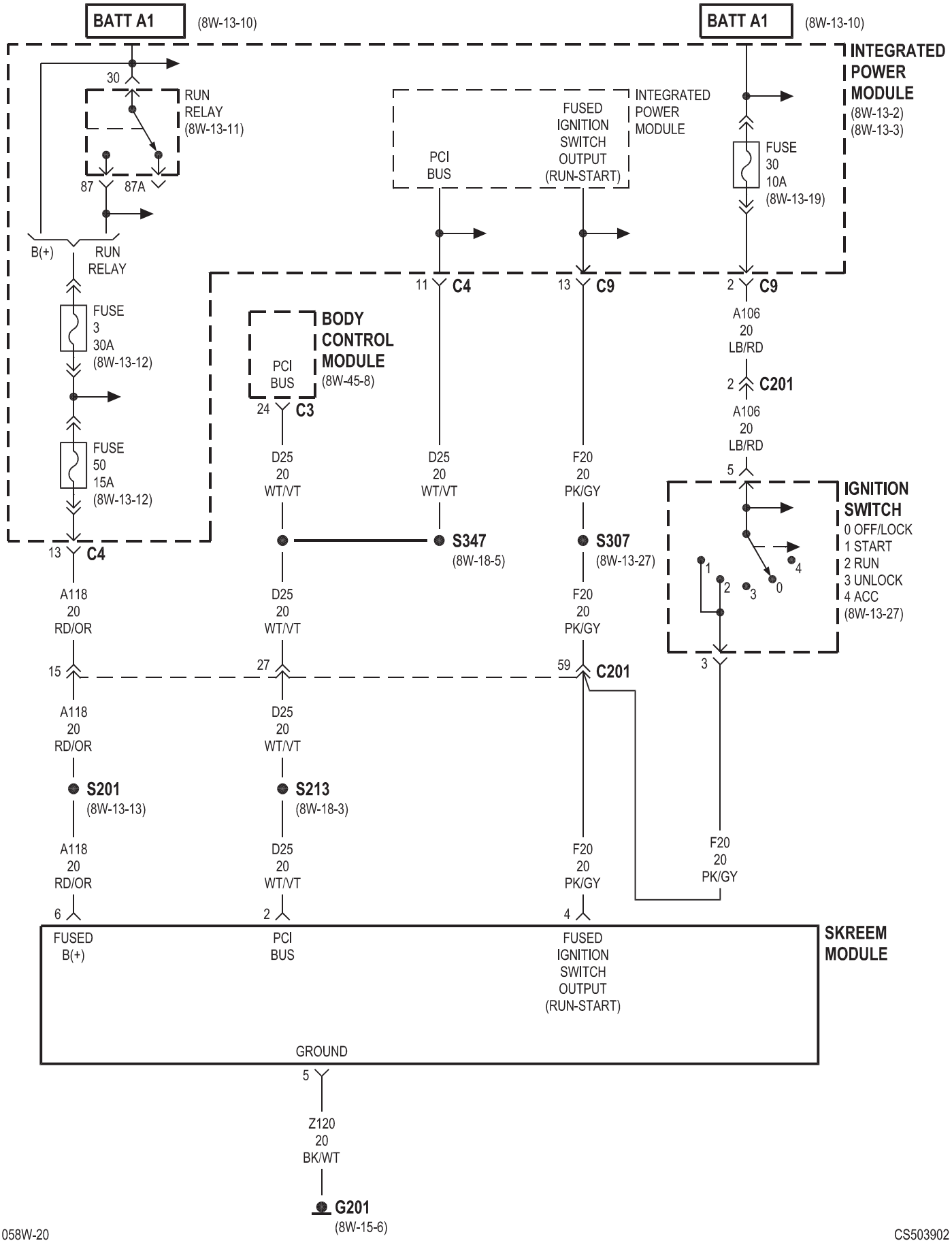

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
FUSE 45 10A
(8W-13-11)
FUSE 15 40A
(8W-13-17)
FUSE 1 40A
(8W-13-11)
4 C1
1 C1
10 C1
F500 18 DG/PK
A111 12 DG/RD
A107 12 TN/RD
8
32
1
FUSED RUN RELAY OUTPUT
FUSED B(+) (VALVE)
FUSED B(+) (PUMP)
ANTI-LOCK BRAKE MODULE
GROUND
47
GROUND
16
Z107 12 BK/LB
Z127 12 BK/DG
S114
(8W-15-2)
Z2 8 BK/WT
G102
(8W-15-2)

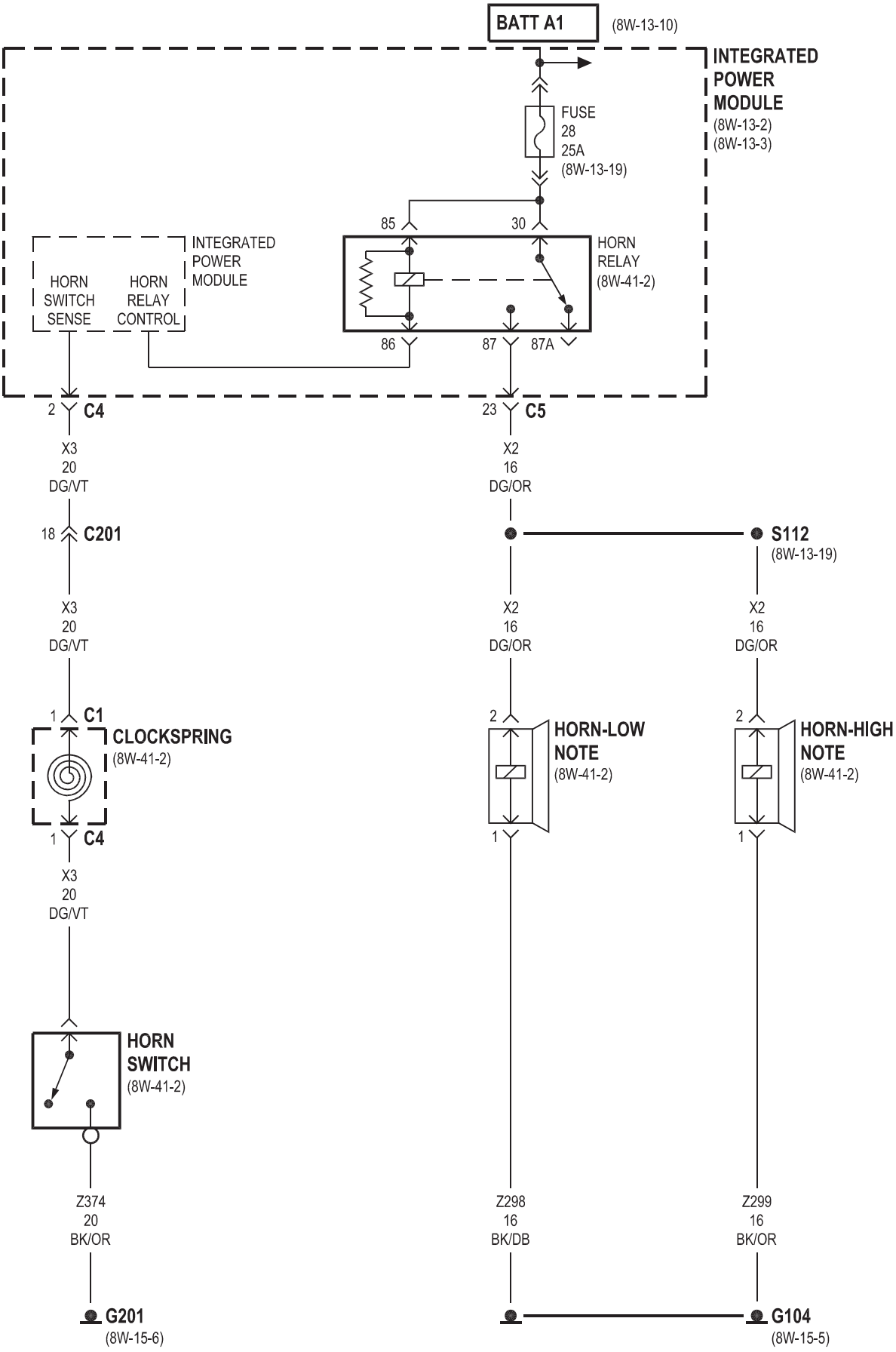

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
PCI BUS
FUSE 29 20A
(8W-13-19)
3 C9
2 C1
A108 18 LG/RD
INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-3)
FUSED B (+)
PANEL LAMPS DRIVER
1 C1
9 C1
A108 18 LG/RD
60 C201
A108 18 LG/RD
E12 20 OR/GY
S204
(8W-44-8)
BODY CONTROL MODULE
(8W-45-9)
TRACTION CONTROL SWITCH SENSE
32 C4
E12 18 OR/GY
B27 20 DG/WT
2
2
3
10 DATA LINK CONNECTOR
(8W-18-2)
BRAKE LAMP SWITCH
(8W-30-20)
TRACTION CONTROL SWITCH
1
1
D24 20 WT/YL
L51 18 WT/DG
52 C201
S315
(8W-13-33)
Z427 20 BK/WT
D24 20 WT/YL
L51 18 WT/DG
2
1 C102
D24 20 WT/YL
L51 18 WT/DG
G201
(8W-15-6)
D25 20 WT/VT
10
6
11
FLASH ABS
BRAKE LAMP SWITCH OUTPUT
PCI BUS
ANTI-LOCK BRAKE MODULE

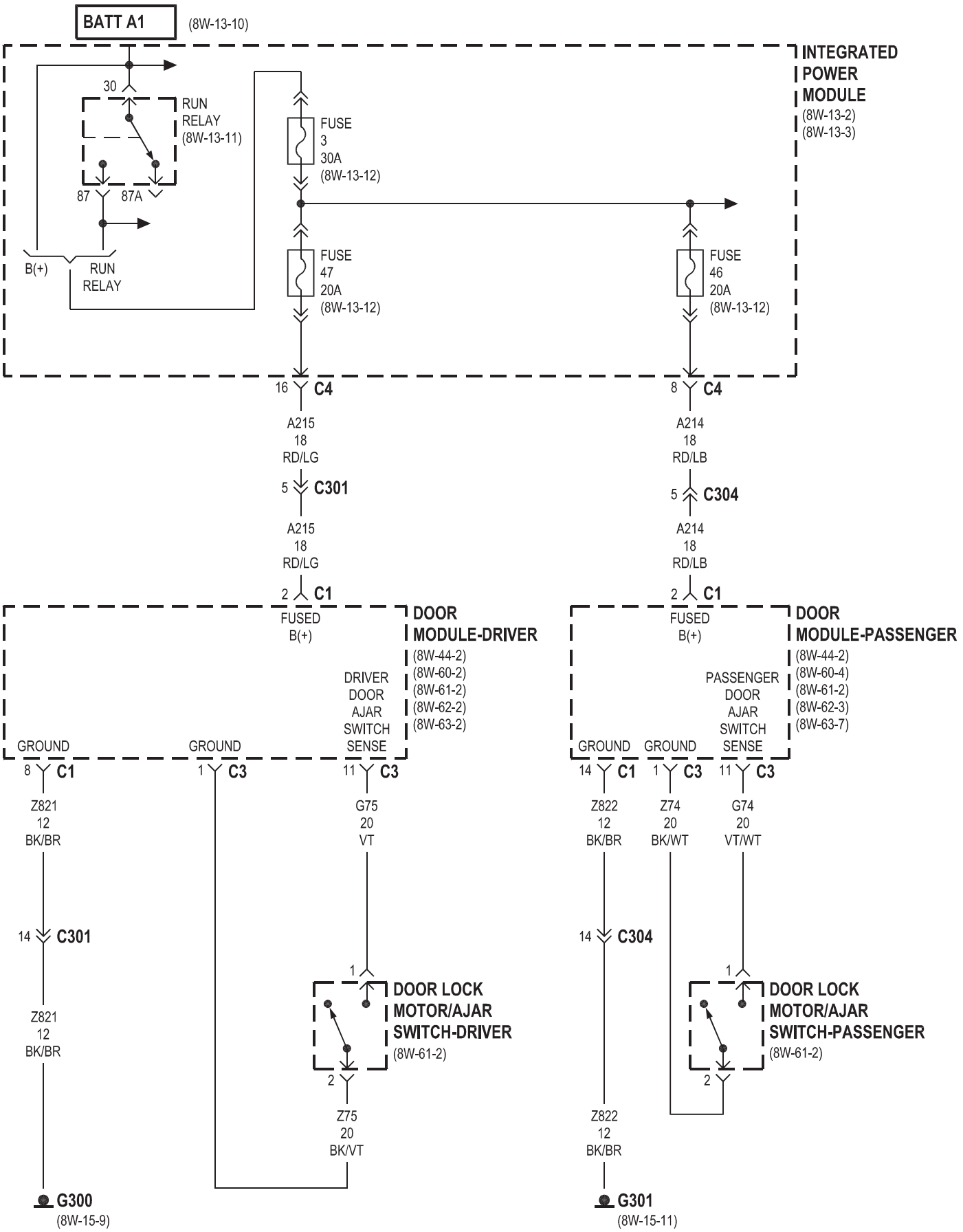

WHEEL SPEED SENSOR-LEFT FRONT
WHEEL SPEED SENSOR-RIGHT FRONT
WHEEL SPEED SENSOR-LEFT REAR
WHEEL SPEED SENSOR-RIGHT REAR
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
2
1
1
2
1
2
1
2
B7 18 DG/VT
B6 18 DG/WT
B4 18 DG/GY
B3 18 DG/YL
B2 18 DG/LB
B1 18 DG/DB
6
3
C105
5
6
C102
14
13
C101
B8 18 DG/TN
B9 18 DG/LG
B7 18 DG/VT
B6 18 DG/WT
B4 18 DG/GY
B3 18 DG/YL
B2 18 DG/LB
B1 18 DG/DB
46
45
34
33
36
37
43
42
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
ANTI-LOCK BRAKE MODULE

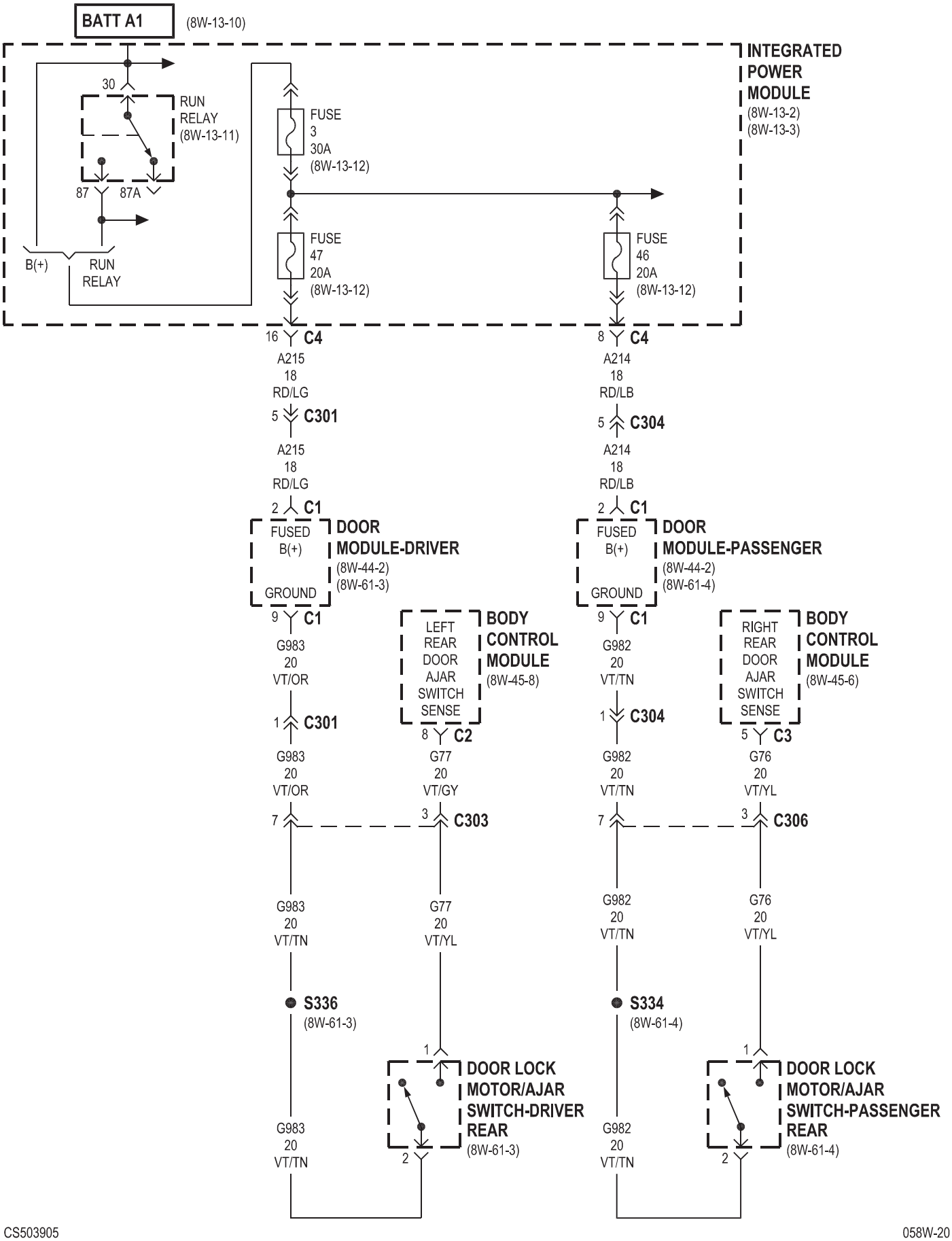
8W-39 VEHICLE THEFT SECURITY SYSTEM

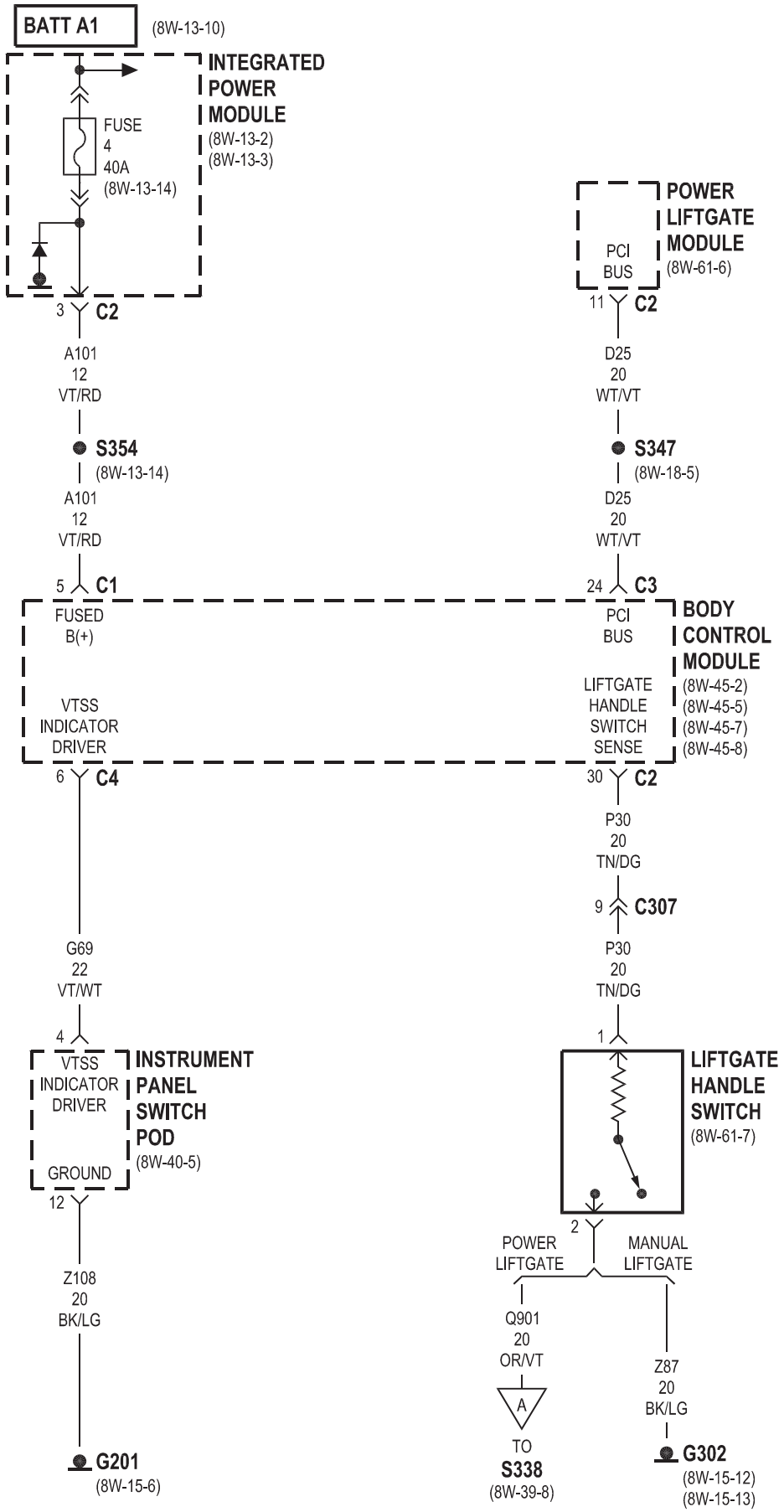
Component	Page
Clockspring	8W-39-3
Door Lock Motor/Ajar Switch-Driver	8W-39-4
Door Lock Motor/Ajar Switch-Driver Rear	8W-39-5
Door Lock Motor/Ajar Switch-Passenger	8W-39-4
Door Lock Motor/Ajar Switch-Passenger Rear	8W-39-5
Door Module-Driver	8W-39-4, 5
Door Module-Passenger	8W-39-4, 5
Fuse 11	8W-39-8
Fuse 28	8W-39-3
Fuse 3	8W-39-2, 4, 5
Fuse 30	8W-39-2
Fuse 4	8W-39-6, 7
Fuse 46	8W-39-4, 5
Fuse 47	8W-39-4, 5
Fuse 50	8W-39-2
G104	8W-39-3
G201	8W-39-2, 3, 6
G300	8W-39-4
G301	8W-39-4
G302	8W-39-6, 7
Horn Relay	8W-39-3
Horn Switch	8W-39-3
Horn-High Note	8W-39-3
Horn-Low Note	8W-39-3
Ignition Switch	8W-39-2
Instrument Panel Switch Pod	8W-39-6
Integrated Power Module	8W-39-2, 3, 4, 5, 6, 7, 8
Liftgate Cinch/Release Motor	8W-39-7, 8
Liftgate Handle Switch	8W-39-6, 7, 8
Liftgate Pinch Sensor-Left	8W-39-8
Liftgate Pinch Sensor-Right	8W-39-8
Power Liftgate Drive Unit	8W-39-8
Power Liftgate Module	8W-39-6, 8
Run Relay	8W-39-2, 4, 5
SKREEM Module	8W-39-2

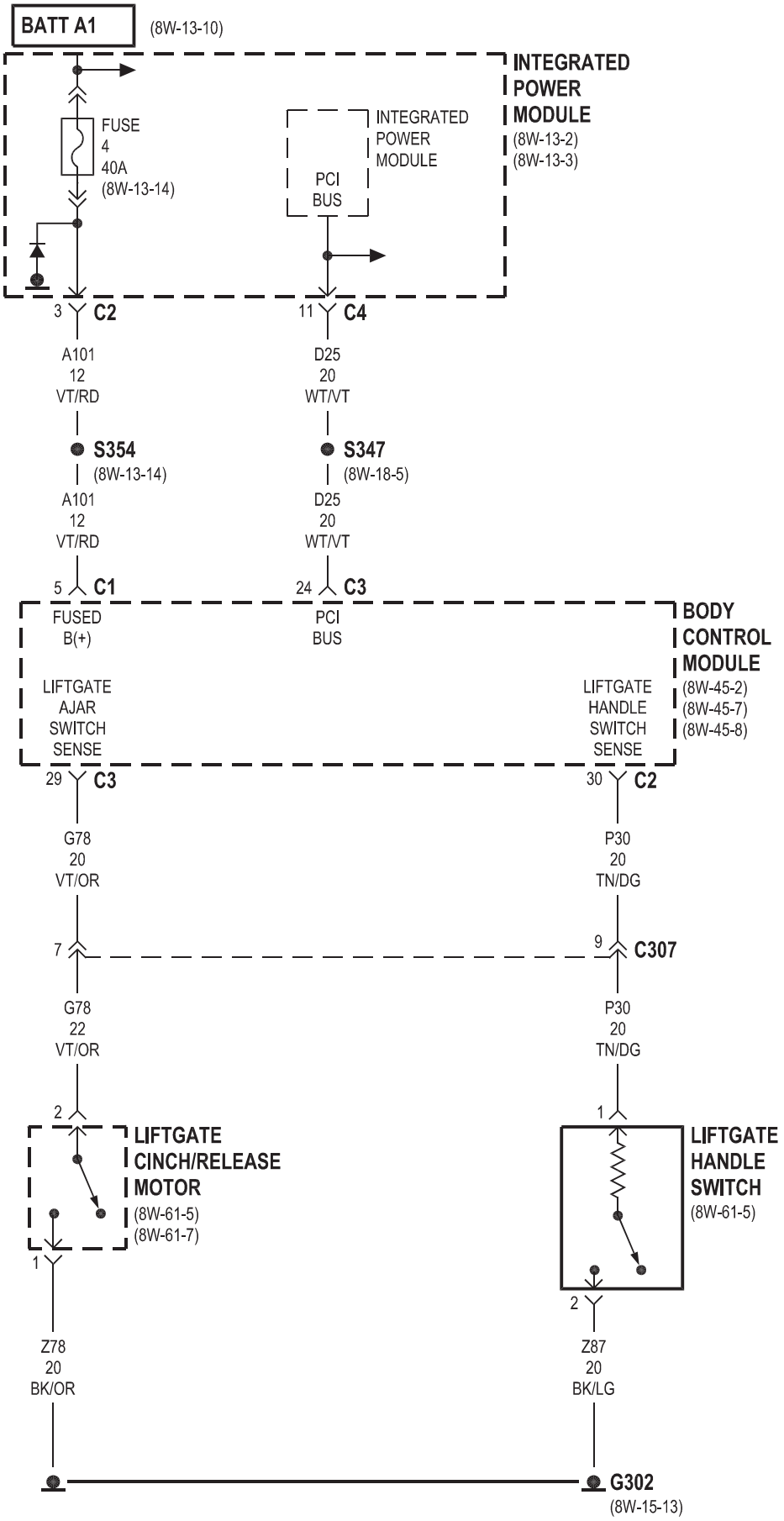

BATT A1
(8W-13-10)
BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 50 15A
(8W-13-12)
13 C4
A118 20 RD/OR
15
A118 20 RD/OR
S201
(8W-13-13)
A118 20 RD/OR
6
FUSED B(+)
PCI BUS
FUSED IGNITION SWITCH OUTPUT (RUN-START)
INTEGRATED POWER MODULE
11 C4
13 C9
2 C9
FUSE 30 10A
(8W-13-19)
A106 20 LB/RD
2 C201
A106 20 LB/RD
5
BODY CONTROL MODULE
(8W-45-8)
PCI BUS
24 C3
D25 20 WT/VT
D25 20 WT/VT
S347
(8W-18-5)
D25 20 WT/VT
27
D25 20 WT/VT
S213
(8W-18-3)
D25 20 WT/VT
2
PCI BUS
F20 20 PK/GY
S307
(8W-13-27)
59 C201
F20 20 PK/GY
4
FUSED IGNITION SWITCH OUTPUT (RUN-START)
IGNITION SWITCH
0 OFF/LOCK
1 START
2 RUN
3 UNLOCK
4 ACC
(8W-13-27)
1
2
3
0
4
3
F20 20 PK/GY
SKREEM MODULE
GROUND
5
Z120 20 BK/WT
G201
(8W-15-6)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 28 25A
(8W-13-19)
85
30
INTEGRATED POWER MODULE
HORN SWITCH SENSE
HORN RELAY CONTROL
HORN RELAY
(8W-41-2)
86
87
87A
2 C4
23 C5
X3 20 DG/VT
X2 16 DG/OR
18 C201
S112
(8W-13-19)
X3 20 DG/VT
X2 16 DG/OR
X2 16 DG/OR
1 C1
CLOCKSPRING
(8W-41-2)
2
HORN-LOW NOTE
(8W-41-2)
2
HORN-HIGH NOTE
(8W-41-2)
1 C4
1
1
X3 20 DG/VT
HORN SWITCH
(8W-41-2)
Z374 20 BK/OR
Z298 16 BK/DB
Z299 16 BK/OR
G201
(8W-15-6)
G104
(8W-15-5)

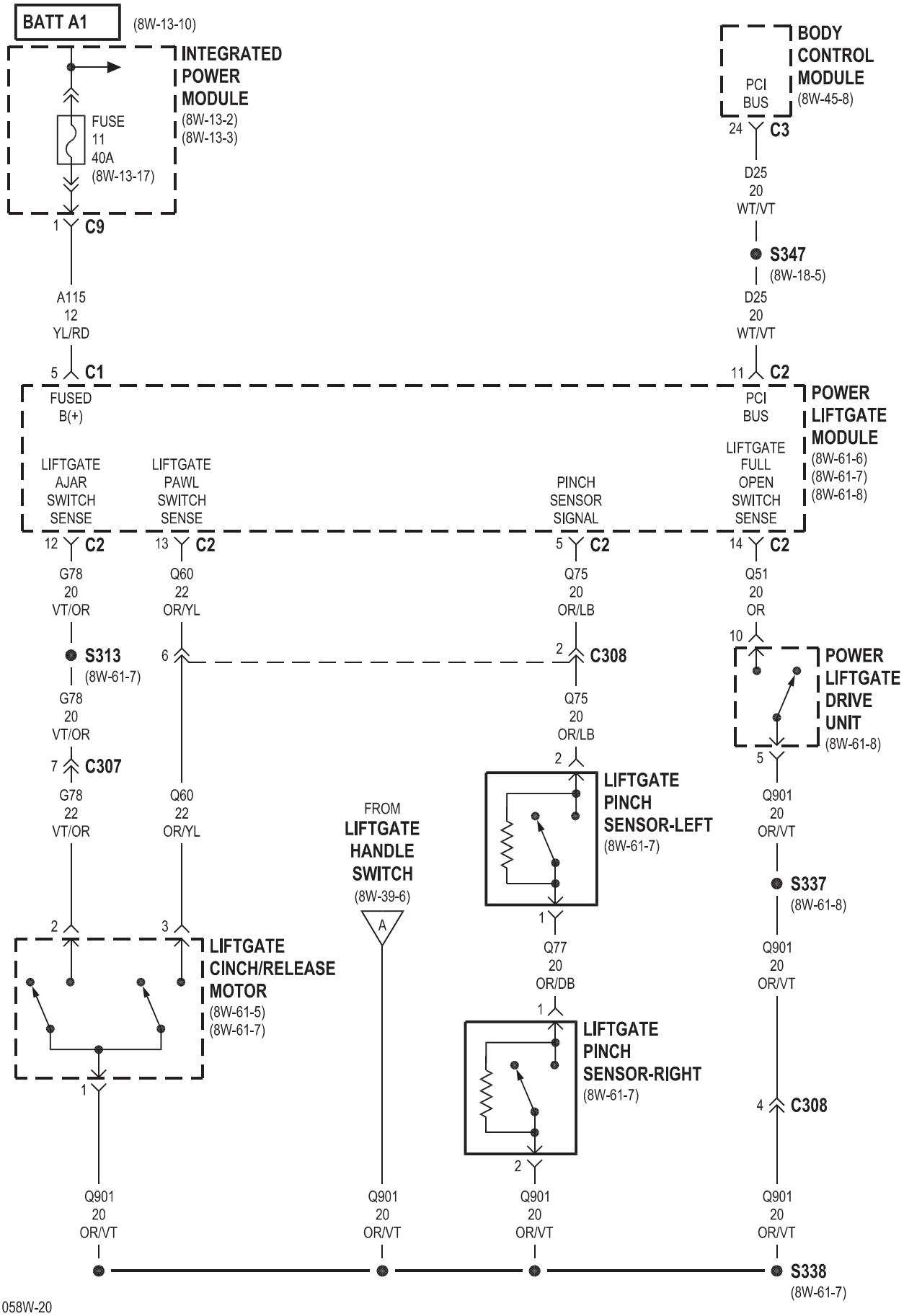

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 47 20A
(8W-13-12)
FUSE 46 20A
(8W-13-12)
16 C4
8 C4
A215 18 RD/LG
A214 18 RD/LB
5 C301
5 C304
A215 18 RD/LG
A214 18 RD/LB
2 C1
2 C1
FUSED B(+)
FUSED B(+)
DOOR MODULE-DRIVER
(8W-44-2)
(8W-60-2)
(8W-61-2)
(8W-62-2)
(8W-63-2)
DOOR MODULE-PASSENGER
(8W-44-2)
(8W-60-4)
(8W-61-2)
(8W-62-3)
(8W-63-7)
DRIVER DOOR AJAR SWITCH SENSE
PASSENGER DOOR AJAR SWITCH SENSE
GROUND
GROUND
GROUND
GROUND
8 C1
1 C3
11 C3
14 C1
1 C3
11 C3
Z821 12 BK/BR
G75 20 VT
Z822 12 BK/BR
Z74 20 BK/WT
G74 20 VT/WT
14 C301
14 C304
1
1
DOOR LOCK MOTOR/AJAR SWITCH-DRIVER
(8W-61-2)
DOOR LOCK MOTOR/AJAR SWITCH-PASSENGER
(8W-61-2)
2
2
Z75 20 BK/VT
Z821 12 BK/BR
Z822 12 BK/BR
G300
(8W-15-9)
G301
(8W-15-11)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 47 20A
(8W-13-12)
FUSE 46 20A
(8W-13-12)
16 C4
A215 18 RD/LG
5 C301
A215 18 RD/LG
2 C1
FUSED B(+)
GROUND
DOOR MODULE-DRIVER
(8W-44-2)
(8W-61-3)
8 C4
A214 18 RD/LB
5 C304
A214 18 RD/LB
2 C1
FUSED B(+)
GROUND
DOOR MODULE-PASSENGER
(8W-44-2)
(8W-61-4)
9 C1
G983 20 VT/OR
1 C301
G983 20 VT/OR
7
G983 20 VT/TN
S336
(8W-61-3)
G983 20 VT/TN
LEFT REAR DOOR AJAR SWITCH SENSE
8 C2
G77 20 VT/GY
3 C303
G77 20 VT/YL
1
DOOR LOCK MOTOR/AJAR SWITCH-DRIVER REAR
(8W-61-3)
2
BODY CONTROL MODULE
(8W-45-8)
9 C1
G982 20 VT/TN
1 C304
G982 20 VT/TN
7
G982 20 VT/TN
S334
(8W-61-4)
G982 20 VT/TN
RIGHT REAR DOOR AJAR SWITCH SENSE
5 C3
G76 20 VT/YL
3 C306
G76 20 VT/YL
1
DOOR LOCK MOTOR/AJAR SWITCH-PASSENGER REAR
(8W-61-4)
2
BODY CONTROL MODULE
(8W-45-6)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE
4
40A
(8W-13-14)
3 C2
A101
12
VT/RD
S354
(8W-13-14)
A101
12
VT/RD
5 C1
FUSED
B(+)
VTSS
INDICATOR
DRIVER
6 C4
G69
22
VT/WT
4
VTSS
INDICATOR
DRIVER
GROUND
INSTRUMENT PANEL SWITCH POD
(8W-40-5)
12
Z108
20
BK/LG
G201
(8W-15-6)
POWER LIFTGATE MODULE
(8W-61-6)
PCI
BUS
11 C2
D25
20
WT/VT
S347
(8W-18-5)
D25
20
WT/VT
24 C3
PCI
BUS
LIFTGATE
HANDLE
SWITCH
SENSE
BODY CONTROL MODULE
(8W-45-2)
(8W-45-5)
(8W-45-7)
(8W-45-8)
30 C2
P30
20
TN/DG
9 C307
P30
20
TN/DG
1
LIFTGATE HANDLE SWITCH
(8W-61-7)
2
POWER LIFTGATE
MANUAL LIFTGATE
Q901
20
OR/VT
A
TO
S338
(8W-39-8)
Z87
20
BK/LG
G302
(8W-15-12)
(8W-15-13)

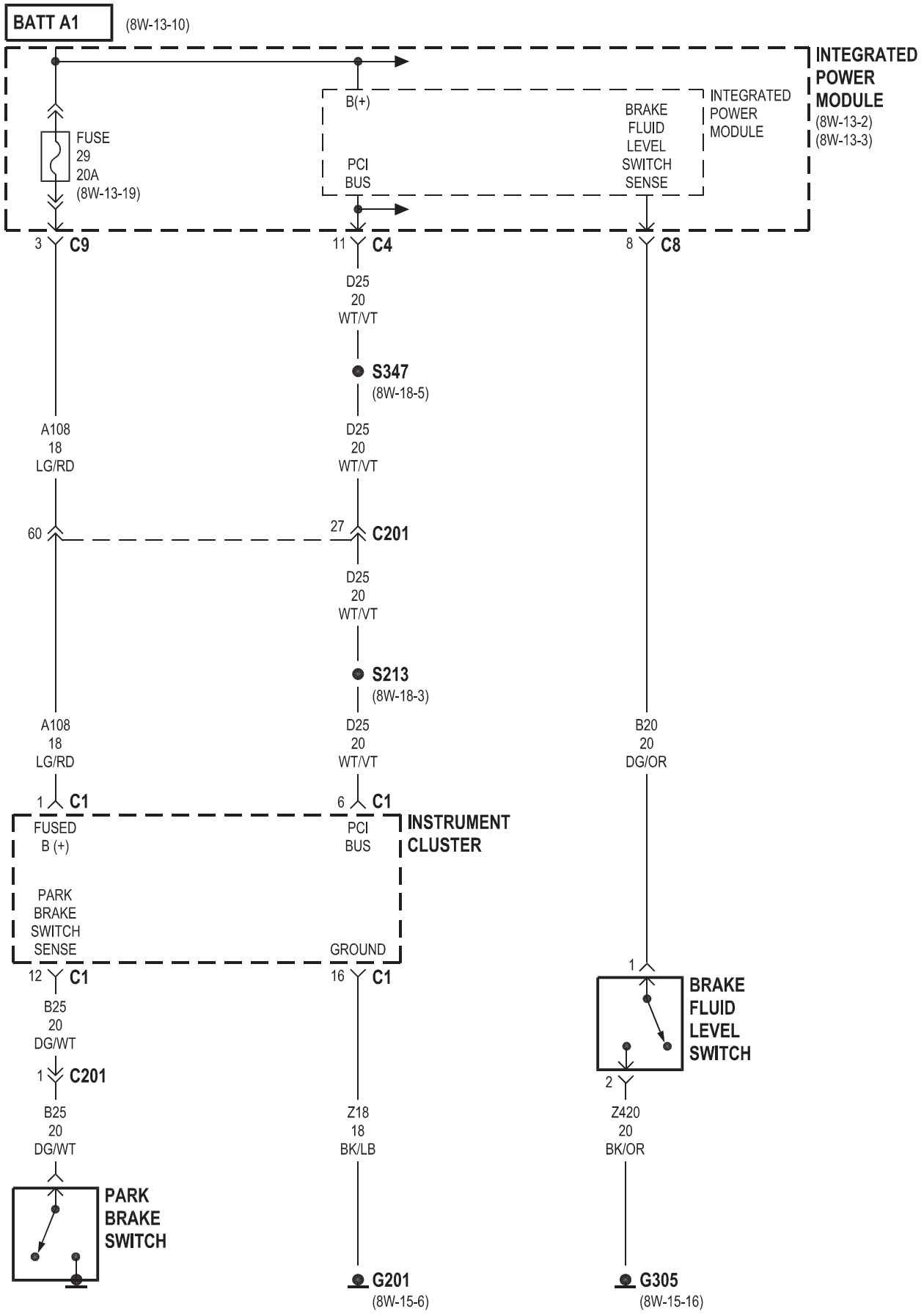

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 4 40A
(8W-13-14)
INTEGRATED POWER MODULE
PCI BUS
3 C2
11 C4
A101 12 VT/RD
D25 20 WT/VT
S354
(8W-13-14)
S347
(8W-18-5)
A101 12 VT/RD
D25 20 WT/VT
5 C1
24 C3
FUSED B(+)
PCI BUS
BODY CONTROL MODULE
(8W-45-2)
(8W-45-7)
(8W-45-8)
LIFTGATE AJAR SWITCH SENSE
LIFTGATE HANDLE SWITCH SENSE
29 C3
30 C2
G78 20 VT/OR
P30 20 TN/DG
7
9 C307
G78 22 VT/OR
P30 20 TN/DG
2
1
LIFTGATE CINCH/RELEASE MOTOR
(8W-61-5)
(8W-61-7)
LIFTGATE HANDLE SWITCH
(8W-61-5)
1
2
Z78 20 BK/OR
Z87 20 BK/LG
G302
(8W-15-13)

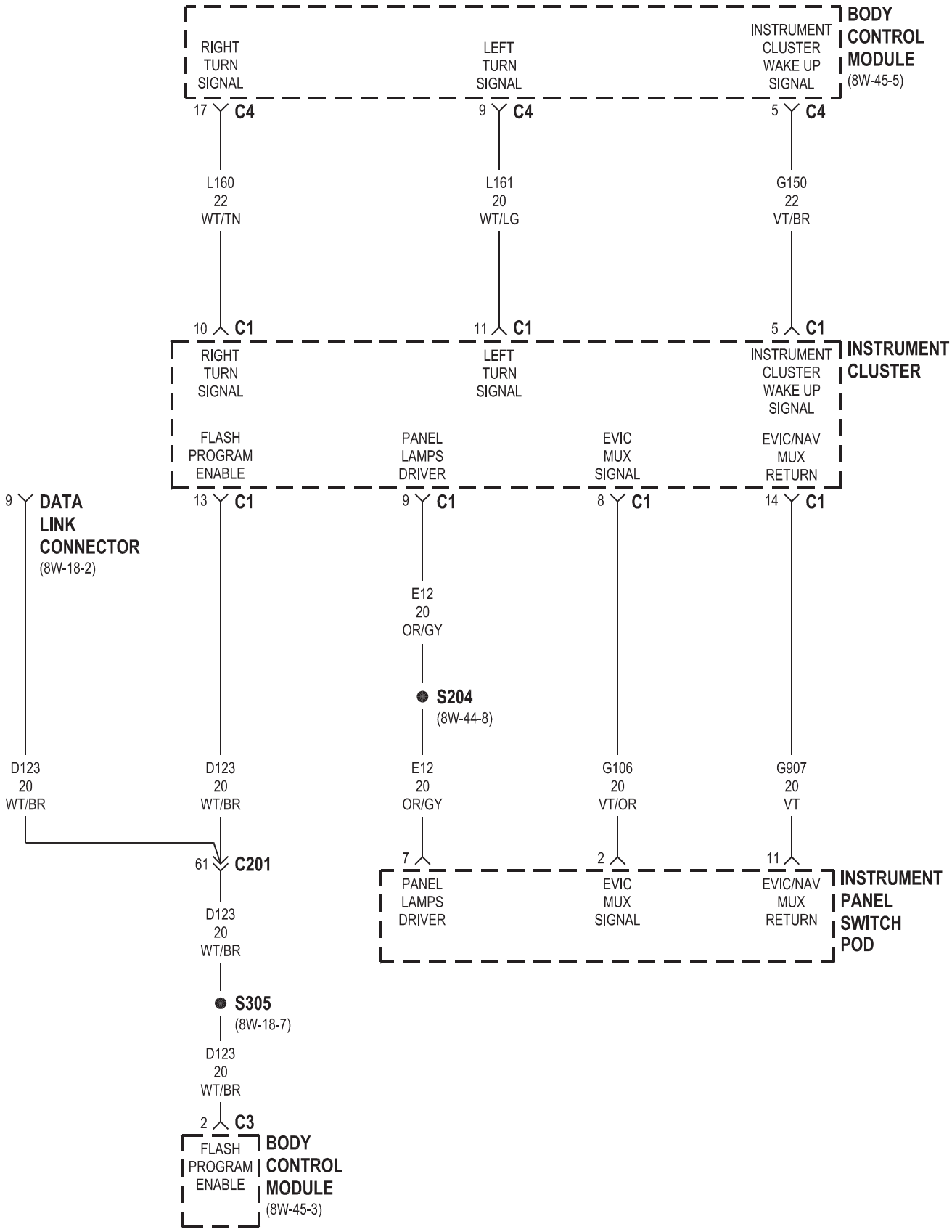
POWER LIFTGATE

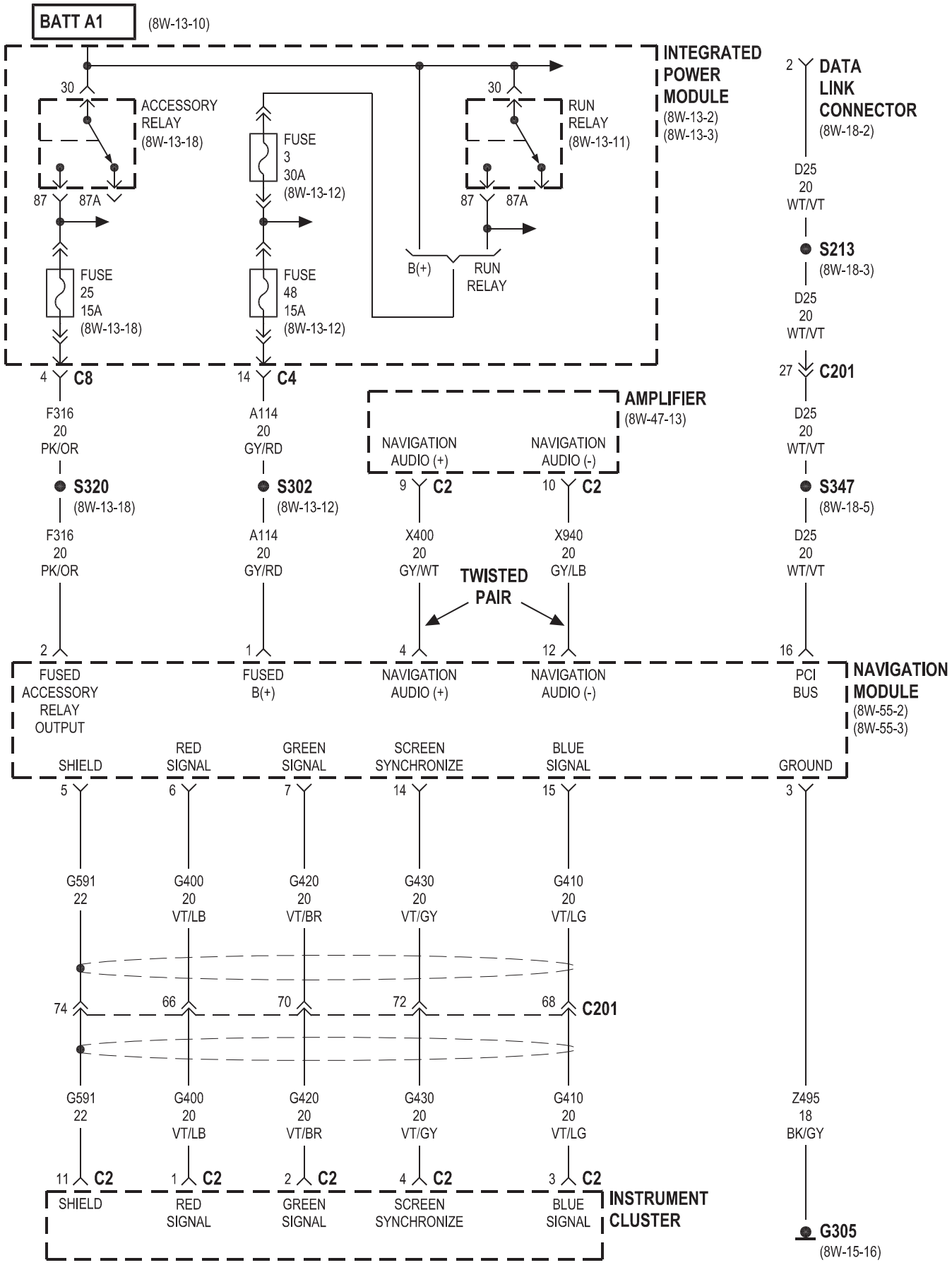


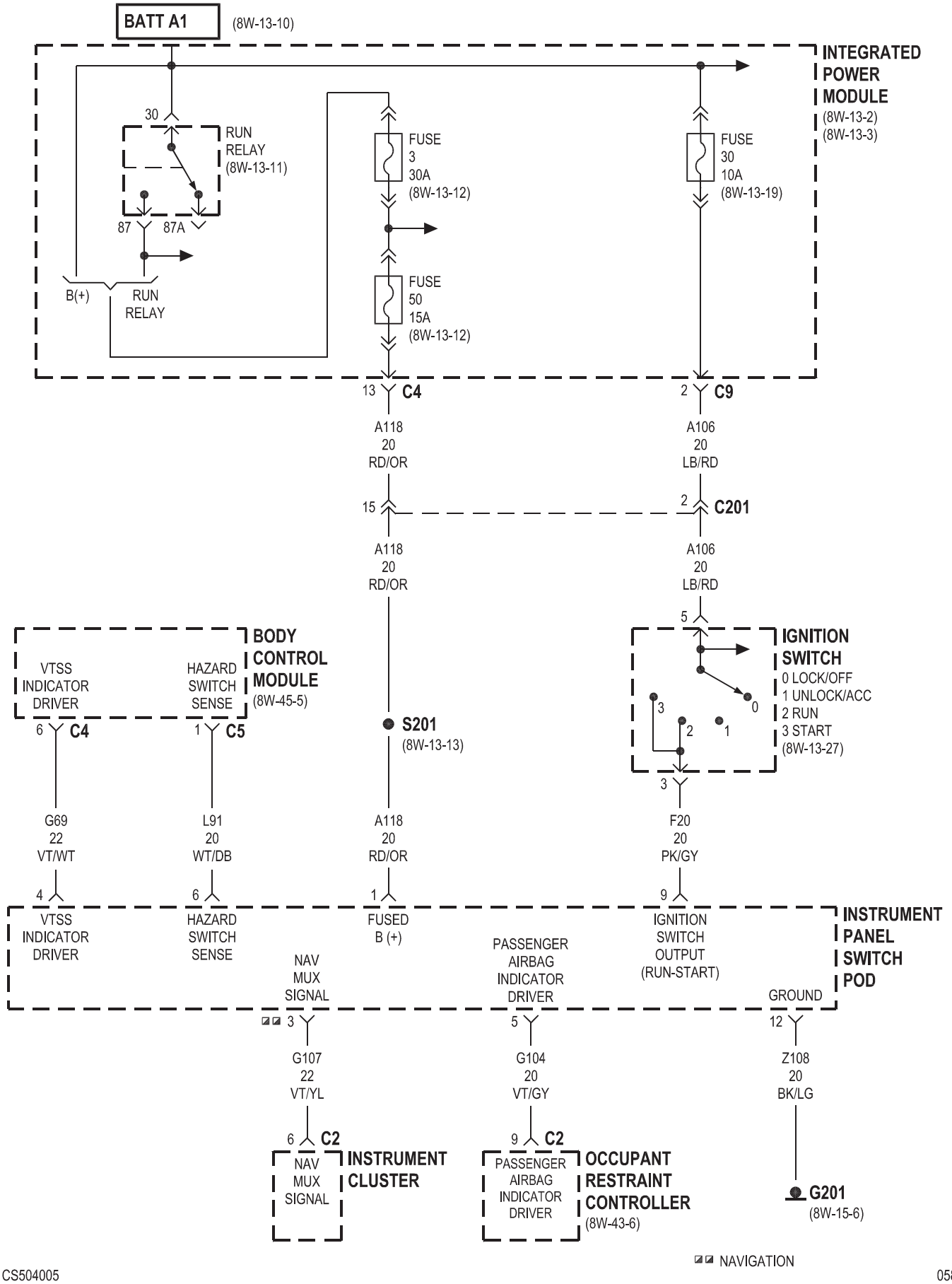
8W-40 INSTRUMENT CLUSTER

Component	Page
Amplifier	8W-40-4
Body Control Module	8W-40-3, 5
Brake Fluid Level Switch	8W-40-2
Data Link Connector	8W-40-3, 4
Fuse 25	8W-40-4
Fuse 29	8W-40-2
Fuse 3	8W-40-4, 5
Fuse 30	8W-40-5
Fuse 48	8W-40-4
Fuse 50	8W-40-5
G201	8W-40-2, 5
G305	8W-40-2, 4
Ignition Switch	8W-40-5
Instrument Cluster	8W-40-2, 3, 4, 5
Instrument Panel Switch POD	8W-40-3, 5
Integrated Power Module	8W-40-2, 4, 5
Navigation Module	8W-40-4
Occupant Restraint Controller	8W-40-5
Park Brake Switch	8W-40-2
Run Relay	8W-40-4, 5


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 29 20A
(8W-13-19)
B(+)
PCI BUS
INTEGRATED POWER MODULE
BRAKE FLUID LEVEL SWITCH SENSE
3 C9
11 C4
8 C8
D25 20 WT/VT
S347
(8W-18-5)
A108 18 LG/RD
D25 20 WT/VT
60
27 C201
D25 20 WT/VT
S213
(8W-18-3)
A108 18 LG/RD
D25 20 WT/VT
B20 20 DG/OR
1 C1
6 C1
INSTRUMENT CLUSTER
FUSED B (+)
PCI BUS
PARK BRAKE SWITCH SENSE
GROUND
12 C1
16 C1
1
BRAKE FLUID LEVEL SWITCH
B25 20 DG/WT
1 C201
B25 20 DG/WT
Z18 18 BK/LB
2
Z420 20 BK/OR
PARK BRAKE SWITCH
G201
(8W-15-6)
G305
(8W-15-16)

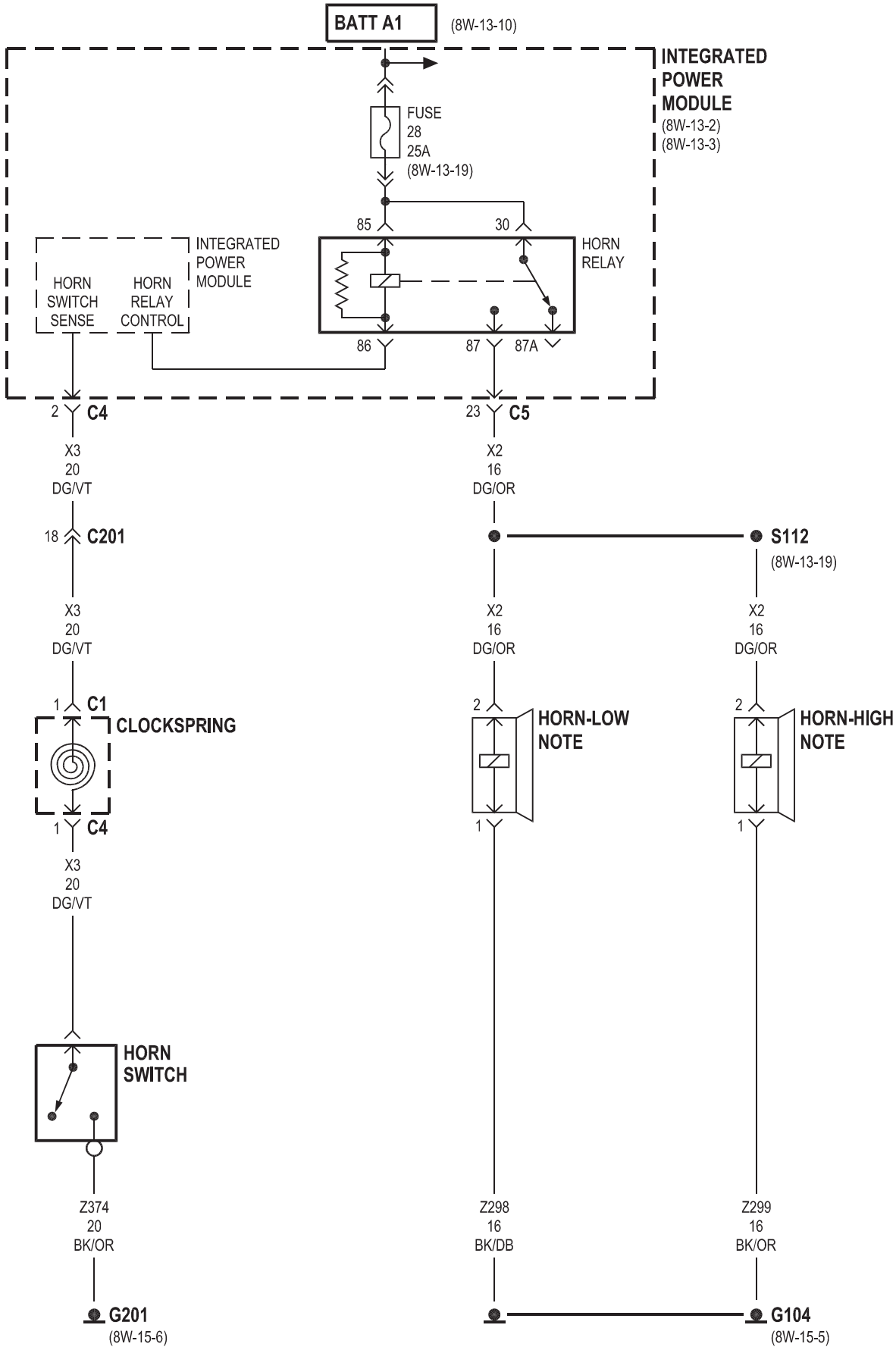

BODY CONTROL MODULE
(8W-45-5)
RIGHT TURN SIGNAL
LEFT TURN SIGNAL
INSTRUMENT CLUSTER WAKE UP SIGNAL
17 C4
9 C4
5 C4
L160 22 WT/TN
L161 20 WT/LG
G150 22 VT/BR
10 C1
11 C1
5 C1
INSTRUMENT CLUSTER
RIGHT TURN SIGNAL
LEFT TURN SIGNAL
INSTRUMENT CLUSTER WAKE UP SIGNAL
FLASH PROGRAM ENABLE
PANEL LAMPS DRIVER
EVIC MUX SIGNAL
EVIC/NAV MUX RETURN
9 DATA LINK CONNECTOR
(8W-18-2)
13 C1
9 C1
8 C1
14 C1
E12 20 OR/GY
S204
(8W-44-8)
D123 20 WT/BR
D123 20 WT/BR
E12 20 OR/GY
G106 20 VT/OR
G907 20 VT
61 C201
7
2
11
INSTRUMENT PANEL SWITCH POD
PANEL LAMPS DRIVER
EVIC MUX SIGNAL
EVIC/NAV MUX RETURN
D123 20 WT/BR
S305
(8W-18-7)
D123 20 WT/BR
2 C3
BODY CONTROL MODULE
(8W-45-3)
FLASH PROGRAM ENABLE

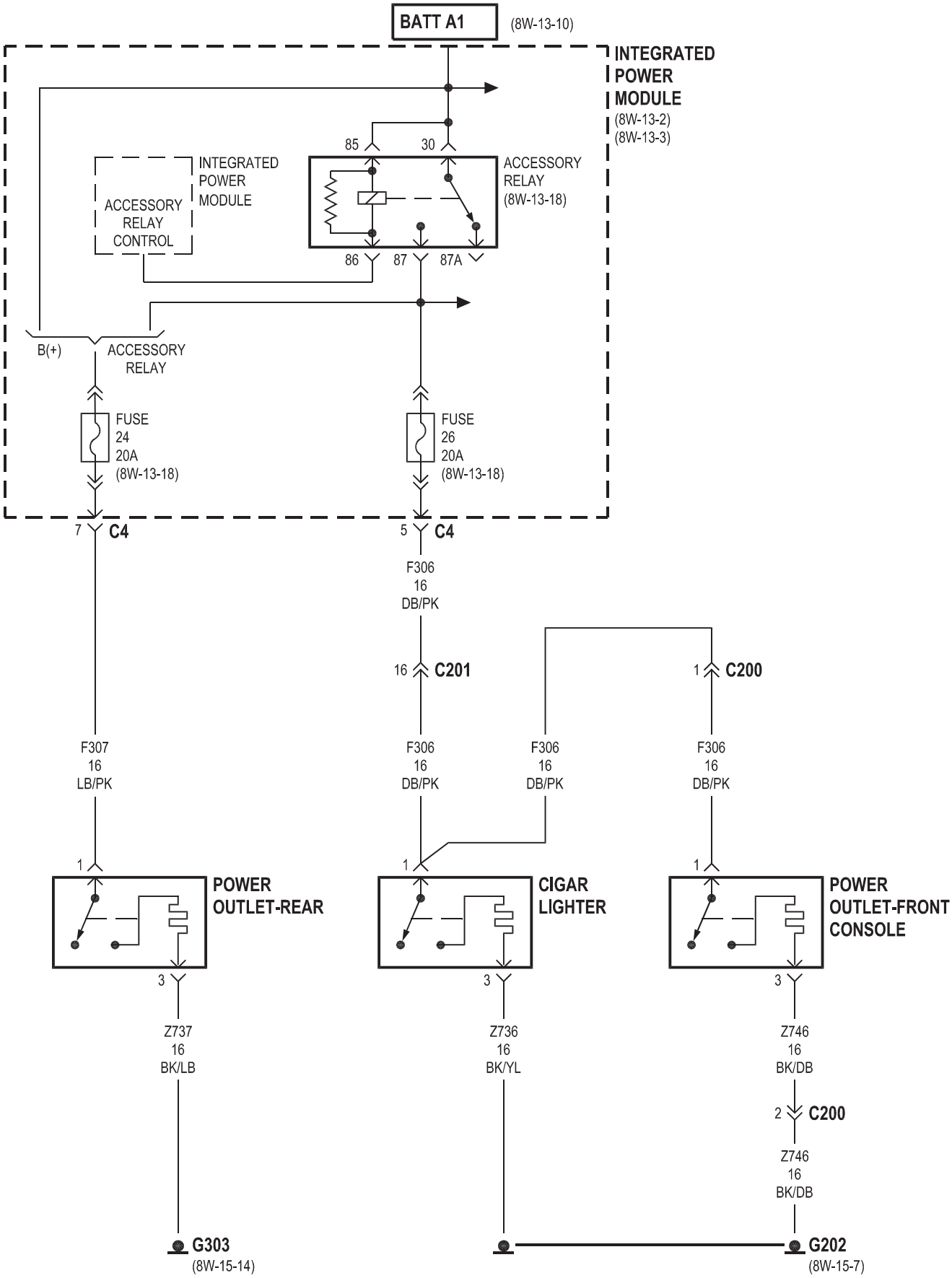

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
ACCESSORY RELAY
(8W-13-18)
FUSE 3 30A
(8W-13-12)
RUN RELAY
(8W-13-11)
FUSE 25 15A
(8W-13-18)
FUSE 48 15A
(8W-13-12)
B(+)
RUN RELAY
DATA LINK CONNECTOR
(8W-18-2)
S213
(8W-18-3)
C201
C8
C4
AMPLIFIER
(8W-47-13)
NAVIGATION AUDIO (+)
NAVIGATION AUDIO (-)
S320
(8W-13-18)
S302
(8W-13-12)
S347
(8W-18-5)
TWISTED PAIR
FUSED ACCESSORY RELAY OUTPUT
FUSED B(+)
NAVIGATION AUDIO (+)
NAVIGATION AUDIO (-)
PCI BUS
NAVIGATION MODULE
(8W-55-2)
(8W-55-3)
SHIELD
RED SIGNAL
GREEN SIGNAL
SCREEN SYNCHRONIZE
BLUE SIGNAL
GROUND
INSTRUMENT CLUSTER
G305
(8W-15-16)

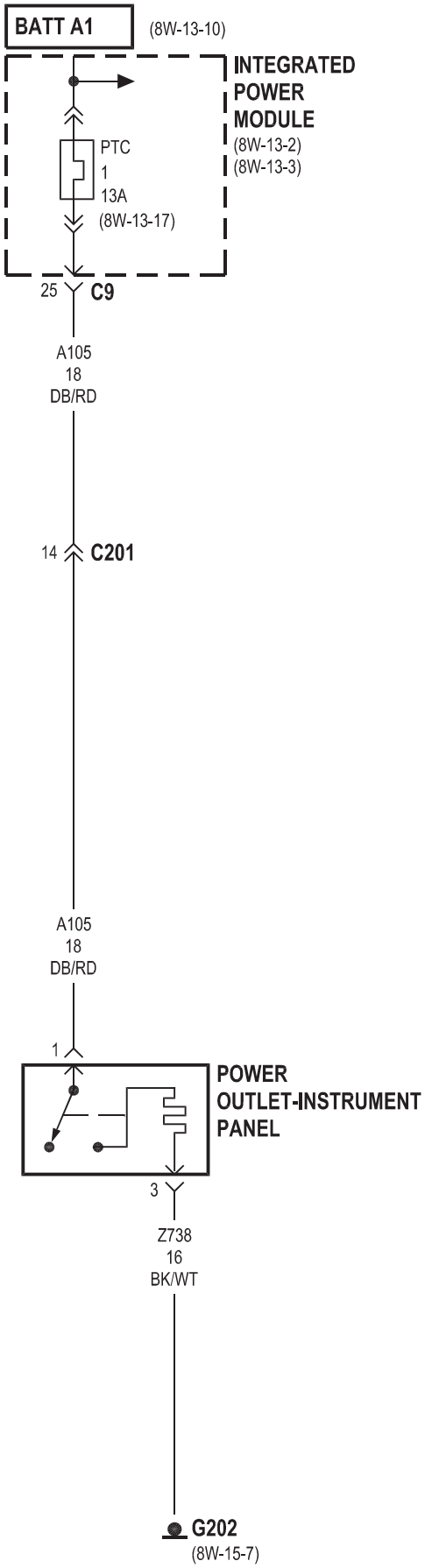

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 50 15A
(8W-13-12)
FUSE 30 10A
(8W-13-19)
13 C4
2 C9
A118 20 RD/OR
A106 20 LB/RD
15
2 C201
A118 20 RD/OR
A106 20 LB/RD
5
BODY CONTROL MODULE
(8W-45-5)
VTSS INDICATOR DRIVER
HAZARD SWITCH SENSE
6 C4
1 C5
S201
(8W-13-13)
IGNITION SWITCH
0 LOCK/OFF
1 UNLOCK/ACC
2 RUN
3 START
(8W-13-27)
3
G69 22 VT/WT
L91 20 WT/DB
A118 20 RD/OR
F20 20 PK/GY
4
6
1
9
VTSS INDICATOR DRIVER
HAZARD SWITCH SENSE
FUSED B (+)
IGNITION SWITCH OUTPUT (RUN-START)
INSTRUMENT PANEL SWITCH POD
NAV MUX SIGNAL
PASSENGER AIRBAG INDICATOR DRIVER
GROUND
3
5
12
G107 22 VT/YL
G104 20 VT/GY
Z108 20 BK/LG
6 C2
9 C2
NAV MUX SIGNAL
INSTRUMENT CLUSTER
PASSENGER AIRBAG INDICATOR DRIVER
OCCUPANT RESTRAINT CONTROLLER
(8W-43-6)
G201
(8W-15-6)
NAVIGATION

8W-41 HORN/CIGAR LIGHTER/POWER OUTLET

Component	Page
Accessory Relay	8W-41-3
Cigar Lighter	8W-41-3
Clockspring	8W-41-2
Fuse 24	8W-41-3
Fuse 26	8W-41-3
Fuse 28	8W-41-2
G104	8W-41-2
G201	8W-41-2
G202	8W-41-3, 4
G303	8W-41-3
Horn Relay	8W-41-2
Horn Switch	8W-41-2
Horn-High Note	8W-41-2
Horn-Low Note	8W-41-2
Integrated Power Module	8W-41-2, 3, 4
Power Outlet-Front Console	8W-41-3
Power Outlet-Instrument Panel	8W-41-4
Power Outlet-Rear	8W-41-3
PTC 1	8W-41-4

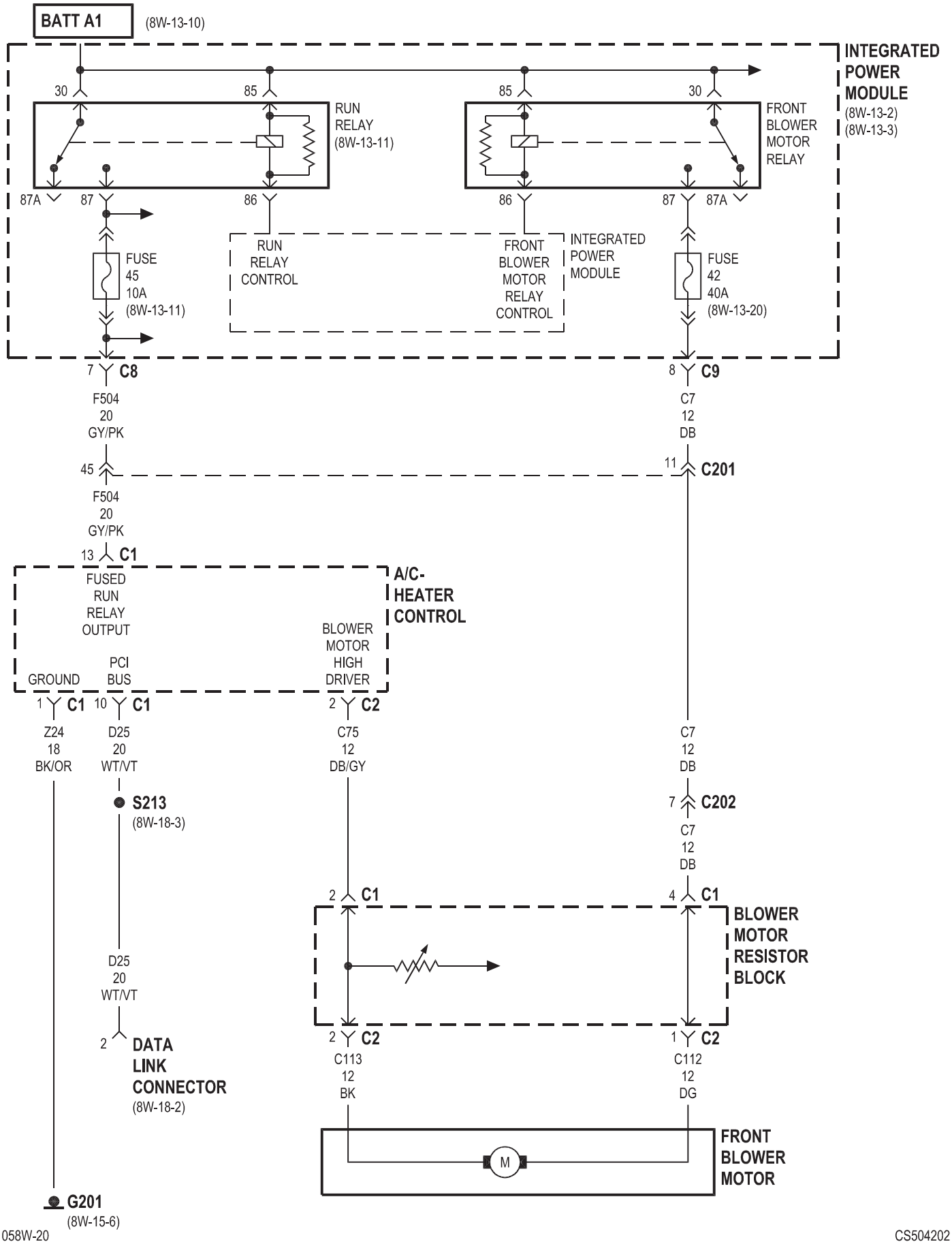

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE
28
25A
(8W-13-19)
85
30
INTEGRATED POWER MODULE
HORN SWITCH SENSE
HORN RELAY CONTROL
HORN RELAY
86
87
87A
2 C4
23 C5
X3
20
DG/VT
X2
16
DG/OR
18 C201
S112
(8W-13-19)
1 C1
CLOCKSPRING
1 C4
2
HORN-LOW NOTE
HORN-HIGH NOTE
1
HORN SWITCH
Z374
20
BK/OR
Z298
16
BK/DB
Z299
16
BK/OR
G201
(8W-15-6)
G104
(8W-15-5)

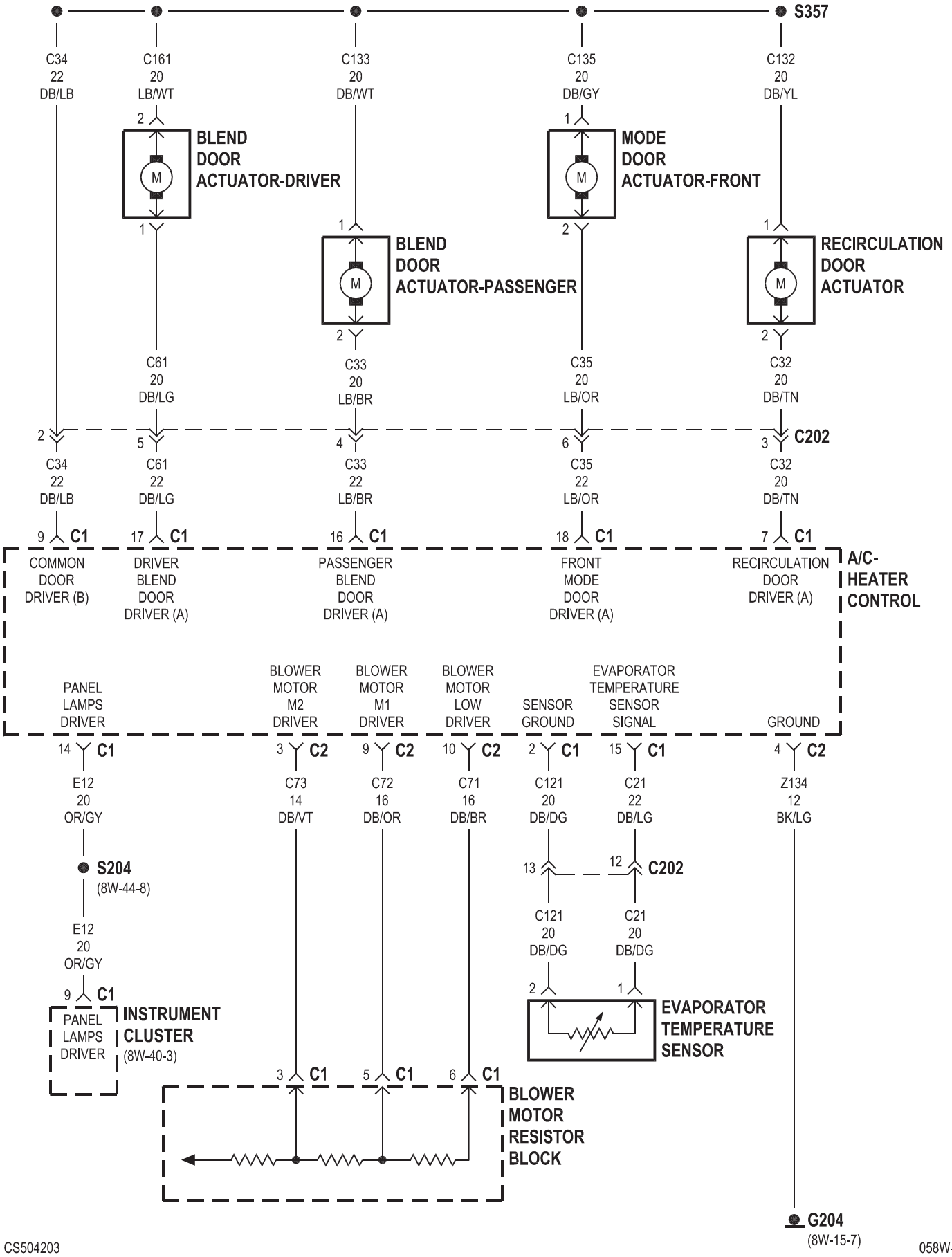

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
85
30
INTEGRATED POWER MODULE
ACCESSORY RELAY CONTROL
ACCESSORY RELAY
(8W-13-18)
86
87
87A
B(+)
ACCESSORY RELAY
FUSE 24 20A
(8W-13-18)
FUSE 26 20A
(8W-13-18)
7 C4
5 C4
F306 16 DB/PK
16 C201
1 C200
F307 16 LB/PK
F306 16 DB/PK
F306 16 DB/PK
F306 16 DB/PK
1
1
1
POWER OUTLET-REAR
CIGAR LIGHTER
POWER OUTLET-FRONT CONSOLE
3
3
3
Z737 16 BK/LB
Z736 16 BK/YL
Z746 16 BK/DB
2 C200
Z746 16 BK/DB
G303
(8W-15-14)
G202
(8W-15-7)

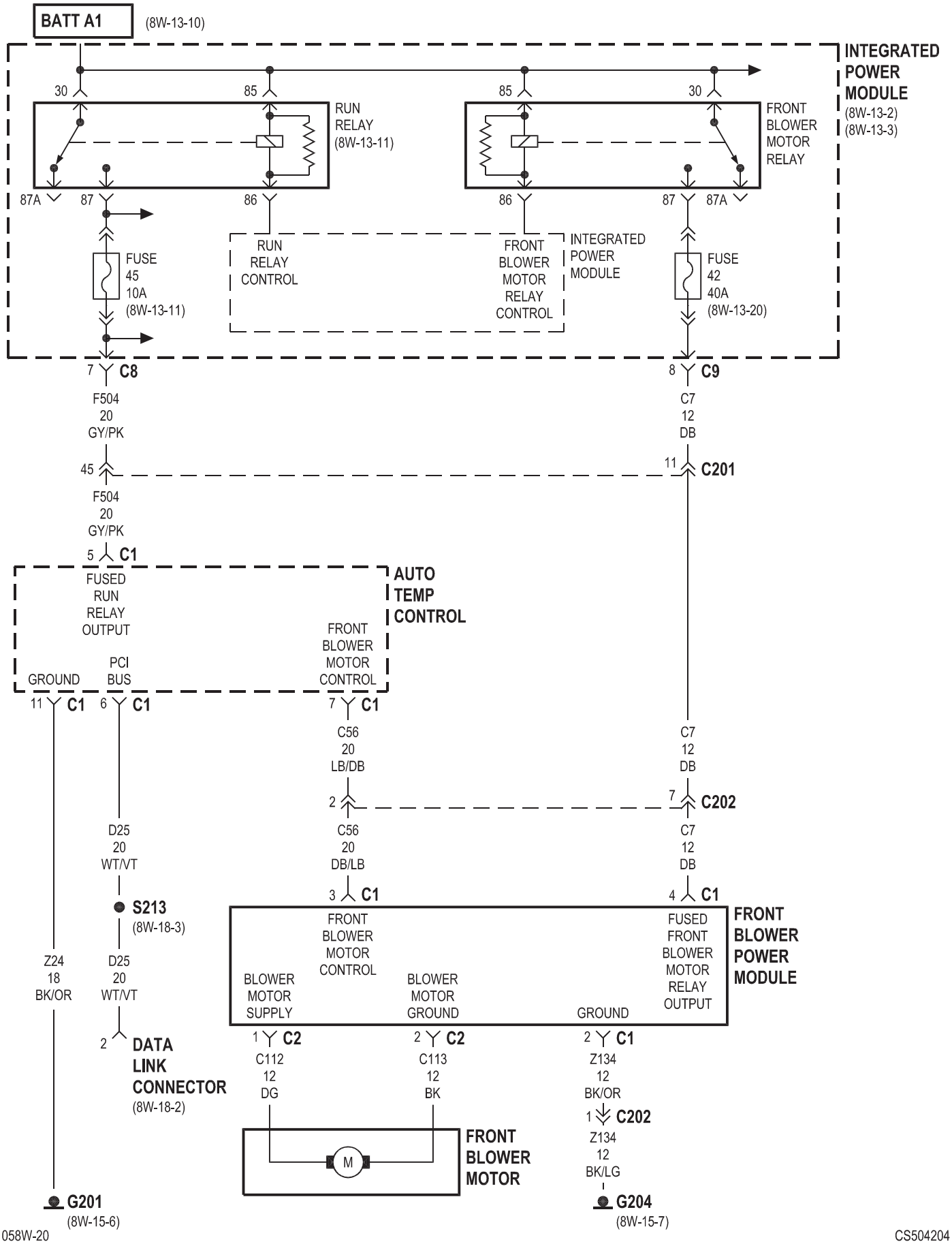

BATT A1
(8W-13-10)
INTEGRATED
POWER
MODULE
(8W-13-2)
(8W-13-3)
PTC
1
13A
(8W-13-17)
25
C9
A105
18
DB/RD
14
C201
A105
18
DB/RD
1
POWER
OUTLET-INSTRUMENT
PANEL
3
Z738
16
BK/WT
G202
(8W-15-7)

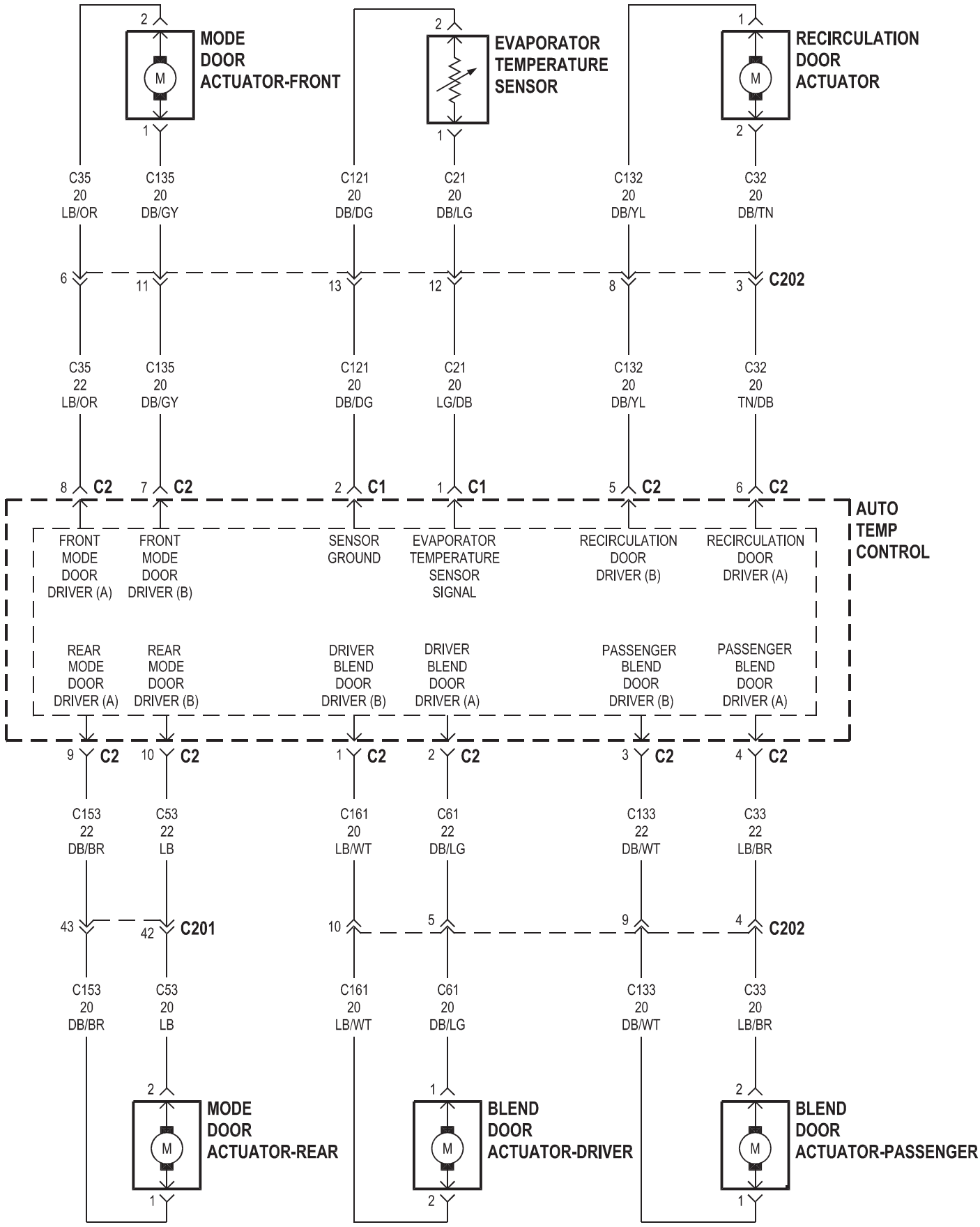
8W-42 AIR CONDITIONING/HEATER

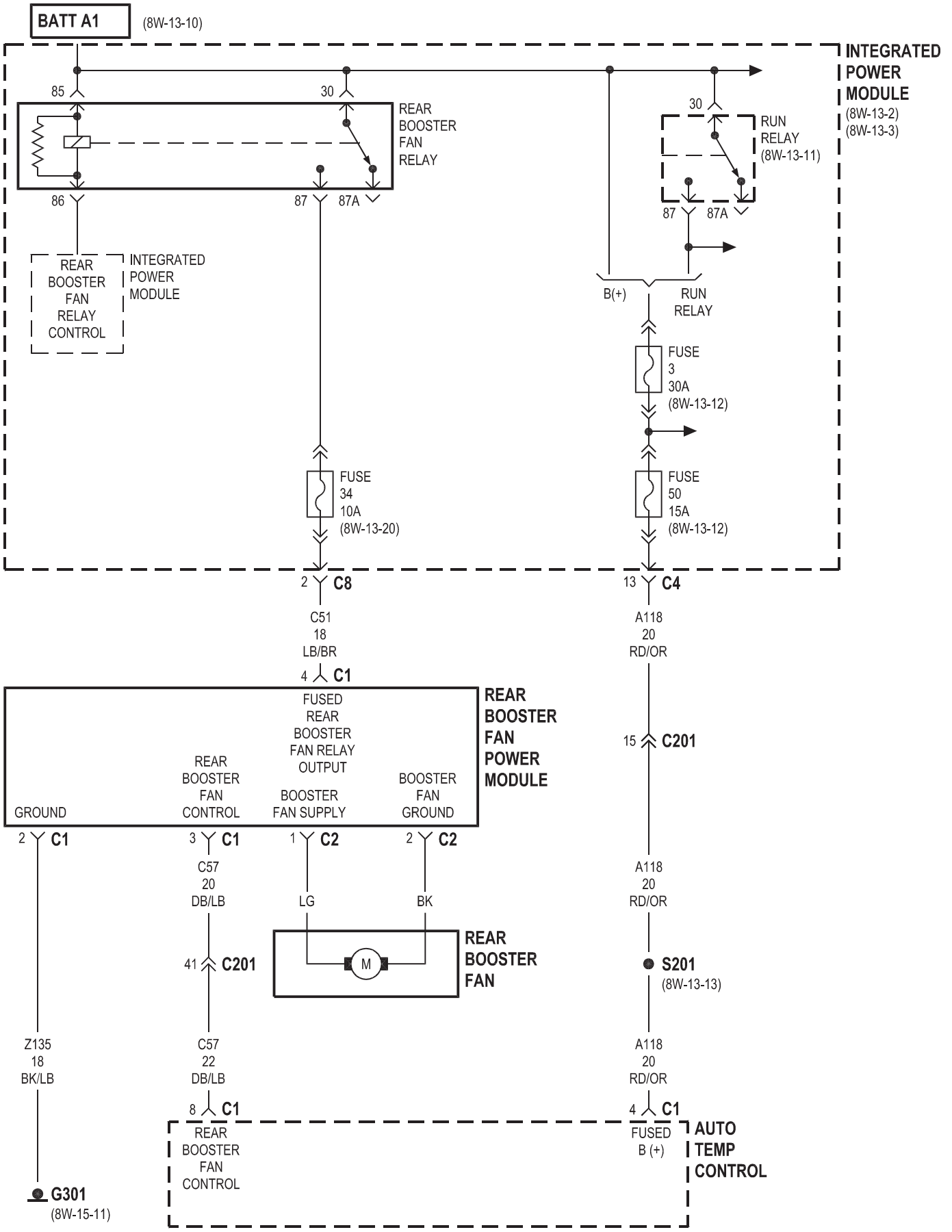
Component	Page
A/C Compressor Clutch Relay	8W-42-8
A/C Pressure Transducer	8W-42-8
A/C-Heater Control	8W-42-2, 3
Auto Temp Control	8W-42-4, 5, 6, 7
Blend Door Actuator-Driver	8W-42-3, 5
Blend Door Actuator-Passenger	8W-42-3, 5
Blower Motor Resistor Block	8W-42-2, 3
Data Link Connector	8W-42-2, 4
Evaporator Temperature Sensor	8W-42-3, 5
Front Blower Motor	8W-42-2, 4
Front Blower Motor Relay	8W-42-2, 4
Front Blower Power Module	8W-42-4
Fuse 13	8W-42-9
Fuse 3	8W-42-6
Fuse 34	8W-42-6
Fuse 38	8W-42-8
Fuse 42	8W-42-2, 4
Fuse 45	8W-42-2, 4
Fuse 50	8W-42-6
G102	8W-42-8
G104	8W-42-9
G201	8W-42-2, 4
G204	8W-42-3, 4
G301	8W-42-6, 7
Instrument Cluster	8W-42-3, 7
Integrated Power Module	8W-42-2, 4, 6, 8, 9
Mode Door Actuator-Front	8W-42-3, 5
Mode Door Actuator-Rear	8W-42-5
Powertrain Control Module	8W-42-8, 9
Radiator Fan Motor No. 1	8W-42-9
Radiator Fan Motor No. 2	8W-42-9
Radiator Fan Relay	8W-42-9
Rear Booster Fan	8W-42-6
Rear Booster Fan Power Module	8W-42-6
Rear Booster Fan Rear Control Switch	8W-42-7
Rear Booster Fan Relay	8W-42-6
Recirculation Door Actuator	8W-42-3, 5
Run Relay	8W-42-2, 4, 6

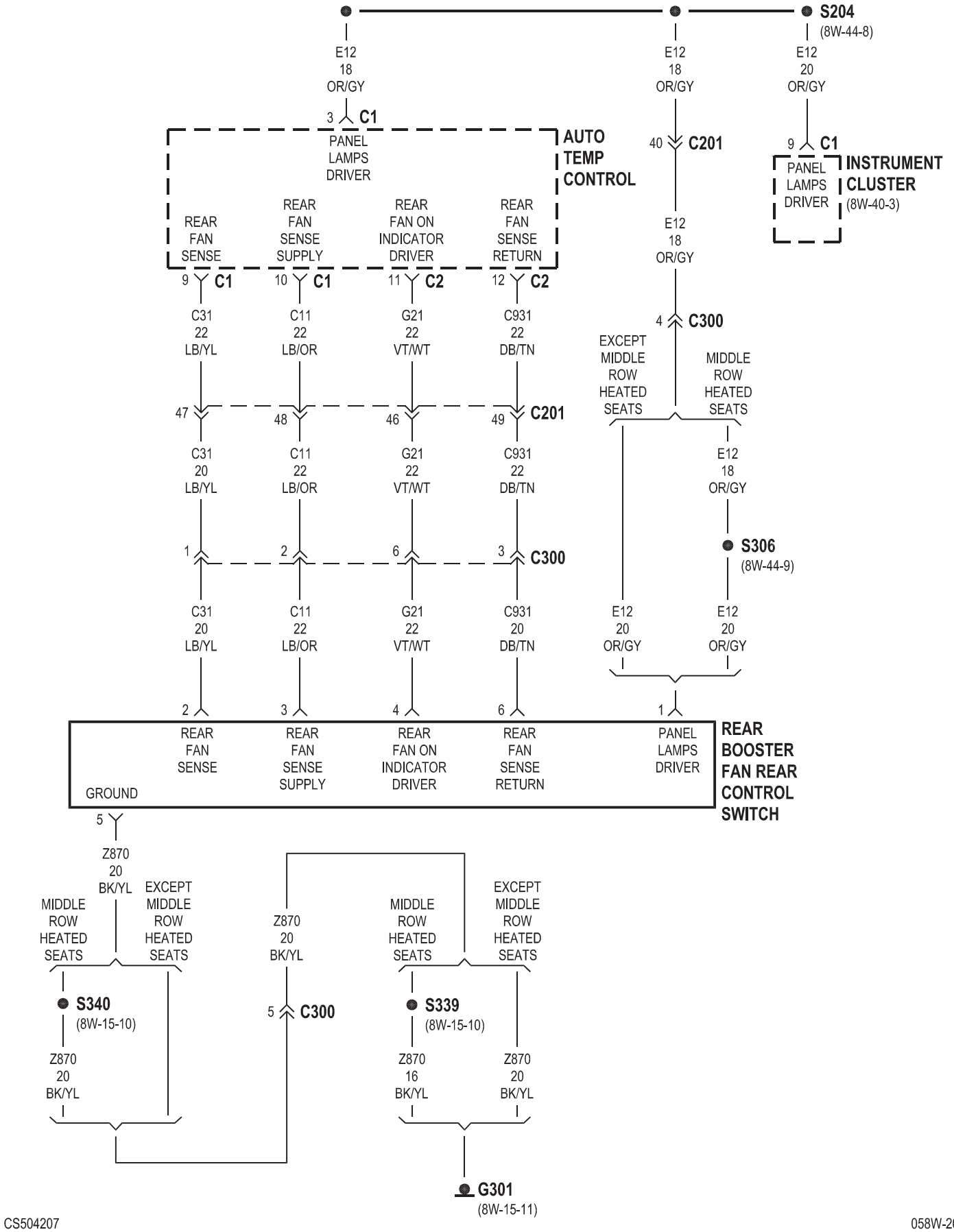

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
85
RUN RELAY
(8W-13-11)
85
30
FRONT BLOWER MOTOR RELAY
87A
87
86
86
87
87A
FUSE 45 10A
(8W-13-11)
RUN RELAY CONTROL
FRONT BLOWER MOTOR RELAY CONTROL
INTEGRATED POWER MODULE
FUSE 42 40A
(8W-13-20)
7 C8
8 C9
F504 20 GY/PK
C7 12 DB
45
11 C201
F504 20 GY/PK
13 C1
A/C-HEATER CONTROL
FUSED RUN RELAY OUTPUT
GROUND
PCI BUS
BLOWER MOTOR HIGH DRIVER
1 C1
10 C1
2 C2
Z24 18 BK/OR
D25 20 WT/VT
C75 12 DB/GY
C7 12 DB
S213
(8W-18-3)
7 C202
C7 12 DB
2 C1
4 C1
BLOWER MOTOR RESISTOR BLOCK
D25 20 WT/VT
2
DATA LINK CONNECTOR
(8W-18-2)
2 C2
1 C2
C113 12 BK
C112 12 DG
M
FRONT BLOWER MOTOR
G201
(8W-15-6)

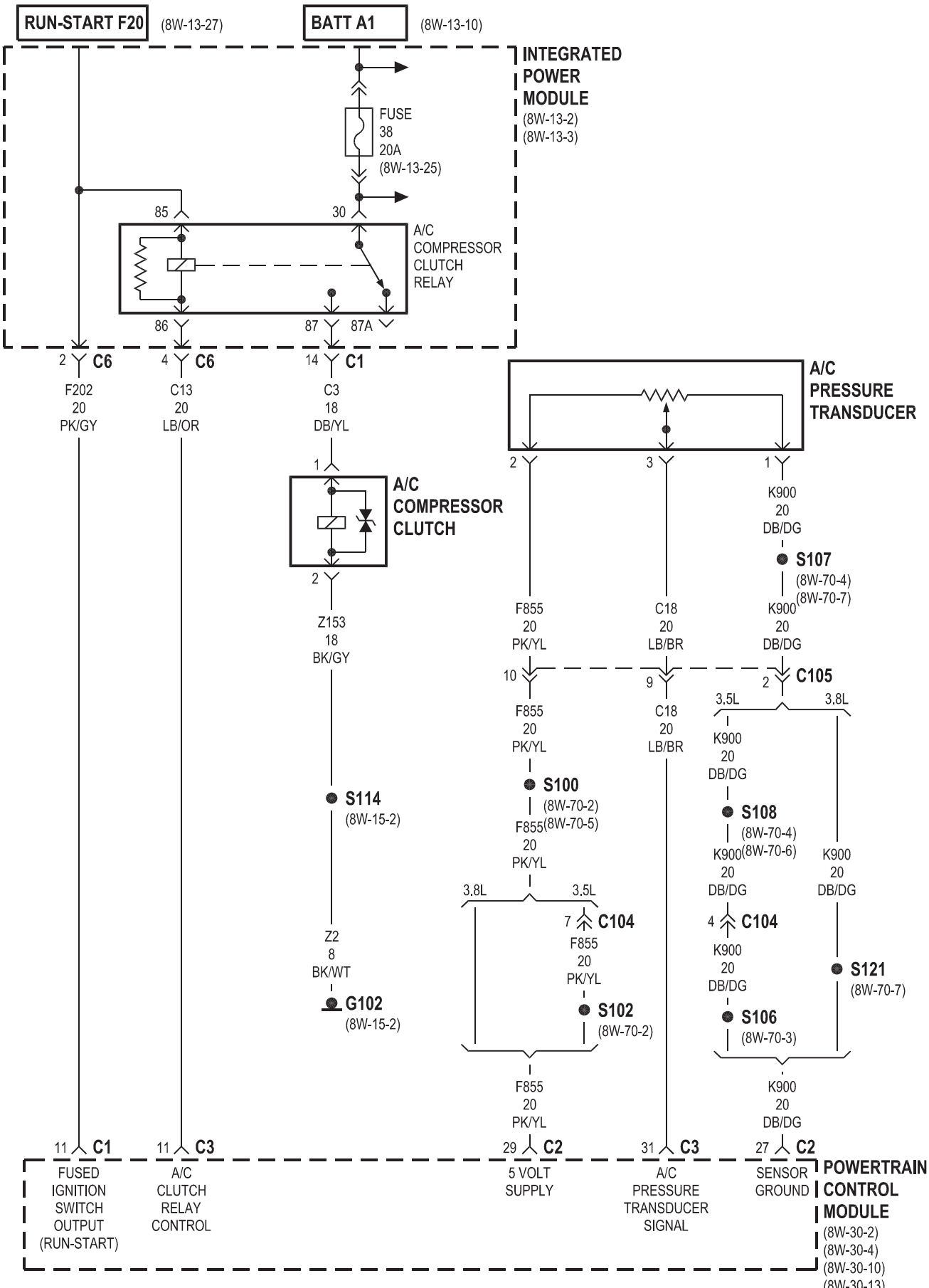

S357
C34 22 DB/LB
C161 20 LB/WT
C133 20 DB/WT
C135 20 DB/GY
C132 20 DB/YL
BLEND DOOR ACTUATOR-DRIVER
BLEND DOOR ACTUATOR-PASSENGER
MODE DOOR ACTUATOR-FRONT
RECIRCULATION DOOR ACTUATOR
C61 20 DB/LG
C33 20 LB/BR
C35 20 LB/OR
C32 20 DB/TN
C202
C34 22 DB/LB
C61 22 DB/LG
C33 22 LB/BR
C35 22 LB/OR
C32 20 DB/TN
C1
COMMON DOOR DRIVER (B)
DRIVER BLEND DOOR DRIVER (A)
PASSENGER BLEND DOOR DRIVER (A)
FRONT MODE DOOR DRIVER (A)
RECIRCULATION DOOR DRIVER (A)
A/C-HEATER CONTROL
PANEL LAMPS DRIVER
BLOWER MOTOR M2 DRIVER
BLOWER MOTOR M1 DRIVER
BLOWER MOTOR LOW DRIVER
SENSOR GROUND
EVAPORATOR TEMPERATURE SENSOR SIGNAL
GROUND
C2
E12 20 OR/GY
C73 14 DB/VT
C72 16 DB/OR
C71 16 DB/BR
C121 20 DB/DG
C21 22 DB/LG
Z134 12 BK/LG
S204
(8W-44-8)
INSTRUMENT CLUSTER
(8W-40-3)
EVAPORATOR TEMPERATURE SENSOR
BLOWER MOTOR RESISTOR BLOCK
G204
(8W-15-7)

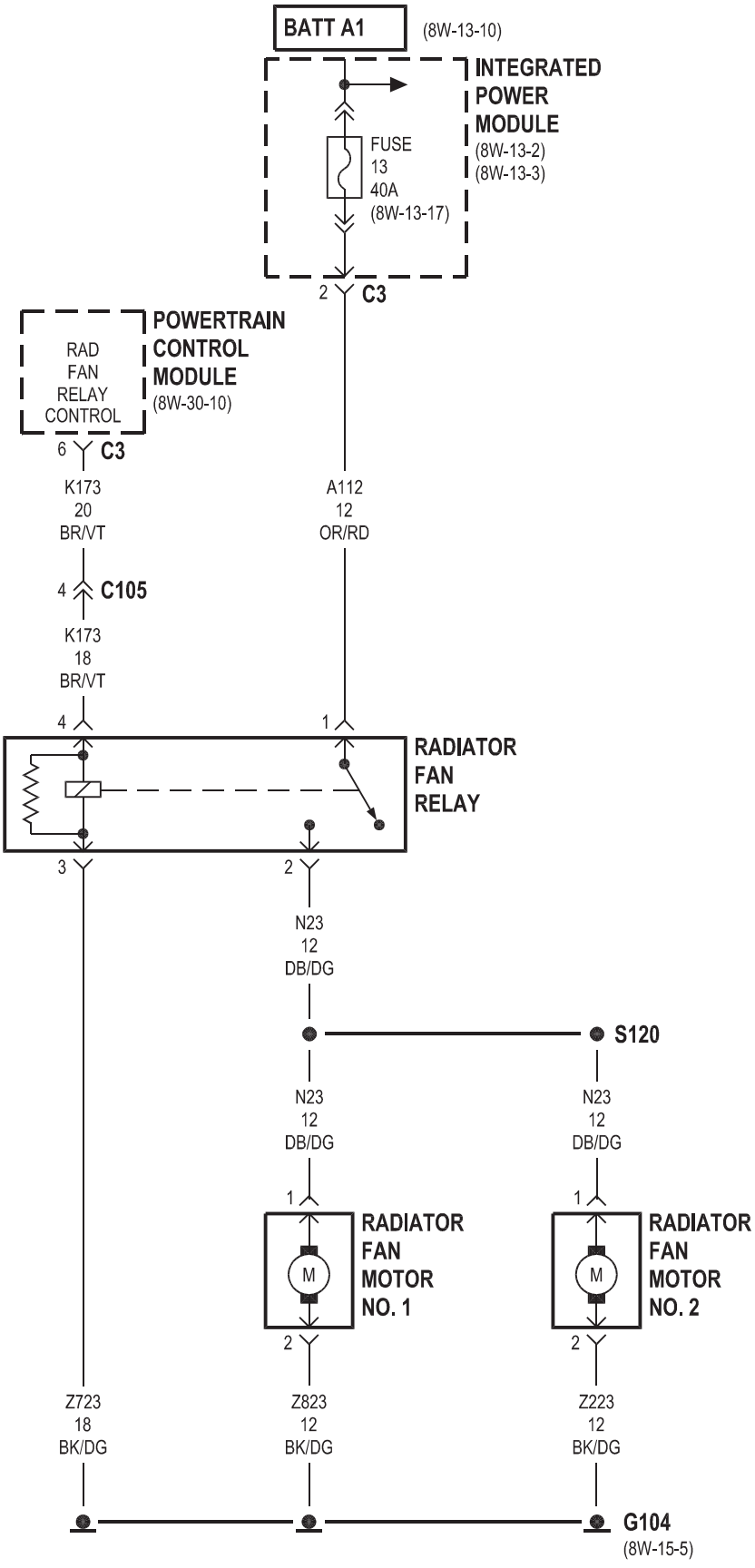

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
85
RUN RELAY
(8W-13-11)
85
30
FRONT BLOWER MOTOR RELAY
87A
87
86
86
87
87A
FUSE 45 10A
(8W-13-11)
RUN RELAY CONTROL
FRONT BLOWER MOTOR RELAY CONTROL
INTEGRATED POWER MODULE
FUSE 42 40A
(8W-13-20)
7 C8
8 C9
F504 20 GY/PK
C7 12 DB
45
11 C201
F504 20 GY/PK
5 C1
FUSED RUN RELAY OUTPUT
AUTO TEMP CONTROL
GROUND
PCI BUS
FRONT BLOWER MOTOR CONTROL
11 C1
6 C1
7 C1
C56 20 LB/DB
C7 12 DB
2
7 C202
D25 20 WT/VT
C56 20 DB/LB
C7 12 DB
3 C1
4 C1
S213
(8W-18-3)
FRONT BLOWER MOTOR CONTROL
FUSED FRONT BLOWER MOTOR RELAY OUTPUT
FRONT BLOWER POWER MODULE
Z24 18 BK/OR
D25 20 WT/VT
BLOWER MOTOR SUPPLY
BLOWER MOTOR GROUND
GROUND
2
1 C2
2 C2
2 C1
C112 12 DG
C113 12 BK
Z134 12 BK/OR
DATA LINK CONNECTOR
(8W-18-2)
1 C202
Z134 12 BK/LG
M
FRONT BLOWER MOTOR
G201
(8W-15-6)
G204
(8W-15-7)


MODE DOOR ACTUATOR-FRONT
EVAPORATOR TEMPERATURE SENSOR
RECIRCULATION DOOR ACTUATOR
C35 20 LB/OR
C135 20 DB/GY
C121 20 DB/DG
C21 20 DB/LG
C132 20 DB/YL
C32 20 DB/TN
C202
C35 22 LB/OR
C135 20 DB/GY
C121 20 DB/DG
C21 20 LG/DB
C132 20 DB/YL
C32 20 TN/DB
AUTO TEMP CONTROL
FRONT MODE DOOR DRIVER (A)
FRONT MODE DOOR DRIVER (B)
SENSOR GROUND
EVAPORATOR TEMPERATURE SENSOR SIGNAL
RECIRCULATION DOOR DRIVER (B)
RECIRCULATION DOOR DRIVER (A)
REAR MODE DOOR DRIVER (A)
REAR MODE DOOR DRIVER (B)
DRIVER BLEND DOOR DRIVER (B)
DRIVER BLEND DOOR DRIVER (A)
PASSENGER BLEND DOOR DRIVER (B)
PASSENGER BLEND DOOR DRIVER (A)
C153 22 DB/BR
C53 22 LB
C161 20 LB/WT
C61 22 DB/LG
C133 22 DB/WT
C33 22 LB/BR
C201
C153 20 DB/BR
C53 20 LB
C161 20 LB/WT
C61 20 DB/LG
C133 20 DB/WT
C33 20 LB/BR
MODE DOOR ACTUATOR-REAR
BLEND DOOR ACTUATOR-DRIVER
BLEND DOOR ACTUATOR-PASSENGER


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
85
30
REAR BOOSTER FAN RELAY
86
87
87A
REAR BOOSTER FAN RELAY CONTROL
INTEGRATED POWER MODULE
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 34 10A
(8W-13-20)
FUSE 50 15A
(8W-13-12)
2 C8
13 C4
C51 18 LB/BR
4 C1
A118 20 RD/OR
15 C201
REAR BOOSTER FAN POWER MODULE
FUSED REAR BOOSTER FAN RELAY OUTPUT
REAR BOOSTER FAN CONTROL
BOOSTER FAN SUPPLY
BOOSTER FAN GROUND
GROUND
2 C1
3 C1
1 C2
2 C2
C57 20 DB/LB
LG
BK
A118 20 RD/OR
41 C201
M
REAR BOOSTER FAN
S201
(8W-13-13)
Z135 18 BK/LB
C57 22 DB/LB
A118 20 RD/OR
8 C1
4 C1
REAR BOOSTER FAN CONTROL
FUSED B (+)
AUTO TEMP CONTROL
G301
(8W-15-11)

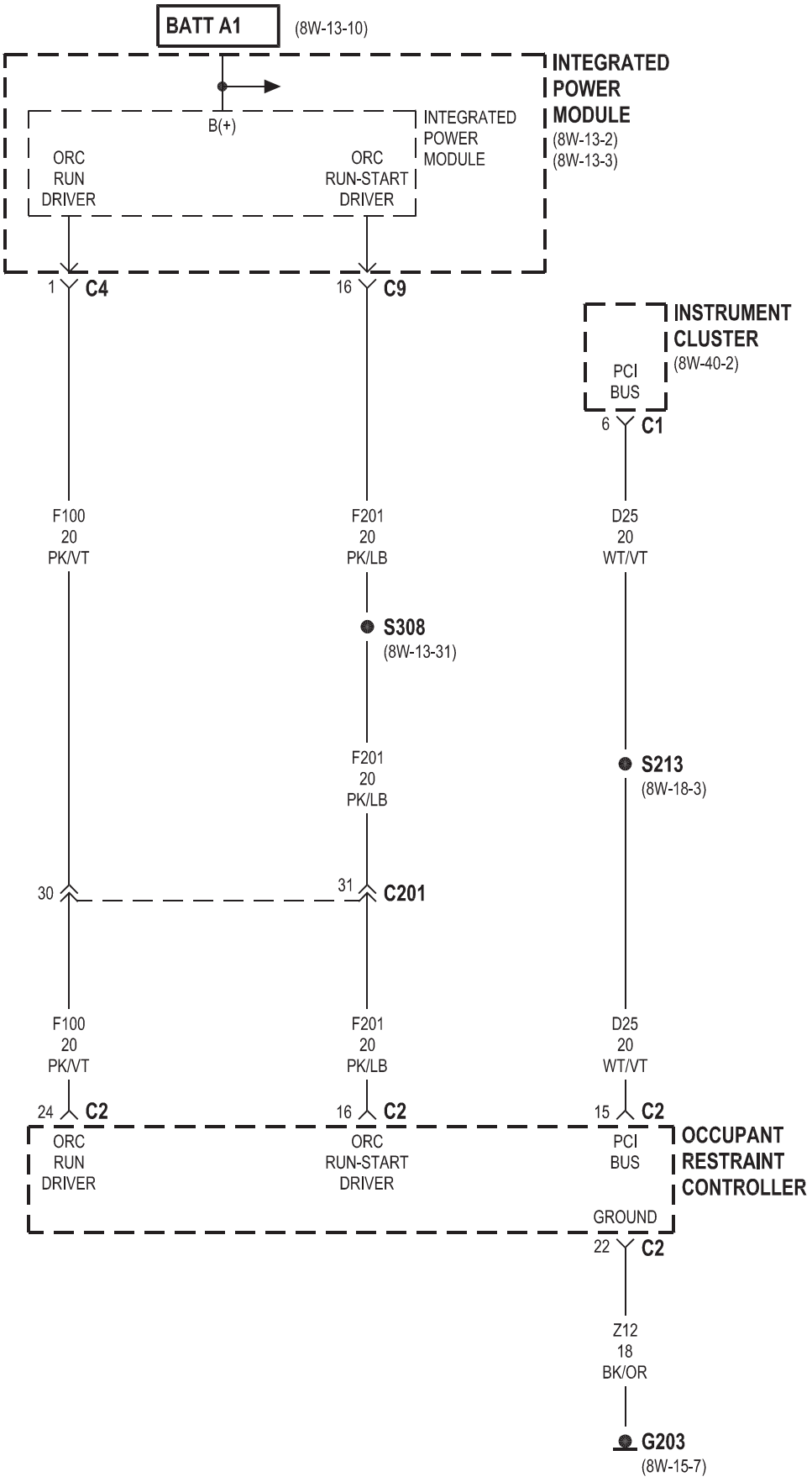

S204
(8W-44-8)
E12
18
OR/GY
3 C1
PANEL
LAMPS
DRIVER
AUTO
TEMP
CONTROL
REAR
FAN
SENSE
REAR
FAN
SENSE
SUPPLY
REAR
FAN ON
INDICATOR
DRIVER
REAR
FAN
SENSE
RETURN
9 C1
10 C1
11 C2
12 C2
C31
22
LB/YL
C11
22
LB/OR
G21
22
VT/WT
C931
22
DB/TN
47
48
46
49 C201
C31
20
LB/YL
C11
22
LB/OR
G21
22
VT/WT
C931
22
DB/TN
1
2
6
3 C300
C31
20
LB/YL
C11
22
LB/OR
G21
22
VT/WT
C931
20
DB/TN
2
3
4
6
REAR
FAN
SENSE
REAR
FAN
SENSE
SUPPLY
REAR
FAN ON
INDICATOR
DRIVER
REAR
FAN
SENSE
RETURN
GROUND
5
Z870
20
BK/YL
MIDDLE
ROW
HEATED
SEATS
EXCEPT
MIDDLE
ROW
HEATED
SEATS
S340
(8W-15-10)
Z870
20
BK/YL
Z870
20
BK/YL
5 C300
MIDDLE
ROW
HEATED
SEATS
EXCEPT
MIDDLE
ROW
HEATED
SEATS
S339
(8W-15-10)
Z870
16
BK/YL
Z870
20
BK/YL
G301
(8W-15-11)
E12
18
OR/GY
40 C201
4 C300
EXCEPT
MIDDLE
ROW
HEATED
SEATS
MIDDLE
ROW
HEATED
SEATS
E12
20
OR/GY
E12
20
OR/GY
1
PANEL
LAMPS
DRIVER
REAR
BOOSTER
FAN REAR
CONTROL
SWITCH
E12
18
OR/GY
S306
(8W-44-9)
E12
20
OR/GY
E12
20
OR/GY
9 C1
PANEL
LAMPS
DRIVER
INSTRUMENT
CLUSTER
(8W-40-3)

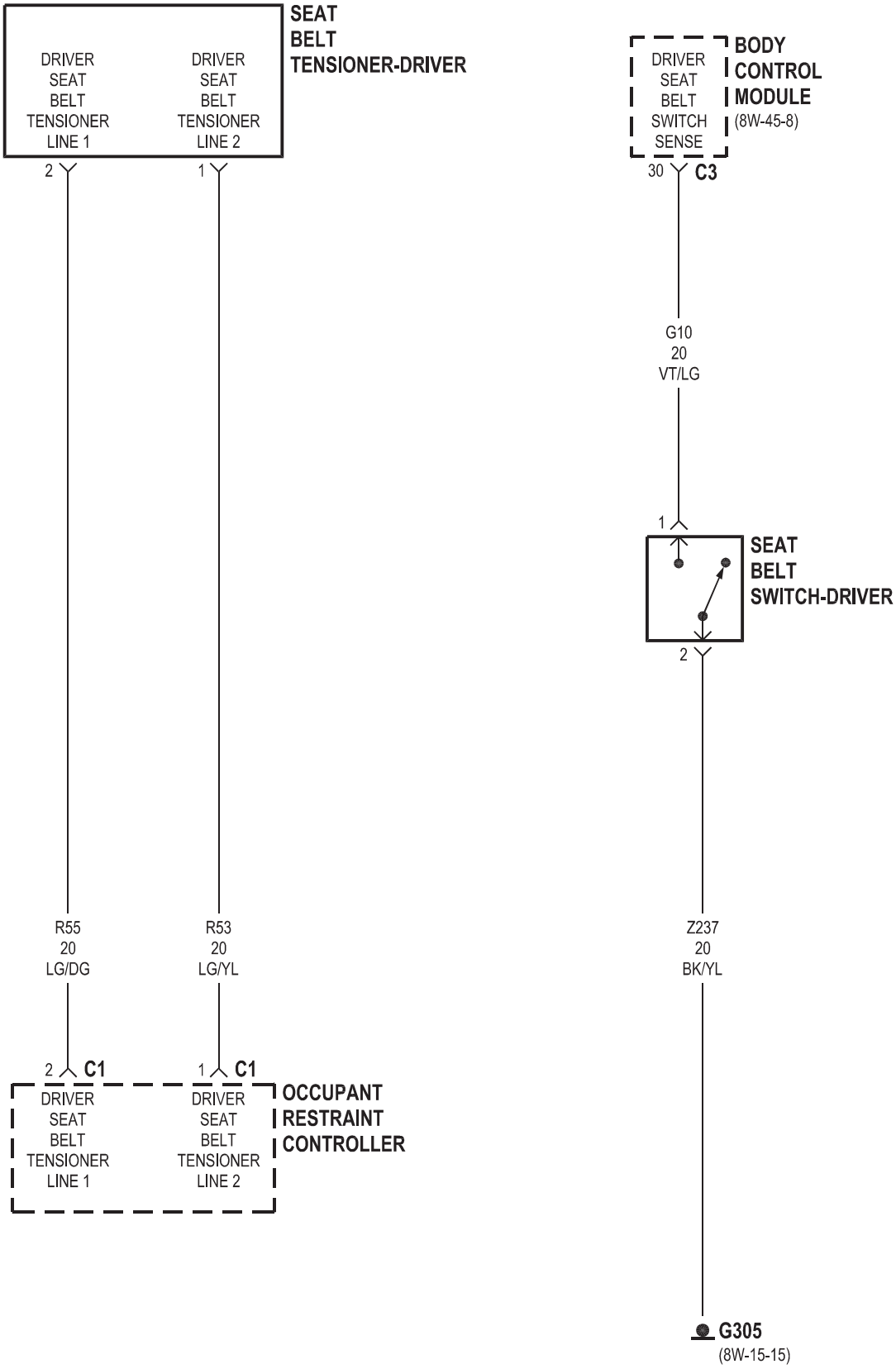

RUN-START F20
(8W-13-27)
BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 38 20A
(8W-13-25)
85
30
A/C COMPRESSOR CLUTCH RELAY
86
87
87A
2 C6
F202 20 PK/GY
4 C6
C13 20 LB/OR
14 C1
C3 18 DB/YL
1
A/C COMPRESSOR CLUTCH
2
Z153 18 BK/GY
S114
(8W-15-2)
Z2 8 BK/WT
G102
(8W-15-2)
A/C PRESSURE TRANSDUCER
2
3
1
K900 20 DB/DG
S107
(8W-70-4)
(8W-70-7)
F855 20 PK/YL
C18 20 LB/BR
K900 20 DB/DG
10
9
2 C105
3.5L
3.8L
F855 20 PK/YL
C18 20 LB/BR
K900 20 DB/DG
S100
(8W-70-2)
F855 (8W-70-5) 20 PK/YL
S108
(8W-70-4)
K900 (8W-70-6) 20 DB/DG
K900 20 DB/DG
3.8L
3.5L
7 C104
F855 20 PK/YL
4 C104
K900 20 DB/DG
S121
(8W-70-7)
S102
(8W-70-2)
S106
(8W-70-3)
F855 20 PK/YL
K900 20 DB/DG
11 C1
11 C3
29 C2
31 C3
27 C2
FUSED IGNITION SWITCH OUTPUT (RUN-START)
A/C CLUTCH RELAY CONTROL
5 VOLT SUPPLY
A/C PRESSURE TRANSDUCER SIGNAL
SENSOR GROUND
POWERTRAIN CONTROL MODULE
(8W-30-2)
(8W-30-4)
(8W-30-10)
(8W-30-13)

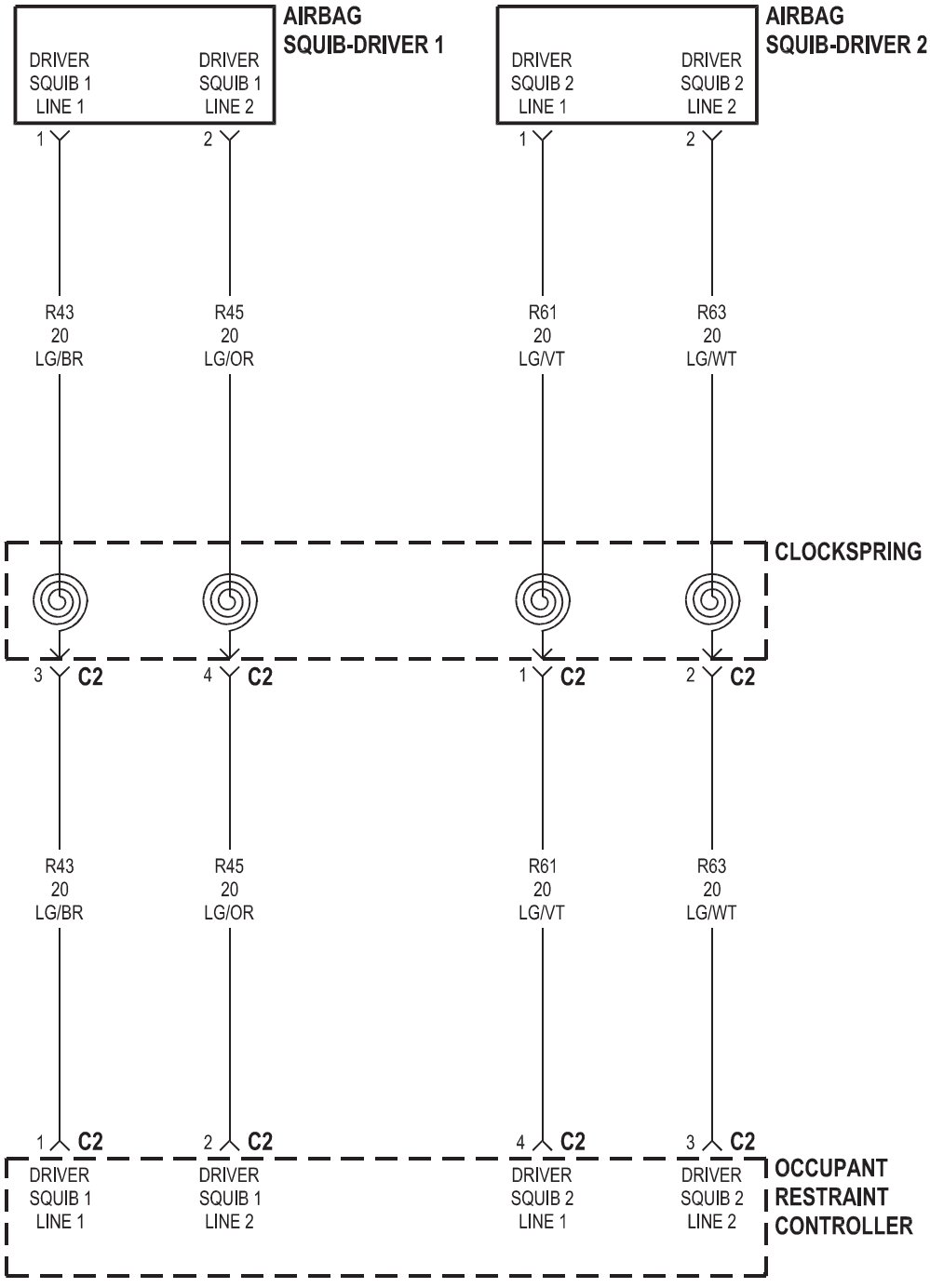

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 13 40A
(8W-13-17)
2
C3
POWERTRAIN CONTROL MODULE
(8W-30-10)
RAD FAN RELAY CONTROL
6
C3
K173 20 BR/VT
A112 12 OR/RD
4
C105
K173 18 BR/VT
4
1
RADIATOR FAN RELAY
3
2
N23 12 DB/DG
S120
N23 12 DB/DG
N23 12 DB/DG
1
1
RADIATOR FAN MOTOR NO. 1
RADIATOR FAN MOTOR NO. 2
M
M
2
2
Z723 18 BK/DG
Z823 12 BK/DG
Z223 12 BK/DG
G104
(8W-15-5)

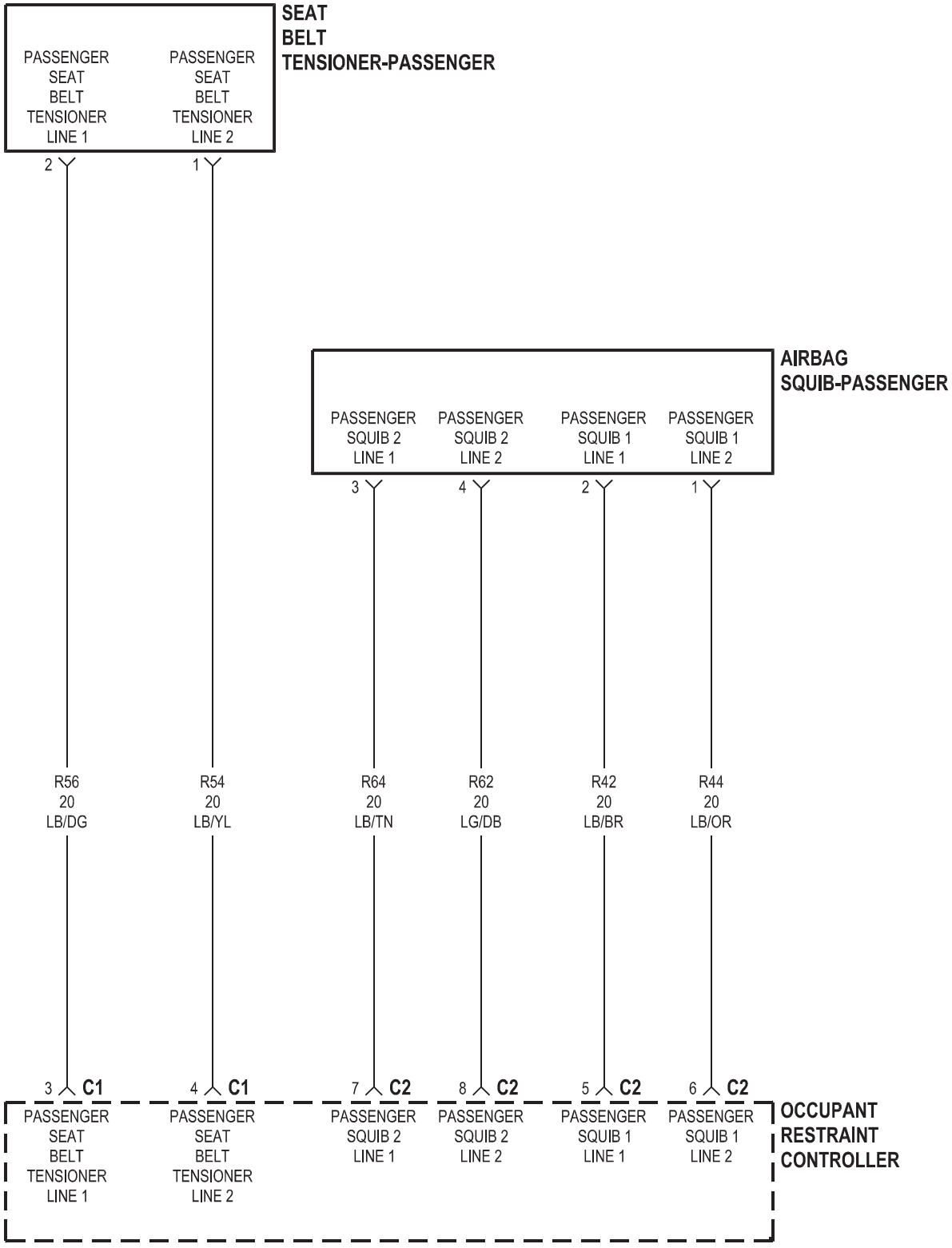
8W-43 OCCUPANT RESTRAINT SYSTEM

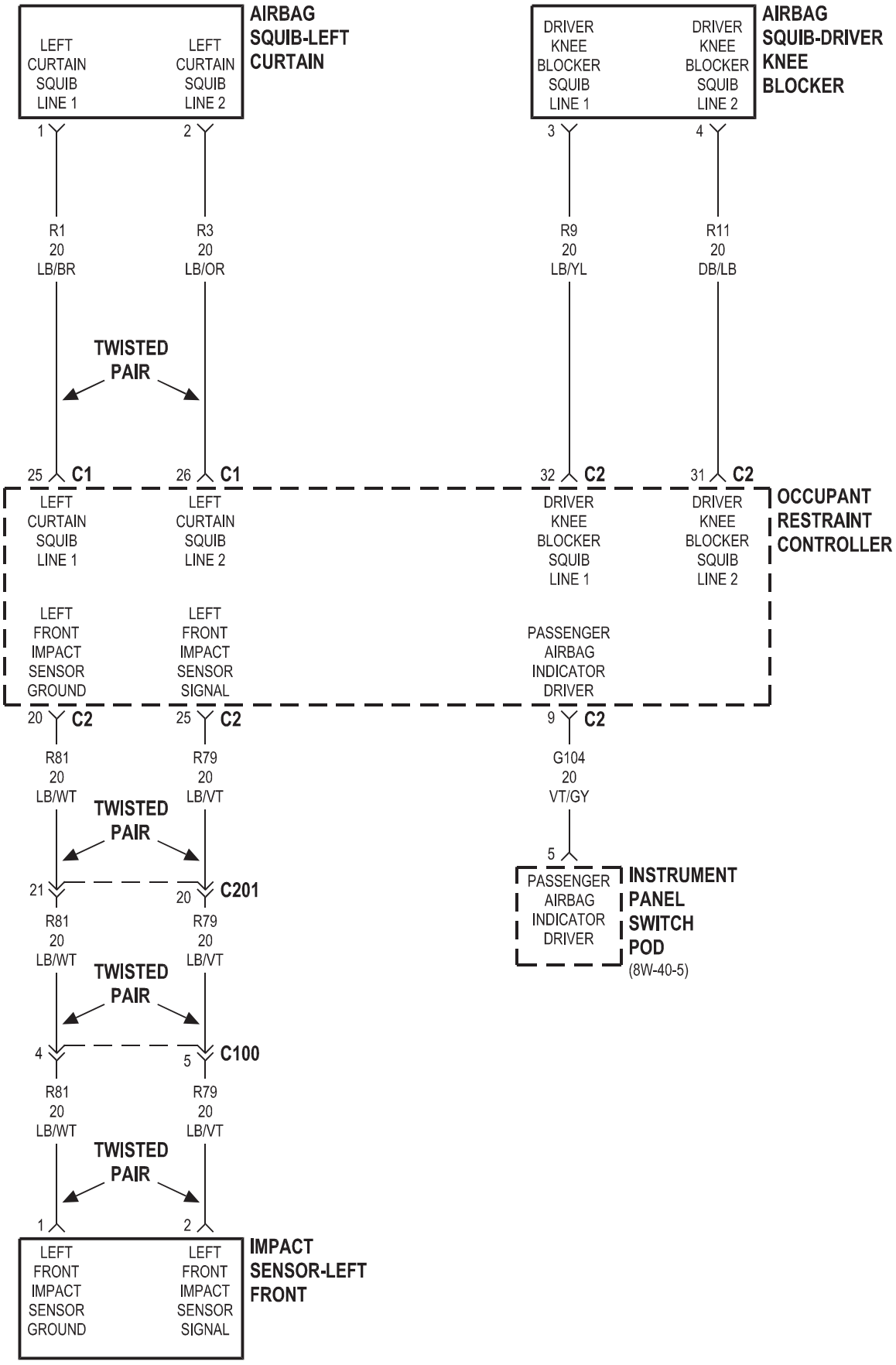
Component	Page
Airbag Squib-Driver 1	8W-43-4
Airbag Squib-Driver 2	8W-43-4
Airbag Squib-Driver Knee Blocker	8W-43-6
Airbag Squib-Left Curtain	8W-43-6
Airbag Squib-Passenger	8W-43-5
Airbag Squib-Right Curtain	8W-43-8
Belt Tension Sensor	8W-43-10
Body Control Module	8W-43-3
Clockspring	8W-43-4
Data Link Connector	8W-43-9
G203	8W-43-2, 9
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Impact Sensor-Left Side 1	8W-43-7
Impact Sensor-Left Side 2	8W-43-7
Impact Sensor-Right Front	8W-43-8
Impact Sensor-Right Side 1	8W-43-7
Impact Sensor-Right Side 2	8W-43-7
Instrument Cluster	8W-43-2
Instrument Panel Switch Pod	8W-43-6
Integrated Power Module	8W-43-2, 9
Occupant Classification Module	8W-43-9, 10
Occupant Restraint Controller	8W-43-2, 3, 4, 5, 6, 7, 8
Passenger Seat Weight Sensor	8W-43-9
Seat Belt Switch-Driver	8W-43-3
Seat Belt Tensioner-Driver	8W-43-3
Seat Belt Tensioner-Passenger	8W-43-5


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
B(+)
INTEGRATED POWER MODULE
ORC RUN DRIVER
ORC RUN-START DRIVER
1 C4
16 C9
INSTRUMENT CLUSTER
(8W-40-2)
PCI BUS
6 C1
F100 20 PK/VT
F201 20 PK/LB
D25 20 WT/VT
S308
(8W-13-31)
F201 20 PK/LB
S213
(8W-18-3)
30
31 C201
F100 20 PK/VT
F201 20 PK/LB
D25 20 WT/VT
24 C2
16 C2
15 C2
ORC RUN DRIVER
ORC RUN-START DRIVER
PCI BUS
OCCUPANT RESTRAINT CONTROLLER
GROUND
22 C2
Z12 18 BK/OR
G203
(8W-15-7)

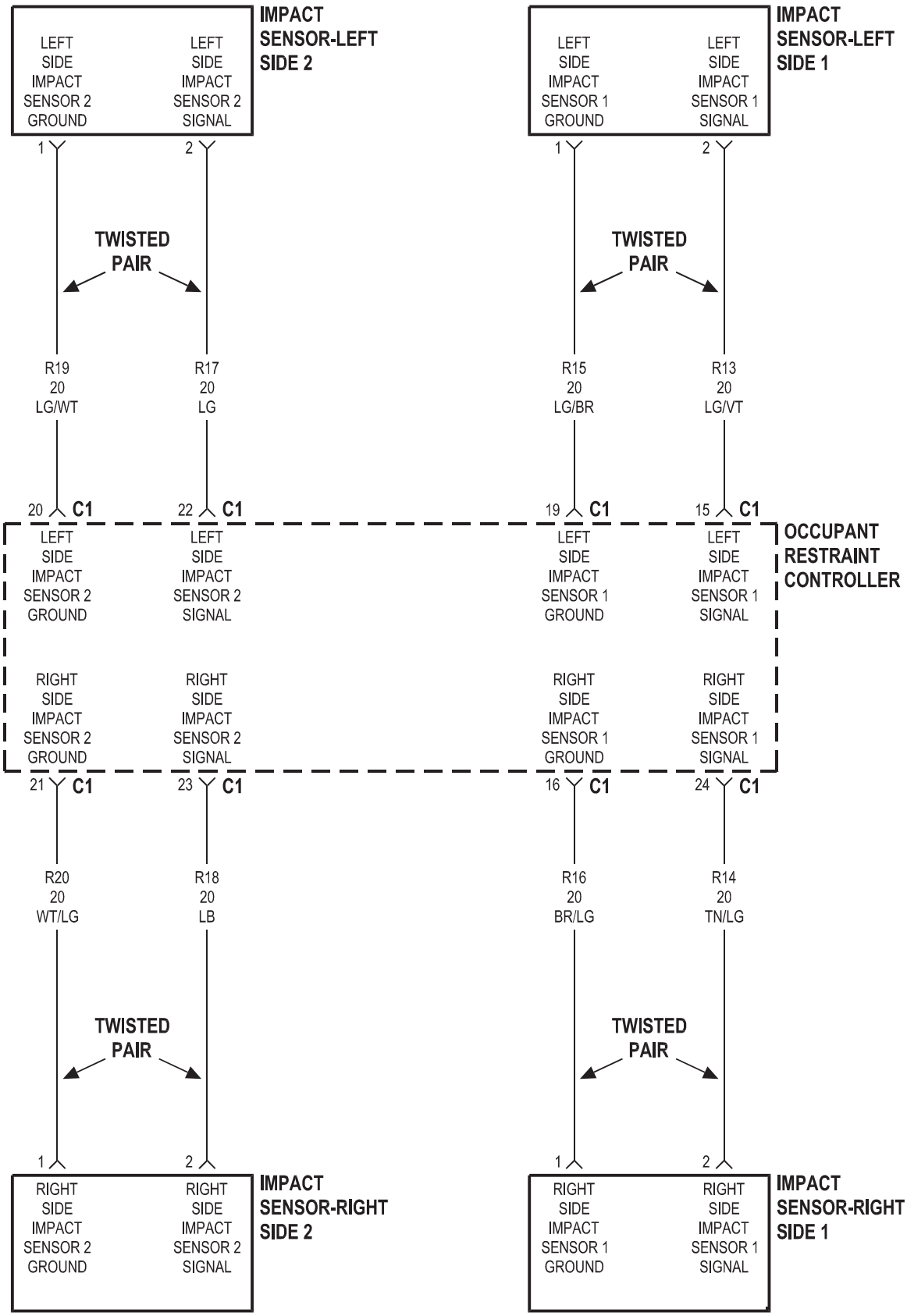

SEAT
BELT
TENSIONER-DRIVER
DRIVER
SEAT
BELT
TENSIONER
LINE 1
DRIVER
SEAT
BELT
TENSIONER
LINE 2
2
1
BODY
CONTROL
MODULE
(8W-45-8)
DRIVER
SEAT
BELT
SWITCH
SENSE
30
C3
G10
20
VT/LG
1
SEAT
BELT
SWITCH-DRIVER
2
R55
20
LG/DG
R53
20
LG/YL
Z237
20
BK/YL
2
C1
1
C1
OCCUPANT
RESTRAINT
CONTROLLER
DRIVER
SEAT
BELT
TENSIONER
LINE 1
DRIVER
SEAT
BELT
TENSIONER
LINE 2
G305
(8W-15-15)

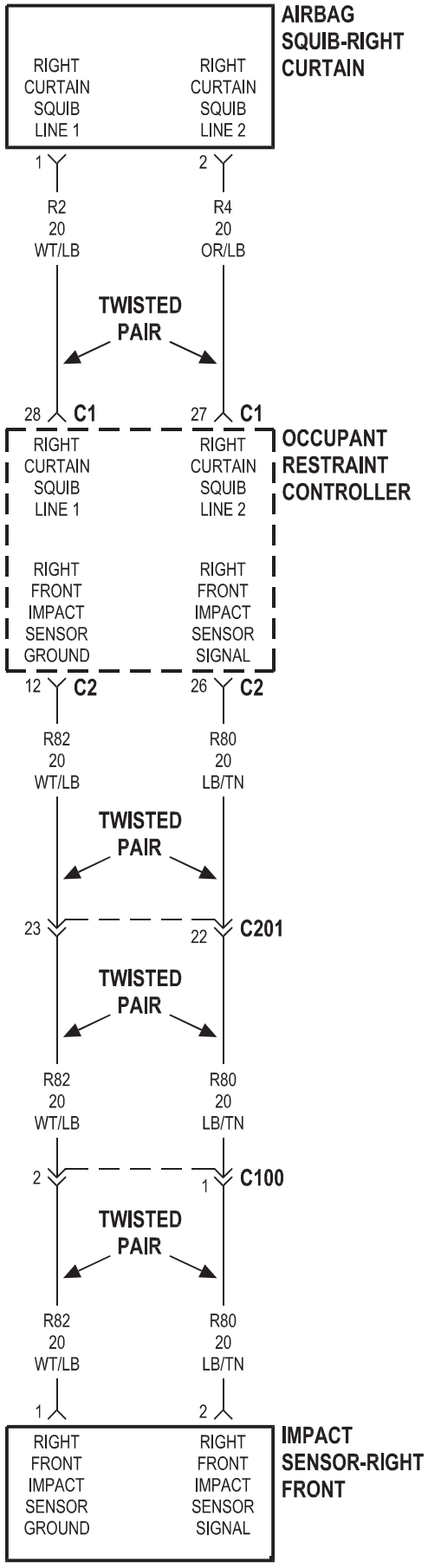

AIRBAG
SQUIB-DRIVER 1
DRIVER
SQUIB 1
LINE 1
DRIVER
SQUIB 1
LINE 2
AIRBAG
SQUIB-DRIVER 2
DRIVER
SQUIB 2
LINE 1
DRIVER
SQUIB 2
LINE 2
1
2
1
2
R43
20
LG/BR
R45
20
LG/OR
R61
20
LG/VT
R63
20
LG/WT
CLOCKSPRING
3 C2
4 C2
1 C2
2 C2
R43
20
LG/BR
R45
20
LG/OR
R61
20
LG/VT
R63
20
LG/WT
1 C2
2 C2
4 C2
3 C2
DRIVER
SQUIB 1
LINE 1
DRIVER
SQUIB 1
LINE 2
DRIVER
SQUIB 2
LINE 1
DRIVER
SQUIB 2
LINE 2
OCCUPANT
RESTRAINT
CONTROLLER

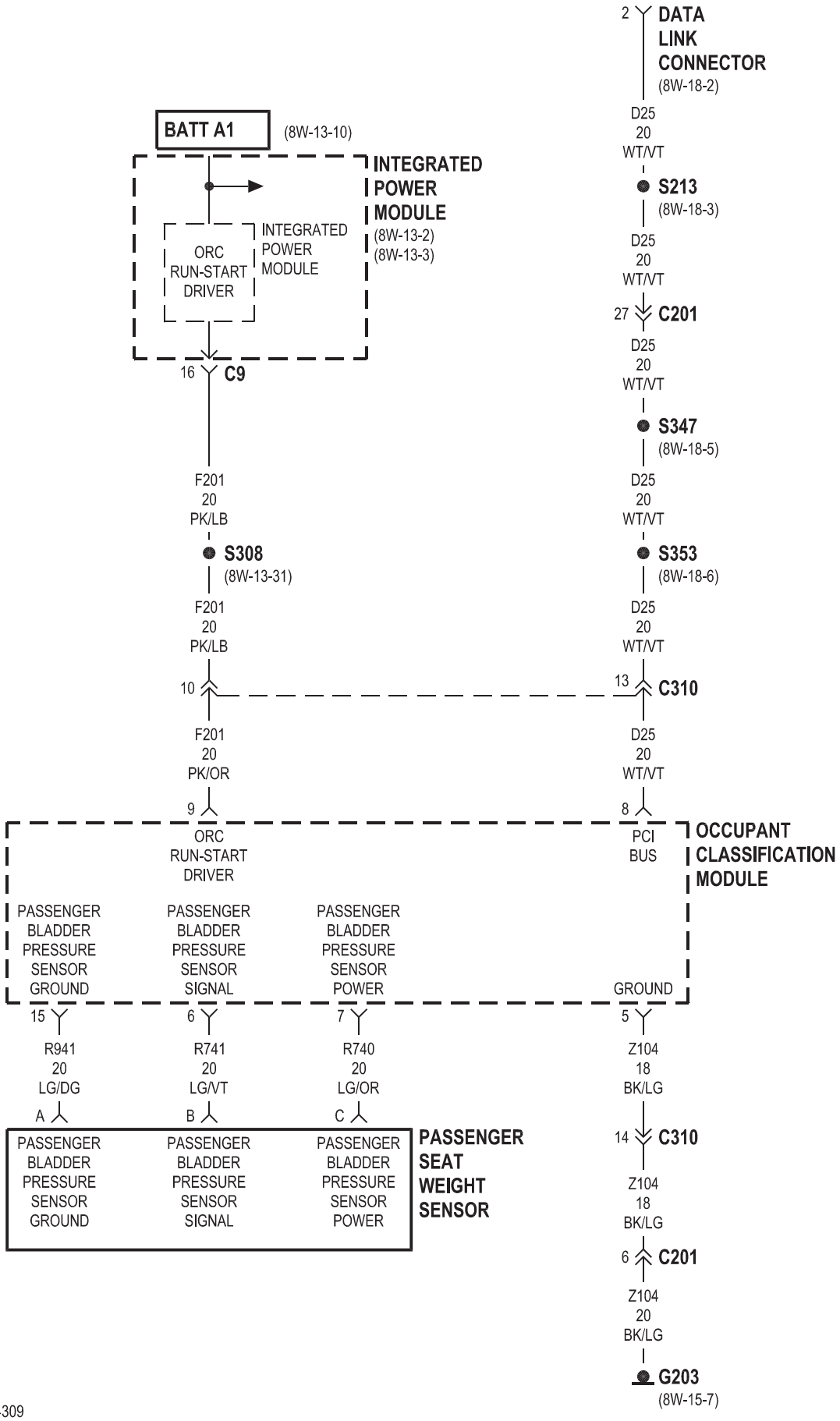

SEAT BELT TENSIONER-PASSENGER
PASSENGER SEAT BELT TENSIONER LINE 1
PASSENGER SEAT BELT TENSIONER LINE 2
2
1
AIRBAG SQUIB-PASSENGER
PASSENGER SQUIB 2 LINE 1
PASSENGER SQUIB 2 LINE 2
PASSENGER SQUIB 1 LINE 1
PASSENGER SQUIB 1 LINE 2
3
4
2
1
R56 20 LB/DG
R54 20 LB/YL
R64 20 LB/TN
R62 20 LG/DB
R42 20 LB/BR
R44 20 LB/OR
3 C1
4 C1
7 C2
8 C2
5 C2
6 C2
PASSENGER SEAT BELT TENSIONER LINE 1
PASSENGER SEAT BELT TENSIONER LINE 2
PASSENGER SQUIB 2 LINE 1
PASSENGER SQUIB 2 LINE 2
PASSENGER SQUIB 1 LINE 1
PASSENGER SQUIB 1 LINE 2
OCCUPANT RESTRAINT CONTROLLER

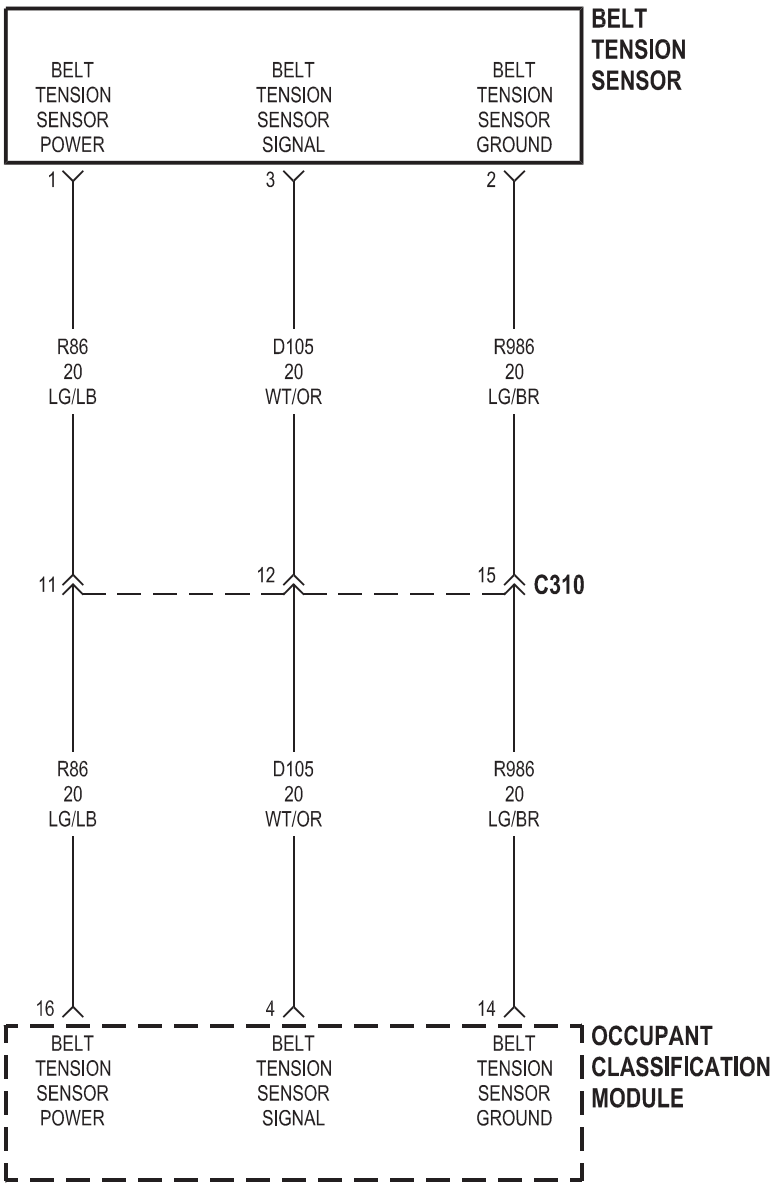

AIRBAG SQUIB-LEFT CURTAIN
LEFT CURTAIN SQUIB LINE 1
LEFT CURTAIN SQUIB LINE 2
1
2
AIRBAG SQUIB-DRIVER KNEE BLOCKER
DRIVER KNEE BLOCKER SQUIB LINE 1
DRIVER KNEE BLOCKER SQUIB LINE 2
3
4
R1 20 LB/BR
R3 20 LB/OR
R9 20 LB/YL
R11 20 DB/LB
TWISTED PAIR
25 C1
26 C1
32 C2
31 C2
OCCUPANT RESTRAINT CONTROLLER
LEFT CURTAIN SQUIB LINE 1
LEFT CURTAIN SQUIB LINE 2
DRIVER KNEE BLOCKER SQUIB LINE 1
DRIVER KNEE BLOCKER SQUIB LINE 2
LEFT FRONT IMPACT SENSOR GROUND
LEFT FRONT IMPACT SENSOR SIGNAL
PASSENGER AIRBAG INDICATOR DRIVER
20 C2
25 C2
9 C2
R81 20 LB/WT
R79 20 LB/VT
G104 20 VT/GY
TWISTED PAIR
5
21
20 C201
PASSENGER AIRBAG INDICATOR DRIVER
INSTRUMENT PANEL SWITCH POD
(8W-40-5)
4
5 C100
1
2
IMPACT SENSOR-LEFT FRONT

SIDE AIRBAGS



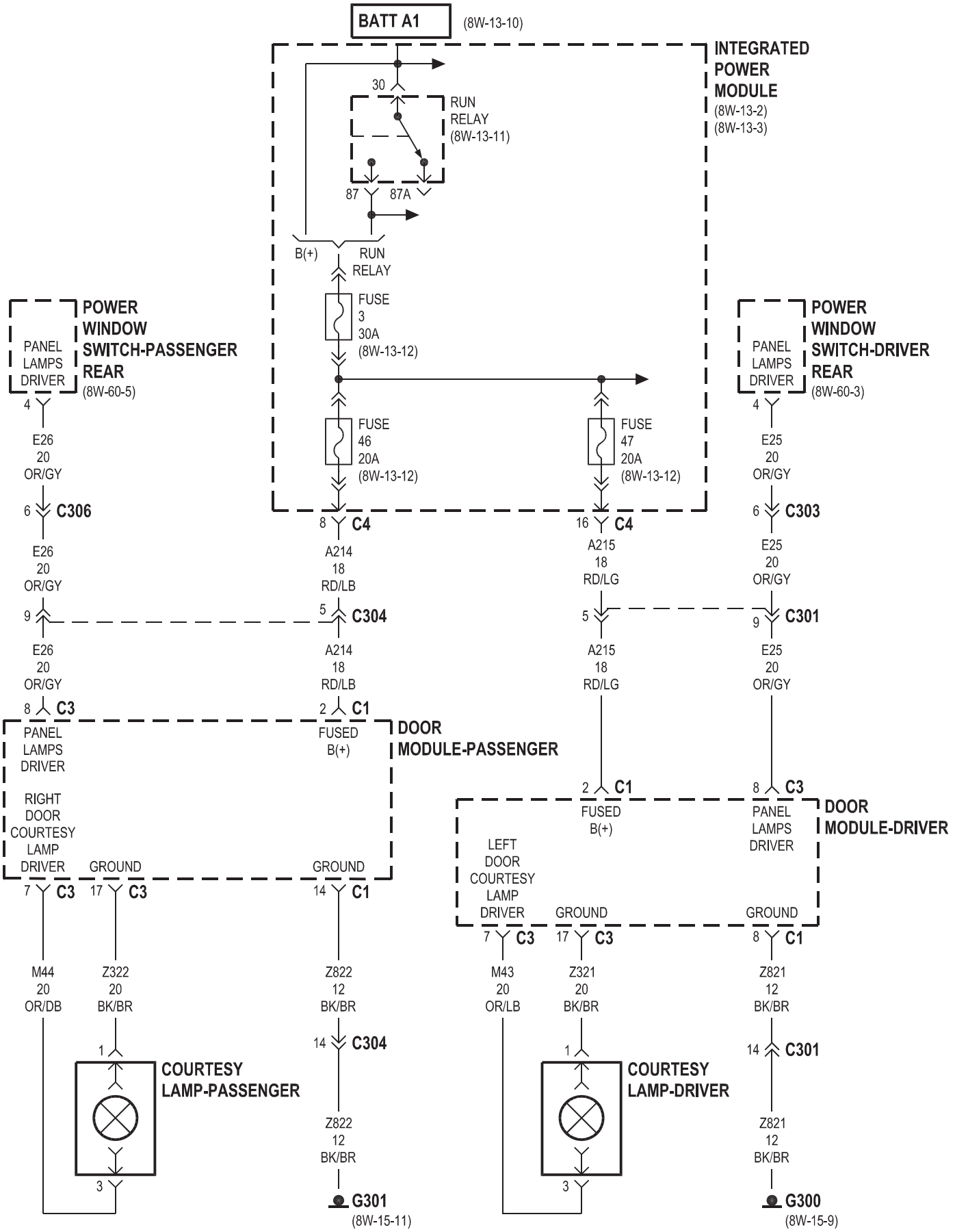

AIRBAG SQUIB-RIGHT CURTAIN
RIGHT CURTAIN SQUIB LINE 1
RIGHT CURTAIN SQUIB LINE 2
1
2
R2 20 WT/LB
R4 20 OR/LB
TWISTED PAIR
28 C1
27 C1
OCCUPANT RESTRAINT CONTROLLER
RIGHT CURTAIN SQUIB LINE 1
RIGHT CURTAIN SQUIB LINE 2
RIGHT FRONT IMPACT SENSOR GROUND
RIGHT FRONT IMPACT SENSOR SIGNAL
12 C2
26 C2
R82 20 WT/LB
R80 20 LB/TN
TWISTED PAIR
23
22 C201
TWISTED PAIR
R82 20 WT/LB
R80 20 LB/TN
2
1 C100
TWISTED PAIR
R82 20 WT/LB
R80 20 LB/TN
1
2
IMPACT SENSOR-RIGHT FRONT
RIGHT FRONT IMPACT SENSOR GROUND
RIGHT FRONT IMPACT SENSOR SIGNAL

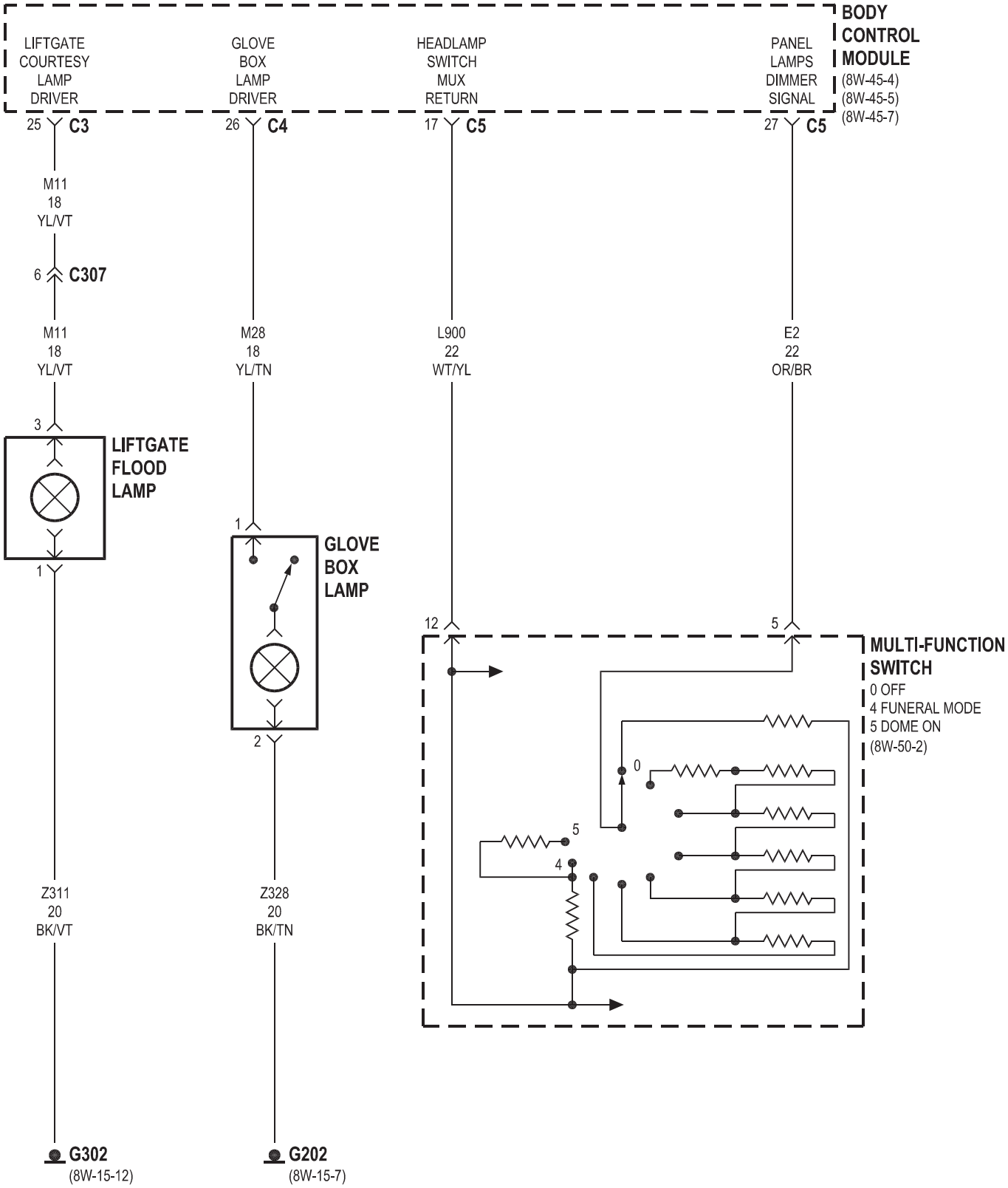

2
DATA LINK CONNECTOR
(8W-18-2)
D25
20
WT/VT
S213
(8W-18-3)
D25
20
WT/VT
27
C201
D25
20
WT/VT
S347
(8W-18-5)
D25
20
WT/VT
S353
(8W-18-6)
D25
20
WT/VT
13
C310
D25
20
WT/VT
8
PCI BUS
BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
ORC RUN-START DRIVER
16
C9
F201
20
PK/LB
S308
(8W-13-31)
F201
20
PK/LB
10
F201
20
PK/OR
9
ORC RUN-START DRIVER
OCCUPANT CLASSIFICATION MODULE
PASSENGER BLADDER PRESSURE SENSOR GROUND
PASSENGER BLADDER PRESSURE SENSOR SIGNAL
PASSENGER BLADDER PRESSURE SENSOR POWER
GROUND
15
6
7
5
R941
20
LG/DG
R741
20
LG/VT
R740
20
LG/OR
Z104
18
BK/LG
A
B
C
PASSENGER BLADDER PRESSURE SENSOR GROUND
PASSENGER BLADDER PRESSURE SENSOR SIGNAL
PASSENGER BLADDER PRESSURE SENSOR POWER
PASSENGER SEAT WEIGHT SENSOR
14
C310
Z104
18
BK/LG
6
C201
Z104
20
BK/LG
G203
(8W-15-7)

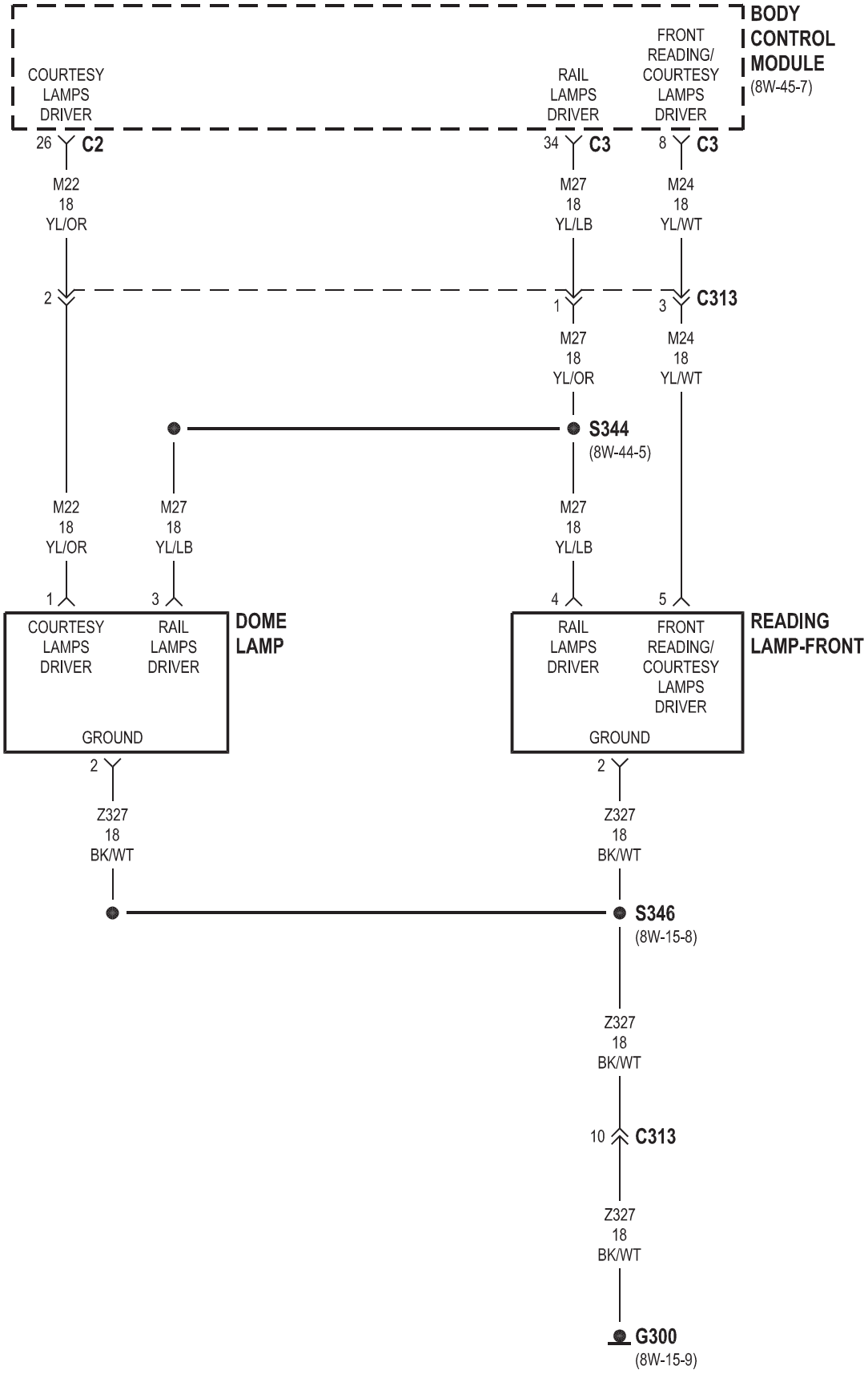

BELT TENSION SENSOR
BELT TENSION SENSOR POWER
BELT TENSION SENSOR SIGNAL
BELT TENSION SENSOR GROUND
1
3
2
R86 20 LG/LB
D105 20 WT/OR
R986 20 LG/BR
11
12
15
C310
R86 20 LG/LB
D105 20 WT/OR
R986 20 LG/BR
16
4
14
BELT TENSION SENSOR POWER
BELT TENSION SENSOR SIGNAL
BELT TENSION SENSOR GROUND
OCCUPANT CLASSIFICATION MODULE

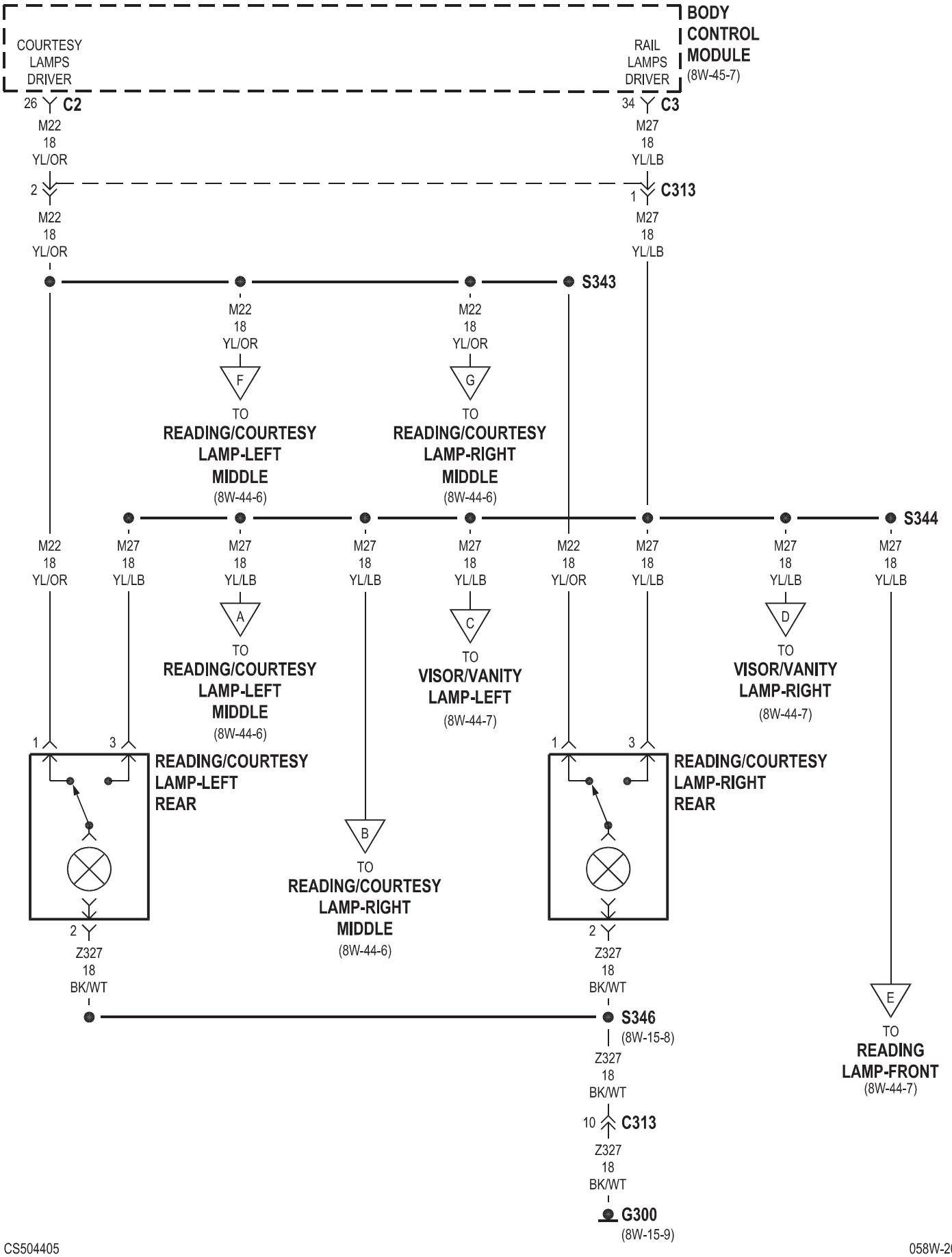
8W-44 INTERIOR LIGHTING

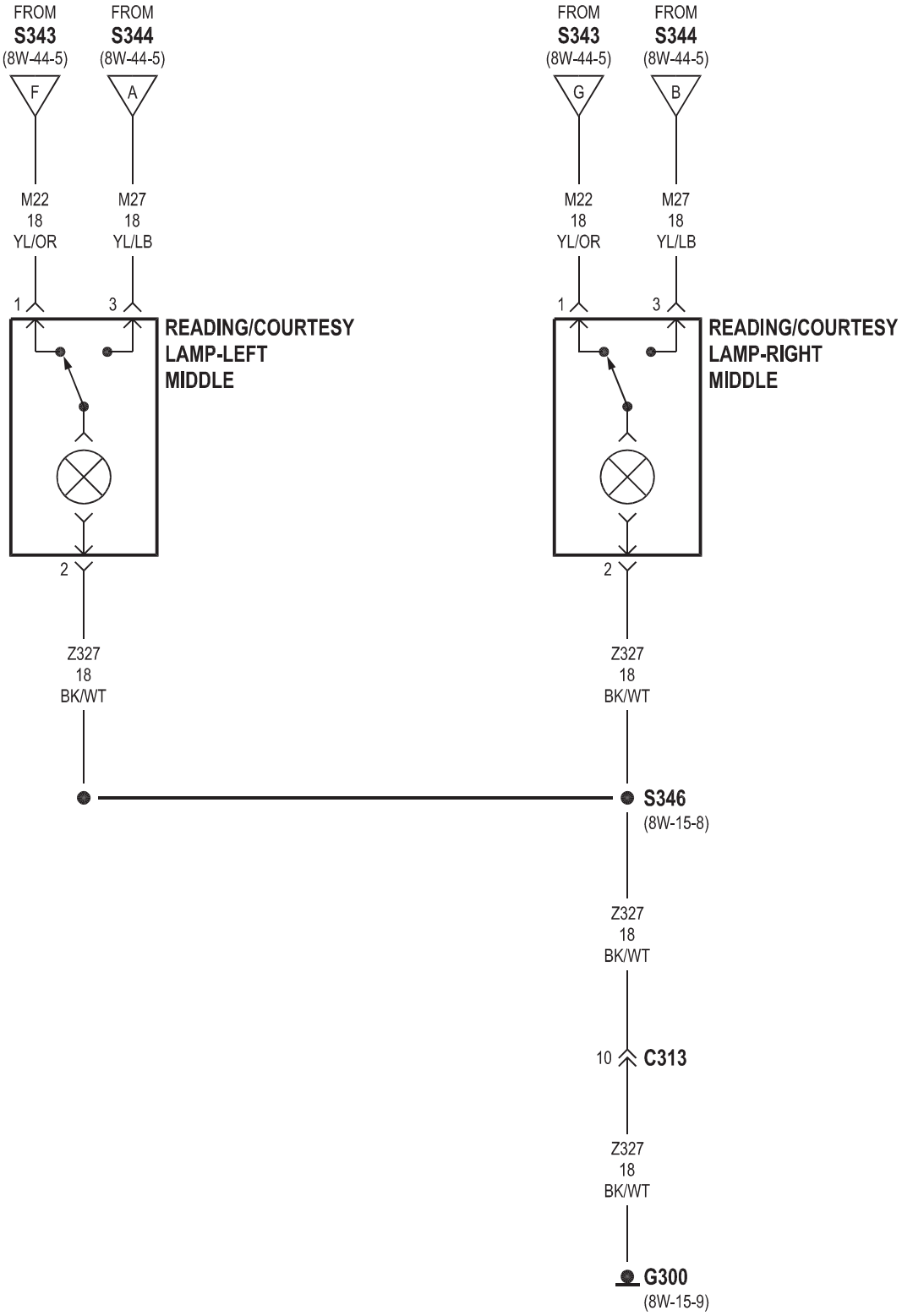
Component	Page
A/C-Heater Control	8W-44-8
Auto Temp Control	8W-44-8
Body Control Module	8W-44-3, 4, 5, 7
Courtesy Lamp-Driver	8W-44-2
Courtesy Lamp-Passenger	8W-44-2
Dome Lamp	8W-44-4
Door Module-Driver	8W-44-2, 10
Door Module-Passenger	8W-44-2, 10
Dvd/Cd Changer	8W-44-8
Fuse 3	8W-44-2
Fuse 44	8W-44-11
Fuse 46	8W-44-2
Fuse 47	8W-44-2
G201	8W-44-8
G202	8W-44-3, 8
G300	8W-44-2, 4, 5, 6, 7
G301	8W-44-2, 9, 11
G302	8W-44-3
Glove Box Lamp	8W-44-3
Heated Seat Switch-Left Middle Row	8W-44-9, 11
Heated Seat Switch-Right Middle Row	8W-44-9, 11
Instrument Cluster	8W-44-8
Instrument Panel Switch Pod	8W-44-8
Integrated Power Module	8W-44-2, 8, 11
Liftgate Flood Lamp	8W-44-3
Multi-Function Switch	8W-44-3
Overhead Console	8W-44-7
Power Seat Switch-Driver	8W-44-10
Power Seat Switch-Passenger	8W-44-10
Power Window Switch-Driver Rear	8W-44-2
Power Window Switch-Passenger Rear	8W-44-2
Radio	8W-44-8
Reading Lamp-Front	8W-44-4, 5, 7
Reading/Courtesy Lamp-Left Middle	8W-44-5, 6
Reading/Courtesy Lamp-Left Rear	8W-44-5
Reading/Courtesy Lamp-Right Middle	8W-44-5, 6
Reading/Courtesy Lamp-Right Rear	8W-44-5
Rear Booster Fan Rear Control Switch	8W-44-9
Run Relay	8W-44-2, 11
Satellite Radio Multiplexer	8W-44-8
Seat Heater Interface Module	8W-44-11
Shift Lever Assembly	8W-44-8
Traction Control Switch	8W-44-8
Visor/Vanity Lamp-Left	8W-44-5, 7
Visor/Vanity Lamp-Right	8W-44-5, 7

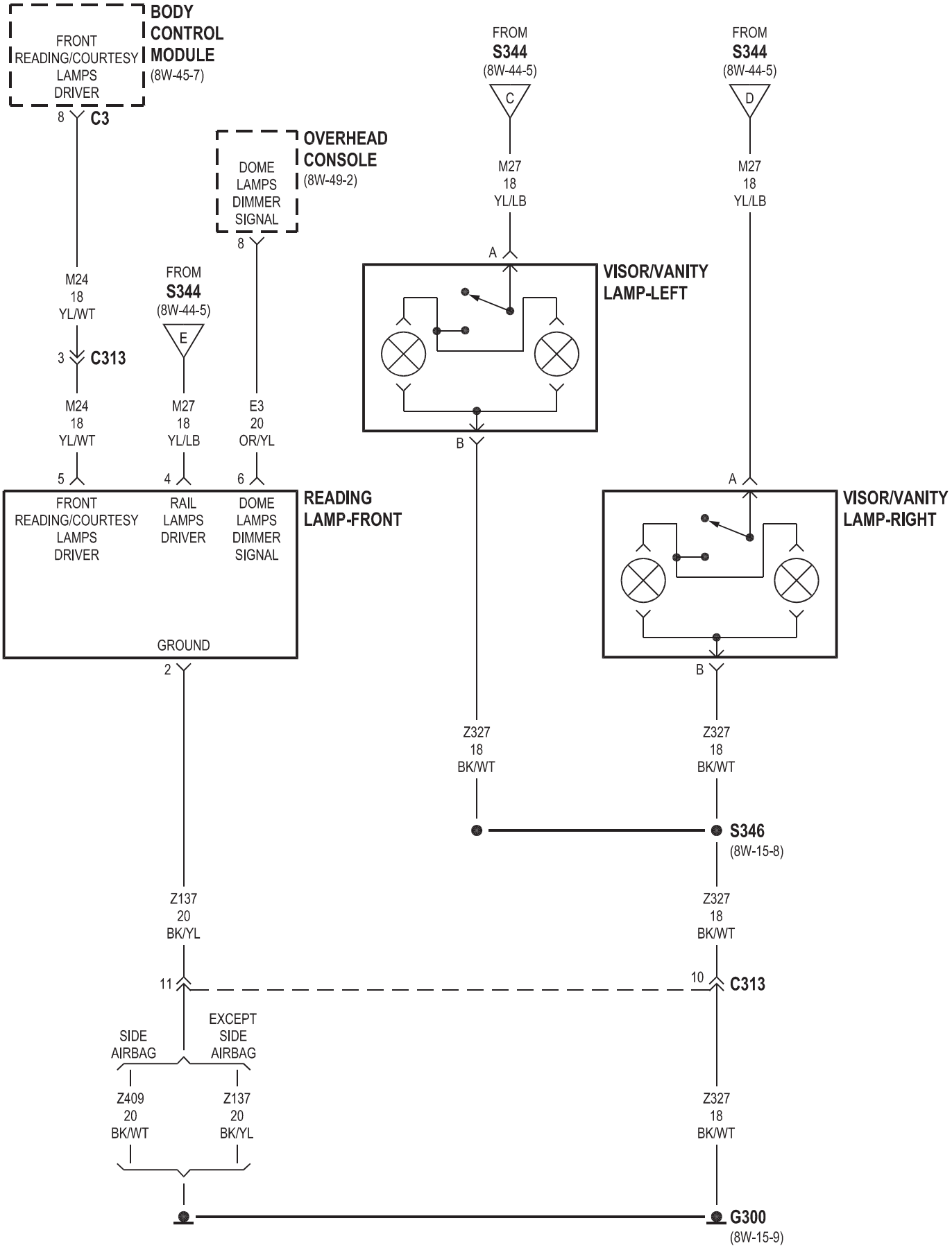

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 46 20A
(8W-13-12)
FUSE 47 20A
(8W-13-12)
POWER WINDOW SWITCH-PASSENGER REAR
(8W-60-5)
PANEL LAMPS DRIVER
4
E26 20 OR/GY
6 C306
E26 20 OR/GY
9
E26 20 OR/GY
8 C3
POWER WINDOW SWITCH-DRIVER REAR
(8W-60-3)
PANEL LAMPS DRIVER
4
E25 20 OR/GY
6 C303
E25 20 OR/GY
9 C301
E25 20 OR/GY
8 C3
8 C4
A214 18 RD/LB
5 C304
A214 18 RD/LB
2 C1
FUSED B(+)
16 C4
A215 18 RD/LG
5
A215 18 RD/LG
2 C1
FUSED B(+)
DOOR MODULE-PASSENGER
PANEL LAMPS DRIVER
RIGHT DOOR COURTESY LAMP DRIVER
GROUND
7 C3
17 C3
14 C1
M44 20 OR/DB
Z322 20 BK/BR
Z822 12 BK/BR
14 C304
Z822 12 BK/BR
G301
(8W-15-11)
1
3
COURTESY LAMP-PASSENGER
DOOR MODULE-DRIVER
PANEL LAMPS DRIVER
LEFT DOOR COURTESY LAMP DRIVER
GROUND
8 C3
7 C3
17 C3
8 C1
M43 20 OR/LB
Z321 20 BK/BR
Z821 12 BK/BR
14 C301
Z821 12 BK/BR
G300
(8W-15-9)
1
3
COURTESY LAMP-DRIVER

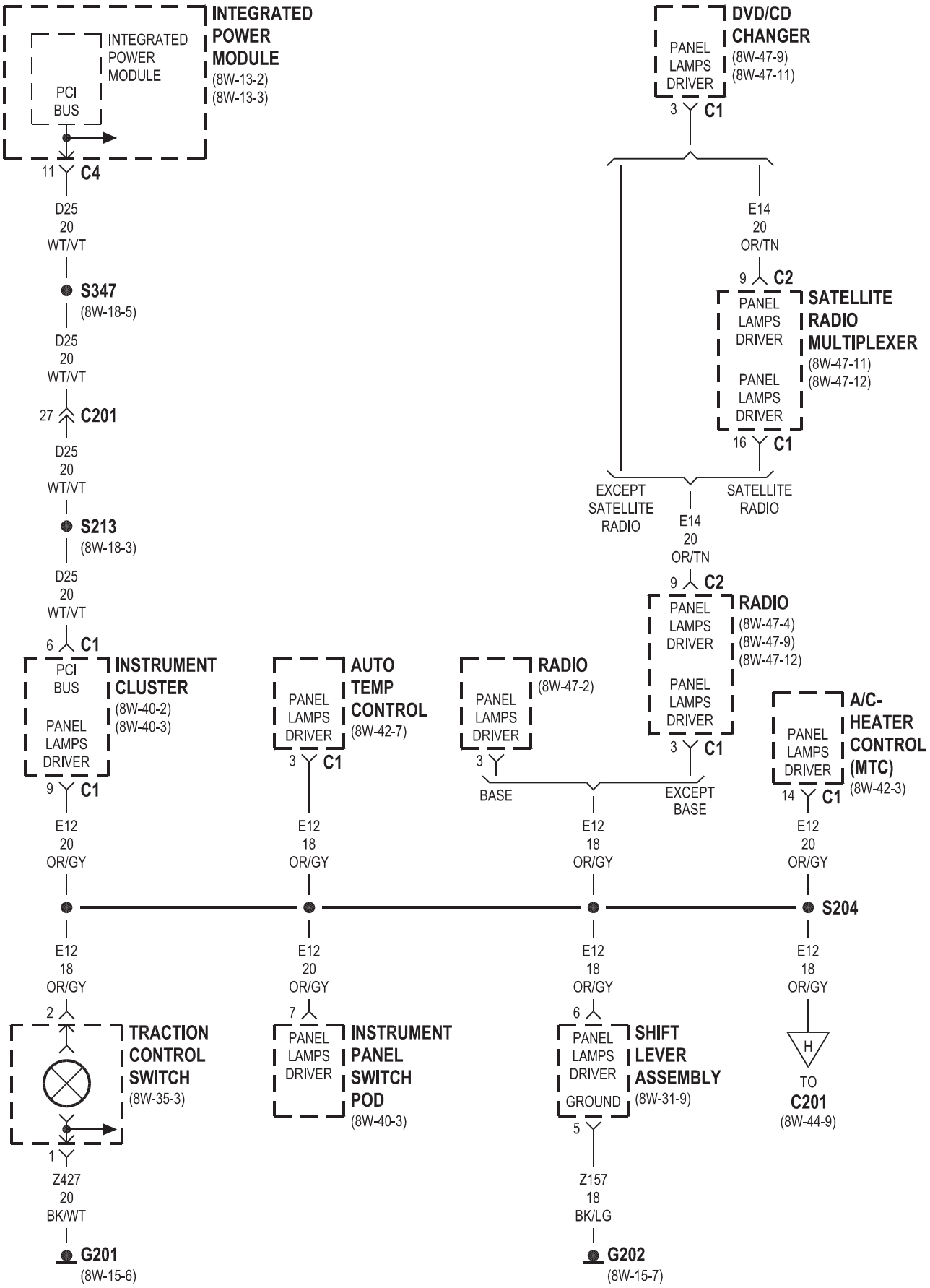

BODY CONTROL MODULE
(8W-45-4)
(8W-45-5)
(8W-45-7)
LIFTGATE COURTESY LAMP DRIVER
GLOVE BOX LAMP DRIVER
HEADLAMP SWITCH MUX RETURN
PANEL LAMPS DIMMER SIGNAL
25 C3
26 C4
17 C5
27 C5
M11 18 YL/VT
6 C307
M11 18 YL/VT
M28 18 YL/TN
L900 22 WT/YL
E2 22 OR/BR
3
LIFTGATE FLOOD LAMP
1
1
GLOVE BOX LAMP
2
12
5
MULTI-FUNCTION SWITCH
0 OFF
4 FUNERAL MODE
5 DOME ON
(8W-50-2)
0
5
4
Z311 20 BK/VT
Z328 20 BK/TN
G302
(8W-15-12)
G202
(8W-15-7)

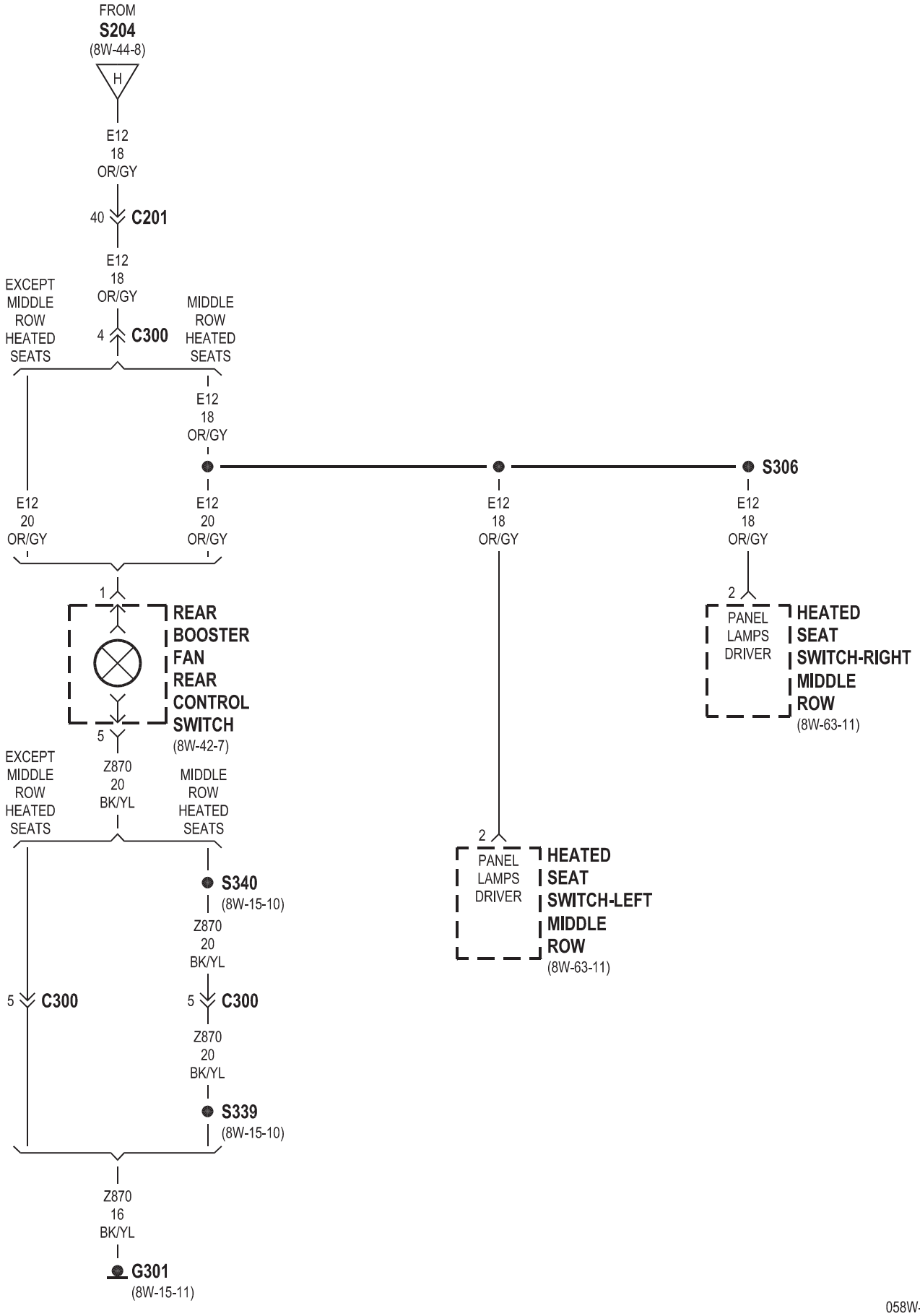

BODY CONTROL MODULE
(8W-45-7)
COURTESY LAMPS DRIVER
RAIL LAMPS DRIVER
FRONT READING/ COURTESY LAMPS DRIVER
26 C2
34 C3
8 C3
M22 18 YL/OR
M27 18 YL/LB
M24 18 YL/WT
2
1
3 C313
M27 18 YL/OR
M24 18 YL/WT
S344
(8W-44-5)
M22 18 YL/OR
M27 18 YL/LB
M27 18 YL/LB
1
3
4
5
COURTESY LAMPS DRIVER
RAIL LAMPS DRIVER
DOME LAMP
RAIL LAMPS DRIVER
FRONT READING/ COURTESY LAMPS DRIVER
READING LAMP-FRONT
GROUND
GROUND
2
2
Z327 18 BK/WT
Z327 18 BK/WT
S346
(8W-15-8)
Z327 18 BK/WT
10 C313
Z327 18 BK/WT
G300
(8W-15-9)


BODY CONTROL MODULE
(8W-45-7)
COURTESY LAMPS DRIVER
RAIL LAMPS DRIVER
26 C2
34 C3
M22 18 YL/OR
M27 18 YL/LB
2
1 C313
S343
S344
F
G
TO READING/COURTESY LAMP-LEFT MIDDLE (8W-44-6)
TO READING/COURTESY LAMP-RIGHT MIDDLE (8W-44-6)
A
B
C
D
E
TO READING/COURTESY LAMP-LEFT MIDDLE (8W-44-6)
TO READING/COURTESY LAMP-RIGHT MIDDLE (8W-44-6)
TO VISOR/VANITY LAMP-LEFT (8W-44-7)
TO VISOR/VANITY LAMP-RIGHT (8W-44-7)
TO READING LAMP-FRONT (8W-44-7)
READING/COURTESY LAMP-LEFT REAR
READING/COURTESY LAMP-RIGHT REAR
1
3
2
Z327 18 BK/WT
S346
(8W-15-8)
10 C313
G300
(8W-15-9)

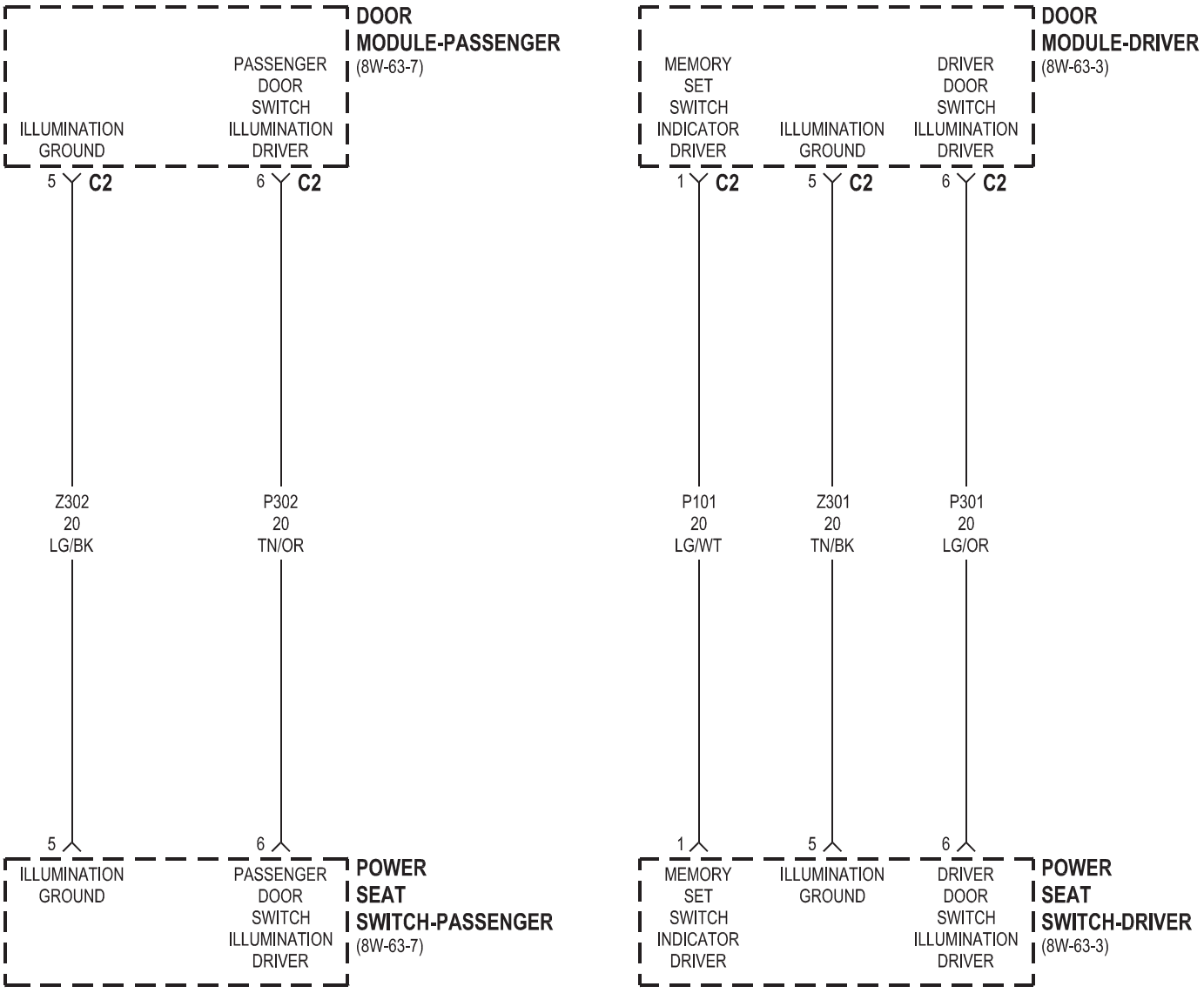

FROM
S343
(8W-44-5)
F
FROM
S344
(8W-44-5)
A
M22
18
YL/OR
M27
18
YL/LB
1
3
READING/COURTESY
LAMP-LEFT
MIDDLE
2
Z327
18
BK/WT
FROM
S343
(8W-44-5)
G
FROM
S344
(8W-44-5)
B
M22
18
YL/OR
M27
18
YL/LB
1
3
READING/COURTESY
LAMP-RIGHT
MIDDLE
2
Z327
18
BK/WT
S346
(8W-15-8)
Z327
18
BK/WT
10
C313
Z327
18
BK/WT
G300
(8W-15-9)


BODY CONTROL MODULE
(8W-45-7)
FRONT READING/COURTESY LAMPS DRIVER
8
C3
OVERHEAD CONSOLE
(8W-49-2)
DOME LAMPS DIMMER SIGNAL
8
FROM S344
(8W-44-5)
C
M27
18
YL/LB
A
FROM S344
(8W-44-5)
D
M27
18
YL/LB
VISOR/VANITY LAMP-LEFT
B
M24
18
YL/WT
3
C313
M24
18
YL/WT
5
FROM S344
(8W-44-5)
E
M27
18
YL/LB
4
E3
20
OR/YL
6
FRONT READING/COURTESY LAMPS DRIVER
RAIL LAMPS DRIVER
DOME LAMPS DIMMER SIGNAL
READING LAMP-FRONT
GROUND
2
A
VISOR/VANITY LAMP-RIGHT
B
Z327
18
BK/WT
Z327
18
BK/WT
S346
(8W-15-8)
Z137
20
BK/YL
11
Z327
18
BK/WT
10
C313
SIDE AIRBAG
EXCEPT SIDE AIRBAG
Z409
20
BK/WT
Z137
20
BK/YL
Z327
18
BK/WT
G300
(8W-15-9)

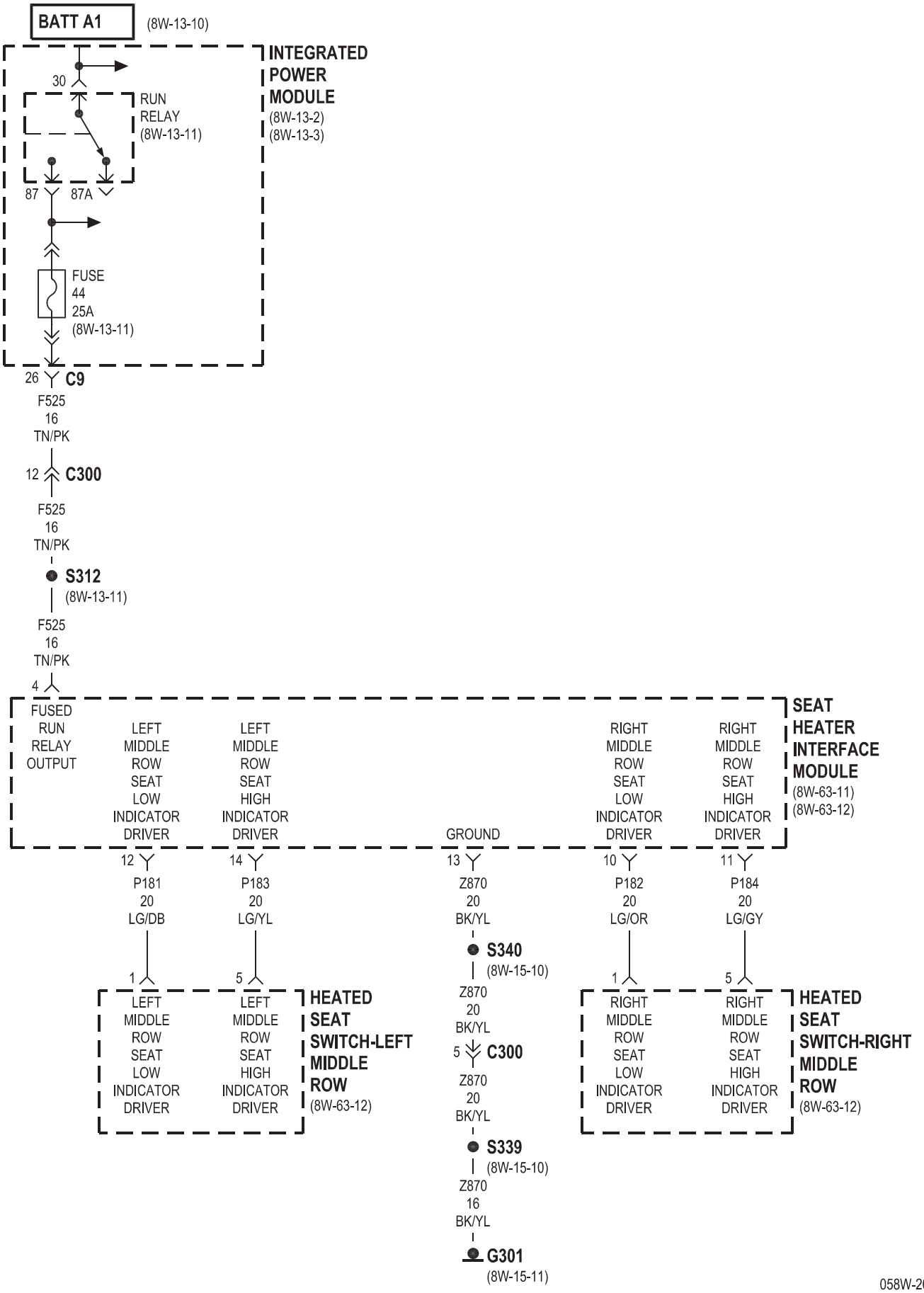

INTEGRATED POWER MODULE
INTEGRATED POWER MODULE
PCI BUS
(8W-13-2)
(8W-13-3)
11 C4
D25 20 WT/VT
S347
(8W-18-5)
D25 20 WT/VT
27 C201
D25 20 WT/VT
S213
(8W-18-3)
D25 20 WT/VT
6 C1
INSTRUMENT CLUSTER
PCI BUS
PANEL LAMPS DRIVER
(8W-40-2)
(8W-40-3)
9 C1
E12 20 OR/GY
AUTO TEMP CONTROL
PANEL LAMPS DRIVER
(8W-42-7)
3 C1
E12 18 OR/GY
RADIO
PANEL LAMPS DRIVER
(8W-47-2)
3
BASE
EXCEPT BASE
E12 18 OR/GY
DVD/CD CHANGER
PANEL LAMPS DRIVER
(8W-47-9)
(8W-47-11)
3 C1
E14 20 OR/TN
9 C2
SATELLITE RADIO MULTIPLEXER
PANEL LAMPS DRIVER
PANEL LAMPS DRIVER
(8W-47-11)
(8W-47-12)
16 C1
EXCEPT SATELLITE RADIO
SATELLITE RADIO
E14 20 OR/TN
9 C2
RADIO
PANEL LAMPS DRIVER
PANEL LAMPS DRIVER
(8W-47-4)
(8W-47-9)
(8W-47-12)
3 C1
A/C-HEATER CONTROL (MTC)
PANEL LAMPS DRIVER
(8W-42-3)
14 C1
E12 20 OR/GY
S204
E12 18 OR/GY
2
TRACTION CONTROL SWITCH
(8W-35-3)
1
Z427 20 BK/WT
G201
(8W-15-6)
E12 20 OR/GY
7
INSTRUMENT PANEL SWITCH POD
PANEL LAMPS DRIVER
(8W-40-3)
E12 18 OR/GY
6
SHIFT LEVER ASSEMBLY
PANEL LAMPS DRIVER
GROUND
(8W-31-9)
5
Z157 18 BK/LG
G202
(8W-15-7)
E12 18 OR/GY
H
TO C201
(8W-44-9)


FROM
S204
(8W-44-8)
H
E12
18
OR/GY
40
C201
E12
18
OR/GY
EXCEPT
MIDDLE
ROW
HEATED
SEATS
4
C300
MIDDLE
ROW
HEATED
SEATS
E12
18
OR/GY
S306
E12
20
OR/GY
E12
20
OR/GY
E12
18
OR/GY
E12
18
OR/GY
1
2
REAR
BOOSTER
FAN
REAR
CONTROL
SWITCH
(8W-42-7)
PANEL
LAMPS
DRIVER
HEATED
SEAT
SWITCH-RIGHT
MIDDLE
ROW
(8W-63-11)
5
Z870
20
BK/YL
EXCEPT
MIDDLE
ROW
HEATED
SEATS
MIDDLE
ROW
HEATED
SEATS
2
PANEL
LAMPS
DRIVER
HEATED
SEAT
SWITCH-LEFT
MIDDLE
ROW
(8W-63-11)
S340
(8W-15-10)
Z870
20
BK/YL
5
C300
5
C300
Z870
20
BK/YL
S339
(8W-15-10)
Z870
16
BK/YL
G301
(8W-15-11)

HEATED SEATS-FRONT ROW

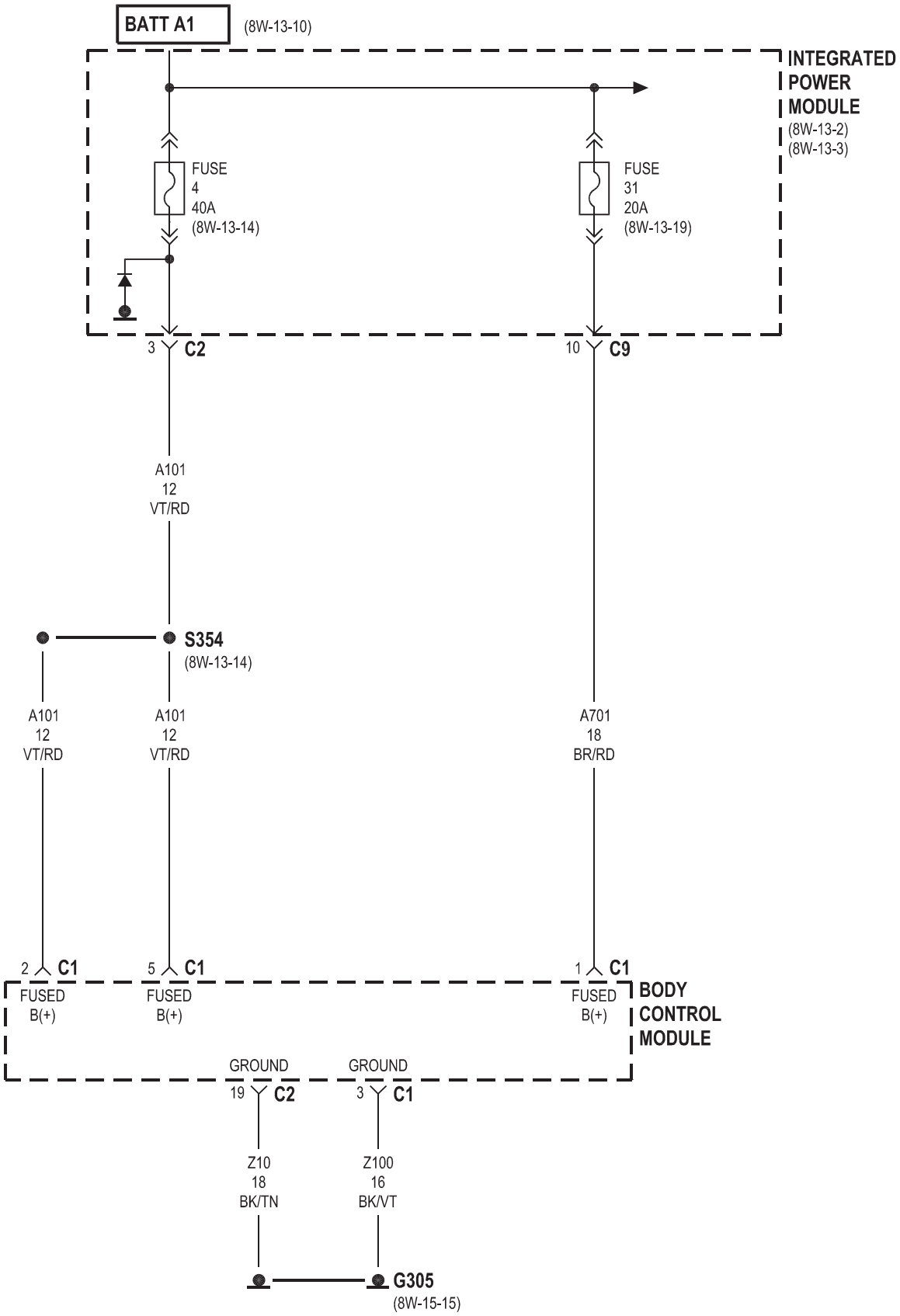


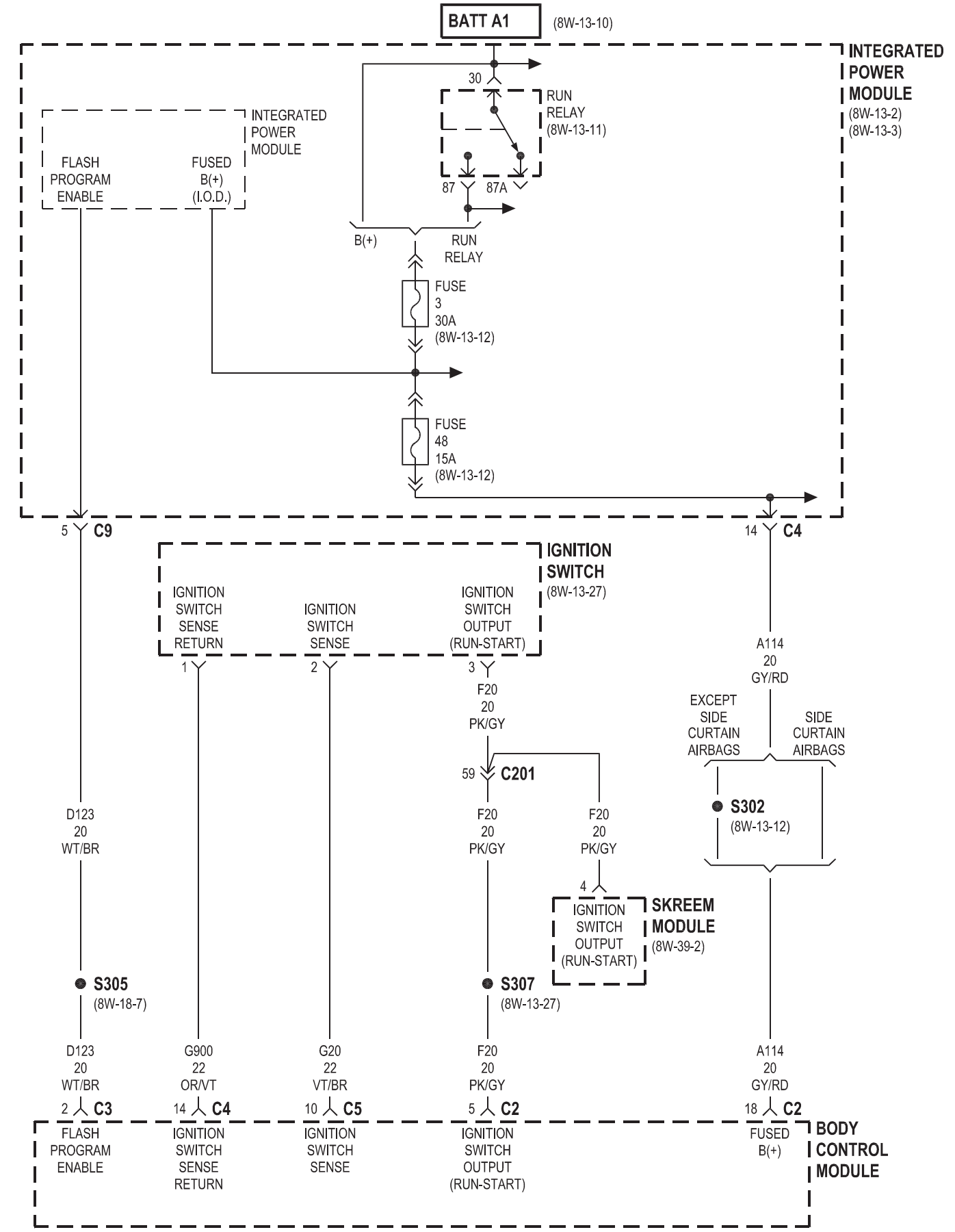
HEATED SEATS-MIDDLE ROW

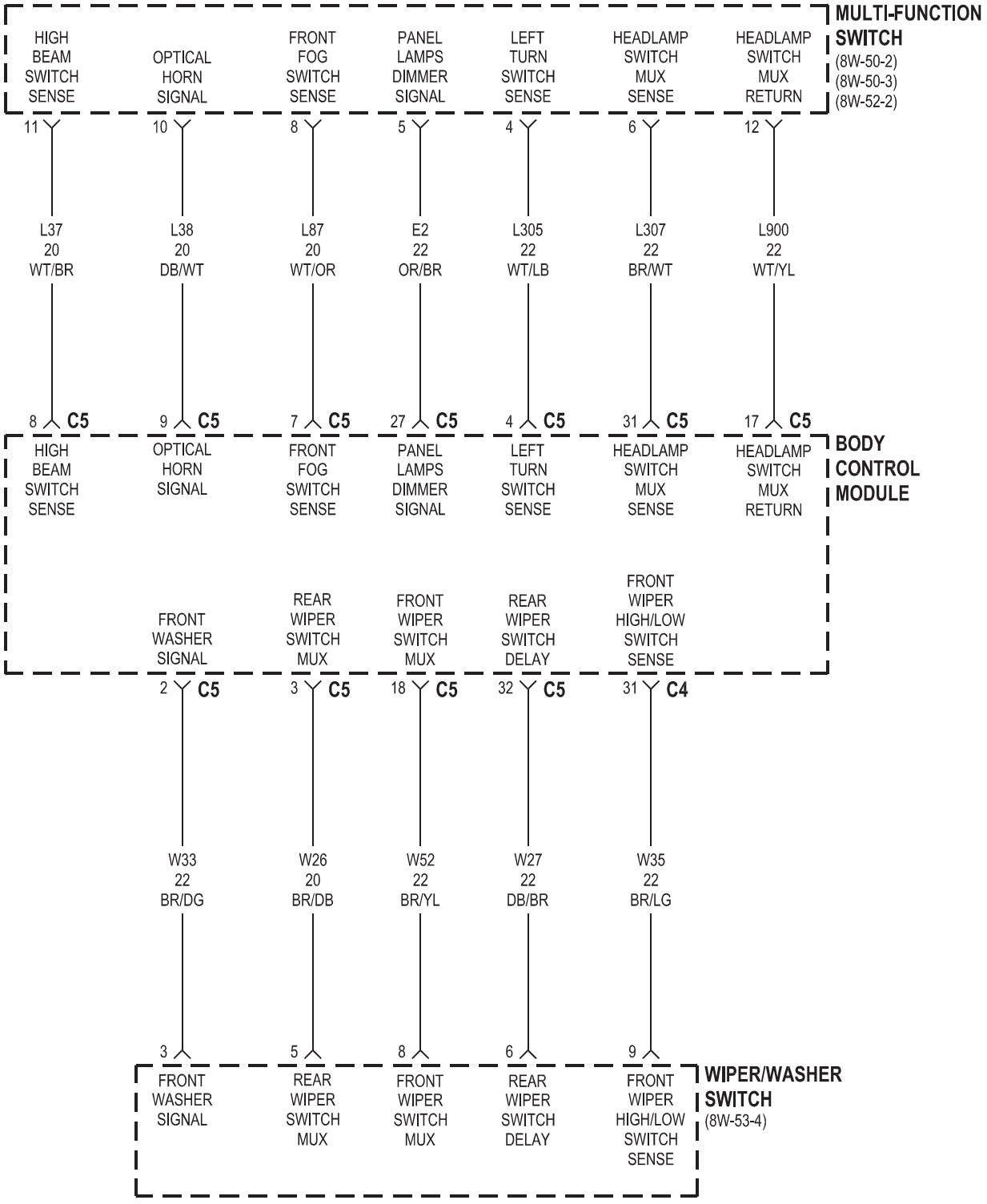


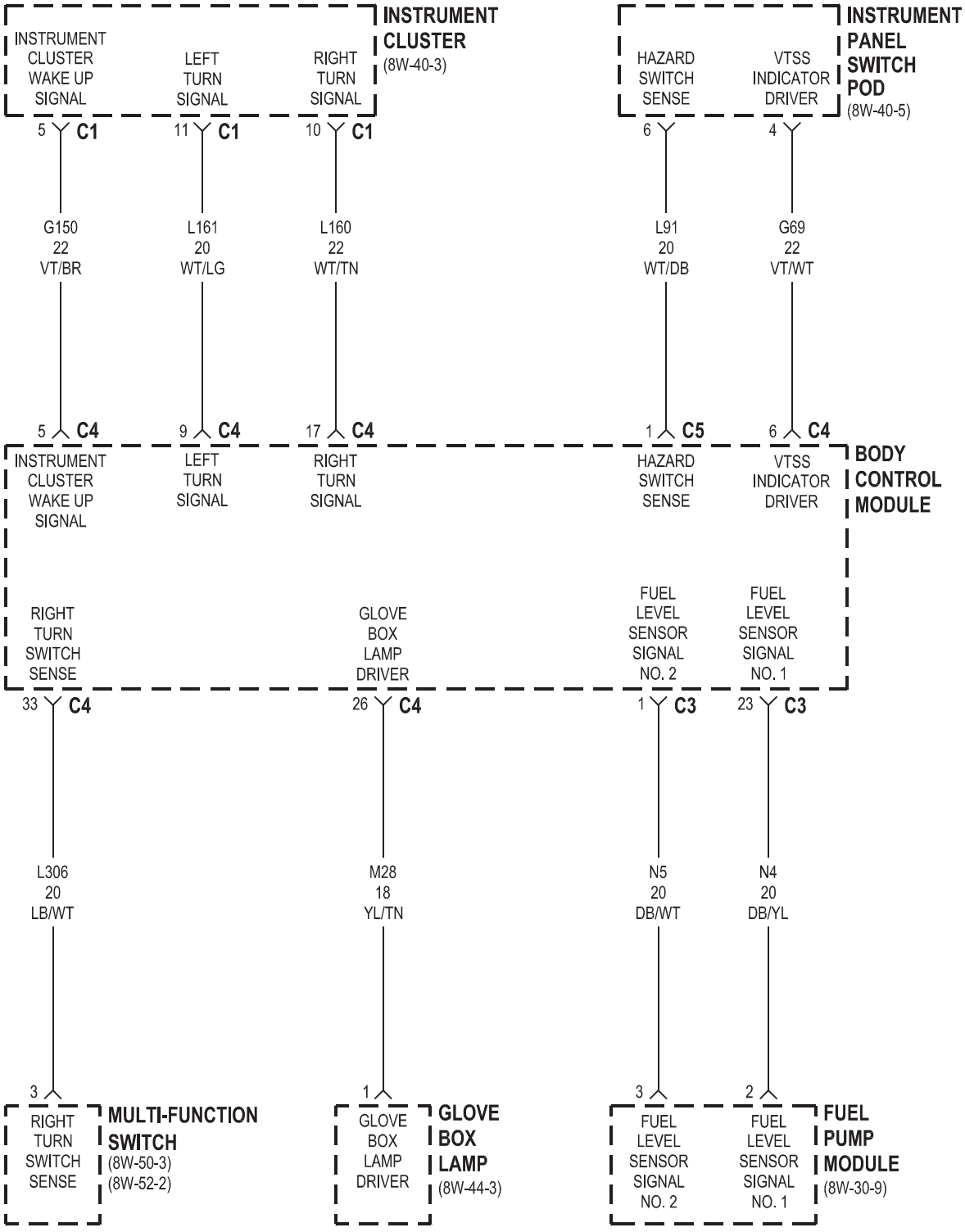
8W-45 BODY CONTROL MODULE

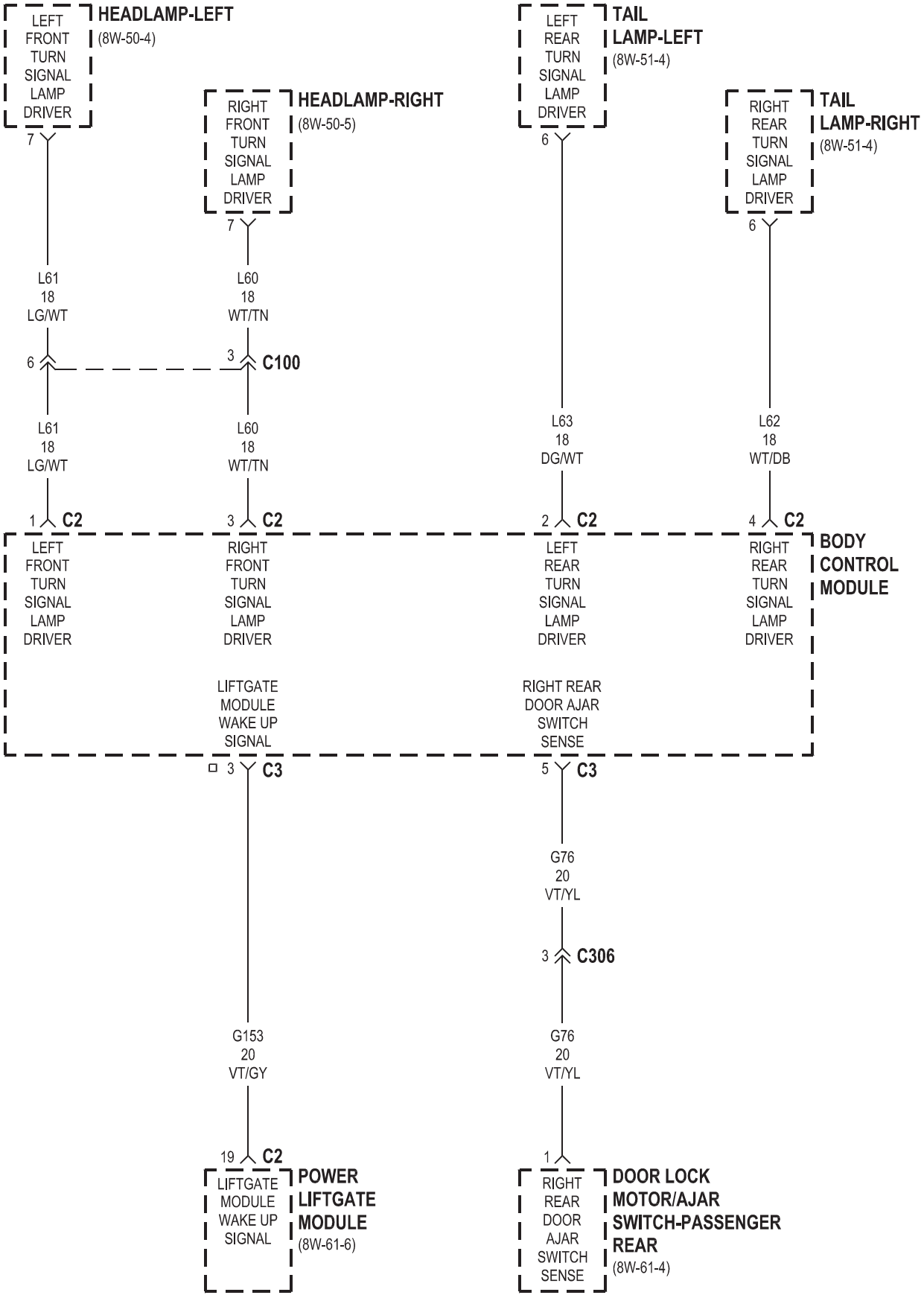
Component	Page
Body Control Module	8W-45-2, 3, 4, 5, 6, 7, 8, 9
Clockspring	8W-45-9
Door Lock Motor/Ajar Switch-Driver Rear	8W-45-8
Door Lock Motor/Ajar Switch-Passenger Rear	8W-45-6
Fuel Pump Module	8W-45-5
Fuse 3	8W-45-3
Fuse 4	8W-45-2
Fuse 31	8W-45-2
Fuse 48	8W-45-3
G305	8W-45-2
Glove Box Lamp	8W-45-5
Headlamp-Left	8W-45-6
Headlamp-Right	8W-45-6
Ignition Switch	8W-45-3
Instrument Cluster	8W-45-5
Instrument Panel Switch Pod	8W-45-5
Integrated Power Module	8W-45-2, 3, 8
Liftgate Cinch/Release Motor	8W-45-8
Liftgate Flood Lamp	8W-45-7
Liftgate Handle Switch	8W-45-7
Multi-Function Switch	8W-45-4, 5
Overhead Console	8W-45-7
Power Liftgate Module	8W-45-6
Reading Lamp-Front	8W-45-7
Reading/Courtesy Lamp-Left Rear	8W-45-7
Run Relay	8W-45-3
Seat Belt Switch-Driver	8W-45-8
Skreem Module	8W-45-3
Tail Lamp-Left	8W-45-6, 8
Tail Lamp-Right	8W-45-6, 8
Traction Control Switch	8W-45-9
Wiper Module-Rear	8W-45-7
Wiper/Washer Switch	8W-45-4, 9

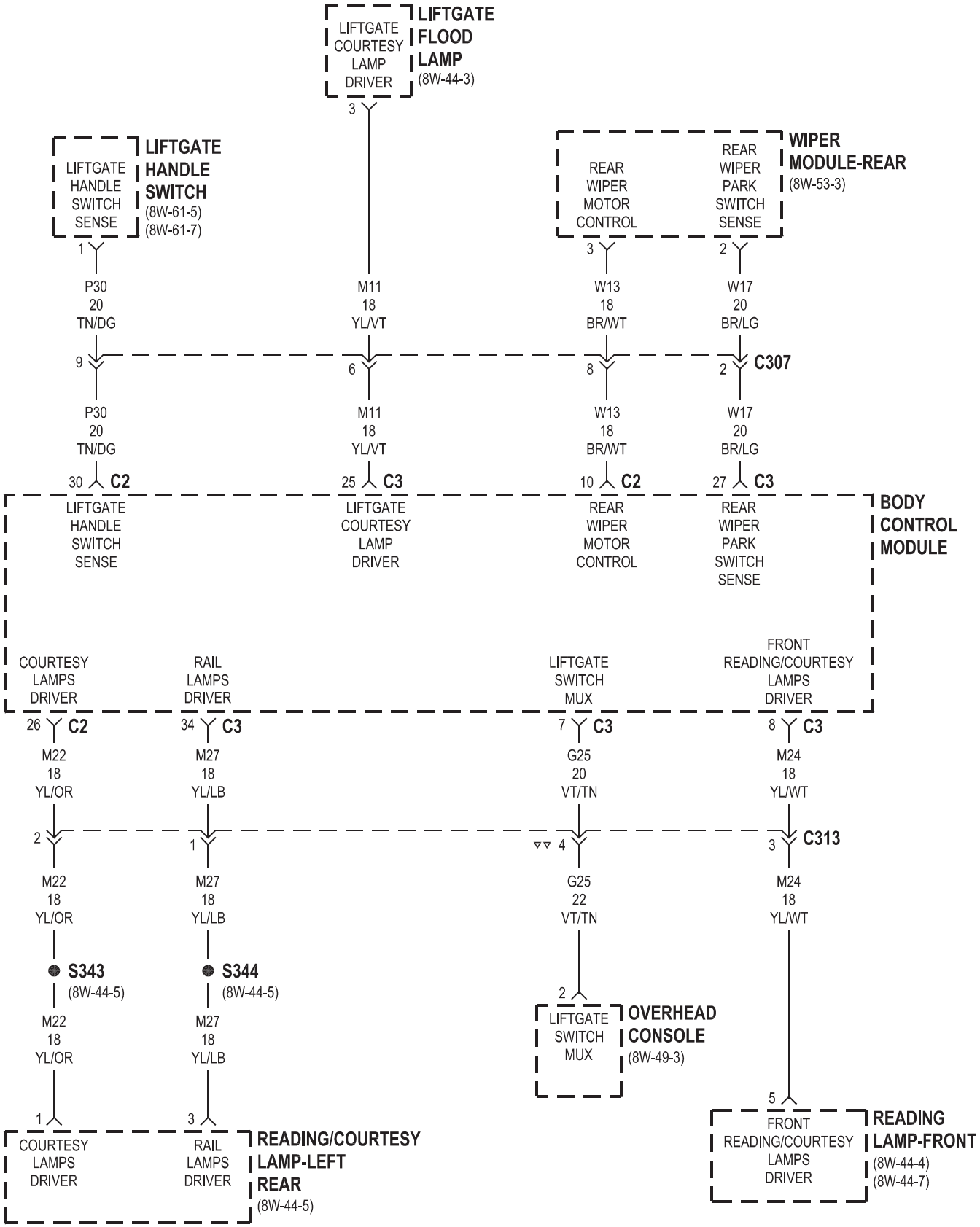

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 4 40A (8W-13-14)
FUSE 31 20A (8W-13-19)
3 C2
10 C9
A101 12 VT/RD
S354
(8W-13-14)
A101 12 VT/RD
A101 12 VT/RD
A701 18 BR/RD
2 C1
5 C1
1 C1
FUSED B(+)
FUSED B(+)
FUSED B(+)
BODY CONTROL MODULE
GROUND
GROUND
19 C2
3 C1
Z10 18 BK/TN
Z100 16 BK/VT
G305
(8W-15-15)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
INTEGRATED POWER MODULE
FLASH PROGRAM ENABLE
FUSED B(+) (I.O.D.)
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 48 15A
(8W-13-12)
5 C9
14 C4
IGNITION SWITCH
(8W-13-27)
IGNITION SWITCH SENSE RETURN
IGNITION SWITCH SENSE
IGNITION SWITCH OUTPUT (RUN-START)
1
2
3
F20 20 PK/GY
59 C201
A114 20 GY/RD
EXCEPT SIDE CURTAIN AIRBAGS
SIDE CURTAIN AIRBAGS
S302
(8W-13-12)
D123 20 WT/BR
F20 20 PK/GY
F20 20 PK/GY
4
IGNITION SWITCH OUTPUT (RUN-START)
SKREEM MODULE
(8W-39-2)
S305
(8W-18-7)
S307
(8W-13-27)
D123 20 WT/BR
G900 22 OR/VT
G20 22 VT/BR
F20 20 PK/GY
A114 20 GY/RD
2 C3
14 C4
10 C5
5 C2
18 C2
FLASH PROGRAM ENABLE
IGNITION SWITCH SENSE RETURN
IGNITION SWITCH SENSE
IGNITION SWITCH OUTPUT (RUN-START)
FUSED B(+)
BODY CONTROL MODULE

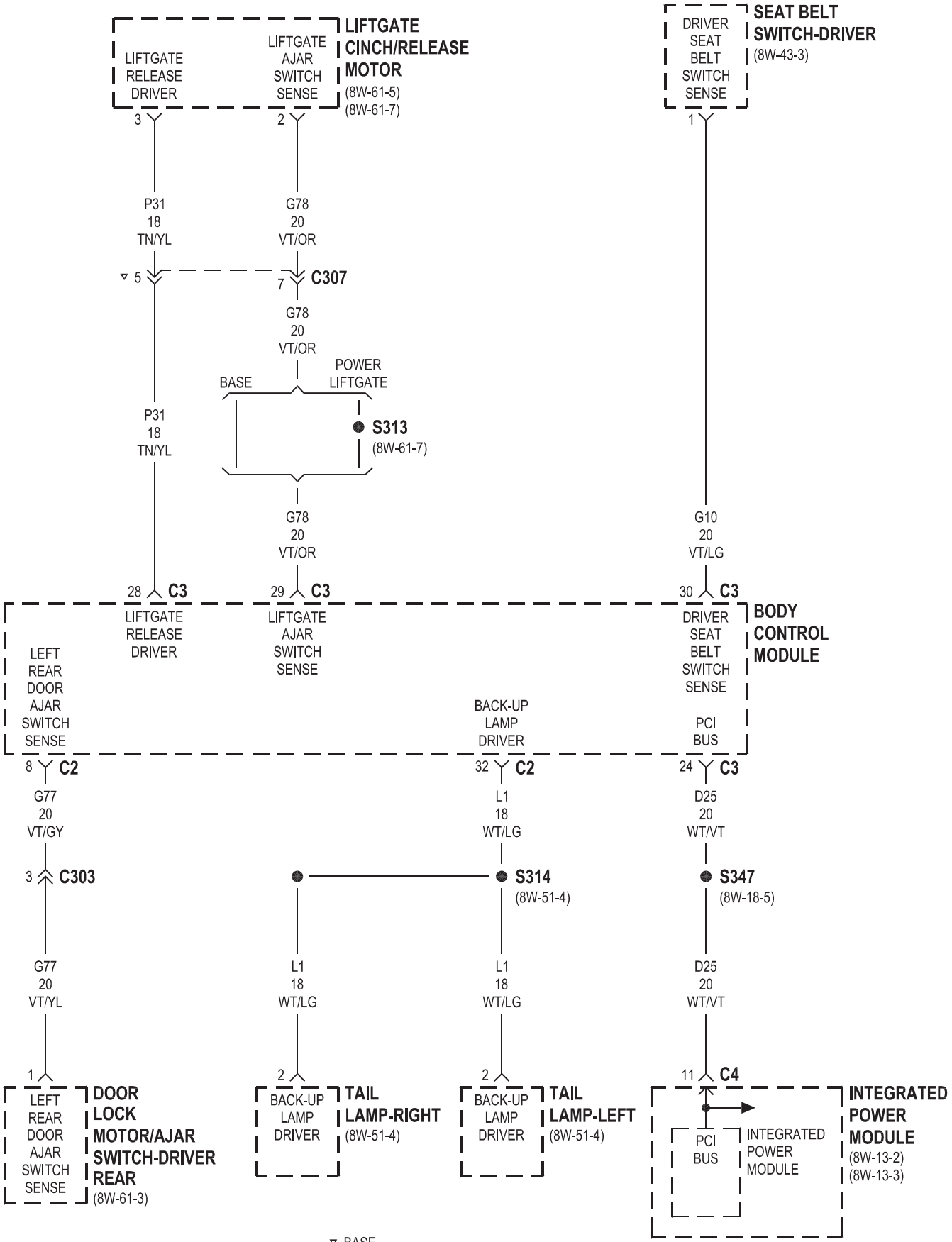

MULTI-FUNCTION SWITCH
(8W-50-2)
(8W-50-3)
(8W-52-2)
HIGH BEAM SWITCH SENSE
OPTICAL HORN SIGNAL
FRONT FOG SWITCH SENSE
PANEL LAMPS DIMMER SIGNAL
LEFT TURN SWITCH SENSE
HEADLAMP SWITCH MUX SENSE
HEADLAMP SWITCH MUX RETURN
11
10
8
5
4
6
12
L37 20 WT/BR
L38 20 DB/WT
L87 20 WT/OR
E2 22 OR/BR
L305 22 WT/LB
L307 22 BR/WT
L900 22 WT/YL
8 C5
9 C5
7 C5
27 C5
4 C5
31 C5
17 C5
BODY CONTROL MODULE
HIGH BEAM SWITCH SENSE
OPTICAL HORN SIGNAL
FRONT FOG SWITCH SENSE
PANEL LAMPS DIMMER SIGNAL
LEFT TURN SWITCH SENSE
HEADLAMP SWITCH MUX SENSE
HEADLAMP SWITCH MUX RETURN
FRONT WASHER SIGNAL
REAR WIPER SWITCH MUX
FRONT WIPER SWITCH MUX
REAR WIPER SWITCH DELAY
FRONT WIPER HIGH/LOW SWITCH SENSE
2 C5
3 C5
18 C5
32 C5
31 C4
W33 22 BR/DG
W26 20 BR/DB
W52 22 BR/YL
W27 22 DB/BR
W35 22 BR/LG
3
5
8
6
9
WIPER/WASHER SWITCH
(8W-53-4)
FRONT WASHER SIGNAL
REAR WIPER SWITCH MUX
FRONT WIPER SWITCH MUX
REAR WIPER SWITCH DELAY
FRONT WIPER HIGH/LOW SWITCH SENSE

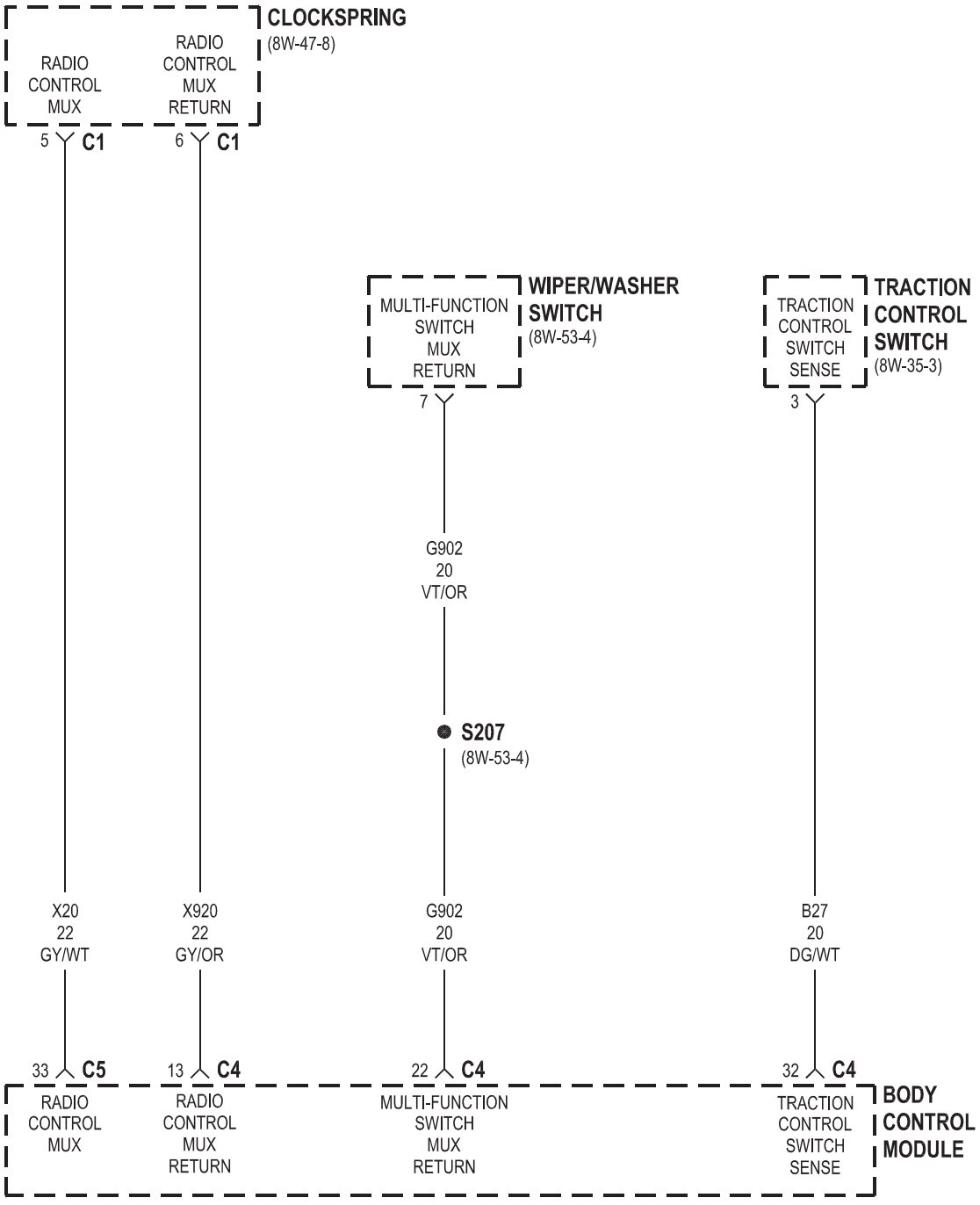

INSTRUMENT CLUSTER
(8W-40-3)
INSTRUMENT CLUSTER WAKE UP SIGNAL
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
INSTRUMENT PANEL SWITCH POD
(8W-40-5)
HAZARD SWITCH SENSE
VTSS INDICATOR DRIVER
5 C1
11 C1
10 C1
6
4
G150 22 VT/BR
L161 20 WT/LG
L160 22 WT/TN
L91 20 WT/DB
G69 22 VT/WT
5 C4
9 C4
17 C4
1 C5
6 C4
BODY CONTROL MODULE
INSTRUMENT CLUSTER WAKE UP SIGNAL
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
HAZARD SWITCH SENSE
VTSS INDICATOR DRIVER
RIGHT TURN SWITCH SENSE
GLOVE BOX LAMP DRIVER
FUEL LEVEL SENSOR SIGNAL NO. 2
FUEL LEVEL SENSOR SIGNAL NO. 1
33 C4
26 C4
1 C3
23 C3
L306 20 LB/WT
M28 18 YL/TN
N5 20 DB/WT
N4 20 DB/YL
3
1
3
2
MULTI-FUNCTION SWITCH
(8W-50-3)
(8W-52-2)
RIGHT TURN SWITCH SENSE
GLOVE BOX LAMP
(8W-44-3)
GLOVE BOX LAMP DRIVER
FUEL PUMP MODULE
(8W-30-9)
FUEL LEVEL SENSOR SIGNAL NO. 2
FUEL LEVEL SENSOR SIGNAL NO. 1


LEFT FRONT TURN SIGNAL LAMP DRIVER
HEADLAMP-LEFT
(8W-50-4)
RIGHT FRONT TURN SIGNAL LAMP DRIVER
HEADLAMP-RIGHT
(8W-50-5)
LEFT REAR TURN SIGNAL LAMP DRIVER
TAIL LAMP-LEFT
(8W-51-4)
RIGHT REAR TURN SIGNAL LAMP DRIVER
TAIL LAMP-RIGHT
(8W-51-4)
7
7
6
6
L61 18 LG/WT
L60 18 WT/TN
6
3
C100
L61 18 LG/WT
L60 18 WT/TN
L63 18 DG/WT
L62 18 WT/DB
1
C2
3
C2
2
C2
4
C2
LEFT FRONT TURN SIGNAL LAMP DRIVER
RIGHT FRONT TURN SIGNAL LAMP DRIVER
LEFT REAR TURN SIGNAL LAMP DRIVER
RIGHT REAR TURN SIGNAL LAMP DRIVER
BODY CONTROL MODULE
LIFTGATE MODULE WAKE UP SIGNAL
RIGHT REAR DOOR AJAR SWITCH SENSE
3
C3
5
C3
G76 20 VT/YL
3
C306
G153 20 VT/GY
G76 20 VT/YL
19
C2
1
LIFTGATE MODULE WAKE UP SIGNAL
POWER LIFTGATE MODULE
(8W-61-6)
RIGHT REAR DOOR AJAR SWITCH SENSE
DOOR LOCK MOTOR/AJAR SWITCH-PASSENGER REAR
(8W-61-4)
POWER LIFTGATE


LIFTGATE COURTESY LAMP DRIVER
LIFTGATE FLOOD LAMP
(8W-44-3)
3
LIFTGATE HANDLE SWITCH SENSE
LIFTGATE HANDLE SWITCH
(8W-61-5)
(8W-61-7)
1
REAR WIPER MOTOR CONTROL
REAR WIPER PARK SWITCH SENSE
WIPER MODULE-REAR
(8W-53-3)
3
2
P30 20 TN/DG
M11 18 YL/VT
W13 18 BR/WT
W17 20 BR/LG
9
6
8
2
C307
P30 20 TN/DG
M11 18 YL/VT
W13 18 BR/WT
W17 20 BR/LG
30 C2
25 C3
10 C2
27 C3
LIFTGATE HANDLE SWITCH SENSE
LIFTGATE COURTESY LAMP DRIVER
REAR WIPER MOTOR CONTROL
REAR WIPER PARK SWITCH SENSE
BODY CONTROL MODULE
COURTESY LAMPS DRIVER
RAIL LAMPS DRIVER
LIFTGATE SWITCH MUX
FRONT READING/COURTESY LAMPS DRIVER
26 C2
34 C3
7 C3
8 C3
M22 18 YL/OR
M27 18 YL/LB
G25 20 VT/TN
M24 18 YL/WT
2
1
▽▽ 4
3
C313
M22 18 YL/OR
M27 18 YL/LB
G25 22 VT/TN
M24 18 YL/WT
S343
(8W-44-5)
S344
(8W-44-5)
2
M22 18 YL/OR
M27 18 YL/LB
LIFTGATE SWITCH MUX
OVERHEAD CONSOLE
(8W-49-3)
5
1
3
COURTESY LAMPS DRIVER
RAIL LAMPS DRIVER
READING/COURTESY LAMP-LEFT REAR
(8W-44-5)
FRONT READING/COURTESY LAMPS DRIVER
READING LAMP-FRONT
(8W-44-4)
(8W-44-7)

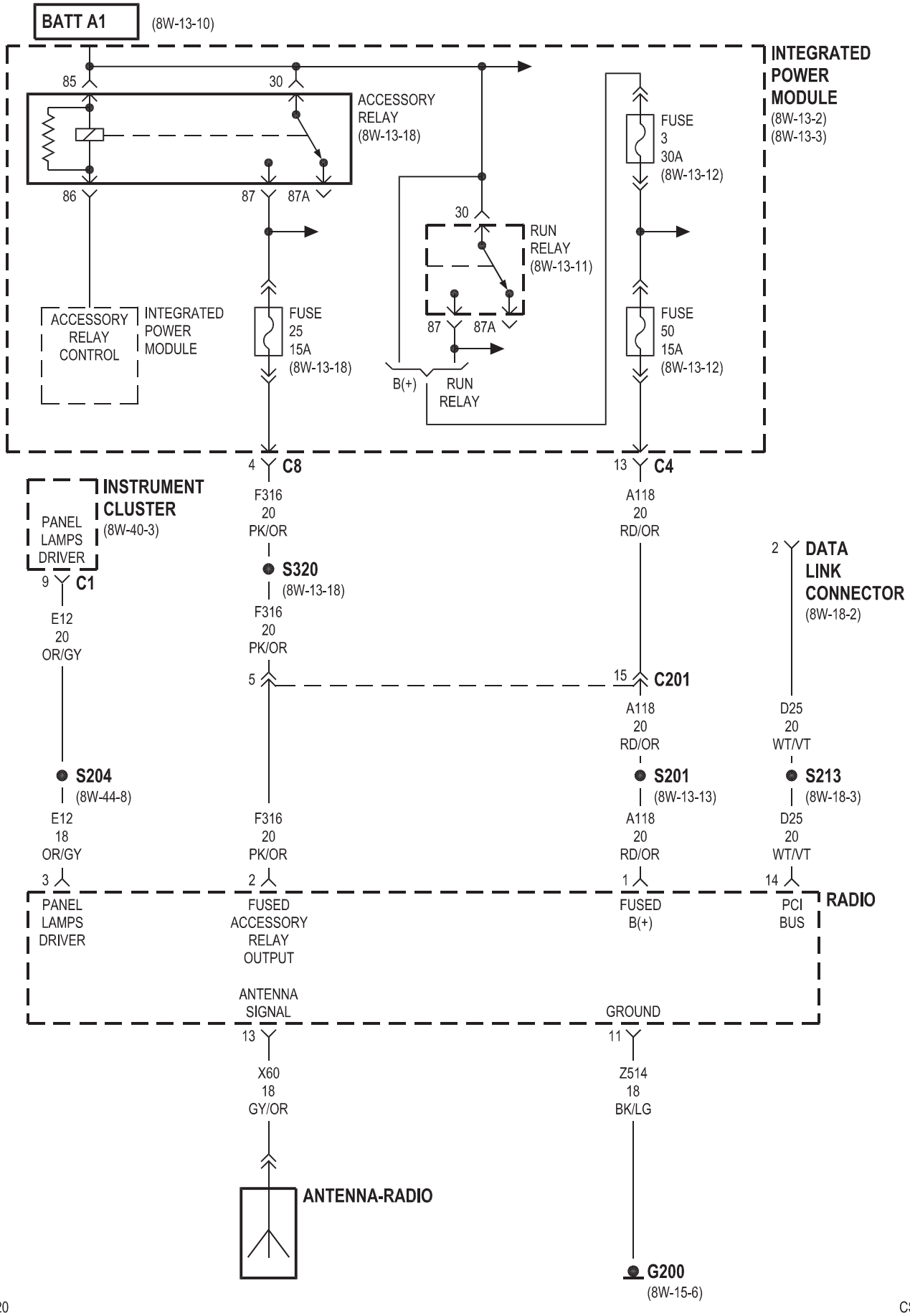
▽▽ EXCEPT BASE


LIFTGATE CINCH/RELEASE MOTOR
(8W-61-5)
(8W-61-7)
LIFTGATE RELEASE DRIVER
LIFTGATE AJAR SWITCH SENSE
3
2
P31 18 TN/YL
G78 20 VT/OR
5
7
C307
G78 20 VT/OR
BASE
POWER LIFTGATE
S313
(8W-61-7)
P31 18 TN/YL
G78 20 VT/OR
28 C3
29 C3
LIFTGATE RELEASE DRIVER
LIFTGATE AJAR SWITCH SENSE
SEAT BELT SWITCH-DRIVER
(8W-43-3)
DRIVER SEAT BELT SWITCH SENSE
1
G10 20 VT/LG
30 C3
DRIVER SEAT BELT SWITCH SENSE
BODY CONTROL MODULE
LEFT REAR DOOR AJAR SWITCH SENSE
BACK-UP LAMP DRIVER
PCI BUS
8 C2
32 C2
24 C3
G77 20 VT/GY
L1 18 WT/LG
D25 20 WT/VT
3 C303
S314
(8W-51-4)
S347
(8W-18-5)
G77 20 VT/YL
L1 18 WT/LG
L1 18 WT/LG
D25 20 WT/VT
1
2
2
11 C4
LEFT REAR DOOR AJAR SWITCH SENSE
DOOR LOCK MOTOR/AJAR SWITCH-DRIVER REAR
(8W-61-3)
BACK-UP LAMP DRIVER
TAIL LAMP-RIGHT
(8W-51-4)
BACK-UP LAMP DRIVER
TAIL LAMP-LEFT
(8W-51-4)
PCI BUS
INTEGRATED POWER MODULE
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
BASE

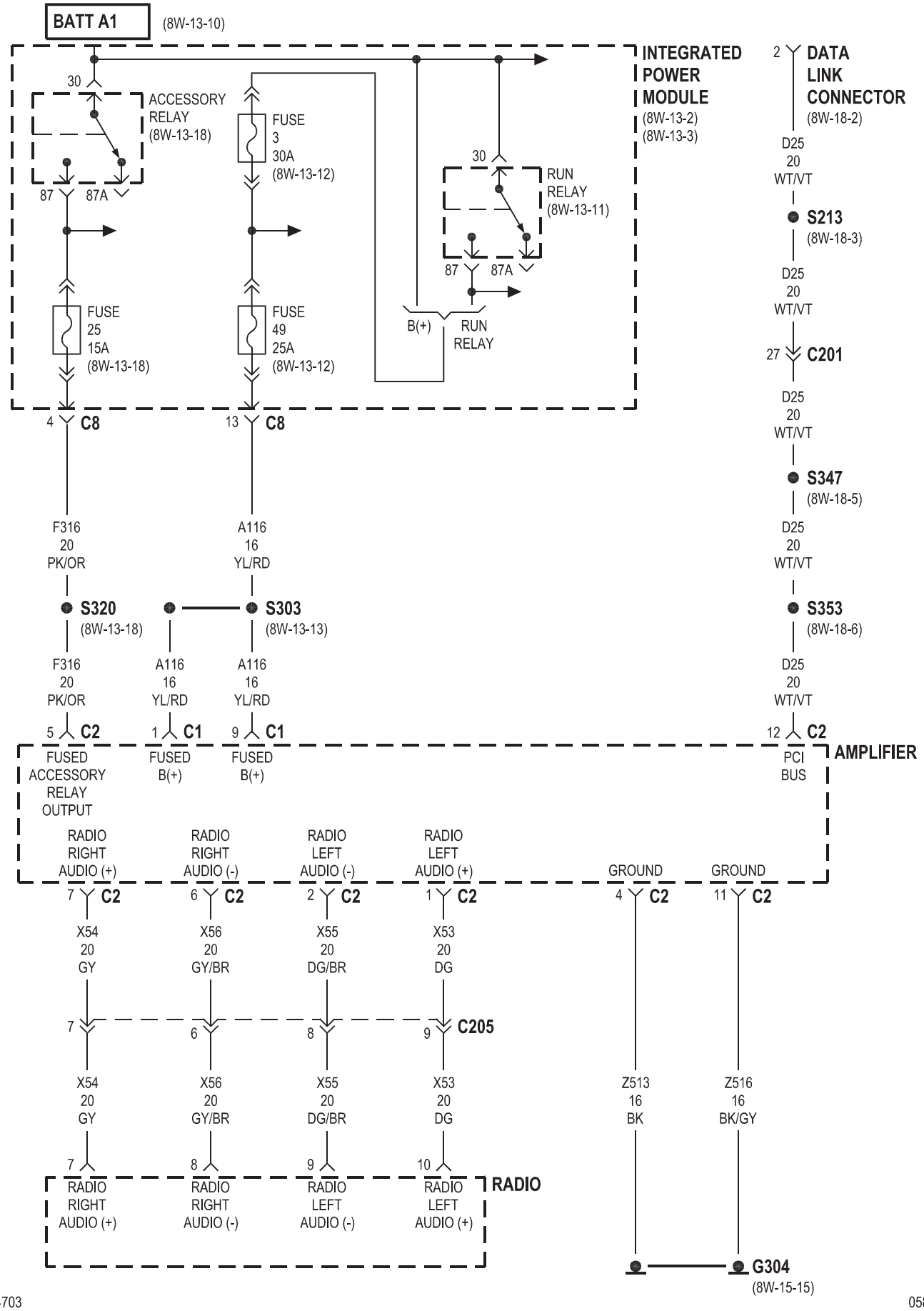

CLOCKSPRING
(8W-47-8)
RADIO CONTROL MUX
RADIO CONTROL MUX RETURN
5 C1
6 C1
WIPER/WASHER SWITCH
(8W-53-4)
MULTI-FUNCTION SWITCH MUX RETURN
7
TRACTION CONTROL SWITCH
(8W-35-3)
TRACTION CONTROL SWITCH SENSE
3
G902
20
VT/OR
S207
(8W-53-4)
X20
22
GY/WT
X920
22
GY/OR
G902
20
VT/OR
B27
20
DG/WT
33 C5
13 C4
22 C4
32 C4
RADIO CONTROL MUX
RADIO CONTROL MUX RETURN
MULTI-FUNCTION SWITCH MUX RETURN
TRACTION CONTROL SWITCH SENSE
BODY CONTROL MODULE

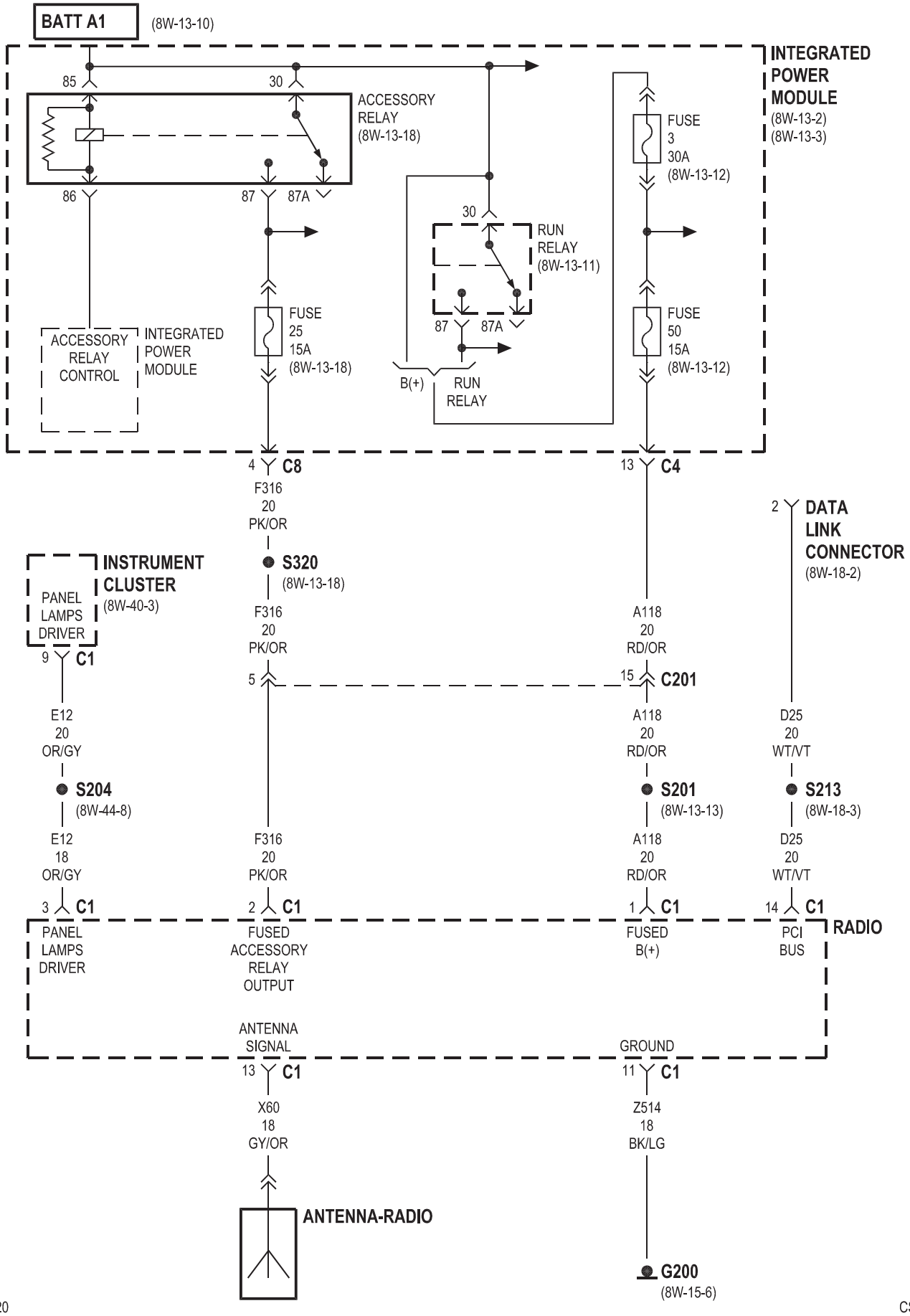
8W-47 AUDIO/VIDEO SYSTEM

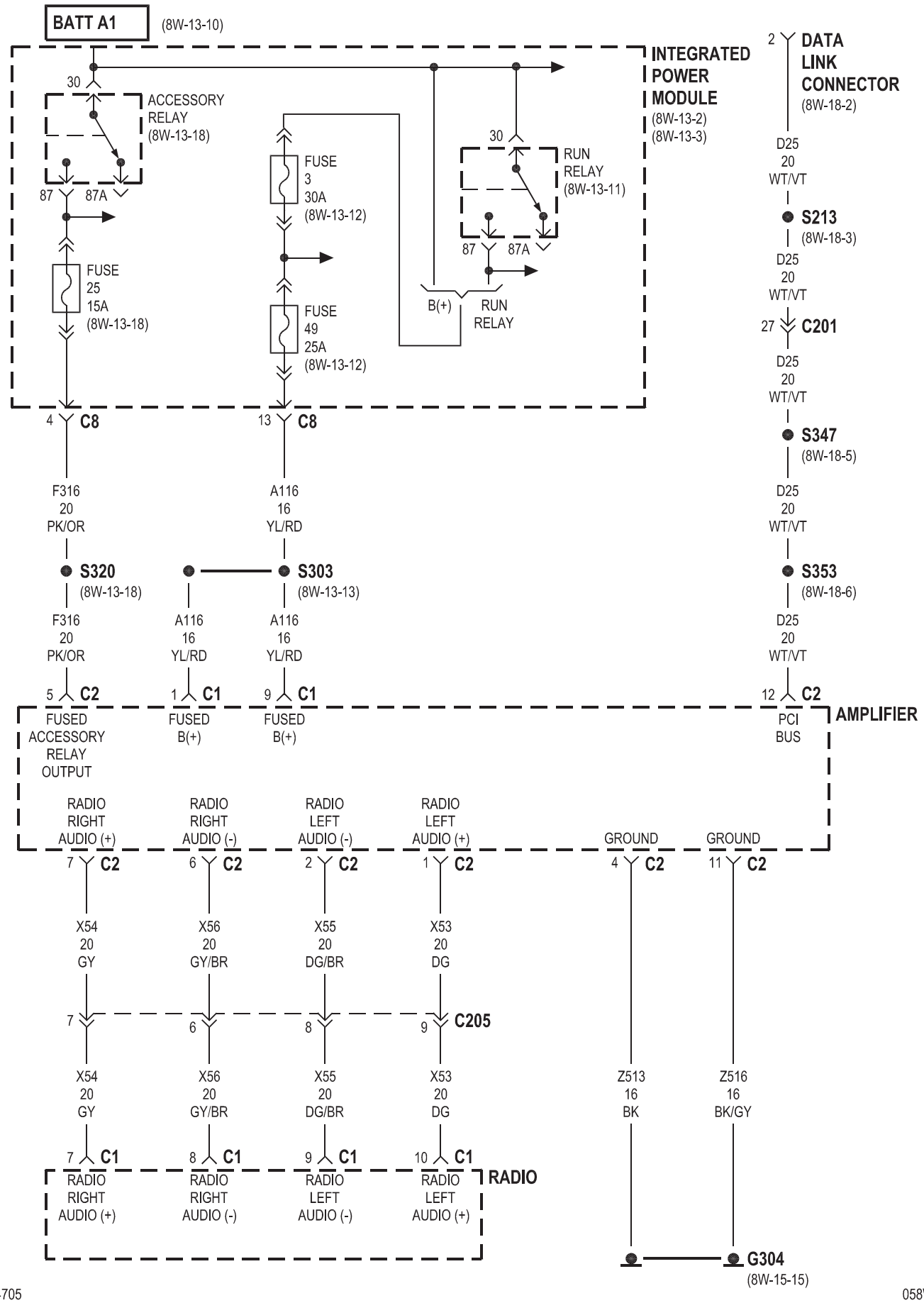
Component	Page
Amplifier	8W-47-3, 5, 6, 7, 13
Antenna-Radio	8W-47-2, 4
Antenna-Satellite Radio	8W-47-12
Body Control Module	8W-47-8
Clockspring	8W-47-8
DVD Screen	8W-47-10
DVD/CD Changer	8W-47-9, 10, 11
Data Link Connector	8W-47-2, 3, 4, 5
Fuse 25	8W-47-2, 3, 4, 5
Fuse 3	8W-47-2, 3, 4, 5, 9, 11
Fuse 49	8W-47-3, 5
Fuse 50	8W-47-2, 4, 9, 11
G200	8W-47-2, 4, 9, 11
G304	8W-47-3, 5
Hands Free Module	8W-47-13
Instrument Cluster	8W-47-2, 4
Integrated Power Module	8W-47-2, 3, 4, 5, 9, 11
Navigation Module	8W-47-13
Radio	8W-47-2, 3, 4, 5, 9, 12
Remote Radio Switch-Left	8W-47-8
Remote Radio Switch-Right	8W-47-8
Run Relay	8W-47-2, 3, 4, 5, 9, 11
Satellite Radio Multiplexer	8W-47-11, 12
Satellite Radio Receiver	8W-47-12
Speaker-Center Instrument Panel	8W-47-7
Speaker-Left Front Door Tweeter	8W-47-6
Speaker-Left Front Door Woofer	8W-47-6
Speaker-Left Rear Door	8W-47-7
Speaker-Right Front Door Tweeter	8W-47-6
Speaker-Right Front Door Woofer	8W-47-6
Speaker-Right Rear Door	8W-47-7
Speaker-Subwoofer	8W-47-7

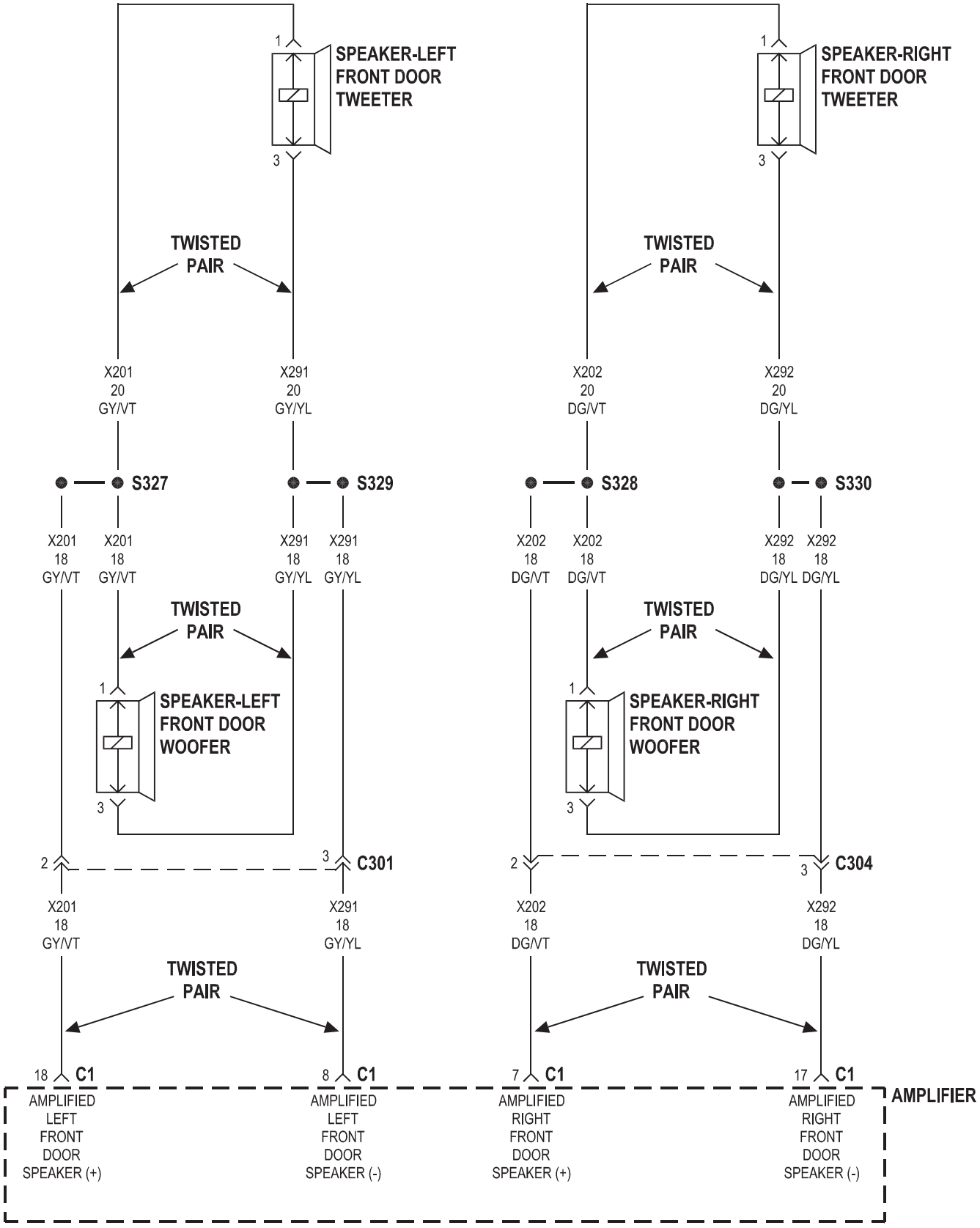

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
85
30
ACCESSORY RELAY
(8W-13-18)
86
87
87A
FUSE 3 30A
(8W-13-12)
30
RUN RELAY
(8W-13-11)
87
87A
ACCESSORY RELAY CONTROL
INTEGRATED POWER MODULE
FUSE 25 15A
(8W-13-18)
B(+)
RUN RELAY
FUSE 50 15A
(8W-13-12)
4 C8
13 C4
INSTRUMENT CLUSTER
(8W-40-3)
PANEL LAMPS DRIVER
9 C1
F316 20 PK/OR
S320
(8W-13-18)
F316 20 PK/OR
5
A118 20 RD/OR
15 C201
2 DATA LINK CONNECTOR
(8W-18-2)
E12 20 OR/GY
S204
(8W-44-8)
E12 18 OR/GY
3
A118 20 RD/OR
S201
(8W-13-13)
D25 20 WT/VT
S213
(8W-18-3)
F316 20 PK/OR
2
A118 20 RD/OR
1
D25 20 WT/VT
14
RADIO
PANEL LAMPS DRIVER
FUSED ACCESSORY RELAY OUTPUT
FUSED B(+)
PCI BUS
ANTENNA SIGNAL
13
GROUND
11
X60 18 GY/OR
Z514 18 BK/LG
ANTENNA-RADIO
G200
(8W-15-6)

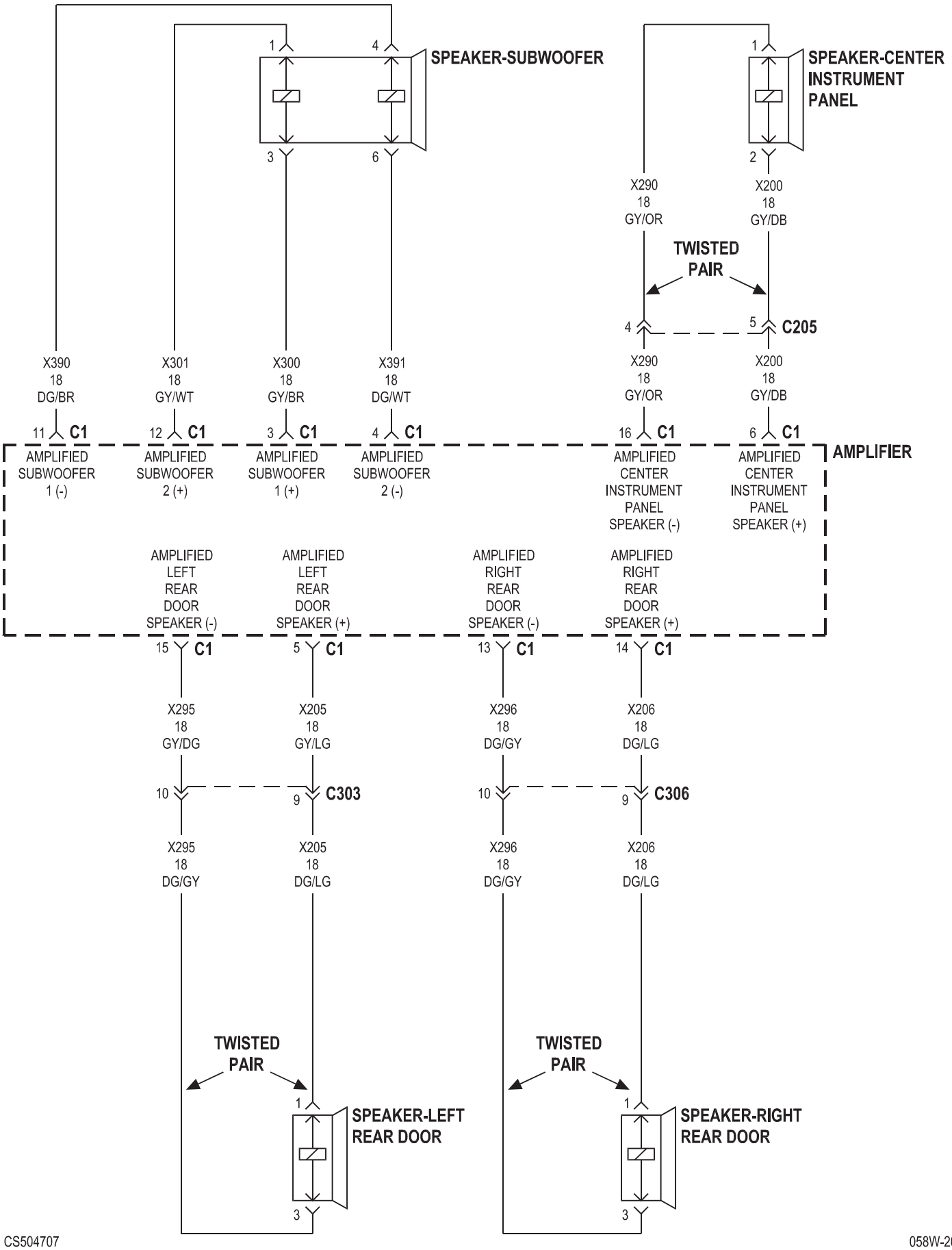
BASE

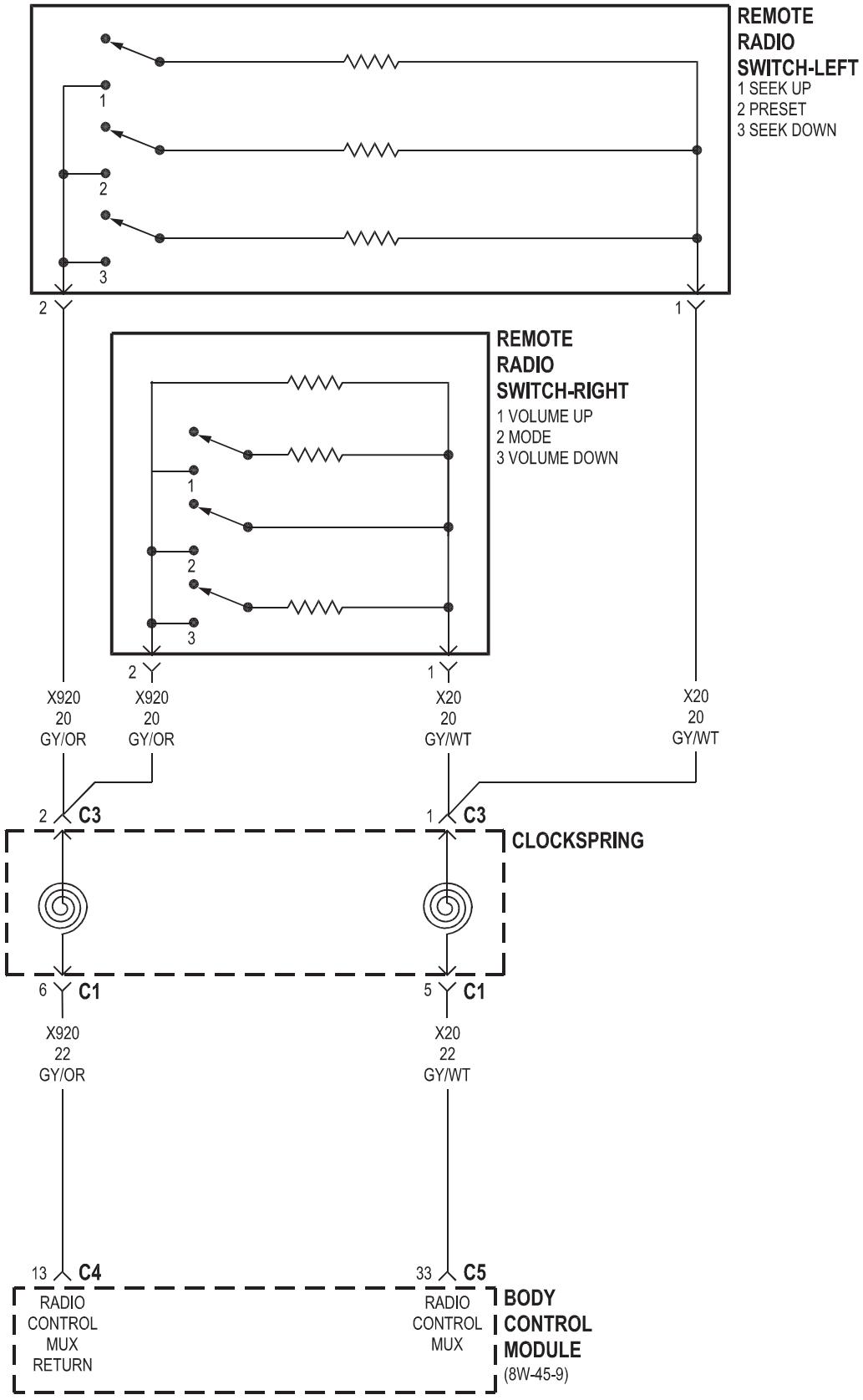

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
ACCESSORY RELAY
(8W-13-18)
87
87A
FUSE 3 30A
(8W-13-12)
30
RUN RELAY
(8W-13-11)
87
87A
FUSE 25 15A
(8W-13-18)
FUSE 49 25A
(8W-13-12)
B(+)
RUN RELAY
4 C8
13 C8
F316 20 PK/OR
A116 16 YL/RD
S320
(8W-13-18)
S303
(8W-13-13)
F316 20 PK/OR
A116 16 YL/RD
A116 16 YL/RD
5 C2
1 C1
9 C1
FUSED ACCESSORY RELAY OUTPUT
FUSED B(+)
FUSED B(+)
2 DATA LINK CONNECTOR
(8W-18-2)
D25 20 WT/VT
S213
(8W-18-3)
D25 20 WT/VT
27 C201
D25 20 WT/VT
S347
(8W-18-5)
D25 20 WT/VT
S353
(8W-18-6)
D25 20 WT/VT
12 C2
PCI BUS
AMPLIFIER
RADIO RIGHT AUDIO (+)
RADIO RIGHT AUDIO (-)
RADIO LEFT AUDIO (-)
RADIO LEFT AUDIO (+)
GROUND
GROUND
7 C2
6 C2
2 C2
1 C2
4 C2
11 C2
X54 20 GY
X56 20 GY/BR
X55 20 DG/BR
X53 20 DG
7
6
8
9 C205
X54 20 GY
X56 20 GY/BR
X55 20 DG/BR
X53 20 DG
Z513 16 BK
Z516 16 BK/GY
7
8
9
10
RADIO RIGHT AUDIO (+)
RADIO RIGHT AUDIO (-)
RADIO LEFT AUDIO (-)
RADIO LEFT AUDIO (+)
RADIO
G304
(8W-15-15)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
85
30
ACCESSORY RELAY
(8W-13-18)
86
87
87A
FUSE 3 30A
(8W-13-12)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
ACCESSORY RELAY CONTROL
INTEGRATED POWER MODULE
FUSE 25 15A
(8W-13-18)
FUSE 50 15A
(8W-13-12)
4 C8
F316 20 PK/OR
13 C4
A118 20 RD/OR
2 DATA LINK CONNECTOR
(8W-18-2)
INSTRUMENT CLUSTER
(8W-40-3)
PANEL LAMPS DRIVER
9 C1
S320
(8W-13-18)
F316 20 PK/OR
5
15 C201
E12 20 OR/GY
S204
(8W-44-8)
E12 18 OR/GY
3 C1
PANEL LAMPS DRIVER
A118 20 RD/OR
S201
(8W-13-13)
A118 20 RD/OR
1 C1
FUSED B(+)
D25 20 WT/VT
S213
(8W-18-3)
D25 20 WT/VT
14 C1
PCI BUS
RADIO
F316 20 PK/OR
2 C1
FUSED ACCESSORY RELAY OUTPUT
ANTENNA SIGNAL
13 C1
X60 18 GY/OR
ANTENNA-RADIO
GROUND
11 C1
Z514 18 BK/LG
G200
(8W-15-6)

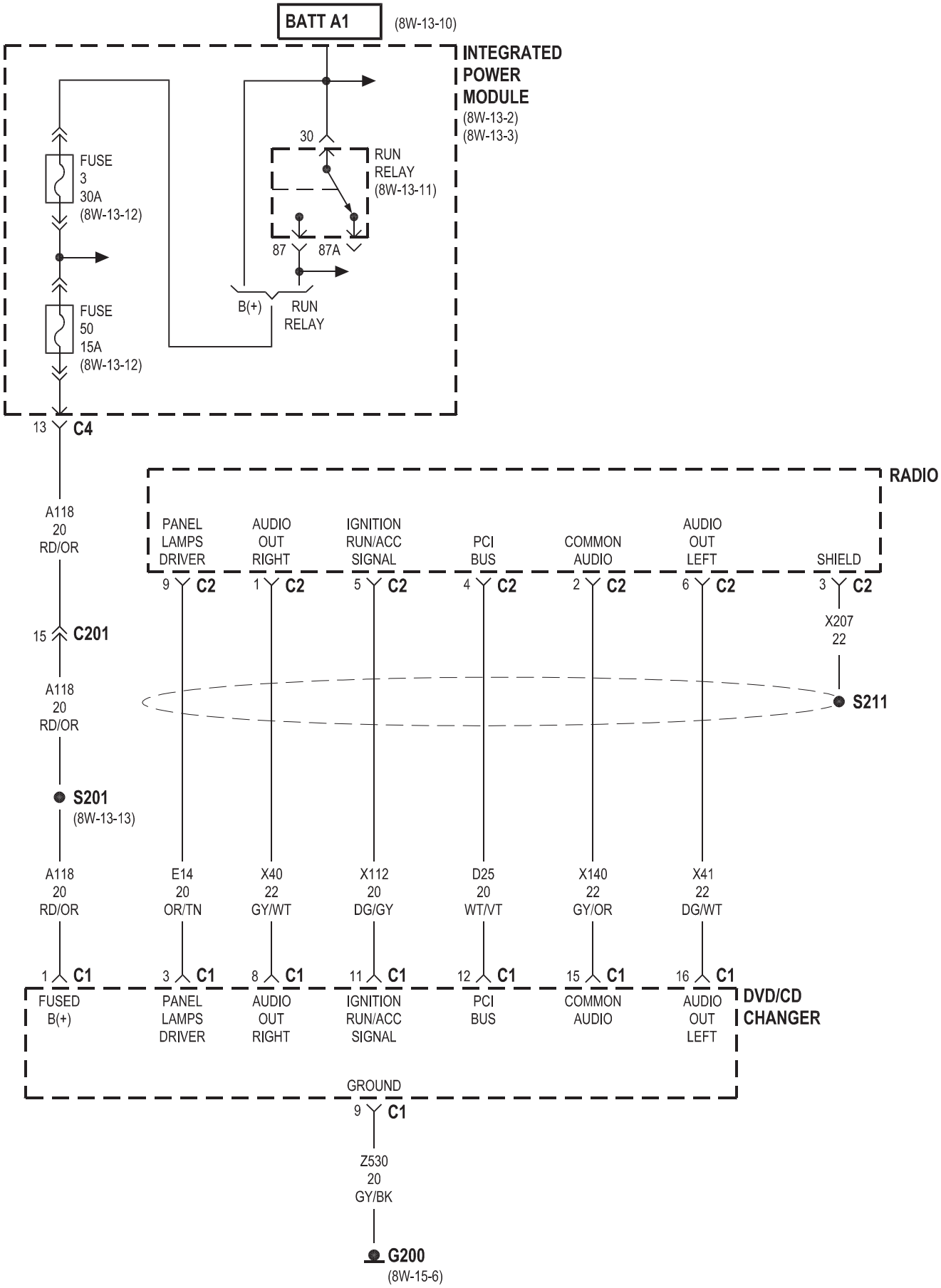

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
ACCESSORY RELAY
(8W-13-18)
87
87A
FUSE 25 15A
(8W-13-18)
FUSE 3 30A
(8W-13-12)
FUSE 49 25A
(8W-13-12)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
2
DATA LINK CONNECTOR
(8W-18-2)
D25 20 WT/VT
S213
(8W-18-3)
D25 20 WT/VT
27
C201
D25 20 WT/VT
S347
(8W-18-5)
D25 20 WT/VT
S353
(8W-18-6)
D25 20 WT/VT
4
C8
13
C8
F316 20 PK/OR
A116 16 YL/RD
S320
(8W-13-18)
S303
(8W-13-13)
F316 20 PK/OR
A116 16 YL/RD
A116 16 YL/RD
5
C2
1
C1
9
C1
12
C2
AMPLIFIER
FUSED ACCESSORY RELAY OUTPUT
FUSED B(+)
FUSED B(+)
PCI BUS
RADIO RIGHT AUDIO (+)
RADIO RIGHT AUDIO (-)
RADIO LEFT AUDIO (-)
RADIO LEFT AUDIO (+)
GROUND
GROUND
7
C2
6
C2
2
C2
1
C2
4
C2
11
C2
X54 20 GY
X56 20 GY/BR
X55 20 DG/BR
X53 20 DG
7
6
8
9
C205
X54 20 GY
X56 20 GY/BR
X55 20 DG/BR
X53 20 DG
Z513 16 BK
Z516 16 BK/GY
7
C1
8
C1
9
C1
10
C1
RADIO
RADIO RIGHT AUDIO (+)
RADIO RIGHT AUDIO (-)
RADIO LEFT AUDIO (-)
RADIO LEFT AUDIO (+)
G304
(8W-15-15)

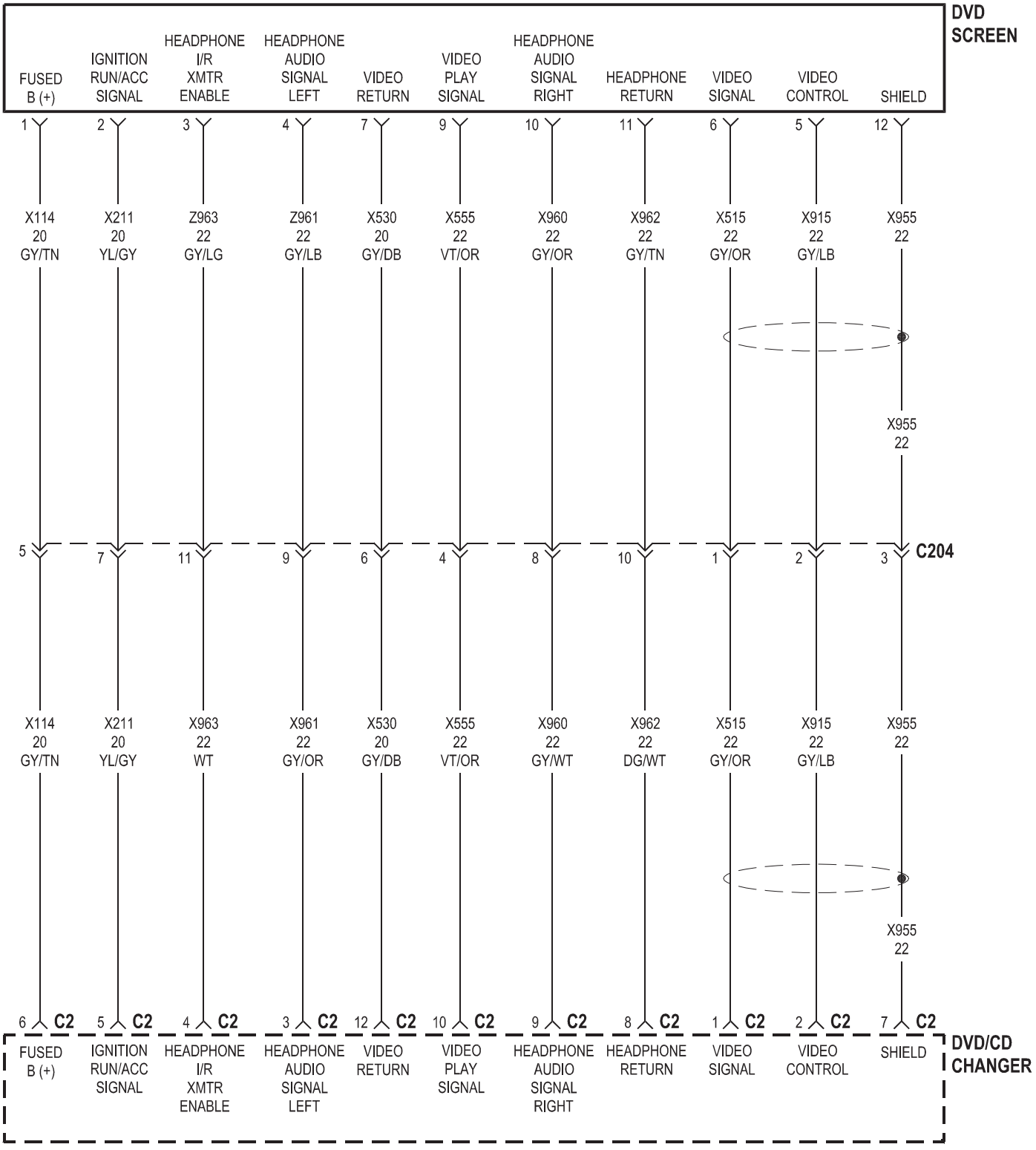

SPEAKER-LEFT FRONT DOOR TWEETER
SPEAKER-RIGHT FRONT DOOR TWEETER
TWISTED PAIR
X201 20 GY/VT
X291 20 GY/YL
X202 20 DG/VT
X292 20 DG/YL
S327
S329
S328
S330
X201 18 GY/VT
X291 18 GY/YL
X202 18 DG/VT
X292 18 DG/YL
SPEAKER-LEFT FRONT DOOR WOOFER
SPEAKER-RIGHT FRONT DOOR WOOFER
C301
C304
18 C1
8 C1
7 C1
17 C1
AMPLIFIED LEFT FRONT DOOR SPEAKER (+)
AMPLIFIED LEFT FRONT DOOR SPEAKER (-)
AMPLIFIED RIGHT FRONT DOOR SPEAKER (+)
AMPLIFIED RIGHT FRONT DOOR SPEAKER (-)
AMPLIFIER


SPEAKER-SUBWOOFER
1
4
3
6
SPEAKER-CENTER INSTRUMENT PANEL
1
2
X290 18 GY/OR
X200 18 GY/DB
TWISTED PAIR
4
5
C205
X390 18 DG/BR
X301 18 GY/WT
X300 18 GY/BR
X391 18 DG/WT
11 C1
12 C1
3 C1
4 C1
16 C1
6 C1
AMPLIFIER
AMPLIFIED SUBWOOFER 1 (-)
AMPLIFIED SUBWOOFER 2 (+)
AMPLIFIED SUBWOOFER 1 (+)
AMPLIFIED SUBWOOFER 2 (-)
AMPLIFIED CENTER INSTRUMENT PANEL SPEAKER (-)
AMPLIFIED CENTER INSTRUMENT PANEL SPEAKER (+)
AMPLIFIED LEFT REAR DOOR SPEAKER (-)
AMPLIFIED LEFT REAR DOOR SPEAKER (+)
AMPLIFIED RIGHT REAR DOOR SPEAKER (-)
AMPLIFIED RIGHT REAR DOOR SPEAKER (+)
15 C1
5 C1
13 C1
14 C1
X295 18 GY/DG
X205 18 GY/LG
X296 18 DG/GY
X206 18 DG/LG
10
9
C303
C306
X295 18 DG/GY
X205 18 DG/LG
X296 18 DG/GY
X206 18 DG/LG
TWISTED PAIR
TWISTED PAIR
1
3
SPEAKER-LEFT REAR DOOR
SPEAKER-RIGHT REAR DOOR

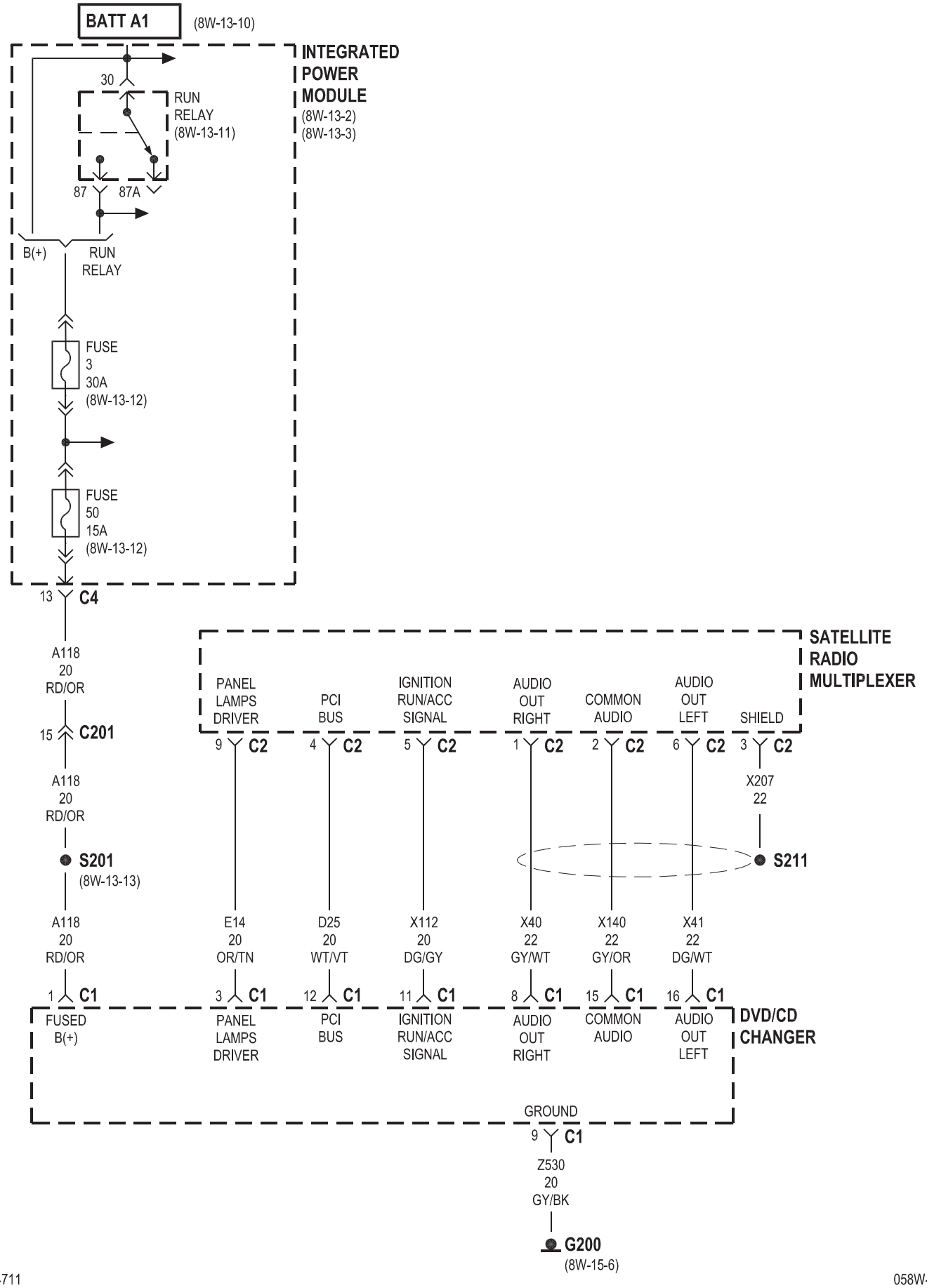

REMOTE
RADIO
SWITCH-LEFT
1 SEEK UP
2 PRESET
3 SEEK DOWN
REMOTE
RADIO
SWITCH-RIGHT
1 VOLUME UP
2 MODE
3 VOLUME DOWN
X920
20
GY/OR
X920
20
GY/OR
X20
20
GY/WT
X20
20
GY/WT
C3
C3
CLOCKSPRING
C1
C1
X920
22
GY/OR
X20
22
GY/WT
C4
C5
RADIO
CONTROL
MUX
RETURN
RADIO
CONTROL
MUX
BODY
CONTROL
MODULE
(8W-45-9)

DVD/CD CHANGER

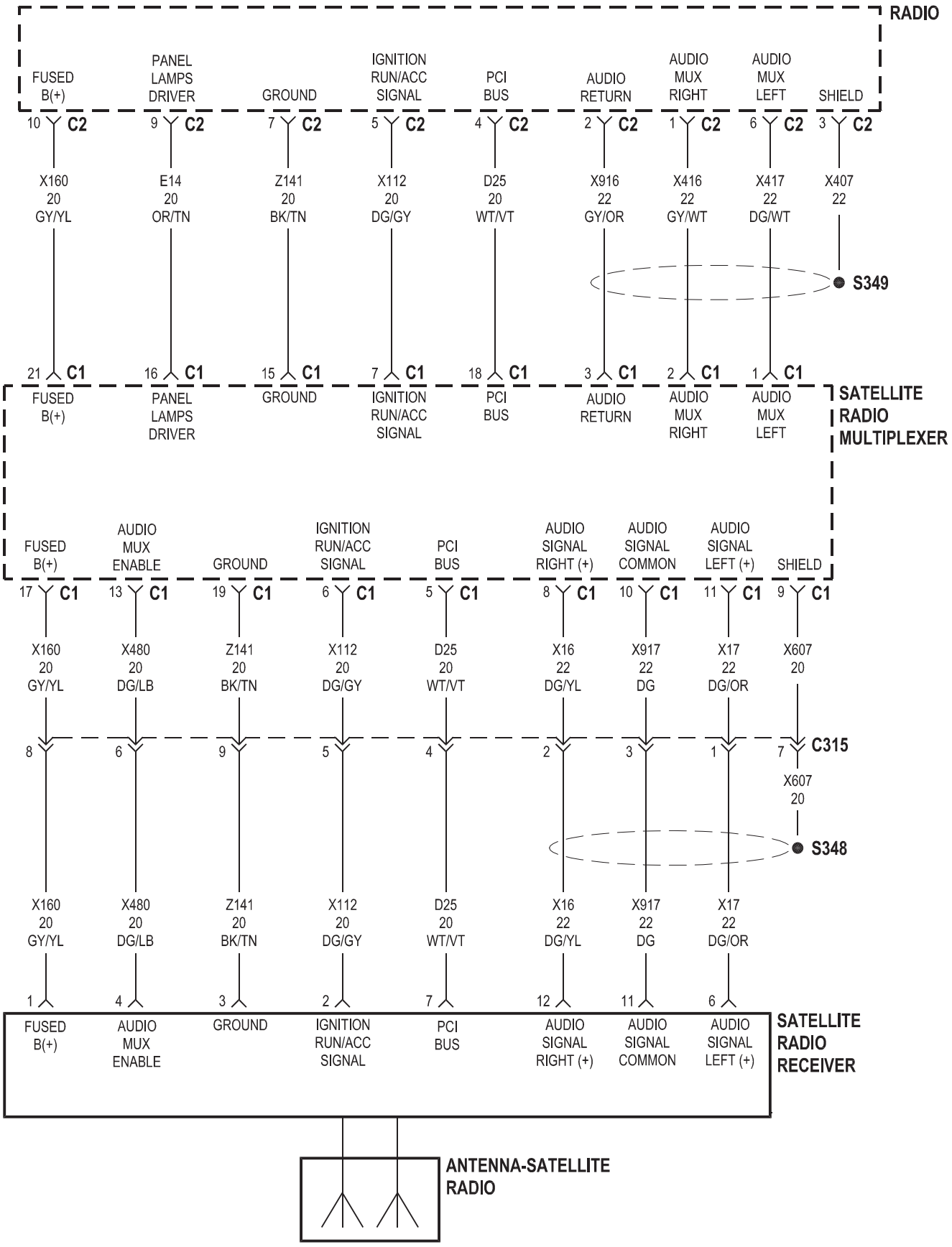


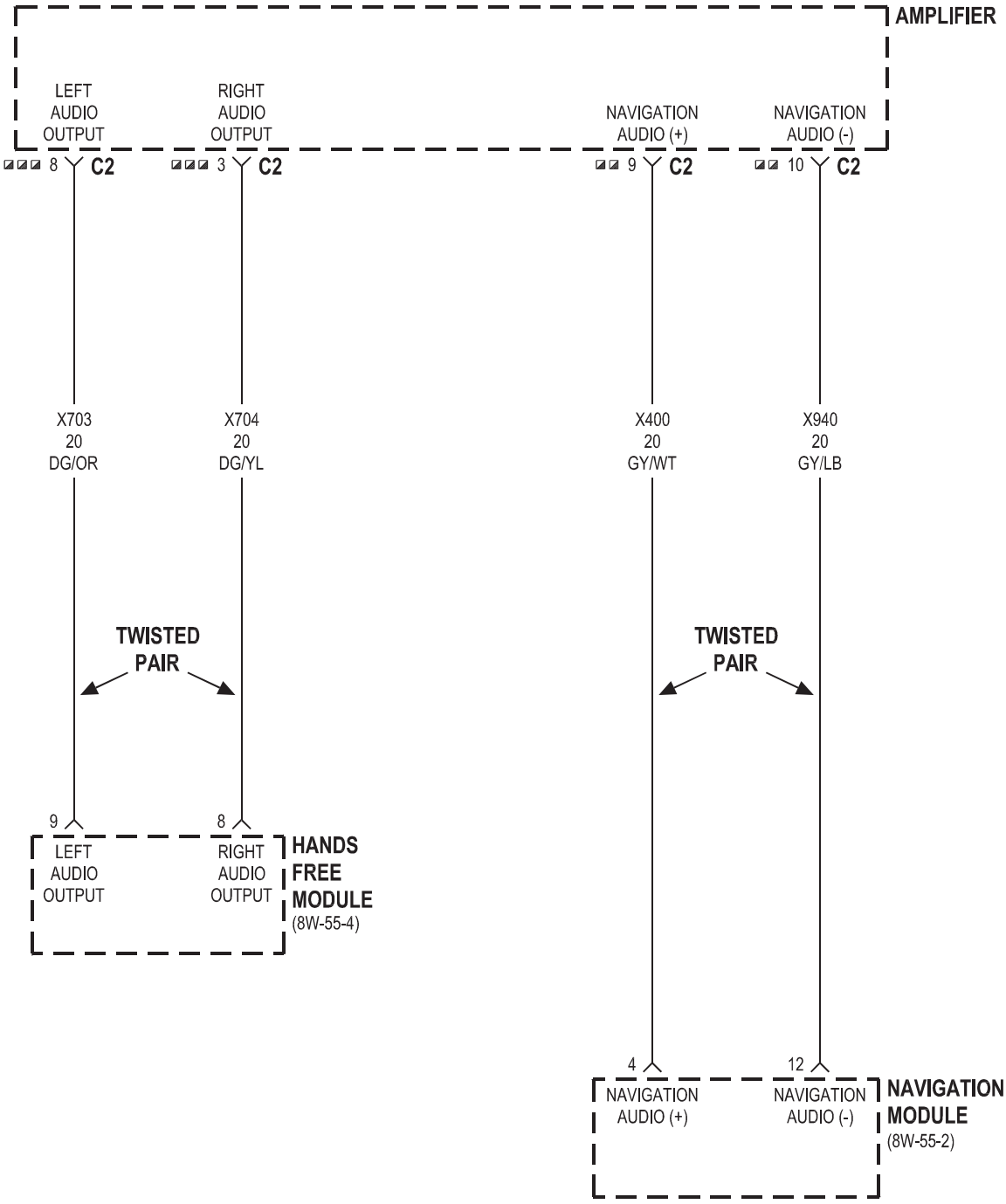

DVD SCREEN
FUSED B (+)
IGNITION RUN/ACC SIGNAL
HEADPHONE I/R XMTR ENABLE
HEADPHONE AUDIO SIGNAL LEFT
VIDEO RETURN
VIDEO PLAY SIGNAL
HEADPHONE AUDIO SIGNAL RIGHT
HEADPHONE RETURN
VIDEO SIGNAL
VIDEO CONTROL
SHIELD
1 2 3 4 7 9 10 11 6 5 12
X114 20 GY/TN
X211 20 YL/GY
Z963 22 GY/LG
Z961 22 GY/LB
X530 20 GY/DB
X555 22 VT/OR
X960 22 GY/OR
X962 22 GY/TN
X515 22 GY/OR
X915 22 GY/LB
X955 22
X955 22
5 7 11 9 6 4 8 10 1 2 3 C204
X114 20 GY/TN
X211 20 YL/GY
X963 22 WT
X961 22 GY/OR
X530 20 GY/DB
X555 22 VT/OR
X960 22 GY/WT
X962 22 DG/WT
X515 22 GY/OR
X915 22 GY/LB
X955 22
X955 22
6 C2 5 C2 4 C2 3 C2 12 C2 10 C2 9 C2 8 C2 1 C2 2 C2 7 C2
FUSED B (+)
IGNITION RUN/ACC SIGNAL
HEADPHONE I/R XMTR ENABLE
HEADPHONE AUDIO SIGNAL LEFT
VIDEO RETURN
VIDEO PLAY SIGNAL
HEADPHONE AUDIO SIGNAL RIGHT
HEADPHONE RETURN
VIDEO SIGNAL
VIDEO CONTROL
SHIELD
DVD/CD CHANGER

SATELLITE RADIO



SATELLITE RADIO

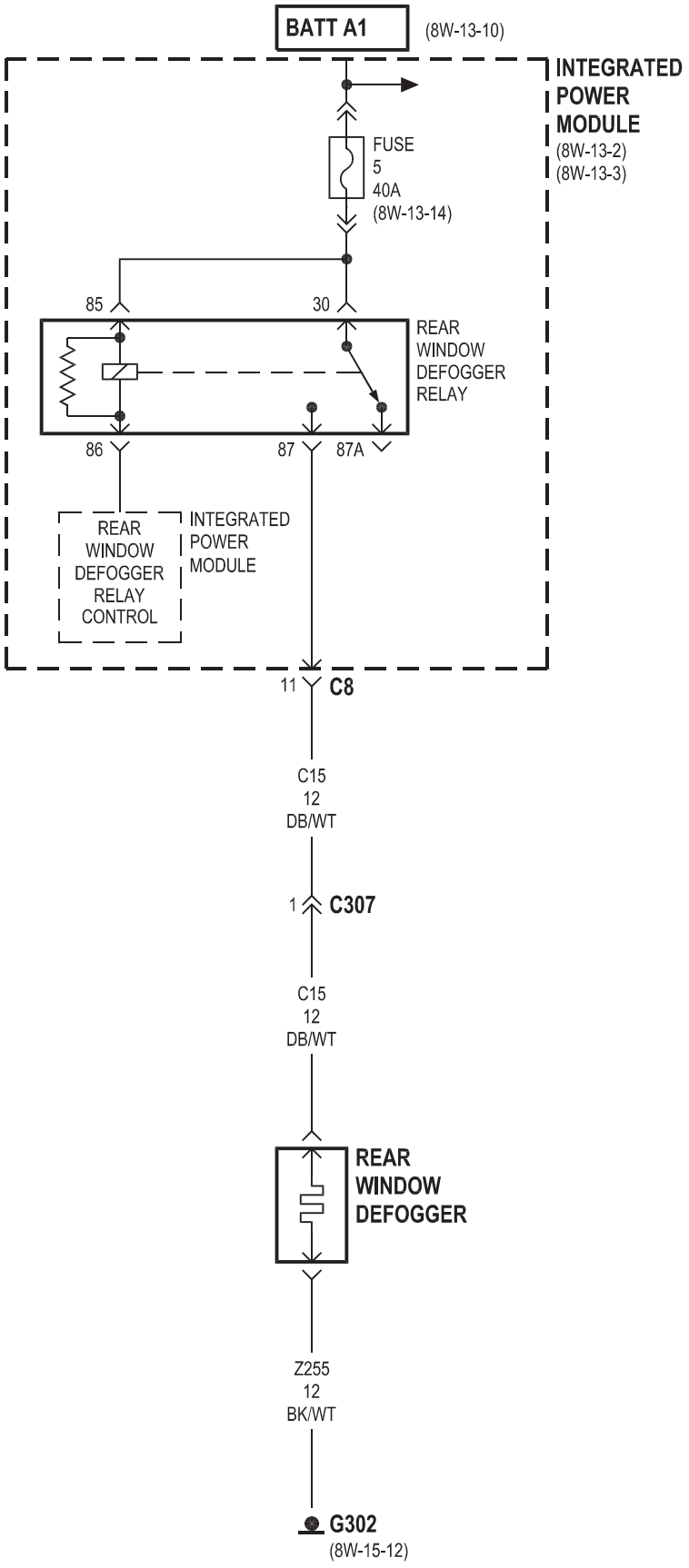




NAVIGATION
HANDS FREE

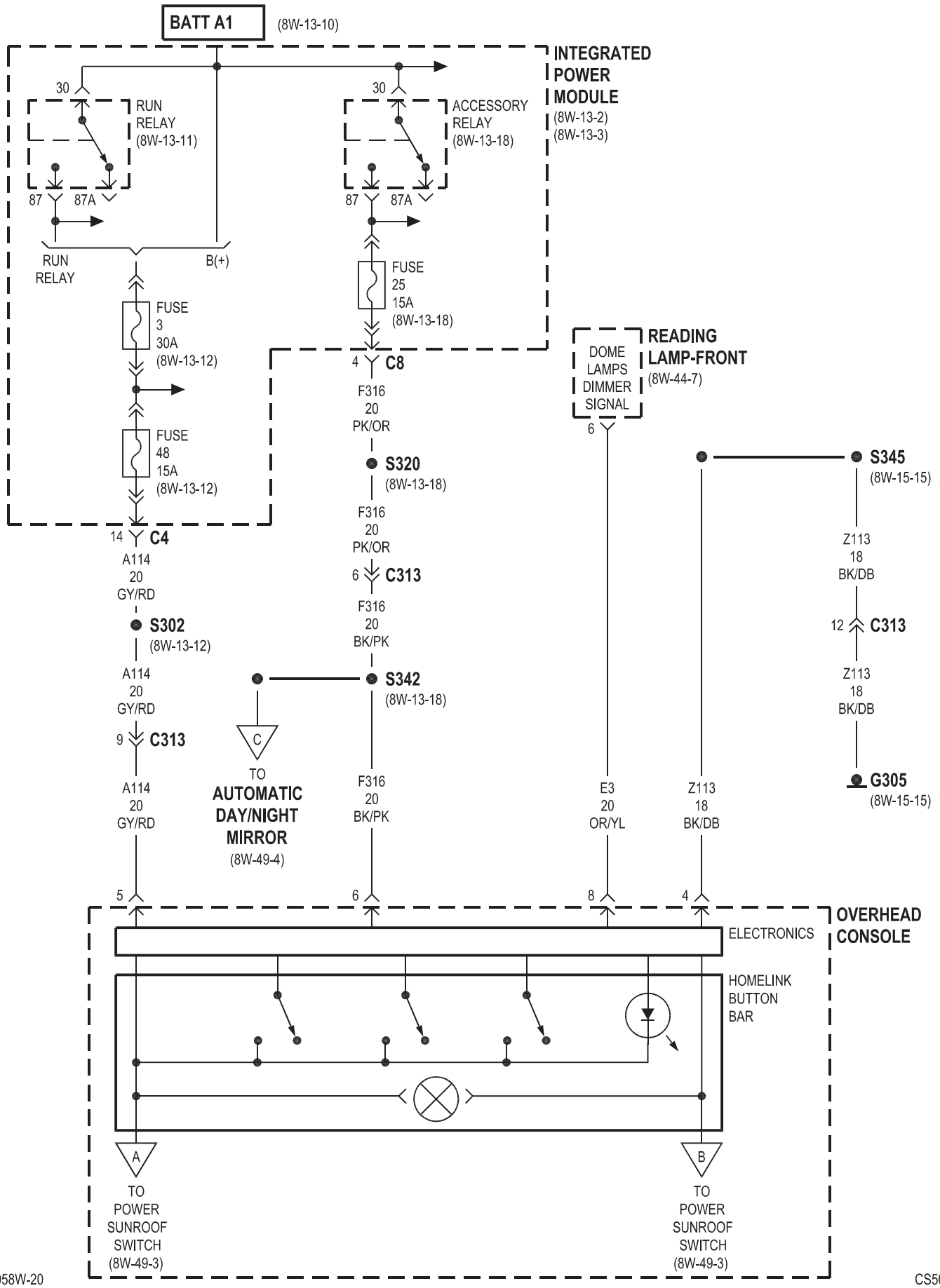
8W-48 REAR WINDOW DEFOGGER

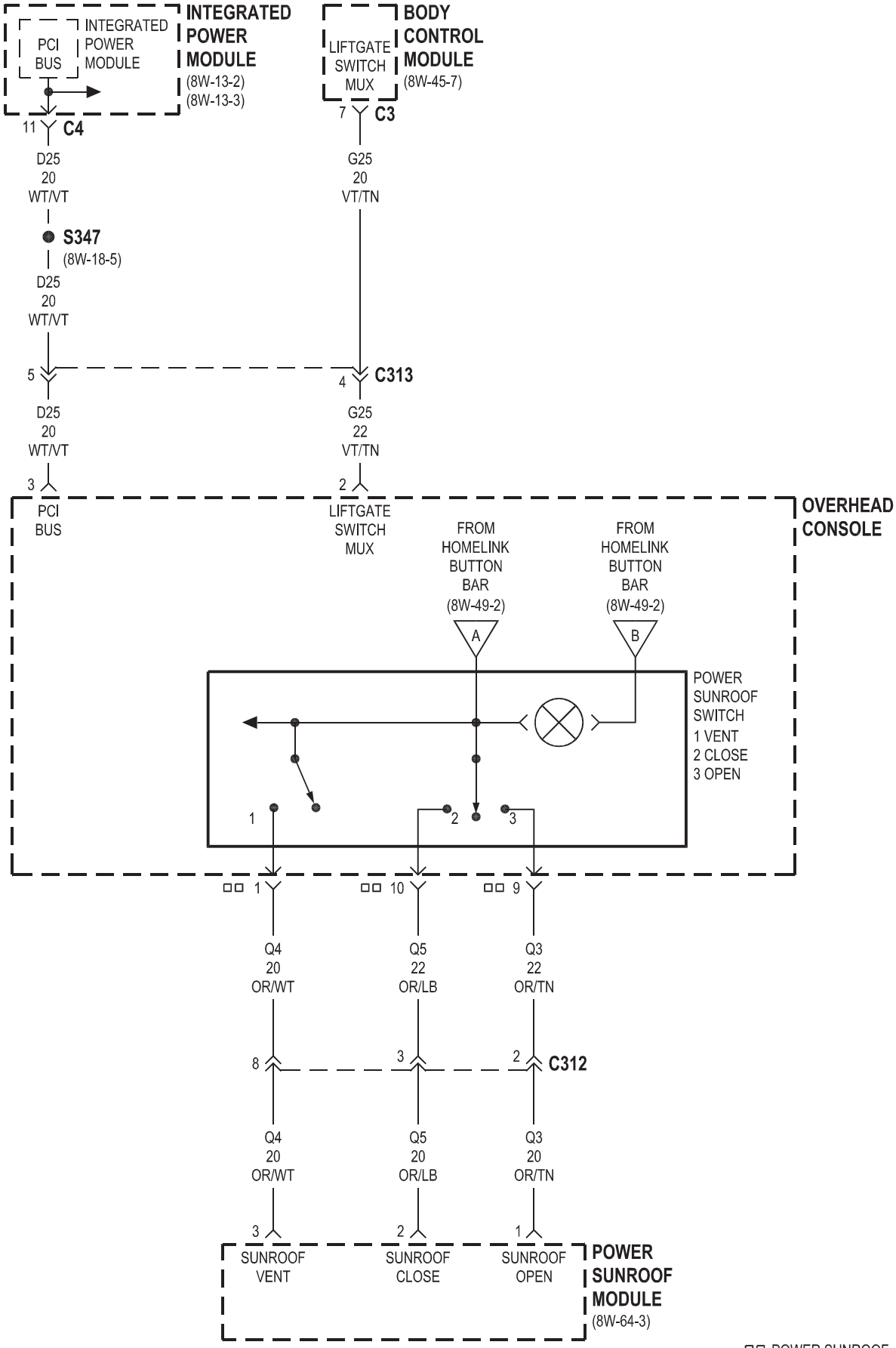
Component	Page
Fuse 5	8W-48-2
G302	8W-48-2
Integrated Power Module	8W-48-2
Rear Window Defogger	8W-48-2
Rear Window Defogger Relay	8W-48-2

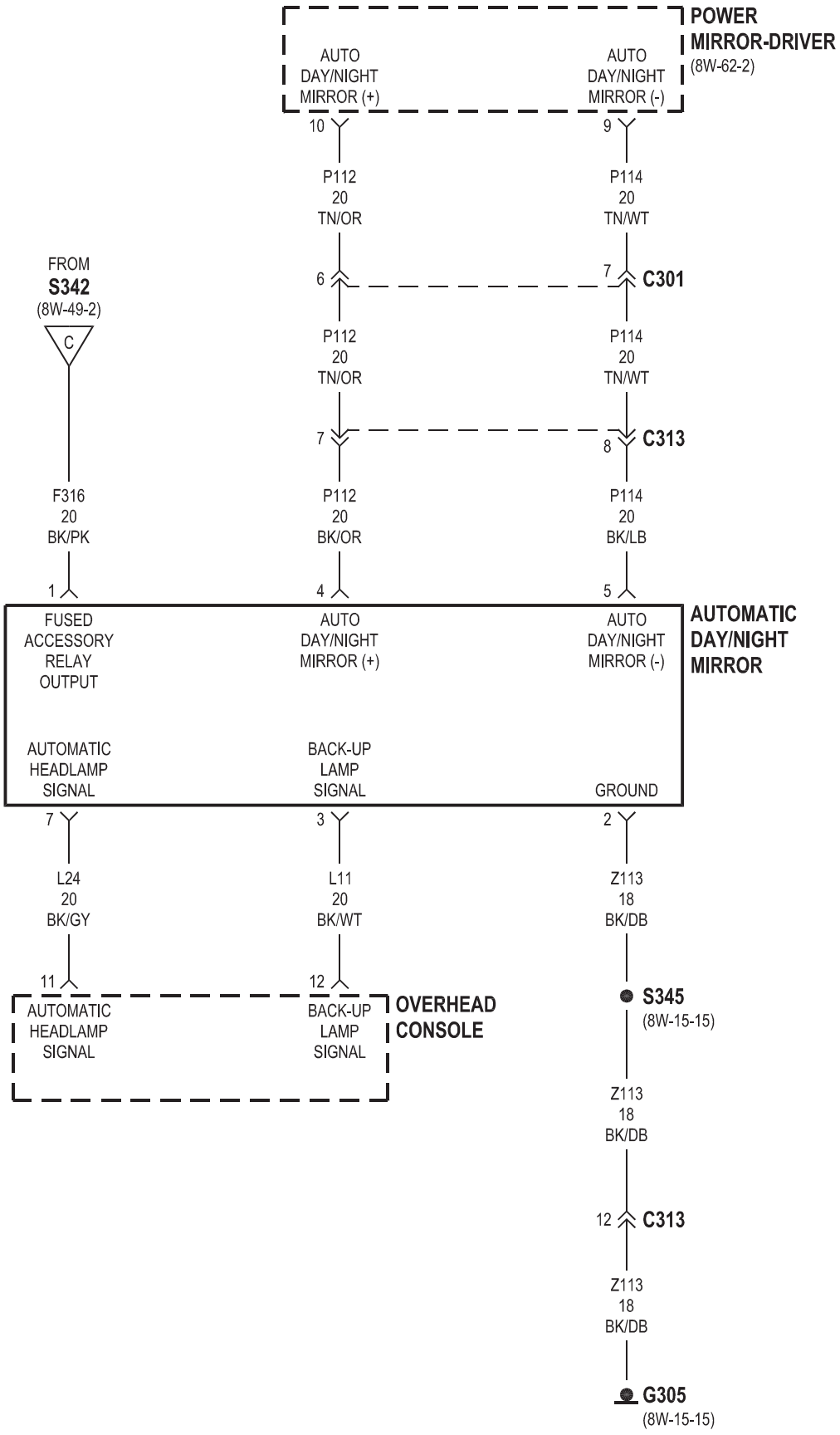

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE
5
40A
(8W-13-14)
85
30
REAR WINDOW DEFOGGER RELAY
86
87
87A
REAR WINDOW DEFOGGER RELAY CONTROL
INTEGRATED POWER MODULE
11
C8
C15
12
DB/WT
1
C307
C15
12
DB/WT
REAR WINDOW DEFOGGER
Z255
12
BK/WT
G302
(8W-15-12)

8W-49 OVERHEAD CONSOLE

Component	Page
Accessory Relay	8W-49-2
Automatic Day/Night Mirror	8W-49-2, 4
Body Control Module	8W-49-3
Fuse 3	8W-49-2
Fuse 25	8W-49-2
Fuse 48	8W-49-2
G305	8W-49-2, 4
Integrated Power Module	8W-49-2, 3
Overhead Console	8W-49-2, 3, 4
Power Mirror-Driver	8W-49-4
Power Sunroof Module	8W-49-3
Reading Lamp-Front	8W-49-2
Run Relay	8W-49-2

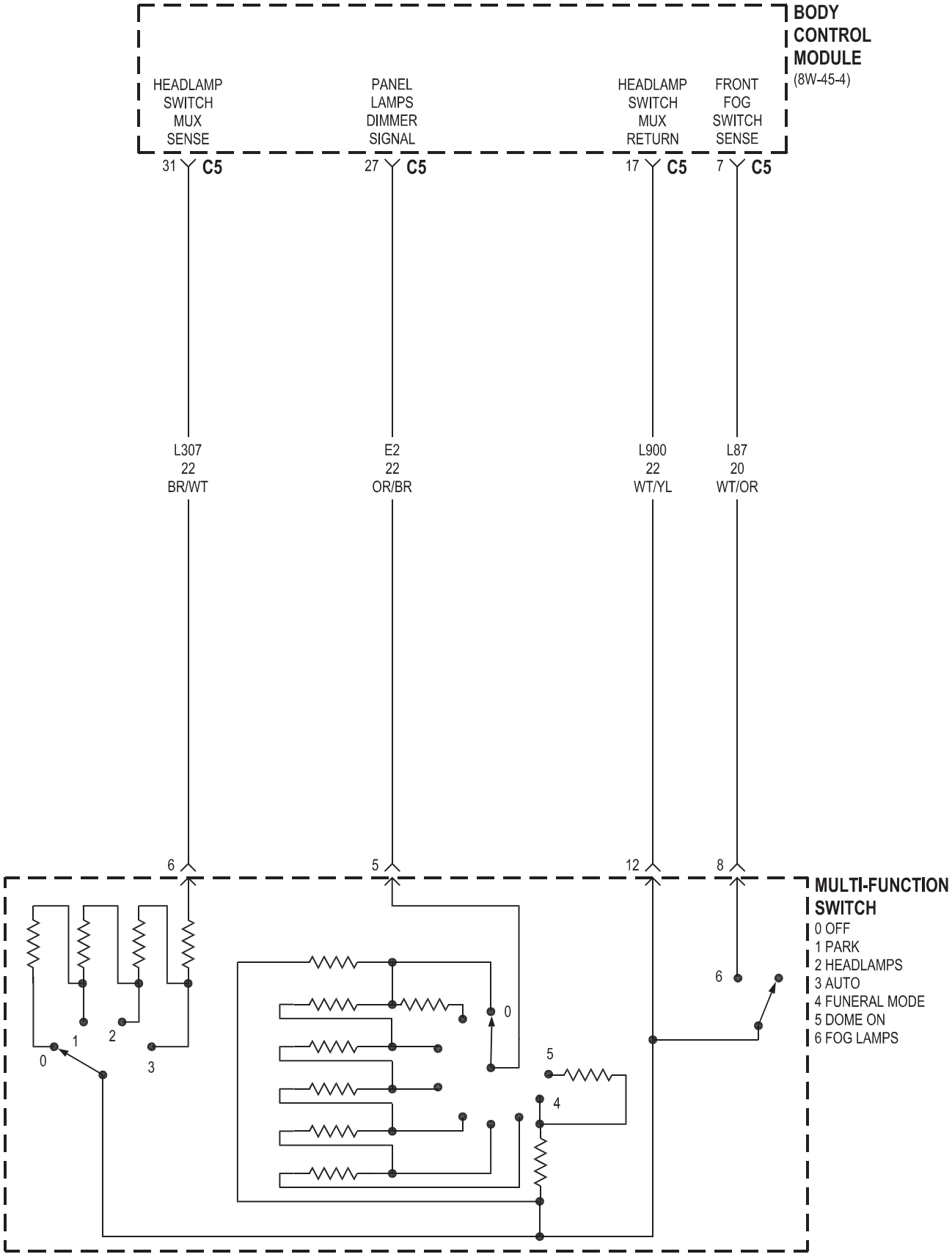

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
RUN RELAY
B(+)
FUSE 3 30A
(8W-13-12)
FUSE 48 15A
(8W-13-12)
14 C4
A114 20 GY/RD
S302
(8W-13-12)
A114 20 GY/RD
9 C313
A114 20 GY/RD
5
30
ACCESSORY RELAY
(8W-13-18)
87
87A
FUSE 25 15A
(8W-13-18)
4 C8
F316 20 PK/OR
S320
(8W-13-18)
F316 20 PK/OR
6 C313
F316 20 BK/PK
S342
(8W-13-18)
F316 20 BK/PK
6
C
TO AUTOMATIC DAY/NIGHT MIRROR
(8W-49-4)
DOME LAMPS DIMMER SIGNAL
6
E3 20 OR/YL
8
READING LAMP-FRONT
(8W-44-7)
S345
(8W-15-15)
Z113 18 BK/DB
12 C313
Z113 18 BK/DB
G305
(8W-15-15)
Z113 18 BK/DB
4
OVERHEAD CONSOLE
ELECTRONICS
HOMELINK BUTTON BAR
A
TO POWER SUNROOF SWITCH
(8W-49-3)
B
TO POWER SUNROOF SWITCH
(8W-49-3)

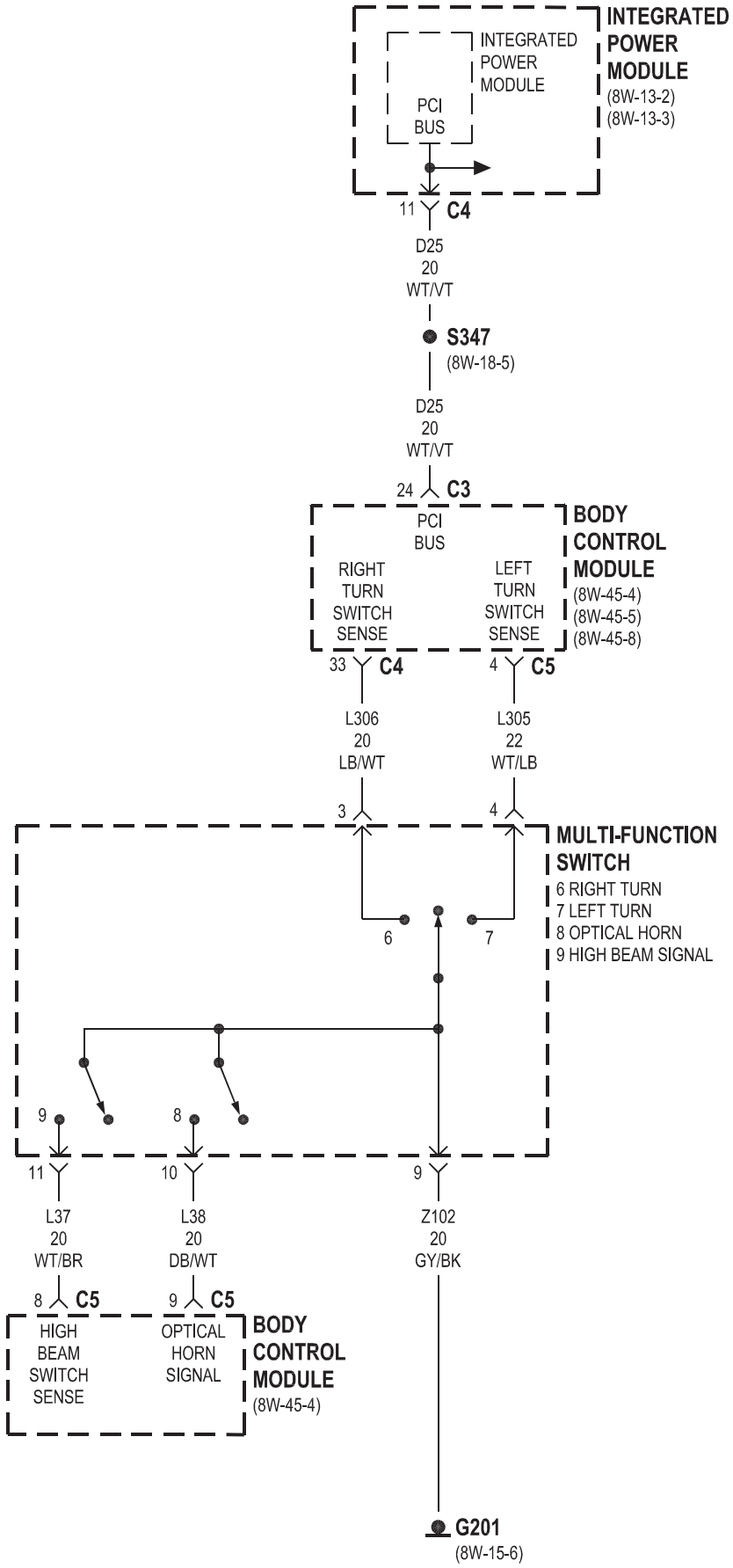

INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
PCI BUS
INTEGRATED POWER MODULE
11 C4
D25 20 WT/VT
S347
(8W-18-5)
D25 20 WT/VT
5
D25 20 WT/VT
3
PCI BUS
BODY CONTROL MODULE
(8W-45-7)
LIFTGATE SWITCH MUX
7 C3
G25 20 VT/TN
4 C313
G25 22 VT/TN
2
LIFTGATE SWITCH MUX
OVERHEAD CONSOLE
FROM HOMELINK BUTTON BAR (8W-49-2)
A
FROM HOMELINK BUTTON BAR (8W-49-2)
B
POWER SUNROOF SWITCH
1 VENT
2 CLOSE
3 OPEN
1
2
3
1
10
9
Q4 20 OR/WT
Q5 22 OR/LB
Q3 22 OR/TN
8
3
2 C312
Q4 20 OR/WT
Q5 20 OR/LB
Q3 20 OR/TN
3
2
1
SUNROOF VENT
SUNROOF CLOSE
SUNROOF OPEN
POWER SUNROOF MODULE
(8W-64-3)
POWER SUNROOF

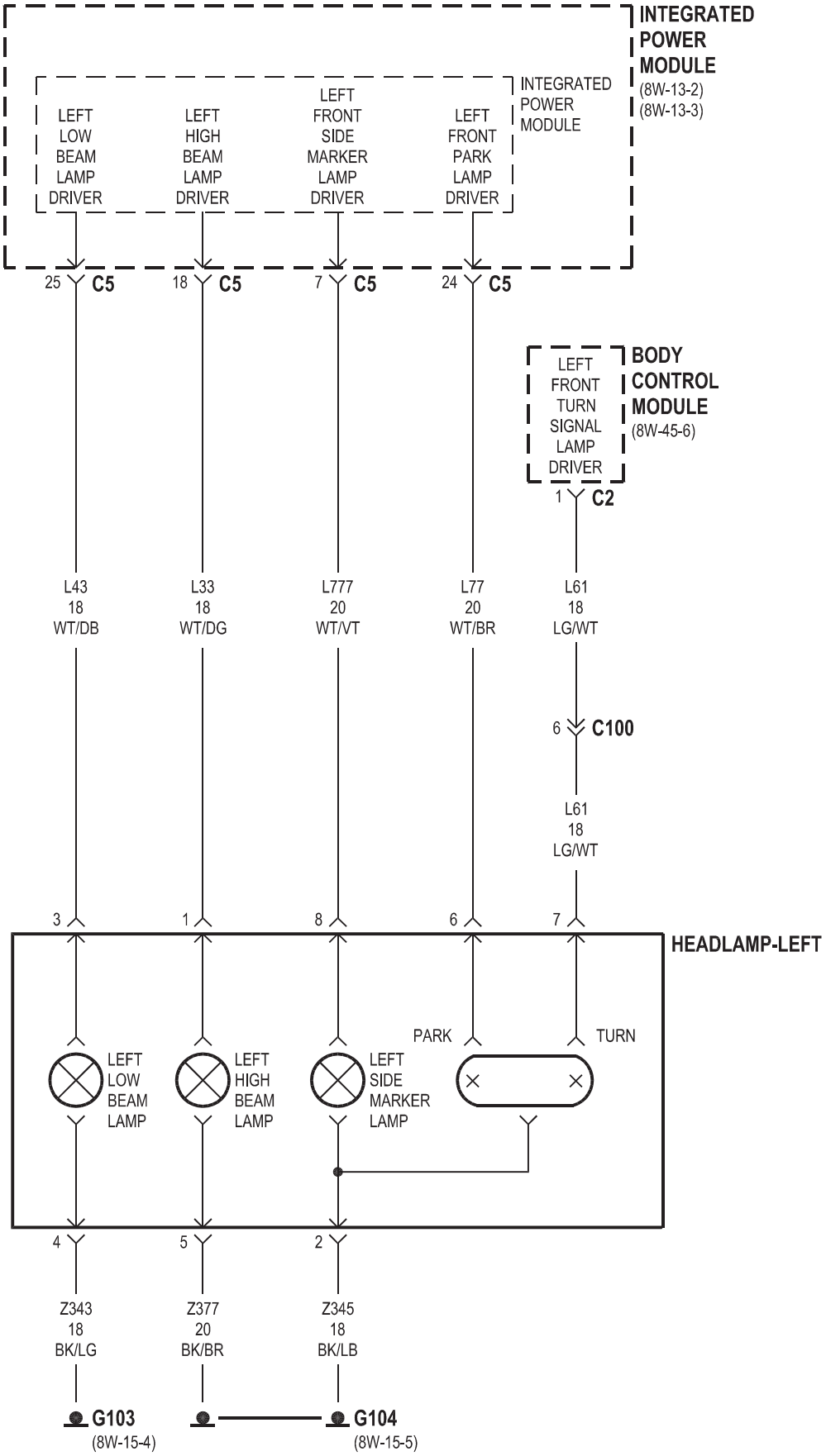

POWER
MIRROR-DRIVER
(8W-62-2)
AUTO
DAY/NIGHT
MIRROR (+)
AUTO
DAY/NIGHT
MIRROR (-)
10
9
P112
20
TN/OR
P114
20
TN/WT
FROM
S342
(8W-49-2)
C
6
7
C301
P112
20
TN/OR
P114
20
TN/WT
7
8
C313
F316
20
BK/PK
P112
20
BK/OR
P114
20
BK/LB
1
4
5
FUSED
ACCESSORY
RELAY
OUTPUT
AUTO
DAY/NIGHT
MIRROR (+)
AUTO
DAY/NIGHT
MIRROR (-)
AUTOMATIC
DAY/NIGHT
MIRROR
AUTOMATIC
HEADLAMP
SIGNAL
BACK-UP
LAMP
SIGNAL
GROUND
7
3
2
L24
20
BK/GY
L11
20
BK/WT
Z113
18
BK/DB
11
12
AUTOMATIC
HEADLAMP
SIGNAL
BACK-UP
LAMP
SIGNAL
OVERHEAD
CONSOLE
S345
(8W-15-15)
Z113
18
BK/DB
12
C313
Z113
18
BK/DB
G305
(8W-15-15)

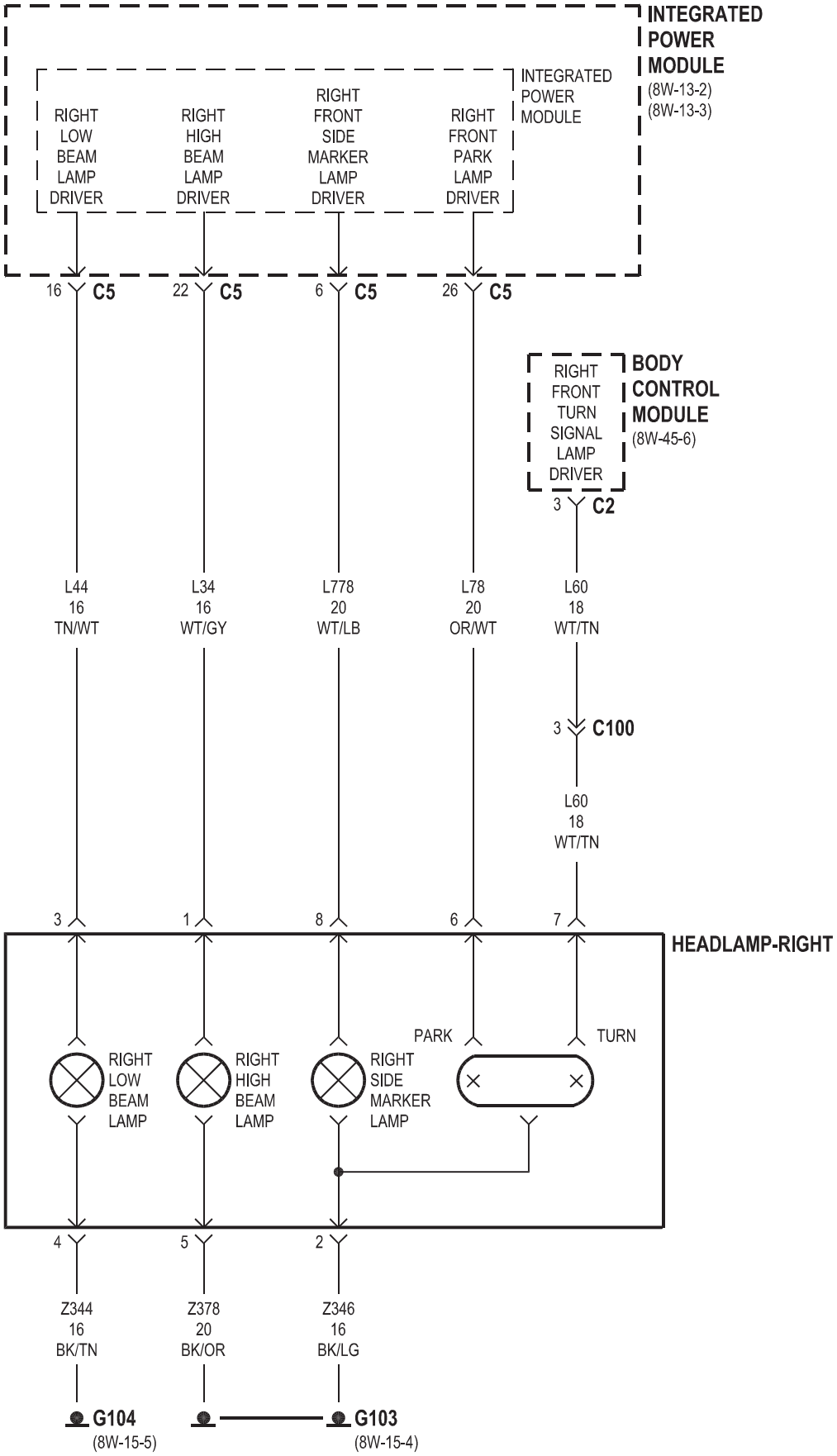
8W-50 FRONT LIGHTING

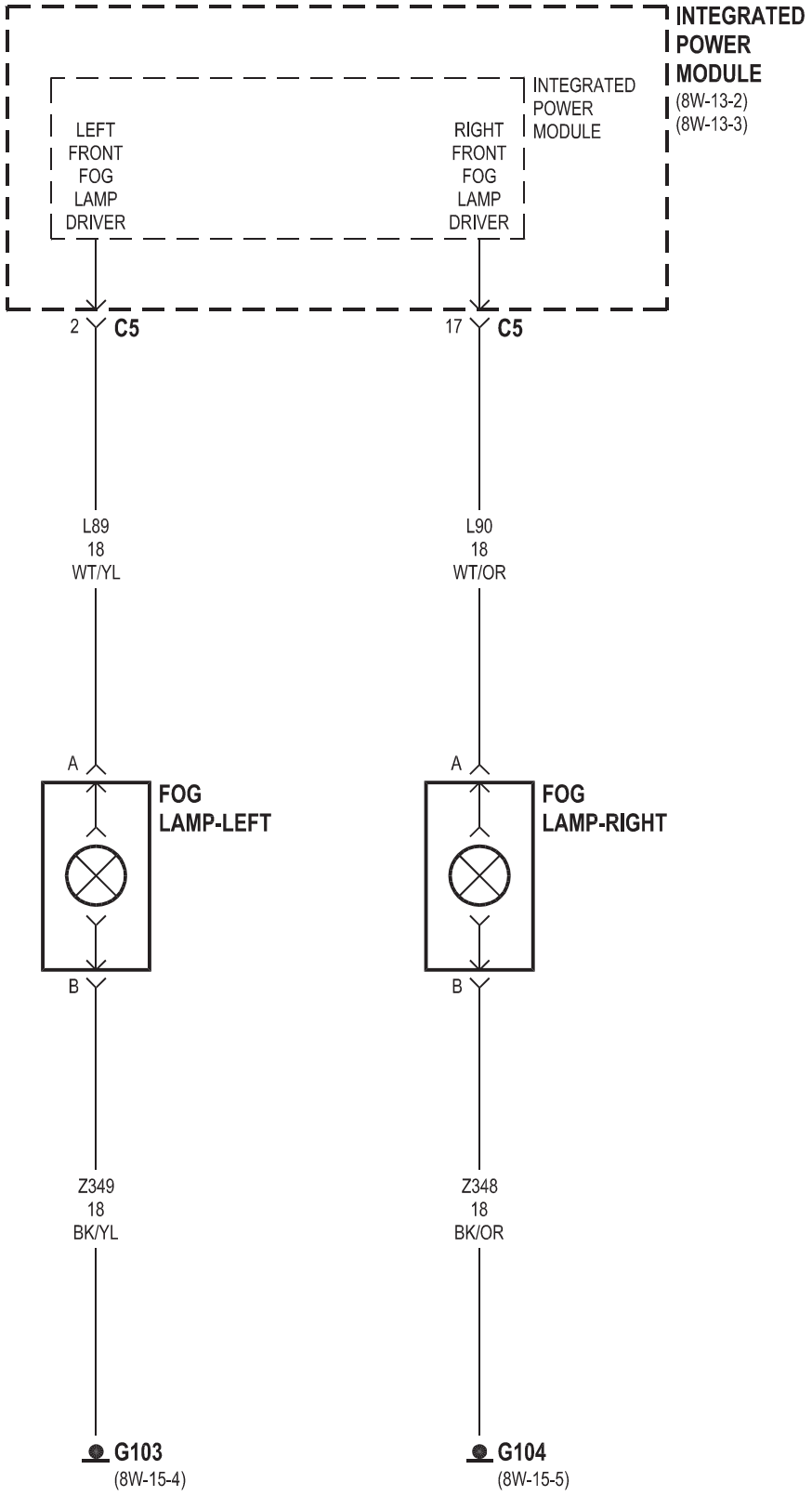
Component	Page
Body Control Module	8W-50-2, 3, 4, 5
Fog Lamp-Left	8W-50-6
Fog Lamp-Right	8W-50-6
G103	8W-50-4, 5, 6
G104	8W-50-4, 5, 6
G201	8W-50-3
Headlamp-Left	8W-50-4
Headlamp-Right	8W-50-5
Integrated Power Module	8W-50-3, 4, 5, 6
Multi-Function Switch	8W-50-2, 3


BODY CONTROL MODULE
(8W-45-4)
HEADLAMP SWITCH MUX SENSE
PANEL LAMPS DIMMER SIGNAL
HEADLAMP SWITCH MUX RETURN
FRONT FOG SWITCH SENSE
31 C5
27 C5
17 C5
7 C5
L307 22 BR/WT
E2 22 OR/BR
L900 22 WT/YL
L87 20 WT/OR
6
5
12
8
MULTI-FUNCTION SWITCH
0 OFF
1 PARK
2 HEADLAMPS
3 AUTO
4 FUNERAL MODE
5 DOME ON
6 FOG LAMPS
0
1
2
3
4
5
6


INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
PCI BUS
11 C4
D25
20
WT/VT
S347
(8W-18-5)
D25
20
WT/VT
24 C3
BODY CONTROL MODULE
(8W-45-4)
(8W-45-5)
(8W-45-8)
PCI BUS
RIGHT TURN SWITCH SENSE
LEFT TURN SWITCH SENSE
33 C4
4 C5
L306
20
LB/WT
L305
22
WT/LB
3
4
MULTI-FUNCTION SWITCH
6 RIGHT TURN
7 LEFT TURN
8 OPTICAL HORN
9 HIGH BEAM SIGNAL
6
7
9
8
11
10
9
L37
20
WT/BR
L38
20
DB/WT
Z102
20
GY/BK
8 C5
9 C5
BODY CONTROL MODULE
(8W-45-4)
HIGH BEAM SWITCH SENSE
OPTICAL HORN SIGNAL
G201
(8W-15-6)

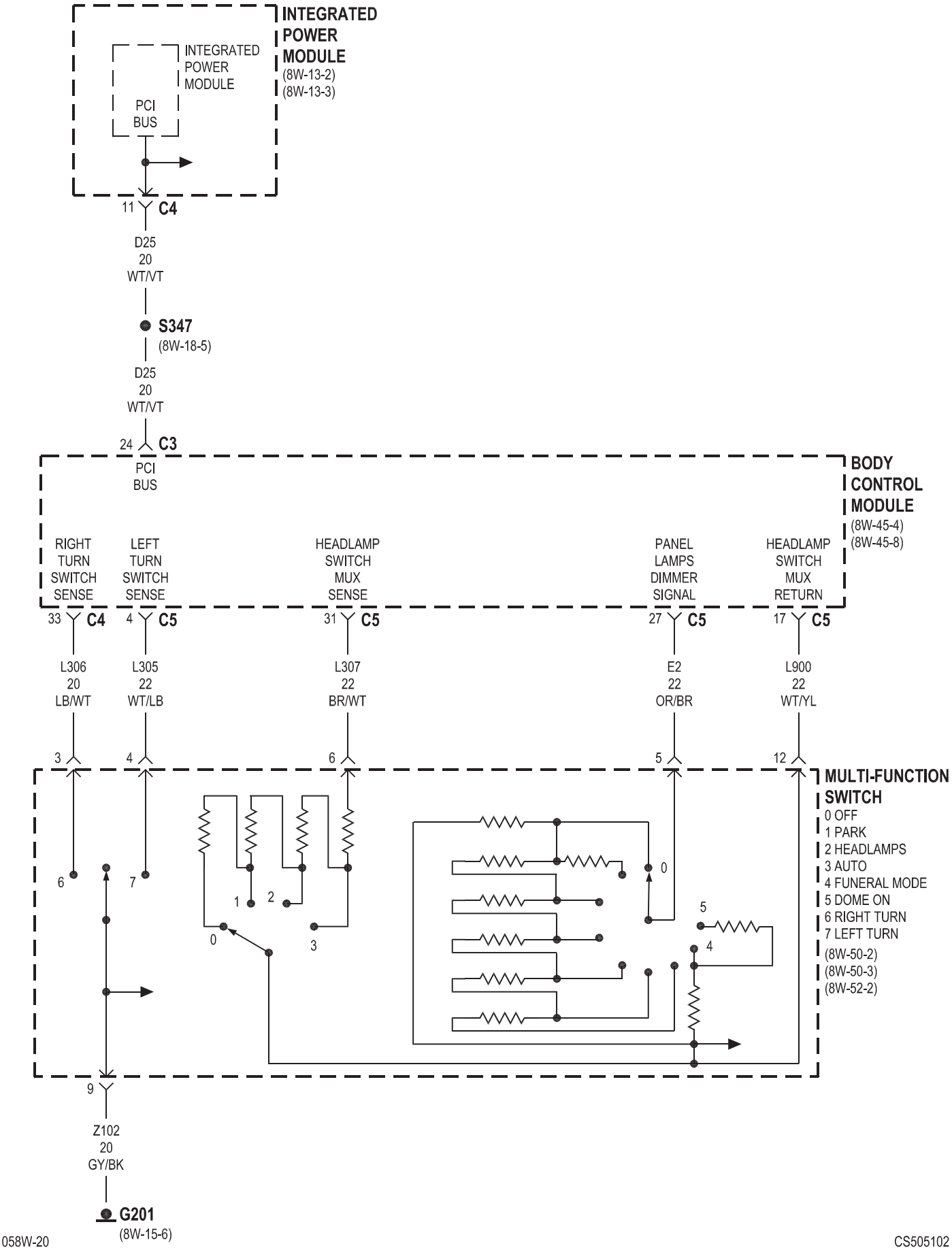

INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
LEFT LOW BEAM LAMP DRIVER
LEFT HIGH BEAM LAMP DRIVER
LEFT FRONT SIDE MARKER LAMP DRIVER
LEFT FRONT PARK LAMP DRIVER
25 C5
18 C5
7 C5
24 C5
BODY CONTROL MODULE
(8W-45-6)
LEFT FRONT TURN SIGNAL LAMP DRIVER
1 C2
L43 18 WT/DB
L33 18 WT/DG
L777 20 WT/VT
L77 20 WT/BR
L61 18 LG/WT
6 C100
L61 18 LG/WT
3
1
8
6
7
HEADLAMP-LEFT
LEFT LOW BEAM LAMP
LEFT HIGH BEAM LAMP
LEFT SIDE MARKER LAMP
PARK
TURN
4
5
2
Z343 18 BK/LG
Z377 20 BK/BR
Z345 18 BK/LB
G103
(8W-15-4)
G104
(8W-15-5)

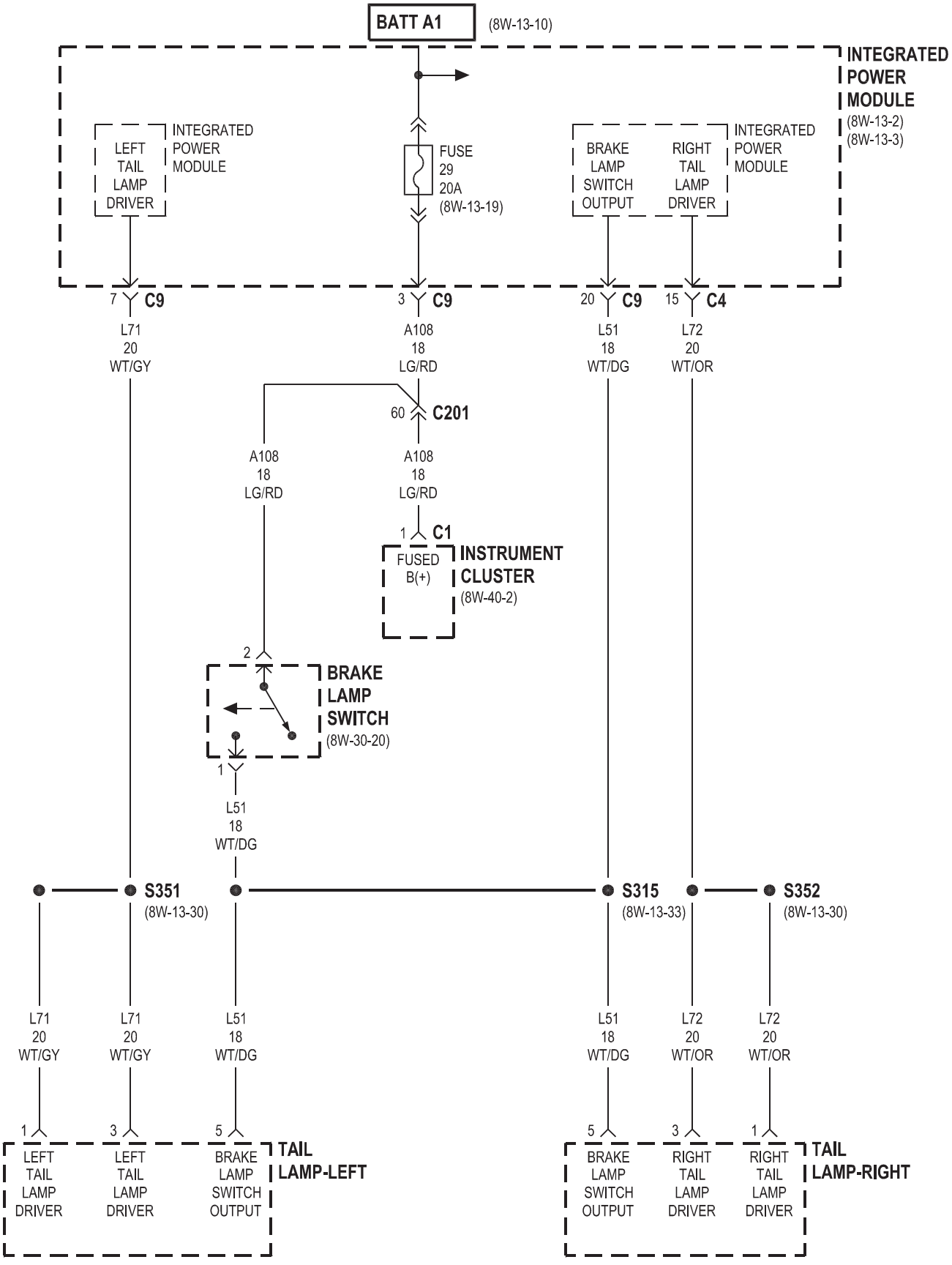

INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
RIGHT LOW BEAM LAMP DRIVER
RIGHT HIGH BEAM LAMP DRIVER
RIGHT FRONT SIDE MARKER LAMP DRIVER
RIGHT FRONT PARK LAMP DRIVER
16 C5
22 C5
6 C5
26 C5
BODY CONTROL MODULE
(8W-45-6)
RIGHT FRONT TURN SIGNAL LAMP DRIVER
3 C2
L44 16 TN/WT
L34 16 WT/GY
L778 20 WT/LB
L78 20 OR/WT
L60 18 WT/TN
3 C100
L60 18 WT/TN
3
1
8
6
7
HEADLAMP-RIGHT
RIGHT LOW BEAM LAMP
RIGHT HIGH BEAM LAMP
RIGHT SIDE MARKER LAMP
PARK
TURN
4
5
2
Z344 16 BK/TN
Z378 20 BK/OR
Z346 16 BK/LG
G104
(8W-15-5)
G103
(8W-15-4)

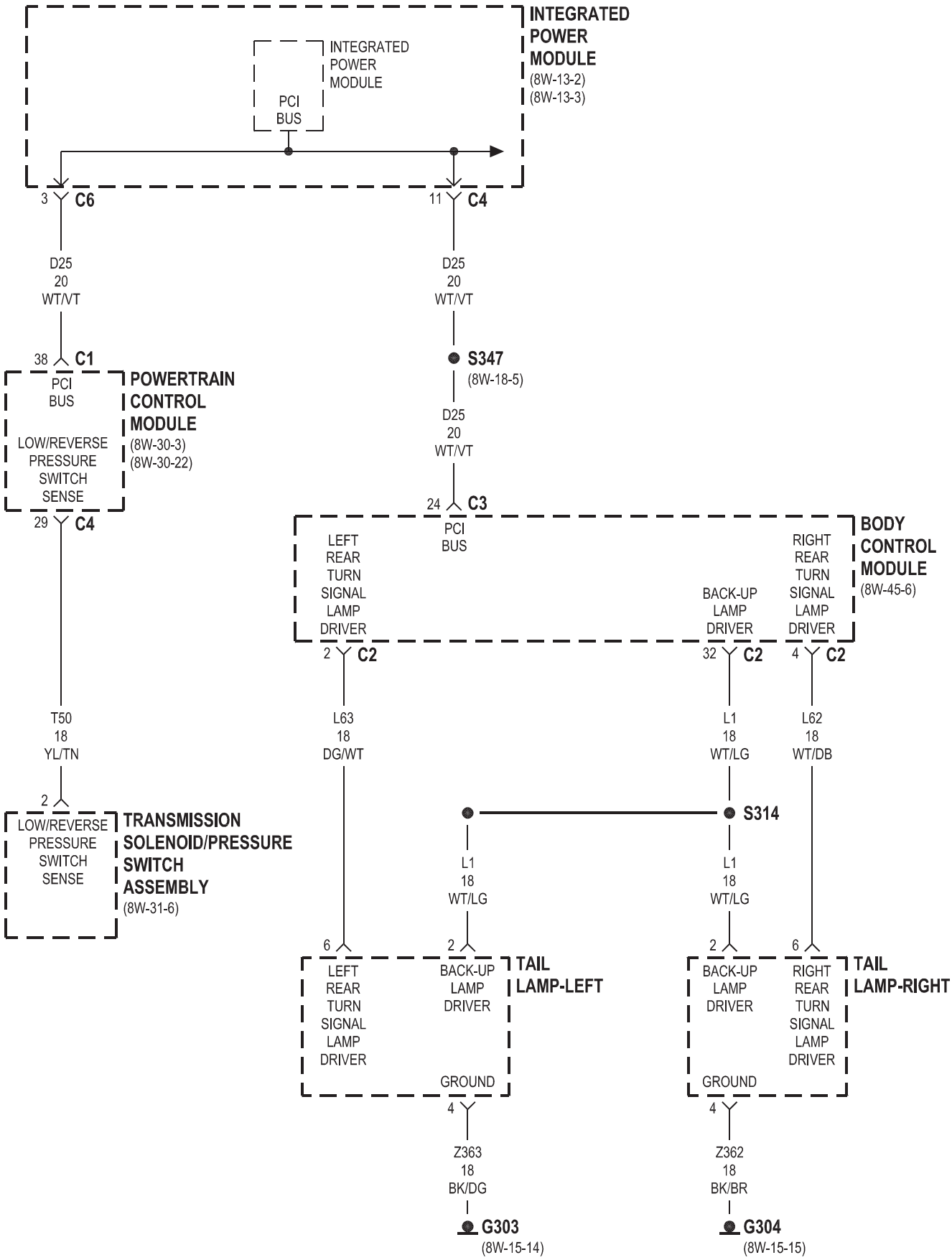

INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
LEFT FRONT FOG LAMP DRIVER
RIGHT FRONT FOG LAMP DRIVER
2 C5
17 C5
L89 18 WT/YL
L90 18 WT/OR
A
B
FOG LAMP-LEFT
FOG LAMP-RIGHT
Z349 18 BK/YL
Z348 18 BK/OR
G103
(8W-15-4)
G104
(8W-15-5)

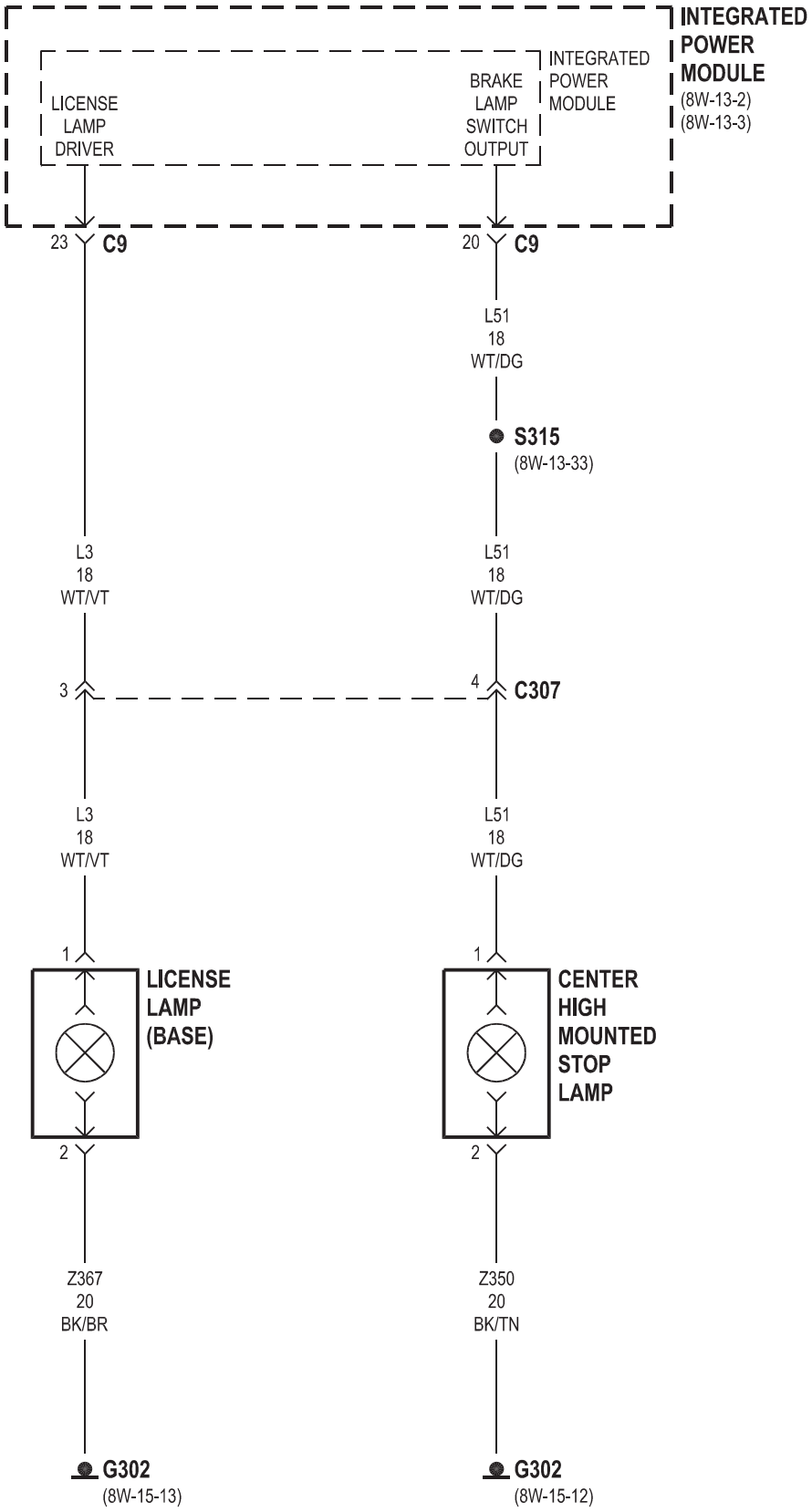
8W-51 REAR LIGHTING

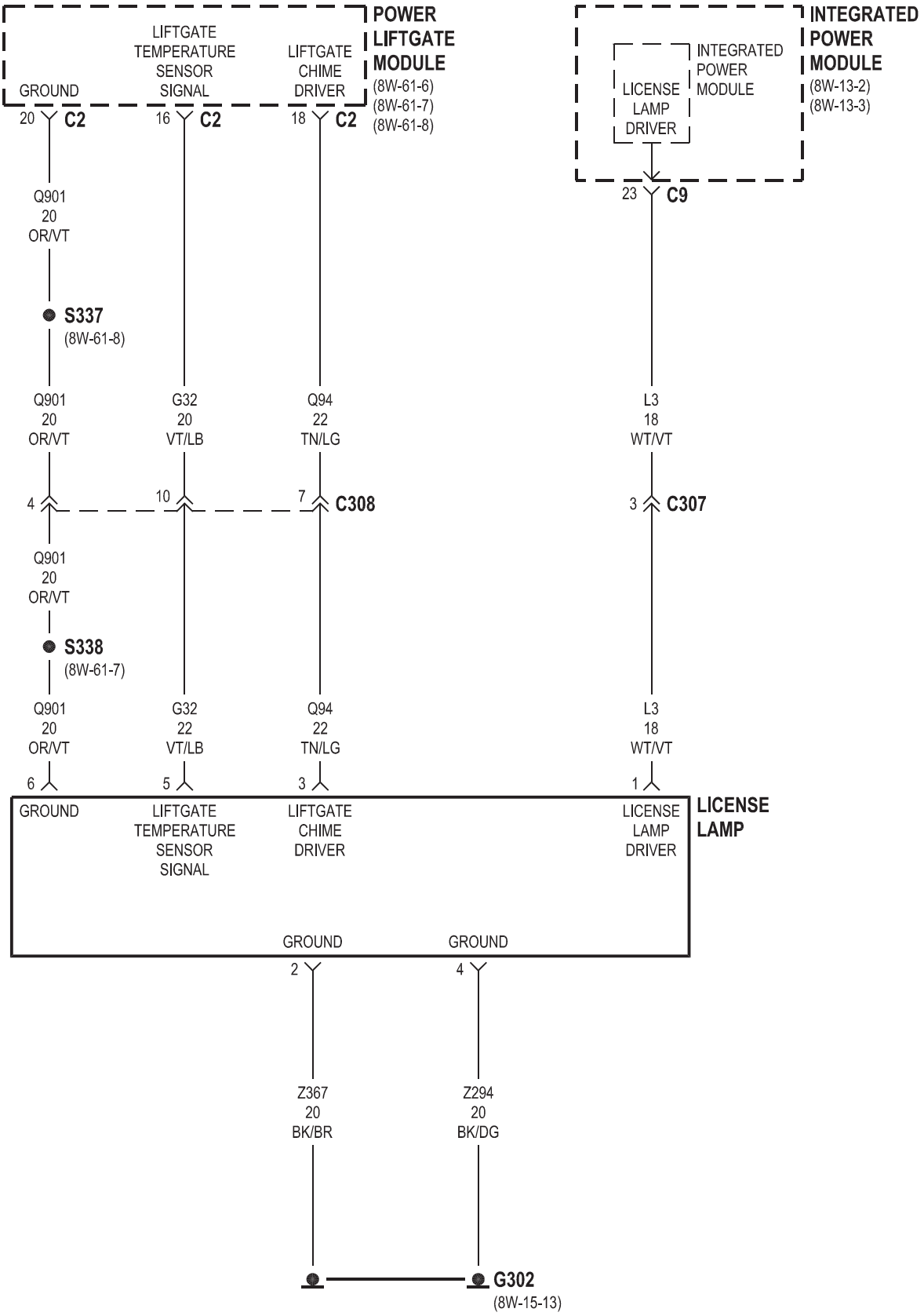
Component	Page
Body Control Module	8W-51-2, 4
Brake Lamp Switch	8W-51-3
Center High Mounted Stop Lamp	8W-51-5
Fuse 29	8W-51-3
G201	8W-51-2
G302	8W-51-5, 6
G303	8W-51-4
G304	8W-51-4
Instrument Cluster	8W-51-3
Integrated Power Module	8W-51-2, 3, 4, 5, 6
License Lamp	8W-51-5, 6
Multi-Function Switch	8W-51-2
Power Liftgate Module	8W-51-6
Powertrain Control Module	8W-51-4
Tail Lamp-Left	8W-51-3, 4
Tail Lamp-Right	8W-51-3, 4
Transmission Solenoid/Pressure Switch Assembly	8W-51-4


INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
PCI BUS
11 C4
D25
20
WT/VT
S347
(8W-18-5)
D25
20
WT/VT
24 C3
PCI BUS
BODY CONTROL MODULE
(8W-45-4)
(8W-45-8)
RIGHT TURN SWITCH SENSE
LEFT TURN SWITCH SENSE
HEADLAMP SWITCH MUX SENSE
PANEL LAMPS DIMMER SIGNAL
HEADLAMP SWITCH MUX RETURN
33 C4
4 C5
31 C5
27 C5
17 C5
L306
20
LB/WT
L305
22
WT/LB
L307
22
BR/WT
E2
22
OR/BR
L900
22
WT/YL
3
4
6
5
12
MULTI-FUNCTION SWITCH
0 OFF
1 PARK
2 HEADLAMPS
3 AUTO
4 FUNERAL MODE
5 DOME ON
6 RIGHT TURN
7 LEFT TURN
(8W-50-2)
(8W-50-3)
(8W-52-2)
6
7
1
2
0
3
0
5
4
9
Z102
20
GY/BK
G201
(8W-15-6)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
LEFT TAIL LAMP DRIVER
INTEGRATED POWER MODULE
FUSE 29 20A
(8W-13-19)
BRAKE LAMP SWITCH OUTPUT
RIGHT TAIL LAMP DRIVER
INTEGRATED POWER MODULE
7 C9
3 C9
20 C9
15 C4
L71 20 WT/GY
A108 18 LG/RD
L51 18 WT/DG
L72 20 WT/OR
60 C201
A108 18 LG/RD
A108 18 LG/RD
1 C1
FUSED B(+)
INSTRUMENT CLUSTER
(8W-40-2)
2
BRAKE LAMP SWITCH
(8W-30-20)
1
L51 18 WT/DG
S351
(8W-13-30)
S315
(8W-13-33)
S352
(8W-13-30)
L71 20 WT/GY
L71 20 WT/GY
L51 18 WT/DG
L51 18 WT/DG
L72 20 WT/OR
L72 20 WT/OR
1
3
5
5
3
1
LEFT TAIL LAMP DRIVER
LEFT TAIL LAMP DRIVER
BRAKE LAMP SWITCH OUTPUT
TAIL LAMP-LEFT
BRAKE LAMP SWITCH OUTPUT
RIGHT TAIL LAMP DRIVER
RIGHT TAIL LAMP DRIVER
TAIL LAMP-RIGHT

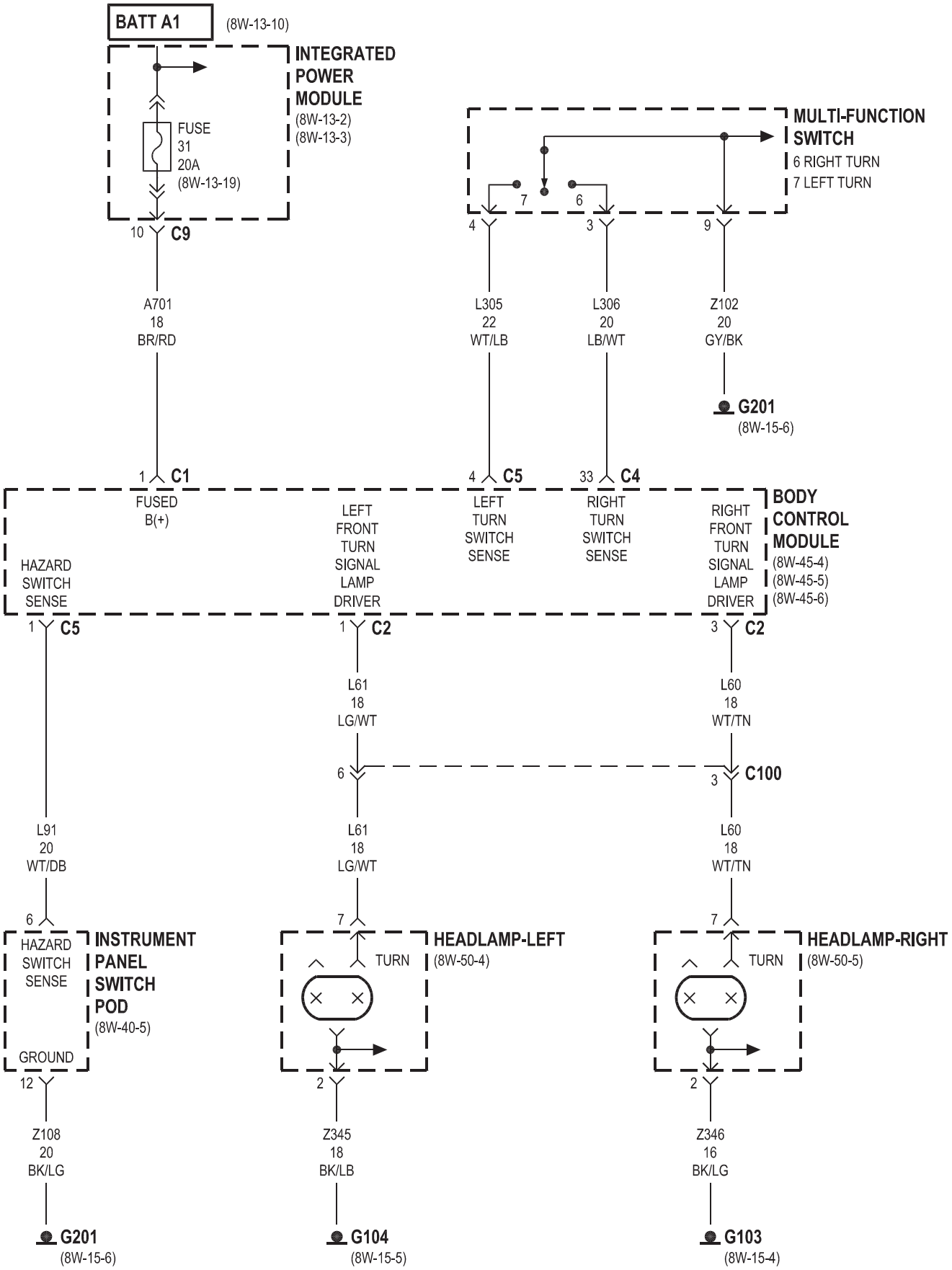

INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
PCI BUS
3 C6
11 C4
D25 20 WT/VT
D25 20 WT/VT
38 C1
S347
(8W-18-5)
POWERTRAIN CONTROL MODULE
(8W-30-3)
(8W-30-22)
PCI BUS
LOW/REVERSE PRESSURE SWITCH SENSE
D25 20 WT/VT
24 C3
29 C4
BODY CONTROL MODULE
(8W-45-6)
LEFT REAR TURN SIGNAL LAMP DRIVER
PCI BUS
BACK-UP LAMP DRIVER
RIGHT REAR TURN SIGNAL LAMP DRIVER
2 C2
32 C2
4 C2
T50 18 YL/TN
L63 18 DG/WT
L1 18 WT/LG
L62 18 WT/DB
2
S314
TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY
(8W-31-6)
LOW/REVERSE PRESSURE SWITCH SENSE
L1 18 WT/LG
L1 18 WT/LG
6
2
2
6
TAIL LAMP-LEFT
LEFT REAR TURN SIGNAL LAMP DRIVER
BACK-UP LAMP DRIVER
GROUND
TAIL LAMP-RIGHT
BACK-UP LAMP DRIVER
RIGHT REAR TURN SIGNAL LAMP DRIVER
GROUND
4
4
Z363 18 BK/DG
Z362 18 BK/BR
G303
(8W-15-14)
G304
(8W-15-15)

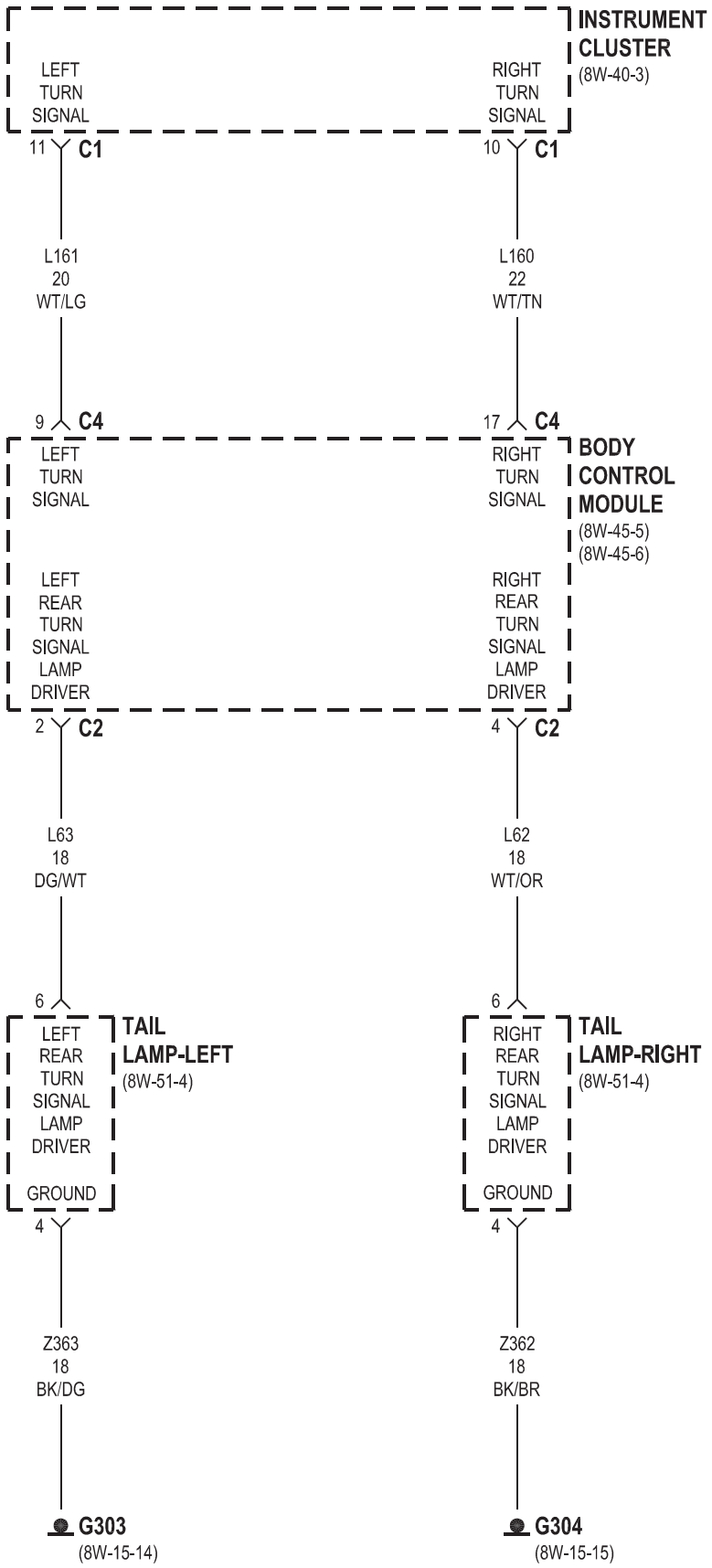

INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
LICENSE LAMP DRIVER
BRAKE LAMP SWITCH OUTPUT
23 C9
20 C9
L51 18 WT/DG
S315
(8W-13-33)
L3 18 WT/VT
L51 18 WT/DG
3
4 C307
L3 18 WT/VT
L51 18 WT/DG
1
1
LICENSE LAMP (BASE)
CENTER HIGH MOUNTED STOP LAMP
2
2
Z367 20 BK/BR
Z350 20 BK/TN
G302
(8W-15-13)
G302
(8W-15-12)


POWER LIFTGATE MODULE
(8W-61-6)
(8W-61-7)
(8W-61-8)
GROUND
LIFTGATE TEMPERATURE SENSOR SIGNAL
LIFTGATE CHIME DRIVER
20 C2
16 C2
18 C2
Q901 20 OR/VT
S337
(8W-61-8)
Q901 20 OR/VT
G32 20 VT/LB
Q94 22 TN/LG
4
10
7 C308
Q901 20 OR/VT
S338
(8W-61-7)
Q901 20 OR/VT
G32 22 VT/LB
Q94 22 TN/LG
6
5
3
GROUND
LIFTGATE TEMPERATURE SENSOR SIGNAL
LIFTGATE CHIME DRIVER
LICENSE LAMP DRIVER
LICENSE LAMP
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
LICENSE LAMP DRIVER
INTEGRATED POWER MODULE
23 C9
L3 18 WT/VT
3 C307
L3 18 WT/VT
1
GROUND
GROUND
2
4
Z367 20 BK/BR
Z294 20 BK/DG
G302
(8W-15-13)

8W-52 TURN SIGNALS

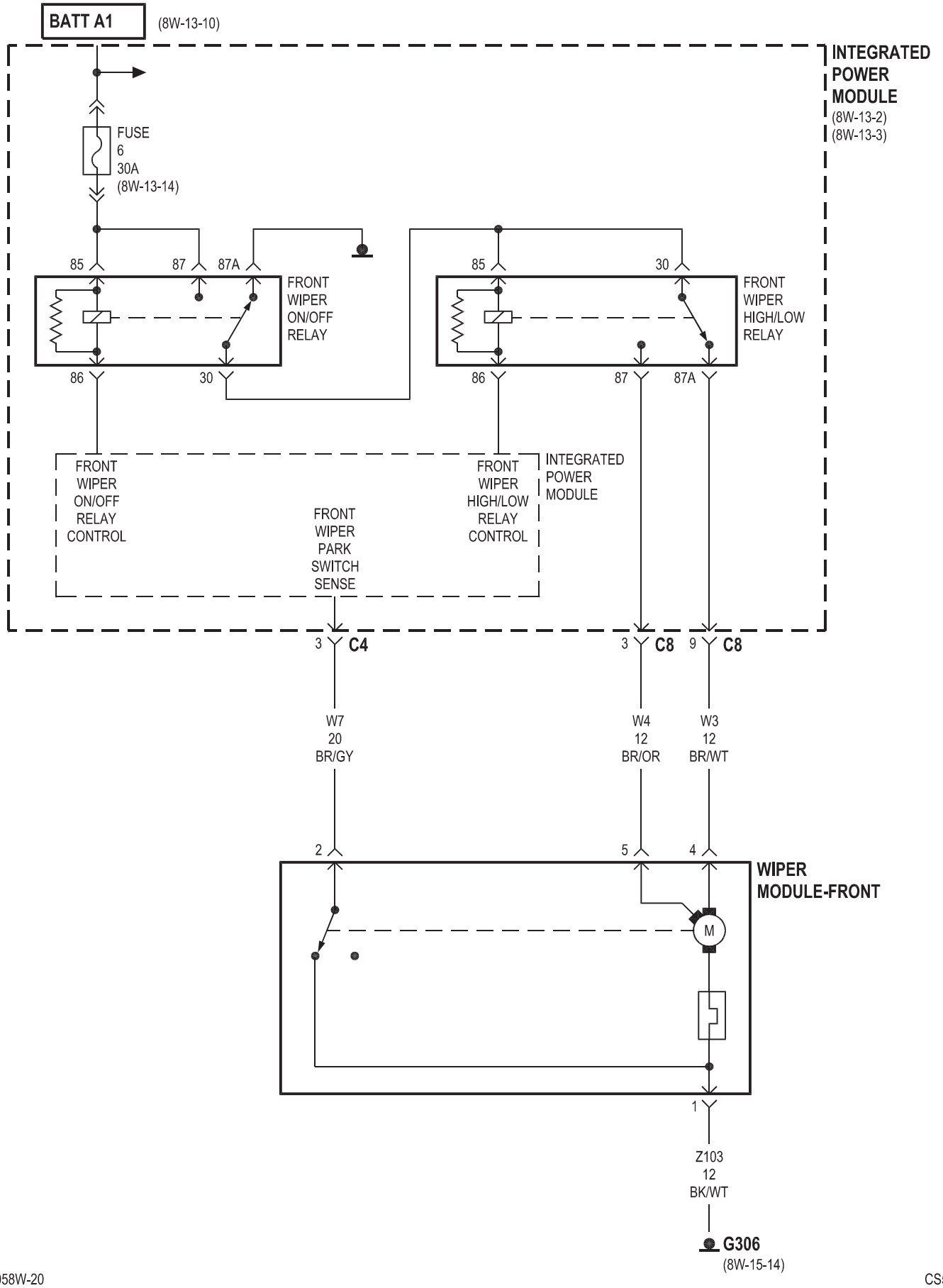
Component	Page
Body Control Module	8W-52-2, 3
Fuse 31	8W-52-2
G103	8W-52-2
G104	8W-52-2
G201	8W-52-2
G303	8W-52-3
G304	8W-52-3
Headlamp-Left	8W-52-2
Headlamp-Right	8W-52-2
Instrument Cluster	8W-52-3
Instrument Panel Switch Pod	8W-52-2
Integrated Power Module	8W-52-2
Multi-Function Switch	8W-52-2
Tail Lamp-Left	8W-52-3
Tail Lamp-Right	8W-52-3

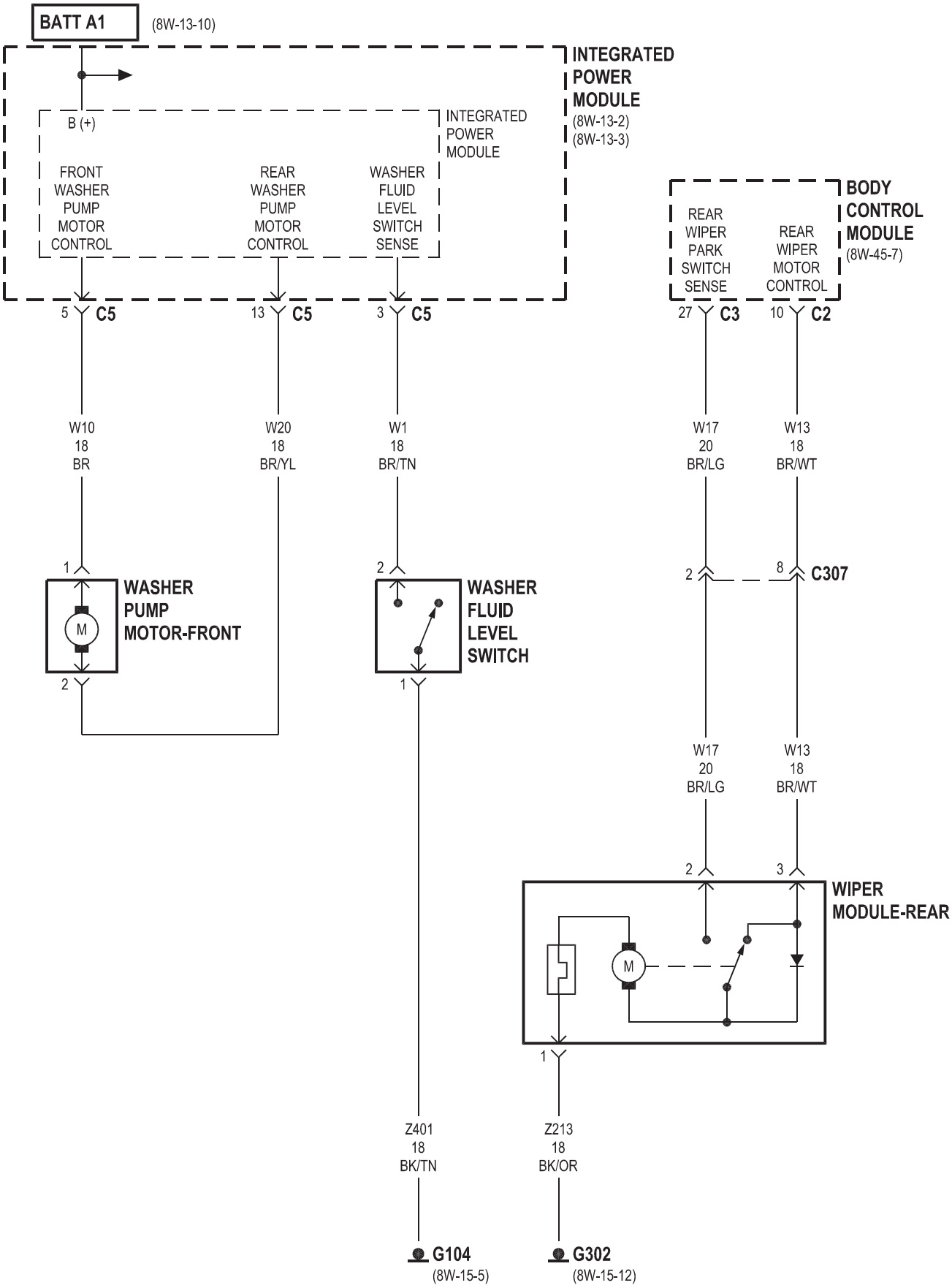

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 31 20A
(8W-13-19)
10 C9
A701 18 BR/RD
MULTI-FUNCTION SWITCH
6 RIGHT TURN
7 LEFT TURN
7
6
4
3
9
L305 22 WT/LB
L306 20 LB/WT
Z102 20 GY/BK
G201
(8W-15-6)
1 C1
FUSED B(+)
4 C5
LEFT TURN SWITCH SENSE
33 C4
RIGHT TURN SWITCH SENSE
BODY CONTROL MODULE
(8W-45-4)
(8W-45-5)
(8W-45-6)
HAZARD SWITCH SENSE
LEFT FRONT TURN SIGNAL LAMP DRIVER
RIGHT FRONT TURN SIGNAL LAMP DRIVER
1 C5
1 C2
3 C2
L61 18 LG/WT
L60 18 WT/TN
6
3 C100
L91 20 WT/DB
L61 18 LG/WT
L60 18 WT/TN
6
7
7
INSTRUMENT PANEL SWITCH POD
(8W-40-5)
HAZARD SWITCH SENSE
GROUND
12
HEADLAMP-LEFT
(8W-50-4)
TURN
2
HEADLAMP-RIGHT
(8W-50-5)
TURN
2
Z108 20 BK/LG
Z345 18 BK/LB
Z346 16 BK/LG
G201
(8W-15-6)
G104
(8W-15-5)
G103
(8W-15-4)

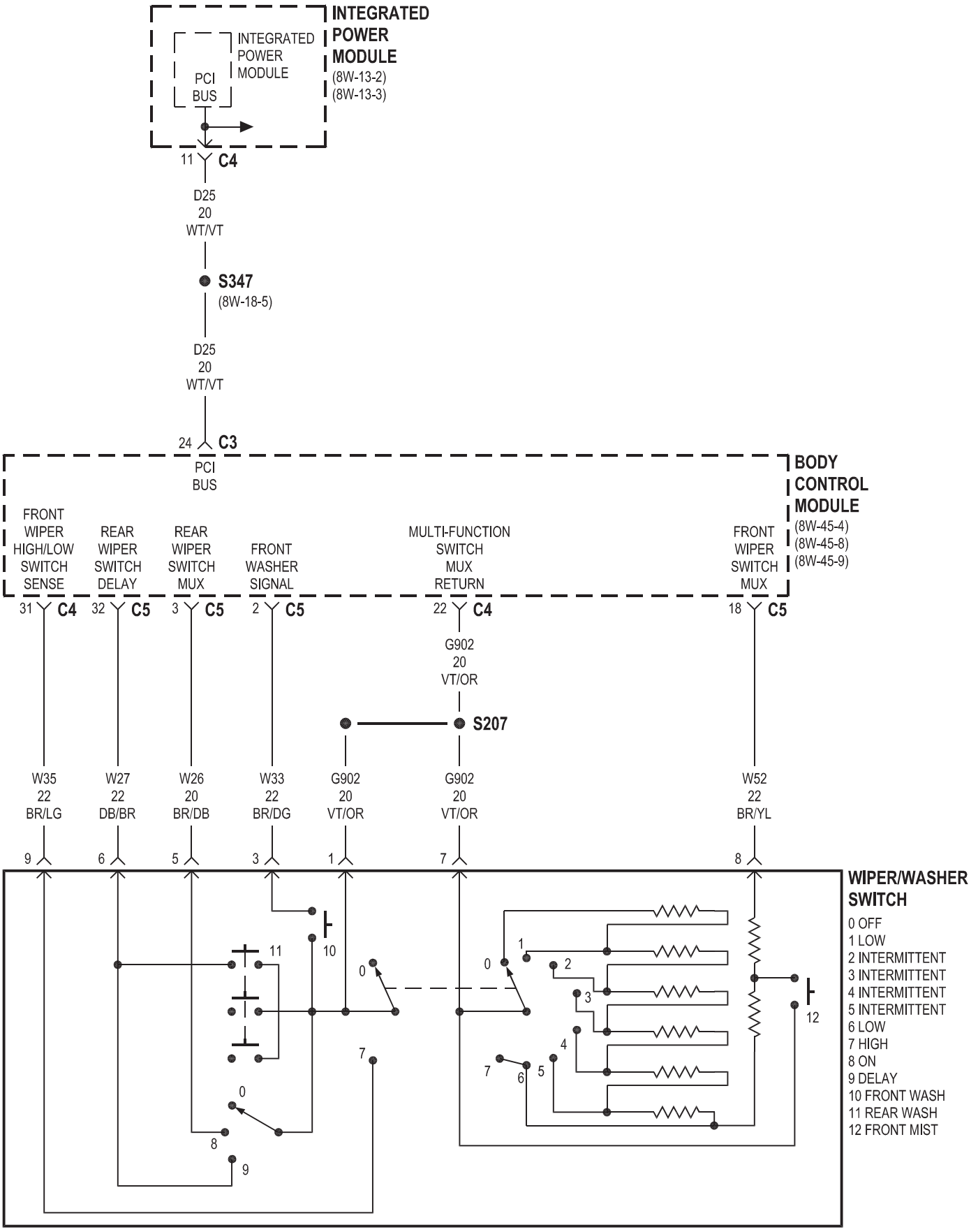

INSTRUMENT CLUSTER
(8W-40-3)
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
11 C1
10 C1
L161
20
WT/LG
L160
22
WT/TN
9 C4
17 C4
BODY CONTROL MODULE
(8W-45-5)
(8W-45-6)
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
LEFT REAR TURN SIGNAL LAMP DRIVER
RIGHT REAR TURN SIGNAL LAMP DRIVER
2 C2
4 C2
L63
18
DG/WT
L62
18
WT/OR
6
6
TAIL LAMP-LEFT
(8W-51-4)
TAIL LAMP-RIGHT
(8W-51-4)
LEFT REAR TURN SIGNAL LAMP DRIVER
RIGHT REAR TURN SIGNAL LAMP DRIVER
GROUND
GROUND
4
4
Z363
18
BK/DG
Z362
18
BK/BR
G303
(8W-15-14)
G304
(8W-15-15)

8W-53 WIPERS

Component	Page
Body Control Module	8W-53-3, 4
Front Wiper High/Low Relay	8W-53-2
Front Wiper On/Off Relay	8W-53-2
Fuse 6	8W-53-2
G104	8W-53-3
G302	8W-53-3
G306	8W-53-2
Integrated Power Module	8W-53-2, 3, 4
Washer Fluid Level Switch	8W-53-3
Washer Pump Motor-Front	8W-53-3
Wiper Module-Front	8W-53-2
Wiper Module-Rear	8W-53-3
Wiper/Washer Switch	8W-53-4

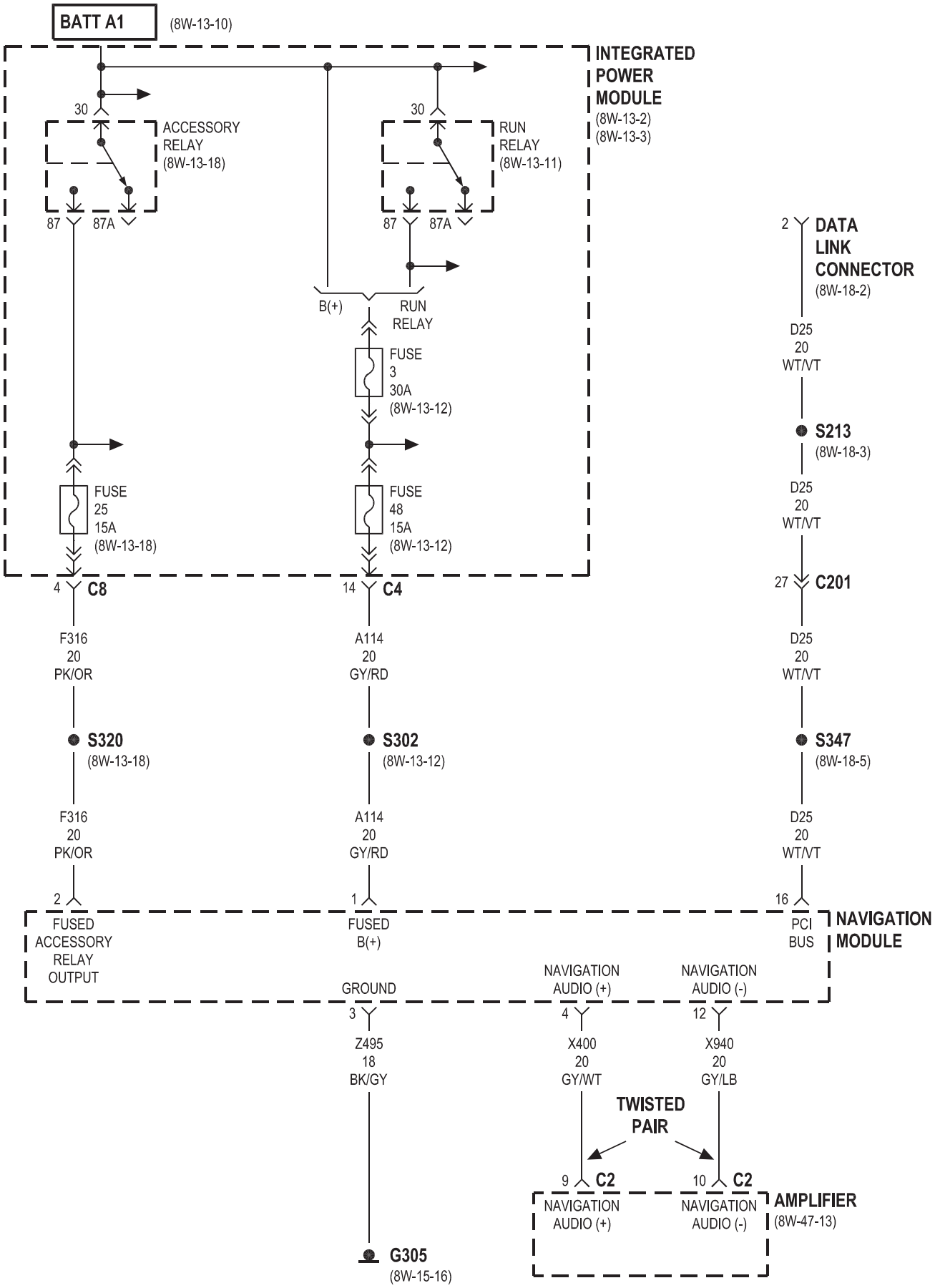

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE
6
30A
(8W-13-14)
85
87
87A
FRONT WIPER ON/OFF RELAY
86
30
85
30
FRONT WIPER HIGH/LOW RELAY
86
87
87A
FRONT WIPER ON/OFF RELAY CONTROL
FRONT WIPER HIGH/LOW RELAY CONTROL
INTEGRATED POWER MODULE
FRONT WIPER PARK SWITCH SENSE
3 C4
3 C8
9 C8
W7
20
BR/GY
W4
12
BR/OR
W3
12
BR/WT
2
5
4
WIPER MODULE-FRONT
M
1
Z103
12
BK/WT
G306
(8W-15-14)

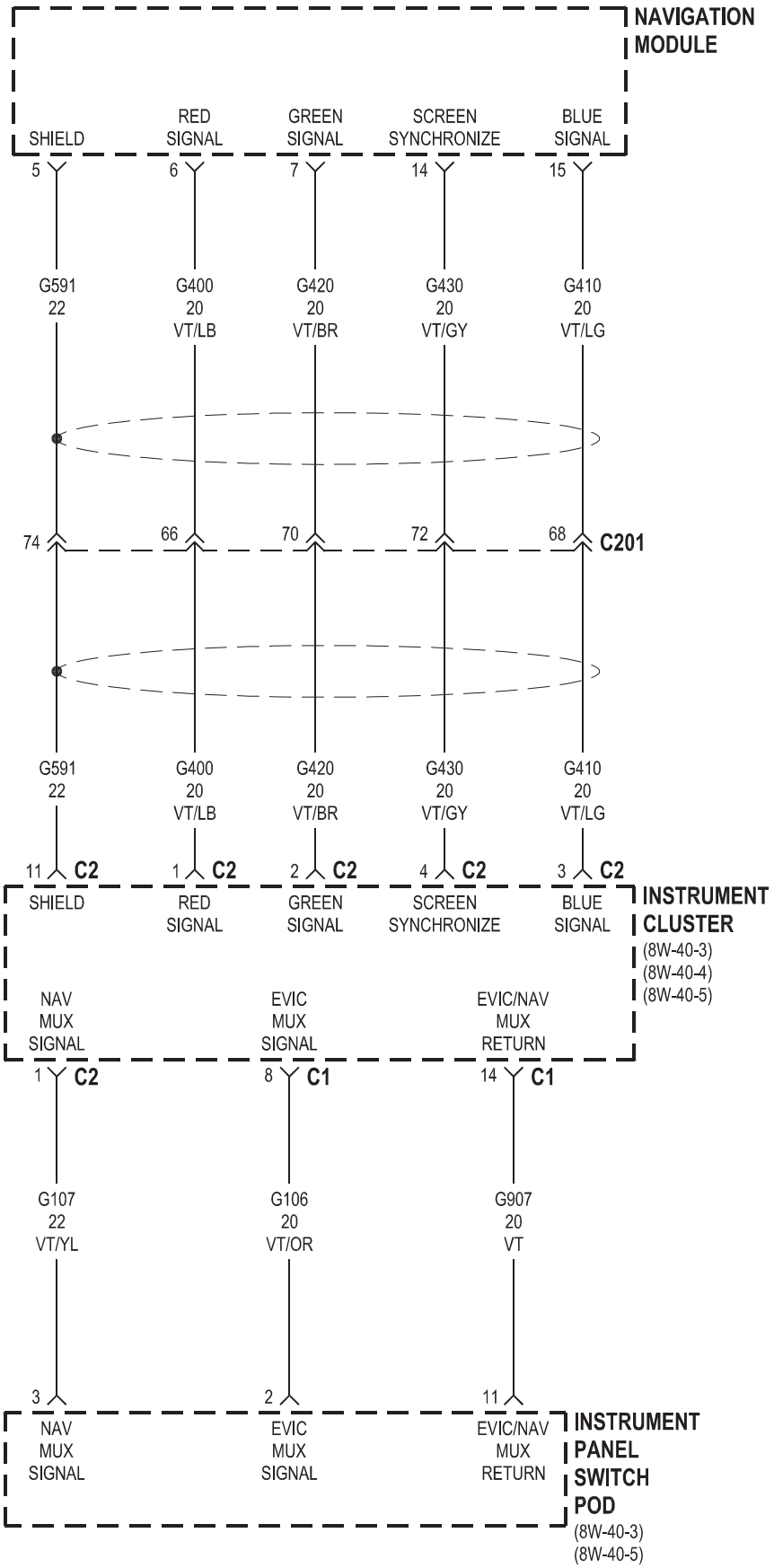

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
B (+)
INTEGRATED POWER MODULE
FRONT WASHER PUMP MOTOR CONTROL
REAR WASHER PUMP MOTOR CONTROL
WASHER FLUID LEVEL SWITCH SENSE
BODY CONTROL MODULE
(8W-45-7)
REAR WIPER PARK SWITCH SENSE
REAR WIPER MOTOR CONTROL
5 C5
13 C5
3 C5
27 C3
10 C2
W10 18 BR
W20 18 BR/YL
W1 18 BR/TN
W17 20 BR/LG
W13 18 BR/WT
1
2
WASHER PUMP MOTOR-FRONT
M
2
1
WASHER FLUID LEVEL SWITCH
2
8
C307
W17 20 BR/LG
W13 18 BR/WT
2
3
WIPER MODULE-REAR
M
1
Z401 18 BK/TN
Z213 18 BK/OR
G104
(8W-15-5)
G302
(8W-15-12)

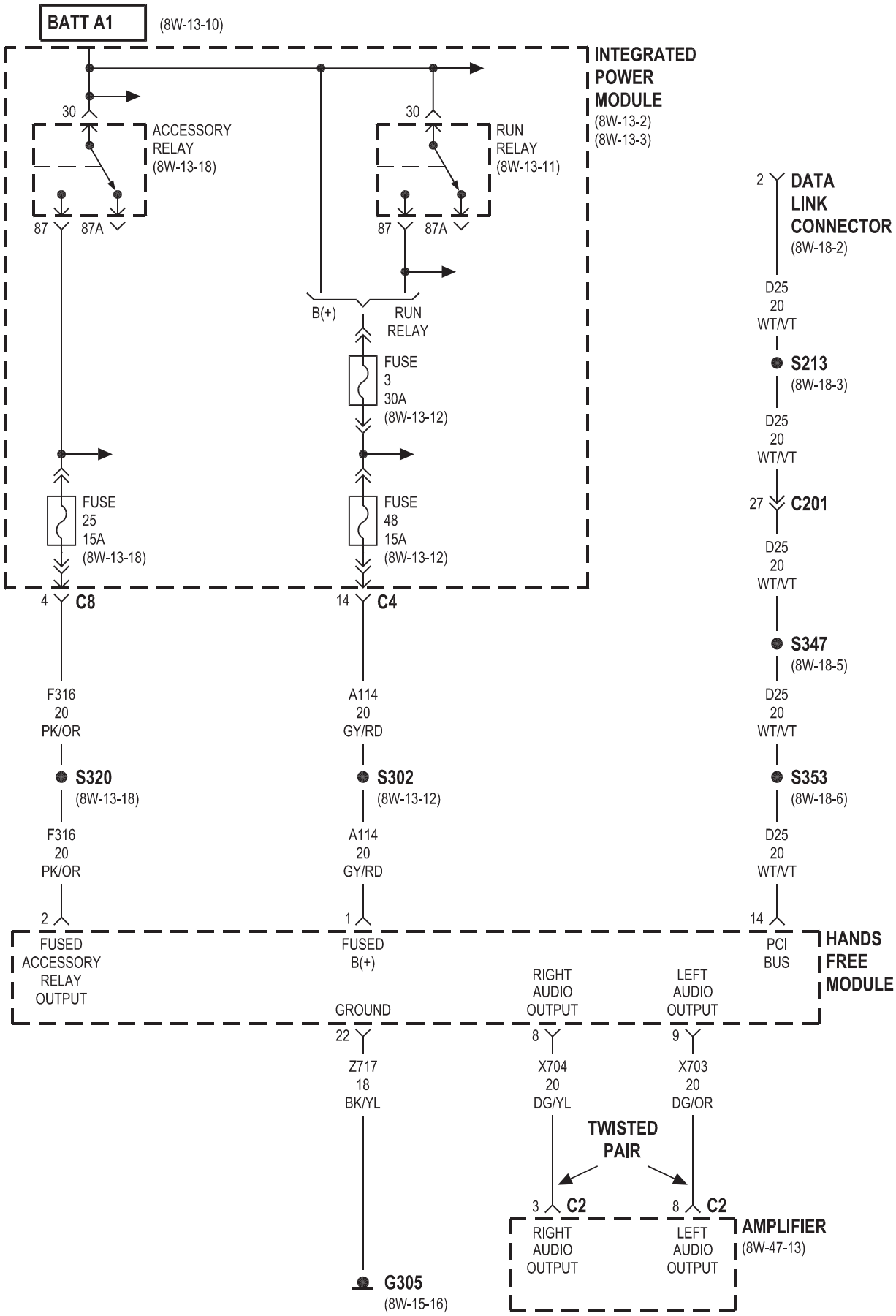

INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
INTEGRATED POWER MODULE
PCI BUS
11 C4
D25
20
WT/VT
S347
(8W-18-5)
D25
20
WT/VT
24 C3
PCI BUS
BODY CONTROL MODULE
(8W-45-4)
(8W-45-8)
(8W-45-9)
FRONT WIPER HIGH/LOW SWITCH SENSE
REAR WIPER SWITCH DELAY
REAR WIPER SWITCH MUX
FRONT WASHER SIGNAL
MULTI-FUNCTION SWITCH MUX RETURN
FRONT WIPER SWITCH MUX
31 C4
32 C5
3 C5
2 C5
22 C4
18 C5
G902
20
VT/OR
S207
W35
22
BR/LG
W27
22
DB/BR
W26
20
BR/DB
W33
22
BR/DG
G902
20
VT/OR
G902
20
VT/OR
W52
22
BR/YL
9
6
5
3
1
7
8
WIPER/WASHER SWITCH
0 OFF
1 LOW
2 INTERMITTENT
3 INTERMITTENT
4 INTERMITTENT
5 INTERMITTENT
6 LOW
7 HIGH
8 ON
9 DELAY
10 FRONT WASH
11 REAR WASH
12 FRONT MIST

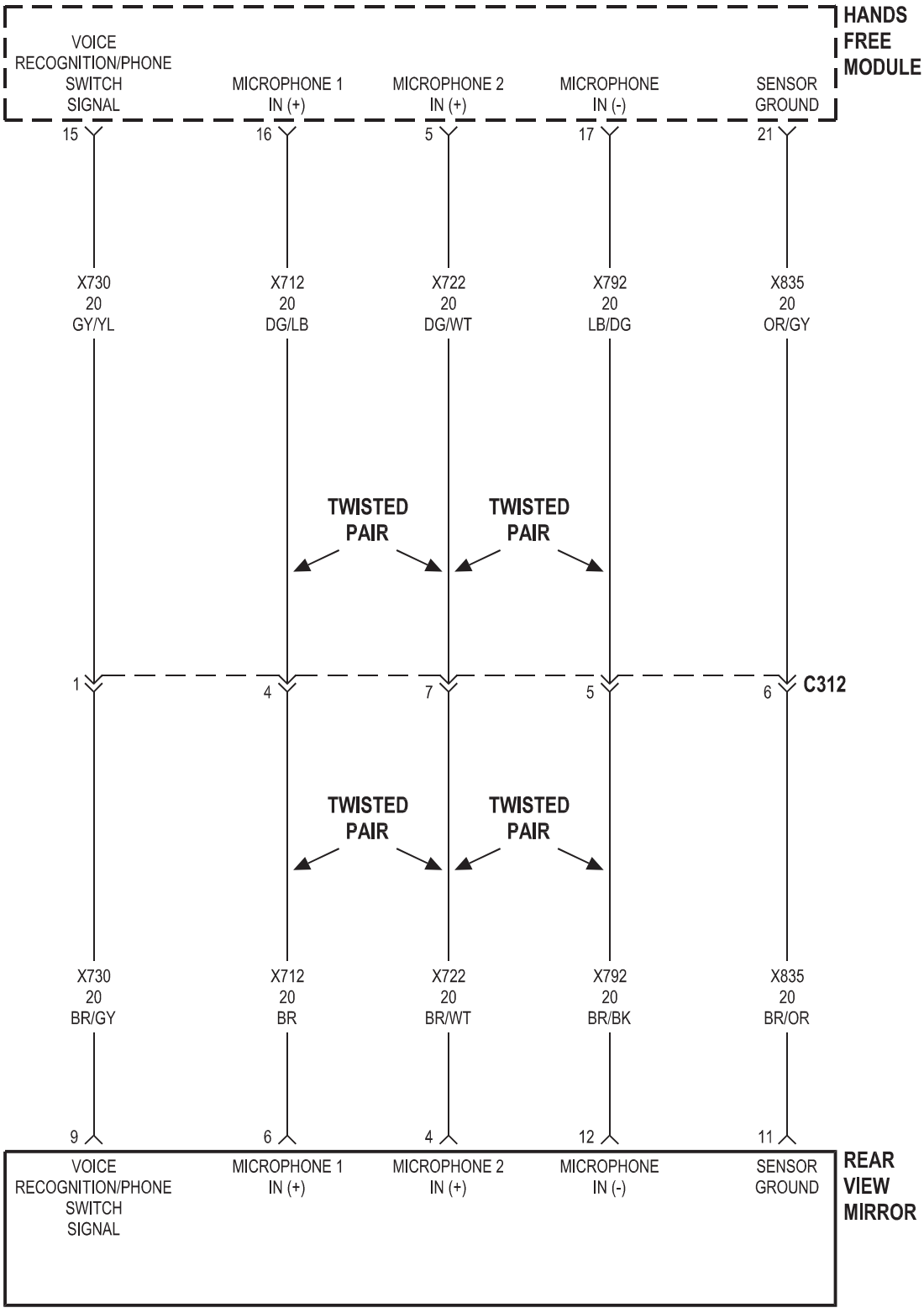
8W-55 NAVIGATION/TELECOMMUNICATIONS

Component	Page
Accessory Relay	8W-55-2, 4
Amplifier	8W-55-2, 4
Data Link Connector	8W-55-2, 4
Fuse 3	8W-55-2, 4
Fuse 25	8W-55-2, 4
Fuse 48	8W-55-2, 4
G305	8W-55-2, 4
Hands Free Module	8W-55-4, 5
Instrument Cluster	8W-55-3
Instrument Panel Switch Pod	8W-55-3
Integrated Power Module	8W-55-2, 4
Navigation Module	8W-55-2, 3
Rear View Mirror	8W-55-5
Run Relay	8W-55-2, 4


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
ACCESSORY RELAY
(8W-13-18)
87
87A
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 25 15A
(8W-13-18)
FUSE 48 15A
(8W-13-12)
4 C8
14 C4
F316 20 PK/OR
A114 20 GY/RD
S320
(8W-13-18)
S302
(8W-13-12)
F316 20 PK/OR
A114 20 GY/RD
2
1
FUSED ACCESSORY RELAY OUTPUT
FUSED B(+)
GROUND
3
Z495 18 BK/GY
G305
(8W-15-16)
2 DATA LINK CONNECTOR
(8W-18-2)
D25 20 WT/VT
S213
(8W-18-3)
D25 20 WT/VT
27 C201
D25 20 WT/VT
S347
(8W-18-5)
D25 20 WT/VT
16
PCI BUS
NAVIGATION MODULE
NAVIGATION AUDIO (+)
NAVIGATION AUDIO (-)
4
12
X400 20 GY/WT
X940 20 GY/LB
TWISTED PAIR
9 C2
10 C2
NAVIGATION AUDIO (+)
NAVIGATION AUDIO (-)
AMPLIFIER
(8W-47-13)

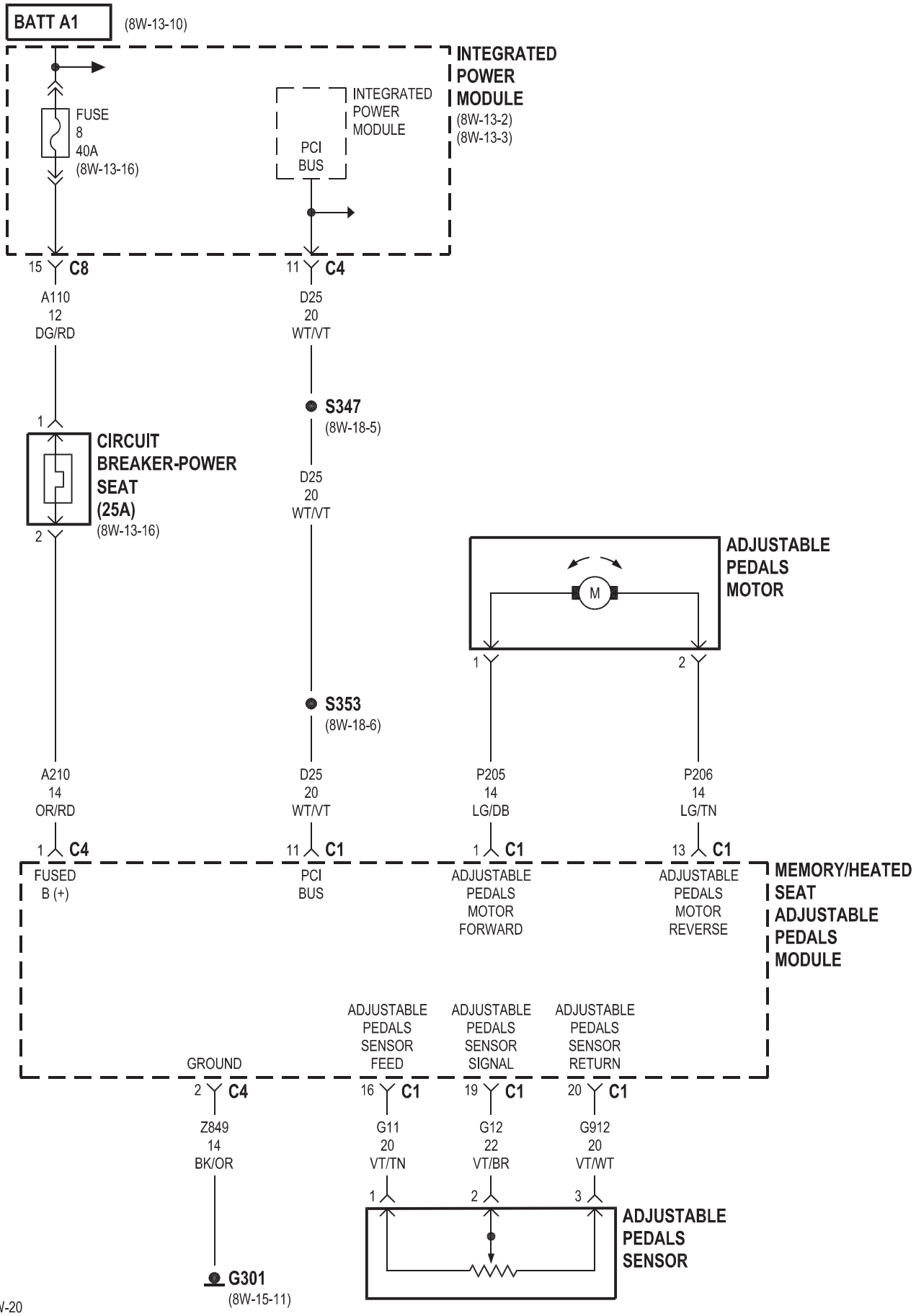

NAVIGATION MODULE
SHIELD
RED SIGNAL
GREEN SIGNAL
SCREEN SYNCHRONIZE
BLUE SIGNAL
5
6
7
14
15
G591 22
G400 20 VT/LB
G420 20 VT/BR
G430 20 VT/GY
G410 20 VT/LG
74
66
70
72
68
C201
G591 22
G400 20 VT/LB
G420 20 VT/BR
G430 20 VT/GY
G410 20 VT/LG
11 C2
1 C2
2 C2
4 C2
3 C2
SHIELD
RED SIGNAL
GREEN SIGNAL
SCREEN SYNCHRONIZE
BLUE SIGNAL
INSTRUMENT CLUSTER
(8W-40-3)
(8W-40-4)
(8W-40-5)
NAV MUX SIGNAL
EVIC MUX SIGNAL
EVIC/NAV MUX RETURN
1 C2
8 C1
14 C1
G107 22 VT/YL
G106 20 VT/OR
G907 20 VT
3
2
11
NAV MUX SIGNAL
EVIC MUX SIGNAL
EVIC/NAV MUX RETURN
INSTRUMENT PANEL SWITCH POD
(8W-40-3)
(8W-40-5)

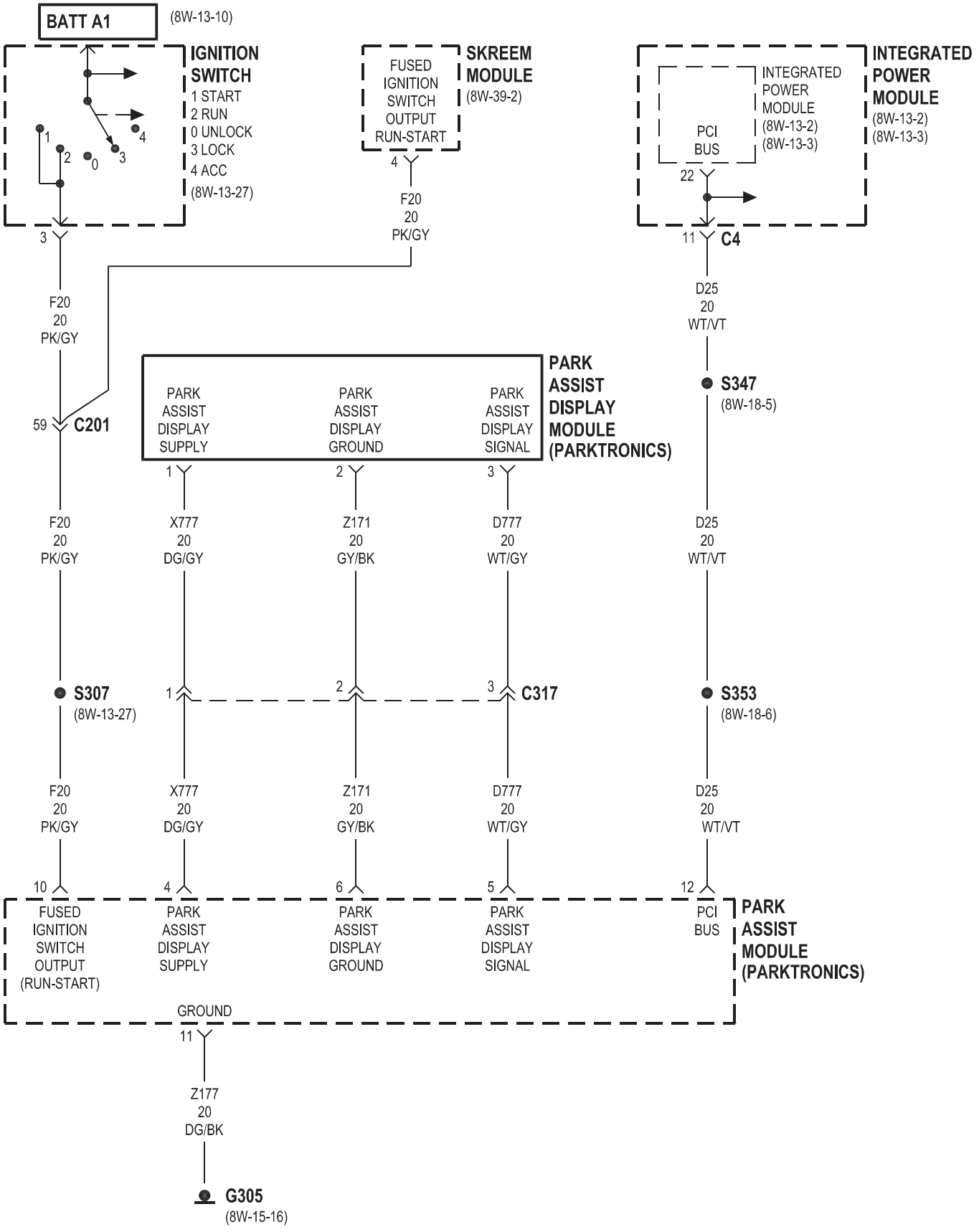

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
ACCESSORY RELAY
(8W-13-18)
87
87A
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 25 15A
(8W-13-18)
FUSE 48 15A
(8W-13-12)
4 C8
14 C4
F316 20 PK/OR
S320
(8W-13-18)
F316 20 PK/OR
2
A114 20 GY/RD
S302
(8W-13-12)
A114 20 GY/RD
1
2 DATA LINK CONNECTOR
(8W-18-2)
D25 20 WT/VT
S213
(8W-18-3)
D25 20 WT/VT
27 C201
D25 20 WT/VT
S347
(8W-18-5)
D25 20 WT/VT
S353
(8W-18-6)
D25 20 WT/VT
14
FUSED ACCESSORY RELAY OUTPUT
FUSED B(+)
PCI BUS
HANDS FREE MODULE
GROUND
RIGHT AUDIO OUTPUT
LEFT AUDIO OUTPUT
22
8
9
Z717 18 BK/YL
X704 20 DG/YL
X703 20 DG/OR
TWISTED PAIR
3 C2
8 C2
RIGHT AUDIO OUTPUT
LEFT AUDIO OUTPUT
AMPLIFIER
(8W-47-13)
G305
(8W-15-16)

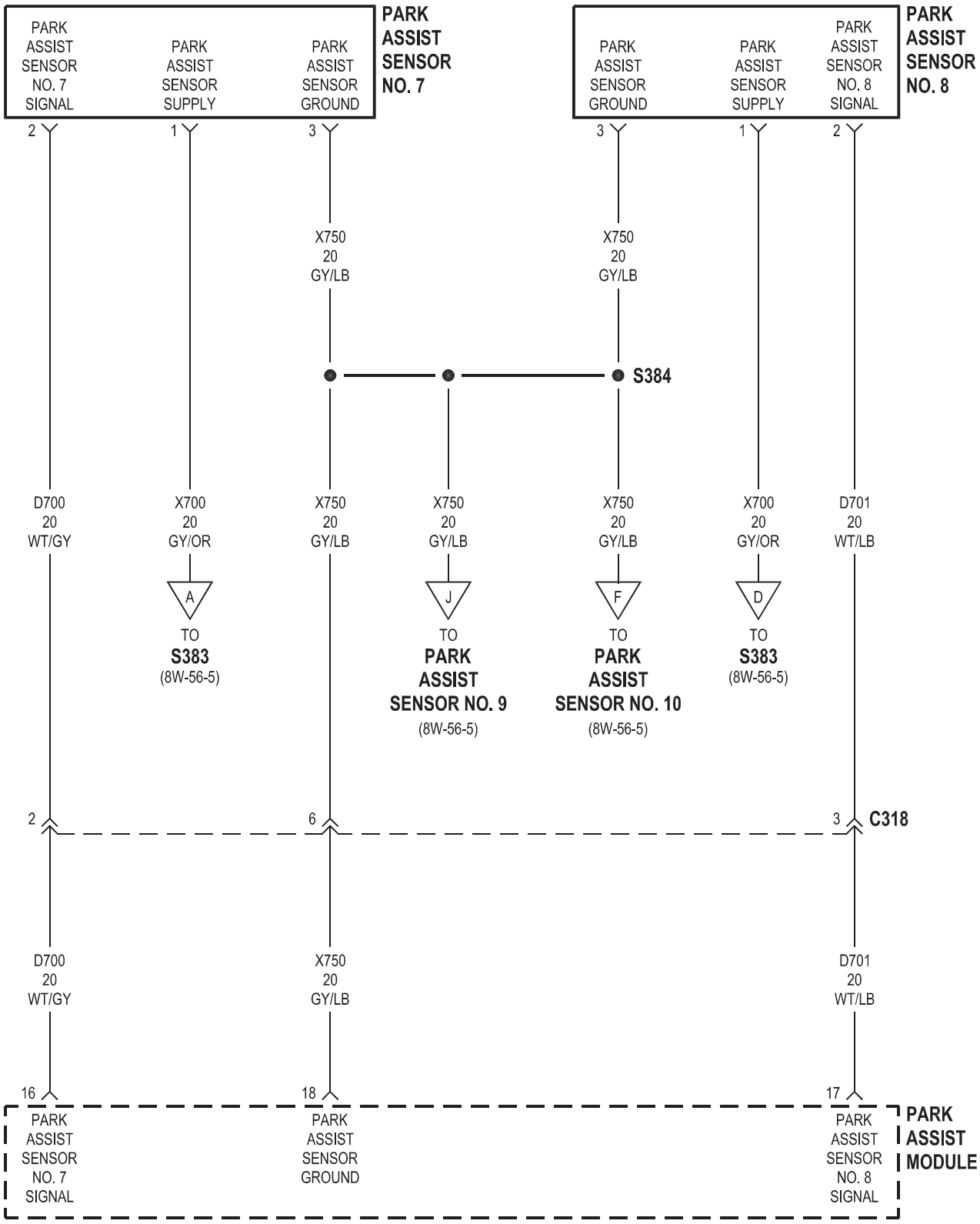

HANDS FREE MODULE
VOICE RECOGNITION/PHONE SWITCH SIGNAL
MICROPHONE 1 IN (+)
MICROPHONE 2 IN (+)
MICROPHONE IN (-)
SENSOR GROUND
15
16
5
17
21
X730 20 GY/YL
X712 20 DG/LB
X722 20 DG/WT
X792 20 LB/DG
X835 20 OR/GY
TWISTED PAIR
TWISTED PAIR
1
4
7
5
6
C312
TWISTED PAIR
TWISTED PAIR
X730 20 BR/GY
X712 20 BR
X722 20 BR/WT
X792 20 BR/BK
X835 20 BR/OR
9
6
4
12
11
VOICE RECOGNITION/PHONE SWITCH SIGNAL
MICROPHONE 1 IN (+)
MICROPHONE 2 IN (+)
MICROPHONE IN (-)
SENSOR GROUND
REAR VIEW MIRROR

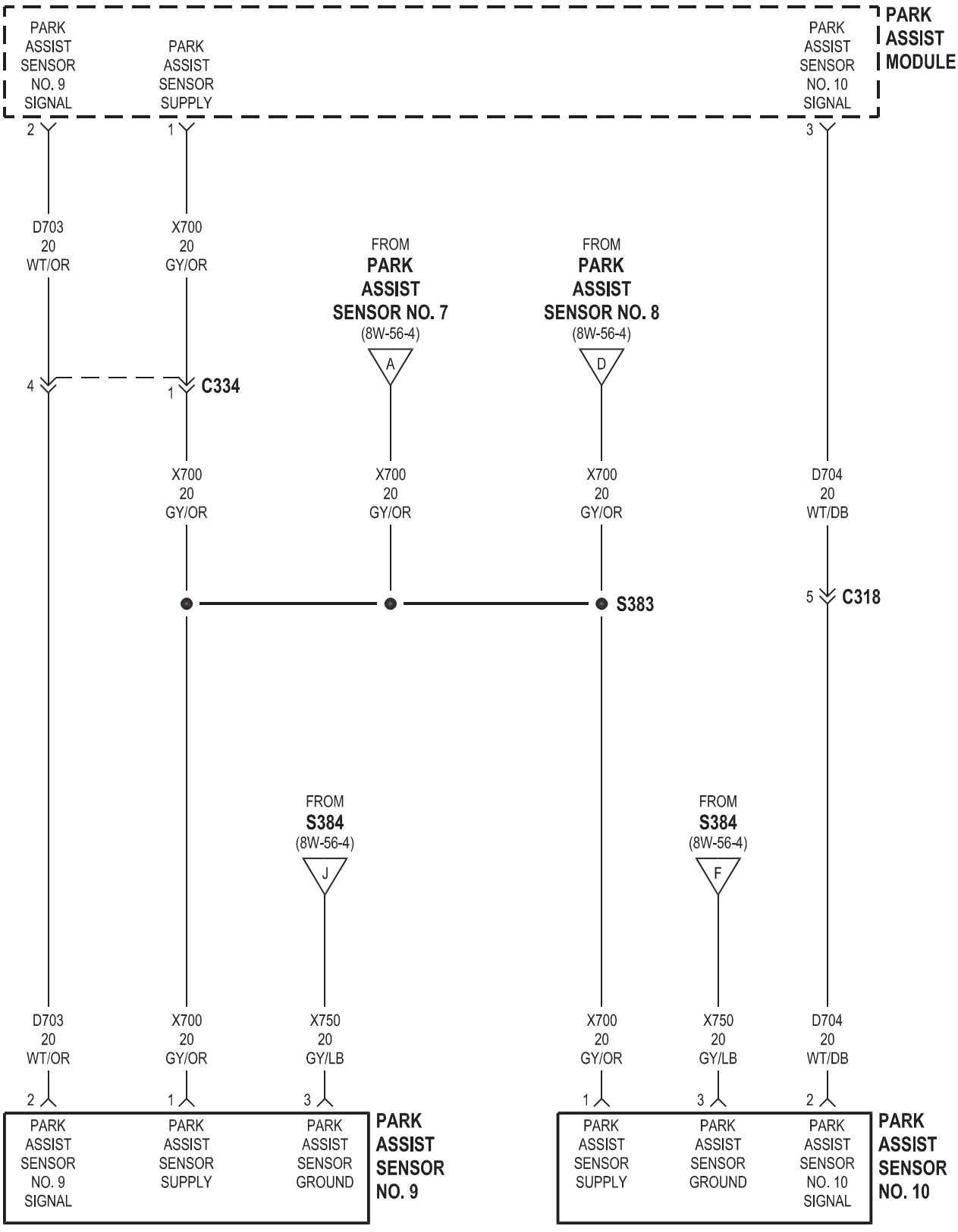
8W-56 CONVENIENCE SYSTEM

Component	Page
Adjustable Pedals Motor	8W-56-2
Adjustable Pedals Sensor	8W-56-2
Circuit Breaker-Power Seat	8W-56-2
Fuse 8	8W-56-2
G301	8W-56-2
G305	8W-56-3
Ignition Switch	8W-56-3
Integrated Power Module	8W-56-2, 3
Memory/Heated Seat Adjustable Pedals Module	8W-56-2
Park Assist Display Module	8W-56-3
Park Assist Module	8W-56-3, 4, 5
Park Assist Sensor No. 7	8W-56-4, 5
Park Assist Sensor No. 8	8W-56-4, 5
Park Assist Sensor No. 9	8W-56-4, 5
Park Assist Sensor No. 10	8W-56-4, 5
Skreem Module	8W-56-3


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 8 40A
(8W-13-16)
INTEGRATED POWER MODULE
PCI BUS
15 C8
11 C4
A110 12 DG/RD
D25 20 WT/VT
S347
(8W-18-5)
1
CIRCUIT BREAKER-POWER SEAT (25A)
(8W-13-16)
2
D25 20 WT/VT
ADJUSTABLE PEDALS MOTOR
M
1
2
S353
(8W-18-6)
A210 14 OR/RD
D25 20 WT/VT
P205 14 LG/DB
P206 14 LG/TN
1 C4
11 C1
1 C1
13 C1
FUSED B (+)
PCI BUS
ADJUSTABLE PEDALS MOTOR FORWARD
ADJUSTABLE PEDALS MOTOR REVERSE
MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE
ADJUSTABLE PEDALS SENSOR FEED
ADJUSTABLE PEDALS SENSOR SIGNAL
ADJUSTABLE PEDALS SENSOR RETURN
GROUND
2 C4
16 C1
19 C1
20 C1
Z849 14 BK/OR
G11 20 VT/TN
G12 22 VT/BR
G912 20 VT/WT
1
2
3
ADJUSTABLE PEDALS SENSOR
G301
(8W-15-11)

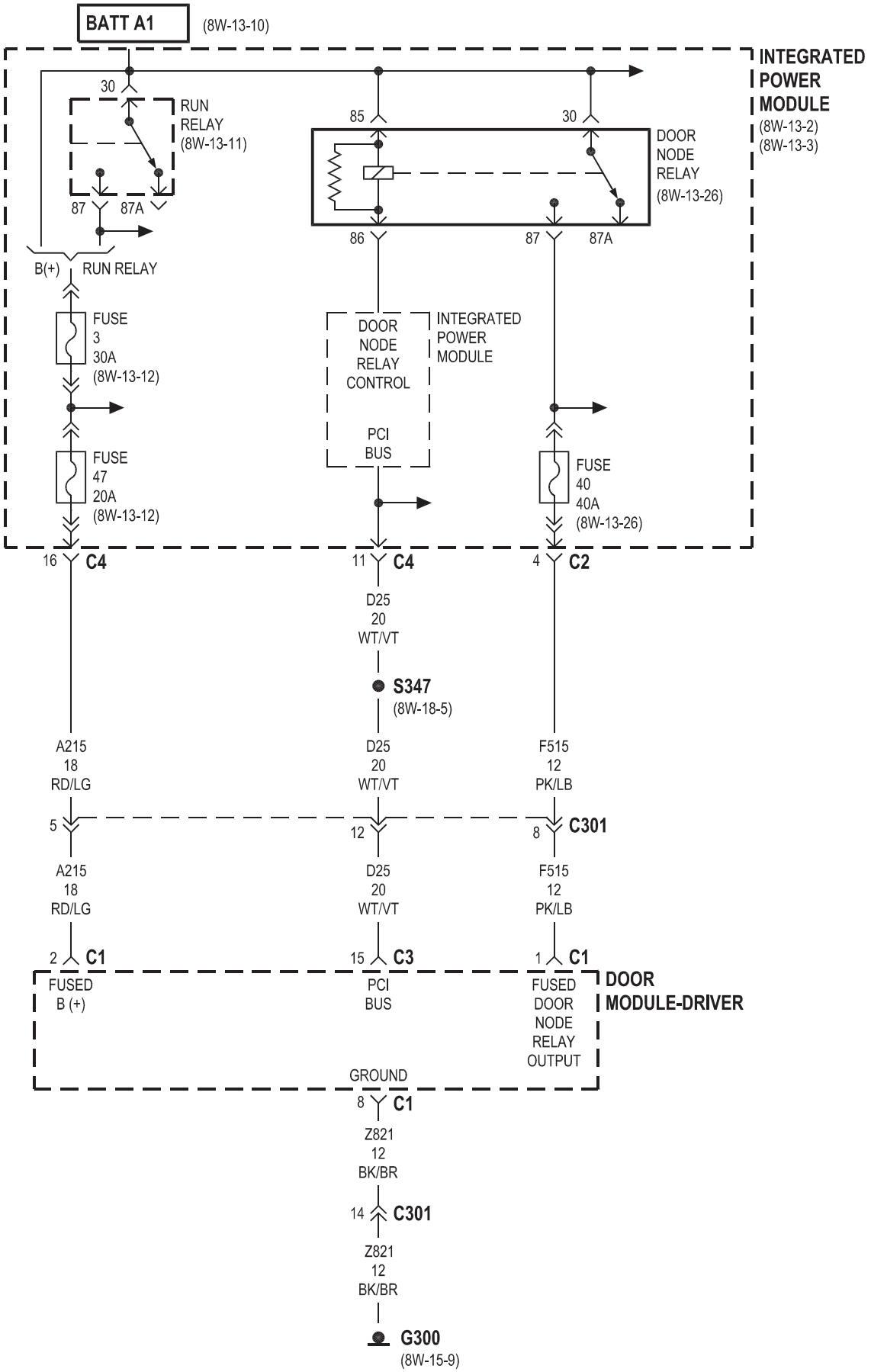

BATT A1
(8W-13-10)
IGNITION SWITCH
1 START
2 RUN
0 UNLOCK
3 LOCK
4 ACC
(8W-13-27)
FUSED IGNITION SWITCH OUTPUT RUN-START
SKREEM MODULE
(8W-39-2)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
PCI BUS
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
F20 20 PK/GY
C201
PARK ASSIST DISPLAY SUPPLY
PARK ASSIST DISPLAY GROUND
PARK ASSIST DISPLAY SIGNAL
PARK ASSIST DISPLAY MODULE (PARKTRONICS)
D25 20 WT/VT
C4
S347
(8W-18-5)
X777 20 DG/GY
Z171 20 GY/BK
D777 20 WT/GY
S307
(8W-13-27)
C317
S353
(8W-18-6)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PARK ASSIST DISPLAY SUPPLY
PARK ASSIST DISPLAY GROUND
PARK ASSIST DISPLAY SIGNAL
PCI BUS
PARK ASSIST MODULE (PARKTRONICS)
GROUND
Z177 20 DG/BK
G305
(8W-15-16)

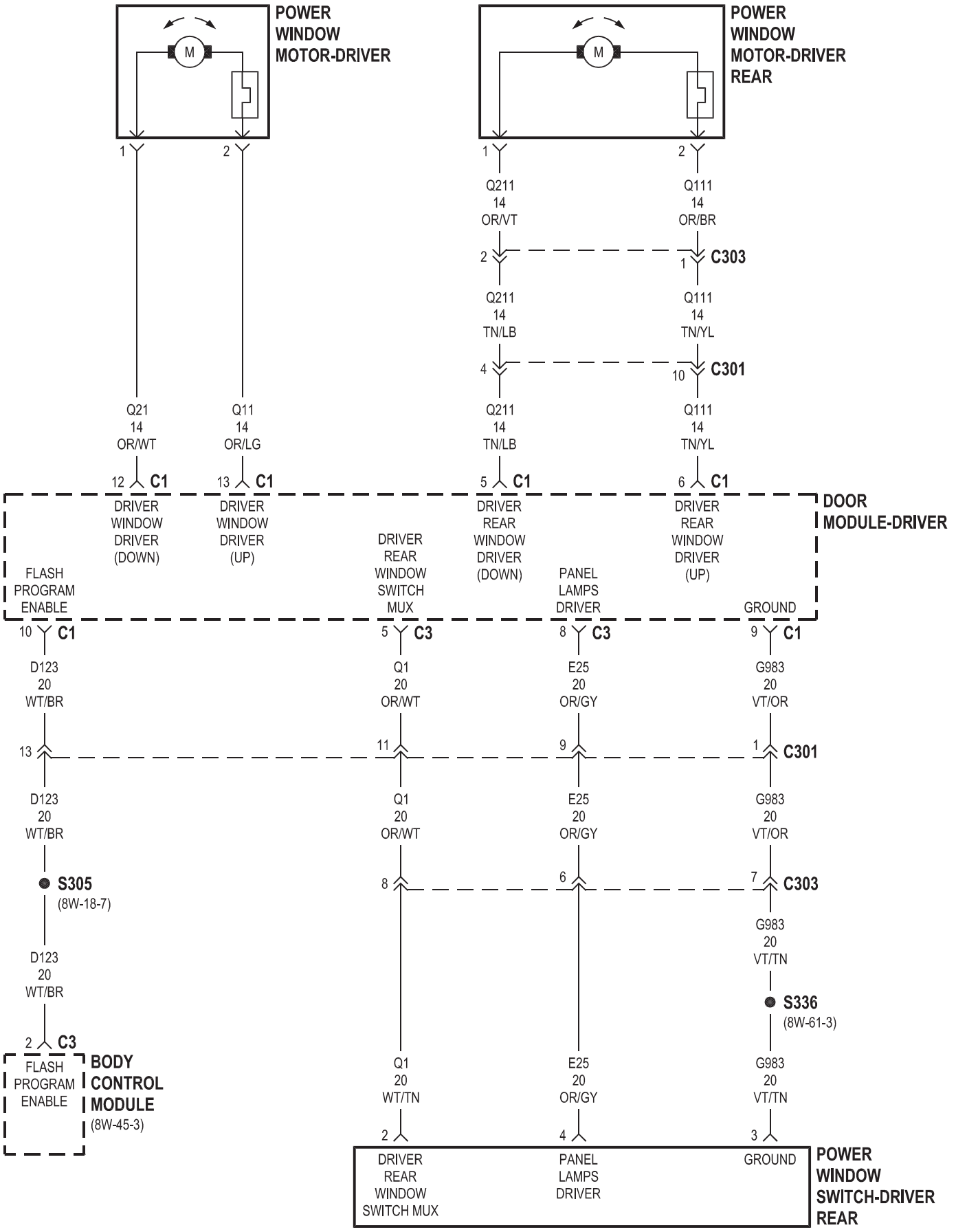

PARK ASSIST SENSOR NO. 7
PARK ASSIST SENSOR NO. 7 SIGNAL
PARK ASSIST SENSOR SUPPLY
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR NO. 8
PARK ASSIST SENSOR NO. 8 SIGNAL
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR SUPPLY
2
1
3
3
1
2
X750 20 GY/LB
X750 20 GY/LB
S384
D700 20 WT/GY
X700 20 GY/OR
X750 20 GY/LB
X750 20 GY/LB
X750 20 GY/LB
X700 20 GY/OR
D701 20 WT/LB
A
J
F
D
TO S383 (8W-56-5)
TO PARK ASSIST SENSOR NO. 9 (8W-56-5)
TO PARK ASSIST SENSOR NO. 10 (8W-56-5)
TO S383 (8W-56-5)
2
6
3
C318
D700 20 WT/GY
X750 20 GY/LB
D701 20 WT/LB
16
18
17
PARK ASSIST SENSOR NO. 7 SIGNAL
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR NO. 8 SIGNAL
PARK ASSIST MODULE

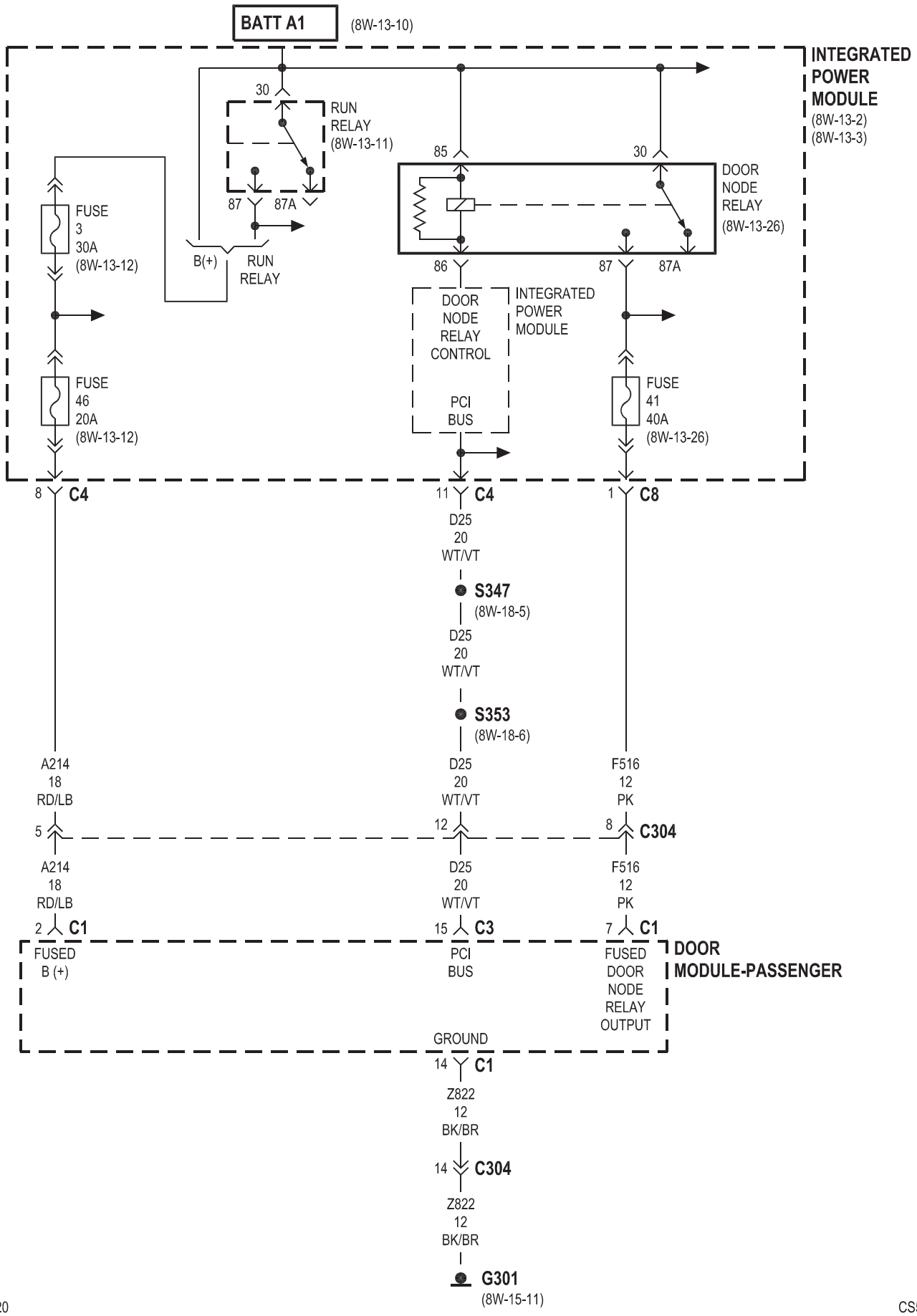

PARK ASSIST MODULE
PARK ASSIST SENSOR NO. 9 SIGNAL
PARK ASSIST SENSOR SUPPLY
PARK ASSIST SENSOR NO. 10 SIGNAL
2
1
3
D703 20 WT/OR
X700 20 GY/OR
FROM PARK ASSIST SENSOR NO. 7 (8W-56-4)
FROM PARK ASSIST SENSOR NO. 8 (8W-56-4)
A
D
4
1
C334
X700 20 GY/OR
X700 20 GY/OR
X700 20 GY/OR
D704 20 WT/DB
S383
5
C318
FROM S384 (8W-56-4)
FROM S384 (8W-56-4)
J
F
D703 20 WT/OR
X700 20 GY/OR
X750 20 GY/LB
X700 20 GY/OR
X750 20 GY/LB
D704 20 WT/DB
2
1
3
1
3
2
PARK ASSIST SENSOR NO. 9 SIGNAL
PARK ASSIST SENSOR SUPPLY
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR NO. 9
PARK ASSIST SENSOR SUPPLY
PARK ASSIST SENSOR GROUND
PARK ASSIST SENSOR NO. 10 SIGNAL
PARK ASSIST SENSOR NO. 10

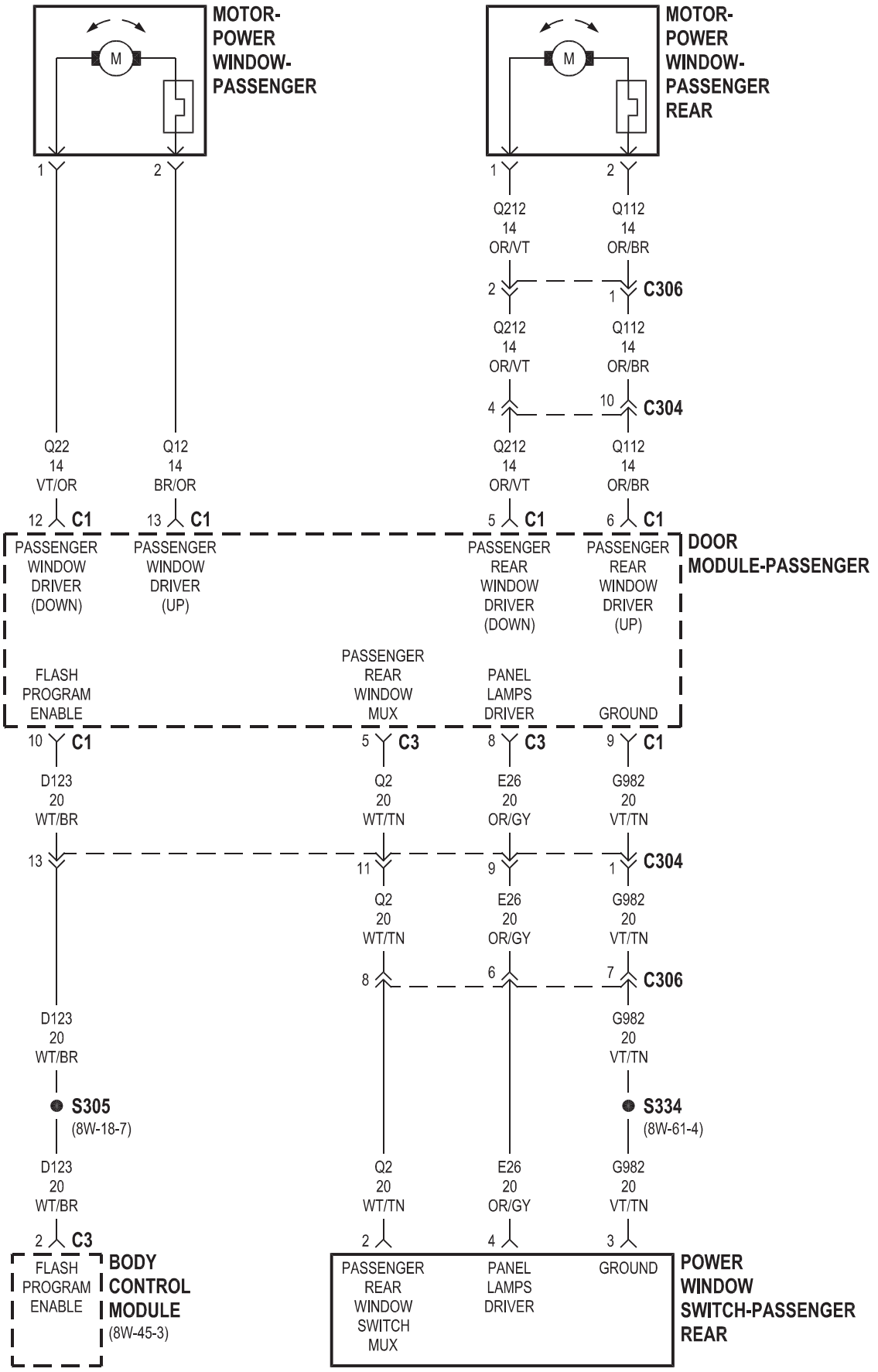
8W-60 POWER WINDOWS

Component	Page
Body Control Module	8W-60-3, 5
Door Module-Driver	8W-60-2, 3
Door Module-Passenger	8W-60-4, 5
Door Node Relay	8W-60-2, 4
Fuse 3	8W-60-2, 4
Fuse 40	8W-60-2
Fuse 41	8W-60-4
Fuse 46	8W-60-4
Fuse 47	8W-60-2
G300	8W-60-2
G301	8W-60-4
Integrated Power Module	8W-60-2, 4
Motor-Power Window-Passenger	8W-60-5
Motor-Power Window-Passenger Rear	8W-60-5
Power Window Motor-Driver	8W-60-3
Power Window Motor-Driver Rear	8W-60-3
Power Window Switch-Driver Rear	8W-60-3
Power Window Switch-Passenger Rear	8W-60-5
Run Relay	8W-60-2, 4


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
85
30
DOOR NODE RELAY
(8W-13-26)
86
87
87A
FUSE 3 30A
(8W-13-12)
FUSE 47 20A
(8W-13-12)
DOOR NODE RELAY CONTROL
INTEGRATED POWER MODULE
PCI BUS
FUSE 40 40A
(8W-13-26)
16 C4
11 C4
4 C2
D25 20 WT/VT
S347
(8W-18-5)
A215 18 RD/LG
D25 20 WT/VT
F515 12 PK/LB
5
12
8 C301
A215 18 RD/LG
D25 20 WT/VT
F515 12 PK/LB
2 C1
15 C3
1 C1
FUSED B (+)
PCI BUS
FUSED DOOR NODE RELAY OUTPUT
DOOR MODULE-DRIVER
GROUND
8 C1
Z821 12 BK/BR
14 C301
Z821 12 BK/BR
G300
(8W-15-9)

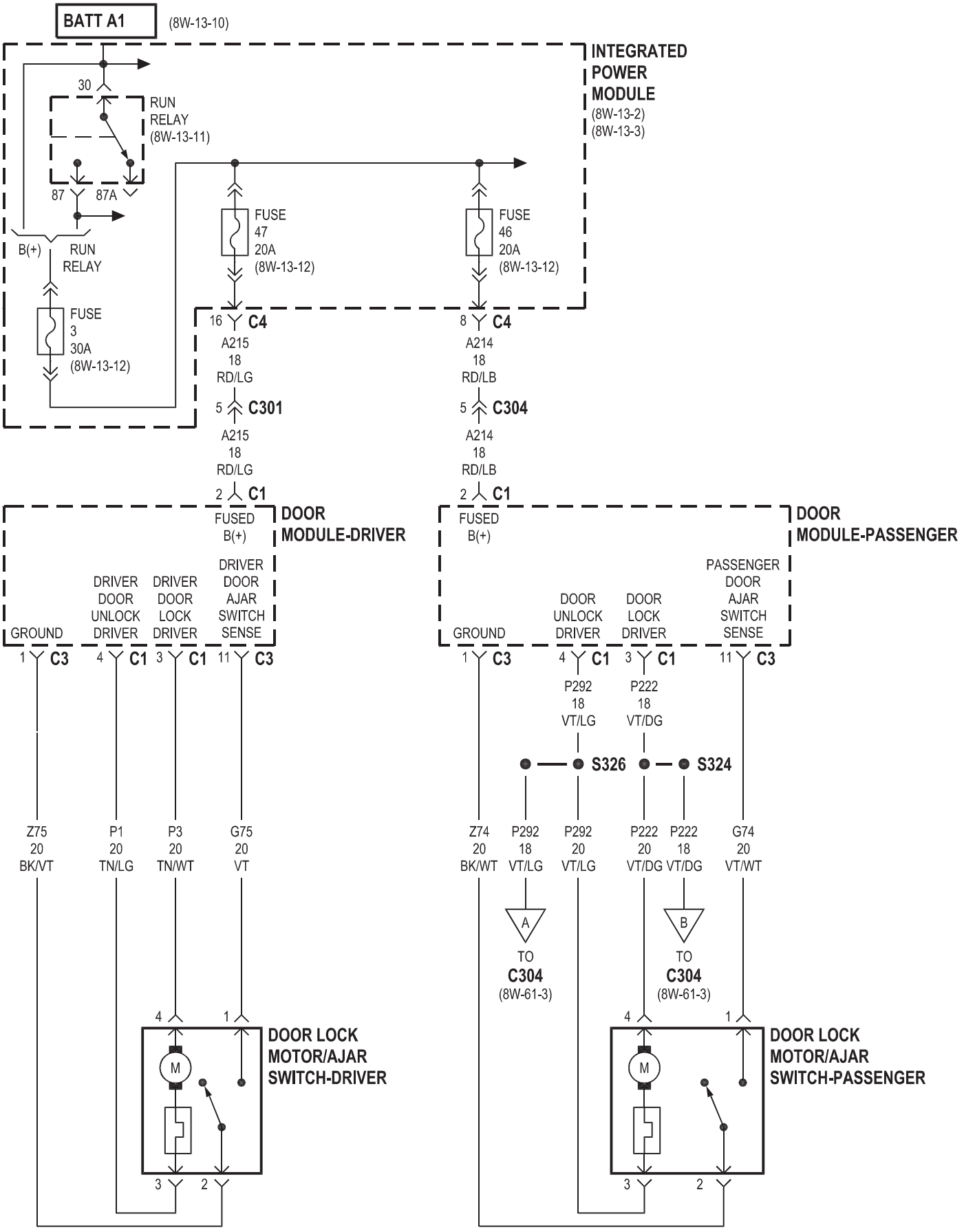

POWER WINDOW MOTOR-DRIVER
POWER WINDOW MOTOR-DRIVER REAR
M
1
2
Q21 14 OR/WT
Q11 14 OR/LG
Q211 14 OR/VT
Q111 14 OR/BR
C303
Q211 14 TN/LB
Q111 14 TN/YL
C301
12 C1
13 C1
5 C1
6 C1
DRIVER WINDOW DRIVER (DOWN)
DRIVER WINDOW DRIVER (UP)
DRIVER REAR WINDOW DRIVER (DOWN)
DRIVER REAR WINDOW DRIVER (UP)
DOOR MODULE-DRIVER
FLASH PROGRAM ENABLE
DRIVER REAR WINDOW SWITCH MUX
PANEL LAMPS DRIVER
GROUND
10 C1
5 C3
8 C3
9 C1
D123 20 WT/BR
Q1 20 OR/WT
E25 20 OR/GY
G983 20 VT/OR
13
11
9
1 C301
S305
(8W-18-7)
8
6
7 C303
G983 20 VT/TN
S336
(8W-61-3)
2 C3
FLASH PROGRAM ENABLE
BODY CONTROL MODULE
(8W-45-3)
Q1 20 WT/TN
E25 20 OR/GY
G983 20 VT/TN
2
4
3
DRIVER REAR WINDOW SWITCH MUX
PANEL LAMPS DRIVER
GROUND
POWER WINDOW SWITCH-DRIVER REAR

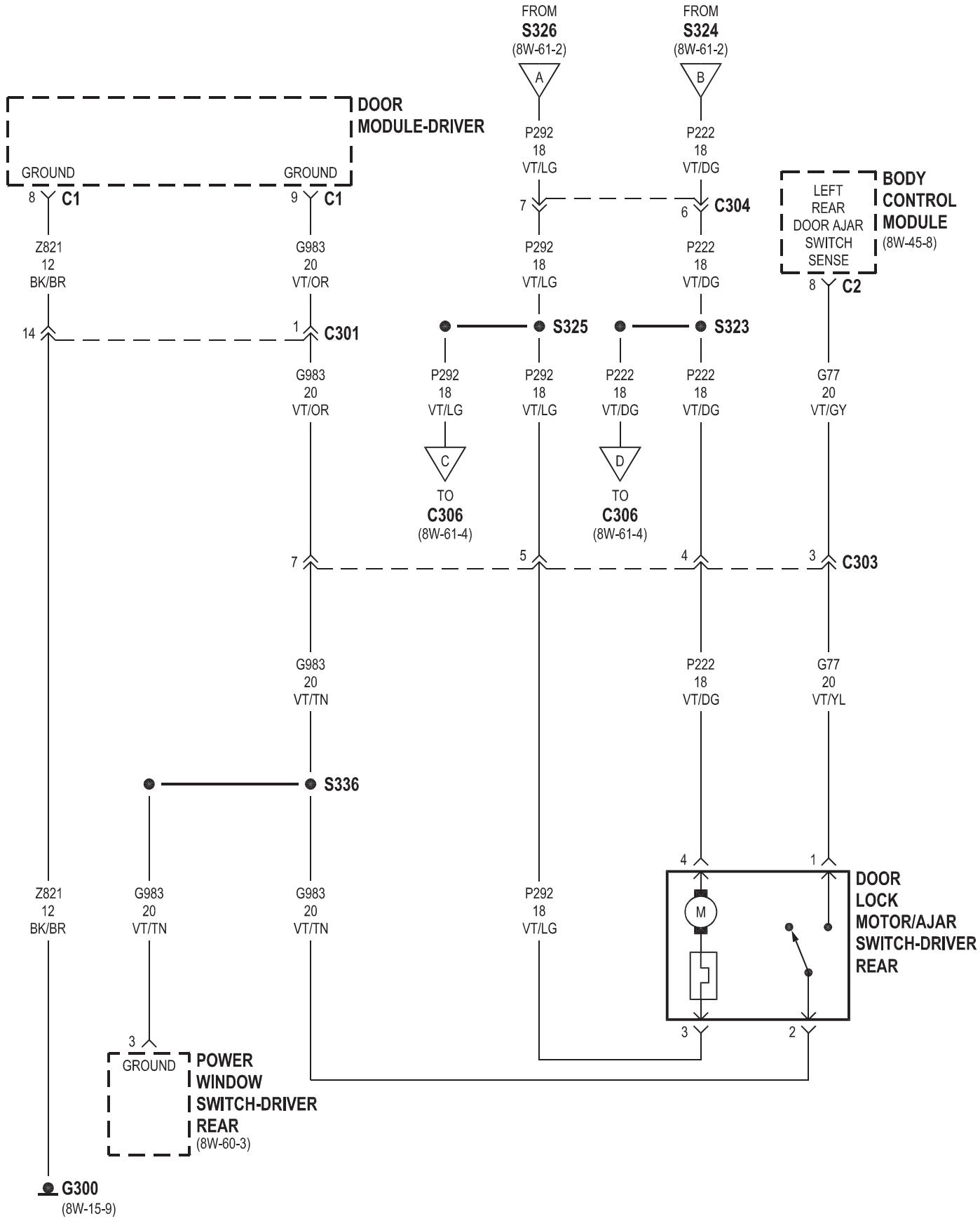

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
85
30
DOOR NODE RELAY
(8W-13-26)
86
87
87A
DOOR NODE RELAY CONTROL
INTEGRATED POWER MODULE
PCI BUS
FUSE 3 30A
(8W-13-12)
FUSE 46 20A
(8W-13-12)
FUSE 41 40A
(8W-13-26)
8 C4
11 C4
1 C8
D25 20 WT/VT
S347
(8W-18-5)
D25 20 WT/VT
S353
(8W-18-6)
A214 18 RD/LB
D25 20 WT/VT
F516 12 PK
5
12
8 C304
A214 18 RD/LB
D25 20 WT/VT
F516 12 PK
2 C1
15 C3
7 C1
FUSED B (+)
PCI BUS
FUSED DOOR NODE RELAY OUTPUT
DOOR MODULE-PASSENGER
GROUND
14 C1
Z822 12 BK/BR
14 C304
Z822 12 BK/BR
G301
(8W-15-11)

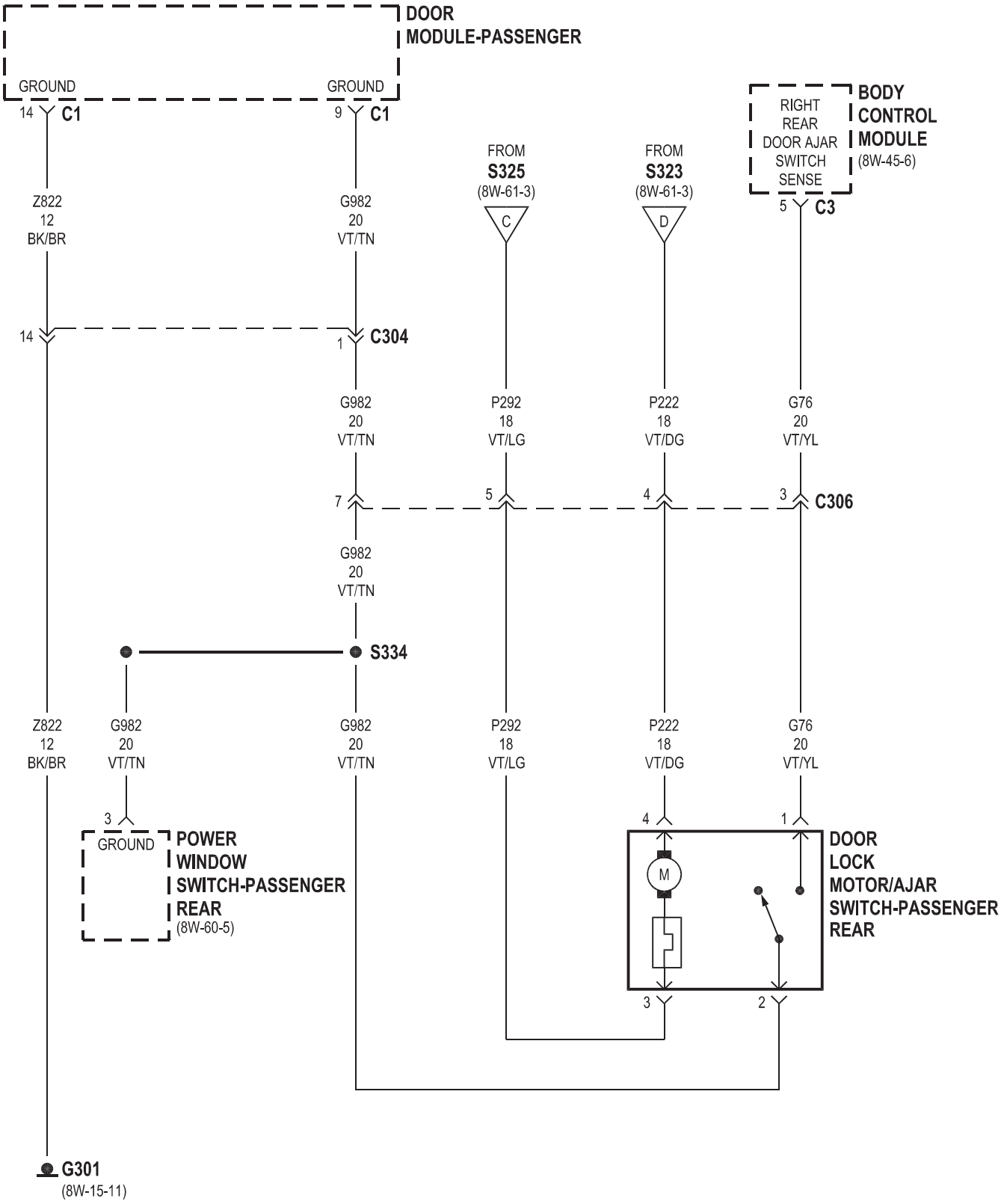

MOTOR-
POWER
WINDOW-
PASSENGER
MOTOR-
POWER
WINDOW-
PASSENGER
REAR
M
M
1
2
1
2
Q212
14
OR/VT
Q112
14
OR/BR
2
1
C306
Q212
14
OR/VT
Q112
14
OR/BR
4
10
C304
Q22
14
VT/OR
Q12
14
BR/OR
Q212
14
OR/VT
Q112
14
OR/BR
12
C1
13
C1
5
C1
6
C1
DOOR
MODULE-PASSENGER
PASSENGER
WINDOW
DRIVER
(DOWN)
PASSENGER
WINDOW
DRIVER
(UP)
PASSENGER
REAR
WINDOW
DRIVER
(DOWN)
PASSENGER
REAR
WINDOW
DRIVER
(UP)
FLASH
PROGRAM
ENABLE
PASSENGER
REAR
WINDOW
MUX
PANEL
LAMPS
DRIVER
GROUND
10
C1
5
C3
8
C3
9
C1
D123
20
WT/BR
Q2
20
WT/TN
E26
20
OR/GY
G982
20
VT/TN
13
11
9
1
C304
Q2
20
WT/TN
E26
20
OR/GY
G982
20
VT/TN
8
6
7
C306
D123
20
WT/BR
G982
20
VT/TN
S305
(8W-18-7)
S334
(8W-61-4)
D123
20
WT/BR
Q2
20
WT/TN
E26
20
OR/GY
G982
20
VT/TN
2
C3
2
4
3
FLASH
PROGRAM
ENABLE
BODY
CONTROL
MODULE
(8W-45-3)
PASSENGER
REAR
WINDOW
SWITCH
MUX
PANEL
LAMPS
DRIVER
GROUND
POWER
WINDOW
SWITCH-PASSENGER
REAR

8W-61 POWER DOOR LOCKS

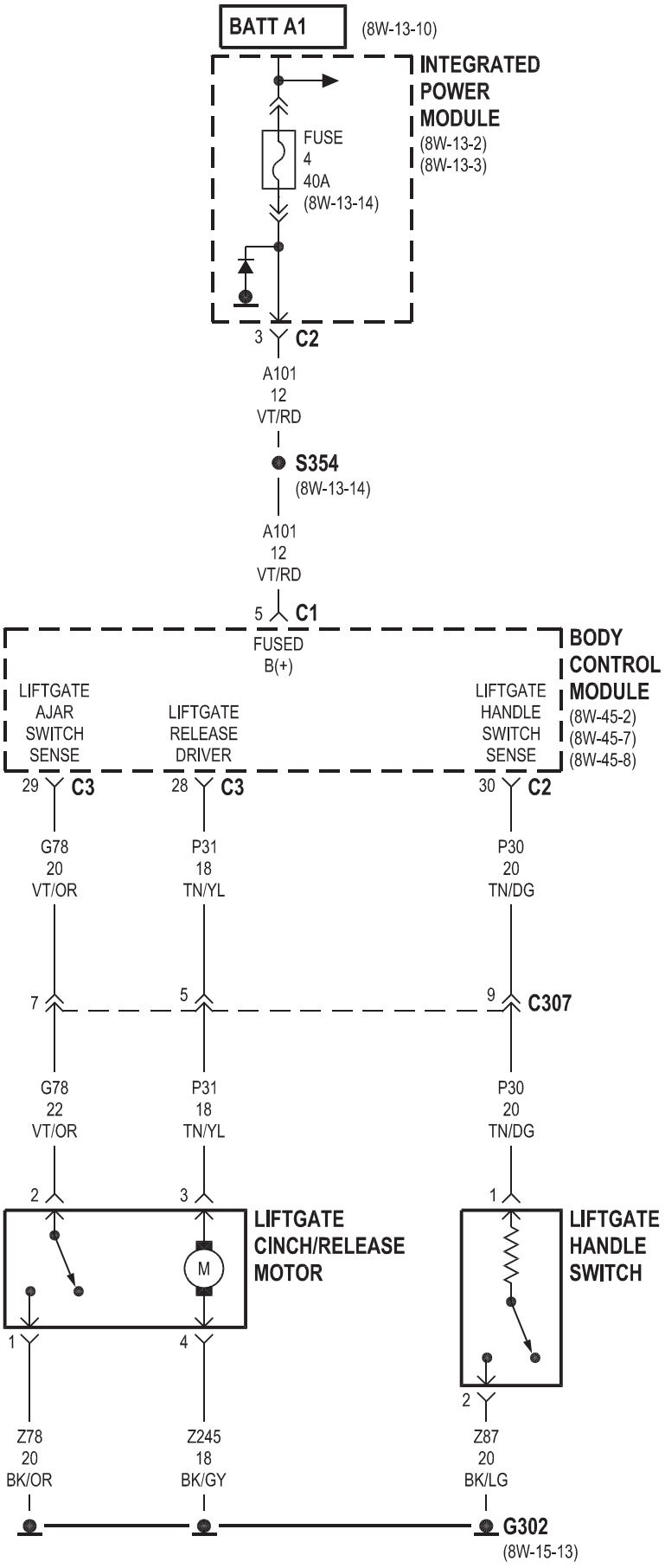
Component	Page
Body Control Module	8W-61-3, 4, 5, 6, 7
Door Lock Motor/Ajar Switch-Driver	8W-61-2
Door Lock Motor/Ajar Switch-Driver Rear	8W-61-3
Door Lock Motor/Ajar Switch-Passenger	8W-61-2
Door Lock Motor/Ajar Switch-Passenger Rear	8W-61-4
Door Module-Driver	8W-61-2, 3
Door Module-Passenger	8W-61-2, 4
Fuse 3	8W-61-2
Fuse 4	8W-61-5
Fuse 11	8W-61-6, 8
Fuse 46	8W-61-2
Fuse 47	8W-61-2
G300	8W-61-3
G301	8W-61-4
G302	8W-61-5, 6
G303	8W-61-6, 8
G306	8W-61-6
Integrated Power Module	8W-61-2, 5, 6, 8
License Lamp	8W-61-6, 7
Liftgate Cinch/Release Motor	8W-61-5, 6, 7
Liftgate Handle Switch	8W-61-5, 7
Liftgate Pinch Sensor-Left	8W-61-7
Liftgate Pinch Sensor-Right	8W-61-7
Power Liftgate Drive Unit	8W-61-8
Power Liftgate Module	8W-61-6, 7, 8
Power Window Switch-Driver Rear	8W-61-3
Power Window Switch-Passenger Rear	8W-61-4
Run Relay	8W-61-2

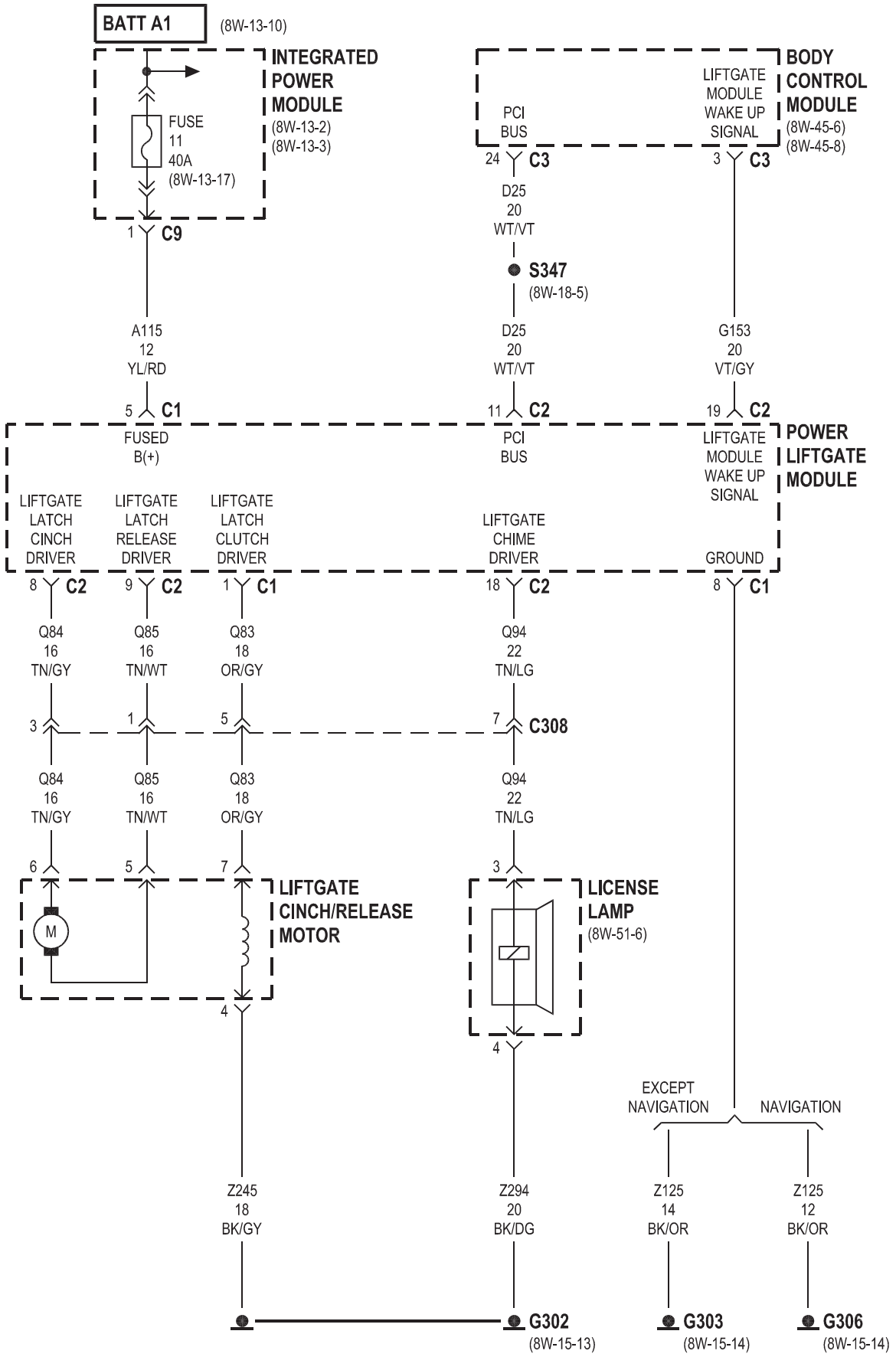

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 47 20A
(8W-13-12)
FUSE 46 20A
(8W-13-12)
16 C4
A215 18 RD/LG
5 C301
A215 18 RD/LG
2 C1
8 C4
A214 18 RD/LB
5 C304
A214 18 RD/LB
2 C1
DOOR MODULE-DRIVER
FUSED B(+)
GROUND
DRIVER DOOR UNLOCK DRIVER
DRIVER DOOR LOCK DRIVER
DRIVER DOOR AJAR SWITCH SENSE
1 C3
4 C1
3 C1
11 C3
Z75 20 BK/VT
P1 20 TN/LG
P3 20 TN/WT
G75 20 VT
4
1
M
3
2
DOOR LOCK MOTOR/AJAR SWITCH-DRIVER
DOOR MODULE-PASSENGER
FUSED B(+)
GROUND
DOOR UNLOCK DRIVER
DOOR LOCK DRIVER
PASSENGER DOOR AJAR SWITCH SENSE
1 C3
4 C1
3 C1
11 C3
P292 18 VT/LG
P222 18 VT/DG
S326
S324
Z74 20 BK/WT
P292 18 VT/LG
P292 20 VT/LG
P222 20 VT/DG
P222 18 VT/DG
G74 20 VT/WT
A
TO C304
(8W-61-3)
B
TO C304
(8W-61-3)
4
1
M
3
2
DOOR LOCK MOTOR/AJAR SWITCH-PASSENGER


FROM
S326
(8W-61-2)
A
FROM
S324
(8W-61-2)
B
DOOR
MODULE-DRIVER
GROUND
GROUND
8
C1
9
C1
P292
18
VT/LG
P222
18
VT/DG
7
6
C304
BODY
CONTROL
MODULE
(8W-45-8)
LEFT
REAR
DOOR AJAR
SWITCH
SENSE
8
C2
Z821
12
BK/BR
G983
20
VT/OR
P292
18
VT/LG
P222
18
VT/DG
14
1
C301
S325
S323
P292
18
VT/LG
P292
18
VT/LG
P222
18
VT/DG
P222
18
VT/DG
G77
20
VT/GY
C
D
TO
C306
(8W-61-4)
TO
C306
(8W-61-4)
7
5
4
3
C303
G983
20
VT/TN
P222
18
VT/DG
G77
20
VT/YL
S336
4
1
Z821
12
BK/BR
G983
20
VT/TN
G983
20
VT/TN
P292
18
VT/LG
M
DOOR
LOCK
MOTOR/AJAR
SWITCH-DRIVER
REAR
3
2
3
GROUND
POWER
WINDOW
SWITCH-DRIVER
REAR
(8W-60-3)
G300
(8W-15-9)

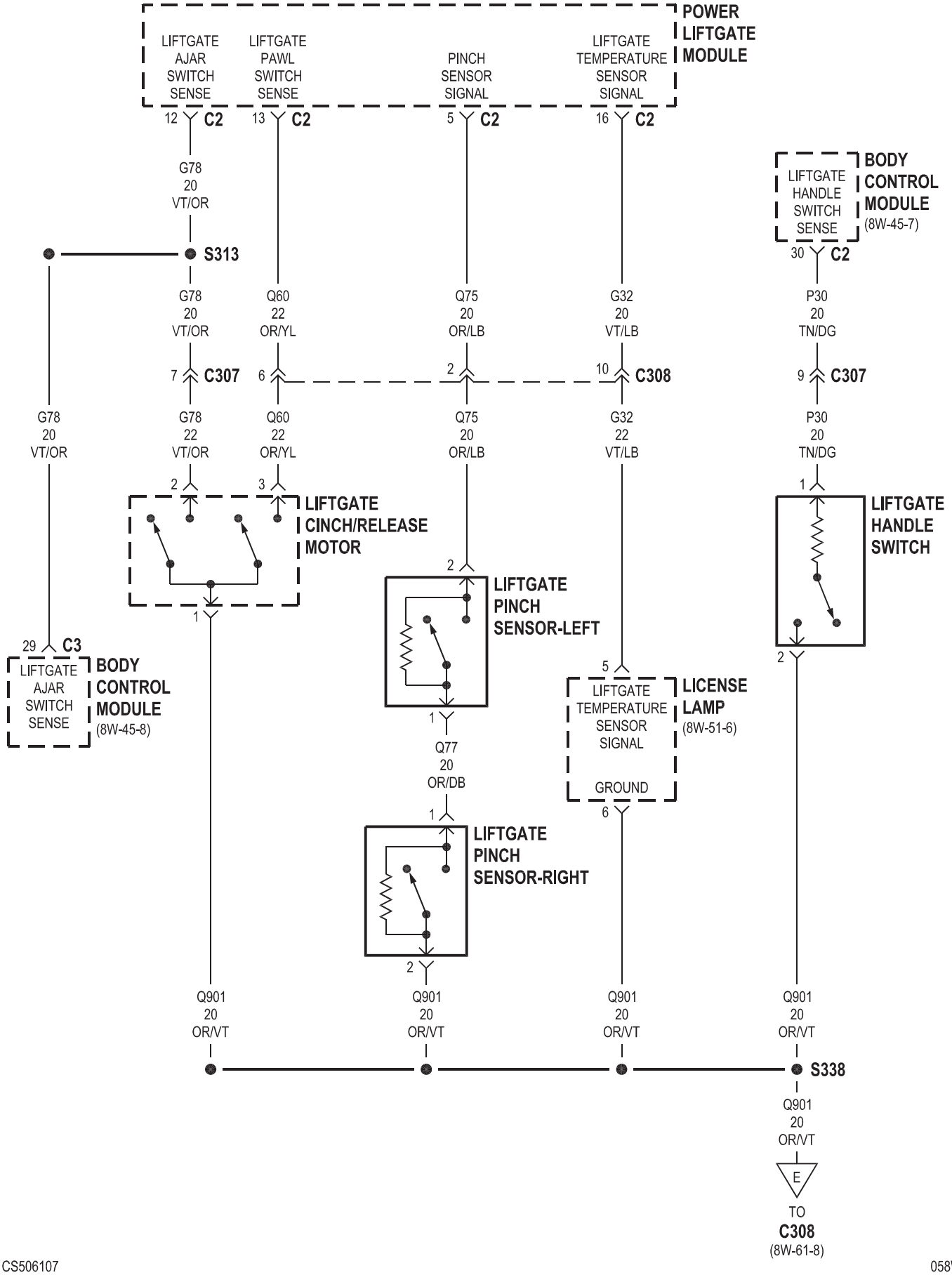

DOOR MODULE-PASSENGER
GROUND
14 C1
GROUND
9 C1
Z822 12 BK/BR
G982 20 VT/TN
14
1 C304
G982 20 VT/TN
7
G982 20 VT/TN
S334
Z822 12 BK/BR
G982 20 VT/TN
3
GROUND
POWER WINDOW SWITCH-PASSENGER REAR
(8W-60-5)
G982 20 VT/TN
G301
(8W-15-11)
FROM S325 (8W-61-3)
C
P292 18 VT/LG
5
P292 18 VT/LG
FROM S323 (8W-61-3)
D
P222 18 VT/DG
4
P222 18 VT/DG
4
M
3
RIGHT REAR DOOR AJAR SWITCH SENSE
BODY CONTROL MODULE
(8W-45-6)
5 C3
G76 20 VT/YL
3 C306
G76 20 VT/YL
1
DOOR LOCK MOTOR/AJAR SWITCH-PASSENGER REAR
2

BASE

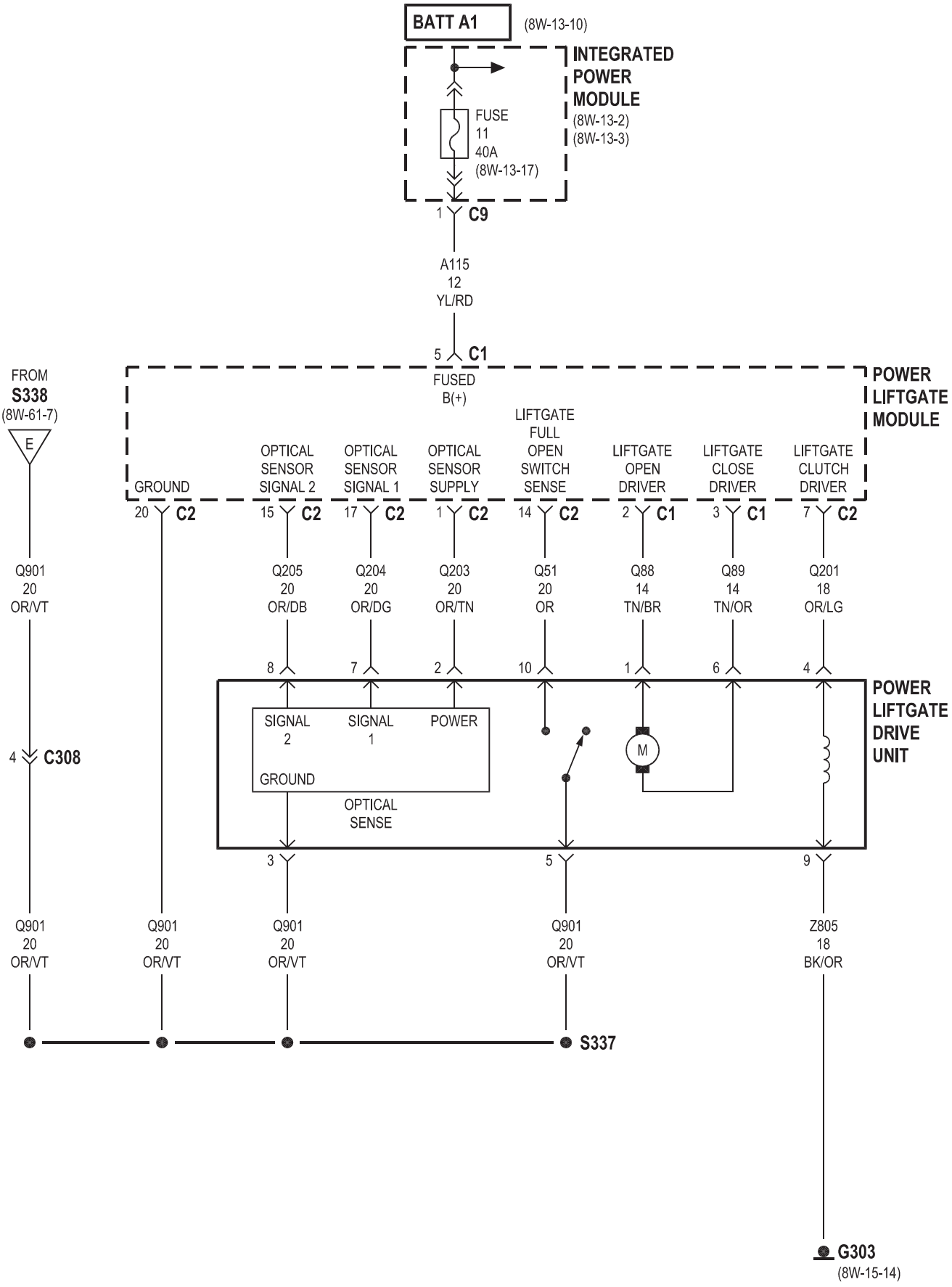

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 4 40A
(8W-13-14)
3 C2
A101 12 VT/RD
S354
(8W-13-14)
A101 12 VT/RD
5 C1
FUSED B(+)
BODY CONTROL MODULE
(8W-45-2)
(8W-45-7)
(8W-45-8)
LIFTGATE AJAR SWITCH SENSE
LIFTGATE RELEASE DRIVER
LIFTGATE HANDLE SWITCH SENSE
29 C3
28 C3
30 C2
G78 20 VT/OR
P31 18 TN/YL
P30 20 TN/DG
7
5
9 C307
G78 22 VT/OR
P31 18 TN/YL
P30 20 TN/DG
2
3
1
LIFTGATE CINCH/RELEASE MOTOR
M
LIFTGATE HANDLE SWITCH
1
4
2
Z78 20 BK/OR
Z245 18 BK/GY
Z87 20 BK/LG
G302
(8W-15-13)


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 11 40A
(8W-13-17)
1 C9
BODY CONTROL MODULE
(8W-45-6)
(8W-45-8)
PCI BUS
LIFTGATE MODULE WAKE UP SIGNAL
24 C3
3 C3
D25 20 WT/VT
S347
(8W-18-5)
A115 12 YL/RD
D25 20 WT/VT
G153 20 VT/GY
5 C1
11 C2
19 C2
FUSED B(+)
PCI BUS
LIFTGATE MODULE WAKE UP SIGNAL
POWER LIFTGATE MODULE
LIFTGATE LATCH CINCH DRIVER
LIFTGATE LATCH RELEASE DRIVER
LIFTGATE LATCH CLUTCH DRIVER
LIFTGATE CHIME DRIVER
GROUND
8 C2
9 C2
1 C1
18 C2
8 C1
Q84 16 TN/GY
Q85 16 TN/WT
Q83 18 OR/GY
Q94 22 TN/LG
3
1
5
7 C308
Q84 16 TN/GY
Q85 16 TN/WT
Q83 18 OR/GY
Q94 22 TN/LG
6
5
7
3
M
LIFTGATE CINCH/RELEASE MOTOR
LICENSE LAMP
(8W-51-6)
4
4
EXCEPT NAVIGATION
NAVIGATION
Z245 18 BK/GY
Z294 20 BK/DG
Z125 14 BK/OR
Z125 12 BK/OR
G302
(8W-15-13)
G303
(8W-15-14)
G306
(8W-15-14)

POWER LIFTGATE

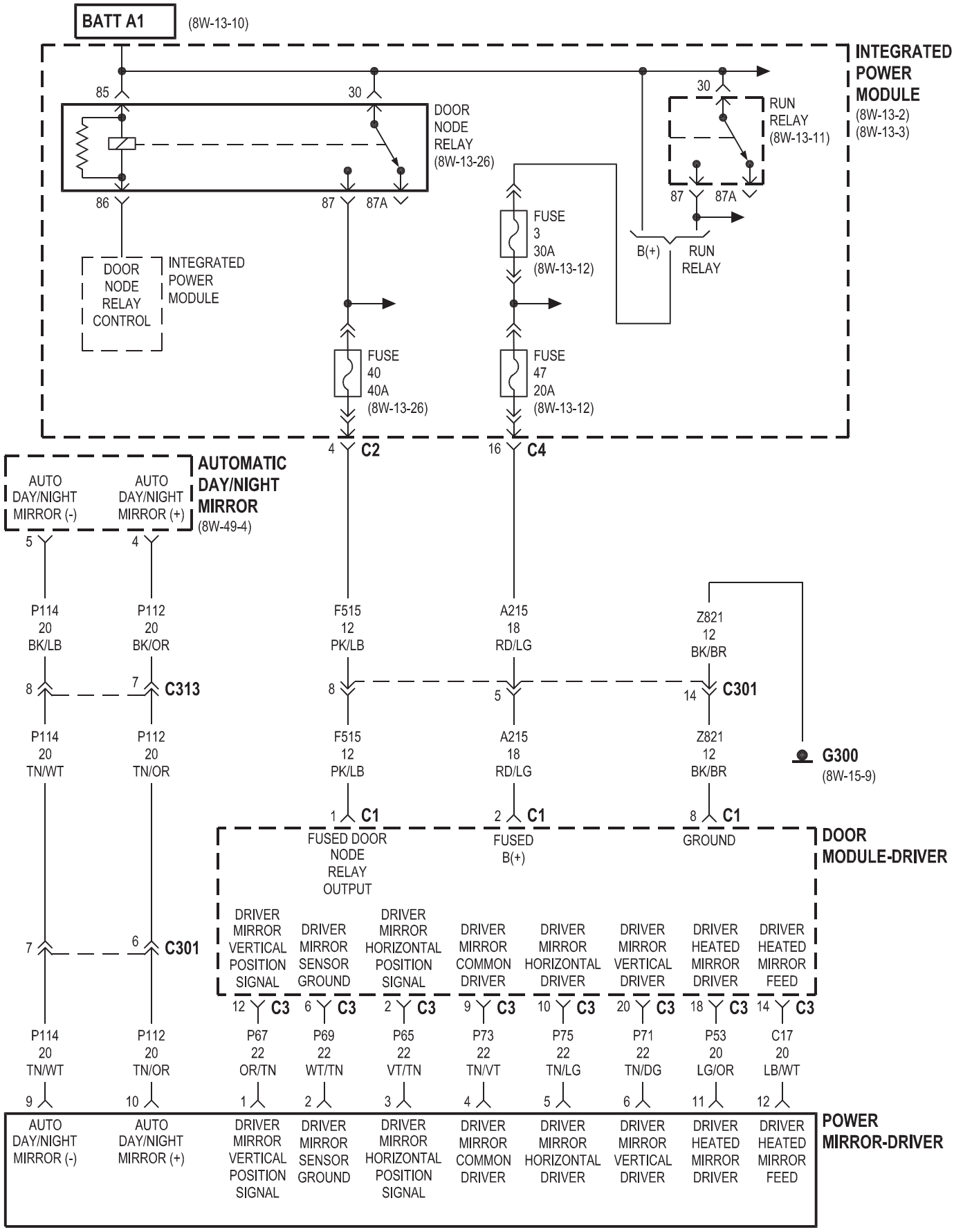


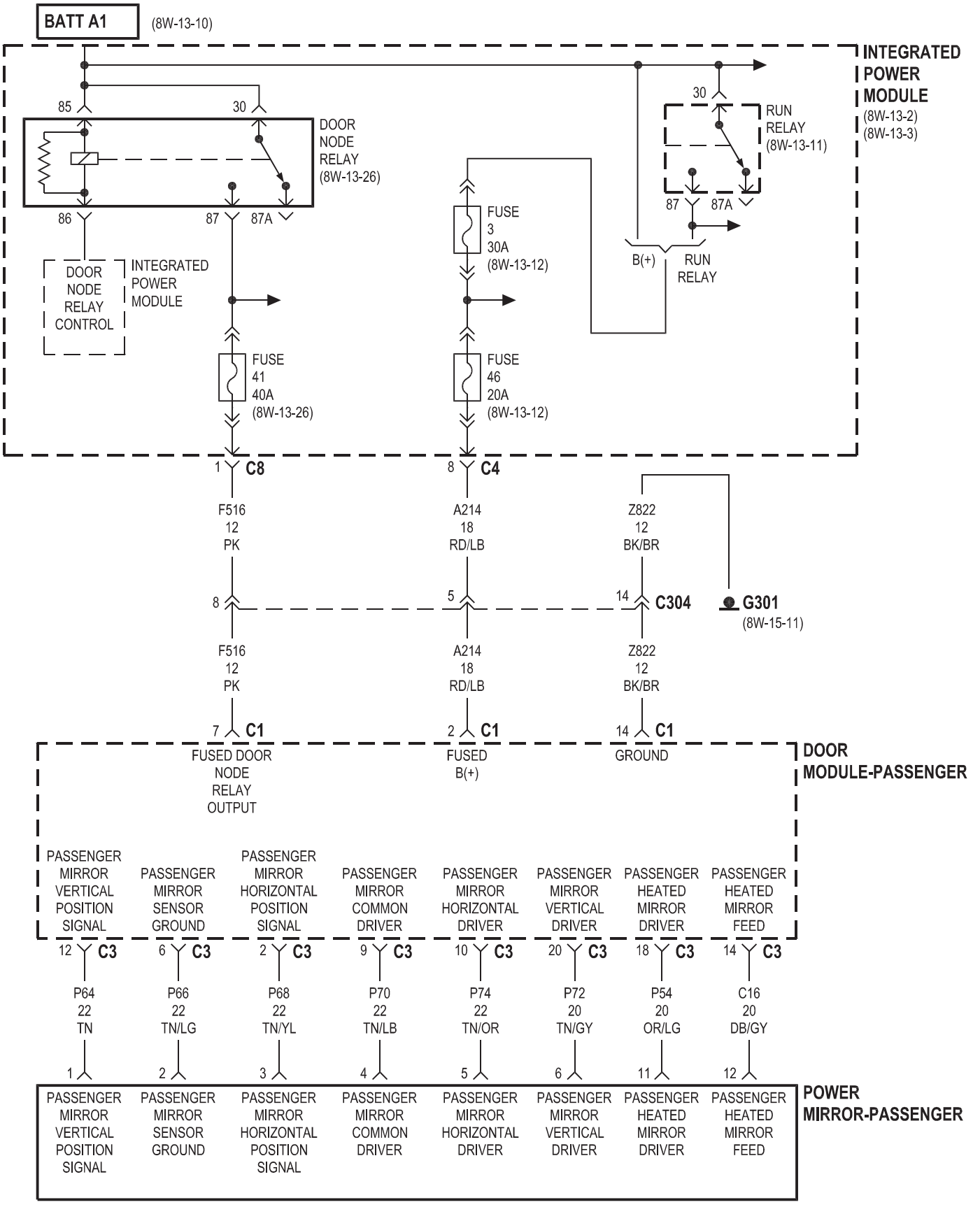
POWER LIFTGATE



8W-62 POWER MIRRORS

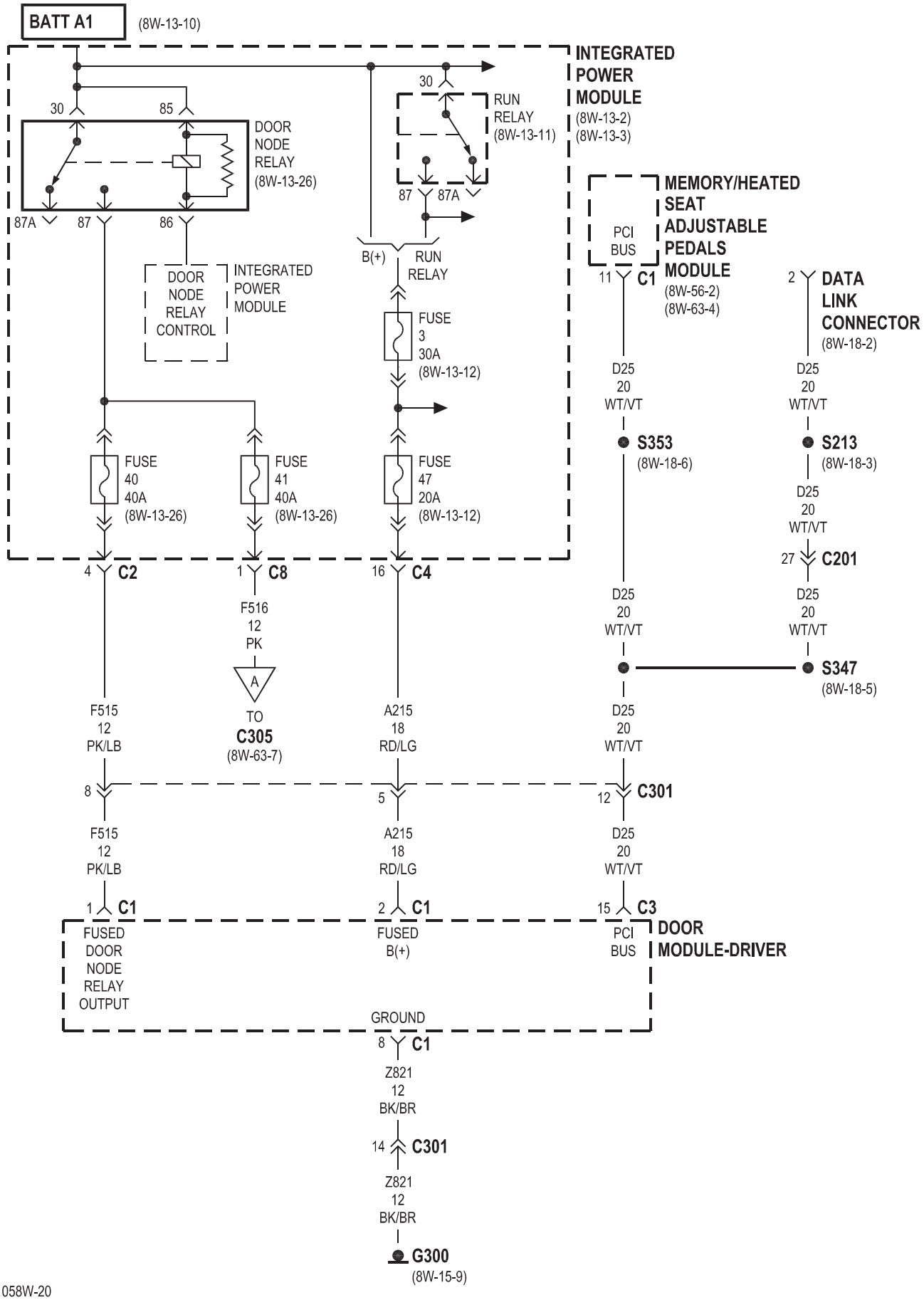
Component	Page
Automatic Day/Night Mirror	8W-62-2
Door Module-Driver	8W-62-2
Door Module-Passenger	8W-62-3
Door Node Relay	8W-62-2, 3
Fuse 3	8W-62-2, 3
Fuse 40	8W-62-2
Fuse 41	8W-62-3
Fuse 46	8W-62-3
Fuse 47	8W-62-2
G300	8W-62-2
G301	8W-62-3
Integrated Power Module	8W-62-2, 3
Power Mirror-Driver	8W-62-2
Power Mirror-Passenger	8W-62-3
Run Relay	8W-62-2, 3

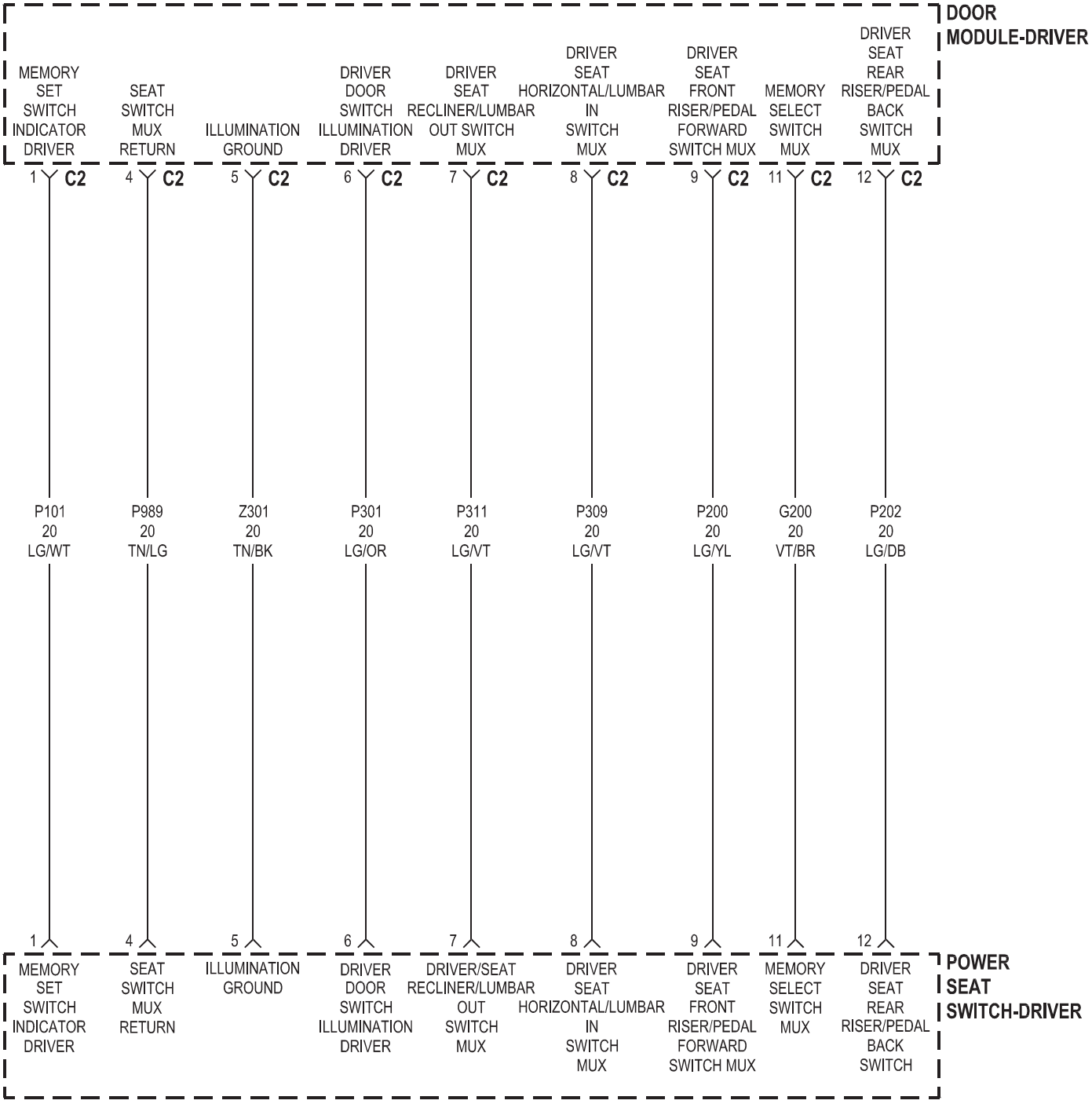

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
85
30
DOOR NODE RELAY
(8W-13-26)
86
87
87A
30
RUN RELAY
(8W-13-11)
87
87A
FUSE 3 30A
(8W-13-12)
B(+)
RUN RELAY
DOOR NODE RELAY CONTROL
INTEGRATED POWER MODULE
FUSE 40 40A
(8W-13-26)
FUSE 47 20A
(8W-13-12)
4 C2
16 C4
AUTOMATIC DAY/NIGHT MIRROR
(8W-49-4)
AUTO DAY/NIGHT MIRROR (-)
AUTO DAY/NIGHT MIRROR (+)
5
4
P114 20 BK/LB
P112 20 BK/OR
F515 12 PK/LB
A215 18 RD/LG
Z821 12 BK/BR
8
7
C313
8
5
14
C301
P114 20 TN/WT
P112 20 TN/OR
F515 12 PK/LB
A215 18 RD/LG
Z821 12 BK/BR
G300
(8W-15-9)
1 C1
2 C1
8 C1
FUSED DOOR NODE RELAY OUTPUT
FUSED B(+)
GROUND
DOOR MODULE-DRIVER
7
6
C301
DRIVER MIRROR VERTICAL POSITION SIGNAL
DRIVER MIRROR SENSOR GROUND
DRIVER MIRROR HORIZONTAL POSITION SIGNAL
DRIVER MIRROR COMMON DRIVER
DRIVER MIRROR HORIZONTAL DRIVER
DRIVER MIRROR VERTICAL DRIVER
DRIVER HEATED MIRROR DRIVER
DRIVER HEATED MIRROR FEED
12 C3
6 C3
2 C3
9 C3
10 C3
20 C3
18 C3
14 C3
P114 20 TN/WT
P112 20 TN/OR
P67 22 OR/TN
P69 22 WT/TN
P65 22 VT/TN
P73 22 TN/VT
P75 22 TN/LG
P71 22 TN/DG
P53 20 LG/OR
C17 20 LB/WT
9
10
1
2
3
4
5
6
11
12
AUTO DAY/NIGHT MIRROR (-)
AUTO DAY/NIGHT MIRROR (+)
DRIVER MIRROR VERTICAL POSITION SIGNAL
DRIVER MIRROR SENSOR GROUND
DRIVER MIRROR HORIZONTAL POSITION SIGNAL
DRIVER MIRROR COMMON DRIVER
DRIVER MIRROR HORIZONTAL DRIVER
DRIVER MIRROR VERTICAL DRIVER
DRIVER HEATED MIRROR DRIVER
DRIVER HEATED MIRROR FEED
POWER MIRROR-DRIVER

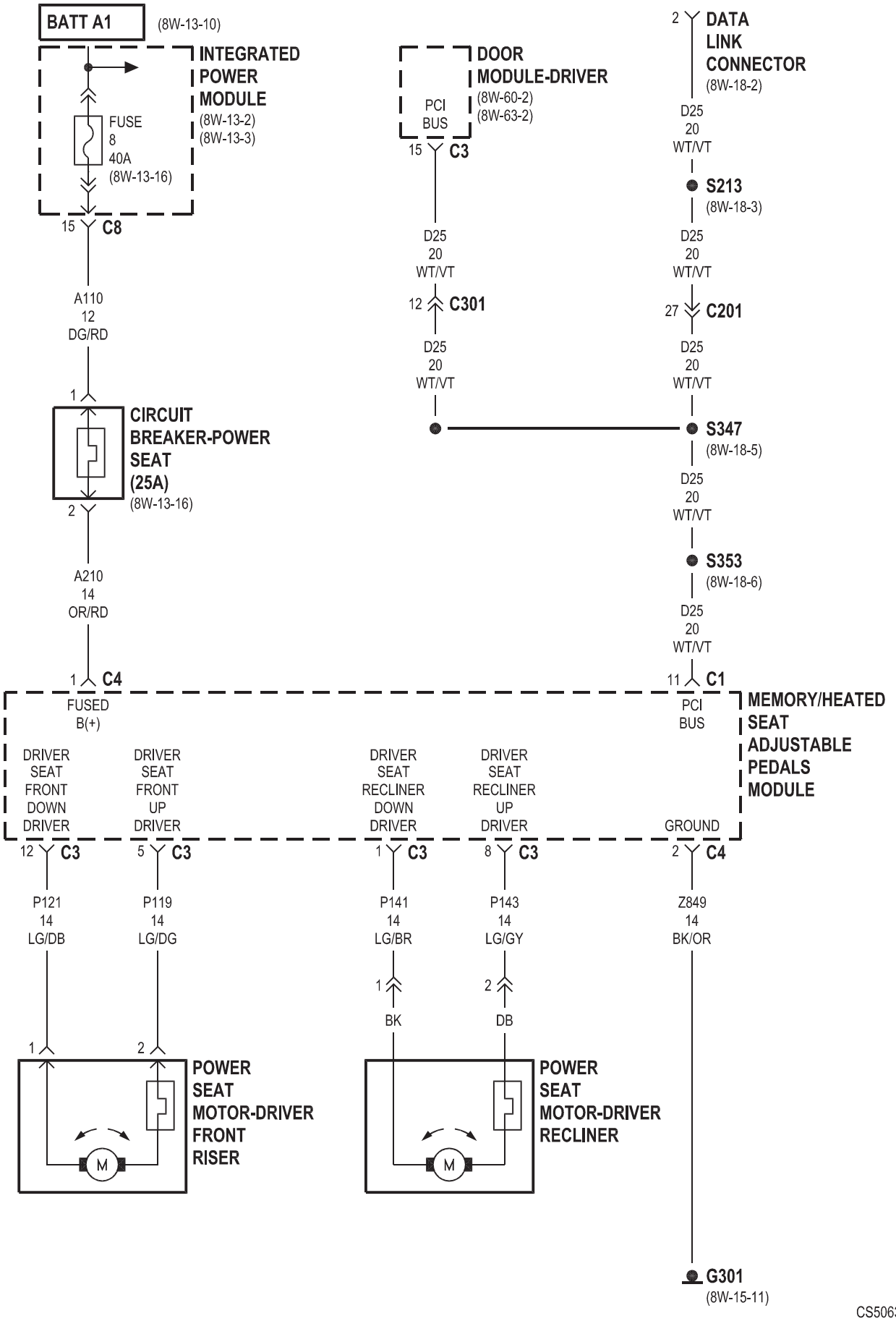

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
85
30
DOOR NODE RELAY
(8W-13-26)
86
87
87A
DOOR NODE RELAY CONTROL
INTEGRATED POWER MODULE
FUSE 41 40A (8W-13-26)
FUSE 3 30A (8W-13-12)
FUSE 46 20A (8W-13-12)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
1 C8
8 C4
F516 12 PK
A214 18 RD/LB
Z822 12 BK/BR
8
5
14 C304
G301
(8W-15-11)
F516 12 PK
A214 18 RD/LB
Z822 12 BK/BR
7 C1
2 C1
14 C1
FUSED DOOR NODE RELAY OUTPUT
FUSED B(+)
GROUND
DOOR MODULE-PASSENGER
PASSENGER MIRROR VERTICAL POSITION SIGNAL
PASSENGER MIRROR SENSOR GROUND
PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
PASSENGER MIRROR COMMON DRIVER
PASSENGER MIRROR HORIZONTAL DRIVER
PASSENGER MIRROR VERTICAL DRIVER
PASSENGER HEATED MIRROR DRIVER
PASSENGER HEATED MIRROR FEED
12 C3
6 C3
2 C3
9 C3
10 C3
20 C3
18 C3
14 C3
P64 22 TN
P66 22 TN/LG
P68 22 TN/YL
P70 22 TN/LB
P74 22 TN/OR
P72 20 TN/GY
P54 20 OR/LG
C16 20 DB/GY
1
2
3
4
5
6
11
12
PASSENGER MIRROR VERTICAL POSITION SIGNAL
PASSENGER MIRROR SENSOR GROUND
PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
PASSENGER MIRROR COMMON DRIVER
PASSENGER MIRROR HORIZONTAL DRIVER
PASSENGER MIRROR VERTICAL DRIVER
PASSENGER HEATED MIRROR DRIVER
PASSENGER HEATED MIRROR FEED
POWER MIRROR-PASSENGER

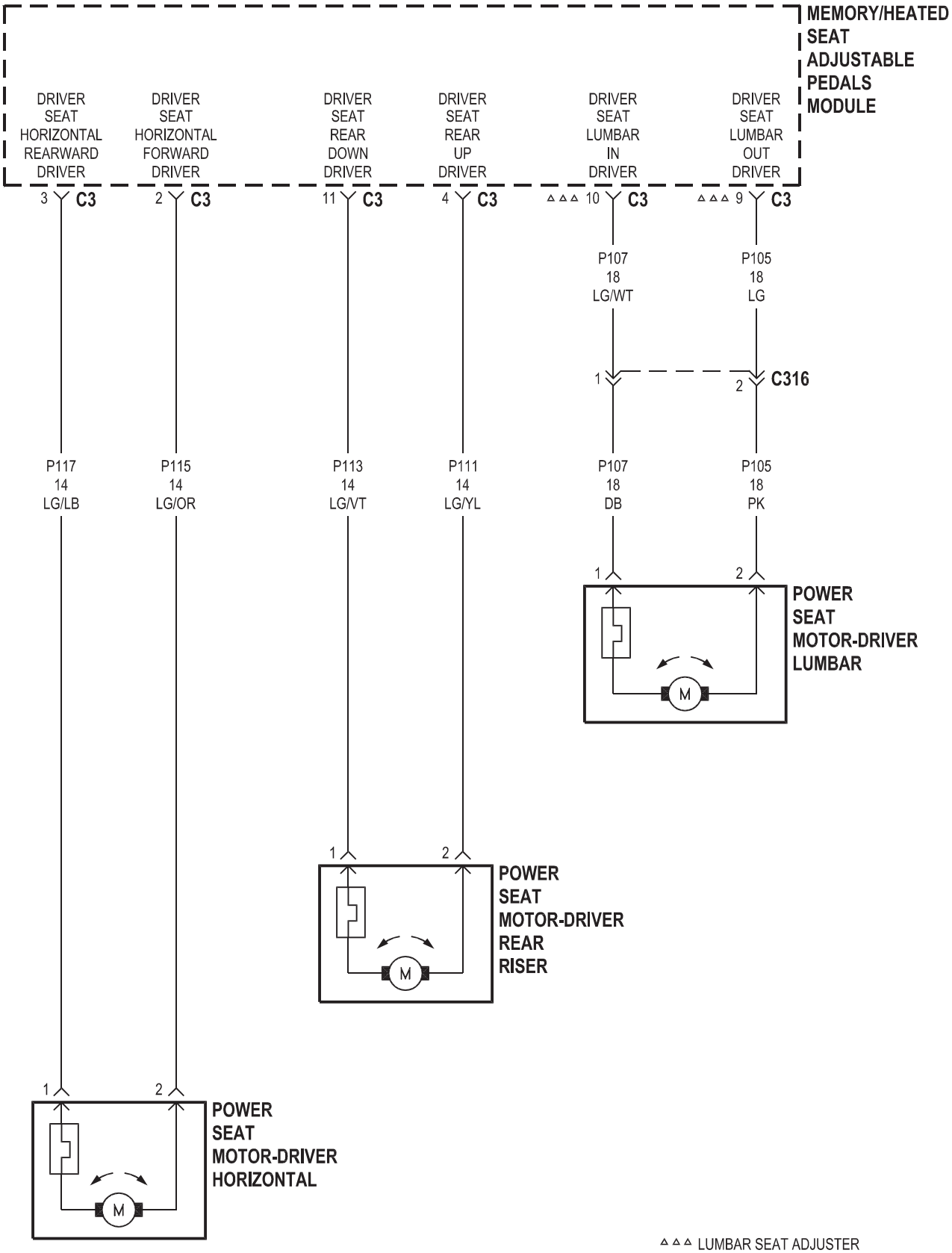
8W-63 POWER SEATS

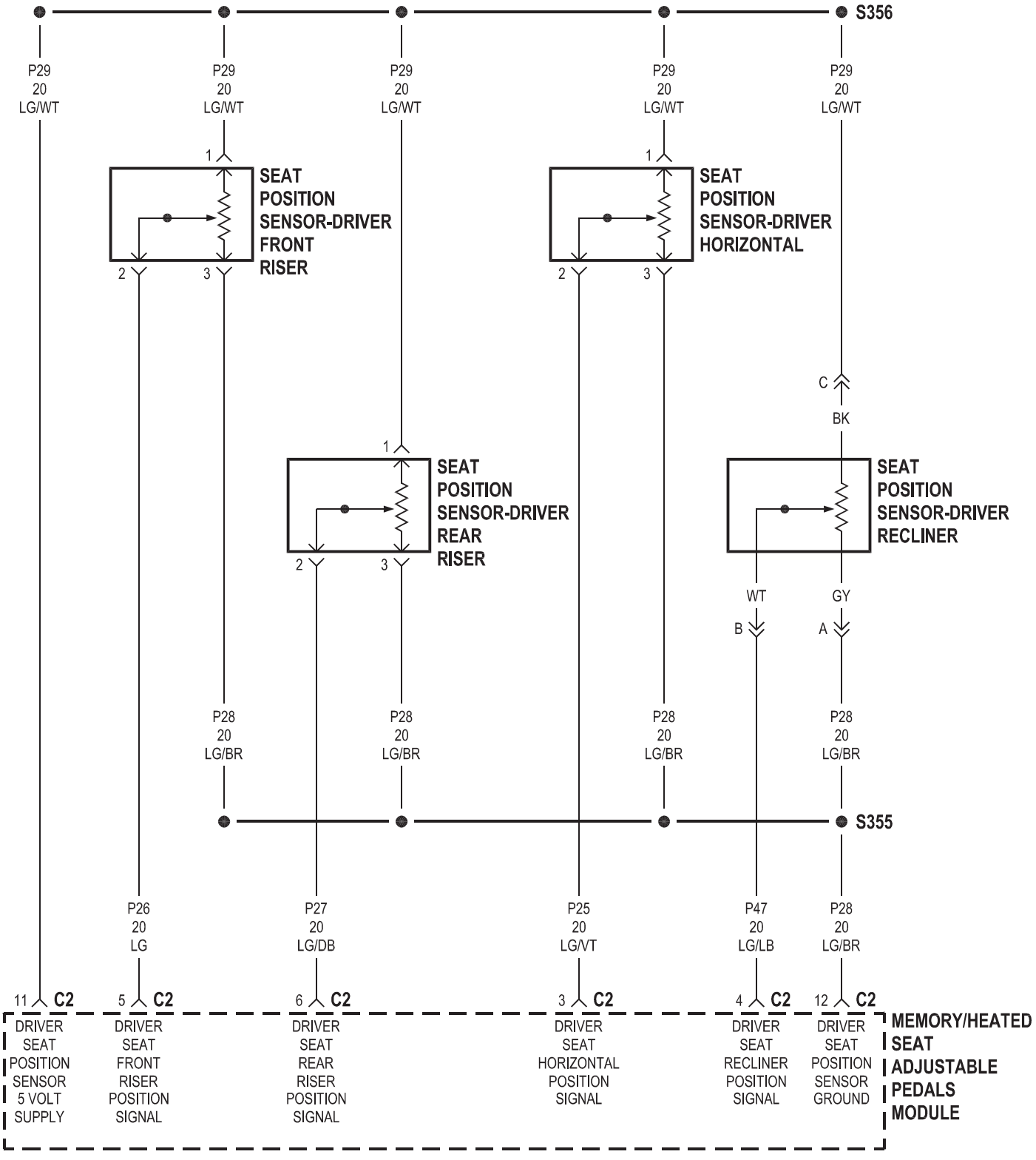
Component	Page
Circuit Breaker-Power Seat	8W-63-4
Data Link Connector	8W-63-2, 4, 7
Door Module-Driver	8W-63-2, 3, 4, 9
Door Module-Passenger	8W-63-7, 9
Door Node Relay	8W-63-2
Fuse 3	8W-63-2, 7
Fuse 8	8W-63-4
Fuse 40	8W-63-2
Fuse 41	8W-63-2
Fuse 44	8W-63-11
Fuse 46	8W-63-7
Fuse 47	8W-63-2
G300	8W-63-2
G301	8W-63-4, 7, 11, 13
Heated Seat Back-Driver	8W-63-10
Heated Seat Back-Passenger	8W-63-10
Heated Seat Cushion-Driver	8W-63-10
Heated Seat Cushion-Passenger	8W-63-10
Heated Seat Switch-Left Middle Row	8W-63-11, 12
Heated Seat Switch-Right Middle Row	8W-63-11, 12
Heated Seat-Left Middle Row	8W-63-13
Heated Seat-Right Middle Row	8W-63-13
Instrument Cluster	8W-63-11
Integrated Power Module	8W-63-2, 4, 7, 11
Memory/Heated Seat Adjustable Pedals Module	8W-63-2, 4, 5, 6, 7, 8, 10
Power Seat Motor-Driver Front Riser	8W-63-4
Power Seat Motor-Driver Horizontal	8W-63-5
Power Seat Motor-Driver Lumbar	8W-63-5
Power Seat Motor-Driver Rear Riser	8W-63-5
Power Seat Motor-Driver Recliner	8W-63-4
Power Seat Motor-Passenger Horizontal	8W-63-8
Power Seat Motor-Passenger Recliner	8W-63-8
Power Seat Switch-Driver	8W-63-3, 9
Power Seat Switch-Passenger	8W-63-7, 9
Run Relay	8W-63-2, 7, 11
Seat Heater Interface Module	8W-63-11, 12, 13
Seat Position Sensor-Driver Front Riser	8W-63-6
Seat Position Sensor-Driver Horizontal	8W-63-6
Seat Position Sensor-Driver Rear Riser	8W-63-6
Seat Position Sensor-Driver Recliner	8W-63-6

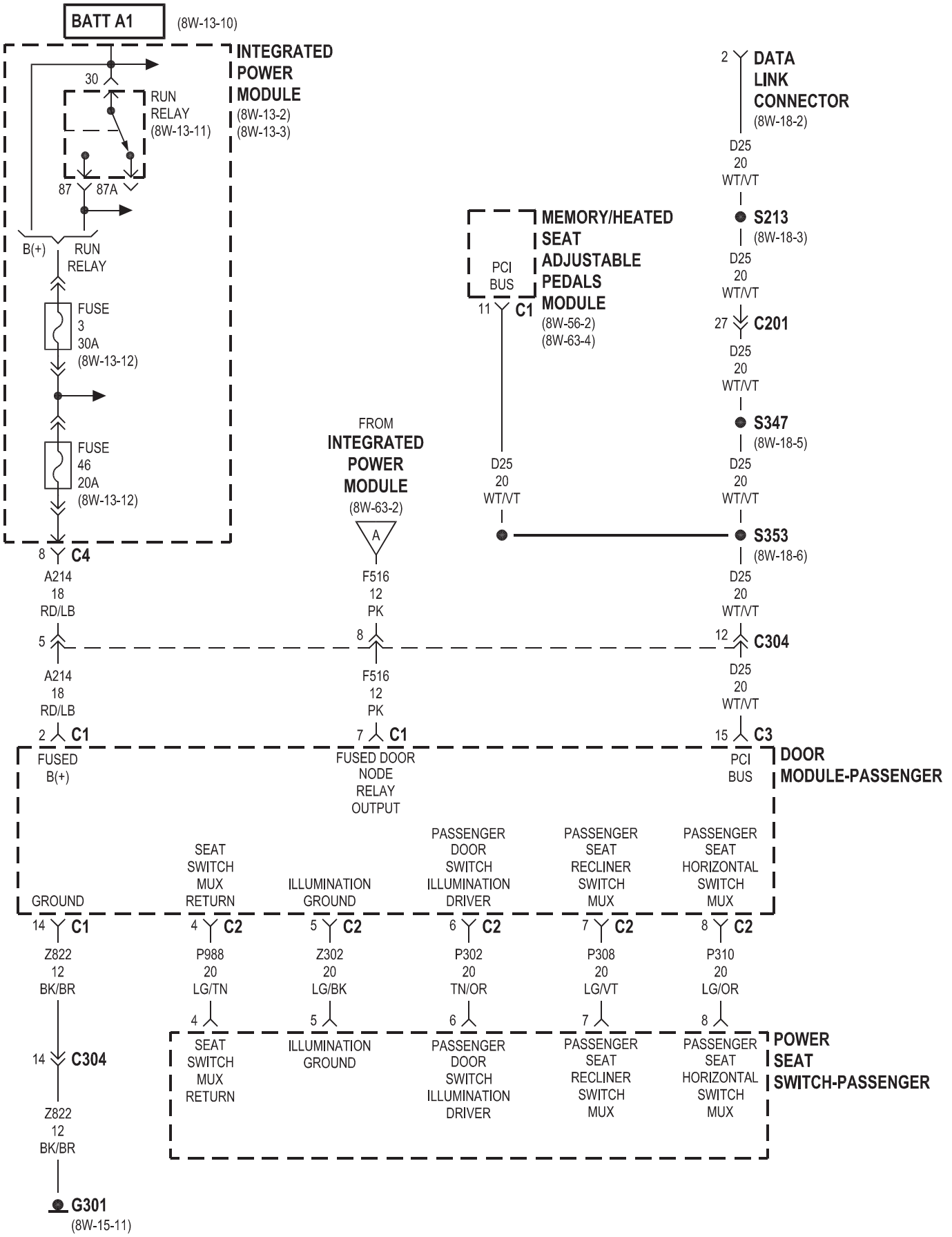

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
85
DOOR NODE RELAY
(8W-13-26)
87A
87
86
DOOR NODE RELAY CONTROL
INTEGRATED POWER MODULE
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 40 40A
(8W-13-26)
FUSE 41 40A
(8W-13-26)
FUSE 47 20A
(8W-13-12)
4 C2
1 C8
16 C4
F516 12 PK
A
TO C305
(8W-63-7)
F515 12 PK/LB
A215 18 RD/LG
D25 20 WT/VT
MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE
(8W-56-2)
(8W-63-4)
PCI BUS
11 C1
S353
(8W-18-6)
DATA LINK CONNECTOR
(8W-18-2)
2
S213
(8W-18-3)
27 C201
S347
(8W-18-5)
8
5
12 C301
1 C1
2 C1
15 C3
FUSED DOOR NODE RELAY OUTPUT
FUSED B(+)
PCI BUS
DOOR MODULE-DRIVER
GROUND
8 C1
Z821 12 BK/BR
14 C301
G300
(8W-15-9)

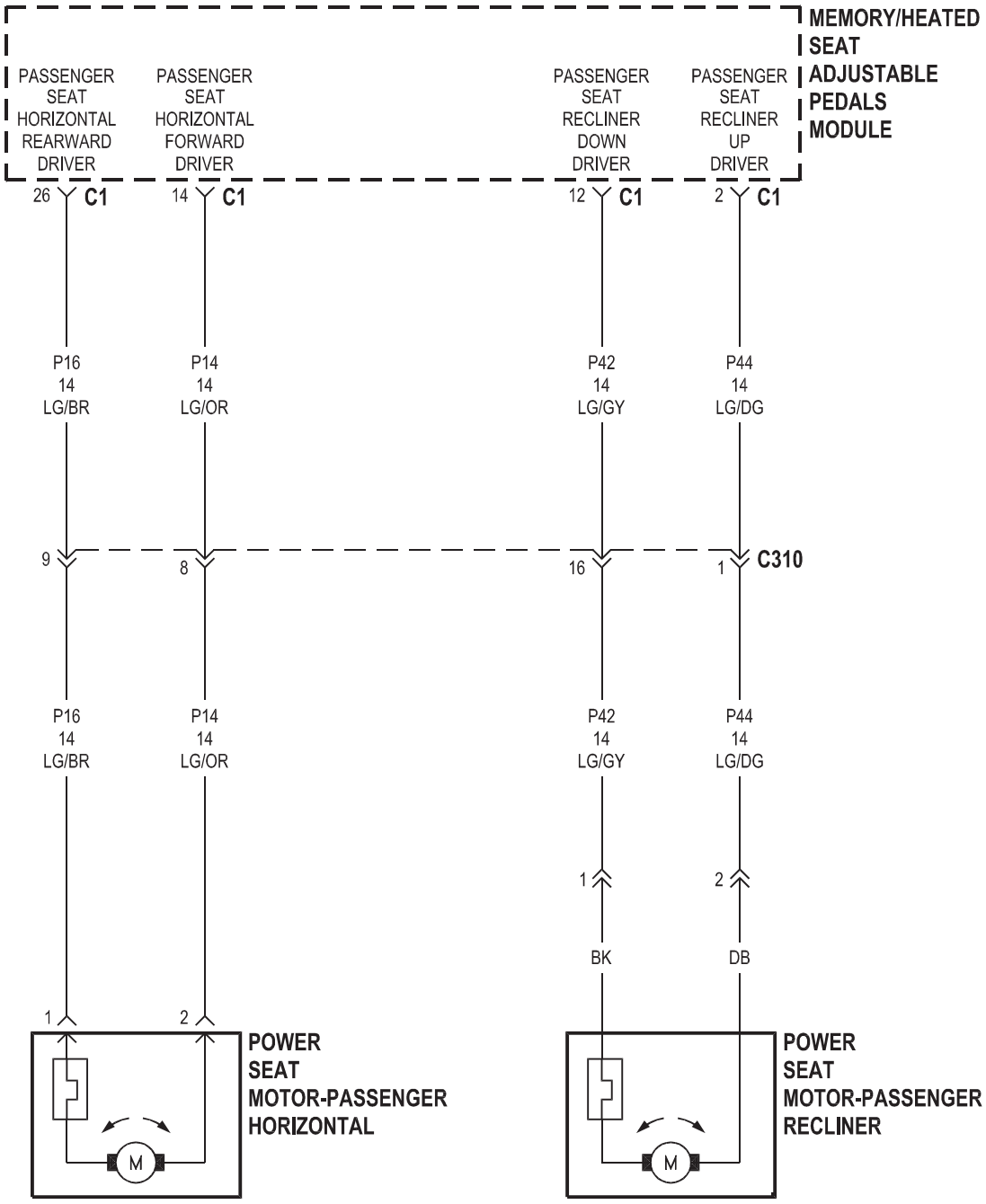

DOOR MODULE-DRIVER
MEMORY SET SWITCH INDICATOR DRIVER
SEAT SWITCH MUX RETURN
ILLUMINATION GROUND
DRIVER DOOR SWITCH ILLUMINATION DRIVER
DRIVER SEAT RECLINER/LUMBAR OUT SWITCH MUX
DRIVER SEAT HORIZONTAL/LUMBAR IN SWITCH MUX
DRIVER SEAT FRONT RISER/PEDAL FORWARD SWITCH MUX
MEMORY SELECT SWITCH MUX
DRIVER SEAT REAR RISER/PEDAL BACK SWITCH MUX
1 C2
4 C2
5 C2
6 C2
7 C2
8 C2
9 C2
11 C2
12 C2
P101 20 LG/WT
P989 20 TN/LG
Z301 20 TN/BK
P301 20 LG/OR
P311 20 LG/VT
P309 20 LG/VT
P200 20 LG/YL
G200 20 VT/BR
P202 20 LG/DB
1
4
5
6
7
8
9
11
12
MEMORY SET SWITCH INDICATOR DRIVER
SEAT SWITCH MUX RETURN
ILLUMINATION GROUND
DRIVER DOOR SWITCH ILLUMINATION DRIVER
DRIVER/SEAT RECLINER/LUMBAR OUT SWITCH MUX
DRIVER SEAT HORIZONTAL/LUMBAR IN SWITCH MUX
DRIVER SEAT FRONT RISER/PEDAL FORWARD SWITCH MUX
MEMORY SELECT SWITCH MUX
DRIVER SEAT REAR RISER/PEDAL BACK SWITCH
POWER SEAT SWITCH-DRIVER


BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
FUSE 8 40A
(8W-13-16)
15 C8
A110 12 DG/RD
1
CIRCUIT BREAKER-POWER SEAT (25A)
(8W-13-16)
2
A210 14 OR/RD
1 C4
FUSED B(+)
DOOR MODULE-DRIVER
(8W-60-2)
(8W-63-2)
PCI BUS
15 C3
D25 20 WT/VT
12 C301
D25 20 WT/VT
2 DATA LINK CONNECTOR
(8W-18-2)
D25 20 WT/VT
S213
(8W-18-3)
D25 20 WT/VT
27 C201
D25 20 WT/VT
S347
(8W-18-5)
D25 20 WT/VT
S353
(8W-18-6)
D25 20 WT/VT
11 C1
PCI BUS
MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE
DRIVER SEAT FRONT DOWN DRIVER
DRIVER SEAT FRONT UP DRIVER
DRIVER SEAT RECLINER DOWN DRIVER
DRIVER SEAT RECLINER UP DRIVER
GROUND
12 C3
5 C3
1 C3
8 C3
2 C4
P121 14 LG/DB
P119 14 LG/DG
P141 14 LG/BR
P143 14 LG/GY
Z849 14 BK/OR
1
2
BK
DB
1
2
POWER SEAT MOTOR-DRIVER FRONT RISER
POWER SEAT MOTOR-DRIVER RECLINER
M
M
G301
(8W-15-11)

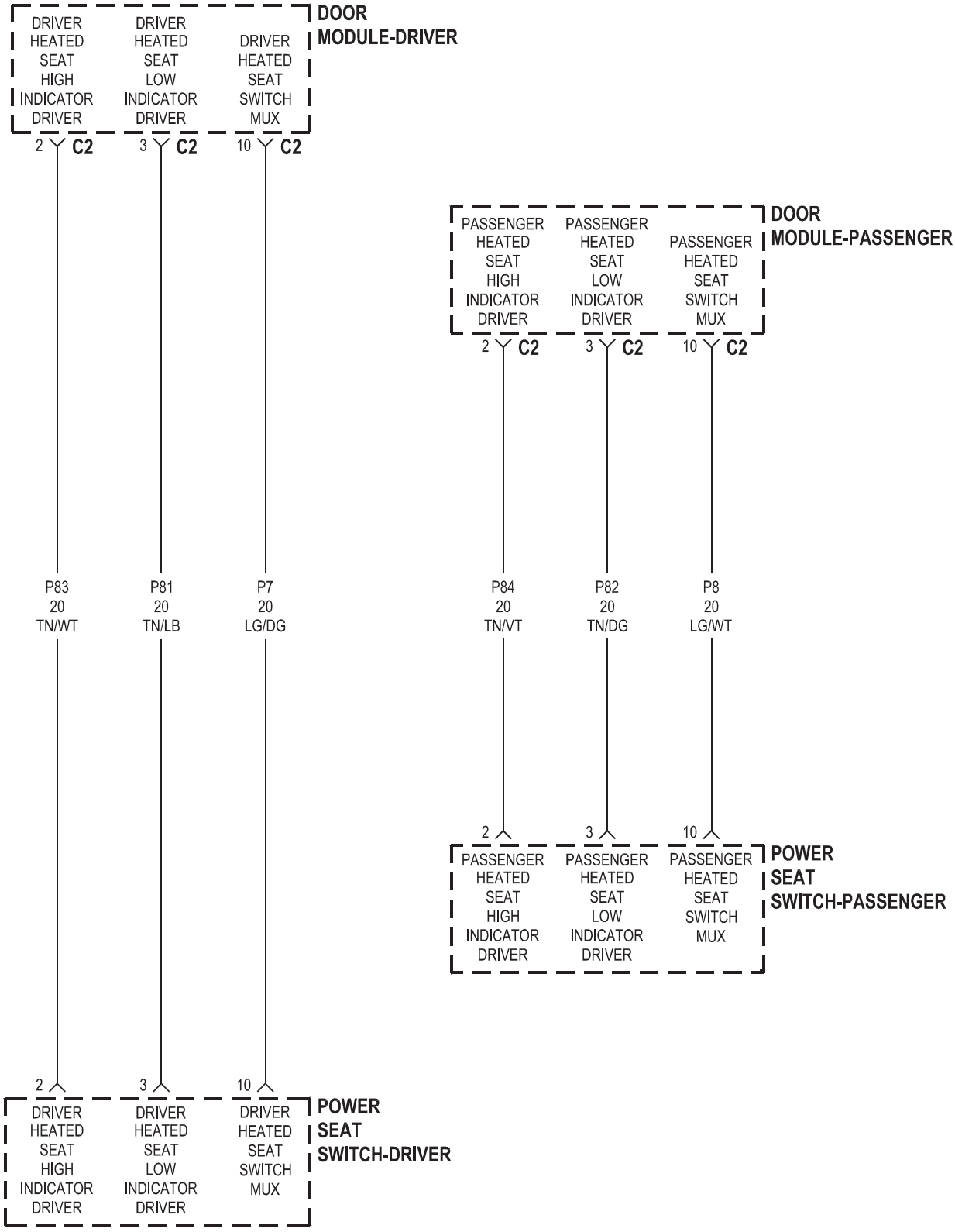

MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE
DRIVER SEAT HORIZONTAL REARWARD DRIVER
DRIVER SEAT HORIZONTAL FORWARD DRIVER
DRIVER SEAT REAR DOWN DRIVER
DRIVER SEAT REAR UP DRIVER
DRIVER SEAT LUMBAR IN DRIVER
DRIVER SEAT LUMBAR OUT DRIVER
3 C3
2 C3
11 C3
4 C3
10 C3
9 C3
P107 18 LG/WT
P105 18 LG
1
2 C316
P117 14 LG/LB
P115 14 LG/OR
P113 14 LG/VT
P111 14 LG/YL
P107 18 DB
P105 18 PK
POWER SEAT MOTOR-DRIVER LUMBAR
POWER SEAT MOTOR-DRIVER REAR RISER
POWER SEAT MOTOR-DRIVER HORIZONTAL
M
LUMBAR SEAT ADJUSTER


S356
P29
20
LG/WT
SEAT
POSITION
SENSOR-DRIVER
FRONT
RISER
SEAT
POSITION
SENSOR-DRIVER
HORIZONTAL
SEAT
POSITION
SENSOR-DRIVER
REAR
RISER
SEAT
POSITION
SENSOR-DRIVER
RECLINER
C
BK
WT
GY
B
A
P28
20
LG/BR
S355
P26
20
LG
P27
20
LG/DB
P25
20
LG/VT
P47
20
LG/LB
11 C2
5 C2
6 C2
3 C2
4 C2
12 C2
DRIVER SEAT POSITION SENSOR 5 VOLT SUPPLY
DRIVER SEAT FRONT RISER POSITION SIGNAL
DRIVER SEAT REAR RISER POSITION SIGNAL
DRIVER SEAT HORIZONTAL POSITION SIGNAL
DRIVER SEAT RECLINER POSITION SIGNAL
DRIVER SEAT POSITION SENSOR GROUND
MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE

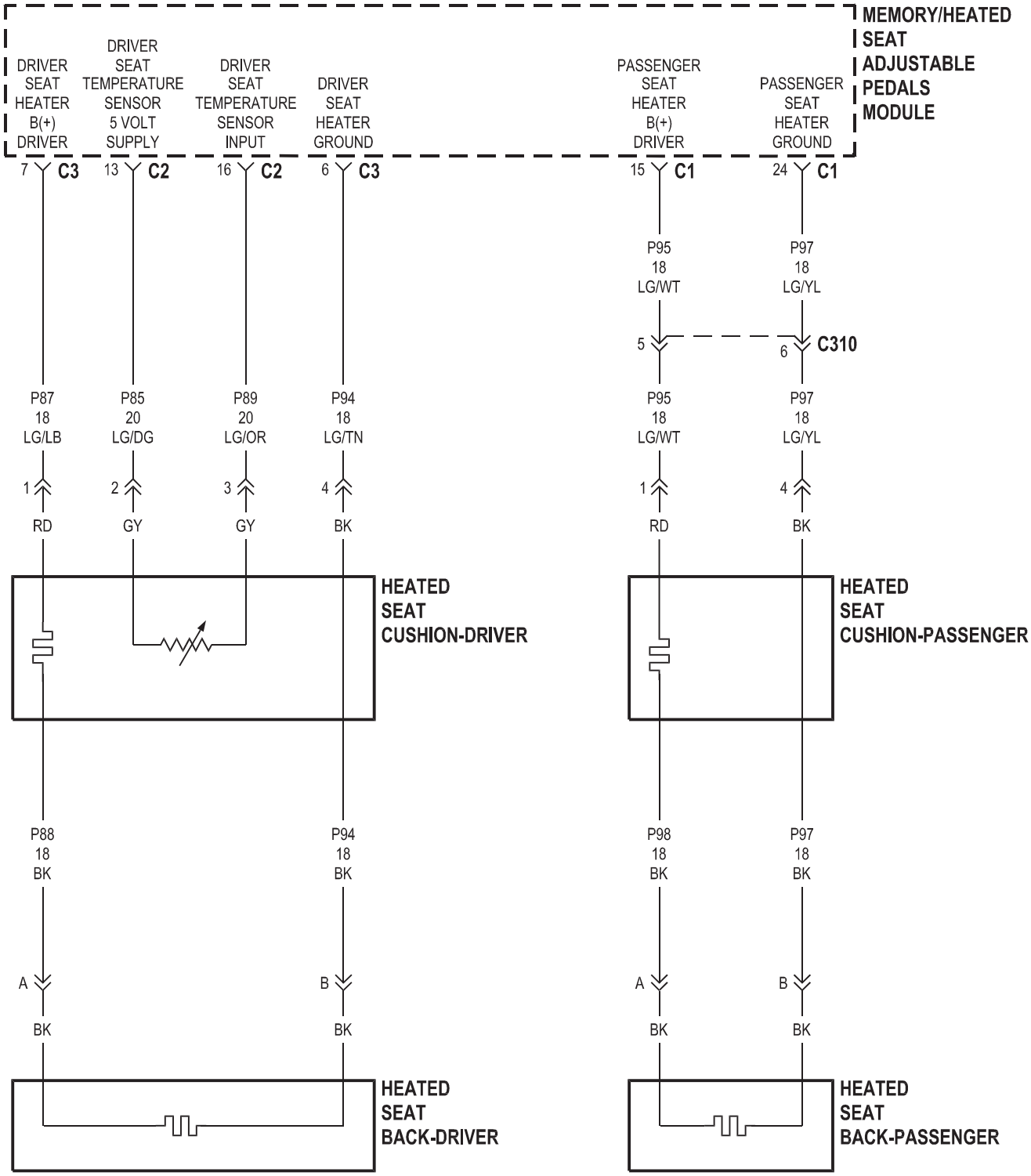

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
RUN RELAY
(8W-13-11)
87
87A
B(+)
RUN RELAY
FUSE 3 30A
(8W-13-12)
FUSE 46 20A
(8W-13-12)
8 C4
A214 18 RD/LB
5
A214 18 RD/LB
2 C1
FUSED B(+)
FROM INTEGRATED POWER MODULE
(8W-63-2)
A
F516 12 PK
8
F516 12 PK
7 C1
FUSED DOOR NODE RELAY OUTPUT
MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE
(8W-56-2)
(8W-63-4)
PCI BUS
11 C1
D25 20 WT/VT
2 DATA LINK CONNECTOR
(8W-18-2)
D25 20 WT/VT
S213
(8W-18-3)
D25 20 WT/VT
27 C201
D25 20 WT/VT
S347
(8W-18-5)
D25 20 WT/VT
S353
(8W-18-6)
D25 20 WT/VT
12 C304
D25 20 WT/VT
15 C3
PCI BUS
DOOR MODULE-PASSENGER
GROUND
SEAT SWITCH MUX RETURN
ILLUMINATION GROUND
PASSENGER DOOR SWITCH ILLUMINATION DRIVER
PASSENGER SEAT RECLINER SWITCH MUX
PASSENGER SEAT HORIZONTAL SWITCH MUX
14 C1
4 C2
5 C2
6 C2
7 C2
8 C2
Z822 12 BK/BR
P988 20 LG/TN
Z302 20 LG/BK
P302 20 TN/OR
P308 20 LG/VT
P310 20 LG/OR
4
5
6
7
8
14 C304
Z822 12 BK/BR
G301
(8W-15-11)
SEAT SWITCH MUX RETURN
ILLUMINATION GROUND
PASSENGER DOOR SWITCH ILLUMINATION DRIVER
PASSENGER SEAT RECLINER SWITCH MUX
PASSENGER SEAT HORIZONTAL SWITCH MUX
POWER SEAT SWITCH-PASSENGER


MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE
PASSENGER SEAT HORIZONTAL REARWARD DRIVER
PASSENGER SEAT HORIZONTAL FORWARD DRIVER
PASSENGER SEAT RECLINER DOWN DRIVER
PASSENGER SEAT RECLINER UP DRIVER
26 C1
14 C1
12 C1
2 C1
P16 14 LG/BR
P14 14 LG/OR
P42 14 LG/GY
P44 14 LG/DG
9
8
16
1
C310
P16 14 LG/BR
P14 14 LG/OR
P42 14 LG/GY
P44 14 LG/DG
1
2
BK
DB
1
2
M
POWER SEAT MOTOR-PASSENGER HORIZONTAL
M
POWER SEAT MOTOR-PASSENGER RECLINER

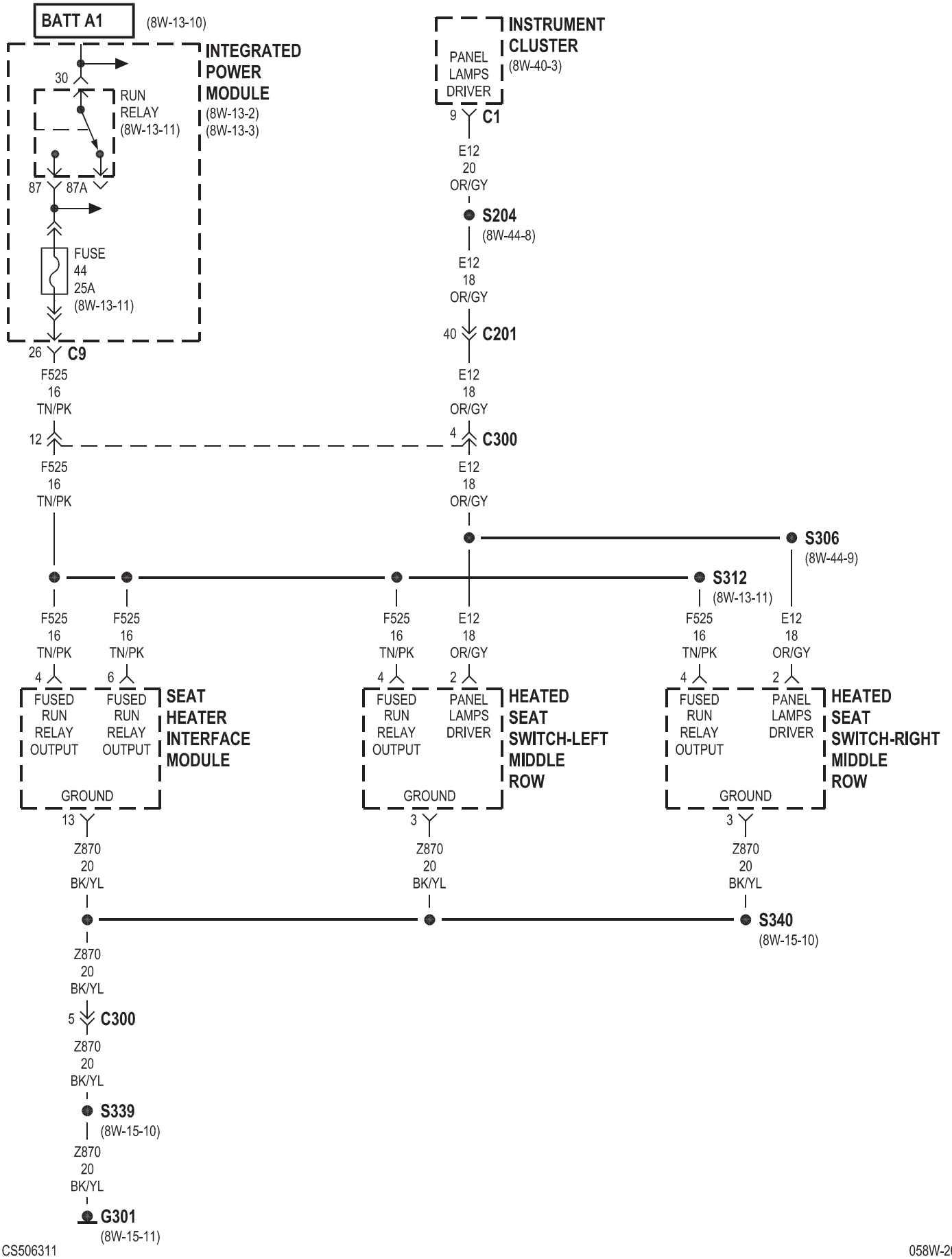
HEATED SEATS-FRONT ROW



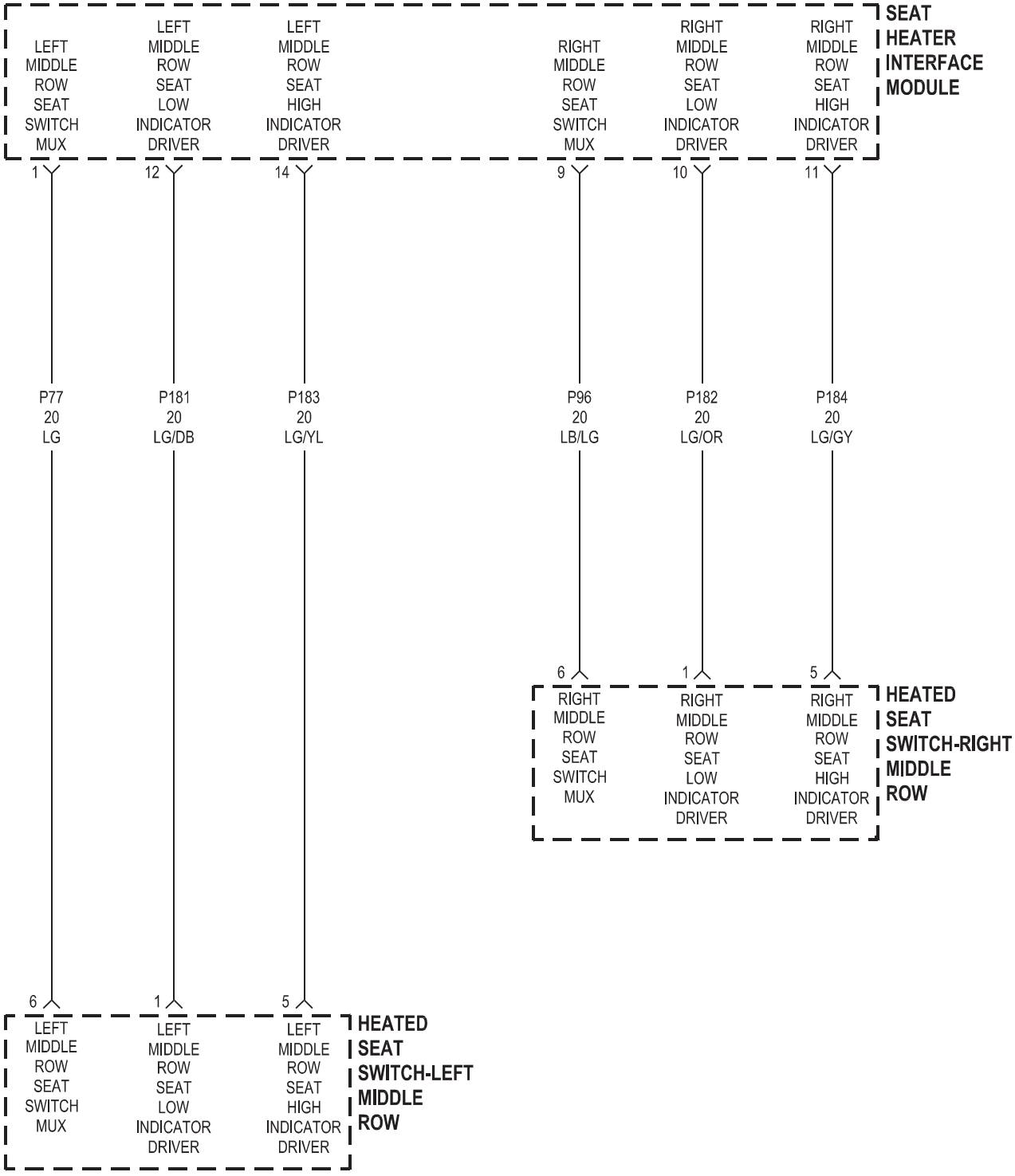
HEATED SEATS-FRONT ROW



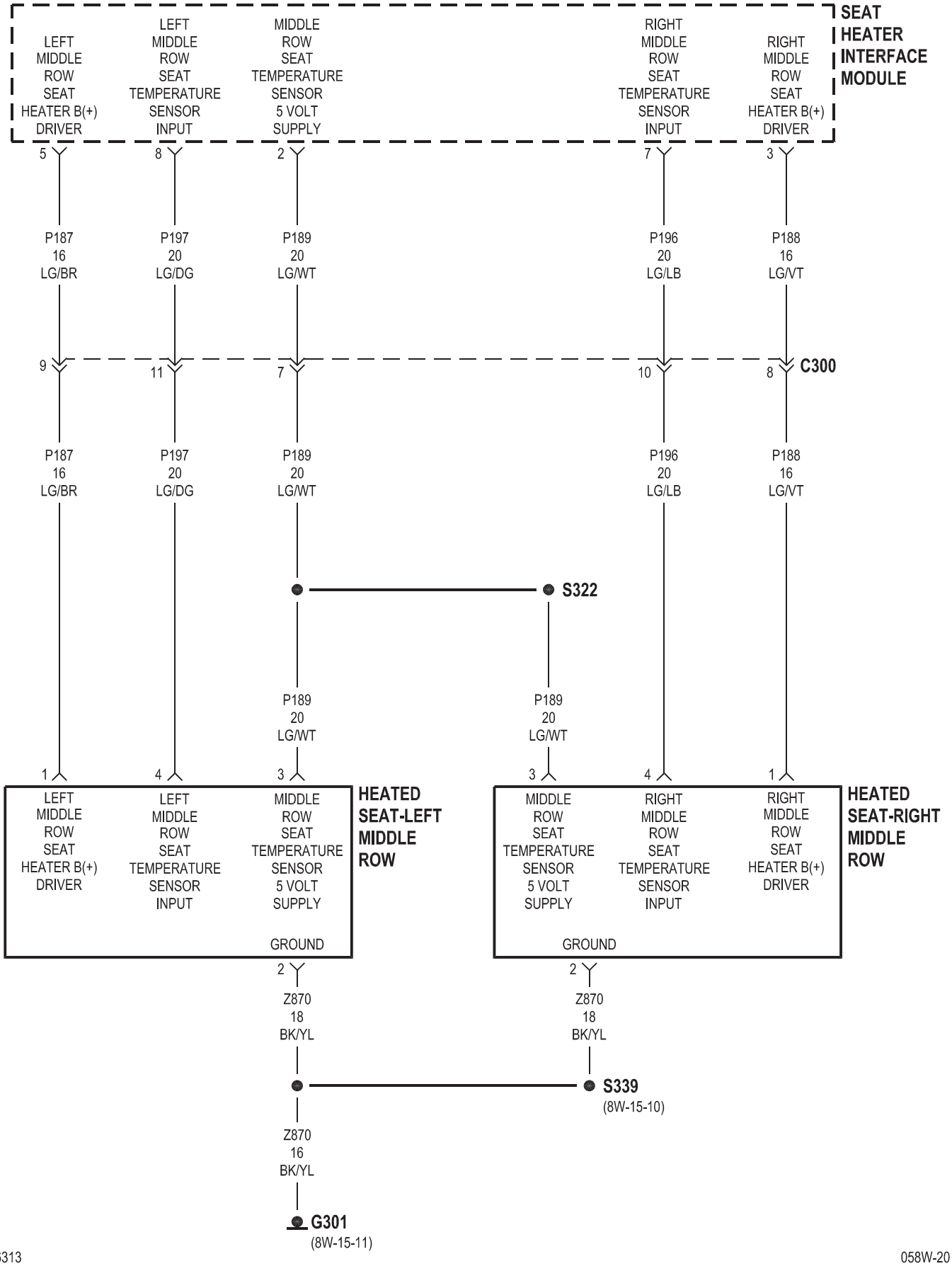
HEATED SEATS-MIDDLE ROW



HEATED SEATS-MIDDLE ROW

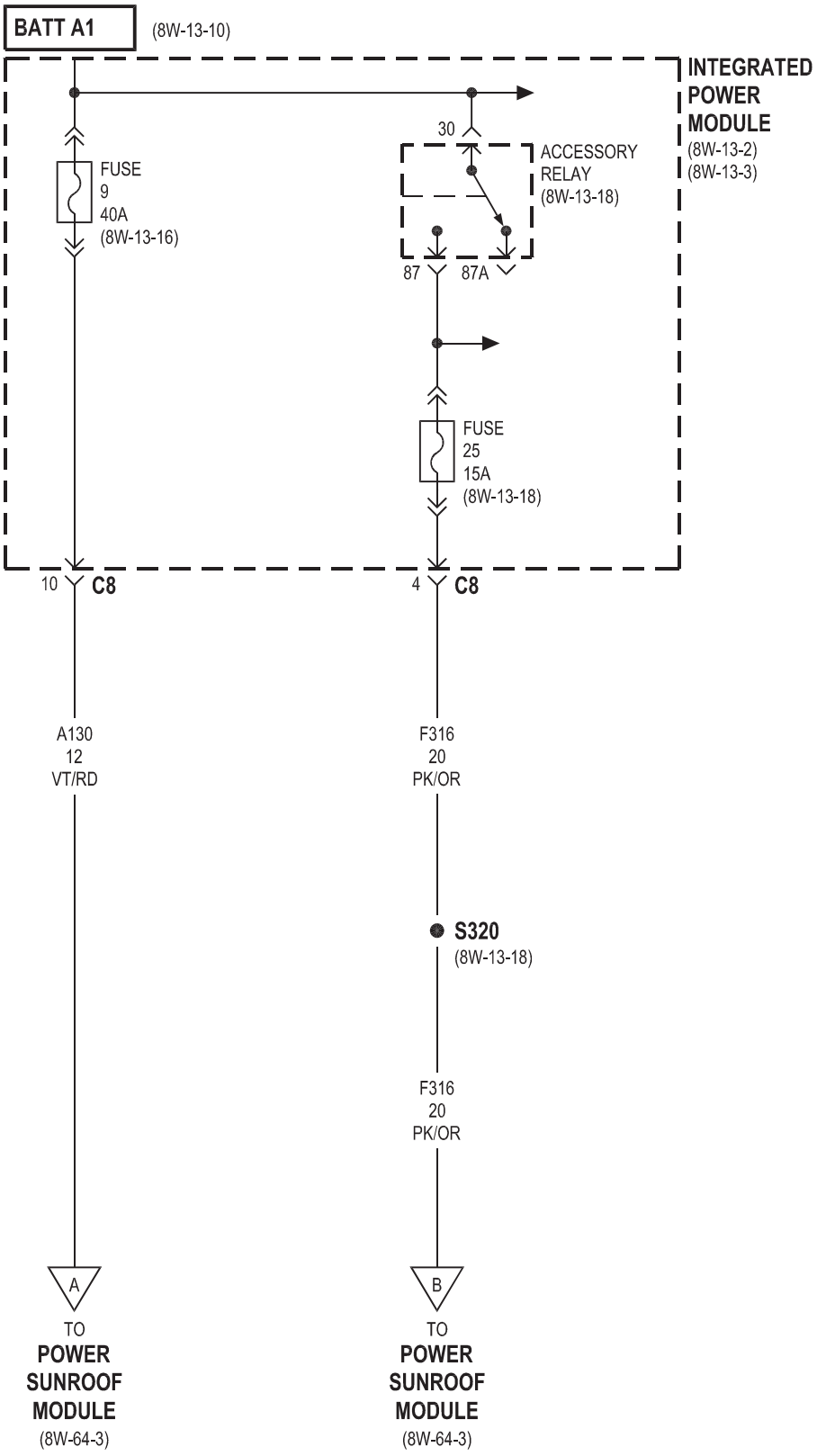


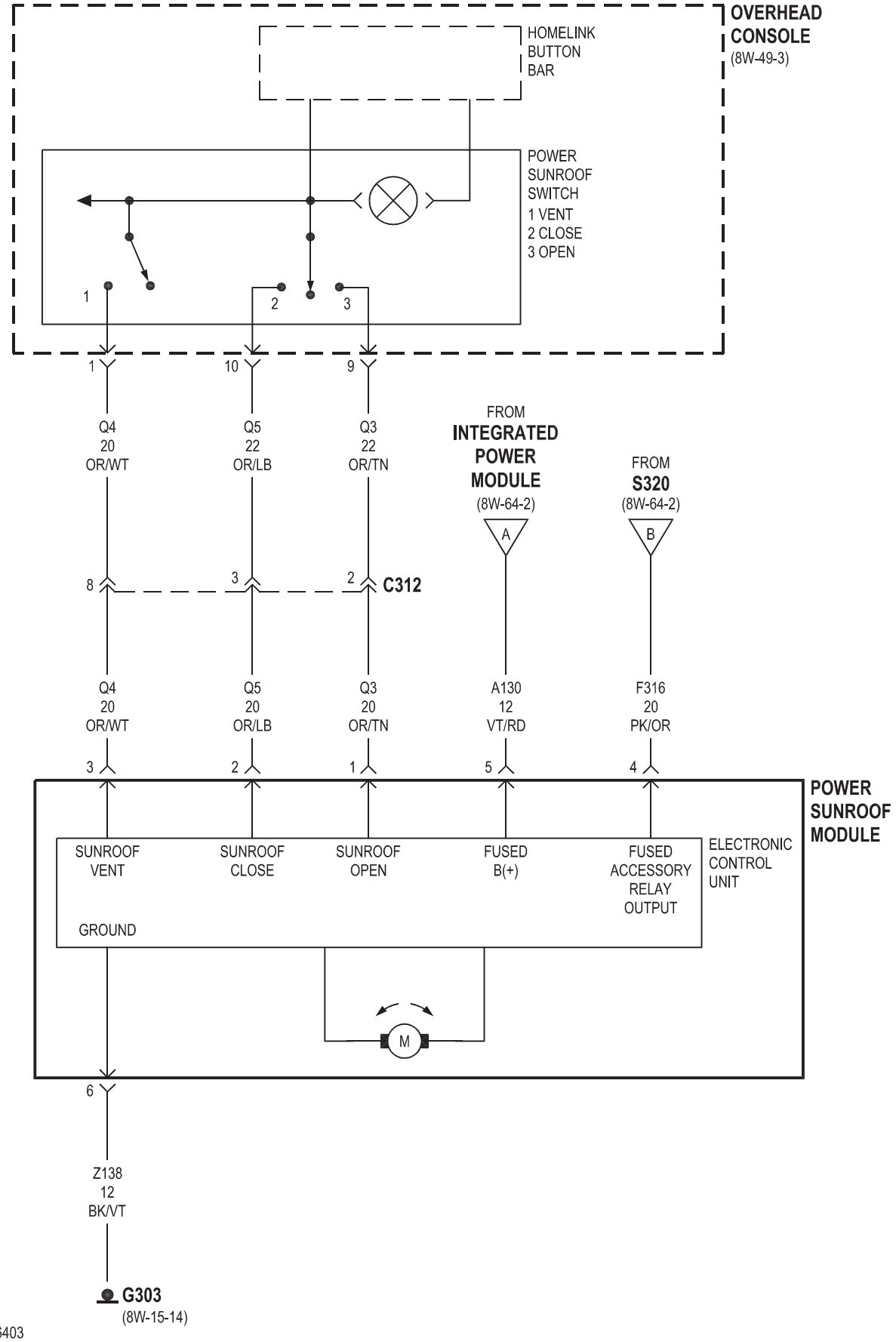
HEATED SEATS-MIDDLE ROW



8W-64 POWER SUNROOF

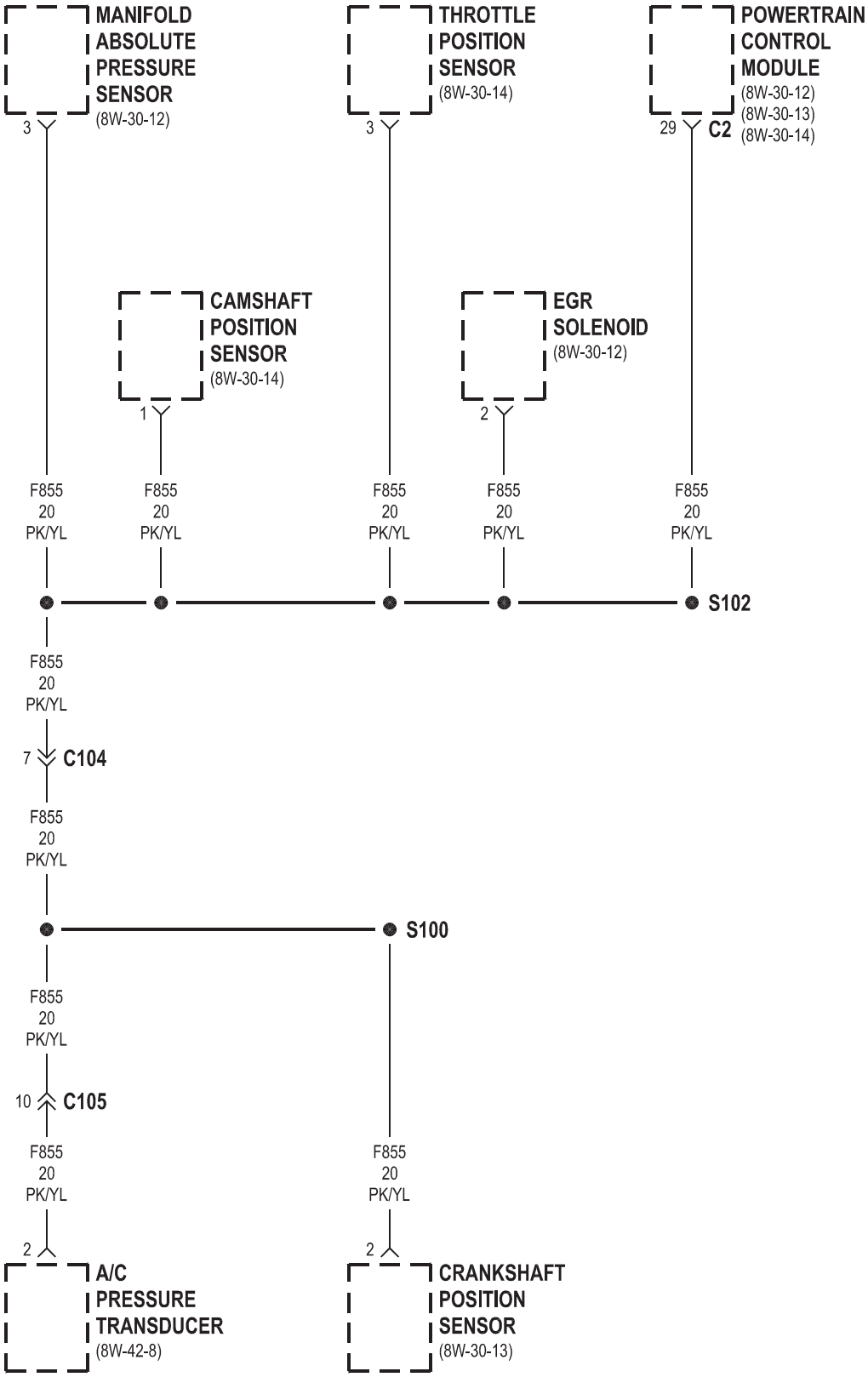
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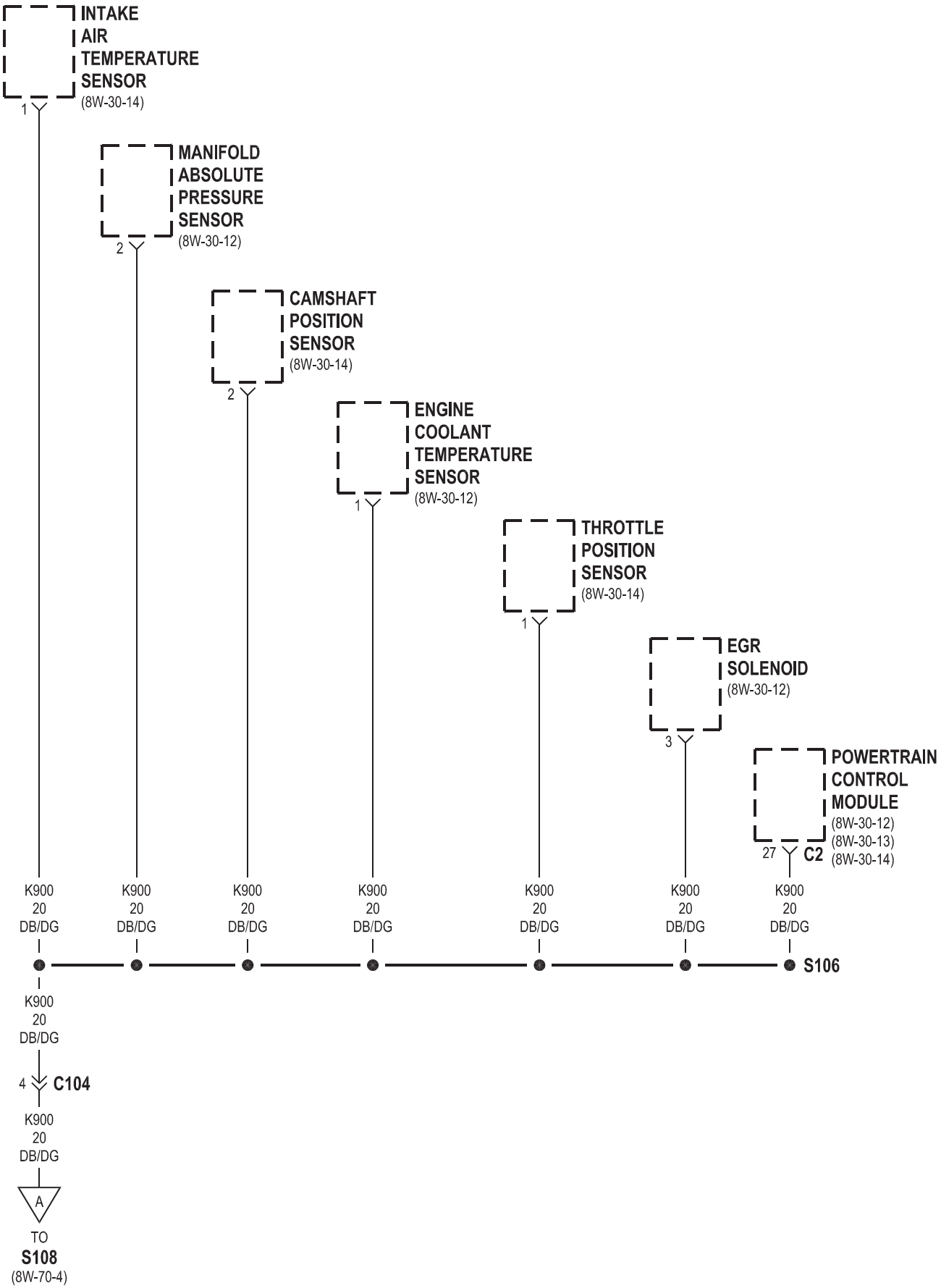

BATT A1
(8W-13-10)
INTEGRATED POWER MODULE
(8W-13-2)
(8W-13-3)
30
ACCESSORY RELAY
(8W-13-18)
FUSE
9
40A
(8W-13-16)
87
87A
FUSE
25
15A
(8W-13-18)
10
C8
4
C8
A130
12
VT/RD
F316
20
PK/OR
S320
(8W-13-18)
F316
20
PK/OR
A
B
TO
POWER SUNROOF MODULE
(8W-64-3)
TO
POWER SUNROOF MODULE
(8W-64-3)

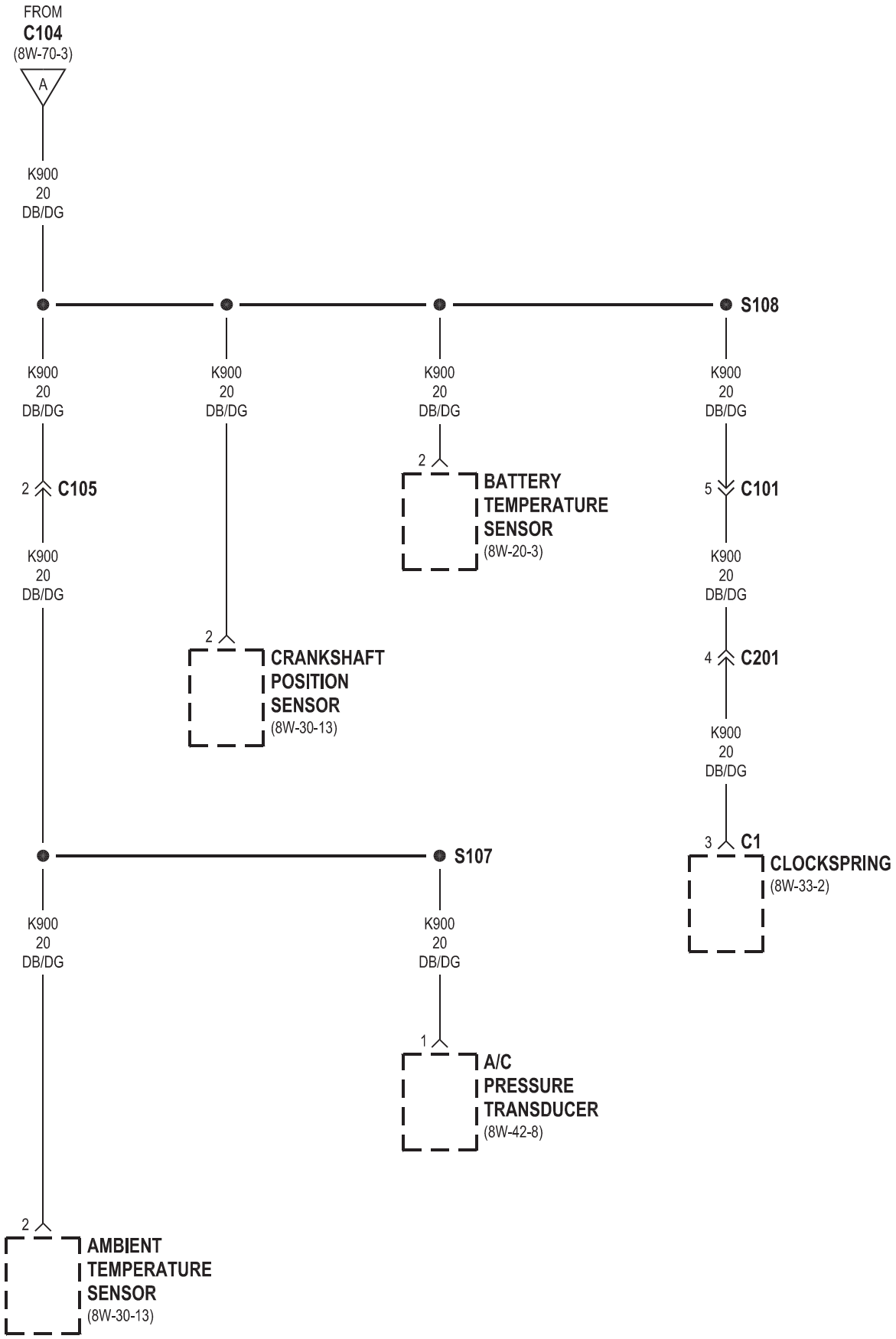

OVERHEAD CONSOLE
(8W-49-3)
HOMELINK BUTTON BAR
POWER SUNROOF SWITCH
1 VENT
2 CLOSE
3 OPEN
1
2
3
1
10
9
Q4 20 OR/WT
Q5 22 OR/LB
Q3 22 OR/TN
FROM INTEGRATED POWER MODULE
(8W-64-2)
A
FROM S320
(8W-64-2)
B
8
3
2
C312
Q4 20 OR/WT
Q5 20 OR/LB
Q3 20 OR/TN
A130 12 VT/RD
F316 20 PK/OR
3
2
1
5
4
POWER SUNROOF MODULE
SUNROOF VENT
SUNROOF CLOSE
SUNROOF OPEN
FUSED B(+)
FUSED ACCESSORY RELAY OUTPUT
ELECTRONIC CONTROL UNIT
GROUND
M
6
Z138 12 BK/VT
G303
(8W-15-14)

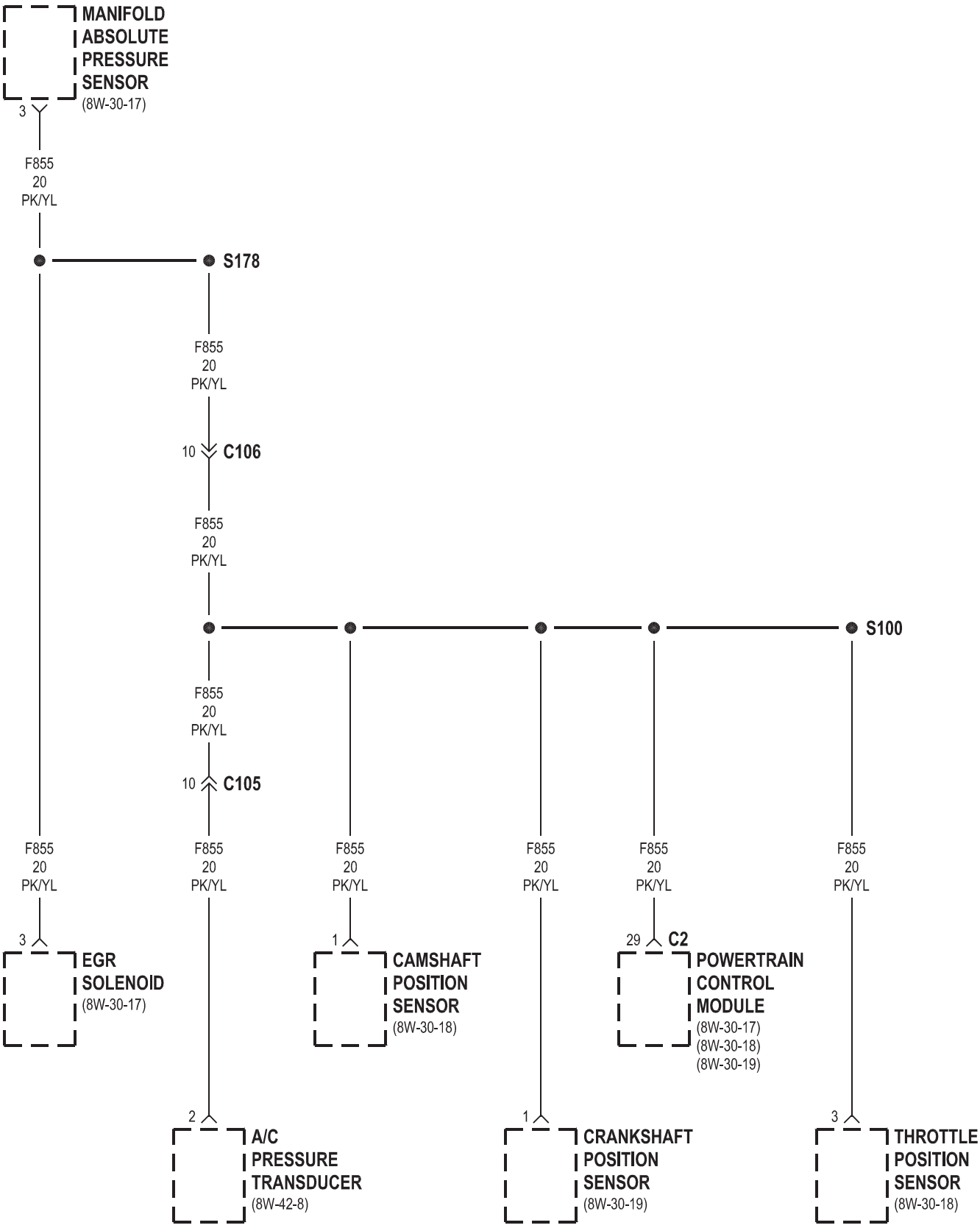
8W-70 SPLICE INFORMATION

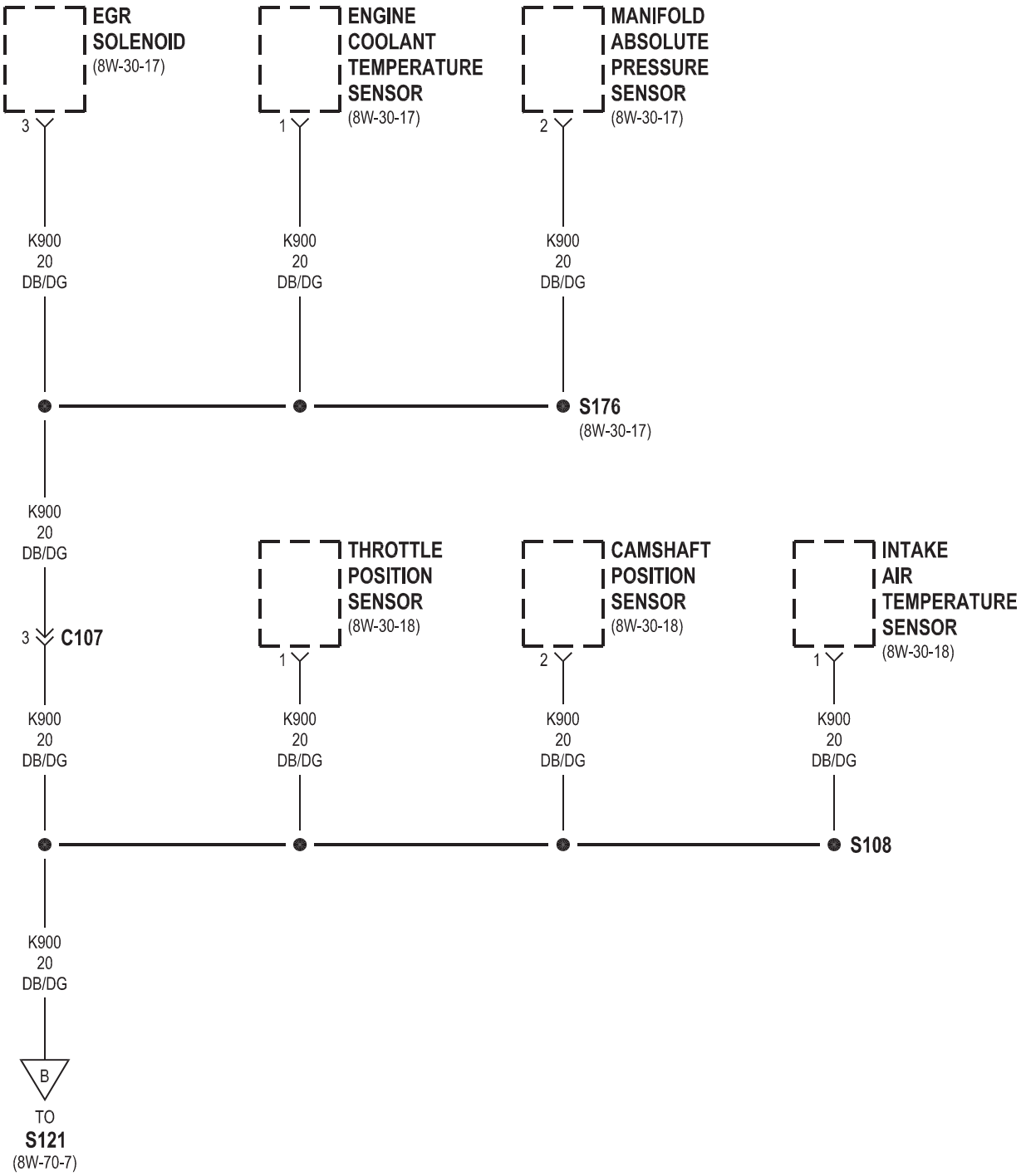
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S111	8W-31-4
S112	8W-13-19
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S116	8W-15-3
S117	8W-13-23
S118	8W-13-23
S119	8W-13-22
S120	8W-42-9
S121	8W-70-7
S176	8W-30-17
S177	8W-13-24
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S207	8W-53-4
S211	8W-47-9, 11
S213	8W-18-3
S302	8W-13-12
S303	8W-13-13
S305	8W-18-7
S306	8W-44-9
S307	8W-13-27
S308	8W-13-31
S312	8W-13-11
S313	8W-61-7
S314	8W-51-4
S315	8W-13-33
S320	8W-13-18
S322	8W-63-13
S323	8W-61-3
S324	8W-61-2
S325	8W-61-3
S326	8W-61-2
S327	8W-47-6
S328	8W-47-6
S329	8W-47-6
S330	8W-47-6
S334	8W-61-4
S336	8W-61-3
S337	8W-61-8
S338	8W-61-7
S339	8W-15-10
S340	8W-15-10
S342	8W-13-18
S343	8W-44-5
S344	8W-44-5
S345	8W-15-15
S346	8W-15-8
S347	8W-18-5
S348	8W-47-12
S349	8W-47-12
S351	8W-13-30
S352	8W-13-30
S353	8W-18-6
S354	8W-13-14
S355	8W-63-6
S356	8W-63-6
S357	8W-42-3
S383	8W-56-5
S384	8W-56-4

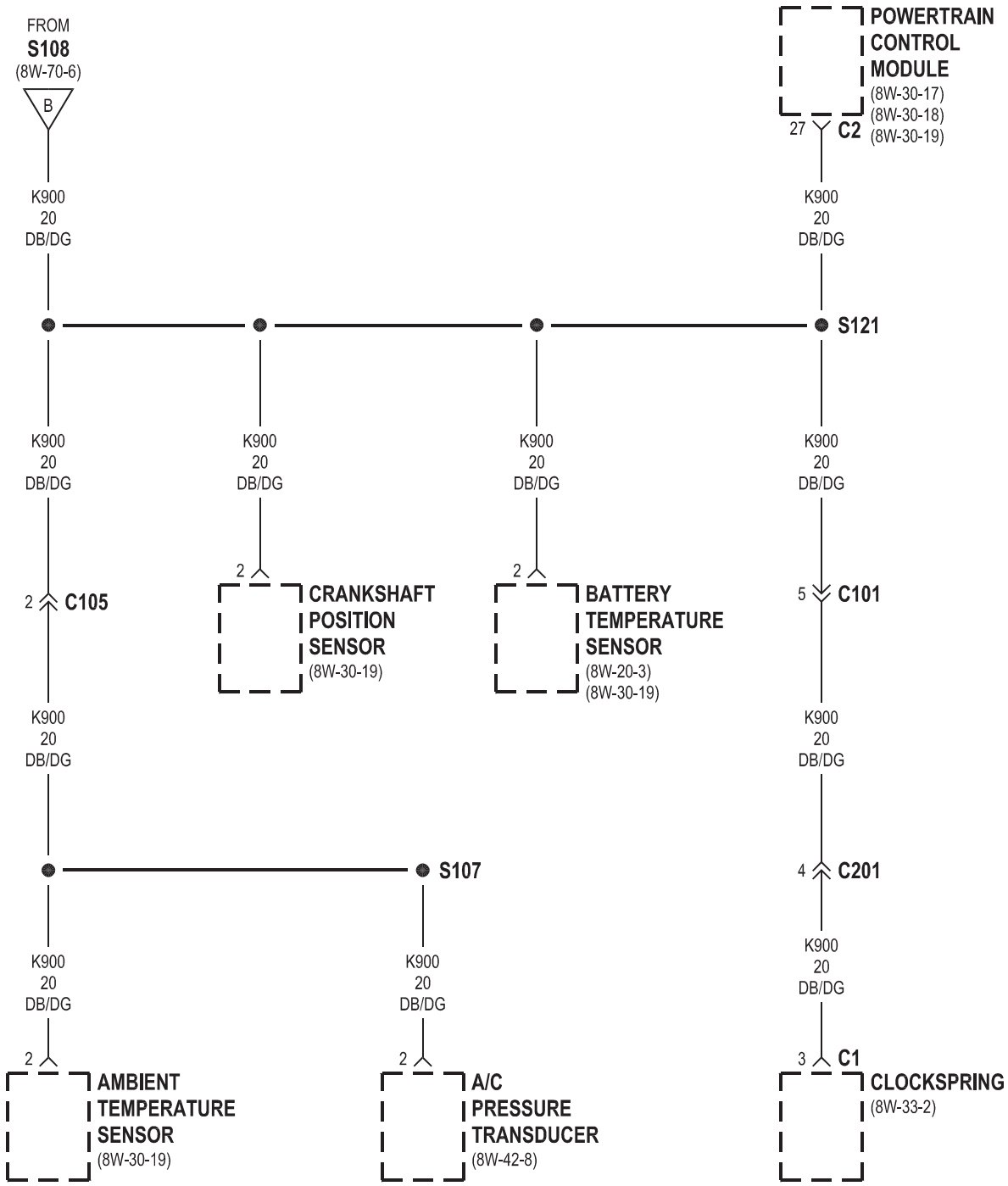

MANIFOLD ABSOLUTE PRESSURE SENSOR
(8W-30-12)
3
THROTTLE POSITION SENSOR
(8W-30-14)
3
POWERTRAIN CONTROL MODULE
(8W-30-12)
(8W-30-13)
(8W-30-14)
29
C2
CAMSHAFT POSITION SENSOR
(8W-30-14)
1
EGR SOLENOID
(8W-30-12)
2
F855
20
PK/YL
S102
7
C104
S100
10
C105
2
A/C PRESSURE TRANSDUCER
(8W-42-8)
CRANKSHAFT POSITION SENSOR
(8W-30-13)


INTAKE AIR TEMPERATURE SENSOR (8W-30-14)
1
MANIFOLD ABSOLUTE PRESSURE SENSOR (8W-30-12)
2
CAMSHAFT POSITION SENSOR (8W-30-14)
2
ENGINE COOLANT TEMPERATURE SENSOR (8W-30-12)
1
THROTTLE POSITION SENSOR (8W-30-14)
1
EGR SOLENOID (8W-30-12)
3
POWERTRAIN CONTROL MODULE (8W-30-12) (8W-30-13) (8W-30-14)
27 C2
K900 20 DB/DG
S106
K900 20 DB/DG
4 C104
K900 20 DB/DG
A
TO S108 (8W-70-4)


FROM
C104
(8W-70-3)
A
K900
20
DB/DG
S108
2
C105
5
C101
4
C201
3
C1
CLOCKSPRING
(8W-33-2)
BATTERY
TEMPERATURE
SENSOR
(8W-20-3)
CRANKSHAFT
POSITION
SENSOR
(8W-30-13)
S107
A/C
PRESSURE
TRANSDUCER
(8W-42-8)
AMBIENT
TEMPERATURE
SENSOR
(8W-30-13)


MANIFOLD ABSOLUTE PRESSURE SENSOR
(8W-30-17)
3
F855 20 PK/YL
S178
F855 20 PK/YL
10 C106
F855 20 PK/YL
S100
F855 20 PK/YL
10 C105
F855 20 PK/YL
3 EGR SOLENOID
(8W-30-17)
F855 20 PK/YL
2 A/C PRESSURE TRANSDUCER
(8W-42-8)
F855 20 PK/YL
1 CAMSHAFT POSITION SENSOR
(8W-30-18)
F855 20 PK/YL
1 CRANKSHAFT POSITION SENSOR
(8W-30-19)
F855 20 PK/YL
29 C2
POWERTRAIN CONTROL MODULE
(8W-30-17)
(8W-30-18)
(8W-30-19)
F855 20 PK/YL
3 THROTTLE POSITION SENSOR
(8W-30-18)


EGR SOLENOID
(8W-30-17)
3
ENGINE COOLANT TEMPERATURE SENSOR
(8W-30-17)
1
MANIFOLD ABSOLUTE PRESSURE SENSOR
(8W-30-17)
2
K900 20 DB/DG
K900 20 DB/DG
K900 20 DB/DG
S176
(8W-30-17)
K900 20 DB/DG
3 C107
THROTTLE POSITION SENSOR
(8W-30-18)
1
CAMSHAFT POSITION SENSOR
(8W-30-18)
2
INTAKE AIR TEMPERATURE SENSOR
(8W-30-18)
1
K900 20 DB/DG
K900 20 DB/DG
K900 20 DB/DG
K900 20 DB/DG
S108
K900 20 DB/DG
B
TO
S121
(8W-70-7)


FROM
S108
(8W-70-6)
B
K900
20
DB/DG
POWERTRAIN
CONTROL
MODULE
(8W-30-17)
(8W-30-18)
(8W-30-19)
27
C2
S121
2
C105
2
CRANKSHAFT
POSITION
SENSOR
(8W-30-19)
2
BATTERY
TEMPERATURE
SENSOR
(8W-20-3)
(8W-30-19)
5
C101
S107
4
C201
2
AMBIENT
TEMPERATURE
SENSOR
(8W-30-19)
2
A/C
PRESSURE
TRANSDUCER
(8W-42-8)
3
C1
CLOCKSPRING
(8W-33-2)

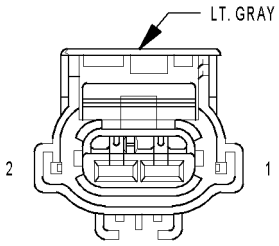
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C100	8W-80-17
C101	8W-80-17
C101	8W-80-18
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C102	8W-80-18
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C104	8W-80-19
C105	8W-80-19
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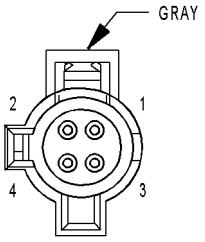
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Power Sunroof Module	8W-80-79
Power Window Motor-Driver	8W-80-80
Power Window Motor-Driver Rear	8W-80-80
Power Window Motor-Passenger	8W-80-80
Power Window Motor-Passenger Rear	8W-80-81
Power Window Switch-Driver Rear	8W-80-81
Power Window Switch-Passenger Rear	8W-80-81
Powertrain Control Module C1	8W-80-82
Powertrain Control Module C2	8W-80-83
Powertrain Control Module C3	8W-80-84
Powertrain Control Module C4	8W-80-85
Radiator Fan Motor No. 1	8W-80-86
Radiator Fan Motor No. 2	8W-80-86
Radiator Fan Relay	8W-80-86
Radio (Base)	8W-80-87
Radio C1 (Except Base)	8W-80-87
Radio C2 (DVD/CD Changer)	8W-80-88
Radio C2 (Satellite Radio)	8W-80-88
Reading Lamp-Front	8W-80-88
Reading/Courtesy Lamp-Left Middle	8W-80-89
Reading/Courtesy Lamp-Left Rear	8W-80-89
Reading/Courtesy Lamp-Right Middle	8W-80-89
Reading/Courtesy Lamp-Right Rear	8W-80-89
Rear Booster Fan Power Module C1	8W-80-90
Rear Booster Fan Power Module C2	8W-80-90
Rear Booster Fan Rear Control Switch	8W-80-90
Rear View Mirror	8W-80-90
Recirculation Door Actuator	8W-80-91
Remote Radio Switch-Left	8W-80-91
Remote Radio Switch-Right	8W-80-91
Satellite Radio Multiplexer C1	8W-80-92
Satellite Radio Multiplexer C2	8W-80-92
Satellite Radio Receiver	8W-80-93
Seat Belt Switch-Driver	8W-80-93
Seat Belt Tensioner-Driver	8W-80-93
Seat Belt Tensioner-Passenger	8W-80-93
Seat Heater Interface Module	8W-80-94
Seat Position Sensor-Driver Front Riser	8W-80-94
Seat Position Sensor-Driver Horizontal	8W-80-94
Seat Position Sensor-Driver Rear Riser	8W-80-94
Seat Position Sensor-Driver Recliner	8W-80-95
Shift Lever Assembly	8W-80-95
Short Runner Valve Solenoid	8W-80-95
SKREEM Module	8W-80-95
Speaker-Center Instrument Panel	8W-80-96
Speaker-Left Front Door Tweeter	8W-80-96
Speaker-Left Front Door Woofer	8W-80-96
Speaker-Left Rear Door	8W-80-96
Speaker-Right Front Door Tweeter	8W-80-97
Speaker-Right Front Door Woofer	8W-80-97
Speaker-Right Rear Door	8W-80-97
Speaker-Subwoofer	8W-80-97
Speed Control Servo	8W-80-98
Speed Control Switch-Left	8W-80-98
Speed Control Switch-Right	8W-80-98
Speed Sensor-Input	8W-80-98
Speed Sensor-Output	8W-80-99
Tail Lamp-Left	8W-80-99
Tail Lamp-Right	8W-80-99
Throttle Position Sensor	8W-80-99
Traction Control Switch	8W-80-100
Trailer Tow Connector	8W-80-100
Transmission Range Sensor	8W-80-100
Transmission Solenoid/Pressure Switch Assembly	8W-80-100
Visor/Vanity Lamp-Left	8W-80-101
Visor/Vanity Lamp-Right	8W-80-101
Washer Fluid Level Switch	8W-80-101
Washer Pump Motor-Front	8W-80-101
Wheel Speed Sensor-Left Front	8W-80-102
Wheel Speed Sensor-Left Rear	8W-80-102
Wheel Speed Sensor-Right Front	8W-80-102
Wheel Speed Sensor-Right Rear	8W-80-103
Wiper Module-Front	8W-80-103
Wiper Module-Rear	8W-80-103
Wiper/Washer Switch	8W-80-104



A/C COMPRESSOR CLUTCH

A/C COMPRESSOR CLUTCH - LT. GRAY 2 WAY

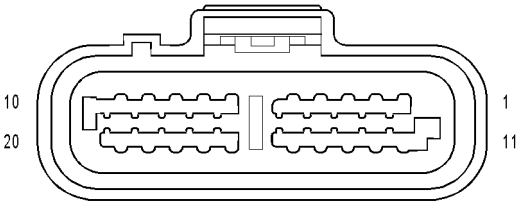
CAV	CIRCUIT	FUNCTION
1	C3 18DB/YL	A/C COMPRESSOR CLUTCH RELAY OUTPUT
2	Z153 18BK/GY	GROUND



A/C PRESSURE TRANSDUCER

A/C PRESSURE TRANSDUCER - GRAY 4 WAY

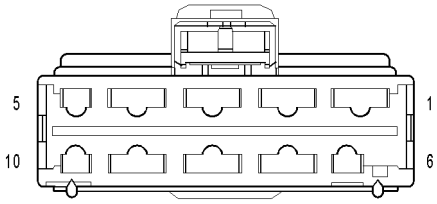
CAV	CIRCUIT	FUNCTION
1	K900 20DB/DG	SENSOR GROUND
2	F855 20PK/YL	5 VOLT SUPPLY
3	C18 20LB/BR	A/C PRESSURE TRANSDUCER SIGNAL
4	-	-



A/C-HEATER CONTROL C1 (MTC)

A/C-HEATER CONTROL C1 (MTC) - 20 WAY

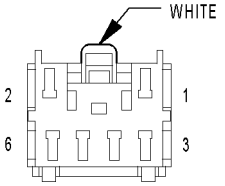
CAV	CIRCUIT	FUNCTION
1	Z24 18BK/OR	GROUND
2	C121 20DB/DG	SENSOR GROUND
3	-	-
4	-	-
5	-	-
6	-	-
7	C32 22DB/TN	RECIRCULATION DOOR DRIVER (A)
8	-	-
9	C34 22DB/LB	COMMON DOOR DRIVER (B)
10	D25 20WT/VT	PCI BUS
11	-	-
12	-	-
13	F504 20GY/PK	FUSED RUN RELAY OUTPUT
14	E12 20OR/GY	PANEL LAMPS DRIVER
15	C21 22DB/LG	EVAPORATOR TEMPERATURE SENSOR SIGNAL
16	C33 22LB/BR	PASSENGER BLEND DOOR DRIVER (A)
17	C61 22DB/LG	DRIVER BLEND DOOR DRIVER (A)
18	C35 22LB/OR	FRONT MODE DOOR DRIVER (A)
19	-	-
20	-	-



A/C-HEATER CONTROL C2 (MTC)

A/C-HEATER CONTROL C2 (MTC) - 10 WAY

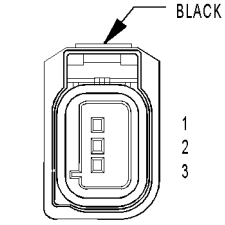
CAV	CIRCUIT	FUNCTION
1	-	-
2	C75 12DB/GY	BLOWER MOTOR HIGH DRIVER
3	C73 14DB/VT	BLOWER MOTOR M2 DRIVER
4	Z134 12BK/LG	GROUND
5	-	-
6	-	-
7	-	-
8	-	-
9	C72 16DB/OR	BLOWER MOTOR M1 DRIVER
10	C71 16DB/BR	BLOWER MOTOR LOW DRIVER



ADJUSTABLE PEDALS MOTOR

ADJUSTABLE PEDALS MOTOR - WHITE 6 WAY

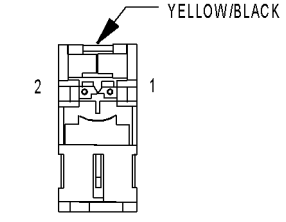
CAV	CIRCUIT	FUNCTION
1	P205 14LG/DB	ADJUSTABLE PEDALS MOTOR FORWARD
2	P206 14LG/TN	ADJUSTABLE PEDALS MOTOR REVERSE
3	-	-
4	-	-
5	-	-
6	-	-



ADJUSTABLE PEDALS SENSOR

ADJUSTABLE PEDALS SENSOR - BLACK 3 WAY

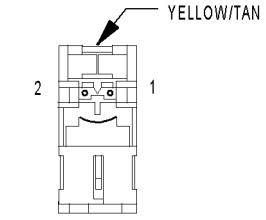
CAV	CIRCUIT	FUNCTION
1	G11 20VT/TN	ADJUSTABLE PEDALS SENSOR FEED
2	G12 22VT/BR	ADJUSTABLE PEDALS SENSOR SIGNAL
3	G912 20VT/WT	ADJUSTABLE PEDALS SENSOR RETURN



AIRBAG SQUIB-DRIVER 1

AIRBAG SQUIB-DRIVER 1 - YELLOW/BLACK 2 WAY

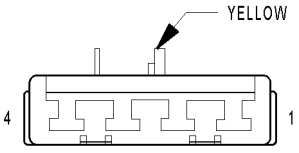
CAV	CIRCUIT	FUNCTION
1	R43 20LG/BR	DRIVER SQUIB 1 LINE 1
2	R45 20LG/OR	DRIVER SQUIB 1 LINE 2



AIRBAG SQUIB-DRIVER 2

AIRBAG SQUIB-DRIVER 2 - YELLOW/TAN 2 WAY

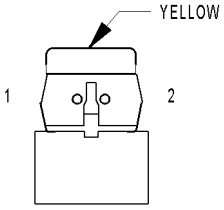
CAV	CIRCUIT	FUNCTION
1	R61 20LG/VT	DRIVER SQUIB 2 LINE 1
2	R63 20LG/WT	DRIVER SQUIB 2 LINE 2



AIRBAG SQUIB-DRIVER KNEE BLOCKER

AIRBAG SQUIB-DRIVER KNEE BLOCKER - YELLOW 4 WAY

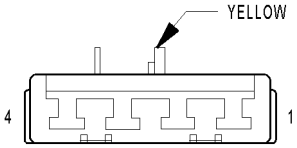
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	R9 20LB/YL	DRIVER KNEE BLOCKER SQUIB LINE 1
4	R11 20DB/LB	DRIVER KNEE BLOCKER SQUIB LINE 2



AIRBAG SQUIB-LEFT CURTAIN

AIRBAG SQUIB-LEFT CURTAIN - YELLOW 2 WAY

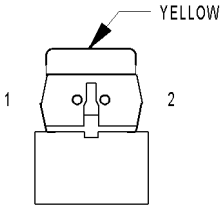
CAV	CIRCUIT	FUNCTION
1	R1 20LB/BR	LEFT CURTAIN SQUIB LINE 1
2	R3 20LB/OR	LEFT CURTAIN SQUIB LINE 2



AIRBAG SQUIB- PASSENGER

AIRBAG SQUIB-PASSENGER - YELLOW 4 WAY

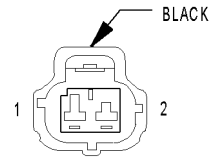
CAV	CIRCUIT	FUNCTION
1	R44 20LB/OR	PASSENGER SQUIB 1 LINE 2
2	R42 20LB/BR	PASSENGER SQUIB 1 LINE 1
3	R64 20LB/TN	PASSENGER SQUIB 2 LINE 1
4	R62 20LG/DB	PASSENGER SQUIB 2 LINE 2



AIRBAG SQUIB- RIGHT CURTAIN

AIRBAG SQUIB-RIGHT CURTAIN - YELLOW 2 WAY

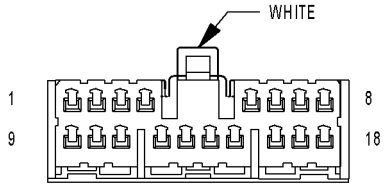
CAV	CIRCUIT	FUNCTION
1	R2 20WT/LB	RIGHT CURTAIN SQUIB LINE 1
2	R4 20OR/LB	RIGHT CURTAIN SQUIB LINE 2



AMBIENT TEMPERATURE SENSOR

AMBIENT TEMPERATURE SENSOR - BLACK 2 WAY

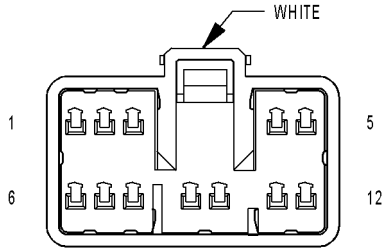
CAV	CIRCUIT	FUNCTION
1	G31 20OR/VT	AAT SIGNAL
2	K900 20DB/DG	SENSOR GROUND



AMPLIFIER C1

AMPLIFIER C1 - WHITE 18 WAY

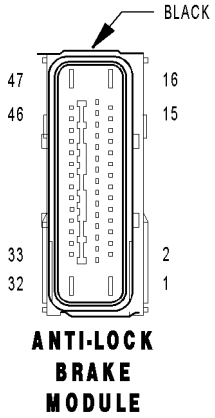
CAV	CIRCUIT	FUNCTION
1	A116 16YL/RD	FUSED B(+)
2	-	-
3	X300 18GY/BR	AMPLIFIED SUBWOOFER 1 (+)
4	X391 18DG/WT	AMPLIFIED SUBWOOFER 2 (-)
5	X205 18GY/LG	AMPLIFIED LEFT REAR DOOR SPEAKER (+)
6	X200 18GY/DB	AMPLIFIED CENTER INSTRUMENT PANEL SPEAKER (+)
7	X202 18DG/VT	AMPLIFIED RIGHT FRONT DOOR SPEAKER (+)
8	X291 18GY/YL	AMPLIFIED LEFT FRONT DOOR SPEAKER (-)
9	A116 16YL/RD	FUSED B(+)
10	-	-
11	X390 18DG/BR	AMPLIFIED SUBWOOFER 1 (-)
12	X301 18GY/WT	AMPLIFIED SUBWOOFER 2 (+)
13	X296 18DG/GY	AMPLIFIED RIGHT REAR DOOR SPEAKER (-)
14	X206 18DG/LG	AMPLIFIED RIGHT REAR DOOR SPEAKER (+)
15	X295 18GY/DG	AMPLIFIED LEFT REAR DOOR SPEAKER (-)
16	X290 18GY/OR	AMPLIFIED CENTER INSTRUMENT PANEL SPEAKER (-)
17	X292 18DG/YL	AMPLIFIED RIGHT FRONT DOOR SPEAKER (-)
18	X201 18GY/VT	AMPLIFIED LEFT FRONT DOOR SPEAKER (+)



AMPLIFIER C2

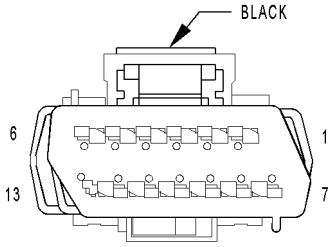
AMPLIFIER C2 - WHITE 12 WAY

CAV	CIRCUIT	FUNCTION
1	X53 20DG	RADIO LEFT AUDIO (+)
2	X55 20DG/BR	RADIO LEFT AUDIO (-)
3	X704 20DG/YL (HANDS FREE)	RIGHT AUDIO OUTPUT
4	Z513 16BK	GROUND
5	F316 20PK/OR	FUSED ACCESSORY RELAY OUTPUT
6	X56 20GY/BR	RADIO RIGHT AUDIO (-)
7	X54 20GY	RADIO RIGHT AUDIO (+)
8	X703 20DG/OR (HANDS FREE)	LEFT AUDIO OUTPUT
9	X400 20GY/WT (NAVIGATION)	NAVIGATION AUDIO (+)
10	X940 20GY/LB (NAVIGATION)	NAVIGATION AUDIO (-)
11	Z516 16BK/GY	GROUND
12	D25 20WT/VT	PCI BUS



ANTI-LOCK BRAKE MODULE - BLACK 47 WAY

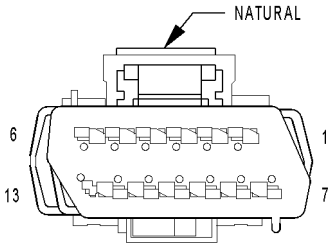
CAV	CIRCUIT	FUNCTION
1	A107 12TN/RD	FUSED B(+) (PUMP)
2	-	-
3	-	-
4	-	-
5	-	-
6	L51 18WT/DG	BRAKE LAMP SWITCH OUTPUT
7	-	-
8	F500 18DG/PK	FUSED RUN RELAY OUTPUT
9	-	-
10	D24 20WT/YL	FLASH ABS
11	D25 20WT/VT	PCI BUS
12	-	-
13	-	-
14	-	-
15	-	-
16	Z127 12BK/DG	GROUND
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-
31	-	-
32	A111 12DG/RD	FUSED B(+) (VALVE)
33	B6 18DG/WT	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
34	B7 18DG/VT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
35	-	-
36	B4 18DG/GY	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
37	B3 18DG/YL	LEFT REAR WHEEL SPEED SENSOR SIGNAL
38	-	-
39	-	-
40	-	-
41	-	-
42	B1 18DG/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL
43	B2 18DG/LB	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
44	-	-
45	B9 18DG/LG	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
46	B8 18DG/TN	LEFT FRONT WHEEL SPEED SENSOR SIGNAL
47	Z107 12BK/LB	GROUND



AUTO TEMP CONTROL C1

AUTO TEMP CONTROL C1 - BLACK 13 WAY

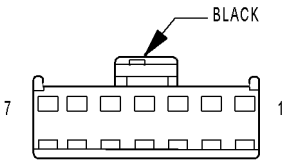
CAV	CIRCUIT	FUNCTION
1	C21 20LG/DB	EVAPORATOR TEMPERATURE SENSOR SIGNAL
2	C121 20DB/DG	SENSOR GROUND
3	E12 18OR/GY	PANEL LAMPS DRIVER
4	A118 20RD/OR	FUSED B(+)
5	F504 20GY/PK	FUSED RUN RELAY OUTPUT
6	D25 20WT/VT	PCI BUS
7	C56 20LB/DB	FRONT BLOWER MOTOR CONTROL
8	C57 22DB/LB	REAR BOOSTER FAN CONTROL
9	C31 22LB/YL	REAR FAN SENSE
10	C11 22LB/OR	REAR FAN SENSE SUPPLY
11	Z24 18BK/OR	GROUND
12	-	-
13	-	-



AUTO TEMP CONTROL C2

AUTO TEMP CONTROL C2 - NATURAL 13 WAY

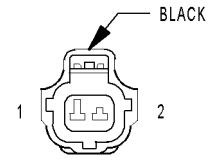
CAV	CIRCUIT	FUNCTION
1	C161 20LB/WT	DRIVER BLEND DOOR DRIVER (B)
2	C61 22DB/LG	DRIVER BLEND DOOR DRIVER (A)
3	C133 22DB/WT	PASSENGER BLEND DOOR DRIVER (B)
4	C33 22LB/BR	PASSENGER BLEND DOOR DRIVER (A)
5	C132 20DB/YL	RECIRCULATION DOOR DRIVER (B)
6	C32 20TN/DB	RECIRCULATION DOOR DRIVER (A)
7	C135 20DB/GY	FRONT MODE DOOR DRIVER (B)
8	C35 22LB/OR	FRONT MODE DOOR DRIVER (A)
9	C153 22DB/BR	REAR MODE DOOR DRIVER (A)
10	C53 22LB	REAR MODE DOOR DRIVER (B)
11	G21 22VT/WT	REAR FAN ON INDICATOR DRIVER
12	C931 22DB/TN	REAR FAN SENSE RETURN
13	-	-



AUTOMATIC DAY/NIGHT MIRROR

AUTOMATIC DAY/NIGHT MIRROR - BLACK 7 WAY

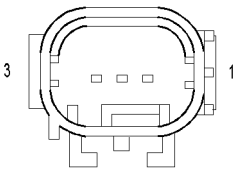
CAV	CIRCUIT	FUNCTION
1	F316 20BK/PK	FUSED ACCESSORY RELAY OUTPUT
2	Z113 18BK/DB	GROUND
3	L11 20BK/WT	BACK-UP LAMP SIGNAL
4	P112 20BK/OR	AUTO DAY/NIGHT MIRROR (+)
5	P114 20BK/LB	AUTO DAY/NIGHT MIRROR (-)
6	-	-
7	L24 20BK/GY	AUTOMATIC HEADLAMP SIGNAL



BATTERY TEMPERATURE SENSOR

BATTERY TEMPERATURE SENSOR - BLACK 2 WAY

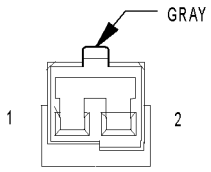
CAV	CIRCUIT	FUNCTION
1	K91 20DB/YL	BATTERY TEMP SIGNAL
2	K900 20DB/DG	SENSOR GROUND



BELT TENSION SENSOR

BELT TENSION SENSOR - 3 WAY

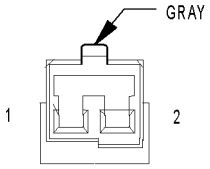
CAV	CIRCUIT	FUNCTION
1	R86 20LG/LB	BELT TENSION SENSOR FEED
2	R986 20LG/BR	BELT TENSION SENSOR GROUND
3	D105 20WT/OR	BELT TENSION SENSOR SIGNAL



BLEND DOOR ACTUATOR-DRIVER

BLEND DOOR ACTUATOR-DRIVER - GRAY 2 WAY

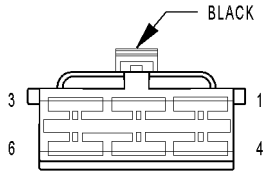
CAV	CIRCUIT	FUNCTION
1	C61 20DB/LG	DRIVER BLEND DOOR DRIVER (A)
2	C161 20LB/WT	DRIVER BLEND DOOR DRIVER (B)



BLEND DOOR ACTUATOR-PASSENGER

BLEND DOOR ACTUATOR-PASSENGER - GRAY 2 WAY

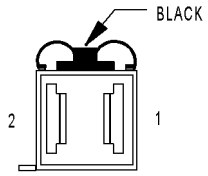
CAV	CIRCUIT	FUNCTION
1	C133 20DB/WT	PASSENGER BLEND DOOR DRIVER (B)
2	C33 20LB/BR	PASSENGER BLEND DOOR DRIVER (A)



BLOWER MOTOR RESISTOR BLOCK C1 (MTC)

BLOWER MOTOR RESISTOR BLOCK C1 (MTC) - BLACK 6 WAY

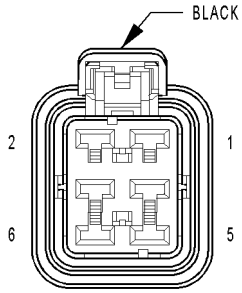
CAV	CIRCUIT	FUNCTION
1	-	-
2	C75 12DB/GY	BLOWER MOTOR HIGH DRIVER
3	C73 14DB/VT	BLOWER MOTOR M2 DRIVER
4	C7 12DB	FUSED FRONT BLOWER MOTOR RELAY OUTPUT
5	C72 16DB/OR	BLOWER MOTOR M1 DRIVER
6	C71 16DB/BR	BLOWER MOTOR LOW DRIVER



BLOWER MOTOR RESISTOR BLOCK C2 (MTC)

BLOWER MOTOR RESISTOR BLOCK C2 (MTC) - BLACK 2 WAY

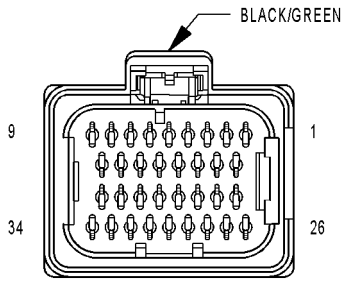
CAV	CIRCUIT	FUNCTION
1	C112 12DG	BLOWER SUPPLY
2	C113 12BK	BLOWER DRIVER



BODY CONTROL MODULE C1

BODY CONTROL MODULE C1 - BLACK 6 WAY

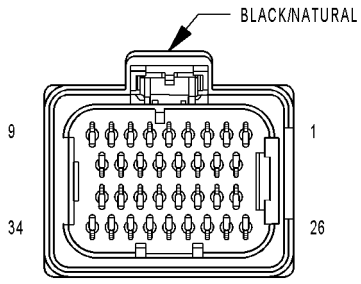
CAV	CIRCUIT	FUNCTION
1	A701 18BR/RD	FUSED B(+)
2	A101 12VT/RD	FUSED B(+)
3	Z100 16BK/VT	GROUND
4	-	-
5	A101 12VT/RD	FUSED B(+)
6	-	-



BODY CONTROL MODULE C2

BODY CONTROL MODULE C2 - BLACK/GREEN 34 WAY

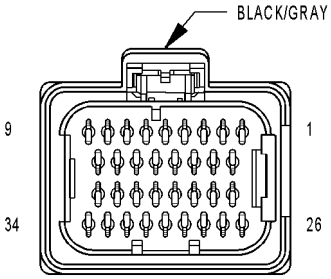
CAV	CIRCUIT	FUNCTION
1	L61 18LG/WT	LEFT FRONT TURN SIGNAL LAMP DRIVER
2	L63 18DG/WT	LEFT REAR TURN SIGNAL LAMP DRIVER
3	L60 18WT/TN	RIGHT FRONT TURN SIGNAL LAMP DRIVER
4	L62 18WT/DB	RIGHT REAR TURN SIGNAL LAMP DRIVER
5	F20 20PK/GY	IGNITION SWITCH OUTPUT (RUN-START)
6	-	-
7	-	-
8	G77 20VT/GY	LEFT REAR DOOR AJAR SWITCH SENSE
9	-	-
10	W13 18BR/WT	REAR WIPER MOTOR CONTROL
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	A114 20GY/RD	FUSED B(+)
19	Z10 18BK/TN	GROUND
20	-	-
21	-	-
22	-	-
23	-	-
24	-	-
25	-	-
26	M22 18YL/OR	COURTESY LAMPS DRIVER
27	-	-
28	-	-
29	-	-
30	P30 20TN/DG	LIFTGATE HANDLE SWITCH SENSE
31	-	-
32	L1 18WT/LG	BACK-UP LAMP DRIVER
33	-	-
34	-	-



BODY CONTROL MODULE C3

BODY CONTROL MODULE C3 - BLACK/NATURAL 34 WAY

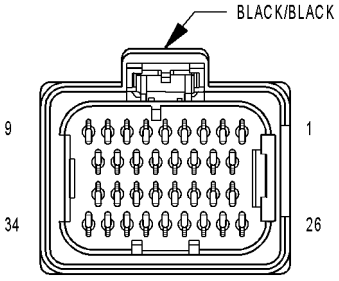
CAV	CIRCUIT	FUNCTION
1	N5 20DB/WT	FUEL LEVEL SENSOR SIGNAL NO. 2
2	D123 20WT/BR	FLASH PROGRAM ENABLE
3	G153 20VT/GY (POWER LIFTGATE)	LIFTGATE MODULE WAKE UP SIGNAL
4	-	-
5	G76 20VT/YL	RIGHT REAR DOOR AJAR SWITCH SENSE
6	-	-
7	G25 20VT/TN	LIFTGATE SWITCH MUX
8	M24 18YL/WT	FRONT READING/COURTESY LAMPS DRIVER
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-
23	N4 20DB/YL	FUEL LEVEL SENSOR SIGNAL NO. 1
24	D25 20WT/VT	PCI BUS
25	M11 18YL/VT	LIFTGATE COURTESY LAMP DRIVER
26	-	-
27	W17 20BR/LG	REAR WIPER PARK SWITCH SENSE
28	P31 18TN/YL (BASE)	LIFTGATE RELEASE DRIVER
29	G78 20VT/OR	LIFTGATE AJAR SWITCH SENSE
30	G10 20VT/LG	DRIVER SEAT BELT SWITCH SENSE
31	-	-
32	-	-
33	-	-
34	M27 18YL/LB	RAIL LAMPS DRIVER



BODY CONTROL MODULE C4

BODY CONTROL MODULE C4 - BLACK/GRAY 34 WAY

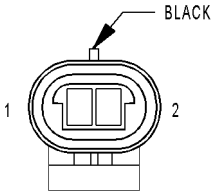
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	G150 22VT/BR	INSTRUMENT CLUSTER WAKE UP SIGNAL
6	G69 22VT/WT	VTSS INDICATOR DRIVER
7	-	-
8	-	-
9	L161 20WT/LG	LEFT TURN SIGNAL
10	-	-
11	-	-
12	-	-
13	X920 22GY/OR	RADIO CONTROL MUX RETURN
14	G900 22OR/VT	IGNITION SWITCH SENSE RETURN
15	-	-
16	-	-
17	L160 22WT/TN	RIGHT TURN SIGNAL
18	-	-
19	-	-
20	-	-
21	-	-
22	G902 20VT/OR	MULTI-FUNCTION SWITCH MUX RETURN
23	-	-
24	-	-
25	-	-
26	M28 18YL/TN	GLOVE BOX LAMP DRIVER
27	-	-
28	-	-
29	-	-
30	-	-
31	W35 22BR/LG	FRONT WIPER HIGH/LOW SWITCH SENSE
32	B27 20DG/WT	TRACTION CONTROL SWITCH SENSE
33	L306 20LB/WT	RIGHT TURN SWITCH SENSE
34	-	-



BODY CONTROL MODULE C5

BODY CONTROL MODULE C5 - BLACK/BLACK 34 WAY

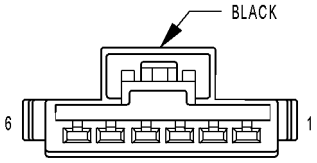
CAV	CIRCUIT	FUNCTION
1	L91 20WT/DB	HAZARD SWITCH SENSE
2	W33 22BR/DG	FRONT WASHER SIGNAL
3	W26 20BR/DB	REAR WIPER SWITCH MUX
4	L305 22WT/LB	LEFT TURN SWITCH SENSE
5	-	-
6	-	-
7	L87 20WT/OR	FRONT FOG SWITCH SENSE
8	L37 20WT/BR	HIGH BEAM SWITCH SENSE
9	L38 20DB/WT	OPTICAL HORN SIGNAL
10	G20 22VT/BR	IGNITION SWITCH SENSE
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-
17	L900 22WT/YL	HEADLAMP SWITCH MUX RETURN
18	W52 22BR/YL	FRONT WIPER SWITCH MUX
19	-	-
20	-	-
21	-	-
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	E2 22OR/BR	PANEL LAMPS DIMMER SIGNAL
28	-	-
29	-	-
30	-	-
31	L307 22BR/WT	HEADLAMP SWITCH MUX SENSE
32	W27 22DB/BR	REAR WIPER SWITCH DELAY
33	X20 22GY/WT	RADIO CONTROL MUX
34	-	-



BRAKE FLUID LEVEL SWITCH

BRAKE FLUID LEVEL SWITCH - BLACK 2 WAY

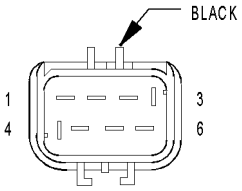
CAV	CIRCUIT	FUNCTION
1	B20 20DG/OR	BRAKE FLUID LEVEL SWITCH SENSE
2	Z420 20BK/OR	GROUND



BRAKE LAMP SWITCH

BRAKE LAMP SWITCH - BLACK 6 WAY

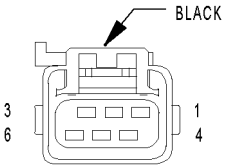
CAV	CIRCUIT	FUNCTION
1	L51 18WT/DG	BRAKE LAMP SWITCH OUTPUT
2	A108 18LG/RD	FUSED B(+)
3	V30 20VT/WT	SPEED CONTROL BRAKE SWITCH OUTPUT
4	V32 20VT/YL	S/C SUPPLY
5	Z429 20BK/OR	GROUND
6	B29 20DG/WT	BRAKE SWITCH SIGNAL



C100

C100 - BLACK (BODY SIDE)

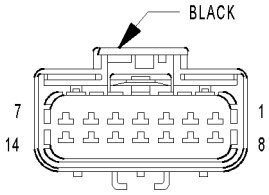
CAV	CIRCUIT
1	R80 20LB/TN
2	R82 20WT/LB
3	L60 18WT/TN
4	R81 20LB/WT
5	R79 20LB/VT
6	L61 18LG/WT



C100

C100 - BLACK (FRONT END LIGHTING SIDE)

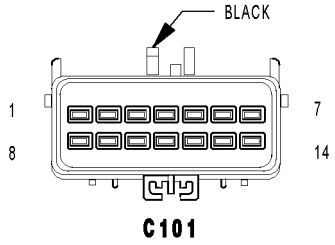
CAV	CIRCUIT
1	R80 20LB/TN
2	R82 20WT/LB
3	L60 18WT/TN
4	R81 20LB/WT
5	R79 20LB/VT
6	L61 18LG/WT



C101

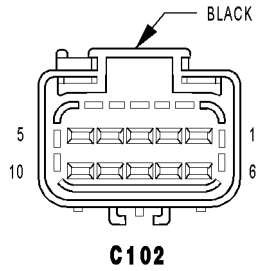
C101 - BLACK (BODY SIDE)

CAV	CIRCUIT
1	D21 20WT/GY
2	D123 20WT/BR
3	D20 20WT/LG
4	D15 20BR/WT
5	K900 20DB/DG
6	-
7	-
8	V32 20VT/YL
9	B29 20DG/WT
10	V37 20VT
11	V30 20VT/WT
12	T5 20DG/YL
13	B1 18DG/DB
14	B2 18DG/LB



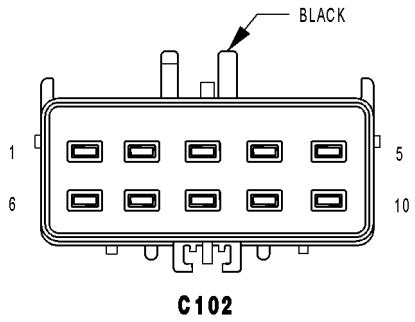
C101 - BLACK (POWERTRAIN SIDE)

CAV	CIRCUIT
1	D21 20WT/GY
2	D123 20WT/BR
3	D20 20WT/LG
4	D15 20BR/WT
5	K900 20DB/DG
6	-
7	-
8	V32 20VT/YL
9	B29 20DG/WT
10	V37 20VT
11	V30 20VT/WT
12	T5 20DG/YL
13	B1 18DG/DB
14	B2 18DG/LB



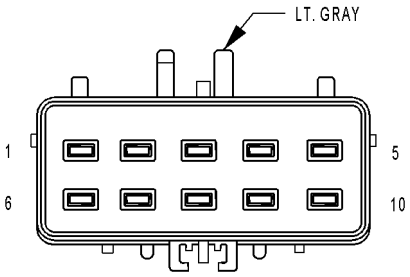
C102 - BLACK (BODY SIDE)

CAV	CIRCUIT
1	L51 18WT/DG
2	D24 20WT/YL
3	K106 20VT/LB
4	K107 20VT/WT
5	B4 18DG/GY
6	B3 18DG/YL
7	-
8	T44 20YL/DG
9	Z111 18BK/WT
10	-



C102 - BLACK (POWERTRAIN SIDE)

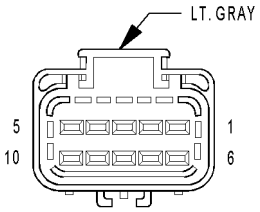
CAV	CIRCUIT
1	L51 18WT/DG
2	D24 20WT/YL
3	K106 20VT/LB
4	K107 20VT/WT
5	B4 18DG/GY
6	B3 18DG/YL
7	-
8	T44 20YL/DG
9	Z111 18BK/WT
10	-



C104

C104 - LT. GRAY (ENGINE SIDE)

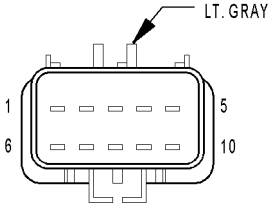
CAV	CIRCUIT
1	-
2	K36 20DB/YL
3	K24 20BR/LB
4	K900 20DB/DG
5	K342 16BR/WT
6	-
7	F855 20PK/YL
8	K20 18BR/GY
9	K236 18DB/LG
10	K136 18BR



C104

C104 - LT. GRAY (POWERTRAIN SIDE)

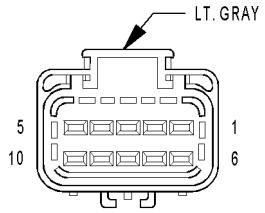
CAV	CIRCUIT
1	-
2	K36 20DB/YL
3	K24 20BR/LB
4	K900 20DB/DG
5	K342 16BR/WT
6	-
7	F855 20PK/YL
8	K20 18BR/GY
9	K236 16DB/LG
10	K136 18BR



C105

C105 - LT. GRAY (FRONT END LIGHTING SIDE)

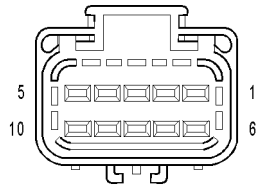
CAV	CIRCUIT
1	G31 20OR/VT
2	K900 20DB/DG
3	B6 18DG/WT
4	K173 18BR/VT
5	V30 20VT/WT
6	B7 18DG/VT
7	V35 20VT/OR
8	V36 20YL/VT
9	C18 20LB/BR
10	F855 20PK/YL



C105

C105 - LT. GRAY (POWERTRAIN SIDE)

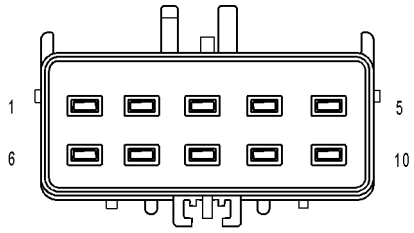
CAV	CIRCUIT
1	G31 20OR/VT
2	K900 20DB/DG
3	B6 18DG/WT
4	K173 20BR/VT
5	V30 20VT/WT
6	B7 18DG/VT
7	V35 20VT/OR
8	V36 20YL/VT
9	C18 20LB/BR
10	F855 20PK/YL



C106
(3.8L)

C106 (3.8L) - (POWERTRAIN SIDE)

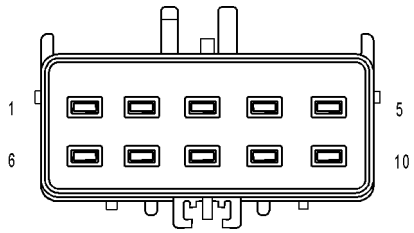
CAV	CIRCUIT
1	K342 16BR/WT
2	K1 20VT/BR
3	K11 16BR/YL
4	K12 16BR/DB
5	K13 16BR/LB
6	K14 16BR/TN
7	K19 16DB/DG
8	K38 16BR/OR
9	K58 16BR/VT
10	F855 20PK/YL



C106
(3.8L)

C106 (3.8L) - (ENGINE SIDE)

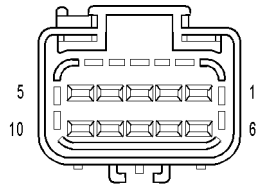
CAV	CIRCUIT
1	K342 16BR/WT
2	K1 20VT/BR
3	K11 16BR/YL
4	K12 16BR/DB
5	K13 16BR/LB
6	K14 16BR/TN
7	K19 16DB/DG
8	K38 16BR/OR
9	K58 16BR/VT
10	F855 20PK/YL



C107
(3.8L)

C107 (3.8L) - (ENGINE SIDE)

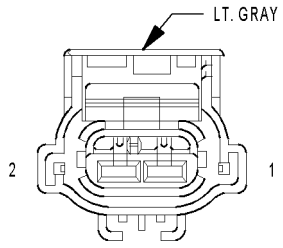
CAV	CIRCUIT
1	K34 20DB/LG
2	-
3	K900 20DB/DG
4	Z335 18BK/WT
5	K2 18VT/OR
6	K35 18DB/VT
7	K18 16DB/OR
8	-
9	-
10	K17 16DB/TN



C107
(3.8L)

C107 (3.8L) - (POWERTRAIN SIDE)

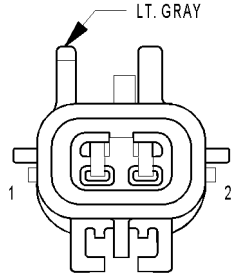
CAV	CIRCUIT
1	K34 20DB/LG
2	-
3	K900 20DB/DG
4	Z335 18BK/WT
5	K2 18VT/OR
6	K35 18DB/VT
7	K18 16DB/OR
8	-
9	-
10	K17 16DB/TN



C200

C200 - LT. GRAY (FRONT CONSOLE SIDE)

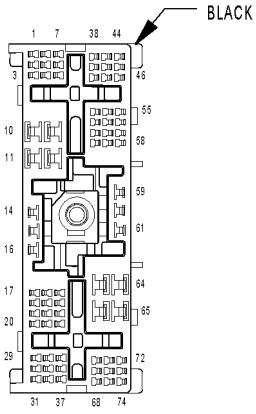
CAV	CIRCUIT
1	F306 16DB/PK
2	Z746 16BK/DB



C200

C200 - LT. GRAY (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	F306 16DB/PK
2	Z746 16BK/DB



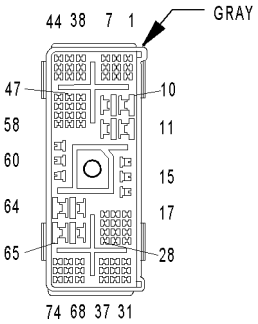
C201

C201 - BLACK (BODY SIDE)

CAV	CIRCUIT
1	B25 20DG/WT
2	A106 20LB/RD
3	-
4	K900 20DB/DG
5	F316 20PK/OR
6	Z104 20BK/LG
7	T751 20YL
8	-
9	-
10	-
11	C7 12DB
12	-
13	-
14	A105 18DB/RD
15	A118 20RD/OR
16	F306 16DB/PK
17	V37 20VT
18	X3 20DG/VT
19	-
20	R79 20LB/VT
21	R81 20LB/WT
22	R80 20LB/TN
23	R82 20WT/LB
24	-
25	-
26	-
27	D25 20WT/VT
28	-
29	-
30	F100 20PK/VT
31	F201 20PK/LB
32	-
33	T44 20YL/DG
34	T5 20DG/YL
35	D15 20BR/WT
36	-
37	-
38	F2 18PK/YL
39	-
40	E12 18OR/GY
41	C57 20DB/LB
42	C53 20LB
43	C153 20DB/BR
44	-
45	F504 20GY/PK
46	G21 22VT/WT
47	C31 20LB/YL
48	C11 22LB/OR
49	C931 22DB/TN
50	D20 20WT/LG
51	D21 20WT/GY
52	D24 20WT/YL
53	-
54	Z111 18BK/WT

C201 - BLACK (BODY SIDE)

CAV	CIRCUIT
55	-
56	-
57	-
58	-
59	F20 20PK/GY
60	A108 18LG/RD
60	A108 18LG/RD
61	D123 20WT/BR
62	-
63	-
64	-
65	-
66	G400 20VT/LB (NAVIGATION)
67	-
68	G410 20VT/LG (NAVIGATION)
69	-
70	G420 20VT/BR (NAVIGATION)
71	-
72	G430 20VT/GY (NAVIGATION)
73	-
74	G591 22 (NAVIGATION)



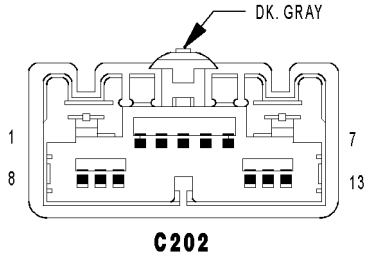
C201

C201 - GRAY (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	B25 20DG/WT
2	A106 20LB/RD
3	-
4	K900 20DB/DG
5	F316 20PK/OR
6	Z104 20BK/LG
7	T751 20YL
8	-
9	-
10	-
11	C7 12DB
11	C7 12DB (MTC)
12	-
13	-
14	A105 18DB/RD
14	A105 20DB/RD
15	A118 20RD/OR
16	F306 16DB/PK
17	V37 20VT
18	X3 20DG/VT
19	-
20	R79 20LB/VT
21	R81 20LB/WT
22	R80 20LB/TN
23	R82 20WT/LB
24	-
25	-
26	-
27	D25 20WT/VT

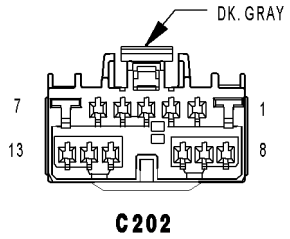
C201 - GRAY (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
28	-
29	-
30	F100 20PK/VT
31	F201 20PK/LB
32	-
33	T44 20YL/DG
34	T5 20DG/YL
35	D15 20BR/WT
36	-
37	-
38	F2 18PK/YL
39	-
40	E12 18OR/GY
41	C57 22DB/LB
42	C53 22LB
43	C153 22DB/BR
44	-
45	F504 20GY/PK
46	G21 22VT/WT
47	C31 22LB/YL
48	C11 22LB/OR
49	C931 22DB/TN
50	D20 20WT/LG
51	D21 20WT/GY
52	D24 20WT/YL
53	-
54	Z111 18BK/WT
55	-
56	-
57	-
58	-
59	F20 20PK/GY
59	F20 20PK/GY
60	A108 18LG/RD
61	D123 20WT/BR
61	D123 20WT/BR
62	-
63	-
64	-
65	-
66	G400 20VT/LB (NAVIGATION)
67	-
68	G410 20VT/LG (NAVIGATION)
69	-
70	G420 20VT/BR (NAVIGATION)
71	-
72	G430 20VT/GY (NAVIGATION)
73	-
74	G591 22 (NAVIGATION)



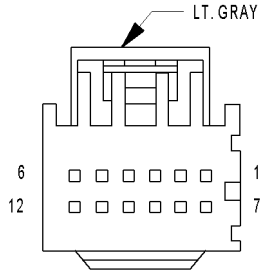
C202 - DK. GRAY (HVAC SIDE)

CAV	CIRCUIT
1	Z134 12BK/OR
2	C56 20LB/DB (ATC)
2	C34 22DB/LB (MTC)
3	C32 20TN/DB (ATC)
3	C32 22DB/TN (MTC)
4	C33 20LB/BR
5	C61 20DB/LG
6	C35 20LB/OR
7	C7 12DB
8	C132 20DB/YL (ATC)
9	C133 20DB/WT (ATC)
10	C161 20LB/WT (ATC)
11	C135 20DB/GY (ATC)
12	C21 20LG/DB (ATC)
12	C21 22DB/LG (MTC)
13	C121 20DB/DG



C202 - DK. GRAY (INSTRUMENT PANEL SIDE)

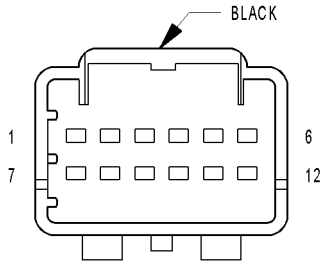
CAV	CIRCUIT
1	Z134 12BK/LG
2	C56 20LB/DB (ATC)
2	C34 22DB/LB (MTC)
3	C32 20TN/DB (ATC)
3	C32 22DB/TN (MTC)
4	C33 22LB/BR
5	C61 22DB/LG
6	C35 22LB/OR
7	C7 12DB
8	C132 20DB/YL (ATC)
9	C133 22DB/WT (ATC)
10	C161 20LB/WT (ATC)
11	C135 20DB/GY (ATC)
12	C21 20LG/DB (ATC)
12	C21 22DB/LG (MTC)
13	C121 20DB/DG



C204
(DVD)

C204 (DVD) - LT. GRAY (DVD SCREEN SIDE)

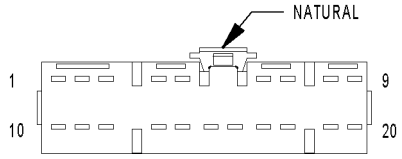
CAV	CIRCUIT
1	X515 22GY/OR
2	X915 22GY/LB
3	X955 22
4	X555 22VT/OR
5	X114 20GY/TN
6	X530 20GY/DB
7	X211 20YL/GY
8	-
9	-
10	-
11	-
12	-



C204
(DVD)

C204 (DVD) - BLACK
(INSTRUMENT PANEL SIDE)

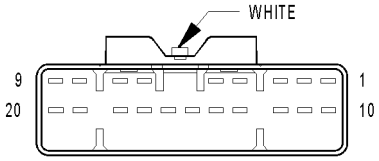
CAV	CIRCUIT
1	X515 22GY/OR
2	X915 22GY/LB
3	X955 22
4	X555 22VT/OR
5	X114 20GY/TN
6	X530 20GY/DB
7	X211 20YL/GY
8	-
9	-
10	-
11	-
12	-



C205

C205 - NATURAL (INSTRUMENT PANEL SIDE)

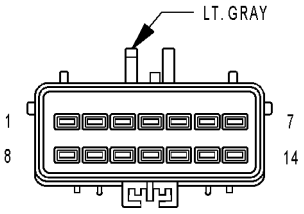
CAV	CIRCUIT
1	-
2	-
3	-
4	X290 18GY/OR
5	X200 18GY/DB
6	X56 20GY/BR
7	X54 20GY
8	X55 20DG/BR
9	X53 20DG
10	-
11	-
12	-
13	-
14	-
15	-
16	-
17	-
18	-
19	-
20	-



C205

C205 - WHITE (BODY SIDE)

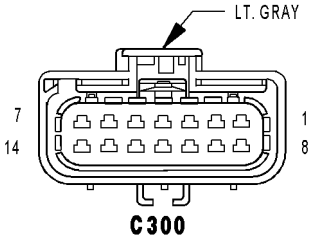
CAV	CIRCUIT
1	-
2	-
3	-
4	X290 18GY/OR
5	X200 18GY/DB
6	X56 20GY/BR
7	X54 20GY
8	X55 20DG/BR
9	X53 20DG
10	-
11	-
12	-
13	-
14	-
15	-
16	-
17	-
18	-
19	-
20	-



C300

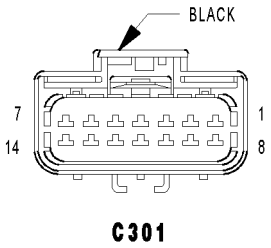
C300 - LT. GRAY (BODY SIDE)

CAV	CIRCUIT
1	C31 20LB/YL
2	C11 22LB/OR
3	C931 22DB/TN
4	E12 18OR/GY
5	Z870 20BK/YL
6	G21 22VT/WT
7	P189 20LG/WT (MIDDLE ROW HEATED SEATS)
8	P188 16LG/VT (MIDDLE ROW HEATED SEATS)
9	P187 16LG/BR (MIDDLE ROW HEATED SEATS)
10	P196 20LG/LB (MIDDLE ROW HEATED SEATS)
11	P197 20LG/DG (MIDDLE ROW HEATED SEATS)
12	F525 16TN/PK (MIDDLE ROW HEATED SEATS)
13	-
14	-



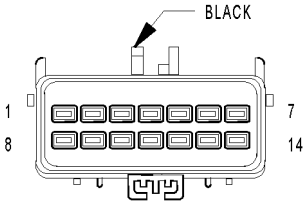
C300 - LT. GRAY (REAR CONSOLE SIDE)

CAV	CIRCUIT
1	C31 20LB/YL
2	C11 22LB/OR
3	C931 20DB/TN
4	E12 20OR/GY (EXCEPT MIDDLE ROW HEATED SEATS)
4	E12 18OR/GY (MIDDLE ROW HEATED SEATS)
5	Z870 20BK/YL
6	G21 22VT/WT
7	P189 20LG/WT (MIDDLE ROW HEATED SEATS)
8	P188 16LG/VT (MIDDLE ROW HEATED SEATS)
9	P187 16LG/BR (MIDDLE ROW HEATED SEATS)
10	P196 20LG/LB (MIDDLE ROW HEATED SEATS)
11	P197 20LG/DG (MIDDLE ROW HEATED SEATS)
12	F525 16TN/PK (MIDDLE ROW HEATED SEATS)
13	-
14	-



C301 - BLACK (BODY SIDE)

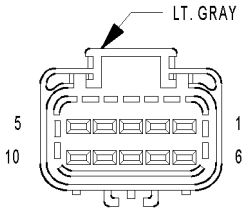
CAV	CIRCUIT
1	G983 20VT/OR
2	X201 18GY/VT
3	X291 18GY/YL
4	Q211 14TN/LB
5	A215 18RD/LG
6	P112 20TN/OR
7	P114 20TN/WT
8	F515 12PK/LB
9	E25 20OR/GY
10	Q111 14TN/YL
11	Q1 20OR/WT
12	D25 20WT/VT
13	D123 20WT/BR
14	Z821 12BK/BR



C301

C301 - BLACK (LEFT FRONT DOOR SIDE)

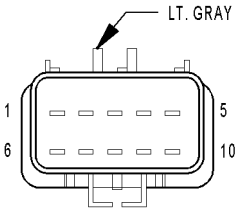
CAV	CIRCUIT
1	G983 20VT/OR
2	X201 18GY/VT
3	X291 18GY/YL
4	Q211 14TN/LB
5	A215 18RD/LG
6	P112 20TN/OR
7	P114 20TN/WT
8	F515 12PK/LB
9	E25 20OR/GY
10	Q111 14TN/YL
11	Q1 20OR/WT
12	D25 20WT/VT
13	D123 20WT/BR
14	Z821 12BK/BR



C303

C303 - LT. GRAY (BODY SIDE)

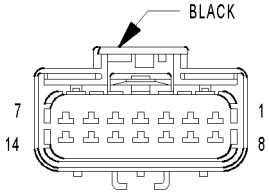
CAV	CIRCUIT
1	Q111 14TN/YL
2	Q211 14TN/LB
3	G77 20VT/GY
4	P222 18VT/DG
5	P292 18VT/LG
6	E25 20OR/GY
7	G983 20VT/OR
8	Q1 20OR/WT
9	X205 18GY/LG
10	X295 18GY/DG



C303

C303 - LT. GRAY (LEFT REAR DOOR SIDE)

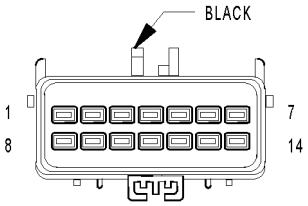
CAV	CIRCUIT
1	Q111 14OR/BR
2	Q211 14OR/VT
3	G77 20VT/YL
4	P222 18VT/DG
5	P292 18VT/LG
6	E25 20OR/GY
7	G983 20VT/TN
8	Q1 20WT/TN
9	X205 18DG/LG
10	X295 18DG/GY



C304

C304 - BLACK (BODY SIDE)

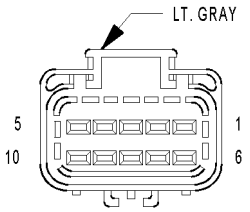
CAV	CIRCUIT
1	G982 20VT/TN
2	X202 18DG/VT
3	X292 18DG/YL
4	Q212 14OR/VT
5	A214 18RD/LB
6	P222 18VT/DG
7	P292 18VT/LG
8	F516 12PK
9	E26 20OR/GY
10	Q112 14OR/BR
11	Q2 20WT/TN
12	D25 20WT/VT
13	D123 20WT/BR
14	Z822 12BK/BR



C304

C304 - BLACK (RIGHT FRONT DOOR SIDE)

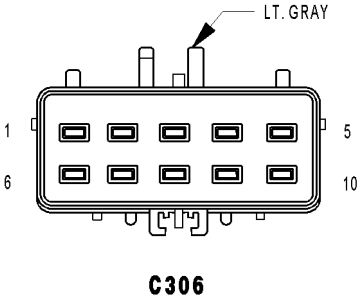
CAV	CIRCUIT
1	G982 20VT/TN
2	X202 18DG/VT
3	X292 18DG/YL
4	Q212 14OR/VT
5	A214 18RD/LB
6	P222 18VT/DG
7	P292 18VT/LG
8	F516 12PK
9	E26 20OR/GY
10	Q112 14OR/BR
11	Q2 20WT/TN
12	D25 20WT/VT
13	D123 20WT/BR
14	Z822 12BK/BR



C306

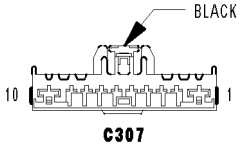
C306 - LT. GRAY (BODY SIDE)

CAV	CIRCUIT
1	Q112 14OR/BR
2	Q212 14OR/VT
3	G76 20VT/YL
4	P222 18VT/DG
5	P292 18VT/LG
6	E26 20OR/GY
7	G982 20VT/TN
8	Q2 20WT/TN
9	X206 18DG/LG
10	X296 18DG/GY



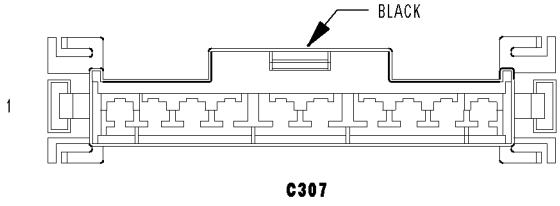
C306 - LT. GRAY (RIGHT REAR DOOR SIDE)

CAV	CIRCUIT
1	Q112 14OR/BR
2	Q212 14OR/VT
3	G76 20VT/YL
4	P222 18VT/DG
5	P292 18VT/LG
6	E26 20OR/GY
7	G982 20VT/TN
8	Q2 20WT/TN
9	X206 18DG/LG
10	X296 18DG/GY



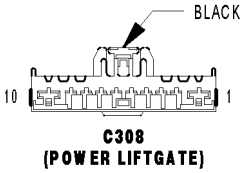
C307 - BLACK (BODY SIDE)

CAV	CIRCUIT
1	C15 12DB/WT
2	W17 20BR/LG
3	L3 18WT/VT
4	L51 18WT/DG
5	P31 18TN/YL
6	M11 18YL/VT
7	G78 20VT/OR
8	W13 18BR/WT
9	P30 20TN/DG
10	Z800 12BK



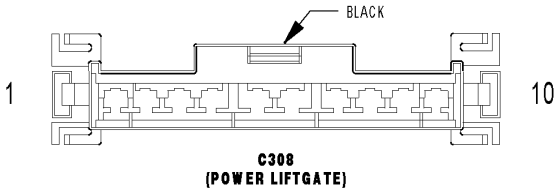
C307 - BLACK (LIFTGATE SIDE)

CAV	CIRCUIT
1	C15 12DB/WT
2	W17 20BR/LG
3	L3 18WT/VT
4	L51 18WT/DG
5	P31 18TN/YL (BASE)
6	M11 18YL/VT
7	G78 22VT/OR
8	W13 18BR/WT
9	P30 20TN/DG
10	Z800 12BK



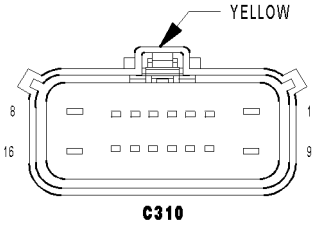
C308 (POWER LIFTGATE) - BLACK (BODY SIDE)

CAV	CIRCUIT
1	Q85 16TN/WT
2	Q75 20OR/LB
3	Q84 16TN/GY
4	Q901 20OR/VT
5	Q83 18OR/GY
6	Q60 22OR/YL
7	Q94 22TN/LG
8	-
9	-
10	G32 20VT/LB



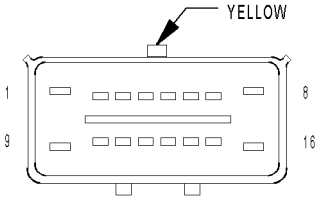
C308 (POWER LIFTGATE) - BLACK (LIFTGATE SIDE)

CAV	CIRCUIT
1	Q85 16TN/WT
2	Q75 20OR/LB
3	Q84 16TN/GY
4	Q901 20OR/VT
5	Q83 18OR/GY
6	Q60 22OR/YL
7	Q94 22TN/LG
8	-
9	-
10	G32 22VT/LB



C310 - YELLOW (BODY SIDE)

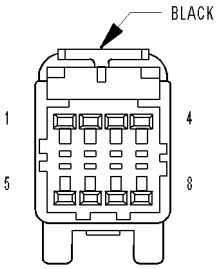
CAV	CIRCUIT
1	P44 14LG/DG
2	-
3	-
4	-
5	P95 18LG/WT (FRONT ROW HEATED SEATS)
6	P97 18LG/YL (FRONT ROW HEATED SEATS)
7	-
8	P14 14LG/OR
9	P16 14LG/BR
10	F201 20PK/LB
11	R86 20LG/LB
12	D105 20WT/OR
13	D25 20WT/VT
14	Z104 20BK/LG
15	R986 20LG/BR
16	R42 14LG/GY



C310

C310 - YELLOW (SEAT SIDE)

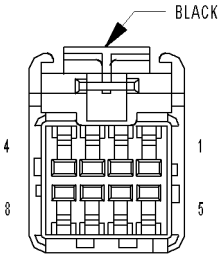
CAV	CIRCUIT
1	P44 14LG/DG
2	-
3	-
4	-
5	P95 18LG/WT (FRONT ROW HEATED SEATS)
6	P97 18LG/YL (FRONT ROW HEATED SEATS)
7	-
8	P14 14LG/OR
9	P16 14LG/BR
10	F201 20PK/LB
11	R86 20LG/LB
12	D105 20WT/OR
13	D25 20WT/VT
14	Z104 20BK/LG
15	R986 20LG/BR
16	P42 14LG/GY



C312
(EXCEPT BASE)

C312 (EXCEPT BASE) - BLACK (BODY SIDE)

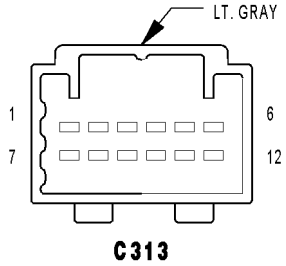
CAV	CIRCUIT
1	X730 20GY/YL (HANDS FREE)
2	Q3 20OR/TN (POWER SUNROOF)
3	Q5 20OR/LB (POWER SUNROOF)
4	X712 20DG/LB (HANDS FREE)
5	X792 20LB/DG (HANDS FREE)
6	X835 20OR/GY (HANDS FREE)
7	X722 20DG/WT (HANDS FREE)
8	Q4 20OR/WT (POWER SUNROOF)



C312
(EXCEPT BASE)

C312 (EXCEPT BASE) - BLACK (DOME SIDE)

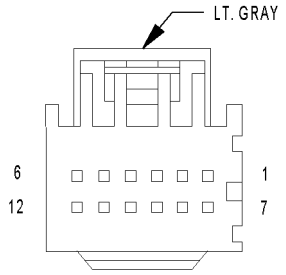
CAV	CIRCUIT
1	X730 20BR/GY (HANDS FREE)
2	Q3 22OR/TN (POWER SUNROOF)
3	Q5 22OR/LB (POWER SUNROOF)
4	X712 20BR (HANDS FREE)
5	X792 20BR/BK (HANDS FREE)
6	X835 20BR/OR (HANDS FREE)
7	X722 20BR/WT (HANDS FREE)
8	Q4 20OR/WT (POWER SUNROOF)



C313

C313 - LT. GRAY (BODY SIDE)

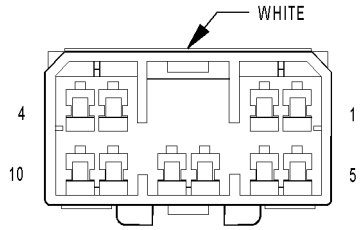
CAV	CIRCUIT
1	M27 18YL/LB
2	M22 18YL/OR
3	M24 18YL/WT
4	G25 20VT/TN
5	D25 20WT/VT (EXCEPT SIDE AIRBAG)
5	E12 18OR/GY (SIDE AIRBAG)
6	F316 20PK/OR
7	P112 20TN/OR
8	P114 20TN/WT
9	A114 20GY/RD
10	Z327 18BK/WT
11	Z137 20BK/YL (EXCEPT SIDE AIRBAG)
11	Z409 20BK/WT (SIDE AIRBAG)
12	Z113 18BK/DB



C313

C313 - LT. GRAY (DOME SIDE)

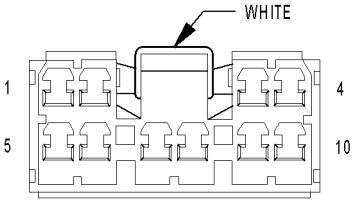
CAV	CIRCUIT
1	M27 18YL/LB
2	M22 18YL/OR
3	M24 18YL/WT
4	G25 22VT/TN (EXCEPT BASE)
5	D25 20WT/VT (EXCEPT BASE)
6	F316 20BK/PK (EXCEPT BASE)
7	P112 20BK/OR (EXCEPT BASE)
8	P114 20BK/LB (EXCEPT BASE)
9	A114 20GY/RD (EXCEPT BASE)
10	Z327 18BK/WT
11	Z137 20BK/YL
12	Z113 18BK/DB (EXCEPT BASE)



C315
(SATELLITE RADIO)

C315 (SATELLITE RADIO) - WHITE (BODY SIDE)

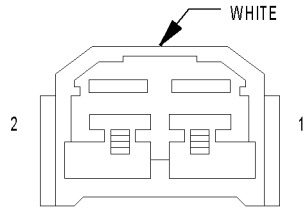
CAV	CIRCUIT
1	X17 22DG/OR
2	X16 22DG/YL
3	X917 22DG
4	D25 20WT/VT
5	X112 20DG/GY
6	X480 20DG/LB
7	X607 20
8	X160 20GY/YL
9	Z141 20BK/TN
10	-



C315
(SATELLITE RADIO)

C315 (SATELLITE RADIO) - WHITE (INSTRUMENT PANEL SIDE)

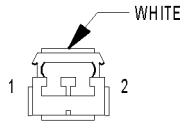
CAV	CIRCUIT
1	X17 22DG/OR
2	X16 22DG/YL
3	X917 22DG
4	D25 20WT/VT
5	X112 20DG/GY
6	X480 20DG/LB
7	X607 20
8	X160 20GY/YL
9	Z141 20BK/TN
10	-



C316
(LUMBAR SEAT ADJUSTER)

C316 (LUMBAR SEAT ADJUSTER) - WHITE (DRIVER SEAT SIDE)

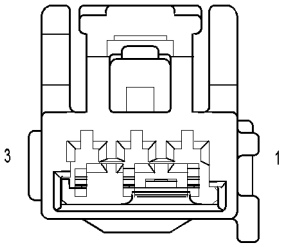
CAV	CIRCUIT
1	P107 18LG/WT
2	P105 18LG



C316
(LUMBAR SEAT ADJUSTER)

C316 (LUMBAR SEAT ADJUSTER) - WHITE (LUMBAR JUMPER SIDE)

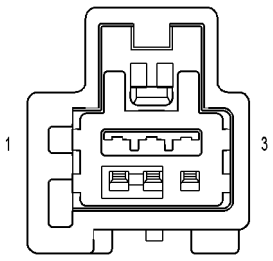
CAV	CIRCUIT
1	P107 18DB
2	P105 18PK



C317
(PARKTRONICS)

C317 (PARKTRONICS) - (PARK ASSIST JUMPER SIDE)

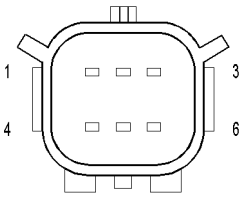
CAV	CIRCUIT
1	X777 20DG/GY
2	Z171 20GY/BK
3	D777 20WT/GY



C317
(PARKTRONICS)

C317 (PARKTRONICS) - (BODY SIDE)

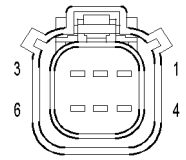
CAV	CIRCUIT
1	X777 20DG/GY
2	Z171 20GY/BK
3	D777 20WT/GY



C318
(PARKTRONICS)

C318 (PARKTRONICS) - (BODY SIDE)

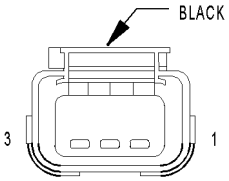
CAV	CIRCUIT
1	X700 20GY/OR
2	D700 20WT/GY
3	D701 20WT/LB
4	D703 20WT/OR
5	D704 20WT/DB
6	X750 20GY/LB



C318
(PARKTRONICS)

C318 (PARKTRONICS) - (REAR FASCIA SIDE)

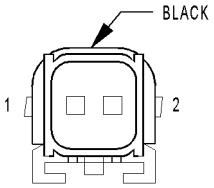
CAV	CIRCUIT
1	X700 20GY/OR
2	D700 20WT/GY
3	D701 20WT/LB
4	D703 20WT/OR
5	D704 20WT/DB
6	X750 20GY/LB



CAMSHAFT
POSITION
SENSOR

CAMSHAFT POSITION SENSOR - BLACK 3 WAY

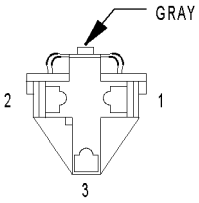
CAV	CIRCUIT	FUNCTION
1	F855 20PK/YL	5 VOLT SUPPLY
2	K900 20DB/DG	SENSOR GROUND
3	K44 20DB/GY	CMP SIGNAL



CENTER HIGH MOUNTED STOP LAMP

CENTER HIGH MOUNTED STOP LAMP - BLACK 2 WAY

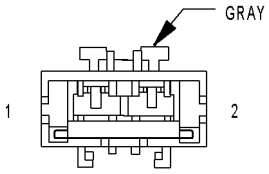
CAV	CIRCUIT	FUNCTION
1	L51 18WT/DG	BRAKE LAMP SWITCH OUTPUT
2	Z350 20BK/TN	GROUND



CIGAR LIGHTER

CIGAR LIGHTER - GRAY 3 WAY

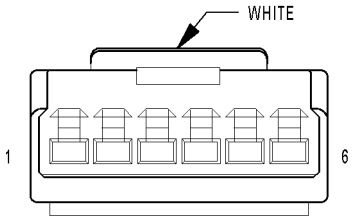
CAV	CIRCUIT	FUNCTION
1	F306 16DB/PK	FUSED ACCESSORY RELAY OUTPUT
1	F306 16DB/PK	FUSED ACCESSORY RELAY OUTPUT
2	-	-
3	Z736 16BK/YL	GROUND



CIRCUIT BREAKER-POWER SEAT (25A)

CIRCUIT BREAKER-POWER SEAT (25A) - GRAY 2 WAY

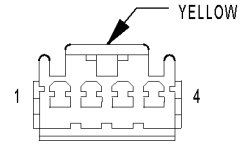
CAV	CIRCUIT	FUNCTION
1	A110 12DG/RD	FUSED B(+)
2	A210 14OR/RD	FUSED B(+)



CLOCKSPRING C1

CLOCKSPRING C1 - WHITE 6 WAY

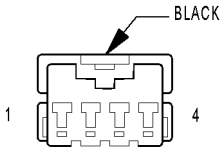
CAV	CIRCUIT	FUNCTION
1	X3 20DG/VT	HORN SWITCH SENSE
2	-	-
3	K900 20DB/DG	SENSOR GROUND
4	V37 20VT	S/C SWITCH SIGNAL
5	X20 22GY/WT	RADIO CONTROL MUX
6	X920 22GY/OR	RADIO CONTROL MUX RETURN



CLOCKSPRING C2

CLOCKSPRING C2 - YELLOW 4 WAY

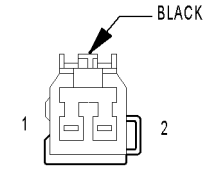
CAV	CIRCUIT	FUNCTION
1	R61 20LG/VT	DRIVER SQUIB 2 LINE 1
2	R63 20LG/WT	DRIVER SQUIB 2 LINE 2
3	R43 20LG/BR	DRIVER SQUIB 1 LINE 1
4	R45 20LG/OR	DRIVER SQUIB 1 LINE 2



CLOCKSPRING C3

CLOCKSPRING C3 - BLACK 4 WAY

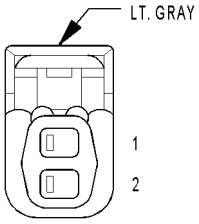
CAV	CIRCUIT	FUNCTION
1	X20 20GY/WT	RADIO CONTROL MUX
1	X20 20GY/WT	RADIO CONTROL MUX
2	X920 20GY/OR	RADIO CONTROL MUX RETURN
2	X920 20GY/OR	RADIO CONTROL MUX RETURN
3	V37 20VT	S/C SWITCH SIGNAL
3	V37 20VT	S/C SWITCH SIGNAL
4	Z23 20BK/VT	SPEED CONTROL SWITCH GROUND
4	Z23 20BK/VT	SPEED CONTROL SWITCH GROUND



CLOCKSPRING C4

CLOCKSPRING C4 - BLACK 2 WAY

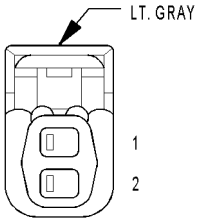
CAV	CIRCUIT	FUNCTION
1	X3 20DG/VT	HORN SWITCH SENSE
2	-	-



COIL ON PLUG NO. 1

COIL ON PLUG NO. 1 - LT. GRAY 2 WAY

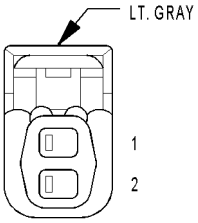
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K19 16DB/DG	COIL CONTROL NO. 1



COIL ON PLUG NO. 2

COIL ON PLUG NO. 2 - LT. GRAY 2 WAY

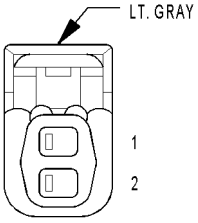
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K17 16DB/TN	COIL CONTROL NO. 2



COIL ON PLUG NO. 3

COIL ON PLUG NO. 3 - LT. GRAY 2 WAY

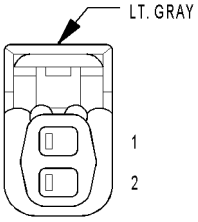
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K18 16DB/OR	COIL CONTROL NO. 3



COIL ON PLUG NO. 4

COIL ON PLUG NO. 4 - LT. GRAY 2 WAY

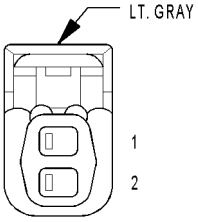
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K15 16DB	COIL CONTROL NO. 4



COIL ON PLUG NO. 5

COIL ON PLUG NO. 5 - LT. GRAY 2 WAY

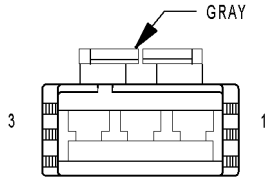
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K16 16DB/YL	COIL CONTROL NO. 5



COIL ON PLUG NO. 6

COIL ON PLUG NO. 6 - LT. GRAY 2 WAY

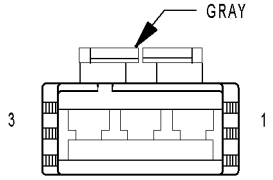
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K10 16DB/OR	COIL CONTROL NO. 6



COURTESY LAMP- DRIVER

COURTESY LAMP-DRIVER - GRAY 3 WAY

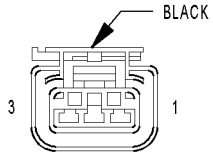
CAV	CIRCUIT	FUNCTION
1	Z321 20BK/BR	GROUND
2	-	-
3	M43 20OR/LB	LEFT DOOR COURTESY LAMP DRIVER



COURTESY LAMP- PASSENGER

COURTESY LAMP-PASSENGER - GRAY 3 WAY

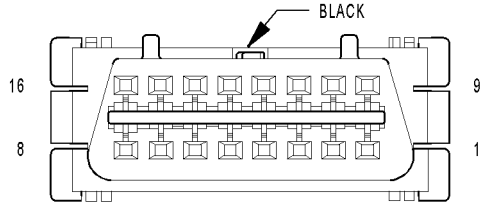
CAV	CIRCUIT	FUNCTION
1	Z322 20BK/BR	GROUND
2	-	-
3	M44 20OR/DB	RIGHT DOOR COURTESY LAMP DRIVER



CRANKSHAFT POSITION SENSOR

CRANKSHAFT POSITION SENSOR - BLACK 3 WAY

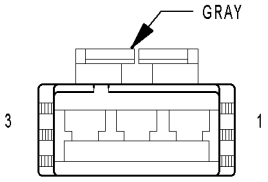
CAV	CIRCUIT	FUNCTION
1	F855 20PK/YL	5 VOLT SUPPLY
2	K900 20DB/DG	SENSOR GROUND
3	K24 20BR/LB	CKP SIGNAL



DATA LINK CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

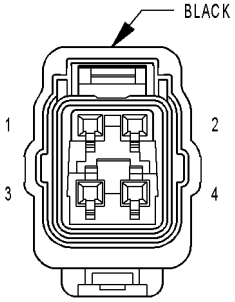
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20WT/VT	PCI BUS
3	-	-
4	Z11 18BK/LG	GROUND
5	Z111 18BK/WT	GROUND
6	-	-
7	D21 20WT/GY	SCI TRANSMIT (PCM)
8	-	-
9	D123 20WT/BR	FLASH PROGRAM ENABLE
10	D24 20WT/YL	FLASH ABS
11	-	-
12	D20 20WT/LG	SCI RECEIVE (PCM)
13	-	-
14	-	-
15	D15 20BR/WT	SCI TRANSMIT (TCM)
16	A105 20DB/RD	FUSED B(+)



DOME LAMP (BASE)

DOME LAMP (BASE) - GRAY 3 WAY

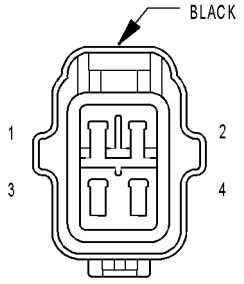
CAV	CIRCUIT	FUNCTION
1	M22 18YL/OR	COURTESY LAMPS DRIVER
2	Z327 18BK/WT	GROUND
3	M27 18YL/LB	RAIL LAMPS DRIVER



DOOR LOCK MOTOR/ AJAR SWITCH-DRIVER

DOOR LOCK MOTOR/AJAR SWITCH-DRIVER - BLACK 4 WAY

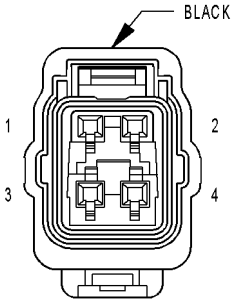
CAV	CIRCUIT	FUNCTION
1	G75 20VT	DRIVER DOOR AJAR SWITCH SENSE
2	Z75 20BK/VT	GROUND
3	P1 20TN/LG	DRIVER DOOR UNLOCK DRIVER
4	P3 20TN/WT	DRIVER DOOR LOCK DRIVER



DOOR LOCK MOTOR/AJAR SWITCH-DRIVER REAR

DOOR LOCK MOTOR/AJAR SWITCH-DRIVER REAR - BLACK 4 WAY

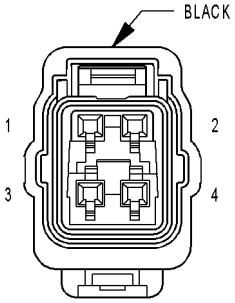
CAV	CIRCUIT	FUNCTION
1	G77 20VT/YL	LEFT REAR DOOR AJAR SWITCH SENSE
2	G983 20VT/TN	GROUND
3	P292 18VT/LG	DOOR UNLOCK DRIVER
4	P222 18VT/DG	DOOR LOCK DRIVER



DOOR LOCK MOTOR/ AJAR SWITCH- PASSENGER

DOOR LOCK MOTOR/AJAR SWITCH-PASSENGER - BLACK 4 WAY

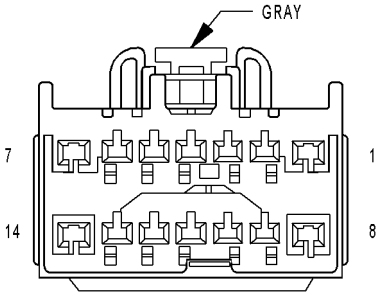
CAV	CIRCUIT	FUNCTION
1	G74 20VT/WT	PASSENGER DOOR AJAR SWITCH SENSE
2	Z74 20BK/WT	GROUND
3	P292 20VT/LG	DOOR UNLOCK DRIVER
4	P222 20VT/DG	DOOR LOCK DRIVER



DOOR LOCK MOTOR/ AJAR SWITCH- PASSENGER REAR

DOOR LOCK MOTOR/AJAR SWITCH-PASSENGER REAR - BLACK 4 WAY

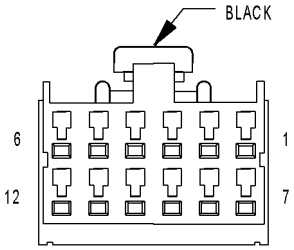
CAV	CIRCUIT	FUNCTION
1	G76 20VT/YL	RIGHT REAR DOOR AJAR SWITCH SENSE
2	G982 20VT/TN	GROUND
3	P292 18VT/LG	DOOR UNLOCK DRIVER
4	P222 18VT/DG	DOOR LOCK DRIVER



DOOR MODULE- DRIVER C1

DOOR MODULE-DRIVER C1 - GRAY 14 WAY

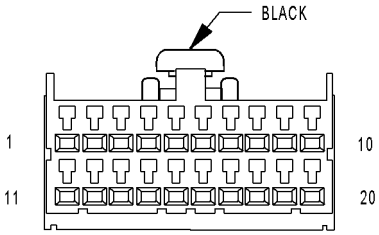
CAV	CIRCUIT	FUNCTION
1	F515 12PK/LB	FUSED DOOR NODE RELAY OUTPUT
2	A215 18RD/LG	FUSED B(+)
3	P3 20TN/WT	DRIVER DOOR LOCK DRIVER
4	P1 20TN/LG	DRIVER DOOR UNLOCK DRIVER
5	Q211 14TN/LB	DRIVER REAR WINDOW DRIVER (DOWN)
6	Q111 14TN/YL	DRIVER REAR WINDOW DRIVER (UP)
7	-	-
8	Z821 12BK/BR	GROUND
9	G983 20VT/OR	GROUND
10	D123 20WT/BR	FLASH PROGRAM ENABLE
11	-	-
12	Q21 14OR/WT	DRIVER WINDOW DRIVER (DOWN)
13	Q11 14OR/LG	DRIVER WINDOW DRIVER (UP)
14	-	-



DOOR MODULE-DRIVER C2

DOOR MODULE-DRIVER C2 - BLACK 12 WAY

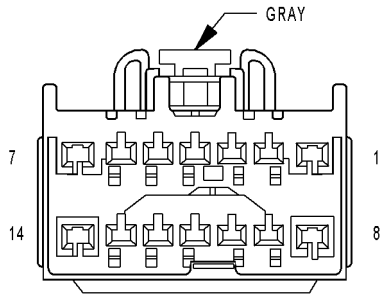
CAV	CIRCUIT	FUNCTION
1	P101 20LG/WT	MEMORY SET SWITCH INDICATOR DRIVER
2	P83 20TN/WT	DRIVER HEATED SEAT HIGH INDICATOR DRIVER
3	P81 20TN/LB	DRIVER HEATED SEAT LOW INDICATOR DRIVER
4	P989 20TN/LG	SEAT SWITCH MUX RETURN
5	Z301 20TN/BK	ILLUMINATION GROUND
6	P301 20LG/OR	DRIVER DOOR SWITCH ILLUMINATION DRIVER
7	P311 20LG/VT	DRIVER SEAT RECLINER/LUMBAR OUT SWITCH MUX
8	P309 20LG/VT	DRIVER SEAT HORIZONTAL/LUMBAR IN SWITCH MUX
9	P200 20LG/YL	DRIVER SEAT FRONT RISER/PEDAL FORWARD SWITCH MUX
10	P7 20LG/DG	DRIVER HEATED SEAT SWITCH MUX
11	G200 20VT/BR	MEMORY SELECT SWITCH MUX
12	P202 20LG/DB	DRIVER SEAT REAR RISER/PEDAL BACK SWITCH MUX



DOOR MODULE-DRIVER C3

DOOR MODULE-DRIVER C3 - BLACK 20 WAY

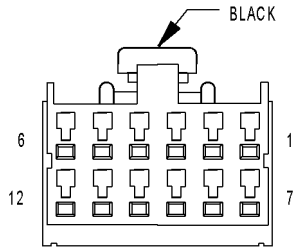
CAV	CIRCUIT	FUNCTION
1	Z75 20BK/VT	GROUND
2	P65 22VT/TN	DRIVER MIRROR HORIZONTAL POSITION SIGNAL
3	-	-
4	-	-
5	Q1 20OR/WT	DRIVER REAR WINDOW SWITCH MUX
6	P69 22WT/TN	DRIVER MIRROR SENSOR GROUND
7	M43 20OR/LB	LEFT DOOR COURTESY LAMP DRIVER
8	E25 20OR/GY	PANEL LAMPS DRIVER
9	P73 22TN/VT	DRIVER MIRROR COMMON DRIVER
10	P75 22TN/LG	DRIVER MIRROR HORIZONTAL DRIVER
11	G75 20VT	DRIVER DOOR AJAR SWITCH SENSE
12	P67 22OR/TN	DRIVER MIRROR VERTICAL POSITION SIGNAL
13	-	-
14	C17 20LB/WT	DRIVER HEATED MIRROR FEED
15	D25 20WT/VT	PCI BUS
16	-	-
17	Z321 20BK/BR	GROUND
18	P53 20LG/OR	DRIVER HEATED MIRROR DRIVER
19	-	-
20	P71 22TN/DG	DRIVER MIRROR VERTICAL DRIVER



DOOR MODULE- PASSENGER C1

DOOR MODULE-PASSENGER C1 - GRAY 14 WAY

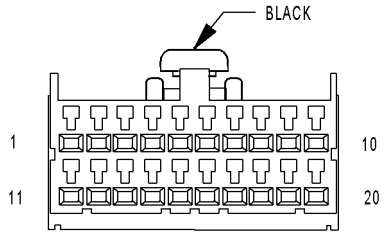
CAV	CIRCUIT	FUNCTION
1	-	-
2	A214 18RD/LB	FUSED B(+)
3	P222 18VT/DG	DOOR LOCK DRIVER
4	P292 18VT/LG	DOOR UNLOCK DRIVER
5	Q212 14OR/VT	PASSENGER REAR WINDOW DRIVER (DOWN)
6	Q112 14OR/BR	PASSENGER REAR WINDOW DRIVER (UP)
7	F516 12PK	FUSED DOOR NODE RELAY OUTPUT
8	-	-
9	G982 20VT/TN	GROUND
10	D123 20WT/BR	FLASH PROGRAM ENABLE
11	-	-
12	Q22 14VT/OR	PASSENGER WINDOW DRIVER (DOWN)
13	Q12 14BR/OR	PASSENGER WINDOW DRIVER (UP)
14	Z822 12BK/BR	GROUND



DOOR MODULE-PASSENGER C2

DOOR MODULE-PASSENGER C2 - BLACK 12 WAY

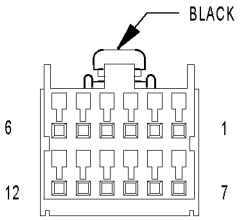
CAV	CIRCUIT	FUNCTION
1	-	-
2	P84 20TN/VT	PASSENGER HEATED SEAT HIGH INDICATOR DRIVER
3	P82 20TN/DG	PASSENGER HEATED SEAT LOW INDICATOR DRIVER
4	P988 20LG/TN	SEAT SWITCH MUX RETURN
5	Z302 20LG/BK	ILLUMINATION GROUND
6	P302 20TN/OR	PASSENGER DOOR SWITCH ILLUMINATION DRIVER
7	P308 20LG/VT	PASSENGER SEAT RECLINER SWITCH MUX
8	P310 20LG/OR	PASSENGER SEAT HORIZONTAL SWITCH MUX
9	-	-
10	P8 20LG/WT	PASSENGER HEATED SEAT SWITCH MUX
11	-	-
12	-	-



DOOR MODULE- PASSENGER C3

DOOR MODULE-PASSENGER C3 - BLACK 20 WAY

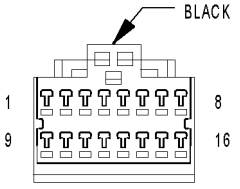
CAV	CIRCUIT	FUNCTION
1	Z74 20BK/WT	GROUND
2	P68 22TN/YL	PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
3	-	-
4	-	-
5	Q2 20WT/TN	PASSENGER REAR WINDOW SWITCH MUX
6	P66 22TN/LG	PASSENGER MIRROR SENSOR GROUND
7	M44 20OR/DB	RIGHT DOOR COURTESY LAMP DRIVER
8	E26 20OR/GY	PANEL LAMPS DRIVER
9	P70 22TN/LB	PASSENGER MIRROR COMMON DRIVER
10	P74 22TN/OR	PASSENGER MIRROR HORIZONTAL DRIVER
11	G74 20VT/WT	PASSENGER DOOR AJAR SWITCH SENSE
12	P64 22TN	PASSENGER MIRROR VERTICAL POSITION SIGNAL
13	-	-
14	C16 20DB/GY	PASSENGER HEATED MIRROR FEED
15	D25 20WT/VT	PCI BUS
16	-	-
17	Z322 20BK/BR	GROUND
18	P54 20OR/LG	PASSENGER HEATED MIRROR DRIVER
19	-	-
20	P72 20TN/GY	PASSENGER MIRROR VERTICAL DRIVER



DVD SCREEN

DVD SCREEN - BLACK 12 WAY

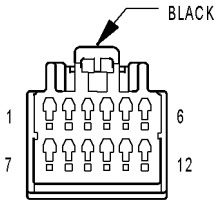
CAV	CIRCUIT	FUNCTION
1	X114 20GY/TN	FUSED B(+)
2	X211 20YL/GY	IGNITION RUN/ACC SIGNAL
3	X963 22GY/LG	HEADPHONE I/R XMTR ENABLE
4	X961 22GY/LB	HEADPHONE AUDIO SIGNAL LEFT
5	X915 22GY/LB	VIDEO CONTROL
6	X515 22GY/OR	VIDEO SIGNAL
7	X530 20GY/DB	VIDEO RETURN
8	-	-
9	X555 22VT/OR	VIDEO PLAY SIGNAL
10	X960 22GY/OR	HEADPHONE AUDIO SIGNAL RIGHT
11	X962 22GY/TN	HEADPHONE RETURN
12	X955 22	SHIELD



DVD/CD CHANGER C1

DVD/CD CHANGER C1 - BLACK 16 WAY

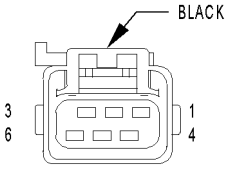
CAV	CIRCUIT	FUNCTION
1	A118 20RD/OR	FUSED B(+)
2	-	-
3	E14 20OR/TN	PANEL LAMPS DRIVER
4	-	-
5	-	-
6	-	-
7	-	-
8	X40 22GY/WT	AUDIO OUT RIGHT
9	Z530 20GY/BK	GROUND
10	-	-
11	X112 20DG/GY	IGNITION RUN/ACC SIGNAL
12	D25 20WT/VT	PCI BUS
13	-	-
14	-	-
15	X140 22GY/OR	COMMON AUDIO
16	X41 22DG/WT	AUDIO OUT LEFT



DVD/CD CHANGER C2

DVD/CD CHANGER C2 - BLACK 12 WAY

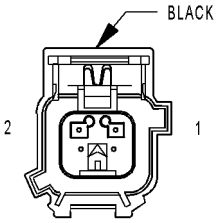
CAV	CIRCUIT	FUNCTION
1	X515 22GY/OR	VIDEO SIGNAL
2	X915 22GY/LB	VIDEO CONTROL
3	X961 22GY/OR	HEADPHONE AUDIO SIGNAL LEFT
4	X963 22WT	HEADPHONE I/R XMTR ENABLE
5	X211 20YL/GY	IGNITION RUN/ACC SIGNAL
6	X114 20GY/TN	FUSED B(+)
7	X955 22	SHIELD
8	X962 22DG/WT	HEADPHONE RETURN
9	X960 22GY/WT	HEADPHONE AUDIO SIGNAL RETURN
10	X555 22VT/OR	VIDEO PLAY SIGNAL
11	-	-
12	X530 20GY/DB	VIDEO RETURN



EGR SOLENOID

EGR SOLENOID - BLACK 6 WAY

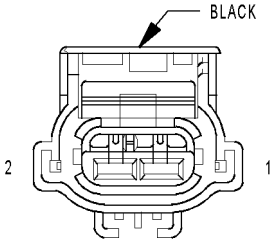
CAV	CIRCUIT	FUNCTION
1	K34 20DB/LG	EGR SIGNAL
2	F855 20PK/YL	5 VOLT SUPPLY
3	K900 20DB/DG	SENSOR GROUND
4	Z335 18BK/WT	GROUND
5	-	-
6	K35 18DB/VT	EGR SOL CONTROL



ENGINE COOLANT TEMPERATURE SENSOR

ENGINE COOLANT TEMPERATURE SENSOR - BLACK 2 WAY

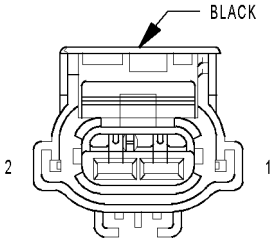
CAV	CIRCUIT	FUNCTION
1	K900 20DB/DG	SENSOR GROUND
2	K2 18VT/OR	ECT SIGNAL



ENGINE OIL PRESSURE SWITCH

ENGINE OIL PRESSURE SWITCH - BLACK 2 WAY

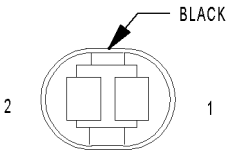
CAV	CIRCUIT	FUNCTION
1	G6 16VT/GY	OIL PRESSURE SIGNAL
2	-	-



EVAP/ PURGE SOLENOID

EVAP/PURGE SOLENOID - BLACK 2 WAY

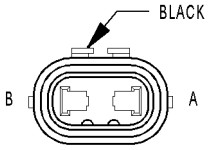
CAV	CIRCUIT	FUNCTION
1	K52 20DB/WT	EVAP PURGE CONTROL
2	K70 20DB/BR	EVAP PURGE RETURN



EVAPORATOR TEMPERATURE SENSOR

EVAPORATOR TEMPERATURE SENSOR - BLACK 2 WAY

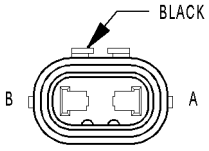
CAV	CIRCUIT	FUNCTION
1	C21 20DB/LG	EVAPORATOR TEMPERATURE SENSOR SIGNAL
2	C121 20DB/DG	SENSOR GROUND



FOG LAMP-LEFT

FOG LAMP-LEFT - BLACK 2 WAY

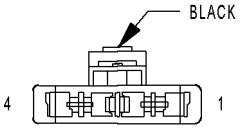
CAV	CIRCUIT	FUNCTION
A	L89 18WT/YL	LEFT FRONT FOG LAMP DRIVER
B	Z349 18BK/YL	GROUND



FOG LAMP-RIGHT

FOG LAMP-RIGHT - BLACK 2 WAY

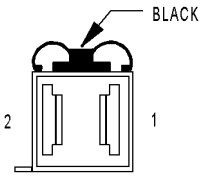
CAV	CIRCUIT	FUNCTION
A	L90 18WT/OR	RIGHT FRONT FOG LAMP DRIVER
B	Z348 18BK/OR	GROUND



FRONT BLOWER POWER MODULE C1

FRONT BLOWER POWER MODULE C1 - BLACK 4 WAY

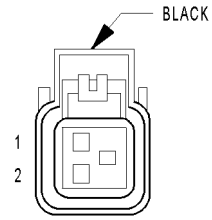
CAV	CIRCUIT	FUNCTION
1	-	-
2	Z134 12BK/OR	GROUND
3	C56 20DB/LB	FRONT BLOWER MOTOR CONTROL
4	C7 12DB	FUSED FRONT BLOWER MOTOR RELAY OUTPUT



FRONT BLOWER POWER MODULE C2

FRONT BLOWER POWER MODULE C2 - BLACK 2 WAY

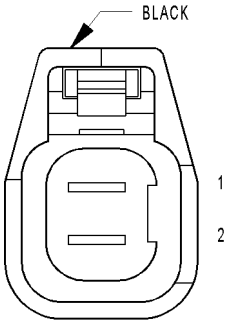
CAV	CIRCUIT	FUNCTION
1	C112 12DG	BLOWER MOTOR SUPPLY
2	C113 12BK	BLOWER MOTOR GROUND



FUEL INJECTOR NO. 1 (3.8L)

FUEL INJECTOR NO. 1 (3.8L) - BLACK 2 WAY

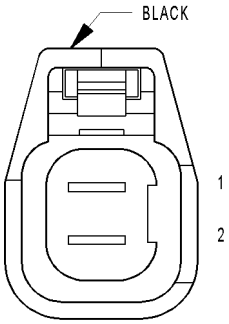
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K11 16BR/YL	INJECTOR CONTROL NO. 1



FUEL INJECTOR NO. 1 (3.5L)

FUEL INJECTOR NO. 1 (3.5L) - BLACK 2 WAY

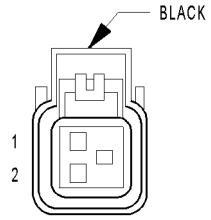
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K11 16BR/YL	INJECTOR CONTROL NO. 1



FUEL INJECTOR NO. 2 (3.5L)

FUEL INJECTOR NO. 2 (3.5L) - BLACK 2 WAY

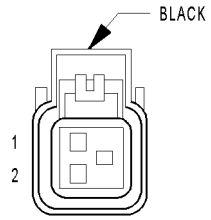
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K12 16BR/DB	INJECTOR CONTROL NO. 2



FUEL INJECTOR NO. 2 (3.8L)

FUEL INJECTOR NO. 2 (3.8L) - BLACK 2 WAY

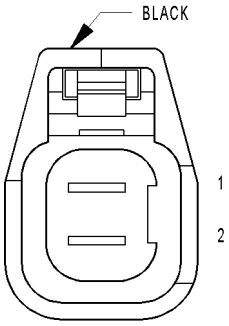
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K12 16BR/DB	INJECTOR CONTROL NO. 2



FUEL INJECTOR NO. 3 (3.8L)

FUEL INJECTOR NO. 3 (3.8L) - BLACK 2 WAY

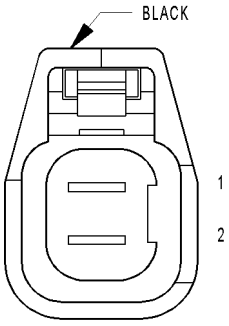
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K13 16BR/LB	INJECTOR CONTROL NO. 3



FUEL INJECTOR NO. 3 (3.5L)

FUEL INJECTOR NO. 3 (3.5L) - BLACK 2 WAY

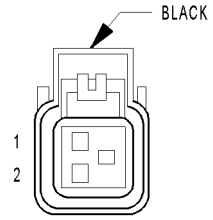
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K13 16BR/LB	INJECTOR CONTROL NO. 3



FUEL INJECTOR NO. 4 (3.5L)

FUEL INJECTOR NO. 4 (3.5L) - BLACK 2 WAY

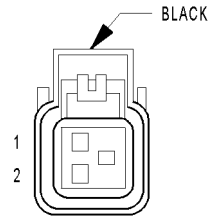
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K14 16BR/TN	INJECTOR CONTROL NO. 4



FUEL INJECTOR NO. 4 (3.8L)

FUEL INJECTOR NO. 4 (3.8L) - BLACK 2 WAY

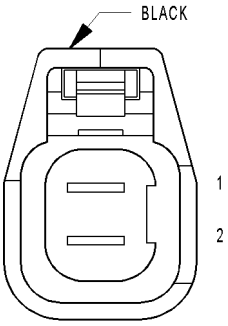
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K14 16BR/TN	INJECTOR CONTROL NO. 4



FUEL INJECTOR NO. 5 (3.8L)

FUEL INJECTOR NO. 5 (3.8L) - BLACK 2 WAY

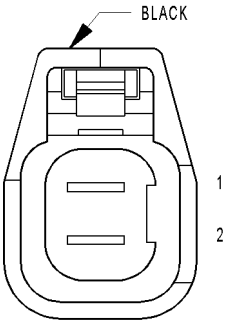
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K38 16BR/OR	INJECTOR CONTROL NO. 5



FUEL INJECTOR NO. 5 (3.5L)

FUEL INJECTOR NO. 5 (3.5L) - BLACK 2 WAY

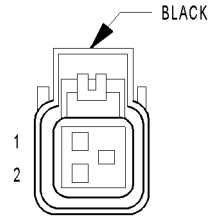
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K38 16BR/OR	INJECTOR CONTROL NO. 5



FUEL INJECTOR NO. 6 (3.5L)

FUEL INJECTOR NO. 6 (3.5L) - BLACK 2 WAY

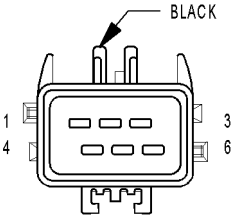
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K58 16BR/VT	INJECTOR CONTROL NO. 6



FUEL INJECTOR NO. 6 (3.8L)

FUEL INJECTOR NO. 6 (3.8L) - BLACK 2 WAY

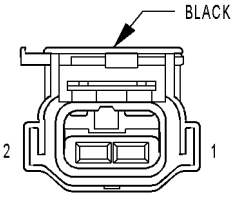
CAV	CIRCUIT	FUNCTION
1	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K58 16BR/VT	INJECTOR CONTROL NO. 6



FUEL PUMP MODULE

FUEL PUMP MODULE - BLACK 6 WAY

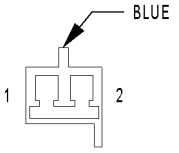
CAV	CIRCUIT	FUNCTION
1	N1 16DB/OR	FUEL PUMP RELAY OUTPUT
2	N4 20DB/YL	FUEL LEVEL SENSOR SIGNAL NO. 1
3	N5 20DB/WT	FUEL LEVEL SENSOR SIGNAL NO. 2
4	-	-
5	Z210 20BK/LB	GROUND
6	Z201 16BK	GROUND



GENERATOR

GENERATOR - BLACK 2 WAY

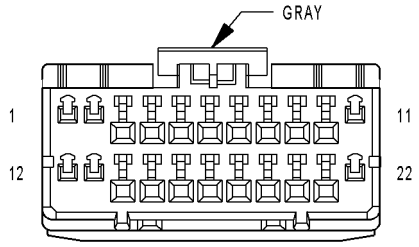
CAV	CIRCUIT	FUNCTION
1	Z20 18BR/BK	GROUND
2	K20 18BR/GY	GEN FIELD CONTROL



GLOVE BOX LAMP

GLOVE BOX LAMP - BLUE 2 WAY

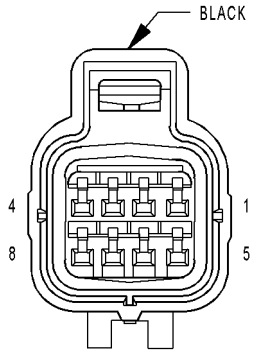
CAV	CIRCUIT	FUNCTION
1	M28 18YL/TN	GLOVE BOX LAMP DRIVER
2	Z328 20BK/TN	GROUND



HANDS FREE MODULE

HANDS FREE MODULE - GRAY 22 WAY

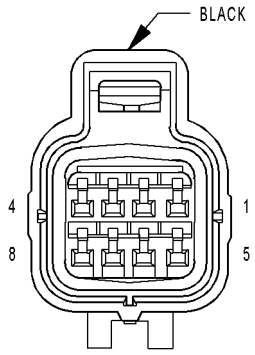
CAV	CIRCUIT	FUNCTION
1	A114 20GY/RD	FUSED B(+)
2	F316 20PK/OR	FUSED ACCESSORY RELAY OUTPUT
3	-	-
4	-	-
5	X722 20DG/WT	MICROPHONE 2 IN(+)
6	-	-
7	-	-
8	X704 20DG/YL	RIGHT AUDIO OUTPUT
9	X703 20DG/OR	LEFT AUDIO OUTPUT
10	-	-
11	-	-
12	-	-
13	-	-
14	D25 20WT/VT	PCI BUS
15	X730 20GY/YL	VOICE RECOGNITION/PHONE SWITCH SIGNAL
16	X712 20DG/LB	MICROPHONE 1 IN(+)
17	X792 20LB/DG	MICROPHONE IN(-)
18	-	-
19	-	-
20	-	-
21	X835 20OR/GY	SENSOR GROUND
22	Z717 18BK/YL	GROUND



HEADLAMP-LEFT

HEADLAMP-LEFT - BLACK 8 WAY

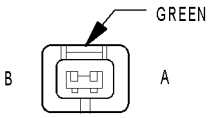
CAV	CIRCUIT	FUNCTION
1	L33 18WT/DG	LEFT HIGH BEAM LAMP DRIVER
2	Z345 18BK/LB	GROUND
3	L43 18WT/DB	LEFT LOW BEAM LAMP DRIVER
4	Z343 18BK/LG	GROUND
5	Z377 20BK/BR	GROUND
6	L77 20WT/BR	LEFT FRONT PARK LAMP DRIVER
7	L61 18LG/WT	LEFT FRONT TURN SIGNAL LAMP DRIVER
8	L777 20WT/VT	LEFT FRONT SIDE MARKER LAMP DRIVER



HEADLAMP-RIGHT

HEADLAMP-RIGHT - BLACK 8 WAY

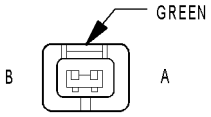
CAV	CIRCUIT	FUNCTION
1	L34 16WT/GY	RIGHT HIGH BEAM LAMP DRIVER
2	Z346 16BK/LG	GROUND
3	L44 16TN/WT	RIGHT LOW BEAM LAMP DRIVER
4	Z344 16BK/TN	GROUND
5	Z378 20BK/OR	GROUND
6	L78 20OR/WT	RIGHT FRONT PARK LAMP DRIVER
7	L60 18WT/TN	RIGHT FRONT TURN SIGNAL LAMP DRIVER
8	L778 20WT/LB	RIGHT FRONT SIDE MARKER LAMP DRIVER



HEATED SEAT
BACK-DRIVER

HEATED SEAT BACK-DRIVER - GREEN 2 WAY

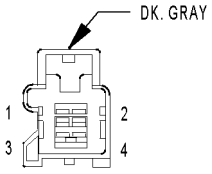
CAV	CIRCUIT	FUNCTION
A	P88 18BK	DRIVER HEATED SEAT DRIVER
B	P94 18BK	DRIVER SEAT HEATER GROUND



HEATED SEAT
BACK-PASSENGER

HEATED SEAT BACK-PASSENGER - GREEN 2 WAY

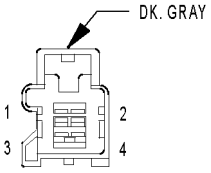
CAV	CIRCUIT	FUNCTION
A	P98 18BK	PASSENGER HEATED SEAT DRIVER
B	P97 18BK	PASSENGER SEAT HEATER GROUND



HEATED SEAT
CUSHION-DRIVER

HEATED SEAT CUSHION-DRIVER - DK. GRAY 4 WAY

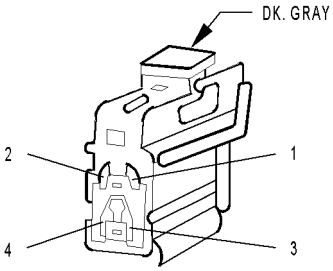
CAV	CIRCUIT	FUNCTION
1	P87 18LG/LB	DRIVER SEAT HEATER B(+) DRIVER
2	P85 20LG/DG	DRIVER SEAT TEMPERATURE SENSOR 5 VOLT SUPPLY
3	P89 20LG/OR	DRIVER SEAT TEMPERATURE SENSOR INPUT
4	P94 18LG/TN	DRIVER SEAT HEATER GROUND



HEATED SEAT
CUSHION-PASSENGER

HEATED SEAT CUSHION-PASSENGER - DK. GRAY 4 WAY

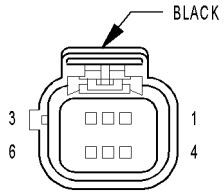
CAV	CIRCUIT	FUNCTION
1	P95 18LG/WT	PASSENGER SEAT HEATER B(+) DRIVER
2	-	-
3	-	-
3	P97 18LG/YL	PASSENGER SEAT HEATER GROUND



HEATED SEAT
CUSHION-PASSENGER
(SEAT CUSHION SIDE)

HEATED SEAT CUSHION-PASSENGER (SEAT CUSHION SIDE) - DK. GRAY 4 WAY

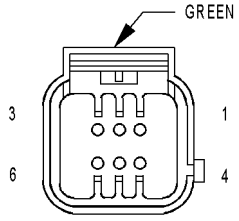
CAV	CIRCUIT	FUNCTION
1	RD	PASSENGER SEAT HEATER B(+) DRIVER
2	-	-
3	-	-
4	BK	PASSENGER SEAT HEATER GROUND



HEATED SEAT SWITCH- LEFT MIDDLE ROW

HEATED SEAT SWITCH-LEFT MIDDLE ROW - BLACK 6 WAY

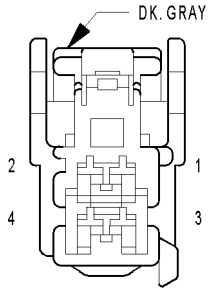
CAV	CIRCUIT	FUNCTION
1	P181 20LG/DB	LEFT MIDDLE ROW SEAT LOW INDICATOR DRIVER
2	E12 18OR/GY	PANEL LAMPS DRIVER
3	Z870 20BK/YL	GROUND
4	F525 16TN/PK	FUSED RUN RELAY OUTPUT
5	P183 20LG/YL	LEFT MIDDLE ROW SEAT HIGH INDICATOR DRIVER
6	P77 20LG	LEFT MIDDLE ROW SEAT SWITCH MUX



HEATED SEAT SWITCH- RIGHT MIDDLE ROW

HEATED SEAT SWITCH-RIGHT MIDDLE ROW - GREEN 6 WAY

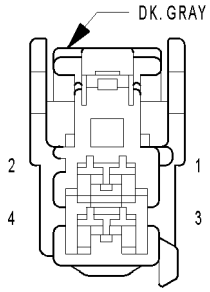
CAV	CIRCUIT	FUNCTION
1	P182 20LG/OR	RIGHT MIDDLE ROW SEAT LOW INDICATOR DRIVER
2	E12 18OR/GY	PANEL LAMPS DRIVER
3	Z870 20BK/YL	GROUND
4	F525 16TN/PK	FUSED RUN RELAY OUTPUT
5	P184 20LG/GY	RIGHT MIDDLE ROW SEAT HIGH INDICATOR DRIVER
6	P96 20LB/LG	RIGHT MIDDLE ROW SEAT SWITCH MUX



HEATED SEAT- LEFT MIDDLE ROW

HEATED SEAT-LEFT MIDDLE ROW - DK. GRAY 4 WAY

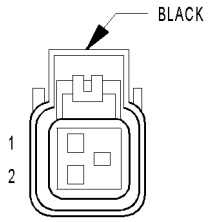
CAV	CIRCUIT	FUNCTION
1	P187 16LG/BR	LEFT MIDDLE ROW SEAT HEATER B(+) DRIVER
2	Z870 18BK/YL	GROUND
3	P189 20LG/WT	MIDDLE ROW SEAT TEMPERATURE SENSOR 5 VOLT SUPPLY
4	P197 20LG/DG	LEFT MIDDLE ROW SEAT TEMPERATURE SENSOR INPUT



HEATED SEAT- RIGHT MIDDLE ROW

HEATED SEAT-RIGHT MIDDLE ROW - DK. GRAY 4 WAY

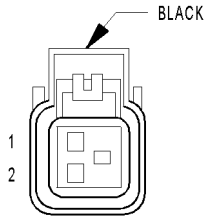
CAV	CIRCUIT	FUNCTION
1	P188 16LG/VT	RIGHT MIDDLE ROW SEAT HEATER B(+) DRIVER
2	Z870 18BK/YL	GROUND
3	P189 20LG/WT	MIDDLE ROW SEAT TEMPERATURE SENSOR 5 VOLT SUPPLY
4	P196 20LG/LB	RIGHT MIDDLE ROW SEAT TEMPERATURE SENSOR INPUT



HORN- HIGH NOTE

HORN-HIGH NOTE - BLACK 2 WAY

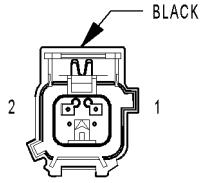
CAV	CIRCUIT	FUNCTION
1	Z299 16BK/OR	GROUND
2	X2 16DG/OR	HORN RELAY OUTPUT



HORN- LOW NOTE

HORN-LOW NOTE - BLACK 2 WAY

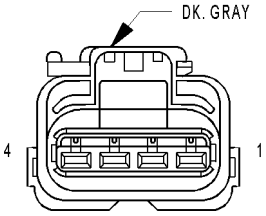
CAV	CIRCUIT	FUNCTION
1	Z298 16BK/DB	GROUND
2	X2 16DG/OR	HORN RELAY OUTPUT



IDLE AIR CONTROL MOTOR

IDLE AIR CONTROL MOTOR - BLACK 2 WAY

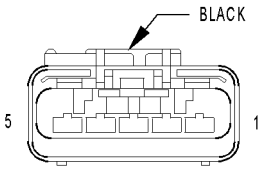
CAV	CIRCUIT	FUNCTION
1	K61 20VT/GY	IAC MOTOR CONTROL
2	K961 20BR/VT	IAC RETURN



IGNITION COIL (3.8L)

IGNITION COIL (3.8L) - DK. GRAY 4 WAY

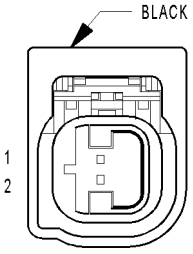
CAV	CIRCUIT	FUNCTION
1	K18 16DB/OR	COIL CONTROL NO. 3
2	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
3	K19 16DB/DG	COIL CONTROL NO. 1
4	K17 16DB/TN	COIL CONTROL NO. 2



IGNITION SWITCH

IGNITION SWITCH - BLACK 5 WAY

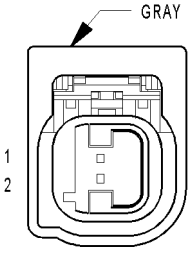
CAV	CIRCUIT	FUNCTION
1	G900 22OR/VT	IGNITION SWITCH SENSE RETURN
2	G20 22VT/BR	IGNITION SWITCH SENSE
3	F20 20PK/GY	IGNITION SWITCH OUTPUT (RUN-START)
3	F20 20PK/GY	IGNITION SWITCH OUTPUT (RUN-START)
4	T751 20YL	IGNITION SWITCH OUTPUT (START)
5	A106 20LB/RD	FUSED B(+)



IMPACT SENSOR-LEFT FRONT

IMPACT SENSOR-LEFT FRONT - BLACK 2 WAY

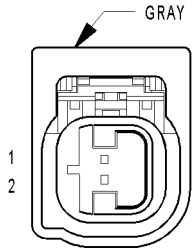
CAV	CIRCUIT	FUNCTION
1	R81 20LB/WT	LEFT FRONT IMPACT SENSOR GROUND
2	R79 20LB/VT	LEFT FRONT IMPACT SENSOR SIGNAL



IMPACT SENSOR-LEFT SIDE 1

IMPACT SENSOR-LEFT SIDE 1 - GRAY 2 WAY

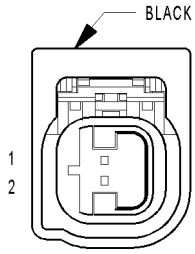
CAV	CIRCUIT	FUNCTION
1	R15 20LG/BR	LEFT SIDE IMPACT SENSOR 1 GROUND
2	R13 20LG/VT	LEFT SIDE IMPACT SENSOR 1 SIGNAL



IMPACT SENSOR- LEFT SIDE 2

IMPACT SENSOR-LEFT SIDE 2 - GRAY 2 WAY

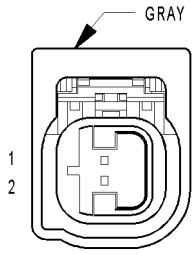
CAV	CIRCUIT	FUNCTION
1	R19 20LG/WT	LEFT SIDE IMPACT SENSOR 2 GROUND
2	R17 20LG	LEFT SIDE IMPACT SENSOR 2 SIGNAL



IMPACT SENSOR- RIGHT FRONT

IMPACT SENSOR-RIGHT FRONT - BLACK 2 WAY

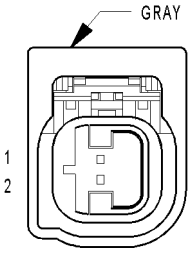
CAV	CIRCUIT	FUNCTION
1	R82 20WT/LB	RIGHT FRONT IMPACT SENSOR GROUND
2	R80 20LB/TN	RIGHT FRONT IMPACT SENSOR SIGNAL



IMPACT SENSOR- RIGHT SIDE 1

IMPACT SENSOR-RIGHT SIDE 1 - GRAY 2 WAY

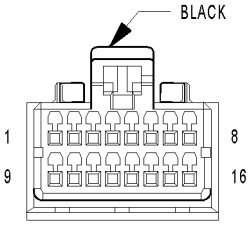
CAV	CIRCUIT	FUNCTION
1	R16 20BR/LG	RIGHT SIDE IMPACT SENSOR 1 GROUND
2	R14 20TN/LG	RIGHT SIDE IMPACT SENSOR 1 SIGNAL



IMPACT SENSOR- RIGHT SIDE 2

IMPACT SENSOR-RIGHT SIDE 2 - GRAY 2 WAY

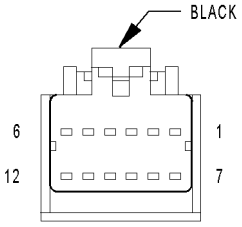
CAV	CIRCUIT	FUNCTION
1	R20 20WT/LG	RIGHT SIDE IMPACT SENSOR 2 GROUND
2	R18 20LB	RIGHT SIDE IMPACT SENSOR 2 SIGNAL



INSTRUMENT CLUSTER C1

INSTRUMENT CLUSTER C1 - BLACK 16 WAY

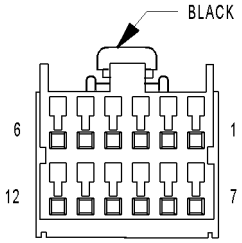
CAV	CIRCUIT	FUNCTION
1	A108 18LG/RD	FUSED B(+)
2	-	-
3	-	-
4	-	-
5	G150 22VT/BR	INSTRUMENT CLUSTER WAKE UP SIGNAL
6	D25 20WT/VT	PCI BUS
7	-	-
8	G106 20VT/OR	EVIC MUX SIGNAL
9	E12 20OR/GY	PANEL LAMPS DRIVER
10	L160 22WT/TN	RIGHT TURN SIGNAL
11	L161 20WT/LG	LEFT TURN SIGNAL
12	B25 20DG/WT	PARK BRAKE SWITCH SENSE
13	D123 20WT/BR	FLASH PROGRAM ENABLE
14	G907 20VT	EVIC/NAV MUX RETURN
15	-	-
16	Z18 18BK/LB	GROUND



INSTRUMENT CLUSTER C2 (NAVIGATION)

INSTRUMENT CLUSTER C2 (NAVIGATION) - BLACK 12 WAY

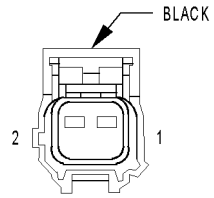
CAV	CIRCUIT	FUNCTION
1	G400 20VT/LB	RED SIGNAL
2	G420 20VT/BR	GREEN SIGNAL
3	G410 20VT/LG	BLUE SIGNAL
4	G430 20VT/GY	SCREEN SYNCHRONIZE
5	-	-
6	G107 22VT/YL	NAV MUX SIGNAL
7	-	-
8	-	-
9	-	-
10	-	-
11	G591 22	SHIELD
12	-	-



INSTRUMENT PANEL SWITCH POD

INSTRUMENT PANEL SWITCH POD - BLACK 12 WAY

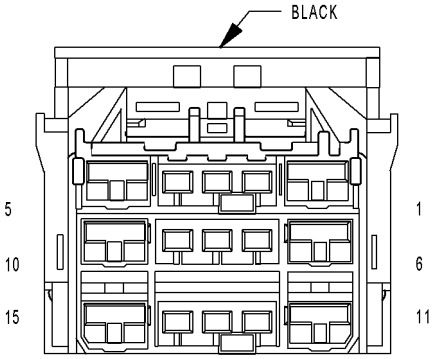
CAV	CIRCUIT	FUNCTION
1	A118 20RD/OR	FUSED B(+)
2	G106 20VT/OR	EVIC MUX SIGNAL
3	G107 22VT/YL (NAVIGATION)	NAV MUX SIGNAL
4	G69 22VT/WT	VTSS INDICATOR DRIVER
5	G104 20VT/GY	PASSENGER AIRBAG INDICATOR DRIVER
6	L91 20WT/DB	HAZARD SWITCH SENSE
7	E12 20OR/GY	PANEL LAMPS DRIVER
8	-	-
9	F20 20PK/GY	IGNITION SWITCH OUTPUT (RUN-START)
10	-	-
11	G907 20VT	EVIC/NAV MUX RETURN
12	Z108 20BK/LG	GROUND



INTAKE AIR TEMPERATURE SENSOR

INTAKE AIR TEMPERATURE SENSOR - BLACK 2 WAY

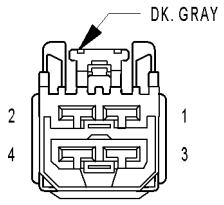
CAV	CIRCUIT	FUNCTION
1	K900 20DB/DG	SENSOR GROUND
2	K21 20BR/WT	IAT SIGNAL



INTEGRATED POWER MODULE C1

INTEGRATED POWER MODULE C1 - BLACK 15 WAY

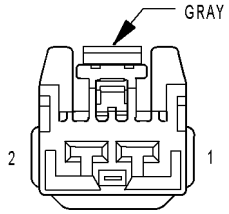
CAV	CIRCUIT	FUNCTION
1	A111 12DG/RD	FUSED B(+)
2	D25 20WT/VT	PCI BUS
3	A109 18OR/RD	FUSED B(+)
4	F500 18DG/PK	FUSED RUN RELAY OUTPUT
5	T750 12YL/GY	STARTER MOTOR RELAY OUTPUT
6	Z127 12BK/DG (ASSY. PLANT EVAC & FILL)	GROUND
7	-	-
8	-	-
9	-	-
10	A107 12TN/RD	FUSED B(+)
11	-	-
12	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
13	K136 18BR	MANIFOLD TUNING VALVE RELAY OUTPUT
14	C3 18DB/YL	A/C COMPRESSOR CLUTCH RELAY OUTPUT
15	-	-



INTEGRATED POWER MODULE C2

INTEGRATED POWER MODULE C2 - DK. GRAY 4 WAY

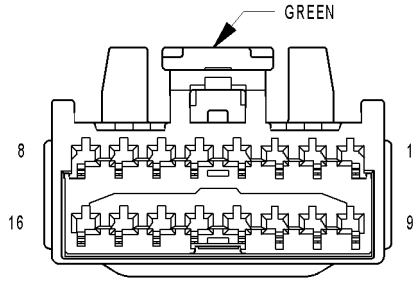
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	A101 12VT/RD	FUSED B(+)
4	F515 12PK/LB	FUSED DOOR NODE RELAY OUTPUT



INTEGRATED POWER MODULE C3

INTEGRATED POWER MODULE C3 - GRAY 2 WAY

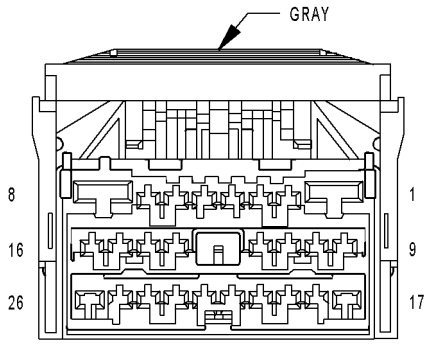
CAV	CIRCUIT	FUNCTION
1	-	-
2	A112 12OR/RD	FUSED B(+)



INTEGRATED POWER MODULE C4

INTEGRATED POWER MODULE C4 - GREEN 16 WAY

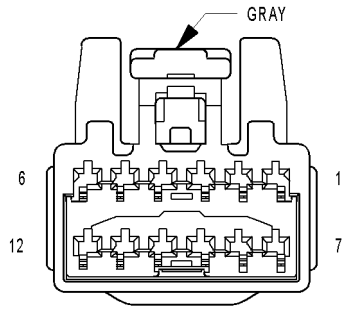
CAV	CIRCUIT	FUNCTION
1	F100 20PK/VT	ORC RUN DRIVER
2	X3 20DG/VT	HORN SWITCH SENSE
3	W7 20BR/GY	FRONT WIPER PARK SWITCH SENSE
4	T751 20YL	IGNITION SWITCH OUTPUT (START)
5	F306 16DB/PK	FUSED ACCESSORY RELAY OUTPUT
6	-	-
7	F307 16LB/PK	FUSED ACCESSORY RELAY OUTPUT
8	A214 18RD/LB	FUSED B(+)
9	-	-
10	-	-
11	D25 20WT/VT	PCI BUS
12	Z710 18GY/BK	GROUND
13	A118 20RD/OR	FUSED B(+)
14	A114 20GY/RD	FUSED B(+)
15	L72 20WT/OR	RIGHT TAIL LAMP DRIVER
16	A215 18RD/LG	FUSED B(+)



INTEGRATED POWER MODULE C5

INTEGRATED POWER MODULE C5 - GRAY 26 WAY

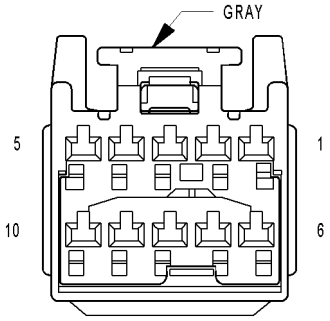
CAV	CIRCUIT	FUNCTION
1	-	-
2	L89 18WT/YL (FOG LAMPS)	LEFT FRONT FOG LAMP DRIVER
3	W1 18BR/TN	WASHER FLUID LEVEL SWITCH SENSE
4	-	-
5	W10 18BR	FRONT WASHER PUMP MOTOR CONTROL
6	L778 20WT/LB	RIGHT FRONT SIDE MARKER LAMP DRIVER
7	L777 20WT/VT	LEFT FRONT SIDE MARKER LAMP DRIVER
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-
13	W20 18BR/YL	REAR WASHER PUMP MOTOR CONTROL
14	Z118 18BK/YL	GROUND
15	-	-
16	L44 16TN/WT	RIGHT LOW BEAM LAMP DRIVER
17	L90 18WT/OR (FOG LAMPS)	RIGHT FRONT FOG LAMP DRIVER
18	L33 18WT/DG	LEFT HIGH BEAM LAMP DRIVER
19	-	-
20	-	-
21	-	-
22	L34 16WT/GY	RIGHT HIGH BEAM LAMP DRIVER
23	X2 16DG/OR	HORN RELAY OUTPUT
24	L77 20WT/BR	LEFT FRONT PARK LAMP DRIVER
25	L43 18WT/DB	LEFT LOW BEAM LAMP DRIVER
26	L78 20OR/WT	RIGHT FRONT PARK LAMP DRIVER



INTEGRATED POWER MODULE C6

INTEGRATED POWER MODULE C6 - GRAY 12 WAY

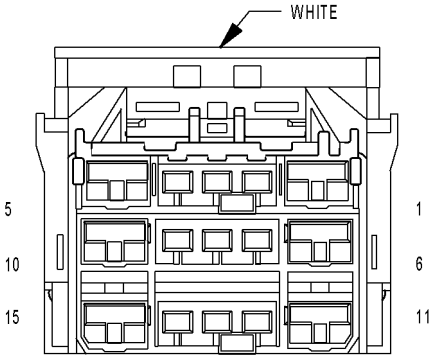
CAV	CIRCUIT	FUNCTION
1	-	-
2	F202 20PK/GY	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	D25 20WT/VT	PCI BUS
4	C13 20LB/OR	A/C CLUTCH RELAY CONTROL
5	-	-
6	K51 18BR/GY	AUTOMATIC SHUT DOWN RELAY CONTROL
7	-	-
8	-	-
9	F1 20PK/WT	IGNITION UNLOCK-RUN-START
10	K36 20DB/YL	MTV CONTROL
11	-	-
12	-	-



INTEGRATED POWER MODULE C7

INTEGRATED POWER MODULE C7 - GRAY 10 WAY

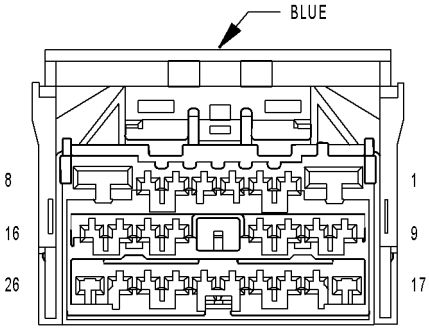
CAV	CIRCUIT	FUNCTION
1	T751 20YL	IGNITION SWITCH OUTPUT (START)
2	-	-
3	T752 20DG/OR	STARTER RELAY CONTROL
4	T15 20YL/BR	TRANSMISSION CONTROL RELAY CONTROL
5	-	-
6	-	-
7	-	-
8	Z115 18BK/OR	GROUND
9	T16 16YL/OR	TRANSMISSION CONTROL RELAY OUTPUT
10	K31 20BR	FUEL PUMP RELAY CONTROL



INTEGRATED POWER MODULE C8

INTEGRATED POWER MODULE C8 - WHITE 15 WAY

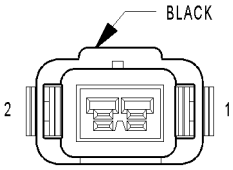
CAV	CIRCUIT	FUNCTION
1	F516 12PK	FUSED DOOR NODE RELAY OUTPUT
2	C51 18LB/BR	FUSED REAR BOOSTER FAN RELAY OUTPUT
3	W4 12BR/OR	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
4	F316 20PK/OR	FUSED ACCESSORY RELAY OUTPUT
5	A100 16RD/VT (TRAILER TOW)	FUSED B(+)
6	-	-
7	F504 20GY/PK	FUSED RUN RELAY OUTPUT
8	B20 20DG/OR	BRAKE FLUID LEVEL SWITCH SENSE
9	W3 12BR/WT	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT
10	A130 12VT/RD (POWER SUNROOF)	FUSED B(+)
11	C15 12DB/WT	REAR WINDOW DEFOGGER RELAY OUTPUT
12	-	-
13	A116 16YL/RD	FUSED B(+)
14	-	-
15	A110 12DG/RD	FUSED B(+)



INTEGRATED POWER MODULE C9

INTEGRATED POWER MODULE C9 - BLUE 26 WAY

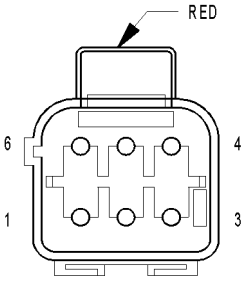
CAV	CIRCUIT	FUNCTION
1	A115 12YL/RD (POWER LIFTGATE)	FUSED B(+)
2	A106 20LB/RD	FUSED B(+)
3	A108 18LG/RD	FUSED B(+)
4	-	-
5	D123 20WT/BR	FLASH PROGRAM ENABLE
6	-	-
7	L71 20WT/GY	LEFT TAIL LAMP DRIVER
8	C7 12DB	FUSED FRONT BLOWER MOTOR RELAY OUTPUT
9	-	-
10	A701 18BR/RD	FUSED B(+)
11	-	-
12	-	-
13	F20 20PK/GY	IGNITION SWITCH OUTPUT (RUN-START)
14	-	-
15	-	-
16	F201 20PK/LB	ORC RUN-START DRIVER
17	-	-
18	-	-
19	F2 18PK/YL	IGNITION SWITCH OUTPUT (RUN-START)
20	L51 18WT/DG	BRAKE LAMP SWITCH OUTPUT
21	-	-
22	-	-
23	L3 18WT/VT	LICENSE LAMP DRIVER
24	N1 16DB/OR	FUEL PUMP RELAY OUTPUT
25	A105 18DB/RD	FUSED B(+)
26	F525 16TN/PK (MIDDLE ROW HEATED SEATS)	FUSED RUN RELAY OUTPUT



KNOCK SENSOR

KNOCK SENSOR - BLACK 2 WAY

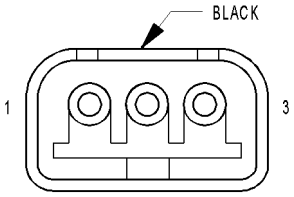
CAV	CIRCUIT	FUNCTION
1	K42 20DB/OR	KS SIGNAL
2	K942 20BR/LG	KS RETURN



LICENSE LAMP (POWER LIFTGATE)

LICENSE LAMP (POWER LIFTGATE) - RED 6 WAY

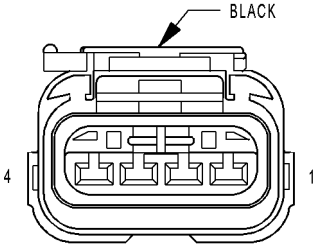
CAV	CIRCUIT	FUNCTION
1	L3 18WT/VT	LICENSE LAMP DRIVER
2	Z367 20BK/BR	GROUND
3	Q94 22TN/LG	LIFTGATE CHIME DRIVER
4	Z294 20BK/DG	GROUND
5	G32 22VT/LB	LIFTGATE TEMPERATURE SENSOR SIGNAL
6	Q901 20OR/VT	GROUND



LICENSE LAMP (MANUAL LIFTGATE)

LICENSE LAMP (MANUAL LIFTGATE) - BLACK 3 WAY

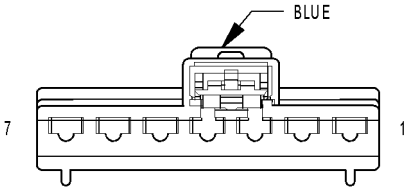
CAV	CIRCUIT	FUNCTION
1	L3 18WT/VT	LICENSE LAMP DRIVER
2	Z367 20BK/BR	GROUND
3	-	-



LIFTGATE CINCH/ RELEASE MOTOR (MANUAL LIFTGATE)

LIFTGATE CINCH/RELEASE MOTOR (MANUAL LIFTGATE) - BLACK 4 WAY

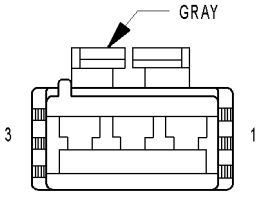
CAV	CIRCUIT	FUNCTION
1	Z78 20BK/OR	GROUND
2	G78 22VT/OR	LIFTGATE AJAR SWITCH SENSE
3	P31 18TN/YL	LIFTGATE RELEASE DRIVER
4	Z245 18BK/GY	GROUND



LIFTGATE CINCH/ RELEASE MOTOR (POWER LIFTGATE)

LIFTGATE CINCH/RELEASE MOTOR (POWER LIFTGATE) - BLUE 7 WAY

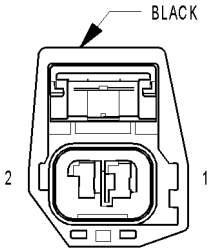
CAV	CIRCUIT	FUNCTION
1	Q901 20OR/VT	GROUND
2	G78 22VT/OR	LIFTGATE AJAR SWITCH SENSE
3	Q60 22OR/YL	LIFTGATE PAWL SWITCH SENSE
4	Z245 18BK/GY	GROUND
5	Q85 16TN/WT	LIFTGATE LATCH RELEASE DRIVER
6	Q84 16TN/GY	LIFTGATE LATCH CINCH DRIVER
7	Q83 18OR/GY	LIFTGATE LATCH CLUTCH DRIVER



LIFTGATE FLOOD LAMP

LIFTGATE FLOOD LAMP - GRAY 3 WAY

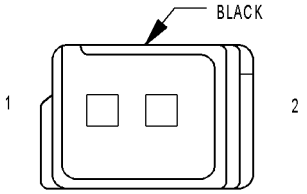
CAV	CIRCUIT	FUNCTION
1	Z311 20BK/VT	GROUND
2	-	-
3	M11 18YL/VT	LIFTGATE COURTESY LAMP DRIVER



LIFTGATE HANDLE SWITCH

LIFTGATE HANDLE SWITCH - BLACK 2 WAY

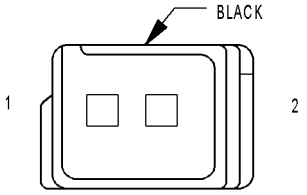
CAV	CIRCUIT	FUNCTION
1	P30 20TN/DG	LIFTGATE HANDLE SWITCH SENSE
2	Z87 20BK/LG (MANUAL LIFTGATE)	GROUND
2	Q901 20OR/VT (POWER LIFTGATE)	GROUND



LIFTGATE PINCH SENSOR-LEFT (POWER LIFTGATE)

LIFTGATE PINCH SENSOR-LEFT (POWER LIFTGATE) - BLACK 2 WAY

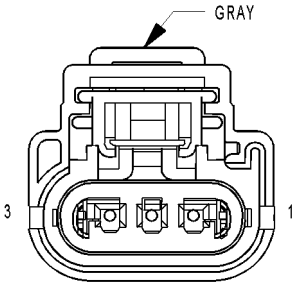
CAV	CIRCUIT	FUNCTION
1	Q77 20OR/DB	RIGHT PINCH SENSOR SIGNAL
2	Q75 20OR/LB	PINCH SENSOR SIGNAL



LIFTGATE PINCH SENSOR-RIGHT (POWER LIFTGATE)

LIFTGATE PINCH SENSOR-RIGHT (POWER LIFTGATE) - BLACK 2 WAY

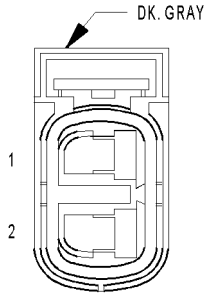
CAV	CIRCUIT	FUNCTION
1	Q77 20OR/DB	RIGHT PINCH SENSOR SIGNAL
2	Q901 20OR/VT	GROUND



MANIFOLD ABSOLUTE PRESSURE SENSOR

MANIFOLD ABSOLUTE PRESSURE SENSOR - GRAY 3 WAY

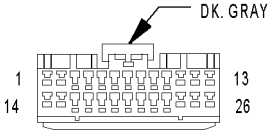
CAV	CIRCUIT	FUNCTION
1	K1 20VT/BR	MAP SIGNAL
2	K900 20DB/DG	SENSOR GROUND
3	F855 20PK/YL	5 VOLT SUPPLY



MANIFOLD TUNING VALVE SOLENOID (3.5L)

MANIFOLD TUNING VALVE SOLENOID (3.5L) - DK. GRAY 2 WAY

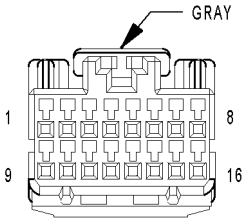
CAV	CIRCUIT	FUNCTION
1	Z110 20BK/LG	GROUND
2	K136 18BR	MANIFOLD TUNING VALVE RELAY OUTPUT



MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE C1

MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE C1 - DK. GRAY 26 WAY

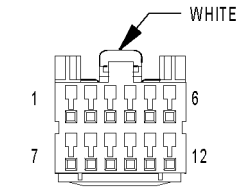
CAV	CIRCUIT	FUNCTION
1	P205 14LG/DB (ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS MOTOR FORWARD
2	P44 14LG/DG	PASSENGER SEAT RECLINER UP DRIVER
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-
11	D25 20WT/VT	PCI BUS
12	P42 14LG/GY	PASSENGER SEAT RECLINER DOWN DRIVER
13	P206 14LG/TN (ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS MOTOR REVERSE
14	P14 14LG/OR	PASSENGER SEAT HORIZONTAL FORWARD DRIVER
15	P95 18LG/WT (FRONT ROW HEATED SEATS)	PASSENGER SEAT HEATER B(+) DRIVER
16	G11 20VT/TN (ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS SENSOR FEED
17	-	-
18	-	-
19	G12 22VT/BR (ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS SENSOR SIGNAL
20	G912 20VT/WT (ADJUSTABLE PEDALS)	ADJUSTABLE PEDALS SENSOR RETURN
21	-	-
22	-	-
23	-	-
24	P97 18LG/YL (FRONT ROW HEATED SEATS)	PASSENGER SEAT HEATER GROUND
25	-	-
26	P16 14LG/BR	PASSENGER SEAT HORIZONTAL REARWARD DRIVER



MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE C2

MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE C2 - GRAY 16 WAY

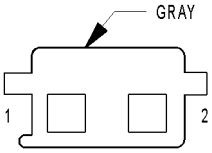
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	P25 20LG/VT	DRIVER SEAT HORIZONTAL POSITION SIGNAL
4	P47 20LG/LB	DRIVER SEAT RECLINER POSITION SIGNAL
5	P26 20LG	DRIVER SEAT FRONT RISER POSITION SIGNAL
6	P27 20LG/DB	DRIVER SEAT REAR RISER POSITION SIGNAL
7	-	-
8	-	-
9	-	-
10	-	-
11	P29 20LG/WT	DRIVER SEAT POSITION SENSOR 5 VOLT SUPPLY
12	P28 20LG/BR	DRIVER SEAT POSITION SENSOR GROUND
13	P85 20LG/DG (FRONT ROW HEATED SEATS)	DRIVER SEAT TEMPERATURE SENSOR 5 VOLT SUPPLY
14	-	-
15	-	-
16	P89 20LG/OR (FRONT ROW HEATED SEATS)	DRIVER SEAT TEMPERATURE SENSOR INPUT



MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE C3

MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE C3 - WHITE 12 WAY

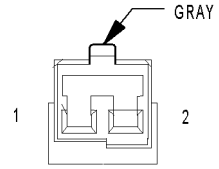
CAV	CIRCUIT	FUNCTION
1	P141 14LG/BR	DRIVER SEAT RECLINER DOWN DRIVER
2	P115 14LG/OR	DRIVER SEAT HORIZONTAL FORWARD DRIVER
3	P117 14LG/LB	DRIVER SEAT HORIZONTAL REARWARD DRIVER
4	P111 14LG/YL	DRIVER SEAT REAR UP DRIVER
5	P119 14LG/DG	DRIVER SEAT FRONT UP DRIVER
6	P94 18LG/TN (FRONT ROW HEATED SEATS)	DRIVER SEAT HEATER GROUND
7	P87 18LG/LB (FRONT ROW HEATED SEATS)	DRIVER SEAT HEATER B(+) DRIVER
8	P143 14LG/GY	DRIVER SEAT RECLINER UP DRIVER
9	P105 18LG (LUMBAR SEAT ADJUSTER)	DRIVER SEAT LUMBAR OUT DRIVER
10	P107 18LG/WT (LUMBAR SEAT ADJUSTER)	DRIVER SEAT LUMBAR IN DRIVER
11	P113 14LG/VT	DRIVER SEAT REAR DOWN DRIVER
12	P121 14LG/DB	DRIVER SEAT FRONT DOWN DRIVER



MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE C4

MEMORY/HEATED SEAT ADJUSTABLE PEDALS MODULE C4 - GRAY 2 WAY

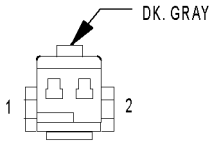
CAV	CIRCUIT	FUNCTION
1	A210 14OR/RD	FUSED B(+)
2	Z849 14BK/OR	GROUND



MODE DOOR ACTUATOR-FRONT

MODE DOOR ACTUATOR-FRONT - GRAY 2 WAY

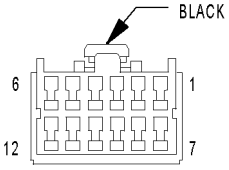
CAV	CIRCUIT	FUNCTION
1	C135 20DB/GY	FRONT MODE DOOR DRIVER (B)
2	C35 20LB/OR	FRONT MODE DOOR DRIVER (A)



MODE DOOR ACTUATOR-REAR

MODE DOOR ACTUATOR-REAR - DK. GRAY 2 WAY

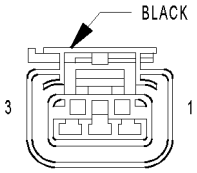
CAV	CIRCUIT	FUNCTION
1	C153 20DB/BR	REAR MODE DOOR DRIVER (A)
2	C53 20LB	REAR MODE DOOR DRIVER (B)



MULTI-FUNCTION SWITCH

MULTI-FUNCTION SWITCH - BLACK 12 WAY

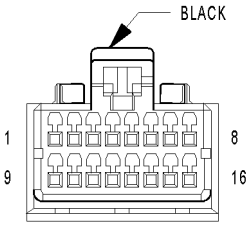
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	L306 20LB/WT	RIGHT TURN SWITCH SENSE
4	L305 22WT/LB	LEFT TURN SWITCH SENSE
5	E2 22OR/BR	PANEL LAMPS DIMMER SIGNAL
6	L307 22BR/WT	HEADLAMP SWITCH MUX SENSE
7	-	-
8	L87 20WT/OR	FRONT FOG SWITCH SENSE
9	Z102 20GY/BK	GROUND
10	L38 20DB/WT	OPTICAL HORN SIGNAL
11	L37 20WT/BR	HIGH BEAM SWITCH SENSE
12	L900 22WT/YL	HEADLAMP SWITCH MUX RETURN



NATURAL VACUUM LEAK DETECTION ASSEMBLY

NATURAL VACUUM LEAK DETECTION ASSEMBLY - BLACK 3 WAY

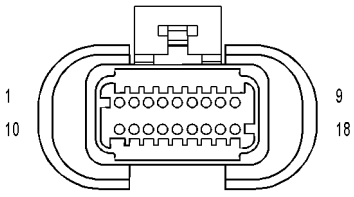
CAV	CIRCUIT	FUNCTION
1	Z166 18BK/WT	GROUND
2	K107 20VT/WT	NVLD SWITCH SIGNAL
3	K106 20VT/LB	NVLD SOL CONTROL



NAVIGATION MODULE

NAVIGATION MODULE - BLACK 16 WAY

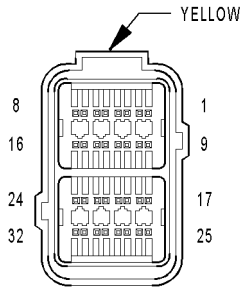
CAV	CIRCUIT	FUNCTION
1	A114 20GY/RD	FUSED B(+)
2	F316 20PK/OR	FUSED ACCESSORY RELAY OUTPUT
3	Z495 18BK/GY	GROUND
4	X400 20GY/WT	NAVIGATION AUDIO (+)
5	G591 22	SHIELD
6	G400 20VT/LB	RED SIGNAL
7	G420 20VT/BR	GREEN SIGNAL
8	-	-
9	-	-
10	-	-
11	-	-
12	X940 20GY/LB	NAVIGATION AUDIO (-)
13	-	-
14	G430 20VT/GY	SCREEN SYNCHRONIZE
15	G410 20VT/LG	BLUE SIGNAL
16	D25 20WT/VT	PCI BUS



OCCUPANT CLASSIFICATION MODULE

OCCUPANT CLASSIFICATION MODULE - 18 WAY

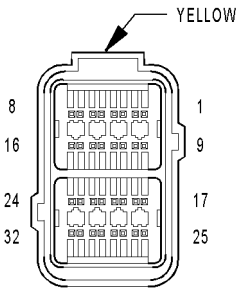
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	D105 20WT/OR	SEAT BELT TENSION SENSOR SIGNAL
5	Z104 18BK/LG	GROUND
6	R741 20LG/VT	PASSENGER BLADDER PRESSURE SENSOR SIGNAL
7	R740 20LG/OR	PASSENGER BLADDER PRESSURE SENSOR POWER
8	D25 20WT/VT	PCI BUS
9	F201 20PK/OR	ORC RUN-START DRIVER
10	-	-
11	-	-
12	-	-
13	-	-
14	R986 20LG/BR	SEAT BELT TENSION SENSOR GROUND
15	R941 20LG/DG	PASSENGER BLADDER PRESSURE SENSOR GROUND
16	R86 20LG/LB	SEAT BELT TENSION SENSOR POWER
17	-	-
18	-	-



OCCUPANT RESTRAINT CONTROLLER C1

OCCUPANT RESTRAINT CONTROLLER C1 - YELLOW 32 WAY

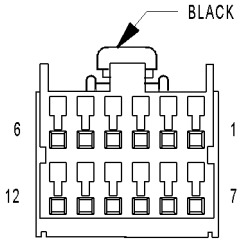
CAV	CIRCUIT	FUNCTION
1	R53 20LG/YL	DRIVER SEAT BELT TENSIONER LINE 2
2	R55 20LG/DG	DRIVER SEAT BELT TENSIONER LINE 1
3	R56 20LB/DG	PASSENGER SEAT BELT TENSIONER LINE 1
4	R54 20LB/YL	PASSENGER SEAT BELT TENSIONER LINE 2
5	-	-
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	R13 20LG/VT	LEFT SIDE IMPACT SENSOR 1 SIGNAL
16	R16 20BR/LG	RIGHT SIDE IMPACT SENSOR 1 GROUND
17	-	-
18	-	-
19	R15 20LG/BR	LEFT SIDE IMPACT SENSOR 1 GROUND
20	R19 20LG/WT	LEFT SIDE IMPACT SENSOR 2 GROUND
21	R20 20WT/LG	RIGHT SIDE IMPACT SENSOR 2 GROUND
22	R17 20LG	LEFT SIDE IMPACT SENSOR 2 SIGNAL
23	R18 20LB	RIGHT SIDE IMPACT SENSOR 2 SIGNAL
24	R14 20TN/LG	RIGHT SIDE IMPACT SENSOR 1 SIGNAL
25	R1 20LB/BR	LEFT CURTAIN SQUIB LINE 1
26	R3 20LB/OR	LEFT CURTAIN SQUIB LINE 2
27	R4 20OR/LB	RIGHT CURTAIN SQUIB LINE 2
28	R2 20WT/LB	RIGHT CURTAIN SQUIB LINE 1
29	-	-
30	-	-
31	-	-
32	-	-



OCCUPANT RESTRAINT CONTROLLER C2

OCCUPANT RESTRAINT CONTROLLER C2 - YELLOW 32 WAY

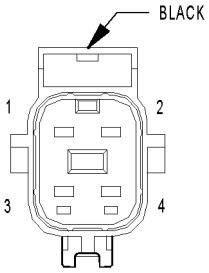
CAV	CIRCUIT	FUNCTION
1	R43 20LG/BR	DRIVER SQUIB 1 LINE 1
2	R45 20LG/OR	DRIVER SQUIB 1 LINE 2
3	R63 20LG/WT	DRIVER SQUIB 2 LINE 2
4	R61 20LG/VT	DRIVER SQUIB 2 LINE 1
5	R42 20LB/BR	PASSENGER SQUIB 1 LINE 1
6	R44 20LB/OR	PASSENGER SQUIB 1 LINE 2
7	R64 20LB/TN	PASSENGER SQUIB 2 LINE 1
8	R62 20LG/DB	PASSENGER SQUIB 2 LINE 2
9	G104 20VT/GY	PASSENGER AIRBAG INDICATOR DRIVER
10	-	-
11	-	-
12	R82 20WT/LB	RIGHT FRONT IMPACT SENSOR GROUND
13	-	-
14	-	-
15	D25 20WT/VT	PCI BUS
16	F201 20PK/LB	ORC RUN-START DRIVER
17	-	-
18	-	-
19	-	-
20	R81 20LB/WT	LEFT FRONT IMPACT SENSOR GROUND
21	-	-
22	Z12 18BK/OR	GROUND
23	-	-
24	F100 20PK/VT	ORC RUN DRIVER
25	R79 20LB/VT	LEFT FRONT IMPACT SENSOR SIGNAL
26	R80 20LB/TN	RIGHT FRONT IMPACT SENSOR SIGNAL
27	-	-
28	-	-
29	-	-
30	-	-
31	R11 20DB/LB	DRIVER KNEE BLOCKER SQUIB LINE 2
32	R9 20LB/YL	DRIVER KNEE BLOCKER SQUIB LINE 1



OVERHEAD CONSOLE

OVERHEAD CONSOLE - BLACK 12 WAY

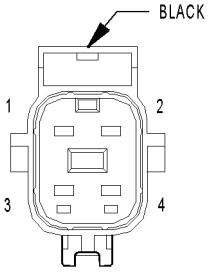
CAV	CIRCUIT	FUNCTION
1	Q4 20OR/WT (POWER SUNROOF)	SUNROOF VENT
2	G25 22VT/TN	LIFTGATE SWITCH MUX
3	D25 20WT/VT	PCI BUS
4	Z113 18BK/DB	GROUND
5	A114 20GY/RD	FUSED B(+)
6	F316 20BK/PK	FUSED ACCESSORY RELAY OUTPUT
7	-	-
8	E3 20OR/YL	DOME LAMPS DIMMER SIGNAL
9	Q3 22OR/TN (POWER SUNROOF)	SUNROOF OPEN
10	Q5 22OR/LB (POWER SUNROOF)	SUNROOF CLOSE
11	L24 20BK/GY	AUTOMATIC HEADLAMP SIGNAL
12	L11 20BK/WT	BACK-UP LAMP SIGNAL



OXYGEN SENSOR-1/1 UPSTREAM

OXYGEN SENSOR-1/1 UPSTREAM - BLACK 4 WAY

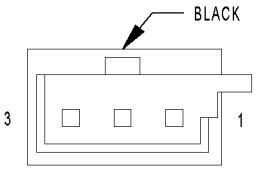
CAV	CIRCUIT	FUNCTION
1	Z42 18BK/LG	GROUND
2	K99 18BR/TN	O2 1/1 HEATER CONTROL
3	K902 18BR/DG	O2 RETURN (UP)
4	K41 18DB/LB	O2 1/1 SIGNAL



OXYGEN SENSOR-1/2 DOWNSTREAM

OXYGEN SENSOR-1/2 DOWNSTREAM - BLACK 4 WAY

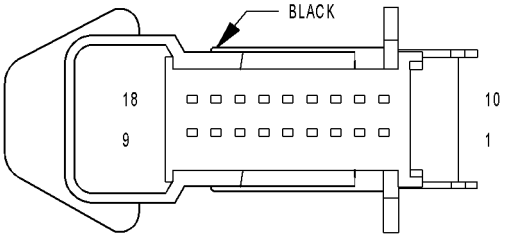
CAV	CIRCUIT	FUNCTION
1	Z43 18BK/LB	GROUND
2	K299 18BR/OR	O2 1/2 HEATER CONTROL
3	K904 20DB/DG	O2 RETURN (DOWN)
4	K141 20DB/YL	O2 1/2 SIGNAL



PARK ASSIST DISPLAY MODULE (PARKTRONICS)

PARK ASSIST DISPLAY MODULE (PARKTRONICS) - BLACK 3 WAY

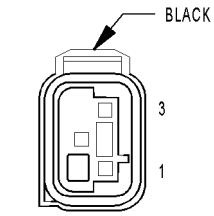
CAV	CIRCUIT	FUNCTION
1	X777 20DG/GY	PARK ASSIST DISPLAY SUPPLY
2	Z171 20GY/BK	PARK ASSIST DISPLAY GROUND
3	D777 20WT/GY	PARK ASSIST DISPLAY SIGNAL



PARK ASSIST MODULE (PARKTRONICS)

PARK ASSIST MODULE (PARKTRONICS) - BLACK 18 WAY

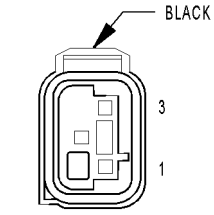
CAV	CIRCUIT	FUNCTION
1	X700 20GY/OR	PARK ASSIST SENSOR SUPPLY
2	D703 20WT/OR	PARK ASSIST SENSOR NO. 9 SIGNAL
3	D704 20WT/DB	PARK ASSIST SENSOR NO. 10 SIGNAL
4	X777 20DG/GY	PARK ASSIST DISPLAY SUPPLY
5	D777 20WT/GY	PARK ASSIST DISPLAY SIGNAL
6	Z171 20GY/BK	PARK ASSIST DISPLAY GROUND
7	-	-
8	-	-
9	-	-
10	F20 20PK/GY	IGNITION SWITCH OUTPUT (RUN-START)
11	Z177 20DG/BK	GROUND
12	D25 20WT/VT	PCI BUS
13	-	-
14	-	-
15	-	-
16	D700 20WT/GY	PARK ASSIST SENSOR NO. 7 SIGNAL
17	D701 20WT/LB	PARK ASSIST SENSOR NO. 8 SIGNAL
18	X750 20GY/LB	PARK ASSIST SENSOR GROUND



PARK ASSIST SENSOR NO. 7 (PARKTRONICS)

PARK ASSIST SENSOR NO. 7 (PARKTRONICS) - BLACK 3 WAY

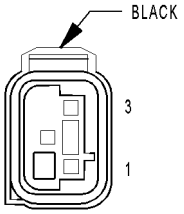
CAV	CIRCUIT	FUNCTION
1	X700 20GY/OR	PARK ASSIST SENSOR SUPPLY
2	D700 20WT/GY	PARK ASSIST SENSOR NO. 7 SIGNAL
3	X750 20GY/LB	PARK ASSIST SENSOR GROUND



PARK ASSIST SENSOR NO. 8 (PARKTRONICS)

PARK ASSIST SENSOR NO. 8 (PARKTRONICS) - BLACK 3 WAY

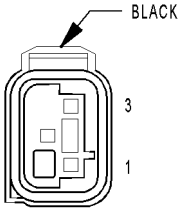
CAV	CIRCUIT	FUNCTION
1	X700 20GY/OR	PARK ASSIST SENSOR SUPPLY
2	D701 20WT/LB	PARK ASSIST SENSOR NO. 8 SIGNAL
3	X750 20GY/LB	PARK ASSIST SENSOR GROUND



PARK ASSIST SENSOR NO. 9 (PARKTRONICS)

PARK ASSIST SENSOR NO. 9 (PARKTRONICS) - BLACK 3 WAY

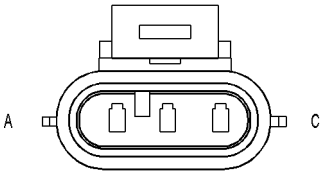
CAV	CIRCUIT	FUNCTION
1	X700 20GY/OR	PARK ASSIST SENSOR SUPPLY
2	D703 20WT/OR	PARK ASSIST SENSOR NO. 9 SIGNAL
3	X750 20GY/LB	PARK ASSIST SENSOR GROUND



PARK ASSIST SENSOR NO. 10 (PARKTRONICS)

PARK ASSIST SENSOR NO. 10 (PARKTRONICS) - BLACK 3 WAY

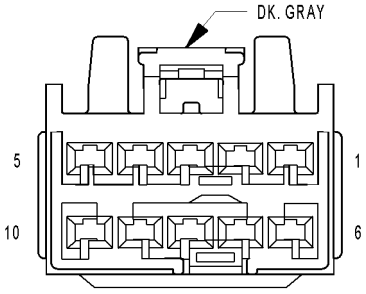
CAV	CIRCUIT	FUNCTION
1	X700 20GY/OR	PARK ASSIST SENSOR SUPPLY
2	D704 20WT/DB	PARK ASSIST SENSOR NO. 10 SIGNAL
3	X750 20GY/LB	PARK ASSIST SENSOR GROUND



PASSENGER SEAT WEIGHT SENSOR

PASSENGER SEAT WEIGHT SENSOR - 3 WAY

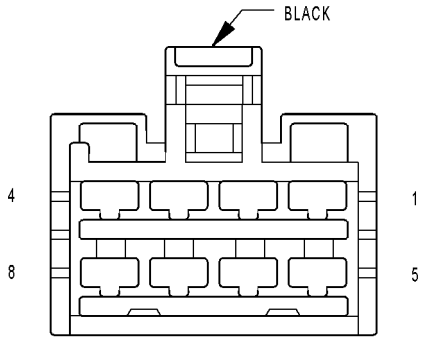
CAV	CIRCUIT	FUNCTION
A	R941 20LG/DG	PASSENGER BLADDER PRESSURE SENSOR GROUND
B	R741 20LG/VT	PASSENGER BLADDER PRESSURE SENSOR SIGNAL
C	R740 20LG/OR	PASSENGER BLADDER PRESSURE SENSOR POWER



POWER LIFTGATE DRIVE UNIT

POWER LIFTGATE DRIVE UNIT - DK. GRAY 10 WAY

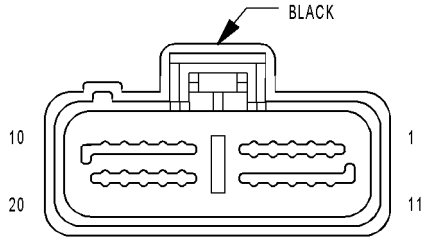
CAV	CIRCUIT	FUNCTION
1	Q88 14TN/BR	LIFTGATE OPEN DRIVER
2	Q203 20OR/TN	OPTICAL SENSOR SUPPLY
3	Q901 20OR/VT	GROUND
4	Q201 18OR/LG	LIFTGATE CLUTCH DRIVER
5	Q901 20OR/VT	GROUND
6	Q89 14TN/OR	LIFTGATE CLOSE DRIVER
7	Q204 20OR/DG	OPTICAL SENSOR SIGNAL 1
8	Q205 20OR/DB	OPTICAL SENSOR SIGNAL 2
9	Z805 18BK/OR	GROUND
10	Q51 20OR	LIFTGATE FULL OPEN SWITCH SENSE



POWER LIFTGATE MODULE C1

POWER LIFTGATE MODULE C1 - BLACK 8 WAY

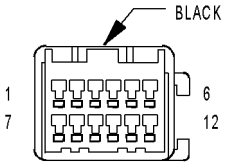
CAV	CIRCUIT	FUNCTION
1	Q83 18OR/GY	LIFTGATE LATCH CLUTCH DRIVER
2	Q88 14TN/BR	LIFTGATE OPEN DRIVER
3	Q89 14TN/OR	LIFTGATE CLOSE DRIVER
4	-	-
5	A115 12YL/RD	FUSED B(+)
6	-	-
7	-	-
8	Z125 14BK/OR (EXCEPT NAVIGATION)	GROUND
8	Z125 12BK/OR (NAVIGATION)	GROUND



POWER LIFTGATE MODULE C2

POWER LIFTGATE MODULE C2 - BLACK 20 WAY

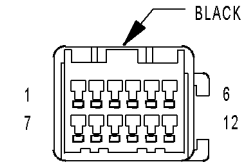
CAV	CIRCUIT	FUNCTION
1	Q203 20OR/TN	OPTICAL SENSOR SUPPLY
2	-	-
3	-	-
4	-	-
5	Q75 20OR/LB	PINCH SENSOR SIGNAL
6	-	-
7	Q201 18OR/LG	LIFTGATE CLUTCH DRIVER
8	Q84 16TN/GY	LIFTGATE LATCH CINCH DRIVER
9	Q85 16TN/WT	LIFTGATE LATCH RELEASE DRIVER
10	-	-
11	D25 20WT/VT	PCI BUS
12	G78 20VT/OR	LIFTGATE AJAR SWITCH SENSE
13	Q60 22OR/YL	LIFTGATE PAWL SWITCH SENSE
14	Q51 20OR	LIFTGATE FULL OPEN SWITCH SENSE
15	Q205 20OR/DB	OPTICAL SENSOR SIGNAL 2
16	G32 20VT/LB	LIFTGATE TEMPERATURE SENSOR SIGNAL
17	Q204 20OR/DG	OPTICAL SENSOR SIGNAL 1
18	Q94 22TN/LG	LIFTGATE CHIME DRIVER
19	G153 20VT/GY	LIFTGATE MODULE WAKE UP SIGNAL
20	Q901 20OR/VT	GROUND



POWER MIRROR-DRIVER

POWER MIRROR-DRIVER - BLACK 12 WAY

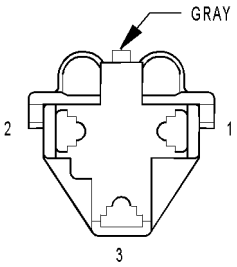
CAV	CIRCUIT	FUNCTION
1	P67 22OR/TN	DRIVER MIRROR VERTICAL POSITION SIGNAL
2	P69 22WT/TN	DRIVER MIRROR SENSOR GROUND
3	P65 22VT/TN	DRIVER MIRROR HORIZONTAL POSITION SIGNAL
4	P73 22TN/VT	DRIVER MIRROR COMMON DRIVER
5	P75 22TN/LG	DRIVER MIRROR HORIZONTAL DRIVER
6	P71 22TN/DG	DRIVER MIRROR VERTICAL DRIVER
7	-	-
8	-	-
9	P114 20TN/WT	AUTO DAY/NIGHT MIRROR (-)
10	P112 20TN/OR	AUTO DAY/NIGHT MIRROR (+)
11	P53 20LG/OR	DRIVER HEATED MIRROR DRIVER
12	C17 20LB/WT	DRIVER HEATED MIRROR FEED



POWER MIRROR-PASSENGER

POWER MIRROR-PASSENGER - BLACK 12 WAY

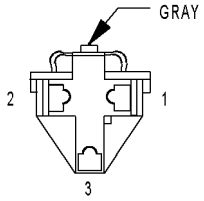
CAV	CIRCUIT	FUNCTION
1	P64 22TN	PASSENGER MIRROR VERTICAL POSITION SIGNAL
2	P66 22TN/LG	PASSENGER MIRROR SENSOR GROUND
3	P68 22TN/YL	PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
4	P70 22TN/LB	PASSENGER MIRROR COMMON DRIVER
5	P74 22TN/OR	PASSENGER MIRROR HORIZONTAL DRIVER
6	P72 20TN/GY	PASSENGER MIRROR VERTICAL DRIVER
7	-	-
8	-	-
9	-	-
10	-	-
11	P54 20OR/LG	PASSENGER HEATED MIRROR DRIVER
12	C16 20DB/GY	PASSENGER HEATED MIRROR FEED



POWER OUTLET-FRONT CONSOLE

POWER OUTLET-FRONT CONSOLE - GRAY 3 WAY

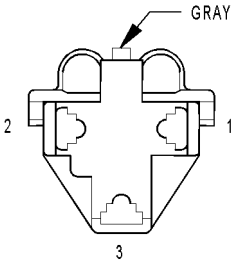
CAV	CIRCUIT	FUNCTION
1	F306 16DB/PK	FUSED ACCESSORY RELAY OUTPUT
2	-	-
3	Z746 16BK/DB	GROUND



POWER OUTLET-INSTRUMENT PANEL

POWER OUTLET-INSTRUMENT PANEL - GRAY 3 WAY

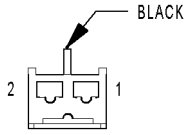
CAV	CIRCUIT	FUNCTION
1	A105 18DB/RD	FUSED B(+)
2	-	-
3	Z738 16BK/WT	GROUND



POWER OUTLET-REAR

POWER OUTLET-REAR - GRAY 3 WAY

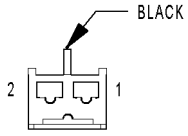
CAV	CIRCUIT	FUNCTION
1	F307 16LB/PK	FUSED ACCESSORY RELAY OUTPUT
2	-	-
3	Z737 16BK/LB	GROUND



POWER SEAT MOTOR-DRIVER FRONT RISER

POWER SEAT MOTOR-DRIVER FRONT RISER - BLACK 2 WAY

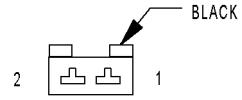
CAV	CIRCUIT	FUNCTION
1	P121 14LG/DB	DRIVER SEAT FRONT DOWN DRIVER
2	P119 14LG/DG	DRIVER SEAT FRONT UP DRIVER



POWER SEAT MOTOR-DRIVER HORIZONTAL

POWER SEAT MOTOR-DRIVER HORIZONTAL - BLACK 2 WAY

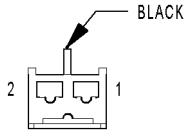
CAV	CIRCUIT	FUNCTION
1	P117 14LG/LB	DRIVER SEAT HORIZONTAL REARWARD DRIVER
2	P115 14LG/OR	DRIVER SEAT HORIZONTAL FORWARD DRIVER



POWER SEAT MOTOR-DRIVER LUMBAR

POWER SEAT MOTOR-DRIVER LUMBAR - BLACK 2 WAY

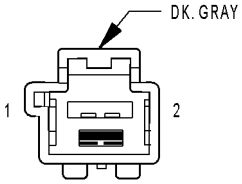
CAV	CIRCUIT	FUNCTION
1	P107 18DB	DRIVER SEAT LUMBAR IN DRIVER
2	P105 18PK	DRIVER SEAT LUMBAR OUT DRIVER



POWER SEAT MOTOR-DRIVER REAR RISER

POWER SEAT MOTOR-DRIVER REAR RISER - BLACK 2 WAY

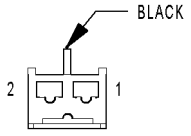
CAV	CIRCUIT	FUNCTION
1	P113 14LG/VT	DRIVER SEAT REAR DOWN DRIVER
2	P111 14LG/YL	DRIVER SEAT REAR UP DRIVER



POWER SEAT MOTOR-DRIVER RECLINER

POWER SEAT MOTOR-DRIVER RECLINER - DK. GRAY 2 WAY

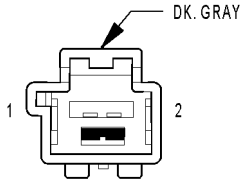
CAV	CIRCUIT	FUNCTION
1	P141 14LG/BR	DRIVER SEAT RECLINER DOWN DRIVER
2	P143 14LG/GY	DRIVER SEAT RECLINER UP DRIVER



POWER SEAT MOTOR-PASSENGER HORIZONTAL

POWER SEAT MOTOR-PASSENGER HORIZONTAL - BLACK 2 WAY

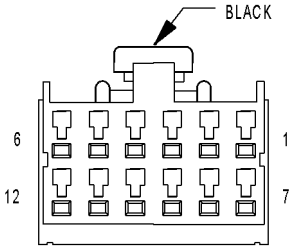
CAV	CIRCUIT	FUNCTION
1	P16 14LG/BR	PASSENGER SEAT HORIZONTAL REARWARD DRIVER
2	P14 14LG/OR	PASSENGER SEAT HORIZONTAL FORWARD DRIVER



POWER SEAT MOTOR-PASSENGER RECLINER

POWER SEAT MOTOR-PASSENGER RECLINER - DK. GRAY 2 WAY

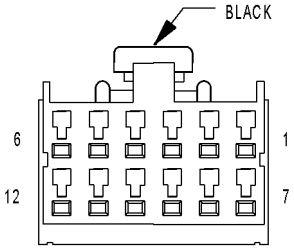
CAV	CIRCUIT	FUNCTION
1	P42 14LG/GY	PASSENGER SEAT RECLINER DOWN DRIVER
2	P44 14LG/DG	PASSENGER SEAT RECLINER UP DRIVER



POWER SEAT SWITCH-DRIVER

POWER SEAT SWITCH-DRIVER - BLACK 12 WAY

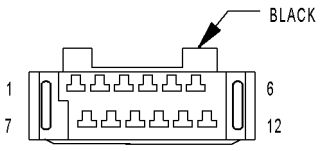
CAV	CIRCUIT	FUNCTION
1	P101 20LG/WT	MEMORY SET SWITCH INDICATOR DRIVER
2	P83 20TN/WT (FRONT ROW HEATED SEATS)	DRIVER HEATED SEAT HIGH INDICATOR DRIVER
3	P81 20TN/LB (FRONT ROW HEATED SEATS)	DRIVER HEATED SEAT LOW INDICATOR DRIVER
4	P989 20TN/LG	SEAT SWITCH MUX RETURN
5	Z301 20TN/BK	ILLUMINATION GROUND
6	P301 20LG/OR	DRIVER DOOR SWITCH ILLUMINATION DRIVER
7	P311 20LG/VT	DRIVER SEAT RECLINER/LUMBAR OUT SWITCH MUX
8	P309 20LG/VT	DRIVER SEAT HORIZONTAL/LUMBAR IN SWITCH MUX
9	P200 20LG/YL	DRIVER SEAT FRONT RISER/PEDAL FORWARD SWITCH MUX
10	P7 20LG/DG (FRONT ROW HEATED SEATS)	DRIVER HEATED SEAT SWITCH MUX
11	G200 20VT/BR	MEMORY SELECT SWITCH MUX
12	P202 20LG/DB	DRIVER SEAT REAR RISER/PEDAL BACK SWITCH MUX



POWER SEAT SWITCH-PASSENGER

POWER SEAT SWITCH-PASSENGER - BLACK 12 WAY

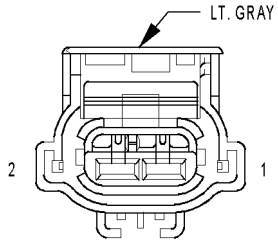
CAV	CIRCUIT	FUNCTION
1	-	-
2	P84 20TN/VT (FRONT ROW HEATED SEATS)	PASSENGER HEATED SEAT HIGH INDICATOR DRIVER
3	P82 20TN/DG (FRONT ROW HEATED SEATS)	PASSENGER HEATED SEAT LOW INDICATOR DRIVER
4	P988 20LG/TN	SEAT SWITCH MUX RETURN
5	Z302 20LG/BK	ILLUMINATION GROUND
6	P302 20TN/OR	PASSENGER DOOR SWITCH ILLUMINATION DRIVER
7	P308 20LG/VT	PASSENGER SEAT RECLINER SWITCH MUX
8	P310 20LG/OR	PASSENGER SEAT HORIZONTAL SWITCH MUX
9	-	-
10	P8 20LG/WT (FRONT ROW HEATED SEATS)	PASSENGER HEATED SEAT SWITCH MUX
11	-	-
12	-	-



POWER SUNROOF MODULE

POWER SUNROOF MODULE - BLACK 12 WAY

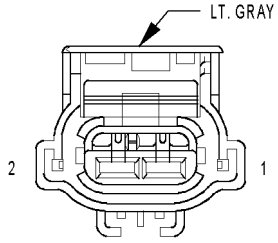
CAV	CIRCUIT	FUNCTION
1	Q3 20OR/TN	SUNROOF OPEN
2	Q5 20OR/LB	SUNROOF CLOSE
3	Q4 20OR/WT	SUNROOF VENT
4	F316 20PK/OR	FUSED ACCESSORY RELAY OUTPUT
5	A130 12VT/RD	FUSED B(+)
6	Z138 12BK/VT	GROUND
7	-	-
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-



POWER WINDOW MOTOR-DRIVER

POWER WINDOW MOTOR-DRIVER - LT. GRAY 2 WAY

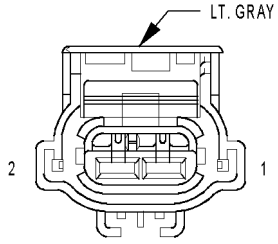
CAV	CIRCUIT	FUNCTION
1	Q21 14OR/WT	DRIVER WINDOW DRIVER (DOWN)
2	Q11 14OR/LG	DRIVER WINDOW DRIVER (UP)



POWER WINDOW MOTOR-DRIVER REAR

POWER WINDOW MOTOR-DRIVER REAR - LT. GRAY 2 WAY

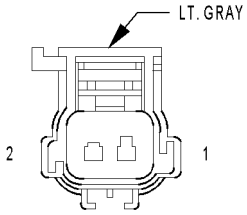
CAV	CIRCUIT	FUNCTION
1	Q211 14OR/VT	DRIVER REAR WINDOW DRIVER (DOWN)
2	Q111 14OR/BR	DRIVER REAR WINDOW DRIVER (UP)



POWER WINDOW MOTOR-PASSENGER

POWER WINDOW MOTOR-PASSENGER - LT. GRAY 2 WAY

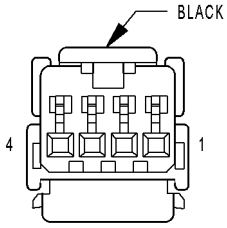
CAV	CIRCUIT	FUNCTION
1	Q22 14VT/OR	PASSENGER WINDOW DRIVER (DOWN)
2	Q12 14BR/OR	PASSENGER WINDOW DRIVER (UP)



POWER WINDOW MOTOR- PASSENGER REAR

POWER WINDOW MOTOR-PASSENGER REAR - LT. GRAY 2 WAY

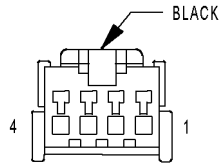
CAV	CIRCUIT	FUNCTION
1	Q212 14OR/VT	PASSENGER REAR WINDOW DRIVER (DOWN)
2	Q112 14OR/BR	PASSENGER REAR WINDOW DRIVER (UP)



POWER WINDOW SWITCH- DRIVER REAR

POWER WINDOW SWITCH-DRIVER REAR - BLACK 4 WAY

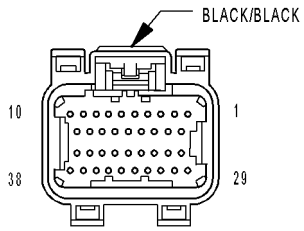
CAV	CIRCUIT	FUNCTION
1	-	-
2	Q1 20WT/TN	DRIVER REAR WINDOW SWITCH MUX
3	G983 20VT/TN	GROUND
4	E25 20OR/GY	PANEL LAMPS DRIVER



POWER WINDOW SWITCH- PASSENGER REAR

POWER WINDOW SWITCH-PASSENGER REAR - BLACK 4 WAY

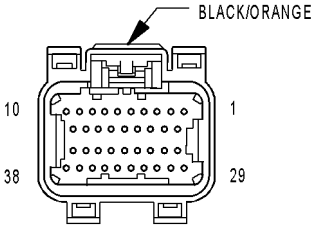
CAV	CIRCUIT	FUNCTION
1	-	-
2	Q2 20WT/TN	PASSENGER REAR WINDOW SWITCH MUX
3	G982 20VT/TN	GROUND
4	E26 20OR/GY	PANEL LAMPS DRIVER



POWERTRAIN CONTROL MODULE C1

POWERTRAIN CONTROL MODULE C1 - BLACK/BLACK 38 WAY

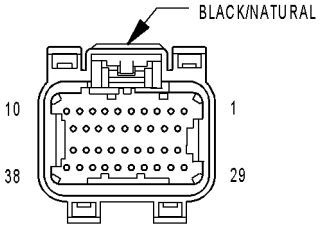
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	Z130 16BK/BR	GROUND
10	-	-
11	F202 20PK/GY	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F1 20PK/WT	IGNITION UNLOCK-RUN-START
13	-	-
14	-	-
15	-	-
16	K236 16DB/LG	SRV SOL CONTROL
17	-	-
18	Z131 16BK/DG	GROUND
19	-	-
20	G6 16VT/GY	OIL PRESSURE SIGNAL
21	-	-
22	G31 20OR/VT	AAT SIGNAL
23	-	-
24	-	-
25	D20 20WT/LG	SCI RECEIVE (PCM)
26	D123 20WT/BR	FLASH PROGRAM ENABLE
27	-	-
28	-	-
29	A109 18OR/RD	FUSED B(+)
30	T751 20YL	IGNITION SWITCH OUTPUT (START)
31	K141 20DB/YL	O2 1/2 SIGNAL
32	K904 20DB/DG	O2 RETURN (DOWN)
33	-	-
34	-	-
35	-	-
36	D21 20WT/GY	SCI TRANSMIT (PCM)
37	D15 20BR/WT	SCI TRANSMIT (TCM)
38	D25 20WT/VT	PCI BUS



POWERTRAIN CONTROL MODULE C2

POWERTRAIN CONTROL MODULE C2 - BLACK/ORANGE 38 WAY

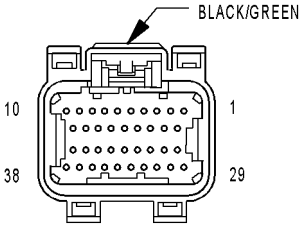
CAV	CIRCUIT	FUNCTION
1	K10 16DB/OR	COIL CONTROL NO. 6
2	K16 16DB/YL	COIL CONTROL NO. 5
3	K15 16DB	COIL CONTROL NO. 4
4	K58 16BR/VT	INJECTOR CONTROL NO. 6
5	K38 16BR/OR	INJECTOR CONTROL NO. 5
6	-	-
7	K18 16DB/OR	COIL CONTROL NO. 3
8	K35 18DB/VT	EGR SOL CONTROL
9	K17 16DB/TN	COIL CONTROL NO. 2
10	K19 16DB/DG	COIL CONTROL NO. 1
11	K14 16BR/TN	INJECTOR CONTROL NO. 4
12	K13 16BR/LB	INJECTOR CONTROL NO. 3
13	K12 16BR/DB	INJECTOR CONTROL NO. 2
14	K11 16BR/YL	INJECTOR CONTROL NO. 1
15	-	-
16	K36 20DB/YL	MTV CONTROL
17	-	-
18	K99 18BR/TN	O2 1/1 HEATER CONTROL
19	K20 18BR/GY	GEN FIELD CONTROL
20	K2 18VT/OR	ECT SIGNAL
21	K22 18BR/OR	TP SIGNAL
22	K34 20DB/LG	EGR SIGNAL
23	K1 20VT/BR	MAP SIGNAL
24	K942 20BR/LG	KS RETURN
25	K42 20DB/OR	KS SIGNAL
26	-	-
27	K900 20DB/DG	SENSOR GROUND
28	K961 20BR/VT	IAC RETURN
29	F855 20PK/YL	5 VOLT SUPPLY
30	K21 20BR/WT	IAT SIGNAL
31	K41 18DB/LB	O2 1/1 SIGNAL
32	K902 18BR/DG	O2 RETURN (UP)
33	-	-
34	K44 20DB/GY	CMP SIGNAL
35	K24 20BR/LB	CKP SIGNAL
36	-	-
37	-	-
38	K61 20VT/GY	IAC MOTOR CONTROL



POWERTRAIN CONTROL MODULE C3

POWERTRAIN CONTROL MODULE C3 - BLACK/NATURAL 38 WAY

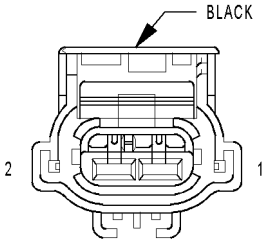
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	K51 18BR/GY	AUTOMATIC SHUT DOWN RELAY CONTROL
4	-	-
5	V35 20VT/OR	S/C VENT CONTROL
6	K173 20BR/VT	RAD FAN RELAY CONTROL
7	V32 20VT/YL	S/C SUPPLY
8	K106 20VT/LB	NVLD SOL CONTROL
9	K299 18BR/OR	O2 1/2 HEATER CONTROL
10	-	-
11	C13 20LB/OR	A/C CLUTCH RELAY CONTROL
12	V36 20YL/VT	S/C VACUUM CONTROL
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	-	-
19	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
20	K52 20DB/WT	EVAP PURGE CONTROL
21	-	-
22	-	-
23	B29 20DG/WT	BRAKE SWITCH SIGNAL
24	-	-
25	-	-
26	T44 20YL/DG	AUTOSTICK DOWNSHIFT SWITCH SIGNAL
27	T5 20DG/YL	AUTOSTICK UPSHIFT SWITCH SIGNAL
28	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT
29	K70 20DB/BR	EVAP PURGE RETURN
30	-	-
31	C18 20LB/BR	A/C PRESSURE TRANSDUCER SIGNAL
32	K91 20DB/YL	BATTERY TEMP SIGNAL
33	-	-
34	V37 20VT	S/C SWITCH SIGNAL
35	K107 20VT/WT	NVLD SWITCH SIGNAL
36	-	-
37	K31 20BR	FUEL PUMP RELAY CONTROL
38	T752 20DG/OR	STARTER RELAY CONTROL



POWERTRAIN CONTROL MODULE C4

POWERTRAIN CONTROL MODULE C4 - BLACK/GREEN 38 WAY

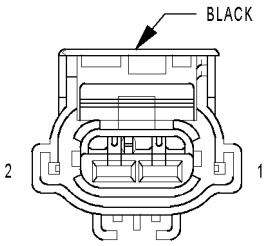
CAV	CIRCUIT	FUNCTION
1	T60 18YL/GY	OD SOLENOID CONTROL
2	T59 18YL/LB	UD SOLENOID CONTROL
3	-	-
4	-	-
5	-	-
6	T19 18DB/YL	2-4 SOLENOID CONTROL
7	-	-
8	-	-
9	-	-
10	T20 18WT/DG	L/R SOLENOID CONTROL
11	-	-
12	-	-
13	Z133 16BK/LG	GROUND
14	Z133 16BK/LG	GROUND
15	T1 18LB/DG	TRS T1 SENSE
16	T3 18DG/DB	TRS T3 SENSE
17	-	-
18	T15 20YL/BR	TRANSMISSION CONTROL RELAY CONTROL
19	-	-
20	-	-
21	-	-
22	T9 18DG/TN	OD PRESSURE SWITCH SENSE
23	-	-
24	-	-
25	-	-
26	-	-
27	T41 18YL/DB	TRS T41 SENSE
28	T16 16YL/OR	TRANSMISSION CONTROL RELAY OUTPUT
29	T50 18YL/TN	L/R PRESSURE SWITCH SENSE
30	T47 18YL/DG	2-4 PRESSURE SWITCH SENSE
31	-	-
32	T14 18DG/BR	OUTPUT SPEED SENSOR SIGNAL
33	T52 18DG/WT	INPUT SPEED SENSOR SIGNAL
34	T13 18DG/VT	SPEED SENSOR GROUND
35	T54 18DG/OR	TRANSMISSION TEMPERATURE SENSOR SIGNAL
36	-	-
37	T42 18DG/YL	TRS T42 SENSE
38	T16 16YL/OR	TRANSMISSION CONTROL RELAY OUTPUT



RADIATOR FAN MOTOR NO. 1

RADIATOR FAN MOTOR NO. 1 - BLACK 2 WAY

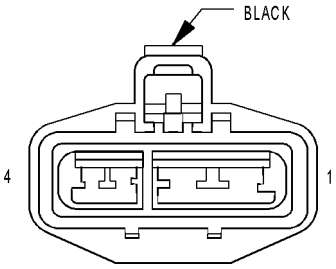
CAV	CIRCUIT	FUNCTION
1	N23 12DB/DG	RADIATOR FAN RELAY OUTPUT
2	Z823 12BK/DG	GROUND



RADIATOR FAN MOTOR NO. 2

RADIATOR FAN MOTOR NO. 2 - BLACK 2 WAY

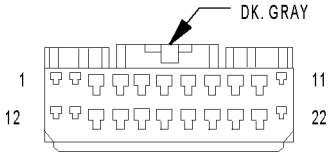
CAV	CIRCUIT	FUNCTION
1	N23 12DB/DG	RADIATOR FAN RELAY OUTPUT
2	Z223 12BK/DG	GROUND



RADIATOR FAN RELAY

RADIATOR FAN RELAY - BLACK 4 WAY

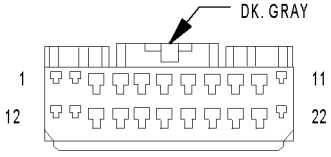
CAV	CIRCUIT	FUNCTION
1	A112 12OR/RD	FUSED B(+)
2	N23 12DB/DG	RADIATOR FAN RELAY OUTPUT
3	Z723 18BK/DG	GROUND
4	K173 18BR/VT	RAD FAN RELAY CONTROL



RADIO (BASE)

RADIO (BASE) - DK. GRAY 22 WAY

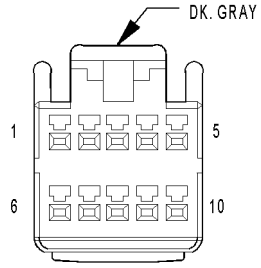
CAV	CIRCUIT	FUNCTION
1	A118 20RD/OR	FUSED B(+)
2	F316 20PK/OR	FUSED ACCESSORY RELAY OUTPUT
3	E12 18OR/GY	PANEL LAMPS DRIVER
4	-	-
5	-	-
6	-	-
7	X54 20GY	RADIO RIGHT AUDIO (+)
8	X56 20GY/BR	RADIO RIGHT AUDIO (-)
9	X55 20DG/BR	RADIO LEFT AUDIO (-)
10	X53 20DG	RADIO LEFT AUDIO (+)
11	Z514 18BK/LG	GROUND
12	-	-
13	X60 18GY/OR	ANTENNA SIGNAL
14	D25 20WT/VT	PCI BUS
15	-	-
16	-	-
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-



RADIO C1 (EXCEPT BASE)

RADIO C1 (EXCEPT BASE) - DK. GRAY 22 WAY

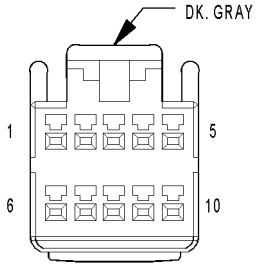
CAV	CIRCUIT	FUNCTION
1	A118 20RD/OR	FUSED B(+)
2	F316 20PK/OR	FUSED ACCESSORY RELAY OUTPUT
3	E12 18OR/GY	PANEL LAMPS DRIVER
4	-	-
5	-	-
6	-	-
7	X54 20GY	RADIO RIGHT AUDIO (+)
8	X56 20GY/BR	RADIO RIGHT AUDIO (-)
9	X55 20DG/BR	RADIO LEFT AUDIO (-)
10	X53 20DG	RADIO LEFT AUDIO (+)
11	Z514 18BK/LG	GROUND
12	-	-
13	X60 18GY/OR	ANTENNA SIGNAL
14	D25 20WT/VT	PCI BUS
15	-	-
16	-	-
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-



RADIO C2
(DVD/CD CHANGER)

RADIO C2 (DVD/CD CHANGER) - DK. GRAY 10 WAY

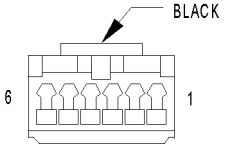
CAV	CIRCUIT	FUNCTION
1	X40 22GY/WT	AUDIO OUT RIGHT
2	X140 22GY/OR	COMMON AUDIO
3	X207 22	SHIELD
4	D25 20WT/VT	PCI BUS
5	X112 20DG/GY	IGNITION RUN/ACC SIGNAL
6	X41 22DG/WT	AUDIO OUT LEFT
7	-	-
8	-	-
9	E14 20OR/TN	PANEL LAMPS DRIVER
10	-	-



RADIO C2
(SATELLITE RADIO)

RADIO C2 (SATELLITE RADIO) - DK. GRAY 10 WAY

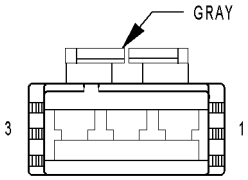
CAV	CIRCUIT	FUNCTION
1	X416 22GY/WT	AUDIO MUX RIGHT
2	X916 22GY/OR	AUDIO RETURN
3	X407 22	SHIELD
4	D25 20WT/VT	PCI BUS
5	X112 20DG/GY	IGNITION RUN/ACC SIGNAL
6	X417 22DG/WT	AUDIO MUX LEFT
7	Z141 20BK/TN	GROUND
8	-	-
9	E14 20OR/TN	PANEL LAMPS DRIVER
10	X160 20GY/YL	FUSED B(+)



READING
LAMP-FRONT

READING LAMP-FRONT - BLACK 6 WAY

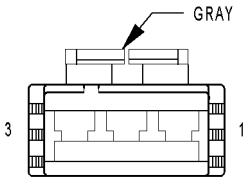
CAV	CIRCUIT	FUNCTION
1	-	-
2	Z327 18BK/WT (BASE)	GROUND
2	Z137 20BK/YL (OVERHEAD CONSOLE)	GROUND
3	-	-
4	M27 18YL/LB	RAIL LAMPS DRIVER
5	M24 18YL/WT	FRONT READING/COURTESY LAMPS DRIVER
6	E3 20OR/YL (OVERHEAD CONSOLE)	DOME LAMPS DIMMER SIGNAL



READING/COURTESY LAMP- LEFT MIDDLE

READING/COURTESY LAMP-LEFT MIDDLE - GRAY 3 WAY

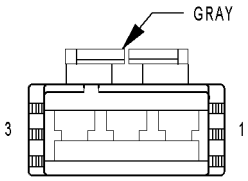
CAV	CIRCUIT	FUNCTION
1	M22 18YL/OR	COURTESY LAMPS DRIVER
2	Z327 18BK/WT	GROUND
3	M27 18YL/LB	RAIL LAMPS DRIVER



READING/COURTESY LAMP- LEFT REAR

READING/COURTESY LAMP-LEFT REAR - GRAY 3 WAY

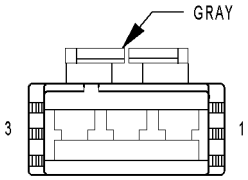
CAV	CIRCUIT	FUNCTION
1	M22 18YL/OR	COURTESY LAMPS DRIVER
2	Z327 18BK/WT	GROUND
3	M27 18YL/LB	RAIL LAMPS DRIVER



READING/COURTESY LAMP- RIGHT MIDDLE

READING/COURTESY LAMP-RIGHT MIDDLE - GRAY 3 WAY

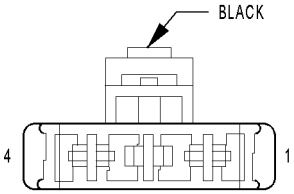
CAV	CIRCUIT	FUNCTION
1	M22 18YL/OR	COURTESY LAMPS DRIVER
2	Z327 18BK/WT	GROUND
3	M27 18YL/LB	RAIL LAMPS DRIVER



READING/COURTESY LAMP- RIGHT REAR

READING/COURTESY LAMP-RIGHT REAR - GRAY 3 WAY

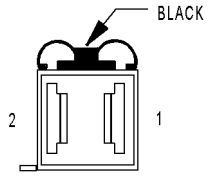
CAV	CIRCUIT	FUNCTION
1	M22 18YL/OR	COURTESY LAMPS DRIVER
2	Z327 18BK/WT	GROUND
3	M27 18YL/LB	RAIL LAMPS DRIVER



REAR BOOSTER FAN POWER MODULE C1

REAR BOOSTER FAN POWER MODULE C1 - BLACK 4 WAY

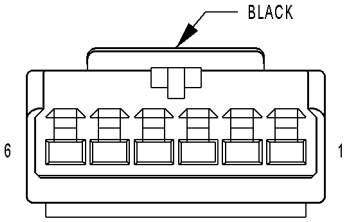
CAV	CIRCUIT	FUNCTION
1	-	-
2	Z135 18BK/LB	GROUND
3	C57 20DB/LB	REAR BOOSTER FAN CONTROL
4	C51 18LB/BR	FUSED REAR BOOSTER FAN RELAY OUTPUT



REAR BOOSTER FAN POWER MODULE C2

REAR BOOSTER FAN POWER MODULE C2 - BLACK 2 WAY

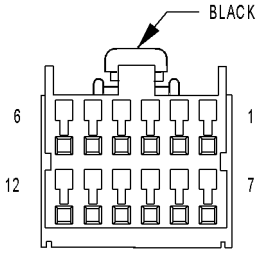
CAV	CIRCUIT	FUNCTION
1	LG	BOOSTER FAN SUPPLY
2	BK	BOOSTER FAN GROUND



REAR BOOSTER FAN REAR CONTROL SWITCH

REAR BOOSTER FAN REAR CONTROL SWITCH - BLACK 6 WAY

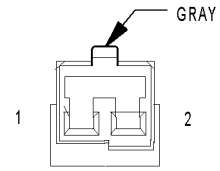
CAV	CIRCUIT	FUNCTION
1	E12 20OR/GY	PANEL LAMPS DRIVER
2	C31 20LB/YL	REAR FAN SENSE
3	C11 22LB/OR	REAR FAN SENSE SUPPLY
4	G21 22VT/WT	REAR FAN ON INDICATOR DRIVER
5	Z870 20BK/YL	GROUND
6	C931 20DB/TN	REAR FAN SENSE RETURN



REAR VIEW MIRROR

REAR VIEW MIRROR - BLACK 12 WAY

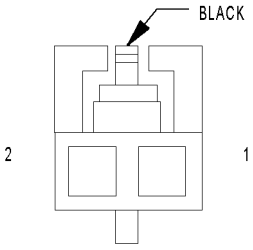
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	X722 20BR/WT	MICROPHONE 2 IN(+)
5	-	-
6	X712 20BR	MICROPHONE 1 IN(+)
7	-	-
8	-	-
9	X730 20BR/GY	VOICE RECOGNITION/PHONE SWITCH SIGNAL
10	-	-
11	X835 20BR/OR	SENSOR GROUND
12	X792 20BR/BK	MICROPHONE IN(-)



RECIRCULATION DOOR ACTUATOR

RECIRCULATION DOOR ACTUATOR - GRAY 2 WAY

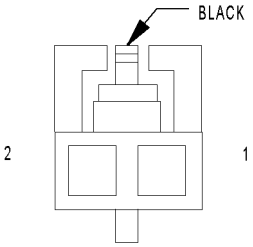
CAV	CIRCUIT	FUNCTION
1	C132 20DB/YL	RECIRCULATION DOOR DRIVER (B)
2	C32 20DB/TN	RECIRCULATION DOOR DRIVER (A)



REMOTE RADIO SWITCH-LEFT

REMOTE RADIO SWITCH-LEFT - BLACK 2 WAY

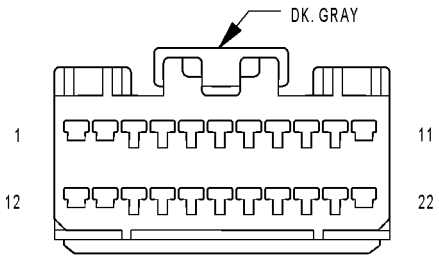
CAV	CIRCUIT	FUNCTION
1	X20 20GY/WT	RADIO CONTROL MUX
2	X920 20GY/OR	RADIO CONTROL MUX RETURN



REMOTE RADIO SWITCH-RIGHT

REMOTE RADIO SWITCH-RIGHT - BLACK 2 WAY

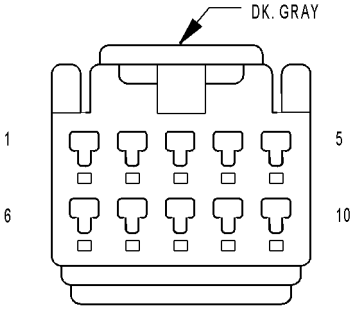
CAV	CIRCUIT	FUNCTION
1	X20 20GY/WT	RADIO CONTROL MUX
2	X920 20GY/OR	RADIO CONTROL MUX RETURN



SATELLITE RADIO MULTIPLEXER C1

SATELLITE RADIO MULTIPLEXER C1 - DK. GRAY 22 WAY

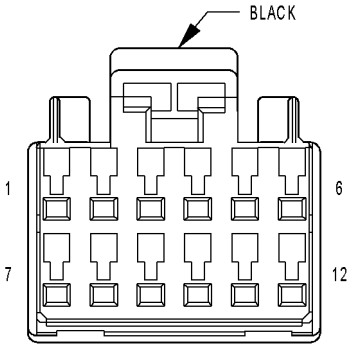
CAV	CIRCUIT	FUNCTION
1	X417 22DG/WT	AUDIO MUX LEFT
2	X416 22GY/WT	AUDIO MUX RIGHT
3	X916 22GY/OR	AUDIO RETURN
4	-	-
5	D25 20WT/VT	PCI BUS
6	X112 20DG/GY	IGNITION RUN/ACC SIGNAL
7	X112 20DG/GY	IGNITION RUN/ACC SIGNAL
8	X16 22DG/YL	AUDIO SIGNAL RIGHT (+)
9	X607 20	SHIELD
10	X917 22DG	AUDIO SIGNAL COMMON
11	X17 22DG/OR	AUDIO SIGNAL LEFT (+)
12	-	-
13	X480 20DG/LB	AUDIO MUX ENABLE
14	-	-
15	Z141 20BK/TN	GROUND
16	E14 20OR/TN	PANEL LAMPS DRIVER
17	X160 20GY/YL	FUSED B(+)
18	D25 20WT/VT	PCI BUS
19	Z141 20BK/TN	GROUND
20	-	-
21	X160 20GY/YL	FUSED B(+)
22	-	-



SATELLITE RADIO MULTIPLEXER C2

SATELLITE RADIO MULTIPLEXER C2 - DK. GRAY 10 WAY

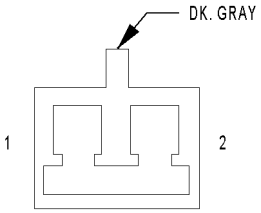
CAV	CIRCUIT	FUNCTION
1	X40 22GY/WT	AUDIO OUT RIGHT
2	X140 22GY/OR	COMMON AUDIO
3	X207 22	SHIELD
4	D25 20WT/VT	PCI BUS
5	X112 20DG/GY	IGNITION RUN/ACC SIGNAL
6	X41 22DG/WT	AUDIO OUT LEFT
7	-	-
8	-	-
9	E14 20OR/TN	PANEL LAMPS DRIVER
10	-	-



SATELLITE RADIO RECEIVER

SATELLITE RADIO RECEIVER - BLACK 12 WAY

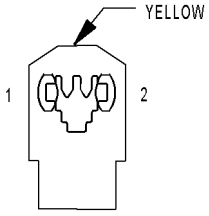
CAV	CIRCUIT	FUNCTION
1	X160 20GY/YL	FUSED B(+)
2	X112 20DG/GY	IGNITION RUN/ACC SIGNAL
3	Z141 20BK/TN	GROUND
4	X480 20DG/LB	AUDIO MUX ENABLE
5	-	-
6	X17 22DG/OR	AUDIO SIGNAL LEFT (+)
7	D25 20WT/VT	PCI BUS
8	-	-
9	-	-
10	-	-
11	X917 22DG	AUDIO SIGNAL COMMON
12	X16 22DG/YL	AUDIO SIGNAL RIGHT (+)



SEAT BELT SWITCH-DRIVER

SEAT BELT SWITCH-DRIVER - DK. GRAY 2 WAY

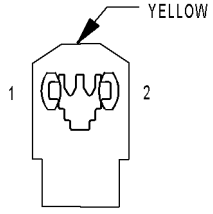
CAV	CIRCUIT	FUNCTION
1	G10 20VT/LG	DRIVER SEAT BELT SWITCH SENSE
2	Z237 20BK/YL	GROUND



SEAT BELT TENSIONER-DRIVER

SEAT BELT TENSIONER-DRIVER - YELLOW 2 WAY

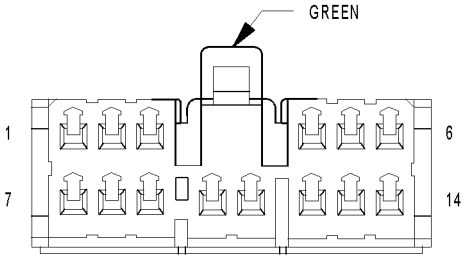
CAV	CIRCUIT	FUNCTION
1	R53 20LG/YL	DRIVER SEAT BELT TENSIONER LINE 2
2	R55 20LG/DG	DRIVER SEAT BELT TENSIONER LINE 1



SEAT BELT TENSIONER-PASSENGER

SEAT BELT TENSIONER-PASSENGER - YELLOW 2 WAY

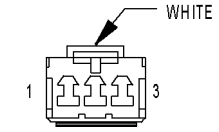
CAV	CIRCUIT	FUNCTION
1	R54 20LB/YL	PASSENGER SEAT BELT TENSIONER LINE 2
2	R56 20LB/DG	PASSENGER SEAT BELT TENSIONER LINE 1



SEAT HEATER INTERFACE MODULE

SEAT HEATER INTERFACE MODULE - GREEN 14 WAY

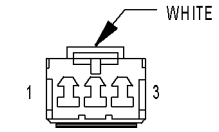
CAV	CIRCUIT	FUNCTION
1	P77 20LG	LEFT MIDDLE ROW SEAT SWITCH MUX
2	P189 20LG/WT	MIDDLE ROW SEAT TEMPERATURE SENSOR 5 VOLT SUPPLY
3	P188 16LG/VT	RIGHT MIDDLE ROW SEAT HEATER B(+) DRIVER
4	F525 16TN/PK	FUSED RUN RELAY OUTPUT
5	P187 16LG/BR	LEFT MIDDLE ROW SEAT HEATER B(+) DRIVER
6	F525 16TN/PK	FUSED RUN RELAY OUTPUT
7	P196 20LG/LB	RIGHT MIDDLE ROW SEAT TEMPERATURE SENSOR INPUT
8	P197 20LG/DG	LEFT MIDDLE ROW SEAT TEMPERATURE SENSOR INPUT
9	P96 20LB/LG	RIGHT MIDDLE ROW SEAT SWITCH MUX
10	P182 20LG/OR	RIGHT MIDDLE ROW SEAT LOW INDICATOR DRIVER
11	P184 20LG/GY	RIGHT MIDDLE ROW SEAT HIGH INDICATOR DRIVER
12	P181 20LG/DB	LEFT MIDDLE ROW SEAT LOW INDICATOR DRIVER
13	Z870 20BK/YL	GROUND
14	P183 20LG/YL	LEFT MIDDLE ROW SEAT HIGH INDICATOR DRIVER



SEAT POSITION SENSOR-DRIVER FRONT RISER

SEAT POSITION SENSOR-DRIVER FRONT RISER - WHITE 3 WAY

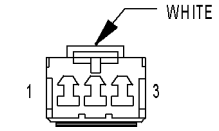
CAV	CIRCUIT	FUNCTION
1	P29 20LG/WT	DRIVER SEAT POSITION SENSOR 5 VOLT SUPPLY
2	P26 20LG	DRIVER SEAT FRONT RISER POSITION SIGNAL
3	P28 20LG/BR	DRIVER SEAT POSITION SENSOR GROUND



SEAT POSITION SENSOR-DRIVER HORIZONTAL

SEAT POSITION SENSOR-DRIVER HORIZONTAL - WHITE 3 WAY

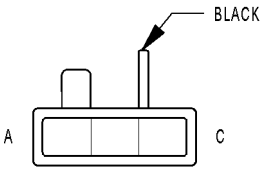
CAV	CIRCUIT	FUNCTION
1	P29 20LG/WT	DRIVER SEAT POSITION SENSOR 5 VOLT SUPPLY
2	P25 20LG/VT	DRIVER SEAT HORIZONTAL POSITION SIGNAL
3	P28 20LG/BR	DRIVER SEAT POSITION SENSOR GROUND



SEAT POSITION SENSOR-DRIVER REAR RISER

SEAT POSITION SENSOR-DRIVER REAR RISER - WHITE 3 WAY

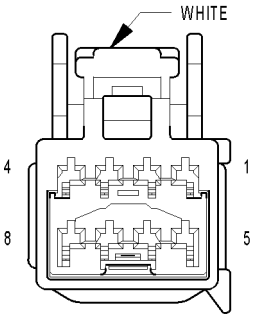
CAV	CIRCUIT	FUNCTION
1	P29 20LG/WT	DRIVER SEAT POSITION SENSOR 5 VOLT SUPPLY
2	P27 20LG/DB	DRIVER SEAT REAR RISER POSITION SIGNAL
3	P28 20LG/BR	DRIVER SEAT POSITION SENSOR GROUND



SEAT POSITION SENSOR-DRIVER RECLINER

SEAT POSITION SENSOR-DRIVER RECLINER - BLACK 3 WAY

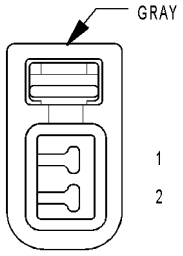
CAV	CIRCUIT	FUNCTION
A	P28 20LG/BR	DRIVER SEAT POSITION SENSOR GROUND
B	P47 20LG/LB	DRIVER SEAT RECLINER POSITION SIGNAL
C	P29 20LG/WT	DRIVER SEAT POSITION SENSOR 5 VOLT SUPPLY



SHIFT LEVER ASSEMBLY

SHIFT LEVER ASSEMBLY - WHITE 8 WAY

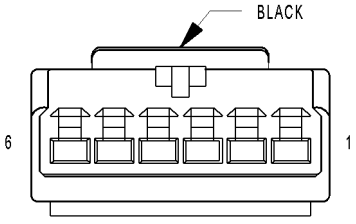
CAV	CIRCUIT	FUNCTION
1	-	-
2	T44 20YL/DG	AUTOSTICK DOWNSHIFT SWITCH SIGNAL
3	T5 20DG/YL	AUTOSTICK UPSHIFT SWITCH SIGNAL
4	Z65 20BK/YL	GROUND
5	Z157 18BK/LG	GROUND
6	E12 18OR/GY	PANEL LAMPS DRIVER
7	Z101 18BK/VT	GROUND
8	F2 18PK/YL	IGNITION SWITCH OUTPUT (RUN-START)



SHORT RUNNER VALVE SOLENOID

SHORT RUNNER VALVE SOLENOID - GRAY 2 WAY

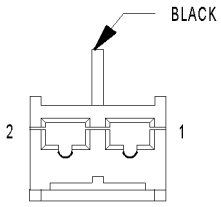
CAV	CIRCUIT	FUNCTION
1	K236 18DB/LG	SRV SOL CONTROL
2	K342 16BR/WT	AUTOMATIC SHUT DOWN RELAY OUTPUT



SKREEM MODULE

SKREEM MODULE - BLACK 6 WAY

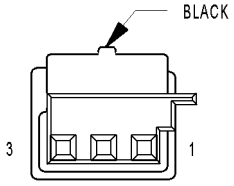
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20WT/VT	PCI BUS
3	-	-
4	F20 20PK/GY	IGNITION SWITCH OUTPUT (RUN-START)
5	Z120 20BK/WT	GROUND
6	A118 20RD/OR	FUSED B(+)



SPEAKER-CENTER INSTRUMENT PANEL

SPEAKER-CENTER INSTRUMENT PANEL - BLACK 2 WAY

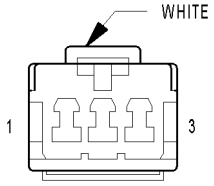
CAV	CIRCUIT	FUNCTION
1	X290 18GY/OR	AMPLIFIED CENTER INSTRUMENT PANEL SPEAKER (-)
2	X200 18GY/DB	AMPLIFIED CENTER INSTRUMENT PANEL SPEAKER (+)



SPEAKER-LEFT FRONT DOOR TWEETER

SPEAKER-LEFT FRONT DOOR TWEETER - BLACK 3 WAY

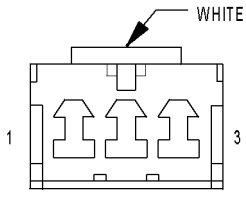
CAV	CIRCUIT	FUNCTION
1	X201 20GY/VT	AMPLIFIED LEFT FRONT DOOR SPEAKER (+)
2	-	-
3	X291 20GY/YL	AMPLIFIED LEFT FRONT DOOR SPEAKER (-)



SPEAKER-LEFT FRONT DOOR WOOFER

SPEAKER-LEFT FRONT DOOR WOOFER - WHITE 3 WAY

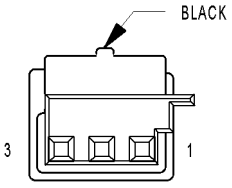
CAV	CIRCUIT	FUNCTION
1	X201 18GY/VT	AMPLIFIED LEFT FRONT DOOR SPEAKER (+)
2	-	-
3	X291 18GY/YL	AMPLIFIED LEFT FRONT DOOR SPEAKER (-)



SPEAKER-LEFT REAR DOOR

SPEAKER-LEFT REAR DOOR - WHITE 3 WAY

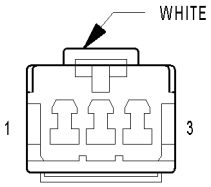
CAV	CIRCUIT	FUNCTION
1	X205 18DG/LG	AMPLIFIED LEFT REAR DOOR SPEAKER (+)
2	-	-
3	X295 18DG/GY	AMPLIFIED LEFT REAR DOOR SPEAKER (-)



**SPEAKER-
RIGHT
FRONT
DOOR
TWEETER**

SPEAKER-RIGHT FRONT DOOR TWEETER - BLACK 3 WAY

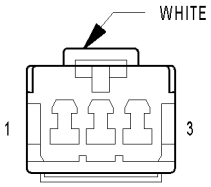
CAV	CIRCUIT	FUNCTION
1	X202 20DG/VT	AMPLIFIED RIGHT FRONT DOOR SPEAKER (+)
2	-	-
3	X292 20DG/YL	AMPLIFIED RIGHT FRONT DOOR SPEAKER (-)



**SPEAKER-
RIGHT
FRONT
DOOR
WOOFER**

SPEAKER-RIGHT FRONT DOOR WOOFER - WHITE 3 WAY

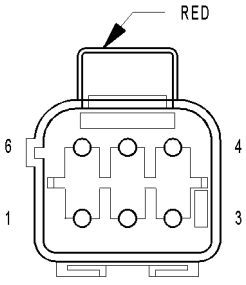
CAV	CIRCUIT	FUNCTION
1	X202 18DG/VT	AMPLIFIED RIGHT FRONT DOOR SPEAKER (+)
2	-	-
3	X292 18DG/YL	AMPLIFIED RIGHT FRONT DOOR SPEAKER (-)



**SPEAKER-
RIGHT
REAR
DOOR**

SPEAKER-RIGHT REAR DOOR - WHITE 3 WAY

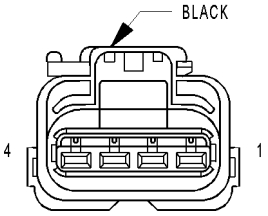
CAV	CIRCUIT	FUNCTION
1	X206 18DG/LG	AMPLIFIED RIGHT REAR DOOR SPEAKER (+)
2	-	-
3	X296 18DG/GY	AMPLIFIED RIGHT REAR DOOR SPEAKER (-)



**SPEAKER-
SUBWOOFER**

SPEAKER-SUBWOOFER - RED 6 WAY

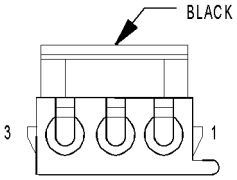
CAV	CIRCUIT	FUNCTION
1	X301 18GY/WT	AMPLIFIED SUBWOOFER 2 (+)
2	-	-
3	X300 18GY/BR	AMPLIFIED SUBWOOFER 1 (+)
4	X390 18DG/BR	AMPLIFIED SUBWOOFER 1 (-)
5	-	-
6	X391 18DG/WT	AMPLIFIED SUBWOOFER 2 (-)



SPEED CONTROL SERVO

SPEED CONTROL SERVO - BLACK 4 WAY

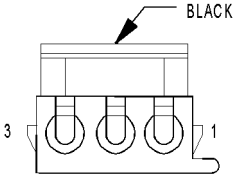
CAV	CIRCUIT	FUNCTION
1	V36 20YL/VT	S/C VACUUM CONTROL
2	V35 20VT/OR	S/C VENT CONTROL
3	V30 20VT/WT	SPEED CONTROL BRAKE SWITCH OUTPUT
4	Z155 18BK/LG	GROUND



SPEED CONTROL SWITCH-LEFT

SPEED CONTROL SWITCH-LEFT - BLACK 3 WAY

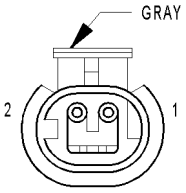
CAV	CIRCUIT	FUNCTION
1	Z23 20BK/VT	SPEED CONTROL SWITCH GROUND
2	-	-
3	V37 20VT	S/C SWITCH SIGNAL



SPEED CONTROL SWITCH-RIGHT

SPEED CONTROL SWITCH-RIGHT - BLACK 3 WAY

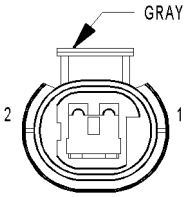
CAV	CIRCUIT	FUNCTION
1	Z23 20BK/VT	SPEED CONTROL SWITCH GROUND
2	-	-
3	V37 20VT	S/C SWITCH SIGNAL



SPEED SENSOR-INPUT

SPEED SENSOR-INPUT - GRAY 2 WAY

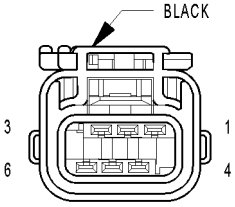
CAV	CIRCUIT	FUNCTION
1	T13 18DG/VT	SPEED SENSOR GROUND
2	T52 18DG/WT	INPUT SPEED SENSOR SIGNAL



SPEED SENSOR- OUTPUT

SPEED SENSOR-OUTPUT - GRAY 2 WAY

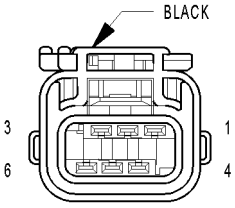
CAV	CIRCUIT	FUNCTION
1	T13 18DG/VT	SPEED SENSOR GROUND
2	T14 18DG/BR	OUTPUT SPEED SENSOR SIGNAL



TAIL LAMP- LEFT

TAIL LAMP-LEFT - BLACK 6 WAY

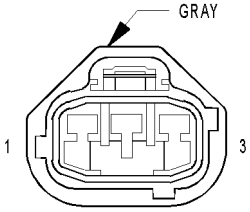
CAV	CIRCUIT	FUNCTION
1	L71 20WT/GY	LEFT TAIL LAMP DRIVER
2	L1 18WT/LG	BACK-UP LAMP DRIVER
3	L71 20WT/GY	LEFT TAIL LAMP DRIVER
4	Z363 18BK/DG	GROUND
5	L51 18WT/DG	BRAKE LAMP SWITCH OUTPUT
6	L63 18DG/WT	LEFT REAR TURN SIGNAL LAMP DRIVER



TAIL LAMP- RIGHT

TAIL LAMP-RIGHT - BLACK 6 WAY

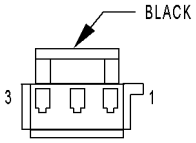
CAV	CIRCUIT	FUNCTION
1	L72 20WT/OR	RIGHT TAIL LAMP DRIVER
2	L1 18WT/LG	BACK-UP LAMP DRIVER
3	L72 20WT/OR	RIGHT TAIL LAMP DRIVER
4	Z362 18BK/BR	GROUND
5	L51 18WT/DG	BRAKE LAMP SWITCH OUTPUT
6	L62 18WT/DB	RIGHT REAR TURN SIGNAL LAMP DRIVER



THROTTLE POSITION SENSOR

THROTTLE POSITION SENSOR - GRAY 3 WAY

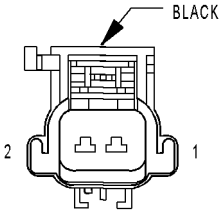
CAV	CIRCUIT	FUNCTION
1	K900 20DB/DG	SENSOR GROUND
2	K22 18BR/OR	TP SIGNAL
3	F855 20PK/YL	5 VOLT SUPPLY



TRACTION CONTROL SWITCH

TRACTION CONTROL SWITCH - BLACK 3 WAY

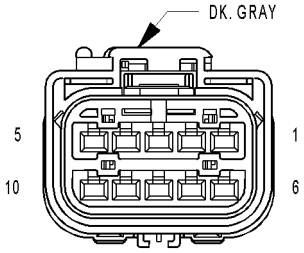
CAV	CIRCUIT	FUNCTION
1	Z427 20BK/WT	GROUND
2	E12 18OR/GY	PANEL LAMPS DRIVER
3	B27 20DG/WT	TRACTION CONTROL SWITCH SENSE



TRAILER TOW CONNECTOR

TRAILER TOW CONNECTOR - BLACK 2 WAY

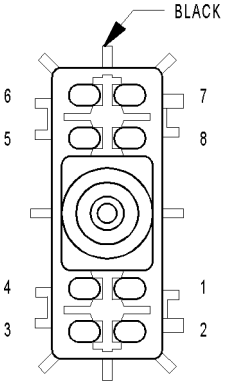
CAV	CIRCUIT	FUNCTION
1	-	-
2	A100 16RD/VT	FUSED B(+)



TRANSMISSION RANGE SENSOR

TRANSMISSION RANGE SENSOR - DK. GRAY 10 WAY

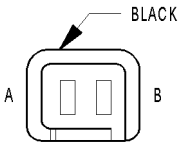
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	T13 18DG/VT	SPEED SENSOR GROUND
4	T54 18DG/OR	TRANSMISSION TEMPERATURE SENSOR SIGNAL
5	T41 18YL/DB	TRS T41 SENSE
6	-	-
7	T1 18LB/DG	TRS T1 SENSE
8	T3 18DG/DB	TRS T3 SENSE
9	T42 18DG/YL	TRS T42 SENSE
10	T41 18YL/DB	TRS T41 SENSE



TRANSMISSION SOLENOID/ PRESSURE SWITCH ASSEMBLY

TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY - BLACK 8 WAY

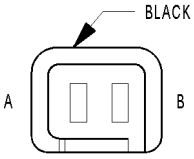
CAV	CIRCUIT	FUNCTION
1	T47 18YL/DG	2-4 PRESSURE SWITCH SENSE
2	T50 18YL/TN	L/R PRESSURE SWITCH SENSE
3	T9 18DG/TN	OD PRESSURE SWITCH SENSE
4	T16 16YL/OR	TRANSMISSION CONTROL RELAY OUTPUT
5	T59 18YL/LB	UD SOLENOID CONTROL
6	T60 18YL/GY	OD SOLENOID CONTROL
7	T20 18WT/DG	L/R SOLENOID CONTROL
8	T19 18DB/YL	2-4 SOLENOID CONTROL



VISOR/ VANITY LAMP- LEFT

VISOR/VANITY LAMP-LEFT - BLACK 2 WAY

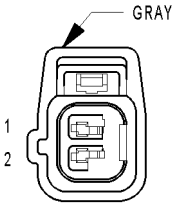
CAV	CIRCUIT	FUNCTION
A	M27 18YL/LB	RAIL LAMPS DRIVER
B	Z327 18BK/WT	GROUND



VISOR/ VANITY LAMP- RIGHT

VISOR/VANITY LAMP-RIGHT - BLACK 2 WAY

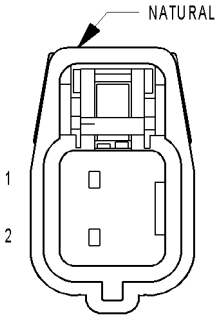
CAV	CIRCUIT	FUNCTION
A	M27 18YL/LB	RAIL LAMPS DRIVER
B	Z327 18BK/WT	GROUND



WASHER FLUID LEVEL SWITCH

WASHER FLUID LEVEL SWITCH - GRAY 2 WAY

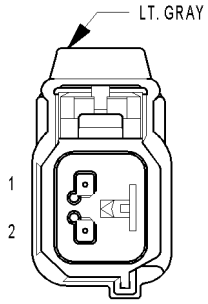
CAV	CIRCUIT	FUNCTION
1	Z401 18BK/TN	GROUND
2	W1 18BR/TN	WASHER FLUID LEVEL SWITCH SENSE



WASHER PUMP MOTOR- FRONT

WASHER PUMP MOTOR-FRONT - NATURAL 2 WAY

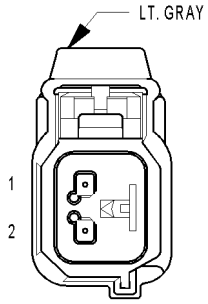
CAV	CIRCUIT	FUNCTION
1	W10 18BR	FRONT WASHER PUMP MOTOR CONTROL
2	W20 18BR/YL	REAR WASHER PUMP MOTOR CONTROL



WHEEL SPEED SENSOR- LEFT FRONT

WHEEL SPEED SENSOR-LEFT FRONT - LT. GRAY 2 WAY

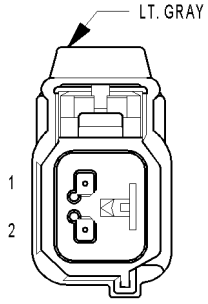
CAV	CIRCUIT	FUNCTION
1	B9 18DG/LG	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B8 18DG/TN	LEFT FRONT WHEEL SPEED SENSOR SIGNAL



WHEEL SPEED SENSOR- LEFT REAR

WHEEL SPEED SENSOR-LEFT REAR - LT. GRAY 2 WAY

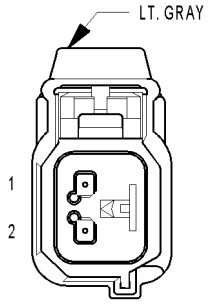
CAV	CIRCUIT	FUNCTION
1	B4 18DG/GY	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B3 18DG/YL	LEFT REAR WHEEL SPEED SENSOR SIGNAL



WHEEL SPEED SENSOR- RIGHT FRONT

WHEEL SPEED SENSOR-RIGHT FRONT - LT. GRAY 2 WAY

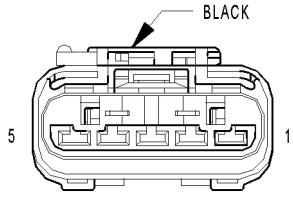
CAV	CIRCUIT	FUNCTION
1	B7 18DG/VT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B6 18DG/WT	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL



WHEEL SPEED SENSOR-RIGHT REAR

WHEEL SPEED SENSOR-RIGHT REAR - LT. GRAY 2 WAY

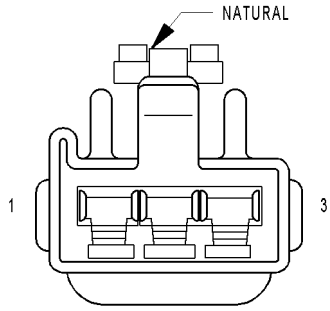
CAV	CIRCUIT	FUNCTION
1	B2 18DG/LB	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B1 18DG/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL



WIPER MODULE-FRONT

WIPER MODULE-FRONT - BLACK 5 WAY

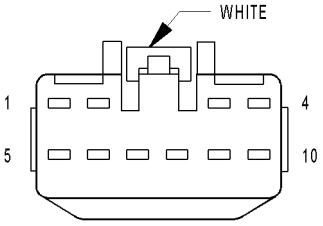
CAV	CIRCUIT	FUNCTION
1	Z103 12BK/WT	GROUND
2	W7 20BR/GY	FRONT WIPER PARK SWITCH SENSE
3	-	-
4	W3 12BR/WT	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT
5	W4 12BR/OR	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT



WIPER MODULE-REAR

WIPER MODULE-REAR - NATURAL 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z213 18BK/OR	GROUND
2	W17 20BR/LG	REAR WIPER PARK SWITCH SENSE
3	W13 18BR/WT	REAR WIPER MOTOR CONTROL



WIPER/ WASHER SWITCH

WIPER/WASHER SWITCH - WHITE 10 WAY

CAV	CIRCUIT	FUNCTION
1	G902 20VT/OR	MULTI-FUNCTION SWITCH MUX RETURN
2	-	-
3	W33 22BR/DG	FRONT WASHER SIGNAL
4	-	-
5	W26 20BR/DB	REAR WIPER SWITCH MUX
6	W27 22DB/BR	REAR WIPER SWITCH DELAY
7	G902 20VT/OR	MULTI-FUNCTION SWITCH MUX RETURN
8	W52 22BR/YL	FRONT WIPER SWITCH MUX
9	W35 22BR/LG	FRONT WIPER HIGH/LOW SWITCH SENSE
10	-	-

8W-91 CONNECTOR/GROUND/SPLICE LOCATION

TABLE OF CONTENTS

page

CONNECTOR/GROUND/SPLICE LOCATION
DESCRIPTION 1

CONNECTOR/GROUND/SPLICE LOCATION

DESCRIPTION

This section provides illustrations identifying connector, ground, and splice locations in the vehicle. Connector, ground, and splice indexes are provided. Use the wiring diagrams in each section for connector, ground, and splice identification. Refer to the appropriate index for the proper figure number. For items that are not shown in this section N/S is placed in the Fig. column.

CONNECTORS

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
A/C-Heater Control C1 (MTC)		Center Instrument Panel	18, 23
A/C-Heater Control C2 (MTC)		Center Instrument Panel	18, 23
A/C Compressor Clutch	LT GY	Right Front of Engine Compartment	10, 11
A/C Pressure Transducer	GY	Right of Engine Compartment	8
Adjustable Pedals Motor	WT	Left Side of Body by Dash	28
Adjustable Pedals Sensor	BK	Left Side of Body by Dash	28
Airbag Control Module C1 (ORC)	YL	Center of Body by Console	29
Airbag Control Module C2 (ORC)	YL	Center Body by Console	18, 21
Airbag Squib - Driver 1	YL/BK	Steering Wheel	25
Airbag Squib - Driver 2	YL/TN	Steering Wheel	25
Airbag Squib - Driver Knee Blocker	YL	Left Side of Dash	18, 19, 24
Airbag Squib - Left Curtain	YL	Left Upper B-Pillar	30
Airbag Squib - Passenger	YL	Right Side of Dash	18, 19
Airbag Squib - Right Curtain	YL	Right Upper B-Pillar	34
Ambient Temperature Sensor	BK	Left Front of Engine Compartment	6
Amplifier C1	WT	Right Rear Body	34, 36, 38
Amplifier C2	WT	Right Rear Body	34, 36, 38
Antenna - Navigation		Right Front Body	19, 35, 36
Antenna - Radio		Center of Dash	18, 20
Antenna - Radio Inline to Antenna-Side Glass		Right Instrument Panel	18, 19
Antenna - Satellite Radio		Right Rear Body	38
Antenna - Side Glass		Right Side of Body	37
Auto Temp Control C1 (ATC)	BK	Center of Dash	18, 23
Auto Temp Control C2 (ATC)	NAT	Center of Dash	18, 23
Automatic Day/Night Mirror	BK	On the Windshield	46

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Battery B(-)		Left Side of Engine Compartment	3, 4, 9
Battery B(+)		Left Side of Engine Compartment	3, 4, 9
Battery Temperature Sensor	BK	Left Side of Engine Compartment	3, 4, 5, 9
Blend Door Actuator - Driver	GY	On HVAC Assembly	17
Blend Door Actuator - Passenger	GY	On HVAC Assembly	17
Blower Motor Resistor Block (MTC)		Right Side Instrument Panel	18, 19
Body Control Module - C1	BK	Left Side of Dash	22, 28
Body Control Module - C2	BK/GN	Left Side of Dash	22 28
Body Control Module - C3	BK/NAT	Left Side of Dash	22, 28
Body Control Module - C4	BK/GY	Left Side of Dash	18, 22, 24
Body Control Module - C5	BK/BK	Left Side of Dash	18, 22, 24
Brake Fluid Level Switch	BK	Left Rear Engine Compartment	3, 4
Brake Lamp Switch	BK	Left Side of Body by Dash	28
C100	BK	Left Front of Engine Compartment	5, 6
C101	BK	Left Front of Engine Compartment	4, 5
C102	BK	Left Front of Engine Compartment	4, 5
C104 (3.5 L)	LT GY	Left Rear Engine Compartment	3, 13, 15
C105	LT GY	Left Front of Engine Compartment	3, 4, 5, 6
C106		Right Top Engine	11
C107		Right Top Engine	11
C200	LT GY	Front Console	18, 26
C201	GY/BK	Left Side of Dash	18, 22, 24, 28
C202	DK GY	Right Side of Dash	17, 18, 19
C204 (DVD)	BK	Right Side of Dash	18, 22, 46
C205	NAT/ WT	Right Side of Dash	18, 19, 22, 33
C300	LT GY	Rear Console	26, 27, 29, 33
C301	BK	Left Side A-Pillar	28, 40
C303	BK	Left Side B-Pillar	30, 42
C304	BK	Right Side A-Pillar	33, 40
C306	BK	Right Side B-Pillar	33, 42
C307	BK	Center Rear of Body	32, 47
C308 (Power Liftgate)	BK	Center Rear of Body	32, 47
C312 (Except Base)	BK	Left Side Body by A-Pillar	28, 46
C313	LT GY	Left Side Body by A-Pillar	28, 46
C315 (Satellite Radio)	WT	Right Side of Dash	19, 22, 33
C316 (Lumbar Seat Adjuster)	WT	Left Side of Driver Seat	44
C317		Body Near Upper Left Liftgate	32
C318		Left Rear Underbody	31
Camshaft Position Sensor	BK	Right Engine	11, 14
Center High Mounted Stop Lamp	BK	Top of Liftgate	47
Cigar Lighter	GY	Center of Dash	18, 21, 23

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Circuit Breaker - Power Seat	GY	Left Side of Dash	22, 28
Clockspring C1	WT	Steering Column	18, 24
Clockspring C2	YL	Steering Column	18, 24
Clockspring C3	BK	Steering Wheel	25
Clockspring C4	BK	Steering Wheel	25
Coil On Plug No. 1	LT GY	Rear Engine	13
Coil On Plug No. 2	LT GY	Front Engine	N/S
Coil On Plug No. 3	LT GY	Rear Engine	13
Coil On Plug No. 4	LT GY	Front Engine	N/S
Coil On Plug No. 5	LT GY	Rear Engine	13
Coil On Plug No. 6	LT GY	Front Engine	N/S
Controller Antilock Brake	BK	Left Front Engine Compartment	3, 4, 10, 11
Courtesy Lamp - Driver	GY	In Door	40
Courtesy Lamp - Passenger	GY	In Door	40
Crankshaft Position Sensor	BK	Left Side of Engine	3, 4, 10, 11
Data Link Connector	BK	Left Instrument Panel	18, 19, 24
Dome Lamp (Base)		Center Headliner	46
Door Lock Motor/Ajar Switch - Driver	BK	In Door	40
Door Lock Motor/Ajar Switch - Driver Rear	BK	In Door	42
Door Lock Motor/Ajar Switch - Passenger	BK	In Door	40
Door Lock Motor/Ajar Switch - Passenger Rear	BK	In Door	42
Door Module - Driver C1	GY	In Door	40
Door Module - Driver C2	BK	In Door	41
Door Module - Driver C3	BK	In Door	40
Door Module - Passenger C1	GY	In Door	40
Door Module - Passenger C2	BK	In Door	41
Door Module - Passenger C3	BK	In Door	40
DVD Screen	BK	Upper Console Headliner	46
DVD/CD Changer C1	BK	Center of Dash	18, 20
DVD/CD Changer C2	BK	Center of Dash	18, 20
EGR Solenoid	BK	Left of Engine	15
Engine Coolant Temperature Sensor	BK	Left of Engine	15
Engine Oil Pressure Switch	BK	Lower Center Engine	10, 11
EVAP/Purge Solenoid	BK	Top Right Side of Engine	10, 16
Evaporator Temperature Sensor	BK	On the HVAC Assembly	17
Fog Lamp - Left	BK	At Lamp in Front Bumper	7
Fog Lamp - Right	BK	At Lamp in Front Bumper	1, 8
Front Blower Power Module C1	BK	On HVAC Assembly	17

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Front Blower Power Module C2	BK	On HVAC Assembly	17
Fuel Injector No. 1	BK	Rear Engine	13
Fuel Injector No. 2	BK	Top Front of Engine	14
Fuel Injector No. 3	BK	Rear Engine	13
Fuel Injector No. 4	BK	Top Front of Engine	N/S
Fuel Injector No. 5	BK	Rear Engine	13
Fuel Injector No. 6	BK	Top Front of Engine	N/S
Fuel Pump Module	BK	Behind Fuel Tank	33, 39
Generator	BK	On Engine	10, 11
Glove Box Lamp	BL	Right Side of Dash	18, 19, 20
Hands Free Module	GY	Low Center Body	33
Headlamp - Left	BK	At Left Headlamp Opening	6, 7
Headlamp - Right	BK	At Right Headlamp Opening	1, 8
Heated Seat Back - Driver	GN	Left Side of Seat	44
Heated Seat Cushion - Driver	DK GY	Inside Seat	44
Heated Seat Switch - Left Middle Row	BK	Rear Center Console	27
Heated Seat Switch - Right Middle Row	GN	Rear Center Console	27
Heated Seat - Left Middle Row	DK GY	Left Side of Body	30, 45
Heated Seat - Right Middle Row	DK GY	Right Side of Body	34, 45
Horn - High Note	BK	Right Front Frame Rail	2, 8
Horn - Low Note	BK	Right Front Frame Rail	2, 8
Idle Air Control Motor	BK	Right Rear Engine	11, 13
Ignition Coil (3.8 L)		Left Rear Engine	15
Ignition Switch	BK	Left Side of Dash	18, 19, 23
Impact Sensor - Left Front	BK	Left Front of Engine Compartment	6
Impact Sensor - Left Side 1	BK	Left Side B-Pillar	30
Impact Sensor - Left Side 2	BK	Left Side of Body	30
Impact Sensor - Right Front	BK	Right Front of Engine Compartment	8
Impact Sensor - Right Side 1	DK GY	Right Side B-Pillar	33
Impact Sensor - Right Side 2	DK GY	Right Side of Body	34
Instrument Cluster C1	BK	Left Side of Dash	18, 24
Instrument Cluster C2 (Navigation)	BK	Left Side of Dash	18, 24
Instrument Panel Switch POD	BK	Center of Dash	18, 21
Intake Air Temperature Sensor	BK	Top Right of Engine	11, 13, 16
Integrated Power Module Battery Feed	-	Left Front Engine Compartment	3, 4
Integrated Power Module C1	BK	Left Front Engine Compartment	3, 4
Integrated Power Module C2	DK GY	Left Front Engine Compartment	3, 4
Integrated Power Module C3	GY	Left Front Engine Compartment	6
Integrated Power Module C4	GN	Left Front Engine Compartment	3 4

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Integrated Power Module C5	GY	Left Front Engine Compartment	6
Integrated Power Module C6	GY	Left Front Engine Compartment	3, 4
Integrated Power Module C7	GY	Left Front Engine Compartment	3, 4
Integrated Power Module C8	WT	Left Front Engine Compartment	3, 4
Integrated Power Module C9	BL	Left Front Engine Compartment	3, 4
Knock Sensor	BK	Left of Engine	4, 12, 15
License Lamp	RD	Rear Liftgate	47, 48
Liftgate Cinch/Release Motor (Power Liftgate)	BL	Rear Liftgate	47
Liftgate Flood Lamp	GY	Rear Liftgate	47
Liftgate Handle Switch	BK	Rear Liftgate	47
Liftgate Lock Motor/Ajar Switch (Base)	BK	Rear Liftgate	47
Liftgate Pinch Sensor - Left (Power Liftgate)	BK	Rear Liftgate	47
Liftgate Pinch Sensor - Right (Power Liftgate)	BK	Rear Liftgate	47
Manifold Absolute Pressure Sensor	GY	Left Top of Engine	13, 15
Manifold Tuning Valve Solenoid	DK GY	Top Right Front of Engine	14
Memory/Heated Seat Adjustable Pedals Module C1	DK GY	Center Console	26, 27, 29
Memory/Heated Seat Adjustable Pedals Module C2	GY	Under Driver Seat	43
Memory/Heated Seat Adjustable Pedals Module C3	WT	Under Driver Seat	43
Memory/Heated Seat Adjustable Pedals Module C4	GY	Center Console	26, 27, 29
Mode Door Actuator - Front	GY	On the HVAC Assembly	17
Mode Door Actuator - Rear	DK GY	In Rear Console	26
Multi-Function Switch	BK	Steering Column	18, 24
Natural Vacuum Leak Detection Assembly	BK	Left Side Body Under A-Pillar	3, 4, 39
Navigation Module	BK	Left Rear Body	31, 36
Noise Suppressor	-	Engine	14
Overhead Console	BK	Front Headliner	46
Oxygen Sensor - 1/1 Upstream	BK	Left Rear Engine	11, 13
Oxygen Sensor - 1/2 Downstream	WT	Rear of Engine	3, 4, 10, 11
Park Brake Switch	-	Left Front Corner of Dash	28
Park Display Module		Body Near Top Center Liftgate	32
Park Module		Left Rear Body	31
Park Sensor No.7		Rear Fascia	N/S
Park Sensor No.8		Rear Fascia	N/S
Park Sensor No.9		Rear Fascia	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Park Sensor No.10		Rear Fascia	N/S
Passenger Seat		Passenger Seat	29
Power Liftgate Drive Unit	DK GY	Left Rear Body	31
Power Liftgate Module C1	BK	Left Rear Body	31
Power Liftgate Module C2	BK	Left Rear Body	31
Power Mirror - Driver	BK	Corner of Door	40
Power Mirror - Passenger	BK	Corner of Door	40
Power Outlet - Front Console	GY	Center Console	26
Power Outlet - Instrument Panel	GY	Center of Dash	18, 21, 23
Power Outlet - Rear	GY	Left Rear Body	31
Power Seat Motor - Driver Front Riser	BK	In Driver Seat	43
Power Seat Motor - Driver Horizontal	BK	Under Driver Seat	43
Power Seat Motor - Driver Lumbar	BK	In Driver Seat	44
Power Seat Motor - Driver Rear Riser	BK	In Driver Seat	43
Power Seat Motor - Driver Recliner	DK GY	In Driver Seat	44
Power Seat Motor - Passenger Horizontal	BK	In Passenger Seat	N/S
Power Seat Motor - Passenger Recliner	DK/GY	In Passenger Seat	44
Power Seat Switch - Driver	BK	Driver Door	41
Power Seat Switch - Passenger	BK	Passenger Door	41
Power Sunroof Module	BK	Left Upper Body	30
Power Window Motor - Driver	LT GY	Middle of Driver Door	40
Power Window Motor - Driver Rear	LT GY	Middle of Driver Rear Door	42
Power Window Motor - Passenger	LT GY	Middle of Passenger Rear Door	40
Power Window Motor - Passenger Rear	LT GY	Middle of Passenger Rear Door	42
Power Window Switch - Driver Rear	BK	Middle of Driver Rear Door	42
Power Window Switch - Passenger Rear	BK	Middle of Passenger Rear Door	42
Powertrain Control Module C1	BK/BK	Left Front of Engine Compartment	7
Powertrain Control Module C2	BK/OR	Left Front of Engine Compartment	7
Powertrain Control Module C3	BK/WT	Left Front of Engine Compartment	7
Powertrain Control Module C4	BK/GN	Left Front of Engine Compartment	7
Radiator Fan Motor No. 1	BK	Center Engine Compartment	6
Radiator Fan Motor No. 2	BK	Center Engine Compartment	6
Radiator Fan Relay	BK	Left Front Engine Compartment	6

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Radio C1	DK GY	Center of Dash	18, 20
Radio C2 (DVD/CD Changer)	DK GY	Center of Dash	18, 20
Radio C2 (Satellite Radio)	DK GY	Center of Dash	19
Reading Lamp - Front	BK	Front Headliner	46
Reading/Courtesy Lamp - Left Middle	GY	Left Headliner	46
Reading/Courtesy Lamp - Left Rear	GY	Left Rear Headliner	46
Reading/Courtesy Lamp - Right Middle	GY	Right Headliner	46
Reading/Courtesy Lamp - Right Rear	GY	Right Rear Headliner	46
Reading Lamp-Rear (Base)		Center Rear Headliner	
Rear Booster Fan Power Module C1	BK	Middle Center of Body	26, 29
Rear Booster Fan Power Module C2	BK	Middle Center of Bodyh	26, 29
Rear Booster Fan Rear Control Switch	BK	Rear Center Console	27
Rear Window Defogger Feed		Right Side Liftgate	47
Rear Window Defogger Ground		Left Side Liftgate	47
Rear View Mirror	BK	On Windshield Glass	46
Recirculation Door Actuator	GY	On the HVAC Assembly	17
Remote Radio Switch - Left	BK	Steering Wheel	25
Remote Radio Switch - Right	BK	Steering Wheel	25
Satellite Radio Multiplexer C1	DK GY	Center of Dash	19
Satellite Radio Multiplexer C2	DK GY	Center of Dash	18, 20
Satellite Radio Receiver	BK	Right Rear Body	38
Seat Belt Force Sensor		Right Side B-Pillar	33
Seat Belt Switch - Driver	DK GY	Left Side B-Pillar	30
Seat Belt Tensioner - Driver	YL	Left Side B-Pillar	30
Seat Belt Tensioner - Passenger	YL	Right Side B-Pillar	33
Seat Heater Interface Module	GN	Rear Center Console	27
Seat Position Sensor - Driver Front Riser	WT	In Driver Seat	43
Seat Position Sensor - Driver Horizontal	WT	In Driver Seat	43
Seat Position Sensor - Driver Rear Riser	WT	In Driver Seat	43
Seat Position Sensor - Driver Recliner	BK	In Driver Seat	44
Shift Lever Assembly		Below Center Console	18, 26
Short Runner Valve Solenoid	GY	Left Rear Engine	13
SKREEM Module	BK	Center of Dash	18, 19, 23

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Speaker - Center Instrument Panel	BK	Center of Dash	18, 21
Speaker - Left Front Door Tweeter	BK	Driver Door	40
Speaker - Left Front Door Woofer	WT	Driver Door	40
Speaker - Left Rear Door	WT	Left Rear Door	42
Speaker - Right Front Door Tweeter	BK	Passenger Door	40
Speaker - Right Front Door Woofer	WT	Passenger Door	40
Speaker - Right Rear Door	WT	Right Rear Door	42
Speaker - Subwoofer	RD	Right Rear Body	34, 38
Speed Control Servo	BK	Left Front Engine Compartment	6
Speed Control Switch - Left	BK	On the Steering Wheel	25
Speed Control Switch - Right	BK	On the Steering Wheel	25
Speed Sensor - Input	GY	Left Side of the Engine	3, 4, 10, 11
Speed Sensor - Output	GY	Left Side of the Engine	3, 10, 11
Starter Motor	-	Lower Center Engine	10, 11
Tail Lamp - Left	BK	Left Rear Body	31
Tail Lamp - Right	BK	Right Rear Body	34, 49
Throttle Position Sensor	GY	Right Rear Engine	11, 13
Traction Control Switch	BK	Under Front Console	18, 26
Trailer Tow Connector	BK	Left Rear Body	31
Transmission Range Sensor	DK GY	Left Front of Engine	3, 4, 10, 11
Transmission Solenoid/Pressure Switch Assembly	BK	Left Side of Engine	3, 4, 10, 11
Visor/Vanity Lamp - Left	BK	Left Front Headliner	46
Visor/Vanity Lamp - Right	BK	Right Front Headliner	46
Washer Fluid Level Switch	GY	Left Lower Front of Engine	7
Washer Pump Motor - Front	NAT	Left Lower Front of Engine	7
Wheel Speed Sensor - Left Front	LT GY	Left Rear of Engine Compartment	7
Wheel Speed Sensor - Left Rear	LT GY	Left Rear Side of Body	31
Wheel Speed Sensor - Right Front	LT GY	Right Rear of Engine Compartment	8
Wheel Speed Sensor - Right Rear	LT GY	Right Rear Side of Body	34
Wiper Module - Front	BK	Rear Center of Engine Compartment	3, 4, 7
Wiper Module - Rear	NAT	Liftgate	47
Wiper/Washer Switch	WT	Lower Steering Column	18, 24

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

GROUNDS

GROUND NUMBER	LOCATION	FIG.
G100	Left Front Side of Engine Compartment	5
G101	Lower Left Side Engine	4, 10
G102	Left Front Side on Engine	3, 4, 5
G103	Left Front Side of Engine Compartment	6
G104	Left Front Side of Engine Compartment	6
G200	Right Side Instrument Panel	18, 19
G201	Right Side Instrument Panel	18, 19
G202	Right Side Instrument Panel	18, 19
G203	Right Side Instrument Panel	18, 19
G204	Right Side Instrument Panel	18, 19
G300	Left Center of Body	29, 30
G301	Right Side of Body	33
G302	Left Side of Power Liftgate	47
G303	Left Rear corner of Body	31
G304	Right Rear Corner of Body	34, 38
G305	Left Center of Body	30
G306	Left Front Side Engine	5
Ground-Horn	Steering Column	18, 19, 24

SPLICES

SPLICE NUMBER	LOCATION	FIG.
S100	Left Side of Engine Compartment	3, 9, 11
S102	On Engine near MAP sensor T/O	15
S103	Center Front Side of Engine	10, 11
S104	On Engine near G104 T/O	15
S105	Left Front of Engine Compartment	3, 4, 7, 11
S106	On Engine near EGR Solenoid T/O	15
S107	Left Front of Engine Compartment	6
S108	Left Front of Engine Compartment	3, 4, 5, 11
S109	Left Front of Engine Compartment	3, 4, 10, 11
S110	Left Front of Engine Compartment	3, 4, 5
S111	Left Front of Engine Compartment	3, 4, 7, 10, 11
S112	Right Front of Engine Compartment	8
S113	Left Front of Engine Compartment	7
S114	Left Front of Engine Compartment	3, 4
S115	Front Center Engine	11
S116	Left Front of Engine Compartment	3, 4 5
S117	On Engine Near Knock Sensor T/O	15
S118	On Engine Near Manifold Absolute Pressure Sensor T/O	15

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

SPLICE NUMBER	LOCATION	FIG.
S119	On Engine Near Manifold Absolute Pressure Sensor T/O	15
S120	Left Front of Engine Compartment	6
S176	Between Fuel Injector No.1 T/O and No.3 T/O	13
S177	Near T/O for Engine Coolant Temperature Sensor	15
S178	Between Fuel Injector No.4 T/O and No.6 T/O	N/S
S200	Center I/P	18
S201	Center I/P	18, 19, 20
S204	Center I/P Center of Dash	18, 19, 20
S207	Left I/P Left Side of Dash	18, 19, 24
S211 (DVD/CD Changer)	Center I/P	18, 20
S213	Center I/P	18
S302	Left Center Side of Body	30
S303	Right Rear Body	34
S305	Left Center Side of Body	28
S306 (Middle Row Heated Seats)	In Rear Center Console	27
S307	Left Side of Engine Compartment	3
S308	Left Kick Panel	28
S312 (Middle Row Heated Seats)	In Rear Center Console	27
S313	Left Rear Body	30
S314	Left Center Body near Console	29
S315	Left Center Side of Body	30
S320	Right Center Body near Console	29
S322	Middle Center of Body	29
S323	Right Center Side of Body	33
S324	Right Front Door	40
S325	Right Center of Body	33
S326	Right Front Door	40
S327	Left Front Door	40
S328	Right Front Door	40
S329	Left Front Door	40
S330	Right Front Door	40
S333	Left Front Door	40
S334	Right Rear Door	42
S336	Left Rear Door	42
S337	Left Rear Body	31
S338	Center Rear Power Liftgate	47
S339	Right Center Side of Body	29
S340 (Middle Row Heated Seat)	In Rear Center Console	27
S342	Front Headliner	46

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

SPLICE NUMBER	LOCATION	FIG.
S343	Left Front Headliner	46
S344	Left Front Headliner	46
S345	Front Headliner	46
S346	Left Front Headliner	46
S347	Left Side Body near A-Pillar	28
S348	Right Rear Body	38
S349	Center Instrument Panel	19
S351	Left Rear Body	31
S352	Right Rear Part of Body	34
S353	Left Center Side of Body	29
S354	Left Center Side of Body	28
S355	Below Driver Seat Cushion	43
S356	Below Driver Seat Cushion	43

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

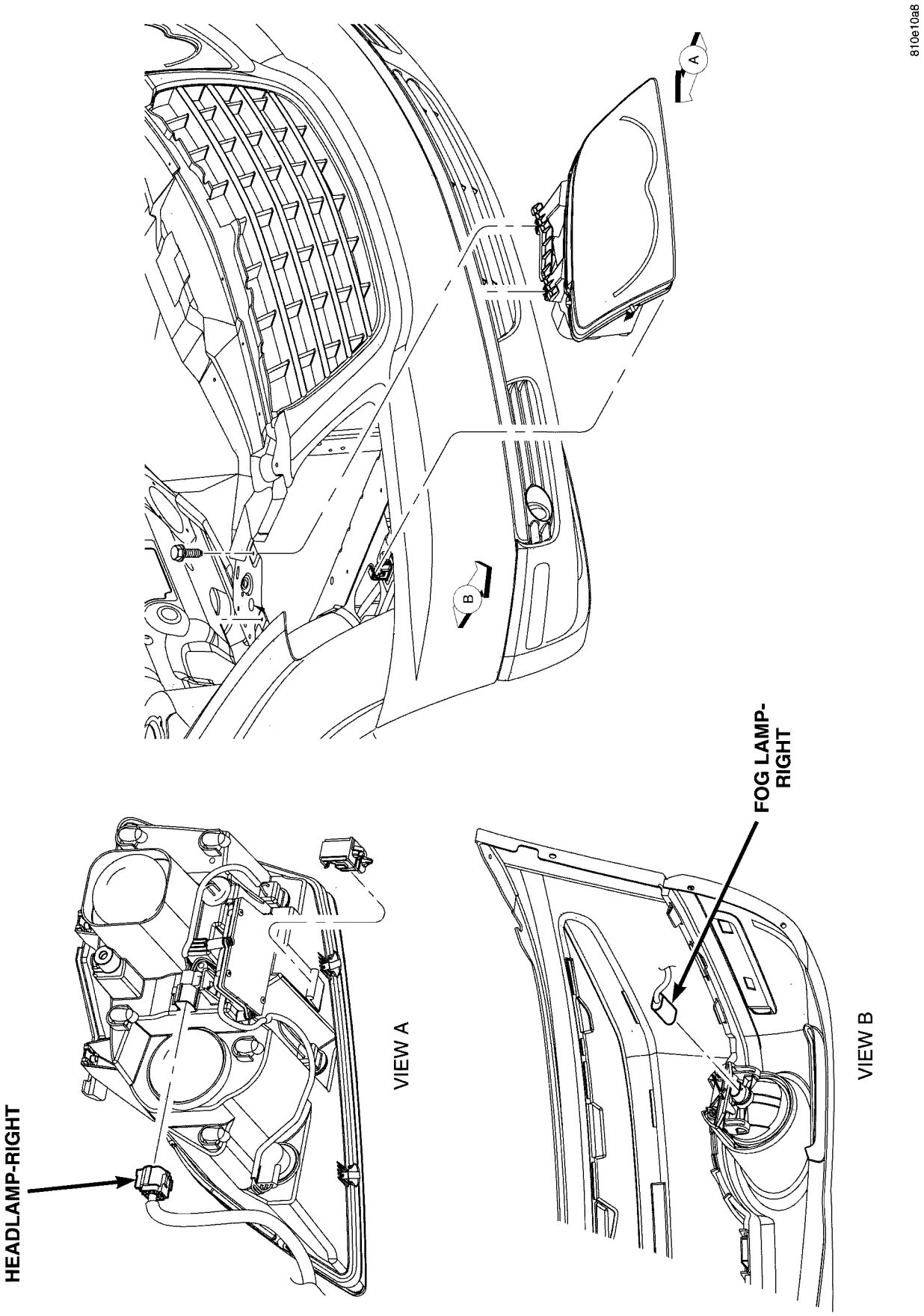


Fig. 1 FRONT LIGHTING

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

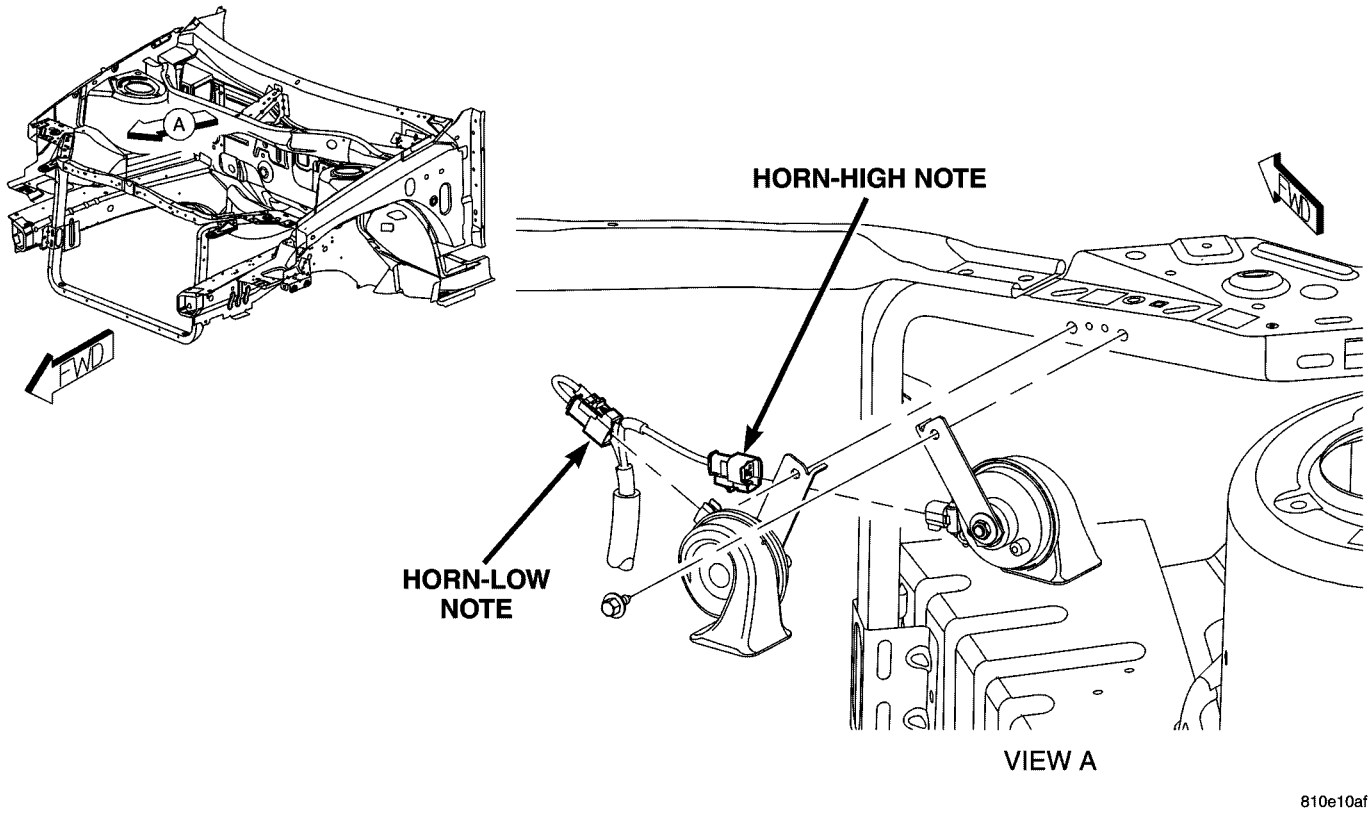


Fig. 2 HORN

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

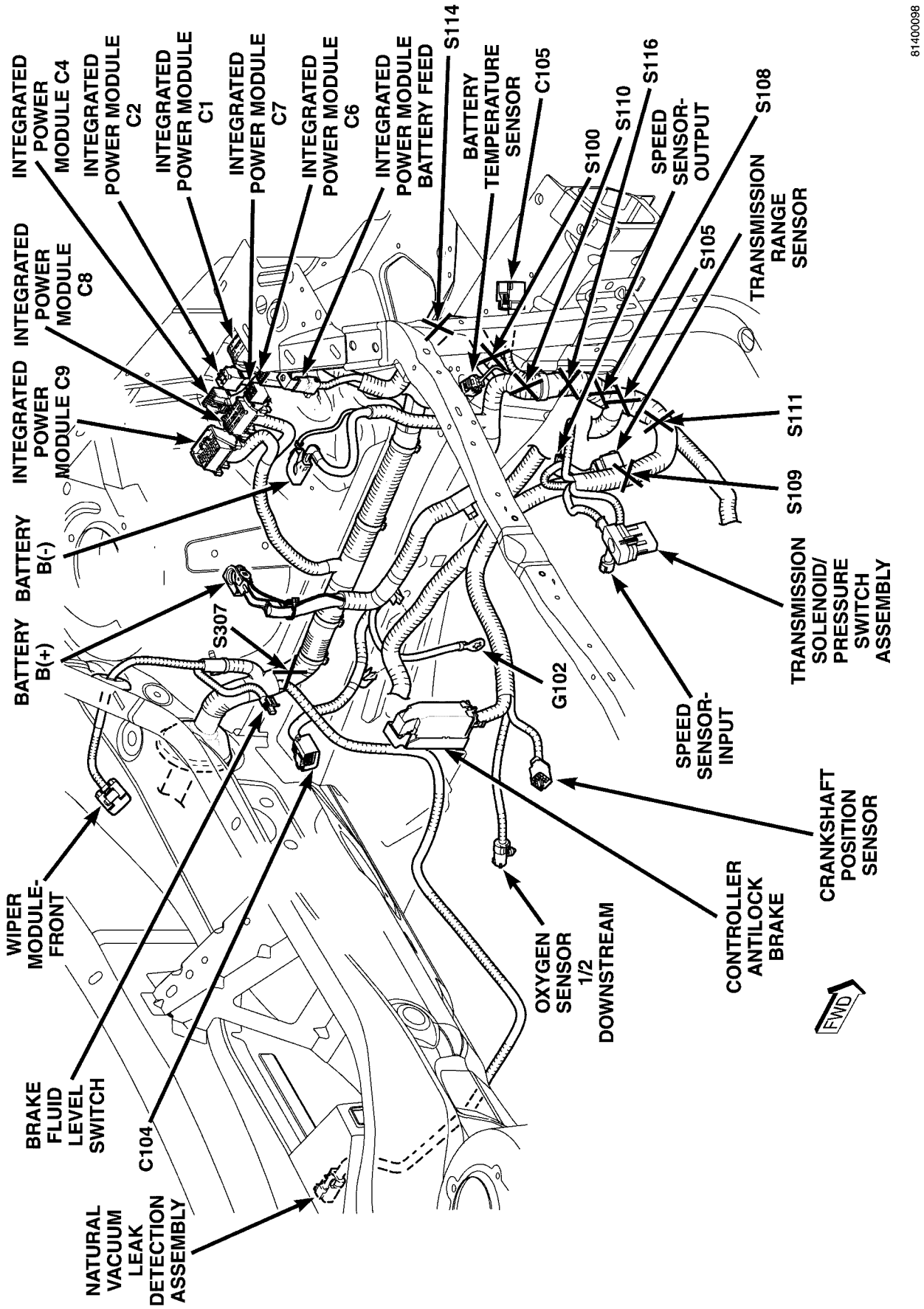


Fig. 3 ENGINE COMPARTMENT - LEFT FRONT-3.5L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

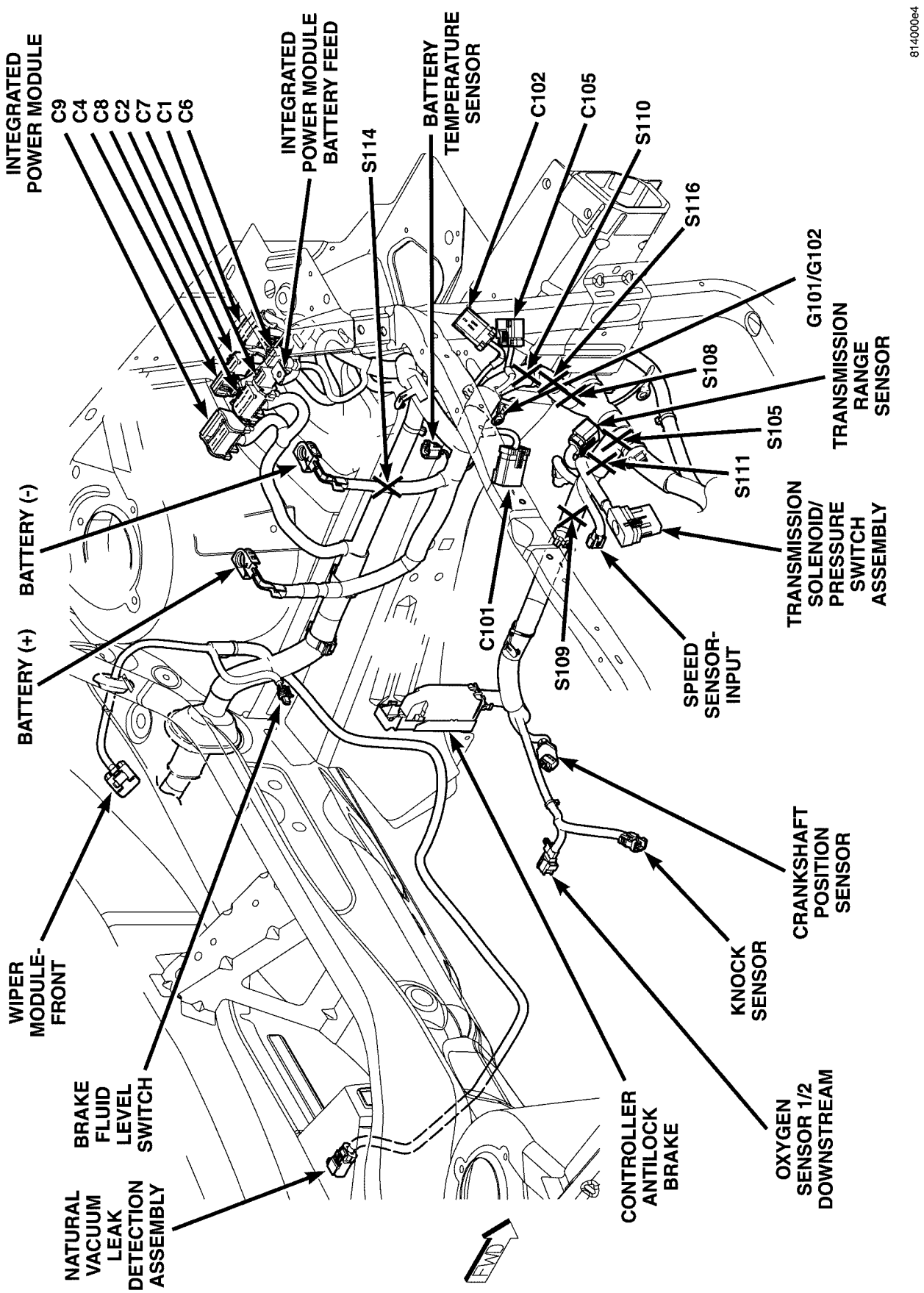


Fig. 4 ENGINE COMPARTMENT - LEFT FRONT 3.8L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

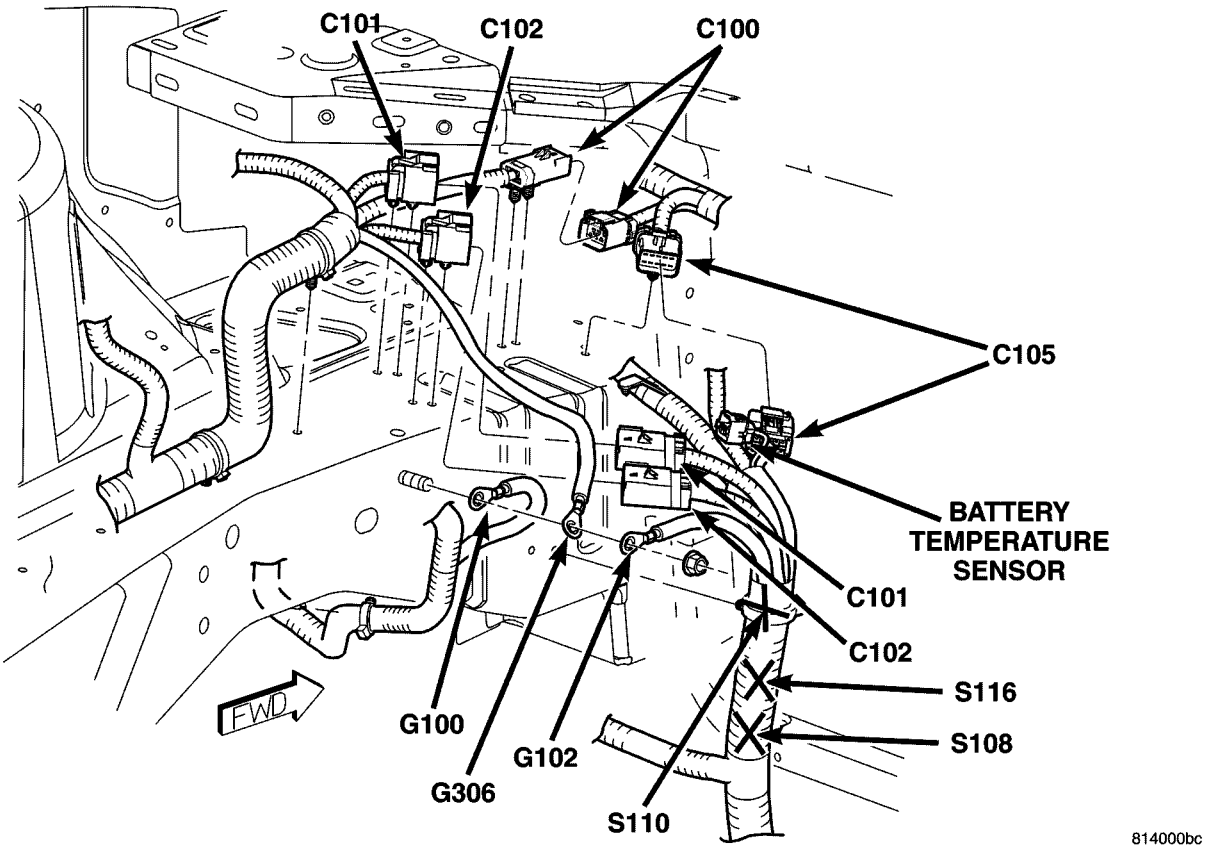


Fig. 5 ENGINE COMPARTMENT - LEFT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

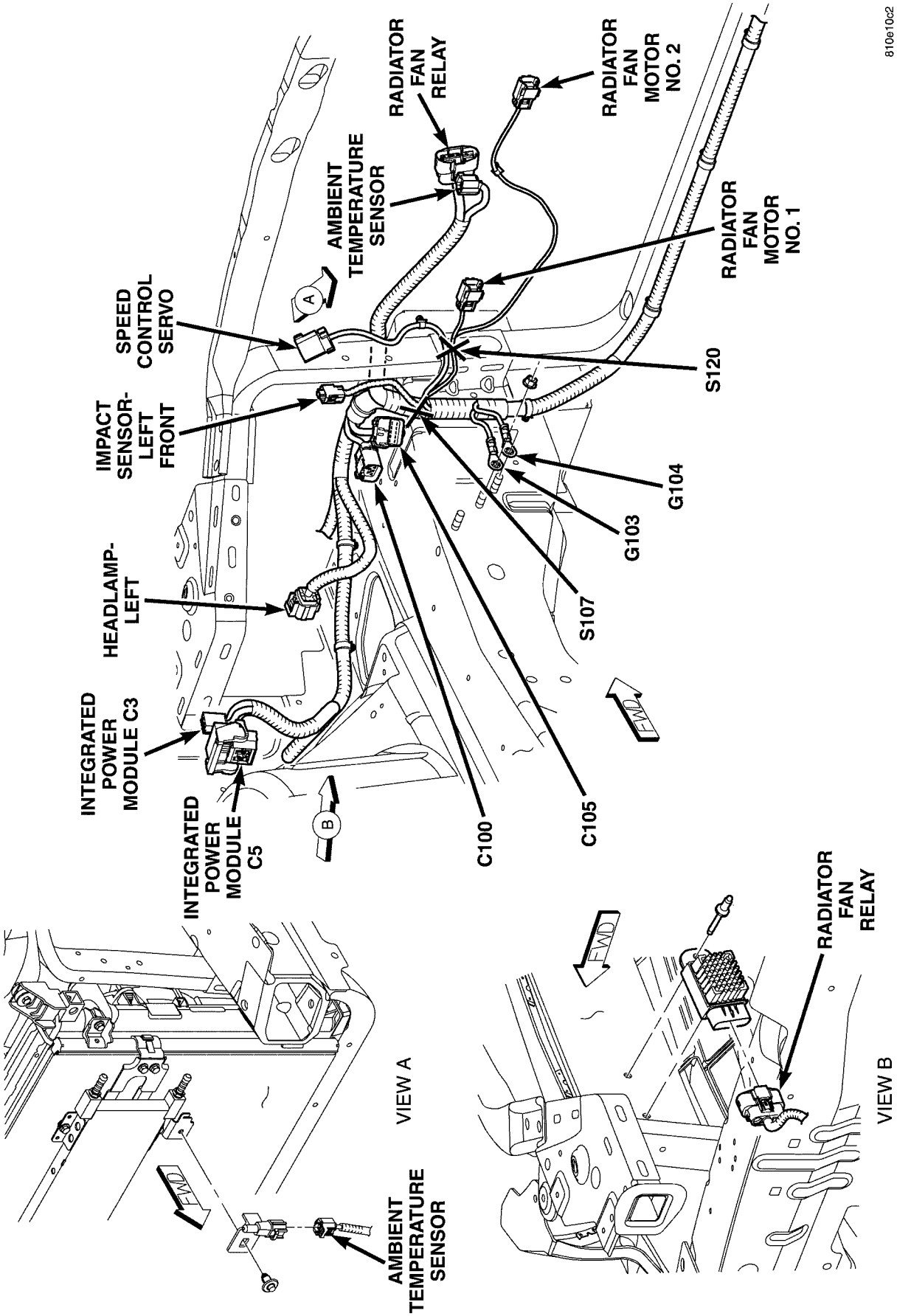


Fig. 6 ENGINE COMPARTMENT - FRONT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

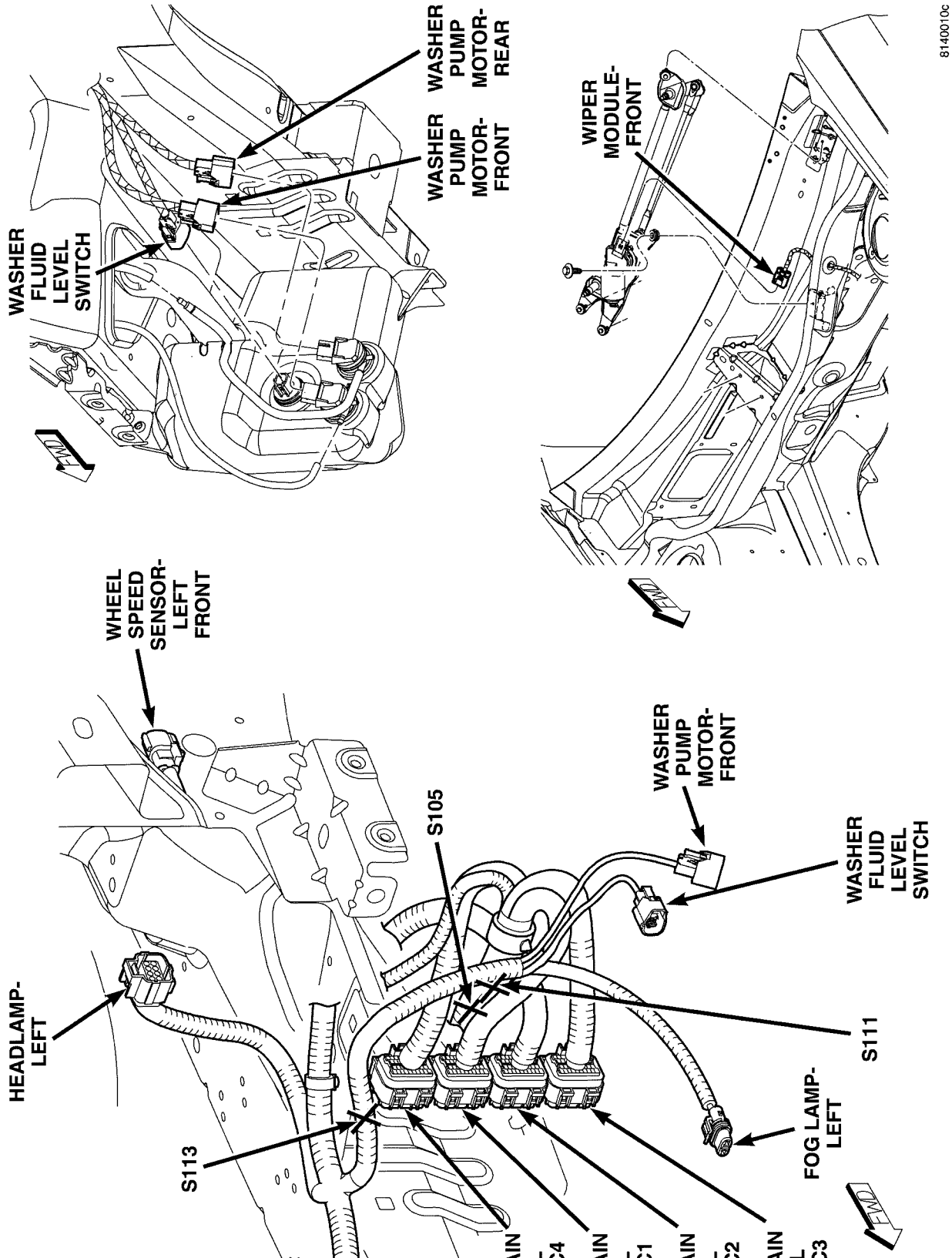


Fig. 7 ENGINE COMPARTMENT - LEFT FRONT AND REAR

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

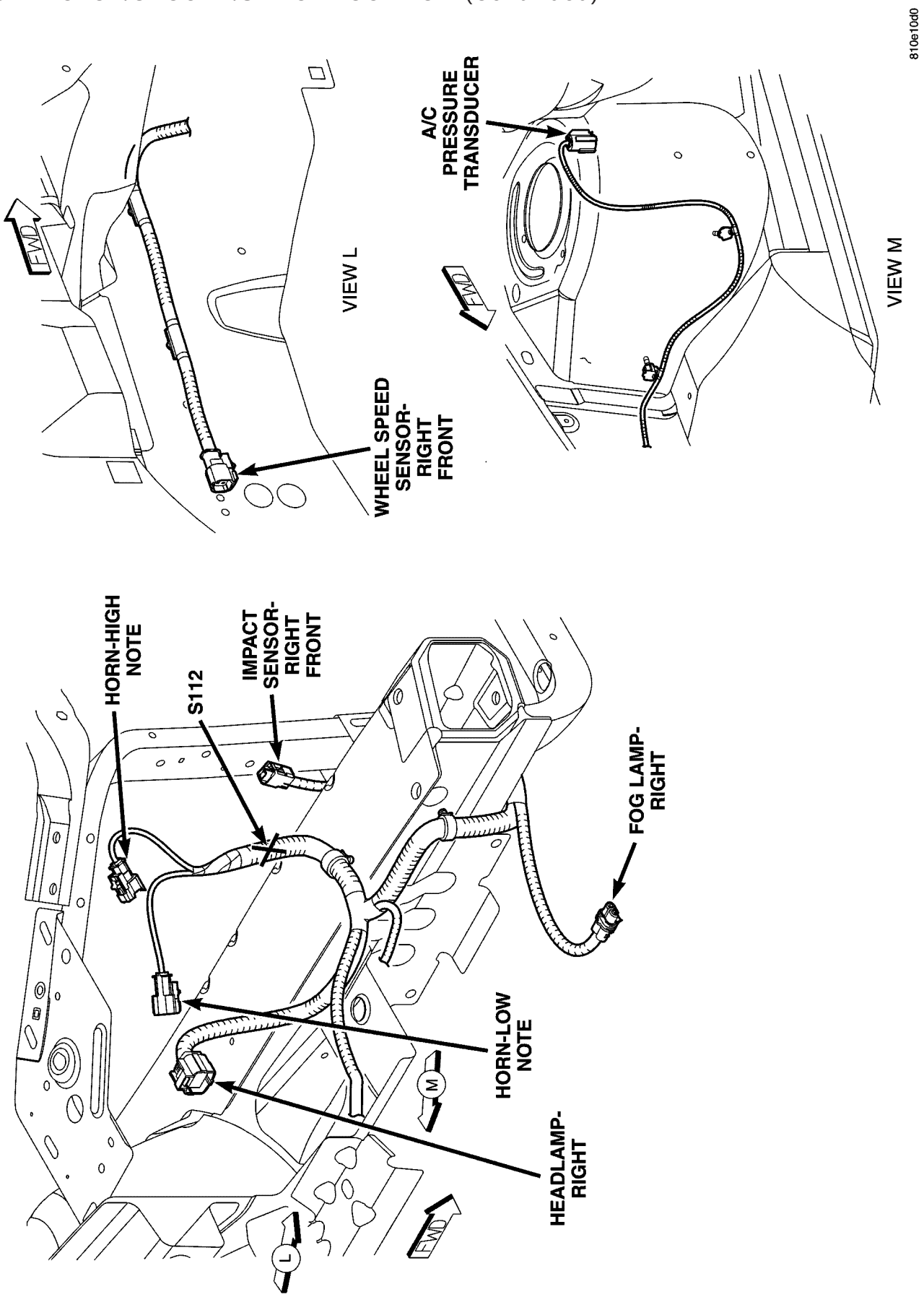


Fig. 8 ENGINE COMPARTMENT - RIGHT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

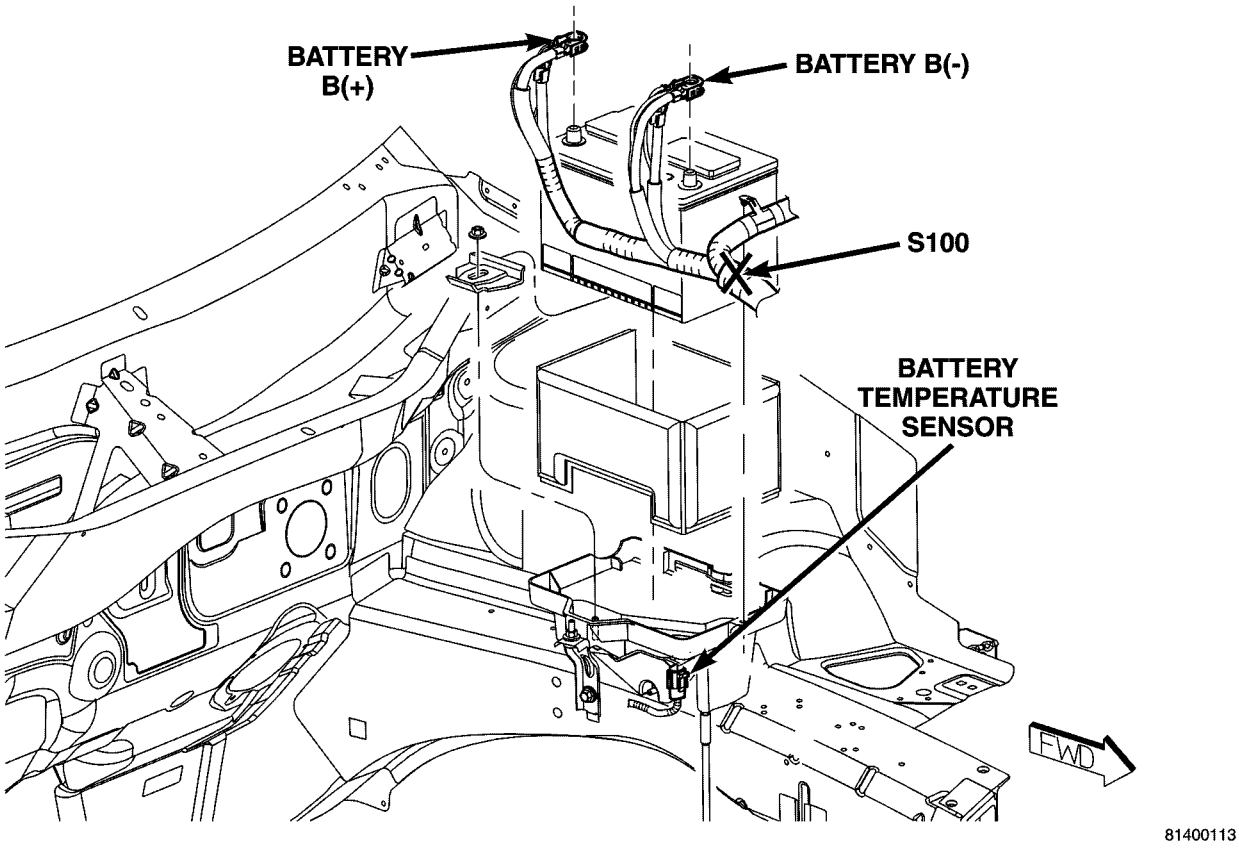


Fig. 9 BATTERY

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

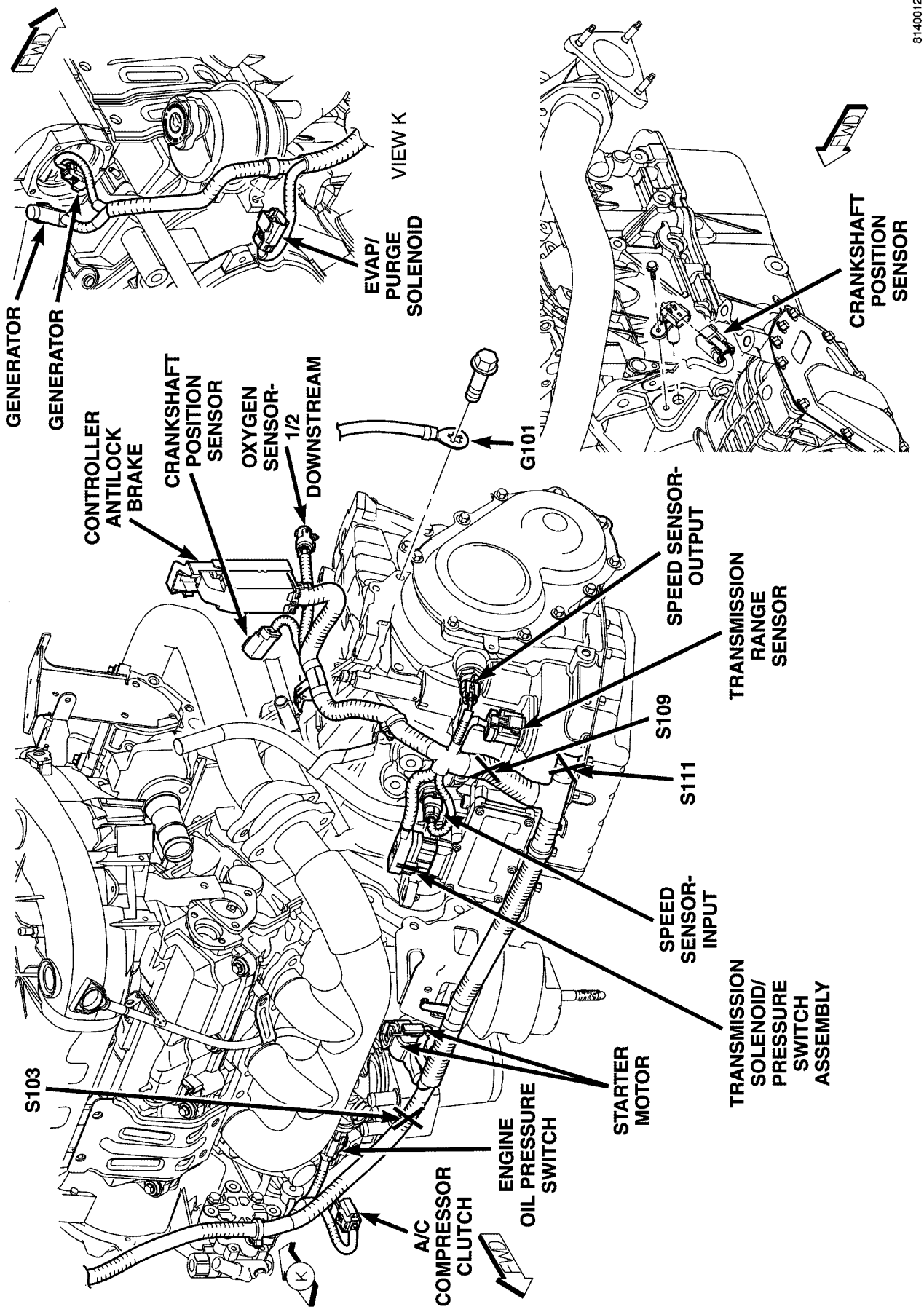


Fig. 10 ENGINE 3.5L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

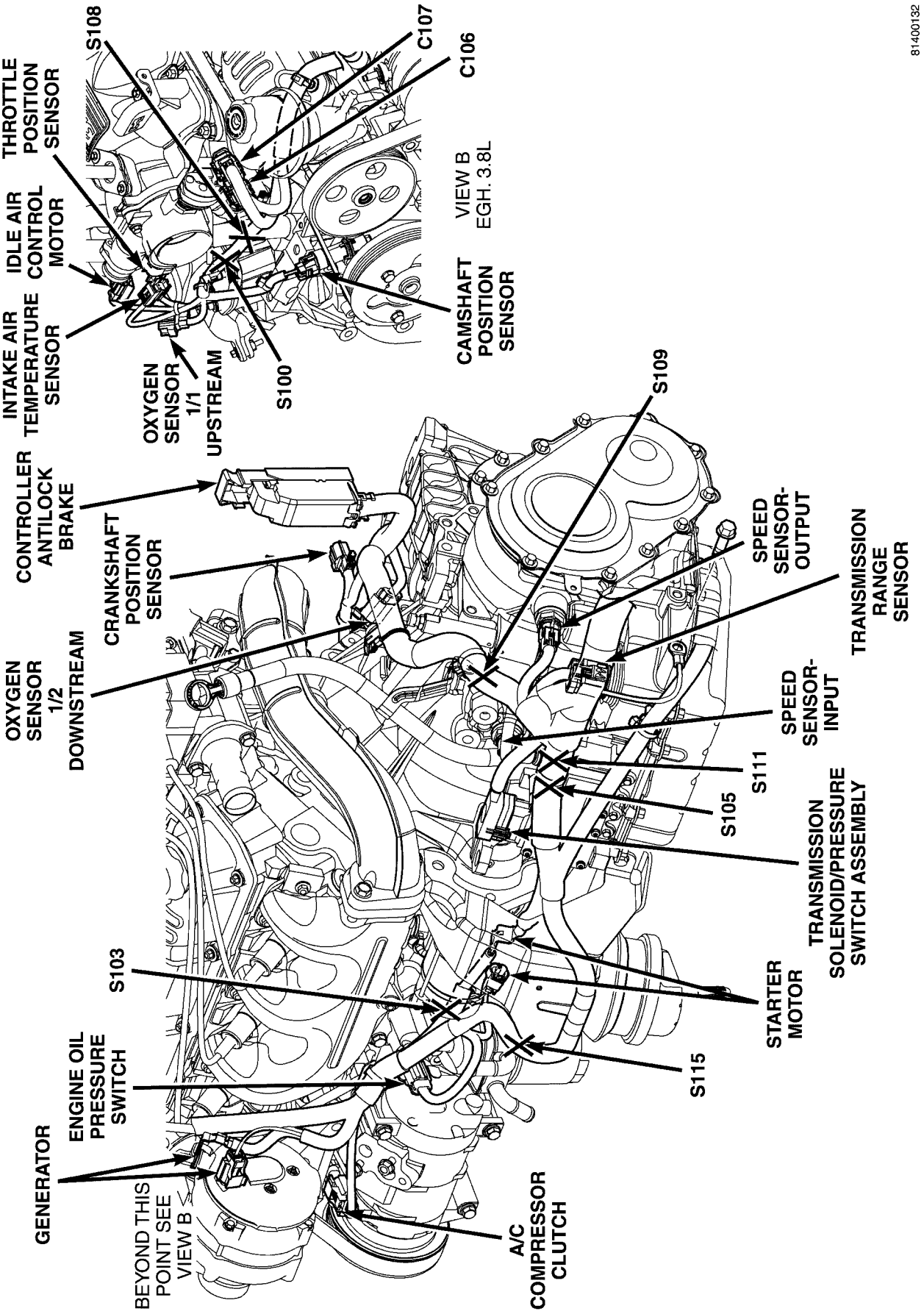


Fig. 11 ENGINE 3.8 L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

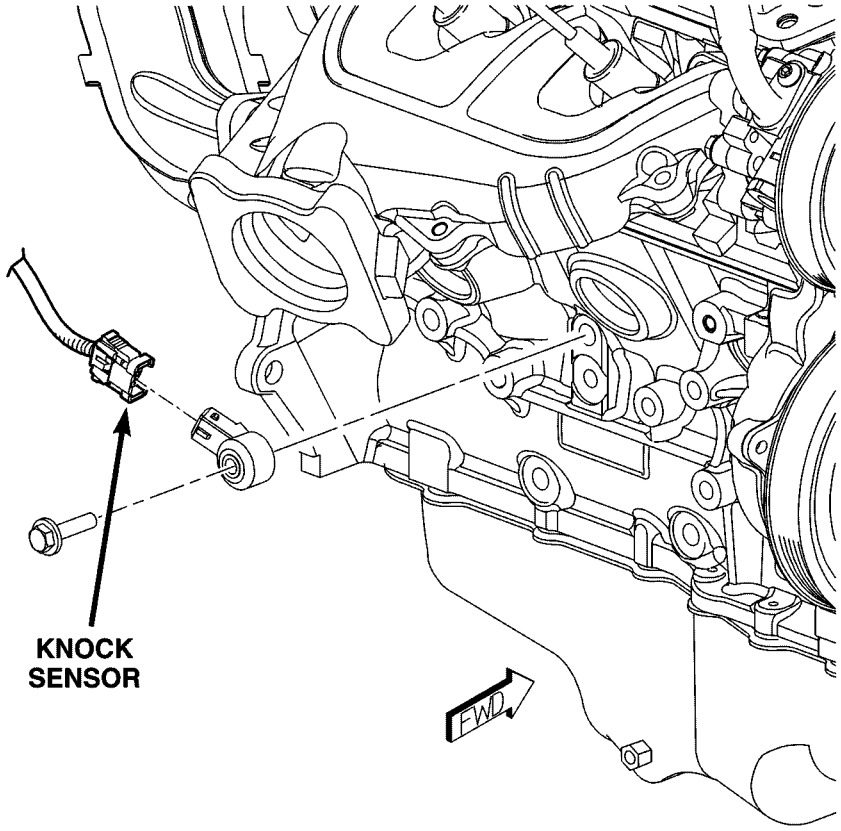


Fig. 12 ENGINE - LOWER REAR - 3.8 L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

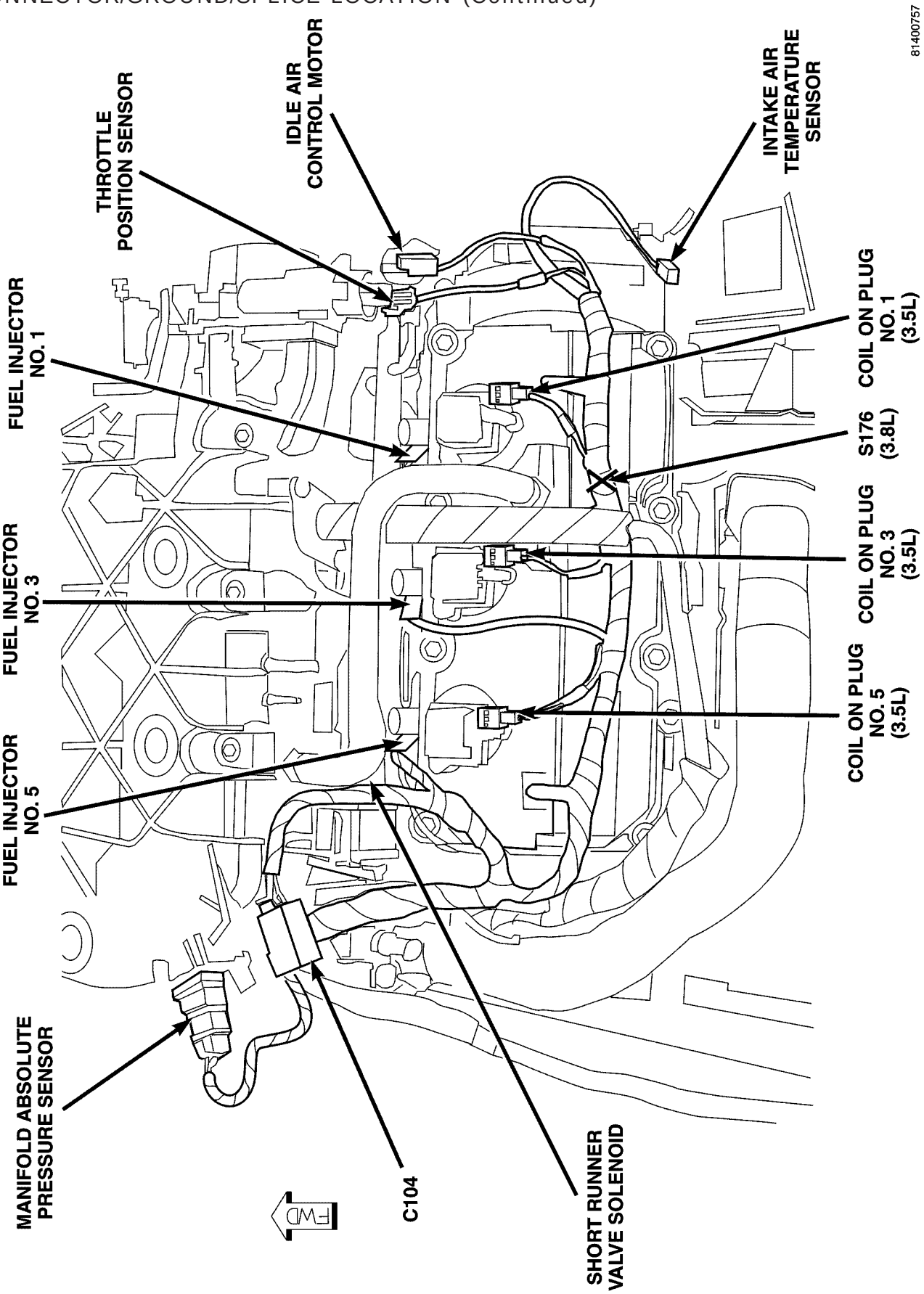


Fig. 13 ENGINE REAR

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

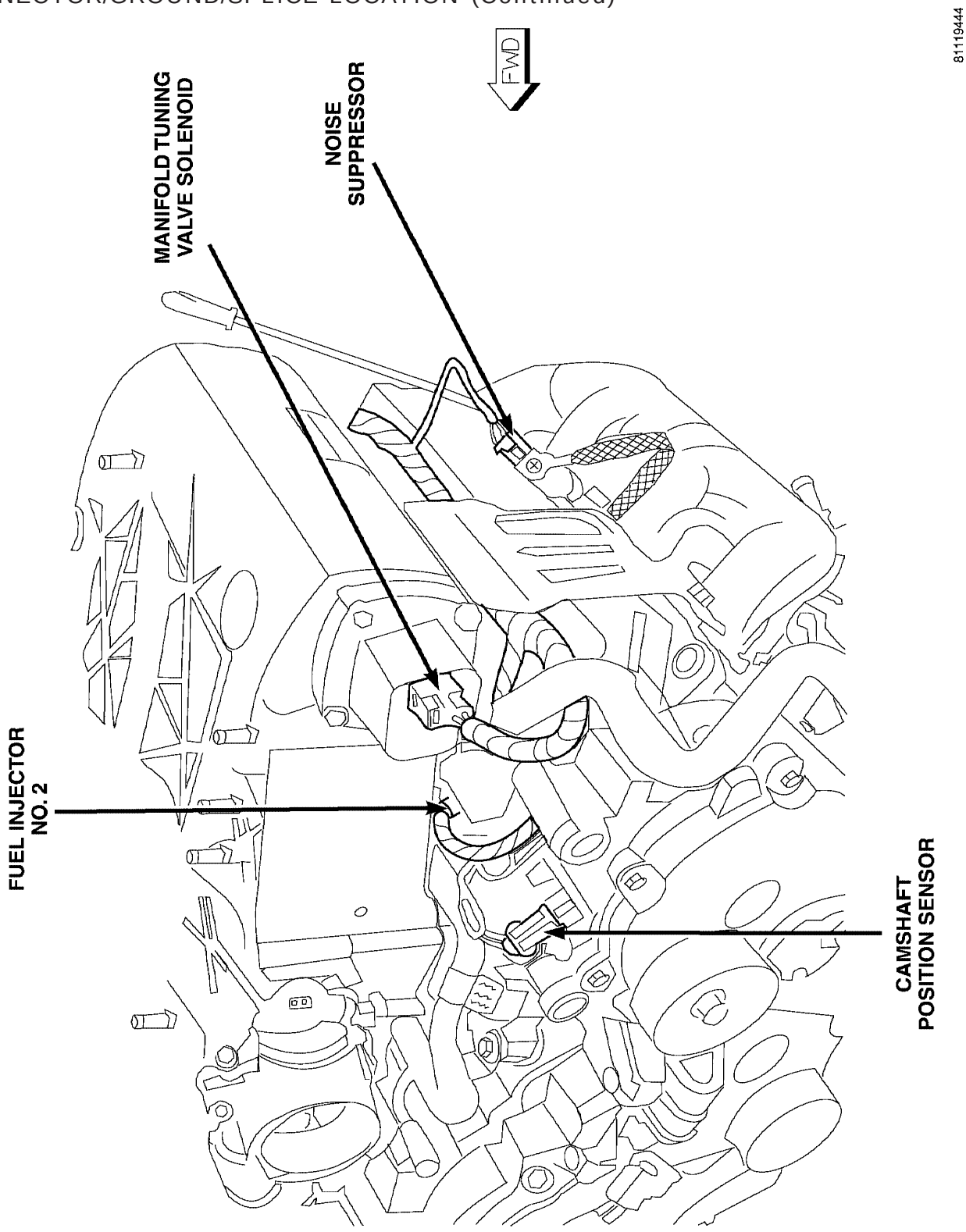


Fig. 14 ENGINE RIGHT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

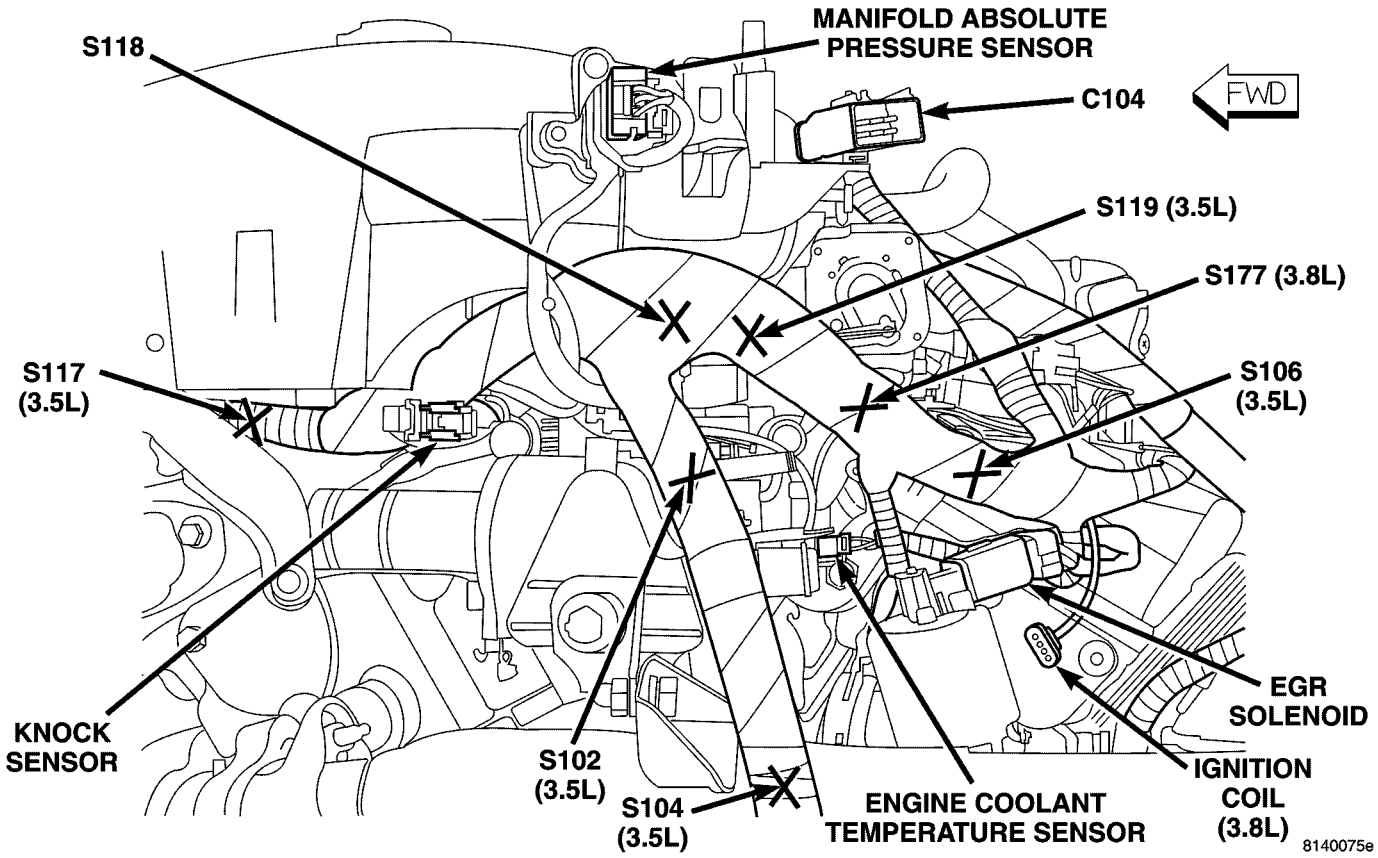


Fig. 15 ENGINE LEFT REAR

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

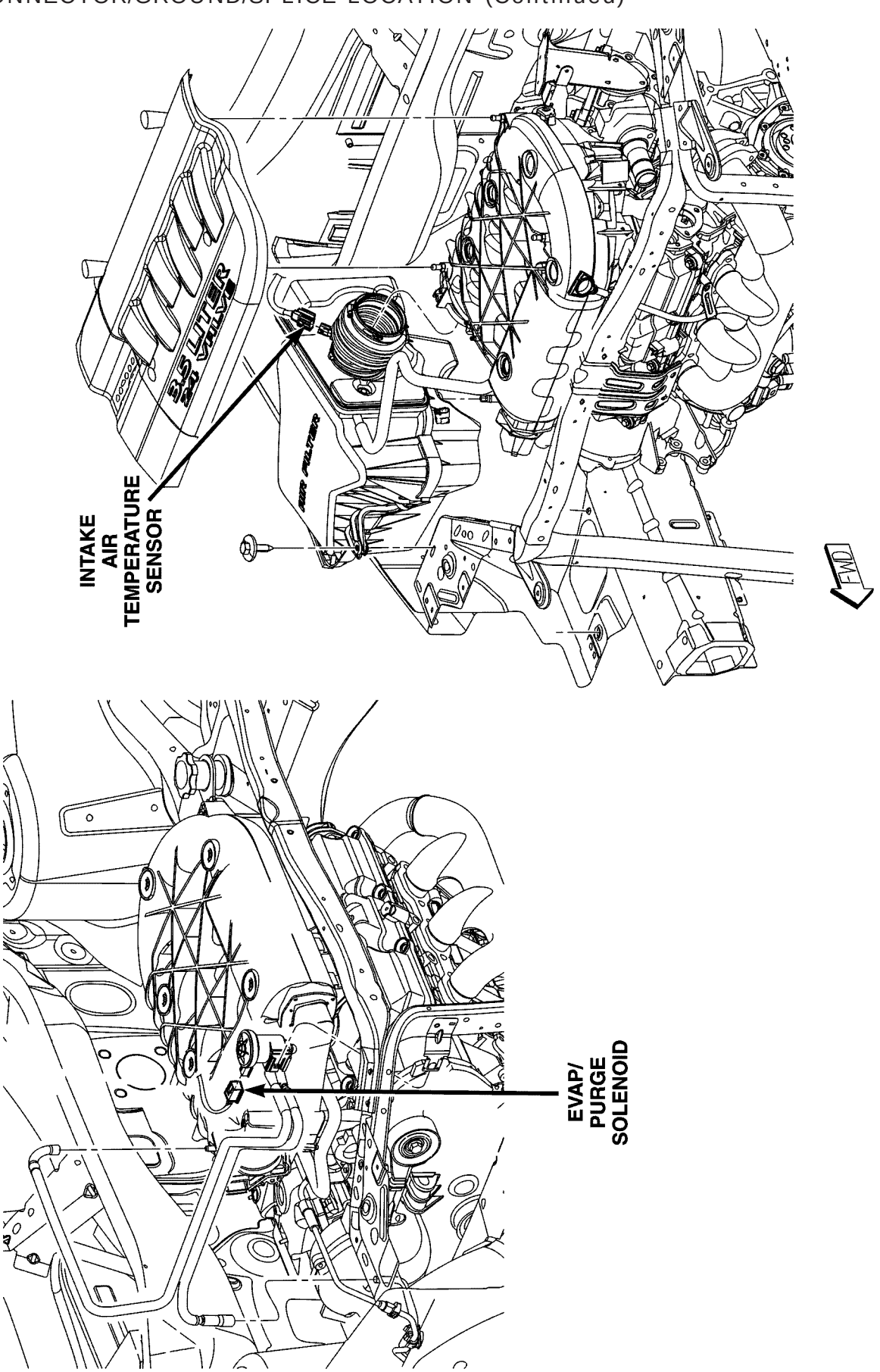


Fig. 16 ENGINE - TOP

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

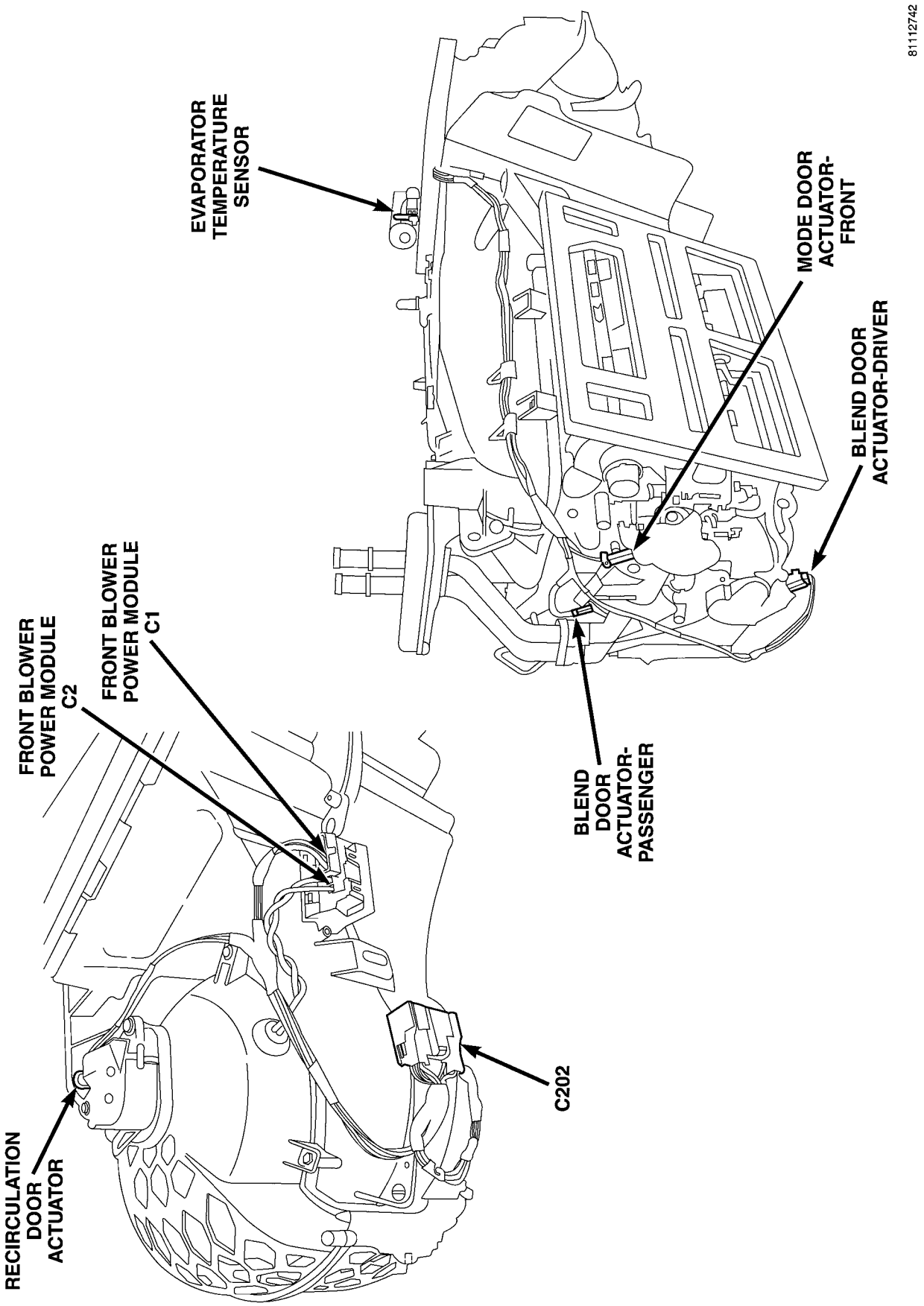


Fig. 17 HVAC

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

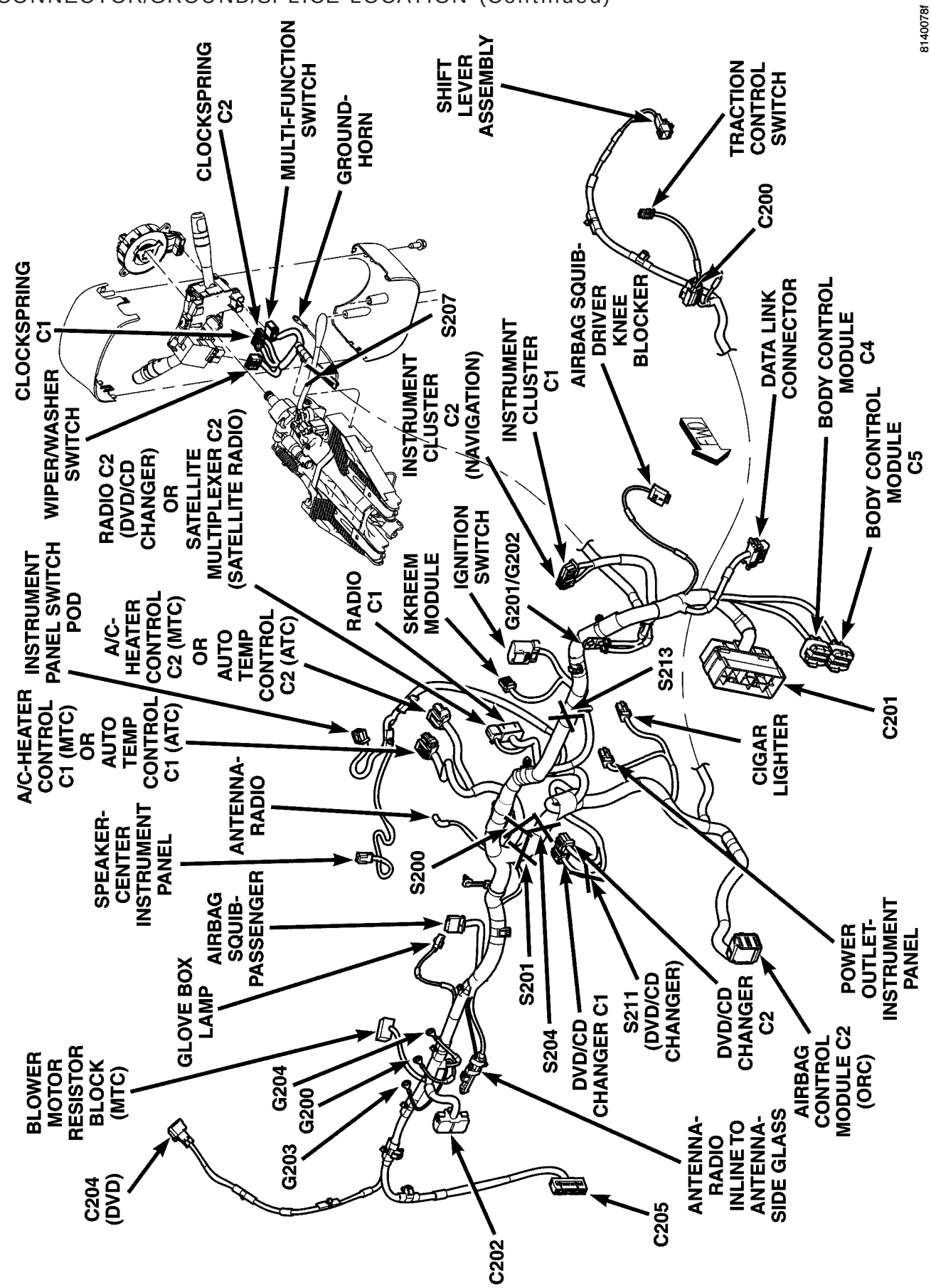


Fig. 18 INSTRUMENT PANEL HARNESS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

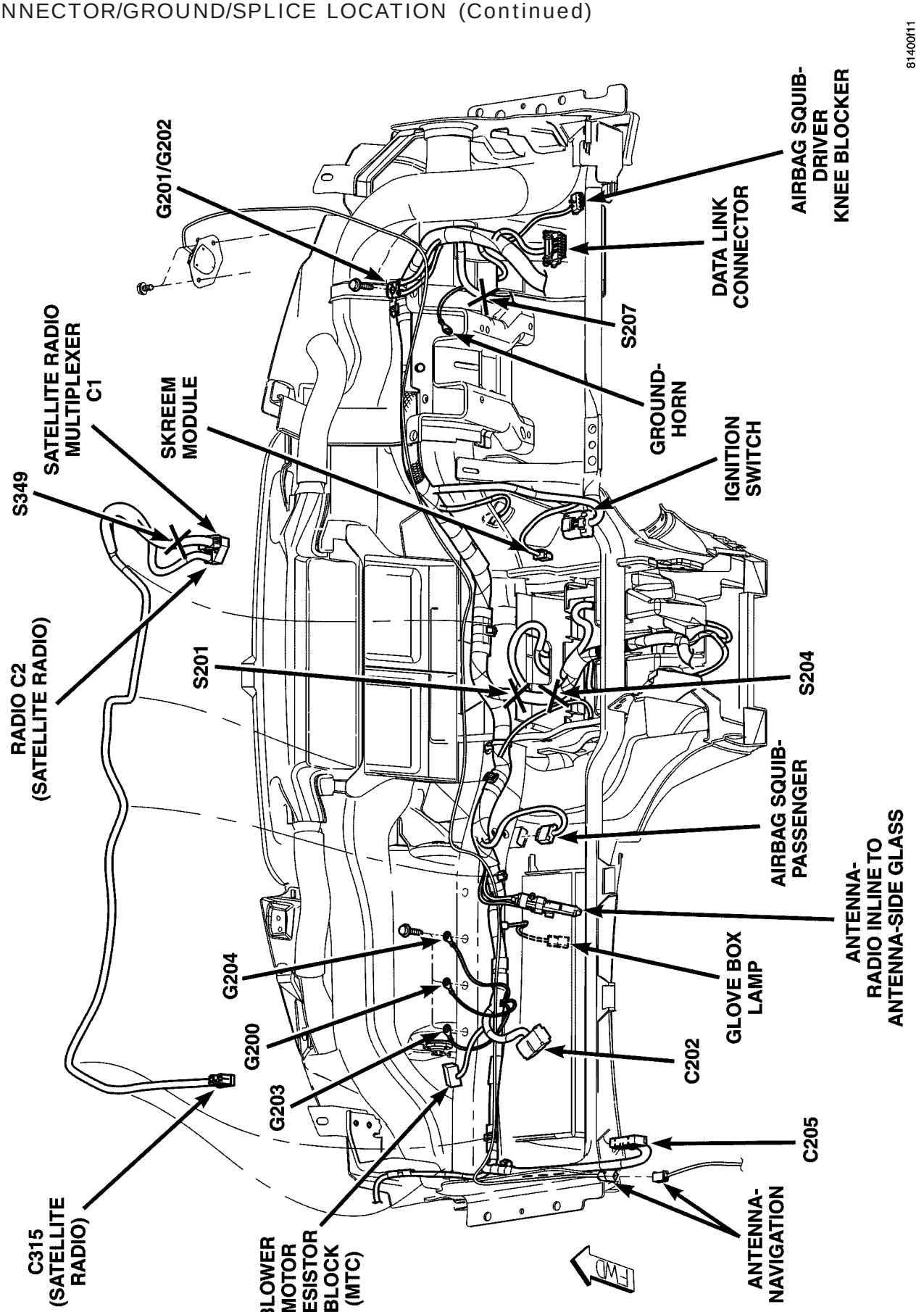


Fig. 19 INSTRUMENT PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

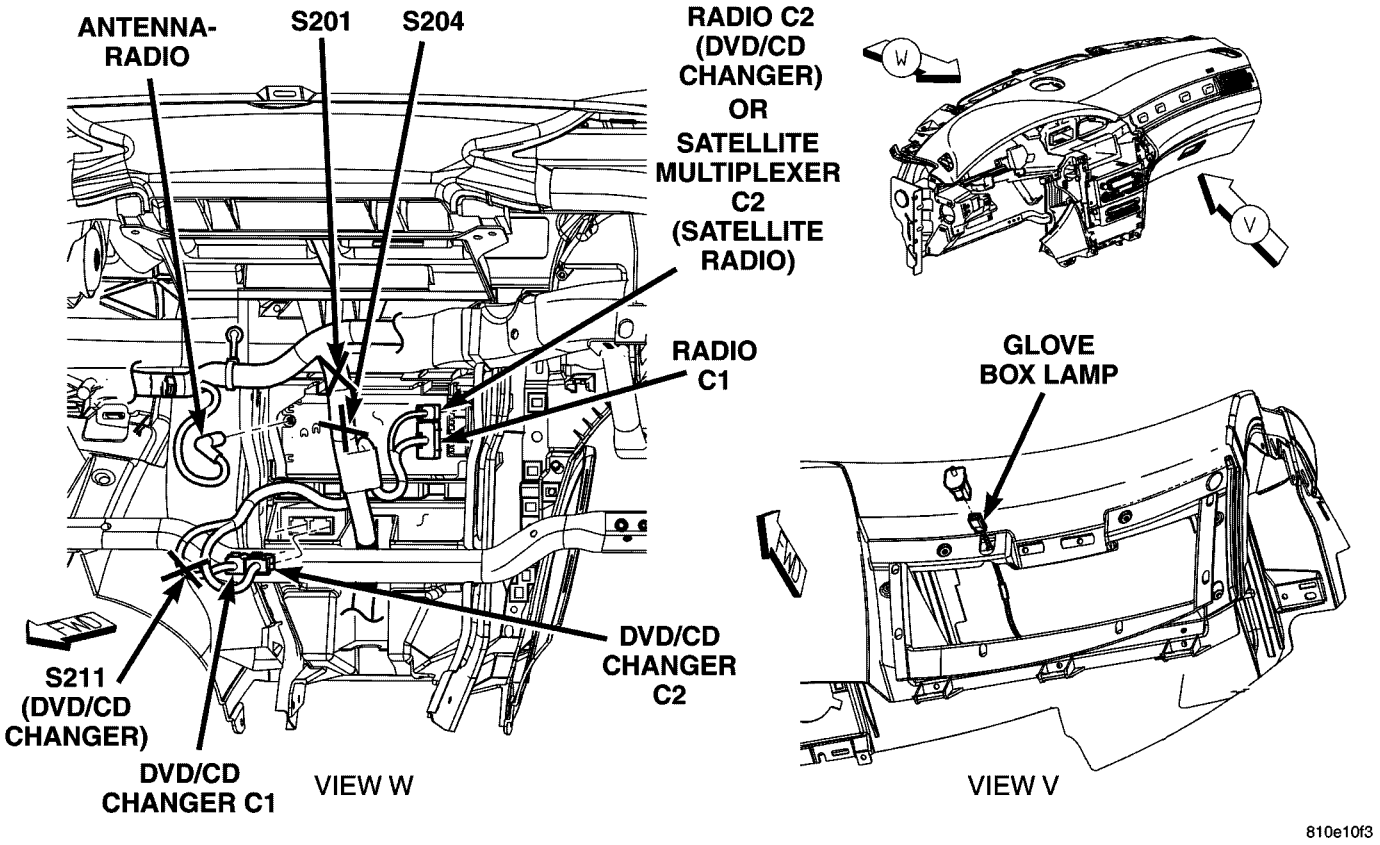


Fig. 20 INSTRUMENT PANEL - CENTER AND RIGHT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

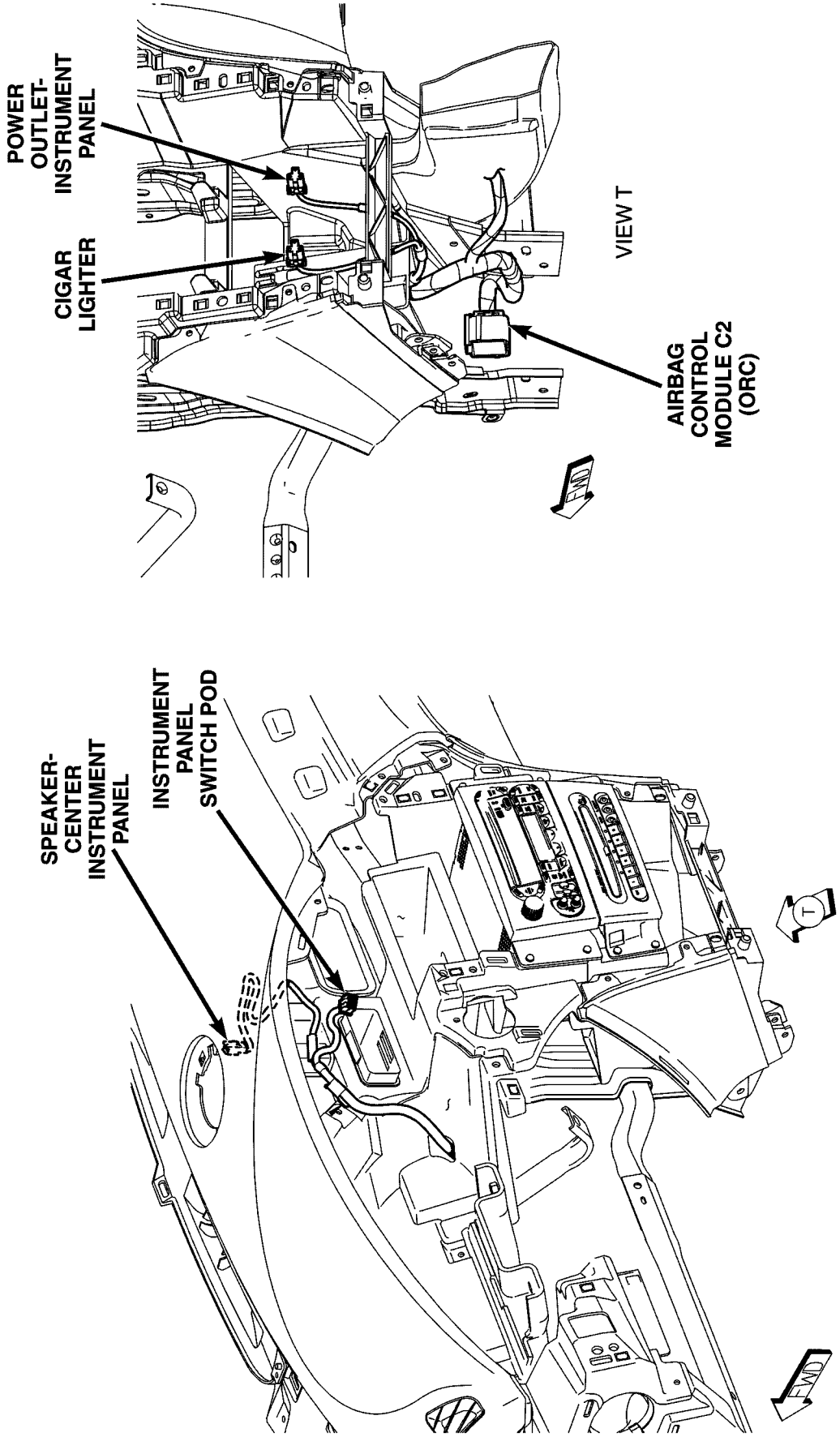


Fig. 21 INSTRUMENT PANEL - CENTER

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

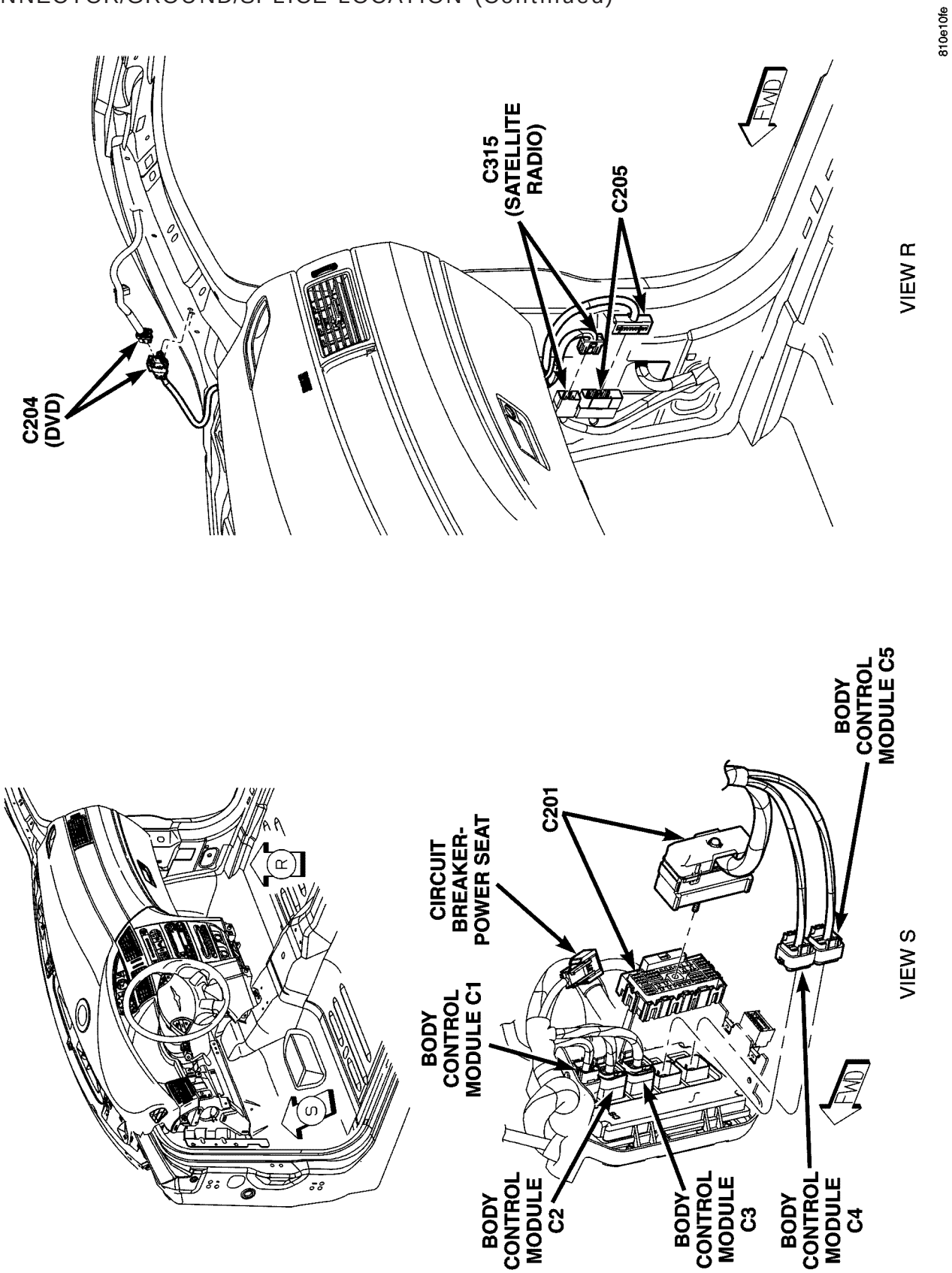


Fig. 22 INSTRUMENT PANEL - SIDES

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

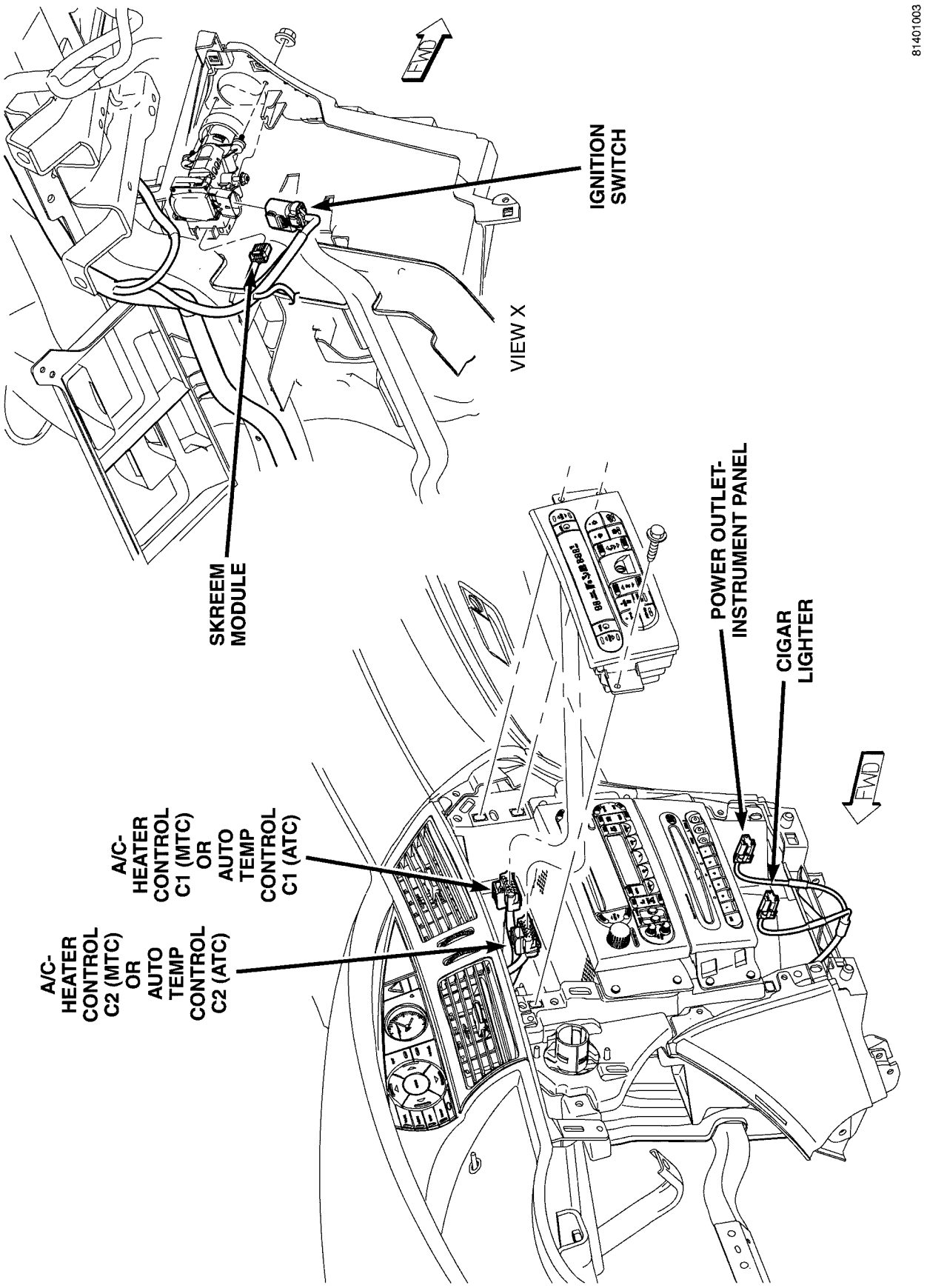


Fig. 23 INSTRUMENT PANEL - CENTER STACK

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

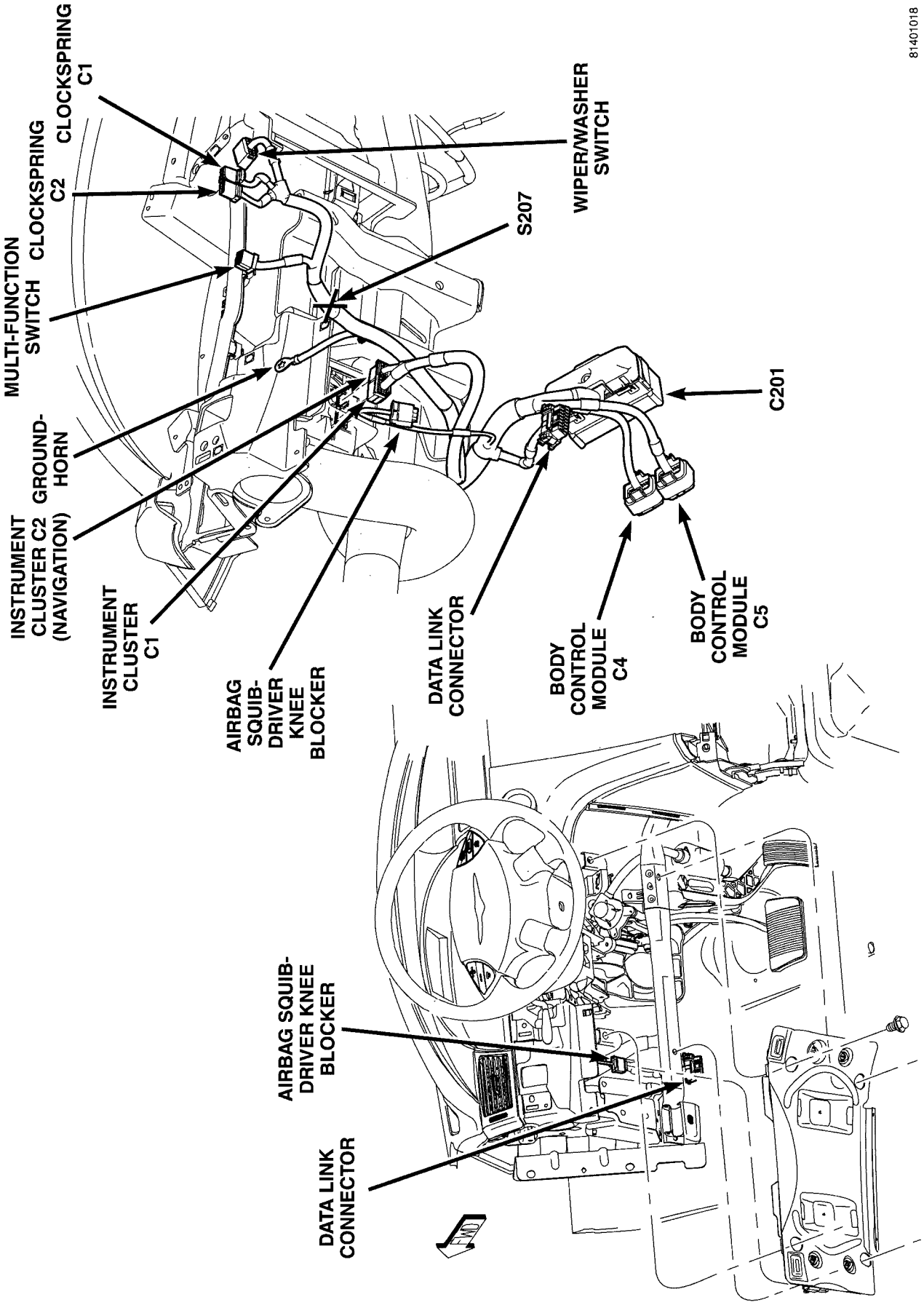


Fig. 24 INSTRUMENT PANEL - STEERING COLUMN

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

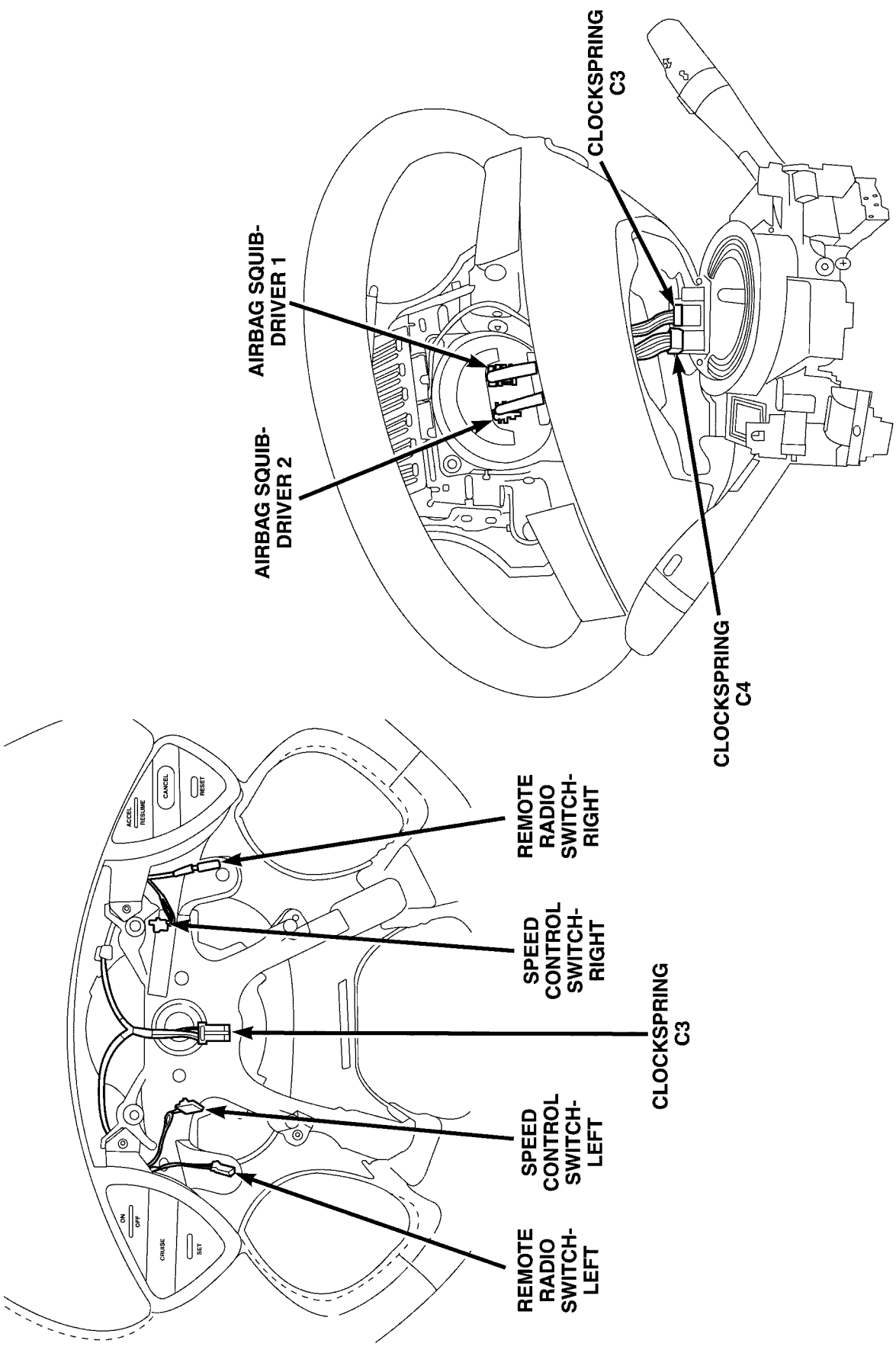


Fig. 25 STEERING WHEEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

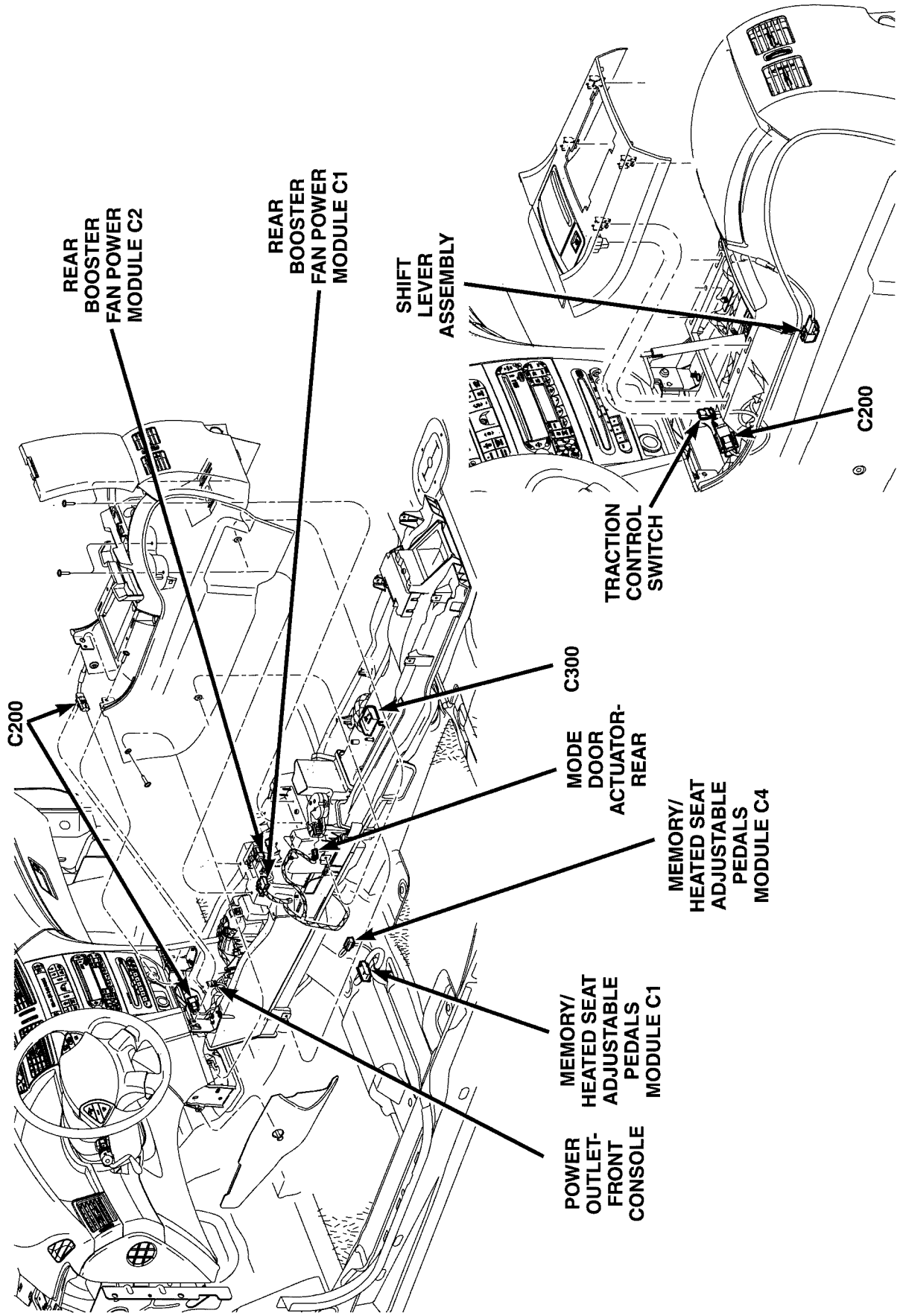


Fig. 26 BODY - CENTER

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

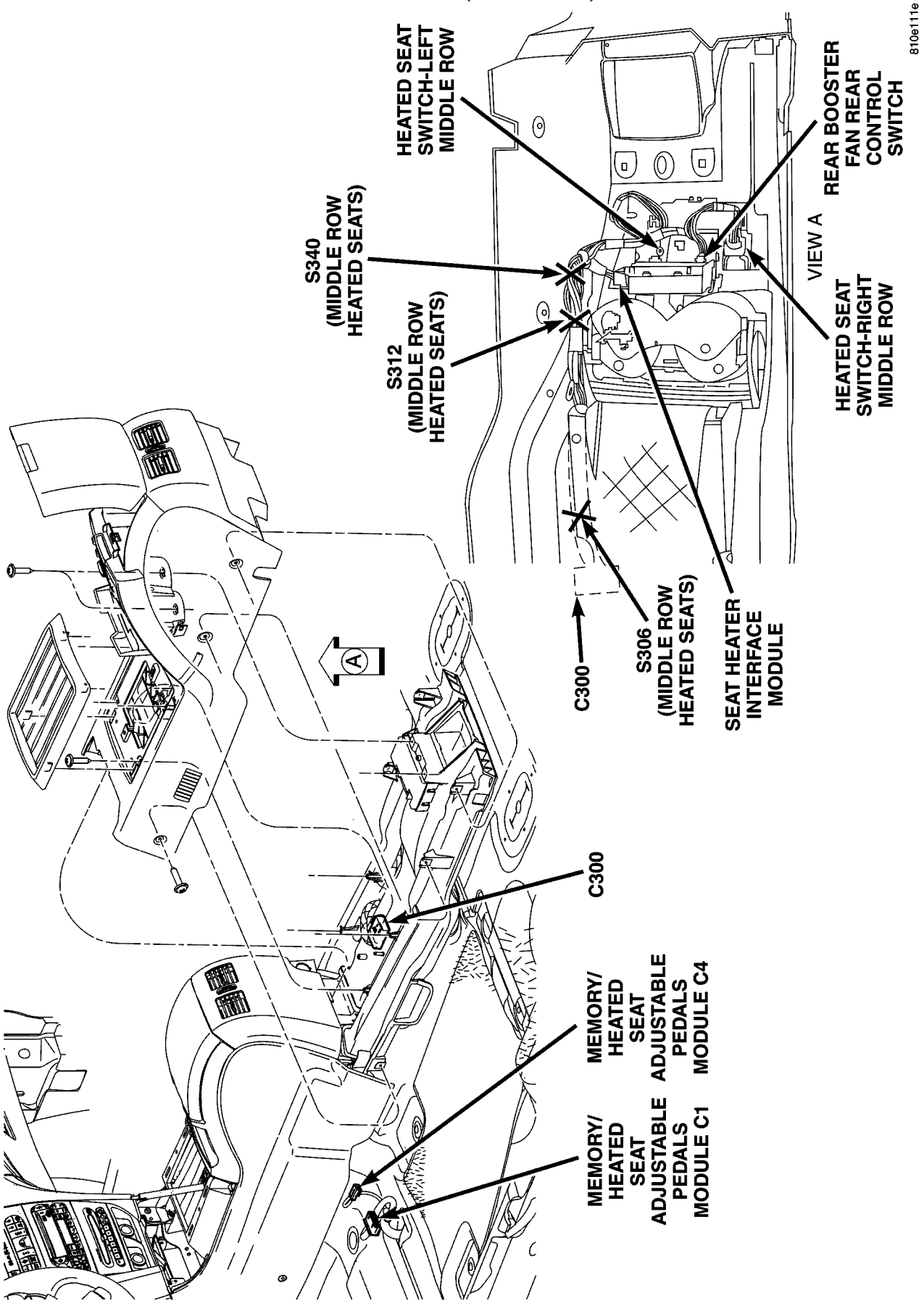


Fig. 27 BODY - CENTER CONSOLE

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

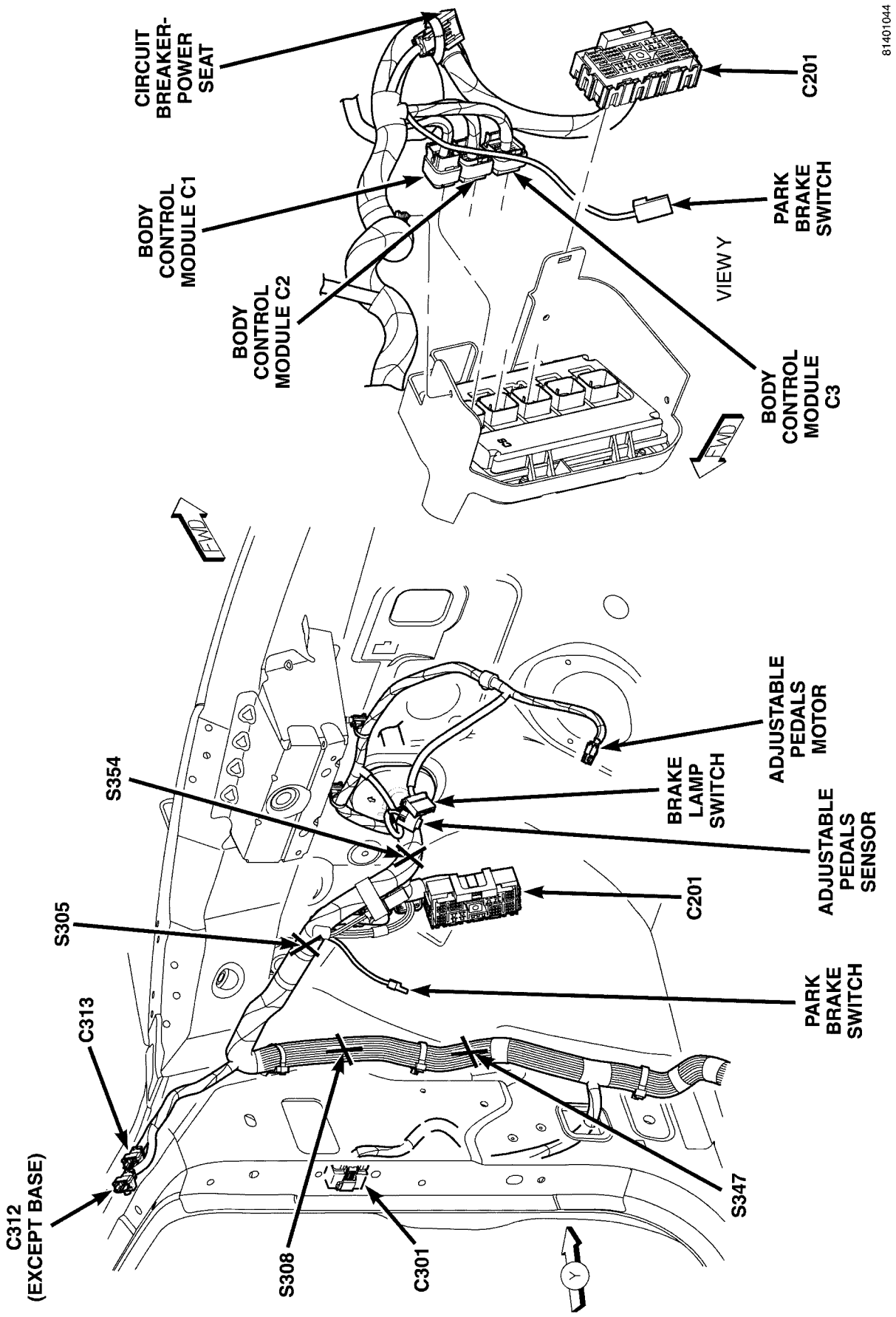


Fig. 28 BODY - LEFT KICK PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

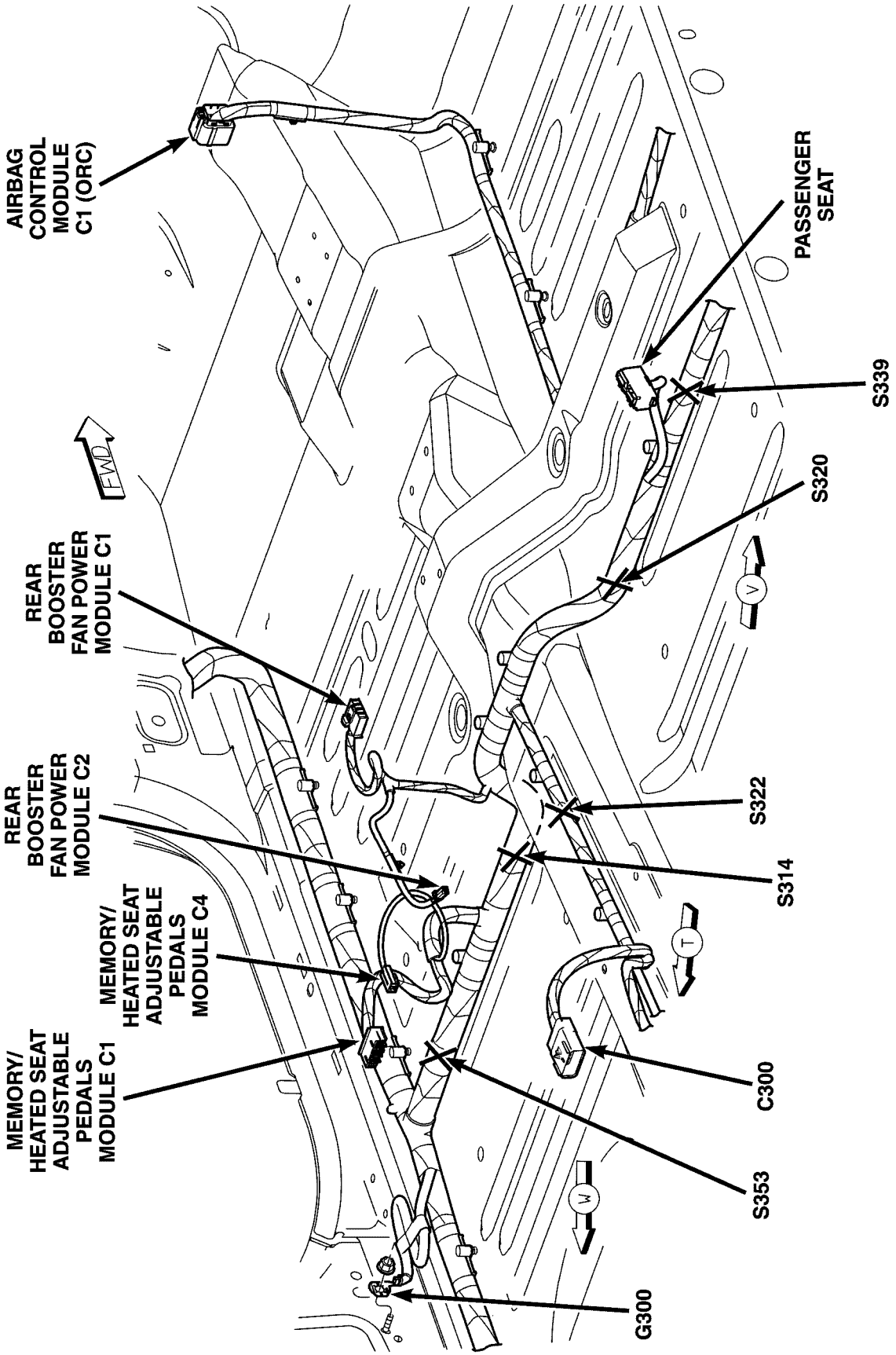


Fig. 29 29 BODY

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

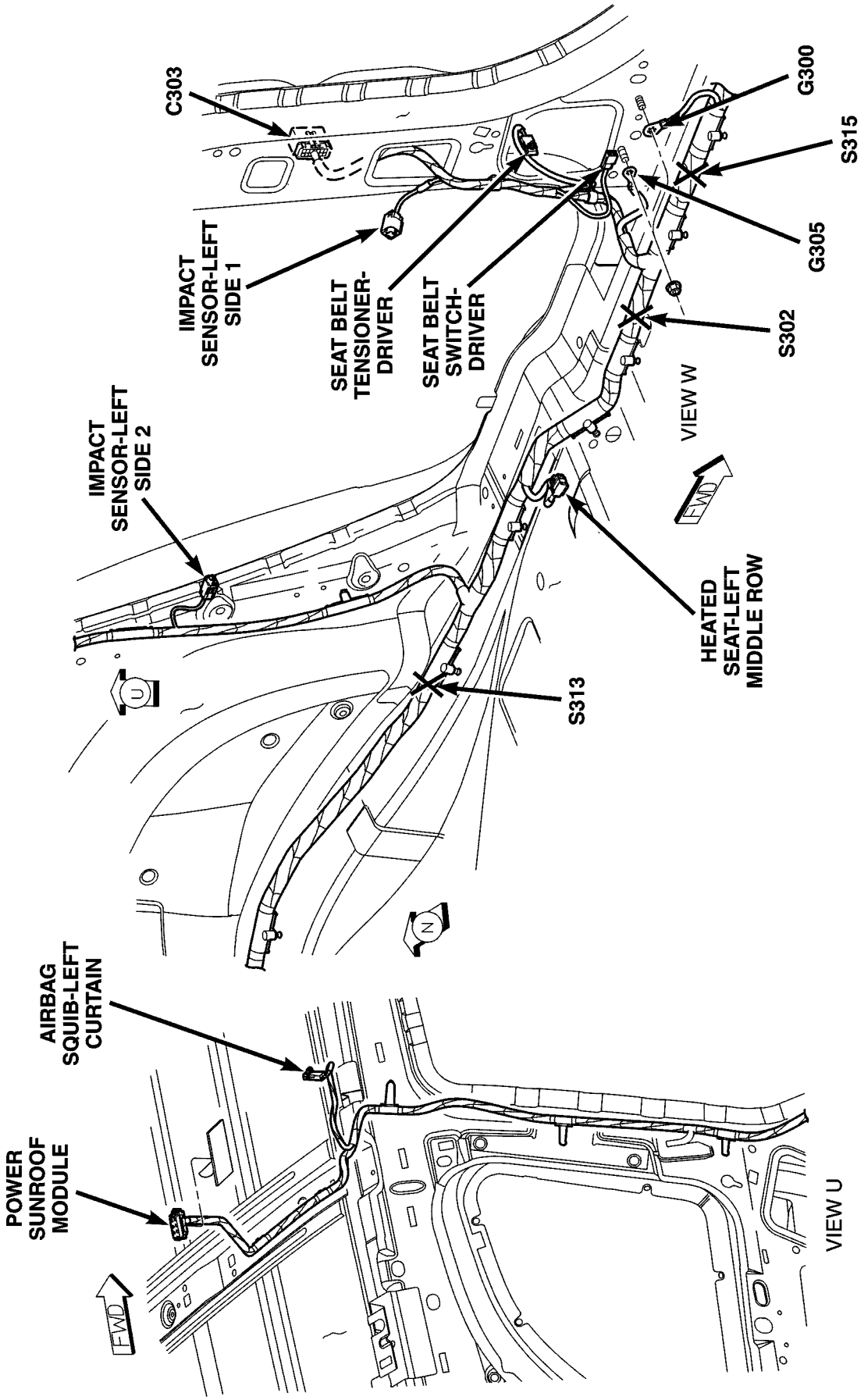


Fig. 30 BODY - LEFT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

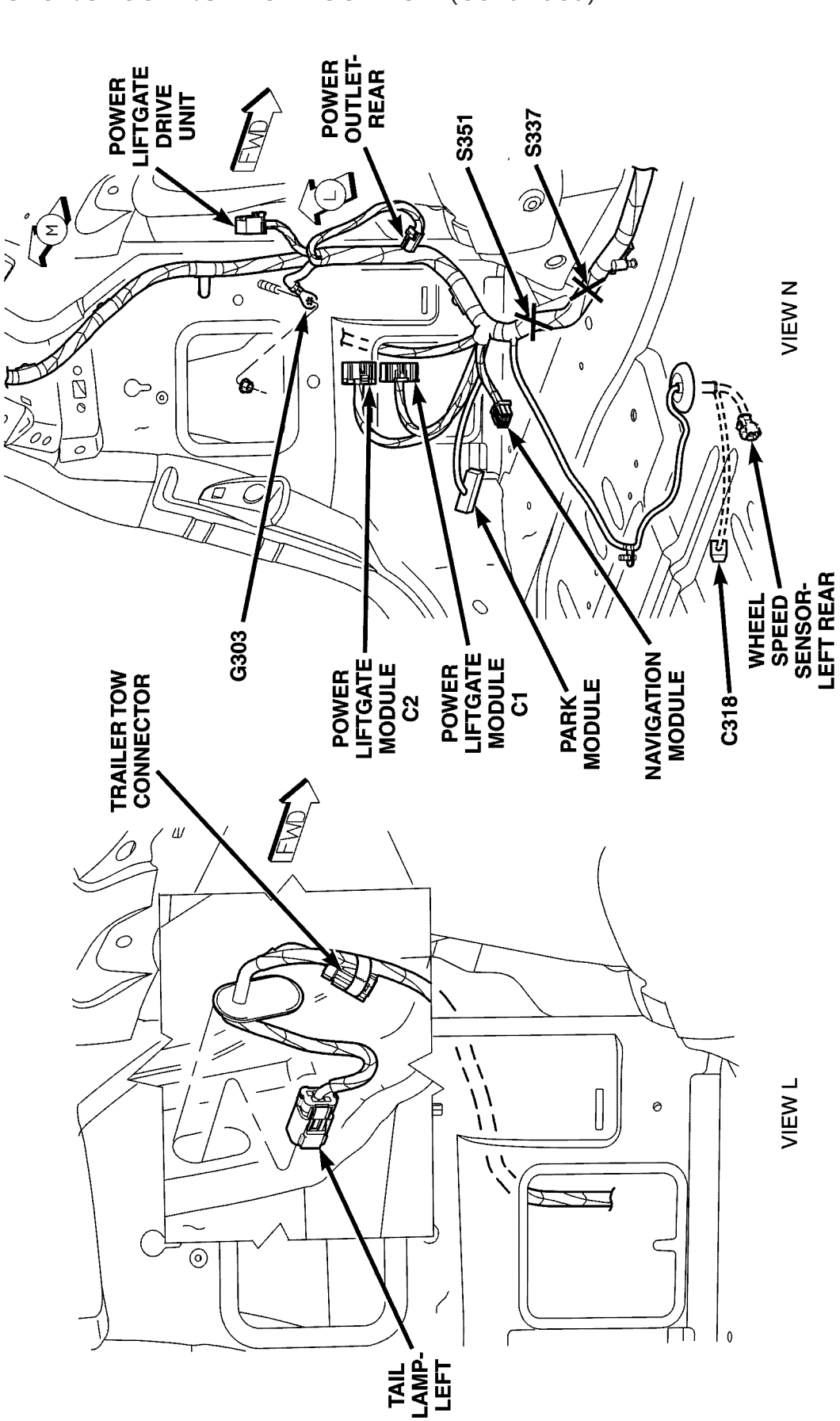


Fig. 31 BODY - LEFT REAR

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

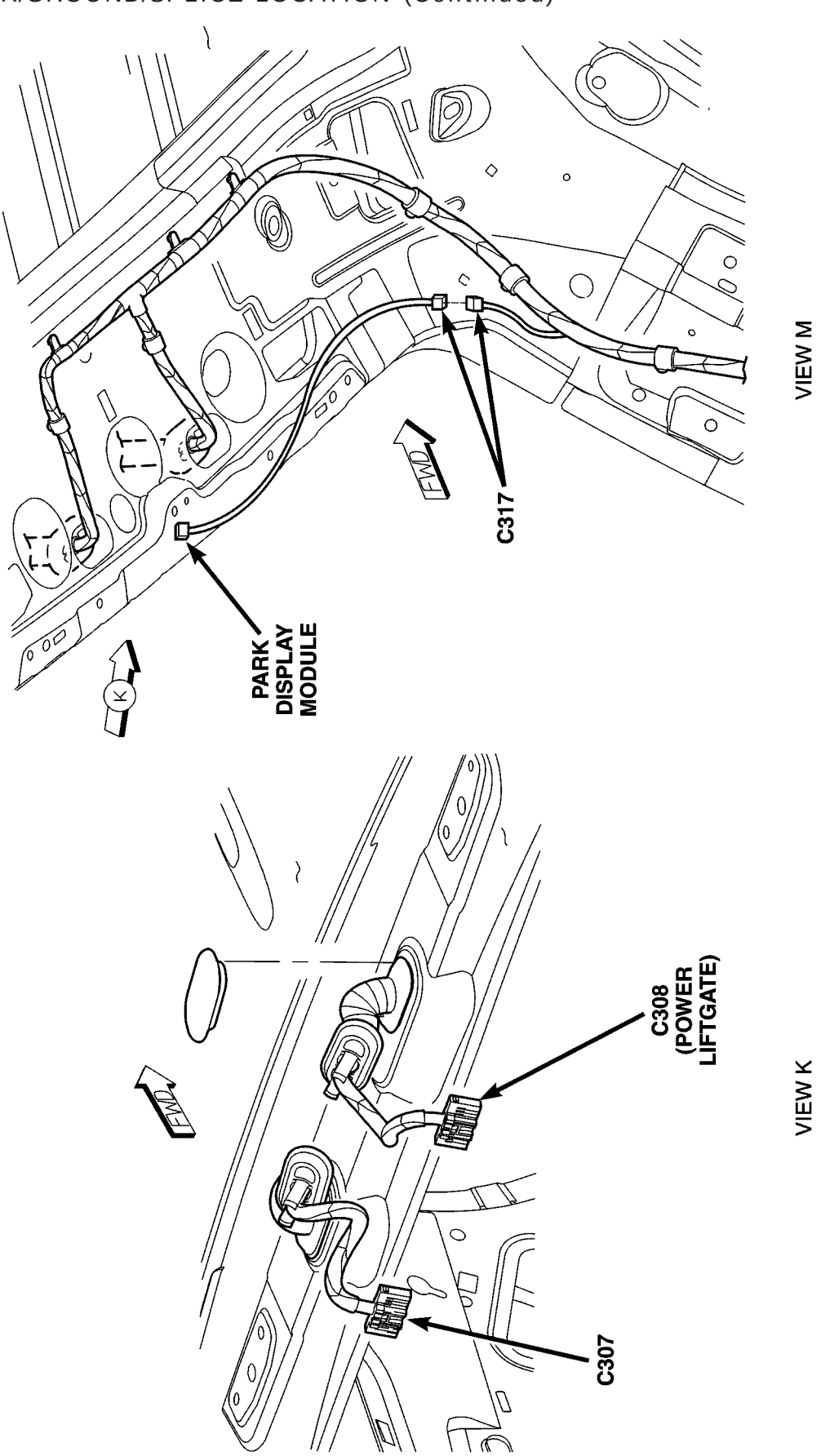


Fig. 32 BODY - REAR

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

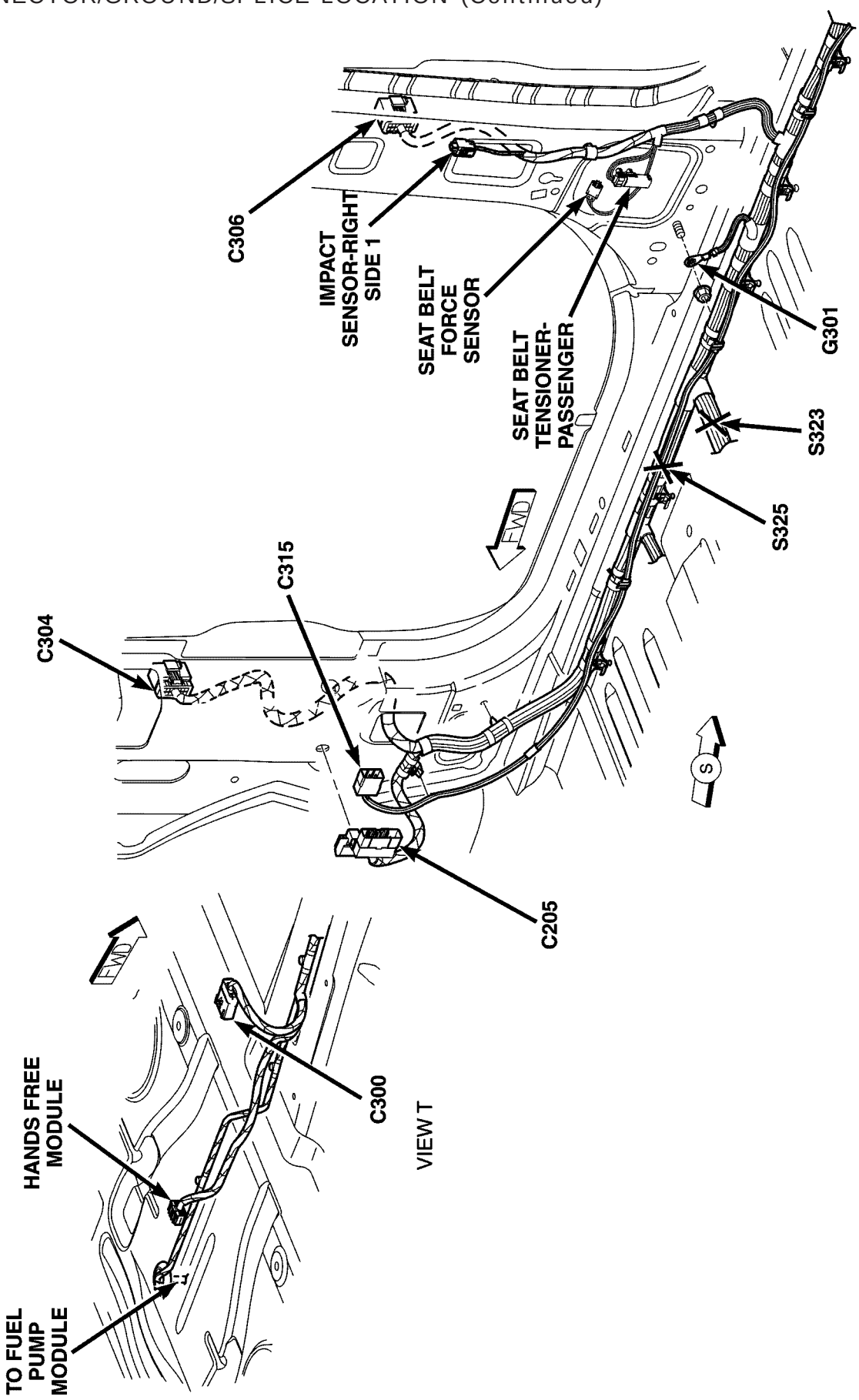


Fig. 33 BODY - LEFT SIDE

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

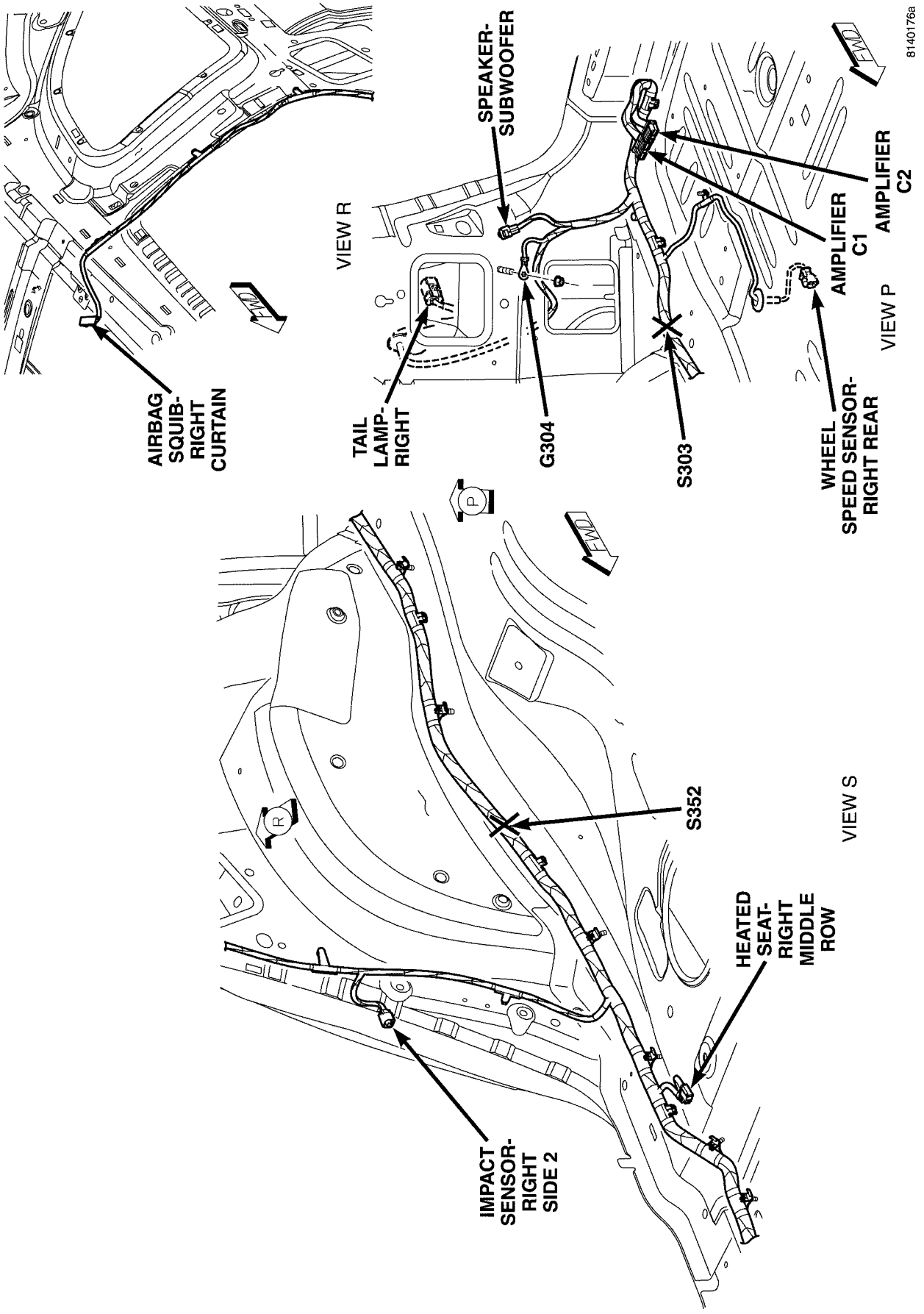


Fig. 34 BODY - RIGHT SIDE

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

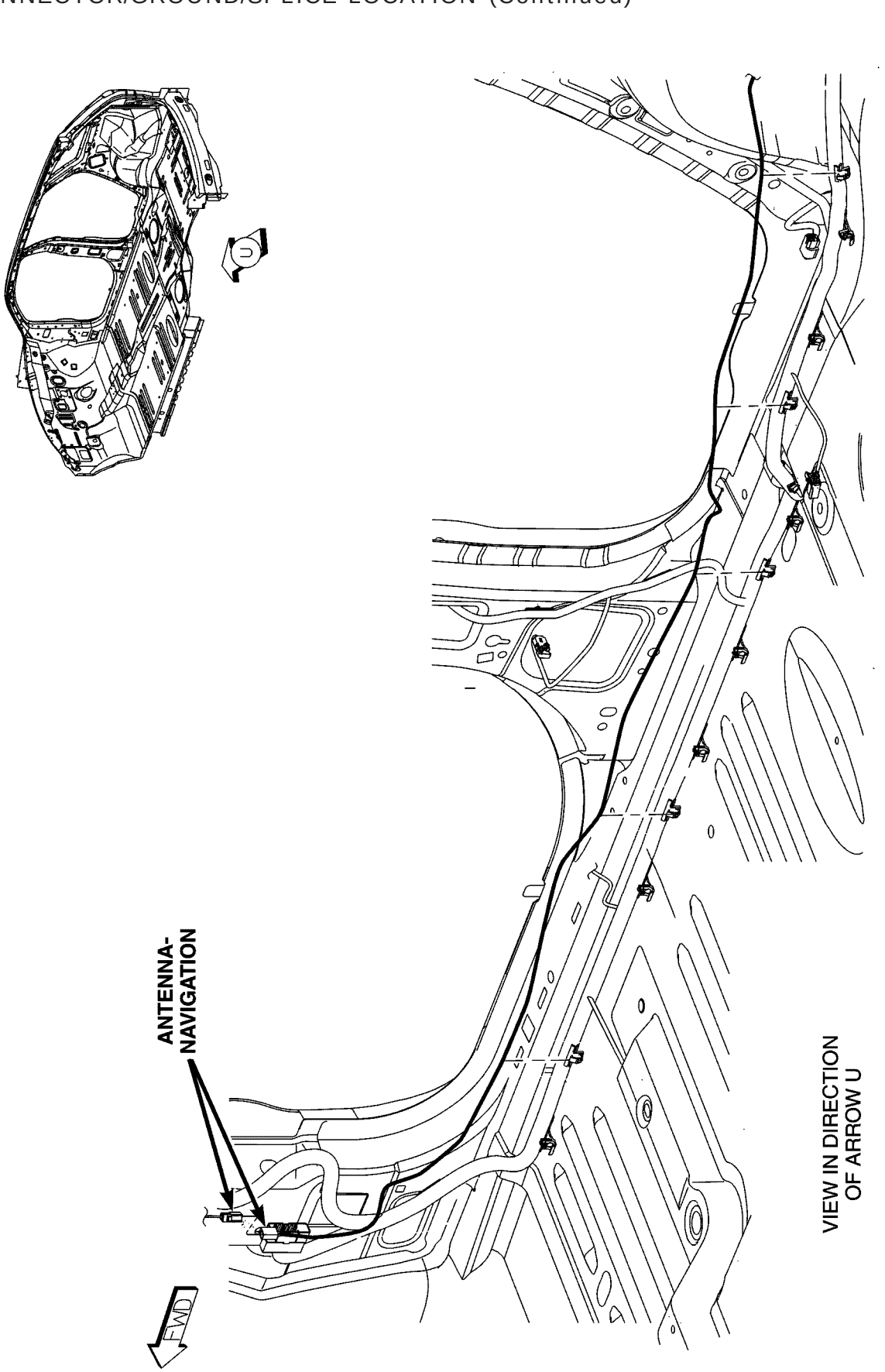


Fig. 35 BODY - ANTENNA CABLE

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

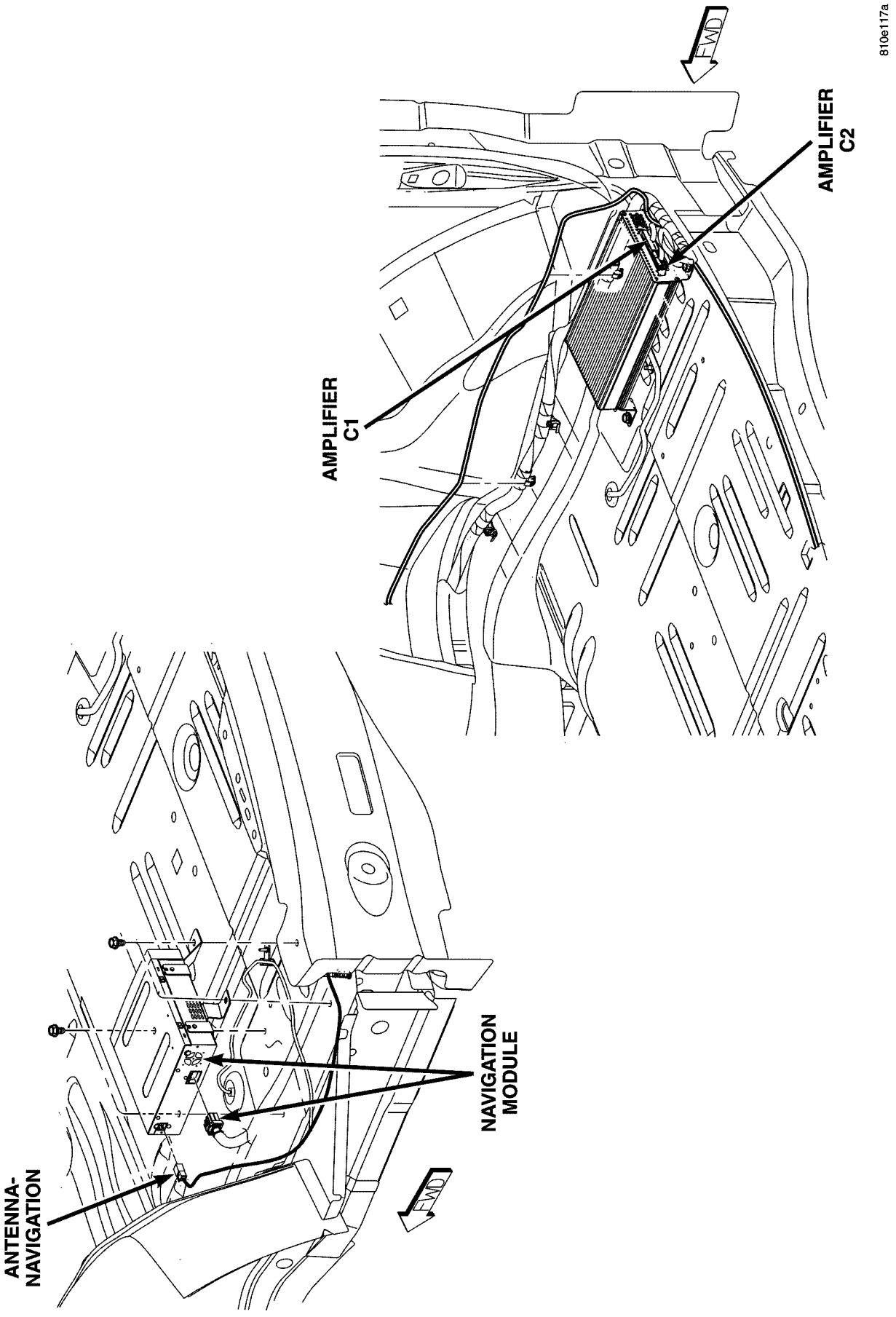


Fig. 36 BODY - REAR FLOOR

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

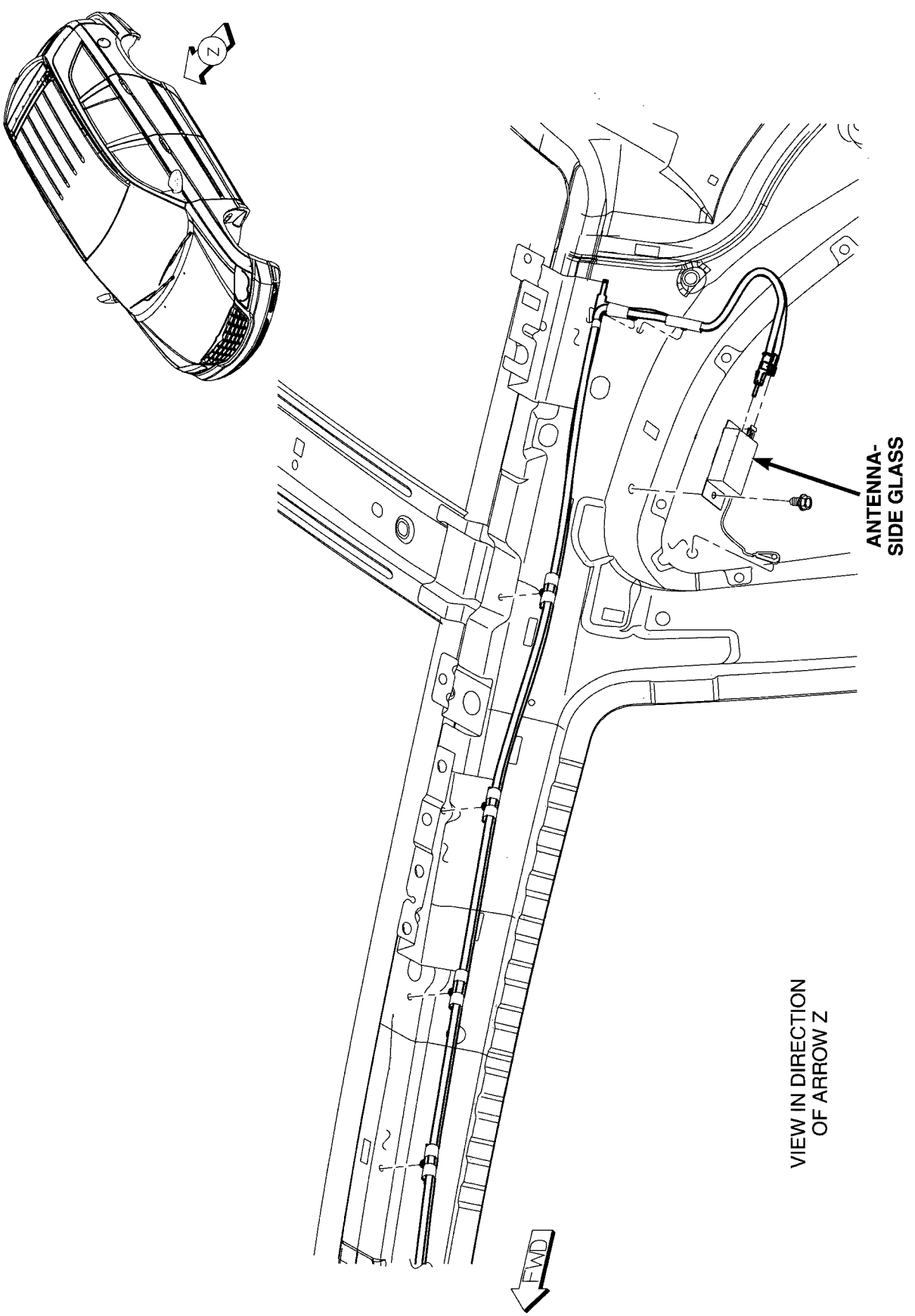


Fig. 37 REAR SIDE GLASS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

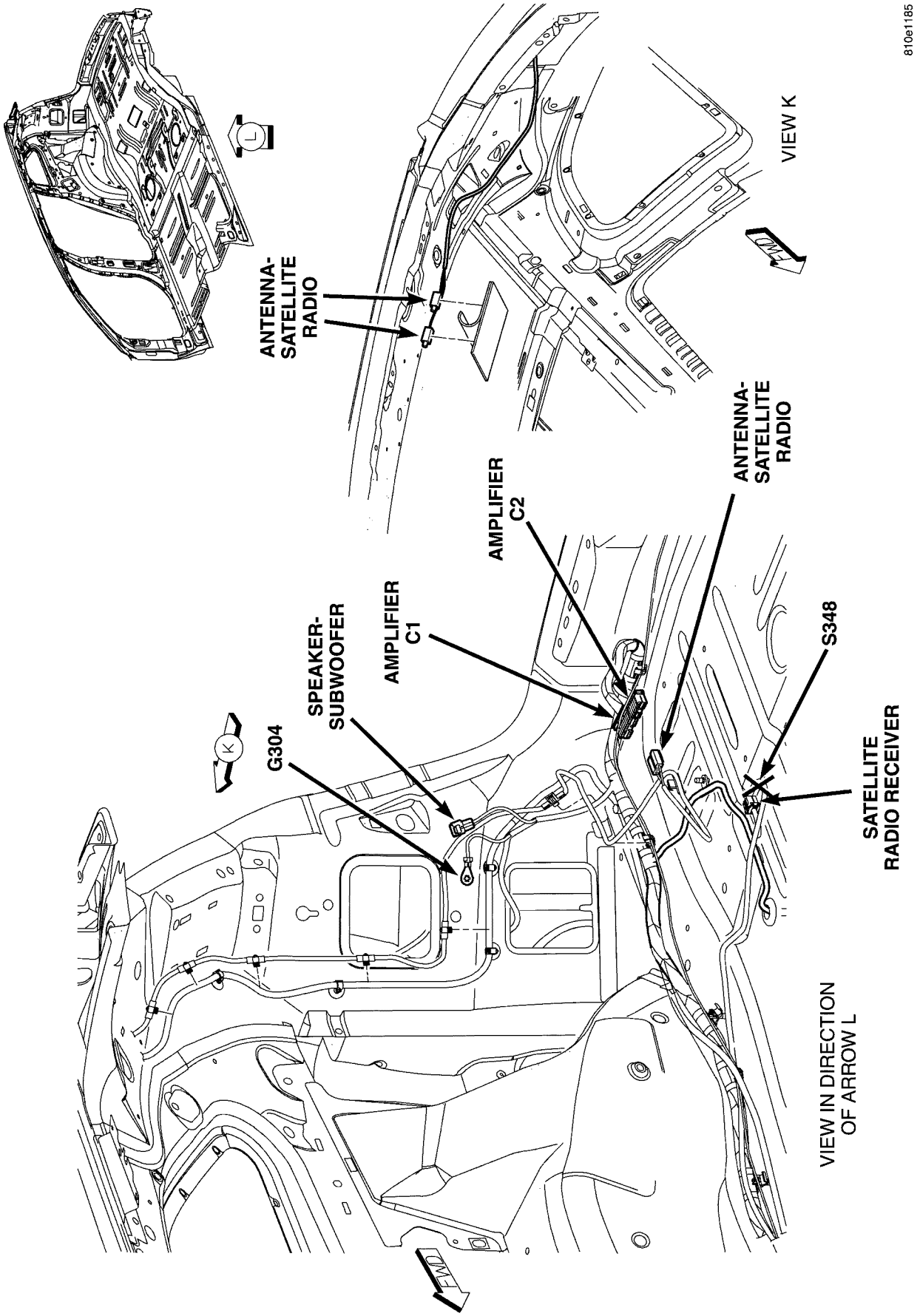


Fig. 38 BODY - RIGHT REAR

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

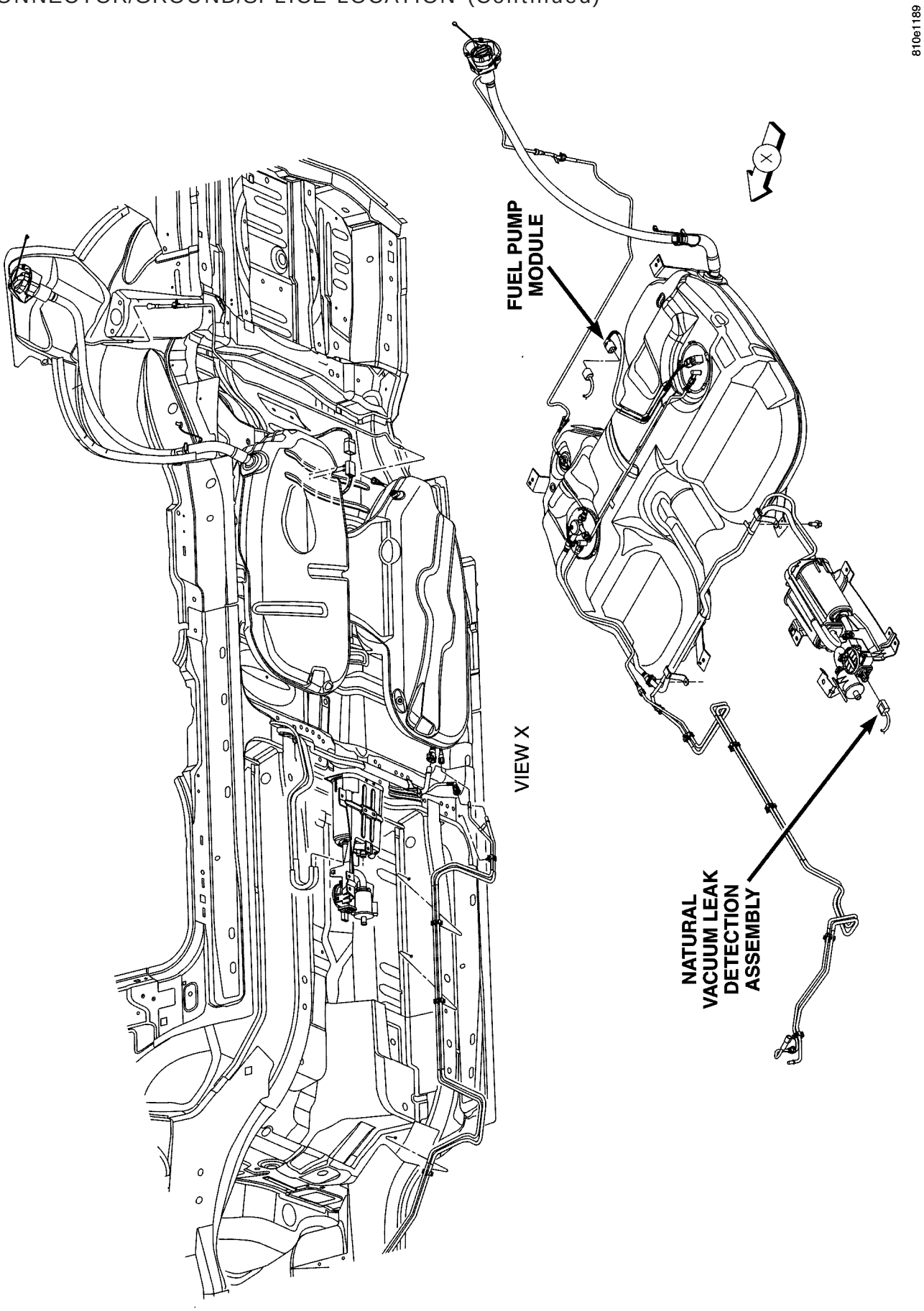


Fig. 39 FUEL TANK

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

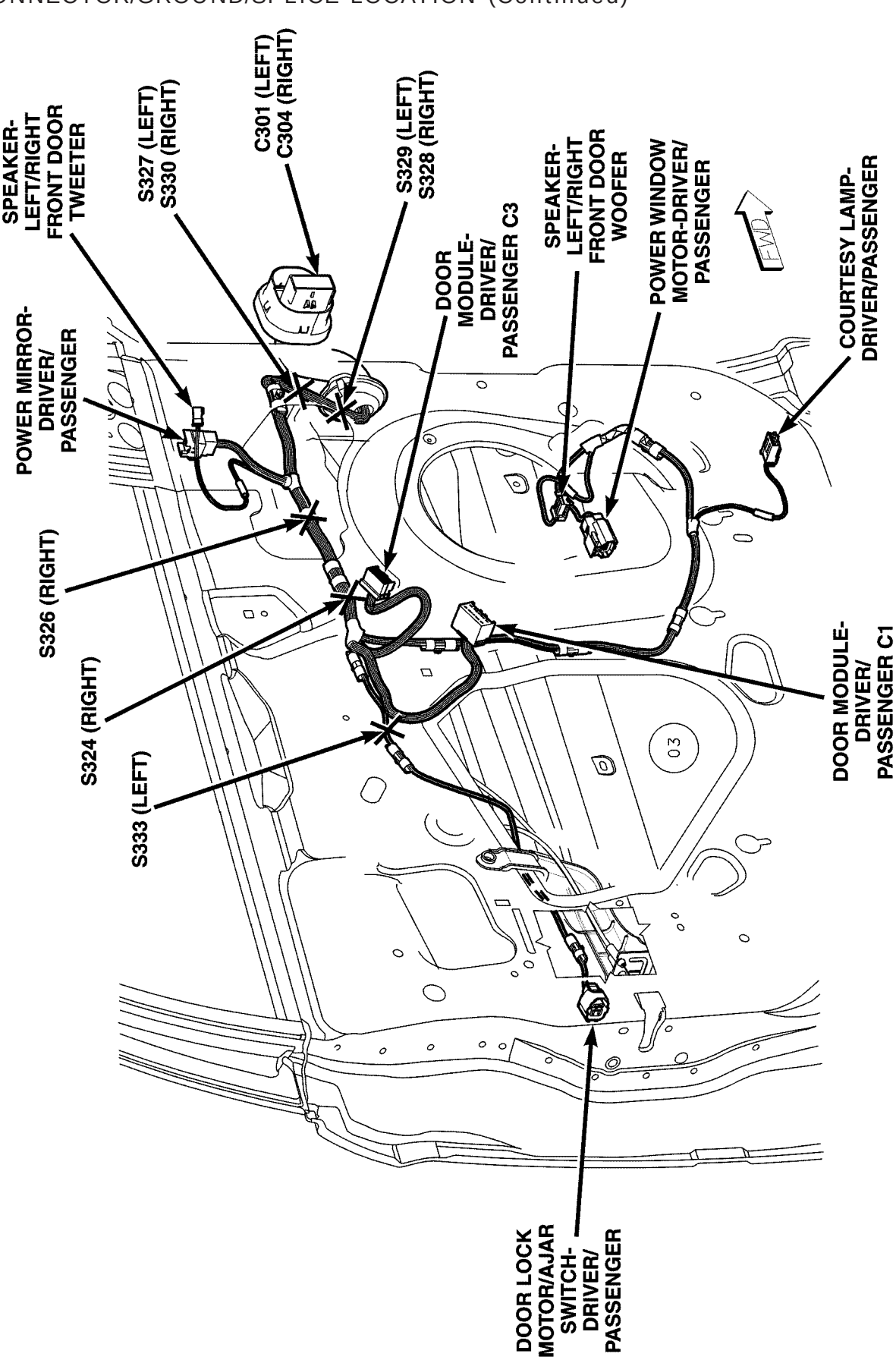


Fig. 40 DOOR - FRONT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

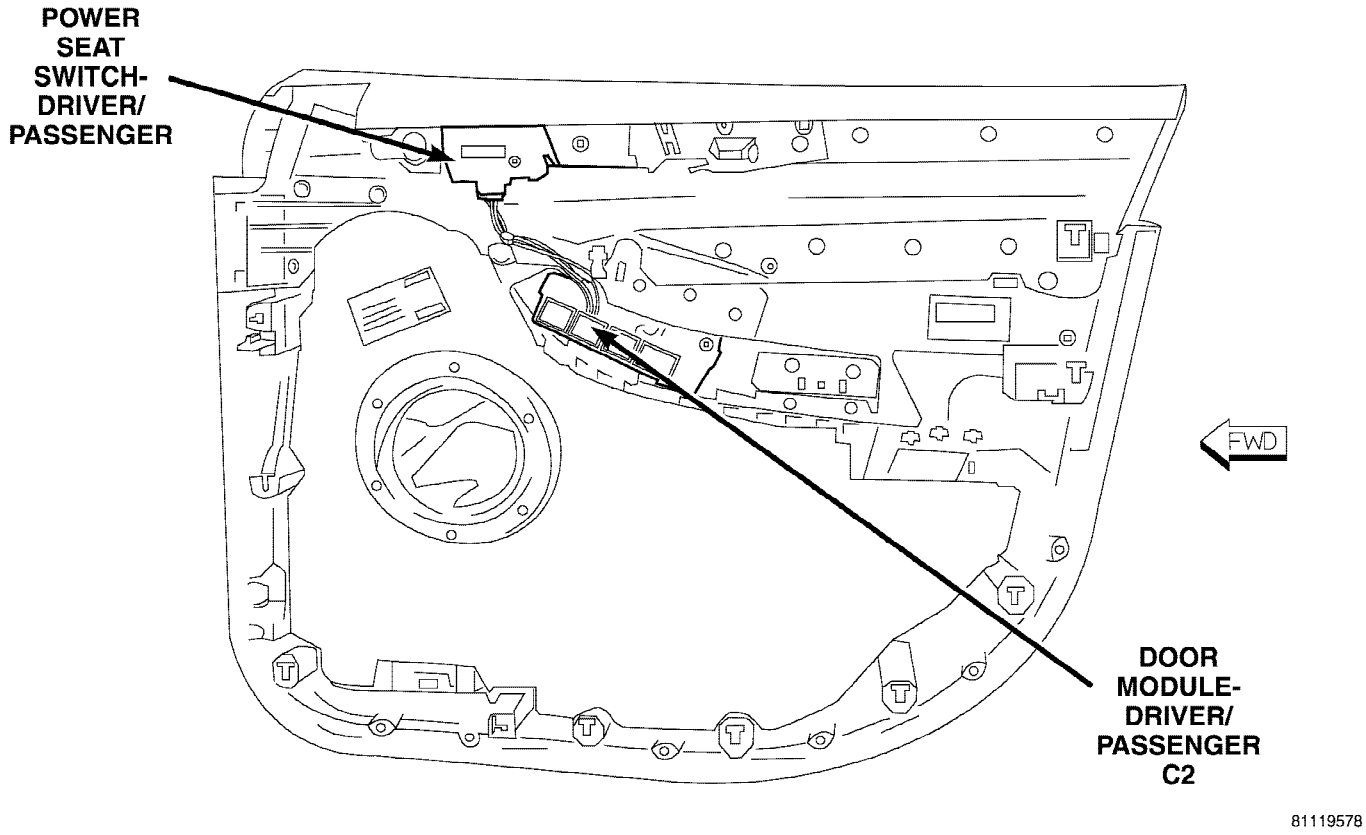
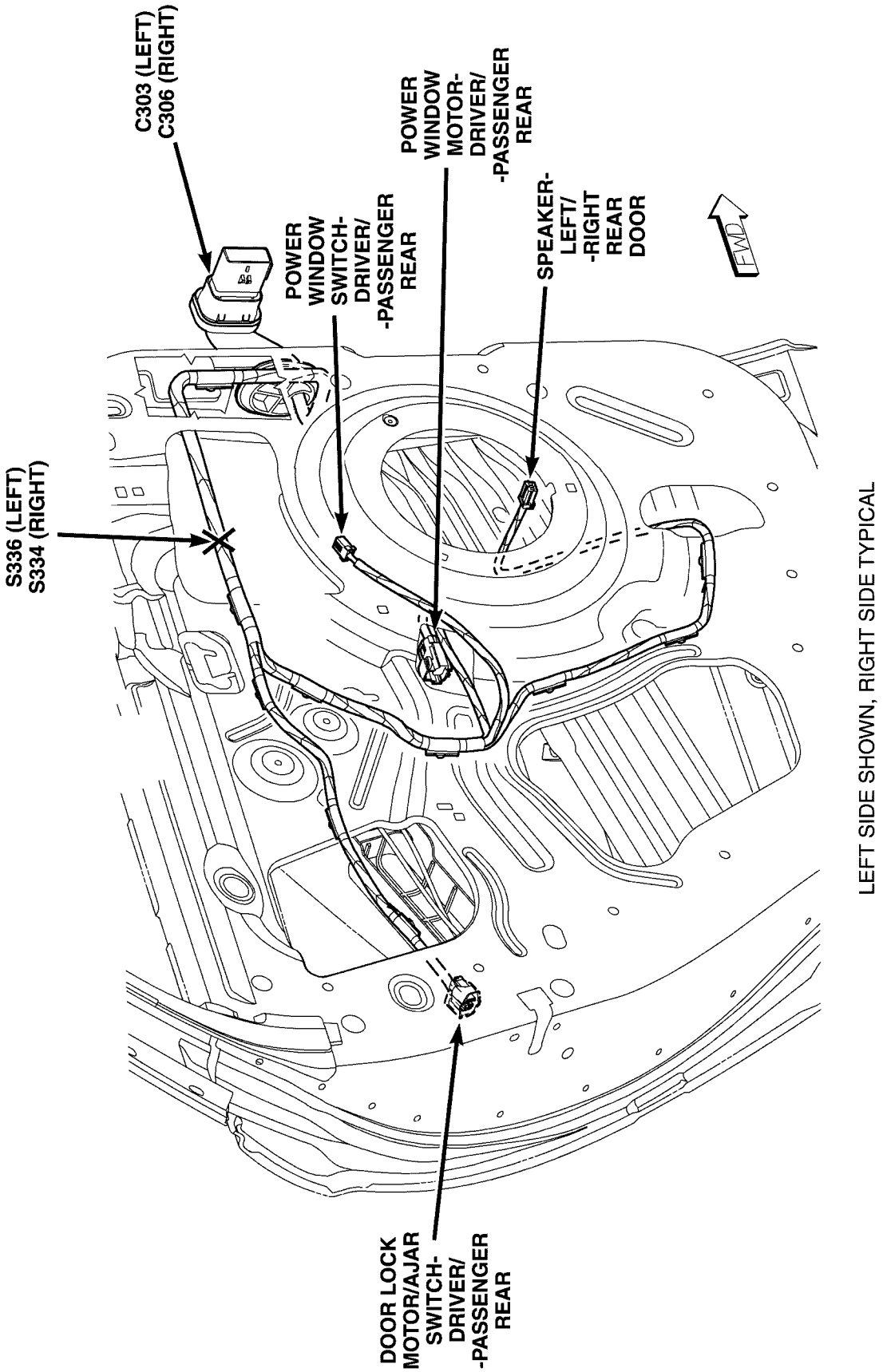


Fig. 41 FRONT DOOR PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



LEFT SIDE SHOWN, RIGHT SIDE TYPICAL

Fig. 42 DOOR - REAR

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

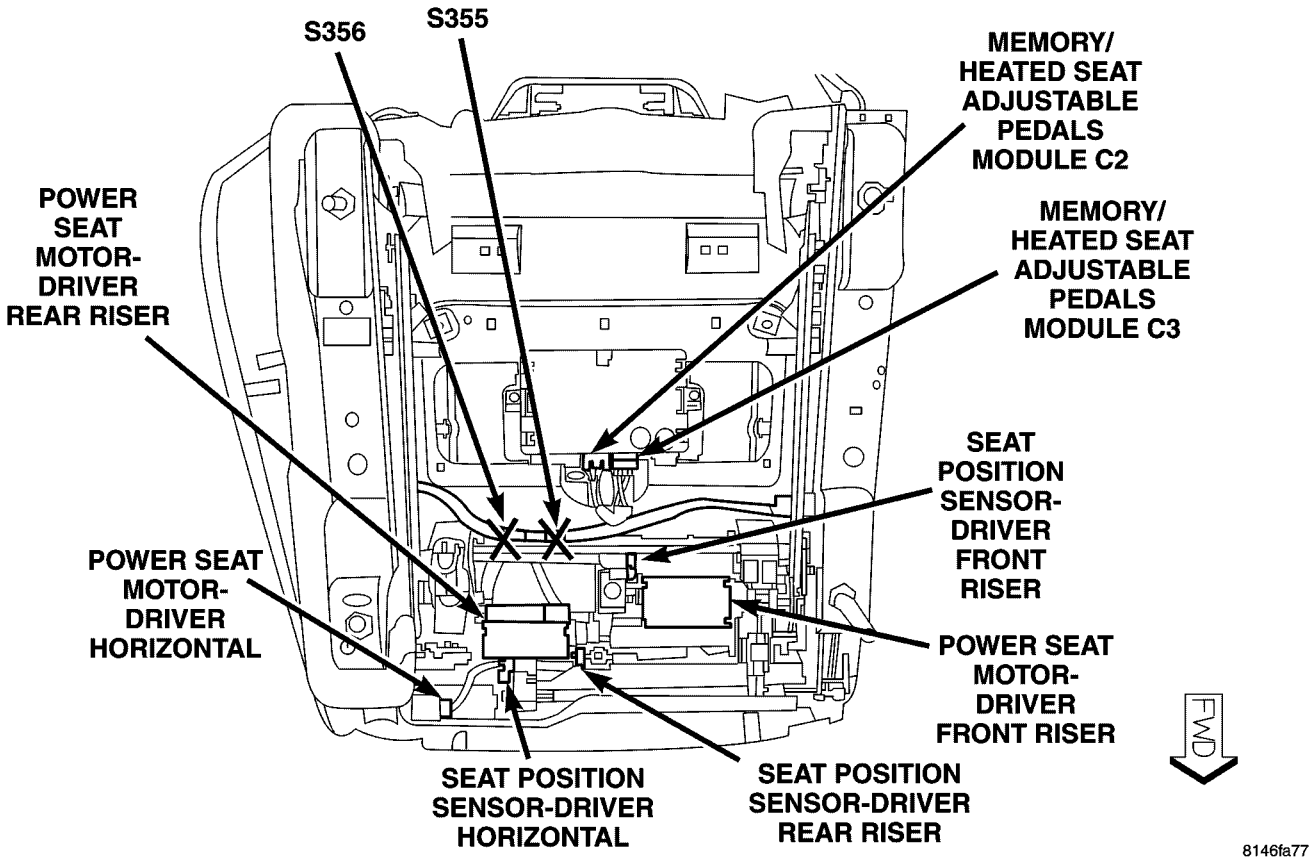


Fig. 43 SEATS-FRONT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

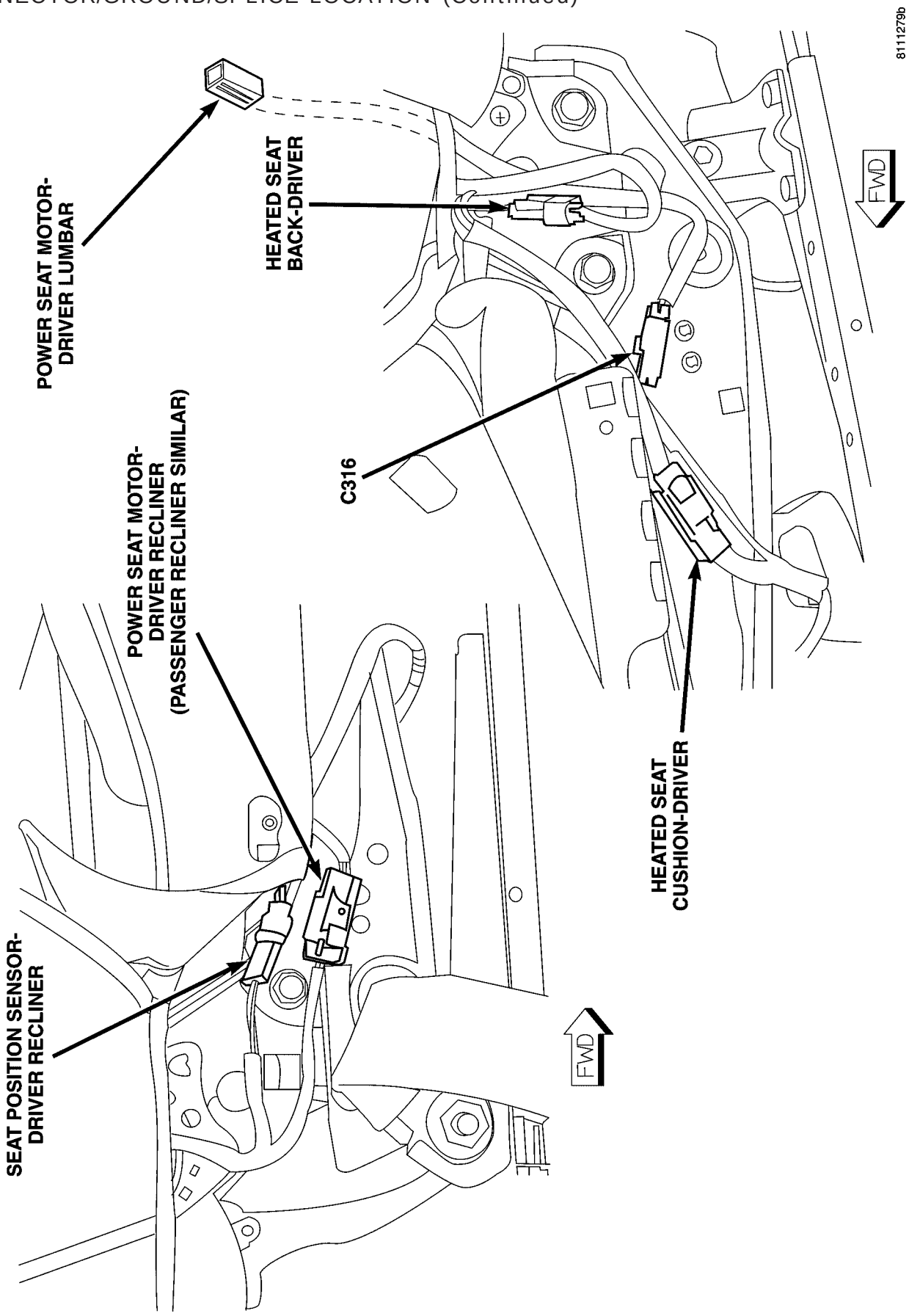


Fig. 44 DRIVER SEAT - SIDES

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

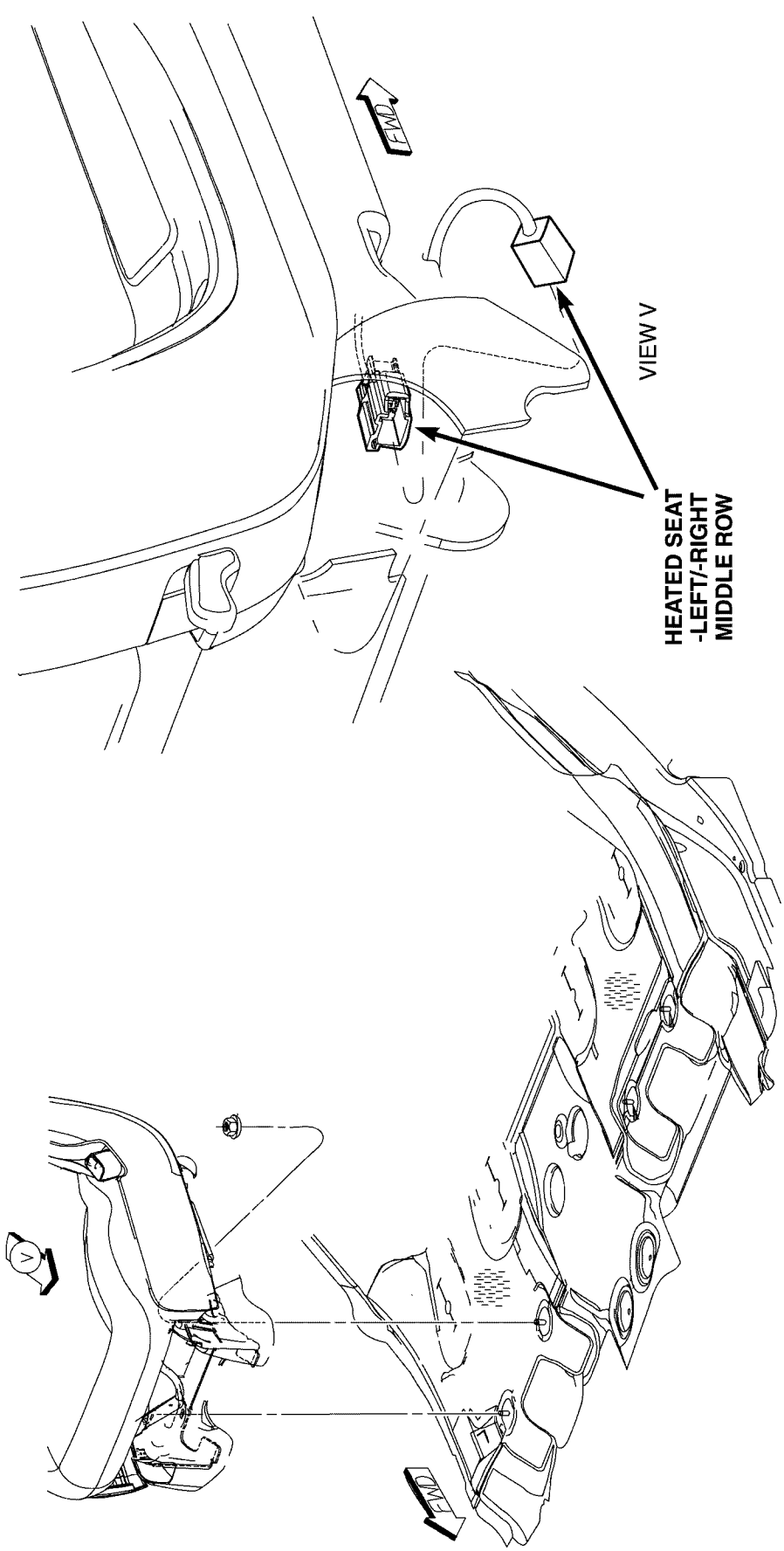


Fig. 45 SEAT - MIDDLE ROW

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

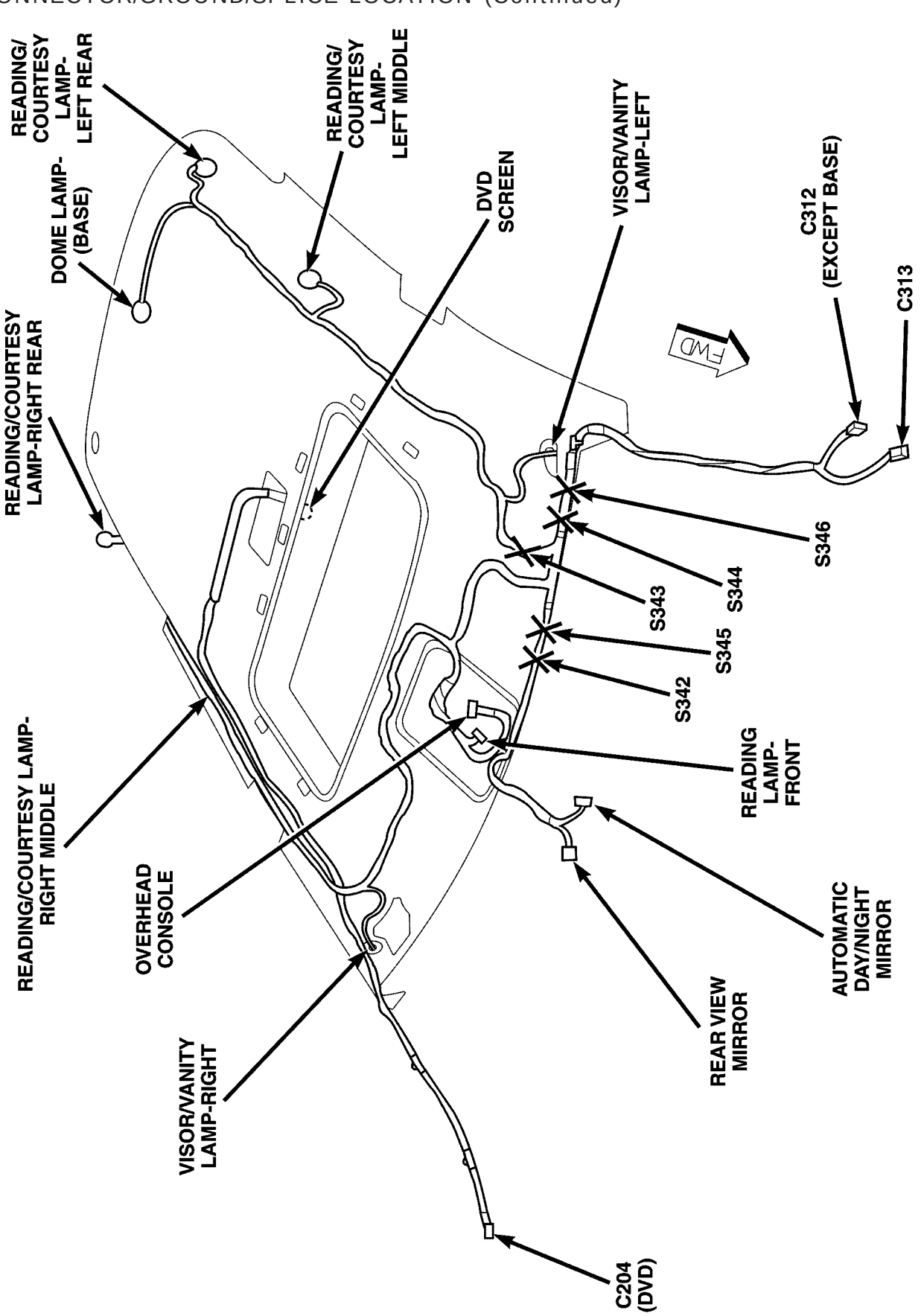


Fig. 46 HEADLINER

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

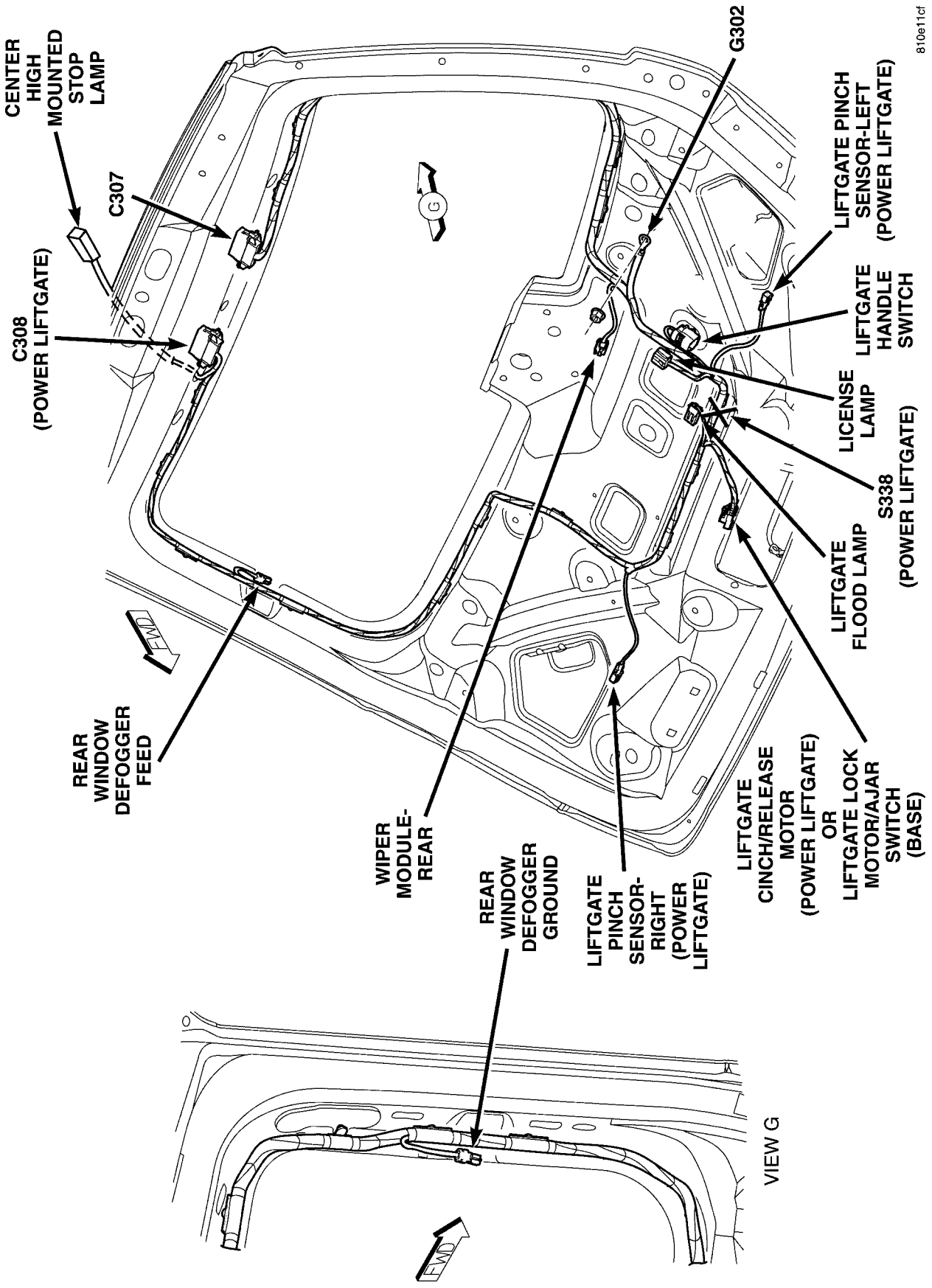


Fig. 47 LIFTGATE

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

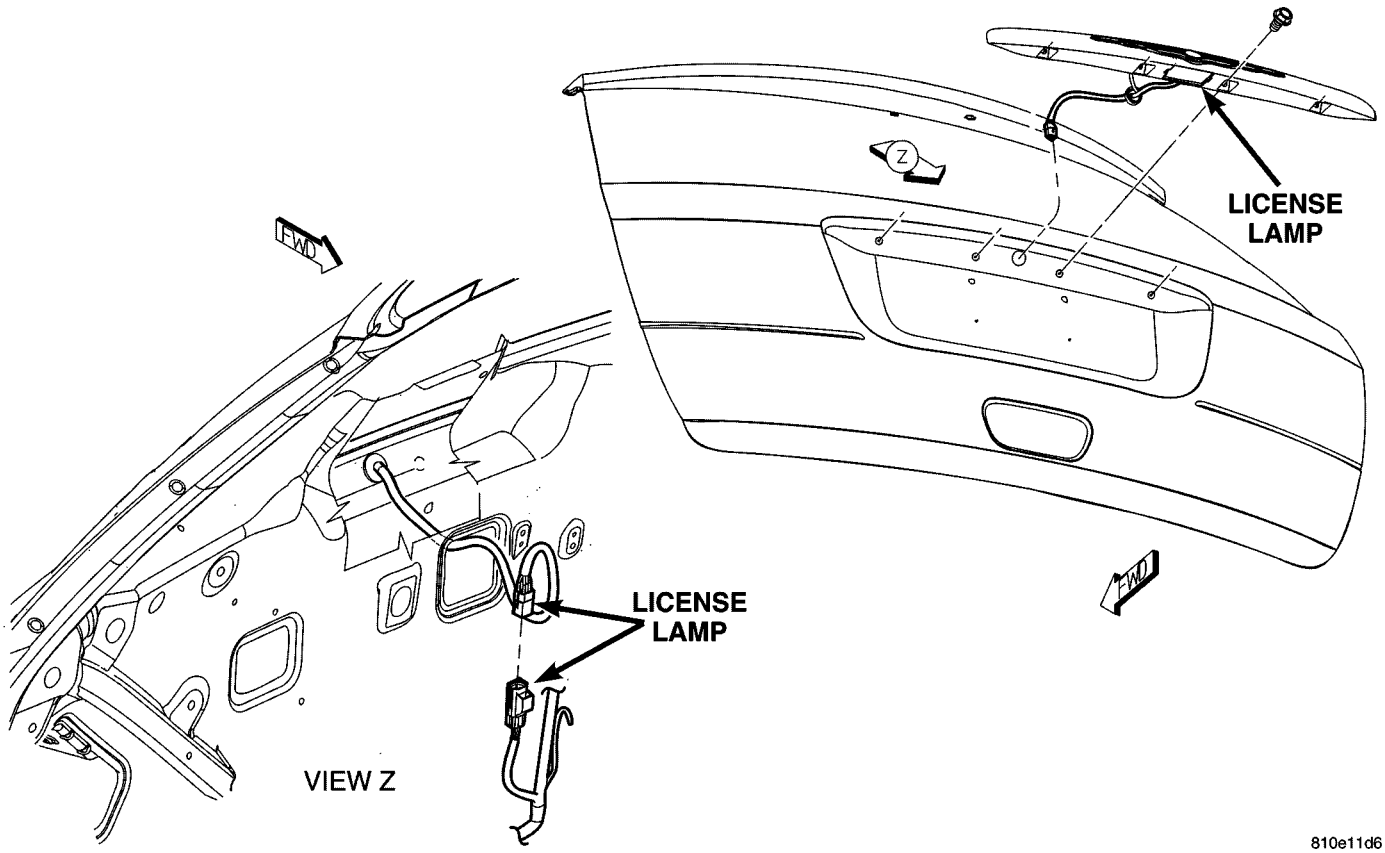


Fig. 48 LICENSE LAMP

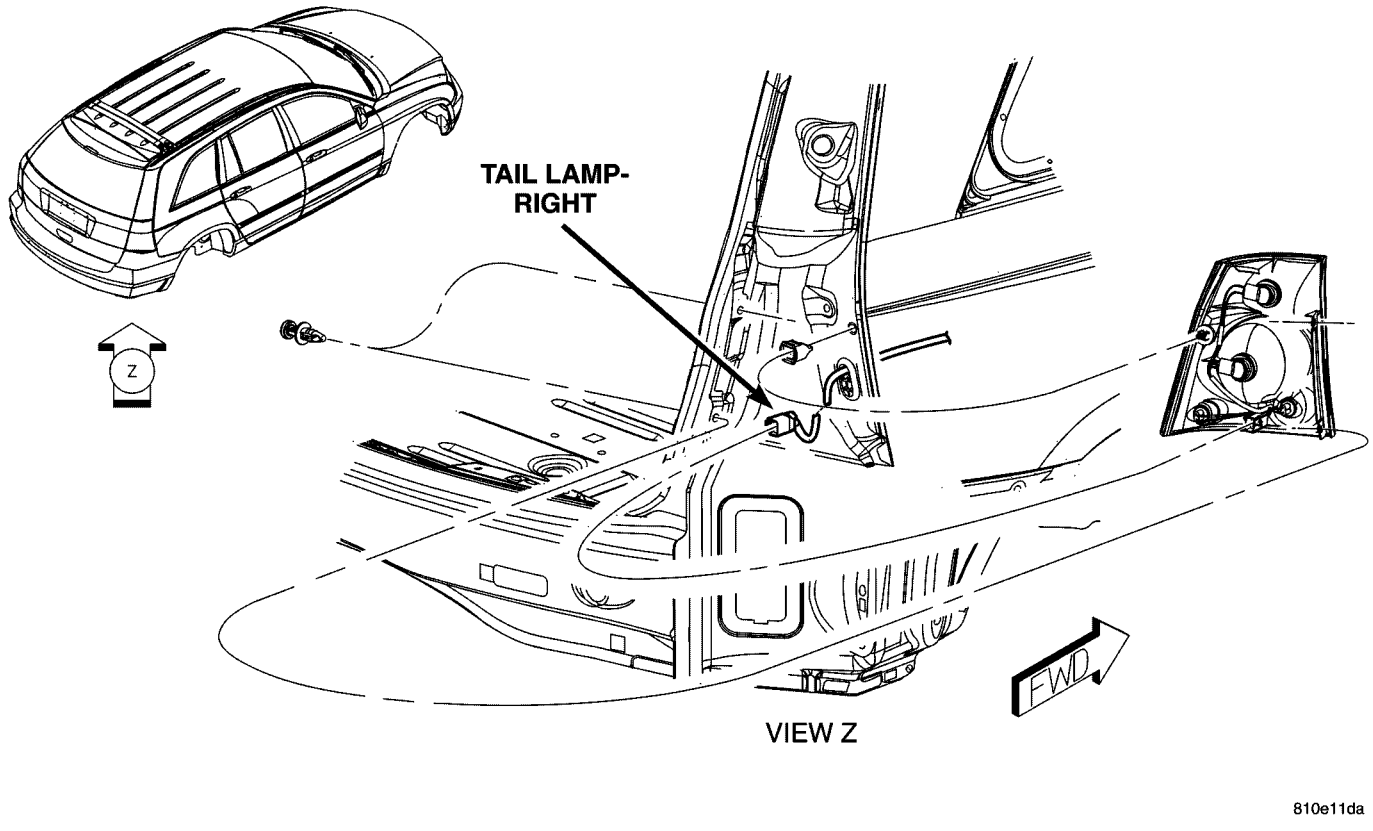


Fig. 49 TAIL LAMP - RIGHT

8W-97 POWER DISTRIBUTION

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INTEGRATED POWER MODULE

DESCRIPTION

The Integrated Power Module (IPM) is mounted in the engine compartment, next to the battery. The IPM houses all fuses and relays for the vehicle.

Fuse and relay information is laser etched inside surface of the hinged cover. As well as housing fuses and relays, the IPM is an electrical control and interface center in the engine compartment. It provides and distributes information to the rest of the vehicle. The IPM controls the following features:

CONTROLLED POWER FEEDS

- BTSI
- EATX module power
- Front airbag system
- Front and rear marker lamps
- Front and rear park lamps
- Front fog lamps
- Headlamp power (High/Low beam)
- License plate lamp

RELAY CONTROLS

- Accessory relay
- Door node relay
- EBL relay
- Front and rear blower relay
- Front wiper HI/LOW relay
- Front wiper ON relay
- Horn relay
- Run relay
- Fuel pump relay

REMOVAL

NOTE: When a replacement IPM is installed in the vehicle, the IOD fuse must be rotated to the "customer" position.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the hood cable retaining clip near the Integrated Power Module (IPM).

(3) Using a flat bladed tool, depress the four locking tabs on the side of the IPM (Fig. 1).

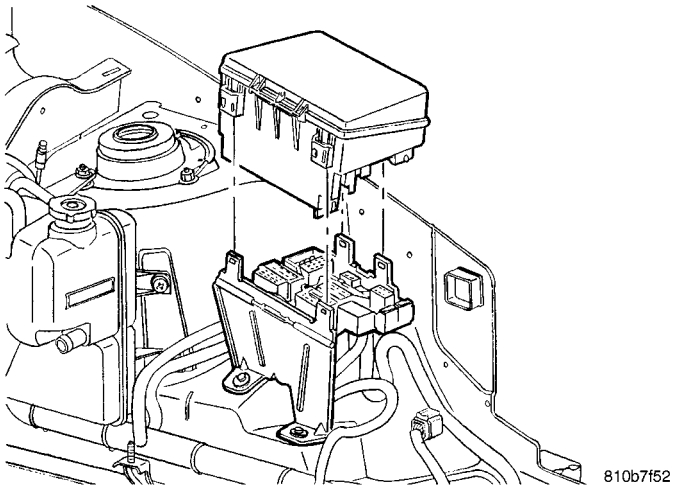


Fig. 1 INTEGRATED POWER MODULE

(4) Lift the IPM from the bracket.

(5) Disconnect the electrical harness connectors from the IPM.

(6) Disconnect the battery connection to the IPM by removing the nut attaching the connection to the bolt.

INSTALLATION

NOTE: When a replacement IPM is installed in the vehicle, the IOD fuse must be rotated to the "customer" position.

(1) Install battery connection and retaining nut. Tighten nut to 28 N·m (250 in. lbs.)

(2) Connect the electrical harness connectors to the Integrated Power Module (IPM).

(3) Position IPM into place, and lock into position.

(4) Install the hood cable retaining clip.

(5) Connect battery negative cable.

IOD FUSE

DESCRIPTION

All vehicles are equipped with an Ignition-Off Draw (IOD) fuse that is mounted in an asymmetrical holder within the Integrated Power Module (IPM). Prior to delivery to the customer, this fuse is positioned (shipping mode) for the "always on" equipment only when the ignition is in the ON position. This avoids long term drain on the battery during shipping and storage. The IOD fuse will be aligned with the other fuses on the same row it is in when in the shipping mode. Dealer personnel are to reverse the IOD fuse to "customer mode" by rotating the asymmetrical fuse holder (with the IOD fuse in it) 180 degrees in its position to switch these features to battery power just prior to new vehicle delivery. The fuse will NOT be aligned to the other fuses in the row it is in when it is in the customer mode. **When a replacement IPM is installed in the vehicle, the IOD fuse must be rotated to the "customer" position.**

OPERATION

The term ignition-off draw identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. The IOD fuse feeds the memory and sleep mode functions for some of the electronic modules in the vehicle as well as various other accessories that require battery current when the ignition switch is in the Off position, including the clock. The only reason the IOD fuse is reversed in its holder is to reduce the normal IOD of the vehicle electrical system during new vehicle transportation and pre-delivery storage to reduce battery depletion, while still allowing vehicle operation so that the vehicle can be loaded, unloaded and moved as needed by both vehicle transportation company and dealer personnel.

POWER OUTLET

DESCRIPTION

This vehicle is equipped with four electrical power outlets. Two are located in the instrument panel center stack, one in the rear of the center console and one in the left quarter trim panel behind the rear seats.

One instrument panel and the center console outlet are battery powered - on at all times. The other outlets receive power only when the ignition is ON. The ignition powered instrument panel outlet will accept a cigar lighter element.

The operator can choose to make the ignition powered left rear quarter panel outlet battery powered by repositioning a fuse in the Integrated Power Module (IPM).

All outlets include tethered caps with ISO "battery" or "key" icons indicating whether they are battery or ignition powered.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Look inside and note position of the retaining bosses (Fig. 2).

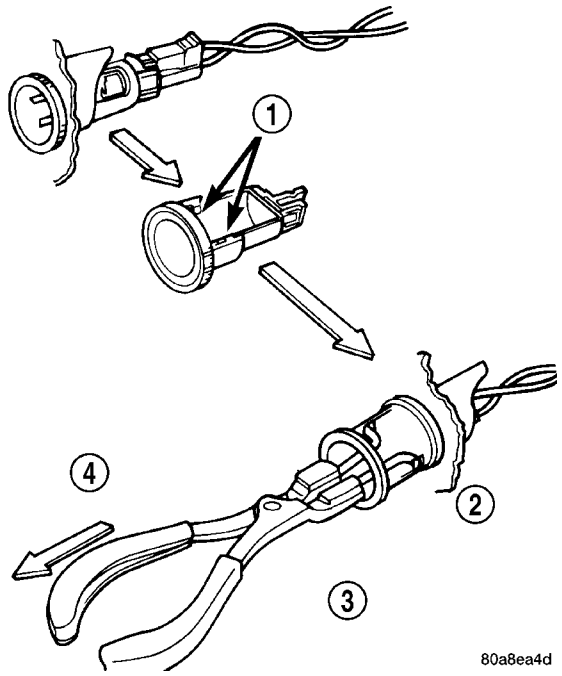


Fig. 2 CIGAR LIGHTER / POWER OUTLET BASE REMOVAL

1 - RETAINING BOSSES-ENGAGE PLIERS HERE
2 - PARTIALLY REMOVED
3 - EXTERNAL SNAP-RING PLIERS
4 - PULL BASE OUT-THROUGH MOUNTING RING

(3) Using external snap ring pliers with 90 degree tips. Insert pliers with tips against bosses and squeeze forcing bosses out of base.

(4) Pull out the base through mounting ring by gently rocking pliers.

(5) Disconnect the base wires.

(6) Set base aside and remove base mount ring.

INSTALLATION

(1) Install base mount ring.

(2) Connect the base wires.

(3) Firmly snap base into position inside of instrument panel.

(4) Connect the battery negative cable.

ENGINE

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ENGINE 3.5L

DESCRIPTION

The 3.5 Liter (214 Cubic Inches) 60 degree V-6 engine is a single overhead camshaft design with hydraulic lifters and four valves per cylinder (Fig. 1). The engine does not have provisions for a free wheeling valve train.

The cylinders are numbered from front to rear, with the right bank odd numbered, and the left bank even numbered (Fig. 2). The firing order is 1–2–3–4–5–6.

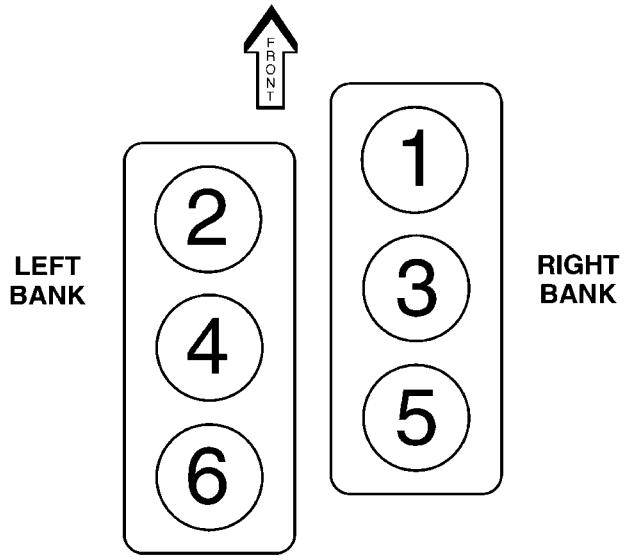


Fig. 2 Cylinder Numbering and Firing Order

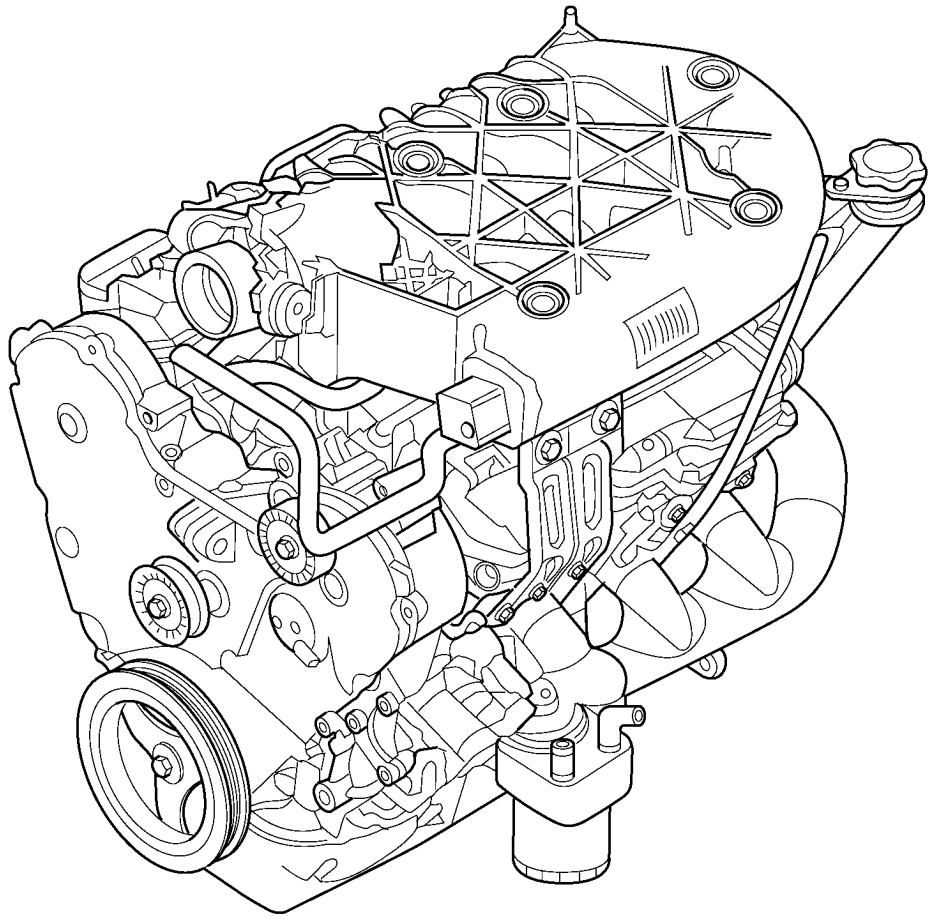


Fig. 1 3.5L ENGINE

ENGINE 3.5L (Continued)

The engine identification number is located on the rear of engine block just below the left cylinder head (Fig. 3).

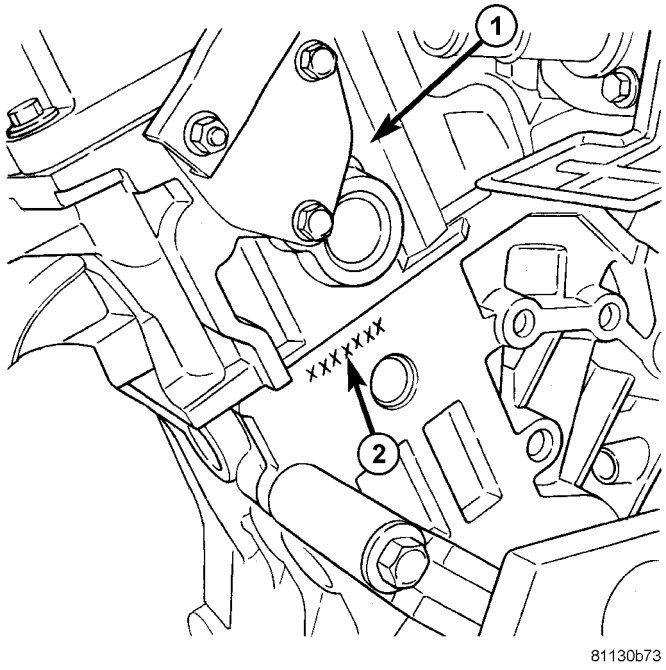


Fig. 3 ENGINE IDENTIFICATION

1 - REAR OF LEFT CYLINDER HEAD
2 - ENGINE IDENTIFICATION NUMBER

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE

DIAGNOSIS - INTRODUCTION

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either mechanical (e.g., a strange noise), or performance (e.g., engine idles rough and stalls).

Refer to Service Diagnosis—Mechanical Chart and Service Diagnosis—Performance Chart, for possible causes and corrections of malfunctions. Refer to FUEL SYSTEM for the fuel system diagnosis.

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that cannot be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following:

- Cylinder Compression Pressure Test
- Cylinder Combustion Pressure Leakage Test
- Cylinder Head Gasket Failure Diagnosis
- Intake Manifold Leakage Diagnosis
- Lash Adjuster (Tappet) Noise Diagnosis
- Engine Oil Leak Inspection

ENGINE 3.5L (Continued)

DIAGNOSIS AND TESTING - ENGINE PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery.	1. Test battery. Charge or replace as necessary. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/ BATTERY - DESCRIPTION)
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to terminals.
	3. Faulty starter.	3. Test starting system. (Refer to 8 - ELECTRICAL/STARTING - DIAGNOSIS AND TESTING)
	4. Faulty coil(s) or control unit.	4. Test and replace as needed. (Refer to Appropriate Diagnostic Information)
	5. Incorrect spark plug gap.	5. Check and adjust gap as needed.
	6. Contamination in fuel system.	6. Clean system and replace fuel filter.
	7. Faulty fuel pump.	7. Test fuel pump and replace as needed. (Refer to Appropriate Diagnostic Information)
	8. Incorrect engine timing.	8. Check for a skipped timing belt or a loose camshaft sprocket.
ENGINE STALLS OR IDLES ROUGH	1. Idle speed too low.	1. Test minimum air flow. (Refer to Appropriate Diagnostic Information)
	2. Incorrect fuel mixture.	2. (Refer to Appropriate Diagnostic Information)
	3. Intake manifold leakage.	3. Inspect intake manifold gasket, manifold, and vacuum hoses.
	4. Faulty coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)

ENGINE 3.5L (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped plugs.	1. Set gap as needed or replace plug(s).
	2. Contamination in fuel system.	2. Clean system and replace fuel filter.
	3. Faulty fuel pump.	3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Incorrect valve timing.	4. Correct valve timing as needed.
	5. Leaking cylinder head gasket.	5. Replace cylinder head gasket.
	6. Low compression.	6. Test compression of each cylinder.
	7. Burned, warped, or pitted valves.	7. Replace valves.
	8. Plugged or restricted exhaust system.	8. Check exhaust system restriction. Replace parts, as necessary.
	9. Faulty coil(s).	9. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES ON ACCELERATION	1. Dirty or incorrectly gapped spark plugs.	1. Set gap as needed or replace plug(s).
	2. Contamination in Fuel System.	2. Clean fuel system and replace fuel filter.
	3. Burned, warped, or pitted valves.	3. Replace valves.
	4. Faulty coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES AT HIGH SPEED	1. Dirty or incorrect spark plug gap.	1. Set gap as needed or replace plug(s).
	2. Faulty coil(s).	2. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	3. Dirty fuel injector(s).	Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Contamination in fuel system.	4. Clean system and replace fuel filter.

ENGINE 3.5L (Continued)

DIAGNOSIS AND TESTING - ENGINE MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY VALVES	1. High or low oil level in crankcase.	1. Check and correct engine oil level.
	2. Thin or diluted oil.	2. Change oil to correct viscosity.
	3. Thick oil	3. (a.) Change oil and filter. (b.) Run engine to operating temperature. (c.) Change oil and filter again.
	4. Low oil pressure.	4. Check and correct engine oil level.
	5. Dirt in tappets/lash adjusters.	5. Replace rocker arm/hydraulic lash adjuster assembly.
	6. Worn rocker arms.	6. Inspect oil supply to rocker arms.
	7. Worn tappets/lash adjusters.	7. Install new rocker arm/hydraulic lash adjuster assembly.
	8. Worn valve guides.	8. Replace cylinder head(s).
	9. Excessive runout of valve seats on valve faces.	9. Grind valve seats and valves.
	10. Missing adjuster pivot.	10. Replace rocker arm/hydraulic lash adjuster assembly.
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thick / Thin or diluted oil.	3. Change oil to correct viscosity. (a.) Change oil and filter. (b.) Run engine to operating temperature. (c.) Change oil and filter again.
	4. Excessive bearing clearance.	4. Measure bearings for correct clearance. Repair as necessary.
	5. Connecting rod journal out-of-round.	5. Replace crankshaft or grind surface.
	6. Misaligned connecting rods.	6. Replace bent connecting rods.

ENGINE 3.5L (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
MAIN BEARING NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thick / Thin or diluted oil.	3. Change oil to correct viscosity. (a.) Change oil and filter. (b.) Run engine to operating temperature. (c.) Change oil and filter again.
	4. Excessive bearing clearance.	4. Measure bearings for correct clearance. Repair as necessary.
	5. Excessive end play.	5. Check thrust bearing for wear on flanges.
	6. Crankshaft journal out-of-round or worn.	6. Replace crankshaft or grind journals.
	7. Loose flywheel or torque converter.	7. Tighten to correct torque.
OIL PRESSURE DROP	1. Low oil level.	1. Check engine oil level.
	2. Faulty oil pressure sending unit.	2. Install new sending unit.
	3. Low oil pressure.	3. Check sending unit and main bearing oil clearance.
	4. Clogged oil filter.	4. Install new oil filter.
	5. Worn parts in oil pump.	5. Replace worn parts or pump.
	6. Thin or diluted oil.	6. Change oil to correct viscosity.
	7. Oil pump relief valve stuck.	7. Remove valve and inspect, clean, or replace.
	8. Oil pump suction tube loose.	8. Remove oil pan and install new tube or clean, if necessary.
	9. Oil pump cover warped or cracked.	9. Install new oil pump.
	10. Excessive bearing clearance.	10. Measure bearings for correct clearance.
OIL LEAKS	1. Misaligned or deteriorated gaskets.	1. Replace gasket(s).
	2. Loose fastener, broken or porous metal part.	2. Tighten, repair or replace the part.
	3. Misaligned or deteriorated cup or threaded plug.	3. Replace as necessary.

ENGINE 3.5L (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL CONSUMPTION OR SPARK PLUGS FOULED	1. PCV system malfunction.	1. Check system and repair as necessary. (Refer to Appropriate Diagnostic Manual)
	2. Worn, scuffed or broken rings.	2. Hone cylinder bores. Install new rings.
	3. Carbon in oil ring slots.	3. Clean pistons and install new rings.
	4. Rings fitted too tightly in grooves.	4. Remove rings and check grooves. If groove is not proper width, replace piston.
	5. Worn valve guide(s).	5. Replace cylinder head(s).
	6. Valve stem seal(s) worn or damaged.	6. Replace seal(s).

DIAGNOSIS AND TESTING - CYLINDER COMPRESSION PRESSURE TEST

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

(1) Check engine oil level and add oil if necessary.

(2) Drive the vehicle until engine reaches normal operating temperature. Select a route free from traffic and other forms of congestion, observe all traffic laws, and accelerate through the gears several times briskly.

(3) Remove all spark plugs from engine. As spark plugs are being removed, check electrodes for abnormal firing indicators fouled, hot, oily, etc. Record cylinder number of spark plug for future reference.

(4) Remove the Auto Shutdown (ASD) relay from the PDC.

(5) Be sure throttle blade is fully open during the compression check.

(6) Insert compression gauge adaptor Special Tool 8116 or the equivalent, into the #1 spark plug hole in cylinder head. Connect the 0–500 psi (Blue) pressure transducer (Special Tool CH7059) with cable adaptors to the DRBIII®. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).

(7) Crank engine until maximum pressure is reached on gauge. Record this pressure as #1 cylinder pressure.

(8) Repeat the previous step for all remaining cylinders.

(9) Compression should not be less than 689 kPa (100 psi) and not vary more than 25 percent from cylinder to cylinder.

(10) If one or more cylinders have abnormally low compression pressures, repeat the compression test.

(11) If the same cylinder or cylinders repeat an abnormally low reading on the second compression test, it could indicate the existence of a problem in the cylinder in question. **The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine should not be disassembled to determine the cause of low compression unless some malfunction is present.**

DIAGNOSIS AND TESTING - CYLINDER COMBUSTION PRESSURE LEAKAGE TEST

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
- Leaks between adjacent cylinders or into water jacket.
- Any causes for combustion/compression pressure loss.

WARNING: DO NOT REMOVE THE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

Check the coolant level and fill as required. DO NOT install the pressure cap.

Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.

Clean spark plug recesses with compressed air.

Remove the spark plugs.

Remove the oil filler cap.

Remove the air cleaner.

Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum, with 552 kPa (80 psi) recommended.

Perform the test procedures on each cylinder according to the tester manufacturer's instructions. While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the coolant.

All gauge pressure indications should be equal, with no more than 25% leakage per cylinder.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

ENGINE OIL LEAK INSPECTION

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

(1) Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.

(2) Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.

(3) Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair as necessary.

(4) If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.

(5) **If the oil leak source is not positively identified at this time**, proceed with the air leak detection test method as follows:

- Disconnect the fresh air hose (make-up air) at the cylinder head cover and plug or cap the nipple on the cover.
- Remove the PCV valve hose from the cylinder head cover. Cap or plug the PCV valve nipple on the cover.
- Attach an air hose with pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kpa (3 PSI) of test pressure.

- Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provides the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service manual procedures.
- If the leakage occurs at the crankshaft rear oil seal area, refer to the section, Inspection for Rear Seal Area Leak.

(6) If no leaks are detected, turn off the air supply. Remove the air hose, all plugs, and caps. Install the PCV valve and fresh air hose (make-up air). Proceed to next step.

(7) Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

NOTE: If oil leakage is observed at the dipstick tube to block location; remove the tube, clean and reseal using Mopar® Stud & Bearing Mount (press fit tube applications only), and for O-ring style tubes, remove tube and replace the O-ring seal.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

(1) Disconnect the battery.

(2) Raise the vehicle.

(3) Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak. If a leak is present in this area, remove transmission for further inspection.

(a) Circular spray pattern generally indicates seal leakage or crankshaft damage.

(b) Where leakage tends to run straight down, possible causes are a porous block, oil gallery cup plug, bedplate to cylinder block mating surfaces and seal bore. See proper repair procedures for these items.

(4) If no leaks are detected, pressurize the crankcase as previously described.

CAUTION: Do not exceed 20.6 kPa (3 psi).

(5) If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

(6) For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

(7) After the oil leak root cause and appropriate corrective action have been identified, replace component(s) as necessary.

STANDARD PROCEDURE

STANDARD PROCEDURE - FORM-IN-PLACE GASKETS AND SEALERS

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® BED PLATE SEALANT is a unique (green-in-color) anaerobic type gasket material that is specially made to seal the area between the bedplate and cylinder block without disturbing the bearing clearance or alignment of these components. The material cures slowly in the absence of air when torqued between two metallic surfaces, and will rapidly cure when heat is applied.

MOPAR® GASKET SEALANT is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can w/applicator.

SEALER APPLICATION

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can w/applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

STANDARD PROCEDURE - ENGINE GASKET SURFACE PREPARATION

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

ENGINE 3.5L (Continued)

- Metal scraper
- Abrasive pad or paper to clean cylinder block and head
- High speed power tool with an abrasive pad or a wire brush (Fig. 4)

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper (Fig. 4)
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow) (Fig. 4)

CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.

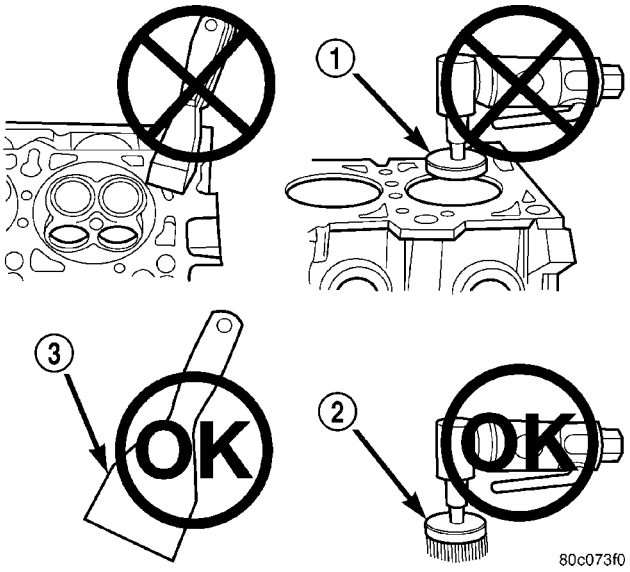


Fig. 4 Proper Tool Usage For Surface Preparation

1 - ABRASIVE PAD
2 - 3M ROLOC™ BRISTLE DISC
3 - PLASTIC/WOOD SCRAPER

STANDARD PROCEDURE - REPAIR OF DAMAGED OR WORN THREADS

Damaged or worn threads (excluding spark plug and camshaft bearing cap attaching threads) can be repaired. Essentially, this repair consists of drilling out worn or damaged threads, tapping the hole with a special Heli-Coil Tap, (or equivalent) and installing an insert into the tapped hole. This brings the hole back to its original thread size.

CAUTION: Be sure that the tapped holes maintain the original center line.

Heli-Coil tools and inserts are readily available from automotive parts jobbers.

STANDARD PROCEDURE - HYDROSTATIC LOCKED ENGINE

When an engine is suspected to be hydrostatically locked, regardless of what caused the problem, the following steps should be used.

CAUTION: DO NOT use starter motor to rotate the engine, severe damage may occur.

(1) Inspect air cleaner, induction system and intake manifold to insure system is dry and clear of foreign material.
(2) Remove negative battery cable.
(3) Place a shop towel around the spark plugs when removing them from the engine. This will catch any fluid that may possibly be in the cylinder under pressure.
(4) With all spark plugs removed, rotate engine crankshaft using a breaker bar and socket.
(5) Identify the fluid in the cylinder(s) (i.e., coolant, fuel, oil or other).
(6) Make sure all fluid has been removed from the cylinders. Inspect engine for damage (i.e., connecting rods, pistons, valves, etc.)
(7) Repair engine or components as necessary to prevent this problem from re-occurring.

CAUTION: Squirt approximately one teaspoon of oil into the cylinders, rotate engine to lubricate the cylinder walls to prevent damage on restart.

(8) Install new spark plugs.
(9) Drain engine oil and remove oil filter.
(10) Install a new oil filter.
(11) Fill engine with specified amount of approved oil.
(12) Connect negative battery cable.
(13) Start engine and check for any leaks.

STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS

Using a blunt tool such as a drift and a hammer, strike the bottom edge of the cup plug. With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug (Fig. 5).

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and cause serious engine problems.

ENGINE 3.5L (Continued)

Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer. Lightly coat inside of cup plug hole with Mopar® Stud and Bearing Mount. Make certain the new plug is cleaned of all oil or grease. Using proper drive plug, drive plug into hole so that the sharp edge of the plug is at least 0.5 mm (0.020 in.) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be refilled and the vehicle placed in service immediately.

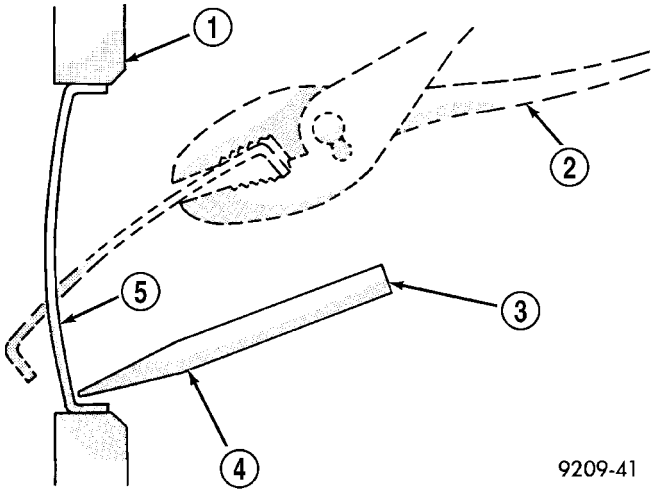


Fig. 5 Core Hole Plug Removal

1 - CYLINDER BLOCK
2 - REMOVE PLUG WITH PLIERS
3 - STRIKE HERE WITH HAMMER
4 - DRIFT PUNCH
5 - CUP PLUG

REMOVAL - ENGINE ASSEMBLY

NOTE: Capture and store any residual fluid drainage, or leakage from ancillary components, in the appropriately marked containers.

(1) Perform the fuel pressure release procedure.
(2) Disconnect negative battery cable.
(3) Drain the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
(4) Remove the engine cover (Fig. 6).
(5) Remove the cruise control servo.
(6) Remove the radiator closure panel.
(7) Remove the radiator core support.

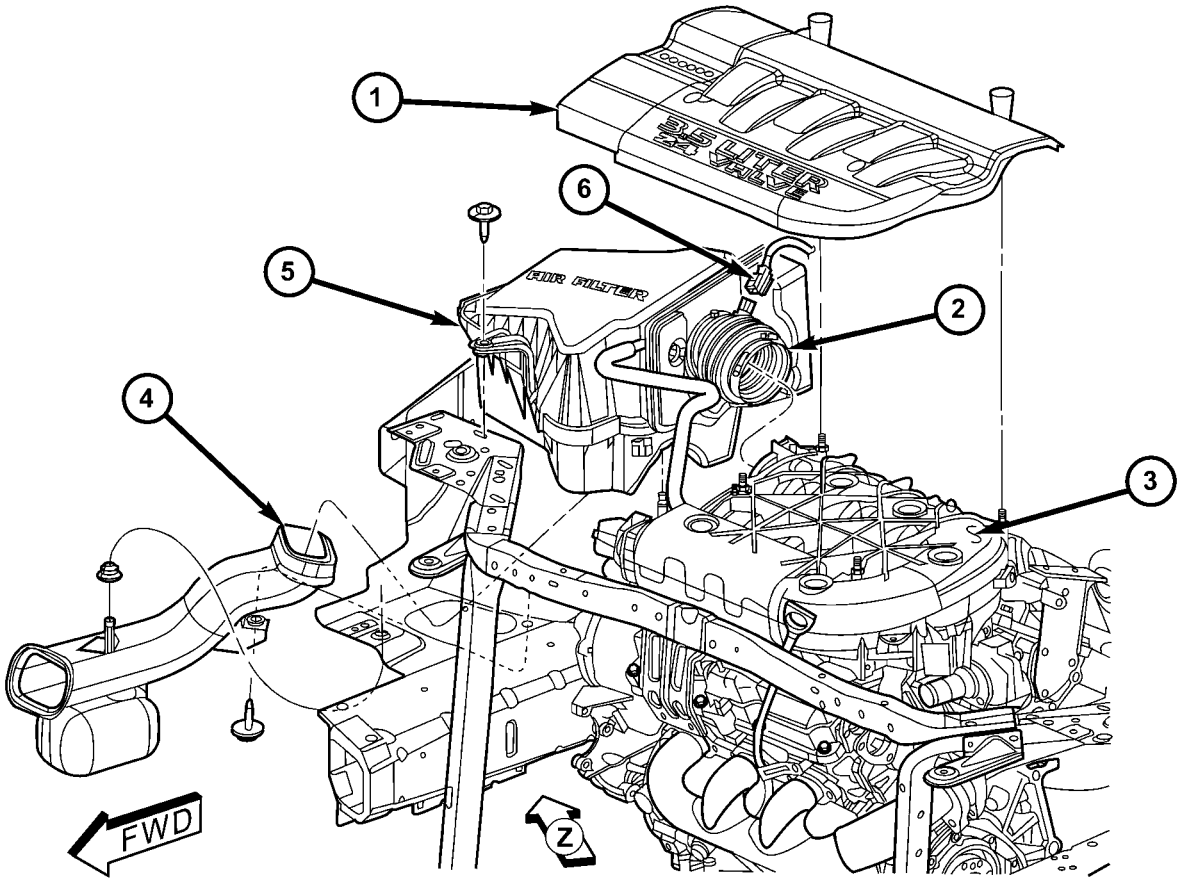


Fig. 6 AIR INTAKE SYSTEM

1 - ENGINE COVER
2 - AIR INTAKE TUBE
3 - UPPER INTAKE MANIFOLD
4 - AIR CLEANER RESONATOR
5 - AIR CLEANER ASSEMBLY
6 - INLET AIR TEMPERATURE SENSOR HARNESS CONNECTOR

ENGINE 3.5L (Continued)

(8) Remove upper radiator hose.

(9) Remove the radiator cooling fan assembly (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).

(10) Remove air cleaner housing (Fig. 6).

(11) Evacuate and recover the air conditioning (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING/REFRIGERANT - STANDARD PROCEDURE).

(12) Disconnect the throttle and cruise control cables from the throttle body (Fig. 7).

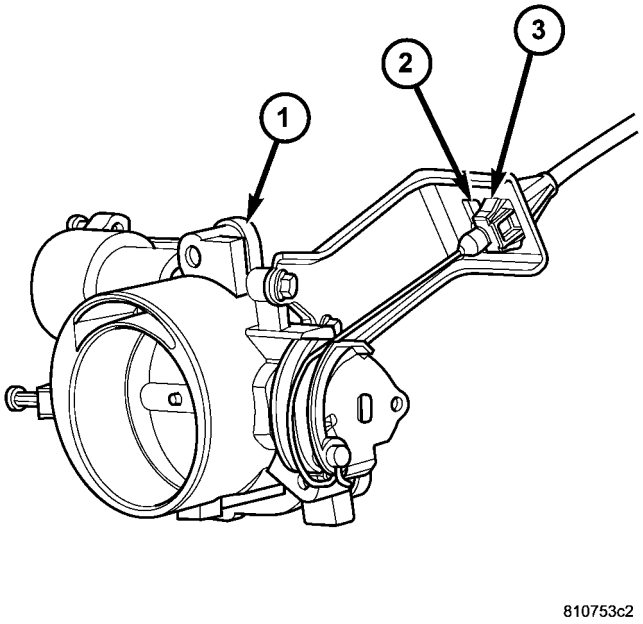


Fig. 7 THROTTLE BODY

1 - THROTTLE BODY
2 - SPEED CONTROL CABLE ACCESS
3 - THROTTLE CABLE

(13) Disconnect the cruise control and power brake booster vacuum hoses at the engine.

(14) Disconnect the transmission wiring harness from the solenoid pack, input and output sensors and the range sensor connectors (Fig. 8).

(15) Disconnect the engine wiring harness grounds at the left inner frame rail.

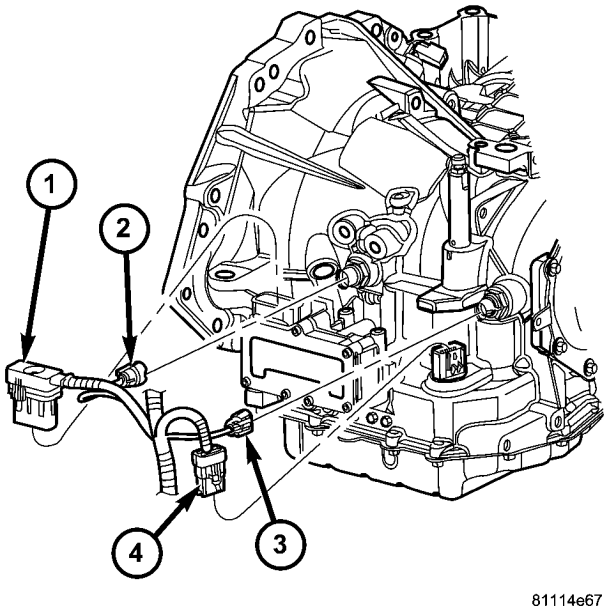


Fig. 8 Transmission Connectors

1 - SOLENOID PACK CONNECTOR
2 - INPUT SPEED SENSOR CONNECTOR
3 - OUTPUT SPEED SENSOR CONNECTOR
4 - TRANSMISSION RANGE SENSOR CONNECTOR

(16) Disconnect the transmission shift cable.

(17) Disconnect the transmission cooler lines (Fig. 9).

(18) Disconnect the engine block heater wiring connector and set aside (if equipped).

(19) Disconnect the coolant reservoir hoses at the thermostat housing (Fig. 9).

(20) Disconnect the heater hoses at the heater core (Fig. 9).

(21) Disconnect upper radiator hose at the thermostat housing (Fig. 9).

ENGINE 3.5L (Continued)

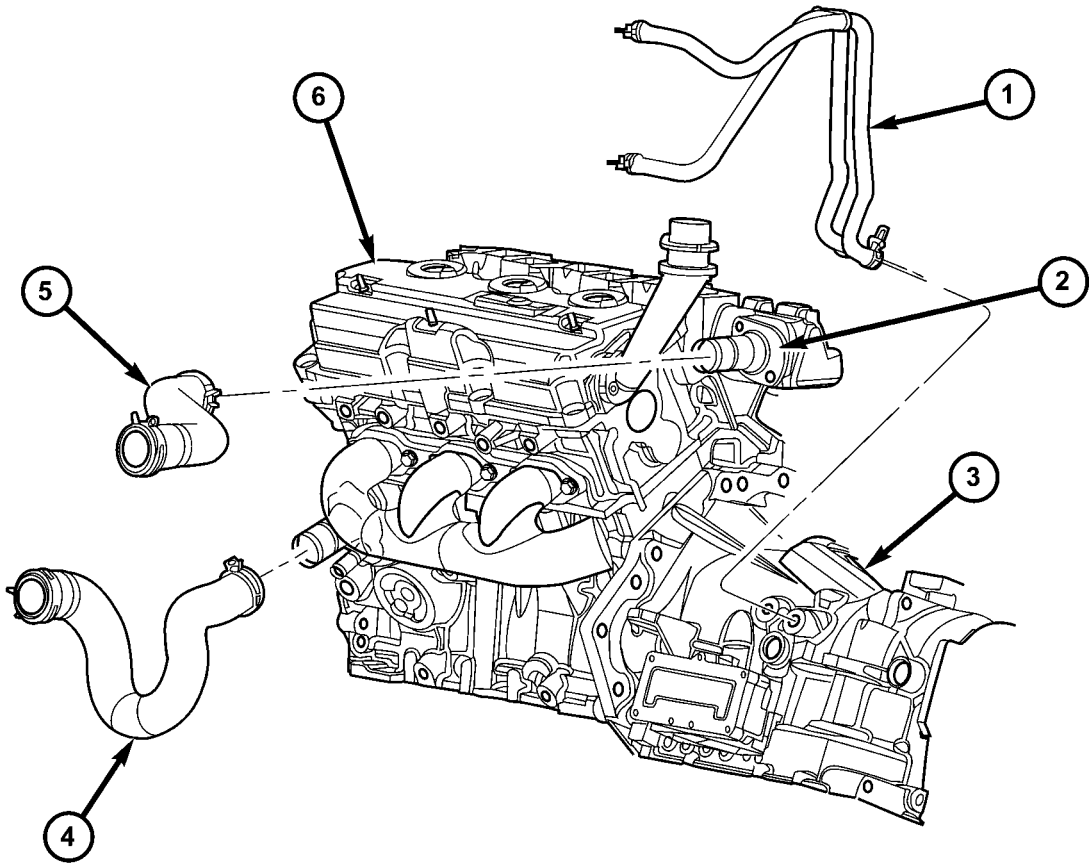


Fig. 9 COOLANT HOSES

1 - TRANSMISSION OIL COOLER HOSES
2 - THERMOSTAT HOUSING
3 - TRANSMISSION
4 - LOWER RADIATOR HOSE
5 - UPPER RADIATOR HOSE
6 - ENGINE

ENGINE 3.5L (Continued)

NOTE: Use a brake pedal prop rod and depress the brake pedal to prevent excessive brake fluid loss when the brake system is opened.

(22) Disconnect both front brake lines from the Hydraulic Control Unit (HCU) (Fig. 10).

(23) Disconnect the air condition suction discharge hoses at the air conditioning compressor and plug the compressor openings to prevent contamination.

(24) Disconnect lower radiator hose at the engine outlet and remove. (Fig. 9).

(25) Disconnect A/C clutch electrical connector.

(26) Disconnect oil pressure sending unit wiring harness connector.

(27) Disconnect the electrical connectors at the generator.

(28) Disconnect the fuel supply line at the fuel rail.

(29) Disconnect the ignition harness connector at the intake manifold.

(30) Raise and support the vehicle.

(31) Remove the front wheels.

(32) Remove left inner fender well.

(33) Disconnect the engine harness from the powertrain control module (PCM).

(34) Disconnect the left wheel speed sensor and retainers (Fig. 10).

(35) Remove the left sway bar link at the front strut (Fig. 10).

(36) Remove left drive axle nut (Fig. 10).

(37) Remove both left steering knuckle pinch bolts (Fig. 10).

(38) Separate the left steering knuckle from the strut and suitably support steering knuckle (Fig. 10).

(39) Disconnect the negative battery cable from the transmission.

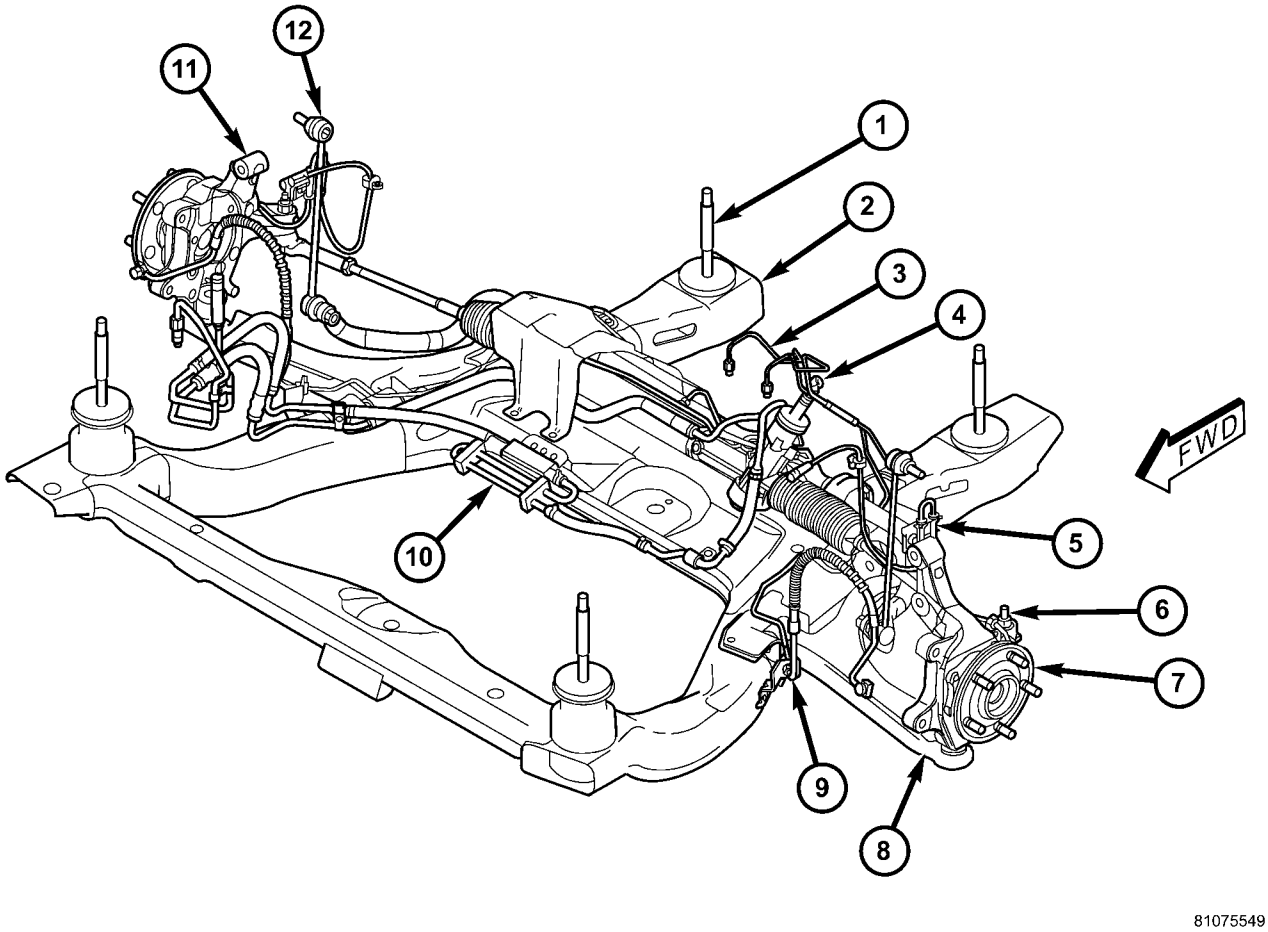


Fig. 10 FRONT CRADLE ASSEMBLY

1 - FRONT CRADLE BOLT
2 - FRONT CRADLE ASSEMBLY
3 - FRONT BRAKE LINES
4 - STEERING GEAR
5 - WHEEL SPEED SENSOR HARNESS
6 - TIE ROD END
7 - WHEEL HUB
8 - LOWER CONTROL ARM
9 - FRONT BRAKE HOSE
10 - POWER STEERING COOLER
11 - STEERING KNUCKLE
12 - STABILIZER LINK

ENGINE 3.5L (Continued)

(40) Remove the left fascia screws.
(41) Remove right inner fender well.
(42) Remove right fascia screws.
(43) Disconnect the right wheel speed sensor and retainers (Fig. 10).
(44) Remove right sway bar link at the front strut (Fig. 10).
(45) Remove right drive axle nut (Fig. 10).
(46) Remove right steering knuckle pinch bolts (Fig. 10).
(47) Separate the right steering knuckle from the strut and suitably support the steering knuckle (Fig. 10).
(48) Unplug fascia driving lamps (if equipped).
(49) Remove front fascia.
(50) Raise the vehicle.
(51) Disconnect the starter wiring connectors and harness retainers.
(52) Disconnect the exhaust manifold Oxygen sensor electrical connector (Fig. 11).
(53) Disconnect the catalytic converter oxygen sensor electrical connector (Fig. 11).
(54) Remove the exhaust system from the manifold and set aside.
(55) Paint mark the rear driveshaft front and rear positions, then remove the drive shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT - REMOVAL).
(56) Remove the engine to transmission support plate.
(57) Remove transmission inspection shield.
(58) Remove the flex plate to torque converter bolts.

CAUTION: Secure the steering wheel to prevent rotation and possible damage to the steering column clock spring when coupling is separated.

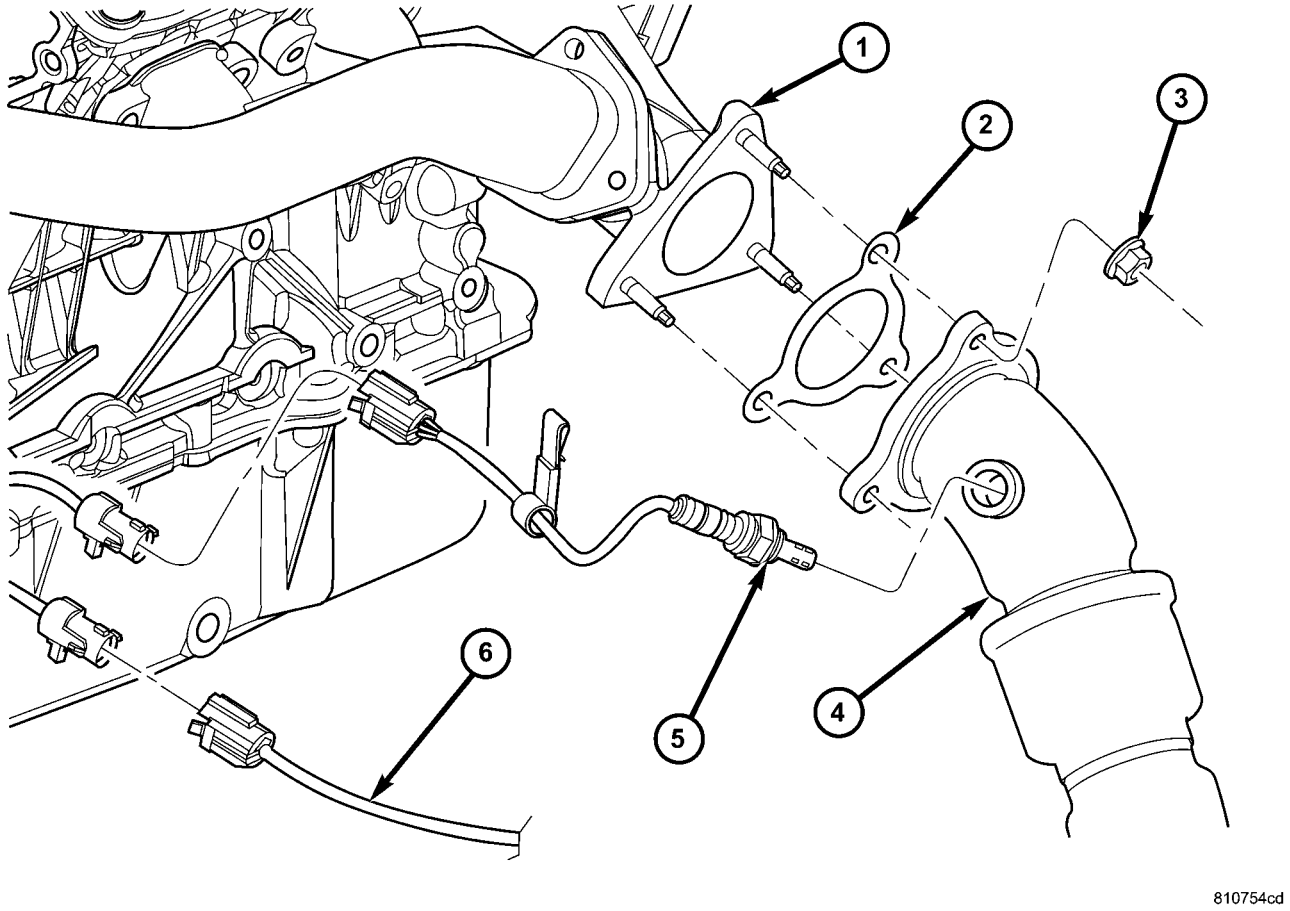


Fig. 11 FRONT EXHAUST PIPE

1 - EXHAUST MANIFOLD
2 - GASKET
3 - RETAINING NUT
4 - FRONT EXHAUST PIPE
5 - OXYGEN SENSOR 1 OF 2
6 - OXYGEN SENSOR 2 OF 2

ENGINE 3.5L (Continued)

(59) Remove the lower steering column coupling pin with special tool 6831–A, and separate union. (Fig. 12).

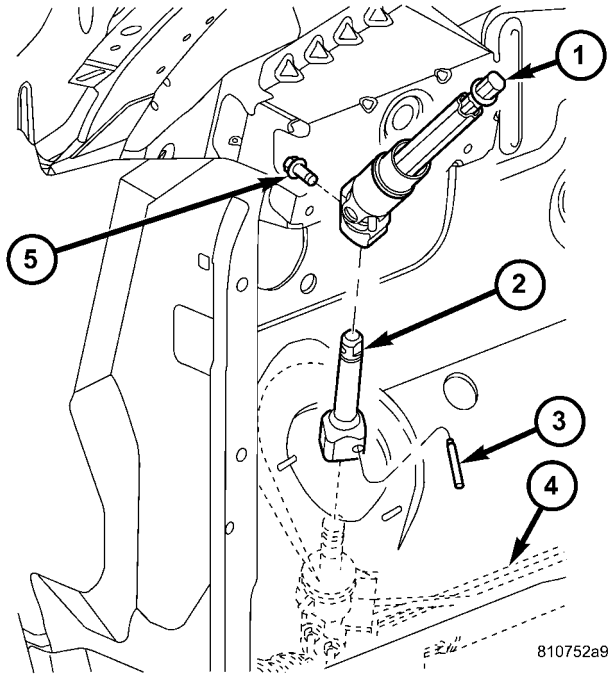


Fig. 12 STEERING COLUMN COUPLING

1 - LOWER STEERING COLUMN COUPLING ASSEMBLY
2 - INTERMEDIATE SHAFT TO STEERING GEAR
3 - PIN
4 - STEERING GEAR
5 - EXTENSION TO SHAFT BOLT

(60) Remove both lower engine mount nuts (Fig. 13).

(61) Paint mark the front cradle to body location and position the engine cradle support under the vehicle (Fig. 13).

(62) Lower the vehicle until just above the cradle support fixture (Fig. 13).

(63) Align the cradle support dowels with the cradle access holes (Fig. 13).

(64) Adjust engine support fixture to fit flush with the oil pan and adjust cradle support fixture arms to fit flush with cradle (Fig. 14).

(65) Carefully lower the vehicle onto the cradle support fixture.

(66) Remove the upper engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/FRONT MOUNT - REMOVAL).

CAUTION: While slowly separating the body from the cradle assembly, constant checks must be made to assure proper positioning and that no damage to other components or wiring harnesses occur during separation.

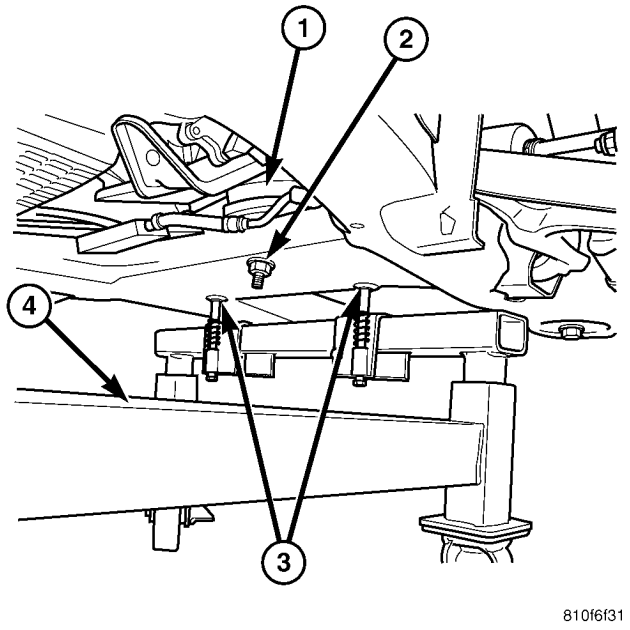


Fig. 13 CRADLE SUPPORT FIXTURE - REAR

1 - RIGHT LOWER ENGINE MOUNT
2 - RIGHT LOWER ENGINE MOUNT NUT
3 - ALIGNMENT DOWEL ACCESS HOLES
4 - CRADLE SUPPORT FIXTURE

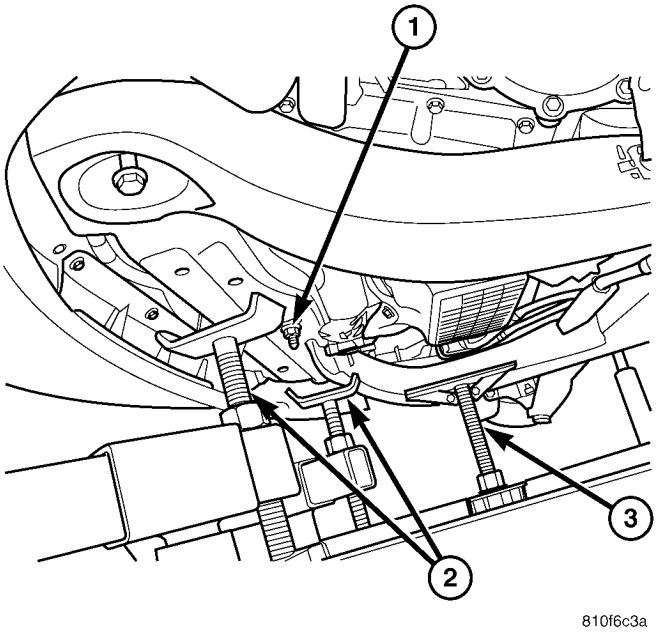


Fig. 14 CRADLE SUPPORT FIXTURE - FRONT

1 - LEFT LOWER ENGINE MOUNT NUT
2 - CRADLE SUPPORT FIXTURE ARMS
3 - CRADLE SUPPORT FIXTURE ENGINE STABILIZER

(67) **Carefully** remove the front and rear cradle mounting bolts and raise the vehicle to separate the

engine, transmission and cradle assembly from the vehicle.

(68) Connect engine lifting brackets to engine (Fig. 15)

(69) Separate the Power Transfer Unit (PTU), (if equipped).

(70) Separate the engine and transmission from the engine cradle using the lifting brackets. (Fig. 15).

(71) Separate the transmission from the engine.

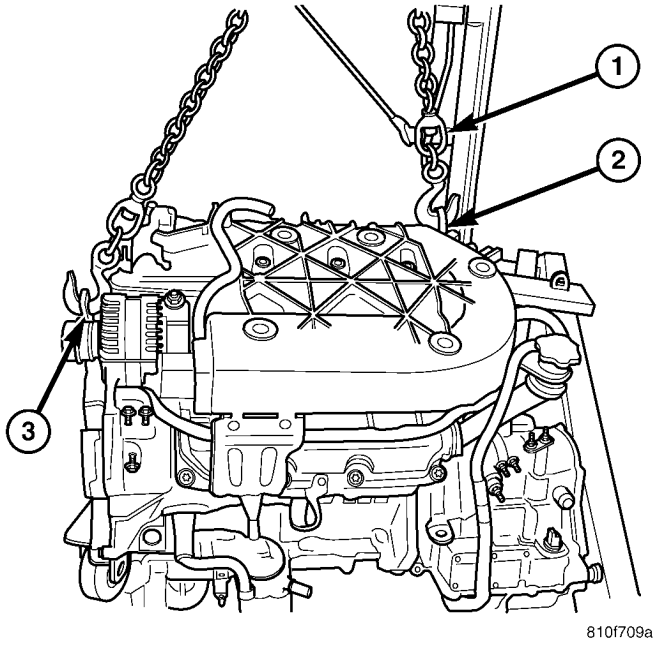


Fig. 15 ENGINE LIFTING BRACKET

1 - SUITABLE LIFTING CHAIN
2 - 8534-7 PART OF KIT 8534-12
3 - 8534-15 PART OF KIT 8534-12

INSTALLATION - ENGINE ASSEMBLY

(1) Install transmission and power transfer unit (PTU) (if equipped), onto engine assembly.

(2) Mount engine assembly onto cradle assembly.

(3) **Carefully** position the engine cradle assembly under the vehicle.

CAUTION: While slowly lowering the body to the cradle assembly, constantly check to assure proper positioning and no damage occurs to other components or harnesses until union is made.

(4) Lower the vehicle until the union is made between the cradle assembly and body, taking care to align the cradle to body marks.

(5) Install the cradle supporting bolts and tighten to 163 N·m (120 lbs. ft.).

(6) Install upper engine mount, tighten bolt to timing cover to 54 N·m (40 lbs. ft.). Tighten bolt to right rail 68 N·m (50 lbs.ft.).

(7) Slowly raise the vehicle off of the engine cradle support.

(8) Insert drive axles into steering knuckles. Tighten nut to 244 N·m (180 lbs. ft.). (Refer to 2 - SUSPENSION/FRONT/HUB / BEARING - INSTALLATION).

(9) Align front steering knuckles with struts and install bolts. Tighten bolts to 244 N·m (180 lbs. ft.). (Fig. 10). (Refer to 2 - SUSPENSION/FRONT/KNUCKLE - INSTALLATION).

(10) Install front wheel speed sensor wire support brackets to the struts (Fig. 10). Tighten bolts to 12 N·m (105 lbs. in.).

(11) Connect both front wheel speed sensors to wiring harness.

(12) Install brake line support bracket to cradle (Fig. 10). Tighten bolts to 12 N·m (105 lbs. in.).

(13) Connect sway bar links to front struts (Fig. 10).

(14) Raise vehicle.

(15) Install the steering column coupler pin.

(16) Connect the engine block heater (if equipped).

(17) Connect negative battery cable to transmission.

(18) Route engine wiring harness connector to PCM and connect.

(19) Install inner fender wells.

(20) Connect both front driving lights to the front fascia.

(21) Install front fascia.

(22) Install engine mount nuts and tighten to 101 N·m (75 lbs.ft.).

(23) Install flex plate to torque converter bolts. Tighten bolts to 75 N·m (55 lbs.ft.).

(24) Install transmission inspection shield. Tighten bolts to 12 N·m (105 lbs. in.).

(25) Install engine to transmission support collar-.Tighten bolts to 54 N·m (40 lbs. ft.).

(26) Properly align and install the drive shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT - INSTALLATION)

(27) Install exhaust system (Refer to 11 - EXHAUST SYSTEM - INSTALLATION).

(28) Connect exhaust manifold and catalytic converter oxygen sensor electrical connectors (Fig. 11).

(29) Connect starter wiring and properly position harness wiring.

(30) Install front wheels.

(31) Lower the vehicle.

(32) Connect both front brake lines to the brake system H.C.U. and tighten.

(33) Connect the ignition harness connector at the intake manifold.

(34) Connect the engine wiring harness and the ground wire on left frame rail

(35) Connect transmission cooler lines to transmission (Fig. 9).
(36) Connect transmission shift cable.
(37) Connect transmission solenoid pack, input and output sensors and transmission range sensor.
(38) Install the cruise control, power brake booster and fuel vapor vacuum hoses to the engine.
(39) Connect throttle cable and cruise control cable to throttle body (Fig. 7).
(40) Connect electrical connectors to generator.
(41) Connect oil pressure sending unit wiring harness connector.
(42) Connect A/C electrical connector.
(43) Connect suction/discharge hose at air conditioning compressor.
(44) Connect lower radiator hose to engine (Fig. 9).
(45) Connect heater hoses to heater core (Fig. 9).
(46) Connect coolant reservoir hose to thermostat housing (Fig. 9).
(47) Connect the fuel line to the fuel rail.
(48) Install cooling fan assembly (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
(49) Install radiator core support.
(50) Install radiator close out panel.
(51) Connect upper radiator hose (Fig. 9).
(52) Install the cruise control servo.
(53) Install air cleaner housing (Fig. 6).
(54) Install the engine cover (Fig. 6).
(55) Install new oil filter. Fill engine crankcase with proper oil to correct level.
(56) Connect negative battery cable to battery.
(57) Fill the cooling system (Refer to 7 - COOLING/ENGINE/COOLANT - STANDARD PROCEDURE).
(58) Bleed brakes.
(59) Start engine and run until operating temperature is reached and radiator fans cycle.
(60) Evacuate and recharge air conditioning.
(61) Check all fluid levels and properly fill.
(62) Check front end alignment.

SPECIFICATIONS

SPECIFICATIONS - 3.5L ENGINE

GENERAL SPECIFICATIONS

DESCRIPTION	SPECIFICATION	
Type	60° SOHC V-6 24-Valve	
Displacement	3.5L	
Firing Order	1-2-3-4-5-6	
Compression Ratio	10:1	
Lead Cylinder	#1 Right Bank	
	Metric	**Standard**
Displacement	3.5L Liters	214 cu. in.
Bore	96.0 mm	3.780 in.
Stroke	81.0 mm	3.189 in.

CYLINDER BLOCK

DESCRIPTION	SPECIFICATIONS	
	Metric	**Standard**
Cylinder Bore Diameter	96.0 mm ± 0.0076	3.780 in. ± 0.0003 in.
Out-of-Round (Max.)	0.076 mm	0.003 in.
Taper (Max.)	0.051 mm	0.002 in.

PISTONS

DESCRIPTION	SPECIFICATIONS	
	Metric	**Standard**
Material Type	Aluminum (Full Floating Pins)	
Piston Diameter	95.98 mm ± 0.019 mm	3.7788 in. ± 0.0008 in.
Clearance at Size Location	-0.007 to +0.047 mm	-0.003 to +0.0018 in.
Piston Weight - A	438-443 grams	15.45-15.62 oz.
Piston Weight - B	433-438 grams	15.27-15.45 oz.
Piston Ring Groove Diameter #1	87.4-87.6 mm	3.441-3.449 in.
Piston Ring Groove Diameter #2	86.3-86.5 mm	3.397-3.4055 in.
Piston Ring Groove Diameter #3	85.8-86.0 mm	3.378-3.385 in.

ENGINE 3.5L (Continued)

PISTON PINS

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Type	Full Floating	
Clearance in Piston	0.005-0.015 mm	0.002-0.0006 in.
Clearance in Rod	0.007-0.018 mm	0.0003-0.007 in.
Diameter	23.997-24.000 mm	0.9448-0.9449 in.

PISTON RINGS

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Ring Gap-Top Compression Ring	0.20-0.36 mm	0.008-0.014 in.
Ring Gap-2nd Compression Ring (Micro-Napier	0.20-0.40 mm	0.0078-0.0157 in.
Ring Gap-Oil Control (Steel Rails)	0.25-0.76 mm	0.010-0.030 in.

PISTON RING SIDE CLEARANCE

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Top and Second Compression Ring	0.04-0.08 mm	0.0016-0.0031 in.
Oil Ring (Steel Rails	0.038-0.184 mm	0.0015-0.0073 in.

PISTON RING WIDTH

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Top Compression Ring	1.17-1.19 mm	0.0461-0.0469 in.
2nd Compression Ring (Micro-Napier	1.47-1.49 mm	0.058-0.059 in.
Oil Control (Steel Rails)	0.445-0.470 mm	0.0176-0.0186 in.

CONNECTING RODS

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Bearing Clearance	0.038-0.074 mm	0.0015-0.0029 in.
Piston Pin Bore Diameter	24.0076-24.0153 mm	0.9452-0.9455 in.
Side Clearance (MAX)	0.39 mm	0.0153 in.
Total Weight (Less Bearing)	647 grams	22.8223 oz.

CRANKSHAFT MAIN BEARING JOURNALS

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Diameter	63.987-64.013 mm	2.519-2.520 in.
Main Bearing Diametrical Clearance	0.036-0.065 mm	0.0014-0.0026 in.
MAX Allowable	0.080 mm	0.0031 in.
Out-of-Round (MAX)	0.015 mm	0.0006 in.
Taper (MAX)	0.015	0.0006 in.
End Play	0.10-0.30 mm	0.004-0.012 in.
End Play (MAX)	0.43 mm	0.017 in.

ENGINE 3.5L (Continued)

CONNECTING ROD JOURNALS

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Diameter	57.982-58.002 mm	2.282-2.283 in.
Bearing Diametrical Clearance	0.028-0.084 mm	0.001-0.003 in.
Out-of-Round (MAX)	0.010 mm	0.0004 in.
Taper (MAX)	0.015	0.0006 in.

CAMSHAFT

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Bore Diameter	43.038-43.059 mm	1.6944-1.6953 in.
Diametrical Clearance	0.078-0.12 mm	0.003-0.0047 in.
Diametrical Clearance (MAX)	0.15 mm	0.0059 in.
Bearing Journal Diameter	42.939-42.960 mm	1.6905-1.6913 in.
End Play	0.03-0.035 mm	0.001-0.014 in.

VALVE TIMING-INTAKE VALVE

DESCRIPTION	SPECIFICATIONS (CRANKSHAFT DEGREES)
Opens (ATDC)	3°
Closes (ABDC)	61°
Duration	238°
Centerline	122°

VALVE TIMING-EXHAUST VALVE

DESCRIPTION	SPECIFICATIONS (CRANKSHAFT DEGREES)
Opens (BBDC)	56°
Closes (ATDC)	16°
Duration	252°
Centerline	110°

CYLINDER HEAD

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Gasket Thickness (Compressed)	1.78 mm	0.059 in.
Valve Seat Angle (From Horizontial)	45-45.5°	
Valve Seat Runout (MAX)	0.051 mm	0.002 in.
Valve Seat Width-Intake	0.8-1.2 mm	0.031-0.067 in.
Valve Seat Width-Exhaust	1.3-1.7 mm	0.05-0.067 in.
Guide Bore Diameter (Std.)	6.975-7.00 mm	0.2746-0.2756 in.
Valve Guide Height *	9.5-10.5 mm	0.3740-0.4134 in.
* Measured from cylinder head surface		

ENGINE 3.5L (Continued)

VALVES

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Face Angle (From Horizontial)	44.5°-45°	
Head Diameter-Intake	36.37-36.63 mm	1.4319-14421 in.
Head Diameter-Exhaust	28.87-29.13 mm	1.1366-1.1469 in.
Length-Intake (Overall)	114.41-114.99 mm	4.5043-4.5272 in.
Length-Exhaust (Overall)	126.17-126.75 mm	4.9673-4.9902 in.
Stem Diameter-Intake	6.935-6.953 mm	0.2730-0.2737 in.
Stem Diameter-Exhaust	6.906-6.924 mm	0.2719-0.2726 in.
Stem-to-Guide Clearance-Intake	0.022-0.065 mm	0.0009-0.0026 in.
Stem-to-Guide Clearance-Intake (MAX.) Rocking Method	0.29 mm	0.0114 in.
Stem-to-Guide Clearance-Exhaust	0.051-0.094 mm	0.002-0.0037 in.
Stem-to-Guide Clearance-Intake (MAX.) Rocking Method	0.370 mm	0.0146 in.
Valve Lift-Intake (Zero Lash)	8.55 mm	0.3367 in.
Valve Lift-Exhaust (Zero Lash)	6.53 mm	0.2571 in.
Valve Margin-Intake	0.835-1.165 mm	0.0329-0.0459 in.
Valve Margin-Exhaust	1.44-1.77 mm	0.0567-0.0697 in.
Valve Stem Tip Height-Intake	42.366-43.665 mm	1.6680-1.7187 in.
Valve Stem Tip Height-Exhaust	45.205-46.486 mm	1.780-1.8305 in.

VALVE SPRINGS

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Free Length-Intake (Approx.)	43.675 mm	1.7195 in.
Free Length-Exhaust- Yellow (Approx.)	47.1 mm	1.8543 in.
Free Length-Exhaust- White (Approx.)	48.3 mm	1.9015 in.
Spring Force-Intake (Valve Closed)	309-358 N @ 38.0 mm	69.5-80.5 lbs. @ 1.4961 in.
Spring Force-Exhaust- Yellow-(Valve Closed)	314-354 N @ 38.0 mm	70.5-79.5 lbs. @ 1.496 in.
Spring Force-Exhaust- White-(Valve Closed)	355-401 N @ 38.0 mm	80-90 lbs. @ 1.496 in.
Spring Force-Exhaust- Yellow-(Valve Open)	579-640 N @ 31.47 mm	130-144 lbs. @ 1.239 in.
Spring Force-Exhaust- White-(Valve Open)	621-687 N @ 31.47 mm	139.5-154.5 lbs. @ 1.239 in.
Spring Force-Intake (Valve Open)	836-907 N @ 29.45 mm	188-204 lbs. @ 1.1594 in.
Number of Coils-Intake	6.86	
Number of Coils-Exhaust	7.66	
Color of Spring (Top of Coils)-Intake-Right Hand Coil Direction	Orange	
Color of Spring (Top of Coils)-Exhaust-Left Hand Coil Direction	Yellow or White	
Wire Diameter-Intake	4.29-4.35 mm	0.1547-0.1570 in.
Wire Diameter-Exhaust	3.93-3.99 mm	0.1547-0.1570 in.
Spring Installed Height *	38.0 mm	1.4961 in.
* Spring Seat to Bottom Retainer-Intake and Exhaust		

ENGINE 3.5L (Continued)

OIL PUMP

DESCRIPTION	SPECIFICATIONS	
	Metric	Standard
Clearance Over Rotors	0.077 mm	0.003 in.
Cover-Out-of-Flat (MAX.)	0.025 mm	0.001 in.
Inner and Outer Rotor Thickness (MIN.)	14.229 mm	0.563 in.
Outer Rotor Thickness (MAX.)	0.39 mm	0.015 in.
Outer Rotor Diameter (MIN.)	79.997 mm	3.149 in.
Tip Clearance Between Rotors (MAX.)	0.20 mm	0.008 in.

OIL PRESSURE

DESCRIPTION	SPECIFICATIONS
NOTE: At Normal Operating Temperatures	
Pressure @ Curb Idle Speed *	34.47 kPa Min. (5 PSI MIN.)
Pressure @ 3000 RPM	300-724 kPa (45-105 PSI.)
*CAUTION: If pressure is zero at curb idle, DO NOT run engine at 3000 RPM.	

SPECIFICATIONS - TORQUE

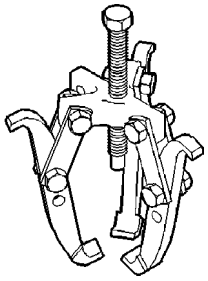
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Camshaft Sprocket Bolt—Right Side	102 +¼ Turn	75 +¼ Turn	—
Camshaft Sprocket Bolt—Left Side	115 +¼ Turn	85 +¼ Turn	—
Camshaft Thrust Plate—Bolts	28	—	250
Connecting Rod Cap—Bolts	27 +¼ Turn	20 +¼ Turn	—
Crankshaft Main Bearing Cap			
—Inner Main Cap Bolts	20 +¼ Turn	15 +¼ Turn	—
—Outer Main Cap Bolts	27 +¼ Turn	20 +¼ Turn	—
—Tie Bolts (Horizontal)	28	—	250
Crankshaft Damper—Bolt	95	70	—
Cylinder Head Bolts*			
—Step 1	61	45	—
—Step 2	88	65	—
—Step 3	88	65	—
—Step 4	+¼ Turn	+¼ Turn	—
*Refer to procedure for tightening sequence. (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION)			
Cylinder Head Cover—Bolts	12	—	105
Exhaust Manifold to Cylinder Head—Bolts	23	—	200
Exhaust Manifold Heat Shield—Bolts	12	—	105
Flex plate to Crankshaft	95	70	—
Flex plate to Torque Converter	75	55	—
Intake Manifold - Lower	28	—	250
Intake Manifold - Upper	12	—	105
Left Engine Mount to Cradle	75	55	—
Oil Pan			
—M6 Bolts	12	—	105
—M8 Bolts	28	—	250
Oil Pan Drain Plug	27	20	—
Oil Filter Adaptor Bolt	40	30	—
Oil Filter	16	12	—
M8 Oil Pump to Block—Bolts	28	—	250
M6 Oil Pump Cover—Bolts	12	—	105
Oil Pump Pick Up Tube—Bolt	28	—	250
Windage Tray	28 + 90°	20 + 90°	–
Crankshaft Rear Seal Retainer	12	—	105
Right Engine Mount to Cradle	75	55	—

ENGINE 3.5L (Continued)

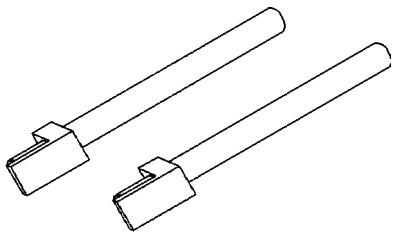
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Rocker Shaft Pedestal Retaining—Bolts	31	—	275
Spark Plugs	28	20	—
Structural Collar	(Refer to 9 - ENGINE/ ENGINE BLOCK/ STRUCTURAL COVER - INSTALLATION)		
Timing Belt Tensioner—Bolts	28	—	250
Timing Belt Tensioner Pulley Assembly—Bolt	61	45	—
Timing Belt Cover			
—M6 Bolts	12	—	105
—M8 Bolts	28	—	250
—M10 Bolts	54	40	—
Upper Engine Mount to Frame Rail	68	50	—
Upper Engine Mount to timing Cover	54	40	—

SPECIAL TOOLS

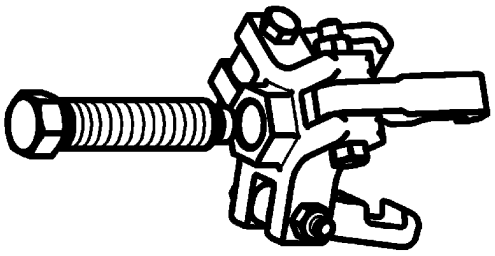
3.5L ENGINE



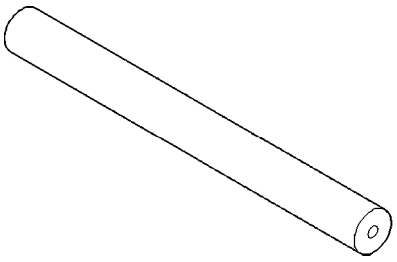
Puller 1023



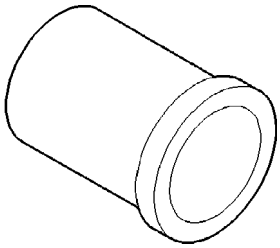
Connecting Rod Installation Guides 8189



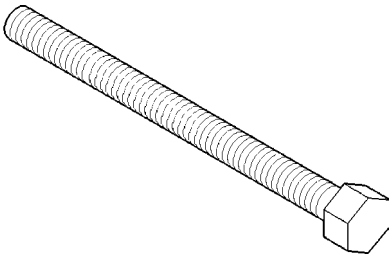
Puller 8454



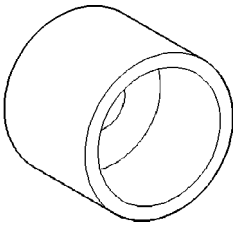
Vibration Damper Remover Insert 9020 - Crank Sprocket Remover Insert C4685-C2



Camshaft Seal Installer MD-998306

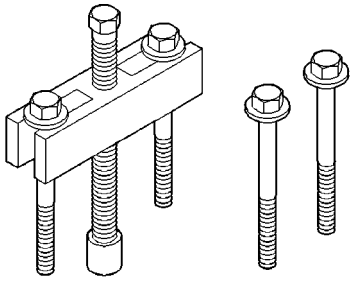


Crankshaft Damper Installer Bolt C-4685-C1

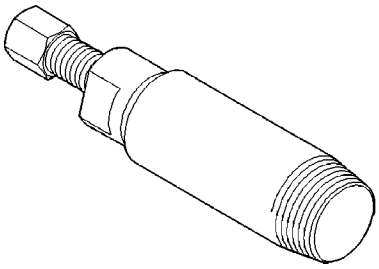


Crankshaft Damper Installer 6792-1

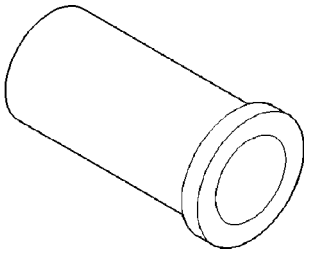
ENGINE 3.5L (Continued)



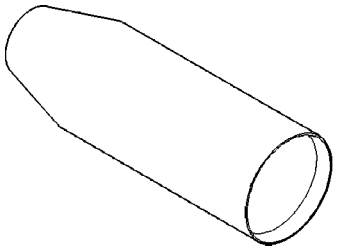
Gear Puller L-4407A



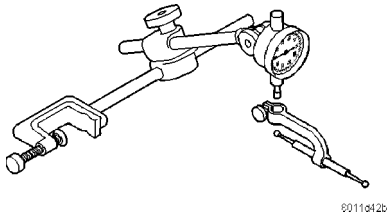
Front Crankshaft Seal Remover 6341A



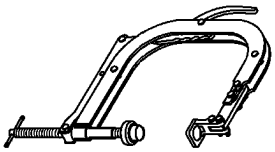
Driver 6342



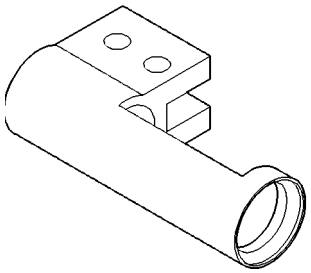
Crankshaft Seal Protector 6780-2



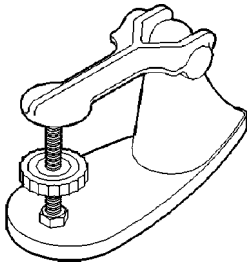
DIAL INDICATOR C-3339



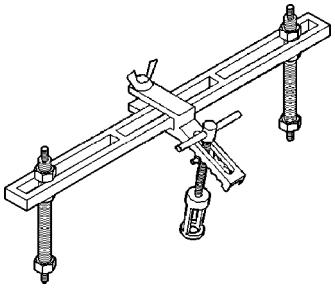
Valve Spring Compressor C-3422-D



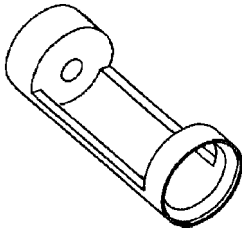
Spring Compressor Adapter 6526



Valve Spring Tester C-647

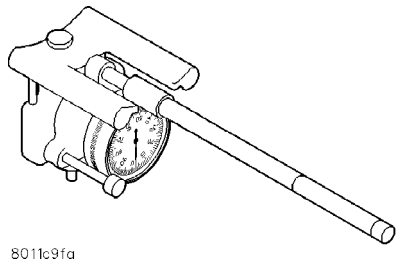


Valve Spring Compressor MD998772A

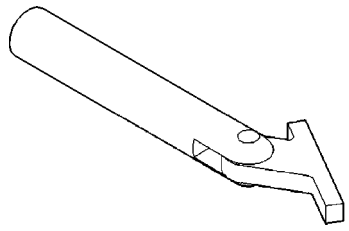


Valve Spring Adapter 6527

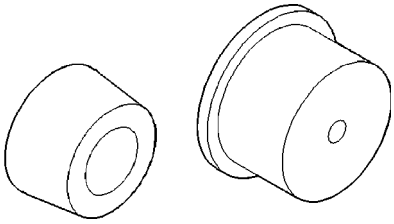
ENGINE 3.5L (Continued)



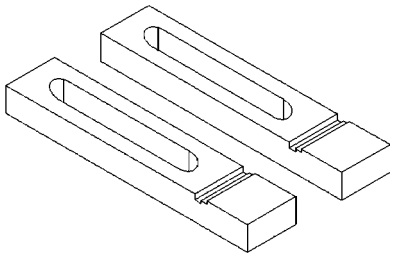
Indicator, Cylinder Bore C-119



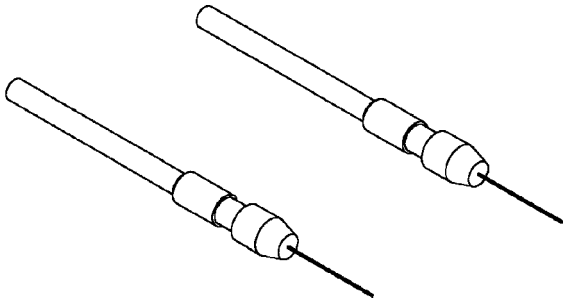
Crankshaft Main Bearing Remover C-3059



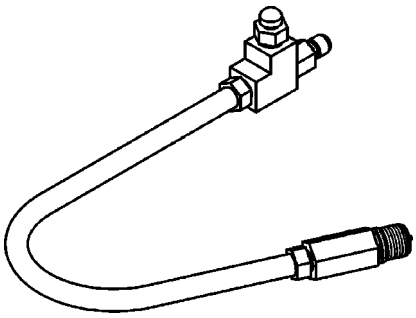
Rear Crankshaft Oil Seal Installer 6926



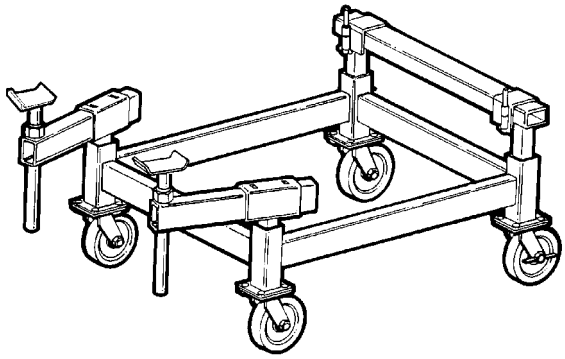
Crankshaft Real Seal Retainer Alignment Fixture 8225



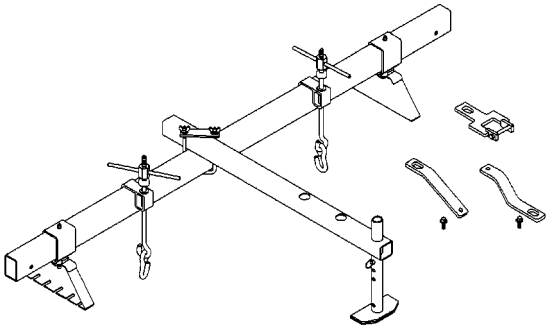
Release Probe 8351



Cylinder Compression Pressure Adaptor 8116



Driveline Support Table 8874



Driveline Support Fixture 8534B

ELEMENT-AIR CLEANER

REMOVAL

(1) Disconnect the intake air temperature sensor (IAT) wiring harness connector.
(2) Disconnect the air inlet tube at the throttle body.
(3) Remove the cover screws
(4) Lift cover and pull toward the engine and remove cover tabs from air box.
(5) Lift cover and remove the element (Fig. 16).

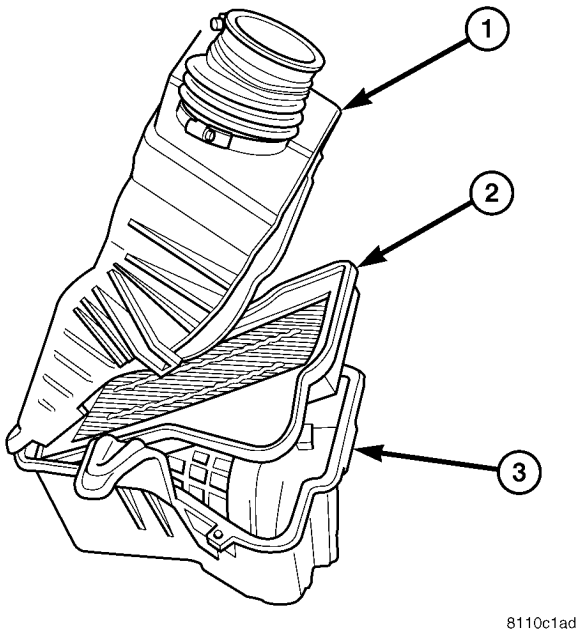


Fig. 16 AIR CLEANER ELEMENT

1 - HOUSING COVER
2 - SCREWS
3 - ELEMENT HOUSING

INSTALLATION

(1) Install the air filter element into air box (Fig. 16).
(2) Move cover so that the tabs insert into the air box.
(3) Seat cover onto element housing and tighten the screws.
(4) Reconnect the air inlet tube and tighten clamp.
(5) Connect the intake air temperature sensor wire harness connector

HOUSING-AIR CLEANER

REMOVAL

(1) Disconnect the intake air temperature (IAT) sensor wiring harness connector.
(2) Remove the air inlet hose at the throttle body.
(3) Disconnect the air circulation hose at the element housing.
(4) Remove the housing retaining bolt.
(5) Pull housing up and off of the locating pin.
(6) Remove element housing from vehicle.

INSTALLATION

(1) Install housing into vehicle and the locating pin.
(2) Install housing retaining bolt.
(3) Connect the air inlet hose to the throttle body and tighten clamp.
(4) Connect the air circulation hose to housing.
(5) Connect the intake air temperature (IAT) sensor wiring harness connector.

CYLINDER HEAD(S)

DESCRIPTION

The aluminum alloy cylinder heads feature cross-flow type intake and exhaust ports. Valve guides and seat inserts are powdered metal. Valves are arranged in a “V”, with each camshaft on center. To improve combustion speed the chambers are a compact spherical design with a squish area of approximately 30 percent of the piston top area. The cylinder heads are common to either cylinder bank by reversing the direction of installation.

DIAGNOSIS AND TESTING—CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING). An engine cylinder head gasket leaking between adja-

cent cylinders will result in approximately a 50–70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

REMOVAL - CYLINDER HEAD(S)

RIGHT CYLINDER HEAD

(1) Perform the fuel relief procedure.

(2) Disconnect the negative battery cable.

(3) Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(4) Remove the engine cover.

(5) Remove air cleaner element housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

(6) Disconnect the fuel line at the fuel rail.

(7) Remove the upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(8) Remove the lower intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(9) Raise the vehicle.

(10) Remove right front tire.

(11) Remove right inner splash shield.

(12) Remove accessory drive belt (Fig. 18).

(13) Remove vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL) (Fig. 17).

(14) Remove lower accessory drive belt idler pulley (Fig. 18).

(15) Remove the power steering mounting bolts and set the pump aside (Refer to 19 - STEERING/PUMP - REMOVAL).

(16) Remove lower outer timing belt cover bolts (Fig. 17).

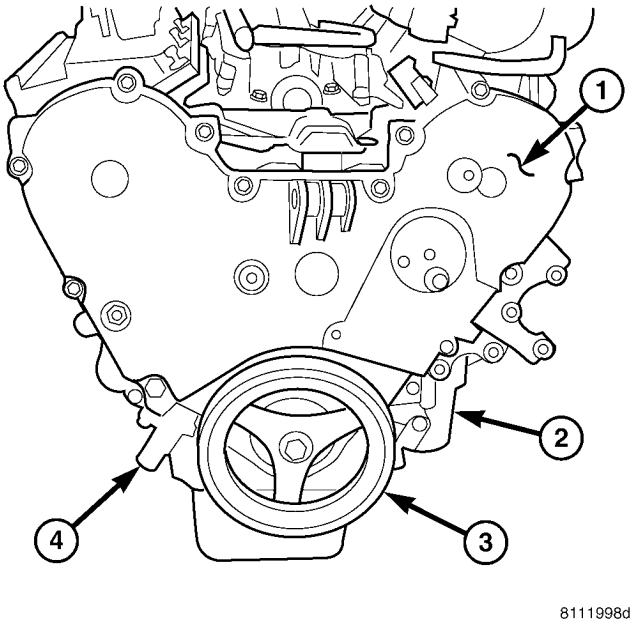


Fig. 17 FRONT TIMING BELT COVER

1 - FRONT TIMING BELT COVER
2 - ENGINE OIL FILTER
3 - VIBRATION DAMPER
4 - TIMING BELT TENSIONER

(17) Raise the vehicle.

(18) Remove catalytic converter mounting nuts (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - REMOVAL).

(19) Disconnect both oxygen sensor harness connectors.

(20) Separate the muffler to tail pipe union (Refer to 11 - EXHAUST SYSTEM/MUFFLER - REMOVAL).

(21) Remove catalytic converter (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - REMOVAL).

(22) Remove the exhaust cross over pipe lower bolts (Refer to 11 - EXHAUST SYSTEM/CROSSOVER PIPE - REMOVAL).

CYLINDER HEAD(S) (Continued)

(23) Remove right exhaust manifold (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - REMOVAL).

(24) Lower vehicle.

(25) Remove the upper accessory drive belt idler pulley (Fig. 18).

(26) Remove the belt tensioner (Fig. 18).

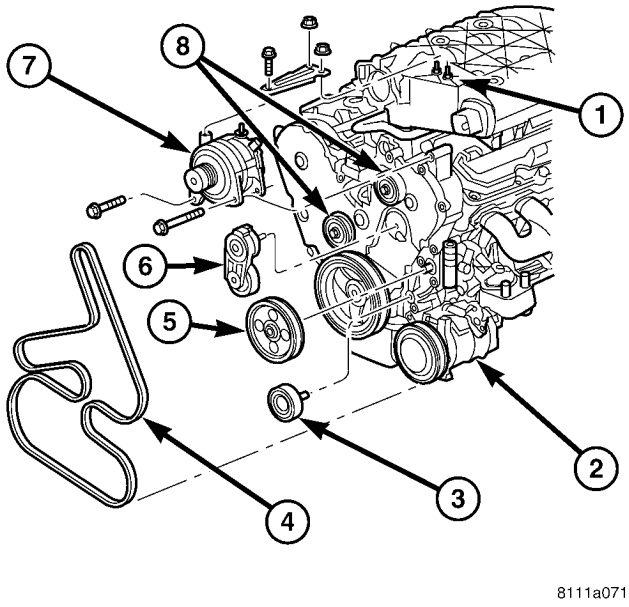


Fig. 18 ACCESSORY DRIVE BELT AND PULLEYS

1 - UPPER INTAKE MANIFOLD
2 - AIR CONDITIONING COMPRESSOR
3 - IDLER PULLEY
4 - ACCESSORY DRIVE BELT
5 - POWER STEERING PULLEY
6 - ACCESSORY DRIVE BELT TENSIONER
7 - GENERATOR
8 - IDLER PULLEYS

(27) Support the engine with a block of wood and the floor jack.

(28) Remove the upper engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/FRONT MOUNT - REMOVAL).

(29) Remove the power steering reservoir bolts and set reservoir aside.

(30) Remove the remaining outer timing belt cover bolts and cover.

(31) Rotate the engine to TDC and align timing belt marks.

(32) Remove the timing belt tensioner and reset the tensioner (Refer to 9 - ENGINE/VALVE TIMING/TMNG BELT/CHAIN TENSIONER&PULLEY - REMOVAL). (Fig. 17).

(33) Remove the timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(34) Remove the right valve cover to cylinder head ground strap (Fig. 20).

(35) Remove the EGR valve and tube assembly (Fig. 20).

(36) Remove the right cylinder head cover (Fig. 20).

(37) Remove the right rocker arm assembly (Fig. 21).

(38) Remove the right rear camshaft thrust plate.

(39) Counterhold the cam gear and remove the right cam gear retaining bolt.

CYLINDER HEAD(S) (Continued)

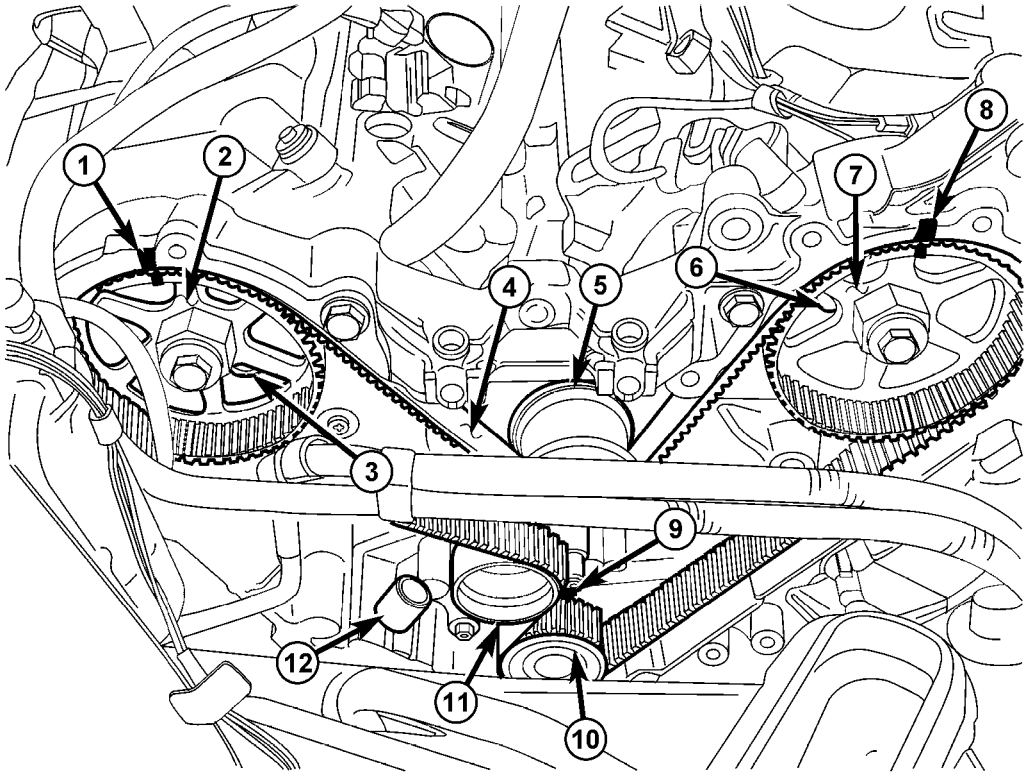


Fig. 19 TIMING GEAR MARKS

1 - RIGHT CAMSHAFT GEAR ALIGNMENT MARK
2 - RIGHT CAMSHAFT GEAR
3 - CYLINDER HEAD TO INNER TIMING BELT COVER BOLTS - RIGHT
4 - TIMING BELT
5 - WATER PUMP PULLEY
6 - CYLINDER HEAD TO INNER TIMING BELT COVER BOLTS - LEFT
7 - LEFT CAMSHAFT GEAR
8 - LEFT CAMSHAFT GEAR ALIGNMENT MARK
9 - CRANKSHAFT GEAR ALIGNMENT MARK
10 - CRANKSHAFT GEAR
11 - TIMING BELT TENSIONER PULLEY
12 - TIMING BELT TENSIONER

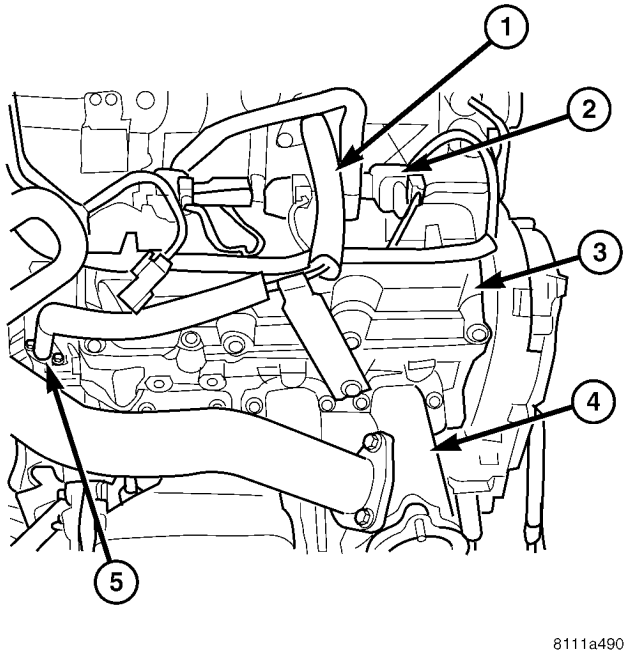


Fig. 20 EGR VALVE AND TUBE

1 - EGR TUBE
2 - IGNITION COIL
3 - CYLINDER HEAD COVER
4 - RIGHT EXHAUST MANIFOLD
5 - EGR VALVE

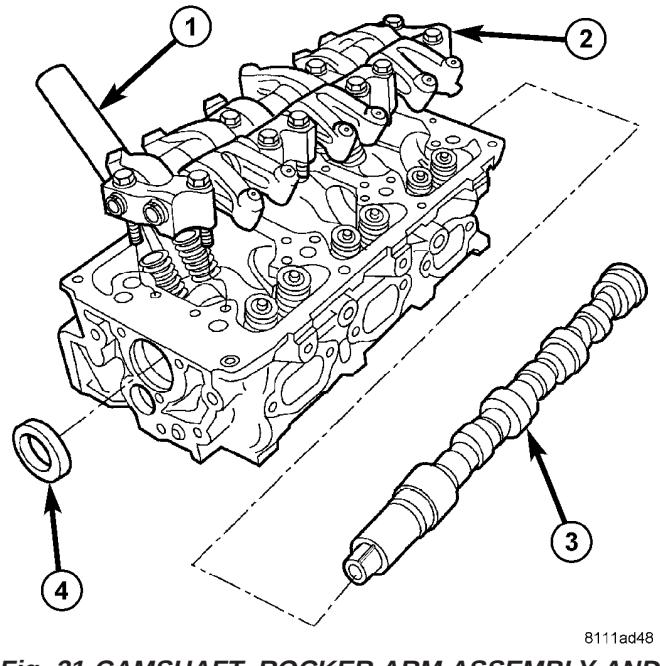


Fig. 21 CAMSHAFT, ROCKER ARM ASSEMBLY AND CYLINDER HEAD

1 - SPARK PLUG TUBE
2 - ROCKER ARM ASSEMBLY
3 - CAMSHAFT
4 - CAMSHAFT SEAL

CYLINDER HEAD(S) (Continued)

(40) Push the camshaft out of the back of the cylinder head approximately 3.5 inches and remove the cam gear (Fig. 22).

(41) Remove the inner timing cover to cylinder head retaining bolts.

(42) Remove the cylinder head bolts in REVERSE of tightening sequence (Fig. 22).

NOTE: Because of clearance restrictions when removing the right cylinder head, the front four cylinder head bolts must be loosened, raised and supported with a rubber band before the cylinder head can be removed.

(43) Remove the cylinder head (Fig. 22).

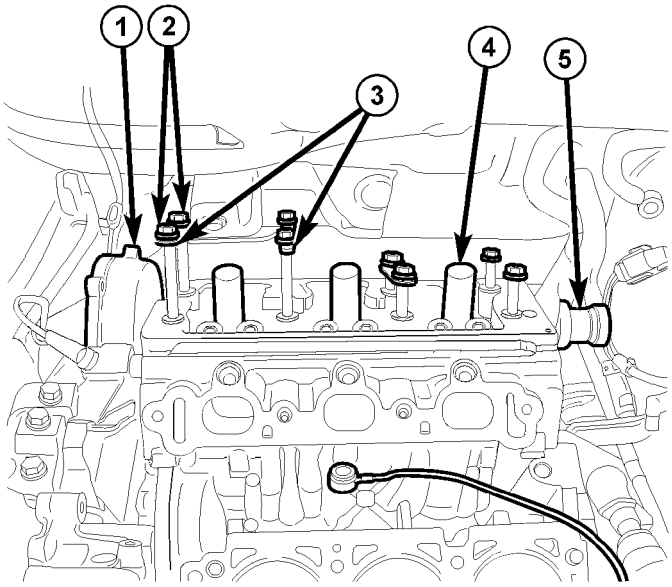


Fig. 22 RIGHT CYLINDER HEAD

1 - INNER TIMING BELT COVER
2 - CYLINDER HEAD BOLTS
3 - RUBBER BANDS
4 - SPARK PLUG TUBE
5 - CAMSHAFT

(44) Clean and inspect all mating surfaces.

LEFT CYLINDER HEAD

(1) Perform the fuel relief procedure.

(2) Disconnect the negative battery cable.

(3) Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(4) Remove engine cover.

(5) Remove air cleaner element housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

(6) Remove radiator close out panel.

(7) Remove radiator core support.

(8) Remove radiator fan assembly (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).

(9) Disconnect the fuel line at the fuel rail.

(10) Remove the lower intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(11) Remove the left exhaust manifold (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - REMOVAL).

(12) Remove the outer timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

(13) Rotate the engine to TDC and align the timing marks (Fig. 19).

(14) Remove the timing belt tensioner, timing belt, then reset tensioner (Fig. 19).

(15) Remove the left cylinder head cover to cylinder head ground strap.

(16) Remove the left cylinder head cover.

(17) Remove the left rocker arm assembly.

(18) Remove the left camshaft thrust plate.

(19) Counterhold the left cam gear and remove the cam gear retaining bolt (Fig. 19).

(20) Push the camshaft out of the back of the cylinder head approximately 3.5 inches and remove the cam gear.

(21) Remove the front timing belt housing to cylinder head bolts (Fig. 19).

(22) Remove the cylinder head bolts in REVERSE of tightening sequence.

(23) Remove the cylinder head.

(24) Clean and inspect all mating surfaces.

CLEANING

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Remove all gasket material from cylinder head and block (Refer to 9 - ENGINE - STANDARD PROCEDURE). Be careful not to gouge or scratch the aluminum head sealing surface.

Clean all engine oil passages.

INSPECTION

(1) Before cleaning, check for leaks, damage and cracks.

(2) Clean cylinder head and oil passages.

(3) Check cylinder head for flatness (Fig. 23).

(4) Cylinder head must be flat within:

- Standard dimension = less than 0.05 mm (0.002 inch.)
- Service Limit = 0.2 mm (0.008 inch.)

CYLINDER HEAD(S) (Continued)

- Grinding Limit = Maximum of 0.2 mm (0.008 inch.) is permitted.

CAUTION: 0.20 mm (0.008 in.) MAX is a combined total dimension of the stock removal limit from cylinder head and block top surface (Deck) together.

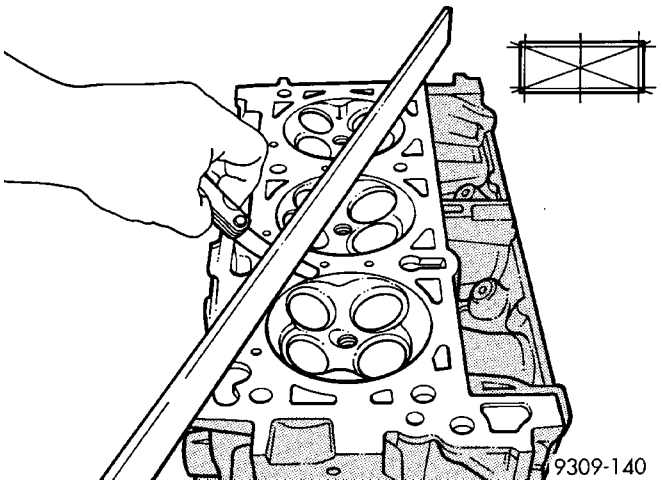


Fig. 23 Checking Cylinder Head Flatness

INSTALLATION - CYLINDER HEAD(S)

RIGHT CYLINDER HEAD

CAUTION: THE CYLINDER HEAD GASKETS ARE NOT INTERCHANGEABLE BETWEEN CYLINDER HEADS AND ARE CLEARLY MARKED RIGHT OR LEFT.

The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined BEFORE reuse. If the threads are necked down the bolts must be replaced (Fig. 24)..

Necking can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt must be replaced (Fig. 24).

CAUTION: When cleaning cylinder head and cylinder block surfaces, DO NOT use a metal scraper because the surfaces could be cut or ground. Use ONLY a wooden or plastic scraper (Refer to 9 - ENGINE - STANDARD PROCEDURE - ENGINE GASKET SURFACE PREPARATION).

(1) Clean sealing surfaces of cylinder head and block.

CAUTION: Ensure that the correct head gaskets are used and are oriented correctly on cylinder block.

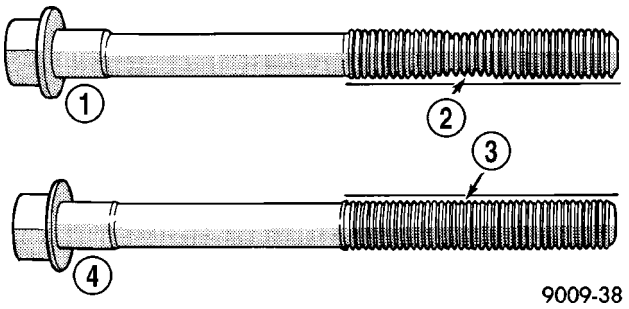


Fig. 24 Check for Stretched Bolts

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

(2) Install head gasket over locating dowels. Ensure the gasket is installed on the correct side of engine.

NOTE: Before installing the cylinder head bolts, lubricate the threads with engine oil.

(3) Insert the front four cylinder head bolts into the cylinder head. Pull the bolts up to the top of their travel and retain with rubber bands.

(4) Install the cylinder head over locating dowels and finger tighten the head bolts.

(5) Tighten the cylinder head bolts in the sequence shown in (Fig. 25). Using the 4 step torque-turn method, tighten according to the following torque values:

- Step 1: All to 61 N·m (45 ft. lbs.)
- Step 2: All to 88 N·m (65 ft. lbs.)
- Step 3: All (again) to 88 N·m (65 ft. lbs.)
- Step 4: + 90° Turn **Do not use a torque wrench for this step.**

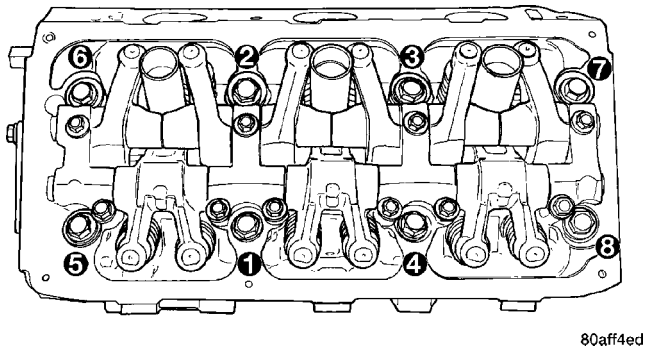


Fig. 25 Cylinder Head Bolt Tightening Sequence

(6) Bolt torque after 90° turn should be over 122 N·m (90 ft. lbs.) in the tightening direction. If not, replace the bolt.

(7) Install the inner timing cover to cylinder head bolts. Tighten bolts to 54 N·m (40 lbs.ft.).

CYLINDER HEAD(S) (Continued)

(8) Install camshaft sprocket. Counterhold the camshaft sprocket gear and tighten the camshaft sprocket bolt to 102 N·m plus a 1/4 turn (75 lbs. ft. plus a 1/4 turn). (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(9) Install the rear camshaft thrust plate.

(10) Rotate the camshaft gear to it's alignment mark and check the left camshaft gear and crankshaft gear timing alignment marks.

(11) Install the timing belt and tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(12) Install the timing belt outer cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(13) Install the power steering reservoir.

(14) Install the vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(15) Install the upper engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/FRONT MOUNT - INSTALLATION).

(16) Install the accessory drive belt tensioner.

(17) Install the accessory drive belt idler pulley.

(18) Install the right exhaust manifold (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - INSTALLATION).

(19) Install the exhaust cross over pipe (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - INSTALLATION).

(20) Install the catalytic converter and exhaust system.

(21) Connect both oxygen sensors.

(22) Lower the vehicle.

(23) Install the right rocker arm assembly.

(24) Install the right cylinder head cover and ground strap.

(25) Install lower intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(26) Install the fuel rail.

(27) Install the upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(28) Install the air cleaner element housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION)..

(29) Install the engine cover.

(30) Fill the coolant system.

(31) Connect the negative battery cable.

LEFT CYLINDER HEAD

CAUTION: THE CYLINDER HEAD GASKETS ARE NOT INTERCHANGEABLE BETWEEN CYLINDER HEADS AND ARE CLEARLY MARKED RIGHT OR LEFT.

The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined BEFORE reuse. If the threads are necked down the bolts must be replaced (Fig. 24)..

Necking can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt must be replaced (Fig. 26).

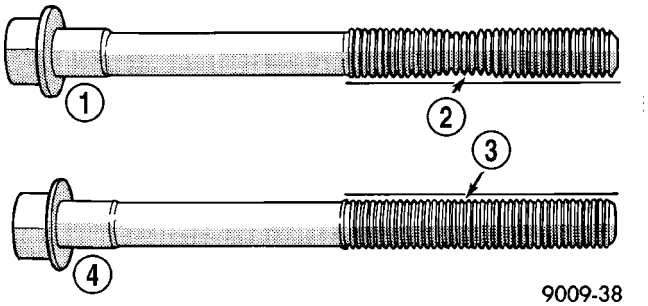


Fig. 26 Check for Stretched Bolts

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

CAUTION: When cleaning cylinder head and cylinder block surfaces, DO NOT use a metal scraper because the surfaces could be cut or ground. Use ONLY a wooden or plastic scraper (Refer to 9 - ENGINE - STANDARD PROCEDURE - ENGINE GASKET SURFACE PREPARATION).

(1) Clean sealing surfaces of cylinder head and block.

CAUTION: Ensure that the correct head gaskets are used and are oriented correctly on cylinder block.

(2) Install head gasket over locating dowels. Ensure the gasket is installed on the correct side of engine.

NOTE: Before installing the cylinder head bolts, lubricate the threads with engine oil.

(3) Install the cylinder head over locating dowels, insert and finger tighten the head bolts.

(4) Tighten the cylinder head bolts in the sequence shown in (Fig. 27). Using the 4 step torque-turn method, tighten according to the following torque values:

- Step 1: All to 61 N·m (45 ft. lbs.)
- Step 2: All to 88 N·m (65 ft. lbs.)
- Step 3: All (again) to 88 N·m (65 ft. lbs.)

CYLINDER HEAD(S) (Continued)

• Step 4: + 90° Turn **Do not use a torque wrench for this step.**

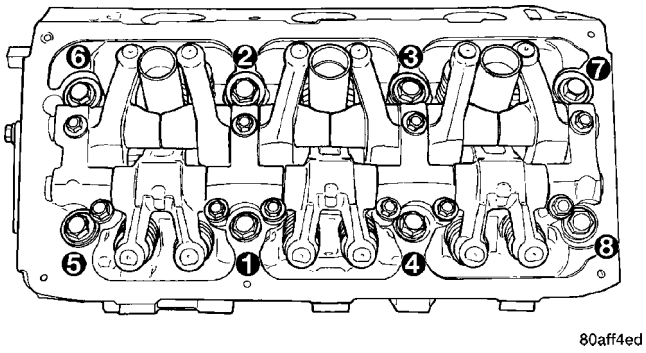


Fig. 27 Cylinder Head Bolt Tightening Sequence

(5) Bolt torque after 90° turn should be over 122 N·m (90 ft. lbs.) in the tightening direction. If not, replace the bolt.

(6) Install the inner timing cover to cylinder head bolts. Tighten bolts to 54 N·m (40 lbs.ft.).

(7) Install camshaft sprocket. Counterhold the camshaft sprocket gear and tighten the camshaft sprocket bolt to 115 N·m plus a 1/4 turn (85 lbs. ft. plus a 1/4 turn). (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(8) Install the rear camshaft thrust plate.

(9) Rotate the camshaft gear to it's alignment mark and check the right camshaft gear and crankshaft gear timing alignment marks.

(10) Install the timing belt and tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(11) Install the timing belt front cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(12) Install the vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(13) Install the upper engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/FRONT MOUNT - INSTALLATION).

(14) Install the accessory drive belt tensioner.

(15) Install the accessory drive belt idler pulley.

(16) Install the left exhaust manifold (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - INSTALLATION).

(17) Install the exhaust cross over pipe (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - INSTALLATION).

(18) Install the left rocker arm assembly.

(19) Install the left cylinder head cover and ground strap.

(20) Install lower intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(21) Install the fuel rail.

(22) Install the upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(23) Install the radiator cooling fan assembly (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).

(24) Install the radiator core support.

(25) Install the radiator close out panel.

(26) Install the air cleaner element housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).

(27) Install the engine cover.

(28) Fill the coolant system.

(29) Connect the negative battery cable.

SEAL -CAMSHAFT OIL

REMOVAL

RIGHT CYLINDER HEAD

(1) Disconnect the negative battery cable.

(2) Remove front timing cover and align the camshaft gear and crankshaft gear timing marks to TDC (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

(3) Remove timing belt and right camshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(4) Remove the camshaft thrust plate from the rear of the cylinder head.

(5) Remove the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(6) Remove the rocker arm assembly (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL).

(7) Maneuver the camshaft rearward and out of the cylinder head approximately 3.5 inches (Fig. 28).

NOTE: Care must be taken not to damage the cylinder head to seal or camshaft journal surfaces when removing the camshaft seal.

(8) Using an appropriate driver carefully remove camshaft oil seal (Fig. 28).

LEFT CYLINDER HEAD

(1) Disconnect the negative battery cable.

(2) Drain cooling system.

(3) Remove front timing cover and align the camshaft gear and crankshaft gear timing marks to TDC (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

SEAL -CAMSHAFT OIL (Continued)

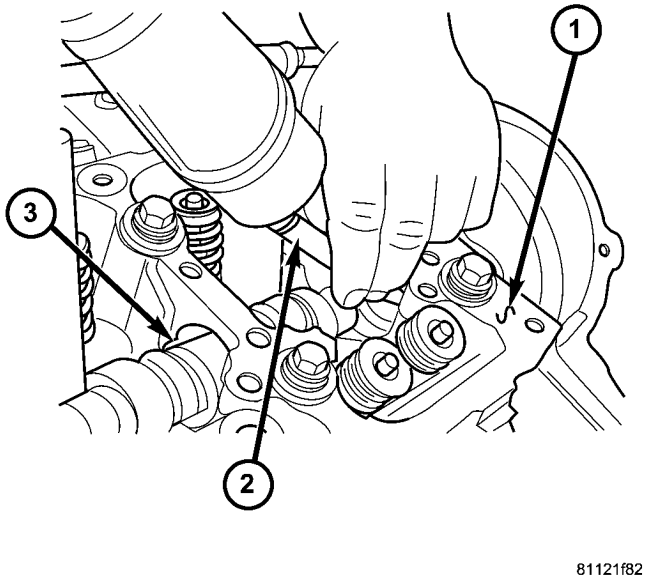


Fig. 28 CAMSHAFT SEAL REMOVAL - RIGHT CYLINDER HEAD

1 - CYLINDER HEAD
2 - DRIFT
3 - CAMSHAFT

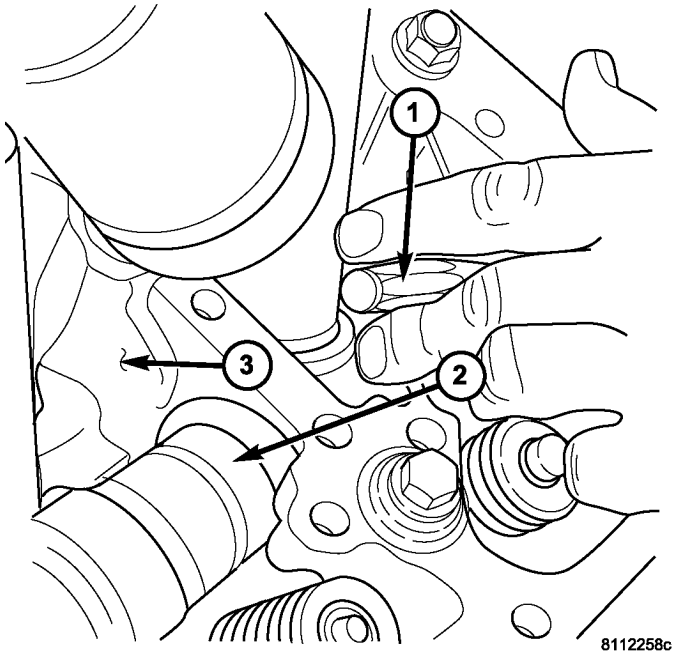


Fig. 29 CAMSHAFT SEAL REMOVAL - LEFT CYLINDER HEAD

1 - DRIFT
2 - CAMSHAFT
3 - CYLINDER HEAD

(4) Remove the rear timing cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

(5) Remove the cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(6) Remove the rocker arm assembly (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL).

(7) Remove the camshaft thrust plate from the rear of the cylinder head.

(8) Maneuver the camshaft rearward and out of the cylinder head approximately 3.5 inches (Fig. 29)

NOTE: Care must be taken not to damage the cylinder head to seal or camshaft journal surfaces when removing the camshaft seal.

(9) Using an appropriate driver carefully remove camshaft oil seal (Fig. 29).

INSTALLATION

RIGHT CYLINDER HEAD

(1) Position the camshaft seal into the cylinder head (Fig. 30).

(2) Using special tool MD-998306 tap the seal into place (Fig. 30).

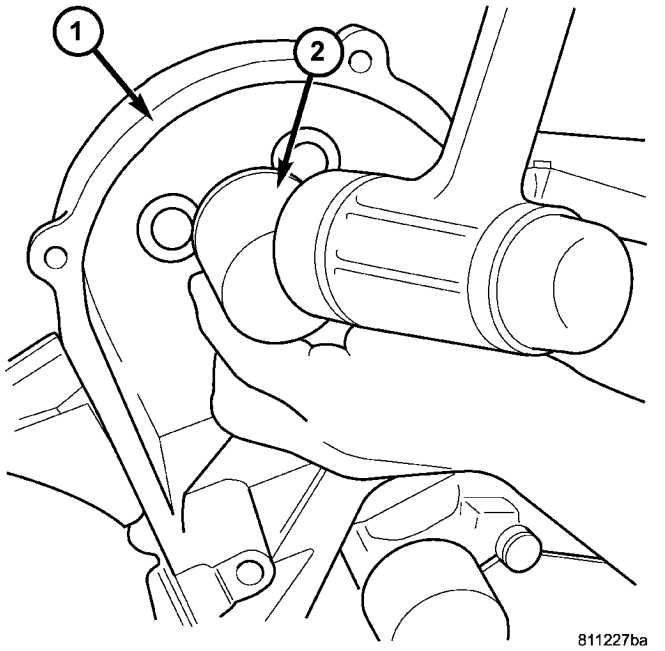


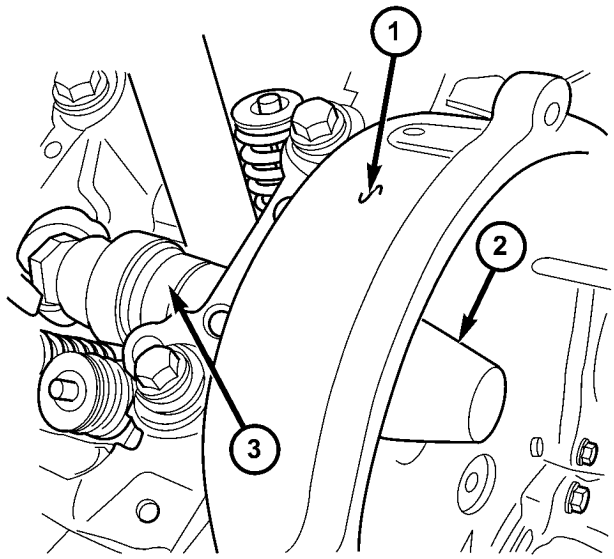
Fig. 30 CAMSHAFT SEAL INSTALLATION

1 - REAR TIMING COVER
2 - SPECIAL TOOL 6788

(3) Apply light coat of clean engine oil to the camshaft oil seal lip and Special Tool 6788 Seal Protector Sleeve.

SEAL -CAMSHAFT OIL (Continued)

(4) Install oil seal Special Tool 6788 Seal Protector Sleeve onto the camshaft (Fig. 31).



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Fig. 31 CAMSHAFT INSTALLATION

1 - REAR TIMING COVER
2 - SPECIAL TOOL 6788
3 - CAMSHAFT

(5) Slide the camshaft forward, inserting the seal protector through the camshaft seal until the camshaft seats (Fig. 31).

(6) Remove Special Tool 6788 from the camshaft.

(7) Install the camshaft thrust plate to the rear of the cylinder head.

(8) Install camshaft sprocket and timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

LEFT CYLINDER HEAD

(1) Position the camshaft seal into the cylinder head

(2) Using special tool MD-998306 tap the seal into place (Fig. 32).

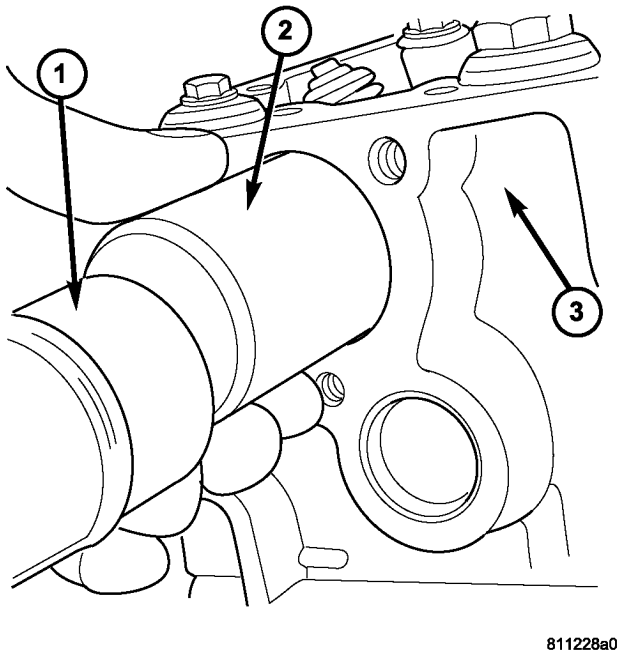
(3) Apply light coat of engine oil to the camshaft oil seal lip and Special Tool 6788 Seal Protector Sleeve.

(4) Install oil seal Special Tool 6788 Seal Protector Sleeve onto the camshaft (Fig. 33)

(5) Slide the camshaft forward, inserting the seal protector through the camshaft seal until the camshaft seats (Fig. 33).

(6) Remove Special Tool 6788 from the camshaft.

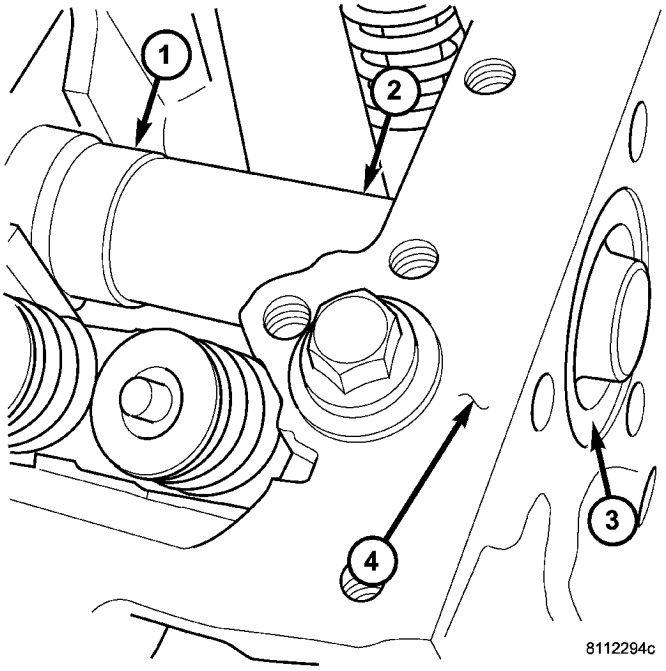
(7) Install the camshaft thrust plate to the rear of the cylinder head.



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Fig. 32 CAMSHAFT SEAL

1 - MALLET
2 - SPECIAL TOOL MD-998306
3 - CYLINDER HEAD



8112294c

Fig. 33 CAMSHAFT INSTALLATION - LEFT

1 - CAMSHAFT
2 - SPECIAL TOOL6788
3 - CAMSHAFT SEAL
4 - CYLINDER HEAD

(8) Install rear timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

SEAL -CAMSHAFT OIL (Continued)

(9) Install the camshaft gear and align the timing marks.

(10) Install the timing belt (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(11) Install the rocker arm assembly.

(12) Install the cylinder head cover.

(13) Install the front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(14) Install the vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(15) Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(16) Connect the negative battery cable.

CAMSHAFT(S)

DESCRIPTION

A single overhead camshaft per cylinder head provides valve actuation. The left camshaft accommodates a cam sensor pick-up wheel and is therefore longer. Each camshaft is supported by four bearing journals. A thrust plate attached to the rear of each cylinder head controls camshaft end play. Right and left camshaft driving sprockets support a timing mark, are keyed, and not interchangeable because of the cam sensor pick-up wheel on the left sprocket. Camshaft bearing lubrication is provided via a oil supply passage through each rocker shaft pedestal dowel.

OPERATION

The camshaft is driven by the crankshaft via drive sprockets and belt. The camshaft has precisely machined lobes to provide accurate valve timing and duration.

REMOVAL

NOTE: Camshafts are removed from the rear of each cylinder head.

(1) Remove the cylinder head (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).

CAUTION: Care must be taken not to nick or scratch the journals when removing the camshaft.

(2) Carefully remove the camshaft from the rear of the cylinder head (Fig. 34).

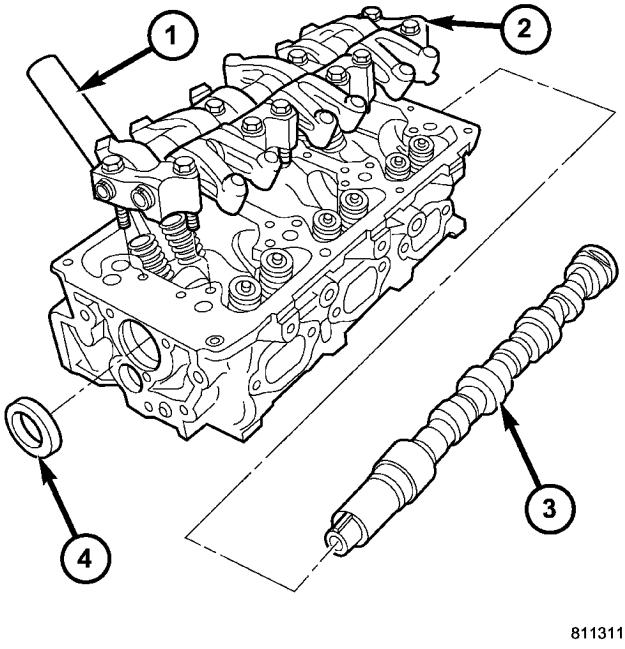


Fig. 34 CYLINDER HEAD, CAMSHAFT AND ROCKER ARM

1 - SPARK PLUG TUBE
2 - ROCKER ARM ASSEMBLY
3 - CAMSHAFT
4 - SEAL

INSPECTION

(1) Inspect camshaft bearing journals for damage and binding. If journals are binding, check the cylinder head for damage. Also check cylinder head oil holes for clogging.

(2) Check the cam lobe and bearing surfaces for abnormal wear and damage. Replace camshaft if defective.

NOTE: If camshaft is replaced due to lobe wear or damage, always replace the rocker arms.

CAMSHAFT(S) (Continued)

(3) Measure the lobe actual wear (Fig. 35) and replace camshaft if out of limit. Standard value is 0.0254 mm (0.001 in.), wear **limit** is 0.254 mm (0.010 in.).

INSTALLATION

NOTE: Care must be taken not to scrape or nick the camshaft journals when installing the camshaft into position.

(1) Lubricate camshaft bearing journals, camshaft lobes and camshaft seal with clean engine oil and install camshaft into cylinder head (Fig. 34).

(2) Install the cylinder head (Refer to 9 - ENGINE/ CYLINDER HEAD - INSTALLATION).

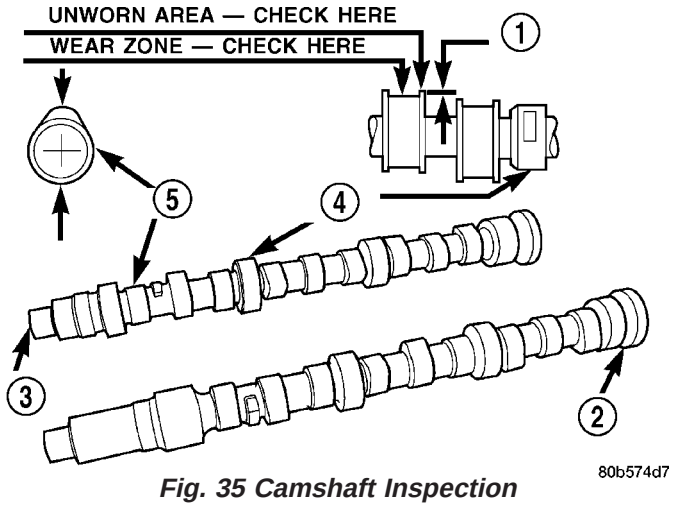


Fig. 35 Camshaft Inspection

1 - ACTUAL WEAR
2 - LEFT CAMSHAFT
3 - RIGHT CAMSHAFT
4 - BEARING JOURNAL
5 - LOBE

CYLINDER HEAD COVER - LEFT

REMOVAL

WARNING: DO NOT START OR RUN ENGINE WITH CYLINDER HEAD COVER REMOVED FROM THE ENGINE. DAMAGE OR PERSONAL INJURY MAY OCCUR.

(1) Disconnect and isolate the negative battery cable.

(2) Remove the upper intake manifold from the engine (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(3) Cover lower intake manifold with a suitable cover during service.

(4) Disconnect and remove the three ignition coils (Fig. 36).

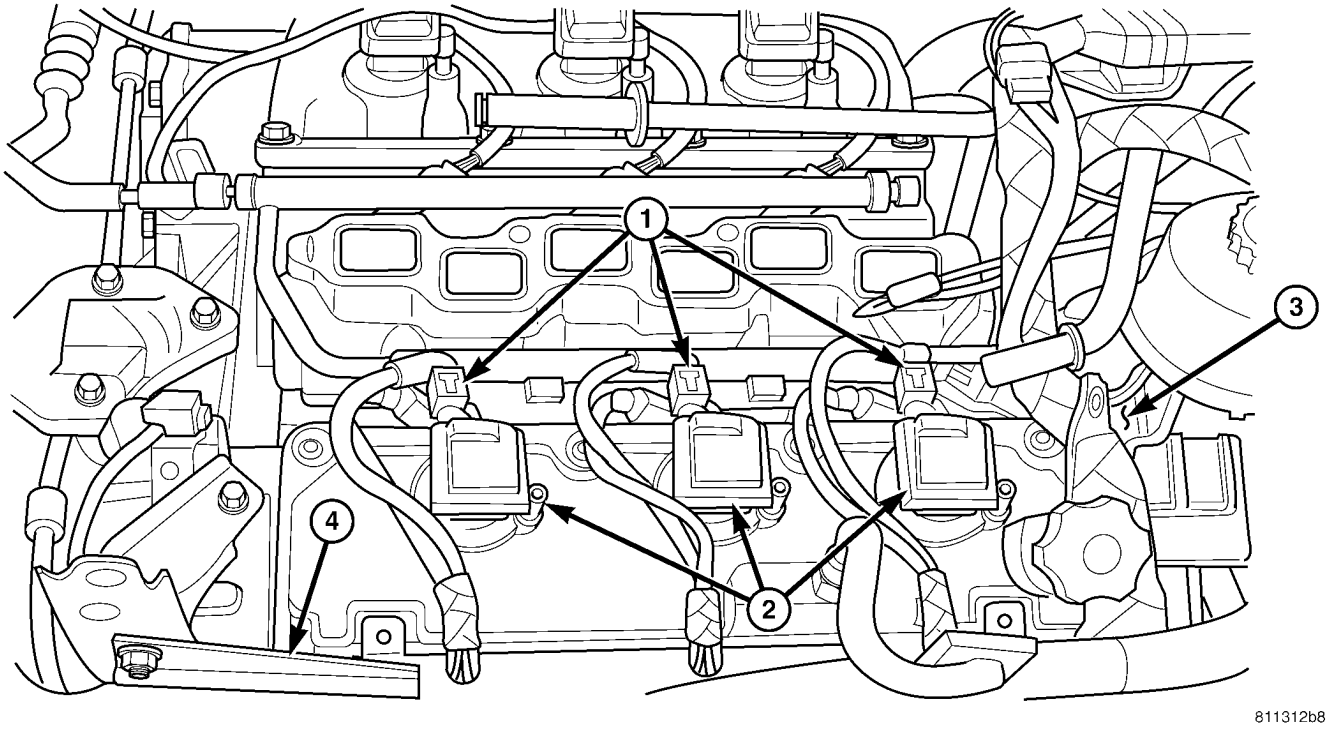


Fig. 36 IGNITION COILS

1 - ELECTRICAL CONNECTORS
2 - IGNITION COILS
3 - CYLINDER HEAD COVER
4 - BRACKET

CYLINDER HEAD COVER - LEFT (Continued)

(5) Remove the upper intake manifold support brackets from the front and rear of the engine.

(6) Lift up on the wire harness track retaining tabs (Fig. 37).

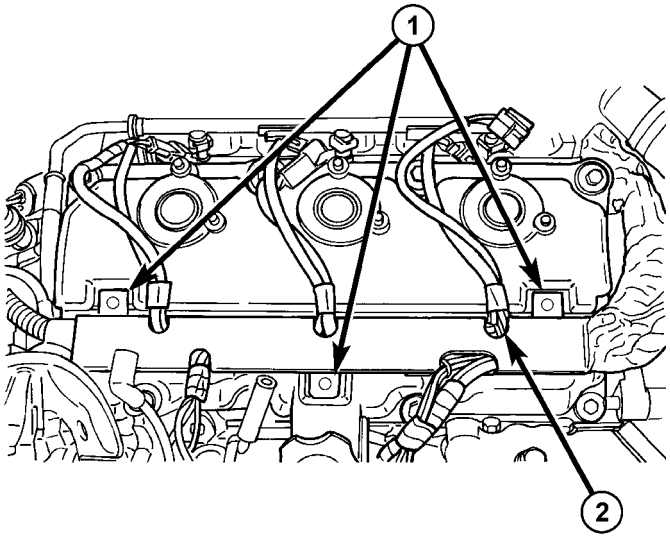


Fig. 37 WIRING HARNESS RETAINING TABS

1 - PUSH TABS
2 - WIRING HARNESS

(7) Remove the ground strap/resistor retaining bolt from the cylinder head cover.

(8) Completely loosen the cylinder head cover retaining bolts and remove the cylinder head cover (Fig. 38).

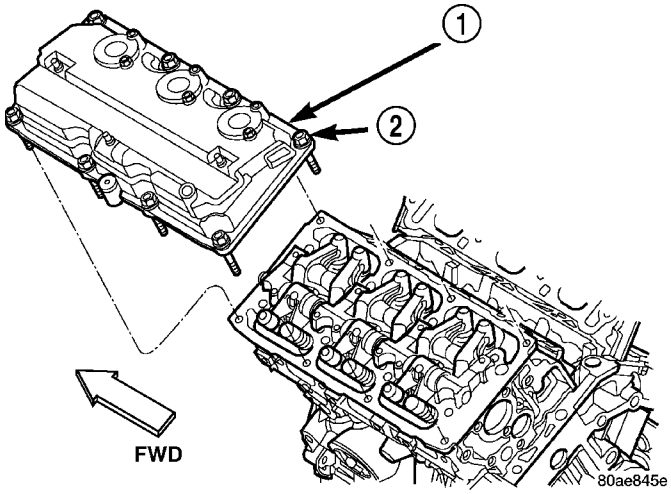


Fig. 38 Cylinder Head Covers

1 - CYLINDER HEAD COVER-LEFT SIDE
2 - BOLTS (8)

(9) Remove the PCV valve from the valve cover assembly (if required).

INSTALLATION

(1) Clean cylinder head and cover mating surfaces. Inspect and replace gasket and seals as necessary (Fig. 39).

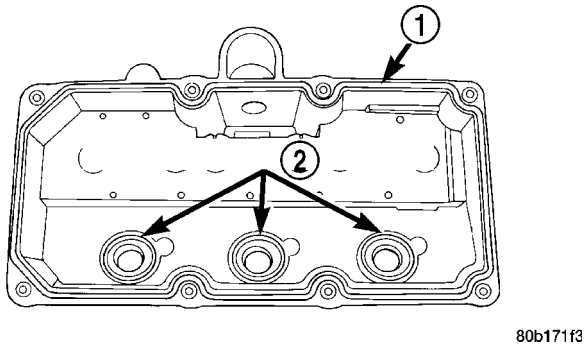


Fig. 39 Cylinder Head Cover Gasket and Spark Plug Tube Seals

1 - CYLINDER HEAD COVER GASKET
2 - SPARK PLUG TUBE SEALS

(2) To replace spark plug tube seals:

(a) Using a suitable pry tool, carefully remove tube seals.

(b) Position new seal with the part number on seal facing cylinder head cover.

(c) Install seals using Special Tool MD-998306 (Fig. 40).

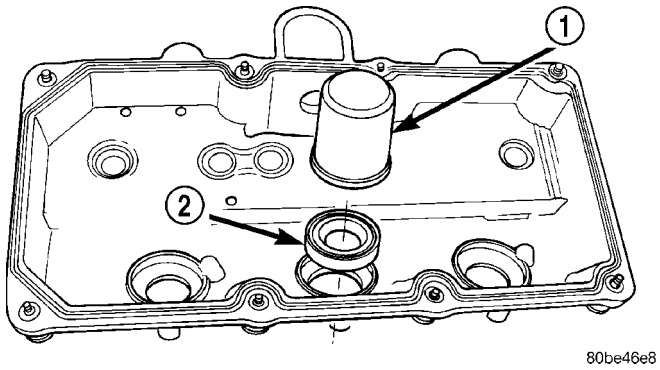


Fig. 40 Spark Plug Tube Seal Installation

1 - SPECIAL TOOL MD-998306
2 - SPARK PLUG TUBE SEAL

(3) Install PCV valve (if required)

(4) Install cylinder head cover and bolts. Tighten to 12 N·m (105 in. lbs.).

(5) Position the wiring harness on the cylinder head cover.

(6) Reclip the wire harness track retaining tabs into the cover (Fig. 37).

(7) Install the ground strap/resistor retaining bolt onto the cylinder head cover.

CYLINDER HEAD COVER - LEFT (Continued)

(8) Install the upper intake manifold support brackets onto the front and rear of the engine.

(9) Install the ignition coils. Tighten mounting screws to 6.7 N.m (60 in. lbs.) (Fig. 36).

(10) Connect the ignition coil electrical connectors.

(11) Install upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(12) Connect negative battery cable.

COVER CYLINDER HEAD - RIGHT

REMOVAL

WARNING: DO NOT START OR RUN ENGINE WITH CYLINDER HEAD COVER REMOVED FROM THE ENGINE. DAMAGE OR PERSONAL INJURY MAY OCCUR.

(1) Disconnect the negative battery cable.

(2) Remove the upper intake manifold from the engine (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(3) Cover lower intake manifold with a suitable cover during service.

(4) Disconnect and remove the three ignition coils (Fig. 41).

(5) Lift up on the wire harness track retaining tabs.

(6) Remove the ground strap retaining bolt from the cylinder head cover.

(7) Completely loosen the cylinder head cover retaining bolts and remove the cylinder head cover.

INSTALLATION

(1) Clean cylinder head and cover mating surfaces. Inspect and replace gasket and seals as necessary (Fig. 42).

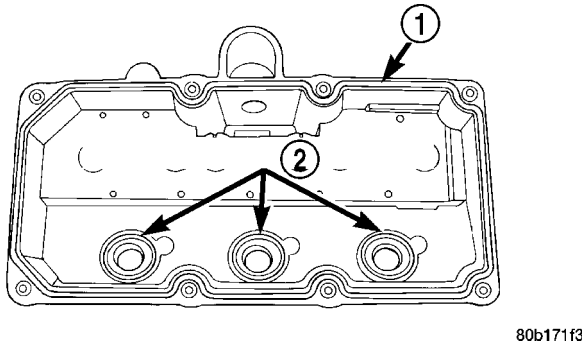


Fig. 42 Cylinder Head Cover Gasket and Spark Plug Tube Seals

1 - CYLINDER HEAD COVER GASKET
2 - SPARK PLUG TUBE SEALS

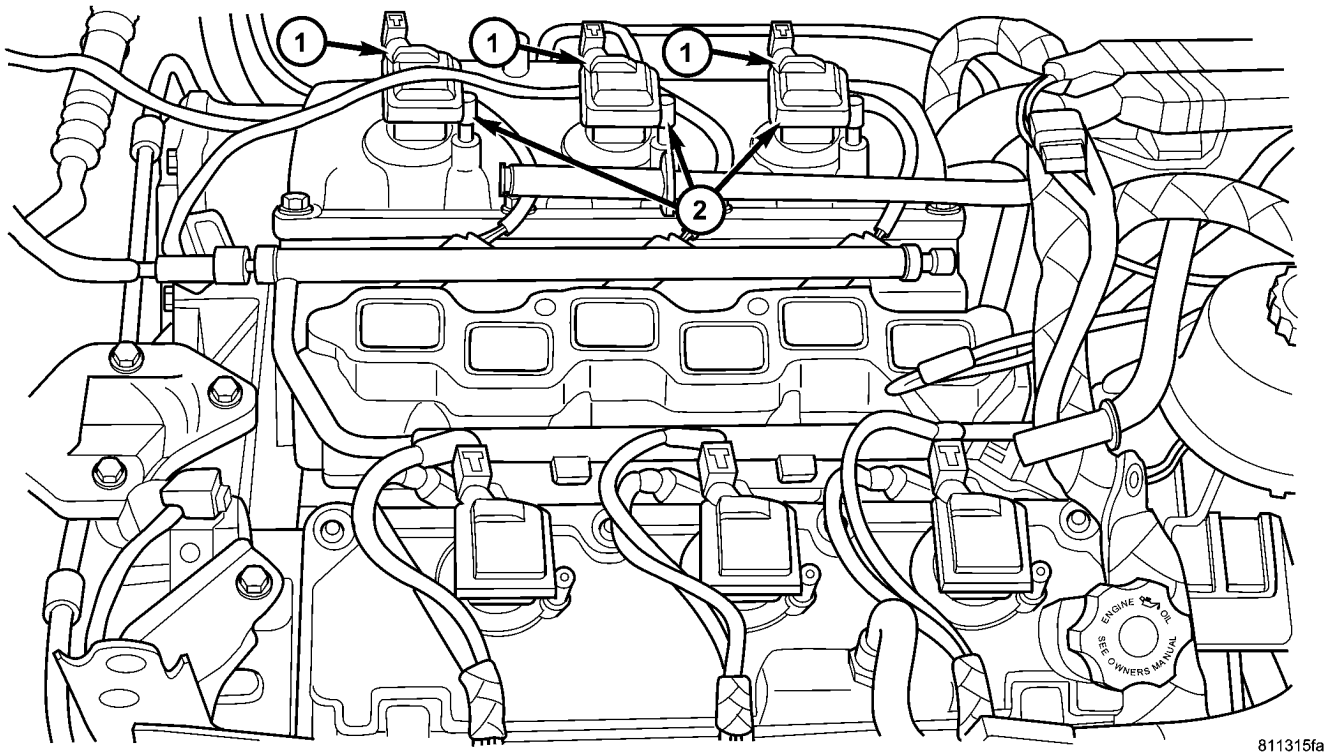


Fig. 41 IGNITION COIL-RH

1 - ELECTRICAL CONNECTORS
2 - IGNITION COILS

COVER CYLINDER HEAD - RIGHT (Continued)

(2) To replace spark plug tube seals:

(a) Using a suitable pry tool, carefully remove tube seals.

(b) Position new seal with the part number on seal facing cylinder head cover.

(c) Install seals using Special Tool MD-998306 (Fig. 43).

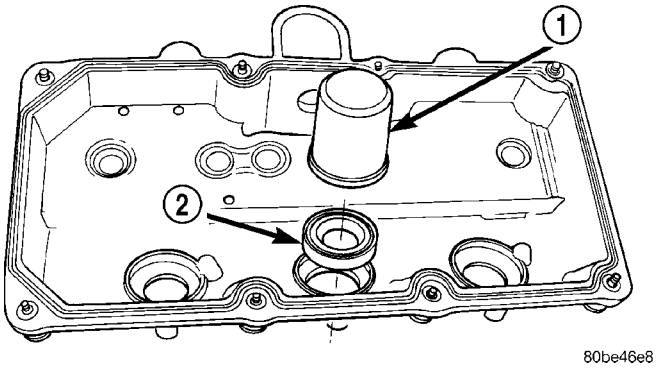


Fig. 43 Spark Plug Tube Seal Installation

1 - SPECIAL TOOL MD-998306
2 - SPARK PLUG TUBE SEAL

(3) Install cylinder head cover bolts and tighten to 12 N·m (105 in. lbs.).

(4) Install the ground strap retaining bolt to the cylinder head cover.

(5) Install the wire harness track retaining nuts (Fig. 41).

(6) Install the ignition coils. Tighten mounting screws to 6.7 N.m (60 in. lbs.) (Fig. 41).

(7) Connect the ignition coil electrical connectors (Fig. 41).

(8) Install upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(9) Connect negative battery cable.

VALVES & SEATS -INTAKE/ EXHAUST

DESCRIPTION

Valves are made of highly heat-resistant steel and are chrome plated to prevent stem scuffing. The intake valve is a one-piece forging, while the exhaust valve has a forged head with a welded stem for lock groove hardenability. The four valves (two intake and two exhaust) employ a three-groove lock design to help facilitate valve rotation.

OPERATION

The intake valve allows the air/fuel mixture to enter the combustion chamber. The exhaust valve allows the burned air/fuel mixture to exit the combustion chamber. Also, the intake and exhaust valves seal the combustion chamber during the compression and power strokes.

STANDARD PROCEDURE - VALVE AND VALVE SEAT REFACING

The valve face and valve seat angles are shown in (Fig. 44).

VALVES

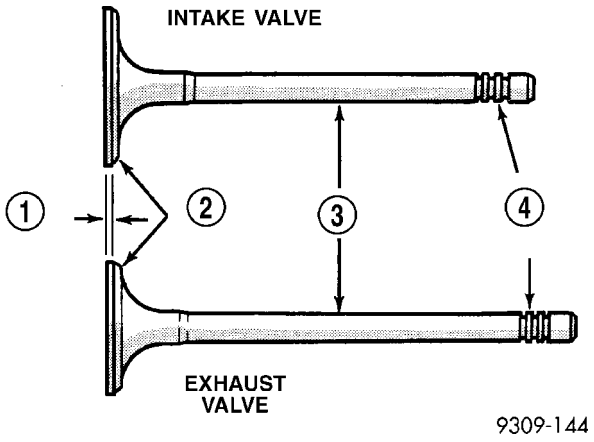


Fig. 44 Intake and Exhaust Valves

1 - MARGIN
2 - FACE
3 - STEM
4 - VALVE SPRING RETAINER LOCK GROOVES

(1) Inspect the remaining margin after the valves are refaced (Refer to 9 - ENGINE - SPECIFICATIONS).

VALVE SEATS

(1) When refacing valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

(2) Measure the concentricity of valve seat using dial indicator. Total runout should not exceed 0.051 mm (0.002 inch.) total indicator reading.

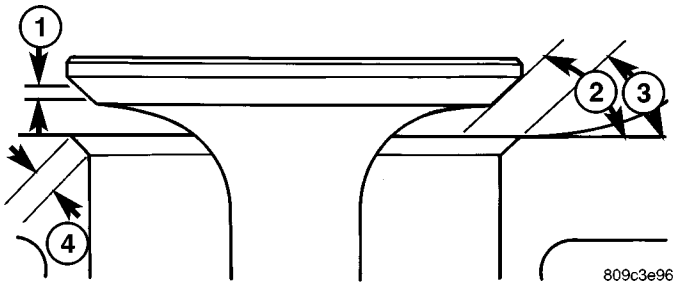


Fig. 45 Valve Face & Seat

1 - SEAT WIDTH
2 - FACE ANGLE
3 - SEAT ANGLE
4 - SEAT CONTACT AREA

VALVES & SEATS -INTAKE/EXHAUST (Continued)

(3) Inspect the valve seat with Prussian blue to determine where the valve contacts the seat. To do this, coat valve seat **LIGHTLY**with Prussian blue then set valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of valve face, contact is satisfactory. If the blue is transferred to top edge of valve face, then lower valve seat with a 15 degree stone. If the blue is transferred to the bottom edge of valve face, then raise valve seat with a 65 degree stone.

NOTE: Valve seats which are worn or burned can be reworked, provided that correct angle and seat width are maintained. Otherwise cylinder head must be replaced.

(4) When seat is properly positioned the width of the intake seats should be 0.75 to 1.25 mm (0.0296 to 0.0493 in.) and exhaust seats should be 1.25 to 1.75 mm (0.049 to 0.069 in.) (Fig. 45).

VALVE AND SPRING INSTALLED HEIGHT

(1) Coat valve stems with clean engine oil and insert them in cylinder head.

(2) If valves or seats have been refaced, check valve tip height (A) (Fig. 46). If valve tip height is greater than 43.65 mm (1.7185 in.) intake or 45.98 mm (1.8102 in.) exhaust, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.

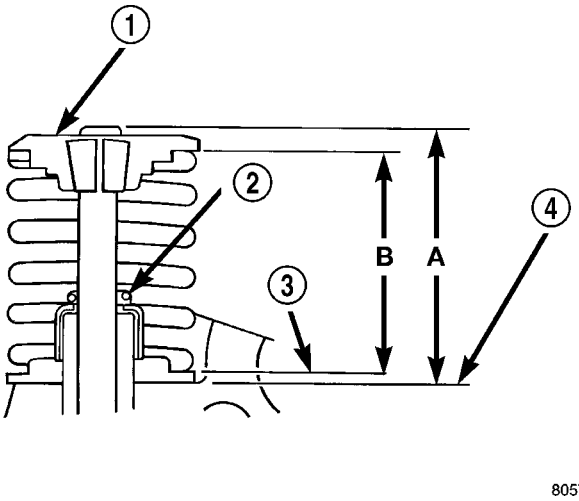


Fig. 46 Checking Valve Tip Height and Valve Spring Installed Height

1 - SPRING RETAINER
2 - GARTER SPRING
3 - VALVE SPRING SEAT TOP
4 - CYLINDER HEAD SURFACE

(3) Install valve seal/spring seat assembly over valve guides on all valve stems (Fig. 48). Ensure that the garter spring is intact around the top of the rubber seal.

(4) Place valve spring (color-coded end facing up) (Fig. 47) and valve retainer into position on spring seat (Fig. 46).

(5) Compress valve springs with valve spring compressor C-3422-D and adapter 6526 (Refer to 9 - ENGINE - SPECIAL TOOLS), install locks and release tool.

(6) If valves and/or seats are refaced, measure the installed height of springs (Fig. 46).. Measurements are taken from top of spring seat to the bottom surface of spring retainer. If height is greater than 38.75 mm (1.5256 in.), install a 0.762 mm (0.030 in.) spacer in head counterbore under the valve spring seat to bring spring height back within specification.

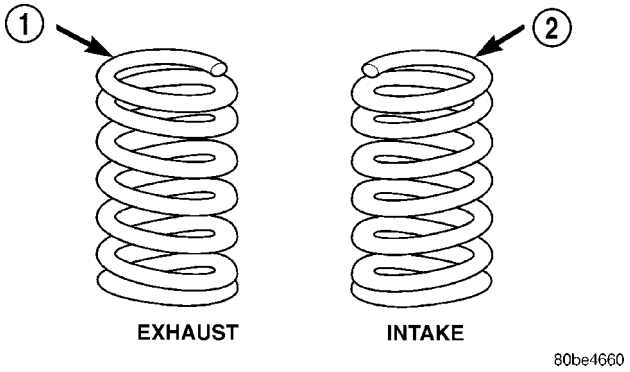


Fig. 47 Valve Spring Identification

1 - YELLOW OR WHITE DYE
2 - ORANGE DYE

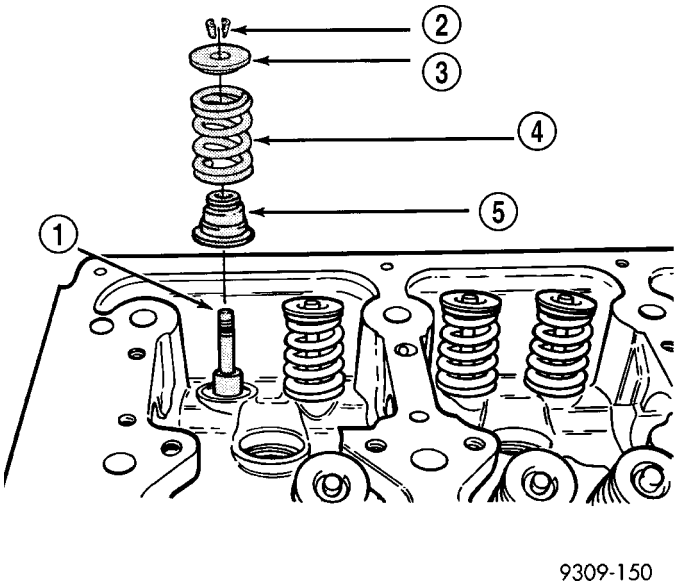


Fig. 48 Valve Seal and Spring—Installation

1 - VALVE
2 - VALVE RETAINING LOCKS
3 - VALVE SPRING RETAINER
4 - VALVE SPRING
5 - VALVE SEAL AND VALVE SPRING SEAT ASSEMBLY

VALVES & SEATS -INTAKE/EXHAUST (Continued)

REMOVAL

(1) Remove cylinder head(s) (Refer to 9 - ENGINE/ CYLINDER HEAD - REMOVAL).

(2) Remove rocker arm assembly (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL).

(3) Remove valve spring(s) (Refer to 9 - ENGINE/ CYLINDER HEAD/VALVE SPRINGS - REMOVAL).

(4) Before removing valve, **remove any burrs from valve stem lock grooves to prevent damage to the valve guides.** Identify valves to insure installation in original location.

(5) Remove valve(s) from cylinder head.

CLEANING

(1) Clean all valves thoroughly and discard burned, warped and cracked valves.

INSPECTION

INSPECTION - VALVES

(1) Measure valve stems for wear (Fig. 49) approximately 60 mm (2.36 in.) below the valve lock grooves.

(2) Compare measurement to specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

NOTE: Valve stems are chrome plated and should not be polished (Fig. 49).

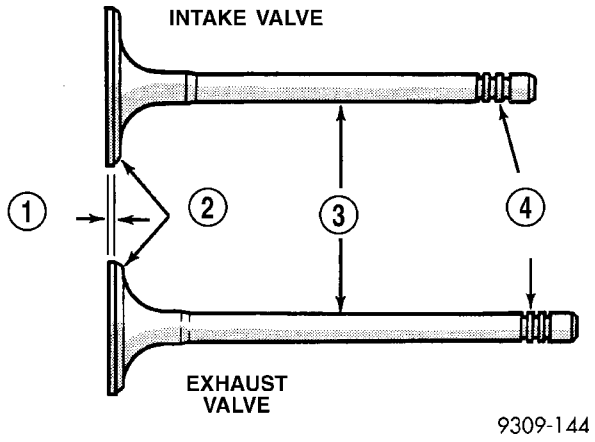


Fig. 49 Intake and Exhaust Valves

1 - MARGIN
2 - FACE
3 - STEM
4 - VALVE SPRING RETAINER LOCK GROOVES

INSPECTION - VALVE GUIDES

(1) Measure valve stem-to-guide clearance as follows:

(2) Install valve into cylinder head so it is 15 mm (0.590 inch.) off the valve seat. A small piece of hose may be used to hold valve in place.

(3) Attach dial indicator Tool C-3339 to cylinder head and set it at right angle of valve stem being measured (Fig. 50).

(4) Move valve to and from the indicator.

(5) Note dial indicator reading and compare to engine specifications. (Refer to 9 - ENGINE - SPECIFICATIONS)

NOTE: Replace cylinder head if stem-to-guide clearance exceeds specifications, or if guide is loose in cylinder head.

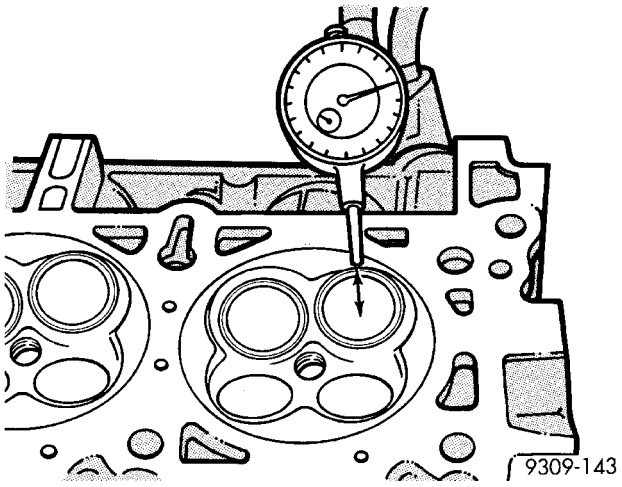


Fig. 50 Measuring Valve Guide Wear

VALVES & SEATS -INTAKE/EXHAUST (Continued)

INSTALLATION

(1) Coat valve stems with clean engine oil and insert them in cylinder head.

(2) If valves or seats have been reground, check valve tip height (A) (Fig. 51). If valve tip height is greater than 43.65 mm (1.7185 in.) intake or 45.98 mm (1.8102 in.) exhaust, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.

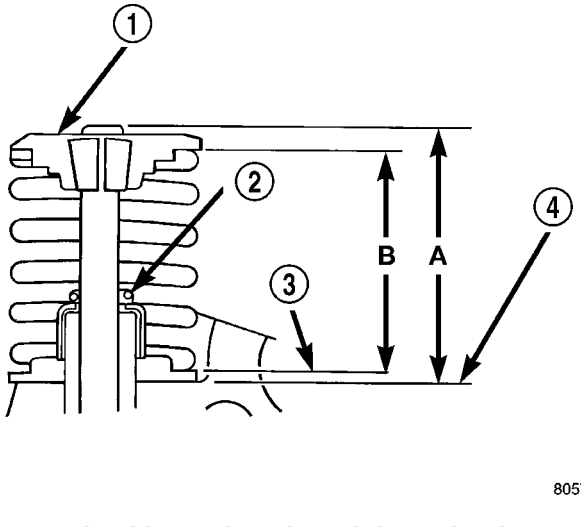


Fig. 51 Checking Valve Tip Height and Valve Spring Installed Height

1 - SPRING RETAINER
2 - GARTER SPRING
3 - VALVE SPRING SEAT TOP
4 - CYLINDER HEAD SURFACE

(3) Install new valve stem seals.

(4) Install valve springs (Refer to 9 - ENGINE/ CYLINDER HEAD/VALVE SPRINGS - INSTALLATION).

(5) Install cylinder head(s) (Refer to 9 - ENGINE/ CYLINDER HEAD - INSTALLATION).

ROCKER ARM SHAFT/ ROCKER ARM / LASH ADJUSTER

DESCRIPTION

DESCRIPTION - ROCKER ARM

Rocker arms are made of light weight permanent mold aluminum alloy with a roller type follower operating against the camshaft (Fig. 52). The valve actuating end of the rocker arms are machined to retain hydraulic lash adjusters, eliminating the need for manual valve lash adjustment.

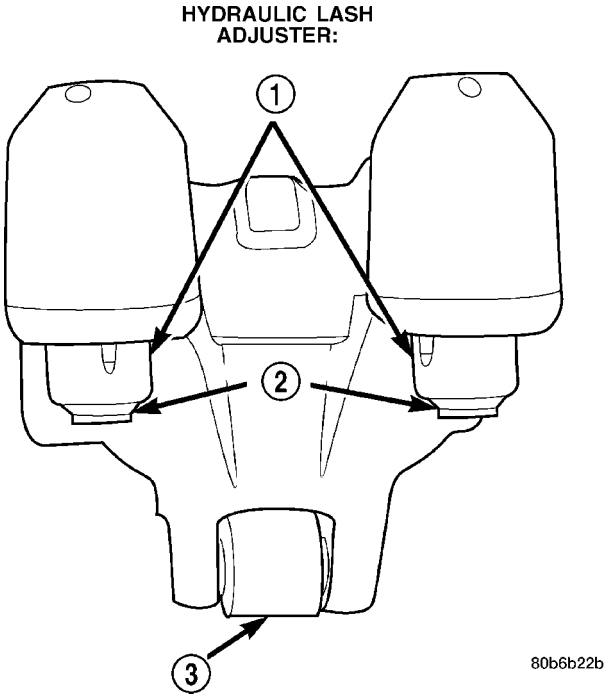


Fig. 52 Rocker Arm Assembly

1 - RETAINER
2 - SWIVEL PAD
3 - ROLLER

DESCRIPTION - ROCKER ARM SHAFTS

The rocker arm shafts (Fig. 53) are tubular steel and are supported by several forged aluminum alloy pedestals, which are fastened to the cylinder head. Four shafts are used, one for each intake and exhaust rocker arm bank on each cylinder head. The shafts are hollow to provide a duct for lubricating oil flow from the cylinder head to the valve mechanisms. One hollow dowel per pedestal is used to locate the pedestal to the cylinder head, orient the exhaust rocker shaft, and serve as a cam bearing oil feed passage.

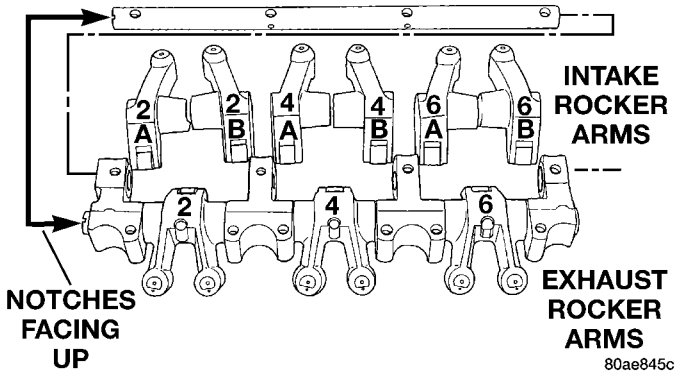


Fig. 53 Rocker Arms and Shafts

OPERATION

The rocker arm is the pivot point between the camshaft lobe and the valve.

DIAGNOSIS AND TESTING

LASH ADJUSTER (TAPPET) NOISE DIAGNOSIS

Proper noise diagnosis is essential in locating the source of a NVH complaint. Locating a lash adjuster (tappet) type noise can sometimes be difficult. As a result, an initial misdiagnosis may occur.

Refer to the following chart indicating possible lash adjuster (tappet) noise sources and possible sources that could lead to a misdiagnosis.

Refer to Lash Adjuster (Tappet) Noise Chart for Possible Causes and Correction of a lash adjuster (tappet) type noise.

POSSIBLE NOISE SOURCES	POSSIBLE NOISE MISDIAGNOSIS SOURCES
Spongy/soft/aerated lash adjusters.	Exhaust leak.
Missing lash adjuster swivel contact pads.	Exhaust rocker arm-to-cylinder head cover contact.
Intake rocker-to-camshaft bearing journal contact.	Piston pin bore fit.
Rocker arm bind-up.	Timing drive hydraulic tensioner tick.
Intake rocker arm-to-spark plug tube contact.	Accessory drive belt deterioration.
Excessive cam end play.	Piston-to-bore clearance knock.
Broken valve spring.	Crankshaft bearing noise.
Broken/loose camshaft sprocket bolt.	
Incomplete cam lobe machining.	
Cracked lash adjuster cartridge body.	

LASH ADJUSTER (TAPPET) NOISE CHART

POSSIBLE CAUSES	CORRECTION
1. Engine oil level—too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.	1. Check and correct engine oil level.
2. Insufficient running time after rebuilding cylinder head.	2. Low speed running of up to 1 hour may be required to fully evacuate trapped air from the valve train system. During this time, turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
3. Air trapped in lash adjuster (after 1 hour run time).	3. See below: (a) Check lash adjusters for sponginess while installed in cylinder head. Depress part of rocker arm over adjuster. Normal adjusters should feel very firm. Very spongy adjusters can be bottomed out easily. (b) Before proceeding, perform Lash Adjuster Bleeding procedure. (c) If lash adjuster(s) are still spongy, replace with new adjuster/rocker arm assembly*.

ROCKER ARM SHAFT/ ROCKER ARM / LASH ADJUSTER (Continued)

POSSIBLE CAUSES	CORRECTION
4. Low oil pressure	4. See below: (a) Check and correct engine oil level. (b) Check engine oil pressure. (c) Check for excessive bearing clearance and correct. (d) Check for worn oil pump.
5. Oil passage to cylinder head(s) plugged with debris.	5. Check cylinder head oil passages and cylinder head gasket restrictor for blockage. Clean or replace as necessary.
6. Worn valve guide(s).	6. Ream guide(s) and replace valve(s) with oversize valves and seal(s).
7. Air injested into oil due to broken or cracked oil pump pickup tube.	7. Inspect pickup tube and replace as necessary.
8. Collapsed lash adjuster due to debris injestion.	8. Clean debris from engine and replace lash adjuster/rocker assembly*.
9. Intake rocker arm roller clevis ear(s) contacting camshaft bearing journal(s) on side.	9. Inspect camshaft end play and all valve train components for wear. Replace as necessary.
***Lash adjusters are serviced with the rocker arms—do not disassemble.**	

STANDARD PROCEDURE - HYDRAULIC LASH ADJUSTER BLEEDING

Use this procedure to manually bleed aerated oil from the lash adjuster and remove sponginess.

(1) Run the engine, bringing it to operating temperature in order to freshly pressurize and warm the valvetrain system oil supply.

(2) Remove cylinder head cover(s).

(3) Ensure the rocker arm is positioned on the base circle of the cam (Fig. 54). Rotate engine as necessary.

(4) For intake rocker arm positions:

(a) Adjust Special Tool 8351 Release Probe's gauge pin to extend approximately 20 mm (0.787 in.). Then, carefully insert the release probe gauge pin into the lash adjuster service access hole (Fig. 55).

CAUTION: If probe tip breaks off within the lash adjuster, replace the affected rocker arm.

(b) Gently unseat lash adjuster's internal check ball.

(c) While the internal check ball is held unseated, press the rocker arm into the valve tip, allowing the lash adjuster to fully collapse. Hold this fully collapsed position for about one second, or longer.

(d) Slowly release the rocker arm, thereby allowing the lash adjuster to extend, which in turn refills the high pressure chamber with non-aerated oil.

(e) Remove probe to allow check ball to seat.

(f) Recheck for sponginess. If the lash adjuster sponginess is not completely or nearly eliminated, then repeat procedure.

(g) If the spongy condition cannot be removed, replace effected rocker arm(s).

ROCKER ARM SHAFT/ ROCKER ARM / LASH ADJUSTER (Continued)

(5) For exhaust rocker arm positions:

(a) Adjust Special Tool 8351 Release Probe gauge pin to extend approximately 20 mm (0.787 in.). Then, using two release probes, carefully insert gauge pins into the lash adjuster service access holes (Fig. 55).

CAUTION: If probe tip breaks off within the lash adjuster, replace the affected rocker arm.

(b) Gently unseat BOTH lash adjuster's internal check ball at the same time.

(c) While the internal check ball is held unseated, press the rocker arm into the valve tip, allowing the lash adjuster to fully collapse. Hold this fully collapsed position for about one second, or longer.

(d) Slowly release the rocker arm, thereby allowing the lash adjuster to extend, which in turn refills the high pressure chamber with non-aerated oil.

(e) Remove probes to allow check balls to seat.

(f) Recheck for sponginess. If the lash adjuster sponginess is not completely or nearly eliminated, then repeat procedure.

(g) If the spongy condition cannot be removed, replace effected rocker arm(s).

(6) Install cylinder head cover(s).

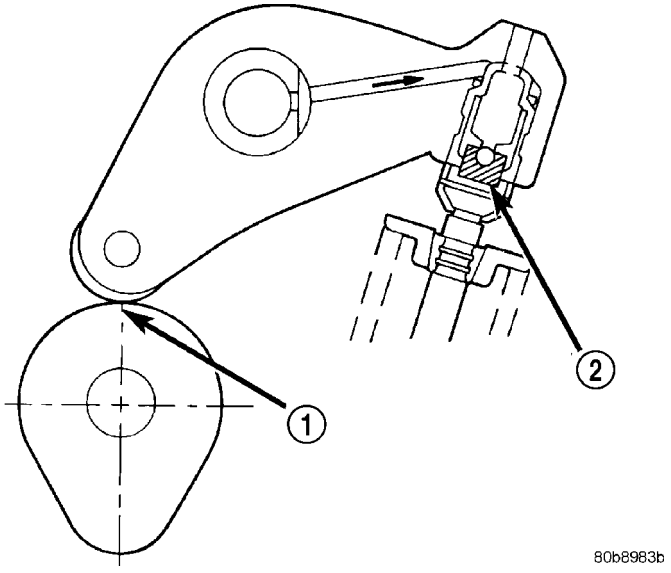


Fig. 54 Rocker Arm Positioned On Base Circle Of Camshaft

1 - CAMSHAFT BASE CIRCLE
2 - HIGH-PRESSURE CHAMBER

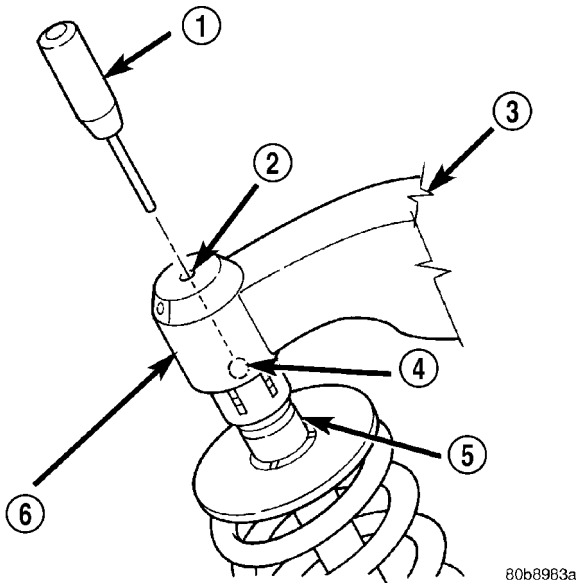


Fig. 55 Purging Air From Lash Adjuster

1 - SPECIAL TOOL 8351
2 - OIL AIR RELIEF SERVICE ACCESS HOLE
3 - ROCKER ARM ASSY
4 - INTERNAL CHECK BALL
5 - VALVE TIP
6 - HYDRAULIC LASH ADJUSTER WITHIN ROCKER ARM

ROCKER ARM SHAFT/ ROCKER ARM / LASH ADJUSTER (Continued)

REMOVAL

CAUTION: The rocker arm shafts are hollow and are used as lubrication oil passages. The rocker arm and shaft assembly on the RIGHT side of the engine has an oil passage hole from the cylinder head to the third rocker shaft support. The rocker arm shaft assembly on the LEFT side of the engine has an oil passage hole from the cylinder head to the second rocker shaft support.

(1) Remove cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)
(2) Identify the rocker arm assembly and rocker arms before disassembly (Fig. 56).
(3) Remove rocker arm assembly bolts.
(4) Remove rocker arm assembly.

NOTE: To prevent air ingestion into lash adjusters, avoid turning rocker arm assembly upside down.2

CAUTION: Do not allow rocker arm assembly to rest on lash adjusters, as damage may occur to lash adjusters and/or plastic retainers.

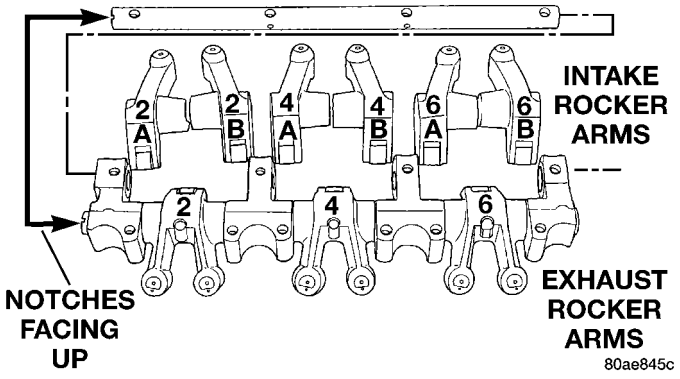


Fig. 56 Rocker Arms and Shafts

DISASSEMBLY

(1) Remove rocker arm and shafts. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL)
(2) Remove dowel pin using a 4 mm screw, nut, spacer, and washer installed into the pin (Fig. 57). Thread the screw into the pin, then loosen the nut on the screw. This will pull the dowel out of the shaft support. Do not reuse dowel pins. Remove the rocker arms and pedestals in order.
(3) Check the rocker arm mounting portion of the shafts for wear or damage. Replace if damaged or heavily worn.
(4) Check shaft oil holes for clogging with small wire, clean as required.

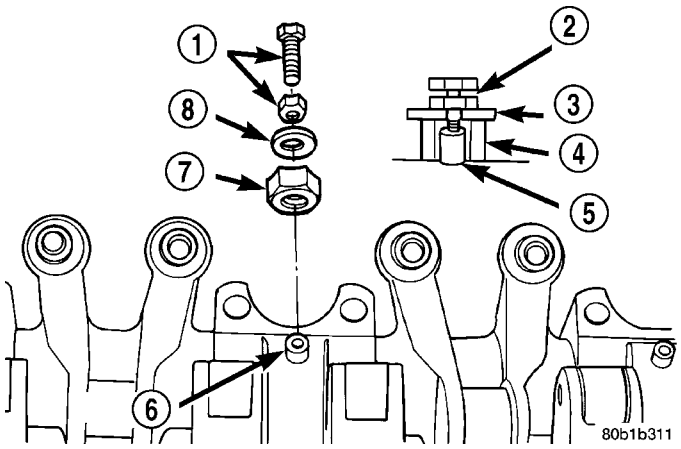


Fig. 57 Rocker Arms and Shaft - Disassembly

1 - 4mm SCREW AND NUT
2 - 4mm SCREW AND NUT
3 - WASHER
4 - SPACER
5 - DOWEL
6 - DOWEL
7 - SPACER
8 - WASHER

INSPECTION

The rocker arm shafts are hollow and are used as lubrication oil ducts. The rocker arm and shaft assembly on the **right** side of the engine has an oil passage hole from the cylinder head located at the third rocker shaft support pedestal. The rocker arm and shaft assembly on the **left** side of the engine has an oil passage hole from the cylinder head located at the second rocker shaft support pedestal.

NOTE: To prevent air ingestion into lash adjusters, avoid turning rocker arm assembly upside down.

CAUTION: Do not allow rocker arm assembly to rest on lash adjusters, as damage may occur to lash adjuster and plastic retainer.

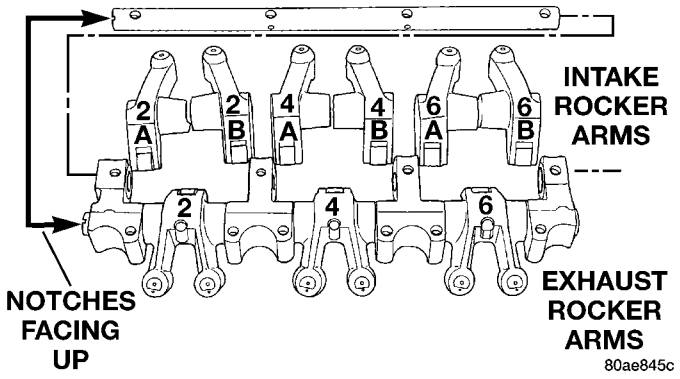


Fig. 58 Rocker Arms and Shafts

ROCKER ARM SHAFT/ ROCKER ARM / LASH ADJUSTER (Continued)

The intake and exhaust rocker arms are different. They should be identified before disassembling the assembly (Fig. 58).

Check rocker arms for wear or damage (Fig. 59):

- Roller scuffing or wear
- Shaft bore scuffing or wear
- Swivel pad on lash adjuster missing or broken
- Rocker arm showing signs of fatigue or cracking
- Roller axle protruding from arm

Replace assembly as necessary if any rocker arms shows signs of wear.

CAUTION: Do Not remove lash adjuster from rocker arm assembly. Damage to the adjuster and rocker arm will result.

HYDRAULIC LASH ADJUSTER:

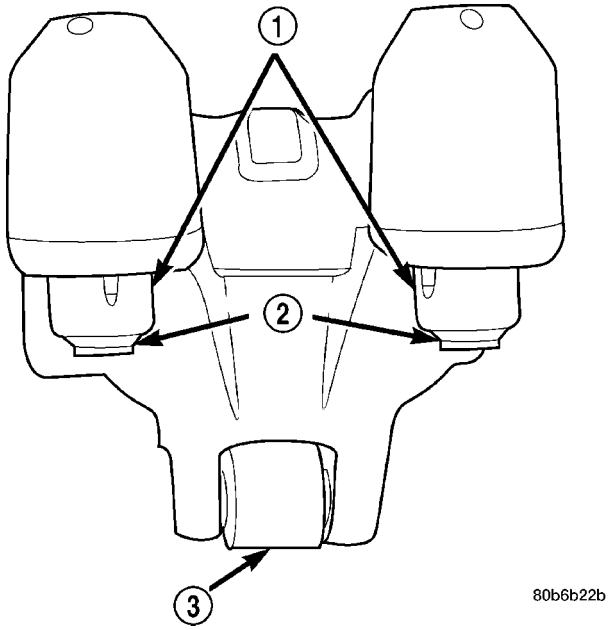


Fig. 59 Rocker Arm Assembly

1 - RETAINER
2 - SWIVEL PAD
3 - ROLLER

ASSEMBLY

CAUTION: New dowel pins must be installed when reassembling.

(1) Install the rocker arms, and pedestals onto the shaft.

(2) Install dowel pins (Fig. 60). Dowel pins pass through the pedestal into the exhaust rocker shafts. Dowel pins should be pressed in until they bottom-out against the rocker shaft in the pedestal.

(3) Install rocker arm and shafts. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - INSTALLATION)

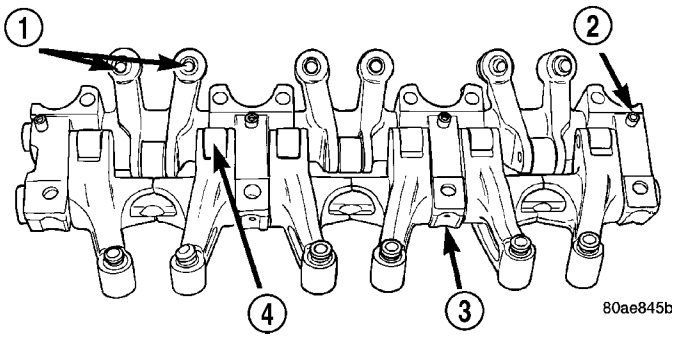


Fig. 60 Assemble Rocker Arms and Shaft

1 - HYDRAULIC LASH ADJUSTERS
2 - DOWEL PIN
3 - PEDESTAL
4 - ROLLER

INSTALLATION

NOTE: Rocker arm and shaft assembly can be installed either prior to or after (preferred) cylinder head installation.

(1) Rotate camshafts to the position shown in (Fig. 61). With the camshafts in these positions the lobes are in a neutral position (no load to the valve). This will allow the rocker arm shaft assembly to be tightened into position with little or no valve spring load on it.

(2) Install the rocker arm and shaft assembly making sure that the identification marks face toward the front of engine for left head and toward the rear of the engine for right head.

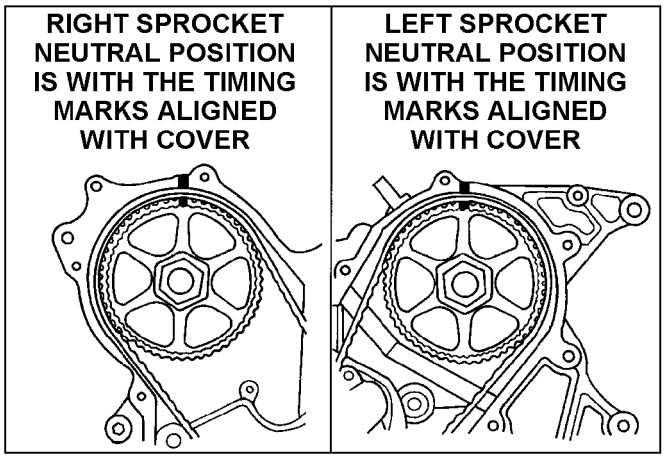


Fig. 61 CAMSHAFT GEAR TIMING MARKS

ROCKER ARM SHAFT/ ROCKER ARM / LASH ADJUSTER (Continued)

(3) Tighten rocker arm/shaft assembly bolts in sequence to 31 N·m (275 in. lbs.) (Fig. 62).

(4) Install cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

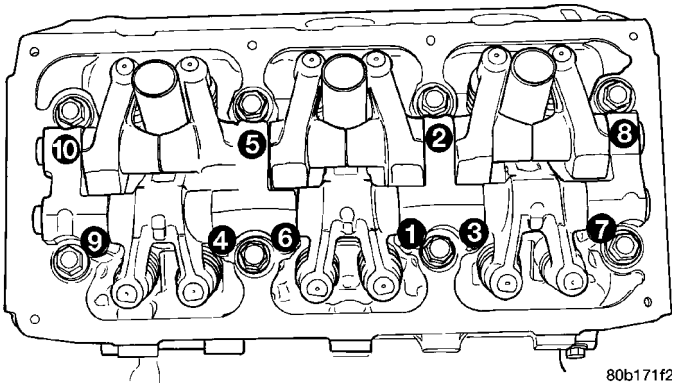


Fig. 62 ROCKER ARM AND CAMSHAFT ASSEMBLY

TUBE -SPARK PLUG

REMOVAL

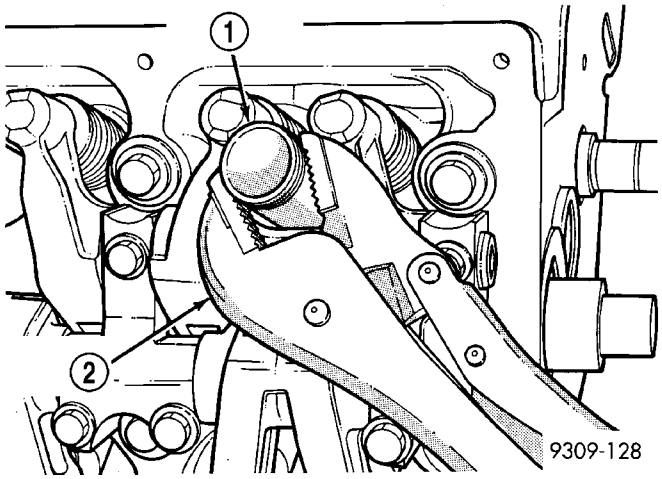


Fig. 63 Servicing Spark Plug Tubes

1 - SPARK PLUG TUBE
2 - LOCKING PLIERS

(1) Remove cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(2) Using suitable locking pliers, remove the tube from the cylinder head (Fig. 63) and discard tube.

(3) Clean area around spark plug with Mopar® Parts Cleaner or equivalent.

INSTALLATION

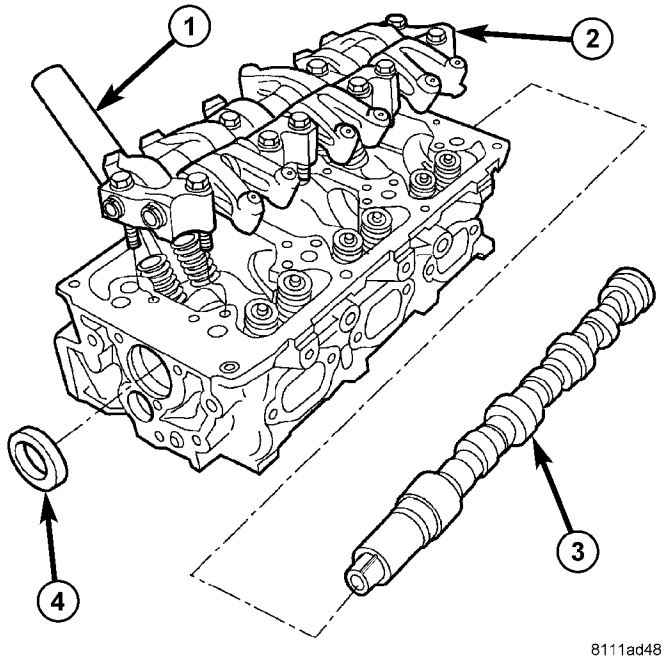


Fig. 64 CAMSHAFT, ROCKER ARM ASSEMBLY AND CYLINDER HEAD

1 - SPARK PLUG TUBE
2 - ROCKER ARM ASSEMBLY
3 - CAMSHAFT
4 - CAMSHAFT SEAL

(1) Apply Mopar® Stud and Bearing Mount to a new tube (1) approximately 1 mm (0.039 in.) from the end of tube, in a 3 mm (0.118 in.) wide area (Fig. 64).

(2) Install sealer end of tube(1) into the cylinder head. Then carefully install the tube (1) using a hardwood block and mallet. Install the tube (1) until it is seated into the bottom of the bore.

(3) For spark plug tube (1) seal replacement, (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(4) Install cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

SEAL -VALVE STEM

REMOVAL

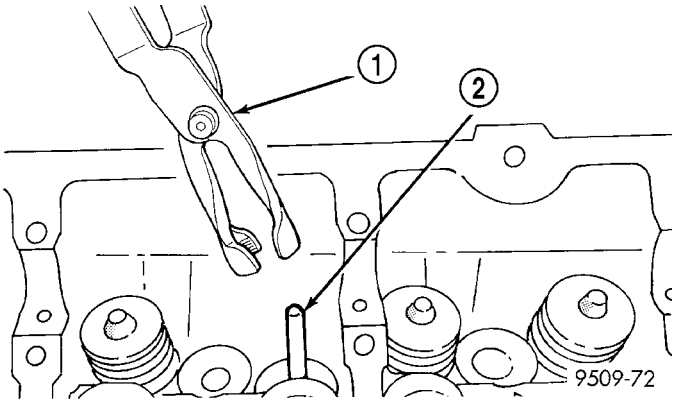


Fig. 65 Valve Stem Seal - Removal

1 - VALVE SEAL TOOL
2 - VALVE STEM

(1) Remove valve spring. (Refer to 9 - ENGINE/ CYLINDER HEAD/VALVE SPRINGS - REMOVAL)

(2) Remove valve stem seals by using a valve stem seal tool (Fig. 65).

INSTALLATION

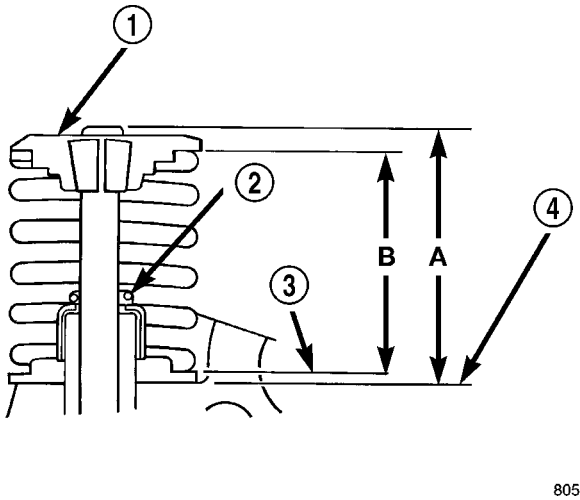


Fig. 66 Checking Valve Tip Height and Valve Spring Installed Height

1 - SPRING RETAINER
2 - GARTER SPRING
3 - VALVE SPRING SEAT TOP
4 - CYLINDER HEAD SURFACE

(1) The valve stem seal/valve spring seat should be pushed firmly and squarely over the valve guide using the valve stem as guide. **Do Not Force** seal against top of guide. When installing the valve retainer locks, compress the spring **only enough** to install the locks.

CAUTION: Do not remove garter spring (2) around the seal at the top of the valve stem seal (Fig. 66).

(2) Install valve spring. (Refer to 9 - ENGINE/ CYLINDER HEAD/VALVE SPRINGS - INSTALLATION)

SPRING -VALVE

DESCRIPTION

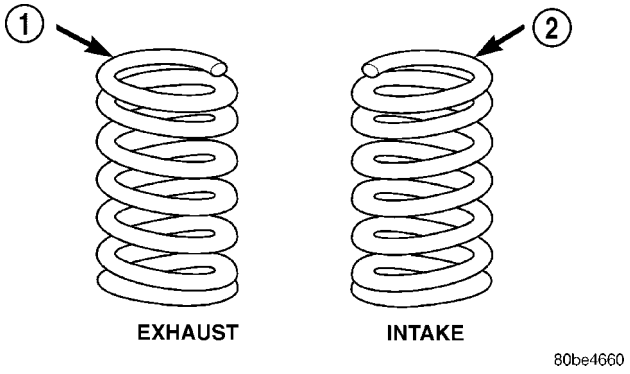


Fig. 67 Valve Spring Identification

1 - YELLOW OR WHITE DYE
2 - ORANGE DYE

The valve springs are made from chrome silicon alloy wire and incorporate a “bee-hive” design. Valve spring retainers and locks are common from valve-to-valve. The valve spring seat is integral with the valve stem oil seal, which incorporates a garter spring to maintain consistent lubrication control to the valve stem.

The valve springs are unique for intake compared to exhaust. Both have different lengths and are wound in opposite directions. The valve springs are color coded, intake spring is right hand coil direction with orange dye on the top coils, and the exhaust spring is left hand coil direction with a yellow or white dye on the top coils (Fig. 67).

The exhaust spring with the white dye on the top of the coils has an increased open and closed load when compared to the exhaust spring with the yellow dye. A yellow and a white exhaust valve spring **should never** be used on a single forked rocker arm. Color coated exhaust springs should always be used in pairs for a forked exhaust rocker springs.

OPERATION

The valve spring returns the valve against its seat for a positive seal of the combustion chamber.

SPRING -VALVE (Continued)

REMOVAL

REMOVAL - CYLINDER HEAD OFF

(1) Compress valve spring with valve spring compressor C-3422-D and adapter 6526 (Refer to 9 - ENGINE - SPECIAL TOOLS).

(2) Remove valve retaining locks. Release valve spring compressor. Remove valve spring retainer and valve spring.

(3) Remove valve stem seal assembly. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE STEM SEALS - REMOVAL)

REMOVAL - CYLINDER HEAD ON

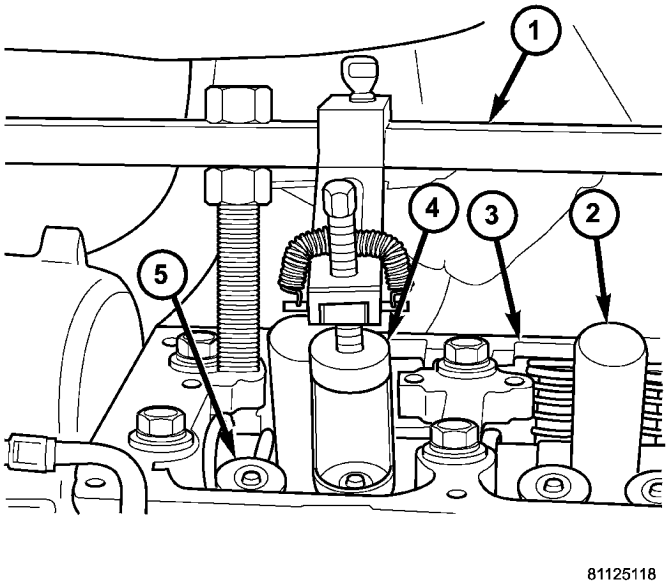


Fig. 68 VALVE SPRING REMOVAL

1 - MD 998772A
2 - SPARK PLUG TUBES
3 - CYLINDER HEAD
4 - 6527 - ADAPTOR
5 - VALVE SPRING RETAINER

(1) Disconnect negative battery cable.

(2) Remove upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(3) Remove cylinder head cover(s) (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(4) Remove rocker arm and shaft assembly (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL).

(5) Remove spark plugs.

(6) Rotate the crankshaft clockwise, until the number 1 piston is at TDC (Top Dead Center) on the compression stroke.

(7) With air hose attached to spark plug adapter installed in number 1 spark plug hole, apply 620.5 to 689 kPa (90 to 100 psi) air pressure. This is to hold valves into place while servicing components.

(8) Using Tool MD 998772A (1) with adapter 6527 (4) or equivalent, compress valve spring and remove valve locks (5). Release tension on valve spring, remove retainer (5) and valve spring (Refer to 9 - ENGINE - SPECIAL TOOLS) (Fig. 68).

(9) Remove valve stem seal, if required. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE STEM SEALS - REMOVAL)

(10) Follow the same procedure on the remaining 5 cylinders using the firing sequence 1-2-3-4-5-6. **Make sure piston is at TDC in each cylinder of the valve spring that is being removed.**

(11) Remove spark plug adapter tool.

INSPECTION

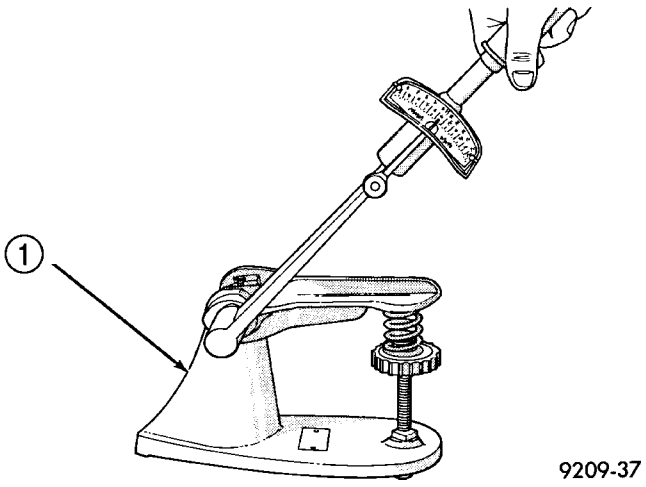


Fig. 69 Testing Valve Spring

1 - SPECIAL TOOL C-647

When valves have been removed for inspection, reconditioning or replacement, valve springs should be tested (Fig. 69). **As an example;** the compression length of the spring to be tested is 38.00 mm (1.496 in.). Turn table of Tool C-647 until surface is in line with the 38.00 mm (1.496 inches.) mark on the threaded stud and the zero mark on the front. Place spring over stud on the table and lift compressing lever to set tone device. Pull on torque wrench until ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. Refer to Engine Specifications to obtain specified height and allowable tensions (Refer to 9 - ENGINE - SPECIFICATIONS). Replace springs that do not meet specifications.

SPRING -VALVE (Continued)

INSTALLATION

INSTALLATION - CYLINDER HEAD OFF

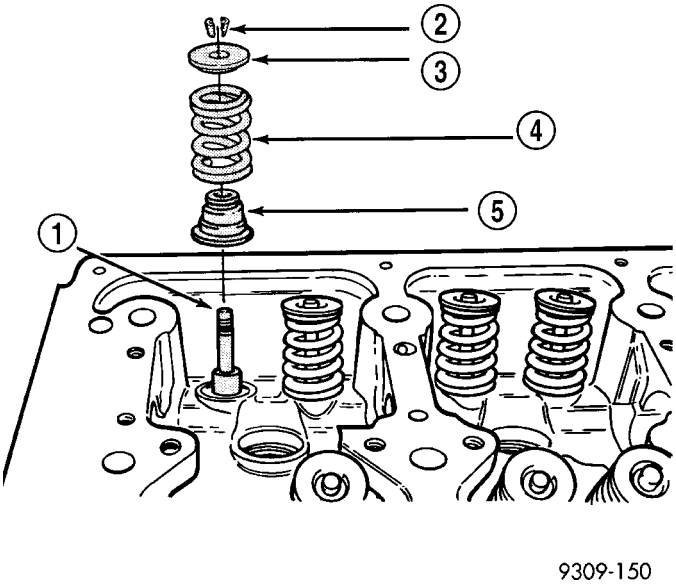


Fig. 70 Valve Seal and Spring—Installation

1 - VALVE
2 - VALVE RETAINING LOCKS
3 - VALVE SPRING RETAINER
4 - VALVE SPRING
5 - VALVE SEAL AND VALVE SPRING SEAT ASSEMBLY

(1) Install valves if removed.

(2) Install valve stem seal/spring seat assembly (5) over valve guides on all valve stems (Fig. 70). Ensure that the garter spring is intact around the top of the rubber seal.

(3) Place valve spring (color-coded end facing up)(4) and valve retainer into position.

(4) Compress valve spring with valve spring compressor. Install locks and release tool. **If valve and/or seat are reground, measure the installed height of springs (B), make sure measurements are taken from top of spring seat to the bottom surface of spring retainer**. If height is greater than 38.75 mm (1.5256 in.), install a 0.762 mm (0.030 in.) spacer in head counterbore under the valve spring seat to bring spring height back within specification (Fig. 71).

INSTALLATION - CYLINDER HEAD ON

(1) Install new valve seal(s) if required (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE STEM SEALS - INSTALLATION).

(2) Place valve spring (color-coded end facing up) and valve retainer into position.

(3) Compress valve spring using Special Tool MD 998772A (1) with Adaptor 6527 (4) only enough to install locks (5) (Fig. 72).

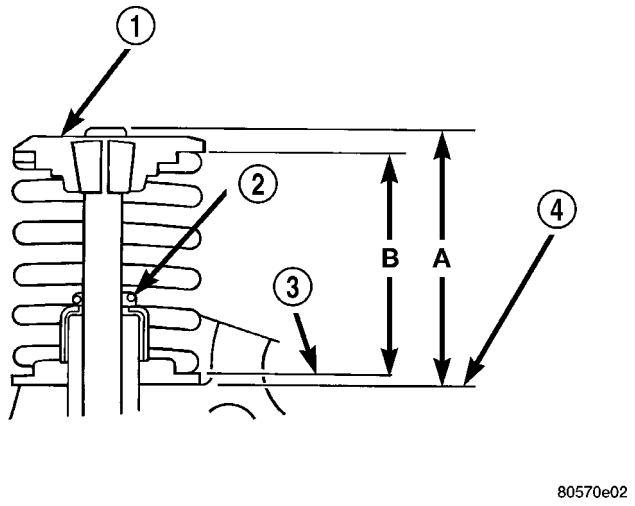


Fig. 71 Checking Valve Tip Height and Valve Spring Installed Height

1 - SPRING RETAINER
2 - GARTER SPRING
3 - VALVE SPRING SEAT TOP
4 - CYLINDER HEAD SURFACE

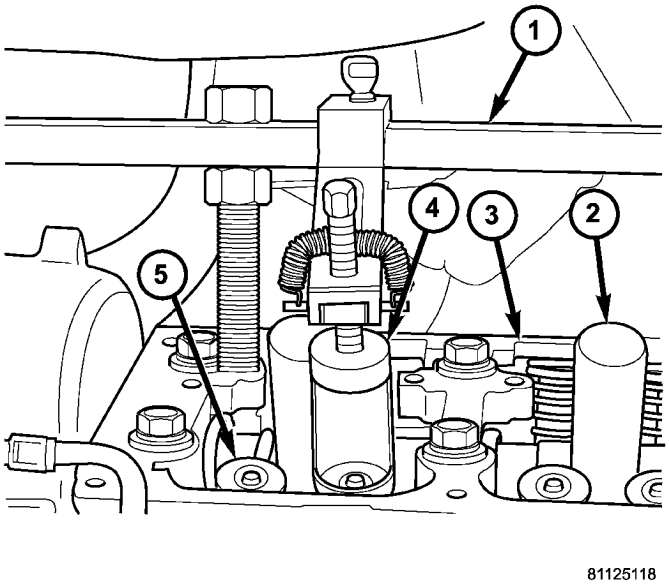


Fig. 72 VALVE SPRING SERVICING

1 - MD 998772A
2 - SPARK PLUG TUBES
3 - CYLINDER HEAD
4 - 6527 - ADAPTOR
5 - VALVE SPRING RETAINER

(4) After installing locks, release tension on valve spring and verify proper installation.

(5) Remove Special Tool MD 998772A (1) and spark plug adapter tool.

SPRING -VALVE (Continued)

(6) Install rocker arm and shaft assembly. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - INSTALLATION)

(7) Install cylinder head cover(s) (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

(8) Install spark plugs.

(9) Install upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(10) Connect negative battery cable.

ENGINE BLOCK

DESCRIPTION

The cylinder block (Fig. 73) is made of heat treated aluminum with cast-in-place iron liners. The block is a closed deck design with the right bank forward. To provide high rigidity and improved noise, vibration and harshness (NVH), the block has cast-in contours and ribs, along with powdered metal 6 bolt main caps (4 vertical, 2 horizontal), with a die cast aluminum structural beam windage tray mounted to the main caps.

CLEANING

Clean cylinder block thoroughly using a suitable cleaning solvent.

INSPECTION

ENGINE BLOCK

(1) Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking.

(2) If new core plugs are to be installed, (Refer to 9 - ENGINE - STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS).

(3) Examine block and cylinder bores for cracks or fractures.

(4) Check block deck surfaces for flatness. Deck surface must be within service limit of 0.1 mm (0.004 in.).

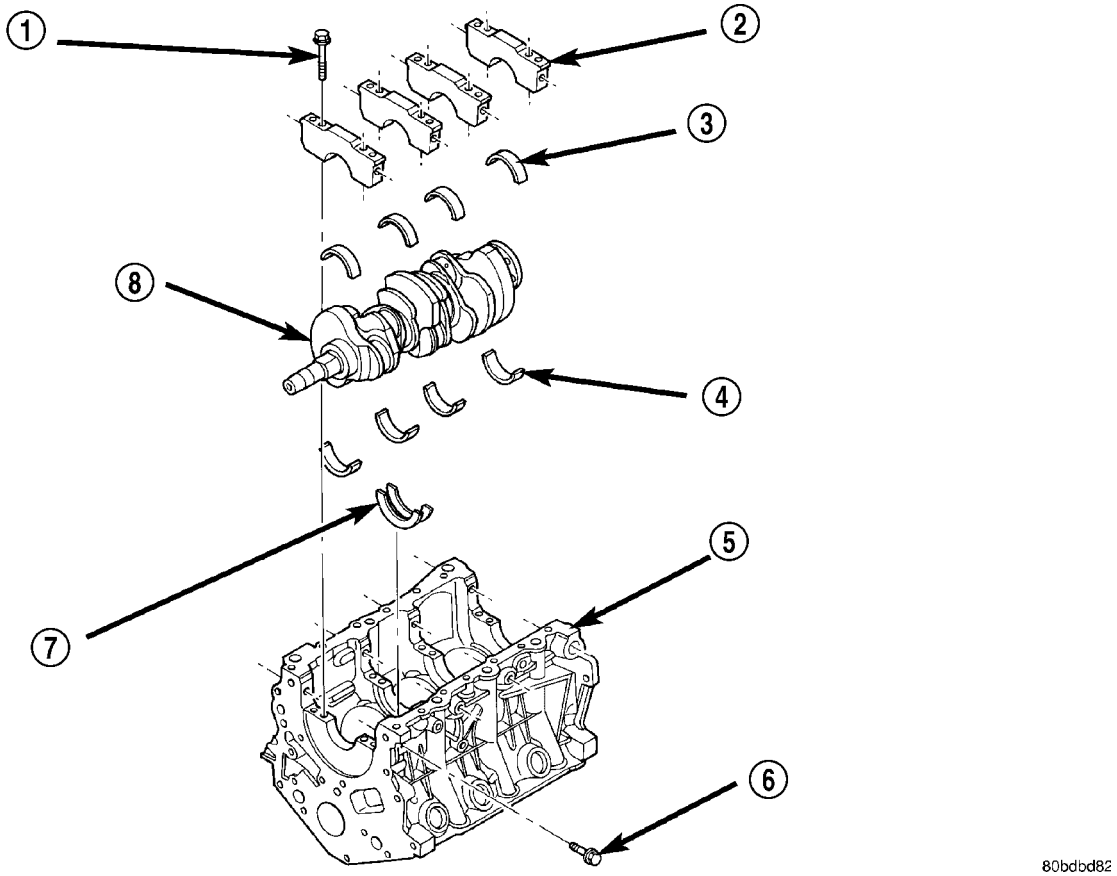


Fig. 73 Cylinder Block and Crankshaft

1 - MAIN CAP BOLT - VERTICAL
2 - MAIN CAP
3 - MAIN BEARING - LOWER
4 - MAIN BEARING - UPPER
5 - CYLINDER BLOCK
6 - MAIN CAP BOLT - HORIZONTAL
7 - CRANKSHAFT THRUST WASHER
8 - CRANKSHAFT

ENGINE BLOCK (Continued)

CYLINDER BORE

NOTE: The cylinder bores should be measured at normal room temperature, 21°C (70°F).

The cylinder walls should be checked for out-of-round and taper with Tool C119 or equivalent (Fig. 74) (Refer to 9 - ENGINE - SPECIFICATIONS). If the cylinder walls are badly scuffed or scored, the cylinder block should be replaced, and new pistons and rings fitted.

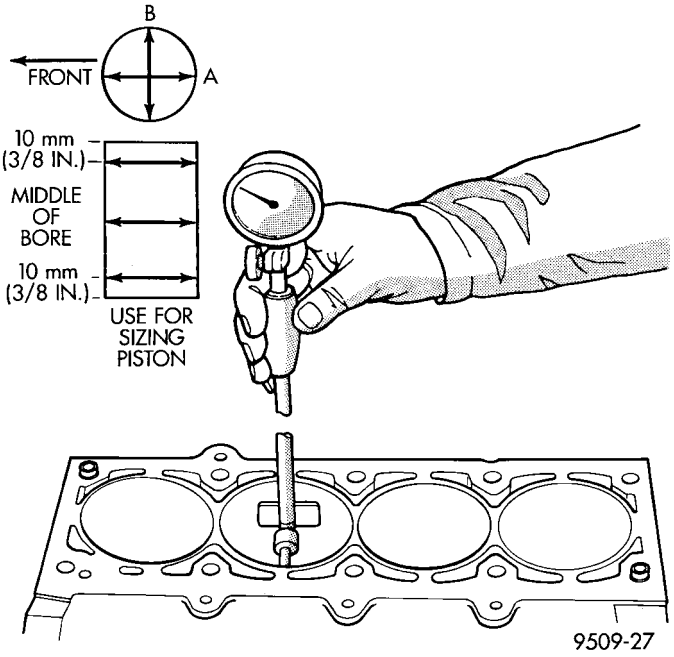


Fig. 74 Cylinder Bore Measurement

Measure the cylinder bore at three levels in directions A and B (Fig. 74). Top measurement should be 10 mm (3/8 in.) down and bottom measurement should be 10 mm (3/8 in.) up from bottom of bore. (Refer to 9 - ENGINE - SPECIFICATIONS).

CONNECTING ROD BEARINGS

STANDARD PROCEDURE - CONNECTING RODS AND BEARINGS

CONNECTING ROD BEARINGS

The bearing caps are not interchangeable and should be marked at removal to insure correct assembly.

The bearing shells must be installed with the tangs inserted into the machined grooves in the rods and caps. Install cap with the tangs on the same side as the rod.

Fit all rods on one bank until complete.

Limits of taper or out-of-round on any crankshaft journals should be held to 0.005 mm (0.0001 in.). Bearings are available in standard, 0.025 mm (0.001 in.), and 0.254 mm (0.010 in.) undersizes. **Install the bearings in pairs. Do not use a new bearing half with an old bearing half. Do not file the rods or bearing caps.**

(1) For measuring main bearing clearance and connecting rod bearing clearance use plastigage (Fig. 75). For more information on using plastigage (Refer to 9 - ENGINE - STANDARD PROCEDURE). Refer to Engine Specifications for bearing clearance specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

NOTE: The rod bearing bolts should be examined before reuse. If the threads are necked down the bolts must be replaced (Fig. 76).

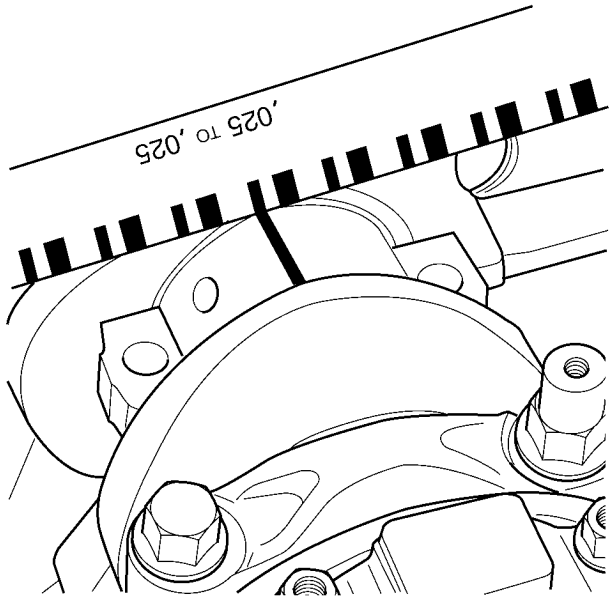


Fig. 75 CONNECTING ROD BEARING CLEARANCE

CONNECTING ROD BEARINGS (Continued)

CONNECTING ROD BOLTS

(1) Examine connecting rod bolts for stretching. Stretching can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt must be replaced.

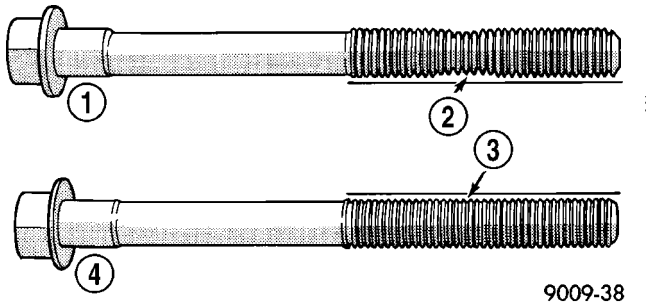


Fig. 76 Check for Stretched Bolts

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

(2) Before installing the bolts the threads should be cleaned and inspected.

(3) Install clean bolts finger tight. Then alternately torque each bolt to assemble the cap properly.

(4) Tighten the connecting rod cap bolts to specification. (Refer to 9 - ENGINE - SPECIFICATIONS)

CONNECTING ROD SIDE CLEARANCE

(1) Mount a dial indicator to a stationary point on engine. Locate probe perpendicular to and resting against the connecting rod cap being checked. Move connecting rod all the way to rear of its travel. Zero the dial indicator. Move connecting rod forward to limit of travel and read the dial indicator (Fig. 77). Compare measurement to specification listed in engine specifications (Refer to 9 - ENGINE - SPECIFICATIONS). Repeat procedure for each connecting rod. Turn crankshaft for connecting rod accessibility.

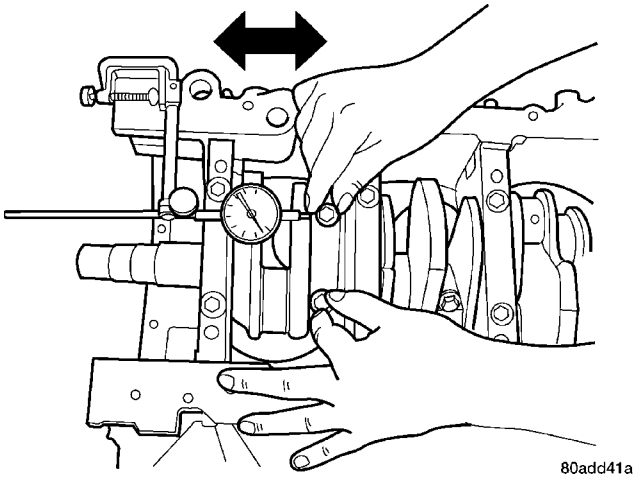


Fig. 77 Connecting Rod Side Clearance Measuring

CRANKSHAFT

DESCRIPTION

The crankshaft is constructed of a forged micro alloy steel. A six throw, nine counterweight crankshaft is supported by four select fit main bearings with number two serving as the thrust washer location. The six separate connecting rod throws are an even-firing design which reduces torque fluctuations while a torsional vibration damper is used to control torsion caused vibration of the crankshaft. Rubber lipped seals are used at front and rear. The front seal is retained in the oil pump case and the rear seal is retained in a block-mounted housing.

OPERATION

The crankshaft transfers force generated by combustion within the cylinder to the flywheel or flexplate.

REMOVAL

(1) Remove engine from vehicle (Refer to 9 - ENGINE - REMOVAL).

(2) Remove oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

(3) Remove oil pickup tube and windage tray (Fig. 78).

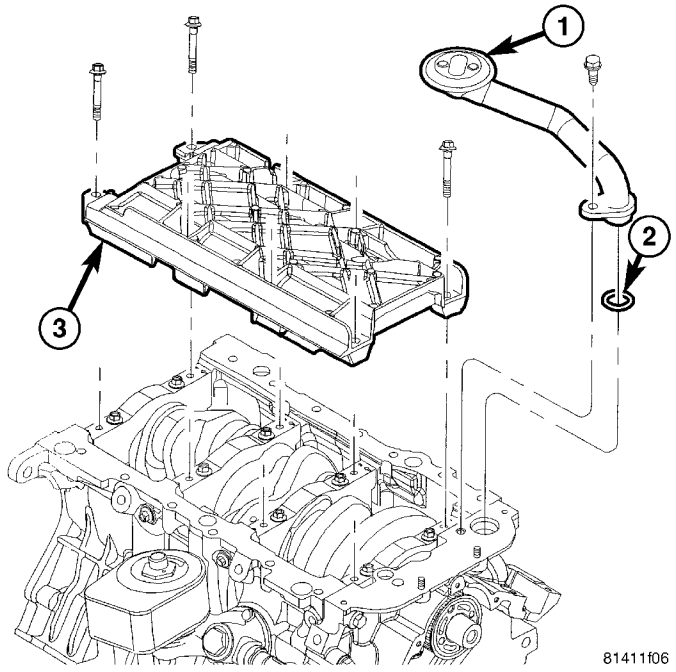


Fig. 78 OIL PICK UP TUBE AND WINDAGE TRAY

1 - OIL PICK UP TUBE
2 - SEAL
3 - WINDAGE TRAY

CRANKSHAFT (Continued)

(4) Remove front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

(5) Remove timing belt and tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(6) Remove crankshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(7) Tap dowel pin out of crankshaft.

(8) Remove oil pump assembly (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).

(9) Remove crankshaft rear oil seal retainer (Fig. 79).

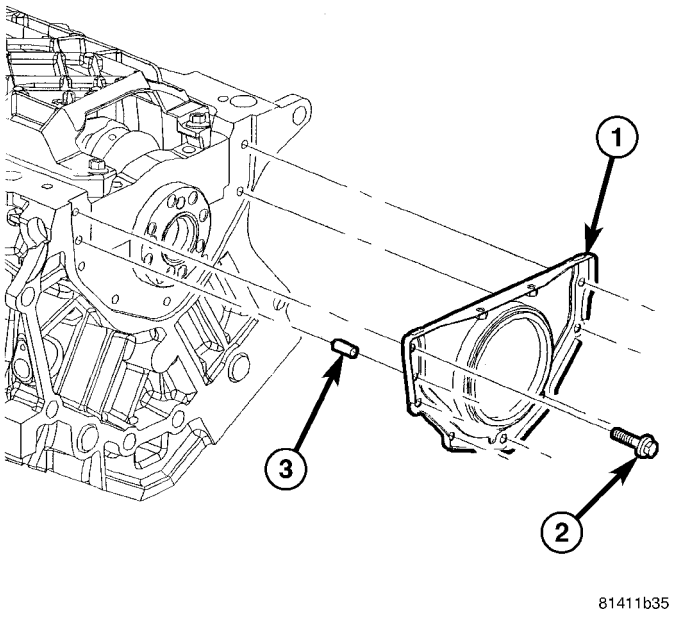


Fig. 79 REAR CRANKSHAFT OIL SEAL AND RETAINER

1 - REAR OIL SEAL AND RETAINER ASSEMBLY
2 - BOLT
3 - ALIGNMENT DOWEL

WARNING: DO NOT use a metal stamp to mark the bearing caps. Do Use a scribe or paint mark

(10) Remove connecting rod bearing caps. Connecting rod bearing caps are not interchangeable and should be paint marked or scribed before removal to insure correct assembly (Fig. 80) (Fig. 82).

(11) Remove main bearing caps. Main bearing caps are not interchangeable and are marked to insure correct assembly (Fig. 81). (Fig. 82)

(12) Remove crankshaft from cylinder block (Fig. 82).

NOTE: Before installing crankshaft, refer to Fitting Main Bearings and Installation of Connecting Rod Bearings. (Refer to 9 - ENGINE/ENGINE BLOCK/ CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE) (Refer to 9 - ENGINE/ENGINE BLOCK/ CONNECTING ROD BEARINGS - STANDARD PROCEDURE)

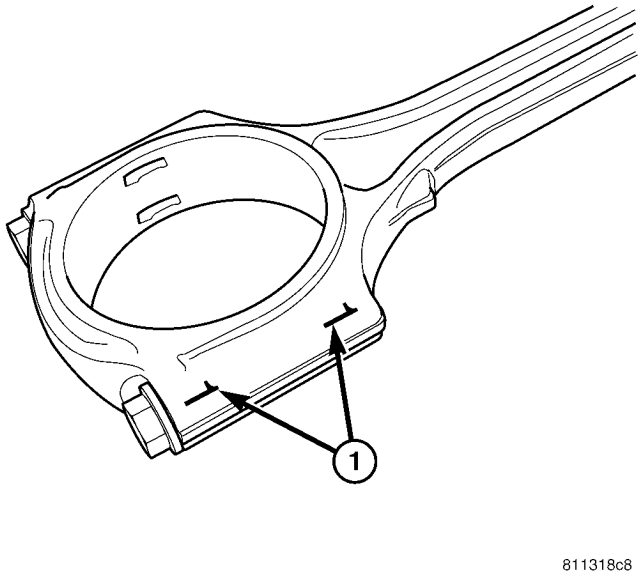


Fig. 80 CONNECTING ROD TO CYLINDER IDENTIFICATION

1 - PAINT MARK OR SCRIBE

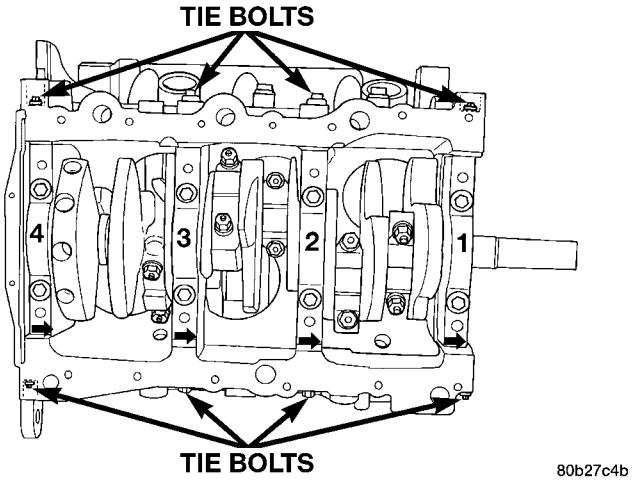


Fig. 81 Main Bearing Cap Identification

INSPECTION

The crankshaft journals should be checked for excessive wear, taper and scoring. Limits of taper on any crankshaft journals should be held to 0.015 mm (0.0006 in.). Limits for journal roundness should be 0.010 mm (0.0004 in.). Journal grinding should not exceed 0.254 mm (0.010 in.) under the standard jour-

CRANKSHAFT (Continued)

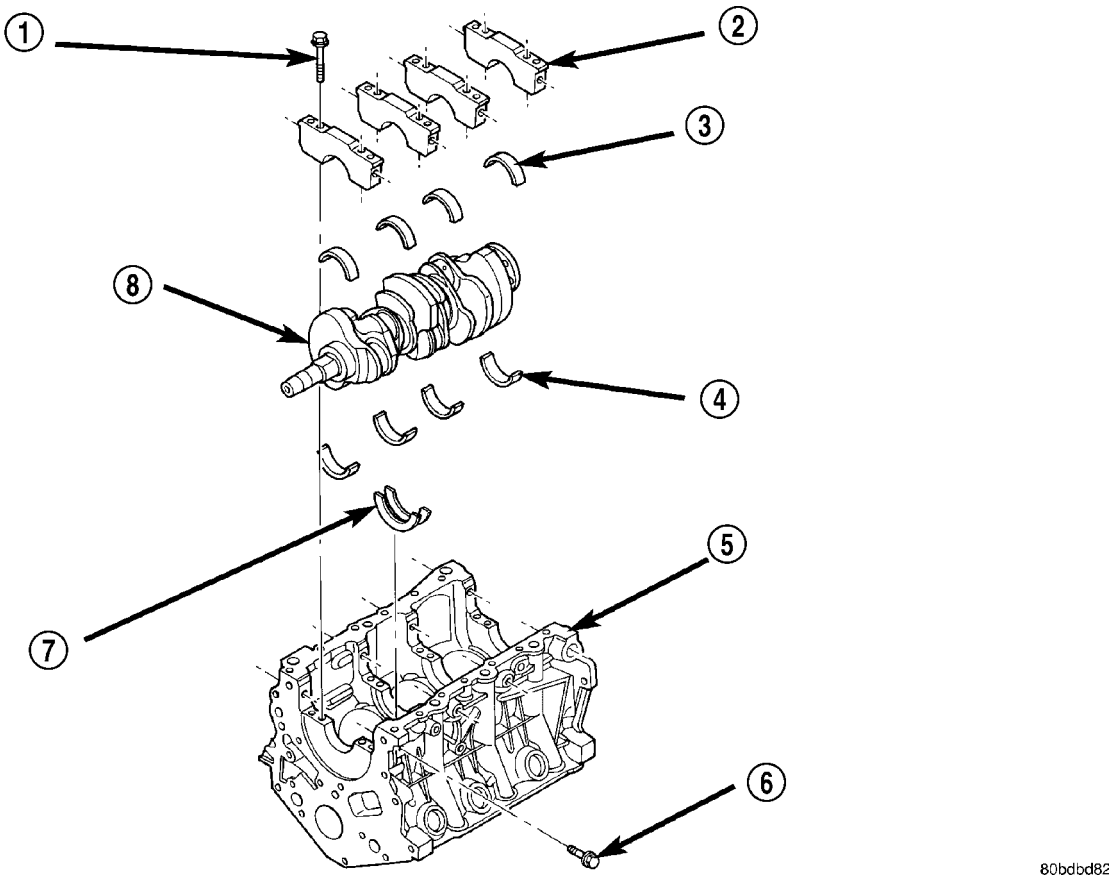


Fig. 82 Cylinder Block and Crankshaft

1 - MAIN CAP BOLT - VERTICAL
2 - MAIN CAP
3 - MAIN BEARING - LOWER
4 - MAIN BEARING - UPPER
5 - CYLINDER BLOCK
6 - MAIN CAP BOLT - HORIZONTAL
7 - CRANKSHAFT THRUST WASHER
8 - CRANKSHAFT

nal diameter. DO NOT grind thrust faces of Number 2 main bearing. DO NOT nick crank pin or bearing fillets. After grinding, remove rough edges from crankshaft oil holes and clean out all passages.

CAUTION: With a forged steel crankshaft it is important that the final paper or cloth polish after any journal regrind be in the same direction as normal rotation in the engine.

INSTALLATION

CAUTION: Main bearings are select fit (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE) for proper bearing size selection.

(1) Install crankshaft upper main bearings in cylinder block. Ensure oil holes in bearings line up with oil holes in cylinder block (Fig. 83). (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE)

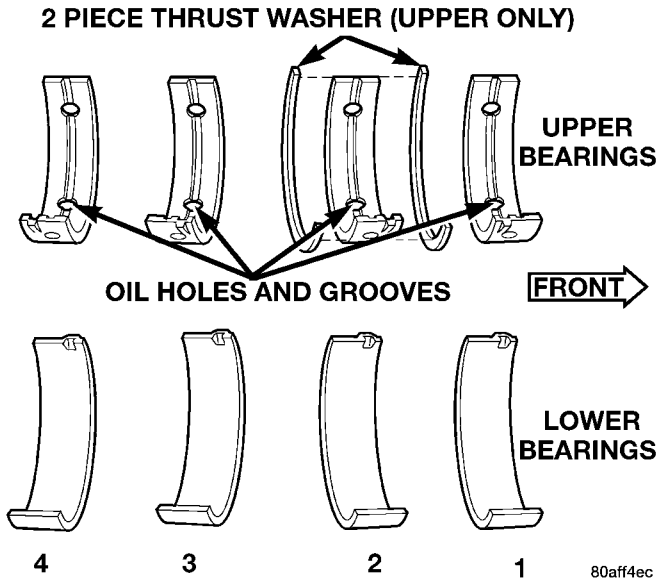


Fig. 83 Main Bearing Identification

(2) Install the crankshaft to cylinder block. (Fig. 82)

CRANKSHAFT (Continued)

(3) Move crankshaft forward to limit of travel. Lubricate and install the front thrust washer by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface (Fig. 84).

(4) Move crankshaft rearward to limit of travel. Lubricate and install the rear thrust washer by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface (Fig. 84).

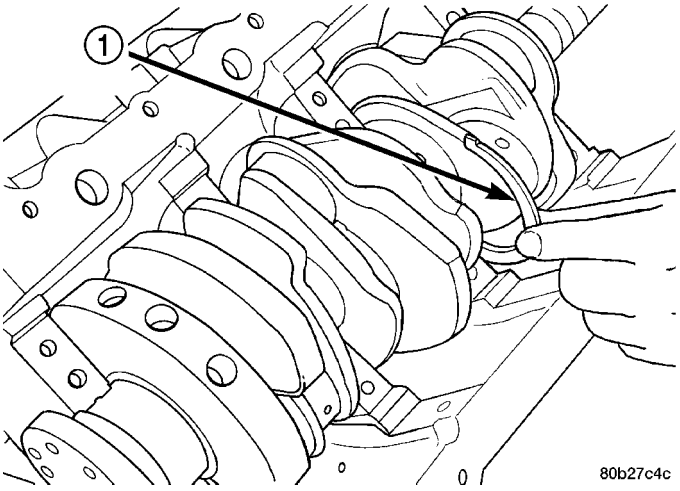


Fig. 84 Thrust Washer Installation

1 - FRONT THRUST WASHER

(5) Install lower main bearings into main bearing caps.

(6) Lubricate lower main bearings with clean engine oil.

NOTE: Lubricate main bearing cap bolts with engine oil before installation.

(7) Install each main cap and tighten bolts finger tight.

The main bearing cap bolts must be tightened in the proper sequence. First the inner main cap bolts, secondly the windage tray bolts, lastly the main cap tie (horizontal) bolts.

(8) Install the inside main bearing cap bolts and tighten to 20 N·m + 1/4 turn (15 ft. lbs. + 1/4 turn).

(9) Measure crankshaft end play. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - STANDARD PROCEDURE)

(10) Install connecting rods and measure side clearance. (Refer to 9 - ENGINE/ENGINE BLOCK/ CONNECTING ROD BEARINGS - STANDARD PROCEDURE)

(11) Install windage tray. Lubricate bolts with engine oil. Finger tighten all bolts first, then tighten to 28 N·m + 90° turn (20 ft. lbs. + 90° turn) beginning with the inside bolts tightening outward (Fig. 78).

(12) Install the main cap tie (horizontal) bolts and tighten to 28 N·m (250 in. lbs.).

(13) Install rear crankshaft oil seal retainer and oil seal (Refer to 9 - ENGINE/ENGINE BLOCK/ CRANKSHAFT REAR OIL SEAL RETAINER - INSTALLATION) and (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION)

(14) Install oil pump assembly (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION).

(15) Install dowel pin in crankshaft (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - FRONT - INSTALLATION).

(16) Install crankshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(17) Install timing belt and tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(18) Install front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(19) Install oil pickup tube and tighten bolt to 28 N·m (250 in. lbs.).

(20) Install oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

(21) Install engine assembly (Refer to 9 - ENGINE - INSTALLATION).

(22) Fill engine crankcase with proper amount of oil.

CRANKSHAFT MAIN BEARINGS

STANDARD PROCEDURE - CRANKSHAFT MAIN BEARING FITTING

The main bearings are a “select fit” to achieve proper oil clearances. For main bearing selection, the block and crankshaft have grade identification marks.

The marks for the cylinder block main bore grade are located on the left side pan rail (Fig. 85). These grade marks (1, 2, or 3) are read left to right, corresponding to main bore 1, 2, 3, 4.

The grade marks for the crankshaft are located on the rearmost crankshaft counter weight as shown in (Fig. 86). The crankshaft journal grade marks (A, B, or C) are read left to right, corresponding with journal number 1, 2, 3, 4.

Refer to the MAIN BEARING SELECTION CHART to properly select the main bearings. For an example, if the main bore grade is 3 and the journal

CRANKSHAFT MAIN BEARINGS (Continued)

grade is B, the proper select fit bearing would be a (2) +0.003 mm (+0.0002 in.).

NOTE: Service main bearings have a number from (1–5) marked in ink on the bearing surface (Fig. 87). For verification, refer to the MAIN BEARING SELECTION CHART for number to size identification.

The upper main bearing has a oil feed hole and a center groove to allow lubrication of the main journal and must be properly positioned in the block.

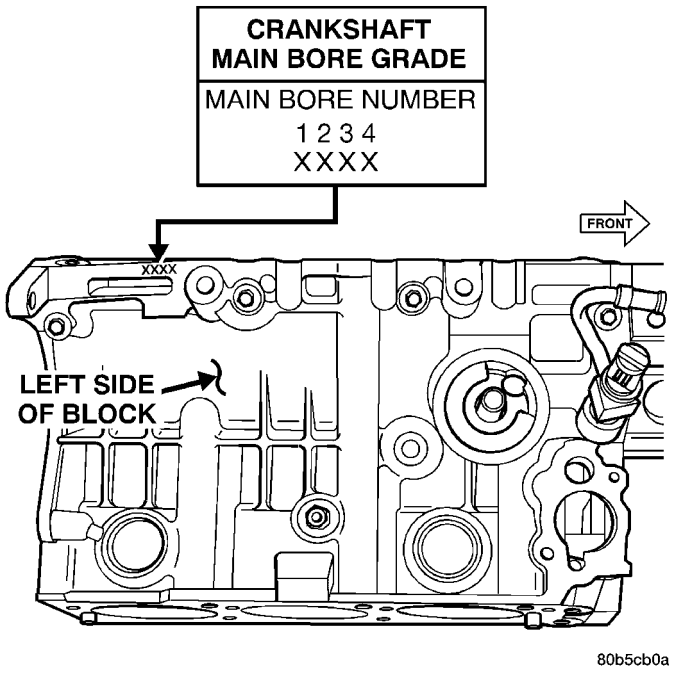


Fig. 85 CYLINDER BLOCK MAIN BORE GRADE MARKING LOCATION

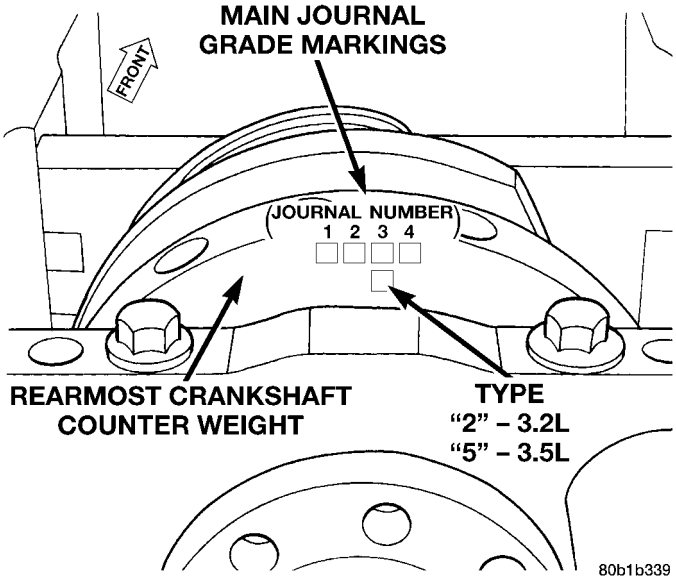


Fig. 86 Crankshaft Main Journal Grade Marking Location—Rear Of Block

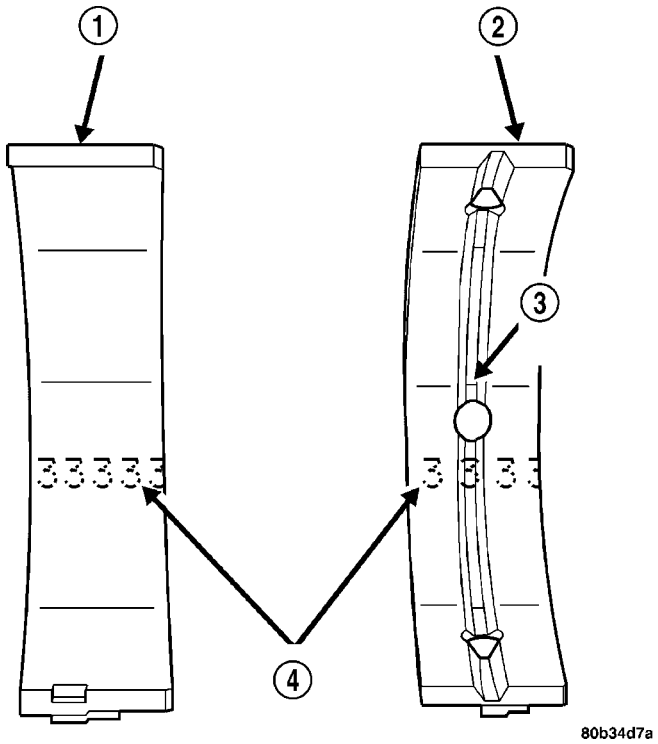


Fig. 87 Main Bearing Grade Marks

1 - LOWER MAIN BEARING
2 - UPPER MAIN BEARING
3 - OIL FEED HOLE AND GROOVE
4 - GRADE SELECTION INK MARKS

MAIN BEARING SELECTION CHART

		Main Bearing Bore Grade Marks		
		1	2	3
Crankshaft Main Journal Grade Marks	A	(3) Standard	(2) +005 mm (+0.0001 in.)	(1) +0.006 mm (+0.0002 in.)
	B	(4) -0.005 mm (-0.0001 in.)	(3) Standard	(2) +005 mm (+0.0001 in.)
	C	(5) -0.006 mm (-0.0002 in.)	(4) -0.005 mm (-0.0001 in.)	(3) Standard

CRANKSHAFT MAIN BEARINGS (Continued)

REMOVAL

Bearing caps are not interchangeable and are marked to insure correct assembly (Fig. 88). Upper and lower bearing halves are NOT interchangeable.

(1) Remove oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(2) Remove oil pick-up tube and windage tray.

(3) Identify bearing caps before removal (Fig. 88).

(4) Remove bearing caps one at a time. Remove upper half of bearing by inserting Special Main Bearing Tool C-3059 (Fig. 89) into the oil hole of crankshaft.

(5) Slowly rotate crankshaft clockwise, forcing out upper half of bearing shell.

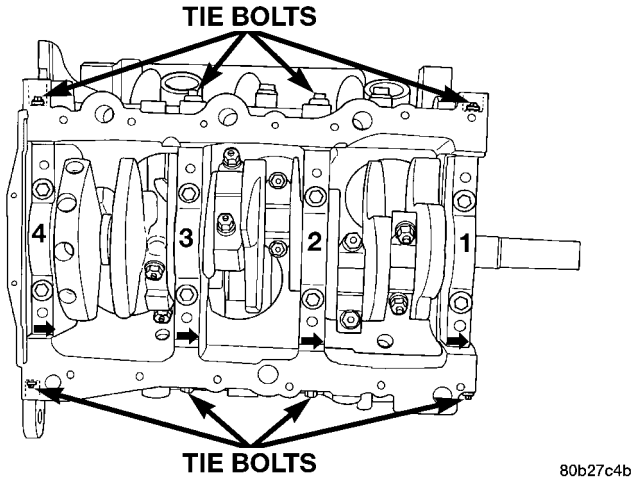


Fig. 88 Main Bearing Cap Identification

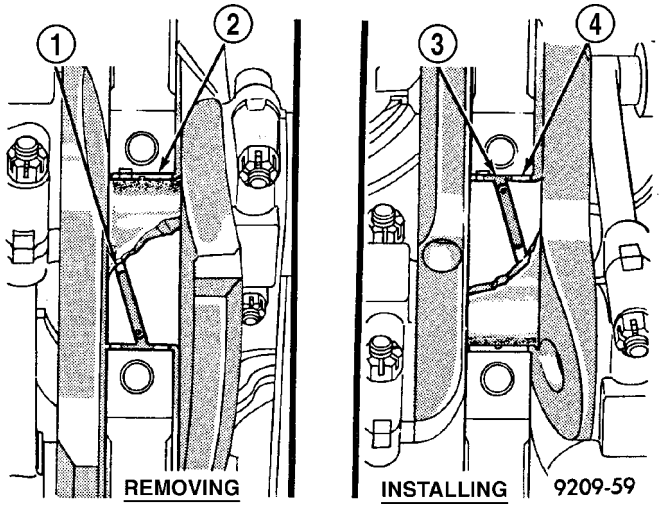


Fig. 89 Removing and Installing Upper Main Bearing With Special Tool C- 3059

1 - SPECIAL TOOL C-3059
2 - BEARING
3 - SPECIAL TOOL C-3059
4 - BEARING

INSTALLATION

Bearing caps are not interchangeable and are marked to insure correct assembly. Upper and lower bearing halves are NOT interchangeable (Fig. 90).

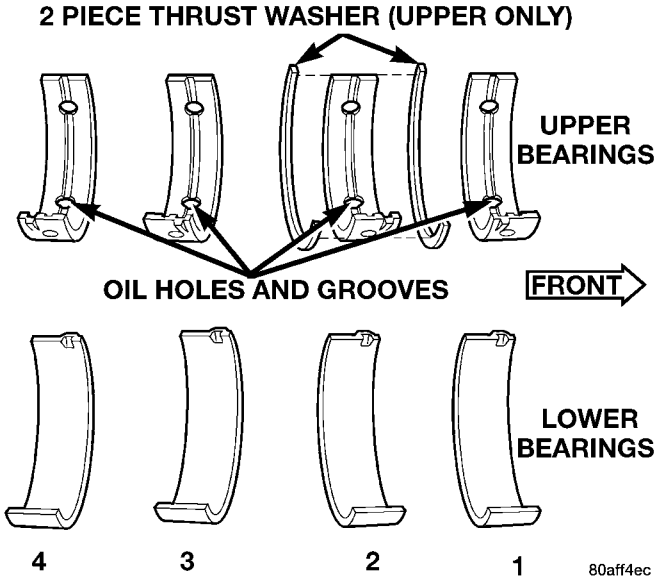


Fig. 90 Main Bearing Identification

CAUTION: Main bearings are select fit. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE)

NOTE: Only one main bearing should be selectively fitted while all other main bearing caps are properly tightened.

When installing a new upper bearing shell, slightly chamfer the sharp edges from the plain side.

(1) Lubricate main bearing with clean engine oil.

(2) Start bearing in place, and insert Main Bearing Tool C-3059 into oil hole of crankshaft (Fig. 89).

(3) Slowly rotate crankshaft counterclockwise sliding the bearing into position. Remove Special Main Bearing Tool C-3059.

NOTE: Lubricate main bearing cap bolts with engine oil before installation.

(4) Lubricate and install lower bearing half and main cap Tighten bolts finger tight.

CRANKSHAFT MAIN BEARINGS (Continued)

(5) For installing thrust washers at the No. 2 main bearing location, use the following procedure:

(a) Move crankshaft forward to limit of travel. Lubricate and install the front thrust washer by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface (Fig. 91).

(b) Move crankshaft rearward to limit of travel. Lubricate and install the rear thrust washer by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface.

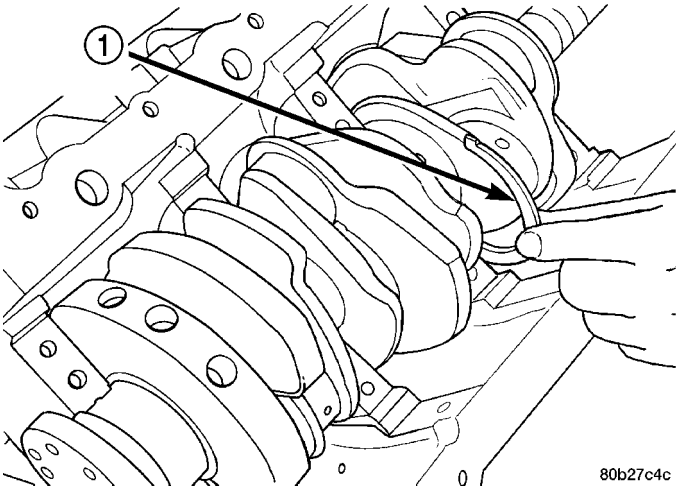


Fig. 91 Thrust Washer Installation

1 - FRONT THRUST WASHER

The main bearing cap bolts must be tightened in the proper sequence. First the inner main cap bolts, secondly the windage tray bolts, lastly the main cap tie (horizontal) bolts.

(6) Install each main bearing cap and tighten inner bolts finger tight.

(7) Tighten inner main bearing cap bolts to 20 N·m + 1/4 turn (15 ft. lbs. + 1/4 turn).

(8) Measure crankshaft end play. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - STANDARD PROCEDURE)

(9) Install windage tray. Lubricate bolts with engine oil and tighten to 27 N·m + 1/4 turn (20 ft. lbs. + 1/4 turn).

(10) Install the main cap tie (horizontal) bolts and tighten to 28 N·m (250 in. lbs.).

(11) Install oil pick-up tube.

(12) Install oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

(13) Fill engine crankcase with proper oil to correct level.

CRANKSHAFT OIL SEAL - FRONT

REMOVAL

(1) Remove the crankshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(2) Tap the dowel pin out of the crankshaft (Fig. 92).

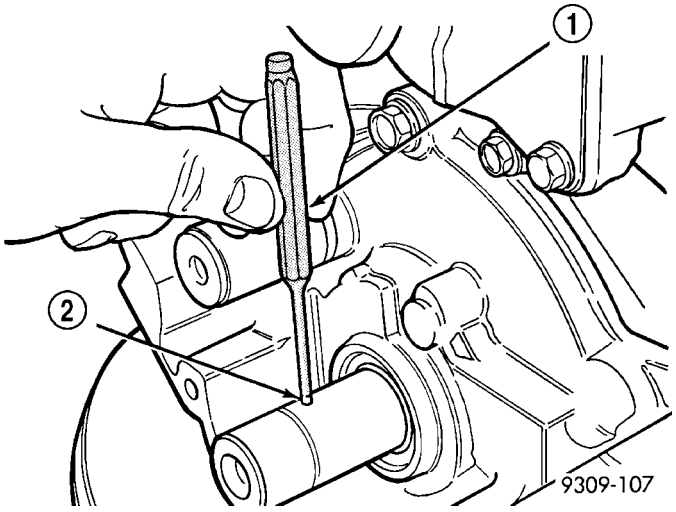


Fig. 92 Crankshaft Sprocket Dowel Pin—Removal/ Installation

1 - PIN PUNCH
2 - DOWEL

CRANKSHAFT OIL SEAL - FRONT (Continued)

(3) Remove crankshaft seal using Special Tool 6341A (Fig. 93).

CAUTION: Do not nick shaft seal surface or seal bore.

(4) Shaft seal lip surface must be free of varnish, dirt or nicks. Polish with 400 grit paper if necessary.

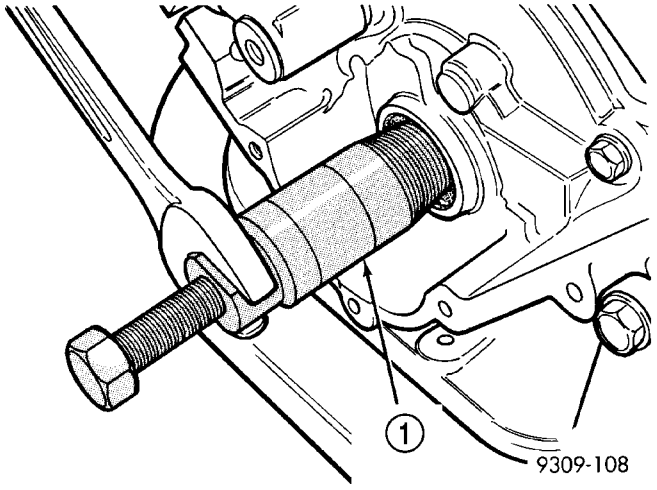


Fig. 93 Crankshaft Oil Seal with Special Tool 6341A—Removal

1 - SPECIAL TOOL 6341A

INSTALLATION

(1) Install crankshaft seal using Special Tool 6342 (Fig. 94).

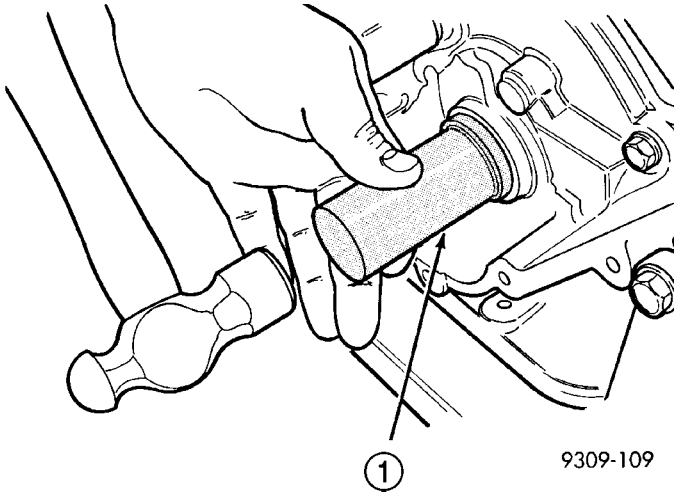


Fig. 94 Crankshaft Oil Seal with Special Tool 6342—Installation

1 - SPECIAL TOOL 6342

(2) Install the dowel pin into the crankshaft to 1.2 mm (0.047 in.) protrusion (Fig. 92).

(3) Install the crankshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

CRANKSHAFT OIL SEAL - REAR

REMOVAL

(1) Remove transaxle from vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - REMOVAL)

(2) Remove drive plate.

(3) Insert a 3/16” wide flat bladed screwdriver between the dust lip and the metal case of the crankshaft seal. Angle the screwdriver (Fig. 95) through the dust lip against the metal case of the seal. Pry out seal.

CAUTION: Do not allow the screwdriver blade to contact the crankshaft seal surface. Contact of the screwdriver blade against crankshaft edge (chamfer) is permitted.

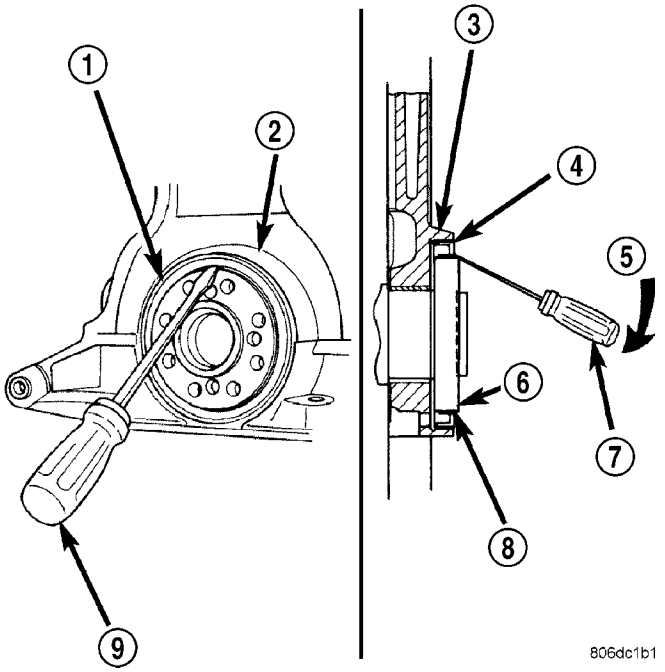


Fig. 95 Rear Crankshaft Oil Seal - Removal

1 - REAR CRANKSHAFT SEAL
2 - ENGINE BLOCK
3 - ENGINE BLOCK
4 - REAR CRANKSHAFT SEAL METAL CASE
5 - PRY IN THIS DIRECTION
6 - CRANKSHAFT
7 - SCREWDRIVER
8 - REAR CRANKSHAFT SEAL DUST LIP
9 - SCREWDRIVER

CRANKSHAFT OIL SEAL - REAR (Continued)

INSTALLATION

CAUTION: If a burr or scratch is present on the crankshaft edge (chamfer), clean surface using 400 grit sand paper to prevent seal damage during installation.

(1) Place Special Tool 6926-1 Guide on crankshaft (Fig. 96). This is a pilot tool with a magnetic base.

(2) Position seal over pilot tool. Assure that lip of seal is facing towards the crankshaft during installation. The pilot tool remains on crankshaft during seal installation.

(3) Using Special Tool 6926-2 Installer, and C-4171 Handle (Fig. 96), drive seal into the retainer housing until seal is flush with housing surface.

(4) Install drive plate and transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - INSTALLATION)

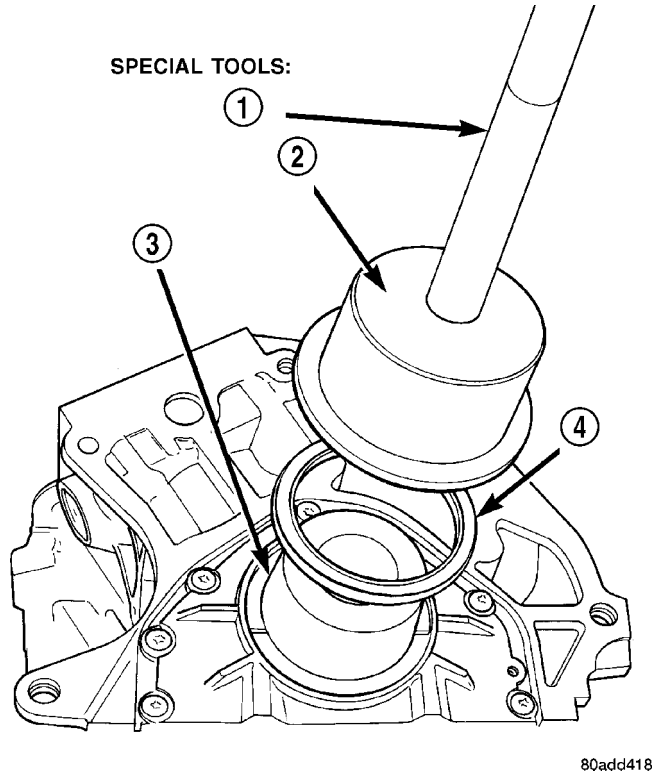


Fig. 96 Crankshaft Rear Seal—Installation

1 - C-4171 HANDLE
2 - 6926–2 INSTALLER
3 - 6926–1 GUIDE
4 - SEAL

CRANKSHAFT REAR OIL SEAL RETAINER

REMOVAL

(1) Remove crankshaft rear oil seal. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL)

(2) Remove oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(3) Remove seal retainer attaching screws.

(4) Remove seal retainer (Fig. 97).

NOTE: Seal retainer gasket is bonded to the retainer and must be replaced as an assembly.

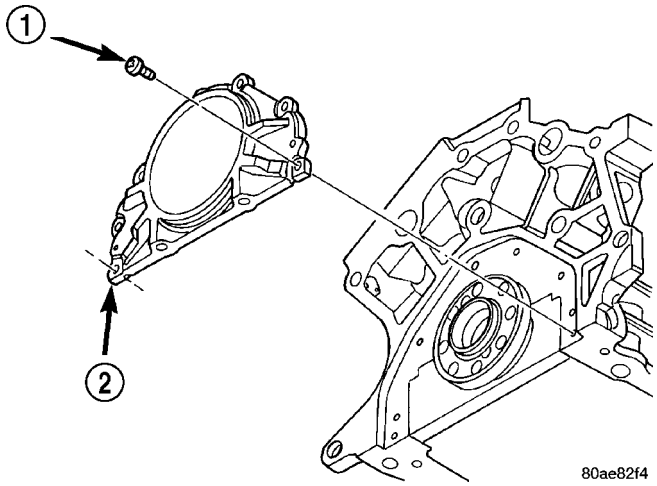


Fig. 97 Oil Seal Retainer

1 - SCREWS (7)
2 - SEAL RETAINER

INSTALLATION

(1) Clean all sealing surfaces. Replace retainer assembly if gasket is torn or damaged.

(2) Install seal retainer to block, but do not tighten attaching screws at this time.

NOTE: The following steps must be performed to prevent oil leaks at sealing joints.

CRANKSHAFT REAR OIL SEAL RETAINER (Continued)

(3) Attach Special Tools 8225 to pan rail using the oil pan fasteners (Fig. 98).

NOTE: Make sure the marking "3.5L" on Special Tools 8225, is facing towards the cylinder block pan rail surface (notch on tool is towards the seal retainer).

(4) While applying firm pressure to the seal retainer against Special Tools 8225 (Fig. 98), tighten seal retainer screws to 12 N·m (105 in. lbs.).

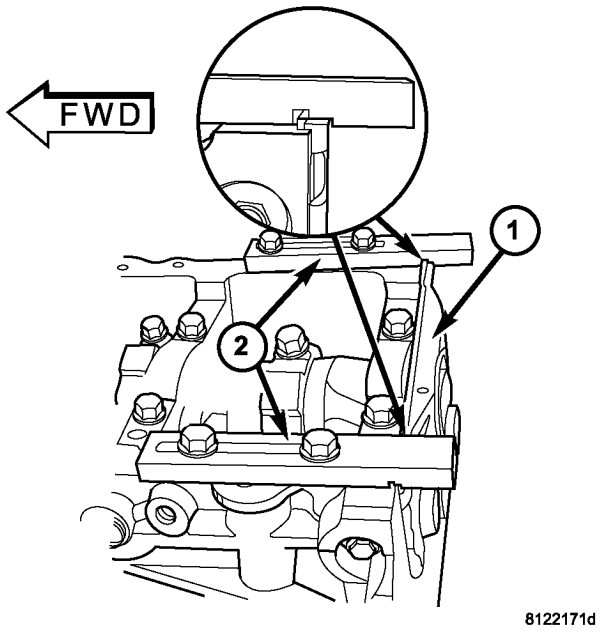


Fig. 98 REAR CRANKSHAFT SEAL RETAINER ALIGNMENT

1 - SEAL RETAINER
2 - SPECIAL TOOLS 8225

(5) Install crankshaft rear oil seal. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION)

(6) Install oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

FLEX PLATE

REMOVAL

(1) Remove the transaxle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - REMOVAL).

(2) Remove flex plate attaching bolts.

(3) Remove the flex plate (Fig. 99).

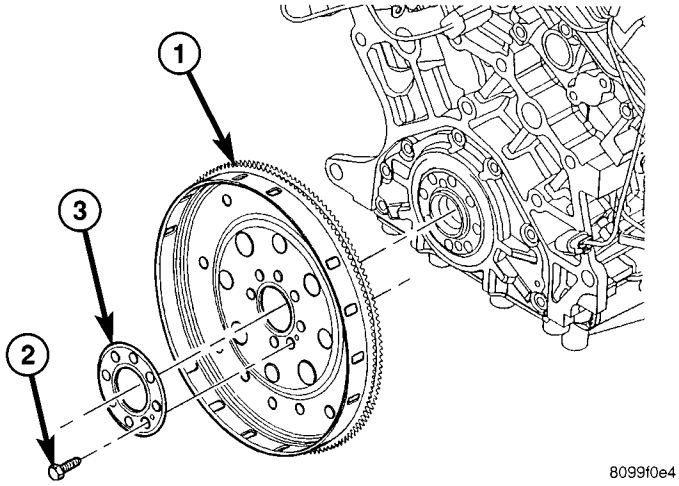


Fig. 99 FLEX PLATE

1 - FLEX PLATE
2 - BOLT (QTY. 8)
3 - BACKING PLATE

INSTALLATION

(1) Position flex plate with backing plate on the crankshaft (Fig. 99).

(2) Apply Mopar® Lock & Seal Adhesive to the flex plate bolts.

(3) Install flex plate bolts (Fig. 99). Tighten bolts to 95 N·m (70 ft. lbs.).

(4) Install the transaxle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - INSTALLATION).

PISTON & CONNECTING ROD

DESCRIPTION

The pistons are made of a high strength aluminum alloy. Top land height has been decreased to reduce emissions. Piston skirts are coated with a solid lubricant for scuff resistance. Connecting rod is forged steel with a fractured connecting rod cap design. The connecting rod is also equipped with a squirt hole and attaches to the piston with a full floating pin retained by lock rings.

OPERATION

The piston and connecting rod assembly is the link between the combustion force and the crankshaft.

PISTON & CONNECTING ROD (Continued)

STANDARD PROCEDURE - FITTING PISTONS

The pistons are machined to two different weight specifications and matched to rods based on weight. All piston and rod assemblies weigh the same to maintain engine balance.

Piston and cylinder wall must be clean and dry. Piston diameter should be measured 90 degrees to piston pin at size location shown in (Fig. 100). Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line (Refer to 9 - ENGINE - SPECIFICATIONS). **Pistons and cylinder bores should be measured at normal room temperature, 70°F (21°C).**

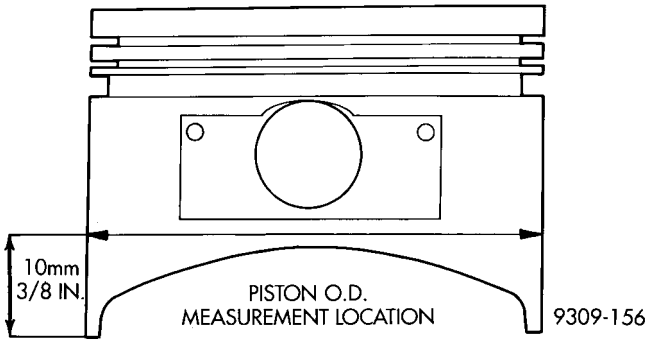


Fig. 100 Piston Measurements

REMOVAL

(1) Remove the cylinder heads (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL)

(2) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(3) Remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation. Pistons and connecting rods must be removed from top of cylinder block. When removing piston and connecting rod assemblies from the engine, rotate crankshaft so that each connecting rod is centered in cylinder bore.**

(4) Inspect connecting rods and connecting rod caps for cylinder identification. Identify them with a paint mark or scribe, if necessary (Fig. 101).

(5) Remove connecting rod cap. Install protectors on connecting rod. (Fig. 104). Push each piston and rod assembly out of cylinder bore.

NOTE: Be careful not to nick crankshaft journals.

(6) After removal, install bearing cap on the mating rod.

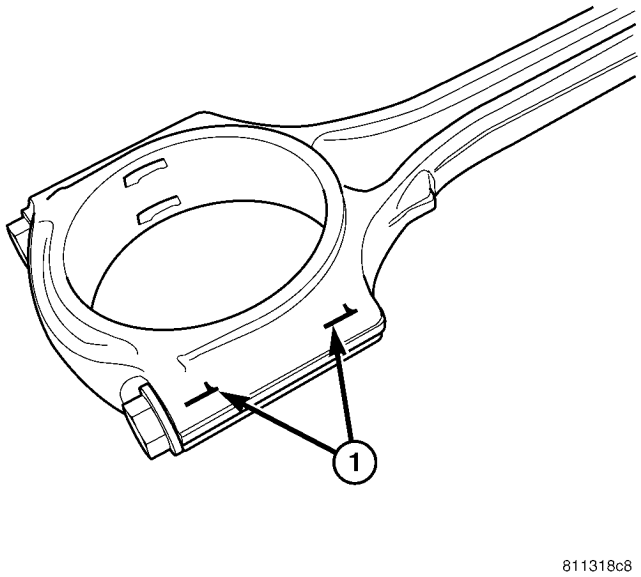


Fig. 101 CONNECTING ROD TO CYLINDER IDENTIFICATION

1 - PAINT MARK OR SCRIBE

INSTALLATION

(1) Install the piston rings. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - INSTALLATION)

NOTE: The connecting rod bearing cap bolts must be examined before reuse. If the threads are necked down, the bolts must be replaced.

(2) Check connecting rod bolts for necking by holding a scale or straight edge against the threads. If all threads do not contact the scale, the bolt must be replaced (Fig. 102).

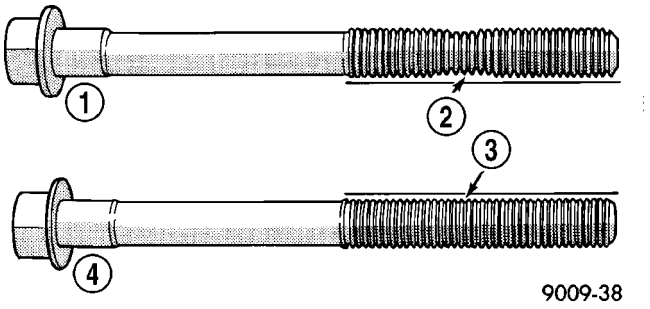


Fig. 102 Check for Stretched Bolts

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

PISTON & CONNECTING ROD (Continued)

(3) Before installing pistons and connecting rod assemblies into the bore, ensure that compression ring gaps are staggered so that neither is in line with oil ring rail gap (Fig. 103).

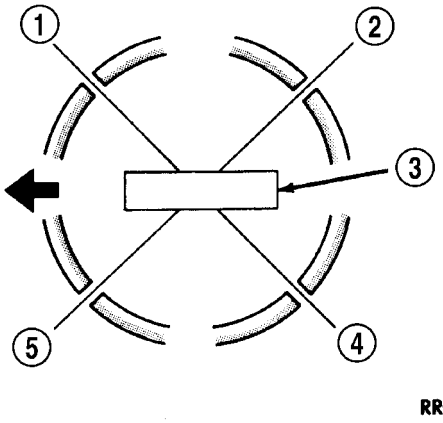


Fig. 103 PISTON RING END GAP POSITION

1 - SIDE RAIL UPPER
2 - NO. 1 RING GAP
3 - PISTON PIN
4 - SIDE RAIL LOWER
5 - NO. 2 RING GAP AND SPACER EXPANDER GAP

(4) Immerse the piston head and rings in clean engine oil, slide the ring compressor over the piston and tighten with the special wrench (Fig. 104). **Ensure position of rings does not change during this operation.**

(5) Install connecting rod bolt protectors on rod bolts (Fig. 104).

(6) Rotate crankshaft so that the connecting rod journal is on the center of the cylinder bore. Insert rod and piston into cylinder bore and guide rod over the crankshaft journal.

CAUTION: Do Not interchange piston assemblies cylinder-to-cylinder or bank-to-bank.

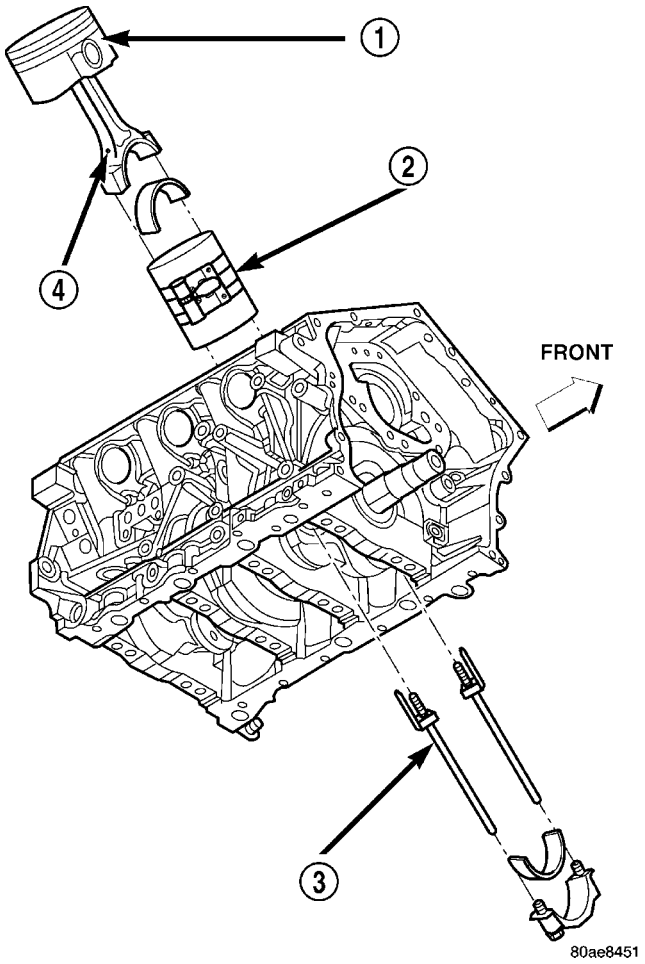


Fig. 104 Piston and Connecting Rod

1 - “F” TOWARD FRONT OF ENGINE
2 - RING COMPRESSOR
3 - SPECIAL TOOL 8189
4 - OIL SQUIRT HOLE

PISTON & CONNECTING ROD (Continued)

(7) The arrow on top of piston must be pointing toward front of engine (Fig. 105) and oil squirt hole on connecting rod faces the major thrust (right) side of the cylinder bore (Fig. 106).

(8) Tap the piston down in cylinder bore, using a hammer handle. At the same time, guide connecting rod into position on connecting rod journal.

(9) Install rod caps. Install cleaned and inspected connecting rod bolts and tighten to 27 N·m (20 ft. lbs.) Plus 1/4 turn.

(10) Install the cylinder head(s) (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION)

(11) Install the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

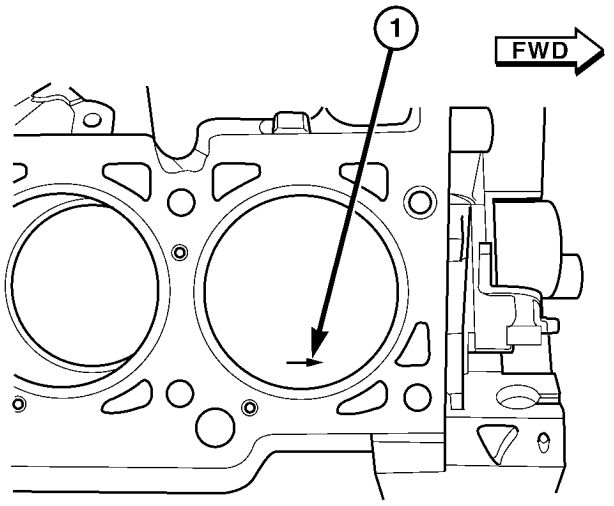


Fig. 105 PISTON ORIENTATION

1 - ARROW FACES FRONT OF ENGINE

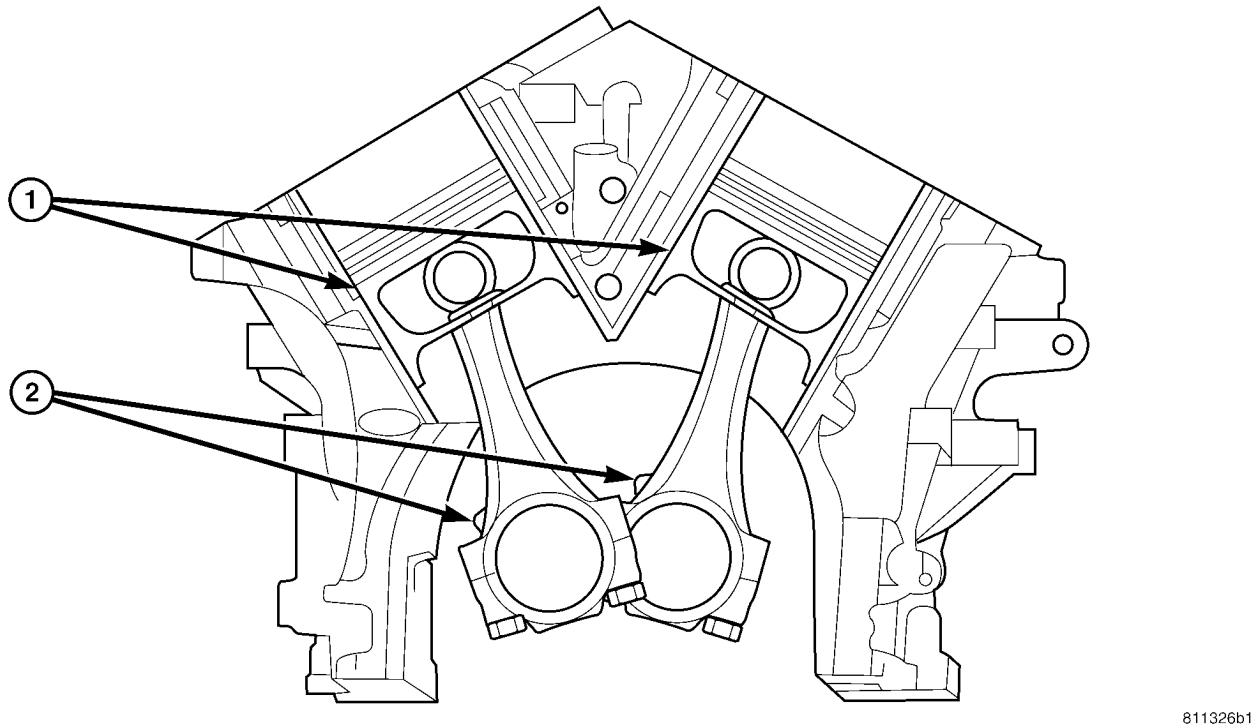


Fig. 106 PISTON AND CONNECTING ROD POSITIONING

1 - MAJOR THRUST SIDE OF PISTON

2 - OIL SQUIRT HOLE

PISTON RINGS

DESCRIPTION

The piston rings include a moly-filled top ring with a symmetrical barrel face. The intermediate piston ring is of the standard chrome design OR Micro-Napier design. The Micro-Napier design has a reduced “hook” on the running face, removes the need for chroming and improves oil economy. The oil control package consists of two steel rails and an expander spacer (Fig. 107).

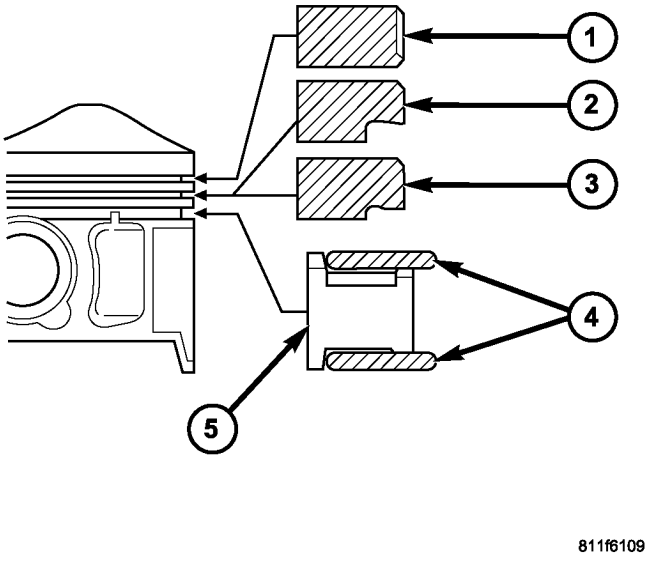


Fig. 107 PISTON RINGS

1 - TOP PISTON RING
2 - CHROME INTERMEDIATE PISTON RING
3 - MICRO-NAPIER INTERMEDIATE PISTON RING
4 - OIL CONTROL RINGS
5 - SPACER

STANDARD PROCEDURE - PISTON RING FITTING

(1) Wipe cylinder bore clean. Insert ring and push down with piston to ensure it is square in bore. The ring gap measurement must be made with the ring positioning at least 12 mm (0.50 in.) from bottom of cylinder bore. Check gap with feeler gauge (Fig. 108). For clearance specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

(2) Check piston ring to groove clearance: (Fig. 109). For clearance specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

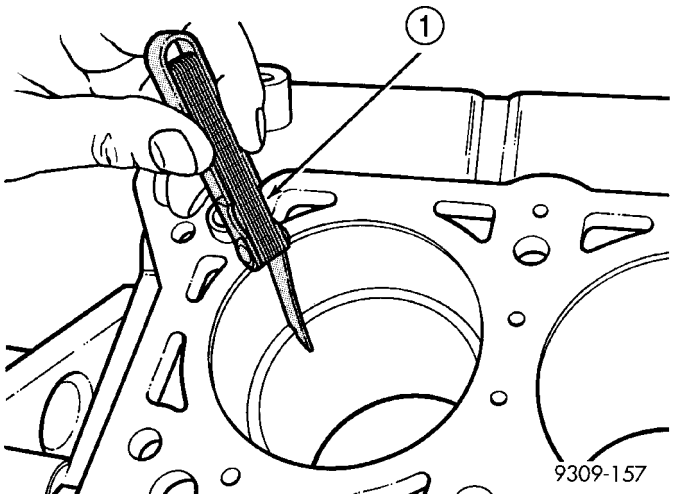


Fig. 108 CHECK GAP ON PISTON RINGS

1 - FEELER GAUGE

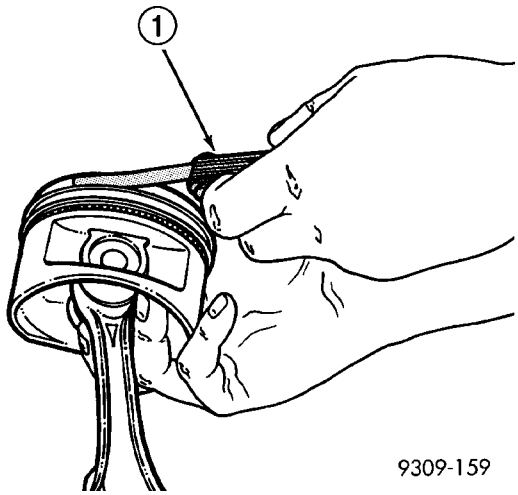


Fig. 109 MEASURING PISTON RING SIDE CLEARANCE

1 - FEELER GAUGE

REMOVAL

(1) Remove piston and connecting rod. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - REMOVAL)

(2) Remove No. 1 and No.2 piston rings from piston using a ring expander tool (Fig. 112).

(3) Remove upper oil ring side rail.

(4) Remove lower oil ring side rail.

(5) Remove oil ring expander

PISTON RINGS (Continued)

INSTALLATION

(1) Measure clearance of piston rings to the cylinder bore and piston. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - STANDARD PROCEDURE)

The No. 1 and No. 2 piston rings have a different cross section (Fig. 110). Insure that which ever design No. 2 ring is installed, it is installed with manufacturers I.D. mark (dot) facing up, towards top of the piston (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - DESCRIPTION) (Fig. 110).

CAUTION: Install piston rings in the following order:

- Oil ring expander.
- Upper oil ring side rail.
- Lower oil ring side rail.
- No. 2 Intermediate piston ring.
- No. 1 Upper piston ring.

(2) Install the side rail by placing one end between the piston ring groove and the expander. Hold end firmly and press down the portion to be installed until side rail is in position. **Do not use a piston ring expander during this step (Fig. 111).**

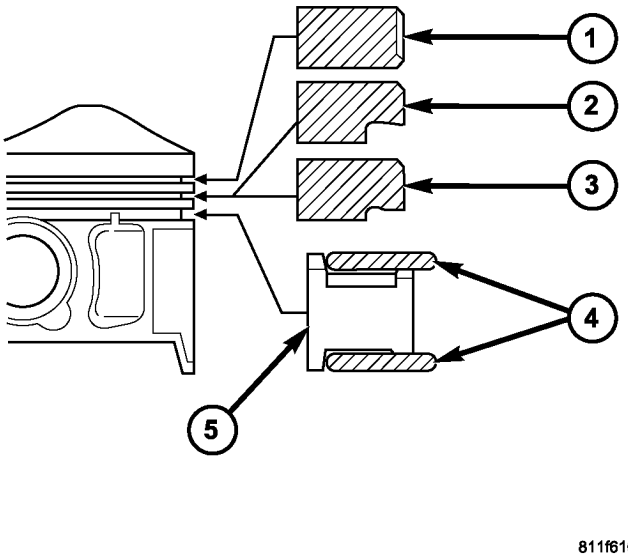


Fig. 110 PISTON RINGS

1 - TOP PISTON RING
2 - CHROME INTERMEDIATE PISTON RING
3 - MICRO-NAPIER INTERMEDIATE PISTON RING
4 - OIL CONTROL RINGS
5 - SPACER

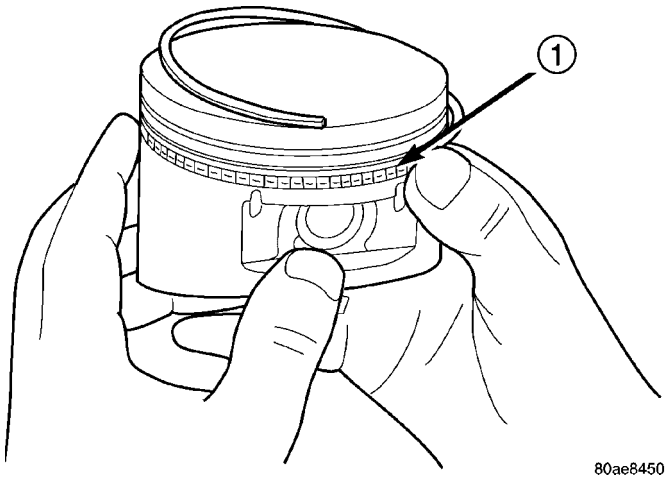


Fig. 111 SIDE RAIL - INSTALLATION

1 - SIDE RAIL END

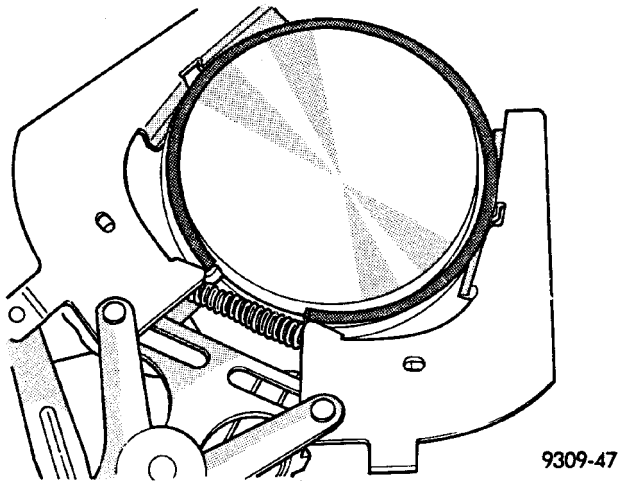


Fig. 112 UPPER AND INTERMEDIATE RINGS

(3) Install upper side rail first and then the lower side rail.

The No. 1 and No. 2 piston rings have a different cross section (Fig. 110). Insure that which ever design No. 2 ring is installed, it is installed with manufacturers I.D. mark (dot) facing up, towards top of the piston (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - DESCRIPTION) (Fig. 110).

(4) Install either No. 2 piston ring and then No. 1 piston ring (Fig. 112).

PISTON RINGS (Continued)

(5) Position piston ring end gaps as shown in (Fig. 113).

(6) Position oil ring expander gap at least 45° from the side rail gaps but **not** on the piston pin center or on the thrust direction. Staggering ring gap is important for oil control.

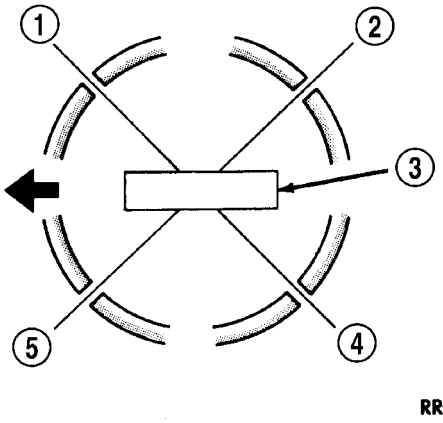


Fig. 113 PISTON RING END GAP POSITION

1 - SIDE RAIL UPPER
2 - NO. 1 RING GAP
3 - PISTON PIN
4 - SIDE RAIL LOWER
5 - NO. 2 RING GAP AND SPACER EXPANDER GAP

STRUCTURAL COVER

REMOVAL

(1) Raise and support the vehicle.

(2) Remove the bolts attaching the structural collar to the oil pan and transmission housing (Fig. 114).

(3) Remove the structural collar.

INSTALLATION

CAUTION: The collar must be tightened using this service procedure, as damage to collar and/or oil pan may occur.

(1) Install structural collar (Fig. 114) using the following tightening sequence:

- Loosely install the collar to oil pan bolts.
- Loosely install the collar to transmission bolts.
- Initial torque bolts to 27 N·m (20 ft. lbs.).
- Final torque bolts to 55 N·m (40 ft. lbs.).

(2) Lower vehicle.

VIBRATION DAMPER

REMOVAL

(1) Disconnect negative battery cable.

(2) Raise vehicle on hoist.

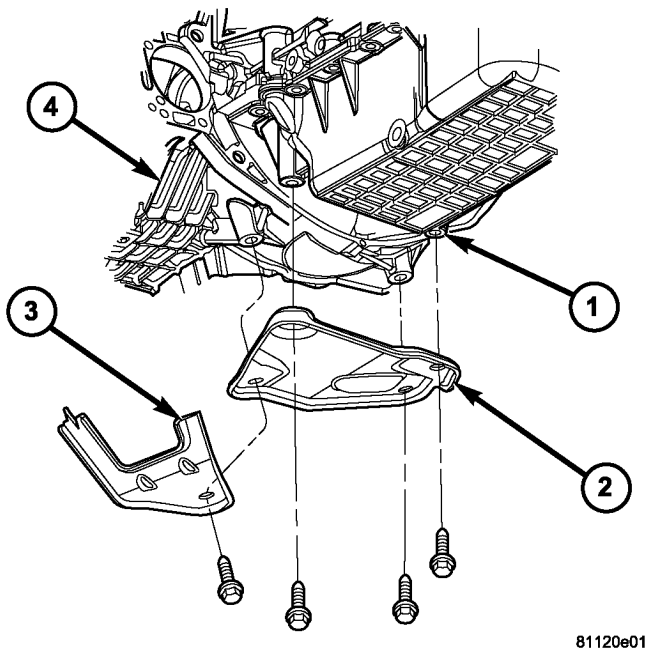


Fig. 114 STRUCTURAL COVER

1 - ENGINE OIL PAN
2 - STRUCTURAL SUPPROT
3 - ENGINE MOUNT BRACKET
4 - TRANSMISSION

(3) Remove the right front wheel and accessory drive belt splash shield.

(4) Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(5) Remove vibration damper bolt.

(6) Use Special Tool 1023 puller, and insert 9020–R, remove crankshaft damper (Fig. 115)

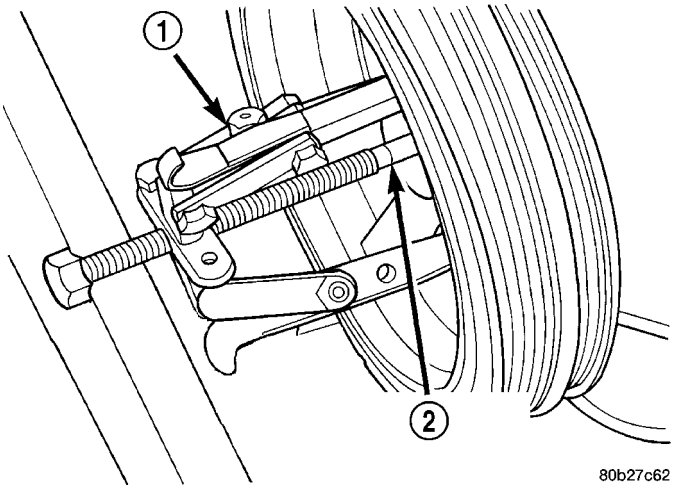


Fig. 115 Crankshaft Damper—Removal

1 - SPECIAL TOOL 1023 PULLER
2 - SPECIAL TOOL 9020-R INSERT

VIBRATION DAMPER (Continued)

INSTALLATION

(1) Install crankshaft damper using Special Tools C-4685-C1 (5.9 in.) Bolt, with Nut and Thrust Bearing from 6792, and 6792-1 Installer (Fig. 116).

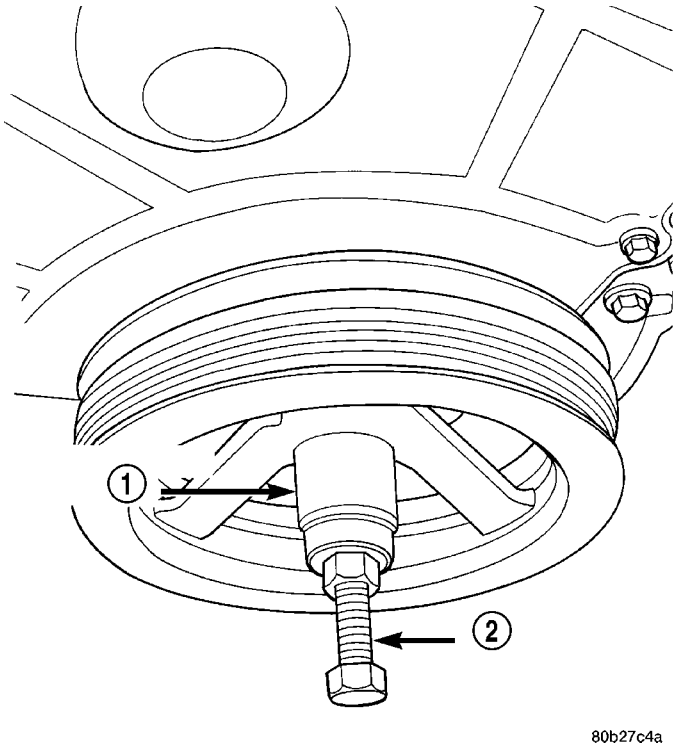


Fig. 116 Crankshaft Damper—Installation

1 - SPECIAL TOOL 6792-1
2 - SPECIAL TOOL C-4685-C1

(2) Install vibration damper bolt. Torque bolt to 95 N·m (70 ft. lbs.).

(3) Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(4) Install the accessory drive belt splash shield and right front wheel.

(5) Lower vehicle.

(6) Connect negative battery cable.

ENGINE MOUNTING

DESCRIPTION

The engine mounting system are of molded rubber material and consist of three mounts; right and a left side support the powertrain, and a front mount control powertrain torque.

UPPER MOUNT

REMOVAL

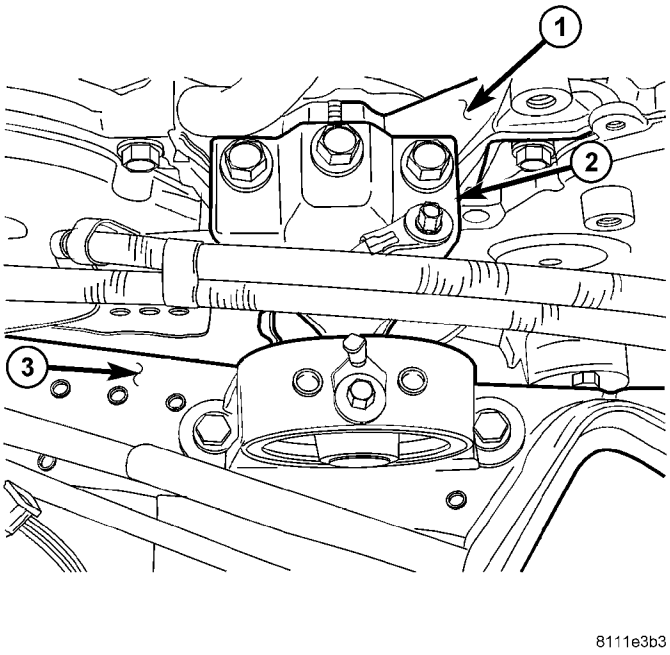


Fig. 117 UPPER ENGINE MOUNT

1 - INTAKE MANIFOLD
2 - UPPER ENGINE MOUNT
3 - FRAME RAIL

(1) Support engine assembly with a floor jack so it will not rotate.

(2) Remove the air cleaner element housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

(3) Remove the upper engine mount bolts from the inner frame rail (Fig. 117).

(4) Remove the upper engine mount bolts from the engine (Fig. 117).

UPPER MOUNT (Continued)

INSTALLATION

(1) Support the engine assembly with a floor jack.
(2) Properly position the upper engine mount and install the retaining bolts (Fig. 118).
(3) Tighten the bolts attached to the intake manifold to 54 N·m (40 lbs. ft.).
(4) Tighten the bolts attached to the inner frame rail to 68 N·m (50 lbs. ft.).
(5) Remove the jack used to support engine assembly.
(6) Install the air cleaner element housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).

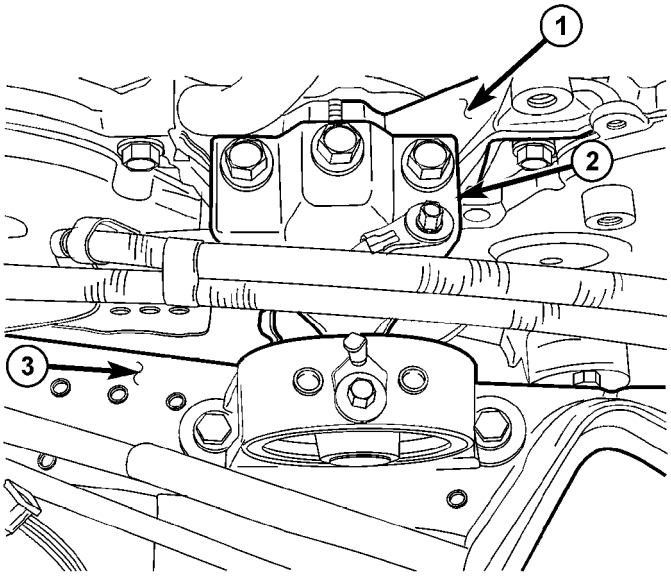


Fig. 118 UPPER ENGINE MOUNT

1 - INTAKE MANIFOLD
2 - UPPER ENGINE MOUNT
3 - FRAME RAIL

LEFT MOUNT

REMOVAL

(1) Disconnect the negative battery cable.
(2) Remove engine cover.
(3) Remove radiator cooling fan assembly (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
(4) Raise and support the vehicle.
(5) Remove both of the engine mount to cradle nuts (Fig. 119).
(6) Lower the vehicle.

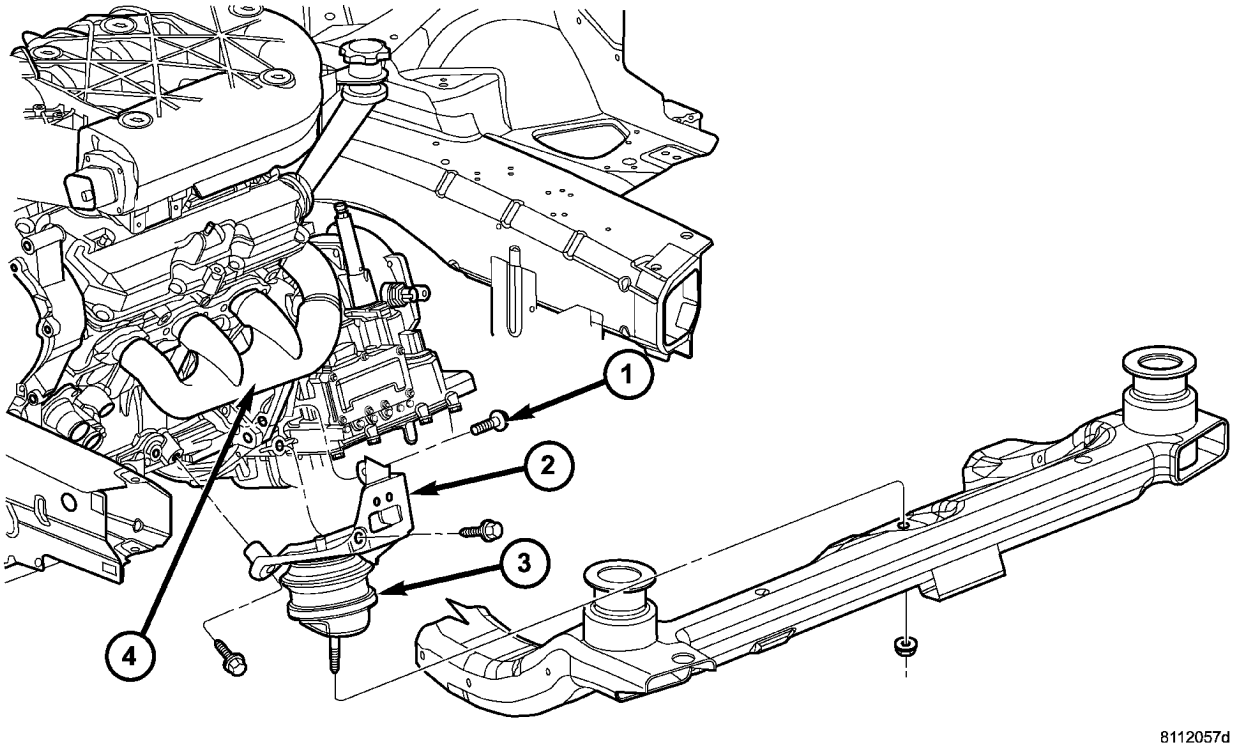


Fig. 119 LEFT ENGINE MOUNT

1 - BOLT
2 - BRACKET
3 - ENGINE MOUNT
4 - LEFT EXHAUST MANIFOLD

LEFT MOUNT (Continued)

(7) Connect the engine suport fixture and support engine weight.

(8) Remove the engine mount bolts and remove mount (Fig. 119).

INSTALLATION

(1) Install engine mount to bracket. Tighten nut to 101 N·m (75 lbs. ft.) (Fig. 120).

(2) Install left mount to the engine block.Tighten bolts to 54 N·m (40 lbs.ft.) (Fig. 120).

(3) Lower vehicle.

(4) Remove the engine support fixture.

(5) Raise and support the vehicle.

(6) Install both of the engine mount to cradle nut. Tighten nut to 101 N·m (75 lbs. ft.) (Fig. 120).

(7) Lower vehicle.

(8) Install radiator fan assembly (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).

(9) Install the engine cover.

(10) Connect the negative battery cable.

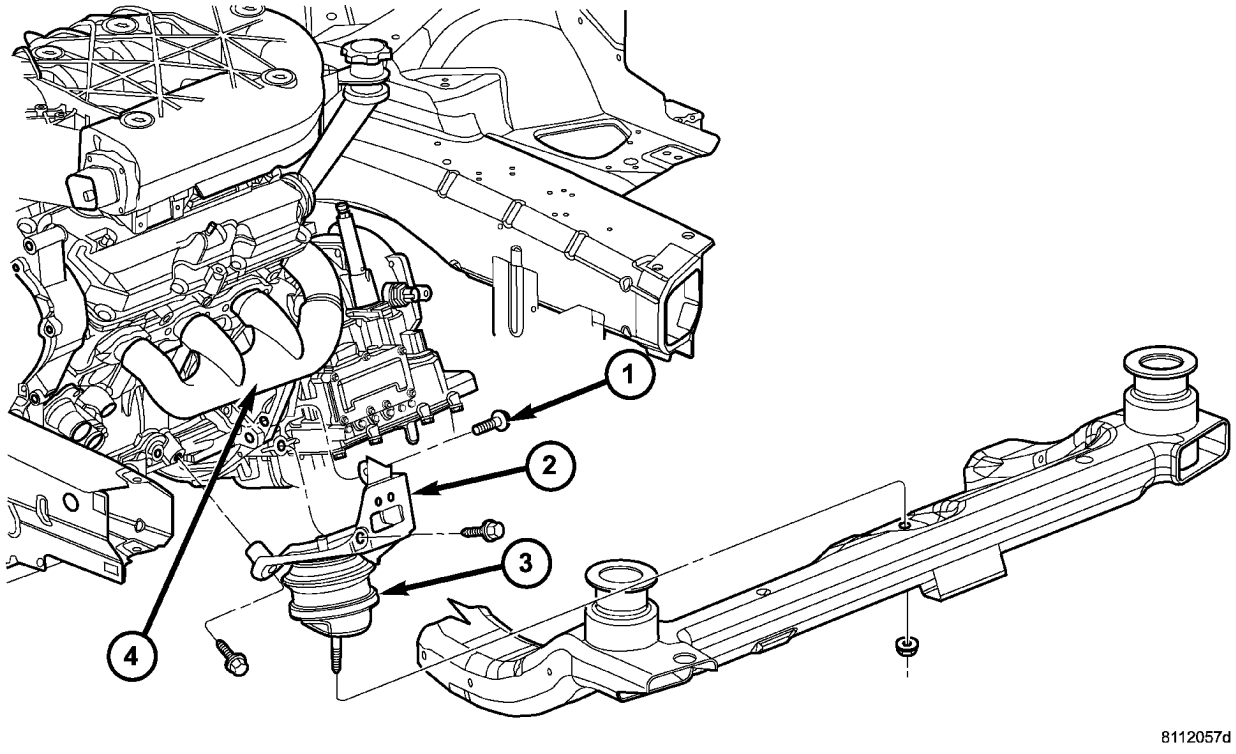


Fig. 120 LEFT ENGINE MOUNT

1 - BOLT
2 - BRACKET
3 - ENGINE MOUNT
4 - LEFT EXHAUST MANIFOLD

RIGHT MOUNT

REMOVAL

(1) Disconnect the negative battery cable.
(2) Raise and support the vehicle.
(3) Remove both of the engine mount to cradle nuts.
(4) Lower the vehicle.
(5) Connect the engine support fixture and support the engine weight.
(6) Raise and support the vehicle.
(7) Remove the right mount bracket bolts (Fig. 121)
(8) Remove the engine mount top nut (Fig. 121).
(9) Remove the engine mount plate and engine mount (Fig. 121).

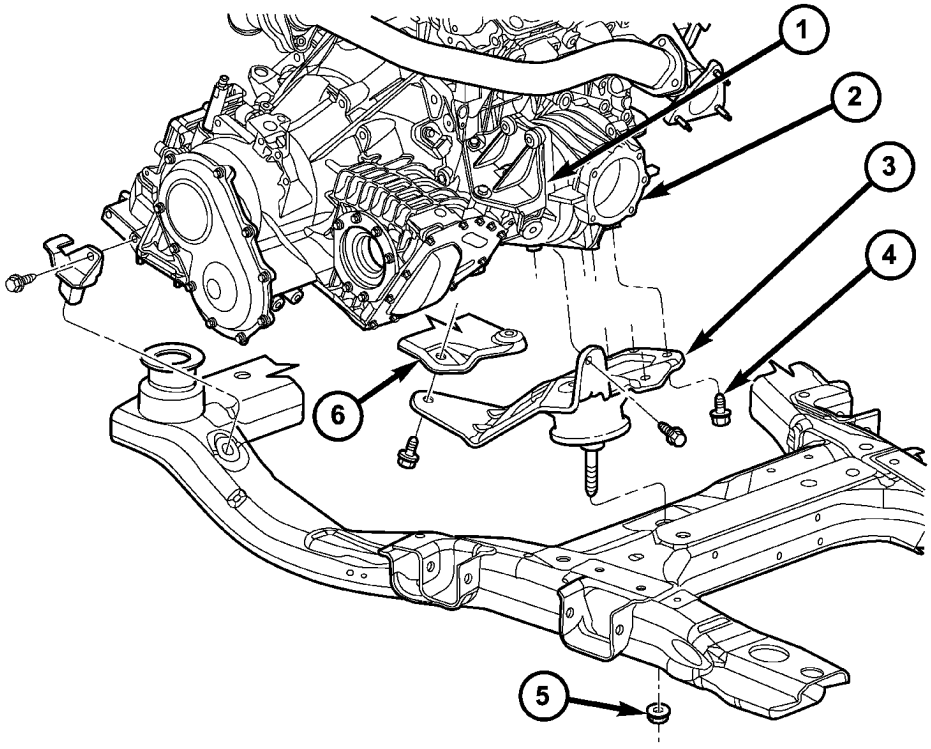


Fig. 121 RIGHT ENGINE MOUNT

1 - POWER TRANSFER UNIT UPPER BRACKET
2 - POWER TRANSFER UNIT
3 - ENGINE MOUNT BRACKET
4 - BOLT
5 - NUT
6 - STRUCTURAL COVER

RIGHT MOUNT (Continued)

INSTALLATION

(1) Install the engine mount and plate.Tighten bolts to 54 N·m (40 lbs. ft.) (Fig. 122).

(2) Install the engine mount upper nut. Tighten nut to 101 N·m (75 lbs. ft.) (Fig. 122).

(3) Install right engine mount bracket bolts.Tighten bolts to 54 N·m (40 lbs. ft.) (Fig. 122).

(4) Lower the vehicle.

(5) Remove the engine support fixture.

(6) Raise and support the vehicle.

(7) Install both lower engine mount to cradle nuts. Tighten nuts to 101 N·m (75 lbs. ft.) (Fig. 122).

(8) Lower vehicle and connect the negative battery cable.

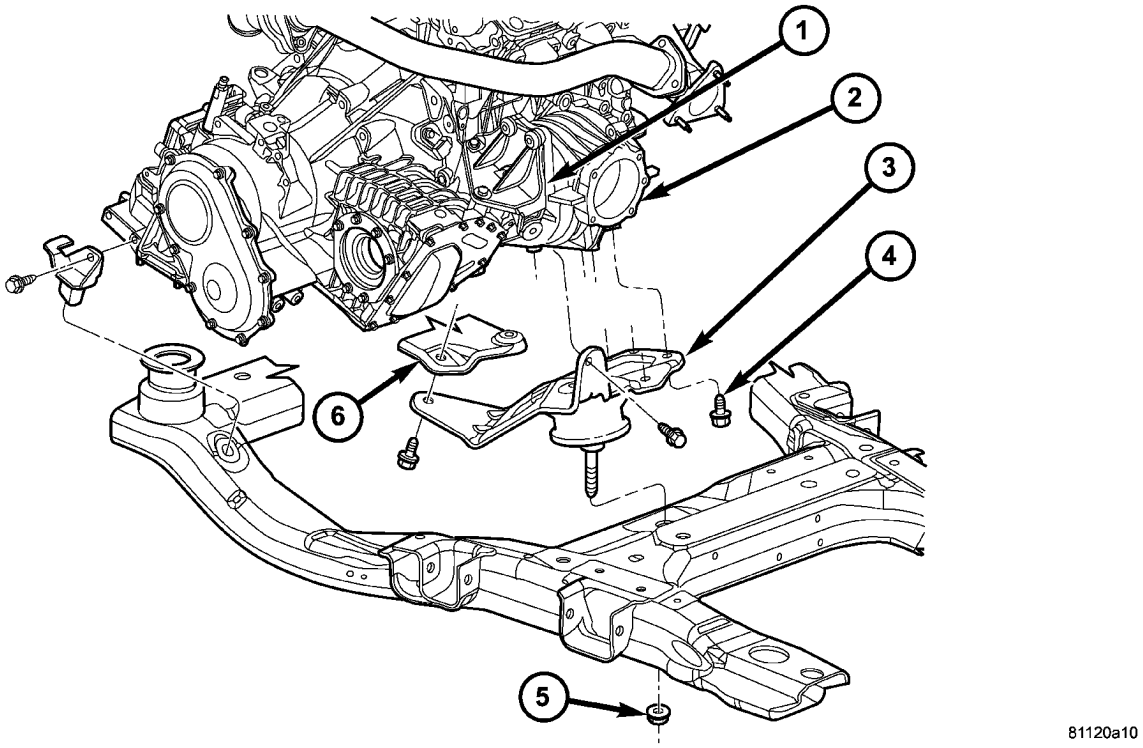


Fig. 122 RIGHT ENGINE MOUNT

1 - POWER TRANSFER UNIT UPPER BRACKET
2 - POWER TRANSFER UNIT
3 - ENGINE MOUNT BRACKET
4 - BOLT
5 - NUT
6 - STRUCTURAL COVER

LUBRICATION

DESCRIPTION

The oil lubrication system (Fig. 123) is a full-flow filtration, pressure feed type. The oil pump body is mounted to the engine block. The pump inner rotor is driven by the crankshaft. A windage tray, increases power by minimizing oil windage at high engine RPM. For increased oil cooling, an oil-to-coolant oil cooler is used.

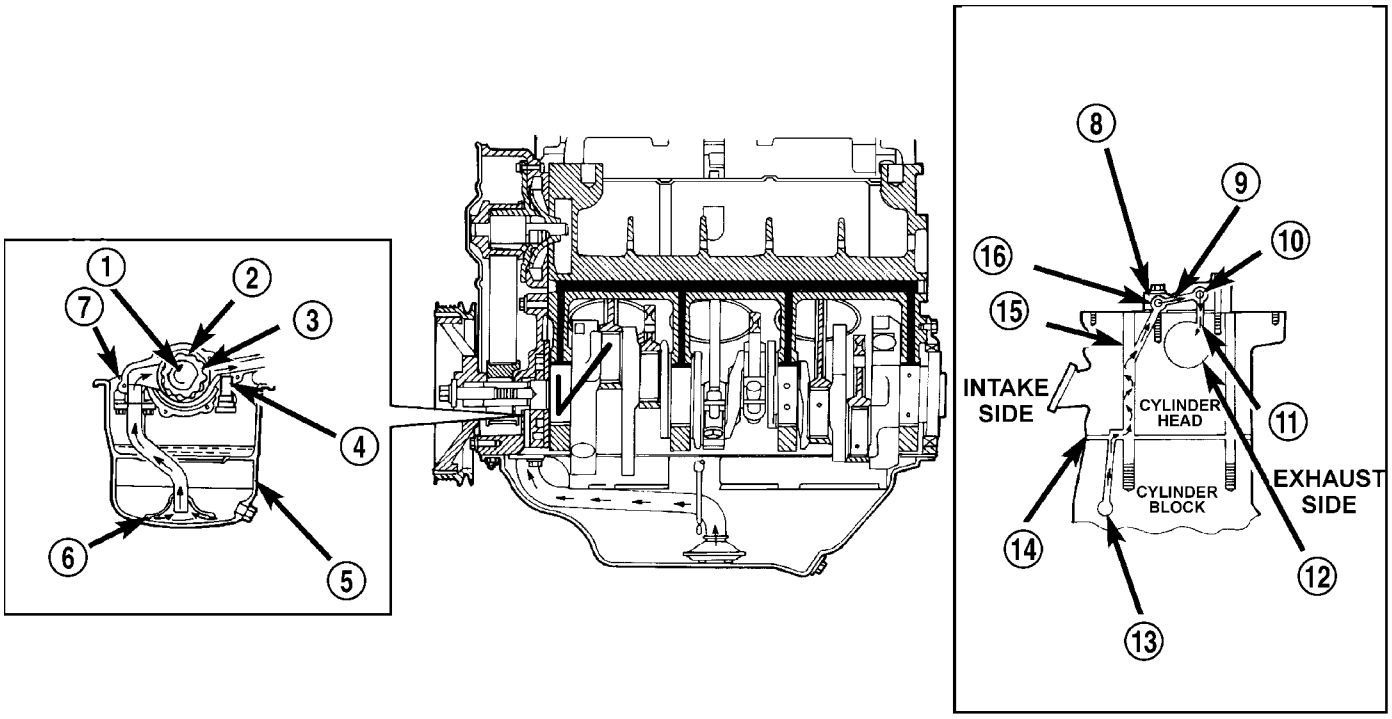


Fig. 123 Oil Lubrication System

1 - CRANKSHAFT
2 - OUTER ROTOR
3 - INNER ROTOR
4 - RELIEF VALVE
5 - OIL PAN
6 - OIL SCREEN
7 - OIL PUMP CASE
8 - OIL FLOWS TO ONLY ONE PEDESTAL ON EACH HEAD - SECOND FROM REAR ON RIGHT HEAD - SECOND FROM FRONT ON LEFT HEAD
9 - PEDESTAL DRILLED PASSAGE
10 - EXHAUST ROCKER SHAFT
11 - SHAFT/PEDESTAL DOWEL PASSAGE
12 - CAMSHAFT BEARING BORE
13 - CYLINDER BLOCK OIL GALLERY
14 - CYLINDER HEAD GASKET
15 - HEAD BOLT HOLE
16 - INTAKE ROCKER SHAFT

LUBRICATION (Continued)

OPERATION

Engine oil stored in the oil pan is drawn in and discharged by a gerotor type oil pump. The oil pump is directly coupled to the crankshaft. Oil pressure is regulated by a relief valve. The oil is fed through an oil filter and to the crankshaft journals from the oil gallery in the cylinder block. This gallery also feeds oil under pressure to the cylinder heads. Oil flows through each cylinder heads oil passage to the rocker shafts. Oil then feeds the camshaft journals, rocker arms, and hydraulic lash adjusters (Fig. 124).

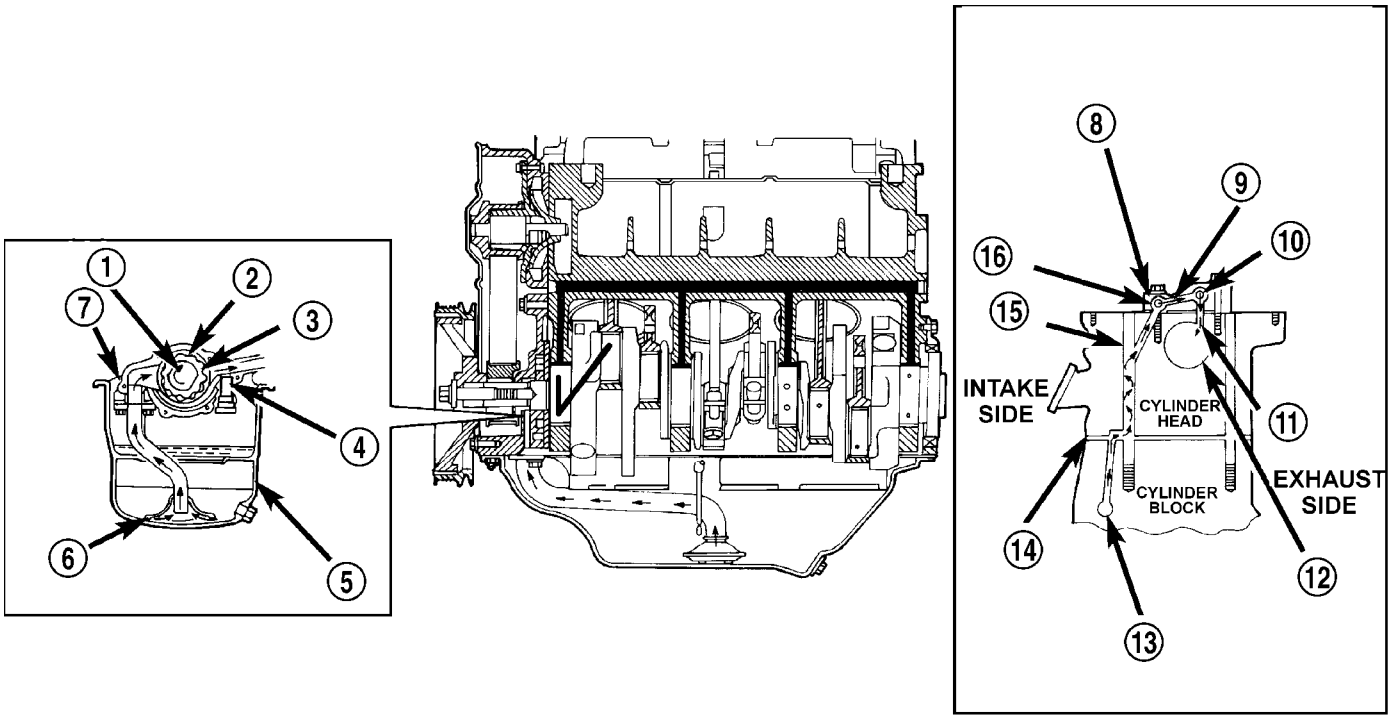


Fig. 124 Oil Lubrication System

1 - CRANKSHAFT
2 - OUTER ROTOR
3 - INNER ROTOR
4 - RELIEF VALVE
5 - OIL PAN
6 - OIL SCREEN
7 - OIL PUMP CASE
8 - OIL FLOWS TO ONLY ONE PEDESTAL ON EACH HEAD - SECOND FROM REAR ON RIGHT HEAD - SECOND FROM FRONT ON LEFT HEAD
9 - PEDESTAL DRILLED PASSAGE
10 - EXHAUST ROCKER SHAFT
11 - SHAFT/PEDESTAL DOWEL PASSAGE
12 - CAMSHAFT BEARING BORE
13 - CYLINDER BLOCK OIL GALLERY
14 - CYLINDER HEAD GASKET
15 - HEAD BOLT HOLE
16 - INTAKE ROCKER SHAFT

LUBRICATION (Continued)

DIAGNOSIS AND TESTING - CHECKING ENGINE OIL PRESSURE

Check oil pressure using a gauge at oil pressure switch (Fig. 125) location.

(1) Remove the oil pressure switch (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/ SWITCH - REMOVAL).

(2) Install oil pressure test gauge, Special Tool C-3292 with Adapter 8406. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).

CAUTION: If oil pressure is 0 at idle, Do Not Run engine at 3000 RPM.

(3) Warm engine to normal operating temperature.

(4) Monitor gauge readings at idle and 3000 rpm. For specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

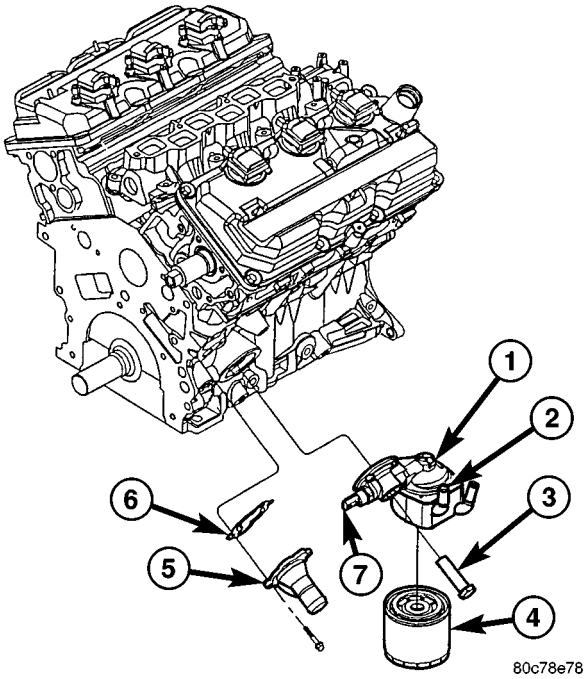


Fig. 125 Engine Oil Cooler and Filter Ad

1 - OIL FILTER ADAPTER
2 - OIL COOLER
3 - FASTENER-OIL FILTER ADAPTER
4 - OIL FILTER
5 - WATER INLET TUBE
6 - GASKET
7 - OIL PRESSURE SENSOR

OIL

DESCRIPTION

For engine oil type and capacity (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION - ENGINE OIL)

STANDARD PROCEDURE

STANDARD PROCEDURE - ENGINE OIL LEVEL CHECK

The best time to check engine oil level is after it has sat overnight, or if the engine has been running, allow the engine to be shut off for at least 5 minutes before checking oil level.

Checking the oil while the vehicle is on level ground will improve the accuracy of the oil level reading. Add only when the level is at or below the ADD mark.

STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE

Change engine oil at mileage and time intervals described in the Maintenance Schedule. (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

OIL (Continued)

TO CHANGE ENGINE OIL

(1) Run engine until achieving normal operating temperature.

(2) Position the vehicle on a level surface and turn engine off.

(3) Open hood, remove engine oil fill cap (Fig. 126).

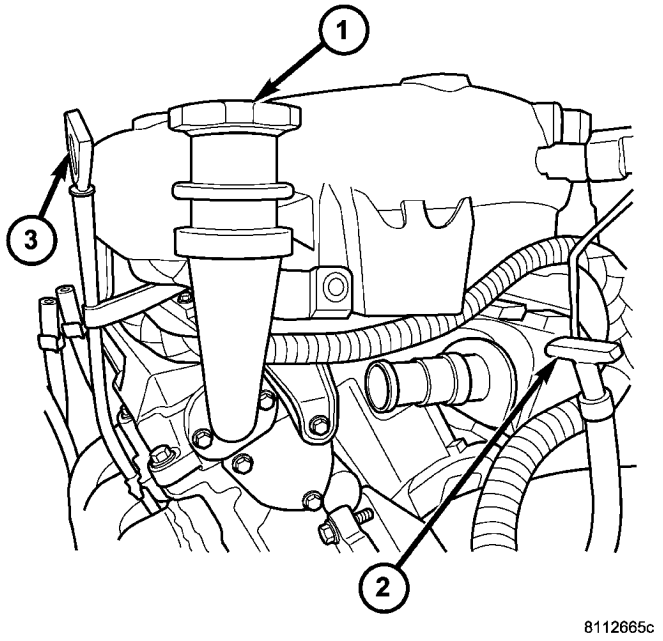


Fig. 126 ENGINE OIL FILL AND LEVEL CHECK

1 - ENGINE OIL FILL CAP
2 - TRANSMISSION FLUID LEVEL INDICATOR
3 - ENGINE OIL LEVEL INDICATOR

(4) Raise vehicle on hoist.

(5) Place a suitable drain pan under crankcase drain.

(6) Remove oil pan drain plug from crankcase and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug and gasket if damaged.

(7) Remove oil filter (Fig. 127).

(8) Install drain plug in crankcase. Torque oil pan drain plug to 27 N·m (20 ft. lbs.).

(9) Install new oil filter (Fig. 127).

(10) Lower vehicle.

(11) Fill crankcase with specified type and amount of engine oil (Fig. 126). (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION - ENGINE OIL) (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS)

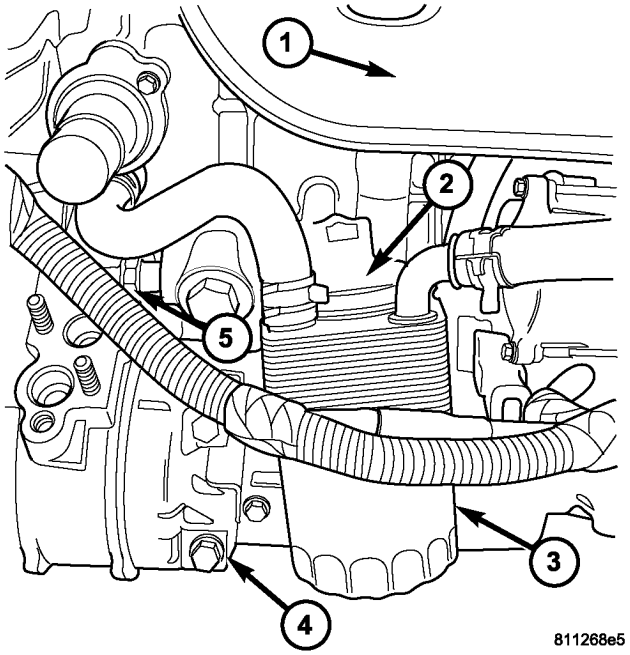


Fig. 127 ENGINE OIL FILTER AND COOLER

1 - EXHAUST MANIFOLD
2 - ENGINE OIL COOLER
3 - ENGINE OIL FILTER
4 - AIR CONDITIONING COMPRESSOR
5 - OIL PRESSURE SENDING UNIT

(12) Install oil fill cap (Fig. 126).

(13) Start engine and inspect for leaks.

(14) Stop engine and inspect oil level.

OIL FILTER SPECIFICATION

All engines are equipped with a high quality full-flow, disposable type oil filter. When replacing oil filter, use a Mopar® filter or equivalent.

USED ENGINE OIL DISPOSAL

Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING above.

ENGINE OIL COOLER

DESCRIPTION

The engine oil cooler is a coolant-to-oil type and is mounted between the oil filter and the oil filter adapter (Fig. 128).

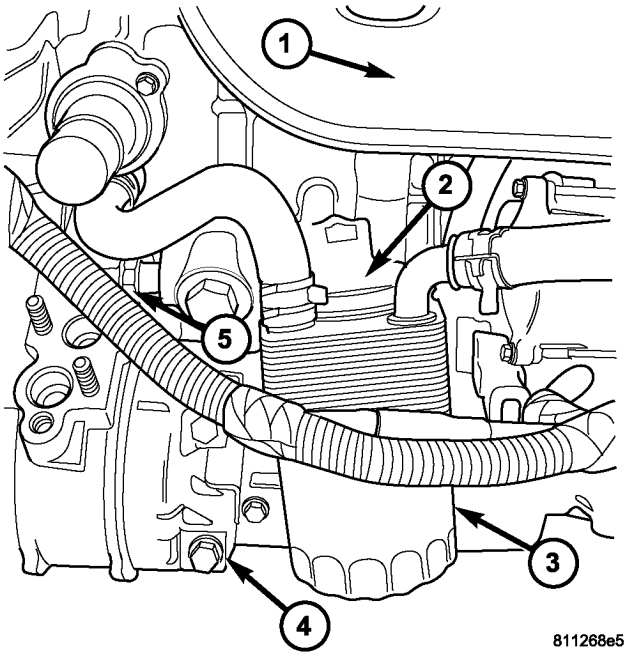


Fig. 128 ENGINE OIL FILTER AND COOLER

1 - EXHAUST MANIFOLD
2 - ENGINE OIL COOLER
3 - ENGINE OIL FILTER
4 - AIR CONDITIONING COMPRESSOR
5 - OIL PRESSURE SENDING UNIT

OPERATION

Engine oil travels from the oil cooler and into the oil filter. Engine oil then exits the filter into the main gallery. Engine coolant flows into the cooler from the heater return tube and exits into the water inlet tube.

REMOVAL

(1) Drain cooling system (Refer to 7 - COOLING/ ENGINE/COOLANT - STANDARD PROCEDURE).
(2) Raise vehicle on hoist.
(3) Disconnect coolant hoses from oil cooler.
(4) Remove oil filter.
(5) Remove oil cooler attaching fastener from center of oil cooler.
(6) Remove oil cooler (Fig. 129).

INSTALLATION

(1) Lubricate seal and position oil cooler to fitting on oil filter adapter (Fig. 130).

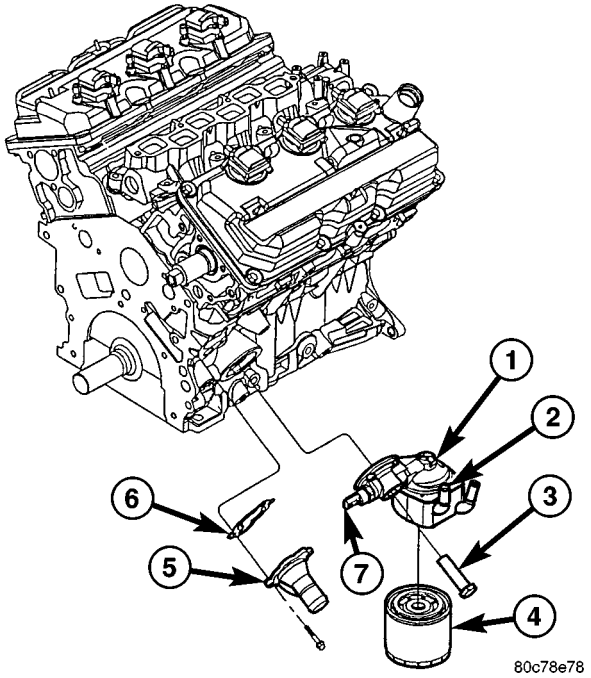


Fig. 129 Engine Oil Cooler and Filter Ad

1 - OIL FILTER ADAPTER
2 - OIL COOLER
3 - FASTENER - OIL FILTER ADAPTER
4 - OIL FILTER
5 - WATER INLET TUBE
6 - GASKET
7 - OIL PRESSURE SENSOR

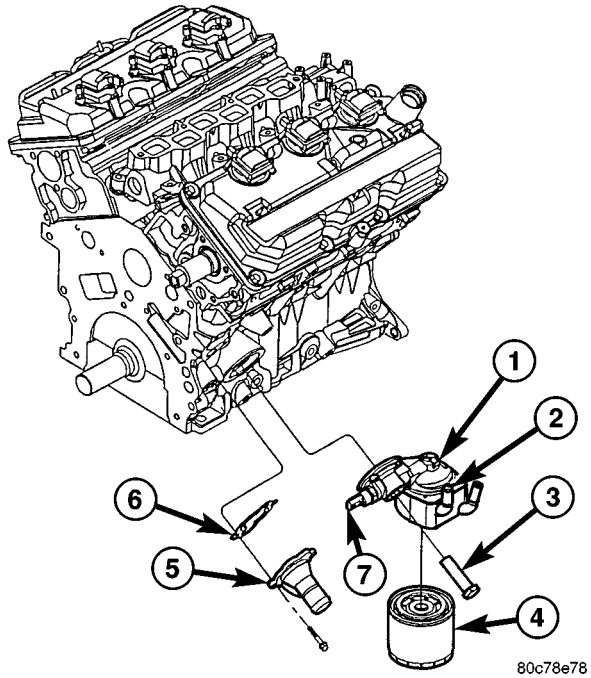


Fig. 130 Engine Oil Cooler and Filter Adapter

1 - OIL FILTER ADAPTER
2 - OIL COOLER
3 - FASTENER - OIL FILTER ADAPTER
4 - OIL FILTER
5 - WATER INLET TUBE
6 - GASKET
7 - OIL PRESSURE SENSOR

ENGINE OIL COOLER (Continued)

NOTE: Position the flat side of oil cooler parallel to oil pan rail.

(2) Install oil cooler attaching fastener and tighten to 54 N·m (40 ft. lbs.).
(3) Install oil filter.
(4) Connect coolant hoses to oil cooler.
(5) Fill cooling system (Refer to 7 - COOLING/ENGINE/COOLANT - STANDARD PROCEDURE).

OIL FILTER

REMOVAL

NOTE: When servicing the oil filter, avoid deforming the filter can. Install the remove/install tool band strap against the base lock seam. The lock seam joining the can to the base is reinforced by the base plate.

(1) Using a suitable oil filter wrench, unscrew filter from base and discard (Fig. 131).

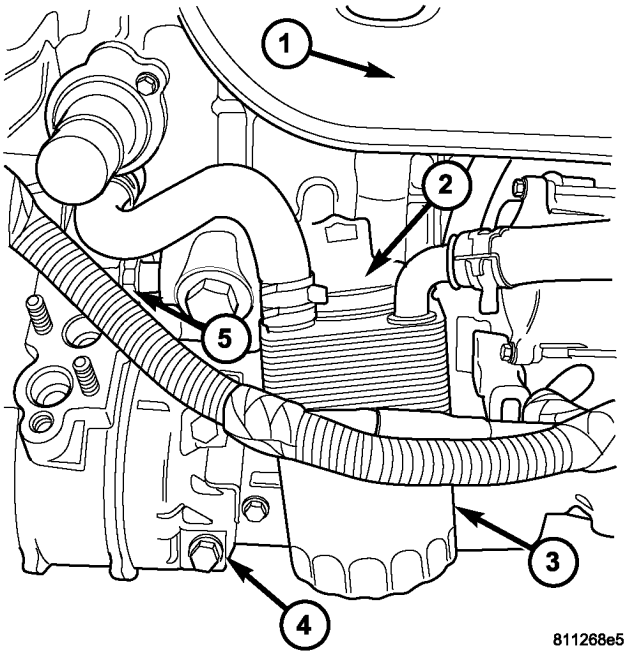


Fig. 131 ENGINE OIL FILTER AND COOLER

1 - EXHAUST MANIFOLD
2 - ENGINE OIL COOLER
3 - ENGINE OIL FILTER
4 - AIR CONDITIONING COMPRESSOR
5 - OIL PRESSURE SENDING UNIT

INSTALLATION

(1) Wipe base clean, then inspect gasket contact surface.
(2) Lubricate gasket of new filter with clean engine oil.
(3) Install and tighten filter to 16 N·m (12 ft. lbs.) of torque after gasket contacts base (Fig. 132). Use filter wrench if necessary.
(4) Start engine and check for leaks.

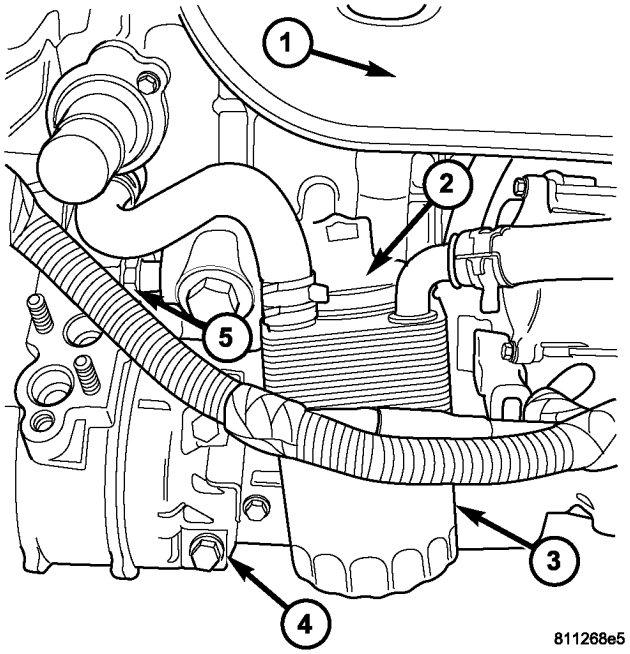


Fig. 132 ENGINE OIL FILTER AND COOLER

1 - EXHAUST MANIFOLD
2 - ENGINE OIL COOLER
3 - ENGINE OIL FILTER
4 - AIR CONDITIONING COMPRESSOR
5 - OIL PRESSURE SENDING UNIT

OIL FILTER ADAPTER

REMOVAL

(1) Raise vehicle on hoist.
(2) Remove the oil filter.
(3) Remove oil cooler attaching fastener from center of oil cooler.
(4) Reposition oil cooler.
(5) Disconnect oil pressure switch electrical connector.
(6) Remove oil filter adapter attaching bolt (Fig. 133).

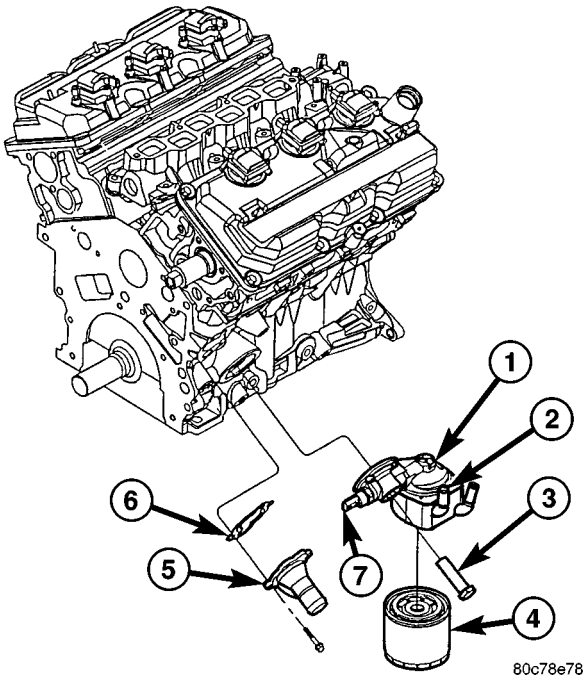


Fig. 133 Engine Oil Cooler and Filter Ad

1 - OIL FILTER ADAPTER
2 - OIL COOLER
3 - FASTENER-OIL FILTER ADAPTER
4 - OIL FILTER
5 - WATER INLET TUBE
6 - GASKET
7 - OIL PRESSURE SENSOR

INSTALLATION

(1) Clean oil filter adapter sealing surfaces and install new seal.
(2) Position adapter on engine block and install attaching bolt (Fig. 134).Tighten bolt to 40 N·m (30 lbs. ft.).
(3) Connect oil pressure switch electrical connector.
(4) Install oil cooler.
(5) Install the oil filter.
(6) Lower vehicle on hoist.
(7) Start engine and allow to run approximately 2 minutes.
(8) Turn off engine and check oil level. Adjust oil level as necessary.

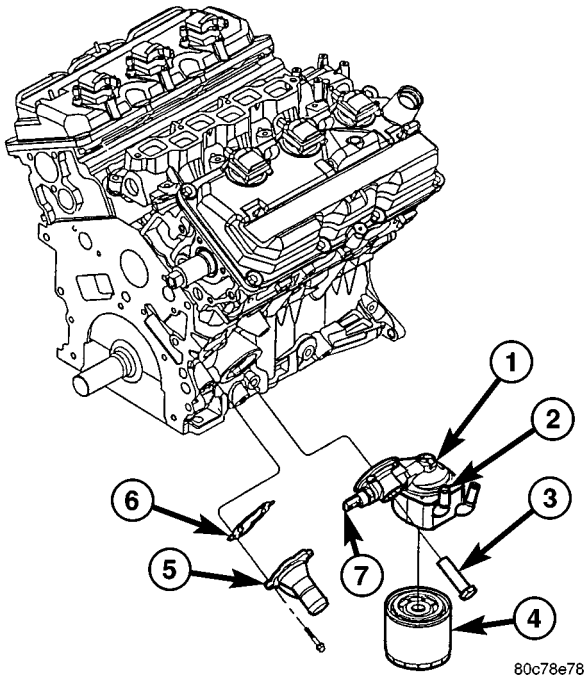


Fig. 134 Engine Oil Cooler and Filter Ad

1 - OIL FILTER ADAPTER
2 - OIL COOLER
3 - FASTENER-OIL FILTER ADAPTER
4 - OIL FILTER
5 - WATER INLET TUBE
6 - GASKET
7 - OIL PRESSURE SENSOR

OIL PAN

REMOVAL

(1) Disconnect negative battery cable.
(2) Remove radiator close out panel.
(3) Remove radiator core support.
(4) Remove radiator cooling fans.
(5) Remove the engine oil indicator.

NOTE: It is not necessary to recover the refrigerant from the refrigerant system to perform this procedure.

(6) Remove the top air conditioning compressor bolts.
(7) Raise and support the vehicle.

NOTE: It is not necessary to recover the refrigerant from the refrigerant system to perform this procedure.

(8) Remove the lower air conditioning compressor mounting bolts and reposition the compressor with a suitable retaining strap.

OIL PAN (Continued)

(9) Remove the air conditioning compressor bracket

(10) Remove structural collar from oil pan and transmission housing (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - REMOVAL).

(11) Remove the inspection shield between the transmission and oil pan.

(12) Drain engine oil.

(13) Remove oil pan fasteners. Remove oil pan (Fig. 135).

NOTE: A small amount of oil will remain in the oil pan. Use care when removing the oil pan from the engine.

(14) Remove oil pan gasket.

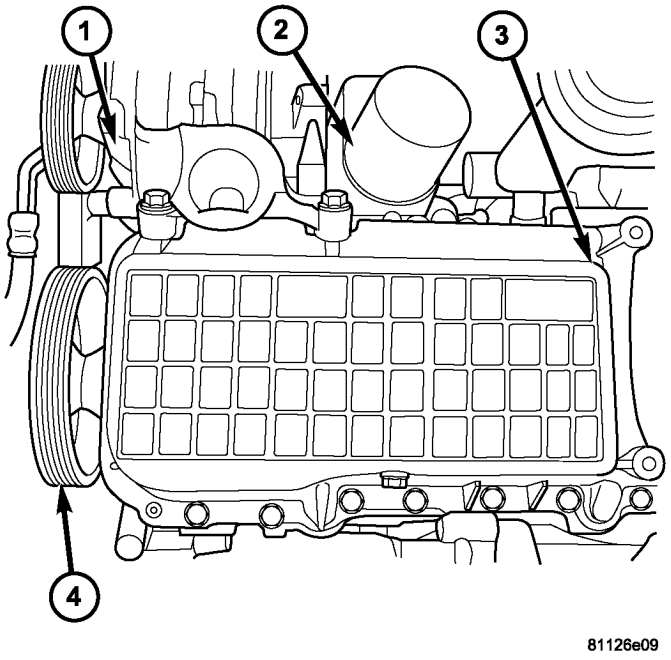


Fig. 135 OIL PAN

1 - AIR CONDITIONING COMPRESSOR
2 - OIL FILTER
3 - OIL PAN
4 - VIBRATION DAMPER

INSTALLATION

(1) Clean oil pan and all gasket surfaces.

(2) Apply a 1/8 inch bead of Mopar® Engine RTV GEN II at the parting line of the oil pump housing and the rear seal retainer (Fig. 136).

(3) Install oil pan gasket to the engine block.

(4) Install pan while aligning the oil level indicator tube and attach fasteners finger tight.

(5) First tighten the M8 oil pan alignment bolt (1) to 28N·m (250 lbs. in.), then tighten alignment pan bolt (3) to 28N·m (250 lbs. in.) (Fig. 137).

(6) Tighten the remaining M8 bolts and M8 nuts to 28 N.m (250 in. lbs.) starting on the oppisite side of the oil pan, then the M6 bolts to 12 N.m (105 in. lbs.) (Fig. 137).

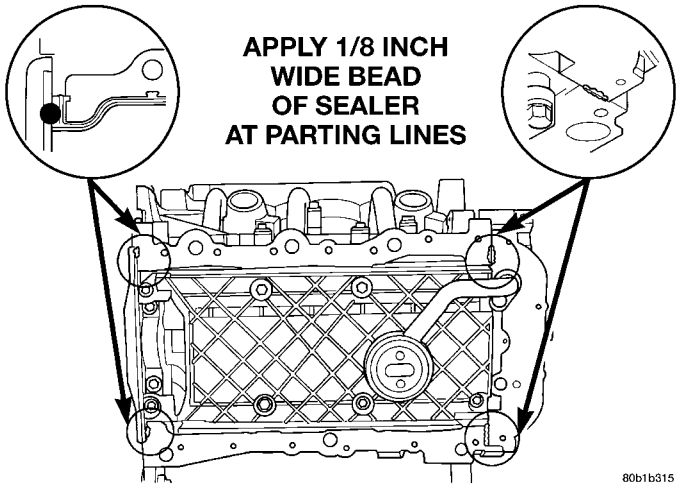


Fig. 136 OIL PAN SEALING - TYPICAL

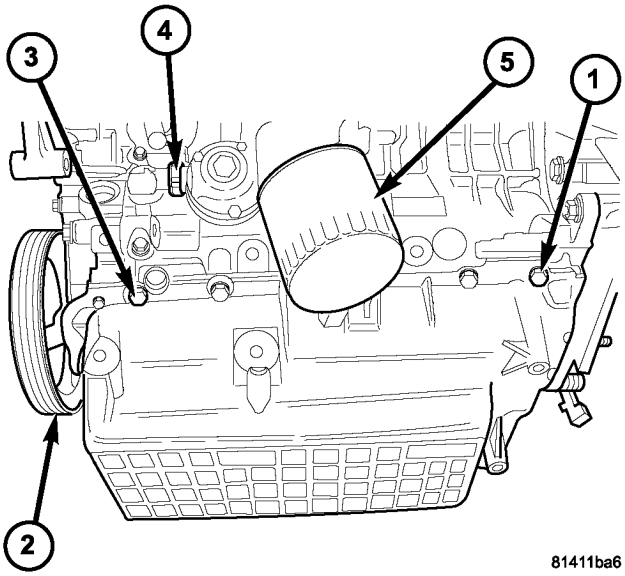


Fig. 137 OIL PAN ALIGNMENT BOLTS

1 - M8 OIL PAN ALIGNMENT BOLT
2 - VIBRATION DAMPER
3 - M8 OIL PAN ALIGNMENT BOLT
4 - OIL PRESSURE SENDING UNIT
5 - OIL FILTER

(7) Install inspection shield between the engine block and transmission bell housing.

(8) Install the structural collar (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION).

(9) Install the A/C compressor mounting bracket bolts. Tighten bolts to 54 N.m (40 ft. lbs.).

(10) Install the lower A/C compressor and mounting bolts. Tighten bolts to 28 N.m (250 in. lbs.).

OIL PAN (Continued)

(11) Lower vehicle.
(12) Install the upper A/C compressor mounting bolts. Tighten bolts to 28 N.m (250 in. lbs.).
(13) Install the oil indicator.
(14) Install radiator fans, core support and close out panel.
(15) Fill engine crankcase with proper oil to correct level.
(16) Connect negative battery cable.

OIL PRESSURE RELIEF VALVE

REMOVAL

(1) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
(2) To remove the relief valve, proceed as follows:
(a) Remove the cotter pin that retains the retainer cap.
(b) Drill a 3.175 mm (1/8 inch.) hole into the relief valve retainer cap
(c) Insert a self-threading sheet metal screw into cap.
(d) Using a suitable slide hammer tool, remove retainer cap. Discard retainer cap
(e) Remove spring and relief valve (Fig. 138).

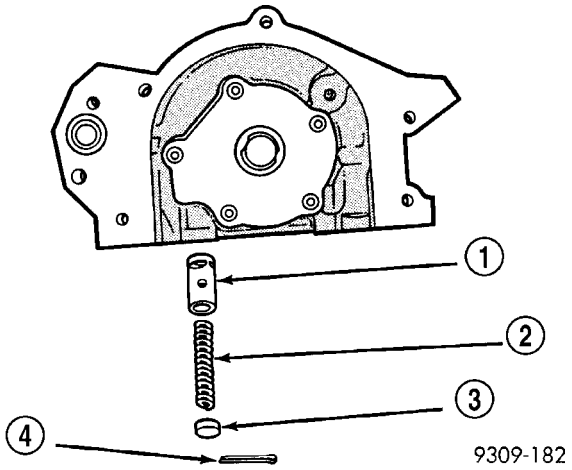


Fig. 138 Oil Pressure Relief Valve

1 - RELIEF VALVE
2 - SPRING
3 - RETAINER CAP
4 - COTTER PIN

INSPECTION

(1) Inspect oil pressure relief valve plunger for scoring and free operation in its bore. Small marks may be removed with 400-grit wet or dry sandpaper.
(2) The relief valve spring has a free length of approximately 49.5 mm (1.95 in.) it should test between 101-110 N (23-25 lbs.) when compressed to 34 mm (1.34 in.). Replace spring that fails to meet specifications.

INSTALLATION

(1) Lubricate relief valve with oil.

CAUTION: The pressure relief valve must be installed as shown in (Fig. 139), or engine damage may occur.

(2) Install valve, spring and retainer cap.
(3) Install new cotter pin.
(4) Install the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

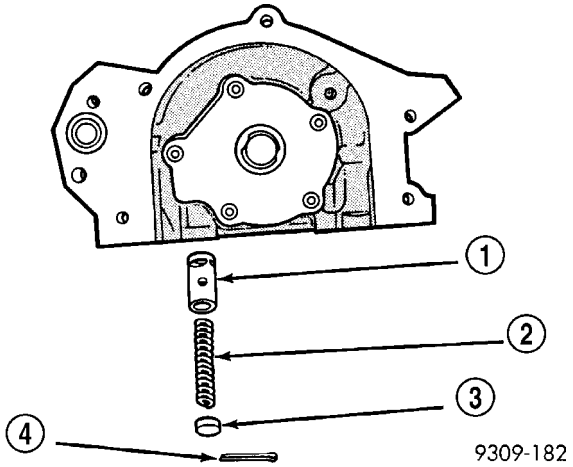


Fig. 139 Oil Pressure Relief Valve

1 - RELIEF VALVE
2 - SPRING
3 - RETAINER CAP
4 - COTTER PIN

SWITCH-OIL PRESSURE SENSOR

REMOVAL

(1) Raise vehicle on hoist.
(2) Position an oil collecting container under switch location.
(3) Disconnect electrical connector.
(4) Unscrew oil pressure switch from oil filter adapter (Fig. 140).

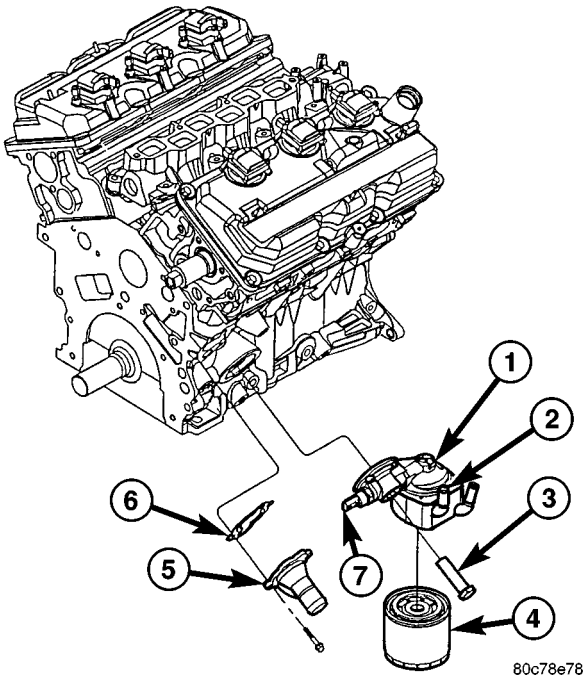


Fig. 140 Engine Oil Cooler and Filter Ad

1 - OIL FILTER ADAPTER
2 - OIL COOLER
3 - FASTENER - OIL FILTER ADAPTER
4 - OIL FILTER
5 - WATER INLET TUBE
6 - GASKET
7 - OIL PRESSURE SENSOR

INSTALLATION

(1) Apply Mopar® Thread Sealant to the switch threads.
(2) Install oil pressure switch to fitting (Fig. 141).
(3) Connect electrical connector.
(4) Lower vehicle.
(5) Start engine and check for leaks.
(6) Check engine oil level and adjust as neccessary.

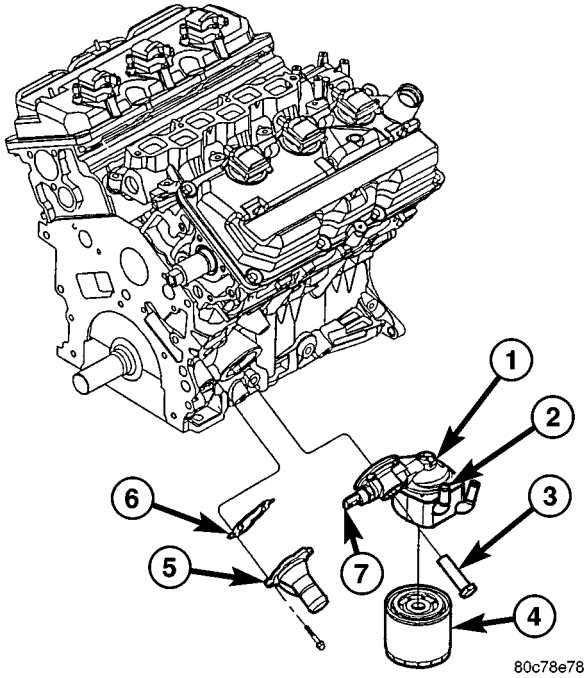


Fig. 141 Engine Oil Cooler and Filter Ad

1 - OIL FILTER ADAPTER
2 - OIL COOLER
3 - FASTENER - OIL FILTER ADAPTER
4 - OIL FILTER
5 - WATER INLET TUBE
6 - GASKET
7 - OIL PRESSURE SENSOR

OIL PUMP

REMOVAL

It is necessary to remove the oil pump body to service the oil pump rotors.

The oil pump pressure relief valve can be serviced by removing the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE RELIEF VALVE - REMOVAL)

(1) Drain the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)
(2) Remove the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)
(3) Remove the crankshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

OIL PUMP (Continued)

(4) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
(5) Remove the oil pickup tube.
(6) Remove the oil pump fasteners. Remove pump and gasket from engine (Fig. 142).

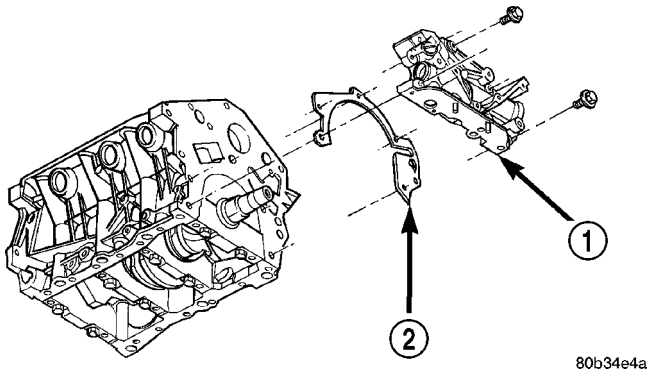


Fig. 142 OIL PUMP

1 - OIL PUMP
2 - GASKET

DISASSEMBLY

(1) To remove the relief valve, proceed as follows:
(2) Remove cotter pin. Drill a 3.175 mm (1/8 inch.) hole into the relief valve retainer cap and insert a self-threading sheet metal screw into cap.
(3) Clamp screw into a vise and while supporting oil pump body, remove cap by tapping oil pump body using a soft hammer. Discard retainer cap and remove spring and relief valve (Fig. 143).

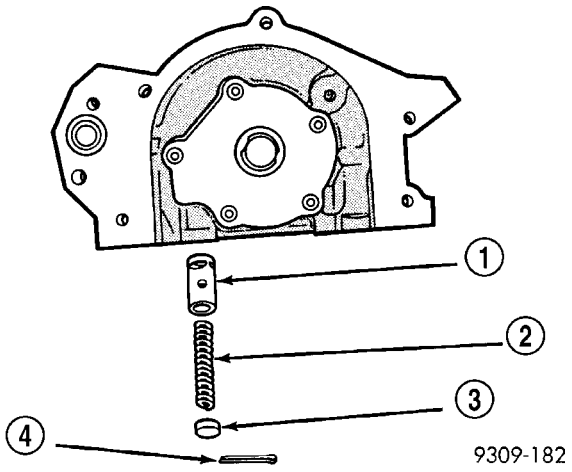


Fig. 143 Oil Pressure Relief Valve

1 - RELIEF VALVE
2 - SPRING
3 - RETAINER CAP
4 - COTTER PIN

(4) Remove oil pump cover screws, and lift off cover.
(5) Remove pump rotors.
(6) Wash all parts in a suitable solvent and inspect carefully for damage or wear (Fig. 144).

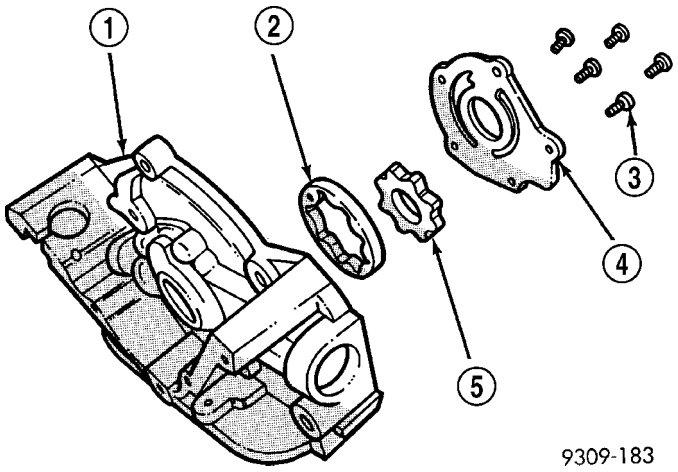


Fig. 144 Oil Pump

1 - OIL PUMP BODY
2 - OIL PUMP OUTER ROTOR
3 - SCREWS
4 - OIL PUMP COVER
5 - OIL PUMP INNER ROTOR

CLEANING

(1) Clean all parts thoroughly in a suitable solvent.

INSPECTION

(1) Disassemble oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - DISASSEMBLY)
(2) Clean all parts thoroughly. Mating surface of the oil pump housing should be smooth. Replace pump cover if scratched or grooved.
(3) Lay a straightedge across the pump cover surface (Fig. 145). If a 0.025 mm (0.001 in.) feeler gauge can be inserted between cover and straight edge, cover should be replaced.

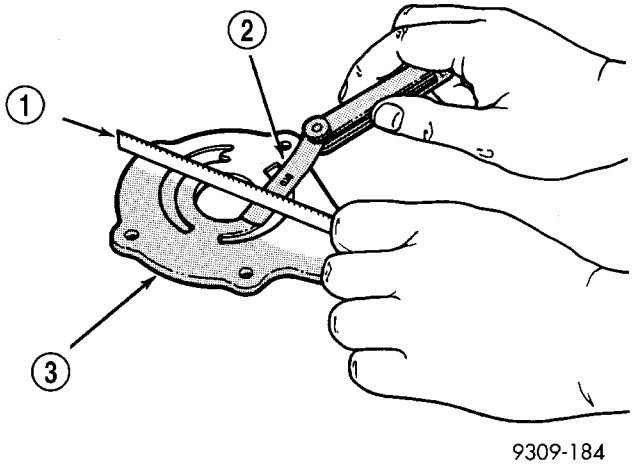


Fig. 145 Checking Oil Pump Cover Flatness

1 - STRAIGHT EDGE
2 - FEELER GAUGE
3 - OIL PUMP COVER

OIL PUMP (Continued)

(4) Measure thickness and diameter of outer rotor. If outer rotor thickness measures 14.299 mm (0.563 in.) or less (Fig. 146), or if the diameter is 79.78 mm (3.141 inches.) or less, replace outer rotor.

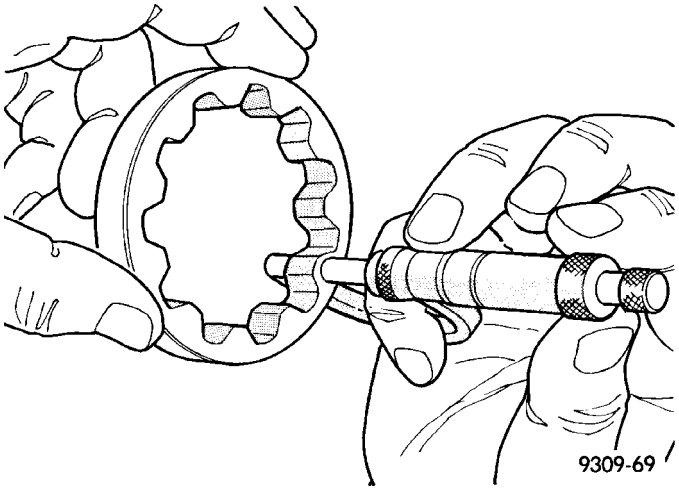


Fig. 146 Measuring Outer

(5) If inner rotor measures 14.299 mm (0.563 in.) or less replace inner rotor (Fig. 147).

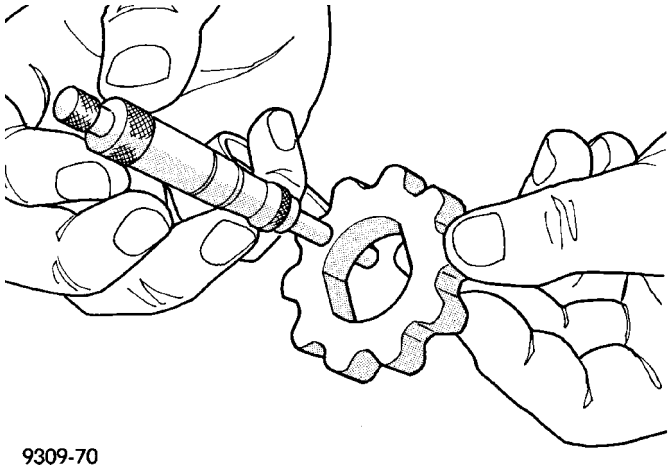


Fig. 147 Measuring Inner Rotor Thickness

(6) Slide outer rotor into body, press to one side with fingers and measure clearance between rotor and body (Fig. 148). If measurement is 0.39 mm (0.015 inch.) or more, replace body only if outer rotor is in specifications.

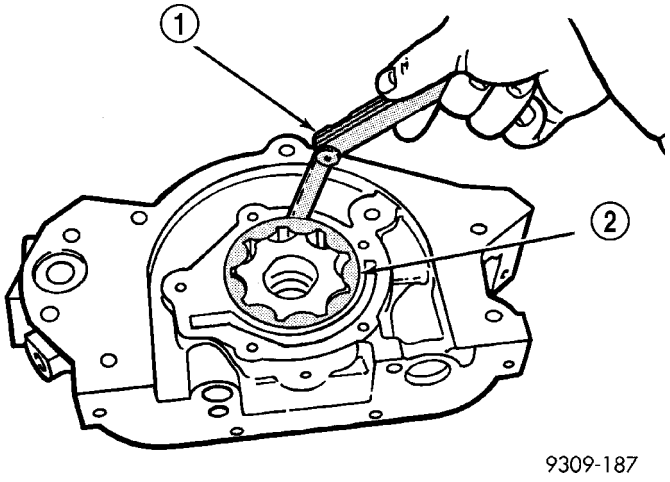


Fig. 148 Measuring Outer Rotor Clearance in Housing

1 - FEELER GAUGE
2 - OUTER ROTOR

(7) Install inner rotor into body. If clearance between inner and outer rotors (Fig. 149) is 0.20 mm (0.008 inch.) or more, replace both rotors.

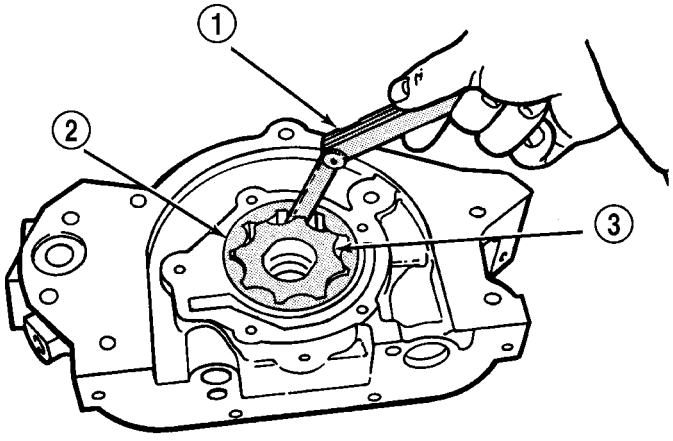


Fig. 149 Measuring Clearance Between Rotors

1 - FEELER GAUGE
2 - OUTER ROTOR
3 - INNER ROTOR

OIL PUMP (Continued)

(8) Place a straightedge across the face of the body, between bolt holes. If a feeler gauge of 0.077 mm (0.003 in.) or more can be inserted between rotors and the straightedge, replace pump assembly (Fig. 150) **ONLY** if rotors are in specs.

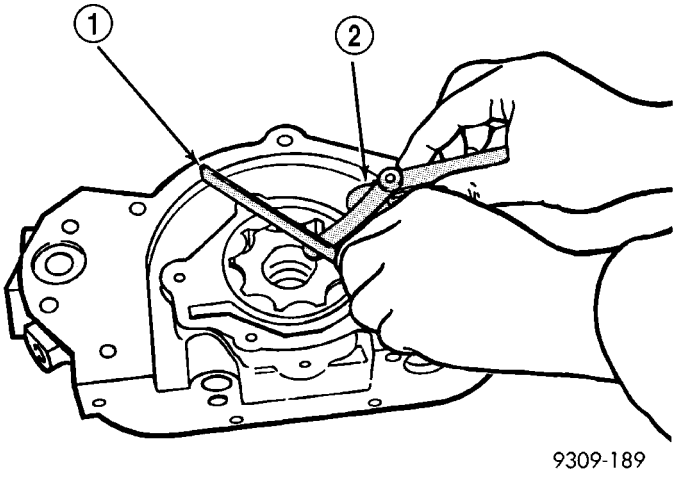


Fig. 150 Measuring Clearance Over Rotors

1 - STRAIGHT EDGE
2 - FEELER GAUGES

(9) Inspect oil pressure relief valve plunger for scoring and free operation in its bore. Small marks may be removed with 400-grit wet or dry sandpaper.

(10) The relief valve spring (Fig. 151) has a free length of approximately 49.5 mm (1.95 in.) it should test between 101–110 N (23–25 lbs.) when compressed to 34 mm (1–11/32 in.). Replace spring that fails to meet specifications.

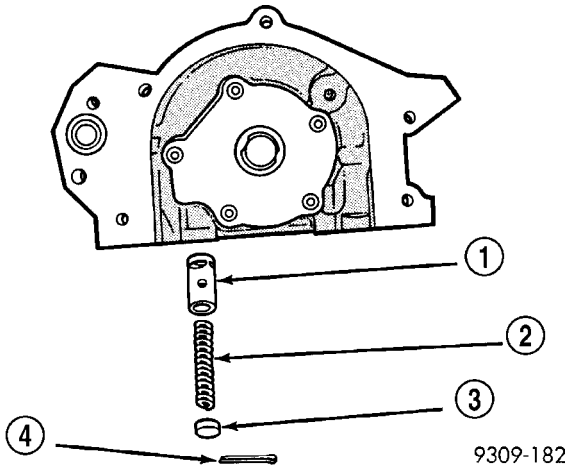


Fig. 151 Oil Pressure Relief Valve

1 - RELIEF VALVE
2 - SPRING
3 - RETAINER CAP
4 - COTTER PIN

(11) Assemble oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - ASSEMBLY)

ASSEMBLY

(1) Assemble oil pump using new parts as required.

(2) Tighten cover screws to 12 N·m (105 in. lbs.) (Fig. 152).

(3) Prime oil pump before installation by filling rotor cavity with engine oil.

(4) If oil pressure is low and pump is within specifications, inspect for worn engine bearings or other reasons for oil pressure loss.

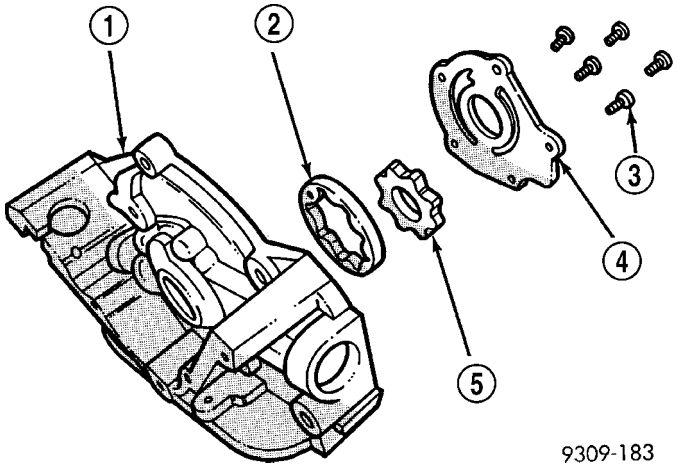


Fig. 152 Oil Pump

1 - OIL PUMP BODY
2 - OIL PUMP OUTER ROTOR
3 - SCREWS
4 - OIL PUMP COVER
5 - OIL PUMP INNER ROTOR

INSTALLATION

NOTE: Thoroughly clean all bolt threads and threaded area in the engine, removing all oil residue, before assembly.

(1) Prime oil pump before installation by filling rotor cavity with clean engine oil.

(2) Install oil pump and gasket carefully over the crankshaft and position pump onto block (Fig. 153).

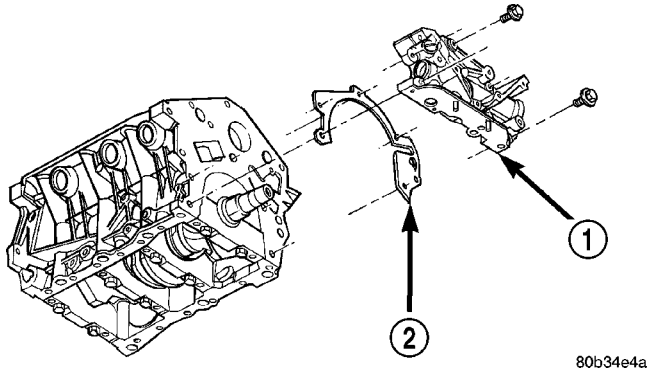


Fig. 153 OIL PUMP

1 - OIL PUMP
2 - GASKET

OIL PUMP (Continued)

NOTE: DO NOT apply the thread sealant to the underside of the bolt head.

(3) Apply Mopar Thread Sealant as directed on the package to the oil pump cover bolts where indicated. The sealant must be applied from the tip to approximately 10 mm of the thread length. Tighten the oil pump cover bolts to 12 N·m (105 in.lbs.). Tighten oil pump to block bolts to 28 N·m (250 in. lbs.) (Fig. 154)

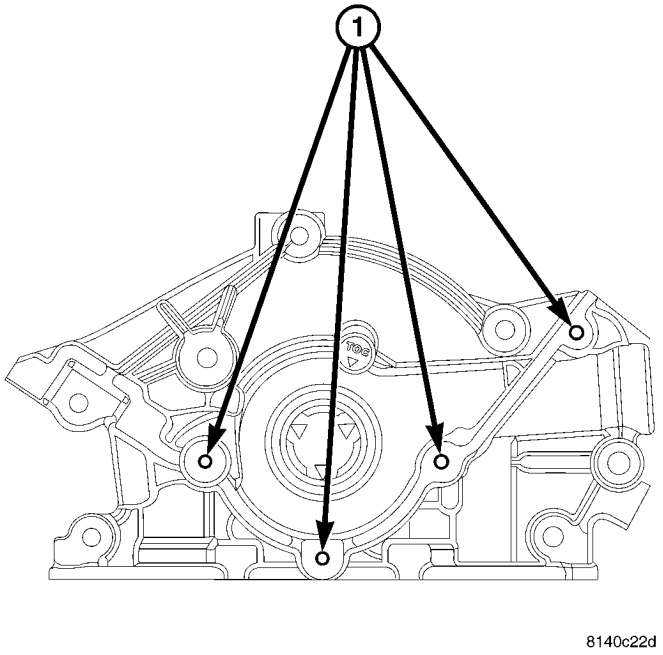


Fig. 154 OIL PUMP COVER BOLT(S)

1 - SEALANT APPLICATION LOCATION

(4) Install new O-ring on oil pickup tube.
(5) Install oil pickup tube.
(6) Install oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)
(7) Install crankshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)
(8) Install timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)
(9) Install the timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)
(10) Install the crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)
(11) Install the accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)
(12) Fill the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)
(13) Fill engine crankcase with proper oil to the correct level.

INTAKE MANIFOLD

REMOVAL

REMOVAL - UPPER INTAKE MANIFOLD

(1) Disconnect negative battery cable.
(2) Remove air cleaner housing and inlet hose.
(3) Remove engine cover.
(4) Remove throttle and speed control cables from throttle arm and bracket (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE CONTROL CABLE - REMOVAL).
(5) Remove the two cable bracket retaining bolts and position the cables and bracket assembly out of the way.
(6) Remove the oil fill tube to upper intake manifold retaining bolt (Fig. 155).

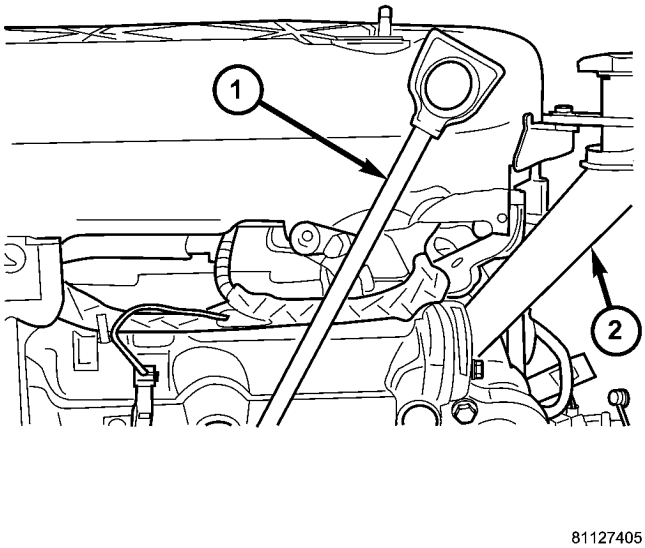


Fig. 155 OIL LEVEL INDICATOR AND FILL TUBE

1 - OIL LEVEL INDICATOR AND TUBE
2 - OIL FILL TUBE

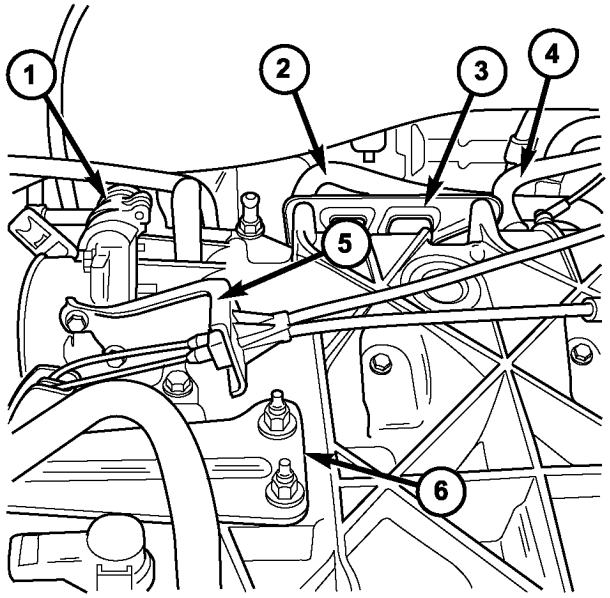
(7) Remove the oil level tube to upper intake manifold retaining bolt (Fig. 155).
(8) Disconnect electrical connectors from the following sensors and actuators:

- Manifold Tuning Valve (MTV)
- Short Runner Valve
- Exhaust Gas Recirculation (EGR)
- Throttle Position Sensor (TPS)
- Idle Air Control (IAC)

INTAKE MANIFOLD (Continued)

- Manifold Absolute Pressure (MAP)

(9) Remove alternator support bracket (Fig. 156).



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Fig. 156 UPPER INTAKE MANIFOLD

1 -IDLE AIR CONTROL
2 - PCV VALVE
3 - RIGHT UPPER INTAKE MANIFOLD SUPPORT BRACKET
4 - POWER BRAKE BOOSTER VACUUM SUPPLY HOSE
5 - THROTTLE CABLE ASSEMBLY
6 - BRACKET

(10) Disconnect the EGR tube (Refer to 25 - EMISSIONS CONTROL/EXHAUST GAS RECIRCULATION/VALVE - REMOVAL).

(11) Disconnect vacuum hoses from the following (Fig. 156):

- Positive Crankcase Ventilation (PCV) Valve
- EVAP Purge Solenoid
- Power Brake Booster

(12) Remove the front and rear intake manifold support brackets (Fig. 157). (Fig. 158)

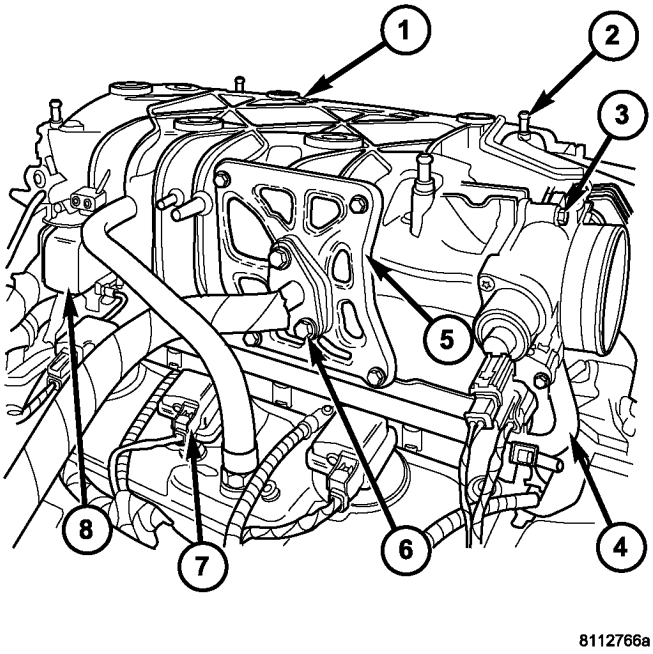
(13) Remove the upper intake manifold retaining bolts and manifold. Clean all gasket sealing surfaces.

REMOVAL - LOWER INTAKE MANIFOLD

(1) Perform fuel pressure release procedure. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Drain the cooling system (Refer to 7 - COOLING/ENGINE/COOLANT - STANDARD PROCEDURE).

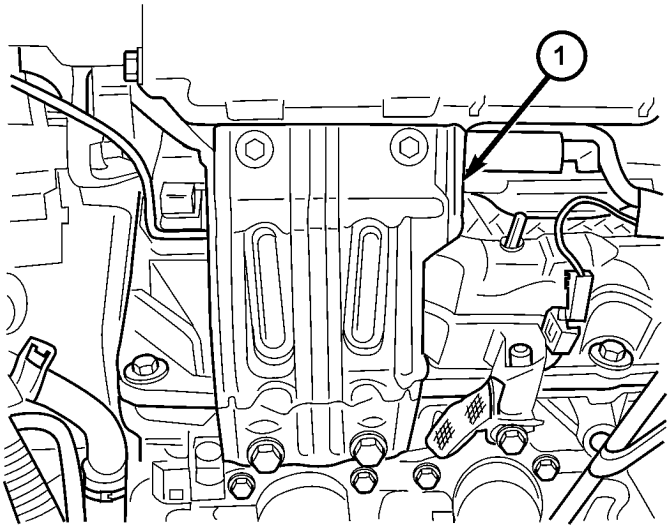
(3) Disconnect the upper radiator hose from the thermostat housing.



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Fig. 157 UPPER INTAKE MANIFOLD - RIGHT

1 - UPPER INTAKE MANIFOLD
2 - ENGINE COVER MOUNTING STUD
3 - THROTTLE BODY
4 - FUEL RAIL
5 - UPPER INTAKE MANIFOLD RETAINING BRACKET
6 - EGR TUBE
7 - IGNITION COIL ASSEMBLY
8 - MANIFOLD TUNER VALVE ACTUATOR



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Fig. 158 UPPER INTAKE MANIFOLD SUPPORT-LEFT

1 - INTAKE MANIFOLD SUPPORT

INTAKE MANIFOLD (Continued)

(4) Remove the upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(5) Reposition power steering fluid reservoir and bracket.

(6) Disconnect the electrical connectors to fuel injectors and coolant temperature sensor.

(7) Disconnect the exhaust cross over retaining bolt.

(8) Disconnect heater hose from intake manifold.

(9) Disconnect the coolant container hose at thermostat housing.

(10) Disconnect the fuel supply hose from fuel rail (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE).

(11) Remove the bolts attaching fuel rail.

(12) Remove fuel rail and injectors as an assembly.

(13) Remove bolts attaching lower intake and remove intake manifold (Fig. 159).

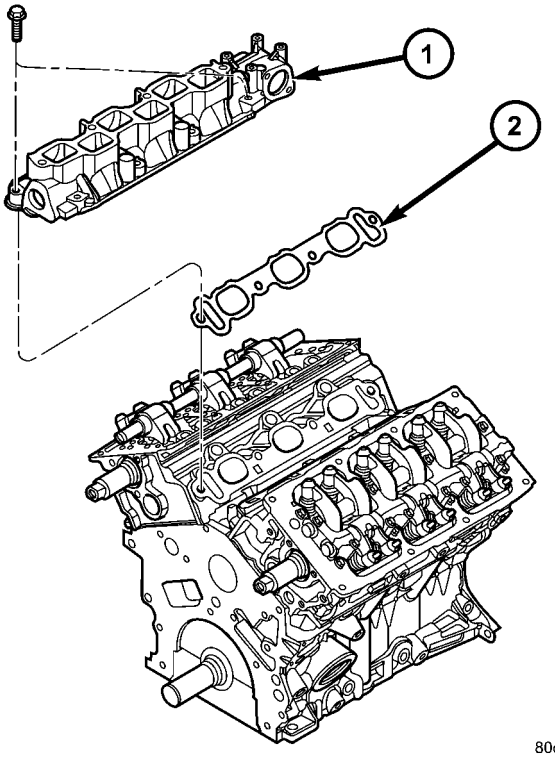


Fig. 159 Lower Intake Manifold

1 - LOWER INTAKE MANIFOLD
2 - GASKET

INSTALLATION

INSTALLATION - LOWER INTAKE MANIFOLD

(1) Clean all sealing surfaces.

(2) Position new gaskets and intake manifold on cylinder head surfaces.

(3) Install intake manifold bolts and gradually tighten in sequence shown in (Fig. 160) until a torque of 28 N·m (250 in. lbs.) is obtained.

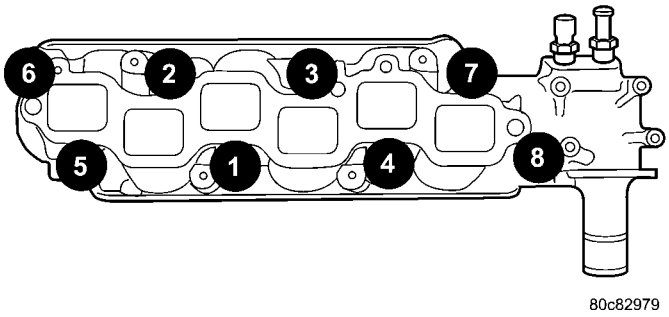


Fig. 160 Lower Intake Manifold Tightening Sequence

(4) Install fuel rail and injectors as an assembly.

(5) Connect fuel supply hose to fuel rail. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)

(6) Connect heater hose to intake manifold.

(7) Connect coolant container to thermostat housing.

(8) Install the exhaust cross over retaining bolt to the intake manifold.

(9) Connect electrical connectors to fuel injectors and coolant temperature sensor.

(10) Install power steering fluid reservoir and bracket.

(11) Install upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(12) Connect the upper radiator hose to the thermostat housing.

(13) Fill the cooling system (Refer to 7 - COOLING/ENGINE/COOLANT - STANDARD PROCEDURE).

INSTALLATION - UPPER INTAKE MANIFOLD

(1) Clean and inspect gasket sealing surfaces.

(2) Position new gasket.

(3) Install the throttle body on the upper intake (if required) (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE BODY - INSTALLATION).

(4) Install upper intake manifold and hand start all attaching bolts.

(5) Tighten bolts gradually starting in the center working outward until a torque of 12 N·m (105 in. lbs.) is obtained.

(6) Install the front and rear intake manifold support brackets.

(7) Install the oil level indicater and oil fill tube to intake manifold bolts (Fig. 155).

INTAKE MANIFOLD (Continued)

(8) Install the EGR tube (Refer to 25 - EMISSIONS CONTROL/EXHAUST GAS RECIRCULATION/VALVE - INSTALLATION).

(9) Connect vacuum lines to the following (Fig. 156):

- Positive Crankcase Ventilation (PCV) Valve
- EVAP Purge Solenoid
- Power Brake Booster

(10) Install alternator support bracket (Fig. 156).

(11) Connect electrical connectors to the following (Fig. 157):

- Manifold Tuning Valve (MTV)
- Exhaust Gas Recirculation (EGR)
- Throttle Position Sensor (TPS)
- Idle Air Control (IAC)
- Manifold Absolute Pressure (MAP)

(12) Install the throttle and speed control cable bracket and retaining bolts.

(13) Install throttle and speed control cables to bracket and throttle arm. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE CONTROL CABLE - INSTALLATION)

(14) Install air cleaner housing and inlet hose.

(15) Install the engine cover.

(16) Connect negative battery cable.

EXHAUST MANIFOLD - LEFT

REMOVAL - LEFT EXHAUST MANIFOLD

(1) Disconnect and isolate the negative battery cable.

(2) Remove the radiator close out panel.

(3) Remove the radiator core support (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL).

(4) Remove the radiator cooling fan assembly.

(5) Loosen the oil level indicator tube retaining bolt and position the dipstick out of the way.

(6) Remove the exhaust manifold crossover pipe retaining bolts (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - REMOVAL).

(7) Remove the exhaust manifold retaining bolts, exhaust manifold, and discard gasket.

INSPECTION

(1) Inspect exhaust manifolds for damage or cracks.

(2) Check manifold flatness.

(3) Inspect the exhaust manifold gasket for obvious discoloration or distortion.

(4) Check distortion of the cylinder head mounting surface with a straightedge and thickness gauge.

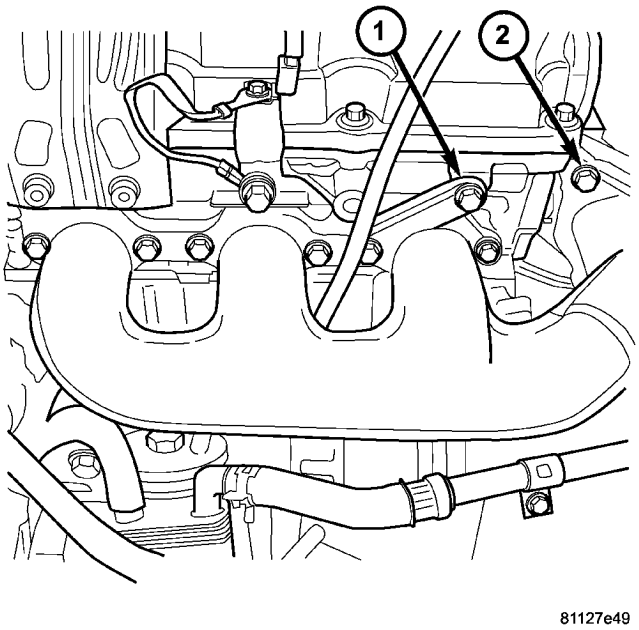


Fig. 161 LEFT EXHAUST MANIFOLD

1 - OIL LEVEL INDICATOR TUBE RETAINING BOLT
2 - EXHAUST CROSS OVER PIPE UNION

INSTALLATION - LEFT EXHAUST MANIFOLD

(1) Position the exhaust manifold and gasket. Install the retaining bolts. Tighten bolts starting at the center working outward to 23 N.m (200 in. lbs.) (Fig. 161).

(2) Install the exhaust manifold crossover pipe retaining bolts. Tighten bolts to 31 N.m (275 in. lbs.).

(3) Position the oil dipstick tube and install the retaining bolt.

(4) Install the radiator cooling fan assembly.

(5) Install the radiator closure panel crossmember (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION).

(6) Install the radiator close out panel.

(7) Connect the negative battery cable.

EXHAUST MANIFOLD - RIGHT

REMOVAL - RIGHT EXHAUST MANIFOLD

(1) Disconnect the negative battery cable.

(2) Disconnect the upstream oxygen sensor electrical connector.

(3) Remove the exhaust manifold crossover pipe retaining bolts (Fig. 162).

(4) Raise and support the vehicle.

(5) Disconnect the downstream oxygen sensor electrical connector.

EXHAUST MANIFOLD - RIGHT (Continued)

(6) Remove the exhaust manifold flange retaining bolts and disconnect the exhaust system hangers from the pipe assembly.

(7) Remove the exhaust system from the vehicle.

(8) Remove the EGR tube support bracket bolt (Fig. 162).

(9) Remove the lower exhaust manifold retaining bolts (Fig. 162).

(10) Remove the oxygen sensor from the exhaust manifold.

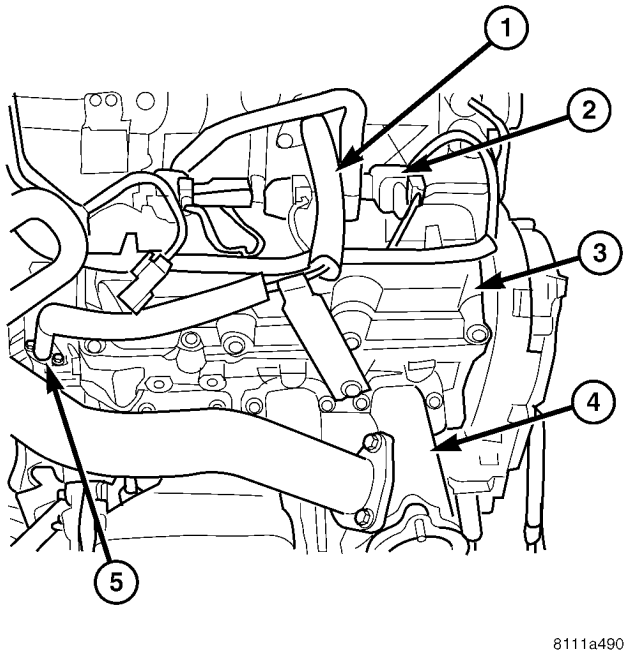


Fig. 162 EGR VALVE AND TUBE

1 - EGR TUBE
2 - IGNITION COIL
3 - CYLINDER HEAD COVER
4 - RIGHT EXHAUST MANIFOLD
5 - EGR VALVE

INSTALLATION - RIGHT EXHAUST MANIFOLD

(1) Clean gasket surfaces.

(2) Position the exhaust manifold and gasket. Install the retaining bolts. Tighten bolts starting at the center working outward to 23 N.m (200 in. lbs.) (Fig. 162).

(3) Install exhaust system. Connect the exhaust system hangers from the pipe assembly and install the three exhaust manifold flange retaining bolts. Tighten the bolts to 30 N.m (22 ft. lbs.).

(4) Connect the downstream oxygen sensor electrical connector.

(5) Install the EGR tube retaining bracket (Fig. 162).

(6) Lower vehicle.

(7) Install the exhaust manifold crossover pipe retaining bolts. Tighten bolts to 31 N.m (275 in. lbs.) (Fig. 162).

(8) Connect the upstream oxygen sensor electrical connector.

(9) Connect the negative battery cable.

CROSSOVER PIPE - EXHAUST MANIFOLD

REMOVAL

(1) Remove the bolts and nuts attaching the cross-over pipe the manifolds (Fig. 163).

(2) Remove the crossover pipe and gaskets. Discard the gaskets.

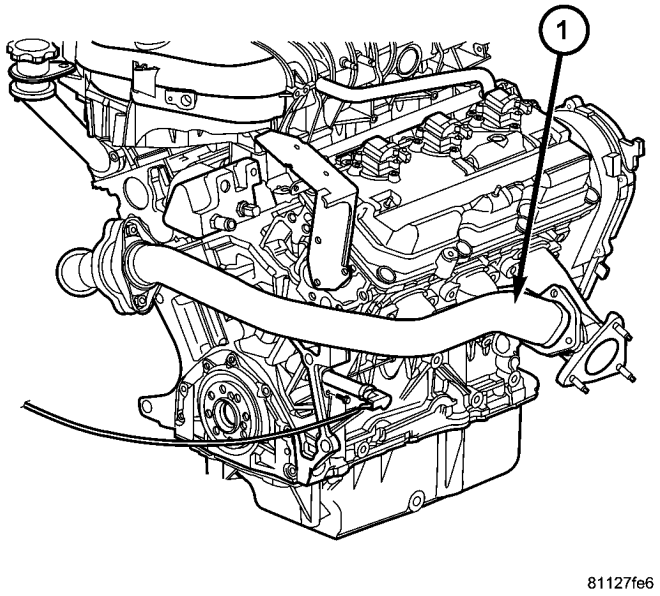


Fig. 163 EXHAUST CROSS OVER PIPE

1 - CROSS OVER PIPE

INSTALLATION

(1) Position new gasket on left exhaust manifold.

(2) Position cross-over pipe to the manifold connections.

(3) Position new gasket on right exhaust manifold and install the bolts. Tighten bolts to 41 N.m (30 ft. lbs.)

(4) Install and tighten nuts to 41 N·m (30 ft. lbs.). (Fig. 163)

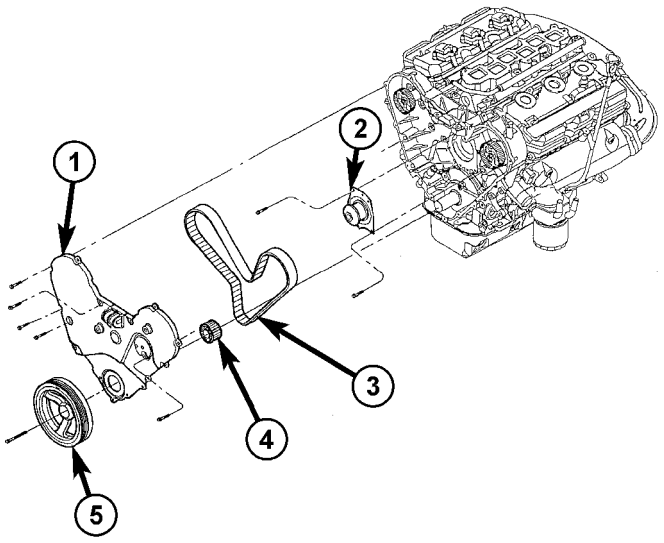
(5) Install coolant recovery container (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY CONTAINER - INSTALLATION).

VALVE TIMING

DESCRIPTION

The timing drive system has been designed to provide quiet performance and reliability to support a **NON** free-wheeling engine.

The timing drive components include a crankshaft sprocket, camshaft sprockets, tensioner pulley, hydraulic tensioner and a timing belt. The water pump is driven by the back side of the timing belt. The right and left camshaft sprockets are keyed and not interchangeable because of the cam sensor pick-up wheel on the left sprocket (Fig. 164).



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Fig. 164 TIMING DRIVE SYSTEM

1 - FRONT TIMING COVER
2 - WATER PUMP
3 - TIMING BELT
4 - CRANKSHAFT SPROCKET
5 - CRANKSHAFT DAMPER

FRONT TIMING BELT COVER

REMOVAL

(1) Perform fuel pressure release procedure. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).

(2) Disconnect negative battery cable.

(3) Raise vehicle on hoist.

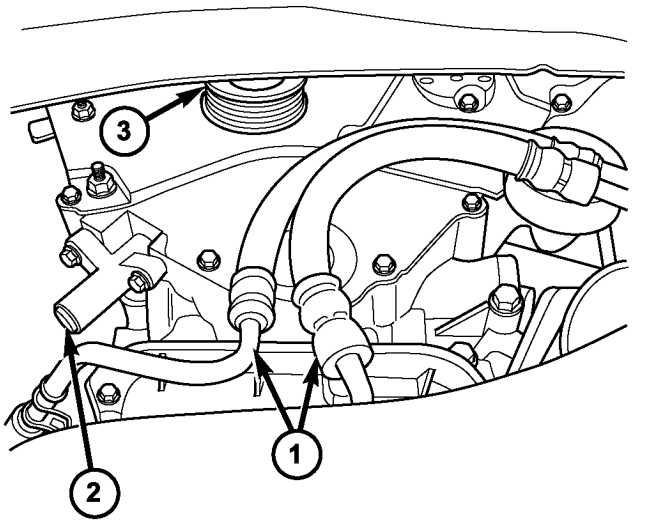
(4) Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(5) Remove accessory drive belt tensioner.

(6) Remove bolts for power steering pump. Reposition power steering pump aside.

(7) Remove crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

(8) Remove the lower front timing belt cover fasteners (Fig. 165).



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Fig. 165 LOWER TIMING BELT FRONT COVER

1 - POWER STEERING HOSE
2 - TIMING BELT TENSIONER
3 - IDLER PULLEY

(9) Lower the vehicle.

(10) Support the engine with a floor jack.

(11) Remove the air cleaner housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

(12) Remove the front engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/FRONT MOUNT - REMOVAL).

(13) Disconnect the fuel supply line at the fuel rail (Fig. 166).

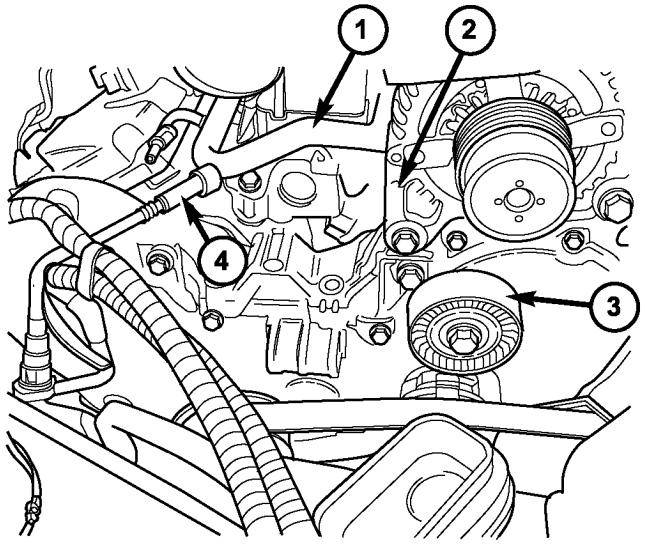
(14) Remove the upper timing belt cover bolts and remove front timing belt cover (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

INSTALLATION

NOTE: The timing cover bolts and both holes to the engine block must be thoroughly cleaned and free of oil residue before assembly. IN ADDITION add thread sealant to the timing cover bolts that mount to the oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION).

(1) Install front timing belt cover (Fig. 164).

FRONT TIMING BELT COVER (Continued)



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Fig. 166 UPPER TIMING BELT FRONT COVER

1 - FUEL RAIL
2 - GENERATOR
3 - IDLER PULLEY
4 - FUEL SUPPLY LINE

(2) Install the upper engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/FRONT MOUNT - INSTALLATION).

(3) Connect fuel supply line at fuel rail (Fig. 166).

(4) Install the air cleaner housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).

(5) Remove floor jack and raise vehicle.

(6) Install power steering pump fasteners. Tighten bolts to 23 N·m (200 lbs. in..).

(7) Install crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(8) Install accessory drive belt tensioner. Torque fastener to 28 N·m (250 in. lbs.).

(9) Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(10) Lower vehicle.

(11) Connect negative battery cable.

REAR TIMING BELT COVER

REMOVAL

(1) Perform fuel pressure release procedure. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).

(2) Disconnect the negative battery cable.

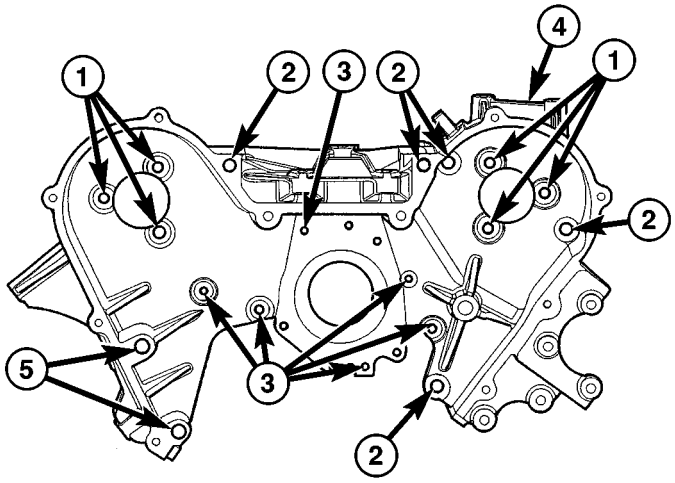
(3) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(4) Remove camshaft sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(5) Remove rear timing belt cover bolts (Fig. 167).

(6) Remove the rear cover.

NOTE: The rear timing belt cover has O-rings to seal the water pump passages to cylinder block (Fig. 167). Do not reuse the O-rings.



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Fig. 167 Rear Timing Belt Cover Fasteners

1 - M8 FASTENERS (APPLY THREAD SEALANT)
2 - M10 FASTENERS
3 - M6 FASTENERS
4 - REAR TIMING BELT COVER
5 - M10 FASTENERS (STUD/NUT)

REAR TIMING BELT COVER (Continued)

INSTALLATION

(1) Clean rear timing belt cover O-ring sealing surfaces and grooves (Fig. 168). Lubricate new O-rings with Mopar® Dielectric Grease or equivalent to facilitate assembly.

(2) Position NEW O-rings on cover (Fig. 168).

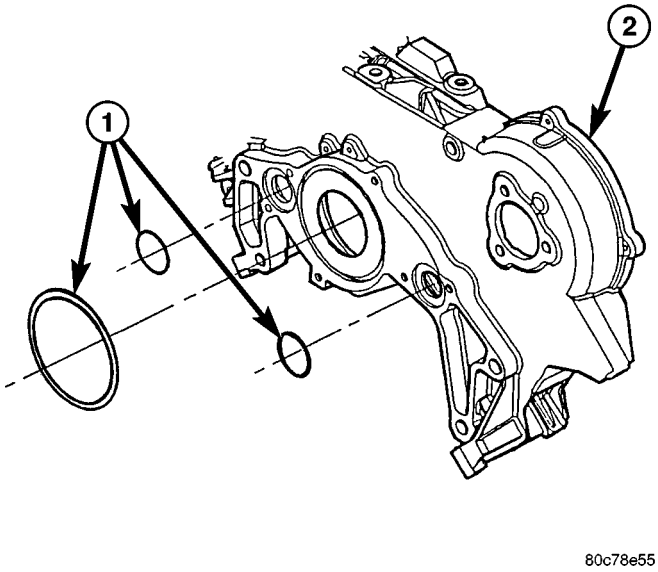


Fig. 168 Rear Timing Belt Cover Seals

1 - REAR TIMING BELT COVER SEALS
2 - REAR TIMING BELT COVER

(3) Install rear timing belt cover (Fig. 167). Tighten bolts to the following specified torque:

- M10—54 N·m (40 ft. lbs.)
- M8—28 N·m (20 ft. lbs.)
- M6—12 N·m (105 in. lbs.)

(4) Install camshaft sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(5) Install timing belt (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

TIMING BELT AND SPROCKETS

REMOVAL

REMOVAL - TIMING BELT

TIMING VERIFICATION

Remove the outer timing covers. Rotate the crankshaft until the pointer on the crankshaft sprocket aligns the TDC mark on the oil pump. Check to determine if the camshaft sprocket timing marks are aligned with the marks on the inner timing cover. It may take an additional full revolution of the crankshaft before the camshaft sprocket marks are aligned (Fig. 169).

CAUTION: The 3.5L is NOT a freewheeling engine. Therefore, loosen the valve train rocker assemblies before servicing the timing drive.

(1) Perform fuel pressure release procedure. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).

(2) Disconnect negative battery cable.

(3) Remove both cylinder head covers and loosen the rocker arm assemblies.

(4) Remove the front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

(5) Mark belt running direction, if timing belt is to be reused.

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

(6) Rotate engine clockwise until crankshaft mark aligns with the TDC mark on oil pump housing and the camshaft sprocket timing marks are aligned with the marks on the rear cover (Fig. 169)

(7) Remove the timing belt tensioner (Fig. 169) and remove timing belt.

(8) Inspect the tensioner for fluid leakage.

(9) Inspect the pivot and bolt for free movement, bearing grease leakage, and smooth rotation. If not rotating freely, replace the arm and pulley assembly.

(10) When tensioner is removed from the engine it is necessary to compress the plunger into the tensioner body.

CAUTION: Index the tensioner in the vise the same way it is installed on the engine. This ensures proper pin orientation when tensioner is installed on the engine.

(a) Place the tensioner into a vise and SLOWLY compress the plunger (Fig. 170). Total bleed down of tensioner should take about 5 minutes.

(b) When plunger is compressed into the tensioner body install a pin through the body and plunger to retain plunger in place until tensioner is installed.

TIMING BELT AND SPROCKETS (Continued)

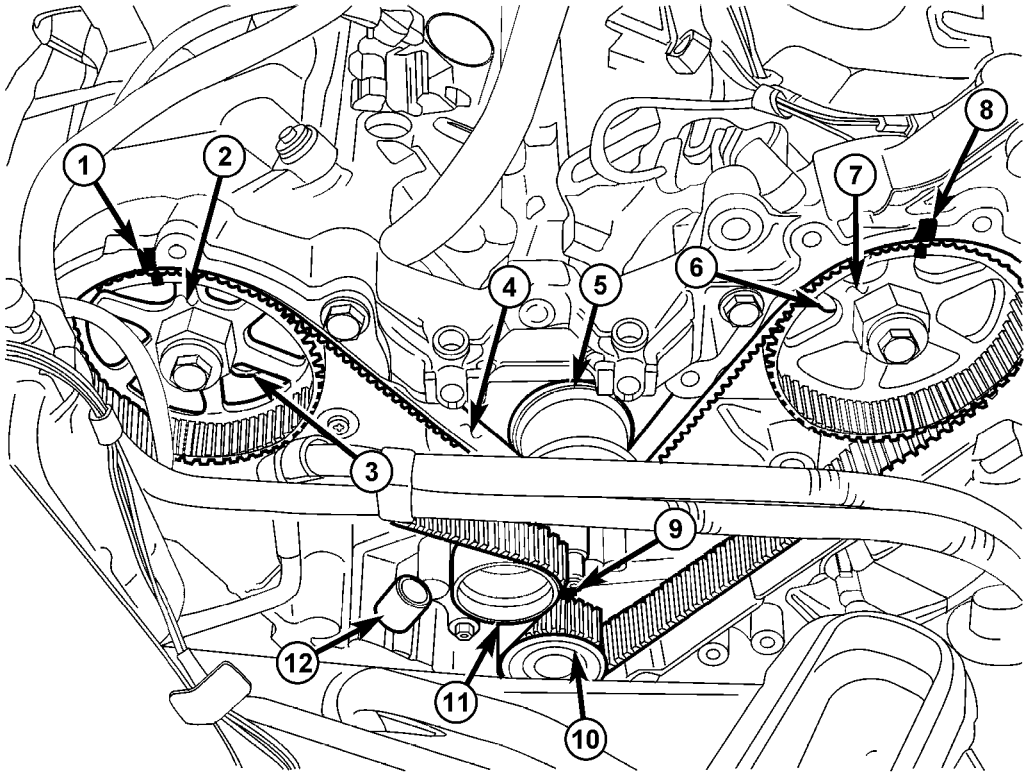


Fig. 169 TIMING GEAR MARKS

1 - RIGHT CAMSHAFT GEAR ALIGNMENT MARK
2 - RIGHT CAMSHAFT GEAR
3 - CYLINDER HEAD TO INNER TIMING BELT COVER BOLTS - RIGHT
4 - TIMING BELT
5 - WATER PUMP PULLEY
6 - CYLINDER HEAD TO INNER TIMING BELT COVER BOLTS - LEFT
7 - LEFT CAMSHAFT GEAR
8 - LEFT CAMSHAFT GEAR ALIGNMENT MARK
9 - CRANKSHAFT GEAR ALIGNMENT MARK
10 - CRANKSHAFT GEAR
11 - TIMING BELT TENSIONER PULLEY
12 - TIMING BELT TENSIONER

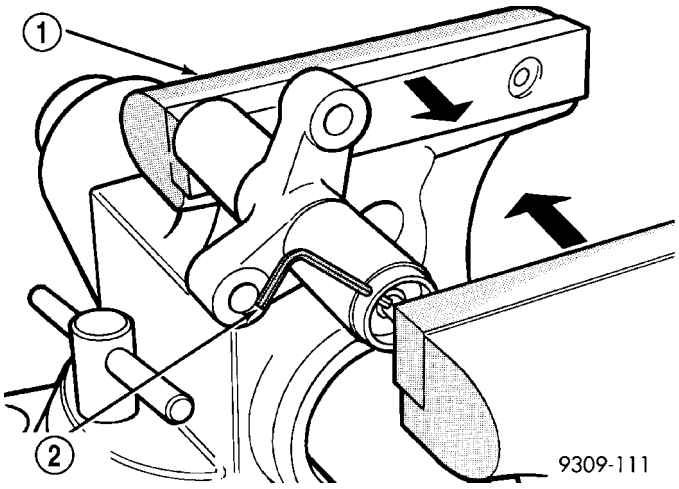


Fig. 170 Compressing Timing Belt Tensioner

1 - VISE
2 - LOCKING PIN

REMOVAL - CAMSHAFT SPROCKETS

CAUTION: The 3.5L engine is NOT a free-wheeling design. Therefore, care should be taken not to rotate the camshafts or crankshaft with the timing belt removed.

NOTE: The camshaft timing gears are keyed to the camshaft.

(1) Perform fuel pressure release procedure. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).

(2) Remove front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

(3) Position crankshaft sprocket to the TDC mark on the oil pump housing by turning crankshaft in the clockwise direction

(4) Install a dial indicator in number 1 cylinder to check TDC of the piston. Rotate the crankshaft until the piston is at exactly TDC.

TIMING BELT AND SPROCKETS (Continued)

(5) Remove camshaft retainer/thrust plate from rear of right cylinder head (Fig. 171).

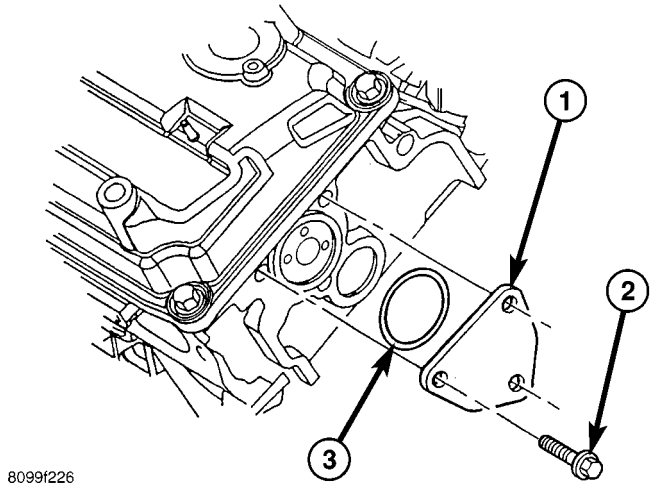


Fig. 171 CAMSHAFT THRUST PLATE

1 - CAMSHAFT THRUST PLATE
2 - BOLT
3 - O-RING

(6) Remove the right cylinder head cover.
(7) Remove the right rocker arm assembly.
(8) Remove the timing belt tensioner and timing belt.

CAUTION: The right camshaft must be pushed rearward approximately 3 1/2 inches to remove the camshaft gear retaining bolt and gear. Care must be taken not to scratch or nick the camshaft or cylinder head journals when moving camshaft.

(9) Hold camshaft sprockets with 36 mm (1 7/16 in.) box end wrench.
(10) Loosen and remove the camshaft gear retaining bolt and washer. The right bolt is 213 mm (8 3/8 in.) long and the left bolt is 255 mm (10.0 in.) long.

NOTE: The camshaft timing gears are keyed to the camshaft.

(11) Remove the camshaft sprockets (Fig. 172), (Fig. 173).

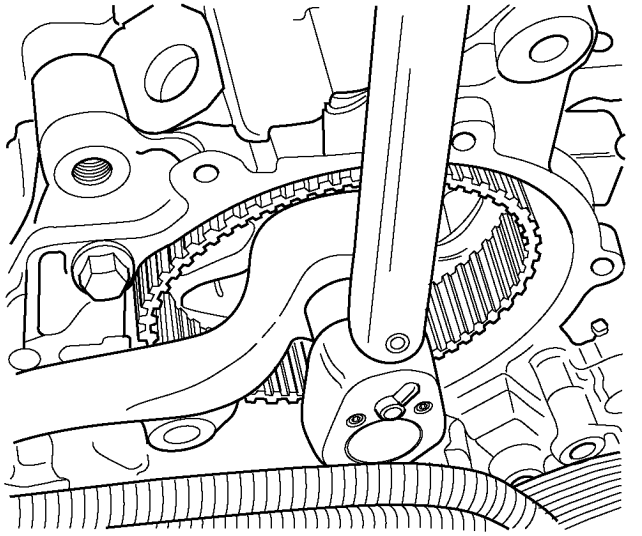


Fig. 172 LEFT CAMSHAFT SPROCKET

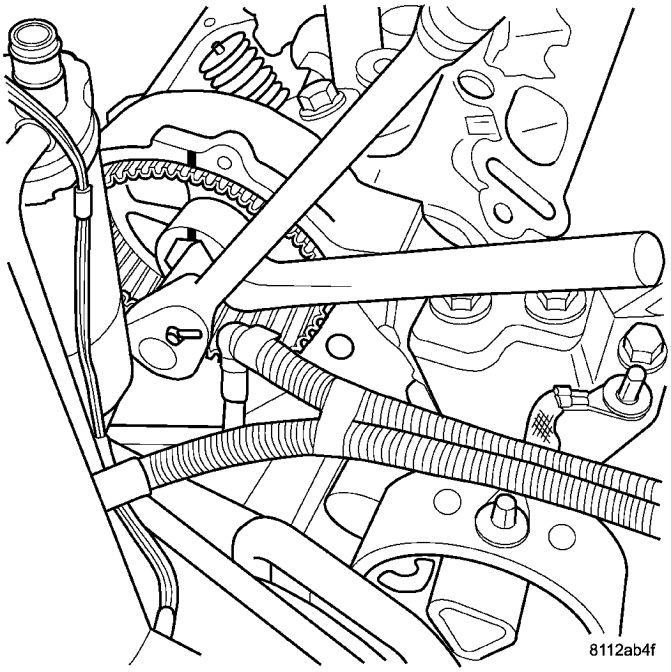


Fig. 173 RIGHT CAMSHAFT SPROCKET

TIMING BELT AND SPROCKETS (Continued)

REMOVAL - CRANKSHAFT SPROCKET

(1) Remove the timing belt (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(2) Remove crankshaft sprocket using Special Tool L-4407-A (Fig. 174).

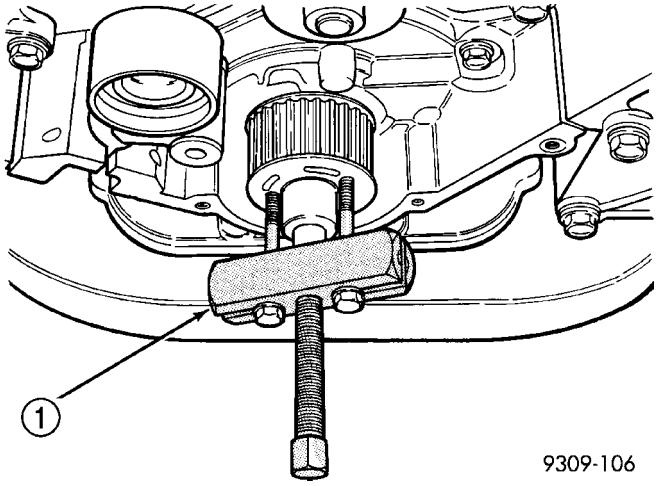


Fig. 174 Crankshaft Sprocket - Removal

1 - SPECIAL TOOL L-4407–A

INSPECTION

TIMING VERIFICATION

Remove the outer timing covers. Rotate the crankshaft until the pointer on the crankshaft sprocket (10) (Fig. 175) aligns the TDC mark on the oil pump (9). Check to determine if the camshaft sprocket (2, 7) timing marks (1, 8) are aligned with the marks on the inner timing cover. It may take an additional full revolution of the crankshaft before the camshaft sprocket marks are aligned.

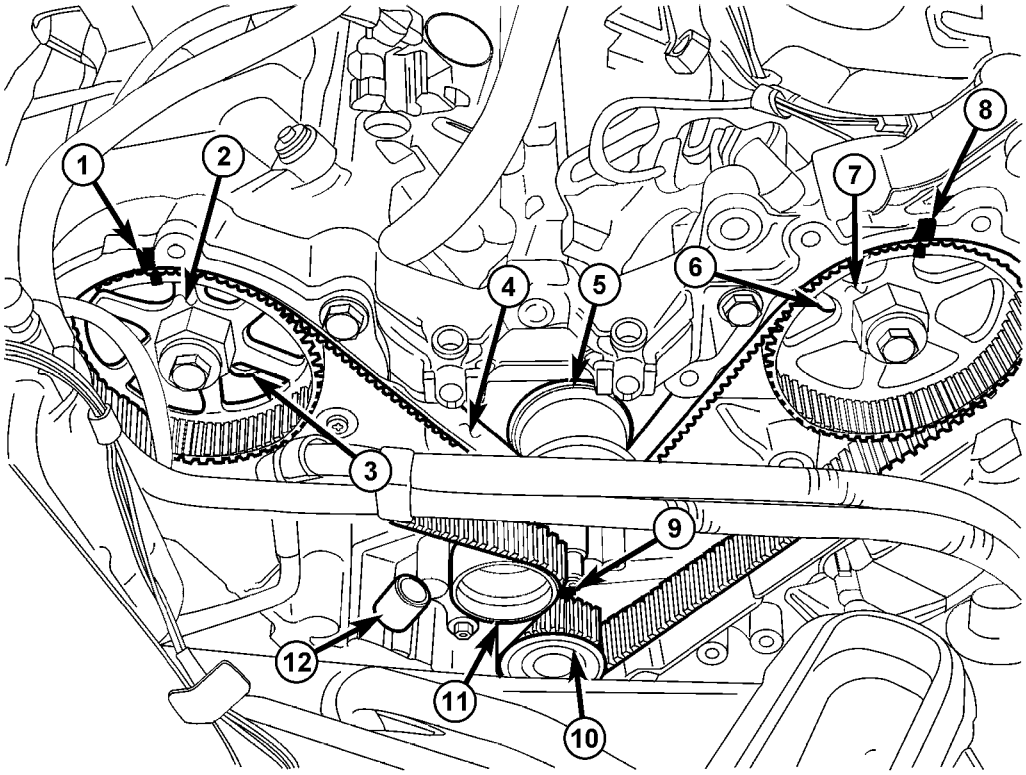


Fig. 175 TIMING GEAR MARKS

1 - RIGHT CAMSHAFT GEAR ALIGNMENT MARK
2 - RIGHT CAMSHAFT GEAR
3 - CYLINDER HEAD TO INNER TIMING BELT COVER BOLTS - RIGHT
4 - TIMING BELT
5 - WATER PUMP PULLEY
6 - CYLINDER HEAD TO INNER TIMING BELT COVER BOLTS - LEFT
7 - LEFT CAMSHAFT GEAR
8 - LEFT CAMSHAFT GEAR ALIGNMENT MARK
9 - CRANKSHAFT GEAR ALIGNMENT MARK
10 - CRANKSHAFT GEAR
11 - TIMING BELT TENSIONER PULLEY
12 - TIMING BELT TENSIONER

TIMING BELT AND SPROCKETS (Continued)

INSPECTION - TIMING BELT

(1) Remove front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

(2) Inspect both sides of the timing belt. Replace belt if any of the following conditions exist (Fig. 176):

(a) Hardening of back rubber back side is glossy without resilience and leaves no indent when pressed with fingernail.

(b) Cracks on rubber back.

(c) Cracks or peeling of canvas.

(d) Cracks on rib root.

(e) Cracks on belt sides.

(f) Missing teeth.

(g) Abnormal wear of belt sides. The sides are normal if they are sharp as if cut by a knife.

(h) Vehicle mileage or time at component maintenance requirement. (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

(3) If none of the above conditions are seen on the belt, the front timing belt cover can be installed (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

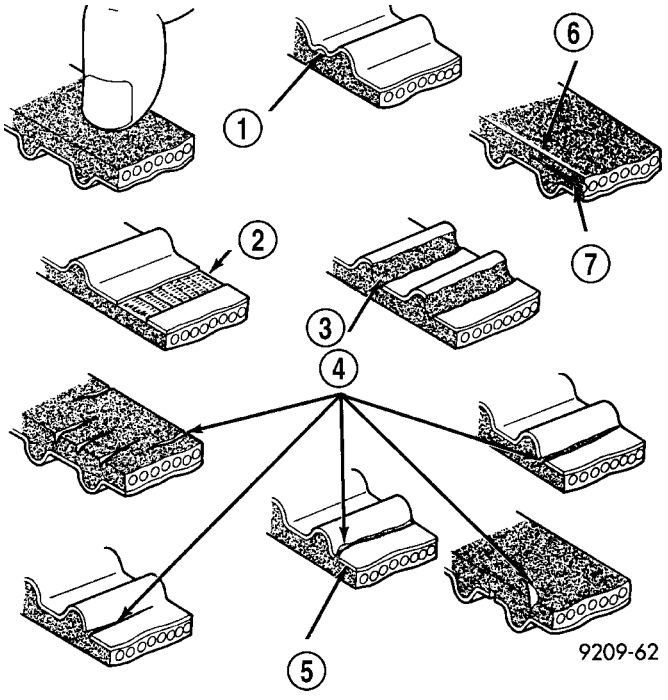


Fig. 176 Timing Belt Inspection

1 - PEELING
2 - TOOTH MISSING AND CANVAS FIBER EXPOSED
3 - RUBBER EXPOSED
4 - CRACKS
5 - PEELING
6 - ROUNDED EDGE
7 - ABNORMAL WEAR (FLUFFY STRAND)

INSTALLATION

INSTALLATION - CRANKSHAFT SPROCKET

CAUTION: To ensure proper installation depth of crankshaft sprocket, Special Tool 6641 must be used.

(1) Install crankshaft sprocket using Special Tools 6641 and C-4685-C1 (Fig. 177).

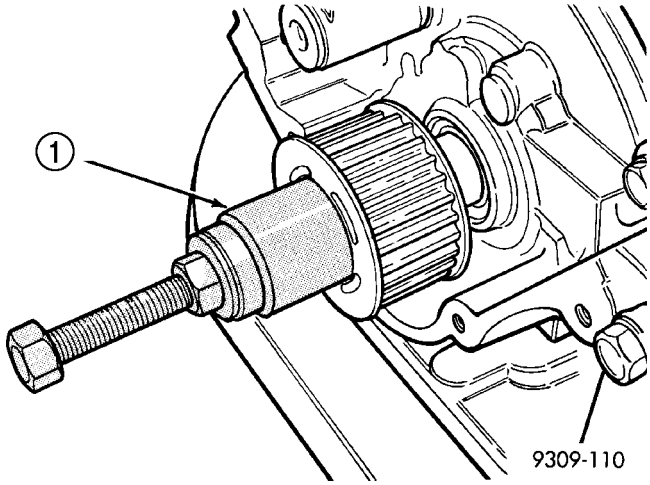


Fig. 177 Crankshaft Sprocket - Installation

1 - INSTALL WITH SPECIAL TOOL 6641 WITH 12mm SCREW C-4685–C1 AND THRUST BEARING AND WASHER

(2) Install timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

INSTALLATION - CAMSHAFT SPROCKETS

CAUTION: The camshaft sprockets are keyed and not interchangeable from side to side because of the camshaft position sensor pick–up.

(1) Install camshaft sprockets onto the camshafts. Install **NEW** sprocket attaching bolts into place. The 255 mm (10 in.) bolt is to be installed in the left camshaft and the 213 mm (8 3/8 in.) bolt is to be installed into the right camshaft. **Do not tighten the bolts; tightened at later step.** Camshaft sprocket mark should be aligned with the marks on the cover at both sprockets (Fig. 169).

(2) Install the right camshaft thrust plate and seal. Tighten bolts to 28 N·m (250 in. lbs.) (Fig. 178).

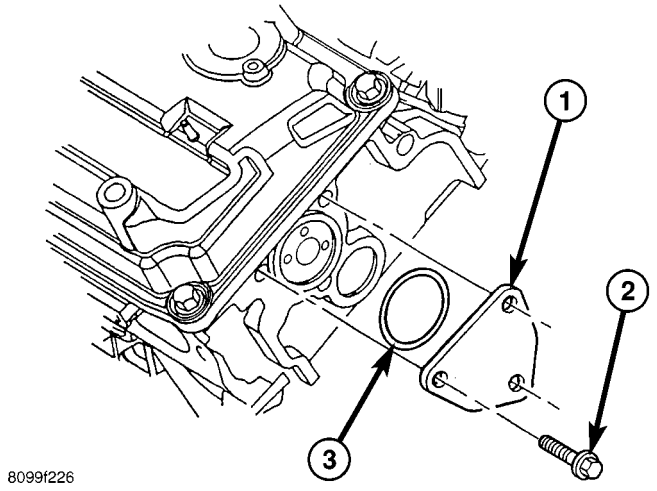


Fig. 178 CAMSHAFT THRUST PLATE

1 - CAMSHAFT THRUST PLATE
2 - BOLT
3 - O-RING

(3) Install the timing belt starting first at the crankshaft sprocket, then to remaining components in a counterclockwise direction.

(4) Install the belt around the last sprocket. Maintain tension on the belt as it is positioned around the tensioner pulley. Each camshaft sprockets mark should still be aligned with the rear cover marks (Fig. 169).

NOTE: For timing belt tensioner reset procedure, (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - TIMING BELT - REMOVAL).

(5) Hold the tensioner pulley against the belt and install the reset (pinned) timing belt tensioner into the housing. Tighten attaching bolts to 28 N·m (250 in. lbs.).

(6) Remove tensioner retaining pin to allow the tensioner to extend to the pulley bracket.

(7) Using a dial indicator, position the number 1 piston at TDC.

(8) Hold the camshaft sprocket hex with a 36 mm (1 7/16 in.) wrench and tighten the camshaft bolts to the following:

- Right side = 102 N·m (75 ft. lbs.) +90° turn
- Left side = 115 N·m (85 ft. lbs.) +90° turn

(9) Remove dial indicator and install spark plug.

(10) Remove Special Tools 6642.

(11) Install cam retainer/thrust plates and O-rings (Fig. 178).

(12) Install front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(13) Install engine assembly (Refer to 9 - ENGINE - INSTALLATION).

TIMING BELT

CAUTION: If camshafts have moved from the timing marks, always rotate camshaft towards the direction nearest to the timing marks (DO NOT TURN CAMSHAFTS A FULL REVOLUTION OR DAMAGE to valves and/or pistons could result).

(1) Align the crankshaft sprocket (10) (Fig. 179) with the TDC mark (9) on oil pump cover.

(2) Align the camshaft sprockets (2, 7) timing reference marks (1, 8) with the marks on the rear cover.

(3) Install the timing belt starting at the crankshaft sprocket (10) going in a counterclockwise direction. Install the belt around the last sprocket. Maintain tension on the belt as it is positioned around the tensioner pulley (11).

NOTE: If the camshaft gears have been removed it is only necessary to have the camshaft gear retaining bolts installed to a snug torque at this time.

(4) Holding the tensioner pulley (11) against the belt, install the tensioner into the housing and tighten to 28 N·m (250 in. lbs.). Each camshaft sprocket mark should remain aligned the cover marks.

(5) When tensioner is in place pull retaining pin to allow the tensioner to extend to the pulley bracket.

(6) Rotate crankshaft sprocket 2 revolutions and check the timing marks on the camshafts and crankshaft. The marks should line up within their respective locations. If marks do not line up, repeat procedure.

NOTE: If camshaft gears have been removed and timing is correct, counterhold and tighten the camshaft gears to final torque specification (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(7) Install the front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(8) Tighten the rocker arm assemblies and install the cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - INSTALLATION).

(9) Connect negative battery cable.

TIMING BELT AND SPROCKETS (Continued)

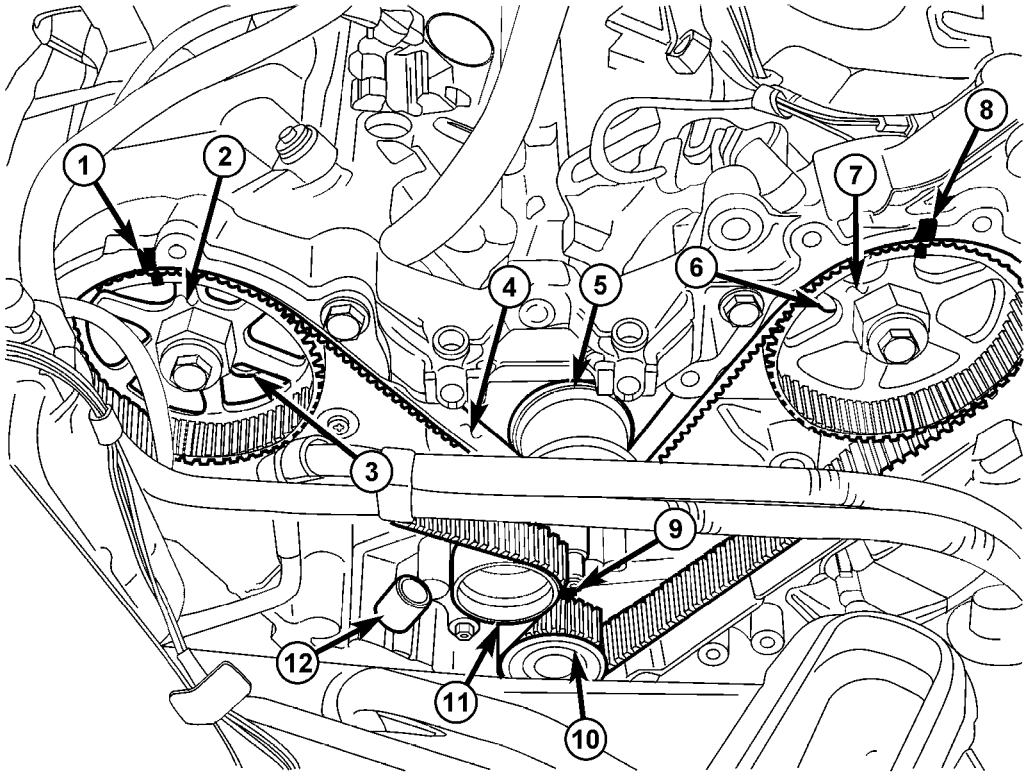


Fig. 179 TIMING GEAR MARKS

1 - RIGHT CAMSHAFT GEAR ALIGNMENT MARK
2 - RIGHT CAMSHAFT GEAR
3 - CYLINDER HEAD TO INNER TIMING BELT COVER BOLTS - RIGHT
4 - TIMING BELT
5 - WATER PUMP PULLEY
6 - CYLINDER HEAD TO INNER TIMING BELT COVER BOLTS - LEFT
7 - LEFT CAMSHAFT GEAR
8 - LEFT CAMSHAFT GEAR ALIGNMENT MARK
9 - CRANKSHAFT GEAR ALIGNMENT MARK
10 - CRANKSHAFT GEAR
11 - TIMING BELT TENSIONER PULLEY
12 - TIMING BELT TENSIONER

TIMING BELT TENSIONER & PULLEY

REMOVAL

TENSIONER

(1) For timing belt tensioner removal procedure (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL - TIMING BELT)

REMOVAL - TENSIONER PULLEY ASSEMBLY

(1) Remove the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL - TIMING BELT)

(2) Remove the timing belt tensioner pulley and bracket assembly by unscrewing the pivot bolt from the oil pump housing (Fig. 180).

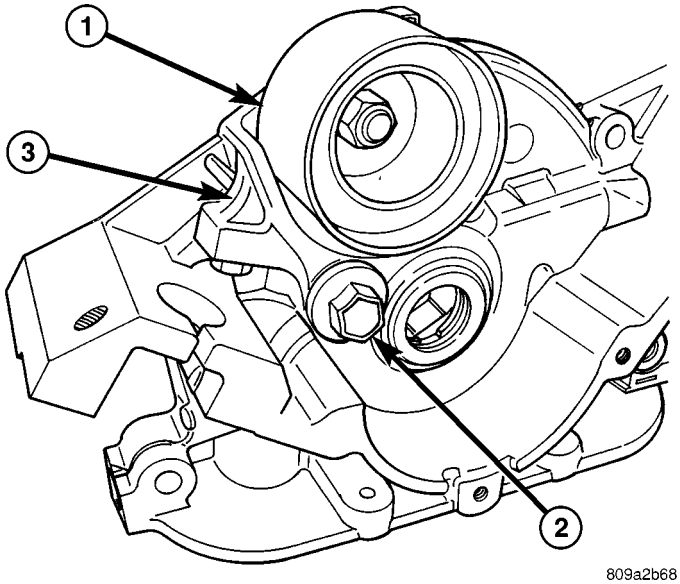


Fig. 180 TENSIONER PULLEY

1 - TENSIONER PULLEY
2 - PIVOT BOLT
3 - TENSIONER BRACKET

INSPECTION

INSPECTION - TENSIONER

(1) Inspect hydraulic tensioner for fluid loss around the plunger seal (Fig. 181). Replace tensioner if leaking.

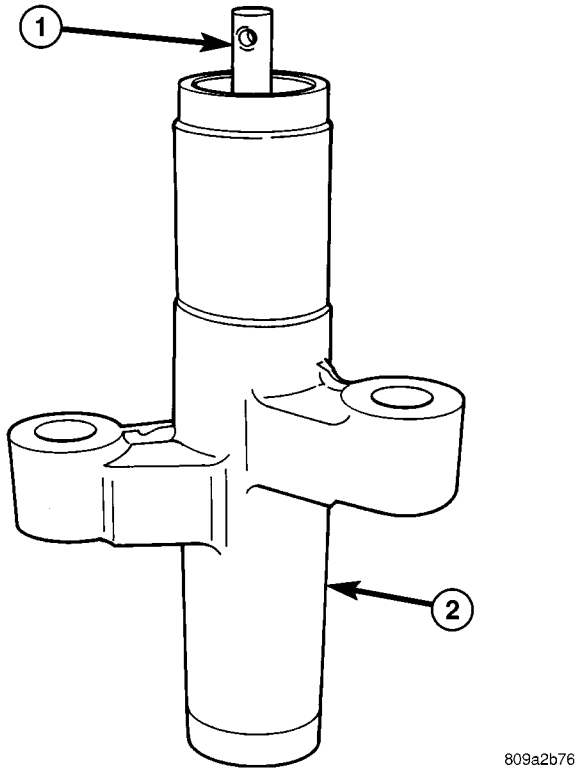


Fig. 181 TIMING BELT TENSIONER

1 - PLUNGER (EXTENDED POSITION)
2 - TENSIONER HOUSING

TIMING BELT TENSIONER & PULLEY (Continued)

INSPECTION - TENSIONER PULLEY ASSEMBLY

NOTE: The tensioner pulley, bracket, and pivot bolt is serviced as an assembly.

(1) Inspect pulley for free movement. Replace if pulley is loose, seized, or rough turning (Fig. 182).

(2) Inspect pulley bearing and seal. Replace if damaged.

(3) Inspect pivot bolt for free movement in assembly housing. Replace assembly if seized or excessive looseness.

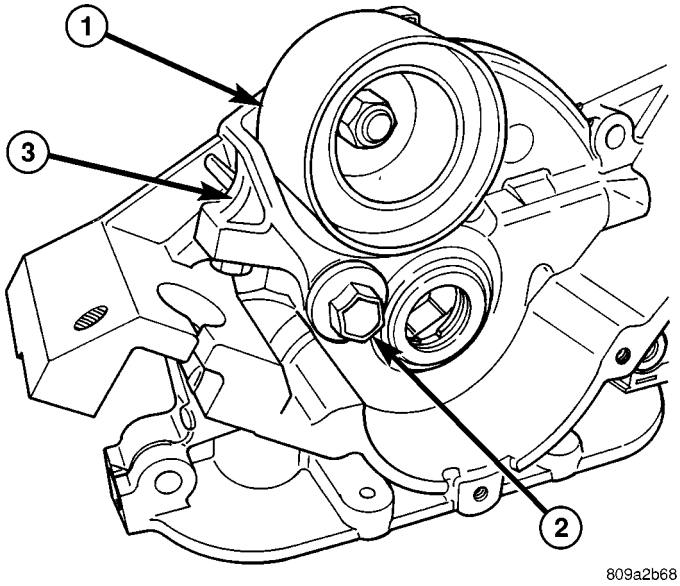


Fig. 182 TENSIONER PULLEY

1 - TENSIONER PULLEY
2 - PIVOT BOLT
3 - TENSIONER BRACKET

INSTALLATION

INSTALLATION - TENSIONER PULLEY ASSEMBLY

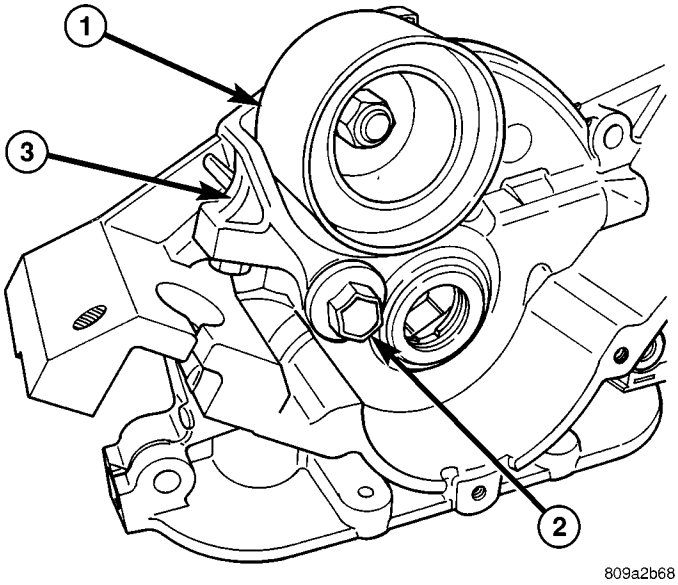


Fig. 183 TENSIONER PULLEY

1 - TENSIONER PULLEY
2 - PIVOT BOLT
3 - TENSIONER BRACKET

(1) Install the timing belt tensioner pulley (1) (Fig. 183) assembly. Tighten the pivot bolt (2) to 61 N·m (45 ft. lbs.).

(2) Install the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION - TIMING BELT)

TENSIONER

(1) For timing belt tensioner installation procedure (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION - TIMING BELT).

ENGINE 3.8L

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ENGINE 3.8L

DESCRIPTION

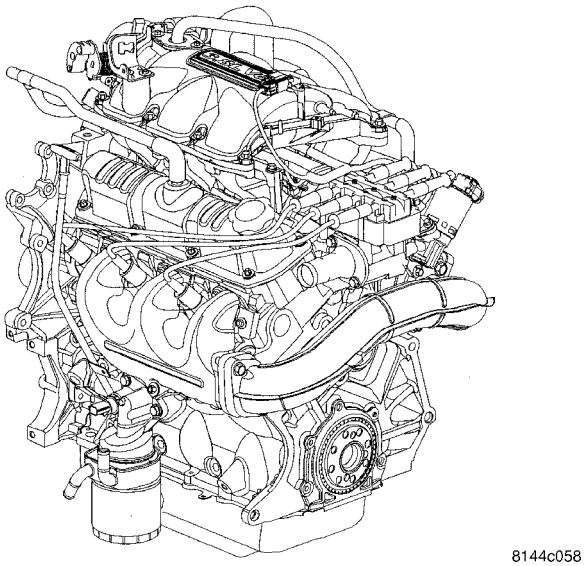
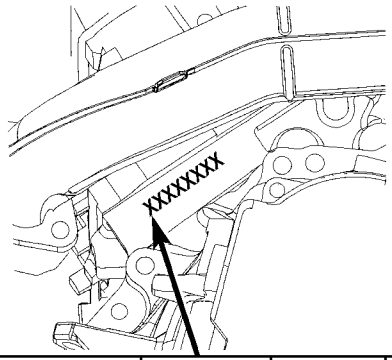


Fig. 1 3.8L ENGINE

The 3.8 Liter (231 cu. in.) engine is 60° V-6 engines with cast iron cylinder blocks and aluminum cylinder heads (Fig. 1). The engine uses a single, block mounted camshaft, roller lifters with pushrods to actuate the valves and either cracked cap, or standard cap, forged connecting rods. The engine does not have provisions for a free wheeling valve train.

The firing order is 1–2–3–4–5–6. The cylinders are numbered from the front of the engine to the rear. The front cylinder bank is numbered 2, 4, and 6. The rear cylinder bank is numbered 1, 3, and 5.



X Model Year	X Manufacturing Plant	XXXXX Componet Code/Usage	XXXX Month/Day	XXXXXXXX Serial Code
Last digit of model year	Saltillo S Trento T	Engine 3.8L Usage Pass Car PC Truck T		Last 8 Digits of VIN

8144c057

Fig. 2 ENGINE IDENTIFICATION

The engine identification number is located on the rear of the cylinder block just below the cylinder head (Fig. 2).

ENGINE 3.8L (Continued)

DIAGNOSIS AND TESTING

ENGINE DIAGNOSIS - INTRODUCTION

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either mechanical (e.g., a strange noise), or performance (e.g., engine idles rough and stalls).

Refer to the Engine Mechanical and the Engine Performance diagnostic charts, for possible causes and corrections of malfunctions (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING - PERFORMANCE).

For fuel system diagnosis, (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - DIAGNOSIS AND TESTING).

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that cannot be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following:

- Cylinder Compression Pressure Test
- Cylinder Combustion Pressure Leakage Test
- Engine Cylinder Head Gasket Failure Diagnosis
- Intake Manifold Leakage Diagnosis
- Hydraulic Lash Adjuster Noise Diagnosis
- Engine Oil Leak Inspection

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery.	1. Test battery. Charge or replace as necessary (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - DIAGNOSIS AND TESTING)
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to terminals.
	3. Faulty starter.	3. Test starting system. (Refer to 8 - ELECTRICAL/STARTING - DIAGNOSIS AND TESTING)
	4. Faulty coil(s) or control unit.	4. Test and replace as needed. (Refer to Appropriate Diagnostic Information)
	5. Incorrect spark plug gap.	5. Set gap. (Refer to 8 - ELECTRICAL/IGNITION CONTROL - SPECIFICATIONS)
	6. Contamination in fuel system.	6. Clean system and replace fuel filter.
	7. Faulty fuel pump.	7. Test fuel pump and replace as needed. (Refer to Appropriate Diagnostic Information)
	8. Incorrect engine timing.	8. Check for a skipped timing belt/chain.
ENGINE STALLS OR IDLES ROUGH	1. Idle speed too low.	1. Test minimum air flow. (Refer to Appropriate Diagnostic Information)
	2. Incorrect fuel mixture.	2. (Refer to Appropriate Diagnostic Information)
	3. Intake manifold leakage.	3. Inspect intake manifold, manifold gasket, and vacuum hoses.
	4. Faulty ignition coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)

ENGINE 3.8L (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped plugs.	1. Clean plugs and set gap.
	2. Contamination in fuel system.	2. Clean system and replace fuel filter.
	3. Faulty fuel pump.	3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Incorrect valve timing.	4. Correct valve timing.
	5. Leaking cylinder head gasket.	5. Replace cylinder head gasket.
	6. Low compression.	6. Test compression of each cylinder.
	7. Burned, warped, or pitted valves.	7. Replace valves.
	8. Plugged or restricted exhaust system.	8. Perform exhaust restriction test. (Refer to 11 - EXHAUST SYSTEM - DIAGNOSIS AND TESTING) Install new parts, as necessary.
	9. Faulty ignition coil(s).	9. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES ON ACCELERATION	1. Dirty or incorrectly gapped spark plugs.	1. Clean spark plugs and set gap.
	2. Contamination in Fuel System.	2. Clean fuel system and replace fuel filter.
	3. Burned, warped, or pitted valves.	3. Replace valves.
	4. Faulty ignition coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES AT HIGH SPEED	1. Dirty or incorrect spark plug gap.	1. Clean spark plugs and set gap.
	2. Faulty ignition coil(s).	2. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	3. Dirty fuel injector(s).	3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Contamination in fuel system.	4. Clean system and replace fuel filter.

ENGINE 3.8L (Continued)

ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY VALVES	1. High or low oil level in crankcase.	1. Check and correct engine oil level.
	2. Thin or diluted oil.	2. Change oil to correct viscosity.
	3. Thick oil	3. (a) Change engine oil and filter. (b) Run engine to operating temperature. (c) Change engine oil and filter again.
	4. Low oil pressure.	4. Check and correct engine oil pressure problem.
	5. Dirt in hydraulic lifters/lash adjusters.	5. Replace hydraulic lifters/lash adjusters.
	6. Worn rocker arms.	6. Inspect oil supply to rocker arms.
	7. Worn hydraulic lifters/lash adjusters.	7. Replace hydraulic lifters/lash adjusters.
	8. Worn valve guides.	8. Replace cylinder head assembly.
	9. Excessive runout of valve seats on valve faces.	9. Grind valve seats and valves.
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thin or diluted oil.	3. Change oil to correct viscosity.
	4. Thick oil	4. (a) Change engine oil and filter. (b) Run engine to operating temperature. (c) Change engine oil and filter again.
	5. Excessive bearing clearance.	5. Measure bearings for correct clearance. Repair as necessary.
	6. Connecting rod journal out-of-round.	6. Replace crankshaft or grind surface.
	7. Misaligned connecting rods.	7. Replace bent connecting rods.

ENGINE 3.8L (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
MAIN BEARING NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thin or diluted oil.	3. Change oil to correct viscosity.
	4. Thick oil	4. (a) Change engine oil and filter.
		(b) Run engine to operating temperature.
		(c) Change engine oil and filter again.
	5. Excessive bearing clearance.	5. Measure bearings for correct clearance. Repair as necessary.
	6. Excessive end play.	6. Check thrust bearing for wear on flanges.
	7. Crankshaft journal out-of-round or worn.	7. Replace crankshaft or grind journals.
	8. Loose flywheel or torque converter.	8. Tighten to correct torque.
OIL PRESSURE DROP	1. Low oil level.	1. Check engine oil level.
	2. Faulty oil pressure sensor/switch.	2. Replace oil pressure sensor/ switch.
	3. Low oil pressure.	3. Check oil pressure sensor/switch and main bearing oil clearance.
	4. Clogged oil filter.	4. Install new oil filter.
	5. Worn parts in oil pump.	5. Replace worn parts or pump.
	6. Thin or diluted oil.	6. Change oil to correct viscosity.
	7. Oil pump relief valve stuck.	7. Remove valve and inspect, clean, or replace.
	8. Oil pump suction tube loose.	8. Remove oil pan and install new tube or clean, if necessary.
	9. Oil pump cover warped or cracked.	9. Install new oil pump.
	10. Excessive bearing clearance.	10. Measure bearings for correct clearance.
OIL LEAKS	1. Misaligned or deteriorated gaskets.	1. Replace gasket(s).
	2. Loose fastener, broken or porous metal part.	2. Tighten, repair or replace the part.
	3. Misaligned or deteriorated cup or threaded plug.	3. Replace as necessary.

ENGINE 3.8L (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL CONSUMPTION OR SPARK PLUGS FOULED	1. PCV system malfunction.	1. Check system and repair as necessary. (Refer to 25 - EMISSIONS CONTROL/ EVAPORATIVE EMISSIONS/PCV VALVE - DIAGNOSIS AND TESTING)
	2. Worn, scuffed or broken rings.	2. Hone cylinder bores. Install new rings.
	3. Carbon in oil ring slots.	3. Install new rings.
	4. Rings fitted too tightly in grooves.	4. Remove rings and check grooves. If groove is not proper width, replace piston.
	5. Worn valve guide(s).	5. Replace cylinder head assembly.
	6. Valve stem seal(s) worn or damaged.	6. Replace seal(s).

ENGINE OIL LEAK INSPECTION

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

(1) Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.

(2) Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil oil level indicator to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.

(3) Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair as necessary.

(4) If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.

(5) **If the oil leak source is not positively identified at this time**, proceed with the air leak detection test method as follows:

- Disconnect the fresh air hose (make-up air) at the cylinder head cover and plug or cap the outlet on the cover.
- Remove the PCV valve hose from the cylinder head cover. Cap or plug the PCV valve outlet on the cover.
- Attach an air hose with pressure gauge and regulator to the oil level indicator tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kpa (3 PSI) of test pressure.

- Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provides the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service manual procedures.
- If the leakage occurs at the crankshaft rear oil seal area, refer to the section, Inspection for Rear Seal Area Leak.

(6) If no leaks are detected, turn off the air supply. Remove the air hose, all plugs, and caps. Install the PCV valve and fresh air hose (make-up air). Proceed to next step.

(7) Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

NOTE: If oil leakage is observed at the oil level indicator tube to block location; remove the tube, clean and reseal using Mopar® Stud & Bearing Mount (press fit tube applications only), and for O-ring style tubes, remove tube and replace the O-ring seal.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

(1) Disconnect the battery.

(2) Raise the vehicle.

(3) Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak. If a leak is present in this area, remove transmission for further inspection.

(a) Circular spray pattern generally indicates seal leakage or crankshaft damage.

(b) Where leakage tends to run straight down, possible causes are a porous block, oil gallery cup plug, bedplate to cylinder block mating surfaces and seal bore. See proper repair procedures for these items.

(4) If no leaks are detected, pressurize the crankcase as previously described.

CAUTION: Do not exceed 20.6 kPa (3 psi).

(5) If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

(6) For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

(7) After the oil leak root cause and appropriate corrective action have been identified, replace component(s) as necessary.

DIAGNOSIS AND TESTING - CYLINDER COMPRESSION PRESSURE TEST

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

(1) Check engine oil level and add oil if necessary.

(2) Drive the vehicle until engine reaches normal operating temperature. Select a route free from traffic and other forms of congestion, observe all traffic laws, and accelerate through the gears several times briskly.

(3) Remove all spark plugs from engine. As spark plugs are being removed, check electrodes for abnormal firing indicators fouled, hot, oily, etc. Record cylinder number of spark plug for future reference.

(4) Remove the Auto Shutdown (ASD) relay from the PDC.

(5) Be sure throttle blade is fully open during the compression check.

(6) Insert compression gauge adaptor Special Tool 8116 or the equivalent, into the #1 spark plug hole in cylinder head. Connect the 0–500 psi (Blue) pressure transducer (Special Tool CH7059) with cable adaptors to the DRBIII®. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).

(7) Crank engine until maximum pressure is reached on gauge. Record this pressure as #1 cylinder pressure.

(8) Repeat the previous step for all remaining cylinders.

(9) Compression should not be less than 689 kPa (100 psi) and not vary more than 25 percent from cylinder to cylinder.

(10) If one or more cylinders have abnormally low compression pressures, repeat the compression test.

(11) If the same cylinder or cylinders repeat an abnormally low reading on the second compression test, it could indicate the existence of a problem in the cylinder in question. **The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine should not be disassembled to determine the cause of low compression unless some malfunction is present.**

CYLINDER COMBUSTION PRESSURE LEAKAGE TEST

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
- Leaks between adjacent cylinders or into water jacket.
- Any causes for combustion/compression pressure loss.

WARNING: DO NOT REMOVE THE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

Check the coolant level and fill as required. DO NOT install the pressure cap.

Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.

Clean spark plug recesses with compressed air.

Remove the spark plugs.

Remove the oil filler cap.

Remove the air cleaner.

Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum, with 552 kPa (80 psi) recommended.

Perform the test procedures on each cylinder according to the tester manufacturer's instructions. While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the coolant.

All gauge pressure indications should be equal, with no more than 25% leakage per cylinder.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

STANDARD PROCEDURE

STANDARD PROCEDURE - MEASURING BEARING CLEARANCE USING PLASTIGAGE

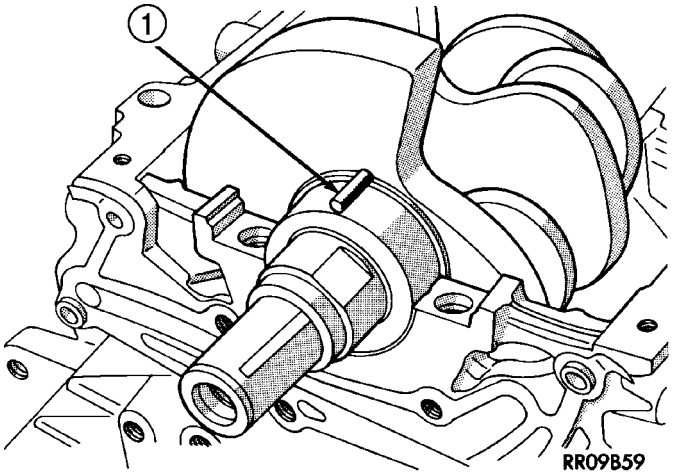


Fig. 3 Plastigage Placed in Lower Shell—Typical

1 - PLASTIGAGE

Engine crankshaft bearing clearances can be determined by use of Plastigage or equivalent. The following is the recommended procedure for the use of Plastigage:

(1) Remove oil film from surface to be checked. Plastigage is soluble in oil.

(2) Place a piece of Plastigage across the entire width of the bearing shell in the cap approximately 6.35 mm (1/4 in.) off center and away from the oil holes (Fig. 3). (In addition, suspected areas can be checked by placing the Plastigage in the suspected area). Torque the bearing cap/bed plate bolts of the bearing being checked to the proper specifications.

(3) Remove the bearing cap and compare the width of the flattened Plastigage with the metric scale provided on the package. Locate the band closest to the same width. This band shows the amount of clearance in thousandths of a millimeter. Differences in readings between the ends indicate the amount of taper present. Record all readings taken. Compare the clearance measurements to specsifications found in the engine specifications table (Refer to 9 - ENGINE - SPECIFICATIONS). **Plastigage generally is accompanied by two scales. One scale is in inches, the other is a metric scale.**

NOTE: Plastigage is available in a variety of clearance ranges. Use the most appropriate range for the specifications you are checking.

(4) Install the proper crankshaft bearings to achieve the specified bearing clearances.

FORM-IN-PLACE GASKETS AND SEALERS

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

ENGINE 3.8L (Continued)

MOPAR® BED PLATE SEALANT is a unique (green-in-color) anaerobic type gasket material that is specially made to seal the area between the bed plate and cylinder block without disturbing the bearing clearance or alignment of these components. The material cures slowly in the absence of air when torqued between two metallic surfaces, and will rapidly cure when heat is applied.

MOPAR® GASKET SEALANT is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can w/applicator.

SEALER APPLICATION

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can w/applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

STANDARD PROCEDURE - ENGINE GASKET SURFACE PREPARATION

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

- Metal scraper

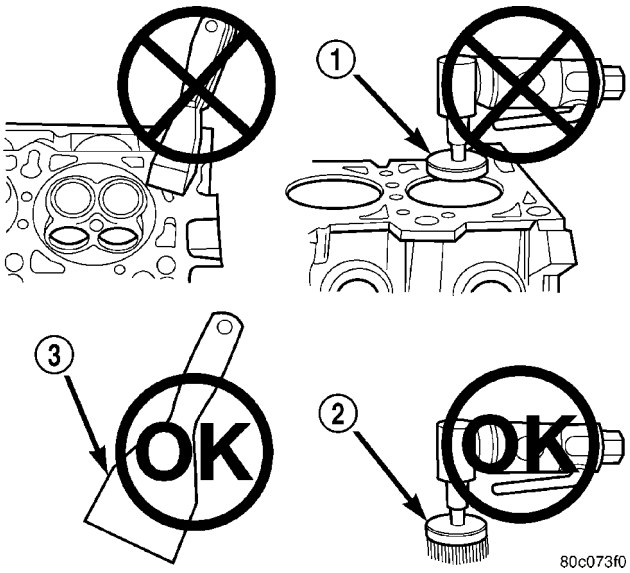


Fig. 4 Proper Tool Usage For Surface Preparation

1 - ABRASIVE PAD
2 - 3M ROLOC™ BRISTLE DISC
3 - PLASTIC/WOOD SCRAPER

- Abrasive pad or paper to clean cylinder block and head
- High speed power tool with an abrasive pad or a wire brush (Fig. 4)

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper (Fig. 4)
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow) (Fig. 4)

CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.

HYDROSTATIC LOCKED ENGINE

When an engine is suspected to be hydrostatically locked, regardless of what caused the problem, the following steps should be used.

CAUTION: DO NOT use starter motor to rotate the engine, severe damage may occur.

(1) Inspect air cleaner, induction system and intake manifold to insure system is dry and clear of foreign material.

ENGINE 3.8L (Continued)

(2) Remove negative battery cable.
(3) Place a shop towel around the spark plugs when removing them from the engine. This will catch any fluid that may possibly be in the cylinder under pressure.
(4) With all spark plugs removed, rotate engine crankshaft using a breaker bar and socket.
(5) Identify the fluid in the cylinder(s) (i.e., coolant, fuel, oil or other).
(6) Make sure all fluid has been removed from the cylinders. Inspect engine for damage (i.e., connecting rods, pistons, valves, etc.)
(7) Repair engine or components as necessary to prevent this problem from re-occurring.

CAUTION: Squirt approximately one teaspoon of oil into the cylinders, rotate engine to lubricate the cylinder walls to prevent damage on restart.

(8) Install new spark plugs.
(9) Drain engine oil and remove oil filter.
(10) Install a new oil filter.
(11) Fill engine with specified amount of approved oil.
(12) Connect negative battery cable.
(13) Start engine and check for any leaks.

STANDARD PROCEDURE - REPAIR OF DAMAGED OR WORN THREADS

Damaged or worn threads (excluding spark plug and camshaft bearing cap attaching threads) can be repaired. Essentially, this repair consists of drilling out worn or damaged threads, tapping the hole with a special Heli-Coil Tap, (or equivalent) and installing an insert into the tapped hole. This brings the hole back to its original thread size.

CAUTION: Be sure that the tapped holes maintain the original center line.

Heli-Coil tools and inserts are readily available from automotive parts jobbers.

STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS

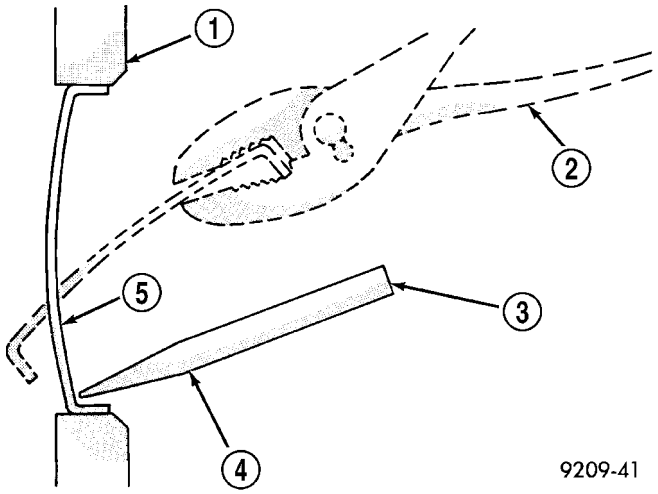


Fig. 5 Core Hole Plug Removal

1 - CYLINDER BLOCK
2 - REMOVE PLUG WITH PLIERS
3 - STRIKE HERE WITH HAMMER
4 - DRIFT PUNCH
5 - CUP PLUG

Using a blunt tool such as a drift and a hammer, strike the bottom edge of the cup plug. With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug (Fig. 5).

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and cause serious engine problems.

Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer. Lightly coat inside of cup plug hole with Mopar® Stud and Bearing Mount. Make certain the new plug is cleaned of all oil or grease. Using proper drive plug, drive plug into hole so that the sharp edge of the plug is at least 0.5 mm (0.020 in.) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be refilled and the vehicle placed in service immediately. .

ENGINE 3.8L (Continued)

REMOVAL - ENGINE ASSEMBLY

(1) Perform fuel pressure release procedure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).

(2) Disconnect negative battery cable.

(3) Drain the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(4) Secure the steering wheel in the center position.

(5) Evacuate and recover the air conditioning (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING/REFRIGERANT - STANDARD PROCEDURE).

(6) Disconnect the CCV hose at the left cylinder head cover.

(7) Remove the air cleaner cover and housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

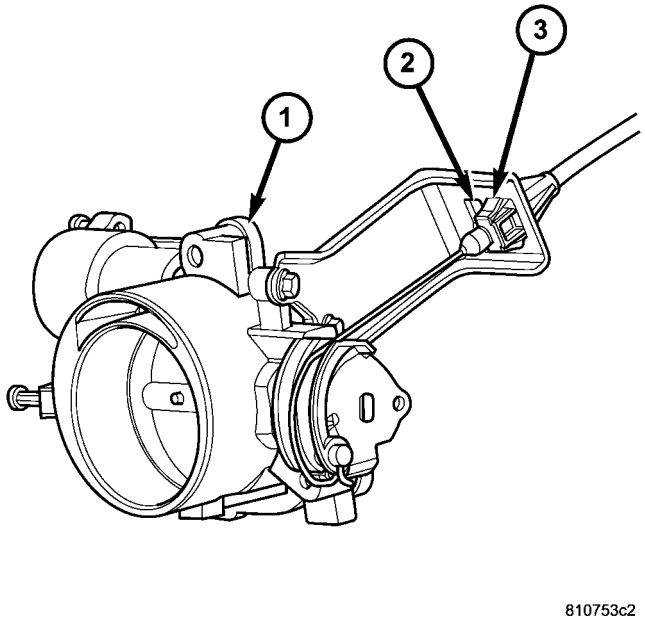


Fig. 6 THROTTLE BODY

1 - THROTTLE BODY
2 - SPEED CONTROL CABLE ACCESS
3 - THROTTLE CABLE

(8) Disconnect the throttle and cruise control cable from the throttle, separate the cables from the bracket and set aside (Fig. 6).

(9) Disconnect the cruise control and power brake booster vacuum hoses and set aside.

(10) Disconnect the upper radiator hose from the thermostat housing and the lower radiator hose from the radiator (Refer to 7 - COOLING/ENGINE/RADIATOR - REMOVAL).

(11) Disconnect the heater hoses and coolant reservoir hose from the intake manifold.

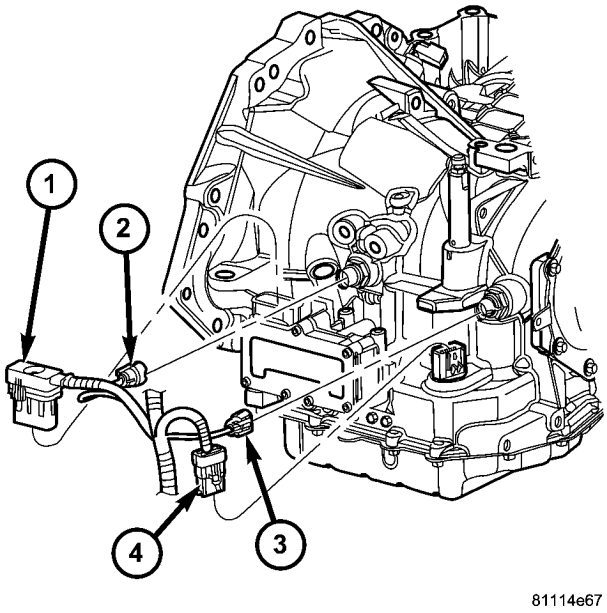


Fig. 7 Transmission Connectors

1 - SOLENOID PACK CONNECTOR
2 - INPUT SPEED SENSOR CONNECTOR
3 - OUTPUT SPEED SENSOR CONNECTOR
4 - TRANSMISSION RANGE SENSOR CONNECTOR

(12) Disconnect the transmission controller and transmission sensor wire harness connectors (Fig. 7).

(13) Disconnect the brake controller wire harness connector.

(14) Disconnect the transmission shift cable, remove the cable from the bracket and set the cable aside.

NOTE: Capture and store any fluid spillage in appropriately marked containers.

(15) Disconnect the transmission lines using special tool # 8875.

(16) Disconnect the generator electrical connectors.

(17) Disconnect the fuel line from fuel rail (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/QUICK CONNECT FITTING - STANDARD PROCEDURE).

(18) Disconnect the EVAP hose from the throttle body.

(19) Disconnect the throttle position (TP), idle air control (IAC) motor, oxygen (HO2), cam position (CMP), manifold absolute pressure (MAP) and the two engine wiring harness connectors. Free the harness from the cover studs and set harness aside.

(20) Disconnect the purge solenoid harness connector.

(21) Remove engine wiring harness retainer from left cylinder head cover and oil level indicator tube.

ENGINE 3.8L (Continued)

(22) Disconnect the A/C electrical connector, and both A/C lines from the compressor. Cover and seal all openings of hoses and compressor.

(23) Disconnect the oil pressure sending unit (OPS).

(24) Disconnect the coolant hose at the engine oil cooler.

(25) Raise and support the vehicle.

(26) Remove the front wheels.

(27) Remove the front fascia.

(28) Disconnect the starter wiring and push pin.

(29) Remove the flex plate inspection cover.

(30) Rotate the engine at the crankshaft pulley bolt and remove the torque converter bolts.

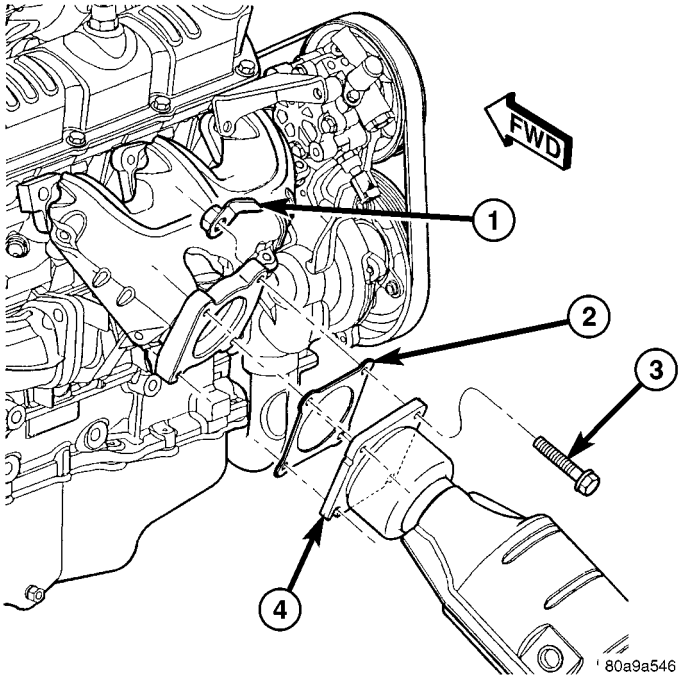


Fig. 8 CONVERTER TO MANIFOLD - 3.8L

1 - FLAG NUT
2 - GASKET
3 - BOLT
4 - CATALYTIC CONVERTER

(31) Disconnect the rear oxygen sensor and remove the exhaust system (Fig. 8).

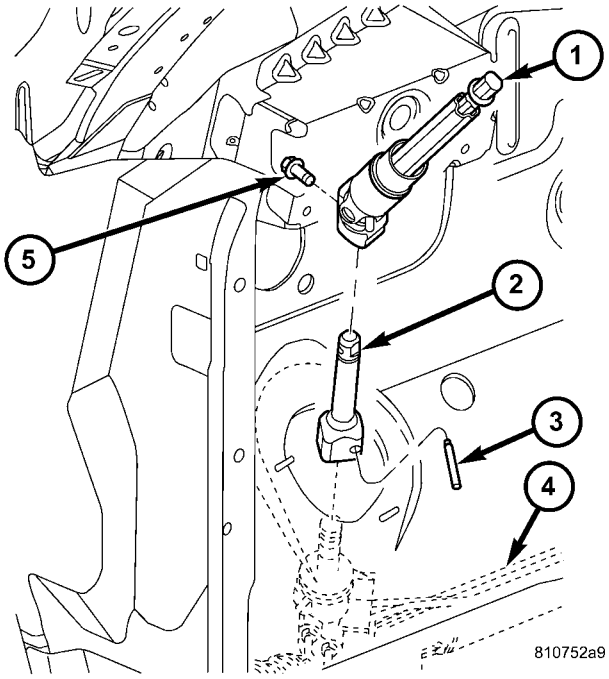


Fig. 9 STEERING COLUMN COUPLING

1 - LOWER STEERING COLUMN COUPLING ASSEMBLY
2 - INTERMEDIATE SHAFT TO STEERING GEAR
3 - PIN
4 - STEERING GEAR
5 - EXTENSION TO SHAFT BOLT

(32) Separate the steering column intermediate shaft from the steering gear using special tool # 6831–A (Fig. 9).

(33) Disconnect the knock sensor wiring harness connector and remove the crankshaft sensor.

(34) Disconnect the in block heater (if equipped).

(35) Disconnect the left wheel speed sensor and sensor harness push pin from the body, and set the harness aside (Fig. 10).

(36) Disconnect the left upper stabilizer link (Fig. 10).

(37) Disconnect the left strut to steering knuckle bolts and separate the union (Fig. 10).

(38) Disconnect the right wheel speed sensor and sensor harness push pin from the body, and set the harness aside (Fig. 10).

(39) Disconnect the right upper stabilizer link (Fig. 10).

(40) Disconnect the right strut to steering knuckle bolts and separate the union (Fig. 10).

ENGINE 3.8L (Continued)

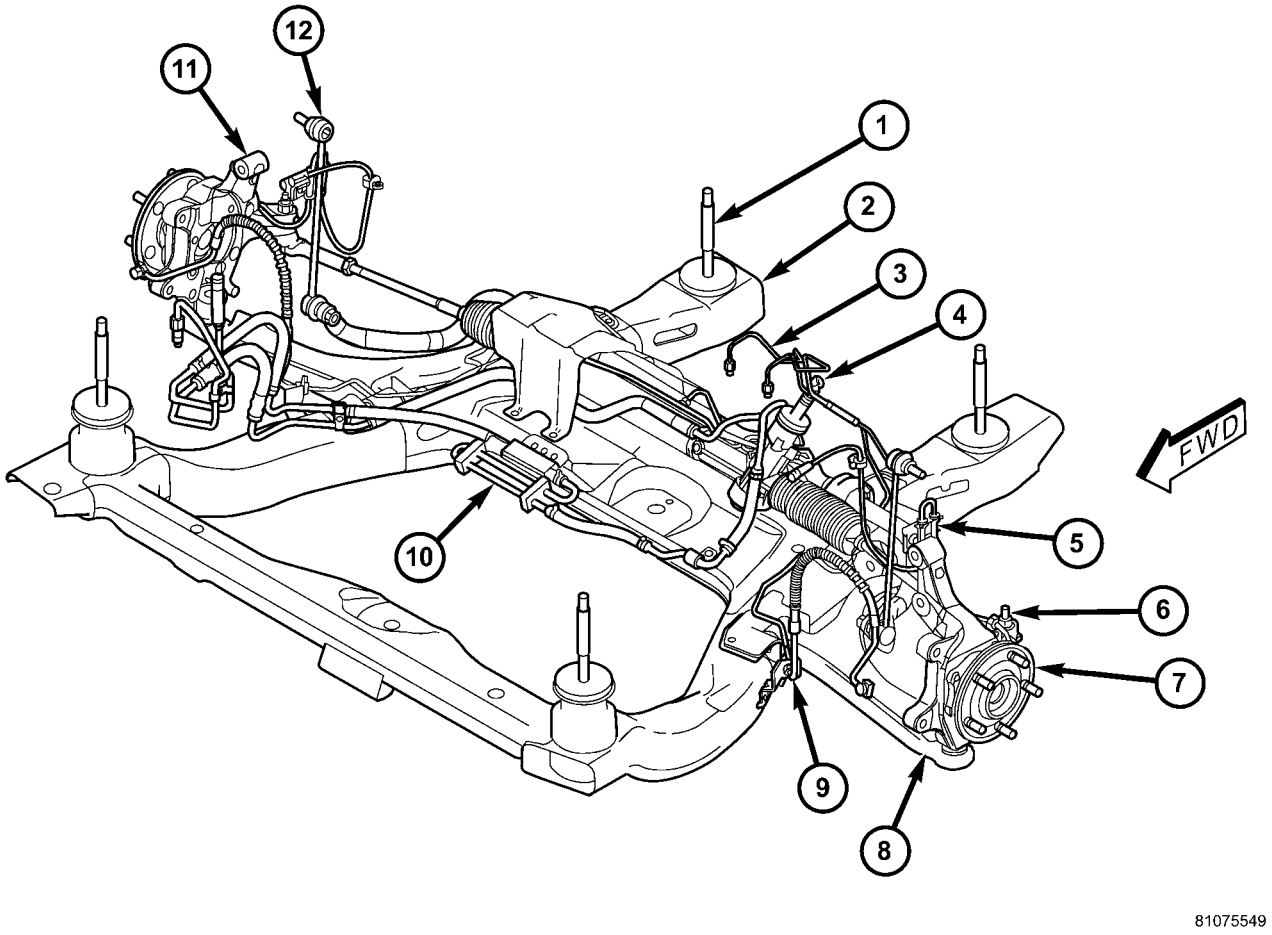


Fig. 10 FRONT CRADLE ASSEMBLY

1 - FRONT CRADLE BOLT
2 - FRONT CRADLE ASSEMBLY
3 - FRONT BRAKE LINES
4 - STEERING GEAR
5 - WHEEL SPEED SENSOR HARNESS
6 - TIE ROD END
7 - WHEEL HUB
8 - LOWER CONTROL ARM
9 - FRONT BRAKE HOSE
10 - POWER STEERING COOLER
11 - STEERING KNUCKLE
12 - STABILIZER LINK

ENGINE 3.8L (Continued)

(41) Disconnect the engine harness ground at the transmission.

(42) Disconnect the rear transmission mount from the body

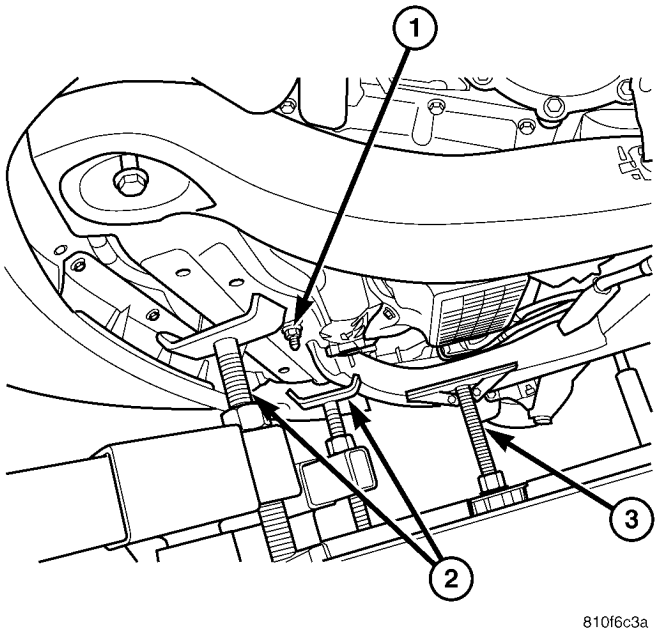


Fig. 11 CRADLE SUPPORT FIXTURE - FRONT

1 - LEFT LOWER ENGINE MOUNT NUT
2 - CRADLE SUPPORT FIXTURE ARMS
3 - CRADLE SUPPORT FIXTURE ENGINE STABILIZER

(43) Set up and adjust the cradle support fixture arms and dowels, (Fig. 11), (Fig. 12) then paint mark the cradle to body location at all four cradle bolt positions.

CAUTION: DO NOT APPLY the total vehicle weight on the cradle support fixture.

(44) Lower the front cradle onto the table (Fig. 11), (Fig. 12) and remove all four front cradle mount bolts.

NOTE: Use a brake pedal prop rod and depress the brake pedal to prevent excessive brake fluid loss when the brake system is open.

(45) Disconnect both front brake lines at the brake controller and route aside (Fig. 10).

(46) Disconnect the right front engine mount (Fig. 13).

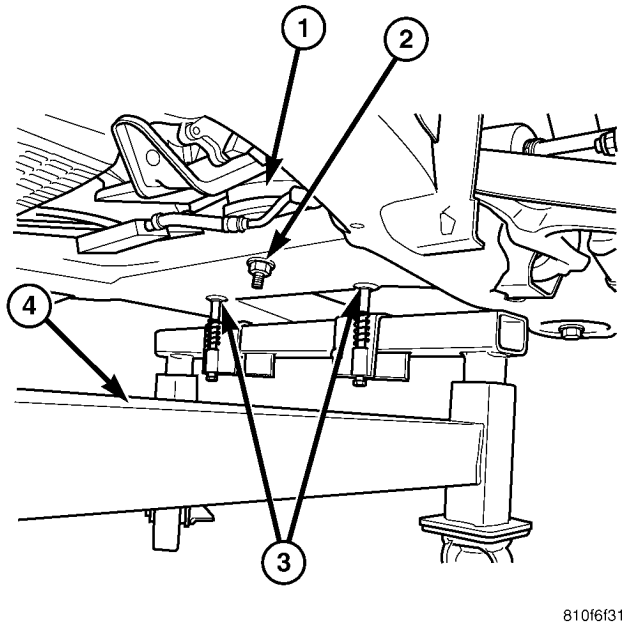


Fig. 12 CRADLE SUPPORT FIXTURE - REAR

1 - RIGHT LOWER ENGINE MOUNT
2 - RIGHT LOWER ENGINE MOUNT NUT
3 - ALIGNMENT DOWEL ACCESS HOLES
4 - CRADLE SUPPORT FIXTURE

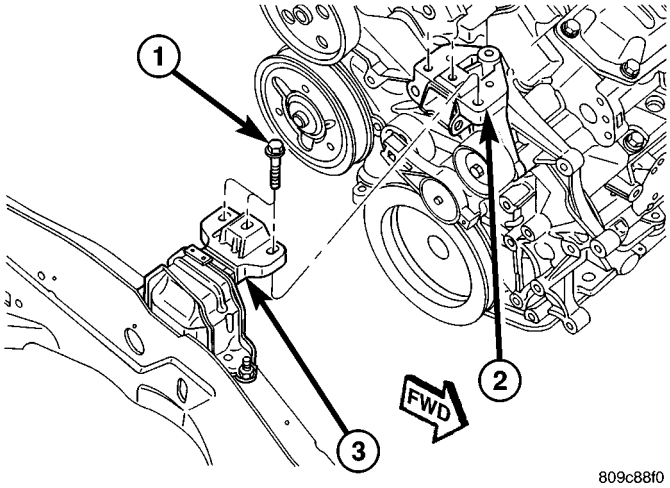


Fig. 13 RIGHT ENGINE MOUNT TO ENGINE

1 - BOLT
2 - MOUNT BRACKET
3 - ENGINE RIGHT MOUNT ASSEMBLY

ENGINE 3.8L (Continued)

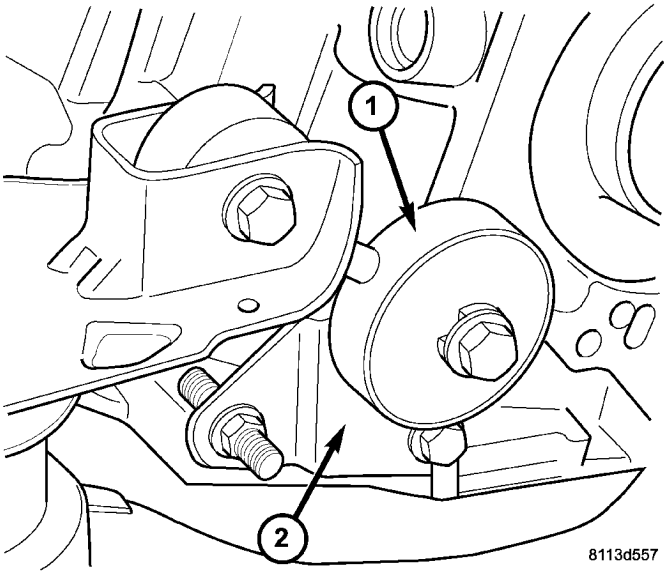


Fig. 14 Powertrain Torque Strut

1 - STRUT
2 - BRACKET

(47) Remove the left powertrain torque strut to frame bracket bolt (Fig. 14)

CAUTION: While slowly separating the body from the cradle assembly, constant checks must be performed to assure proper positioning and that no damage occurs during separation.

(48) Carefully raise the vehicle off of the engine and cradle assembly.

(49) Connect engine lift bracket, special tool # 8534–8 to the left cylinder head and # 8534–7 to the right cylinder head.

(50) Separate the engine and transmission from the cradle using the lift brackets.

(51) Separate the transmission from the engine.

INSTALLATION - ENGINE ASSEMBLY

CAUTION: While slowly lowering the body to the cradle assembly, constantly check to assure proper positioning and no damage occurs to other components until union is made.

(1) Position engine and transmission assembly under vehicle. Slowly lower the vehicle down over the engine and transmission until the cradle is aligned.

(2) Install the cradle supporting bolts and tighten to 163 N·m (120 ft.lbs.) (Fig. 10).

(3) Install the right engine mount. tighten the bolts to the timing cover to 54 N·m (40 ft.lbs.), tighten the bolts to the right rail to 68 N·m (50 ft.lbs.). (Fig. 15).

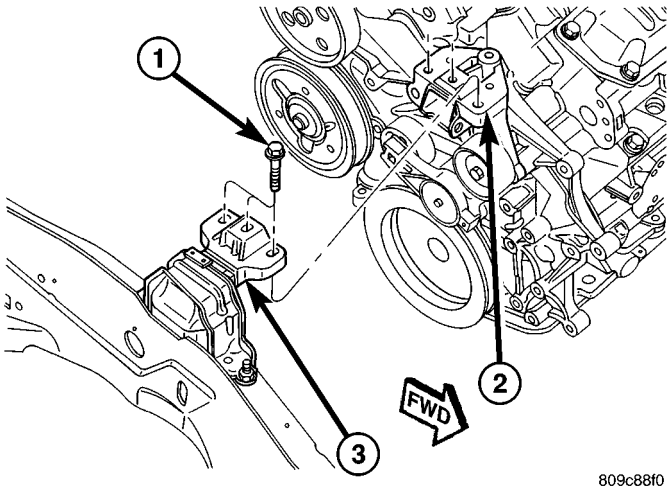


Fig. 15 RIGHT ENGINE MOUNT TO ENGINE

1 - BOLT
2 - MOUNT BRACKET
3 - ENGINE RIGHT MOUNT ASSEMBLY

(4) Slowly raise the vehicle off of the cradle support.

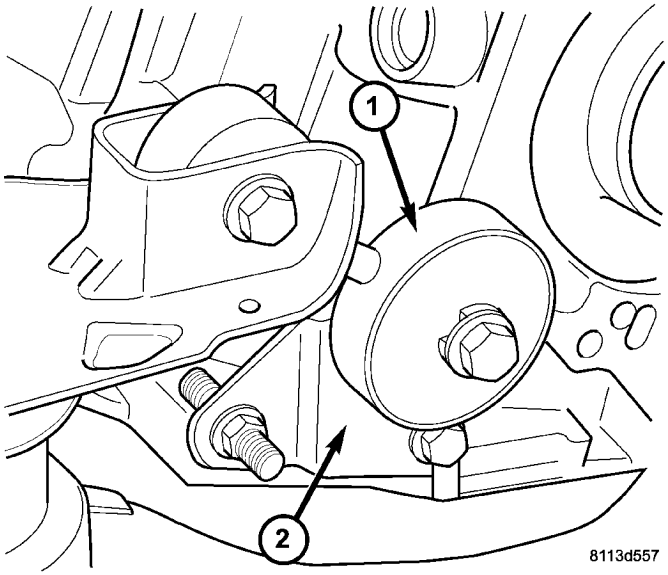


Fig. 16 Powertrain Torque Strut

1 - STRUT
2 - BRACKET

(5) Install the rear transmission torque strut and tighten bolts to 54 N·m (40 ft. lbs.) (Fig. 16).

(6) Install the engine wiring harness ground strap to transmission case.

(7) Connect the left front strut to steering knuckle. Tighten bolts to 81 N·m (60 ft. lbs.) plus 90 degrees.

(8) Connect the left stabilizer link. Tighten to 88N·m (65 ft.lbs.).

ENGINE 3.8L (Continued)

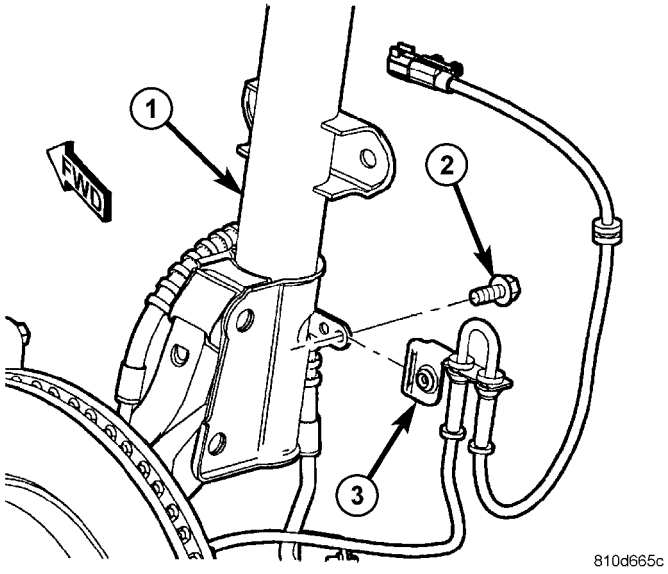


Fig. 17 Wheel Speed Sensor Mounting To Strut

1 - STRUT ASSEMBLY
2 - SCREW
3 - WHEEL SPEED SENSOR ROUTING BRACKET

(9) Connect the left wheel speed sensor and harness push pin (Fig. 17).

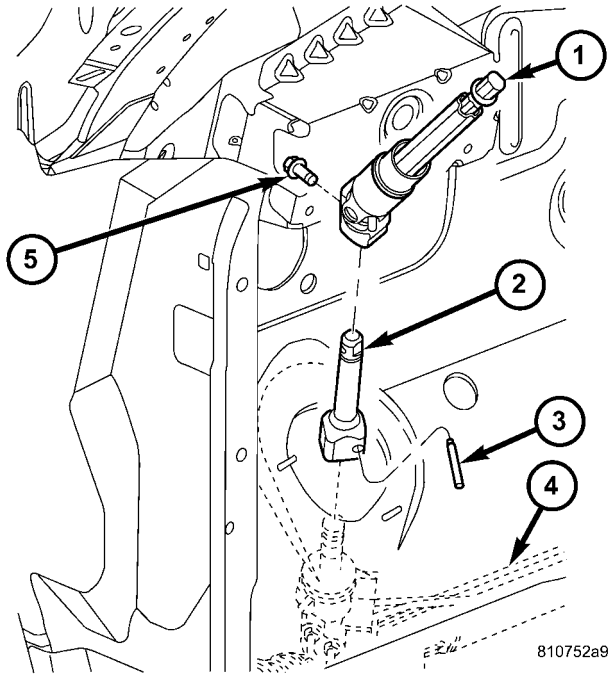


Fig. 18 STEERING COLUMN COUPLING

1 - LOWER STEERING COLUMN COUPLING ASSEMBLY
2 - INTERMEDIATE SHAFT TO STEERING GEAR
3 - PIN
4 - STEERING GEAR
5 - EXTENSION TO SHAFT BOLT

(10) Reconnect the steering column intermediate shaft to the steering gear (Fig. 18).

(11) Connect the right front strut to steering knuckle. Tighten bolts to 81 N·m (60 ft. lbs.) plus 90 degrees (Fig. 10)

(12) Connect the right stabilizer link. Tighten to 88N·m (65 ft.lbs.) (Fig. 10).

(13) Connect the right wheel speed sensor and harness push pin (Fig. 17).

(14) Install wheels.

(15) Connect the in block heater (if equipped).

(16) Connect the knock sensor electrical connector.

(17) Install the exhaust system and connect the O2 sensor.

(18) Install the torque converter bolts. Tighten the bolts to 88N·m (65 ft.lbs.).

(19) Install the flex plate inspection cover.

(20) Connect the starter wiring, route harness and secure with push pin.

(21) Install the front fascia.

(22) Connect the coolant hose at the engine oil cooler.

(23) Connect the oil pressure sending unit (OPS) wiring harness connector.

(24) Lower the vehicle.

(25) Connect the A/C lines and compressor electrical connector (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - INSTALLATION).

(26) Route the engine harness to the left cylinder head and attach the purge solenoid.

(27) Connect the engine sensor wiring harness connectors.

(28) Connect the engine vacuum harnesses.

(29) Connect the fuel line to the fuel rail.

(30) Connect the generator electrical connectors (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - INSTALLATION).

(31) Connect the transmission controller, sensor electrical connectors and fluid lines (Fig. 19).

(32) Connect the radiator, coolant reservoir and heater hoses.

(33) Connect the throttle and cruise control cables (Fig. 20).

(34) Install the air cleaner housing and connect the CCV hose to the left cylinder head cover (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER ELEMENT - INSTALLATION).

(35) Fill the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(36) Evacuate and recharge A/C system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT - STANDARD PROCEDURE).

(37) Install new oil filter. Fill engine crankcase with proper oil to correct level (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - SPECIFICATIONS).

(38) Connect negative cable to battery.

ENGINE 3.8L (Continued)

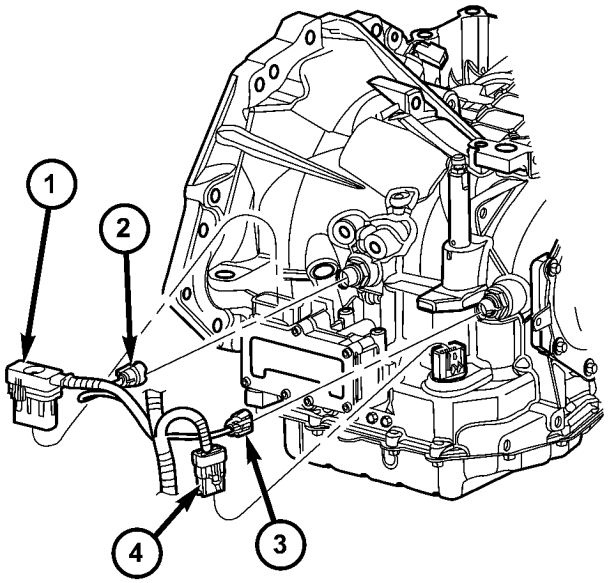


Fig. 19 Transmission Connectors

1 - SOLENOID PACK CONNECTOR
2 - INPUT SPEED SENSOR CONNECTOR
3 - OUTPUT SPEED SENSOR CONNECTOR
4 - TRANSMISSION RANGE SENSOR CONNECTOR

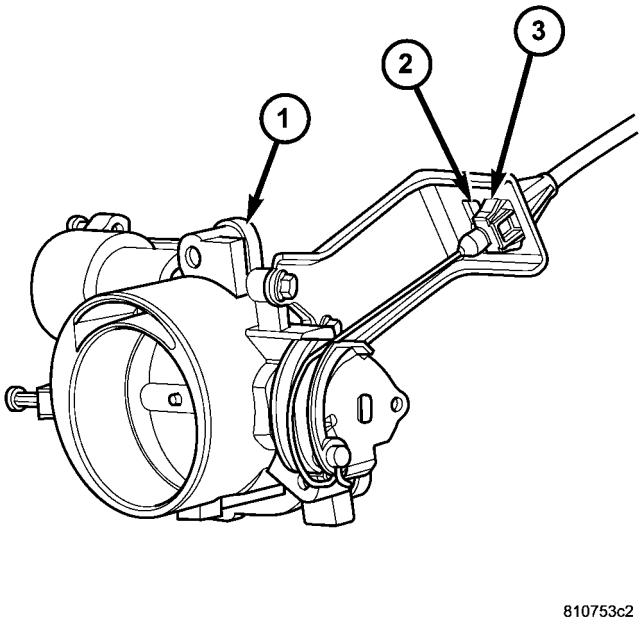


Fig. 20 THROTTLE BODY

1 - THROTTLE BODY
2 - SPEED CONTROL CABLE ACCESS
3 - THROTTLE CABLE

(39) Fill the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(40) Bleed the braking system (Refer to 5 - BRAKES - STANDARD PROCEDURE), (Refer to 5 - BRAKES - STANDARD PROCEDURE).

(41) Start engine and run until operating temperature is reached.

SPECIFICATIONS

3.8L ENGINE

GENERAL DESCRIPTION

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Engine Type	60° V-6 Engine	
Number of Cylinders	6	
Displacement 3.8L	3.8 Liters	231 cu. in.
Bore 3.8L	96.0 mm	3.779 cu.in.
Stroke	87 mm	3.425 in.
Compression Ratio 3.8L	-	9.6:1
Firing Order	-	1-2-3-4-5-6
Compression Pressure-Minimum	689.5 kPa	100 psi.
Cylinder Compression (Max. Difference Between Cylinders	-	25%

CYLINDER BLOCK

DESCRIPTION	SPECIFICATION	
	Metric	**Standard**
Cylinder Bore Diameter (Standard) 3.8L	95.993-96.007 mm	3.7792-3.780 in.
Out of Round (Service Limits)	0.076 mm	0.003 in.
Taper (Service Limits)	0.051 mm	0.002 in.
Lifter Bore Diameter	22.980-23.010 mm	0.905-0.906 in.
Deck Surface Flatness (Max.)	0.1 mm	0.004 in.

ENGINE 3.8L (Continued)

CRANKSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Connecting Rod Journal Diameter	57.979-58.005 mm	2.2827-2.2837 in.
Main Bearing Journal Diameter	63.993-64.013 mm	2.5194-2.5202 in.
Journal Out-of-Round (Max.)	0.025 mm	0.001 in.
Journal Taper (Max.)	0.025 mm	0.001 in
End Play	0.09-0.24 mm	0.0036-0.0095 in.
Wear Limit	0.381 mm	0.015 in.
Main Bearing Diametrical Clearance 1-2-3-4	0.011-0.055 mm	0.0005-0.0022 in.
Wear Limit	0.076 mm	0.003 in.

CONNECTING RODS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Bearing Clearance	0.019-0.065 mm.	0.017-0.020 in.
Wear Limit	0.074 mm	0.003 in.
Side Clearance	0.13-0.32 mm	0.005-0.013 in.
Wear Limit	0.38 mm	0.015 in.

PISTONS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Piston Diameter 3.8L-Measured 33.01 mm (1.30 in) From Piston Top	95.968-95.998 mm.	3.778-3.779 in.
Clearance in Bore @ Size Location (New)	-0.005-0.039 mm	-0.0002–0.0015 in.
Weight 3.8L	426 ± 5 grams	15.03 ± 0.1764 oz.

PISTON PINS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Type	Press Fit in Rod (Serviced as a Assembly)	
Clearance in Piston @ 21C (70°F)	0.006-0.019 mm	0.0002-0.0007 in.
Clearance in Connecting Rod	Interference Fit	
Diameter	22.87-22.88 mm	0.9007-0.9009 in.
Length 3.8L	71.25-71.75 mm	2.805-2.824 in.

ENGINE 3.8L (Continued)

PISTON RINGS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Ring End Gap		
Top Compression Ring	0.18-0.38 mm	0.007-0.015 in.
Second Compression Ring	0.28-0.57 mm	0.011-0.022 in.
Oil Control (Steel Rails)	0.23-0.78 mm	0.009-0.030 in.
Wear Limit-Compression Rings	1.0 mm	0.039 in.
Wear Limit-Oil Control Steel Rails	1.88 mm	0.074 in.
Ring Side Clearance		
Top Compression Ring 3.8L	0.030-0.069 mm	0.0012-0.0027 in.
Second Compression Ring 3.8L	0.041-0.085 mm	0.0016-0.0033 in.
Oil Ring (Steel Ring)	0.039-0.200 mm	0.0015-0.0078 in.
Wear Limit- Top Ring	0.10 mm	0.004 in.
Wear Limit-2nd Ring	0.13 mm	0.005
Wear Limit Oil Ring Pack	0.266 mm	0.009
Ring Width-Top Compression Ring 3.8L	1.175-1.190 mm	0.0462-0.0468
Ring Width-2nd Compression Ring 3.8L	1.46-1.49 mm	0.0575-0.058 in.
Ring Width-Oil Ring (Steel Rails) 3.8L	0.435-0.510 mm	0.017-0.020

CAMSHAFT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Journal Diameter		
#1	50.724-50.775 mm	1.997-1.999 in.
#2	50.317-50.368 mm	1.9809-1.9829 in.
#3	49.936-49.987 mm	1.9659-1.9679 in.
#4	49.530-49.581 mm	1.9499-1.9520 in.
Bearing Clearance-Diametrical	0.025-0.101 mm	0.001-0.004 in.
Bearing Clearance (Max.Allowable)	0.127 mm	0.005 in.
End Play	0.254-0.508 mm	0.010-0.020 in.
Camshaft Bearing Diameter		
#1	50.800-50.825	1.9999-2.0009 in.
#2	50.393-50.419 mm	1.9839-1.9849 in.
#3	50.013-50.038 mm	1.9690-1.9699 in.
#4	49.606-49.632 mm	1.9529-1.954 in.
Exhaust Valve Timing		
Closes-3.8L (ATDC)	-	18°
Opens-3.8L (BBDC)	-	46°
Duration-3.8L	-	244°
Intake Valve Timing		
Closes-3.8L (ABDC)	-	63°
Opens-3.8L (ATDC)	-	1°
Duration-3.8L	-	242°
Valve Overlap-3.8L	-	17°

ENGINE 3.8L (Continued)

HYDRAULIC LIFTER

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Type	Hydraulic Roller	
Outside Diameter	22.949-22.962 mm	0.903-0.904 in.
Clearance in Block	0.020-0.061 mm	0.0007-0.0024 in.

CYLINDER HEAD

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Gasket Thickness (Compressed)	0.65-0.75 mm	0.0007-0.0024 in.

VALVES

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Face Angle-Intake	-	45-45.5°
Face Angle-Exhaust	-	45-45.5°
Head Diameter-Intake	47.87-48.13 mm	1.88-1.89 in.
Head Diameter-Exhaust	35.37-35.63 mm	1.39-1.40 in.
Valve Lift (Zero Lash)-Intake and Exhaust-3.8L	11.0 mm	0.433 in.
Valve Length-Intake	125.84-126.6 mm	4.95-4.98 in.
Valve Length-Exhaust	127.20-127.96	5.00-5.04 in.
Valve Stem to Tip Height (valve tip to spring seat washer)-Intake	48.1-49.7 mm	1.89-1.95 in.
Valve Stem to Tip Height (valve tip to spring seat washer)-Exhaust	48.53-50.09 mm	1.91-1.97 in.

VALVE SEAT

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Angle	-	44.5-45°
Run Out (Service Limits)	0.0762 mm	0.003 in.
Width-Intake and Exhaust	1.50-2.00 mm	0.057-0.078 in.

VALVE GUIDE

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Guide Bore Diameter (Std.)	6.975-7.00 mm	0.274-0.275 in.

VALVE MARGIN

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Intake	0.825-0.973 mm	0.032-0.038 in.
Exhaust	1.565-1.713 mm	0.061-0.067 in.

VALVE STEM DIAMETER

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Intake (Standard)	6.935-6.953 mm	0.2718-0.2725 in.
Exhaust (Standard)	6.906-6.924 mm	0.2718-0.2725 in.

ENGINE 3.8L (Continued)

VALVE STEM TO GUIDE CLEARANCE

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Intake	0.025-0.065 mm	0.001-0.0025 in.
Exhaust	0.059-0.094 mm	0.002-0.0037 in.
Max Allowable-Intake (Rocking Method)	0.247 mm	0.010 in.
Max Allowable-Exhaust (Rocking Method)	0.414 mm	0.016 in.

PUSH RODS

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Length	135.438 mm	5.33 in.

VALVE SPRING

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Free Length-Type A	51.4 mm	2.02 in.
Free Length-Type B	53.4 mm	2.10 in.
Wire Diameter Type A	3.95-4.77 mm	0.15-0.19 in.
Wire Diameter Type B	4.19-4.29 mm	0.16-0.17 in.
Number of Coils Type A	7.52	
Number of Coils Type B	7.25	
Spring Tension (Valve Closed) Type A	376.4-424.4 N @ 41.9 mm	84.6-95.6 lbs. @ 1.65 in.
Spring Tension (Valve Open) Type A	863.9-959.9 N @ 41.9 mm	194.2-215.8 lbs. @ 1.65 in.
Spring Tension (Valve Closed) Type B	377-423 N @ 41.9 mm	84.8-95.2 lbs. @ 1.65 in.
Spring Tension (Valve Open) Type B	880-962 N @ 30.91 mm	197.9-216.3 lbs. @ 122 in.
Installed Height	41.1-42.7 mm	1.61-1.68 in

LUBRICATION

DESCRIPTION	SPECIFICATION	
	Metric	Standard
At Curb Idle Speed* (Minimum with engine at operating temperature)	34.47 kPa	5 psi
At 3000 RPM	205-551 kPa	30-80 psi
Oil Filter By-Pass Valve Setting	62-103 kPa	9-15 psi
Oil Pressure Switch Actuating Pressure	14-28 Kpa	2-4 psi
caution: *If pressure is ZERO at curb idle, DO NOT run engine at 3000 rpm.		

OIL PUMP

DESCRIPTION	SPECIFICATION	
	Metric	Standard
Clearance Over rotors-Inner and Outer	0.10 mm	0.004 in.
Cover Out-Of-Flat (Max.)	0.025 mm	0.001 in.
Inner Rotor Thickness	7.64 mm	0.301 in.
Outer Rotor Thickness (Min)	7.64 mm	0.301 in.
Outer Rotor Clearance (Max)	0.039 mm	0.015 in.
Outer Rotor Diameter (Min)	79.95 mm	3.148 in.
Tip Clearance Between Rotors (Max)	0.20 mm	0.008 in.

ENGINE 3.8L (Continued)

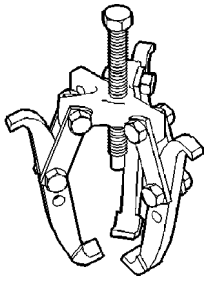
SPECIFICATIONS - TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Camshaft Sprocket—Bolt	54	40	—
Camshaft Thrust Plate—Bolts	12	—	105
Forged Connecting Rod Cap-Nuts	54 +¼ turn	40 +¼ turn	—
Cracked Connecting Rod Cap-Bolts	(Refer to 9 - ENGINE/ ENGINE BLOCK/ PISTON & CONNECTING ROD - INSTALLATION)		
Crankshaft Main Bearing Cap-Bolts	41 +¼ turn	30 +¼ turn	—
Crankshaft Main Bearing Cap Cross Bolts (3.8L)	61	45	—
Crankshaft Oil Seal Retainer Rear-Bolts	12	—	105
Crankshaft Damper-Bolt	54	40	—
Cylinder Block Drain Plugs	20	15	—
Cylinder Head-Bolts	(Refer to 9 - ENGINE/ CYLINDER HEAD - INSTALLATION)		
Cylinder Head Cover-Bolts	12	—	105
Flex Plate to Crankshaft	88	65	—
Engine Mounting	(Refer to 9 - ENGINE/ ENGINE MOUNTING)		
Powertrain Torque Strut	54	40	—
Exhaust Manifold-Bolts	23	—	200
Exhaust Crossover Pipe-Bolts	54	40	—
Intake Manifold - Lower-Bolts	23	—	200
Intake Manifold - Lower Gasket Retainer-Bolts	12	—	105
Intake Manifold Upper-Bolts	12	—	105
Lifter Yoke Retainer-Bolts	12	—	105
Oil Filter Attaching Fitting	54	40	—
Oil Cooler Attaching Fitting	27	20	—
Oil Filter	20	15	—
Oil Filter Adapter-Bolts	28	—	250
Oil Gallery Plug	27	20	—
Oil Pan—Bolts	12	—	105
Oil Pan Drain-Plug	27	20	—
Oil Pressure Switch	23	—	200
Oil Pump Cover Plate-Screws	12	—	105
Oil Pump Pick-up Tube-Bolt	28	—	250
Oil Dipstick Housing-Bolts	48	35	—
Rocker Arm Shaft-Bolts	23	—	200
Spark Plug	16	12	—
Thermostat Housing	12	—	105
Timing Chain Case Cover			
—M8 Bolt	27	20	—
—M10 Bolt	54	40	—
Water Pump-Bolts	12	—	105
Water Pump Pulley-Bolts	28	—	250

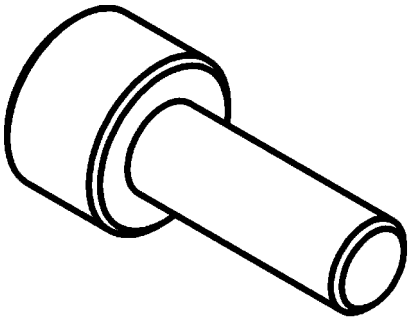
ENGINE 3.8L (Continued)

SPECIAL TOOLS

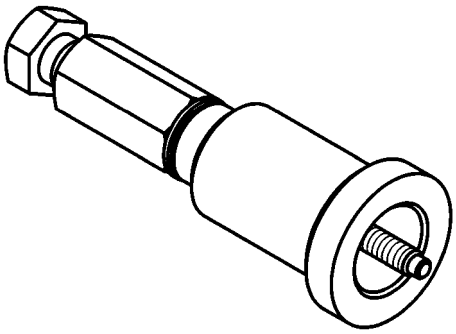
3.8L ENGINE



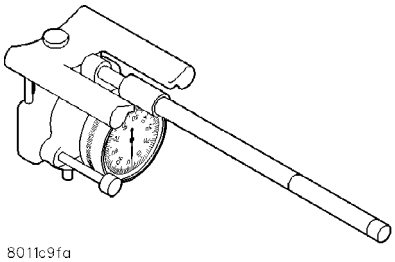
Puller 1023



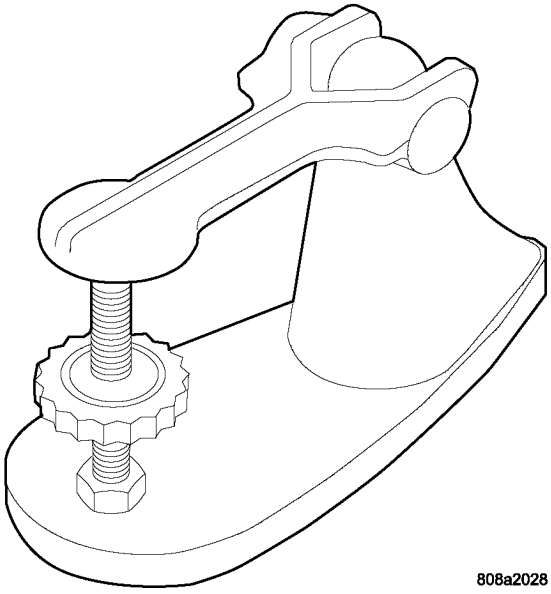
INSERT 8450



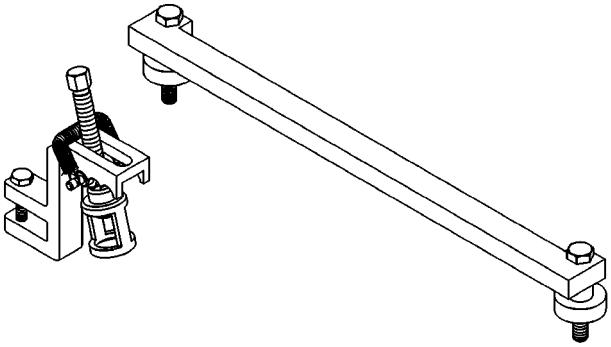
Crankshaft Damper/Sprocket Installer 8452



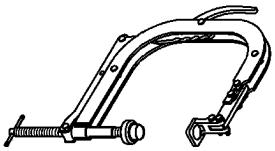
INDICATOR CYLINDER BORE C-119



Valve Spring Tester C-647

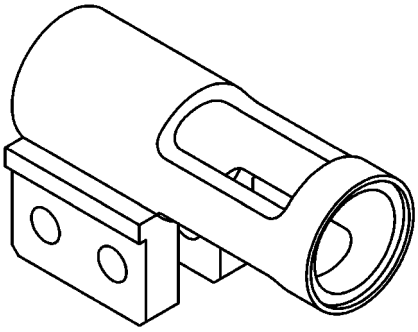


COMPRESSOR, VALVE SPRING 8453

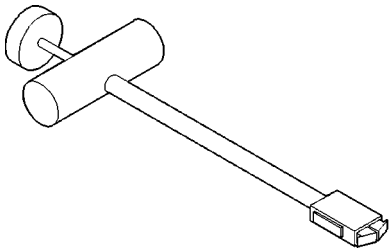


Valve Spring Compressor C-3422-D

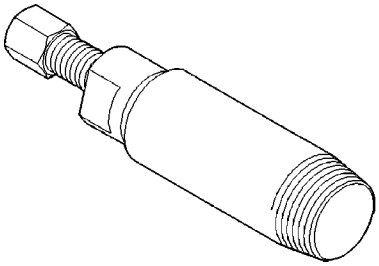
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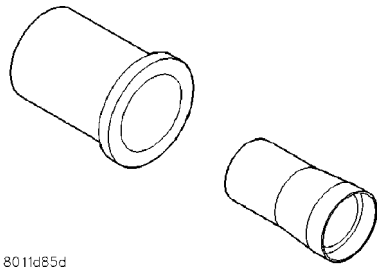
ADAPTER, VALVE SPRING 8464



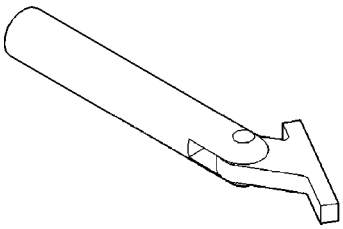
Valve Tappet



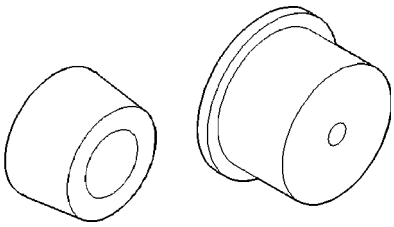
Front Crankshaft Seal Remover 6341A



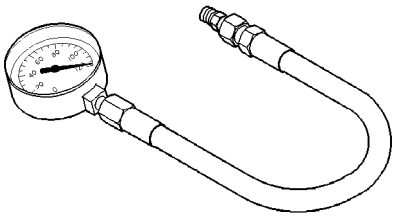
Seal Installer C-4992



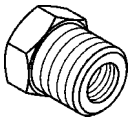
Crankshaft Main Bearing Remover C-3059



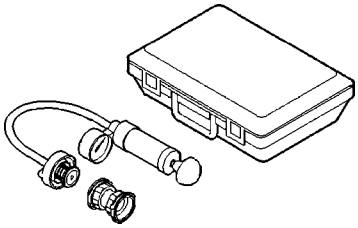
Rear Crankshaft Oil Seal Installer 6926



Oil Pressure Gauge C-3292

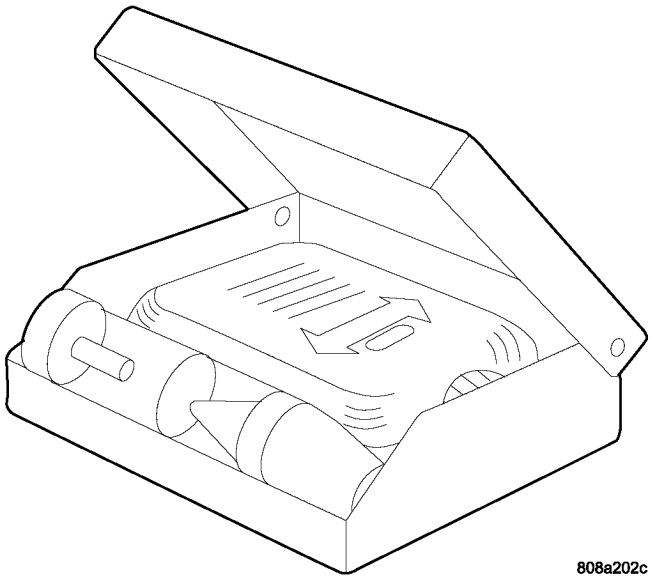


Adaptor 8406

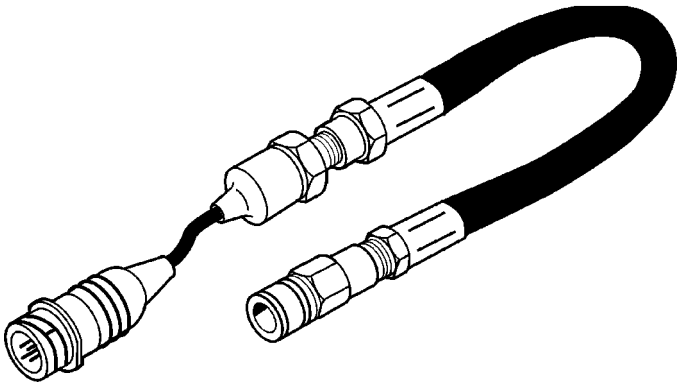


Pressure Tester Kit 7700

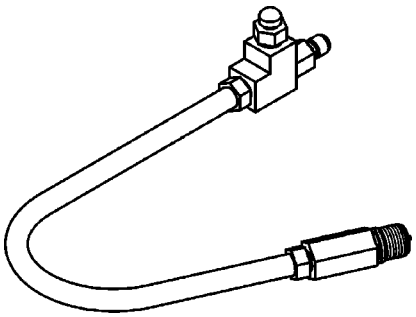
ENGINE 3.8L (Continued)



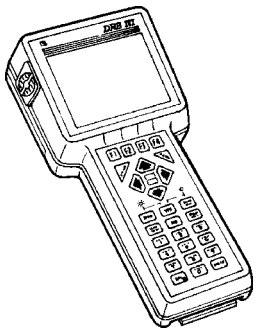
BLOC-CHEK KIT C-3685



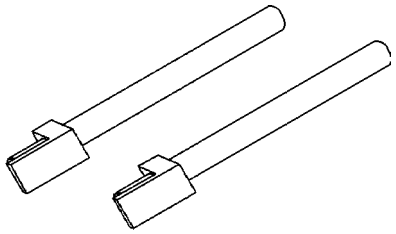
Pressure Transducer CH7059



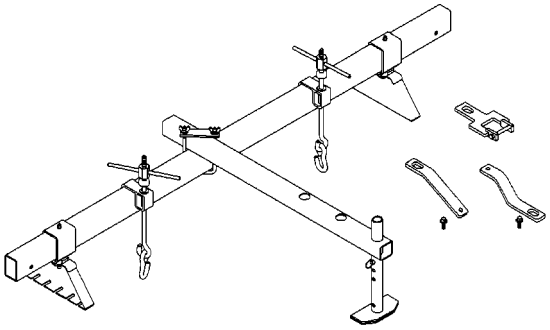
Cylinder Compression Pressure Adaptor 8116



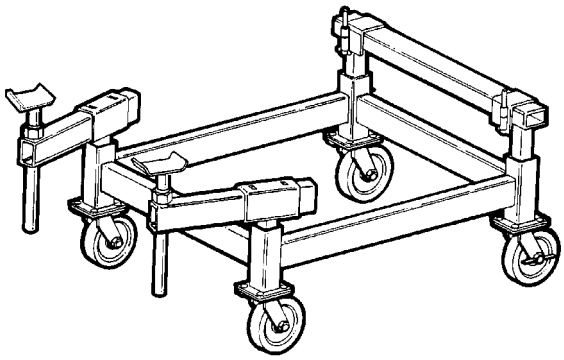
DRB III® with PEP Module – OT-CH6010A



Connecting Rod Installation Guides 8189



Driveline Support Fixture 8534B



Driveline Support Table 8874

AIR CLEANER ELEMENT

REMOVAL

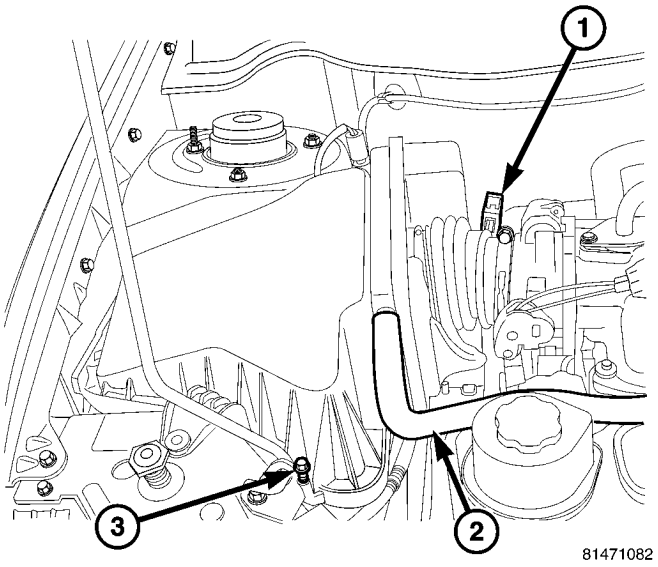


Fig. 21 AIR CLEANER COVER

1 - INTAKE AIR TEMPERATURE SENSOR
2 - CRANK CASE VENTILATION HOSE
3 - BOLT

(1) Disconnect the IAT sensor (Fig. 21).
(2) Disconnect the CCV hose (Fig. 21).
(3) Separate the air inlet tube from the throttle body (Fig. 21).
(4) Remove the air cleaner cover bolts (Fig. 21).

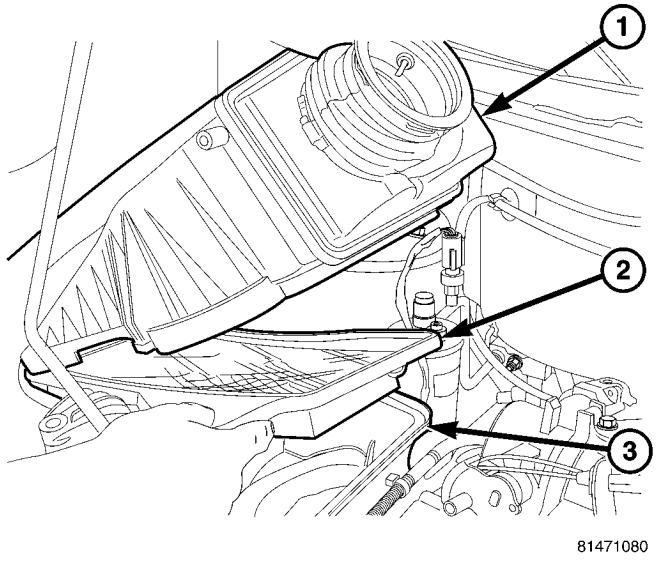


Fig. 22 AIR CLEANER ELEMENT

1 - AIR CLEANER COVER
2 - AIR CLEANER ELEMENT
3 - AIR CLEANER HOUSING

(5) Lift cover and pull toward the engine and remove cover tabs from air cleaner housing.
(6) Lift cover and remove the filter (Fig. 22).

INSTALLATION

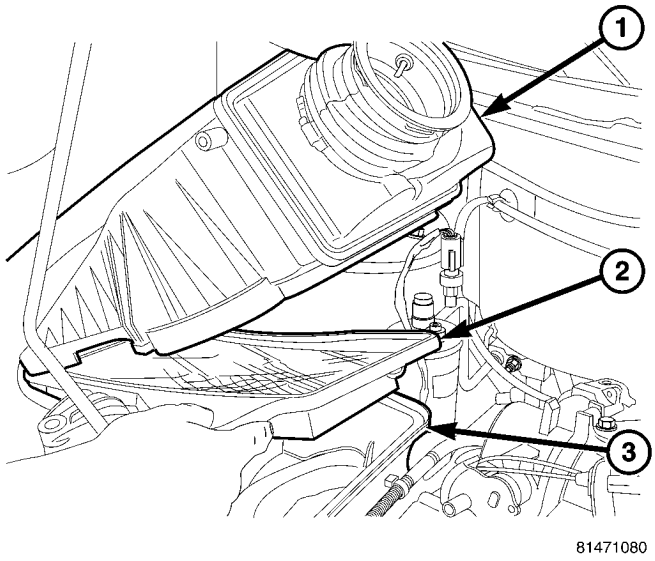


Fig. 23 AIR CLEANER ELEMENT

1 - AIR CLEANER COVER
2 - AIR CLEANER ELEMENT
3 - AIR CLEANER HOUSING

(1) Install the air filter element into air box (Fig. 23).
(2) Move cover so that the tabs insert into the air cleaner housing.

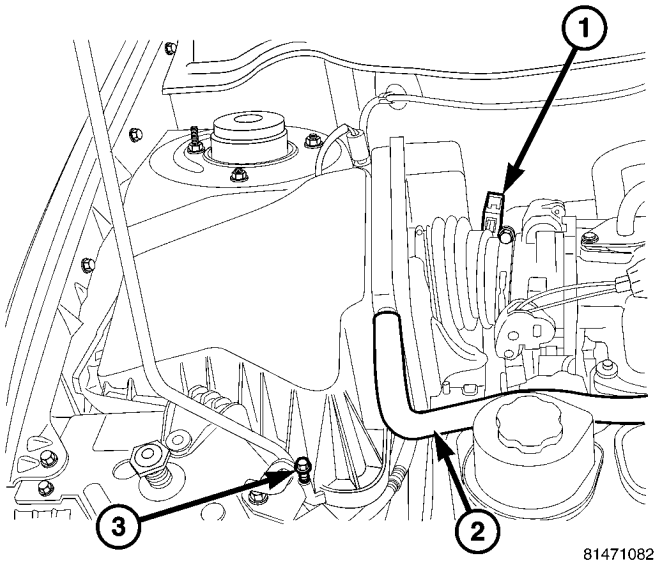


Fig. 24 AIR CLEANER COVER

1 - INTAKE AIR TEMPERATURE SENSOR
2 - CRANK CASE VENTILATION HOSE
3 - BOLT

AIR CLEANER ELEMENT (Continued)

(3) Position the cover down over the element and lower housing and tighten the fasteners (Fig. 24).
(4) Connect the air inlet tube to the throttle body and tighten the clamp.
(5) Connect the IAT sensor (Fig. 24).
(6) Connect the CCV hose (Fig. 24).

AIR CLEANER HOUSING

REMOVAL

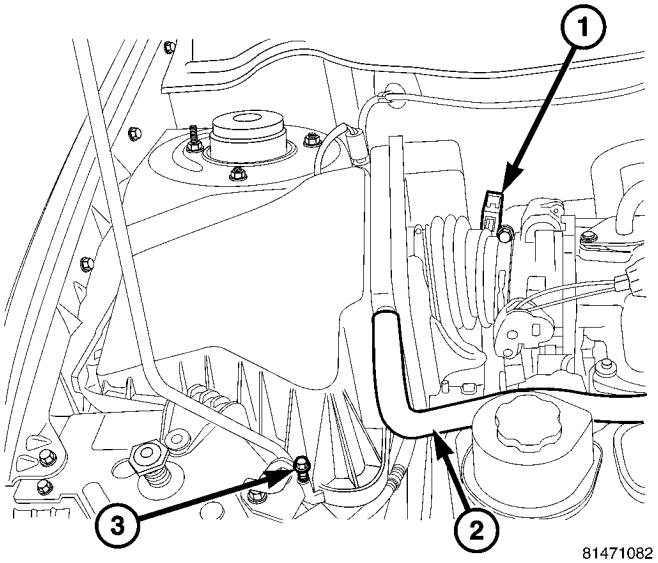


Fig. 25 AIR CLEANER COVER

1 - INTAKE AIR TEMPERATURE SENSOR
2 - CRANK CASE VENTILATION HOSE
3 - BOLT

(1) Disconnect the negative battery cable.
(2) Disconnect the inlet air temperature sensor (Fig. 25).
(3) Disconnect the CCV hose from the air cleaner cover (Fig. 25).
(4) Remove the air inlet tube to throttle body (Fig. 25).
(5) Remove the bolt for air cleaner housing at upper radiator cross member (Fig. 25).
(6) Pull air box up and off over the single locating pin.
(7) Remove air box from vehicle.

INSTALLATION

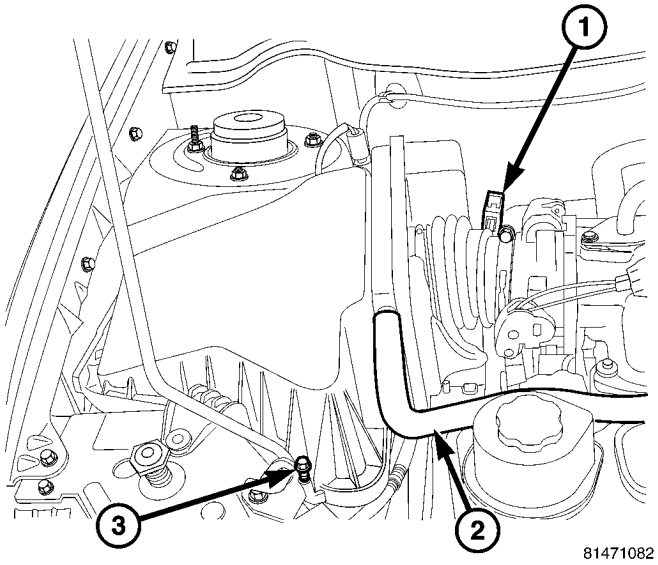


Fig. 26 AIR CLEANER COVER

1 - INTAKE AIR TEMPERATURE SENSOR
2 - CRANK CASE VENTILATION HOSE
3 - BOLT

(1) Install air cleaner housing into vehicle and onto the locating pin.
(2) Install bolt to hold air cleaner housing to the upper radiator cross member (Fig. 26).
(3) Install the air inlet tube to the throttle body and tighten clamp (Fig. 26).
(4) Connect the IAT sensor (Fig. 26).
(5) Connect the CCV hose to the air cleaner cover (Fig. 26).
(6) Connect the negative battery cable.

CYLINDER HEAD

DESCRIPTION

The aluminum cylinder heads (Fig. 27) are designed to create high flow combustion chambers to improve performance, while minimizing the change to the burn rate in the chamber. The cylinder head incorporates the combustion chamber. Two valves per-cylinder are used with inserted valve seats and guides. A multi-layer steel (MLS) type gasket is used between the cylinder head and engine block.

DIAGNOSIS AND TESTING

CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING). An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50–70% reduction in compression pressure.

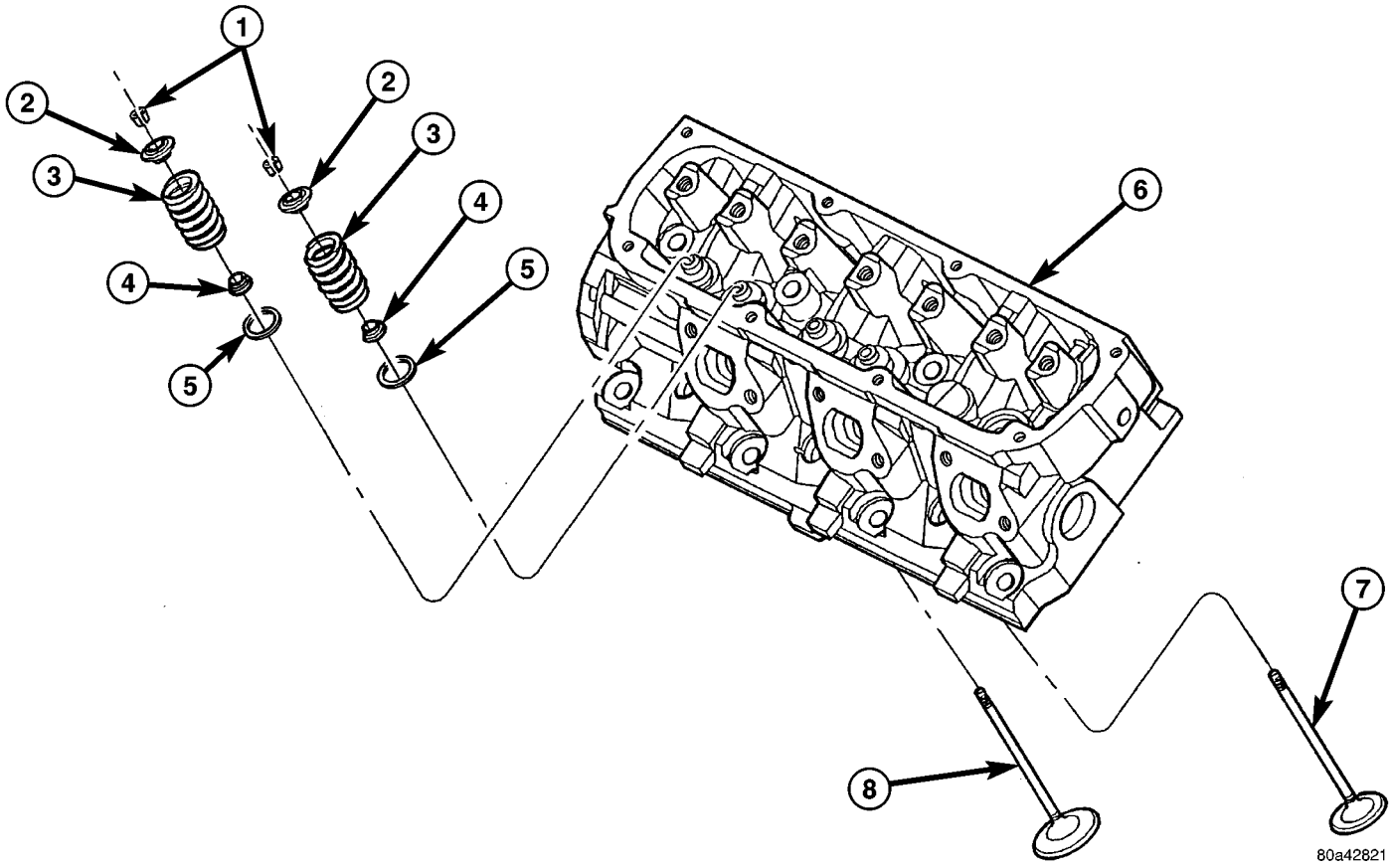


Fig. 27 VALVE COMPONENTS

1 - VALVE LOCKS
2 - RETAINERS
3 - VALVE SPRINGS
4 - VALVE STEM SEALS
5 - SPRING SEATS
6 - CYLINDER HEAD
7 - VALVE - EXHAUST
8 - VALVE - INTAKE

CYLINDER HEAD (Continued)

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

REMOVAL - CYLINDER HEAD

(1) Drain the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(2) Disconnect negative cable from battery.

(3) Remove upper and lower intake manifolds. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

WARNING: INTAKE MANIFOLD GASKET IS MADE OF VERY THIN METAL AND MAY CAUSE PERSONAL INJURY, HANDLE WITH CARE.

(4) Remove the cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(5) Remove the spark plugs from cylinder head.

(6) Remove the oil level indicator and tube (Fig. 28).

(7) Remove exhaust manifold(s). (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - REMOVAL)

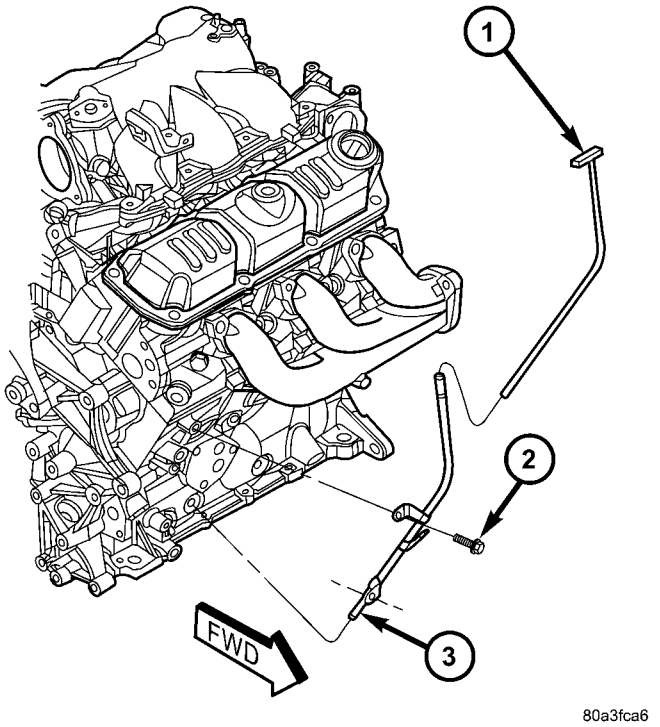


Fig. 28 OIL LEVEL INDICATOR & TUBE

1 - INDICATOR
2 - BOLT
3 - TUBE

(8) Remove rocker arm and shaft assemblies. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - REMOVAL) Remove push rods and **mark positions to ensure installation in original locations.**

(9) Remove the eight head bolts from each cylinder head and remove cylinder heads (Fig. 27).

CLEANING

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Remove all gasket material from cylinder head and block (Refer to 9 - ENGINE - STANDARD PROCEDURE). Be careful not to gouge or scratch the aluminum head sealing surface.

Clean all engine oil passages.

INSPECTION

(1) Before cleaning, check for leaks, damage and cracks.

(2) Clean cylinder head and oil passages.

CYLINDER HEAD (Continued)

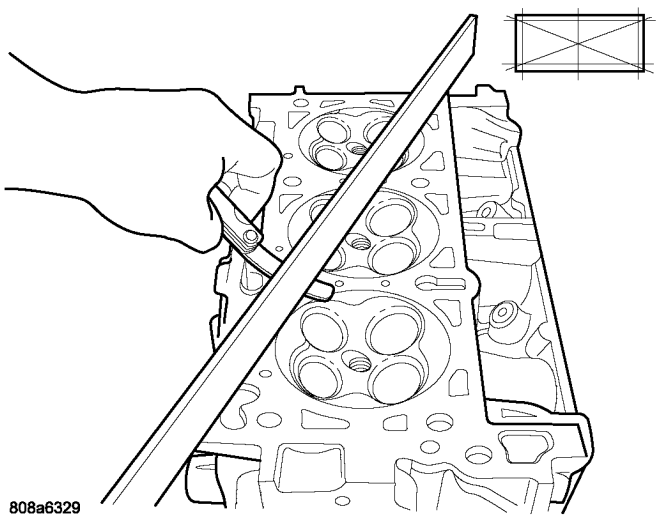


Fig. 29 Checking Cylinder Head Flatness—Typical

(3) Check cylinder head for flatness (Fig. 29).

(4) Cylinder head must be flat within:

- Standard dimension = less than 0.05 mm (0.002 inch.)
- Service Limit = 0.2 mm (0.008 inch.)
- Grinding Limit = Maximum of 0.2 mm (0.008 inch.) is permitted.

CAUTION: 0.20 mm (0.008 in.) MAX is a combined total dimension of the stock removal limit from cylinder head and block top surface (Deck) together.

INSTALLATION - CYLINDER HEAD

(1) Clean all sealing surfaces of engine block and cylinder heads. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

(2) Position new gasket(s) on engine block (Fig. 30). The left bank gasket is identified with the "L" stamped in the exposed area of the gasket located at front of engine (shown in (Fig. 30)). The right bank gasket is identified with a "R" stamped in the exposed area of the gasket also, but is located at the rear of the engine.

(3) **The cylinder head bolts are torqued using the torque yield method, they should be examined BEFORE reuse. If the threads are necked down, the bolts must be replaced** (Fig. 31).

(4) Necking can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt should be replaced.

(5) Tighten the cylinder head bolts 1–8 in the sequence shown in (Fig. 32). Using the 4 step torque turn method, tighten according to the following values:

- Step 1: Bolts 1 – 8 to 61 N·m (45 ft. lbs.)

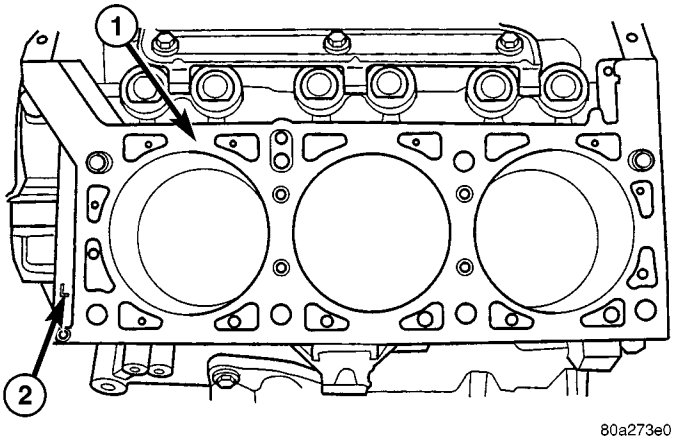


Fig. 30 CYLINDER HEAD GASKET

1 - CYLINDER HEAD GASKET
2 - LOCATION IDENTIFICATION (L = LEFT BANK, R = RIGHT BANK)

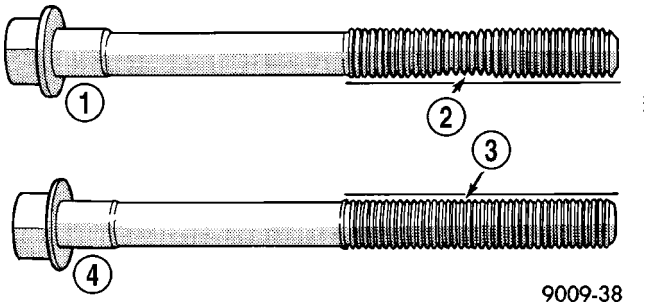


Fig. 31 Check for Stretched Bolts

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

- Step 2: Bolts 1 – 8 to 88 N·m (65 ft. lbs.)
- Step 3: Bolts 1 – 8 (again) to 88 N·m (65 ft. lbs.)
- Step 4: Bolts 1 – 8 turn an additional 1/4 Turn. **(Do not use a torque wrench for this step.)**

NOTE: Bolt torque after 1/4 turn should be over 122 N·m (90 ft. lbs.). If not, replace the bolt.

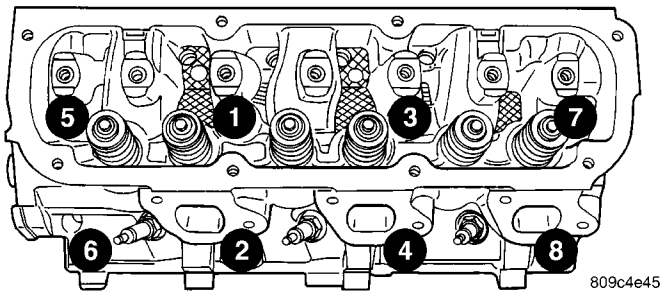


Fig. 32 CYLINDER HEAD TIGHTENING SEQ

(6) Inspect and replace worn or bent push rods.

(7) Install the push rods.

CYLINDER HEAD (Continued)

(8) Install the rocker arm and shaft assemblies. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - INSTALLATION)

(9) Install the cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

(10) Install the exhaust manifolds. (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - INSTALLATION)

(11) Install new O-ring on oil level indicator tube. Install oil level indicator tube assembly (Fig. 140).

(12) Install the spark plugs.

(13) Install upper and lower intake manifolds. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(14) Fill the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(15) Connect negative cable to battery.

CYLINDER HEAD COVER(S)

DESCRIPTION

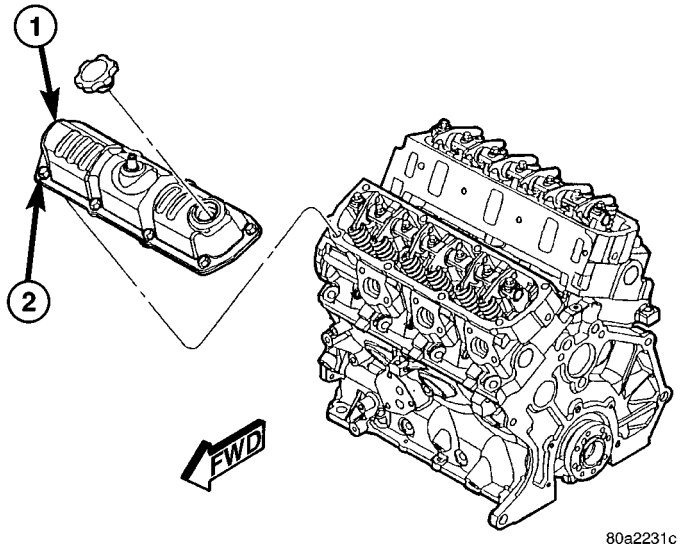


Fig. 33 CYLINDER HEAD COVER

1 - CYLINDER HEAD COVER
2 - BOLT

The cylinder head covers are made of composite material. The covers are sealed with steel reinforced silicon rubber gaskets. The cylinder head cover uses rubber isolators at each fastener location (Fig. 33).

NOTE: Due to the tight packaging near the cylinder head covers, which makes spill clean-up difficult, a spill during an engine oil change may be misinterpreted as an oil leak. When investigating an oil leak in the location of the cylinder head covers and intake manifold, follow the procedure found in Oil Leak Diagnosis (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING) for determining the source of a leak.

CYLINDER HEAD COVER - RIGHT

REMOVAL

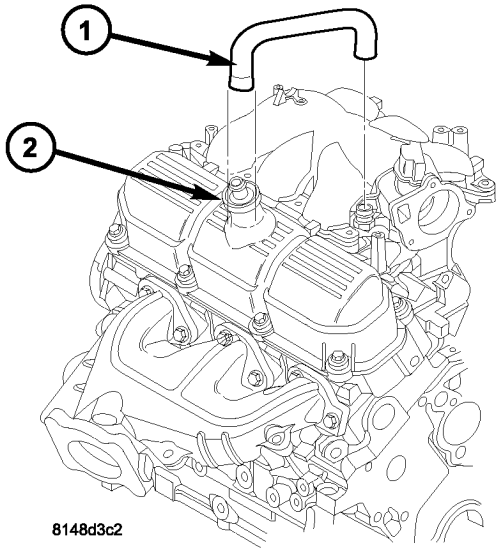


Fig. 34 PCV HOSE

1 - HOSE
2 - PCV VALVE

(1) Disconnect negative cable from battery.

(2) Disconnect spark plug wires from plugs.

(3) Disconnect PCV hose from cylinder head cover (Fig. 34).

(4) Remove cylinder head cover bolts.

(5) Remove cylinder head cover and gasket (Fig. 35).

CYLINDER HEAD COVER - RIGHT (Continued)

INSTALLATION

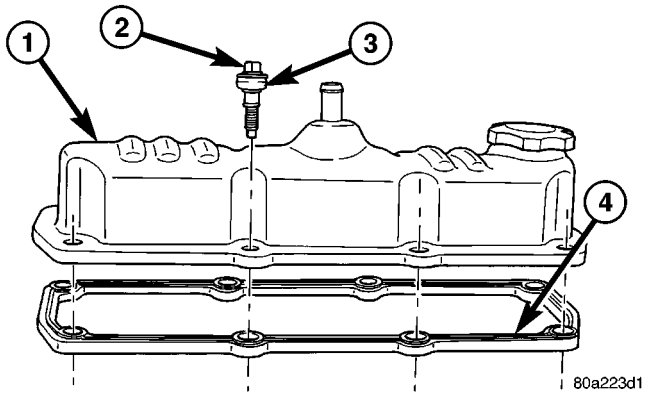


Fig. 35 CYLINDER HEAD COVER GASKET

1 - CYLINDER HEAD COVER
2 - BOLT
3 - SEAL (SERVICED WITH BOLT)
4 - GASKET

(1) Clean cylinder head and cylinder head cover mating surfaces. Inspect cylinder head cover surface for flatness. Replace gasket as necessary.

(2) Inspect seal on the cover bolt for wear or damage (Fig. 35). Replace bolt assembly as necessary.

(3) Inspect the PCV hose for damage. replace as necessary.

NOTE: The cylinder head cover bolts contain a torque limiter sleeve and a seal (Fig. 35). The seal and torque sleeve is replaced with the bolt.

(4) Assemble gasket to cylinder cover by inserting the bolt assemblies through each bolt hole on the cover and gasket (Fig. 35).

(5) Install cylinder head cover and bolts (Fig. 36).

(6) Tighten cylinder head cover bolts to 12 N·m (105 in. lbs.) (Fig. 36).

NOTE: Be sure that the PCV valve is properly seated inside the cylinder head cover protrusion and that the PCV hose completely covers the cylinder head cover protrusion.

(7) Connect PCV hose to cylinder head cover (Fig. 37).

(8) Connect spark plug wires to spark plugs.

(9) Connect negative cable to battery.

CYLINDER HEAD COVER - LEFT

REMOVAL

(1) Disconnect spark plug wires from spark plugs.

(2) Disconnect crankcase vent hose from cylinder head cover.

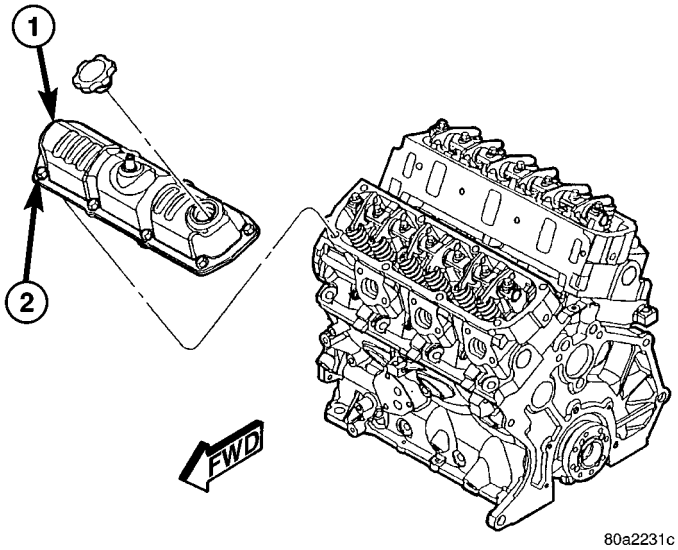


Fig. 36 CYLINDER HEAD COVER

1 - CYLINDER HEAD COVER
2 - BOLT

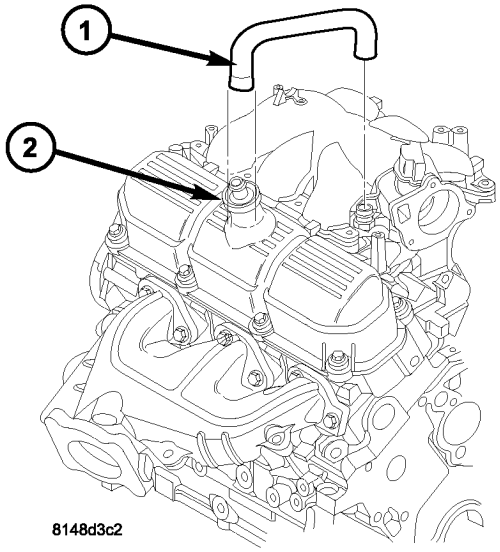


Fig. 37 PCV HOSE

1 - HOSE
2 - PCV VALVE

(3) Remove cylinder head cover bolts.

(4) Remove cylinder head cover and gasket.

INSTALLATION

(1) Clean cylinder head and cylinder head cover mating surfaces. Inspect cylinder head cover surface for flatness. Replace gasket as necessary.

(2) Assemble gasket to cylinder cover by inserting the fasteners through each bolt hole on cover and gasket (Fig. 35).

(3) Install the cylinder head cover and bolts.

CYLINDER HEAD COVER - LEFT (Continued)

(4) Tighten cylinder head cover bolts to 12 N·m (105 in. lbs.) (Fig. 37).
(5) Connect crankcase vent hose.
(6) Connect spark plug wires to spark plugs.

INTAKE/EXHAUST VALVES & SEATS

DESCRIPTION

The valves have chrome plated valve stems with four-bead lock grooves. The valve stem seals are made of Viton rubber.

OPERATION

The two valves per cylinder are opened using roller hydraulic lifters, push rods, and rocker arms.

STANDARD PROCEDURE - REFACING VALVES AND VALVE SEATS

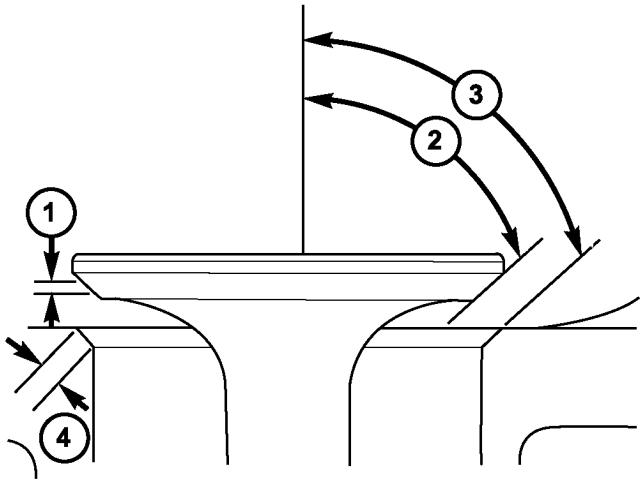


Fig. 38 VALVE FACE AND SEAT

1 - VALVE FACE WIDTH
2 - VALVE FACE ANGLE
3 - SEAT ANGLE
4 - SEAT CONTACT AREA

The intake and exhaust valves and seats are machined to specific angles (Fig. 38).

VALVES

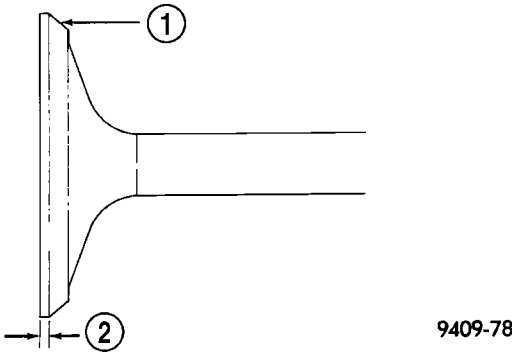


Fig. 39 Intake and Exhaust Valve Refacing

1 - VALVE FACE
2 - VALVE MARGIN

(1) Inspect the remaining margin after the valves are refaced (Fig. 39). (Refer to 9 - ENGINE - SPECIFICATIONS)

VALVE SEATS

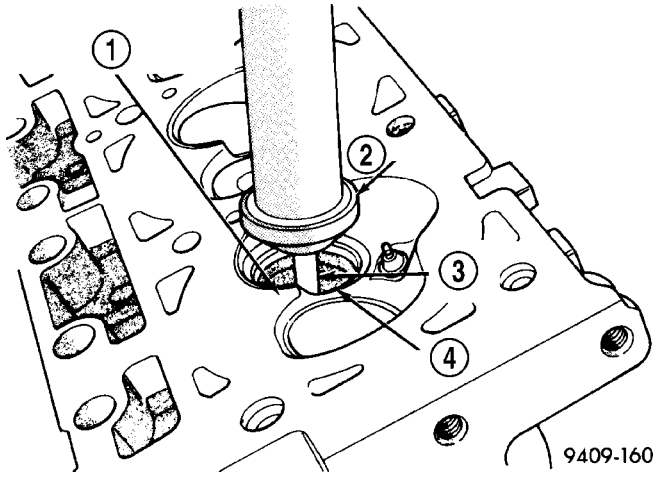


Fig. 40 Refacing Valve Seats

1 - REFACING STONE MUST NOT CUT INTO CYLINDER HEAD
2 - STONE
3 - PILOT
4 - SEAT

CAUTION: Remove metal from valve seat only. Do not remove material from cylinder head (Fig. 40).

INTAKE/EXHAUST VALVES & SEATS (Continued)

(1) When refacing valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

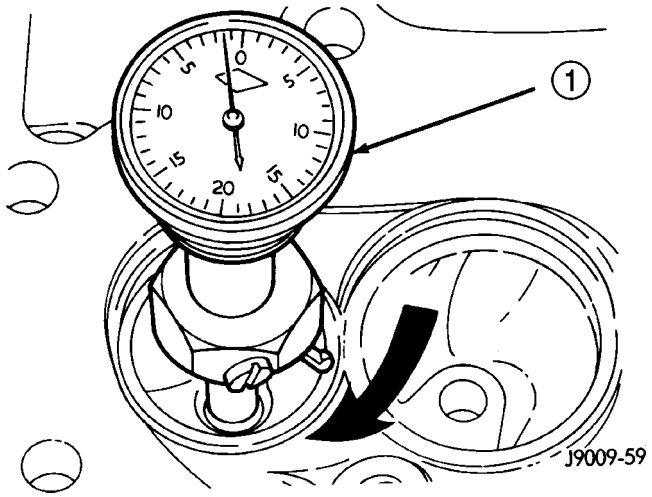


Fig. 41 Measurement of Valve Seat Runout

1 - DIAL INDICATOR

(2) Measure the concentricity of valve seat using dial indicator (Fig. 41). Total runout should not exceed 0.051 mm (0.002 in.) total indicator reading.

(3) Inspect the valve seat using Prussian blue to determine where the valve contacts the seat. To do this, coat valve seat **LIGHTLY**with Prussian blue then set valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of valve face, contact is satisfactory. If the blue is transferred to top edge of valve face, lower valve seat with a 15 degree stone. If the blue is transferred to the bottom edge of valve face raise valve seat with a 65 degrees stone.

NOTE: Valve seats which are worn or burned can be reworked, provided that correct angle and seat width are maintained. Otherwise cylinder head must be replaced.

(4) When seat is properly positioned the width of intake and exhaust seats should be 1.50–2.00 mm (0.059–0.078 in.) (Fig. 38).

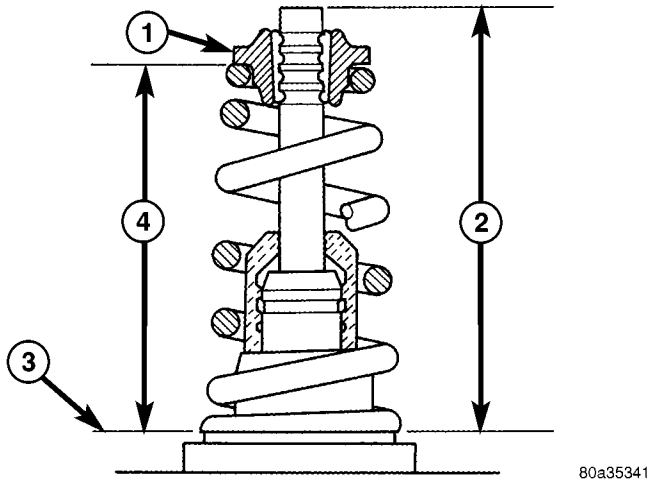


Fig. 42 VALVE INSTALLED HEIGHT

1 - SPRING RETAINER
2 - VALVE INSTALLED HEIGHT* - 48.1–49.7 mm (1.89–1.95 in.)
3 - CYINDER HEAD SURFACE
4 - SPRING INSTALLED HEIGHT* - 41.1–42.7 mm (1.61–1.68 in.)
*(MEASURED FROM TOP OF SPRING SEAT)

(5) After grinding the valve seats or faces, install the valve in cylinder head and check valve installed height by measuring from valve tip to spring seat (Fig. 42). Remove valve from cylinder head and grind valve tip until within specifications. Check valve tip for scoring. The tip chamfer should be reground (if necessary) to prevent seal damage when the valve is installed.

(6) Check the valve spring installed height after refacing the valve and seat (Fig. 42).

If valves and/or seats are reground, measure the installed height of springs (Fig. 42), make sure measurements are taken from top of spring seat to the bottom surface of spring retainer. If height is greater than specifications, install a 0.794 mm (0.0312 in.) spacer in head counterbore to bring spring height back within specifications.

INTAKE/EXHAUST VALVES & SEATS (Continued)

REMOVAL

(1) With cylinder head removed, compress valve springs using Valve Spring Compressor Tool C-3422-D with adapter 8464 (Fig. 43).

(2) Remove valve retaining locks (Fig. 44).

(3) Slowly release valve spring compressor. Remove valve spring retainer, valve spring, and valve stem seal.

(4) Before removing valves, **remove any burrs from valve stem lock grooves to prevent damage to the valve guides.** Identify valves to insure installation in original location.

CLEANING

(1) Clean all valves thoroughly and discard burned, warped and cracked valves.

INSPECTION

VALVES

(1) Clean and inspect valves thoroughly. Replace burned, warped and cracked valves.

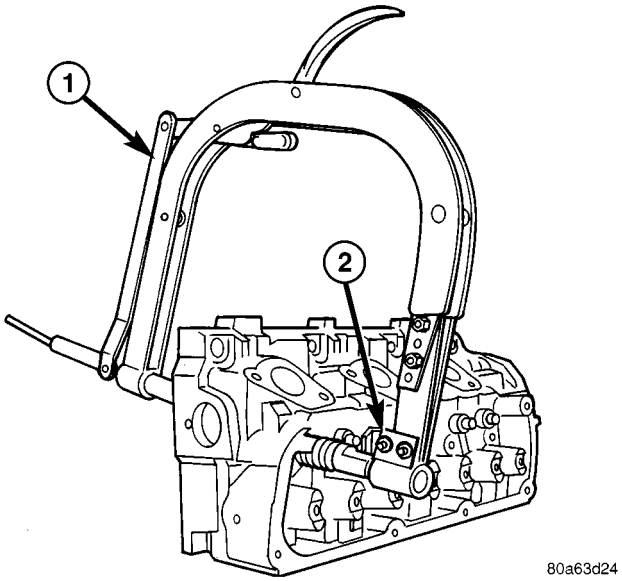


Fig. 43 VALVE SPRING - REMOVE/INSTALL

1 - SPECIAL TOOL C-3422-D SPRING COMPRESSOR
2 - SPECIAL TOOL 8464 ADAPTER

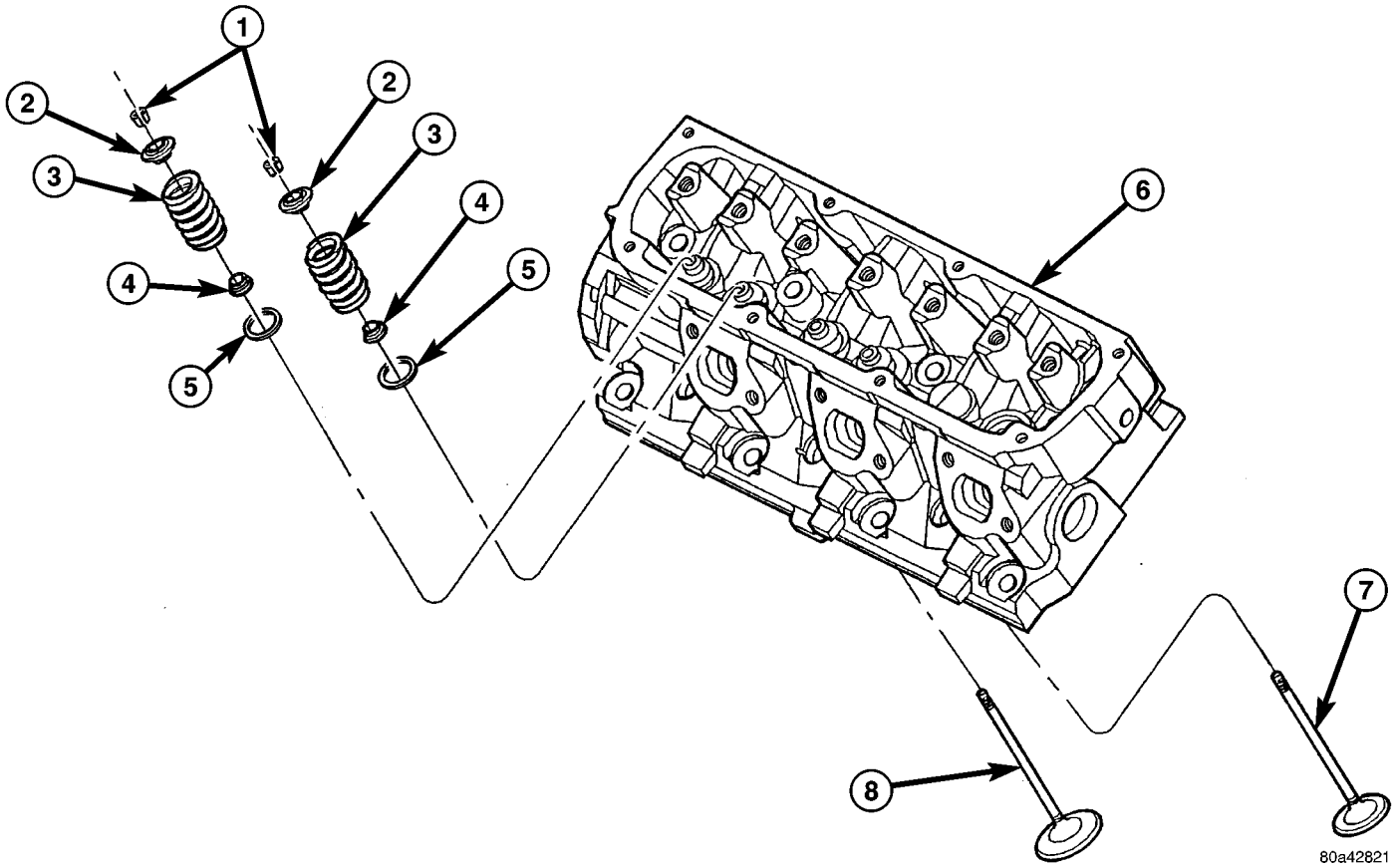


Fig. 44 VALVE COMPONENTS

1 - VALVE LOCKS
2 - RETAINERS
3 - VALVE SPRINGS
4 - VALVE STEM SEALS
5 - SPRING SEATS
6 - CYLINDER HEAD
7 - VALVE - EXHAUST
8 - VALVE - INTAKE

INTAKE/EXHAUST VALVES & SEATS (Continued)

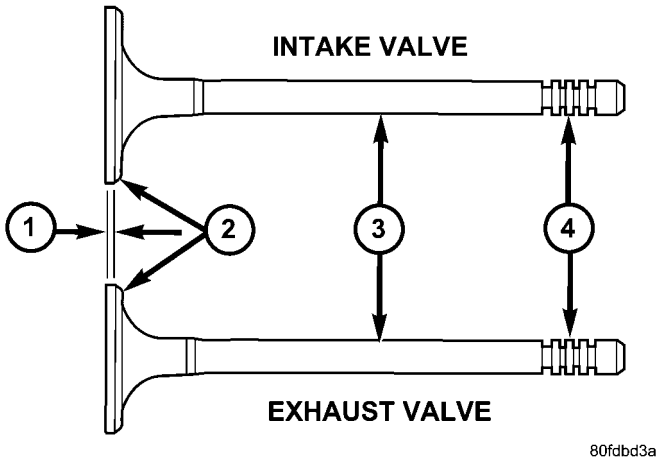


Fig. 45 Intake and Exhaust Valves

1 - MARGIN
2 - FACE
3 - STEM
4 - VALVE SPRING RETAINER LOCK GROOVES

(2) Measure valve stems for wear (Fig. 45). For valve specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

NOTE: Valve stems are chrome plated and should not be polished (Fig. 45).

VALVE GUIDES

(1) Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.

(2) Measure valve stem-to-guide clearance as follows:

(3) Install valve into cylinder head so it is 15 mm (0.590 inch.) off the valve seat. A small piece of hose may be used to hold valve in place.

(4) Attach dial indicator Tool C-3339 to cylinder head and set it at right angle of valve stem being measured (Fig. 46).

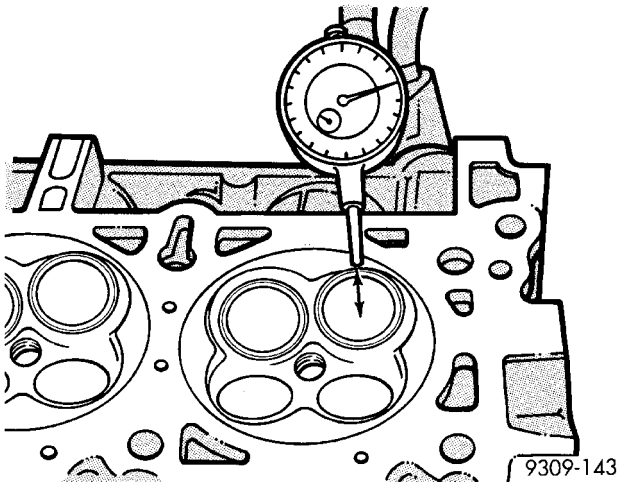


Fig. 46 Measuring Valve Guide Wear

(5) Move valve to and from the indicator. For clearance specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

NOTE: Replace cylinder head if stem-to-guide clearance exceeds specifications, or if guide is loose in cylinder head.

INSTALLATION

(1) Coat valve stems with clean engine oil and insert them in cylinder head (Fig. 47).

(2) Install valve spring seat on head (Fig. 47).

(3) Install new seals on all valve stems and over valve guides Install valve springs and valve retainers (Fig. 48)

(4) Install the valve springs. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - INSTALLATION)

INTAKE/EXHAUST VALVES & SEATS (Continued)

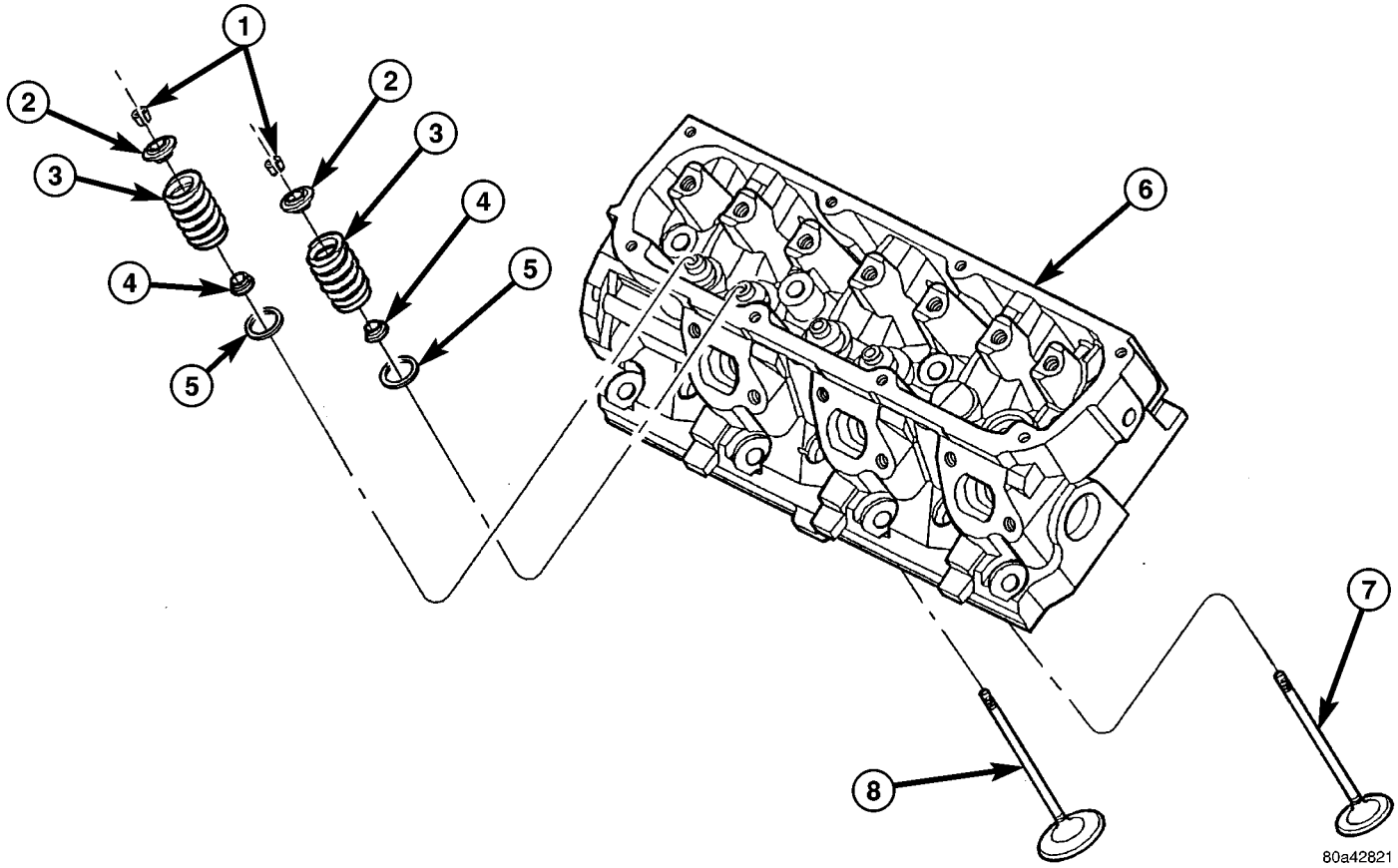


Fig. 47 VALVE COMPONENTS

1 - VALVE LOCKS
2 - RETAINERS
3 - VALVE SPRINGS
4 - VALVE STEM SEALS
5 - SPRING SEATS
6 - CYLINDER HEAD
7 - VALVE - EXHAUST
8 - VALVE - INTAKE

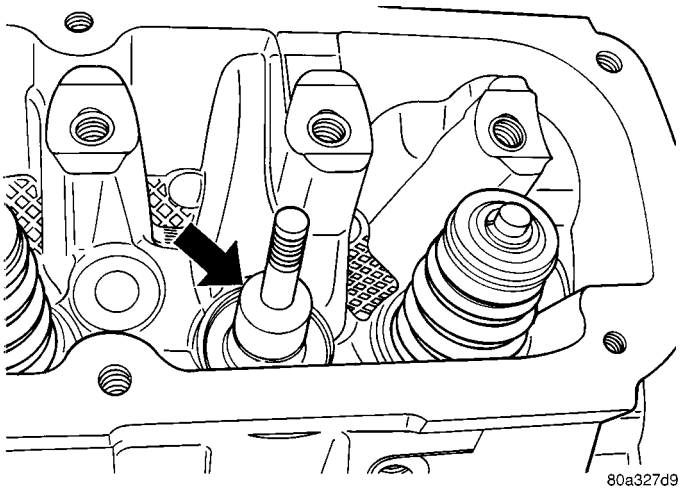


Fig. 48 VALVE STEM SEAL

VALVE SPRINGS

DESCRIPTION

There are two interchangeable, floating (spring rotates during operation), valve spring designs. Type A may be identified by the counterclockwise (spring spirals down and to the left) appearance, And Type B may be identified by the clockwise (spring spirals down and to the right) appearance. Both of the valve springs are a bee-hive shaped design but have different specifications (Fig. 49).

The springs are seated on a steel washer on the cylinder head with retainers and locks retaining the springs (Fig. 50). The springs are installed with the smaller diameter against spring retainer (Fig. 49).

OPERATION

The valve spring returns the valve against its seat for a positive seal of the combustion chamber.

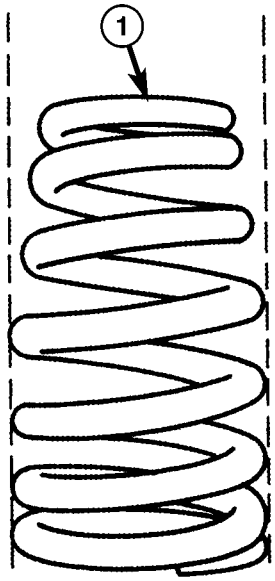


Fig. 49 VALVE SPRING

1 - VALVE SPRING (TOP - SMALLER DIAMETER)

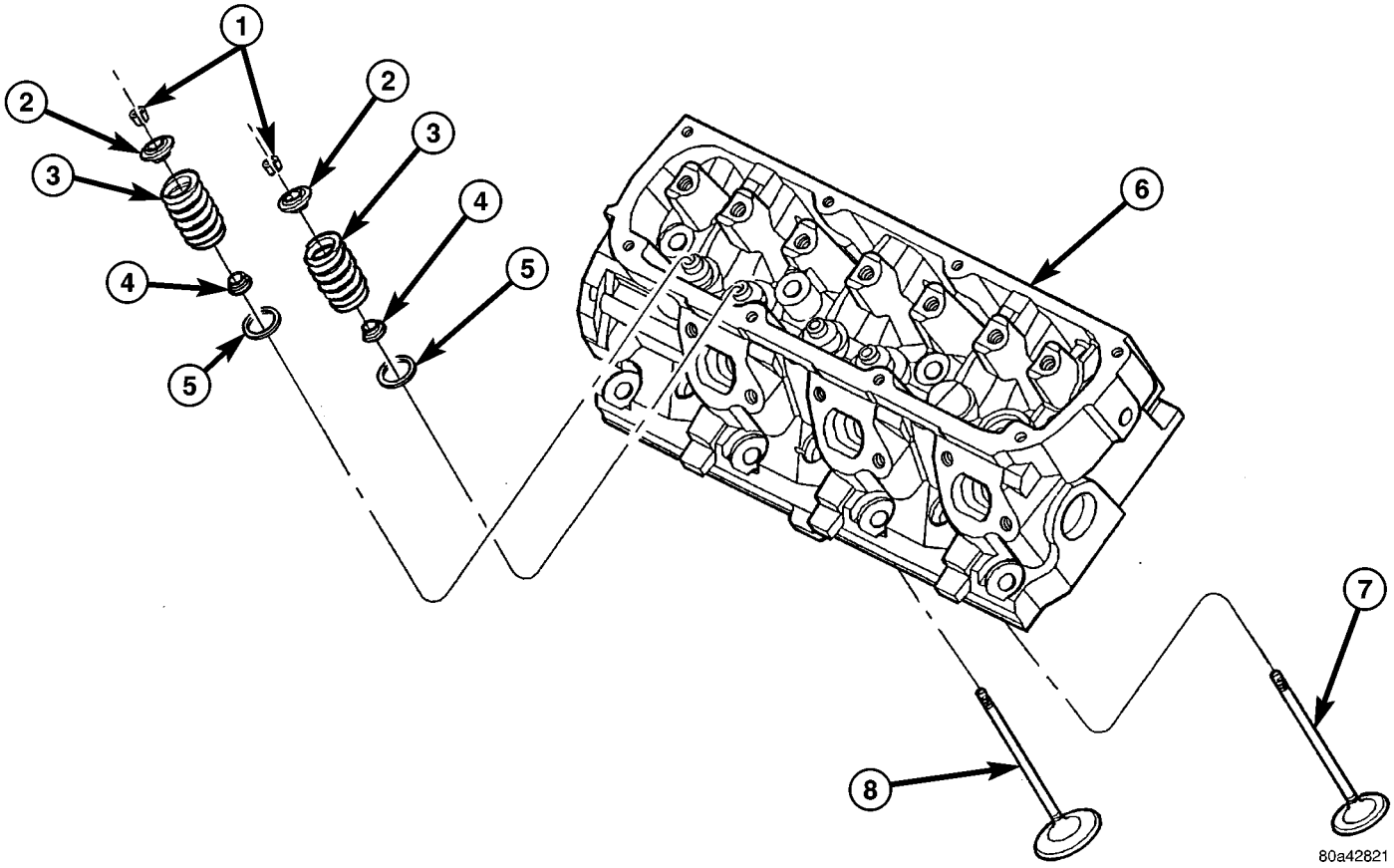


Fig. 50 VALVE COMPONENTS

1 - VALVE LOCKS
2 - RETAINERS
3 - VALVE SPRINGS
4 - VALVE STEM SEALS
5 - SPRING SEATS
6 - CYLINDER HEAD
7 - VALVE - EXHAUST
8 - VALVE - INTAKE

VALVE SPRINGS (Continued)

REMOVAL

REMOVAL - CYLINDER HEAD OFF

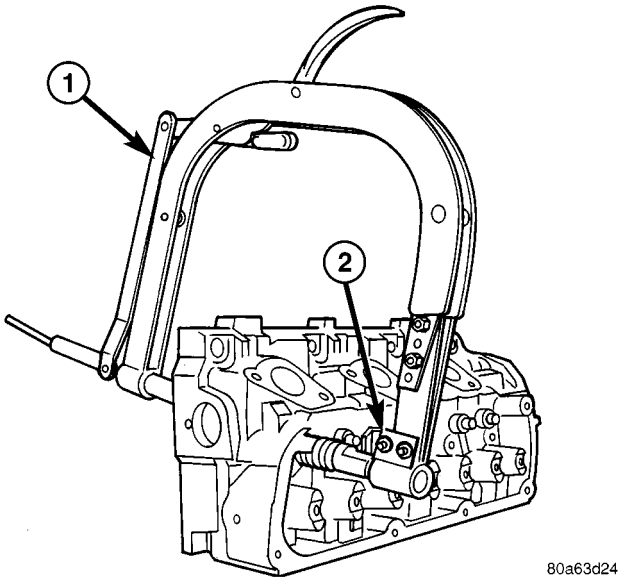


Fig. 51 VALVE SPRING - REMOVE/INSTALL

1 - SPECIAL TOOL C-3422-D SPRING COMPRESSOR
2 - SPECIAL TOOL 8464 ADAPTER

(1) With the cylinder head on a bench, position Special Tool C-3422-D with 8464 Adapter on the valve and spring retainer (Fig. 51).

(2) Compress the spring only enough to remove the valve retainer locks.

(3) Slowly release the spring tension and remove the valve spring and retainer.

(4) For removal of the valve stem seal (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE STEM SEALS - REMOVAL).

REMOVAL - CYLINDER HEAD ON

(1) Disconnect negative cable from battery.

(2) Remove spark plug wires and all spark plugs.

(3) Remove cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

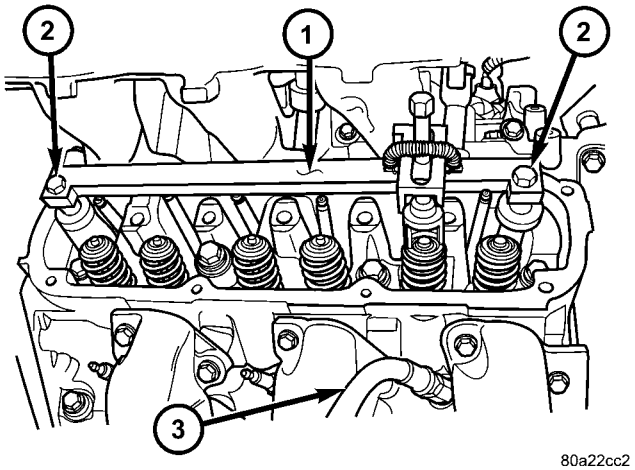


Fig. 52 VALVE SPRING - REMOVE/INSTALL (HEAD ON)

1 - SPECIAL TOOL 8453
2 - BOLTS - SPECIAL TOOL ATTACHING
3 - AIR SUPPLY HOSE ADAPTER

(4) Remove rocker arms and shaft. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - REMOVAL)

(5) Rotate engine until the piston in the cylinder bore requiring spring removal is at TDC.

(6) Install Special Tool 8453 to the cylinder head (Fig. 52). Tighten the attaching bolts to 23 N·m (200 in. lbs.).

(7) Install a spark plug adapter in the spark plug hole. Connect air hose that can supply 620.5–689 kPa (90–100 psi) of air pressure to adapter. This is to hold valves in place while servicing components.

(8) Locate the forcing screw and spring retainer adapter assembly over the spring requiring removal (Fig. 52).

(9) Slowly turn the forcing screw clockwise (compressing the valve spring) until the valve keepers can be removed.

(10) Turn forcing screw counterclockwise to relieve spring tension. Remove retainer and valve spring.

(11) Repeat procedure for each cylinder requiring valve spring removal.

VALVE SPRINGS (Continued)

INSPECTION

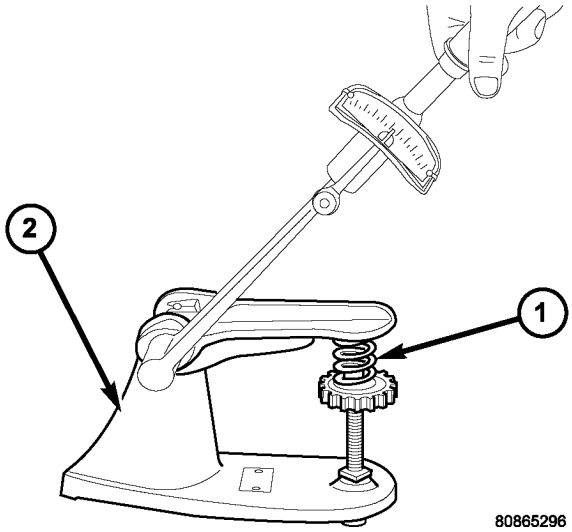


Fig. 53 Testing Valve Spring

1 - SPECIAL TOOL C-647

NOTE: The are two different types of valve springs used that are interchangable, but have different specifications (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - DESCRIPTION).

Whenever valves have been removed for inspection, reconditioning or replacement, valve springs should be tested (Fig. 53). **As an example;** the compression length of a spring to be tested is 38.00 mm (1.496 in.). Turn the table of Tool C-647 until surface is in line with the 38.00 mm (1.496 in.) mark on the threaded stud and the zero mark on the front. Place spring over stud on the table and lift compressing lever to set tone device. Pull on torque wrench until ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. Refer to Engine Specifications to obtain specified height and allowable tensions (Refer to 9 - ENGINE - SPECIFICATIONS). Replace any springs that do not meet specifications.

INSTALLATION

INSTALLATION - CYLINDER HEAD OFF

(1) If removed, install a new valve stem seal (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE STEM SEALS - INSTALLATION).

(2) Position valve spring and retainer on spring seat.

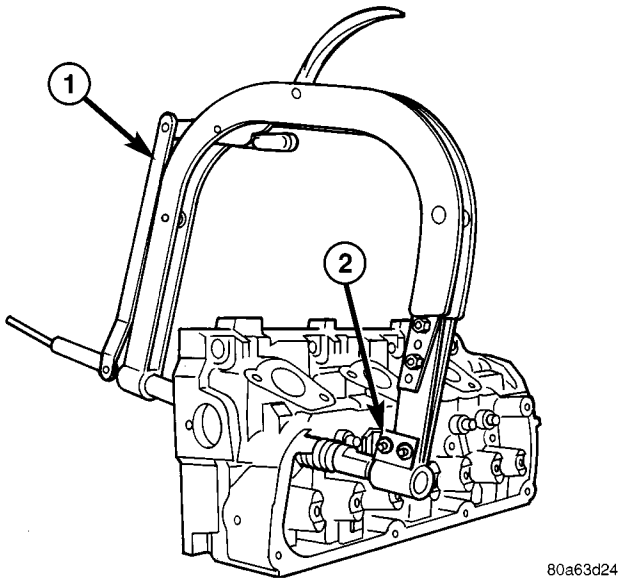


Fig. 54 VALVE SPRING COMPRESSOR

1 - SPECIAL TOOL C-3422-D SPRING COMPRESSOR
2 - SPECIAL TOOL 8464 ADAPTER

(3) Using Special Tool C-3422-D with 8464 Adapter (Fig. 54), compress the spring only enough to install the valve retainer locks. Install valve retainer locks.

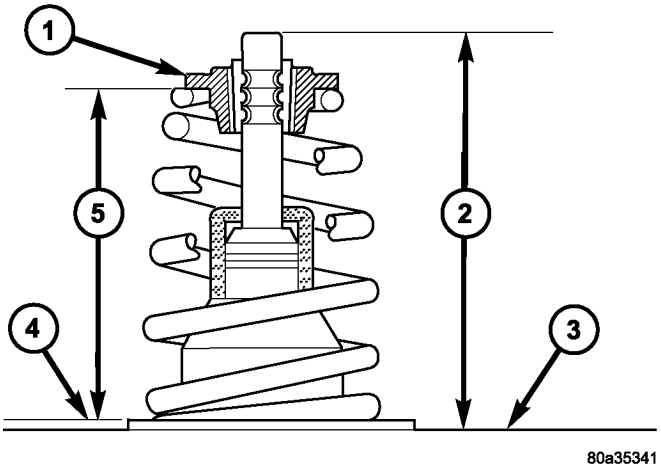


Fig. 55 VALVE SPRING INSTALLED

1 - VALVE SPRING RETAINER
2 - VALVE INSTALLED HEIGHT
3 - CYLINDER HEAD SURFACE
4 - VALVE SPRING SEAT SURFACE
5 - VALVE SPRING INSTALLED HEIGHT

(4) Slowly release the spring tension. Ensure the retainer locks are seated properly (Fig. 55).

VALVE SPRINGS (Continued)

INSTALLATION - CYLINDER HEAD ON

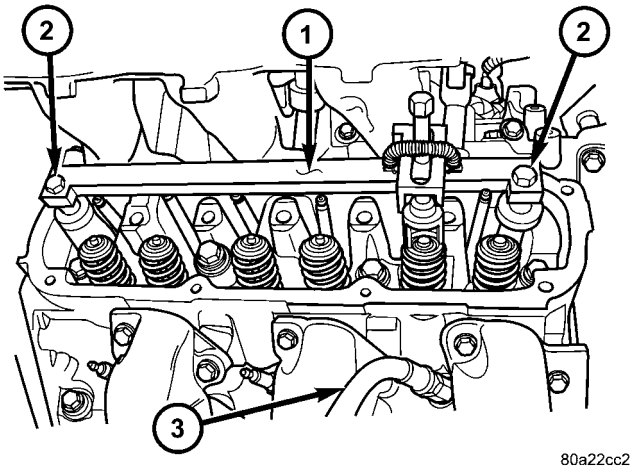


Fig. 56 VALVE SPRING - REMOVE/INSTALL (HEAD ON)

1 - SPECIAL TOOL 8453
2 - BOLTS - SPECIAL TOOL ATTACHING
3 - AIR SUPPLY HOSE ADAPTER

(1) The intake valve stem seals should be pushed firmly and squarely over the valve guide using the valve stem as guide. **Do Not Force** seal against top of guide. When installing the valve retainer locks, compress the spring **only enough** to install the locks (Fig. 56).

CAUTION: Do not pinch seal between retainer and top of valve guide.

(2) Follow the same procedure on the remaining 5 cylinders using the firing sequence 1-2-3-4-5-6. **Make sure piston in cylinder is at TDC on the valve spring that is being covered.**

(3) Remove spark plug adapter tool.

(4) Install rocker arms and shaft assembly. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - INSTALLATION)

(5) Install cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

(6) Install spark plugs and connect wires.

(7) Connect negative cable to battery.

ROCKER ARMS

DESCRIPTION

DESCRIPTION - ROCKER ARMS

The rocker arms are installed on the rocker arm shaft. The rocker arms and shaft assembly is attached to the cylinder head with seven billeted bolts and retainers. The rocker arms are made of stamped steel.

PUSHRODS

The pushrods are made of steel and are a hollow design. The pushrods are positioned between the hydraulic lifter and the rocker arm.

OPERATION

OPERATION - ROCKER ARMS

The rocker arm pivots are on the rocker shaft. Rocker arms are used to translate up and down motions provided by the camshaft, hydraulic roller lifter, and pushrod on one end, into a down and up motions on the valve stem on the opposing end.

OPERATION - PUSHRODS

The pushrod is a solid link between the hydraulic roller lifter and the rocker arm. Also, the pushrod supplies engine oil from the hydraulic lifter to the rocker arm.

REMOVAL

ROCKER ARMS AND SHAFT

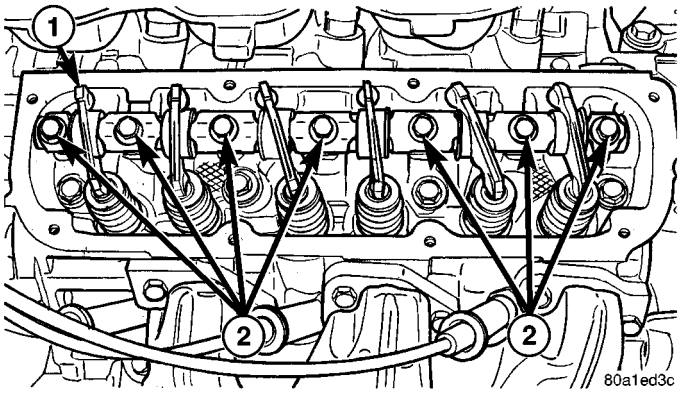


Fig. 57 ROCKER ARMS AND SHAFT

1 - ROCKER ARMS AND SHAFT ASSEMBLY
2 - ROCKER SHAFT BOLTS

(1) Remove the cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

NOTE: Rocker arm shaft bolts are captured to the shaft.

(2) Loosen the rocker shaft bolts (Fig. 57), rotating one turn each, until all valve spring pressure is relieved.

(3) Remove the rocker arms and shaft assembly (Fig. 57).

ROCKER ARMS (Continued)

(4) For rocker arm disassembly procedures, (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - DISASSEMBLY).

DISASSEMBLY - ROCKER ARMS AND SHAFT

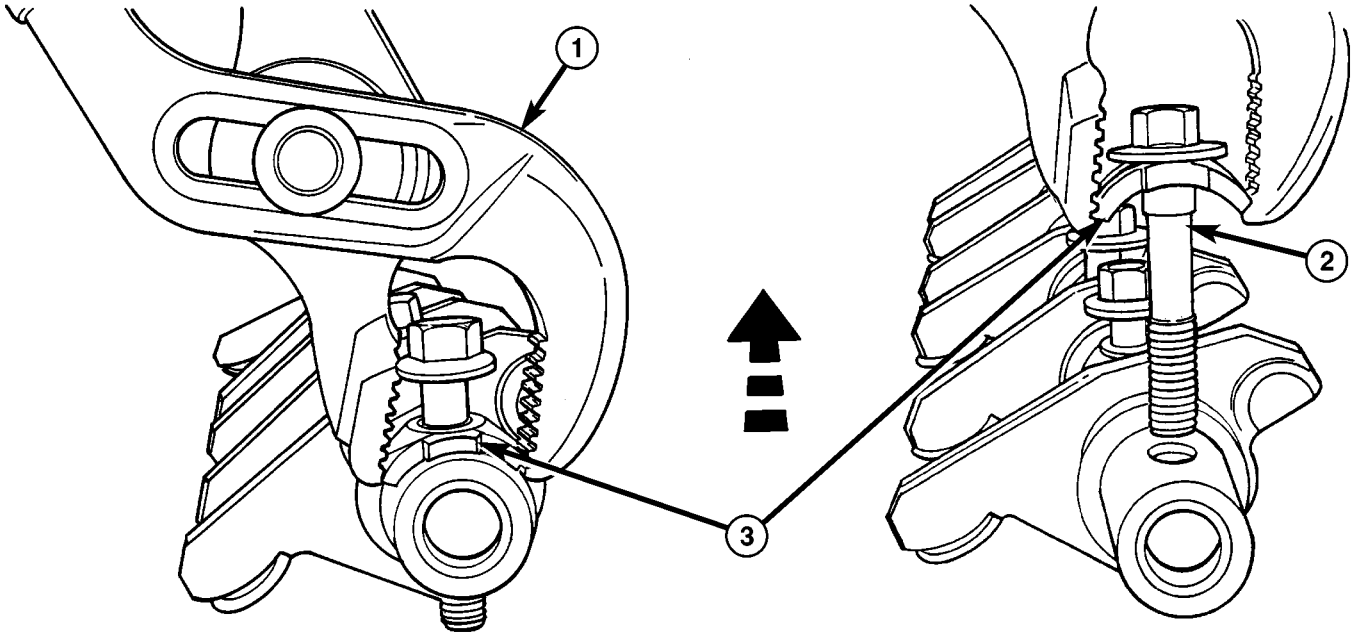
CAUTION: Do not attempt to drive the billeted bolt from the rocker shaft. This can damage the rocker arm retainer and bolt assembly.

(1) Remove the rocker arm retainer and bolt by performing the following procedure:

(a) Using adjustable pliers, grip the edges of the retainer (Fig. 58).

(b) Apply an upward force with a slight rocking motion until the retainer disengages from shaft (Fig. 58).

(2) Remove rocker arms (Fig. 59). Identify the component locations for reassembly in original locations.



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Fig. 58 ROCKER ARM RETAINER - REMOVAL

1 - ADJUSTABLE PLIERS
2 - BILLETED ROCKER SHAFT BOLT
3 - ROCKER ARM RETAINER

ROCKER ARMS (Continued)

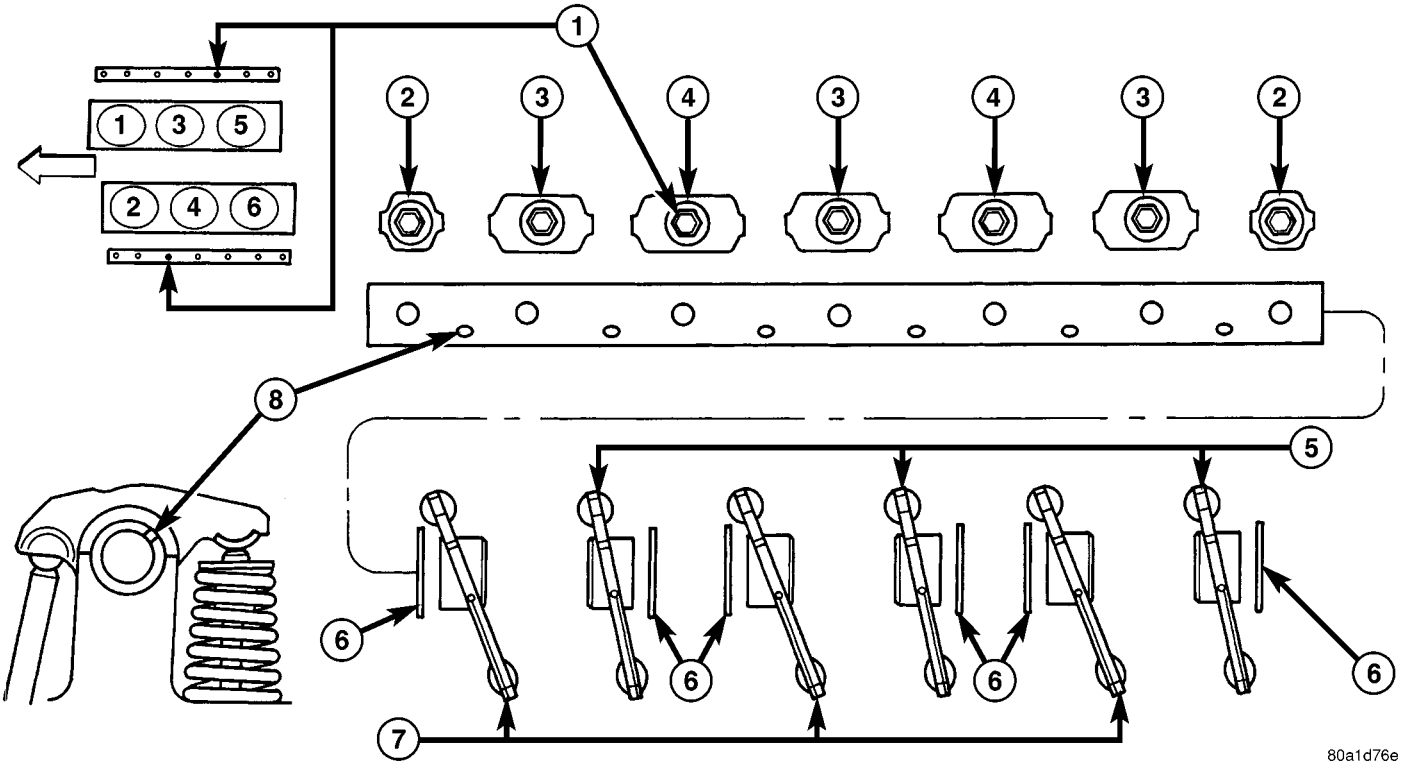


Fig. 59 ROCKER ARMS AND SHAFT

1 - BOLT (ROCKER SHAFT OIL FEED - LONGER LENGTH)
2 - SHAFT RETAINER/SPACER - 21.5 mm (0.84 in.)
3 -SHAFT RETAINER/SPACER - 37.5 mm (1.47 in.)
4 - SHAFT RETAINER/SPACER - 40.9 mm (1.61 in.)
5 - ROCKER ARM - EXHAUST
6 - WASHER
7 - ROCKER ARM - INTAKE (LARGER OFFSET)
8 - ROCKER ARMS LUBRICATION FEED HOLE (POSITION UPWARD & TOWARD VALVE SPRING)

ASSEMBLY - ROCKER ARMS AND SHAFT

(1) Install rocker arms on the shaft. Install in the orginal positions if re-used. **Ensure** the rocker shaft, all the retainers and washers are properly positioned and installed in the correct locations (Fig. 59).

(2) Install rocker arms and shaft to the cylinder head. (Refer to 9 - ENGINE/CYLINDER HEAD/ ROCKER ARMS - INSTALLATION)

INSTALLATION

ROCKER ARMS AND SHAFT

CAUTION: Ensure the longer shaft retaining bolt is installed in the proper location on the rocker shaft. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - ASSEMBLY)

(1) Position the rocker arm and shaft assemblies on the pedestal mounts.

CAUTION: Ensure all pushrods are properly located on the lifter and the rocker arm socket.

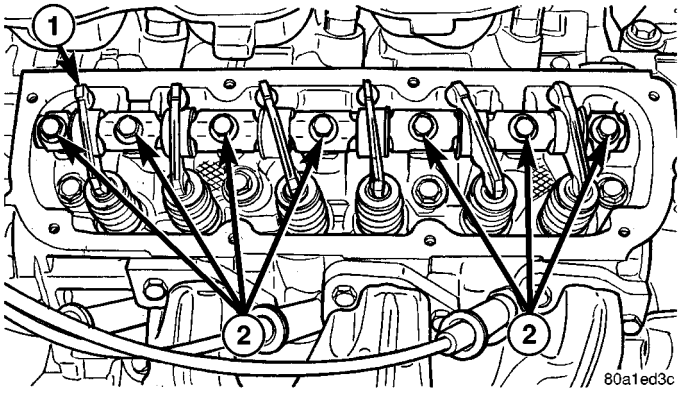


Fig. 60 ROCKER ARMS AND SHAFT

1 - ROCKER ARMS AND SHAFT ASSEMBLY
2 - ROCKER SHAFT BOLTS

(2) Align each rocker arm socket with each push-rod end.

CAUTION: The rocker arm shaft should be tightened down slowly, starting with the center bolts. Allow 20 minutes lifter bleed down time after installation of the rocker shafts before engine operation.

ROCKER ARMS (Continued)

(3) Slowly tighten rocker shaft bolts evenly until shaft is seated. Tighten bolts to 23 N·m (200 in. lbs.) (Fig. 60).

(4) Install the cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION.)

VALVE STEM SEALS

DESCRIPTION

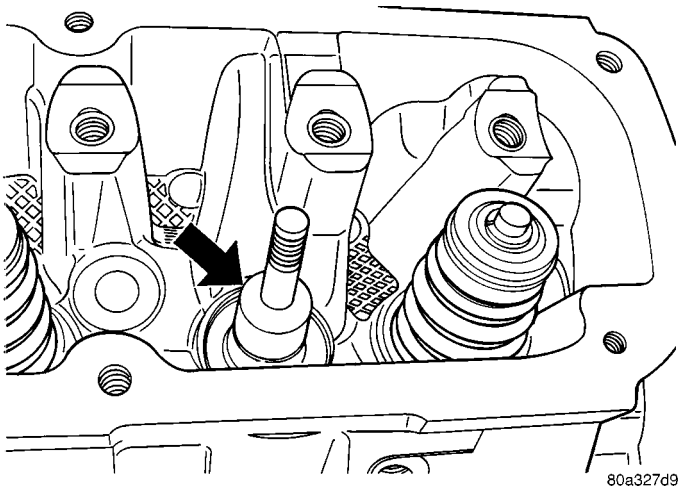


Fig. 61 VALVE STEM SEAL

The valve stem seals are made of Viton rubber. The seals are positioned over the valve stem and seated on the valve guide (Fig. 61).

REMOVAL

(1) Remove the valve springs. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - REMOVAL)

(2) Remove the valve stem seal (Fig. 61).

INSTALLATION

(1) Install the valve stem seal squarely over the valve guide, using the valve stem as a guide (Fig. 61). Do not force the seal against top of the valve guide.

(2) Install the valve spring. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - INSTALLATION)

ENGINE BLOCK

DESCRIPTION

The cylinder block is made of cast iron and is a deep skirt design.

STANDARD PROCEDURE - CYLINDER BORE HONING

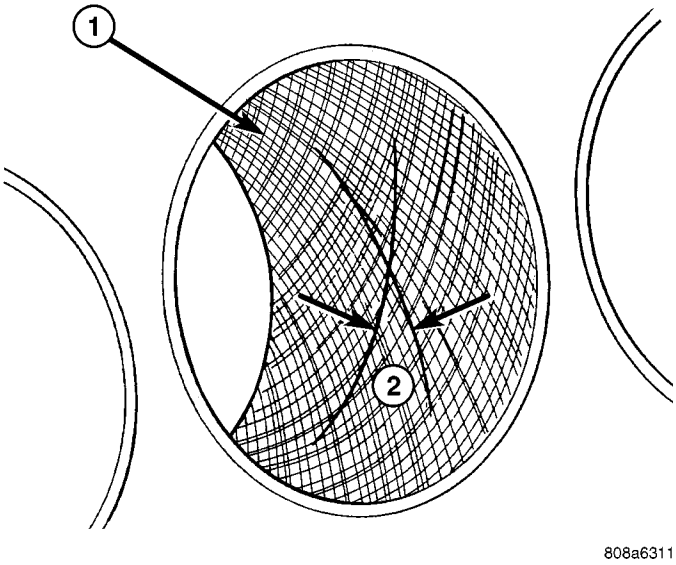


Fig. 62 Cylinder Bore Cross-Hatch Pattern

1 - CROSS-HATCH PATTERN
2 - 40°–60°

(1) Used carefully, the cylinder bore resizing hone, recommended tool C-823 or equivalent, equipped with 220 grit stones, is the best tool for this honing procedure. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches. Usually a few strokes will clean up a bore and maintain the required limits.

(2) Deglazing of the cylinder walls may be done using a cylinder surfacing hone, recommended tool C-3501 or equivalent, equipped with 280 grit stones, if the cylinder bore is straight and round. 20–60 strokes depending on the bore condition, will be sufficient to provide a satisfactory surface. Use a light honing oil. **Do not use engine or transmission oil, mineral spirits or kerosene.** Inspect cylinder walls after each 20 strokes.

(3) Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern. When hone marks **intersect** at 40-60 degrees, the cross hatch angle is most satisfactory for proper seating of rings (Fig. 62).

(4) A controlled hone motor speed between 200–300 RPM is necessary to obtain the proper cross-hatch angle. The number of up and down strokes per minute can be regulated to get the desired 40–60 degree angle. Faster up and down strokes increase the cross-hatch angle.

(5) After honing, it is necessary that the block be cleaned again to remove all traces of abrasive.

ENGINE BLOCK (Continued)

CAUTION: Ensure all abrasives are removed from engine parts after honing. It is recommended that a solution of soap and hot water be used with a brush and the parts then thoroughly dried. The bore can be considered clean when it can be wiped clean with a white cloth and cloth remains clean. Oil the bores after cleaning to prevent rusting.

CLEANING

Clean cylinder block thoroughly using a suitable cleaning solvent.

INSPECTION

ENGINE BLOCK

(1) Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking.

(2) If new core plugs are to be installed, (Refer to 9 - ENGINE - STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS).

(3) Examine block and cylinder bores for cracks or fractures.

(4) Check block deck surfaces for flatness. Deck surface must be within service limit of 0.1 mm (0.004 in.).

CYLINDER BORE

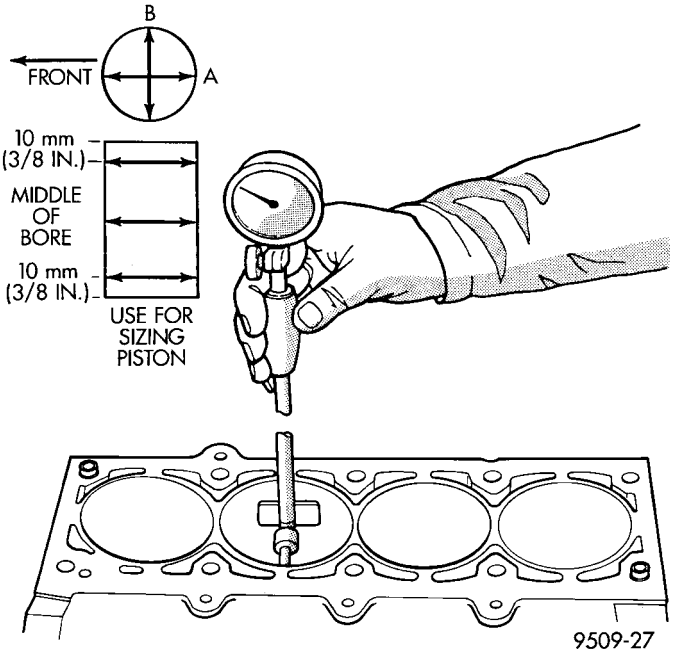


Fig. 63 Cylinder Bore Measurement

NOTE: The cylinder bores should be measured at normal room temperature, 21°C (70°F).

The cylinder walls should be checked for out-of-round and taper with Tool C119 or equivalent (Fig. 63) (Refer to 9 - ENGINE - SPECIFICATIONS). If the cylinder walls are badly scuffed or scored, the cylinder block should be replaced, and new pistons and rings fitted.

Measure the cylinder bore at three levels in directions A and B (Fig. 63). Top measurement should be 10 mm (3/8 in.) down and bottom measurement should be 10 mm (3/8 in.) up from bottom of bore. (Refer to 9 - ENGINE - SPECIFICATIONS).

HYDRAULIC LIFTERS (CAM IN BLOCK)

DESCRIPTION

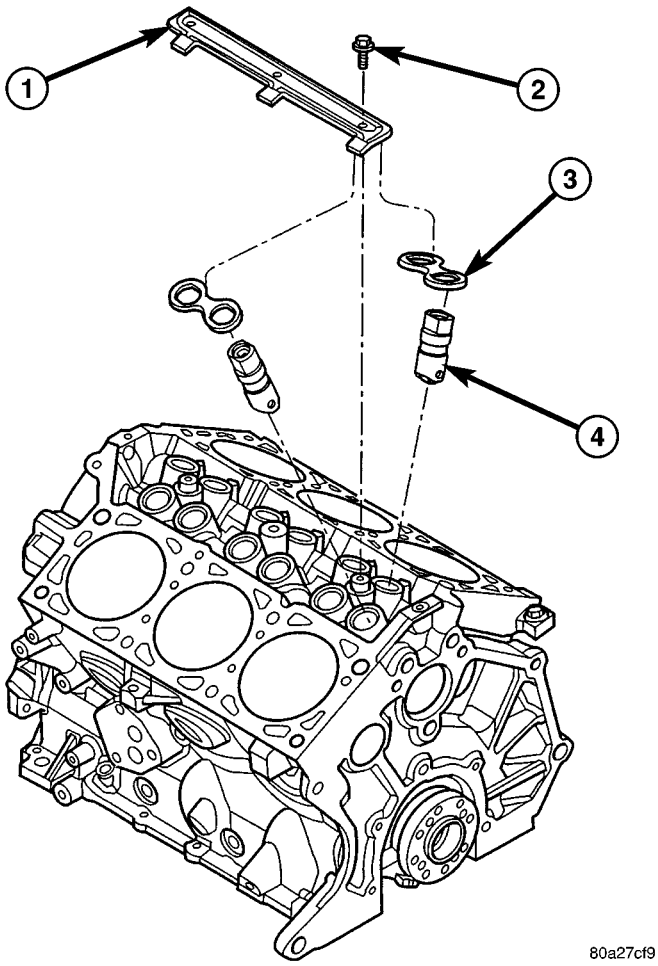


Fig. 64 HYDRAULIC LIFTERS

1 - YOKE RETAINER
2 - BOLT - YOKE RETAINER
3 - ALIGNING YOKE
4 - HYDRAULIC LIFTER

The hydraulic lifters are a roller type design and are positioned in the cylinder block with the lubrication whole facing upward. The lifters are aligned and retained by a yoke and a retainer (Fig. 64).

HYDRAULIC LIFTERS (CAM IN BLOCK) (Continued)

Lifter alignment is maintained by machined flats on lifter body. Lifters are fitted in pairs into six aligning yokes. The aligning yokes are secured by a yoke retainer (Fig. 64).

DIAGNOSIS AND TESTING - HYDRAULIC LIFTERS

HYDRAULIC LIFTERS DIAGNOSIS - PRELIMINARY STEP

Before disassembling any part of the engine to correct lifter noise, check the engine oil pressure. (Refer to 9 - ENGINE/LUBRICATION - DIAGNOSIS AND TESTING)

Check engine oil level. The oil level in the pan should never be above the MAX mark on dipstick, or below the MIN mark. Either of these two conditions could cause noisy lifters.

OIL LEVEL TOO HIGH

If oil level is above the MAX mark on dipstick, it is possible for the connecting rods to dip into the oil while engine is running and create foaming. Foam in oil pan would be fed to the hydraulic lifters by the oil pump causing them to become soft and allow valves to seat noisily.

OIL LEVEL TOO LOW

Low oil level may allow pump to take in air which when fed to the lifters it causes them to become soft and allows valves to seat noisily. Any leaks on intake side of pump, through which air can be drawn, will create the same lifter noise. Check the lubrication system from the intake strainer to the oil pump cover, including the relief valve retainer cap. When lifter noise is due to aeration, it may be intermittent or constant, and usually more than one lifter will be noisy. When oil level and leaks have been corrected, the engine should be operated at fast idle to allow all of the air inside of the lifters to be bled out.

VALVE TRAIN NOISE

To determine source of valve train noise, operate engine at idle with cylinder head covers removed and listen for source of the noise.

NOTE: Worn valve guides or cocked springs are sometimes mistaken for noisy lifters. If such is the case, noise may be dampened by applying side thrust on the valve spring. If noise is not appreciably reduced, it can be assumed the noise is in the tappet. Inspect the rocker arm push rod sockets and push rod ends for wear.

Valve lifter noise ranges from light noise to a heavy click. A light noise is usually caused by excessive leak-down around the unit plunger which will necessitate replacing the lifter, or by the plunger partially sticking in the lifter body cylinder. A heavy click is caused either by a lifter check valve not seating, or by foreign particles becoming wedged between the plunger and the lifter body causing the plunger to stick in the down position. This heavy click will be accompanied by excessive clearance between the valve stem and rocker arm as valve closes. In either case, lifter assembly should be removed for inspection.

REMOVAL

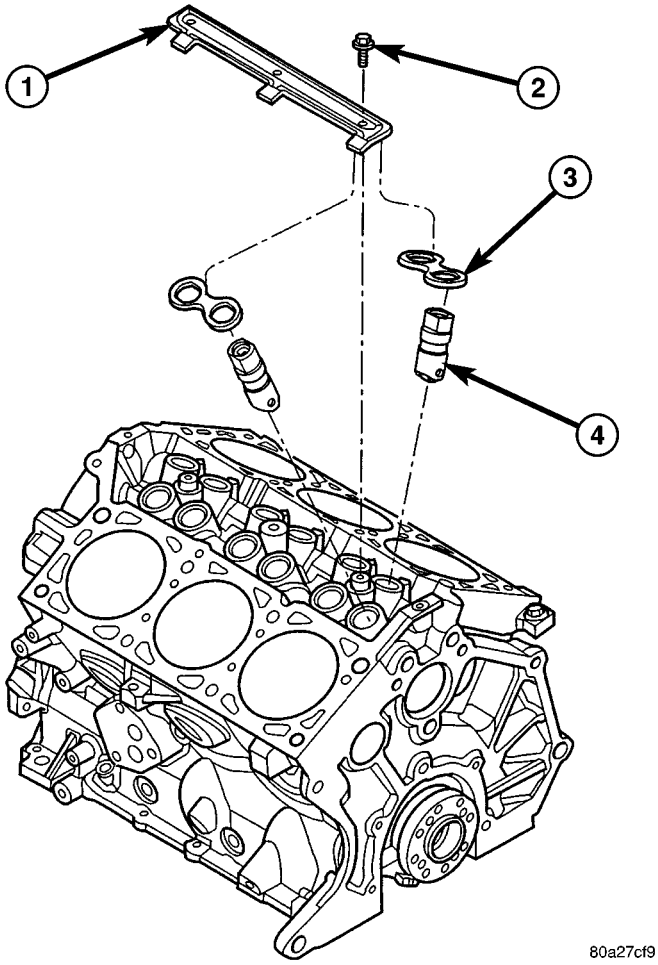


Fig. 65 HYDRAULIC LIFTERS

1 - YOKE RETAINER
2 - BOLT - YOKE RETAINER
3 - ALIGNING YOKE
4 - HYDRAULIC LIFTER

(1) Remove the cylinder head(s). (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL)

(2) Remove the yoke retainer and aligning yokes (Fig. 65).

(3) Remove the hydraulic lifters. If necessary use Special Tool C-4129, or equivalent to remove lifters

HYDRAULIC LIFTERS (CAM IN BLOCK) (Continued)

from bores. If lifters are to be reused, identify each lifter to ensure installation in original location.

INSTALLATION

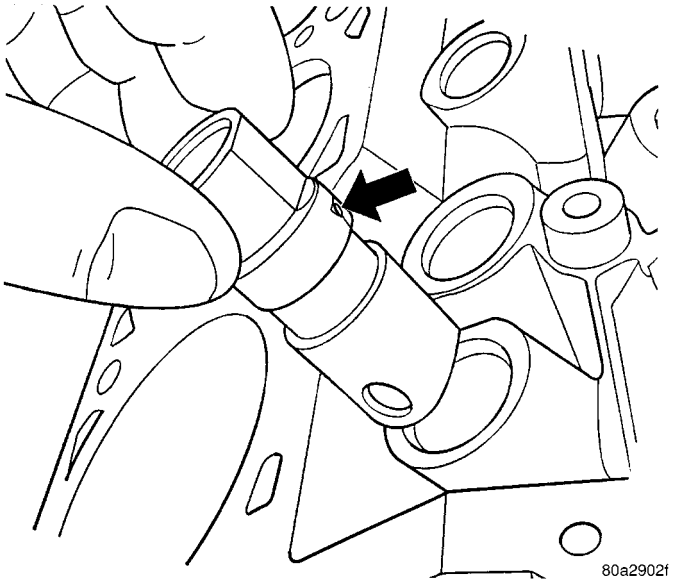


Fig. 66 UNDER CONSTRUCTION

(1) Lubricate the lifters with engine oil.

NOTE: Position the lifter in bore with the lubrication hole facing upward (Fig. 66).

(2) Install the hydraulic lifters with the lubrication hole facing upward towards middle of block (Fig. 66). Install lifters in original positions, if reused.

(3) Install lifter aligning yokes (Fig. 67).

(4) Install yoke retainer and torque screws to 12 N·m (105 in. lbs.) (Fig. 67).

(5) Install the cylinder heads. (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION)

(6) Start and operate engine. Warm up to normal operating temperature.

CAUTION: To prevent damage to valve mechanism, engine must not be run above fast idle until all hydraulic lifters have filled with oil and have become quiet.

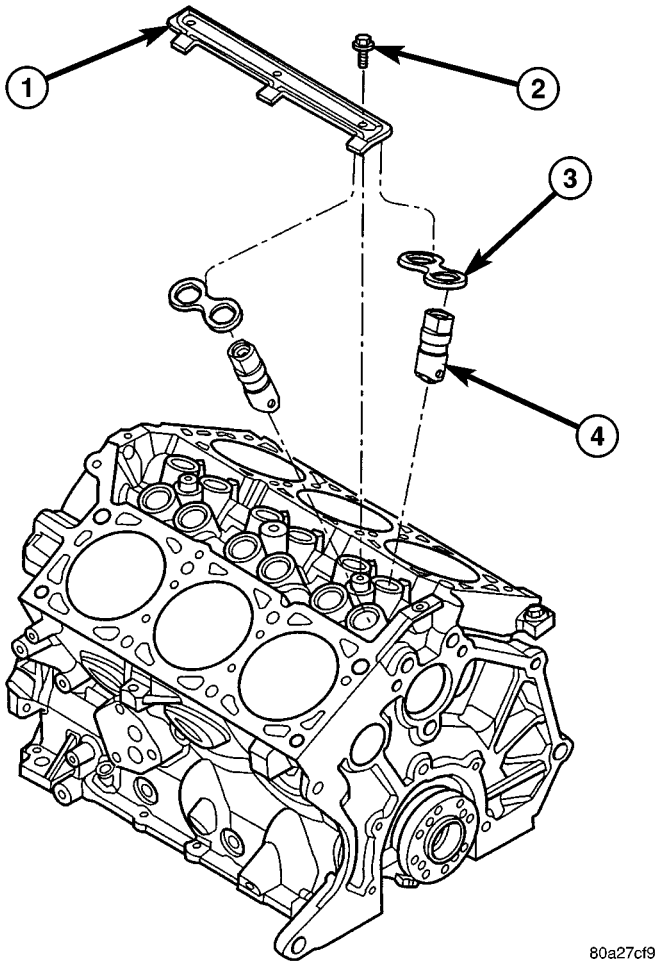


Fig. 67 HYDRAULIC LIFTERS

1 - YOKE RETAINER
2 - BOLT - YOKE RETAINER
3 - ALIGNING YOKE
4 - HYDRAULIC LIFTER

CAMSHAFT & BEARINGS (IN BLOCK)

DESCRIPTION

The nodular iron camshaft is mounted in the engine block and supported with four steel backed aluminum bearings (Fig. 68). A thrust plate, located in front of the first bearing, is bolted to the block and controls the camshaft end play.

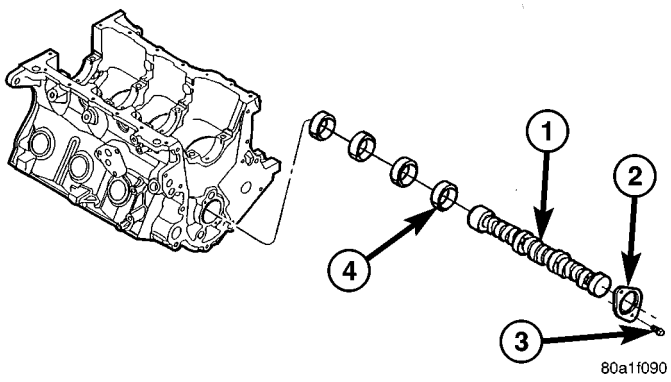


Fig. 68 CAMSHAFT AND BEARINGS

1 - CAMSHAFT
2 - THRUST PLATE
3 - BOLT
4 - CAMSHAFT BEARINGS (SERVICED WITH BLOCK)

CAMSHAFT & BEARINGS (IN BLOCK) (Continued)

OPERATION

The camshaft is driven by the crankshaft through a timing chain and sprockets. The camshaft has precisely machined (egg-shaped) lobes to provide accurate valve timing and duration.

REMOVAL

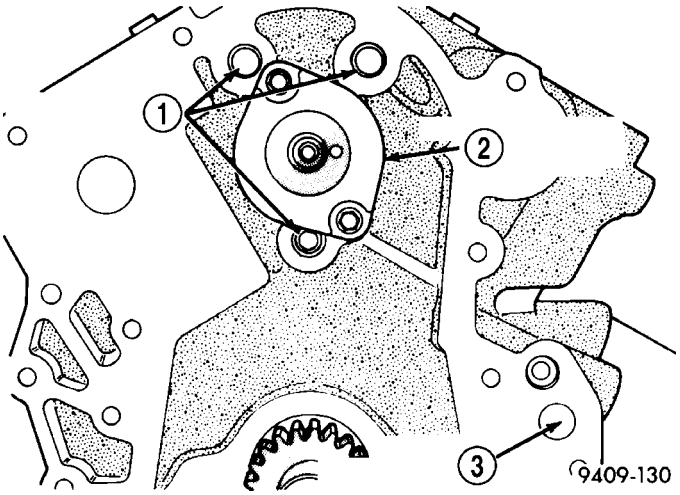


Fig. 69 Camshaft Thrust Plate

1 - OIL GALLERY CUP PLUGS
2 - CAMSHAFT THRUST PLATE
3 - OIL FEED GALLERY FROM PUMP

(1) Remove the engine assembly from vehicle (Refer to 9 - ENGINE - REMOVAL).

(2) Remove the cylinder heads (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).

(3) Remove the timing chain and camshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(4) Remove the hydraulic lifters (Refer to 9 - ENGINE/ENGINE BLOCK/HYDRAULIC LIFTERS (CAM IN BLOCK) - REMOVAL). Identify each tappet for reinstallation in original location.

(5) Remove camshaft thrust plate (Fig. 69).

NOTE: Slowly remove the camshaft from the engine taking precautions not to damage the camshaft bearings.

(6) Install a long bolt into front of camshaft to facilitate removal of the camshaft.

(7) Carefully remove the camshaft (Fig. 69),

NOTE: The camshaft bearings are serviced with the engine block.

INSPECTION

(1) Check the cam lobes and bearing surfaces for abnormal wear and damage (Fig. 70). Replace camshaft as required.

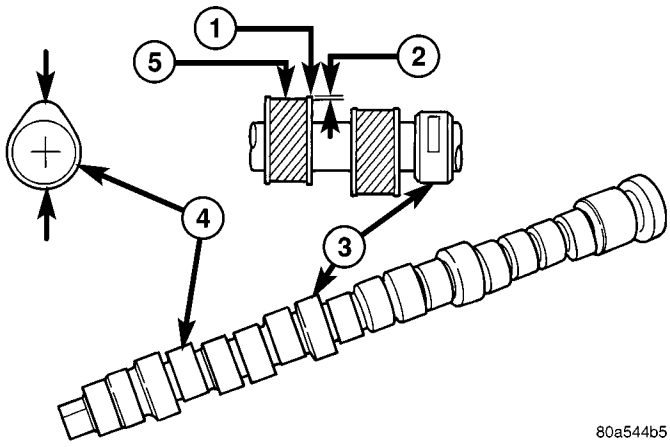


Fig. 70 CAMSHAFT - INSPECTION

1 - UNWORN AREA
2 - ACTUAL WEAR
3 - BEARING JOURNAL
4 - LOBE
5 - WEAR ZONE

NOTE: If camshaft is replaced due to lobe wear or damage, always replace the lifters.

(2) Measure the lobe actual wear (unworn area - wear zone = actual wear) (Fig. 70) and replace camshaft if out of limit. Standard value is 0.0254 mm (0.001 in.), wear **limit** is 0.254 mm (0.010 in.).

INSTALLATION

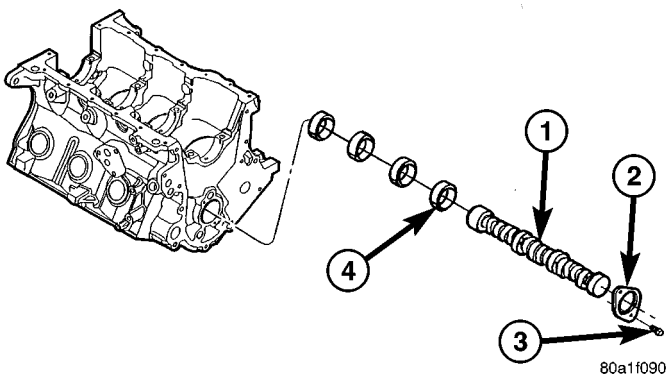


Fig. 71 CAMSHAFT AND BEARINGS

1 - CAMSHAFT
2 - THRUST PLATE
3 - BOLT
4 - CAMSHAFT BEARINGS (SERVICED WITH BLOCK)

(1) Lubricate camshaft lobes and camshaft bearing journals with engine oil (Fig. 71).

(2) Install a long bolt into the camshaft to assist in the installation of the camshaft (Fig. 71).

(3) Carefully install the camshaft in engine block (Fig. 71).

(4) Install camshaft thrust plate and bolts (Fig. 71). Tighten to 12 N·m (105 in. lbs.) torque.

CAMSHAFT & BEARINGS (IN BLOCK) (Continued)

(5) Measure camshaft end play. (Refer to 9 - ENGINE - SPECIFICATIONS) If not within specifications, replace thrust plate.

(6) Install the timing chain and sprockets. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/ CHAIN AND SPROCKETS - INSTALLATION)

NOTE: When camshaft is replaced, all of the hydraulic lifters must be replaced.

(7) Install the hydraulic lifters with lubrication whole in the upward position (Refer to 9 - ENGINE/ ENGINE BLOCK/HYDRAULIC LIFTERS (CAM IN BLOCK) - INSTALLATION).

(8) Install the timing chain cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)

(9) Install the cylinder heads. (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION)

(10) Install the cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

(11) Install the lower and upper intake manifolds. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(12) Install the engine assembly. (Refer to 9 - ENGINE - INSTALLATION)

PISTON & CONNECTING ROD

DESCRIPTION

CAUTION: DO NOT STAMP the connecting rods during identification. The use of a scribe or a paint mark is acceptable.

NOTE: The 3.8L may have any combination of forged or cracked cap connecting rods. The cracked cap design is easily identified by the connecting rod cap bolts rather than the traditional forged connecting rod cap nuts. The cracked cap design also has a different tightening procedure and specification. The connecting rod caps must be paint marked or scribed to identify the accompanying connecting rod. All connecting rod caps ARE NOT inner changeable between connecting rods.

The pistons are made of cast aluminum alloy and are a strutless, short skirt design. The connecting rods have either the standard forged caps or forged cracked cap design. Both the cracked cap and forged cap connecting rod designs are interchangeable and may be found in any combination when mounted to the crankshaft. The difference between the two different rod caps, aside from design, is the tightening procedure and specification. The piston rings consist of two compression rings and a three piece oil ring. Piston pins connect the piston to the forged steel connecting rods. The piston pins are a press fit into the connecting rod small bore. The piston, pin and connecting rod are serviced as an assembly.

STANDARD PROCEDURE

STANDARD PROCEDURE - FITTING CONNECTING RODS

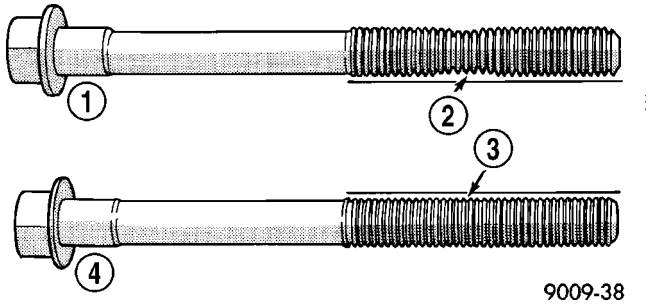


Fig. 72 Check for Stretched Bolts

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

The bearing caps are not interchangeable or reversible, and should be marked at removal to ensure correct reassembly. Forged bearing caps stay with forged rods, cracked bearing caps stay with the forged cracked rod. The bearing shells must be installed with the tangs inserted into the machined grooves in the rods and caps. Install cap with the tangs on the same side as the rod. For connecting rod bearing fitting (Refer to 9 - ENGINE/ENGINE BLOCK/CONNECTING ROD BEARINGS - STANDARD PROCEDURE). Fit all connecting rods on one bank until complete.

NOTE: The connecting rod cap bolts should be examined before reuse. Bolt stretch can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt must be replaced (Fig. 72).

(1) Before installing the nuts or the bolts the threads should be oiled with engine oil.

(2) Install nuts or bolts finger tight then alternately torque each nut or bolt to assemble the cap properly.

(3) Tighten the nuts to 54 N·m PLUS 1/4 turn (40 ft. lbs. PLUS 1/4 turn).

(4) Tighten the cracked cap bolts to 28 N·m PLUS 90 degrees (20 ft.lbs.) plus 90 degrees.

PISTON & CONNECTING ROD (Continued)

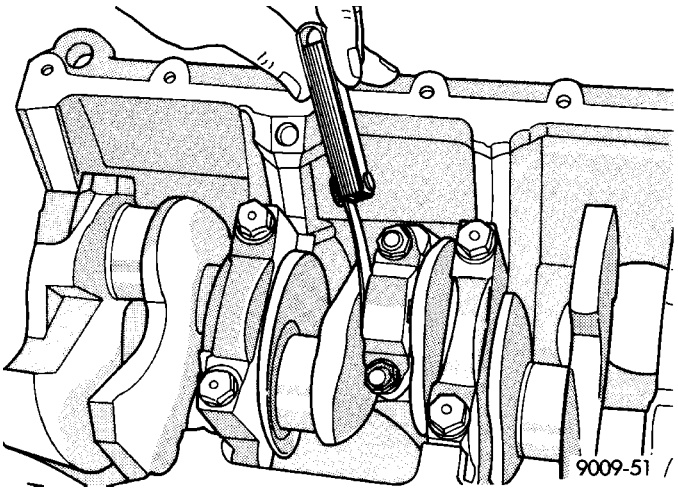


Fig. 73 Checking

(5) Using a feeler gauge, check connecting rod side clearance (Fig. 73). Refer to Engine Specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

STANDARD PROCEDURE - FITTING PISTONS

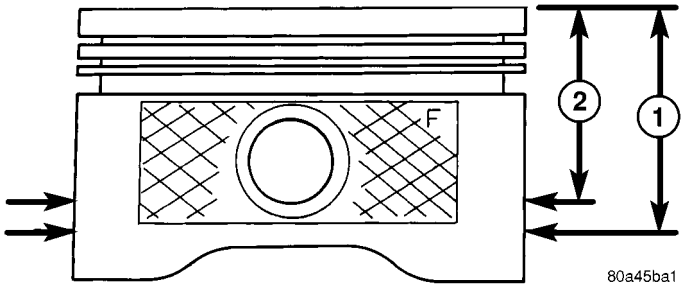


Fig. 74 PISTON MEASUREMENTS

1 - 33.0 mm (1.29 in.) 3.8L ENGINE

NOTE: Pistons and connecting rods are machined to tight weight tolerances and need not be sorted in any way.

The piston and cylinder wall must be clean and dry. Piston diameter should be measured 90 degrees to piston pin at size location shown in (Fig. 74).

Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line shown in (Fig. 75). Refer to Engine Specifications (Refer to 9 - ENGINE - SPECIFICATIONS). **Pistons and cylinder bores should be measured at normal room temperature, 21°C (70°F).**

REMOVAL

NOTE: Refer to the connecting rod Description before beginning repair. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - DESCRIPTION).

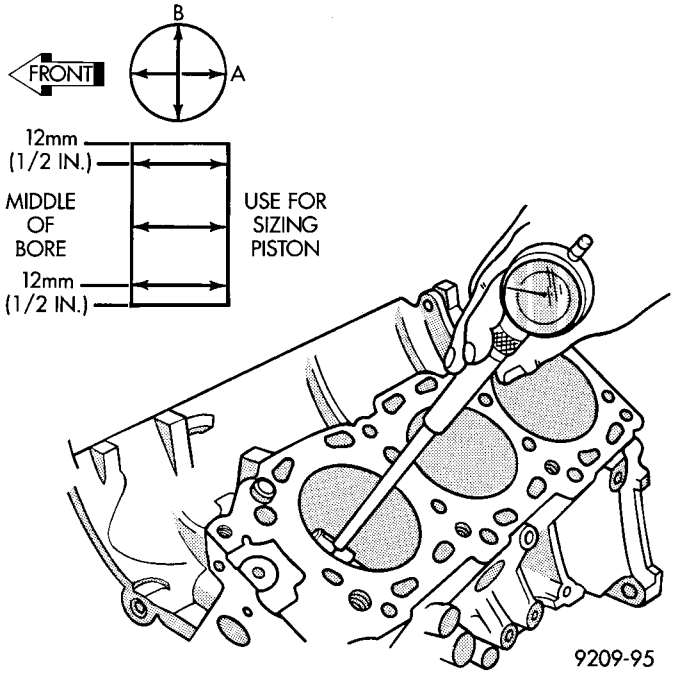


Fig. 75 Cylinder Bore Size Checking

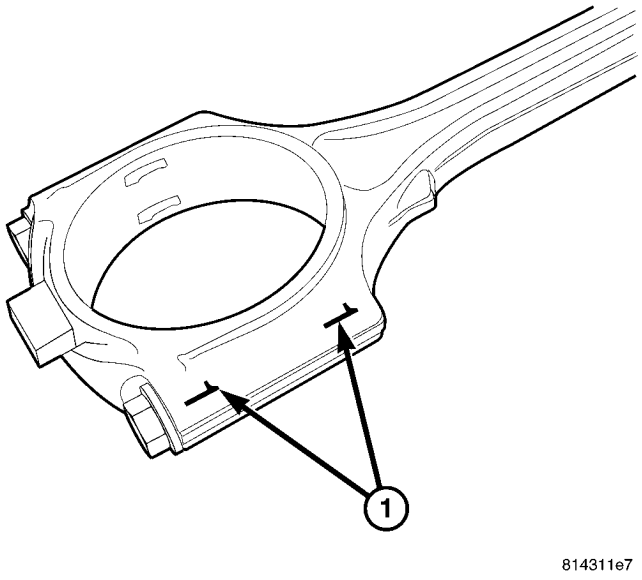


Fig. 76 CONNECTING ROD TO CYLINDER IDENTIFICATION

1 - PAINT MARK OR SCRIBE

(1) Disconnect negative cable from battery.

(2) Remove the cylinder heads. (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL)

(3) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(4) Remove the top ridge of cylinder bores with a reliable ridge reamer, if necessary, before removing

PISTON & CONNECTING ROD (Continued)

pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation. Pistons and connecting rods must be removed from top of cylinder block. When removing piston and connecting rod assemblies from the engine, rotate crankshaft so that each connecting rod is centered in cylinder bore.**

(5) Inspect connecting rods and connecting rod caps for cylinder identification. Identify them with a paint mark or scribe, if necessary (Fig. 76).

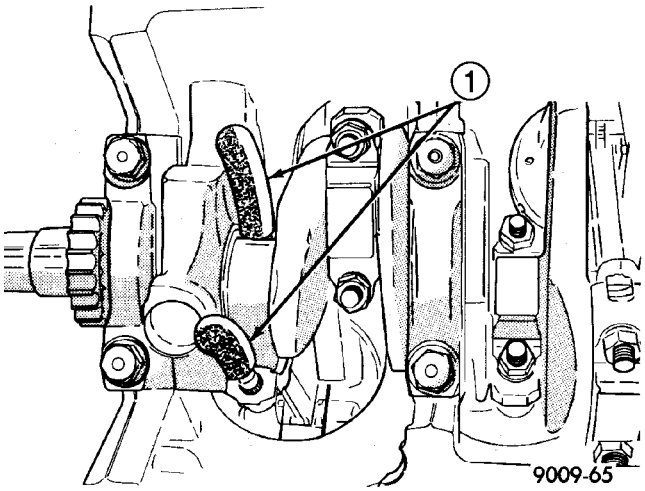


Fig. 77 Connecting Rod Protectors

1 - COVER ROD BOLTS WITH A SUITABLE COVERING WHEN REMOVING OR INSTALLING PISTON ASSEMBLY

(6) Remove connecting rod cap. Install connecting rod bolt protectors (Fig. 77). on connecting rod bolts or use special tool #8189 to guide cracked connecting rod.

(7) Remove each piston and connecting rod assembly out of the cylinder bore.

NOTE: Be careful not to nick crankshaft journals.

(8) After removal, install bearing cap on the mating rod.

INSTALLATION

NOTE: Refer to the connecting rod Description before beginning repair. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - DESCRIPTION).

(1) Before installing pistons and connecting rod assemblies into the bore, ensure that compression ring gaps are staggered so that neither is in line with oil ring rail gap (Fig. 78)and that the arrow on top of the piston is facing the front of the engine, if equipped (Fig. 79).

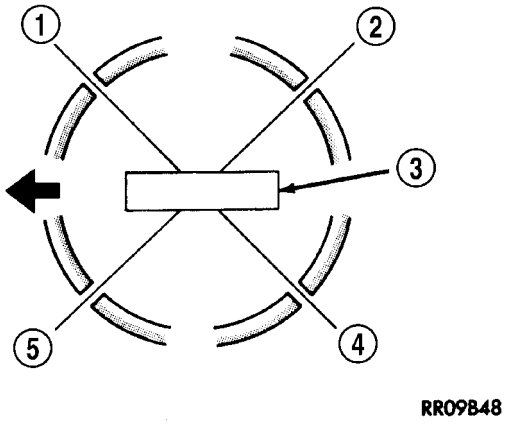


Fig. 78 PISTON RING END GAP POSITION

1 - SIDE RAIL UPPER
2 - NO. 1 RING GAP
3 - PISTON PIN
4 - SIDE RAIL LOWER
5 - NO. 2 RING GAP AND SPACER EXPANDER GAP

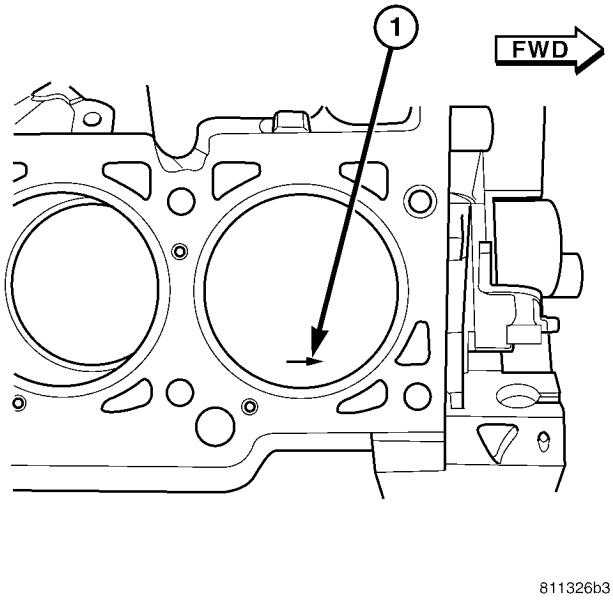


Fig. 79 PISTON ORIENTATION TYPICAL

1 - ARROW FACES FRONT OF ENGINE

(2) Before installing the ring compressor, ensure the oil ring expander ends are butted and the rail gaps located as shown in (Fig. 78).

PISTON & CONNECTING ROD (Continued)

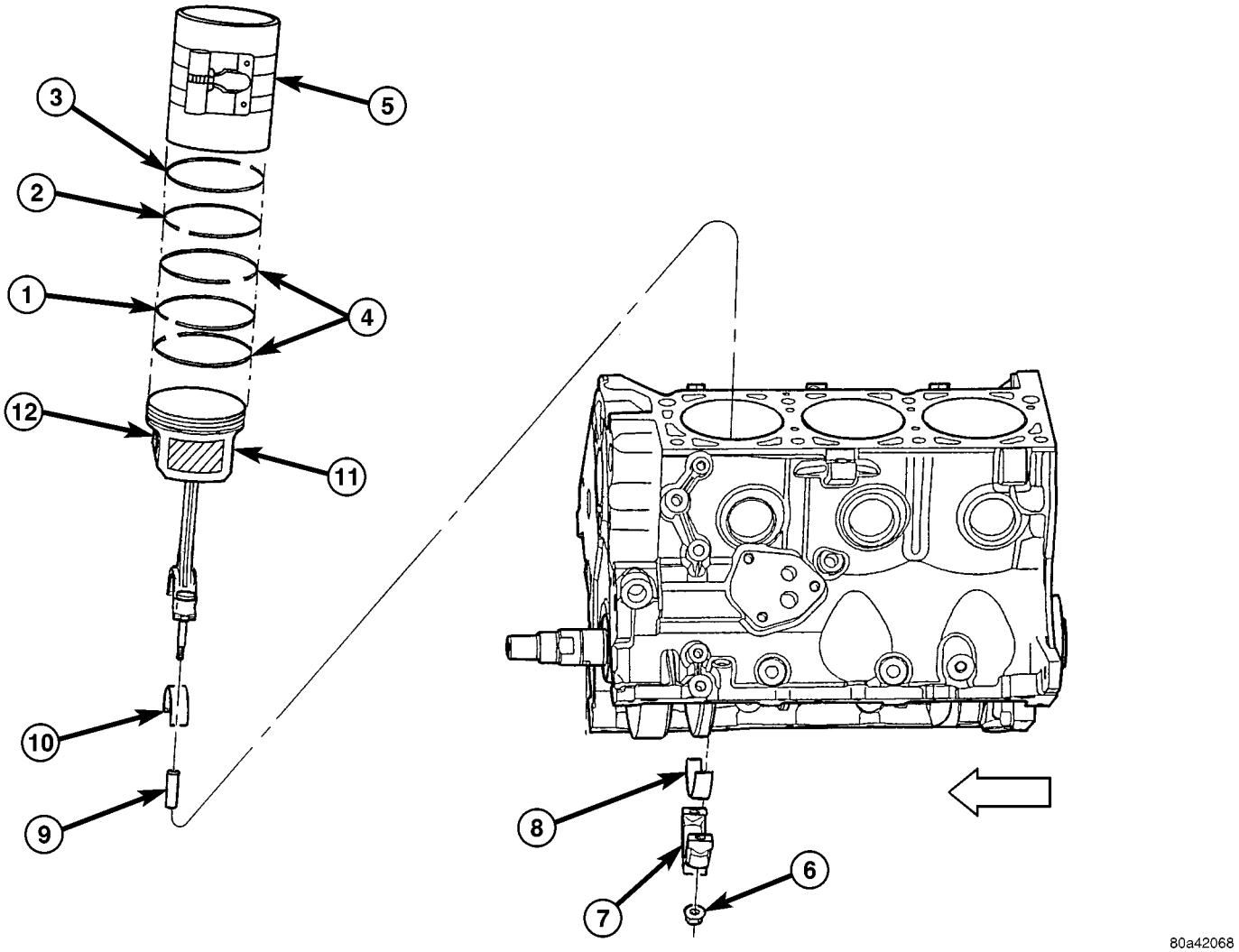


Fig. 80 PISTON AND ROD INSTALL - TYPICAL

1 - RING - OIL CONTROL
2 - RING - NO. 2 COMPRESSION
3 - RING - NO. 1 COMPRESSION
4 - RING - SIDE RAIL UPPER & LOWER
5 - PISTON RING COMPRESSOR
6 - NUT - CONNECTING ROD
7 - CAP - CONNECTING ROD
8 - BEARING - CONNECTING ROD LOWER
9 - CRANKSHAFT JOURNAL PROTECTOR (RUBBER HOSE)
10 - BEARING - CONNECTING ROD UPPER
11 - PISTON AND CONNECTING ROD ASSEMBLY
12 - PISTON LOCATION MARK (F = FRONT)

(3) Lubricate the piston and rings with clean engine oil. Position a ring compressor over the piston and rings, and tighten the compressor (Fig. 80). **Be sure position of rings does not change during this operation.**

(4) Position upper bearing onto connecting rod. Lubricate bearing with oil.

(5) Install connecting rod bolt protectors (rubber hose or equivalent) (Fig. 80). on the connecting rod bolts, or use special tool (Fig. 81) #8189 for cracked cap design

(6) The pistons are marked with a “F” located near the piston pin, or an arrow on top of the piston. Install piston with this mark positioned to front of engine on both cylinder banks. The connecting rod oil squirt hole faces the major thrust (right) side of the engine block (Fig. 82).

(7) Rotate crankshaft until the connecting rod journal is located in the center of the cylinder bore. Insert connecting rod and piston into cylinder bore by tapping down on the piston using a hammer handle. At the same time, guide connecting rod into position on connecting rod journal. (Fig. 80).

(8) Install lower bearing shell and the appropriate connecting rod cap (Fig. 80).

(9) Install connecting rod cap retaining nuts on cleaned and oiled rod bolts and tighten to 54 N·m (40 ft. lbs.) PLUS ¼ turn. Install connecting rod bolts and tighten to 7 N·m (5 ft. lbs) initially. Tighten the

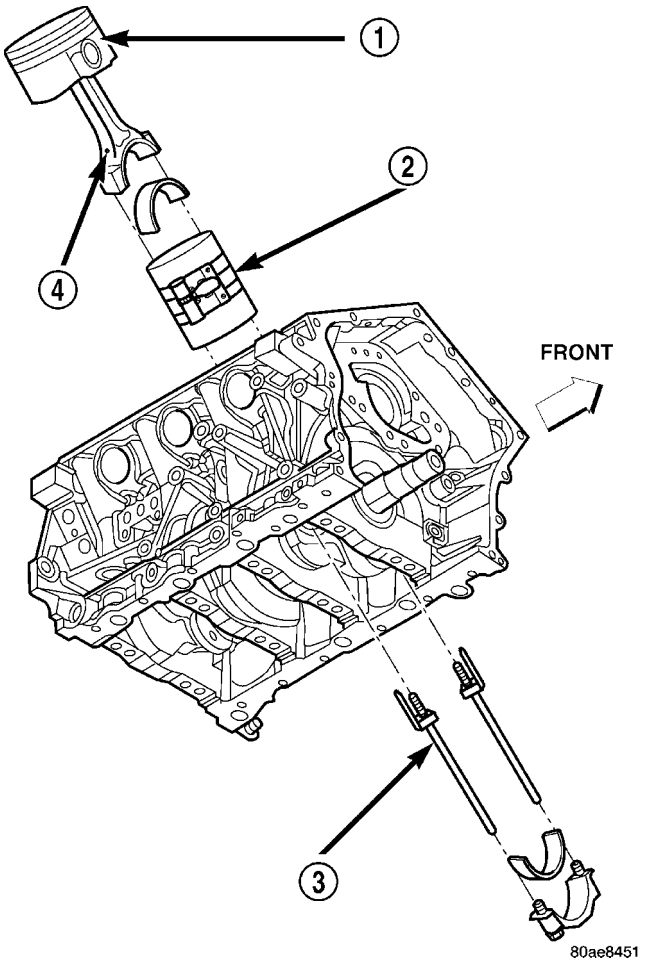


Fig. 81 Piston and Connecting Rod

1 - "F" TOWARD FRONT OF ENGINE
2 - RING COMPRESSOR
3 - SPECIAL TOOL 8189
4 - OIL SQUIRT HOLE

bolts an additional 21 N·m (15 ft. lbs.) and then turn each bolt 90° to final clamping load.

(10) Repeat procedure for each piston and connecting rod installation.

(11) Install the cylinder heads. (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION)

(12) Install the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

(13) Fill engine crankcase with proper oil to correct level.

(14) Connect negative cable to battery.

CONNECTING ROD BEARINGS

STANDARD PROCEDURE - MEASURING CONNECTING ROD BEARING CLEARANCE

CAUTION: Two styles of connecting rod with bearing caps are available (standard forged and forged cracked cap). Either may be used as a replacement part, as both rods interchange. The difference is the tightening specification between designs.

Either style of bearing cap is not interchangeable and should be marked at removal to ensure correct assembly. The bearing shells must be installed with the tangs inserted into the machined grooves in the rods and caps. Install cap with the tangs on the same side as the rod. Fit all rods on one bank until complete. Connecting rod bearings are available in the standard size and the following undersizes: 0.025 mm (0.001 in.) and 0.250 mm (0.010 in.).

CAUTION: Install the bearings in pairs. Do not use a new bearing half with an old bearing half. Do not file the rods or bearing caps.

Measure connecting rod journal for taper and out-of-round. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - INSPECTION)

The connecting rod bearing clearances can be determined by use of Plastigage or the equivalent. The following is the recommended procedure for the use of Plastigage:

(1) Rotate the crankshaft until the connecting rod to be checked is at the bottom of its stroke.

(2) Remove oil film from surface to be checked. Plastigage is soluble in oil.

(3) Place a piece of Plastigage across the entire width of the bearing shell in the bearing cap approximately 6.35 mm (1/4 in.) off center and away from the oil hole. In addition, suspect areas can be checked by placing Plastigage in that area.

(4) Assemble the rod cap with Plastigage in place. Tighten the rod cap to the specified torque. **Do not rotate the crankshaft while assembling the cap or the Plastigage may be smeared, giving inaccurate results.**

CONNECTING ROD BEARINGS (Continued)

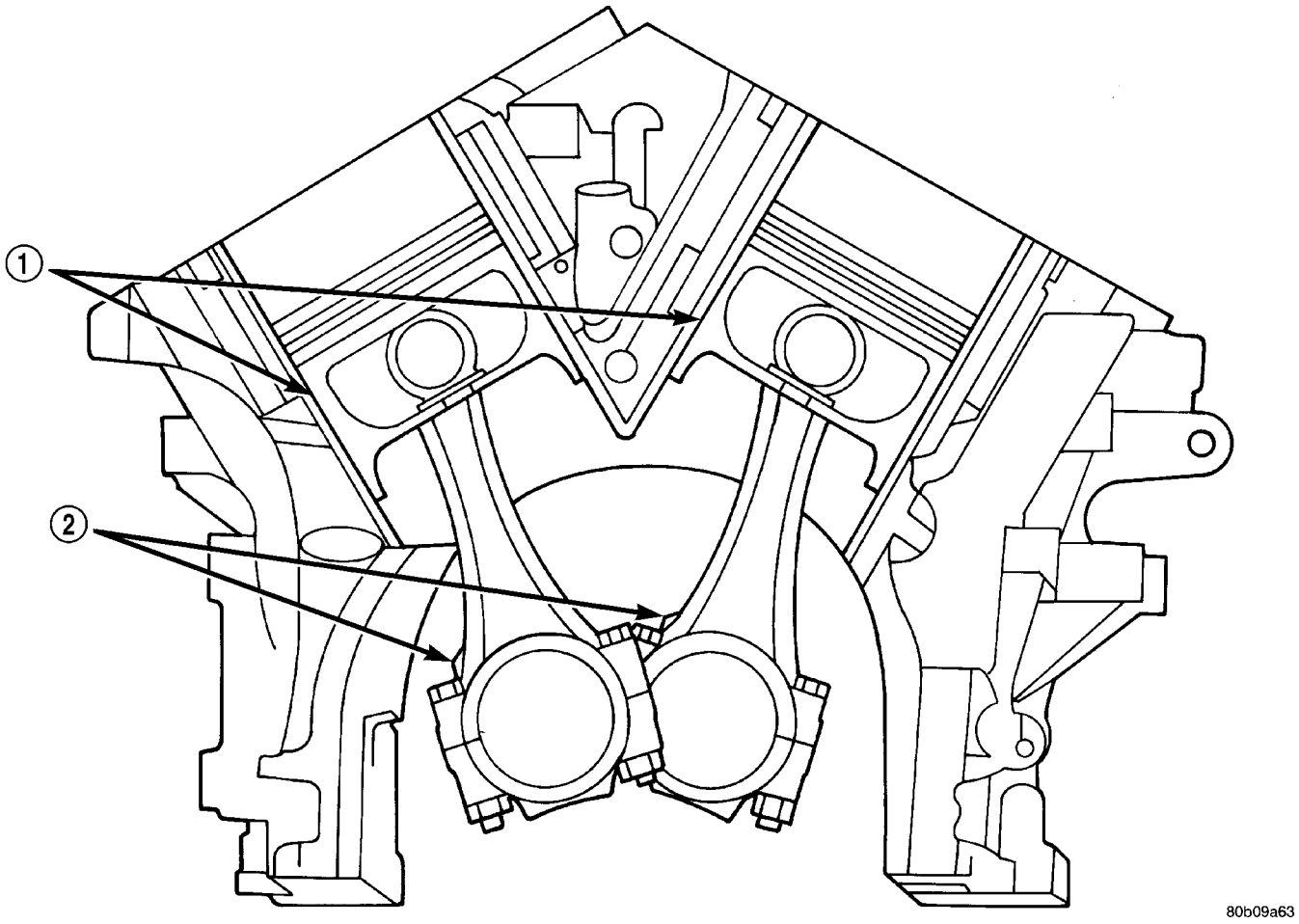


Fig. 82 Piston and Connecting Rod Positioning

1 - MAJOR THRUST SIDE OF PISTON
2 - OIL SQUIRT HOLE

CONNECTING ROD BEARINGS (Continued)

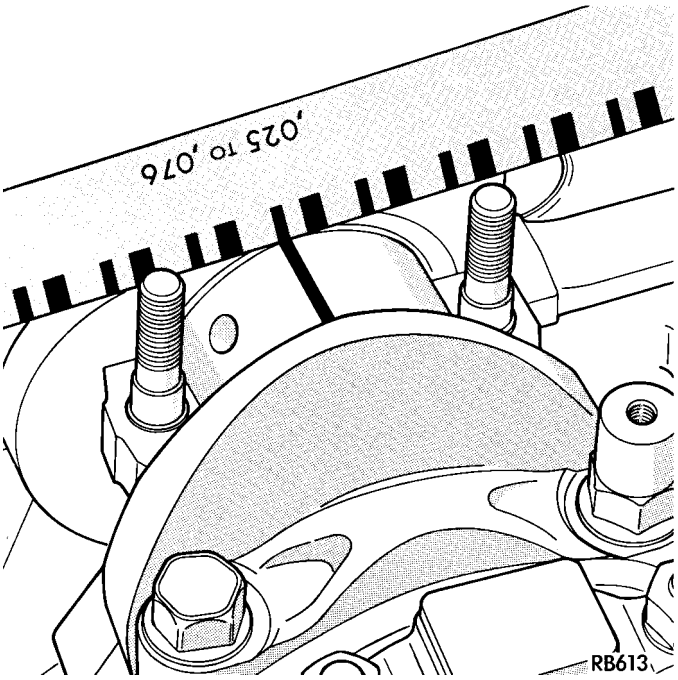


Fig. 83 Checking Connecting Rod Bearing Clearance—Typical

(5) Remove the bearing cap and compare the width of the flattened Plastigage with the scale provided on the package (Fig. 83). Locate the band closest to the same width. This band indicates the amount of oil clearance. Differences in readings between the ends indicate the amount of taper present. Record all readings taken. Refer to Engine Specifications (Refer to 9 - ENGINE - SPECIFICATIONS). **Plastigage generally is accompanied by two scales. One scale is in inches, the other is a metric scale. If the bearing clearance exceeds wear limit specification, replace the bearing.**

PISTON RINGS

STANDARD PROCEDURE - PISTON RING FITTING

(1) Wipe cylinder bore clean. Insert the ring and push down with piston to ensure squareness in bore to approximately 12 mm (0.50 in.) from top of cylinder bore. Check ring gap with a feeler gauge (Fig. 84). For clearance specification (Refer to 9 - ENGINE - SPECIFICATIONS).

(2) Check piston ring to groove side clearance (Fig. 85). For clearance specification (Refer to 9 - ENGINE - SPECIFICATIONS)

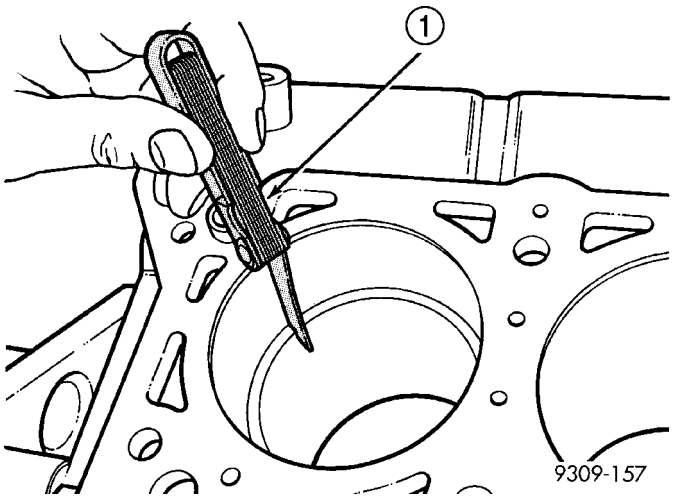


Fig. 84 Check Gap on Piston Rings

1 - FEELER GAUGE

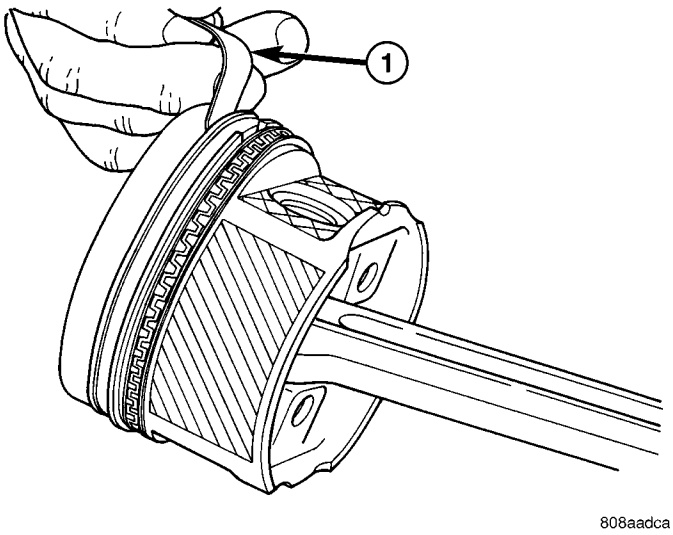


Fig. 85 Piston Ring Side Clearance

1 - FEELER GAUGE

PISTON RINGS (Continued)

REMOVAL

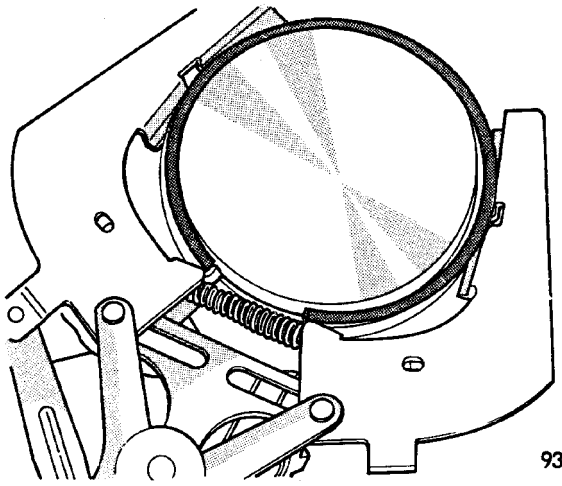


Fig. 86 Upper and Intermediate Rings - Service

(1) Remove piston and connecting rod. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - REMOVAL)

(2) Remove No. 1 and No.2 piston rings from piston using a ring expander tool (Fig. 86).

(3) Remove upper oil ring side rail.

(4) Remove lower oil ring side rail.

(5) Remove oil ring expander.

INSTALLATION

(1) Install rings with manufacturers I.D. mark (if present) facing up, to the top of the piston (Fig. 87).

CAUTION: Install piston rings in the following order:

1. Oil ring expander.
2. Upper oil ring side rail.
3. Lower oil ring side rail.
4. No. 2 Intermediate piston ring.
5. No. 1 Upper piston ring.

(2) Install the side rail by placing one end between the piston ring groove and the expander. Hold end firmly and press down the portion to be installed until side rail is in position. **Do not use a piston ring expander** (Fig. 88).

(3) Install upper side rail first and then the lower side rail.

(4) Install No. 2 piston ring and then No. 1 piston ring (Fig. 89).

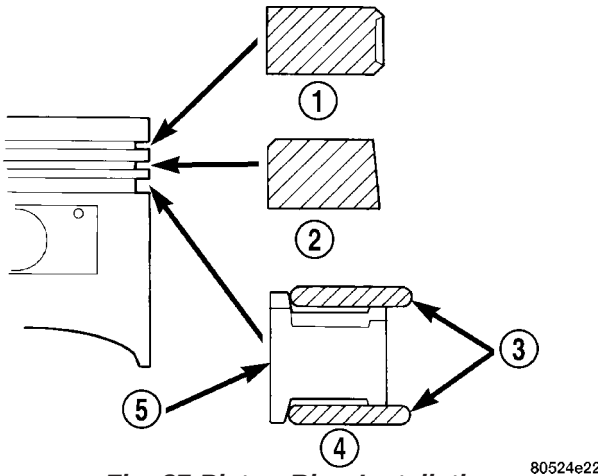


Fig. 87 Piston Ring Installation

1 - NO. 1 PISTON RING
2 - NO. 2 PISTON RING
3 - SIDE RAIL
4 - OIL RING
5 - SPACER EXPANDER

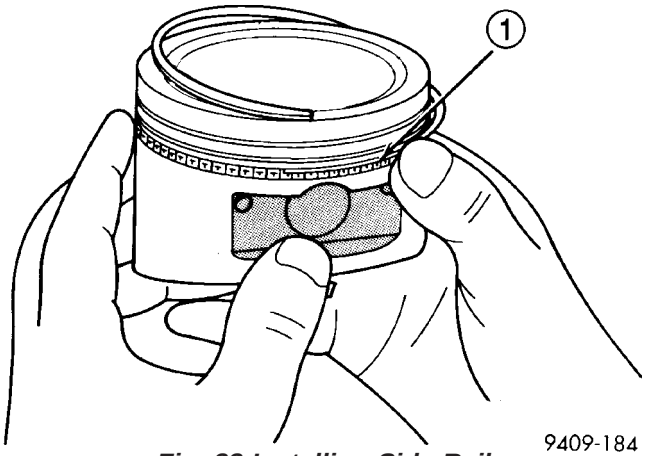


Fig. 88 Installing Side Rail

1 - SIDE RAIL END

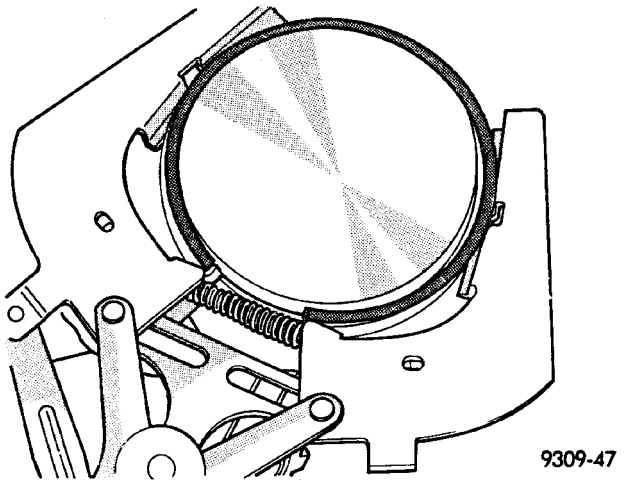


Fig. 89 Upper and Intermediate Rings—Installation

PISTON RINGS (Continued)

(5) Position piston ring end gaps as shown in (Fig. 90).

(6) Position oil ring expander gap at least 45° from the side rail gaps but **not** on the piston pin center or on the thrust direction. Staggering ring gap is important for oil control.

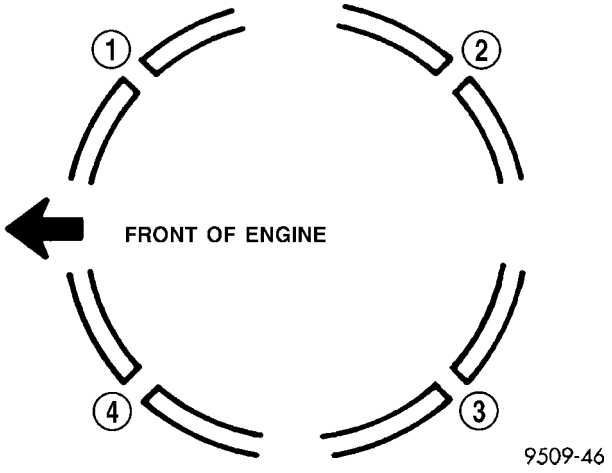


Fig. 90 Piston Ring End Gap Position

1 - GAP OF LOWER SIDE RAIL
2 - NO. 1 RING GAP
3 - GAP OF UPPER SIDE RAIL
4 - NO. 2 RING GAP AND SPACER EXPANDER GAP

CRANKSHAFT MAIN BEARINGS

STANDARD PROCEDURE - MAIN BEARING FITTING

Bearing caps are not interchangeable and should be marked at removal to insure correct assembly (Fig. 91). Upper and lower bearing halves are NOT interchangeable. Lower main bearing halves of 1, 3 and 4 are interchangeable. Upper main bearing halves of 1, 3 and 4 are interchangeable.

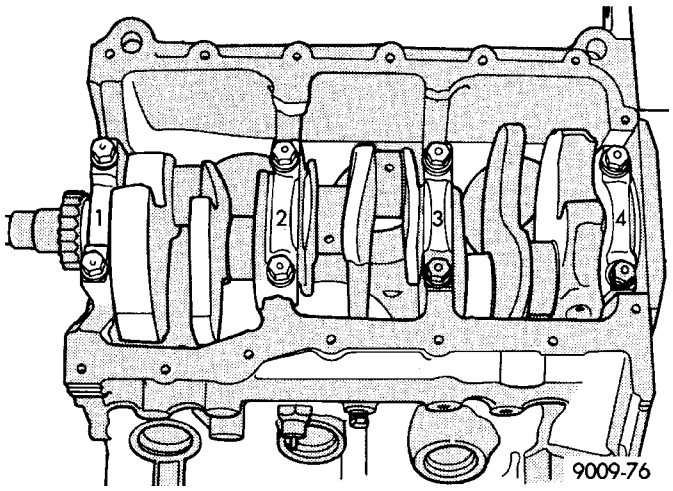


Fig. 91 Main Bearing Cap Identification

Upper and lower number 2 bearing halves are flanged to carry the crankshaft thrust loads and are NOT interchangeable with any other bearing halves in the engine (Fig. 92). All bearing cap bolts removed during service procedures are to be cleaned and lubricated with engine oil before installation. Bearing shells are available in standard and the following undersizes: 0.025 mm (0.001 in.) and 0.254 mm (0.010 in). Never install an undersize bearing that will reduce clearance below specifications.

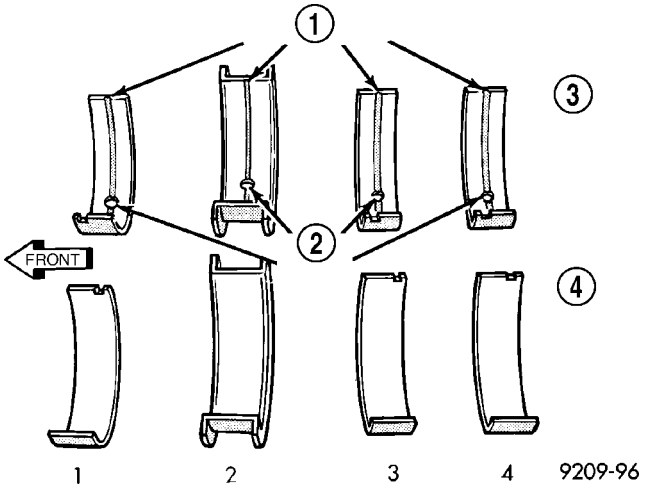


Fig. 92 Main Bearing Identification

1 - OIL GROOVES
2 - OIL HOLES
3 - UPPER BEARINGS
4 - LOWER BEARINGS

CRANKSHAFT BEARING OIL CLEARANCE

Inspect the crankshaft bearing journals. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - INSPECTION)

Engine crankshaft bearing clearances can be determined by use of Plastigage or the equivalent. The following is the recommended procedures for the use of Plastigage with the engine in the vehicle or engine on a repair stand.

PLASTIGAGE METHOD—ENGINE IN-VEHICLE

NOTE: The total clearance of the main bearings can only be determined with the engine in the vehicle by removing the weight of the crankshaft. This can be accomplished by either of two following methods:

(1) Preferred method:

a. Shim the bearings adjacent to the bearing to be checked in order to remove the clearance between upper bearing shell and the crankshaft. This can be accomplished by placing a minimum of 0.254 mm (0.010 in.) shim (e. g. cardboard, matchbook cover, etc.) between the bearing shell and the bearing cap

CRANKSHAFT MAIN BEARINGS (Continued)

on the adjacent bearings and tightening bolts to 14–20 N·m (10–15 ft. lbs.).

- When checking #1 main bearing shim #2 main bearing.
- When checking #2 main bearing shim #1 & #3 main bearing.
- When checking #3 main bearing shim #2 & #4 main bearing.
- When checking #4 main bearing shim #3 main bearing.

NOTE: Remove all shims before reassembling engine.

(2) Alternative Method:

a. Support the weight of the crankshaft with a jack under the counterweight adjacent to the bearing being checked.

(3) Remove oil film from surface to be checked. Plastigage is soluble in oil.

NOTE: The 3.8L engine may be equipped with any number or combination of standard forged rod cap or cracked cap connecting rods. The connecting rods are interchangeable but require a different tightening specification (Refer to 9 - ENGINE - SPECIFICATIONS).

(4) Place a piece of Plastigage across the entire width of the bearing shell in the cap approximately 6.35 mm (1/4 in.) off center and away from the oil holes (Fig. 93). (In addition, suspected areas can be checked by placing the Plastigage in the suspected area). Torque the bearing cap bolts of the bearing being checked to the proper specifications.

(5) Remove the bearing cap and compare the width of the flattened Plastigage (Fig. 94) with the scale provided on the package. Locate the band closest to the same width. This band shows the amount of clearance in thousandths. Differences in readings between the ends indicate the amount of taper present. Record all readings taken. (Refer to 9 - ENGINE - SPECIFICATIONS) **Plastigage generally is accompanied by two scales. One scale is in inches, the other is a metric scale.**

NOTE: Plastigage is available in a variety of clearance ranges. Use the most appropriate range for the specifications you are checking.

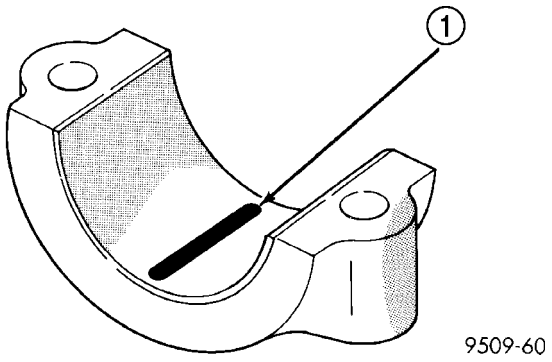


Fig. 93 Plastigage Placed in Lower Shell

1 - PLASTIGAGE

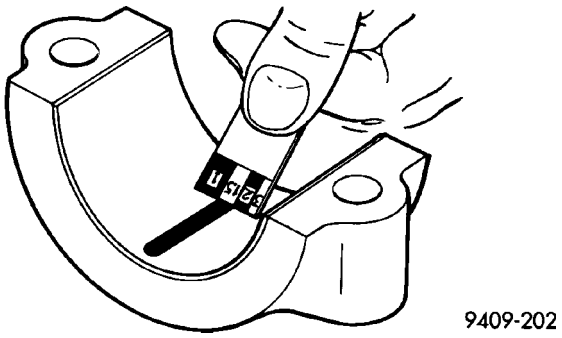


Fig. 94 Clearance Measurement

PLASTIGAGE METHOD—ENGINE OUT-OF-VEHICLE

(1) With engine in the inverted position (crankshaft up) and mounted on a repair stand, remove main journal cap.

(2) Remove oil from journal and bearing shell.

(3) Cut Plastigage to same length as width of the bearing and place it in parallel with the journal axis (Fig. 93).

(4) Carefully install the main bearing cap and tighten the bolts to specified torque (Refer to 9 - ENGINE - SPECIFICATIONS).

CAUTION: Do not rotate crankshaft or the Plastigage will be smeared.

(5) Carefully remove the bearing cap and measure the width of the Plastigage at the widest part using the scale on the Plastigage package (Fig. 94). Refer to Engine Specifications for proper clearances (Refer to 9 - ENGINE - SPECIFICATIONS). If the clearance exceeds the specified limits, replace the main bearing(s) with the appropriate size, and if necessary, have the crankshaft machined to next undersize.

CRANKSHAFT MAIN BEARINGS (Continued)

REMOVAL - CRANKSHAFT MAIN BEARINGS

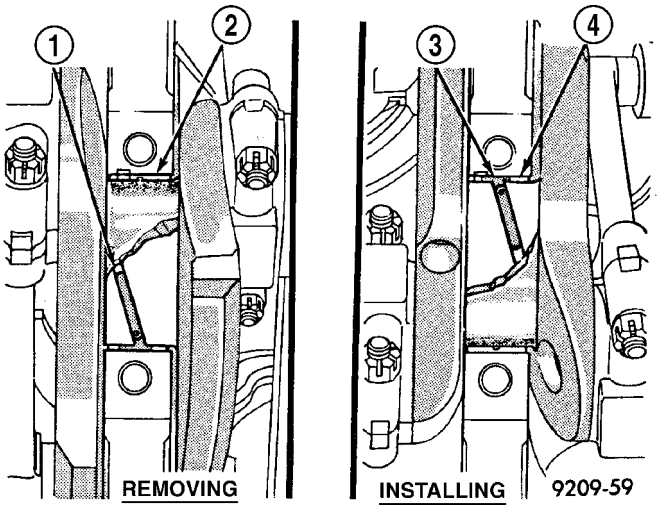


Fig. 95 Removing and Installing Upper Main Bearing With Special Tool C- 3059

1 - SPECIAL TOOL C-3059
2 - BEARING
3 - SPECIAL TOOL C-3059
4 - BEARING

(1) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(2) Identify main bearing caps before removal.

(3) Remove bearing caps one at a time. Remove upper half of bearing by inserting Special Main Bearing Tool C-3059 (Fig. 95) into the oil hole of crankshaft.

(4) Slowly rotate crankshaft clockwise, forcing out upper half of bearing shell.

INSTALLATION - CRANKSHAFT MAIN BEARINGS

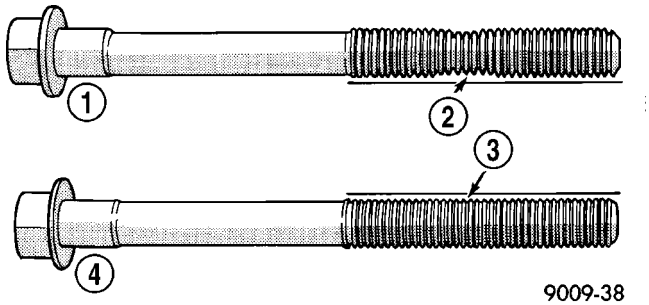


Fig. 96 Check for Stretched Bolts

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

NOTE: One main bearing should be selectively fitted while all other main bearing caps are properly tightened.

(1) For main bearing fitting procedure, (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE)

(2) Start bearing in place, and insert Main Bearing Tool C-3059 into oil hole of crankshaft (Fig. 95).

(3) Slowly rotate crankshaft counterclockwise sliding the bearing into position. Remove Special Main Bearing Tool C-3059.

(4) Inspect main cap bolts for stretching (Fig. 96). Replace bolts that are stretched.

NOTE: The main cap bolts should be examined before reuse. Bolt stretch can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt must be replaced (Fig. 96).

(5) Install each main cap and tighten bolts finger tight.

(6) Tighten number 1, 3 and 4 main cap bolts to 41 N·m + 1/4 Turn (30 ft. lbs.+ 1/4 Turn).

(7) Rotate the crankshaft until the number 6 piston is at TDC.

(8) To ensure correct thrust bearing alignment the following procedure must be done:

a. Move crankshaft all the way to the rear of its travel.

b. Then, move crankshaft all the way to the front of its travel.

c. Wedge an appropriate tool between the rear of the cylinder block and rear crankshaft counterweight. This will hold the crankshaft in it's most forward position.

d. Tighten the #2 Thrust Bearing cap bolts to 41 N·m + 1/4 Turn (30 ft. lbs.+ 1/4 Turn). Remove the holding tool.

(9) Install oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

(10) Fill engine crankcase with proper oil to correct level.

CRANKSHAFT

DESCRIPTION - 3.8L

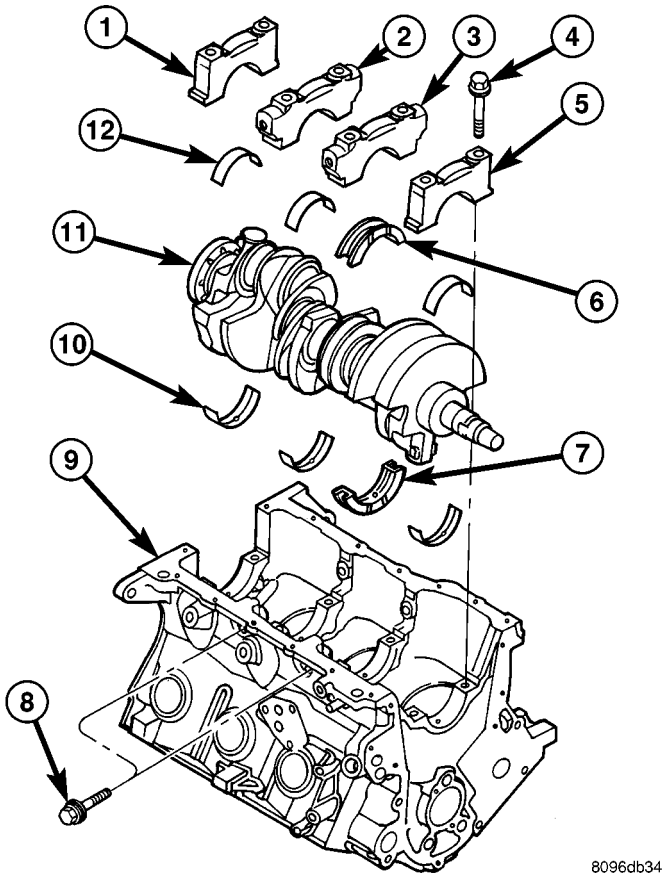


Fig. 97 CRANKSHAFT AND BLOCK - 3.8L

1 - MAIN BEARING CAP No. 4
2 - MAIN BEARING CAP No. 3
3 - MAIN BEARING CAP No. 2
4 - MAIN BEARING CAP BOLT
5 - MAIN BEARING CAP No. 1
6 - THRUST MAIN BEARING - LOWER
7 - THRUST MAIN BEARING - UPPER
8 - MAIN BEARING CAP CROSS BOLT
9 - ENGINE BLOCK
10 - MAIN BEARING - UPPER
11 - CRANKSHAFT
12 - MAIN BEARING - LOWER

The nodular iron crankshaft is supported by four main bearings, with number two position providing thrust bearing location (Fig. 97). Each main bearing cap has two vertical retaining bolts. The two center main caps have horizontal bolts to add increased rigidity to the lower engine block (Fig. 97). Crankshaft end sealing is provided by front and rear rubber seals.

STANDARD PROCEDURE - MEASURING CRANKSHAFT END PLAY

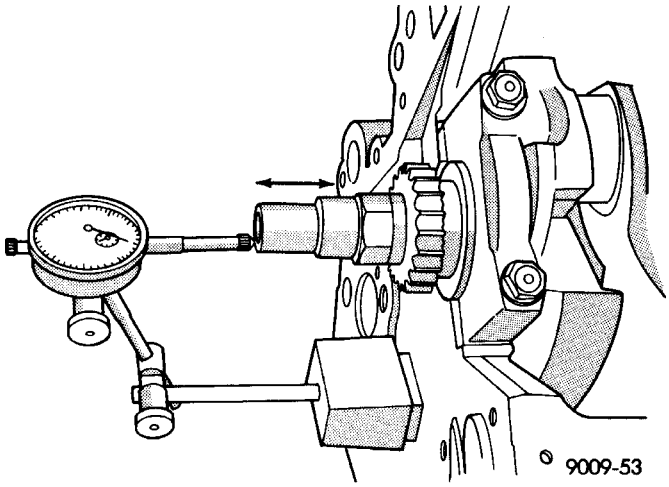


Fig. 98 Crankshaft End Play—Typical

(1) Mount a dial indicator to front of engine with the locating probe on nose of crankshaft (Fig. 98).
(2) Move crankshaft all the way to the rear of its travel.
(3) Zero the dial indicator.
(4) Move crankshaft all the way to the front and read the dial indicator. (Refer to 9 - ENGINE - SPECIFICATIONS) for end play specification.

REMOVAL

(1) Remove the engine assembly (Refer to 9 - ENGINE - REMOVAL).
(2) Separate transaxle from engine.
(3) Mount engine on an engine stand.
(4) Remove the oil filter.
(5) Remove the oil pan and oil pick-up tube (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
(6) Remove the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN COVER - REMOVAL).
(7) Remove timing chain and sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - REMOVAL).
(8) Remove crankshaft rear oil seal and retainer (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL).

NOTE: The 3.8L can have any number or combination of standard forged or cracked connecting rod caps. Do not mix or interchange the rod caps.

(9) Rotate the crankshaft until connecting rod cap is accessible.
(10) Paint mark or scribe the connecting rod cap position.

CRANKSHAFT (Continued)

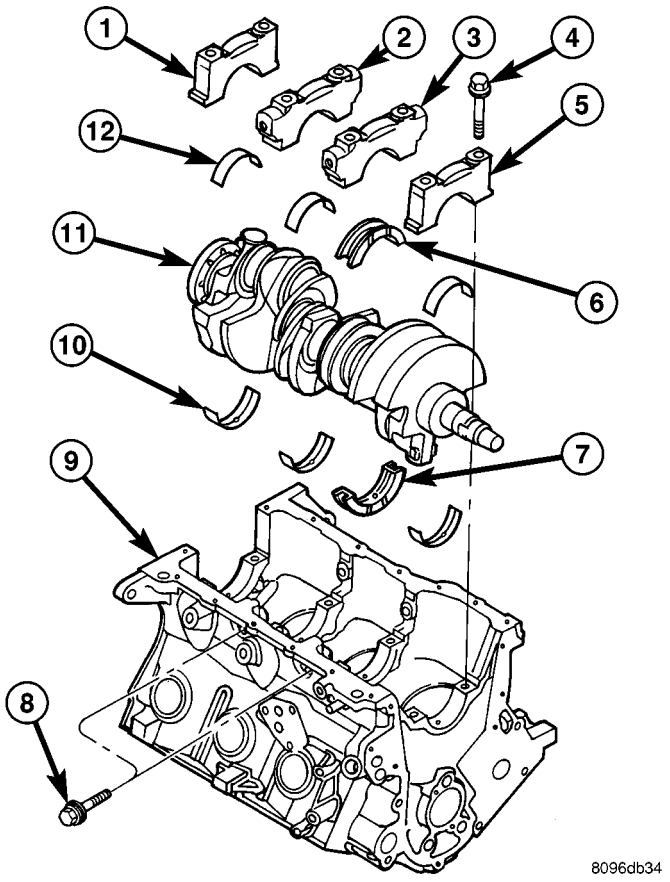


Fig. 99 CRANKSHAFT AND BLOCK - 3.8L

1 - MAIN BEARING CAP No. 4
2 - MAIN BEARING CAP No. 3
3 - MAIN BEARING CAP No. 2
4 - MAIN BEARING CAP BOLT
5 - MAIN BEARING CAP No. 1
6 - THRUST MAIN BEARING - LOWER
7 - THRUST MAIN BEARING - UPPER
8 - MAIN BEARING CAP CROSS BOLT
9 - ENGINE BLOCK
10 - MAIN BEARING - UPPER
11 - CRANKSHAFT
12 - MAIN BEARING - LOWER

(11) Remove connecting rod bearing cap. Use care to prevent damage to the crankshaft bearing surfaces.

(12) Repeat removal procedure for each connecting rod cap.

(13) Remove and discard the main bearing cross bolts and washers. (Fig. 99)

NOTE: Install new cross bolt and washer assembly upon reassembly.

(14) Remove the main bearing cap bolts (Fig. 99)

(15) Remove the main bearing caps (Fig. 99).

(16) Remove the crankshaft from engine block (Fig. 99).

INSTALLATION

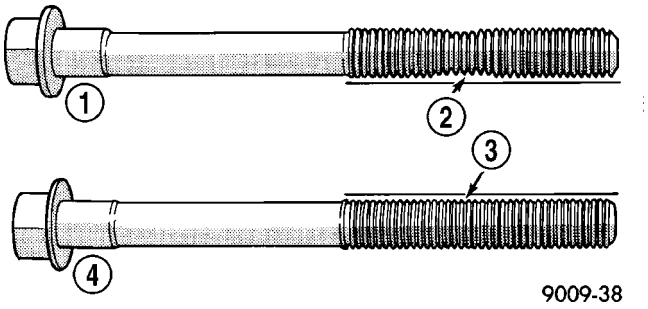


Fig. 100 Check for Stretched Bolts

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

(1) For main bearing identification, refer to (Fig. 92). Lubricate with engine oil and install the crankshaft main bearing halves in the engine block.

(2) Position the crankshaft in engine block (Fig. 101).

(3) Perform main bearing fitting procedure (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE).

(4) Inspect main cap bolts for stretching (Fig. 100). Replace bolts that are stretched.

NOTE: The main cap bolts should be examined before reuse. Bolt stretch can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt must be replaced (Fig. 100).

(5) Install the main bearing caps and bolts. Tighten bolts to 41 N·m (30 ft. lbs.) plus ¼ turn.

NOTE: Install new cross bolt and washer assembly upon reassembly.

(6) Install and tighten the NEW cross bolts and washer assemblies to 61 N·m (45 ft. lbs.) (Fig. 101).

(7) Position and install the connecting rod and bearing caps on the crankshaft (Refer to 9 - ENGINE/ENGINE BLOCK/CONNECTING ROD BEARINGS - STANDARD PROCEDURE).

(8) Install the crankshaft rear oil seal (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION).

(9) Install the crankshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - INSTALLATION).

(10) Install the timing chain and camshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - INSTALLATION).

CRANKSHAFT (Continued)

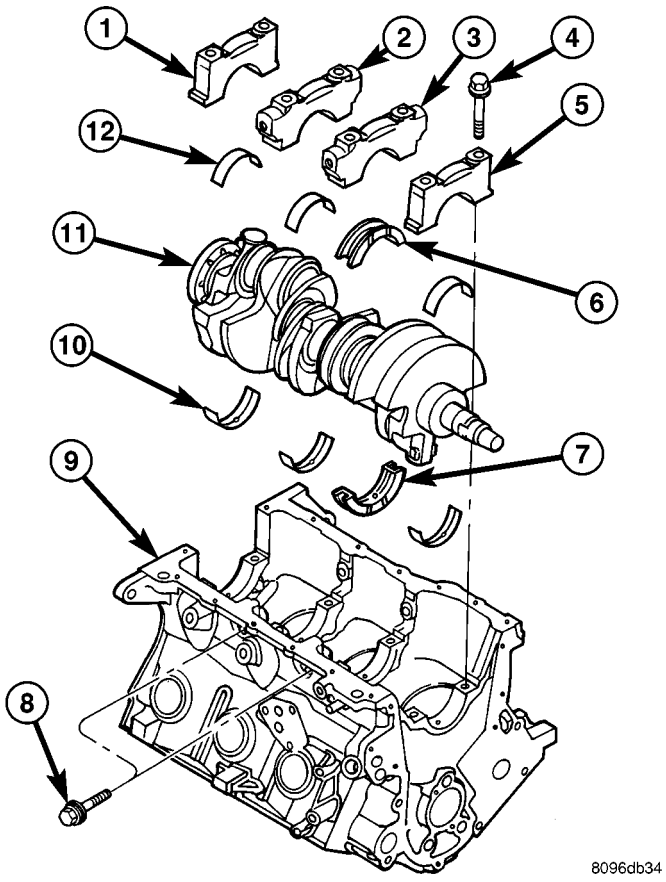


Fig. 101 CRANKSHAFT AND BLOCK - 3.8L

1 - MAIN BEARING CAP No. 4
2 - MAIN BEARING CAP No. 3
3 - MAIN BEARING CAP No. 2
4 - MAIN BEARING CAP BOLT
5 - MAIN BEARING CAP No. 1
6 - THRUST MAIN BEARING - LOWER
7 - THRUST MAIN BEARING - UPPER
8 - MAIN BEARING CAP CROSS BOLT
9 - ENGINE BLOCK
10 - MAIN BEARING - UPPER
11 - CRANKSHAFT
12 - MAIN BEARING - LOWER

(11) Install the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN COVER - INSTALLATION).

(12) Install the oil pick-up tube and oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

(13) Install the transaxle to the engine.

(14) Install the engine assembly (Refer to 9 - ENGINE - INSTALLATION).

CRANKSHAFT OIL SEAL - FRONT

REMOVAL

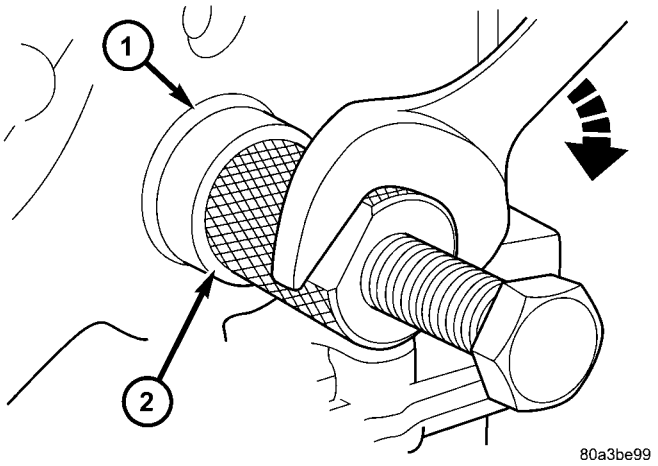


Fig. 102 ENGAGETOOL ON FRONT SEAL

1 - SEAL
2 - SPECIAL TOOL 6341A

(1) Disconnect negative cable from battery.

(2) Raise vehicle on hoist. Remove right wheel and inner splash shield.

(3) Remove accessory drive belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)

(4) Remove crankshaft damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(5) Position Special Tool 6341A on crankshaft nose. Carefully screw the tool into the seal until it engages firmly (Fig. 102). Be careful not to damage that crankshaft seal surface of cover

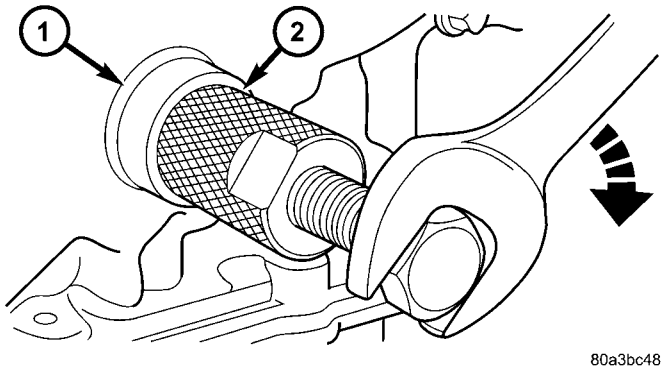


Fig. 103 CRANKSHAFT FRONT SEAL REMOVAL

1 - SEAL
2 - SPECIAL TOOL 6341A

(6) Remove oil seal by turning the forcing screw until the seal disengages from the cover (Fig. 103).

CRANKSHAFT OIL SEAL - FRONT (Continued)

INSTALLATION

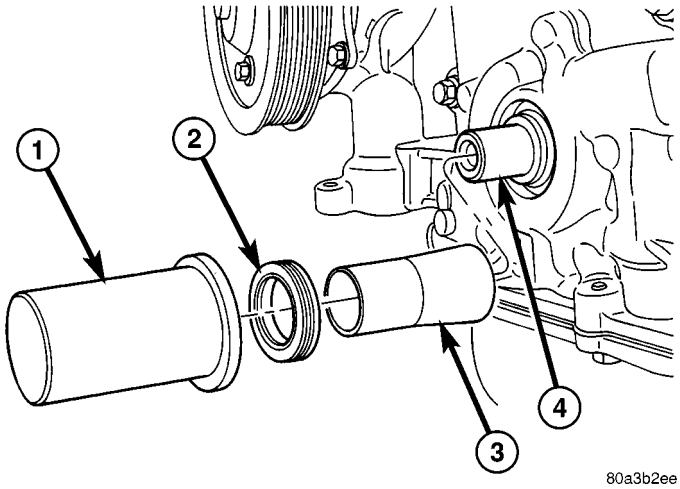


Fig. 104 CRANKSHAFT FRONT SEAL INSTALLATION

1 - SPECIAL TOOL C-4992-1
2 - SEAL
3 - SPECIAL TOOL C-4992-2
4 - CRANKSHAFT

(1) Position Special Tool C-4992-2 Guide, on the crankshaft nose (Fig. 104).

(2) Position new seal over the guide with the seal spring in the direction of the engine front cover (Fig. 104).

(3) Install seal using Special Tool C-4992-1 until seal is flush with cover. (Fig. 104).

(4) Install crankshaft damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(5) Install accessory drive belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(6) Install inner splash shield and right front wheel.

(7) Lower vehicle and connect negative cable to battery.

CRANKSHAFT OIL SEAL - REAR

REMOVAL

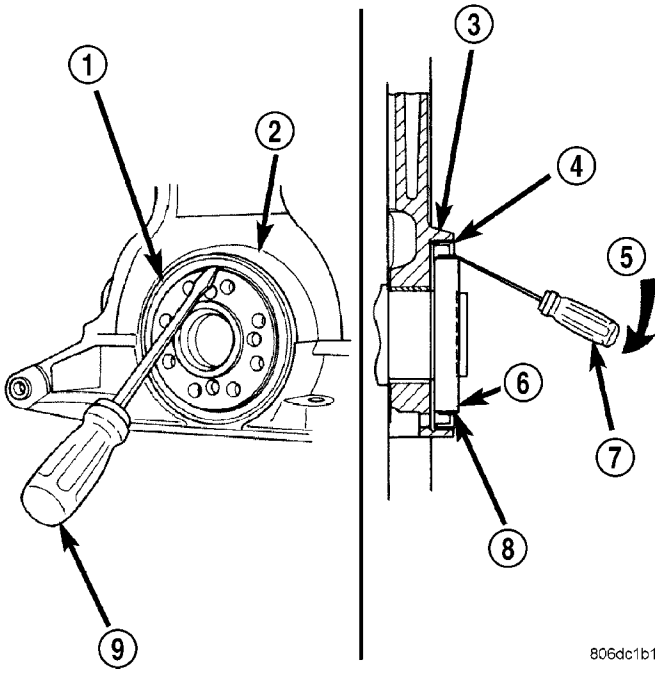


Fig. 105 Rear Crankshaft Oil Seal - Removal

1 - REAR CRANKSHAFT SEAL
2 - ENGINE BLOCK
3 - ENGINE BLOCK
4 - REAR CRANKSHAFT SEAL METAL CASE
5 - PRY IN THIS DIRECTION
6 - CRANKSHAFT
7 - SCREWDRIVER
8 - REAR CRANKSHAFT SEAL DUST LIP
9 - SCREWDRIVER

(1) Remove the transmission (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - REMOVAL).

(2) Remove the flex plate. (Refer to 9 - ENGINE/ENGINE BLOCK/FLEX PLATE - REMOVAL)

(3) Insert a 3/16 flat bladed pry tool between the dust lip and the metal case of the crankshaft seal. Angle the pry tool (Fig. 105) through the dust lip against metal case of the seal. Pry out seal.

CAUTION: Do not permit the pry tool blade to contact crankshaft seal surface. Contact of the pry tool blade against crankshaft edge (chamfer) is permitted.

INSTALLATION

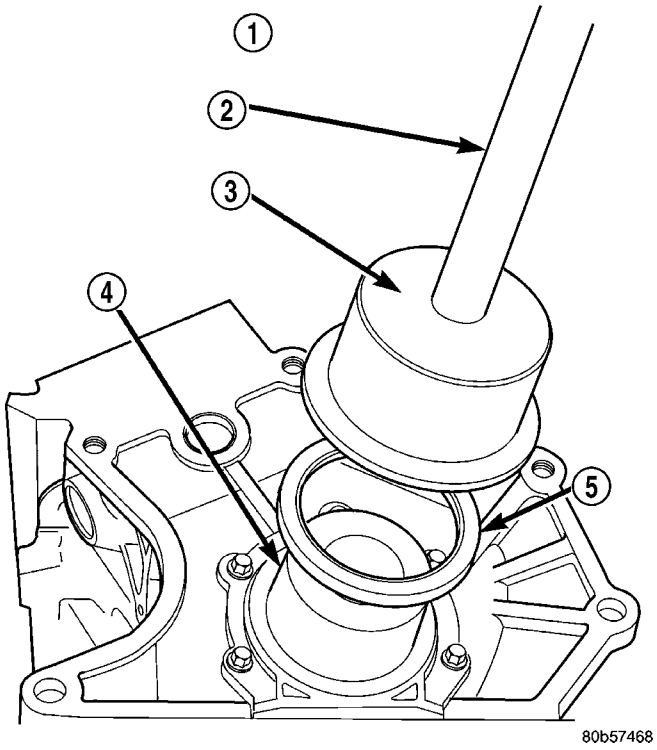


Fig. 106 Rear Crankshaft Oil Seal—Installation

1 - SPECIAL TOOLS:
2 - C-4171 HANDLE
3 - 6926–2 INSTALLER
4 - 6926–1 GUIDE
5 - SEAL

CAUTION: If burr or scratch is present on the crankshaft edge (chamfer), cleanup with 400 grit sand paper to prevent seal damage during installation of new seal.

(1) Place Special Tool 6926-1 magnetic pilot tool on crankshaft (Fig. 106).

(2) Place seal over Special Tool 6926-1 Pilot. Using Special Tool 6926-2 Installer with C-4171 Handle, drive seal into the retainer housing (Fig. 106).

(3) Install the flex plate. (Refer to 9 - ENGINE/ ENGINE BLOCK/FLEX PLATE - INSTALLATION)

(4) Install transmission (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - INSTALLATION).

CRANKSHAFT REAR OIL SEAL RETAINER

REMOVAL

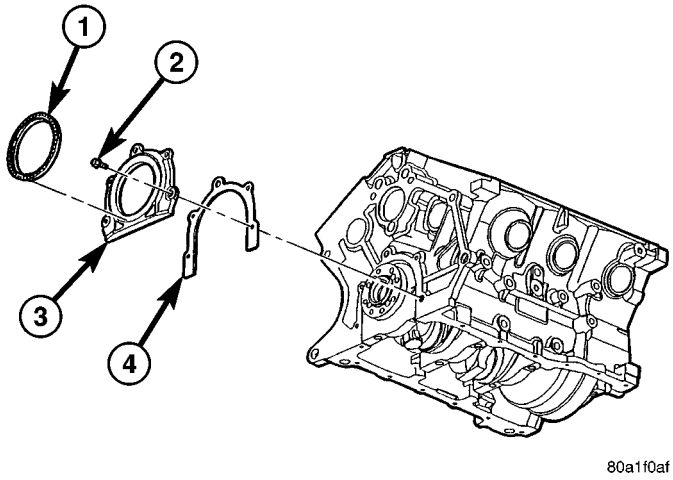


Fig. 107 CRANKSHAFT REAR OIL SEAL

1 - OIL SEAL
2 - BOLT
3 - RETAINER - OIL SEAL
4 - GASKET

(1) Remove crankshaft rear oil seal (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL).

(2) Remove oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

(3) Remove oil seal retainer screws (Fig. 107).

(4) Remove oil seal retainer (Fig. 107).

(5) Clean engine block and retainer of oil and gasket material. Make sure surfaces are clean and free of oil.

INSTALLATION

(1) Position new gasket and install retainer on block (Fig. 107). Tighten attaching screws to 12 N·m (105 in. lbs.).

(2) Install oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

(3) Install oil seal (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION).

VIBRATION DAMPER

REMOVAL

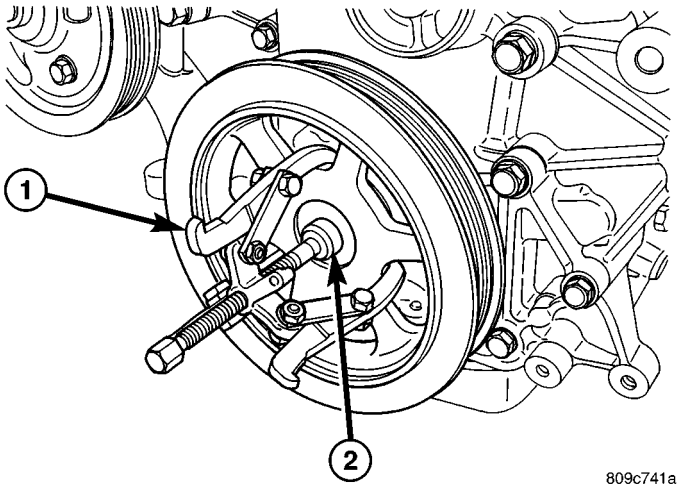


Fig. 108 VIBRATION DAMPER - REMOVAL

1 - SPECIAL TOOL 8450 - INSERT
2 - SPECIAL TOOL 1026 - 3 JAW PULLER

(1) Disconnect negative cable from battery.
(2) Raise vehicle on hoist.
(3) Remove the right front wheel and inner splash shield.
(4) Remove the accessory drive belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)
(5) Remove vibration damper bolt.
(6) Insert Special Tool 8450 into crankshaft nose (Fig. 108).
(7) Position 3-jaw puller Special Tool 1026 on damper as shown in (Fig. 108). Turn puller forcing screw until damper releases from crankshaft.
(8) Remove the crankshaft vibration damper.

INSTALLATION

(1) Install crankshaft vibration damper using the forcing screw, nut, and thrust bearing/washer from Special Tool 8452 (Fig. 109).

NOTE: To minimize friction and prolong tool life, lubricate the threads on the forcing screw of Special Tool 8452.

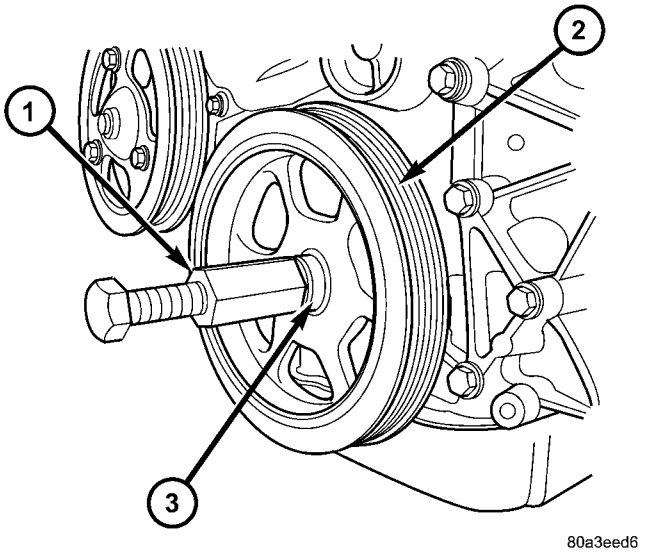


Fig. 109 CRANKSHAFT DAMPER

1 - FORCING SCREW / NUT FROM SPECIAL TOOL 8452
2 - VIBRATION DAMPER
3 - THRUST BEARING / WASHER

(2) Position vibration damper on crankshaft.
(3) Screw Special Tool 8452 into crankshaft until the bolt seats. Turn the nut to install damper until it seats fully.
(4) Remove Special Tool 8452.
(5) Install vibration damper bolt. Torque bolt to 54 N·m (40 ft. lbs.).
(6) Install the accessory drive belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)
(7) Install inner splash shield and right front wheel.
(8) Connect negative cable to battery.

FLEX PLATE

REMOVAL

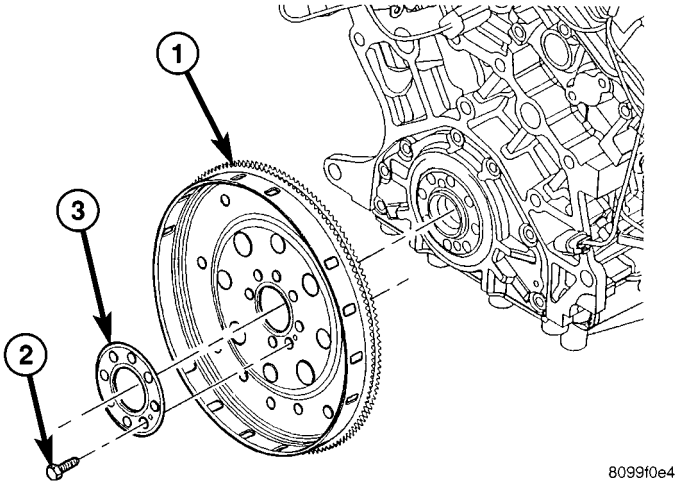


Fig. 110 FLEX PLATE

1 - FLEX PLATE
2 - BOLT (QTY. 8)
3 - BACKING PLATE

(1) Remove the transmission (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - REMOVAL).
(2) Remove flex plate attaching bolts.
(3) Remove the flex plate (Fig. 110).

INSTALLATION

(1) Position flex plate with backing plate on the crankshaft (Fig. 110).
(2) Apply Mopar® Lock & Seal Adhesive to the flex plate bolts.
(3) Install flex plate bolts. Tighten bolts to 95 N·m (70 ft. lbs.).
(4) Install the transmission (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - INSTALLATION).

ENGINE MOUNTING

DESCRIPTION

The engine mounting system consist of four mounts; right and a left side support the powertrain, and a front and a rear mount control powertrain torque. The right side mount is a hydro-type, all others are of molded rubber material.

UPPER ENGINE MOUNT

REMOVAL - UPPER ENGINE MOUNT

(1) Remove air cleaner housing.

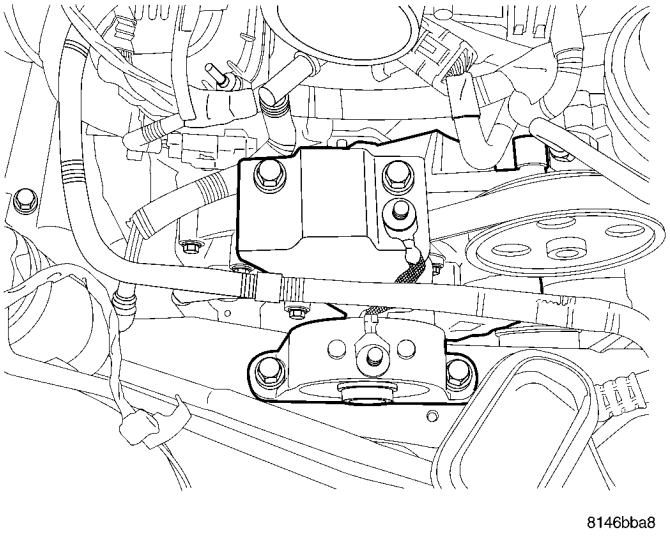


Fig. 111 UPPER ENGINE MOUNT

(2) Remove the load on the upper engine mount by carefully supporting the engine assembly with a floor jack.
(3) Remove the bolts attaching the engine mount to the frame rail (Fig. 111).
(4) Remove the bolts attaching the engine mount to the engine bracket (Fig. 111).
(5) Remove the upper engine mount (Fig. 111).

INSTALLATION - UPPER ENGINE MOUNT

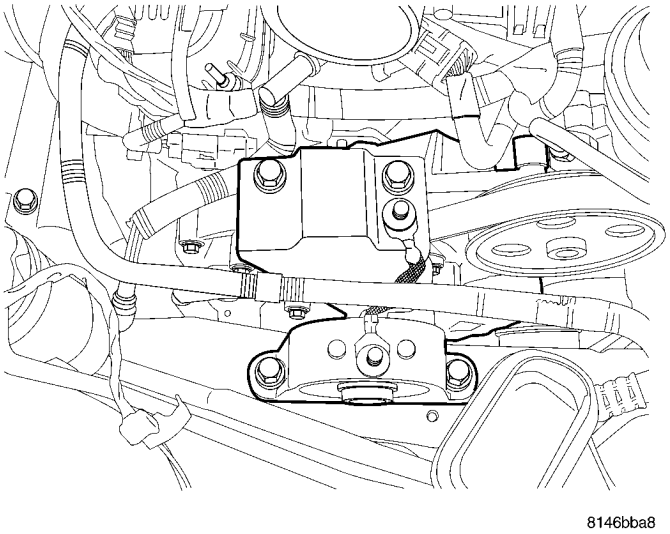


Fig. 112 UPPER ENGINE MOUNT

(1) Install engine bracket (if removed). Tighten bolts to 33 N·m (24 ft. lbs.).
(2) Position the upper engine mount and install frame rail to mount bolts (Fig. 112). Tighten bolts to 68 N·m (50 ft. lbs.).

UPPER ENGINE MOUNT (Continued)

(3) Install the mount to engine bracket bolts and tighten to 54 N·m (40 ft. lbs.). (Fig. 112)
(4) Remove jack from under engine.
(5) Install air cleaner housing and element.

LEFT MOUNT

REMOVAL - LEFT ENGINE MOUNT

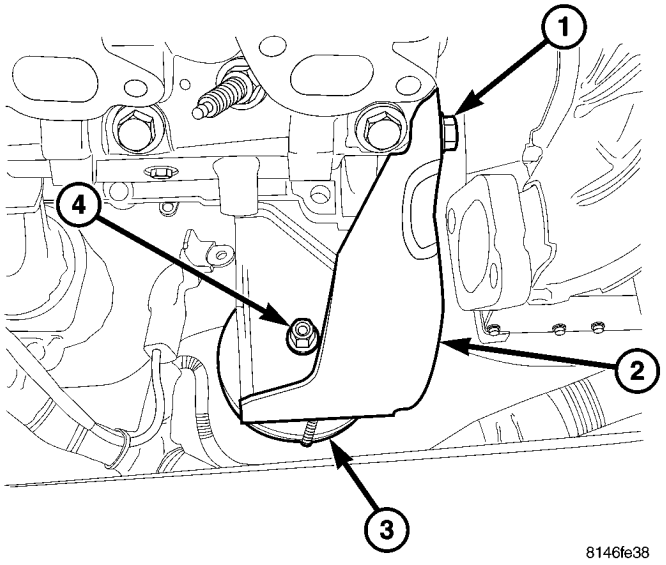


Fig. 113 LEFT ENGINE MOUNT AND BRACKET

1 - UPPER ENGINE MOUNT BRACKET FASTENER
2 - ENGINE MOUNT BRACKET
3 - ENGINE MOUNT
4 - ENGINE MOUNT FASTENER

(1) Disconnect the negative battery cable.
(2) Remove the cruise control servo and position servo aside.
(3) Remove the radiator fan assembly (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).
(4) Remove the left exhaust manifold (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - REMOVAL).
(5) Remove the starter (Refer to 8 - ELECTRICAL/ STARTING/STARTER MOTOR - REMOVAL).
(6) Raise and support the vehicle.
(7) Remove the lower engine bracket mount fasteners from the engine.
(8) Remove the engine mount to cradle fastener.
(9) Lower the vehicle.
(10) Support the engine with a floor jack.
(11) Remove the upper engine mount bracket to engine block fasteners and remove engine mount (Fig. 113).
(12) Separate the engine mount from the bracket.

INSTALLATION - LEFT ENGINE MOUNT

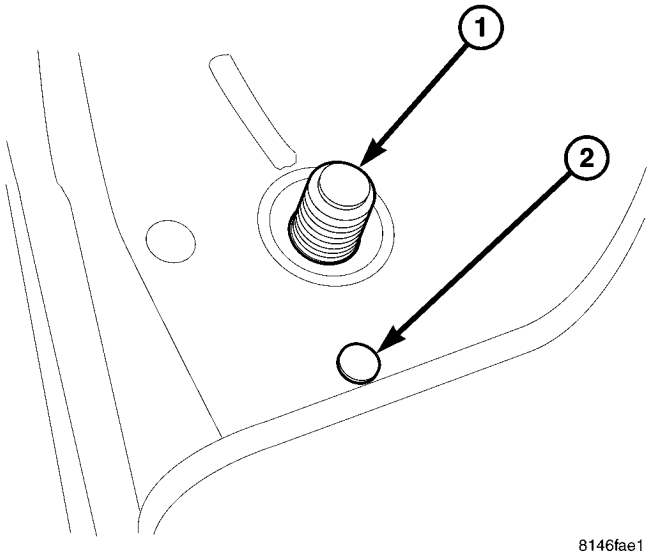


Fig. 114 ENGINE MOUNT TO BRACKET ALIGNMENT

1 - ENGINE MOUNT STUD
2 - ALIGNMENT HOLE

(1) Align engine mount to bracket and tighten upper engine mount fastener to 101 N·m (75 ft.lbs.) (Fig. 114).

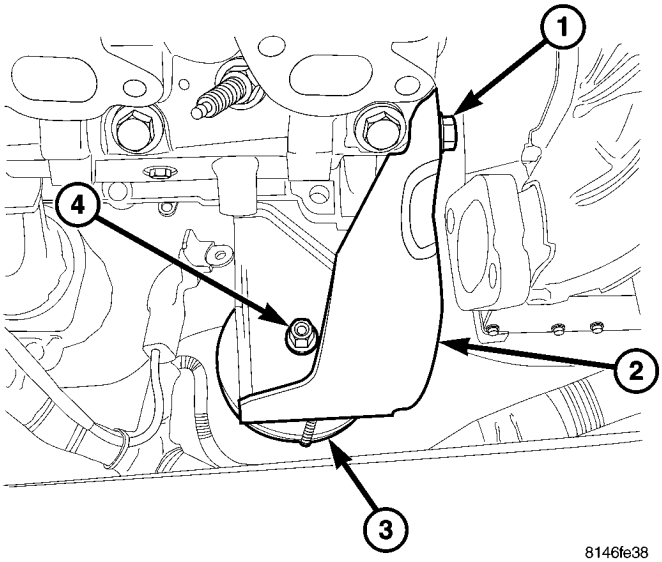


Fig. 115 LEFT ENGINE MOUNT AND BRACKET

1 - UPPER ENGINE MOUNT BRACKET FASTENER
2 - ENGINE MOUNT BRACKET
3 - ENGINE MOUNT
4 - ENGINE MOUNT FASTENER

(2) Install the engine mount with bracket into position and hand tighten the upper engine mount bracket fasteners (Fig. 115).
(3) Raise and support the vehicle.

LEFT MOUNT (Continued)

(4) Install the left engine mount bracket lower fasteners. Tighten the fasteners to 68 N·m (50 ft.lbs.).
(5) Remove the jackstand.
(6) Install the engine mount to cradle fastener. Tighten the fastener to 101 N·m (75 ft.lbs.).
(7) Lower the vehicle.
(8) Tighten the upper engine mount bracket fasteners to 101 N·m (75 ft.lbs.).
(9) Install the starter (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - INSTALLATION).
(10) Install the left exhaust manifold (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - INSTALLATION).
(11) Install the radiator fan assembly (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).
(12) Install the cruise control servo.
(13) Reconnect the negative battery cable.

RIGHT MOUNT

REMOVAL

(1) Disconnect the negative battery cable.
(2) Raise vehicle on hoist.

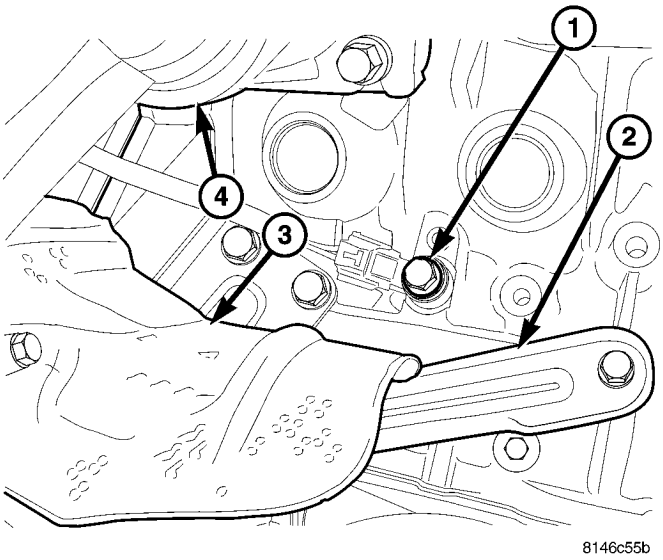


Fig. 116 RIGHT ENGINE MOUNT HEAT SHIELD

1 - CRANKSHAFT SENSOR
2 - BRACKET
3 - HEAT SHIELD
4 - EXHAUST

(3) Remove the right mount heat shield (Fig. 116).
(4) Remove the push pins for the in block heater (if equipped), the crankshaft sensor and the oxygen sensor from the engine mount bracket.
(5) Support the engine with a jack stand.
(6) Remove the engine mount bracket fasteners from the transaxle (Fig. 117).
(7) Remove the right engine mount to cradle fastener (Fig. 117).
(8) Loosen the front engine mount to cradle fastener.
(9) Raise and support the engine with the jack stand.

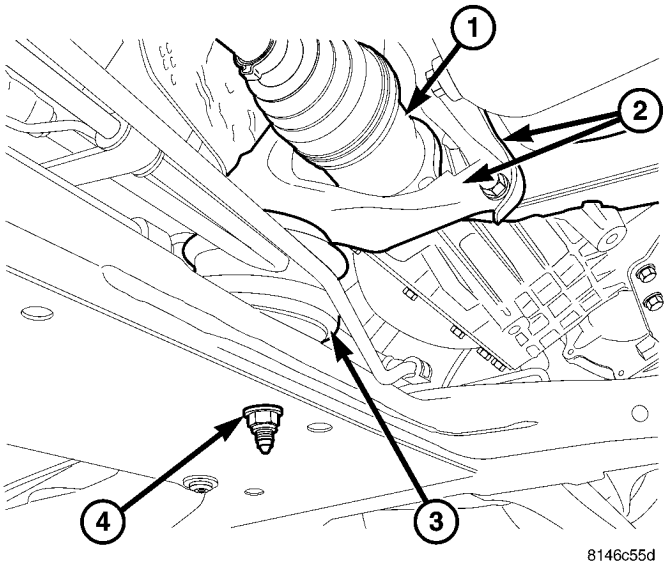


Fig. 117 RIGHT ENGINE MOUNT

1 - DRIVE AXLE
2 - BRACKET
3 - ENGINE MOUNT

(10) Remove the engine mount (Fig. 117).
(11) Separate the engine mount from bracket.

INSTALLATION - RIGHT ENGINE MOUNT

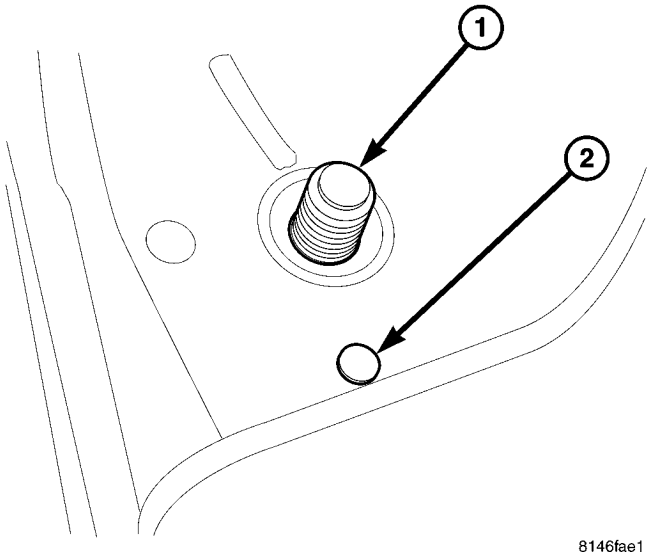


Fig. 118 ENGINE MOUNT TO BRACKET ALIGNMENT

1 - ENGINE MOUNT STUD
2 - ALIGNMENT HOLE

RIGHT MOUNT (Continued)

(1) Align and Install mount bracket, if removed. Tighten top engine mount fastener to 101N·m (75 ft.lbs.) (Fig. 118).

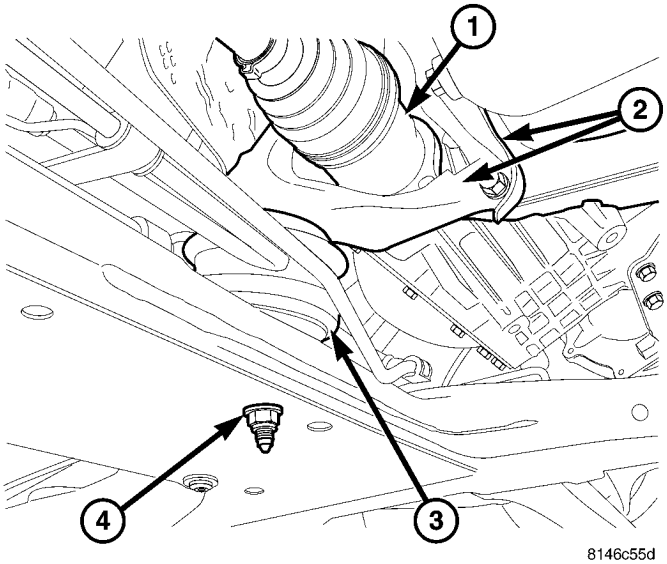


Fig. 119 RIGHT ENGINE MOUNT

1 - DRIVE AXLE
2 - BRACKET
3 - ENGINE MOUNT

(2) Install the right mount, bracket and bolts (Fig. 119). Tighten bolts to 101 N·m (75 ft. lbs.).

(3) Lower the engine and remove the jack stand.

(4) Install the engine mount to cradle fastener (Fig. 118). Tighten both engine mount to cradle fasteners to 101 N·m (75 ft. lbs.).

(5) Install the right mount heat shield (Fig. 120).

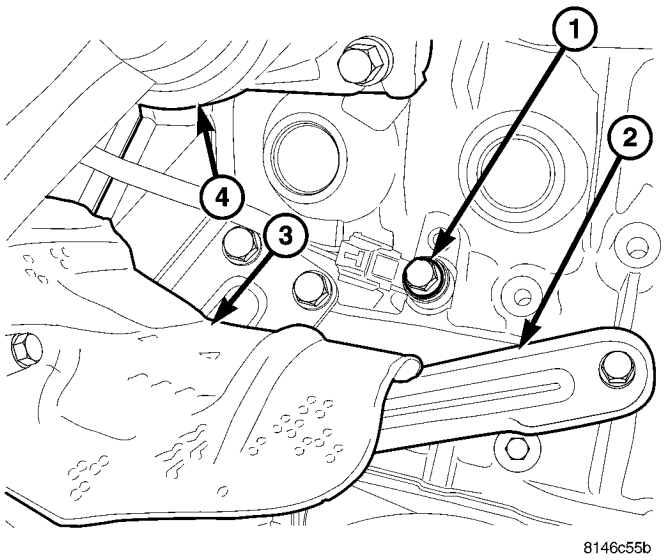


Fig. 120 RIGHT ENGINE MOUNT HEAT SHIELD

1 - CRANKSHAFT SENSOR
2 - BRACKET
3 - HEAT SHIELD
4 - EXHAUST

TORQUE STRUT

REMOVAL

(1) Disconnect the negative battery cable.
(2) Raise and support the vehicle.
(3) Support the transmission with a floor jack.
(4) Remove the torque strut (Fig. 121).

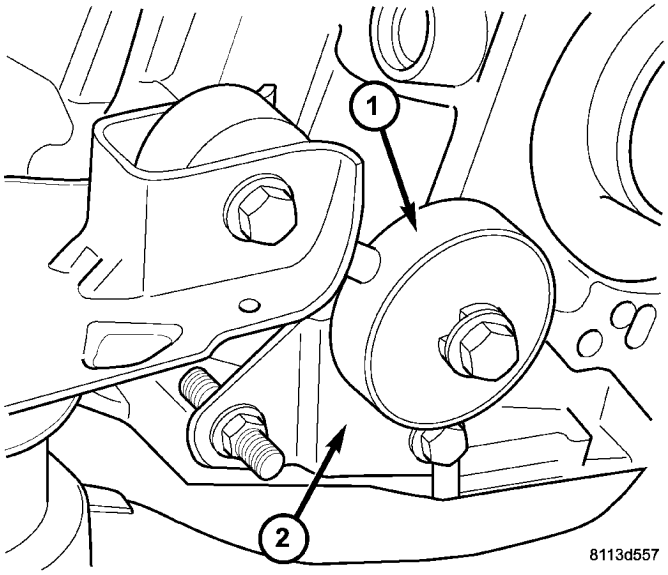


Fig. 121 Powertrain Torque Strut

1 - STRUT
2 - BRACKET

TORQUE STRUT (Continued)

INSTALLATION

(1) Install the torque strut (Fig. 122). Tighten the fasteners to 54 N·m (40 ft.lbs.).
(2) Remove the floor jack
(3) Lower the vehicle.
(4) Reconnect the negative battery cable.

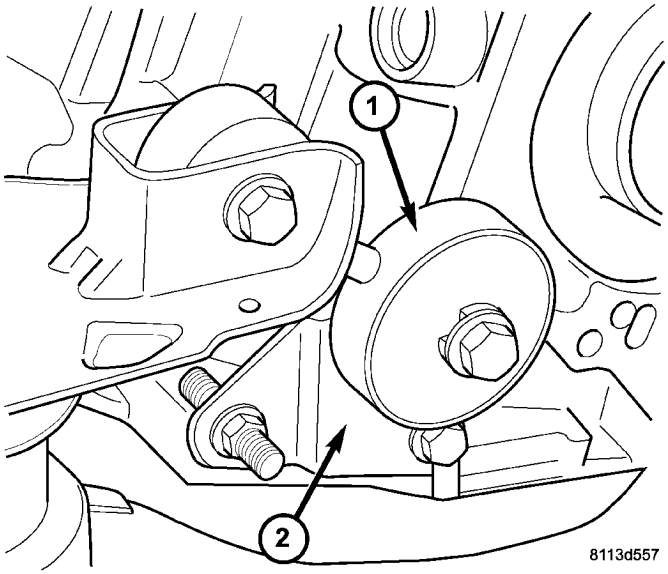


Fig. 122 Powertrain Torque Strut

1 - STRUT
2 - BRACKET

LUBRICATION

DESCRIPTION

The lubrication system is a full flow filtration pressure feed type. The oil pump is mounted in the timing chain cover and is driven by the crankshaft

OPERATION

Oil from the oil pan is pumped by a internal gear type oil pump directly coupled to the crankshaft. The pressure is regulated by a relief valve located in the timing chain cover. The oil is pumped through an oil filter and feeds a main oil gallery. This oil gallery feeds oil under pressure to the main and rod bearings, camshaft bearings. Passages in the cylinder block feed oil to the hydraulic lifters and rocker shaft brackets which feeds the rocker arm pivots (Fig. 123).

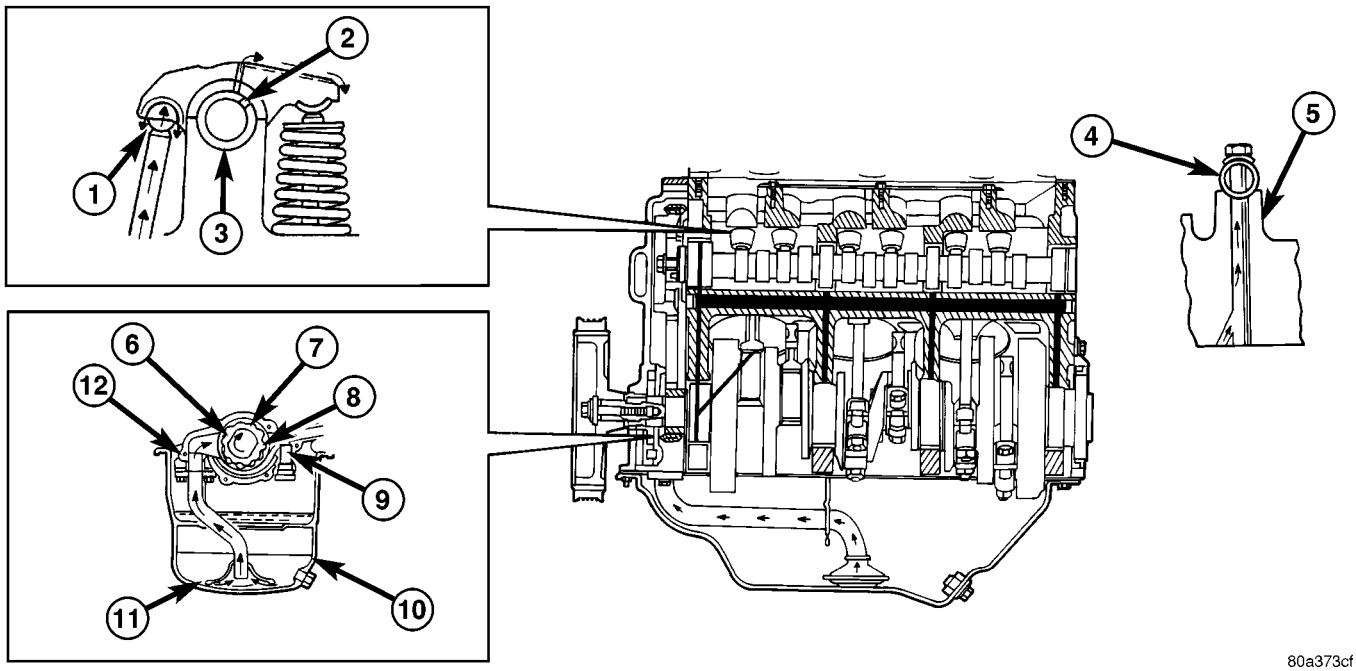


Fig. 123 ENGINE LUBRICATION

1 - OIL SUPPLY FOR BALL SOCKET THROUGH PUSH ROD
2 - OIL SUPPLY PASSAGE FROM SHAFT TO ROCKER ARM
3 - ROCKER SHAFT
4 - OIL FLOWS TO ONLY ONE PEDASTAL ON EACH HEAD; THIRD FROM REAR ON RIGHT HEAD, THIRD FROM FRONT ON LEFT HEAD
5 - ROCKER SHAFT TOWER
6 - CRANKSHAFT
7 - OUTER ROTOR
8 - INNER ROTOR
9 - RELIEF VALVE
10 - OIL PAN
11 - OIL SCREEN
12 - OIL PUMP CASE

LUBRICATION (Continued)

DIAGNOSIS AND TESTING - ENGINE OIL PRESSURE

(1) Disconnect and remove oil pressure switch (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - REMOVAL).

(2) Install Special Tools C-3292 Gauge with 8406 Adaptor. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).

(3) Start engine and record oil pressure. Refer to Oil Pressure in Engine Specifications for the correct pressure (Refer to 9 - ENGINE - SPECIFICATIONS).

OIL

STANDARD PROCEDURE

STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE

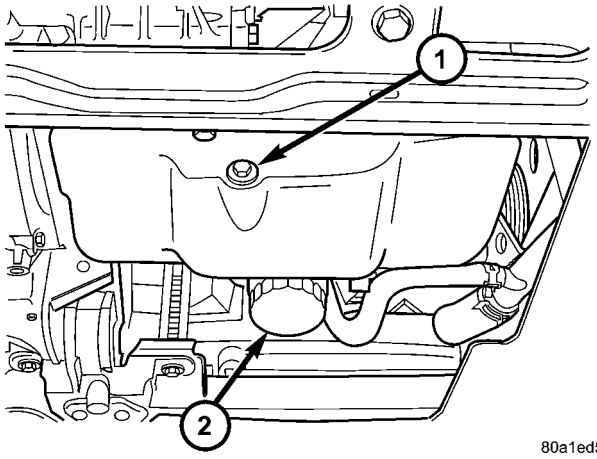


Fig. 124 DRAIN PLUG AND OIL FILTER

1 - DRAIN PLUG
2 - OIL FILTER

Change engine oil at mileage and time intervals described in the Maintenance Schedule. (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

Run engine until achieving normal operating temperature.

(1) Position the vehicle on a level surface and turn engine off.

(2) Open hood, remove oil fill cap (Fig. 125).

(3) Hoist and support vehicle on safety stands. Refer to Hoisting and Jacking Recommendations. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(4) Place a suitable drain pan under crankcase drain (Fig. 124).

(5) Remove drain plug from crankcase (Fig. 124) and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug and gasket if damaged.

(6) Remove oil filter. (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - REMOVAL)

(7) Install and tighten drain plug in crankcase.

(8) Install new oil filter. (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - INSTALLATION)

(9) Lower vehicle and fill crankcase with specified type and amount of engine oil. (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION)

(10) Install oil fill cap.

(11) Start engine and inspect for leaks.

(12) Stop engine and inspect oil level.

NOTE: Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING listed above.

OIL (Continued)

STANDARD PROCEDURE - ENGINE OIL LEVEL CHECK

The best time to check engine oil level is after it has sat overnight, or if the engine has been running, allow the engine to be shut off for at least 5 minutes before checking oil level.

Checking the oil while the vehicle is on level ground will improve the accuracy of the oil level reading (Fig. 125). Add engine oil only when the level is at or below the ADD mark on the indicator.

OIL COOLER & LINES

DESCRIPTION

An engine oil cooler is used on 3.8L engines (Heavy Duty Cooling Only) (Fig. 126). The cooler is a coolant-to-oil type and mounted between the oil filter and engine block.

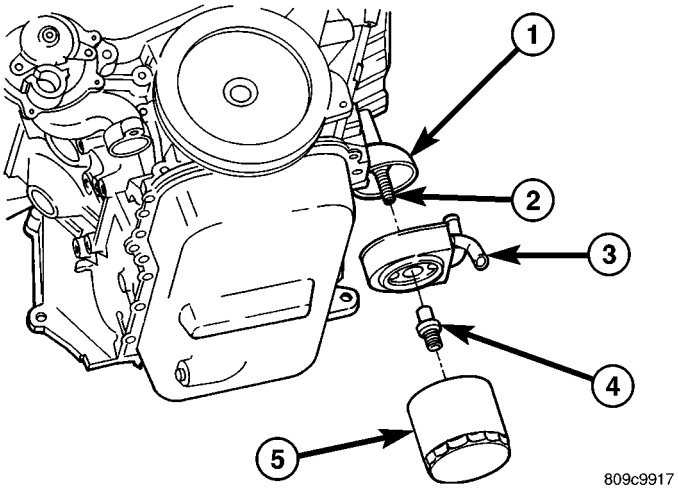


Fig. 126 ENGINE OIL COOLER

1 - OIL FILTER ADAPTER
2 - CONNECTOR
3 - ENGINE OIL COOLER
4 - OIL COOLER ATTACHMENT FITTING
5 - OIL FILTER

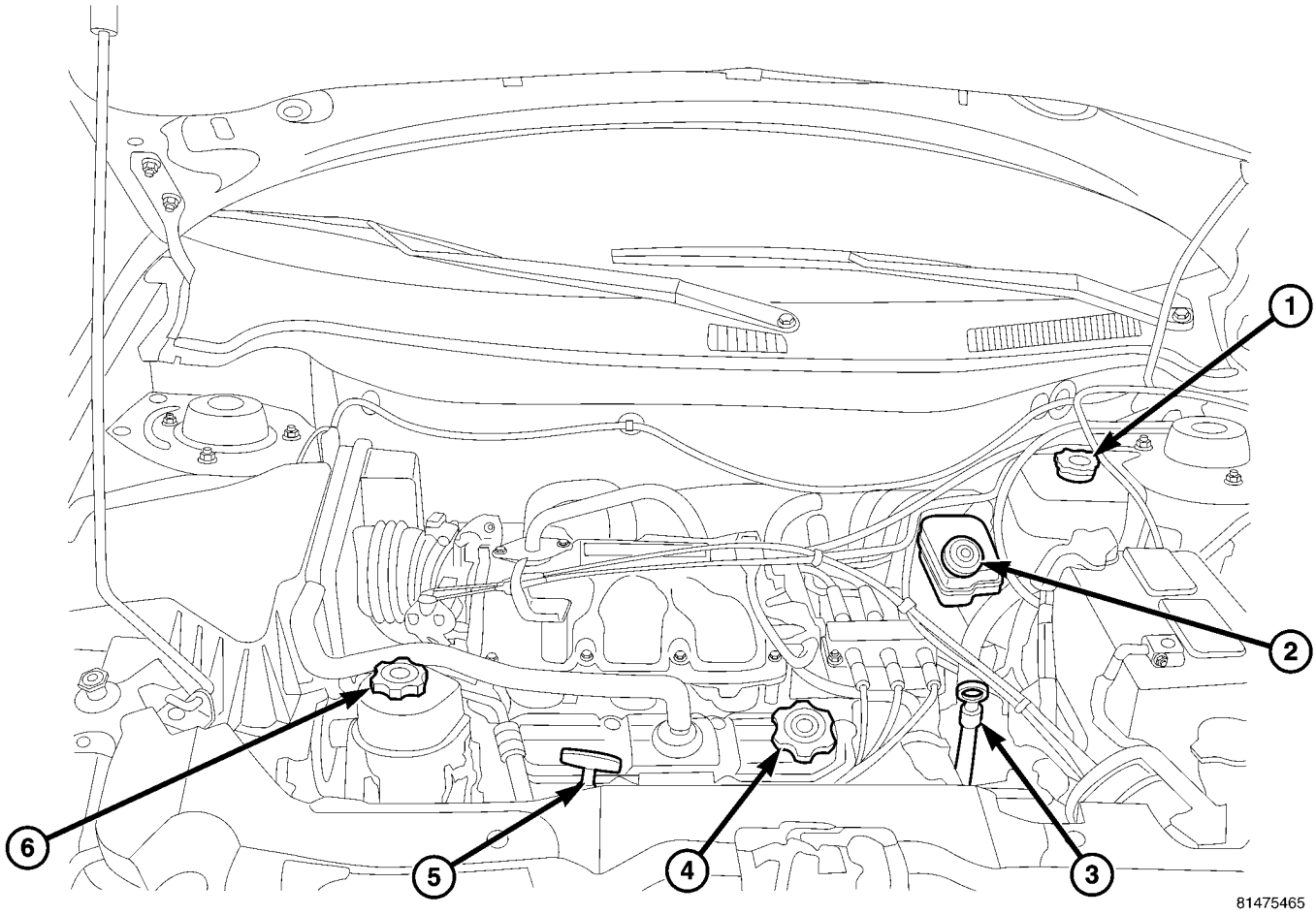


Fig. 125 ENGINE OIL FILL AND INDICATOR

1 - ENGINE COOLANT RESERVOIR
2 - MASTER CYLINDER
3 - TRANSMISSION OIL LEVEL INDICATOR
4 - ENGINE OIL FILL
5 - OIL LEVEL INDICATOR
6 - POWER STEERING RESERVOIR

OIL COOLER & LINES (Continued)

OPERATION

Engine oil travels from the oil filter and into the oil cooler. Engine oil then exits the cooler into the main gallery. Engine coolant flows into the cooler from the heater return tube and exits into the water pump inlet.

REMOVAL

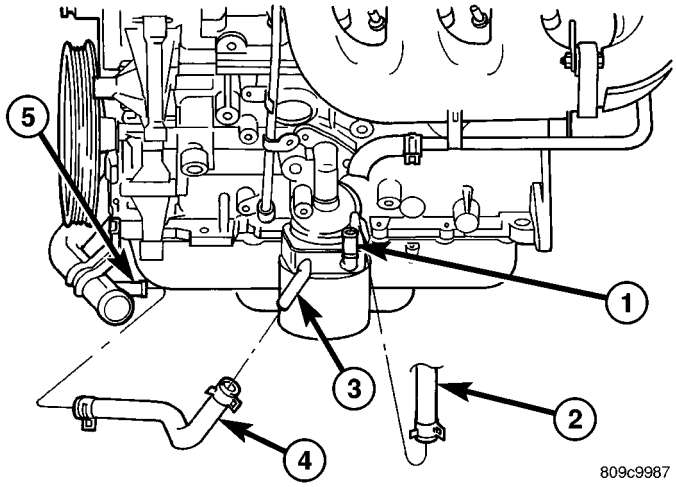


Fig. 127 ENGINE OIL COOLER LINES

1 - OIL COOLER INLET TUBE
2 - INLET HOSE
3 - OIL COOLER OUTLET TUBE
4 - OUTLET HOSE
5 - WATER PUMP INLET TUBE

(1) Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM DRAINING).

(2) Disconnect oil cooler inlet and outlet hoses (Fig. 127).

(3) Remove oil filter.

(4) Remove oil cooler attachment fitting (Fig. 128).

(5) Remove oil cooler.

INSTALLATION

(1) Lubricate seal and position oil cooler to connector fitting on oil filter adapter (Fig. 129).

NOTE: Position the flat side of oil cooler parallel to oil pan rail.

(2) Install oil cooler attachment fitting and tighten to 27 N·m (20 ft. lbs.) (Fig. 129).

(3) Install oil filter.

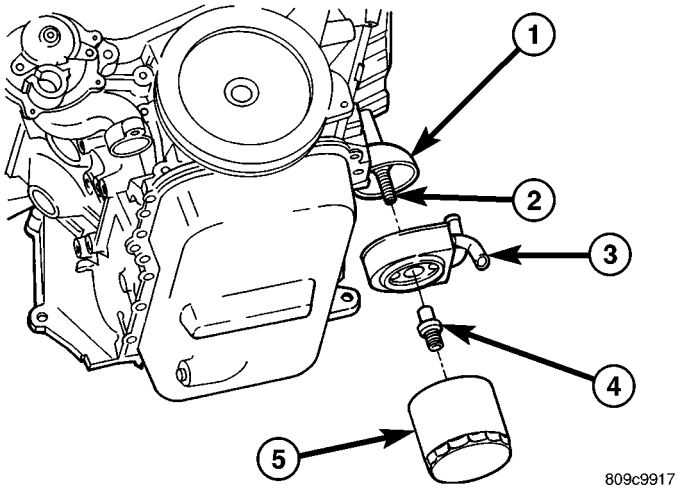


Fig. 128 ENGINE OIL COOLER

1 - OIL FILTER ADAPTER
2 - CONNECTOR
3 - ENGINE OIL COOLER
4 - OIL COOLER ATTACHMENT FITTING
5 - OIL FILTER

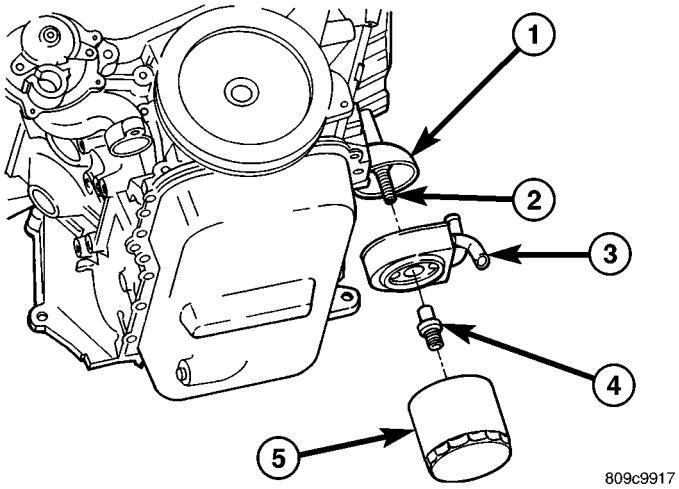


Fig. 129 ENGINE OIL COOLER

1 - OIL FILTER ADAPTER
2 - CONNECTOR
3 - ENGINE OIL COOLER
4 - OIL COOLER ATTACHMENT FITTING
5 - OIL FILTER

OIL COOLER & LINES (Continued)

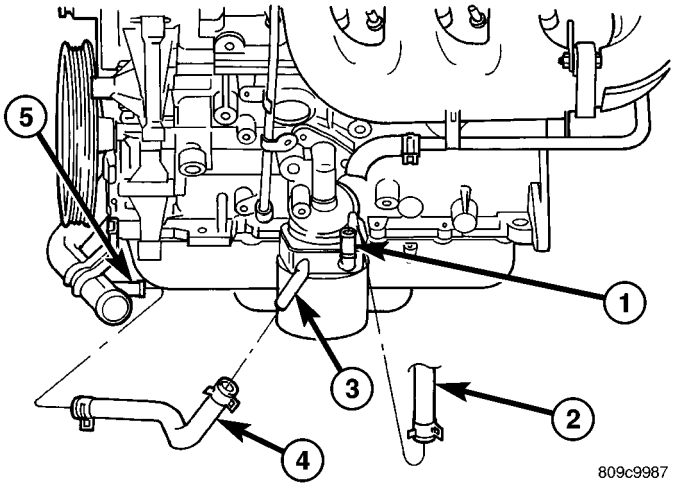


Fig. 130 ENGINE OIL COOLER LINES

1 - OIL COOLER INLET TUBE
2 - INLET HOSE
3 - OIL COOLER OUTLET TUBE
4 - OUTLET HOSE
5 - WATER PUMP INLET TUBE

(4) Connect oil cooler inlet and outlet hoses (Fig. 130).

(5) Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM FILLING).

OIL FILTER

REMOVAL

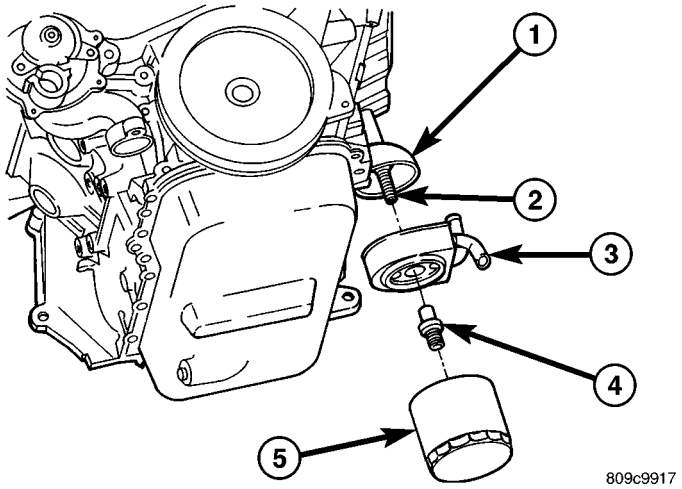


Fig. 131 ENGINE OIL COOLER

1 - OIL FILTER ADAPTER
2 - CONNECTOR
3 - ENGINE OIL COOLER
4 - OIL COOLER ATTACHMENT FITTING
5 - OIL FILTER

CAUTION: When servicing the oil filter avoid deforming the filter can by installing the remove/install tool band strap against the can-to-base lock seam. The lock seam joining the can to the base is reinforced by the base plate.

(1) Using suitable oil filter wrench, turn filter counterclockwise to remove from oil filter adapter (Fig. 131). Properly discard used oil filter.

INSTALLATION

(1) Wipe oil filter adapter base clean and inspect gasket contact surface.

(2) Lubricate gasket of new filter with clean engine oil.

(3) Install new filter until gasket contacts base (Fig. 131). Tighten filter 1 turn or 20 N·m (15 ft. lbs.). Use filter wrench if necessary.

(4) Start engine and check for leaks.

OIL FILTER ADAPTER

REMOVAL

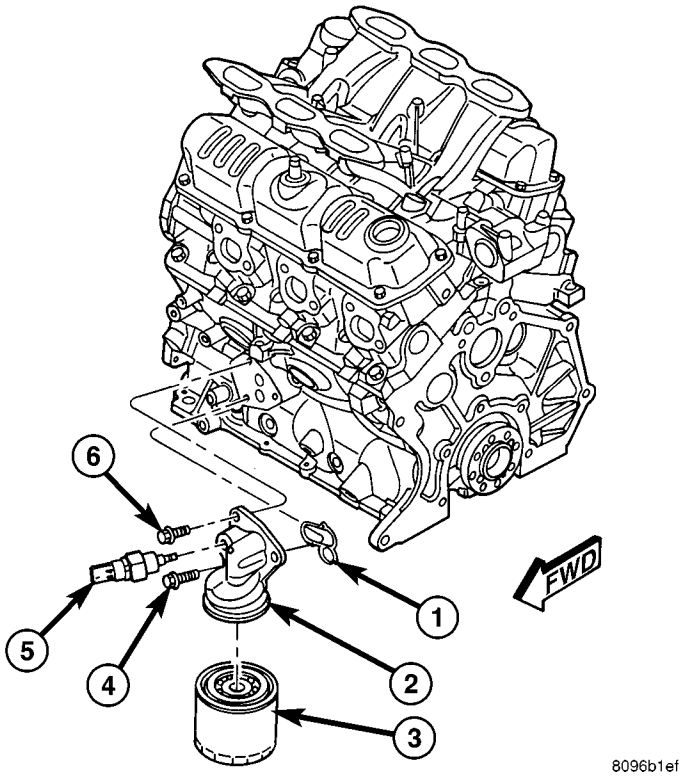


Fig. 132 OIL FILTER ADAPTER

1 - SEAL
2 - OIL FILTER ADAPTER
3 - OIL FILTER
4 - BOLT
5 - OIL PRESSURE SWITCH
6 - BOLT

(1) Raise vehicle on hoist.

(2) Remove the oil filter.

OIL FILTER ADAPTER (Continued)

(3) Disconnect oil pressure switch electrical connector.
(4) Remove oil filter adapter attaching bolts (Fig. 132).
(5) Remove oil filter adapter and seal (Fig. 132).

INSTALLATION

(1) Clean oil filter adapter and install new seal.
(2) Position adapter on engine block and install bolts (Fig. 132).
(3) Tighten adapter bolts to 28 N·m (250 in. lbs.).
(4) Connect oil pressure switch electrical connector (Fig. 132).
(5) Install the oil filter.
(6) Lower vehicle on hoist.
(7) Start engine and allow to run approximately 2 minutes.
(8) Turn off engine and check oil level. Adjust oil level as necessary.

OIL PAN

REMOVAL

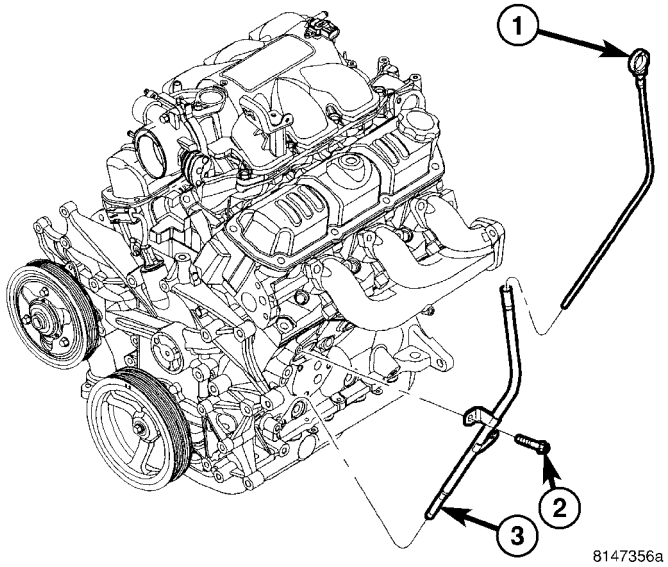


Fig. 133 OIL LEVEL INDICATOR

1 - OIL LEVEL INDICATOR
2 - BOLT
3 - TUBE

(1) Disconnect negative cable from battery and remove engine oil level indicator tube (Fig. 133).
(2) Raise vehicle on hoist and drain engine oil.

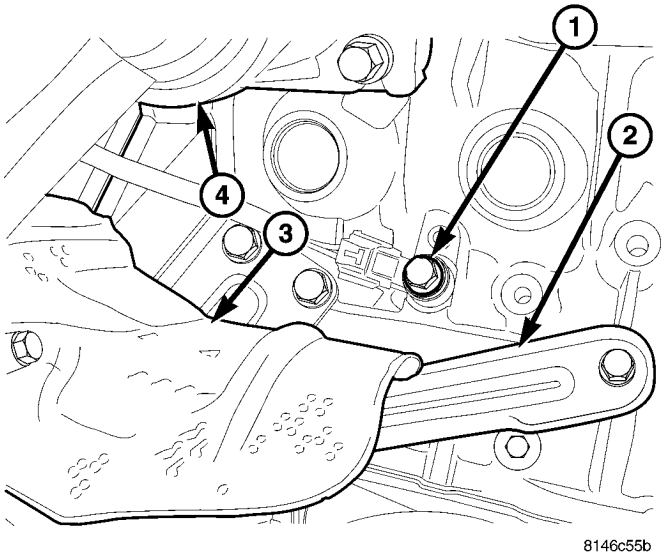


Fig. 134 RIGHT ENGINE MOUNT HEAT SHIELD

1 - CRANKSHAFT SENSOR
2 - BRACKET
3 - HEAT SHIELD
4 - EXHAUST

(3) Remove the right engine mount heat shield (Fig. 134).
(4) Disconnect the in block heater (if equipped) (Fig. 134).

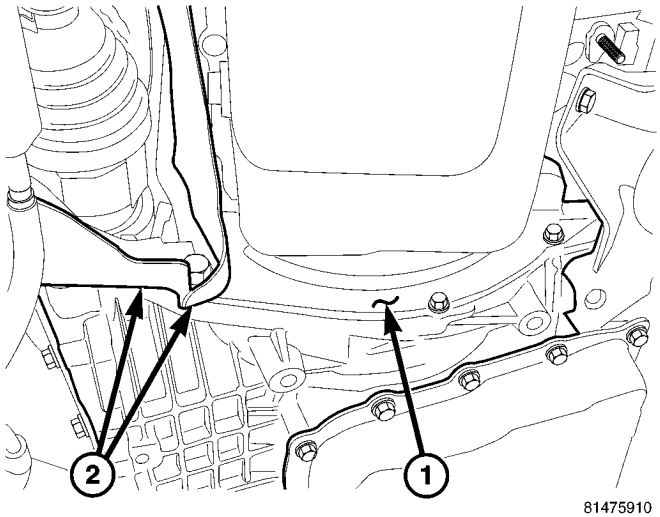


Fig. 135 INSPECTION COVER

1 - FLEX PLATE INSPECTION COVER
2 - RIGHT ENGINE MOUNT BRACKETING

(5) Remove the right engine mount structural bracket at the engine and transaxle (Fig. 135).

OIL PAN (Continued)

(6) Remove the flex plate inspection cover (Fig. 135).
(7) Remove oil pan fasteners (Fig. 137).
(8) Remove the oil pan and gasket (Fig. 137).

CLEANING

(1) Clean oil pan with solvent and wipe dry with a clean cloth.
(2) Clean all gasket material from mounting surfaces of pan and block.
(3) Clean oil screen and pick-up tube in clean solvent.

INSPECTION

(1) Inspect oil drain plug and plug hole for stripped or damaged threads and repair as necessary. Install a new drain plug gasket. Tighten to 27 N·m (20 ft. lbs.).
(2) Inspect oil pan mounting flange for bends or distortion. Straighten flange if necessary.
(3) Inspect condition of oil screen and pick-up tube, clean or replace as necessary.

INSTALLATION

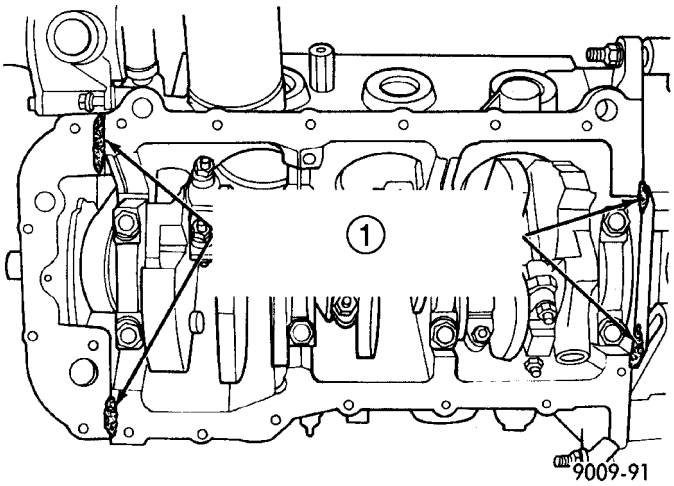


Fig. 136 Oil Pan Sealing

1 - SEALER LOCATIONS

(1) Clean sealing surfaces and apply a 1/8 inch bead of Mopar® Engine RTV GEN II at the parting line of the chain case cover and the rear seal retainer (Fig. 136).
(2) Position a new pan gasket on oil pan (Fig. 137).
(3) Install oil pan and tighten fasteners to 12 N·m (105 in. lbs.) (Fig. 137).
(4) Install the flex plate cover (Fig. 138).
(5) Install the right engine mount bracket (Fig. 138).
(6) Connect the in block heater (if equipped) (Fig. 138).

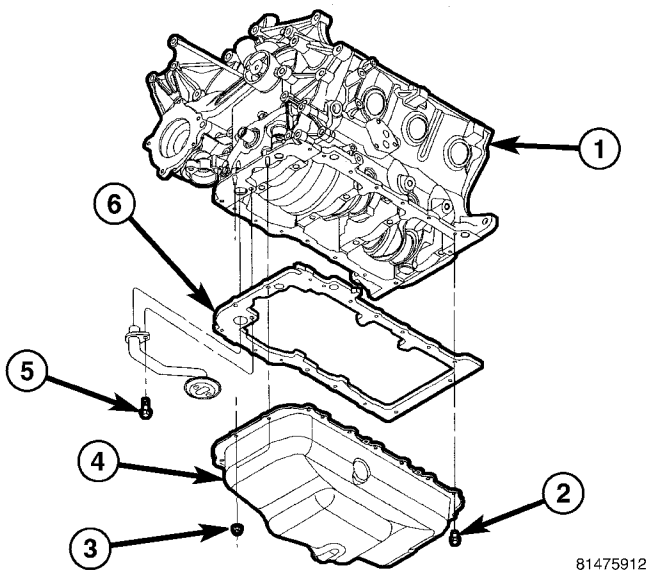


Fig. 137 OIL PAN AND GASKET

1 - ENGINE BLOCK
2 - BOLT
3 - NUT
4 - OIL PAN
5 - BOLT
6 - GASKET

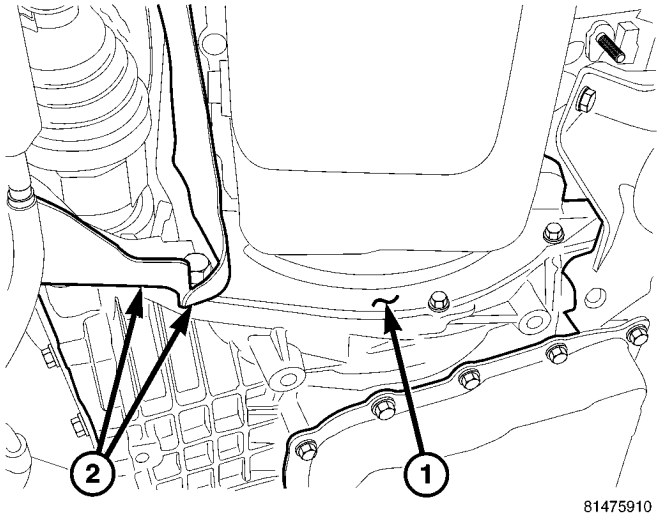


Fig. 138 INSPECTION COVER

1 - FLEX PLATE INSPECTION COVER
2 - RIGHT ENGINE MOUNT BRACKETING

OIL PAN (Continued)

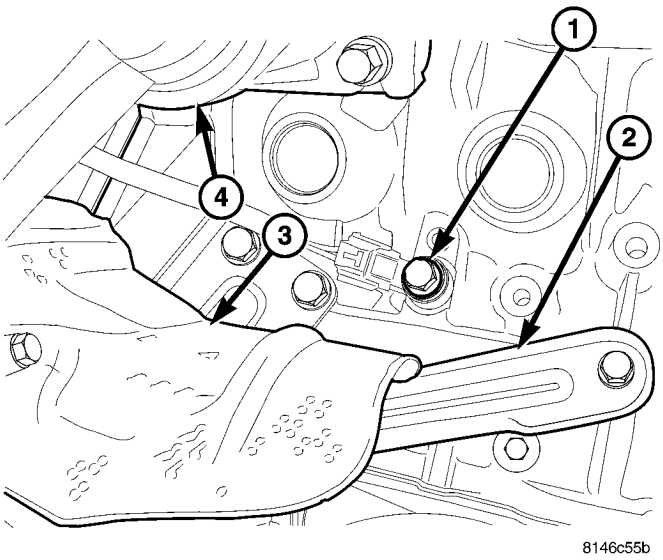


Fig. 139 RIGHT ENGINE MOUNT HEAT SHIELD

1 - CRANKSHAFT SENSOR
2 - BRACKET
3 - HEAT SHIELD
4 - EXHAUST

(7) Install the right engine mount heat shield (Fig. 139).

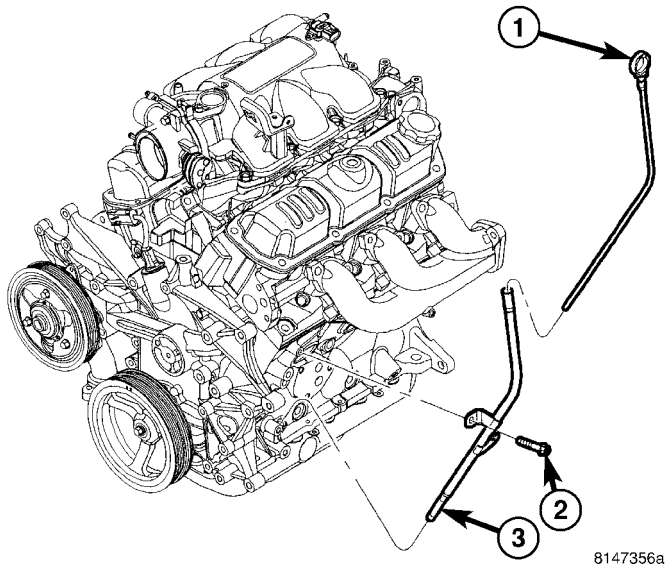


Fig. 140 OIL LEVEL INDICATOR

1 - OIL LEVEL INDICATOR
2 - BOLT
3 - TUBE

(8) Lower vehicle and install oil level indicator (Fig. 140).
(9) Connect negative cable to battery.
(10) Fill crankcase with oil to proper level.

OIL PRESSURE RELIEF VALVE

REMOVAL

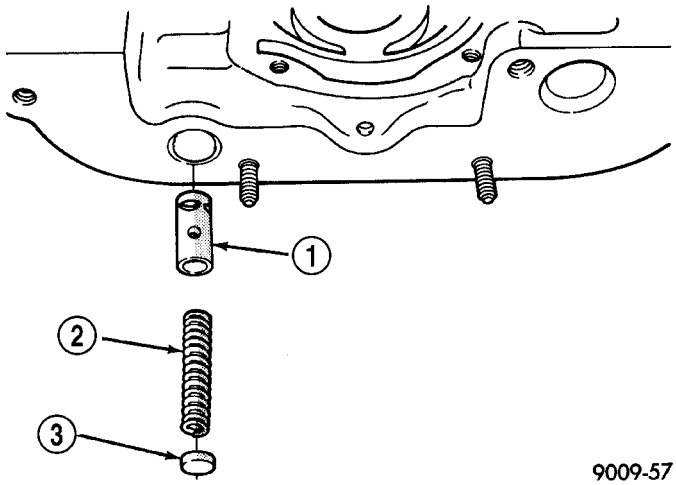


Fig. 141 Oil Pressure Relief Valve

1 - RELIEF VALVE
2 - SPRING
3 - RETAINER CAP

(1) Remove oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
(2) Drill a 3.175 mm (1/8 in.) hole in the center of the retainer cap (Fig. 141). Insert a self-threading sheet metal screw into the cap.
(3) Using suitable pliers, remove cap and discard.
(4) Remove spring and relief valve (Fig. 141).

INSTALLATION

(1) Clean relief valve, spring and bore.

NOTE: Lubricate relief valve with clean engine oil before installing.

(2) Install relief valve and spring into housing.
(3) Install new retainer cap until flush with sealing surface.
(4) Install oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).
(5) Fill crankcase with proper oil to correct level.

OIL PRESSURE SWITCH

DESCRIPTION

The engine oil pressure switch is located on the lower left front side of the engine. It screws into the oil filter adapter. The normally closed switch provides an input through a single wire to the low pressure indicator light on the instrument cluster.

OIL PRESSURE SWITCH (Continued)

OPERATION

The oil pressure switch provides a ground for the instrument cluster low oil pressure indicator light. The switch receives oil pressure input from the engine main oil gallery. When engine oil pressure is greater than 27.5 Kpa (4 psi), the switch contacts open, providing a open circuit to the low pressure indicator light. For wiring circuits and diagnostic information, (Refer to Appropriate Wiring/Diagnostic Information).

REMOVAL

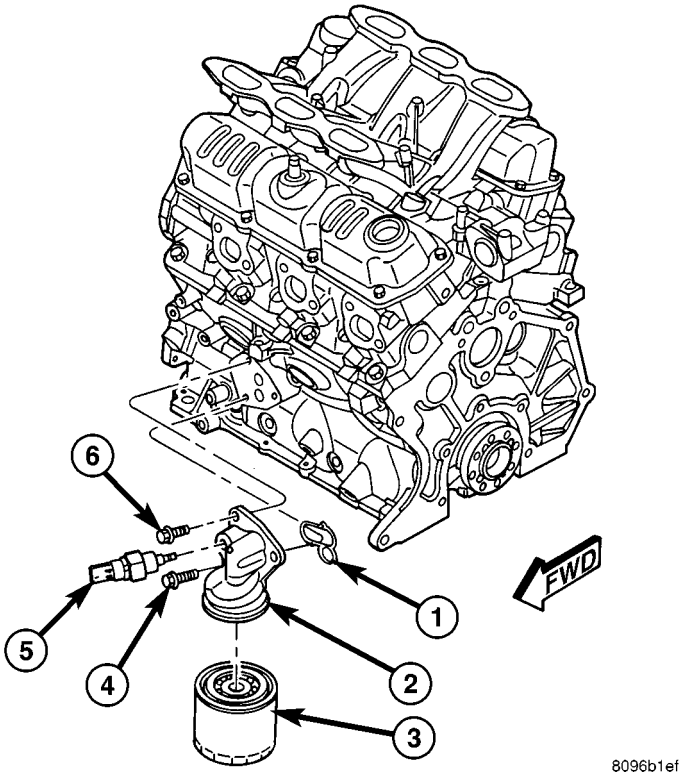


Fig. 142 OIL FILTER ADAPTER

1 - SEAL
2 - OIL FILTER ADAPTER
3 - OIL FILTER
4 - BOLT
5 - OIL PRESSURE SWITCH
6 - BOLT

(1) Raise vehicle on hoist.
(2) Disconnect electrical connector from switch.
(3) Remove oil pressure switch (Fig. 142).

INSTALLATION

(1) Install oil pressure switch. Torque oil pressure switch to 23 N·m (200 in. lbs.) (Fig. 142).
(2) Connect electrical connector to switch.
(3) Lower the vehicle.
(4) Start engine and check for leaks.
(5) Check engine oil level. Adjust as necessary.

OIL PUMP

DESCRIPTION

The oil pump is located in the timing chain cover. It is driven by the crankshaft.

REMOVAL

The oil pump is contained within the timing chain cover housing.

(1) Remove oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
(2) Remove the timing chain cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)
(3) Disassemble oil pump from timing chain cover. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - DISASSEMBLY)
(4) Clean and Inspect oil pump components. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - CLEANING) (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSPECTION).

DISASSEMBLY

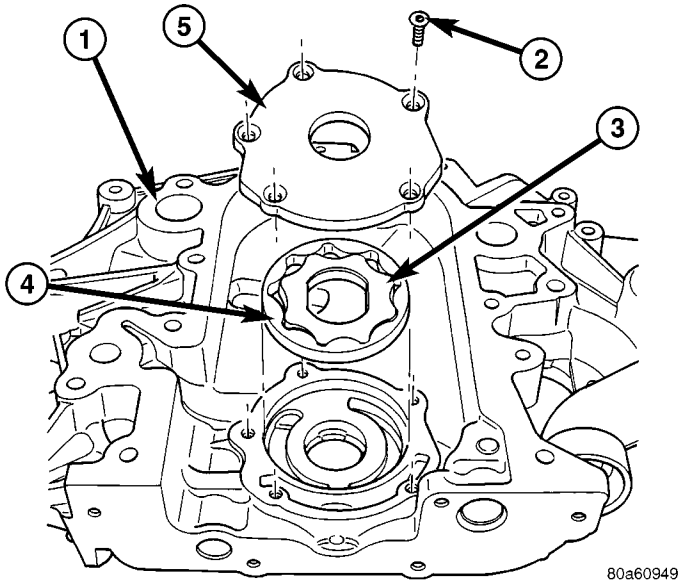


Fig. 143 OIL PUMP

1 - TIMING CHAIN COVER
2 - SCREWS
3 - INNER ROTOR
4 - OUTER ROTOR
5 - COVER

(1) Remove oil pump cover screws, and lift off cover (Fig. 143).
(2) Remove oil pump rotors (Fig. 143).
(3) Clean and inspect oil pump components. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - CLEANING) (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSPECTION).

OIL PUMP (Continued)

CLEANING

(1) Clean all parts thoroughly in a suitable solvent.

INSPECTION

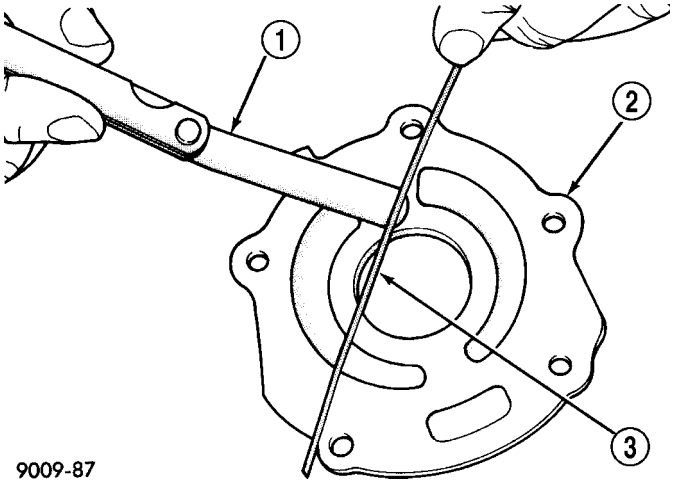


Fig. 144 Checking Oil Pump Cover Flatness

1 - FEELER GAUGE
2 - OIL PUMP COVER
3 - STRAIGHT EDGE

(1) Inspect mating surface of the chain case cover. Surface should be smooth. Replace cover if scratched or grooved.

(2) Lay a straightedge across the pump cover surface (Fig. 144). If a 0.025 mm (0.001 in.) feeler gauge can be inserted between cover and straight edge, cover should be replaced.

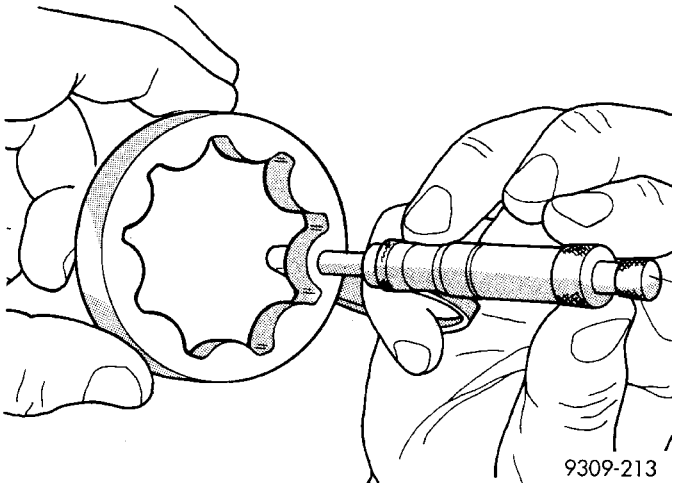


Fig. 145 Measuring Outer Rotor Thickness

(3) Measure thickness and diameter of outer rotor. If outer rotor thickness measures 7.64 mm (0.301 in.) or less (Fig. 145), or if the diameter is 79.95 mm (3.148 in.) or less, replace outer rotor.

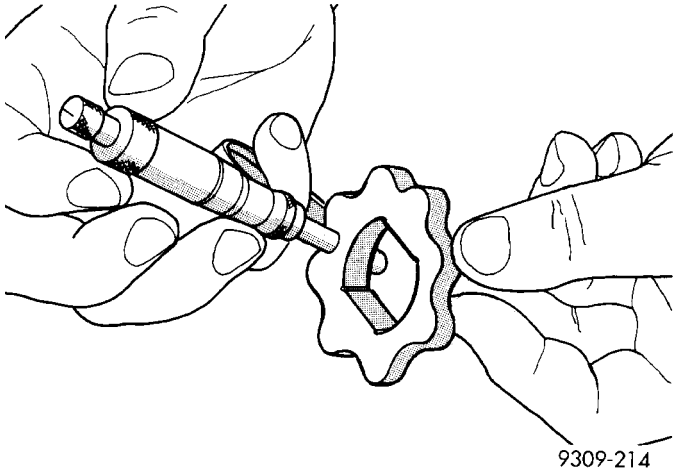


Fig. 146 Measuring Inner Rotor Thickness

(4) If inner rotor thickness measures 7.64 mm (0.301 in.) or less, replace inner rotor (Fig. 146).

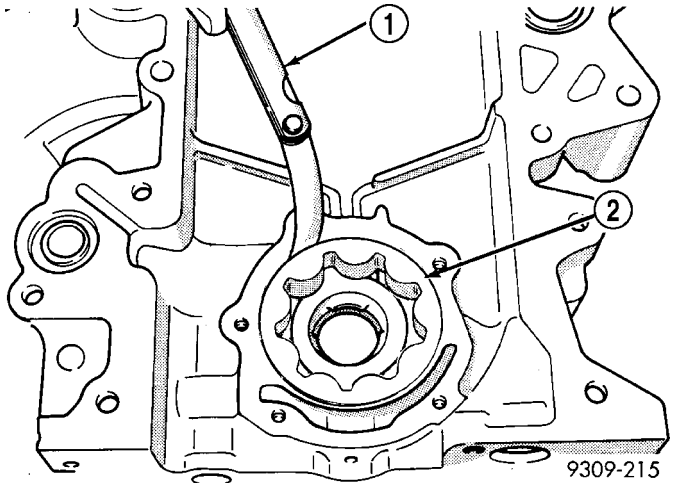


Fig. 147 Measuring Outer Rotor Clearance in Housing

1 - FEELER GAUGE
2 - OUTER ROTOR

(5) Install outer rotor into chain case cover. Press rotor to one side with fingers and measure clearance between rotor and chain case cover (Fig. 147). If measurement is 0.39 mm (0.015 in.) or more, replace chain case cover, only if outer rotor is in specification.

OIL PUMP (Continued)

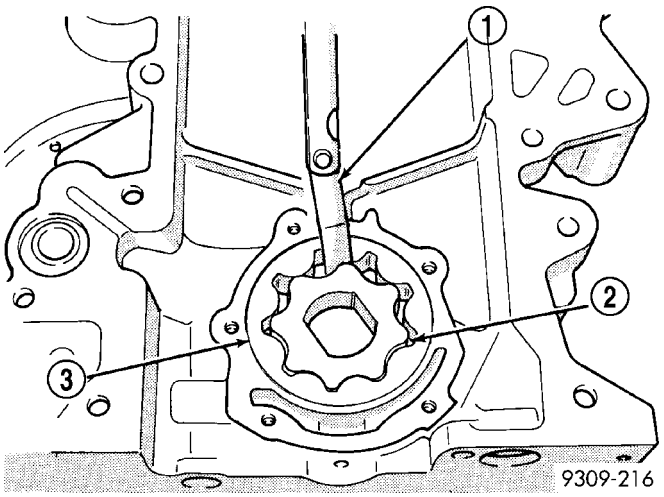


Fig. 148 Measuring Clearance Between Rotors

1 - FEELER GAUGE
2 - INNER ROTOR
3 - OUTER ROTOR

(6) Install inner rotor into chain case cover. If clearance between inner and outer rotors (Fig. 148) is 0.203 mm (0.008 in.) or more, replace both rotors.

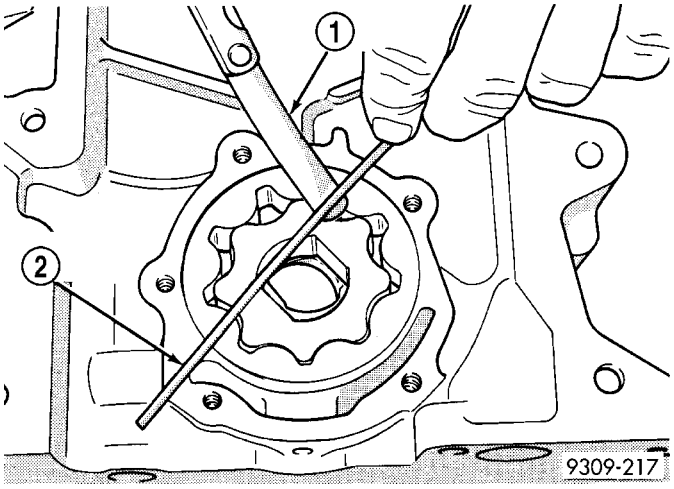


Fig. 149 Measuring Clearance Over Rotors

1 - FEELER GAUGE
2 - STRAIGHT EDGE

(7) Place a straightedge across the face of the chain case cover, between bolt holes. If a feeler gauge of 0.10 mm (0.004 in.) or more can be inserted between rotors and the straightedge, replace pump assembly (Fig. 149). **ONLY** if rotors are in specs.

(8) Remove oil pressure relief valve. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE RELIEF VALVE - REMOVAL)

(9) Inspect oil pressure relief valve and bore. Inspect for scoring, pitting and free valve operation in bore (Fig. 150). Small marks may be removed with 400-grit wet or dry sandpaper.

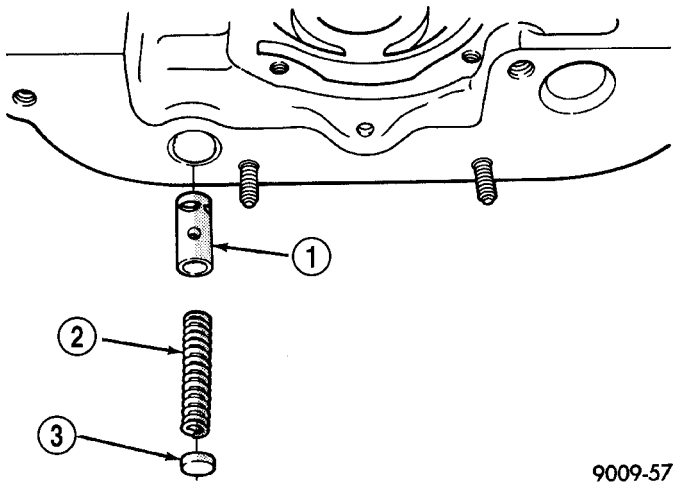


Fig. 150 Oil Pressure Relief Valve

1 - RELIEF VALVE
2 - SPRING
3 - RETAINER CAP

(10) The relief valve spring has a free length of approximately 49.5 mm (1.95 inches) it should test between 19.5 and 20.5 pounds when compressed to 34 mm (1-11/32 inches). Replace spring that fails to meet specifications.

(11) If oil pressure is low and pump is within specifications, inspect for worn engine bearings or other reasons for oil pressure loss.

ASSEMBLY

(1) Assemble pump, using new parts as required. **Install the inner rotor with chamfer facing the cast iron oil pump cover.**

(2) Prime oil pump before installation by filling rotor cavity with engine oil.

(3) Install cover and tighten screws to 12 N·m (105 in. lbs.).

(4) If removed, install the oil pressure relief valve. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE RELIEF VALVE - INSTALLATION).

INSTALLATION

(1) Install oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - ASSEMBLY)

(2) Install timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION) and oil pan (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

INTAKE MANIFOLD

DESCRIPTION

The intake system is made up of an upper and lower intake manifold. The upper intake manifold is

made of a composite material for the 3.8L engine. The lower intake manifold also provides coolant crossover between cylinder heads and houses the coolant thermostat

The intake manifold utilizes a compact design with very low restriction and outstanding flow balance. This design allows the engine to perform with a wide torque curve while increasing higher rpm horsepower.

If, for some reason, the molded-in vacuum ports break, the composite manifold can be salvaged. The vacuum ports are designed to break at the shoulder, if overloaded. Additional material in the shoulder area provides sufficient stock to repair. For more information and procedure, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - STANDARD PROCEDURE). Also, if the special screws that attach the MAP sensor, power steering reservoir, throttle cable bracket, and the EGR tube become stripped, an oversized screw is available to repair the stripped-out condition. For more information and procedure, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - STANDARD PROCEDURE)

DIAGNOSIS AND TESTING - INTAKE MANIFOLD LEAKS

An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR THE FAN. DO NOT WEAR LOOSE CLOTHING.

(1) Start the engine.
(2) Spray a small stream of water (Spray Bottle) at the suspected leak area.
(3) If engine RPM'S change, the area of the suspected leak has been found.
(4) Repair as required.

INTAKE MANIFOLD - UPPER

STANDARD PROCEDURE

STANDARD PROCEDURE - MANIFOLD STRIPPED THREAD REPAIR

The composite upper intake manifold thread bosses, if stripped out, can be repaired by utilizing a repair screw available through Mopar® parts. Repair screws are available for the following manifold attached components:

- MAP sensor
- Power steering reservoir
- EGR tube
- Throttle cable bracket

The repair screws require a unique tightening torque specification from the original screw. Refer to the following chart for specification.

DESCRIPTION	TORQUE*
STRIP-OUT REPAIR SCREWS ONLY	
MAP Sensor Repair Screw	4 N·m (35 in. lbs.)
Power Steering Reservoir Repair Screw	9 N·m (80 in. lbs.)
EGR Tube Attaching Repair Screw	9 N·m (80 in. lbs.)
Throttle Cable Bracket Repair Screw	9 N·m (80 in. lbs.)
*Install Slowly Using Hand Tools Only	

STANDARD PROCEDURE - INTAKE MANIFOLD VACUUM PORT REPAIR

The composite intake manifold vacuum ports can be repaired. Although, if the manifold plenum chamber is damaged or cracked, the manifold must be replaced.

To repair a broken or damaged vacuum port on the composite intake manifold, perform the following procedure:

PARTS REQUIRED	TOOLS REQUIRED
· Brass Port – 1/4″ O.D. x 1/8″ pipe thread (LDP/Speed Control Port)	· Pipe Tap – 1/8″ - 18 NPT · Drill Bit – 11/32″ · File/Sandpaper
· Brass Port – 1/2″ O.D. x 1/4″ pipe thread (Brake Booster Port)	· Pipe Tap – 1/4″ - 18 NPT · Drill Bit – 7/16″ · File/Sandpaper

NOTE: While performing this procedure, avoid getting the manifold material residue into the plenum chamber.

(1) File or sand the remaining port back until a flat surface is obtained (plane normal to port axis).
(2) Drill out the port base using a 7/16” (brake booster port) or 11/32” (LDP/speed control port) drill bit (Fig. 151).
(3) Using a 1/4”–18 NPT (brake booster port) or 1/8”–18 NPT (LDP/speed control port) pipe tap, cut

internal threads (Fig. 151). Use caution to start tap in a axis same as original port.

(4) Apply Mopar® Thread Sealant to threads of repair port (s).

(5) Install repair port (s). Do not over torque repair port (s).

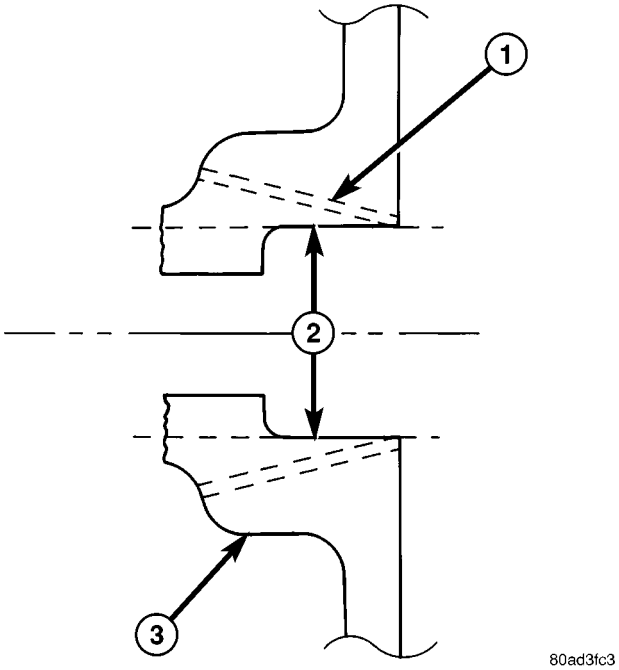


Fig. 151 Manifold Port (Nipple) Repair

1 - BRAKE BOOSTER PORT = 1/4″–18 NPT PIPE TAP
1 - LDP/SPEED CONTROL PORT = 1/8″–18 NPT PIPE TAP
2 - DRILL BIT = 7/16″ BRAKE BOOSTER PORT
2 - DRILL BIT = 11/32″ LDP/SPEED CONTROL PORT
3 - INTAKE MANIFOLD

REMOVAL - UPPER INTAKE MANIFOLD

(1) Disconnect battery negative cable.

(2) Disconnect inlet air temperature (IAT) sensor electrical connector (Fig. 152).

(3) Remove air inlet resonator to throttle body hose assembly.

(4) Disconnect the throttle and speed control cables from throttle body, separate the throttle bracket from the upper intake manifold and set aside. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE CONTROL CABLE - REMOVAL).

(5) Disconnect the EVAP hose at the throttle (Fig. 153).

(6) Remove the EGR tube (Fig. 152).

(7) Disconnect the idle air control (IAC) motor and throttle position sensor (TPS) wiring connectors from throttle body (Fig. 153).

(8) Disconnect the manifold absolute pressure (MAP) sensor electrical connector (Fig. 152).

(9) Disconnect the PCV hose (Fig. 152).

(10) Disconnect the brake booster and cruise control vacuum hoses from intake manifold (Fig. 152).

(11) Remove intake manifold bolts and remove the manifold.

(12) Cover the lower intake manifold with a suitable cover while the upper manifold is removed.

(13) Clean and inspect the upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - CLEANING) and (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSPECTION).

CLEANING

(1) Discard gasket(s).

(2) Clean all sealing surfaces.

INSPECTION

Check manifold for:

- Damage and cracks.
- Mounting surface distortion by using a straightedge and thickness gauge.

INTAKE MANIFOLD - UPPER (Continued)

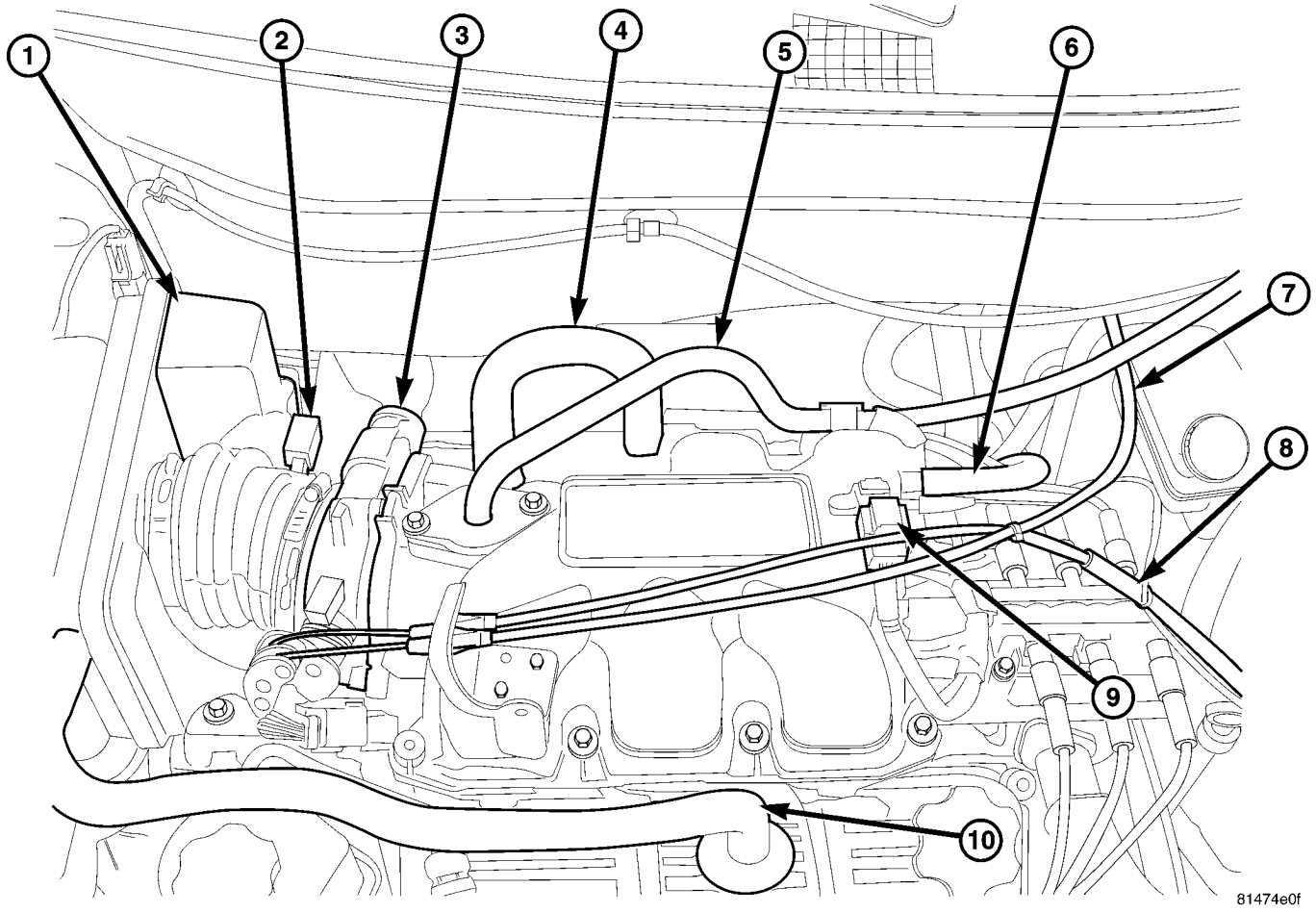


Fig. 152 3.8L COMPONENT LOCATION

1 - AIR CLEANER HOUSING
2 - INLET AIR TEMPERATURE SENSOR
3 - IDLE AIR CONTROL VALVE
4 - PCV HOSE
5 - EGR TUBE
6 - BRAKE BOOSTER VACUUM HOSE
7 - ACCELERATOR CABLE
8 - CRUISE CONTROL CABLE
9 - MANIFOLD ABSOLUTE PRESSURE SENSOR
10 - CRANK CASE BREATHER

INTAKE MANIFOLD - UPPER (Continued)

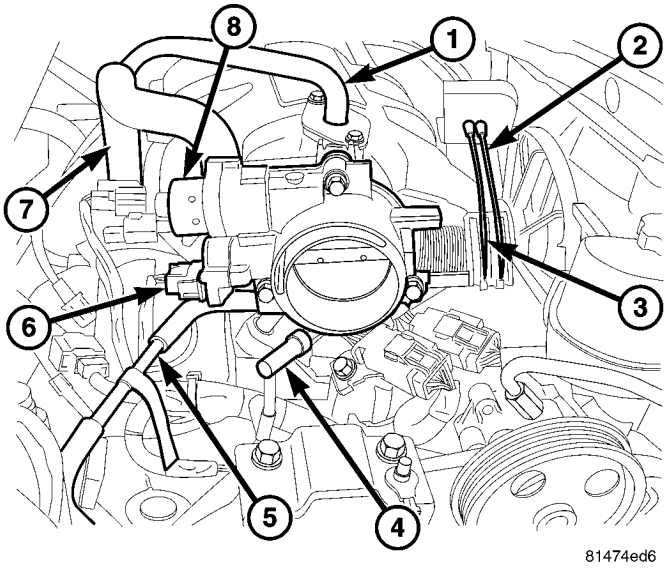


Fig. 153 THROTTLE ASSEMBLY

1 - EGR TUBE
2 - ACCELERATOR CABLE
3 - CRUISE CONTROL CABLE
4 - FUEL INLET
5 - EVAP HOSE
6 - THROTTLE POSITION SENSOR
7 - PCV HOSE
8 - IDLE SPEED CONTROL

INSTALLATION - UPPER INTAKE MANIFOLD

(1) If the following components were removed from manifold, install and tighten to specifications:

CAUTION: The special screws used for the composite manifold attached components must be installed slowly using hand tools only. This requirement is to prevent the melting of material that causes stripped threads. If threads become stripped, an oversize repair screw is available. For more information and procedure (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - STANDARD PROCEDURE - MANIFOLD STRIPPED THREAD REPAIR).

- MAP sensor - 1.7 N·m (15 in. lbs.)
- Throttle cable bracket - 5.6 N·m (50 in. lbs.)

(2) Remove covering on lower intake manifold and clean surfaces.

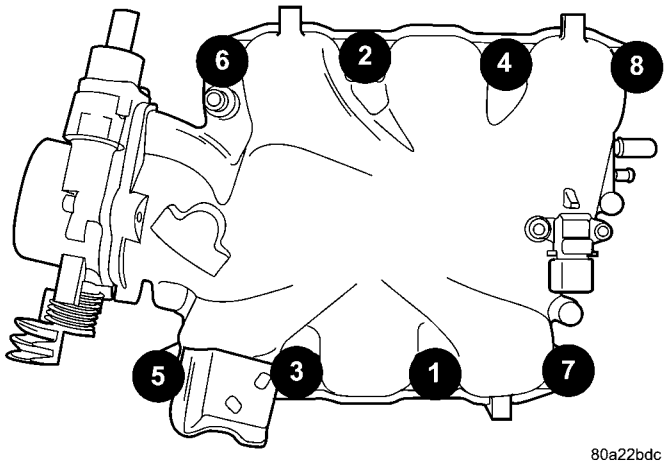


Fig. 154 UPPER MANIFOLD TIGHTENING SEQUENCE

(3) Inspect manifold gasket condition. Gaskets can be re-used, if not damaged. Position new gasket in seal channel and press lightly in-place. Repeat procedure for each gasket position.

(4) Position upper manifold on lower manifold.

(5) Apply Mopar® Lock & Seal Adhesive (Medium Strength Threadlocker) to each upper intake manifold bolt. Install and tighten bolts to 12 N·m (105 in. lbs.) following torque sequence in (Fig. 154).

(6) Connect the MAP sensor electrical connector (Fig. 155).

(7) Connect the brake booster and cruise control vacuum hose to intake manifold (Fig. 155).

CAUTION: The special screws used for attaching the EGR tube to the manifold must be installed slowly using hand tools only. This requirement is to prevent the melting of material that causes stripped threads. If threads become stripped, an oversize repair screw is available. For more information and procedure (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - STANDARD PROCEDURE - MANIFOLD STRIPPED THREAD REPAIR).

(8) Install the EGR tube.

INTAKE MANIFOLD - UPPER (Continued)

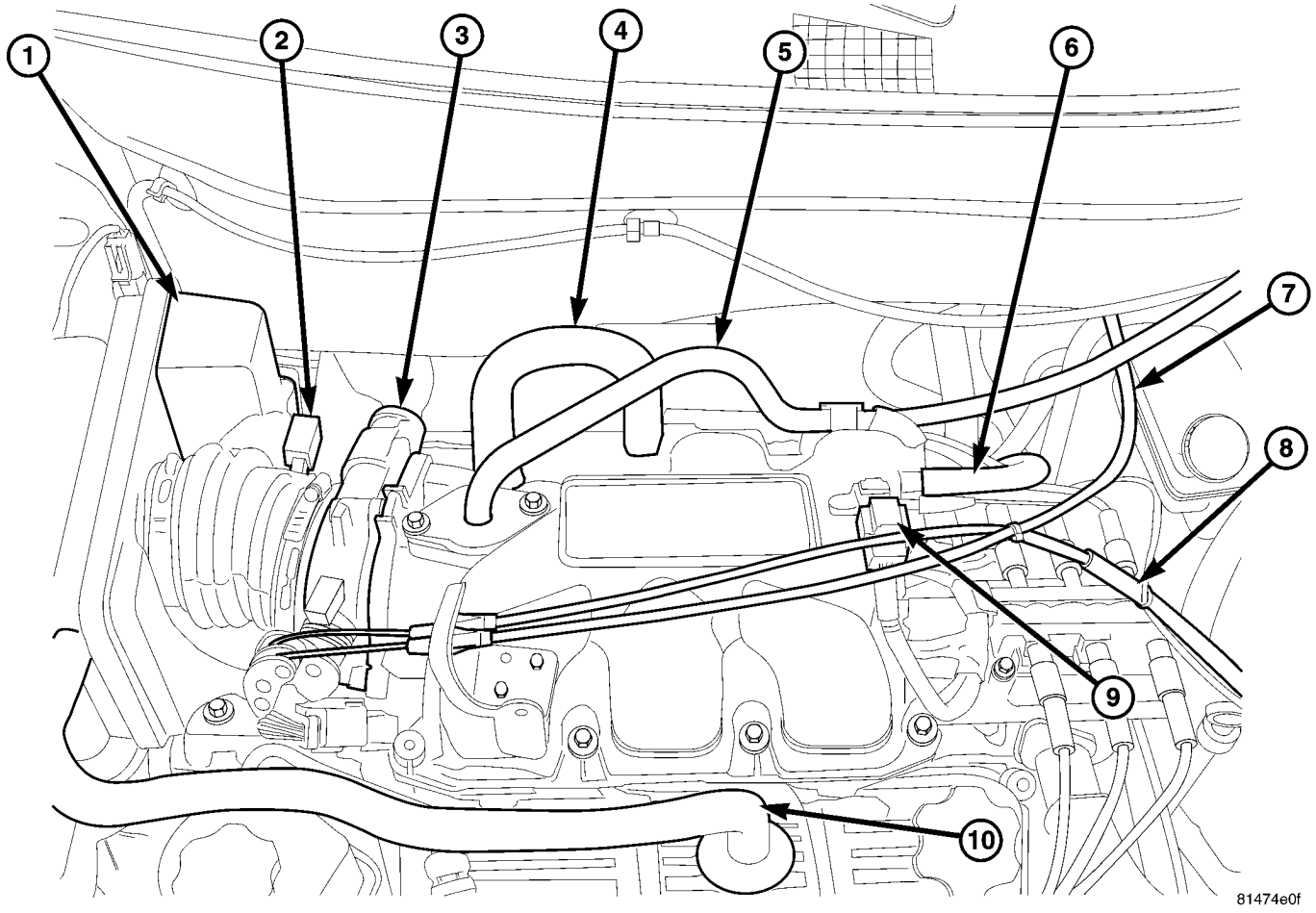


Fig. 155 3.8L COMPONENT LOCATION

1 - AIR CLEANER HOUSING
2 - INLET AIR TEMPERATURE SENSOR
3 - IDLE AIR CONTROL VALVE
4 - PCV HOSE
5 - EGR TUBE
6 - BRAKE BOOSTER VACUUM HOSE
7 - ACCELERATOR CABLE
8 - CRUISE CONTROL CABLE
9 - MANIFOLD ABSOLUTE PRESSURE SENSOR
10 - CRANK CASE BREATHER

INTAKE MANIFOLD - UPPER (Continued)

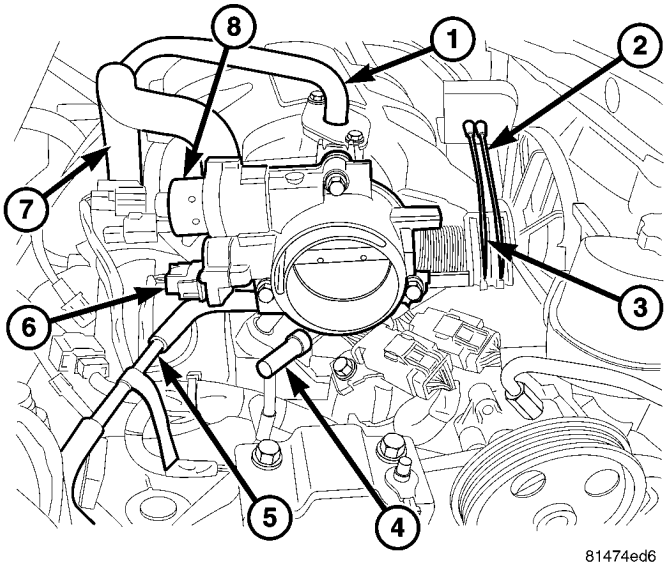


Fig. 156 THROTTLE ASSEMBLY

1 - EGR TUBE
2 - ACCELERATOR CABLE
3 - CRUISE CONTROL CABLE
4 - FUEL INLET
5 - EVAP HOSE
6 - THROTTLE POSITION SENSOR
7 - PCV HOSE
8 - IDLE SPEED CONTROL

(9) Connect throttle and speed control cables to throttle body (Fig. 156)

(10) Connect the EVAP hose to the throttle body.

(11) Connect the wiring connectors to the throttle position sensor (TPS) and idle air control (IAC) motor. (Fig. 156)

(12) Install air cleaner and air inlet hose assembly.

(13) Connect the inlet air temperature (IAT) sensor electrical connector.

(14) Connect battery negative cable.

INTAKE MANIFOLD - LOWER

REMOVAL - LOWER INTAKE MANIFOLD

(1) Perform fuel system pressure release procedure **(before attempting any repairs).** (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Drain the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(3) Remove the upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(4) Remove the fuel line. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE) (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/QUICK CONNECT FITTING - STANDARD PROCEDURE)

(5) Remove ignition coil and bracket (Fig. 157).

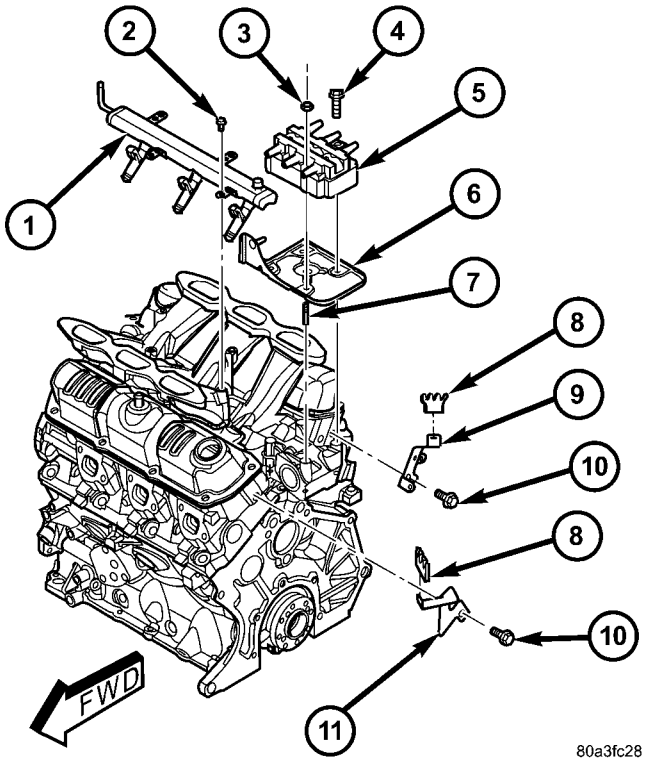


Fig. 157 FUEL RAIL & IGNITION.COIL & BRACKET

1 - FUEL RAIL
2 - BOLT - FUEL RAIL
3 - NUT - IGNITION COIL
4 - BOLT - IGNITION COIL
5 - IGNITION COIL
6 - BRACKET - IGNITION COIL
7 - STUD - IGNITION COIL
8 - SEPARATOR - SPARK PLUG CABLE
9 - BRACKET - SPARK PLUG CABLE SEPARATOR
10 - BOLT - SEPARATOR BRACKET
11 - BRACKET - SPARK PLUG CABLE SEPARATOR

(6) Disconnect heater supply hose and engine coolant temperature sensor (Fig. 158).

(7) Disconnect the fuel injector wire harness.

(8) Remove the fuel injectors and rail assembly (Fig. 157).

(9) Remove radiator upper hose.

(10) Remove the intake manifold bolts.

(11) Remove lower intake manifold (Fig. 159).

WARNING: INTAKE MANIFOLD GASKET IS MADE OF VERY THIN METAL AND MAY CAUSE PERSONAL INJURY, HANDLE WITH CARE.

(12) Remove intake manifold seal retainers screws (Fig. 159). Remove intake manifold gasket.

(13) Inspect and clean manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSPECTION) (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - CLEANING)

INTAKE MANIFOLD - LOWER (Continued)

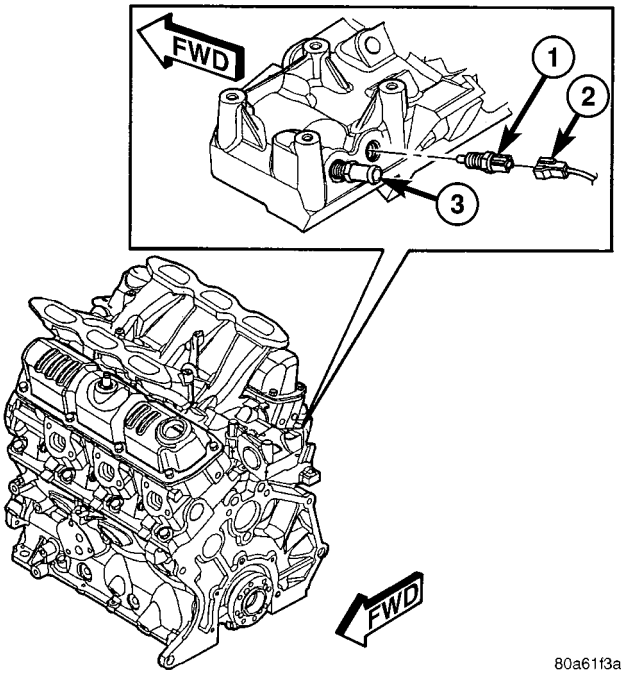


Fig. 158 COOLANT TEMPERATURE SENSOR & HEATER SUPPLY

1 - ENGINE COOLANT TEMPERATURE SENSOR
2 - CONNECTOR - ENGINE COOLANT SENSOR
3 - FITTING - HEATER SUPPLY

CLEANING

(1) Discard gasket(s).
(2) Clean all sealing surfaces.

INSPECTION

Check for:

- Damage and cracks of each section.
- Clogged water passages in end cross-overs (if equipped).
- Check for cylinder head mounting surface distortion using a straightedge and thickness gauge. (Refer to 9 - ENGINE/CYLINDER HEAD - INSPECTION)

INSTALLATION - LOWER INTAKE MANIFOLD

(1) Place a bead (approximately 1/4 in. diameter) of Mopar® Engine RTV GEN II onto each of the **four** manifold to cylinder head gasket corners (Fig. 160).

(2) Carefully install the new intake manifold gasket (Fig. 159). Tighten end seal retainer screws to 12 N·m (105 in. lbs.).

(3) Install lower intake manifold (Fig. 159). Install the bolts and torque to 1 N·m (10 in. lbs.). Then torque bolts to 22 N·m (200 in. lbs.) in sequence shown in (Fig. 161). Then torque again to 22 N·m (200 in. lbs.). After intake manifold is in place, **inspect to make sure seals are in place.**

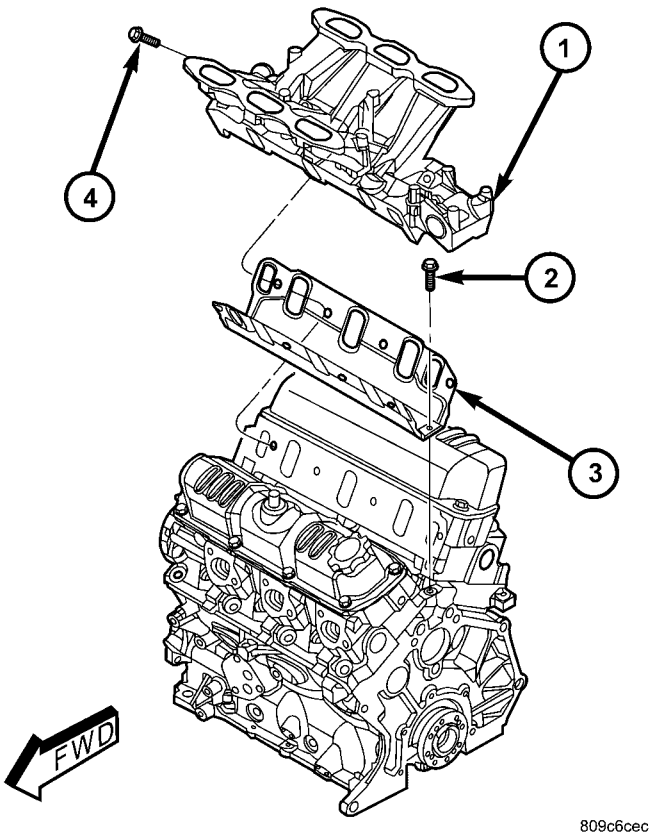


Fig. 159 INTAKE MANIFOLD - LOWER

1 - INTAKE MANIFOLD - LOWER
2 - BOLT - GASKET END SEAL RETAINER
3 - GASKET
4 - BOLT - LOWER INTAKE MANIFOLD

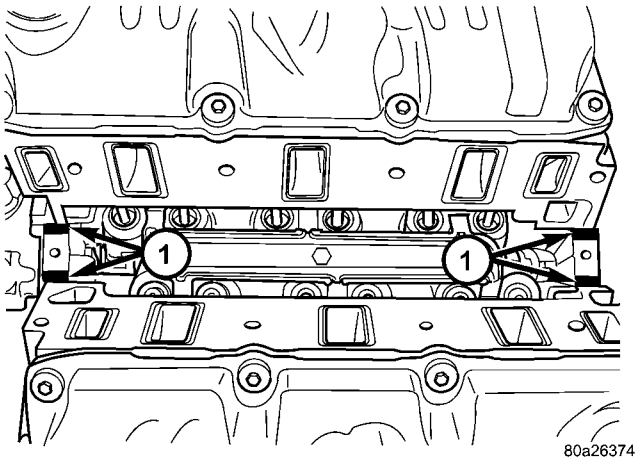


Fig. 160 SEALER LOCATIONS

1 - SEALER LOCATIONS

(4) Install the fuel injectors and rail assembly. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/ FUEL RAIL - INSTALLATION)

(5) Connect fuel injector electrical harness.

INTAKE MANIFOLD - LOWER (Continued)

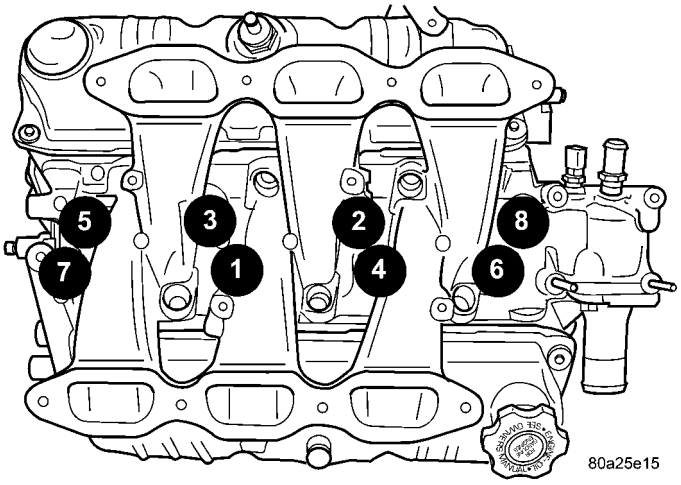


Fig. 161 LOWER MANIFOLD TIGHTENING SEQUENCE

(6) Connect the engine coolant temperature sensor.

(7) Connect the heater supply and radiator upper hoses to manifold.

(8) Connect the fuel line. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/QUICK CONNECT FITTING - STANDARD PROCEDURE)

(9) Install the upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(10) Connect negative battery cable.

(11) Fill the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(12) Connect the negative battery cable.

EXHAUST MANIFOLD - RIGHT

REMOVAL

(1) Disconnect battery negative cable.

(2) Raise and support the vehicle.

(3) Separate the exhaust pipe at the exhaust manifold.

(4) Remove bolts fastening crossover pipe to exhaust manifold (Fig. 162).

(5) Lower the vehicle.

(6) Remove the air cleaner housing.

(7) Disconnect the TPS, IAC and purge vacuum hose from the throttle body (Fig. 163).

(8) Disconnect the upstream oxygen sensor (Fig. 163).

(9) Disconnect the spark plug wires at the spark plugs.

(10) Remove bolts attaching exhaust manifold to cylinder head and remove manifold (Fig. 163).

(11) Inspect and clean manifold. (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - CLEANING) (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - INSPECTION)

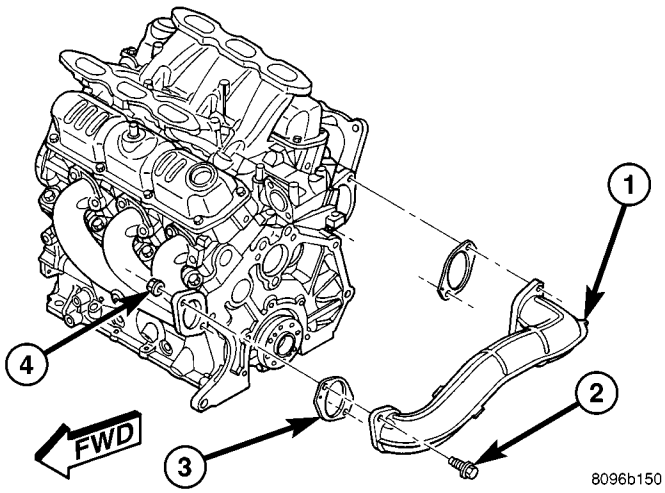


Fig. 162 CROSS-OVER PIPE

1 - CROSS-OVER PIPE
2 - BOLT
3 - GASKET
4 - FLAG NUT

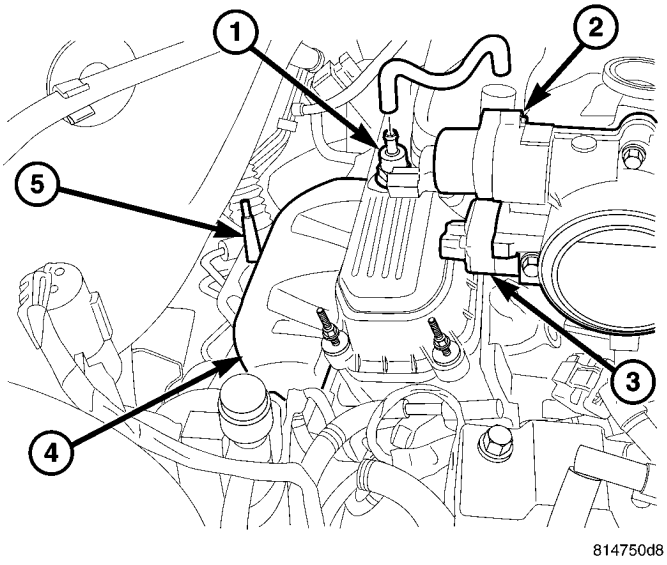


Fig. 163 RIGHT EXHAUST MANIFOLD

1 - PCV VALVE
2 - IAC MOTOR
3 - TP SENSOR
4 - RIGHT EXHAUST MANIFOLD
5 -OXYGEN SENSOR

CLEANING

(1) Discard gasket (if equipped) and clean all surfaces of manifold and cylinder head.

INSPECTION

Inspect exhaust manifolds for damage or cracks and check distortion of the cylinder head mounting surface and exhaust crossover mounting surface with a straightedge and thickness gauge (Fig. 164).

EXHAUST MANIFOLD - RIGHT (Continued)

Manifold surface flatness limits should not exceed 1.0 mm (0.039 in.).

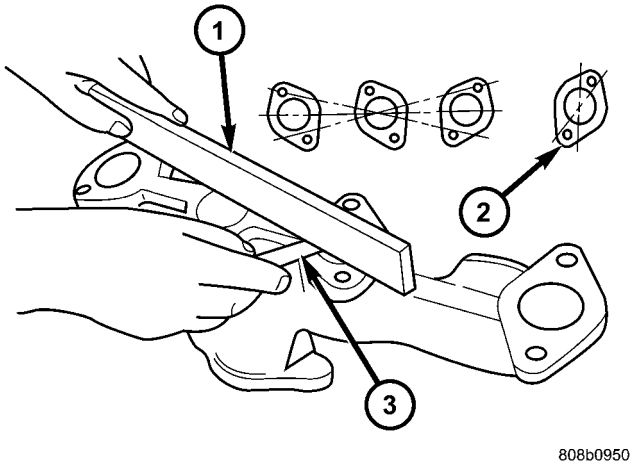


Fig. 164 Check Exhaust Manifold Mounting

1 - STRAIGHT EDGE
2 - CROSSOVER PIPE MOUNTING SURFACE
3 - FEELER GAUGE

INSTALLATION

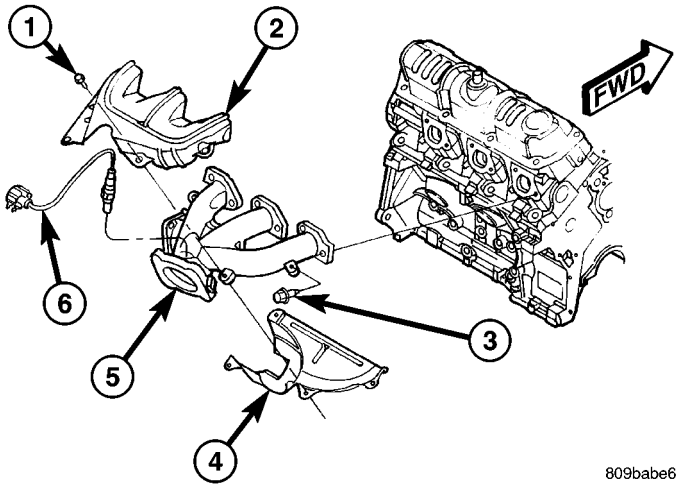


Fig. 165 EXHAUST MANIFOLD - RIGHT

1 - SCREW - HEAT SHIELD
2 - HEAT SHIELD - UPPER
3 - BOLT - EXHAUST MANIFOLD
4 - HEAT SHIELD - LOWER
5 - EXHAUST MANIFOLD - RIGHT
6 - OXYGEN SENSOR - UPSTREAM

(1) Position exhaust manifold on cylinder head and install bolts to center runner (cylinder #3) and initial tighten to 2.8 N·m (25 in. lbs.) (Fig. 165).

NOTE: Inspect crossover pipe fasteners for damage from heat and corrosion. The cross-over bolts are made of a special stainless steel alloy. If replacement is required, OEM bolts are highly recommended.

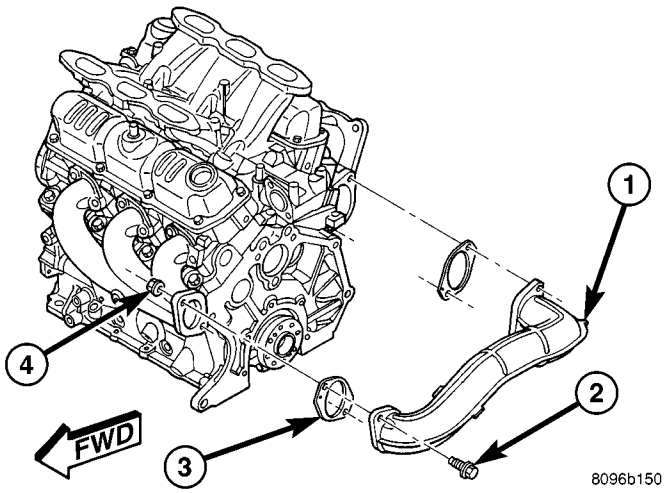


Fig. 166 CROSS-OVER PIPE

1 - CROSS-OVER PIPE
2 - BOLT
3 - GASKET
4 - FLAG NUT

(2) Using a new gasket, attach crossover pipe to exhaust manifold and tighten bolts to 41 N·m (30 ft. lbs.) (Fig. 166).

(3) Install the remaining manifold attaching bolts. Tighten all bolts to 23 N·m (200 in. lbs.).

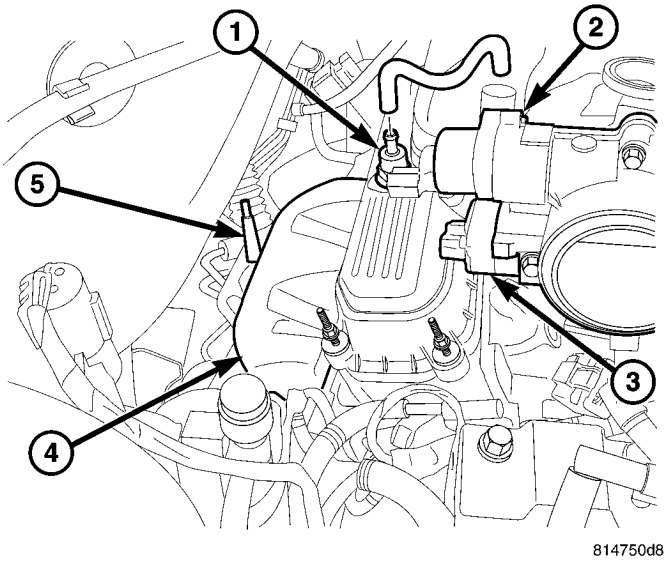


Fig. 167 RIGHT EXHAUST MANIFOLD

1 - PCV VALVE
2 - IAC MOTOR
3 - TP SENSOR
4 - RIGHT EXHAUST MANIFOLD
5 -OXYGEN SENSOR

(4) Install and connect upstream oxygen sensor (Fig. 167).

(5) Connect the spark plug wires to the spark plugs.

EXHAUST MANIFOLD - RIGHT (Continued)

(6) Connect the IAC,TPS and the EVAP hose to the throttle body.
(7) Install the air cleaner housing.
(8) Raise the vehicle.
(9) Attach catalytic converter pipe to exhaust manifold using new gasket and tighten bolts to 37 N·m (27 ft. lbs.)
(10) Connect battery negative cable.

EXHAUST MANIFOLD - LEFT

REMOVAL

(1) Disconnect battery negative cable.
(2) Remove bolts attaching crossover pipe to exhaust manifold (Fig. 168).

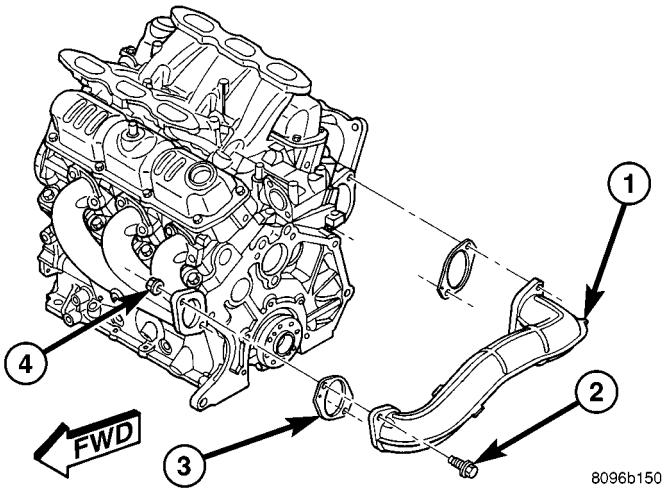


Fig. 168 CROSS-OVER PIPE

1 - CROSS-OVER PIPE
2 - BOLT
3 - GASKET
4 - FLAG NUT

(3) Disconnect left cylinder bank spark plug wires.
(4) Remove heat shield attaching bolts (Fig. 169).
(5) Remove bolts attaching exhaust manifold to cylinder head (Fig. 169).
(6) Remove the exhaust manifold (Fig. 169).
(7) Inspect and clean manifold. (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - INSPECTION) (Refer to 9 - ENGINE/MANIFOLDS/ EXHAUST MANIFOLD - CLEANING).

CLEANING

(1) Discard gasket (if equipped) and clean all surfaces of manifold and cylinder head.

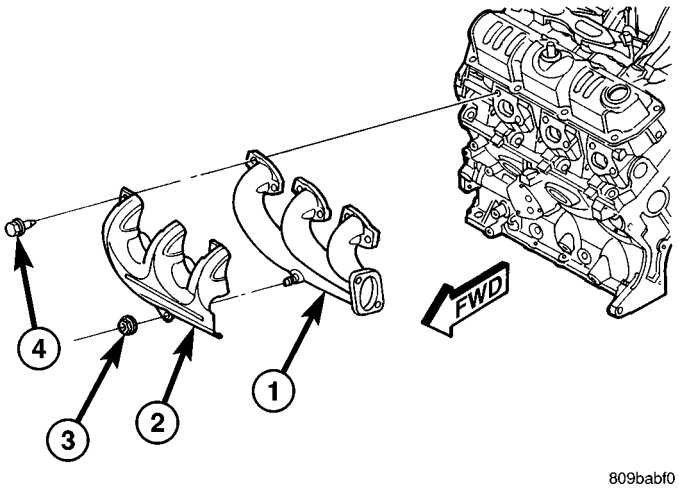


Fig. 169 EXHAUST MANIFOLD - LEFT

1 - EXHAUST MANIFOLD - LEFT BANK
2 - HEAT SHIELD
3 - NUT - HEAT SHIELD
4 - BOLT - EXHAUST MANIFOLD

INSPECTION

Inspect exhaust manifolds for damage or cracks and check distortion of the cylinder head mounting surface and exhaust crossover mounting surface with a straightedge and thickness gauge (Fig. 170).

Manifold surface flatness limits should not exceed 1.0 mm (0.039 in.).

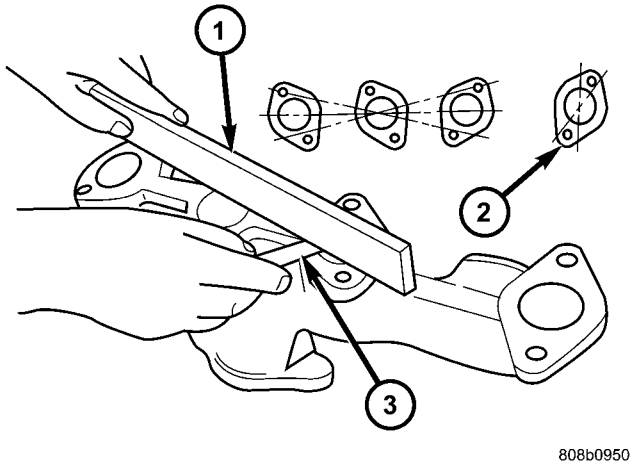


Fig. 170 Check Exhaust Manifold Mounting

1 - STRAIGHT EDGE
2 - CROSSOVER PIPE MOUNTING SURFACE
3 - FEELER GAUGE

EXHAUST MANIFOLD - LEFT (Continued)

INSTALLATION

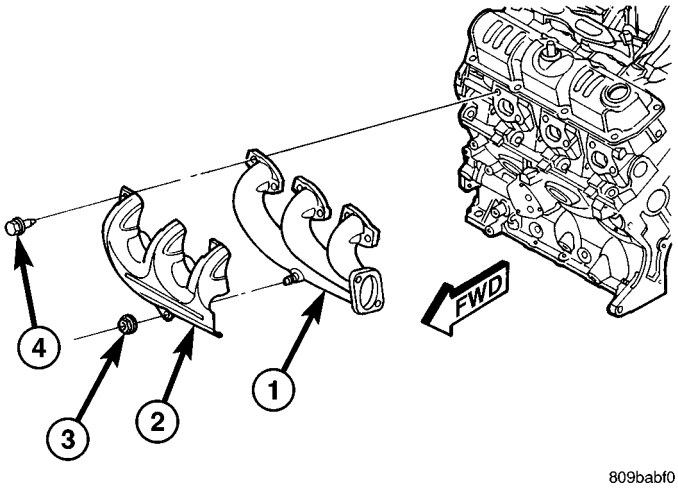


Fig. 171 EXHAUST MANIFOLD - LEFT

1 - EXHAUST MANIFOLD - LEFT BANK
2 - HEAT SHIELD
3 - NUT - HEAT SHIELD
4 - BOLT - EXHAUST MANIFOLD

(1) Position exhaust manifold on cylinder head (Fig. 171). Install bolts to center runner (cylinder #4) and initial tighten to 2.8 N·m (25 in. lbs.).

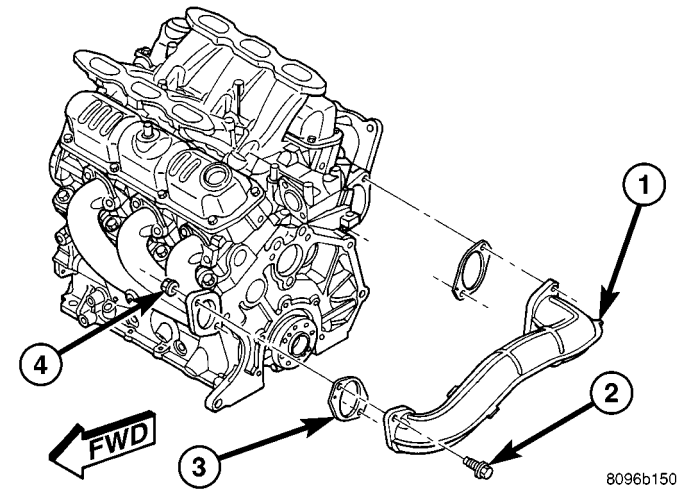


Fig. 172 CROSS-OVER PIPE

1 - CROSS-OVER PIPE
2 - BOLT
3 - GASKET
4 - FLAG NUT

(2) Using a new gasket, attach crossover pipe to exhaust manifold and tighten bolts to 41 N·m (30 ft. lbs.) (Fig. 172).

NOTE: Inspect crossover pipe fasteners for damage from heat and corrosion. The cross-over bolts are made of a special stainless steel alloy. If replacement is required, OEM bolts are highly recommended.

(3) Position heat shield on manifold (Fig. 171).

(4) Install the remaining manifold attaching bolts. Tighten all bolts to 23 N·m (200 in. lbs.).

(5) Install and tighten heat shield attaching nut to 12 N·m (105 in. lbs.) (Fig. 171).

(6) Connect battery negative cable.

VALVE TIMING

STANDARD PROCEDURE

STANDARD PROCEDURE - VALVE TIMING VERIFICATION

(1) Remove front cylinder head cover and all 6 spark plugs.

(2) Rotate engine until the #2 piston is at TDC of the compression stroke.

(3) Install a degree wheel on the crankshaft pulley.

(4) With proper adaptor, install a dial indicator into #2 spark plug hole. Using the indicator find TDC on the compression stroke.

(5) Position the degree wheel to zero.

(6) Remove dial indicator from spark plug hole.

(7) Place a 5.08 mm (0.200 in.) spacer between the valve stem tip of #2 intake valve and rocker arm pad. Allow tappet to bleed down to give a solid tappet effect.

(8) Install a dial indicator so plunger contacts the #2 intake valve spring retainer as nearly perpendicular as possible. Zero the indicator.

(9) Rotate the engine clockwise until the intake valve has lifted .254 mm (0.010 in.).

CAUTION: Do not turn crankshaft any further clockwise as intake valve might bottom and result in serious damage.

(10) Degree wheel should read 6 degrees BTDC to 6 degrees ATDC.

STANDARD PROCEDURE - MEASURING TIMING CHAIN WEAR

NOTE: This procedure must be performed with the timing chain cover removed (Refer to 9 - ENGINE/ VALVE TIMING/TIMING CHAIN COVER - REMOVAL).

(1) Position a scale next to timing chain so that any movement of chain may be measured (Fig. 173).

(2) Position a torque wrench and socket on the camshaft sprocket attaching bolt. Apply force in the direction of crankshaft rotation to take up slack to the following torque:

- 41 N·m (30 ft. lb.) with cylinder heads installed
- 20 N·m (15 ft. lb.) with cylinder heads removed

VALVE TIMING (Continued)

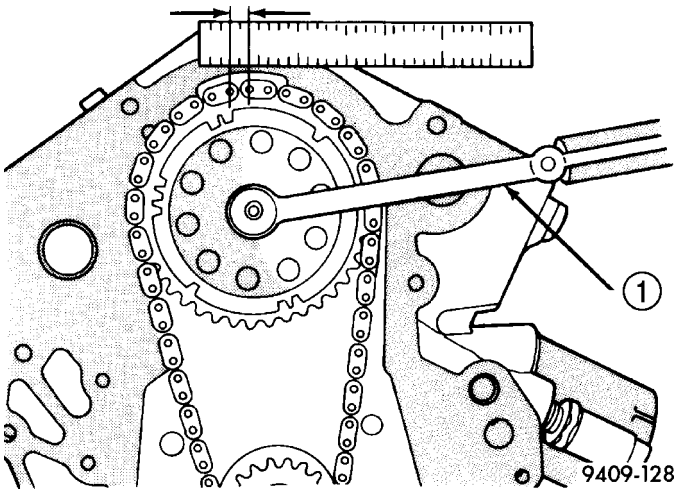


Fig. 173 Measuring Timing Chain Wear

1 - TORQUE WRENCH

NOTE: With torque applied to the camshaft sprocket bolt, crankshaft should not be permitted to move. It may be necessary to block crankshaft to prevent rotation.

(3) Holding a measuring scale along edge of chain links (Fig. 173).

(4) Apply force in the reverse direction to the following torque:

- 41 N·m (30 ft. lb.) with cylinder heads installed
- 20 N·m (15 ft. lb.) with cylinder heads removed

(5) Measure amount of sprocket/chain movement.

(6) Install a new timing chain and sprockets if movement exceeds 3.175 mm (1/8 in.).

TIMING CHAIN COVER

REMOVAL

(1) Perform the fuel pressure relief procedure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).

(2) Disconnect negative cable from battery.

(3) Evacuate air conditioning (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE).

(4) Drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(5) Remove the air cleaner assembly (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

(6) Loosen the water pump pulley bolts (Fig. 175).

(7) Remove the accessory drive belt and belt tensioner (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(8) Remove power steering pump fasteners and set pump aside (Fig. 175).

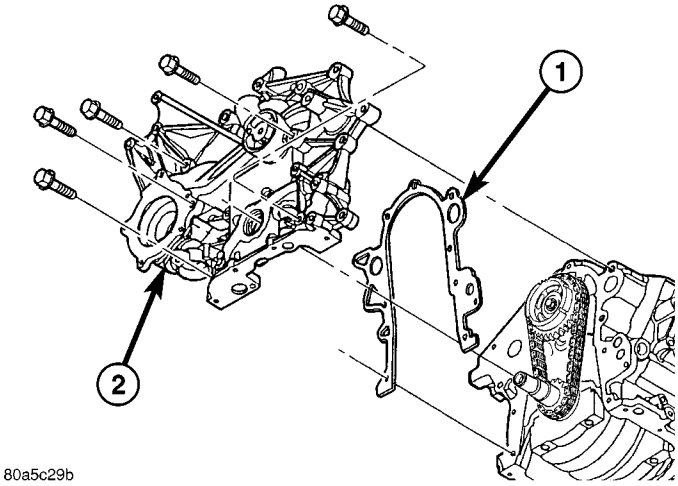


Fig. 174 TIMING CHAIN COVER AND GASKET

1 - GASKET
2 - TIMING CHAIN COVER

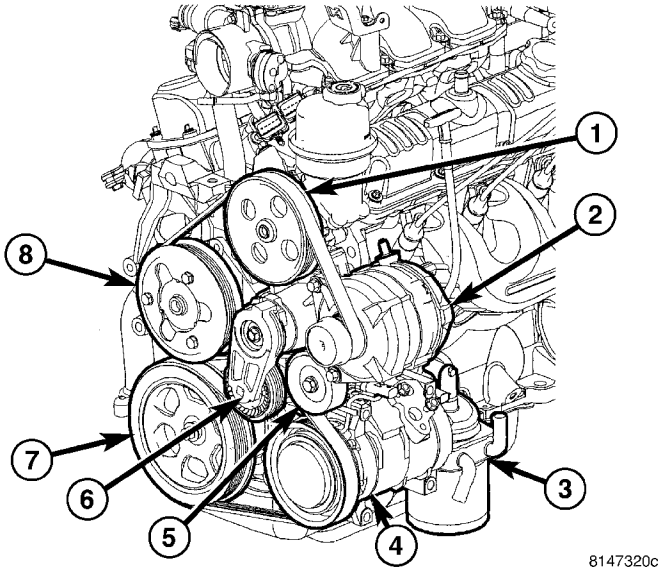


Fig. 175 ACCESSORY DRIVE BELT

1 - POWER STEERING
2 - GENERATOR
3 - ENGINE OIL COOLER
4 - AIR CONDITIONING COMPRESSOR
5 - IDLER PULLEY
6 - BELT TENSIONER
7 - CRANKSHAFT DAMPER
8 - WATER PUMP

(9) Remove the generator (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - REMOVAL).

(10) Disconnect the air conditioning compressor clutch electrical connector and suction discharge hoses (Fig. 175).

(11) Remove the oil level indicator tube.

(12) Raise vehicle on hoist.

(13) Drain engine oil.

(14) Remove right wheel and inner splash shield.

TIMING CHAIN COVER (Continued)

(15) Remove oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

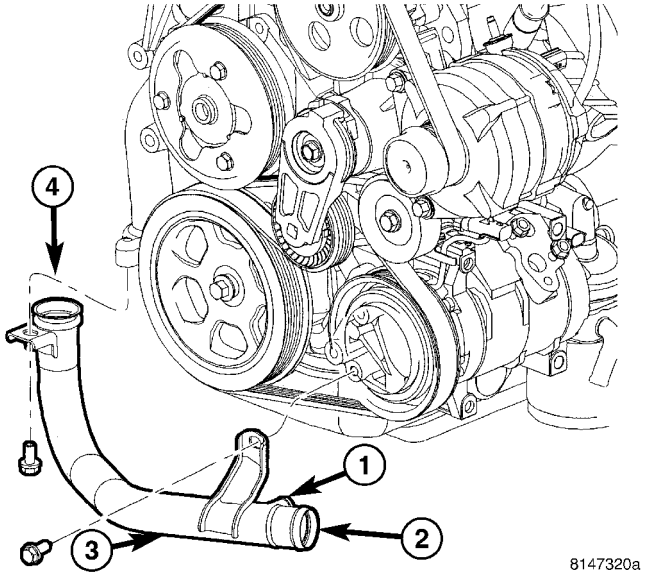


Fig. 176 COOLANT CROSS OVER PIPE

1 - FLOW TO OIL COOLER
2 - FLOW TO RADIATOR
3 - PIPE
4 - FLOW FROM WATER PUMP

(16) Disconnect the lower radiator hose and oil cooler hose at the coolant cross over pipe (Fig. 176).

(17) Separate the power steering lines from the A/C bracket and bracket at cradle.

(18) Separate the air conditioning compressor from the engine and set aside.

(19) Remove crankshaft vibration damper using special tool #8454 and insert #8450. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(20) Remove the coolant cross over pipe fasteners and pipe (Fig. 176).

(21) Remove accessible lower timing cover fasteners through the wheel well (Fig. 174).

(22) Remove camshaft position sensor from timing chain cover (Fig. 177).

(23) Remove the water pump, for cover removal clearance. (Refer to 7 - COOLING/ENGINE/WATER PUMP - REMOVAL).

(24) Support the engine with a floor jack and remove the upper engine mount assembly.

(25) Remove the timing chain cover fasteners and remove timing chain cover (Fig. 174).

INSTALLATION

CAUTION: Crankshaft oil seal must be removed to insure correct oil pump engagement.

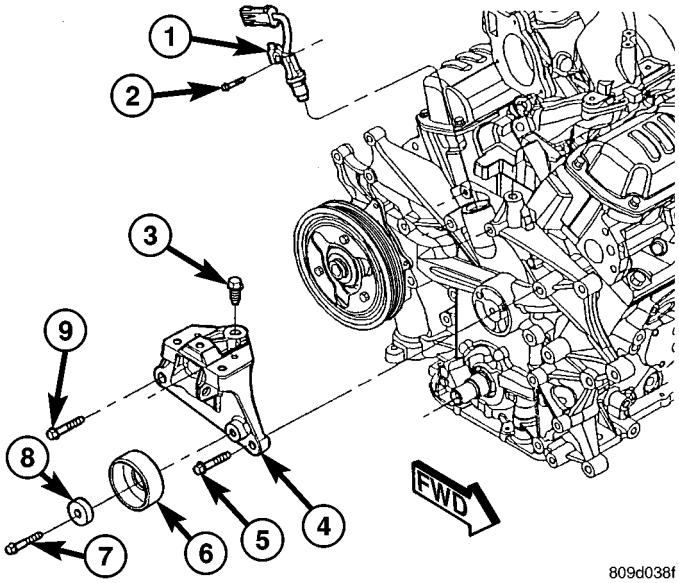


Fig. 177 ENGINE MOUNT BRACKET

1 - CAMSHAFT SENSOR
2 - BOLT - CAMSHAFT SENSOR
3 - BOLT - MOUNT BRACKET (VERTICAL)
4 - BRACKET - ENGINE MOUNT
5 - BOLT - MOUNT BRACKET (HORIZONTAL)
6 - PULLEY - IDLER
7 - BOLT - IDLER PULLEY
8 - SPACER - IDLER PULLEY BOLT
9 - BOLT - MOUNT BRACKET (HORIZONTAL)

(1) Be sure mating surfaces of chain case cover and cylinder block are clean and free from burrs.

NOTE: DO NOT USE SEALER ON COVER GASKET

(2) Position new gasket on timing cover (Fig. 178). Adhere new gasket to chain case cover, making sure that the lower edge of the gasket is 0.5 mm (0.020 in.) beyond the lower edge of the cover.

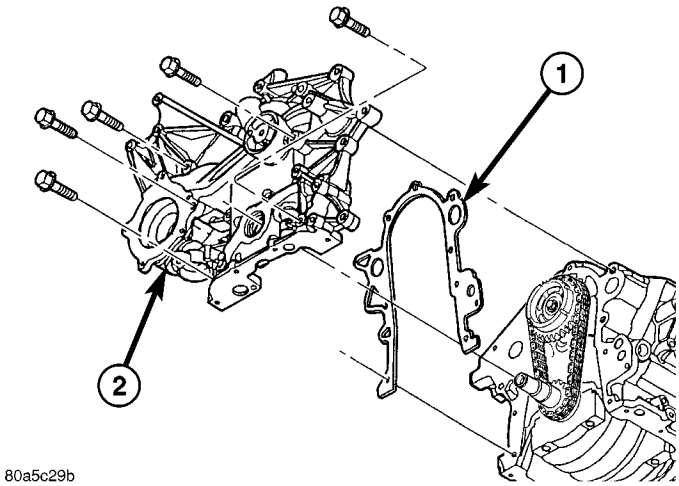


Fig. 178 TIMING CHAIN COVER AND GASKET

1 - GASKET
2 - TIMING CHAIN COVER

TIMING CHAIN COVER (Continued)

(3) Rotate crankshaft so that the oil pump drive flats are in the vertical position.

(4) Position oil pump inner rotor so the mating flats are in the same position as the crankshaft drive flats (Fig. 178).

CAUTION: Make sure the oil pump is engaged on the crankshaft correctly or severe damage may result.

(5) Install timing cover (Fig. 178).

(6) Install timing chain cover bolts. Tighten M8 bolts to 27 N·m (20 ft. lbs.) and M10 bolts to 54 N·m (40 ft. lbs.) (Fig. 179).

(7) Install crankshaft front oil seal. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - FRONT - INSTALLATION)

(8) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(9) Install the coolant cross over pipe (Fig. 180).

(10) Install A/C compressor.

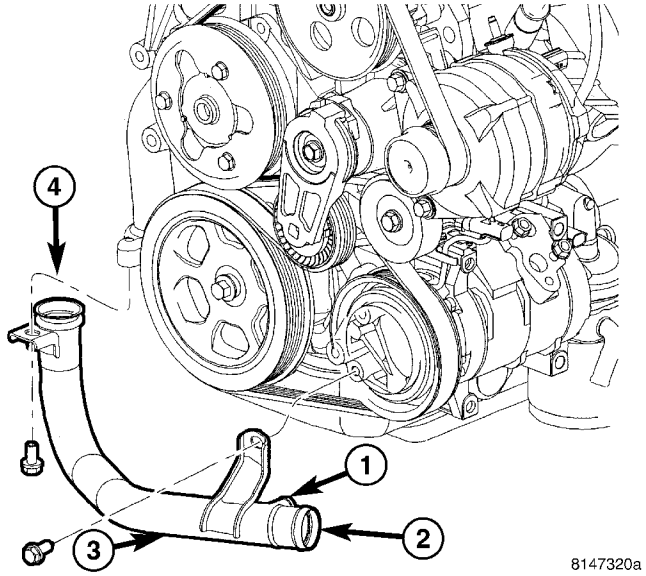


Fig. 180 COOLANT CROSS OVER PIPE

1 - FLOW TO OIL COOLER
2 - FLOW TO RADIATOR
3 - PIPE
4 - FLOW FROM WATER PUMP

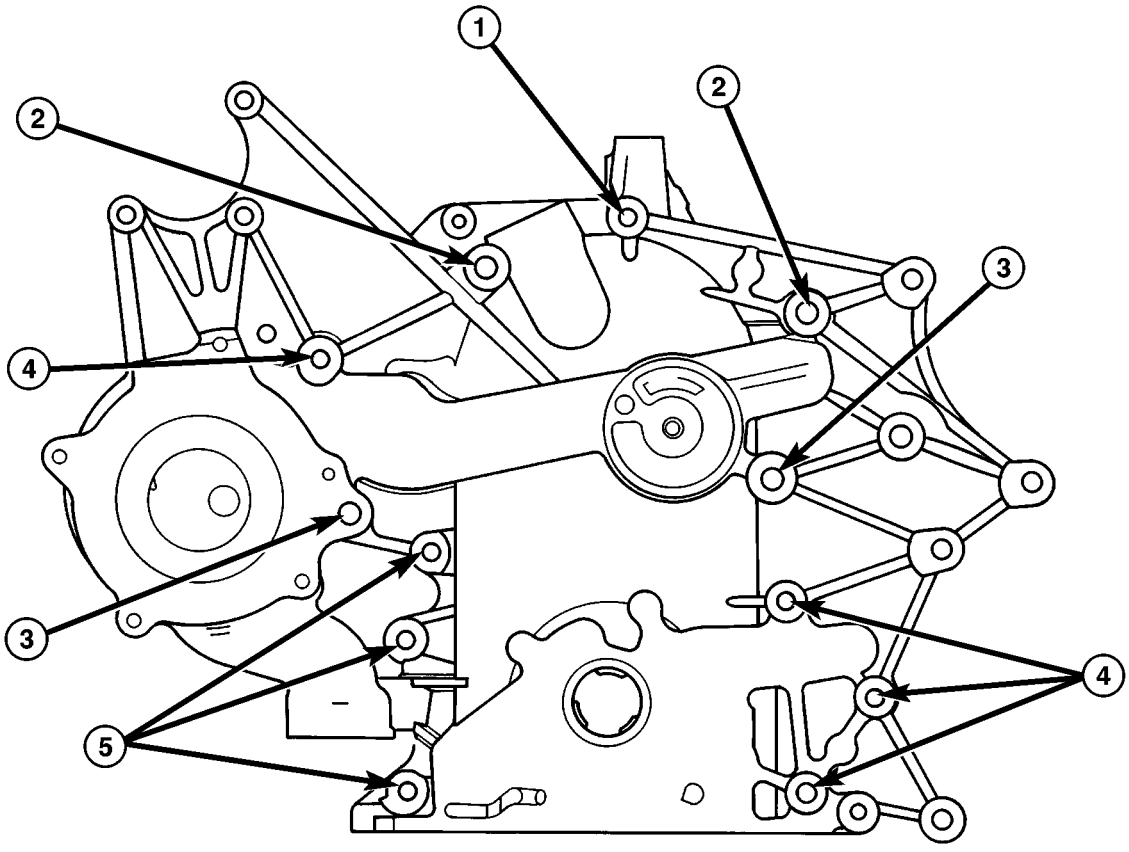


Fig. 179 TIMING CHAIN COVER BOLT LOCATIONS

1 - BOLT - M8 x 1.25 x 95
2 - BOLT - M10 x 1.5 x 100
3 - BOLT - M10 x 1.5 x 85
4 - BOLT - M8 x 1.25 x 80
5 - BOLT - M8 x 1.25 x 45

TIMING CHAIN COVER (Continued)

(11) Position and install the power steering line hold downs at the cradle and A/C bracket.
(12) Connect the coolant hoses to the coolant cross over pipe.
(13) Install the inner fender splash shield.
(14) Install oil pump pick-up tube with new O-ring. Tighten attaching bolt to 28 N·m (250 in. lbs.).
(15) Install the oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).
(16) Lower the vehicle.

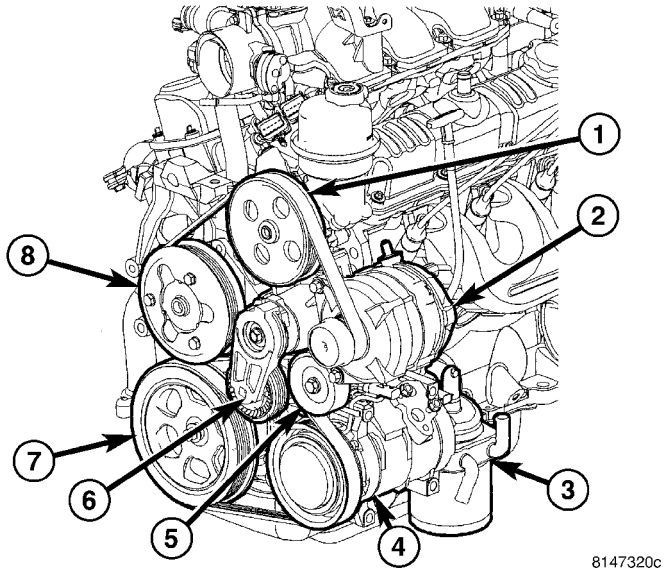


Fig. 181 ACCESSORY DRIVE BELT

1 - POWER STEERING
2 - GENERATOR
3 - ENGINE OIL COOLER
4 - AIR CONDITIONING COMPRESSOR
5 - IDLER PULLEY
6 - BELT TENSIONER
7 - CRANKSHAFT DAMPER
8 - WATER PUMP

(17) Install water pump and pulley. (Refer to 7 - COOLING/ENGINE/WATER PUMP - INSTALLATION)
(18) Install camshaft position sensor (Refer to 8 - ELECTRICAL/IGNITION CONTROL/CAMSHAFT POSITION SENSOR - INSTALLATION).
(19) Connect the A/C electrical connector and the suction, discharge hoses (Fig. 181).
(20) Install the oil level indicator tube.
(21) Install the generator (Fig. 181).
(22) Install the power steering pump (Fig. 181).
(23) Install the idler pulley (Fig. 181).
(24) Install the accessory drive belt (Fig. 181)
(25) Install the upper engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/RIGHT MOUNT - INSTALLATION).
(26) Fill crankcase with engine oil to proper level.
(27) Fill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)
(28) Evacuate and recharge A/C.
(29) Check and refill all fluid levels.
(30) Connect negative cable to battery.

TIMING CHAIN AND SPROCKETS

REMOVAL

REMOVAL - TIMING CHAIN AND CAMSHAFT SPROCKET

(1) Disconnect negative cable from battery.
(2) Remove the timing chain cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)
(3) Rotate engine by turning crankshaft until the timing marks are aligned as shown in (Fig. 182).
(4) Remove camshaft sprocket attaching bolt.
(5) Remove the timing chain with camshaft sprocket.
(6) Remove the crankshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

REMOVAL - CRANKSHAFT SPROCKET

(1) Remove the timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)
(2) Using Special Tools 8539, 5048-6, and 5048-1, remove the crankshaft sprocket while holding the crankshaft from turning (Fig. 183). Be careful not to damage the crankshaft surfaces.

INSTALLATION

INSTALLATION - CRANKSHAFT SPROCKET

(1) Position the sprocket on the crankshaft (timing mark out) with the timing slot aligned with the timing pin.
(2) Install sprocket using Special Tool 8452 (Fig. 184). Install sprocket until it is fully seats on the crankshaft.
(3) Install the timing chain and camshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

INSTALLATION - TIMING CHAIN AND CAMSHAFT SPROCKET

(1) Rotate crankshaft so the timing arrow is to the 12 o'clock position (Fig. 182).

TIMING CHAIN AND SPROCKETS (Continued)

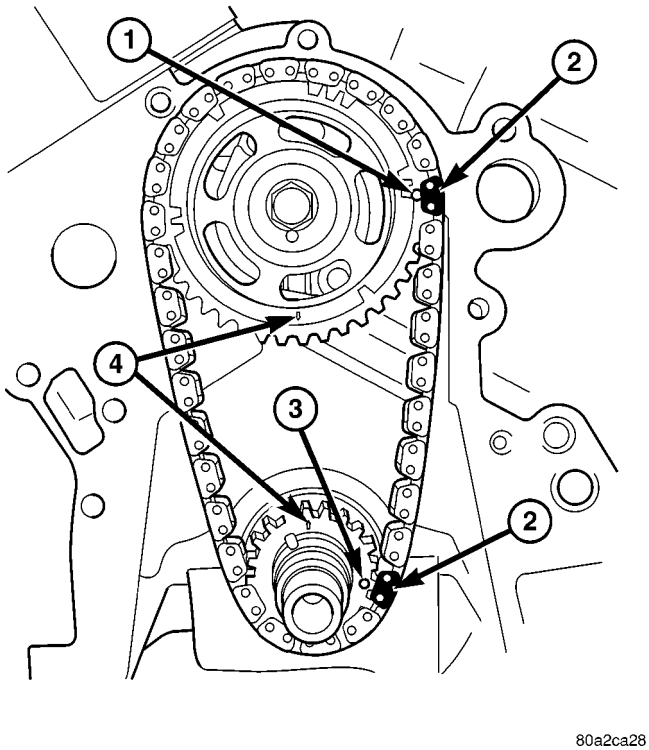


Fig. 182 TIMING MARKS

1 - CAMSHAFT SPROCKET TIMING MARK (DOT)
2 - PLATED LINK
3 - CRANKSHAFT SPROCKET TIMING MARK (DOT)
4 - ARROWS

NOTE: Lubricate timing chain and sprockets with clean engine oil before installation.

(2) While holding camshaft sprocket and chain in hand, place timing chain around the sprocket, aligning the plated link with the dot on the sprocket. Position the timing arrow to the 6 o'clock position (Fig. 182).

(3) Place timing chain around crankshaft sprocket with the plated link lined up with the dot on the sprocket. Install camshaft sprocket into position.

(4) Use a straight edge to check alignment of timing marks.

(5) Install camshaft sprocket bolt and washer. Tighten bolt to 54 N·m (40 ft. lbs.).

(6) Rotate crankshaft 2 revolutions and check timing mark alignment (Fig. 182). If timing marks do not line up, remove camshaft sprocket and realign.

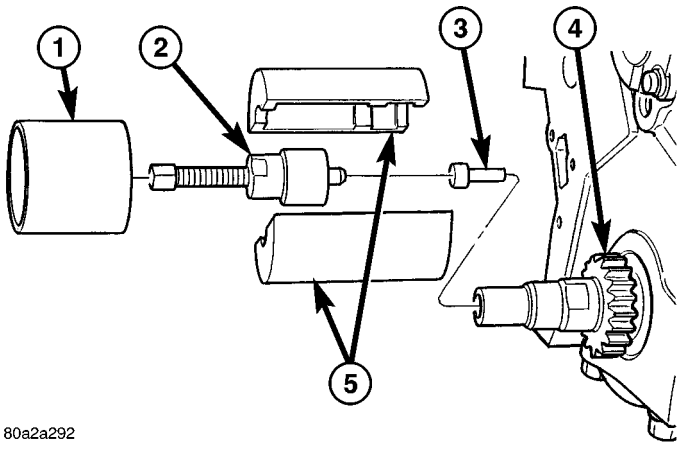


Fig. 183 CRANKSHAFT SPROCKET - REMOVAL

1 - SPECIAL TOOL 5048-6
2 - SPECIAL TOOL 5048-1
3 - SPECIAL TOOL 8450
4 - CRANKSHAFT SPROCKET
5 - SPECIAL TOOL 8539

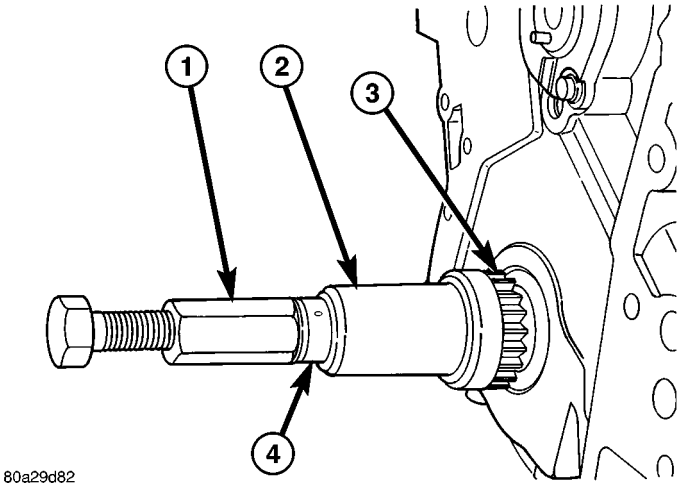


Fig. 184 CRANKSHAFT SPROCKET - INSTALLATION

1 - SPECIAL TOOL 8452-3
2 - SPECIAL TOOL 8452-1
3 - CRANKSHAFT SPROCKET
4 - THRUST BEARING / WASHER

(7) Install the timing chain cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)

(8) Connect negative cable to battery.

EXHAUST SYSTEM

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EXHAUST SYSTEM

DESCRIPTION

The exhaust system consists of a catalytic converter, muffler, and a resonator with connecting pipes in-between. The system is serviced in three sections; the catalytic converter , the muffler, and the resonator and tailpipe (Fig. 1). A torca clamp is used to connect the joint between the muffler and catalytic converter. A torca clamp is used to connect the muffler and the resonator and tailpipe. Support hanger rods with rubber isolators are used to support and isolate the exhaust system. A flexible joint, integral to the catalytic converter, allows for engine movement. A second flexible joint is located between the muffler and the resonator/tailpipe assemble to allow for exhaust system movement. The exhaust system is tuned for each vehicle/powertrain combination.

EXHAUST SYSTEM (Continued)

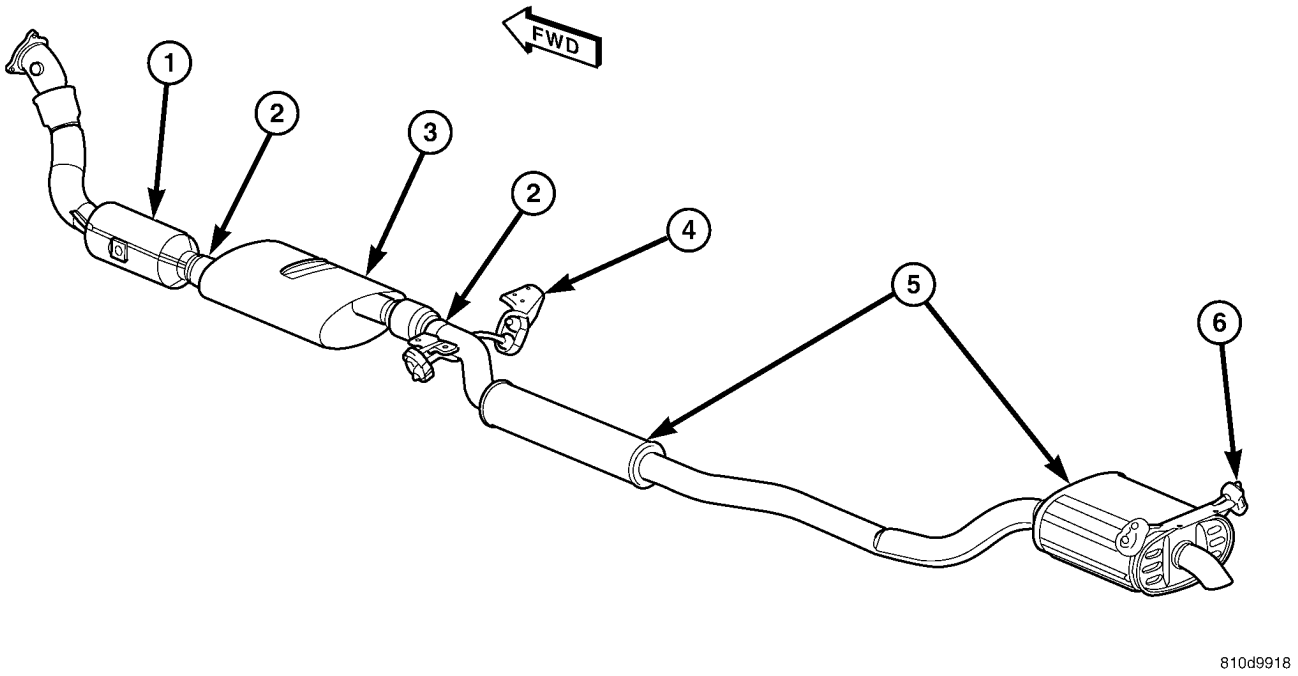


Fig. 1 EXHAUST SYSTEM - TYPICAL (ALL)

1 - CATYLITIC CONVERTER
2 - TORCA CLAMP
3 - MUFFLER
4 - ISOLATOR
5 - RESONATOR/TAILPIPE

EXHAUST SYSTEM (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - EXCESSIVE EXHAUST SYSTEM NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
EXCESSIVE EXHAUST NOISE (UNDER HOOD)	1. Exhaust manifold cracked or broken.	1. Replace manifold.
	2. Manifold to cylinder head leak.	2. Tighten manifold and/or replace gasket.
	3. EGR Valve to manifold gasket leakage.	3. Tighten fasteners or replace gasket.
	4. EGR Valve to EGR tube gasket leakage.	4. Tighten fasteners or replace gasket.
	5. EGR tube to manifold tube leakage.	5. Tighten tube nut.
	6. Exhaust down pipe to manifold leak.	6. Tighten joint fasteners and/or replace gasket.
	7. Exhaust flex-joint.	7. Replace catalytic converter assembly.
	8. Pipe and shell noise from front exhaust pipe.	8. Characteristic of single wall pipe.
EXCESSIVE EXHAUST NOISE	1. Leak at exhaust pipe joints.	1. Tighten clamps at leaking joints.
	2. Burned or rusted out muffler assembly or exhaust pipe.	2. Replace muffler resonator tailpipe assembly or exhaust pipe with catalytic converter assembly.
	3. Burned or rusted out resonator.	3. Replace muffler resonator tailpipe assembly.
	4. Restriction in exhaust system.	4. Perform Exhaust System Restriction Check. Replace component as necessary.
	5. Converter material in muffler.	5. Replace muffler and converter assemblies. Check fuel injection and ignition systems for proper operation.
	6. Substrate breakage in catalyltic converter	6. Replace catalytic converter. Check fuel injection system and ignition system for proper operation. Check manifold crossover pipe for damage.

EXHAUST SYSTEM (Continued)

DIAGNOSIS AND TESTING - EXHAUST SYSTEM RESTRICTION CHECK

Exhaust system restriction can be checked by measuring back pressure using the DRB III® and PEP module pressure tester.

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

(1) Disconnect and remove the upstream (before catalytic converter) oxygen sensor.
(2) Install the Exhaust Back Pressure Fitting Adaptor CH8519.
(3) Connect the Low Pressure Sensor (15 psi) CH7063 to the back pressure fitting.
(4) Following the PEP module instruction manual, connect all required cables to the DRB III® and PEP module. Select the available menu options on the DRBIII® display screen for using the digital pressure gauge function.
(5) Apply the park brake and start the engine.
(6) With transmission in Park or Neutral, raise engine speed to 2000 RPM. Monitor the pressure readings on the DRBIII®. Back pressure should not exceed specified limit. Refer to specification in table below EXHAUST BACK PRESSURE LIMITS.

NOTE: For applications with dual catalytic converters, repeat test on opposite converter using the previous steps.

(7) If pressure exceeds maximum limits, inspect exhaust system for restricted component. Replace component(s) as necessary.

EXHAUST BACK PRESSURE LIMITS

Exhaust Back Pressure Limit (Max)	
Vehicle in Park/Neutral (no load) @2000 RPM	3.45 Kpa (0.5 psi)

REMOVAL - EXHAUST SYSTEM

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

It is easier to service the exhaust system components (Fig. 1) when system is removed from the vehicle.
(1) Raise vehicle on hoist.
(2) Disconnect the two oxygen sensor connectors.
(3) Remove the nuts at the exhaust maifold.

CAUTION: At this time, the exhaust system is held by only isolators. Support the exhaust system underneath the front resonator and the muffler while the isolators are being removed. Do not use any tools to remove the isolators, remove by hand only. Soapy water or silicone-based spray may be used to assist removal. Do Not use a petroleum-based lubricant on the isolators. This will damage the rubber material.

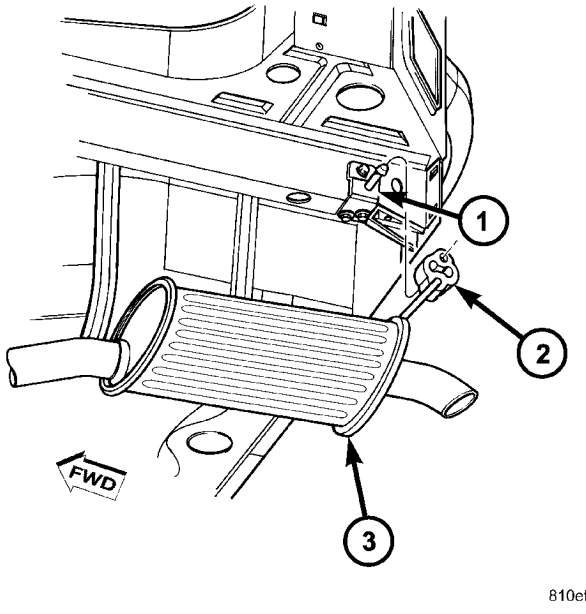


Fig. 2 Rubber Isolator Hanger to Body Support Bracket

1 - SUPPORT BRACKET
2 - ISOLATOR
3 - RESONATOR/PIPE

(4) Support exhaust system with jack stand.
(5) Remove the rubber isolators from the support brackets (Fig. 2).
(6) Lower exhaust system and lay on the ground.

NOTE: Care must be taken not to scratch the black paint on the rear of the muffler (Fig. 2).

EXHAUST SYSTEM (Continued)

NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts be used for the following reasons:

- To ensure proper alignment with other parts in the system.
- Provide acceptable exhaust noise levels and does not change exhaust system back pressure that could affect emissions and performance.

INSTALLATION - EXHAUST SYSTEM

(1) Install and loose assemble the front resonator to the converter pipes.

(2) Place the exhaust system on two supports (one on side of muffler, one behind the resonator). Connect the system to the exhaust manifold. Do not tighten the nuts.

(3) Install the system's rubber isolators onto the support brackets (Fig. 2).

(4) Visually inspect the isolators. They should be straight when viewing from front to back of the vehicle. Working from the front of system, align each component to maintain position and proper clearance with underbody parts.

(5) Tighten the catylitic converter-to-exhaust manifold nuts to 37 N·m (325 in. lbs.) and torca clamp to 54 N·m (459 in. lbs.).

(6) Lower the vehicle.

(7) Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.

(8) Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

SPECIFICATIONS -

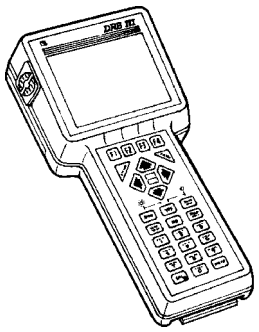
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Torca Clamp Bolt	54	40	-
Heat Shield-to-Body Bolts (Front)	2.03	-	18
Heat Shield -to-body Bolts (Rear)	2.59	-	23
Catalytic Conveter-to-Exhaust Manifold Bolts	36	27	-

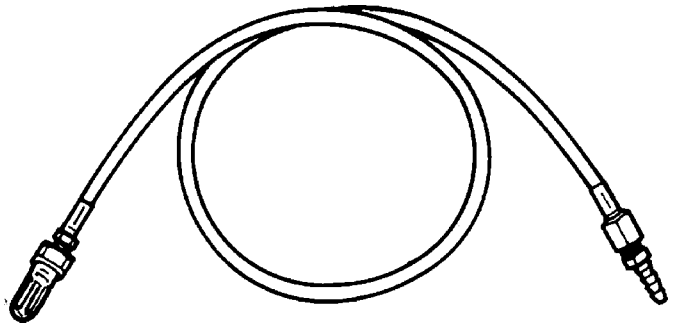
EXHAUST SYSTEM (Continued)

SPECIAL TOOLS

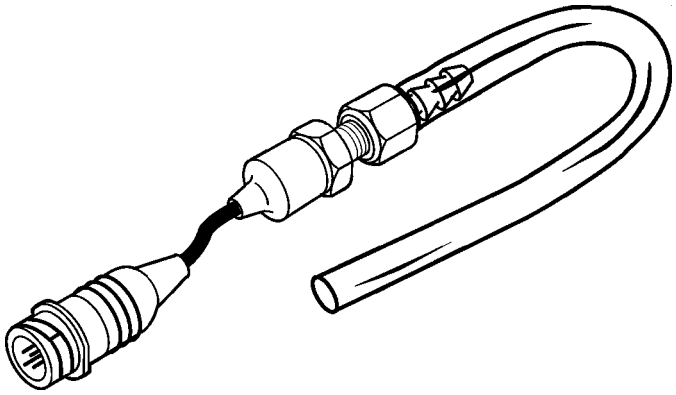
EXHAUST SYSTEM



DRB III & PEP Module - OT-CH6010A



BACK PRESSURE TEST ADAPTER - CH8519



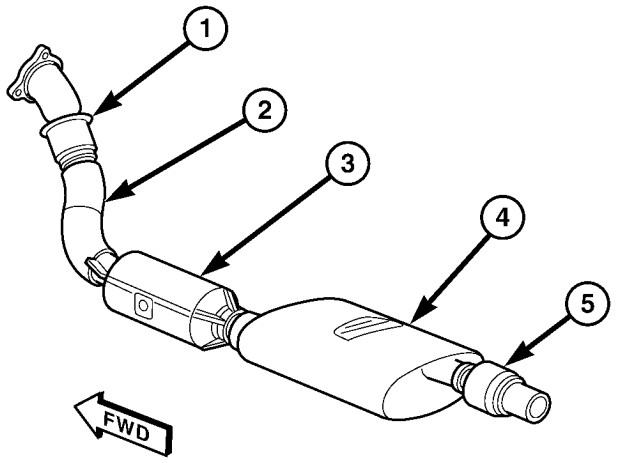
Pressure Transducer CH7063

CATALYTIC CONVERTER

DESCRIPTION

The toe board three-way catalytic converter is connected to the exhaust manifold by the use of a down pipe assembly. The outlet connects to the muffler inlet pipe and is secured with a torca clamp (Fig. 3).

CAUTION: When servicing, care must be exercised not to dent or bend the bellows or bellows cover of the flex-joint. Should this occur, the flex-joint will eventually fail and require the catalytic converter be replaced.



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Fig. 3 FLEX-JOINT - TYPICAL

1 - FLEXIBLE BELLOWS
2 - DOWN PIPE
3 - CATALYTIC CONVERTER
4 - MUFFLER
5 - FLEXIBLE BELLOWS

OPERATION

The three-way catalytic converter simultaneously converts three exhaust emissions into harmless gases. Specifically, HC and CO emissions are converted into water (H2O) and carbon dioxide (CO2). Oxides of Nitrogen (NOx) are converted into elemental Nitrogen (N) and water. The three-way catalyst is most efficient in converting HC, CO and NOx at the stoichiometric air fuel ratio of 14.7:1.

The oxygen content in a catalyst is important for efficient conversion of exhaust gases. When a high oxygen content (lean) air/fuel ratio is present for an extended period, oxygen content in a catalyst can reach a maximum. When a rich air/fuel ratio is present for an extended period, the oxygen content in the catalyst can become totally depleted. When this occurs, the catalyst fails to convert the gases. This is known as catalyst ″punch through.″

Catalyst operation is dependent on its ability to store and release the oxygen needed to complete the emissions-reducing chemical reactions. As a catalyst deteriorates, its ability to store oxygen is reduced. Since the catalyst's ability to store oxygen is somewhat related to proper operation, oxygen storage can be used as an indicator of catalyst performance. Refer to the appropriate Diagnostic Information for diagnosis of a catalyst related Diagnostic Trouble Code (DTC).

CATALYTIC CONVERTER (Continued)

The combustion reaction caused by the catalyst releases additional heat in the exhaust system, causing temperature increases in the area of the reactor under severe operating conditions. Such conditions can exist when the engine misfires or otherwise does not operate at peak efficiency. **Do not** remove spark plug wires from plugs or by any other means short out cylinders, if exhaust system is equipped with a catalytic converter. Failure of the catalytic converter can occur due to temperature increases caused by unburned fuel passing through the converter. This deterioration of the catalyst core can result in excessively high emission levels, noise complaints, and exhaust restrictions.

Unleaded gasoline must be used to avoid ruining the catalyst core. Do not allow engine to operate above 1200 RPM in neutral for extended periods over 5 minutes. This condition may result in excessive exhaust system/floor pan temperatures because of no air movement under the vehicle.

The flex joint allows flexing as the engine moves, preventing breakage that could occur from the back-and-forth motion of a transverse mounted engine.

CAUTION: Due to exterior physical similarities of some catalytic converters with pipe assemblies, extreme care should be taken with replacement parts. There are internal converter differences required in some parts of the country (particularly vehicles built for States with strict emission requirements) and between model years.

REMOVAL

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

(1) Disconnect negative battery cable at remote jumper terminal located at right strut tower.
(2) Raise vehicle on hoist.
(3) Remove exhaust system (Refer to 11 - EXHAUST SYSTEM - REMOVAL).
(4) Remove the torca clamp.
(5) Seperate the catalyltic converter from the muffler.
(6) Clean ends of the catalytic converter and muffler to assure mating of all parts. Discard broken or worn insulators, rusted clamps, supports and attaching parts. **When replacement is required on any component of the exhaust system, it is important that original equipment parts (or equivalent) be used for the following conditions:**

INSTALLATION

(1) Position torca band clamp on the catalytic converter.
(2) Install the muffler into the catalytic converter until guide pin seats in slot on muffler.
(3) Tighten torca clamp to 54 N·m (480 in. lbs.).
(4) Install exhaust system (Refer to 11 - EXHAUST SYSTEM - INSTALLATION).

CROSS-OVER PIPE

REMOVAL

(1) Disconnect negative cable from battery.
(2) Remove the fasteners attaching the left bank manifold connection to cross-over pipe (Fig. 4).
(3) Loosen and remove the lower fastener.
(4) Remove the cross-over pipe support fastener.
(5) Remove the cross-over pipe (Fig. 4).
(6) Remove gaskets and discard (Fig. 4).

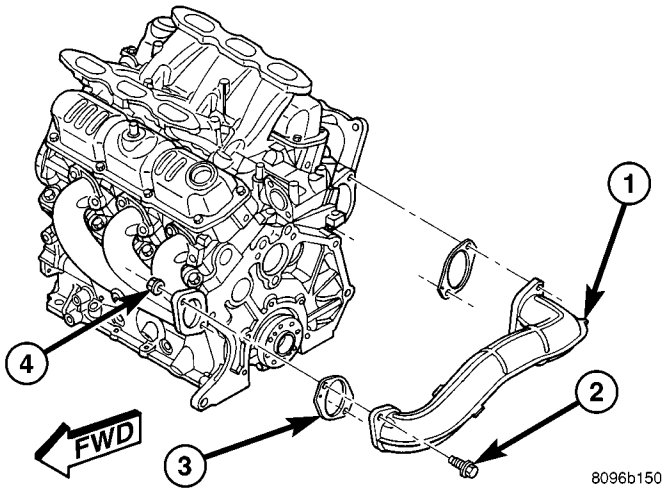


Fig. 4 CROSS-OVER PIPE

1 - CROSS-OVER PIPE
2 - BOLT
3 - GASKET
4 - FLAG NUT

INSTALLATION

(1) Position cross-over pipe to the manifold connections.
(2) Position new gaskets and loosely install fasteners.
(3) Tighten fastener to 41 N·m (30 ft. lbs.).
(4) Install the cross-over support fastener. Tighten fastener to 41 N·m (30 ft. lbs.).
(5) Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.

CROSS-OVER PIPE (Continued)

(6) Check the exhaust system for contact with the body panels. Make the necessary ajustments, if needed.

HEAT SHIELDS

DESCRIPTION

The exhaust system heat shields (Fig. 5), (Fig. 6), or (Fig. 7) are attached to the under body of the vehicle.

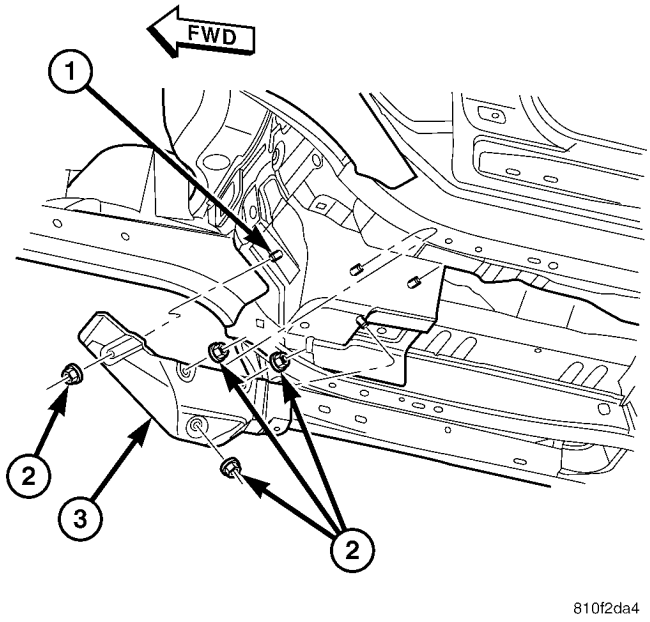


Fig. 5 Forward Catalytic Converter Heat Shield

1 - MOUNTING STUD
2 - NUT (QTY. 4)
3 - HEAT SHEILD

MUFFLER

REMOVAL - FRONT

(1) Raise vehicle on a body contact type hoist.

NOTE: To provide removal clearance between muffler/resonator pipe and rear axle parts, the rear suspension must be relieved of all body weight.

(2) Apply a penetrating oil to flange nuts and torca clamp nuts of component requiring removal.

CAUTION: When servicing the exhaust system, care must be exercised not to dent or bend the bellows of the flex-joint. Should this occur, the flex-joint will eventually fail, requiring replacement of the catalytic converter.

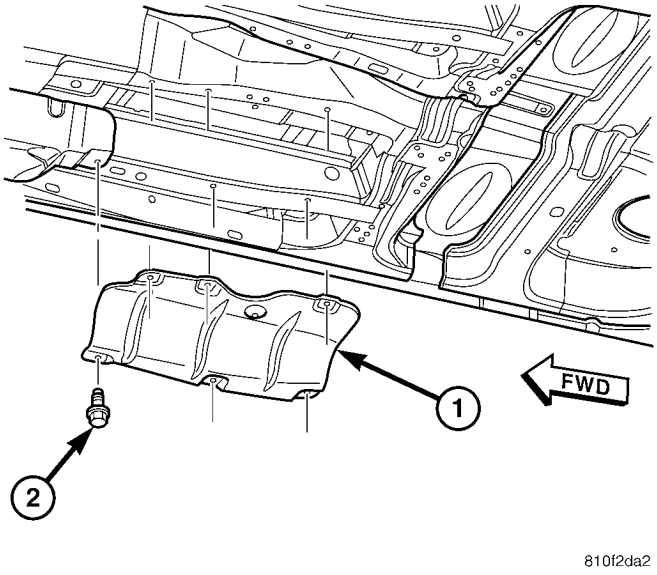


Fig. 6 Muffler Heat Shield - FWD

1 - HEAT SHIELD - MUFFLER
2 - SCREW (QTY. 6)

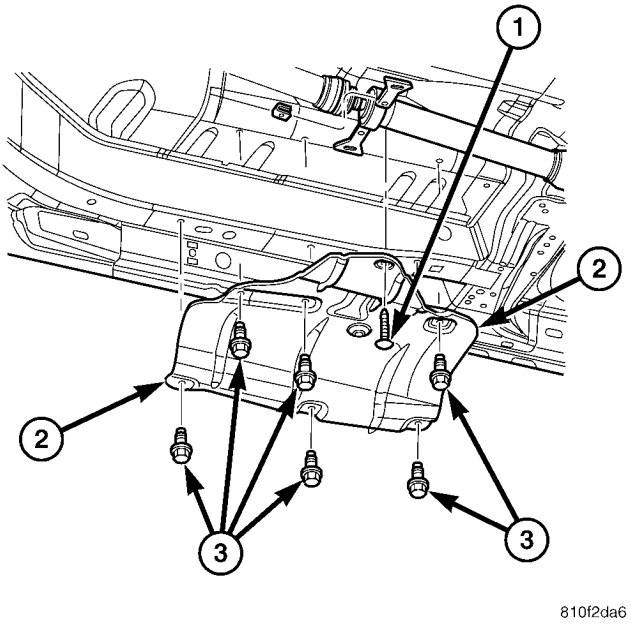


Fig. 7 Muffler Heat Shield - AWD

1 - PUSH PIN
2 - HEAT SHIELD
3 - Screws (QTY 6)

(3) Remove resonator/muffler assembly (Refer to 11 - EXHAUST SYSTEM/RESONATOR - REMOVAL).

(4) Loosen the torca clamp.

MUFFLER (Continued)

(5) Seperate the muffler from the catalytic converter and remove from the vehicle.

INSTALLATION - FRONT

(1) Position the torca clamp on the catalytic converterr.

(2) Install the muffler into the catalytic converter until the guide pin on the converter seats into the slot on the muffler.

(3) Install the outlet pipe of the muffler into the inlet pipe of the resonator/muffler assembly with 44.95mm (1.77 in.) of insertion.

(4) Tighten tocra clamp nut to 54 N·m (40 ft. lbs.).

(5) Install the resonator/muffler assembly (Refer to 11 - EXHAUST SYSTEM/RESONATOR - INSTALLATION).

(6) Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.

(7) Check the exhaust system for contact with the body panels. Make the necessary ajustments, if needed.

RESONATOR

REMOVAL

(1) Raise vehicle on a body contact type hoist.

NOTE: To provide removal clearance between muffler/resonator pipe and rear axle parts, the rear suspension must be relieved of all body weight.

(2) Apply a penetrating oil to torca of component requiring removal.

CAUTION: When servicing the exhaust system, care must be exercised not to dent or bend the bellows of the flex-joint. Should this occur, the flex-joint will eventually fail, requiring replacement of the catalytic converter.

(3) Loosen the torca clamp nut (Fig. 1).

(4) Support the muffler/resonator assembly.

(5) Remove the insulators from the muffler/resonator assembly and remove from the vehicle.

NOTE: Care must be taken not to scratch the black paint on the rear of the resonator/muffler assembly.

INSTALLATION

(1) Support the muffler/resonator assembly under the vehicle.

(2) Install the insulators.

(3) Position torca clamp on the resonator/muffler assembly.

(4) Align paint marks and insert the resonator/muffler assembly into the muffler outlet pipe 44.95mm (1.77 in.).

(5) Tighten torca clamp nut to 54 N·m (40 ft. lbs.).

(6) Start the engine and inspect for exhaust leaks. Repair exhaust leaks as necessary.

(7) Check the exhaust system for contact with the body panels. Make the necessary adjustments, if needed.

FRAME & BUMPERS

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BUMPERS

SPECIFICATIONS - TIGHTENING

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Front bumper reinforcement attaching nut	20	15	—
Front fascia to upper crossmember bracket attaching screws	5	—	43
Lower front fascia bracket to lower radiator crossmember attaching screws	6	—	50
Front fascia to fender screws	6	—	50
Rear bumper attaching bracket screws	95	70	—
Rear bumper reinforcement attaching nut	27	20	—
Rear fascia to aperture bracket	3	—	23

FRONT BUMPER REINFORCEMENT

REMOVAL

(1) Remove front bumper fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).

(2) Support front bumper reinforcement on a suitable lifting device.

(3) Remove the three bolts attaching front bumper reinforcement to frame rail (Fig. 1).

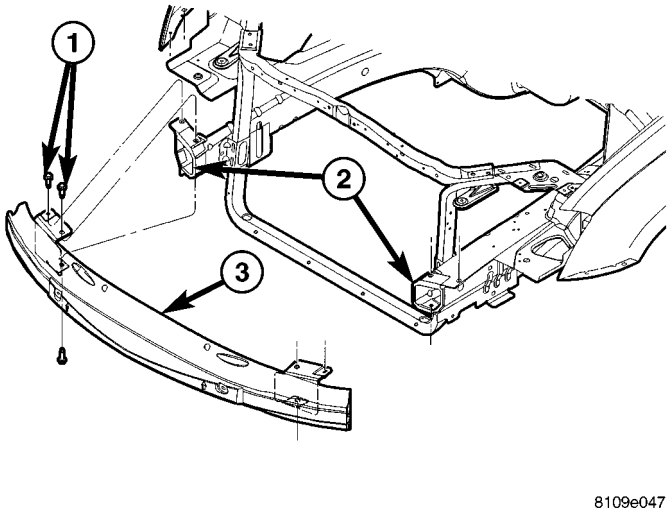
(4) Remove front bumper reinforcement from vehicle.

INSTALLATION

(1) Place front bumper reinforcement into position on vehicle.

(2) Install the three bolts attaching front bumper reinforcement to frame rail and tighten to 20 N·m (15 ft. lbs.). (Fig. 1).

(3) Install front bumper fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).



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Fig. 1 FRONT BUMPER REINFORCEMENT

1 - ATTACHING SCREW(S)
2 - RAIL ASSEMBLY
3 - BUMPER REINFORCEMENT

FRONT FASCIA

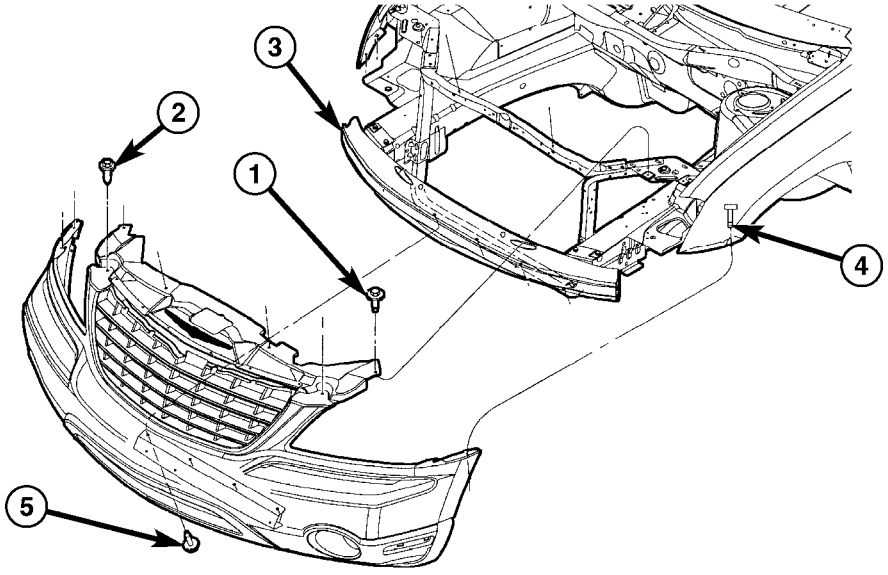
REMOVAL

(1) Release hood latch and open hood.

(2) Remove the headlamp assemblies (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ HEADLAMP - REMOVAL).

(3) Hoist vehicle and support with safety stands, as necessary.

(4) Remove the four screws attaching bottom of fascia/air dam to radiator closure panel (Fig. 2).



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Fig. 2 FRONT FASCIA

1 - PUSH PINS (4)
2 - ATTACHING SCREW
3 - FRONT BUMPER REINFORCEMENT
4 - FASCIA TO FENDER ATTACHING SCREW
5 - FASCIA ATTACHING SCREWS

FRONT FASCIA (Continued)

NOTE: The whole front splash shield does not need to be removed.

(5) Remove three screws attaching front fascia to front splash shield on each side. (Refer to 23 - BODY/ EXTERIOR/WHEELHOUSE SPLASH SHIELD - REMOVAL).

(6) Remove the screw attaching fascia to the front fenders on each side.

(7) Disconnect fog lamp wire connectors, if necessary.

(8) Lower vehicle.

(9) Remove push pins attaching the upper appearance panel to upper crossmember.

(10) Remove screw attaching the upper grille support to the headlamp mounting panel at each side of the grille.

(11) Remove bumper fascia from vehicle.

(12) Place fascia on a clean surface (Fig. 3).

(13) Remove spring clips attaching upper and lower fascia together (Fig. 4).

(14) Using a trim stick release locking tabs and separate the upper and lower fascia.

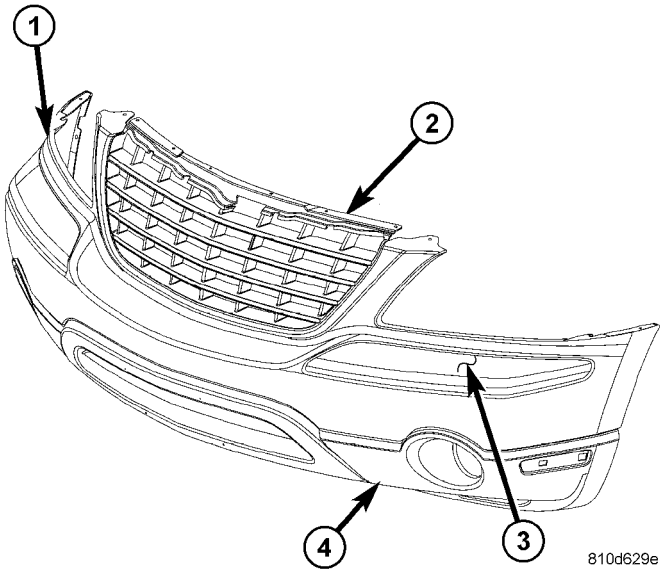


Fig. 3 UPPER AND LOWER FRONT FASCIA

1 - FRONT UPPER FASCIA
2 - GRILLE
3 - BRIGHT CHROME MOLDING
4 - FRONT LOWER FASCIA

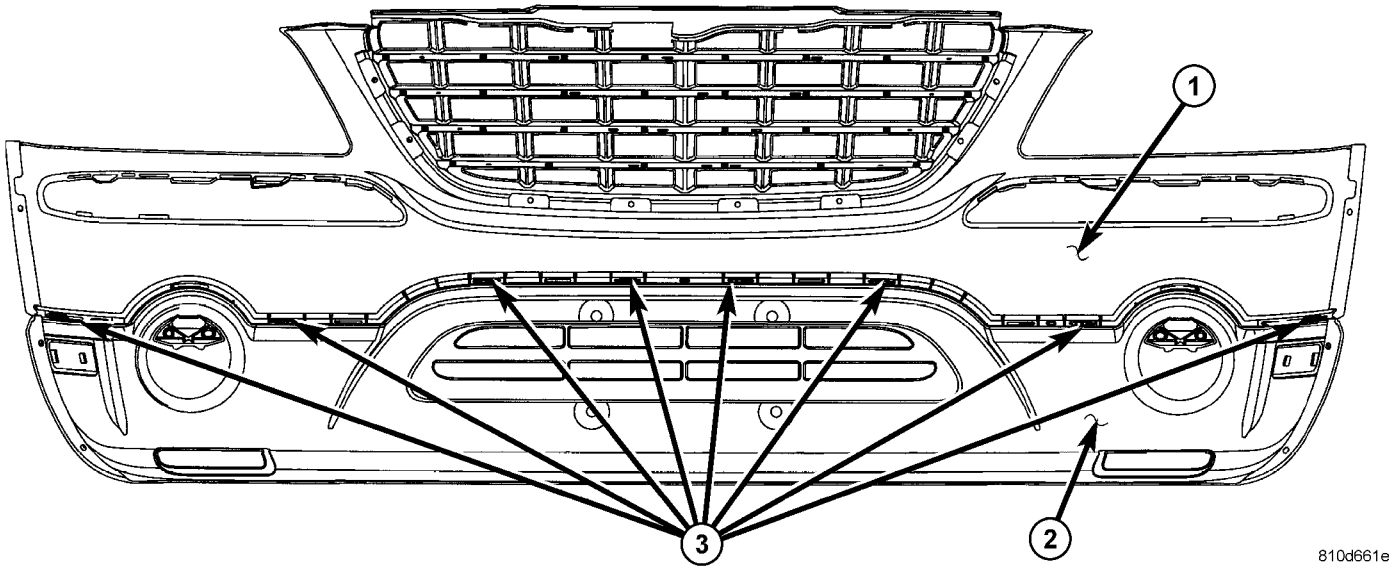


Fig. 4 INTERLOCKING SEAM AND SPRING CLIPS

1 - FRONT UPPER FASCIA
2 - LOCKING TABS AND SPRING CLIPS
3 - FRONT LOWER FASCIA

FRONT FASCIA (Continued)

(15) Remove the bright chrome molding from the upper fascia (Fig. 5). Using a trim stick, starting at the outer edge of the fascia release the locking tabs (Fig. 6). Grip the molding and pull outward from the fascia while releasing the locking tabs (Fig. 7).

(16) Remove molding from fascia.

(17) Remove grille from fascia. (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).

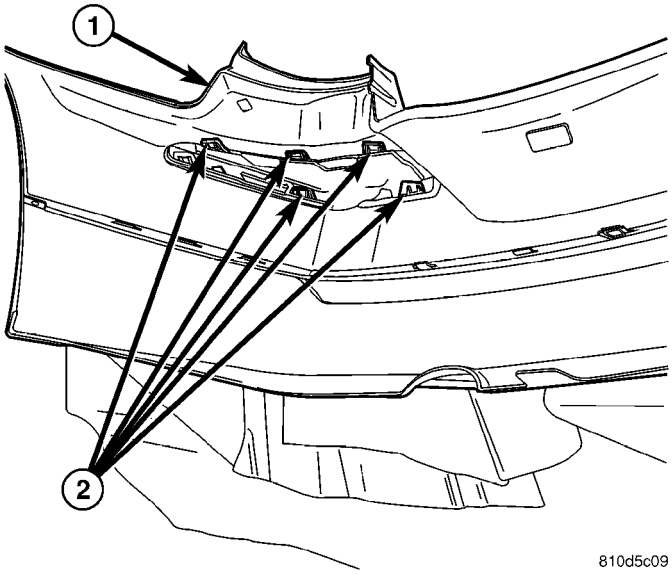


Fig. 5 BRIGHT CHROME MOLDING LOCKING TABS

1 - UPPER AND LOWER FASCIA
2 - LOCKING TABS

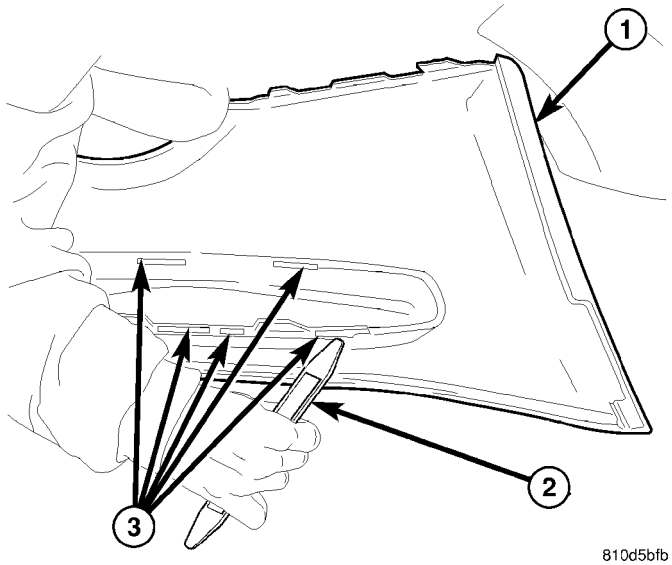


Fig. 6 RELEASING LOCKING TABS

1 - FRONT UPPER FASCIA
2 - TRIM STICK
3 - BRIGHT CHROME MOLDING LOCKING TABS

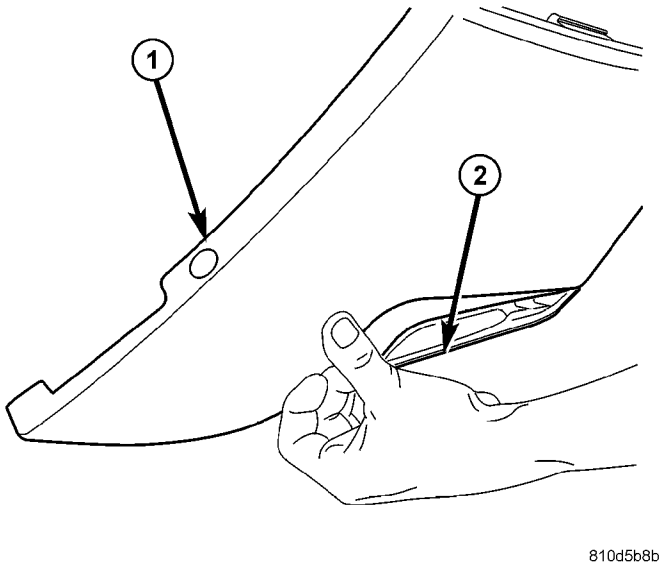


Fig. 7 REMOVING BRIGHT CHROME MOLDING

1 - FRONT UPPER FASCIA
2 - PULL BRIGHT CHROME MOLDING

INSTALLATION

(1) Place bright chrome molding in position on the upper fascia.

(2) Using hand presser press bright chrome molding locking tabs in the full lock position (Fig. 7).

(3) Position upper and lower fascia on a clean surface so that locking tabs align with the slots (Fig. 3) and (Fig. 4).

(4) Press the fascia together to lock locking tabs into position.

(5) Install new spring clips attaching upper and lower fascia together. The spring clips are not reusable.

(6) Place bumper fascia into position on vehicle.

(7) Install grille to fascia. (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).

(8) Install screw attaching the upper grille support to the headlamp mounting panel at each side of the grille.

(9) Install push pins attaching the upper appearance panel to upper crossmember.

(10) Raise vehicle and support with safety stands, as necessary.

(11) Connect fog lamp wire connectors, if necessary.

(12) Position and align fascia slotted cut out into fender push fastener (Fig. 8).

(13) Install screw attaching fascia to the front fenders on each side.

(14) Install front wheelhouse splash shields fasteners as necessary (Refer to 23 - BODY/EXTERIOR/WHEELHOUSE SPLASH SHIELD - INSTALLATION).

(15) Install front wheels.

(16) Install the four screws attaching bottom of fascia/air dam to radiator closure panel.

FRONT FASCIA (Continued)

(17) Lower vehicle.
(18) Install the headlamp assemblies (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ HEADLAMP - INSTALLATION)
(19) Close hood.

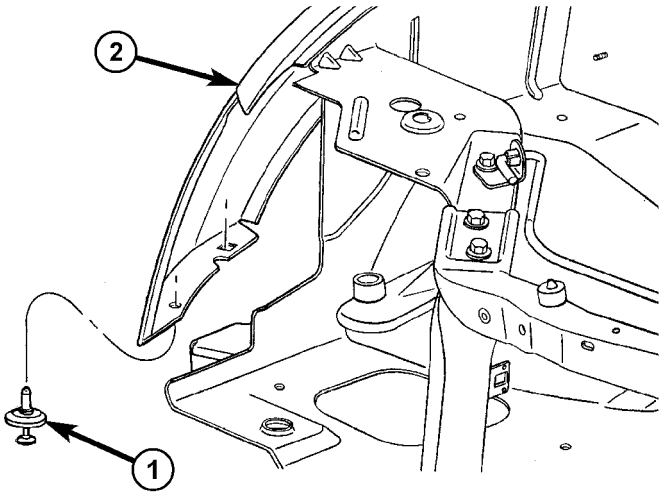


Fig. 8 FASCIA ATTACHING FASTENER

1 - FASCIA ATTACHING FASTENER
2 - FRONT FENDER

FRONT LOWER FASCIA

DESCRIPTION

For Front Lower Fascia Procedures (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL) and (Refer to 13 - FRAME & BUMPERS/ BUMPERS/FRONT FASCIA - INSTALLATION).

FRONT UPPER FASCIA

DESCRIPTION

For Front Upper Fascia Procedures (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL) and (Refer to 13 - FRAME & BUMPERS/ BUMPERS/FRONT FASCIA - INSTALLATION).

REAR BUMPER REINFORCEMENT BRACKET

REMOVAL

(1) Remove rear fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - REMOVAL).
(2) Remove rear bumper reinforcement. (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR BUMPER REINFORCEMENT - REMOVAL).
(3) Remove two screws attaching reinforcement bracket (left or right side) (Fig. 9) or (Fig. 10).

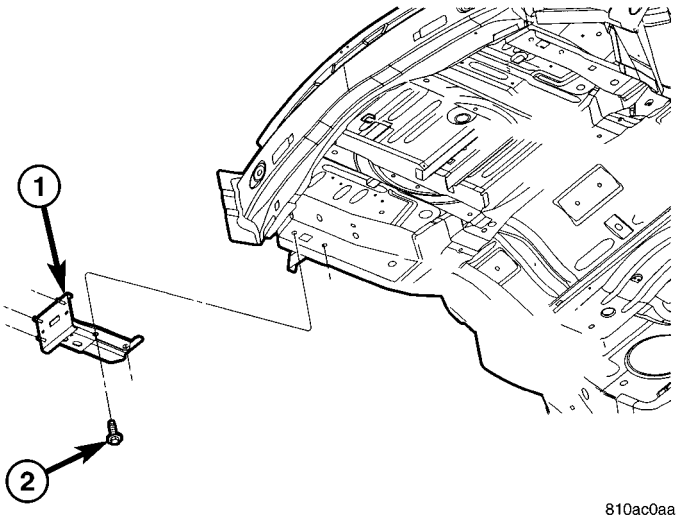


Fig. 9 LEFT REINFORCEMENT BRACKET

1 - LEFT REINFORCEMENT BRACKET
2 - ATTACHING SCREWS AND WASHERS

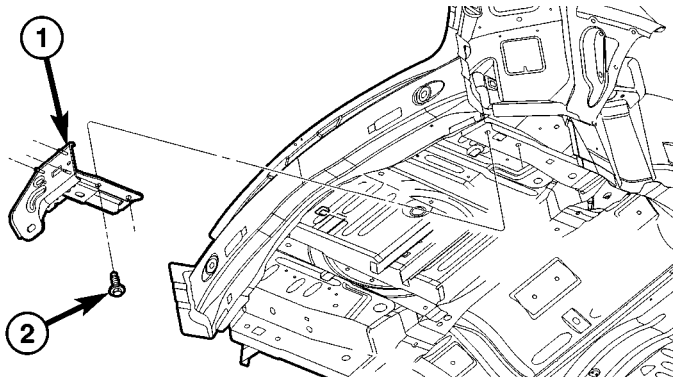


Fig. 10 RIGHT REINFORCEMENT BRACKET

1 - RIGHT REINFORCEMENT BRACKET
2 - ATTACHING SCREWS AND WASHERS

INSTALLATION

(1) Place reinforcement bracket into position.
(2) Install two screws attaching reinforcement bracket (left or right side) (Fig. 9) or (Fig. 10).
(3) Tighten screws to 95 N·m (70 ft. lbs.) torque.
(4) Install rear bumper reinforcement (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR BUMPER REINFORCEMENT - INSTALLATION).

REAR BUMPER REINFORCEMENT BRACKET (Continued)

(5) Install rear fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - INSTALLATION).

REAR BUMPER REINFORCEMENT

REMOVAL

(1) Remove rear bumper fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - REMOVAL).

(2) Support rear bumper reinforcement on a suitable lifting device.

(3) Remove the six nuts attaching rear bumper reinforcement to frame rail extensions (Fig. 11).

(4) Remove rear bumper reinforcement from vehicle.

INSTALLATION

(1) Support rear bumper reinforcement using a suitable lifting device to lift into position.

(2) Position rear bumper reinforcement on vehicle.

(3) Install the six nuts attaching rear bumper reinforcement to frame rail extensions and tighten to 27 N·m (20 ft. lbs.) torque (Fig. 11).

(4) Install rear bumper fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - INSTALLATION).

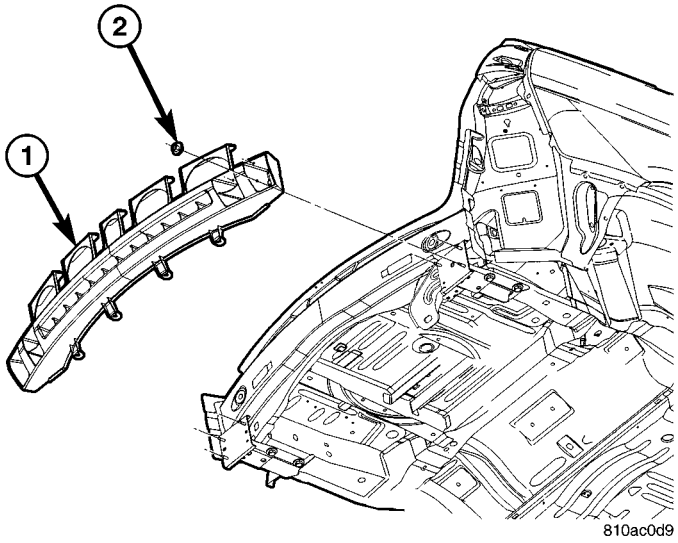


Fig. 11 REAR BUMPER REINFORCEMENT

1 - REAR BUMPER REINFORCEMENT
2 - ATTACHING NUT(S)

REAR FASCIA

REMOVAL

(1) Open liftgate.

(2) Remove two push pin fasteners per side at the liftgate tower area (Fig. 12).

(3) Hoist and support vehicle with safety stands, as necessary.

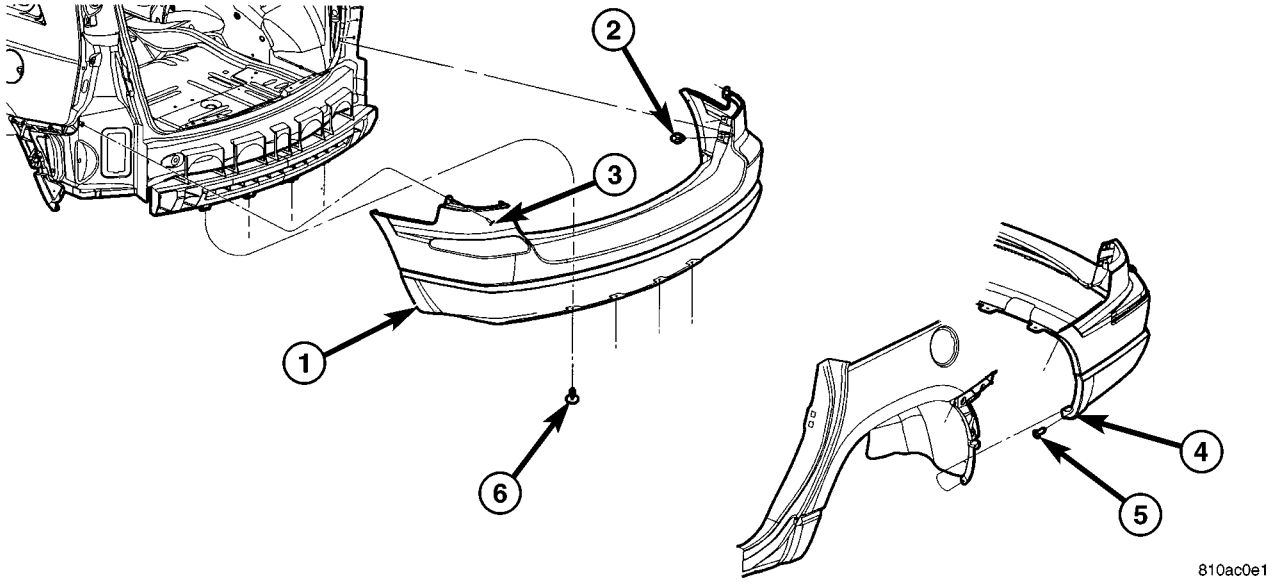


Fig. 12 REAR FASCIA

1 - REAR FASCIA
2 - PUSH PIN FASTENERS
3 - SCREWS (2)
4 - CHECK ALIGNMENT
5 - SCREWS (2 PER SIDE)
6 - PUSH PINS (4)

REAR FASCIA (Continued)

(4) Disconnect the park assist wire connector under the vehicle and the push pin fasteners attaching wire harness under the vehicle (Fig. 13)

(5) Remove the four push pin fasteners attaching rear fascia to reinforcement bumper.

(6) Remove two screws (each side) attaching fascia to rear fascia bracket in the wheelhouse.

(7) Remove the screw on each side attaching the upper fascia in the tail lamp bucket area.

(8) Remove rear fascia from vehicle by lifting sides of fascia up and outboard to release from rear fascia brackets.

(9) Place fascia on a clean surface.

(10) Remove park assist sensors, if necessary (Fig. 14). (Refer to 8 - ELECTRICAL/CHIME/BUZZER/ PARK ASSIST SENSOR - REMOVAL).

(11) Remove spring clips attaching upper and lower fascia together (Fig. 15).

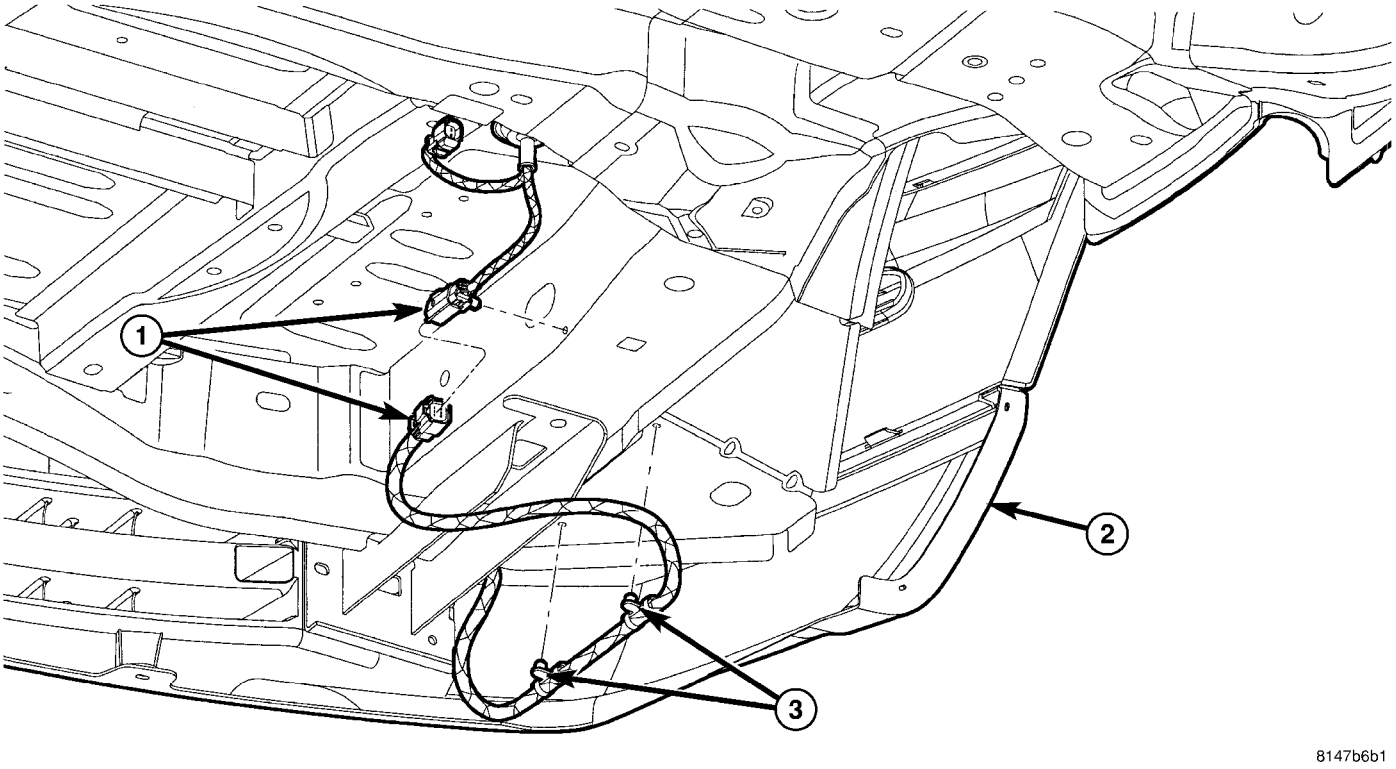


Fig. 13 PARK ASSIST SENSOR WIRE HARNESS

1 - PARK ASSIST WIRE CONNECTOR
2 - REAR FASCIA
3 - PUSH PIN FASTENERS ATTACHING WIRE HARNESS

REAR FASCIA (Continued)

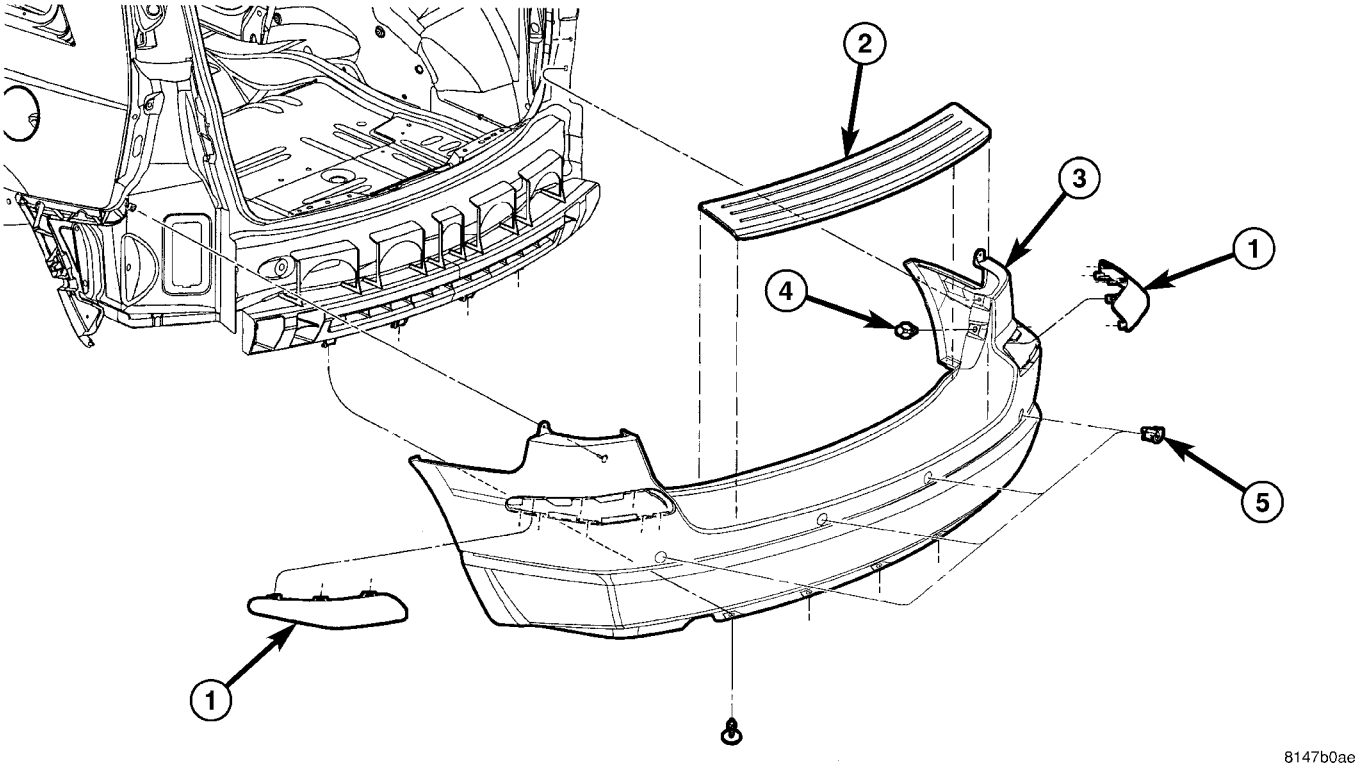


Fig. 14 REAR FASCIA WITH PARK ASSIST SENSOR

1 - BRIGHT CHROME MOLDING
2 - STEP PAD
3 - REAR FASCIA
4 - FASCIA FASTENER
5 - PARK ASSIST SENSOR

REAR FASCIA (Continued)

(12) Using a trim stick release locking tabs and separate the upper and lower fascia.

(13) Remove move the bright chrome molding from the upper fascia (Fig. 16). Using a trim stick, starting at the out edge of the fascia release the locking tabs (Fig. 17). Grip the molding and pull outward from the fascia while releasing the locking tabs.

(14) Remove molding from fascia.

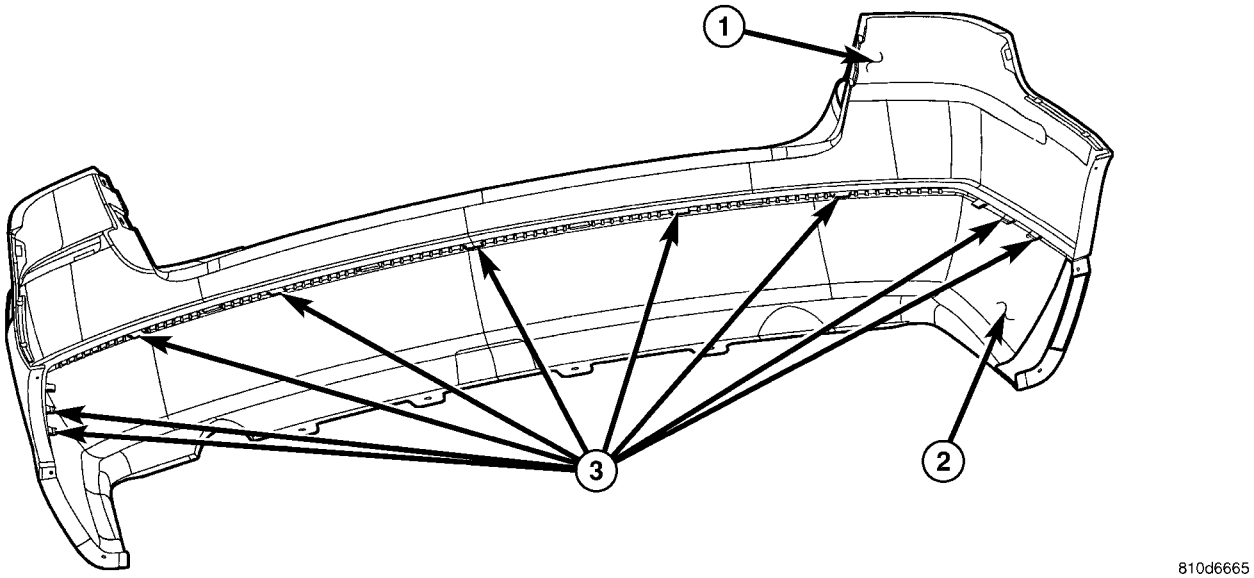


Fig. 15 INTERLOCKING SEAM TABS AND SPRING CLIPS

1 - REAR UPPER FASCIA
2 - REAR LOWER FASCIA
3 - INTERLOCKING SEAM AND SPRING CLIPS

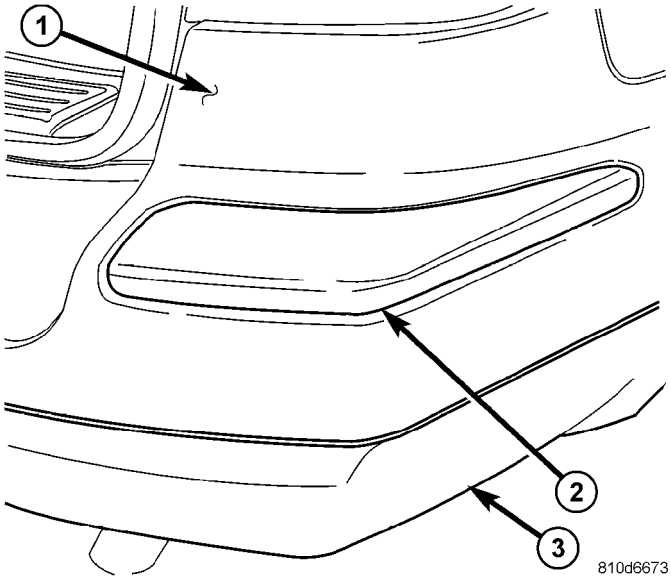


Fig. 16 REAR FASCIA BRIGHT CHROME MOLDING

1 - REAR UPPER FASCIA
2 - BRIGHT CHROME MOLDING
3 - REAR LOWER FASCIA

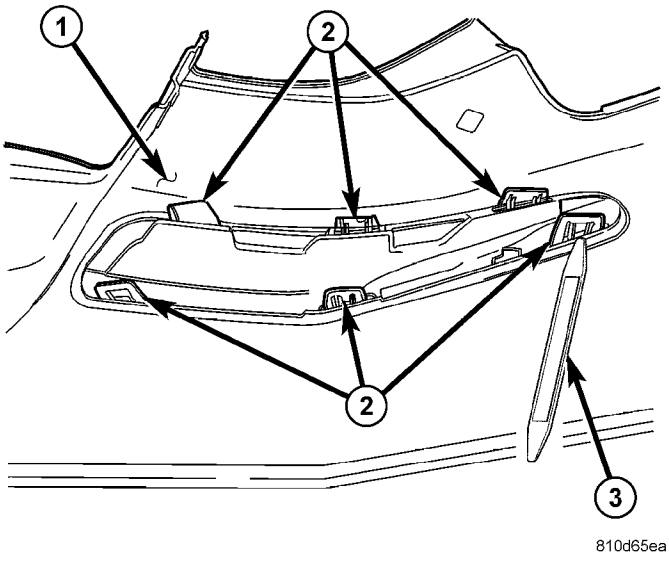


Fig. 17 BRIGHT CHROME MOLDING LOCKING TABS

1 - REAR FASCIA
2 - LOCKING TABS
3 - TRIM STICK

REAR FASCIA (Continued)

INSTALLATION

(1) Place bright chrome molding in position on the upper fascia.

(2) Using hand presser press molding locking tabs in the full lock position (Fig. 18).

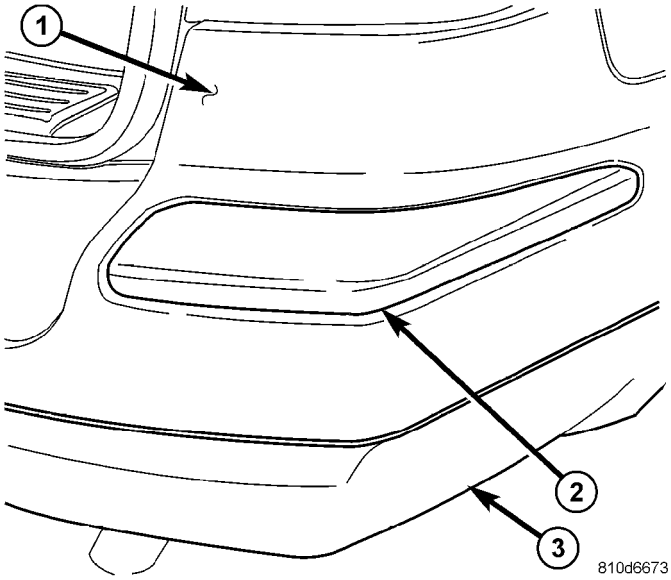


Fig. 18 REAR FASCIA BRIGHT CHROME MOLDING

1 - REAR UPPER FASCIA
2 - BRIGHT CHROME MOLDING
3 - REAR LOWER FASCIA

(3) Position upper and lower fascia on a clean surface so that locking tabs align with the slots (Fig. 15) and (Fig. 19).

NOTE: Using care not to scratch the surface of the fascias.

(4) Press the fascias together to lock locking tabs into position.

(5) Install new spring clips attaching upper and lower fascia together. The spring clips are not reusable (Fig. 20).

(6) Install park assist sensors, if necessary (Fig. 21). (Refer to 8 - ELECTRICAL/CHIME/BUZZER/ PARK ASSIST SENSOR - INSTALLATION).

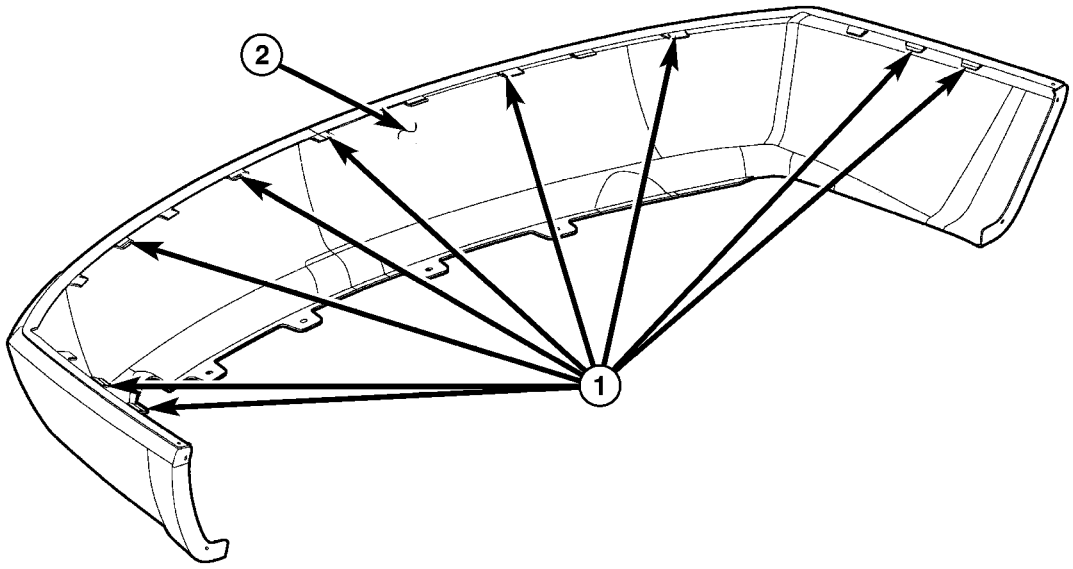


Fig. 19 LOWER FASCIA LOCKING TABS

1 - LOCKING TABS
2 - LOWER FASCIA

REAR FASCIA (Continued)

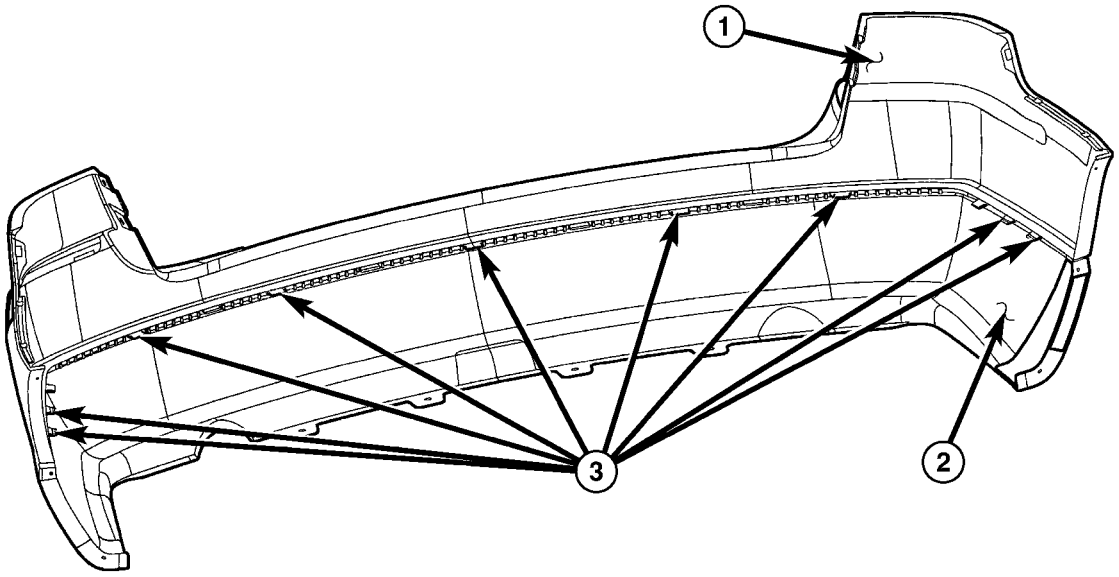


Fig. 20 INTERLOCKING SEAM TABS AND SPRING CLIPS

1 - REAR UPPER FASCIA
2 - REAR LOWER FASCIA
3 - INTERLOCKING SEAM AND SPRING CLIPS

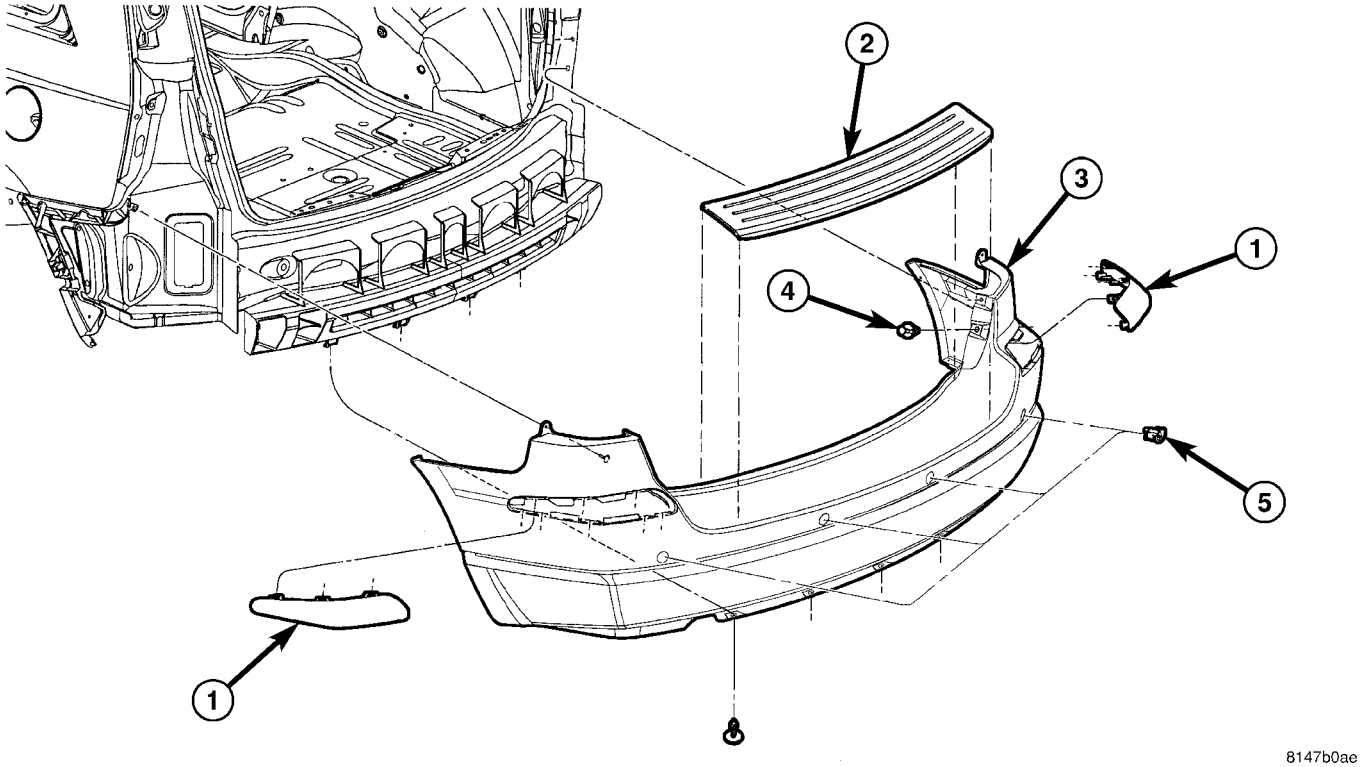


Fig. 21 REAR FASCIA WITH PARK ASSIST SENSOR

1 - BRIGHT CHROME MOLDING
2 - STEP PAD
3 - REAR FASCIA
4 - FASCIA FASTENER
5 - PARK ASSIST SENSOR

REAR FASCIA (Continued)

(7) Place bumper fascia into position on vehicle (Fig. 22).

(8) Stretch fascia around fascia aperture brackets and slide fascia between body side aperture and fascia aperture brackets.

(9) Install the two screws attaching the upper fascia in the tail lamp bucket area.

(10) Install two screws (each side) attaching fascia to rear fascia bracket in the wheelhouse.

(11) Install the four new push pin fasteners attaching rear fascia to reinforcement bumper.

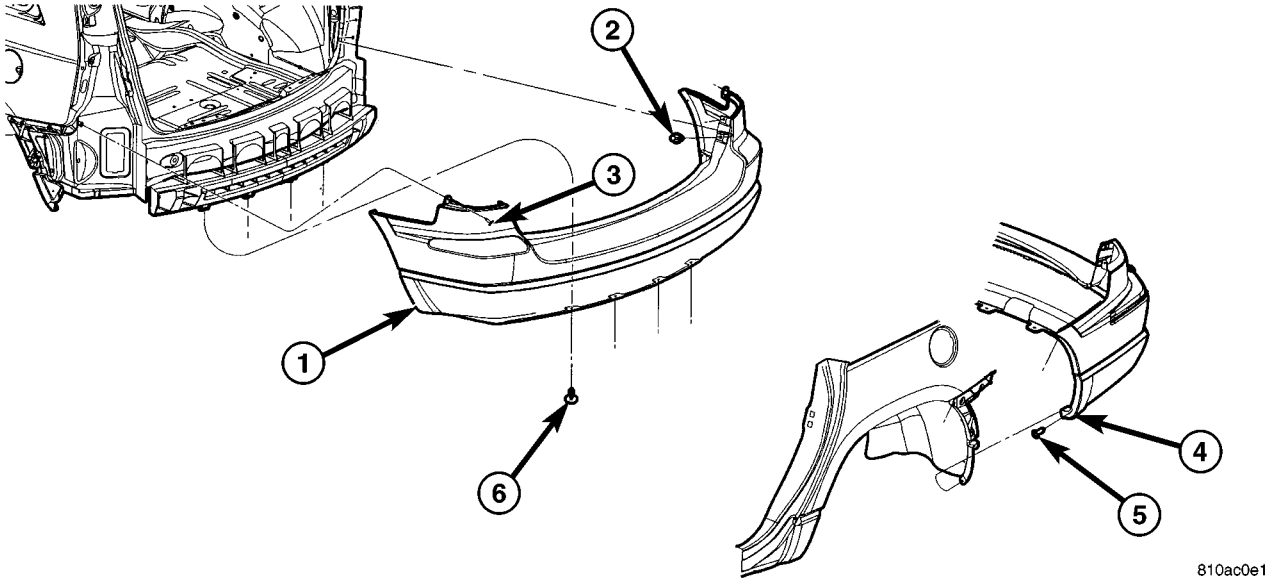


Fig. 22 REAR FASCIA

1 - REAR FASCIA
2 - PUSH PIN FASTENERS
3 - SCREWS (2)
4 - CHECK ALIGNMENT
5 - SCREWS (2 PER SIDE)
6 - PUSH PINS (4)

REAR FASCIA (Continued)

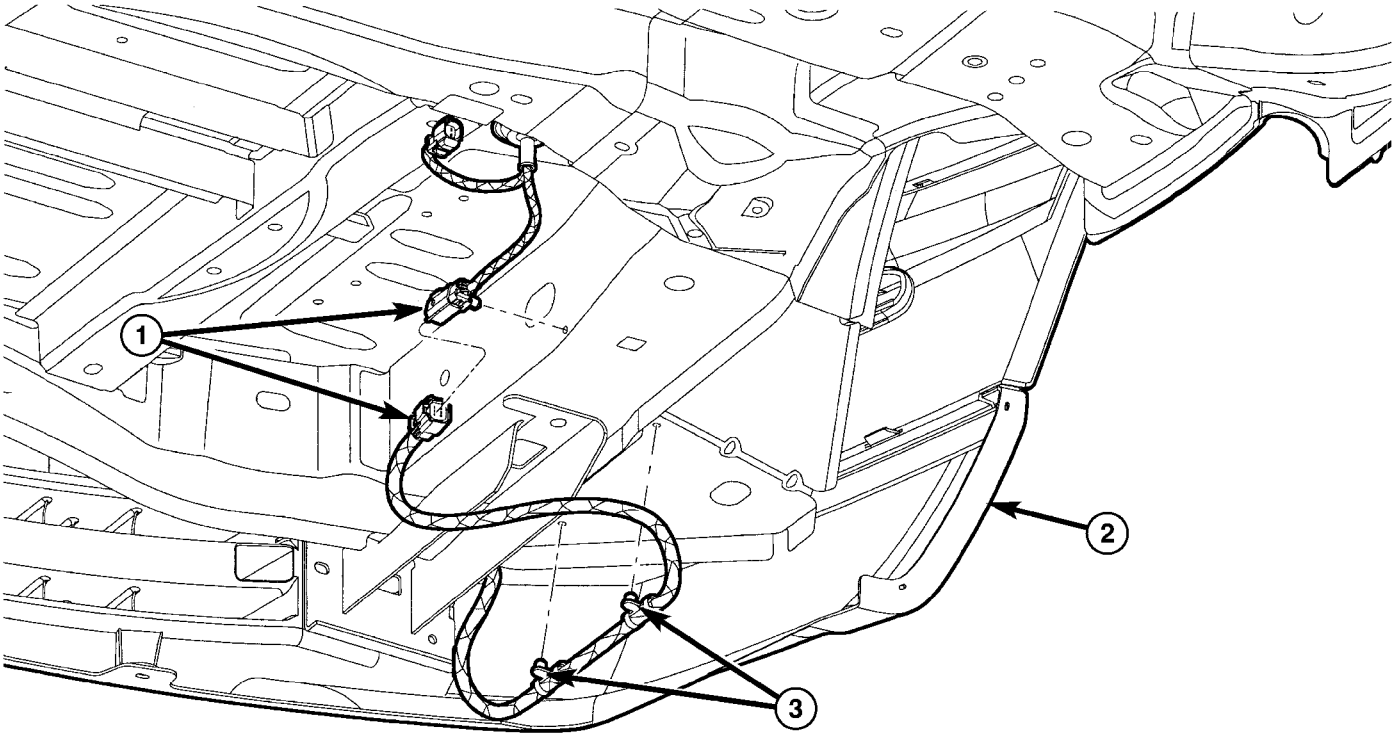


Fig. 23 PARK ASSIST SENSOR WIRE HARNESS

1 - PARK ASSIST WIRE CONNECTOR
2 - REAR FASCIA
3 - PUSH PIN FASTENERS ATTACHING WIRE HARNESS

(12) Connect park assist sensor wire harness under vehicle (Fig. 23).

(13) Lower vehicle.

(14) Install push pin fasteners two per side at the liftgate tower area.

(15) Close liftgate.

REAR FASCIA TO APERTURE BRACKET

REMOVAL

(1) Remove rear fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - REMOVAL).

(2) Remove two push pins on each side attaching splash shield to rear fascia aperture bracket.

(3) Remove rear fascia bracket to aperture panel (left or right side).

INSTALLATION

(1) Place rear fascia bracket to aperture panel (left or right side) into position and start screws. Holding bracket up so the stand off ribs on bracket are against aperture panel. Ensure bracket is up until ribs hit at top for a good fit.

(2) Tighten aperture bracket screws in sequence to 3 N·m (23 in. lbs.) torque (Fig. 24).

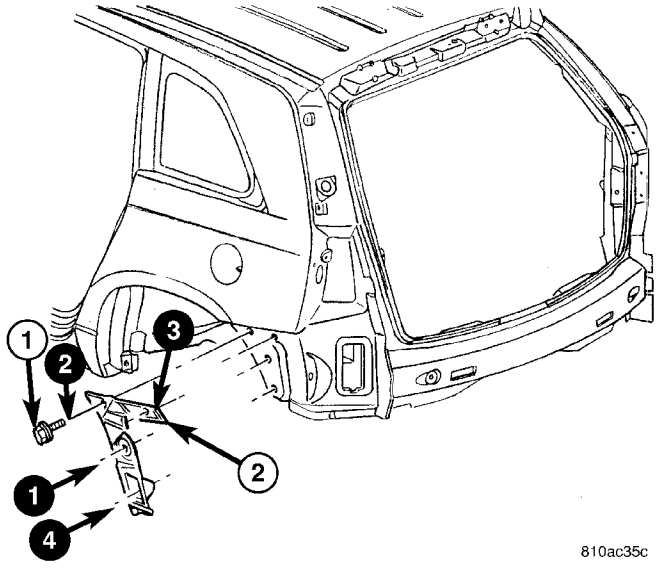


Fig. 24 REAR FASCIA TO APERTURE BRACKET

1 - ATTACHING SCREWS
2 - REAR FASCIA BRACKET

(3) Install rear fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA - INSTALLATION).

FRAME

SPECIFICATIONS

FRAME DIMENSIONS

Frame dimensions are listed in metric scale. All dimensions are from center to center of Principal Locating Point (PLP), or from center to center of PLP and fastener location.

VEHICLE PREPARATION

Position the vehicle on a frame alignment rack, refer to instructions provided with equipment being used. Adjust the vehicle PLP heights to the specified dimension above the work surface (datum line). Vertical dimensions can be taken from the datum line to the locations indicated were applicable.

INDEX

DESCRIPTION	FIGURE
FRAME	25
ENGINE COMPARTMENT	26
ENGINE CRADLE AND BODY DIMENSIONS	27
ENGINE CRADLE CROSSMEMBER HEIGHT DIMENSIONS	28
REAR CROSSMEMBER HEIGHT DIMENSIONS	29

FRAME (Continued)

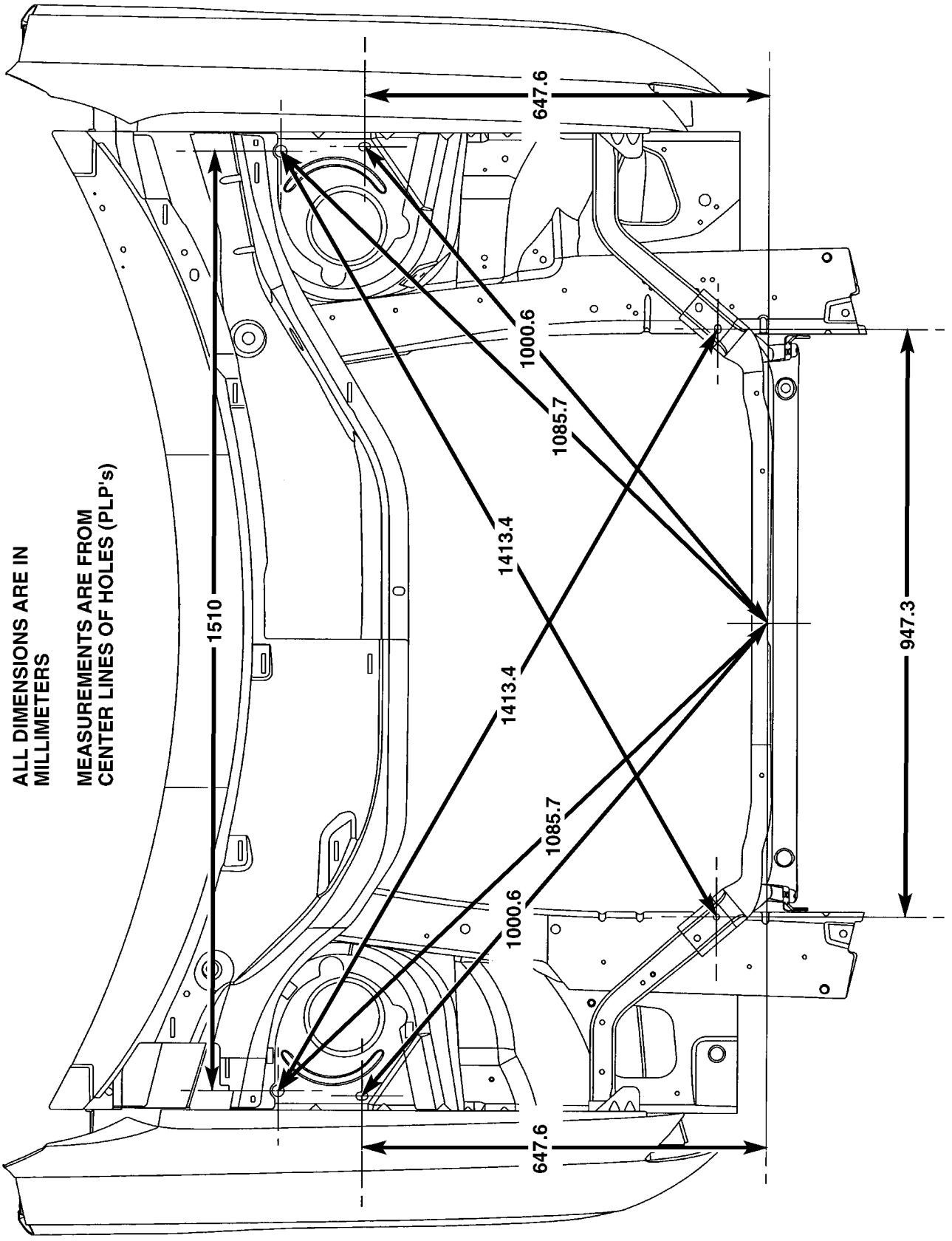


Fig. 25 ENGINE COMPARTMENT

FRAME (Continued)

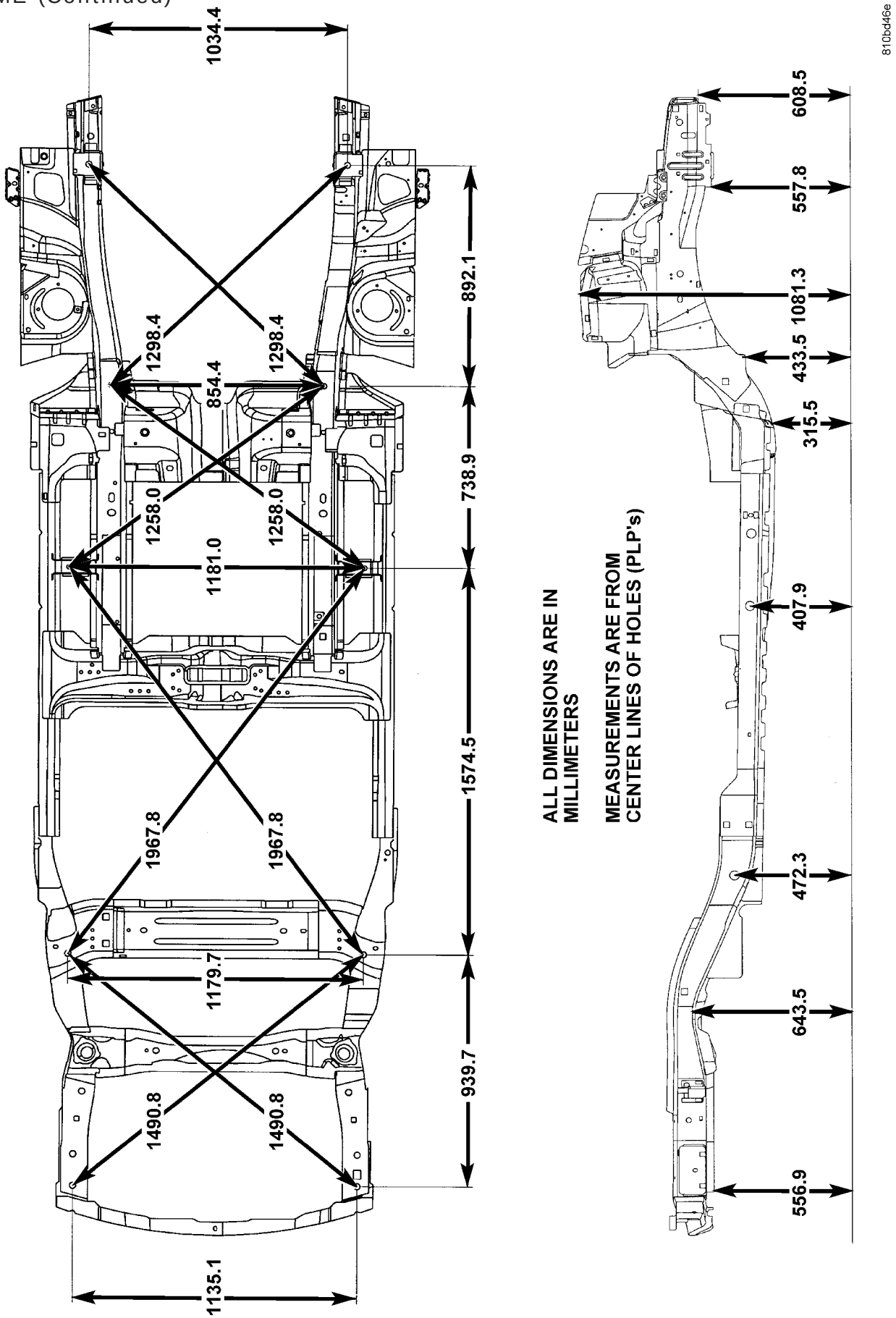


Fig. 26 FRAME

FRAME (Continued)

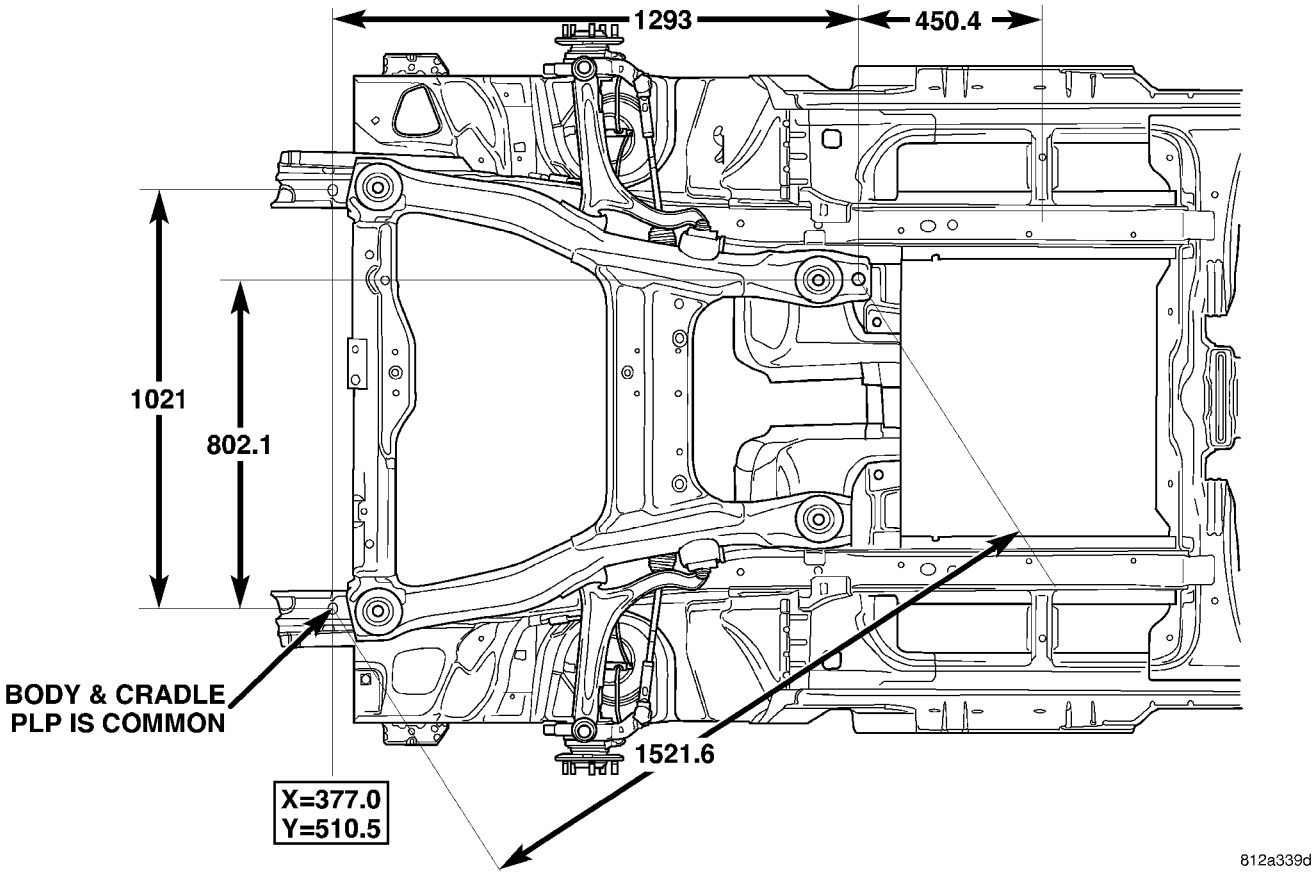


Fig. 27 ENGINE CRADLE AND BODY DIMENSIONS

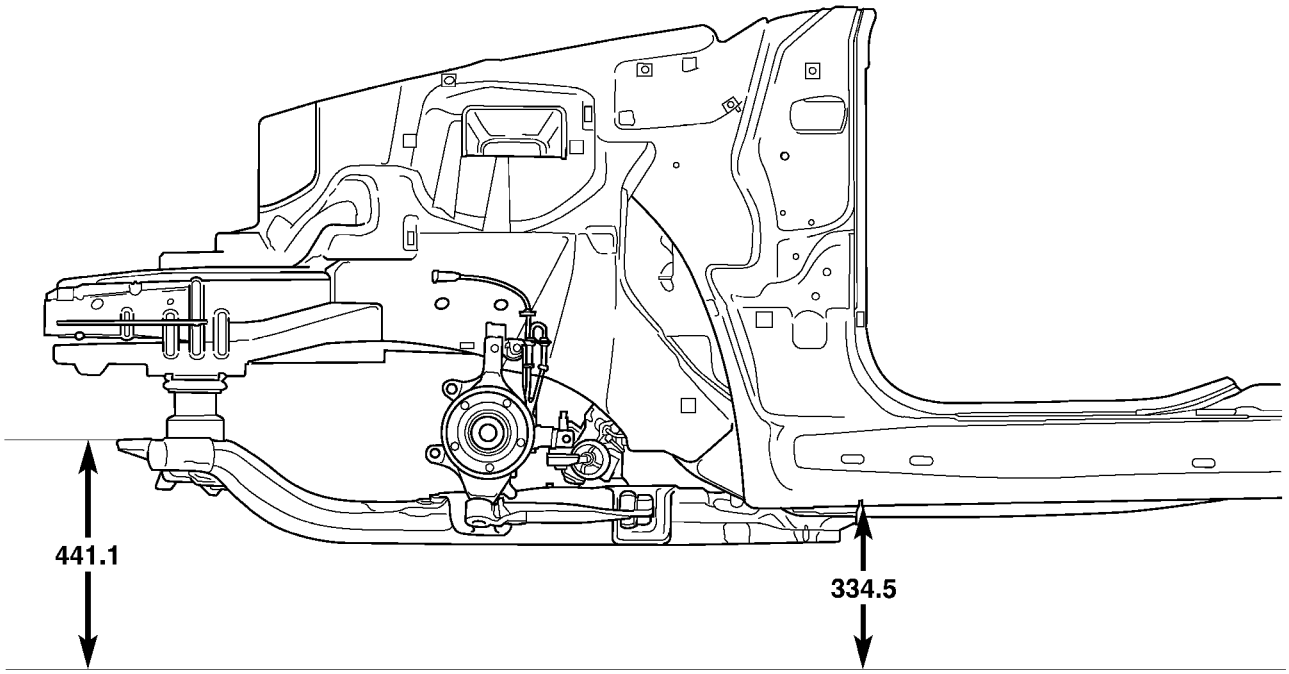
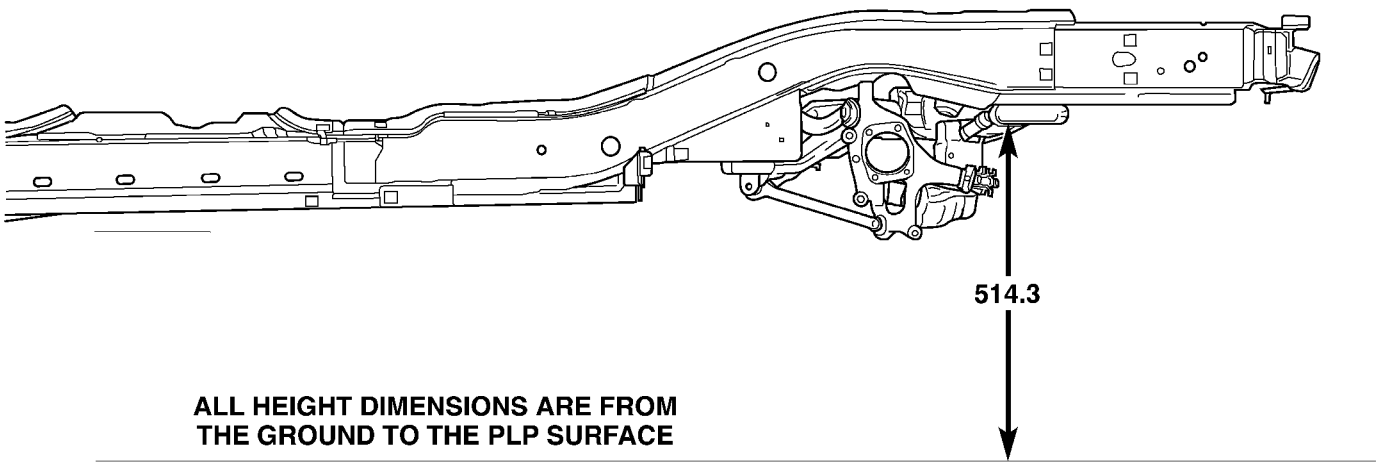


Fig. 28 ENGINE CRADLE CROSSMEMBER HEIGHT DIMENSIONS

FRAME (Continued)



812a338b

Fig. 29 REAR CROSSMEMBER HEIGHT DIMENSIONS

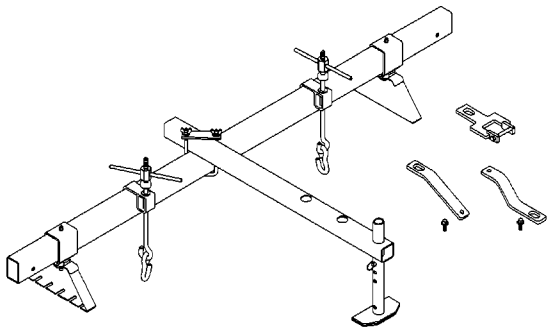
SPECIFICATIONS - TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Front Cradle/Crossmember-to-Body Attaching Bolts	163	120	—
Front Engine Mount-to-Cradle Attaching Bolt	54	40	—
Rear Engine Mount-to-Cradle Attaching Bolt	54	40	—
Tuned Mass Damper-to-Cradle Mounting Bolt	68	50	
Radiator Support Crossmember Attaching Bolts	51	38	—
Rear Crossmember Mounting Bolts	163	120	—
Rear Suspension Camber Link Bolt	68	50	—
Rear Suspension Compression Link Bolt	68	50	—
Rear Suspension Spring Link Bolt	129	95	—
Rear Suspension Tension Link Bolt	68	50	—
Rear Suspension Toe Link Nut	172	127	—
Rear Shock Absorber Lower Mounting Bolt	102	75	—
Propeller Shaft Rear Flange-to-Module Mounting Bolt	54	40	—
Wheel Mounting Nut	135	100	—

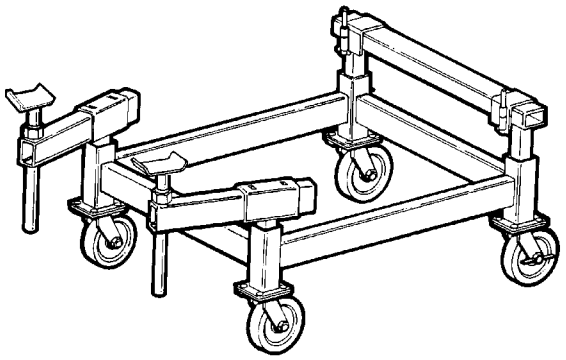
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SPECIAL TOOLS

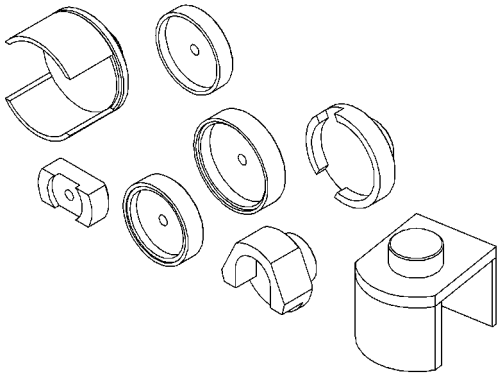
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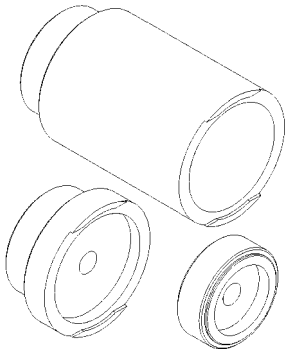
Driveline Support Fixture 8534B



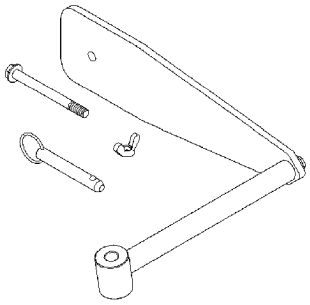
Driveline Support Table 8874



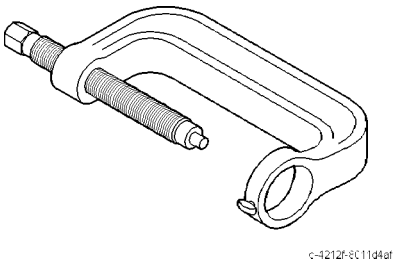
Remover/Installer, Bushing 9031



Remover/Installer, Bushing 9032



Gage, Curb Height 9094



Press, Ball Joint C-4212F

ENGINE CRADLE CROSSMEMBER

REMOVAL

(1) Disconnect and isolate battery negative cable. (Fig. 30)

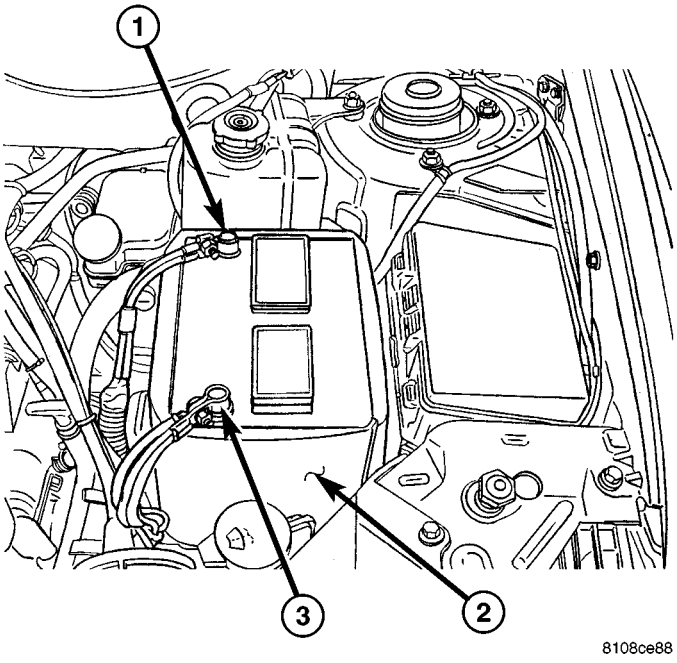


Fig. 30 Battery

1 - BATTERY POSITIVE CABLE
2 - THERMO-WRAP
3 - BATTERY NEGATIVE CABLE

(2) Install overhead powertrain support fixture (Tool 8534B and adapter kit 8534-12) (Fig. 31):

(a) Remove engine oil dipstick tube-to-cylinder head fastener (Fig. 32). Install lift/support bracket 8534-8 and secure with dipstick tube bolt.

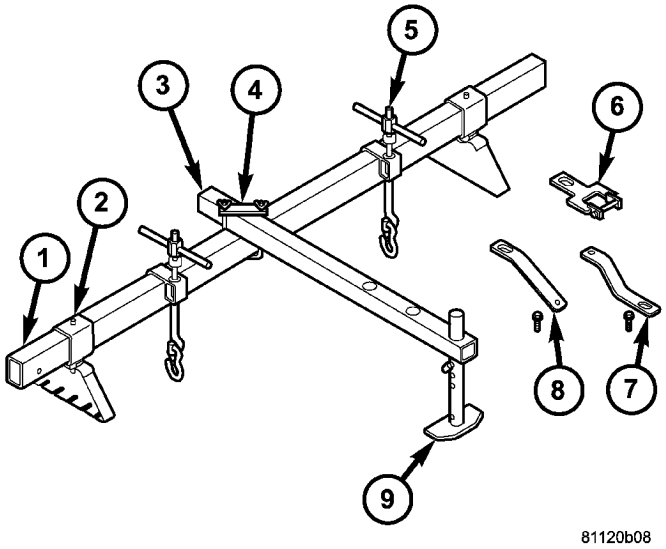


Fig. 31 Engine Support Fixture 8534B

1 - SUPPORT TUBE 8534-1
2 - BRACKET/SLEEVE 8534-2
3 - CROSS-BAR 8534-3
4 - CLAMP 8534-5
5 - LIFT HOOK ASSEMBLY
6 - LIFT BRACKET/BOLT 8534-15
7 - LIFT BRACKET/BOLT 8534-7
8 - LIFT BRACKET/BOLT 8534-8
9 - SUPPORT LEG 8534-4

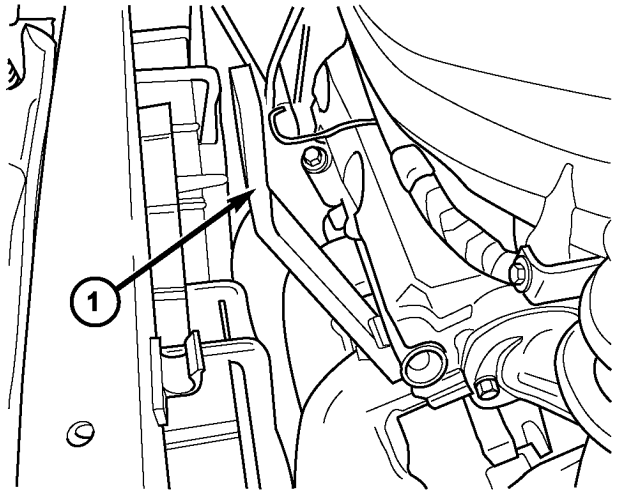


Fig. 32 Lift Bracket 8534-8

1 - BRACKET 8534-8

ENGINE CRADLE CROSSMEMBER (Continued)

(b) Disconnect coolant temperature sensor (at thermostat housing). Remove engine harness-to-cylinder head bolt. Position harness out of the way. Install and secure lift/support bracket and bolt 8534-7 as shown in (Fig. 33).

(c) Assemble 8534-2 mounting bracket/sleeve assemblies to support tube 8534-1 and install to vehicle, allowing brackets to rest on inner fender ledges (Fig. 34).

(d) Assemble cross-bar 8534-3, clamp 8534-5 and support leg 8534-4 to support tube, allowing support leg to rest on radiator upper support (Fig. 35).

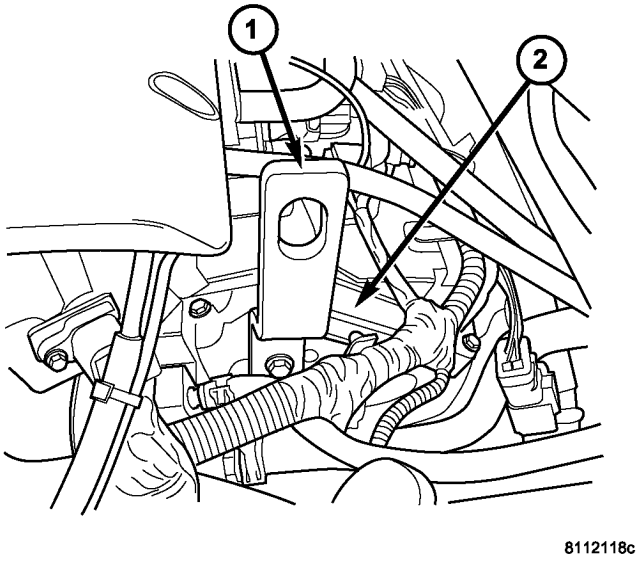


Fig. 33 Lift Bracket 8534-7

1 - BRACKET 8534-7
2 - REAR CYLINDER HEAD

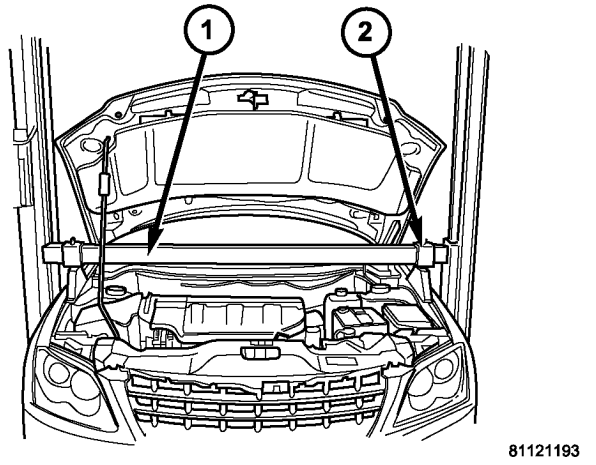


Fig. 34 Support Tube and Sleeve/Brackets

1 - SUPPORT TUBE 8534-1
2 - BRACKET/SLEEVE 8534-2

(e) Tighten cross-bar-to-support tube clamp 8534-5 (Fig. 36), as well as mounting bracket/sleeve 8534-2 thumb screw and hex nut to secure fixture (Fig. 37).

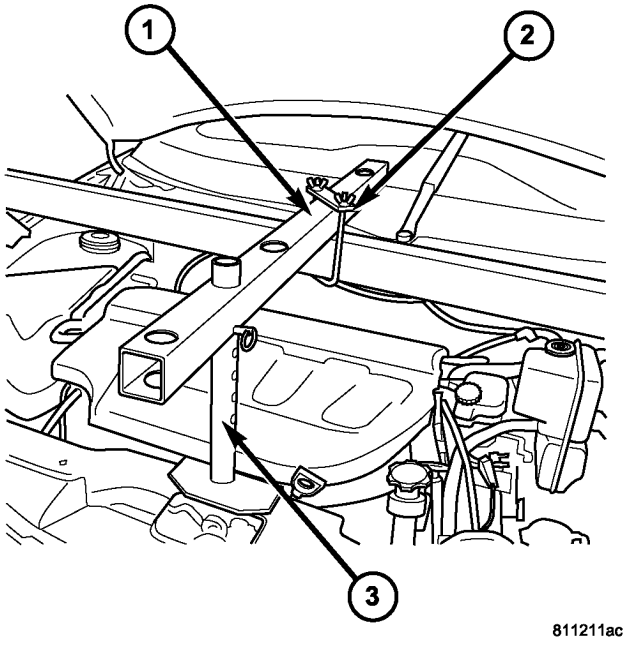


Fig. 35 Crossbar and Support Leg

1 - CROSS-BAR 8534-3
2 - CLAMP 8534-5
3 - SUPPORT LEG 8534-4

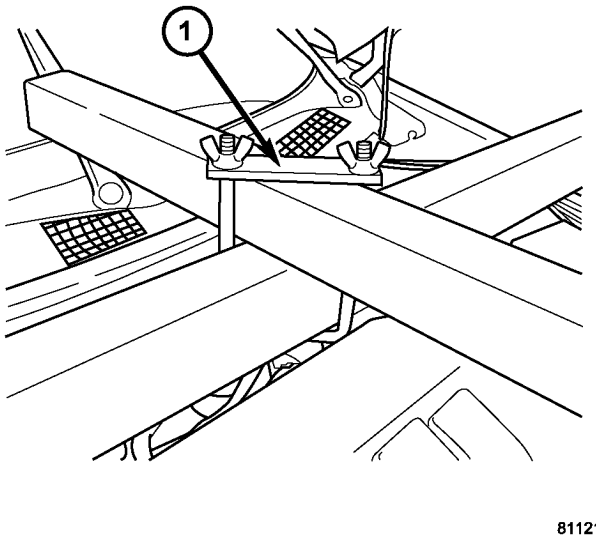


Fig. 36 Clamp 8534-5

1 - CLAMP 8534-5

ENGINE CRADLE CROSSMEMBER (Continued)

(f) Install lift bracket/hook assemblies as shown in (Fig. 38) (Fig. 39) (Fig. 40). Tighten T-handles just enough to build tension between the fixture and drivetrain.

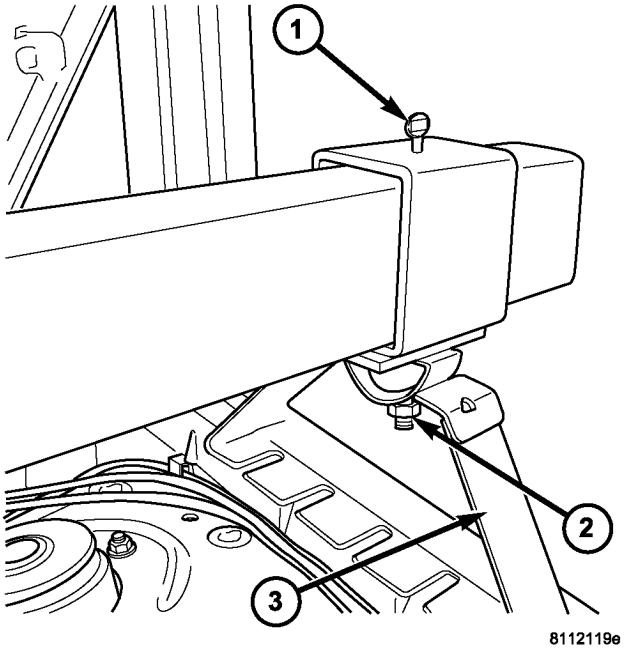


Fig. 37 Torque Thumb Screw and Pivot Nut

1 - THUMB SCREW
2 - PIVOT HEX NUT
3 - BRACKET/SLEEVE 8534-2

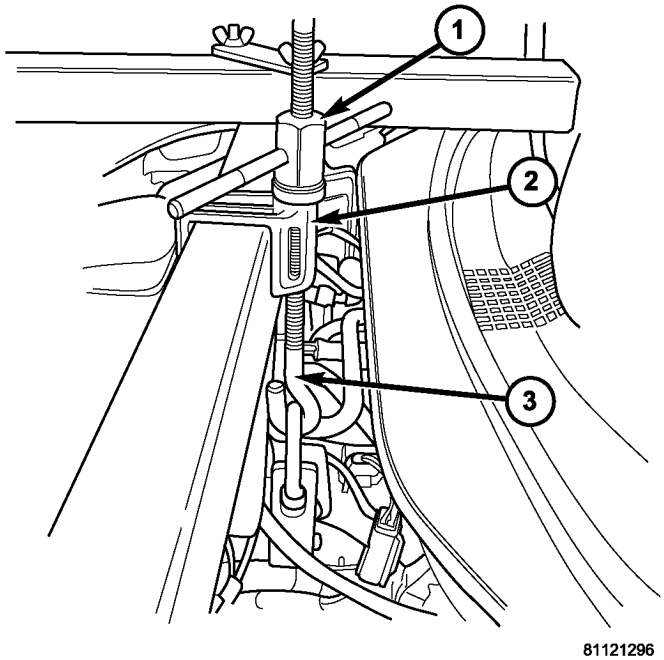


Fig. 38 T-Handle, Bracket, and Hook Assembly at Rear Lift Bracket

1 - T-HANDLE 8534-14
2 - LIFTING BRACKET 8534-13
3 - HOOK ASSEMBLY 8534-11

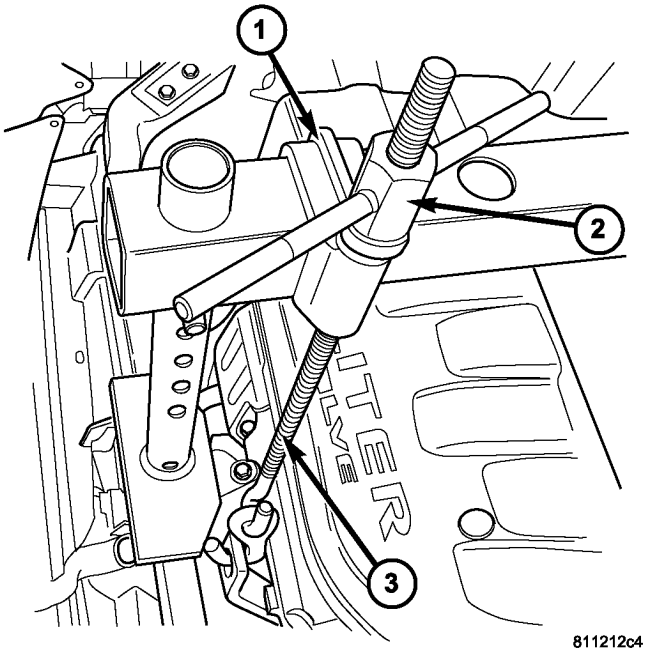


Fig. 39 T-Handle, Bracket, and Hook Assembly at Front Lift Bracket

1 - LIFTING BRACKET 8534-13
2 - T-HANDLE 8534-14
3 - HOOK ASSEMBLY 8534-11

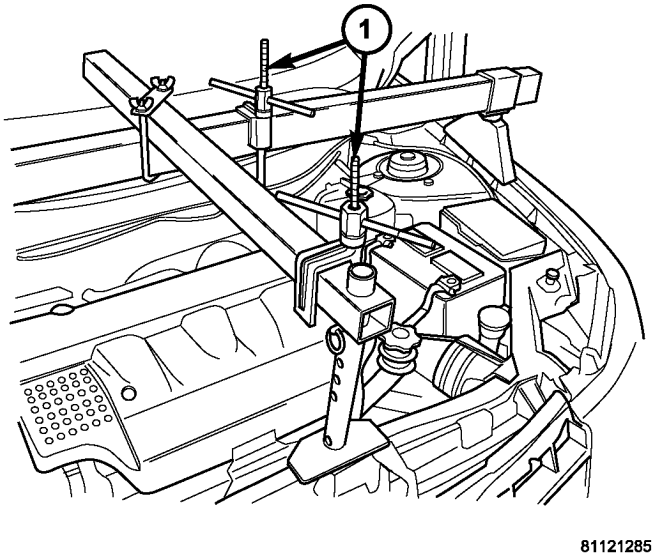


Fig. 40 Engine Support Fixture 8534B

1 - LIFT BRACKET/HOOK ASSEMBLY

(3) Raise vehicle on hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(4) Remove both front tire/wheel assemblies.

(5) If necessary, disconnect the wheel speed sensor harness from the support brackets to gain slack in harness.

ENGINE CRADLE CROSSMEMBER (Continued)

(6) Disconnect sway bar links from struts (Fig. 41).

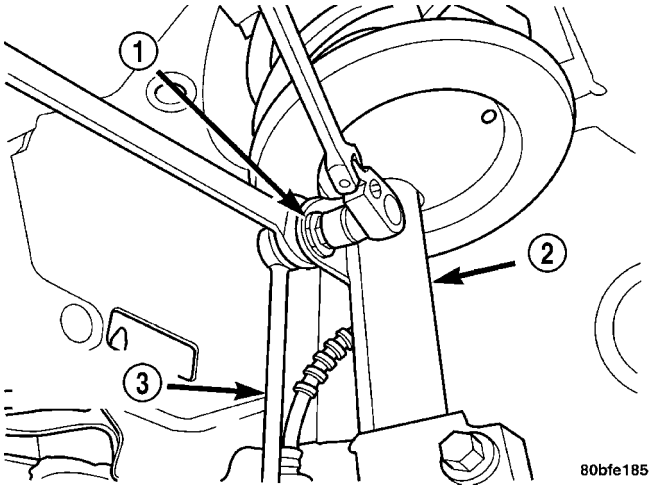


Fig. 41 Stabilizer Bar Link To Strut

1 - NUT
2 - STRUT
3 - STABILIZER BAR LINK

(7) Remove lower control arm bolts to engine cradle and swing control arms out of the way. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - REMOVAL)

(8) Remove fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL)

(9) Remove engine front and rear mount-to-cradle nuts.

(10) Disconnect brake hydraulic line and brackets from frame rails.

(11) Remove the bolts and separate the brake line support bracket from cradle.

(12) Remove screw mounting power steering hydraulic hose clamps to cradle on right side (Fig. 42).

(13) Remove tie-strap clip securing power steering hydraulic pressure hose to engine cradle (Fig. 43).

(14) Remove screw securing power steering hydraulic return hose clamp to engine cradle at cooling loop (Fig. 43).

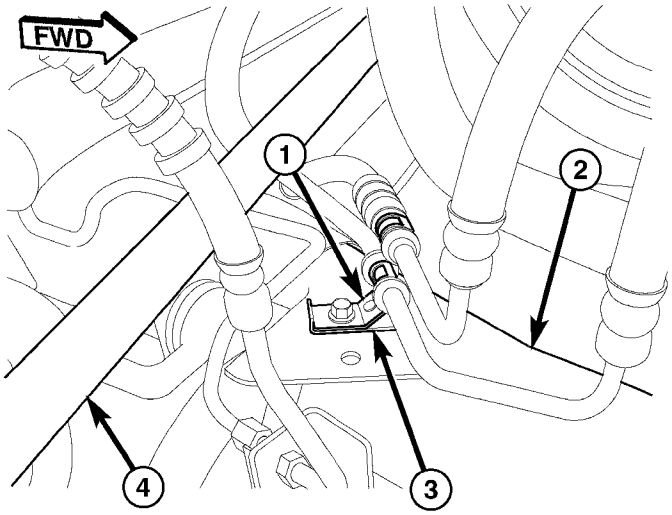


Fig. 42 Hose Routing Clamp - Right Side Cradle

1 - PRESSURE HOSE ROUTING CLAMP
2 - ENGINE CRADLE
3 - RETURN HOSE ROUTING CLAMP
4 - RIGHT HALF SHAFT

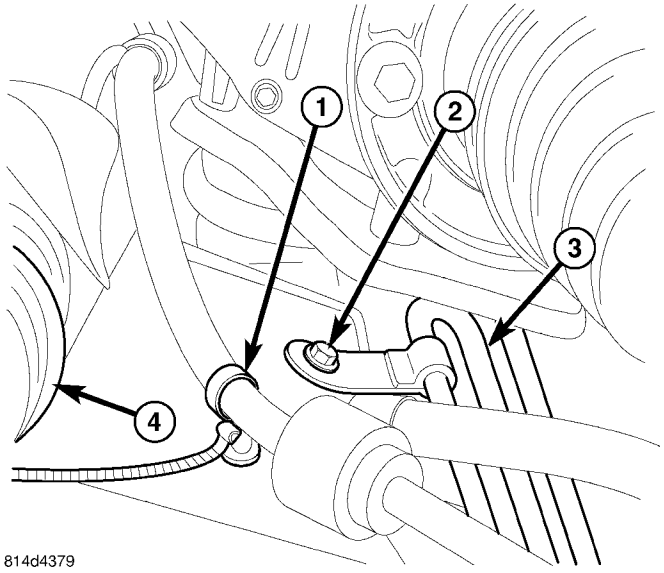


Fig. 43 Hose Mounting To Engine Cradle

1 - PRESSURE HOSE TIE-STRAP CLIP
2 - ROUTING CLAMP MOUNTING SCREW
3 - RETURN HOSE (COOLING LOOP PORTION)
4 - POWER STEERING GEAR

ENGINE CRADLE CROSSMEMBER (Continued)

(15) Remove screw securing power steering hydraulic return hose clamp to left side of engine cradle (Fig. 44).

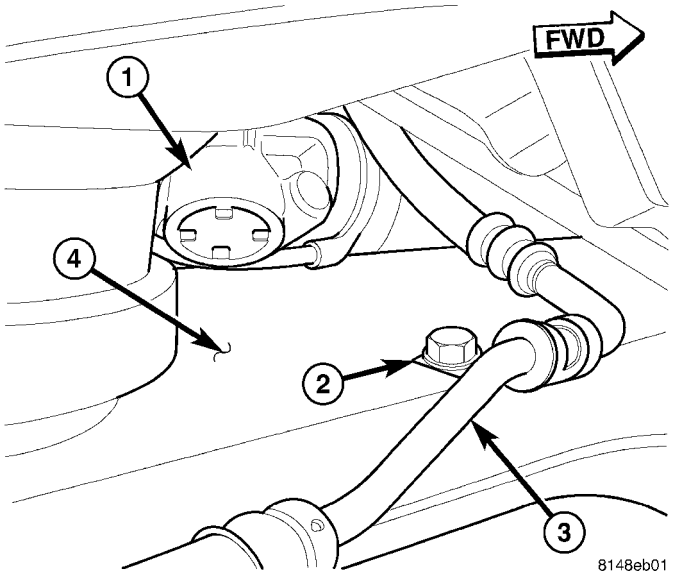


Fig. 44 Hose Routing Clamp - Left Side Cradle

1 - POWER STEERING GEAR
2 - ROUTING CLAMP AND SCREW
3 - RETURN HOSE
4 - ENGINE CRADLE

(16) Remove power steering rack and pinion mounting bolts. (Refer to 19 - STEERING/GEAR - REMOVAL)

(17) Set Driveline Support Table, Tool 8874 into position (Fig. 45) (Fig. 46).

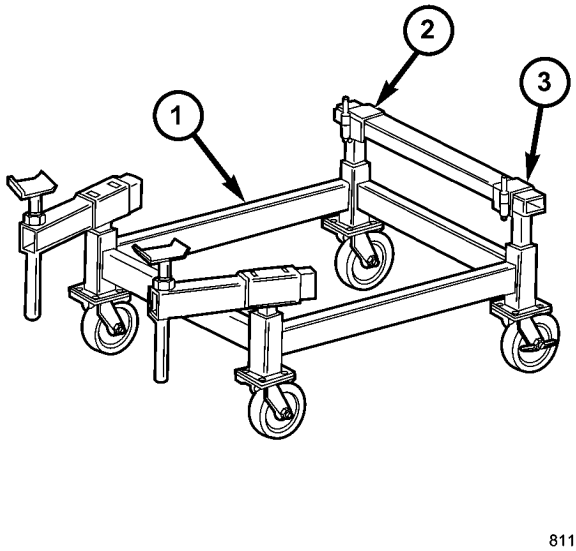


Fig. 45 Driveline Support Table 8874

1 - DRIVELINE SUPPORT TABLE 8874-1
2 - BRACKET 8874-4
3 - BRACKET 8874-3

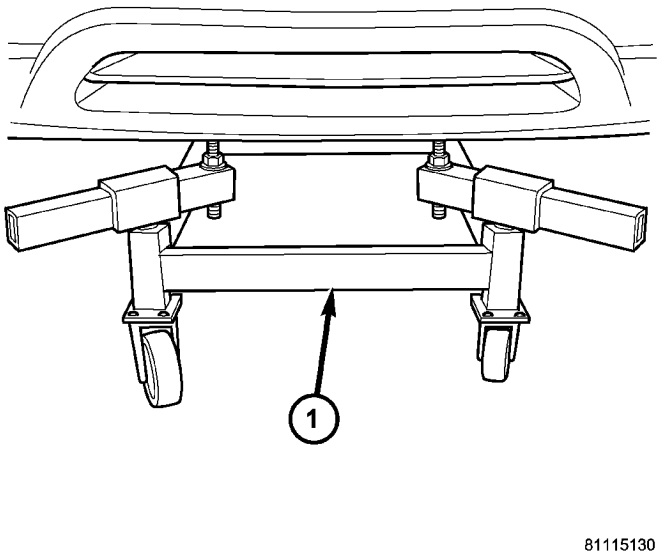


Fig. 46 Driveline Support Table in Position

1 - DRIVELINE SUPPORT TABLE 8874

(18) Lower vehicle until cradle and fixture engage as shown in (Fig. 47).

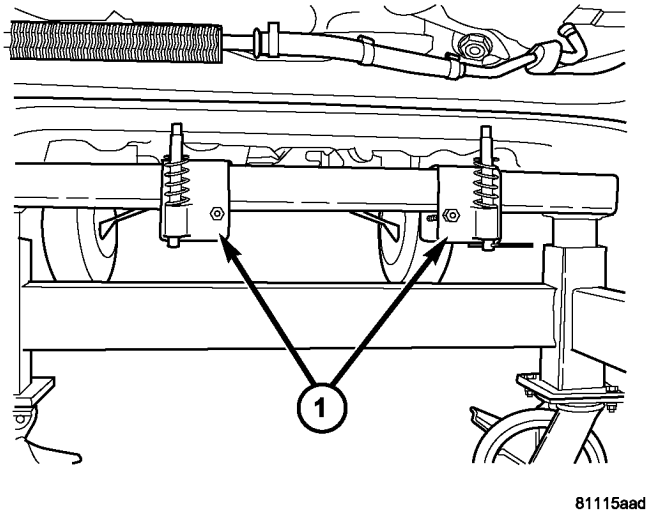


Fig. 47 Locating Brackets at Cradle

1 - SLIDING BRACKETS WITH LOCATORS

(19) Remove four (4) cradle-to-body bolts.

(20) Slowly raise vehicle on hoist to separate cradle from vehicle. **Verify that overhead fixture is secure to inner fenders and radiator upper support.** Have helper guide brake and power steering hydraulic lines through, as they will remain attached to cradle assembly.

(21) Remove stabilizer bar. (Refer to 2 - SUSPENSION/FRONT/STABILIZER BAR - REMOVAL)

ENGINE CRADLE CROSSMEMBER (Continued)

(22) If equipped with 3.8L engine, remove both tuned mass dampers as necessary (Fig. 48).

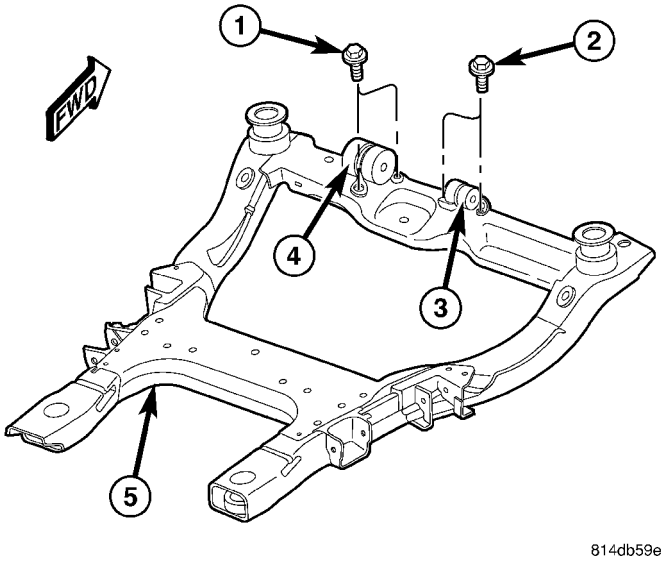


Fig. 48 Tuned Mass Damper Mounting

1 - MOUNTING BOLT
2 - MOUNTING BOLT
3 - TUNED MASS DAMPER - 2 LB.
4 - TUNED MASS DAMPER - 10 LB.
5 - ENGINE CRADLE

INSTALLATION

(1) If equipped with 3.8L engine, install both tuned mass dampers (Fig. 49). Tighten mounting bolts to 68 N·m (50 ft. lbs.).

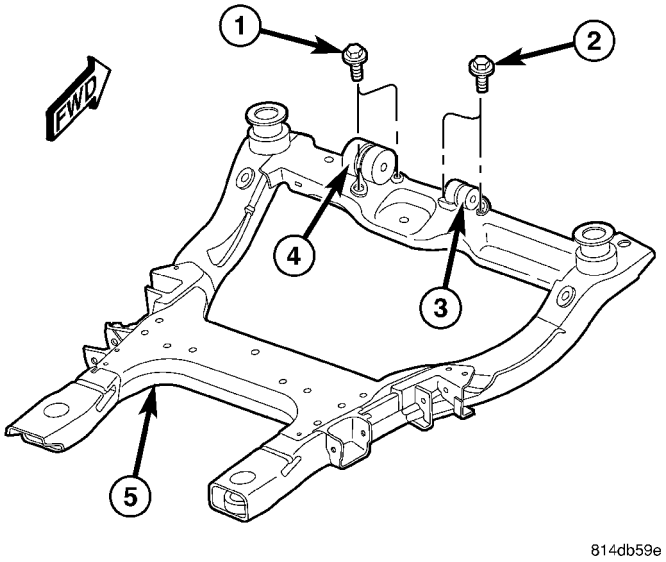


Fig. 49 Tuned Mass Damper Mounting

1 - MOUNTING BOLT
2 - MOUNTING BOLT
3 - TUNED MASS DAMPER - 2 LB.
4 - TUNED MASS DAMPER - 10 LB.
5 - ENGINE CRADLE

(2) Install stabilizer bar onto engine cradle. (Refer to 2 - SUSPENSION/FRONT/STABILIZER BAR - INSTALLATION)

(3) Install cradle and fixture into position under vehicle.

(4) Slowly lower vehicle (Fig. 50). While lowering vehicle, align engine front and rear mount studs to their respective thru-holes in cradle.

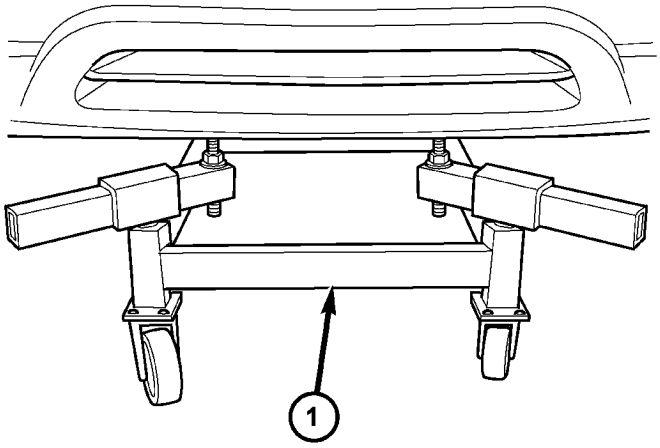


Fig. 50 Driveline Support Table in Position

1 - DRIVELINE SUPPORT TABLE 8874

(5) Aligning index/scribe mark placed upon disassembly, Install four (4) cradle-to-body bolts and tighten to 162 N·m (120 ft. lbs.).

(6) Remove overhead powertrain support fixture from engine compartment:

(a) Remove rear support/lift bracket and connect coolant temperature sensor.

(b) Remove front support/lift bracket. Install and tighten engine oil dipstick fastener.

(7) Raise vehicle on hoist and remove driveline support table.

(8) Install and tighten engine front and rear mount-to-cradle nuts to 54 N·m (40 ft. lbs.).

(9) Install power steering rack and pinion mounting bolts. (Refer to 19 - STEERING/GEAR - INSTALLATION)

ENGINE CRADLE CROSSMEMBER (Continued)

(10) Install screw securing power steering hydraulic return hose clamp to left side of engine cradle (Fig. 51).

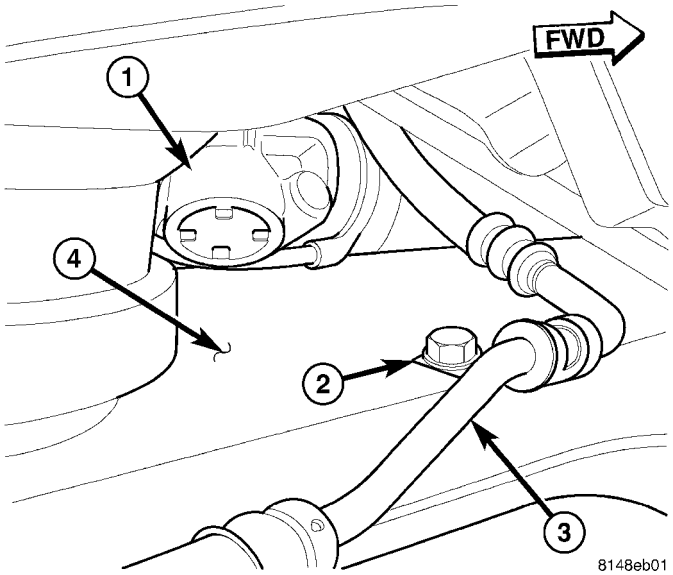


Fig. 51 Hose Routing Clamp - Left Side Cradle

1 - POWER STEERING GEAR
2 - ROUTING CLAMP AND SCREW
3 - RETURN HOSE
4 - ENGINE CRADLE

(11) Install hose clamp screw securing power steering hydraulic return hose to engine cradle at cooling loop (Fig. 52).

(12) Install tie-strap clip into engine cradle securing power steering hydraulic pressure hose in place (Fig. 52).

(13) Overlap power steering hydraulic hose clamps and install mounting screw fastening hydraulic hoses to cradle on right side (Fig. 53).

(14) Position brake line support brackets onto cradle and install the bolts.

(15) Position brake lines into the plastic support brackets and fasten the brackets.

(16) Install the fascia. (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION)

(17) Position the lower control arms in place and install the control arm to cradle bolts. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - INSTALLATION)

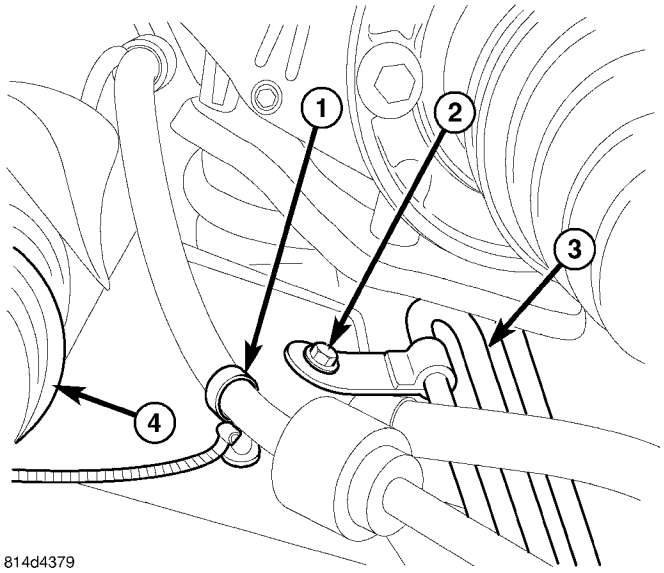


Fig. 52 Hose Mounting To Engine Cradle

1 - PRESSURE HOSE TIE-STRAP CLIP
2 - ROUTING CLAMP MOUNTING SCREW
3 - RETURN HOSE (COOLING LOOP PORTION)
4 - POWER STEERING GEAR

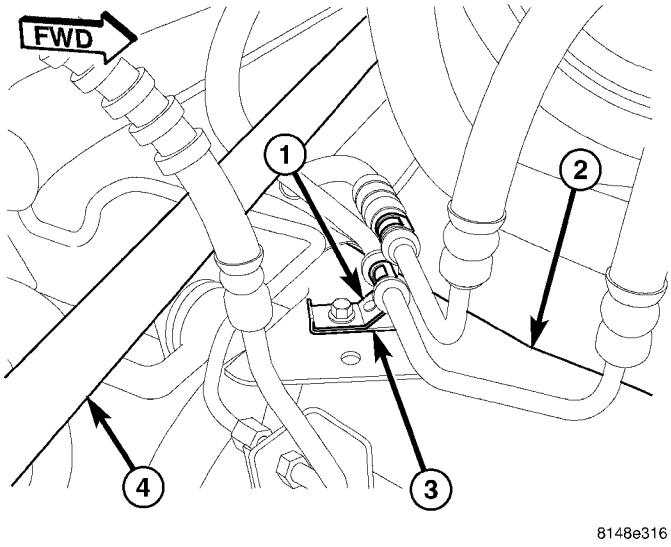


Fig. 53 Hose Routing Clamp - Right Side Cradle

1 - PRESSURE HOSE ROUTING CLAMP
2 - ENGINE CRADLE
3 - RETURN HOSE ROUTING CLAMP
4 - RIGHT HALF SHAFT

ENGINE CRADLE CROSSMEMBER (Continued)

(18) Install sway bar links to strut attaching points (Fig. 54). Tighten link-to-strut nuts to 88 N·m (65 ft. lbs.).

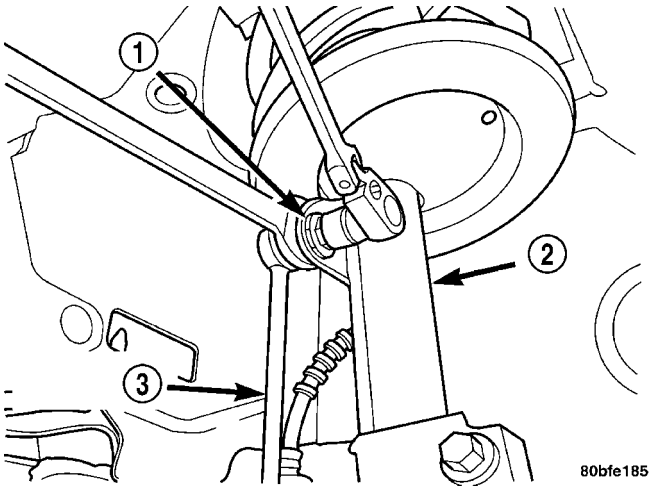


Fig. 54 Stabilizer Bar Link To Strut

1 - NUT
2 - STRUT
3 - STABILIZER BAR LINK

(19) If necessary, position wheel speed sensor harness back onto support bracket.

(20) Install both front tire/wheel assemblies.

(21) Connect solenoid/pressure switch connector (Fig. 55). Tighten screw to 4 N·m (35 in. lbs.).

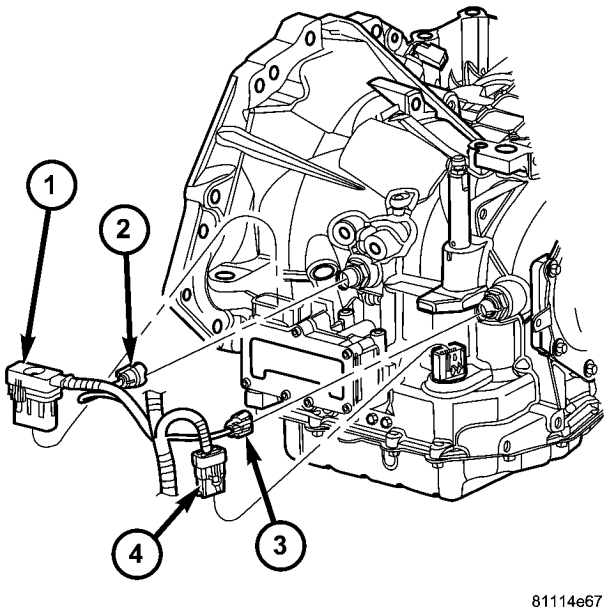


Fig. 55 Transmission Connectors

1 - SOLENOID PACK CONNECTOR
2 - INPUT SPEED SENSOR CONNECTOR
3 - OUTPUT SPEED SENSOR CONNECTOR
4 - TRANSMISSION RANGE SENSOR CONNECTOR

(22) Connect battery negative cable.

(23) Align front end. Refer to (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

REAR CROSSMEMBER

REMOVAL

(1) Disconnect and isolate battery negative cable from battery post.

(2) Remove spare tire.

(3) Lock out automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(4) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Position an extra pair of jack stands under and support forward end of engine cradle to help stabilize vehicle during rear suspension removal/installation.

(6) Remove both rear wheel and tire assemblies. (Refer to 22 - TIRES/WHEELS - REMOVAL)

(7) Access and remove both rear hub and bearing assemblies. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - REMOVAL)

(8) Remove rear half of exhaust system. (Refer to 11 - EXHAUST SYSTEM - REMOVAL)

NOTE: It may be necessary to back off parking brake shoe adjustment to allow sufficient slack to disengage cable buttons from connectors in following two steps.

(9) Slide left rear parking brake cable button inboard and remove from equalizer (Fig. 56).

(10) While holding parking brake cable connector on end of front cable secure with a pair of pliers at the front cable button, slide right rear parking brake cable button inboard and remove from cable connector (Fig. 56).

(11) Remove screw mounting left rear brake hose routing bracket to front of rear crossmember (Fig. 57). Tie brake hose off to side, away from crossmember.

(12) Remove screw mounting right rear brake hose routing bracket to front of rear crossmember (Fig. 57). Tie brake hose off to side, away from crossmember.

(13) If equipped with AWD, remove rear driveline module and both rear half shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR DRIVELINE MODULE - REMOVAL)

(14) Carefully mark location of rear crossmember on body at all four mount (bushing) locations using a marker or crayon (Fig. 58). **Do not use a scratch awl to mark location.**

REAR CROSSMEMBER (Continued)

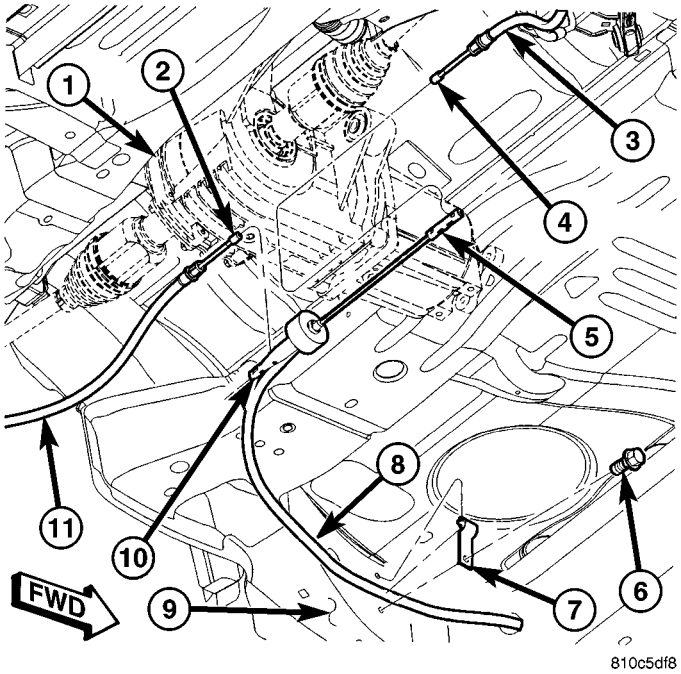


Fig. 56 Cable Routing And Connections

1 - REAR DRIVELINE MODULE (AWD MODELS ONLY)
2 - LEFT REAR CABLE END BUTTON
3 - RIGHT REAR CABLE
4 - RIGHT REAR CABLE END BUTTON
5 - CONNECTOR ON END OF FRONT CABLE
6 - SCREW
7 - FRONT CABLE ROUTING CLAMP
8 - FRONT CABLE
9 - LEFT FRAME RAIL
10 - EQUALIZER
11 - LEFT REAR CABLE

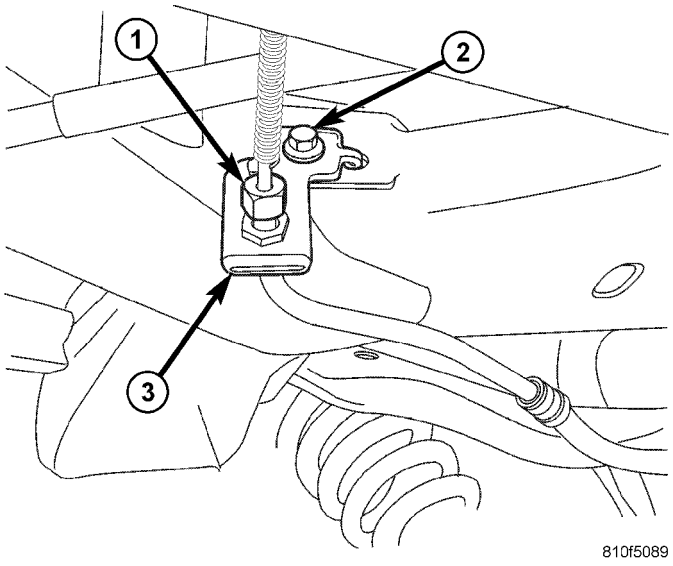


Fig. 57 Brake Hose Bracket At Crossmember

1 - CHASSIS BRAKE TUBE NUT
2 - SCREW
3 - BRACKET

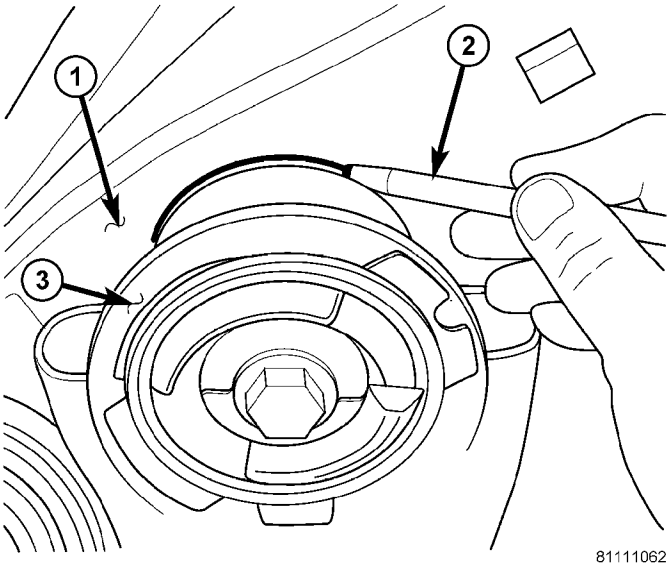


Fig. 58 Marking Location Of Crossmember Mount To Body

1 - BODY
2 - MARKER (OR CRAYON)
3 - CROSSMEMBER BUSHING FLANGE

(15) Position under-hoist utility jack or transmission jack under center of rear suspension crossmember. Raise jack head to contact suspension crossmember and secure crossmember to jack.

(16) Remove lower mounting bolt and nut at each rear shock absorber (Fig. 59).

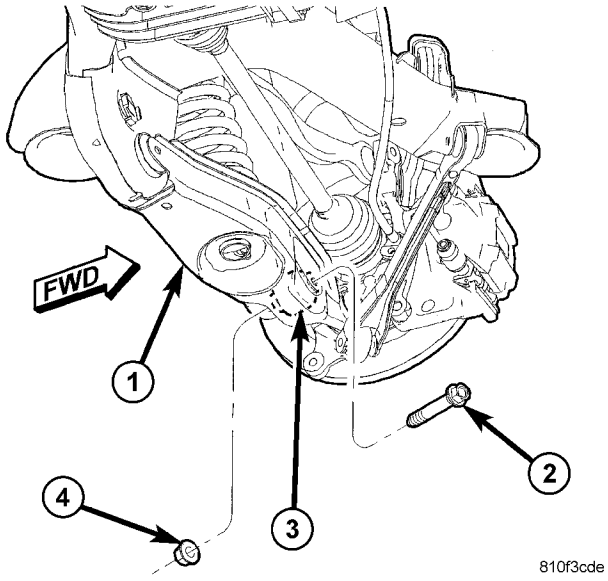


Fig. 59 Shock Absorber Mounting - Lower

1 - SPRING LINK
2 - BOLT
3 - SHOCK ABSORBER
4 - NUT

REAR CROSSMEMBER (Continued)

(17) Remove both front and rear crossmember mounting bolts on **left** side of vehicle (Fig. 60).

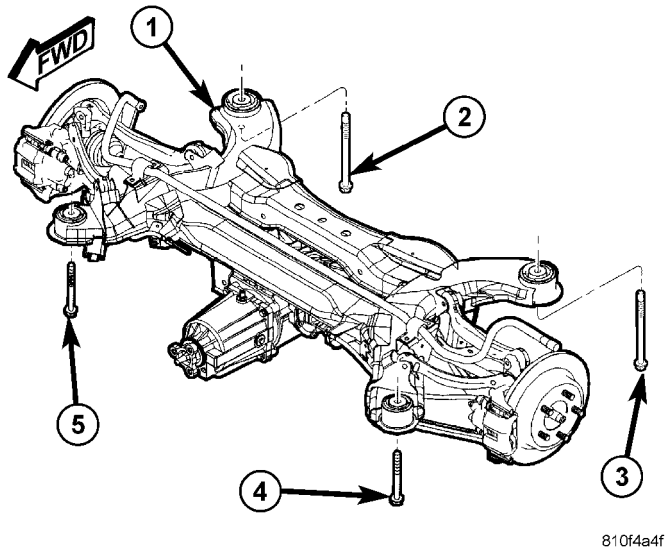


Fig. 60 Rear Crossmember Mounting Bolts

1 - REAR SUSPENSION CROSSMEMBER
2 - RIGHT REAR MOUNTING BOLT
3 - LEFT REAR MOUNTING BOLT
4 - LEFT FRONT MOUNTING BOLT
5 - RIGHT FRONT MOUNTING BOLT

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to remove coil spring.

(18) **Slowly** lower jack allowing left side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring removal. **Do not lower jack any further than necessary.**

(19) Remove coil spring and isolator (Fig. 61), lower end first.

(20) Raise left side of crossmember back into mounted position and install previously removed mounting bolts. It is not necessary to tighten bolts at this point.

(21) Remove both front and rear crossmember mounting bolts on **right** side of vehicle (Fig. 60).

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to remove coil spring.

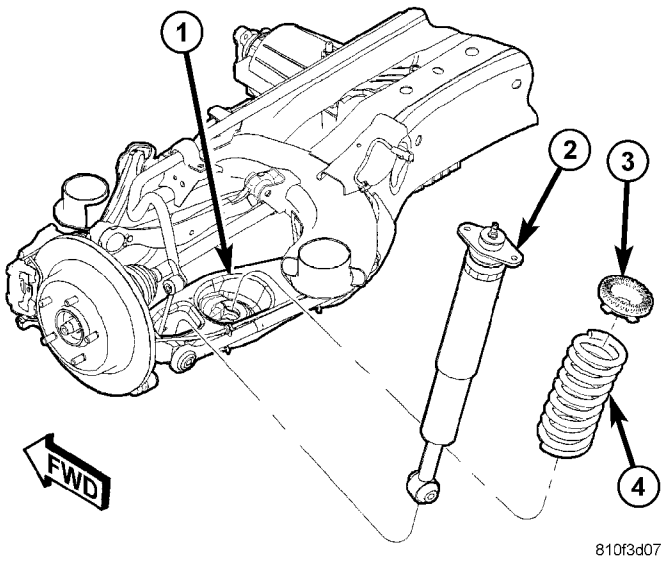


Fig. 61 Coil Spring And Shock Absorber

1 - SPRING LINK
2 - SHOCK ABSORBER
3 - ISOLATOR
4 - COIL SPRING

(22) **Slowly** lower jack allowing right side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring removal. **Do not lower jack any further than necessary.**

(23) Remove coil spring and isolator (Fig. 61), lower end first.

(24) Raise right side of crossmember back into mounted position. It is not necessary to install mounting bolts.

(25) Remove both front and rear crossmember mounting bolts previously removed on **left** side of crossmember (Fig. 60).

(26) **Slowly** lower jack. **Do not lower jack at a fast rate.** As jack is lowered, remove propeller shaft from alignment pin on end of rear driveline module input flange and support it with a bungee or cord, keeping it at its normal height. **Do not allow propeller shaft to hang on its own.**

(27) Continue to lower jack until crossmember is at a comfortable working level.

REAR CROSSMEMBER (Continued)

(28) Remove bolt and nut fastening stabilizer bar to each stabilizer link (Fig. 62).

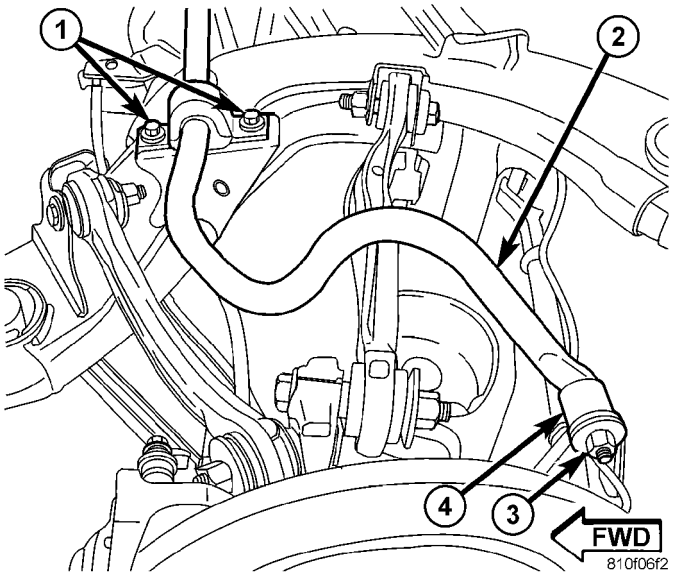


Fig. 62 Rear Stabilizer Bar Mounting

1 - RETAINER BOLTS
2 - STABILIZER BAR
3 - MOUNTING BOLT AND NUT
4 - STABILIZER LINK

(29) Remove bolts fastening each stabilizer bar cushion retainer to crossmember (Fig. 62).

(30) Remove stabilizer bar with cushions and retainers from crossmember.

NOTE: For installation purposes, when removing link fasteners, it important to note which bolt fastens what component and in what direction each fastener is installed in.

(31) Perform following to each side of rear suspension:

(a) Place a 13 mm 12-point box wrench over cable retainer on end of cable housing at crossmember and collapse retainer fingers (Fig. 63). Remove cable from crossmember.

(b) Remove bolt and nut fastening spring link to crossmember (Fig. 64).

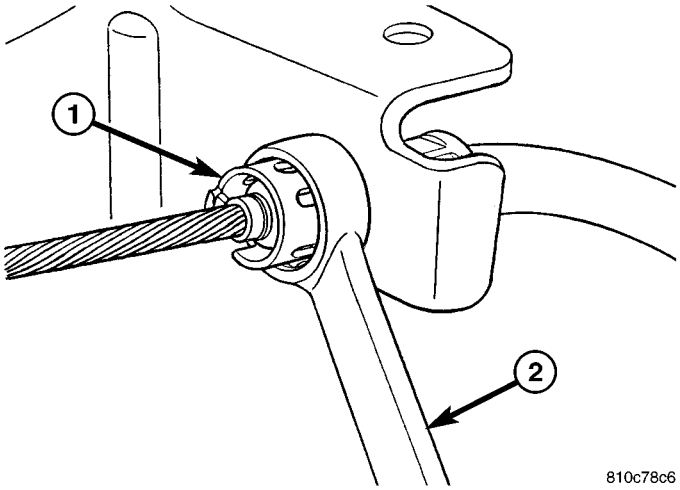


Fig. 63 Wrench Positioned To Release Cable Retainer

1 - CABLE RETAINER
2 - 12-POINT BOX END WRENCH

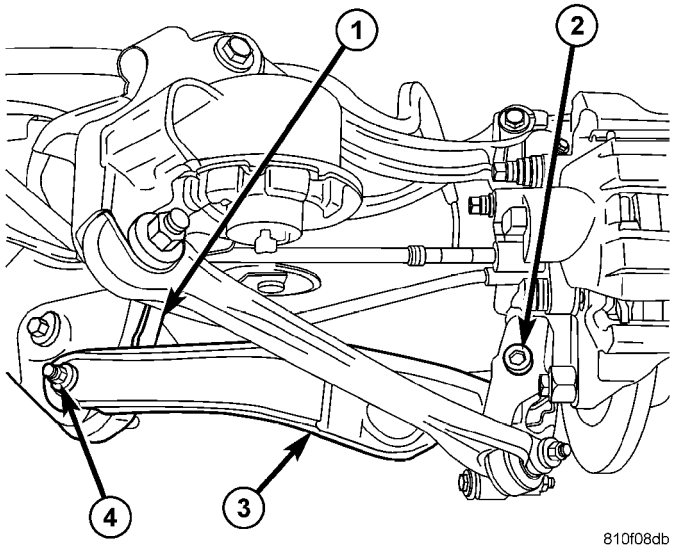


Fig. 64 Spring Link Mounting

1 - CROSSMEMBER
2 - MOUNTING BOLT AND NUT
3 - SPRING LINK
4 - MOUNTING BOLT AND NUT

REAR CROSSMEMBER (Continued)

(c) While holding toe adjustment cam bolt from rotating (Fig. 65), remove nut securing toe link at crossmember (Fig. 66). Remove link from cam bolt, then remove cam bolt and washer from crossmember.

(d) Remove bolt and nut mounting compression link to crossmember (Fig. 67).

(e) Remove nut and bolt mounting tension link to crossmember (Fig. 68).

(f) Remove nut and bolt mounting camber link to crossmember (Fig. 68).

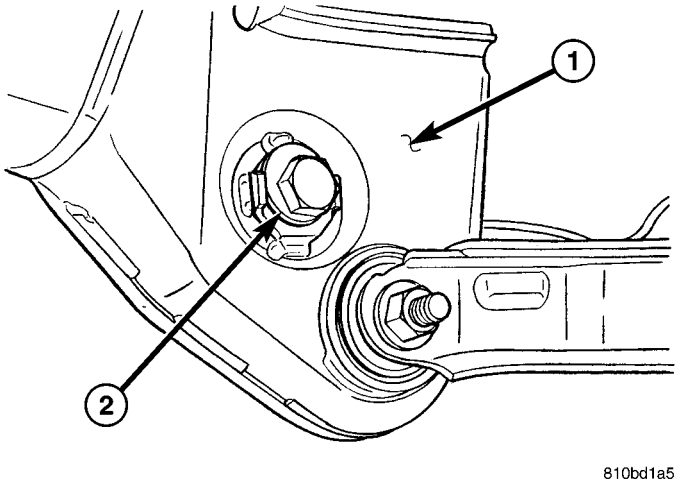


Fig. 65 Cam Bolt Securing Toe Link - Front View

1 - CAM BOLT (TOE ADJUSTMENT)
2 - FRONT OF REAR CROSSMEMBER

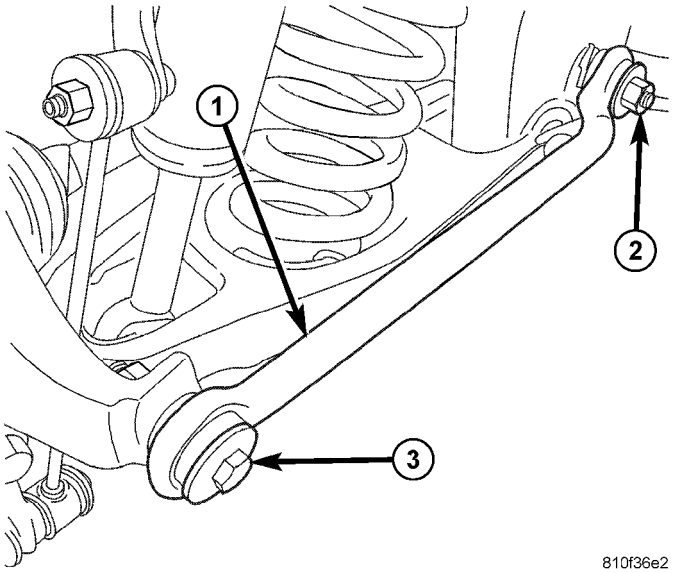


Fig. 66 Toe Link Mounting

1 - TOE LINK
2 - MOUNTING NUT AT CROSSMEMBER
3 - MOUNTING BOLT AT KNUCKLE

(g) Carefully lift knuckle with links and parking brake cable attached as an assembly from rear suspension crossmember.

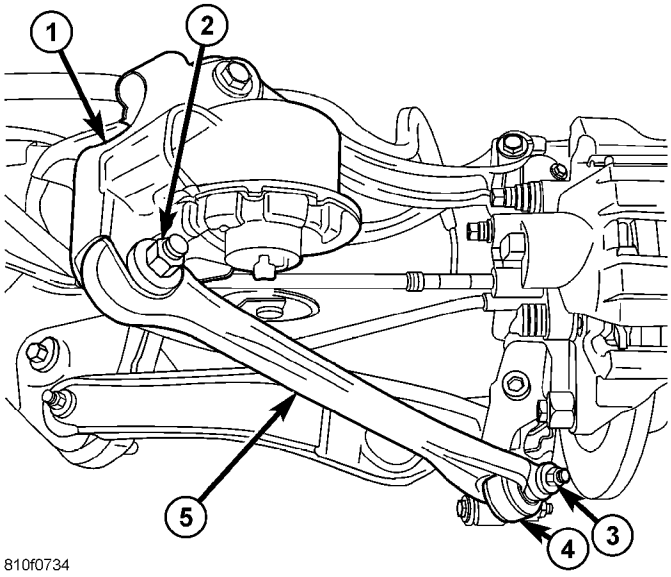


Fig. 67 Compression Link Mounting

1 - REAR SUSPENSION CROSSMEMBER
2 - MOUNTING BOLT AND NUT
3 - MOUNTING BOLT AND NUT
4 - KNUCKLE
5 - COMPRESSION LINK

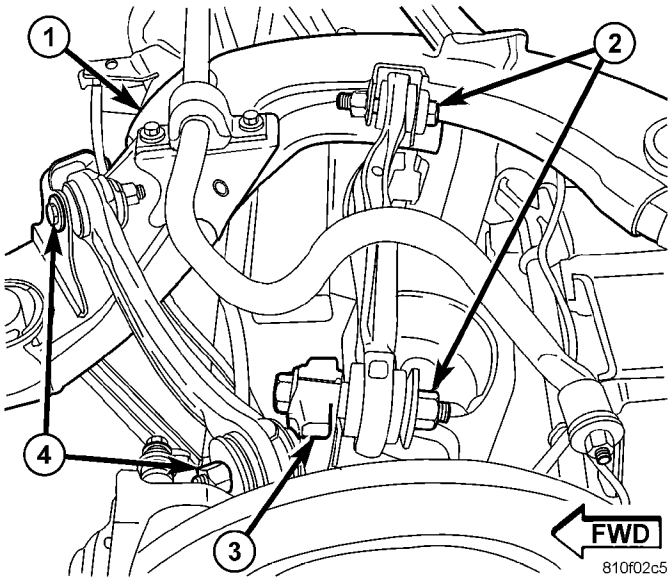


Fig. 68 Camber Link And Tension Link Mounting

1 - REAR SUSPENSION CROSSMEMBER
2 - CAMBER LINK MOUNTING BOLTS
3 - KNUCKLE
4 - TENSION LINK MOUNTING BOLTS

(32) If necessary, remove ABS wheel speed sensor routing clips from crossmember.

(33) Remove crossmember from jack head.

REAR CROSSMEMBER (Continued)

INSTALLATION

(1) Install crossmember on jack head in the same position in which it was removed and secure in place.

(2) If necessary, install ABS wheel speed sensor routing clips in crossmember.

(3) Perform following to each side of rear suspension:

(a) Carefully place knuckle with links and parking brake cable attached as an assembly into mounting position on rear suspension crossmember.

(b) Install bolt and nut mounting camber link to crossmember (Fig. 69). **Do not tighten at this time.**

(c) Install bolt and nut mounting tension link to crossmember (Fig. 69). **Do not tighten at this time.**

(d) Install bolt and nut mounting compression link to crossmember (Fig. 70).

(e) Slide toe adjustment cam bolt through rear crossmember from front and place cam washer over threads on rear. Place eccentric on head of bolt upward to 12 O'clock position. Install toe link over end of bolt and install nut. While holding cam bolt from rotating (Fig. 71), install nut securing toe link to crossmember (Fig. 72). **Do not fully tighten at this time.**

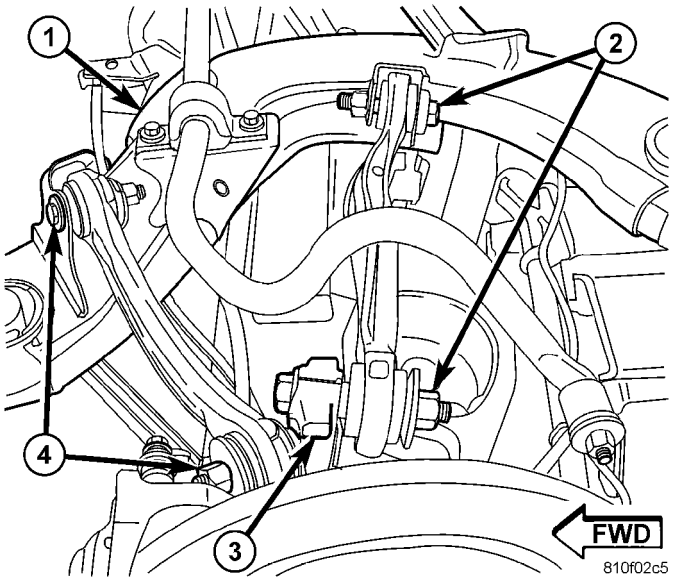


Fig. 69 Camber Link And Tension Link Mounting

1 - REAR SUSPENSION CROSSMEMBER
2 - CAMBER LINK MOUNTING BOLTS
3 - KNUCKLE
4 - TENSION LINK MOUNTING BOLTS

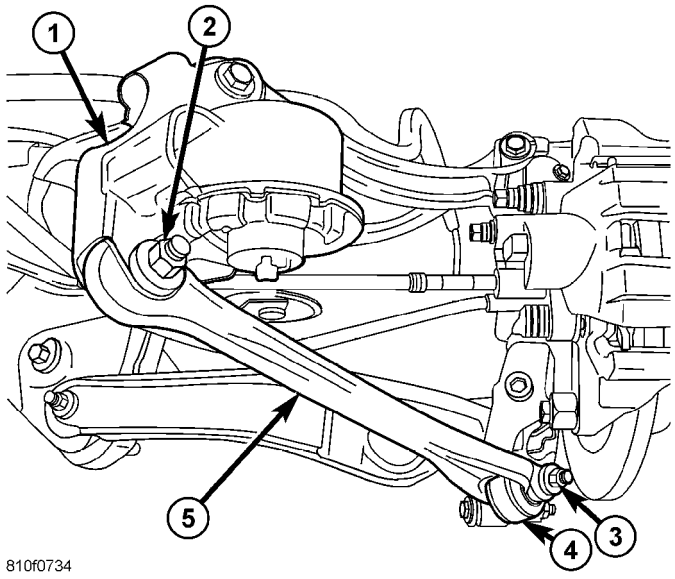


Fig. 70 Compression Link Mounting

1 - REAR SUSPENSION CROSSMEMBER
2 - MOUNTING BOLT AND NUT
3 - MOUNTING BOLT AND NUT
4 - KNUCKLE
5 - COMPRESSION LINK

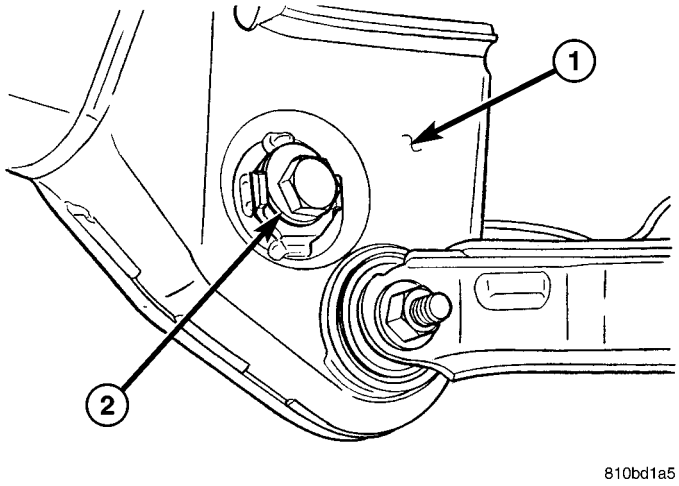


Fig. 71 Cam Bolt Securing Toe Link - Front View

1 - CAM BOLT (TOE ADJUSTMENT)
2 - FRONT OF REAR CROSSMEMBER

REAR CROSSMEMBER (Continued)

(f) Install bolt and nut fastening spring link to crossmember (Fig. 73). **Do not tighten at this time.**

(g) Set current-side of rear suspension to curb height using following tools:

(I) Place Receiver, Special Tool 9031-3, cup-side-down over top of crossmember rear mount bushing (Fig. 74).

(II) Place Curb Height Gage, Special Tool 9094, into shock absorber pocket in spring link and opposite end of tool over Receiver, Special Tool 9031-3 (Fig. 74).

(III) Install bolt through crossmember rear mount bushing, Receiver, Special Tool 9031-3, and Curb Height Gage, Special Tool 9094. Install wing nut, hand tightening tools in place (Fig. 74).

(IV) Move spring link up or down as necessary aligning lower shock bolt mounting hole with Curb Height Gage hole, then insert pin through both (Fig. 74).

(h) Tighten link fasteners at crossmember to following specifications:

- Camber Link bolt – 68 N·m (50 ft. lbs.) torque (Fig. 69).
- Compression Link bolt – 68 N·m (50 ft. lbs.) torque (Fig. 70).
- Spring Link bolt – 129 N·m (95 ft. lbs.) torque (Fig. 73).
- Tension Link bolt – 68 N·m (50 ft. lbs.) torque (Fig. 69).

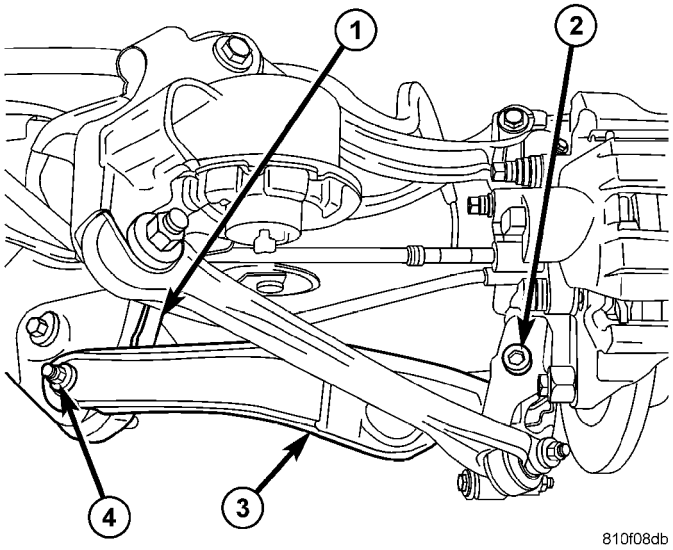


Fig. 73 Spring Link Mounting

1 - CROSSMEMBER
2 - MOUNTING BOLT AND NUT
3 - SPRING LINK
4 - MOUNTING BOLT AND NUT

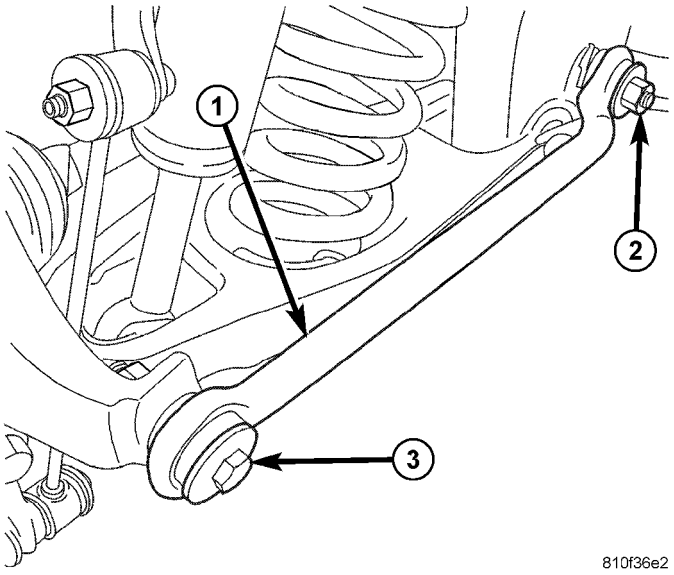


Fig. 72 Toe Link Mounting

1 - TOE LINK
2 - MOUNTING NUT AT CROSSMEMBER
3 - MOUNTING BOLT AT KNUCKLE

- Toe Link nut – 172 N·m (127 ft. lbs.) torque (Fig. 72).

(i) Remove special tools.

(j) Install end of parking brake cable into mounting hole in crossmember. Slide cable retainer on end of cable housing into hole until retainer fingers click into place.

(4) Install stabilizer bar with cushions and retainers on crossmember.

(5) Install cushion retainer mounting bolts (Fig. 75). **Do not tighten at this time.**

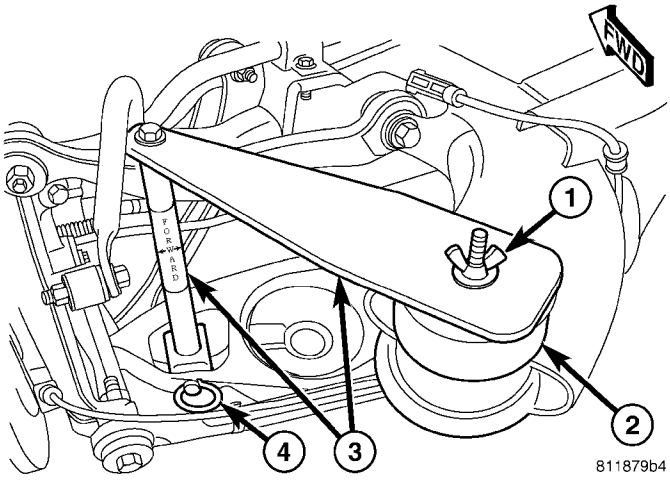


Fig. 74 Curb Height Gage Mounted In Place

1 - WING NUT AND BOLT
2 - RECEIVER 9031-3
3 - GAGE 9094
4 - PIN

REAR CROSSMEMBER (Continued)

(6) Install bolt and nut fastening stabilizer bar to each stabilizer link (Fig. 75). **Do not tighten at this time.**

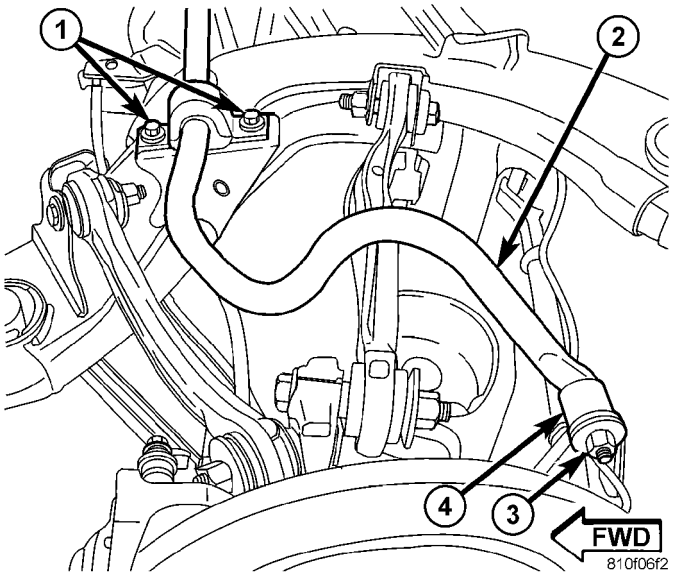


Fig. 75 Rear Stabilizer Bar Mounting

1 - RETAINER BOLTS
2 - STABILIZER BAR
3 - MOUNTING BOLT AND NUT
4 - STABILIZER LINK

(7) Tighten cushion retainer mounting bolts to 61 N·m (45 ft. lbs.) torque.

(8) Raise crossmember to body mounting points. As crossmember is raised, align shocks with pockets in spring links.

(9) Continue to raise crossmember with jack until crossmember mounting bolts can be installed. Install left side crossmember mounting bolts, but not the right side bolts (Fig. 76). It is not necessary to tighten bolts at this point.

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to install coil spring.

(10) **Slowly** lower jack allowing right side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring installation. **Do not lower jack any further than necessary.**

(11) Install coil spring and isolator (Fig. 77), top end first.

NOTE: Verify that spring lower end coil is correctly placed against abutment built into spring link.

(12) Carefully raise jack, guiding coil spring and lower end of shock absorber into mounted positions. Once shock absorber lower mounting hole lines up with hole in spring link, stop jacking.

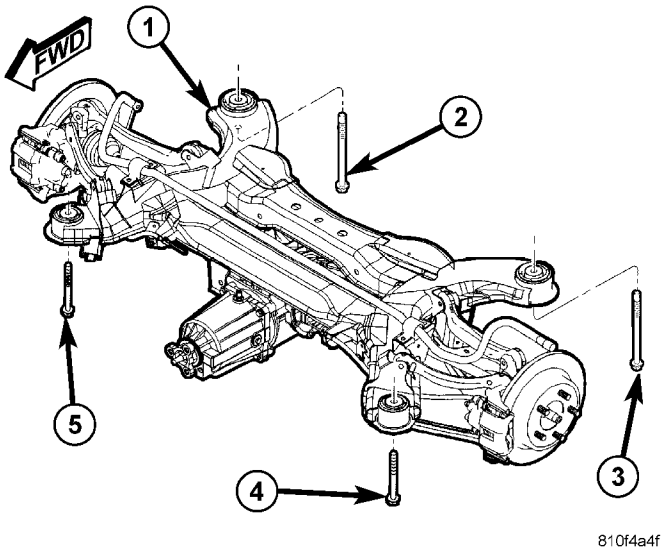


Fig. 76 Rear Crossmember Mounting Bolts

1 - REAR SUSPENSION CROSSMEMBER
2 - RIGHT REAR MOUNTING BOLT
3 - LEFT REAR MOUNTING BOLT
4 - LEFT FRONT MOUNTING BOLT
5 - RIGHT FRONT MOUNTING BOLT

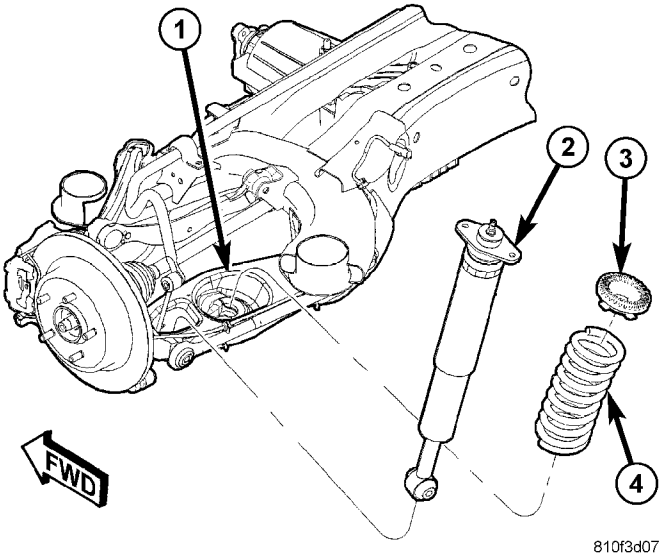


Fig. 77 Coil Spring And Shock Absorber

1 - SPRING LINK
2 - SHOCK ABSORBER
3 - ISOLATOR
4 - COIL SPRING

REAR CROSSMEMBER (Continued)

(13) Install lower shock mounting bolt (Fig. 78). **Do not tighten at this time.**

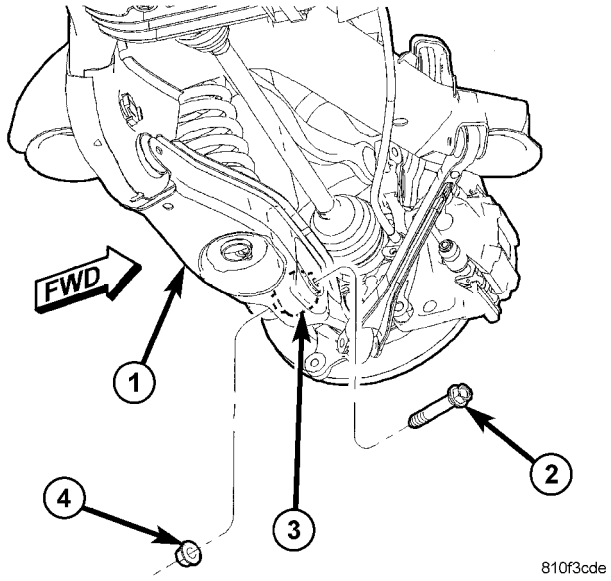


Fig. 78 Shock Absorber Mounting - Lower

1 - SPRING LINK
2 - BOLT
3 - SHOCK ABSORBER
4 - NUT

(14) Raise right side of crossmember into mounted position. Install right side crossmember mounting bolts (Fig. 76). **Do not fully tighten bolts at this time.**

(15) Remove both front and rear crossmember mounting bolts on **left** side of vehicle (Fig. 76).

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to install coil spring.

(16) **Slowly** lower jack allowing left side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring installation. **Do not lower jack any further than necessary.**

(17) Install coil spring and isolator (Fig. 77), top end first.

NOTE: Verify that spring lower end coil is correctly placed against abutment built into spring link.

(18) Carefully raise jack, guiding coil spring and lower end of shock absorber into mounted positions. Once shock absorber lower mounting hole lines up with hole in spring link, stop jacking.

(19) Install lower shock mounting bolt (Fig. 78). **Do not tighten at this time.**

(20) Raise left side of crossmember into mounted position and install previously removed mounting bolts (Fig. 76). **Do not fully tighten bolts at this time.**

(21) Shift crossmember as necessary to line up mounts with location marks drawn in before removal (Fig. 79).

NOTE: If proper location marks are unavailable or as a check, the crossmember can be positioned utilizing the PLP points. Shift the crossmember as necessary to achieve the measured distances shown in the figure (Fig. 80).

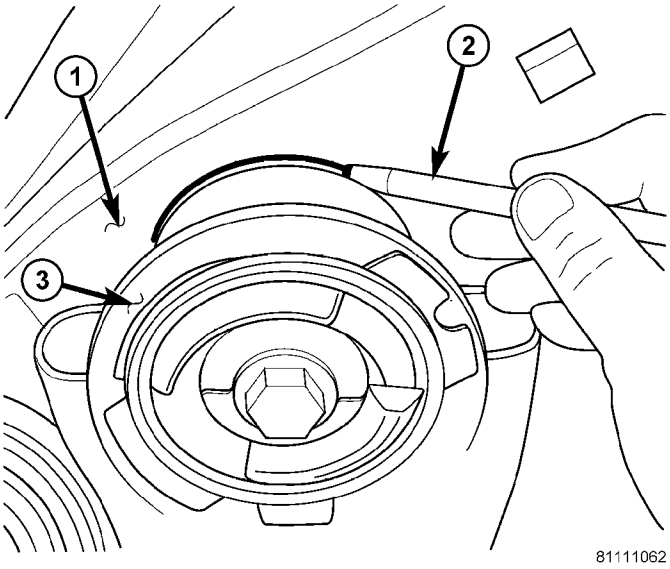


Fig. 79 Marking Location Of Crossmember Mount To Body

1 - BODY
2 - MARKER (OR CRAYON)
3 - CROSSMEMBER BUSHING FLANGE

(22) Once mounts are lined up with location marks, tighten all four crossmember mounting bolts to 163 N·m (120 ft. lbs.) torque.

(23) Tighten shock absorber lower mounting bolts to 102 N·m (75 ft. lbs.) torque.

(24) Remove jack from under crossmember.

(25) If equipped with AWD, install rear driveline module and both rear half shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/REAR DRIVELINE MODULE - INSTALLATION)

REAR CROSSMEMBER (Continued)

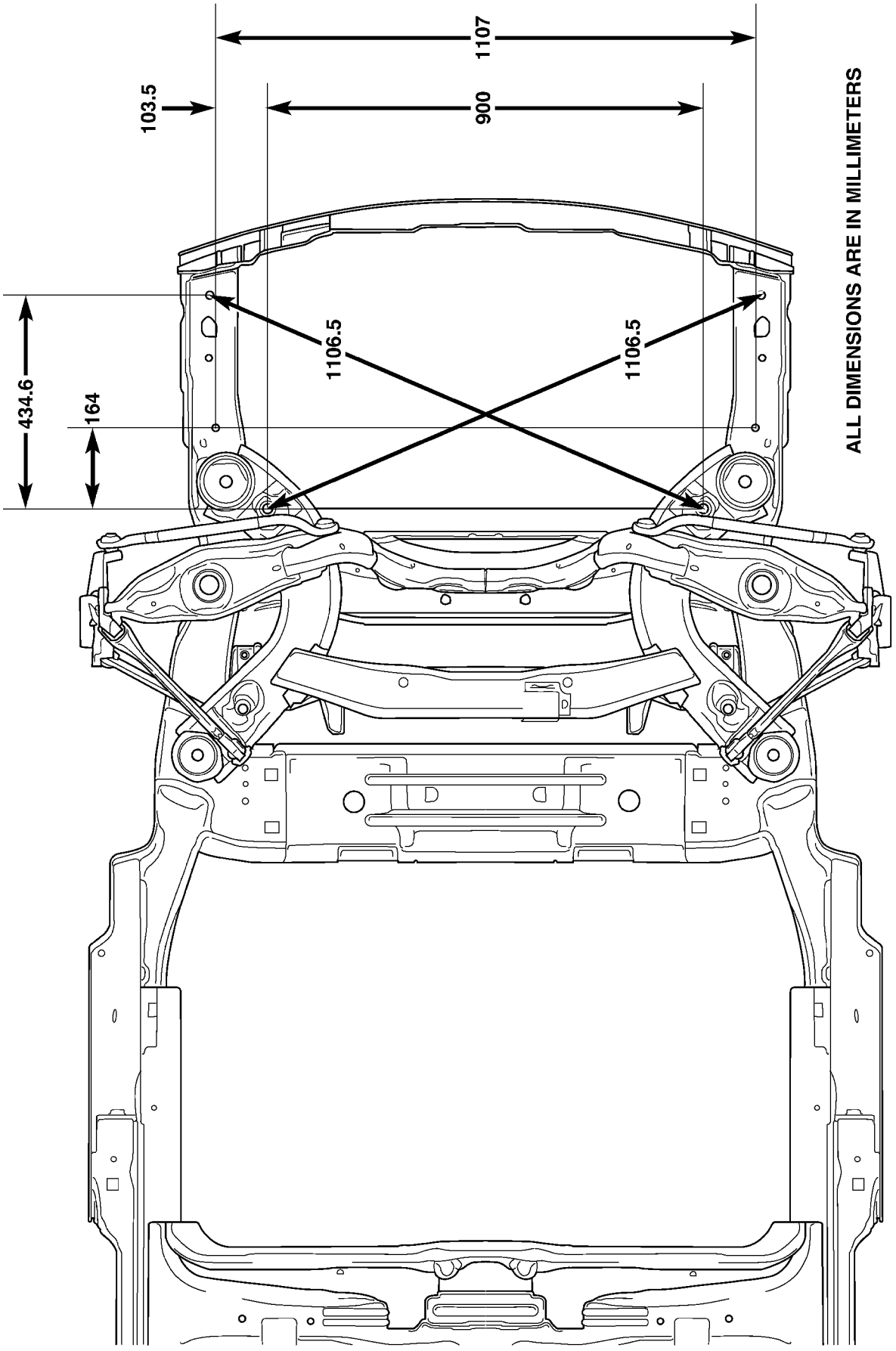


Fig. 80 PLP Points

REAR CROSSMEMBER (Continued)

(26) Install screw mounting right rear brake hose routing bracket to front of rear crossmember (Fig. 81).

(27) Install screw mounting left rear brake hose routing bracket to front of rear crossmember (Fig. 81).

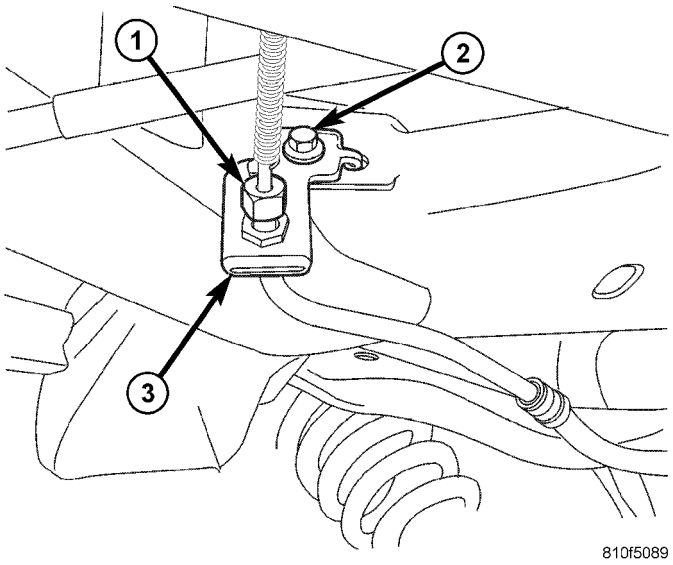


Fig. 81 Brake Hose Bracket At Crossmember

1 - CHASSIS BRAKE TUBE NUT
2 - SCREW
3 - BRACKET

(28) While holding cable connector on end of front cable secure with a pair of pliers at the front cable button, Place right rear cable button into cable connector (Fig. 82). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(29) Place left rear parking brake cable button into equalizer (Fig. 82). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(30) Install rear half of exhaust system. (Refer to 11 - EXHAUST SYSTEM - INSTALLATION)

(31) Install both hub and bearings with wheel speed sensors as well as all components necessary to access them. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - INSTALLATION)

(32) Install tire and wheel assemblies (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(33) Lower vehicle.

(34) Unlock automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(35) Connect battery negative cable to battery post.

(36) Install spare tire under vehicle.

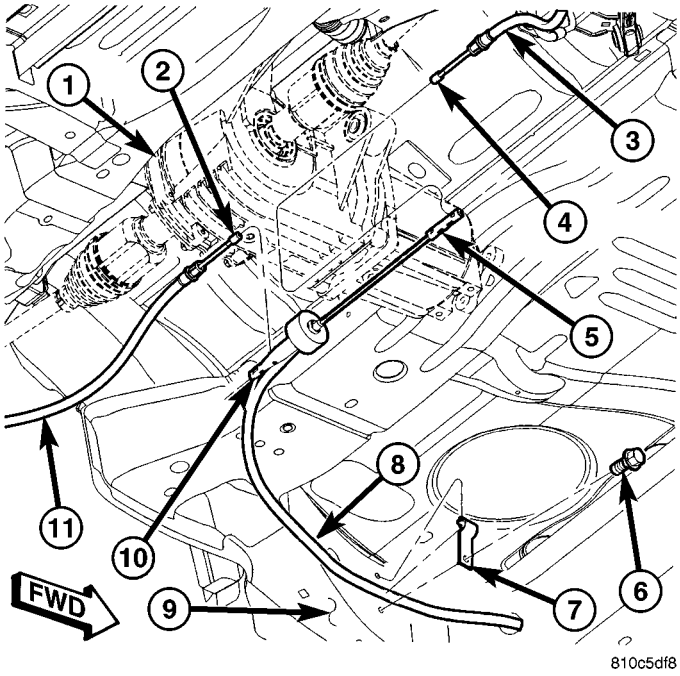


Fig. 82 Cable Routing And Connections

1 - REAR DRIVELINE MODULE (AWD MODELS ONLY)
2 - LEFT REAR CABLE END BUTTON
3 - RIGHT REAR CABLE
4 - RIGHT REAR CABLE END BUTTON
5 - CONNECTOR ON END OF FRONT CABLE
6 - SCREW
7 - FRONT CABLE ROUTING CLAMP
8 - FRONT CABLE
9 - LEFT FRAME RAIL
10 - EQUALIZER
11 - LEFT REAR CABLE

(37) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access mounting bolts.

(38) Tighten stabilizer link fasteners to 61 N·m (45 ft. lbs.) torque.

(39) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

REAR CROSSMEMBER BUSHING - FRONT MOUNT

REMOVAL

(1) Disconnect and isolate battery negative cable from battery post.

(2) If vehicle is not equipped with All Wheel Drive (AWD), remove spare tire.

(3) Lock out automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

REAR CROSSMEMBER BUSHING - FRONT MOUNT (Continued)

(4) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Position an extra pair of jack stands under and support forward end of engine cradle to help stabilize vehicle during rear suspension removal/installation.

(6) Remove both rear wheel and tire assemblies. (Refer to 22 - TIRES/WHEELS - REMOVAL)

(7) Remove rear half of exhaust system. (Refer to 11 - EXHAUST SYSTEM - REMOVAL)

NOTE: It may be necessary to back off parking brake shoe adjustment to allow sufficient slack to disengage cable buttons from connectors in following two steps.

(8) Slide left rear parking brake cable button inboard and remove from equalizer (Fig. 56).

(9) While holding parking brake cable connector on end of front cable secure with a pair of pliers at the front cable button, slide right rear parking brake cable button inboard and remove from cable connector (Fig. 56).

(10) Remove screw mounting left rear brake hose routing bracket to front of rear crossmember (Fig. 57).

(11) Remove screw mounting right rear brake hose routing bracket to front of rear crossmember (Fig. 57).

NOTE: In some cases, it may be necessary to retract caliper piston in its bore a small amount in order to provide sufficient clearance between shoes and rotor to easily remove caliper from knuckle. This can usually be accomplished before guide pin bolts are removed, by grasping rear of caliper and pulling outward working with guide pins, thus retracting piston. Never push on piston directly as it may get damaged.

(12) Remove each rear caliper from its mount and support as follows:

(a) Remove two caliper guide pin bolts (Fig. 83).

(b) Remove caliper assembly from brake adapter by first rotating bottom of caliper away from rotor, then lifting caliper (with shoes) away from upper adapter abutment (Fig. 84).

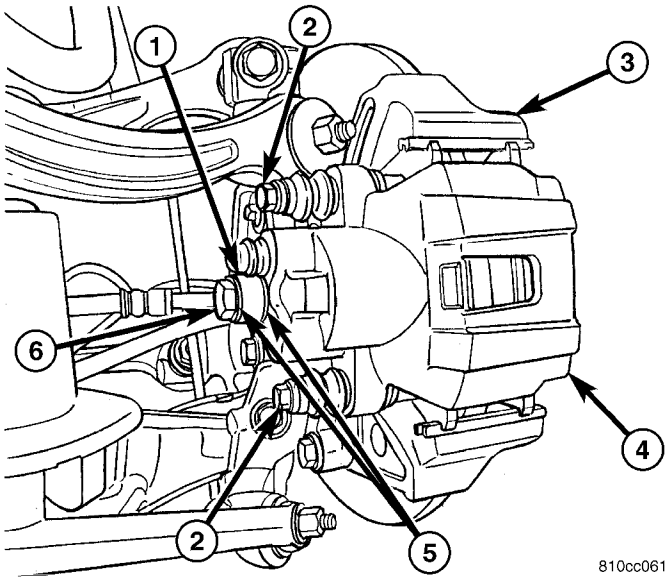


Fig. 83 Rear Brake Caliper Mounting

1 - BRAKE HOSE BANJO FITTING
2 - CALIPER GUIDE PIN BOLT
3 - CALIPER ADAPTER
4 - DISC BRAKE CALIPER
5 - COPPER SEAL WASHERS
6 - BANJO BOLT

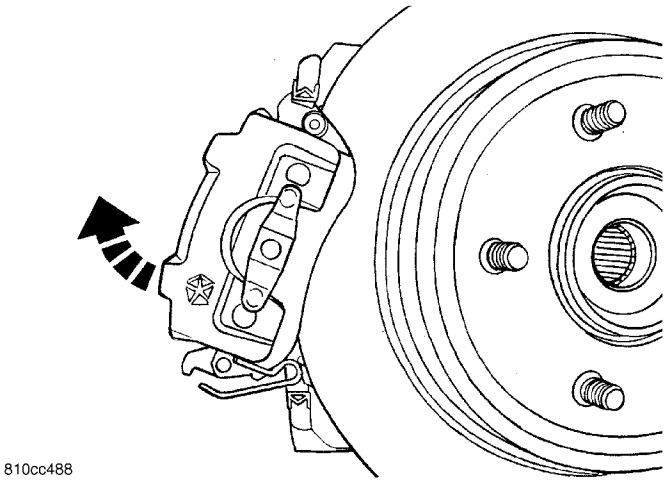


Fig. 84 Rear Caliper Removal

REAR CROSSMEMBER BUSHING - FRONT MOUNT (Continued)

(c) To prevent weight of caliper from overextending and damaging brake hose and tubing while caliper is off mount, hang brake caliper from vehicle using wire or cord (Fig. 85). **Be sure to hang caliper and brake hose far enough forward on body, away from crossmember, to allow sufficient room to lower crossmember without interference.**

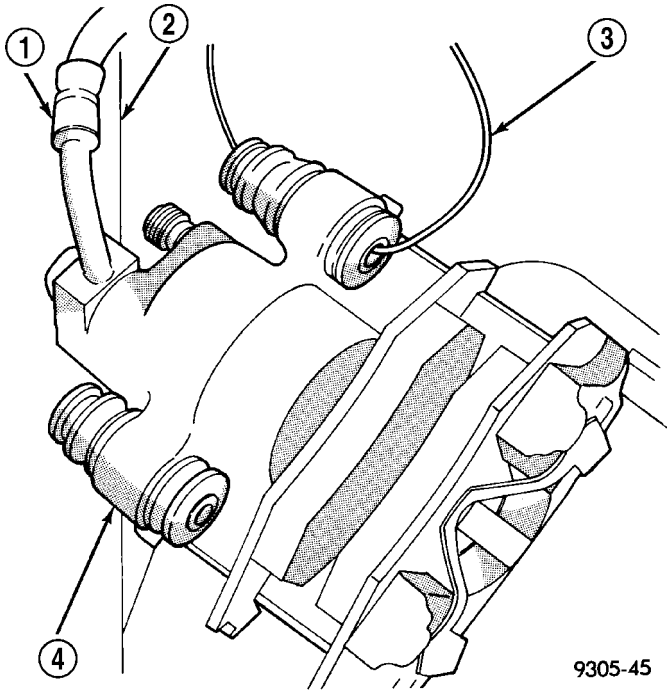


Fig. 85 Supporting Caliper

1 - BRAKE HOSE
2 - SUSPENSION
3 - WIRE HANGER (HANG TO VEHICLE/SUSPENSION)
4 - BRAKE CALIPER

(13) Disconnect vehicle wiring harness from each rear wheel speed sensor connector (Fig. 86).

(14) Unclip each rear wheel speed sensor connector from spare tire mounting support (Fig. 86).

(15) If equipped with AWD:

(a) Reference mark propeller shaft-to-rear driveline module input flange connection.

(b) Remove three propeller shaft-to-rear driveline module mounting bolts. Do not attempt removal of shaft from module at this time due to alignment pin interference. Removal happens as crossmember is lowered in a later step.

(16) Carefully mark location of rear crossmember on body at all four mount (bushing) locations using a marker or crayon (Fig. 58). **Do not use a scratch awl to mark location.**

(17) Position under-hoist utility jack or transmission jack under center of rear suspension crossmember (without AWD) or rear driveline module (with

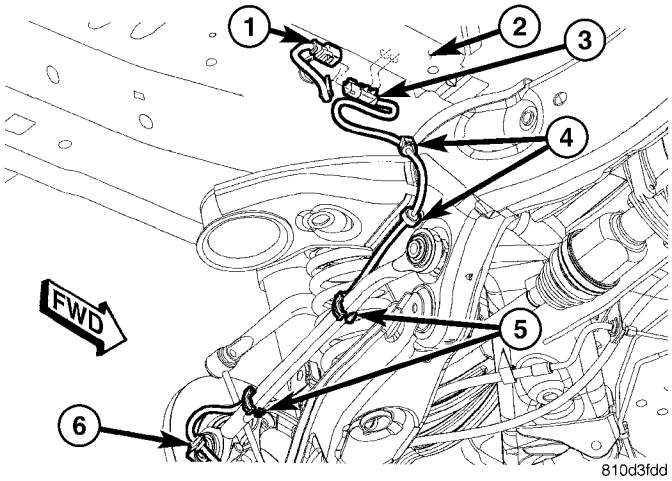


Fig. 86 Rear Wheel Speed Sensor Cable Routing

1 - WIRING HARNESS CONNECTOR
2 - SPARE TIRE MOUNTING SUPPORT
3 - WHEEL SPEED SENSOR CONNECTOR
4 - ROUTING CLIPS
5 - ROUTING CLIPS
6 - ROUTING BRACKET ON BRAKE SUPPORT

AWD) (Fig. 87). Raise jack head to contact driveline module/suspension crossmember and secure in place.

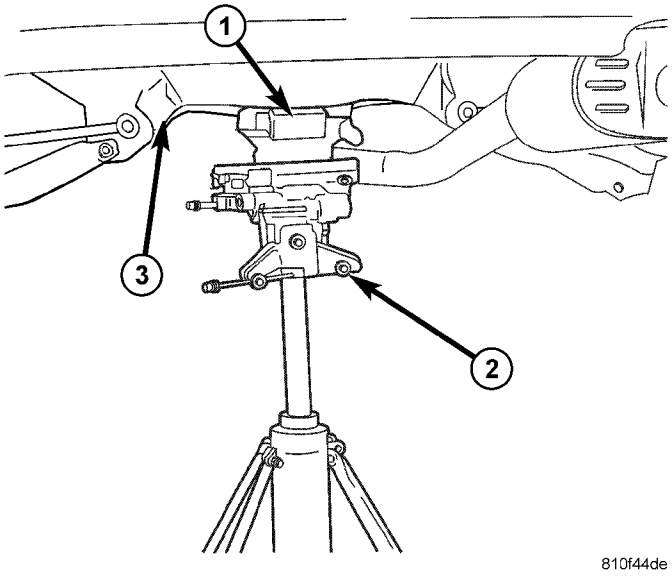


Fig. 87 Support Using Transmission Jack

1 - REAR DRIVELINE MODULE
2 - JACK
3 - REAR SUSPENSION CROSSMEMBER

(18) Remove lower mounting bolt and nut at each rear shock absorber (Fig. 59).

(19) Remove both front and rear crossmember mounting bolts on **left** side of vehicle (Fig. 60).

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to remove coil spring.

REAR CROSSMEMBER BUSHING - FRONT MOUNT (Continued)

(20) **Slowly** lower jack allowing left side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring removal. **Do not lower jack any further than necessary.**

(21) Remove coil spring and isolator (Fig. 61), lower end first.

(22) Raise left side of crossmember back into mounted position and install previously removed mounting bolts. It is not necessary to tighten bolts at this point.

(23) Remove both front and rear crossmember mounting bolts on **right** side of vehicle (Fig. 60).

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to remove coil spring.

(24) **Slowly** lower jack allowing right side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring removal. **Do not lower jack any further than necessary.**

(25) Remove coil spring and isolator (Fig. 61), lower end first.

(26) Raise right side of crossmember back into mounted position. It is not necessary to install mounting bolts.

(27) Remove both front and rear crossmember mounting bolts previously removed on **left** side of crossmember (Fig. 60).

(28) **Slowly** lower jack. **Do not lower jack at a fast rate.** As jack is lowered, remove propeller shaft from alignment pin on end of rear driveline module input flange and support it with a bungee or cord, keeping it at its normal height. **Do not allow propeller shaft to hang on its own.**

(29) Continue to lower jack until rear suspension module is at a comfortable working level.

(30) Remove rear suspension module from jack.

(31) Turn rear suspension module upside down and place on appropriate working surface.

(32) As an installation reference, carefully mark location of bushing requiring removal on crossmember using a marker or crayon (Fig. 58) and (Fig. 88). **Do not use a scratch awl to mark location.**

(33) Using a mallet, remove bushing ear by tapping it upward off bushing (Fig. 89).

(34) Remove nut and bolt fastening compression link to crossmember (Fig. 89).

(35) Lift compression link out of mounted position on crossmember and move it inboard.

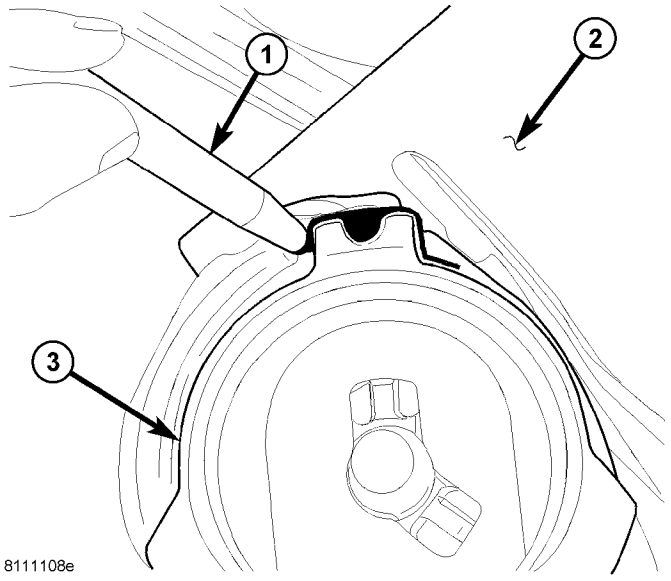


Fig. 88 Marking Location Of Front Bushing

1 - MARKER OR CRAYON
2 - CROSSMEMBER
3 - BUSHING CAN FLANGE

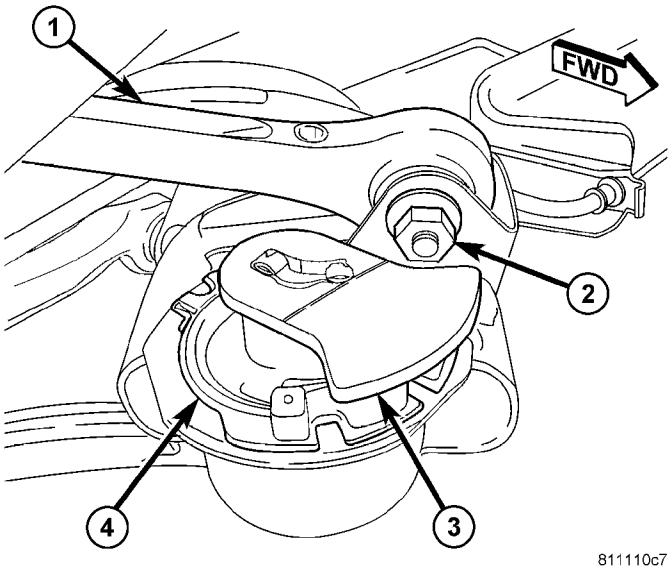


Fig. 89 Front Bushing

1 - COMPRESSION LINK
2 - LINK MOUNTING NUT AND BOLT
3 - BUSHING EAR
4 - BUSHING

REAR CROSSMEMBER BUSHING - FRONT MOUNT (Continued)

(36) Assemble tools over bushing as shown (remember crossmember is upside-down) (Fig. 90). Ensure Remover lies between voids on bushing to better contact bushing can.

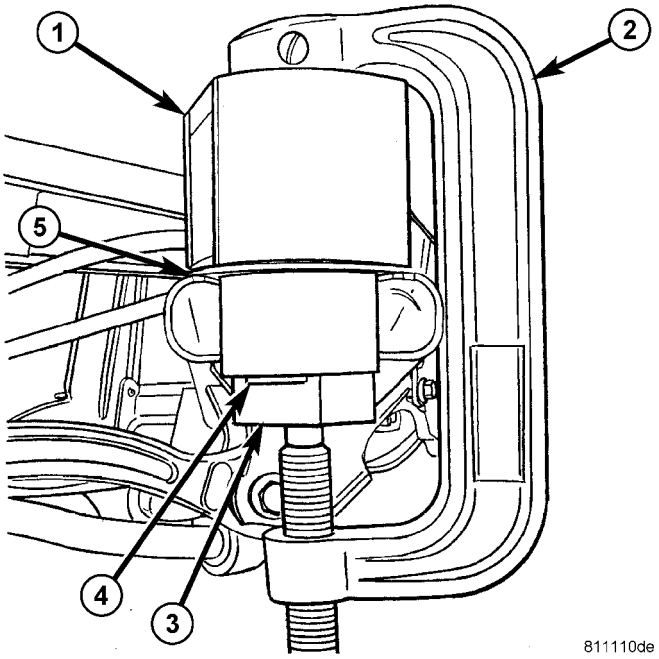


Fig. 90 Front Bushing Removal

1 - RECEIVER 9031-8
2 - PRESS C-4212F
3 - REMOVER 9031-5
4 - BUSHING VOIDS
5 - REAR CROSSMEMBER

(37) Tighten Press screw-drive, pressing bushing out of crossmember.

INSTALLATION

CAUTION: It is very important that bushing be installed in same position as original to maintain vehicle ride quality and bushing longevity. That is why bushing, once installed, needs closely match reference marks applied upon removal of original bushing.

(1) Position bushing over crossmember bushing bore aligning bushing can flange with reference marks applied during removal.

(2) Assemble tools over bushing and crossmember as shown (remember crossmember is upside-down) (Fig. 91). Ensure Installer, Special Tool 9031-7, is positioned that it will clear compression link bracket when bushing is installed (Fig. 92).

(3) Using hand tools, tighten Press screw-drive, pressing bushing into crossmember. Install bushing until bushing can flange contacts surface of crossmember.

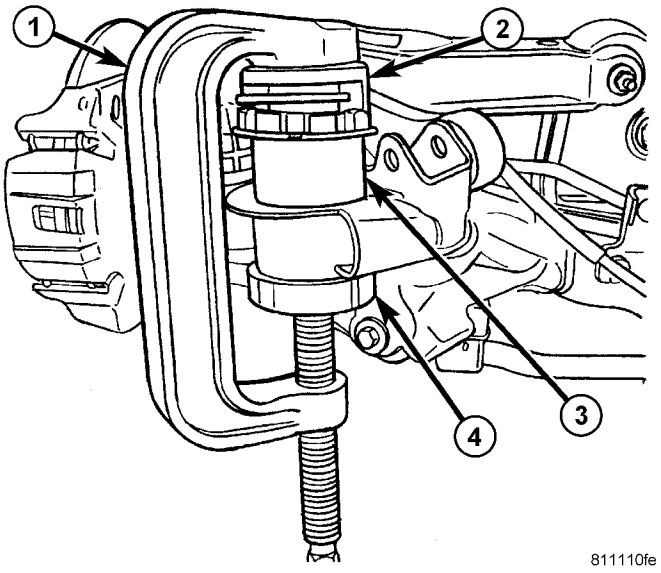


Fig. 91 Front Bushing Installation

1 - PRESS C-4212F
2 - INSTALLER 9031-7
3 - BUSHING
4 - RECEIVER 9031-6

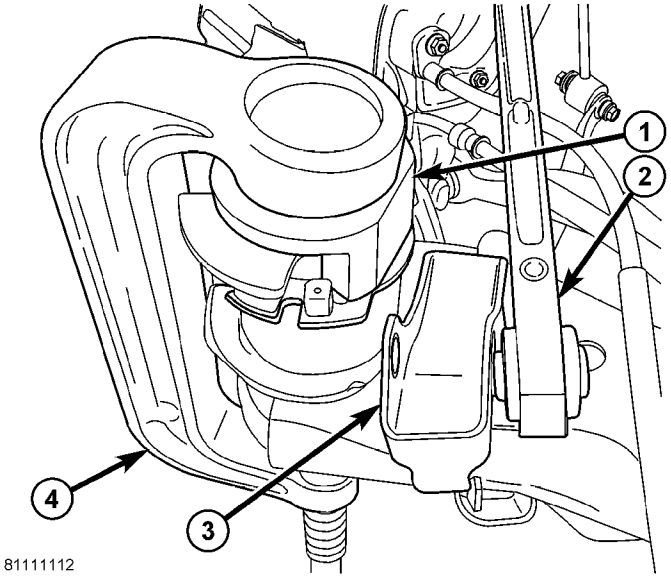


Fig. 92 Installer Positioned To Clear Link Bracket

1 - INSTALLER 9031-7
2 - COMPRESSION LINK
3 - LINK BRACKET ON CROSSMEMBER
4 - PRESS C-4212F

(4) Remove tools.

(5) Verify bushing closely lines up with reference marks applied during removal.

(6) Place compression link back into mounting bracket and install bolt and nut as shown (Fig. 89). **Do not tighten bolt at this time.**

REAR CROSSMEMBER BUSHING - FRONT MOUNT (Continued)

(7) Turn rear suspension module right-side-up and center it on jack in same position as upon removal. Secure crossmember to jack.

(8) Raise crossmember to body mounting points. As crossmember is raised, slide propeller shaft onto alignment pin on end of rear driveline module input flange and align shocks with pockets in spring links.

(9) Continue to raise crossmember with jack until two crossmember mounting bolts can be installed (Fig. 60). Install left side crossmember mounting bolts, but not the right side bolts (Fig. 60). It is not necessary to tighten bolts at this point.

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to install coil spring.

(10) **Slowly** lower jack allowing right side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring Installation. **Do not lower jack any further than necessary.**

(11) Install coil spring and isolator (Fig. 61), top end first.

NOTE: Verify spring lower end coil is correctly placed against abutment built into spring link.

(12) Carefully raise jack, guiding coil spring and lower end of shock absorber into mounted positions. Once shock absorber lower mounting hole lines up with hole in spring link, stop jacking.

(13) Install lower shock mounting bolt (Fig. 59). **Do not tighten at this time.**

(14) Raise right side of crossmember into mounted position. Install right side crossmember mounting bolts (Fig. 60). **Snug, but do not fully tighten bolts at this time.**

(15) Remove both front and rear crossmember mounting bolts on **left** side of vehicle (Fig. 60).

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to install coil spring.

(16) **Slowly** lower jack allowing left side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring installation. **Do not lower jack any further than necessary.**

(17) Install coil spring and isolator (Fig. 61), top end first.

NOTE: Verify spring lower end coil is correctly placed against abutment built into spring link.

(18) Carefully raise jack, guiding coil spring and lower end of shock absorber into mounted positions. Once shock absorber lower mounting hole lines up with hole in spring link, stop jacking.

(19) Install lower shock mounting bolt (Fig. 59). **Do not tighten at this time.**

(20) Raise left side of crossmember into mounted position and install previously removed mounting bolts (Fig. 60). **Snug, but do not fully tighten bolts at this time.**

(21) Shift crossmember as necessary to line up mounts with location marks drawn in before removal (Fig. 58).

(22) Once mounts are lined up with location marks, tighten all four crossmember mounting bolts to 163 N·m (120 ft. lbs.) torque.

(23) Tighten shock absorber lower mounting bolts to 102 N·m (75 ft. lbs.) torque.

(24) Remove jack from under rear driveline module/crossmember.

(25) If equipped with AWD, line up location reference marks and install propeller shaft-to-rear driveline module mounting bolts. Tighten mounting bolts to 54 N·m (40 ft. lbs.) torque.

(26) Clip each wheel speed sensor connector to spare tire mounting support (Fig. 86).

(27) Connect vehicle wiring harness to each wheel speed sensor connector (Fig. 86).

(28) Install each rear brake caliper on its mount as follows:

(a) Make sure abutment shims are in place on both slide abutments of caliper adapter.

CAUTION: Use care when installing brake caliper onto adapter so guide pin bushings and sleeves do not get damaged by mounting bosses on adapter.

(b) Retract caliper guide pins to clear mounting bosses on caliper adapter when installing caliper.

(c) Install brake caliper in opposite way it was removed. Starting with upper end, carefully position caliper and brake shoes over brake rotor and align outboard shoe's upper edge with caliper slide abutment. Rotate lower end of caliper into mounting position on adapter.

CAUTION: Extreme caution should be taken not to cross thread caliper guide pin bolts when they are installed.

(d) Carefully install caliper guide pin bolts (Fig. 83). Tighten bolts to 22 N·m (192 in. lbs.) torque.

(29) Install screw mounting right rear brake hose routing bracket to front of rear crossmember (Fig. 57).

(30) Install screw mounting left rear brake hose routing bracket to front of rear crossmember (Fig. 57).

(31) While holding cable connector on end of front cable secure with a pair of pliers at the front cable button, Place right rear cable button into cable con-

nector (Fig. 56). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(32) Place left rear parking brake cable button into equalizer (Fig. 56). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(33) Install rear half of exhaust system. (Refer to 11 - EXHAUST SYSTEM - INSTALLATION)

(34) Install tire and wheel assemblies (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(35) Lower vehicle.

(36) Unlock automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(37) Connect battery negative cable to battery post.

(38) If vehicle is not equipped with All Wheel Drive (AWD), Install spare tire under vehicle.

(39) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access mounting bolts.

(40) Tighten compression link bolt at crossmember to 68 N·m (50 ft. lbs.) torque.

(41) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

REAR CROSSMEMBER BUSHING - REAR MOUNT

REMOVAL

(1) Disconnect and isolate battery negative cable from battery post.

(2) If vehicle is not equipped with All Wheel Drive (AWD), remove spare tire.

(3) Lock out automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(4) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Position an extra pair of jack stands under and support forward end of engine cradle to help stabilize vehicle during rear suspension removal/installation.

(6) Remove both rear wheel and tire assemblies. (Refer to 22 - TIRES/WHEELS - REMOVAL)

(7) Remove rear half of exhaust system. (Refer to 11 - EXHAUST SYSTEM - REMOVAL)

NOTE: It may be necessary to back off parking brake shoe adjustment to allow sufficient slack to disengage cable buttons from connectors in following two steps.

(8) Slide left rear parking brake cable button inboard and remove from equalizer (Fig. 56).

(9) While holding parking brake cable connector on end of front cable secure with a pair of pliers at the front cable button, slide right rear parking brake cable button inboard and remove from cable connector (Fig. 56).

(10) Remove screw mounting left rear brake hose routing bracket to front of rear crossmember (Fig. 57).

(11) Remove screw mounting right rear brake hose routing bracket to front of rear crossmember (Fig. 57).

NOTE: In some cases, it may be necessary to retract caliper piston in its bore a small amount in order to provide sufficient clearance between shoes and rotor to easily remove caliper from knuckle. This can usually be accomplished before guide pin bolts are removed, by grasping rear of caliper and pulling outward working with guide pins, thus retracting piston. Never push on piston directly as it may get damaged.

(12) Remove each rear caliper from its mount and support as follows:

(a) Remove two caliper guide pin bolts (Fig. 83).

(b) Remove caliper assembly from brake adapter by first rotating bottom of caliper away from rotor, then lifting caliper (with shoes) away from upper adapter abutment (Fig. 84).

(c) To prevent weight of caliper from overextending and damaging brake hose and tubing while caliper is off mount, hang brake caliper from vehicle using wire or cord (Fig. 85). **Be sure to hang caliper and brake hose far enough forward on body, away from crossmember, to allow sufficient room to lower crossmember without interference.**

(13) Disconnect vehicle wiring harness from each rear wheel speed sensor connector (Fig. 86).

(14) Unclip each rear wheel speed sensor connector from spare tire mounting support (Fig. 86).

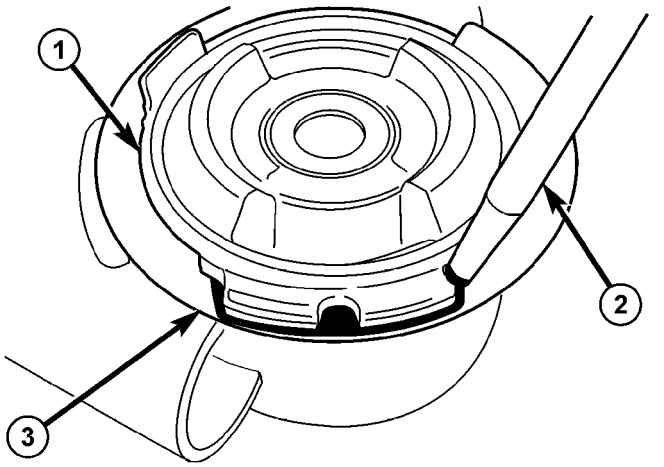
(15) If equipped with AWD:

(a) Reference mark propeller shaft-to-rear driveline module input flange connection.

(b) Remove three propeller shaft-to-rear driveline module mounting bolts. Do not attempt removal of shaft from module at this time due to alignment pin interference. Removal happens as crossmember is lowered in a later step.

REAR CROSSMEMBER BUSHING - REAR MOUNT (Continued)

(16) Carefully mark location of rear crossmember on body at all four mount (bushing) locations using a marker or crayon (Fig. 93). **Do not use a scratch awl to mark location.**



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Fig. 93 Marking Location Of Rear Bushing

1 - BUSHING CAN FLANGE
2 - MARKER OR CRAYON
3 - CROSSMEMBER

(17) Position under-hoist utility jack or transmission jack under center of rear suspension crossmember (without AWD) or rear driveline module (with AWD) (Fig. 87). Raise jack head to contact driveline module/suspension crossmember and secure in place.

(18) Remove lower mounting bolt and nut at each rear shock absorber (Fig. 59).

(19) Remove both front and rear crossmember mounting bolts on **left** side of vehicle (Fig. 60).

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to remove coil spring.

(20) **Slowly** lower jack allowing left side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring removal. **Do not lower jack any further than necessary.**

(21) Remove coil spring and isolator (Fig. 61), lower end first.

(22) Raise left side of crossmember back into mounted position and install previously removed mounting bolts. It is not necessary to tighten bolts at this point.

(23) Remove both front and rear crossmember mounting bolts on **right** side of vehicle (Fig. 60).

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to remove coil spring.

(24) **Slowly** lower jack allowing right side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring removal. **Do not lower jack any further than necessary.**

(25) Remove coil spring and isolator (Fig. 61), lower end first.

(26) Raise right side of crossmember back into mounted position. It is not necessary to install mounting bolts.

(27) Remove both front and rear crossmember mounting bolts previously removed on **left** side of crossmember (Fig. 60).

(28) **Slowly** lower jack. **Do not lower jack at a fast rate.** As jack is lowered, remove propeller shaft from alignment pin on end of rear driveline module input flange and support it with a bungee or cord, keeping it at its normal height. **Do not allow propeller shaft to hang on its own.**

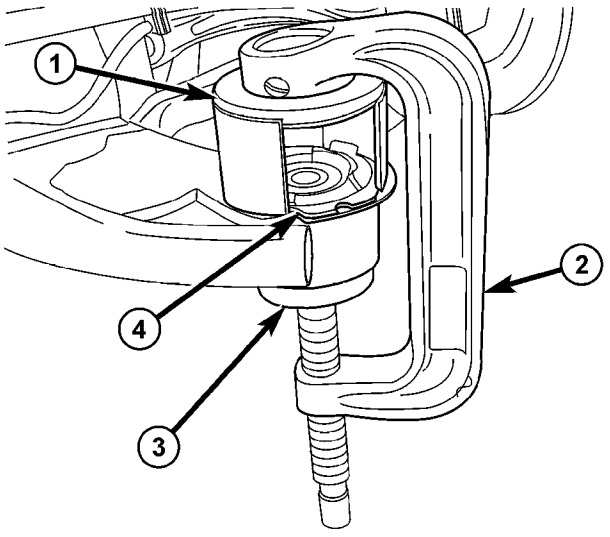
(29) Continue to lower jack until rear suspension module is at a comfortable working level.

(30) Remove rear suspension module from jack.

(31) Turn rear suspension module upside down and place on appropriate working surface.

(32) As an installation reference, carefully mark location of bushing requiring removal on crossmember using a marker or crayon (Fig. 93). **Do not use a scratch awl to mark location.**

(33) Assemble tools over bushing as shown (remember crossmember is upside-down) (Fig. 94). Ensure Receiver straddles can flange on bushing.



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Fig. 94 Rear Bushing Removal

1 - RECEIVER 9031-1
2 - PRESS C-4212F
3 - REMOVER 9031-2
4 - BUSHING

(34) Tighten Press screw-drive, pressing bushing out of crossmember.

REAR CROSSMEMBER BUSHING - REAR MOUNT (Continued)

INSTALLATION

CAUTION: It is very important that bushing be installed in same position as original to maintain vehicle ride quality and bushing longevity. That is why bushing, once installed, needs closely match reference marks applied upon removal of original bushing.

(1) Position bushing over crossmember bushing bore aligning bushing can flange with reference marks applied during removal.

(2) Assemble tools over bushing and crossmember as shown (remember crossmember is upside-down) (Fig. 95). Ensure Installer, Special Tool 9031-4, is positioned to match cutout with can flange on bushing (Fig. 96).

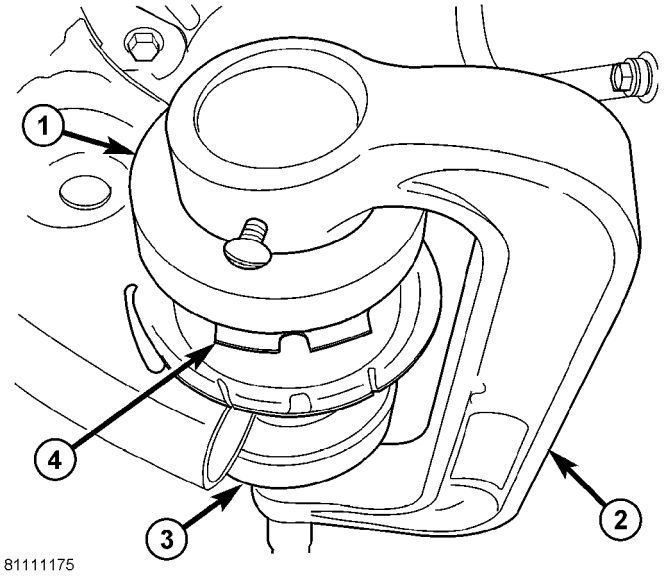


Fig. 95 Rear Bushing Installation

1 - INSTALLER 9031-4
2 - PRESS C-4212F
3 - RECEIVER 9031-3
4 - BUSHING

(3) Using hand tools, tighten Press screw-drive, pressing bushing into crossmember. Install bushing until bushing can flange contacts surface of crossmember.

(4) Remove tools.

(5) Verify bushing closely lines up with reference marks applied during removal.

(6) Turn rear suspension module right-side-up and center it on jack in same position as upon removal. Secure crossmember to jack.

(7) Raise crossmember to body mounting points. As crossmember is raised, slide propeller shaft onto alignment pin on end of rear driveline module input flange and align shocks with pockets in spring links.

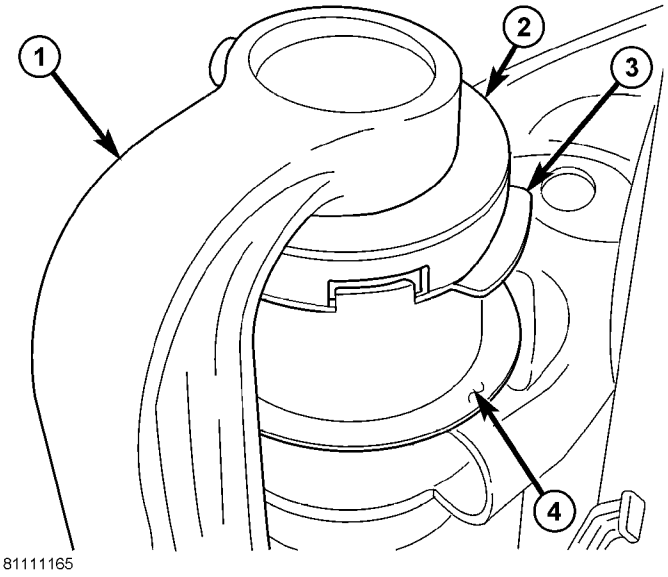


Fig. 96 Installer Positioned On Bushing Flange

1 - PRESS C-4212F
2 - INSTALLER 9031-4
3 - BUSHING
4 - CROSSMEMBER

(8) Continue to raise crossmember with jack until two crossmember mounting bolts can be installed (Fig. 60). Install left side crossmember mounting bolts, but not the right side bolts (Fig. 60). It is not necessary to tighten bolts at this point.

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to install coil spring.

(9) **Slowly** lower jack allowing right side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring Installation. **Do not lower jack any further than necessary.**

(10) Install coil spring and isolator (Fig. 61), top end first.

NOTE: Verify spring lower end coil is correctly placed against abutment built into spring link.

(11) Carefully raise jack, guiding coil spring and lower end of shock absorber into mounted positions. Once shock absorber lower mounting hole lines up with hole in spring link, stop jacking.

(12) Install lower shock mounting bolt (Fig. 59). **Do not tighten at this time.**

(13) Raise right side of crossmember into mounted position. Install right side crossmember mounting bolts (Fig. 60). **Snug, but do not fully tighten bolts at this time.**

(14) Remove both front and rear crossmember mounting bolts on **left** side of vehicle (Fig. 60).

REAR CROSSMEMBER BUSHING - REAR MOUNT (Continued)

CAUTION: To avoid damaging other components of vehicle, do not lower crossmember any further than necessary to install coil spring.

(15) **Slowly** lower jack allowing left side of crossmember to drop. **Do not lower jack at a fast rate.** Lower jack just enough to allow spring installation. **Do not lower jack any further than necessary.**

(16) Install coil spring and isolator (Fig. 61), top end first.

NOTE: Verify spring lower end coil is correctly placed against abutment built into spring link.

(17) Carefully raise jack, guiding coil spring and lower end of shock absorber into mounted positions. Once shock absorber lower mounting hole lines up with hole in spring link, stop jacking.

(18) Install lower shock mounting bolt (Fig. 59). **Do not tighten at this time.**

(19) Raise left side of crossmember into mounted position and install previously removed mounting bolts (Fig. 60). **Snug, but do not fully tighten bolts at this time.**

(20) Shift crossmember as necessary to line up mounts with location marks drawn in before removal (Fig. 93).

(21) Once mounts are lined up with location marks, tighten all four crossmember mounting bolts to 163 N·m (120 ft. lbs.) torque.

(22) Tighten shock absorber lower mounting bolts to 102 N·m (75 ft. lbs.) torque.

(23) Remove jack from under rear driveline module/crossmember.

(24) If equipped with AWD, line up location reference marks and install propeller shaft-to-rear driveline module mounting bolts. Tighten mounting bolts to 54 N·m (40 ft. lbs.) torque.

(25) Clip each wheel speed sensor connector to spare tire mounting support (Fig. 86).

(26) Connect vehicle wiring harness to each wheel speed sensor connector (Fig. 86).

(27) Install each rear brake caliper on its mount as follows:

(a) Make sure abutment shims are in place on both slide abutments of caliper adapter.

CAUTION: Use care when installing brake caliper onto adapter so guide pin bushings and sleeves do not get damaged by mounting bosses on adapter.

(b) Retract caliper guide pins to clear mounting bosses on caliper adapter when installing caliper.

(c) Install brake caliper in opposite way it was removed. Starting with upper end, carefully position caliper and brake shoes over brake rotor and align outboard shoe's upper edge with caliper slide abutment. Rotate lower end of caliper into mounting position on adapter.

CAUTION: Extreme caution should be taken not to cross thread caliper guide pin bolts when they are installed.

(d) Carefully install caliper guide pin bolts (Fig. 83). Tighten bolts to 22 N·m (192 in. lbs.) torque.

(28) Install screw mounting right rear brake hose routing bracket to front of rear crossmember (Fig. 57).

(29) Install screw mounting left rear brake hose routing bracket to front of rear crossmember (Fig. 57).

(30) While holding cable connector on end of front cable secure with a pair of pliers at the front cable button, Place right rear cable button into cable connector (Fig. 56). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(31) Place left rear parking brake cable button into equalizer (Fig. 56). Release cables allowing button to seat. It may take some hand pressure to completely seat button.

(32) Install rear half of exhaust system. (Refer to 11 - EXHAUST SYSTEM - INSTALLATION)

(33) Install tire and wheel assemblies (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(34) Lower vehicle.

(35) Unlock automatic adjuster in parking brake lever. (Refer to 5 - BRAKES/PARKING BRAKE - STANDARD PROCEDURE)

(36) Connect battery negative cable to battery post.

(37) If vehicle is not equipped with All Wheel Drive (AWD), Install spare tire under vehicle.

(38) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

REAR CROSSMEMBER BUSHING - SPRING LINK

REMOVAL

(1) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Access and remove rear spring on side of repair. (Refer to 2 - SUSPENSION/REAR/SPRING - REMOVAL)

(3) Remove bolt and nut fastening spring link to crossmember (Fig. 97).

REAR CROSSMEMBER BUSHING - SPRING LINK (Continued)

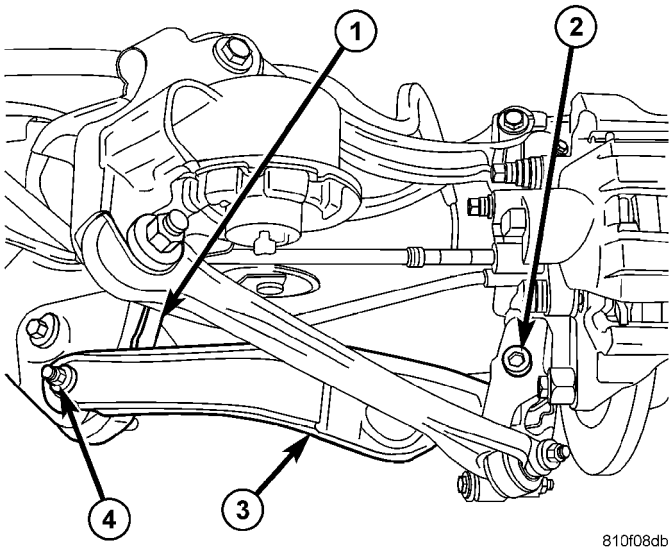


Fig. 97 Spring Link Mounting

1 - CROSSMEMBER
2 - MOUNTING BOLT AND NUT
3 - SPRING LINK
4 - MOUNTING BOLT AND NUT

(4) Position spring link downward, away from bushing in crossmember.

(5) Assemble tools over bushing as shown (Fig. 98). Ensure Receiver, Special Tool 9032-1, sets against crossmember and not welds.

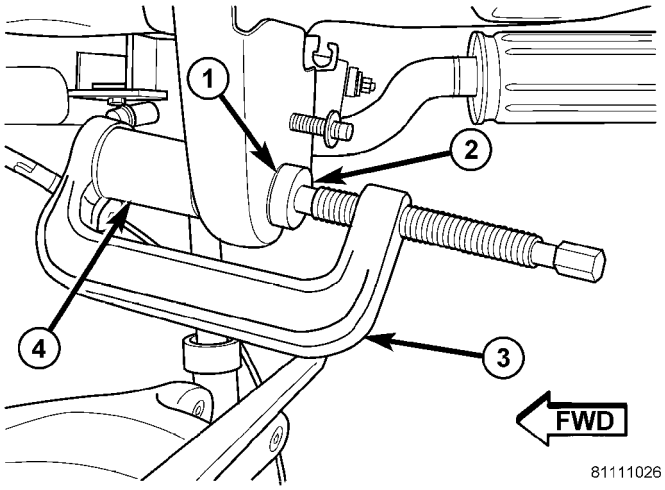


Fig. 98 Spring Link Bushing Removal

1 - BUSHING
2 - REMOVER 9032-2
3 - PRESS C-4212F
4 - RECEIVER 9032-1

(6) Tighten Press screw-drive, pressing bushing out of crossmember.

INSTALLATION

(1) Position bushing over rear or crossmember bushing bore.

(2) Assemble tools over bushing and crossmember as shown (Fig. 99). Ensure Receiver, Special Tool 9032-3, is positioned to avoid welds on rear of crossmember bushing bore.

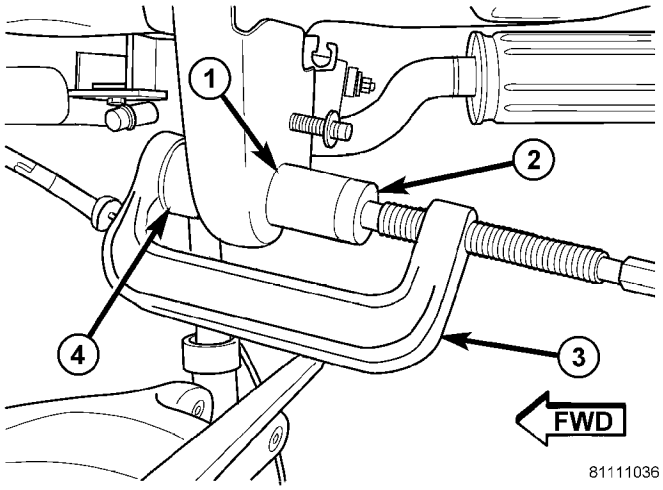


Fig. 99 Spring Link Bushing Installation

1 - BUSHING
2 - REMOVER/INSTALLER 9032-2
3 - PRESS C-4212F
4 - RECEIVER 9032-3

(3) Using hand tools, tighten Press screw-drive, pressing bushing into crossmember. Install bushing until screw-drive stops, when bushing contacts Receiver on opposite side of crossmember.

(4) Remove tools.

(5) Swing spring link up to bushing in crossmember and install bolt and nut fastening spring link to crossmember (Fig. 64). **Do not tighten bolt at this time.**

(6) Install rear spring as well as all components necessary to access it. (Refer to 2 - SUSPENSION/ REAR/HUB / BEARING - INSTALLATION)

(7) Lower vehicle.

(8) Position vehicle on alignment rack/drive-on hoist. Raise vehicle as necessary to access mounting bolt.

(9) Tighten spring link bolt at crossmember to 109 N·m (80 ft. lbs.) torque.

(10) Perform wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

FUEL SYSTEM

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FUEL DELIVERY

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FUEL DELIVERY

DESCRIPTION

The front wheel drive car uses a plastic fuel tank located rear center of the vehicle.

The Fuel Delivery System consists of: the following items:

- Electric fuel pump module
- Fuel filter
- Tubes/lines/hoses
- Fuel injectors

The in-tank fuel pump module contains the fuel pump. The pump is serviced as part of the fuel pump module. Refer to Fuel Pump Module.

The fuel filter is replaceable only as part of the fuel pump module.

OPERATION

The fuel system provides fuel pressure by an in-tank pump module. The Powertrain Control Module (PCM) controls the operation of the fuel system by providing battery voltage to the fuel pump through the fuel pump relay. The PCM requires only three inputs and a good ground to operate the fuel pump relay. The three inputs are:

- Ignition voltage
- Crankshaft Position (CKP) sensor
- Camshaft Position (CMP) sensor

STANDARD PROCEDURE - FUEL SYSTEM PRESSURE RELEASE PROCEDURE

(1) Remove Fuel Pump relay from Power Distribution Center (PDC). For location of relay, refer to label on underside of PDC cover.

(2) Start and run engine until it stalls.

(3) Attempt restarting engine until it will no longer run.

(4) Turn ignition key to OFF position.

(5) Return fuel pump relay to PDC.

(6) One or more Diagnostic Trouble Codes (DTC's) may have been stored in PCM memory due to fuel pump relay removal. The scan tool must be used to erase a DTC.

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
3.5 - Fuel Rail Bolts	28	-	250
3.8 - Fuel Rail Bolts	11.8	-	105
Fuel Tank Strap	54.2	40	-
Filler Tube Clamp	3.4	-	30
Filler Tube Housing to Body	1.9	-	17

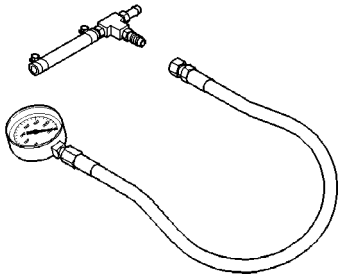
FUEL SYSTEM PRESSURE

400 kpa ±34 kpa (58 psi ± 5 psi)

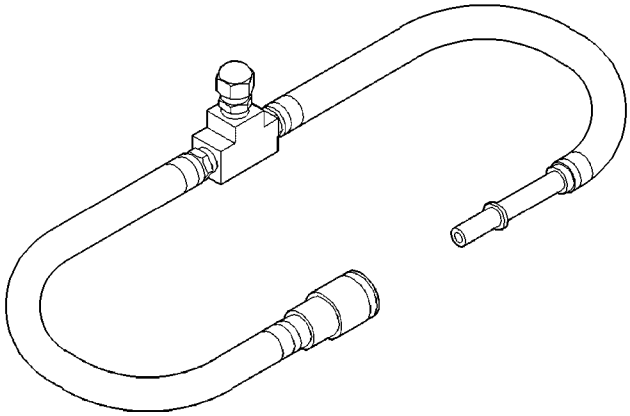
FUEL DELIVERY (Continued)

SPECIAL TOOLS

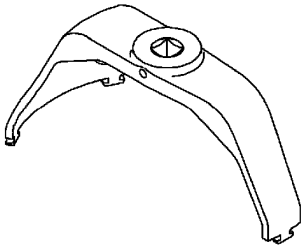
FUEL



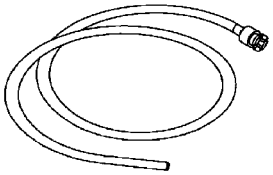
Test Kit, Fuel



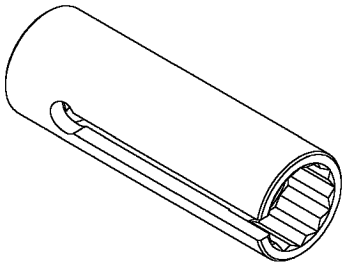
Adapters, Fuel Pressure Test—6539 and/or 6631



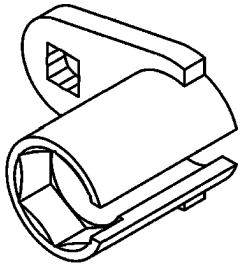
LOCKRING REMOVER/INSTALLER #9340



Fuel Line Adapter 1/4



O2S (OXYGEN SENSOR) REMOVAL/INSTALLER-C4907



Oxygen sensor tool

FUEL LEVEL SENDING UNIT / SENSOR

REMOVAL

(1) Release the fuel pressure, refer to the Fuel Pressure Release Procedure in this section.
(2) Disconnect negative battery cable.
(3) Remove fuel tank, (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - REMOVAL).
(4) Vacuum area before removing module lock ring.
(5) Disconnect vapor line and electrical connector.

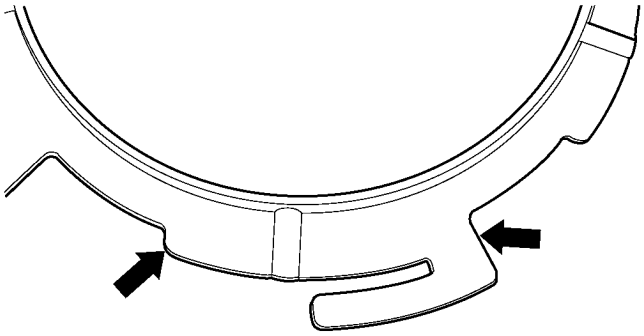


Fig. 1 LOCKING RING CONTACT POINTS

(6) Module lock ring contact points (Fig. 1).

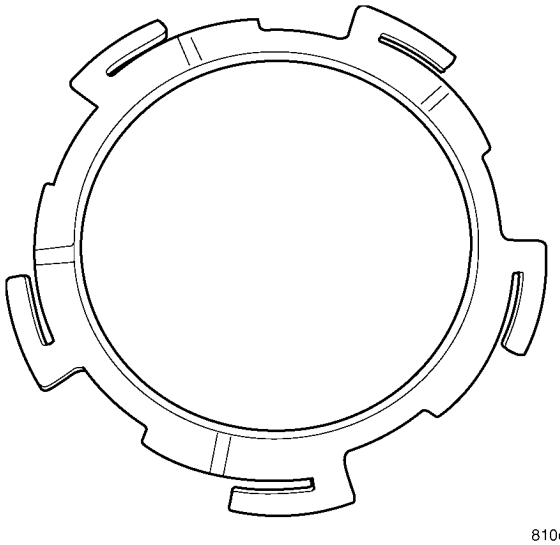


Fig. 2 MODULE LOCKING RING

(7) Remove module lock ring (Fig. 2).

NOTE: Use a brass punch to remove the 1/4 turn lock ring.

(8) Remove module top.
(9) Tip module on to it's side to drain fuel from reservoir in module.
(10) Drain fuel tank, use an approved gasoline draining station.
(11) Disconnect electrical connector for fuel level sending card.

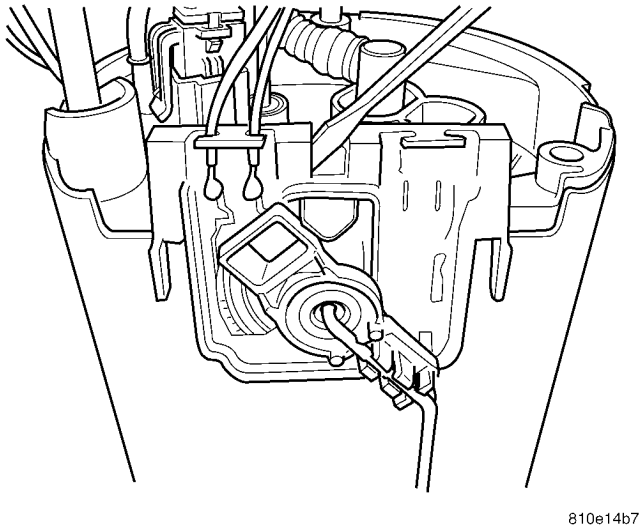


Fig. 3 SENDING CARD REMOVAL

(12) Remove fuel level sending card by prying on locking tab and pulling card down toward bottom of the pump module (Fig. 3).

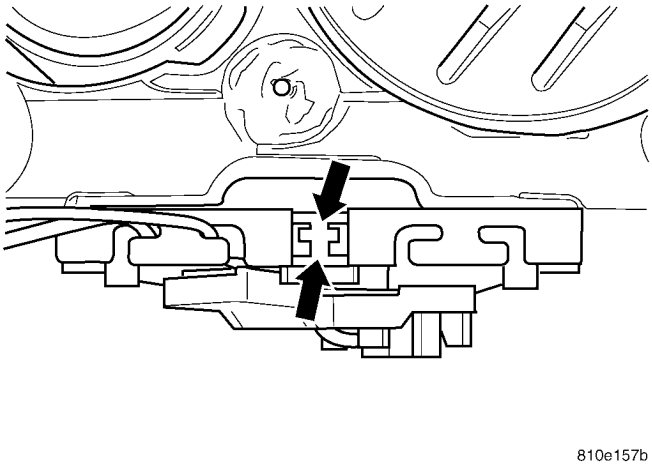


Fig. 4 SENDING CARD LOCKING TABS

(13) There are 2 locking tabs on sending card; one on the front and one on back (Fig. 4).

FUEL LEVEL SENDING UNIT / SENSOR (Continued)

INSTALLATION

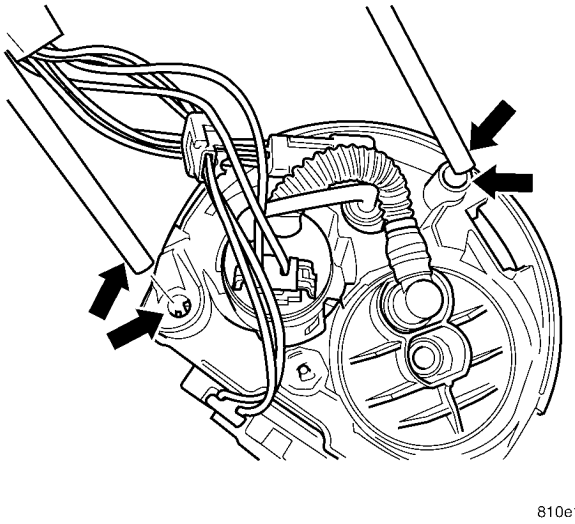


Fig. 5 MODULE TOP ALIGNMENT PINS

(1) Install fuel level sending card to module.
(2) Connect electrical connector for fuel level sending card.
(3) Install module top to module (Fig. 5) and (Fig. 6).

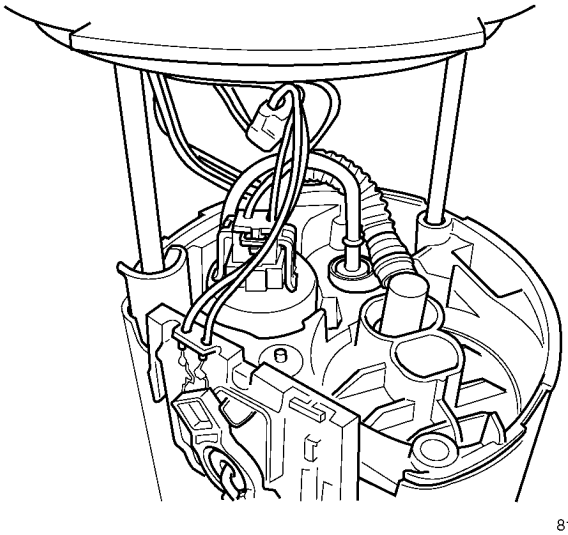


Fig. 6 Alignment PINS IN PLACE

(4) Install module into the tank with the level unit towards rear of tank.
(5) Install a new seal onto the tank, making sure seal is properly seated in tank groove.
(6) Install module lock ring.

NOTE: Use a brass punch to Install the 1/4 turn lock ring. Make sure all 5 tabs are properly seated.

(7) Connect vapor line and electrical connector.
(8) Install fuel tank, (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - INSTALLATION)
(9) Connect negative battery cable.
(10) Fill fuel tank. Use the scan tool to pressurize the fuel system. Check for leaks.

FUEL PRESSURE REGULATOR

REMOVAL

NOTE: THE FUEL PRESSURE REGULATOR IS ON THE PASSENGER SIDE OF THE FUEL TANK.

(1) Release the fuel pressure, refer to the Fuel Pressure Release Procedure in this section.
(2) Disconnect negative battery cable.

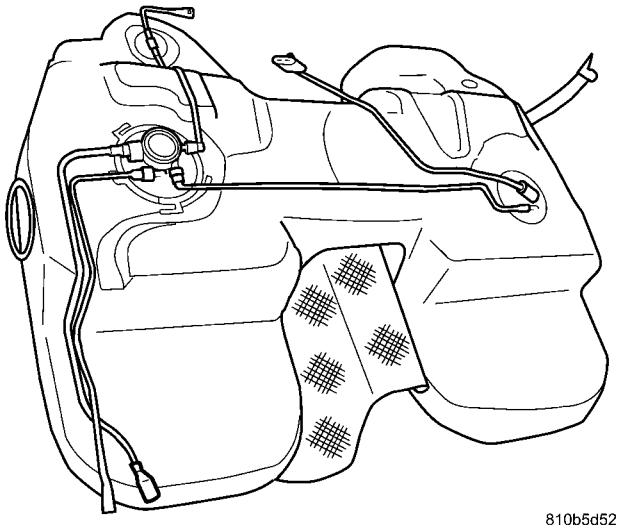


Fig. 7 FUEL TANK ASSEMBLY

(3) Remove fuel tank (Fig. 7), (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - REMOVAL) .
(4) Vacuum area before removing module lock ring.
(5) Disconnect lines from top of the module.

FUEL PRESSURE REGULATOR (Continued)

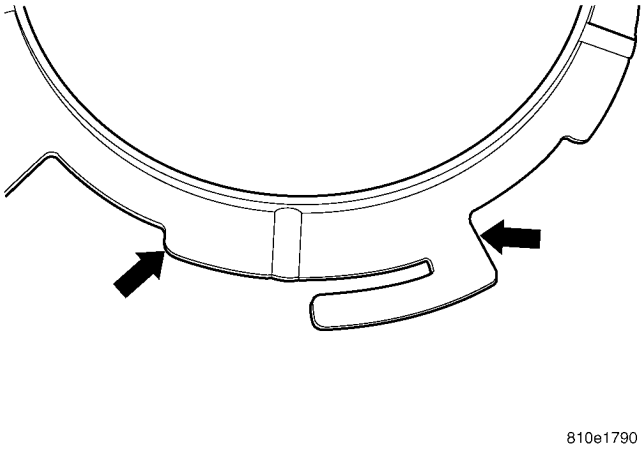


Fig. 8 LOCKING RING CONTACT POINTS

(6) Remove module lock ring (Fig. 8).

NOTE: Use a brass punch to remove the 1/4 turn lock ring.

(7) Drain fuel tank, use an approved gasoline draining station.

(8) Remove module from fuel tank.

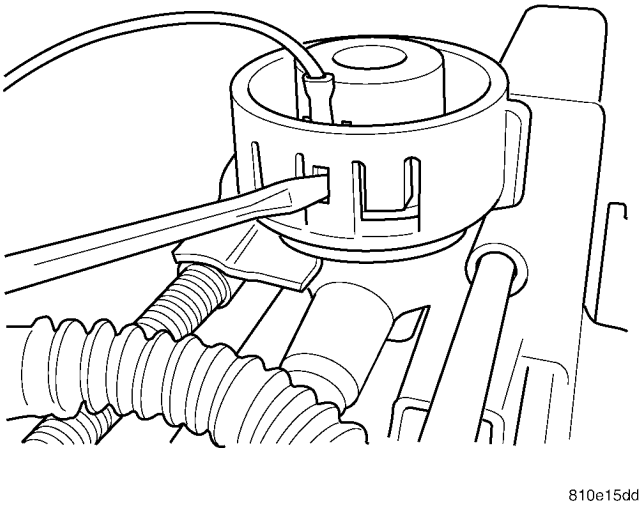


Fig. 9 REGULATOR GROUND REMOVAL

(9) Remove wire from side of regulator, depressed tab on the connector in order to remove the ground wire (Fig. 9).

(10) Ground wire removed (Fig. 10).

(11) Use a socket to compress the 4 tabs that retain regulator.

(12) Pry up regulator and remove regulator and o-rings.

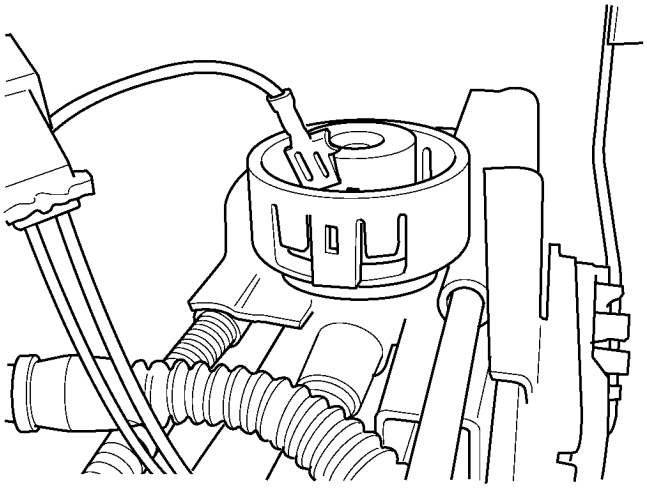


Fig. 10 GROUND REMOVED

INSTALLATION

NOTE: The o-rings should be placed on the regulator first, to prevent them from being rolled out of position during regulator install.

(1) Lightly lubricate the O-rings with clean engine oil and place them onto regulator.

(2) Push regulator down and into place.

(3) Install ground wire.

(4) Install module and gasket seal.

(5) Ensure seal is properly positioned in fuel tank groove.

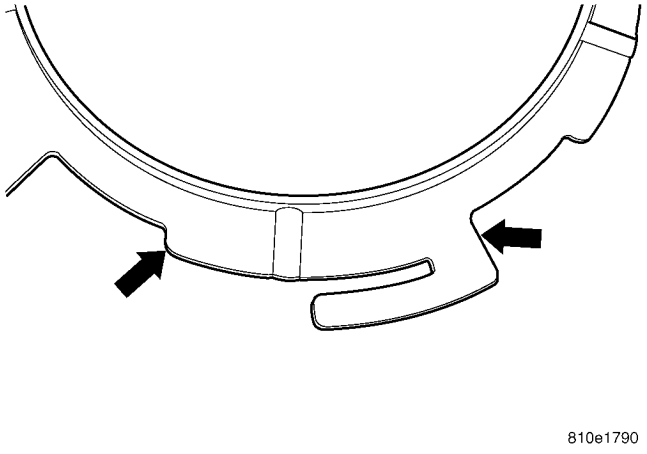


Fig. 11 LOCKING RING CONTACT POINTS

(6) Install the module lock ring (Fig. 11).

FUEL PRESSURE REGULATOR (Continued)

NOTE: Use a brass punch to Install the 1/4 turn lock ring. Make sure all 5 tabs are properly seated.

(7) Connect fuel line and vapor lines.

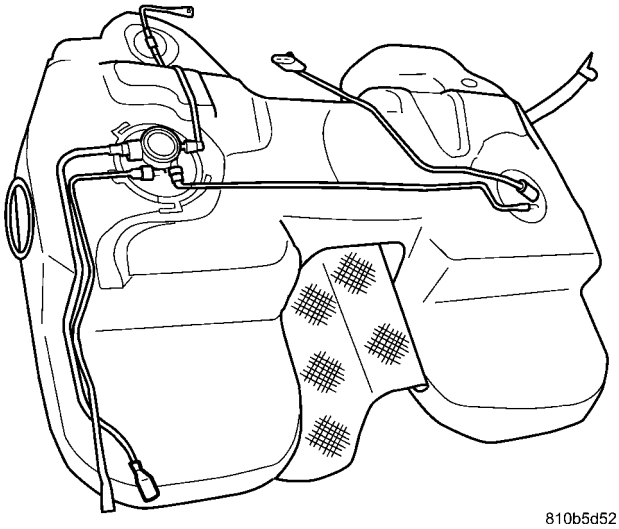


Fig. 12 FUEL TANK ASSEMBLY

(8) Install fuel tank (Fig. 12), (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - INSTALLATION).

(9) Connect negative battery cable.

(10) Fill fuel tank. Use the scan tool to pressurize the fuel system. Check for leaks.

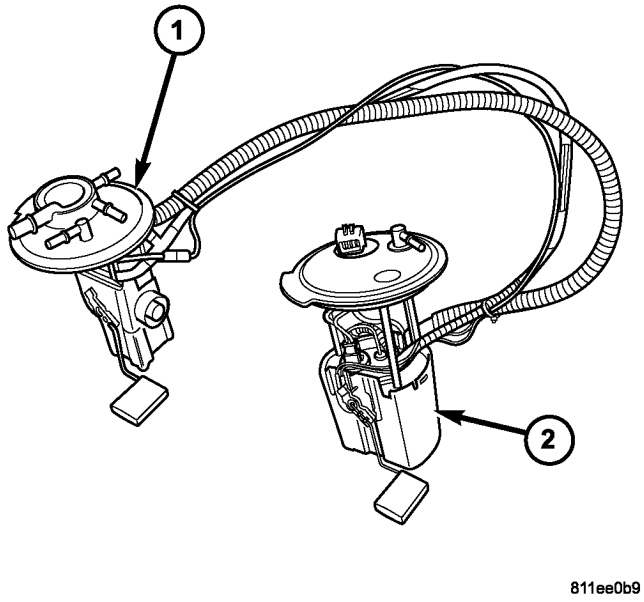
FUEL PUMP MODULE

DESCRIPTION

This vehicle uses a saddle type tank, a reservoir on both sides of the rear drive shaft. The fuel pump is in the module on the driver side of the vehicle and the fuel pressure regulator is in the module on the passenger side of vehicle. The fuel outlet is on the passenger side and supplies fuel to the engine. The fitting on the fuel pump module (Driver side) is a vapor line fitting that connects to the passenger side module. Both modules have fuel level sending cards. There are 2 hoses that connect the modules together, one is the fuel supply line the other is a return or siphon hose. The lines are removed from the fuel pump module when servicing either unit. The ORVR (Onboard Refueling Vapor Recovery) control valve is in the passenger side module.

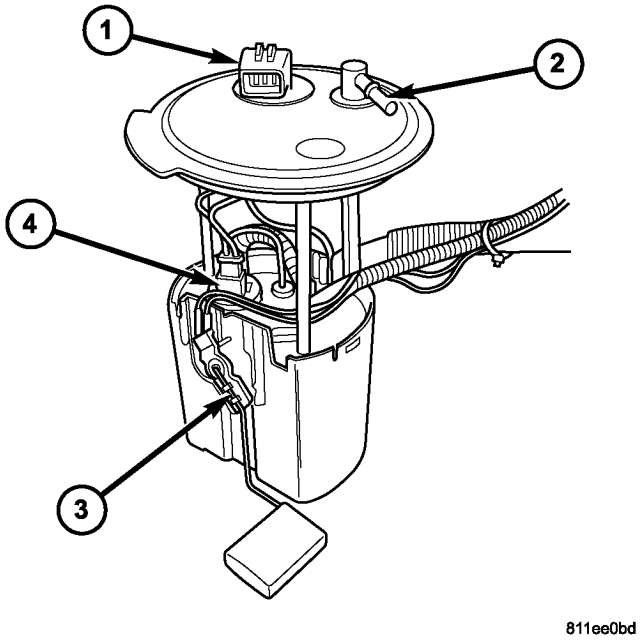
OPERATION

The way the pump works is as follows, fuel enters the reservoir of the driver side module. The fuel pump pumps the fuel through the filter to the passenger side module through a supply line inside tank. The pressure regulator inside the passenger side module regulates the pressure at 58 psi. All unused fuel that is not sent to the engine is fed



FUEL SYSTEM

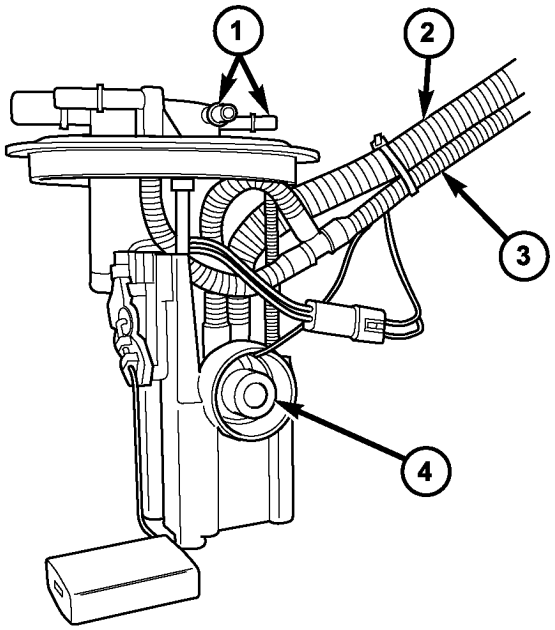
1 - Passenger Side Module
2 - Driver Side Module



DRIVER SIDE MODULE

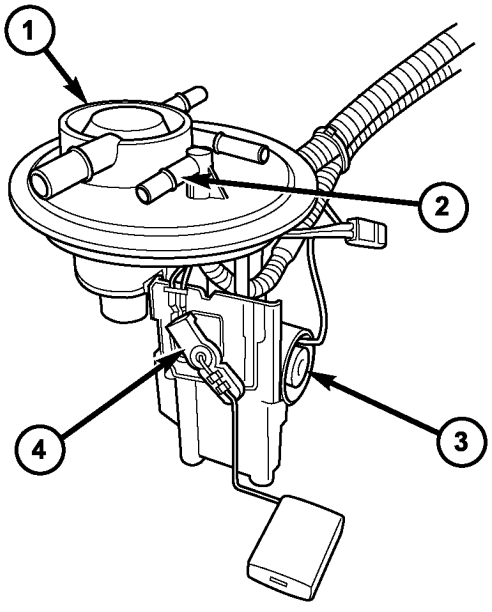
1 - Electrical Connection
2 - Vapor Fittings
3 - Level Sensor
4 - Fuel Pump

FUEL PUMP MODULE (Continued)



PASSENGER SIDE MODULE

1 - Vapor Fittings
2 - Siphon Hose
3 - Fuel Supply Line
4 - Pressure Regulator



PASSENGER SIDE MODULE TOP VIEW

1 - Control Valve
2 - Fuel Supply Fitting
3 - Fuel Pressure Regulator
4 - Level Sensor

through a venturi at the bottom of the passenger side module. This creates a low pressure siphoning effect and draws fuel from the passenger side of the tank and transfers it to the drivers side tank via siphon hose inside the tank. While the vehicle is running the fuel in the passenger side of tank is continuously transferred to the drivers side. Fuel will continue to fill the drivers side tank till it reaches the bridge section and then start to spill over to the passenger side.

As stated above we have two fuel level senders, the reading of these senders are averaged out to give us the fuel gauge reading. When we are diagnosing a sender concern the passenger side reading should never be higher than the Drivers side reading. It is possible, depending on fuel level and driving habit before diagnosing, to spill fuel over to the passenger side that might indeed show a lower resistance value than the driver side.

The tech need to order the correct part when replacing, the senders, modules, and tank as all are able to be replaced individually.

REMOVAL

(1) Release fuel pressure, refer to Fuel Pressure Release Procedure in this section.

(2) Disconnect negative battery cable.

(3) Remove fuel tank, (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - REMOVAL)

(4) Vacuum area before removing fuel pump module lock ring.

(5) Disconnect vapor line and electrical connector.

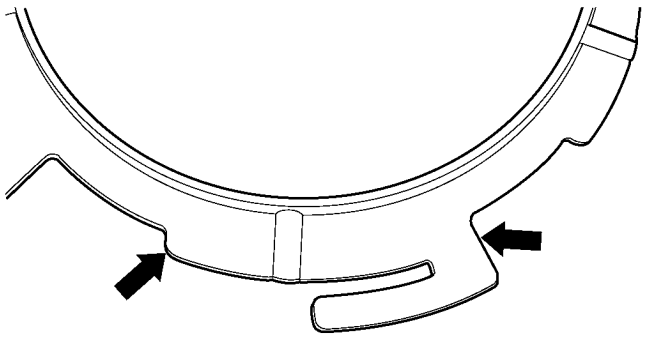


Fig. 13 LOCKING RING CONTACT POINTS

(6) Remove Fuel Pump Module lock ring.

NOTE: Use a brass punch to remove the 1/4 turn lock ring. Make contact only at the points shown (Fig. 13).

FUEL PUMP MODULE (Continued)

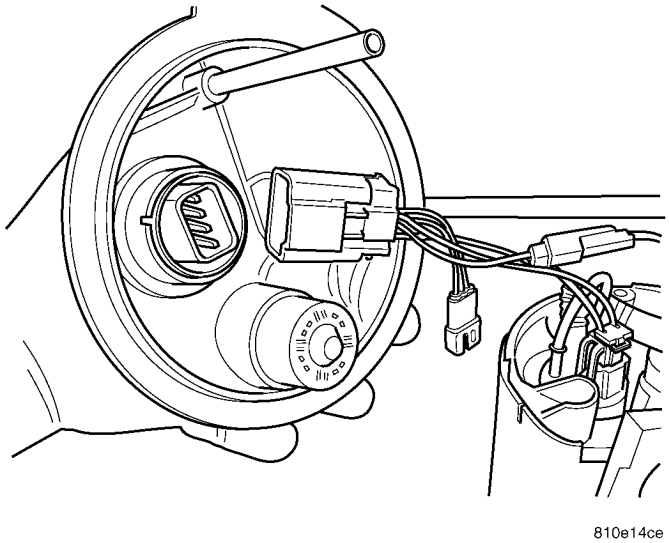


Fig. 14 ELECTRICAL CONNECTOR

(7) Remove fuel pump module top.

(8) Drain Fuel Tank using an approved gasoline draining station.

(9) Disconnect electrical connector (Fig. 14).

(10) The wire connector to the passenger side level sensor needs to be disconnected before removing the reservoir from the tank.

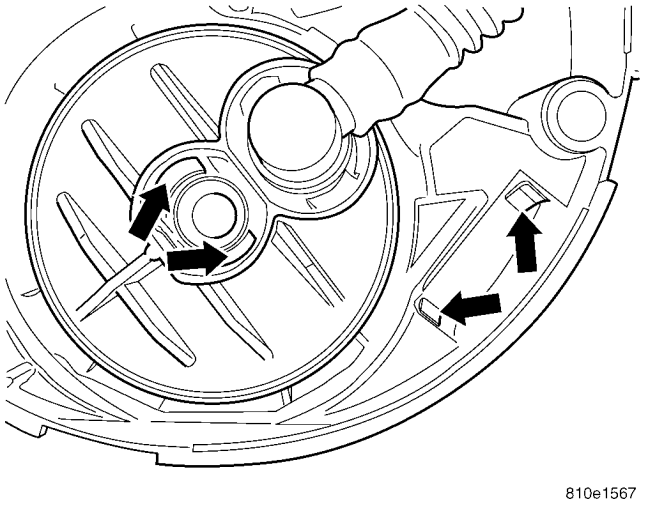


Fig. 15 RETURN HOSE AND FUEL LINE LOCKING TABS

(11) Tab location in fuel pump module for return line and fuel supply line (Fig. 15).

(12) Remove return line from pump module. Use a small screwdriver to pry tab back (Fig. 16) and tip hose to one side. Pry tab on other side back to release hose.

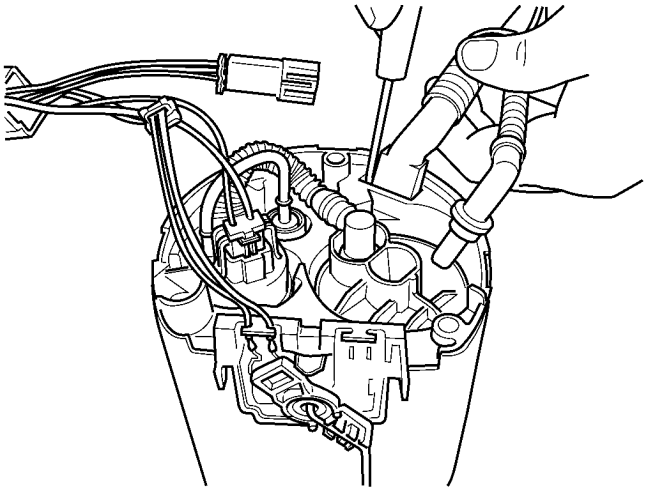


Fig. 16 RETURN HOSE REMOVAL

CAUTION: Care should be taken to not crack/break the locking tabs or supply line fitting.

(13) Remove fuel line from top of the pump module. Use a small screwdriver to pry tab back and tip hose to one side. Pry the tab on other side back to release hose.

(14) Tip fuel pump module on its side to remove fuel from reservoir.

(15) Remove fuel pump module.

INSTALLATION

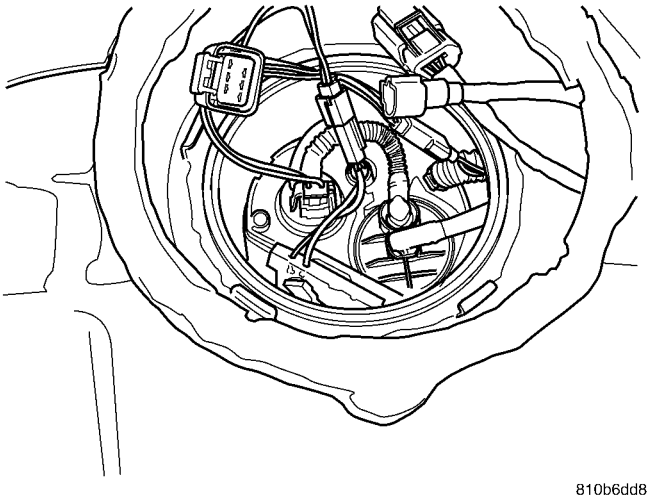


Fig. 17 PUMP WITH TOP REMOVED

(1) Install fuel pump module into fuel tank.

(2) Connect siphon and fuel line to fuel pump module (Fig. 17).

FUEL PUMP MODULE (Continued)

(3) Connect fuel pump electrical connector to bottom of module top (Fig. 14).

(4) The wire connector to the passenger side level sensor needs to be connected.

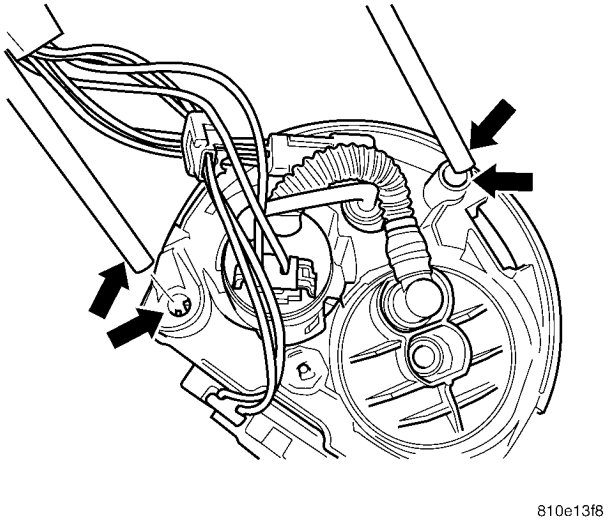


Fig. 18 MODULE TOP ALIGNMENT PINS

(5) Install fuel pump module top to module (Fig. 18) and (Fig. 19).

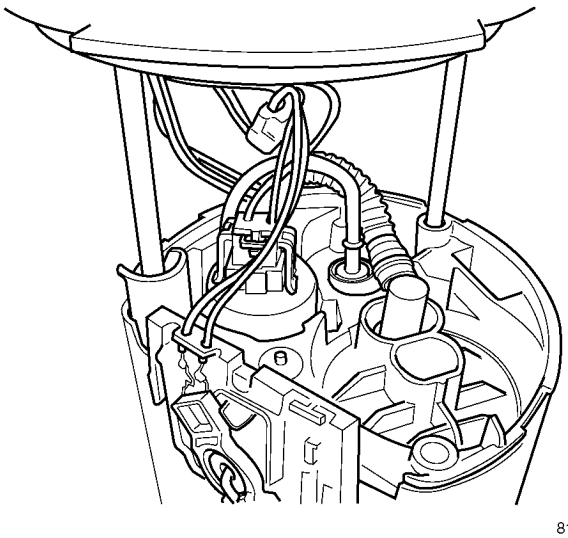


Fig. 19 Alignment PINS IN PLACE

(6) Install Fuel Pump Module gasket and lock ring.

NOTE: Use a brass punch to install the 1/4 turn lock ring.

(7) Connect vapor line and electrical connector.

(8) Install fuel tank, (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - INSTALLATION)

(9) Connect negative battery cable.

(10) Fill fuel tank. Use the scan tool to pressurize fuel system. Check for leaks.

FUEL RAIL

REMOVAL

3.5L

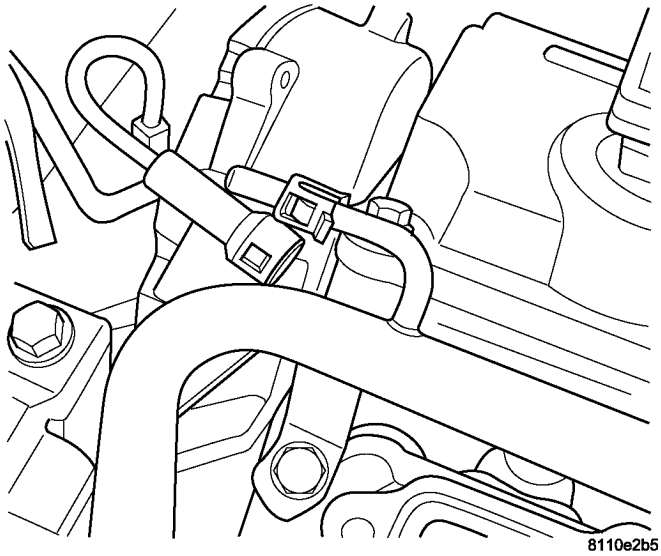


Fig. 20 FUEL LINE QUICK CONNECTOR

(1) Release fuel pressure, refer to Fuel Pressure Release Procedure in this section.

(2) Disconnect the negative battery cable.

(3) Remove the upper intake manifold, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(4) If the injector connectors are not tagged with their cylinder number, tag them to identify the correct cylinder.

(5) Disconnect the fuel supply line from the fuel rail (Fig. 20).

FUEL RAIL (Continued)

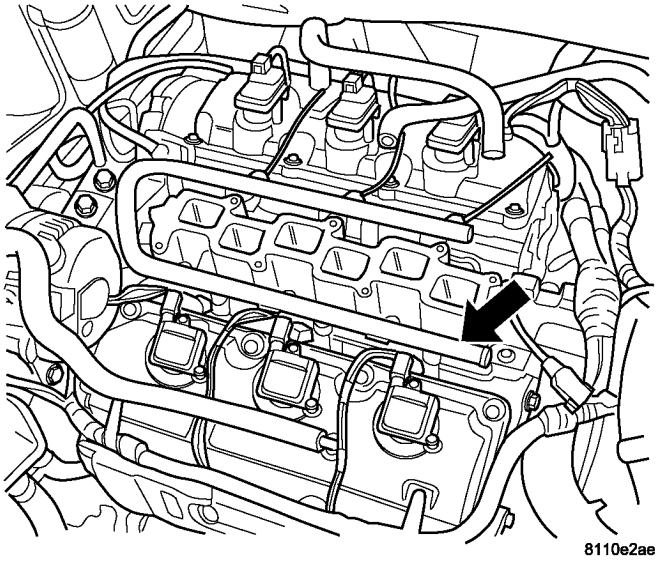


Fig. 21 FUEL RAIL

(6) Remove the 4 mounting bolts from the fuel rail (Fig. 21).
(7) Lift fuel rail straight up off of cylinder head.
(8) Remove retaining clips from fuel injectors at fuel rail.
(9) Remove fuel injector from fuel rail.

3.8L

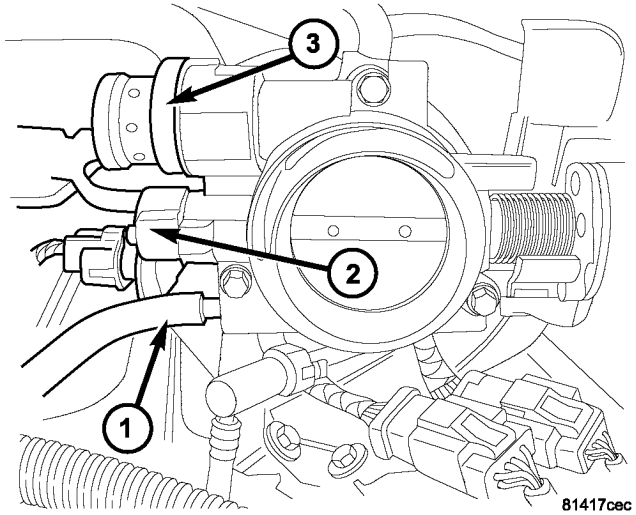


Fig. 22 THROTTLE BODY

1 - Purge Line
2 - Throttle Position Sensor
3 - Idle Air Control Motor

(1) Release fuel pressure, refer to Fuel Pressure Release Procedure in this section.
(2) Disconnect the negative battery cable.
(3) Remove air cleaner housing and inlet hose.
(4) Remove engine cover.
(5) Disconnect the Throttle Position Sensor (Fig. 22).
(6) Disconnect the Idle Air Control.
(7) Disconnect the purge line.
(8) Disconnect the throttle and speed control cables (if equipped).

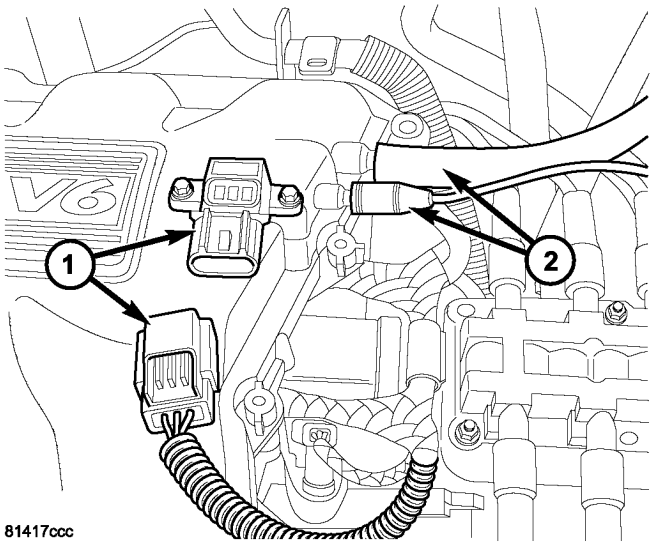


Fig. 23 MAP SENSOR

1 - MAP Sensor
2 - Vacuum Lines

(9) Unlock and disconnect the MAP sensor (Fig. 23).
(10) Disconnect the vacuum lines.
(11) Remove the EGR tube, refer to (Refer to 25 - EMISSIONS CONTROL/EXHAUST GAS RECIRCULATION/TUBE - REMOVAL).

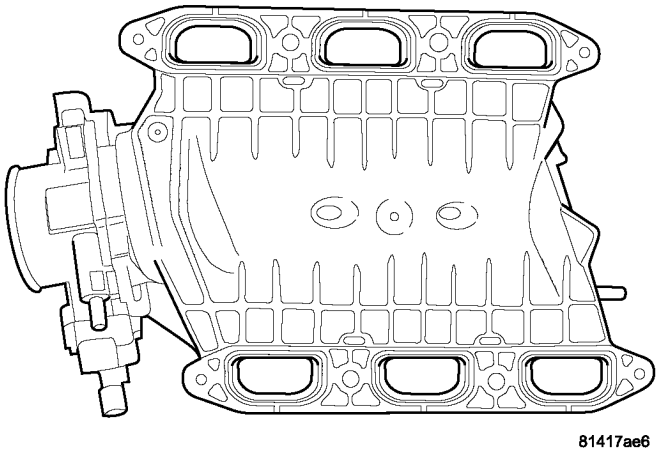


Fig. 24 INTAKE MANIFOLD REMOVED

FUEL RAIL (Continued)

(12) Remove the upper intake manifold (Fig. 24), (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

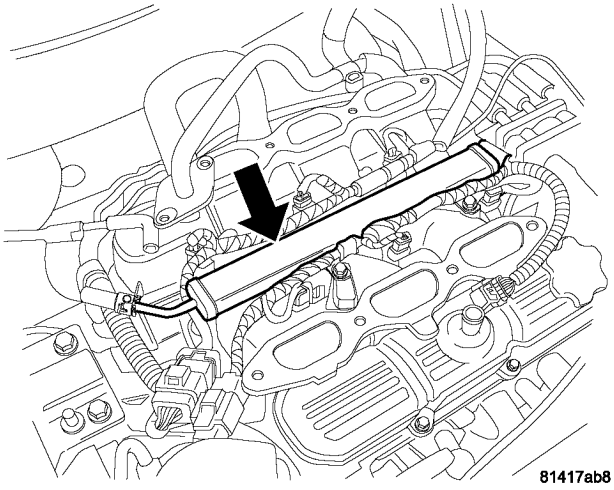


Fig. 25 FUEL RAIL

(13) Fuel Rail, wiring harness and injectors (Fig. 25).

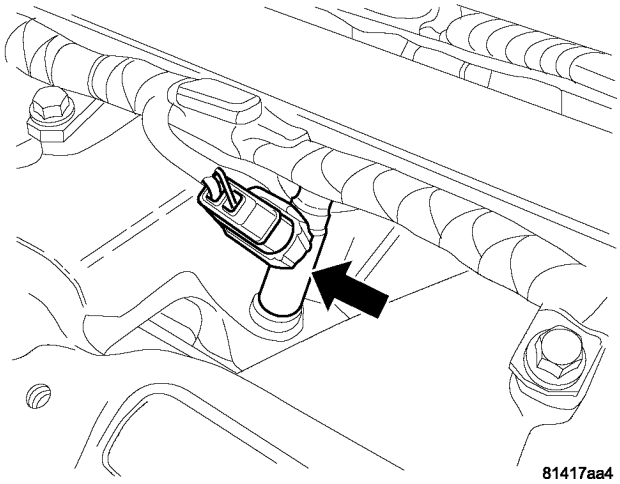


Fig. 26 FUEL INJECTOR LOCATION

(14) Injector and electrical connector (Fig. 26).

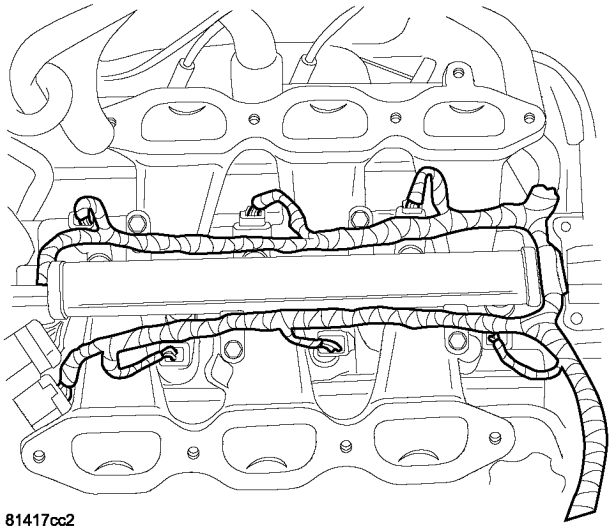


Fig. 27 FUEL INJECTOR WIRING HARNESS

(15) If the injector connectors are not tagged with their cylinder number, tag them to identify the correct cylinder (Fig. 27).

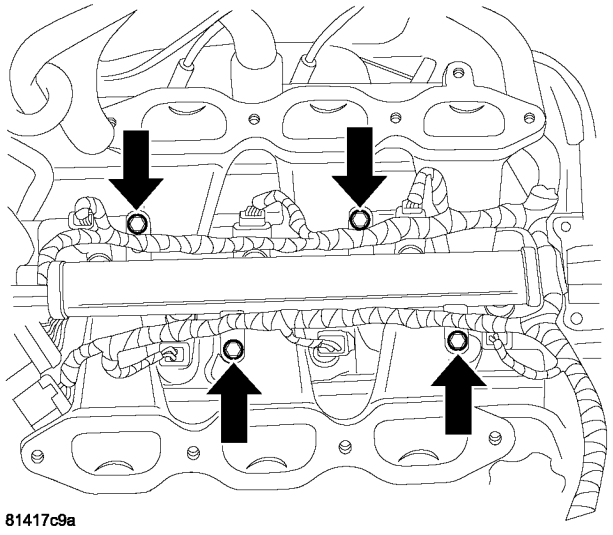


Fig. 28 FUEL RAIL BOLTS LOCATIONS

(16) Remove the 4 mounting bolts from the fuel rail (Fig. 28).

FUEL RAIL (Continued)

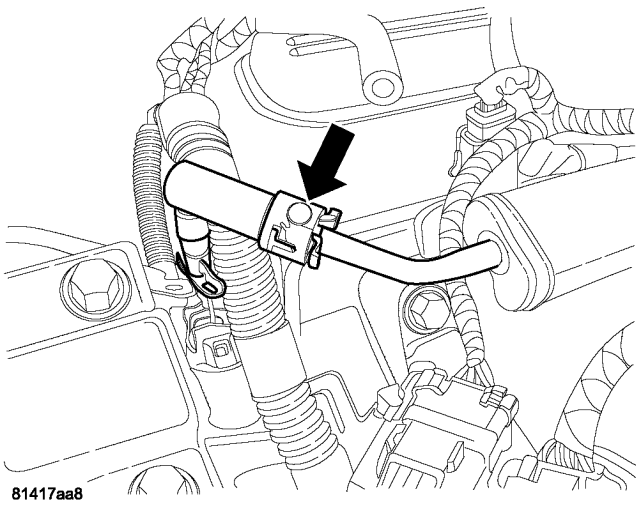


Fig. 29 FUEL LINE DISCONNECT FITTING

(17) Disconnect the fuel supply line from the fuel rail (Fig. 29).

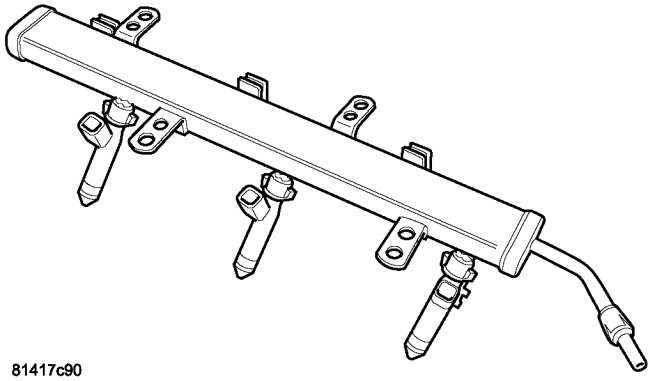


Fig. 30 FUEL RAIL ASSEMBLY

(18) Lift fuel rail straight up off of cylinder head (Fig. 30).

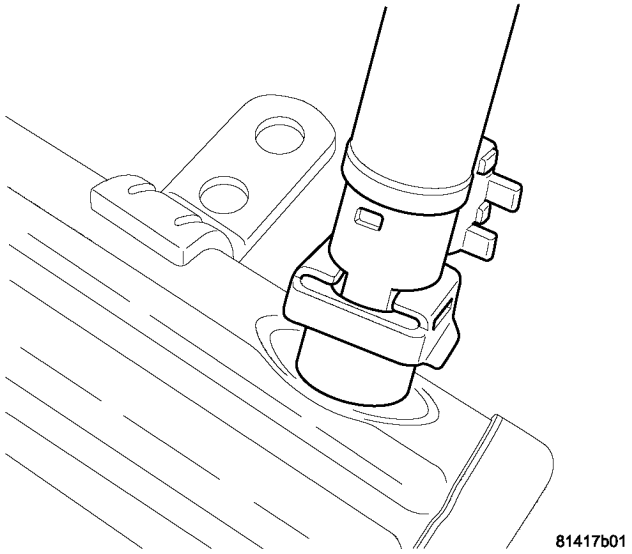


Fig. 31 FUEL INJECTOR CLIP

(19) Remove retaining clips from fuel injectors at fuel rail (Fig. 31).

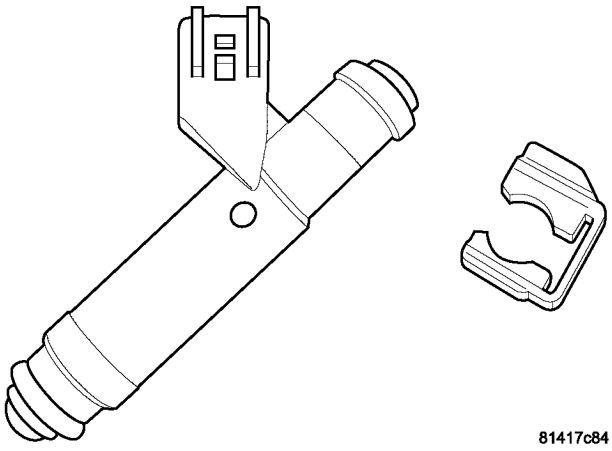


Fig. 32 FUEL INJECTOR AND CLIP

(20) Remove fuel injector from fuel rail (Fig. 32).

FUEL RAIL (Continued)

INSTALLATION

3.5L

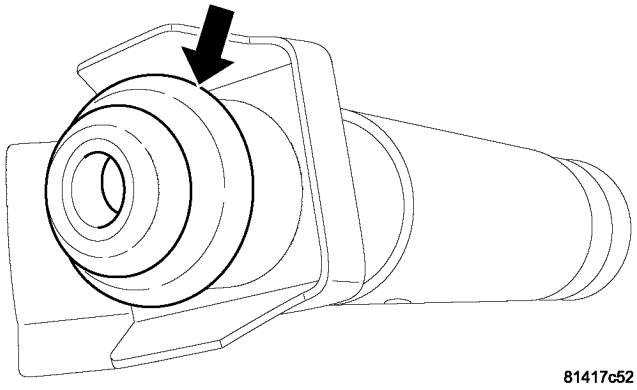


Fig. 33 FUEL INJECTOR O-RING

(1) Lightly lubricate the fuel injector O-rings (Fig. 33) with a couple drops of clean engine oil.

(2) Install retaining clips on fuel injectors.

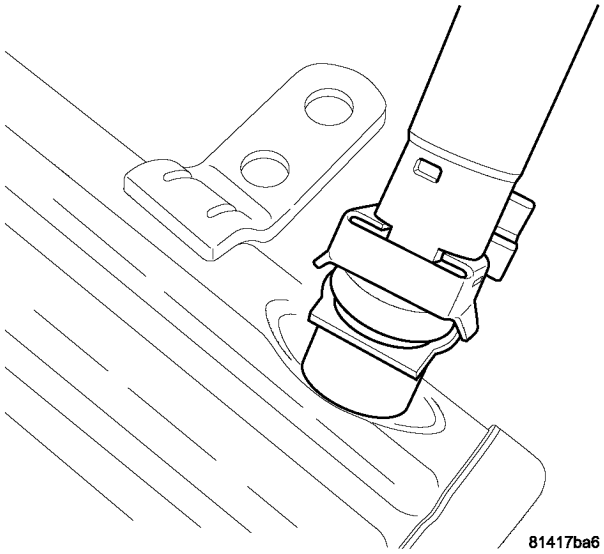


Fig. 34 INSTALLING FUEL INJECTOR

(3) Push injectors into fuel injector rail until clips are in the correct position (Fig. 34).

(4) Position fuel rail over cylinder heads, and push rail into place. Tighten fuel rail mounting bolts to 28 N·m (250 in. lbs.) torque.

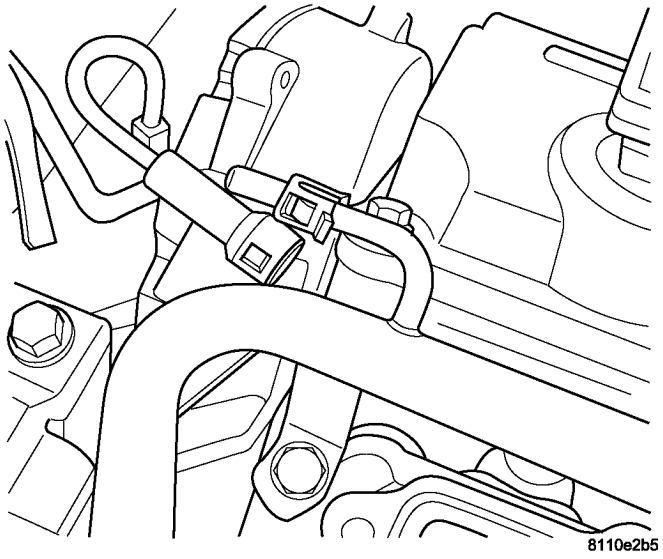


Fig. 35 FUEL LINE QUICK CONNECTOR

(5) Connect the fuel supply tube quick connect fitting to the fuel rail (Fig. 35). Refer to Quick Connect Fittings in the Fuel Delivery Section.

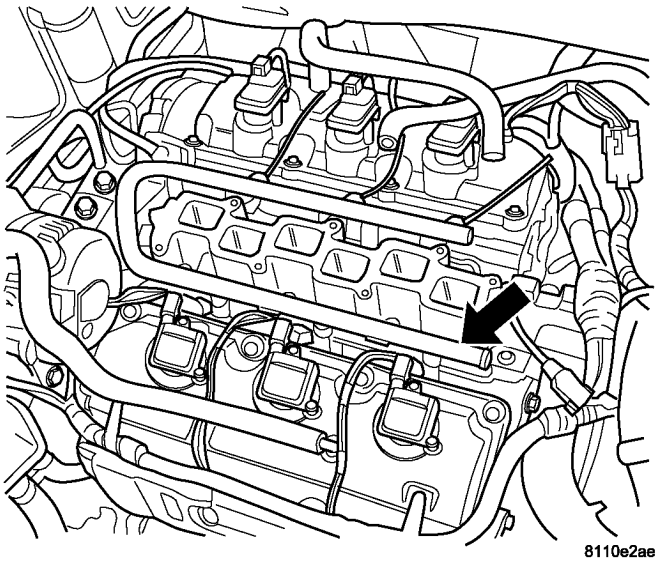


Fig. 36 FUEL RAIL

(6) Connect and lock the electrical connectors to the fuel injectors (Fig. 36).

(7) Install intake manifold plenum, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(8) Connect negative cable to battery.

FUEL RAIL (Continued)

3.8L

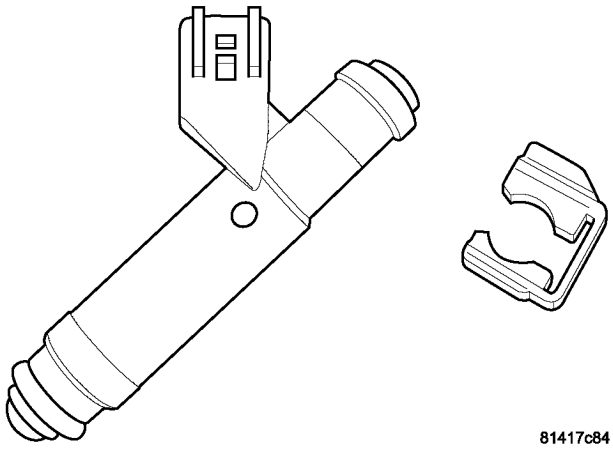


Fig. 37 FUEL INJECTOR AND CLIP

(1) Inspect and replace damaged fuel injector O-rings (Fig. 37).

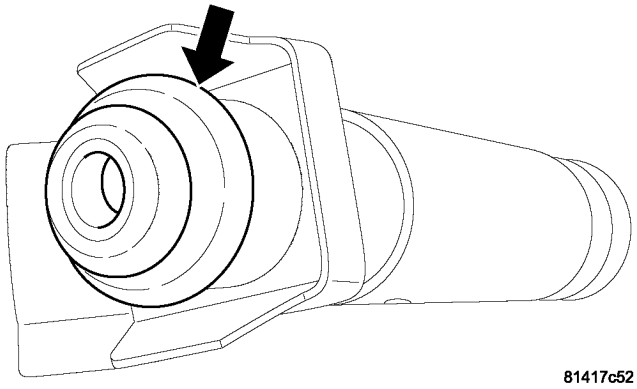


Fig. 38 FUEL INJECTOR O-RING

(2) Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil.

(3) Install retaining clips on fuel injectors (Fig. 38).

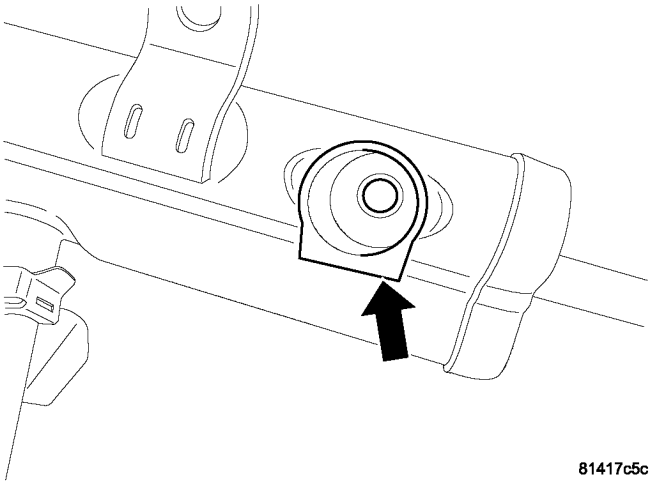


Fig. 39 FUEL RAIL LOCATOR TABS

(4) Fuel injector locator flange on fuel rail (Fig. 39).

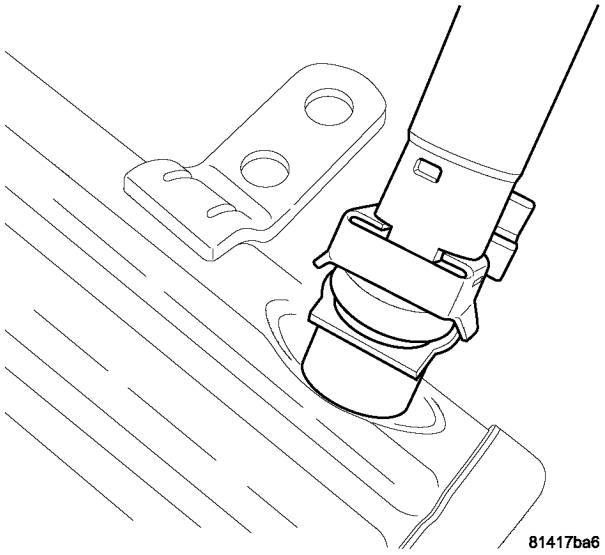


Fig. 40 INSTALLING FUEL INJECTOR

(5) Push injectors into fuel injector rail until clips are in the correct position (Fig. 40).

FUEL RAIL (Continued)

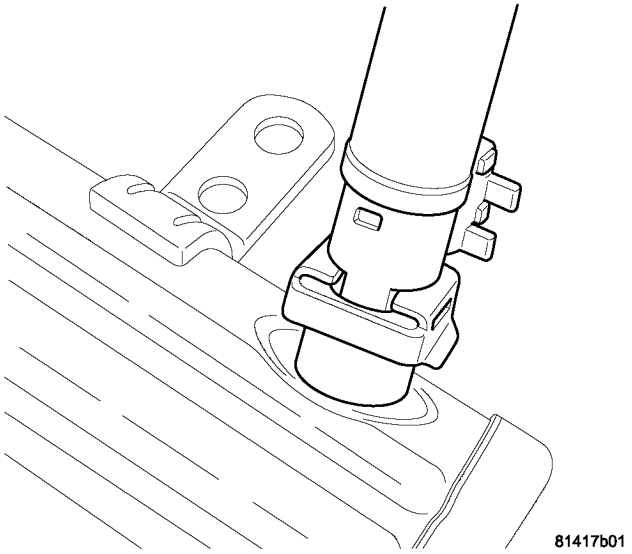


Fig. 41 FUEL INJECTOR CLIP

(6) Fuel injector installed into fuel rail in the correct position (Fig. 41).

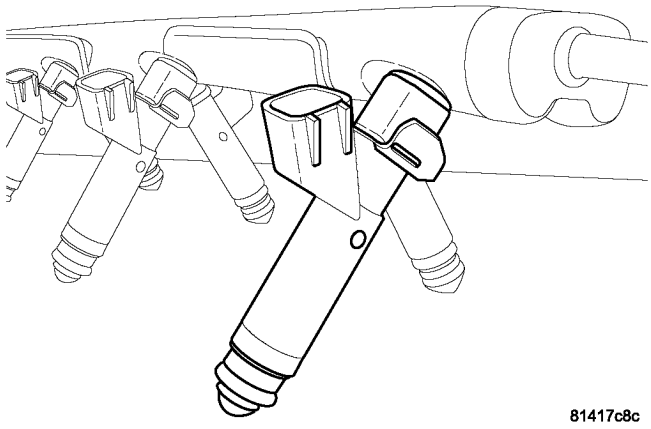


Fig. 42 FUEL INJECTORS INSTALLED

(7) Fuel rail with injectors installed (Fig. 42).

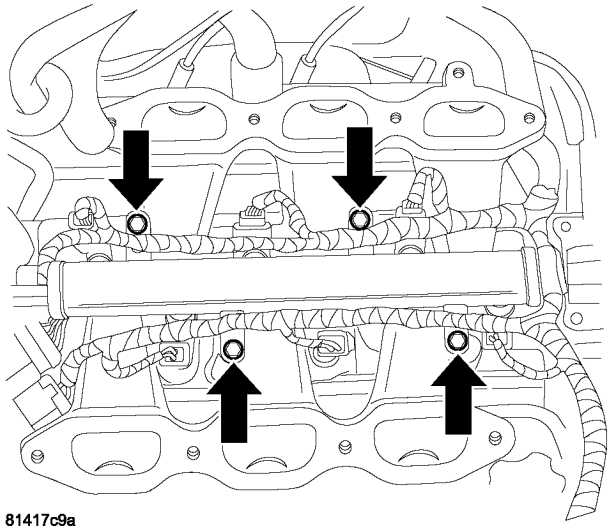


Fig. 43 FUEL RAIL BOLTS LOCATIONS

(8) Position fuel rail over cylinder heads, and push rail into place (Fig. 43). Tighten fuel rail mounting bolts to 28 N·m (250 in. lbs.) torque.

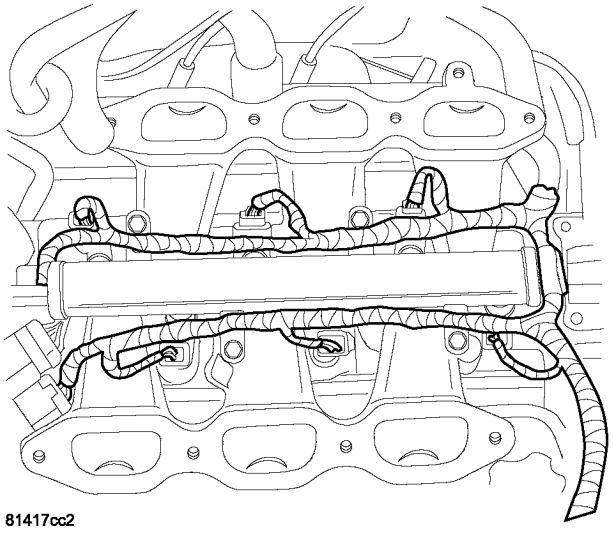


Fig. 44 FUEL INJECTOR WIRING HARNESS

(9) Connect the electrical connectors to the fuel injectors and lock (Fig. 44).

FUEL RAIL (Continued)

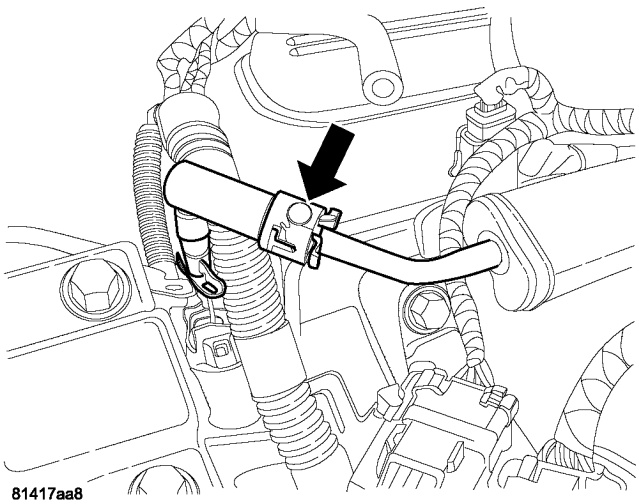


Fig. 45 FUEL LINE DISCONNECT FITTING

(10) Connect the fuel supply tube quick connect fitting to the fuel rail (Fig. 45). Refer to Quick Connect Fittings in the Fuel Delivery Section.

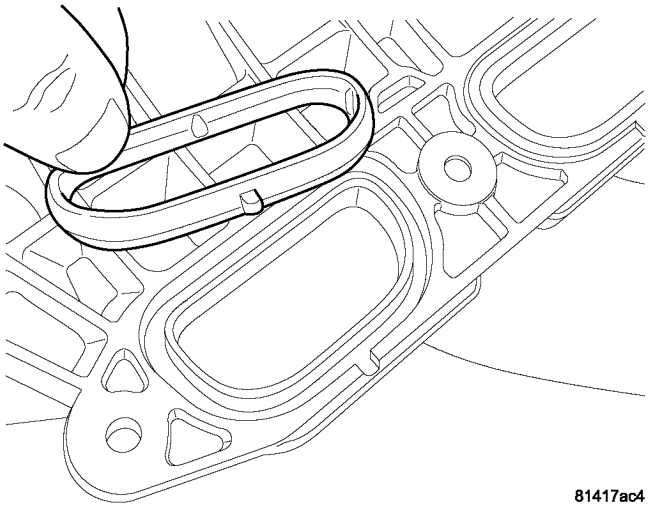


Fig. 46 INTAKE GASKETS REMOVED

(11) Inspect the intake manifold gaskets (Fig. 46).

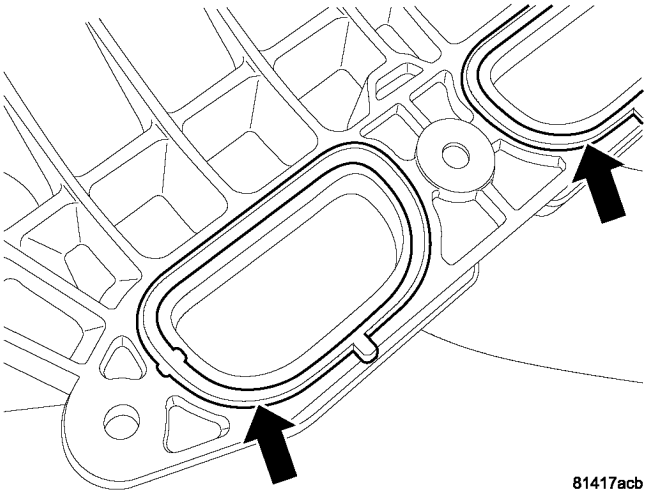


Fig. 47 INTAKE GASKET INSTALLED

(12) Intake manifold gaskets installed (Fig. 47).

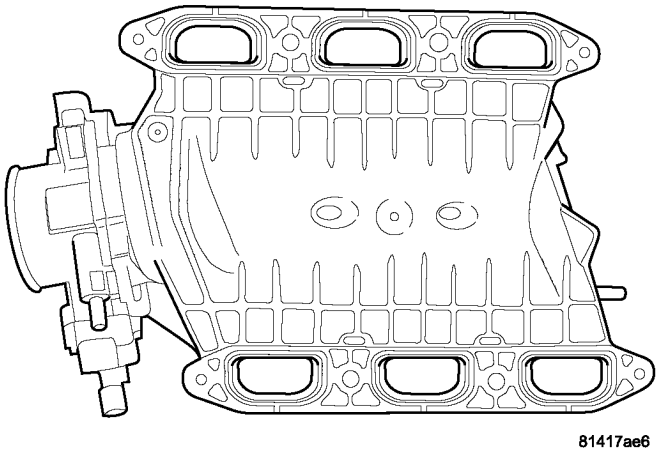


Fig. 48 INTAKE MANIFOLD REMOVED

(13) Install intake manifold plenum (Fig. 48), (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

FUEL RAIL (Continued)

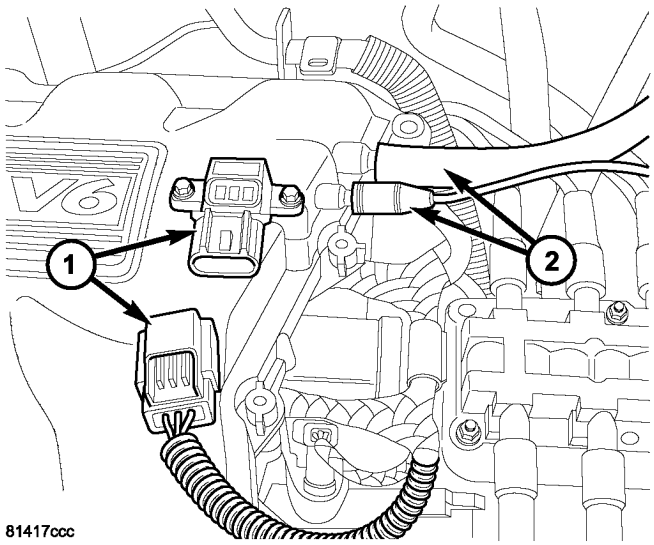


Fig. 49 MAP SENSOR

1 - MAP Sensor
2 - Vacuum Lines

(14) Connect and lock the electrical for the MAP sensor (1).

(15) Connect the vacuum lines (2) (Fig. 49).

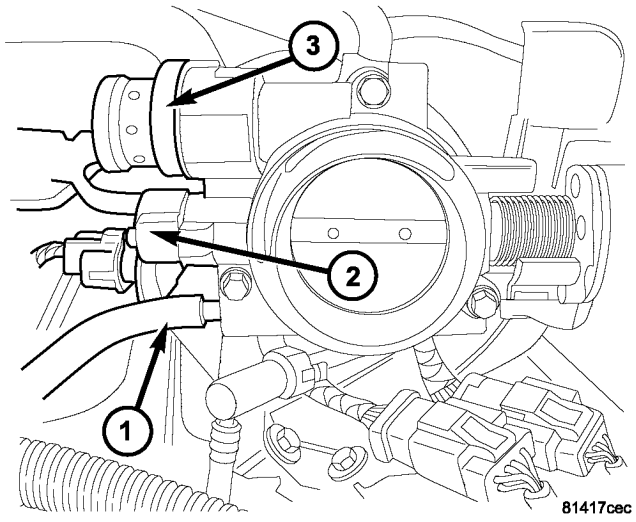


Fig. 50 THROTTLE BODY

1 - Purge Line
2 - Throttle Position Sensor
3 - Idle Air Control Motor

(16) Connect the electrical connector for Throttle Position Sensor (2), Idle Air Control Motor (3) (Fig. 50).

(17) Connect the purge line (1).

(18) Connect negative cable to battery.

FUEL TANK

REMOVAL

(1) Release the fuel pressure, refer to the Fuel Pressure Release Procedure in this section.

(2) Disconnect the negative battery cable.

(3) Drain fuel tank dry into holding tank or a properly labeled **GASOLINE** safety container.

(4) Raise vehicle and support.

(5) Disconnect the exhaust system between the catalytic converter and the muffler.

(6) Support the exhaust system with jack stands.

(7) Remove muffler hanger rubber groments (Fig. 51).

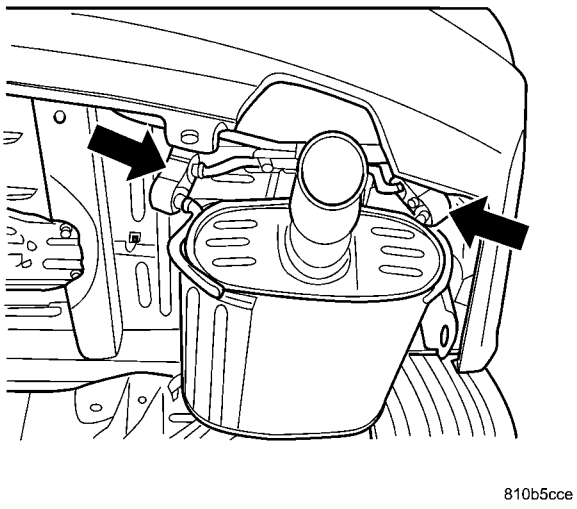
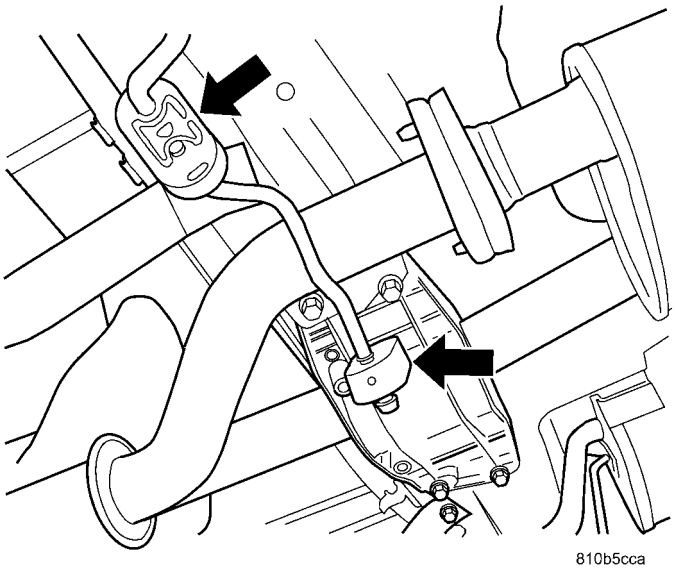


Fig. 51 MUFFLER HANGER

FUEL TANK (Continued)

(8) Remove the center exhaust hanger rubber grommets (Fig. 52).



EXHAUST HANGER

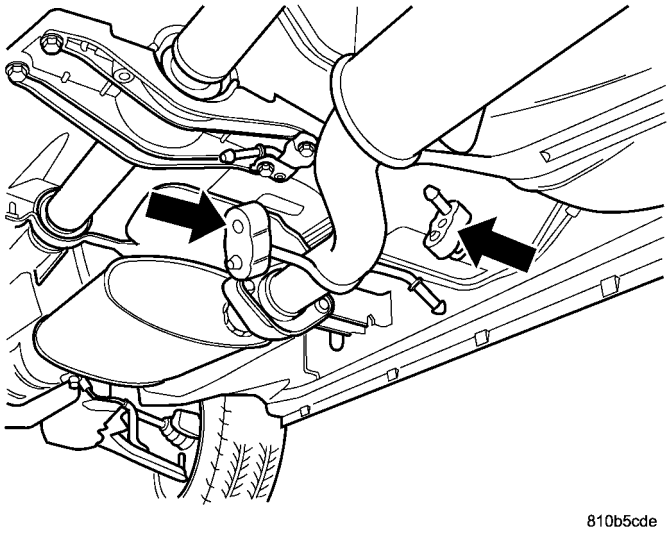


Fig. 52 EXHAUST HANGER REMOVED

(9) Remove the rear portion of the exhaust system and set on floor.

(10) Disconnect the fuel tank electrical connector (Fig. 53).

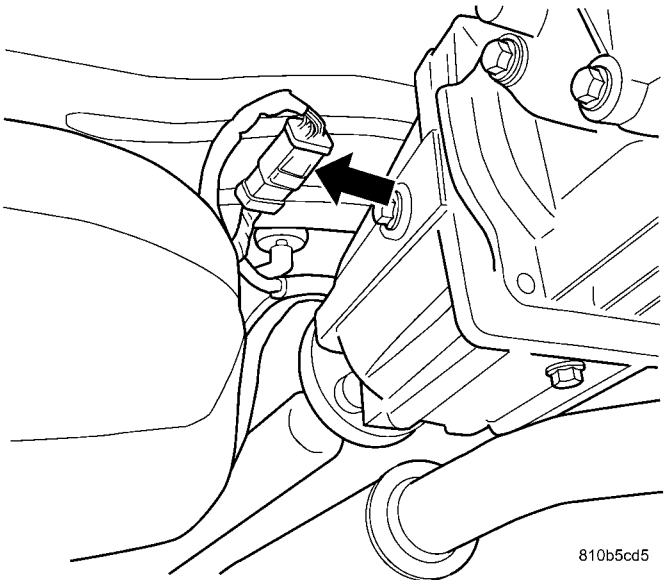


Fig. 53 FUEL TANK ELECTRICAL CONNECTOR

(11) Disconnect the fuel line and EVAP line (Fig. 54).

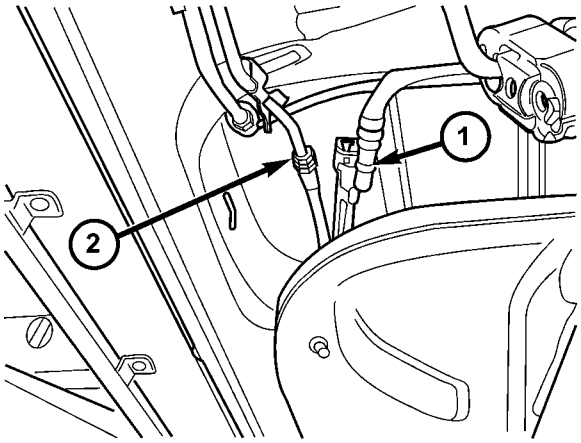


Fig. 54 FUEL SUPPLY LINE AND EVAP LINES

1 - EVAP Line
2 - Fuel Line

FUEL TANK (Continued)

(12) Disconnect the vapor recirculation tube (Fig. 55).

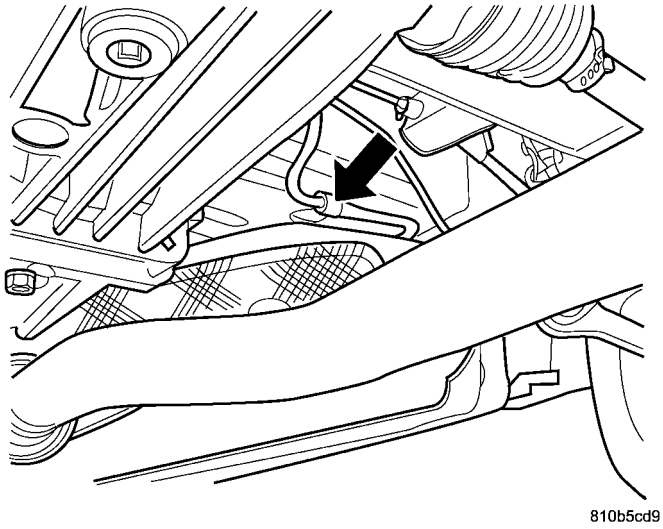


Fig. 55 FUEL TANK VAPOR RECIRCULATION TUBE

(13) Mark the driveshaft rear connection (Fig. 56).

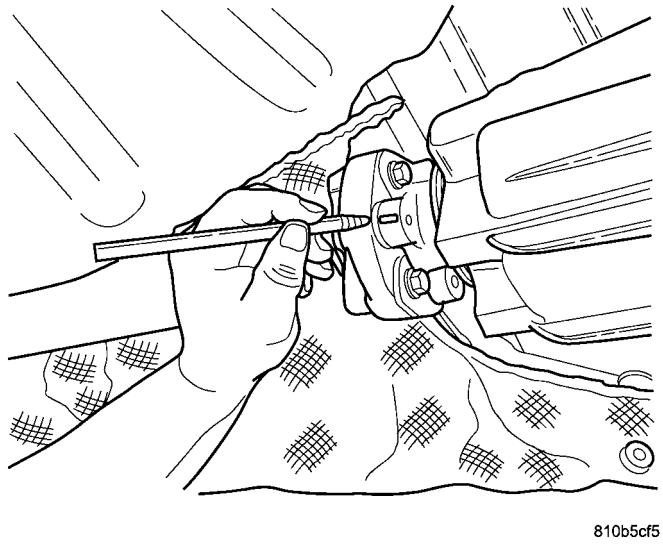


Fig. 56 MARKING DRIVESHAFT

(14) Disconnect the driveshaft rear connection (Fig. 57).

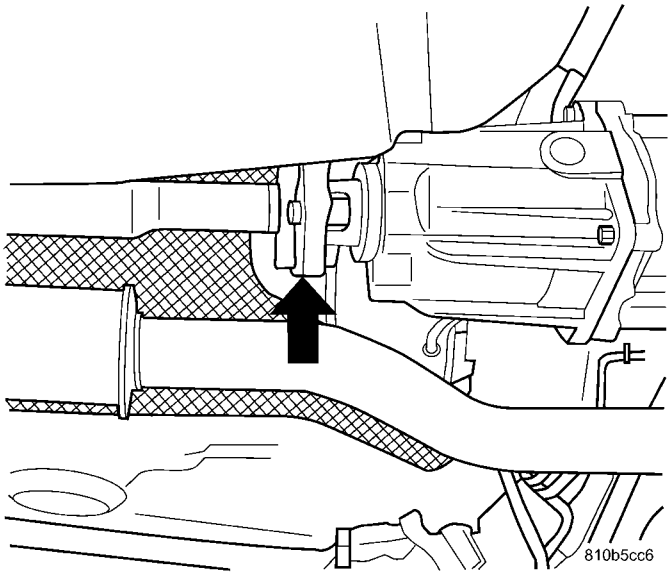


Fig. 57 DRIVESHAFT REAR CONNECTION

(15) Remove the driveshaft support/bearing (Fig. 58).

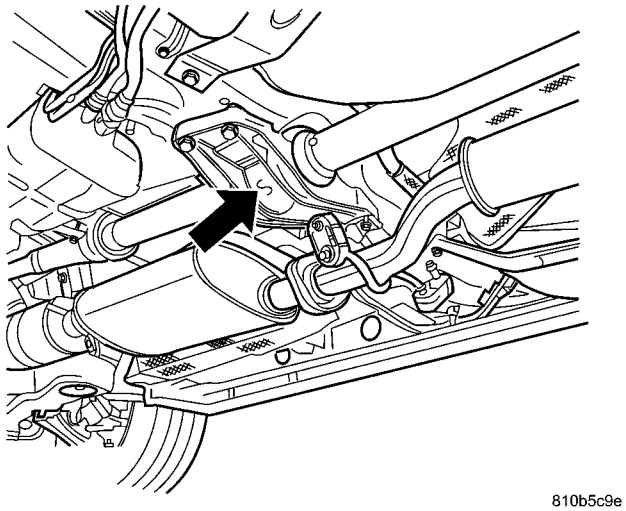
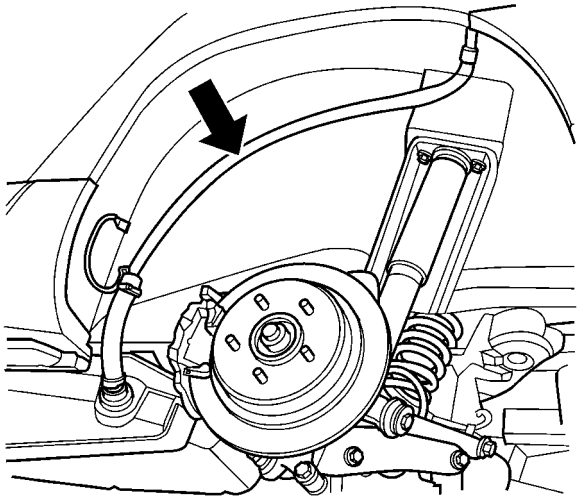


Fig. 58 DRIVESHAFT SUPPORT/BEARING

FUEL TANK (Continued)

(16) Support driveshaft on jack.
(17) Remove the left rear tire and splash shield.
(18) Remove the fuel filler tube from the rubber hose at fuel tank (Fig. 59).



FUEL FILLER TUBE

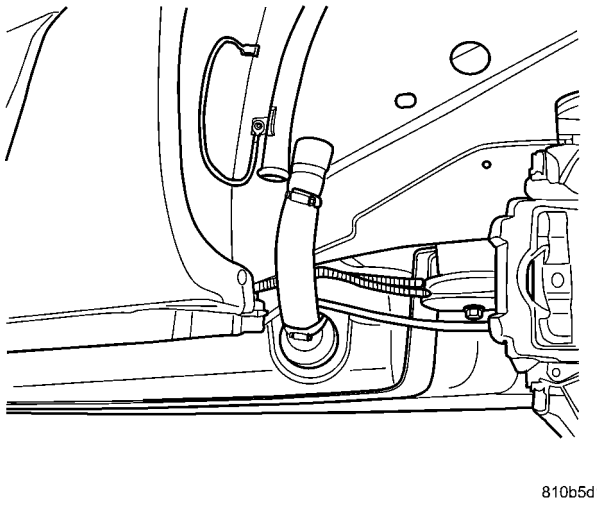


Fig. 59 FILLER TUBE TO RUBBER HOSE

(19) Support the fuel tank with a transmission jack.
(20) Remove the 2 fuel tank straps (Fig. 60).

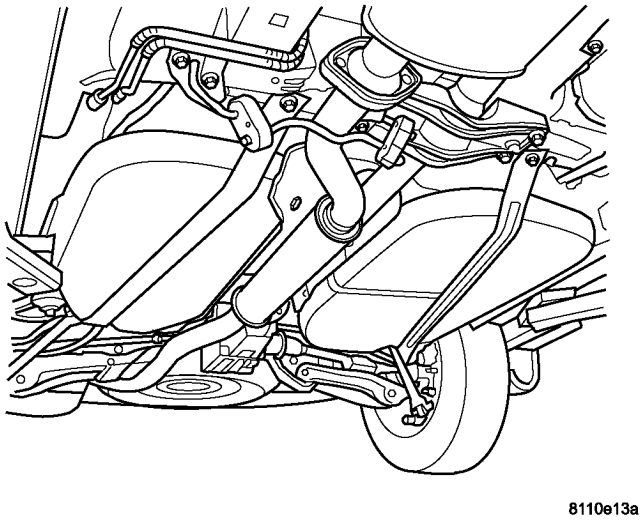


Fig. 60 FUEL TANK STRAPS

(21) Lower fuel tank
(22) Drain Fuel Tank, use an approved GASOLINE draining station.
(23) Remove tank from vehicle (Fig. 61).

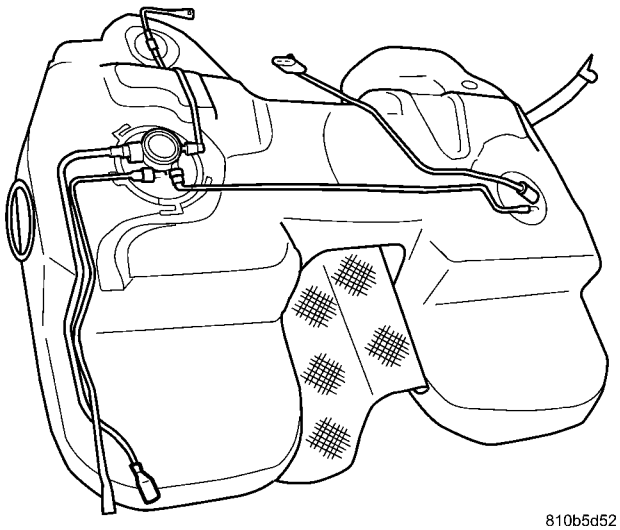


Fig. 61 FUEL TANK ASSEMBLY

FUEL TANK (Continued)

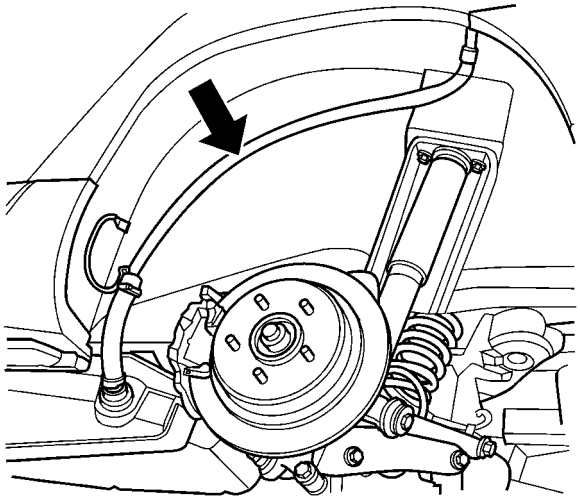
INSTALLATION

(1) Support the fuel tank with a transmission jack.
(2) Raise fuel tank and install to vehicle (Fig. 61).
(3) Install the 2 fuel tank straps (Fig. 60).
(4) Install the fuel filler tube to the rubber hose at fuel tank (Fig. 59).
(5) Connect the vapor recirculation tube (Fig. 55).
(6) Connect the fuel line and EVAP line.
(7) Connect the fuel tank electrical connector (Fig. 53).
(8) Support driveshaft on jack.
(9) Install the driveshaft support/bearing (Fig. 58).
(10) Align the Marks on the driveshaft to the rear connection.
(11) Connect the driveshaft rear connection (Fig. 57).
(12) Install the exhaust system and tighten clamp.
(13) Install the center exhaust hanger rubber groments (Fig. 52).
(14) Install muffler hanger rubber groments (Fig. 51).
(15) Install the left rear tire.
(16) Lower vehicle.
(17) Connect the negative battery cable.
(18) Fill fuel tank. Use the DRBIII® scan tool to pressurize the fuel system. Check for leaks.

FUEL TANK FILLER TUBE

REMOVAL

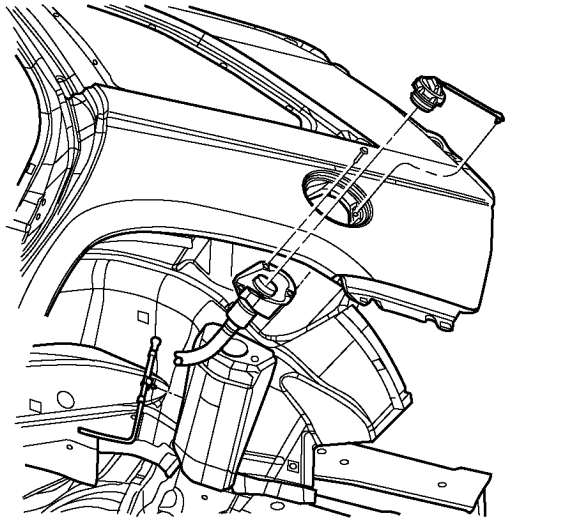
(1) Release the fuel pressure, refer to the Fuel Pressure Release Procedure in this section.
(2) Disconnect the negative battery cable.
(3) Raise vehicle and support.
(4) Remove the left rear tire.
(5) Remove the left rear splash shield.



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FUEL FILLER TUBE

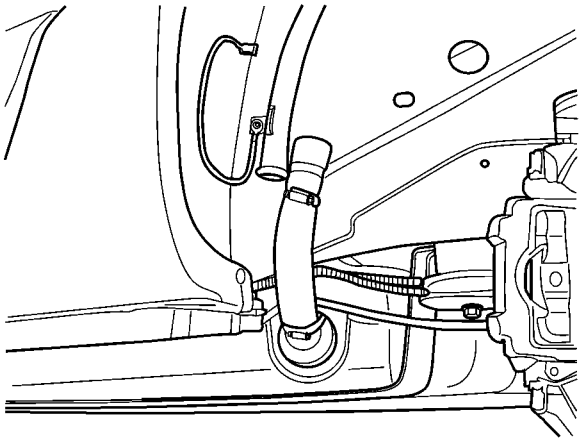
(6) Remove 3 screws from filler neck to quarter panel (Fig. 62).



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Fig. 62 FILLER TUBE

(7) Disconnect the vent line to filler tube.
(8) Remove the fuel filler tube from the rubber hose at fuel tank (Fig. 63).



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Fig. 63 FILLER TUBE TO RUBBER HOSE

(9) Remove the filler tube.

FUEL TANK FILLER TUBE (Continued)

INSTALLATION

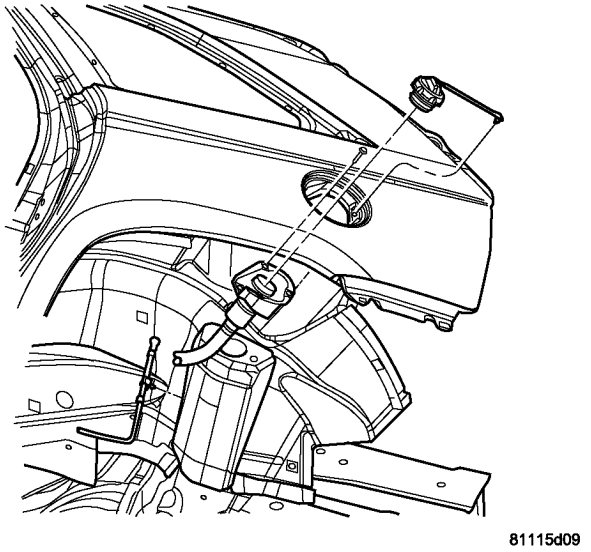


Fig. 64 FILLER TUBE

(1) Install the filler tube.
(2) Install 3 screws from filler neck to quarter panel (Fig. 64).

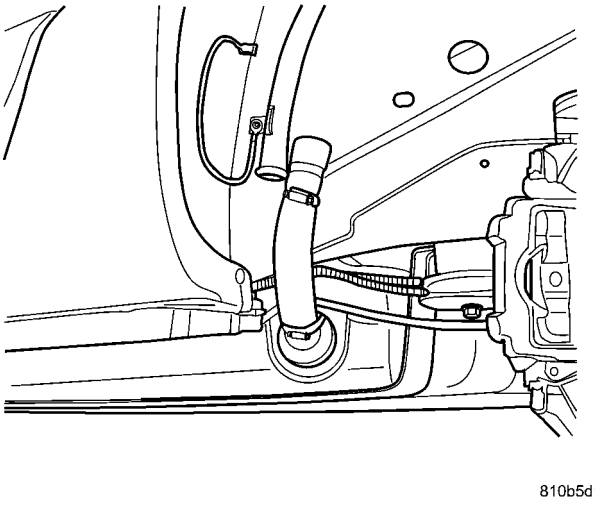


Fig. 65 FILLER TUBE TO RUBBER HOSE

(3) Connect the vent line to filler tube.
(4) Install the fuel filler tube from the rubber hose at fuel tank (Fig. 65).

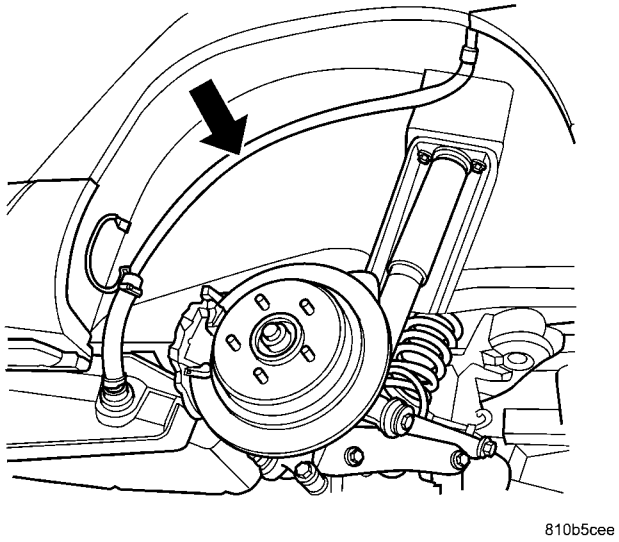


Fig. 66 FUEL FILLER TUBE

(5) Clip ground wire to body (Fig. 66).
(6) Install the left rear splash shield.
(7) Install the left rear tire.
(8) Lower vehicle.
(9) Connect the negative battery cable.

FUEL INJECTION

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FUEL INJECTION

OPERATION

INJECTION SYSTEM

All engines used in this section have a sequential Multi-Port Electronic Fuel Injection system. The MPI system is computer regulated and provides precise air/fuel ratios for all driving conditions. The Powertrain Control Module (PCM) operates the fuel injection system.

The PCM regulates:

- Ignition timing
- Air/fuel ratio
- Emission control devices
- Cooling fan
- Charging system
- Idle speed
- Vehicle speed control

FUEL INJECTION (Continued)

Various sensors provide the inputs necessary for the PCM to correctly operate these systems. In addition to the sensors, various switches also provide inputs to the PCM.

The PCM can adapt its programming to meet changing operating conditions.

Fuel is injected into the intake port above the intake valve in precise metered amounts through electrically operated injectors. The PCM fires the injectors in a specific sequence. Under most operating conditions, the PCM maintains an air fuel ratio of 14.7 parts air to 1 part fuel by constantly adjusting injector pulse width. Injector pulse width is the length of time the injector is open.

The PCM adjusts injector pulse width by opening and closing the ground path to the injector. Engine RPM (speed) and manifold absolute pressure (air density) are the **primary** inputs that determine injector pulse width.

MODES OF OPERATION

As input signals to the PCM change, the PCM adjusts its response to output devices. For example, the PCM must calculate a different injector pulse width and ignition timing for idle than it does for Wide Open Throttle (WOT). There are several different modes of operation that determine how the PCM responds to the various input signals.

There are two different areas of operation, OPEN LOOP and CLOSED LOOP.

During OPEN LOOP modes the PCM receives input signals and responds according to preset PCM programming. Inputs from the upstream and downstream heated oxygen sensors are not monitored during OPEN LOOP modes, except for heated oxygen sensor diagnostics (they are checked for shorted conditions at all times).

During CLOSED LOOP modes the PCM monitors the inputs from the upstream and downstream heated oxygen sensors. The upstream heated oxygen sensor input tells the PCM if the calculated injector pulse width resulted in the ideal air-fuel ratio of 14.7 to one. By monitoring the exhaust oxygen content through the upstream heated oxygen sensor, the PCM can fine tune injector pulse width. Fine tuning injector pulse width allows the PCM to achieve optimum fuel economy combined with low emissions.

For the PCM to enter CLOSED LOOP operation, the following must occur:

(1) Engine coolant temperature must be over 35°F.

- If the coolant is over 35°F the PCM will wait 38 seconds.
- If the coolant is over 50°F the PCM will wait 15 seconds.
- If the coolant is over 167°F the PCM will wait 3 seconds.

(2) For other temperatures the PCM will interpolate the correct waiting time.

(3) O2 sensor must read either greater than 0.745 volts or less than 0.29 volt.

(4) The multi-port fuel injection systems has the following modes of operation:

- Ignition switch ON (Zero RPM)
- Engine start-up
- Engine warm-up
- Cruise
- Idle
- Acceleration
- Deceleration
- Wide Open Throttle
- Ignition switch OFF

(5) The engine start-up (crank), engine warm-up, deceleration with fuel shutoff and wide open throttle modes are OPEN LOOP modes. Under most operating conditions, the acceleration, deceleration (with A/C on), idle and cruise modes, **with the engine at operating temperature** are CLOSED LOOP modes.

IGNITION SWITCH ON (ZERO RPM) MODE

When the ignition switch activates the fuel injection system, the following actions occur:

- The PCM monitors the engine coolant temperature sensor and throttle position sensor input. The PCM determines basic fuel injector pulse width from this input.
- The PCM determines atmospheric air pressure from the MAP sensor input to modify injector pulse width.

When the key is in the ON position and the engine is not running (zero rpm), the Auto Shutdown (ASD) and fuel pump relays de-energize after approximately 1 second. Therefore, battery voltage is not supplied to the fuel pump, ignition coil, fuel injectors and heated oxygen sensors.

ENGINE START-UP MODE

This is an OPEN LOOP mode. If the vehicle is in park or neutral (automatic transaxles) or the clutch pedal is depressed (manual transaxles) the ignition switch energizes the starter relay when the engine is not running. The following actions occur when the starter motor is engaged.

- If the PCM receives the camshaft position sensor and crankshaft position sensor signals, it energizes the Auto Shutdown (ASD) relay and fuel pump relay. If the PCM does not receive both signals within approximately one second, it will not energize the ASD relay and fuel pump relay. The ASD and fuel pump relays supply battery voltage to the fuel pump, fuel injectors, ignition coil, (EGR solenoid and PCV heater if equipped) and heated oxygen sensors.

FUEL INJECTION (Continued)

• The PCM energizes the injectors (on the 69° degree falling edge) for a calculated pulse width until it determines crankshaft position from the camshaft position sensor and crankshaft position sensor signals. The PCM determines crankshaft position within 1 engine revolution.

• After determining crankshaft position, the PCM begins energizing the injectors in sequence. It adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.

• When the engine idles within ±64 RPM of its target RPM, the PCM compares current MAP sensor value with the atmospheric pressure value received during the Ignition Switch On (zero RPM) mode.

Once the ASD and fuel pump relays have been energized, the PCM determines injector pulse width based on the following:

- MAP
- Engine RPM
- Battery voltage
- Engine coolant temperature
- Inlet/Intake air temperature (IAT)
- Throttle position
- The number of engine revolutions since cranking was initiated

During Start-up the PCM maintains ignition timing at 9° BTDC.

ENGINE WARM-UP MODE

This is an OPEN LOOP mode. The following inputs are received by the PCM:

- Manifold Absolute Pressure (MAP)
- Crankshaft position (engine speed)
- Engine coolant temperature
- Inlet/Intake air temperature (IAT)
- Camshaft position
- Knock sensor
- Throttle position
- A/C switch status
- Battery voltage
- Vehicle speed
- Speed control
- O2 sensors

The PCM adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.

The PCM adjusts ignition timing and engine idle speed. Engine idle speed is adjusted through the idle air control motor.

CRUISE OR IDLE MODE

When the engine is at operating temperature this is a CLOSED LOOP mode. During cruising or idle the following inputs are received by the PCM:

- Manifold absolute pressure
- Crankshaft position (engine speed)
- Inlet/Intake air temperature
- Engine coolant temperature
- Camshaft position
- Knock sensor
- Throttle position
- Exhaust gas oxygen content (O2 sensors)
- A/C switch status
- Battery voltage
- Vehicle speed

The PCM adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.

The PCM adjusts engine idle speed and ignition timing. The PCM adjusts the air/fuel ratio according to the oxygen content in the exhaust gas (measured by the upstream and downstream heated oxygen sensor).

The PCM monitors for engine misfire. During active misfire and depending on the severity, the PCM either continuously illuminates or flashes the malfunction indicator lamp (Check Engine light on instrument panel). Also, the PCM stores an engine misfire DTC in memory, if 2nd trip with fault.

The PCM performs several diagnostic routines. They include:

- Oxygen sensor monitor
- Downstream heated oxygen sensor diagnostics during open loop operation (except for shorted)
- Fuel system monitor
- EGR monitor (if equipped)
- Purge system monitor
- Catalyst efficiency monitor
- All inputs monitored for proper voltage range, rationality.
- All monitored components (refer to the Emission section for On-Board Diagnostics).

The PCM compares the upstream and downstream heated oxygen sensor inputs to measure catalytic convertor efficiency. If the catalyst efficiency drops below the minimum acceptable percentage, the PCM stores a diagnostic trouble code in memory, after 2 trips.

During certain idle conditions, the PCM may enter a variable idle speed strategy. During variable idle speed strategy the PCM adjusts engine speed based on the following inputs.

- A/C status
- Battery voltage
- Battery temperature or Calculated Battery Temperature
- Engine coolant temperature
- Engine run time
- Inlet/Intake air temperature
- Vehicle mileage

FUEL INJECTION (Continued)

ACCELERATION MODE

This is a CLOSED LOOP mode. The PCM recognizes an abrupt increase in Throttle Position sensor output voltage or MAP sensor output voltage as a demand for increased engine output and vehicle acceleration. The PCM increases injector pulse width in response to increased fuel demand.

- Wide Open Throttle-open loop

DECELERATION MODE

This is a CLOSED LOOP mode. During deceleration the following inputs are received by the PCM:

- A/C status
- Battery voltage
- Inlet/Intake air temperature
- Engine coolant temperature
- Crankshaft position (engine speed)
- Exhaust gas oxygen content (upstream heated oxygen sensor)
- Knock sensor
- Manifold absolute pressure
- Throttle position sensor
- IAC motor (solenoid) control changes in response to MAP sensor feedback

The PCM may receive a closed throttle input from the Throttle Position Sensor (TPS) when it senses an abrupt decrease in manifold pressure. This indicates a hard deceleration (Open Loop). In response, the PCM may momentarily turn off the injectors. This helps improve fuel economy, emissions and engine braking.

WIDE-OPEN-THROTTLE MODE

This is an OPEN LOOP mode. During wide-open-throttle operation, the following inputs are used by the PCM:

- Inlet/Intake air temperature
- Engine coolant temperature
- Engine speed
- Knock sensor
- Manifold absolute pressure
- Throttle position

When the PCM senses a wide-open-throttle condition through the Throttle Position Sensor (TPS) it de-energizes the A/C compressor clutch relay. This disables the air conditioning system and disables EGR (if equipped).

The PCM adjusts injector pulse width to supply a predetermined amount of additional fuel, based on MAP and RPM.

IGNITION SWITCH OFF MODE

When the operator turns the ignition switch to the OFF position, the following occurs:

- All outputs are turned off, unless 02 Heater Monitor test is being run. Refer to the Emission section for On-Board Diagnostics.
- No inputs are monitored except for the heated oxygen sensors. The PCM monitors the heating elements in the oxygen sensors and then shuts down.

FUEL CORRECTION or ADAPTIVE MEMORIES

DESCRIPTION

In Open Loop, the PCM changes pulse width without feedback from the O2 Sensors. Once the engine warms up to approximately 30 to 35° F, the PCM goes into closed loop **Short Term Correction** and utilizes feedback from the O2 Sensors. Closed loop **Long Term Adaptive Memory** is maintained above 170° to 190° F unless the PCM senses wide open throttle. At that time the PCM returns to Open Loop operation.

OPERATION

Short Term

The first fuel correction program that begins functioning is the short term fuel correction. This system corrects fuel delivery in direct proportion to the readings from the Upstream O2 Sensor.

The PCM monitors the air/fuel ratio by using the input voltage from the O2 Sensor. When the voltage reaches its preset high or low limit, the PCM begins to add or remove fuel until the sensor reaches its switch point. The short term corrections then begin.

The PCM makes a series of quick changes in the injector pulse-width until the O2 Sensor reaches its opposite preset limit or switch point. The process then repeats itself in the opposite direction.

Short term fuel correction will keep increasing or decreasing injector pulse-width based upon the upstream O2 Sensor input. The maximum range of authority for short term memory is 25% (+/-) of base pulse-width. Short term is violated and is lost when ignition is turned OFF.

Long Term

The second fuel correction program is the long term adaptive memory. In order to maintain correct emission throughout all operating ranges of the engine, a cell structure based on engine rpm and load (MAP) is used.

Ther number of cells varies upon the driving conditions. Two cells are used only during idle, based upon TPS and Park/Neutral switch inputs. There may be two other cells used for deceleration, based on TPS, engine rpm, and vehicle speed. The other twelve cells represent a manifold pressure and an rpm range. Six of the cells are high rpm and the

other six are low rpm. Each of these cells has a specific MAP voltage range Typical Adaptive Memory Fuel Cells.

As the engine enters one of these cells the PCM looks at the amount of short term correction being used. Because the goal is to keep short term at 0 (O2 Sensor switching at 0.5 volt), long term will update in the same direction as short term correction was moving to bring the short term back to 0. Once short term is back at 0, this long term correction factor is stored in memory.

The values stored in long term adaptive memory are used for all operating conditions, including open loop and cold starting. However, the updating of the long term memory occurs after the engine has exceeded approximately 170°-190° F, with fuel control in closed loop and two minutes of engine run time. This is done to prevent any transitional temperature or start-up compensations from corrupting long term fuel correction.

Long term adaptive memory can change the pulse-width by as much as 25%, which means it can correct for all of short term. It is possible to have a problem that would drive long term to 25% and short term to another 25% for a total change of 50% away from base pulse-width calculation.

TYPICAL ADAPTIVE MEMORY FUEL CELLS

	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Idle	Decel
Vacuum	20	17	13	9	5	0		
Above 1,984 rpm	1	3	5	7	9	11	13 Drive	15
Below 1,984 rpm	0	2	4	6	8	10	12 Neutral	14
MAP volt =	0	1.4	2.0	2.6	3.3	3.9		

Fuel Correction Diagnostics

There are two fuel correction diagnostic routines:

- Fuel System Rich
- Fuel System Lean

A DTC is set and the MIL is illuminated if the PCM detects either of these conditions. This is determined based on total fuel correction, short term times long term.

SYSTEM DIAGNOSIS

OPERATION

The PCM can test many of its own input and output circuits. If the PCM senses a fault in a major system, the PCM stores a Diagnostic Trouble Code (DTC) in memory.

For DTC information see On-Board Diagnostics (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION) .

SPECIFICATIONS

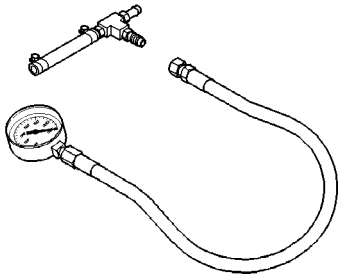
TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
MAP Sensor	4.5	-	40
O2 Sensor	28	20	-
IAC	5.5	-	49
Fuel Rail Bolts	28	-	250
TPS	5.1	-	45

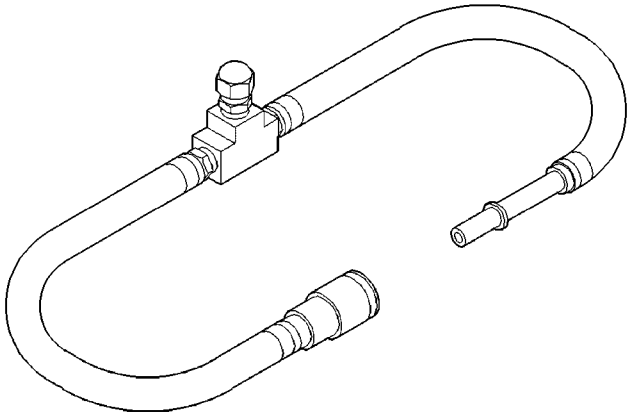
FUEL INJECTION (Continued)

SPECIAL TOOLS

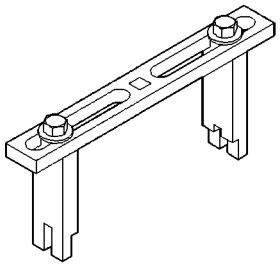
FUEL



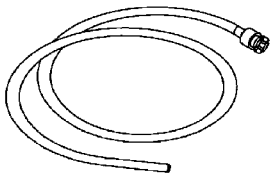
Test Kit, Fuel



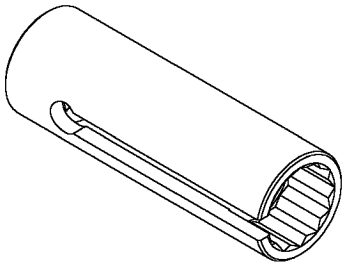
Adapters, Fuel Pressure Test—6539 and/or 6631



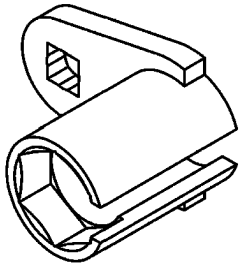
Spanner Wrench—6856



Fuel Line Adapter 1/4



O2S (OXYGEN SENSOR) REMOVAL/INSTALLER-C4907



OXYGEN SENSOR TOOL

ACCELERATOR PEDAL

REMOVAL

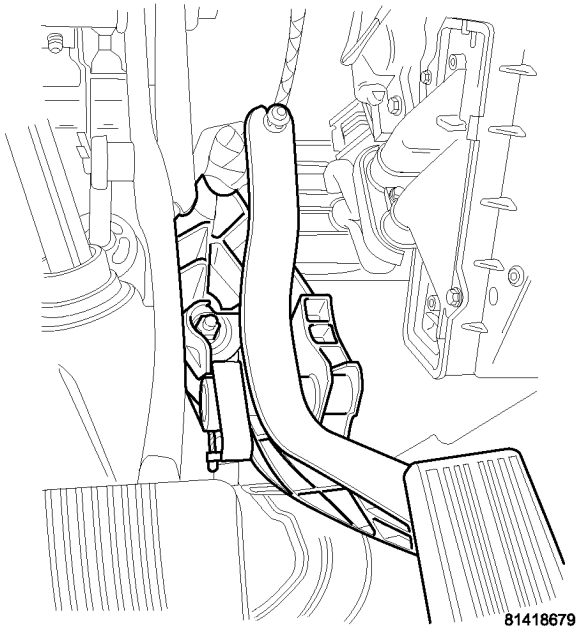


Fig. 1 PEDAL ASSEMBLY

(1) The accelerator pedal is connected to the throttle body linkage by the throttle cable. The cable is protected by a plastic sheathing and is connected to the throttle body linkage. It is connected to the upper part of the accelerator pedal arm by a plastic retainer (clip). This retainer (clip) snaps into the top of the accelerator pedal arm. It is mounted to the dash panel with 2 studs and nuts (Fig. 1).

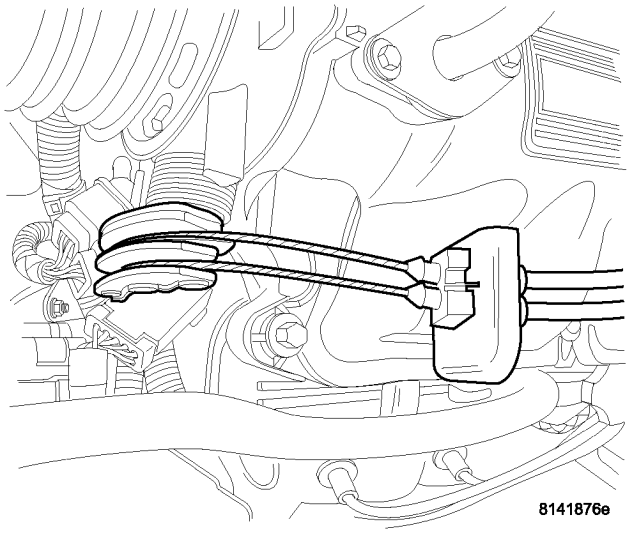


Fig. 2 CABLES AND BRACKET

(2) There are 2 cables at the throttle body, one for speed control and throttle control. Remove the throttle cable from throttle body (Fig. 2).

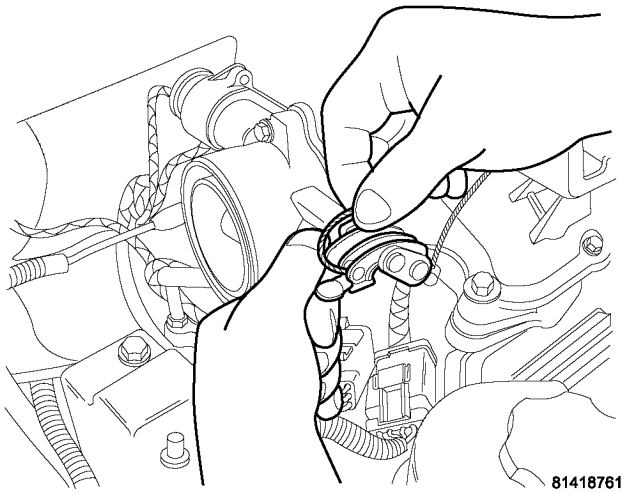


Fig. 3 CABLE AT THROTTLE BODY

CAUTION: Be careful not to damage or kink the cable core wire (within the cable sheathing) while servicing the accelerator pedal or throttle cable.

(3) Removing throttle cable from throttle body lever (Fig. 3).

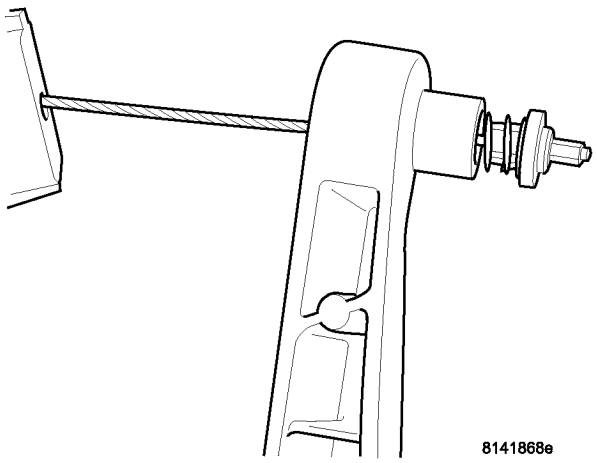


Fig. 4 CABLE ATTACHMENT TO PEDAL

(4) Throttle cable attached to pedal (Fig. 4).

ACCELERATOR PEDAL (Continued)

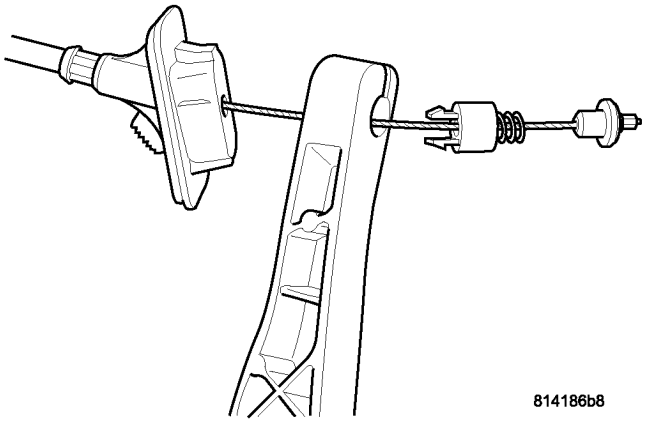


Fig. 5 CABLE ATTACHMENT EXPLODED VIEW

(5) From inside vehicle, hold up accelerator pedal. Remove plastic cable retainer (clip) and throttle cable core wire from upper end of accelerator pedal arm. Plastic cable retainer (clip) snaps into pedal arm (Fig. 5).

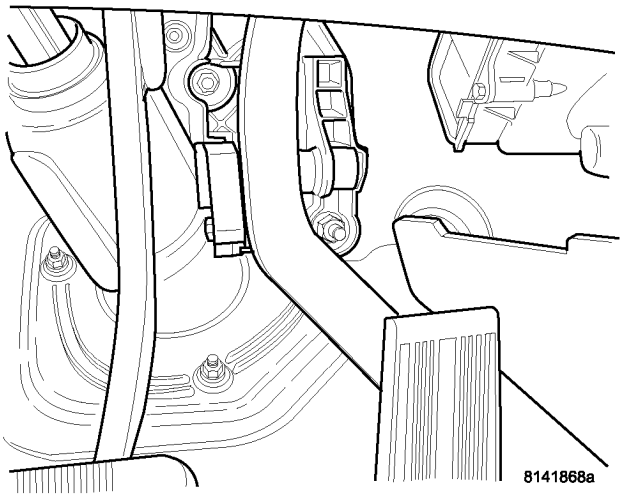


Fig. 6 MOUNTING NUTS

(6) Remove accelerator pedal mounting bracket nuts (Fig. 6).

(7) Remove accelerator pedal assembly.

INSTALLATION

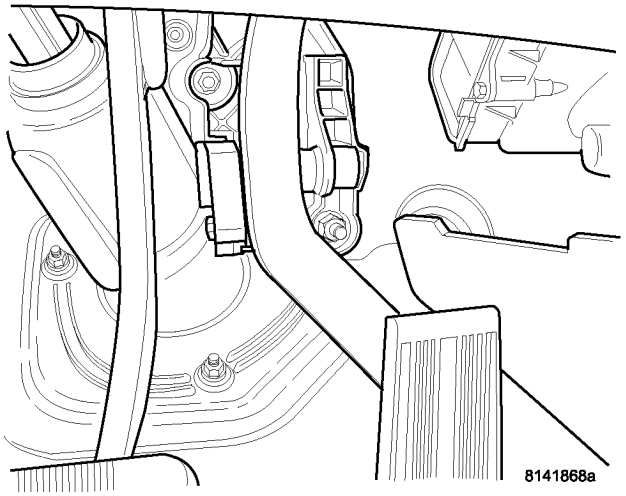


Fig. 7 MOUNTING NUTS

(1) Place accelerator pedal assembly over mounting studs protruding from floor pan (Fig. 7). Tighten retaining nuts to 12 N·m (105 in. lbs.) torque.

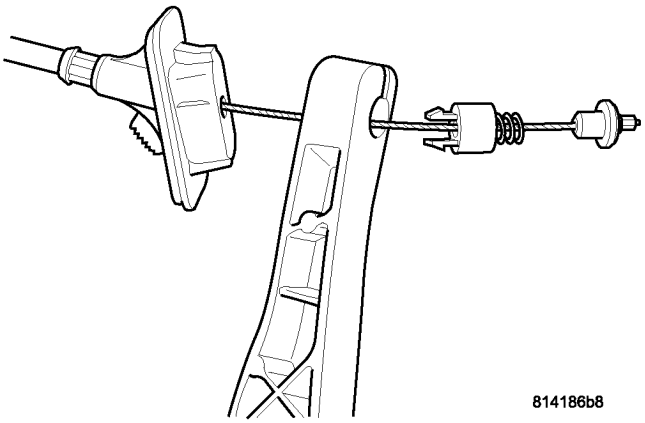


Fig. 8 CABLE ATTACHMENT EXPLODED VIEW

(2) Place cable through slot in top of pedal shaft (Fig. 8).

ACCELERATOR PEDAL (Continued)

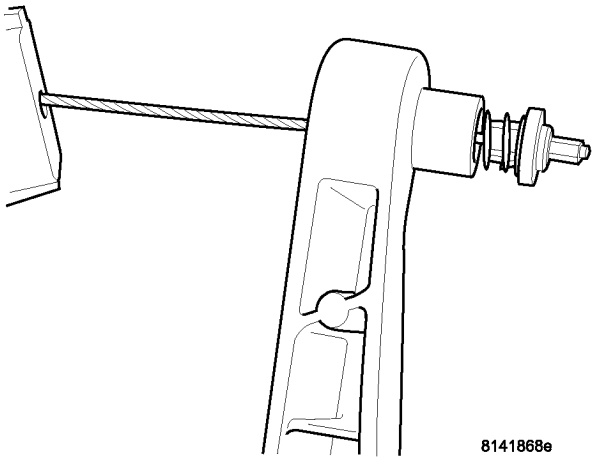


Fig. 9 CABLE ATTACHMENT TO PEDAL

(3) While holding pedal lever, Push retainer clip forward in vehicle engaging it into the pedal lever (Fig. 9).

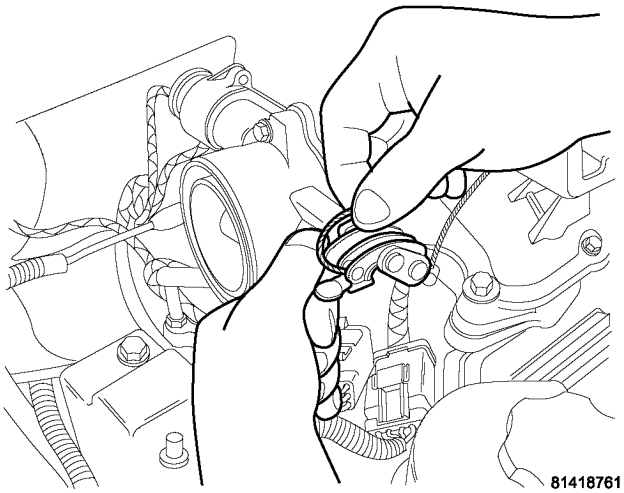


Fig. 10 CABLE AT THROTTLE BODY

(4) Hold the throttle body lever in the wide open position and install the throttle cable (Fig. 10).

(5) Before starting engine, operate accelerator pedal to check for any binding.

CRANKSHAFT POSITION SENSOR

REMOVAL

3.5L

The crankshaft sensor is located on the driver side of the vehicle (Fig. 11), above the differential housing. The bottom of the sensor sits above the drive plate.

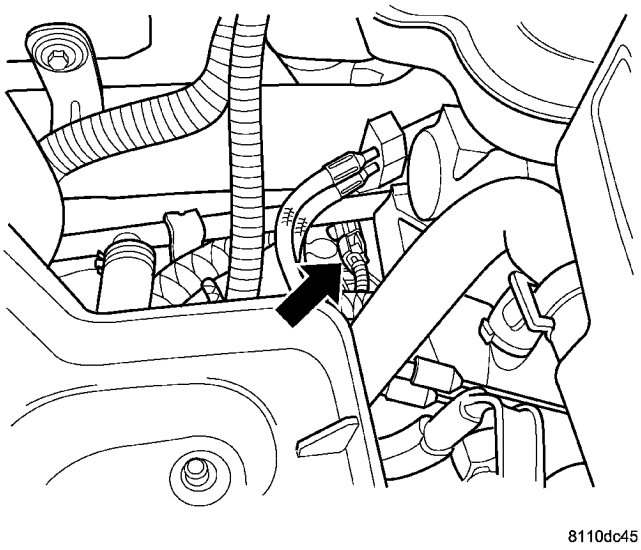


Fig. 11 CRANKSHAFT POSITION SENSOR

(1) Disconnect the negative and positive battery cable.

(2) Remove the battery.

(3) Unlock and disconnect electrical connector from crankshaft position sensor.

(4) Remove sensor mounting screw. Remove sensor.

3.8L

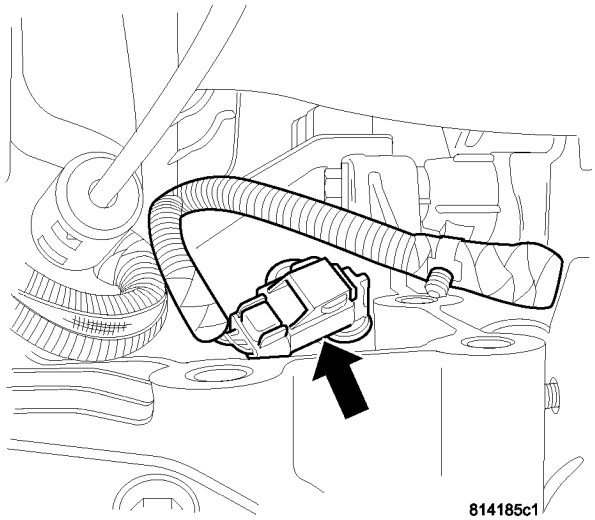


Fig. 12 CRANKSHAFT POSITION SENSOR - 3.8L

The crankshaft sensor is located on the driver side of the vehicle (Fig. 12), above the differential housing. The bottom of the sensor sits above the drive plate.

CRANKSHAFT POSITION SENSOR (Continued)

(1) Disconnect the negative and positive battery cable.
(2) Remove the battery.
(3) Unlock and disconnect electrical connector from crankshaft position sensor.
(4) Remove sensor mounting screw. Remove sensor.

INSTALLATION

3.5L

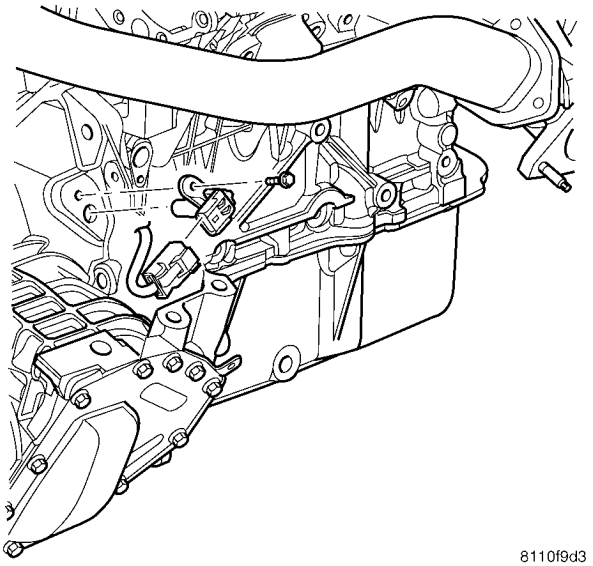


Fig. 13 CRANKSHAFT POSITION SENSOR ASSEMBLY

(1) Install sensor and push sensor down until contact is made with the transmission case (Fig. 13). While holding the sensor in this position, install and tighten the retaining bolt to 12 N·m (105 in. lbs.) torque.
(2) Connect electrical connector and lock to crankshaft position sensor.
(3) Install battery.
(4) Connect the positive then the negative battery cable.

3.8L

(1) Install sensor and push sensor down until contact is made with the transmission case (Fig. 14). While holding the sensor in this position, install and tighten the retaining bolt to 12 N·m (105 in. lbs.) torque.
(2) Connect electrical connector and lock to crankshaft position sensor.
(3) Install battery.
(4) Connect the positive then the negative battery cable.

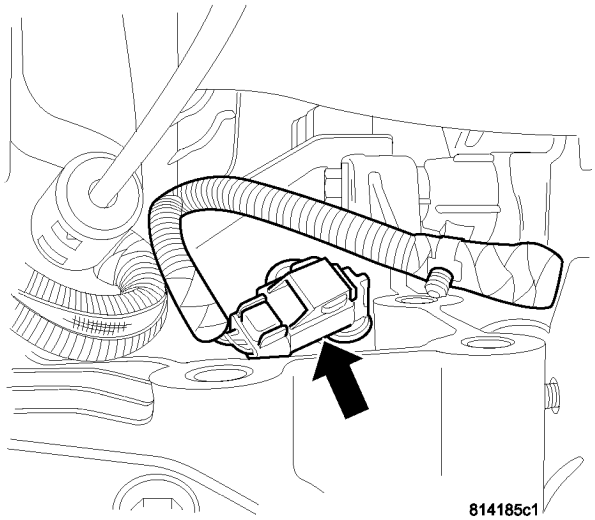


Fig. 14 CRANKSHAFT POSITION SENSOR - 3.8L

FUEL INJECTOR

REMOVAL

3.5L

(1) Release fuel pressure, refer to Fuel Pressure Release Procedure in this section.
(2) Disconnect the negative battery cable.
(3) Remove the upper intake manifold, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

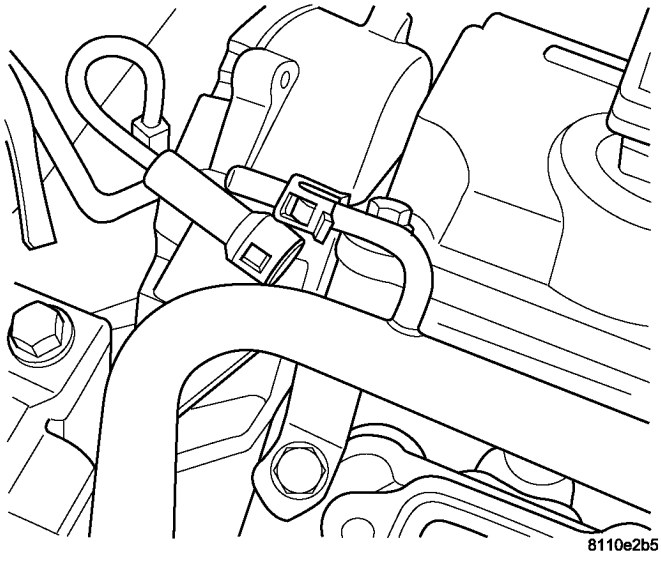


Fig. 15 FUEL LINE QUICK CONNECTOR

(4) If the injector connectors are not tagged with their cylinder number, tag them to identify the correct cylinder.

FUEL INJECTOR (Continued)

(5) Disconnect the fuel supply line from the fuel rail (Fig. 15).

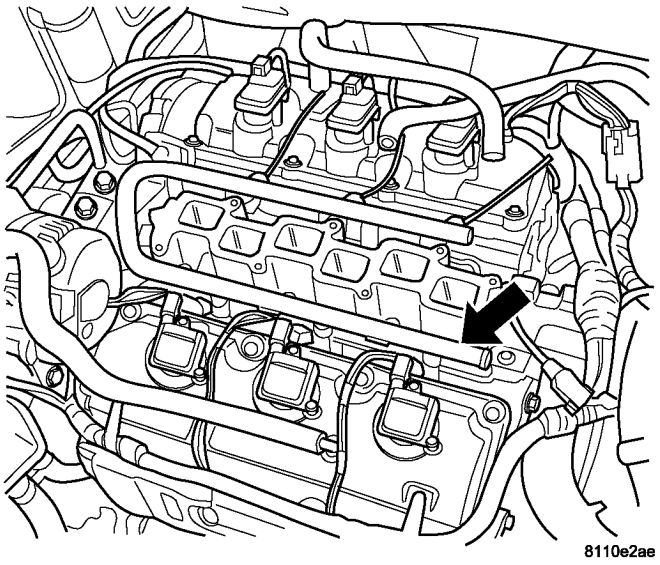


Fig. 16 FUEL RAIL

(6) Remove the 4 mounting bolts from the fuel rail (Fig. 16).
(7) Lift fuel rail straight up off of cylinder head.
(8) Remove retaining clips from fuel injectors at fuel rail.
(9) Remove fuel injector from fuel rail.

REMOVAL

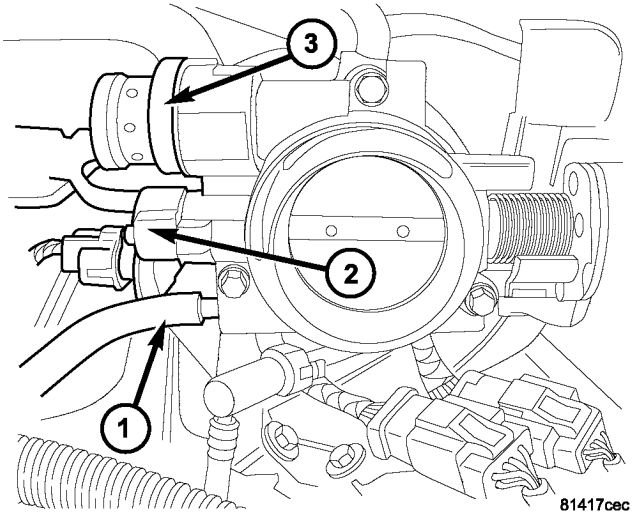


Fig. 17 THROTTLE BODY

1 - Purge Line
2 - Throttle Position Sensor
3 - Idle Air Control Motor

(1) Release fuel pressure, refer to Fuel Pressure Release Procedure in this section.
(2) Disconnect the negative battery cable.
(3) Remove air cleaner housing and inlet hose.
(4) Remove engine cover.
(5) Disconnect the Throttle Position Sensor (Fig. 17).
(6) Disconnect the Idle Air Control.
(7) Disconnect the purge line.
(8) Disconnect the throttle and speed control cables (if equipped).

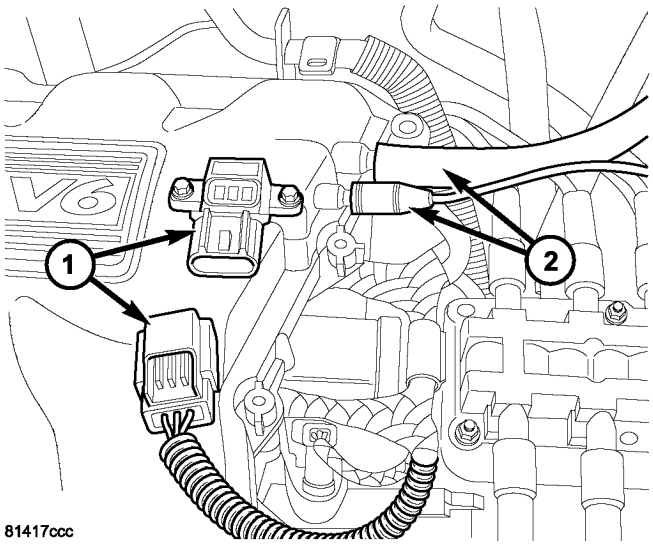


Fig. 18 MAP SENSOR

1 - MAP Sensor
2 - Vacuum Lines

(9) Unlock and disconnect the MAP sensor (Fig. 18).
(10) Disconnect the vacuum lines.
(11) Remove the EGR tube, refer to (Refer to 25 - EMISSIONS CONTROL/EXHAUST GAS RECIRCULATION/TUBE - REMOVAL).

FUEL INJECTOR (Continued)

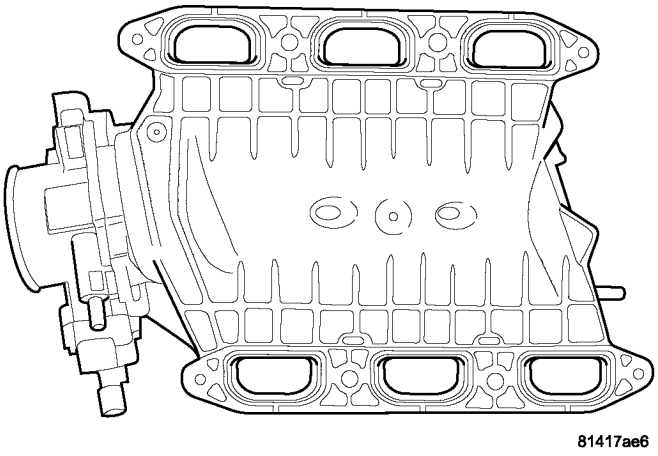


Fig. 19 INTAKE MANIFOLD REMOVED

(12) Remove the upper intake manifold (Fig. 19), (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

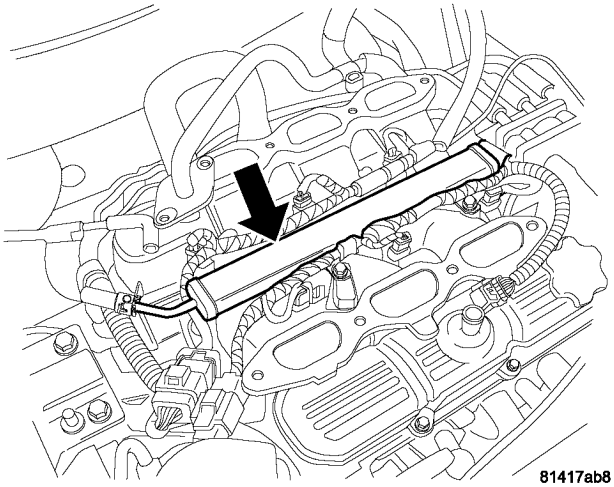


Fig. 20 FUEL RAIL

(13) Fuel Rail, wiring harness and injectors (Fig. 20).

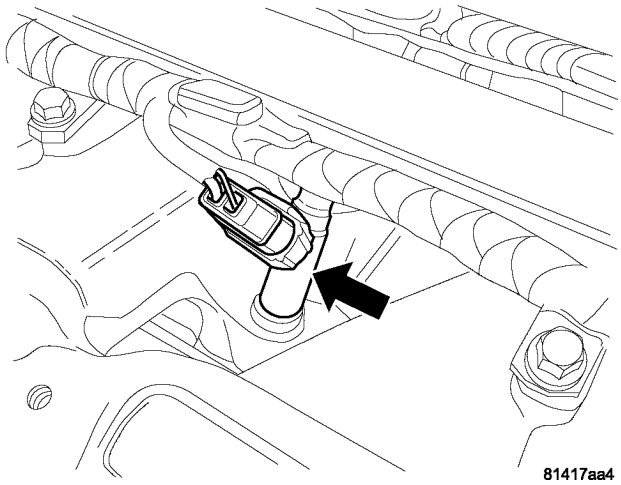


Fig. 21 FUEL INJECTOR LOCATION

(14) Injector and electrical connector (Fig. 21).

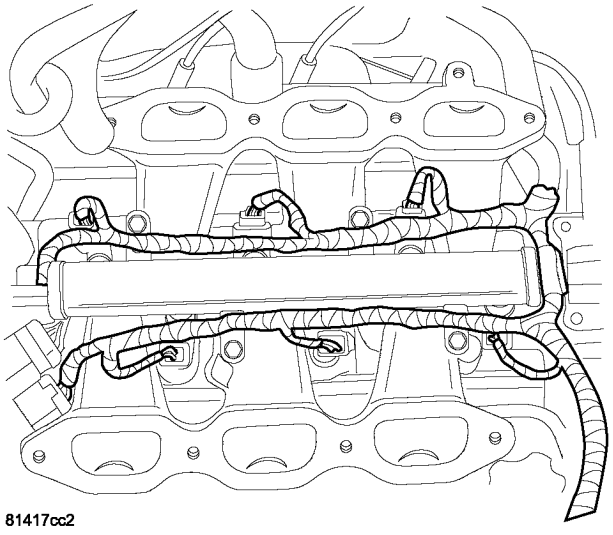


Fig. 22 FUEL INJECTOR WIRING HARNESS

(15) If the injector connectors are not tagged with their cylinder number, tag them to identify the correct cylinder (Fig. 22).

FUEL INJECTOR (Continued)

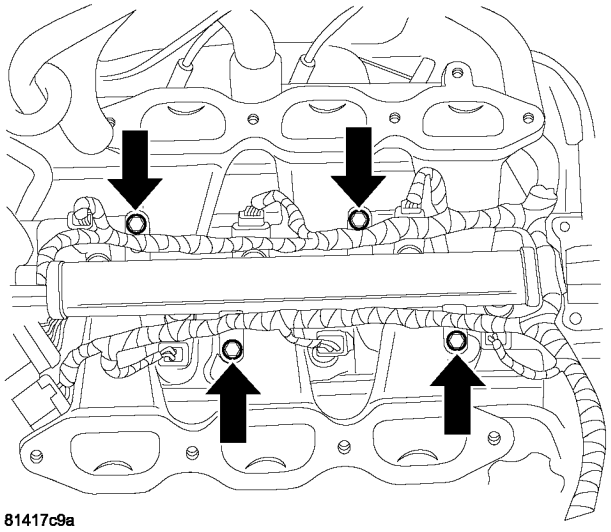


Fig. 23 FUEL RAIL BOLTS LOCATIONS

(16) Remove the 4 mounting bolts from the fuel rail (Fig. 23).

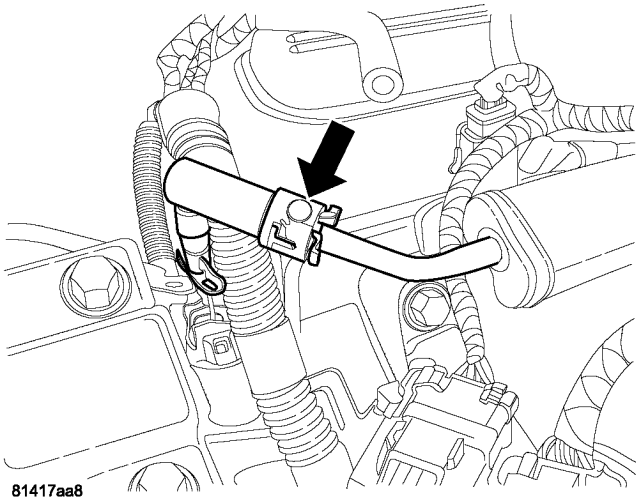


Fig. 24 FUEL LINE DISCONNECT FITTING

(17) Disconnect the fuel supply line from the fuel rail (Fig. 24).

(18) Lift fuel rail straight up off of cylinder head (Fig. 25).

(19) Remove retaining clips from fuel injectors at fuel rail (Fig. 26).

(20) Remove fuel injector from fuel rail (Fig. 27).

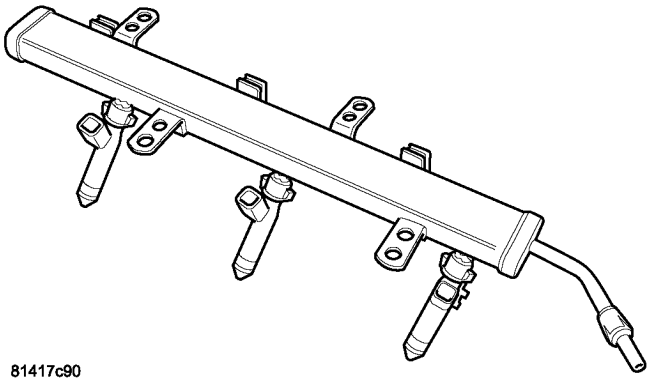


Fig. 25 FUEL RAIL ASSEMBLY

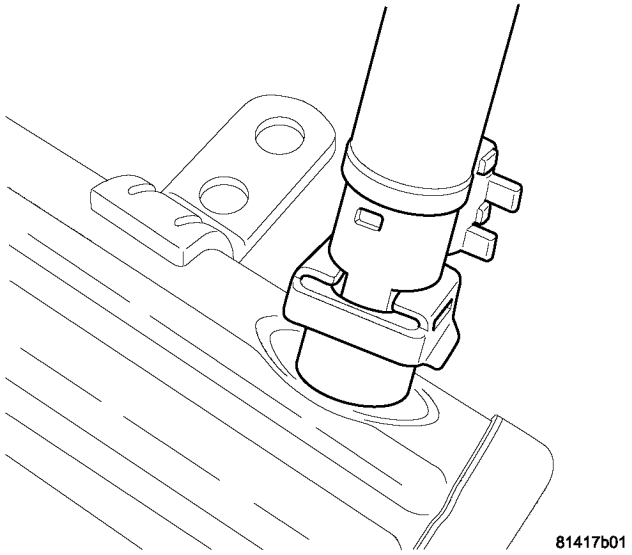


Fig. 26 FUEL INJECTOR CLIP

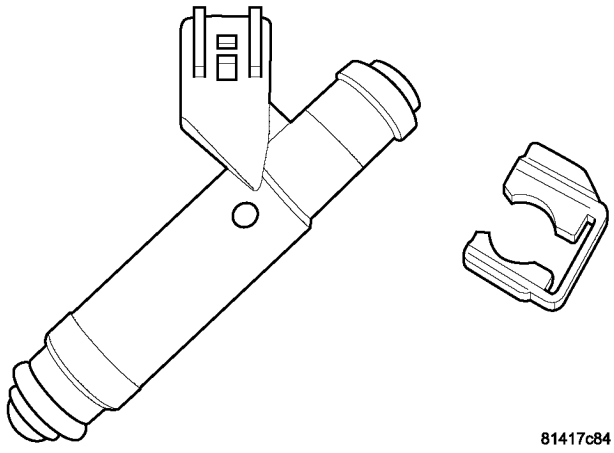


Fig. 27 FUEL INJECTOR AND CLIP

FUEL INJECTOR (Continued)

INSTALLATION

3.5L

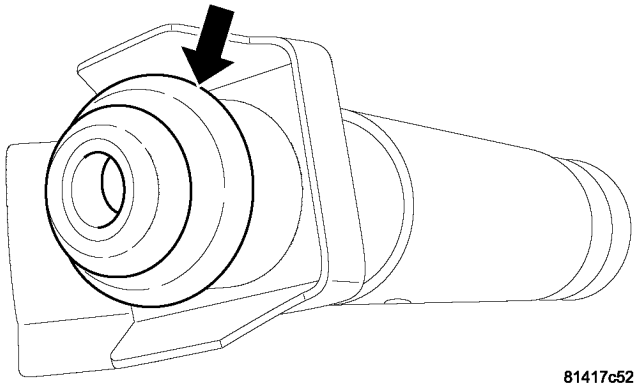


Fig. 28 FUEL INJECTOR O-RING

(1) Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil (Fig. 28).

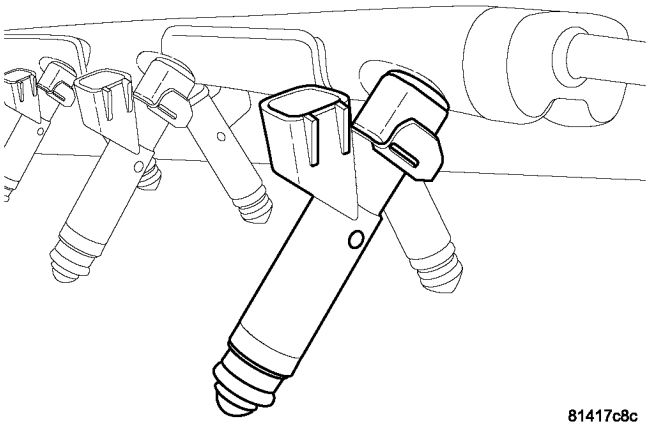


Fig. 29 FUEL INJECTORS INSTALLED

(2) Install retaining clips on fuel injectors.

(3) Push injectors into fuel injector rail until clips are in the correct position (Fig. 29).

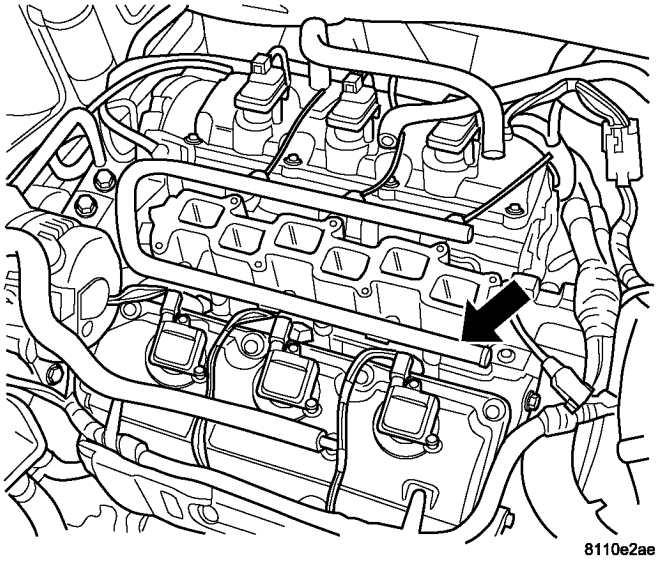


Fig. 30 FUEL RAIL

(4) Position fuel rail over cylinder heads, and push rail into place. Tighten fuel rail mounting bolts to 28 N·m (250 in. lbs.) torque (Fig. 30).

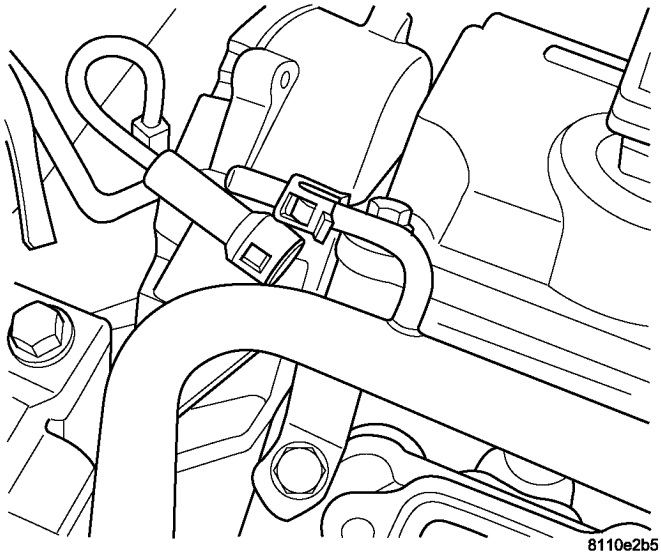


Fig. 31 FUEL LINE QUICK CONNECTOR

(5) Connect the fuel supply tube quick connect fitting to the fuel rail (Fig. 31). Refer to Quick Connect Fittings in the Fuel Delivery Section.

(6) Connect the electrical connectors to the fuel injectors.

(7) Install intake manifold plenum, (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(8) Connect negative cable to battery.

FUEL INJECTOR (Continued)

3.8L

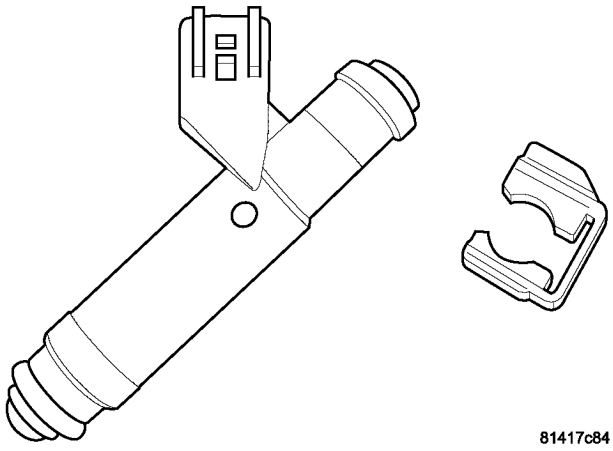


Fig. 32 FUEL INJECTOR AND CLIP

(1) Inspect and replace damaged fuel injector O-rings (Fig. 32).

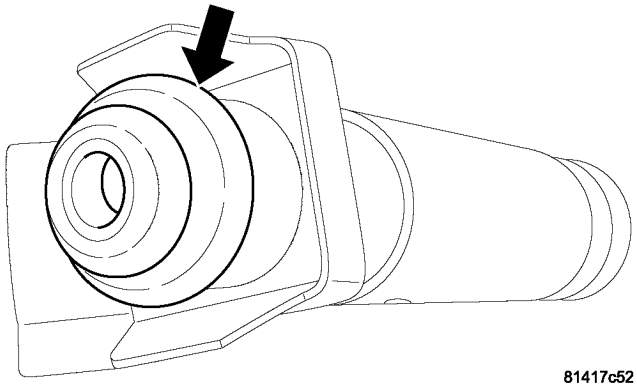


Fig. 33 FUEL INJECTOR O-RING

(2) Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil.

(3) Install retaining clips on fuel injectors (Fig. 33).

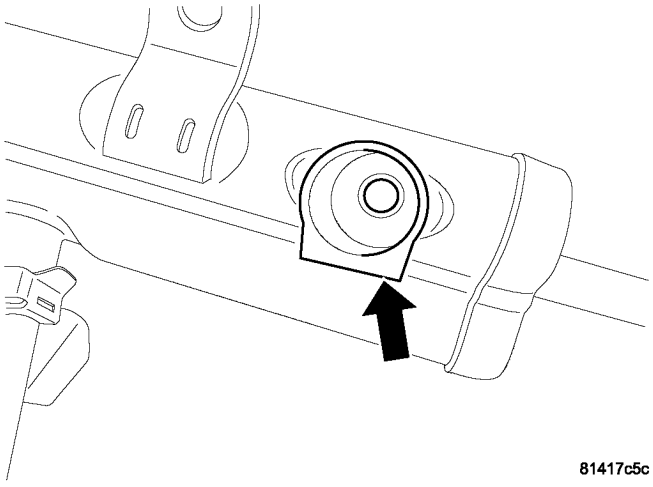


Fig. 34 FUEL RAIL LOCATOR TABS

(4) Fuel injector locator flange on fuel rail (Fig. 34).

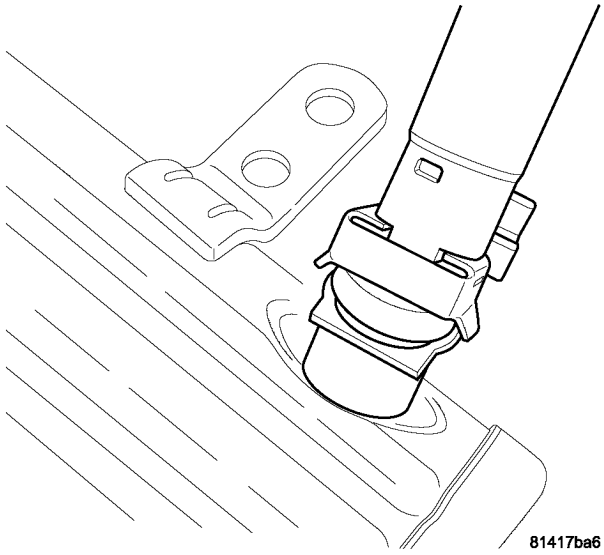


Fig. 35 INSTALLING FUEL INJECTOR

(5) Push injectors into fuel injector rail until clips are in the correct position (Fig. 35).

FUEL INJECTOR (Continued)

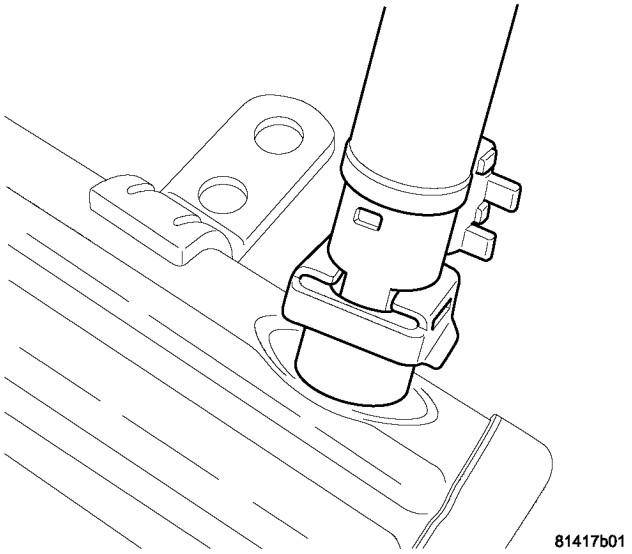


Fig. 36 FUEL INJECTOR CLIP

(6) Fuel injector installed into fuel rail in the correct position (Fig. 36).

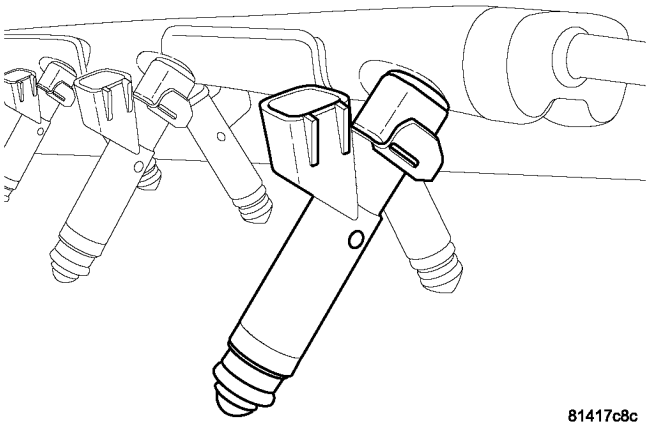


Fig. 37 FUEL INJECTORS INSTALLED

(7) Fuel rail with injectors installed (Fig. 37).

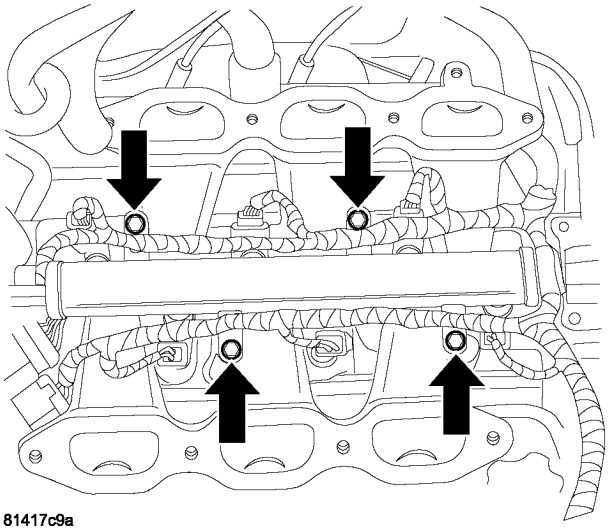


Fig. 38 FUEL RAIL BOLTS LOCATIONS

(8) Position fuel rail over cylinder heads, and push rail into place (Fig. 38). Tighten fuel rail mounting bolts to 28 N·m (250 in. lbs.) torque.

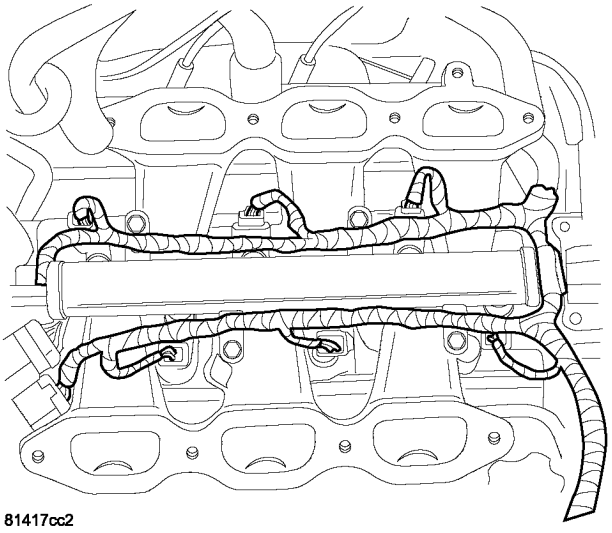


Fig. 39 FUEL INJECTOR WIRING HARNESS

(9) Connect the electrical connectors to the fuel injectors and lock (Fig. 39).

FUEL INJECTOR (Continued)

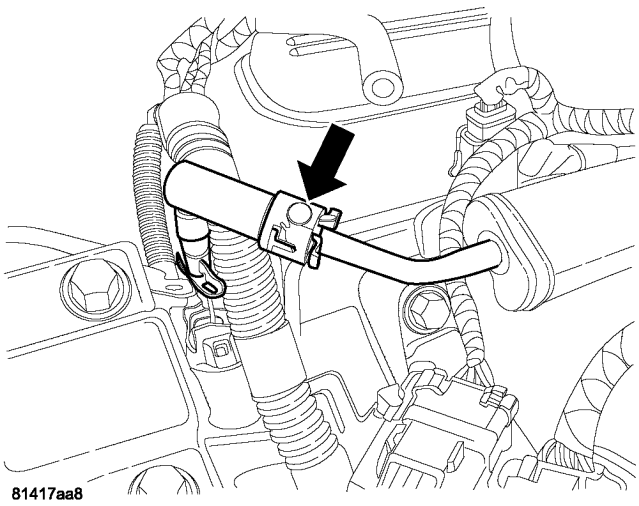


Fig. 40 FUEL LINE DISCONNECT FITTING

(10) Connect the fuel supply tube quick connect fitting to the fuel rail (Fig. 40). Refer to Quick Connect Fittings in the Fuel Delivery Section.

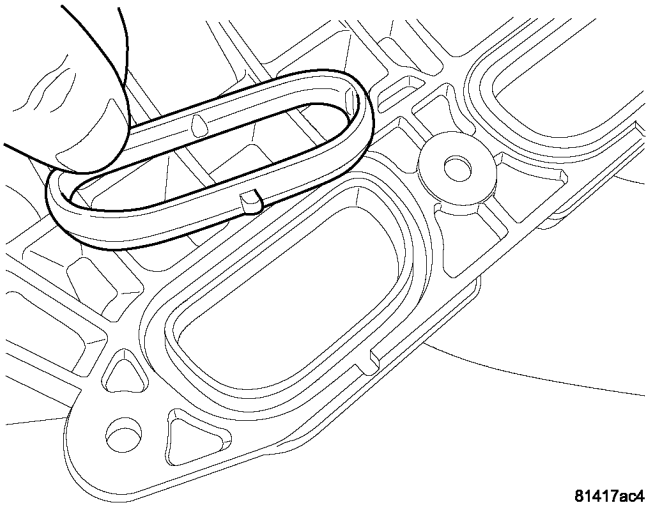


Fig. 41 INTAKE GASKETS REMOVED

(11) Inspect the intake manifold gaskets (Fig. 41).

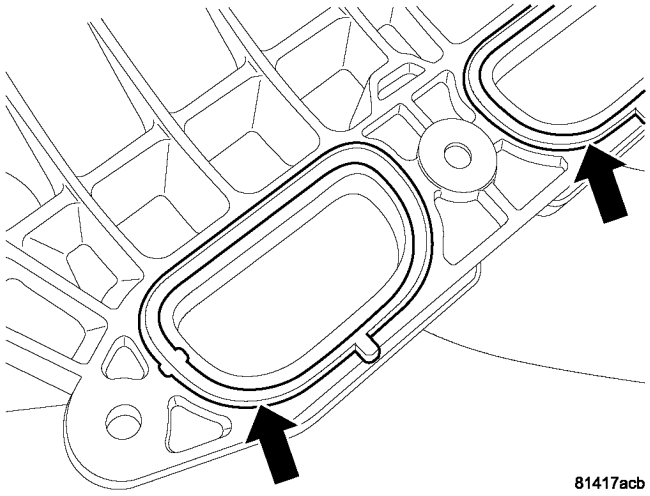


Fig. 42 INTAKE GASKET INSTALLED

(12) Intake manifold gaskets installed (Fig. 42).

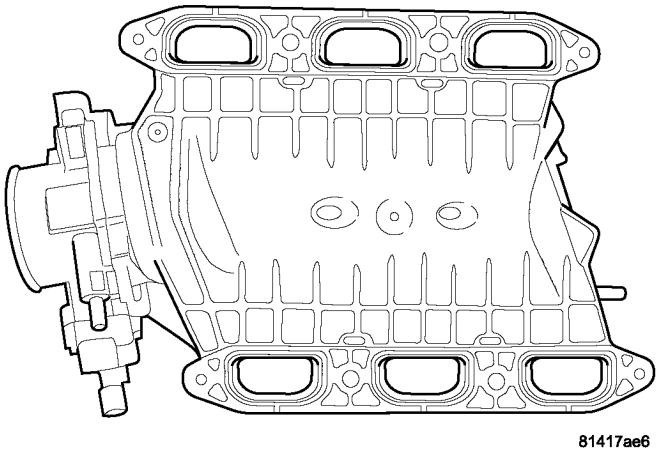


Fig. 43 INTAKE MANIFOLD REMOVED

(13) Install intake manifold plenum (Fig. 43), (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(14) Connect and lock the electrical for the MAP sensor (1).

FUEL INJECTOR (Continued)

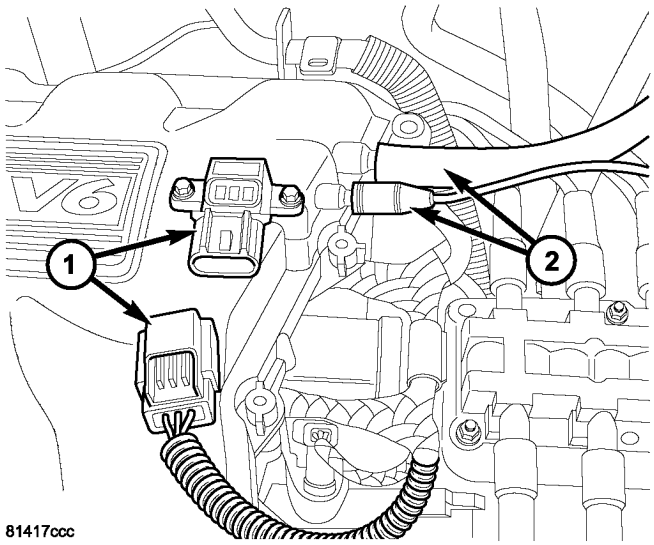


Fig. 44 MAP SENSOR

1 - MAP Sensor
2 - Vacuum Lines

(15) Connect the vacuum lines (2) (Fig. 44).

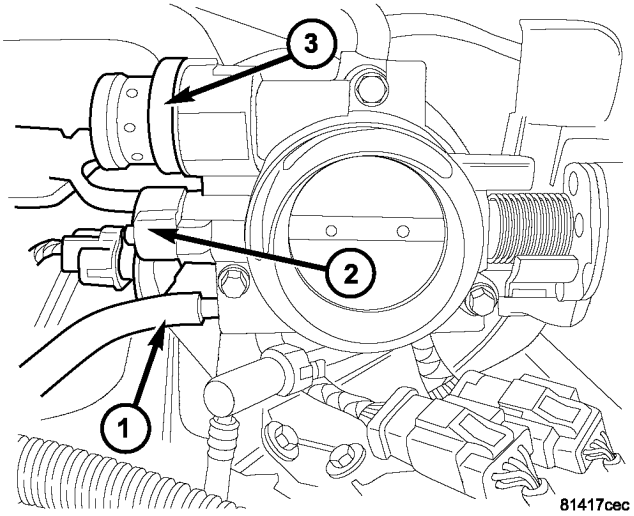


Fig. 45 THROTTLE BODY

1 - Purge Line
2 - Throttle Position Sensor
3 - Idle Air Control Motor

(16) Connect the electrical connector for Throttle Position Sensor (2), Idle Air Control Motor (3) (Fig. 45).
(17) Connect the purge line (1).
(18) Connect negative cable to battery.

IDLE AIR CONTROL MOTOR

REMOVAL

3.5L

(1) Disconnect the negative battery cable.
(2) Disconnect the IAC electrical connector (Fig. 46).

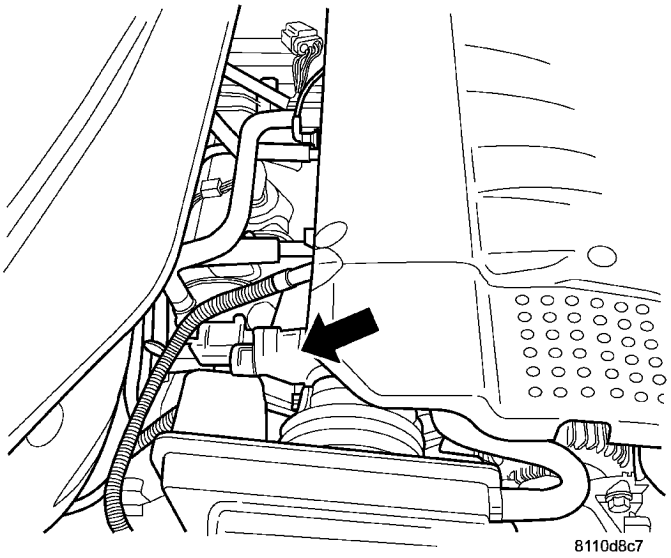


Fig. 46 IDLE AIR CONTROL MOTOR

(3) Remove the IAC mounting screws.
(4) Remove the IAC.

IDLE AIR CONTROL MOTOR (Continued)

3.8L

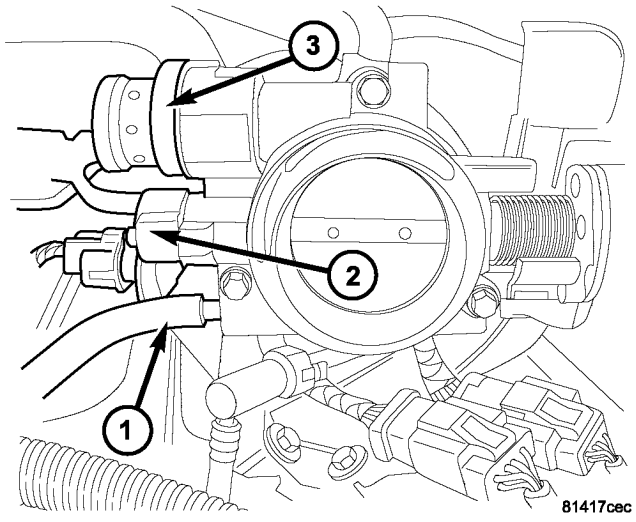


Fig. 47 THROTTLE BODY

1 - Purge Line
2 - Throttle Position Sensor
3 - Idle Air Control Motor

(1) Disconnect negative battery cable.
(2) Unlock and disconnect electrical connector from Idle Air Control Motor (IAC) (Fig. 47).
(3) Remove IAC monting bolt.
(4) Remove IAC from throttle body.

INSTALLATION

3.5L

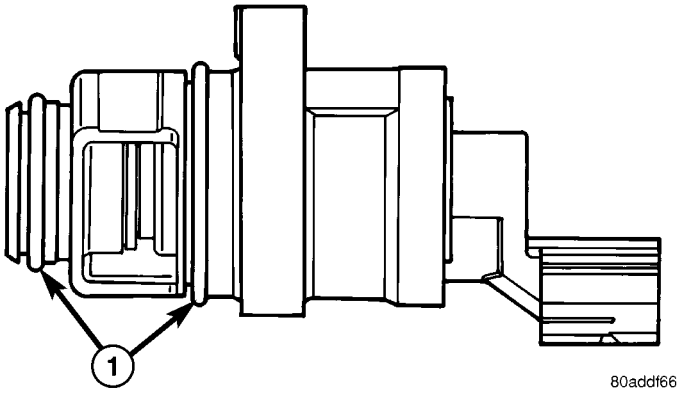


Fig. 48 O-RINGS

1 - O-rings

When servicing throttle body components, always reassemble components with new O-rings and seals where applicable. If assembly of component is difficult, **a light coat of engine oil may be applied to the O-RINGS ONLY (Fig. 48)** to aid assembly.

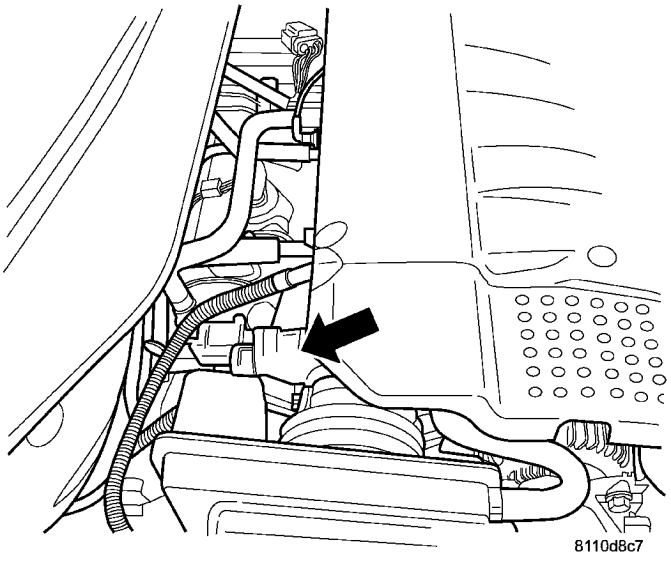


Fig. 49 IDLE AIR CONTROL MOTOR

(1) Install the IAC to the throttle body (Fig. 49).
(2) Tighten mounting screw to 5.5 N·m (49 in. lbs.) torque.
(3) Attach electrical connector to the IAC.
(4) Connect the negative battery cable.

3.8L

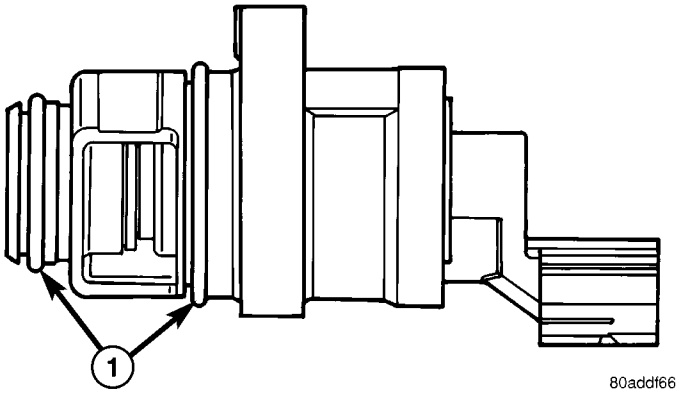


Fig. 50 O-RINGS

1 - O-rings

When servicing throttle body components, always reassemble components with new O-rings and seals where applicable. If assembly of component is difficult, **a light coat of engine oil may be applied to the O-RINGS ONLY (Fig. 50)** to aid assembly.

(1) The new idle air control motor has a new O-ring installed on it.

IDLE AIR CONTROL MOTOR (Continued)

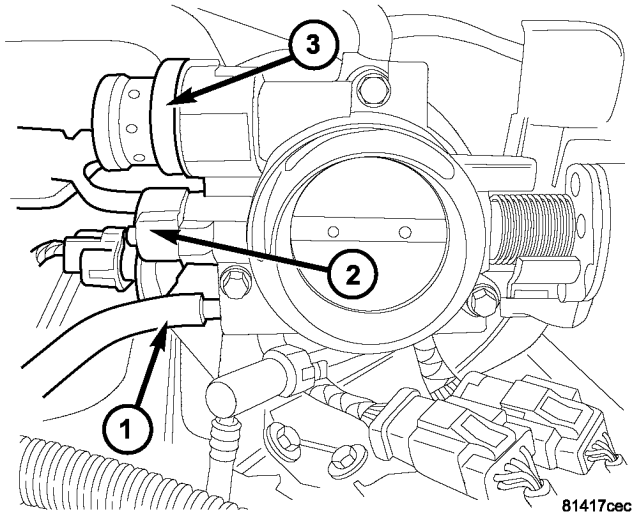


Fig. 51 THROTTLE BODY

1 - Purge Line
2 - Throttle Position Sensor
3 - Idle Air Control Motor

(2) Carefully place idle air control motor into throttle body (Fig. 51).

(3) Install mounting screw(s). Tighten mounting screw to 5.5 N·m (49 in. lbs.) torque.

(4) Connect electrical connector to idle air control motor.

(5) Connect negative cable to battery.

INTAKE AIR TEMPERATURE SENSOR

REMOVAL

(1) Disconnect the negative battery cable.

(2) Unlock and disconect the electrical connector (Fig. 52).

(3) remove sensor from hose.

INSTALLATION

(1) Install sensor into inlet hose.

(2) Connect and lock the electrical connector (Fig. 52).

(3) Connect the negative battery cable.

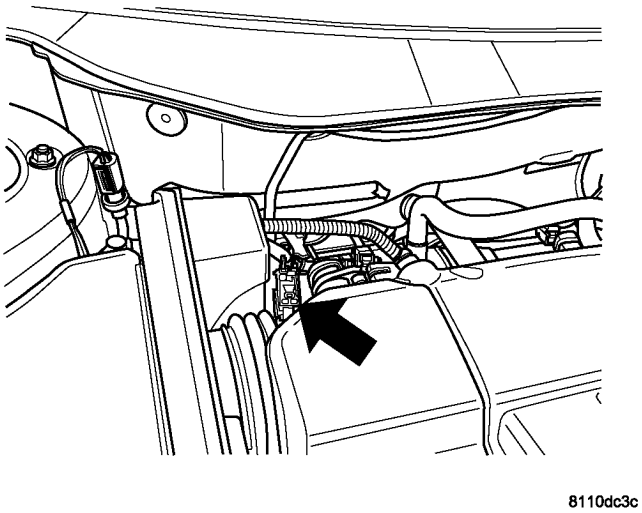


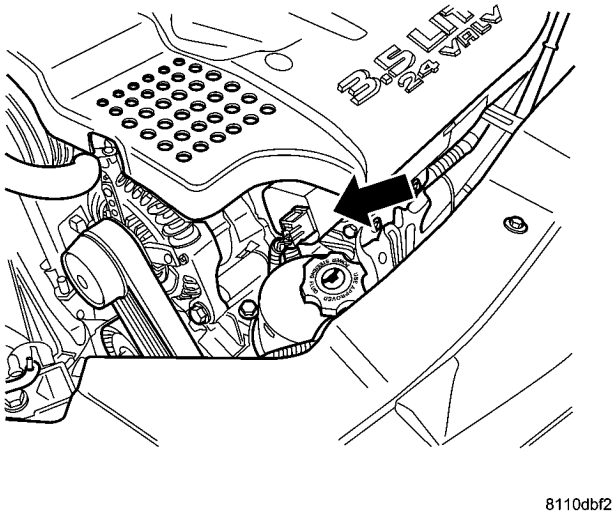
Fig. 52 INTAKE AIR TEMPERATURE SENSOR

MANIFOLD TUNE VALVE

REMOVAL

(1) Disconnect the negative battery cable.

(2) Remove the engine cover.



MANIFOLD TUNING VALVE

MANIFOLD TUNE VALVE (Continued)

(3) Disconnect the electrical connector (Fig. 53).

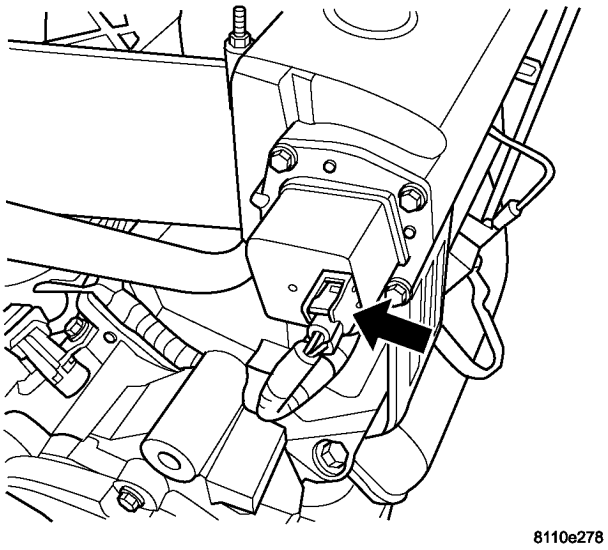


Fig. 53 MANIFOLD TUNING VALVE ELECTRICAL CONNECTOR

(4) Remove the 4 mounting bolts (Fig. 54).

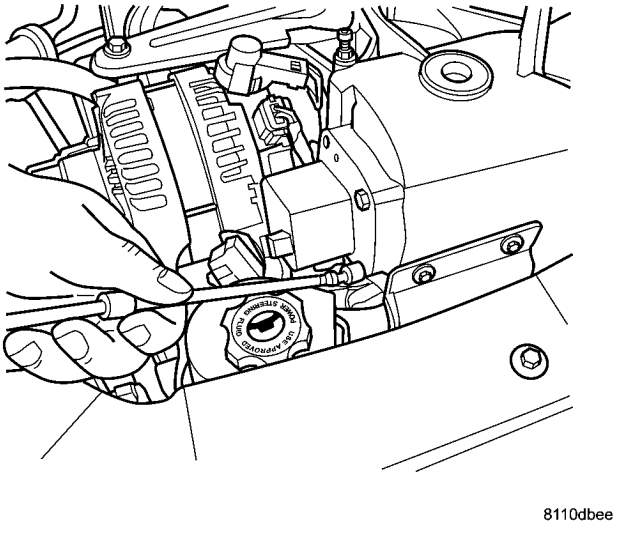


Fig. 54 MTV VALVE

(5) Pull valve straight out of manifold (Fig. 55).

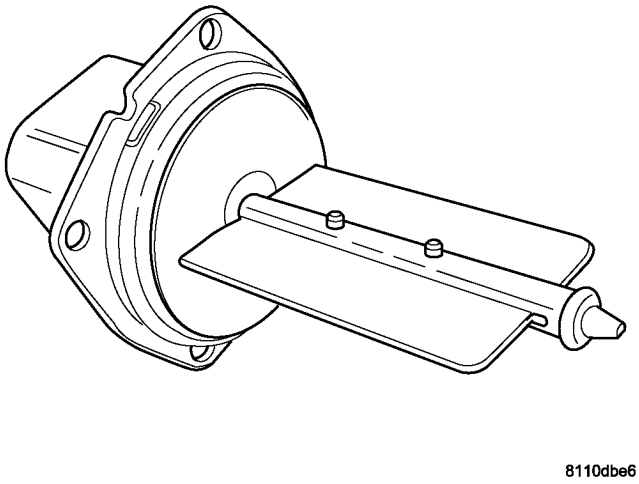


Fig. 55 MTV VALVE REMOVED

INSTALLATION

(1) Install the manifold tuning valve, make sure that the alignment pin (Fig. 56) and notch line up.

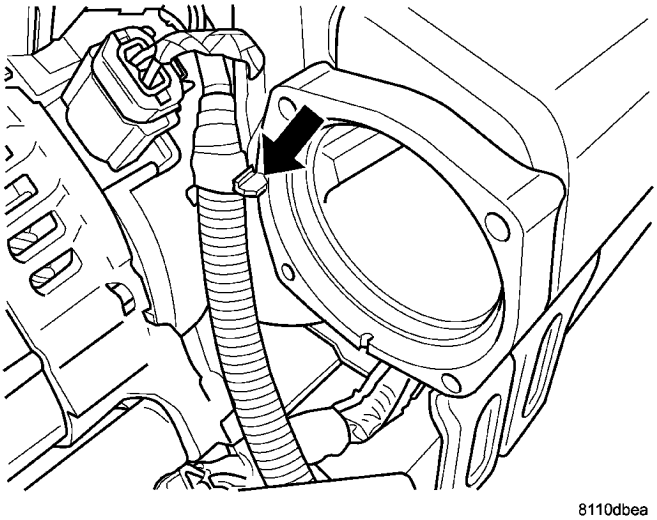


Fig. 56 MTV LOCATING PIN

(2) Install bolts and tighten.
(3) Connect the electrical connector.
(4) Install the engine cover.
(5) Connect the negative battery cable.

MAP SENSOR

REMOVAL

3.5L

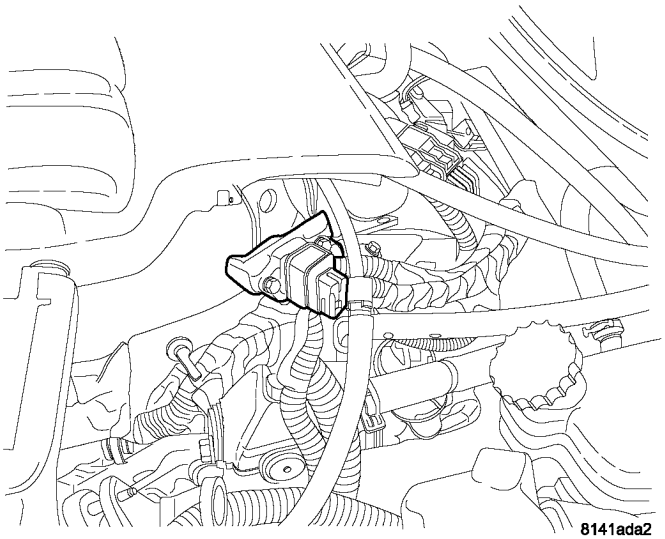


Fig. 57 MAP SENSOR LOCATION

(1) Remove the negative battery cable.
(2) Disconnect the electrical connector from the MAP sensor (Fig. 57).
(3) Remove bolt from sensor.

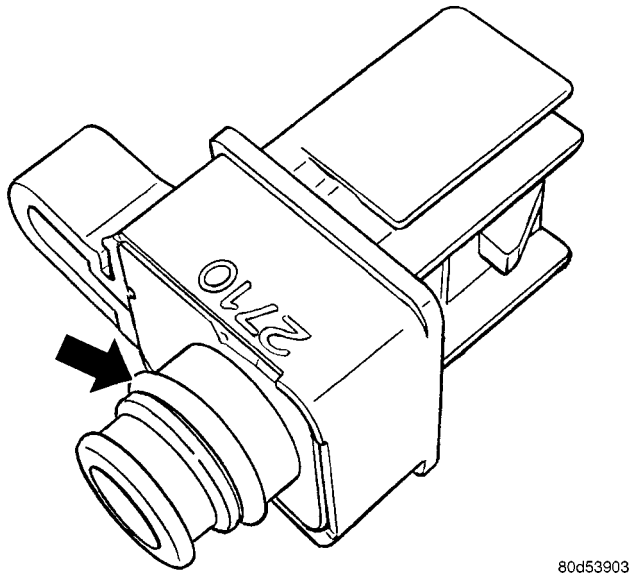


Fig. 58 MAP SENSOR O-RING

(4) Remove sensor (Fig. 58).

3.8L

(1) Disconnect negative battery cable.

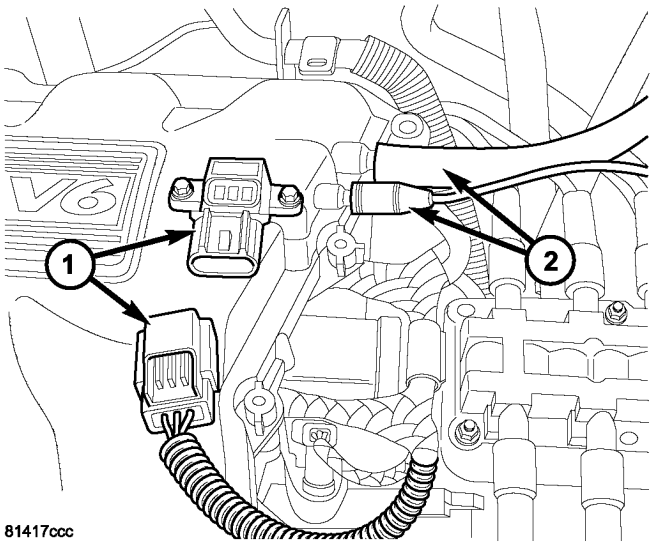


Fig. 59 MAP SENSOR

1 - MAP Sensor
2 - Vacuum Lines

(2) Unlock and disconnect electrical connector (Fig. 59).
(3) Remove 2 mounting screws.
(4) Remove sensor.

INSTALLATION

3.5L

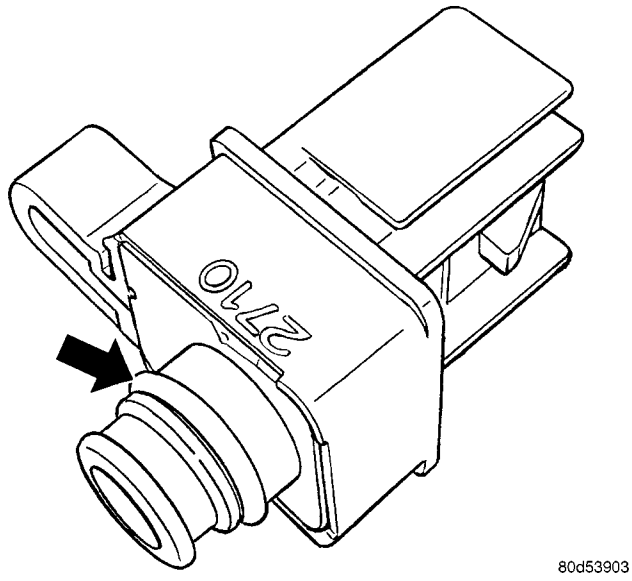


Fig. 60 MAP SENSOR O-RING

(1) The sensor mounts onto intake manifold plenum (Fig. 60). Tighten screws to 4.5 N·m (40 in. lbs.) torque.

MAP SENSOR (Continued)

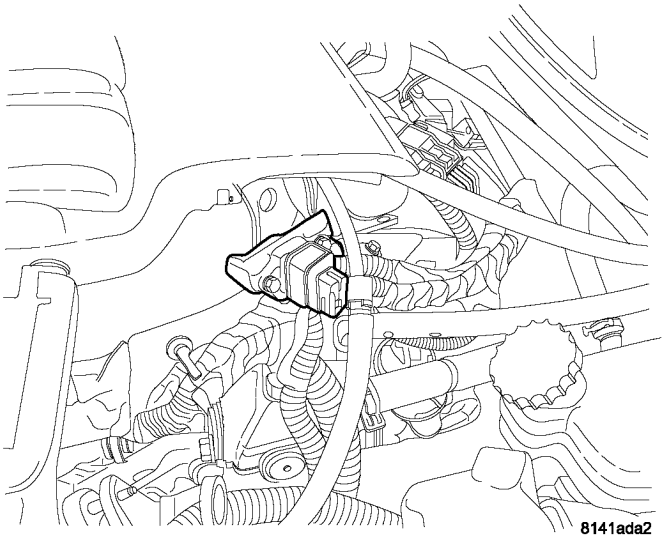


Fig. 61 MAP SENSOR LOCATION

(2) Attach electrical connector to sensor (Fig. 61).
(3) Install the negative battery cable.

3.8L

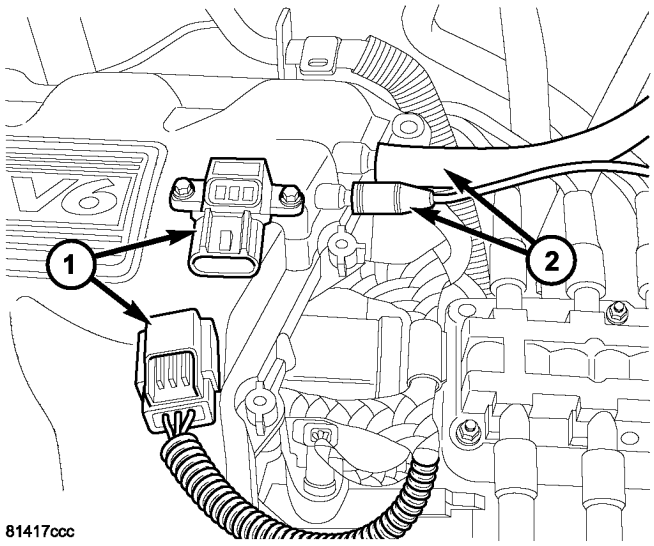


Fig. 62 MAP SENSOR

1 - MAP Sensor
2 - Vacuum Lines

When servicing components, always reassemble components with new O-rings and seals where applicable. If assembly of component is difficult, **a light coat of engine oil may be applied to the O-RINGS ONLY** to aid assembly.

(1) Install MAP sensor (Fig. 62).
(2) Install and tighten screws.
(3) Connect and lock electrical connector.
(4) Connect negative battery cable.

O2 SENSOR

REMOVAL

REMOVAL

The engines uses two heated oxygen sensors.

CAUTION: When disconnecting the sensor electrical connector, do not pull directly on wire going into sensor.

(1) Disconnect the negative battery cable.
(2) Disconnect the heated oxygen sensor electrical connector.
(3) Use a socket such as Snap-On YA8875 or a crow foot wrench to remove oxygen sensor (Fig. 63).

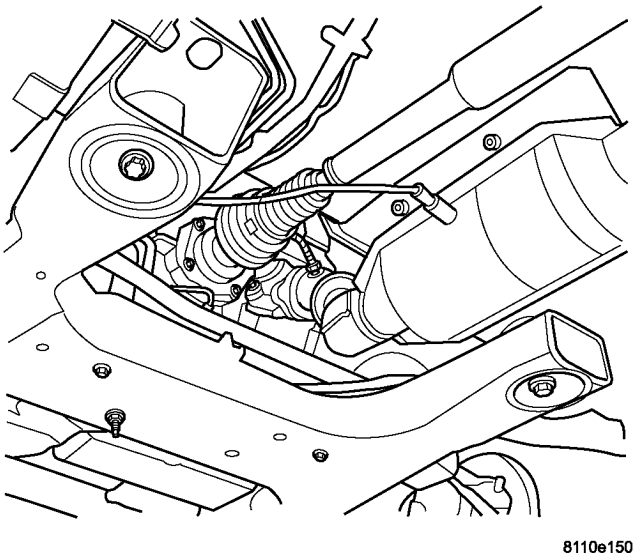


Fig. 63 O2 SENSORS

O2 SENSOR (Continued)

3.8L - UPPER O2 SENSOR

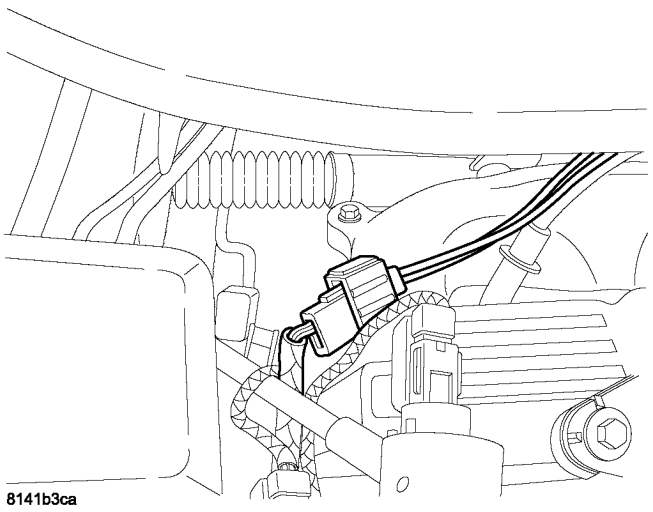


Fig. 64 O2 SENSOR CONNECTOR

The engines uses two heated oxygen sensors.

CAUTION: When disconnecting the sensor electrical connector, do not pull directly on wire going into sensor.

(1) Disconnect negative battery cable.
(2) Disconnect the upper O2 sensor connector (Fig. 64).

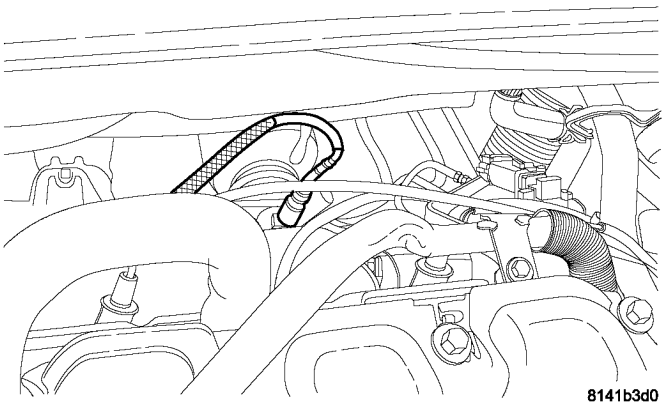


Fig. 65 UPSTREAM O2 SENSOR

1 - Item_1xftjhxfdj
2 - Item _2tjsryjy

(3) Use a socket such as Snap-On YA8875 or a crow foot wrench to remove oxygen sensor (Fig. 65).

3.8L - LOWER O2 SENSOR

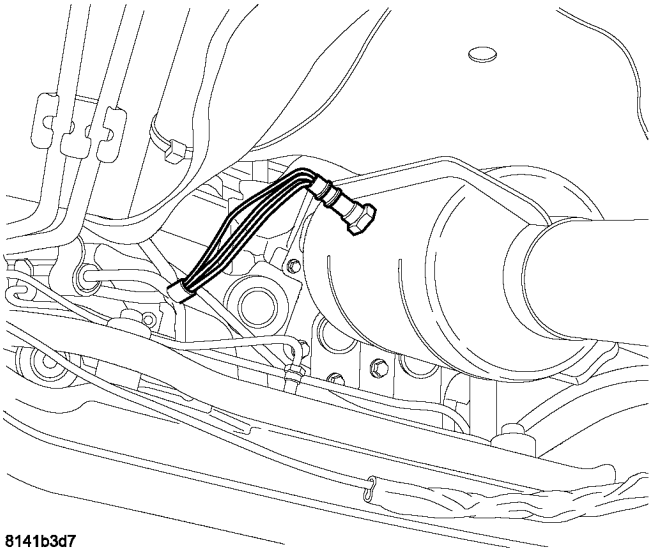


Fig. 66 LOWER O2 LOCATION

The engines uses two heated oxygen sensors.

CAUTION: When disconnecting the sensor electrical connector, do not pull directly on wire going into sensor.

(1) Disconnect negative battery cable.
(2) Raise and support vehicle.
(3) Disconnect the electrical connector.
(4) Use a socket such as Snap-On YA8875 or a crow foot wrench to remove oxygen sensor (Fig. 66).

INSTALLATION

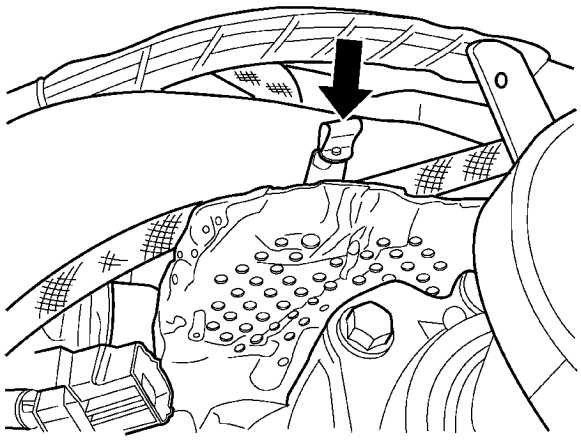
3.5L

NOTE: When replacing an O2 Sensor, the PCM RAM memory must be cleared, either by disconnecting the PCM C-1 connector or momentarily disconnecting the Battery negative terminal. The NGC learns the characteristics of each O2 heater element and these old values should be cleared when installing a new O2 sensor. The customer may experience driveability issues if this is not performed.

(1) After removing the sensor, the threads must be cleaned with an 18 mm X 1.5 + 6E tap. If reusing the original sensor, coat the sensor threads with an anti-seize compound such as Loctite 771- 64 or equivalent. New sensors have compound on the threads and do not require an additional coating. Tighten the sensor to 28 N·m (20 ft. lbs.) torque.
(2) Connect the heated oxygen sensor electrical connector.

O2 SENSOR (Continued)

(3) Install the wiring clip to the heat shield (Fig. 67).



WIRE CLIP LOOSE

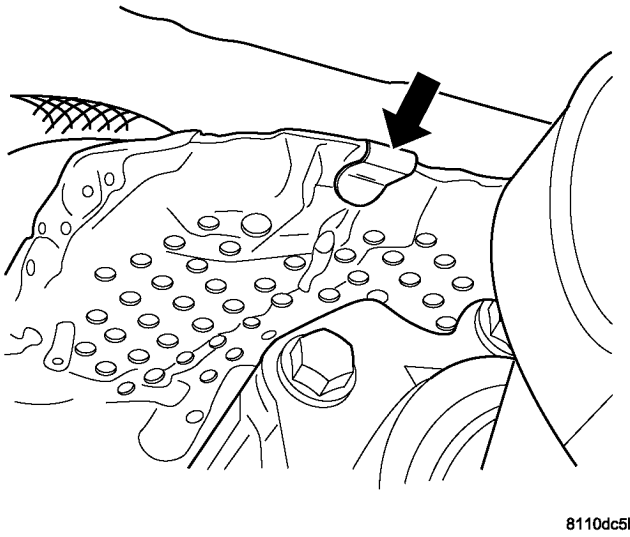


Fig. 67 WIRE CLIP IN PLACE

(4) Connect the negative battery cable.

3.8L - O2 SENSOR UPPER

NOTE: When replacing an O2 Sensor, the PCM RAM memory must be cleared, either by disconnecting the PCM C-1 connector or momentarily disconnecting the Battery negative terminal. The NGC learns the characteristics of each O2 heater element and these old values should be cleared when installing a new O2 sensor. The customer may experience driveability issues if this is not performed.

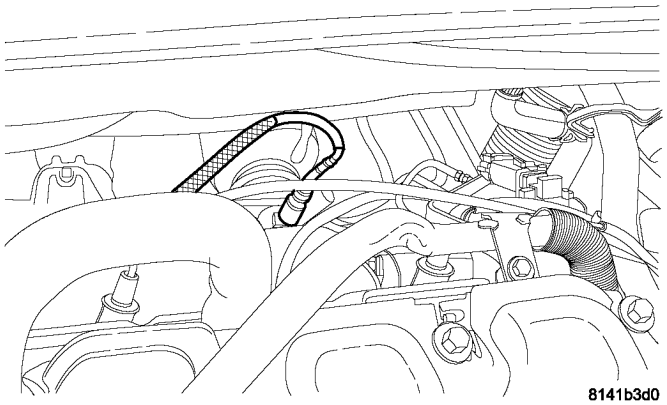


Fig. 68 UPSTREAM O2 SENSOR

1 - Item_1xftjhxfdj
2 - Item _2tjsryjy

(1) After removing the sensor, the threads must be cleaned with an 18 mm X 1.5 + 6E tap. If reusing the original sensor, coat the sensor threads with an anti-seize compound such as Loctite 771- 64 or equivalent. New sensors have compound on the threads and do not require an additional coating. Tighten the sensor to 28 N·m (20 ft. lbs.) torque (Fig. 68).

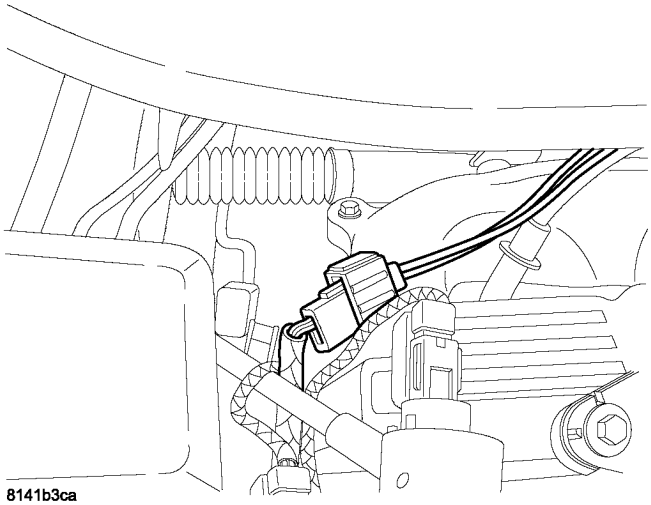


Fig. 69 O2 SENSOR CONNECTOR

(2) Connect the heated oxygen sensor electrical connector (Fig. 69).

(3) Connect the negative battery cable.

O2 SENSOR (Continued)

3.8L - O2 SENSOR LOWER

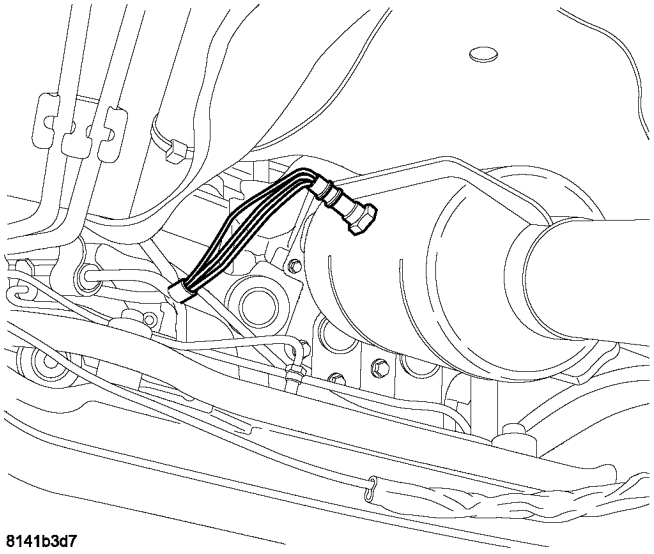


Fig. 70 LOWER O2 LOCATION

NOTE: When replacing an O2 Sensor, the PCM RAM memory must be cleared, either by disconnecting the PCM C-1 connector or momentarily disconnecting the Battery negative terminal. The NGC learns the characteristics of each O2 heater element and these old values should be cleared when installing a new O2 sensor. The customer may experience driveability issues if this is not performed.

(1) After removing the sensor, the threads must be cleaned with an 18 mm X 1.5 + 6E tap. If reusing the original sensor, coat the sensor threads with an anti-seize compound such as Loctite 771- 64 or equivalent. New sensors have compound on the threads and do not require an additional coating. Tighten the sensor to 28 N·m (20 ft. lbs.) torque.

(2) Connect the heated oxygen sensor electrical connector (Fig. 70).

(3) Lower vehicle.

(4) Connect the negative battery cable.

THROTTLE BODY

REMOVAL

3.5L

(1) Disconnect negative cable from battery

(2) Remove the engine cover.

(3) Remove the air cleaner box, (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

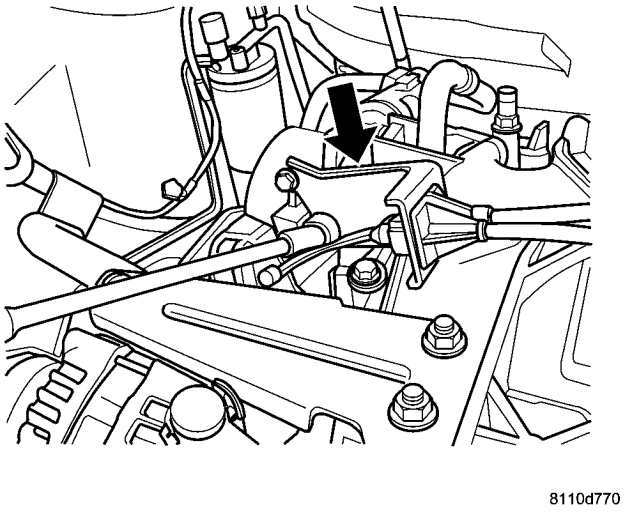


Fig. 71 THROTTLE BODY BRACKET

(4) Hold throttle lever in wide open position. Remove throttle cable and speed control cables from throttle arm.

(5) Remove throttle cable bracket (Fig. 71).

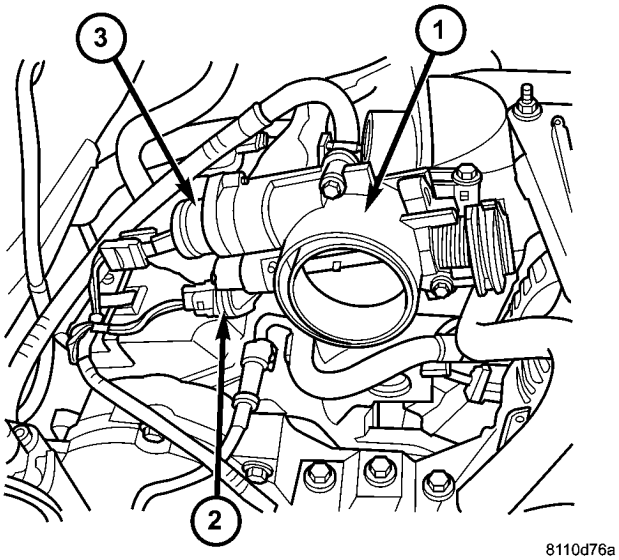


Fig. 72 THROTTLE BODY, TPS, & IAC

1 - Throttle Body
2 - Throttle Position Sensor
3 - Idle Air Control Motor

(6) Disconnect electrical connectors from throttle body (Fig. 72).

THROTTLE BODY (Continued)

(7) Remove 3 throttle body bolts.

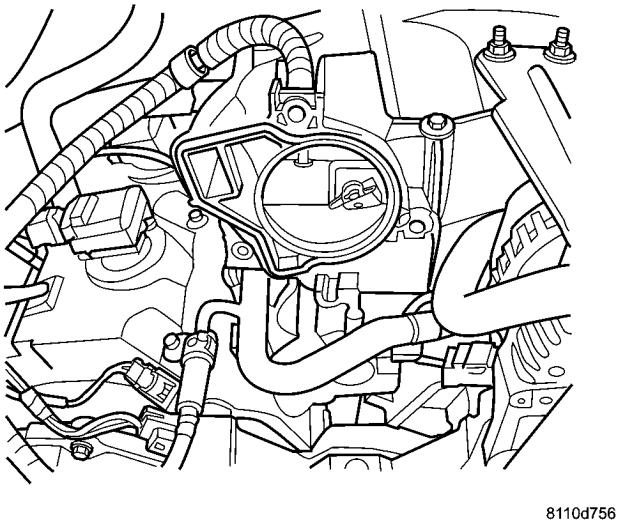


Fig. 73 THROTTLE BODY REMOVED

(8) Remove throttle body (Fig. 73).
(9) Clean mating surfaces.

3.8L

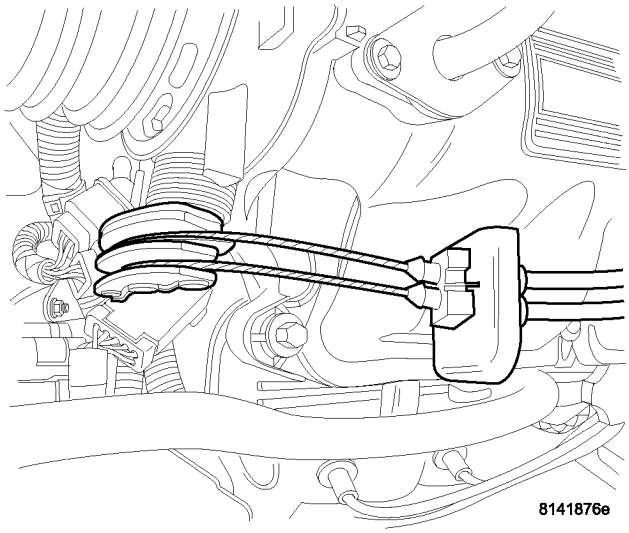


Fig. 74 CABLES AND BRACKET

(1) Disconnect negative cable from battery
(2) Remove the air cleaner box, (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).
(3) Remove throttle and speed control cables (Fig. 74).

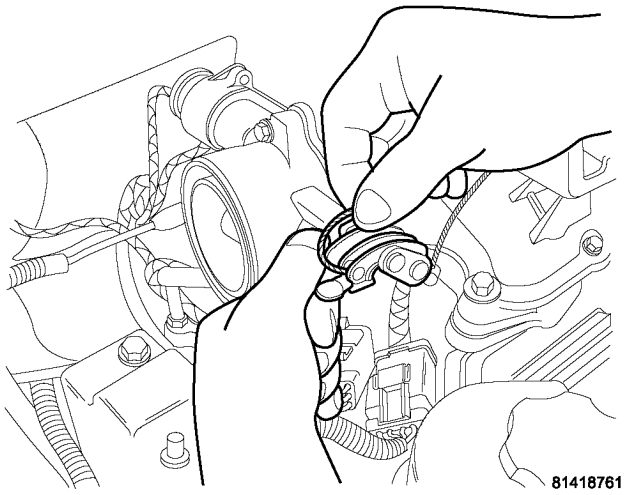


Fig. 75 CABLE AT THROTTLE BODY

(4) Hold throttle lever in wide open position. Remove throttle cable and speed control cables from throttle arm (Fig. 75).

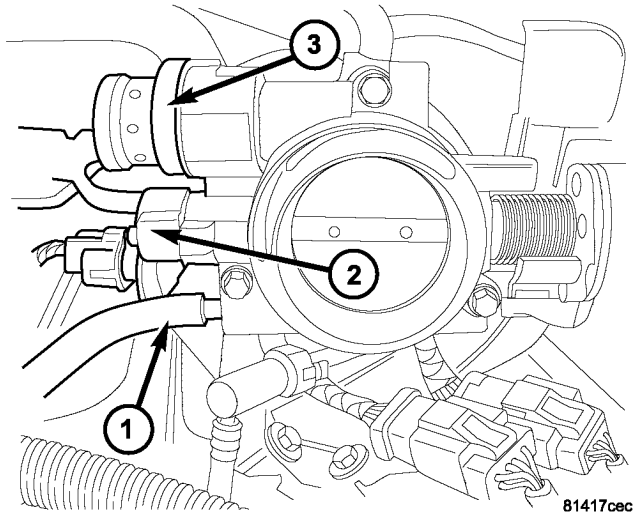


Fig. 76 THROTTLE BODY

1 - Purge Line
2 - Throttle Position Sensor
3 - Idle Air Control Motor

(5) Disconnect electrical connectors and purge line from throttle body (Fig. 76).

THROTTLE BODY (Continued)

(6) Remove 3 throttle body bolts.

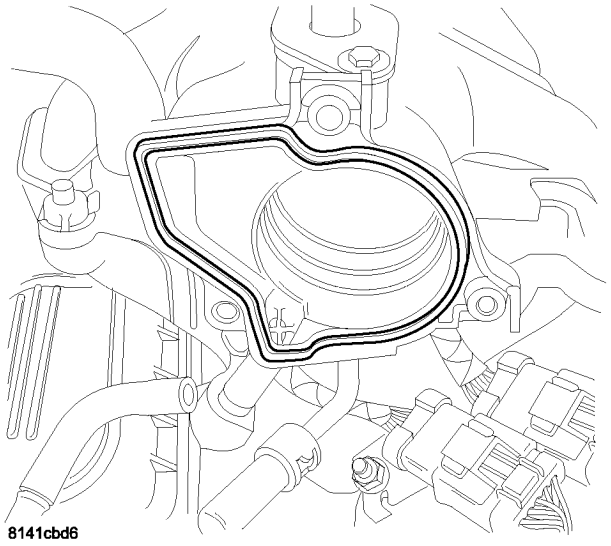


Fig. 77 THROTTLE BODY REMOVED

(7) Remove throttle body (Fig. 77).
(8) Clean mating surfaces.

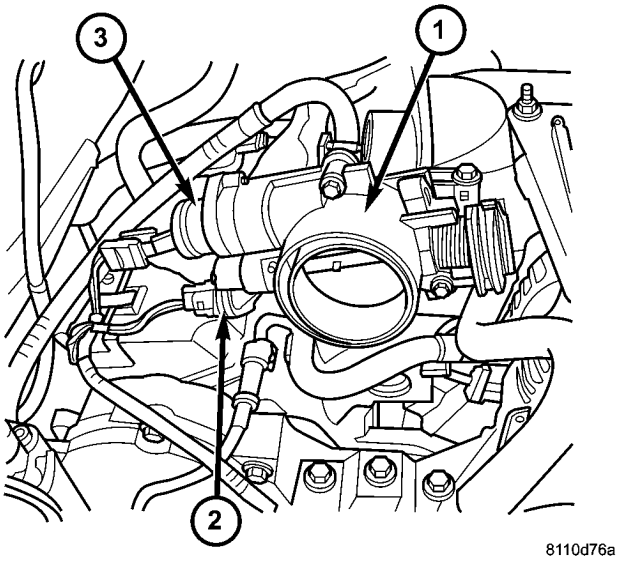


Fig. 79 THROTTLE BODY, TPS, & IAC

1 - Throttle Body
2 - Throttle Position Sensor
3 - Idle Air Control Motor

INSTALLATION

3.5L

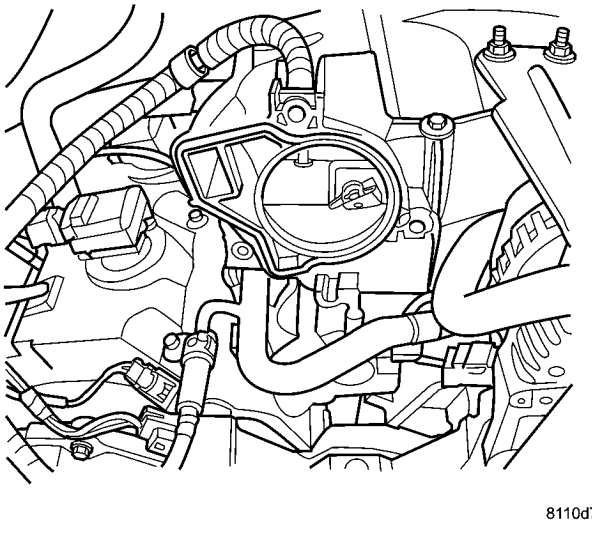


Fig. 78 THROTTLE BODY REMOVED

(1) Inspect and replace throttle body gasket if necessary.
(2) Install throttle body gasket.
(3) Install throttle body (Fig. 78).
(4) Install 3 throttle body bolts and tighten.
(5) Connect electrical connectors to throttle body (Fig. 79).

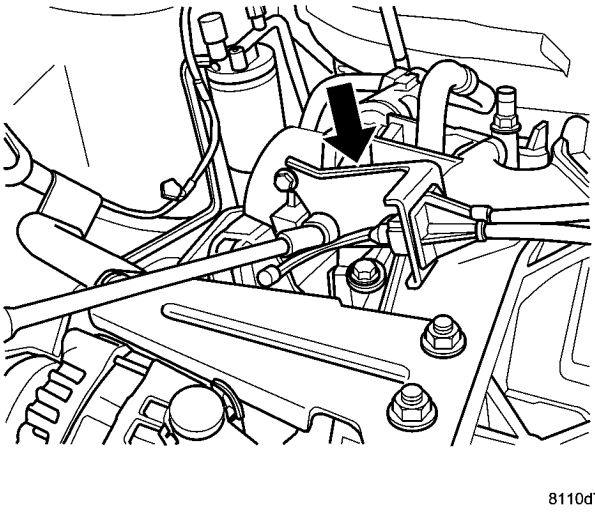


Fig. 80 THROTTLE BODY BRACKET

(6) Install throttle cable bracket (Fig. 80).
(7) Hold throttle lever in wide open position. Install throttle cable and speed control cables to throttle arm.
(8) Install the air cleaner box,
(9) Install the engine cover.
(10) Connect negative cable from battery.

THROTTLE BODY (Continued)

3.8L

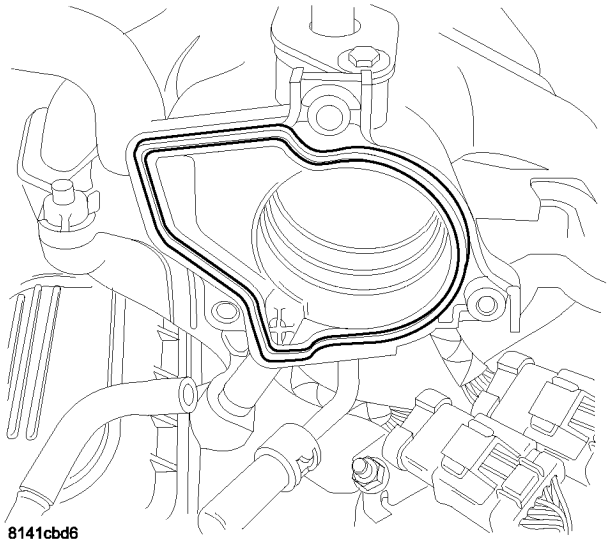


Fig. 81 THROTTLE BODY REMOVED

(1) Inspect and replace throttle body gasket if necessary.

(2) Install throttle body gasket (Fig. 81).

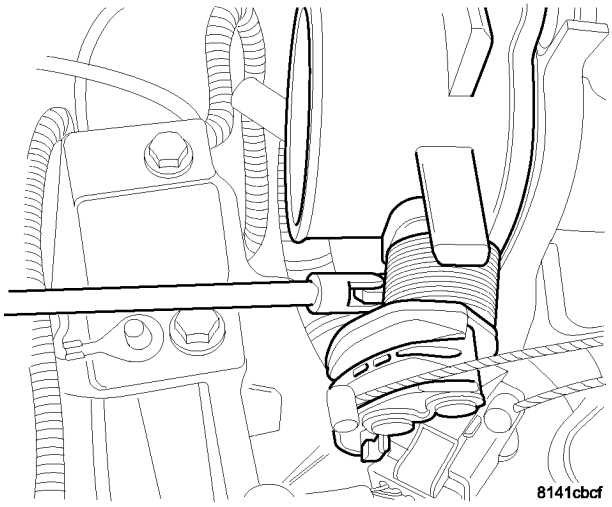


Fig. 82 THROTTLE BODY ATTACHMENT

(3) Install throttle body (Fig. 82).

(4) Install 3 throttle body bolts and tighten.

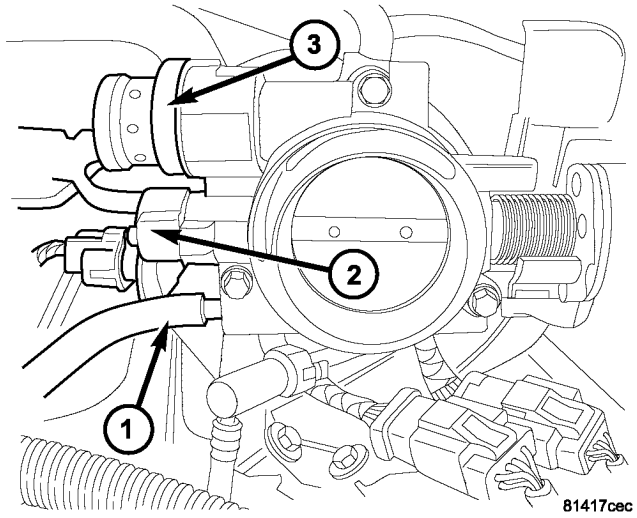


Fig. 83 THROTTLE BODY

1 - Purge Line
2 - Throttle Position Sensor
3 - Idle Air Control Motor

(5) Connect electrical connectors and purge line to throttle body (Fig. 83).

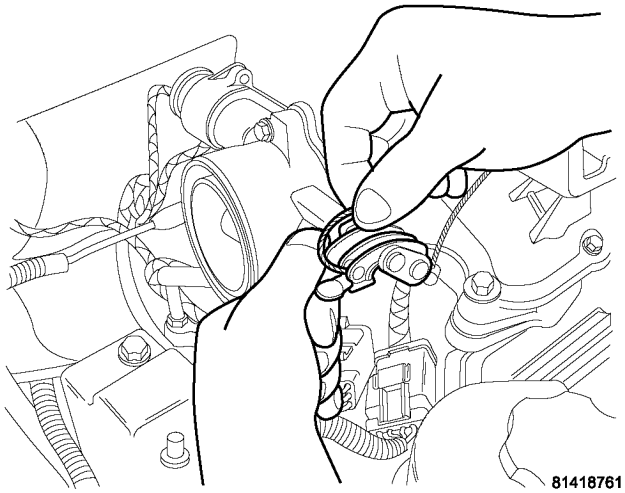


Fig. 84 CABLE AT THROTTLE BODY

(6) Hold throttle lever in wide open position. Install throttle cable and speed control cables to throttle arm (Fig. 84).

(7) Install the air cleaner box,

(8) Install the engine cover.

(9) Connect negative cable from battery.

THROTTLE POSITION SENSOR

REMOVAL

3.5L

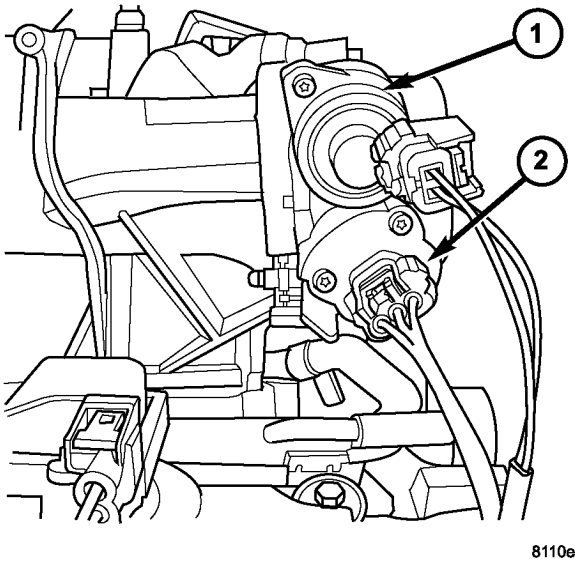


Fig. 85 TPS & IAC

1 - Idle Air Control Motor
2 - Throttle Position Sensor

(1) Disconnect the negative battery cable.
(2) Disconnect the TPS (2) electrical connector (Fig. 85).
(3) Remove the TPS (2) mounting screws.
(4) Remove the TPS (2).

3.8L

(1) Disconnect the negative battery cable.
(2) Disconnect the TPS (2) electrical connector (Fig. 86).
(3) Remove the TPS (2) mounting screws.
(4) Remove the TPS (2).

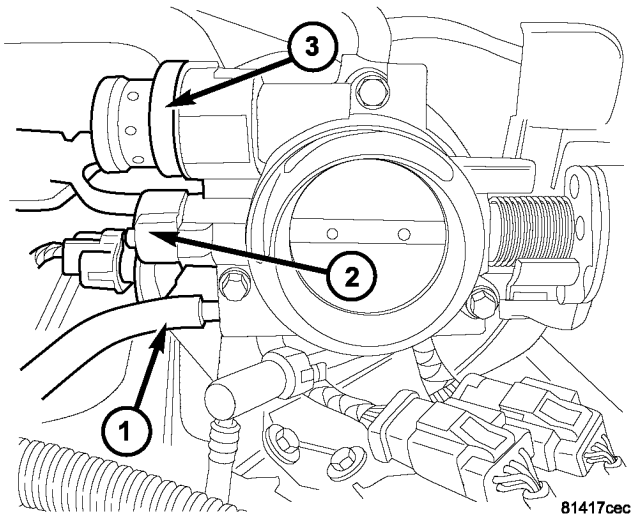


Fig. 86 THROTTLE BODY

1 - Purge Line
2 - Throttle Position Sensor
3 - Idle Air Control Motor

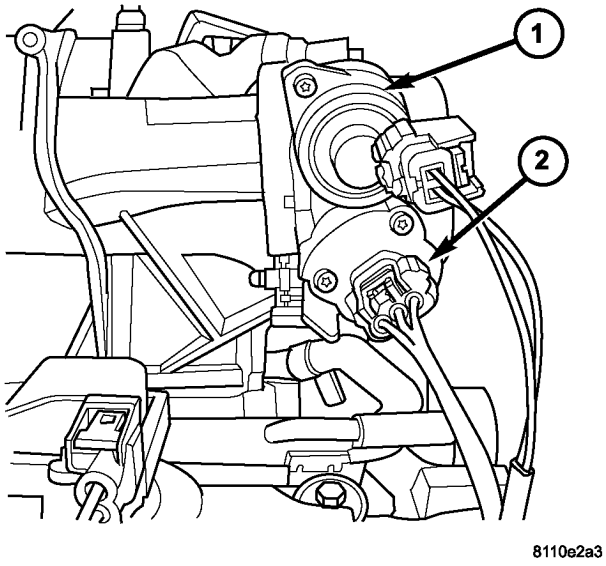


Fig. 87 TPS & IAC

1 - Idle Air Control Motor
2 - Throttle Position Sensor

INSTALLATION

3.5L

(1) The throttle shaft end of the throttle body slides into a socket in the TPS. The socket has two tabs inside it. The throttle shaft rests against the tabs. When indexed correctly, the TPS can rotate clockwise a few degrees to line up the mounting screw holes with the screw holes in the throttle body. The TPS has slight tension when rotated into position. If it is difficult to rotate the TPS into position, install the sensor with the throttle shaft on the other side of the tabs in the socket. Tighten mounting screws to 5.1 N·m (45 in. lbs.) torque.

(2) After installing the TPS (2), the throttle plate should be closed. If the throttle plate is open, install the sensor on the other side of the tabs in the socket.

(3) Attach electrical connector to the TPS (2) (Fig. 87).

(4) Connect the negative battery cable.

THROTTLE POSITION SENSOR (Continued)

3.8L

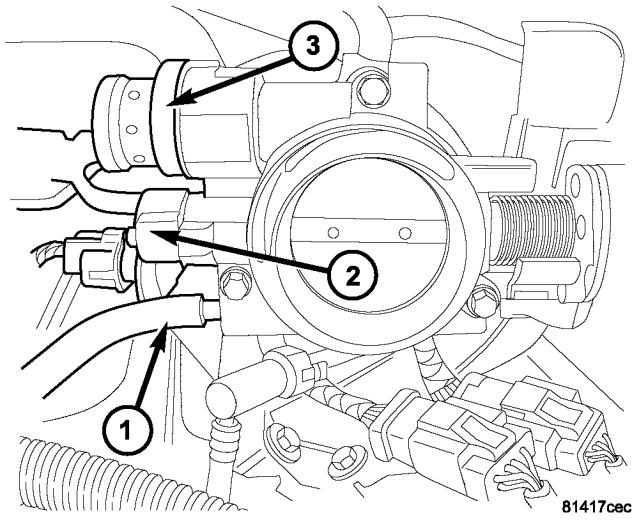


Fig. 88 THROTTLE BODY

1 - Purge Line
2 - Throttle Position Sensor
3 - Idle Air Control Motor

(1) The throttle shaft end of the throttle body slides into a socket in the TPS. The socket has two tabs inside it. The throttle shaft rests against the tabs. When indexed correctly, the TPS can rotate clockwise a few degrees to line up the mounting screw holes with the screw holes in the throttle body. The TPS has slight tension when rotated into position. If it is difficult to rotate the TPS into position, install the sensor with the throttle shaft on the other side of the tabs in the socket. Tighten mounting screws to 5.1 N·m (45 in. lbs.) torque.

(2) After installing the TPS (2), the throttle plate should be closed. If the throttle plate is open, install the sensor on the other side of the tabs in the socket.

(3) Attach electrical connector to the TPS (2) (Fig. 88).

(4) Connect the negative battery cable.

SHORT RUNNER VALVE SOLENOID

REMOVAL

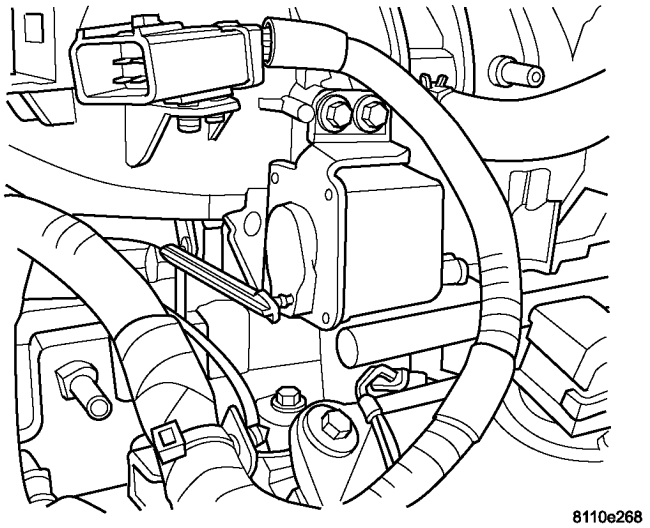


Fig. 89 SHORT RUNNER VALVE

(1) Disconnect the negative battery cable.

(2) Disconnect the electrical connector from the short runner valve (Fig. 89).

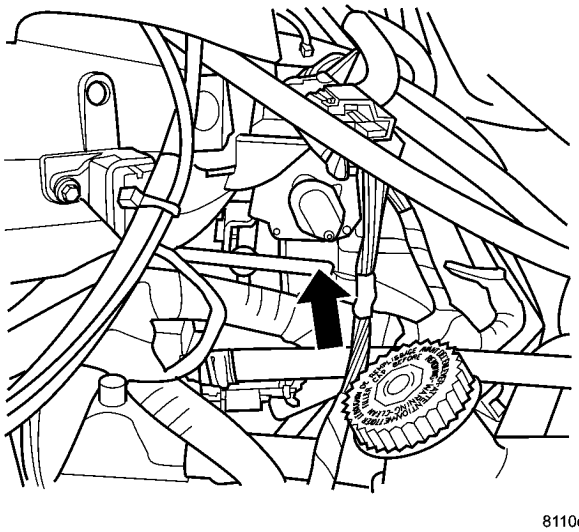


Fig. 90 SOLENOID LINK REMOVED

(3) Remove the link from short runner valve lever (Fig. 90).

SHORT RUNNER VALVE SOLENOID (Continued)

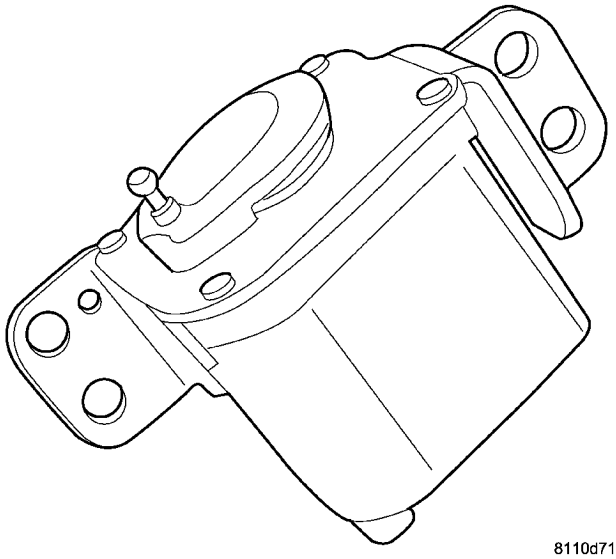


Fig. 91 SHORT RUNNER VALVE SOLENOID REMOVED

(4) Remove the 4 bolts.
(5) Remove short runner valve (Fig. 91).

INSTALLATION

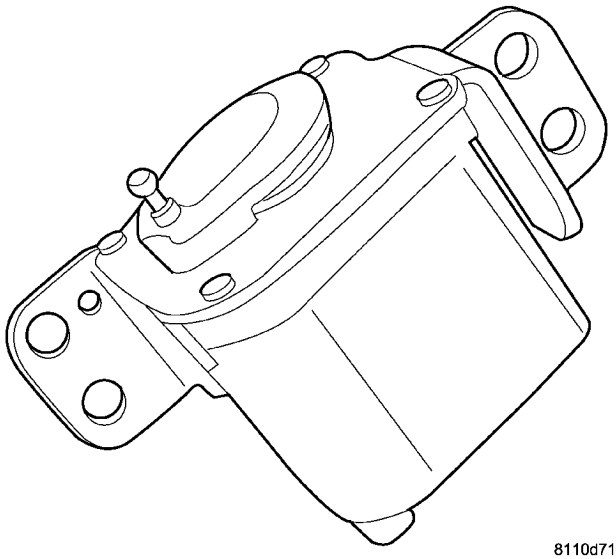


Fig. 92 SHORT RUNNER VALVE SOLENOID REMOVED

(1) Install short runner valve (Fig. 92).
(2) Install the 4 bolts and tighten.

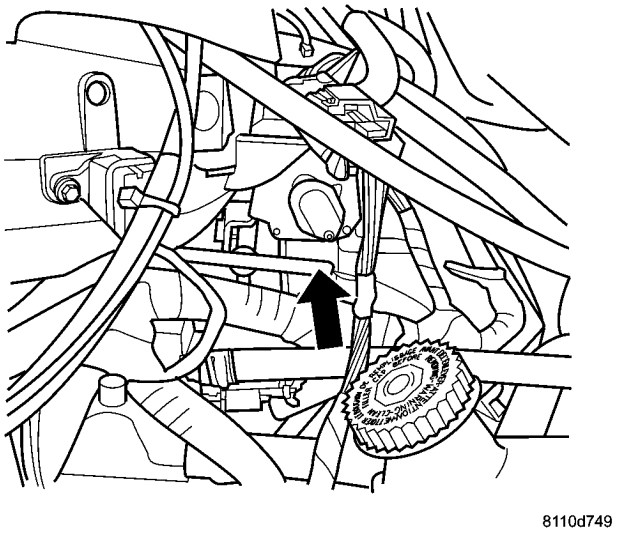


Fig. 93 SOLENOID LINK REMOVED

(3) Install the link to short runner valve lever (Fig. 93).

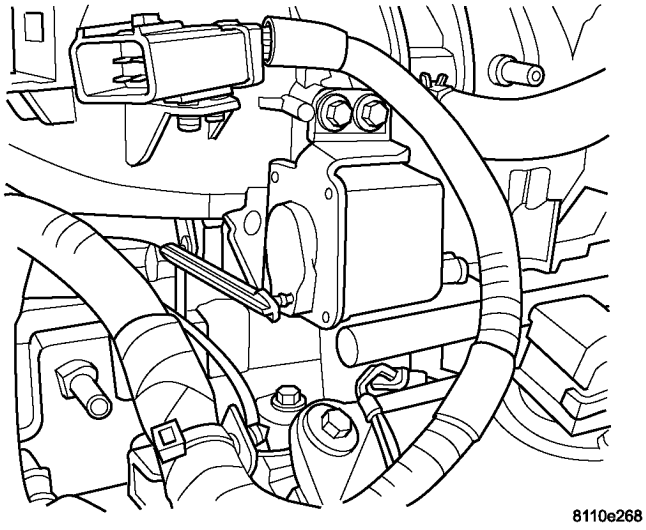


Fig. 94 SHORT RUNNER VALVE

(4) Connect the electrical connector to the short runner valve (Fig. 94).
(5) Connect the negative battery cable.

STEERING

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STEERING

DESCRIPTION - POWER STEERING SYSTEM

This vehicle comes with power steering as standard equipment. The power steering system consists of these major components:

- POWER STEERING PUMP
- POWER STEERING GEAR
- POWER STEERING FLUID
- POWER STEERING FLUID RESERVOIR
- POWER STEERING SUPPLY HOSE (3.5L ENGINE)
- POWER STEERING PRESSURE HOSE
- POWER STEERING RETURN HOSE

For information on the first two components, refer to their respective sections within this service manual group. Information on all other components can be found in POWER STEERING PUMP.

OPERATION - POWER STEERING SYSTEM

Turning of the steering wheel is converted into linear (side-to-side) travel through the meshing of the helical pinion teeth with the rack teeth within the steering gear. The lateral travel pushes and pulls the tie rods to change the direction of the vehicle's front wheels.

Power assist steering is provided by a belt driven rotary type pump. It directs fluid through power steering fluid hoses to the power steering gear where it is used to assist the driver's turning effort.

Manual steering control of the vehicle can be maintained if power steering assist is lost. However, under this condition, steering effort is significantly increased.

WARNINGS AND CAUTIONS

WARNING: POWER STEERING FLUID, ENGINE PARTS AND EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES. DO NOT ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.

WARNING: FLUID LEVEL SHOULD BE CHECKED WITH THE ENGINE OFF TO PREVENT PERSONAL INJURY FROM MOVING PARTS.

CAUTION: When the system is open, cap all open ends of the hoses, power steering pump fittings or power steering gear ports to prevent entry of foreign material into the components.

CAUTION: When servicing power steering components, do not pinch off power steering hoses in an any way to stop fluid flow. Damage to hoses may result.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER STEERING FLOW AND PRESSURE TEST

WARNING: TO PREVENT PERSONAL INJURY, SAFETY GOGGLES SHOULD BE WORN AT ALL TIMES WHILE PERFORMING ANY TEST PROCEDURES ON THE POWER STEERING SYSTEM.

The following procedure is to be used to test the operation of the power steering system on this vehi-

STEERING (Continued)

cle. This test will provide the flow rate of the power steering pump along with the maximum relief pressure. This test is to be performed any time a power steering system problem is present to determine if the power steering pump or power steering gear is not functioning properly. The following flow and pressure test is performed using the Power Steering Analyzer Kit, Special Tool 6815 (Fig. 1), hoses, Special Tools 6905 and 6959, and adapters, Special Tool 8185A.

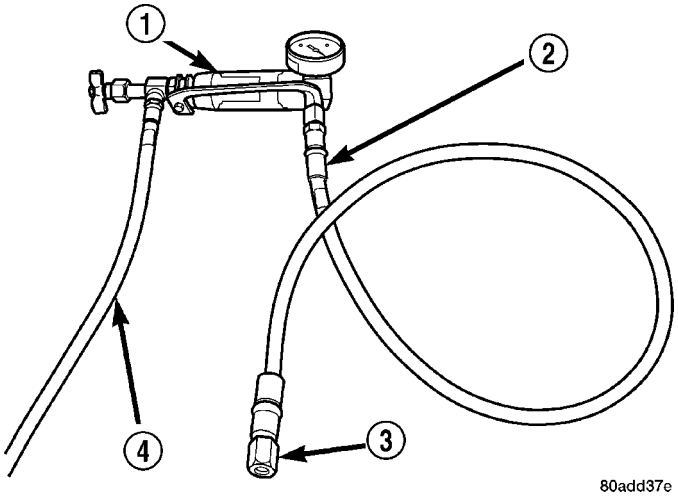


Fig. 1 Power Steering Analyzer With Hoses Installed

1 - SPECIAL TOOL 6815
2 - SPECIAL TOOL 6959
3 - SPECIAL TOOL 8185-2
4 - SPECIAL TOOL 6905 & 6713-1

(1) Assemble hoses on Power Steering Analyzer as shown (Fig. 1). Install Pressure Hose, Special Tool 6959, in inlet fitting (gauge end) of Power Steering Analyzer flow meter. Install Pressure Hose, Special Tool 6905 (in 6893 kit), into outlet fitting (valve end) of Power Steering Analyzer flow meter. Install Pressure Hose, Special Tool 6713 (in 6815 kit) on 6905.

(2) Install Adapter, Special Tool 8185-1A, in end of Pressure Hose, Special Tool 6713.

(3) Install Adapter, Special Tool 8185-2, in end of Pressure Hose, Special Tool 6959.

(4) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Unscrew tube nut and remove power steering fluid pressure hose from power steering gear (Fig. 2).

(6) Thread vehicle's power steering pressure hose into Adapter, Special Tool 8185-2, connected to Analyzer Hose (Fig. 3). Tighten tube nut to specifications (Refer to 19 - STEERING - SPECIFICATIONS). Route hoses away from exhaust system as well as other unfriendly surfaces.

(7) Thread Adapter, Special Tool 8185-1A, connected to Analyzer hose, into open power steering gear port (Fig. 3). Tighten tube nut to specifications

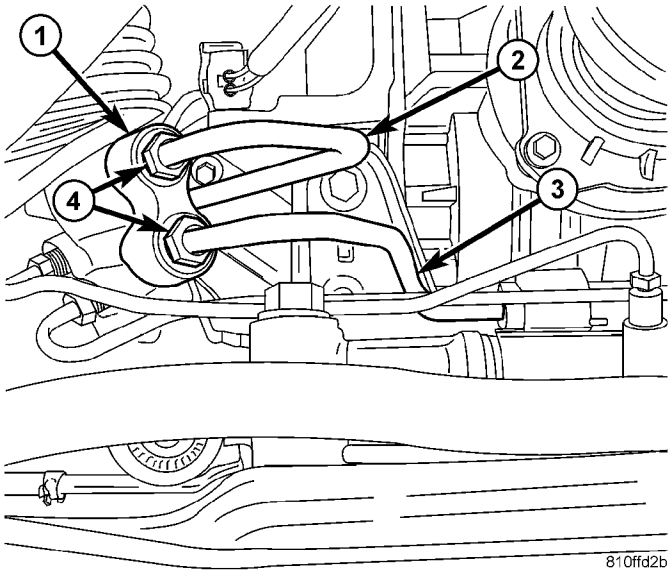


Fig. 2 Hoses At Steering Gear

1 - POWER STEERING GEAR
2 - RETURN HOSE
3 - PRESSURE HOSE
4 - TUBE NUTS

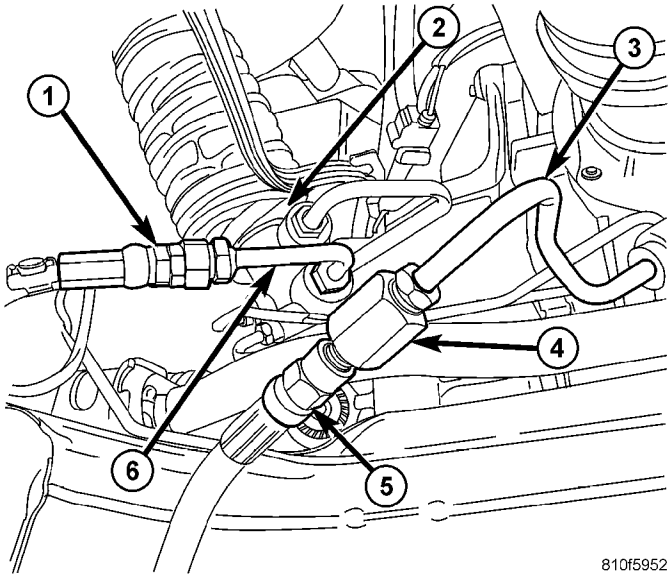


Fig. 3 Analyzer Connections At Gear

1 - HOSE 6713
2 - POWER STEERING GEAR
3 - PRESSURE HOSE
4 - ADAPTER 8185-2
5 - HOSE 6959
6 - ADAPTER 8185-1A

(Refer to 19 - STEERING - SPECIFICATIONS). Route hoses away from exhaust system as well as other unfriendly surfaces.

(8) Being careful not to kink or pinch Analyzer hoses, lower vehicle to ground level.

STEERING (Continued)

TEST PROCEDURE

(1) Completely open valve on Power Steering Analyzer flow meter.

(2) Start engine and let idle long enough to circulate power steering fluid through Analyzer and hoses, until all air is out of fluid. Shut off engine.

(3) Check power steering fluid level and add fluid as necessary. Start engine again and let idle.

(4) The Analyzer gauge should read below 300 psi (2068 kPa). If above, inspect hoses for restrictions and repair as necessary. The initial pressure should be in range of 100–175 psi (689–1896 kPa). The flow meter should read above 1.5 GPM (5.7 LPM).

CAUTION: The following test procedure step involves testing maximum pump pressure output and flow control valve operation. Do not leave valve closed for more than five seconds as the pump could be damaged.

NOTE: Power steering pump maximum pressure is 1400 – 1,500 psi (9653 – 10,342 kPa).

(5) Close flow meter valve fully three times and record highest pressure indicated each time. **All three readings must be within specifications. If any of readings are not within specifications, replace pump.** (Refer to 19 - STEERING/PUMP - REMOVAL)

CAUTION: During the next step, do not force the pump to operate against the stops for more than 4 seconds at a time as pump damage may result.

(6) Once pump has been verified as functioning correctly, completely open valve on Power Steering Analyzer flow meter. Turn steering wheel to extreme left until stop in steering gear is met. Hold it there for 2 – 4 seconds, then release it. Now turn steering wheel to right until right stop is met. Hold it there for 2 – 4 seconds, then release it. Record stabilized pressure at each position. Compare recorded readings to specifications. If output pressures are not within 100 psi (689 kPa) of one another or are below specifications steering gear is leaking internally and must be replaced. (Refer to 19 - STEERING/GEAR - REMOVAL)

NOTE: Before installing power steering hose on power steering gear, wipe clean connections with a lint-free cloth and replace O-ring. Lubricate O-ring using clean power steering fluid.

(7) Remove special tools and reconnect pressure hose. Tighten tube nut to specifications. (Refer to 19 - STEERING - SPECIFICATIONS)

(8) Fill and bleed system using Power Steering Pump Initial Operation Procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

DIAGNOSIS AND TESTING - STEERING SYSTEM DIAGNOSIS CHARTS

NOTE: There are three diagnosis charts following that cover POWER STEERING NOISE, STEERING WHEEL FEEL, and POWER STEERING FLUID.

POWER STEERING NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
OBJECTIONABLE HISS OR WHISTLE*	1. Damaged or mispositioned steering column shaft/coupling dash panel seal.	1. Reposition or replace steering column shaft/coupling dash panel seal.
	2. Mis-routed power steering hose.	2. Check routing of power steering hoses. Ensure hoses do not come in unwanted contact with other components and objects.
	3. Noisy valve in power steering gear.	3. Replace power steering gear.
RATTLE OR EXCESSIVE CLUNK**	1. Power steering gear loose on engine cradle.	1. Inspect power steering gear mounting bolts. Replace as necessary. Tighten to specified torque.
	2. Loose strut assembly mounting fasteners at tower or knuckle.	2. Tighten strut assembly fasteners to the specified torque.

STEERING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	3. Loose tie rod (outer or inner).	3. Check tie rod pivot points for wear. Replace worn/loose parts as required.
	4. Engine cradle mounting fasteners loose at frame.	4. Tighten engine cradle mounting fasteners to the specified torque.
	5. Lug nuts loose.	5. Tighten lug nuts to specifications.
	6. Power steering fluid hose touching the body of the vehicle.	6. Adjust hose to proper position by loosening, repositioning, and tightening attachments to specified torque. Do not bend tubing.
	7. Stabilizer bar link ball joints worn.	7. Replace stabilizer bar link.
	8. Loose lower control arm mounting bolts at engine cradle.	8. Tighten control arm mounting bolts to specified torque.
	9. Lower control arm pivot bushing worn.	9. Replace lower control arm.
	10. Excessive Wheel bearing free-play.	10. Verify correct halfshaft hub nut torque. Replace hub and bearing if torque is okay.
	11. Internal power steering gear noise.	11. Replace power steering gear.
	12. Damaged engine cradle.	12. Replace engine cradle.
POPPING NOISE	1. Worn outer tie rod.	1. Check ball joint for free-play; Replace outer tie rod.
	2. Loose inner tie rod.	2. Replace power steering gear.
	3. Worn half shaft.	3. Repair or replace as necessary. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - DIAGNOSIS AND TESTING)
CHIRP OR SQUEAL (POWER STEERING PUMP)	1. Loose power steering pump drive belt.	1. Check and adjust power steering pump drive belt to specifications or replace automatic tensioner where applicable. Replace belt if worn or glazed.
	2. Malfuctioning belt auto-tensioner	2. Replace belt auto-tensioner.
WHINE, GROWL, MOAN OR GROAN (POWER STEERING PUMP)***	1. Low fluid level.	1. Fill power steering fluid reservoir to proper level and check for leaks (make sure all air is bled from the system fluid).
	2. Power steering hose touching vehicle body or frame.	2. Adjust hose to proper position by loosening, repositioning, and tightening fitting to specified torque. Do not bend tubing. Replace hose if damaged.
	3. Extremely low ambient temperature.	3. Some noise can be expected, but will go away as vehicle warms. Replace pump if noise is excessive.
	4. Extreme wear of power steering pump internal components.	4. Replace power steering pump and flush system as necessary.

STEERING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SUCKING AIR SOUND	1. Loose clamp on power steering fluid return hose.	1. Tighten or replace hose clamp.
	2. Missing O-Ring on power steering hose connection.	2. Inspect connection and replace O-Ring as required.
	3. Low power steering fluid level.	3. Fill power steering fluid reservoir to proper level and check for leaks.
	4. Loose clamp on fluid supply hose.	4. Tighten or replace hose clamp.
SQUEAK OR RUBBING SOUND	1. Steering column shroud rubbing.	1. Realign shrouds as necessary.
	2. Steering column shaft rubbing.	2. Move or realign item rubbing shaft.
	3. Clockspring noisy.	3. Remove clockspring. Reinstall wheel. If noise is gone, replace clockspring.
	4. Seal lubrication inadequate.	4. Lube seal (if external).
	5. Steering gear internally noisy.	5. Replace steering gear (if no other cause can be found).
SCRUBBING OR KNOCKING NOISE.	1. Incorrect tire or wheel size.	1. Replace incorrect size tire or wheel with size used as original equipment.
	2. Interference between steering gear and other vehicle components.	2. Check for bent or misaligned components and correct as necessary.
	3. Steering gear internal stops worn excessively allowing tires to be steered excessively far.	3. Replace steering gear.

*** NOTE: There is some noise in all power steering systems. One of the most common is a hissing sound evident when turning the steering wheel when at a standstill or when parking and the steering wheel is at the end of its travel. Hiss is a very high frequency noise similar to that experienced while slowly closing a water tap. The noise is present in every valve and results when high velocity fluid passes valve orifice edges. There is no relationship between this noise and the performance of the steering system.**

**** NOTE: A light clunk may be felt or heard during steering wheel reversal while vehicle is stationary. This results from internal steering gear rack movement at the bushings and in no way affects the performance of the steering system. This movement may be felt in the steering components during steering wheel reversal.**

***** NOTE: Power steering pump growl/moan/groan results from the development of high pressure fluid flow. Normally this noise level should not be high enough to be objectionable.**

STEERING (Continued)

STEERING WHEEL FEEL

CONDITION	POSSIBLE CAUSES	CORRECTION
STEERING WHEEL/ COLUMN CLICKING, CLUNKING OR RATTLING.	1. Loose steering coupling pinch bolt.	1. Replace pinch bolt and torque to specifications.
	2. Steering column bearings.	2. Replace steering column.
	3. Excessive intermediate shaft coupling free-play.	3. Replace intermediate shaft.
STEERING WHEEL HAS FORE AND AFT LOOSENESS.	1. Steering wheel retaining nut not properly tightened and torqued.	1. Tighten the steering wheel retaining nut to its specified torque.
	2. Steering column lower bearing spring retainer slipped on steering column shaft.	2. Replace steering column.
	3. Loose steering column to instrument panel fasteners.	3. Tighten fasteners to specified torque.
STEERING WHEEL, DASH OR VEHICLE VIBRATES DURING LOW SPEED OR STANDSTILL STEERING MANEUVERS.	1. Air in the fluid of the power steering system.	1. Bleed air from system following the power steering pump initial operation service procedure.*
	2. Tires not properly inflated.	2. Inflate tires to the specified pressure.
	3. Excessive engine vibration.	3. Ensure that the engine is tuned properly.
	4. Loose tie rod end jam nut.	4. Tighten the inner to outer tie rod jam nut to the specified torque.
	5.Overcharged air conditioning system.	5.Check air conditioning pump head pressure and correct as necessary.
	6. Grounded engine mount.	6. Repair as necessary.
	7. Loose outer tie rod.	7. Replace outer tie rod.
STEERING CATCHES, SURGES OR STICKS IN CERTAIN POSITIONS OR IS DIFFICULT TO TURN. ***	1. Low power steering fluid level.	1. Fill power steering fluid reservoir to specified level and check for leaks.
	2. Tires not inflated to specified pressure.	2. Inflate tires to the specified pressure.
	3. Lack of lubrication in front lower control arm ball joints.	3. Lubricate ball joints if ball joints are not a lubricated-for-life type ball joint, then inspect ball joint for wear. Replace as necessary. If ball joint is a lubricated-for-life ball joint, replace lower control arm.
	4. Worn or binding lower control arm ball joint.	4. Replace lower control arm.

STEERING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	5. Lack of lubrication in steering gear outer tie rod ends.	5. Lubricate tie rod ends if they are not a lubricated-for-life type, then inspect for wear. Replace as necessary. If tie rod end is a lubricated-for-life type, replace tie rod end.
	6. Loose power steering pump drive belt.	6. Replace automatic tensioner. If drive belt is worn or glazed, replace belt.
	7. Faulty power steering pump (Perform Power Steering Flow and Pressure Test).	7. Replace power steering pump.
	8. Faulty power steering gear (Perform Power Steering Flow and Pressure Test).	8. Replace power steering gear.
	9. Excessive friction in steering column or intermediate shaft/coupler.	9. Isolate and correct condition.
	10. Excessive friction in power steering gear.	10. Replace power steering gear.
	11. Worn or binding seat and bearing in front strut assembly.	11. Replace seat and bearing in front strut assembly.
STEERING WHEEL DOES NOT RETURN TO CENTER POSITION.	1. Tires not inflated properly.	1. Inflate tires to specified pressure.
	2. Improper front wheel alignment.	2. Check and adjust wheel alignment as necessary.
	3. Lack of lubrication causing binding in front lower control arm ball joints.	3. Lubricate ball joints if ball joints are not a lubricated for life type, then inspect ball joint for wear. Replace lower control arm as necessary. If ball joint is a lubricated for life ball joint, replace lower control arm.
	4. Steering column coupling joints misaligned.	4. Realign steering column coupling joints.
	5. Steering wheel rubbing.**	5. Adjust steering column shrouds to eliminate rubbing condition.
	6. Damaged, mispositioned or unlubricated steering column coupler to dash seal.**	6. Replace, reposition, or lubricate dash seal.
	7. Binding mount bearing in front strut assembly.	7. Replace mount bearing in front strut assembly.
	8. Binding shaft bearing in steering column.	8. Replace the steering column.
	9. Excessive friction in steering column coupling.	9. Replace steering column coupling.
	10. Excessive friction in power steering gear.	10. Replace power steering gear.
EXCESSIVE STEERING WHEEL KICKBACK OR TOO MUCH STEERING WHEEL FREE PLAY.	1. Air in the fluid of the power steering system.	1. Bleed air from system following the the power steering pump initial operation service procedure.*

STEERING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	2. Power steering gear loose on cradle/crossmember.	2. Inspect power steering gear mounting bolts. Replace as necessary. Tighten to the specified torque.
	3. Steering column coupling or intermediate shaft worn, broken or loose.	3. Replace steering column coupling or intermediate shaft.
	4. Free play in steering column.	4. Check all components of the steering column and repair or replace as required.
	5. Worn lower control arm ball joints.	5. Replace lower control arm as required.
	6. Loose steering knuckle-to-ball joint stud pinch bolt.	6. Inspect pinch bolt, replace as necessary, and tighten to specified torque.
	7. Front wheel bearing loose or worn.	7. Replace hub and bearing as necessary.
	8. Loose outer tie rod end.	8. Replace outer tie rod end that has excessive free play.
	9. Loose inner tie rod.	9. Replace power steering gear.
	10. Defective steering gear rotary valve.	10. Replace power steering gear.

*** NOTE: Steering shudder can be expected in new vehicles and vehicles with recent steering system repairs. Shudder should dissipate after the vehicle has been driven several weeks.**

**** NOTE: To evaluate this condition, it may be necessary to disconnect the coupling at the base of the steering column. Turn the steering wheel and feel or listen for internal rubbing in steering column. To avoid damaging the column clockspring, note the following. Before disconnecting coupling, place tires in the straight-ahead position and center steering wheel. Once disconnected, DO NOT rotate steering wheel more than one revolution in either direction and place steering wheel in original location before reconnecting coupling. If this position is lost, the steering column clockspring must be recentered following the procedure found within the procedure for steering column installation in the steering column section.**

***** NOTE: Increased low speed or stationary steering effort can be expected if the steering fluid is at a high temperature. High fluid temperature usually results from high engine rpm due to trailer towing, ascending grades, or racing the engine for prolonged periods of time.**

STEERING (Continued)

POWER STEERING FLUID

CONDITION	POSSIBLE CAUSES	CORRECTION
LOW FLUID LEVEL WITH VISIBLE LEAK.	1. Loose power steering hose fittings.	1. Tighten the fitting to its specified torque.
	2. Damaged or missing fitting seal, gasket, or O-ring.	2. Replace as necessary.
	3. Power steering component leaking.	3. Repair or replace the leaking component as required.
AERATED FLUID.*	1. Low fluid level.	1. Fill power steering fluid reservoir to proper level.
	2. Air leak at supply hose, power steering fluid reservoir or pump.	2. Inspect for proper sealing. Repair as necessary.
	3. Cracked power steering pump housing.	3. Replace the power steering pump.
RESERVOIR FLUID OVERFLOW AND FLUID THAT IS MILKY IN COLOR	1. Water contamination of power steering fluid.	1. Drain the power steering fluid from the system. Flush the system with fresh clean power steering fluid, drain, then refill to the proper level.

*** NOTE: Extremely cold temperatures may cause power steering fluid aeration. Aeration should subside as fluid warms.**

SPECIFICATIONS

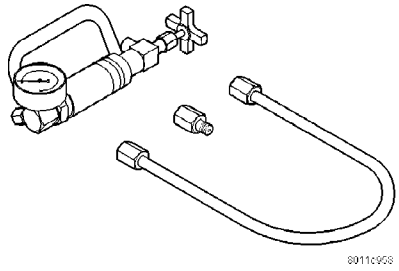
POWER STEERING FASTENER TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Cooler Mounting Screws	10	—	90
Gear Mounting Bolts	163	120	—
Hose Tube Nut At Gear	31	23	275
Hose Tube Nut At Pump	31	23	275
Pump Pressure Fitting	88	65	—
Pump Mounting Bolts	23	17	200
Reservoir Mounting Bolts	12	—	105
Return And Pressure Hose Routing Clamp Bolt At A/C Compressor	12	—	105
Return Hose Cradle Clamp Screw	10	—	90
Tie Rod Steering Arm Nut	47 + 180° Turn	35 + 180° Turn	—
Tie Rod Jam Nut	75	55	—

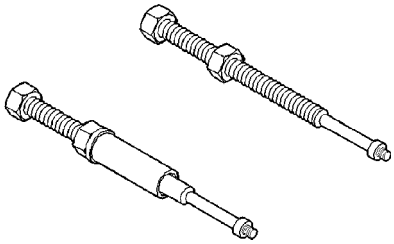
STEERING (Continued)

SPECIAL TOOLS

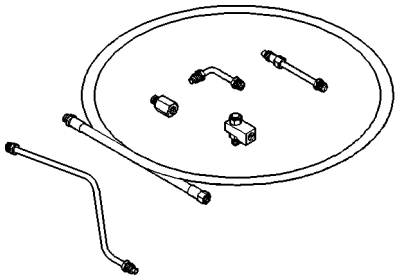
POWER STEERING



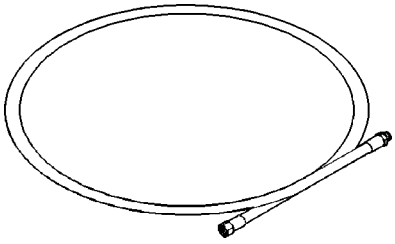
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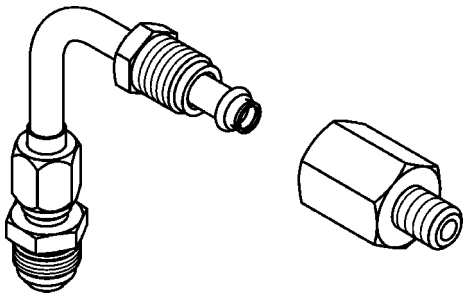
Remover/Installer, Steering Shaft Roll Pin 6831A



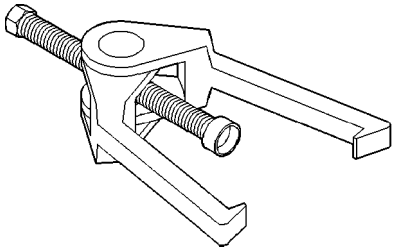
Adapters, Power Steering Analyzer 6893



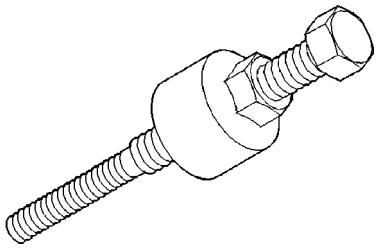
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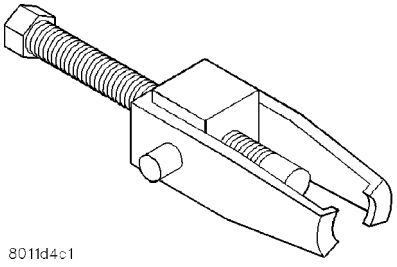
Adapters, Power Steering Analyzer 8185A



Puller C-3894-A



Installer C-4063B



Puller C-4333

COLUMN

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COLUMN

WARNINGS AND CAUTIONS

(Refer to 8 - ELECTRICAL/RESTRAINTS - WARNING)

WARNING: BEFORE BEGINNING ANY SERVICE PROCEDURES THAT INVOLVES REMOVING THE AIR BAG. REMOVE AND ISOLATE THE NEGATIVE (-) BATTERY CABLE (GROUND) FROM THE VEHICLE BATTERY. THIS IS THE ONLY SURE WAY TO DISABLE THE AIR BAG SYSTEM. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIR BAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: THE AIR BAG SYSTEM IS A SENSITIVE, COMPLEX ELECTRO-MECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL THE AIR BAG SYSTEM COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIR BAG AND POSSIBLE PERSONAL INJURY. THE FASTENERS, SCREWS, AND BOLTS, ORIGINALLY USED FOR THE AIR BAG COMPONENTS, HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIR BAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANYTIME A NEW FASTENER IS NEEDED, REPLACE WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR FASTENERS LISTED IN THE PARTS BOOKS.

WARNING: SAFETY GOGGLES SHOULD BE WORN AT ALL TIMES WHEN WORKING ON STEERING COLUMNS.

CAUTION: Disconnect negative (ground) cable from the battery before servicing any column component.

CAUTION: Do not attempt to remove the pivot pins to disassemble the tilting mechanism. Damage will occur.

DIAGNOSIS AND TESTING - STEERING COLUMN

The steering column must be inspected carefully after any frontal impact. Inspect for mount shifting and stress cracks. The steering column needs to be replaced after any impact that triggers the driver airbag.

For diagnosis of conditions relating to the steering column, (Refer to 19 - STEERING - DIAGNOSIS AND TESTING).

REMOVAL

NOTE: Before proceeding, (Refer to 19 - STEERING/COLUMN - WARNING).

(1) Place front wheels of vehicle in STRAIGHT-AHEAD position.

(2) Disconnect and isolate the battery negative (-) cable. Wait two minutes for the airbag system

COLUMN (Continued)

reserve capacitor to discharge before beginning any steering column, instrument panel, or airbag system/ component service.

WARNING: WHEN AN UNDEPLOYED AIRBAG IS TO BE REMOVED FROM THE VEHICLE, FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. ALLOW THE AIRBAG SYSTEM RESERVE CAPACITOR TO DISCHARGE FOR TWO MINUTES BEFORE BEGINNING ANY AIRBAG SYSTEM OR COMPONENT SERVICE. PERSONAL INJURY MAY RESULT IF THIS PROCEDURE IS NOT FOLLOWED.

(3) Remove driver airbag mounting screws (Fig. 1).

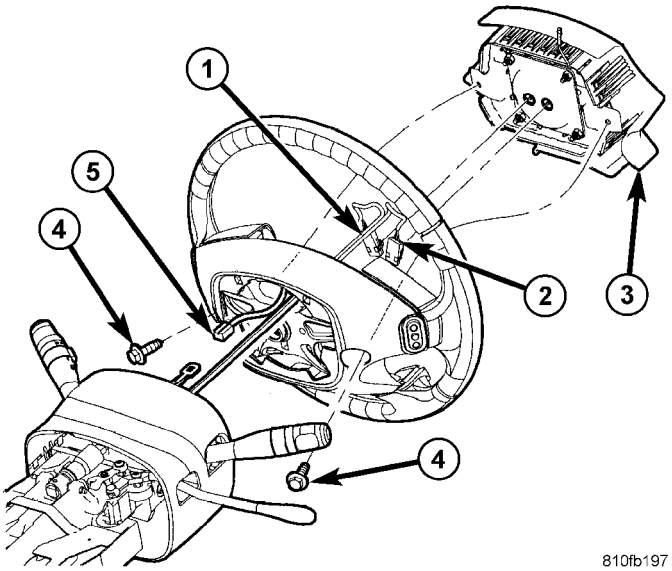


Fig. 1 Airbag Mounting To Steering Wheel

1 - SQUIB CONNECTOR
2 - SQUIB CONNECTOR
3 - DRIVER AIRBAG
4 - AIRBAG MOUNTING SCREW
5 - HORN PIGTAIL (CLOCKSPRING-TO-AIRBAG)

(4) Lift airbag from mount and disconnect two airbag squib connectors and horn connector (Fig. 1) (Fig. 2). Remove driver airbag.

(5) Disconnect speed control wiring connector at clockspring (center terminal) (Fig. 2).

(6) Remove steering wheel retaining nut (Fig. 3).

(7) Remove damper (Fig. 3).

(8) Remove steering wheel using standard wheel puller.

(9) Access and remove knee blocker airbag. (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - REMOVAL)

(10) Remove three screws fastening lower shroud to upper shroud and column (Fig. 4).

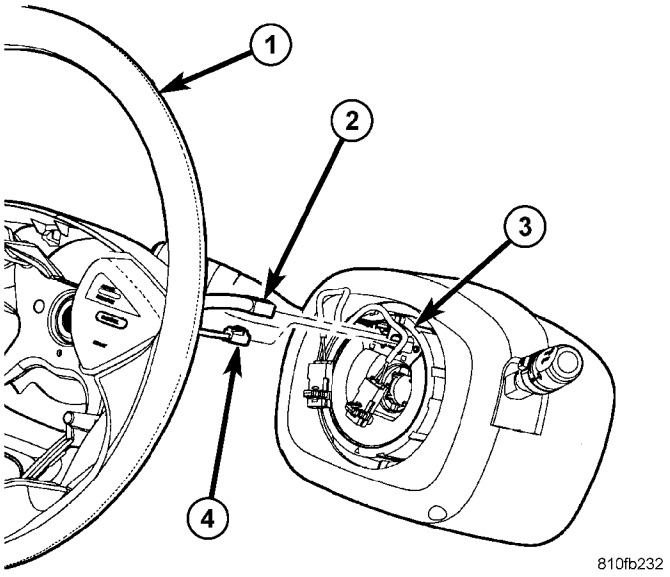


Fig. 2 Speed Control And Horn Wiring Connectors

1 - STEERING WHEEL
2 - SPEED CONTROL WIRING CONNECTOR
3 - CLOCKSPRING
4 - HORN WIRING CONNECTOR

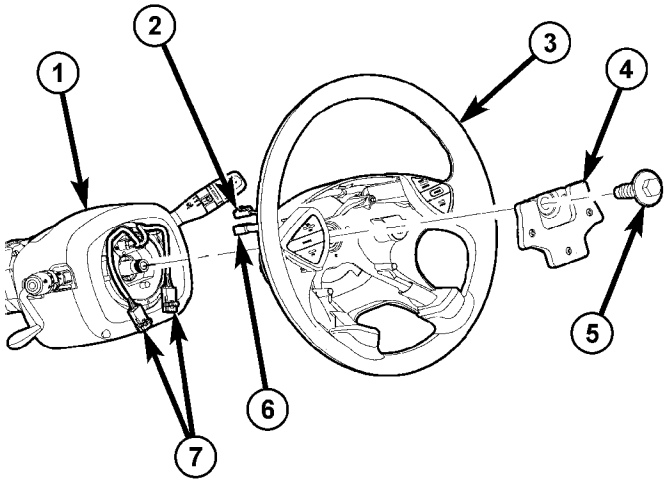


Fig. 3 Steering Wheel Mounting To Column

1 - STEERING COLUMN
2 - WIRING CONNECTOR
3 - STEERING WHEEL
4 - DAMPER
5 - RETAINING BOLT
6 - WIRING CONNECTOR
7 - AIRBAG SQUIB CONNECTORS

COLUMN (Continued)

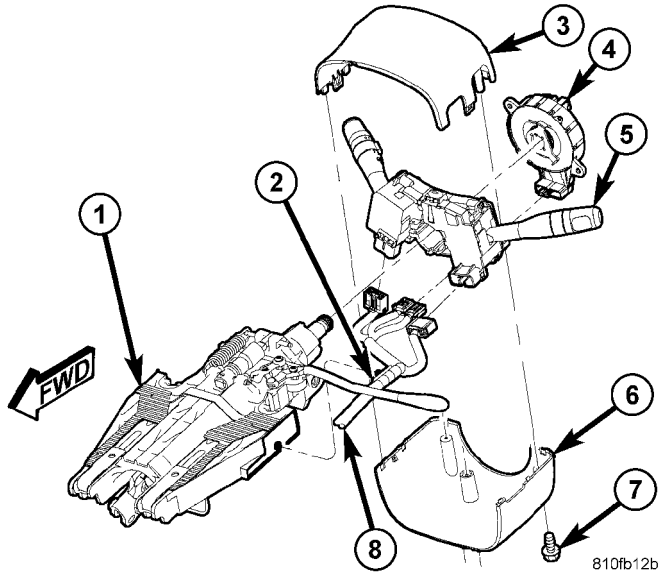


Fig. 4 Components Mounted To Steering Column

1 - STEERING COLUMN
2 - WIRING HARNESS CLIP
3 - UPPER SHROUD
4 - CLOCKSPRING
5 - SWITCH MODULE
6 - LOWER SHROUD
7 - SHROUD MOUNTING SCREW
8 - WIRING HARNESS

(11) Using hands, gently press inward at seams between shrouds at points where inner locking tabs exist, unlocking tabs (Fig. 4).

(12) Remove upper, then lower shroud.

(13) Remove column wiring harness routing clip from left side of column (Fig. 4).

(14) Remove screw on bottom of column (Fig. 5), then slide multi-function switch housing (with switches and clockspring) off column.

(15) Disconnect steering column coupling at intermediate shaft (Fig. 6). To do so:

(a) Remove hair pin at end of coupling pinch bolt.

(b) Loosen nut and remove pinch bolt.

(c) Remove intermediate shaft from coupling.

(16) Remove four nuts fastening column to dash (Fig. 6). Remove column.

INSTALLATION

(1) Place steering column over mounting studs and install four nuts fastening column to dash (Fig. 6). Tighten nuts to 12 N·m (105 in. lbs.) torque.

(2) Connect steering column coupling to intermediate shaft (Fig. 6). To do so:

(a) Match intermediate shaft to coupling pinch loop.

(b) Install coupling pinch bolt. Tighten to 28 N·m (21 ft. lbs.) torque.

(c) Install hair pin at end of pinch bolt.

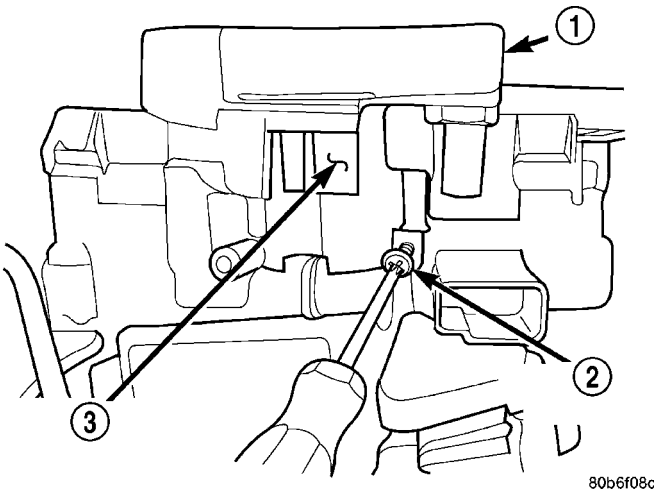


Fig. 5 Multi-Function Switch Mounting Housing Screw

1 - CLOCK SPRING
2 - SCREW
3 - MULTI-FUNCTION SWITCH MOUNTING HOUSING

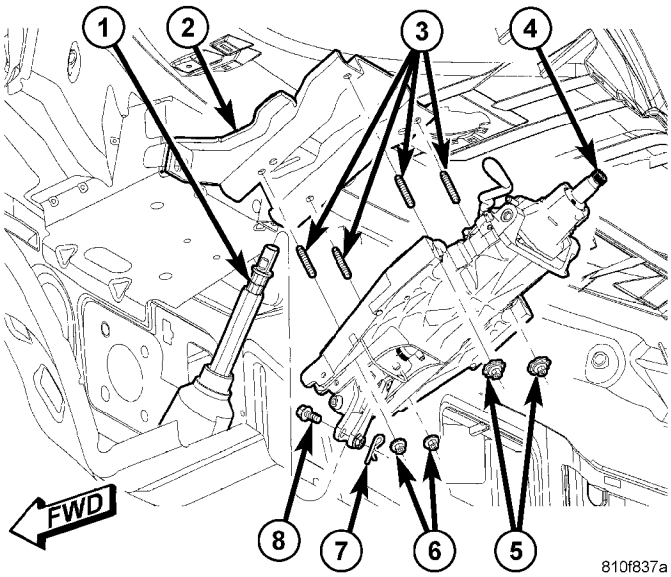


Fig. 6 Steering Column

1 - INTERMEDIATE SHAFT
2 - COLUMN MOUNTING BRACKET
3 - COLUMN MOUNING STUDS
4 - STEERING COLUMN
5 - UPPER MOUNTING NUTS
6 - LOWER MOUNTING NUTS
7 - HAIR PIN
8 - COUPLING PINCH BOLT

(3) Slide multi-function switch mounting housing onto column and install mounting screw. Tighten screw to 1.9 N·m (17 in. lbs.) torque.

(4) Install column wiring harness routing clip into left side of column (Fig. 4).

(5) Install lower and upper shrouds around column (Fig. 4):

COLUMN (Continued)

(a) Snap shrouds together at locking tab locations on both sides.

(b) Install center mounting screw securing lower shroud to column. Tighten screw to 2 N·m (18 in. lbs.) torque.

(c) Install two outer mounting screws securing lower shroud to upper shroud. Tighten screws to 2 N·m (18 in. lbs.) torque.

(d) Inspect shroud mating surfaces for excessive gaps and adjust as necessary.

(6) Install knee blocker airbag and all components necessary to access. (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - REMOVAL)

(7) Match splines on steering wheel hub with that on steering shaft and slide steering wheel onto column shaft.

(8) Install damper on steering wheel (Fig. 3).

(9) Install steering wheel retaining bolt (Fig. 3). Tighten bolt to 61 N·m (45 ft. lbs.) torque.

(10) Connect speed control wiring connector at clockspring (Fig. 2).

(11) Connect two airbag squib connectors and horn connector to driver airbag (Fig. 1).

(12) Place driver airbag on steering wheel and install mounting screws (Fig. 1). Tighten screws to 10 N·m (90 in. lbs.) torque.

(13) Connect battery negative (-) cable to battery post following special Diagnosis And Testing procedure. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

(14) Check operation of all steering column mounted components.

(15) Road test vehicle to ensure operation of steering.

SPECIFICATIONS

STEERING COLUMN FASTENER TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Driver Airbag Attaching Bolts	10	—	90
Steering Column Coupling Pinch Bolt	28	21	250
Steering Column Mounting Nuts	12	—	105
Steering Column Shroud Screws	2	—	18
Steering Wheel Retaining Nut	61	45	—

INTERMEDIATE SHAFT

REMOVAL

NOTE: Before proceeding, (Refer to 19 - STEERING/COLUMN - WARNING).

(1) Disconnect battery negative (-) cable from battery post and isolate.

(2) Place front wheels of vehicle in STRAIGHT-AHEAD position.

(3) Install steering wheel holder locking steering wheel in STRAIGHT-AHEAD position (Fig. 7).

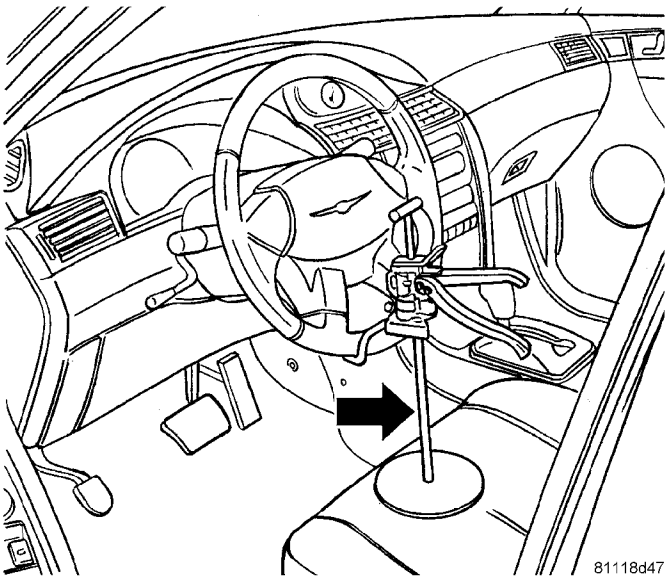


Fig. 7 Steering Wheel Holder

(4) Disconnect steering column coupling at intermediate shaft (Fig. 8). To do so:

(a) Remove hair pin at end of coupling pinch bolt.

(b) Loosen nut and remove pinch bolt.

(c) Remove intermediate shaft from coupling.

(5) Remove two upper intermediate shaft silencer shell/cover mounting nuts (Fig. 12).

(6) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(7) Remove lower silencer shell/cover mounting nut (Fig. 12).

(8) Push upward on lower silencer shell/cover mounting stud loosening silencer shell/cover from dash.

(9) Lower vehicle.

(10) Lift intermediate shaft silencer shell off dash panel, working it past adjustable pedals and remove it from intermediate shaft.

(11) Remove pinch bolt fastening intermediate shaft to intermediate shaft extension (Fig. 9).

INTERMEDIATE SHAFT (Continued)

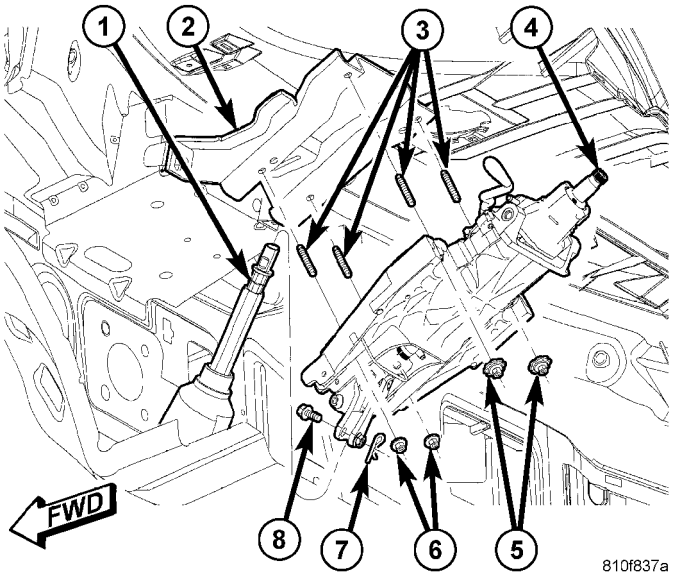


Fig. 8 Steering Column

1 - INTERMEDIATE SHAFT
2 - COLUMN MOUNTING BRACKET
3 - COLUMN MOUNING STUDS
4 - STEERING COLUMN
5 - UPPER MOUNTING NUTS
6 - LOWER MOUNTING NUTS
7 - HAIR PIN
8 - COUPLING PINCH BOLT

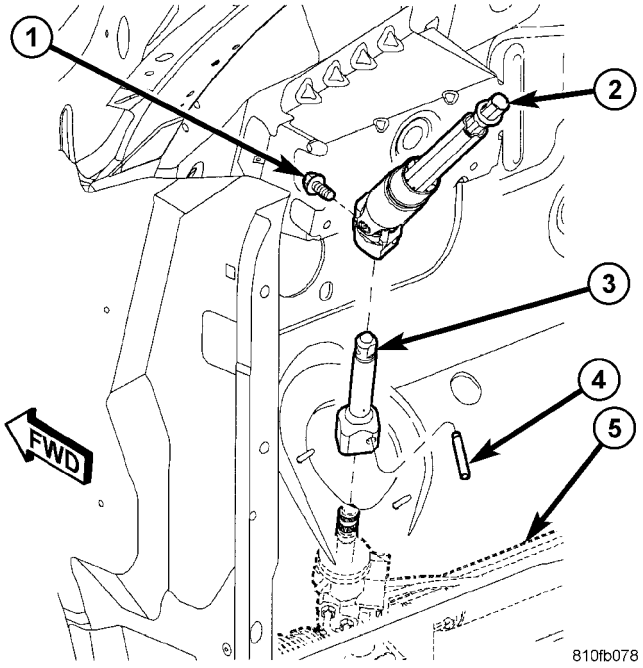


Fig. 9 Intermediate Shaft And Extension

1 - PINCH BOLT
2 - INTERMEDIATE SHAFT
3 - INTERMEDIATE SHAFT EXTENSION
4 - ROLL PIN
5 - POWER STEERING GEAR

(12) Slide intermediate shaft off extension (Fig. 9).

INSTALLATION

(1) Match flats inside intermediate shaft with that on intermediate shaft extension, then slide intermediate shaft onto extension.

(2) Install pinch bolt fastening intermediate shaft to intermediate shaft extension (Fig. 9). Tighten pinch bolt to 43 N·m (32 ft. lbs.) torque.

(3) Slide intermediate shaft silencer shell over intermediate shaft and onto studs on dash panel while inserting lower mounting stud though cover and dash panel (Fig. 12).

(4) Install two upper intermediate shaft silencer shell/cover mounting nuts (Fig. 12). Tighten nuts to 2.8 N·m (25 in. lbs.) torque.

(5) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(6) Install lower silencer shell/cover mounting nut (Fig. 12). Tighten nuts to 2.8 N·m (25 in. lbs.) torque.

(7) Ensure intermediate shaft cover shield is extended down over top of gear housing closing off shaft area.

(8) Lower vehicle.

(9) Connect steering column coupling to intermediate shaft (Fig. 8). To do so:

(a) Match intermediate shaft to coupling pinch loop.

(b) Install coupling pinch bolt. Tighten to 28 N·m (21 ft. lbs.) torque.

(c) Install hair pin at end of pinch bolt.

(10) Remove steering wheel holder.

(11) Connect battery negative (-) cable to battery post.

(12) Road test vehicle to ensure proper operation of steering.

INTERMEDIATE SHAFT - EXTENSION

REMOVAL

(1) Access and remove intermediate shaft. (Refer to 19 - STEERING/COLUMN/INTERMEDIATE SHAFT - REMOVAL)

(2) Remove intermediate shaft cover from dash panel (Fig. 12).

(3) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(4) Remove roll pin fastening intermediate shaft extension to power steering gear shaft as follows (Fig. 10):

(a) Insert Remover, Special Tool 6831A, through roll pin fastening intermediate shaft extension to power steering gear.

(b) Thread knurled nut all way onto end of Remover.

(c) While holding Remove head stationary, turn hex nut pulling roll pin from shafts.

(d) Remove roll pin from tool.

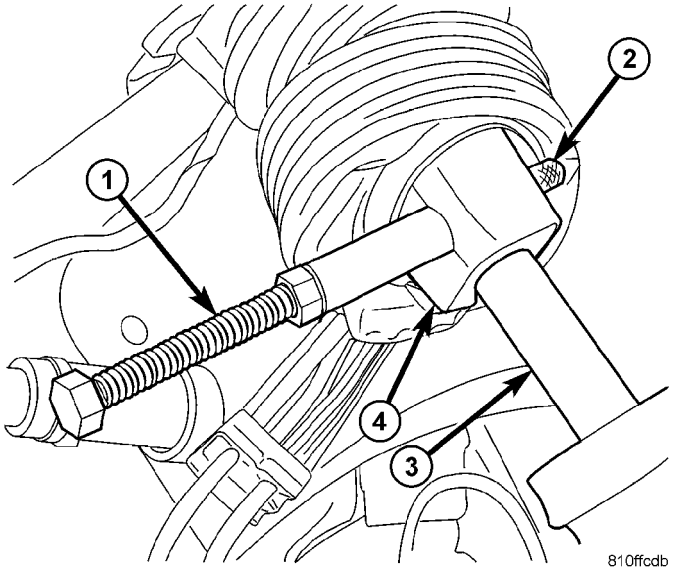


Fig. 10 Roll Pin Removal

1 - REMOVER 6831A
2 - KNURLED NUT
3 - STEERING GEAR SHAFT
4 - INTERMEDIATE SHAFT EXTENSION

(5) Slide intermediate shaft extension off steering gear shaft (Fig. 9).

INSTALLATION

(1) Match splines inside intermediate shaft extension with that on steering gear shaft, then slide extension onto shaft (Fig. 9).

(2) Install roll pin fastening intermediate shaft extension to power steering gear shaft as follows (Fig. 11):

(a) Insert Installer, Special Tool 6831A, extension and steering gear shaft.

(b) Slide roll pin onto Remover shaft.

(c) Thread knurled nut all way onto end of Installer.

(d) While holding Installer head stationary, turn hex nut pulling roll pin into shafts. Stop installing roll pin once it is centered intermediate shaft extension.

(e) Remove tool.

(3) Slide shaft cover shield down over top of steering gear housing closing off shaft area.

(4) Lower vehicle.

(5) Place intermediate shaft cover over intermediate shaft and extension onto mounting studs on dash panel (Fig. 12).

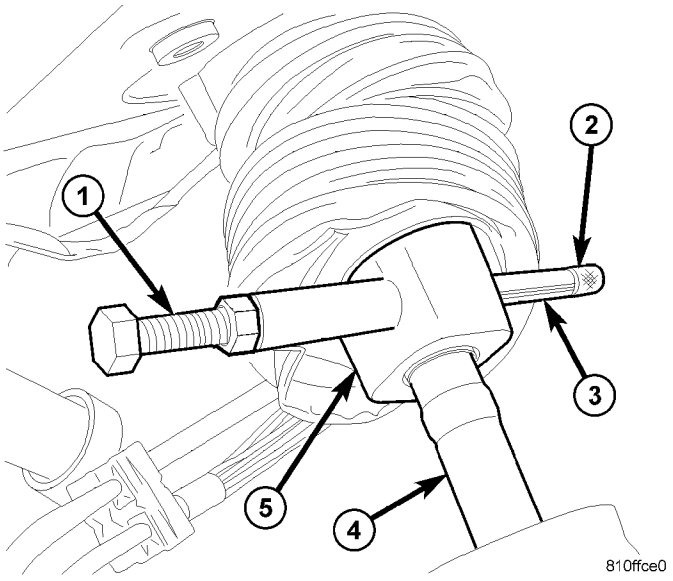


Fig. 11 Roll Pin Installation

1 - INSTALLER 6831A
2 - KNURLED NUT
3 - ROLL PIN
4 - STEERING GEAR SHAFT
5 - INTERMEDIATE SHAFT EXTENSION

(6) Install intermediate shaft and all components necessary to access it. (Refer to 19 - STEERING/COLUMN/INTERMEDIATE SHAFT - INSTALLATION)

(7) Road test vehicle to ensure proper operation of steering.

SEAL - SHAFT SILENCER SHELL/COVER

REMOVAL

NOTE: Before proceeding, (Refer to 19 - STEERING/COLUMN - WARNING).

(1) Disconnect battery negative (-) cable from battery post and isolate.

(2) Place front wheels of vehicle in STRAIGHT-AHEAD position.

(3) Install steering wheel holder locking steering wheel in STRAIGHT-AHEAD position (Fig. 7).

(4) Disconnect steering column coupling at intermediate shaft (Fig. 8). To do so:

(a) Remove hair pin at end of coupling pinch bolt.

(b) Loosen nut and remove pinch bolt.

(c) Remove intermediate shaft from coupling.

(5) Remove two upper intermediate shaft silencer shell/cover mounting nuts (Fig. 12).

SEAL - SHAFT SILENCER SHELL/COVER (Continued)

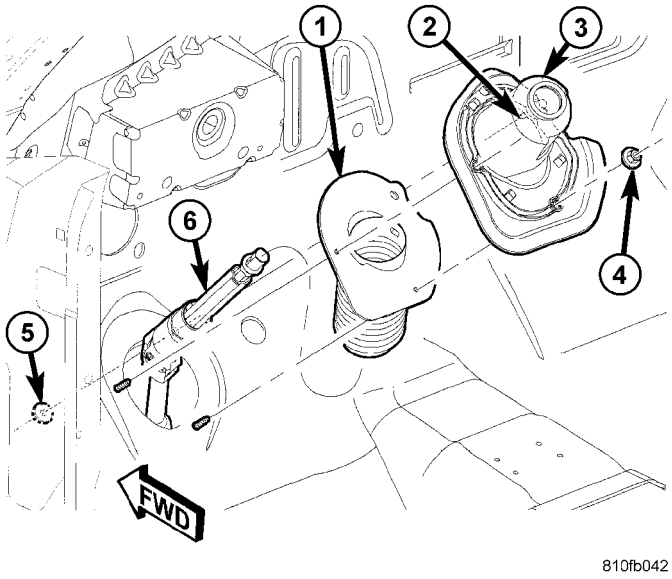


Fig. 12 Intermediate Shaft Cover And Silencer Shell

1 - COVER (SHIELD AND SEAL)
2 - LOWER MOUNTING STUD
3 - SILENCER SHELL
4 - UPPER MOUNTING NUT (2)
5 - LOWER MOUNTING NUT
6 - INTERMEDIATE SHAFT

(6) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(7) Remove lower silencer shell/cover mounting nut (Fig. 12).

(8) Push upward on lower silencer shell/cover mounting stud loosening silencer shell/cover from dash.

(9) Lower vehicle.

(10) Lift intermediate shaft silencer shell off dash panel, working it past adjustable pedals and remove it from intermediate shaft.

(11) Remove intermediate shaft cover from dash panel (Fig. 12).

INSTALLATION

(1) Place intermediate shaft cover over intermediate shaft and extension onto mounting studs on dash panel (Fig. 12).

(2) Slide intermediate shaft silencer shell over intermediate shaft and onto studs on dash panel while inserting lower mounting stud though cover and dash panel (Fig. 12).

(3) Install two upper intermediate shaft silencer shell/cover mounting nuts (Fig. 12). Tighten nuts to 2.8 N·m (25 in. lbs.) torque.

(4) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Install lower silencer shell/cover mounting nut (Fig. 12). Tighten nuts to 2.8 N·m (25 in. lbs.) torque.

(6) Ensure intermediate shaft cover shield is extended down over top of gear housing closing off shaft area.

(7) Lower vehicle.

(8) Connect steering column coupling to intermediate shaft (Fig. 8). To do so:

(a) Match intermediate shaft to coupling pinch loop.

(b) Install coupling pinch bolt. Tighten to 28 N·m (21 ft. lbs.) torque.

(c) Install hair pin at end of pinch bolt.

(9) Remove steering wheel holder.

(10) Connect battery negative (-) cable to battery post.

(11) Road test vehicle to ensure proper operation of steering.

SHROUD - LOWER

REMOVAL

(1) Remove three screws fastening lower shroud to upper shroud and column (Fig. 13).

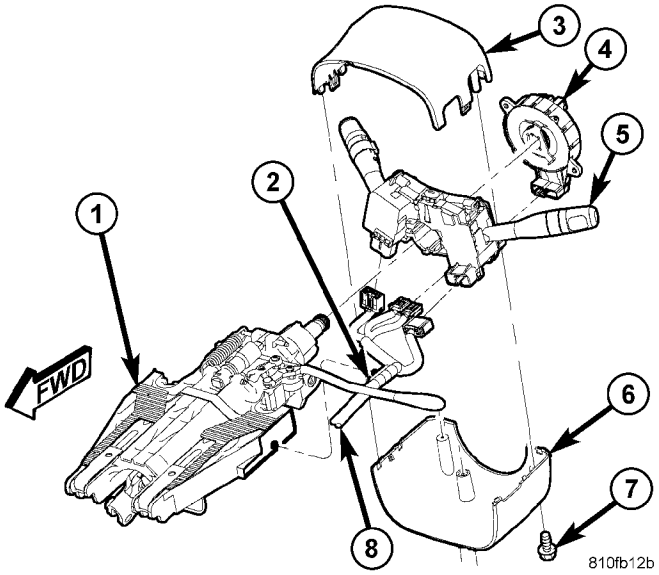


Fig. 13 Components Mounted To Steering Column

1 - STEERING COLUMN
2 - WIRING HARNESS CLIP
3 - UPPER SHROUD
4 - CLOCKSPRING
5 - SWITCH MODULE
6 - LOWER SHROUD
7 - SHROUD MOUNTING SCREW
8 - WIRING HARNESS

(2) Using hands, gently press inward at seams between shrouds at points where inner locking tabs exist, unlocking tabs (Fig. 13).

(3) Remove upper, then lower shroud.

SHROUD - LOWER (Continued)

INSTALLATION

(1) Place lower and upper shrouds around column (Fig. 13).

(2) Snap shrouds together at locking tab locations on both sides.

(3) Install center mounting screw securing lower shroud to column (Fig. 13). Tighten screw to 2 N·m (18 in. lbs.) torque.

(4) Install two outer mounting screws securing lower shroud to upper shroud (Fig. 13). Tighten screws to 2 N·m (18 in. lbs.) torque.

(5) Inspect shroud mating surfaces for excessive gaps and adjust as necessary.

SHROUD - UPPER

REMOVAL

(Refer to 19 - STEERING/COLUMN/LOWER SHROUD - REMOVAL)

INSTALLATION

(Refer to 19 - STEERING/COLUMN/LOWER SHROUD - INSTALLATION)

STEERING WHEEL

REMOVAL

NOTE: Before proceeding, (Refer to 19 - STEERING/ COLUMN - WARNING).

(1) Place front wheels of vehicle in STRAIGHT-AHEAD position.

(2) Disconnect battery negative (-) cable from battery post and isolate.

WARNING: WHEN AN UNDEPLOYED AIRBAG MODULE IS TO BE REMOVED FROM THE VEHICLE, FIRST DISCONNECT THE BATTERY NEGATIVE (GROUND) CABLE AND ISOLATE IT. THEN ALLOW THE SYSTEM CAPACITOR TO DISCHARGE FOR A MINIMUM OF TWO MINUTES BEFORE BEGINNING AIRBAG REMOVAL.

(3) Remove driver airbag mounting screws (Fig. 14).

(4) Lift airbag from mount and disconnect two airbag squib connectors and horn connector (Fig. 14) (Fig. 15). Remove driver airbag.

(5) Disconnect speed control wiring connector at clockspring (center terminal) (Fig. 15).

(6) Remove steering wheel retaining nut (Fig. 16).

(7) Remove damper (Fig. 16).

(8) Remove steering wheel using standard wheel puller.

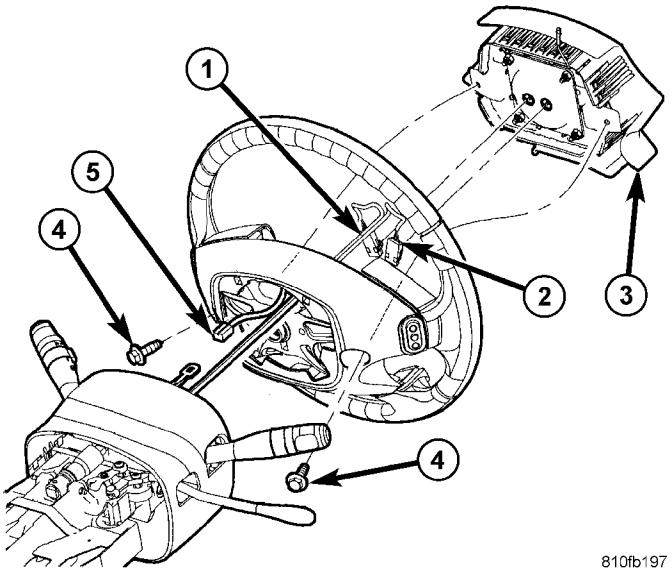


Fig. 14 Airbag Mounting To Steering Wheel

1 - SQUIB CONNECTOR
2 - SQUIB CONNECTOR
3 - DRIVER AIRBAG
4 - AIRBAG MOUNTING SCREW
5 - HORN PIGTAIL (CLOCKSPRING-TO-AIRBAG)

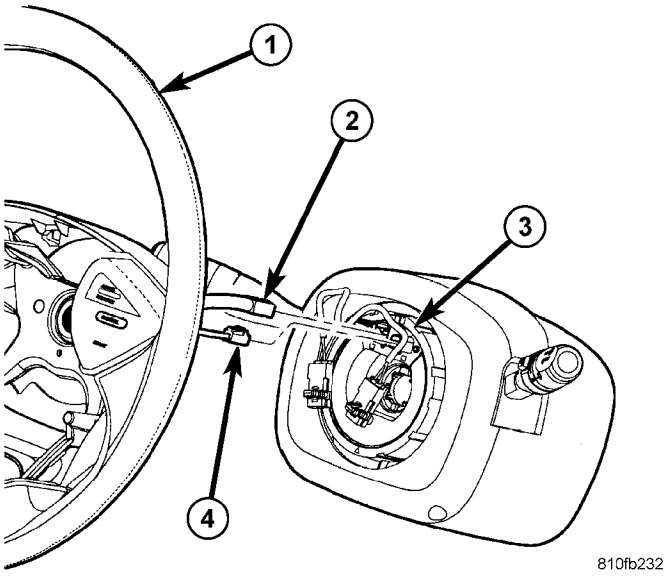


Fig. 15 Speed Control And Horn Wiring Connectors

1 - STEERING WHEEL
2 - SPEED CONTROL WIRING CONNECTOR
3 - CLOCKSPRING
4 - HORN WIRING CONNECTOR

(9) Remove speed control switches from steering wheel. (Refer to 8 - ELECTRICAL/SPEED CONTROL/SWITCH - REMOVAL)

(10) Remove remote audio switches from steering wheel. (Refer to 8 - ELECTRICAL/AUDIO/REMOTE SWITCHES - REMOVAL)

STEERING WHEEL (Continued)

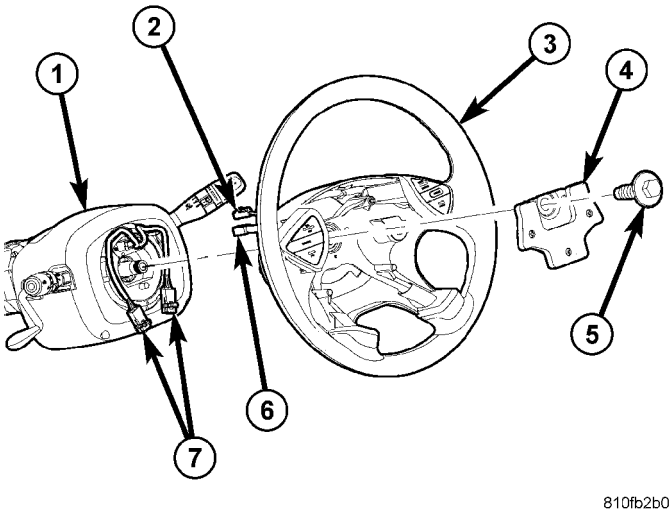


Fig. 16 Steering Wheel Mounting To Column

1 - STEERING COLUMN
2 - WIRING CONNECTOR
3 - STEERING WHEEL
4 - DAMPER
5 - RETAINING BOLT
6 - WIRING CONNECTOR
7 - AIRBAG SQUIB CONNECTORS

INSTALLATION

(1) Install remote audio control switches on steering wheel. (Refer to 8 - ELECTRICAL/AUDIO/REMOTE SWITCHES - INSTALLATION)

(2) Install speed control switches on steering wheel. (Refer to 8 - ELECTRICAL/SPEED CONTROL/SWITCH - INSTALLATION)

(3) Match splines on steering wheel hub with that on steering shaft and slide steering wheel onto column shaft.

(4) Install damper on steering wheel (Fig. 16).

(5) Install steering wheel retaining bolt (Fig. 16). Tighten bolt to 61 N·m (45 ft. lbs.) torque.

(6) Connect speed control wiring connector at clockspring (Fig. 15).

(7) Connect two airbag squib connectors and horn connector to driver airbag (Fig. 14).

(8) Place driver airbag on steering wheel and install mounting screws (Fig. 14). Tighten screws to 10 N·m (90 in. lbs.) torque.

(9) Connect battery negative (-) cable to battery post following special Diagnosis And Testing procedure. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING)

(10) Check operation of horn, speed control and remote audio controls.

GEAR

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GEAR

WARNINGS AND CAUTIONS

WARNING: POWER STEERING FLUID, ENGINE PARTS AND EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES. DO NOT ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.

WARNING: FLUID LEVEL SHOULD BE CHECKED WITH THE ENGINE OFF TO PREVENT PERSONAL INJURY FROM MOVING PARTS.

CAUTION: When the system is open, cap all open ends of the hoses, power steering pump fittings or power steering gear ports to prevent entry of foreign material into the components.

CAUTION: When servicing power steering components, do not pinch off power steering hoses in an any way to stop fluid flow. Damage to hoses may result.

REMOVAL

(1) Place front wheels of vehicle in STRAIGHT-AHEAD position.

(2) Install steering wheel holder locking steering wheel in STRAIGHT-AHEAD position (Fig. 1).

(3) Remove negative (-) battery cable from battery and isolate cable.

(4) Remove cap from power steering fluid reservoir.

(5) Using a siphon pump, remove as much power steering fluid as possible from power steering fluid reservoir.

(6) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(7) Remove both front tire and wheel assemblies.

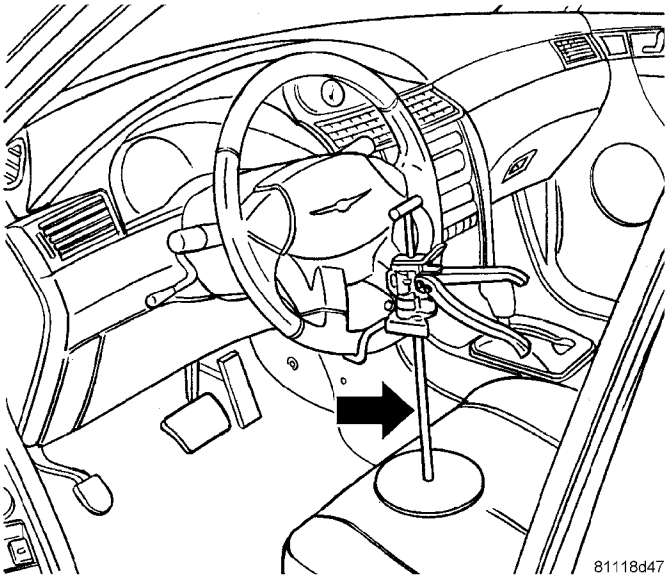


Fig. 1 Steering Wheel Holder

(8) If outer tie rods need to be transferred to new gear, loosen tie rod jam nuts on both sides of vehicle.

(9) On both sides of vehicle, remove nut attaching outer tie rod to steering knuckle by holding rod end stud stationary while loosening and removing nut with a wrench.

(10) Remove each outer tie rod end from steering knuckle using Remover, Special Tool C-3894-A (Fig. 2).

(11) Remove roll pin fastening intermediate shaft extension to power steering gear shaft as follows (Fig. 3):

(a) Insert Remover, Special Tool 6831A, through roll pin fastening intermediate shaft extension to power steering gear.

(b) Thread knurled nut all way onto end of Remover.

(c) While holding Remove head stationary, turn hex nut pulling roll pin from shafts.

(d) Remove roll pin from tool.

(12) Slide intermediate shaft extension off steering gear shaft.

(13) Remove tube nut fastening return hose to power steering gear (Fig. 4). Remove return hose from gear port.

GEAR (Continued)

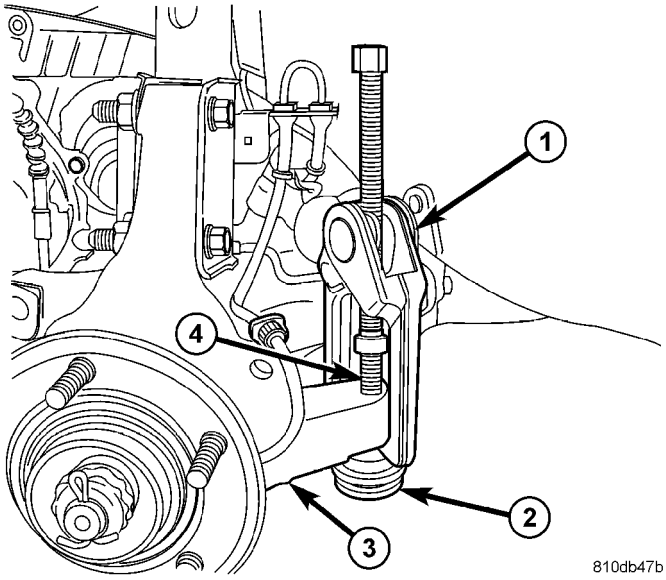


Fig. 2 Using C-3894-A To Release Tie Rod

1 - PULLER C-3894-A
2 - OUTER TIE ROD
3 - STEERING KNUCKLE
4 - TIE ROD STUD

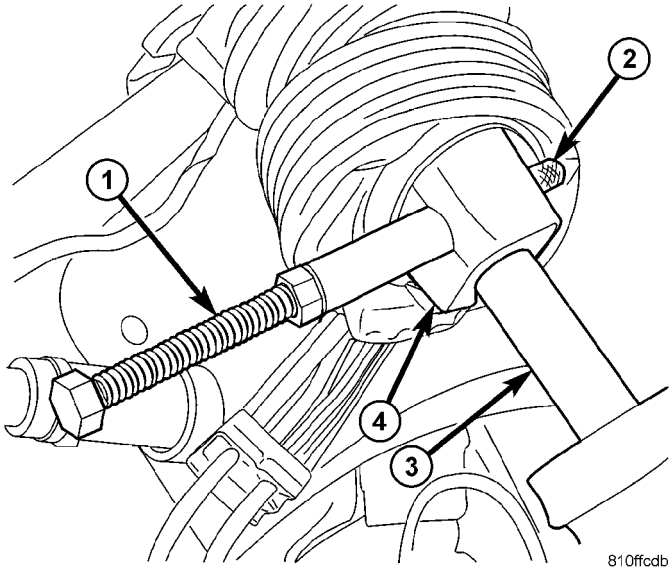


Fig. 3 Roll Pin Removal

1 - REMOVER 6831A
2 - KNURLED NUT
3 - STEERING GEAR SHAFT
4 - INTERMEDIATE SHAFT EXTENSION

(14) Remove tube nut fastening pressure hose to power steering gear (Fig. 4). Remove pressure hose from gear port.

(15) Remove two power steering gear mounting bolts.

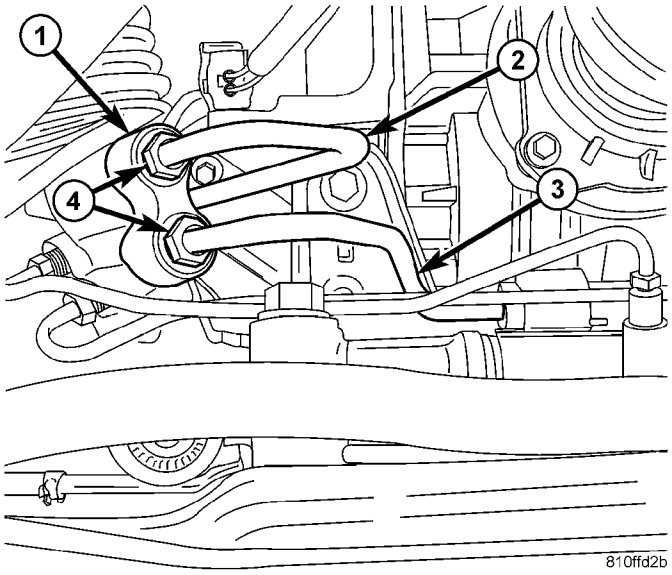


Fig. 4 Hoses At Steering Gear

1 - POWER STEERING GEAR
2 - RETURN HOSE
3 - PRESSURE HOSE
4 - TUBE NUTS

(16) Carefully remove power steering gear. Tip gear forward at top (Fig. 5), then slide gear out left wheel opening. **Use care not to cut tie rod boots on shields as gear is removed.**

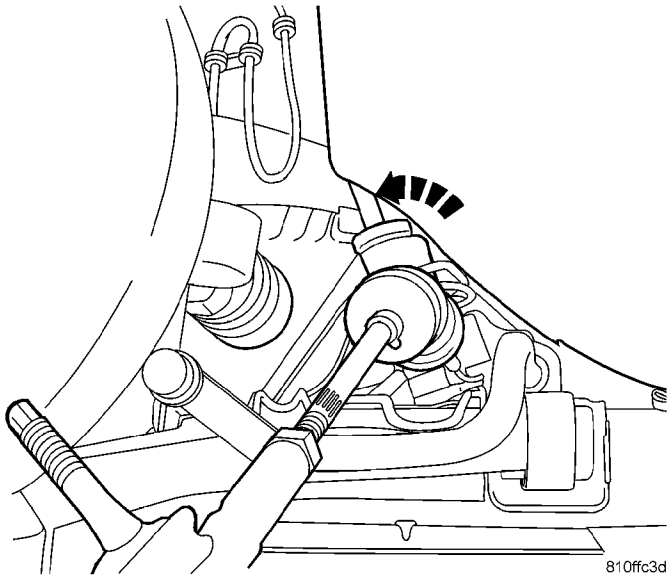


Fig. 5 Gear Tipped Forward For Removal/Installation

(17) If necessary, remove outer tie rods from inner tie rod threads. Count how many rotations it takes to remove each outer tie rod for installation reference.

GEAR (Continued)

INSTALLATION

(1) If necessary, install outer tie rods onto inner tie rod threads. As outer tie rods are installed, count out same amount of rotations as were counted on tie rod removal. This will get toe setting somewhat close to specifications before vehicle is aligned at end of this procedure.

(2) Carefully install power steering gear through left wheel opening using the reverse of how it was removed. **Use care not to cut tie rod boots on shields as gear is installed.**

NOTE: When installing steering gear mounting bolts, note driver's side mounting bolt is longer than passenger's side bolt.

(3) Center gear mounting bosses over mounting holes in cradle and install two power steering gear mounting bolts. Tighten mounting bolts to 163 N·m (120 ft. lbs.) torque.

NOTE: Before installing power steering hoses on power steering gear, wipe clean connections with a lint-free cloth and replace O-rings. Lubricate O-rings using clean power steering fluid.

(4) Install pressure hose into gear port (Fig. 4). Thread pressure hose tube nut into gear and tighten to 31 N·m (275 in. lbs.) torque.

(5) Install return hose into gear port (Fig. 4). Thread return hose tube nut into gear and tighten to 31 N·m (275 in. lbs.) torque.

(6) Find power steering gear's center of travel, then match splines inside intermediate shaft extension with that on steering gear shaft. Slide extension onto shaft (Fig. 9).

(7) Install roll pin fastening intermediate shaft extension to power steering gear shaft as follows (Fig. 6):

(a) Insert Installer, Special Tool 6831A, extension and steering gear shaft.

(b) Slide roll pin onto Remover shaft.

(c) Thread knurled nut all way onto end of Installer.

(d) While holding Installer head stationary, turn hex nut pulling roll pin into shafts. Stop installing roll pin once it is centered intermediate shaft extension.

(e) Remove tool.

(8) Slide shaft cover down over top of steering gear.

(9) Install outer tie rods to steering knuckles. Start NEW nut onto stud of each outer tie rod. While holding stud stationary using a socket, tighten nut. Using a crowfoot wrench on a torque wrench, tighten nut to 47 N·m (35 ft. lbs.) torque. Then, tighten nut an additional 1/2 (180°) turn after that torque is met.

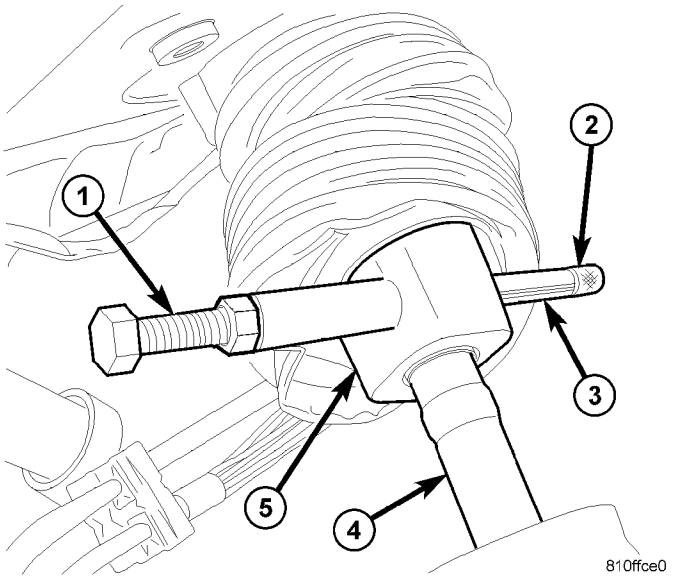


Fig. 6 Roll Pin Installation

1 - INSTALLER 6831A
2 - KNURLED NUT
3 - ROLL PIN
4 - STEERING GEAR SHAFT
5 - INTERMEDIATE SHAFT EXTENSION

(10) Snug tie rod jam nuts on both sides of vehicle. **Do not torque at this time. Tighten tie rod jam nuts to 75 N·m (55 ft. lbs.) torque while performing wheel alignment at end of this procedure.**

(11) Install tire and wheel assemblies (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(12) Lower vehicle.

(13) Connect negative (-) battery cable on negative battery post.

(14) Remove steering wheel holder.

(15) Fill and bleed power steering system using Power Steering Pump Initial Operation Procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(16) Inspect for leaks.

(17) Perform wheel alignment setting toe to specifications. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

PUMP

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PUMP

WARNING

WARNING: POWER STEERING FLUID, ENGINE PARTS AND EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES. DO NOT ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.

WARNING: FLUID LEVEL SHOULD BE CHECKED WITH THE ENGINE OFF TO PREVENT PERSONAL INJURY FROM MOVING PARTS.

CAUTION

CAUTION: When the system is open, cap all open ends of the hoses, power steering pump fittings or power steering gear ports to prevent entry of foreign material into the components.

CAUTION: When servicing power steering components, do not pinch off power steering hoses in an any way to stop fluid flow. Damage to hoses may result.

STANDARD PROCEDURE - POWER STEERING PUMP INITIAL OPERATION

WARNING: FLUID LEVEL SHOULD BE CHECKED AND ADJUSTED WITH ENGINE OFF TO PREVENT INJURY FROM MOVING ENGINE COMPONENTS.

CAUTION: Use only Mopar® ATF+4 Automatic Transmission Fluid (MS-9602) in power steering system. Use of other Mopar® power steering fluids (MS5931 and MS9933) should be avoided to ensure peak performance of the power steering system under all operating conditions. Do not overfill.

Read the fluid level through the side of the power steering fluid reservoir. The fluid level should be within **"FILL RANGE"** when the fluid is at a temperature of approximately 21°C to 27°C (70°F to 80°F).

(1) Wipe the filler cap and area clean, then remove the cap.

(2) Fill the fluid reservoir to the proper level and let the fluid settle for at least two (2) minutes.

PUMP (Continued)

(3) Start the engine and let run for a few seconds, then turn the engine off.
(4) Add fluid if necessary. Repeat the above steps until the fluid level remains constant after running the engine.
(5) Raise the front wheels off the ground.
(6) Start the engine.
(7) Slowly turn the steering wheel right and left, lightly contacting the wheel stops.
(8) Add fluid if necessary.
(9) Lower the vehicle, then turn the steering wheel slowly from lock-to-lock.
(10) Stop the engine. Check the fluid level and refill as required.
(11) If the fluid is extremely foamy, allow the vehicle to stabilize a few minutes, then repeat the above procedure.

REMOVAL

REMOVAL - 3.5L ENGINE

(1) Remove negative (-) battery cable from battery and isolate cable.
(2) Remove cap from power steering fluid reservoir.
(3) Using a siphon pump, remove as much power steering fluid as possible from power steering fluid reservoir.
(4) Remove engine appearance cover.
(5) Remove upper radiator closure panel. (Refer to 23 - BODY/EXTERIOR/CLOSURE PANEL - REMOVAL)
(6) Remove power steering fluid reservoir. (Refer to 19 - STEERING/PUMP/RESERVOIR - REMOVAL)
(7) Remove clamp, then remove fluid supply hose from pump (Fig. 1).
(8) Disconnect pressure hose from pump (Fig. 1).
(9) Remove generator wiring harness routing clip from pump (Fig. 2).
(10) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)
(11) Remove right front tire and wheel assembly.
(12) Remove drive belt splash shield.
(13) Remove nut, then hose tube routing clamp at A/C compressor mounted bracket (Fig. 3).
(14) Remove nuts mounting front and rear motor mounts to engine cradle (one nut each mount).
(15) Remove accessory drive belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)
(16) lower vehicle.
(17) Remove air cleaner housing. (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL)

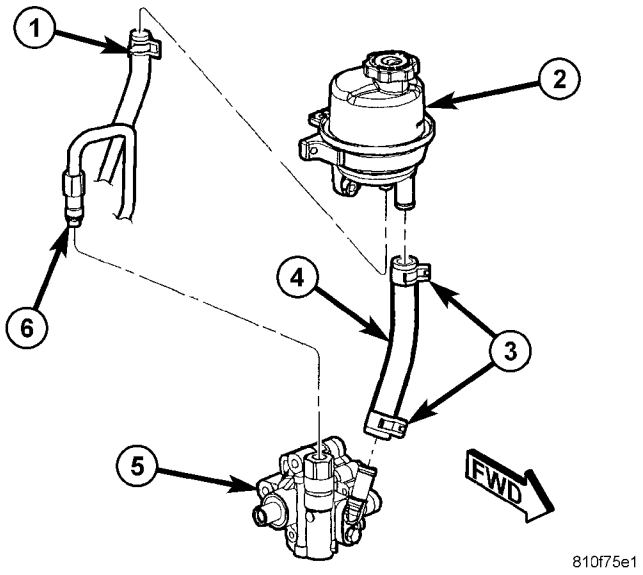


Fig. 1 Hoses At Pump And Reservoir

1 - RETURN HOSE CLAMP
2 - FLUID RESERVOIR
3 - SUPPLY HOSE CLAMPS
4 - SUPPLY HOSE
5 - POWER STEERING PUMP
6 - PRESSURE HOSE TUBE NUT

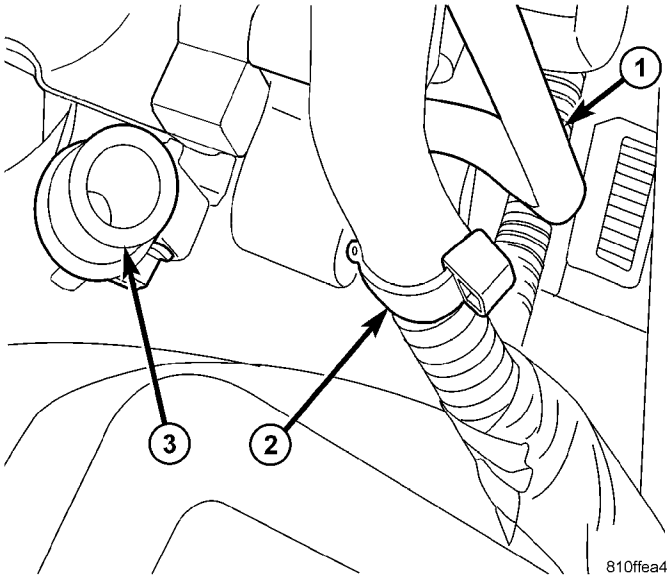


Fig. 2 Wiring Harness Clip At Pump

1 - POWER STEERING HOSE
2 - GENERATOR WIRING HARNESS ROUTING CLIP
3 - SUPPLY FITTING ON PUMP

(18) Remove two bolts fastening right motor mount to frame rail.
(19) Move pressure and return hoses away from pump toward cooling module as far as possible without bending lines.
(20) Place floor jack with an appropriate sized block of wood on it below engine oil pan (Fig. 4).

PUMP (Continued)

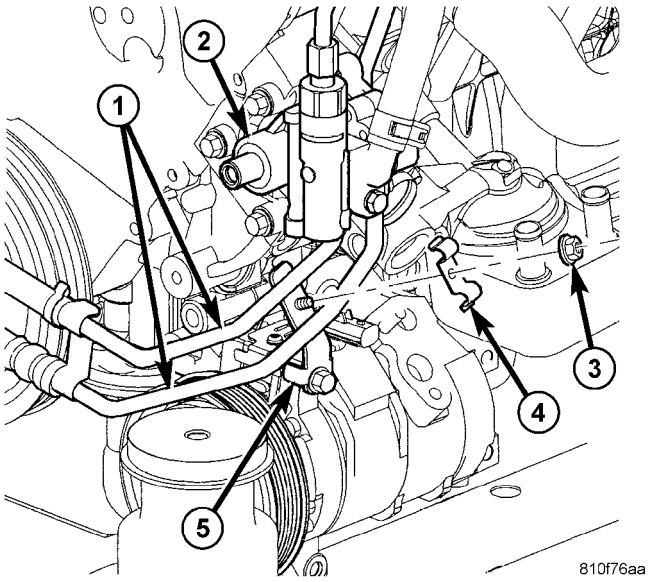


Fig. 3 Hose Routing Clip At A/C Mounted Bracket

1 - POWER STEERING HOSE TUBES
2 - POWER STEERING PUMP
3 - NUT
4 - CLAMP
5 - A/C MOUNTED BRACKET

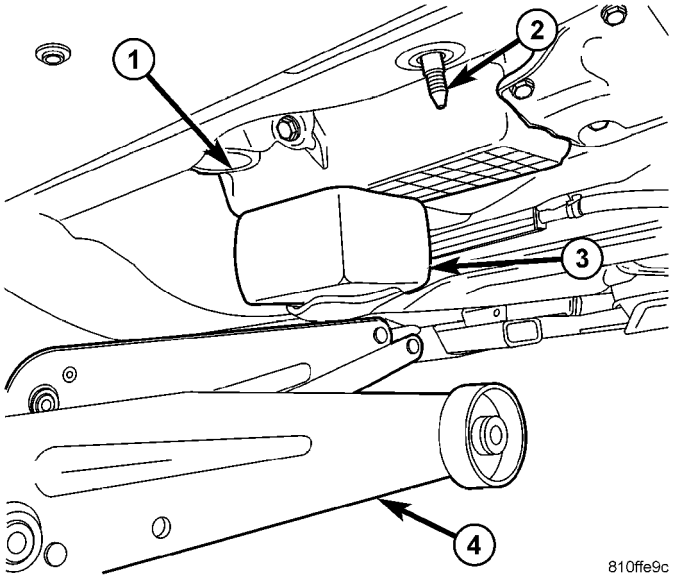


Fig. 4 Jack Placed Under Oil Pan

1 - ENGINE OIL PAN
2 - FRONT ENGINE MOUNT STUD
3 - BLOCK OF WOOD
4 - FLOOR JACK

CAUTION: When lifting engine, DO NOT raise engine more than necessary or damage to driveline half shaft (and possibly other components) will occur.

(21) Carefully raise accessory drive end of engine with floor jack approximately 2 inches (or just enough to access pump mounting bolts).

(22) Remove three pump mounting bolts through pulley (Fig. 5) (Fig. 6).

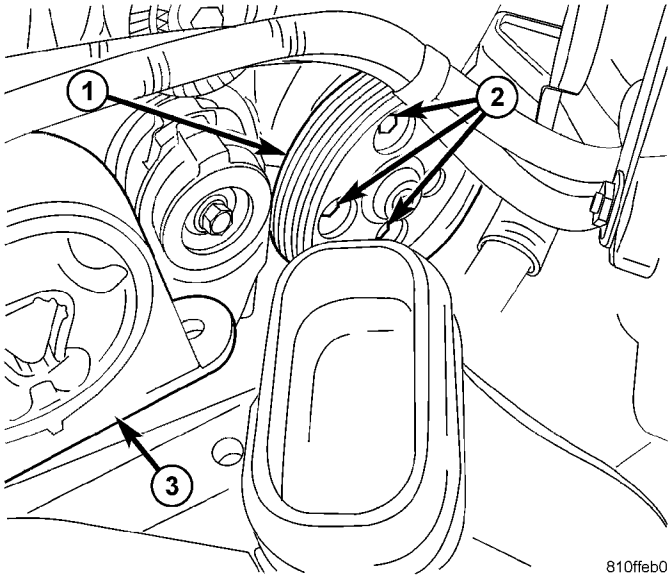


Fig. 5 Pump Mounting Bolts Through Pulley

1 - PUMP PULLEY
2 - PUMP MOUNTING BOLTS
3 - RIGHT ENGINE MOUNT LIFTED OFF FRAME RAIL

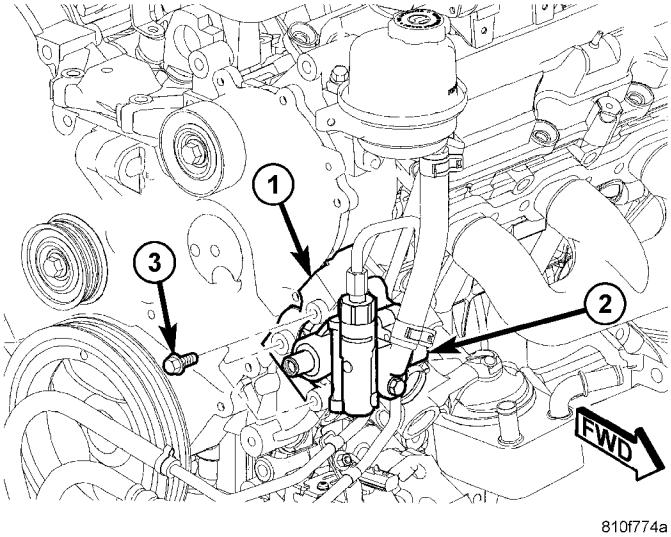


Fig. 6 Power Steering Pump Mounting

1 - PUMP MOUNTING BRACKET ON ENGINE
2 - POWER STEERING PUMP
3 - MOUNTING BOLTS

(23) Remove pump (with pulley) from engine compartment.

PUMP (Continued)

REMOVAL - 3.8L ENGINE

(1) Remove negative (-) battery cable from battery and isolate cable.

(2) Remove cap from power steering fluid reservoir.

(3) Using a siphon pump, remove as much power steering fluid as possible from power steering fluid reservoir.

(4) Remove air cleaner housing and hoses to engine. (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL)

(5) Remove accessory drive belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)

(6) Remove clamp, then remove return hose at reservoir (Fig. 7).

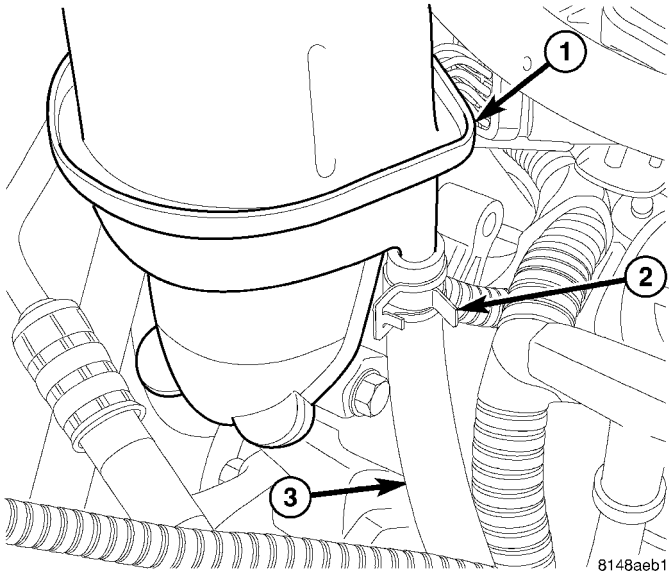


Fig. 7 Return Hose At Reservoir

1 - RESERVOIR
2 - CLAMP
3 - RETURN HOSE

(7) Unthread tube nut and remove pressure hose at pump (Fig. 8).

(8) Remove three pump mounting bolts through pulley (Fig. 9).

(9) Remove pump (with pulley and reservoir) from engine compartment.

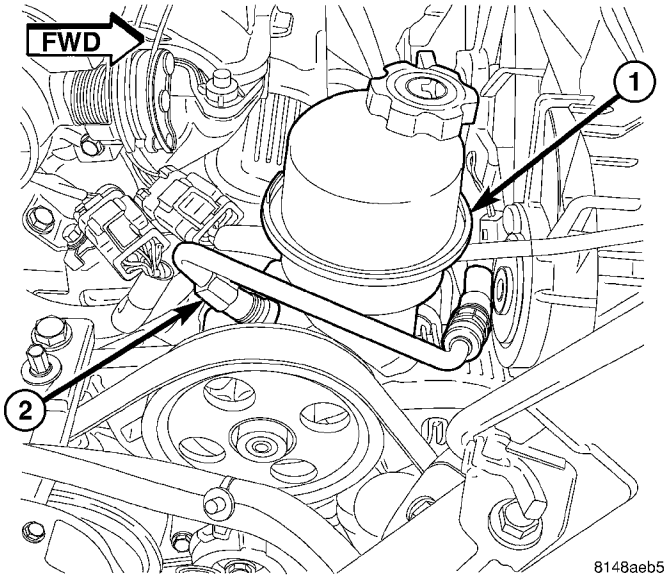


Fig. 8 Pressure Hose At Pump

1 - PUMP
2 - PRESSURE HOSE

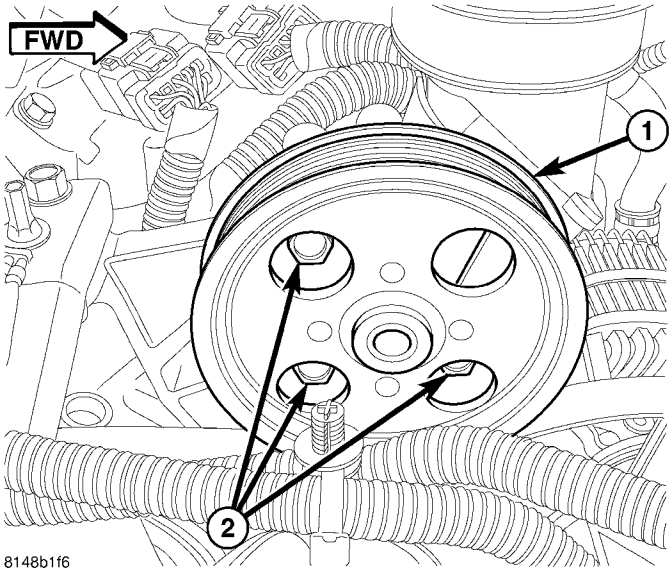


Fig. 9 Pump Mounting Bolts

1 - PULLEY
2 - MOUNTING BOLTS

PUMP (Continued)

DISASSEMBLY - PUMP (PULLEY)

The only serviceable part of the power steering pump is the pulley. The procedure following is for removal and installation of the pulley from the pump once the pump is removed from the vehicle.

(1) Remove the power steering pump from the vehicle. Refer to Removal And Installation in this section of the service manual.

(2) Remove the pulley from the shaft of the power steering pump using Puller C-4333 (Fig. 10).

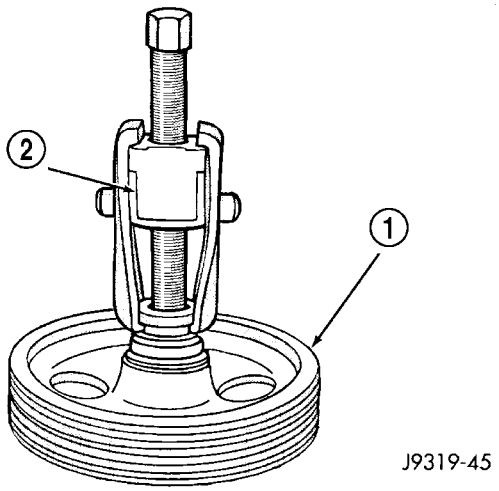


Fig. 10 Pulley Removal

1 - POWER STEERING PUMP DRIVE PULLEY
2 - SPECIAL TOOL C-4333

CAUTION: Do not hammer on power steering pump pulley. This will damage the pulley and the power steering pump.

(3) Replace pulley if it is found to be bent, cracked, or loose.

ASSEMBLY - PUMP (PULLEY)

The only serviceable part of the power steering pump is the pulley. The procedure following is for removal and installation of the pulley from the pump once the pump is removed from the vehicle.

(1) Install the pulley with Installer C-4063 (Fig. 11). Do not use the tool adapters.

(2) Ensure that the tool and the pulley remain aligned with the pump shaft. Prevent the pulley from being cocked on the shaft.

(3) Install the pulley until it is flush with the end of the power steering pump shaft (Fig. 12).

(4) Install the power steering pump on the vehicle.

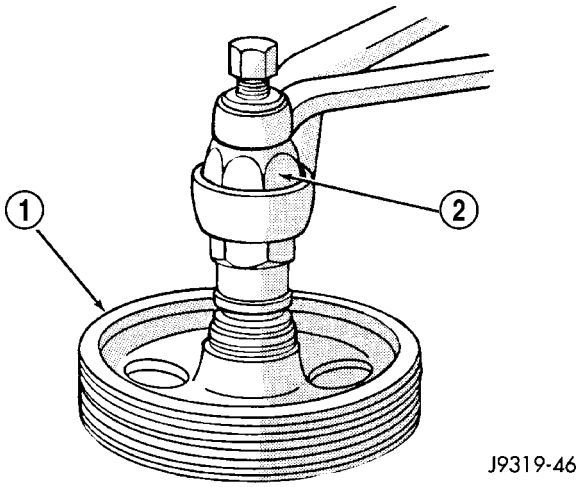


Fig. 11 Pulley Installation

1 - POWER STEERING PUMP DRIVE PULLEY
2 - SPECIAL TOOL C-4063–A

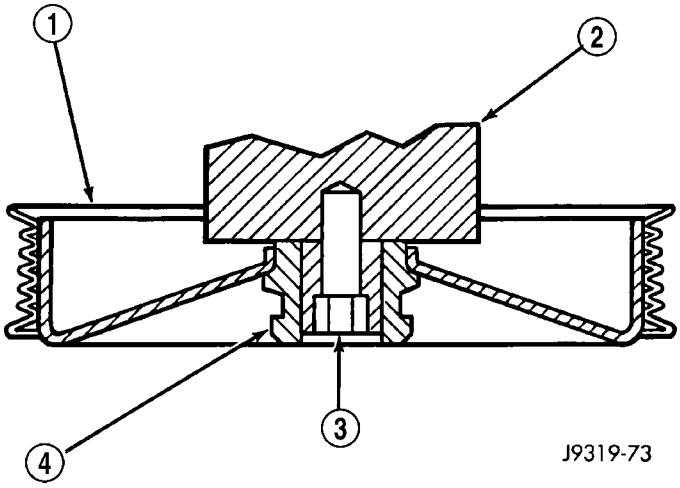


Fig. 12 Pulley To Pump Shaft Location

1 - PULLEY
2 - PUMP BODY
3 - PUMP SHAFT
4 - HUB

INSTALLATION

INSTALLATION - 3.5L ENGINE

(1) Install power steering pump back in engine compartment using reverse order of its removal.

(2) Install power steering pump on its mounting bracket (Fig. 6).

(3) Install three power steering pump mounting bolts through pulley (Fig. 6) (Fig. 5). Tighten pump mounting bolts to 23 N·m (200 in. lbs.) torque.

(4) Lower floor jack allowing engine to return to normal position. Remove jack.

(5) Install two bolts fastening right motor mount to frame rail. Tighten bolts to 68 N·m (50 ft. lbs.) torque.

PUMP (Continued)

(6) Reposition pressure and return hoses to their original locations at pump (Fig. 1).

NOTE: Before installing power steering pressure hose on power steering pump, replace O-ring on end of power steering pressure hose. Lubricate O-ring using clean power steering fluid.

(7) Install pressure hose into pump fitting (Fig. 1). Thread pressure hose tube nut into pump and tighten to 31 N·m (275 in. lbs.) torque.

(8) Raise vehicle.

(9) Install nuts mounting front and rear motor mounts to engine cradle (one nut each mount). Tighten nuts to 102 N·m (75 ft. lbs.) torque.

(10) Install accessory drive belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(11) Place pressure and return hoses on A/C compressor mounted bracket and install routing clamp and nut (Fig. 3). Tighten nut to 12 N·m (105 in. lbs.) torque.

(12) Install drive belt splash shield.

(13) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(14) Lower vehicle.

(15) Install air cleaner housing. (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION)

(16) Install generator wiring harness routing clip into pump (Fig. 2).

(17) Slide fluid supply hose onto pump fitting and install clamp securing it in place (Fig. 1).

(18) Install power steering fluid reservoir. (Refer to 19 - STEERING/PUMP/RESERVOIR - INSTALLATION)

(19) Install upper radiator closure panel. (Refer to 23 - BODY/EXTERIOR/CLOSURE PANEL - INSTALLATION)

(20) Install engine appearance cover.

(21) Connect negative (-) battery cable on negative battery post.

(22) Fill and bleed power steering system using Power Steering Pump Initial Operation Procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(23) Inspect for leaks.

INSTALLATION - 3.8L ENGINE

(1) Position power steering pump on engine.

(2) Install three power steering pump mounting bolts through pulley (Fig. 9). Tighten pump mounting bolts to 23 N·m (200 in. lbs.) torque.

NOTE: Before installing power steering pressure hose on power steering pump, replace O-ring on end of power steering pressure hose. Lubricate O-ring using clean power steering fluid.

(3) Install pressure hose into pump fitting (Fig. 8). Thread pressure hose tube nut into pump and tighten to 31 N·m (275 in. lbs.) torque.

(4) Slide return hose onto reservoir fitting and install clamp securing it in place (Fig. 7).

(5) Install accessory drive belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(6) Install air cleaner housing and hoses. (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION)

(7) Connect negative (-) battery cable on negative battery post.

(8) Fill and bleed power steering system using Power Steering Pump Initial Operation Procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(9) Inspect for leaks.

FLUID

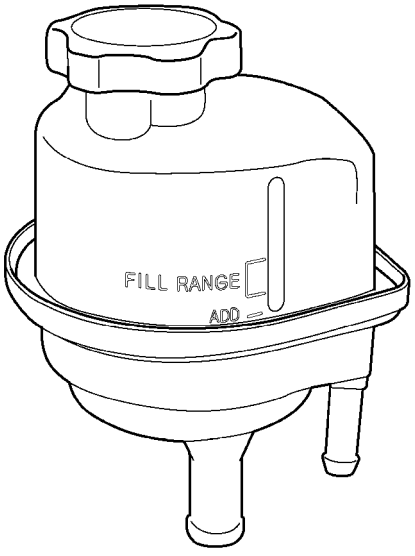
STANDARD PROCEDURE - POWER STEERING FLUID LEVEL CHECKING

WARNING: FLUID LEVEL SHOULD BE CHECKED WITH THE ENGINE OFF TO PREVENT INJURY FROM MOVING PARTS AND TO ENSURE ACCURATE FLUID LEVEL READING.

The fluid level can be read on the exterior of the power steering fluid reservoir. The fluid level should be within the "FILL RANGE" when the fluid is at normal ambient temperature, approximately 21°C to 27°C (70°F to 80°F) (Fig. 13).

Before removing the power steering filler cap, wipe the reservoir filler cap free of dirt and debris. Do not overfill the power steering system. **Use only Mopar® ATF+4 Automatic Transmission Fluid (MS-9602) in the power steering system.** For additional information on Automatic Transmission Fluid, (Refer to LUBRICATION & MAINTENANCE/ FLUID TYPES - DESCRIPTION).

CAUTION: Use only Mopar® ATF+4 Automatic Transmission Fluid (MS-9602). Use of other Mopar® power steering fluids (MS5931 and MS9933) should be avoided to ensure peak performance of the power steering system under all operating conditions.



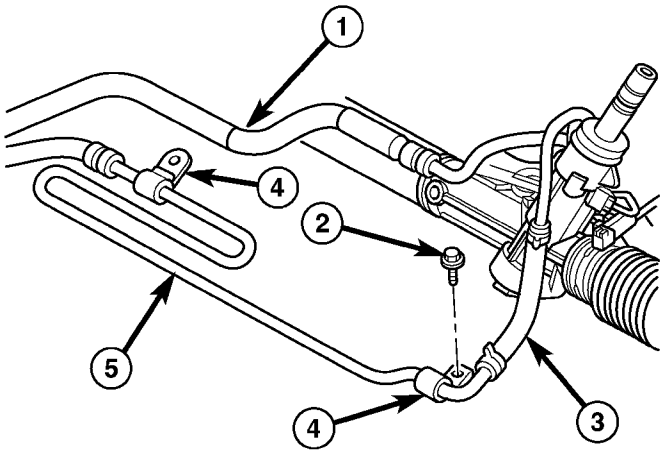
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Fig. 13 Power Steering Fluid Reservoir

FLUID COOLER

DESCRIPTION

For fluid cooling purposes a cooling loop is located in the power steering fluid return hose (Fig. 14). The cooling loop is serviced as part of the return hose.



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Fig. 14 Hoses Near Steering Gear

1 - PRESSURE HOSE
2 - SCREW
3 - RETURN HOSE
4 - ROUTING CLAMP
5 - COOLING LOOP PORTION OF RETURN HOSE

HOSE - PRESSURE

REMOVAL

REMOVAL - 3.5L ENGINE

(1) Remove power steering fluid reservoir. (Refer to 19 - STEERING/PUMP/RESERVOIR - REMOVAL)

(2) Remove tube nut fastening pressure hose to power steering pump (Fig. 15). Remove pressure hose from pump.

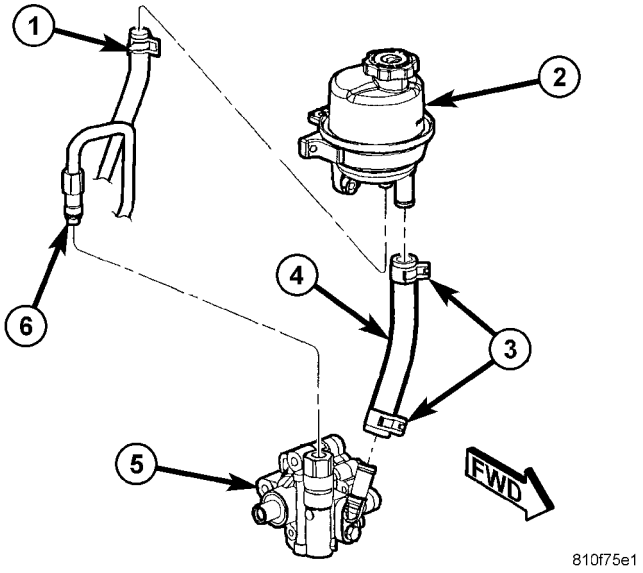


Fig. 15 Hoses At Pump And Reservoir

1 - RETURN HOSE CLAMP
2 - FLUID RESERVOIR
3 - SUPPLY HOSE CLAMPS
4 - SUPPLY HOSE
5 - POWER STEERING PUMP
6 - PRESSURE HOSE TUBE NUT

(3) Remove generator wiring harness routing clip from pump (Fig. 16).

(4) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Remove right front tire and wheel assembly.

(6) Remove drive belt splash shield.

(7) Remove nut, then hose tube routing clamp at A/C compressor mounted bracket (Fig. 17).

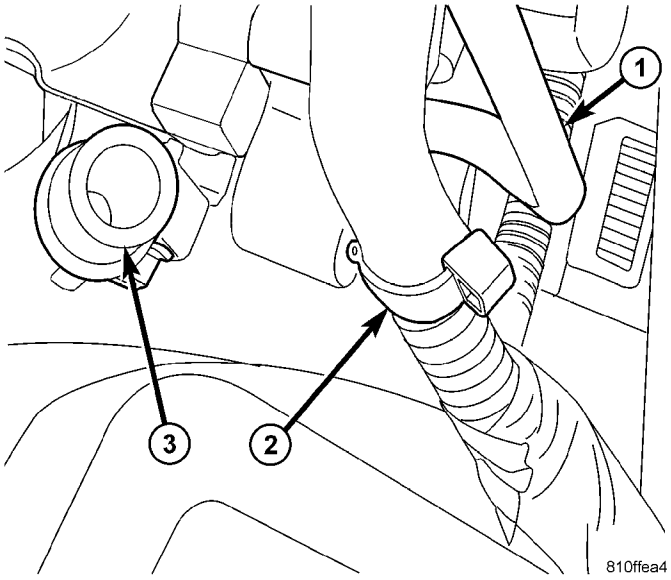


Fig. 16 Wiring Harness Clip At Pump

1 - POWER STEERING HOSE
2 - GENERATOR WIRING HARNESS ROUTING CLIP
3 - SUPPLY FITTING ON PUMP

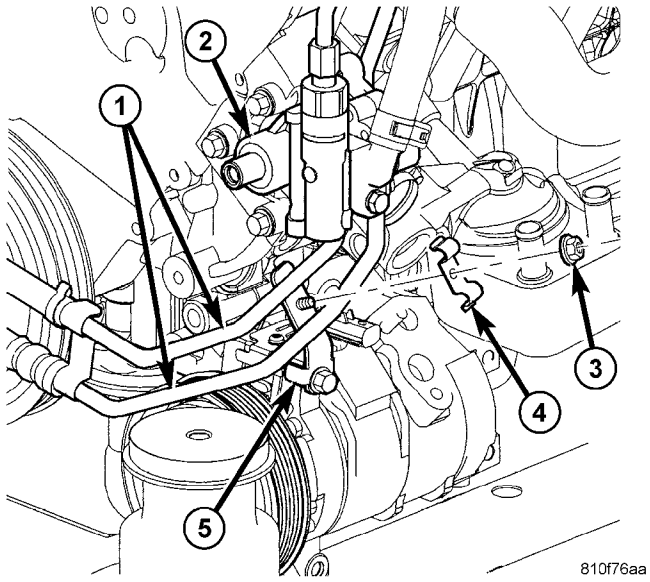


Fig. 17 Hose Routing Clip At A/C Mounted Bracket

1 - POWER STEERING HOSE TUBES
2 - POWER STEERING PUMP
3 - NUT
4 - CLAMP
5 - A/C MOUNTED BRACKET

HOSE - PRESSURE (Continued)

(8) Remove routing clip securing return hose to pressure hose near drive belt (Fig. 18).

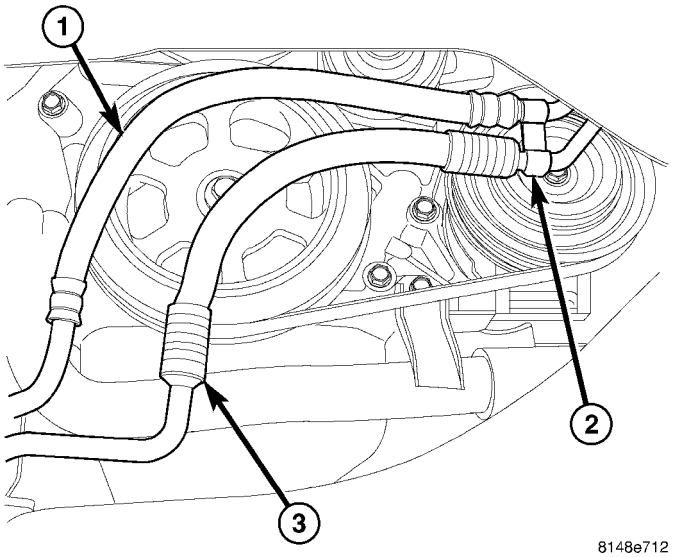


Fig. 18 Hose-To-Hose Routing Clip

1 - RETURN HOSE
2 - ROUTING CLIP
3 - PRESSURE HOSE

(9) Remove screw securing pressure and return hose routing clamps to right side of engine cradle (Fig. 19).

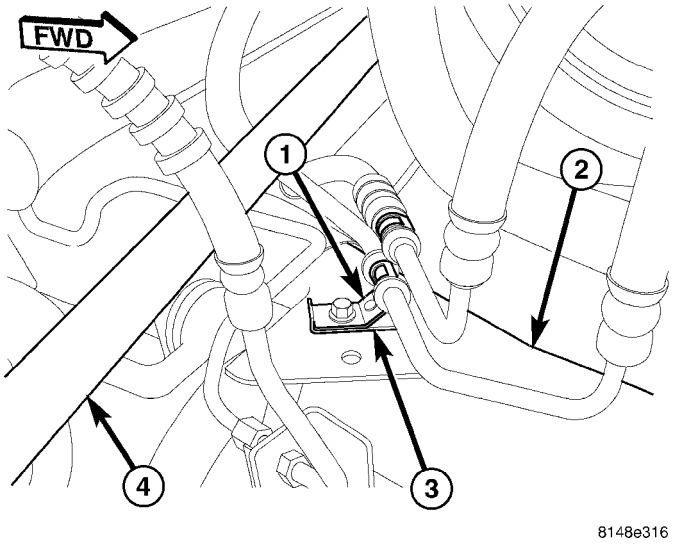


Fig. 19 Hose Routing Clamp - Right Side Cradle

1 - PRESSURE HOSE ROUTING CLAMP
2 - ENGINE CRADLE
3 - RETURN HOSE ROUTING CLAMP
4 - RIGHT HALF SHAFT

(10) Remove tie-strap clip securing pressure hose to engine cradle (Fig. 20).

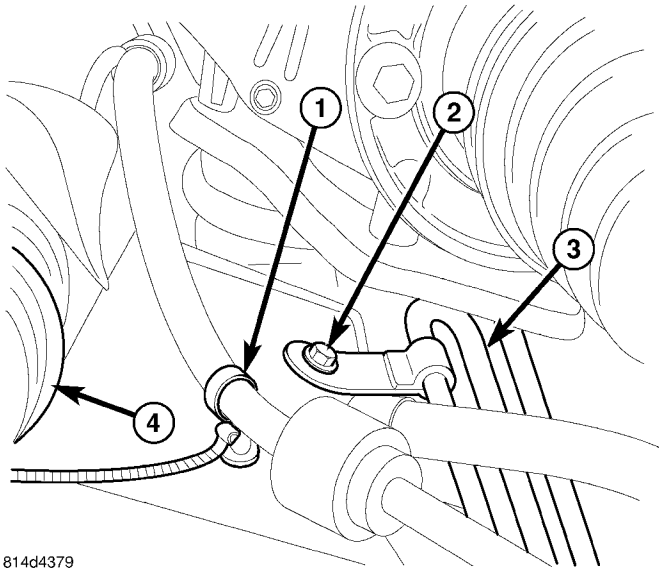


Fig. 20 Hose Mounting To Engine Cradle

1 - PRESSURE HOSE TIE-STRAP CLIP
2 - ROUTING CLAMP MOUNTING SCREW
3 - RETURN HOSE (COOLING LOOP PORTION)
4 - POWER STEERING GEAR

(11) Remove tube nut fastening pressure hose to power steering gear (Fig. 21). Remove hose from gear port.

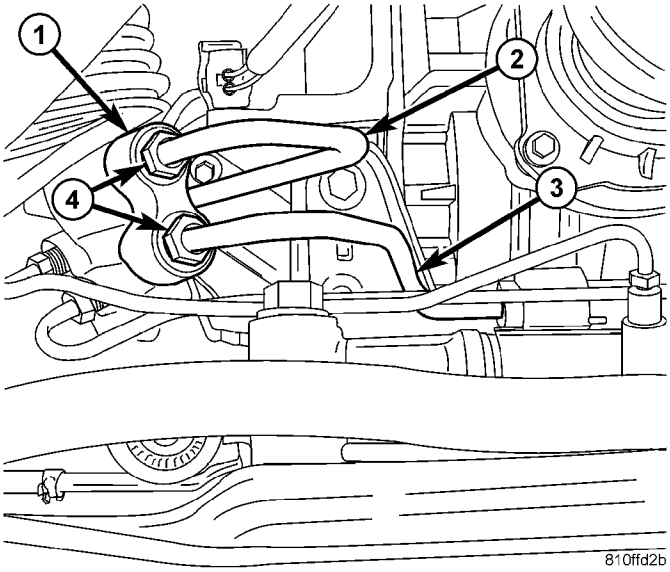


Fig. 21 Hoses At Steering Gear

1 - POWER STEERING GEAR
2 - RETURN HOSE
3 - PRESSURE HOSE
4 - TUBE NUTS

(12) Remove pressure hose from vehicle.

HOSE - PRESSURE (Continued)

REMOVAL - 3.8L ENGINE

(1) Remove negative (-) battery cable from battery and isolate cable.

(2) Remove cap from power steering fluid reservoir.

(3) Using a siphon pump, remove as much power steering fluid as possible from power steering fluid reservoir.

(4) Unthread tube nut and remove pressure hose at pump (Fig. 22).

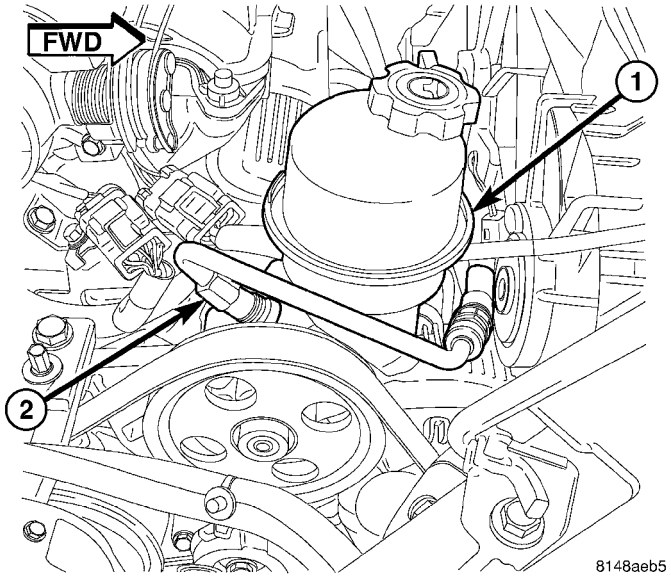


Fig. 22 Pressure Hose At Pump

1 - PUMP
2 - PRESSURE HOSE

(5) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(6) Remove right front tire and wheel assembly.

(7) Remove drive belt splash shield.

(8) Remove nut, then hose tube routing clamp above A/C compressor (Fig. 23).

(9) Remove routing clip securing return hose to pressure hose near drive belt (Fig. 24).

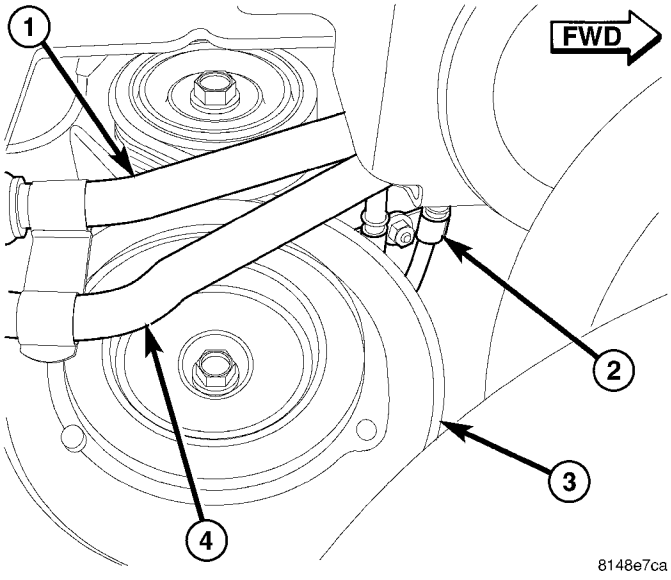


Fig. 23 Hose Routing Clip above A/C Compressor

1 - RETURN HOSE
2 - ROUTING CLAMP
3 - A/C COMPRESSOR
4 - PRESSURE HOSE

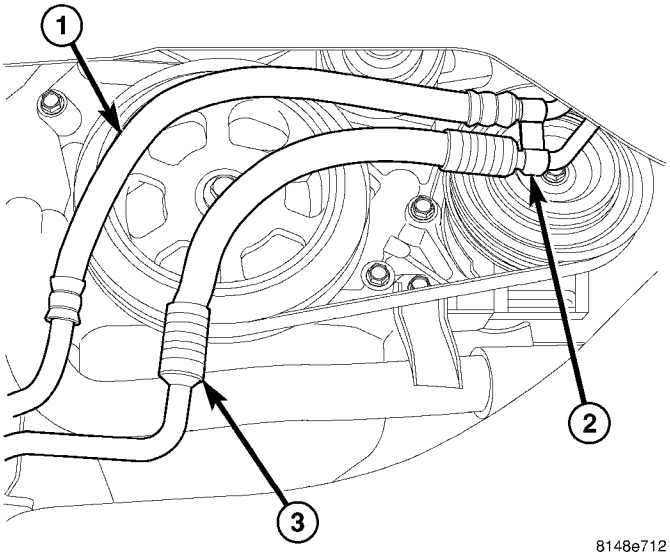


Fig. 24 Hose-To-Hose Routing Clip

1 - RETURN HOSE
2 - ROUTING CLIP
3 - PRESSURE HOSE

HOSE - PRESSURE (Continued)

(10) Remove screw securing pressure and return hose clamps to right side of engine cradle (Fig. 25).

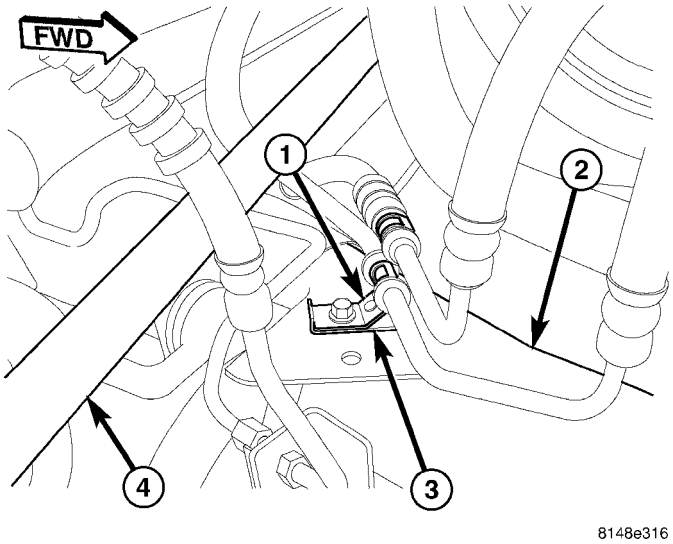


Fig. 25 Hose Routing Clamp - Right Side Cradle

1 - PRESSURE HOSE ROUTING CLAMP
2 - ENGINE CRADLE
3 - RETURN HOSE ROUTING CLAMP
4 - RIGHT HALF SHAFT

(11) Remove tie-strap clip securing pressure hose to engine cradle (Fig. 26).

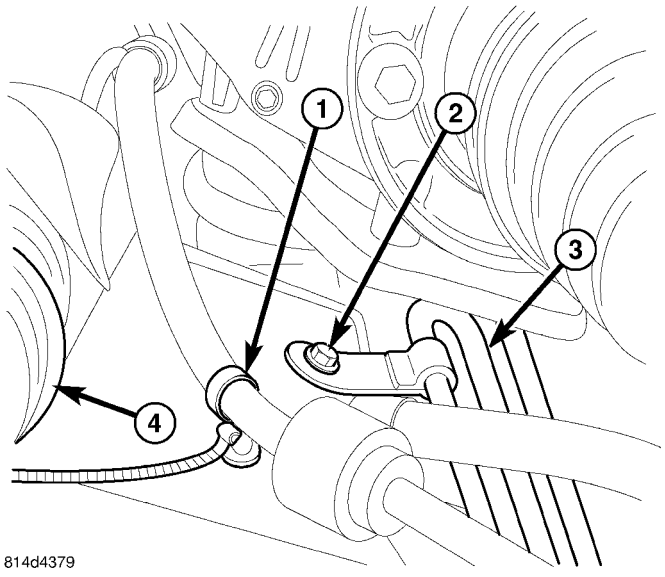


Fig. 26 Hose Mounting To Engine Cradle

1 - PRESSURE HOSE TIE-STRAP CLIP
2 - ROUTING CLAMP MOUNTING SCREW
3 - RETURN HOSE (COOLING LOOP PORTION)
4 - POWER STEERING GEAR

(12) Remove tube nut fastening pressure hose to power steering gear (Fig. 27). Remove hose from gear port.

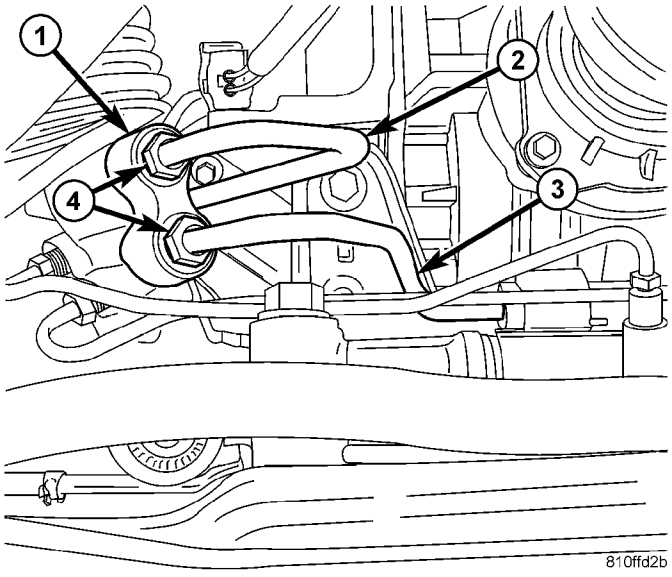


Fig. 27 Hoses At Steering Gear

1 - POWER STEERING GEAR
2 - RETURN HOSE
3 - PRESSURE HOSE
4 - TUBE NUTS

(13) Remove pressure hose from vehicle.

INSTALLATION

INSTALLATION - 3.5L ENGINE

(1) Place pressure hose into engine compartment from below using reverse order of removal.

NOTE: Before installing power steering pressure hose on power steering gear, wipe clean connections with a lint-free cloth and replace O-ring. Lubricate O-ring using clean power steering fluid.

(2) Install pressure hose into gear port (Fig. 21). Thread pressure hose tube nut into gear and tighten to 31 N·m (275 in. lbs.) torque.

(3) Install tie-strap clip securing pressure hose to engine cradle (Fig. 20).

(4) Place pressure hose routing clamp over return hose routing clamp at right side of engine cradle and install screw fastening both to cradle (Fig. 19). Tighten screw to 10 N·m (90 in. lbs.) torque.

(5) Install routing clip securing return hose to pressure hose near drive belt (Fig. 18).

(6) Lower vehicle.

NOTE: Before installing power steering pressure hose on power steering pump, replace O-ring on end of power steering pressure hose. Lubricate O-ring using clean power steering fluid.

HOSE - PRESSURE (Continued)

(7) Install pressure hose into pump fitting (Fig. 15). Thread pressure hose tube nut into pump and tighten to 31 N·m (275 in. lbs.) torque.

(8) Raise and support vehicle.

(9) Place pressure and return hoses on A/C compressor mounted bracket and install routing clamp and nut (Fig. 17). Tighten nut to 12 N·m (105 in. lbs.) torque.

(10) Install drive belt splash shield.

(11) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(12) Lower vehicle.

(13) Install generator wiring harness routing clip into pump (Fig. 16).

(14) Install power steering fluid reservoir. (Refer to 19 - STEERING/PUMP/RESERVOIR - INSTALLATION)

(15) Fill and bleed power steering system using Power Steering Pump Initial Operation Procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(16) Inspect for leaks.

INSTALLATION - 3.8L ENGINE

(1) Place pressure hose into engine compartment from below using reverse order of removal.

NOTE: Before installing power steering pressure hose on power steering gear, wipe clean connections with a lint-free cloth and replace O-ring. Lubricate O-ring using clean power steering fluid.

(2) Install pressure hose into gear port (Fig. 27). Thread pressure hose tube nut into gear and tighten to 31 N·m (275 in. lbs.) torque.

(3) Install tie-strap clip securing pressure hose to engine cradle (Fig. 26).

(4) Place pressure hose routing clamp over return hose routing clamp at right side of engine cradle and install screw fastening both to cradle (Fig. 25). Tighten screw to 10 N·m (90 in. lbs.) torque.

(5) Route hoses up past A/C compressor and install routing clip securing return hose tube to pressure hose tube near drive belt (Fig. 24).

(6) Lower vehicle to access hose from above.

NOTE: Before installing power steering pressure hose on power steering pump, replace O-ring on end of power steering pressure hose. Lubricate O-ring using clean power steering fluid.

(7) Install pressure hose into pump fitting (Fig. 22). Thread pressure hose tube nut into pump and tighten to 31 N·m (275 in. lbs.) torque.

(8) Raise and support vehicle.

(9) Position pressure and return hose tubes above A/C compressor, then install routing clamp and nut securing them in place (Fig. 23). Tighten nut to 12 N·m (105 in. lbs.) torque.

(10) Install drive belt splash shield.

(11) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(12) Lower vehicle.

(13) Install negative (-) battery cable on negative battery post.

(14) Fill and bleed power steering system using Power Steering Pump Initial Operation Procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(15) Inspect for leaks.

HOSE - RETURN

REMOVAL

REMOVAL - 3.5L ENGINE

(1) Remove power steering fluid reservoir. (Refer to 19 - STEERING/PUMP/RESERVOIR - REMOVAL)

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Remove right front tire and wheel assembly.

(4) Remove drive belt splash shield.

(5) Remove nut, then hose tube routing clamp at A/C compressor mounted bracket (Fig. 28).

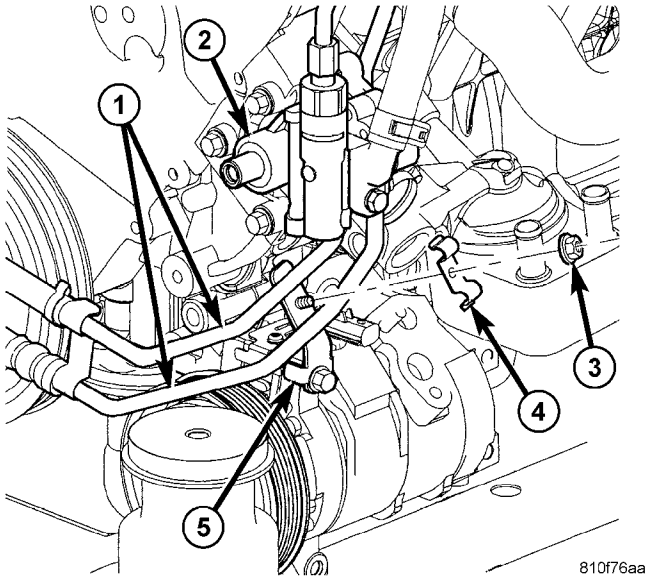


Fig. 28 Hose Routing Clip At A/C Mounted Bracket

1 - POWER STEERING HOSE TUBES
2 - POWER STEERING PUMP
3 - NUT
4 - CLAMP
5 - A/C MOUNTED BRACKET

HOSE - RETURN (Continued)

(6) Remove routing clip securing return hose to pressure hose near drive belt (Fig. 29).

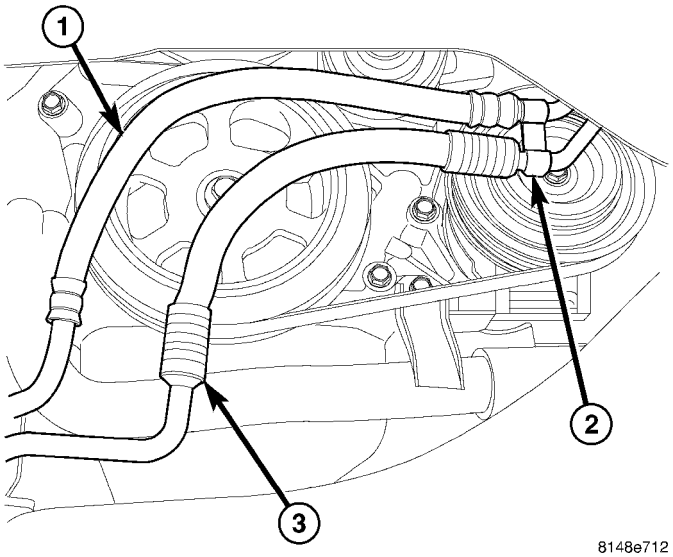


Fig. 29 Hose-To-Hose Routing Clip

1 - RETURN HOSE
2 - ROUTING CLIP
3 - PRESSURE HOSE

(7) Remove screw securing pressure and return hose clamps to right side of engine cradle (Fig. 30).

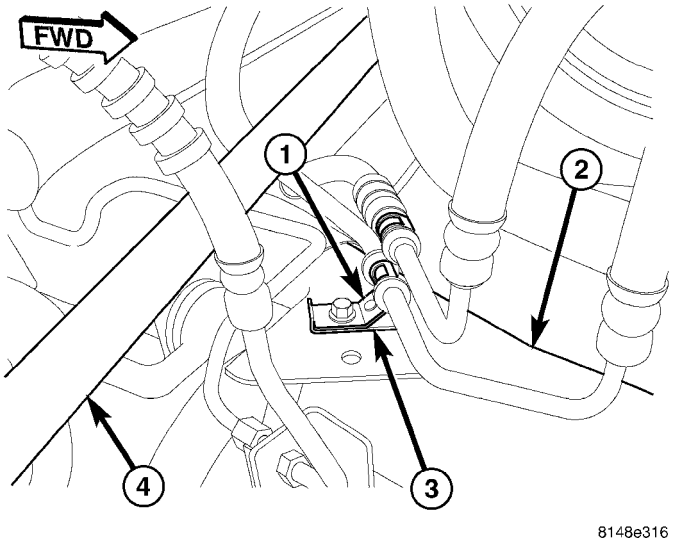


Fig. 30 Hose Routing Clamp - Right Side Cradle

1 - PRESSURE HOSE ROUTING CLAMP
2 - ENGINE CRADLE
3 - RETURN HOSE ROUTING CLAMP
4 - RIGHT HALF SHAFT

(8) Remove screw securing return hose clamp to left side of engine cradle (Fig. 31).

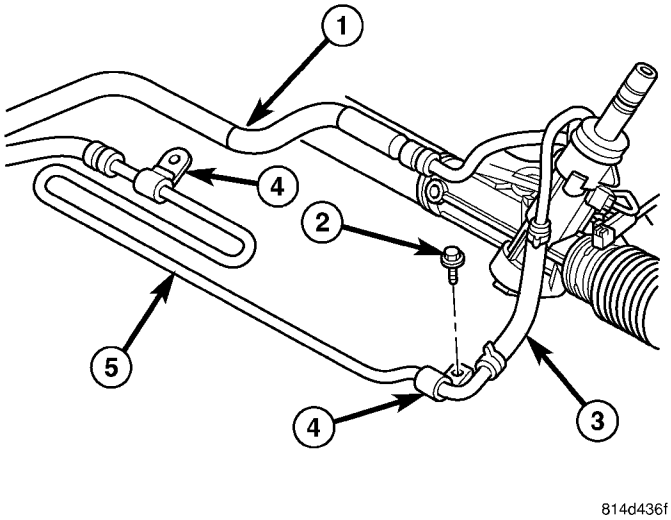


Fig. 31 Hoses Near Steering Gear

1 - PRESSURE HOSE
2 - SCREW
3 - RETURN HOSE
4 - ROUTING CLAMP
5 - COOLING LOOP PORTION OF RETURN HOSE

(9) Remove screw securing return hose clamp at cooling loop to engine cradle (Fig. 32).

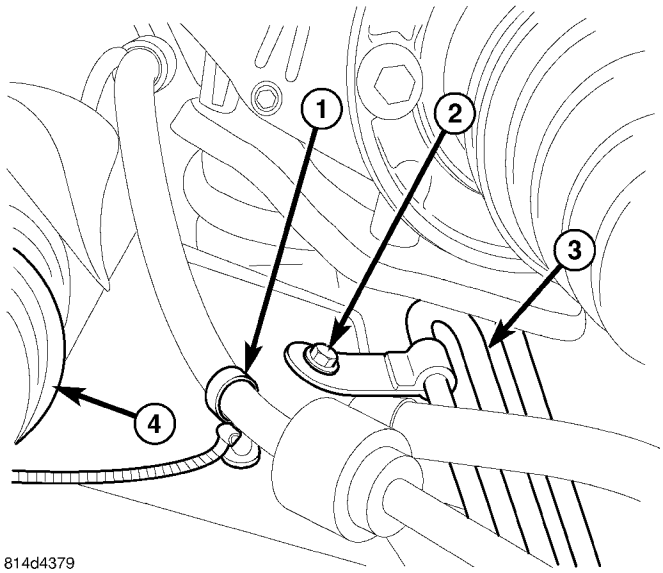


Fig. 32 Hose Mounting To Engine Cradle

1 - PRESSURE HOSE TIE-STRAP CLIP
2 - ROUTING CLAMP MOUNTING SCREW
3 - RETURN HOSE (COOLING LOOP PORTION)
4 - POWER STEERING GEAR

HOSE - RETURN (Continued)

(10) Remove tube nut fastening return hose to power steering gear (Fig. 33). Remove return hose from gear port.

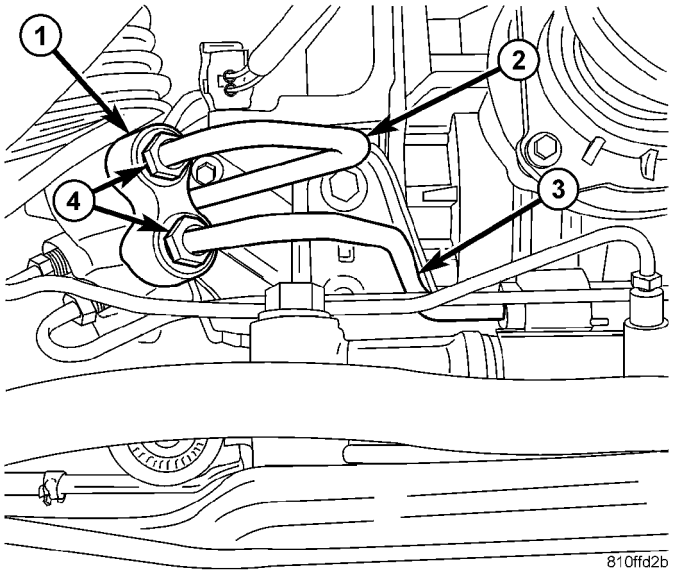


Fig. 33 Hoses At Steering Gear

1 - POWER STEERING GEAR
2 - RETURN HOSE
3 - PRESSURE HOSE
4 - TUBE NUTS

(11) Remove return hose from vehicle.

REMOVAL - 3.8L ENGINE

(1) Remove negative (-) battery cable from battery and isolate cable.

(2) Remove cap from power steering fluid reservoir.

(3) Using a siphon pump, remove as much power steering fluid as possible from power steering fluid reservoir.

(4) Remove clamp attaching return hose to power steering fluid reservoir. Remove hose from reservoir (Fig. 34).

(5) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(6) Remove right front tire and wheel assembly.

(7) Remove drive belt splash shield.

(8) Remove nut, then hose tube routing clamp above A/C compressor (Fig. 35).

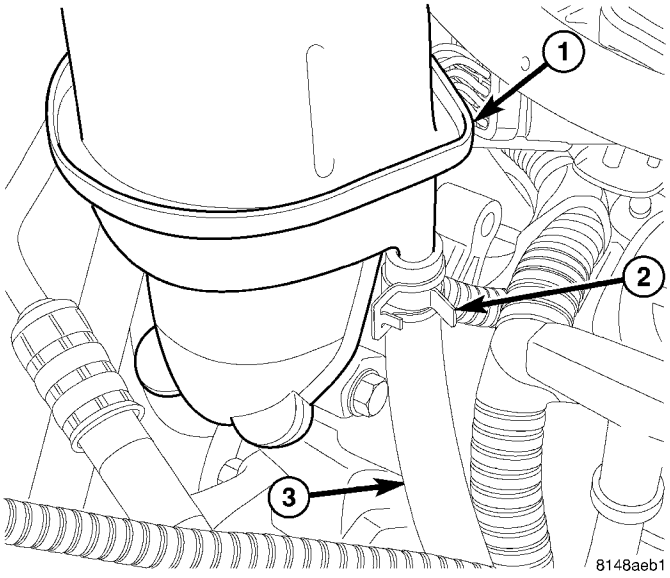


Fig. 34 Return Hose At Reservoir

1 - RESERVOIR
2 - CLAMP
3 - RETURN HOSE

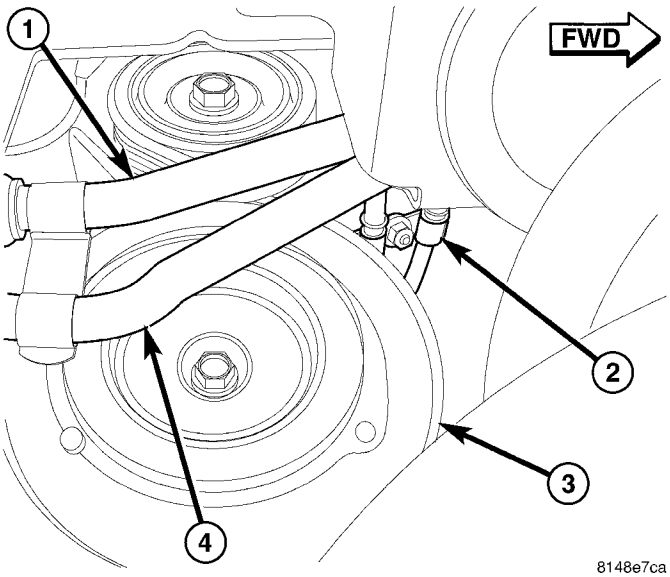


Fig. 35 Hose Routing Clip Above A/C Compressor

1 - RETURN HOSE
2 - ROUTING CLAMP
3 - A/C COMPRESSOR
4 - PRESSURE HOSE

HOSE - RETURN (Continued)

(9) Remove routing clip securing return hose to pressure hose near drive belt (Fig. 36).

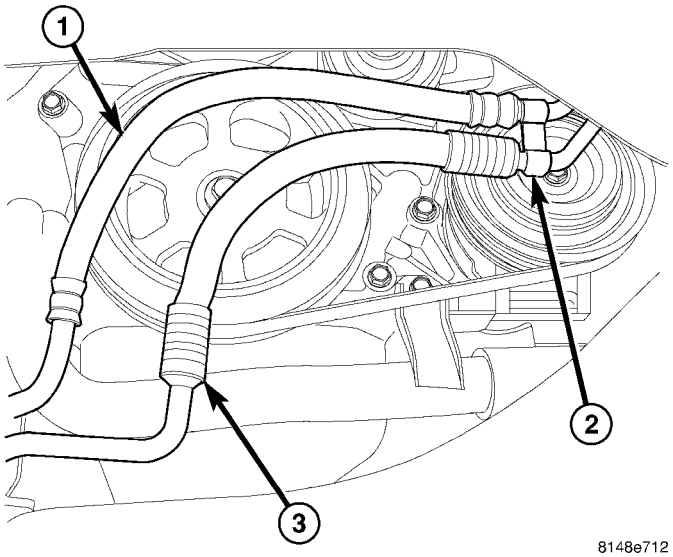


Fig. 36 Hose-To-Hose Routing Clip

1 - RETURN HOSE
2 - ROUTING CLIP
3 - PRESSURE HOSE

(10) Remove screw securing pressure and return hose clamps to right side of engine cradle (Fig. 37).

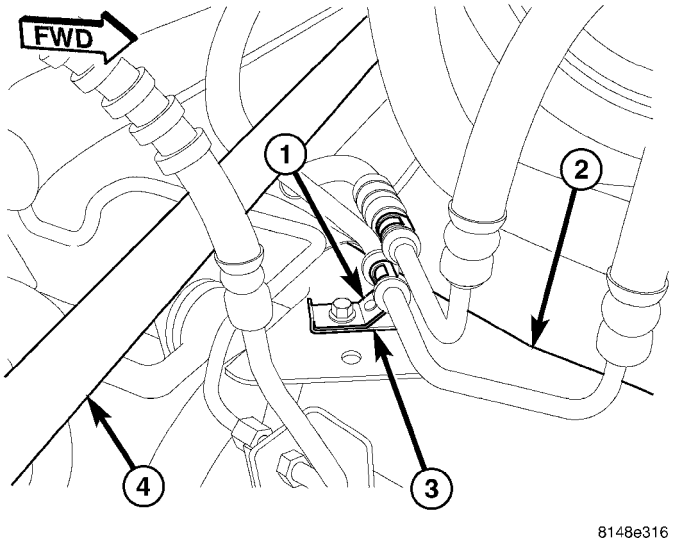


Fig. 37 Hose Routing Clamp - Right Side Cradle

1 - PRESSURE HOSE ROUTING CLAMP
2 - ENGINE CRADLE
3 - RETURN HOSE ROUTING CLAMP
4 - RIGHT HALF SHAFT

(11) Remove screw securing return hose clamp at cooling loop to engine cradle (Fig. 38).

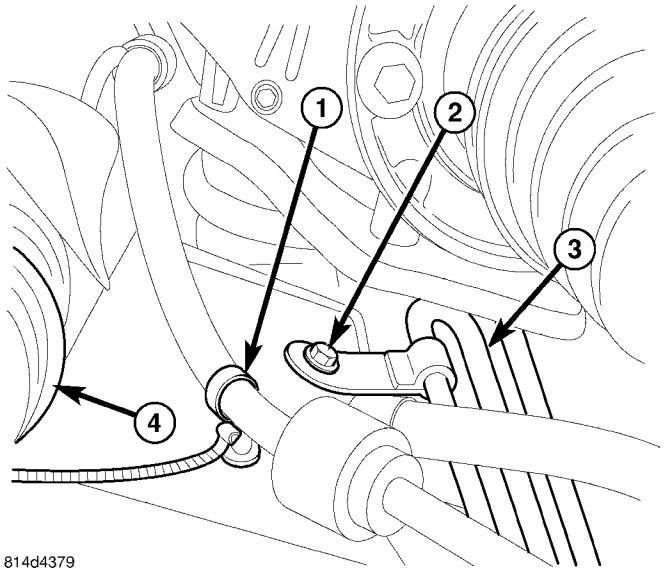


Fig. 38 Hose Mounting To Engine Cradle

1 - PRESSURE HOSE TIE-STRAP CLIP
2 - ROUTING CLAMP MOUNTING SCREW
3 - RETURN HOSE (COOLING LOOP PORTION)
4 - POWER STEERING GEAR

(12) Remove screw securing return hose clamp to left side of engine cradle (Fig. 39).

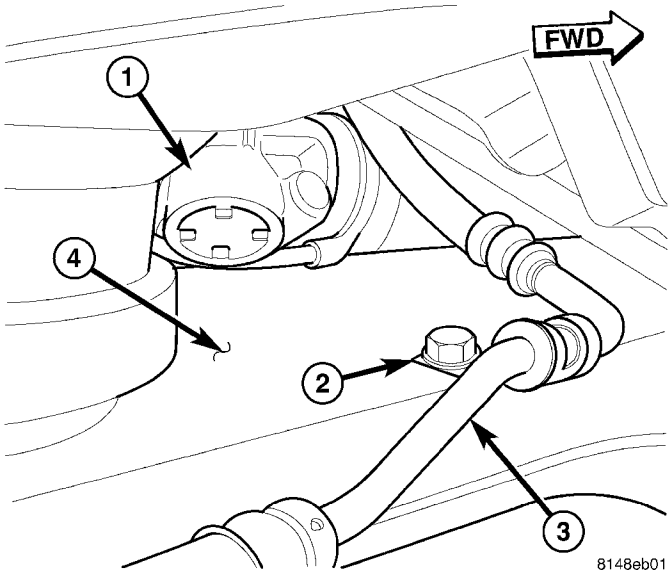


Fig. 39 Hose Routing Clamp - Left Side Cradle

1 - POWER STEERING GEAR
2 - ROUTING CLAMP AND SCREW
3 - RETURN HOSE
4 - ENGINE CRADLE

HOSE - RETURN (Continued)

(13) Remove tube nut fastening return hose to power steering gear (Fig. 40). Remove return hose from gear port.

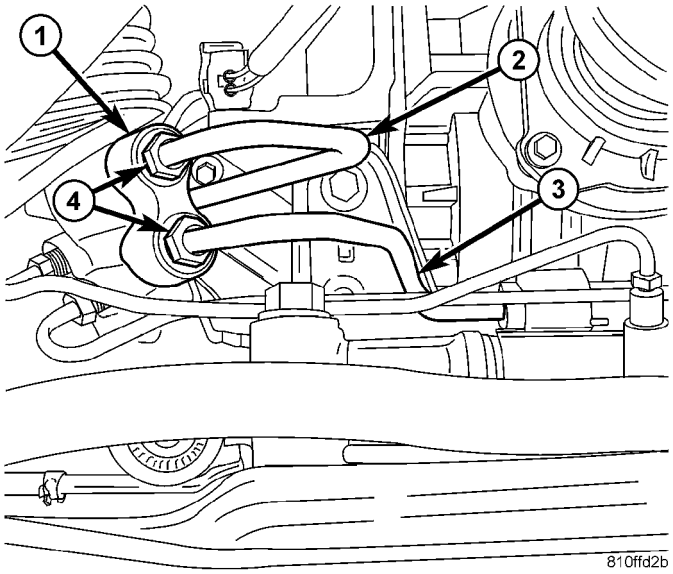


Fig. 40 Hoses At Steering Gear

1 - POWER STEERING GEAR
2 - RETURN HOSE
3 - PRESSURE HOSE
4 - TUBE NUTS

(14) Remove return hose from vehicle.

INSTALLATION

INSTALLATION - 3.5L ENGINE

(1) Place return hose into engine compartment from below using reverse order of removal.

NOTE: Before installing power steering return hose on power steering gear, wipe clean connections with a lint-free cloth and replace O-ring. Lubricate O-ring using clean power steering fluid.

(2) Install return hose into gear port (Fig. 33). Thread return hose tube nut into gear and tighten to 31 N·m (275 in. lbs.) torque.

(3) Position return hose cooling loop clamp on cradle and install mounting screw (Fig. 32). Tighten screw to 10 N·m (90 in. lbs.) torque.

(4) Position return hose clamp on left side of engine cradle and install mounting screw (Fig. 31). Tighten screw to 10 N·m (90 in. lbs.) torque.

(5) Place pressure hose routing clamp over return hose routing clamp at right side of engine cradle and install screw fastening both to cradle (Fig. 30). Tighten screw to 10 N·m (90 in. lbs.) torque.

(6) Install routing clip securing return hose to pressure hose near drive belt (Fig. 29).

(7) Place pressure and return hoses on A/C compressor mounted bracket and install routing clamp and nut (Fig. 28). Tighten nut to 12 N·m (105 in. lbs.) torque.

(8) Install drive belt splash shield.

(9) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(10) Lower vehicle.

(11) Install power steering fluid reservoir. (Refer to 19 - STEERING/PUMP/RESERVOIR - INSTALLATION)

(12) Fill and bleed power steering system using Power Steering Pump Initial Operation Procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(13) Inspect for leaks.

INSTALLATION - 3.8L ENGINE

(1) Place return hose into engine compartment from below using reverse order of removal.

NOTE: Before installing power steering return hose on power steering gear, wipe clean connection with a lint-free cloth and replace O-ring. Lubricate O-ring using clean power steering fluid.

(2) Install return hose into gear port (Fig. 40). Thread return hose tube nut into gear and tighten to 31 N·m (275 in. lbs.) torque.

(3) Position return hose cooling loop clamp on cradle and install mounting screw (Fig. 38). Tighten screw to 10 N·m (90 in. lbs.) torque.

(4) Position return hose clamp on left side of engine cradle and install mounting screw (Fig. 39). Tighten screw to 10 N·m (90 in. lbs.) torque.

(5) Place pressure hose routing clamp over return hose routing clamp at right side of engine cradle and install screw fastening both to cradle (Fig. 37). Tighten screw to 10 N·m (90 in. lbs.) torque.

(6) Route hoses up past A/C compressor and install routing clip securing return hose tube to pressure hose tube near drive belt (Fig. 36).

(7) Lower vehicle to access hose from above.

NOTE: Before installing power steering pressure hose on power steering pump, replace O-ring on end of power steering pressure hose. Lubricate O-ring using clean power steering fluid.

(8) Install return hose onto reservoir (Fig. 34). Slide hose clamp into position on fluid reservoir and attach it. **Be sure hose clamp in installed past bead on fluid reservoir fitting.**

(9) Raise and support vehicle.

(10) Position pressure and return hose tubes above A/C compressor, then install routing clamp and nut

HOSE - RETURN (Continued)

securing them in place (Fig. 35). Tighten nut to 12 N·m (105 in. lbs.) torque.

(11) Install drive belt splash shield.

(12) Install tire and wheel assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.) torque.

(13) Lower vehicle.

(14) Install negative (-) battery cable on negative battery post.

(15) Fill and bleed power steering system using Power Steering Pump Initial Operation Procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(16) Inspect for leaks.

HOSE - SUPPLY

REMOVAL - 3.5L ENGINE

(1) Remove power steering fluid reservoir. (Refer to 19 - STEERING/PUMP/RESERVOIR - REMOVAL)

(2) Remove clamp, then remove supply hose from pump (Fig. 42).

INSTALLATION - 3.5L ENGINE

(1) Slide fluid supply hose onto pump fitting and install clamp securing it in place (Fig. 42).

(2) Install power steering fluid reservoir. (Refer to 19 - STEERING/PUMP/RESERVOIR - INSTALLATION)

(3) Fill and bleed power steering system using Power Steering Pump Initial Operation Procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(4) Inspect system for leaks.

RESERVOIR

REMOVAL - 3.5L ENGINE

(1) Remove negative (-) battery cable from battery and isolate cable.

(2) Remove cap from power steering fluid reservoir.

(3) Using a siphon pump, remove as much power steering fluid as possible from power steering fluid reservoir.

(4) Remove engine appearance cover.

(5) Remove clamp attaching return hose to power steering fluid reservoir. Remove hose from reservoir (Fig. 41).

(6) Remove clamp attaching supply hose to power steering fluid reservoir. Remove hose from reservoir (Fig. 42).

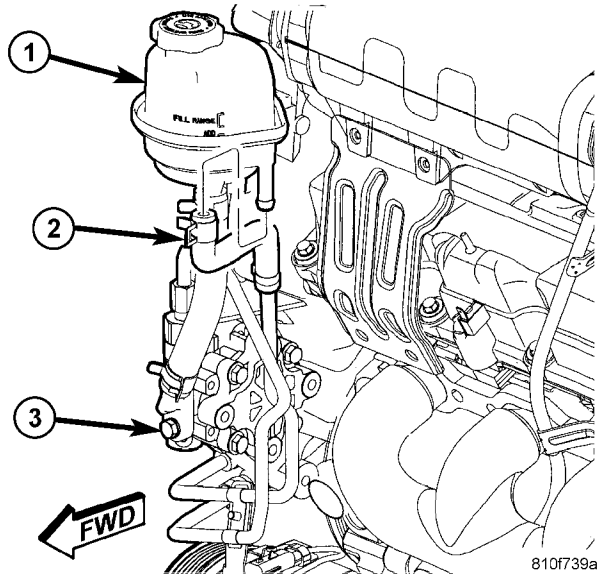


Fig. 41 Return Hose At Reservoir

1 - FLUID RESERVOIR
2 - RETURN HOSE
3 - POWER STEERING PUMP

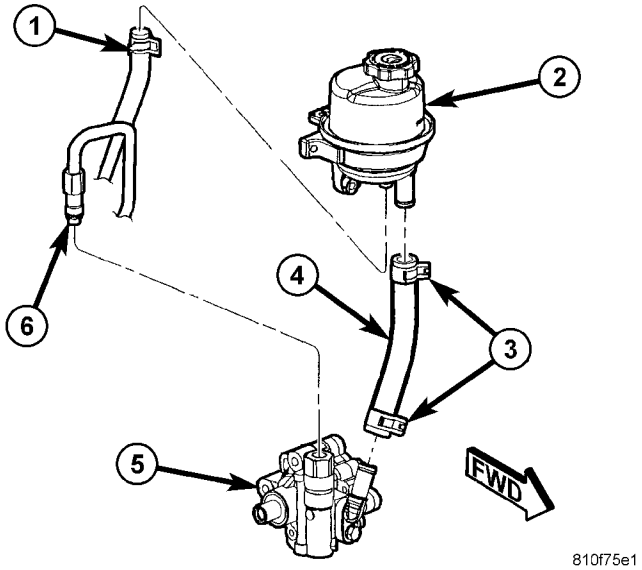


Fig. 42 Hoses At Pump And Reservoir

1 - RETURN HOSE CLAMP
2 - FLUID RESERVOIR
3 - SUPPLY HOSE CLAMPS
4 - SUPPLY HOSE
5 - POWER STEERING PUMP
6 - PRESSURE HOSE TUBE NUT

RESERVOIR (Continued)

(7) Remove two upper mounting bolts securing reservoir in place (Fig. 43).

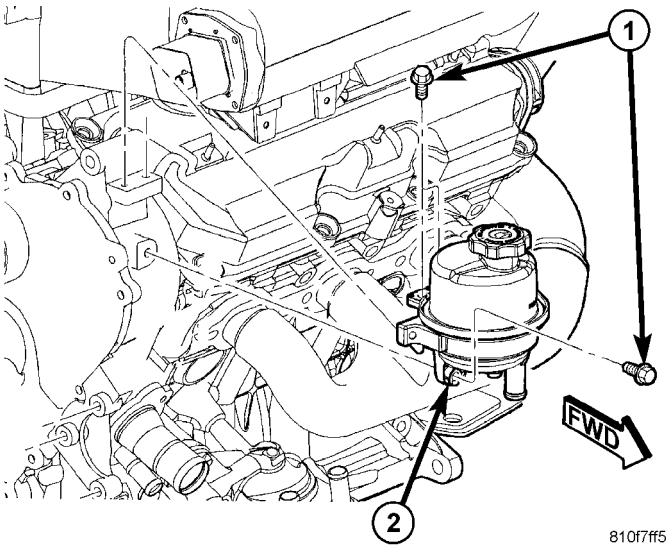


Fig. 43 Reservoir Mounting To Engine

1 - MOUNTING BOLTS
2 - POWER STEERING FLUID RESERVOIR

(8) Loosen, but do not remove, lower mounting bolt securing reservoir in place (Fig. 43).

(9) Slide reservoir upward, off lower mounting bolt.

INSTALLATION - 3.5L ENGINE

(1) Slide fluid reservoir over lower mounting bolt and into place on engine.

(2) Install two upper mounting bolts securing reservoir in place (Fig. 43).

(3) Tighten all three reservoir mounting bolts to 12 N·m (105 in. lbs.) torque.

(4) Install supply hose onto reservoir (Fig. 42). Slide hose clamp into position on fluid reservoir and attach it. **Be sure hose clamp in installed past bead on fluid reservoir fitting.**

(5) Install return hose onto reservoir (Fig. 41). Slide hose clamp into position on fluid reservoir and attach it. **Be sure hose clamp in installed past bead on fluid reservoir fitting.**

(6) Install engine appearance cover.

(7) Install negative (-) battery cable on negative battery post.

(8) Fill and bleed power steering system using Power Steering Pump Initial Operation Procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(9) Inspect system for leaks.

TRANSMISSION/TRANSAXLE

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POWER TRANSFER UNIT

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POWER TRANSFER UNIT

STANDARD PROCEDURE - PTU FLUID DRAIN/FILL

(1) Raise vehicle on hoist.

(2) Remove PTU drain plug. Drain fluid into suitable container.

(3) Install drain plug and torque to 35 N·m (26 ft. lbs.).

(4) Remove PTU drain plug.

(5) Fill PTU with 1.0L (2.1 pts.) of Mopar® 75W-90 Gear and Axle Lubricant.

(6) Install fill plug and torque to 35 N·m (26 ft. lbs.).

(7) Lower vehicle

REMOVAL

(1) Remove right halfshaft assembly. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(2) Remove engine cradle crossmember (Refer to 13 - FRAME & BUMPERS/FRAME/ENGINE CRADLE CROSSMEMBER - REMOVAL)

(3) Remove propeller shaft assembly. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT - REMOVAL).

(4) Remove PTU/rear mount bracket (Fig. 1).

POWER TRANSFER UNIT (Continued)

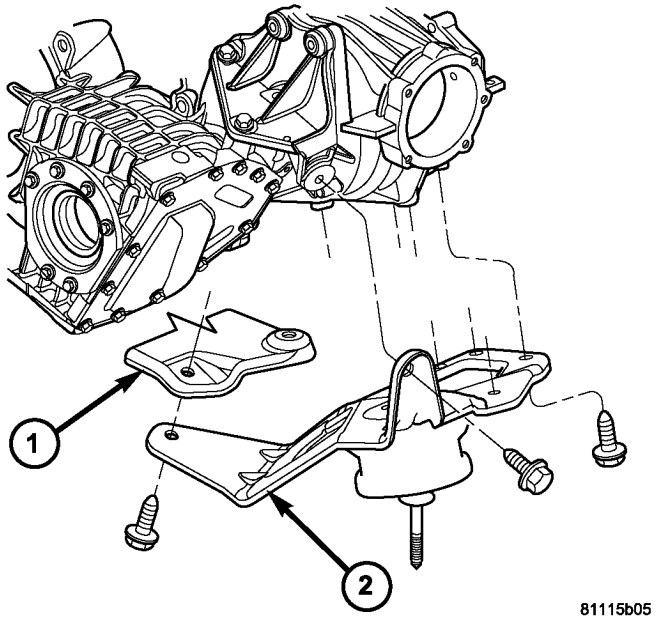


Fig. 1 PTU Bracket/Rear Mount Assembly

1 - COLLAR
2 - BRACKET/REAR MOUNT

(5) Remove oil pan-to-transaxle collar (Fig. 2).

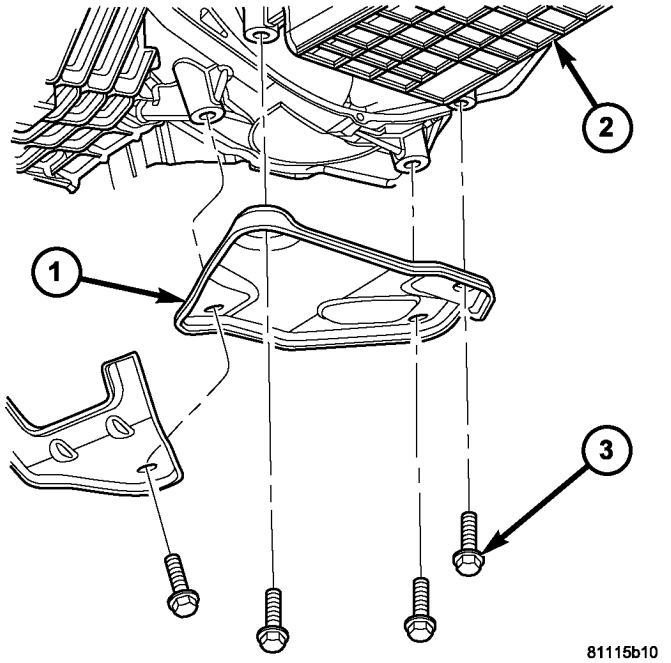


Fig. 2 Oil Pan-to-Transaxle Collar

1 - COLLAR
2 - ENGINE OIL PAN
3 - BOLT (4)

(6) Remove heat shield (Fig. 3).
(7) Remove bracket and brace (Fig. 3).
(8) Remove PTU-to-transaxle upper bolts (Fig. 3).

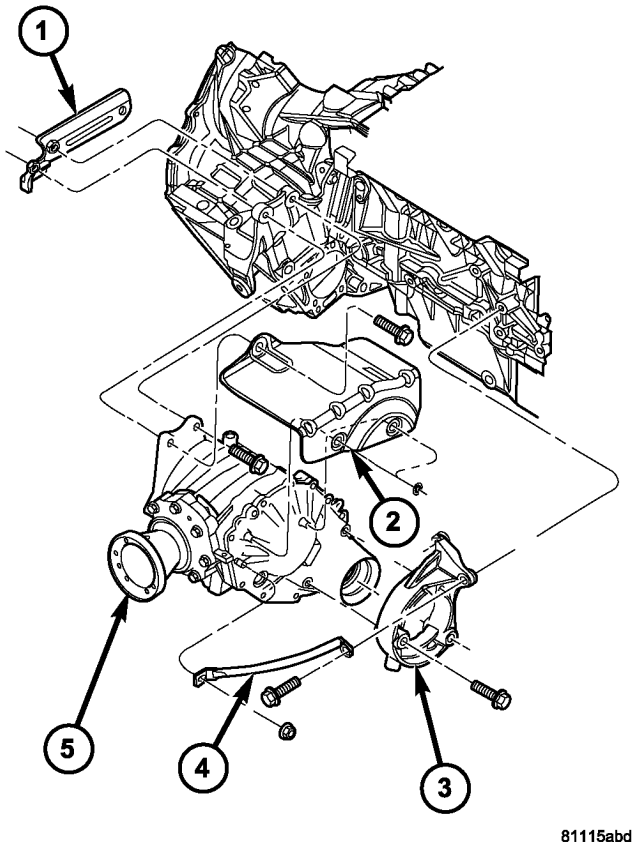


Fig. 3 Power Transfer Unit Mounting

1 - BRACKET
2 - HEAT SHIELD
3 - BRACKET
4 - BRACE
5 - POWER TRANSFER UNIT

(9) Remove PTU-to-bracket lower bolts (Fig. 4).

POWER TRANSFER UNIT (Continued)

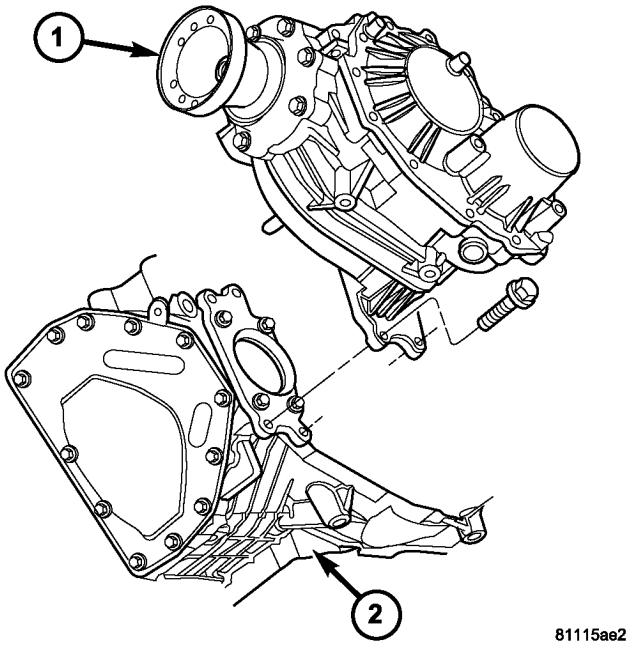


Fig. 4 Power Transfer Unit Lower Bolts

1 - POWER TRANSFER UNIT
2 - TRANSAXLE

(10) Remove PTU from vehicle.

INSTALLATION

(1) Install PTU lower bracket.

(2) Install PTU-to-transaxle upper bolts and torque to 54 N·m (40 ft. lbs.) (Fig. 3).

(3) Install PTU into position. Install two (2) lower PTU-to-bracket bolts and torque to 28 N·m (21 ft. lbs.) (Fig. 188).

(4) Install brace and bracket (Fig. 3).

(5) Install PTU heat shield (Fig. 190).

(6) Install PTU/rear mount bracket. Install and torque six (6) bolts to 54 N·m (40 ft. lbs.). (Fig. 190).

(7) Torque oil pan-to-transaxle collar bolts to 54 N·m (40 ft. lbs.) (Fig. 2).

(8) Install propeller shaft assembly. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT - INSTALLATION)

(9) Install right halfshaft assembly. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

(10) Install engine cradle crossmember. (Refer to 13 - FRAME & BUMPERS/FRAME/ENGINE CRADLE CROSSMEMBER - INSTALLATION)

(11) Check and adjust PTU Fluid level. The PTU holds 1.0L (2.1 pts.) of Mopar® 75W-90 Gear and Axle Lubricant.

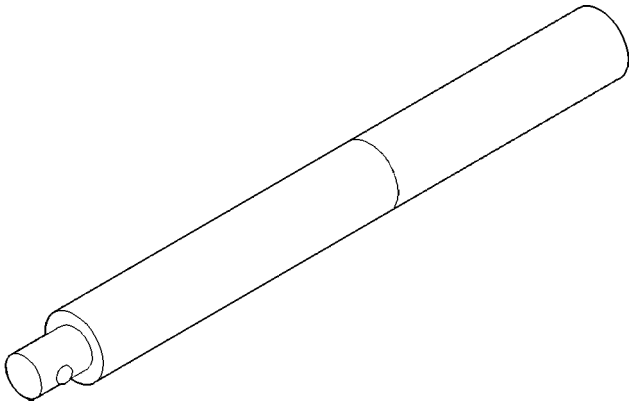
SPECIFICATIONS - POWER TRANSFER UNIT

TORQUE SPECIFICATIONS

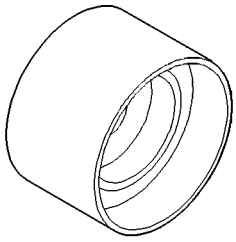
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, PTU-to-Transaxle Lower	28	21	—
Bolt, PTU-to-Transaxle Upper	54	40	—
Bolt, Mount/Bracket-to-PTU	54	40	—
Plug, PTU Drain/Fill	35	26	—

POWER TRANSFER UNIT (Continued)

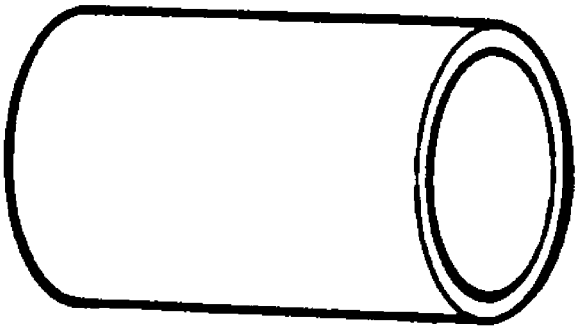
SPECIAL TOOLS



Universal Handle C-4171



Installer 6536-A



Installer, 9321

DIFFERENTIAL CARRIER SEAL

REMOVAL

NOTE: The Power Transfer Unit must be removed from the vehicle to replace this seal.

(1) Remove PTU from transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/POWER TRANSFER UNIT - REMOVAL)

(2) Use a pry bar to remove seal from retainer plate (Fig. 5). Be careful not to damage seal journal when removing seal.

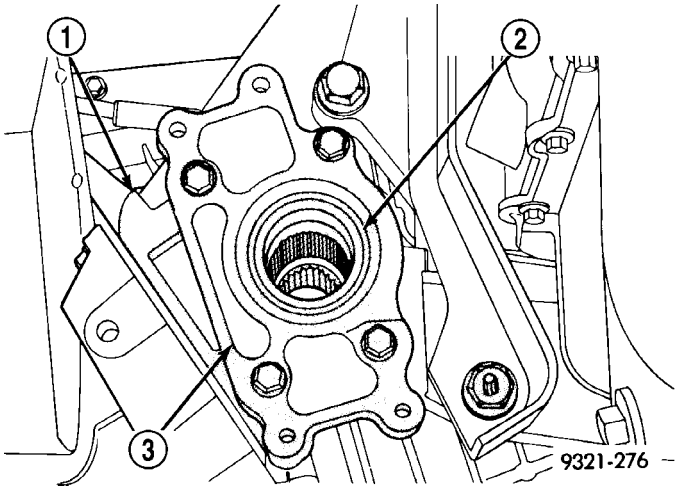


Fig. 5 Transaxle Differential Carrier Seal

1 - TRANSAXLE CASE
2 - DIFFERENTIAL CARRIER SEAL
3 - RETAINER PLATE

INSTALLATION

(1) Using a large socket, carefully install new seal. The spring side of the seal must face the transaxle differential.

(2) Install the PTU to the transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/POWER TRANSFER UNIT - INSTALLATION)

(3) Check PTU fluid level. (Refer to 21 - TRANSMISSION/TRANSAXLE/POWER TRANSFER UNIT - STANDARD PROCEDURE)

END COVER BALL BEARING

REMOVAL

(1) Remove right halfshaft assembly (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL).

(2) Remove outer halfshaft seal (Fig. 6).

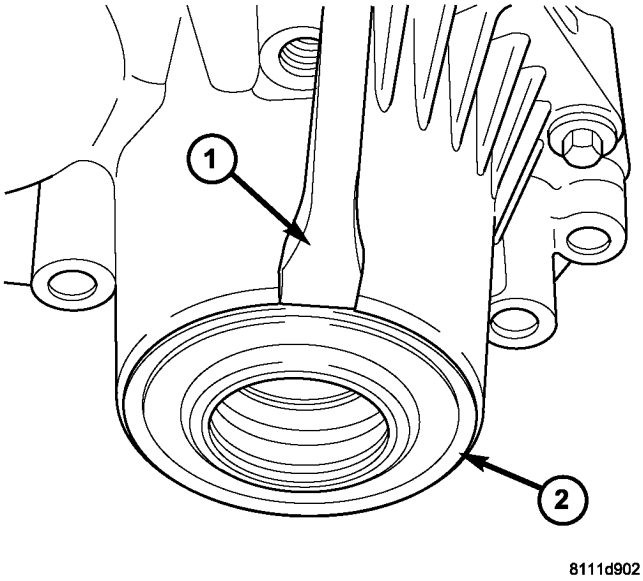


Fig. 6 Outer Halfshaft Seal Removal

1 - SCREWDRIVER
2 - SEAL

(3) Remove snap ring (Fig. 7).

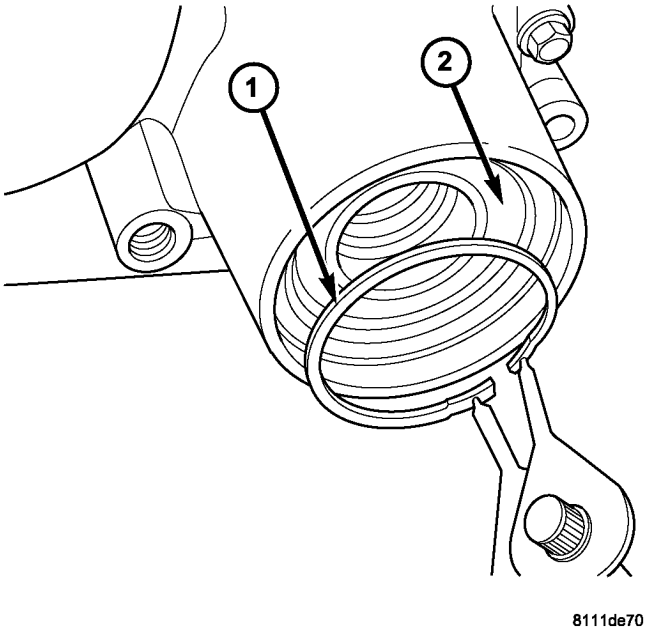


Fig. 7 Snap Ring Removal/Installation

1 - SNAP RING
2 - BEARING

(4) Remove bearing (slip-fit) (Fig. 8).

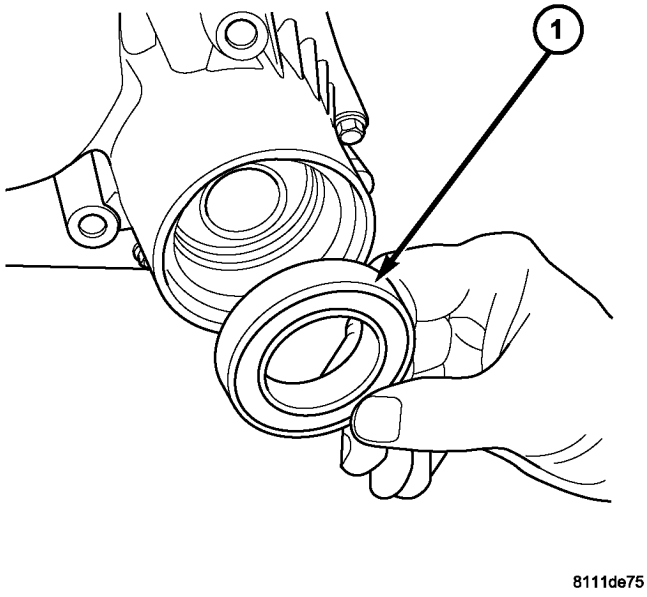


Fig. 8 Bearing Removal/Installation

1 - BEARING

INSTALLATION

(1) Install bearing assembly (Fig. 8).

(2) Install snap ring (Fig. 7).

END COVER BALL BEARING (Continued)

(3) Using Tools C4171 and 6536A, install outer halfshaft seal (Fig. 9).

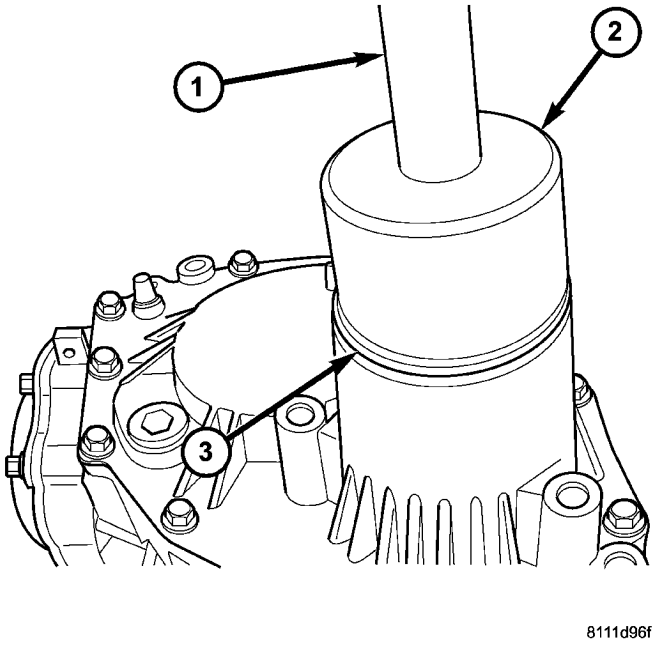


Fig. 9 Outer Halfshaft Seal Installation

1 - TOOL C-4171
2 - TOOL 6536A
3 - SEAL

(4) Install right halfshaft assembly. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

(5) Check and adjust PTU fluid level. (Refer to 21 - TRANSMISSION/TRANSAXLE/POWER TRANSFER UNIT - STANDARD PROCEDURE)

INPUT SHAFT SEAL

REMOVAL

(1) Remove power transfer unit. (Refer to 21 - TRANSMISSION/TRANSAXLE/POWER TRANSFER UNIT - REMOVAL)

(2) Using drill and suitable bit, drill hole in input shaft seal to facilitate removal with slide hammer (Fig. 10). **Use care not to damage the shaft sealing surface.**

(3) Using slide hammer and suitable screw, remove input shaft seal.

INSTALLATION

(1) Using Tools C4171 and 9321, install input shaft seal (Fig. 11).

(2) Install Power Transfer Unit. (Refer to 21 - TRANSMISSION/TRANSAXLE/POWER TRANSFER UNIT - INSTALLATION)

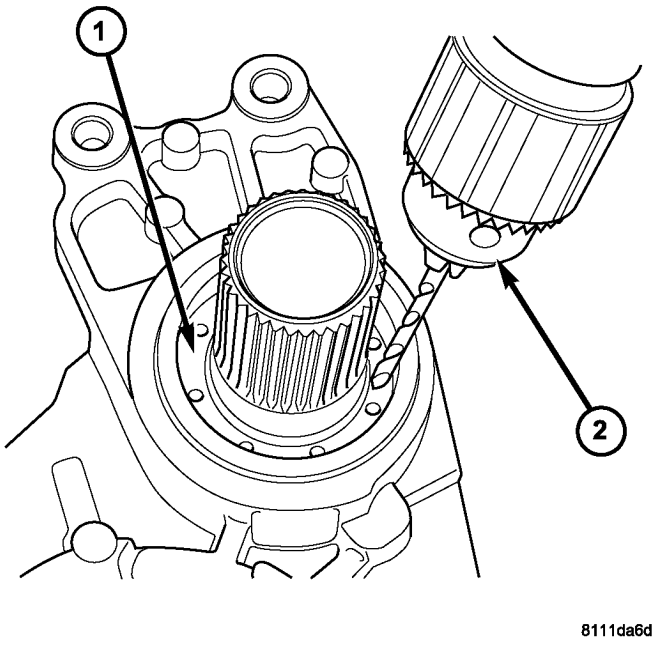


Fig. 10 Preparing Seal for Removal

1 - INPUT SHAFT SEAL
2 - DRILL AND BIT

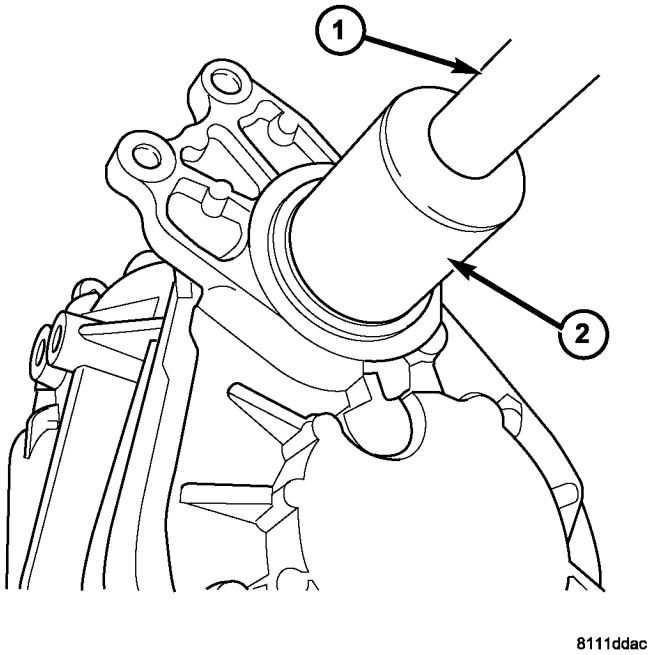


Fig. 11 Input Shaft Seal Installation

1 - TOOL C-4171
2 - TOOL 9321

OUTER HALF SHAFT SEAL

REMOVAL

(1) Remove right halfshaft assembly. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(2) Using suitable screwdriver, remove outer halfshaft seal (Fig. 12).

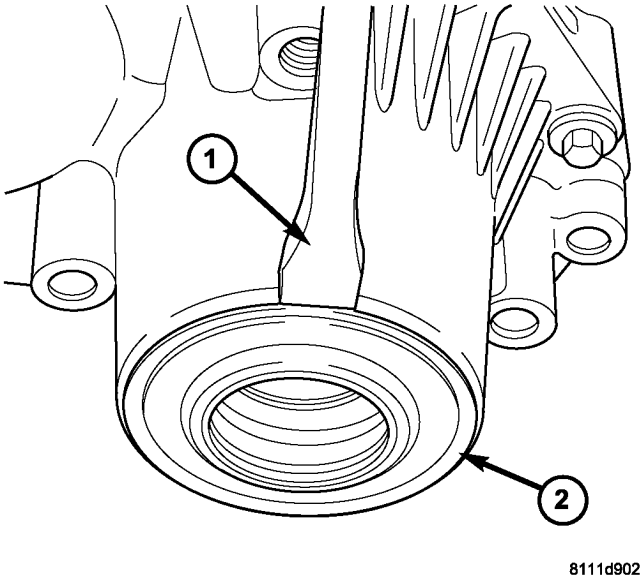


Fig. 12 Outer Halfshaft Seal Removal

1 - SCREWDRIVER
2 - SEAL

INSTALLATION

(1) Install outer halfshaft seal using Tools C-4171 and 6536A (Fig. 13).

(2) Install right halfshaft assembly. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

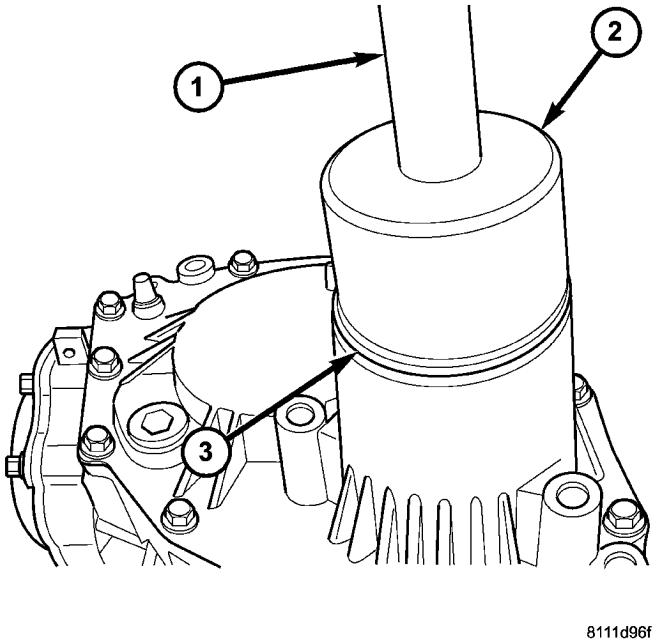


Fig. 13 Outer Halfshaft Seal Installation

1 - TOOL C-4171
2 - TOOL 6536A
3 - SEAL

41AE/TE AUTOMATIC TRANSAXLE

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41AE/TE AUTOMATIC TRANSAXLE

DESCRIPTION

The 41TE (Fig. 1) is a four-speed transaxle that is a conventional hydraulic/mechanical assembly with an integral differential, and is controlled with adaptive electronic controls and monitors. The hydraulic system of the transaxle consists of the transaxle fluid, fluid passages, hydraulic valves, and various line pressure control components. An input clutch assembly which houses the underdrive, overdrive, and reverse clutches is used. It also utilizes separate holding clutches: 2nd/4th gear and Low/Reverse. The primary mechanical components of the transaxle consist of the following:

- Three multiple disc input clutches
- Two multiple disc holding clutches
- Four hydraulic accumulators
- Two planetary gear sets
- Hydraulic oil pump
- Valve body
- Solenoid/Pressure switch assembly
- Integral differential assembly

Control of the transaxle is accomplished by fully adaptive electronics. Optimum shift scheduling is accomplished through continuous real-time sensor feedback information provided to the Powertrain Control Module (PCM) or Transmission Control Module (TCM).

The PCM/TCM is the heart of the electronic control system and relies on information from various direct and indirect inputs (sensors, switches, etc.) to determine driver demand and vehicle operating conditions. With this information, the PCM/TCM can calculate and perform timely and quality shifts through various output or control devices (solenoid pack, transmission control relay, etc.).

The PCM/TCM also performs certain self-diagnostic functions and provides comprehensive information (sensor data, DTC's, etc.) which is helpful in proper diagnosis and repair. This information can be viewed with the DRB scan tool.

41AE/TE AUTOMATIC TRANSAXLE (Continued)

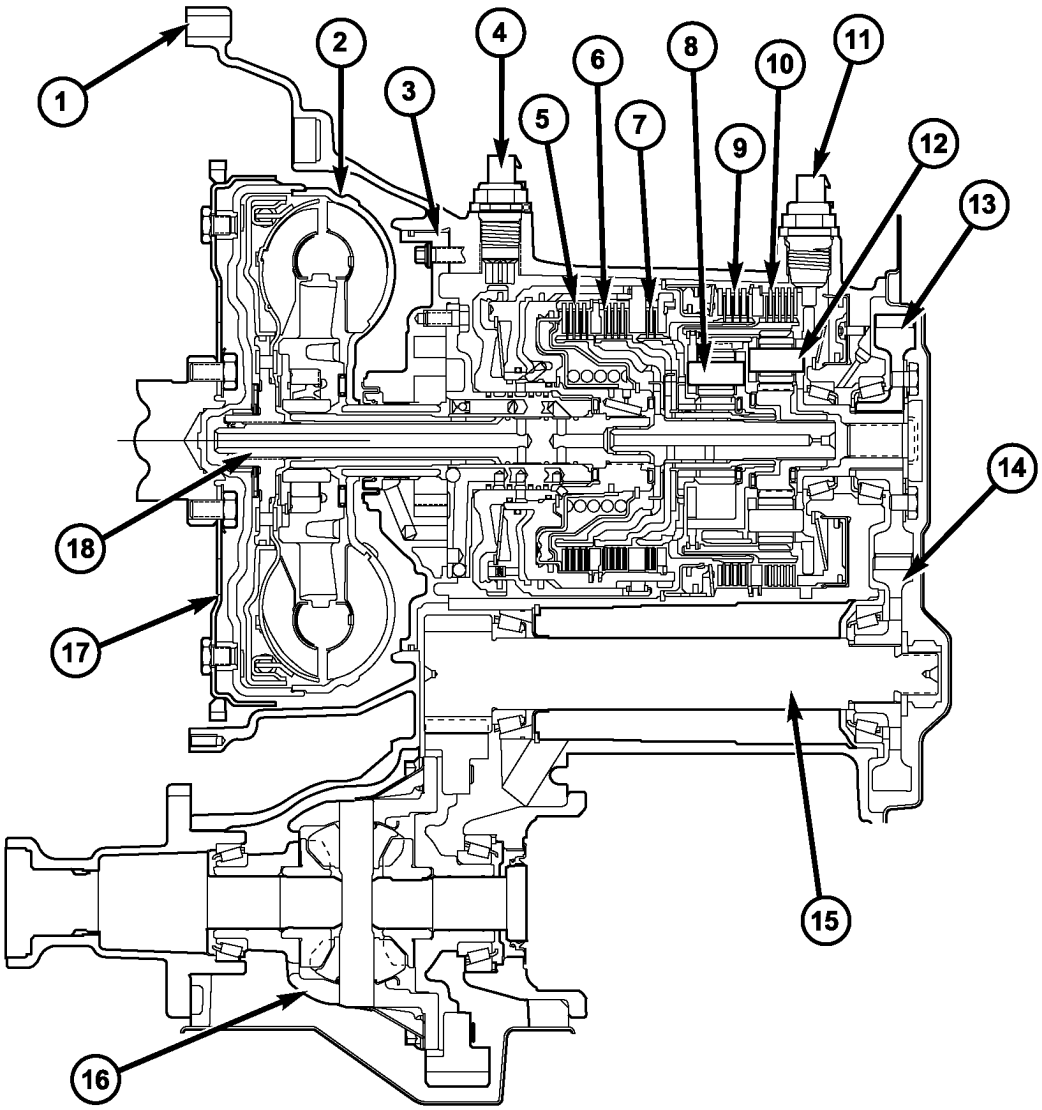


Fig. 1 41TE Automatic Transaxle

1 - TRANSAXLE CASE
2 - TORQUE CONVERTER
3 - OIL PUMP
4 - INPUT SPEED SENSOR
5 - UNDERDRIVE CLUTCH
6 - OVERDRIVE CLUTCH
7 - REVERSE CLUTCH
8 - FRONT PLANET CARRIER
9 - 2/4 CLUTCH
10 - L/R CLUTCH
11 - OUTPUT SPEED SENSOR
12 - REAR PLANET CARRIER/OUTPUT SHAFT
13 - OUTPUT SHAFT GEAR
14 - TRANSFER SHAFT GEAR
15 - TRANSFER SHAFT
16 - DIFFERENTIAL
17 - CONVERTER DRIVE PLATE
18 - INPUT SHAFT

41AE/TE AUTOMATIC TRANSAXLE (Continued)

TRANSAXLE IDENTIFICATION

The 41TE transaxle is identified by a barcode label that is fixed to the transaxle case as shown in (Fig. 2).

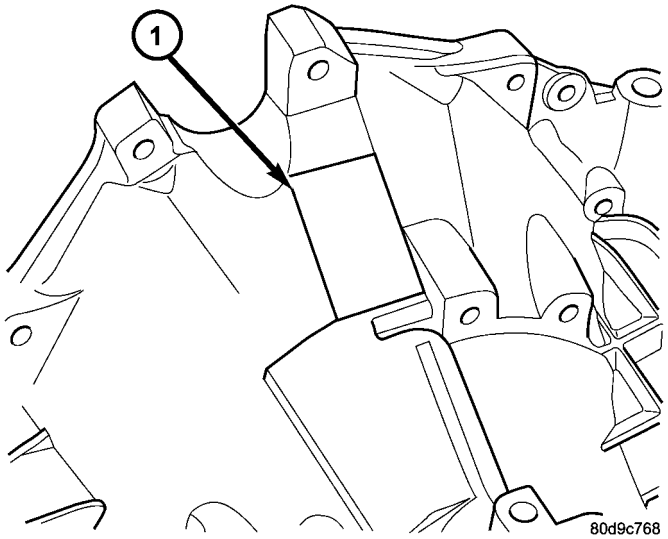


Fig. 2 Transaxle Identification Label

1 - IDENTIFICATION LABEL

The label contains a series of digits that can be translated into useful information such as transaxle part number, date of manufacture, manufacturing origin, plant shift number, build sequence number, etc. Refer to (Fig. 3) for identification label breakdown.

If the tag is not legible or missing, the “PK” number, which is stamped into the transaxle case behind the transfer gear cover, can be referred to for identification. This number differs slightly in that it contains the entire transaxle part number, rather than the last three digits.

OPERATION

Transmission output is directed to an integral differential by a transfer gear system in the following input-to-output ratios:

First	2.84 : 1
Second	1.57 : 1
Third	1.00 : 1
Overdrive	0.69 : 1
Reverse	2.21 : 1

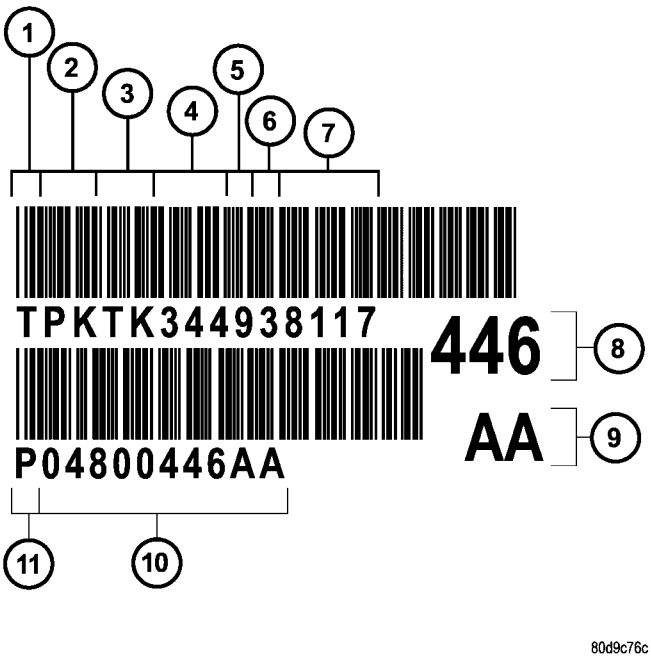


Fig. 3 Identification Label Breakdown

1 - T=TRACEABILITY
2 - SUPPLIER CODE (PK=KOKOMO)
3 - COMPONENT CODE (TK=KOKOMO TRANSMISSION)
4 - BUILD DAY (344=DEC. 9)
5 - BUILD YEAR (9=1999)
6 - LINE/SHIFT CODE (3=3RD SHIFT)
7 - BUILD SEQUENCE NUMBER
8 - LAST THREE OF P/N
9 - ALPHA
10 - TRANSAXLE PART NUMBER
11 - P=PART NUMBER

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - 4XTE TRANSAXLE GENERAL DIAGNOSIS

NOTE: Before attempting any repair on a 4XTE four-speed automatic transaxle, check for diagnostic trouble codes (DTC’s) using the DRB scan tool. Refer to the Transmission Diagnostic Procedures Manual.

Transaxle malfunctions may be caused by these general conditions:

- Poor engine performance
- Improper adjustments
- Hydraulic malfunctions
- Mechanical malfunctions
- Electronic malfunctions

Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level and condition, gearshift cable adjustment. Then perform a road test to determine if the problem has been corrected or that more diagnosis is necessary. If the problem persists after the preliminary tests and cor-

rections are completed, hydraulic pressure checks should be performed.

DIAGNOSIS AND TESTING - ROAD TEST

Prior to performing a road test, verify that the fluid level, fluid condition, and linkage adjustment have been approved.

During the road test, the transaxle should be operated in each position to check for slipping and any variation in shifting.

If the vehicle operates properly at highway speeds, but has poor acceleration, the converter stator overrunning clutch may be slipping. If acceleration is normal, but high throttle opening is needed to maintain highway speeds, the converter stator clutch may have seized. Both of these stator defects require replacement of the torque converter and thorough transaxle cleaning.

Slipping clutches can be isolated by comparing the "Elements in Use" chart with clutch operation encountered on a road test. This chart identifies which clutches are applied at each position of the selector lever.

A slipping clutch may also set a DTC and can be determined by operating the transaxle in all selector positions.

ELEMENTS IN USE AT EACH POSITION OF SELECTOR LEVER

Shift Lever Position	INPUT CLUTCHES			HOLDING CLUTCHES	
	Underdrive	Overdrive	Reverse	2/4	Low/Reverse
P - PARK					X
R - REVERSE			X		X
N - NEUTRAL					X
OD - OVERDRIVE					
First	X				X
Second	X			X	
Direct	X	X			
Overdrive		X		X	
D - DRIVE*					
First	X				X
Second	X			X	
Direct	X	X			
L - LOW*					
First	X				X
Second	X			X	
Direct	X	X			
* Vehicle upshift and downshift speeds are increased when in these selector positions.					

The process of elimination can be used to detect any unit which slips and to confirm proper operation of good units. Road test analysis can diagnose slipping units, but the cause of the malfunction cannot be determined. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

DIAGNOSIS AND TESTING - HYDRAULIC PRESSURE TESTS

Pressure testing is a very important step in the diagnostic procedure. These tests usually reveal the cause of most hydraulic transaxle problems.

Before performing pressure tests, be certain that fluid level and condition, and shift cable adjustments have been checked and approved. Fluid must be at operating temperature (150 to 200 degrees F.).

Install an engine tachometer, raise vehicle on hoist which allows front wheels to turn, and position tachometer so it can be read.

41AE/TE AUTOMATIC TRANSAXLE (Continued)

Attach 300 psi gauge (C-3293SP) to port(s) required for test(s) being conducted. Use adapter set L-4559 to adapt gauge(s) to transaxle.

Test port locations are shown in (Fig. 4).

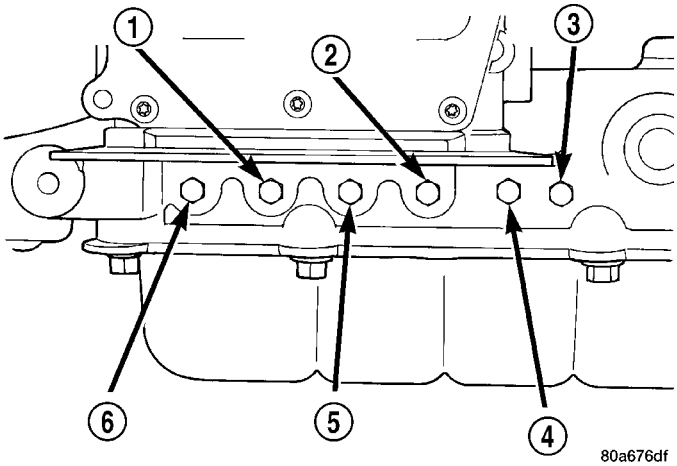


Fig. 4 Pressure Taps

1 - OVERDRIVE CLUTCH
2 - TORQUE CONVERTER OFF
3 - LOW/REVERSE CLUTCH
4 - 2/4 CLUTCH
5 - REVERSE CLUTCH
6 - UNDERDRIVE CLUTCH

TEST ONE-SELECTOR IN LOW (1st GEAR)

(1) Attach pressure gauge to the low/reverse clutch tap.

(2) Move selector lever to the (L) position.

(3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed to 20 mph.

(4) Low/reverse clutch pressure should read 115 to 145 psi.

(5) This test checks pump output, pressure regulation and condition of the low/reverse clutch hydraulic circuit and shift schedule.

TEST TWO-SELECTOR IN DRIVE (2nd GEAR)

NOTE: This test checks the underdrive clutch hydraulic circuit as well as the shift schedule.

(1) Attach gauge to the underdrive clutch tap.

(2) Move selector lever to the 3 position.

(3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 30 mph.

(4) In second gear the underdrive clutch pressure should read 110 to 145 psi.

TEST TWO A–SELECTOR IN OD (4th Gear)

NOTE: This test checks the underdrive clutch hydraulic circuit as well as the shift schedule.

(1) Attach gauge to the underdrive clutch tap.

(2) Move selector lever to the (OD) position.

(3) Allow wheels to rotate freely and increase throttle opening to achieve an indicated speed of 40 mph.

(4) Underdrive clutch pressure should read below 5 psi. If not, then either the solenoid assembly or PCM/TCM is at fault.

TEST THREE-OVERDRIVE CLUTCH CHECK (3rd and 2nd Gear)

(1) Attach gauge to the overdrive clutch tap.

(2) Move selector lever to the (OD) position.

(3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 20 mph. Vehicle should be in 3rd gear.

(4) Overdrive clutch pressure should read 74 to 95 psi.

(5) Move selector lever to the (3) position and increase indicated vehicle speed to 30 mph.

(6) The vehicle should be in second gear and overdrive clutch pressure should be less than 5 psi.

(7) This test checks the overdrive clutch hydraulic circuit as well as the shift schedule.

TEST FOUR-SELECTOR IN OVERDRIVE (4th Gear)

(1) Attach gauge to the 2/4 clutch tap.

(2) Move selector lever to the (OD) position.

(3) Allow vehicle front wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 30 mph. Vehicle should be in 4th gear.

(4) The 2/4 clutch pressure should read 75 to 95 psi.

(5) This test checks the 2/4 clutch hydraulic circuit.

TEST FIVE-SELECTOR IN OVERDRIVE (4th Gear-CC on)

(1) Attach gauge to the torque converter clutch off pressure tap.

(2) Move selector lever to the (OD) position.

(3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 50 mph. Vehicle should be in 4th gear, CC on.

CAUTION: Both wheels must turn at the same speed.

(4) Torque converter clutch off pressure should be less than 5 psi.

(5) This test checks the torque converter clutch hydraulic circuit.

TEST SIX-SELECTOR IN REVERSE

(1) Attach gauges to the reverse and LR clutch tap.

(2) Move selector lever to the (R) position.
(3) Read reverse clutch pressure with output stationary (foot on brake) and throttle opened to achieve 1500 rpm.
(4) Reverse and LR clutch pressure should read 165 to 235 psi.
(5) This test checks the reverse clutch hydraulic circuit.

TEST RESULT INDICATIONS

(1) If proper line pressure is found in any one test, the pump and pressure regulator are working properly.
(2) Low pressure in all positions indicates a defective pump, a clogged filter, or a stuck pressure regulator valve.
(3) Clutch circuit leaks are indicated if pressures do not fall within the specified pressure range.
(4) If the overdrive clutch pressure is greater than 5 psi in Step 4 of Test Three, a worn reaction shaft seal ring or a defective solenoid assembly is indicated.
(5) If the underdrive clutch pressure is greater than 5 psi in Step 4 of Test Two A, a defective solenoid assembly or PCM/TCM is the cause.

PRESSURE CHECK SPECIFICATIONS

Gear Selector Position	Actual Gear	Pressure Taps					
		Underdrive Clutch	Overdrive Clutch	Reverse Clutch	Torque Converter Clutch Off	2/4 Clutch	Low/ Reverse Clutch
Park * 0 mph	PARK	0-2	0-5	0-2	60-110	0-2	115-145
REVERSE * 0 mph	REVERSE	0-2	0-7	165-235	50-100	0-2	165-235
NEUTRAL * 0 mph	NEUTRAL	0-2	0-5	0-2	60-110	0-2	115-145
L # 20 mph	FIRST	110-145	0-5	0-2	60-110	0-2	115-145
3 # 30 mph	SECOND	110-145	0-5	0-2	60-110	115-145	0-2
3 # 45 mph	DIRECT	75-95	75-95	0-2	60-90	0-2	0-2
OD # 30 mph	OVERDRIVE	0-2	75-95	0-2	60-90	75-95	0-2
OD # 50 mph	OVERDRIVE WITH TCC	0-2	75-95	0-2	0-5	75-95	0-2

*** Engine speed at 1500 rpm**

CAUTION: Both front wheels must be turning at the same speed.

DIAGNOSIS AND TESTING - CLUTCH AIR PRESSURE TESTS

Inoperative clutches can be located using a series of tests by substituting air pressure for fluid pressure (Fig. 5) (Fig. 6). The clutches may be tested by applying air pressure to their respective passages. The valve body must be removed and Tool 6056 installed. To make air pressure tests, proceed as follows:

NOTE: The compressed air supply must be free of all dirt and moisture. Use a pressure of 30 psi.

Remove oil pan and valve body. See Valve body removal.

OVERDRIVE CLUTCH

Apply air pressure to the overdrive clutch apply passage and watch for the push/pull piston to move

41AE/TE AUTOMATIC TRANSAXLE (Continued)

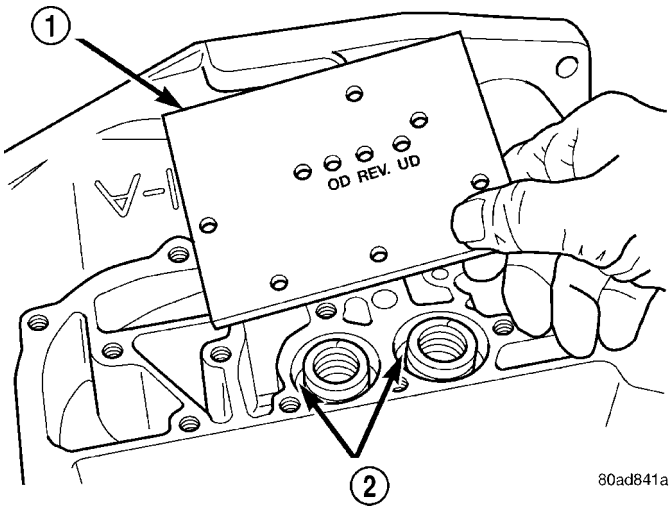


Fig. 5 Air Pressure Test Plate

1 - TOOL 6056
2 - ACCUMULATORS

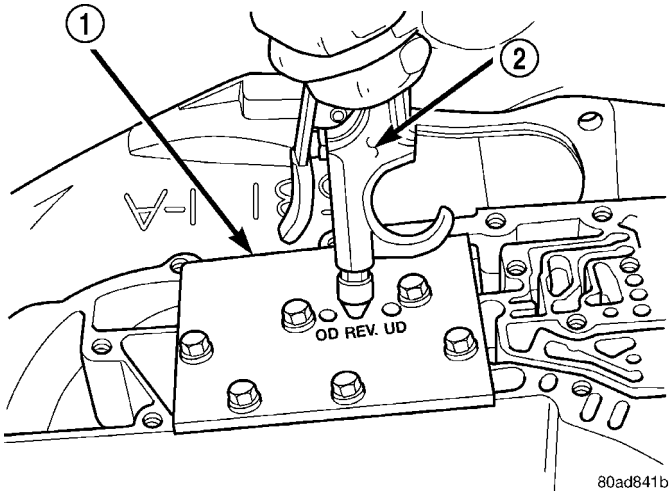


Fig. 6 Testing Reverse Clutch

1 - TOOL 6056
2 - AIR NOZZLE

forward. The piston should return to its starting position when the air pressure is removed.

REVERSE CLUTCH

Apply air pressure to the reverse clutch apply passage and watch for the push/pull piston to move rearward. The piston should return to its starting position when the air pressure is removed.

2/4 CLUTCH

Apply air pressure to the feed hole located on the 2/4 clutch retainer. Look in the area where the 2/4 piston contacts the first separator plate and watch carefully for the 2/4 piston to move rearward. The piston should return to its original position after the air pressure is removed.

LOW/REVERSE CLUTCH

Apply air pressure to the low/reverse clutch feed hole (rear of case, between 2 bolt holes). Then, look in the area where the low/reverse piston contacts the first separator plate. Watch carefully for the piston to move forward. The piston should return to its original position after the air pressure is removed.

UNDERDRIVE CLUTCH

Because this clutch piston cannot be seen, its operation is checked by function. Air pressure is applied to the low/reverse and the 2/4 clutches. This locks the output shaft. Use a piece of rubber hose wrapped around the input shaft and a pair of clamp-on pliers to turn the input shaft. Next apply air pressure to the underdrive clutch. The input shaft should not rotate with hand torque. Release the air pressure and confirm that the input shaft will rotate.

DIAGNOSIS AND TESTING - TORQUE CONVERTER HOUSING FLUID LEAKAGE

When diagnosing converter housing fluid leaks, three actions must be taken before repair:

(1) Verify proper transmission fluid level.

(2) Verify that the leak originates from the converter housing area and is transmission fluid.

(3) Determine the true source of the leak.

Fluid leakage at or around the torque converter area may originate from an engine oil leak (Fig. 7). The area should be examined closely. Factory fill fluid is red and, therefore, can be distinguished from engine oil.

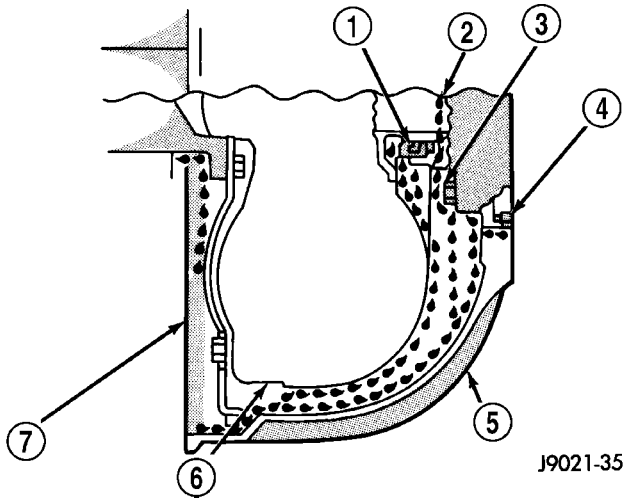


Fig. 7 Converter Housing Leak Paths

1 - PUMP SEAL
2 - PUMP VENT
3 - PUMP BOLT
4 - PUMP GASKET
5 - CONVERTER HOUSING
6 - CONVERTER
7 - REAR MAIN SEAL LEAK

41AE/TE AUTOMATIC TRANSAXLE (Continued)

Some suspected converter housing fluid leaks may not be leaks at all. They may only be the result of residual fluid in the converter housing, or excess fluid spilled during factory fill, or fill after repair. Converter housing leaks have several potential sources. Through careful observation, a leak source can be identified before removing the transmission for repair.

Pump seal leaks tend to move along the drive hub and onto the rear of the converter (Fig. 7). Pump o-ring or pump body leaks follow the same path as a seal leak. Pump attaching bolt leaks are generally deposited on the inside of the converter housing and not on the converter itself. Pump seal or gasket leaks usually travel down the inside of the converter housing (Fig. 7).

TORQUE CONVERTER LEAKAGE

Possible sources of torque converter leakage are:

- Torque converter weld leaks at the outside diameter weld (Fig. 8).
- Torque converter hub weld (Fig. 8).

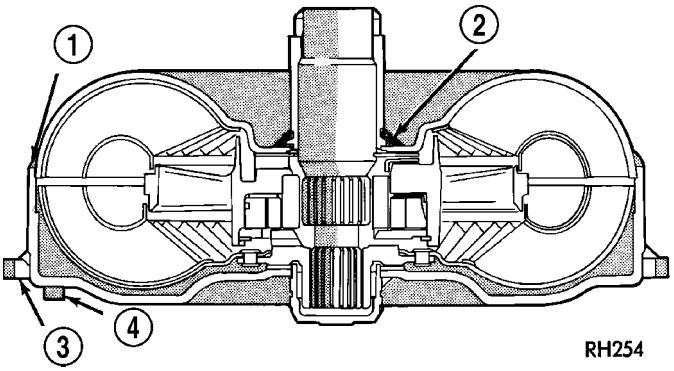


Fig. 8 Converter Leak Points - Typical

1 - OUTSIDE DIAMETER WELD
2 - TORQUE CONVERTER HUB WELD
3 - STARTER RING GEAR
4 - LUG

REMOVAL

(1) Open hood.
(2) Disconnect battery cables (Fig. 9).
(3) Remove battery hold-down clamp.
(4) Remove battery (Fig. 9).
(5) Remove battery tray (Fig. 10). Disconnect battery temperature sensor.
(6) Disconnect gearshift cable from transaxle manual valve lever.
(7) Disconnect oil cooler lines from transaxle using Tool 8875A. (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE)
(8) Remove ground cable/bolt from top of transaxle case.

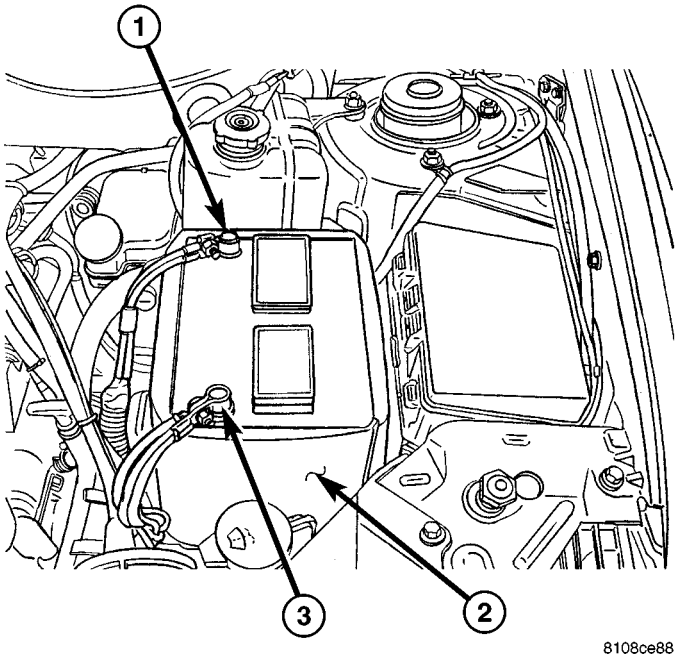


Fig. 9 Battery

1 - BATTERY POSITIVE CABLE
2 - THERMO-WRAP
3 - BATTERY NEGATIVE CABLE

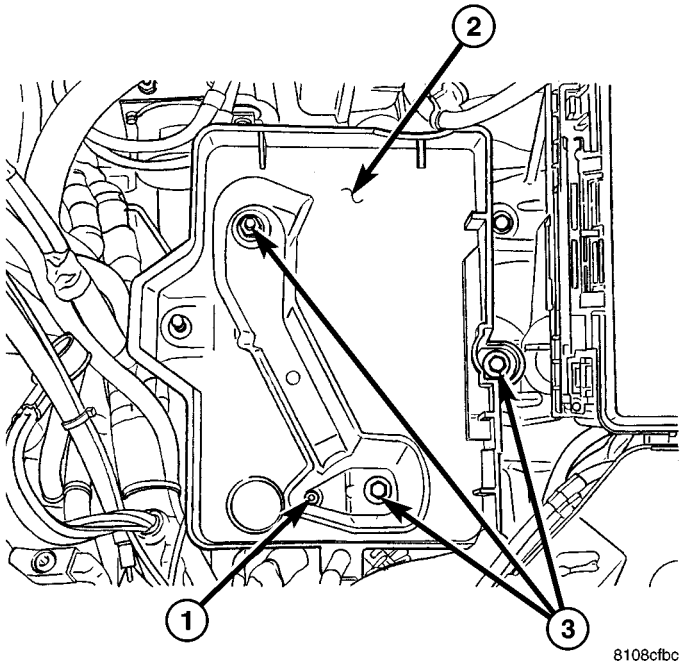


Fig. 10 Battery Tray

1 - DRAIN HOLE/HOSE ATTACHMENT
2 - BATTERY TRAY
3 - BOLTS

41AE/TE AUTOMATIC TRANSAXLE (Continued)

(9) Disconnect and remove crankshaft position sensor (Fig. 11).

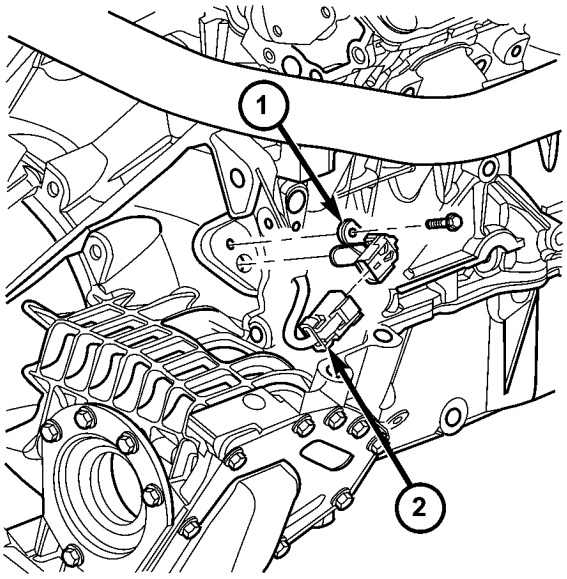


Fig. 11 Crankshaft Position Sensor

1 - CRANK POSITION SENSOR
2 - CONNECTOR

(10) Disconnect input speed sensor connector (Fig. 12).

(11) Disconnect output speed sensor connector (Fig. 12).

(12) Disconnect transaxle range sensor connector (Fig. 12).

(13) Disconnect solenoid/pressure switch assembly connector (Fig. 12).

(14) Release transaxle harness from retainers and position out of way (Fig. 13).

(15) Remove coolant bypass tube-to-engine and transaxle fasteners.

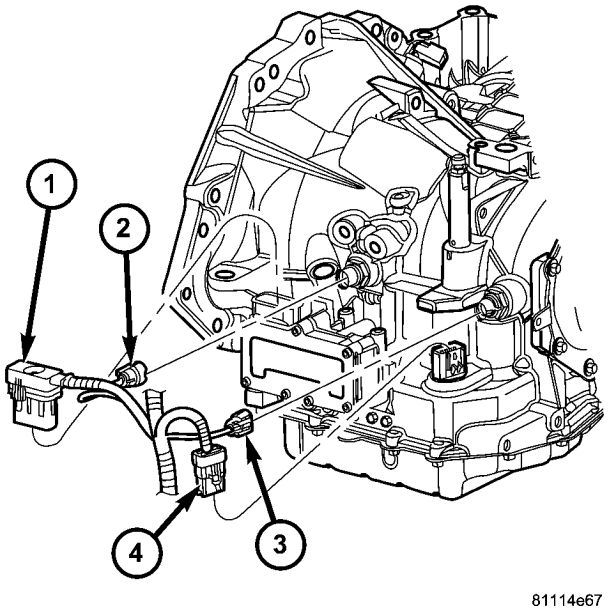


Fig. 12 Transmission Connectors

1 - SOLENOID PACK CONNECTOR
2 - INPUT SPEED SENSOR CONNECTOR
3 - OUTPUT SPEED SENSOR CONNECTOR
4 - TRANSMISSION RANGE SENSOR CONNECTOR

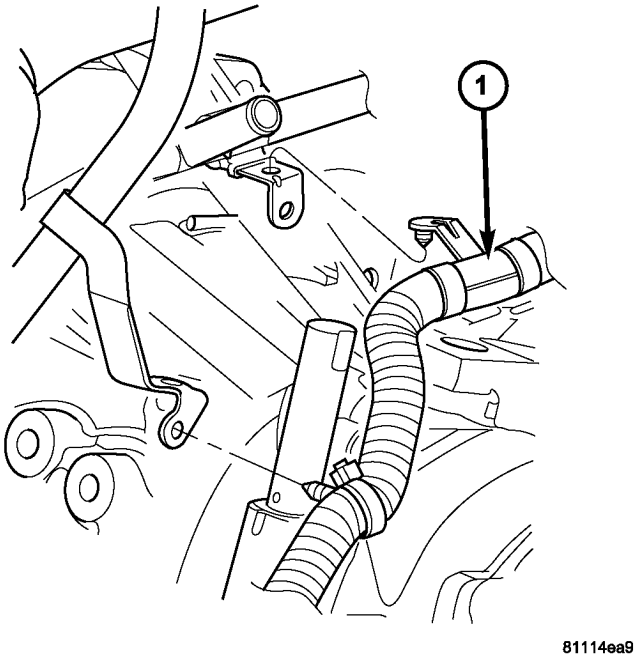


Fig. 13 Transmission Harness/Retainers

1 - TRANSMISSION HARNESS

41AE/TE AUTOMATIC TRANSAXLE (Continued)

(16) Disconnect front brake lines from the hydraulic control unit (Fig. 14). Position out of way for removal clearance.

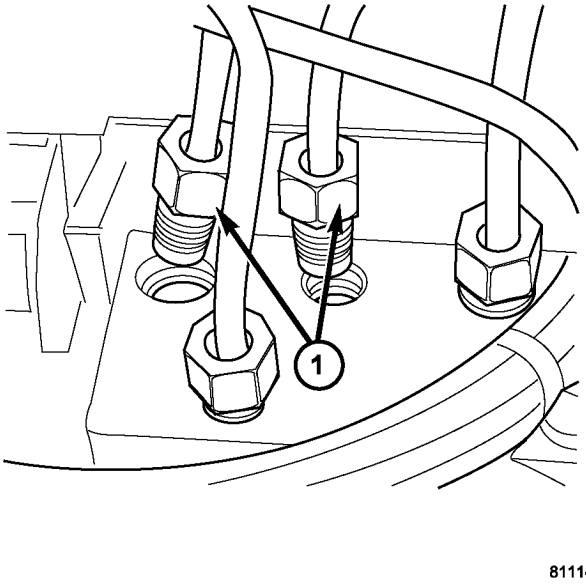


Fig. 14 Brake Lines at Hydraulic Control Unit

1 - FRONT BRAKE LINES

(17) Remove intermediate shaft extension from steering gear (Fig. 16). Remove roll pin using Tool 6831A (Fig. 15). Slide shaft extension off of gear.

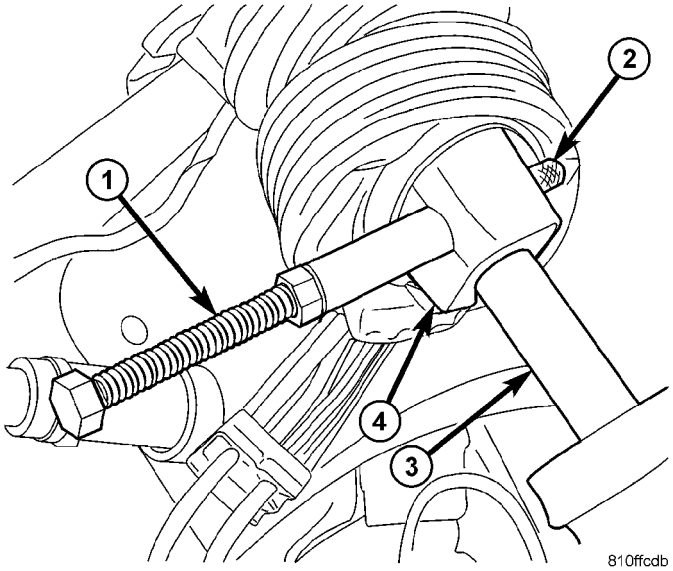


Fig. 15 Roll Pin Removal

1 - TOOL 6831A
2 - ROLL PIN
3 - STEERING GEAR
4 - INTERMEDIATE SHAFT EXTENSION

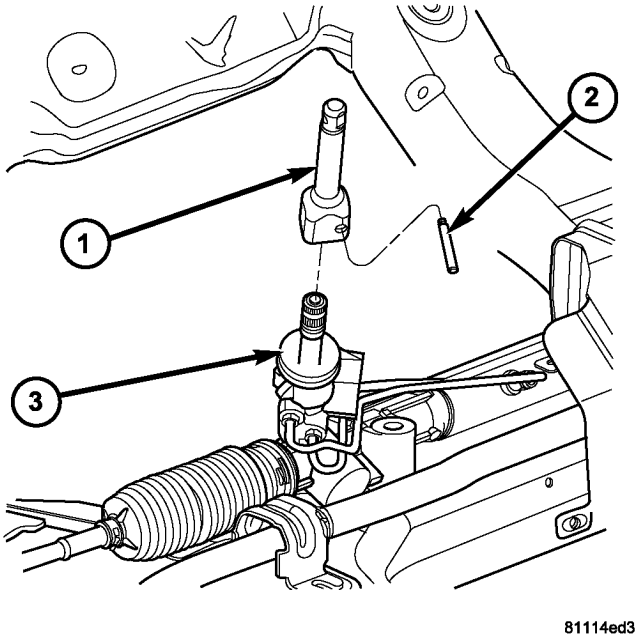


Fig. 16 Intermediate Shaft Extension at Gear

1 - INTERMEDIATE SHAFT EXTENSION
2 - ROLL PIN
3 - STEERING GEAR

(18) Install overhead powertrain support fixture (Tool 8534B and adapter kit 8534-12) (Fig. 17):

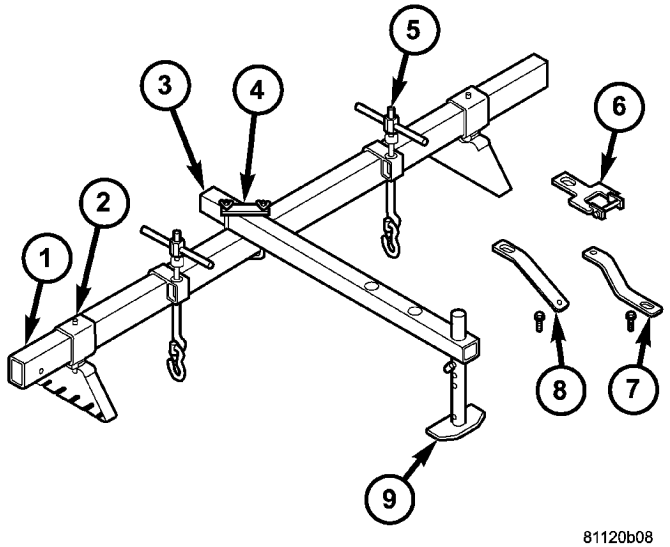


Fig. 17 Engine Support Fixture 8534B

1 - SUPPORT TUBE 8534-1
2 - BRACKET/SLEEVE 8534-2
3 - CROSS-BAR 8534-3
4 - CLAMP 8534-5
5 - LIFT HOOK ASSEMBLY
6 - LIFT BRACKET/BOLT 8534-15
7 - LIFT BRACKET/BOLT 8534-7
8 - LIFT BRACKET/BOLT 8534-8
9 - SUPPORT LEG 8534-4

41AE/TE AUTOMATIC TRANSAXLE (Continued)

(a) Remove engine oil dipstick tube-to-cylinder head fastener (Fig. 18). Install lift/support bracket 8534-8 and secure with dipstick tube bolt.

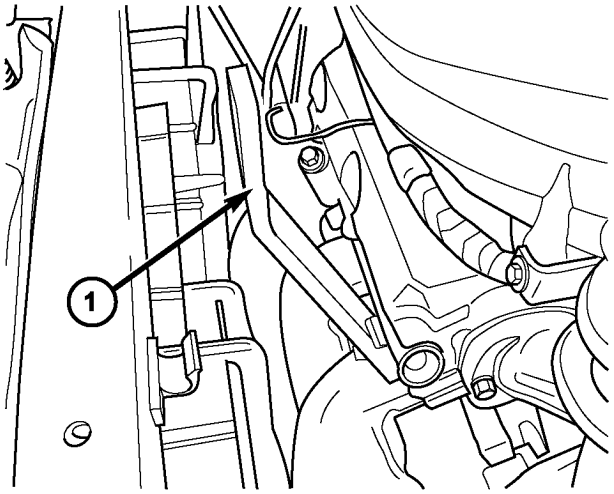


Fig. 18 Lift Bracket 8534-8

1 - BRACKET 8534-8

(b) Disconnect coolant temperature sensor (at thermostat housing). Remove engine harness-to-cylinder head bolt. Position harness out of the way. Install and secure lift/support bracket and bolt 8534-7 as shown in (Fig. 19).

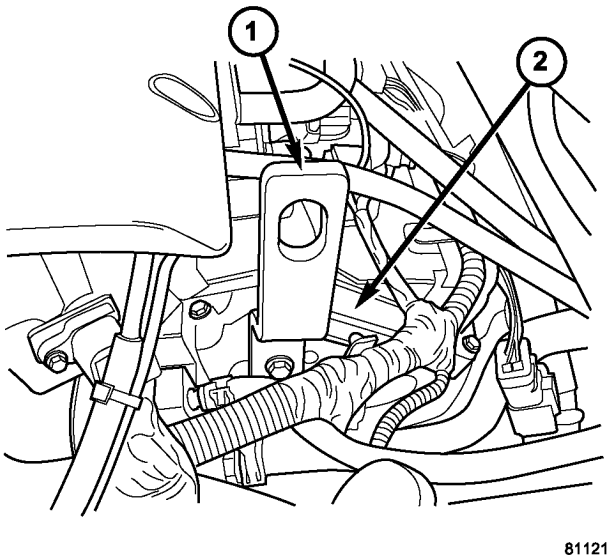


Fig. 19 Lift Bracket 8534-7

1 - BRACKET 8534-7
2 - REAR CYLINDER HEAD

(c) Assemble 8534-2 mounting bracket/sleeve assemblies to support tube 8534-1 and install to vehicle, allowing brackets to rest on inner fender ledges (Fig. 20).

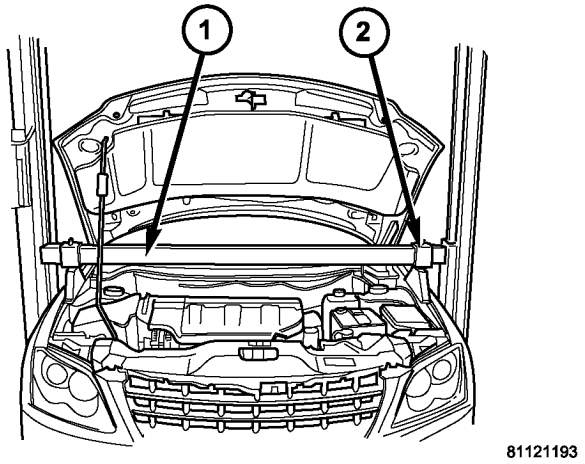


Fig. 20 Support Tube and Sleeve/Brackets

1 - SUPPORT TUBE 8534-1
2 - BRACKET/SLEEVE 8534-2

(d) Assemble cross-bar 8534-3, clamp 8534-5 and support leg 8534-4 to support tube, allowing support leg to rest on radiator upper support (Fig. 21).

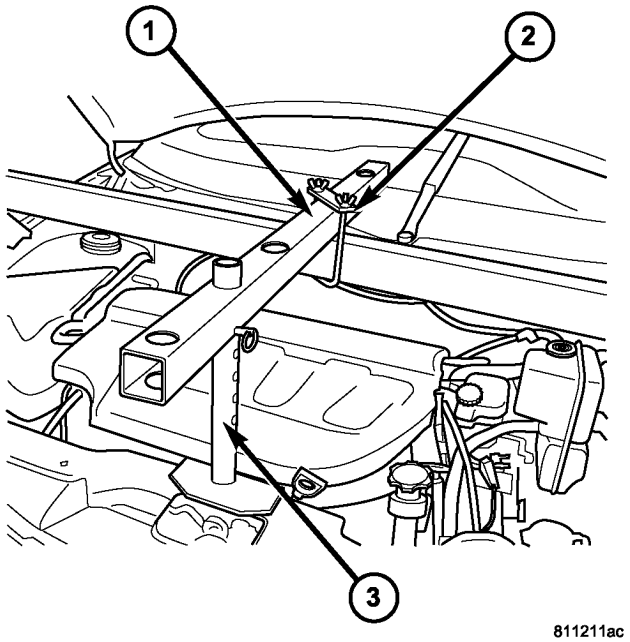


Fig. 21 Crossbar and Support Leg

1 - CROSS-BAR 8534-3
2 - CLAMP 8534-5
3 - SUPPORT LEG 8534-4

(e) Tighten cross-bar-to-support tube clamp 8534-5 (Fig. 22), as well as mounting bracket/sleeve 8534-2 thumb screw and hex nut to secure fixture (Fig. 23).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

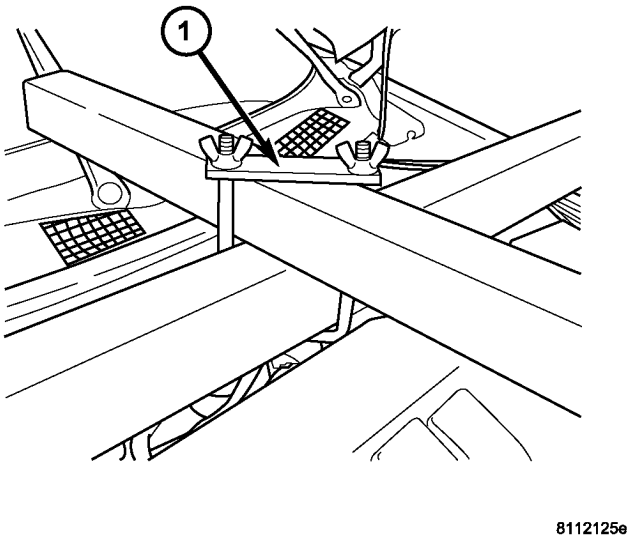


Fig. 22 Clamp 8534-5

1 - CLAMP 8534-5

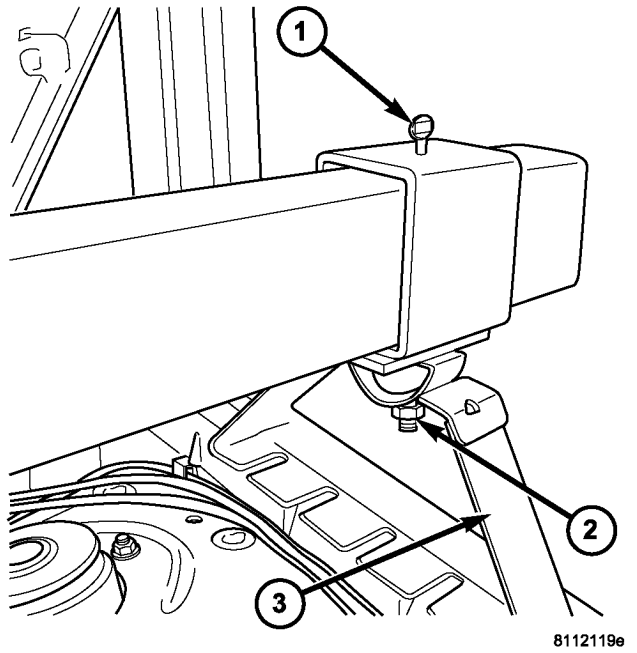


Fig. 23 Torque Thumb Screw and Pivot Nut

1 - THUMB SCREW
2 - PIVOT HEX NUT
3 - BRACKET/SLEEVE 8534-2

(f) Install lift bracket/hook assemblies as shown in (Fig. 23) (Fig. 24) (Fig. 25) (Fig. 26). Tighten t-handles just enough to build tension between the fixture and drivetrain.

(19) Raise vehicle on hoist.

(20) Remove both front tire/wheel assemblies.

(21) Disconnect ABS sensor connector. Remove ABS sensor brackets from struts.

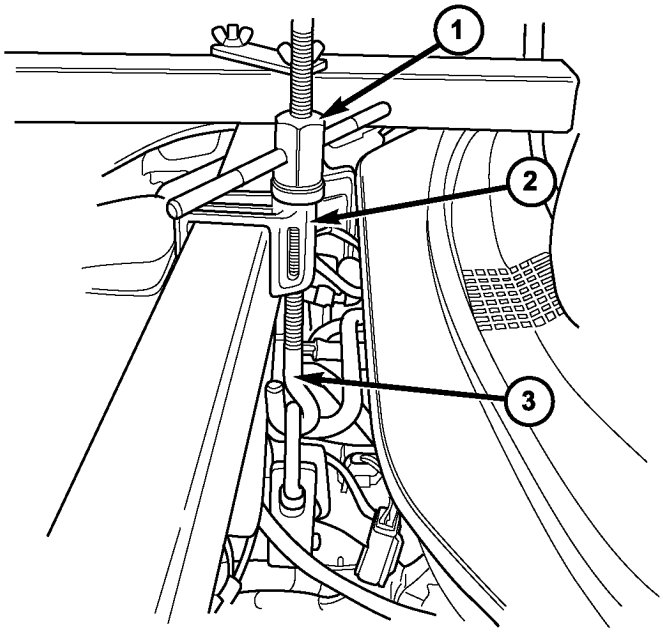


Fig. 24 T-Handle, Bracket, and Hook Assy at Rear Lift Bracket

1 - T-HANDLE 8534-14
2 - LIFTING BRACKET 8534-13
3 - HOOK ASSEMBLY 8534-11

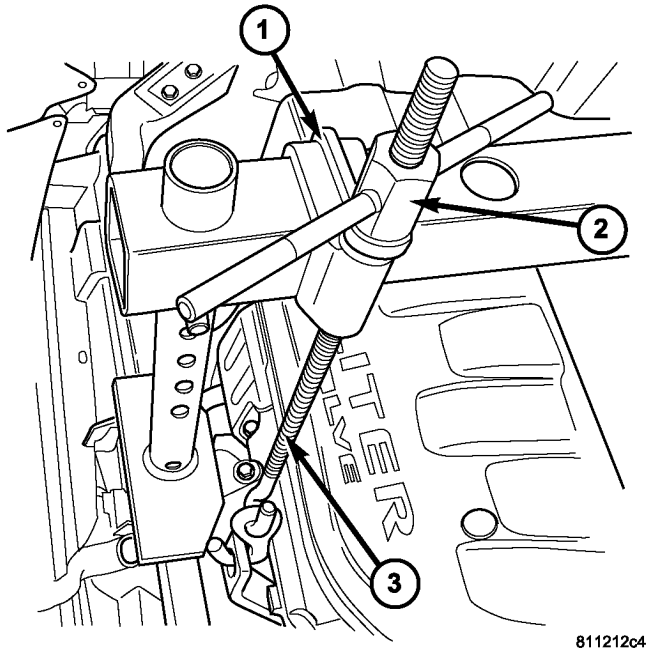


Fig. 25 T-Handle, Bracket, and Hook Assy at Front Lift Bracket

1 - LIFTING BRACKET 8534-13
2 - T-HANDLE 8534-14
3 - HOOK ASSEMBLY 8534-11

41AE/TE AUTOMATIC TRANSAXLE (Continued)

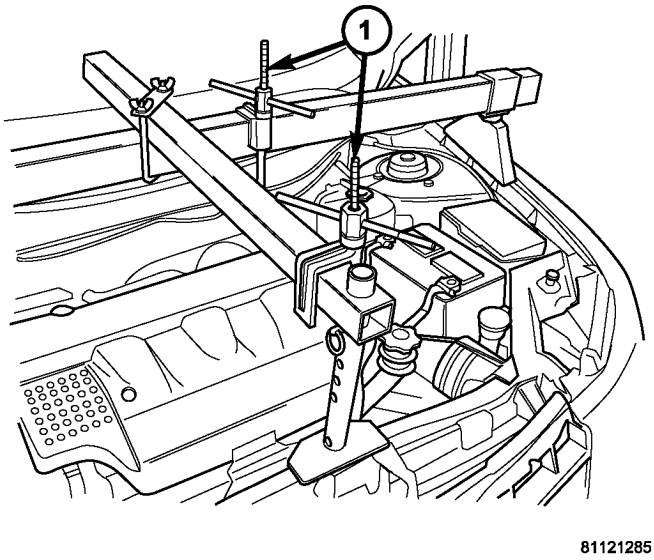


Fig. 26 Engine Support Fixture 8534B

1 - LIFT BRACKET/HOOK ASSEMBLY

(22) Disconnect sway bar links from struts (Fig. 27).

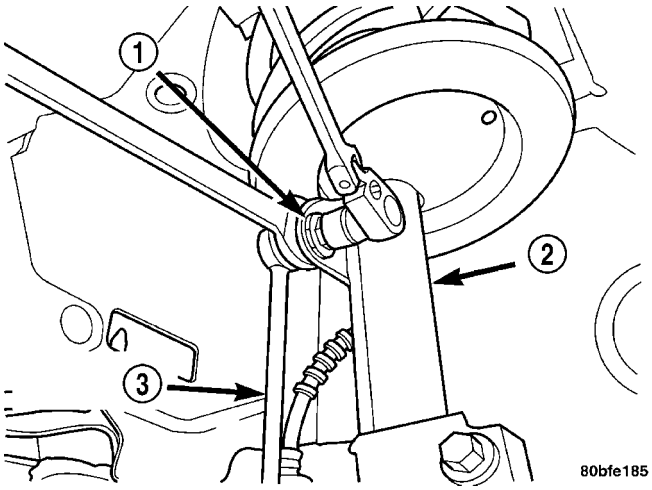


Fig. 27 Stabilizer Bar Link To Strut

1 - NUT
2 - STRUT
3 - STABILIZER BAR LINK

(23) Remove front halfshaft assemblies.

(24) Remove engine front and rear mount-to-cradle nuts.

(25) Disconnect brake hydraulic line and brackets from frame rails.

(26) Disconnect power steering hydraulic line bracket at cradle on passenger side (Fig. 28).

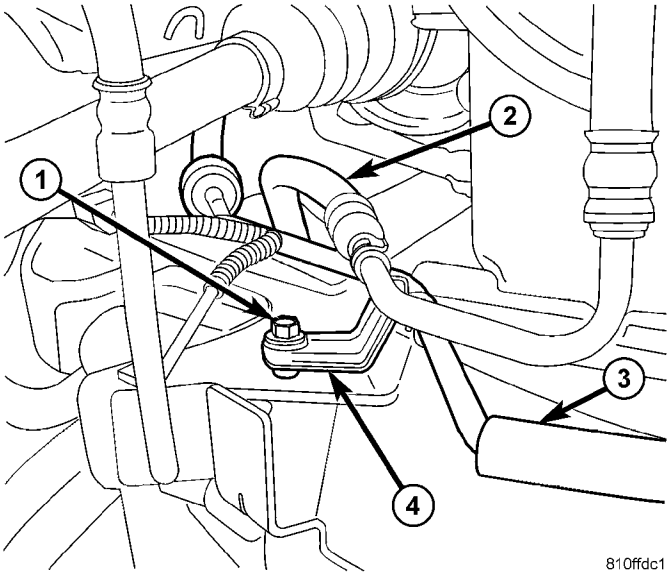


Fig. 28 Hose Routing Clip at Cradle

1 - BOLT
2 - PRESSURE HOSE
3 - RETURN HOSE
4 - CLIP

(27) Disconnect power steering oil cooler from cradle (Fig. 29).

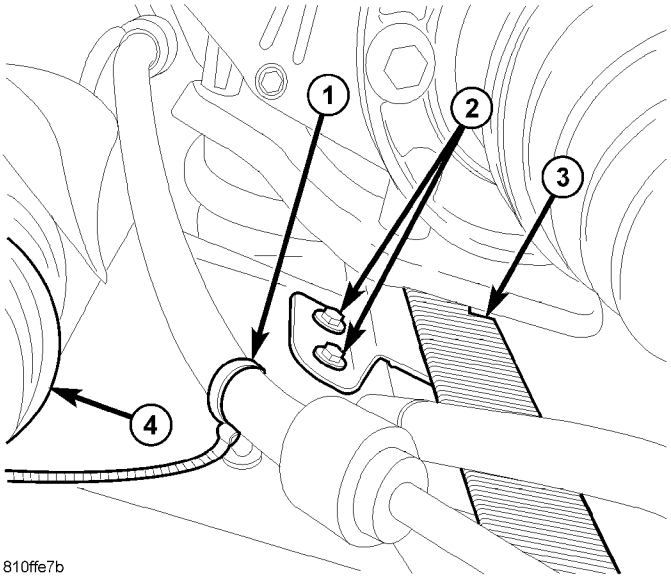


Fig. 29 Cooler Mounting Screws

1 - RETURN HOSE
2 - COOLER BOLTS
3 - POWER STEERING COOLER
4 - STEERING GEAR

(28) Disconnect power steering pressure and return lines from steering gear (Fig. 30). Cap lines to prevent debris intrusion and tie out of way.

41AE/TE AUTOMATIC TRANSAXLE (Continued)

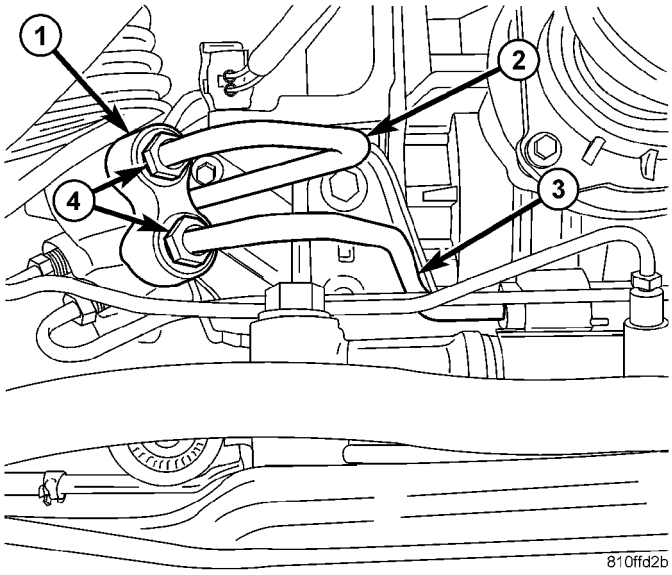


Fig. 30 Hoses at Steering Gear

1 - STEERING GEAR
2 - PRESSURE HOSE
3 - RETURN HOSE
4 - FITTINGS

(29) Remove the transmission-to-cradle torque strut (Fig. 31).

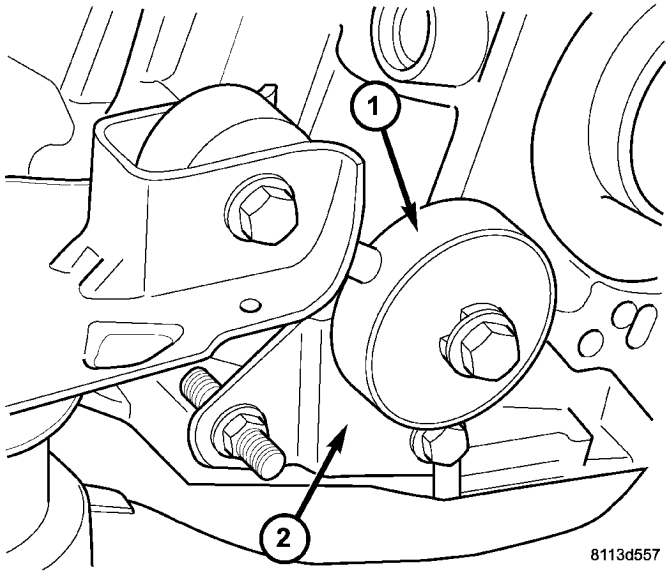


Fig. 31 Powertrain Torque Strut

1 - STRUT
2 - BRACKET

(30) Set Driveline Support Table, Tool 8874 into position (Fig. 32) (Fig. 33).

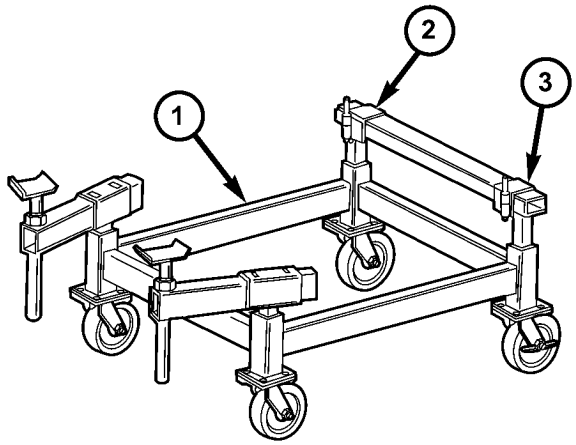


Fig. 32 Driveline Support Table 8874

1 - DRIVELINE SUPPORT TABLE 8874-1
2 - BRACKET 8874-4
3 - BRACKET 8874-3

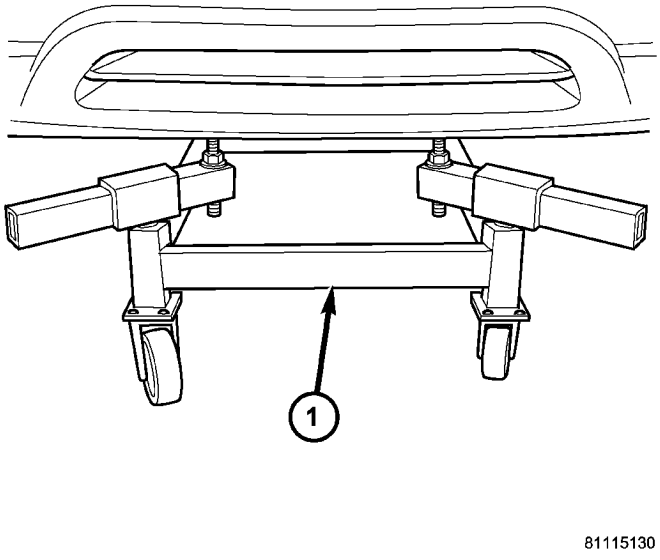


Fig. 33 Driveline Support Table in Position

1 - DRIVELINE SUPPORT TABLE 8874

(31) Lower vehicle until cradle and fixture engage as shown in (Fig. 34).

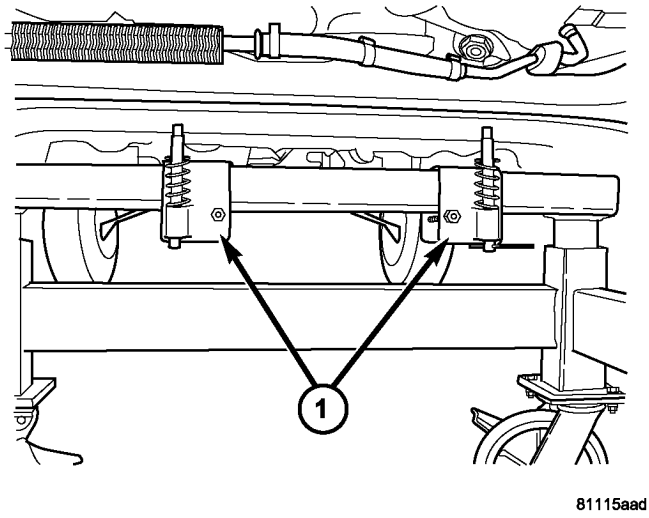


Fig. 34 Locating Brackets at Cradle

1 - SLIDING BRACKETS WITH LOCATORS

(32) Scribe alignment marks to reference the cradle to the body for installation. Remove four (4) cradle-to-body bolts.

(33) Slowly raise vehicle on hoist to separate cradle from vehicle. **Verify that overhead fixture is secure to inner fenders and radiator upper support.** Have helper guide brake and power steering hydraulic lines through, as they will remain attached to cradle assembly.

(34) Remove engine front mount/bracket (Fig. 35).

(35) Disconnect starter motor electrical connectors (Fig. 36). Remove starter motor and shim.

(36) **AWD Models:**

(a) Remove propeller shaft assembly. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT - REMOVAL).

(b) Remove PTU/rear mount bracket (Fig. 37).

(c) Remove oil pan-to-transaxle collar (Fig. 40).

(d) Remove heat shield (Fig. 38).

(e) Remove PTU-to-transaxle upper bolts (Fig. 38).

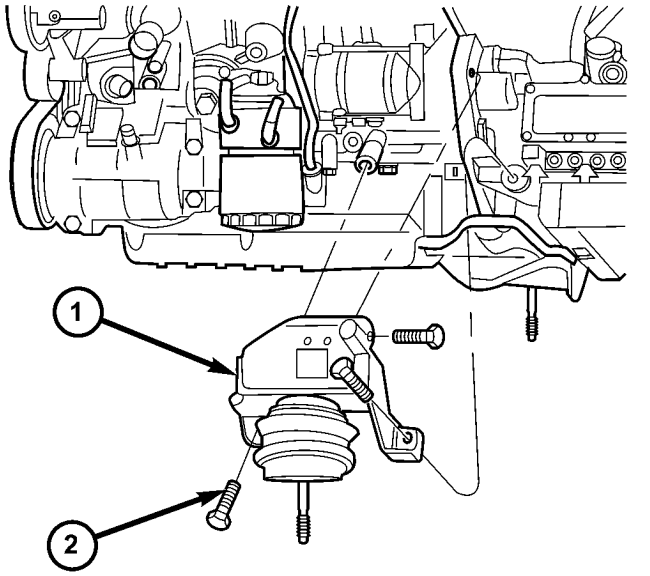


Fig. 35 Engine Front Mount/Bracket

1 - MOUNT/BRACKET ASSY.
2 - BOLTS

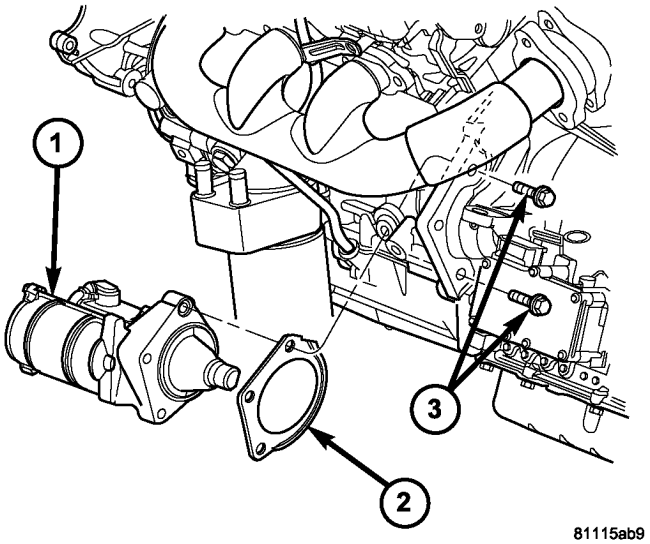


Fig. 36 Starter Motor and Shim

1 - STARTER MOTOR
2 - SHIM
3 - BOLTS

41AE/TE AUTOMATIC TRANSAXLE (Continued)

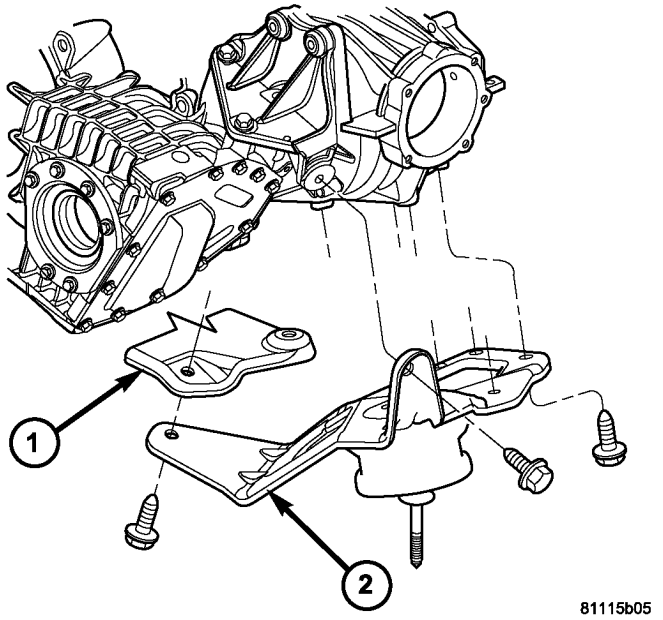


Fig. 37 PTU Bracket/Rear Mount Assembly

1 - COLLAR
2 - BRACKET/REAR MOUNT

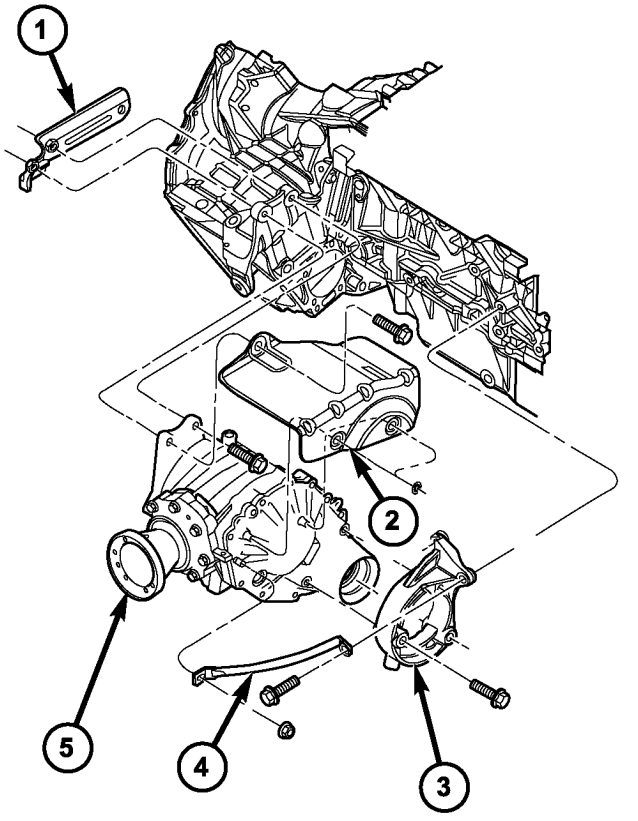


Fig. 38 Power Transfer Unit Mounting

1 - BRACKET
2 - HEAT SHIELD
3 - BRACKET
4 - BRACE
5 - POWER TRANSFER UNIT

(f) Remove PTU-to-bracket lower bolts (Fig. 39).

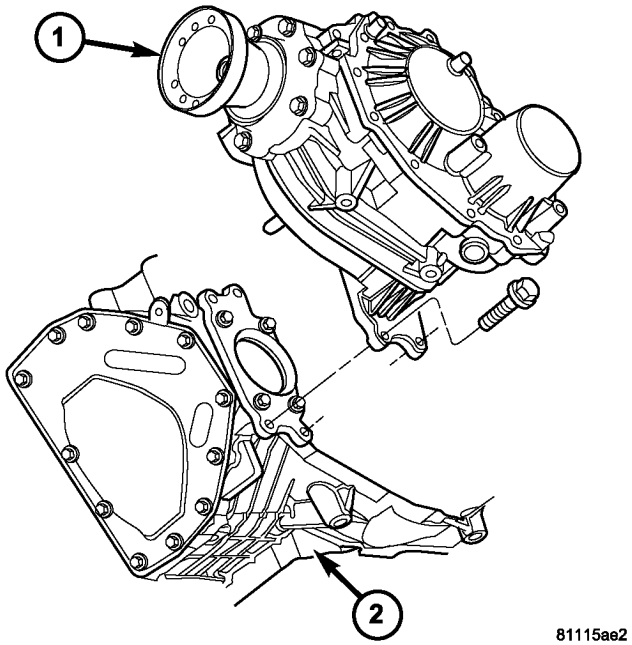


Fig. 39 Power Transfer Unit Lower Bolts

1 - POWER TRANSFER UNIT
2 - TRANSAXLE

(g) Remove PTU from vehicle.

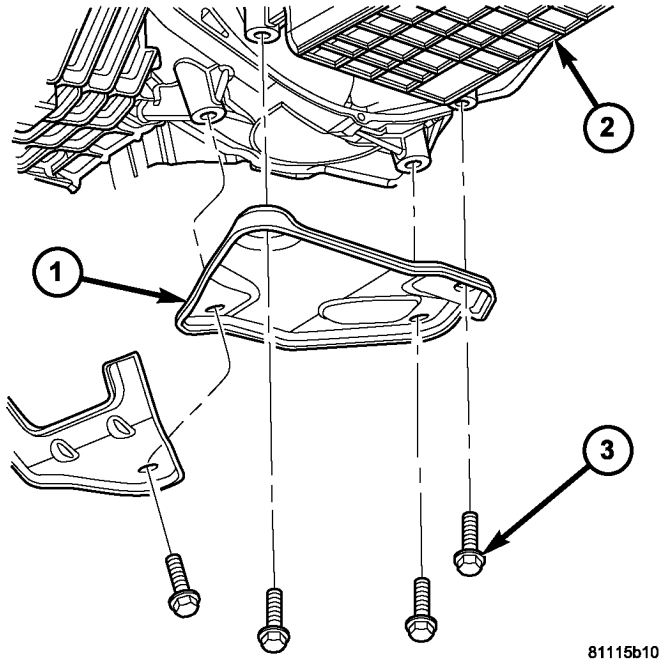


Fig. 40 Oil Pan-to-Transaxle Collar

1 - COLLAR
2 - ENGINE OIL PAN
3 - BOLT (4)

(37) Remove torque converter dust shield (Fig. 41).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

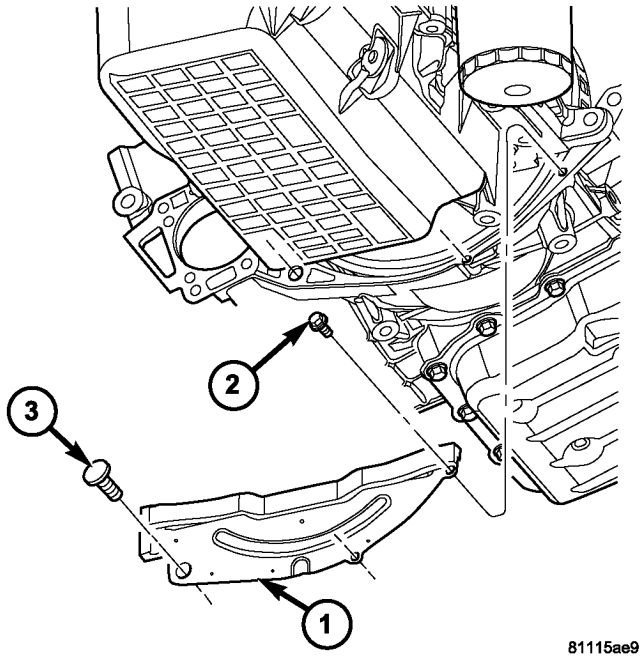


Fig. 41 Torque Converter Dust Shield

1 - DUST SHIELD
2 - BOLT (2)
3 - RETAINER

(38) Remove four (4) torque converter-to-driveplate bolts. Upon removing bolts, a tight-tolerance (slotted) bolt will be encountered. Mark this location (driveplate and converter) with paint for assembly reference.

(39) Lower vehicle.

(40) Remove four (4) transaxle upper bellhousing-to-block bolts.

(41) Lower engine/transaxle at overhead fixture.

(42) Raise vehicle.

(43) Install transmission jack into position. Secure transaxle to jack.

(44) Remove two (2) transaxle-to-engine lower bolts.

(45) Lower transaxle from engine compartment.

DISASSEMBLY

NOTE: If transaxle is being overhauled (clutch and/or seal replacement) or replaced, it is necessary to perform the PCM/TCM Quick Learn Procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

NOTE: This procedure does not include final drive (differential) disassembly.

(1) Remove input and output speed sensors.

(2) Remove three (3) solenoid/pressure switch assembly-to-case bolts.

(3) Remove solenoid/pressure switch assembly and gasket (Fig. 42).

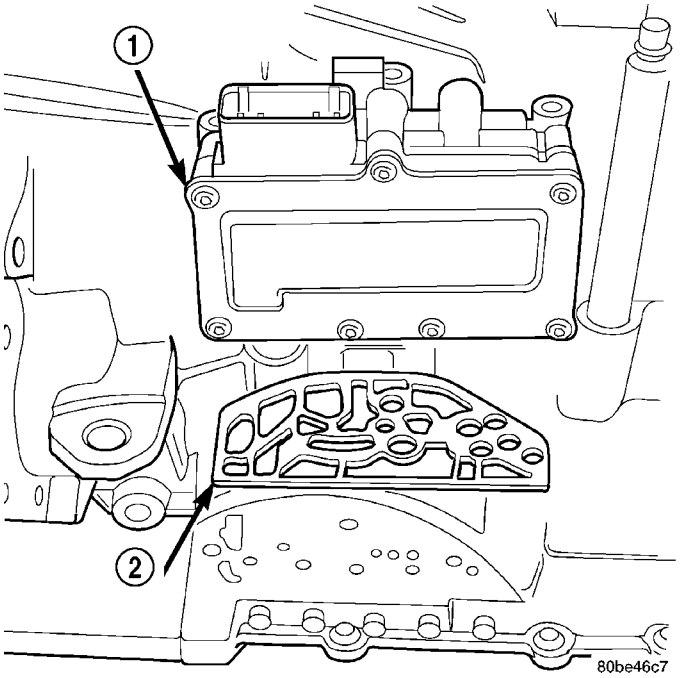


Fig. 42 Solenoid/Pressure Switch Assembly and Gasket

1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - GASKET

(4) Remove oil pan-to-case bolts (Fig. 43).

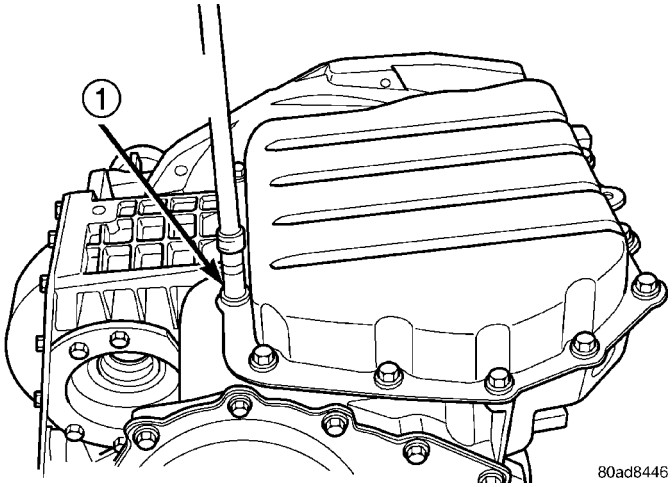


Fig. 43 Remove Oil Pan Bolts

1 - OIL PAN BOLTS (USE RTV UNDER BOLT HEADS)

41AE/TE AUTOMATIC TRANSAXLE (Continued)

(5) Remove oil pan (Fig. 44).

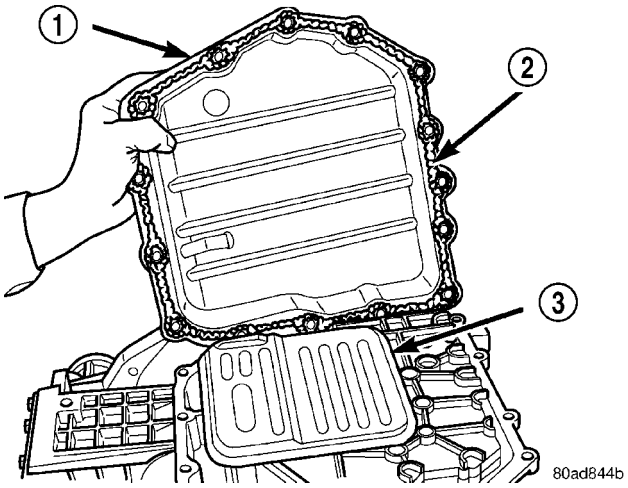


Fig. 44 Remove Oil Pan

1 - OIL PAN
2 - 1/8 INCH BEAD OF MOPAR® ATF RTV (MS-GF41)
3 - OIL FILTER

(6) Remove oil filter (Fig. 45).

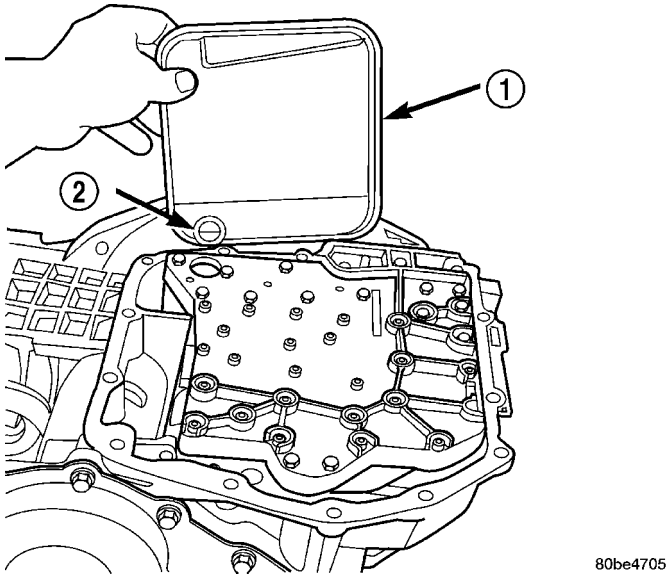


Fig. 45 Remove Oil Filter

1 - OIL FILTER
2 - O-RING

(7) Turn manual valve fully clock-wise to get park rod into position for removal.

(8) Remove valve body-to-case bolts (Fig. 46).

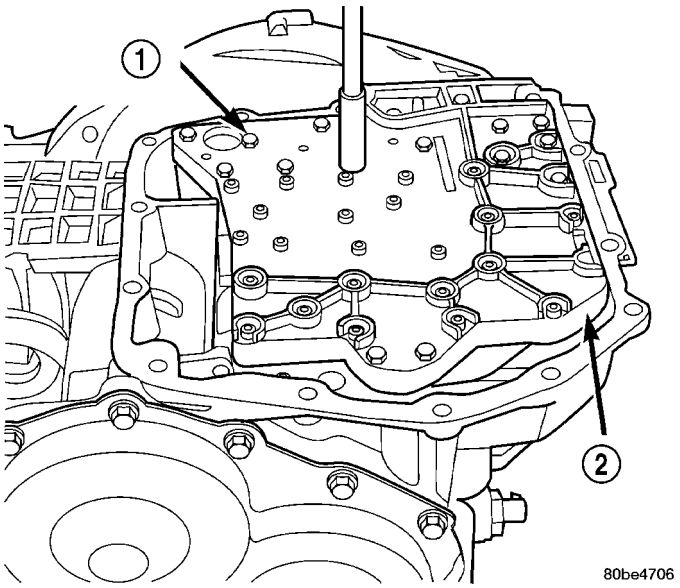


Fig. 46 Remove Valve Body Attaching Bolts

1 - VALVE BODY ATTACHING BOLTS (18)
2 - VALVE BODY

CAUTION: Do not handle the valve body assembly from the manual valve. Damage can result.

(9) Using a screwdriver, push park rod rollers away from guide bracket (Fig. 47) and remove valve body assembly (Fig. 48).

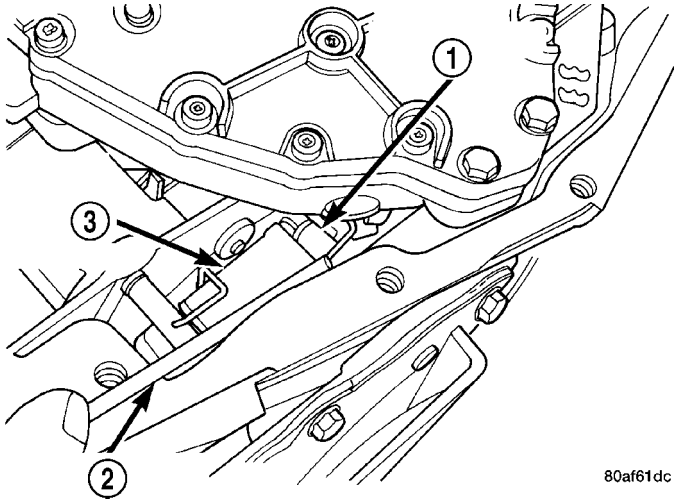


Fig. 47 Push Park Rod Rollers from Guide Bracket

1 - PARK SPRAG ROLLERS
2 - SCREWDRIVER
3 - PARK SPRAG GUIDE BRACKET

41AE/TE AUTOMATIC TRANSAXLE (Continued)

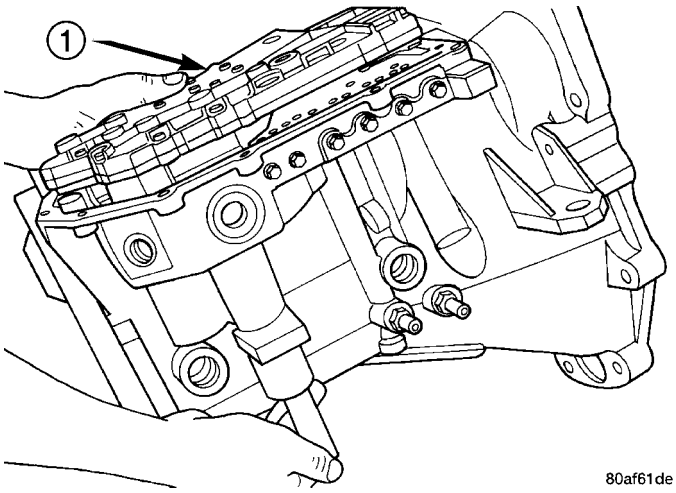


Fig. 48 Remove Valve Body

1 - VALVE BODY

NOTE: Depending on engine application, some accumulators will have two springs and others will have one spring. The springs are color-coded according to application and year. When disassembling, mark accumulator spring location to ease assembly.

(10) Remove underdrive and overdrive accumulators (Fig. 49).

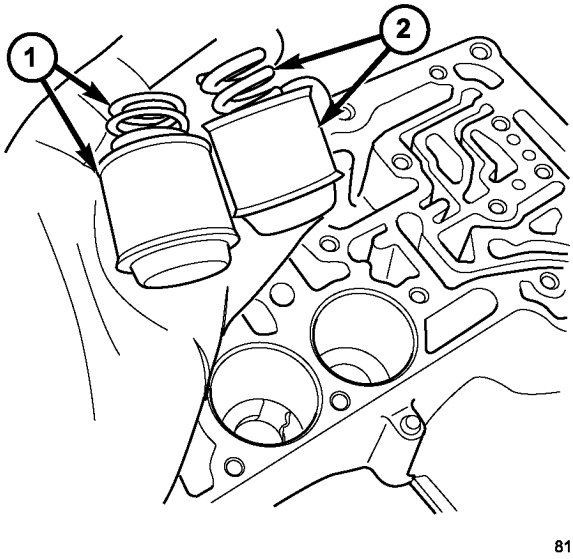


Fig. 49 Underdrive and Overdrive Accumulators

1 - OVERDRIVE PISTON AND SPRING
2 - UNDERDRIVE PISTON AND SPRING

(11) Remove low/reverse accumulator snap ring (Fig. 50).

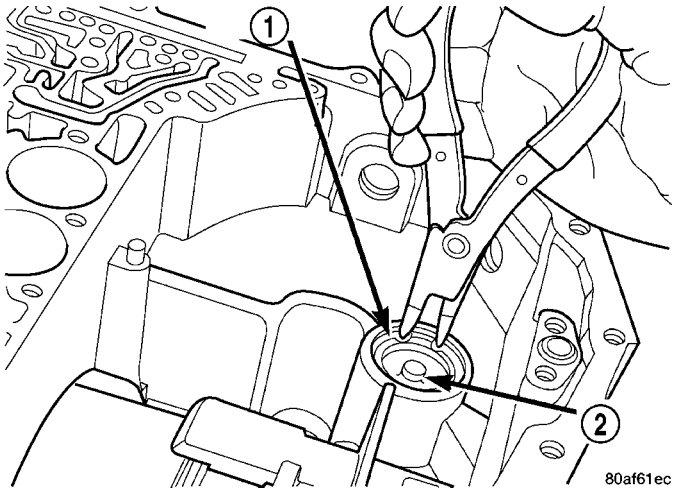


Fig. 50 Remove Low/Reverse Accumulator Snap Ring

1 - SNAP RING
2 - PLUG

(12) Remove low/reverse accumulator plug (Fig. 51).

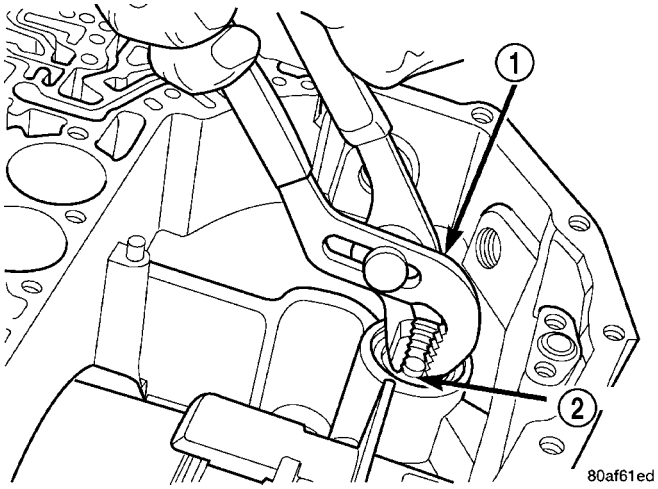


Fig. 51 Remove Low/Reverse Accumulator Plug (Cover)

1 - ADJUSTABLE PLIERS
2 - PLUG

(13) Remove low/reverse accumulator piston using suitable pliers (Fig. 52) (Fig. 53).

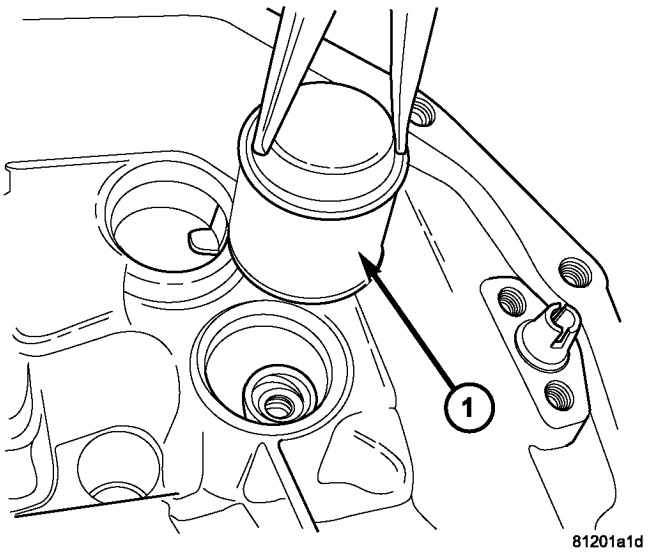


Fig. 52 Low/Reverse Accumulator Piston

1 - ACCUMULATOR PISTON

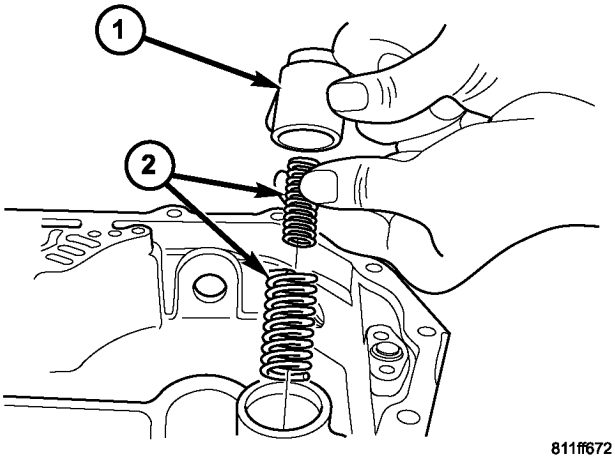


Fig. 53 Low/Reverse Accumulator

1 - PISTON
2 - RETURN SPRINGS

(14) Measure input shaft end play. Place transaxle so input shaft is vertical. Set up end play set and dial indicator as shown in (Fig. 54). **Input shaft end play should be within 0.13-0.64 mm (0.005-0.025 in.)** If outside of this range, a #4 thrust plate change is required. Record indicator reading for reference upon reassembly.

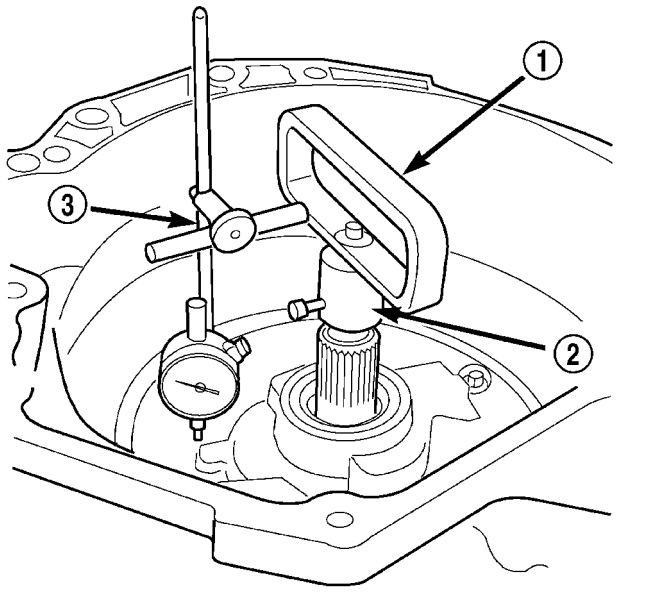


Fig. 54 Measure Input Shaft End Play Using End Play Set 8266

1 - TOOL 8266–8
2 - TOOL 8266–2
3 - TOOL C-3339

(15) Remove oil pump-to-case bolts (Fig. 55).

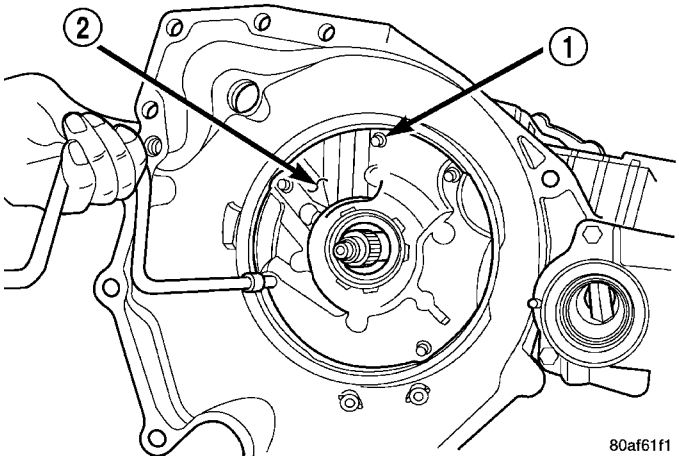


Fig. 55 Remove Pump Attaching Bolts

1 - PUMP ATTACHING BOLTS
2 - PUMP HOUSING

CAUTION: Be sure input speed sensor is removed before removing oil pump.

(16) Install pullers Tool C-3752 as shown in (Fig. 56).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

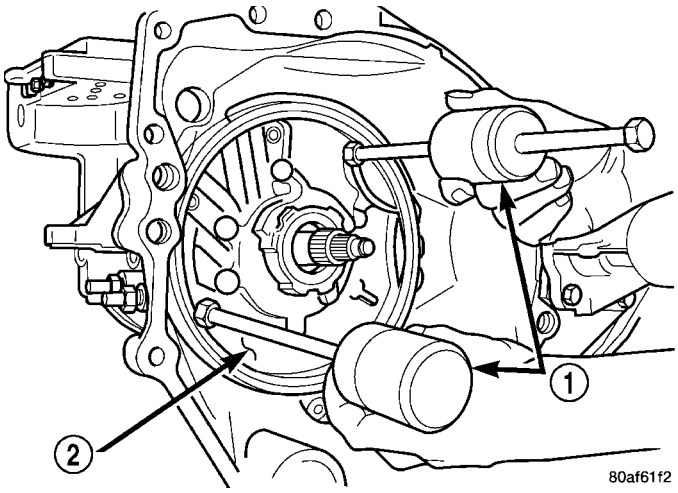


Fig. 56 Install Tool C-3752

1 - PULLERS TOOL C-3752
2 - PUMP

(17) Remove oil pump assembly (Fig. 57) (Fig. 58).

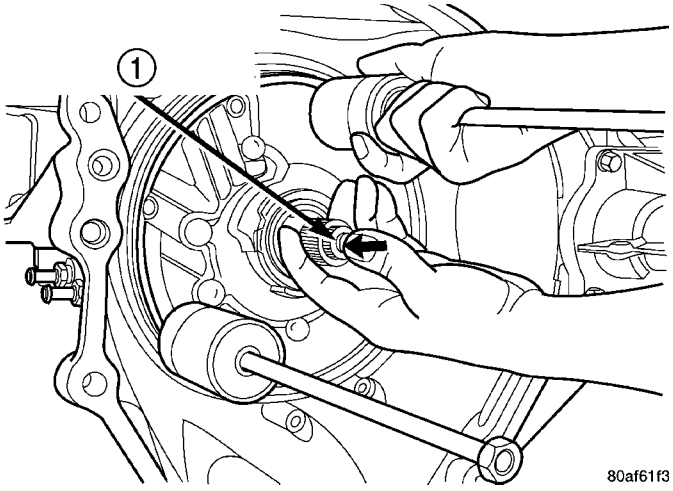


Fig. 57 Remove Oil Pump

1 - "PUSH IN" ON INPUT SHAFT WHILE REMOVING PUMP

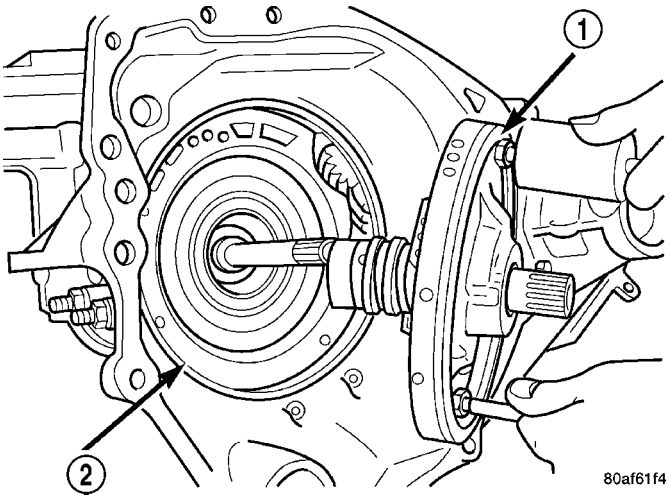


Fig. 58 Oil Pump Removed

1 - OIL PUMP
2 - GASKET

(18) Remove oil pump gasket (Fig. 59).

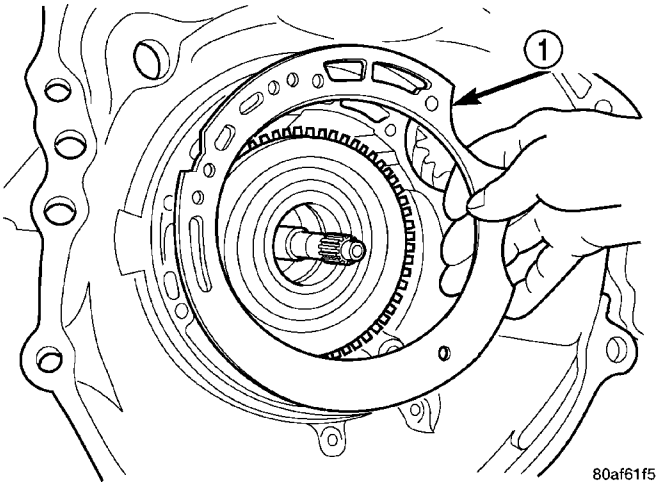


Fig. 59 Remove Oil Pump Gasket

1 - PUMP GASKET

CAUTION: If transaxle failure has occurred, the cooler bypass valve must be replaced. Do not re-use or attempt to clean valve.

(19) Remove cooler bypass valve (Fig. 60).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

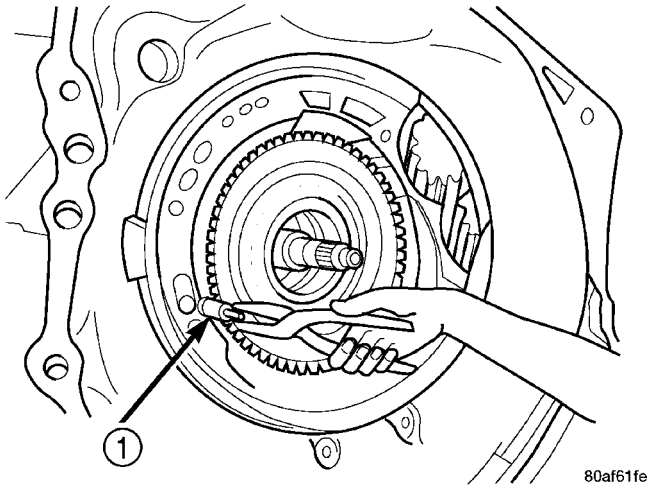


Fig. 60 Remove Bypass Valve

1 - COOLER BYPASS VALVE

(20) Remove #1 needle bearing (Fig. 61).

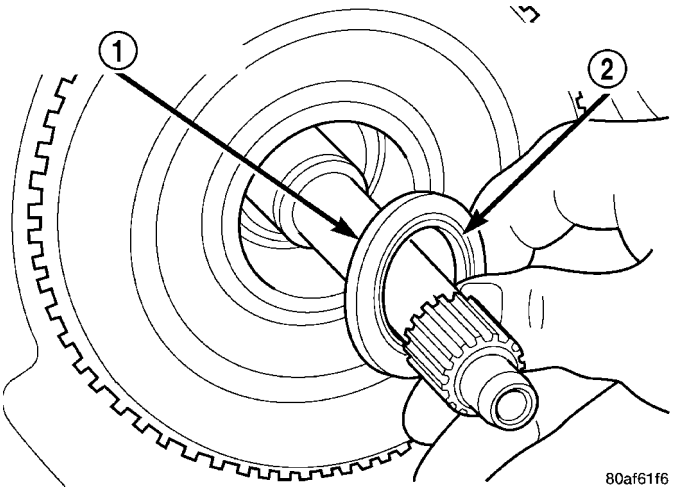


Fig. 61 Remove Caged Needle Bearing

1 - #1 CAGED NEEDLE BEARING
2 - NOTE: TANGED SIDE OUT

(21) Remove input clutch assembly (Fig. 62).

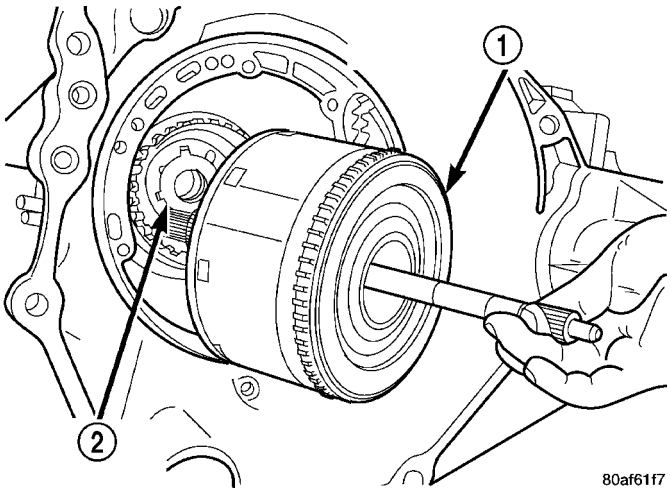


Fig. 62 Remove Input Clutch Assembly

1 - INPUT CLUTCH ASSEMBLY
2 - #4 THRUST WASHER

(22) Remove #4 thrust plate (Fig. 63).

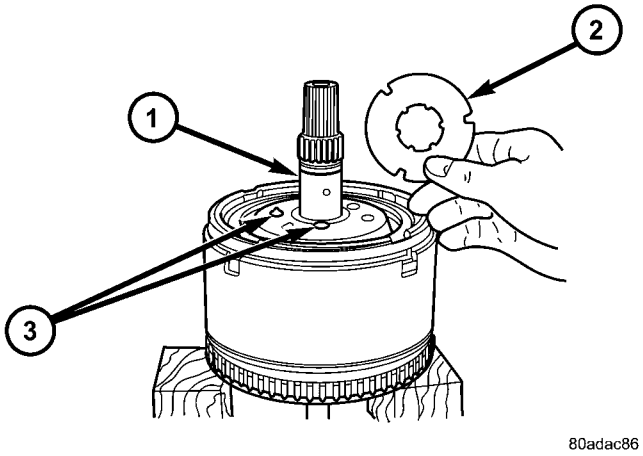


Fig. 63 No. 4 Thrust Plate

1 - OVERDRIVE SHAFT ASSEMBLY
2 - #4 THRUST PLATE (SELECT)
3 - 3 DABS OF PETROLATUM FOR RETENTION

(23) Remove front sun gear assembly and #4 thrust washer (Fig. 64).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

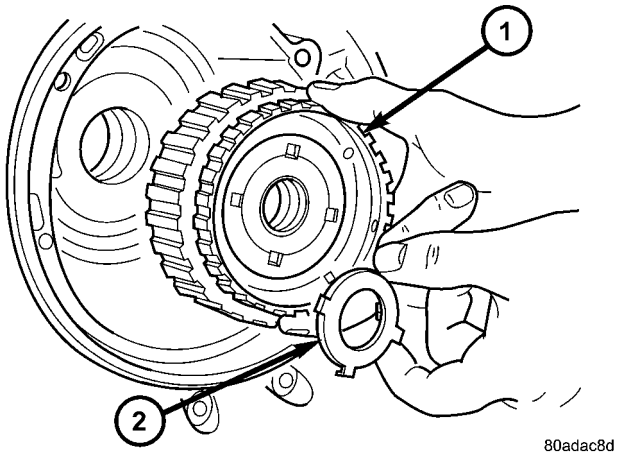


Fig. 64 Remove Front Sun Gear Assembly

1 - FRONT SUN GEAR ASSEMBLY
2 - #4 THRUST WASHER (FOUR TABS)

(24) Remove front carrier/rear annulus assembly and #6 needle bearing (Fig. 65).

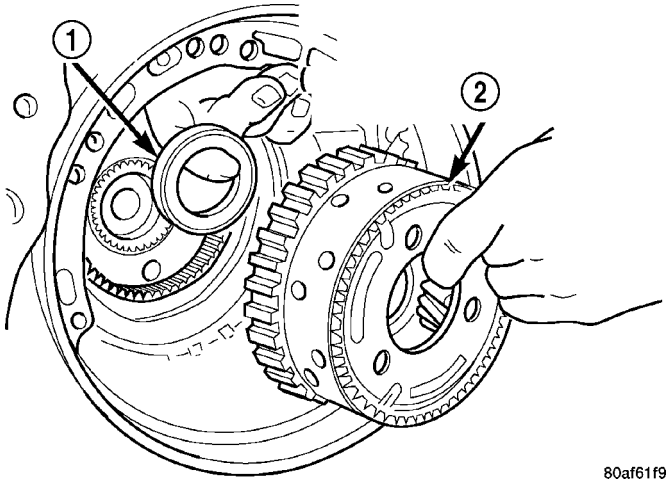


Fig. 65 Remove Front Carrier and Rear Annulus Assembly

1 - #6 NEEDLE BEARING
2 - FRONT CARRIER AND REAR ANNULUS ASSEMBLY (TWIST AND PULL OR PUSH TO REMOVE OR INSTALL).

(25) Remove rear sun gear and #7 needle bearing (Fig. 66).

NOTE: The number 7 needle bearing has three anti-reversal tabs and is common with the number five and number two position. The orientation should allow the bearing to seat flat against the rear sun gear (Fig. 67). A small amount of petrolatum can be used to hold the bearing to the rear sun gear.

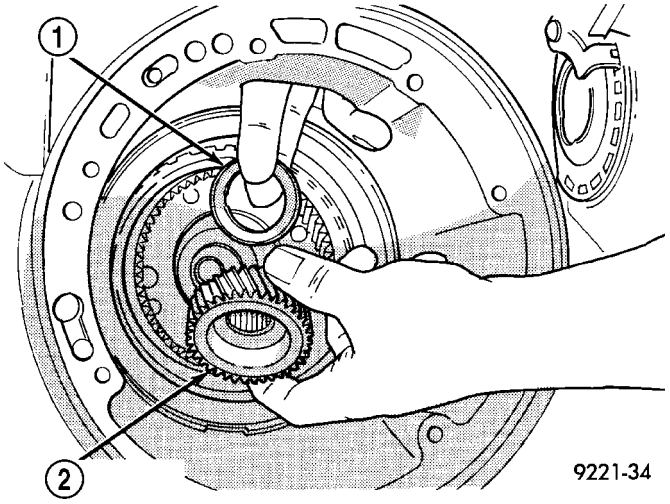


Fig. 66 Remove Rear Sun Gear

1 - #7 NEEDLE BEARING
2 - REAR SUN GEAR

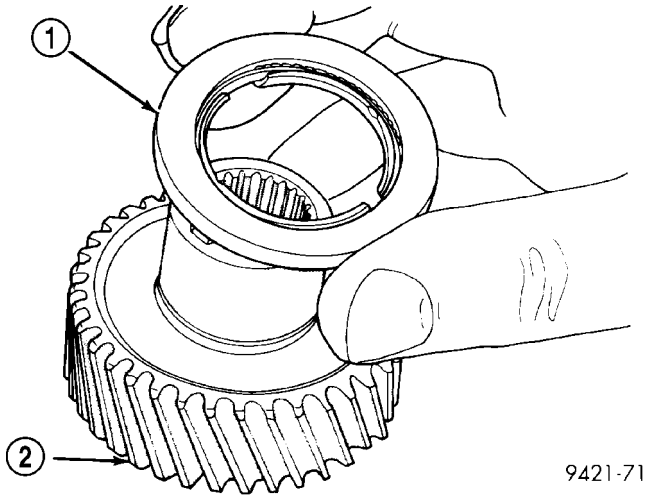


Fig. 67 Number 7 Bearing

1 - #7 NEEDLE BEARING
2 - REAR SUN GEAR

(26) Setup tool 5058 as shown in (Fig. 68). Compress 2/4 clutch return spring (just enough to remove snap ring) and remove snap ring.

NOTE: Verify that Tool 5058 is centered properly over the 2/4 clutch retainer before compressing. If necessary, fasten the 5058 bar to the bellhousing flange with any combination of locking pliers and bolts to center the tool properly.

41AE/TE AUTOMATIC TRANSAXLE (Continued)

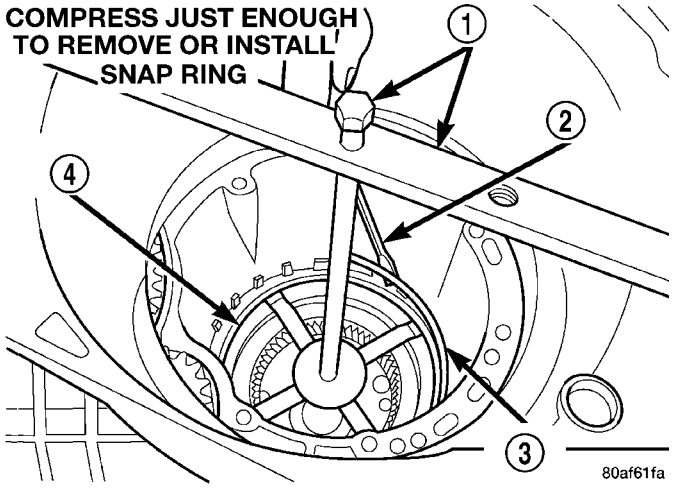


Fig. 68 Remove 2/4 Clutch Retainer Snap Ring

1 - TOOL 5058
2 - SCREWDRIVER
3 - SNAP RING
4 - 2/4 CLUTCH RETAINER

NOTE: The 2/4 Clutch Piston has bonded seals which are not individually serviceable. Seal replacement requires replacement of the piston assembly.

(27) Remove 2/4 clutch retainer (Fig. 69).

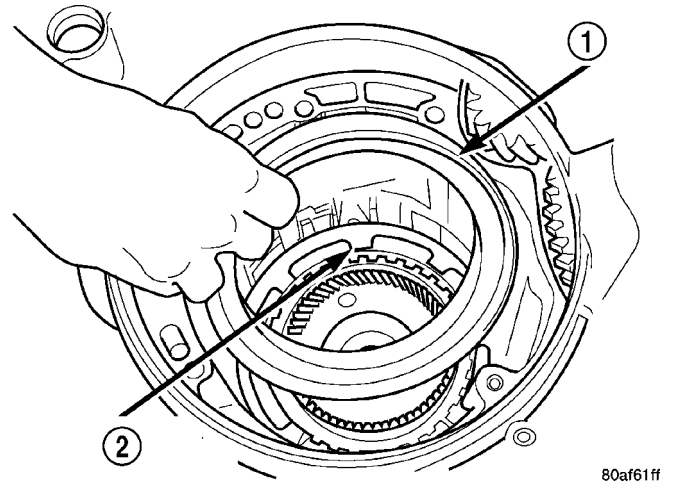


Fig. 69 2/4 Clutch Retainer

1 - 2/4 CLUTCH RETAINER
2 - 2/4 CLUTCH RETURN SPRING

(28) Remove 2/4 clutch return spring (Fig. 70).

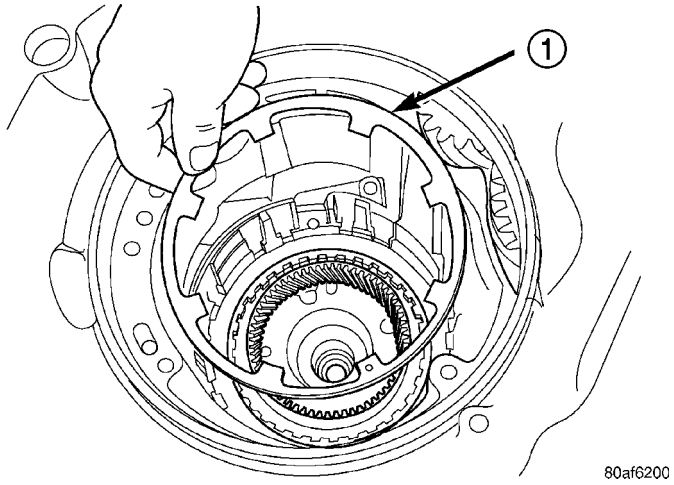


Fig. 70 Remove 2/4 Clutch Return Spring

1 - 2/4 CLUTCH RETURN SPRING

(29) Remove 2/4 clutch pack (Fig. 71). **Tag 2/4 clutch pack for reassembly identification.**

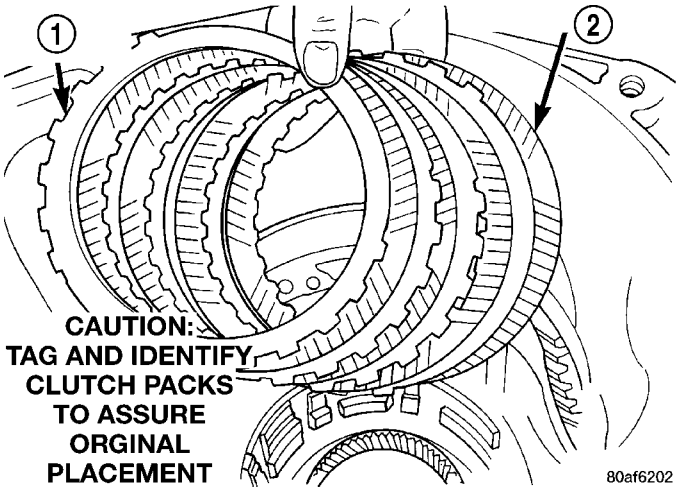


Fig. 71 Remove 2/4 Clutch Pack

1 - CLUTCH PLATE (4)
2 - CLUTCH DISC (4)

(30) Remove tapered snap ring (Fig. 72).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

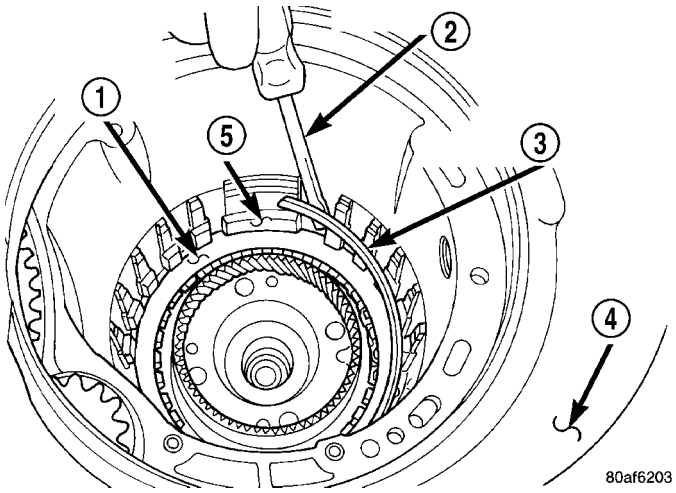


Fig. 72 Remove Tapered Snap Ring

1 - LOW/REVERSE CLUTCH REACTION PLATE
2 - SCREWDRIVER
3 - LOW/REVERSE TAPERED SNAP RING (TAPERED SIDE UP)
4 - OIL PAN FACE
5 - LONG TAB

(31) Remove low/reverse reaction plate (Fig. 73).

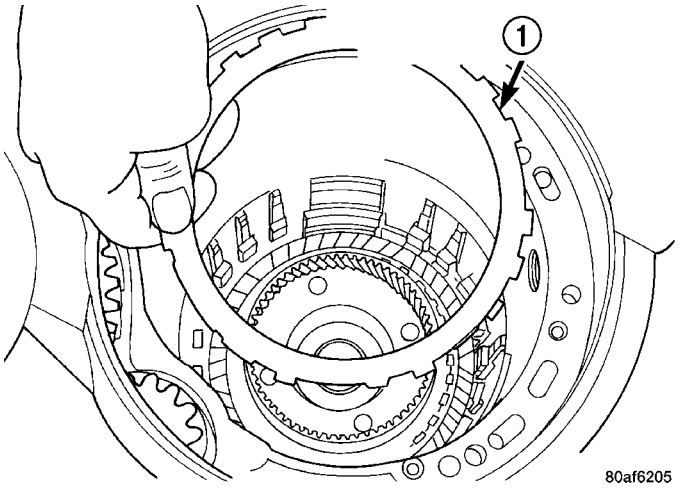


Fig. 73 Remove Low/Reverse Reaction Plate

1 - LOW/REVERSE REACTION PLATE (FLAT SIDE UP)

(32) Remove one low/reverse clutch disc (Fig. 74).

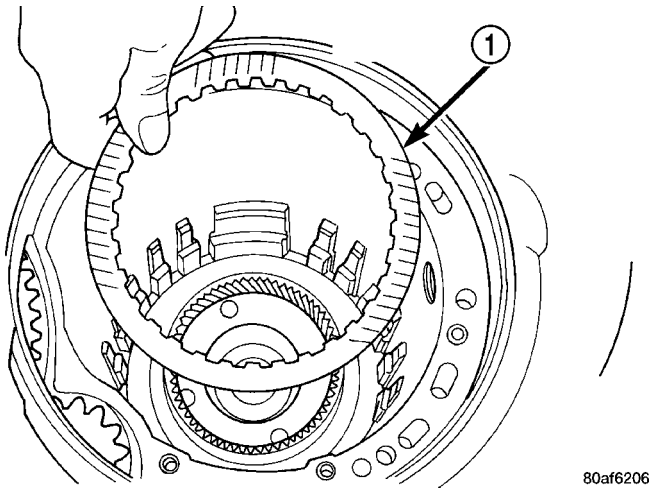


Fig. 74 Remove One Disc

1 - ONE DISC FROM LOW/REVERSE CLUTCH

(33) Remove low/reverse reaction plate snap ring (Fig. 75).

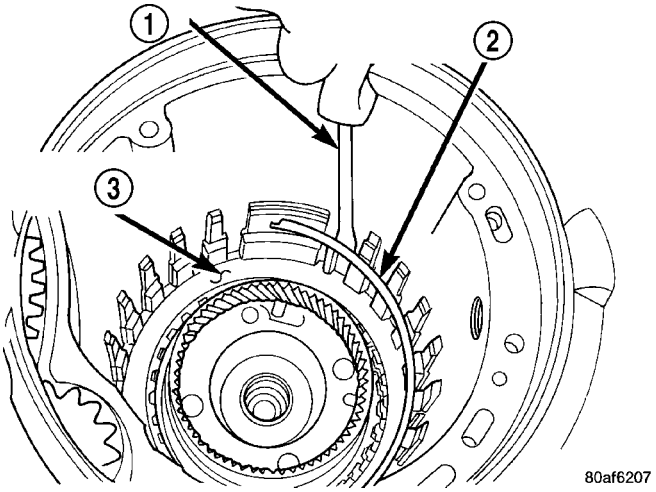


Fig. 75 Remove Low/Reverse Reaction Plate Snap Ring

1 - SCREWDRIVER
2 - LOW/REVERSE REACTION PLATE FLAT SNAP RING
3 - DO NOT SCRATCH CLUTCH PLATE

(34) Remove low/reverse clutch pack (Fig. 76).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

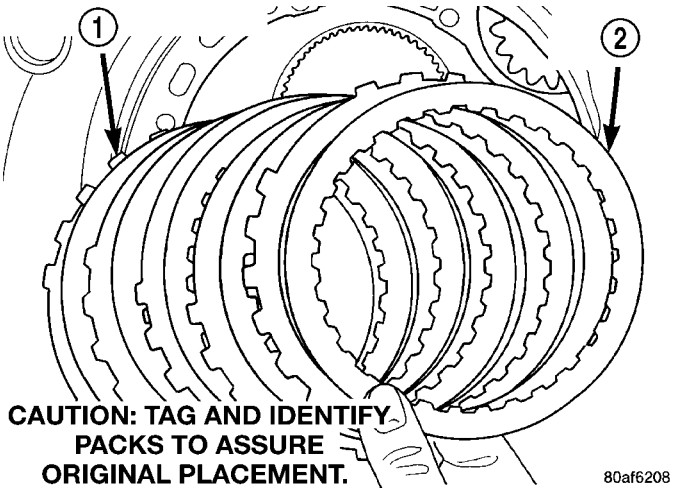


Fig. 76 Remove Low/Reverse Clutch Pack

1 - CLUTCH PLATES (5)
2 - CLUTCH DISCS (5)

(35) Remove transfer gear cover-to-case bolts (Fig. 77).

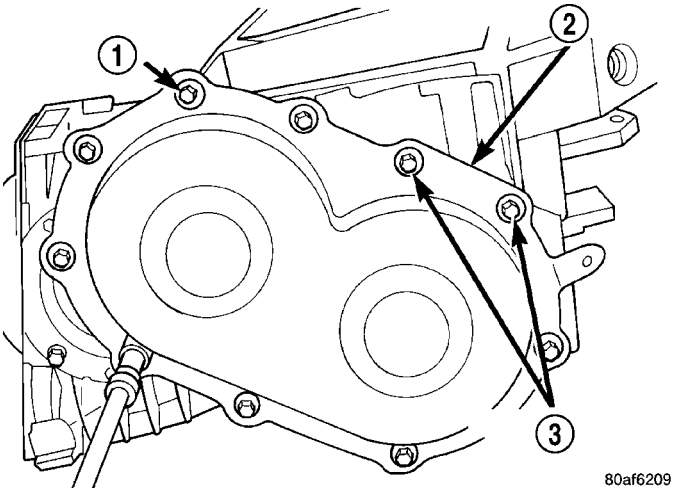


Fig. 77 Remove Rear Cover Bolts

1 - REAR COVER BOLTS
2 - REAR COVER
3 - USE SEALANT ON BOLTS

(36) Remove transfer gear cover (Fig. 78).

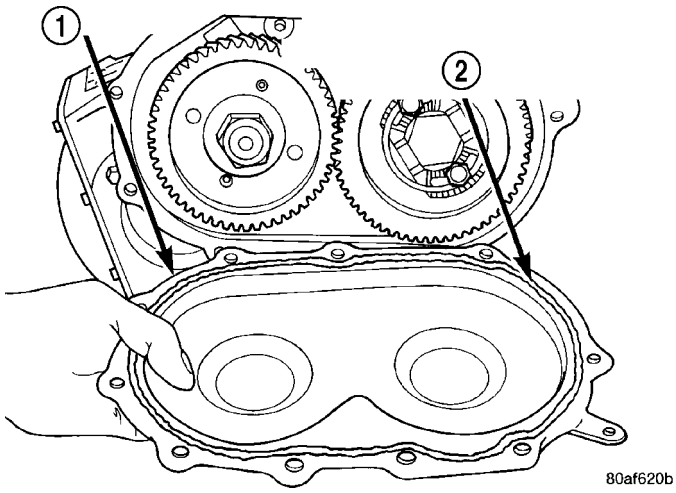


Fig. 78 Remove Rear Cover

1 - REAR COVER
2 - 1/8 INCH BEAD OF MOPAR® ATF RTV (MS-GF41) AS SHOWN

(37) Using Tool 6259, remove transfer shaft gear-to-shaft nut and coned washer (Fig. 79) (Fig. 80).

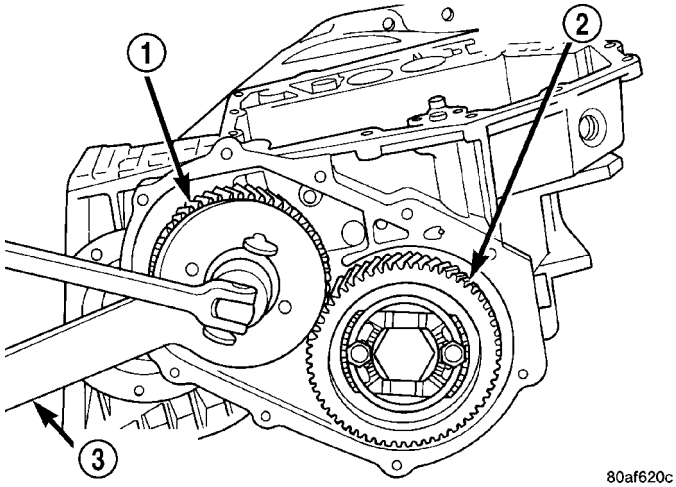


Fig. 79 Remove Transfer Shaft Gear Nut

1 - TRANSFER SHAFT GEAR
2 - OUTPUT GEAR
3 - SPECIAL TOOL 6259

41AE/TE AUTOMATIC TRANSAXLE (Continued)

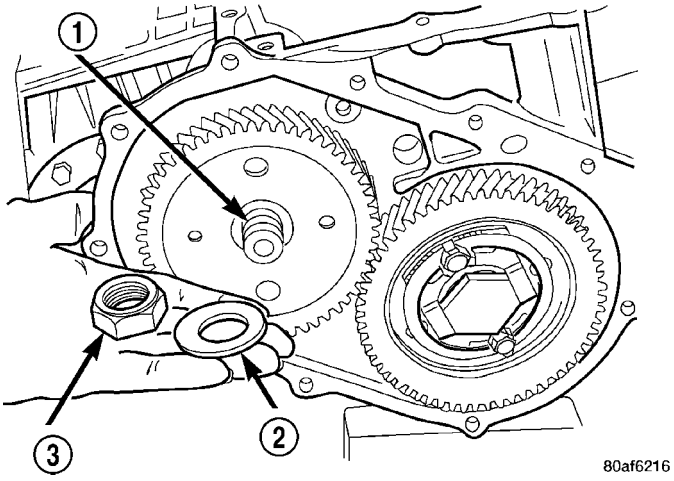


Fig. 80 Transfer Shaft Gear Nut and Coned Washer

1 - TRANSFER SHAFT
2 - LOCK WASHER
3 - NUT

(38) Using tool L-4407A, remove transfer shaft gear (Fig. 81).

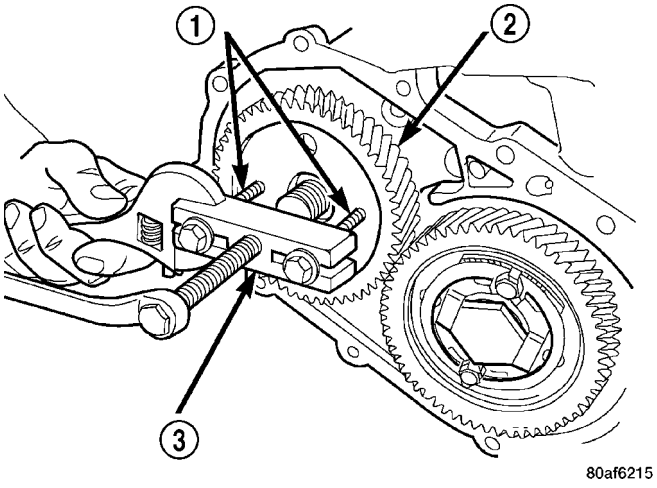


Fig. 81 Remove Transfer Shaft Gear

1 - SPECIAL TOOL L4407-6
2 - TRANSFER SHAFT GEAR
3 - SPECIAL TOOL L4407A

(39) Remove transfer gear shim (select) (Fig. 82).

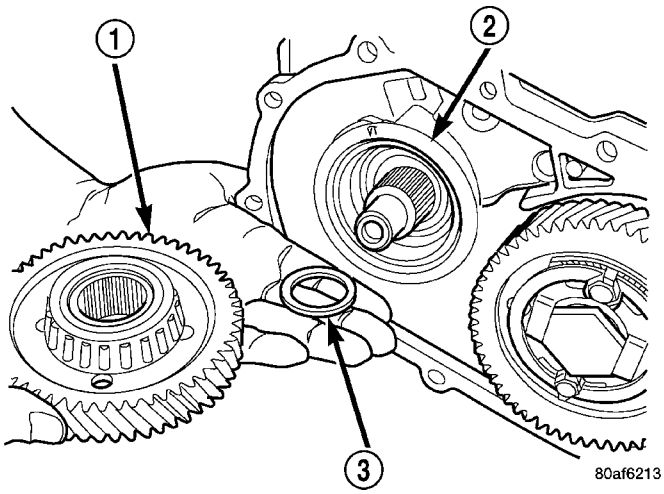


Fig. 82 Remove Transfer Shaft Gear and (Select) Shim

1 - TRANSFER SHAFT GEAR
2 - BEARING CUP RETAINER
3 - SHIM (SELECT)

(40) Remove bearing cup retainer (Fig. 83).

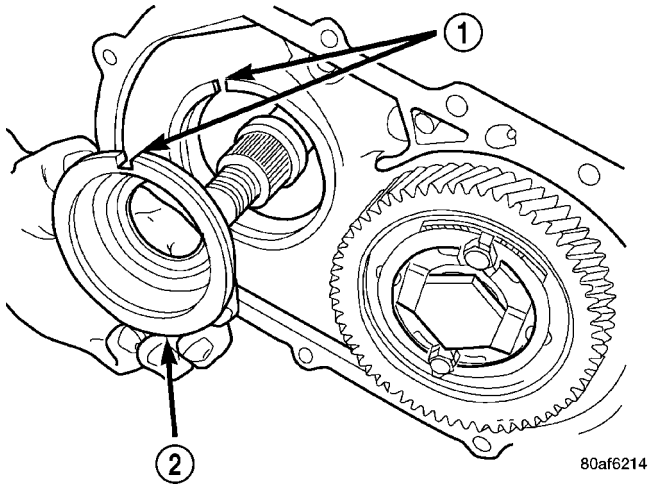


Fig. 83 Remove Bearing Cup Retainer

1 - ALIGN INDEXING TAB TO SLOT
2 - BEARING CUP RETAINER

(41) Remove transfer gear bearing cone using setup shown in (Fig. 84).

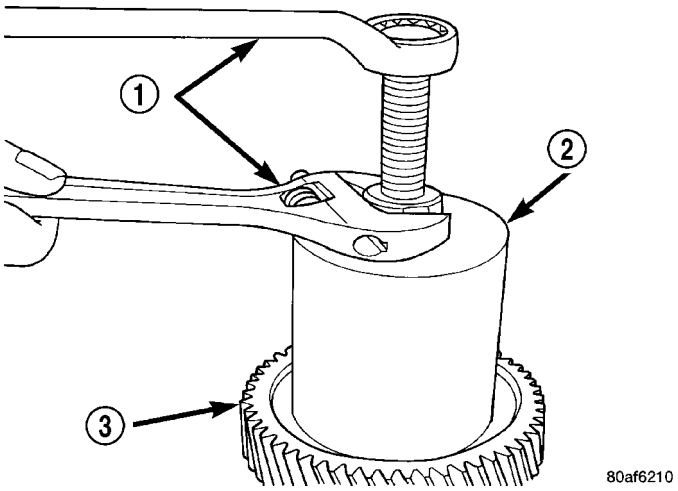


Fig. 84 Remove Transfer Gear Bearing Cone

1 - WRENCHES
2 - TOOL 5048 WITH JAWS TOOL 5048–4 AND BUTTON TOOL L-4539–2
3 - TRANSFER SHAFT GEAR

(42) Remove transfer shaft bearing cup from retainer using Tool 6062 (Fig. 85).

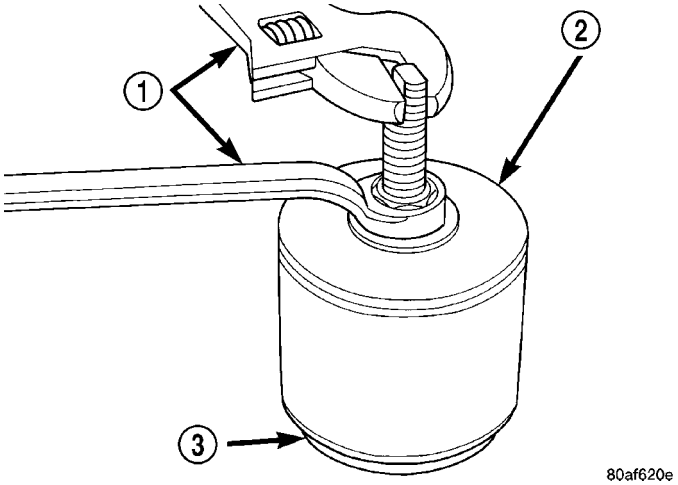


Fig. 85 Remove Transfer Shaft Bearing Cup

1 - WRENCHES
2 - TOOL 6062
3 - TRANSFER SHAFT BEARING CUP RETAINER

(43) Using Tool 6051, remove transfer shaft bearing snap ring (Fig. 86).

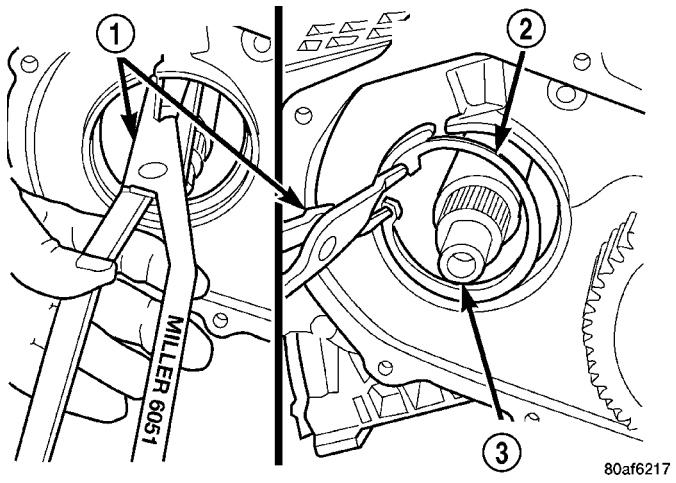


Fig. 86 Remove Transfer Shaft Bearing Snap Ring

1 - SNAP RING PLIERS TOOL 6051
2 - TRANSFER SHAFT BEARING SNAP RING
3 - TRANSFER SHAFT

(44) Using tool 5049A, remove transfer shaft from transaxle (Fig. 87).

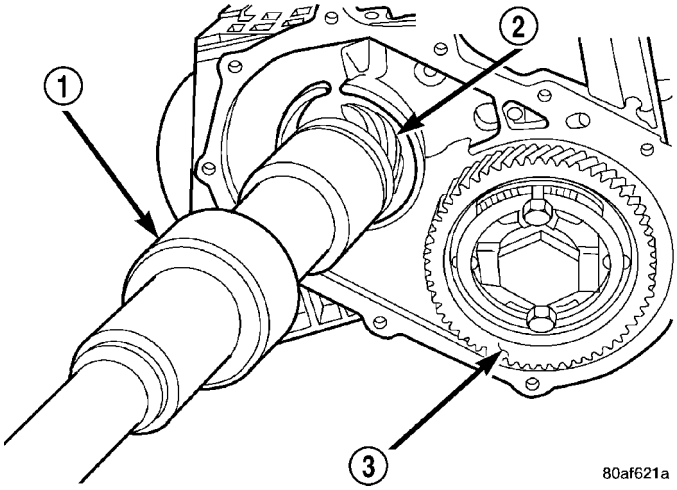


Fig. 87 Remove Transfer Shaft

1 - SPECIAL TOOL 5049–A
2 - TRANSFER SHAFT
3 - OUTPUT GEAR

(45) Slip bearing cup retainer and oil baffle off of shaft (Fig. 88).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

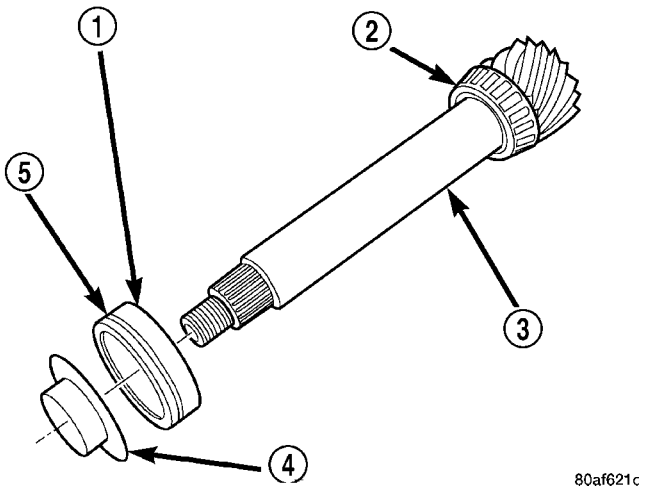


Fig. 88 Bearing Cup Removed

1 - BEARING CUP
2 - BEARING CONE
3 - TRANSFER SHAFT
4 - OIL BAFFLE
5 - O-RING

(46) Using tool P-334, press transfer shaft bearing cone off of shaft (Fig. 89).

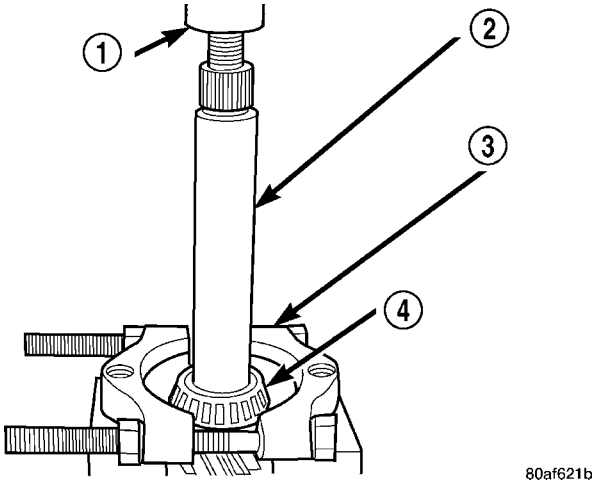


Fig. 89 Remove Transfer Shaft Bearing Cone

1 - ARBOR PRESS RAM
2 - TRANSFER SHAFT
3 - TOOL P-334
4 - BEARING CONE

(47) Bend output gear retaining strap ears flat to allow bolt removal.

(48) Remove output shaft stirrup strap bolts (Fig. 90).

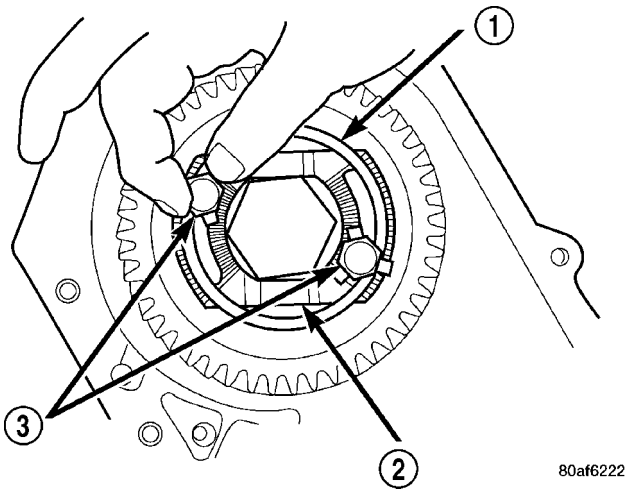


Fig. 90 Remove Strap Bolts

1 - RETAINING STRAP
2 - STIRRUP
3 - RETAINING STRAP BOLTS

(49) Remove stirrup and strap (Fig. 91).

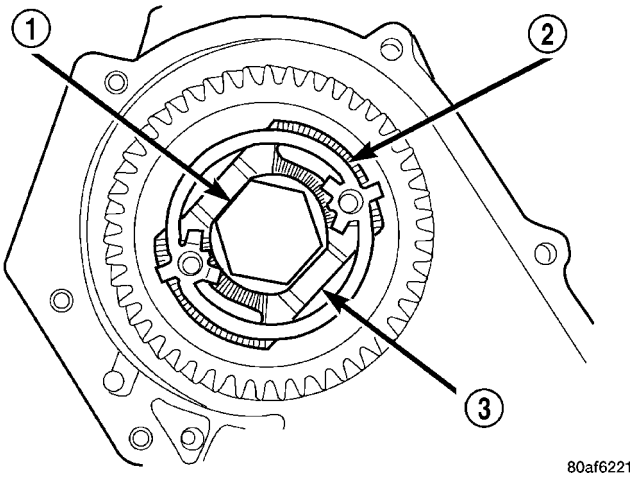


Fig. 91 Remove Stirrup Strap

1 - OUTPUT GEARBOLT
2 - RETAINING STRAP
3 - STIRRUP

(50) Using Tool 6259 (Fig. 92), remove output shaft gear-to-shaft bolt and washer (Fig. 93).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

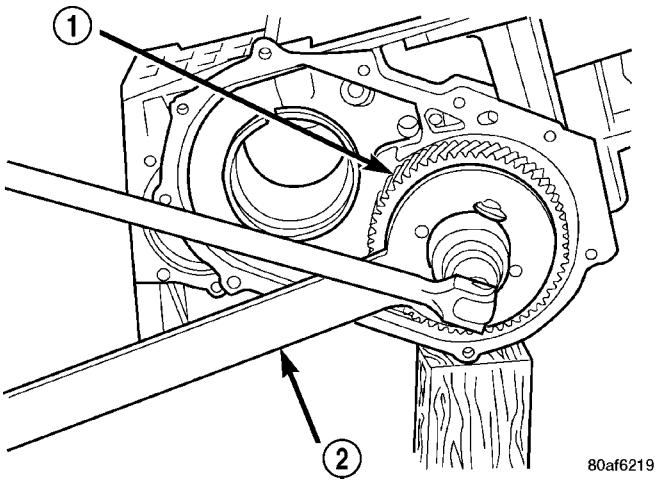


Fig. 92 Remove Output Gear Bolt

1 - OUTPUT GEAR
2 - TOOL 6259

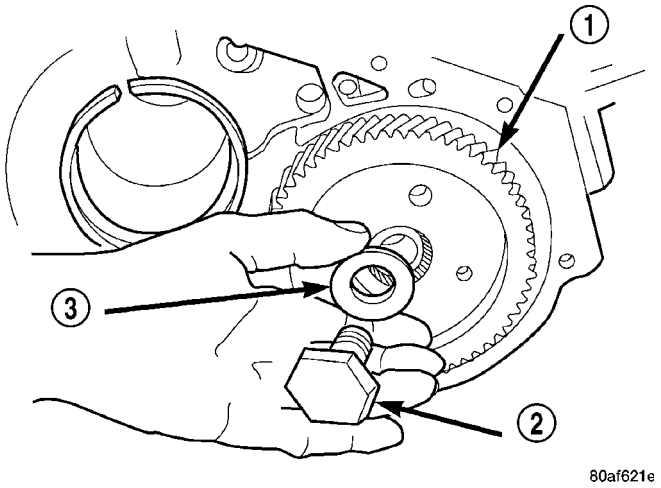


Fig. 93 Output Gear Bolt and Washer

1 - OUTPUT GEAR
2 - BOLT
3 - CONED LOCK WASHER

(51) Using Tool L4407A, and button 6055, remove output gear from shaft (Fig. 94).

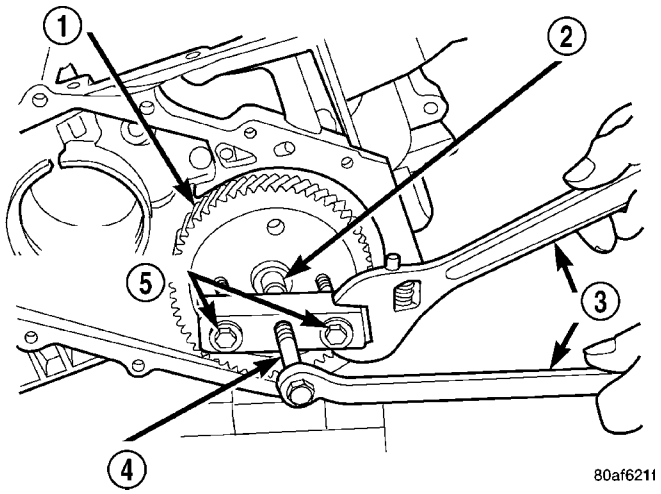


Fig. 94 Remove Output Gear

1 - OUTPUT GEAR
2 - BUTTON TOOL 6055
3 - WRENCHES
4 - TOOL L4407A
5 - BOLTS TOOL L4407–6

(52) Remove output gear bearing shim (select) (Fig. 95).

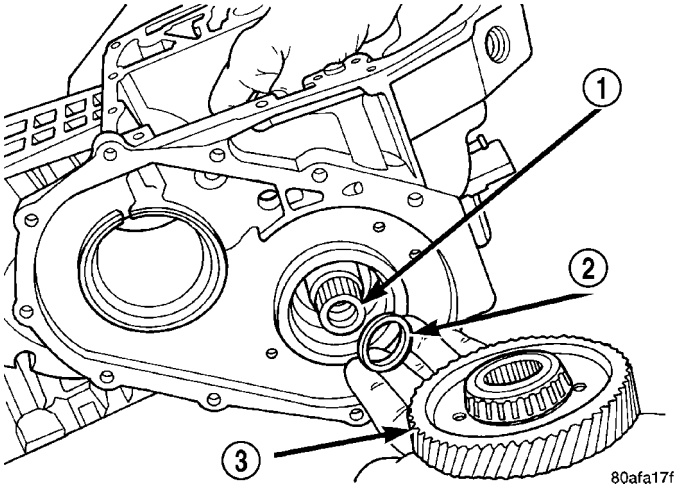


Fig. 95 Output Gear and (Select) Shim

1 - REAR CARRIER ASSEMBLY
2 - SHIM (SELECT)
3 - OUTPUT GEAR

(53) Using setup as shown in (Fig. 96), remove output gear bearing cone.

41AE/TE AUTOMATIC TRANSAXLE (Continued)

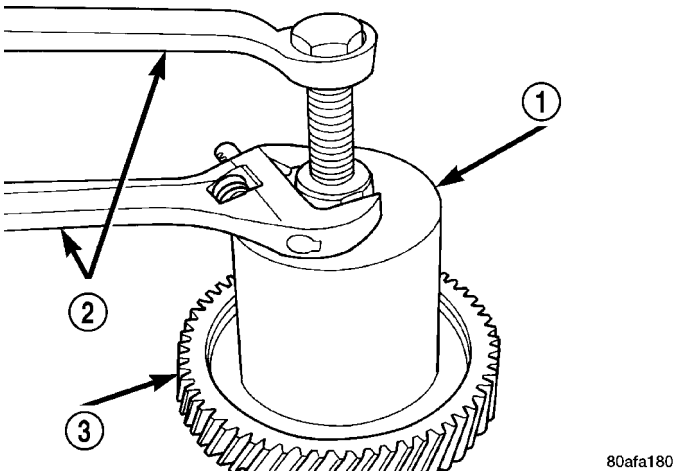


Fig. 96 Remove Bearing Cone

1 - TOOL 5048 WITH JAWS 5048–5 AND BUTTON L-4539–2
2 - WRENCHES
3 - OUTPUT GEAR

(54) Remove rear carrier assembly from transaxle (Fig. 97).

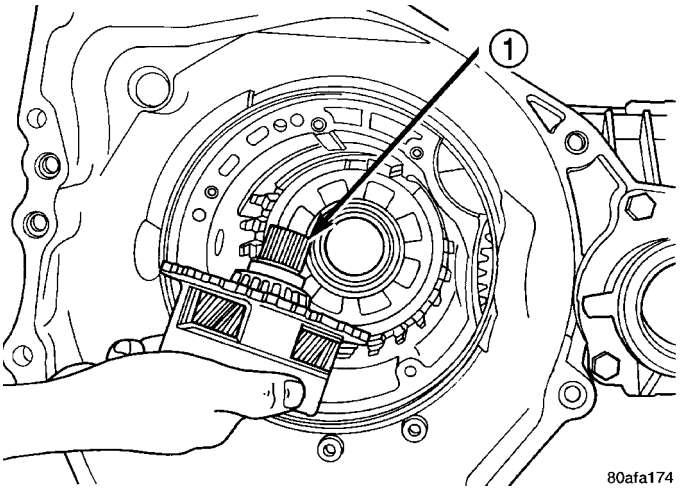


Fig. 97 Remove Rear Carrier Assembly

1 - REAR CARRIER ASSEMBLY

(55) Remove rear carrier assembly bearing cone using setup shown in (Fig. 98).

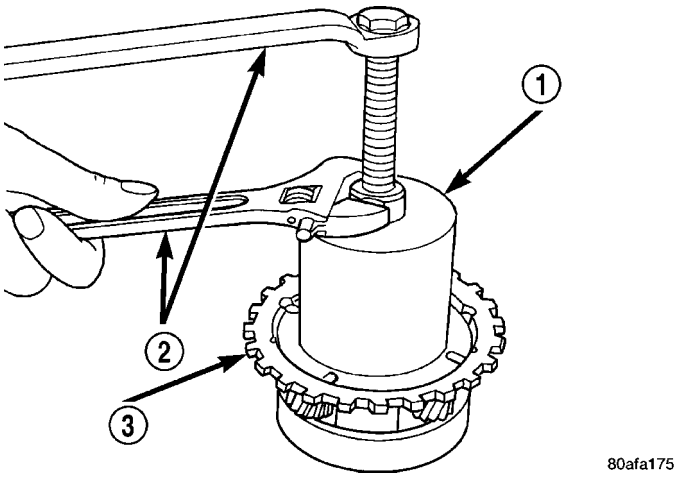


Fig. 98 Remove Rear Carrier Bearing Cone

1 - TOOL 5048 WITH JAWS 5048–3 AND BUTTON 6055
2 - WRENCHES
3 - REAR CARRIER ASSEMBLY

(56) Install low/reverse spring compressor tool as shown in (Fig. 99) (Fig. 100).

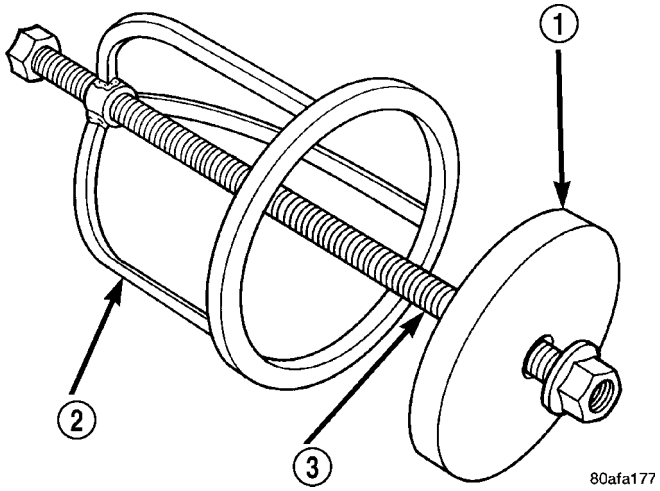


Fig. 99 Low/Reverse Spring Compressor Tool

1 - TOOL 6057
2 - TOOL 5059
3 - TOOL 5058–3

41AE/TE AUTOMATIC TRANSAXLE (Continued)

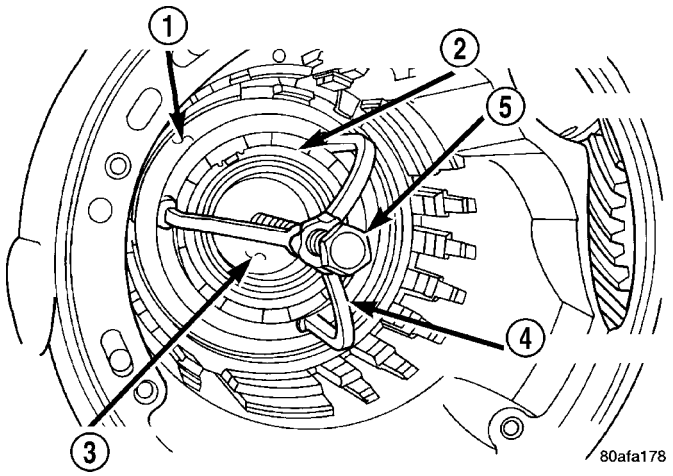


Fig. 100 Compressor Tool in Use

1 - LOW/REVERSE CLUTCH RETURN SPRING
2 - SNAP RING (INSTALL AS SHOWN)
3 - TOOL 6057
4 - TOOL 5059
5 - TOOL 5058–3

(57) Compress low/reverse piston return spring and remove snap ring (Fig. 101).

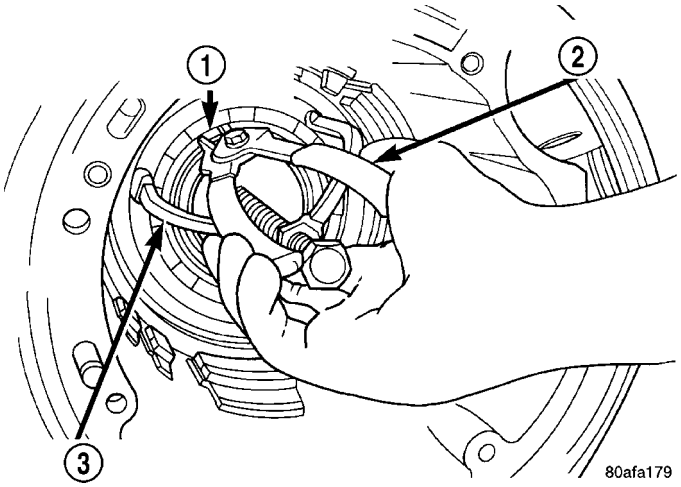


Fig. 101 Remove Snap Ring

1 - SNAP RING OPENING MUST BE BETWEEN SPRING LEVERS (AS SHOWN)
2 - SNAP RING PLIERS
3 - TOOL 6057

(58) Remove low/reverse spring compressor tool and low reverse piston return spring (Fig. 102).

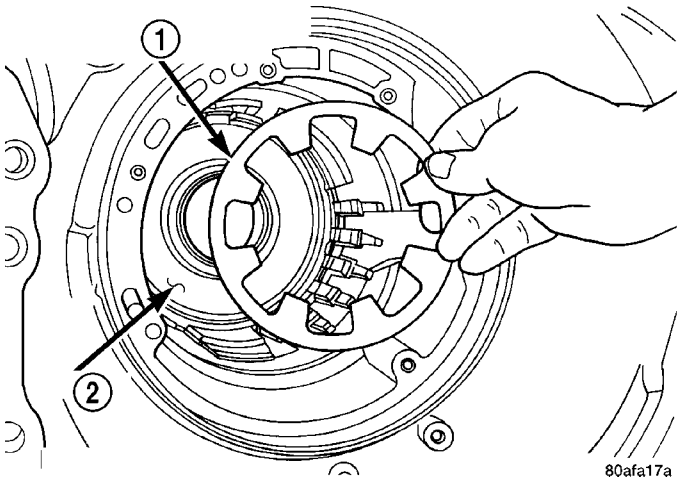


Fig. 102 Low/Reverse Piston Return Spring

1 - LOW/REVERSE PISTON RETURN SPRING
2 - PISTON

(59) Using a suitable punch , drive out park guide bracket pivot shaft plug (Fig. 103).

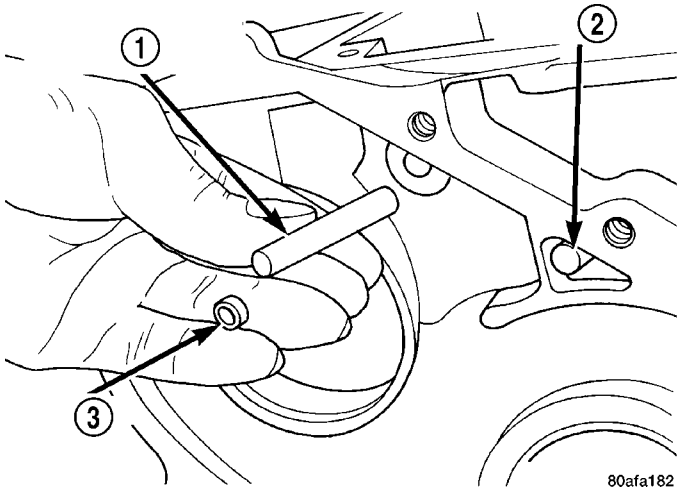


Fig. 103 Remove Anchor Shaft and Plug

1 - GUIDE BRACKET ANCHOR SHAFT
2 - PIVOT SHAFT
3 - ANCHOR SHAFT PLUG

(60) Using ordinary pliers, remove pivot shaft and guide bracket assembly (Fig. 104).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

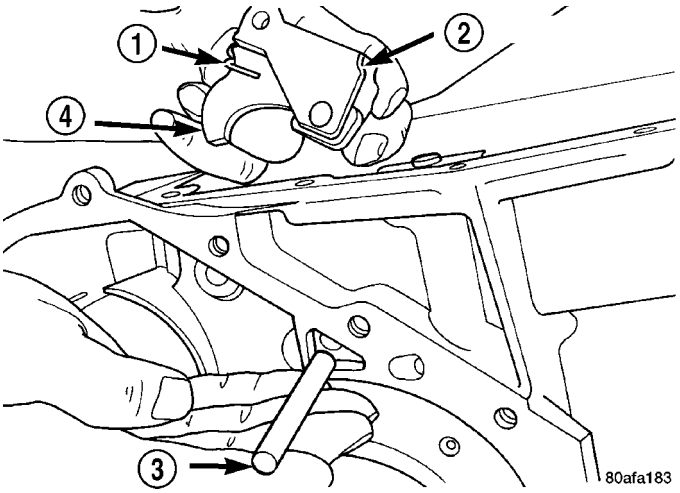


Fig. 104 Pivot Shaft and Guide Bracket

1 - ANTIRACHET SPRING
2 - GUIDE BRACKET
3 - PIVOT SHAFT
4 - PAWL

(61) Inspect guide bracket components for excessive wear and replace if necessary (Fig. 105).

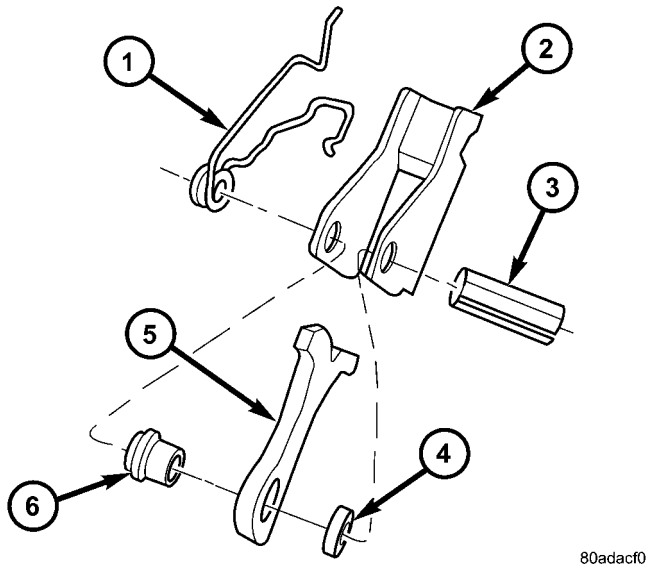


Fig. 105 Guide Bracket Disassembled

1 - ANTIRATCHET SPRING
2 - GUIDE BRACKET
3 - SPLIT SLEEVE
4 - SPACER
5 - PAWL
6 - STEPPED SPACER

NOTE: The Low/Reverse Clutch Piston has bonded seals which are not individually serviceable. Seal replacement requires replacement of the piston assembly.

(62) Remove low/reverse clutch piston (Fig. 106).

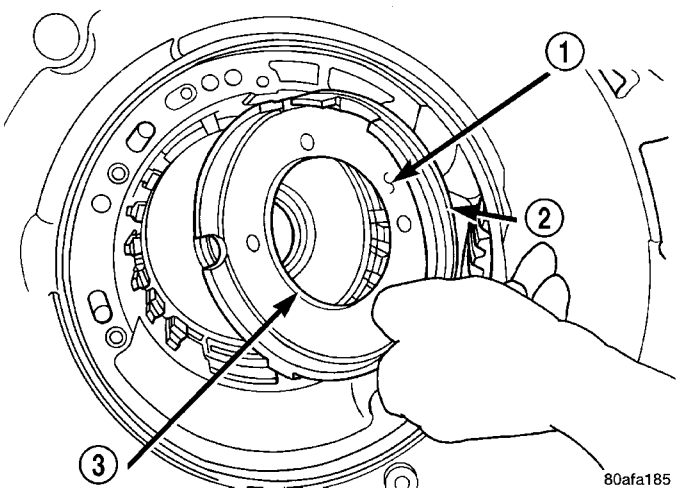


Fig. 106 Remove Low/Reverse Clutch Piston

1 - LOW/REVERSE CLUTCH PISTON
2 - BONDED SEAL
3 - BONDED SEAL

(63) Remove low/reverse piston retainer-to-case screws (Fig. 107).

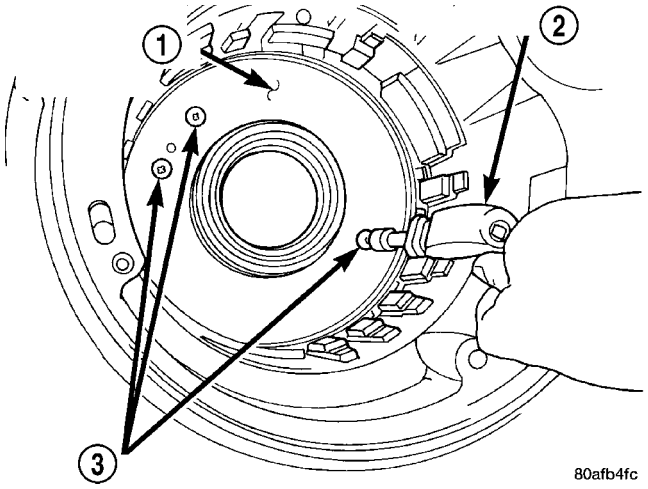


Fig. 107 Remove Piston Retainer Attaching Screws

1 - LOW/REVERSE CLUTCH PISTON RETAINER
2 - SCREWDRIVER
3 - TORX-LOC SCREWS

(64) Remove low/reverse piston retainer (Fig. 108).

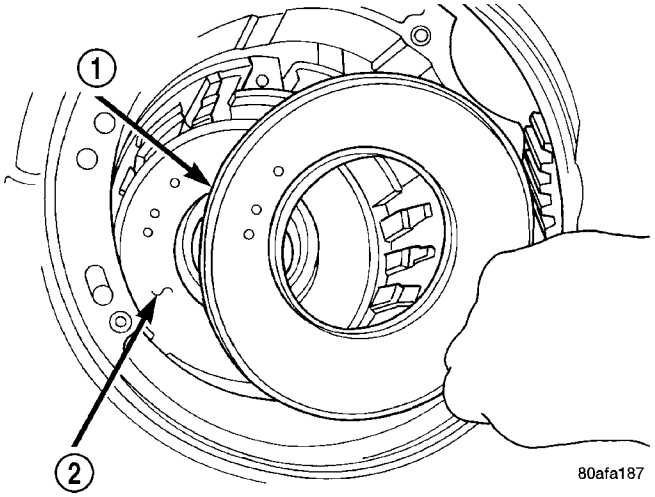


Fig. 108 Remove Piston Retainer

1 - LOW/REVERSE CLUTCH PISTON RETAINER
2 - GASKET

(65) Remove low/reverse piston retainer-to-case gasket (Fig. 109).

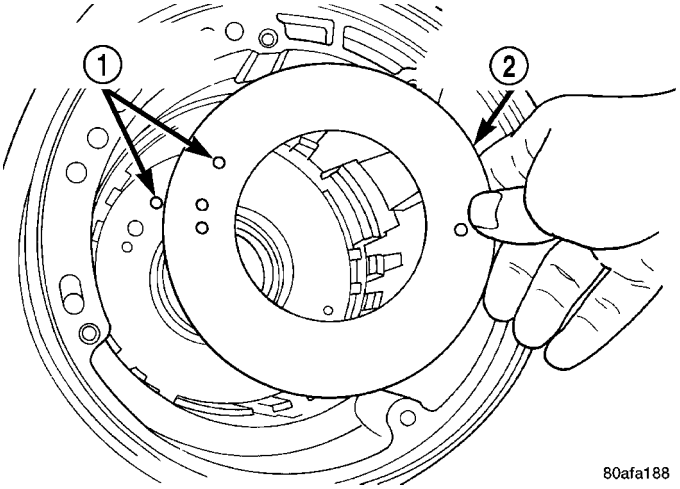


Fig. 109 Remove Piston Retainer Gasket

1 - GASKET HOLES MUST LINE UP
2 - LOW/REVERSE CLUTCH PISTON RETAINER GASKET

(66) Using a hammer and suitable drift, drive out inner output bearing cup (Fig. 110).

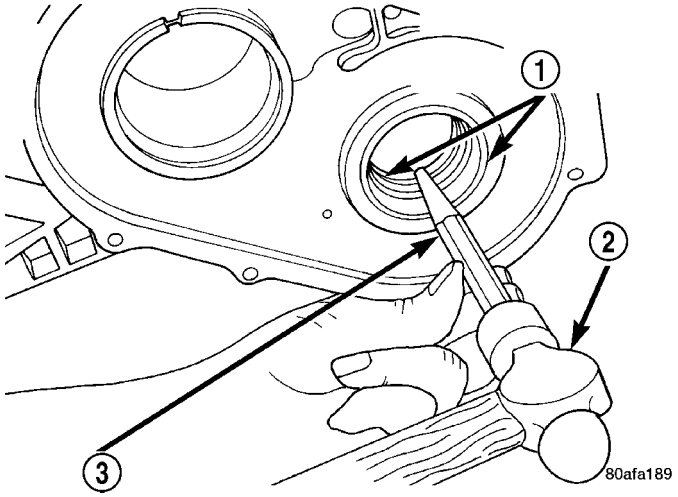


Fig. 110 Remove Output Bearing Inner Cup

1 - OUTPUT BEARING CUPS (REPLACE IN PAIRS)
2 - HAMMER
3 - BRASS DRIFT

(67) Using tool 6062, remove outer output bearing cup (Fig. 111).

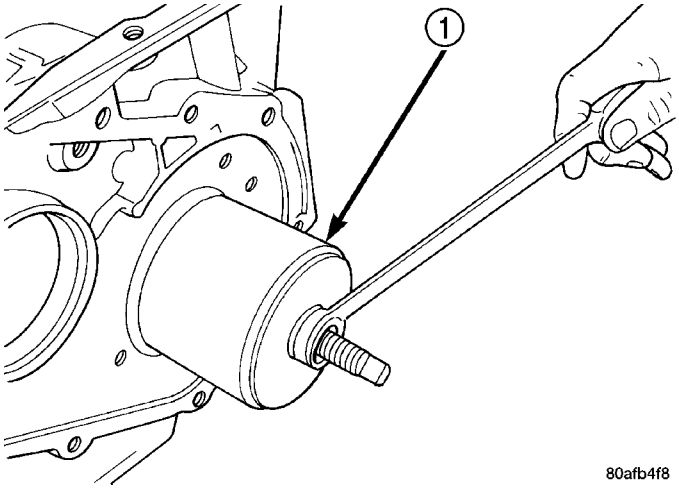


Fig. 111 Remove Output Bearing Outer Cup

1 - TOOL 6062

ASSEMBLY

CAUTION: The cooler bypass valve must be replaced if transaxle failure has occurred. Do not attempt to reuse or clean old valve.

NOTE: If transaxle is being overhauled (clutch and/or seal replacement), the TCM/PCM Quick Learn procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

41AE/TE AUTOMATIC TRANSAXLE (Continued)

(1) Install both output bearing cups using Tool 5050 (Fig. 112).

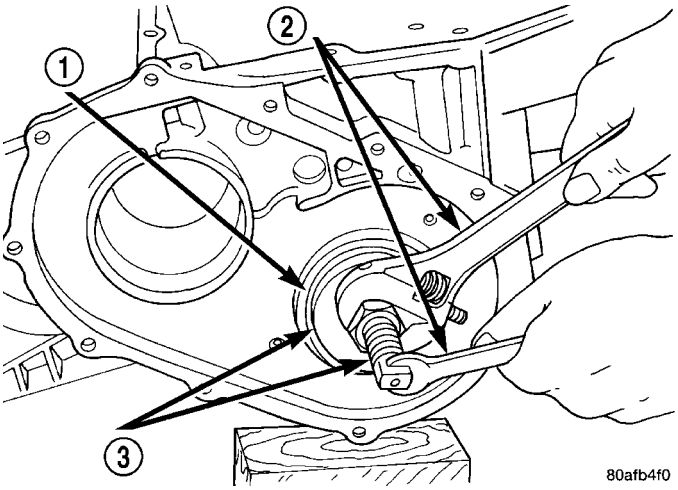


Fig. 112 Install Both Output Bearing Cups

1 - OUTPUT BEARING CUPS
2 - WRENCHES
3 - TOOL 5050

(2) Install low/reverse piston retainer gasket (Fig. 113). Make sure gasket holes line up with case.

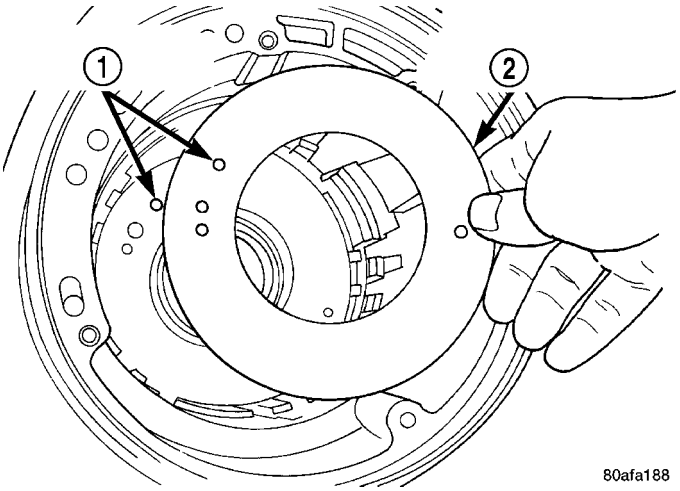


Fig. 113 Install Piston Retainer Gasket

1 - GASKET HOLES MUST LINE UP
2 - LOW/REVERSE CLUTCH PISTON RETAINER GASKET

(3) Install low/reverse piston retainer (Fig. 114).

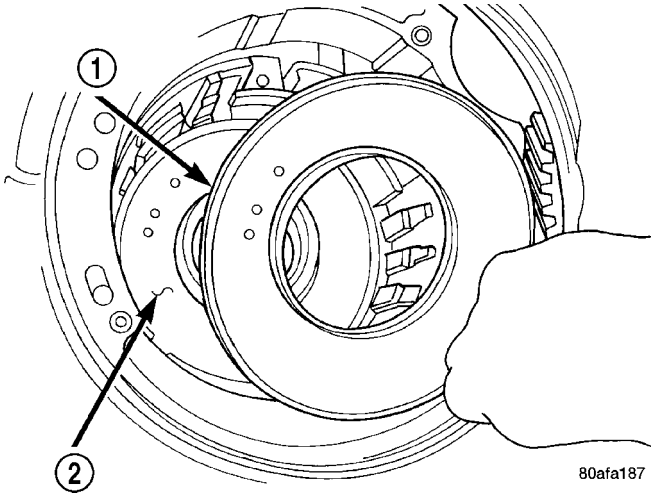


Fig. 114 Install Piston Retainer

1 - LOW/REVERSE CLUTCH PISTON RETAINER
2 - GASKET

(4) Install low/reverse piston retainer-to-case bolts (Fig. 115) and torque to 5 N·m (45 in. lbs.).

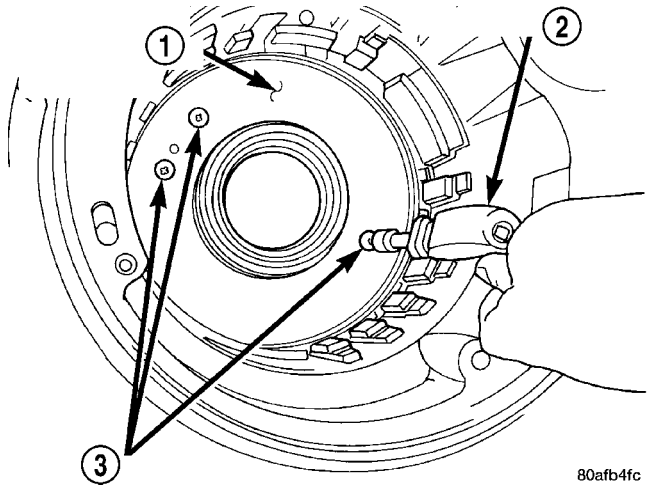


Fig. 115 Install Piston Retainer Attaching Screws

1 - LOW/REVERSE CLUTCH PISTON RETAINER
2 - SCREWDRIVER
3 - TORX-LOC SCREWS

NOTE: The Low/Reverse Clutch Piston has bonded seals which are not individually serviceable. Seal replacement requires replacement of the piston assembly.

(5) Install low/reverse clutch piston (Fig. 116).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

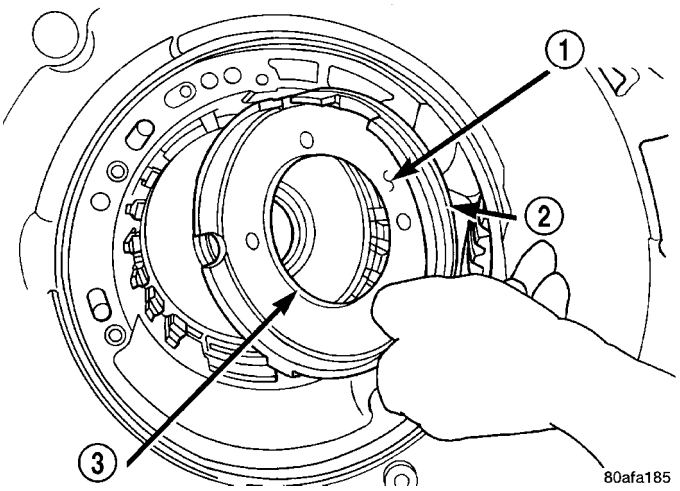


Fig. 116 Install Low/Reverse Clutch Piston

1 - LOW/REVERSE CLUTCH PISTON
2 - BONDED SEAL
3 - BONDED SEAL

(6) Assemble park guide bracket assembly (Fig. 118) (Fig. 117).

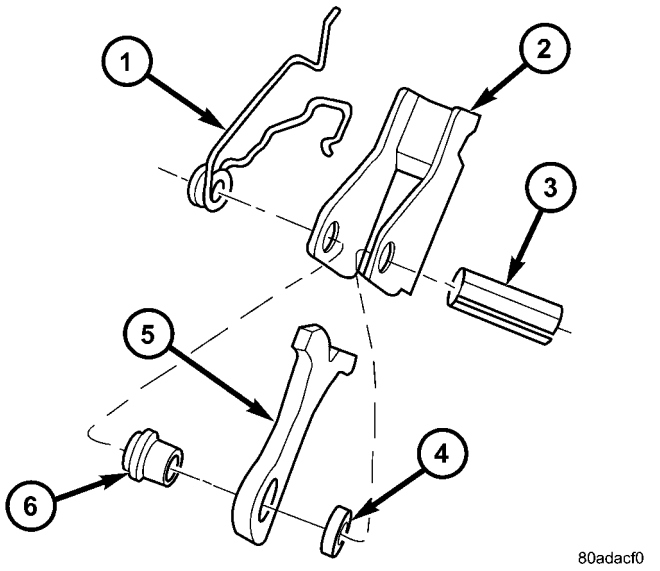


Fig. 117 Guide Bracket Disassembled

1 - ANTIRATCHET SPRING
2 - GUIDE BRACKET
3 - SPLIT SLEEVE
4 - SPACER
5 - PAWL
6 - STEPPED SPACER

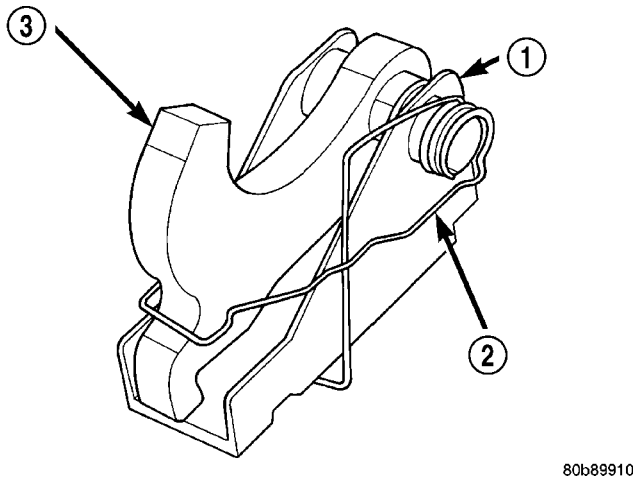


Fig. 118 Guide Bracket

1 - GUIDE BRACKET
2 - ANTIRATCHET SPRING (MUST BE ASSEMBLED AS SHOWN)
3 - PAWL

(7) Install guide bracket into position and insert pivot shaft (Fig. 119).

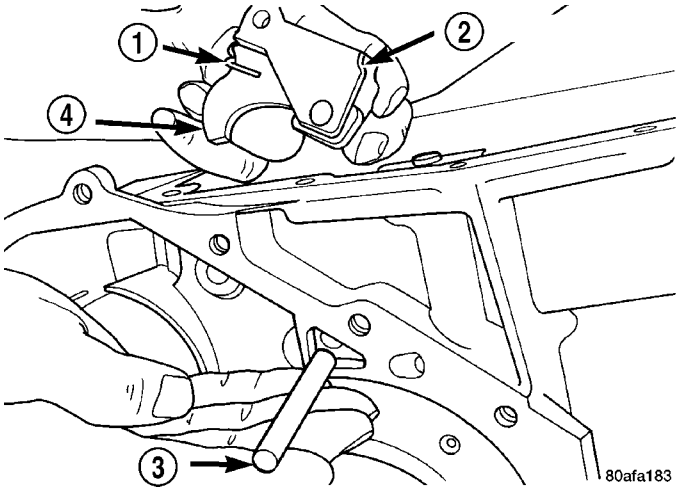


Fig. 119 Pivot Shaft and Guide Bracket

1 - ANTIRACHET SPRING
2 - GUIDE BRACKET
3 - PIVOT SHAFT
4 - PAWL

(8) Install anchor shaft and plug (Fig. 120). Make sure guide bracket and split sleeve are in contact with the rear of the transaxle case.

41AE/TE AUTOMATIC TRANSAXLE (Continued)

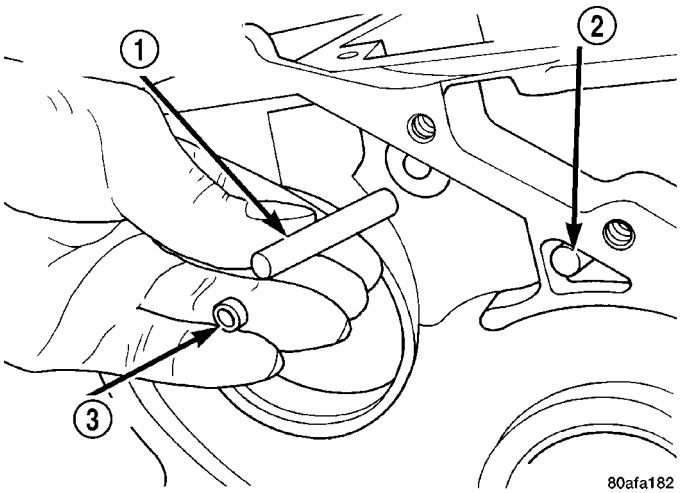


Fig. 120 Install Anchor Shaft and Plug

1 - GUIDE BRACKET ANCHOR SHAFT
2 - PIVOT SHAFT
3 - ANCHOR SHAFT PLUG

(9) Install low/reverse piston return spring (Fig. 121).

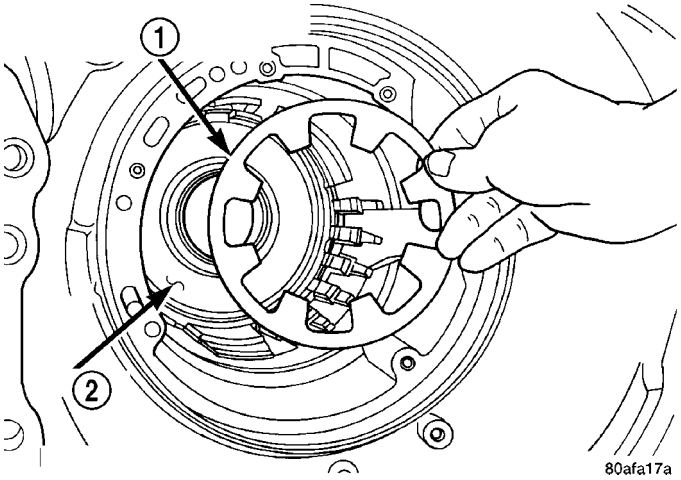


Fig. 121 Low/Reverse Piston Return Spring

1 - LOW/REVERSE PISTON RETURN SPRING
2 - PISTON

(10) Install low/reverse spring compressor into position (Fig. 122). Compress low/reverse piston and install snap ring as shown in (Fig. 123).

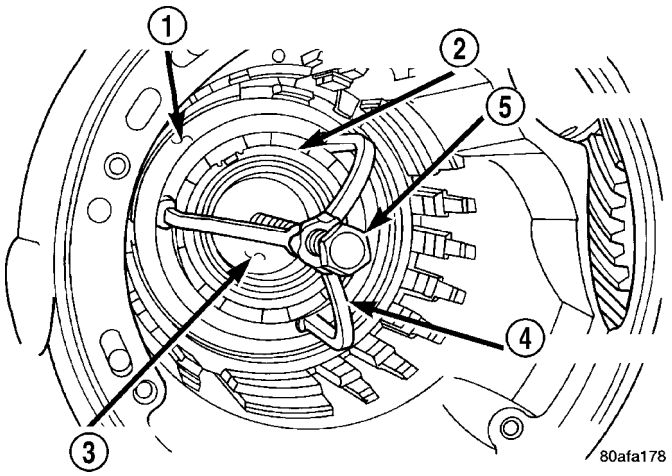


Fig. 122 Compressor Tool in Use

1 - LOW/REVERSE CLUTCH RETURN SPRING
2 - SNAP RING (INSTALL AS SHOWN)
3 - TOOL 6057
4 - TOOL 5059
5 - TOOL 5058–3

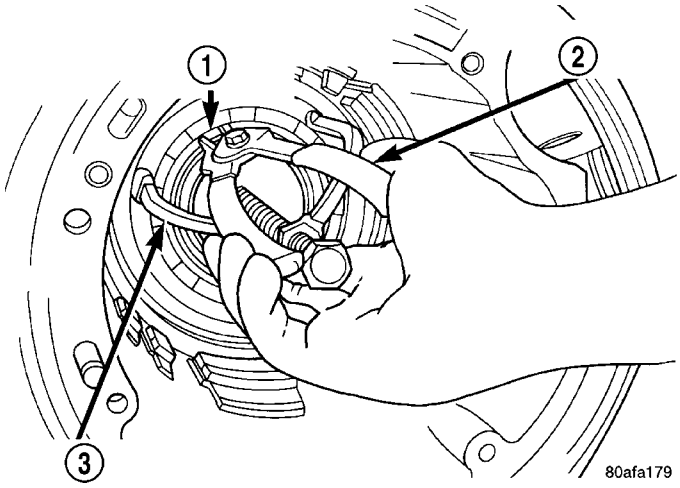


Fig. 123 Install Snap Ring

1 - SNAP RING OPENING MUST BE BETWEEN SPRING LEVERS (AS SHOWN)
2 - SNAP RING PLIERS
3 - TOOL 6057

(11) Install rear carrier bearing cone using Tool 6053 (Fig. 124).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

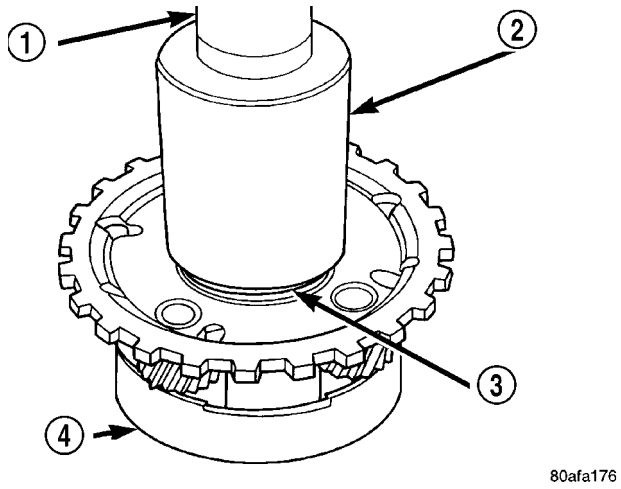


Fig. 124 Install Rear Carrier Bearing Cone

1 - ARBOR PRESS RAM
2 - TOOL 6053
3 - NEW BEARING CONE
4 - REAR CARRIER ASSEMBLY

(12) Install rear carrier assembly to transaxle case (Fig. 125).

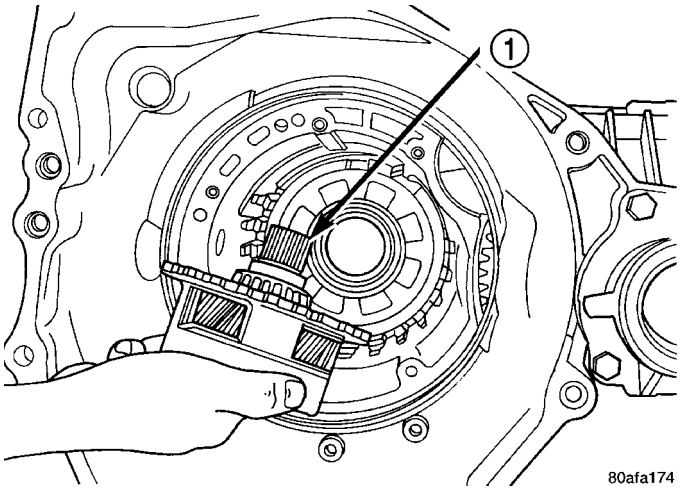


Fig. 125 Install Rear Carrier Assembly

1 - REAR CARRIER ASSEMBLY

(13) Install output gear bearing cone using Tool 5052 (Fig. 126).

(14) **OUTPUT GEAR BEARING ADJUSTMENT:**

(a) With output gear removed, install a 4.50 mm (0.177 in.) gauging shim (Fig. 128) on the rear carrier assembly hub, using grease to hold the shim in place.

(b) Using Tool 6259, install output gear and bearing assembly. Torque to 271 N·m (200 ft. lbs.).

(c) Measure bearing end play. Attach Tool L-4432 to the gear (Fig. 127).

(d) Push and pull the gear while rotating back and forth to ensure seating of bearing rollers.

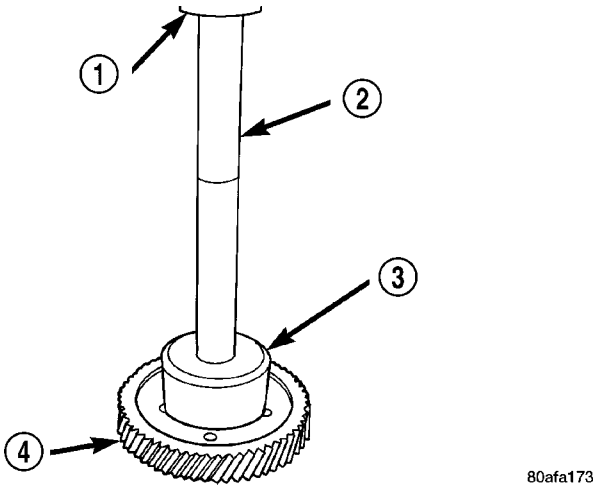


Fig. 126 Install Output Gear Bearing Cone

1 - ARBOR PRESS RAM
2 - HANDLE C-4171
3 - TOOL 5052
4 - OUTPUT GEAR

(e) Using a dial indicator mounted to the transaxle case, measure output gear end play as shown in (Fig. 127).

(f) Refer to the output gear bearing shim chart for the required shim to obtain proper bearing setting.

(g) Use Tool 6259 to remove the output gear retaining bolt and washer. To remove the output gear, use Tool L4407A.

(h) Remove the gauging shim and install the proper shim determined by the chart. Use grease to hold the shim in place.

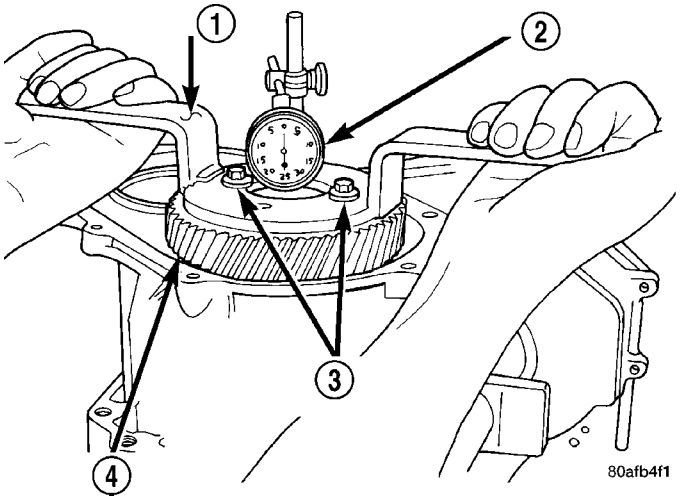


Fig. 127 Checking Output Gear Bearings End Play

1 - TOOL L-4432
2 - DIAL INDICATOR
3 - SPECIAL SCREWS TOOL 6260
4 - OUTPUT GEAR

41AE/TE AUTOMATIC TRANSAXLE (Continued)

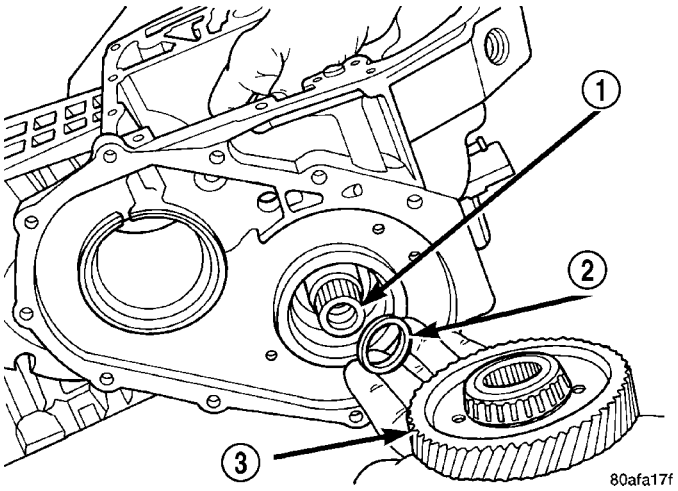


Fig. 128 Output Gear and (Select) Shim

1 - REAR CARRIER ASSEMBLY
2 - SHIM (SELECT)
3 - OUTPUT GEAR

OUTPUT GEAR BEARING SHIM CHART

End Play	Shim Needed	Part Number	End Play	Shim Needed	Part Number
0.05mm (0.002 in.)	4.42mm (0.174 in.)	4412830AB	0.53mm (0.021 in.)	3.94mm (0.155 in.)	4412818AB
0.08mm (0.003 in.)	4.38mm (0.172 in.)	4412829AB	0.56mm (0.022 in.)	3.90mm (0.154 in.)	4412817AB
0.10mm (0.004 in.)	4.38mm (0.172 in.)	4412829AB	0.58mm (0.023 in.)	3.90mm (0.154 in.)	4412817AB
0.13mm (0.005 in.)	4.34mm (0.171 in.)	4412828AB	0.61mm (0.024 in.)	3.86mm (0.152 in.)	4412816AB
0.15mm (0.006 in.)	4.30mm (0.169 in.)	4412827AB	0.64mm (0.025 in.)	3.82mm (0.150 in.)	4412815AB
0.18mm (0.007 in.)	4.30mm (0.169 in.)	4412827AB	0.66mm (0.026 in.)	3.82mm (0.150 in.)	4412815AB
0.20mm (0.008 in.)	4.26mm (0.168 in.)	4412826AB	0.69mm (0.027 in.)	3.78mm (0.149 in.)	4412814AB
0.23mm (0.009 in.)	4.22mm (0.166 in.)	4412825AB	0.71mm (0.028 in.)	3.74mm (0.147 in.)	4412813AB
0.25mm (0.010 in.)	4.22mm (0.166 in.)	4412825AB	0.74mm (0.029 in.)	3.74mm (0.147 in.)	4412813AB
0.28mm (0.011 in.)	4.18mm (0.165 in.)	4412824AB	0.76mm (0.030 in.)	3.70mm (0.146 in.)	4412812AB
0.30mm (0.012 in.)	4.14mm (0.163 in.)	4412823AB	0.79mm (0.031 in.)	3.66mm (0.144 in.)	4412811AB
0.33mm (0.013 in.)	4.14mm (0.163 in.)	4412823AB	0.81mm (0.032 in.)	3.66mm (0.144 in.)	4412811AB
0.36mm (0.014 in.)	4.10mm (0.161 in.)	4412822AB	0.84mm (0.033 in.)	3.62mm (0.143 in.)	4412810AB

41AE/TE AUTOMATIC TRANSAXLE (Continued)

End Play	Shim Needed	Part Number	End Play	Shim Needed	Part Number
0.38mm (0.015 in.)	4.10mm (0.161 in.)	4412822AB	0.86mm (0.034 in.)	3.62mm (0.143 in.)	4412810AB
0.41mm (0.016 in.)	4.06mm (0.160 in.)	4412821AB	0.89mm (0.035 in.)	3.58mm (0.141)	4412809AB
0.43mm (0.017 in.)	4.02mm (0.158 in.)	4412820AB	0.91mm (0.036in.)	3.54mm (0.139 in.)	4412808AB
0.46mm (0.018 in.)	4.02mm (0.158 in.)	4412820AB	0.94mm (0.037 in.)	3.54mm (0.139 in.)	4412808AB
0.48mm (0.019 in.)	3.98mm (0.157 in.)	4412819AB	0.97mm (0.038 in.)	3.50mm (0.138 in.)	4412807AB
0.51mm (0.020 in.)	3.94mm (0.155 in.)	4412818AB			

(15) Install the output gear and bearing assembly using Tool 6261 (Fig. 129).

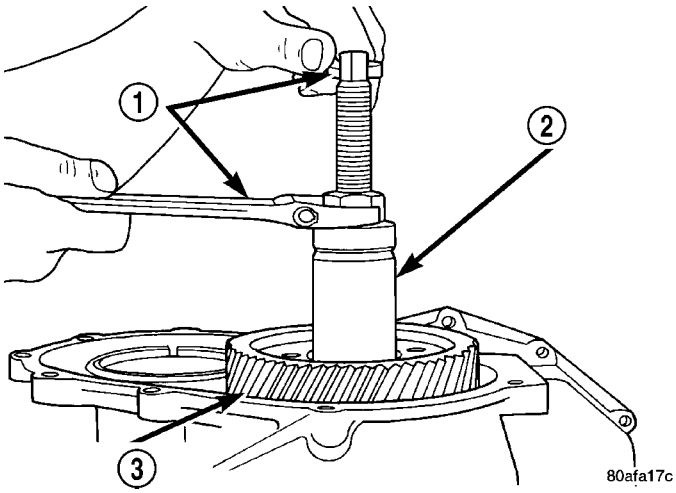


Fig. 129 Install Output Gear

1 - WRENCHES
2 - TOOL 6261 WITH STUD
3 - OUTPUT GEAR

(16) Install NEW output gear retaining bolt and washer (Fig. 130). Using Tool 6259, torque output gear retaining bolt to 271 N·m (200 ft. lbs.) (Fig. 131).

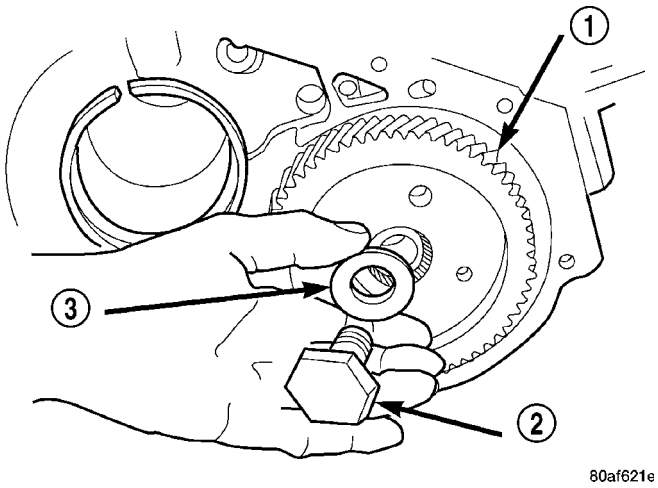


Fig. 130 Output Gear Bolt and Washer

1 - OUTPUT GEAR
2 - BOLT
3 - CONED LOCK WASHER

41AE/TE AUTOMATIC TRANSAXLE (Continued)

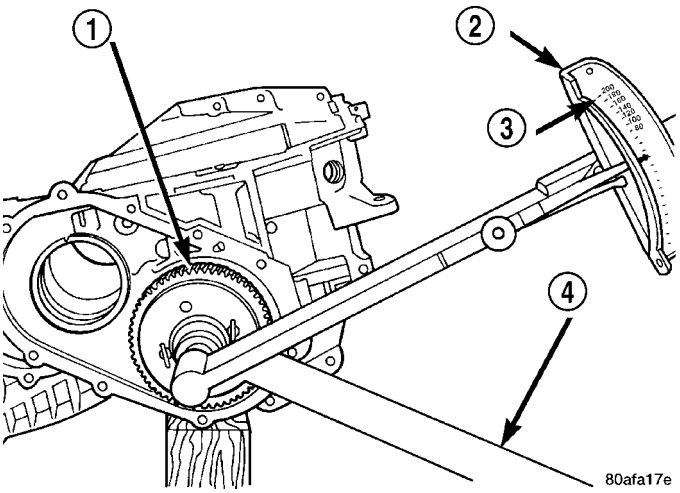


Fig. 131 Tighten Output Gear to 271 N•m (200 ft. lbs.)

1 - OUTPUT GEAR
2 - TORQUE WRENCH
3 - 200 FT. LBS.
4 - TOOL 6259

(17) Using an inch pound torque wrench (Fig. 132), check output shaft turning torque. **Output shaft turning torque should be within 3-8 in. lbs.** If the turning torque is too high, install a 0.04 mm (0.0016 in.) thicker shim. If the turning torque is too low, install a 0.04 mm (0.0016 in.) thinner shim. Repeat until the proper turning torque of 3-8 in. lbs. is obtained.

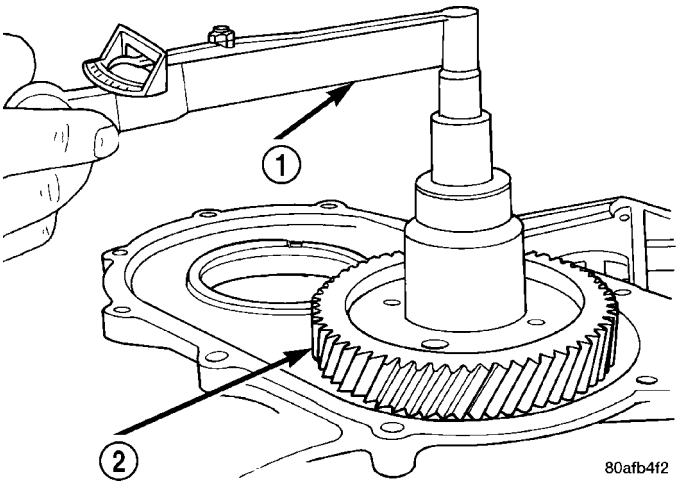


Fig. 132 Check Output Gear Bearings Turning Torque

1 - INCH-POUND TORQUE WRENCH
2 - OUTPUT GEAR

(18) Install output gear stirrup with serrated side out (Fig. 133).

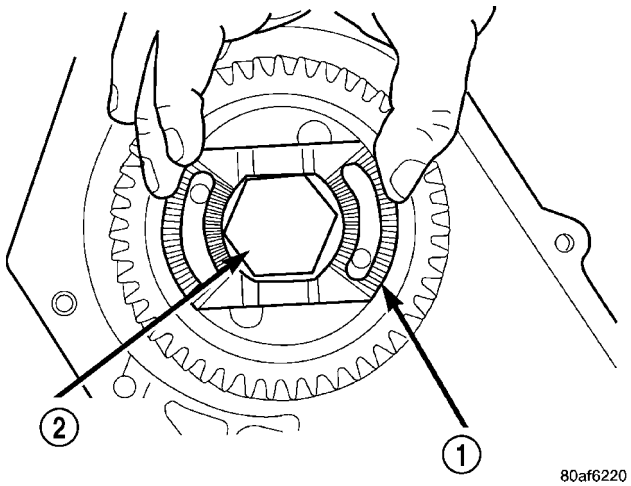


Fig. 133 Install Stirrup

1 - STIRRUP
2 - OUTPUT GEAR RETAINING BOLT

(19) Install retaining strap.

(20) Install strap bolts but do not tighten at this time (Fig. 134).

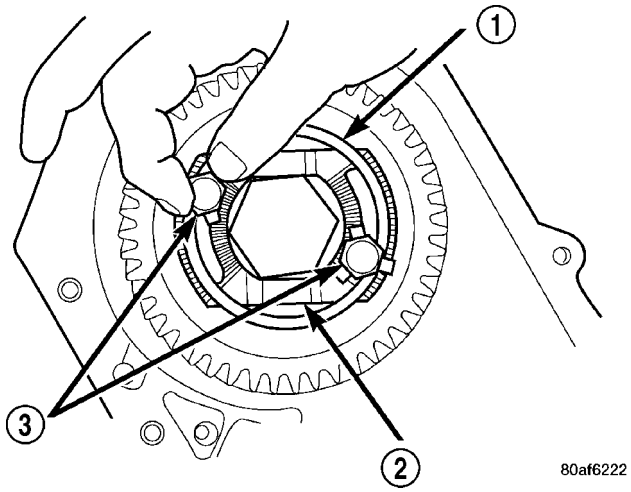


Fig. 134 Install Strap Bolts

1 - RETAINING STRAP
2 - STIRRUP
3 - RETAINING STRAP BOLTS

(21) Rotate stirrup clockwise against flats of retaining bolt (Fig. 135).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

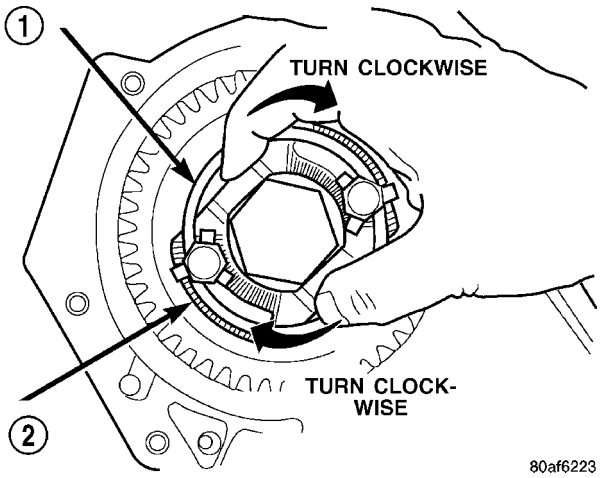


Fig. 135 Turn Stirrup Clockwise Against Bolt Flats

1 - RETAINING STRAP
2 - STIRRUP

(22) Torque stirrup strap bolts to 23 N·m (200 in. lbs.) (Fig. 136).

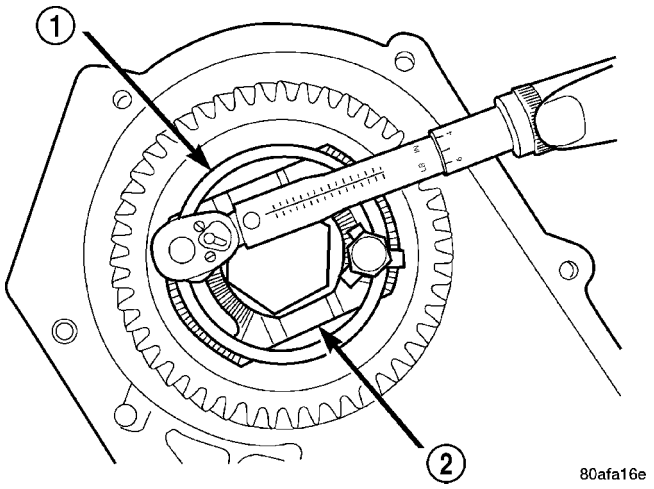


Fig. 136 Tighten Stirrup Strap Bolts To 23 N·m (200 in.) lbs.)

1 - RETAINING STRAP
2 - STIRRUP

(23) Bend tabs on strap up against flats of bolts (Fig. 137).

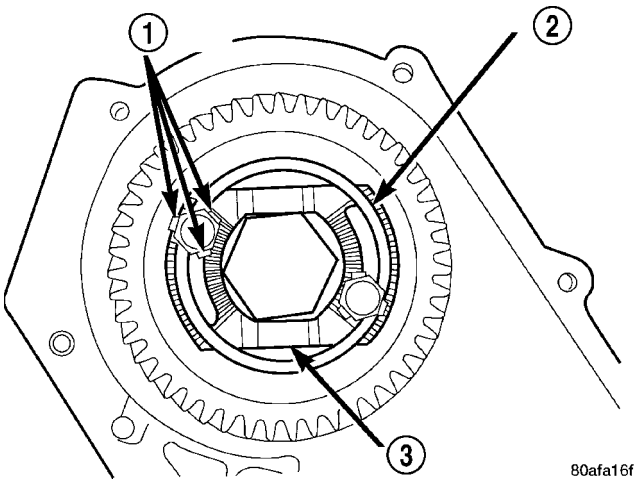


Fig. 137 Bend Tabs On Strap Up Against Flats Of Bolts

1 - RETAINING STRAP TABS
2 - RETAINING STRAP
3 - STIRRUP

(24) Install transfer shaft bearing cone using Tool 6052 (Fig. 138).

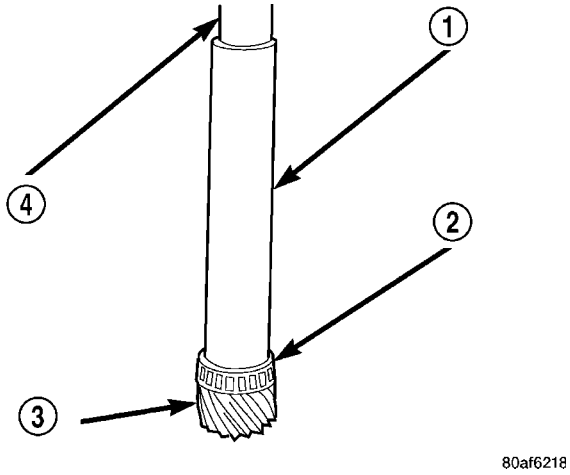


Fig. 138 Install Transfer Shaft Bearing Cone

1 - TOOL 6052
2 - NEW BEARING CONE
3 - TRANSFER SHAFT
4 - ARBOR PRESS RAM

(25) Install bearing cup and oil baffle to transfer shaft (Fig. 139).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

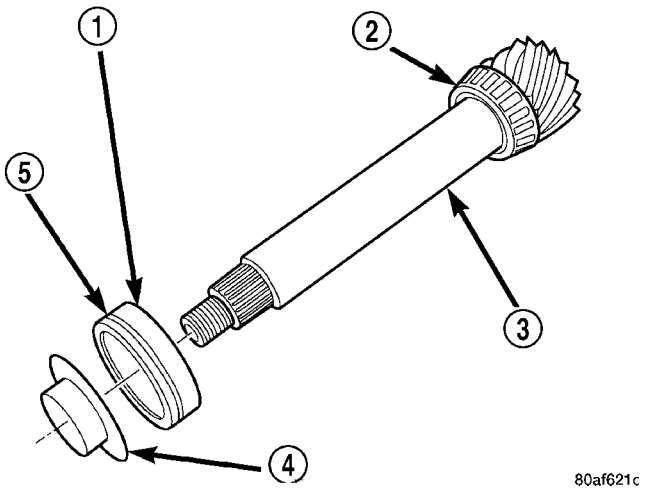


Fig. 139 Install Bearing Cup to Shaft

1 - BEARING CUP
2 - BEARING CONE
3 - TRANSFER SHAFT
4 - OIL BAFFLE
5 - O-RING

(26) Using Tool 5049A, install transfer shaft (Fig. 140).

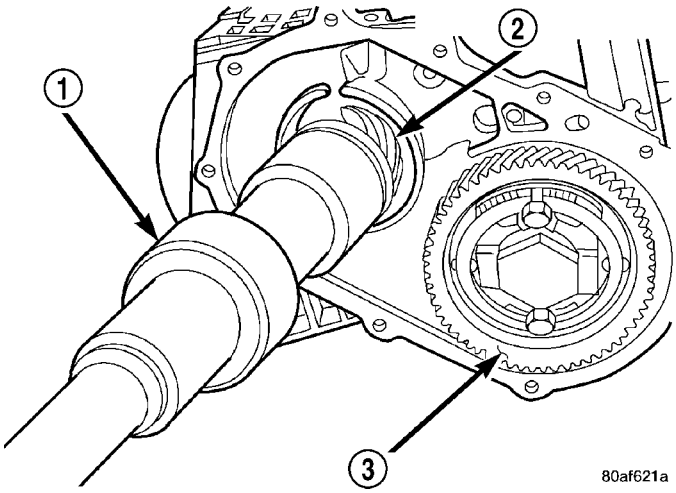


Fig. 140 Install Transfer Shaft

1 - SPECIAL TOOL 5049–A
2 - TRANSFER SHAFT
3 - OUTPUT GEAR

(27) Using Tool 6051, install transfer shaft bearing snap ring (Fig. 141).

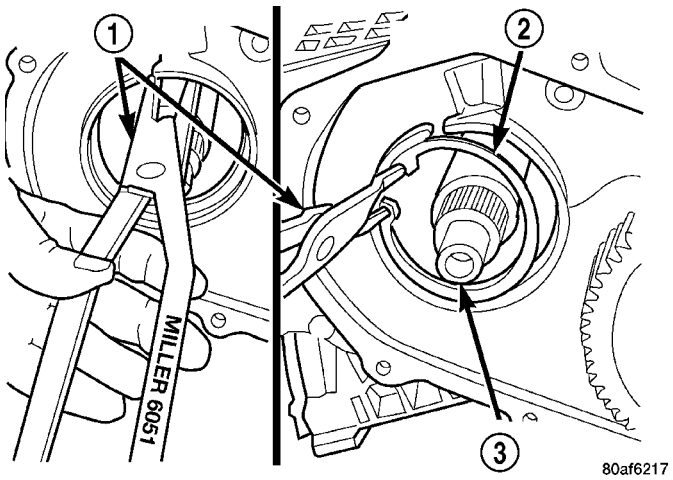


Fig. 141 Install Transfer Shaft Bearing Snap Ring

1 - SNAP RING PLIERS TOOL 6051
2 - TRANSFER SHAFT BEARING SNAP RING
3 - TRANSFER SHAFT

(28) Install transfer shaft bearing cup into retainer using Tool 6061 (Fig. 142).

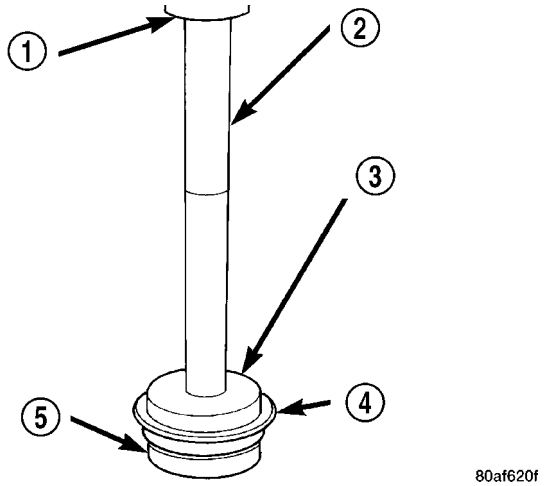


Fig. 142 Install Transfer Shaft Bearing Cup Into Retainer

1 - ARBOR PRESS RAM
2 - HANDLE C-4171
3 - TOOL 6061
4 - TRANSFER SHAFT BEARING CUP RETAINER
5 - USE REMOVED BEARING CUP TO SUPPORT RETAINER

(29) Install bearing cup retainer to transaxle (Fig. 143).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

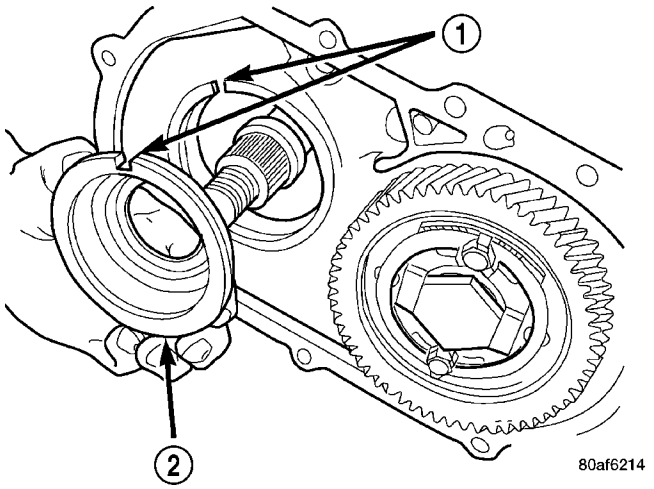


Fig. 143 Remove Bearing Cup Retainer

1 - ALIGN INDEXING TAB TO SLOT
2 - BEARING CUP RETAINER

(30) Install transfer gear bearing cone to transfer gear using Tool 5052 (Fig. 144).

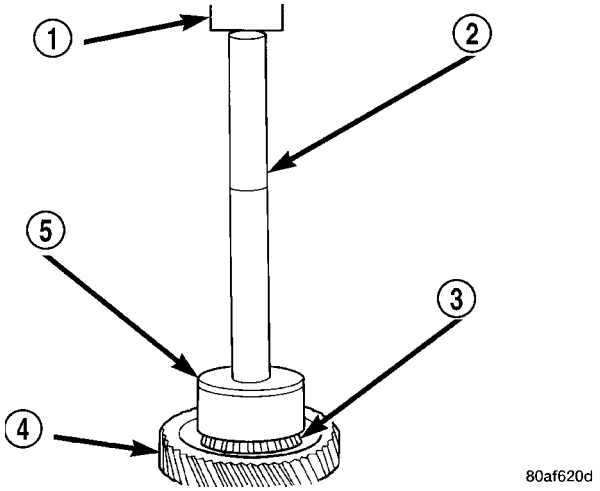


Fig. 144 Install Transfer Gear Bearing Cone

1 - ARBOR PRESS RAM
2 - HANDLE C-4171
3 - NEW BEARING CONE
4 - TRANSFER SHAFT GEAR
5 - TOOL 5052

(31) **TRANSFER GEAR BEARING ADJUSTMENT:**

(a) Install a 4.66 mm (0.184 in.) gauging shim on the transfer shaft (Fig. 145).

(b) Install transfer shaft gear using Tool 6261. Using Tool 6259, install transfer shaft gear retaining nut to 271 N·m (200 ft. lbs.).

(c) Measure end play. Attach Tool L4432 to the transfer gear.

(d) Mount a steel ball with grease into the end of the transfer shaft.

(e) Push and pull the gear while rotating back and forth to ensure seating of the bearing rollers.

(f) Using a dial indicator, measure transfer shaft end play.

(g) Refer to the transfer shaft bearing shim chart for the required shim combination to obtain the proper bearing setting.

(h) Use Tool 6259 to remove the retaining nut and washer. Remove the transfer shaft gear using Tool L4407A.

(i) Remove the gauging shim (Fig. 145) and install the proper shim indicated by the chart.

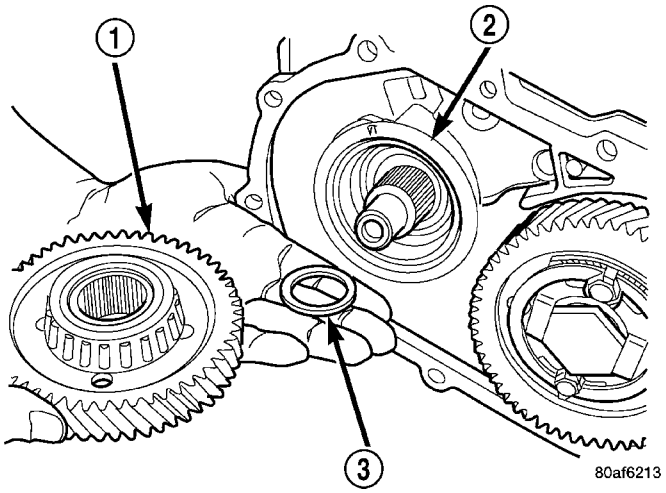


Fig. 145 Install Transfer Shaft Gear and (Select) Shim

1 - TRANSFER SHAFT GEAR
2 - BEARING CUP RETAINER
3 - SHIM (SELECT)

41AE/TE AUTOMATIC TRANSAXLE (Continued)

TRANSFER SHAFT BEARING SHIM CHART

End Play	Shim Needed	Part Number	End Play	Shim Needed	Part Number
0.05mm (0.002 in.)	4.66mm (0.183 in.)	4505588AB	0.76mm (0.030 in.)	3.94mm (0.155 in.)	4412818AB
0.08mm (0.003 in.)	4.62mm (0.182 in.)	4412835AB	0.79mm (0.031 in.)	3.90mm (0.154 in.)	4412817AB
0.10mm (0.004 in.)	4.58mm (0.180 in.)	4412834AB	0.81mm (0.032 in.)	3.90mm (0.154 in.)	4412817AB
0.13mm (0.005 in.)	4.58mm (0.180 in.)	4412834AB	0.84mm (0.033 in.)	3.86mm (0.152 in.)	4412816AB
0.15mm (0.006 in.)	4.54mm (0.178 in.)	4412833AB	0.86mm (0.034 in.)	3.82mm (0.150 in.)	4412815AB
0.18mm (0.007 in.)	4.50mm (0.177 in.)	4412832AB	0.89mm (0.035 in.)	3.82mm (0.150 in.)	4412815AB
0.20mm (0.008 in.)	4.50mm (0.177 in.)	4412832AB	0.91mm (0.036 in.)	3.78mm (0.149 in.)	4412814AB
0.23mm (0.009 in.)	4.46mm (0.175 in.)	4412831AB	0.94mm (0.037 in.)	3.74mm (0.147 in.)	4412813AB
0.25mm (0.010 in.)	4.46mm (0.175 in.)	4412831AB	0.97mm (0.038 in.)	3.74mm (0.147 in.)	4412813AB
0.28mm (0.011 in.)	4.42mm (0.174 in.)	4412830AB	0.99mm (0.039 in.)	3.70mm (0.146 in.)	4412812AB
0.30mm (0.012 in.)	4.38mm (0.172 in.)	4412829AB	1.02mm (0.040 in.)	3.66mm (0.144 in.)	4412811AB
0.33mm (0.013 in.)	4.38mm (0.172 in.)	4412829AB	1.04mm (0.041 in.)	3.66mm (0.144 in.)	4412811AB
0.36mm (0.014 in.)	4.34mm (0.171 in.)	4412828AB	1.07mm (0.042 in.)	3.62mm (0.143 in.)	4412810AB
0.38mm (0.015 in.)	4.30mm (0.169 in.)	4412827AB	1.08mm (0.043 in.)	3.62mm (0.143 in.)	4412810AB
0.41mm (0.016 in.)	4.30mm (0.169 in.)	4412827AB	1.12mm (0.044 in.)	3.58mm (0.141)	4412809AB
0.43mm (0.017 in.)	4.26mm (0.168 in.)	4412826AB	1.14mm (0.045 in.)	3.54mm (0.139 in.)	4412808AB
0.46mm (0.018 in.)	4.22mm (0.166 in.)	4412825AB	1.17mm (0.046 in.)	3.54mm (0.139 in.)	4412808AB
0.48mm (0.019 in.)	4.22mm (0.166 in.)	4412825AB	1.19mm (0.047 in.)	3.50mm (0.138 in.)	4412807AB
0.50mm (0.020 in.)	4.18mm (0.165 in.)	4412824AB	1.22mm (0.048 in.)	3.46mm (0.136 in.)	4412806AB
0.53mm (0.021 in.)	4.18mm (0.165 in.)	4412824AB	1.24mm (0.049 in.)	3.46mm (0.136 in.)	4412806AB
0.56mm (0.022 in.)	4.14mm (0.163 in.)	4412823AB	1.27mm (0.050 in.)	3.42mm (0.135 in.)	4412805AB
0.58mm (0.023 in.)	4.10mm (0.161 in.)	4412822AB	1.30mm (0.051 in.)	3.38mm (0.133 in.)	4412804AB
0.61mm (0.024 in.)	4.10mm (0.161 in.)	4412822AB	1.32mm (0.052 in.)	3.38mm (0.133 in.)	4412804AB

41AE/TE AUTOMATIC TRANSAXLE (Continued)

End Play	Shim Needed	Part Number	End Play	Shim Needed	Part Number
0.64mm (0.025 in.)	4.06mm (0.160 in.)	4412821AB	1.35mm (0.053 in.)	3.34mm (0.132 in.)	4412803AB
0.66mm (0.026 in.)	4.02mm (0.158 in.)	4412820AB	1.37mm (0.054 in.)	3.34mm (0.132 in.)	4412803AB
0.69mm (0.027 in.)	4.02mm (0.158 in.)	4412820AB	1.40mm (0.055 in.)	3.30mm (0.130 in.)	4412802AB
0.71mm (0.028 in.)	3.98mm (0.157 in.)	4412819AB	1.45mm (0.057 in	3.26mm (0.128 in.)	4412801AB
0.74mm (0.029 in.)	3.94mm (0.155 in.)	4412818AB	1.47mm (0.058 in.)	2.22mm (0.127 in.)	4505570AB

(32) Install the transfer shaft gear using Tool 6261 (Fig. 146).

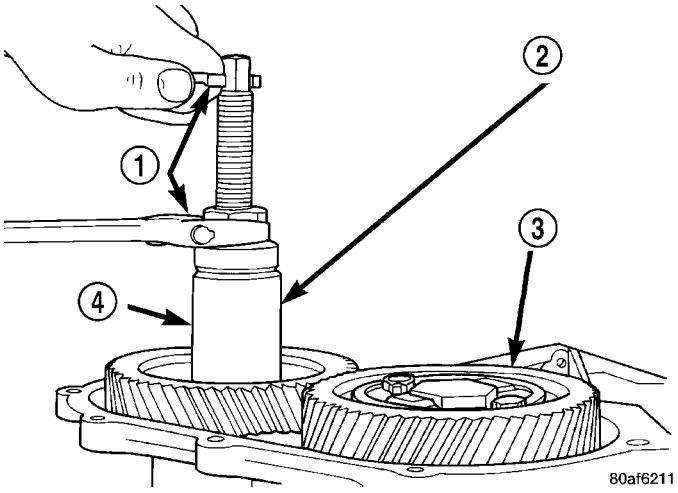


Fig. 146 Install Transfer Shaft Gear

1 - WRENCHES
2 - SPECIAL TOOL 6261
3 - OUTPUT GEAR
4 - TRANSFER SHAFT GEAR

CAUTION: Install a NEW retaining nut, as the original nut MUST NOT be reused.

(33) Install the new retaining nut and washer.

(34) Using Tool 6259, torque transfer gear retaining nut to 271 N·m (200 ft. lbs.) (Fig. 147).

(35) Measure transfer shaft end play. **Transfer shaft end play should be within 0.05-0.10 mm (0.002-0.004 in.).** If the end play is too high, install a 0.04 mm (0.0016 in.) thicker shim. If the end play is too low, install a 0.04 mm (0.0016 in.) thinner shim. Repeat until 0.05-0.10 mm (0.002-0.004 in.) end play is obtained.

(36) Install a bead of Mopar® ATF RTV (MS-GF41) to transfer gear cover (Fig. 148).

(37) Install transfer gear cover-to-case bolts and torque to 20 N·m (175 in. lbs.) torque (Fig. 149).

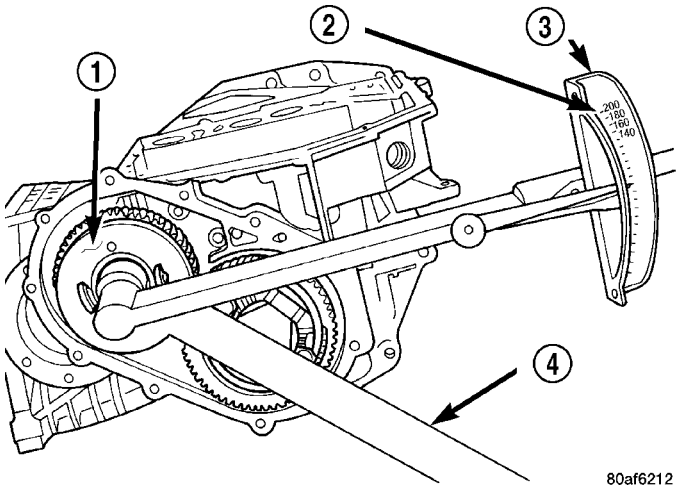


Fig. 147 Tighten Transfer Gear Nut to 271 N•m (200 ft. lbs.)

1 - TRANSFER SHAFT GEAR
2 - 200 FT. LBS.
3 - TORQUE WRENCH
4 - SPECIAL TOOL 6259

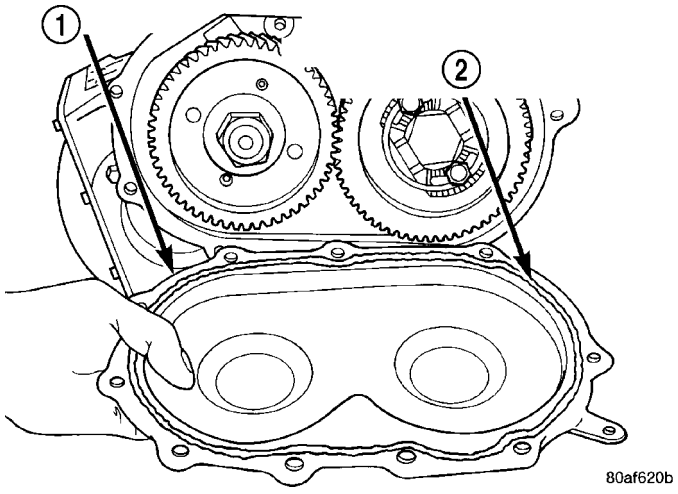


Fig. 148 Install Rear Cover

1 - REAR COVER
2 - 1/8 INCH BEAD OF MOPAR® ATF RTV (MS-GF41) AS SHOWN

41AE/TE AUTOMATIC TRANSAXLE (Continued)

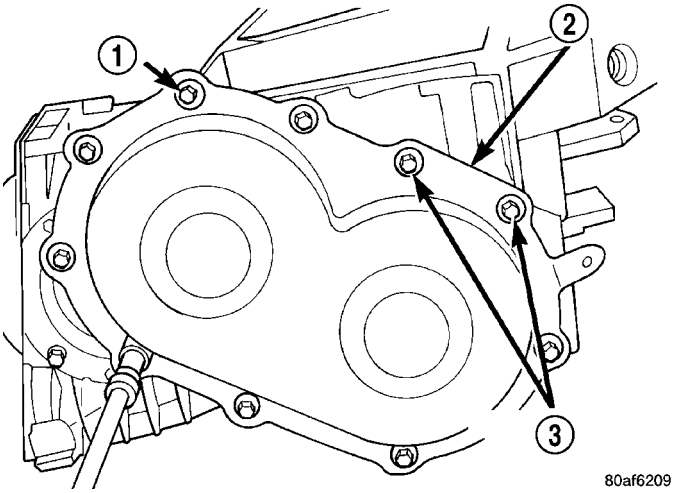


Fig. 149 Install Rear Cover Bolts

1 - REAR COVER BOLTS
2 - REAR COVER
3 - USE SEALANT ON BOLTS

(38) Install low/reverse clutch pack (Fig. 150). Leave uppermost disc out until snap ring is installed.

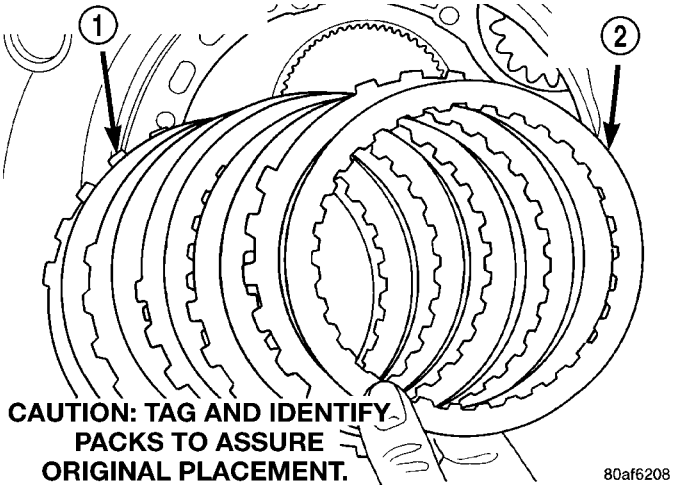


Fig. 150 Install Low/Reverse Clutch Pack

1 - CLUTCH PLATES (5)
2 - CLUTCH DISCS (5)

(39) Install low/reverse reaction plate flat snap ring (Fig. 151).

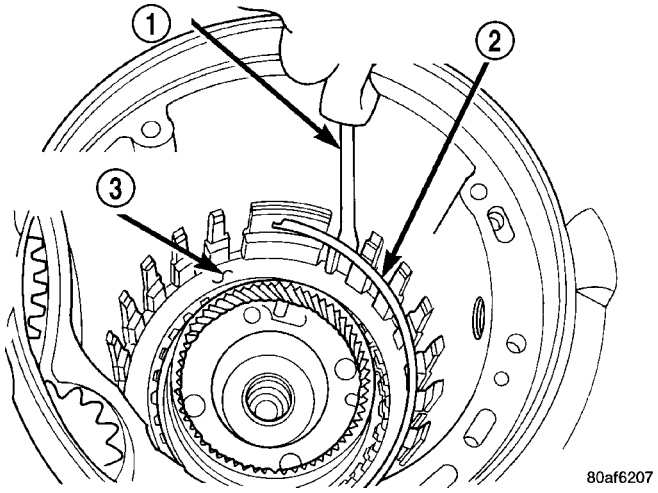


Fig. 151 Install Low/Reverse Reaction Plate Snap Ring

1 - SCREWDRIVER
2 - LOW/REVERSE REACTION PLATE FLAT SNAP RING
3 - DO NOT SCRATCH CLUTCH PLATE

(40) Install remaining low/reverse clutch disc (Fig. 152).

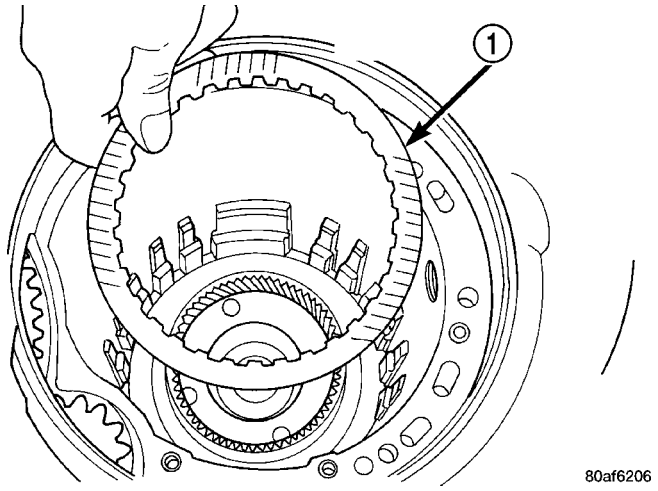


Fig. 152 Install One Disc

1 - ONE DISC FROM LOW/REVERSE CLUTCH

(41) Install low/reverse reaction plate with flat side up (Fig. 153).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

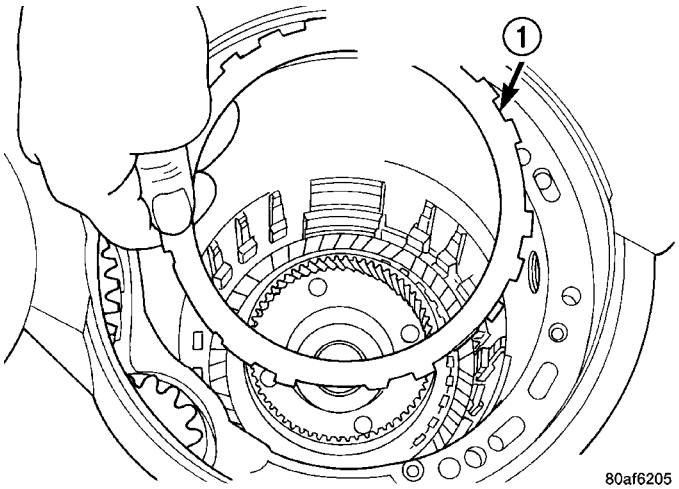


Fig. 153 Install Low/Reverse Reaction Plate

1 - LOW/REVERSE REACTION PLATE (FLAT SIDE UP)

(42) Install tapered snap ring (with tapered side up) as shown in (Fig. 154) (Fig. 155).

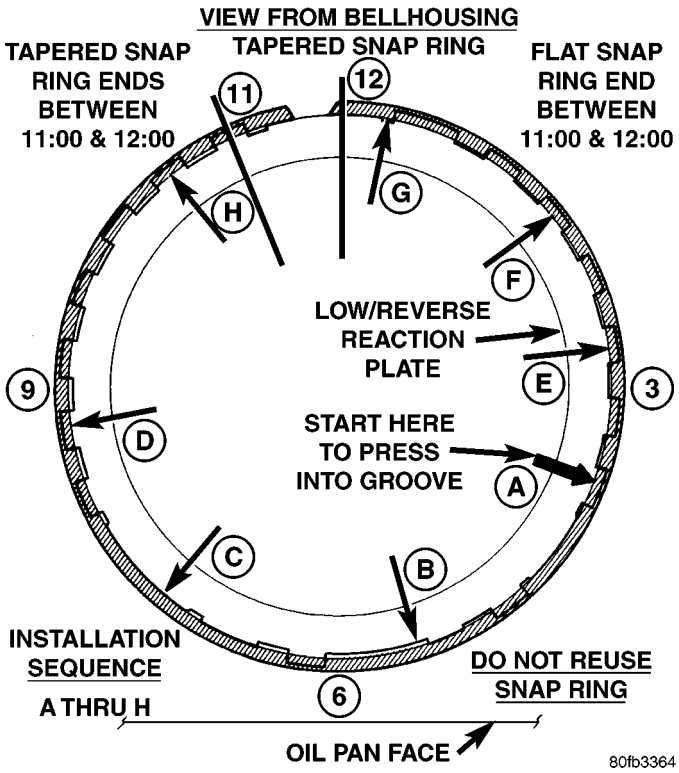


Fig. 154 Tapered Snap Ring Instructions

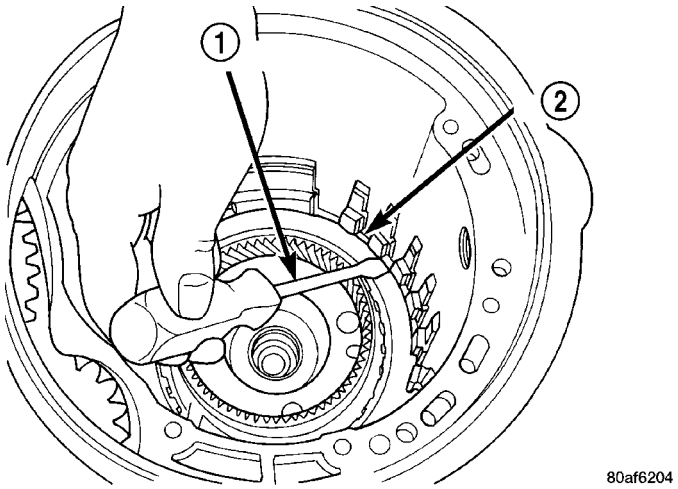


Fig. 155 Snap Ring Installed

1 - SCREWDRIVER
2 - TAPERED SNAP RING (INSTALL AS SHOWN)

(43) Set up dial indicator as shown in (Fig. 156) to measure low/reverse clutch clearance. Press down on clutch pack with finger and zero dial indicator. **Low/ Reverse clutch pack clearance is 0.89-1.47 mm (0.035-0.058 in.)**. Set up indicator and record measurement in four (4) places. Take average of readings and select the proper low/reverse reaction plate to achieve specifications.

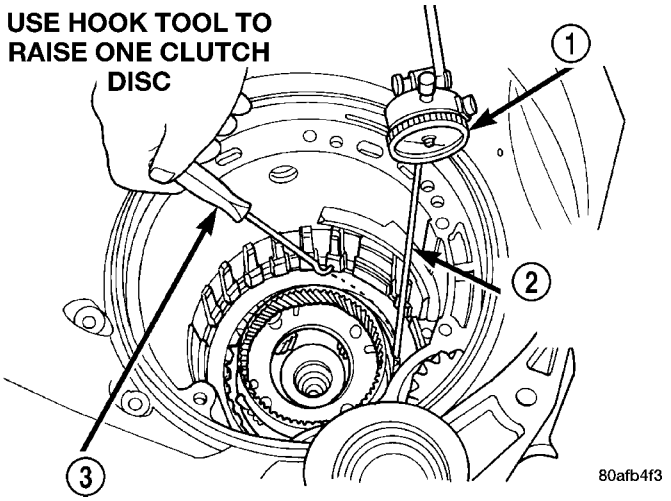


Fig. 156 Check Low/Reverse Clutch Clearance

1 - DIAL INDICATOR
2 - DIAL INDICATOR TIP TOOL 6268
3 - HOOK TOOL

41AE/TE AUTOMATIC TRANSAXLE (Continued)

LOW/REVERSE REACTION PLATE CHART

PART NUMBER	THICKNESS
4799846AA	5.88 mm (0.232 in.)
4799847AA	6.14 mm (0.242 in.)
4799848AA	6.40 mm (0.252 in.)
4799849AA	6.66 mm (0.262 in.)
4799855AA	6.92 mm (0.273 in.)

(44) Install 2/4 clutch pack (Fig. 157).

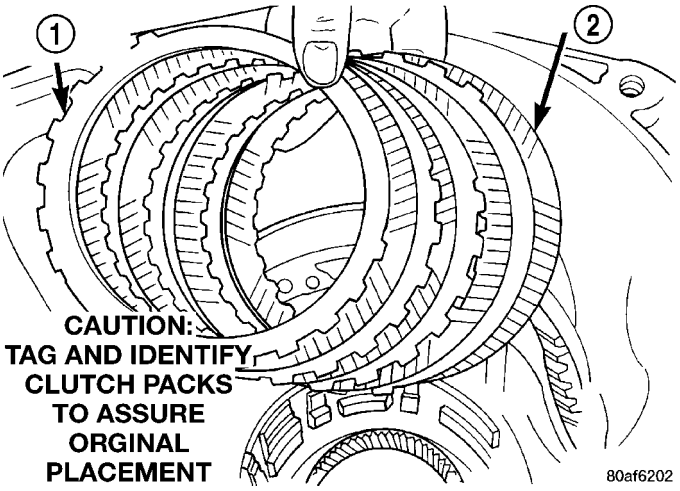


Fig. 157 Install 2/4 Clutch Pack

1 - CLUTCH PLATE (4)
2 - CLUTCH DISC (4)

NOTE: The 2/4 Clutch Piston has bonded seals which are not individually serviceable. Seal replacement requires replacement of the piston assembly.

(45) Orient 2/4 clutch return spring to retainer as shown in (Fig. 158), and install to transaxle (Fig. 159).

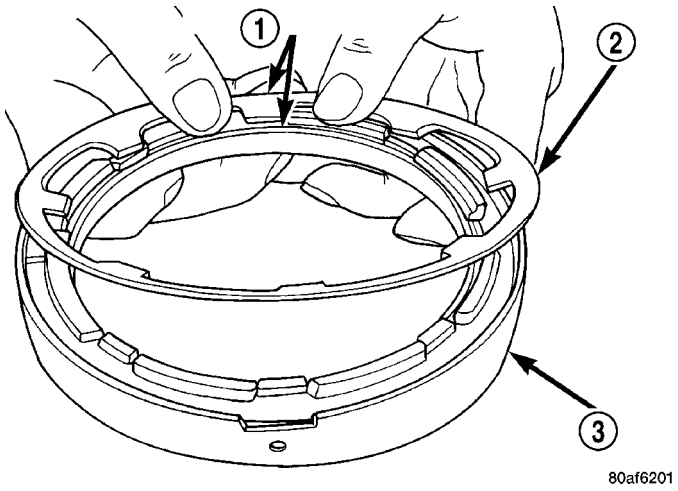


Fig. 158 Proper Orientation of 2/4 Clutch Retainer and Spring

1 - NOTE POSITION
2 - RETURN SPRING
3 - 2/4 CLUTCH RETAINER

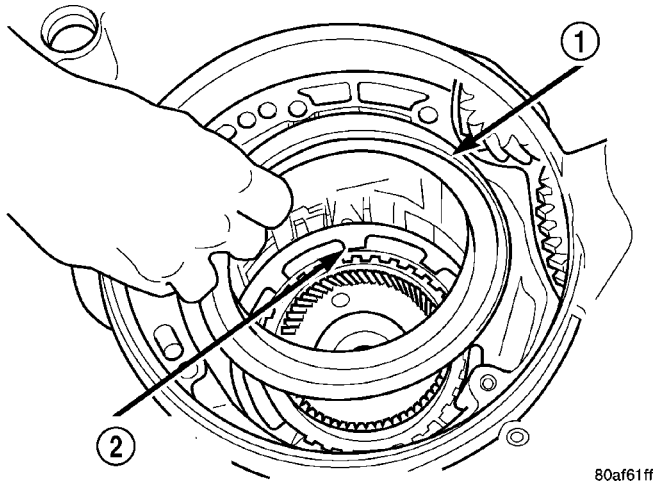


Fig. 159 2/4 Clutch Retainer

1 - 2/4 CLUTCH RETAINER
2 - 2/4 CLUTCH RETURN SPRING

(46) Using tool 5058, compress 2/4 clutch return spring just enough to install snap ring (Fig. 160).

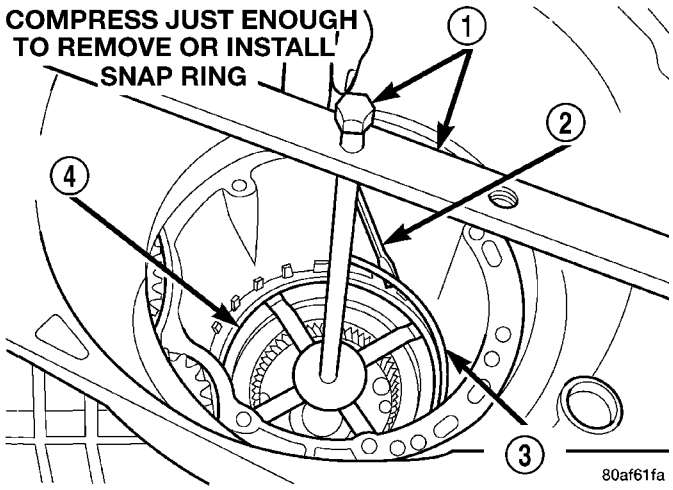


Fig. 160 Install 2/4 Clutch Retainer Snap Ring

1 - TOOL 5058
2 - SCREWDRIVER
3 - SNAP RING
4 - 2/4 CLUTCH RETAINER

(47) Install snap ring.

(48) Set up dial indicator as shown in (Fig. 161) and measure 2/4 clutch clearance. Press down on clutch pack with finger and zero dial indicator. **2/4 clutch pack clearance is 0.76-2.64 mm (0.030-0.104 in.).** Set up indicator and record measurement in four (4) places. Take average of readings. If clearance is outside this range, the clutch is assembled improperly. **There is no adjustment for 2/4 clutch clearance.**

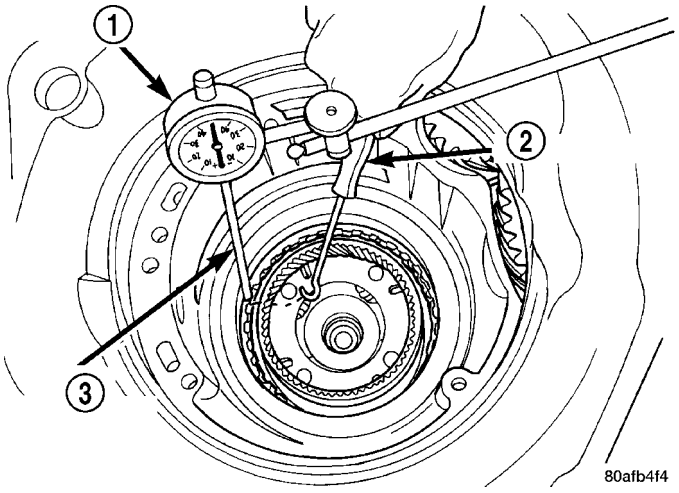


Fig. 161 Check 2/4 Clutch Clearance

1 - DIAL INDICATOR
2 - HOOK TOOL
3 - DIAL INDICATOR TIP TOOL 6268

(49) Install rear sun gear and #7 needle bearing (Fig. 163).

NOTE: The number seven needle bearing has three anti-reversal tabs and is common with the number five and number two position. The orientation should allow the bearing to seat flat against the rear sun gear (Fig. 162). A small amount of petrolatum can be used to hold the bearing to the rear sun gear.

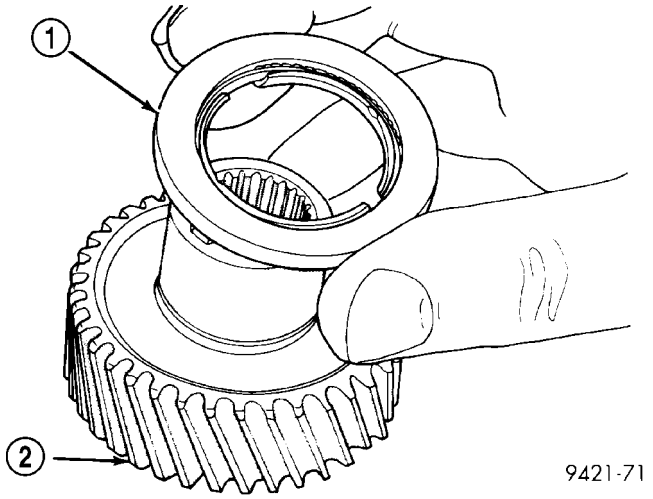


Fig. 162 Number 7 Bearing

1 - #7 NEEDLE BEARING
2 - REAR SUN GEAR

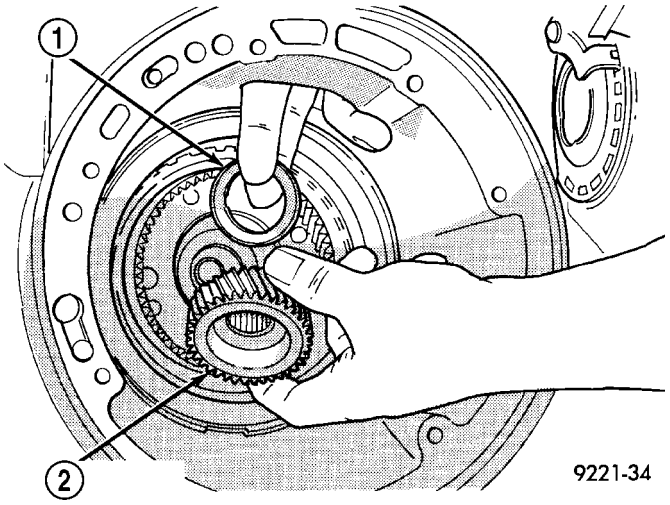


Fig. 163 Install Rear Sun Gear and #7 Needle Bearing

1 - #7 NEEDLE BEARING
2 - REAR SUN GEAR

(50) Install front carrier/rear annulus assembly and #6 needle bearing (Fig. 164).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

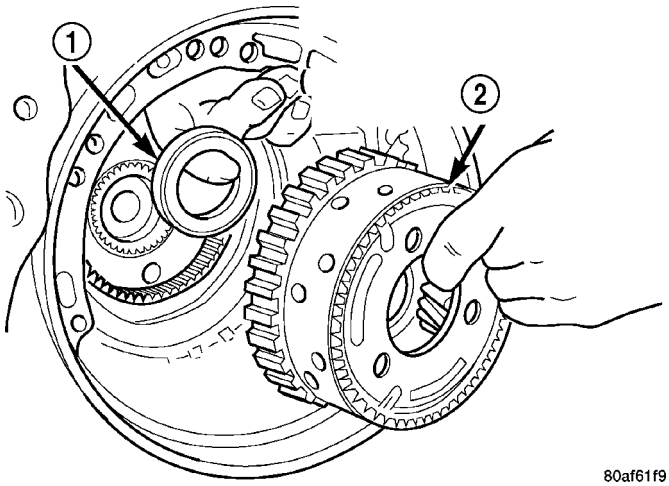


Fig. 164 Install Front Carrier and Rear Annulus Assembly

1 - #6 NEEDLE BEARING
2 - FRONT CARRIER AND REAR ANNULUS ASSEMBLY (TWIST AND PULL OR PUSH TO REMOVE OR INSTALL).

(51) Install front sun gear assembly and #4 thrust washer (Fig. 165).

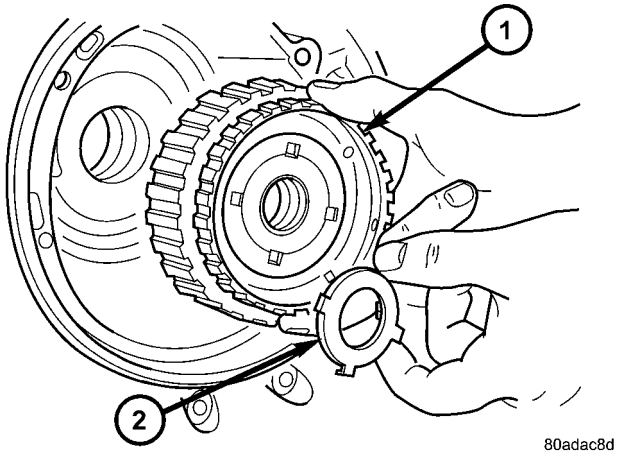


Fig. 165 Install Front Sun Gear Assembly

1 - FRONT SUN GEAR ASSEMBLY
2 - #4 THRUST WASHER (FOUR TABS)

(52) **DETERMINING #4 THRUST PLATE THICKNESS / INPUT SHAFT END PLAY:**

(a) Select the thinnest #4 thrust plate thickness and install to input clutch assembly (Fig. 166). Use petrolatum to retain.

(b) Install input clutch assembly into position and verify that it is completely seated by viewing through input speed sensor hole. If view through input speed sensor hole is not as shown in (Fig. 167), the input clutch assembly is not seated properly.

(c) Remove oil pump o-ring (Fig. 168). **Be sure to reinstall oil pump o-ring after selecting the proper #4 thrust plate.**

(d) Install pump and gasket to transmission. Install and torque bolts.

(e) Set up input shaft for measurement with Indicator Set C3339 and End Play Set 8266 as shown in (Fig. 169).

(f) Measure the input shaft end play with the transaxle in the vertical position. **Input shaft end play must be within 0.005 to 0.025 inch.** For example, if end play reading is 0.055 inch, select No. 4 Thrust Plate which is 0.071 to 0.074 thick. This should provide an input shaft end play reading of 0.020 inch which is within specifications.

(g) Refer to the No. 4 thrust plate chart to select the proper No. 4 thrust plate:

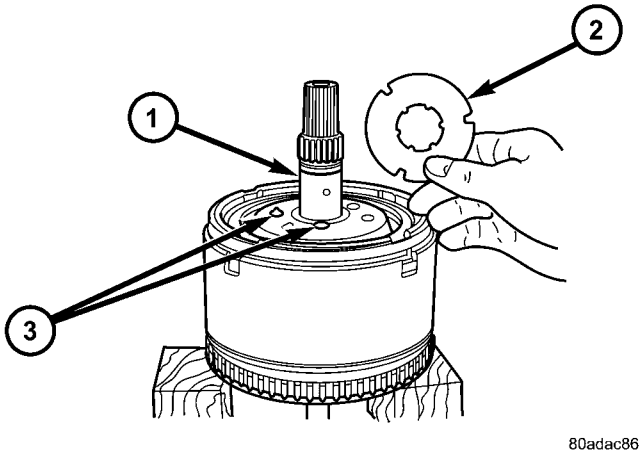


Fig. 166 Select Thinnest No. 4 Thrust Plate

1 - OVERDRIVE SHAFT ASSEMBLY
2 - #4 THRUST PLATE (SELECT)
3 - 3 DABS OF PETROLATUM FOR RETENTION

41AE/TE AUTOMATIC TRANSAXLE (Continued)

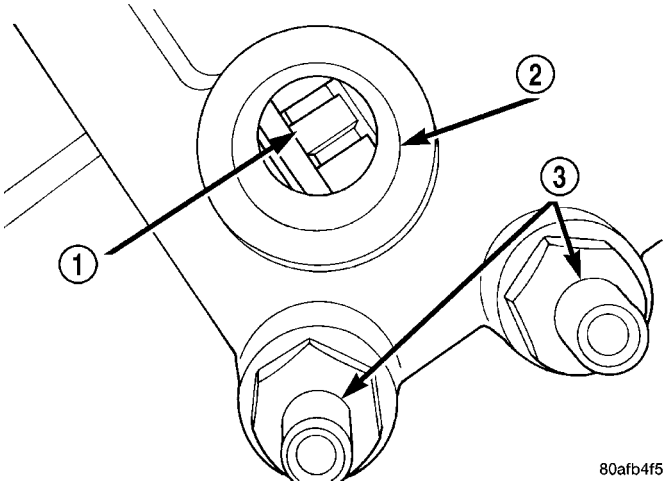


Fig. 167 View Through Input Speed Sensor Hole

1 - INPUT CLUTCH RETAINER
2 - INPUT SPEED SENSOR HOLE
3 - OIL COOLER FITTINGS

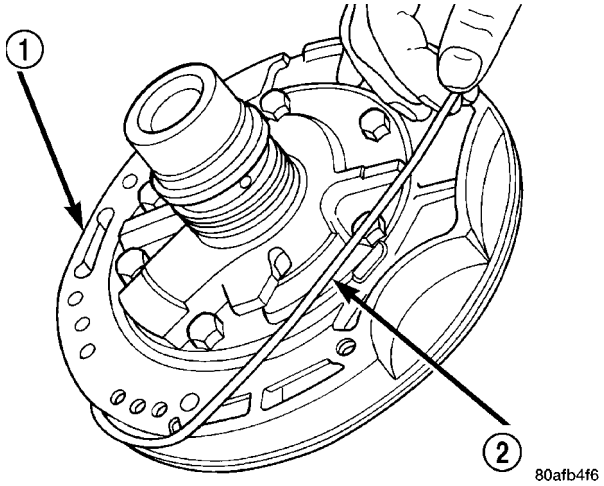


Fig. 168 Remove Oil Pump O-Ring

1 - OIL PUMP ASSEMBLY
2 - O-RING

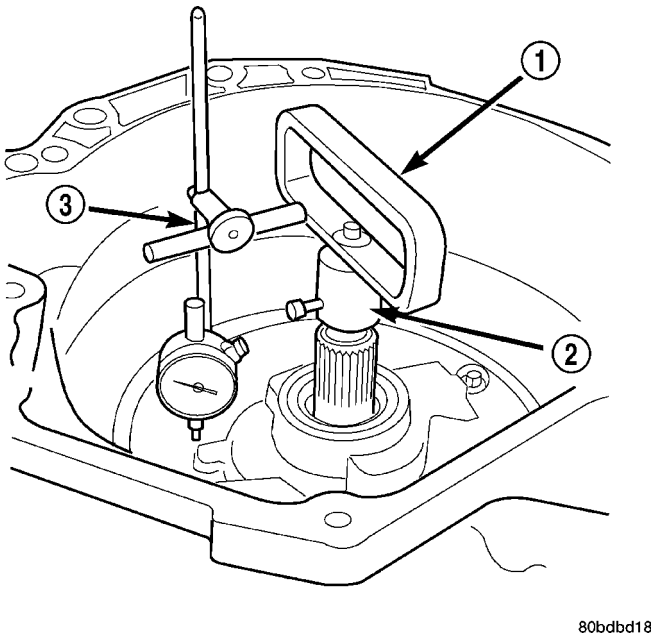


Fig. 169 Measure Input Shaft End Play Using End Play Set 8266

1 - TOOL 8266–8
2 - TOOL 8266–2
3 - TOOL C-3339

NO. 4 THRUST PLATE CHART

PART NUMBER	THICKNESS
4431665AB	1.60mm (0.063 in.)
3836237AB	1.73mm (0.068 in.)
4431666AB	1.80mm (0.071 in.)
3836238AB	1.96mm (0.077 in.)
4431667AB	2.03mm (0.080 in.)
3836239AB	2.16mm (0.085 in.)
4431668AB	2.24mm (0.088 in.)
3836240AB	2.39mm (0.094 in.)
4431669AB	2.46mm (0.097 in.)
3836241AB	2.62mm (0.103 in.)
4446670AB	2.67mm (0.105 in.)
4446671AB	2.90mm (0.114 in.)

(53) Install input clutch assembly (Fig. 170).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

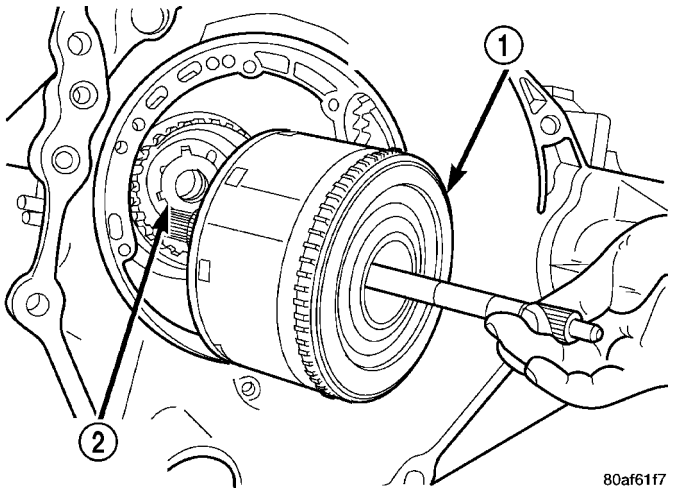


Fig. 170 Install Input Clutch Assembly

1 - INPUT CLUTCH ASSEMBLY
2 - #4 THRUST WASHER

(54) Install #1 caged needle bearing (Fig. 171).

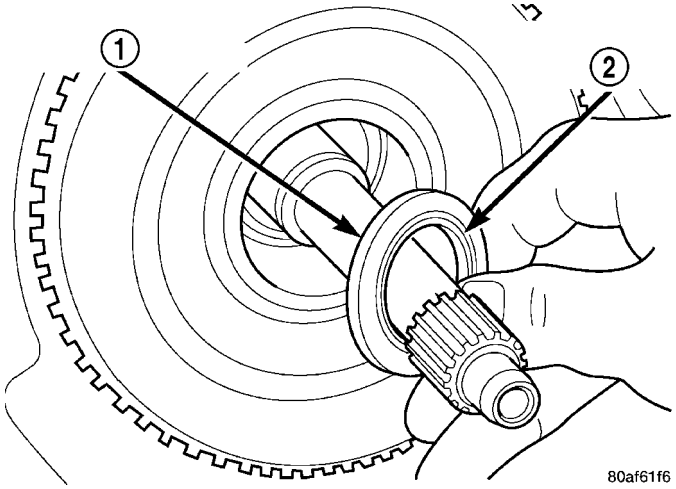


Fig. 171 Install Caged Needle Bearing

1 - #1 CAGED NEEDLE BEARING
2 - NOTE: TANGED SIDE OUT

CAUTION: The cooler bypass valve must be replaced if transaxle failure has occurred. Do not attempt to reuse or clean old valve.

(55) Install cooler bypass valve with o-ring end towards rear of case (Fig. 172).

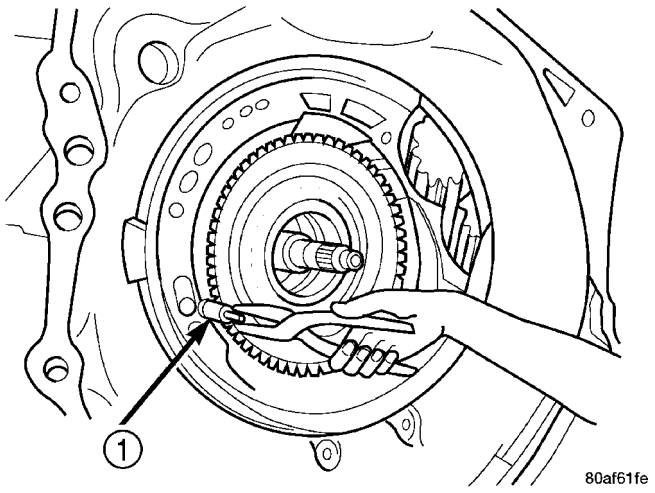


Fig. 172 Install Cooler Bypass Valve

1 - COOLER BYPASS VALVE

(56) Install oil pump gasket (Fig. 173).

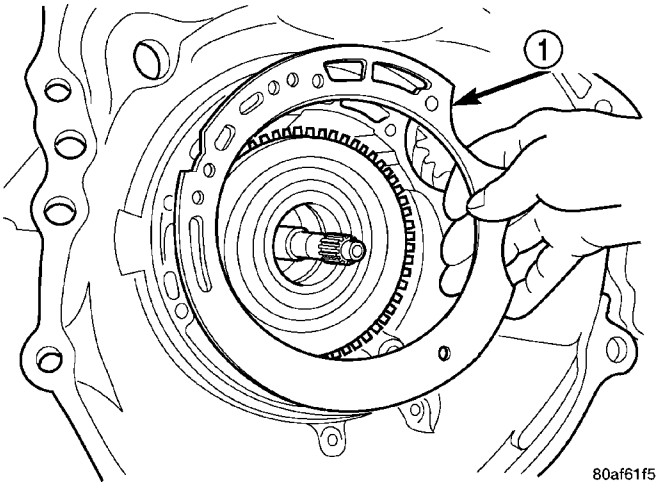


Fig. 173 Install Oil Pump Gasket

1 - PUMP GASKET

(57) Install oil pump assembly (Fig. 174).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

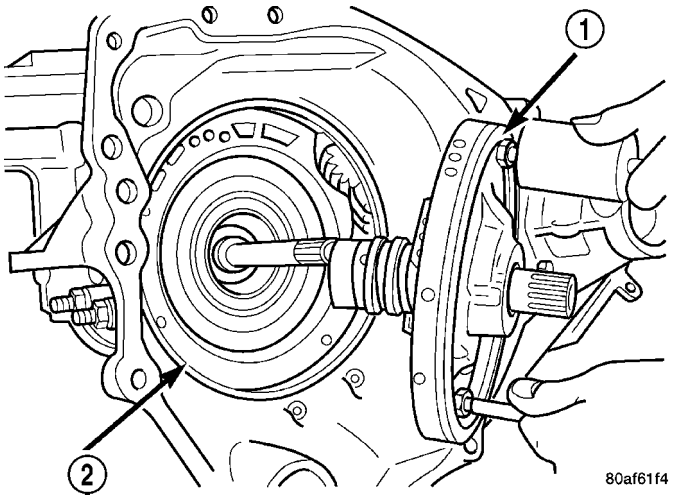


Fig. 174 Install Oil Pump

1 - OIL PUMP
2 - GASKET

(58) Install oil pump-to-case bolts and torque to 27 N·m (20 ft. lbs.) (Fig. 175).

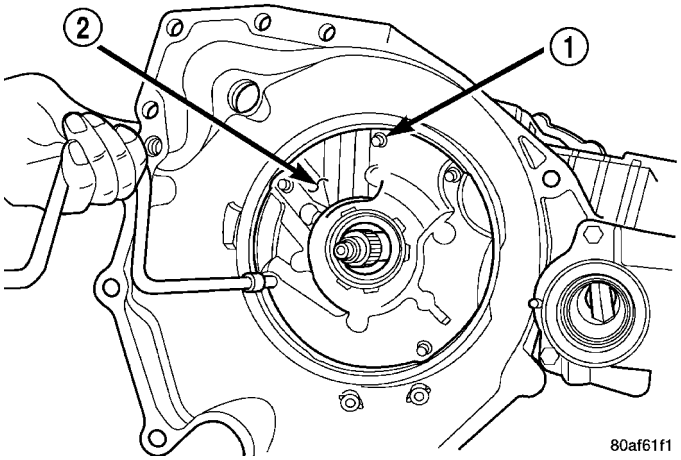


Fig. 175 Install Pump-to-Case Bolts

1 - PUMP ATTACHING BOLTS
2 - PUMP HOUSING

(59) Install low/reverse accumulator (Fig. 176).

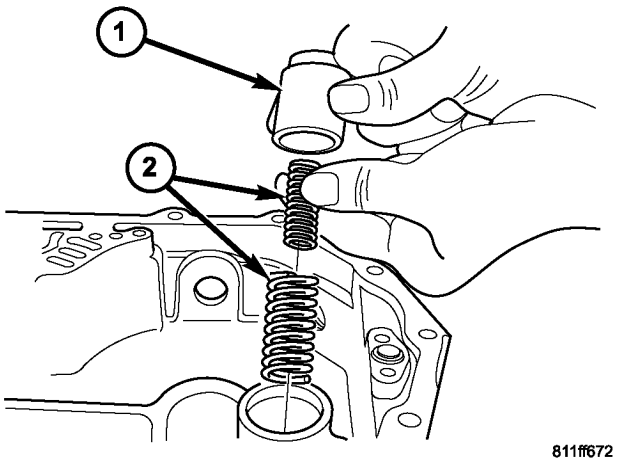


Fig. 176 Low/Reverse Accumulator

1 - PISTON
2 - RETURN SPRINGS

(60) Install low/reverse accumulator plug (Fig. 177).

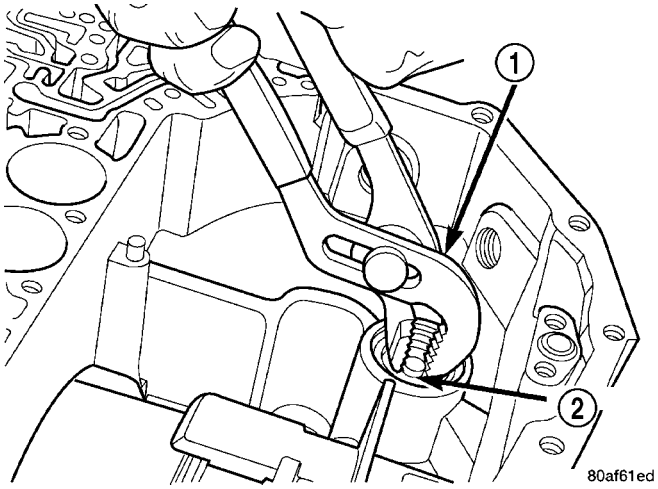


Fig. 177 Install Low/Reverse Accumulator Plug (Cover)

1 - ADJUSTABLE PLIERS
2 - PLUG

(61) Install low/reverse accumulator snap ring (Fig. 178).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

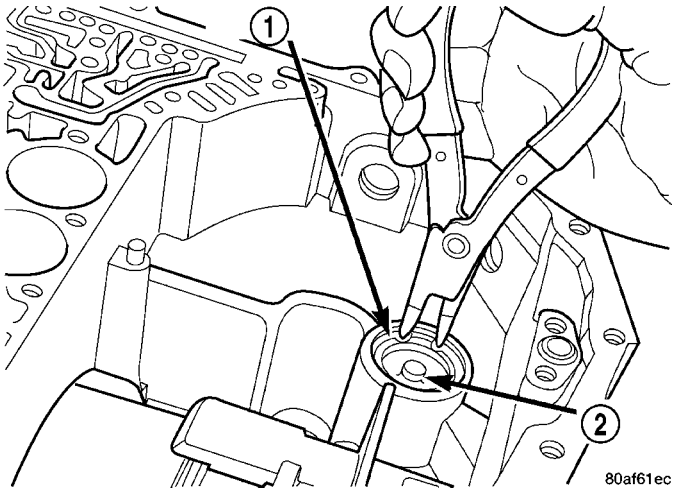


Fig. 178 Install Low/Reverse Accumulator Snap Ring

1 - SNAP RING
2 - PLUG

NOTE: Depending on engine application, some accumulators will have two springs, and others will have one spring. The springs are color-coded for application and year.

(62) Install underdrive and overdrive accumulators (Fig. 179).

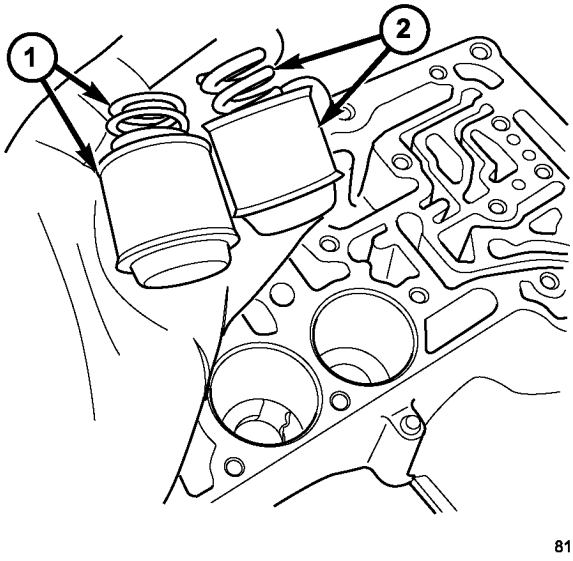


Fig. 179 Underdrive and Overdrive Accumulators

1 - OVERDRIVE PISTON AND SPRING
2 - UNDERDRIVE PISTON AND SPRING

(63) Install valve body to transaxle (Fig. 180). Rotate manual valve shaft fully clockwise to ease installation. Make sure park rod rollers are positioned within park guide bracket.

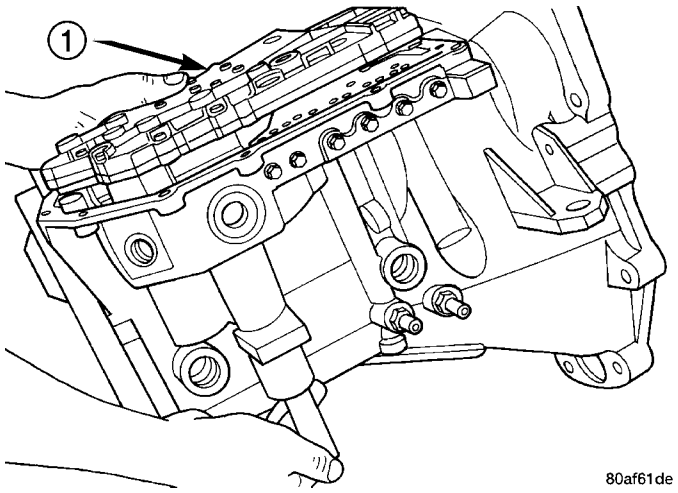


Fig. 180 Install Valve Body

1 - VALVE BODY

(64) Install and torque valve body-to-case bolts to 12 N·m (105 in. lbs.) (Fig. 181).

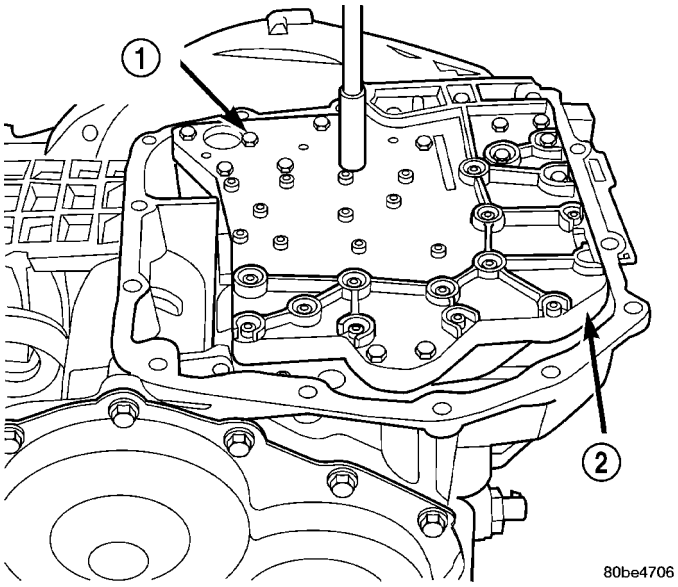


Fig. 181 Install Valve Body-to-Case Bolts

1 - VALVE BODY ATTACHING BOLTS (18)
2 - VALVE BODY

(65) Install oil filter and new o-ring (Fig. 182).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

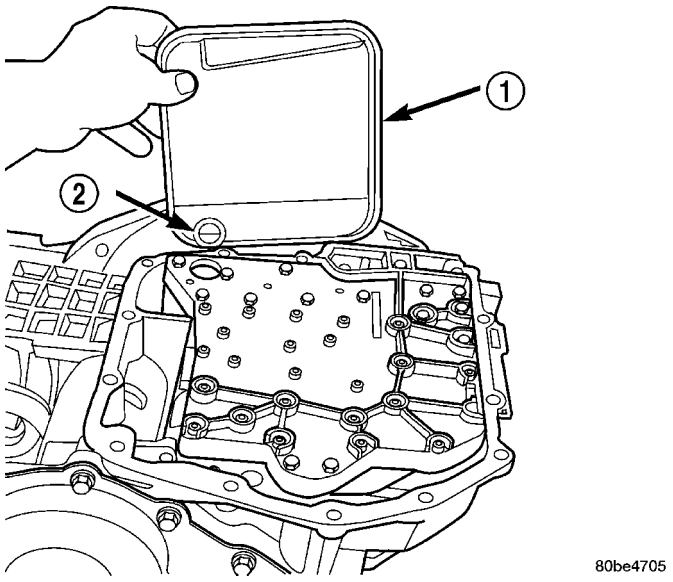


Fig. 182 Install Oil Filter

1 - OIL FILTER
2 - O-RING

(66) Apply an 1/8" bead of Mopar® ATF RTV (MS-GF41) to oil pan and immediately install to case (Fig. 183).

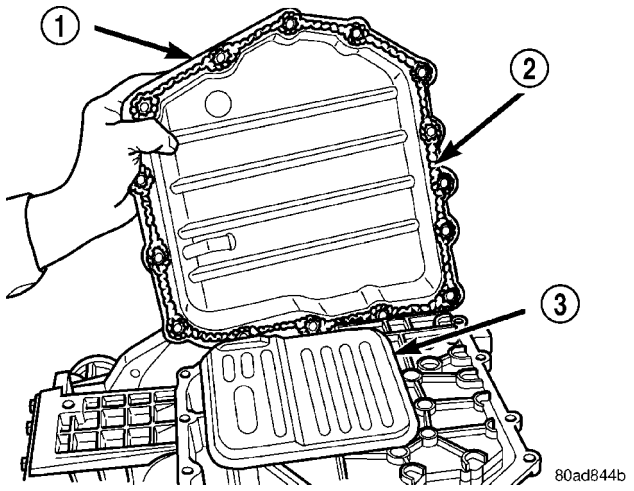


Fig. 183 Install Oil Pan

1 - OIL PAN
2 - 1/8 INCH BEAD OF MOPAR® ATF RTV (MS-GF41)
3 - OIL FILTER

(67) Install oil pan-to-case bolts and torque to 19 N·m (165 in. lbs.).

(68) Install solenoid/pressure switch assembly and gasket to case (Fig. 184).

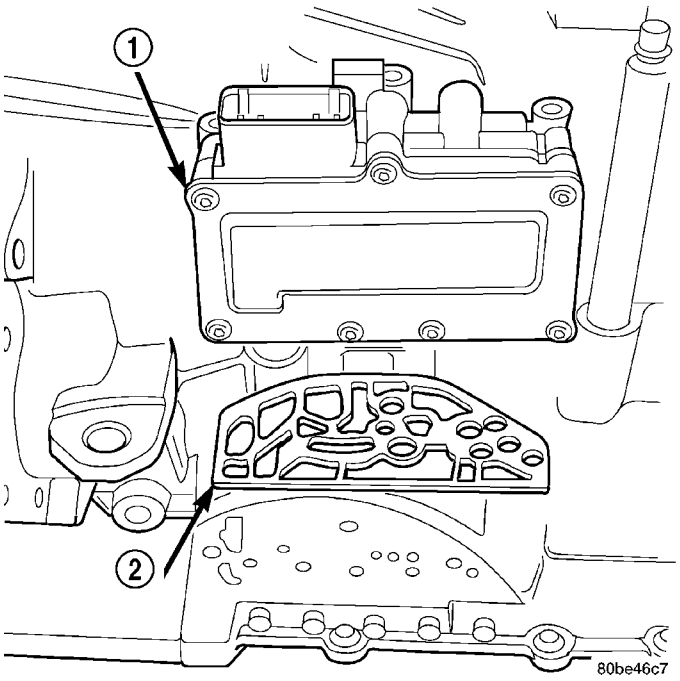


Fig. 184 Solenoid/Pressure Switch Assembly and Gasket

1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - GASKET

(69) Install and tighten solenoid/pressure switch assembly-to-transaxle case bolts to 12 N·m (110 in. lbs.) (Fig. 185).

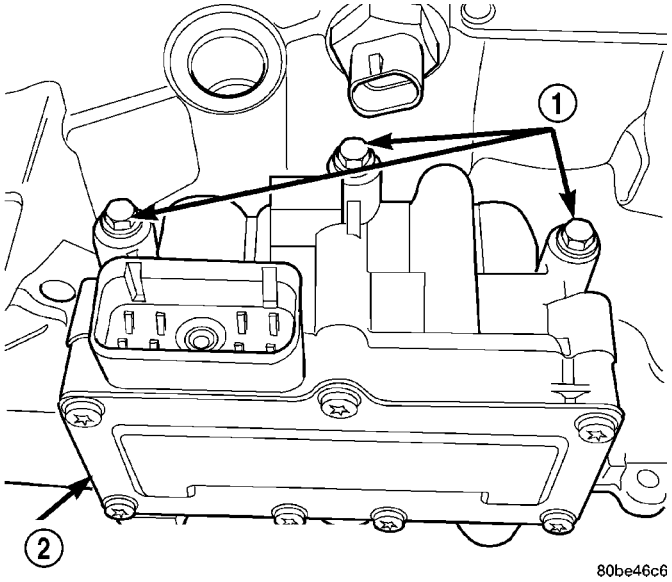


Fig. 185 Solenoid Pack-to-Transaxle Bolts

1 - BOLTS
2 - SOLENOID AND PRESSURE SWITCH ASSEMBLY

(70) Install and torque input and output speed sensors to case to 27 N·m (20 ft. lbs.).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

INSTALLATION

(1) Install transaxle into position. Install two (2) transaxle-to-engine lower bolts and torque to 95 N·m (70 ft. lbs.)..

(2) Remove transmission jack.

(3) Lower vehicle.

(4) Raise engine/transaxle assembly into position with overhead fixture.

(5) Install and torque four (4) transaxle-to-engine upper bolts and torque to 95 N·m (70 ft. lbs.).

(6) Raise vehicle.

(7) Install four (4) torque converter-to-driveplate bolts and torque to 88 N·m (65 ft. lbs.)

(8) Install torque converter dust shield (Fig. 186).

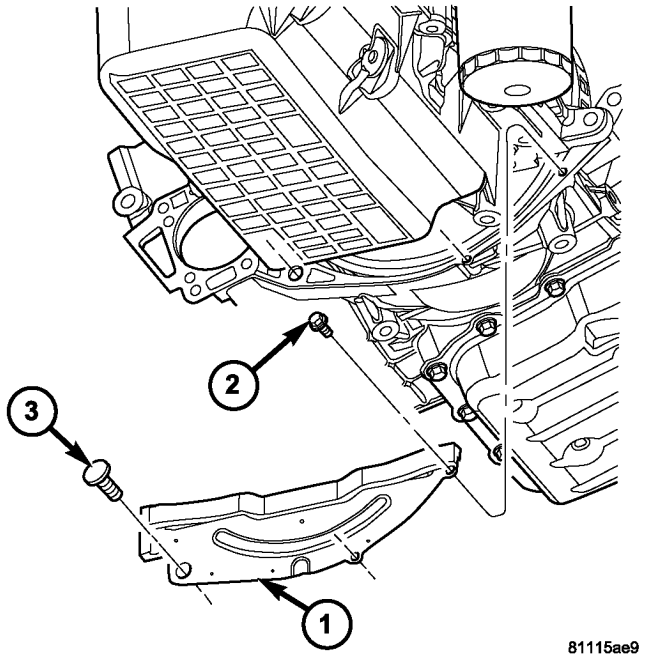


Fig. 186 Torque Converter Dust Shield

1 - DUST SHIELD
2 - BOLT (2)
3 - RETAINER

(9) Loosely assemble engine-to-transmission collar (Fig. 187).

(10) AWD models:

(a) Install PTU lower bracket.

(b) Install PTU into position. Install two (2) lower PTU-to-bracket bolts and torque to 28 N·m (21 ft. lbs.) (Fig. 188).

(c) Install PTU-to-transaxle upper bolts and torque to 54 N·m (40 ft. lbs.) (Fig. 189).

(d) Install PTU/rear mount bracket. Install and torque six (6) bolts to 54 N·m (40 ft. lbs.). (Fig. 190)

(e) Install PTU heat shield (Fig. 190).

(f) Install propeller shaft assembly. Refer to Group 3, Differential and Driveline for proper procedure.

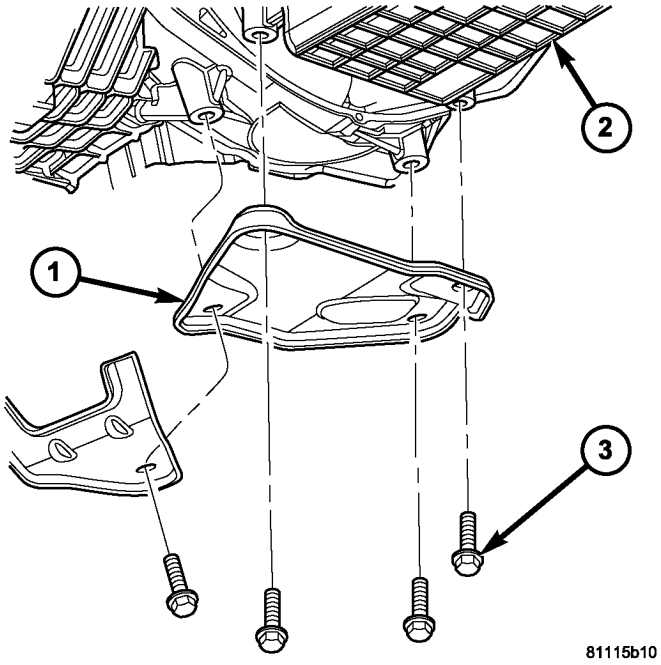


Fig. 187 Oil Pan-to-Transaxle Collar

1 - COLLAR
2 - ENGINE OIL PAN
3 - BOLT (4)

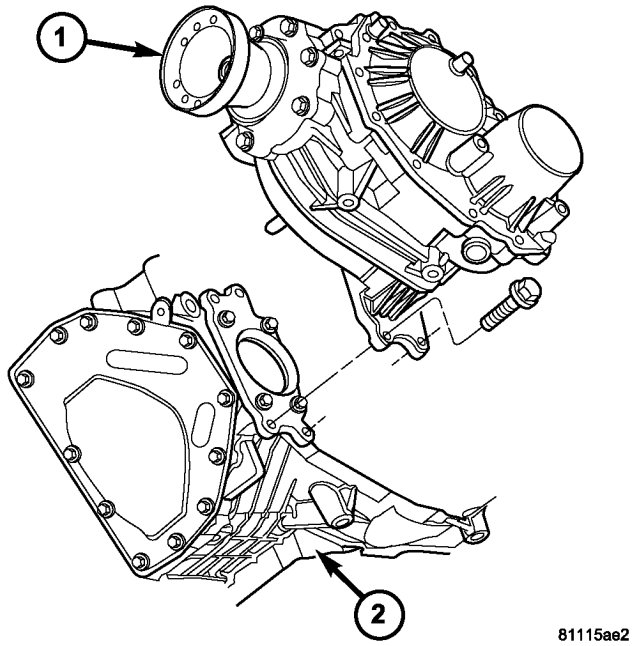


Fig. 188 Power Transfer Unit Lower Bolts

1 - POWER TRANSFER UNIT
2 - TRANSAXLE

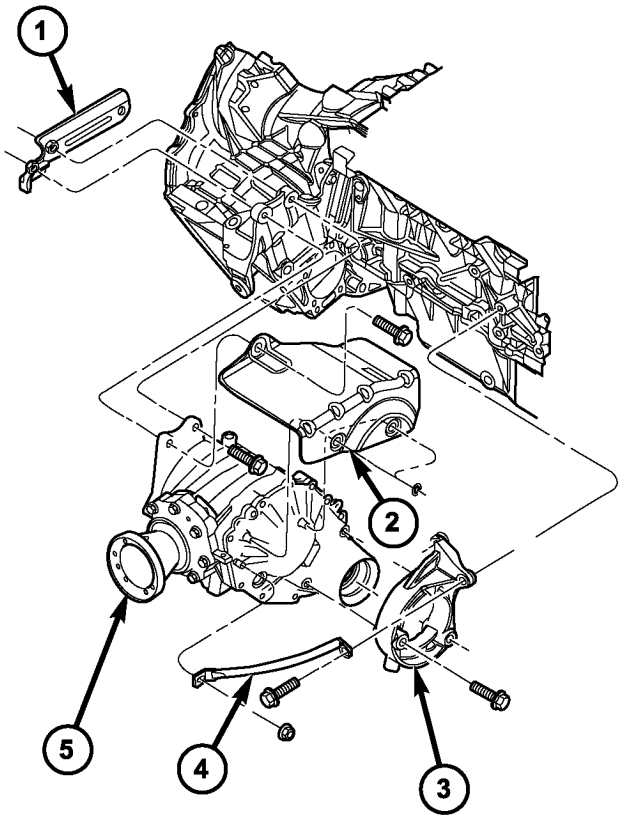


Fig. 189 Power Transfer Unit Mounting

1 - BRACKET
2 - HEAT SHIELD
3 - BRACKET
4 - BRACE
5 - POWER TRANSFER UNIT

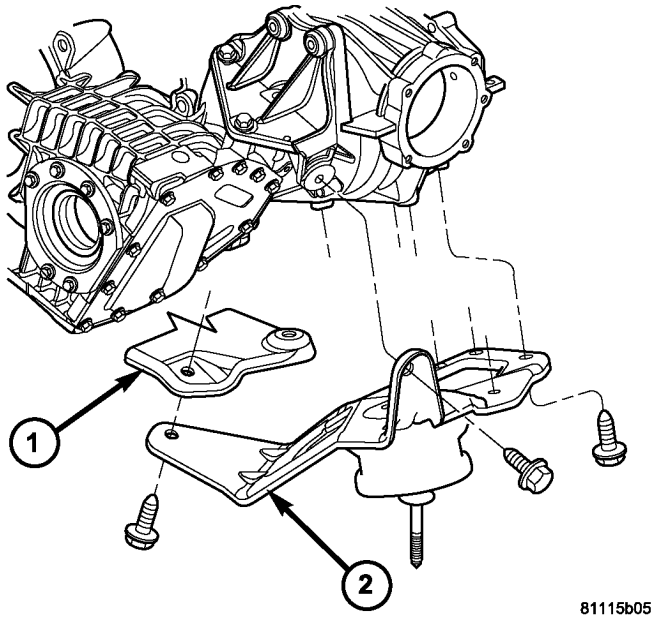


Fig. 190 PTU Bracket/Rear Mount Assembly

1 - COLLAR
2 - BRACKET/REAR MOUNT

(11) Install starter motor and shim (Fig. 191). Install and torque bolts to 47 N·m (35 ft. lbs.).

(12) Install starter motor electrical connectors.

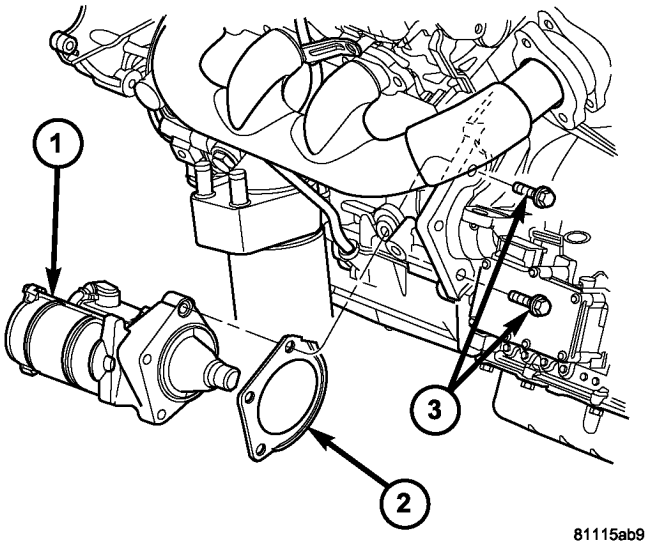


Fig. 191 Starter Motor and Shim

1 - STARTER MOTOR
2 - SHIM
3 - BOLTS

(13) Install engine front mount/bracket assembly and torque to 67 N·m (50 ft. lbs.) (Fig. 192).

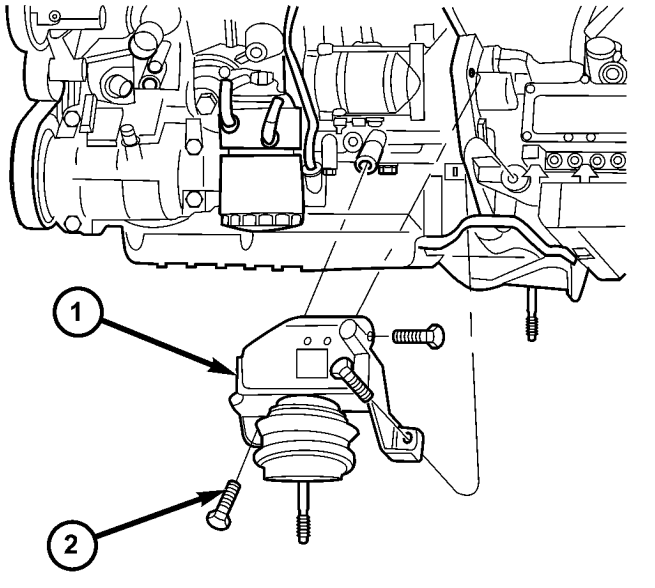


Fig. 192 Engine Front Mount/Bracket

1 - MOUNT/BRACKET ASSY.
2 - BOLTS

41AE/TE AUTOMATIC TRANSAXLE (Continued)

(14) Install cradle and fixture into position under vehicle.

(15) Slowly lower vehicle (Fig. 193). Have helper guide power steering and brake hydraulic lines into position, while aligning cradle to body. While lowering vehicle, align engine front and rear mount studs to their respective thru-holes in cradle.

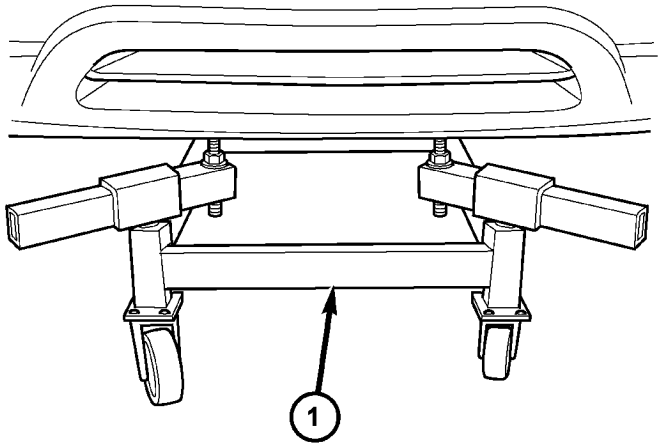


Fig. 193 Driveline Support Table in Position

1 - DRIVELINE SUPPORT TABLE 8874

(16) Aligning index/scribe mark placed upon disassembly, Install four (4) cradle-to-body bolts and torque to 162 N·m (120 ft. lbs.).

(17) Verify that power steering and brake hydraulic lines can be properly routed and installed.

(18) Remove overhead powertrain support fixture from engine compartment:

(a) Remove rear support/lift bracket and connect coolant temperature sensor.

(b) Remove front support/lift bracket. Install and torque engine oil dipstick fastener.

(19) Raise vehicle on hoist and remove driveline support table.

(20) Install and torque engine front and rear mount-to-cradle nuts to 54 N·m (40 ft. lbs.).

(21) Using Tool 6831A, install steering shaft-to-gear coupler (Fig. 194) (Fig. 195)

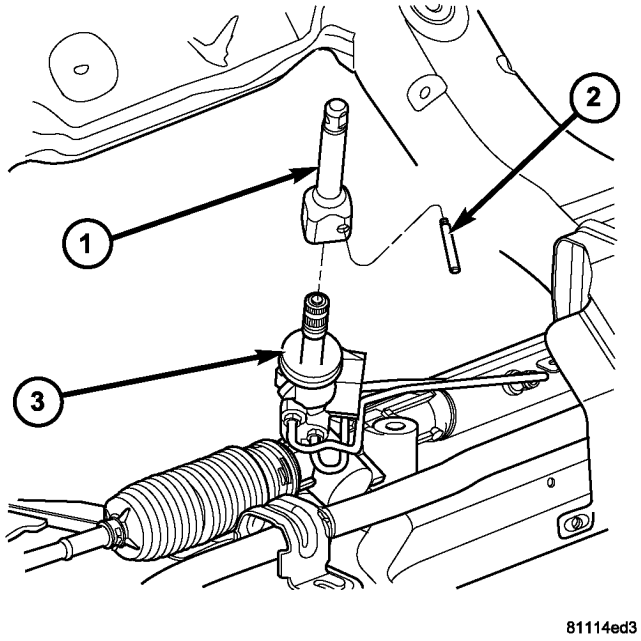


Fig. 194 Intermediate Shaft Extension at Gear

1 - INTERMEDIATE SHAFT EXTENSION
2 - ROLL PIN
3 - STEERING GEAR

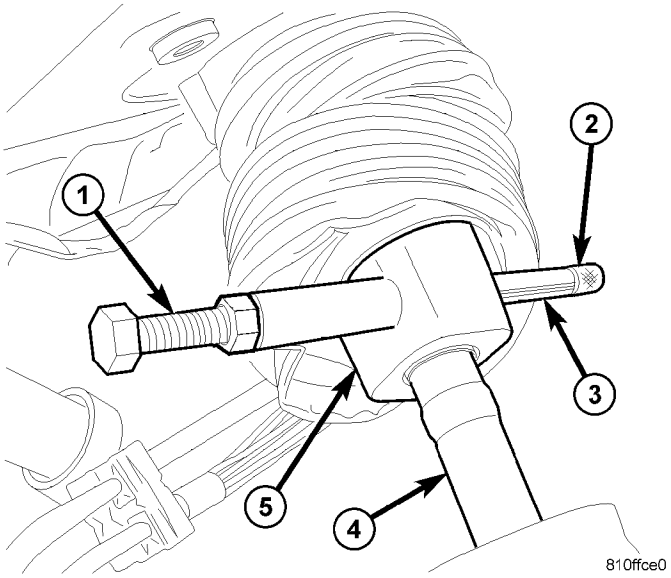


Fig. 195 Roll Pin Installation

1 - INSTALLER 6831A
2 - KNURLED NUT
3 - ROLL PIN
4 - STEERING GEAR SHAFT
5 - INTERMEDIATE SHAFT EXTENSION

41AE/TE AUTOMATIC TRANSAXLE (Continued)

(22) Connect power steering hoses to steering gear (Fig. 196). Torque fittings to 31 N·m (23 ft. lbs.).

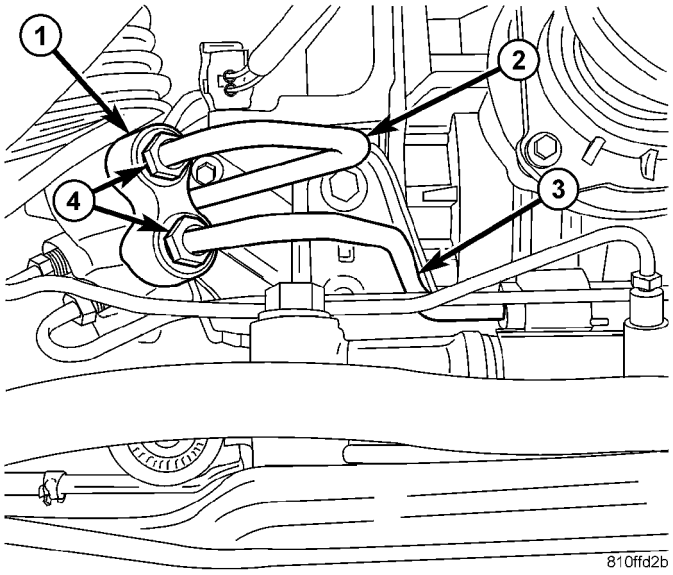


Fig. 196 Hoses at Steering Gear

1 - STEERING GEAR
2 - PRESSURE HOSE
3 - RETURN HOSE
4 - FITTINGS

(23) Install power steering cooler and fasten to cradle (Fig. 197).

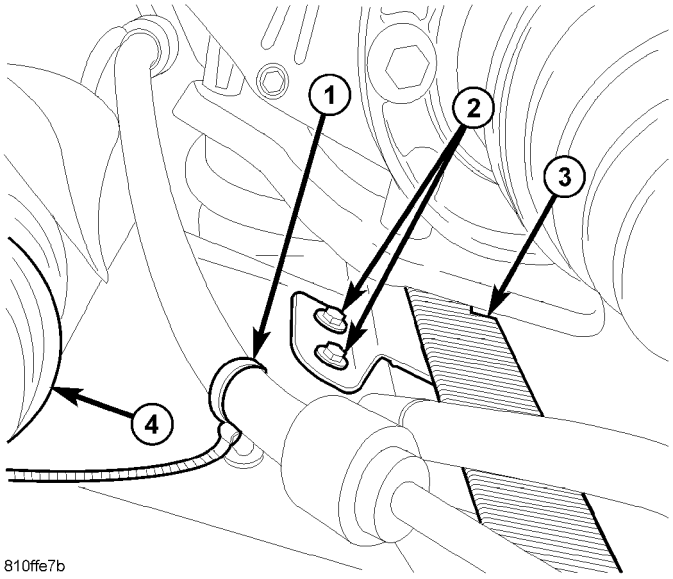


Fig. 197 Cooler Mounting Screws

1 - RETURN HOSE
2 - COOLER BOLTS
3 - POWER STEERING COOLER
4 - STEERING GEAR

(24) Fasten steering hose routing clip to cradle (Fig. 198).

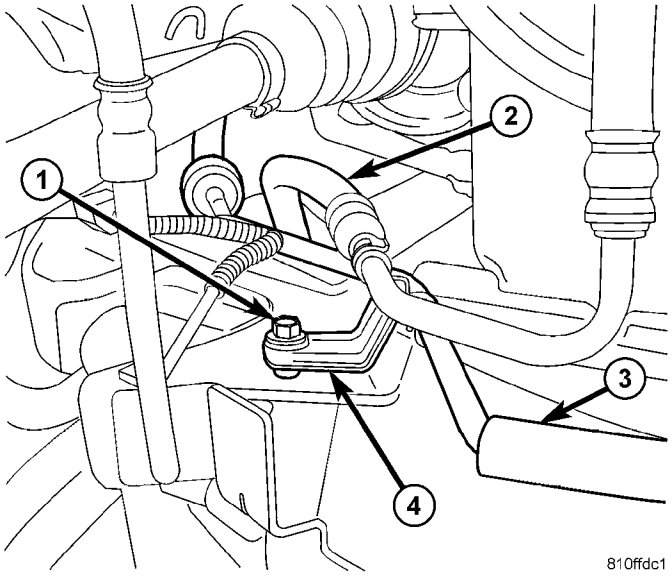


Fig. 198 Hose Routing Clip at Cradle

1 - BOLT
2 - PRESSURE HOSE
3 - RETURN HOSE
4 - CLIP

(25) Install torque strut and torque two (2) bolts to 54 N·m (40 ft. lbs.).

(26) Install halfshaft assemblies. Refer to Group 3, Differential and Driveline.

(27) Install sway bar links to strut attaching points (Fig. 199). Torque link-to-strut nuts to 88 N·m (65 ft. lbs.).

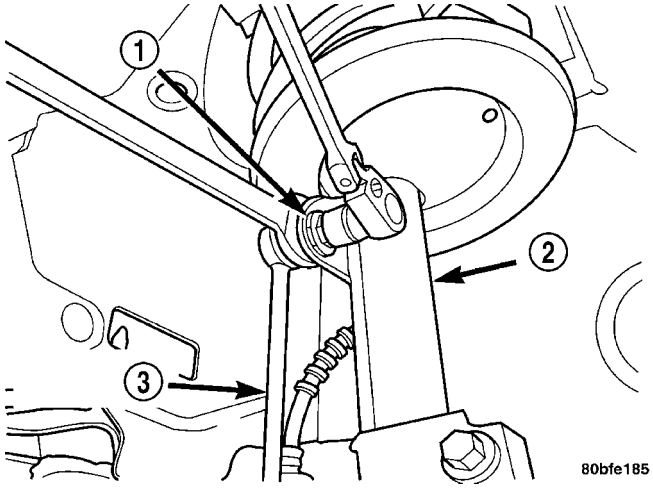


Fig. 199 Stabilizer Bar Link To Strut

1 - NUT
2 - STRUT
3 - STABILIZER BAR LINK

(28) Install ABS sensor brackets to struts (Fig. 200).

41AE/TE AUTOMATIC TRANSAXLE (Continued)

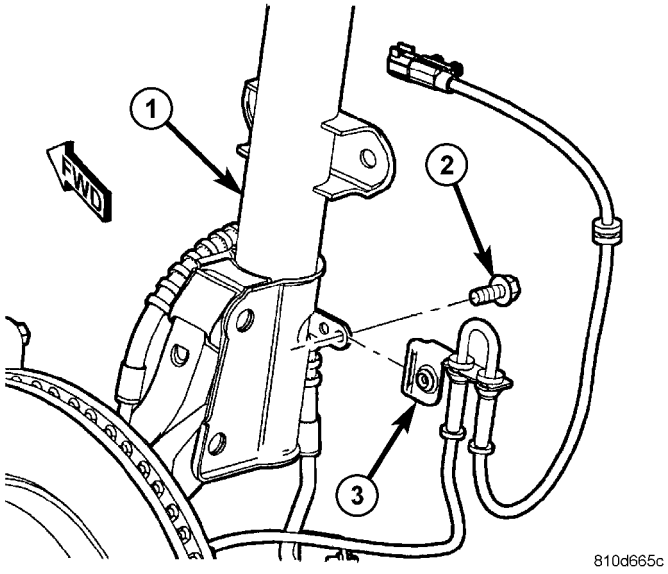


Fig. 200 Wheel Speed Sensor Mounting To Strut

1 - STRUT ASSEMBLY
2 - SCREW
3 - WHEEL SPEED SENSOR ROUTING BRACKET

(29) Connect ABS sensors (Fig. 201).

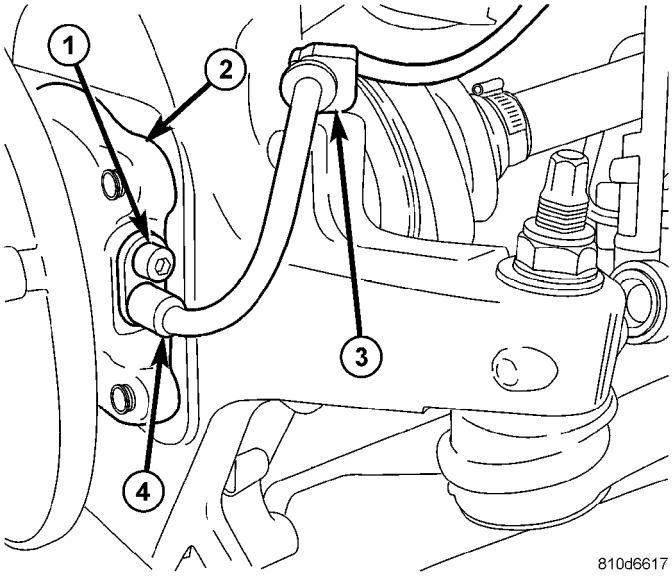


Fig. 201 Sensor Mounting To Front Hub And Bearing

1 - MOUNTING SCREW
2 - HUB AND BEARING
3 - ROUTING CLIP
4 - FRONT WHEEL SPEED SENSOR

(30) Install both front tire/wheel assemblies.

(31) Connect front brake lines to hydraulic control unit (Fig. 202).

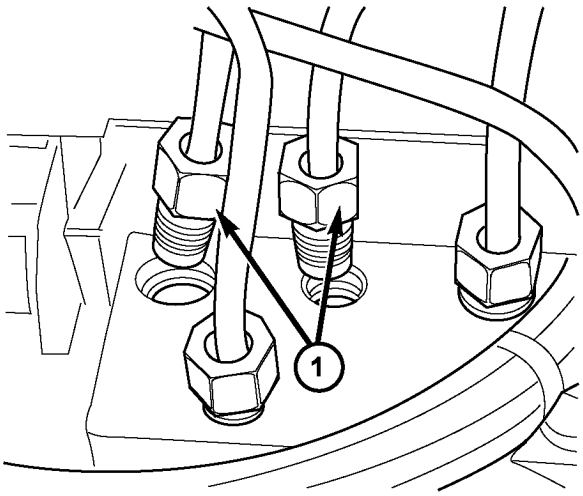


Fig. 202 Brake Lines at Hydraulic Control Unit

1 - FRONT BRAKE LINES

(32) Install coolant bypass tube fasteners.

(33) Connect solenoid/pressure switch connector (Fig. 203). Torque screw to 4 N·m (35 in. lbs.).

(34) Connect transaxle range sensor connector (Fig. 203).

(35) Connect input speed sensor connector (Fig. 203).

(36) Connect output speed sensor connector (Fig. 203).

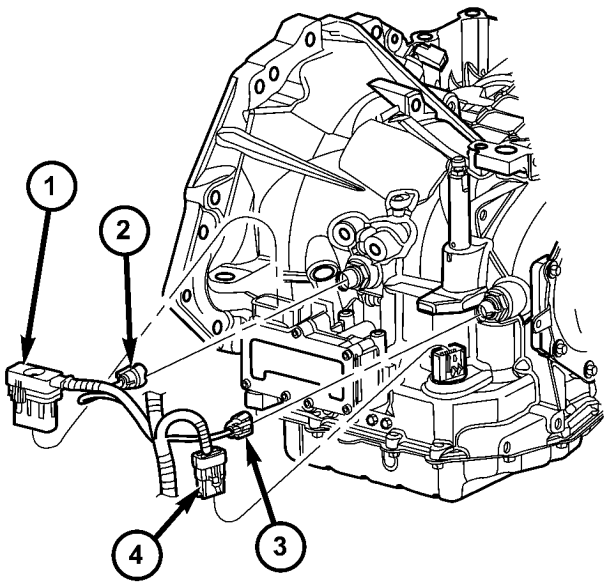


Fig. 203 Transmission Connectors

1 - SOLENOID PACK CONNECTOR
2 - INPUT SPEED SENSOR CONNECTOR
3 - OUTPUT SPEED SENSOR CONNECTOR
4 - TRANSMISSION RANGE SENSOR CONNECTOR

(37) Secure transaxle harness with respective retainers (Fig. 204).

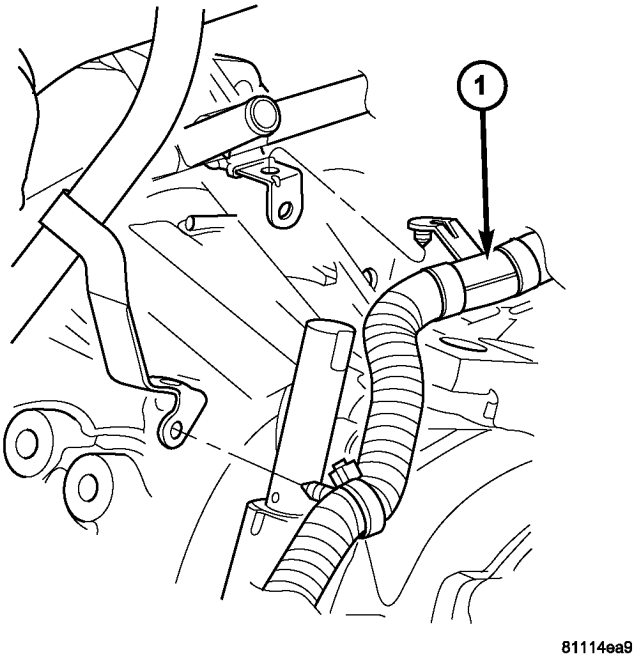


Fig. 204 Transmission Harness/Retainers

1 - TRANSMISSION HARNESS

(38) Install and connect crankshaft position sensor (Fig. 205).

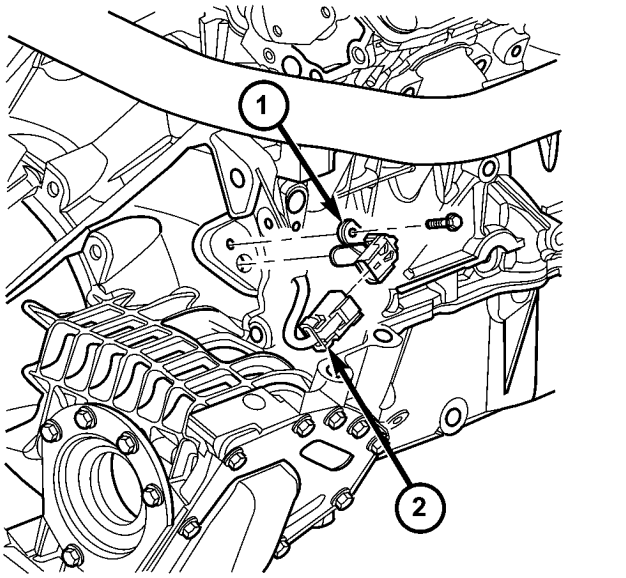


Fig. 205 Crankshaft Position Sensor

1 - CRANK POSITION SENSOR
2 - CONNECTOR

(39) Install ground cable to case and torque bolt.

(40) Connect oil cooler lines to transaxle. An audible 'click' should be heard. Verify connection by pulling outward. (Refer to 7 - COOLING/ TRANSMISSION - STANDARD PROCEDURE)

(41) Connect gearshift cable to transaxle manual valve lever. Verify adjustment.

(42) Install battery tray (Fig. 206). Connect battery temperature sensor.

41AE/TE AUTOMATIC TRANSAXLE (Continued)

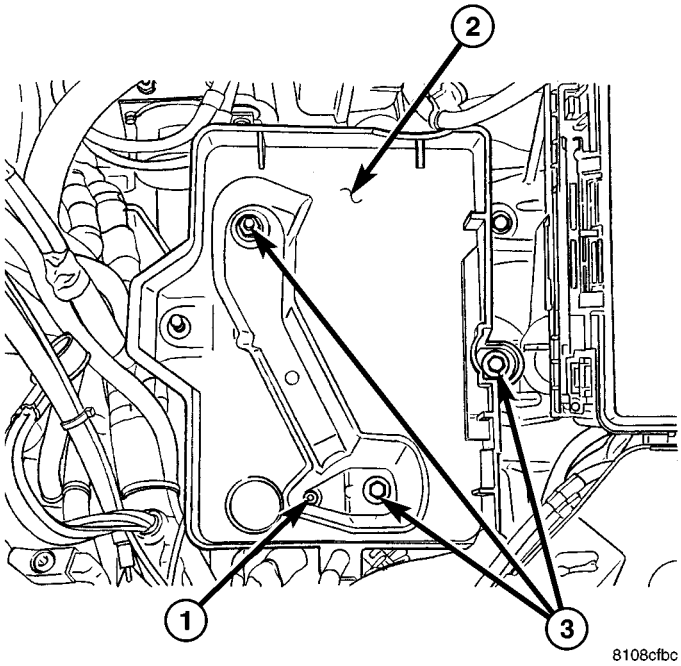


Fig. 206 Battery Tray

1 - DRAIN HOLE/HOSE ATTACHMENT
2 - BATTERY TRAY
3 - BOLTS

(43) Install battery (Fig. 207).

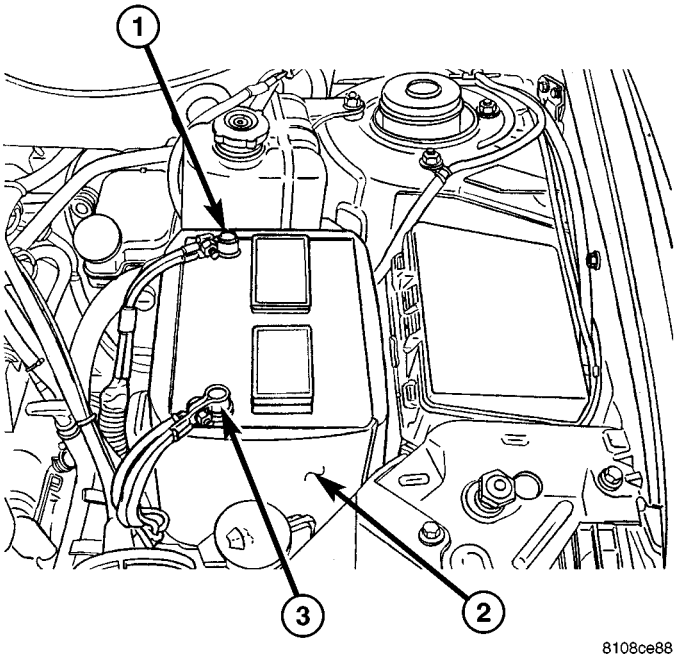


Fig. 207 Battery

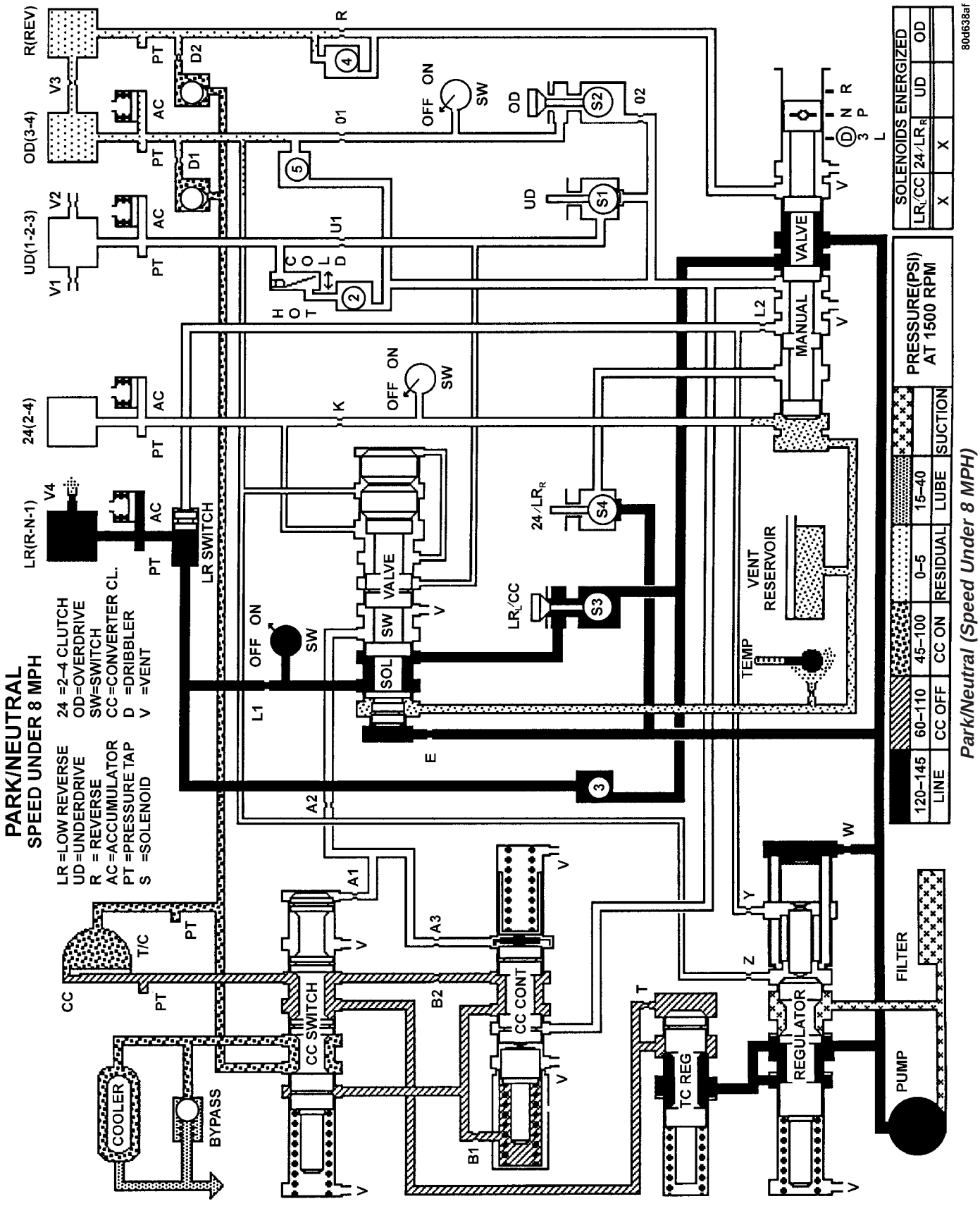
1 - BATTERY POSITIVE CABLE
2 - THERMO-WRAP
3 - BATTERY NEGATIVE CABLE

(44) Install battery hold-down clamp.
(45) Connect battery cables.
(46) Bleed brake hydraulic system. Refer to (Refer to 5 - BRAKES - STANDARD PROCEDURE).
(47) Add power steering fluid as required.
(48) Check and adjust transaxle fluid level. Refer to (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/FLUID - STANDARD PROCEDURE)
(49) AWD models: Check and adjust PTU fluid level. Refer to procedure in this group.
(50) Align front end. Refer to (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

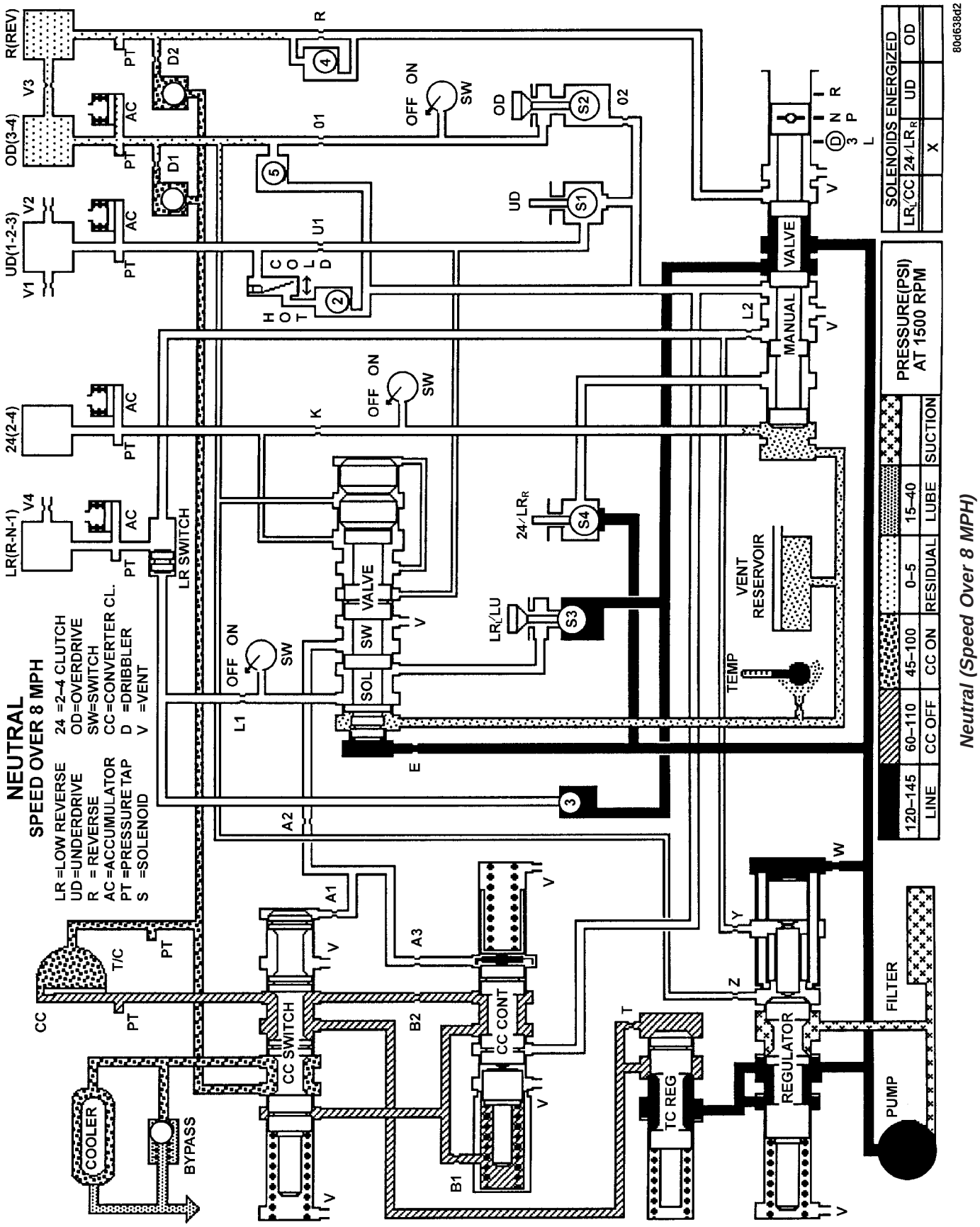
SCHEMATICS AND DIAGRAMS

4XTE TRANSAXLE HYDRAULIC SCHEMATICS

41AE/TE AUTOMATIC TRANSAXLE (Continued)

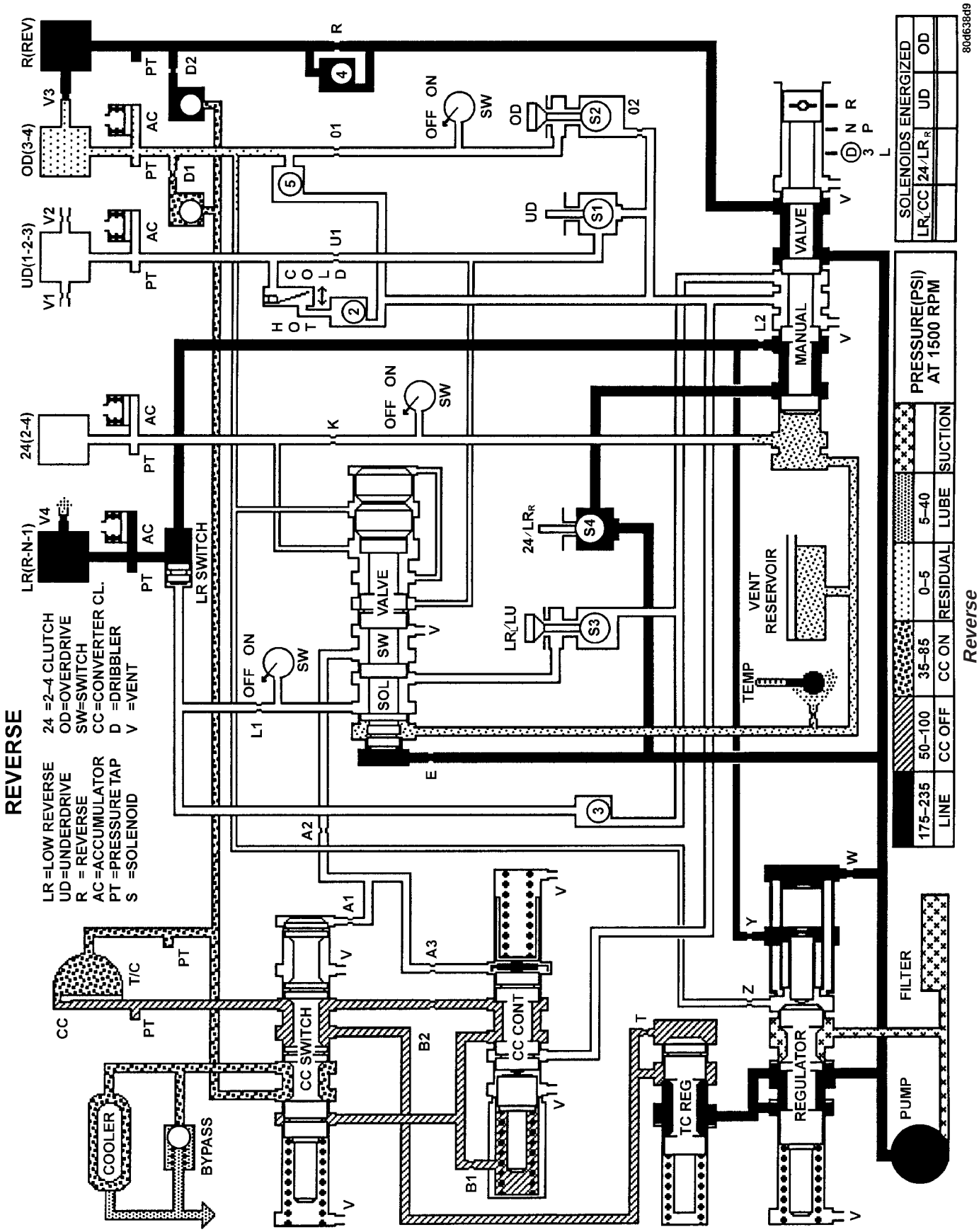


41AE/TE AUTOMATIC TRANSAXLE (Continued)

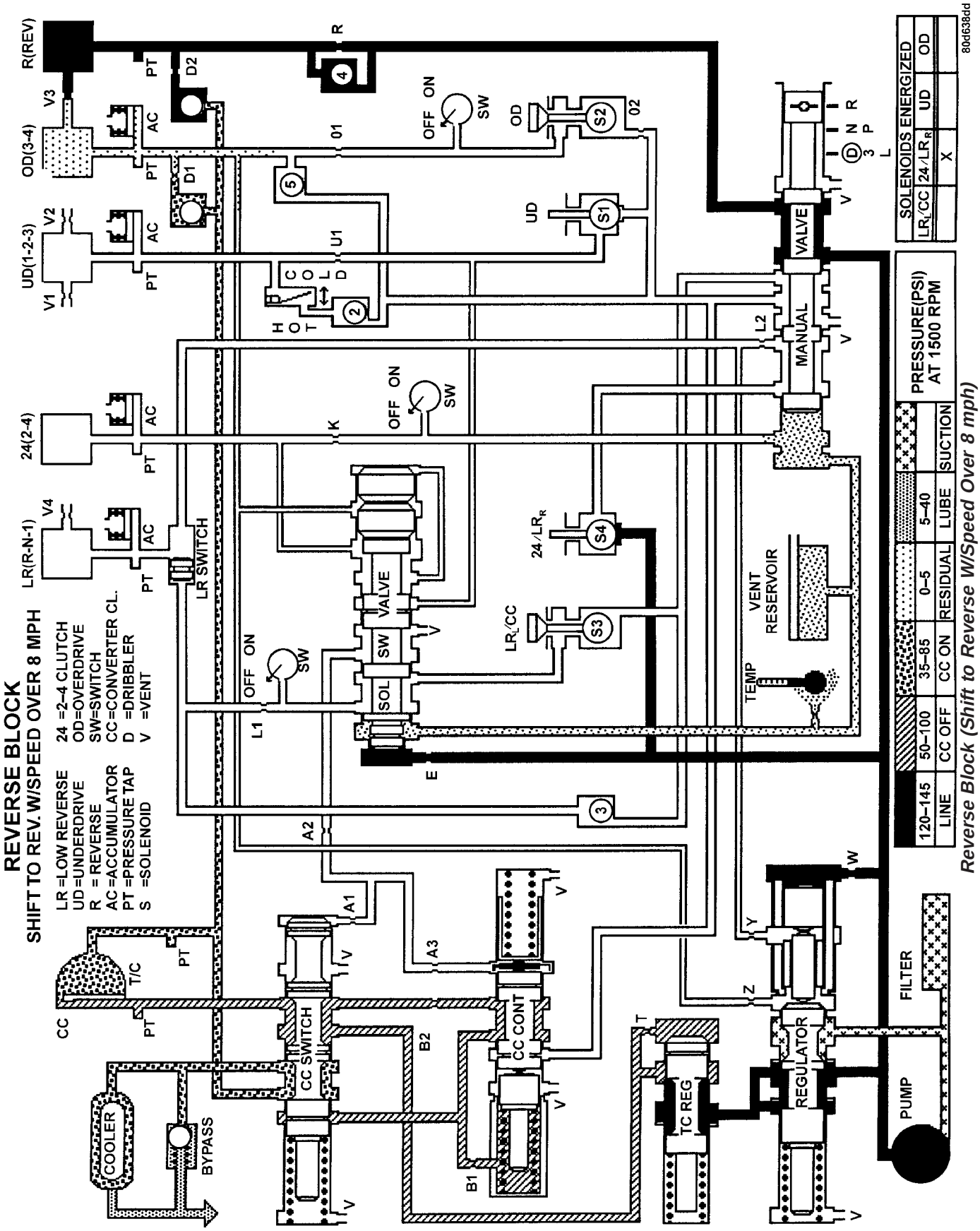


Neutral (Speed Over 8 MPH)

41AE/TE AUTOMATIC TRANSAXLE (Continued)

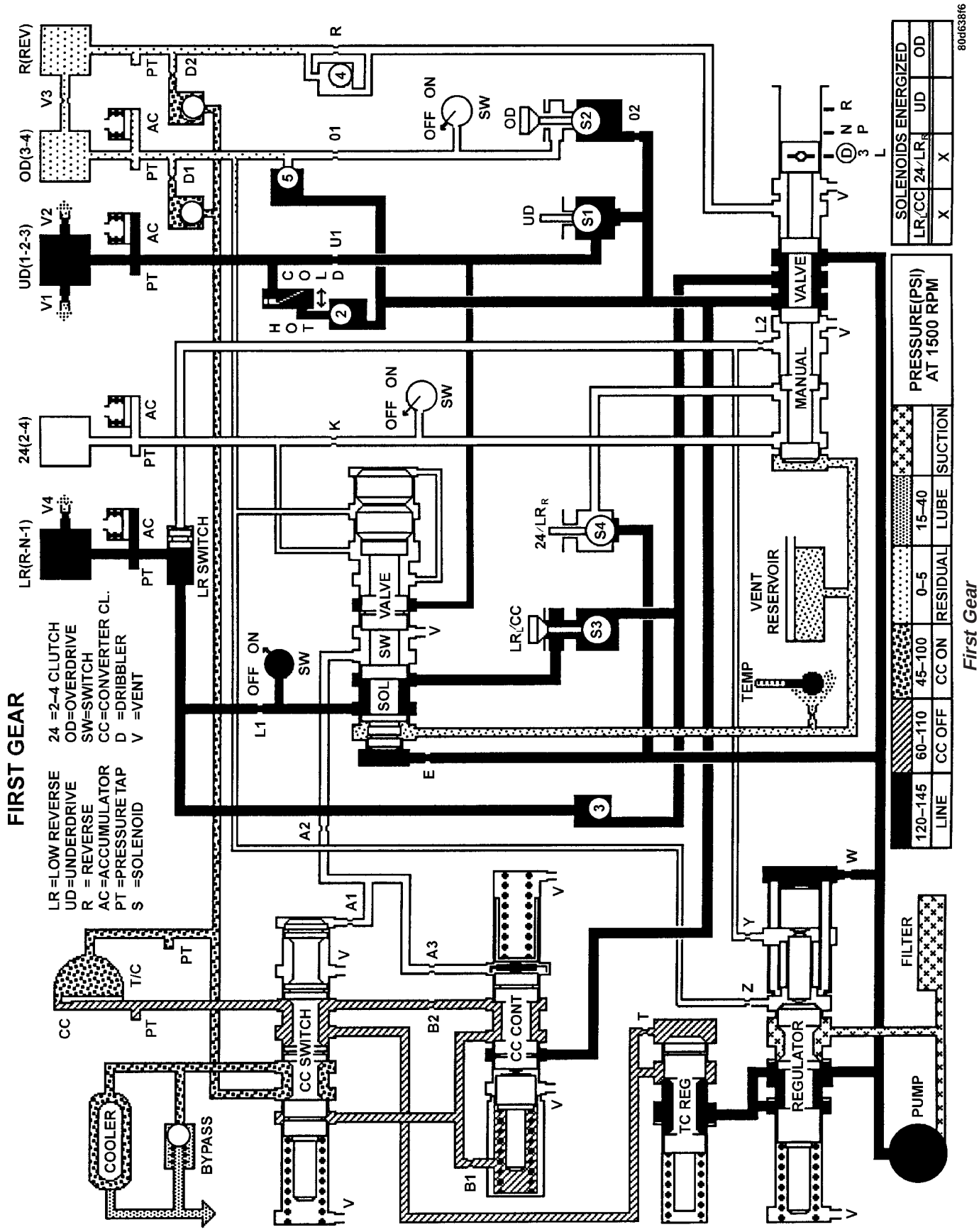


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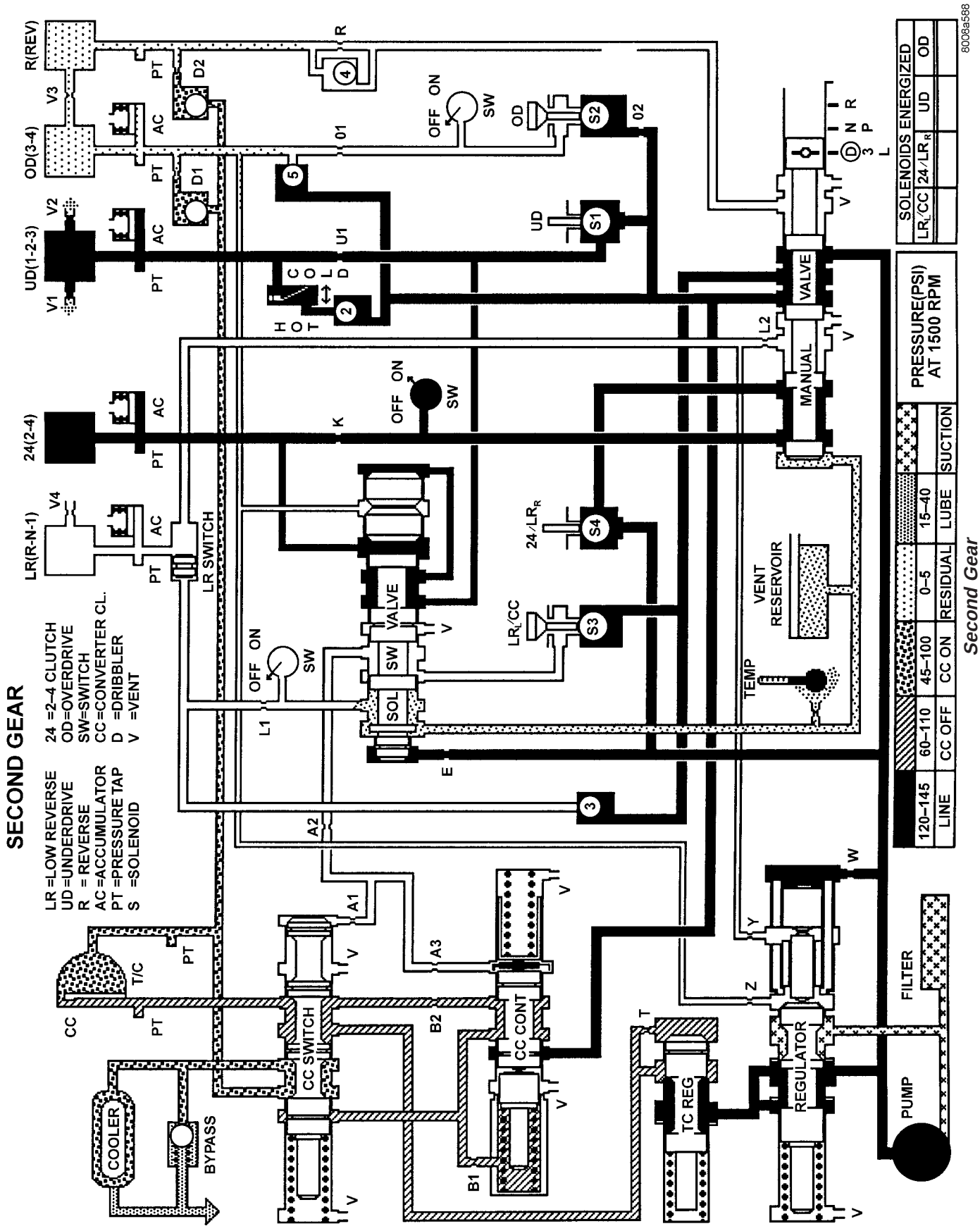


Reverse Block (Shift to Reverse W/Speed Over 8 mph)

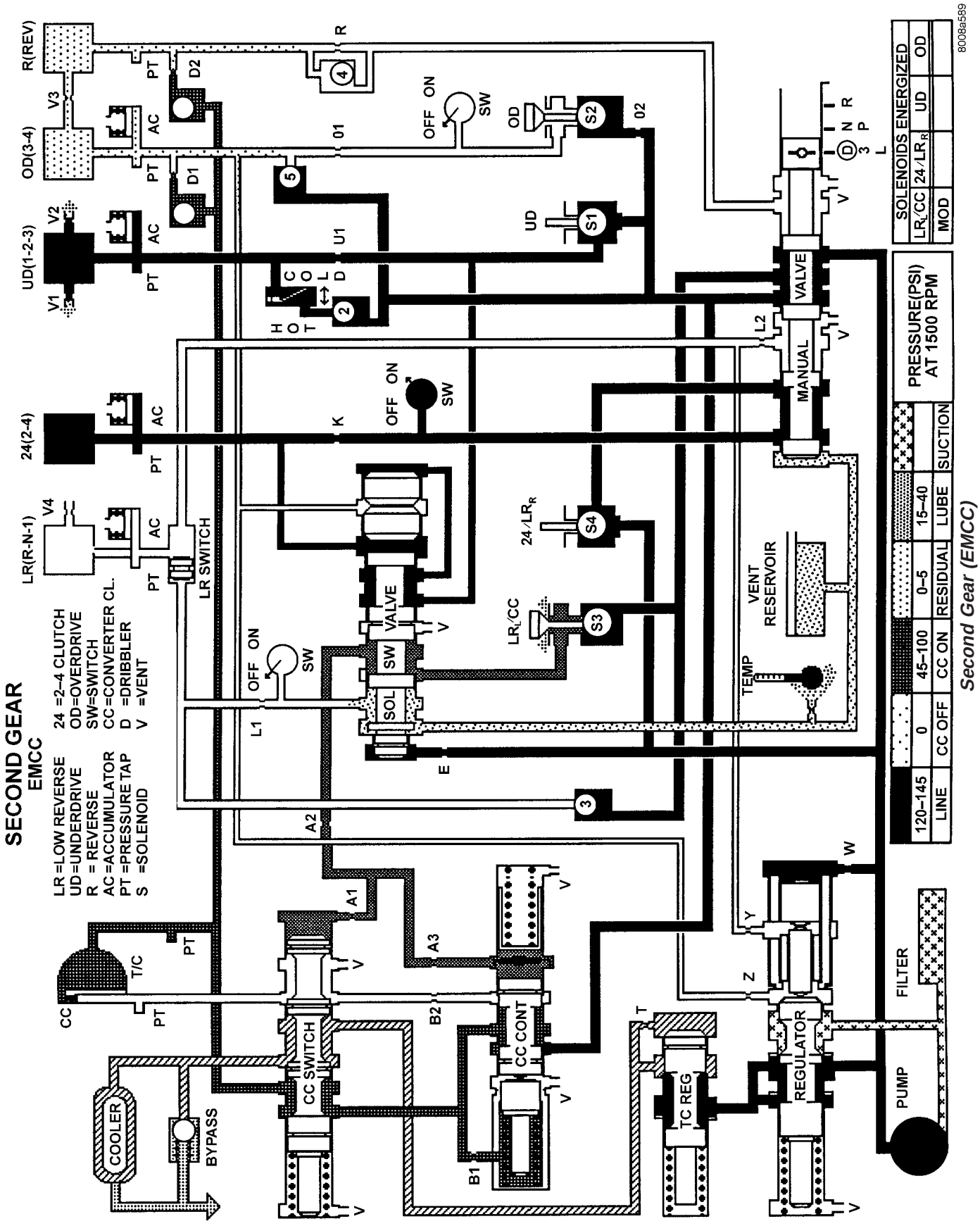
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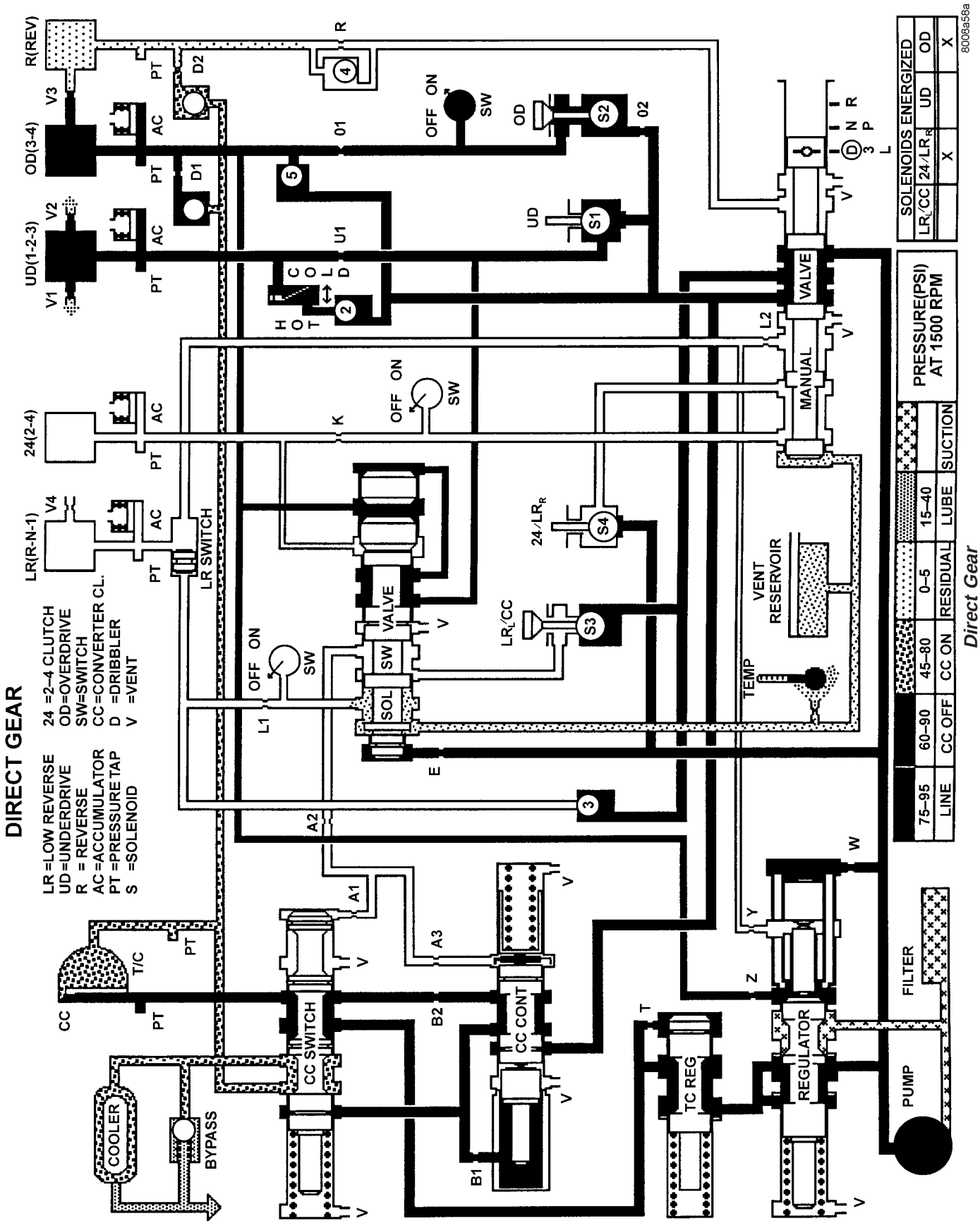
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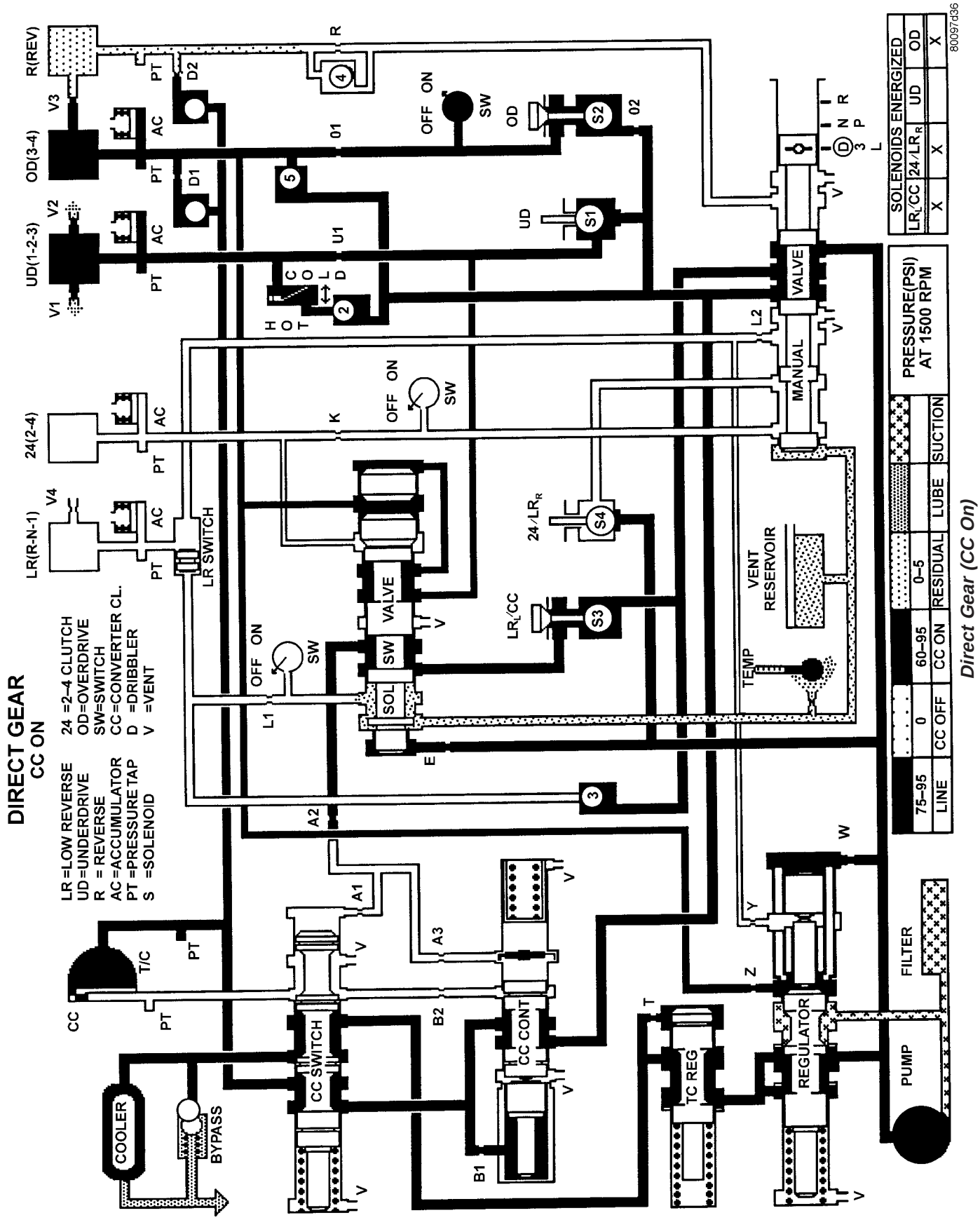
41AE/TE AUTOMATIC TRANSAXLE (Continued)



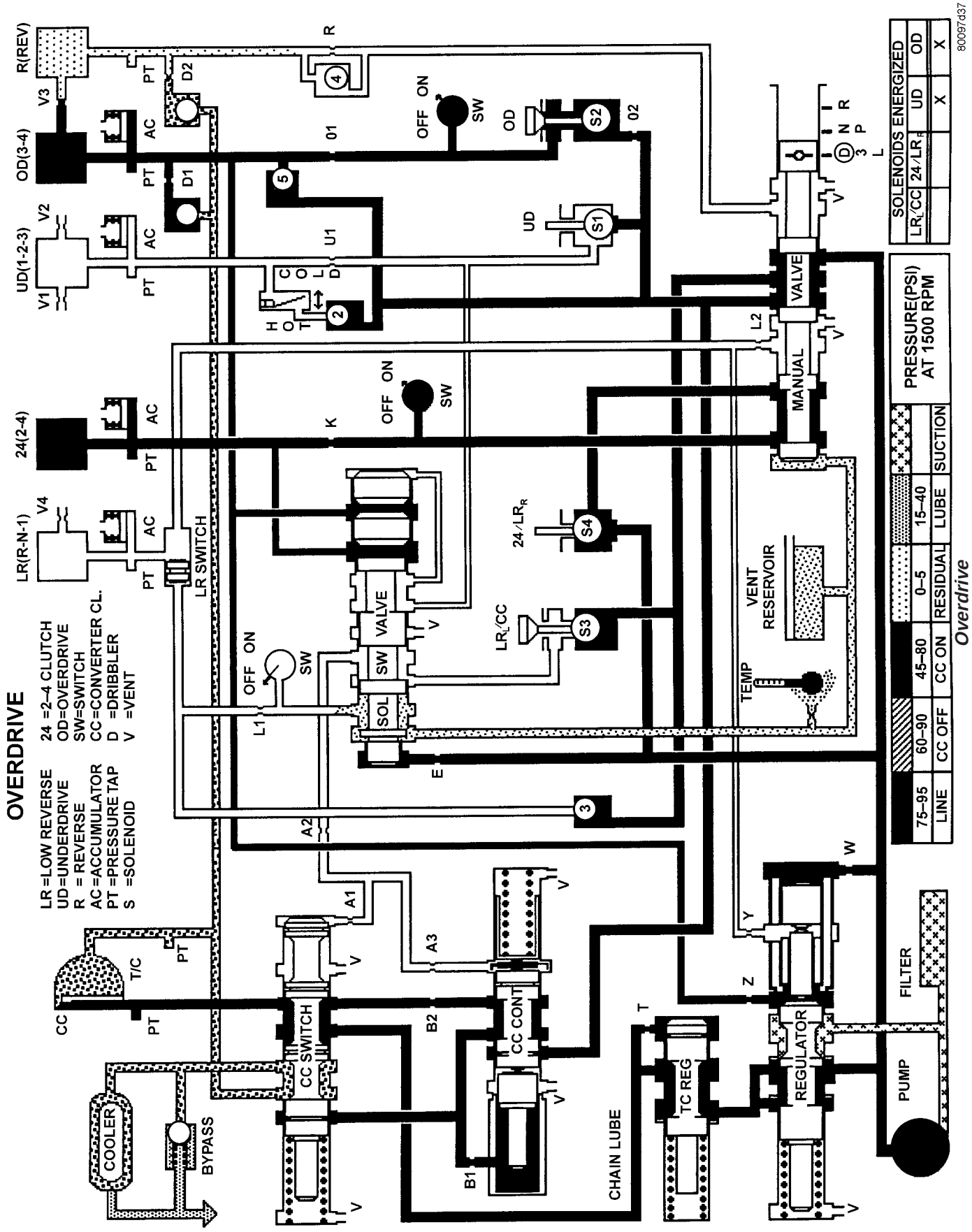
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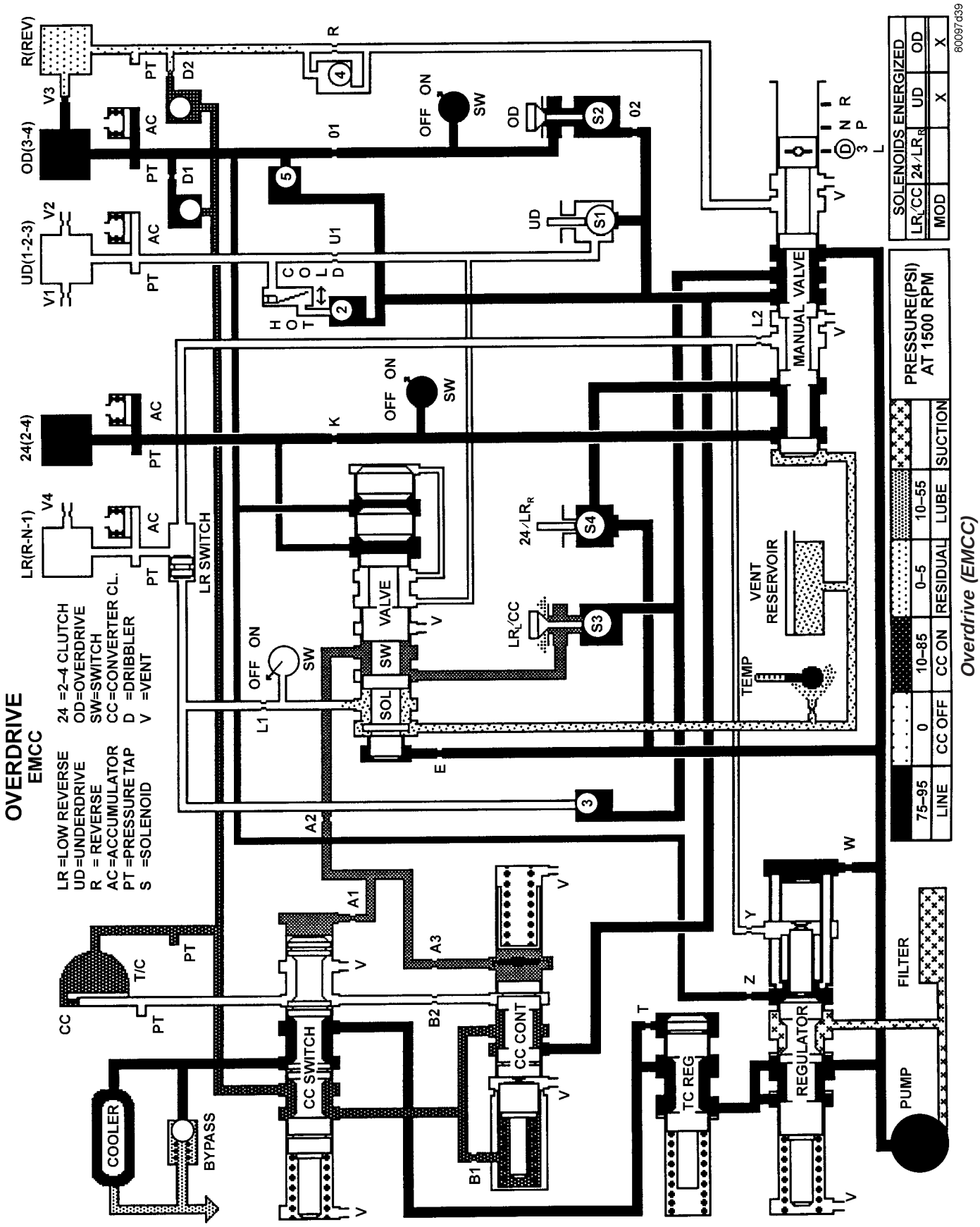
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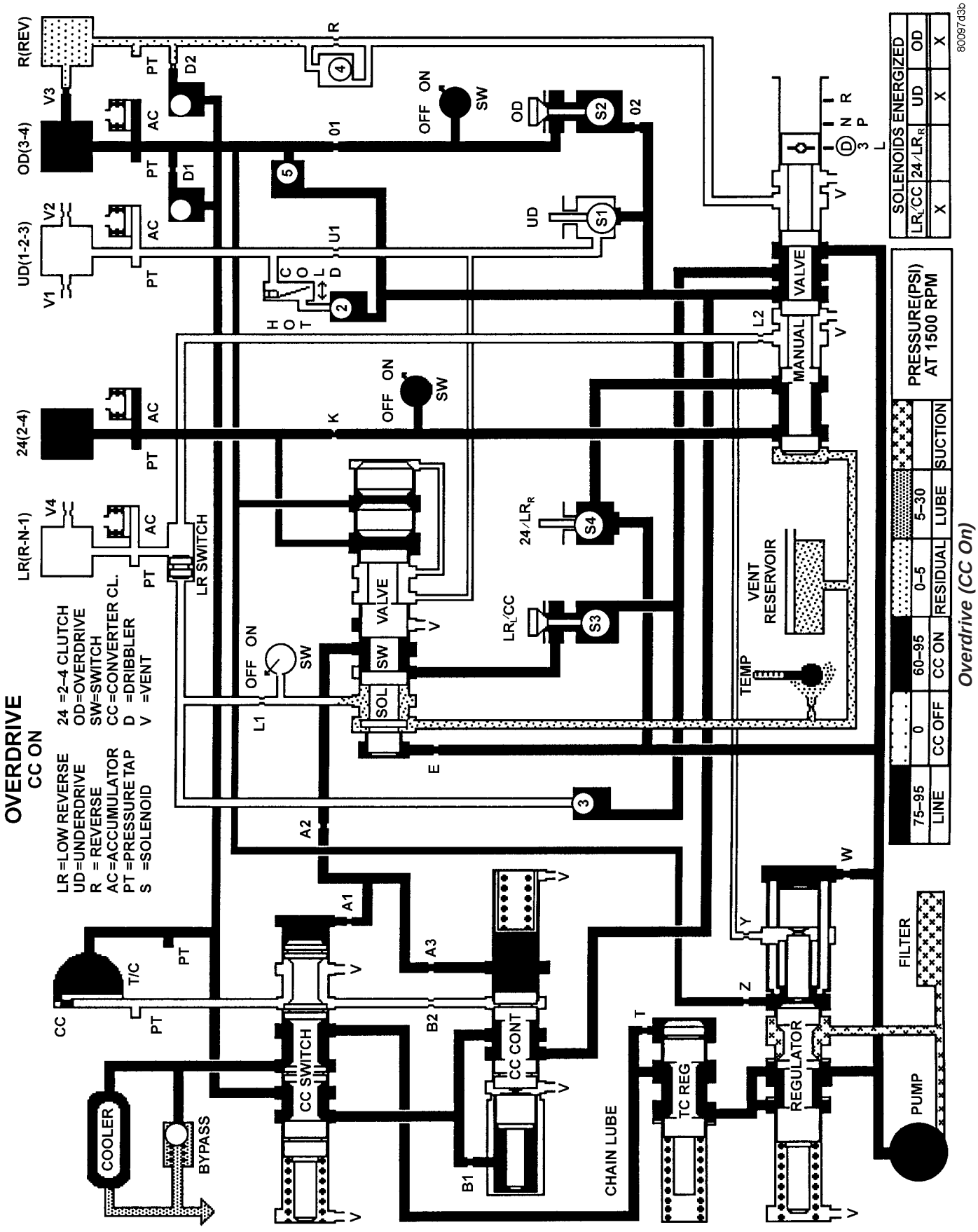
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41AE/TE AUTOMATIC TRANSAXLE (Continued)



41AE/TE AUTOMATIC TRANSAXLE (Continued)



41AE/TE AUTOMATIC TRANSAXLE (Continued)

SPECIFICATIONS - 41TE TRANSAXLE

GENERAL SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Transaxle Type	Fully adaptive, electronically controlled, four speed automatic with torque converter and integral differential
Cooling Method	Air-to-oil heat exchanger
Lubrication	Pump (internal-external gear-type

GEAR RATIOS

DESCRIPTION	SPECIFICATION
First Gear	2.84
Second Gear	1.57
Direct Gear	1.00
Overdrive Gear	0.69
Reverse Gear	2.21

BEARING SETTINGS (END PLAY & TURNING TORQUE)

DESCRIPTION	METRIC	STANDARD
Differential Assembly	0.6-2 N·m	5-18 in. lbs.
Output Hub	0.3-2 N·m	3-8 in. lbs.
Transfer Shaft (End Play)	0.051-0.102 mm	0.002-0.004 in.
Overall Drag At Output Hub	0.3-1.9 N·m	3-16 in. lbs.

CLUTCH CLEARANCES

DESCRIPTION	METRIC	STANDARD
Low/Rev Clutch (Select Reaction Plate)	0.89-1.47 mm	0.035-0.058 in.
Two/Four Clutch (No Selection)	0.76-2.64 mm	0.030-0.104 in.
Reverse Clutch (Select Snap Ring)	0.89-1.37 mm	0.035-0.054 in.
Overdrive Clutch (No Selection)	1.07-3.25 mm	0.042-0.128 in.
Underdrive Clutch (Select Pressure Plate)	0.94-1.50 mm	0.037-0.059 in.

OIL PUMP CLEARANCES

DESCRIPTION	METRIC	STANDARD
Outer Gear-to-Crescent	0.060-0.298 mm	0.0023-0.0117 in.
Inner Gear-to-Crescent	0.093-0.385 mm	0.0036-0.0151 in.
Outer Gear-to-Pocket	0.089-0.202 mm	0.0035-0.0079 in.
Outer Gear Side Clearance	0.020-0.046 mm	0.0008-0.0018 in.
Inner Gear Side Clearance	0.020-0.046 mm	0.0008-0.0018 in.

41AE/TE AUTOMATIC TRANSAXLE (Continued)

INPUT SHAFT

DESCRIPTION	METRIC	SPECIFICATION
End Play	0.127-0.635mm	0.005-0.025 in.

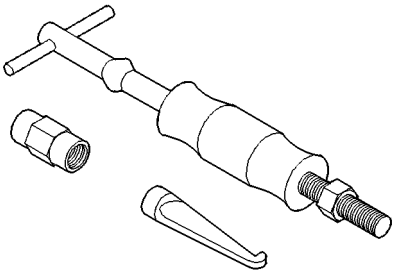
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, Differential Cover-to-Case	19	—	165
Bolt, Differential Ring Gear-to-Case	95	70	—
Bolt, Differential Bearing Retainer-to-Case	28	21	—
Bolt, Driveplate-to-Crankshaft	95	70	—
Bolt, Extension Housing/ Plate-to-Case	28	21	—
Bolt, Oil Pan-to-Case	19	—	165
Bolt, Output Gear	271	200	—
Bolt, Output Gear Stirrup/Strap	23	17	—
Bolt, Oil Pump-to-Case	27	20	—
Bolt, Reaction Support-to-Case	27	20	—
Bolt, Solenoid/Pressure Switch Assy.-to-Case	12	—	110
Bolt, Torque Converter-to-Driveplate	88	65	—
Bolt, Transfer Gear Cover	20	—	175
Bolt, Valve Body-to-Case	12	—	105
Fitting, Oil Cooler Line	12	—	105
Nut, Tranfer Gear	271	200	—
Tap, Transaxle Pressure	5	—	45
Screw, L/R Clutch Retainer	5	—	45
Screw, Solenoid/Pressure Switch Assy. Connector	4	—	35
Screw, Valve Body-to-Transfer Plate	5	—	45
Sensor, Input Speed	27	20	—
Sensor, Output Speed	27	20	—
Sensor, Transmission Range Sensor	5	—	45

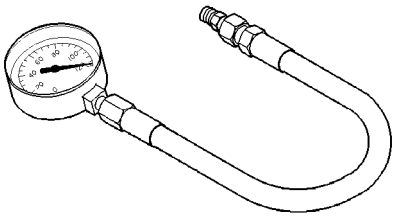
41AE/TE AUTOMATIC TRANSAXLE (Continued)

SPECIAL TOOLS

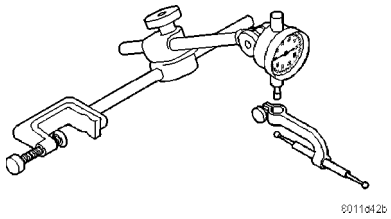
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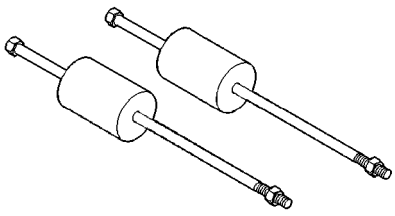
Puller C-637



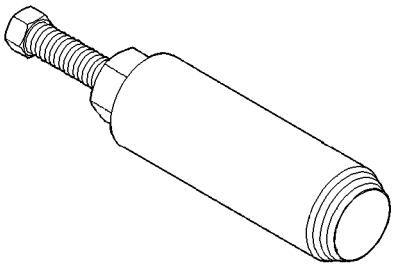
Pressure Gauge (High) C-3293SP



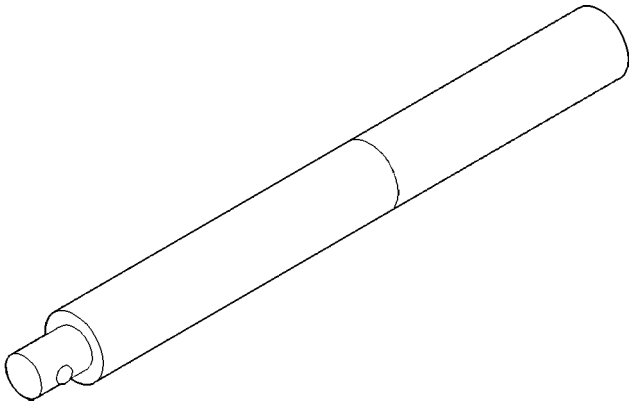
Dial Indicator C-3339



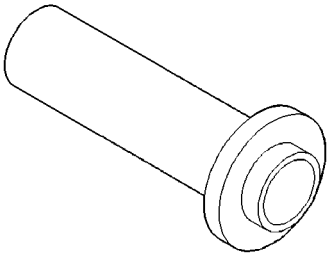
Oil Pump Puller C-3752



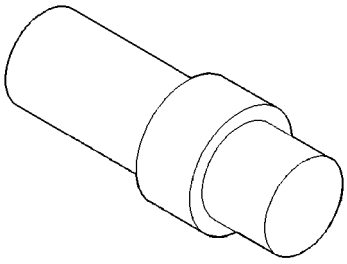
Seal Puller C-3981B



Universal Handle C-4171

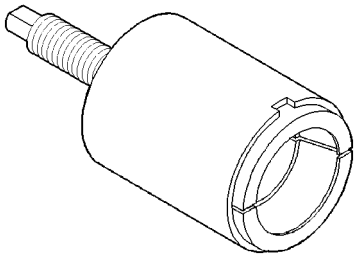


Seal Installer C-4193A

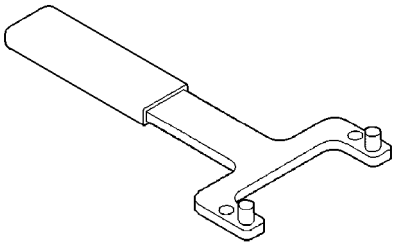


Adapter C-4996

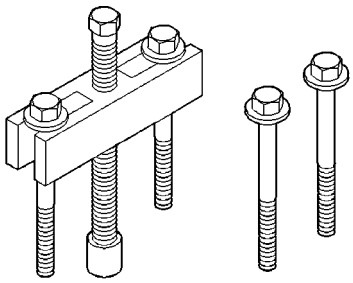
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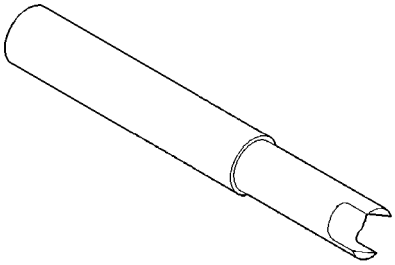
Remover Kit L-4406



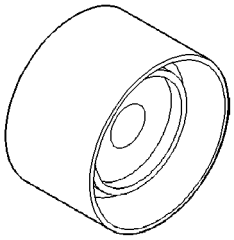
Bearing Puller L-4435



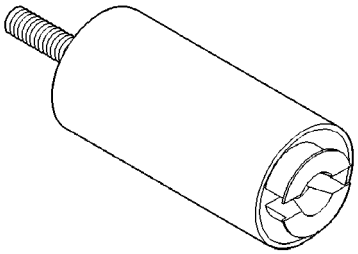
Gear Puller L-4407A



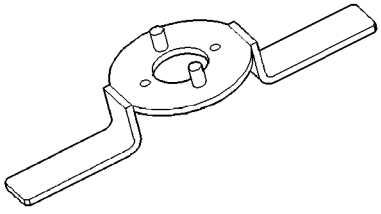
Differential Tool L-4436A



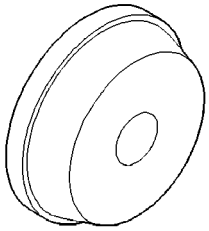
Bearing Installer L-4410



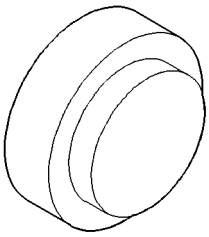
Special Jaw Set L-4518



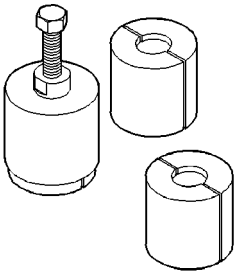
Gear Checking Plate L-4432



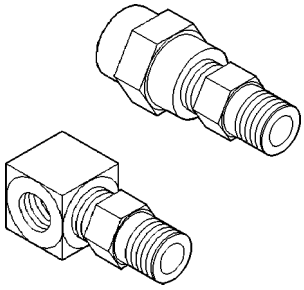
Installer L-4520



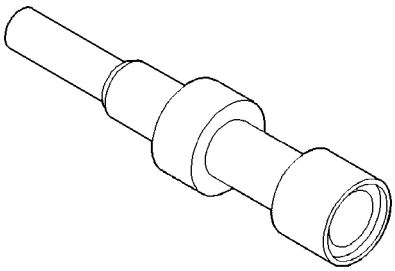
Thrust Button L-4539-2



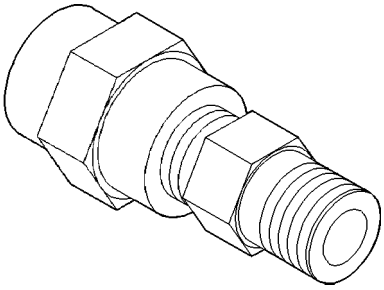
Puller Set 5048



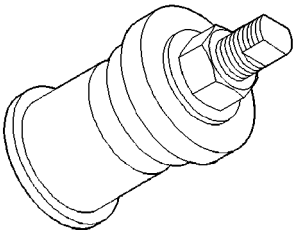
Adapter L-4559



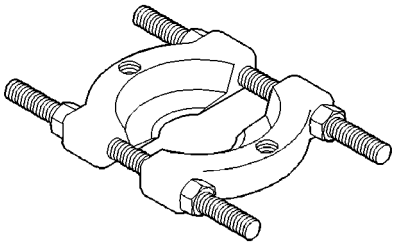
Remover/Installer 5049-A



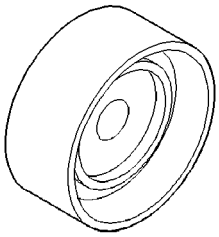
Adapter L-4559-2



Installer 5050A

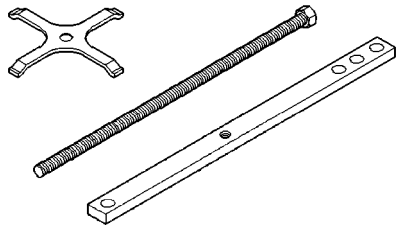


Bearing Splitter P-334

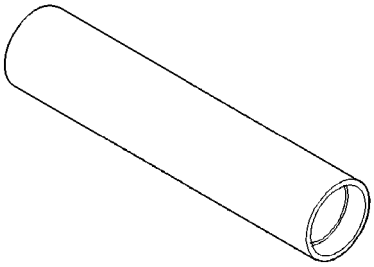


Installer 5052

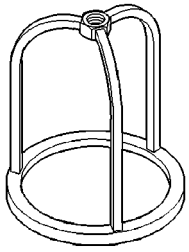
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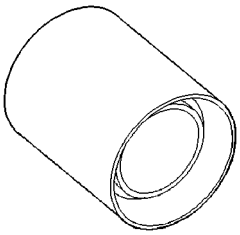
Compressor 5058A



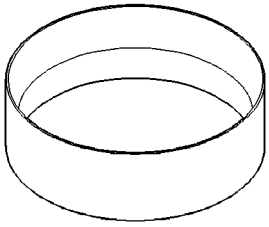
Installer 6052



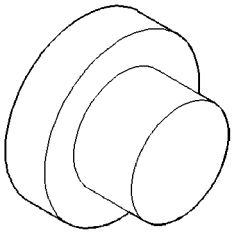
Compressor 5059-A



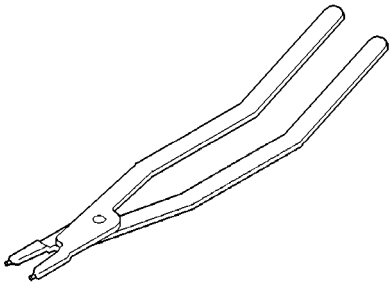
Installer 6053



Installer 5067



Button 6055



Pliers 6051

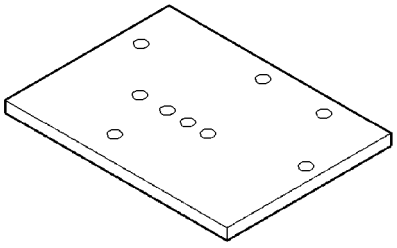
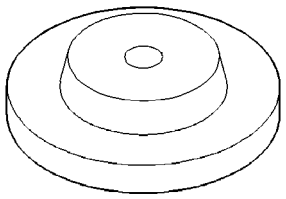
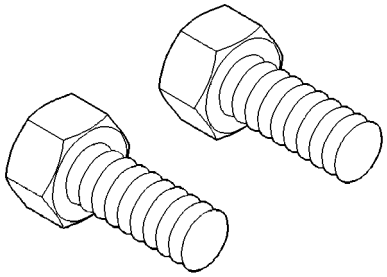


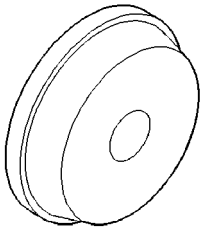
Plate 6056



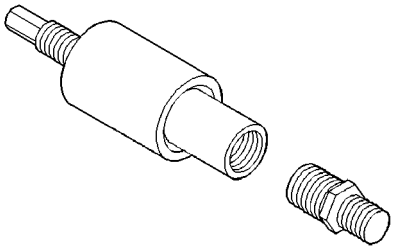
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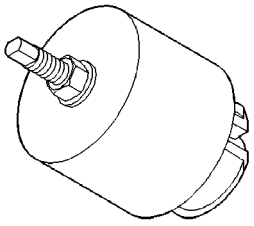
Bolt 6260



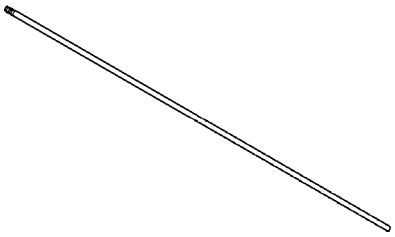
Installer 6061



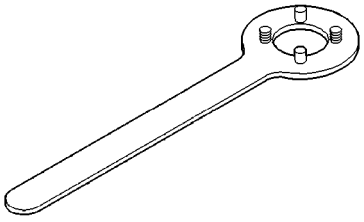
Installer 6261



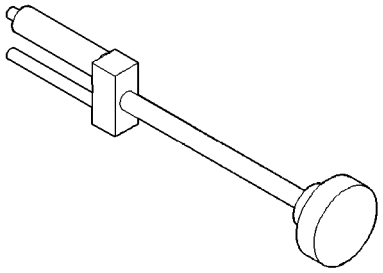
Remover 6062-A



Tip 6268

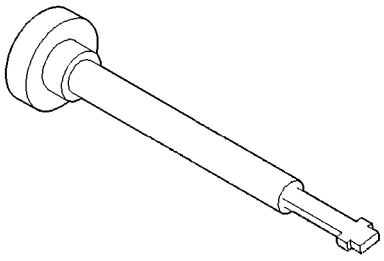


Holder 6259

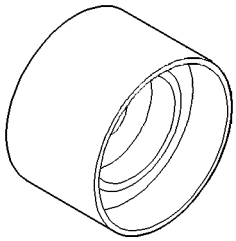


Remover/Installer 6301

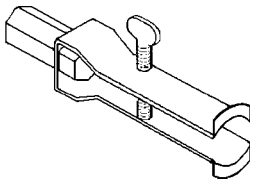
41AE/TE AUTOMATIC TRANSAXLE (Continued)



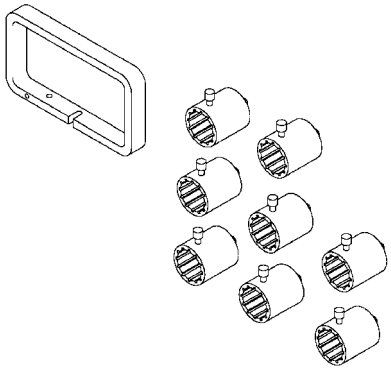
Remover/Installer 6302



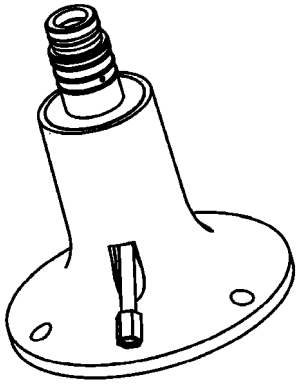
Installer 6536-A



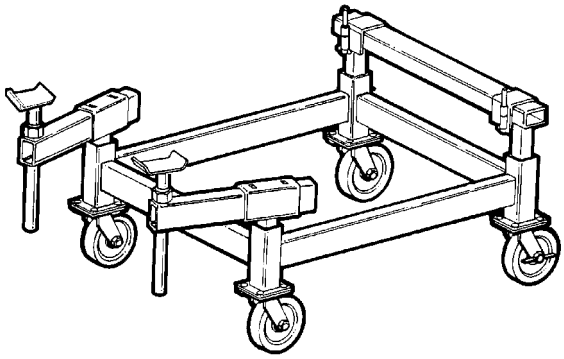
Puller 7794-A



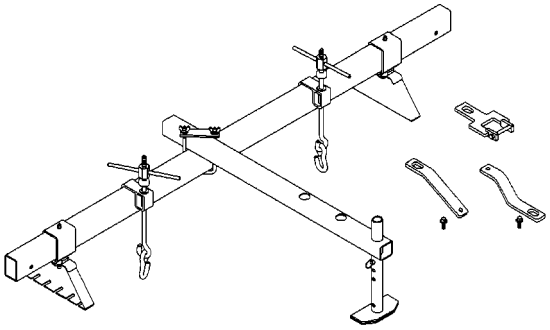
End Play Socket Set 8266



Input Clutch Pressure Fixture 8391



Driveline Support Table 8874



Driveline Support Fixture 8534B

ACCUMULATOR

DESCRIPTION

The 4XTE underdrive, overdrive, low/reverse, and 2/4 clutch hydraulic circuits each contain an accumulator. An accumulator typically consists of a piston, return spring(s), and a cover or plug. The overdrive and underdrive accumulators are located within the transaxle case, and are retained by the valve body (Fig. 208).

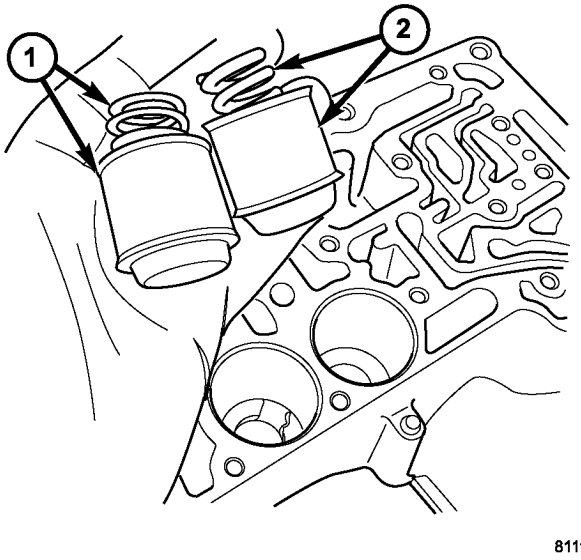


Fig. 208 Underdrive and Overdrive Accumulators

1 - OVERDRIVE PISTON AND SPRING
2 - UNDERDRIVE PISTON AND SPRING

The low reverse accumulator (Fig. 209) is also located within the transaxle case, but the assembly is retained by a cover and a snap-ring.

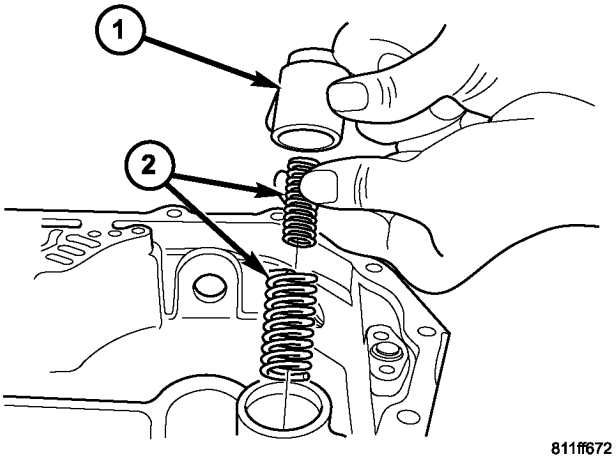


Fig. 209 Low/Reverse Accumulator

1 - PISTON
2 - RETURN SPRINGS

The 2/4 accumulator is located in the valve body. It is retained by a cover and retaining screws (Fig. 210).

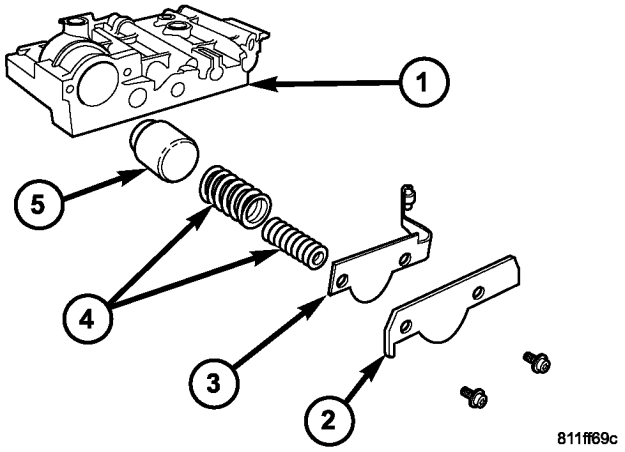


Fig. 210 2/4 Accumulator Assembly

1 - VALVE BODY
2 - RETAINER PLATE
3 - DETENT SPRING
4 - RETURN SPRINGS
5 - PISTON

OPERATION

The function of an accumulator is to cushion the application of a frictional clutch element. When pressurized fluid is applied to a clutch circuit, the application force is dampened by fluid collecting in the respective accumulator chamber against the piston and spring(s). The intended result is a smooth, firm clutch application.

AUTOSTICK SWITCH

DESCRIPTION

Autostick is a driver-interactive transmission feature that offers manual gear shifting capability to provide you with more control. Autostick allows you to maximize engine braking, eliminate undersirable upshifts and downshifts, and improve overall vehicle performance. This sysytem can also provide you with more control during passing, city driving, cold slippery conditions, mountain driving, trailer towing, and many other situations.

OPERATION

Autostick is a driver–interactive transaxle feature that offers manual gear shifting capability. When the shifter is moved into the Autostick position, the transaxle remains in whatever gear it was using before Autostick was activated. Moving the shifter to the left (towards the driver) causes a downshift and moving to the right (towards the passenger) causes

AUTOSTICK SWITCH (Continued)

an upshift. The instrument cluster will illuminate the selected gear. The vehicle can be launched in 1st, 2nd, or 3rd gear while in the Autostick mode. The speed control is operable in 3rd and 4th gear Autostick mode. Speed control will be deactivated if the transaxle is shifted to 2nd gear. Shifting into OD position cancels the Autostick mode, and the transaxle resumes the OD shift schedule.

DEACTIVATION

The autostick feature will be deactivated if one of the following conditions occur:

- DTC P0706–Check Shifter Signal–usually accompanied by all PRNDL lights turning on in Park and Neutral. This will result in a DTC P0706 if three such errors are detected after any one “key–on”.
- DTC P0952–Autostick Input Circuit (Low)
- DTC P1797–Manual Shift Overheat–(Transmission oil temperature >275° F) or (Engine coolant temperature >255° F).

Acceptable powertrain temperature must be achieved to reactivate Autostick after a high temperature fault:

- Transmission Oil Temperature <255° F
- Engine Coolant Temperature <240° F

AUTOMATIC OVERRIDES

For safety, durability, and driveability, some shifts are executed automatically or prevented.

AUTOMATIC SHIFTS WILL OCCUR UNDER THE FOLLOWING CONDITIONS

TYPE OF SHIFT	APPROXIMATE SHIFT POINT
	3.5L
4-3 coast downshift	14 mph
3-2 coast downshift	10 mph
2-1 coast downshift	5 mph
1-2 upshift	6600 engine rpm
2-3 upshift	6600 engine rpm
4-3 kickdown shift	14-52 mph w/sufficient throttle

MANUAL SHIFTS ARE NOT PERMITTED UNDER THE FOLLOWING CONDITIONS

TYPE OF SHIFT	APPROXIMATE SHIFT POINT
3-4 upshift	Below 15 mph
3-2 downshift	Above 81 mph @ closed throttle or 76 mph otherwise
2-1 downshift	Above 45 mph @ closed throttle or 42 mph otherwise

DRIVING CLUTCHES

DESCRIPTION

Three hydraulically applied input clutches are used to drive planetary components. The underdrive, overdrive, and reverse clutches are considered input clutches and are contained within the input clutch assembly (Fig. 211). The input clutch assembly also contains:

- Input shaft
- Input hub
- Clutch retainer
- Underdrive piston
- Overdrive/reverse piston
- Overdrive hub
- Underdrive hub

OPERATION

The three input clutches are responsible for driving different components of the planetary geartrain.

NOTE: Refer to the “Elements In Use” chart in Diagnosis and Testing for a collective view of which clutch elements are applied at each position of the selector lever.

UNDERDRIVE CLUTCH

The underdrive clutch is hydraulically applied in first, second, and third (direct) gears by pressurized fluid against the underdrive piston. When the underdrive clutch is applied, the underdrive hub drives the rear sun gear.

DRIVING CLUTCHES (Continued)

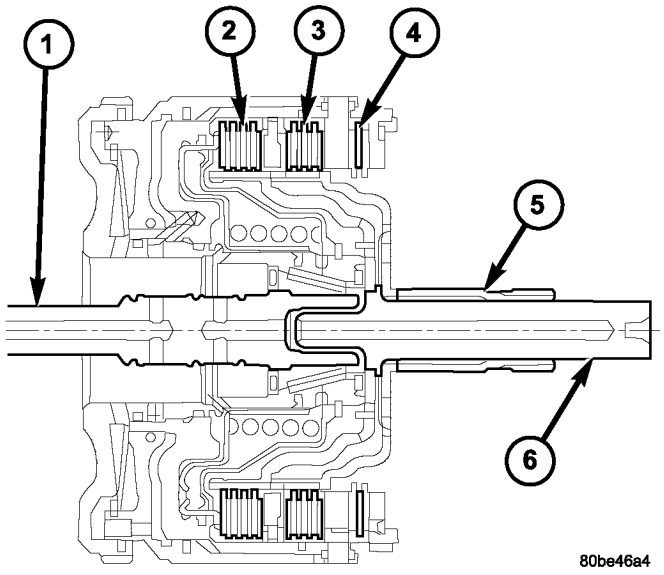


Fig. 211 Input Clutch Assembly

1 - INPUT SHAFT
2 - UNDERDRIVE CLUTCH
3 - OVERDRIVE CLUTCH
4 - REVERSE CLUTCH
5 - OVERDRIVE SHAFT
6 - UNDERDRIVE SHAFT

OVERDRIVE CLUTCH

The overdrive clutch is hydraulically applied in third (direct) and overdrive gears by pressurized fluid against the overdrive/reverse piston. When the overdrive clutch is applied, the overdrive hub drives the front planet carrier.

REVERSE CLUTCH

The reverse clutch is hydraulically applied in reverse gear only by pressurized fluid against the overdrive/reverse piston. When the reverse clutch is applied, the front sun gear assembly is driven.

FINAL DRIVE

DESCRIPTION

The 41TE differential is a conventional open design. It consists of a ring gear and a differential case. The differential case consists of pinion and side gears, and a pinion shaft. The differential case is supported in the transaxle by tapered roller bearings (Fig. 212).

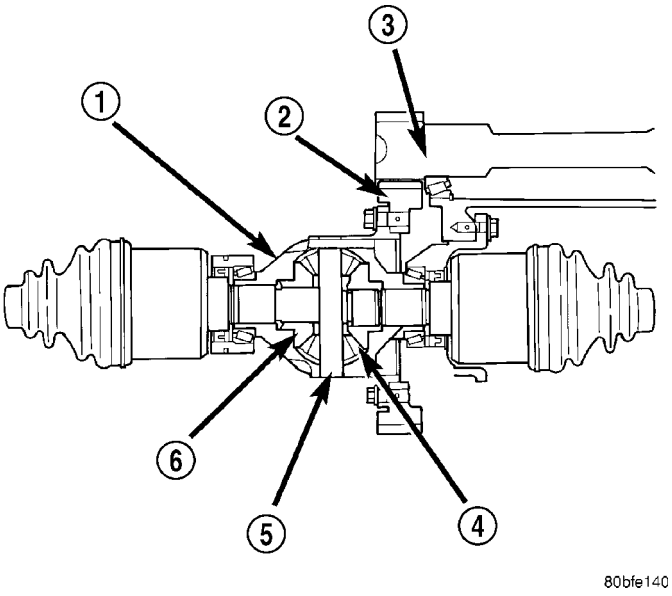


Fig. 212 Differential Assembly

1 - DIFFERENTIAL CASE
2 - RING GEAR
3 - TRANSFER SHAFT
4 - PINION GEAR
5 - PINION SHAFT
6 - SIDE GEAR

OPERATION

The differential assembly is driven by the transfer shaft by way of the differential ring gear. The ring gear drives the differential case, and the case drives the driveshafts through the differential gears. The differential pinion and side gears are supported in the case by thrust washers and a pinion shaft. Differential pinion and side gears make it possible for front tires to rotate at different speeds while cornering.

FINAL DRIVE (Continued)

DISASSEMBLY

The transfer shaft should be removed for differential repair and bearing turning torque checking.

(1) Remove the differential cover and bolts (Fig. 213) (Fig. 214).

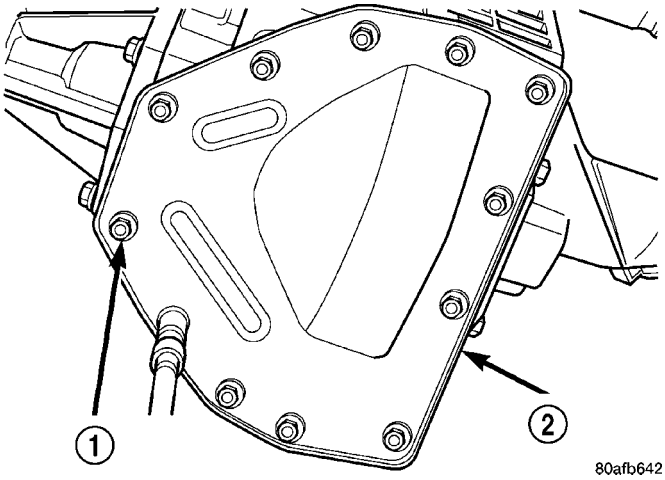


Fig. 213 Differential Cover Bolts

1 - DIFFERENTIAL COVER BOLTS
2 - DIFFERENTIAL COVER

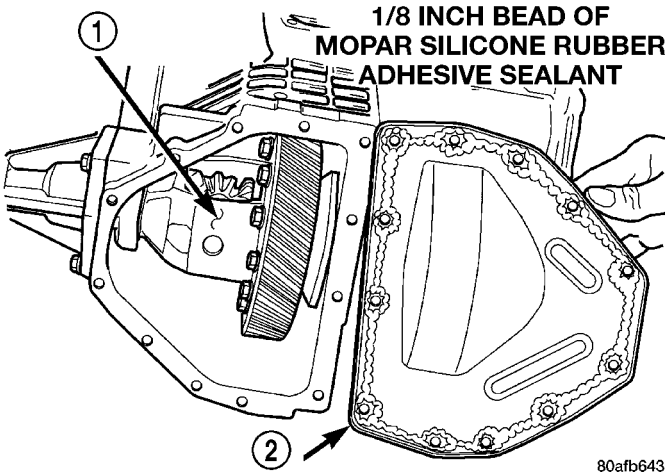


Fig. 214 Remove Differential Cover

1 - DIFFERENTIAL ASSEMBLY
2 - DIFFERENTIAL COVER

(2) Remove the differential bearing retainer and bolts (Fig. 215) (Fig. 216).

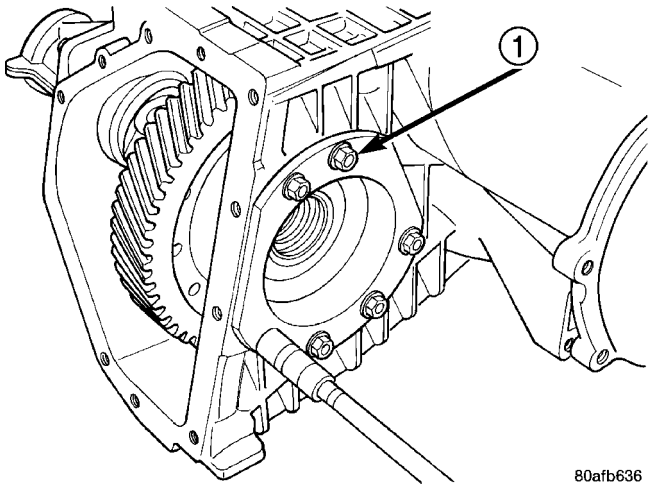


Fig. 215 Differential Retainer Bolts

1 - DIFFERENTIAL RETAINER BOLTS

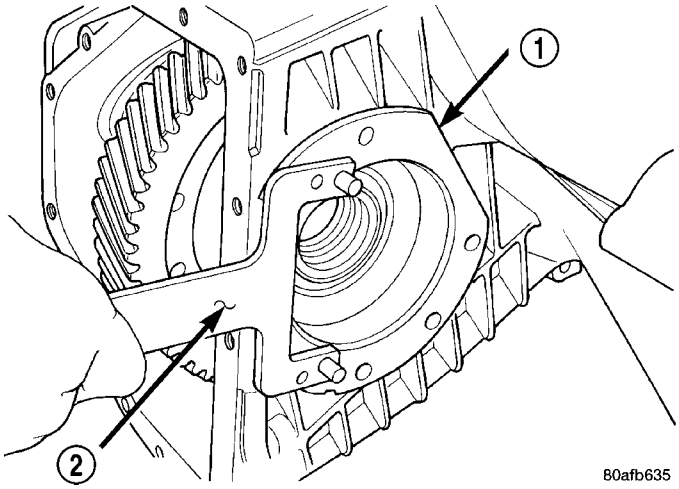


Fig. 216 Remove Bearing Retainer

1 - DIFFERENTIAL BEARING RETAINER
2 - TOOL L-4435

(3) Using a plastic hammer, remove extension housing/adapter plate on the right side of the transaxle.

WARNING: HOLD ONTO DIFFERENTIAL ASSEMBLY TO PREVENT IT FROM ROLLING OUT OF HOUSING.

(4) Use Miller Special Tool 5048, 5048-3 Collets, and L-4539-2 Button to remove the differential bearing cone on the extension housing side.

(5) Use Miller Special Tool 5048, 5048-4 Collets, and L-4539-2 Button to remove the differential bearing cone on the bearing retainer side (Fig. 217) (Fig. 218) (Fig. 219).

FINAL DRIVE (Continued)

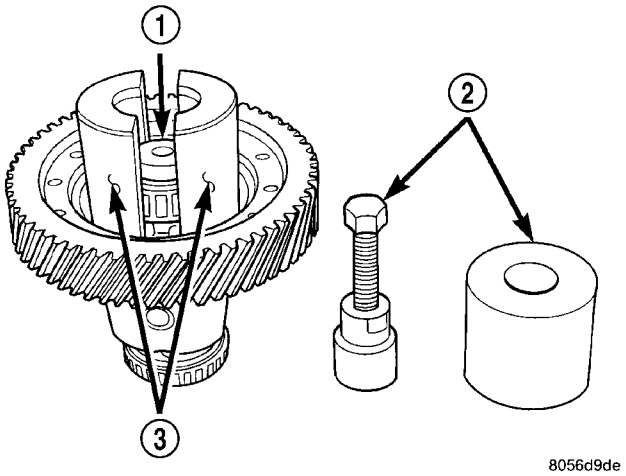


Fig. 217 Position Button and Collets Onto Differential and Bearing (Ring Gear Side)

1 - SPECIAL TOOL L-4539-2
2 - SPECIAL TOOL 5048
3 - SPECIAL TOOL 5048-4

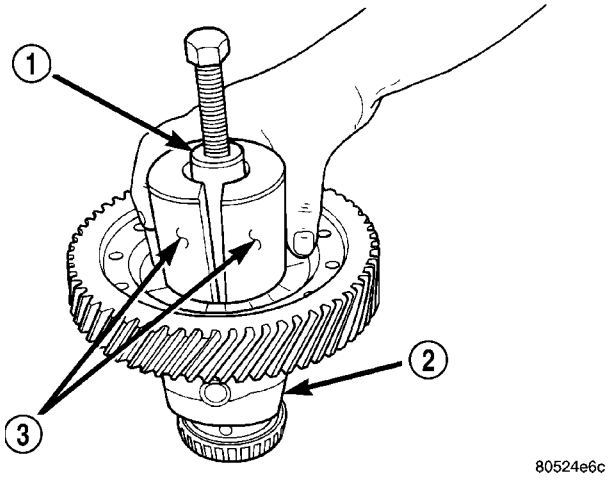


Fig. 218 Position Tool 5048 Over Button and Collets at Differential Bearing (Ring Gear Side)

1 - SPECIAL TO0L 5048
2 - DIFFERENTIAL
3 - SPECIAL TOOL 5048-4

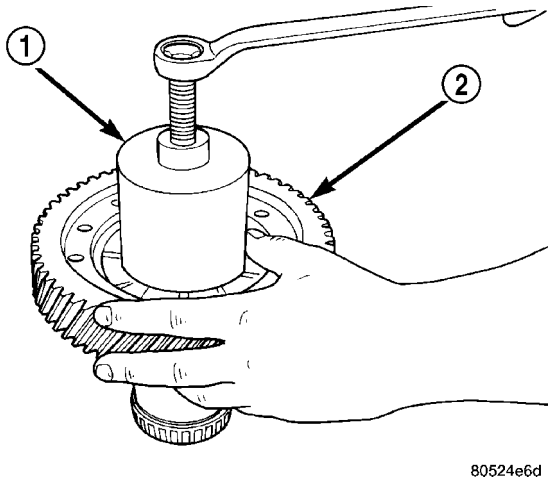


Fig. 219 Remove Differential Bearing Cone (Ring Gear Side)

1 - SPECIAL TOOL 5048
2 - RING GEAR

(6) Using Miller Special Tool L-4518, remove the differential bearing race from the extension housing.

(7) Using Miller Special Tool 6062A, remove the differential bearing race from the bearing retainer (Fig. 220) (Fig. 221).

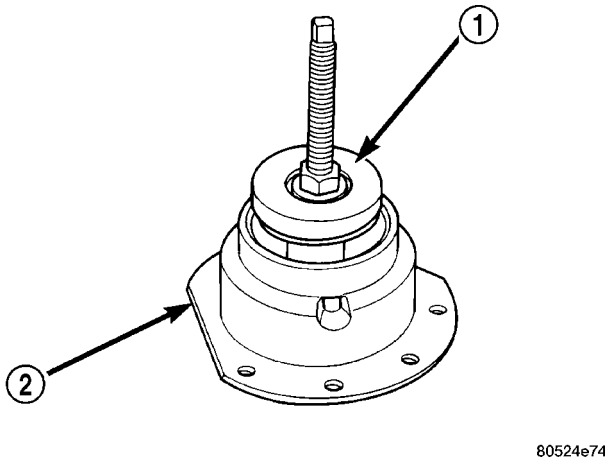


Fig. 220 Position Bearing Cup Remover Tool in Retainer

1 - SPECIAL TOOL 6062A
2 - DIFFERENTIAL BEARING RETAINER

FINAL DRIVE (Continued)

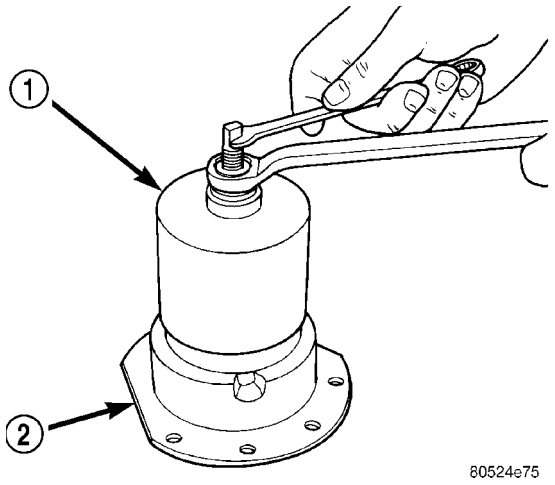


Fig. 221 Remove Bearing Cup

1 - SPECIAL TOOL 6062A
2 - DIFFERENTIAL BEARING RETAINER

(8) Remove ring gear-to-differential case bolts and floating pinion shaft retainers (Fig. 222).

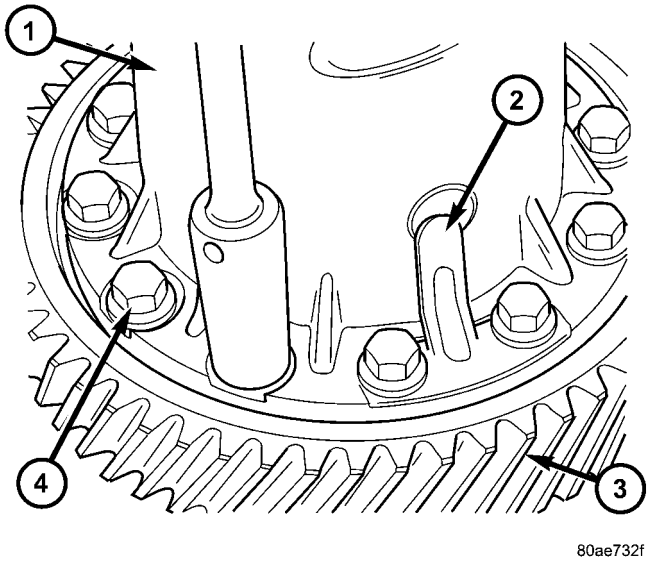


Fig. 222 Ring Gear-to-Case Bolts

1 - DIFFERENTIAL CASE
2 - PINION SHAFT RETAINER
3 - RING GEAR
4 - RING GEAR-TO-CASE BOLT

(9) Separate ring gear from differential case (Fig. 223).

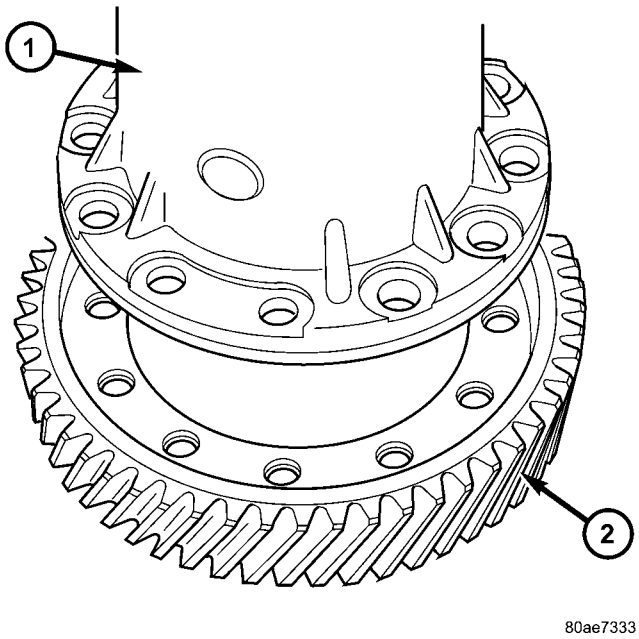


Fig. 223 Ring Gear Removal

1 - DIFFERENTIAL CASE
2 - RING GEAR

(10) Separate differential cover from case using suitable screwdrivers at position shown in (Fig. 224)

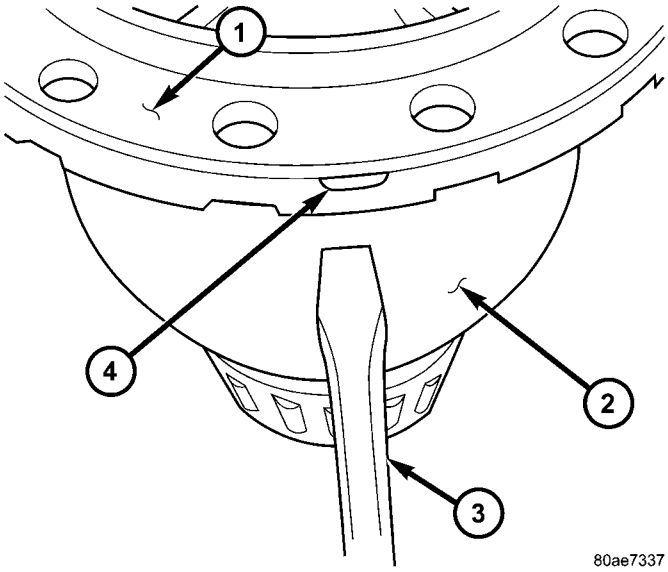


Fig. 224 Separating Differential Support with Screwdrivers

1 - DIFFERENTIAL SUPPORT
2 - DIFFERENTIAL CASE
3 - SCREWDRIVER
4 - RELIEF (2 @ 180° APART)

(11) Lift support from case (Fig. 225).

FINAL DRIVE (Continued)

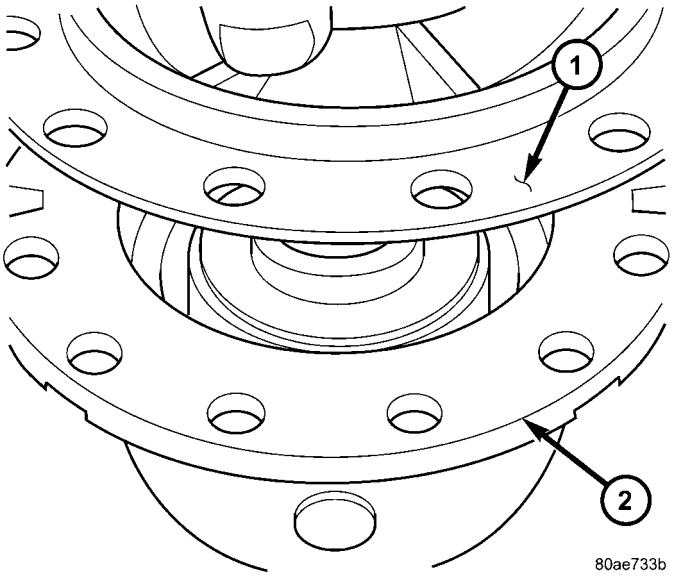


Fig. 225 Differential Support Removal

1 - DIFFERENTIAL SUPPORT
2 - DIFFERENTIAL CASE

(12) Remove side gear thrust washer (Fig. 226).

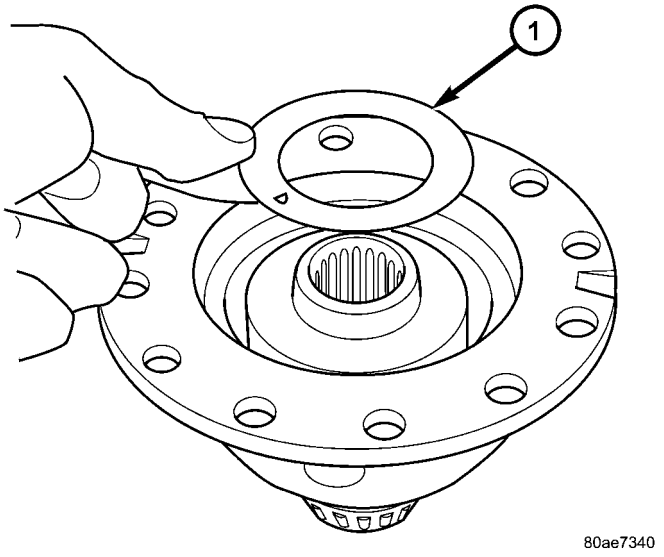


Fig. 226 Side Gear Thrust Washer Removal

1 - SIDE GEAR THRUST WASHER

(13) Remove side gear (Fig. 227).

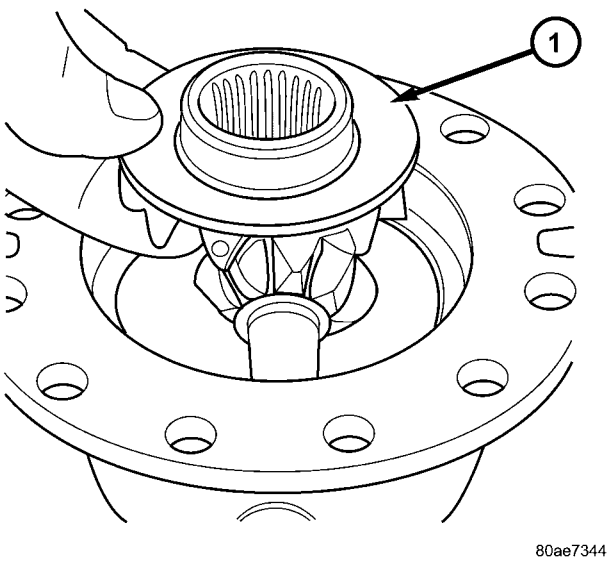


Fig. 227 Side Gear Removal

1 - DIFFERENTIAL SIDE GEAR

(14) Remove pinion shaft (Fig. 228).

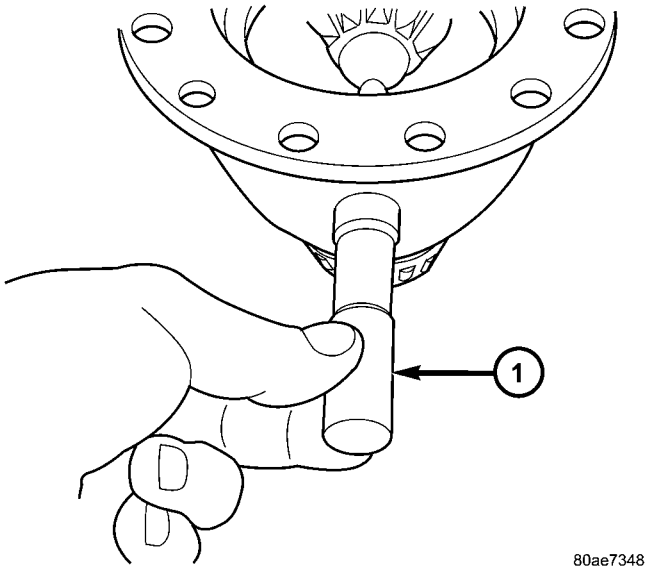


Fig. 228 Pinion Shaft Removal

1 - PINION SHAFT

(15) Remove pinion gears and tabbed washers (Fig. 229).

FINAL DRIVE (Continued)

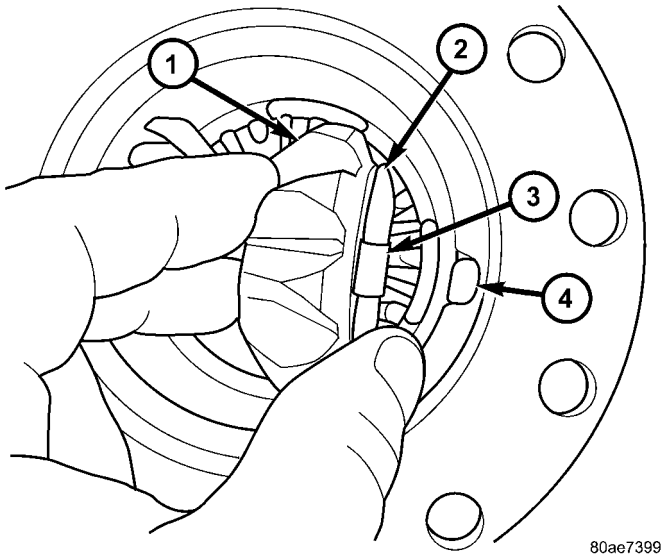


Fig. 229 Pinion Gear and Washer Removal

1 - PINION GEAR
2 - TABBED WASHER
3 - LOCATING TAB
4 - NOTCH

(16) Remove differential side gear (Fig. 230).

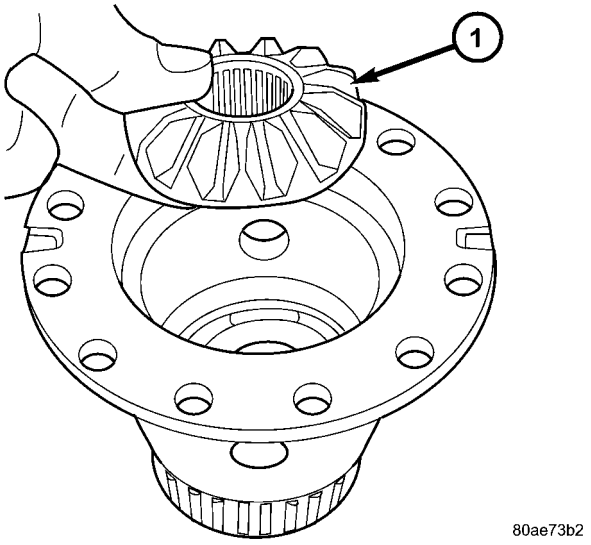


Fig. 230 Side Gear Removal

1 - DIFFERENTIAL SIDE GEAR

(17) Remove side gear thrust washer (Fig. 231).

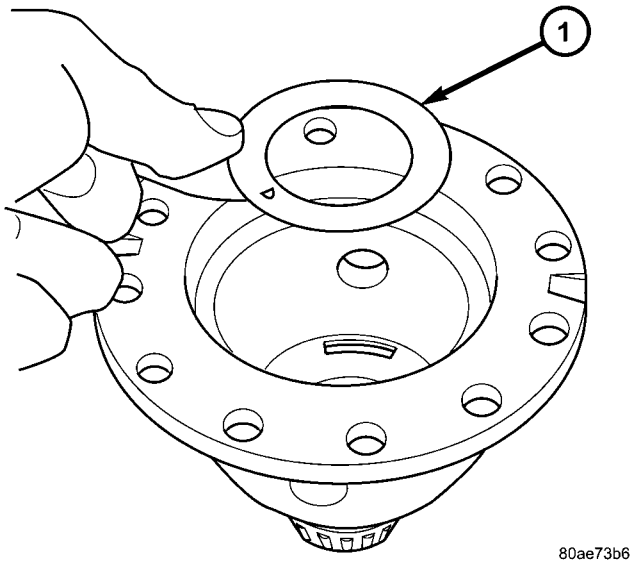


Fig. 231 Side Gear Thrust Washer Removal

1 - THRUST WASHER

(18) Inspect all components for excessive wear.

ASSEMBLY

NOTE: The differential is serviced as an assembly. Differential service is limited to bearing cups and cones. Any other differential component failure must be remedied by differential assembly and transfer shaft replacement.

(1) Install side gear thrust washer to differential case (Fig. 232).

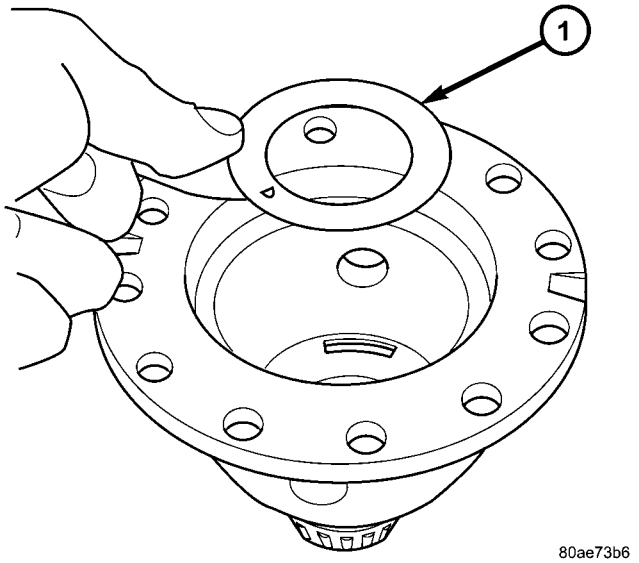


Fig. 232 Thrust Washer Installation

1 - THRUST WASHER

FINAL DRIVE (Continued)

(2) Install side gear to differential case (Fig. 233).

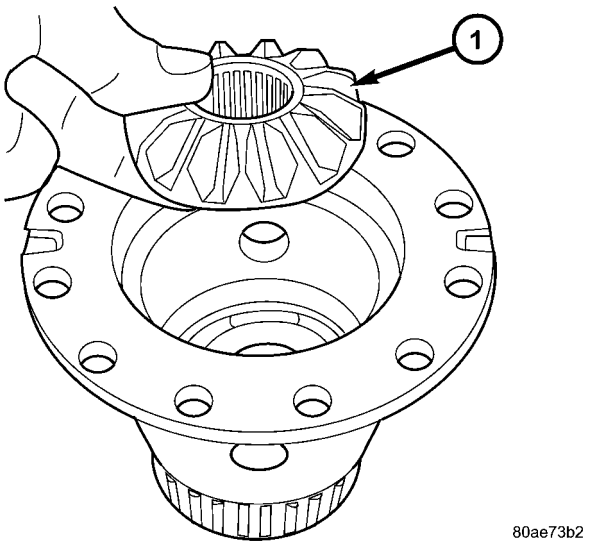


Fig. 233 Side Gear Installation

1 - DIFFERENTIAL SIDE GEAR

(3) Install both pinion gears and washers to case, while orientating washer tabs to notch in case (Fig. 234).

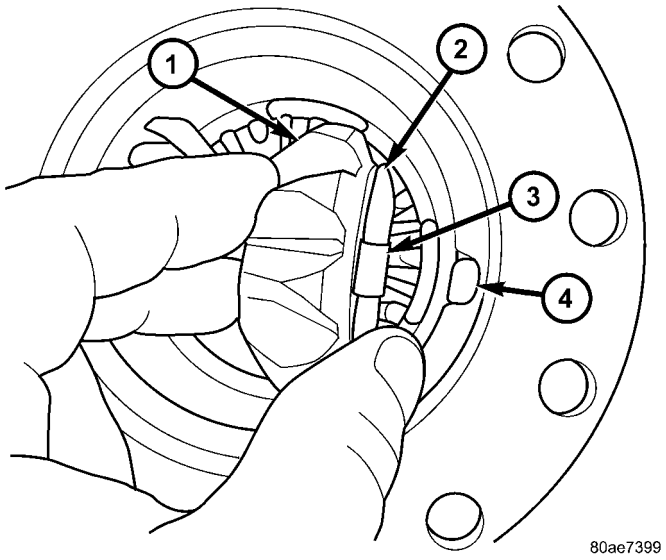


Fig. 234 Pinion Gear and Washer Installation

1 - PINION GEAR
2 - TABBED WASHER
3 - LOCATING TAB
4 - NOTCH

(4) Install pinion shaft (Fig. 235).

(5) Install side gear to case (Fig. 236).

(6) Install side gear thrust washer to case (Fig. 237).

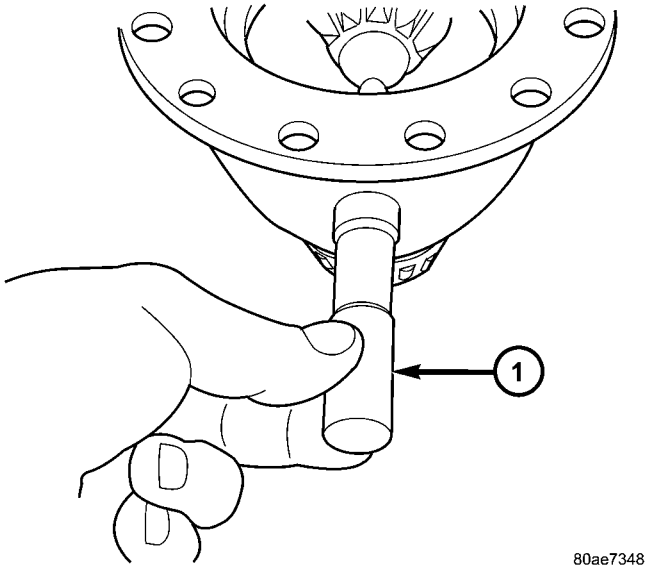


Fig. 235 Pinion Shaft Installation

1 - PINION SHAFT

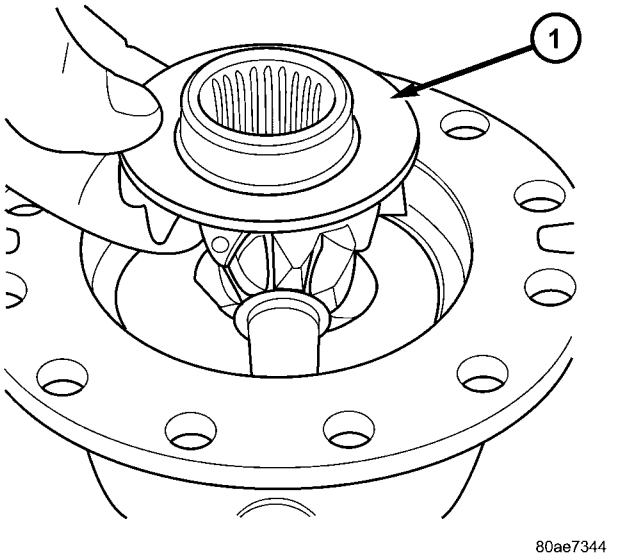


Fig. 236 Side Gear Installation

1 - DIFFERENTIAL SIDE GEAR

FINAL DRIVE (Continued)

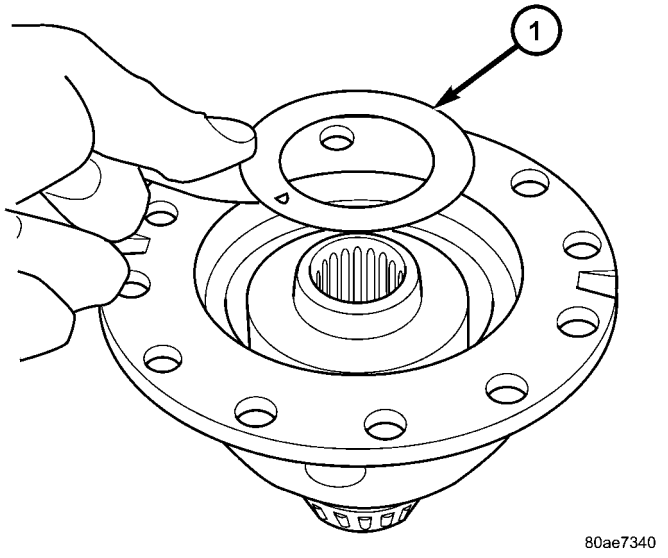


Fig. 237 Side Gear Thrust Washer

1 - SIDE GEAR THRUST WASHER

(7) Install differential support into position, while aligning through-holes (Fig. 238).

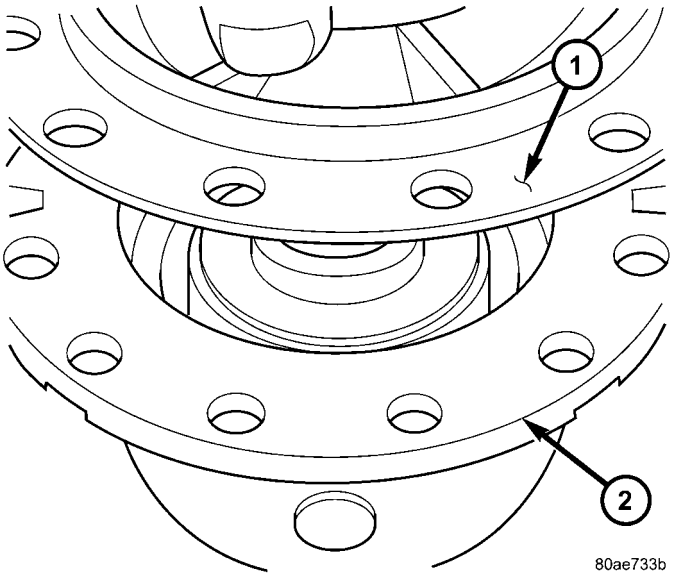


Fig. 238 Diff Support Installation

1 - DIFFERENTIAL SUPPORT
2 - DIFFERENTIAL CASE

(8) Install differential ring gear to case (Fig. 239).

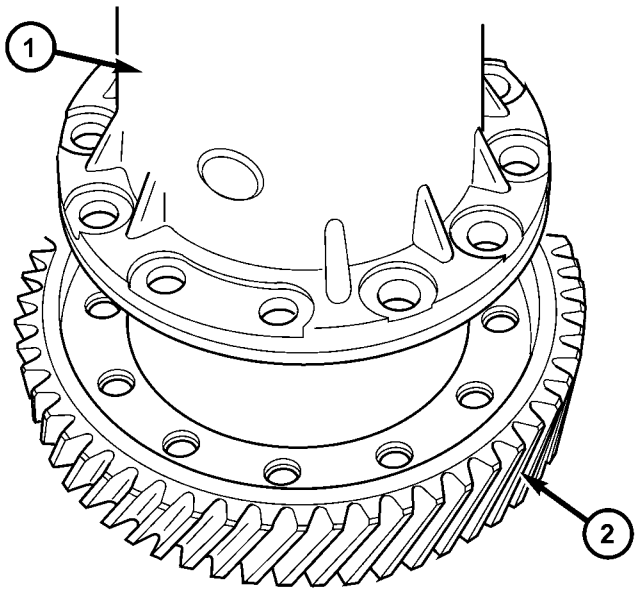


Fig. 239 Ring Gear Installation

1 - DIFFERENTIAL CASE
2 - RING GEAR

(9) Install ring gear-to-case bolts, with pinion shaft retainers (Fig. 240), and torque bolts to 95 N·m (70 ft. lbs.).

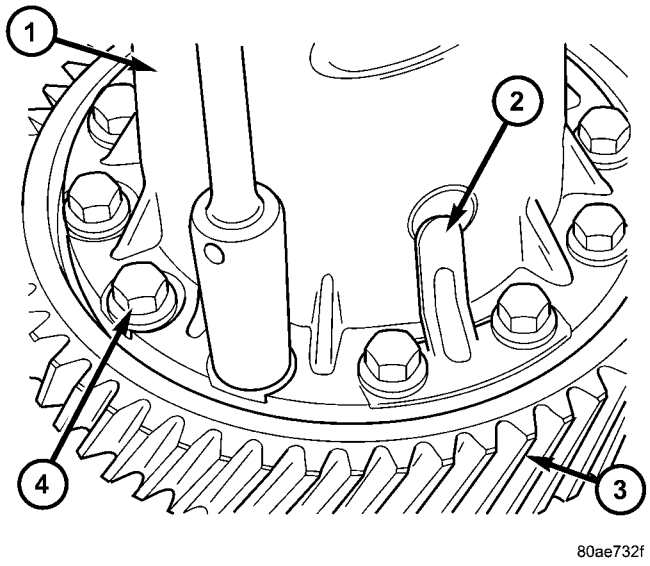


Fig. 240 Ring Gear-to-Case Bolts

1 - DIFFERENTIAL CASE
2 - PINION SHAFT RETAINER
3 - RING GEAR
4 - RING GEAR-TO-CASE BOLT

(10) Using Miller Special Tool L-4410, and C-4171, install differential bearing to differential (extension housing side) (Fig. 241).

FINAL DRIVE (Continued)

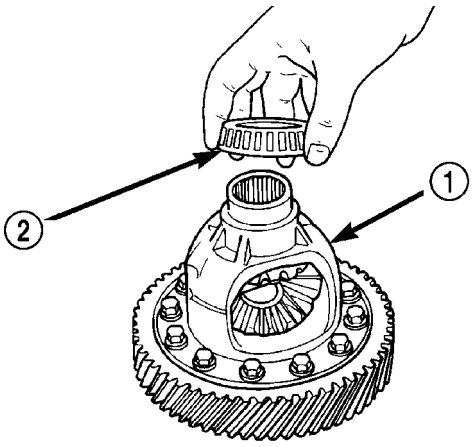


Fig. 241 Position Bearing Cone Onto Differential—Typical

1 - DIFFERENTIAL ASSEMBLY
2 - DIFFERENTIAL BEARING

(11) Using Miller Special Tool 5052 and C-4171, install differential bearing to differential (bearing retainer side).

(12) Using Miller Special Tool 6061 and C-4171, install differential bearing race to bearing retainer (Fig. 242).

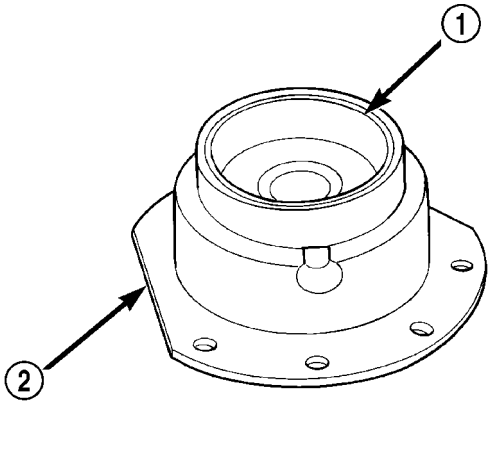


Fig. 242 Differential Bearing Retainer

1 - DIFFERENTIAL BEARING CUP
2 - DIFFERENTIAL BEARING RETAINER

(13) Using Miller Special Tool L–4520 and C-4171, install differential bearing to extension housing.

NOTE: Use Mopar® Silicone Rubber Adhesive Sealant, or equivalent, on retainer and extension housing/adapter plate to seal to case.

(14) Install differential assembly into transaxle case. Install differential bearing retainer (Fig. 243)and torque retainer-to-case bolts (Fig. 244)to 28 N·m (21 ft. lbs.).

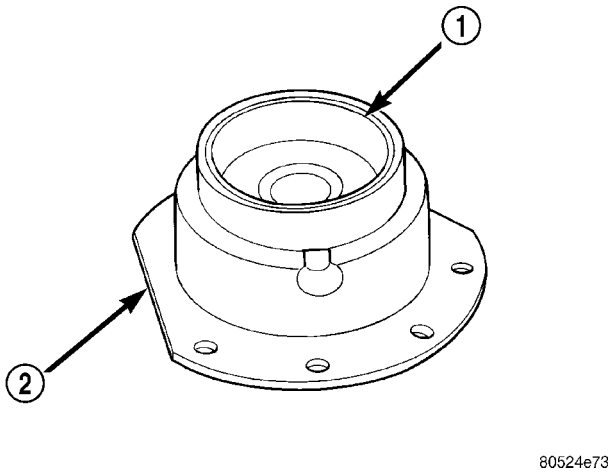


Fig. 243 Differential Bearing Retainer

1 - DIFFERENTIAL BEARING CUP
2 - DIFFERENTIAL BEARING RETAINER

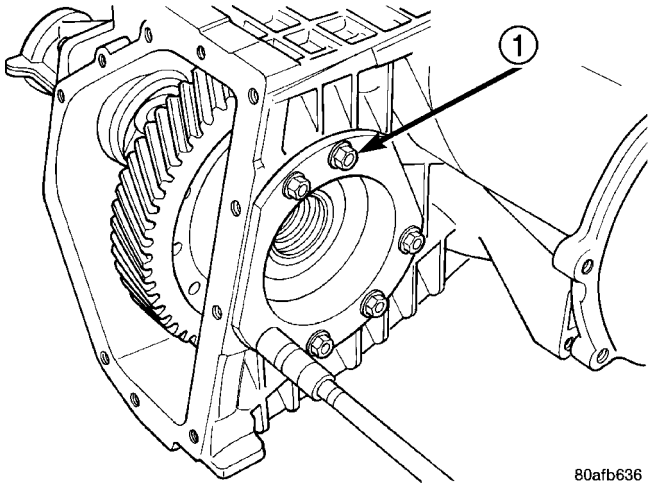


Fig. 244 Differential Retainer Bolts

1 - DIFFERENTIAL RETAINER BOLTS

(15) Apply a bead of Mopar® Silicone Rubber Adhesive Sealant to extension housing/adapter plate and install into position. Install and torque bolts to 28 N·m (21 ft. lbs.).

(16) Measure and adjust differential bearing preload. (Refer to 21 - TRANSMISSION/TRANSAXLE/ AUTOMATIC - 41TE/FINAL DRIVE - ADJUSTMENTS)

(17) Apply a bead of Mopar® Silicone Rubber Adhesive Sealant to differential cover and install to case (Fig. 245).

FINAL DRIVE (Continued)

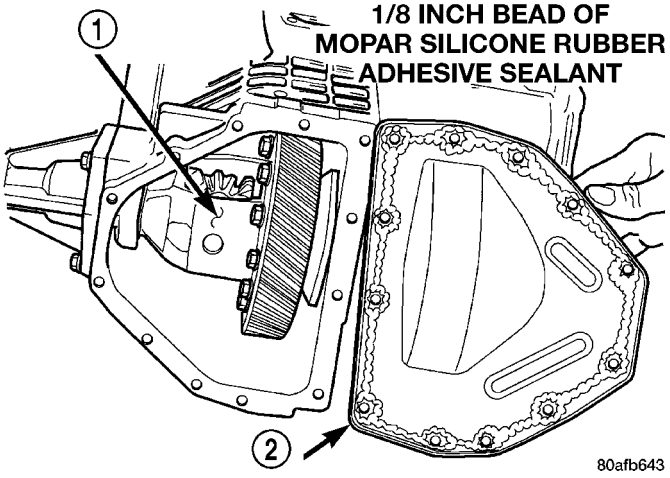


Fig. 245 Install Differential Cover

1 - DIFFERENTIAL ASSEMBLY
2 - DIFFERENTIAL COVER

(18) Install and torque cover-to-case bolts to 19 N·m (165 in. lbs.) (Fig. 246).

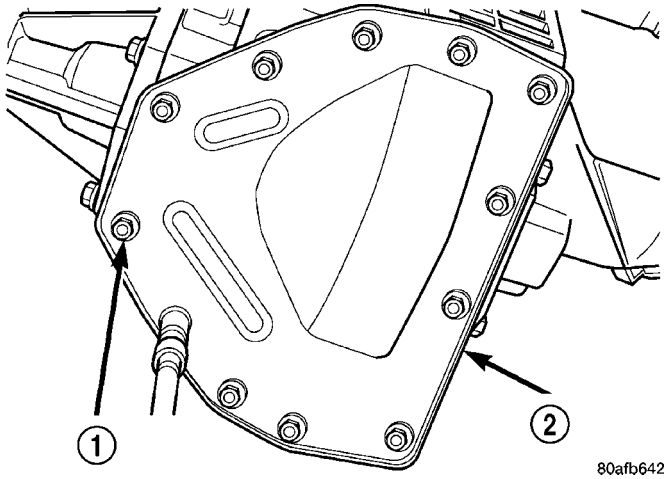


Fig. 246 Differential Cover Bolts

1 - DIFFERENTIAL COVER BOLTS
2 - DIFFERENTIAL COVER

ADJUSTMENTS

ADJUSTMENT - DIFFERENTIAL BEARING PRELOAD

NOTE: Perform all differential bearing preload measurements with the transfer shaft and gear removed.

DIFFERENTIAL BEARING PRELOAD ADJUSTMENT USING EXISTING SHIM

(1) Position the transaxle assembly vertically on the support stand, differential bearing retainer side up.

(2) Install Tool L-4436A into the differential and onto the pinion mate shaft (Fig. 247).

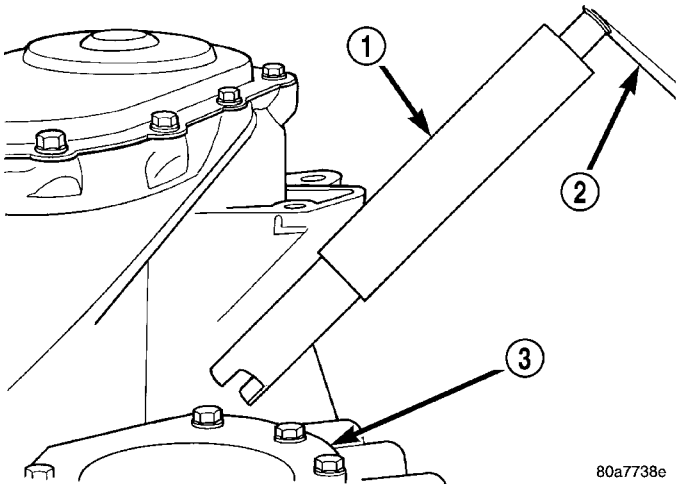


Fig. 247 Tool L-4436 and Torque Wrench

1 - SPECIAL TOOL L-4436–A
2 - TORQUE WRENCH
3 - DIFFERENTIAL BEARING RETAINER

(3) Rotate the differential at least one full revolution to ensure the tapered roller bearings are fully seated.

(4) Using Tool L-4436A and an inch-pound torque wrench, check the turning torque of the differential (Fig. 248). **The turning torque should be between 5 and 18 inch-pounds.**

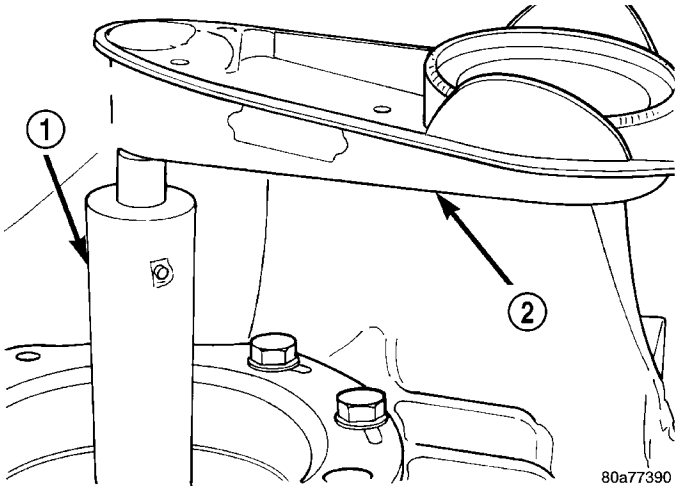


Fig. 248 Checking Differential Bearings Turning Torque

1 - SPECIAL TOOL L-4436–A
2 - TORQUE WRENCH

(5) If the turning torque is within specifications, remove tools. Setup is complete.

(6) If turning torque is not within specifications proceed with the following steps.

FINAL DRIVE (Continued)

(a) Remove differential bearing retainer from the transaxle case.

(b) Remove the bearing cup from the differential bearing retainer using Tool 6062A.

(c) Remove the existing shim from under the cup.

(d) Measure the existing shim.

(e) If the turning torque was too high when measured, install a 0.05 mm (0.002 inch) thinner shim. If the turning torque is was too low, install a 0.05 mm (0.002 inch) thicker shim. Repeat until 5-18 inch-pounds turning torque is obtained. Oil Baffle is not required to be installed when making shim selection.

(f) Install the proper shim under the bearing cup. Make sure the oil baffle is installed properly in the bearing retainer, below the bearing shim and cup.

(g) Install the differential bearing retainer using Tool 5052 and C-4171. Seal the retainer to the housing with MOPAR® Silicone Rubber Adhesive Sealant and torque bolts to 28 N·m (250 in. lbs.).

(7) Using Tool L-4436A and an inch-pound torque wrench, recheck the turning torque of the differential (Fig. 248). **The turning torque should be within 5-18 inch-pounds.**

Shim thickness need be determined only if any of the following parts are replaced:

- Transaxle case
- Differential carrier
- Differential bearing retainer
- Extension housing
- Differential bearing cups and cones

DIFFERENTIAL BEARING SHIM CHART

PART NUMBER	SHIM THICKNESS	
	MM	INCH
4659257	.980	0.0386
4659258	1.02	0.0402
4659259	1.06	0.0418
4659260	1.10	0.0434
4659261	1.14	0.0449
4659262	1.18	0.0465
4659263	1.22	0.0481
4659264	1.26	0.0497
4659265	1.30	0.0512
4659266	1.34	0.0528
4659267	1.38	0.0544
4659268	1.42	0.0560
4659269	1.46	0.0575
4659270	1.50	0.0591
4659271	1.54	0.0607
4659272	1.58	0.0623
4659273	1.62	0.0638
4659274	1.66	0.0654
4659275	1.70	0.0670
4659283	2.02	0.0796
4659284	2.06	0.0812

FINAL DRIVE (Continued)

PRELOAD ADJUSTMENT W/O SHIM

(1) Remove the bearing cup from the differential bearing retainer using Miller special Tool 6062A.
(2) Remove existing shim from under bearing cup.
(3) Reinstall the bearing cup into the retainer using Miller Special Tool 6061, and C-4171.

NOTE: Oil baffle is not required when making the shim calculation.

(4) Install the bearing retainer into the case. Torque bolts to 28 N·m (250 in. lbs.).
(5) Position the transaxle assembly vertically on the support stand and install Miller Special Tool L-4436-A into the bearing retainer.
(6) Rotate the differential at least one full revolution to ensure the tapered roller bearings are fully seated.
(7) Attach a dial indicator to the case and zero the dial. Place the tip on the end of Special Tool L-4436-A.
(8) Place a large screwdriver to each side of the ring gear and lift. Check the dial indicator for the amount of end play.

CAUTION: Do not damage the transaxle case and/or differential retainer sealing surface.

(9) Using the end play measurement that was determined, add 0.18mm (0.007 inch). This should give you between 5-18 inch pounds of bearing preload. Refer to the Differential Bearing Shim Chart to determine which shim to use.
(10) Remove the differential bearing retainer. Remove the bearing cup.
(11) Install the oil baffle. Install the proper shim combination under the bearing cup.
(12) Install the differential bearing retainer. Seal the retainer to the housing with Mopar® Silicone Rubber Adhesive Sealant. Torque bolts to 28 N·m (250 in. lbs.).
(13) Using Miller Special Tool L-4436-A and an inch-pound torque wrench, check the turning torque of the differential (Fig. 248). The turning torque should be between 5-18 inch-pounds.

NOTE: If turning torque is too high install a 0.05mm (0.002 inch) thicker shim. If the turning torque is too low, install a 0.05mm (0.002 inch) thinner shim. Repeat until 5-18 inch-pounds of turning torque is obtained.

FLUID

STANDARD PROCEDURE

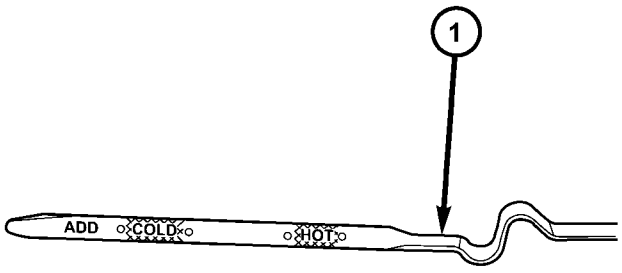
FLUID LEVEL AND CONDITION CHECK

NOTE: Only transmission fluid of the type labeled Mopar ATF+4 (Automatic Transmission Fluid) should be used in this transaxle.

FLUID LEVEL CHECK

The transmission sump has a fluid level indicator (dipstick) to check oil similar to most automatic transmissions. It is located on the left side of the engine. Be sure to wipe all dirt from dipstick handle before removing.

The torque converter fills in both the P Park and N Neutral positions. Place the selector lever in P Park to be sure that the fluid level check is accurate. **The engine should be running at idle speed for at least one minute, with the vehicle on level ground.** At normal operating temperature 82° C (180° F), the fluid level is correct if it is in the HOT region on the oil level indicator (Fig. 249). The fluid level should be within the COLD region of the dipstick at 27° C (80° F) fluid temperature.



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Fig. 249 Fluid Level Indicator

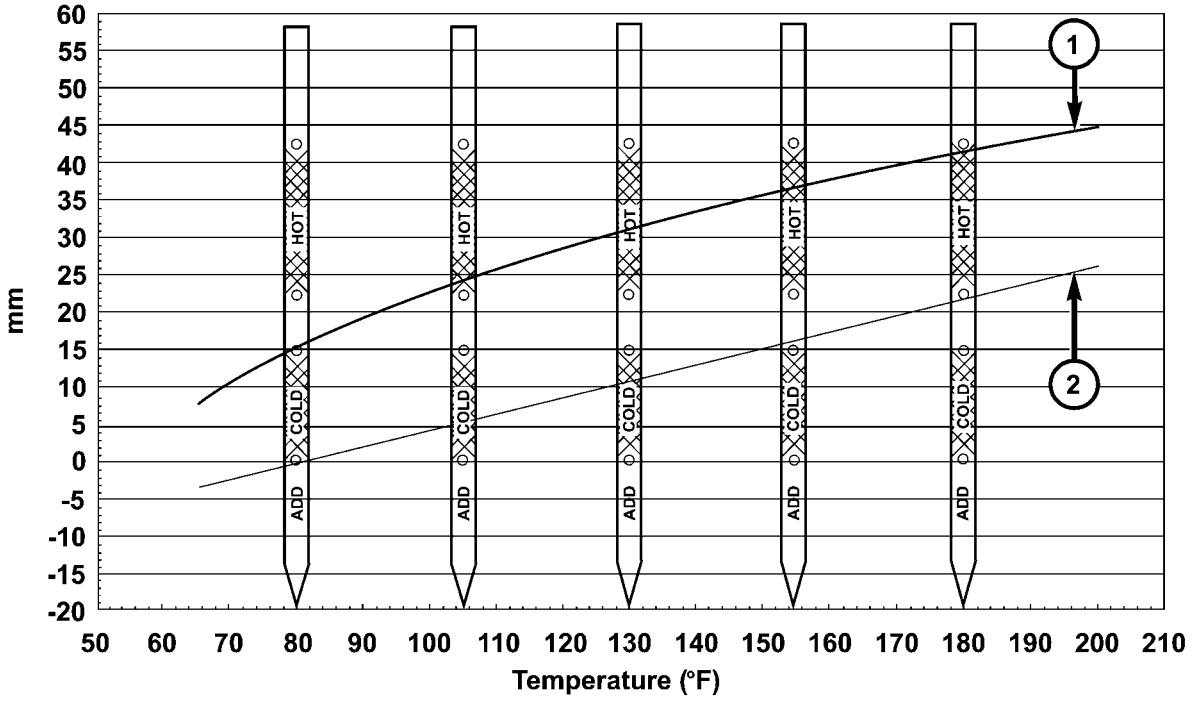
1 - FLUID LEVEL INDICATOR

FLUID LEVEL CHECK USING DRB

NOTE: Engine and Transaxle should be at normal operating temperature before performing this procedure.

(1) Start engine and apply parking brake.
(2) Hook up DRB scan tool and select transmission.

FLUID (Continued)



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Fig. 250 Transmission Fluid Temperature Chart

1 - MAX. LEVEL
2 - MIN. LEVEL

(3) Select sensors.
(4) Read the transmission temperature value.
(5) Compare the fluid temperature value with the fluid temperature chart (Fig. 250).
(6) Adjust transmission fluid level shown on the indicator according to the chart.
(7) Check transmission for leaks.

Low fluid level can cause a variety of conditions because it allows the pump to take in air along with the fluid. As in any hydraulic system, air bubbles make the fluid spongy, therefore, pressures will be low and build up slowly.

Improper filling can also raise the fluid level too high. When the transaxle has too much fluid, the gears churn up foam and cause the same conditions which occur with a low fluid level.

In either case, air bubbles can cause overheating and/or fluid oxidation, and varnishing. This can interfere with normal valve, clutch, and accumulator operation. Foaming can also result in fluid escaping from the transaxle vent where it may be mistaken for a leak.

FLUID CONDITION

Along with fluid level, it is important to check the condition of the fluid. When the fluid smells burned, and is contaminated with metal or friction material particles, a complete transaxle recondition is probably required. Be sure to examine the fluid on the dipstick closely. If there is any doubt about its condition, drain out a sample for a double check.

Mopar® ATF+4 (Automatic Transmission Fluid) when new is red in color. The ATF is dyed red so it can be identified from other fluids used in the vehicle such as engine oil or antifreeze. The red color is not permanent and is not an indicator of fluid condition. As the vehicle is driven, the ATF will begin to look darker in color and may eventually become brown. **This is normal.** ATF+4 also has a unique odor that may change with age. Consequently, **odor and color cannot be used to indicate the fluid condition or the need for a fluid change.**

After the fluid has been checked, seat the dipstick fully to seal out water and dirt.

FLUID (Continued)

STANDARD PROCEDURE - FLUID AND FILTER SERVICE

NOTE: Refer to the maintenance schedules in LUBRICATION and MAINTENANCE, or the vehicle owner's manual, for the recommended maintenance (fluid/filter change) intervals for this transaxle.

NOTE: Only fluids of the type labeled Mopar® ATF+4 should be used. A filter change should be made at the time of the transmission oil change. The magnet (on the inside of the oil pan) should also be cleaned with a clean, dry cloth.

NOTE: If the transaxle is disassembled for any reason, the fluid and filter should be changed.

FLUID/FILTER SERVICE (RECOMMENDED)

(1) Raise vehicle on a hoist. Refer to LUBRICATION and MAINTENANCE for proper procedures. Place a drain container with a large opening, under transaxle oil pan.

(2) Remove both engine mount-to-engine crossmember cradle nuts. Using suitable screw jack and wood block, raise engine and transmission slightly to facilitate transaxle oil pan removal and installation.

(3) Loosen pan bolts and tap the pan at one corner to break it loose allowing fluid to drain, then remove the oil pan.

(4) Install a new filter and o-ring on bottom of the valve body (Fig. 251).

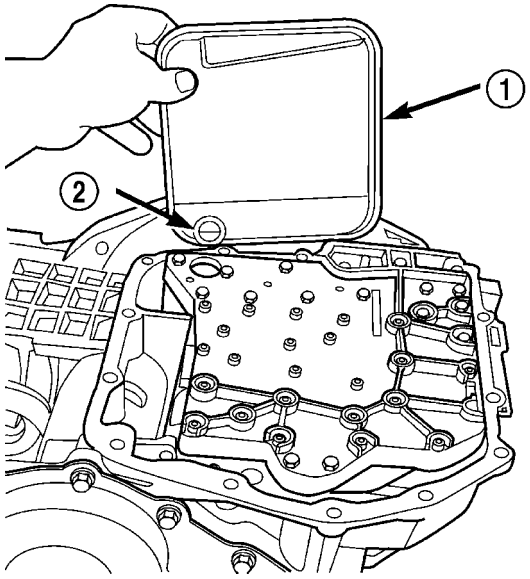


Fig. 251 Filter and O-Ring

1 - OIL FILTER
2 - O-RING

(5) Clean the oil pan and magnet. Reinstall pan using new Mopar Silicone Adhesive sealant. Tighten oil pan bolts to 19 N·m (165 in. lbs.).

(6) Pour four quarts of Mopar® ATF+4 through the dipstick opening.

(7) Start engine and allow to idle for at least one minute. Then, with parking and service brakes applied, move selector lever momentarily to each position, ending in the park or neutral position.

(8) Check the transaxle fluid level and add an appropriate amount to bring the transaxle fluid level to 3mm (1/8 in.) below the lowest mark on the dipstick (Fig. 252).

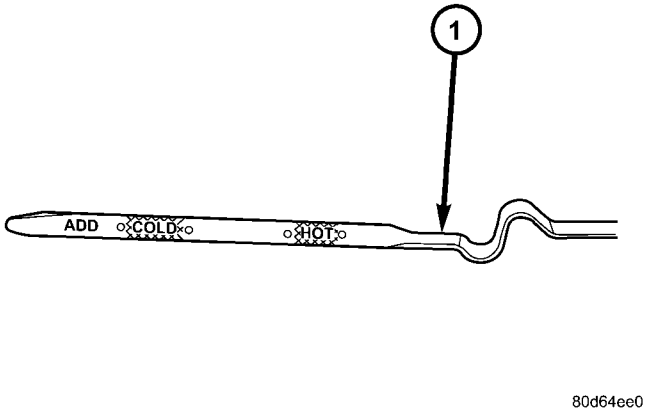


Fig. 252 Fluid Level Indicator

1 - FLUID LEVEL INDICATOR

(9) Recheck the fluid level after the transaxle has reached normal operating temperature (180°F.). Refer to Fluid Level and Condition Check for the proper fluid fill procedure.

(10) To prevent dirt from entering transaxle, make certain that dipstick is fully seated into the dipstick opening.

DIPSTICK TUBE FLUID SUCTION METHOD (ALTERNATIVE)

(1) When performing the fluid suction method, make sure the transaxle is at full operating temperature.

(2) To perform the dipstick tube fluid suction method, use a suitable fluid suction device (Vacula™ or equivalent).

(3) Insert the fluid suction line into the dipstick tube.

FLUID (Continued)

NOTE: Verify that the suction line is inserted to the lowest point of the transaxle oil pan. This will ensure complete evacuation of the fluid in the pan.

(4) Follow the manufacturers recommended procedure and evacuate the fluid from the transaxle.
(5) Remove the suction line from the dipstick tube.
(6) Pour four quarts of Mopar® ATF+4 through the dipstick opening.
(7) Start engine and allow to idle for at least one minute. Then, with parking and service brakes applied, move selector lever momentarily to each position, ending in the park or neutral position.
(8) Check the transaxle fluid level and add an appropriate amount to bring the transaxle fluid level to 3mm (1/8 in.) below the lowest mark on the dipstick (Fig. 252).
(9) Recheck the fluid level after the transaxle has reached normal operating temperature (180°F.). (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/FLUID - STANDARD PROCEDURE)
(10) To prevent dirt from entering transaxle, make certain that dipstick is fully seated into the dipstick opening.

GEAR SHIFT CABLE

REMOVAL

(1) Raise hood.
(2) Disconnect battery negative cable.
(3) Disconnect gearshift cable from transaxle manual valve lever (Fig. 253).
(4) Remove gearshift cable housing from transaxle. Compress retention tabs with suitable pliers and remove from bracket.
(5) Remove front center console assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)
(6) Disconnect gearshift cable from gearshift lever pin and mechanism base (Fig. 254). Compress retention tabs and slide cable assembly out of mechanism.
(7) Disengage cable grommet and remove cable assembly from vehicle.

INSTALLATION

(1) Install gearshift cable to vehicle. Secure grommet.
(2) Install gearshift cable to shift mechanism (Fig. 255). Verfiy that retention tabs have locked cable to mechanism.
(3) Install center console assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)

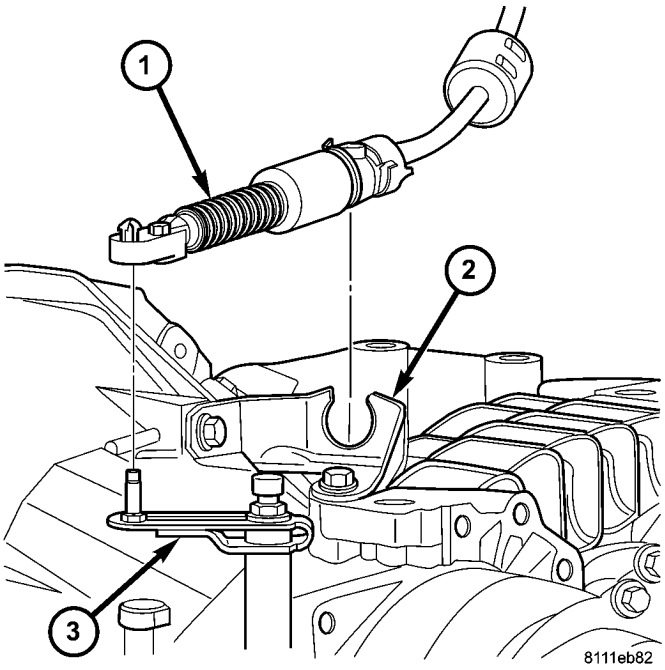


Fig. 253 Gearshift Cable at Transaxle

1 - GEARSHIFT CABLE
2 - BRACKET
3 - MANUAL VALVE LEVER

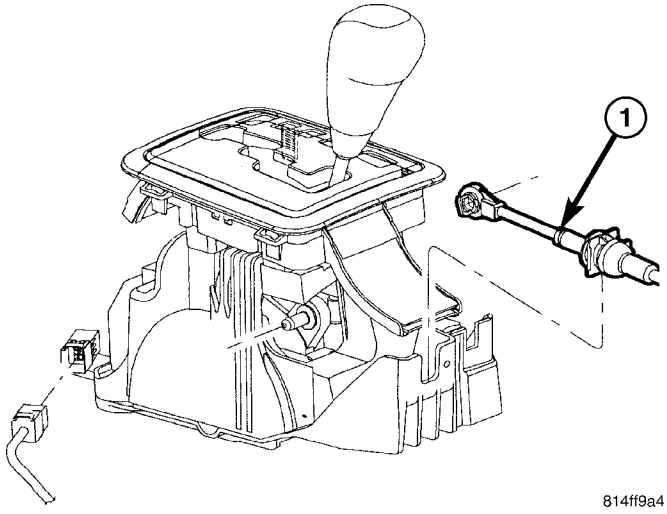


Fig. 254 Gearshift Cable at Mechanism

1 - GEARSHIFT CABLE

(4) From underhood, install gearshift cable to transaxle bracket (Fig. 256). Verify that retention tabs are engaged to bracket.
(5) Install cable to transaxle manual valve lever (Fig. 256).
(6) Adjust gearshift cable. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/GEAR SHIFT CABLE - ADJUSTMENTS)

GEAR SHIFT CABLE (Continued)

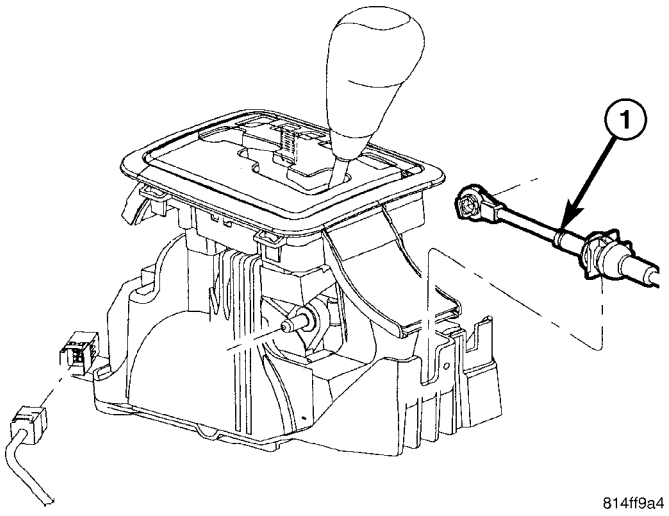


Fig. 255 Gearshift Cable at Mechanism

1 - GEARSHIFT CABLE

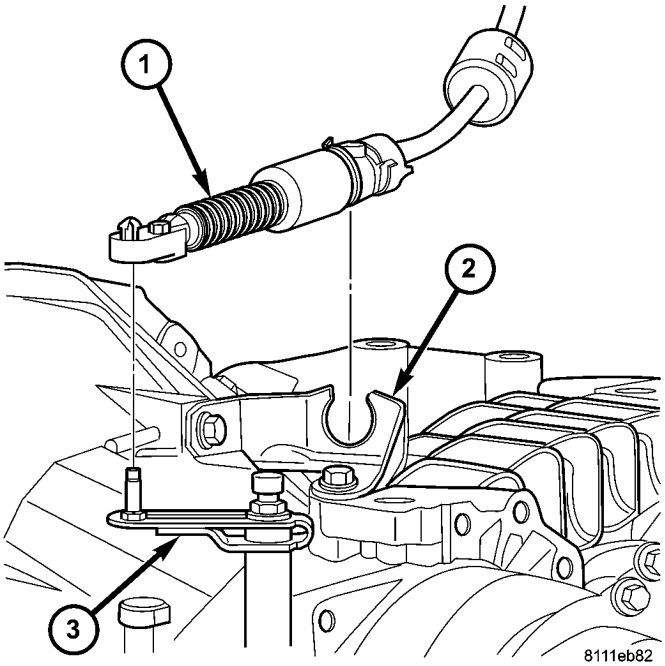


Fig. 256 Gearshift Cable at Transaxle

1 - GEARSHIFT CABLE
2 - BRACKET
3 - MANUAL VALVE LEVER

(7) Connect battery negative cable.

ADJUSTMENTS

GEARSHIFT CABLE ADJUSTMENT

VERIFICATION

(1) Place gearshift lever in gated park (P).

(2) Attempt to move vehicle by rocking back and forth on level ground. If vehicle does not move, attempt to start engine. If engine starts, the park position is correct.

(3) Set parking brake.

(4) Turn key to on/run and depress brake pedal. Place gearshift lever in neutral (N).

(5) Attempt to start engine. If engine starts in both neutral (N) or park (P), gearshift cable is adjusted properly. No adjustment is required.

(6) If engine does not start in either park (P) or neutral (N), perform adjustment procedure.

ADJUSTMENT

(1) Park the vehicle on level ground and set the parking brake.

(2) Place the gearshift lever in gated park (P) and remove ignition key.

(3) Loosen the cable adjustment screw at the transaxle manual valve lever (Fig. 257).

(4) Pull the gearshift lever fully forward to the park detent position.

(5) Release the park brake, then rock the vehicle to assure it is in park. Reset the park brake.

(6) Tighten the cable adjustment screw to 8 N·m (70 in. lbs.). Gearshift cable should now be properly adjusted.

(7) Verify adjustment by using the verification procedure.

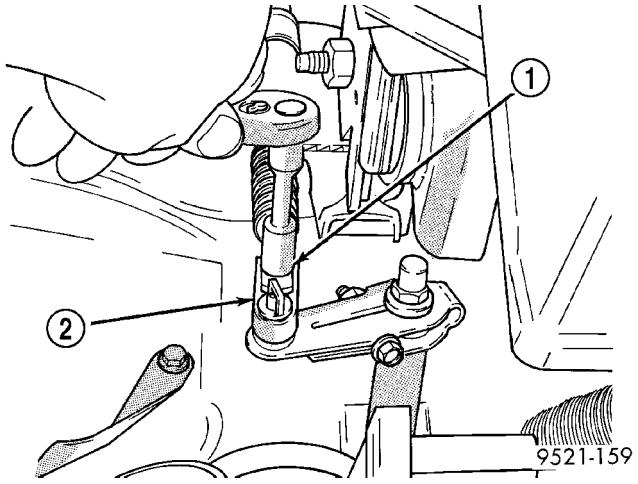


Fig. 257 Gearshift Cable Adjustment

1 - GEARSHIFT CABLE ADJUSTMENT SCREW
2 - GEARSHIFT CABLE

HOLDING CLUTCHES

DESCRIPTION

Two hydraulically applied multi-disc clutches are used to hold planetary geartrain components stationary while the input clutches drive others. The 2/4 and Low/Reverse clutches are considered holding clutches and are contained at the rear of the transaxle case. (Fig. 258).

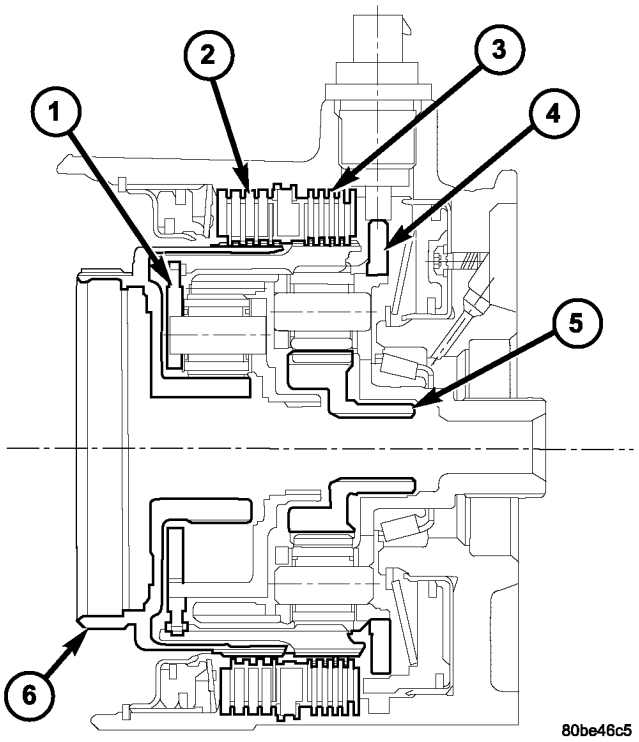


Fig. 258 2/4 and Low/Reverse Clutches

1 - FRONT PLANET CARRIER/REAR ANNULUS
2 - 2/4 CLUTCH
3 - L/R CLUTCH
4 - REAR PLANET CARRIER/FRONT ANNULUS
5 - REAR SUN GEAR
6 - FRONT SUN GEAR ASSEMBLY

OPERATION

NOTE: Refer to the "Elements In Use" chart in Diagnosis and Testing for a collective view of which clutch elements are applied at each position of the selector lever.

2/4 CLUTCH

The 2/4 clutch is hydraulically applied in second and fourth gears by pressurized fluid against the 2/4 clutch piston. When the 2/4 clutch is applied, the front sun gear assembly is held or grounded to the transaxle case.

LOW/REVERSE CLUTCH

The Low/Reverse clutch is hydraulically applied in park, reverse, neutral, and first gears by pressurized fluid against the Low/Reverse clutch piston. When the Low/Reverse clutch is applied, the front planet carrier/rear annulus assembly is held or grounded to the transaxle case.

INPUT CLUTCH ASSEMBLY

DISASSEMBLY

(1) Mount input clutch assembly to Input Clutch Pressure Fixture (Tool 8391).

(2) Tap down reverse clutch reaction plate to release pressure from snap ring (Fig. 259).

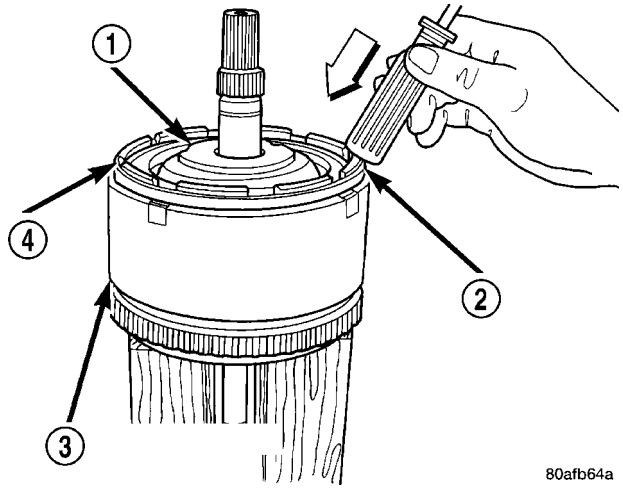


Fig. 259 Tapping Reaction Plate

1 - #4 THRUST PLATE (SELECT)
2 - TAP DOWN REVERSE CLUTCH REACTION PLATE TO REMOVE OR INSTALL SNAP RING
3 - INPUT SHAFT CLUTCHES RETAINER ASSEMBLY
4 - REVERSE CLUTCH REACTION PLATE

(3) Remove reverse clutch snap ring (Fig. 260).

(4) Pry up and remove reverse clutch reaction plate (Fig. 261).

(5) Remove reverse clutch pack (Fig. 262). **Tag components for assembly identification.**

INPUT CLUTCH ASSEMBLY (Continued)

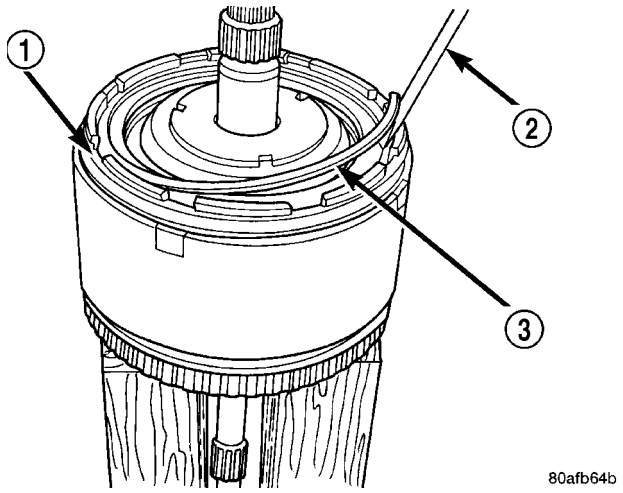


Fig. 260 Reverse Clutch Snap Ring

1 - REACTION PLATE
2 - SCREWDRIVER
3 - REVERSE CLUTCH SNAP RING (SELECT)

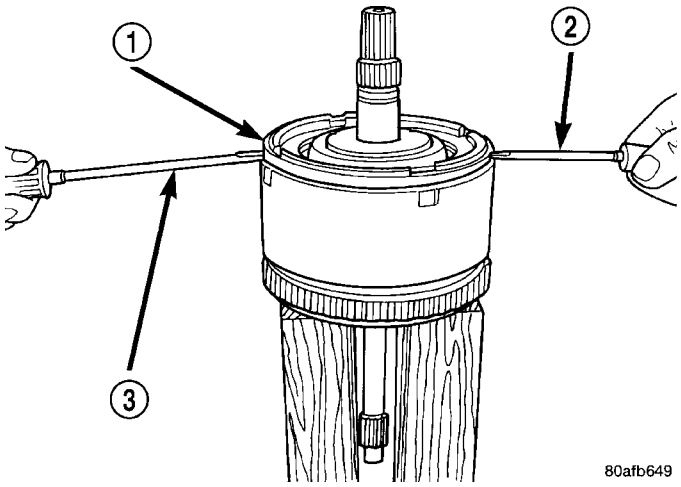


Fig. 261 Pry Reverse Clutch Reaction Plate

1 - REVERSE CLUTCH REACTION PLATE
2 - SCREWDRIVER
3 - SCREWDRIVER

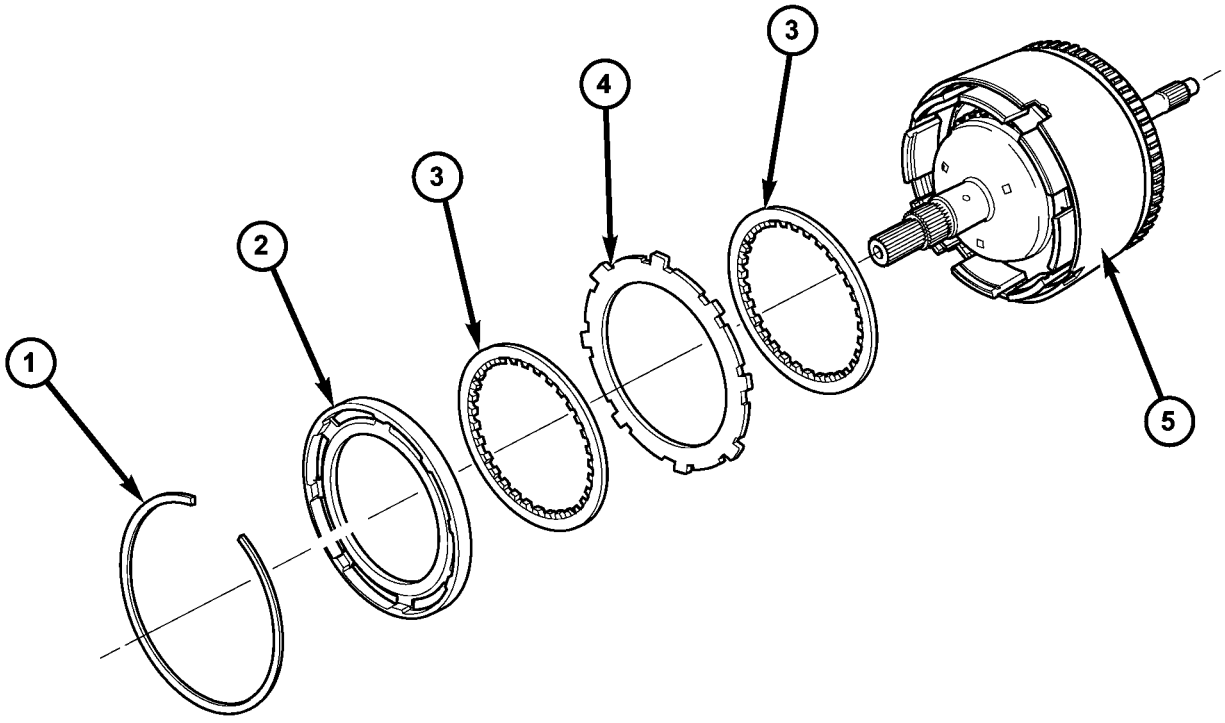


Fig. 262 Reverse Clutch Assembly

1 - SNAP RING
2 - REACTION PLATE
3 - CLUTCH DISC (2)
4 - CLUTCH PLATE (1)
5 - INPUT CLUTCH ASSEMBLY

INPUT CLUTCH ASSEMBLY (Continued)

(6) Remove the OD/Reverse pressure plate snap ring (Fig. 263).

(7) Remove OD/Reverse pressure plate (Fig. 263).

(8) Remove OD/Reverse pressure plate wave snap ring (Fig. 263).

(9) Remove OD clutch pack (Fig. 263). **Tag components for assembly identification.**

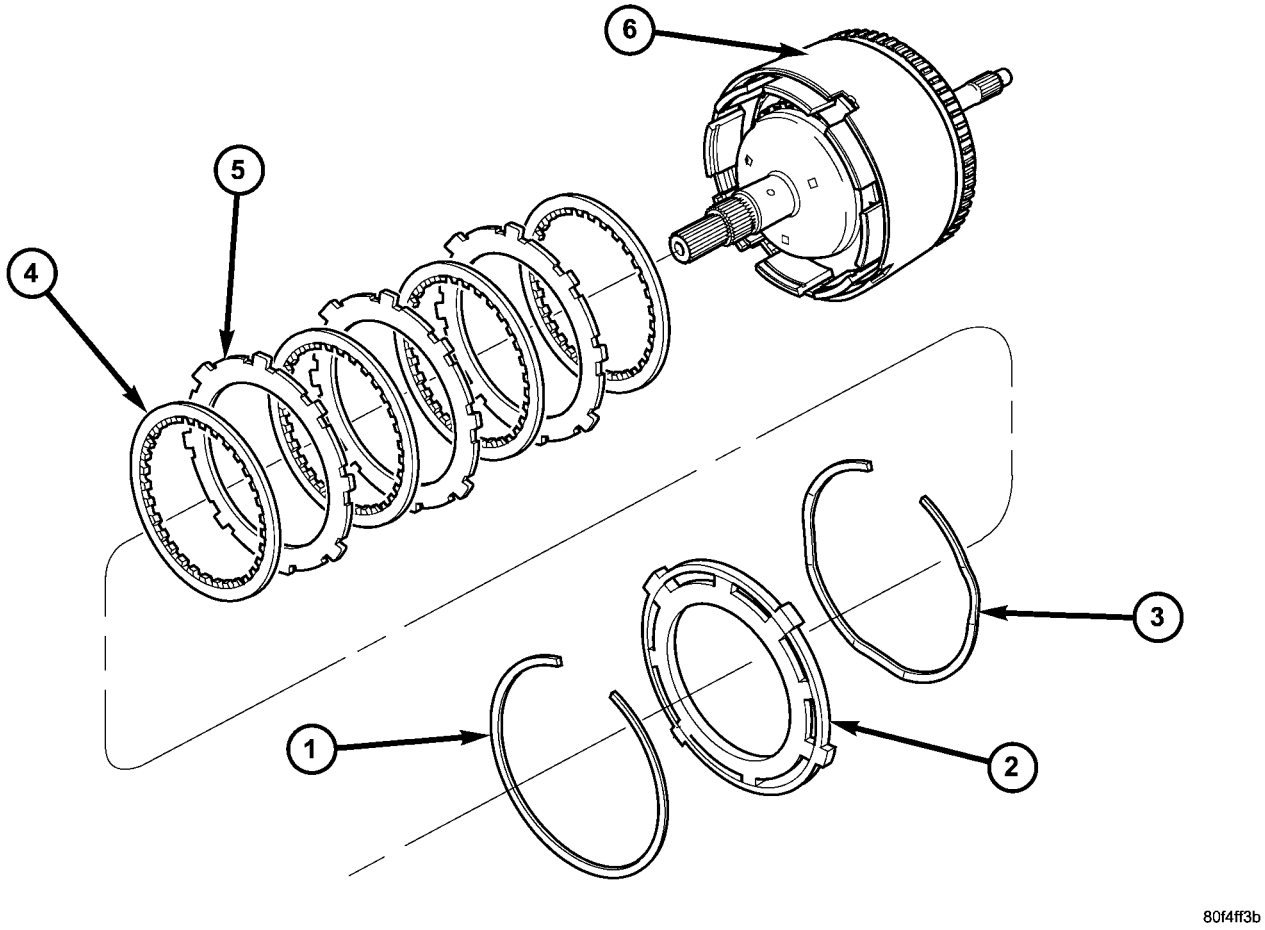


Fig. 263 Overdrive Clutch Assembly

1 - SNAP RING
2 - OD/REVERSE PRESSURE PLATE
3 - SNAP RING (WAVE)
4 - CLUTCH DISC (4)
5 - CLUTCH STEEL (3)
6 - INPUT CLUTCH ASSEMBLY

INPUT CLUTCH ASSEMBLY (Continued)

(10) Remove and inspect OD and UD Shafts, as well as #3 thrust washer and plate, and #2 needle bearing (Fig. 264).

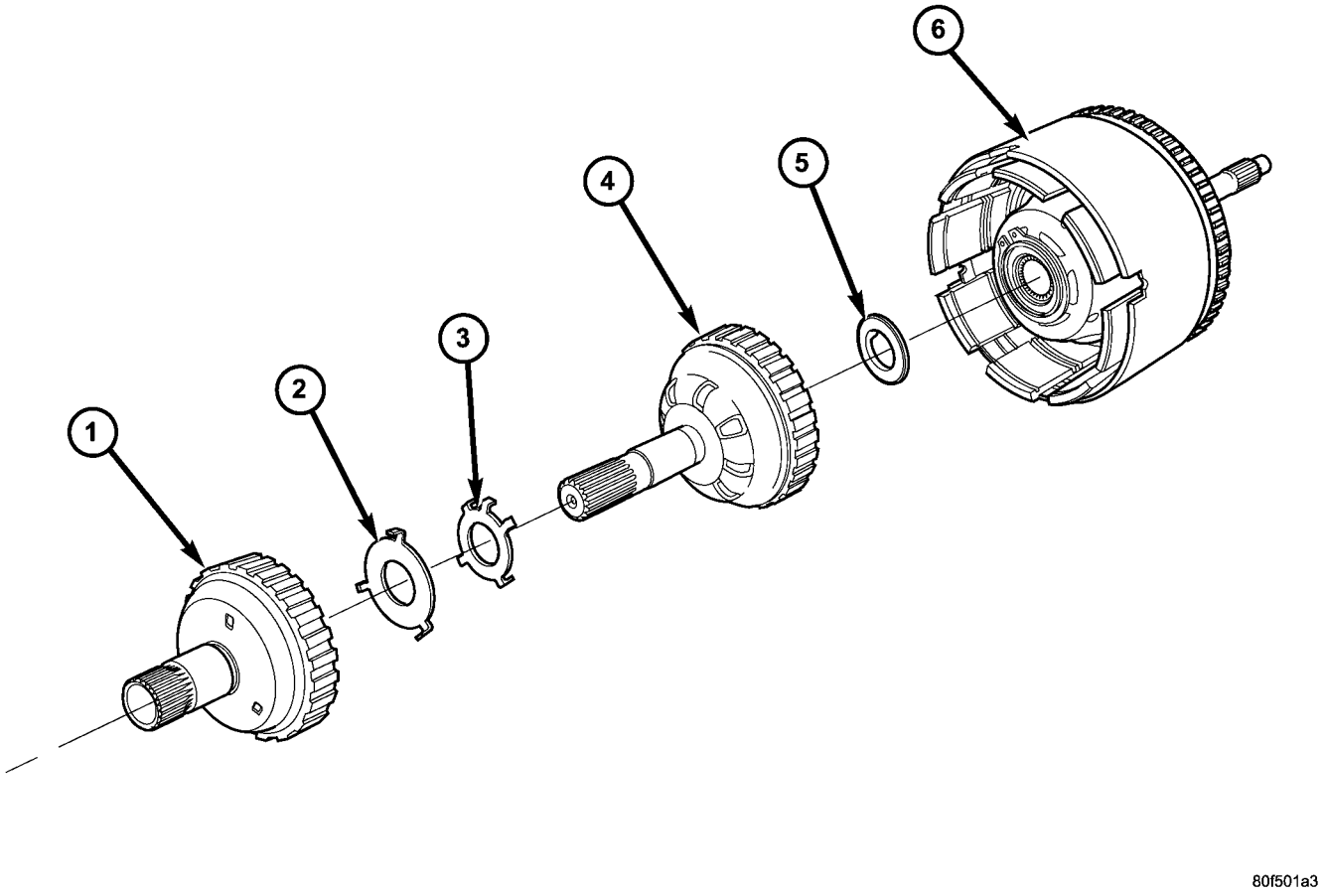


Fig. 264 Overdrive/Underdrive Shafts

1 - OVERDRIVE SHAFT
2 - #3 THRUST PLATE (3 TABS)
3 - #3 THRUST WASHER (5 TABS)
4 - UNDERDRIVE SHAFT
5 - #2 NEEDLE BEARING (3 TABS)
6 - INPUT CLUTCH ASSEMBLY

INPUT CLUTCH ASSEMBLY (Continued)

(11) Remove the OD/UD reaction plate tapered snap ring, reaction plate, and first friction disc (Fig. 265).

(12) Remove the UD clutch flat snap ring and rest of UD clutch pack (Fig. 265). **Tag clutch pack for assembly identification.**

CAUTION: Compress return spring just enough to remove or install snap ring.

(13) Using Tool 5059A and an arbor press, compress UD clutch piston/spring enough to remove snap ring (Fig. 266) (Fig. 267).

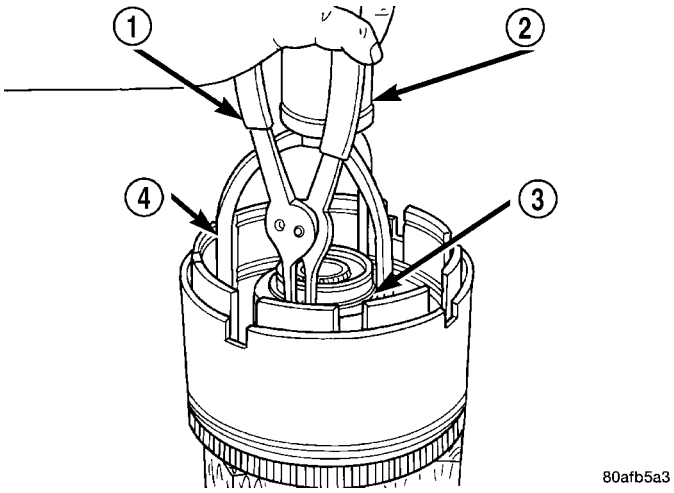


Fig. 266 UD Spring Retainer Snap Ring

1 - SNAP RING PLIERS
2 - ARBOR PRESS RAM
3 - SNAP RING
4 - SPECIAL TOOL 5059A

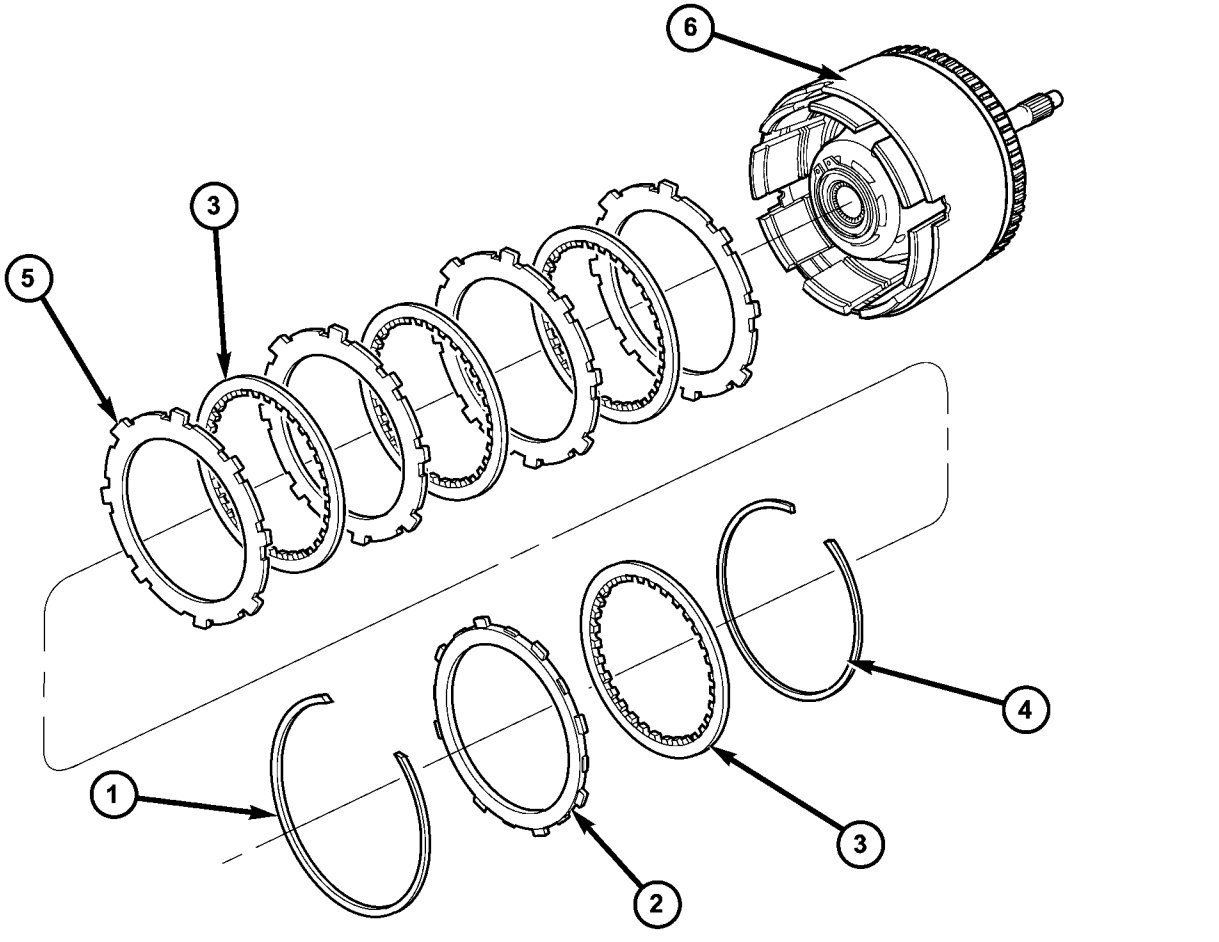
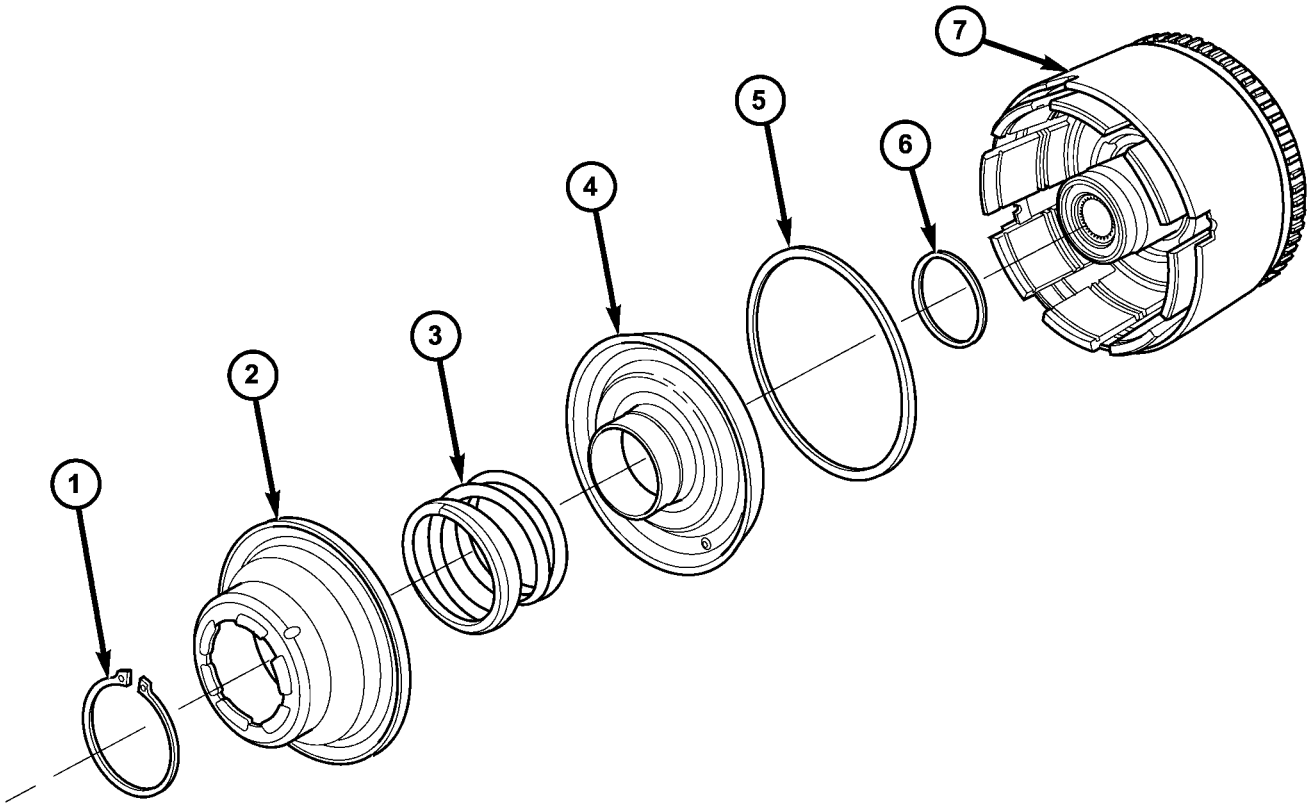


Fig. 265 Underdrive Clutch Assembly

1 - SNAP RING (TAPERED)
2 - OD/UD REACTION PLATE
3 - CLUTCH DISC
4 - SNAP RING (FLAT)
5 - CLUTCH PLATE
6 - INPUT CLUTCH ASSEMBLY

INPUT CLUTCH ASSEMBLY (Continued)



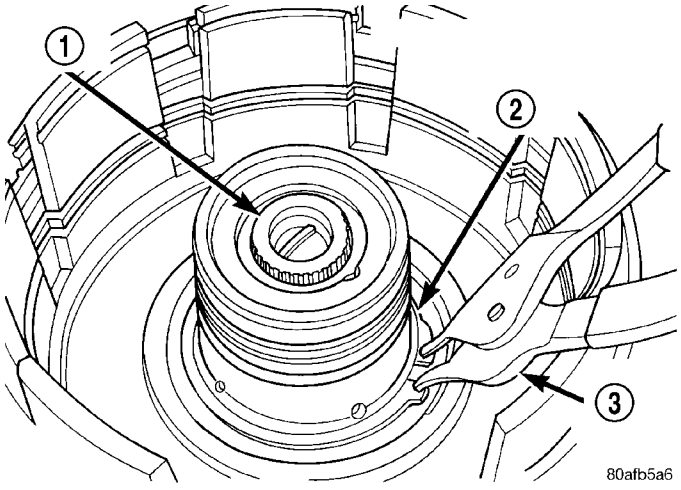
80f503e2

Fig. 267 Underdrive Clutch Piston, Spring and Retainer

1 - SNAP RING
2 - SPRING RETAINER
3 - SPRING
4 - UD CLUTCH PISTON
5 - SEAL, OUTER
6 - SEAL, INNER
7 - INPUT CLUTCH ASSEMBLY

(14) Remove spring retainer, spring, and piston (Fig. 267).

(15) Remove input hub tapered snap ring (Fig. 268) (Fig. 274).



80afb5a6

Fig. 268 Input Hub Tapered Snap Ring

1 - INPUT SHAFT
2 - INPUT HUB SNAP RING (TAPERED SIDE UP WITH TABS IN CAVITY)
3 - SNAP RING PLIERS

INPUT CLUTCH ASSEMBLY (Continued)

(16) Tap on input hub with soft faced hammer and separate input hub from OD/Reverse piston and clutch retainer (Fig. 269).

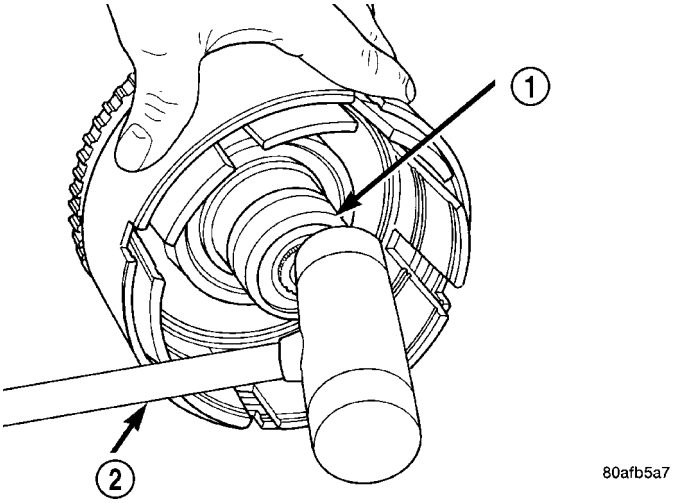


Fig. 269 Tap on Input Hub

1 - INPUT SHAFT AND HUB ASSEMBLY
2 - PLASTIC HAMMER

(17) Separate clutch retainer from OD/Reverse piston (Fig. 270).

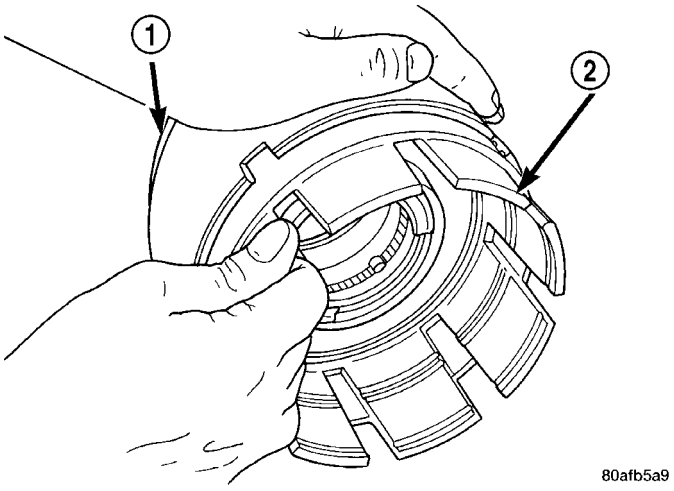


Fig. 270 Pull Retainer from Piston

1 - OVERDRIVE/REVERSE PISTON
2 - INPUT CLUTCHES RETAINER

(18) Using Tool 6057 and an arbor press, compress return OD/Reverse piston return spring just enough to remove snap ring (Fig. 271).

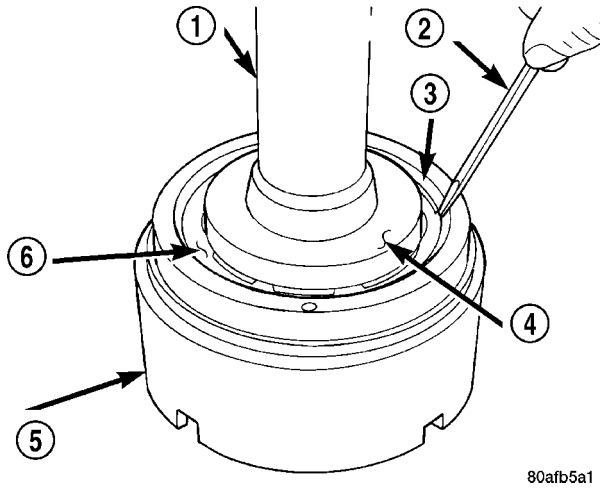


Fig. 271 Remove Snap Ring

1 - ARBOR PRESS RAM (COMPRESS RETURN SPRING JUST ENOUGH TO REMOVE OR INSTALL SNAP RING)
2 - SCREWDRIVER
3 - SNAP RING
4 - SPECIAL TOOL 6057
5 - OD/REVERSE PISTON
6 - RETURN SPRING

(19) Remove input shaft to input clutch hub snap ring (Fig. 272) (Fig. 274).

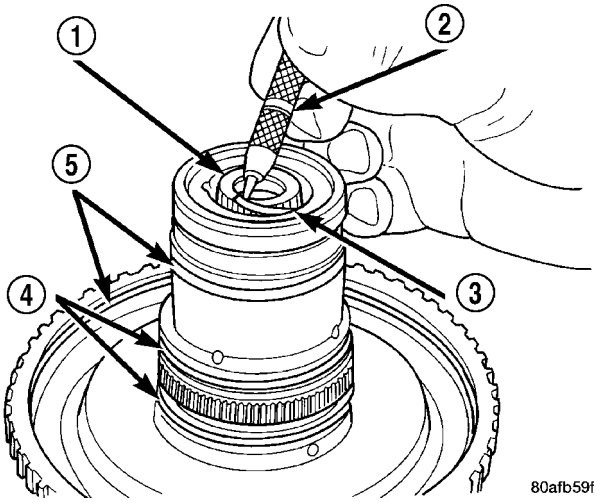


Fig. 272 Remove Input Shaft Snap Ring

1 - INPUT SHAFT
2 - SHARP-POINTED TOOL
3 - SNAP RING
4 - O-RINGS
5 - SEALS

INPUT CLUTCH ASSEMBLY (Continued)

(20) Using a suitably sized socket and an arbor press, remove input shaft from input shaft hub (Fig. 273).

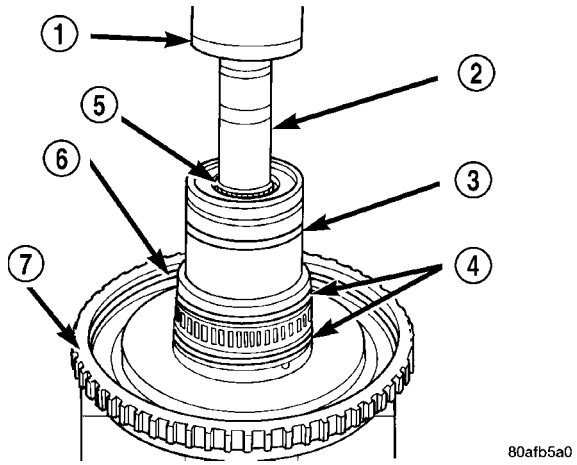


Fig. 273 Remove Input Shaft

1 - ARBOR PRESS RAM
2 - SOCKET
3 - SEAL
4 - O-RINGS
5 - INPUT SHAFT
6 - SEAL
7 - INPUT SHAFT HUB ASSEMBLY

INPUT CLUTCH ASSEMBLY (Continued)

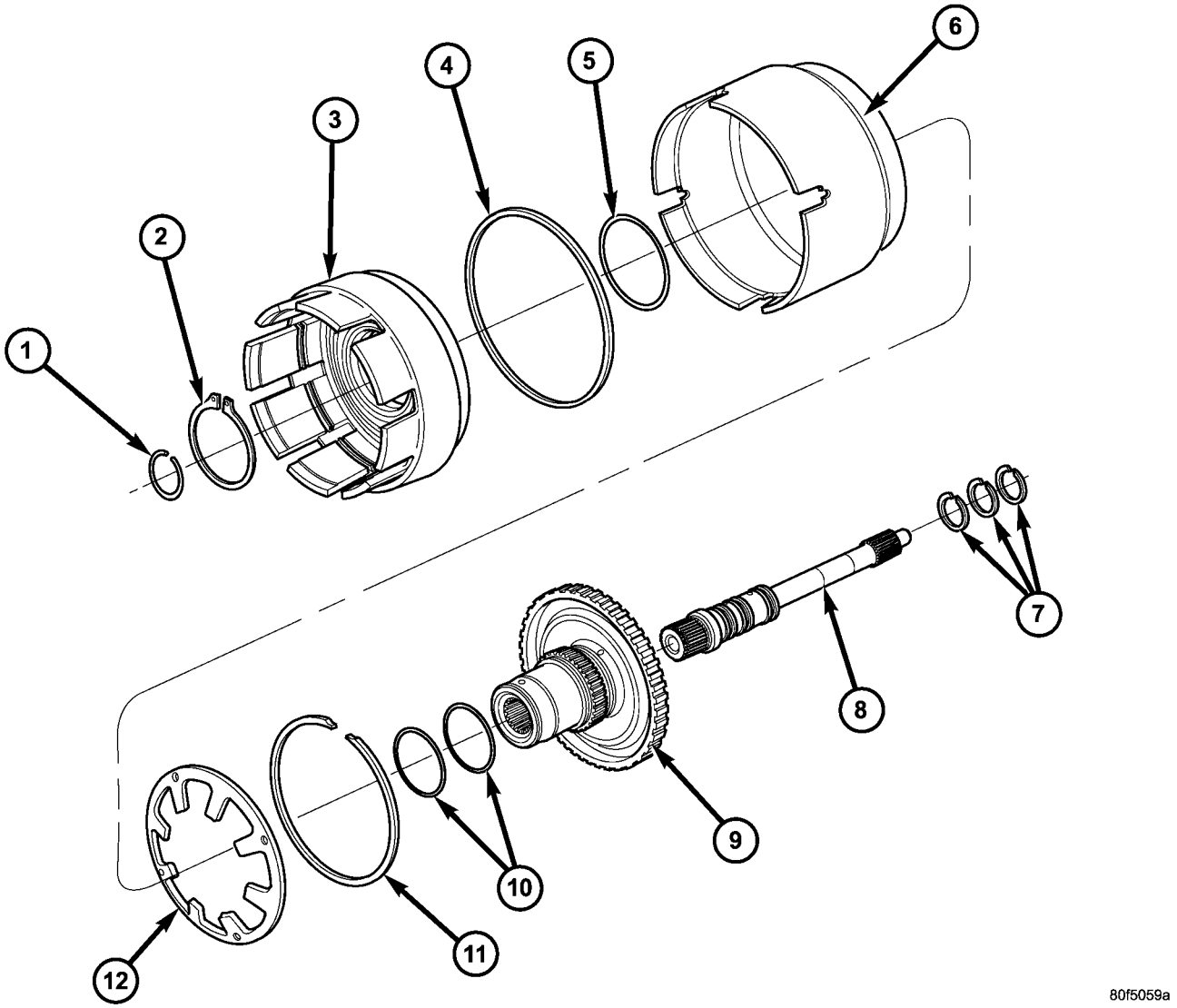


Fig. 274 Input Clutch Hub, Retainer, and OD/Reverse Piston

1 - SNAP RING (INPUT SHAFT)
2 - SNAP RING
3 - CLUTCH RETAINER
4 - SEAL, OUTER
5 - SEAL, INNER
6 - OD/REVERSE PISTON
7 - SEAL, INPUT SHAFT
8 - SHAFT, INPUT
9 - HUB
10 - SEAL
11 - SNAP RING
12 - BELLEVILLE SPRING

INPUT CLUTCH ASSEMBLY (Continued)

ASSEMBLY

Use petrolatum on all seals to ease assembly of components.

(1) Using an arbor press, install input shaft to input shaft hub (Fig. 275).

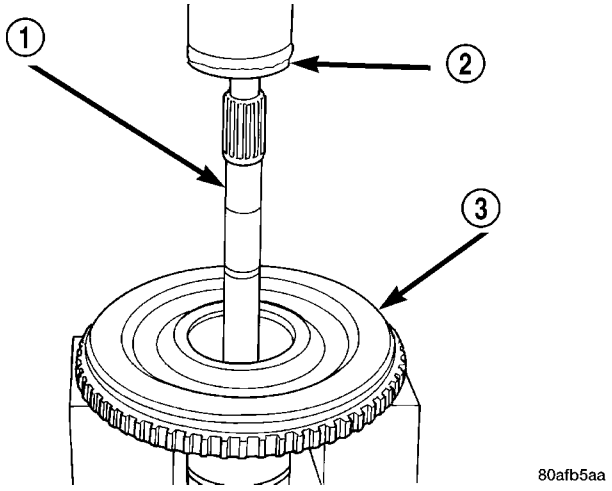


Fig. 275 Install Input Shaft

1 - INPUT SHAFT
2 - ARBOR PRESS RAM
3 - INPUT SHAFT HUB ASSEMBLY

(2) Install input shaft snap ring (Fig. 276).

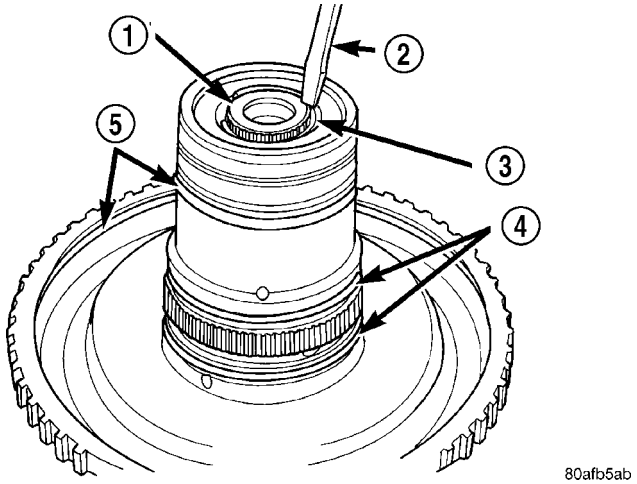


Fig. 276 Install Input Shaft Snap Ring

1 - INPUT SHAFT
2 - SCREWDRIVER (DO NOT SCRATCH BEARING SURFACE)
3 - SNAP RING
4 - O-RINGS
5 - SEALS

(3) Using an arbor press and Tool 6057, Install OD/Reverse piston return spring and snap ring (Fig. 277) (Fig. 278).

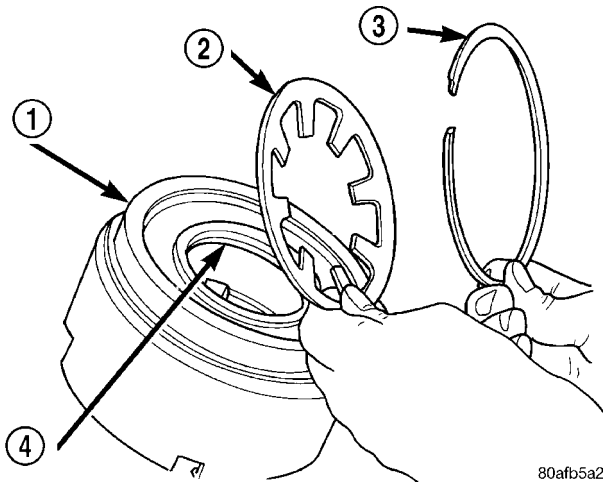


Fig. 277 Return Spring and Snap Ring

1 - OD/REVERSE PISTON
2 - RETURN SPRING
3 - SNAP RING
4 - O-RING

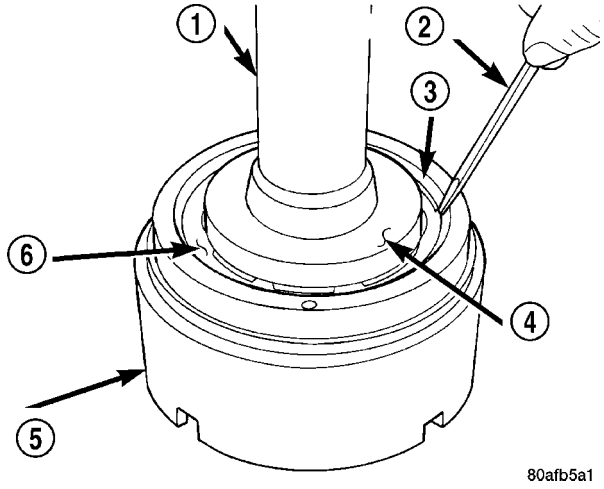


Fig. 278 Install Snap Ring

1 - ARBOR PRESS RAM (COMPRESS RETURN SPRING JUST ENOUGH TO REMOVE OR INSTALL SNAP RING)
2 - SCREWDRIVER
3 - SNAP RING
4 - SPECIAL TOOL 6057
5 - OD/REVERSE PISTON
6 - RETURN SPRING

(4) Install the OD/Reverse piston assembly to the input clutch retainer as shown in (Fig. 279).

INPUT CLUTCH ASSEMBLY (Continued)

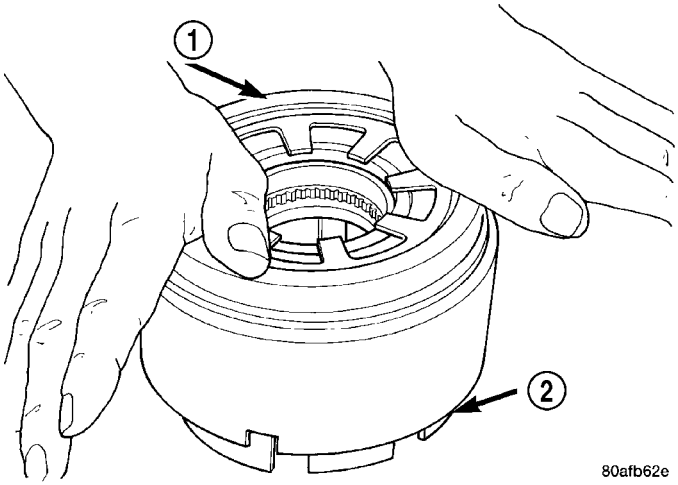


Fig. 279 Install OD/Reverse Piston

1 - PUSH DOWN TO INSTALL OVERDRIVE/REVERSE PISTON
2 - INPUT CLUTCHES RETAINER

(5) Install the input hub/shaft assy. to the OD/Reverse piston/clutch retainer assy. (Fig. 280).

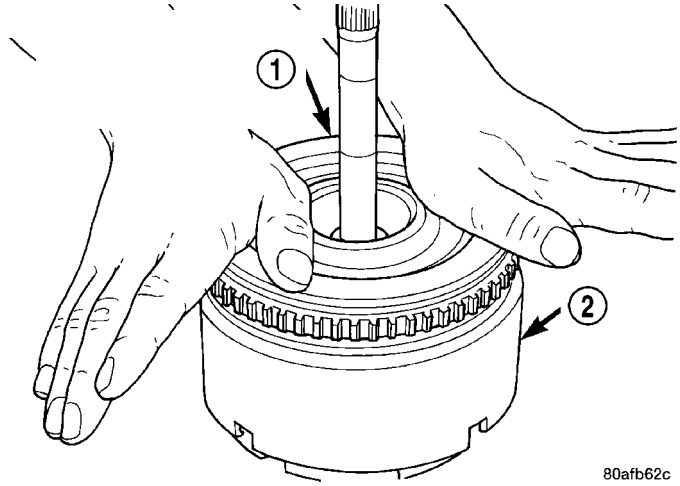


Fig. 280 Install Input Shaft Hub Assembly

1 - PUSH DOWN TO INSTALL INPUT SHAFT HUB ASSEMBLY (ROTATE TO ALIGN SPLINES)
2 - OD/REV. PISTON

(6) Install input hub tapered snap ring (Fig. 281) (Fig. 282).

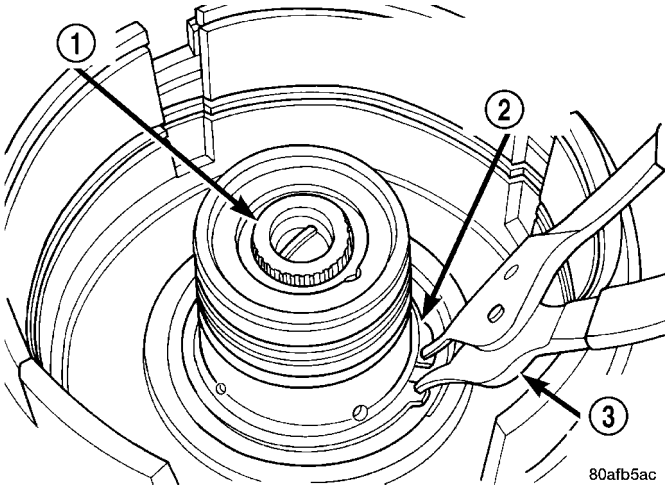


Fig. 281 Install Input Hub Tapered Snap Ring

1 - INPUT SHAFT
2 - INPUT HUB SNAP RING (TAPERED SIDE UP WITH TABS IN CAVITY)
3 - SNAP RING PLIERS

INPUT CLUTCH ASSEMBLY (Continued)

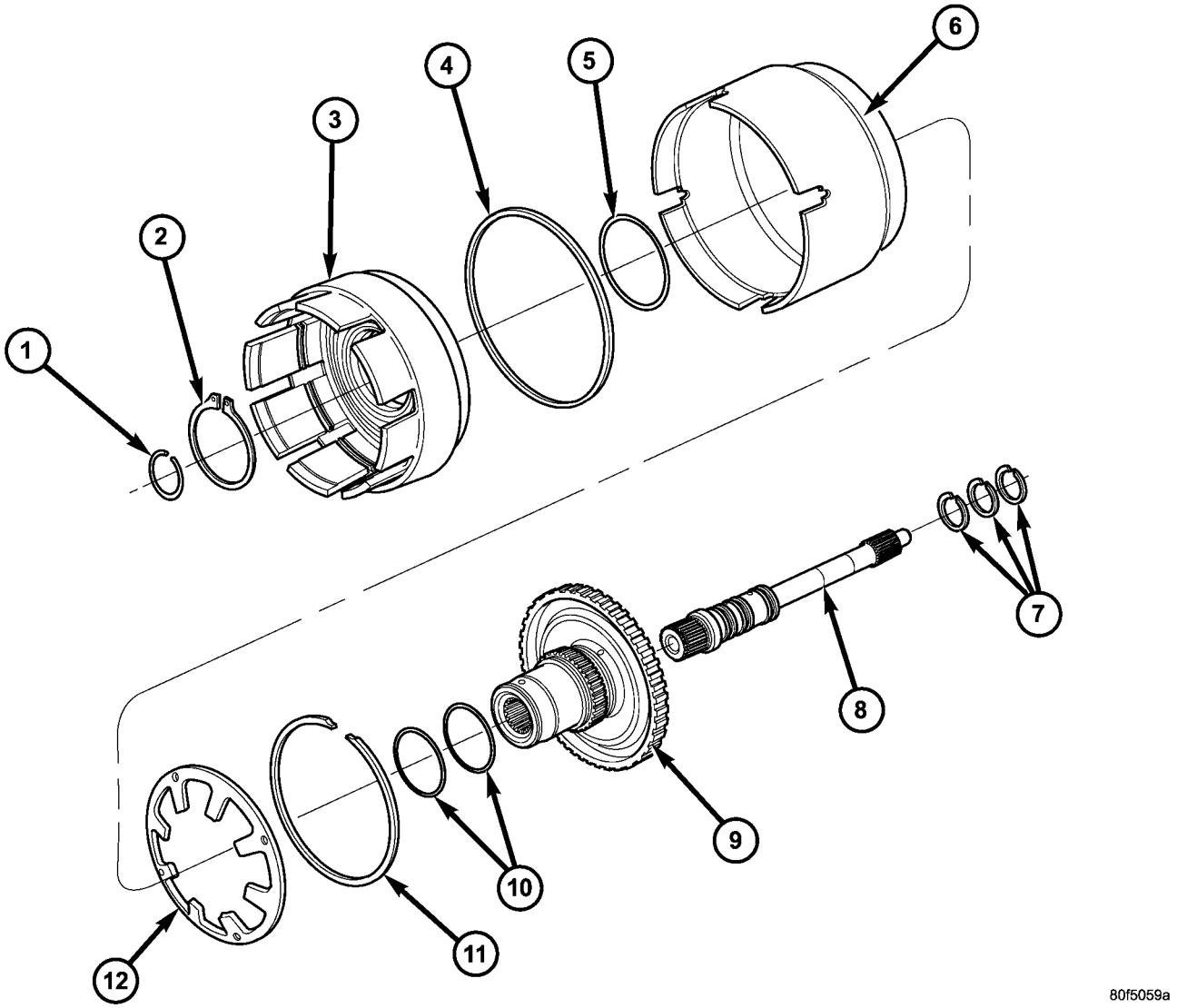


Fig. 282 Input Clutch Hub, Retainer, and OD/Reverse Piston

1 - SNAP RING (INPUT SHAFT)
2 - SNAP RING
3 - CLUTCH RETAINER
4 - SEAL, OUTER
5 - SEAL, INNER
6 - OD/REVERSE PISTON
7 - SEAL, INPUT SHAFT
8 - SHAFT, INPUT
9 - HUB
10 - SEAL
11 - SNAP RING
12 - BELLEVILLE SPRING

INPUT CLUTCH ASSEMBLY (Continued)

(7) Install UD clutch piston (Fig. 283).

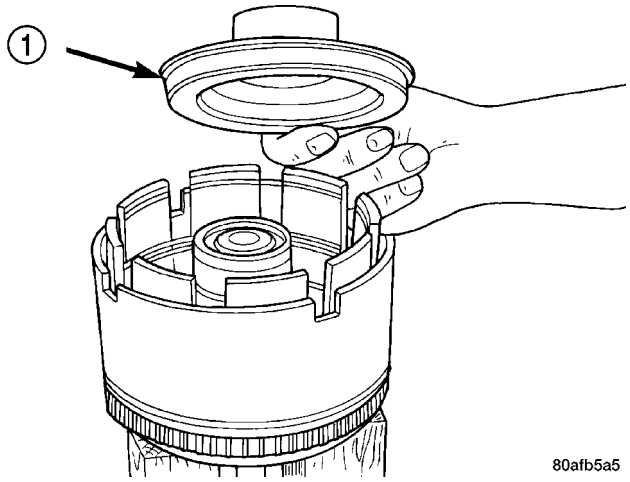


Fig. 283 Underdrive Clutch Piston

1 - PISTON

(8) Install UD piston return spring and Tool 5067 as shown in (Fig. 284).

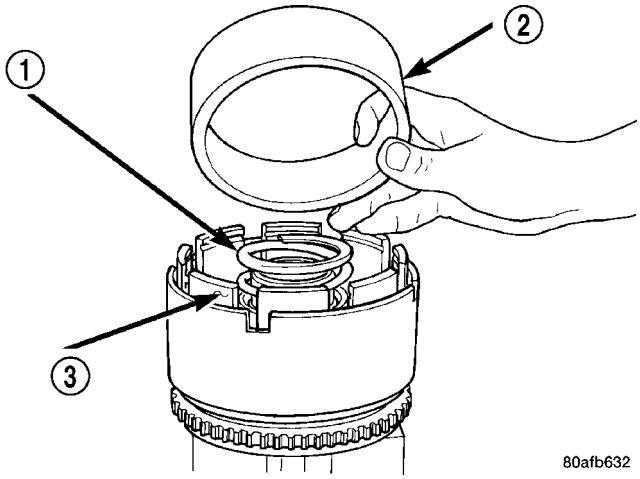


Fig. 284 Seal Compressor Special Tool 5067

1 - PISTON RETURN SPRING
2 - SPECIAL TOOL 5067
3 - INPUT SHAFT CLUTCHES RETAINER ASSEMBLY

(9) Using Tool 5059A and an arbor press, Install the UD spring retainer and snap ring (Fig. 285) (Fig. 286) (Fig. 287) Compress just enough to install snap ring.

CAUTION: Compress return spring just enough to install snap ring.

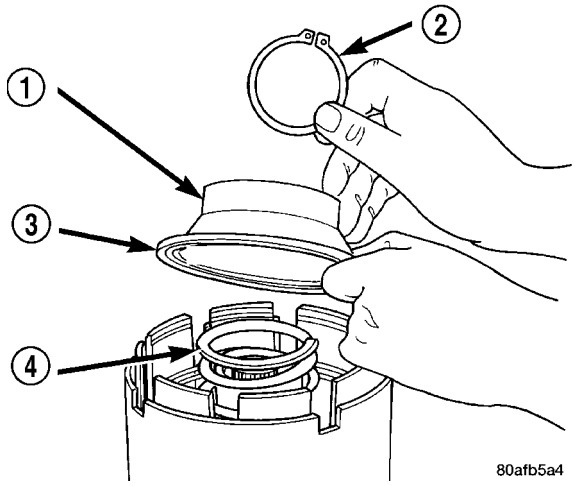


Fig. 285 UD Return Spring and Retainer

1 - UNDERDRIVE SPRING RETAINER
2 - SNAP RING
3 - SEAL
4 - PISTON RETURN SPRING

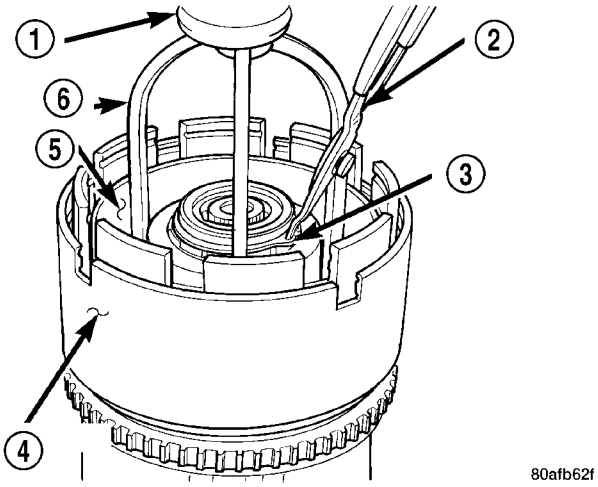


Fig. 286 Install UD Spring Retainer and Snap Ring

1 - ARBOR PRESS RAM
2 - SNAP RING PLIERS
3 - SNAP RING
4 - OD/REVERSE PISTON
5 - TOOL 5067
6 - TOOL 5059A

INPUT CLUTCH ASSEMBLY (Continued)

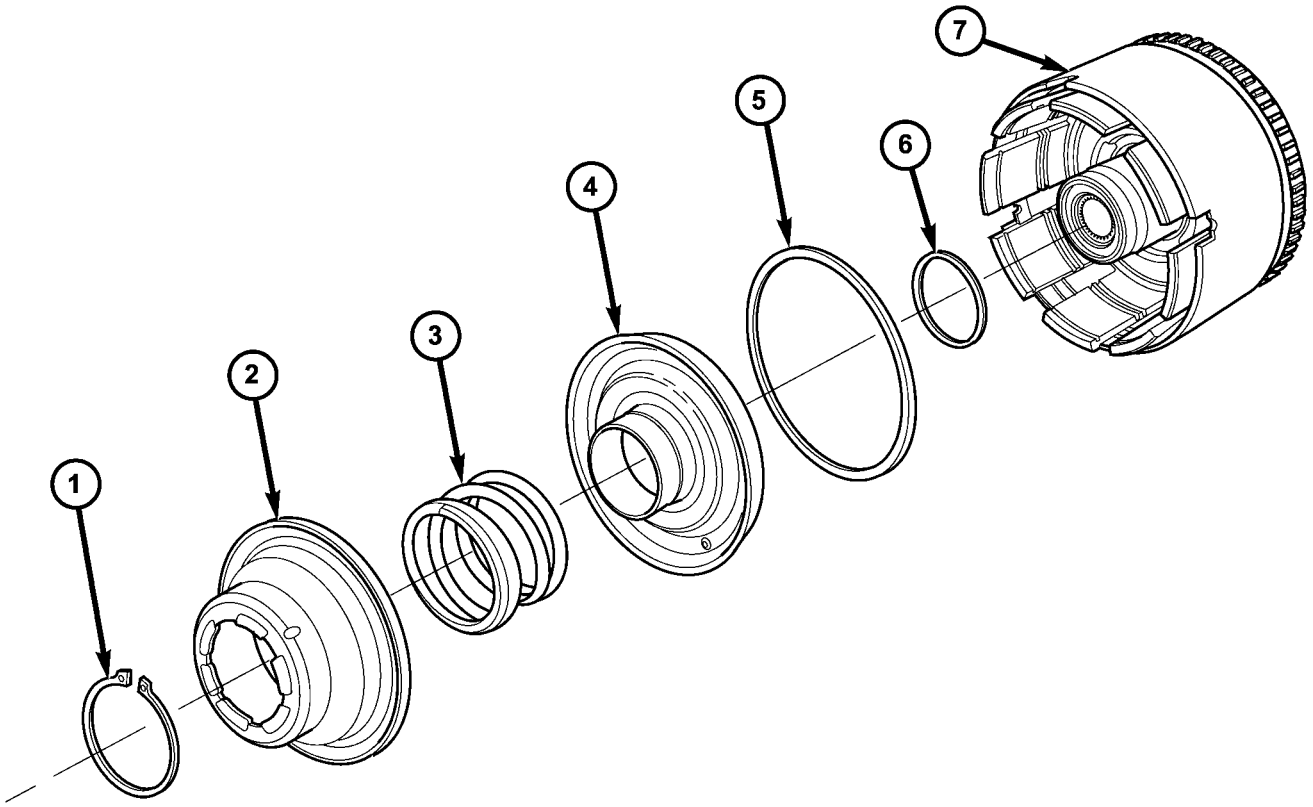


Fig. 287 Underdrive Clutch Piston, Spring and Retainer

1 - SNAP RING
2 - SPRING RETAINER
3 - SPRING
4 - UD CLUTCH PISTON
5 - SEAL, OUTER
6 - SEAL, INNER
7 - INPUT CLUTCH ASSEMBLY

(10) Install the UD clutch pack. Leave out upper disc, until snap ring is installed (Fig. 288).

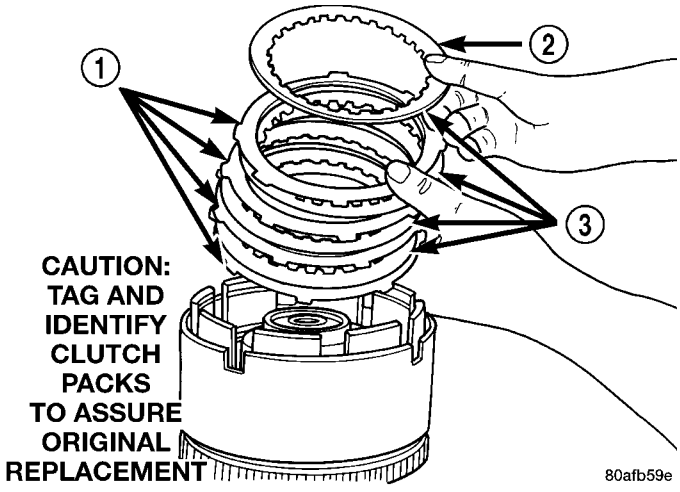


Fig. 288 Underdrive Clutch Pack

1 - CLUTCH PLATE
2 - ONE UD CLUTCH DISC
3 - CLUTCH DISC

INPUT CLUTCH ASSEMBLY (Continued)

(11) Install the UD clutch flat snap ring (Fig. 289).

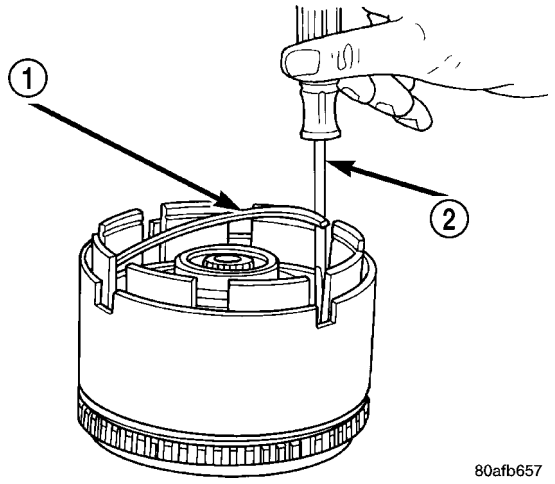


Fig. 289 UD Clutch Flat Snap Ring

1 - UNDERDRIVE CLUTCH REACTION PLATE FLAT SNAP RING
2 - SCREWDRIVER

(12) Install the last UD clutch disc (Fig. 290).

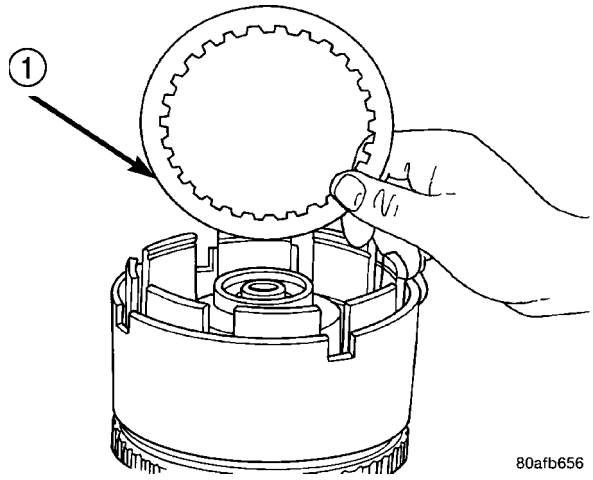


Fig. 290 Install Last UD Clutch Disc

1 - ONE UNDERDRIVE CLUTCH DISC

(13) Install the OD/UD clutch reaction plate and snap ring (Fig. 291) (Fig. 292). The OD/UD clutches reaction plate has a step on both sides. Install the OD/UD clutches reaction plate tapered step side up.

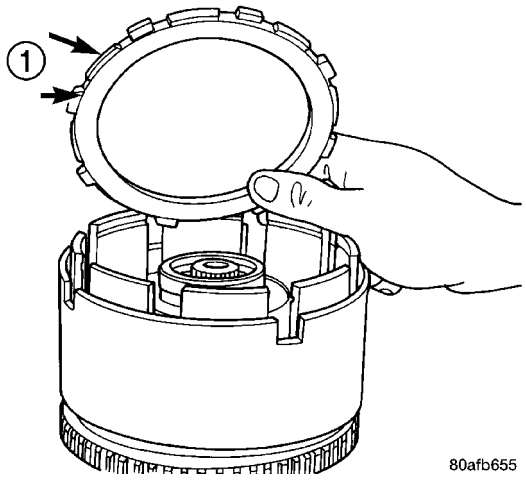


Fig. 291 OD/UD Reaction Plate

1 - OD/UD CLUTCH REACTION PLATE (TAPERED STEP SIDE UP)

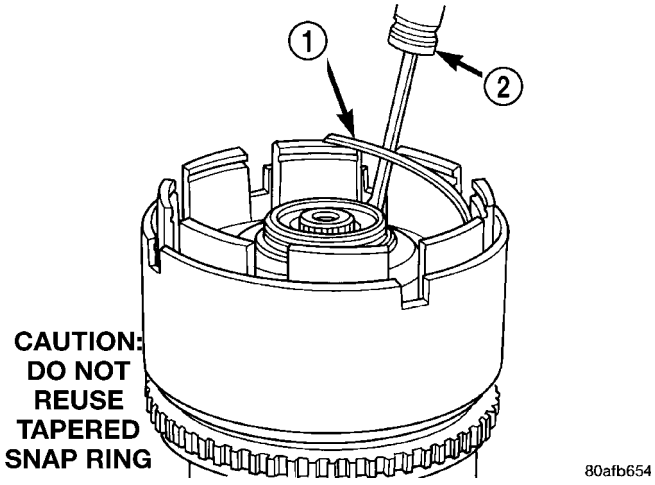


Fig. 292 Tapered Snap Ring

1 - OVERDRIVE/UNDERDRIVE CLUTCHES REACTION PLATE TAPERED SNAP RING
2 - SCREWDRIVER (DO NOT SCRATCH REACTION PLATE)

NOTE: Snap ring ends must be located within one finger of the input clutch hub. Be sure that snap ring is fully seated, by pushing with screwdriver, into snap ring groove all the way around.

(14) Seat tapered snap ring to ensure proper installation (Fig. 293) (Fig. 294).

INPUT CLUTCH ASSEMBLY (Continued)

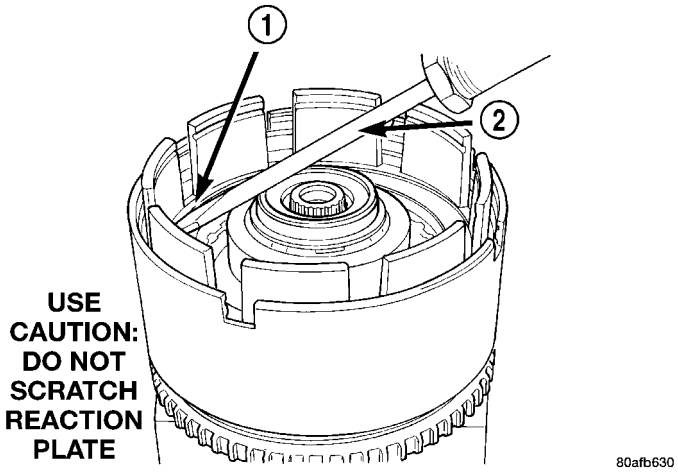


Fig. 293 Seating Tapered Snap Ring

1 - OVERDRIVE/UNDERDRIVE CLUTCHES REACTION PLATE TAPERED SNAP RING
2 - SCREWDRIVER

(15) Install input clutch assembly to the Input Clutch Pressure Fixture–Tool 8391 (Fig. 295).

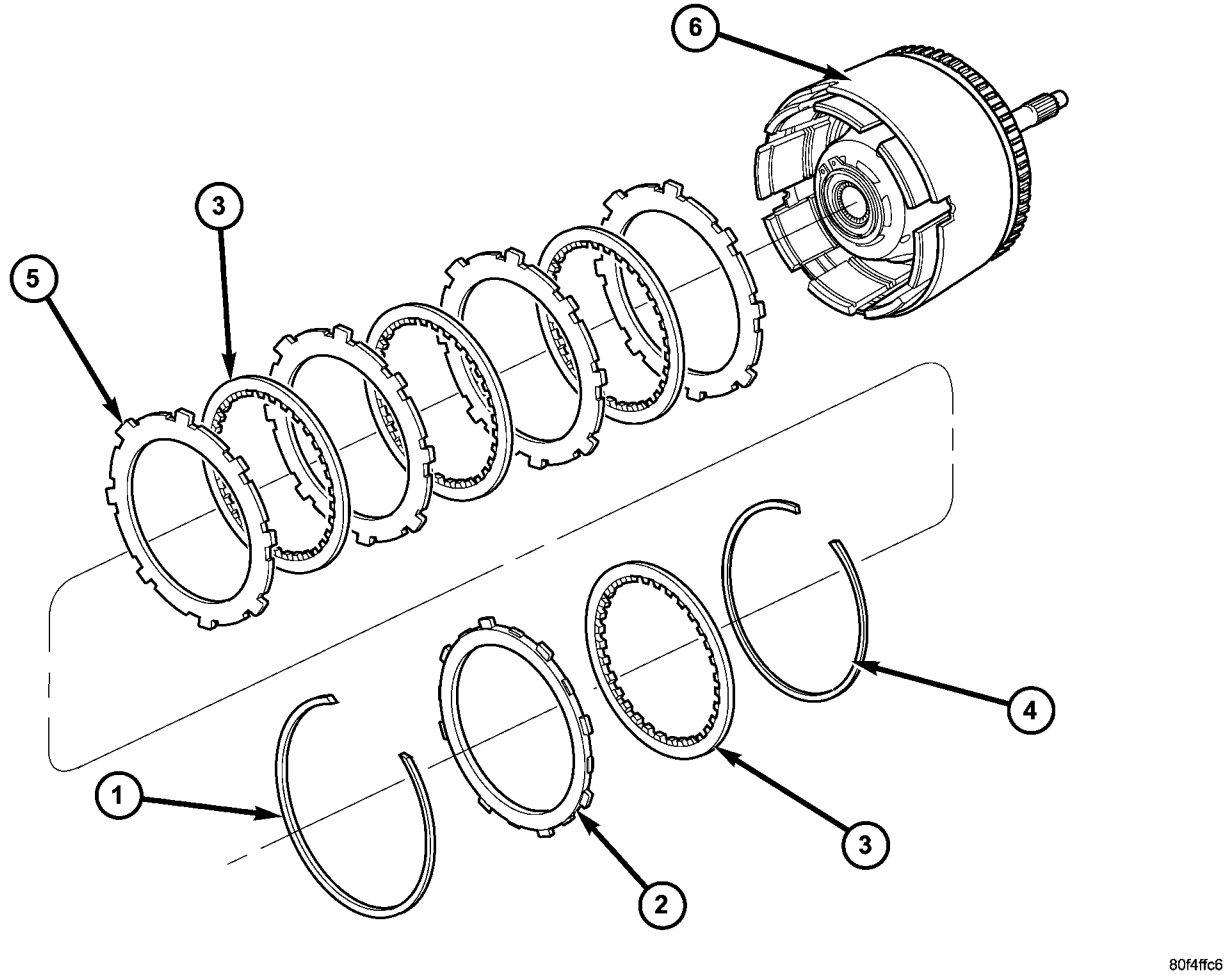


Fig. 294 Underdrive Clutch Assembly

1 - SNAP RING (TAPERED)
2 - OD/UD REACTION PLATE
3 - CLUTCH DISC
4 - SNAP RING (FLAT)
5 - CLUTCH PLATE
6 - INPUT CLUTCH ASSEMBLY

INPUT CLUTCH ASSEMBLY (Continued)

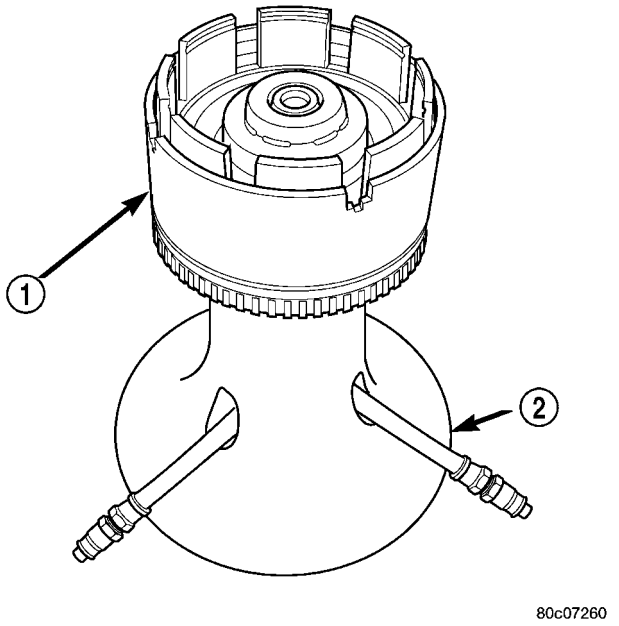


Fig. 295 Input Clutch Assembly on Pressure Fixture Tool 8391

1 - INPUT CLUTCH ASSEMBLY
2 - INPUT CLUTCH PRESSURE FIXTURE 8391

(16) Set up dial indicator on the UD clutch pack as shown in (Fig. 296).

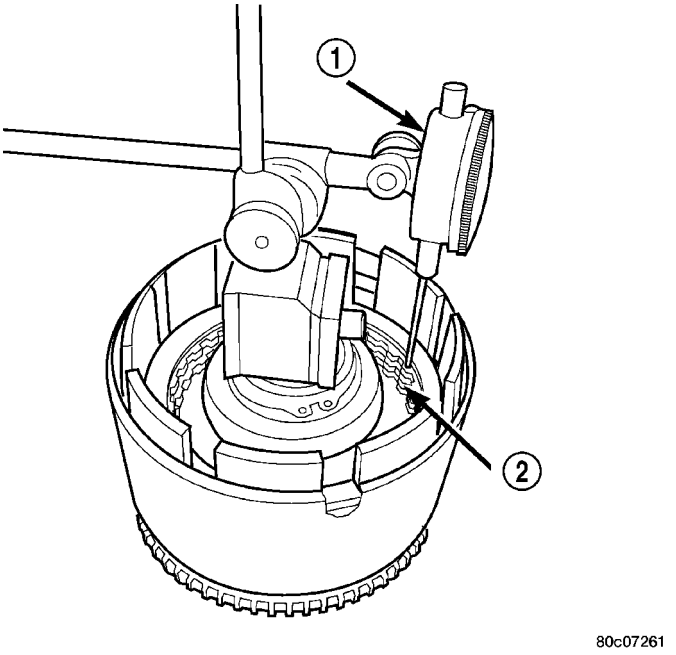


Fig. 296 Set Up Dial Indicator to Measure UD Clutch Clearance

1 - DIAL INDICATOR
2 - UNDERDRIVE CLUTCH

(17) Using moderate pressure, press down and hold (near indicator) the UD clutch pack with screwdriver or suitable tool and zero dial indicator (Fig. 297). When releasing pressure on clutch pack, indicator reading should advance 0.005–0.010.

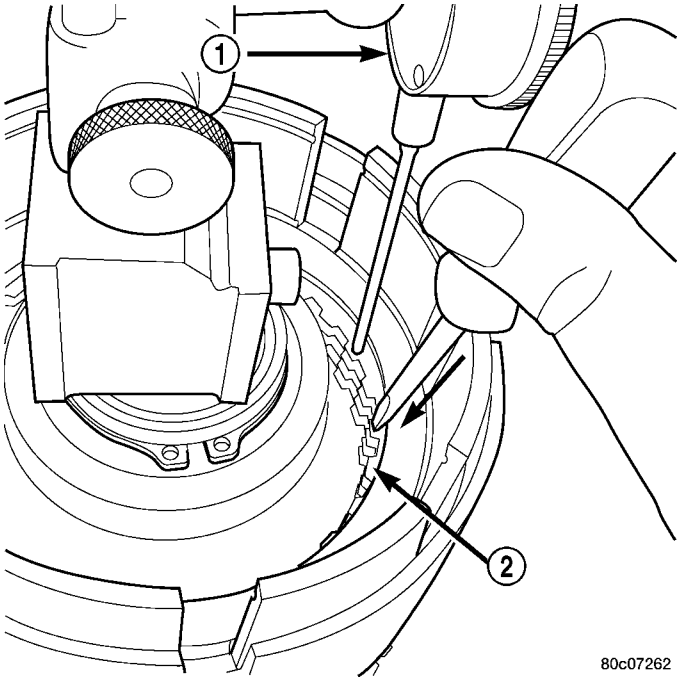


Fig. 297 Press Down on UD Clutch Pack and Zero Dial Indicator

1 - DIAL INDICATOR
2 - UNDERDRIVE CLUTCH

CAUTION: Do not apply more than 30 psi (206 kPa) to the underdrive clutch pack.

(18) Apply 30 psi (206 kPa) to the underdrive hose on Tool 8391 and measure UD clutch clearance. Measure and record UD clutch pack measurement in four (4) places, 90° apart.

(19) Take average of four measurements and compare with UD clutch pack clearance specification. **Underdrive clutch pack clearance must be 0.94-1.50 mm (0.037-0.059 in.).**

(20) If necessary, select the proper reaction plate to achieve specifications:

UNDERDRIVE REACTION PLATE THICKNESS	
4659939AB	5.837-5.937 mm (0.230-0.234 in.)
4659940AB	6.147-6.248 mm (0.242-0.246 in.)
4659941AB	6.457-6.557 mm (0.254-0.258 in.)

(21) Install the OD clutch pack (four frictions/three steels) (Fig. 298).

INPUT CLUTCH ASSEMBLY (Continued)

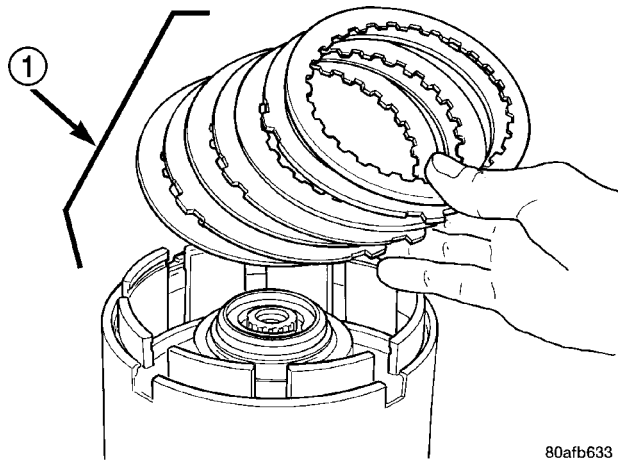


Fig. 298 Install OD Clutch Pack

1 - OVERDRIVE CLUTCH PACK

(22) Install OD pressure plate waved snap ring (Fig. 299).

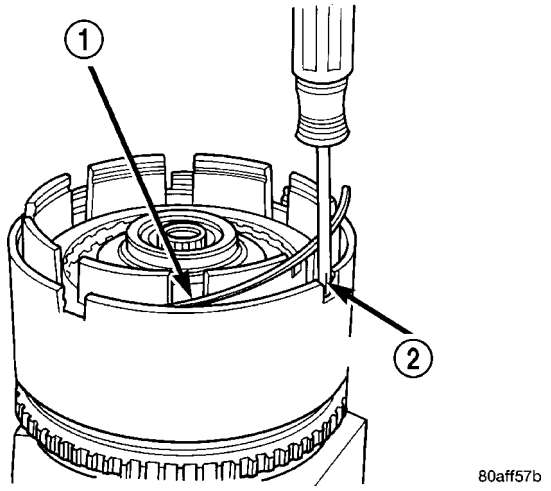


Fig. 299 Install Waved Snap Ring

1 - OVERDRIVE PRESSURE PLATE WAVED SNAP RING
2 - SCREWDRIVER

(23) Install the OD/Reverse pressure plate with large step down (towards OD clutch pack) (Fig. 300).

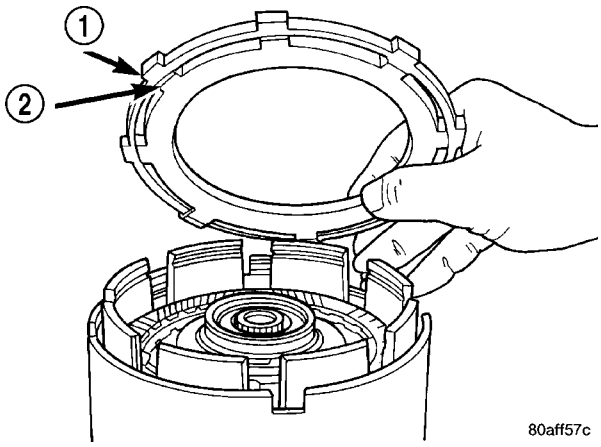


Fig. 300 OD/Reverse Pressure Plate

1 - OVERDRIVE/REVERSE PRESSURE PLATE
2 - (STEP SIDE DOWN)

(24) Install OD pressure plate flat snap ring (Fig. 301) (Fig. 302).

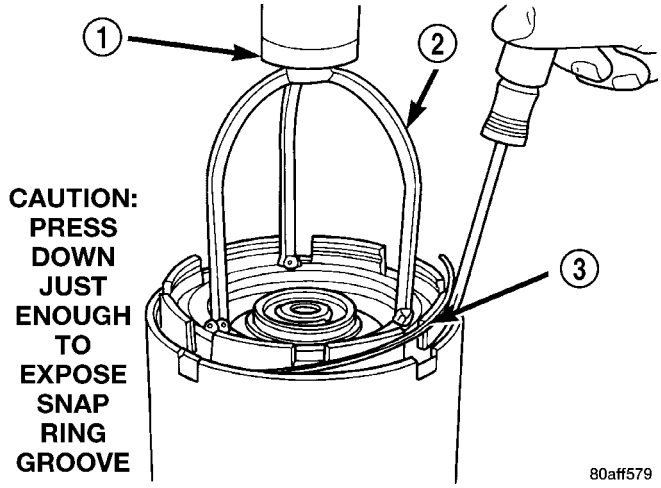


Fig. 301 Install Flat Snap Ring

1 - ARBOR PRESS RAM
2 - TOOL 5059A
3 - FLAT SNAP RING

INPUT CLUTCH ASSEMBLY (Continued)

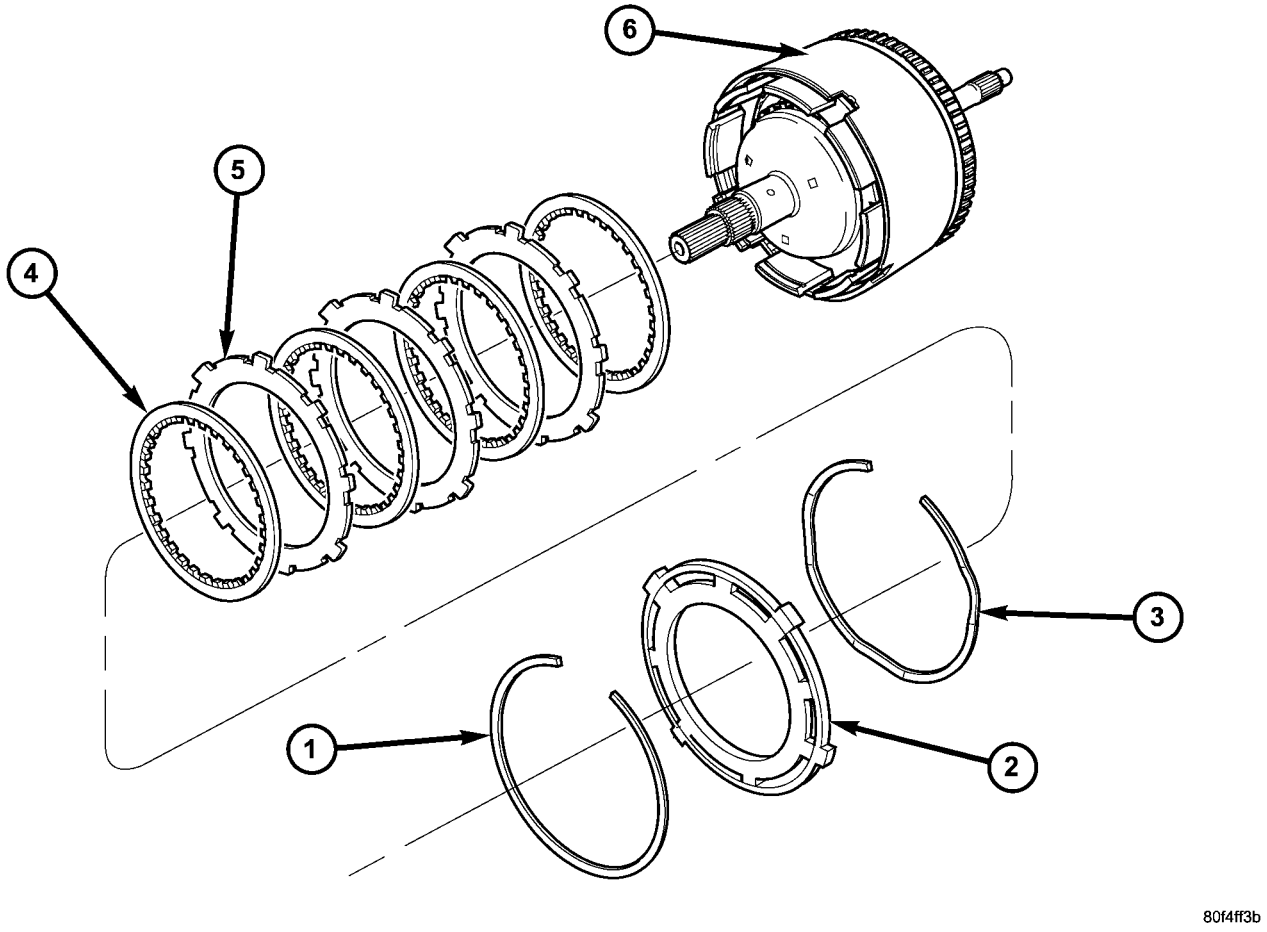


Fig. 302 Overdrive Clutch Assembly

1 - SNAP RING	4 - CLUTCH DISC (4)
2 - OD/REVERSE PRESSURE PLATE	5 - CLUTCH STEEL (3)
3 - SNAP RING (WAVE)	6 - INPUT CLUTCH ASSEMBLY

(25) Measure OD clutch pack clearance. Set up dial indicator on top of the OD/Reverse pressure plate as shown in (Fig. 303).

(26) Zero dial indicator and apply 30 psi (206 kPa) air pressure to the overdrive clutch hose on Tool 8391. Measure and record OD clutch pack measurement in four (4) places, 90° apart.

(27) Take average of four measurements and compare with OD clutch pack clearance specification. **The overdrive (OD) clutch pack clearance is 1.07-3.25 mm (0.042-0.128 in.).**

If not within specifications, the clutch is not assembled properly. There is no adjustment for the OD clutch clearance.

(28) Install reverse clutch pack (two frictions/one steel) (Fig. 304).

(29) Install reverse clutch reaction plate with the flat side down towards reverse clutch (Fig. 305).

(30) Tap reaction plate down to allow installation of the reverse clutch snap ring. Install reverse clutch snap ring (Fig. 306) (Fig. 307).

INPUT CLUTCH ASSEMBLY (Continued)

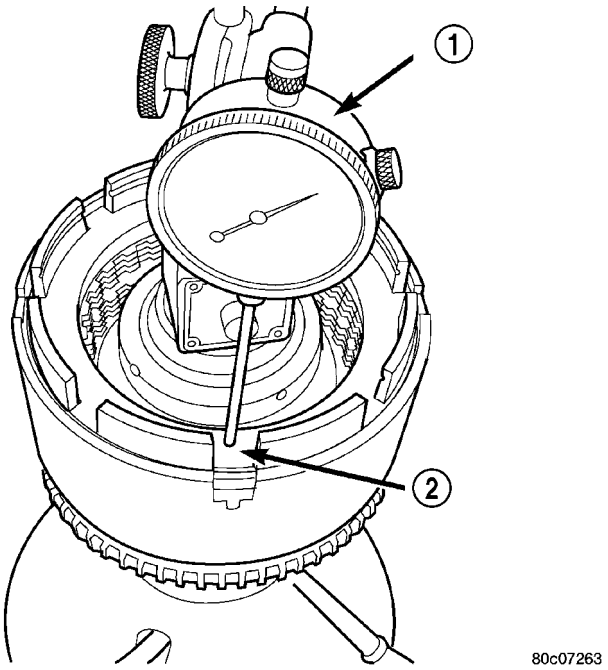


Fig. 303 Measure OD Clutch Pack Clearance

1 - DIAL INDICATOR
2 - OD/REVERSE REACTION PLATE

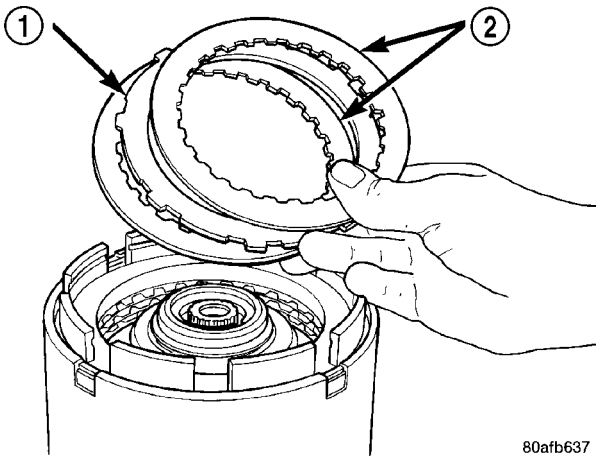


Fig. 304 Install Reverse Clutch Pack

1 - REVERSE CLUTCH PLATE
2 - REVERSE CLUTCH DISCS

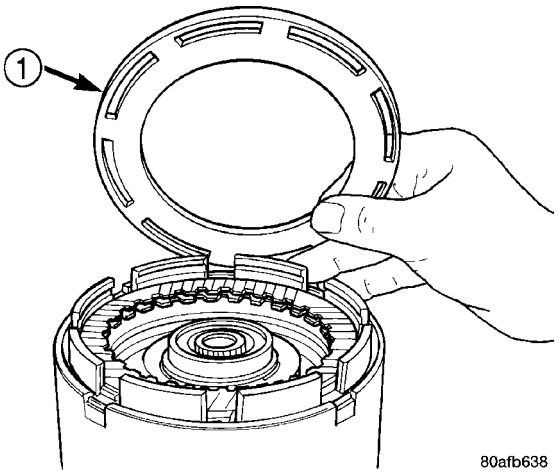


Fig. 305 Install Reaction Plate

1 - REVERSE CLUTCH REACTION PLATE (FLAT SIDE DOWN)

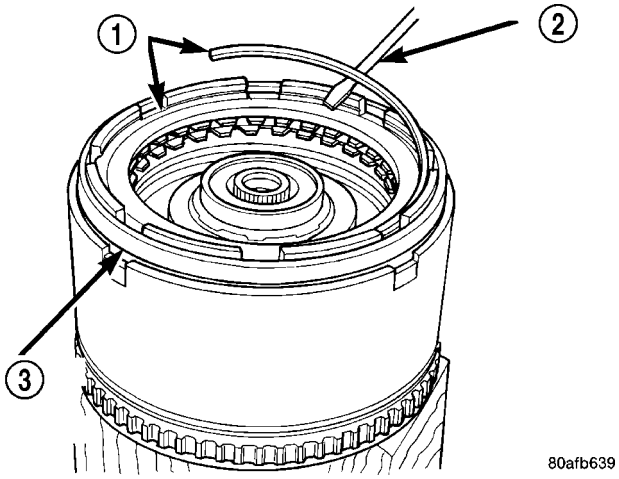


Fig. 306 Install Reverse Clutch Snap Ring

1 - REVERSE CLUTCH SNAP RING (SELECT)
2 - SCREWDRIVER
3 - REVERSE CLUTCH REACTION PLATE

(31) Pry up reverse reaction plate to seat against snap ring (Fig. 308).

(32) Set up a dial indicator on the reverse clutch pack as shown in (Fig. 309).

INPUT CLUTCH ASSEMBLY (Continued)

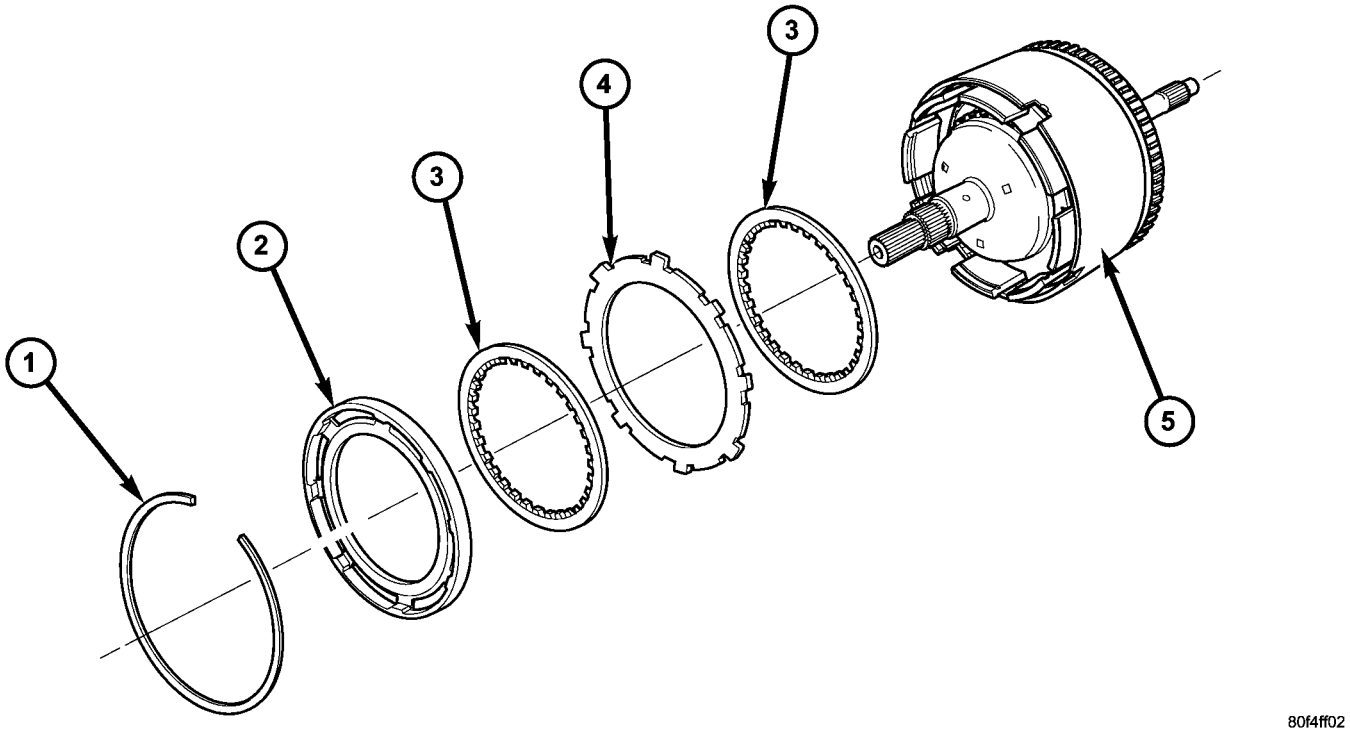


Fig. 307 Reverse Clutch Assembly

1 - SNAP RING
2 - REACTION PLATE
3 - CLUTCH DISC (2)
4 - CLUTCH PLATE (1)
5 - INPUT CLUTCH ASSEMBLY

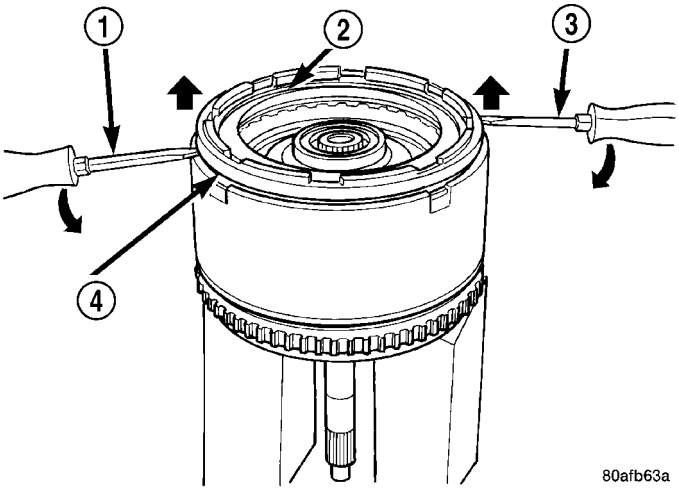


Fig. 308 Pry Up Reaction Plate to Seat Against Snap Ring

1 - SCREWDRIVER
2 - SNAP RING
3 - SCREWDRIVER
4 - MUST RAISE REVERSE REACTION PLATE TO RAISE SNAP RING

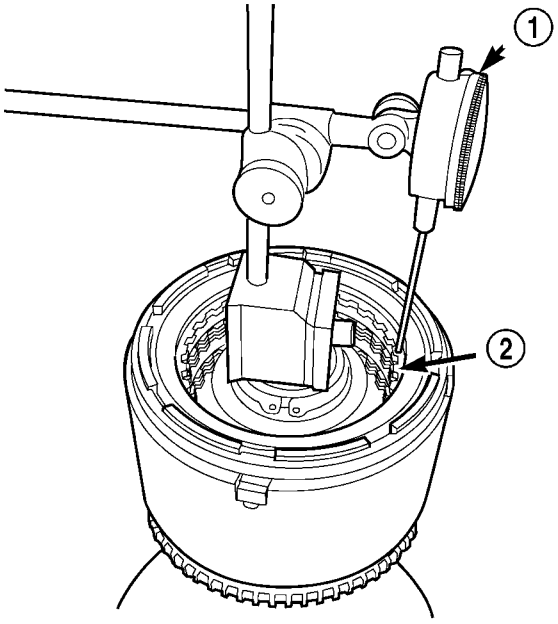


Fig. 309 Measure Reverse Clutch Pack Clearance

1 - DIAL INDICATOR
2 - REVERSE CLUTCH

INPUT CLUTCH ASSEMBLY (Continued)

(33) Using moderate pressure, press down and hold (near indicator) reverse clutch disc with screwdriver or suitable tool and zero dial indicator (Fig. 310). When releasing pressure, indicator should advance 0.005-0.010. as clutch pack relaxes.

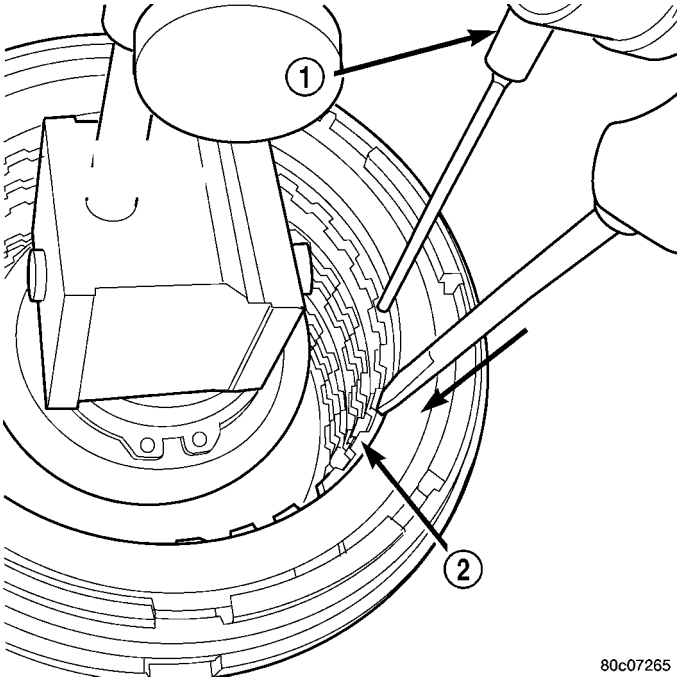


Fig. 310 Press Down on Reverse Clutch and Zero Indicator

1 - DIAL INDICATOR
2 - REVERSE CLUTCH

(34) Apply 30 psi (206 kPa) air pressure to the reverse clutch hose on Tool 8391. Measure and record reverse clutch pack measurement in four (4) places, 90° apart.

(35) Take average of four measurements and compare with reverse clutch pack clearance specification. **The reverse clutch pack clearance is 0.89-1.37 mm (0.035-0.054 in.).** Select the proper reverse clutch snap ring to achieve specifications:

REVERSE CLUTCH SNAP RING THICKNESS	
4377195	1.53-1.58 mm (0.060-0.062 in.)
4412871	1.77-1.83 mm (0.070-0.072 in.)
4412872	2.02-2.07 mm (0.080-0.082 in.)
4412873	2.27-2.32 mm (0.090-0.091 in.)

(36) To complete the assembly, reverse clutch and overdrive clutch must be removed.

(37) Install the #2 needle bearing (Fig. 311).

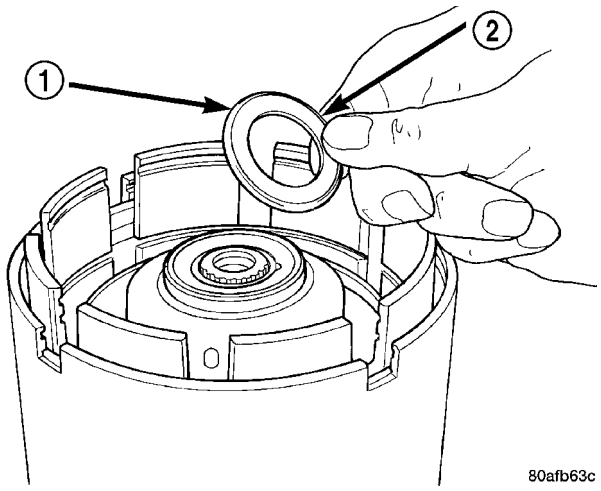


Fig. 311 Install No. 2 Needle Bearing

1 - #2 NEEDLE BEARING (NOTE 3 SMALL TABS)
2 - TABS UP

(38) Install the underdrive shaft assembly (Fig. 312).

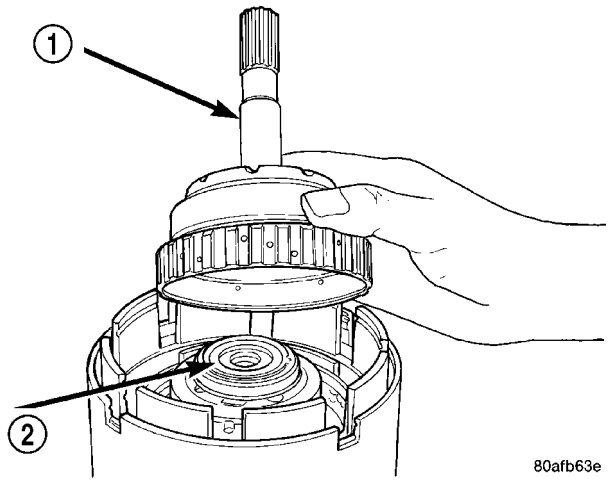


Fig. 312 Install Underdrive Shaft Assembly

1 - UNDERDRIVE SHAFT ASSEMBLY
2 - #2 NEEDLE BEARING

(39) Install the #3 thrust washer to the underdrive shaft assembly. Be sure five tabs are seated properly (Fig. 313).

INPUT CLUTCH ASSEMBLY (Continued)

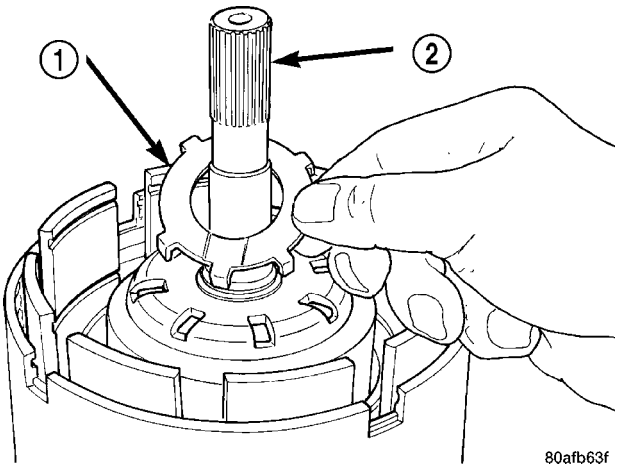


Fig. 313 Install No. 3 Thrust Washer

1 - #3 THRUST WASHER (NOTE 5 TABS)
2 - UNDERDRIVE SHAFT ASSEMBLY

(40) Install the #3 thrust plate to the bottom of the overdrive shaft assembly. Retain with petrolatum or transmission assembly gel (Fig. 314).

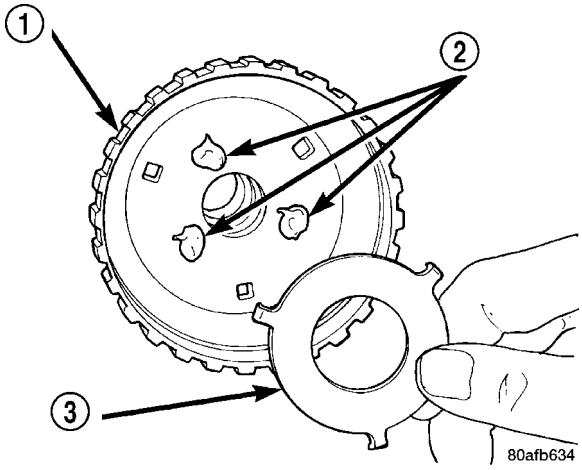


Fig. 314 Install No. 3 Thrust Plate

1 - OVERDRIVE SHAFT ASSEMBLY
2 - DABS OF PETROLATUM (FOR RETENTION)
3 - #3 THRUST PLATE (NOTE 3 TABS)

(41) Install the overdrive shaft assembly (Fig. 315) (Fig. 316).

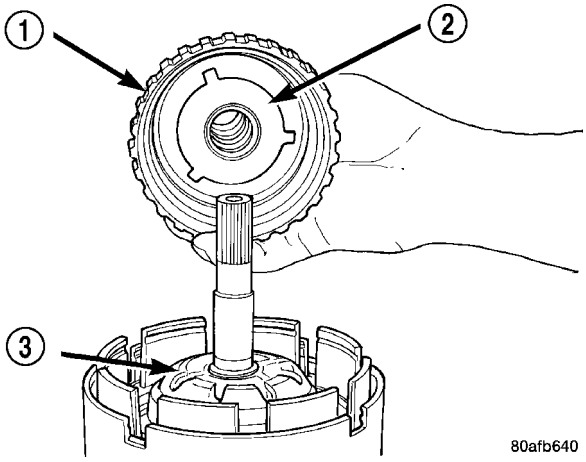


Fig. 315 Install Overdrive Shaft Assembly

1 - OVERDRIVE SHAFT ASSEMBLY
2 - #3 THRUST PLATE
3 - #3 THRUST WASHER

(42) Reinstall overdrive and reverse clutch as shown. **Rechecking these clutch clearances is not necessary.**

INPUT CLUTCH ASSEMBLY (Continued)

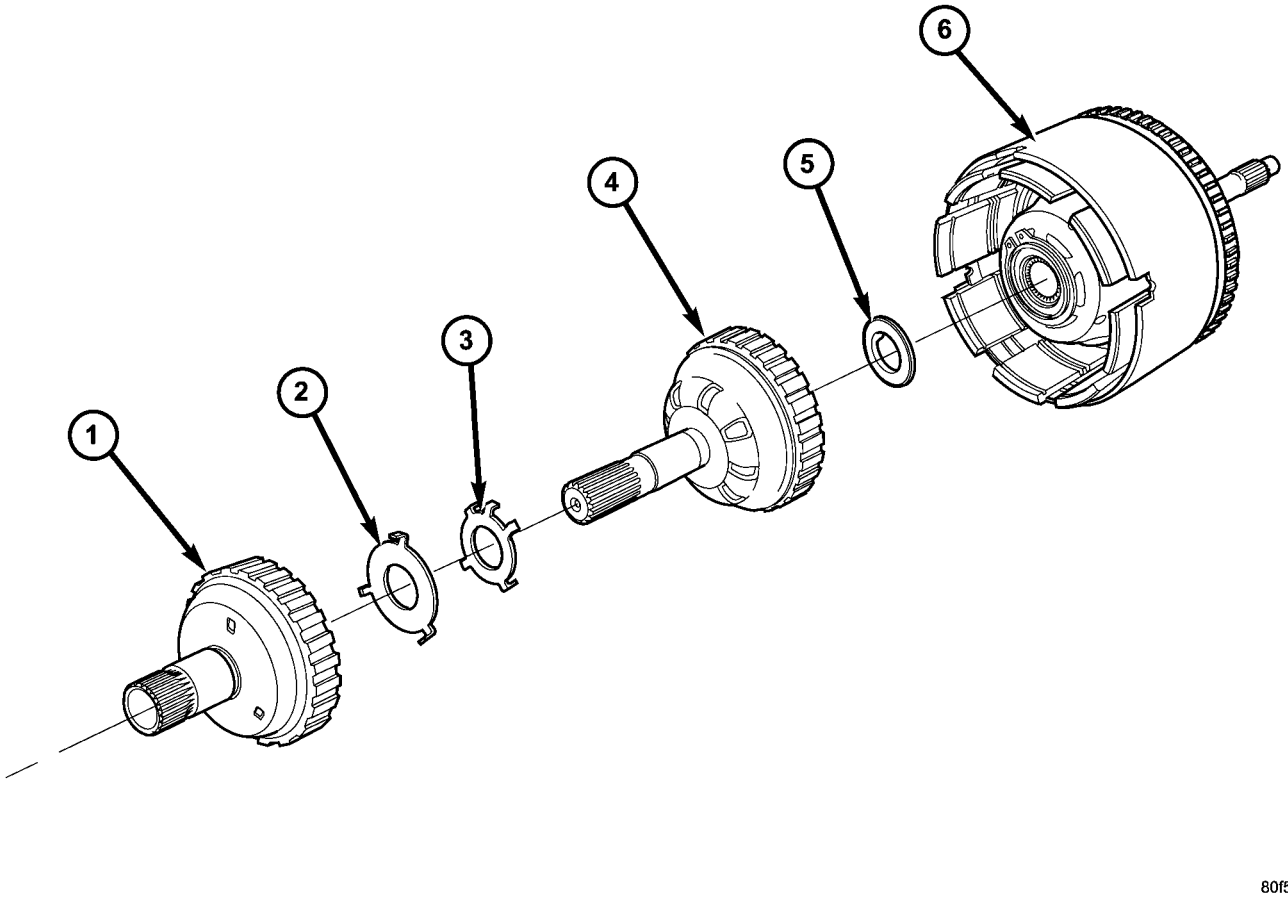


Fig. 316 Overdrive/Underdrive Shafts

1 - OVERDRIVE SHAFT
2 - #3 THRUST PLATE (3 TABS)
3 - #3 THRUST WASHER (5 TABS)
4 - UNDERDRIVE SHAFT
5 - #2 NEEDLE BEARING (3 TABS)
6 - INPUT CLUTCH ASSEMBLY

OIL PUMP

DESCRIPTION

The oil pump is located in the pump housing inside the bell housing of the transaxle case (Fig. 317). The oil pump consists of an inner and outer gear, a housing, and a cover that also serves as the reaction shaft support.

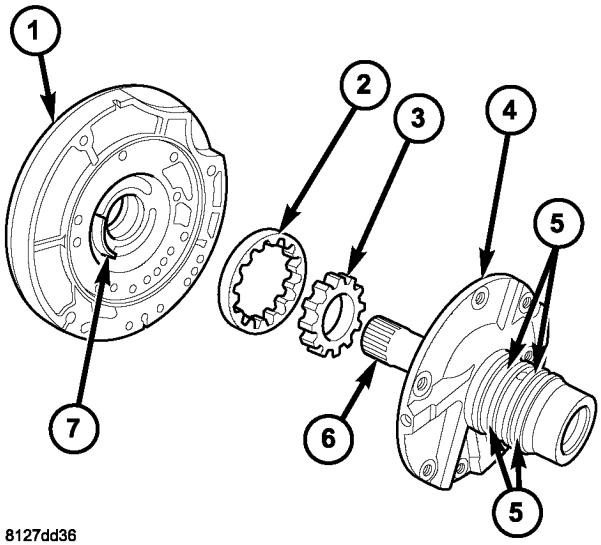


Fig. 317 Oil Pump Assembly

1 - PUMP BODY
2 - OUTER GEAR
3 - INNER GEAR
4 - REACTION SHAFT SUPPORT
5 - SEAL RINGS (4)
6 - REACTION SHAFT
7 - CRESCENT

OPERATION

As the torque converter rotates, the converter hub rotates the inner and outer gears. As the gears rotate, the clearance between the gear teeth increases in the crescent area, and creates a suction at the inlet side of the pump. This suction draws fluid through the pump inlet from the oil pan. As the clearance between the gear teeth in the crescent area decreases, it forces pressurized fluid into the pump outlet and to the valve body.

DISASSEMBLY

When disassembling the transaxle it is necessary to inspect the oil pump for wear and damage.

(1) Remove the reaction shaft support-to-pump body bolts (Fig. 318).

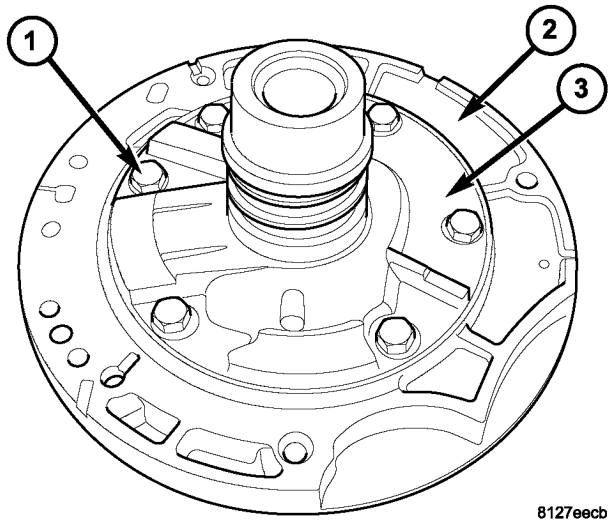


Fig. 318 Reaction Support-to-Pump Body Bolts

1 - BOLT (6)
2 - PUMP BODY
3 - REACTION SHAFT SUPPORT

(2) Remove reaction shaft support from pump housing (Fig. 319).

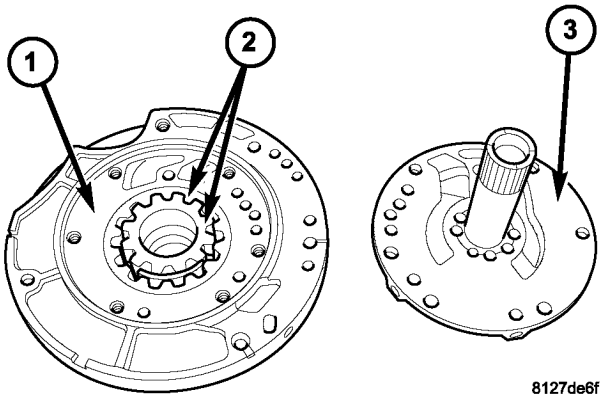


Fig. 319 Reaction Shaft Support

1 - PUMP BODY
2 - PUMP GEARS
3 - REACTION SHAFT SUPPORT

(3) Remove the pump gears (Fig. 320) and check for wear and damage on pump housing and gears.

OIL PUMP (Continued)

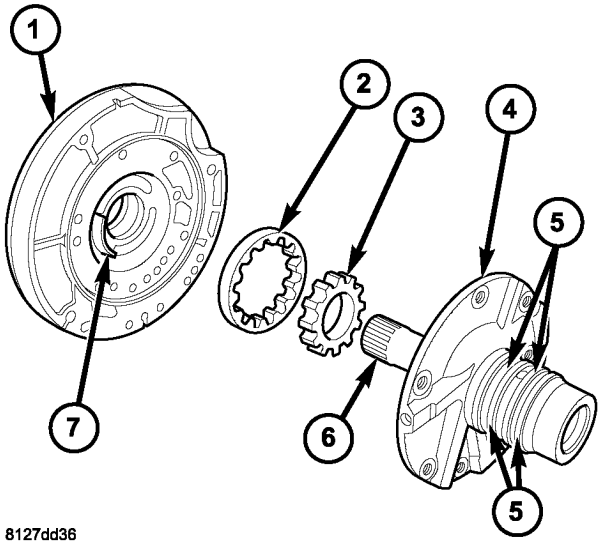


Fig. 320 Oil Pump Assembly

1 - PUMP BODY
2 - OUTER GEAR
3 - INNER GEAR
4 - REACTION SHAFT SUPPORT
5 - SEAL RINGS (4)
6 - REACTION SHAFT
7 - CRESCENT

(4) Re-install the gears and check clearances.

(5) Measure the clearance between the outer gear and the pump pocket (Fig. 321). Clearance should be 0.089–0.202 mm (0.0035-0.0079 in.).

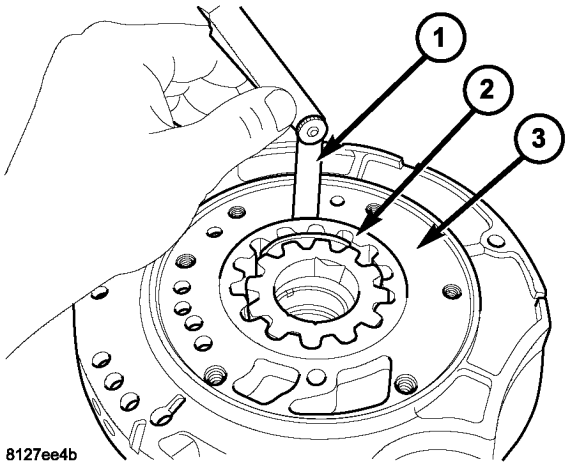


Fig. 321 Measuring Outer Gear-to-Pocket

1 - FEELER GAUGE
2 - OUTER GEAR
3 - PUMP BODY

(6) Measure clearance between outer gear and crescent (Fig. 322). Clearance should be 0.060-0.298 mm (0.0023-0.0117 in.).

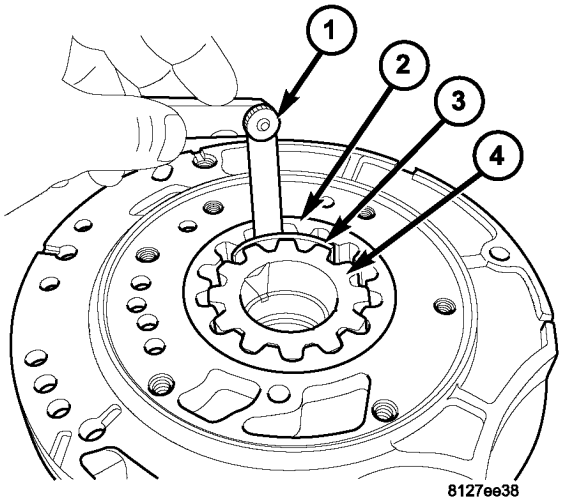


Fig. 322 Measuring Outer Gear-to-Crescent

1 - FEELER GAUGE
2 - OUTER GEAR
3 - CRESCENT
4 - INNER GEAR

(7) Measure clearance between inner gear and crescent (Fig. 323). Clearance should be 0.093-0.385 mm (0.0036-0.0151 in.).

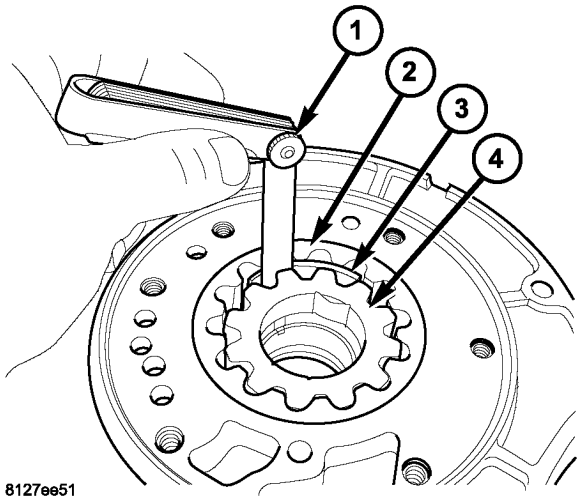


Fig. 323 Measuring Inner Gear-to-Crescent

1 - FEELER GAUGE
2 - OUTER GEAR
3 - CRESCENT
4 - INNER GEAR

OIL PUMP (Continued)

(8) Position an appropriate piece of Plastigage across both pump gears.

(9) Align the Plastigage to a flat area on the reaction shaft support housing.

(10) Install the reaction shaft to the pump housing (Fig. 318). Tighten the bolts to 27 N·m (20 ft. lbs.).

(11) Remove bolts and carefully separate the housings. Measure the Plastigage following the instructions supplied.

(12) Clearance between both gear end faces and the reaction shaft support should be 0.020-0.046 mm (0.0008-0.0018 in.).

ASSEMBLY

(1) Assemble oil pump as shown in (Fig. 324).

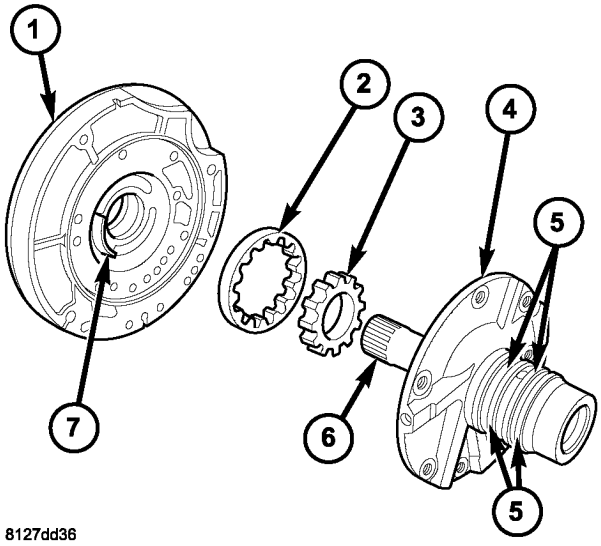


Fig. 324 Oil Pump Assembly

1 - PUMP BODY
2 - OUTER GEAR
3 - INNER GEAR
4 - REACTION SHAFT SUPPORT
5 - SEAL RINGS (4)
6 - REACTION SHAFT
7 - CRESCENT

(2) Install and torque reaction shaft support-to-oil pump housing bolts to 28 N·m (20 ft. lbs.) torque (Fig. 325).

PLANETARY GEARTRAIN

DESCRIPTION

The planetary geartrain is located between the input clutch assembly and the rear of the transaxle case. The planetary geartrain consists of two sun gears, two planetary carriers, two annulus (ring) gears, and one output shaft (Fig. 326).

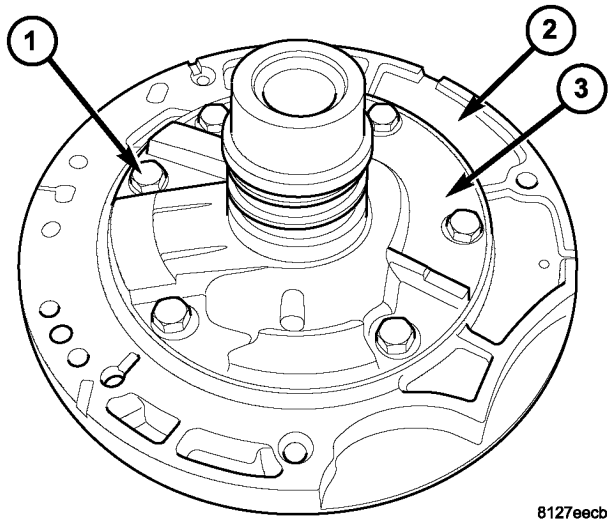


Fig. 325 Reaction Support-to-Pump Body Bolts

1 - BOLT (6)
2 - PUMP BODY
3 - REACTION SHAFT SUPPORT

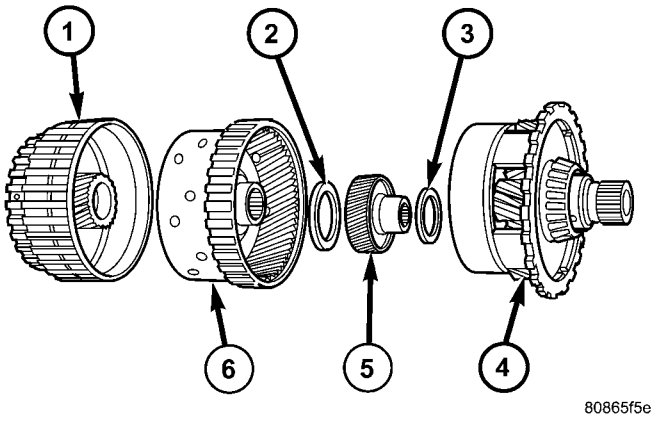


Fig. 326 Planetary Geartrain

1 - FRONT SUN GEAR ASSEMBLY
2 - #6 THRUST BEARING
3 - #7 THRUST BEARING
4 - REAR CARRIER/FRONT ANNULUS ASSEMBLY
5 - REAR SUN GEAR
6 - FRONT CARRIER/REAR ANNULUS ASSEMBLY

OPERATION

The planetary geartrain utilizes two planetary gear sets that connect the transmission input shaft to the output shaft. Input and holding clutches drive or lock different planetary members to change output ratio or direction.

SEAL - OIL PUMP

REMOVAL

(1) Remove transaxle from vehicle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - REMOVAL).

(2) Using Tool C-3981-B, remove oil pump seal (Fig. 327).

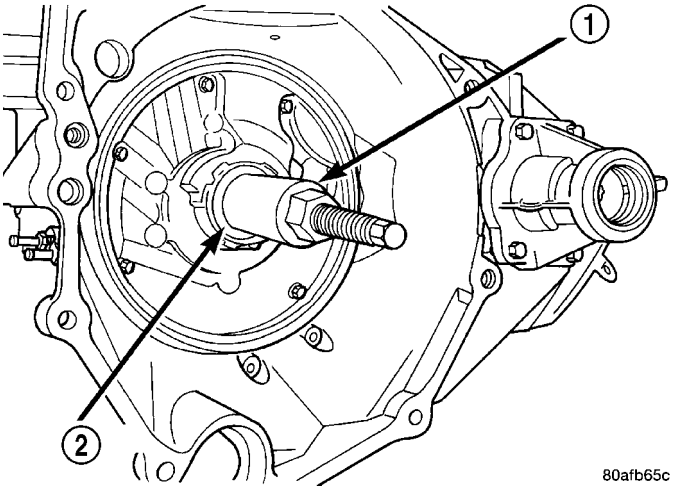


Fig. 327 Remove Oil Pump Seal

1 - TOOL C-3981–B
2 - OIL PUMP SEAL

INSTALLATION

(1) Using Tool C-4193, install oil pump seal (Fig. 328).

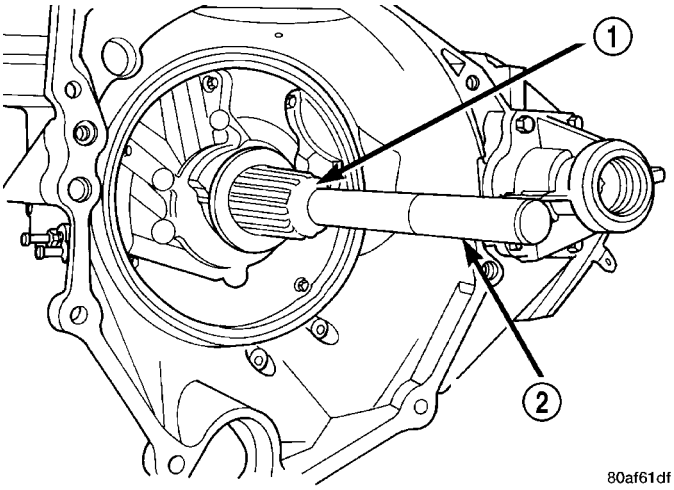


Fig. 328 Install Oil Pump Seal

1 - TOOL C-4193
2 - HANDLE TOOL C-4171

(2) Install transaxle to vehicle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - INSTALLATION).

SHIFT INTERLOCK CABLE

REMOVAL

(1) Disconnect battery negative cable.
(2) Remove instrument panel lower silencer panel.
(3) Remove inflatable knee blocker (Fig. 329).
(4) Place ignition key in the ACC position (Fig. 330).
(5) Disconnect shift interlock cable from ignition cylinder (Fig. 331).
(6) Remove center console assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)
(7) Disconnect shift interlock cable from shift mechanism as shown in (Fig. 332). Release retention tab using suitable screwdriver.

INSTALLATION

(1) Verify that ignition key is in ACC position (Fig. 333).
(2) Install shift interlock cable to ignition cylinder (Fig. 334). Secure cable to instrument panel at retainer.
(3) Route shift interlock cable towards shift mechanism.

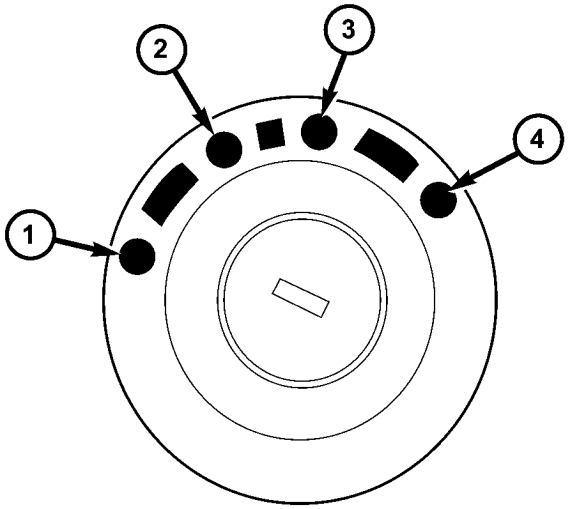


Fig. 330 Ignition Key/Switch Positions

1 - LOCK
2 - ACC
3 - ON
4 - START

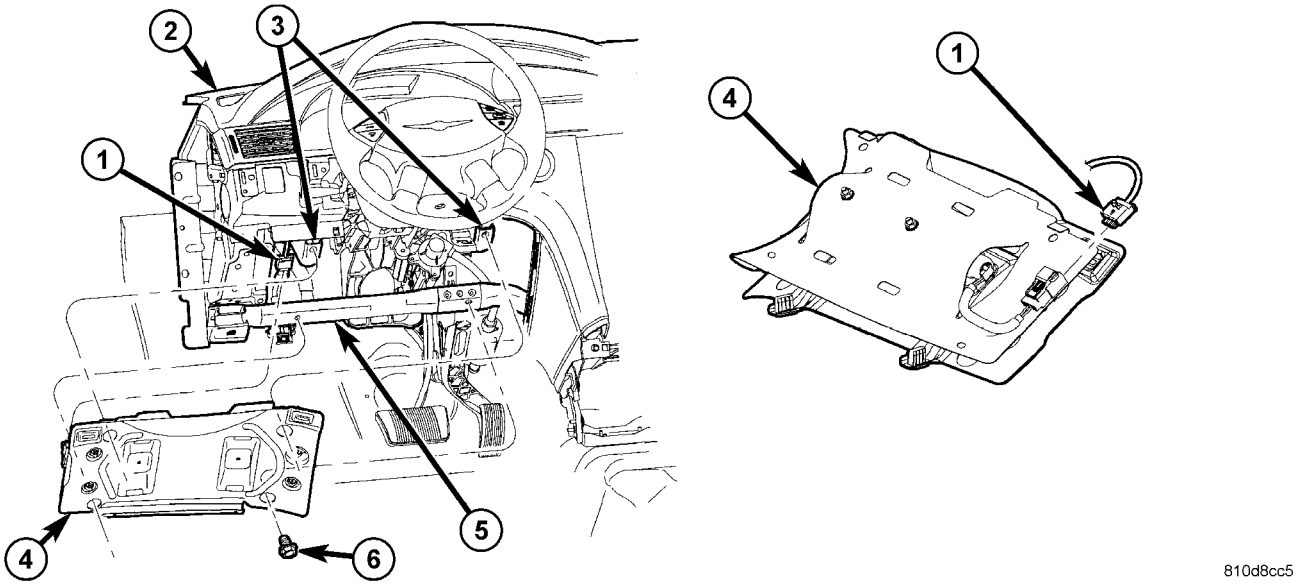


Fig. 329 Inflatable Knee Bolster

1 - CONNECTOR
2 - INSTRUMENT PANEL
3 - INSTRUMENT PANEL BRACKET
4 - INFLATABLE KNEE BLOCKER
5 - INSTRUMENT PANEL REINFORCEMENT
6 - MOUNTING SCREWS

SHIFT INTERLOCK CABLE (Continued)

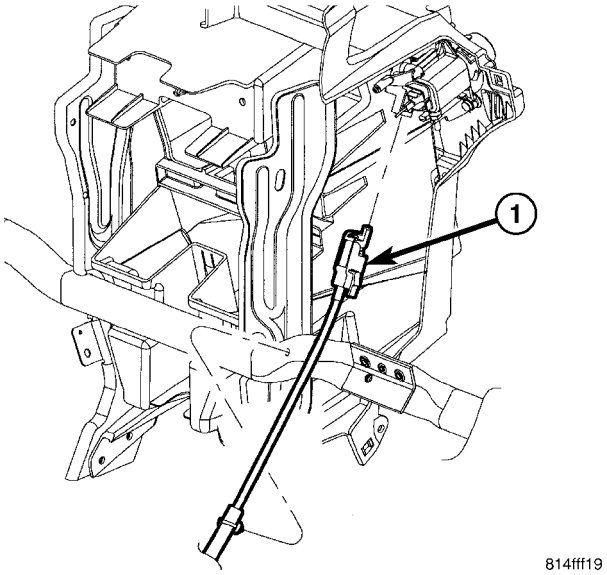


Fig. 331 Interlock Cable at Ignition Cylinder

1 - INTERLOCK CABLE

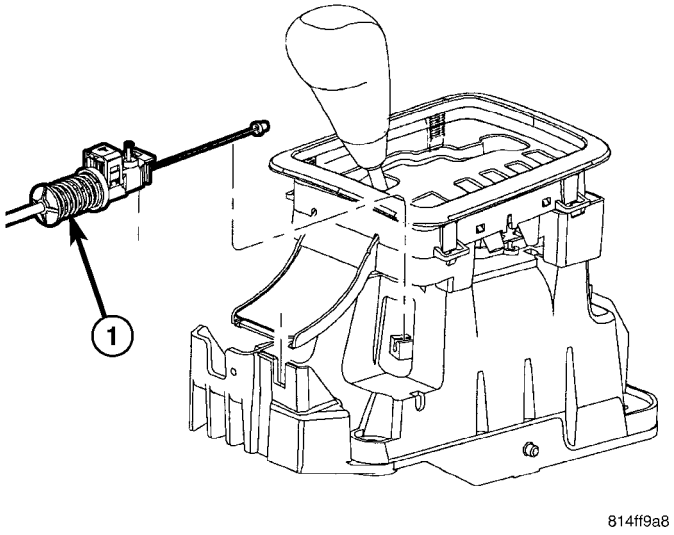


Fig. 332 BTSI Cable at Mechanism

1 - BTSI CABLE

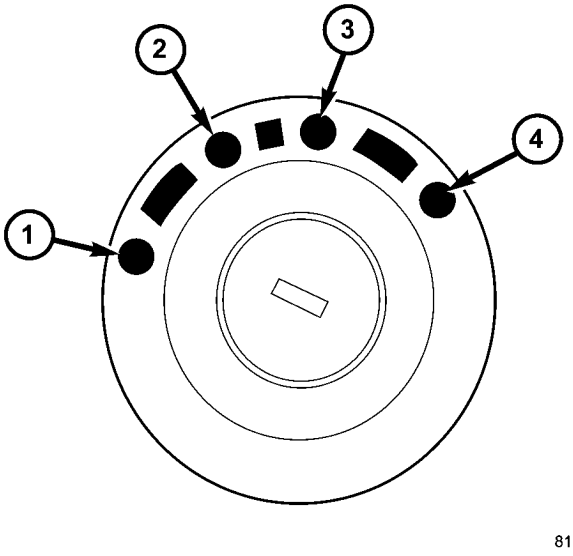


Fig. 333 Ignition Key/Switch Positions

1 - LOCK
2 - ACC
3 - ON
4 - START

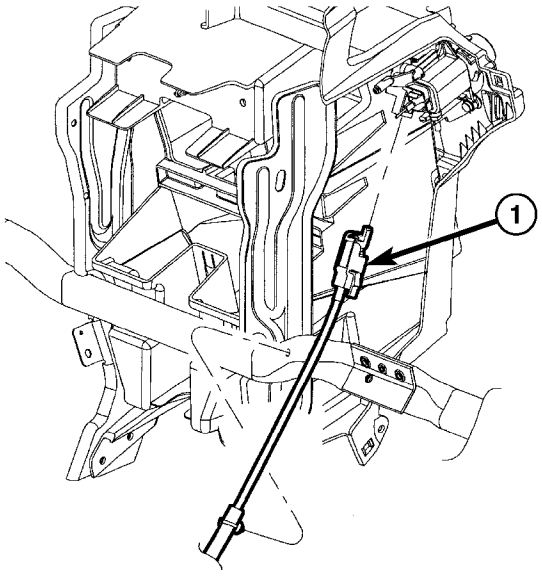


Fig. 334 Interlock Cable at Ignition Cylinder

1 - INTERLOCK CABLE

SHIFT INTERLOCK CABLE (Continued)

(4) Connect interlock cable core to shift mechanism cam, and then secure cable housing to shift mechanism (Fig. 335).

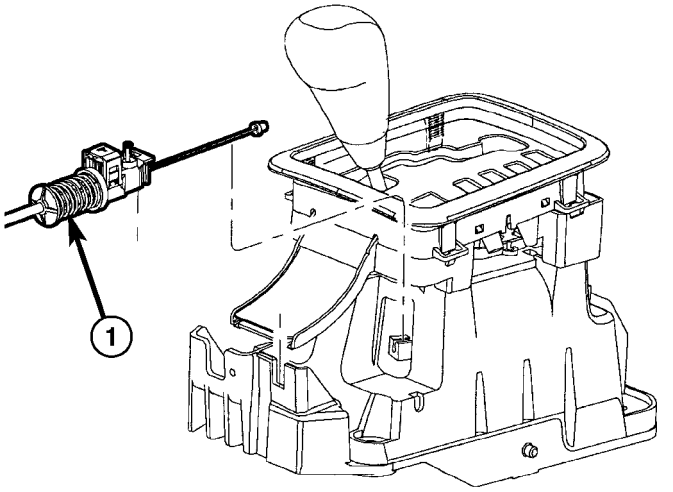


Fig. 335 BTSI Cable at Mechanism

1 - BTSI CABLE

(5) Adjust interlock cable. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT INTERLOCK CABLE - ADJUSTMENTS)

(6) Install center console assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)

ADJUSTMENTS

ADJUSTMENT - INTERLOCK CABLE

(1) Remove center console assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)

(2) Move the gear shifter to PARK and the ignition key to the LOCK position (Fig. 336).

(3) If the interlock cable is being replaced, remove the pin to allow cable to “self adjust.” Press locking clip (Fig. 337) by hand to secure adjustment.

(4) If the interlock cable is not being replaced, the pin will not exist. Loosen the locking clip (Fig. 337) on the interlock cable to allow cable to “self adjust.” Press locking clip (Fig. 337) by hand to secure adjustment.

(5) Install center console assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)

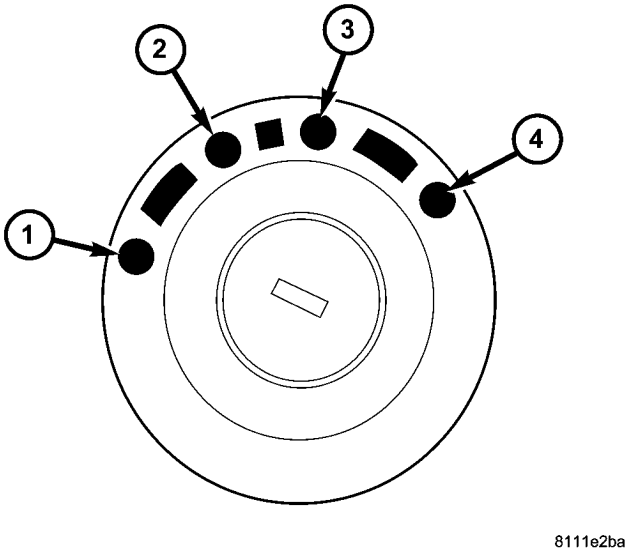


Fig. 336 Ignition Key/Switch Positions

1 - LOCK
2 - ACC
3 - ON
4 - START

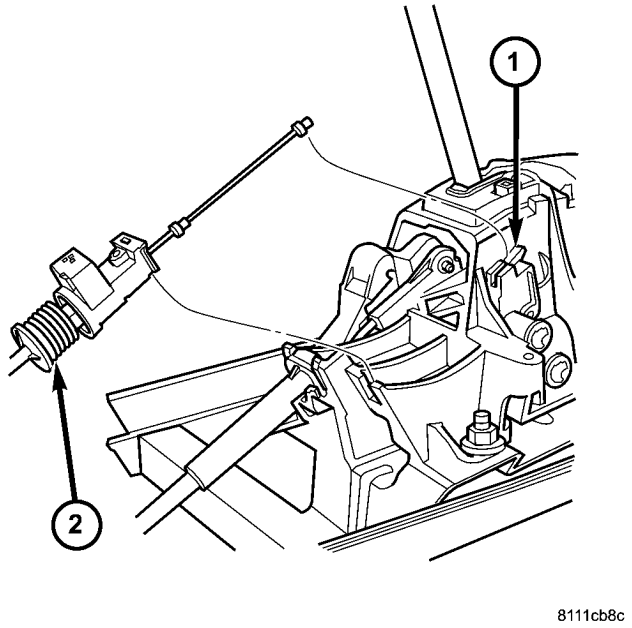


Fig. 337 BTSI Cable at Mechanism

1 - CAM
2 - BTSI CABLE

SHIFT INTERLOCK CABLE (Continued)

ACTION	EXPECTED RESPONSE
1. Turn key to the ″ACC″ position and depress brake pedal.	1. Shifter CAN be shifted out of park.
2. Turn key to the ″ON″ position, with foot off of brake pedal.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the ″ON″ position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear and try to return key to the ″LOCK″ position.	4. Key cannot be returned to the ″LOCK″ position.
5. Return shifter to ″PARK″ and try to remove the key.	5. Key can be removed (after returning to ″LOCK″ position).
6. With the key removed, try to shift out of ″PARK″.	6. Shifter cannot be shifted out of ″PARK″.
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

(6) Install the bezel on the shifter console.
(7) Install shifter handle.

SHIFT INTERLOCK SYSTEM

DESCRIPTION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is a cable and solenoid operated system that prevents the transmission gear shifter from being moved out of PARK without a driver in place.

Refer to the following chart that expected shifter response, depending on ignition key/switch (Fig. 338) and brake pedal positions.

OPERATION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is engaged whenever the ignition switch is in the LOCK or ACC position (Fig. 339). An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half inch. A magnetic holding device integral to the interlock cable is energized when the ignition is in the ON position. When the key is in the ON position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK position, unless the shifter is in the gated PARK position.

The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the “expected response” differs from the vehicle’s response, then system repair and/or adjustment is necessary.

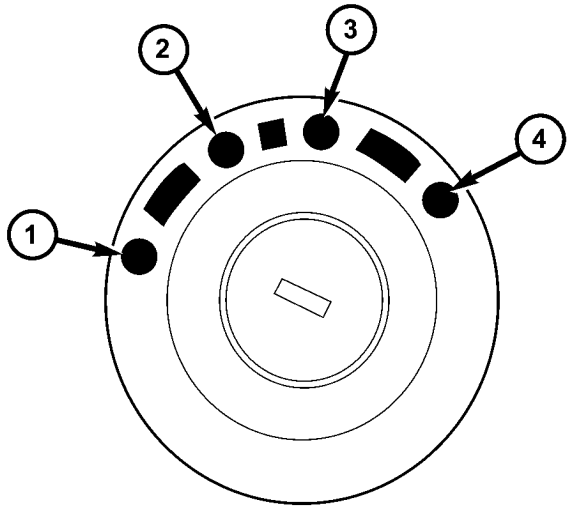


Fig. 338 Ignition Key/Switch Positions

1 - LOCK
2 - ACC
3 - ON
4 - START

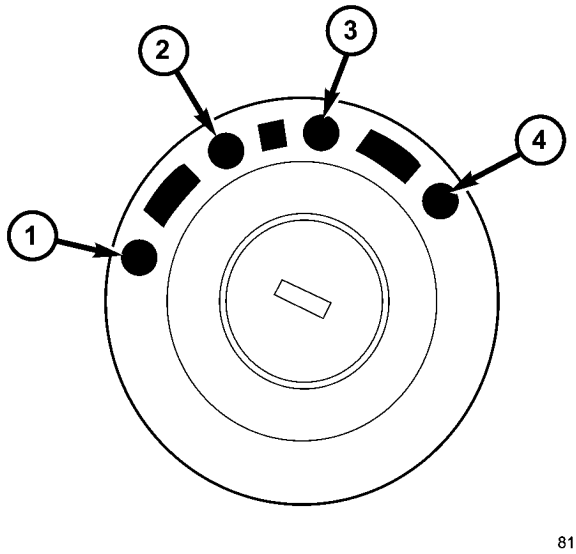


Fig. 339 Ignition Key/Switch Positions

1 - LOCK
2 - ACC
3 - ON
4 - START

SHIFT INTERLOCK SYSTEM (Continued)

ACTION	EXPECTED RESPONSE
1. Turn key to the ″ACC″ position and depress brake pedal.	1. Shifter CAN be shifted out of park.
2. Turn key to the ″ON″ position, with foot off of brake pedal.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the ″ON″ position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear and try to return key to the ″LOCK″ position.	4. Key cannot be returned to the ″LOCK″ position.
5. Return shifter to ″PARK″ and try to remove the key.	5. Key can be removed (after returning to ″LOCK″ position).
6. With the key removed, try to shift out of ″PARK″.	6. Shifter cannot be shifted out of ″PARK″.
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

DIAGNOSIS AND TESTING - SHIFT INTERLOCK SYSTEM

The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the “expected response” differs from the vehicle's response, then system repair and/or adjustment is necessary.

Refer to the following chart that expected shifter response, depending on ignition key/switch (Fig. 340) and brake pedal positions.

If the floor shifter cannot be moved out of the PARK position, refer to Shifter Locked In Place below. If the shift lever can be shifted out of PARK without the brake pedal depressed, refer to Circuit Test below.

SHIFTER LOCKED IN PLACE

(1) Remove the instrument panel cover below the steering column, then remove the steering column shrouds to gain access to the brake transmission shift interlock (BTSI) solenoid. The solenoid is part of the interlock cable assembly.

(2) Disconnect the wire connector from the rear of the BTSI solenoid.

(3) Insert the ignition key and turn it to the ON position.

(4) With the brakes applied, try moving the shifter out of the PARK position.

- If the lever now moves freely in and out of PARK, perform the Circuit Test below.
- If the shift lever still does not move from the PARK position, remove the BTSI cable from the shift lever assembly.

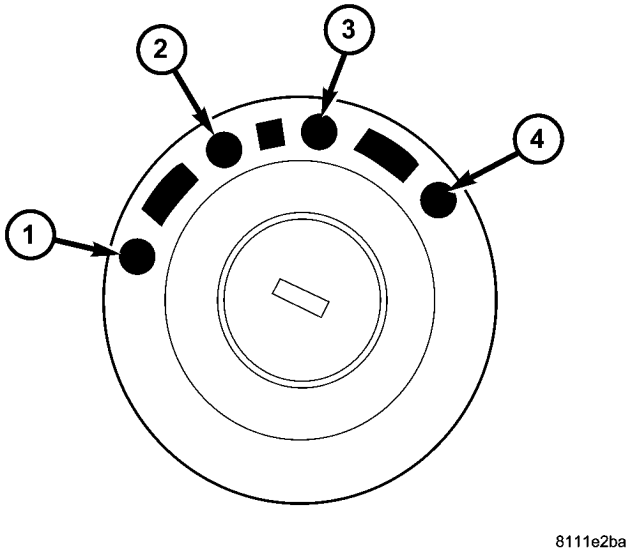


Fig. 340 Ignition Key/Switch Positions

1 - LOCK
2 - ACC
3 - ON
4 - START

If the shift lever now moves freely in and out of the park position, the BTSI solenoid is faulty and the interlock cable must be replaced. If the shift lever still does not move from the park position, the problem is in the shift lever assembly or the ignition interlock cassette.

CIRCUIT TEST

(1) Check the system fuse in the junction block (An open or blown fuse would allow the shift lever to be moved in and out of the PARK position without the brake pedal applied).

(2) Remove the instrument panel cover below the steering column, then remove the steering column shrouds to gain access to the brake transmission shift interlock (BTSI) solenoid.

(3) Disconnect the wire connector from the rear of the BTSI solenoid.

(4) Insert the ignition key and turn it to the ON position.

(5) Back-probe the wire connector's terminal number 2 with a test light. The test light should illuminate. If not, there is an open or short in the ignition feed circuit leading to the BTSI solenoid. Repair the open or short.

(6) Next, back-probe the wire connector with a test light, placing the test light in series between the two wires. At this point, the test light should illuminate. If not, there is an open in the ground circuit or brake lamp switch. Repair the open or replace brake lamp switch as necessary.

SHIFT INTERLOCK SYSTEM (Continued)

(7) Depress the brake pedal. The test light should go out. If it does not, there is a short in the ground circuit or brake lamp switch. Repair the short or replace brake lamp switch as necessary.

(8) Reconnect the wire connector to the solenoid.

If the circuit passes the above test and the shifter can still be moved freely in and out of PARK without the brake pedal depressed, replace the interlock cable.

ACTION	EXPECTED RESPONSE
1. Turn key to the ″ACC″ position and depress brake pedal.	1. Shifter CAN be shifted out of park.
2. Turn key to the ″ON″ position, with foot off of brake pedal.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the ″ON″ position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear and try to return key to the ″LOCK″ position.	4. Key cannot be returned to the ″LOCK″ position.
5. Return shifter to ″PARK″ and try to remove the key.	5. Key can be removed (after returning to ″LOCK″ position).
6. With the key removed, try to shift out of ″PARK″.	6. Shifter cannot be shifted out of ″PARK″.
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

SHIFT MECHANISM

REMOVAL

(1) Remove shifter trim bezel (Fig. 341).

(2) Remove PRNDL surround bezel. Disconnect lamp bulb harness connector. Disconnect traction control switch connector (if equipped). (Fig. 342).

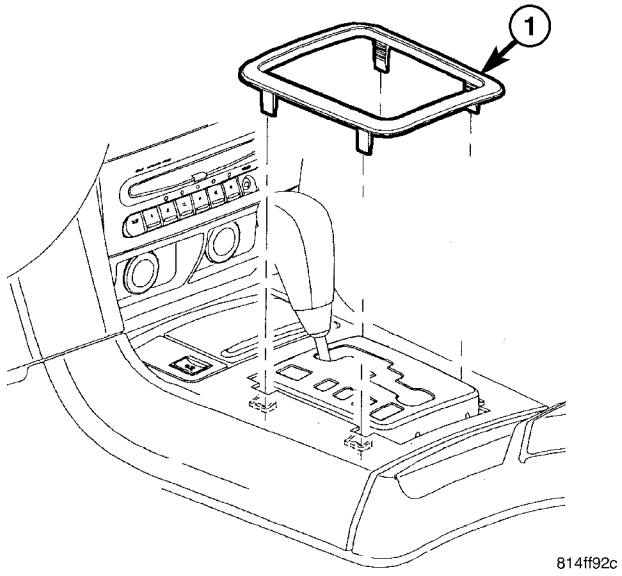


Fig. 341 Shifter Trim Bezel

1 - BEZEL

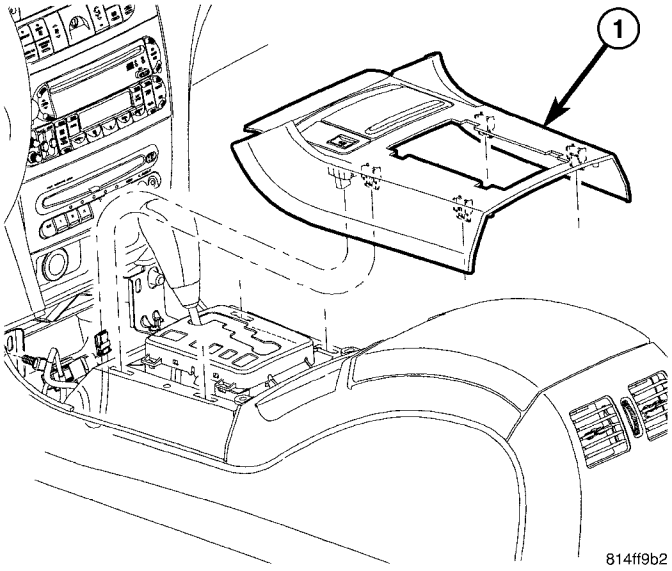


Fig. 342 PRNDL Surround Bezel

1 - BEZEL

SHIFT MECHANISM (Continued)

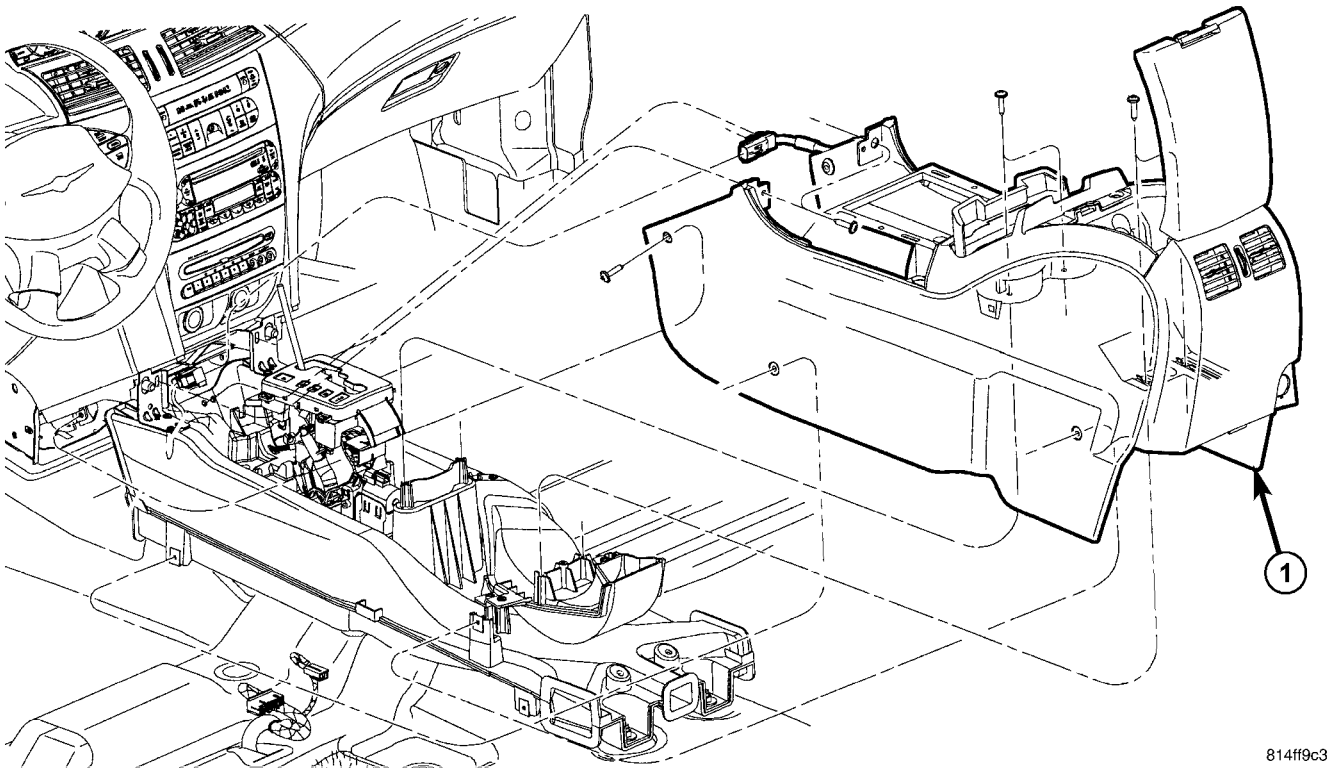


Fig. 343 Front Console Removal/Installation

1 - CENTER CONSOLE ASSEMBLY

(3) Remove front center console assembly as shown in (Fig. 343). Move front seats fore and aft to gain access to and remove console base screws.

(4) **Disconnect battery negative cable.**

(5) Disconnect BTSI cable from shift mechanism (Fig. 344).

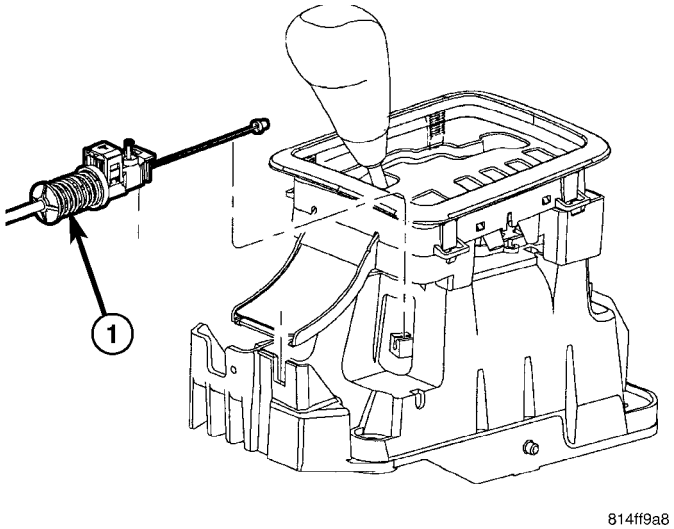


Fig. 344 BTSI Cable at Mechanism

1 - BTSI CABLE

(6) Disconnect and remove gearshift cable from shift mechanism (Fig. 345).

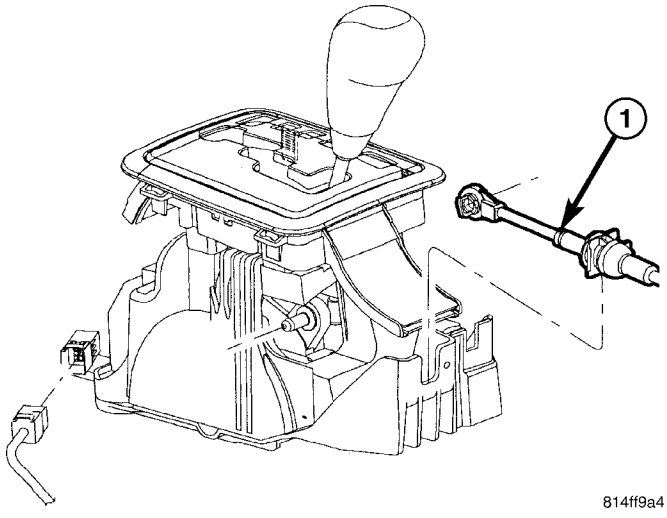


Fig. 345 Gearshift Cable at Mechanism

1 - GEARSHIFT CABLE

SHIFT MECHANISM (Continued)

(7) Disconnect eight-way harness connector (Fig. 346).

(8) Remove four (4) shift mechanism-to-lower console nuts. Remove shift mechanism (Fig. 346).

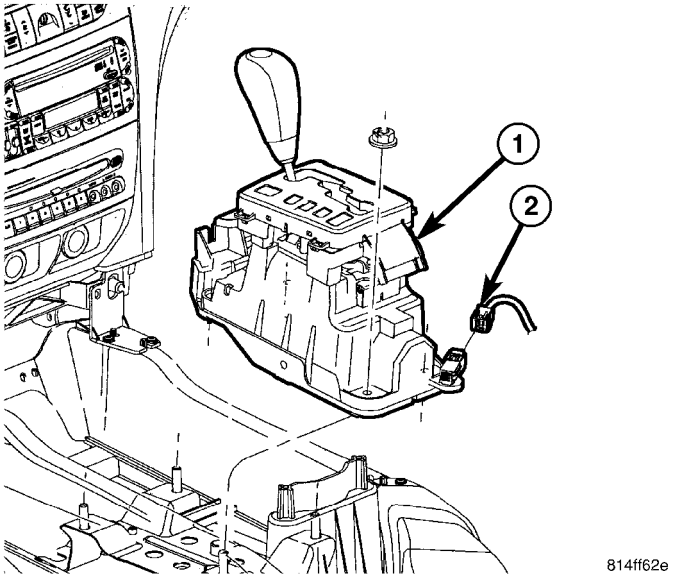


Fig. 346 Gearshift Mechanism Removal/Installation

1 - GEARSHIFT MECHANISM
2 - 8-WAY HARNESS CONNECTOR

INSTALLATION

(1) Install shift mechanism to lower console (Fig. 347). Install and torque four (4) mechanism-to-console base nuts to 12 N·m (105 in. lbs.).

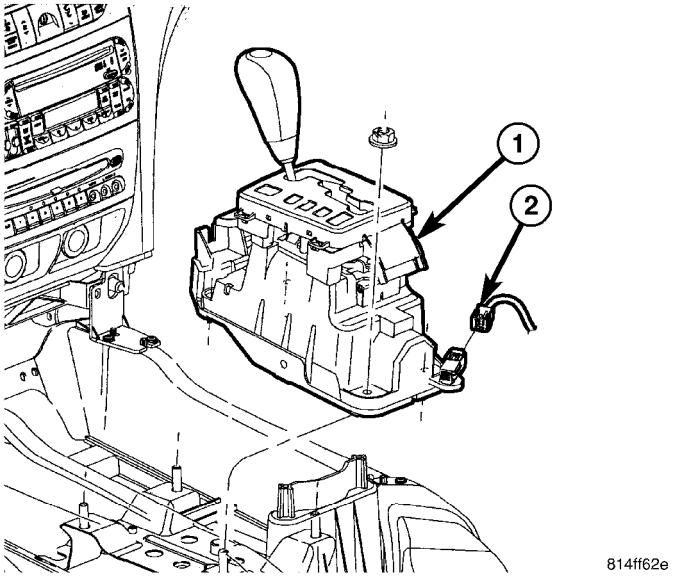


Fig. 347 Gearshift Mechanism Removal/Installation

1 - GEARSHIFT MECHANISM
2 - 8-WAY HARNESS CONNECTOR

(2) Install gearshift cable to mechanism (Fig. 348).

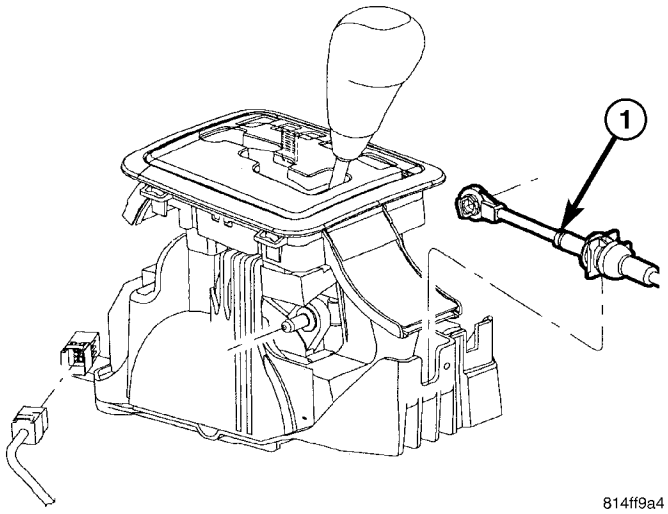


Fig. 348 Gearshift Cable at Mechanism

1 - GEARSHIFT CABLE

(3) Install shift interlock cable to mechanism (Fig. 349).

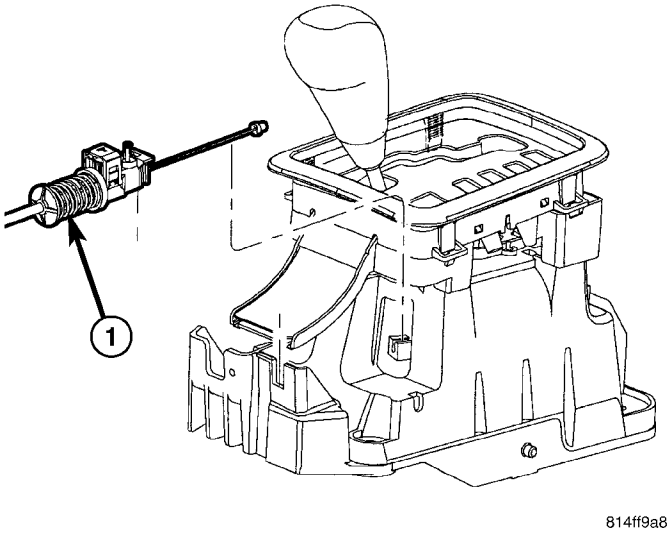


Fig. 349 BTSI Cable at Mechanism

1 - BTSI CABLE

(4) Adjust shift interlock cable. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT INTERLOCK CABLE - ADJUSTMENTS)

SHIFT MECHANISM (Continued)

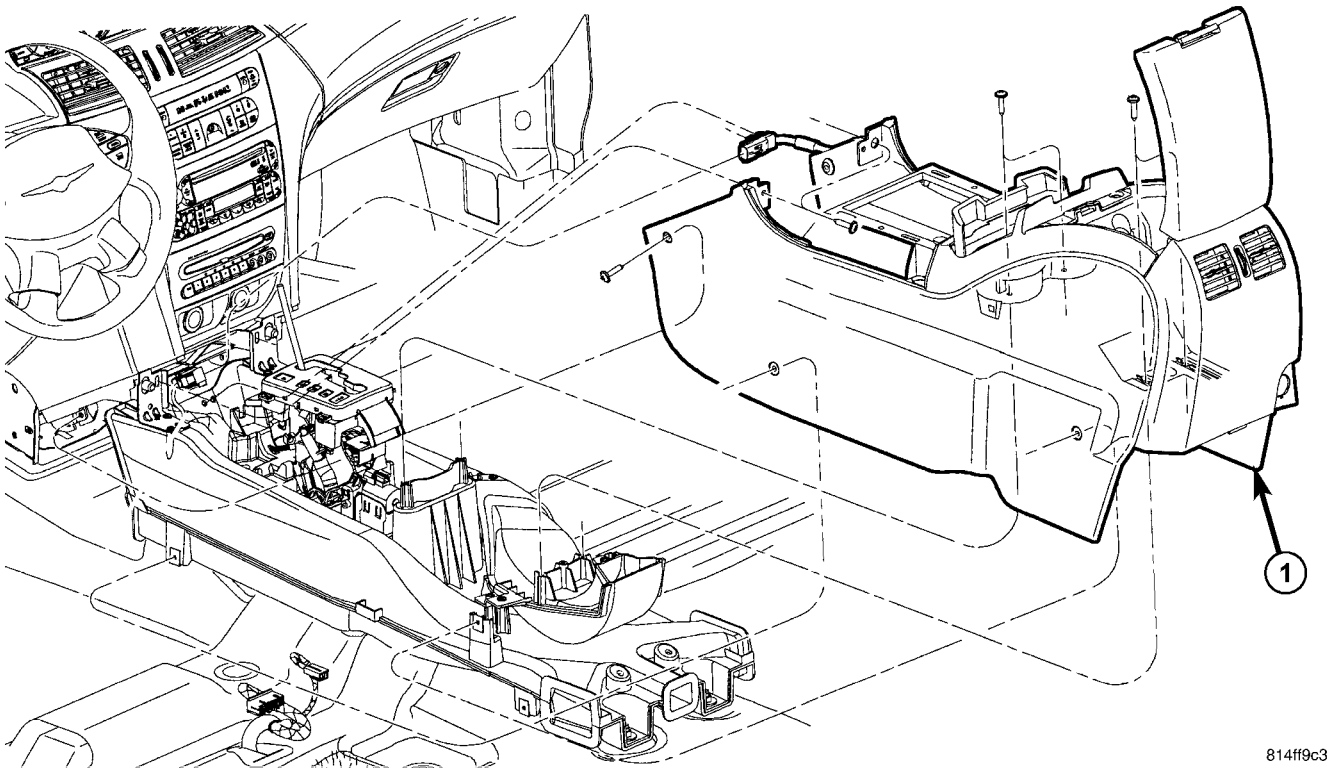


Fig. 350 Front Console Removal/Installation

1 - CENTER CONSOLE ASSEMBLY

(5) Install center console assembly (Fig. 350).
(6) Install PRNDL surround bezel (Fig. 351).

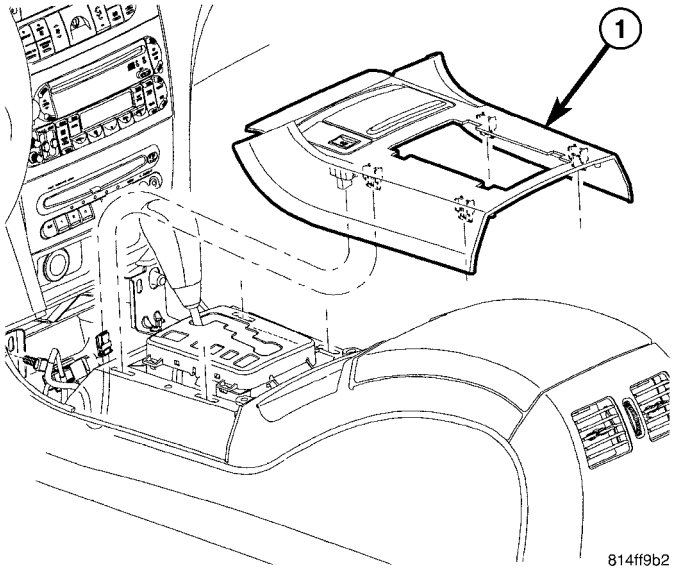


Fig. 351 PRNDL Surround Bezel

1 - BEZEL

(7) Install gearshift bezel (Fig. 352).

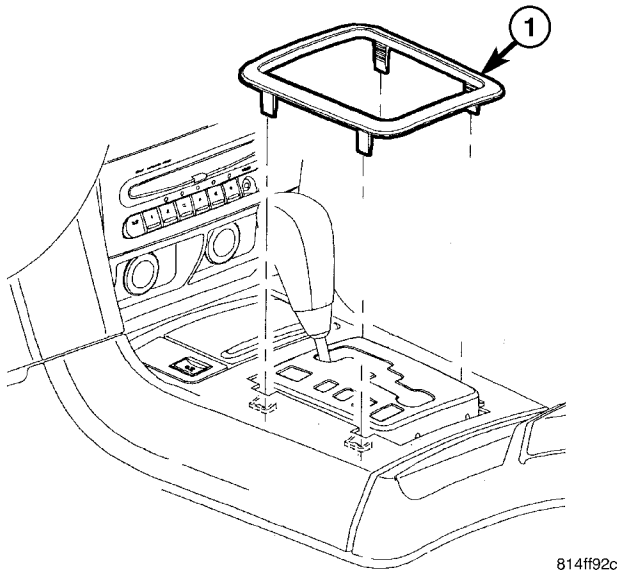


Fig. 352 Shifter Trim Bezel

1 - BEZEL

SOLENOID/PRESSURE SWITCH ASSY

DESCRIPTION

The Solenoid/Pressure Switch Assembly (Fig. 353) is external to the transaxle and mounted to the transaxle case. The assembly consists of four solenoids that control hydraulic pressure to the LR/CC, 2/4, OD, and UD friction elements. The reverse clutch is controlled by line pressure from the manual valve in the valve body. The solenoids are contained within the Solenoid/Pressure Switch Assembly, and can only be serviced by replacing the assembly.

The solenoid assembly also contains pressure switches that monitor and send hydraulic circuit information to the PCM/TCM. Likewise, the pressure switches can only be service by replacing the assembly.

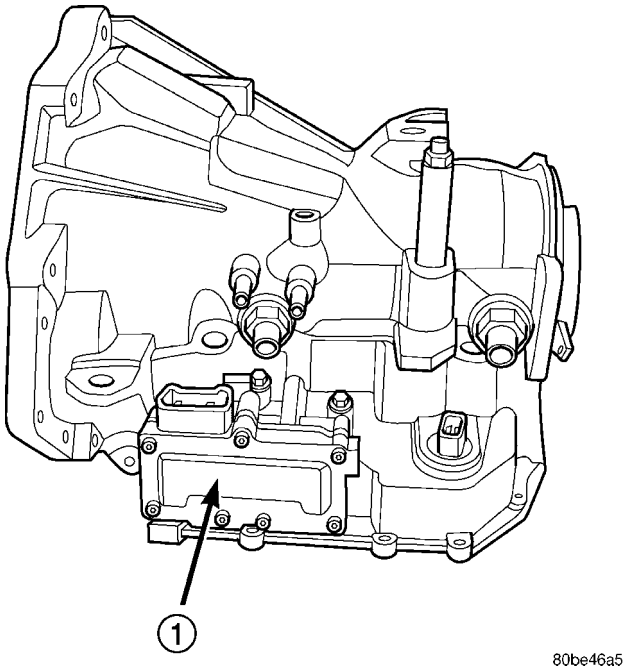


Fig. 353 Solenoid/Pressure Switch Assembly

1 - SOLENOID AND PRESSURE SWITCH ASSEMBLY

OPERATION

SOLENOIDS

The solenoids receive electrical power from the Transmission Control Relay through a single wire. The PCM/TCM energizes or operates the solenoids individually by grounding the return wire of the solenoid needed. When a solenoid is energized, the solenoid valve shifts, and a fluid passage is opened or closed (vented or applied), depending on its default operating state. The result is an apply or release of a frictional element.

The 2/4 and UD solenoids are normally applied, which by design allow fluid to pass through in their relaxed or “off” state. This allows transaxle limp-in (P,R,N,2) in the event of an electrical failure.

The continuity of the solenoids and circuits are periodically tested. Each solenoid is turned on or off depending on its current state. An inductive spike should be detected by the PCM/TCM during this test. It no spike is detected, the circuit is tested again to verify the failure. In addition to the periodic testing, the solenoid circuits are tested if a speed ratio or pressure switch error occurs.

PRESSURE SWITCHES

The PCM/TCM relies on three pressure switches to monitor fluid pressure in the L/R, 2/4, and OD hydraulic circuits. The primary purpose of these switches is to help the PCM/TCM detect when clutch circuit hydraulic failures occur. The range for the pressure switch closing and opening points is 11-23 psi. Typically the switch opening point will be approximately one psi lower than the closing point. For example, a switch may close at 18 psi and open at 17 psi. The switches are continuously monitored by the PCM/TCM for the correct states (open or closed) in each gear as shown in the following chart:

PRESSURE SWITCH STATES

GEAR	L/R	2/4	OD
R	OP	OP	OP
P/N	CL	OP	OP
1st	CL	OP	OP
2nd	OP	CL	OP
D	OP	OP	CL
OD	OP	CL	CL

OP = OPEN

CL = CLOSED

A Diagnostic Trouble Code (DTC) will set if the PCM/TCM senses any switch open or closed at the wrong time in a given gear.

The PCM/TCM also tests the 2/4 and OD pressure switches when they are normally off (OD and 2/4 are tested in 1st gear, OD in 2nd gear, and 2/4 in 3rd gear). The test simply verifies that they are operational, by looking for a closed state when the corresponding element is applied. Immediately after a shift into 1st, 2nd, or 3rd gear with the engine speed above 1000 rpm, the PCM/TCM momentarily turns on element pressure to the 2/4 and/or OD clutch circuits to identify that the appropriate switch has closed. If it doesn’t close, it is tested again. If the switch fails to close the second time, the appropriate Diagnostic Trouble Code (DTC) will set.

SOLENOID/PRESSURE SWITCH ASSY (Continued)

REMOVAL

NOTE: If solenoid/pressure switch assembly is being replaced, the "Quick-Learn" procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Disconnect battery negative cable.
(2) Remove air cleaner assembly.
(3) Disconnect solenoid/pressure switch assembly connector (Fig. 354).
(4) Disconnect input speed sensor connector (Fig. 354).

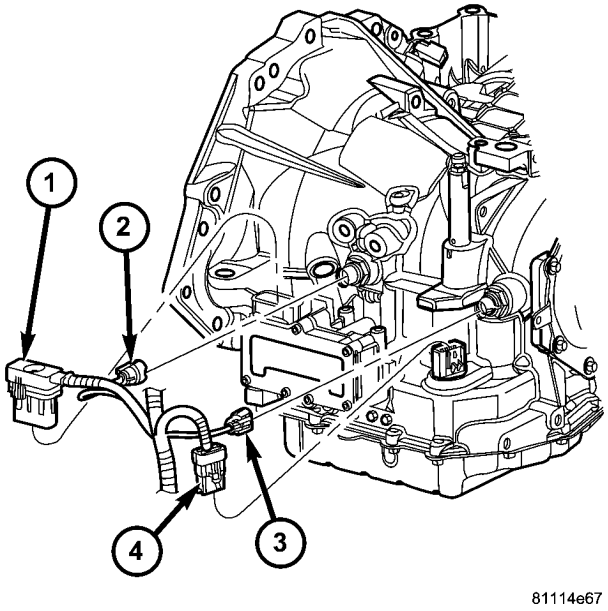


Fig. 354 Transmission Connectors

1 - SOLENOID PACK CONNECTOR
2 - INPUT SPEED SENSOR CONNECTOR
3 - OUTPUT SPEED SENSOR CONNECTOR
4 - TRANSMISSION RANGE SENSOR CONNECTOR

(5) Remove input speed sensor (Fig. 355).
(6) Remove three (3) solenoid/pressure switch assembly-to-transaxle case bolts (Fig. 356).
(7) Remove solenoid/pressure switch assembly and gasket (Fig. 357). Use care to prevent gasket material and foreign objects from become lodged in the transaxle case ports.

INSTALLATION

NOTE: If solenoid/pressure switch assembly is being replaced, it is necessary to perform the "Quick-Learn" procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

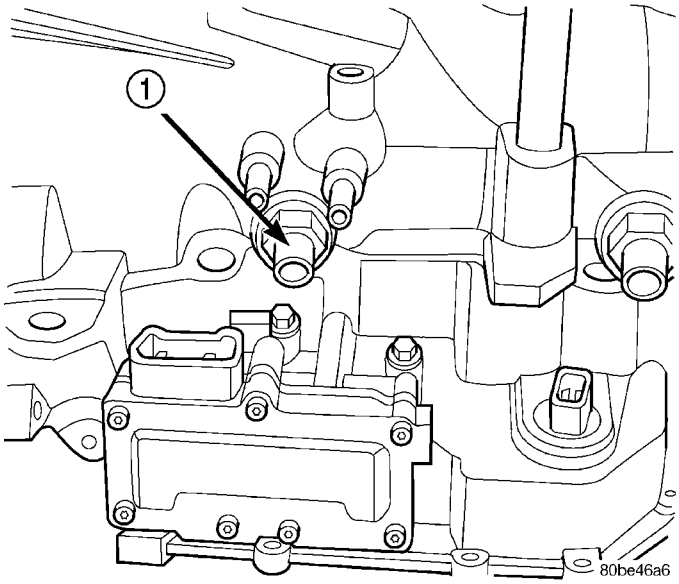


Fig. 355 Input Speed Sensor

1 - INPUT SPEED SENSOR

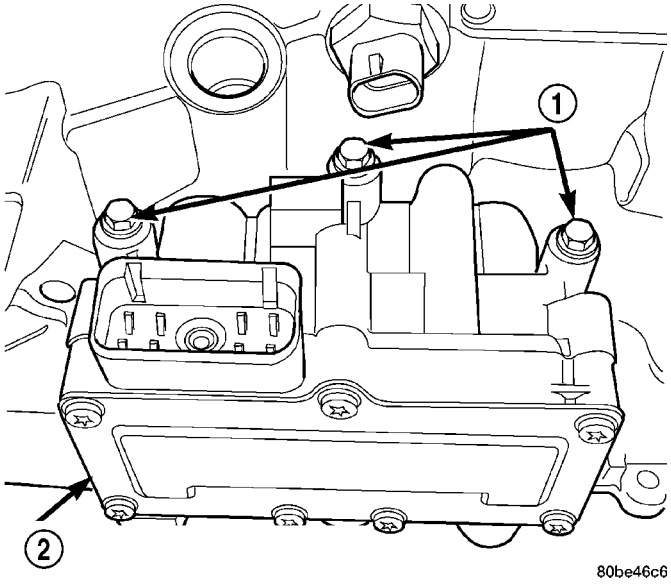


Fig. 356 Solenoid/Pressure Switch Assembly-to-Case Bolts

1 - BOLTS
2 - SOLENOID AND PRESSURE SWITCH ASSEMBLY

(1) Install solenoid/pressure switch assembly and new gasket to transaxle (Fig. 357).
(2) Install and torque three (3) bolts (Fig. 356) to 13 N·m (110 in. lbs.).
(3) Install input speed sensor (Fig. 355) and torque to 27 N·m (20 ft. lbs.).
(4) Connect input speed sensor connector (Fig. 354).

SOLENOID/PRESSURE SWITCH ASSY (Continued)

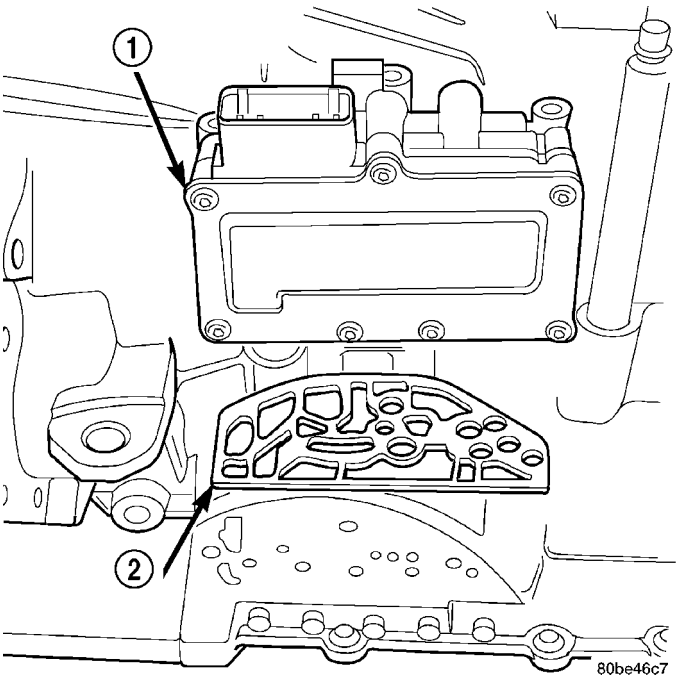


Fig. 357 Solenoid/Pressure Switch Assembly and Gasket

1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - GASKET

(5) Install solenoid/pressure switch 8-way connector and torque to 4 N·m (35 in. lbs.) (Fig. 354).

(6) Install air cleaner assembly.

(7) Connect battery negative cable.

(8) If solenoid/pressure switch assembly was replaced, perform the "Quick-Learn" procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

SPEED SENSOR - INPUT

DESCRIPTION

The Input Speed Sensor is a two-wire magnetic pickup device that generates AC signals as rotation occurs. It is threaded into the transaxle case (Fig. 358), sealed with an o-ring (Fig. 359), and is considered a primary input to the Powertrain/Transmission Control Module.

OPERATION

The Input Speed Sensor provides information on how fast the input shaft is rotating. As the teeth of the input clutch hub pass by the sensor coil (Fig. 360), an AC voltage is generated and sent to the PCM/TCM. The PCM/TCM interprets this information as input shaft rpm.

The PCM/TCM compares the input speed signal with output speed signal to determine the following:

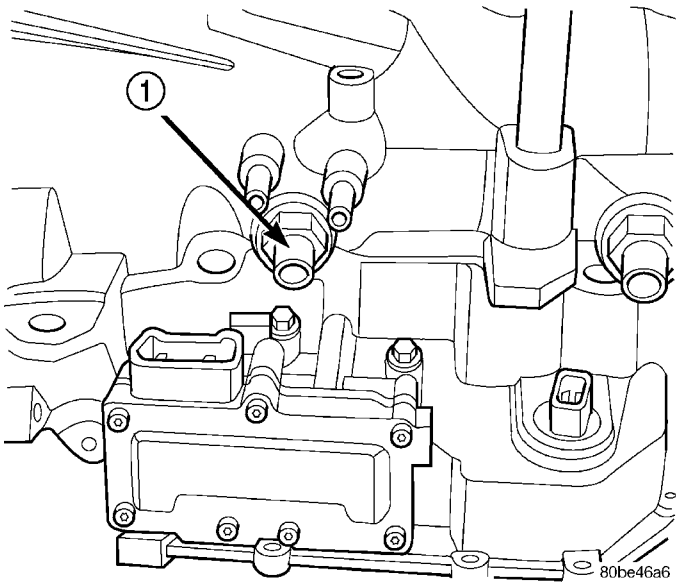


Fig. 358 Input Speed Sensor Location

1 - INPUT SPEED SENSOR

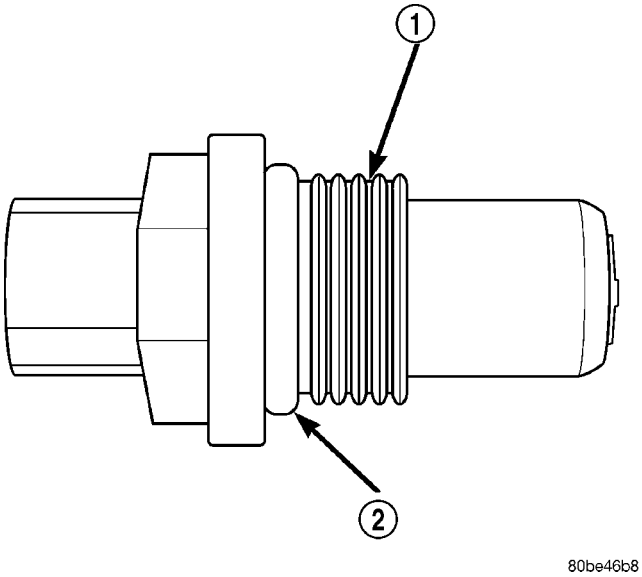


Fig. 359 O-Ring Location

1 - INPUT SPEED SENSOR
2 - O-RING

- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

The PCM/TCM also compares the input speed signal and the engine speed signal to determine the following:

- Torque converter clutch slippage
- Torque converter element speed ratio

REMOVAL

(1) Disconnect battery negative cable.

SPEED SENSOR - INPUT (Continued)

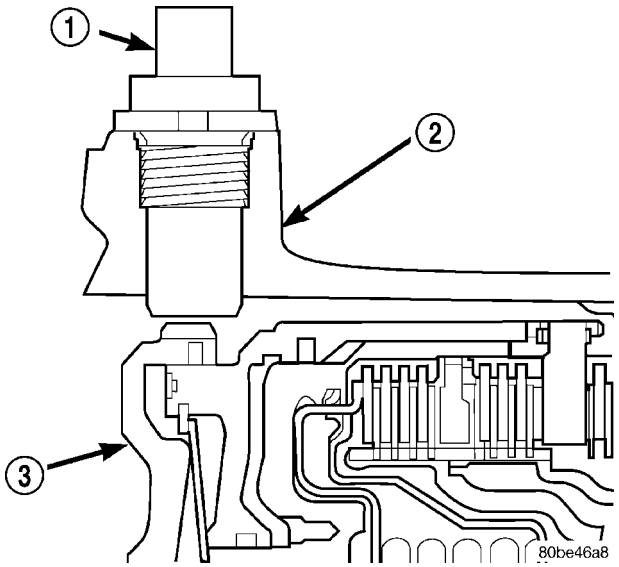


Fig. 360 Sensor Relation to Input Clutch Hub

1 - INPUT SPEED SENSOR
2 - TRANSAXLE CASE
3 - INPUT CLUTCH HUB

(2) Disconnect input speed sensor connector (Fig. 361).

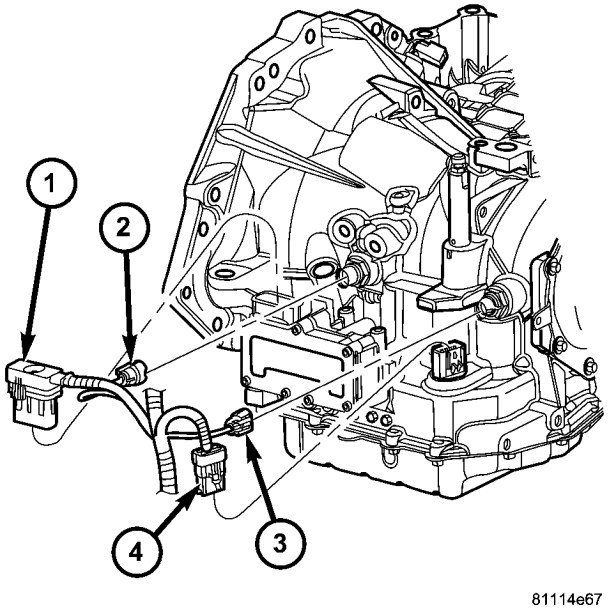


Fig. 361 Transmission Connectors

1 - SOLENOID PACK CONNECTOR
2 - INPUT SPEED SENSOR CONNECTOR
3 - OUTPUT SPEED SENSOR CONNECTOR
4 - TRANSMISSION RANGE SENSOR CONNECTOR

(3) Unscrew and remove input speed sensor (Fig. 362).

(4) Inspect speed sensor o-ring (Fig. 363) and replace if necessary.

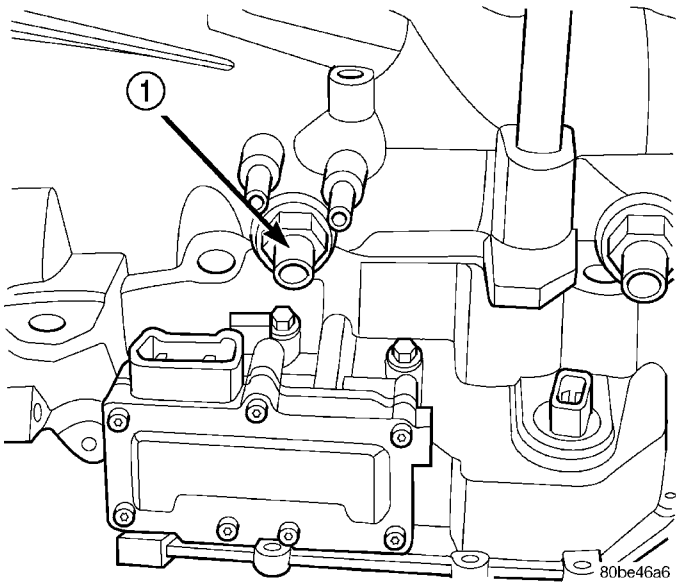


Fig. 362 Input (Turbine) Speed Sensor

1 - INPUT SPEED SENSOR

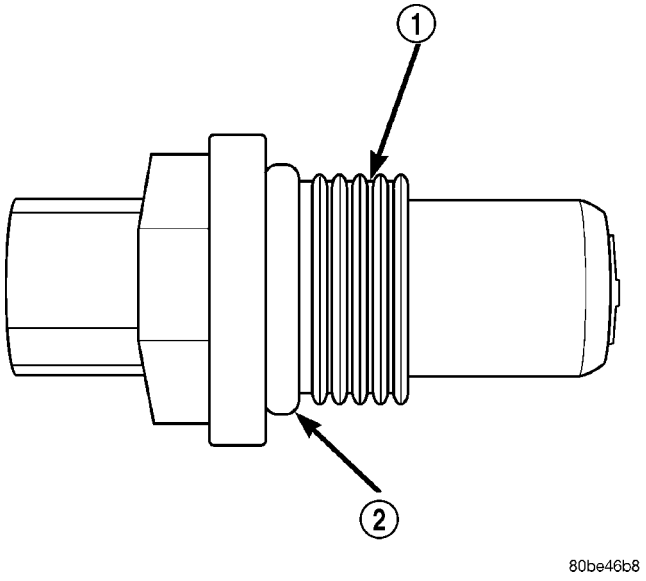


Fig. 363 O-ring Location

1 - INPUT SPEED SENSOR
2 - O-RING

INSTALLATION

(1) Verify o-ring is installed into position (Fig. 363).

(2) Install and tighten input speed sensor to 27 N·m (20 ft. lbs.) (Fig. 362).

(3) Connect speed sensor connector (Fig. 361).

(4) Connect battery negative cable.

SPEED SENSOR - OUTPUT

DESCRIPTION

The Output Speed Sensor is a two-wire magnetic pickup device that generates an AC signal as rotation occurs. It is threaded into the transaxle case (Fig. 364), sealed with an o-ring (Fig. 365), and is considered a primary input to the Powetrain/Transmission Control Module.

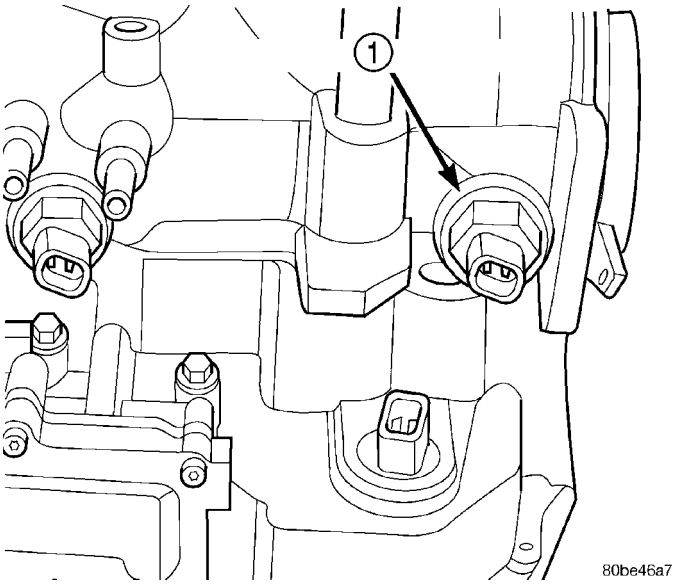


Fig. 364 Output Speed Sensor

1 - OUTPUT SPEED SENSOR

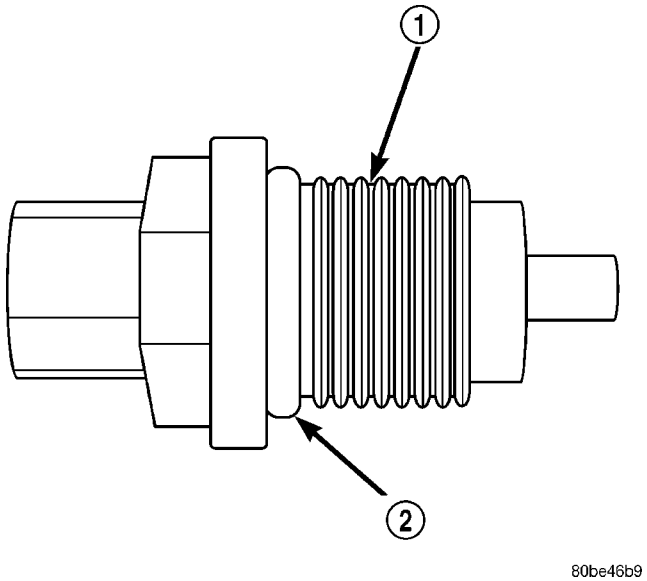


Fig. 365 O-Ring Location

1 - OUTPUT SPEED SENSOR
2 - O-RING

OPERATION

The Output Speed Sensor provides information on how fast the output shaft is rotating. As the rear planetary carrier park pawl lugs pass by the sensor coil (Fig. 366), an AC voltage is generated and sent to the PCM/TCM. The PCM/TCM interprets this information as output shaft rpm.

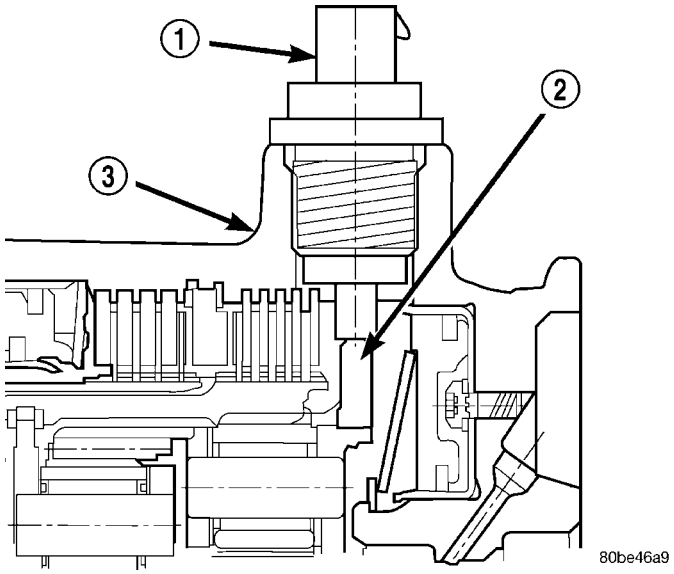


Fig. 366 Sensor Relation to Planet Carrier Park Pawl

1 - OUTPUT SPEED SENSOR
2 - REAR PLANET CARRIER/OUTPUT SHAFT ASSEMBLY
3 - TRANSAXLE CASE

The PCM/TCM compares the input and output speed signals to determine the following:

- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

VEHICLE SPEED SIGNAL

The vehicle speed signal is taken from the Output Speed Sensor. The PCM converts this signal into a pulse per mile signal and sends the vehicle speed message across the communication bus to the BCM. The BCM sends this signal to the Instrument Cluster to display vehicle speed to the driver. The vehicle speed signal pulse is roughly 8000 pulses per mile.

REMOVAL

(1) Disconnect battery negative cable.
(2) Raise vehicle on hoist.
(3) Disconnect output speed sensor connector (Fig. 367).
(4) Unscrew and remove output speed sensor (Fig. 368).
(5) Inspect speed sensor o-ring (Fig. 369) and replace if necessary.

SPEED SENSOR - OUTPUT (Continued)

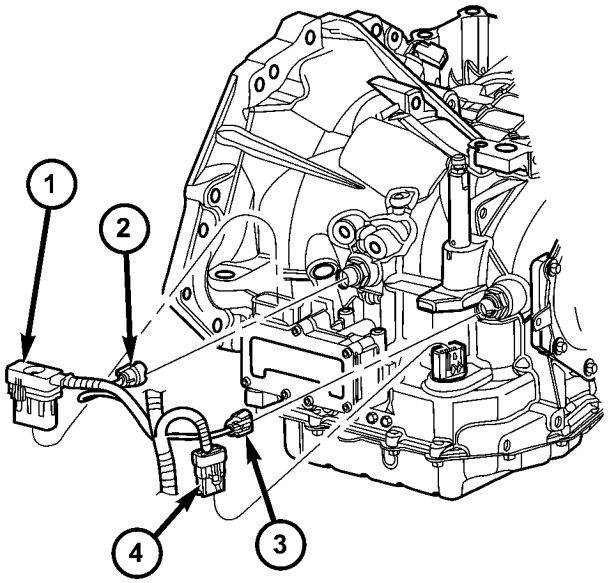


Fig. 367 Transmission Connectors

1 - SOLENOID PACK CONNECTOR
2 - INPUT SPEED SENSOR CONNECTOR
3 - OUTPUT SPEED SENSOR CONNECTOR
4 - TRANSMISSION RANGE SENSOR CONNECTOR

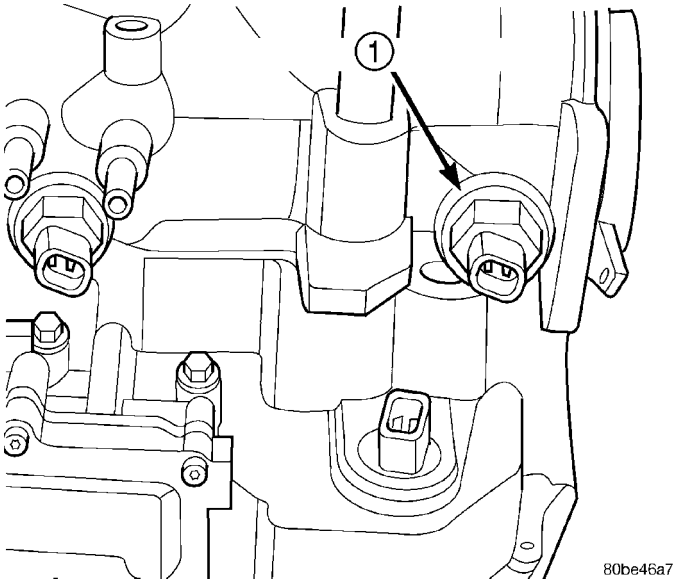


Fig. 368 Output Speed Sensor

1 - OUTPUT SPEED SENSOR

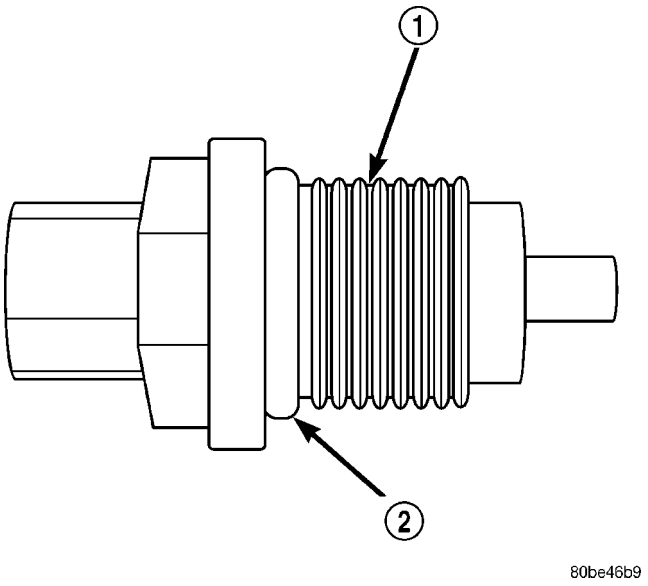


Fig. 369 O-ring Location

1 - OUTPUT SPEED SENSOR
2 - O-RING

INSTALLATION

(1) Verify o-ring is installed into position (Fig. 369).

(2) Install and tighten input speed sensor to 27 N·m (20 ft. lbs.).

(3) Connect speed sensor connector (Fig. 367).

(4) Connect battery negative cable.

TORQUE CONVERTER

DESCRIPTION

The torque converter (Fig. 370) is a hydraulic device that couples the engine crankshaft to the transmission. The torque converter consists of an outer shell with an internal turbine, a stator, an overrunning clutch, an impeller and an electronically applied converter clutch. The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. The converter clutch engages in third gear. The torque converter hub drives the transmission oil (fluid) pump.

The torque converter is a sealed, welded unit that is not repairable and is serviced as an assembly.

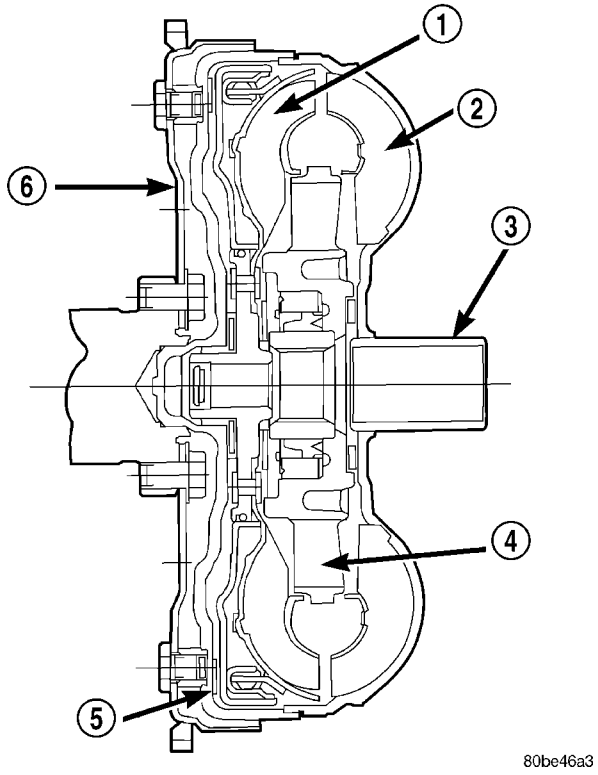


Fig. 370 Torque Converter Assembly

1 - TURBINE
2 - IMPELLER
3 - HUB
4 - STATOR
5 - CONVERTER CLUTCH DISC
6 - DRIVE PLATE

TORQUE CONVERTER (Continued)

IMPELLER

The impeller (Fig. 371) is an integral part of the converter housing. The impeller consists of curved blades placed radially along the inside of the housing on the transmission side of the converter. As the converter housing is rotated by the engine, so is the impeller, because they are one and the same and are the driving member of the system.

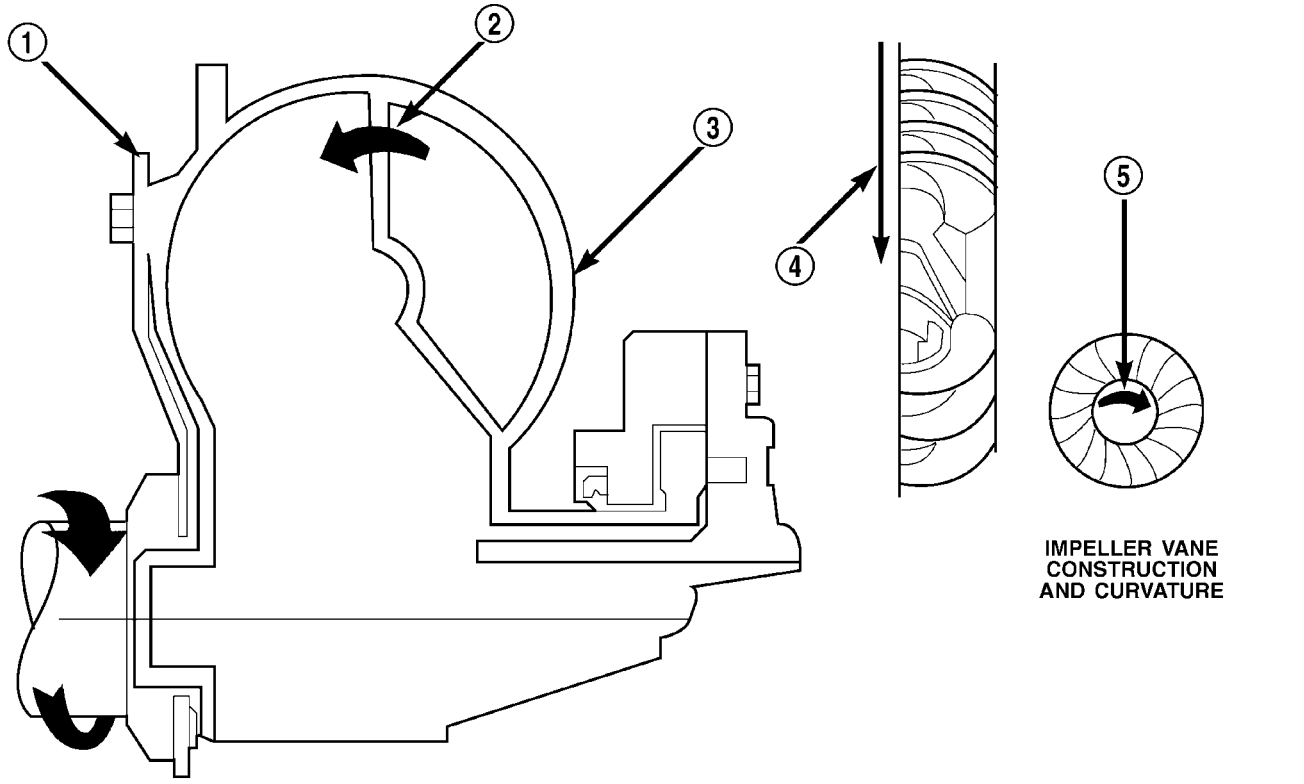


Fig. 371 Impeller

1 - ENGINE FLEXPLATE
2 - OIL FLOW FROM IMPELLER SECTION INTO TURBINE SECTION
3 - IMPELLER VANES AND COVER ARE INTEGRAL
4 - ENGINE ROTATION
5 - ENGINE ROTATION

TORQUE CONVERTER (Continued)

TURBINE

The turbine (Fig. 372) is the output, or driven, member of the converter. The turbine is mounted within the housing opposite the impeller, but is not attached to the housing. The input shaft is inserted through the center of the impeller and splined into the turbine. The design of the turbine is similar to the impeller, except the blades of the turbine are curved in the opposite direction.

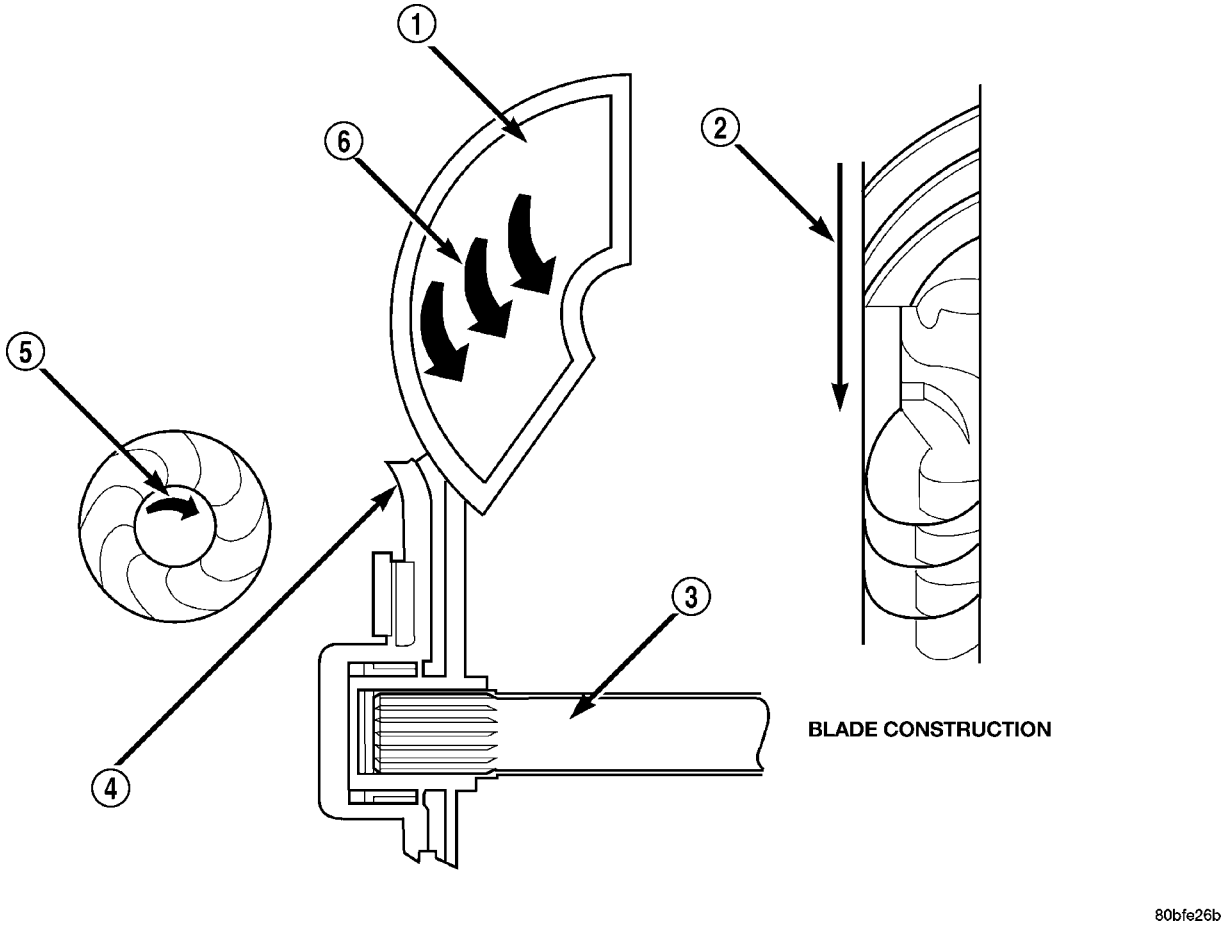


Fig. 372 Turbine

1 - TURBINE VANE
2 - ENGINE ROTATION
3 - INPUT SHAFT
4 - PORTION OF TORQUE CONVERTER COVER
5 - ENGINE ROTATION
6 - OIL FLOW WITHIN TURBINE SECTION

TORQUE CONVERTER (Continued)

STATOR

The stator assembly (Fig. 373) is mounted on a stationary shaft which is an integral part of the oil pump. The stator is located between the impeller and turbine within the torque converter case (Fig. 374). The stator contains an over-running clutch, which allows the stator to rotate only in a clockwise direction. When the stator is locked against the over-running clutch, the torque multiplication feature of the torque converter is operational.

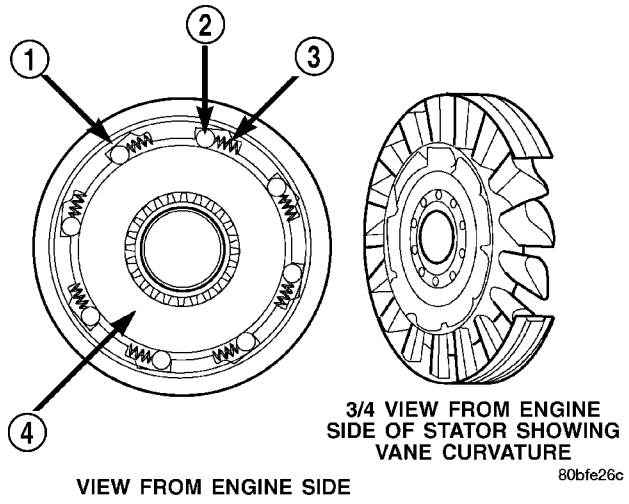


Fig. 373 Stator Components

1 - CAM (OUTER RACE)
2 - ROLLER
3 - SPRING
4 - INNER RACE

TORQUE CONVERTER CLUTCH (TCC)

The TCC (Fig. 375) was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Although the fluid coupling provides smooth, shock–free power transfer, it is natural for all fluid couplings to slip. If the impeller and turbine were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston was added to the turbine, and a friction material was added to the inside of the front cover to provide this mechanical lock-up.

OPERATION

The converter impeller (Fig. 376) (driving member), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. The converter turbine (driven member), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft.

TURBINE

As the fluid that was put into motion by the impeller blades strikes the blades of the turbine, some of the energy and rotational force is transferred into the turbine and the input shaft. This causes both of them (turbine and input shaft) to rotate in a clockwise direction following the impeller. As the fluid is leav-

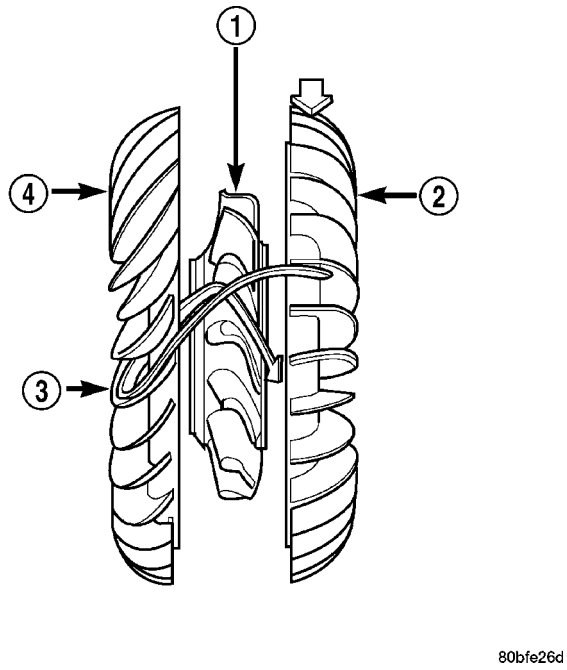


Fig. 374 Stator Location

1 - STATOR
2 - IMPELLER
3 - FLUID FLOW
4 - TURBINE

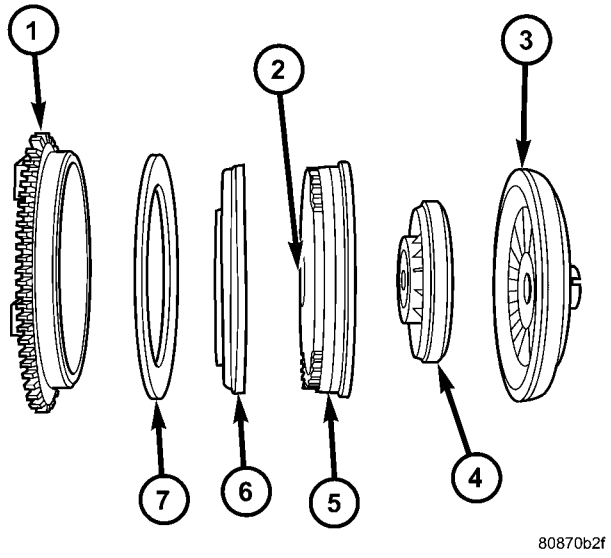


Fig. 375 Torque Converter Clutch (TCC)

1 - IMPELLER FRONT COVER
2 - THRUST WASHER ASSEMBLY
3 - IMPELLER
4 - STATOR
5 - TURBINE
6 - PISTON
7 - FRICTION DISC

TORQUE CONVERTER (Continued)

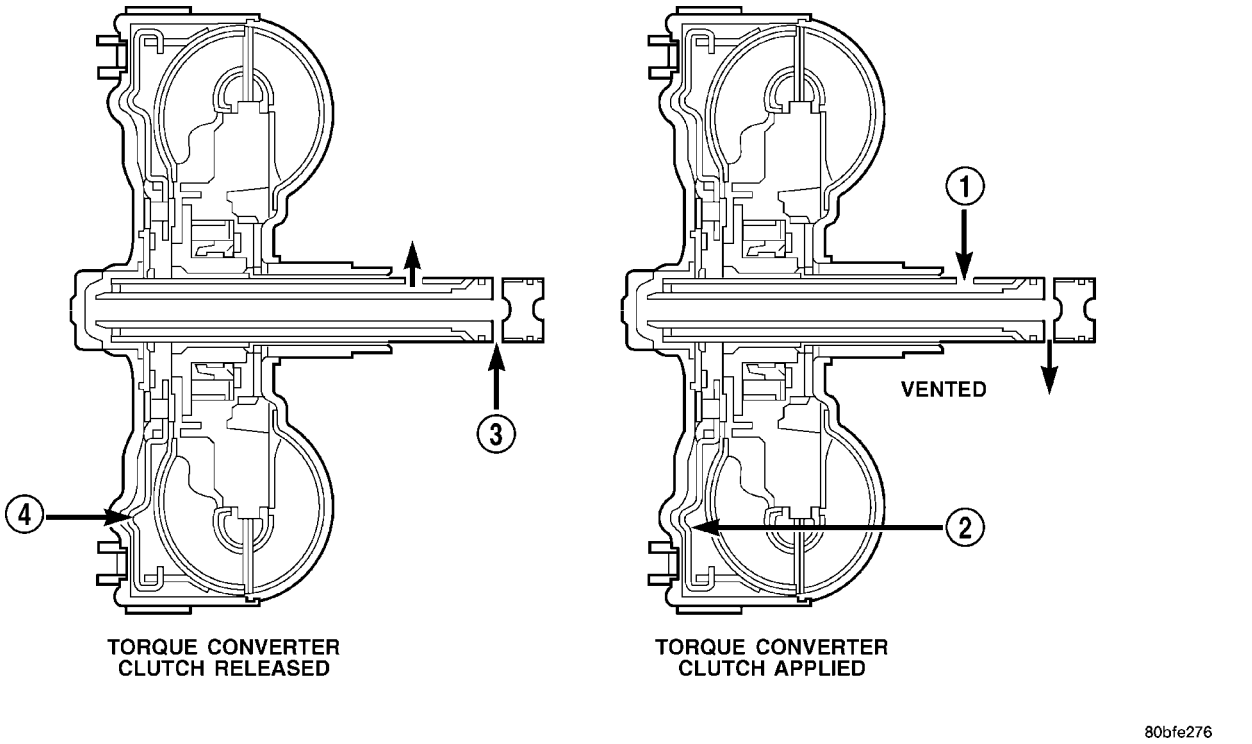


Fig. 376 Torque Converter Fluid Operation

1 - APPLY PRESSURE
2 - THE PISTON MOVES SLIGHTLY FORWARD
3 - RELEASE PRESSURE
4 - THE PISTON MOVES SLIGHTLY REARWARD

ing the trailing edges of the turbine's blades it continues in a "hindering" direction back toward the impeller. If the fluid is not redirected before it strikes the impeller, it will strike the impeller in such a direction that it would tend to slow it down.

STATOR

Torque multiplication is achieved by locking the stator's over-running clutch to its shaft (Fig. 377). Under stall conditions (the turbine is stationary), the oil leaving the turbine blades strikes the face of the stator blades and tries to rotate them in a counterclockwise direction. When this happens the over–running clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator blades and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 2.4:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such as way as to cause it to lock–up is no longer doing so. In this condition of operation, the stator begins to free wheel and the converter acts as a fluid coupling.

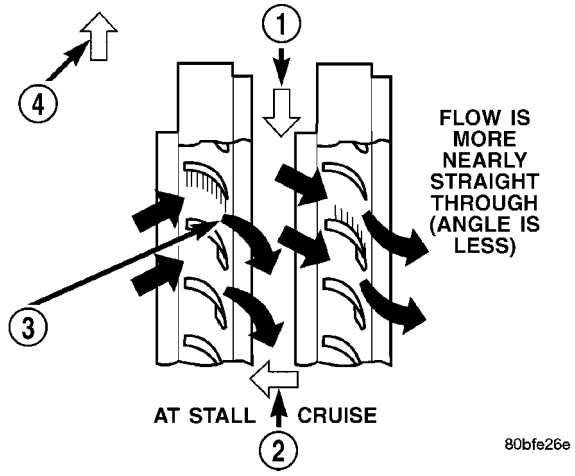


Fig. 377 Stator Operation

1 - DIRECTION STATOR WILL FREE WHEEL DUE TO OIL PUSHING ON BACKSIDE OF VANES
2 - FRONT OF ENGINE
3 - INCREASED ANGLE AS OIL STRIKES VANES
4 - DIRECTION STATOR IS LOCKED UP DUE TO OIL PUSHING AGAINST STATOR VANES

TORQUE CONVERTER (Continued)

TORQUE CONVERTER CLUTCH (TCC)

In a standard torque converter, the impeller and turbine are rotating at about the same speed and the stator is freewheeling, providing no torque multiplication. By applying the turbine's piston to the front cover's friction material, a total converter engagement can be obtained. The result of this engagement is a direct 1:1 mechanical link between the engine and the transmission.

The engagement and disengagement of the TCC are automatic and controlled by the Powertrain Control Module (PCM). The engagement cannot be activated in the lower gears because it eliminates the torque multiplication effect of the torque converter necessary for acceleration. Inputs that determine clutch engagement are: coolant temperature, vehicle speed and throttle position. The torque converter clutch is engaged by the clutch solenoid on the valve body. The clutch will engage at approximately 56 km/h (35 mph) with light throttle, after the shift to third gear.

REMOVAL

(1) Remove transmission and torque converter from vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - REMOVAL)

(2) Place a suitable drain pan under the converter housing end of the transmission.

CAUTION: Verify that transmission is secure on the lifting device or work surface, the center of gravity of the transmission will shift when the torque converter is removed creating an unstable condition. The torque converter is a heavy unit. Use caution when separating the torque converter from the transmission.

(3) Pull the torque converter forward until the center hub clears the oil pump seal.

(4) Separate the torque converter from the transmission.

INSTALLATION

Check converter hub and drive notches for sharp edges, burrs, scratches, or nicks. Polish the hub and notches with 320/400 grit paper or crocus cloth if necessary. The hub must be smooth to avoid damaging the pump seal at installation.

(1) Lubricate converter hub and oil pump seal lip with transmission fluid.

(2) Place torque converter in position on transmission.

CAUTION: Do not damage oil pump seal or bushing while inserting torque converter into the front of the transmission.

(3) Align torque converter to oil pump seal opening.

(4) Insert torque converter hub into oil pump.

(5) While pushing torque converter inward, rotate converter until converter is fully seated in the oil pump gears.

(6) Check converter seating with a scale and straightedge (Fig. 378). Surface of converter lugs should be 1/2 in. to rear of straightedge when converter is fully seated.

(7) If necessary, temporarily secure converter with C-clamp attached to the converter housing.

(8) Install the transmission in the vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - INSTALLATION)

(9) Fill the transmission with the recommended fluid. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/FLUID - STANDARD PROCEDURE)

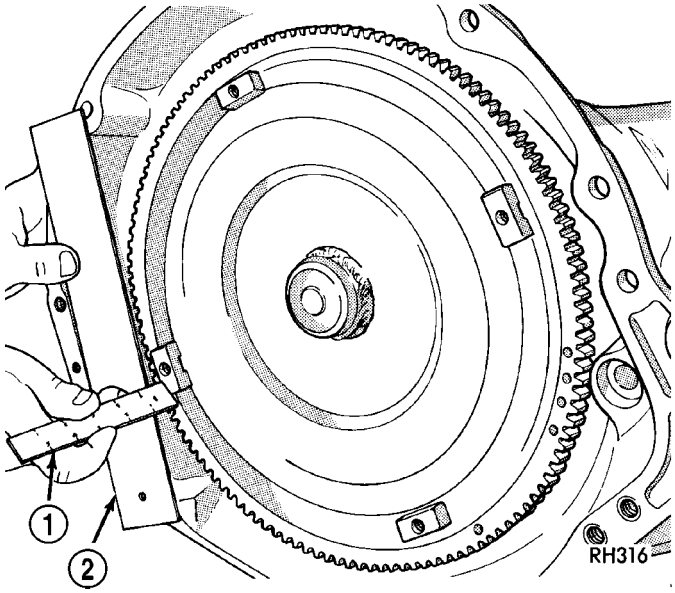


Fig. 378 Checking Torque Converter Seating

1 - SCALE
2 - STRAIGHTEDGE

TRANSMISSION CONTROL RELAY

DESCRIPTION

The transmission control relay (Fig. 379) is located in the Power Distribution Center (PDC) , which is located on the left side of the engine compartment between the battery and radiator upper support.

OPERATION

The Transmission Control Relay is supplied fused B+ voltage, energized by the PCM, and is used to supply power to the solenoid pack when the trans-

TRANSMISSION CONTROL RELAY (Continued)

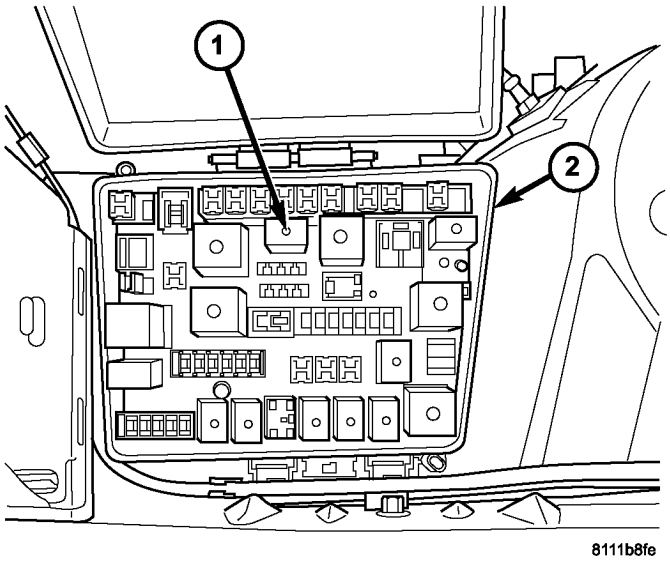


Fig. 379 Transmission Control Relay Location

1 - TRANSMISSION CONTROL RELAY
2 - POWER DISTRIBUTION CENTER

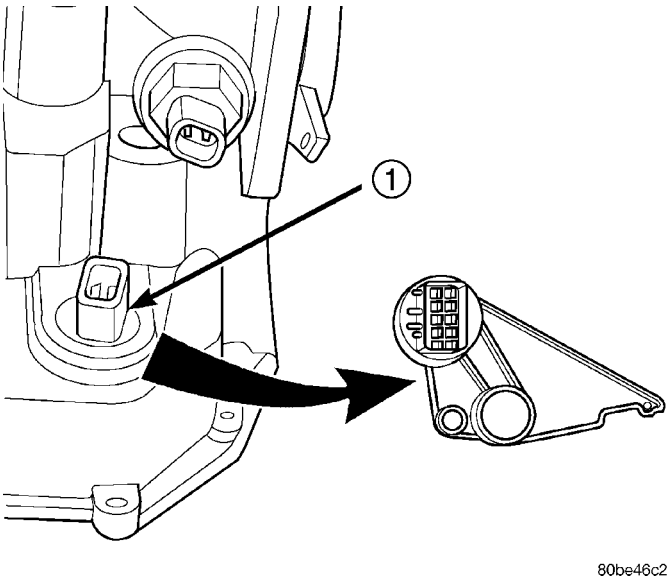


Fig. 380 Transmission Range Sensor (TRS) Location

1 - TRANSMISSION RANGE SENSOR

mission is in normal operating mode. When the relay is "off", no power is supplied to the solenoid pack and the transmission is in "limp-in" mode. After a controller reset (ignition key turned to the "run" position or after cranking engine), the PCM energizes the relay. Prior to this, the PCM verifies that the contacts are open by checking for no voltage at the switched battery terminals. After this is verified, the voltage at the solenoid pack pressure switches is checked. After the relay is energized, the PCM monitors the terminals to verify that the voltage is greater than 3 volts.

TRANSMISSION RANGE SENSOR

DESCRIPTION

The Transmission Range Sensor (TRS) is mounted to the top of the valve body inside the transaxle and can only be serviced by removing the valve body. The electrical connector extends through the transaxle case (Fig. 380).

The Transmission Range Sensor (TRS) has four switch contacts that monitor shift lever position and send the information to the PCM/TCM.

The TRS also has an integrated temperature sensor (thermistor) that communicates transaxle temperature to the TCM and PCM (Fig. 381).

OPERATION

The Transmission Range Sensor (TRS) (Fig. 380) communicates shift lever position (SLP) to the PCM/TCM as a combination of open and closed switches.

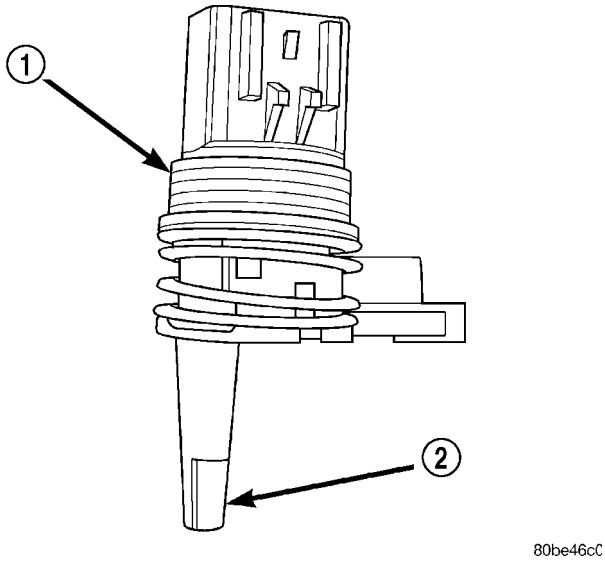


Fig. 381 Transmission Temperature Sensor

1 - TRANSMISSION RANGE SENSOR
2 - TEMPERATURE SENSOR

Each shift lever position has an assigned combination of switch states (open/closed) that the PCM/TCM receives from four sense circuits. The PCM/TCM interprets this information and determines the appropriate transaxle gear position and shift schedule.

Since there are four switches, there are 16 possible combinations of open and closed switches (codes). Seven of these codes are related to gear position and three are recognized as "between gear" codes. This results in six codes which should never occur. These are called "invalid" codes. An invalid code will result

TRANSMISSION RANGE SENSOR (Continued)

in a DTC, and the PCM/TCM will then determine the shift lever position based on pressure switch data. This allows reasonably normal transmission operation with a TRS failure.

TRS SWITCH STATES

SLP	T42	T41	T3	T1
P	CL	CL	CL	OP
R	CL	OP	OP	OP
N	CL	CL	OP	CL
OD	OP	OP	OP	CL
3	OP	OP	CL	OP
L	CL	OP	CL	CL

TRANSMISSION TEMPERATURE SENSOR

The TRS has an integrated thermistor (Fig. 381) that the PCM/TCM uses to monitor the transmission's sump temperature. Since fluid temperature can affect transmission shift quality and convertor lock up, the PCM/TCM requires this information to determine which shift schedule to operate in. The PCM also monitors this temperature data so it can energize the vehicle cooling fan(s) when a transmission "overheat" condition exists. If the thermistor circuit fails, the PCM/TCM will revert to calculated oil temperature usage.

CALCULATED TEMPERATURE

A failure in the temperature sensor or circuit will result in calculated temperature being substituted for actual temperature. Calculated temperature is a predicted fluid temperature which is calculated from a combination of inputs:

- Battery (ambient) temperature
- Engine coolant temperature
- In-gear run time since start-up

REMOVAL

(1) Remove valve body assembly from transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/VALVE BODY - REMOVAL)

(2) Remove transmission range sensor retaining screw and remove sensor from valve body (Fig. 382).

(3) Remove TRS from manual shaft.

INSTALLATION

(1) Install transmission range sensor (TRS) to the valve body and torque retaining screw (Fig. 382) to 5 N·m (45 in. lbs.).

(2) Install valve body to transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/VALVE BODY - INSTALLATION)

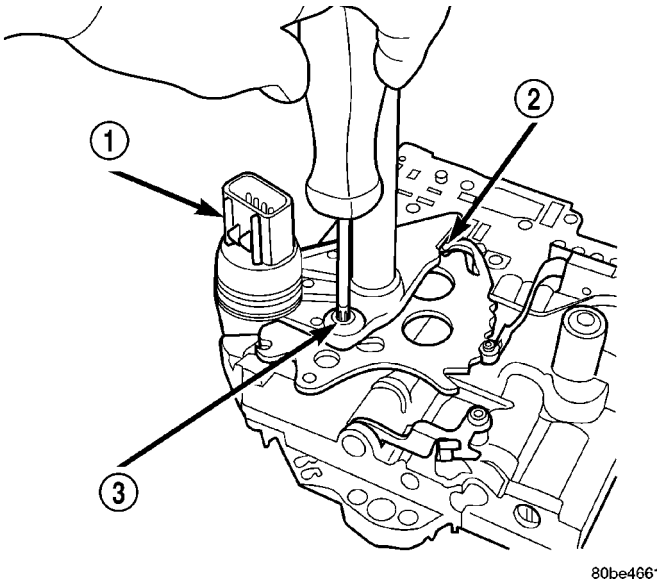


Fig. 382 Remove Transmission Range Sensor

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL VALVE CONTROL PIN
3 - RETAINING SCREW

VALVE BODY

DESCRIPTION

The valve body assembly consists of a cast aluminum valve body, a separator plate, and transfer plate. The valve body contains valves and check balls that control fluid delivery to the torque converter clutch, solenoid/pressure switch assembly, and frictional clutches. The valve body contains the following components (Fig. 383):

- Regulator valve
- Solenoid switch valve
- Manual valve
- Converter clutch switch valve
- Converter clutch control valve
- Torque converter regulator valve
- Low/Reverse switch valve

In addition, the valve body also contains the thermal valve, #2,3&4 check balls, the #5 (overdrive) check valve and the 2/4 accumulator assembly. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/VALVE BODY - DISASSEMBLY)

OPERATION

NOTE: Refer to the Hydraulic Schematics for a visual aid in determining valve location, operation and design.

REGULATOR VALVE

The regulator valve controls hydraulic pressure in the transaxle. It receives unregulated pressure from

VALVE BODY (Continued)

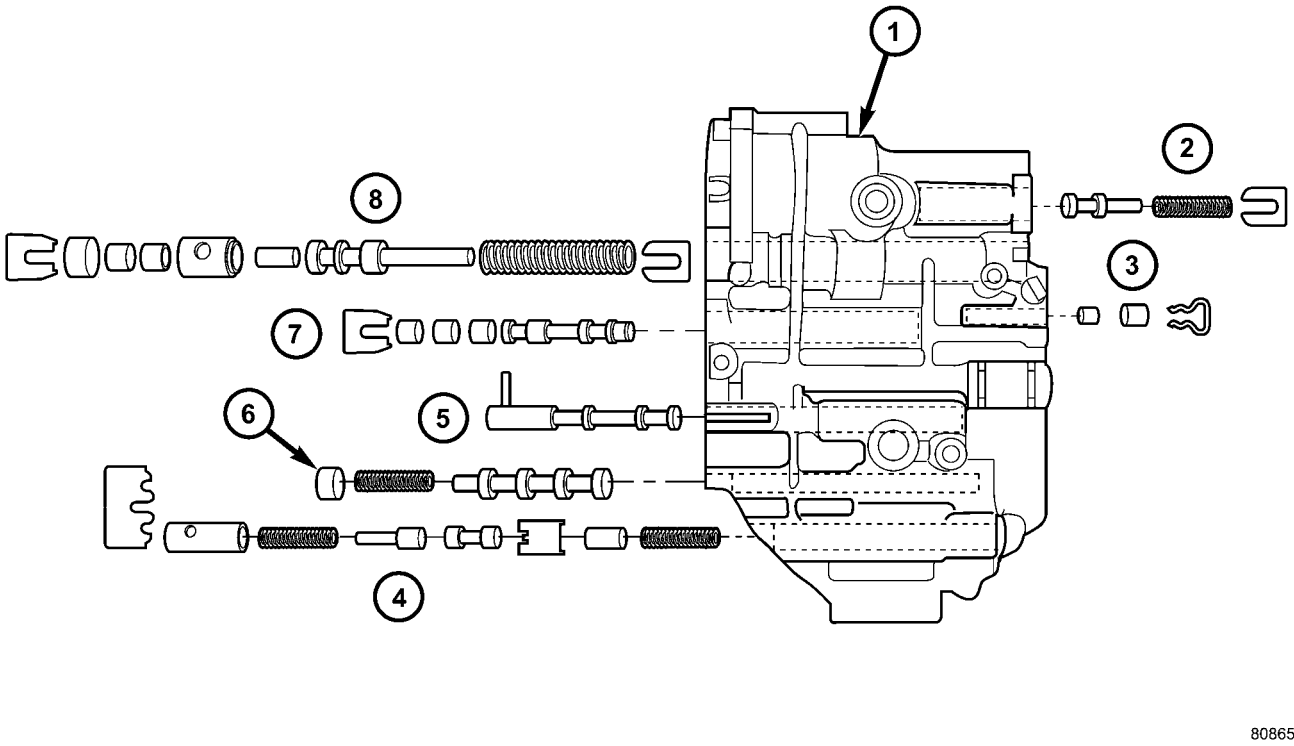


Fig. 383 Valve Body Assembly

1 - VALVE BODY
2 - T/C REGULATOR VALVE
3 - L/R SWITCH VALVE
4 - CONVERTER CLUTCH CONTROL VALVE
5 - MANUAL VALVE
6 - CONVERTER CLUTCH SWITCH VALVE
7 - SOLENOID SWITCH VALVE
8 - REGULATOR VALVE

the pump, which works against spring tension to maintain oil at specific pressures. A system of sleeves and ports allows the regulator valve to work at one of three predetermined pressure levels. Regulated oil pressure is also referred to as “line pressure.”

SOLENOID SWITCH VALVE

The solenoid switch valve controls line pressure from the LR/CC solenoid. In one position, it allows the low/reverse clutch to be pressurized. In the other, it directs line pressure to the converter control and converter clutch valves.

MANUAL VALVE

The manual valve is operated by the mechanical shift linkage. Its primary responsibility is to send line pressure to the appropriate hydraulic circuits and solenoids. The valve has three operating ranges or positions.

CONVERTER CLUTCH SWITCH VALVE

The main responsibility of the converter clutch switch valve is to control hydraulic pressure applied to the front (off) side of the converter clutch piston. Line pressure from the regulator valve is fed to the torque converter regulator valve, where it passes through the valve, and is slightly regulated. The pressure is then directed to the converter clutch switch valve and to the front side of the converter clutch piston. This pressure pushes the piston back and disengages the converter clutch.

CONVERTER CLUTCH CONTROL VALVE

The converter clutch control valve controls the back (on) side of the torque converter clutch. When the PCM/TCM energizes or modulates the LR/CC solenoid to apply the converter clutch piston, both the converter clutch control valve and the converter control valve move, allowing pressure to be applied to the back side of the clutch.

T/C REGULATOR VALVE

The torque converter regulator valve slightly regulates the flow of fluid to the torque converter.

LOW/REVERSE SWITCH VALVE

The low/reverse clutch is applied from different sources, depending on whether low (1st) gear or reverse is selected. The low/reverse switch valve alternates positions depending on from which direc-

VALVE BODY (Continued)

tion fluid pressure is applied. By design, when the valve is shifted by fluid pressure from one channel, the opposing channel is blocked. The switch valve alienates the possibility of a sticking ball check, thus providing consistent application of the low/reverse clutch under all operating conditions.

REMOVAL

NOTE: If valve body is replaced or reconditioned, the PCM Quick Learn Procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

NOTE: The Engine Cradle Crossmember assembly must be partially lowered to gain access to and remove the Valve Body assembly.

(1) Disconnect battery negative cable.
(2) Remove battery and tray (Fig. 384) (Fig. 385).

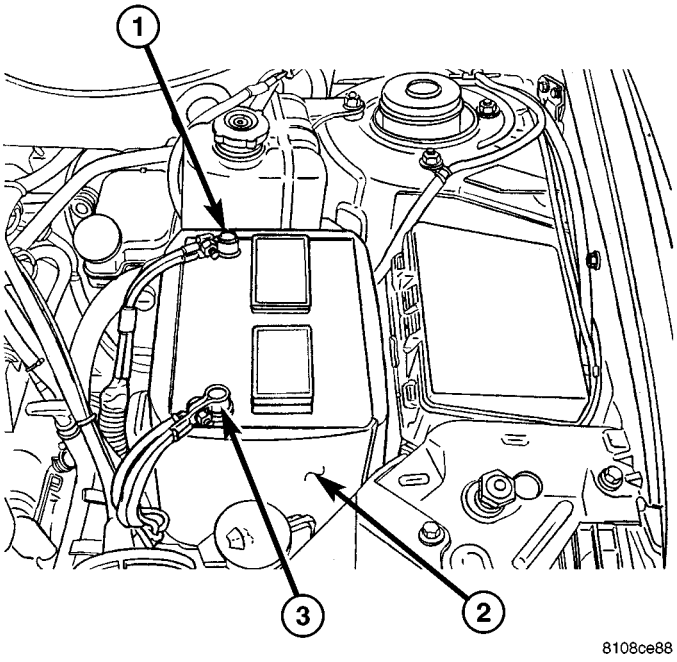


Fig. 384 Battery

1 - BATTERY POSITIVE CABLE
2 - THERMO-WRAP
3 - BATTERY NEGATIVE CABLE

(3) Install overhead powertrain support fixture (Tool 8534B and adapter kit 8534-12) (Fig. 386):

(a) Remove engine oil dipstick tube-to-cylinder head fastener (Fig. 387). Install lift/support bracket 8534-8 and secure with dipstick tube bolt.

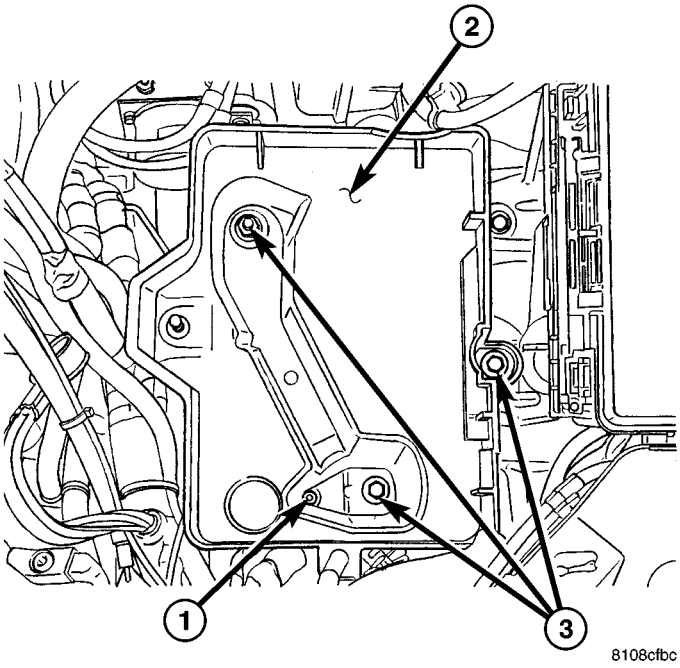


Fig. 385 Battery Tray

1 - DRAIN HOLE/HOSE ATTACHMENT
2 - BATTERY TRAY
3 - BOLTS

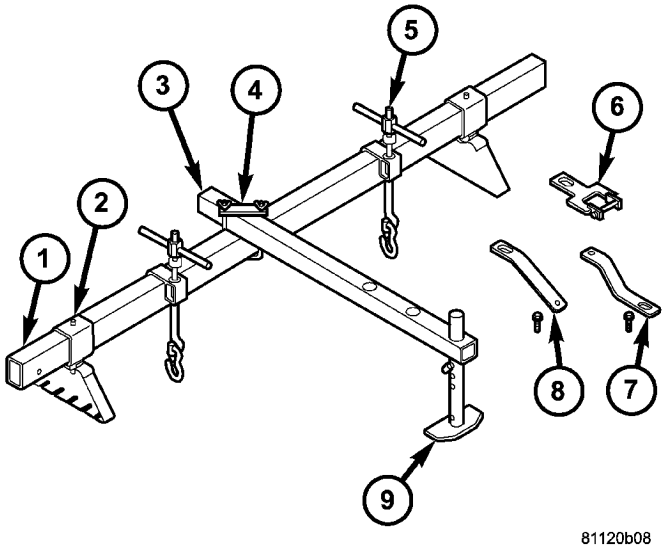


Fig. 386 Engine Support Fixture 8534B

1 - SUPPORT TUBE 8534-1
2 - BRACKET/SLEEVE 8534-2
3 - CROSS-BAR 8534-3
4 - CLAMP 8534-5
5 - LIFT HOOK ASSEMBLY
6 - LIFT BRACKET/BOLT 8534-15
7 - LIFT BRACKET/BOLT 8534-7
8 - LIFT BRACKET/BOLT 8534-8
9 - SUPPORT LEG 8534-4

VALVE BODY (Continued)

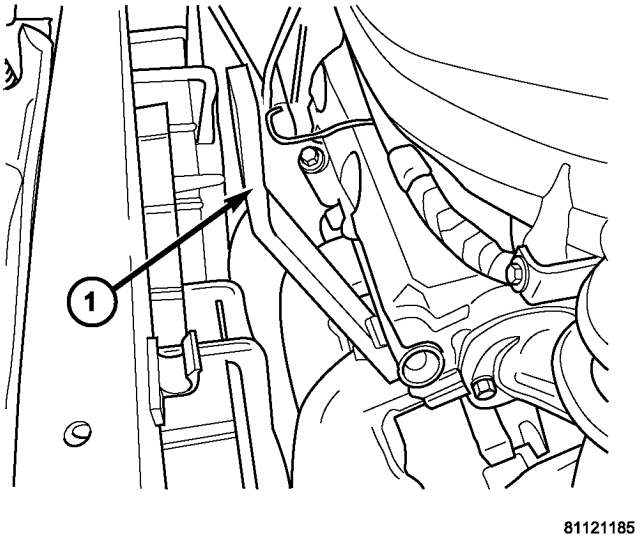


Fig. 387 Lift Bracket 8534-8

1 - BRACKET 8534-8

(b) Disconnect coolant temperature sensor (at thermostat housing). Remove engine harness-to-cylinder head bolt. Position harness out of the way. Install and secure lift/support bracket and bolt 8534-7 as shown in (Fig. 388).

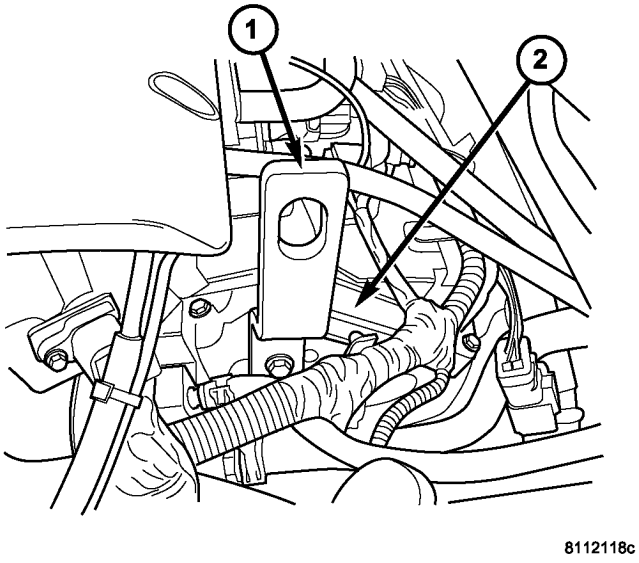


Fig. 388 Lift Bracket 8534-7

1 - BRACKET 8534-7
2 - REAR CYLINDER HEAD

(c) Assemble 8534-2 mounting bracket/sleeve assemblies to support tube 8534-1 and install to vehicle, allowing brackets to rest on inner fender ledges (Fig. 389).

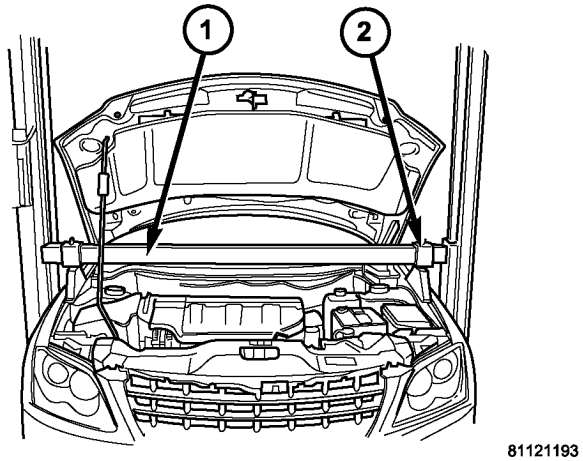


Fig. 389 Support Tube and Sleeve/Brackets

1 - SUPPORT TUBE 8534-1
2 - BRACKET/SLEEVE 8534-2

(d) Assemble cross-bar 8534-3, clamp 8534-5 and support leg 8534-4 to support tube, allowing support leg to rest on radiator upper support (Fig. 390).

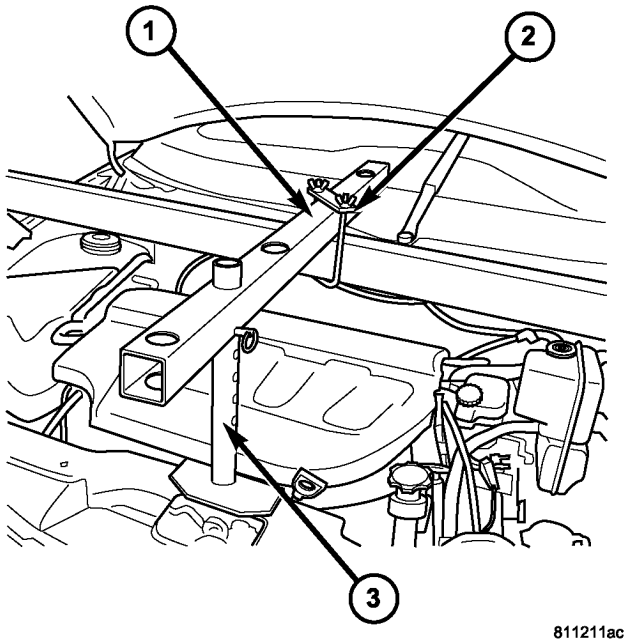


Fig. 390 Crossbar and Support Leg

1 - CROSS-BAR 8534-3
2 - CLAMP 8534-5
3 - SUPPORT LEG 8534-4

VALVE BODY (Continued)

(e) Tighten cross-bar-to-support tube clamp 8534-5 (Fig. 391), as well as mounting bracket/sleeve 8534-2 thumb screw and hex nut to secure fixture (Fig. 392).

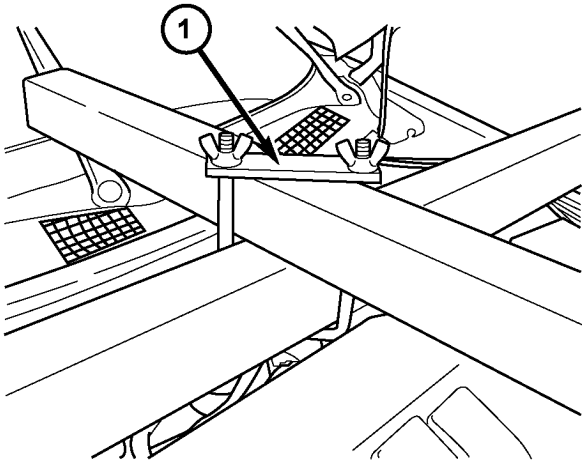


Fig. 391 Clamp 8534-5

1 - CLAMP 8534-5

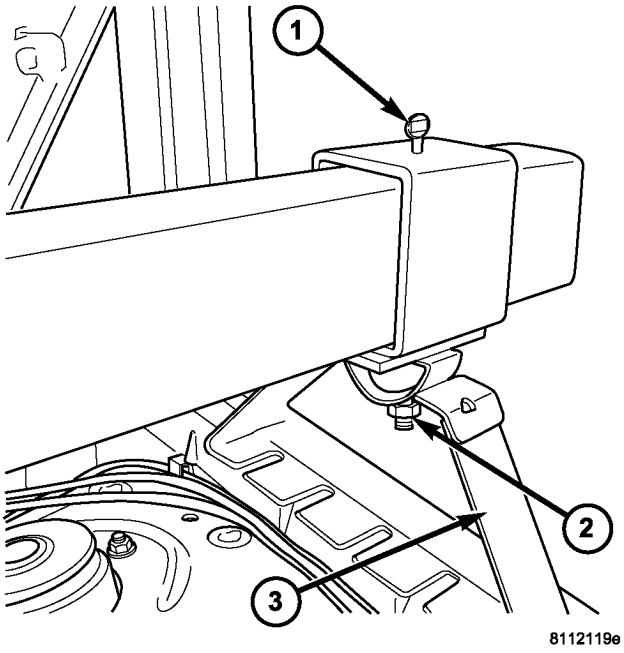


Fig. 392 Torque Thumb Screw and Pivot Nut

1 - THUMB SCREW
2 - PIVOT HEX NUT
3 - BRACKET/SLEEVE 8534-2

(f) Install lift bracket/hook assemblies as shown in (Fig. 393) (Fig. 394) (Fig. 395). Tighten t-handles just enough to build tension between the fixture and drivetrain.

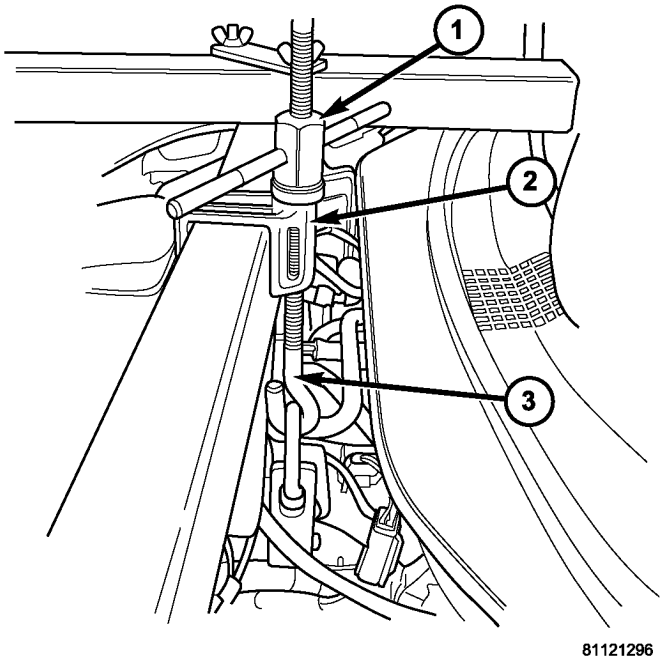


Fig. 393 T-Handle, Bracket, and Hook Assy at Rear Lift Bracket

1 - T-HANDLE 8534-14
2 - LIFTING BRACKET 8534-13
3 - HOOK ASSEMBLY 8534-11

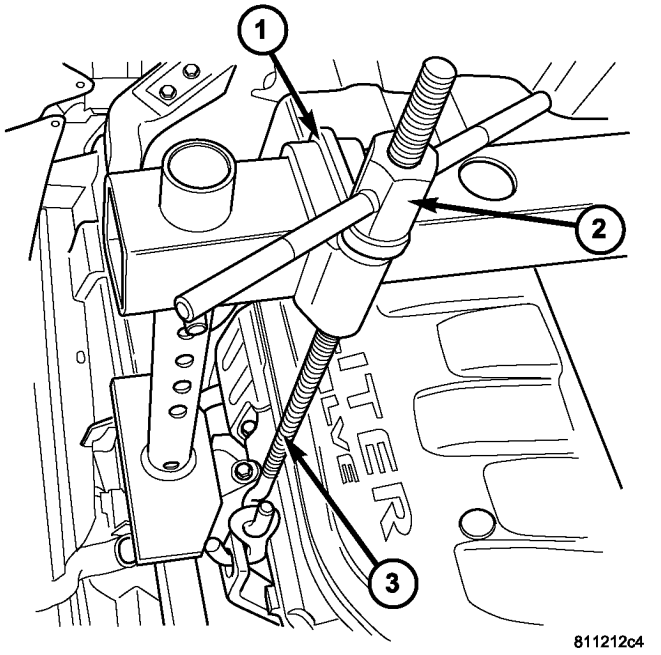


Fig. 394 T-Handle, Bracket, and Hook Assy at Front Lift Bracket

1 - LIFTING BRACKET 8534-13
2 - T-HANDLE 8534-14
3 - HOOK ASSEMBLY 8534-11

VALVE BODY (Continued)

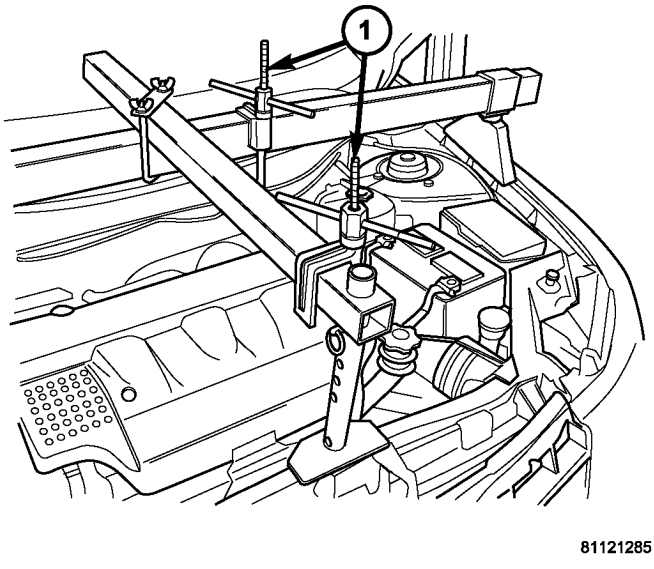


Fig. 395 Engine Support Fixture 8534B

1 - LIFT BRACKET/HOOK ASSEMBLY

(4) Disconnect gearshift cable from manual valve lever.

(5) Remove manual valve lever from manual shaft.

(6) Raise vehicle on hoist.

(7) Remove engine mount (front and rear) to engine cradle crossmember nuts.

(8) Place scribe marks at engine cradle crossmember and body for alignment upon reassembly.

(9) Support cradle at rear with screw jack or equivalent. Partially remove engine cradle crossmember-to-body bolts, lowering cradle at rear enough to facilitate cradle pivoting.

(10) Support cradle at front with screw jack or equivalent. Remove engine cradle crossmember-to-body bolts. Lower cradle at front approximately 10 inches to facilitate valve body removal.

(11) Remove oil pan bolts (Fig. 396).

(12) Remove oil pan (Fig. 397).

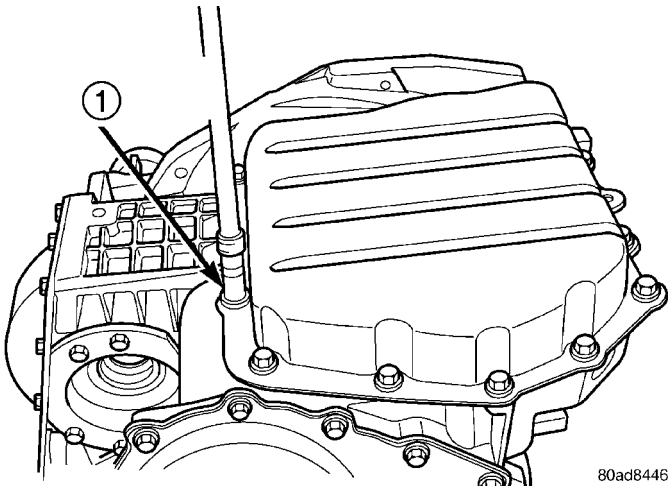


Fig. 396 Oil Pan Bolts

1 - OIL PAN BOLTS (USE RTV UNDER BOLT HEADS)

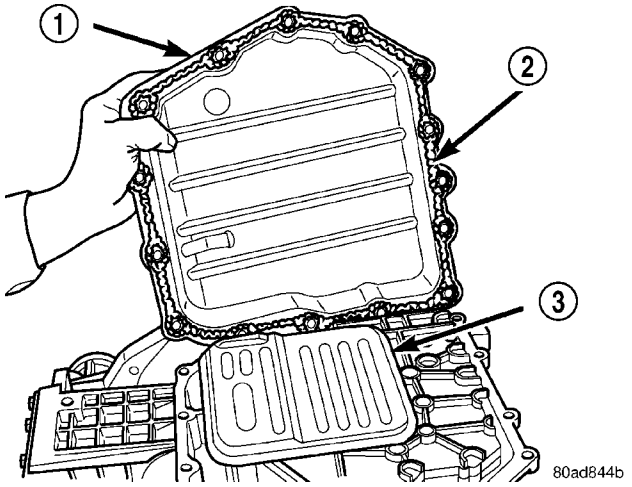


Fig. 397 Oil Pan

1 - OIL PAN
2 - 1/8 INCH BEAD OF RTV SEALANT
3 - OIL FILTER

VALVE BODY (Continued)

(13) Remove oil filter (Fig. 398).

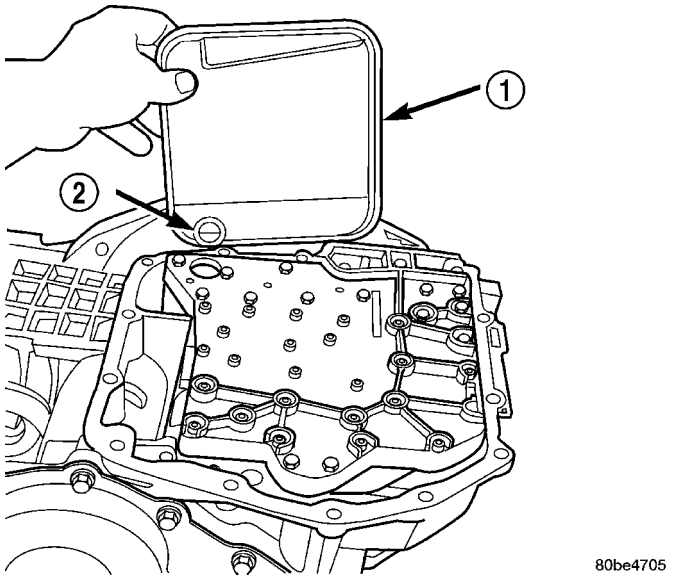


Fig. 398 Oil Filter

1 - OIL FILTER
2 - O-RING

(14) Remove the valve body-to-transaxle case bolts (Fig. 399).

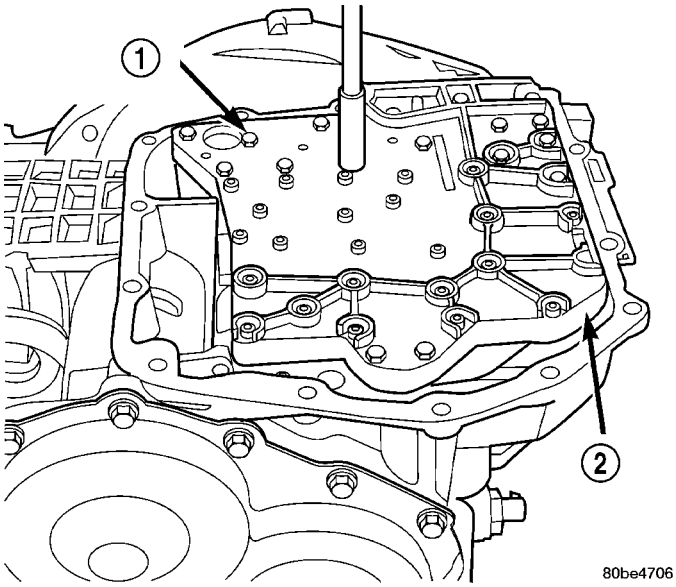


Fig. 399 Valve Body Attaching Bolts

1 - VALVE BODY ATTACHING BOLTS (18)
2 - VALVE BODY

NOTE: To ease removal of the valve body, turn the manual valve lever fully clockwise to low or first gear.

(15) Remove park rod rollers from guide bracket and remove valve body from transaxle (Fig. 400) (Fig. 401). **Note position of accumulator and springs upon removal for assembly reference.**

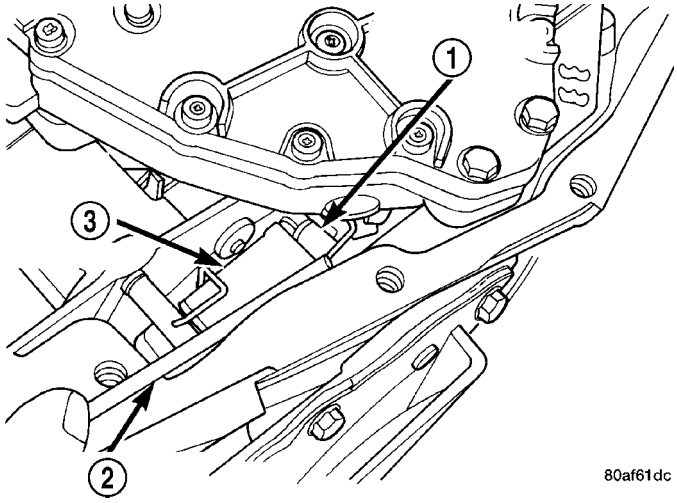


Fig. 400 Push Park Rod Rollers from Guide Bracket

1 - PARK SPRAG ROLLERS
2 - SCREWDRIVER
3 - PARK SPRAG GUIDE BRACKET

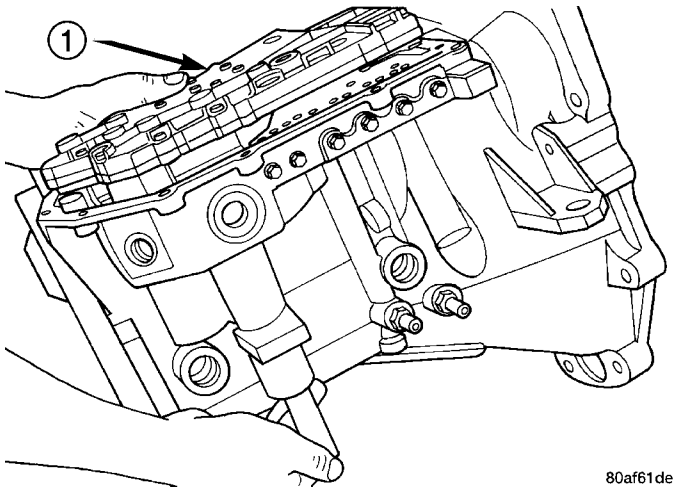


Fig. 401 Valve Body Removal/Installation

1 - VALVE BODY

CAUTION: The valve body manual shaft pilot may distort and bind the manual valve if the valve body is mishandled or dropped.

VALVE BODY (Continued)

DISASSEMBLY

NOTE: If valve body assembly is being reconditioned, the PCM/TCM Quick Learn Procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Remove manual shaft seal (Fig. 402).

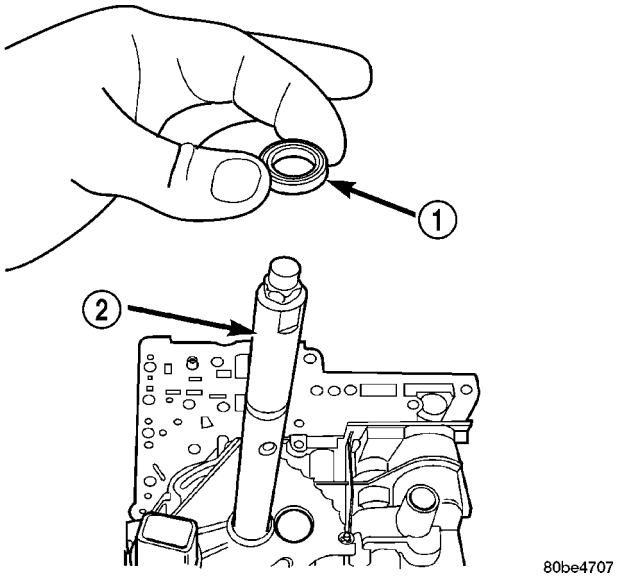


Fig. 402 Manual Shaft Seal

1 - SEAL
2 - MANUAL SHAFT

(2) Remove Transmission Range Sensor retaining screw (Fig. 403).

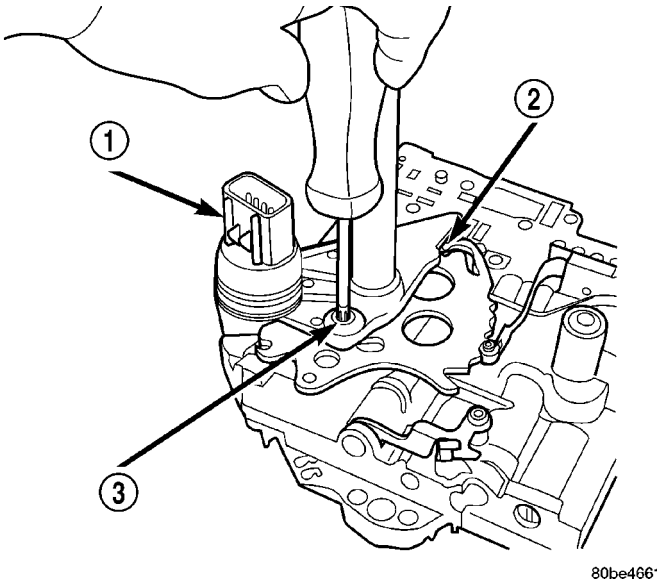


Fig. 403 Remove Transmission Range Sensor

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL VALVE CONTROL PIN
3 - RETAINING SCREW

(3) Remove Manual Shaft/Rooster Comb and Transmission Range Sensor (Fig. 404).

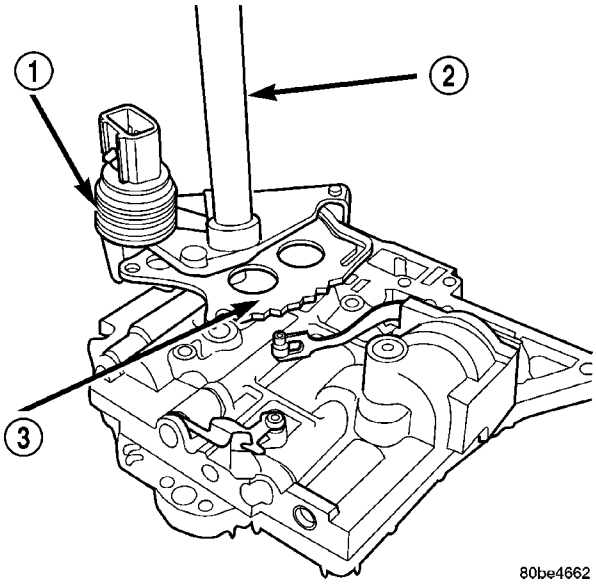


Fig. 404 Manual Shaft/Rooster Comb and Transmission Range Sensor

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL SHAFT
3 - ROOSTER COMB

(4) Remove 2/4 Accumulator Retaining Plate (Fig. 405).

VALVE BODY (Continued)

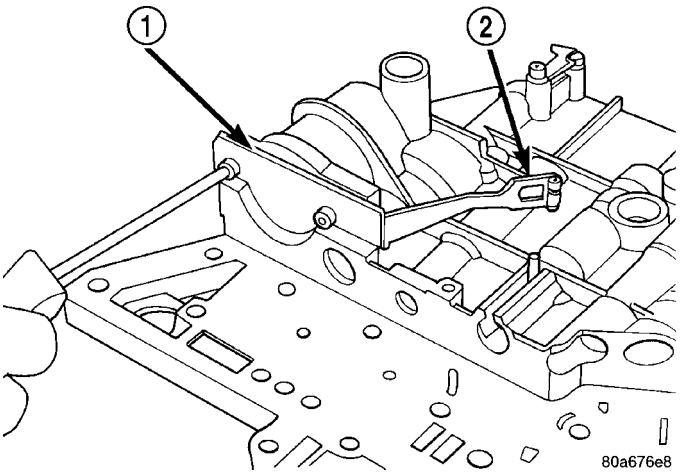


Fig. 405 2/4 Accumulator Retaining Plate

1 - 2–4 ACCUMULATOR RETAINING PLATE
2 - DETENT SPRING

(5) Remove 2/4 Accumulator components as shown in (Fig. 406).

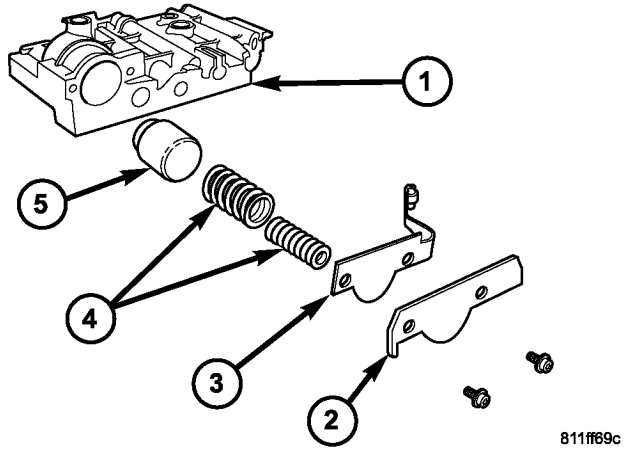


Fig. 406 2/4 Accumulator Assembly

1 - VALVE BODY
2 - RETAINER PLATE
3 - DETENT SPRING
4 - RETURN SPRINGS
5 - PISTON

(6) Remove Valve Body to Transfer Plate screws (Fig. 407).

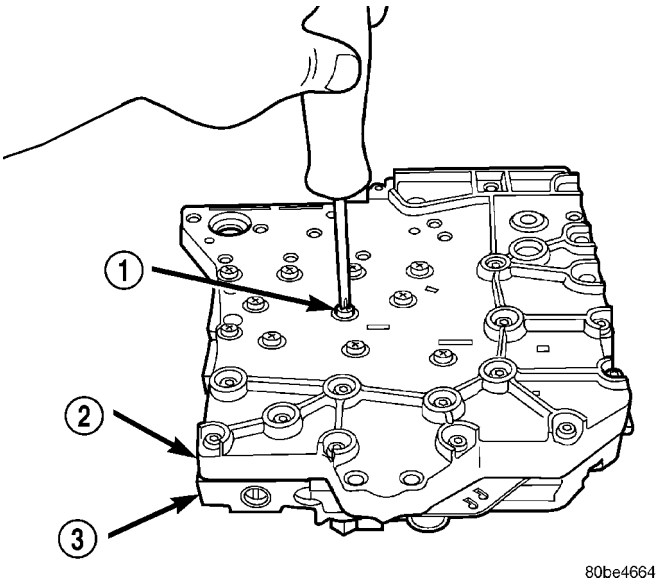


Fig. 407 Remove Valve Body to Transfer Plate Screws

1 - SCREW (24)
2 - TRANSFER PLATE
3 - VALVE BODY

(7) Invert assembly and remove Transfer Plate (Fig. 408). Beware of loose check balls.

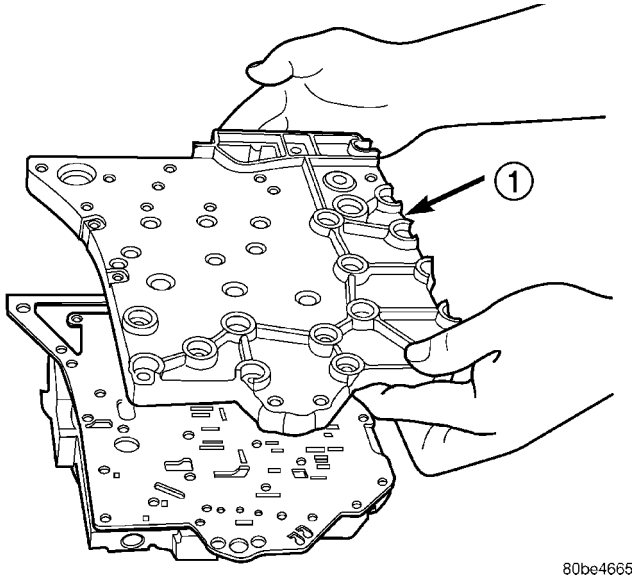


Fig. 408 Remove Transfer Plate

1 - TRANSFER PLATE

(8) Remove oil screen (Fig. 409).

VALVE BODY (Continued)

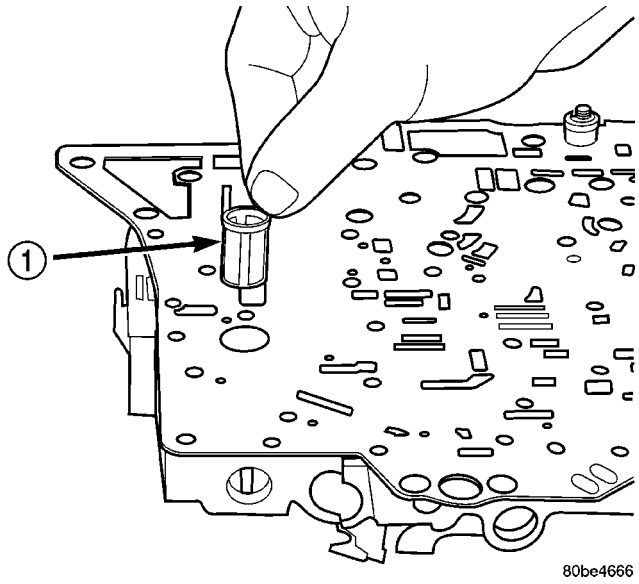


Fig. 409 Remove Oil Screen

1 - OIL SCREEN

(9) Remove the overdrive clutch (#5) check valve (Fig. 410)

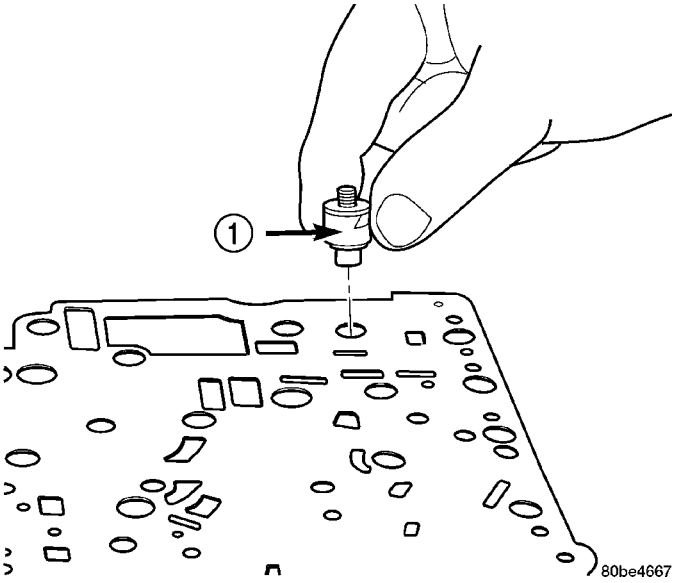


Fig. 410 Remove Overdrive Clutch (#5) Check Valve

1 - OVERDRIVE CLUTCH (#5) CHECK VALVE

(10) Remove separator plate (Fig. 411).

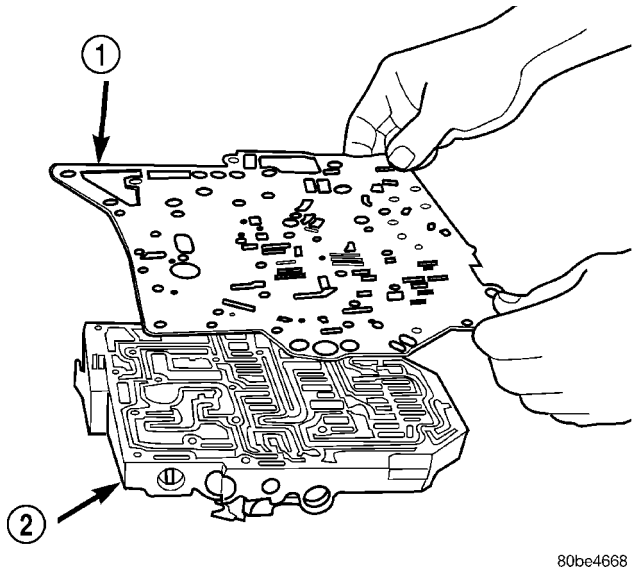


Fig. 411 Remove Separator Plate

1 - SEPARATOR PLATE
2 - VALVE BODY

(11) Remove thermal valve (Fig. 412).

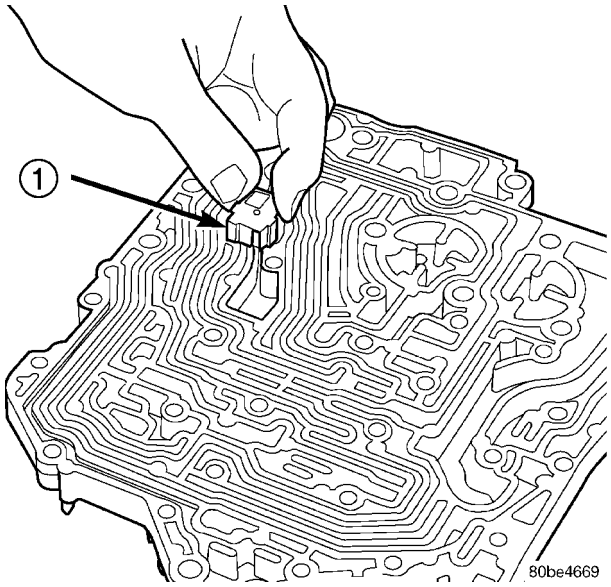


Fig. 412 Remove Thermal Valve

1 - THERMAL VALVE

(12) Remove check balls (Fig. 413).

VALVE BODY (Continued)

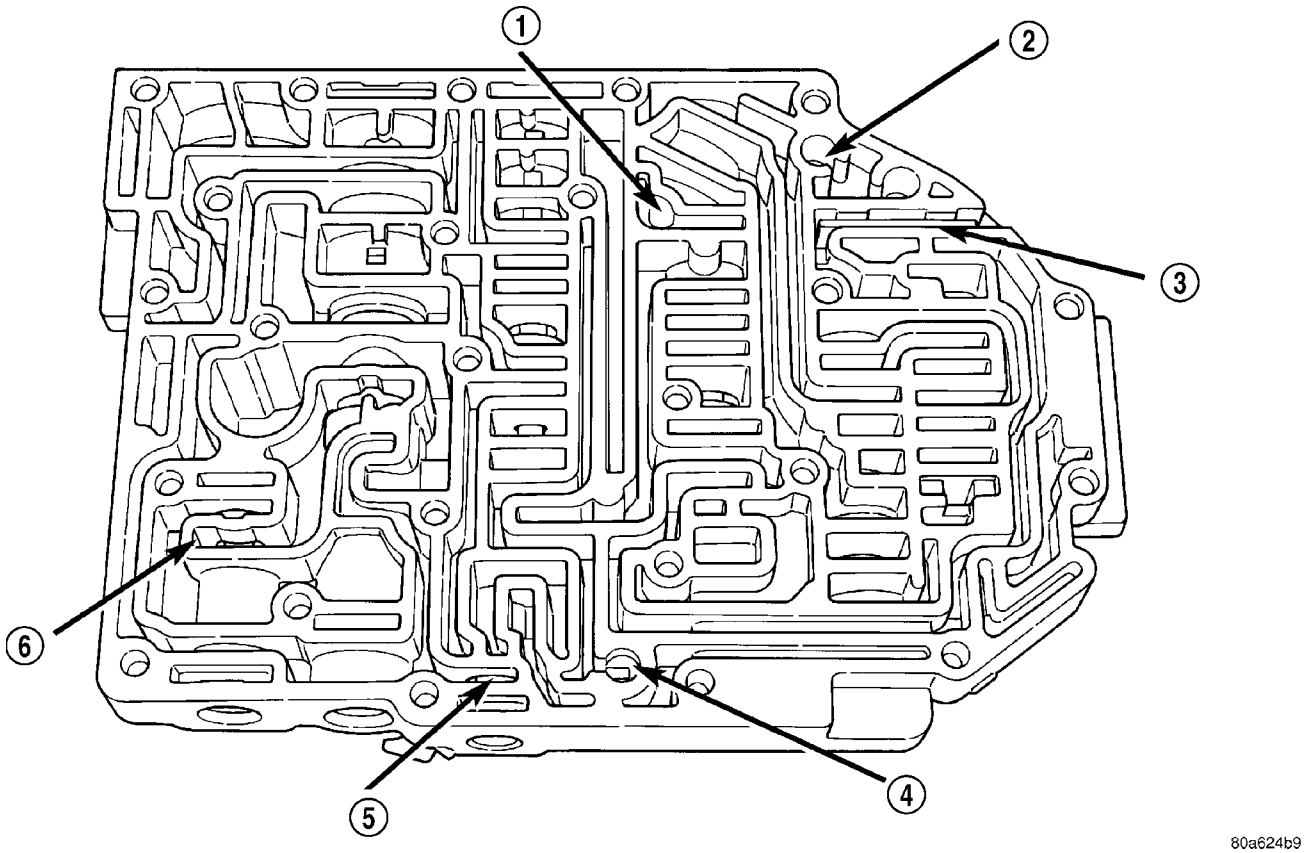


Fig. 413 Ball Check Location

1 - (#4) BALL CHECK LOCATION
2 - (#2) BALL CHECK LOCATION
3 - RETAINER
4 - (#3) BALL CHECK LOCATION
5 - LOW/REVERSE SWITCH VALVE
6 - T/C LIMIT VALVE

NOTE: Tag all valve/spring assemblies for reassembly identification.

(13) Remove dual retainer plate using Tool 6301 (Fig. 414).

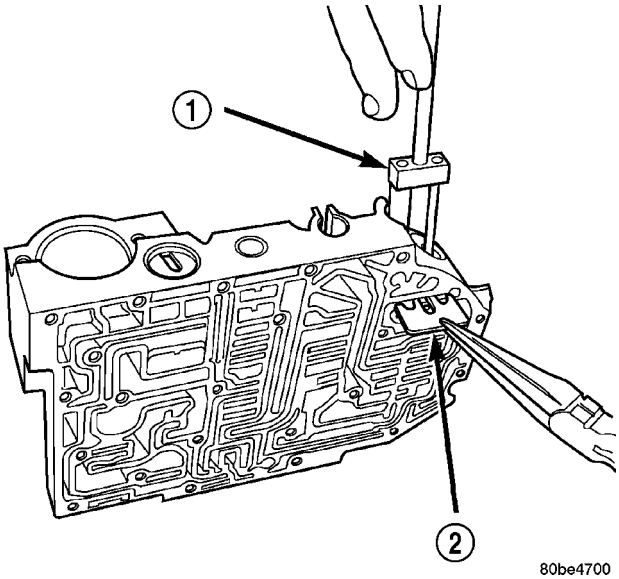


Fig. 414 Remove Dual Retainer Plate using Tool 6301

1 - TOOL 6301
2 - RETAINER

VALVE BODY (Continued)

(14) Remove regulator valve spring retainer (Fig. 415).

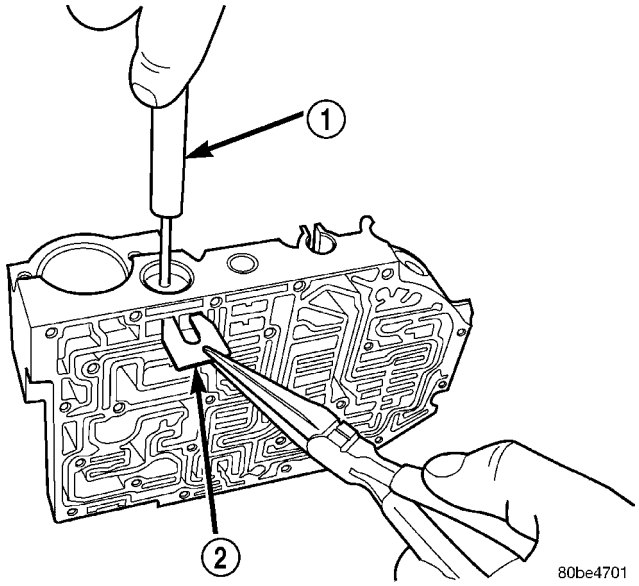


Fig. 415 Remove Regulator Valve Spring Retainer using Tool 6302

1 - TOOL 6302
2 - RETAINER

(15) Remove remaining retainers as shown in (Fig. 416).

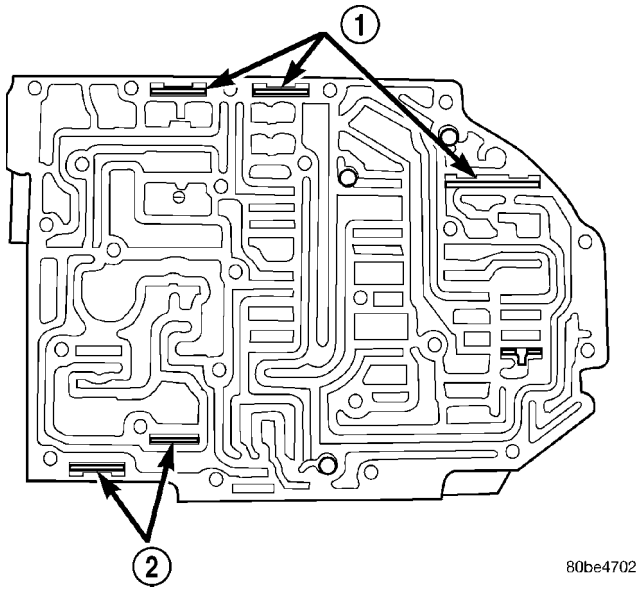


Fig. 416 Valve Retainer Location

1 - RETAINER
2 - RETAINER

VALVE BODY (Continued)

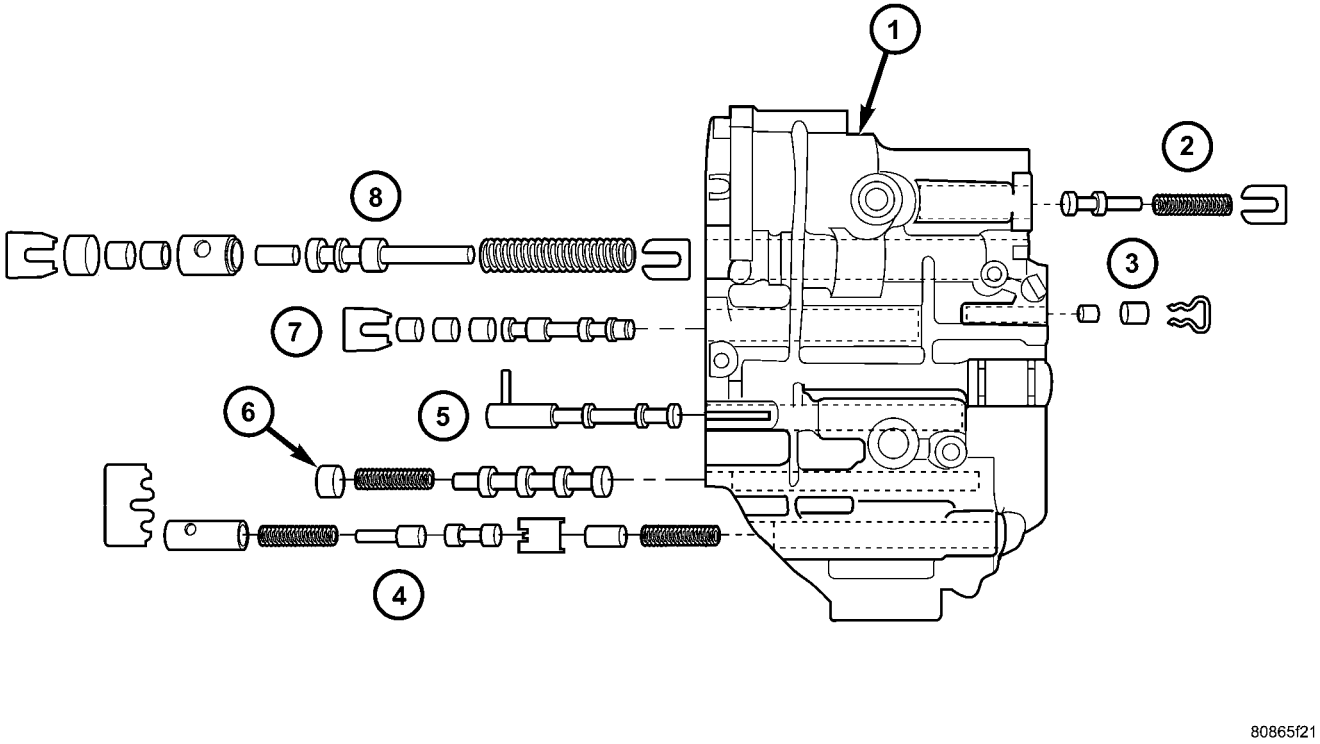


Fig. 417 Springs and Valves Location

1 - VALVE BODY
2 - T/C REGULATOR VALVE
3 - L/R SWITCH VALVE
4 - CONVERTER CLUTCH CONTROL VALVE
5 - MANUAL VALVE
6 - CONVERTER CLUTCH SWITCH VALVE
7 - SOLENOID SWITCH VALVE
8 - REGULATOR VALVE

(16) Remove valves and springs as shown in (Fig. 417).

NOTE: Refer to Valve Body Cleaning and Inspection for cleaning procedures.

ASSEMBLY

NOTE: If valve body assembly is reconditioned, the PCM/TCM Quick Learn Procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Install valves and springs as shown in (Fig. 417).
(2) Install regulator valve spring retainer (Fig. 418).

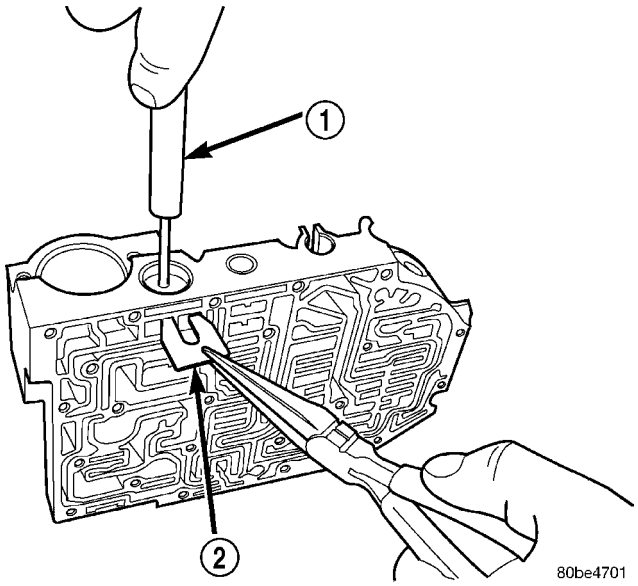


Fig. 418 Install Regulator Valve Spring Retainer using Tool 6302

1 - TOOL 6302
2 - RETAINER

VALVE BODY (Continued)

(3) Install dual retainer plate using Tool 6301 (Fig. 419).

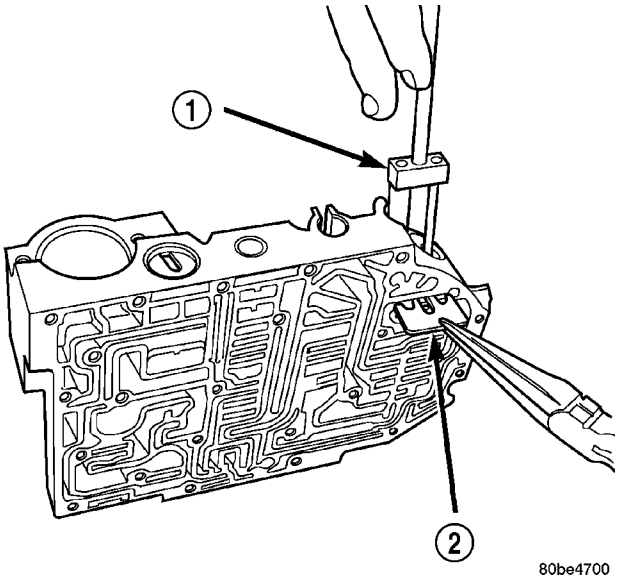


Fig. 419 Install Dual Retainer Plate using Tool 6301

1 - TOOL 6301
2 - RETAINER

(4) Verify that all retainers are installed as shown in (Fig. 420). Retainers should be flush or below valve body surface.

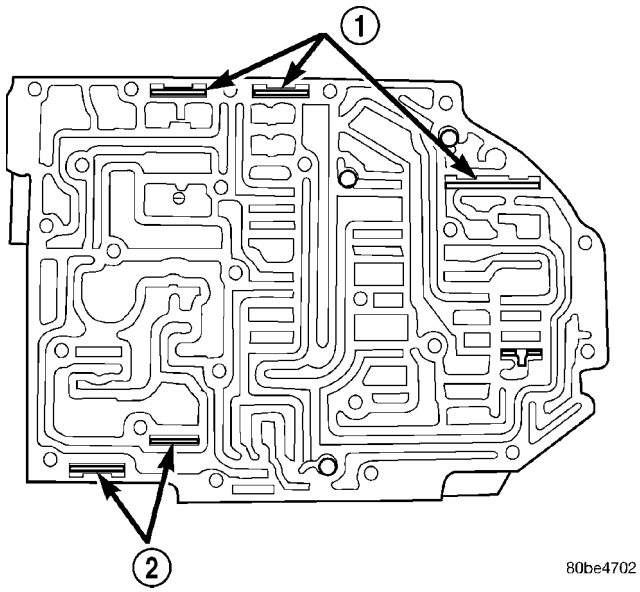


Fig. 420 Valve Retainer Location

1 - RETAINER
2 - RETAINER

VALVE BODY (Continued)

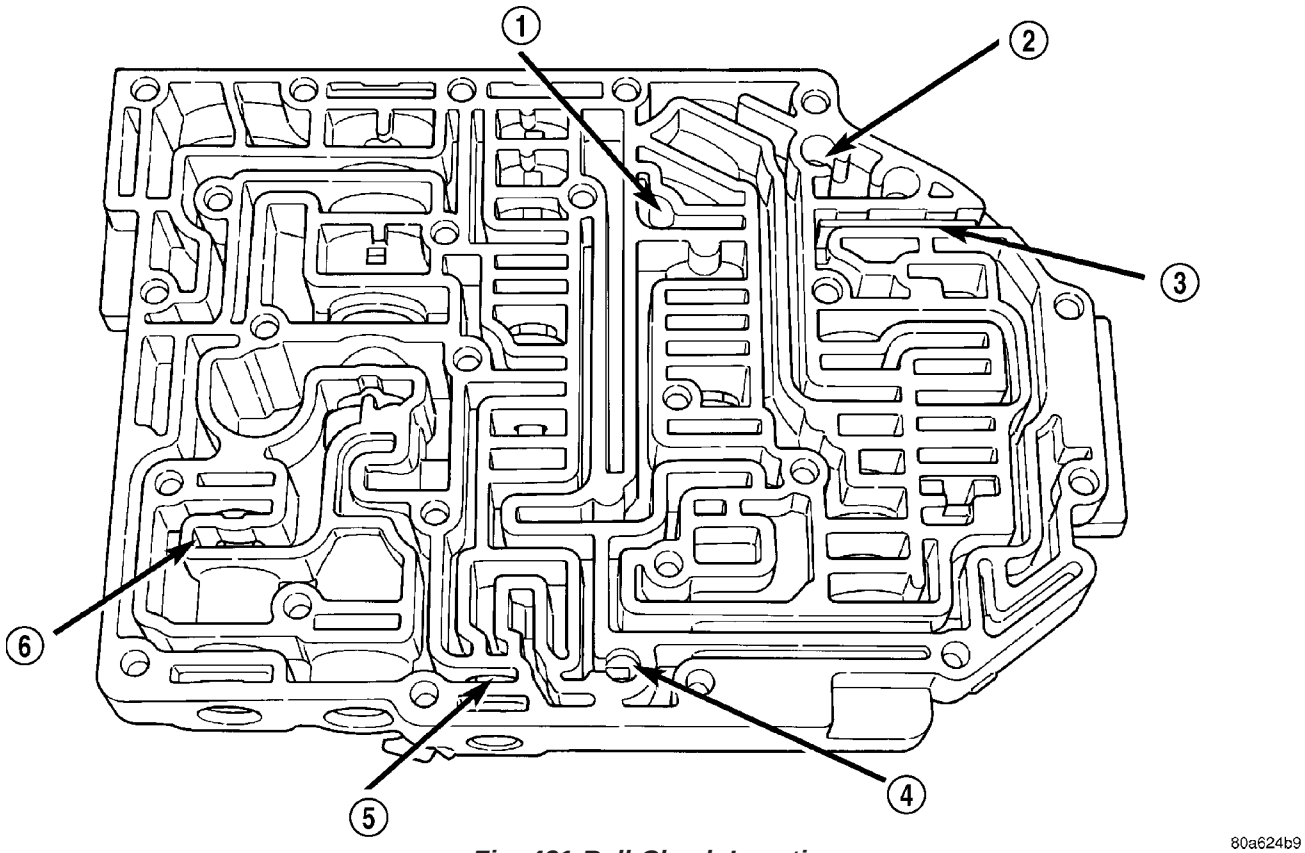


Fig. 421 Ball Check Location

1 - (#4) BALL CHECK LOCATION
2 - (#2) BALL CHECK LOCATION
3 - RETAINER
4 - (#3) BALL CHECK LOCATION
5 - LOW/REVERSE SWITCH VALVE
6 - T/C LIMIT VALVE

(5) Install check balls into position as shown in (Fig. 421). If necessary, secure them with petrolatum or transmission assembly gel for assembly ease.

(6) Install thermal valve into transfer plate (Fig. 422).

(7) Install separator plate to valve body (Fig. 423).

(8) Install the overdrive clutch (#5) check valve to separator plate (Fig. 424)

(9) Install oil screen to separator plate (Fig. 425).

(10) Install transfer plate to valve body and separator plate. Make sure oil screen and #5 check valve do not bind (Fig. 426).

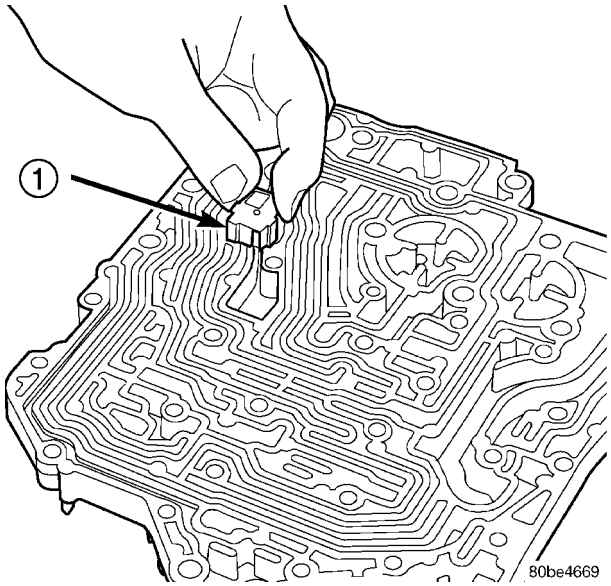


Fig. 422 Install Thermal Valve

1 - THERMAL VALVE

VALVE BODY (Continued)

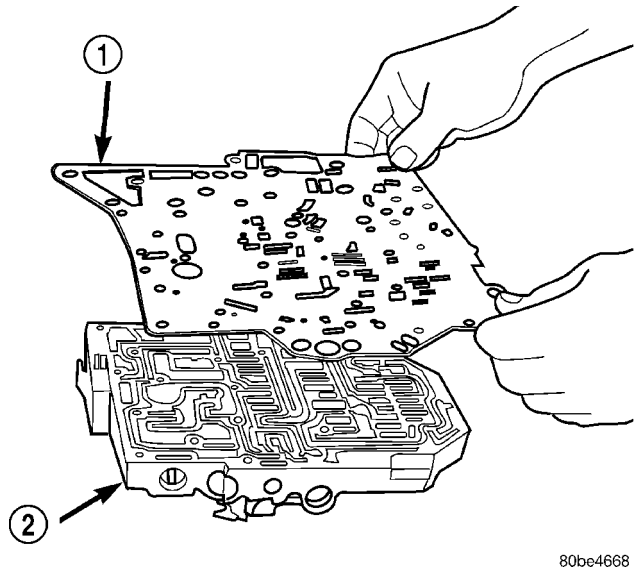


Fig. 423 Install Separator Plate

1 - SEPARATOR PLATE
2 - VALVE BODY

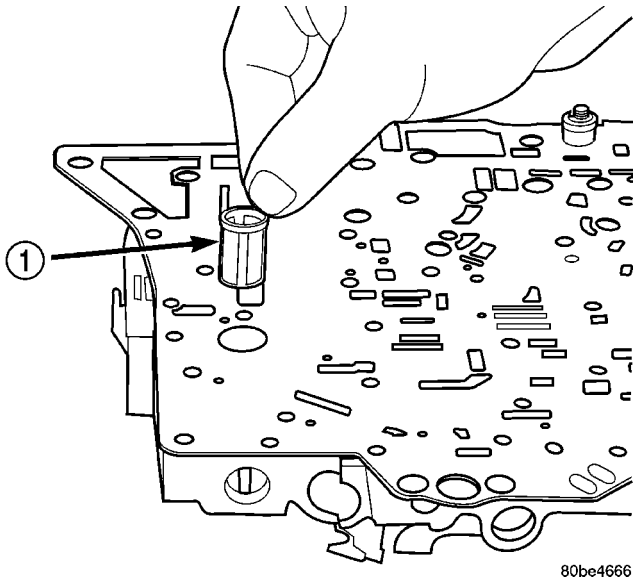


Fig. 425 Install Oil Screen

1 - OIL SCREEN

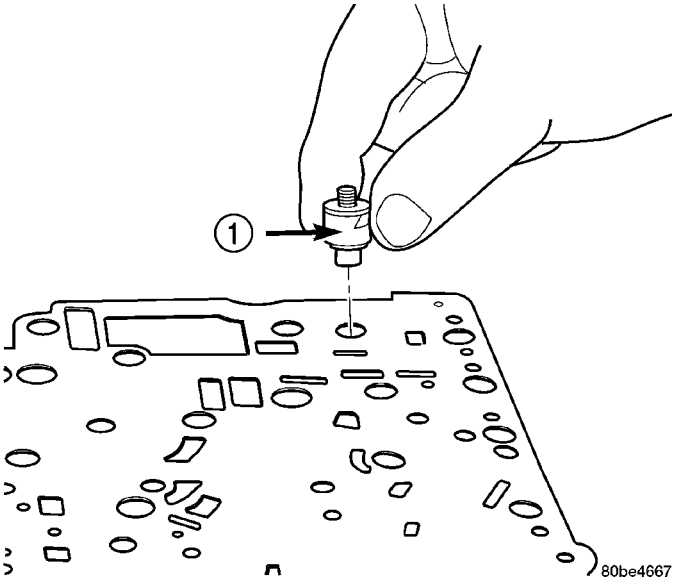


Fig. 424 Install Overdrive Clutch (#5) Check Valve

1 - OVERDRIVE CLUTCH (#5) CHECK VALVE

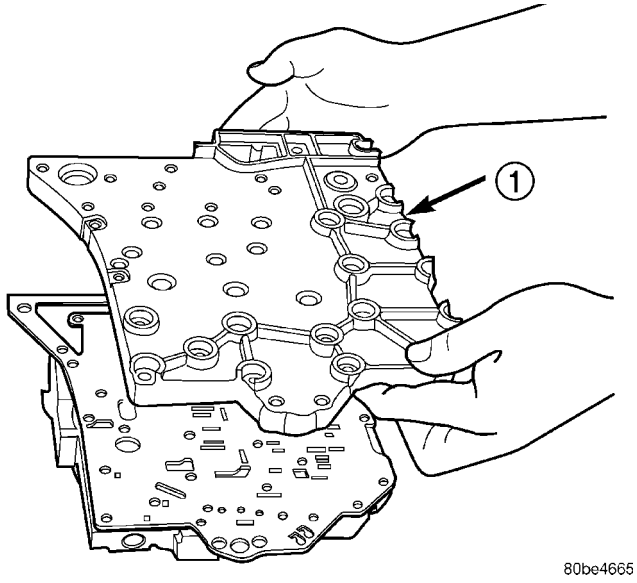


Fig. 426 Install Transfer Plate

1 - TRANSFER PLATE

VALVE BODY (Continued)

(11) Install twenty-four transfer plate to valve body screws (Fig. 427) and torque to 5 N·m (45 in. lbs.).

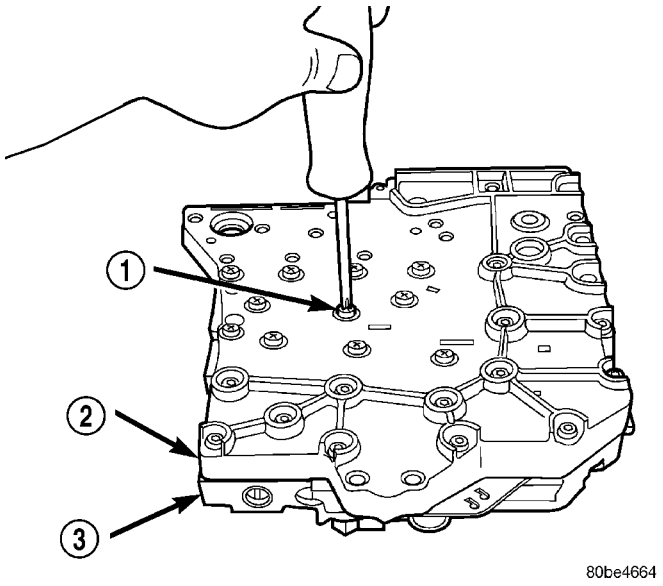


Fig. 427 Install Valve Body to Transfer Plate Screws

1 - SCREW (24)
2 - TRANSFER PLATE
3 - VALVE BODY

(12) Install 2/4 Accumulator components as shown in (Fig. 428).

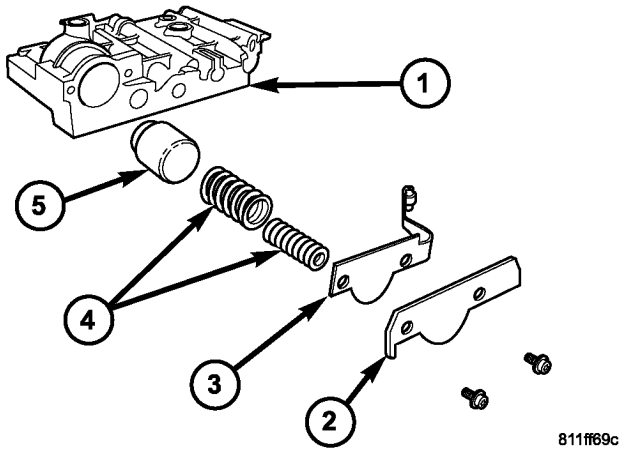


Fig. 428 2/4 Accumulator Assembly

1 - VALVE BODY
2 - RETAINER PLATE
3 - DETENT SPRING
4 - RETURN SPRINGS
5 - PISTON

(13) Torque 2/4 Accumulator retainer to 5 N·m (45 in. lbs.) (Fig. 429).

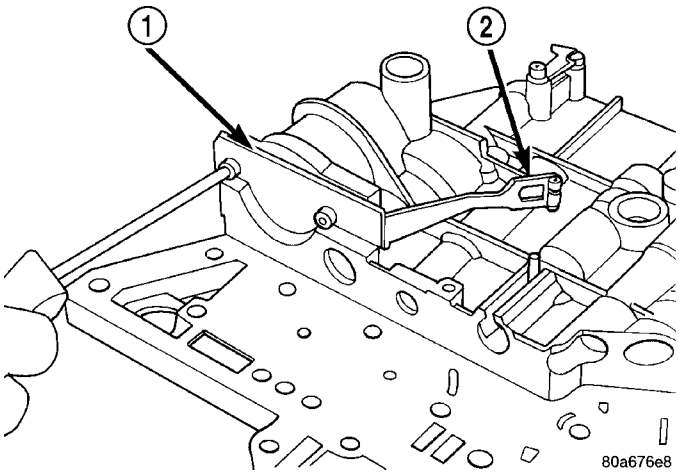


Fig. 429 2/4 Accumulator Retaining Plate

1 - 2–4 ACCUMULATOR RETAINING PLATE
2 - DETENT SPRING

(14) Install Manual Shaft/Rooster Comb and Transmission Range Sensor (Fig. 430).

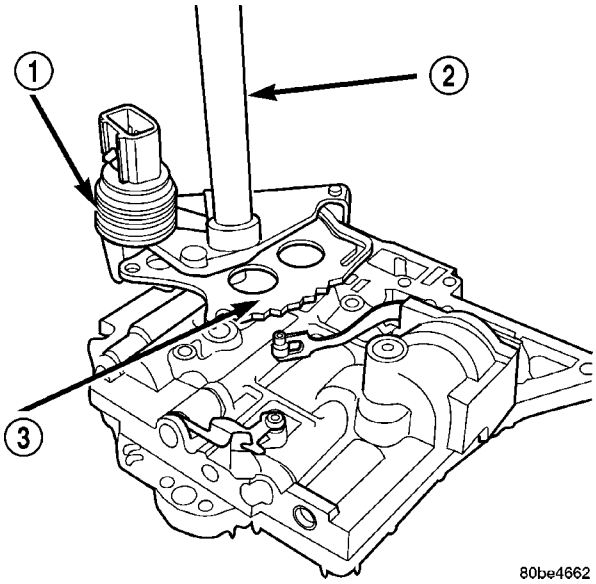


Fig. 430 Install Manual Shaft/Rooster Comb and Transmission Range Sensor

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL SHAFT
3 - ROOSTER COMB

(15) Make sure Manual Valve control pin is contained within the rooster comb slot (Fig. 431). Install Transmission Range Sensor retaining screw (Fig. 431) and torque to 5 N·m (45 in. lbs.).

VALVE BODY (Continued)

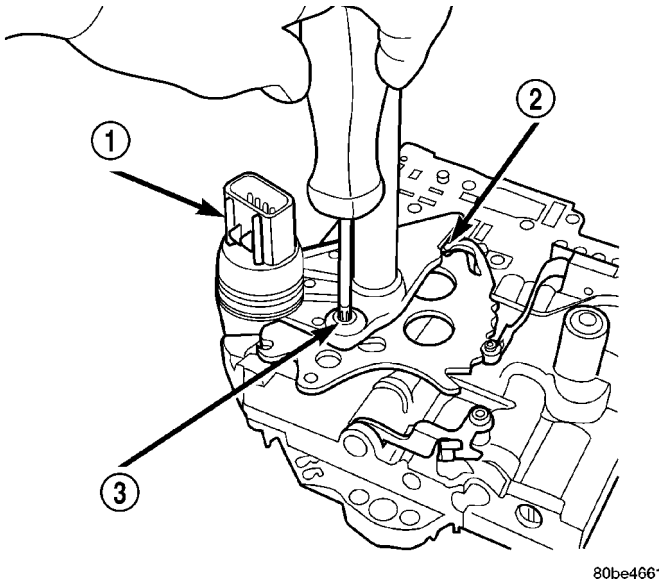


Fig. 431 Install Transmission Range Sensor Retaining Screw

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL VALVE CONTROL PIN
3 - RETAINING SCREW

(16) Install manual shaft seal (Fig. 432).

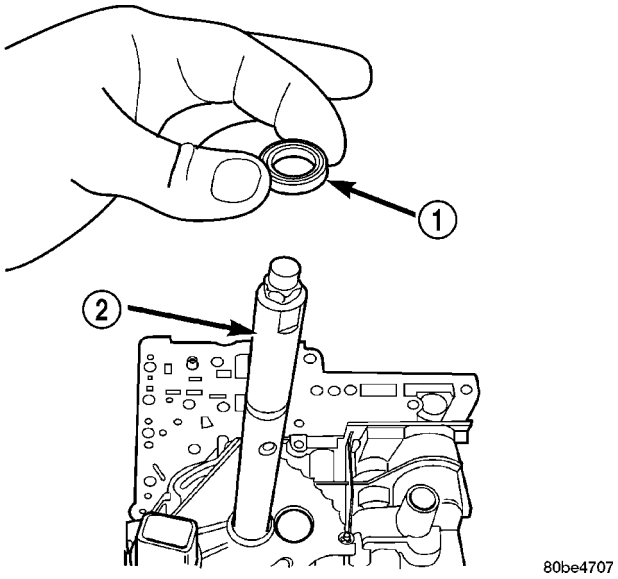


Fig. 432 Manual Shaft Seal

1 - SEAL
2 - MANUAL SHAFT

INSTALLATION

NOTE: If valve body assembly is being replaced or reconditioned, it is necessary to perform the PCM Quick Learn Procedure. (Refer to 8 - ELECTRICAL/ ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Install accumulators and springs as previously removed. Install valve body assembly to transaxle (Fig. 433). Install and torque valve body-to-transaxle case bolts (Fig. 434) to 12 N·m (105 in. lbs.).

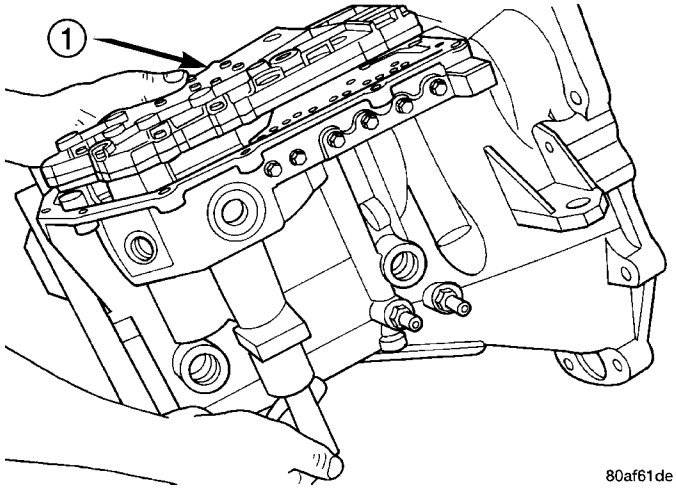


Fig. 433 Valve Body Removal/Installation

1 - VALVE BODY

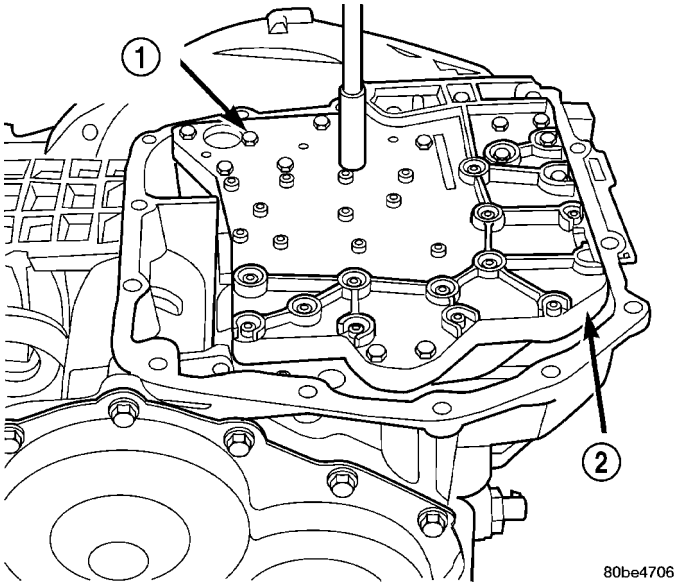


Fig. 434 Valve Body Attaching Bolts

1 - VALVE BODY ATTACHING BOLTS (18)
2 - VALVE BODY

VALVE BODY (Continued)

(2) Install transaxle oil filter (Fig. 435). Inspect the o-ring and replace if necessary.

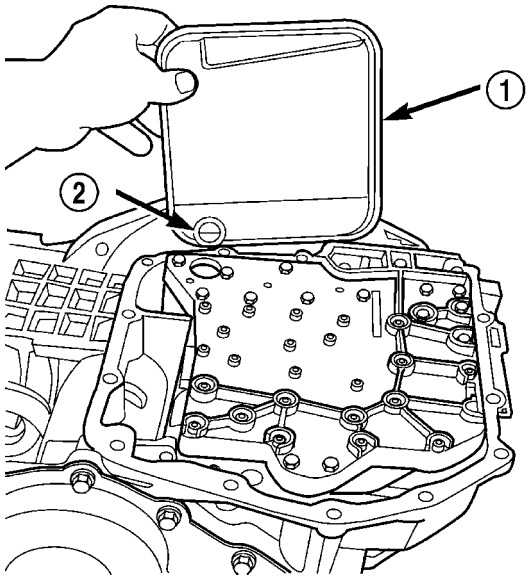


Fig. 435 Oil Filter

1 - OIL FILTER
2 - O-RING

(3) Ensure the transaxle oil pan and transaxle case sealing surfaces are clean and dry. Install an 1/8" bead of Mopar® Silicone Rubber Adhesive Sealant to the oil pan and install (Fig. 436). Torque oil pan-to-transaxle case bolts (Fig. 437) to 19 N·m (165 in. lbs.).

(4) Raise engine cradle crossmember into position.

(5) Aligning index/scribe mark placed upon disassembly, Install four (4) cradle-to-body bolts and torque to 162 N·m (120 ft. lbs.).

(6) Lower vehicle.

(7) Remove engine support fixture 8534B.

(8) Raise vehicle.

(9) Install and torque engine front and rear mount-to-cradle nuts to 54 N·m (40 ft. lbs.).

(10) Lower vehicle.

(11) Connect transmission range sensor connector.

(12) Install manual valve lever to manual shaft.

(13) Install gearshift cable to manual valve lever.

(14) Install battery and tray.

(15) Connect battery negative cable.

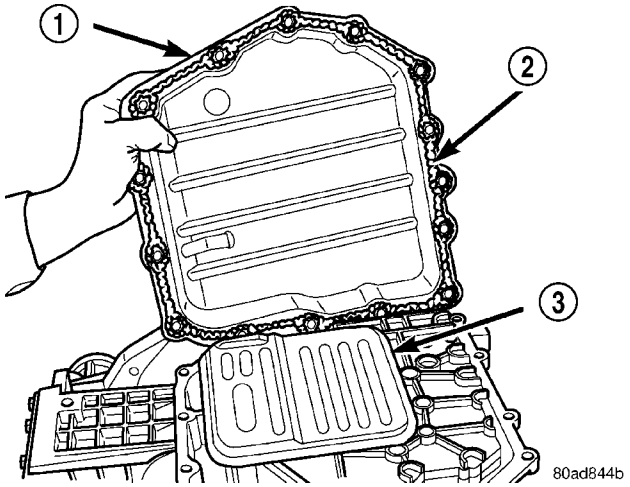


Fig. 436 Oil Pan

1 - OIL PAN
2 - 1/8 INCH BEAD OF RTV SEALANT
3 - OIL FILTER

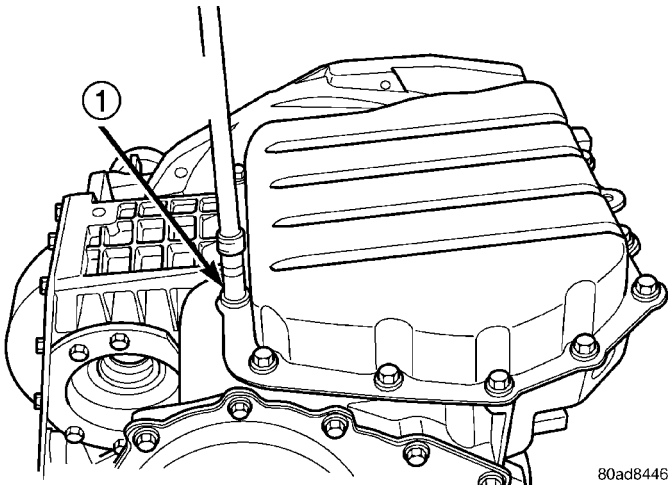


Fig. 437 Oil Pan Bolts

1 - OIL PAN BOLTS (USE RTV UNDER BOLT HEADS)

(16) Fill transaxle with Mopar® ATF +4 Transmission fluid. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/FLUID - STANDARD PROCEDURE)

TIRES/WHEELS

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TIRES/WHEELS

DIAGNOSIS AND TESTING - TIRE AND WHEEL VIBRATION

Tire and wheel imbalance, runout and force variation can cause vehicles to exhibit steering wheel vibration.

VISUAL INSPECTION

Visual inspection of the vehicle is recommended prior to road testing or performing any other procedure. Raise vehicle on a suitable hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

Inspect for the following:

- Verify correct (OEM) wheel and tire, as well as correct wheel weights. Aluminum wheels require unique wheel weights. They are designed to fit the contour of the wheel (Fig. 1).
- Inspect tires and wheels for damage, mud packing and unusual wear; correct as necessary.
- Check and adjust tire air pressure to the pressure listed on the label attached to the rear face of the driver's door.

ROAD TEST

Road test vehicle on a smooth road for a least five miles to warm tires (remove any flat spots). Lightly place hands on steering wheel at the 10:00 and 2:00 positions while slowly sweeping up and down from 90 to 110 km/h (55 to 70 mph) where legal speed limits allow.

Observe the steering wheel for:

- Visual Nibble (oscillation: clockwise/counterclockwise, usually due to tire imbalance)

TIRES/WHEELS (Continued)

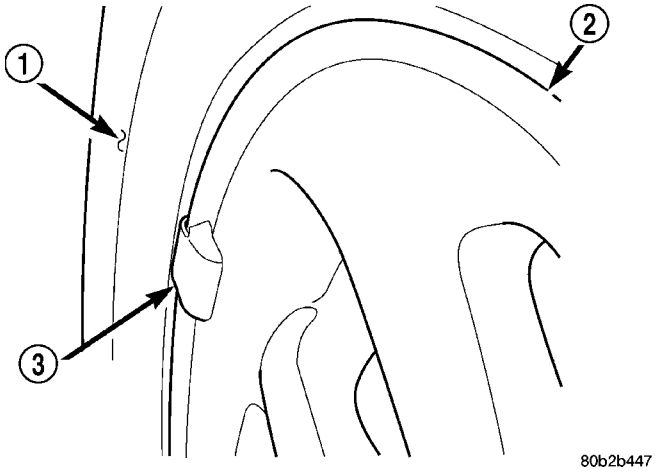


Fig. 1 Aluminum Wheel Weight

1 - TIRE
2 - WHEEL
3 - WHEEL WEIGHT

• Visual Buzziness (high frequency, rapid vibration up and down)

To rule out vibrations due to brakes or powertrain:

• Lightly apply brakes at speed; if vibration occurs or is enhanced, vibration is likely due to causes other than tire and wheel assemblies.

• Shift transmission into neutral while vibration is occurring; if vibration is eliminated, vibration is likely due to causes other than tire and wheel assemblies.

For brake vibrations, (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - DIAGNOSIS AND TESTING).

For powertrain vibrations, (Refer to 3 - DIFFERENTIAL & DRIVELINE - DIAGNOSIS AND TESTING).

For tire and wheel assembly vibrations, continue with this diagnosis and testing procedure.

TIRE AND WHEEL BALANCE

(1) Balance the tire and wheel assemblies as necessary following the wheel balancer manufacturer's instructions and using the information listed in Standard Procedure - Tire And Wheel Balance. (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE)

(2) Road test the vehicle for at least 5 miles, following the format described in Road Test.

(3) If the vibration persists, continue with this diagnosis and testing procedure.

TIRE AND WHEEL RUNOUT/MATCH MOUNTING

(1) **System Radial Runout.** This on-the-vehicle system check will measure the radial runout including the hub, wheel and tire.

(a) Raise vehicle so tires clear floor. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(b) Apply masking tape around the circumference of the tire in the locations to be measured (Fig. 2). Do not overlap the tape.

(c) Check system runout using Dial Indicator Set, Special Tool C-3339A with 25-W wheel, or equivalent. Place the end of the indicator against each taped area (one at a time) (Fig. 2) and rotate the tire and wheel. System radial runout should not exceed 0.76 mm (0.030 inch) with no tread "dips" or "steps." Tread "dips" and "steps" can be identified by spikes of the dial indicator gauge.

• Tread ″dips″; Rapid decrease then increase in dial indicator reading over 101.6 mm (4.0 inch) of tread circumference.

• Tread ″steps″; Rapid decrease or increase in dial indicator reading over 101.6 mm (4.0 inch) of tread circumference.

(d) If system runout is excessive, re-index the tire and wheel assembly on the hub. Remove assembly from vehicle and install it back on the hub two studs over from original mounting position. If re-indexing the tire and wheel assembly corrects or reduces system runout, check hub runout and repair as necessary (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - DIAGNOSIS AND TESTING).

(e) If system runout is still excessive, continue with this diagnosis and testing procedure.

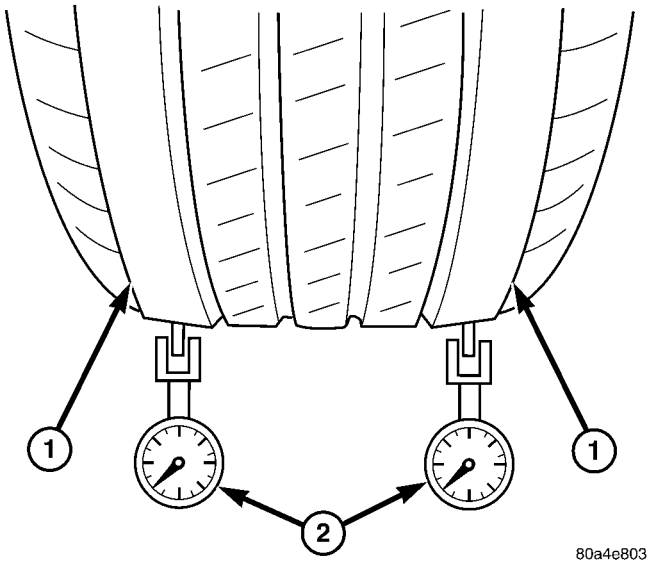


Fig. 2 Radial Runout Measurement

1 - MASKING TAPE
2 - DIAL INDICATOR

TIRES/WHEELS (Continued)

(2) **Tire and Wheel Assembly Radial Runout.** This radial runout check is performed with the tire and wheel assembly off the vehicle.

(a) Remove tire and wheel assembly from vehicle and install it on a suitable wheel balancer.

(b) Check system runout using Dial Indicator Set, Special Tool C-3339A with 25-W wheel, or equivalent. Place the end of the indicator against each taped area (one at a time) (Fig. 2) and rotate the tire and wheel. Radial runout should not exceed 0.76 mm (0.030 inch) with no tread "dips" or "steps." Tread "dips" and "steps" can be identified by spikes of the dial indicator gauge.

(c) If runout exceeds limits, mark the original location of the tire on the wheel at the valve stem (Fig. 3). Also, mark the tire and wheel to indicate the original high spot of the assembly and record the runout measurement.

(d) If runout exceeds limits, the tire will need to be dismounted from the wheel to verify wheel vs. tire contribution. Refer to Wheel Runout below.

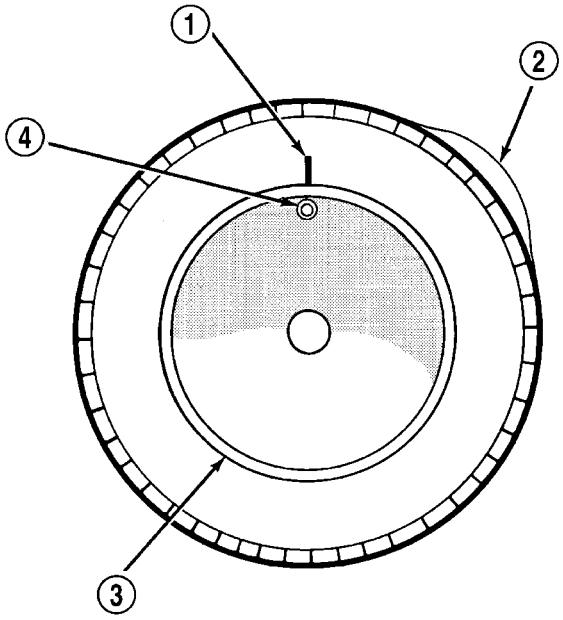


Fig. 3 Marking Tire

1 - REFERENCE MARK
2 - EXAMPLE HIGH SPOT ON TIRE
3 - WHEEL
4 - VALVE STEM

(3) **Lateral Runout.** Lateral runout for the vehicle system as well as the tire and wheel assembly should be less than 0.76 mm (0.030 inch). The same procedure and theory described for radial runout can also be applied to identify and reduce lateral runout.

(4) **Wheel Runout.** This runout check is performed as follows:

(a) Dismount the tire from the wheel.

(b) Mount the wheel back on the wheel balancer.

(c) Measure radial runout of the wheel at the tire bead seat (Fig. 4). Runout should not exceed 0.36 mm (0.014 inch) for aluminum wheels and 0.80 mm (0.031 inch) for steel wheels. Replace the wheel if it exceeds the limit.

(d) Measure lateral runout of the wheel at the tire bead seat (Fig. 5). Runout should not exceed 0.762 mm (0.030 inch) for all wheels. Replace the wheel if it exceeds the limit.

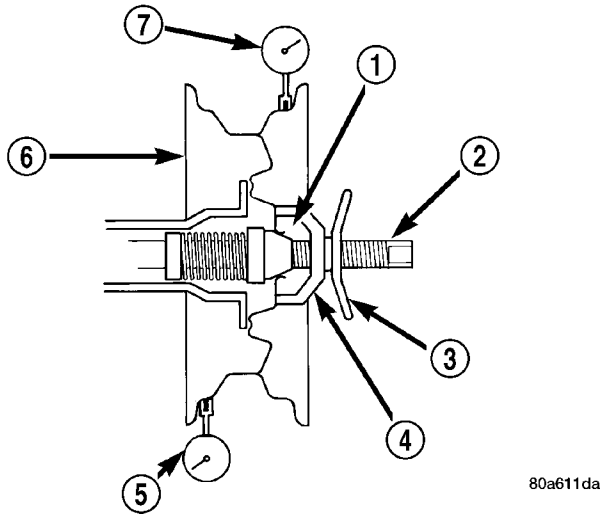


Fig. 4 Checking Radial Runout Of Wheel

1 - MOUNTING CONE
2 - SPINDLE SHAFT
3 - WING NUT
4 - PLASTIC CUP
5 - DIAL INDICATOR
6 - WHEEL
7 - DIAL INDICATOR

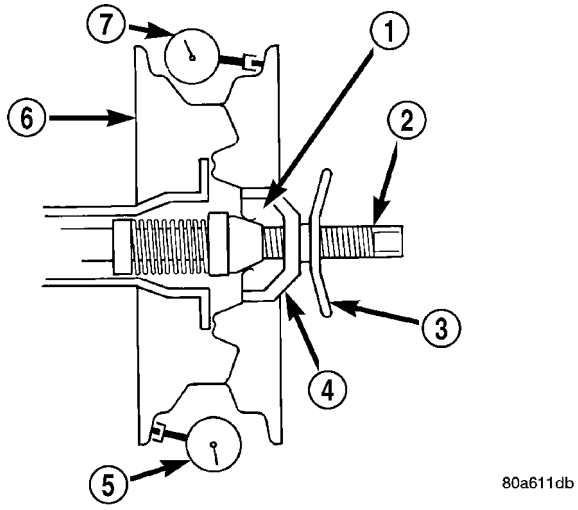


Fig. 5 Checking Lateral Runout Of Wheel

1 - MOUNTING CONE
2 - SPINDLE SHAFT
3 - WING NUT
4 - PLASTIC CUP
5 - DIAL INDICATOR
6 - WHEEL
7 - DIAL INDICATOR

TIRES/WHEELS (Continued)

(5) **Match Mounting.** If the wheel runout is within specifications, tire and wheel assembly runout can be improved by re-indexing (match mounting) the tire to the wheel as described below.

(a) Remount the tire on the rim 180 degrees from its original location (Fig. 6). Ensure the tire bead is properly seated.

(b) Re-measure the total runout. Mark the tire at the high spot and record the measurement.

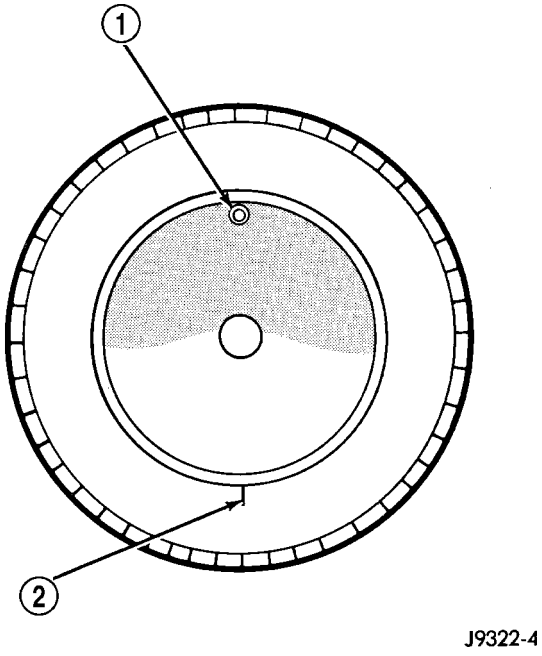


Fig. 6 Remount Tire 180 Degrees

1 - VALVE STEM
2 - REFERENCE MARK

If runout is still excessive, perform the following:

- If the new high spot is within 102 mm (4.0 inch) of the first high spot on the tire, replace the tire.
- If the new high spot is within 102 mm (4.0 inch) of the first high spot on the wheel, the wheel may be out of specification. Refer to Wheel Runout above.
- If the new high spot is NOT within 102 mm (4.0 inch) of either high spot, draw an arrow on the tread from new high spot toward the original (Fig. 7). Break down the tire and remount it 90 degrees on rim in that direction, then re-measure runout. This will normally reduce the runout to an acceptable amount.

(6) Once back together, road test the vehicle for at least 5 miles, following the format described in Road Test. If vibration persists, and all components tested are within specification, the tires may have an excessive radial force condition. Radial force variation can only be checked as indicated below. If this equipment is not available, consult with the tire manufacturer.

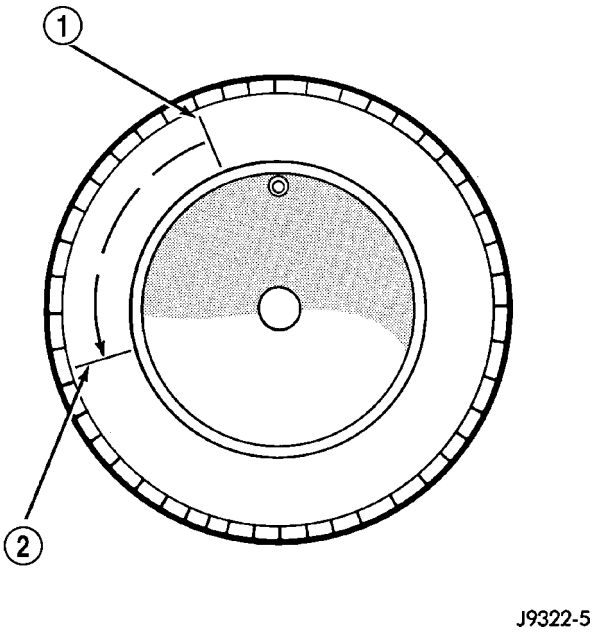


Fig. 7 Remount Tire 90 Degrees In Direction of Arrow

1 - 2ND HIGH SPOT ON TIRE
2 - 1ST HIGH SPOT ON TIRE

RADIAL FORCE VARIATION

Radial Force Variation can be checked using the Hunter GSP 9700 Vibration Control System (Wheel Balancer) or equivalent, if available. This type of equipment helps to correct ride disturbances by reducing the radial force variation of an assembly through re-indexing of the tire to wheel.

The equipment manufacturer or DaimlerChrysler Corporation may supply reference values as guidelines. Radial force measurements above the reference value may not always result in a ride disturbance, nor do they automatically mean the assembly components are out of specification. Do not replace components based on radial force values alone. Balancing, runout diagnosis, re-indexing, and subjective road testing must be performed as outlined in previous sections of this diagnosis and testing procedure.

Use the Radial Force equipment to identify suspect assemblies and minimize the radial forces. After all suspect assemblies are optimized, reinstall the assemblies and road test the vehicle. If a disturbance still exists and all other vibration diagnostic procedures have been completed, replace one tire or one wheel at a time, starting with the assembly having the highest force variation. Be sure to minimize each new assembly. Road test the vehicle following each replacement. Continue this process until the disturbance is resolved.

TIRES/WHEELS (Continued)

NOTE: When using Radial Force equipment, it is critically important to set proper tire inflation pressure and ensure centering of the wheel on the equipment spindle.

RADIAL FORCE VARIATION REFERENCE VALUES

DESCRIPTION	SPECIFICATION
Total Radial Force Variation (RFV)	Less Than 22 Lbs. ± 2 Lbs.
Radial First Harmonic (R1H)	Less Than 16 Lbs. ± 2 Lbs.
Radial Second Harmonic (R2H)	Less Than 12 Lbs. ± 2 Lbs.

STANDARD PROCEDURE - TIRE AND WHEEL BALANCE

NOTE: Balance equipment must be calibrated and maintained per equipment manufacturer's specifications.

Wheel balancing can be accomplished with either on-vehicle or off-vehicle equipment.

NOTE: If using on-vehicle balancing equipment, on the driving axle, remove the opposite wheel and tire assembly.

It is recommended that a two-plane dynamic balancer be used when a wheel and tire assembly requires balancing. A static balancer should only be used when a two-plane balancer is not available.

Balance wheel and tire assemblies dynamically and statically to less than 0.25 (¼) ounce.

For static balancing, find location of heavy spot causing imbalance. Counter balance wheel directly opposite the heavy spot. Determine weight required to counterbalance the area of imbalance. Place half of this weight on the **inner** rim flange and the other half on the **outer** rim flange (Fig. 8).

For dynamic balancing, the balance equipment is designed to indicate the location and amount of weight to be applied to both the inner and outer rim flanges (Fig. 9).

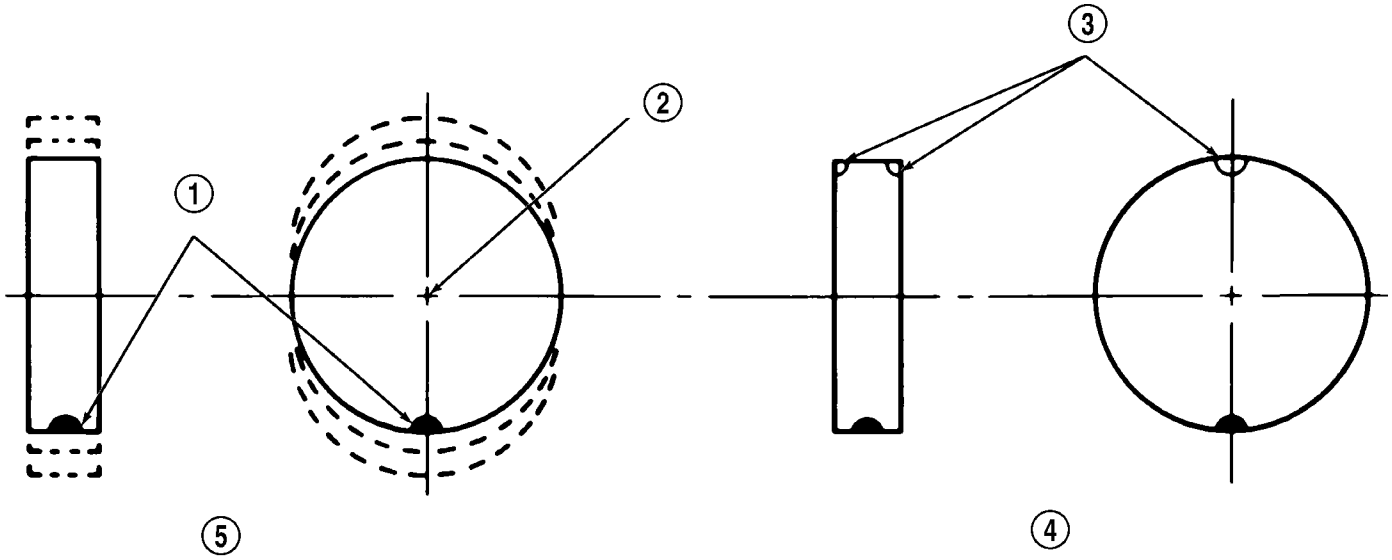


Fig. 8 Static Unbalance & Balance

1 - HEAVY SPOT
2 - CENTER LINE OF SPINDLE
3 - ADD BALANCE WEIGHTS HERE
4 - CORRECTIVE WEIGHT LOCATION
5 - TIRE OR WHEEL TRAMP, OR WHEEL HOP

TIRES/WHEELS (Continued)

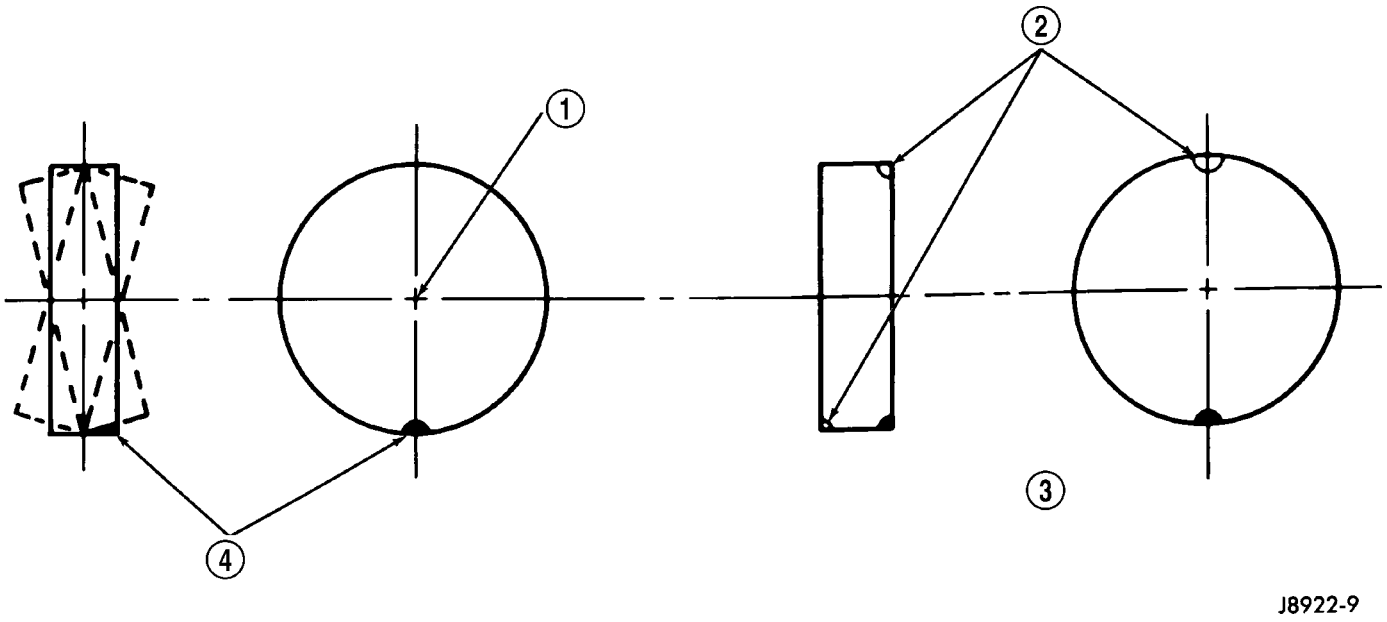


Fig. 9 Dynamic Unbalance & Balance

1 - CENTER LINE OF SPINDLE
2 - ADD BALANCE WEIGHTS HERE
3 - CORRECTIVE WEIGHT LOCATION
4 - HEAVY SPOT WHEEL SHIMMY AND VIBRATION

The aluminum wheels on this vehicle use a unique wheel weight (Fig. 10). This wheel weight is designed to fit the contoured surface of the wheel (Fig. 10). When balancing an aluminum wheel, this wheel weight must be used. Do not use any other type of wheel weight. It will not properly fit the contour of the wheel.

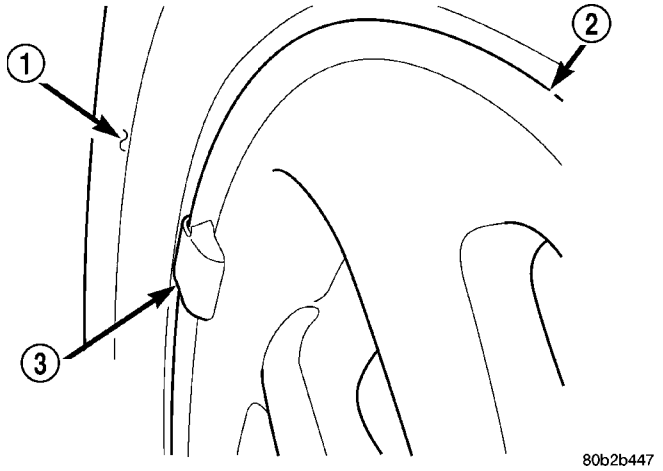


Fig. 10 Aluminum Wheel Weight

1 - TIRE
2 - WHEEL
3 - WHEEL WEIGHT

Always verify the Balance. When using off-vehicle equipment, rotate assembly 180 degrees on balance equipment to verify balance. Variation should not be more than 0.125 (⅛) ounce. If variation is more than 0.125 ounce, balancing equipment could be malfunctioning.

If difficult to balance, break down the wheel and tire assembly and check for loose debris inside tire. Prior to disassembly, mark (index) the tire at the valve stem. Use this mark in order to remount the tire in its original orientation with respect to the wheel.

REMOVAL - TIRE AND WHEEL ASSEMBLY (ALUMINUM WHEEL)

(1) Raise the vehicle so the tire and wheel assembly clears ground level.

(2) Remove the 5 wheel mounting nuts from the studs.

(3) Remove the tire and wheel from the hub.

INSTALLATION - TIRE AND WHEEL ASSEMBLY (ALUMINUM WHEEL)

NOTE: Never use oil or grease on studs or wheel mounting nuts.

(1) Position the tire and wheel assembly on the wheel mounting studs using the hub pilot as a guide. Place and hold the wheel flush up against the mounting surface.

TIRES/WHEELS (Continued)

(2) Loosely install all 5 wheel mounting nuts. Lightly snug the wheel nuts, then progressively tighten them in the proper sequence (Fig. 11). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.).

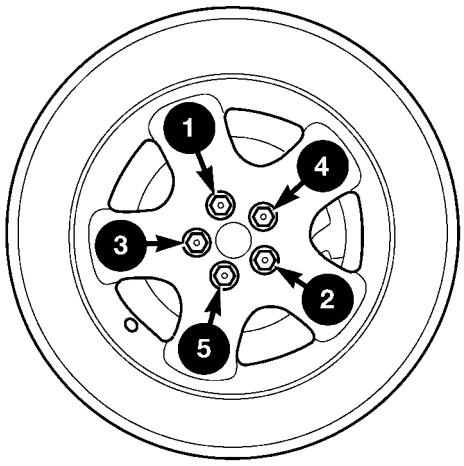


Fig. 11 Tightening Sequence

(3) Lower the vehicle.

TIRE PRESSURE MONITORING

DESCRIPTION

The Tire Pressure Monitoring (TPM) system monitors air pressure in the four road tires. Pressure in the spare tire is not monitored.

The system alerts the driver when tire pressure falls outside predetermined thresholds. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING - OPERATION)

There is a sensor (transmitter) located in each of the vehicle's four road wheels that operates on a 315 MHz radio frequency (Fig. 12).

The TPM system is controlled by the Sentry Key Remote Entry Module (SKREEM). When Diagnosing the TPM, use a scan tool accessing the SKREEM.

An indicator lamp located in the instrument cluster and the Electronic Vehicle Information Center (EVIC) are used to communicate system information.

For further information, refer to the Owners Manual or the appropriate diagnostic information.

OPERATION

The Tire Pressure Monitoring (TPM) system uses radio and sensor technology to monitor tire air pressure levels. Sensors, mounted to each road wheel as part of the valve stem, transmit an RF signal indicating their individual pressure to a receiver located in the Sentry Key Remote Entry Module (SKREEM). These transmissions occur approximately once every minute at speeds over 15 mph (24 km/h). The Tire

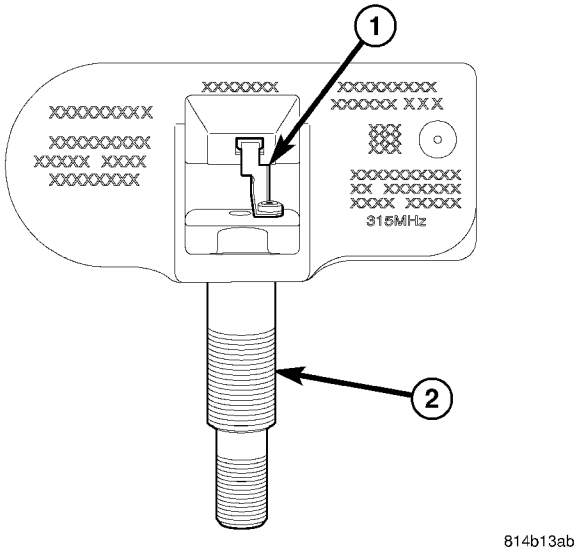


Fig. 12 Tire Pressure Sensor

1 - ANTENNA STRAP
2 - VALVE STEM

Pressure Monitoring system remains active even if no tire pressure related message is displayed.

The sensors lay dormant (Park Mode), then wake and start transmitting (Drive Mode) when the vehicle first reaches speeds over 15 mph (24 km/h). Once the wheels stop rotating for a period of approximately 20 minutes, the sensors shut down until again awaken. Although not transmitting as when in Drive Mode, while in Park Mode, the sensors still transmit approximately once every 13 hours to let the receiver know air pressure status at that time.

If the system detects that the tire pressure in any road tire is going low, beyond the Low Pressure (lamp) ON threshold (see following table), the TPM system will display a message in the instrument cluster and continuously illuminate an indicator lamp. This message will be displayed for the rest of the ignition cycle, or until the Low Tire pressure condition has been corrected. Once pressure in the suspect tire raises above the Low Pressure (lamp) OFF Threshold, the lamp will go out and the system returns to normal within approximately two minutes time. If the C/T, MENU, STEP or RESET button is pressed, the message is replaced by the new message requested; however, if the Low Tire condition has not been corrected, the Low Tire pressure message will again be displayed.

If a system fault is detected, the indicator lamp will flash on/off for 10 seconds, once every 10 minutes.

For further information, refer to the Owners Manual or the Appropriate Diagnostic Information.

TIRE PRESSURE MONITORING (Continued)

TPM THRESHOLD PRESSURES

High Pressure ON Threshold	48 PSI (331 kPa)
High Pressure OFF Threshold	43 PSI (296 kPa)
Placard Pressure (Cold)	33 PSI (228 kPa)
Low Pressure OFF Threshold	30 PSI (207 kPa)
Low Pressure ON Threshold	26 PSI (179 kPa)

SENSOR - TPM

DESCRIPTION

On vehicles equipped with Tire Pressure Monitoring (TPM), one tire pressure sensor is mounted to each wheel in place of the traditional tire valve stem (Fig. 13). Each sensor has an internal battery that lasts up to 10 years. The battery is not serviceable. At the time of battery failure, the sensor must be replaced.

The TPM system operates on a 315 MHz radio frequency (Fig. 13).

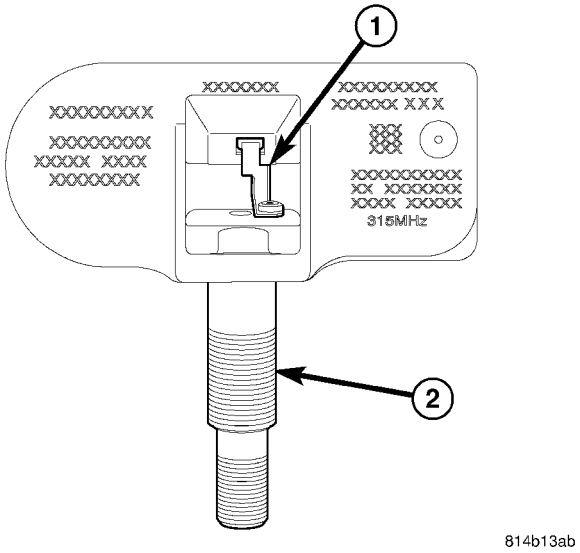


Fig. 13 Tire Pressure Sensor

1 - ANTENNA STRAP
2 - VALVE STEM

The TPM sensors are designed for original style factory wheels. **Do not attempt to install a tire pressure sensor in an aftermarket wheel.**

The serviceable components of the tire pressure sensor are (Fig. 14):

- Sensor-To-Wheel Seal and Metal Washer
- Valve Stem Cap
- Valve Stem Core
- Valve Stem Nut

The valve stem caps and cores used are specifically designed for the tire pressure monitoring sensors.

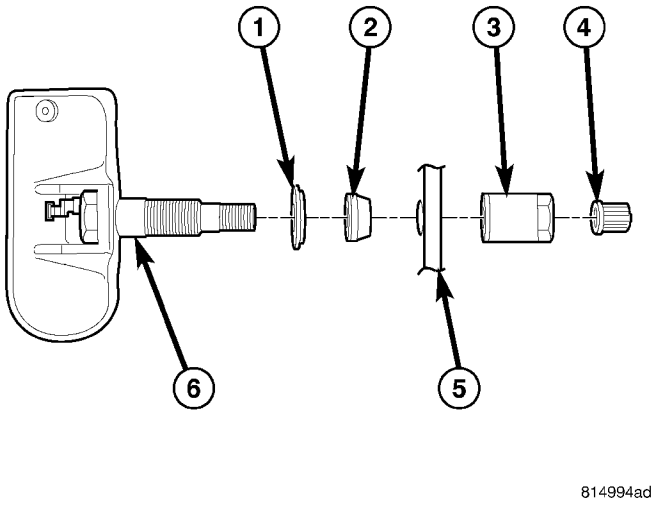


Fig. 14 Sensor Mounting - Exploded View

1 - METAL WASHER
2 - SEAL
3 - NUT (WITH PRESSED-IN WASHER)
4 - CAP (WITH SEAL)
5 - SECTIONAL CUTAWAY OF WHEEL
6 - TPM SENSOR

Although similar to standard valve stem caps and cores, they are different. The valve stem cap has a special seal inside to keep moisture and corrosion out. The valve stem core has a special nickel coating to protect from corrosion.

OPERATION

The battery operated tire pressure sensors lay dormant (Park Mode), then wake and start transmitting (Drive Mode) when the vehicle first reaches speeds over 15 mph (24 km/h). Once the wheels stop rotating for a period of approximately 20 minutes, the sensors shut down until again awaken. Although not transmitting as when in Drive Mode, while in Park Mode, the sensors still transmit approximately once every 13 hours to let the receiver know air pressure status at that time.

Using an RF signal, each sensor transmits tire pressure data approximately once every minute. Each sensor's (transmitter) broadcast is uniquely coded so that the Sentry Key Remote Entry Module (SKREEM) can monitor the state of each of the sensors on the four rotating road wheels. The SKREEM automatically learns and stores the sensor's ID while driving after a sensor has been replaced. **There is no formal retraining procedure necessary.**

For additional information, refer to appropriate diagnostic information.

SENSOR - TPM (Continued)

CAUTION

CAUTION: The use of tire sealants is strictly prohibited for vehicles equipped with the Tire Pressure Monitoring system. Tire sealants can clog tire pressure sensors.

CAUTION: Tire pressure sensor valve stem caps and cores are specially designed for the sensors. Due to risk of corrosion, do not use a standard valve stem cap or core in a tire pressure sensor in place of the original equipment style sensor cap and core.

CAUTION: Do not attempt to install a tire pressure sensor in an aftermarket wheel. Use tire pressure sensors in original style factory wheels only.

CAUTION: Any time a sensor is to be installed in a wheel, a new seal and washer must be installed on the stem to ensure air tight sealing.

NOTE: TPM thresholds have been established for the original tire size equipped on the vehicle. Use original size tires only to maintain system accuracy.

DIAGNOSIS AND TESTING - TIRE PRESSURE SENSOR

NOTE: Tire pressure may increase from 2 to 6 psi (14 to 41 kPa) during normal driving conditions. Do NOT reduce this normal pressure build up.

When diagnosing a tire pressure issue, always check air pressure in the tires first with a known accurate air gauge. Adjust air pressure as necessary to that listed on the Tire Inflation Pressure Label (Placard) provided with the vehicle (usually applied to the driver's side B-pillar). After adjusting air pressure in a tire, allow approximately two minutes for the message or indicator lamp to go out.

Check the tire pressure indicator lamp in the instrument cluster. If the lamp is illuminating continuously, proceed as listed below. If the indicator lamp is flashing on/off three times, once every ten minutes, there is a system fault detected. Refer to the appropriate diagnostic information.

If air pressure in any tire is low, inspect **all** the tires for leaks. A water "dunk tank" or other water test may be used to check for a leak around the sensor as long as any water at the valve core is removed once the procedure is completed. The water can be easily expelled from the core area by pushing in on the core for several seconds, allowing escaping air to drive out any moisture. Reinflate the tire as necessary. Always make sure the original valve stem cap is securely installed to keep moisture out of the sensor.

If the gauge-read pressure in the tires does not indicate a tire pressure issue, refer to the appropriate diagnostic information.

REMOVAL

(1) Remove tire and wheel assembly from vehicle. (Refer to 22 - TIRES/WHEELS - REMOVAL)

CAUTION: The cap used on this valve stem contains an O-ring seal to prevent contamination and moisture from entering the valve stem. Retain this valve stem cap for reuse. Do not substitute a regular valve stem cap in its place.

CAUTION: The valve stem used on this vehicle is made of aluminum and the core is nickel plated brass. The original valve stem core must be reinstalled and not substituted with a valve stem core made of a different material. This is required to prevent corrosion in the valve stem caused by the different metals.

SENSOR - TPM (Continued)

(2) Dismount tire from wheel following tire changer manufacturers instructions while paying special attention to the following to avoid damaging the pressure sensor:

(a) When breaking the tire bead loose from the wheel rim, avoid using the Bead Breaker in the area of the sensor. That includes both front and rear beads of the tire.

(b) When preparing to dismount the tire from the wheel, carefully insert the mounting/dismounting tool at the valve stem ± 10° (Fig. 15), then proceed to dismount the tire from the wheel. Use this process on both the upper and lower tire beads.

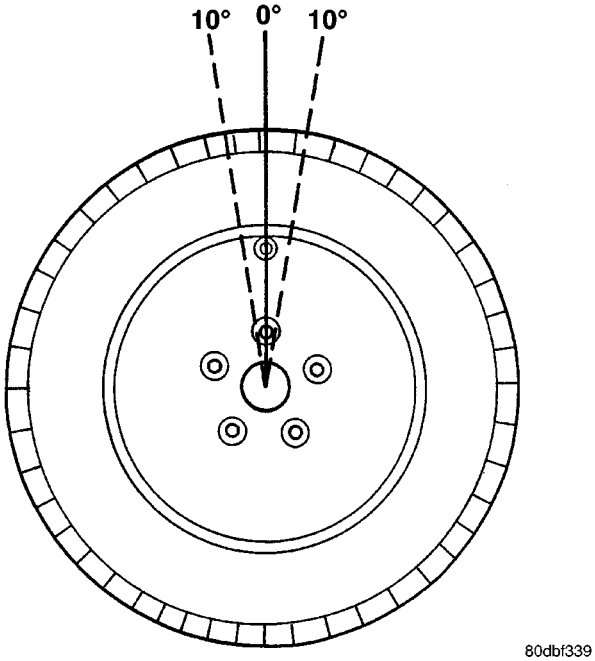


Fig. 15 Start Mount/Dismount Tool Within 10 Degrees Of Valve Stem

(3) Remove sensor nut retaining sensor to wheel (Fig. 16). While removing nut, hold pressure against rear of metal valve stem to keep valve stem from pushing rearward, damaging antenna strap.

(4) Remove sensor from wheel (Fig. 16).

INSTALLATION

NOTE: Before reinstalling an existing tire pressure sensor, replace seal and metal washer at base of valve stem to ensure proper sealing (Fig. 17).

(1) Wipe area clean around sensor/valve stem mounting hole in wheel. Make sure surface of wheel is not damaged.

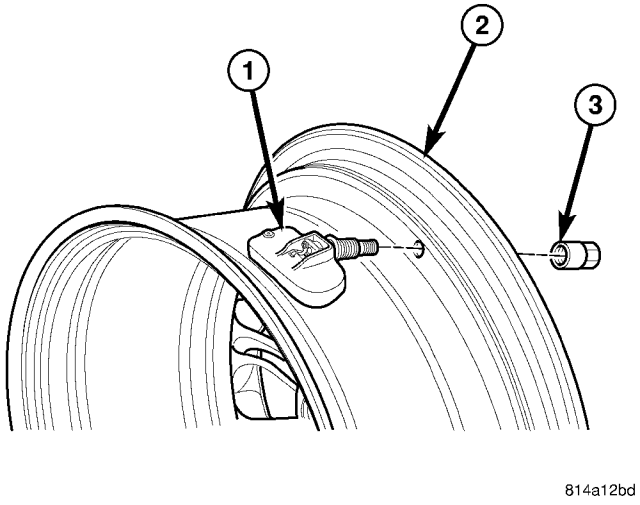


Fig. 16 Sensor Mounting To Wheel

1 - TIRE PRESSURE SENSOR
2 - WHEEL
3 - NUT (WITH PRESSED-IN WASHER)

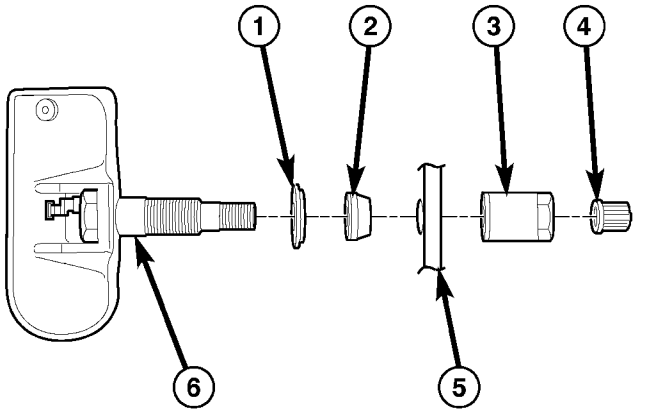


Fig. 17 Sensor Mounting - Exploded View

1 - METAL WASHER
2 - SEAL
3 - NUT (WITH PRESSED-IN WASHER)
4 - CAP (WITH SEAL)
5 - SECTIONAL CUTAWAY OF WHEEL
6 - TPM SENSOR

SENSOR - TPM (Continued)

CAUTION: To avoid damaging sensor antenna strap (Fig. 18), hold pressure against rear of metal valve stem (Fig. 19) while sensor is inserted through wheel mounting hole and nut is installed.

(2) Insert sensor through wheel as shown keeping pressure against rear of metal valve stem. (Fig. 19). Potted side of sensor is to be positioned toward wheel. Do not attempt to mount sensor otherwise, damage may occur.

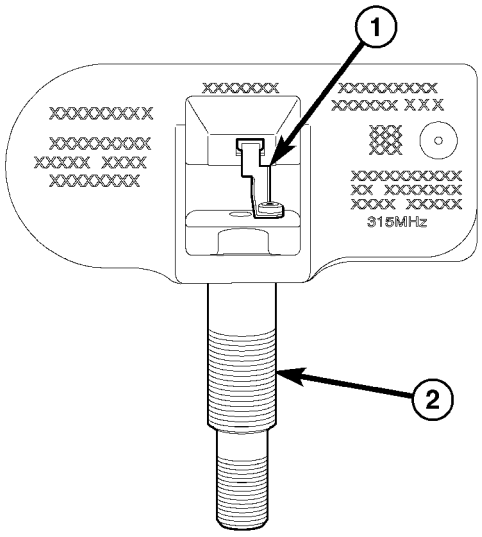


Fig. 18 Tire Pressure Sensor

1 - ANTENNA STRAP
2 - VALVE STEM

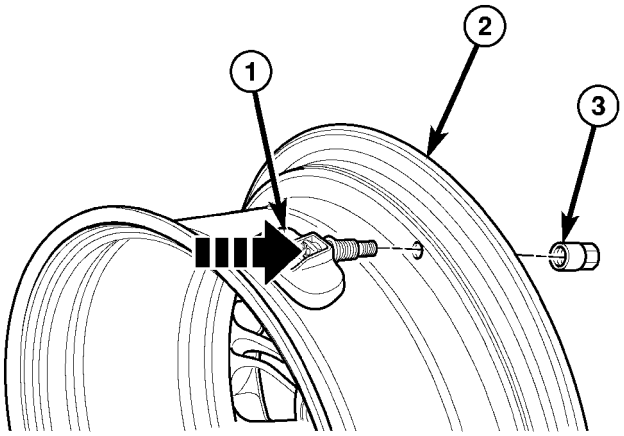


Fig. 19 Sensor Installation To Wheel

1 - TIRE PRESSURE SENSOR
2 - WHEEL
3 - NUT (WITH WASHER)

(3) Install sensor nut (with pressed-in washer) by hand (Fig. 19).

NOTE: Before tightening sensor nut, push downward on sensor housing in an attempt to make it flush with interior contour of wheel (Fig. 20).

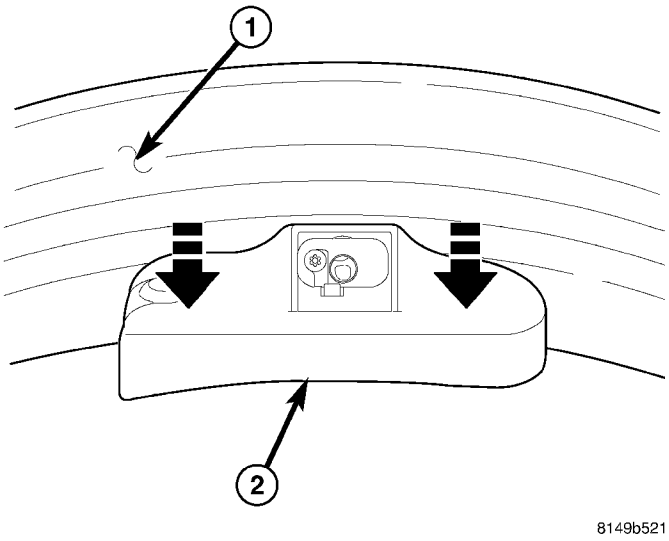


Fig. 20 Seat Sensor Against Wheel Interior

1 - WHEEL INTERIOR
2 - TIRE PRESSURE SENSOR

(4) While holding sensor in position, tighten sensor nut to 6.5 N·m (58 in. lbs.) torque.

CAUTION: Over-torquing the sensor nut by as little as 12 N·m (106 in. lbs.) may result in sensor separation from the valve stem. Under this condition, the sensor may still function, however, the condition should be corrected immediately.

(5) Mount tire on wheel following tire changer manufacturers instructions, paying special attention to the following to avoid damaging tire pressure sensor:

(a) Rotating Wheel Tire Changers - Once the wheel is mounted to the changer, position the sensor valve stem approximately 210° from the head of the changer in a clockwise direction before rotating the wheel (also in a clockwise direction) to mount the tire (Fig. 21). Use this procedure on both the upper and lower tire beads.

(b) Rotating Tool Tire Changers - Position the wheel on the changer so that the sensor valve stem is approximately 210° from the head of the changer in a clockwise direction from the mounting end of the tool (Fig. 22) Make sure the sensor is clear of the lower bead breaker area to avoid damaging the sensor when the breaker rises (Fig. 22). Rotate the tool in a counterclockwise direction to mount the

SENSOR - TPM (Continued)

tire. Use this procedure on both the upper and lower tire beads.

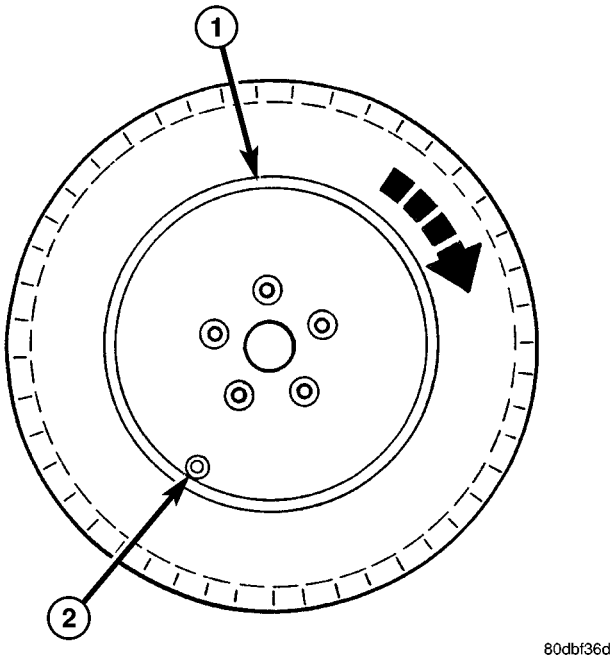


Fig. 21 Mounting Tire Using Rotating Wheel Machine

1 - HEAD OF CHANGER LOCATED HERE
2 - VALVE STEM

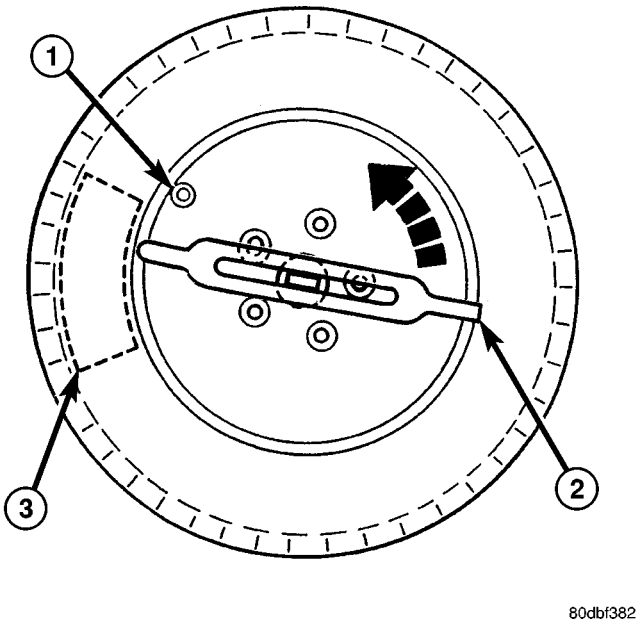


Fig. 22 Mounting Tire Using Rotating Tool Machine

1 - VALVE STEM
2 - MOUNTING END OF TOOL
3 - BEAD BREAKER (KEEP CLEAR OF SENSOR)

(6) Adjust air pressure to that listed on Tire Inflation Pressure Label (Placard) provided with vehicle (usually applied to driver's side B-pillar). Make sure **original style** valve stem cap is securely installed to keep moisture out of sensor.

(7) Install wheel and tire assembly on vehicle. (Refer to 22 - TIRES/WHEELS - INSTALLATION)

(8) Drive vehicle for a minimum of five minutes while maintaining a continuous speed above 15 mph (24 km/h). During this time the system will learn the new sensor ID code and will clear any DTC's automatically.

NOTE: If a sensor cannot be trained, refer to appropriate diagnostic information.

TIRES

DESCRIPTION

DESCRIPTION - TIRE

Tires are designed and engineered for each specific vehicle. They provide the best overall performance for normal operation. The ride and handling characteristics match the vehicle's requirements. With proper care they will give excellent reliability, traction, skid resistance, and tread life.

Driving habits have more effect on tire life than any other factor. Careful drivers will obtain, in most cases, much greater mileage than severe use or careless drivers. A few of the driving habits which will shorten the life of any tire are:

- Rapid acceleration
- Severe application of brakes
- High-speed driving
- Taking turns at excessive speeds
- Striking curbs and other obstacles
- Operating vehicle with over or under inflated tire pressures

Radial ply tires are more prone to irregular tread wear. It is important to follow the tire rotation interval shown in the section on Tire Rotation. This will help to achieve a greater tread-life potential.

TIRE IDENTIFICATION

Tire type, size, load index and speed rating are encoded in the letters and numbers imprinted on the side wall of the tire. Refer to the Tire Identification chart to decipher the code. For example purposes, the tire size P225/60 R 16 97 T is used in the chart. An All Season type tire will also have either M + S, M & S or M - S (indicating mud and snow traction) imprinted on the side wall. An Extra or Light Load marking “XL” or “LL” may also be listed on the side-

TIRES (Continued)

wall. The absence of an “XL” or “LL” marking infers a standard load tire.

TIRE IDENTIFICATION

P	TIRE TYPE (Not present on all tires)	P - Passenger T - Temporary C - Commercial LT - Light Truck
225	SECTIONAL WIDTH	SHOWN IN MILLIMETERS
60	ASPECT RATIO	SECTIONAL HEIGHT ÷ SECTIONAL WIDTH (Refer to Aspect Ratio Figure 23)
R	CONSTRUCTION TYPE	R - RADIAL B - BIAS BELTED D - DIAGONAL (BIAS)
16	WHEEL DIAMETER	SHOWN IN INCHES
97	LOAD INDEX	*
T	SPEED RATING	*

*** NOTE: Consult the tire manufacturer regarding any questions on tire specifications or capabilities.**

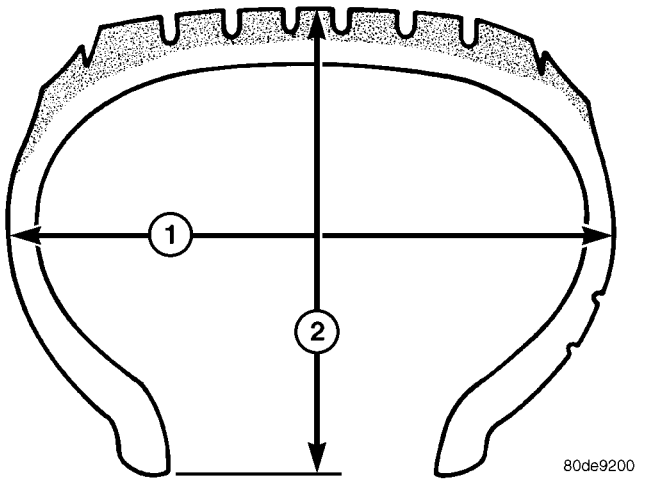


Fig. 23 Tire Aspect Ratio

1 - SECTIONAL WIDTH
2 - SECTIONAL HEIGHT

TIRE CHAINS

Refer to the owners manual supplied with the vehicle to determine whether the use of tire chains is permitted on this vehicle.

DESCRIPTION - RADIAL-PLY TIRES

Radial-ply tires improve handling, tread life, ride quality and decrease rolling resistance.

Radial-ply tires must always be used in sets of four and under no circumstances should they be used on the front only. It is recommended that tires from different manufacturers NOT be mixed. They may be mixed with a temporary spare tire when necessary. A maximum speed of 80 km/h (50 mph) is recommended while a temporary spare is in use.

Radial-ply tires have the same load-carrying capacity as other types of tires of the same size. They also use the same recommended inflation pressures.

DESCRIPTION - REPLACEMENT TIRES

WARNING: FAILURE TO EQUIP THE VEHICLE WITH TIRES HAVING ADEQUATE SPEED CAPABILITY CAN RESULT IN SUDDEN TIRE FAILURE.

WARNING: IN ORDER TO MAINTAIN THE SPEED CAPABILITY OF THE VEHICLE, REPLACEMENT TIRES MUST HAVE SPEED RATINGS EQUAL TO OR HIGHER THAN THOSE FITTED TO THE VEHICLE AS ORIGINAL EQUIPMENT. IF TIRES WITH LOWER SPEED RATINGS ARE FITTED, THE VEHICLE’S HANDLING MAY BE AFFECTED AND THE SPEED CAPABILITY OF THE VEHICLE MAY BE LOWERED TO THE MAXIMUM SPEED CAPABILITY OF THE REPLACEMENT TIRES. TO AVOID AN ACCIDENT RESULTING IN SEVERE OR FATAL INJURY, CONSULT THE TIRE MANUFACTURER IN REGARDS TO MAXIMUM SPEED RATINGS.

It is recommended that tires equivalent to the original equipment tires be used when replacement is needed.

Failure to use equivalent replacement tires may adversely affect the safety and handling of the vehicle.

The original equipment tires provide a proper combination of many characteristics such as:

- Ride
- Noise
- Handling
- Durability
- Tread life
- Traction
- Rolling resistance
- Speed capability

The use of tires smaller than the minimum tire size approved for the vehicle can result in tire overloading and failure.

Use tires that have the approved load rating for the vehicle and never overload them. Failure to equip the vehicle with tires having adequate speed capabil-

ity can result in sudden tire failure and loss of vehicle control.

The use of oversize tires may cause interference with vehicle components. Under extremes of suspension and steering travel, interference with vehicle components may cause tire damage.

DESCRIPTION - SPARE TIRE (TEMPORARY)

The temporary (convenience) spare tire is designed for emergency use only. The original tire should be repaired and reinstalled, or replaced with a new, at the first opportunity.

The temporary (convenience) spare tire should be inflated to the pressure listed on its sidewall. Do not exceed speeds of 80 km/h (50 mph) when the temporary spare tire is in use on the vehicle. Refer to the Owner's Manual for more details.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - TIRE NOISE

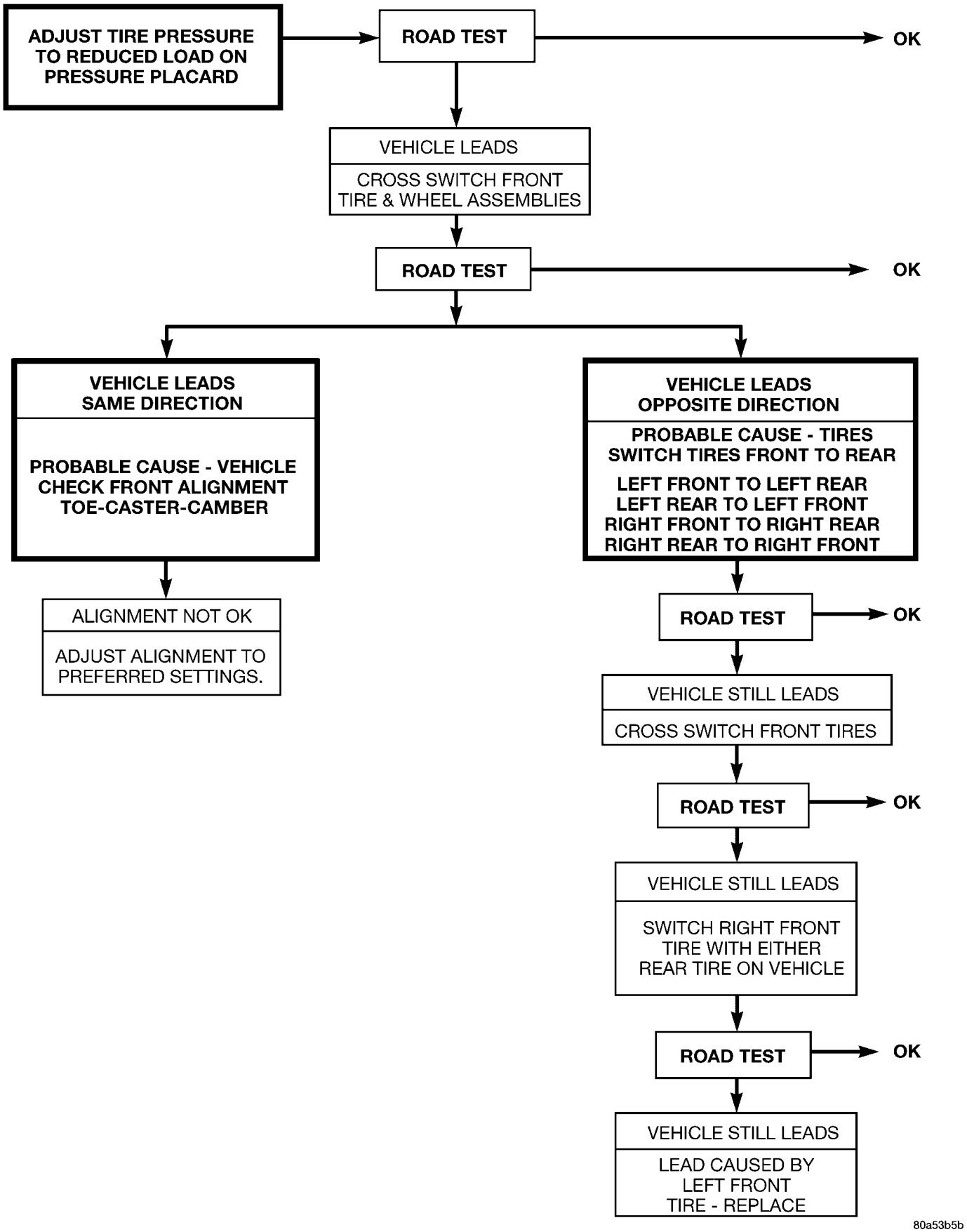
Unusual tire noise can be associated with tire and wheel vibration or irregular tire wear. For vibration, (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING). For irregular tire wear, (Refer to 22 - TIRES/WHEELS/TIRES - DIAGNOSIS AND TESTING).

DIAGNOSIS AND TESTING - TIRE/VEHICLE LEAD

Use the following Vehicle Lead Diagnosis And Correction Chart to diagnose and correct a vehicle lead or drift problem.

TIRES (Continued)

VEHICLE LEAD DIAGNOSIS AND CORRECTION CHART



TIRES (Continued)

DIAGNOSIS AND TESTING - TIRE WEAR PATTERNS

Under inflation will cause wear on the shoulders of tire. Over inflation will cause wear at the center of tire.

Excessive camber causes the tire to run at an angle to the road. One side of tread is then worn more than the other (Fig. 24).

Excessive toe-in or toe-out causes wear on the tread edges and a feathered effect across the tread (Fig. 24).

DIAGNOSIS AND TESTING - TREAD WEAR INDICATORS

Tread wear indicators are molded into the bottom of the tread grooves. When tread depth is 1.6 mm (1/16 in.), the tread wear indicators will appear as a 13 mm (1/2 in.) band (Fig. 25).

Tire replacement is necessary when indicators appear in two or more grooves or if localized balding occurs.

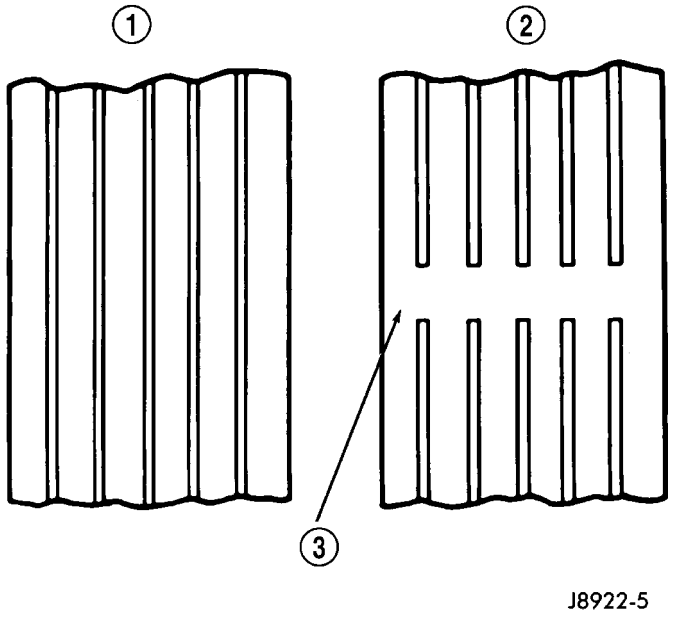


Fig. 25 Tread Wear Indicators

1 - TREAD ACCEPTABLE
2 - TREAD UNACCEPTABLE
3 - WEAR INDICATOR

STANDARD PROCEDURE

STANDARD PROCEDURE - TIRE INFLATION PRESSURES

The specified tire pressures have been chosen to provide safe operation, vehicle stability, and a smooth ride. The proper tire pressure specification can be found on the Tire Inflation Pressure Label provided with the vehicle (usually on the driver's side B-pillar).

A quality air pressure gauge is recommended to check tire air pressure. Tire pressure should be checked cold once per month. Check tire pressure more frequently when the weather temperature varies widely. Tire pressure will decrease when the outdoor temperature drops. After checking the air pressure, replace valve cap finger tight.

Inflation pressures specified on the Tire Inflation Pressure Label are always the cold inflation pressure of the tire. Cold inflation pressure is obtained after the vehicle has not been operated for at least 3 hours, or the vehicle is driven less than one mile after being inoperative for 3 hours. Tire inflation

CONDITION	RAPID WEAR AT SHOULDERS	RAPID WEAR AT CENTER	CRACKED TREADS	WEAR ON ONE SIDE	FEATHERED EDGE	BALD SPOTS	SCALLOPED WEAR
EFFECT	1. 2.						
CAUSE	UNDER-INFLATION OR LACK OF ROTATION	OVER-INFLATION OR LACK OF ROTATION	UNDER-INFLATION OR EXCESSIVE SPEED*	EXCESSIVE CAMBER	INCORRECT TOE	UNBALANCED WHEEL OR TIRE DEFECT *	LACK OF ROTATION OF TIRES OR WORN OR OUT-OF-ALIGNMENT SUSPENSION.
CORRECTION	ADJUST PRESSURE TO SPECIFICATIONS WHEN TIRES ARE COOL ROTATE TIRES			ADJUST CAMBER TO SPECIFICATIONS	ADJUST TOE-IN TO SPECIFICATIONS	DYNAMIC OR STATIC BALANCE WHEELS	ROTATE TIRES AND INSPECT SUSPENSION SEE GROUP 2

*HAVE TIRE INSPECTED FOR FURTHER USE.

RN797

Fig. 24 Tire Wear Patterns

TIRES (Continued)

pressures may increase from 2 to 6 pounds per square inch (psi) (14 to 41 kPa) during operation. Do not reduce this normal pressure buildup.

Improper inflation can cause:

- Uneven wear patterns
- Reduced tread life
- Reduced fuel economy
- Unsatisfactory ride
- The vehicle to drift.

WARNING: OVER OR UNDER INFLATED TIRES CAN AFFECT VEHICLE HANDLING. THE TIRE CAN FAIL SUDDENLY, RESULTING IN LOSS OF VEHICLE CONTROL.

Under inflation causes rapid shoulder wear, tire flexing, and can result in tire failure (Fig. 26).

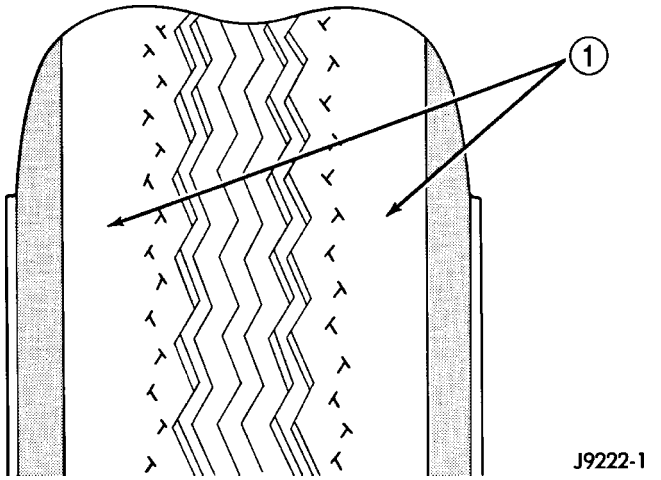


Fig. 26 Under Inflation Wear

1 - THIN TIRE TREAD AREAS

Over inflation causes rapid center wear and loss of the tire's ability to cushion shocks (Fig. 27).

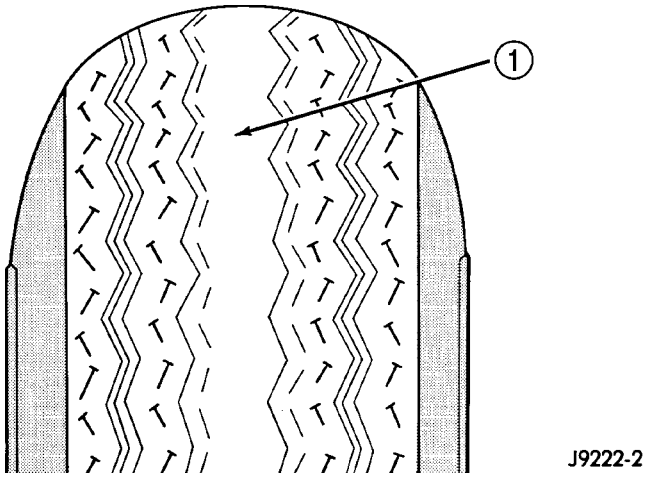


Fig. 27 Over Inflation Wear

1 - THIN TIRE TREAD AREA

STANDARD PROCEDURE - TIRE PRESSURE FOR HIGH SPEED OPERATION

DaimlerChrysler Corporation advocates driving at safe speeds within posted speed limits. Where speed limits allow the vehicle to be driven at high speeds, correct tire inflation pressure is very important. Vehicles loaded to maximum capacity should not be driven at continuous speeds over 120 km/h (75 mph). Never exceed the maximum speed capacity of the tire. For information on tire identification and speed ratings, (Refer to 22 - TIRES/WHEELS/TIRES - DESCRIPTION).

STANDARD PROCEDURE - TIRE LEAK REPAIRING

For proper repairing, a radial tire must be removed from the wheel. Repairs should only be made if the defect, or puncture, is in the tread area (Fig. 28). The tire should be replaced if the puncture is located in the sidewall.

Deflate tire completely before attempting to dismount the tire from the wheel. **Use a lubricant such as a mild soap solution when dismounting or mounting tire.** Use tools free of burrs or sharp edges which could damage the tire or wheel rim.

Before mounting tire on wheel, make sure all rust is removed from the rim bead and repaint if necessary.

Install wheel on vehicle, and progressively tighten the 5 wheel nuts to a torque of 135 N·m (100 ft. lbs.).

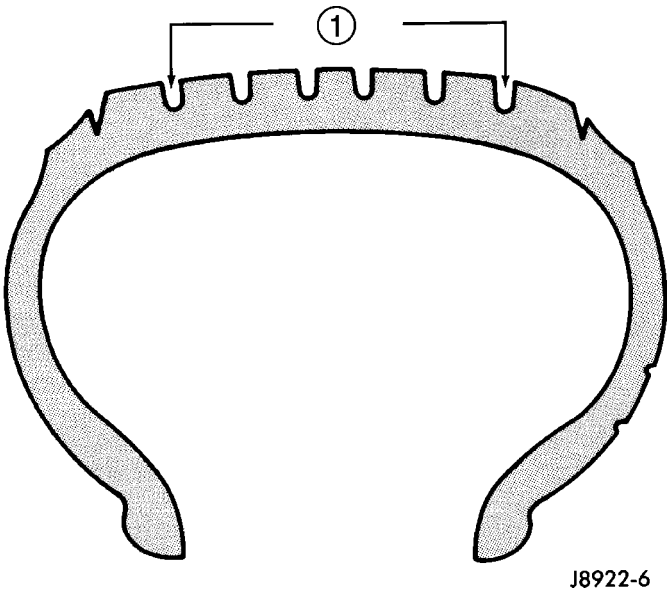


Fig. 28 Tire Repair Area

1 - REPAIRABLE AREA

CLEANING - TIRES

Before delivery of a vehicle, remove the protective coating on the tires with white sidewalls or raised

TIRES (Continued)

white letters. To remove the protective coating, apply warm water and let it soak for a few minutes. Afterwards, scrub the coating away with a soft bristle brush. Steam cleaning may also be used to remove the coating.

CAUTION: DO NOT use gasoline, mineral oil, oil-based solvent or a wire brush for cleaning.

WHEELS

DESCRIPTION - WHEEL

Original equipment wheels are designed for proper operation at all loads up to the specified maximum vehicle capacity.

All models use either steel or aluminum drop-center wheels. Every wheel has raised sections between the rim flanges and rim drop well called safety humps (Fig. 29). Initial inflation of the tires forces the bead over these raised sections. In case of air loss, the safety humps hold the tire in position on the wheel until the vehicle can be brought to a safe stop.

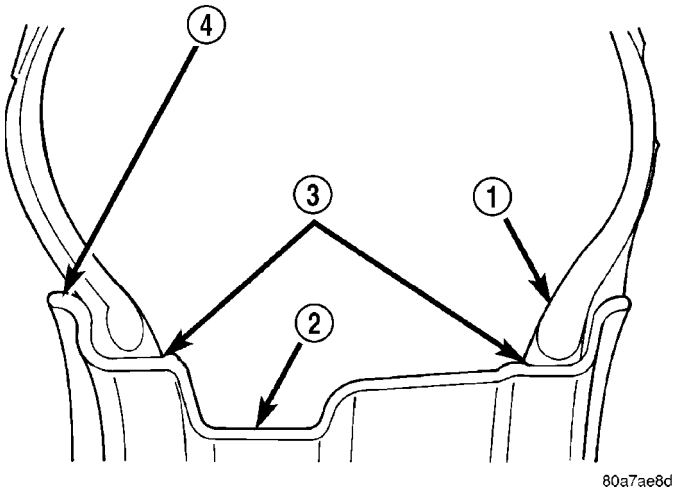


Fig. 29 Safety Rim

1 - TIRE
2 - WELL
3 - SAFETY HUMPS
4 - FLANGE

Cast aluminum wheels require special balance weights to fit on the flange of the rim (Fig. 30).

When wheel alignment is necessary on a vehicle with cast aluminum wheels, special wheel clamps are required to avoid damage to the wheel's finish.

The wheel studs and nuts are designed for specific wheel applications and must be replaced with equivalent parts.

All aluminum wheels have wheel mounting (lug) nuts with an enlarged nose. This enlarged nose is necessary to ensure proper retention of the wheels.

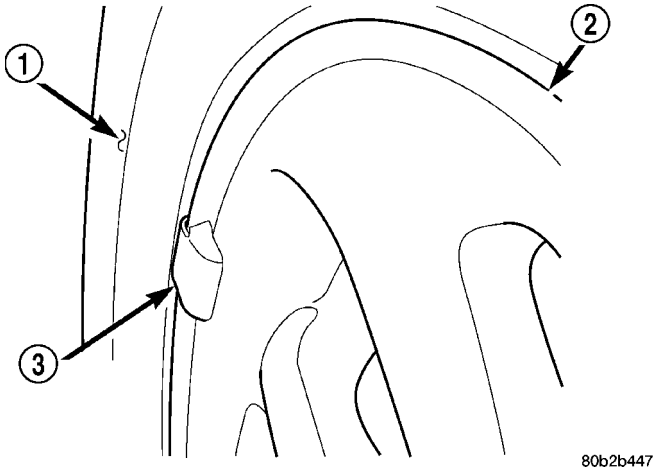


Fig. 30 Styled Aluminum Wheel Weight

1 - TIRE
2 - WHEEL
3 - STYLED WHEEL WEIGHT

DIAGNOSIS AND TESTING - WHEEL INSPECTION

Inspect wheels for:

- Excessive runout
- Dents, cracks or irregular bends
- Damaged wheel stud (lug) holes
- Air Leaks

NOTE: Do not attempt to repair a wheel by hammering, heating or welding.

If a wheel is damaged, an original equipment replacement wheel should be used. When obtaining replacement wheels, they must be equivalent in load carrying capacity. The diameter, width, offset, pilot hole and bolt circle of the wheel should be the same as the original wheel.

WARNING: FAILURE TO USE EQUIVALENT REPLACEMENT WHEELS MAY ADVERSELY AFFECT THE SAFETY AND HANDLING OF THE VEHICLE.

WARNING: REPLACEMENT WITH USED WHEELS IS NOT RECOMMENDED. THE SERVICE HISTORY OF THE WHEEL MAY HAVE INCLUDED SEVERE TREATMENT OR VERY HIGH MILEAGE. THE RIM COULD FAIL WITHOUT WARNING.

CLEANING

WHEEL AND WHEEL TRIM CARE

All wheels and wheel trim, especially aluminum and chrome plated, should be cleaned regularly using

WHEELS (Continued)

mild soap and water to maintain their luster and to prevent corrosion. Wash them with the same soap solution recommended for the body of the vehicle.

When cleaning extremely dirty wheels, care must be taken in the selection of tire and wheel cleaning chemicals and equipment to prevent damage to the wheels. Mopar® Wheel Treatment or Mopar® Chrome Cleaner is recommended. Any of the "DO NOT USE" items listed below can damage wheels and wheel trim.

DO NOT USE:

- Any abrasive cleaner
- Any abrasive cleaning pad (such as steel wool) or abrasive brush
- Any cleaner that contains an acid which can react with and discolor the chrome surface. **Many wheel cleaners contain acids that can harm the wheel surface.**
- Oven cleaner
- A car wash that uses carbide-tipped wheel cleaning brushes or acidic solutions.

SPECIFICATIONS

WHEEL

SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Wheel Mounting (Lug) Nut Hex Size	19 mm
Wheel Mounting Stud Size	M12 x 1.5 mm

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
TPM Sensor Mounting Nut	6.5	—	58
Wheel Mounting (Lug) Nut	135	100	—

STUDS - FRONT

REMOVAL

NOTE: Before proceeding, (Refer to 5 - BRAKES - WARNING) (Refer to 5 - BRAKES - CAUTION).

CAUTION: Wheel mounting studs MUST NOT be hammered out of hub flange of hub and bearing assembly. If a stud is removed by hammering it out, damage to hub and bearing assembly will occur leading to premature bearing failure.

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove front wheel and tire assembly. (Refer to 22 - TIRES/WHEELS - REMOVAL)

(3) Remove two adapter mounting bolts securing disc brake caliper adapter to steering knuckle (Fig. 31).

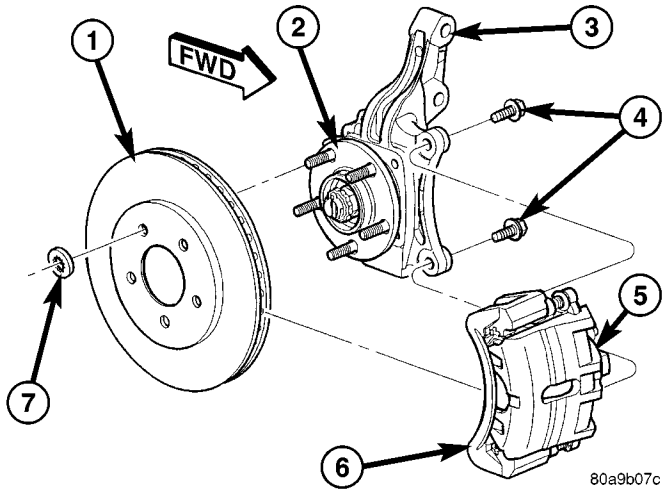


Fig. 31 Front Brake Mounting

1 - BRAKE ROTOR
2 - HUB AND BEARING
3 - STEERING KNUCKLE
4 - ADAPTER MOUNTING BOLTS
5 - BRAKE CALIPER
6 - ADAPTER
7 - CLIP

(4) Remove disc brake caliper and adapter as assembly from steering knuckle (Fig. 31). Hang assembly out of way using wire or a bungee cord. Use care not to overextend brake hose when doing this.

(5) Remove brake rotor from hub by pulling it straight off wheel mounting studs (Fig. 31).

(6) On wheel mounting stud to be removed, install a wheel mounting (lug) nut far enough so the threads on the stud are even with end of nut. Install Remover, Special Tool C-4150A, on hub and bearing flange and wheel stud (Fig. 32).

(7) Tighten down on Remover, pushing wheel stud out of hub flange. Once shoulder of wheel stud is past flange, remove special tool. Remove nut from stud and remove stud from hub flange.

INSTALLATION

(1) Install replacement wheel stud into flange of hub and bearing from rear. Install washers on wheel stud, then install a standard type wheel mounting (lug) nut on stud with flat side of lug nut against washers as shown (Fig. 33).

STUDS - FRONT (Continued)

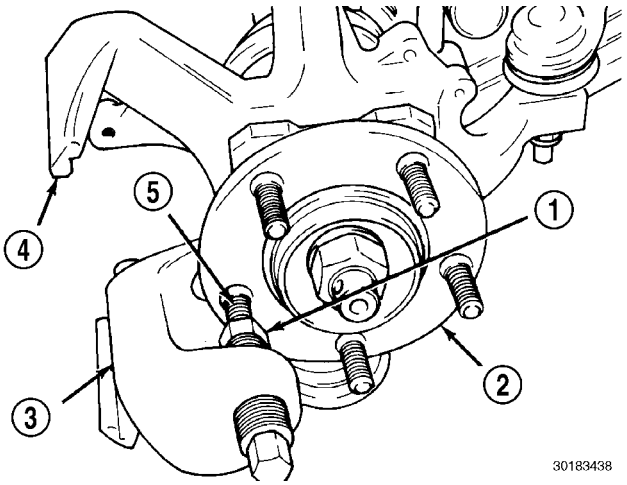


Fig. 32 Wheel Stud Removal (Typical)

1 - WHEEL MOUNTING (LUG) NUT
2 - HUB AND BEARING ASSEMBLY
3 - SPECIAL TOOL C-4150A
4 - STEERING KNUCKLE
5 - WHEEL STUD

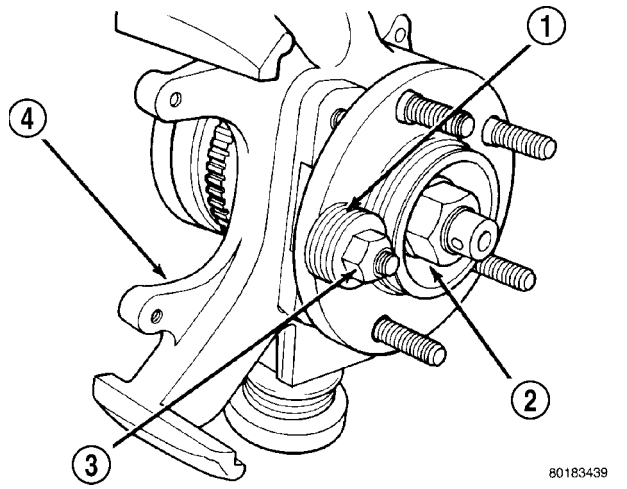


Fig. 33 Installing Wheel Stud (Typical)

1 - WASHERS
2 - HUB AND BEARING ASSEMBLY
3 - WHEEL MOUNTING (LUG) NUT
4 - STEERING KNUCKLE

(2) Tighten nut, pulling wheel stud into hub flange. Once head of stud is fully seated against rear of hub flange, remove nut and washers from stud.

(3) Install brake rotor back on hub and bearing (Fig. 31).

(4) Install brake caliper and adapter back over brake rotor aligning adapter with mounting holes on steering knuckle (Fig. 31).

(5) Install two adapter mounting bolts securing adapter to steering knuckle. Tighten mounting bolts to 169 N·m (125 ft. lbs.) torque.

(6) Install wheel and tire assembly. Tighten wheel mounting (lug) nuts in proper sequence to 135 N·m (100 ft. lbs.) torque.

(7) Lower vehicle.

(8) Road test vehicle to ensure proper operation of the brakes.

STUDS - REAR

REMOVAL

NOTE: Before proceeding, (Refer to 5 - BRAKES - WARNING) (Refer to 5 - BRAKES - CAUTION).

CAUTION: Wheel mounting studs MUST NOT be hammered out of hub flange of hub and bearing assembly. If a stud is removed by hammering it out, damage to hub and bearing assembly will occur leading to premature bearing failure.

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove rear wheel and tire assembly. (Refer to 22 - TIRES/WHEELS - REMOVAL)

(3) Access and remove rear brake rotor. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - REMOVAL)

(4) Back off shoe adjustment until adjuster threads bottom (Fig. 34).

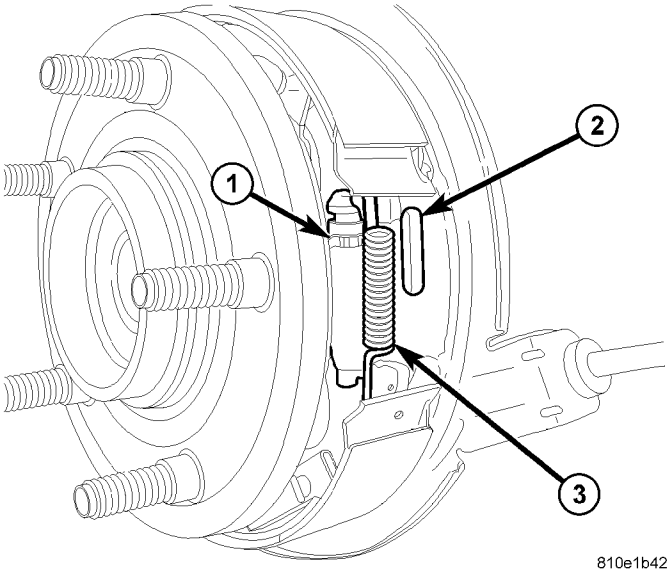


Fig. 34 Shoe Adjuster And Spring

1 - ADJUSTER STAR WHEEL
2 - ADJUSTER ACCESS HOLE IN SUPPORT PLATE
3 - SPRING

STUDS - REAR (Continued)

(5) Using appropriate tools, remove spring at adjuster (Fig. 34).

(6) Pull upward on upper shoe near adjuster to provide enough slack to remove adjuster from shoes, then remove adjuster.

(7) Install Remover, Special Tool C-4150A, on hub and bearing flange and wheel stud (Fig. 35).

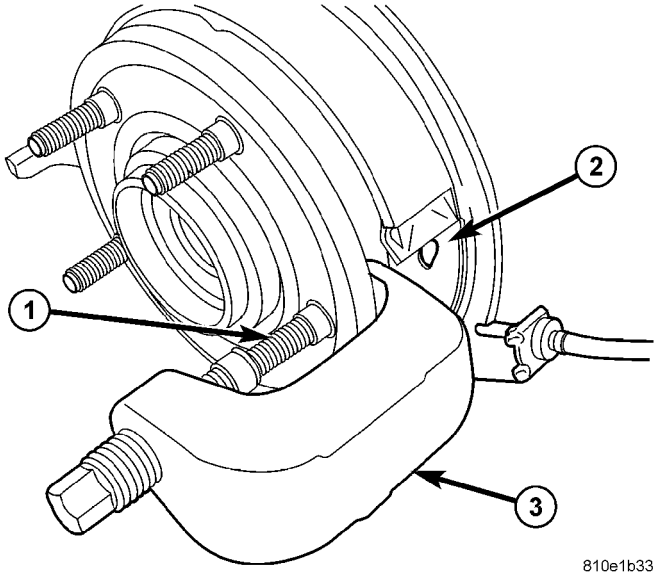


Fig. 35 C-4150A Positioned For Stud Removal

1 - STUD
2 - OPEN AREA WHERE ADJUSTER WAS REMOVED
3 - REMOVER C-4150A

(8) Tighten Remover forcing screw, pushing wheel stud out of hub and bearing flange. Remove tool.

(9) Remove stud from rear of hub flange. It may be necessary to rock hub flange back and forth to ease stud removal.

INSTALLATION

(1) Install replacement wheel stud into flange of hub and bearing from rear. Install a stack of washers (approximately 5, depending on thickness) over stud, then install a standard wheel mounting (lug) nut on stud with flat side of nut against washers (Fig. 36).

(2) Tighten wheel mounting nut, pulling wheel stud into flange of hub and bearing. Once head of stud is fully seated against rear of hub flange, remove nut and washers from wheel stud.

(3) Install parking brake shoe adjuster between upper and lower parking brake shoes. Position end of adjuster with star wheel upward (Fig. 34). Once in place, slide upper shoe downward against adjuster mounting slot, taking up any slack between two pieces.

(4) Using appropriate tools, install spring at adjuster (Fig. 34).

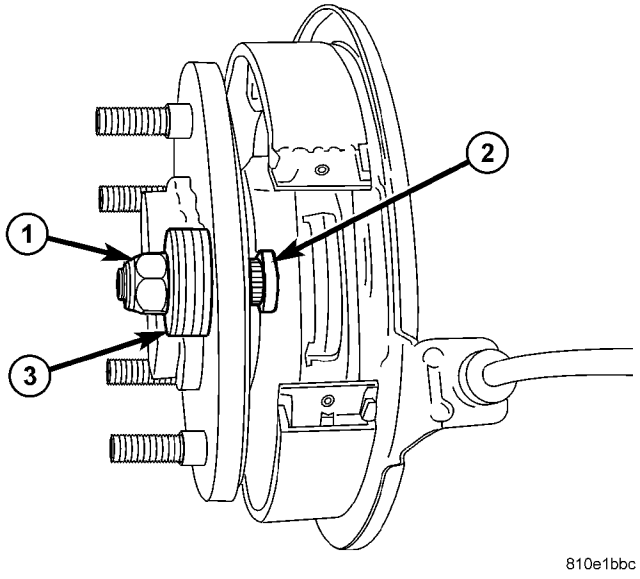


Fig. 36 Nut And Washers Installed On Stud

1 - STANDARD WHEEL NUT INSTALLED FLAT SIDE FIRST
2 - STUD
3 - STACK OF WASHERS

NOTE: When measuring brake drum diameter, diameter should be measured in center of shoe contact surface area.

(5) Using Brake Shoe Gauge, Special Tool C-3919, or equivalent, measure inside diameter of parking brake drum portion of rotor (Fig. 37).

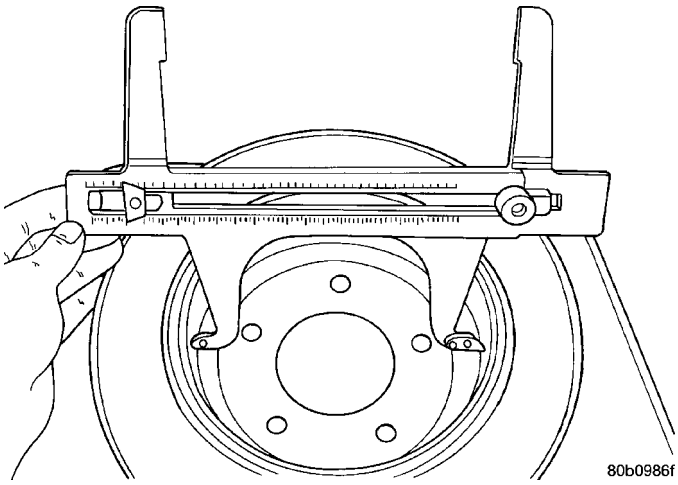


Fig. 37 Measuring Parking Brake Drum Diameter

STUDS - REAR (Continued)

(6) Place Gauge over parking brake shoes at widest point (Fig. 38).

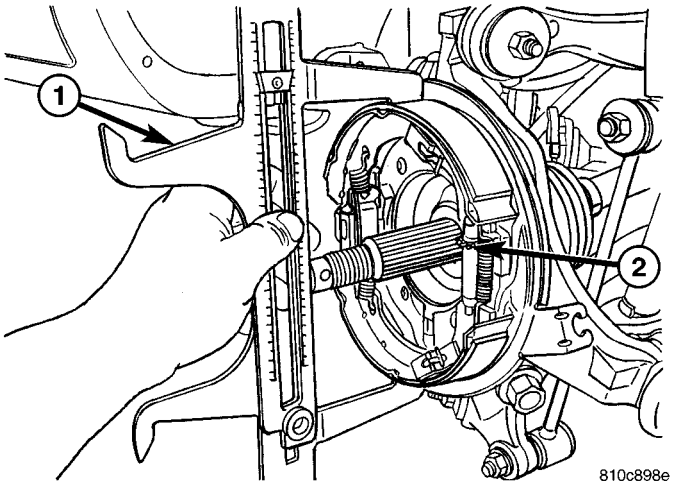


Fig. 38 Measuring Parking Brake Shoes

1 - BRAKE SHOE GAUGE
2 - ADJUSTER STAR WHEEL

(7) Using adjuster star wheel (Fig. 38), adjust parking brake shoes until linings on both park brake shoes just touch jaws on gauge. This will give a good preliminary adjustment of parking brake shoes, before a final adjustment is made at end of this procedure.

(8) Install brake rotor and components removed to access it. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTOR - INSTALLATION)

(9) Install wheel and tire assembly (Refer to 22 - TIRES/WHEELS - INSTALLATION). Tighten wheel mounting (lug) nuts in proper sequence to 135 N·m (100 ft. lbs.) torque.

(10) Adjust parking brake shoes. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - ADJUSTMENT)

(11) Lower vehicle.

(12) Road test vehicle to ensure proper operation of the brakes.

BODY

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BODY

DESCRIPTION - VEHICLE IDENTIFICATION

Throughout this group, references to the DaimlerChrysler Corporation vehicle family identification code are used when describing a procedure that is unique to that vehicle. Refer to Introduction Group of this manual for detailed information on vehicle identification. If a procedure is common to all vehicles covered in this manual, no reference will be made to a vehicle family code.

WARNING

SAFETY PRECAUTIONS AND WARNINGS

WARNING: USE A OSHA APPROVED BREATHING FILTER WHEN SPRAYING PAINT OR SOLVENTS IN A CONFINED AREA. PERSONAL INJURY CAN RESULT.
AVOID PROLONGED SKIN CONTACT WITH PETROLEUM OR ALCOHOL – BASED CLEANING SOLVENTS. PERSONAL INJURY CAN RESULT.
DO NOT STAND UNDER A HOISTED VEHICLE THAT IS NOT PROPERLY SUPPORTED ON SAFETY STANDS. PERSONAL INJURY CAN RESULT.
CAUTION: When holes must be drilled or punched in an inner body panel, verify depth of space to the outer body panel, electrical wiring, or other components. Damage to vehicle can result.
Do not weld exterior panels unless combustible material on the interior of vehicle is removed from the repair area. Fire or hazardous conditions, can result.
Always have a fire extinguisher ready for use when welding.
Disconnect the negative (-) cable clamp from the battery when servicing electrical components that are live when the ignition is OFF. Damage to electrical system can result.
Do not use abrasive chemicals or compounds on painted surfaces. Damage to finish can result.
Do not use harsh alkaline based cleaning solvents on painted or upholstered surfaces. Damage to finish or color can result.
Do not hammer or pound on plastic trim panel when servicing interior trim. Plastic panels can break.

BODY (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - WATER LEAKS

Water leaks can be caused by poor sealing, improper body component alignment, body seam porosity, missing plugs, or blocked drain holes. Centrifugal and gravitational force can cause water to drip from a location away from the actual leak point, making leak detection difficult. All body sealing points should be water tight in normal wet-driving conditions. Water flowing downward from the front of the vehicle should not enter the passenger or luggage compartment. Moving sealing surfaces will not always seal water tight under all conditions. At times, side glass or door seals will allow water to enter the passenger compartment during high pressure washing or hard driving rain (severe) conditions. Overcompensating on door or glass adjustments to stop a water leak that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After completing a repair, water test vehicle to verify leak has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE WATER LEAK TESTS

Verify that floor and body plugs are in place, body drains are clear, and body components are properly aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate section of this group for proper procedures.

WATER LEAK TESTS

WARNING: DO NOT USE ELECTRIC SHOP LIGHTS OR TOOLS IN WATER TEST AREA. PERSONAL INJURY CAN RESULT.

When the conditions causing a water leak have been determined, simulate the conditions as closely as possible.

- If a leak occurs with the vehicle parked in a steady light rain, flood the leak area with an open-ended garden hose.
- If a leak occurs while driving at highway speeds in a steady rain, test the leak area with a reasonable velocity stream or fan spray of water. Direct the spray in a direction comparable to actual conditions.
- If a leak occurs when the vehicle is parked on an incline, hoist the end or side of the vehicle to simulate this condition. This method can be used when the leak occurs when the vehicle accelerates, stops or turns. If the leak occurs on acceleration, hoist the front of the vehicle. If the leak occurs when braking, hoist the back of the vehicle. If the leak occurs on left turns, hoist the left side of the vehicle. If the leak occurs on right turns, hoist the right side of the vehicle. For hoisting recommendations (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

WATER LEAK DETECTION

To detect a water leak point-of-entry, do a water test and watch for water tracks or droplets forming on the inside of the vehicle. If necessary, remove interior trim covers or panels to gain visual access to the leak area. If the hose cannot be positioned without being held, have someone help do the water test.

Some water leaks must be tested for a considerable length of time to become apparent. When a leak appears, find the highest point of the water track or drop. The highest point usually will show the point of entry. After leak point has been found, repair the leak and water test to verify that the leak has stopped.

Locating the entry point of water that is leaking into a cavity between panels can be difficult. The trapped water may splash or run from the cavity, often at a distance from the entry point. Most water leaks of this type become apparent after accelerating, stopping, turning, or when on an incline.

MIRROR INSPECTION METHOD

When a leak point area is visually obstructed, use a suitable mirror to gain visual access. A mirror can also be used to deflect light to a limited-access area to assist in locating a leak point.

BRIGHT LIGHT LEAK TEST METHOD

Some water leaks in the luggage compartment can be detected without water testing. Position the vehicle in a brightly lit area. From inside the darkened luggage compartment inspect around seals and body seams. If necessary, have a helper direct a drop light over the suspected leak areas around the luggage compartment. If light is visible through a normally sealed location, water could enter through the opening.

PRESSURIZED LEAK TEST METHOD

When a water leak into the passenger compartment cannot be detected by water testing, pressurize the passenger compartment and soap test exterior of the vehicle. To pressurize the passenger compartment, close all doors and windows, start engine, and set heater control to high blower in HEAT position. If engine can not be started, connect a charger to the battery to ensure adequate voltage to the blower. With interior pressurized, apply dish detergent solution to suspected leak area on the exterior of the vehicle. Apply detergent solution with spray device or soft bristle brush. If soap bubbles occur at a body seam, joint, seal or gasket, the leak entry point could be at that location.

BODY (Continued)

DIAGNOSIS AND TESTING - WIND NOISE

Wind noise is the result of most air leaks. Air leaks can be caused by poor sealing, improper body component alignment, body seam porosity, or missing plugs in the engine compartment or door hinge pillar areas. All body sealing points should be airtight in normal driving conditions. Moving sealing surfaces will not always seal airtight under all conditions. At times, side glass or door seals will allow wind noise to be noticed in the passenger compartment during high cross winds. Over compensating on door or glass adjustments to stop wind noise that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After a repair procedure has been performed, test vehicle to verify noise has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE TESTS

Verify that floor and body plugs are in place and body components are aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate section of this group for proper procedures.

ROAD TESTING WIND NOISE

(1) Drive the vehicle to verify the general location of the wind noise.

(2) Apply 50 mm (2 in.) masking tape in 150 mm (6 in.) lengths along weatherstrips, weld seams or moldings. After each length is applied, drive the vehicle. If noise goes away after a piece of tape is applied, remove tape, locate, and repair defect.

POSSIBLE CAUSE OF WIND NOISE

- Moldings standing away from body surface can catch wind and whistle.
- Gaps in sealed areas behind overhanging body flanges can cause wind-rushing sounds.
- Misaligned movable components.
- Missing or improperly installed plugs in pillars.
- Weld burn through holes.

STANDARD PROCEDURE

STANDARD PROCEDURE - PLASTIC BODY PANEL REPAIR

There are many different types of plastics used in today's automotive environment. We group plastics in three different categories: Rigid, Semi-Rigid, and Flexible. Any of these plastics may require the use of an adhesion promoter for repair. These types of plastic are used extensively on DaimlerChrysler Motors vehicles. Always follow repair material manufacturer's plastic identification and repair procedures.

Rigid Plastics:

Examples of rigid plastic use: Fascias, Hoods, Doors, and other Body Panels, which include SMC, ABS, and Polycarbonates.

Semi-Rigid Plastics:

Examples of semi-rigid plastic use: Interior Panels, Under Hood Panels, and other Body Trim Panels.

Flexible Plastics:

Examples of flexible plastic use: Fascias, Body Moldings, and upper and lower Fascia Covers.

Repair Procedure:

The repair procedure for all three categories of plastics is basically the same. The one difference is the material used for the repair. The materials must be specific for each substrate, rigid repair material for rigid plastic repair, semi-rigid repair material for semi-rigid plastic repair and flexible repair material for flexible plastic repair.

Adhesion Promoter/Surface Modifier:

Adhesion Promoters/Surface Modifiers are required for certain plastics. All three categories may have plastics that require the use of adhesion promoter/surface modifiers. Always follow repair material manufacturer's plastic identification and repair procedures.

SAFETY PRECAUTION AND WARNINGS

WARNING:

- **EYE PROTECTION SHOULD BE USED WHEN SERVICING COMPONENTS. PERSONAL INJURY CAN RESULT.**
- **USE AN OSHA APPROVED BREATHING MASK WHEN MIXING EPOXY, GRINDING, AND SPRAYING PAINT OR SOLVENTS IN A CONFINED AREA. PERSONAL INJURY CAN RESULT.**
- **AVOID PROLONGED SKIN CONTACT WITH RESIN, PETROLEUM, OR ALCOHOL BASED SOLVENTS. PERSONAL INJURY CAN RESULT.**
- **DO NOT VENTURE UNDER A HOISTED VEHICLE THAT IS NOT PROPERLY SUPPORTED ON SAFETY STANDS. PERSONAL INJURY CAN RESULT.**

NOTE:

- **When holes must be drilled or cut in body panels, verify locations of internal body components and electrical wiring. Damage to vehicle can result.**
- **Do not use abrasive chemicals or compounds on undamaged painted surfaces around repair areas. Damage to finish can result.**

BODY (Continued)

RIGID, SEMI-RIGID, AND FLEXIBLE PLASTIC PARTS TYPES

CODE	FAMILY NAME	COMMON TRADE NAME	TYPICAL APPLICATION
ASA	ACRYLONITRILE STYRENE ACRYLITE	LURANS	CONSOLES, GRILLES
ABS	ACRYLONITRILE BUTADIENE STYRENE	TERLURAN	″A″ PILLARS, CONSOLES, GRILLES
ABS/PC	ABS/PC ALLOY	PULSE, PROLOY, BAYBLEND	DOORS, INSTRUMENT PANELS
ABS/PVC	ABS/PV ALLOY	PROLOY, PULSE, LUSTRAN, CYCLOVIN	DOOR PANELS, GRILLES, TRIM
BMC	BULK MOLDING COMPOUND	BMC	FENDER EXTENSIONS
EMA	EHTYLENE METHYL ACRYLATE/IONOMER	SURLYN, EMA, IONOMER	BUMPER GUARDS, PADS
METTON	METTON	METTON	GRILLES, KICK PANELS, RUNNING BOARDS
MPPO	MODIFIED POLYPHENYLENE OXIDE	MPPO	SPOILER ASSEMBLY
PA	POLYAMID	ZYTEL, VYDYNE, PA, MINLON	FENDERS, QUARTER PANELS
PET	THERMOPLASTIC POLYESTER	RYNITE	TRIM
PBT/PPO	PBT/PPO ALLOY	GERMAX	CLADDINGS
PBTP	POLYBUTYLENE THEREPTHALATE	PBT, PBTP, POCAN, VALOX	WHEEL COVERS, FENDERS, GRILLES
PBTP/EEBC	POLYBUTYLENE THEREPTHALATE/EEBC ALLOY	BEXLOY, ″M″, PBTP/EEBC	FASCIAS, ROCKER PANEL, MOLDINGS
PC	POLYCARBONATE	LEXAN, MERLON, CALIBRE, MAKROLON PC	TAIL LIGHT LENSES, IP TRIM, VALANCE PANELS
PC/ABS	PC/ABS ALLOY	GERMAX, BAY BLENDS, PULSE	DOORS, INSTRUMENT PANELS
PPO	POLYPHENYLENE OXIDE	AZDEL, HOSTALEN, MARLEX, PRFAX, NORYL, GTX, PPO	INTERIOR TRIM, DOOR PANELS, SPLASH SHIELDS, STEERING COLUMN SHROUD
PPO/PA	POLYPHENYLENE/ POLYAMID	PPO/PA, GTX 910	FENDERS, QUARTER PANELS
PR/FV	FIBERGLASS REINFORCED PLASTIC	FIBERGLASS, FV, PR/FV	BODY PANELS
PS	POLYSTYRENE	LUSTREX, STYRON, PS	DOOR PANELS, DASH PANELS
RTM	RESIN TRANSFER MOLDING COMPOUND	RTM	BODY PANELS
SMC	SHEET MOLDED COMPOUND	SMC	BODY PANELS
TMC	TRANSFER MOLDING COMPOUND	TMC	GRILLES

BODY (Continued)

CODE	FAMILY NAME	COMMON TRADE NAME	TYPICAL APPLICATION
UP	UNSATURATED POLYESTER (THERMOSETTING)	SMC, BMC, TMC, ZMC, IMC, XSMC, UP	GRILLE OPENING PANEL, LIFTGATES, FLARESIDE FENDERS, FENDER EXTENSIONS
EEBC	ETHER/ESTER BLOCKED CO-POLYMER	EEBC	BUMPERS
EEBC/PBTP	EEBC/POLYBUTYLENE TEREPTHALATE	EEBC, PBTP, BEXLOY	BUMPER, ROCKER PANELS
EMPP	ETHYLENE MODIFIED POLYPROPYLENE	EMPP	BUMPER COVERS
EPDM	ETHYLENE/ PROPROPYLENE DIENE MONOMER	EPDM, NORDEL, VISTALON	BUMPERS
EPM	ETHYLENE/ PROPROPYLENE CO-POLYMER	EPM	FENDERS
MPU	FOAM POLYURETHANE	MPU	SPOILERS
PE	POLYETHYLENE	ALATHON, DYLAN, LUPOLEN, MARLEX	-
PP	POLYPROPYLENE (BLENDS)	NORYL, AZDEL, MARLOX, DYLON, PRAVEX	INNER FENDER, SPOILERS, KICK PANELS, A-PILLARS, DOOR PANELS, B-PILLARS, QUARTER PANELS, SPORT BAR TRIM, LIFTGATE TRIM, DECKLID TRIM SCUFF PLATES, KICK PANELS, CONSOLES
PP/EPDM	PP/EPDM ALLOY	PP/EPDM	SPOILERS, GRILLES
PUR	POLYURETHANE	COLONELS, PUR, PU	FASCIAS, BUMPERS
PUR/PC	PUR/PC ALLOY	TEXIN	BUMPERS
PVC	POLYVINYL CHLORIDE	APEX, GEON, VINYLITE	BODY MOLDINGS, WIRE INSULATION, STEERING WHEELS
RIM	REACTION INJECTED MOLDED POLYURETHANE	RIM, BAYFLEX	FRONT FASCIAS, MODULAR WINDOWS
RRIM	REINFORCED REACTION INJECTED MOLDED	PUR, RRIM	FASCIAS, BODY PANELS, BODY TRIMS
TPE	THERMO POLYETHYLENE	TPE, HYTREL, BEXLOY-V	FASCIAS, BUMPERS, CLADDINGS
TPO	THERMOPOLYOLEFIN	POLYTROPE, RENFLEX, SANTOPRENE, VISAFLEX, ETA, APEX, TPO, SHIELDS, CLADDINGS	BUMPERS, END CAPS, TELCAR, RUBBER, STRIPS, SIGHT, INTERIOR B POST
TPP	THERMO-POLYPROPYLENE	TPP	BUMPERS
TPU	THERMOPOLYURETHANE, POLYESTER	TPU, HYTREL, TEXIN, ESTANE	BUMPERS, BODY SIDE, MOLDINGS, FENDERS, FASCIAS

BODY (Continued)

PANEL SECTIONING

If it is required to section a large panel for a plastic repair, it will be necessary to reinforce the panel (Fig. 1). To bond two plastic panels together, a reinforcement must overlap both panels. The panels must be "V'd" at a 20 degree angle. The area to be reinforced should be washed, then sanded. Be sure to wipe off any excess soap and water when finished. Lightly sand or abrade the plastic with an abrasive pad or sandpaper. Blow off any dust with compressed air or wipe with a clean dry rag.

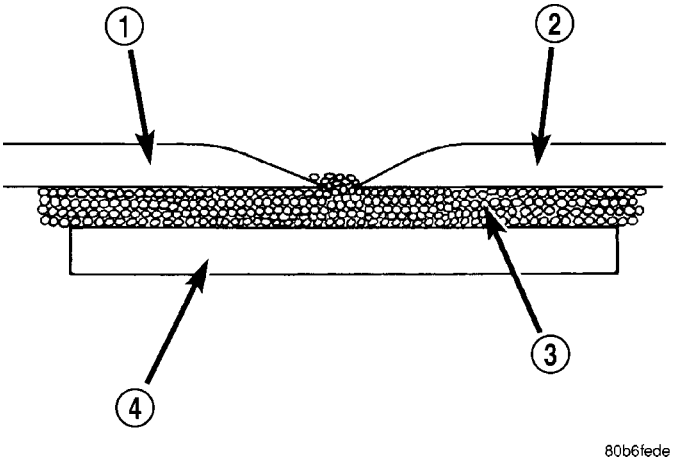


Fig. 1 PANEL SECTIONING

1 - EXISTING PANEL
2 - NEW PANEL
3 - PANEL ADHESIVE
4 - BONDING STRIP

When bonding plastic panels, Follow repair material manufacturers recommendations. Be sure that enough adhesive has been applied to allow squeeze out and to fill the full bond line. Once the pieces have been brought together, do not move them until the adhesive is cured. The assembly can be held together with clamps, rivets, etc. A faster cure can be obtained by heating with a heat lamp or heat gun. After the parts have been bonded and have had time to cure, rough sand the seam and apply the final adhesive filler to the area being repaired. Smooth the filler with a spreader, wooden tongue depressor, or squeegee. For fine texturing, a small amount of water can be applied to the filler surface while smoothing. The cured filler can be sanded as necessary and, as a final step, cleanup can be done with soapy water. Wipe the surface clean with a dry cloth allowing time for the panel to dry before moving on with the repair.

PANEL REINFORCEMENT

Structural repair procedures for rigid panels with large cracks and holes will require a reinforcement backing. Reinforcements can be made with several applications of glass cloth saturated with structural adhesive. Semi-rigid or flexible repair materials should be used for semi-rigid or flexible backing reinforcement (Fig. 2) and (Fig. 3). Open meshed fiberglass dry wall tape can be used to form a reinforcement. The dry wall tape allows the resin to penetrate through and make a good bond between the panel and the adhesive. Structurally, the more dry wall tape used, the stronger the repair.

Another kind of repair that can be done to repair large cracks and holes is to use a scrap piece of similar plastic and bond with structural adhesive. The reinforcement should cover the entire break and should have a generous amount of overlap on either side of the cracked or broken area.

When repairing plastic, the damaged area is first "V'd" out, or beveled. Large bonding areas are desirable when repairing plastic because small repairs are less likely to hold permanently. Beveling the area around a crack at a 20 degree angle will increase the bonding surface for a repair (Fig. 4). It is recommended that sharp edges be avoided because the joint may show through after the panel is refinished.

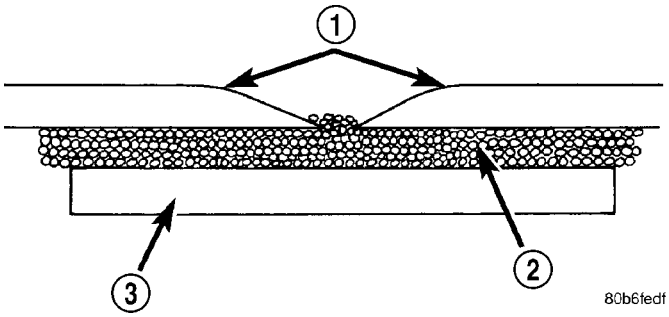


Fig. 2 SOFTENED EDGES

1 - SOFTENED EDGES
2 - PANEL ADHESIVE
3 - BONDING STRIP

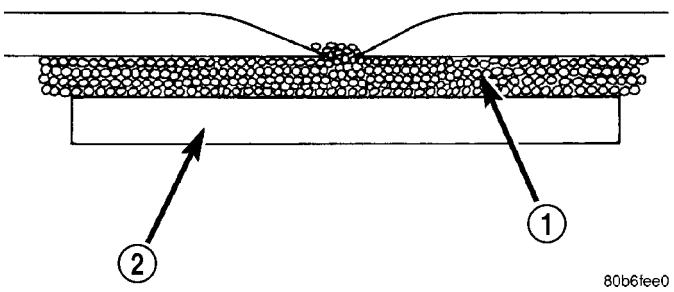


Fig. 3 PANEL REINFORCEMENT

1 - PANEL ADHESIVE
2 - REINFORCEMENT

BODY (Continued)

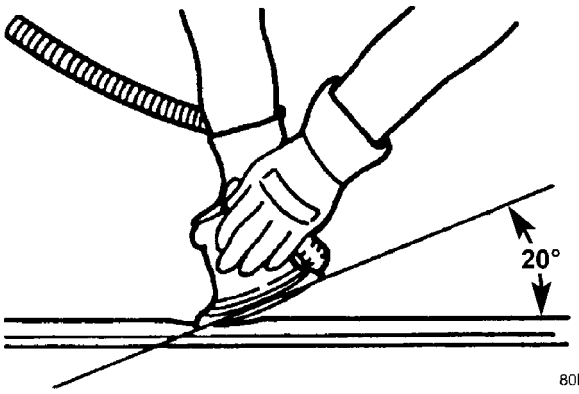


Fig. 4 BEVELING ANGLE - 20 DEGREE

- Panel repair for both flexible and rigid panels are basically the same. The primary difference between flexible panel repair and rigid panel repair is in the adhesive materials used (Fig. 5).
- The technician should first decide what needs to be done when working on any type of body panel. One should determine if it is possible to return the damage part to its original strength and appearance without exceeding the value of the replacement part.
- When plastic repairs are required, it is recommended that the part be left on the vehicle when ever possible. That will save time, and the panel will remain stationary during the repair. Misalignment can cause stress in the repair areas and can result in future failure.

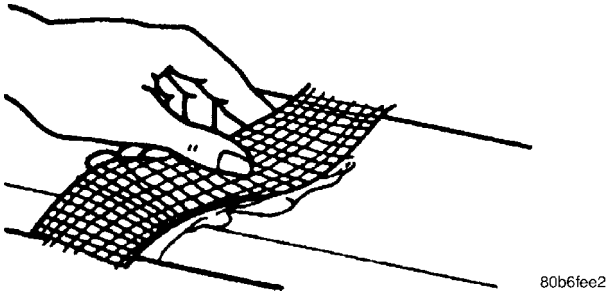


Fig. 5 FIBERGLASS TAPE

VISUAL INSPECTION

Composite materials can mask the severity of an accident. Adhesive bond lines, interior structure of the doors, and steel structures need to be inspected carefully to get a true damage assessment. Close inspection may require partial removal of interior trim or inner panels.

Identify the type of repair: Puncture or Crack - Damage that has penetrated completely through the panel. Damage is confined to one general area; a panel section is not required. However, a backer panel, open fiberglass tape, or matted material must be bonded from behind (Fig. 7) (Fig. 6).

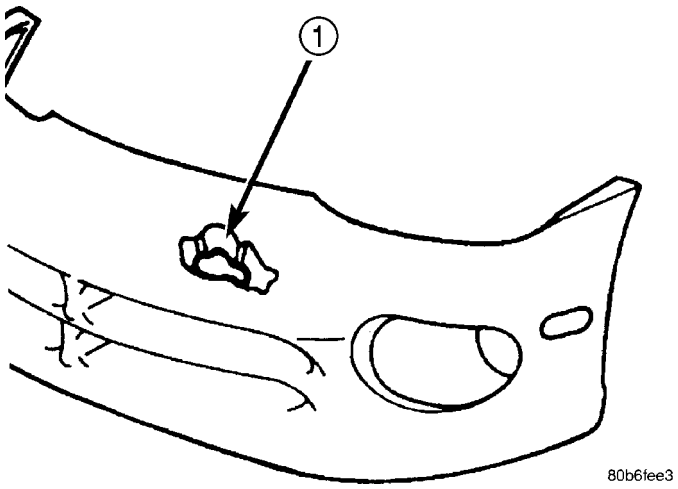


Fig. 6 DAMAGE COMPONENT

1 - PUNCTURE

PANEL SURFACE PREPARATION

If a body panel has been punctured, cracked, or crushed, the damaged area must be removed from the panel to achieve a successful repair. All spider web cracks leading away from a damaged area must be stopped or removed. To stop a running crack in a panel, drill a 6 mm (0.250 in.) hole at the end of the crack farthest away from the damage. If spider web cracks can not be stopped, the panel would require replacement. The surfaces around the damaged area should be stripped of paint and freed from wax and oil. Scuff surfaces around repair area with 360 grit wet/dry sandpaper, or equivalent, to assure adhesion of repair materials.

BODY (Continued)

PATCHING PANELS

An panel that has extensive puncture type damage can be repaired by cutting out the damaged material (Fig. 7). Use a suitable reciprocating saw or cut off wheel to remove the section of the panel that is damaged. The piece cut out can be used as a template to shape the new patch. It is not necessary to have access to the back of the panel to install a patch. Bevel edges of cutout at 20 degrees to expose a larger bonding area on the outer side. This will allow for an increased reinforcement areas.

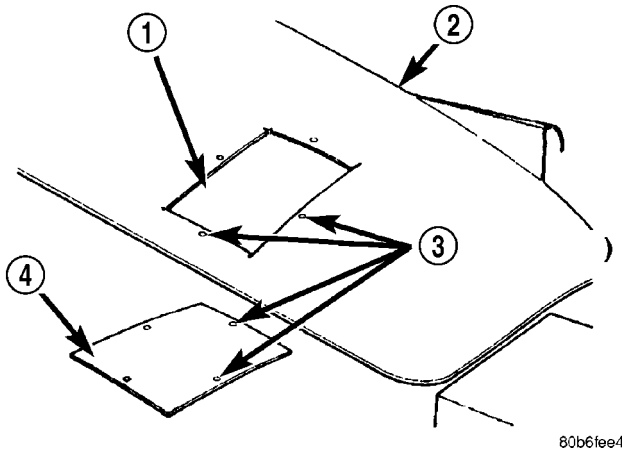


Fig. 7 DAMAGED PANEL CUTOUT AND PATCH

1 - CUTOUT
2 - DAMAGED BODY PANEL
3 - 4 MM (0.160 IN.) HOLES
4 - PATCH CUT TO SIZE

PANEL PATCH FABRICATIONS

A patch can be fabricated from any rigid fiberglass panel that has comparable contour with the repair area. Lift gates and fenders can be used to supply patch material. If existing material is not available or compatible, a patch can be constructed with adhesive and reinforcement mesh (dry wall tape). Perform the following operation if required:

(1) Cover waxed paper or plastic with adhesive backed nylon mesh (dry wall tape) larger than the patch required (Fig. 8).

(2) Tape waxed paper or plastic sheet with mesh to a surface that has a compatible contour to the repair area.

(3) Apply a liberal coat of adhesive over the reinforcement mesh (Fig. 8). If necessary apply a second or third coat of adhesive and mesh after first coat has cured. The thickness of the patch should be the same as the repair area.

(4) After patch has cured, peel waxed paper or plastic from the back of the patch.

(5) If desired, a thin film coat of adhesive can be applied to the back of the patch to cover mesh for added strength.

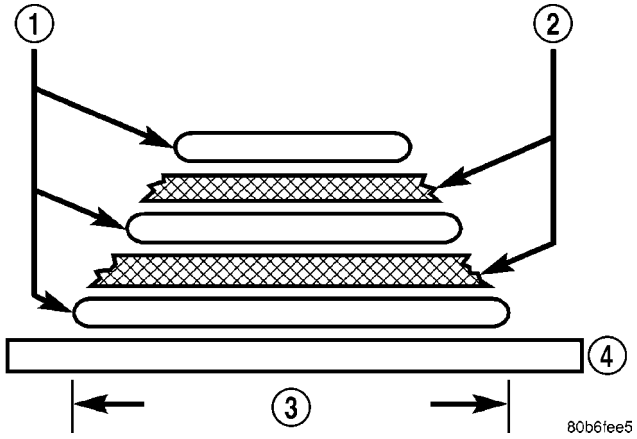


Fig. 8 FABRICATED PANEL

1 - STRUCTURAL ADHESIVE
2 - FIBERGLASS CLOTH OR FIBERGLASS MESH TAPE
3 - WIDTH OF V-GROOVE
4 - WAXED PAPER

PANEL PATCH INSTALLATION

(1) Make a paper or cardboard pattern the size and shape of the cutout hole in the panel.

(2) Trim 3 mm (0.125 in.) from edges of pattern so patch will have a gap between connecting surfaces.

(3) Using the pattern as a guide, cut the patch to size.

(4) Cut scrap pieces of patch material into 50 mm (2 in.) squares to use as patch supports to sustain the patch in the cutout.

(5) Drill 4 mm (0.160 in.) holes 13 mm (0.5 in.) in from edge of cutout hole (Fig. 7).

(6) Drill 4 mm (0.160 in.) holes 13 mm (0.5 in.) away from edge of patch across from holes drilled around cutout.

(7) Drill 3 mm (0.125 in.) holes in the support squares 13 mm (0.5 in.) from the edge in the center of one side.

(8) Scuff the backside of the body panel around the cutout hole with a scuff pad or sandpaper.

(9) Mix enough adhesive to cover one side of all support squares.

(10) Apply adhesive to cover one side of all support squares.

BODY (Continued)

(11) Using number 8 sheet metal screws, secure support squares to back side of body panel with adhesive sandwiched between the panel and squares (Fig. 9).

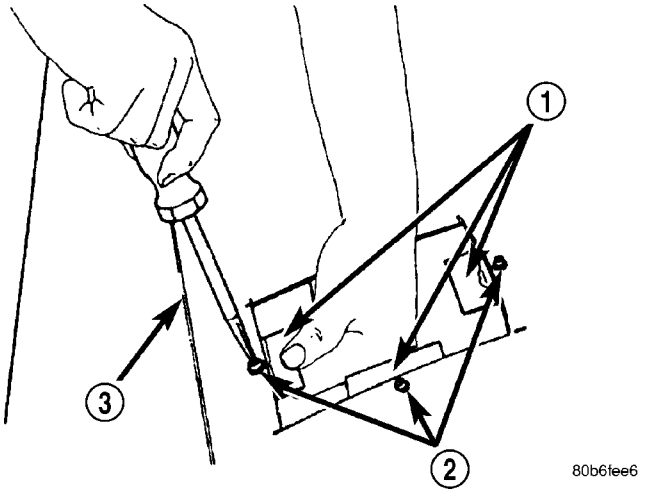


Fig. 9 SECURE SUPPORT SQUARES TO BODY PANEL

1 - SUPPORT SQUARES
2 - SCREWS
3 - DAMAGED BODY PANEL

(12) Position patch in cutout against support squares and adjust patch until the gap is equal along all sides (Fig. 10).

(13) Drill 3 mm (0.125 in.) holes in the support squares through the pre-drilled holes in the patch.

(14) Apply a coat of adhesive to the exposed ends of the support squares (Fig. 11).

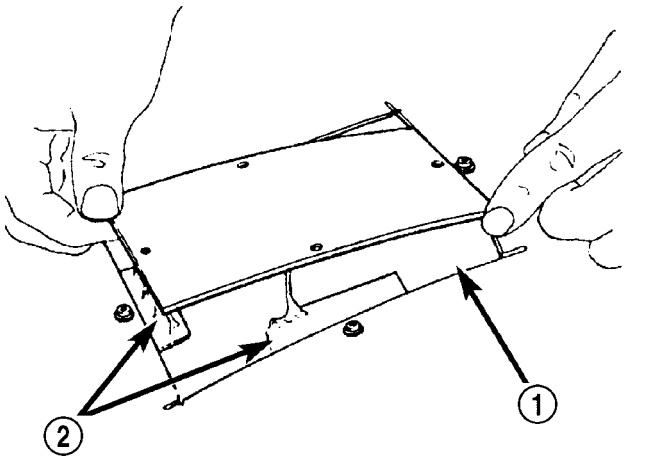


Fig. 10 POSITION PATCH IN CUTOUT AND ALIGN

1 - CUTOUT
2 - SUPPORT SQUARES

(15) Install screws to hold the patch to support squares (Fig. 12). Tighten screws until patch surface is flush with panel surface.

(16) Allow adhesive to cure, and remove all screws.

(17) Using a 125 mm (5 in.) 24 grit disc grinder, grind a 50 mm (2 in.) to 75 mm (3 in.) wide and 2 mm (0.080 in.) deep path across the gaps around the patch (Fig. 13). With compressed air, blow dust from around patch.

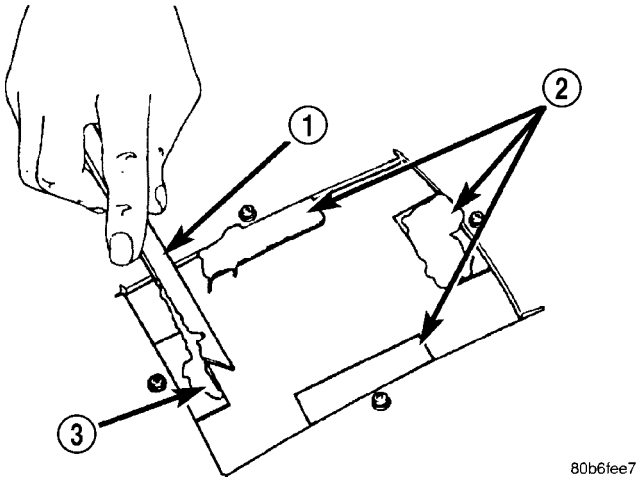


Fig. 11 APPLY ADHESIVE TO SUPPORT SQUARES

1 - APPLICATOR
2 - SUPPORT SQUARES
3 - ADHESIVE

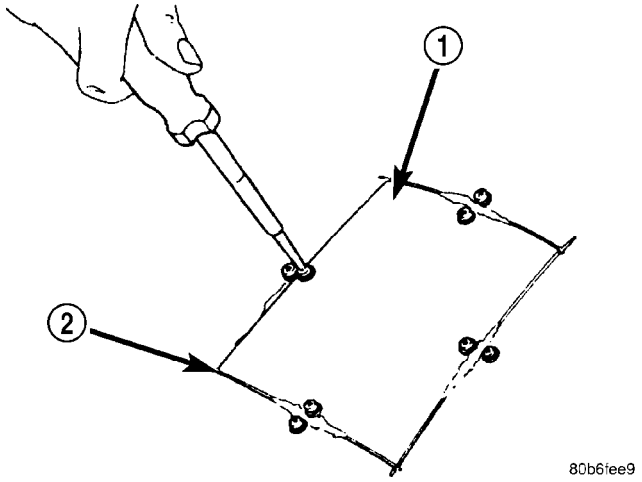


Fig. 12 INSTALL SCREWS

1 - PATCH
2 - GAP

BODY (Continued)

(18) Apply adhesive backed nylon mesh (dry wall tape) over gaps around patch (Fig. 14).

(19) Mix enough adhesive to cover the entire patch area.

(20) Apply adhesive over the mesh around patch, and smooth epoxy with a wide spreader to reduce finish grinding. Use two to three layers of mesh and adhesive to create a stronger repair (Fig. 15).

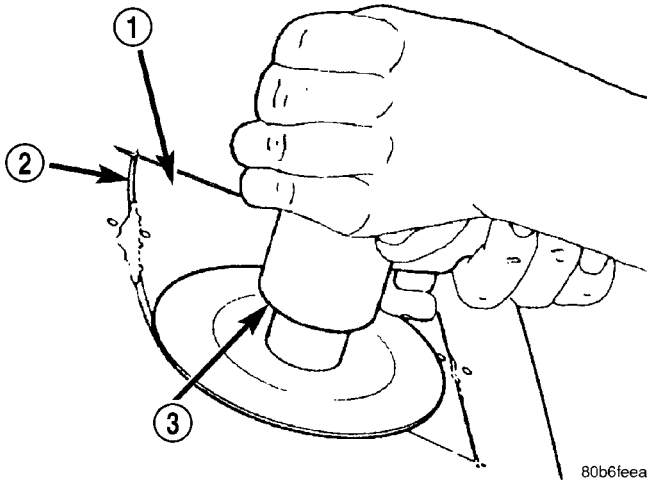


Fig. 13 GRIND SURFACE

1 - PATCH
2 - GAP
3 - DISC GRINDER

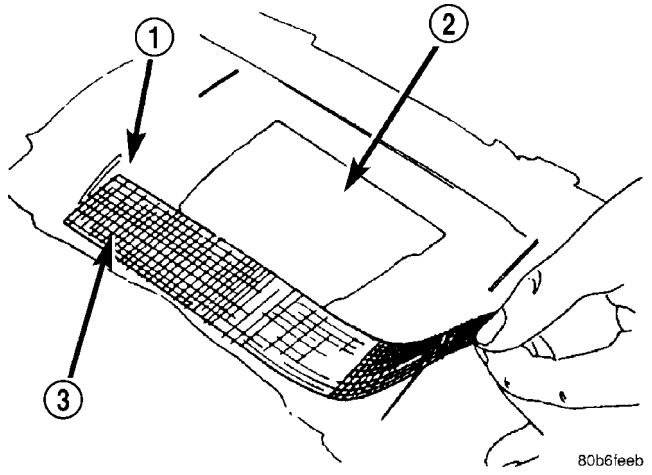


Fig. 14 COVER GAPS WITH MESH

1 - GROUND DOWN AREA
2 - PATCH
3 - MESH

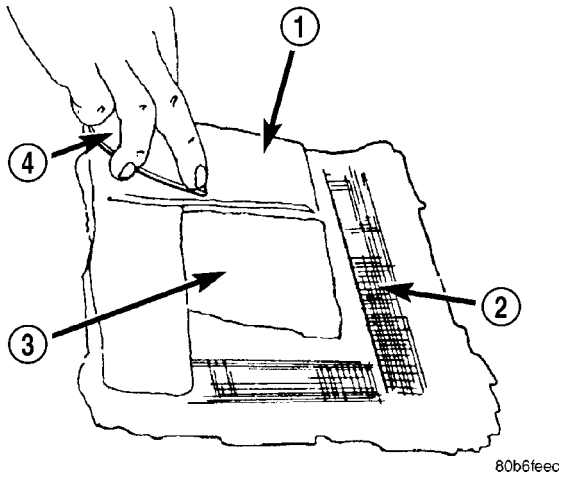


Fig. 15 COVER MESH WITH ADHESIVE

1 - ADHESIVE
2 - MESH
3 - PATCH
4 - SPREADER

PATCHED PANEL SURFACING

After patch panel is installed, the patch area can be finished using the same methods as finishing other types of body panels. If mesh material is exposed in the patched area, grind surface down, and apply a coat of high quality rigid plastic body filler. Prime, block sand, and paint as required.

STANDARD PROCEDURE - HEAT STAKING

(1) Remove trim panel.

(2) Bend or move the trim panel components at the heat staked joints. Observe the heat staked locations and/or component seams for looseness.

(3) Heat stake the components.

(a) If the heat staked or component seam location is loose, hold the two components tightly together and using a soldering gun with a flat tip, melt the material securing the components together. Do not over heat the affected area, damage to the exterior of the trim panel may occur.

(b) If the heat staked material is broken or missing, use a hot glue gun to apply new material to the area to be repaired. The panels that are being heat staked must be held together while the applying the glue. Once the new material is in place, it may be necessary to use a soldering gun to melt the newly applied material. Do not over heat the affected area, damage to the exterior of the trim panel may occur.

(4) Allow the repaired area to cool and verify the repair.

(5) Install trim panel.

BODY (Continued)

SPECIFICATIONS

SPECIFICATIONS

TIGHTENING SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Front Seat to Floor Nuts	88 N·m	65 ft. lbs.	—
First Row Seat to Floor Nuts	54 N·m	40 ft. lbs.	—
Second Row to Floor Nuts	54 N·m	40 ft. lbs.	—
Seat Belt Web Guide to B-Pillar	10 N·m	—	90 in. lbs.
Seat Belt Retractor Bolt	41 N·m	30 ft. lbs.	—
Second Row Seat Belt Bracket	40 N·m	30 ft. lbs.	—
Seat Belt Web Guide Screw	11 N·m	—	100 in. lbs.
Upper & Lower Portion of Retractor Screws	40 N·m	30 ft. lbs.	—
Seat Belt Turning Loop Button Adjuster Screws	40 N·m	30 ft. lbs.	—
Front Door Outside Mirror Nuts	6 N·m	—	50 in. lbs.
Floor Console to Floor	12 N·m	—	105 in. lbs.
Video Bracket to Roof Bow	12 N·m	—	105 in. lbs.
Sunroof to Roof Module	12 N·m	—	105 in. lbs.
Outside Door Handle Bracket Sub-Assemble Screw	4 N·m	—	37 in. lbs.
Front Door Power Latch and Cable Screws	9 N·m	—	80 in. lbs.
Door Hold Open Check Strap Nuts	10 N·m	—	90 in. lbs.
Door Check Strap Screws	12 N·m	—	105 in. lbs.
Outside Handle Cover Fastener	4 N·m	—	37 in. lbs.
Front and Rear Door hinge To Body	34 N·m	—	25 ft. lbs.
Front and Rear Door hinge To Door	34 N·m		25 ft. lbs.
Front Door Latch Striker to B-Pillar Screws	28 N·m	—	250 in. lbs.
Front Door Outside B-Pillar Applique Molding	3 N·m	—	30 in. lbs.
Front Door Glass Run Lower Channel Screw	6 N·m	—	55 in. lbs.
Front Door Power Regulator Screw	9 N·m	—	80 in. lbs.
Rear Door B/C-Pillar Applique Molding Screw	3 N·m	—	30 in. lbs.
Rear Door Power Lock Latch Screw	8 N·m	—	75 in. lbs.
Rear Door Outside Handle Bracket Fastener	4 N·m	—	37 in. lbs.
Rear Door Outside Handle Fastener	4 N·m	—	37 in. lbs.
Rear Door Fixed Glass Run Screw	5 N·m	—	45 in. lbs.
Rear Door Power Regulator Screw	9 N·m	—	80 in. lbs.
Liftgate Prop Rod Bracket Screws	40 N·m	—	350 in. lbs.
Liftgate Prop Rod Stud	36 N·m	—	320 in. lbs.
Liftgate Outside Handle to Liftgate screw	9 N·m	—	80 in. lbs.
Liftgate Latch to Liftgate Screw	11 N·m	—	95 in. lbs.
Liftgate Light Bar to liftgate screws	2 N·m	—	20 in. lbs.
Liftgate Bumper to Drain Trough screw	6 N·m	—	55 in. lbs.
Liftgate Latch Striker	28 N·m	—	250 in. lbs.

BODY (Continued)

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Liftgate Spoiler to Liftgate Outer Nuts	7 N·m	—	60 in. lbs.
Hood Latch to Radiator Crossmember Screws	14 N·m	—	120 in. lbs.
Hood Striker to Hood	14 N·m	—	120 in. lbs.
Hood Hinge to hood	14 N·m	—	120 in. lbs.
Hood Hinge Pivot Bolt	28 N·m	—	250 in. lbs.
Hood Hinge to Fender	9 N·m		80 in. lbs.
Hood Emblem Bright Outer Molding Nuts	4 N·m	—	35 in. lbs.
Instrument Panel to Cowl Side	28 N·m	—	250 in. lbs.
Instrument Panel Column Support Bracket Nuts	23 N·m	17 ft. lbs.	—
Instrument Panel Floor Bracket Brace to Floor Nuts	17 N·m	—	150 in. lbs.
Instrument Panel Floor Bracket to Center Stack Brace Nuts	17 N·m	—	150 in. lbs.
Instrument Panel Plenum Screws	7 N·m	—	60 in. lbs.
Instrument Panel Reinforcement Brace	9 N·m	—	80 in. lbs.
Front & Rear Console Side Walls to Structure Duct	2 N·m	—	20 in. lbs.
Cargo Load Floor Bin Screws	12 N·m	—	105 in. lbs.
Automatic Transaxle Shifter Knob	2 N·m	—	20 in. lbs.
Autostick Shifter Nut	12 N·m	—	105 in. lbs.

BODY LUBRICATION

LUBRICATION REQUIREMENTS

Body mechanisms and linkages should be inspected, cleaned, and lubricated, as required, to maintain ease of operation and to provide protection against rust and wear. When performing other under hood services, the hood latch release mechanism and safety catch should be inspected, cleaned, and lubricated. During the winter season, external door lock cylinders should be lubricated to assure proper operation when exposed to water and ice.

Prior to the application of any lubricant, the parts concerned should be wiped clean to remove dust and grit. If necessary, a suitable solvent can be used to clean the item to be lubricated. After lubricating a component, any excess oil or grease should be removed.

LUBRICANT APPLICATION

DOOR LOCK CYLINDERS

(1) Apply a small amount of lubricant directly into the lock cylinder.

(2) Apply a small amount of lubricant to the key.

(3) Insert key into lock cylinder and cycle the mechanism from the locked to the unlocked position.

NOTE: Do not add more lubricant.

(4) Cycle the lock cylinder mechanism several times to allow the lubricant to flow throughout the cylinder.

(5) Wipe all lubricant from exterior of lock cylinder and key.

ALL OTHER BODY MECHANISMS

(1) Clean component as described above.

(2) Apply specified lubricant to all pivoting and sliding contact areas of component.

LUBRICANT USAGE

ENGINE OIL

- Door Hinges – Hinge Pin and Pivot Contact Areas
- Hood Hinges – Pivot Points
- Liftgate Hinges

MOPAR® SPRAY WHITE LUBE OR EQUIVALENT

- Door Check Straps
- Liftgate Latches
- Liftgate Prop Pivots
- Ash Receiver
- Parking Brake Mechanism
- Sliding Seat Tracks
- Liftgate Latch

MOPAR® Multipurpose GREASE OR EQUIVALENT

- All Other Hood Mechanisms

BODY (Continued)

MOPAR® LOCK CYLINDER LUBRICANT OR EQUIVALENT

- Door Lock Cylinders

SPECIAL TOOLS

BODY

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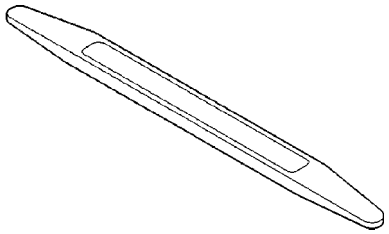


Fig. 16 STICK, TRIM C 4755

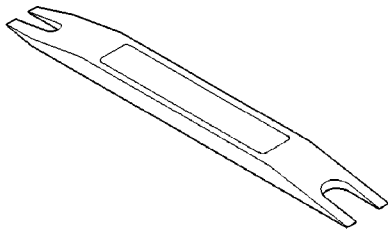


Fig. 17 REMOVER, MOLDINGS C-4829

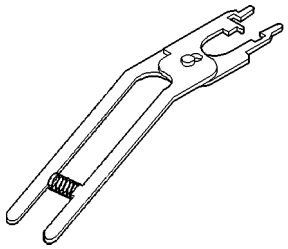


Fig. 18 PLIERS, HEADLINER CLIP 6967

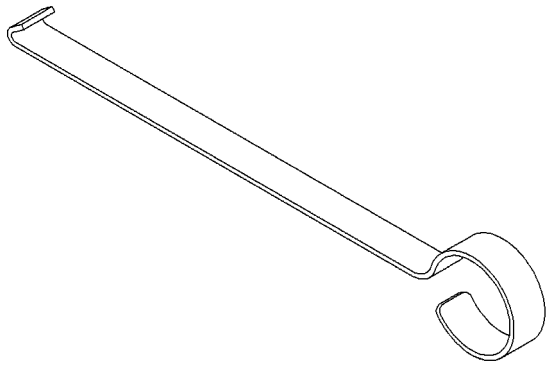


Fig. 19 OUTER BELT MOLDING REMOVER - 9093

DOOR - FRONT

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FRONT DOOR APPLIQUE

REMOVAL

(1) Roll door glass down.
(2) Remove outer door belt molding, as necessary.
(3) Remove door glass run channel. (Refer to 23 - BODY/DOOR - FRONT/GLASS RUN CHANNEL - REMOVAL).
(4) Remove screws attaching front edge of applique to door frame (Fig. 1).
(5) Remove applique from vehicle.

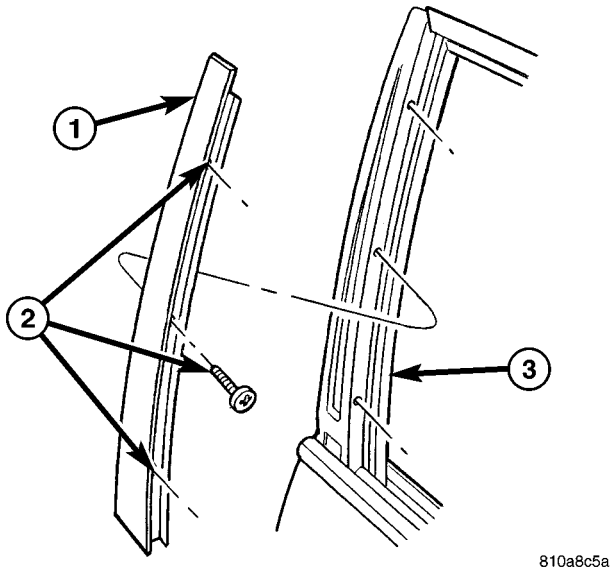


Fig. 1 B-PILLAR APPLIQUE

1 - B-PILLAR APPLIQUE
2 - ATTACHING SCREWS
3 - DOOR B-PILLAR

INSTALLATION

(1) Position applique on vehicle.
(2) Hook rear edge of applique over rear edge of door frame and seat applique bottom edge on sheet metal (Fig. 1).
(3) Install screws attaching applique to door frame.
(4) Install door glass run channel. (Refer to 23 - BODY/DOOR - FRONT/GLASS RUN CHANNEL - INSTALLATION).
(5) Install outer door belt molding.

CHECK STRAP

REMOVAL

(1) Remove screws attaching door check strap to A-pillar (Fig. 2).
(2) Remove check strap from A-pillar.
(3) Remove front door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
(4) Remove front door watershield. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - REMOVAL)
(5) Remove front door speaker, if equipped.
(6) Remove nuts attaching check strap to door end frame (Fig. 3).
(7) Remove check strap from door through speaker hole.

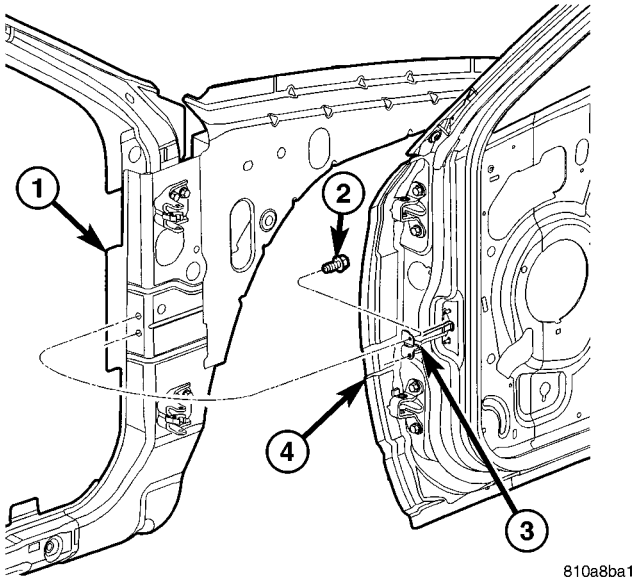


Fig. 2 DOOR OPEN CHECK - A-PILLAR

1 - A-PILLAR
2 - ATTACHING SCREWS
3 - DOOR HOLD OPEN CHECK
4 - FRONT DOOR

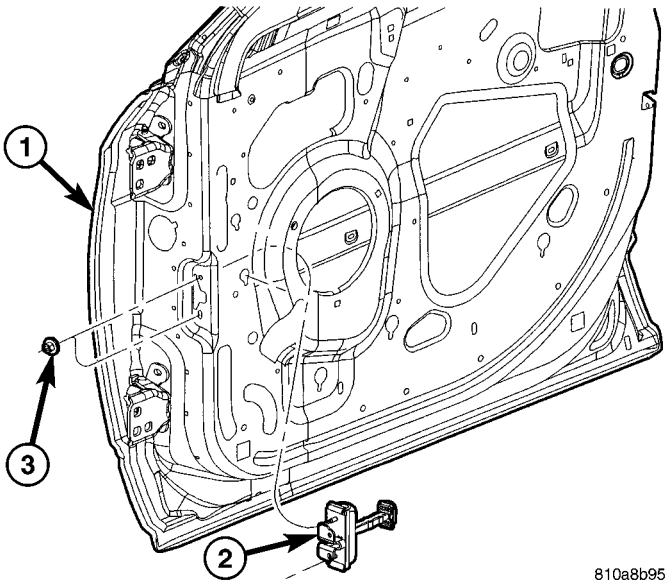


Fig. 3 DOOR OPEN CHECK - DOOR

1 - DOOR ASSEMBLY
2 - DOOR HOLD OPEN CHECK ASSEMBLY
3 - ATTACHING NUTS

CHECK STRAP (Continued)

INSTALLATION

(1) Position check strap on door through speaker hole (Fig. 3).

(2) Install nuts attaching check strap to door end frame. Tighten nuts to 11 N·m (90 in. lbs.) torque.

(3) Install door speaker, if equipped.

(4) Install front door watershield. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - INSTALLATION).

(5) Install front door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION)

(6) Place check strap into position on A-pillar.

(7) Install screws attaching check strap to A-pillar (Fig. 2). Tighten screws to 12 N·m (105 in. lbs.) torque.

DOOR

REMOVAL

(1) Remove front wheelhouse splash shield and silencer/stuffer (Refer to 23 - BODY/EXTERIOR/LF WHEELHOUSE SPLASH SHIELD - REMOVAL).

(2) Remove screws attaching door check strap to A-pillar (Fig. 4).

(3) Disengage clips attaching door harness wire connector to inner fender brace (Fig. 5).

(4) Disconnect positive lock slide on the side of the wire connectors.

(5) Depress lock tab attaching wire connector halves together.

(6) Disconnect door harness from body wiring harness.

(7) Support door on suitable lifting device.

(8) Remove bolts attaching lower hinge to door end frame (Fig. 6).

(9) Steady door on lifting device and remove bolts attaching upper hinge to door end frame.

(10) Remove door from vehicle.

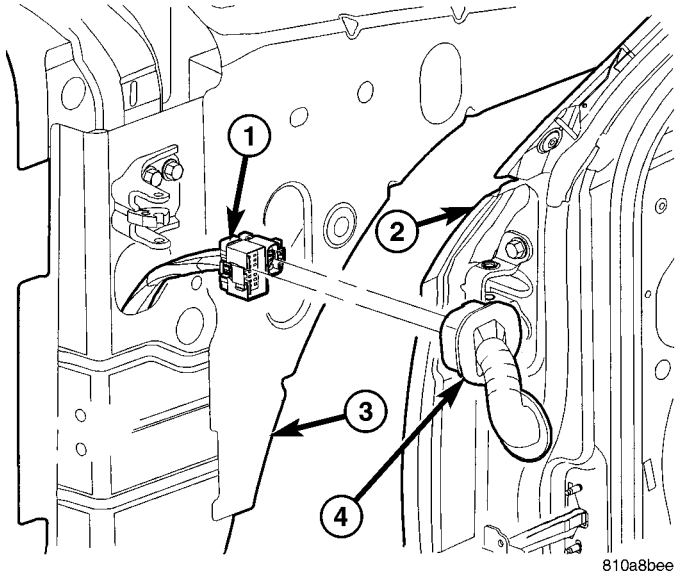


Fig. 5 DOOR WIRE HARNESS CONNECTOR

1 - BODY WIRE HARNESS TO DOOR CONNECTOR
2 - DOOR ASSEMBLY
3 - BODY ASSEMBLY
4 - FRONT DOOR WIRE HARNESS CONNECTOR

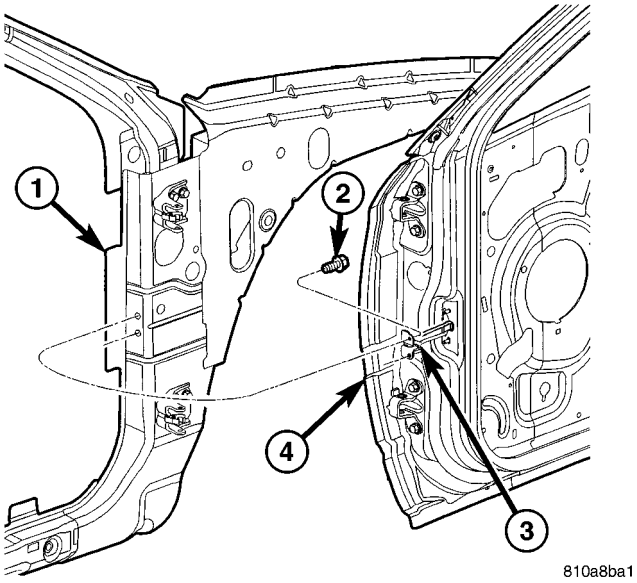


Fig. 4 DOOR OPEN CHECK - A-PILLAR

1 - A-PILLAR
2 - ATTACHING SCREWS
3 - DOOR HOLD OPEN CHECK
4 - FRONT DOOR

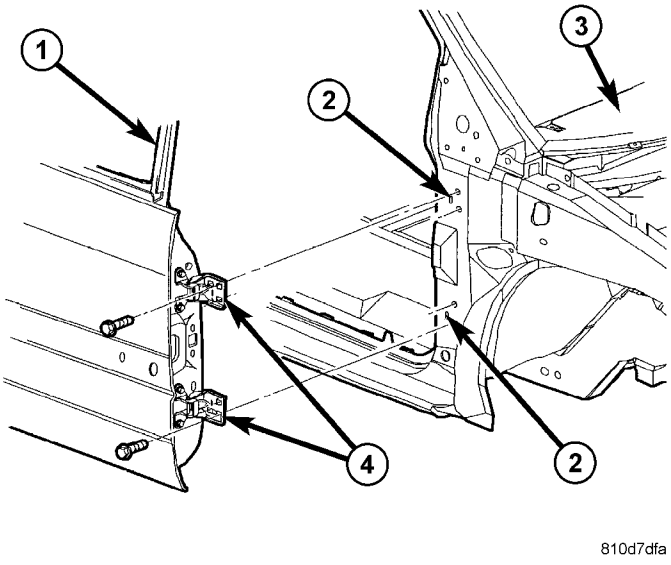


Fig. 6 DOOR HINGE

1 - FRONT DOOR
2 - SLOT(S)
3 - BODY ASSEMBLY
4 - DOOR HINGES

DOOR (Continued)

INSTALLATION

(1) Steady door on lifting device and place door into position.
(2) Loosely install bolts attaching upper hinge to door end frame (Fig. 6).
(3) Loosely install bolts attaching lower hinge to door end frame.
(4) Connect door harness to body wiring harness.
(5) Ensure lock tab attaching wire connector halves together is connected.
(6) Connect positive lock slide on the side of the wire connectors.
(7) Engage clips attaching door harness wire connector to inner fender brace (Fig. 5).
(8) Install front wheelhouse splash shield. (Refer to 23 - BODY/EXTERIOR/LF WHEELHOUSE SPLASH SHIELD - INSTALLATION).
(9) Install screws attaching door check strap to A-pillar (Fig. 4). (Refer to 23 - BODY/DOOR - FRONT/CHECK STRAP - INSTALLATION).
(10) Check door for alignment. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
(11) Tighten hinge bolts. (Refer to 23 - BODY/DOOR - FRONT/HINGE - INSTALLATION).

ADJUSTMENTS

ADJUSTMENT

NOTE: For vehicles with four doors, it is recommended that you adjust the rear door before adjusting the front door. (Refer to 23 - BODY/DOORS - REAR/DOOR - ADJUSTMENTS).

- **Door adjustment measurements should be taken from stationary or welded body panels like the roof, rocker or quarter panels.**
- **During adjustment procedures, it is recommended that all the hinge fasteners be loosened except for the upper most fasteners. Adjustments can be made using the upper bolts to hold the door with final torque of the fasteners occurring after correct door positioning is achieved.**
- **A suitable body sealant should be used when removing or moving the hinges.**

FORE/AFT

NOTE: Fore/aft (lateral) door adjustment is done by loosening the hinge to the hinge pillar fasteners one hinge at a time and moving the door to the correct position.

NOTE: The body side half of door hinges are keyed to the body with a locator nub embossed in hinge which engages a slot punched in pillar. Hinge can not slide (moved) without removing the nub.

(1) Support the door with a suitable lifting device.
(2) Loosen the hinge to hinge pillar fasteners. (Refer to 23 - BODY/DOOR - FRONT/HINGE - REMOVAL).
(3) Adjust the door to the correct position. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
(4) Tighten hinge bolts to 34 N·m (25 ft. lbs.) torque.

UP/DOWN

NOTE: Up/down door adjustment is done by loosening either the hinge to the hinge pillar fasteners or the hinge to door fasteners and moving the door to the correct position.

NOTE: The body side half of door hinges are keyed to the body with a locator nub embossed in hinge which engages a slot punch in pillar. Hinge can not slide (moved) without removing the nub.

(1) Support the door with a suitable lifting device.
(2) Loosen the latch striker bolts and re-center as required. (Refer to 23 - BODY/DOOR - FRONT/LATCH STRIKER - REMOVAL).
(3) Loosen the hinge to door fasteners (Refer to 23 - BODY/DOOR - FRONT/DOOR - REMOVAL) or loosen the hinge to hinge pillar fasteners (Refer to 23 - BODY/DOOR - FRONT/HINGE - REMOVAL).
(4) Adjust the door to the correct position. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
(5) Tighten the hinge pillar fasteners or the door to hinges fasteners to 34 N·m (25 ft. lbs.).
(6) Tighten the latch striker bolts. (Refer to 23 - BODY/DOOR - FRONT/LATCH STRIKER - INSTALLATION).

IN/OUT

NOTE: In/out door adjustment is done by loosening the hinge to door fasteners one hinge at a time and moving the door to the correct position.

(1) Support the door with a suitable lifting device.
(2) Loosen the latch striker bolts and move as necessary to achieve rear door edge flush. (Refer to 23 - BODY/DOOR - FRONT/LATCH STRIKER - REMOVAL).
(3) Loosen the hinge to door fasteners. (Refer to 23 - BODY/DOOR - FRONT/DOOR - REMOVAL).

DOOR (Continued)

(4) Adjust the door to the correct position. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

(5) Tighten the door to hinges fasteners to 34 N·m (25 ft. lbs.).

(6) Tighten the latch striker bolts. (Refer to 23 - BODY/DOOR - FRONT/LATCH STRIKER - INSTALLATION).

DOOR GLASS

REMOVAL

(1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(2) Remove watershield. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - REMOVAL).

(3) Remove inner belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FDR INNER BELT WEATHERSTRIP - REMOVAL)

(4) Position glass to gain access to front and rear regulator lift plates through access hole in door panel (Fig. 7).

(5) Using a trim tool or a flat blade tool release snap locks attaching glass.

(6) Remove glass from regulator glass brackets.

(7) Disengage glass from glass run weatherstrip.

(8) Insert front of glass between glass run channel and outer door panel.

(9) Lift glass upward and out of exterior side of the opening at top of door.

(10) Remove glass from vehicle.

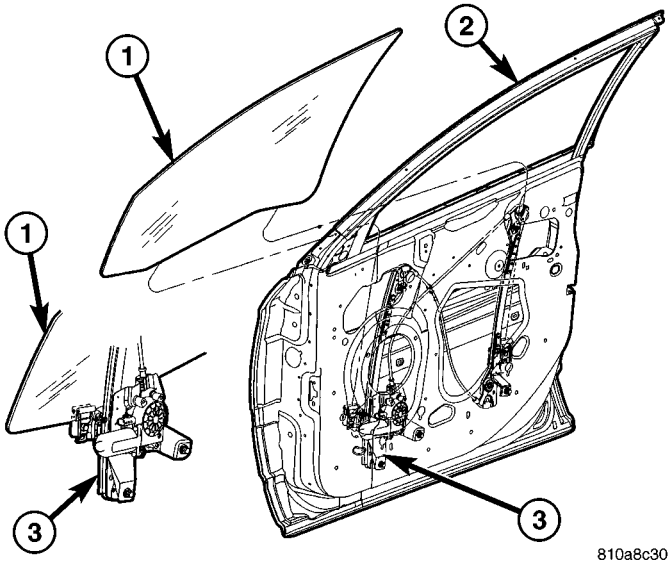


Fig. 7 FRONT DOOR GLASS AND LIFT PLATE

1 - FRONT DOOR GLASS AND LIFT PLATE
2 - DOOR ASSEMBLY
3 - WINDOW REGULATOR

INSTALLATION

(1) Place glass in window opening with front inserted between run channel and outer door panel.

(2) Lower glass downward into door.

(3) Insert ends of glass into glass run weatherstrip channels at front and rear of door.

(4) Place glass in position on regulator clamp brackets.

(5) Press down on glass to lock glass into snap locks.

(6) Install inner belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FDR INNER BELT WEATHERSTRIP - INSTALLATION).

(7) Verify door glass operation and fit.

(8) Install watershield. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - INSTALLATION).

(9) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

DOOR GLASS RUN CHANNEL

REMOVAL

(1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(2) Remove inner belt weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FRONT DOOR INNER BELT WEATHERSTRIP - REMOVAL).

(3) Using a trim stick C-4755 or equivalent and hand pull down on door glass run disengage from glass run channel (Fig. 8).

(4) Remove door glass run from vehicle.

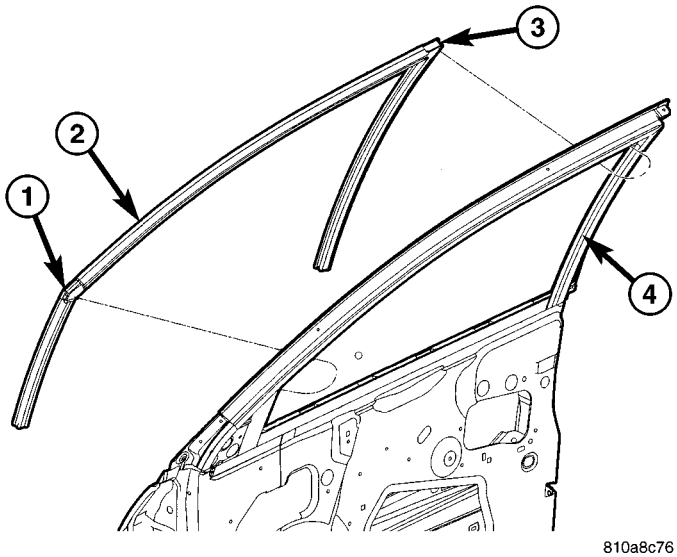


Fig. 8 DOOR GLASS RUN

1 - A-PILLAR CORNER
2 - DOOR GLASS RUN
3 - B-PILLAR CORNER
4 - GLASS RUN CHANNEL

DOOR GLASS RUN CHANNEL (Continued)

INSTALLATION

(1) Place door glass run into position (Fig. 8).

(2) Insert A-pillar section of door glass run into door through belt line and lower to bottom of door using molded corner as guide.

(3) Locate top corner portion of the B-pillar door glass run section into the glass run channel and slide it up until the part bottoms out on the header portion of the glass run channel.

NOTE: Do not JAM the corner into place.

(4) Install entire B-pillar door glass run into glass run channel.

(5) Starting at the B-pillar corner, install 8 to 10 inches of the header glass run into the glass run channel.

NOTE: Care must be taken so not to push or pull the header section and the molded corner off location.

(6) Install A-pillar door glass run section by indexing the molded corner detail into he glass run channel. Slide the glass run up the A-pillar until the rubber molded joint just touches the frame.

(7) Install fully the entire A-pillar door glass run into the glass run channel.

(8) Working from A-pillar rearward install header portion of the door glass run into the glass run channel.

(9) Verify the door glass run is fully seated the header, A-pillar and B-pillar.

(10) Install inner belt weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FRONT DOOR INNER BELT WEATHERSTRIP - INSTALLATION).

(11) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

DOOR HEADER BLACK OUT TAPE

REMOVAL

(1) Warm the door header blackout tape and door metal to approximately 27° C (80° F) using a suitable heat lamp or heat gun (Fig. 9).

(2) Pull stick on blackout tape from painted surface.

(3) Remove adhesive tape residue from painted surface of door.

(4) Use a 3M Scotch-Brite™ Molding Adhesive and Stripe Removal Disc, or equivalent, to clean adhesive residue from painted surfaces. These products are available from automotive paint suppliers. Refer to instructions supplied with the specific product for proper usage.

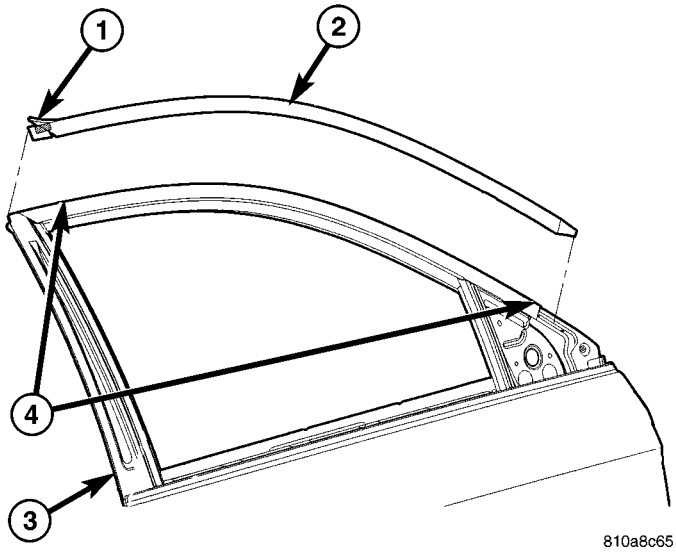


Fig. 9 DOOR HEADER BLACKOUT TAPE

1 - BODY SIDE MOLDING (DOUBLE SIDED) TAPE
2 - DOOR HEADER BLACKOUT TAPE
3 - B-PILLAR
4 - ENSURE PAINTED SURFACE IS CLEAN

INSTALLATION

(1) Door header blackout tape cannot be reused;

(a) Remove tape residue from door.

(b) Clean back of door header blackout tape with Mopar® Super Kleen, or equivalent.

(c) Wipe door header blackout tape dry with lint free cloth.

(d) Apply a single coat of Mopar® TPO Molding Prep to tape side of door header blackout tape and allow to dry thoroughly.

(e) Apply new body side molding (two sided adhesive) tape to back of door header blackout tape (Fig. 9).

(2) Clean body surface with Mopar® Super Kleen, or equivalent. Wipe surface dry with lint free cloth.

(3) Apply door header blackout tape from rear to front of door.

(4) Using a felt pad or clean shop towel apply enough force to assure adhesion. Do not apply excessive force, or damage to door header blackout tape may result.

EXTERIOR HANDLE

REMOVAL

(1) Roll door glass up.

(2) Remove door trim panel. (Refer to 23 - BODY/ DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Remove the watershield as necessary to gain access to the outside door handle. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - REMOVAL).

(4) Disengage clip attaching door latch linkage to outer door handle (Fig. 10).

(5) Disengage clip attaching door lock linkage to outside door handle.

(6) Loosen the screw attaching outside door handle cover to outside handle bracket (Fig. 11), through access hole in door inner panel.

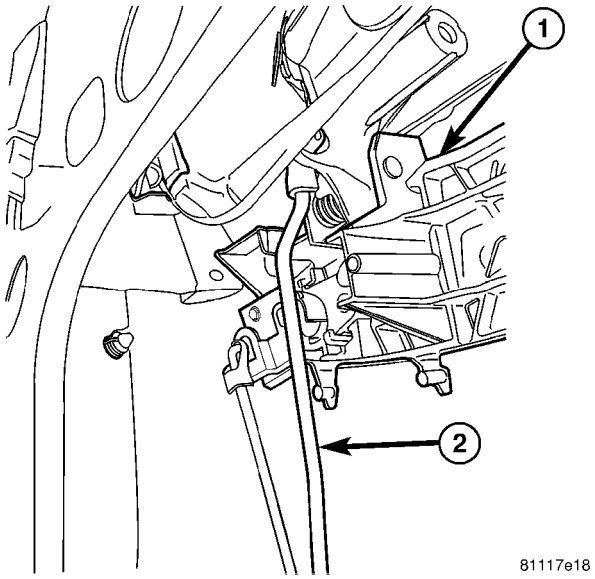


Fig. 10 OUTSIDE DOOR HANDLE BRACKET ASSEMBLY

1 - OUTSIDE DOOR HANDLE BRACKET ASSEMBLY
2 - DOOR HANDLE LINKAGE

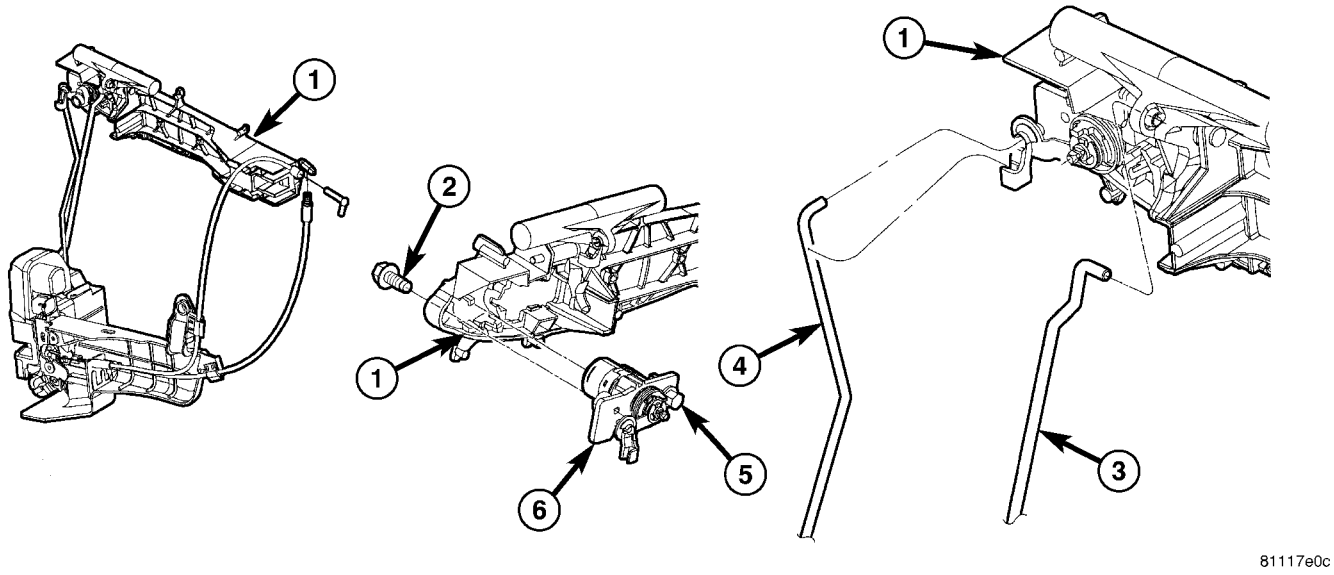


Fig. 11 OUTSIDE HANDLE AND LATCH ASSEMBLY

1 - FRONT DOOR OUTSIDE HANDLE BRACKET ASSEMBLY
2 - REAR STUD SCREW
3 - LATCH TO OUTSIDE HANDLE LINKAGE
4 - LATCH TO OUTSIDE HANDLE KEY CYLINDER LINKAGE
5 - DOOR HANDLE COVER ATTACHING SCREW
6 - DOOR KEY CYLINDER

EXTERIOR HANDLE (Continued)

(7) Remove outside door handle assembly and cover at the same time, by pulling handle towards the rear of vehicle (Fig. 12).

(8) Loosen screws attaching outside handle bracket to outer door panel.

(9) Remove outside handle bracket assembly from outer door panel (Fig. 13).

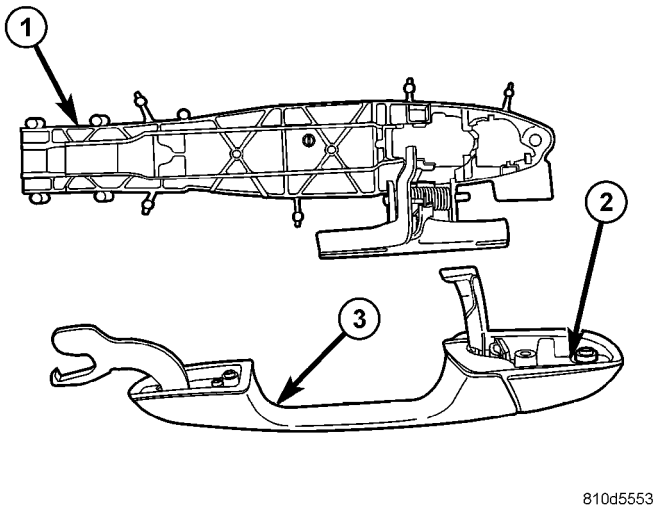


Fig. 12 DOOR OUTSIDE HANDLE

1 - DOOR OUTSIDE HANDLE BRACKET ASSEMBLY
2 - DOOR OUTSIDE HANDLE COVER
3 - DOOR OUTSIDE HANDLE ASSEMBLY

INSTALLATION

(1) Place outside handle bracket assembly onto outer door panel.

(2) Tighten screws attaching outside handle assembly and outside handle bracket to outer door panel. Tighten to 4 N·m (37 in. lbs.) torque.

(3) Install outside door handle and cover assembly into the outer door panel by inserting the pivot leg of the handle into the front access hole (Fig. 12) and (Fig. 13). While inserting the handle pivot leg, move rear of handle towards the outer panel until it makes contact. Push forward on handle until it snaps into position.

(4) Install screw attaching outside door handle cover to outside handle bracket (Fig. 11).

(5) Engage clip attaching door lock linkage to outside door handle.

(6) Engage clip attaching door latch linkage to outer door handle (Fig. 10).

(7) Check outside handle for proper operation.

(8) Install the watershield. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - REMOVAL).

(9) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(10) Verify door handle assembly operation. For adjustment (Refer to 23 - BODY/DOOR - FRONT/LATCH - ADJUSTMENTS).

(11) Make door handle adjustment.

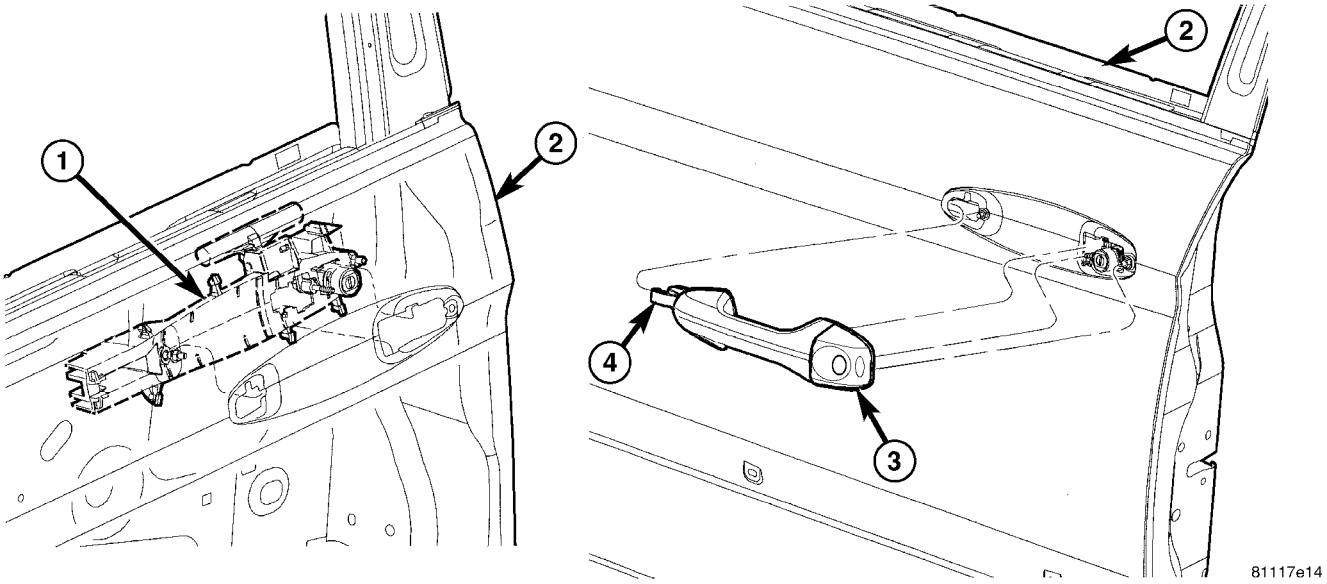


Fig. 13 DOOR OUTSIDE HANDLE ASSEMBLY

1 - FRONT DOOR OUTSIDE HANDLE BRACKET ASSEMBLY
2 - FRONT DOOR OUTER PANEL
3 - DOOR OUTSIDE HANDLE
4 - PIVOT LEG

FRAME CLOSEOUT MOLDING

REMOVAL

(1) Open door.
(2) Lower door window glass.
(3) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/FRONT DOOR TRIM PANEL - REMOVAL).
(4) Remove door inner belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FRONT DOOR INNER BELT WEATHERSTRIP - REMOVAL).
(5) Using a trim stick C-4755 or equivalent and hand pull down on front door frame closeout molding to disengage from window frame channel (Fig. 14).
(6) Remove closeout molding from vehicle.

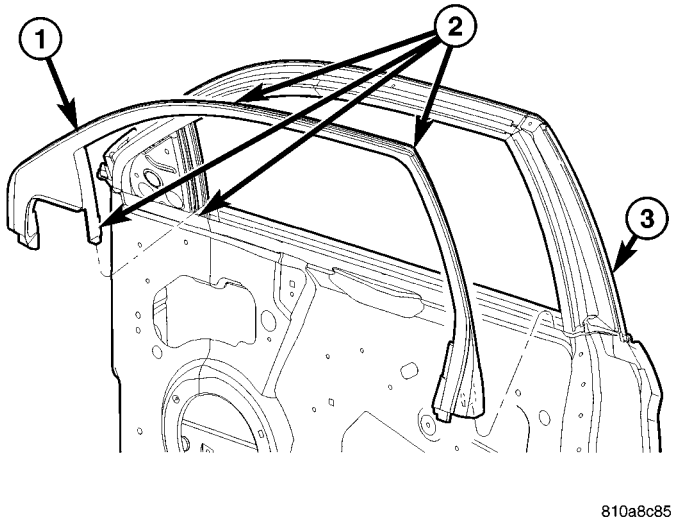


Fig. 14 FRAME CLOSE OUT MOLDING

1 - FRAME CLOSE OUT MOLDING
2 - OUT BOARD LIP OF MOLDING
3 - DOOR ASSEMBLY

INSTALLATION

(1) Lower door window glass.
(2) Place door frame close out molding into position (Fig. 14).
(3) Starting at B-pillar to corner and work along header to A-pillar belt line. Snapping molding into place, using hand pressure.
(4) Finish inserting molding along B-pillar side of door.
(5) Raise door window glass.
(6) Install door inner belt molding weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FRONT DOOR INNER BELT WEATHERSTRIP - INSTALLATION).
(7) Install front door trim panel. (Refer to 23 - BODY/DOOR - FRONT/DOOR TRIM PANEL - INSTALLATION).

HINGE

REMOVAL

NOTE: It is not necessary to remove the door to replace the hinges if they are replace one at a time.

(1) Release front door latch and open door.
(2) Remove check strap from A-pillar. (Refer to 23 - BODY/DOOR - FRONT/CHECK STRAP - REMOVAL).
(3) Mark hinge foot print on both door and pillar to aid when installing door (Fig. 15).
(4) Support door on suitable lifting device.
(5) Remove bolts attaching hinge to A-pillar.
(6) Remove bolts attaching front door to door hinge.
(7) Remove door hinge from vehicle.

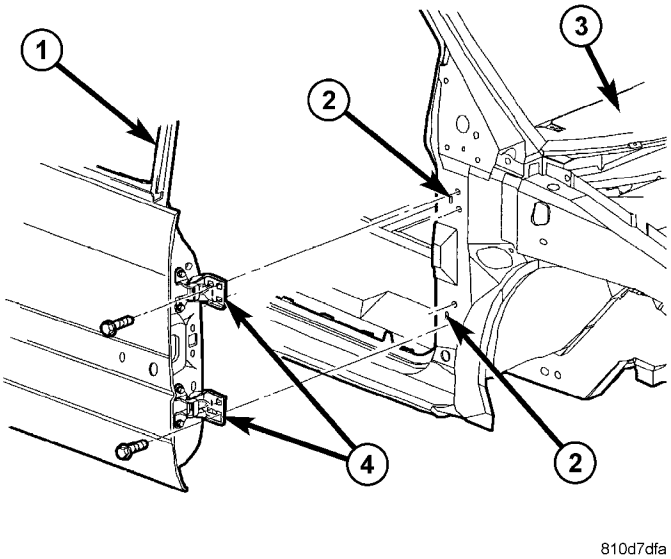


Fig. 15 DOOR HINGE

1 - FRONT DOOR
2 - SLOT(S)
3 - BODY ASSEMBLY
4 - DOOR HINGES

INSTALLATION

NOTE: It is not necessary to remove the door to replace the hinges if they are replace one at a time.

(1) Hinge pins can be serviced. remove spring nut and remove pin. Install new pin and install spring nut (Fig. 16).

CAUTION: When installing a new hinge, make sure that the head of each hinge pin is fully seated into the door hinge. Also, remove the plastic shipping clip and replace it with the correct metal retaining clip once the hinge pin is seated.

HINGE (Continued)

(2) Paint hinge prior to installation, if necessary.
(3) Position door hinge on vehicle (Fig. 15).
(4) Install bolts attaching hinge to pillar. Tighten hinge bolts to 34 N·m (25 ft. lbs.) torque.
(5) Install bolts attaching front door to door hinge. Tighten hinge bolts to 34 N·m (25 ft. lbs.) torque.
(6) For proper tighten. sequence refer to (Fig. 17).
(7) Verify door alignment and operation. Adjust as necessary. (Refer to 23 - BODY/BODY STRUCTURE/ GAP AND FLUSH - SPECIFICATIONS) and (Refer to 23 - BODY/DOOR - FRONT/DOOR - INSTALLATION).

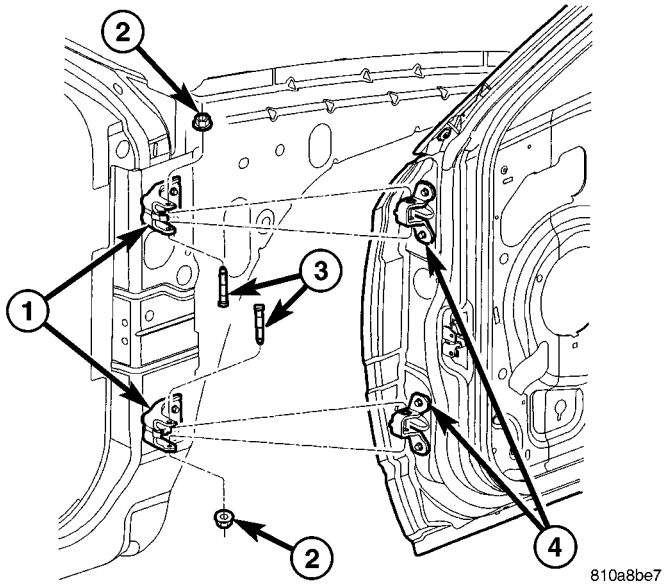


Fig. 16 DOOR HINGE AND PINS

1 - DOOR HINGE TO BODY SIDE
2 - PUSH ON SPRING NUT(S)
3 - HINGE PINS
4 - DOOR HINGE TO DOOR

LATCH

REMOVAL

(1) Remove door trim panel and watershield. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL) and (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - REMOVAL).
(2) Raise door glass.
(3) Disconnect clips holding key cylinder and latch rods to outside door handle (Fig. 18).
(4) Disengage wire connector from power door lock motor and push pin from latch.
(5) Disengage retainer that attaches latch cover to inner panel.
(6) Remove impact foam attaching screws.
(7) Remove screws attaching latch to door inner panel.

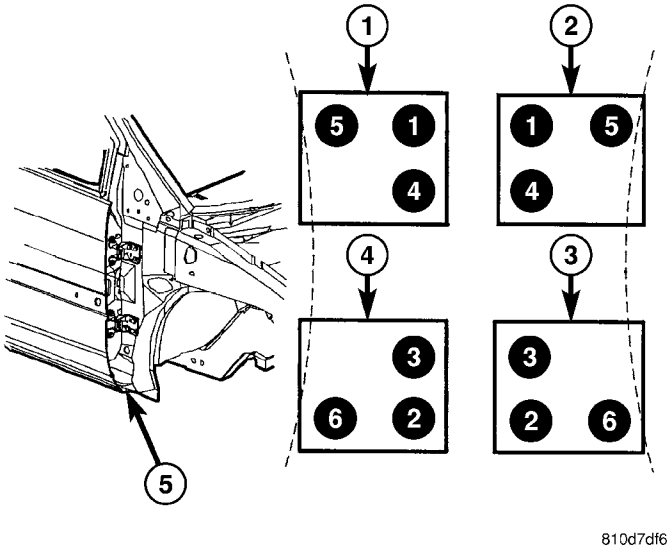


Fig. 17 DOOR HINGE TIGHTEN SEQUENCE

1 - RIGHT DOOR UPPER HINGE
2 - LEFT DOOR UPPER HINGE
3 - LEFT DOOR LOWER HINGE
4 - RIGHT DOOR LOWER HINGE
5 - FRONT DOOR

NOTE: The latch must be lowed below the window regulator rear guide rail, for removal.

(8) Remove door latch from door, using care not to damage cables or rods.

INSTALLATION

NOTE: The screws attaching the door latch to the door end frame have nylon patches on the threads. All screws must be replaced when the latch has been removed.

(1) Place door latch in position on door inner panel (Fig. 18).
(2) Position cables through access hole in watershield.
(3) Install latch cover to inner panel retainer.
(4) Install screws attaching door latch to door end frame. Tighten screws to 10 N·m (90 in. lbs.) torque.
(5) Insert linkages to door handle and engage clips.
(6) Connect wire connector into power door lock motor and push pin into latch.
(7) Verify door latch and power door lock operation.
(8) Install watershield and front door trim panel. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - INSTALLATION) and (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

LATCH (Continued)

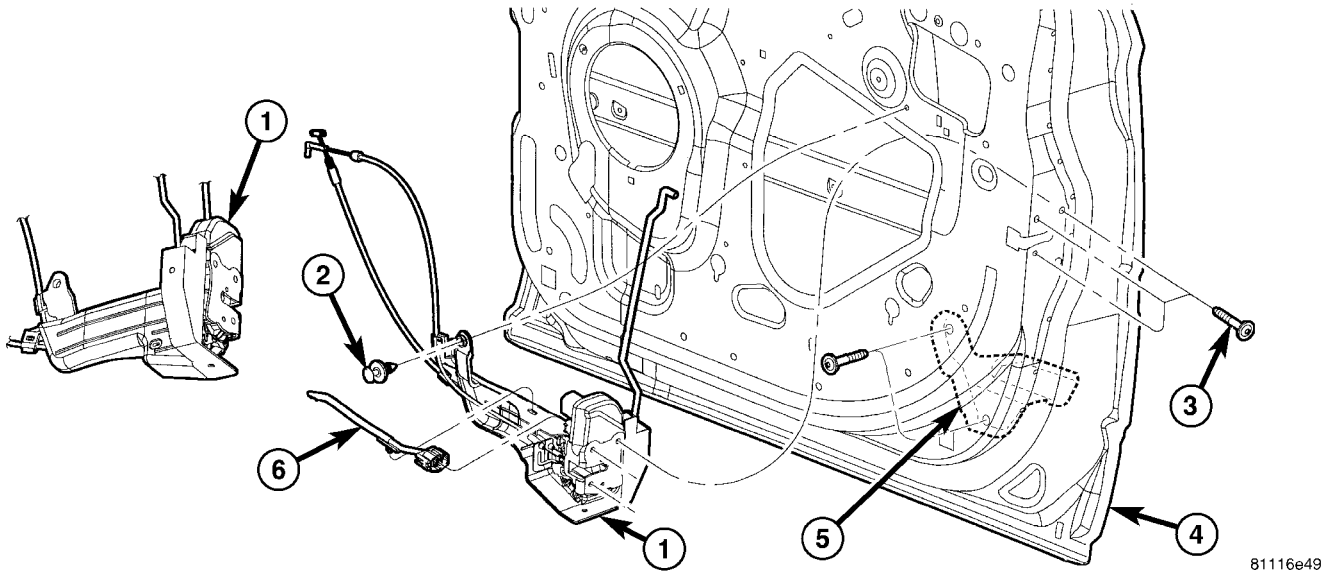


Fig. 18 DOOR POWER LOCK LATCH ASSEMBLY

1 - DOOR POWER LOCK LATCH ASSEMBLY
2 - LATCH COVER TO INNER PANEL RETAINER
3 - LATCH ATTACHING SCREWS
4 - FRONT DOOR
5 - IMPACT FOAM
6 - DOOR WIRING HARNESS

(9) Perform latch adjustment procedure. (Refer to 23 - BODY/DOOR - FRONT/LATCH - ADJUSTMENTS).

ADJUSTMENTS

ADJUSTMENT

(1) Locate access hole and remove the mylar tape covering it. (Fig. 19)

(2) Insert a 5/32 inch hex-wrench through hole and into adjustment screw. Loosen screw.

(3) Operate outside handle several times to release any restriction because of misalignment.

(4) Tighten adjustment screw to 3 N·m (30 in. lbs.).

(5) Test handle for proper operation.

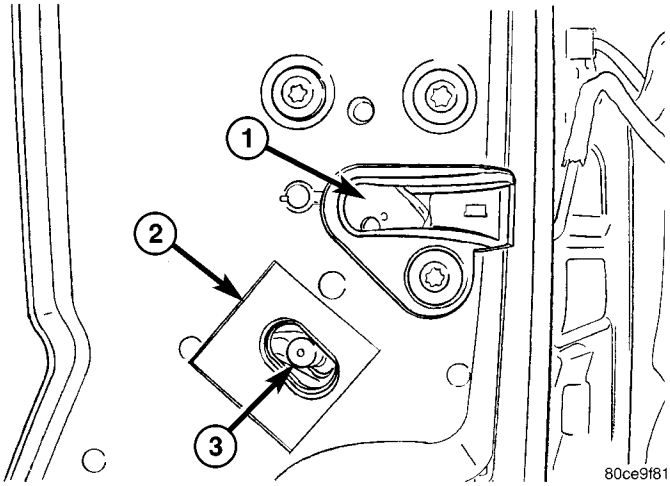


Fig. 19 LATCH ADJUSTMENT SCREW

1 - DOOR LATCH
2 - MYLAR TAPE
3 - ADJUSTMENT SCREW

LATCH STRIKER

REMOVAL

(1) Mark outline of door striker on B-pillar to aid in installation.

(2) Remove screws attaching door latch striker to B-pillar (Fig. 20).

(3) Remove door latch striker from vehicle.

(4) Retrieve any shims found between latch striker and B-pillar.

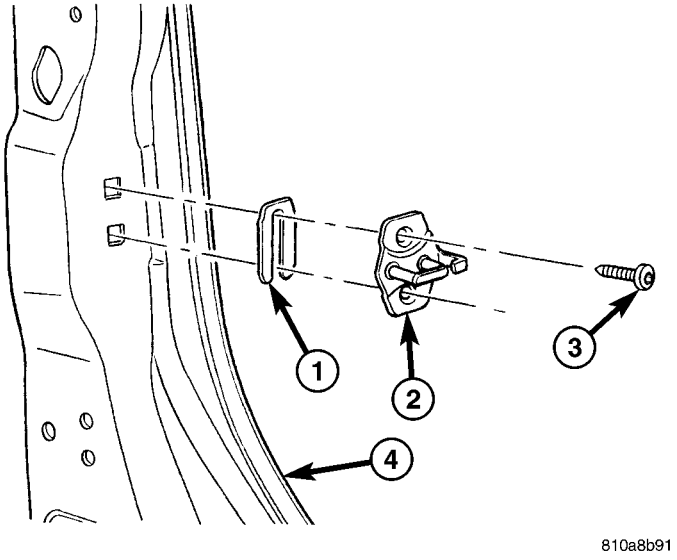


Fig. 20 DOOR LATCH STRIKER

1 - DOOR LATCH STRIKER SPACER
2 - DOOR LATCH STRIKER
3 - ATTACHING SCREW(S)
4 - B-PILLAR

INSTALLATION

(1) Position latch striker and any shims retrieved on vehicle (Fig. 20).

(2) Loosely install screws attaching latch striker to B-pillar.

(3) Align latch striker to outline on B-pillar made previously.

(4) Tighten fasteners to 28 N·m (21 ft. lbs.) torque.

(5) Verify door fit and operation. Adjust latch striker as necessary.

ADJUSTMENTS

ADJUSTMENT

(1) Using a grease pencil or equivalent, mark the position of the striker to aid in adjustment.

(2) Loosen the striker bolts.

(3) Change the striker position to adjust the rear gap and flush measurement. (Refer to 23 - BODY/ BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS)

(4) Tighten fasteners to 27 N·m (20 ft. lbs.) torque.

LOCK CYLINDER

DESCRIPTION

For Cylinder Lock Procedures (Fig. 21), (Refer to 23 - BODY/DOOR - FRONT/EXTERIOR HANDLE - REMOVAL) and (Refer to 23 - BODY/DOOR - FRONT/EXTERIOR HANDLE - INSTALLATION).

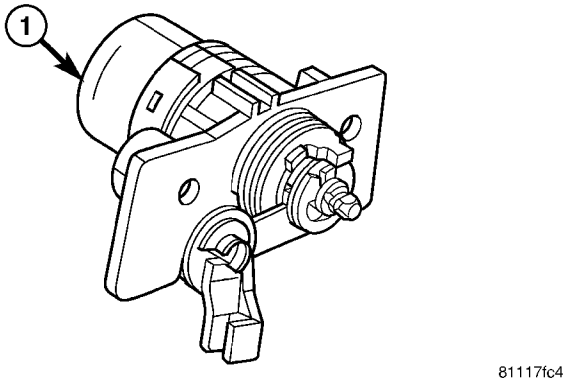


Fig. 21 DOOR LOCK TUMBLER

1 - DOOR KEY CYLINDER

TRIM PANEL

DESCRIPTION

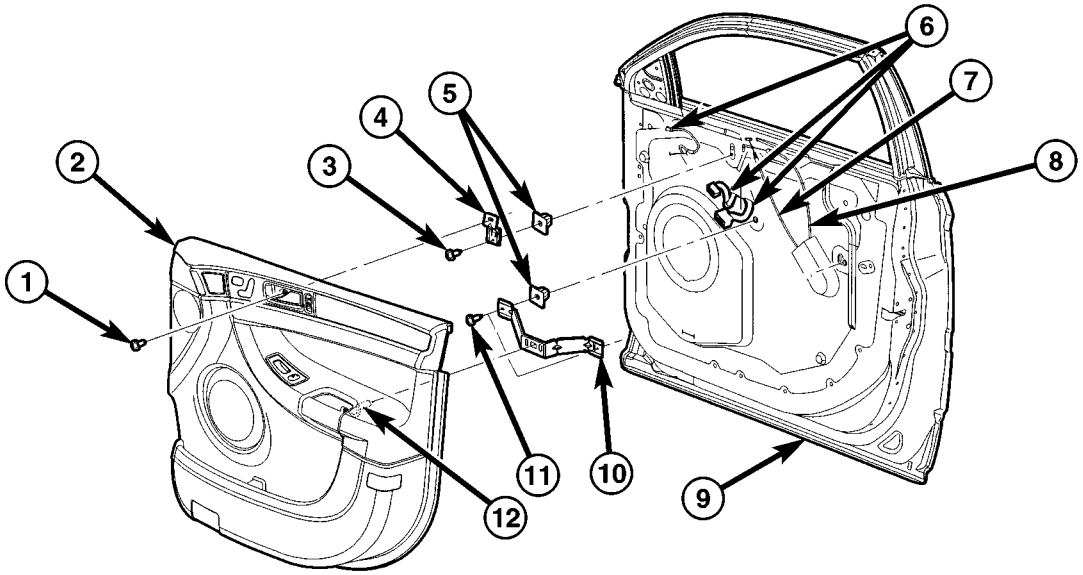


Fig. 22 REMOVE DOOR TRIM PANEL

1 - REMOTE HANDLE BEZEL TO DOOR SCREW
2 - DOOR TRIM PANEL
3 - REMOTE HANDLE BRACKET TO DOOR SCREW
4 - DOOR INSIDE REMOTE HANDLE BRACKET
5 - PLASTIC NUT
6 - DOOR WIRE HARNESS
7 - REMOTE LOCK FRONT ACTUATOR CABLE
8 - RELEASE HANDLE FRONT ACTUATOR CABLE
9 - FRONT DOOR
10 - DOOR PULL CUP BRACKET
11 - PULL HANDLE BRACKET TO DOOR SCREW
12 - FASTENER CLIP

REMOVAL

(1) Release door latch and open door.
(2) Lower door glass.
(3) Open remote handle trim plug and remove screw from behind inside remote handle (Fig. 23).
(4) Open armrest pull cup trim plug and remove screw from inside arm rest pull cup (Fig. 24).
(5) Disengage push-in fasteners attaching trim to door panel around perimeter of trim panel.
(6) Tilt trim panel outward to clear locator pins on backside of trim panel.
(7) Disconnect trim panel from retainer channel in inner belt weatherstrip at top of door by lifting while gently jiggling.

CAUTION: Do not allow door trim panel to hang by the wire connector or wiring.

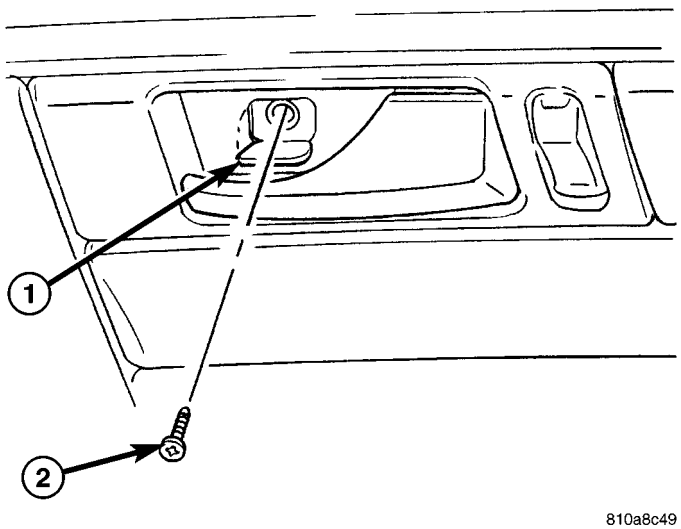


Fig. 23 REMOTE HANDLE TRIM PLUG

1 - REMOTE HANDLE TRIM PLUG
2 - REMOTE HANDLE ATTACHING SCREW

TRIM PANEL (Continued)

(8) Move top of trim panel away from door, while supporting bottom trim panel. (Fig. 25).

(9) Disconnect inside handle cable end from clip, and pull conduit end out from bracket (Fig. 26).

(10) Disconnect lock knob conduit end from bracket. Slide cable barrel end out from the lock knob and guide cable through slot. Ensure that lock knob cable did not get bent (Fig. 26).

(11) Disconnect wire connector from power door lock switch, mirror switch, power window switch, and courtesy lamp.

(12) Remove trim panel from door.

INSTALLATION

(1) Place trim panel in position.

(2) Move trim panel away from door, and connect wire connectors to power door lock switch, mirror switch, and power window switch, and courtesy lamp (Fig. 25).

CAUTION: Do not allow door trim panel to hang by the wire connector or wiring.

(3) Slide cable barrel end into lock knob and guide cable through slot (Fig. 26). Connect lock knob conduit end to bracket. Ensure that lock knob cable did not get kinked.

(4) Connect conduit end into bracket and connect inside handle cable end into clip. Snap the clip on to cable end in to clip. Snap the clip on to the cable end.

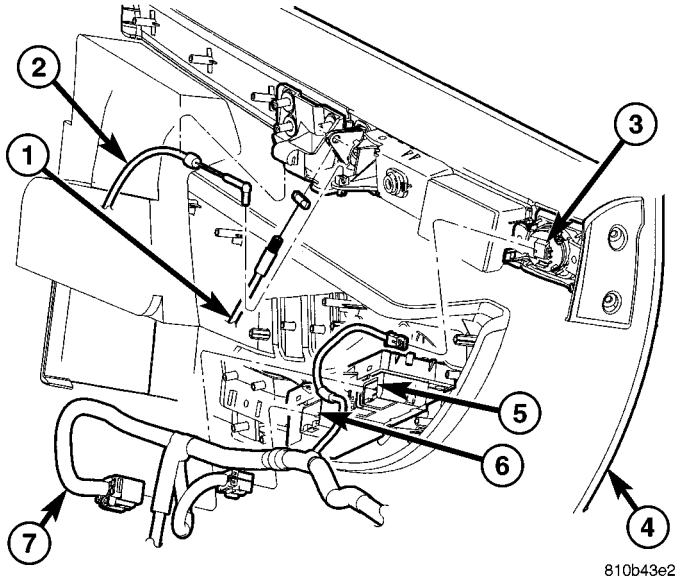


Fig. 25 DISCONNECT DOOR TRIM PANEL

1 - LATCH LOCK KNOB CABLE
2 - LATCH INSIDE HANDLE CABLE
3 - SPEAKER TWEETER
4 - DOOR TRIM PANEL
5 - POWER WINDOW SWITCH CONNECTOR
6 - POWER LOCK SWITCH CONNECTOR
7 - DOOR WIRE HARNESS

(5) Connect trim panel to retainer channel in inner belt weatherstrip at top of door gently jiggling while lowering into position.

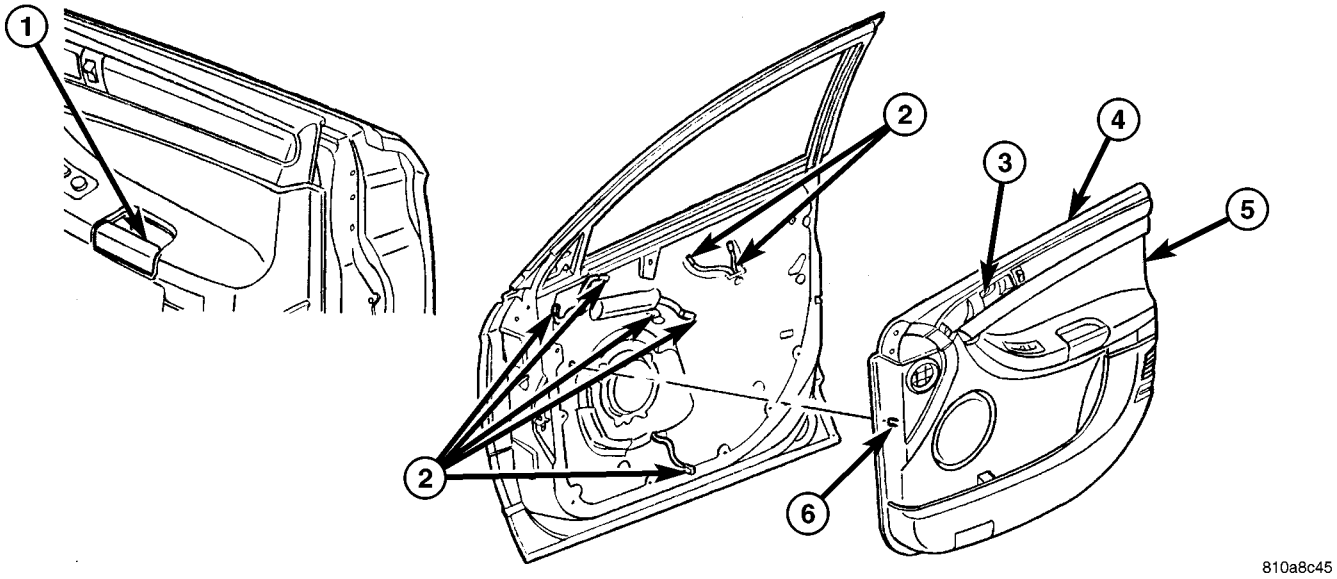


Fig. 24 DOOR TRIM PANEL

1 - PULL HANDLE ATTACHING SCREW
2 - ENSURE MECHANICAL, ELECTRICAL AND LOCK CLIP ARE THROUGH THE INNER PANEL
3- TRIM ATTACHING SCREW
4 - TOP EDGE OF DOOR TRIM PANEL
5 - DOOR TRIM PANEL
6 - TRIM PANEL LOCATORS

TRIM PANEL (Continued)

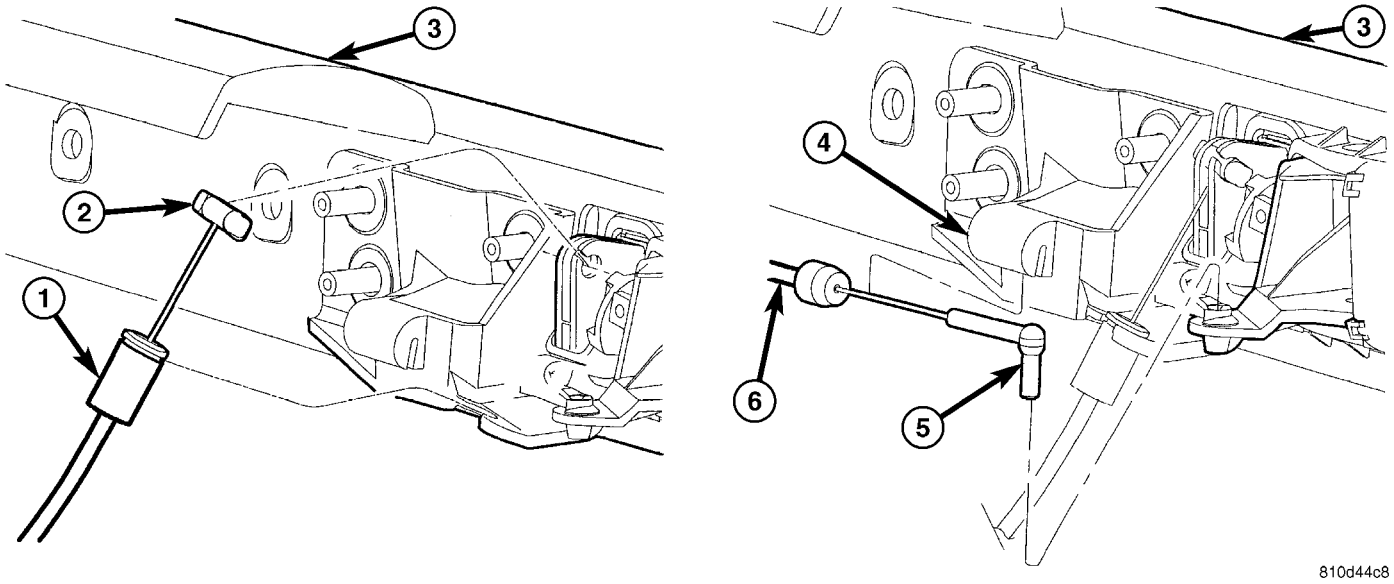


Fig. 26 FRONT DOOR TRIM PANEL MECHANICAL CONNECTIONS

1 - LOCK KNOB CABLE CONDUIT END
2 - LOCK KNOB CABLE BARREL END
3 - DOOR TRIM PANEL
4 - CABLE BRACKET
5 - REMOTE HANDLE CABLE END
6 - REMOTE HANDLE CABLE CONDUIT END

(6) Tilt trim panel outward to align locator pins into position on backside of trim panel.

(7) Applying hand pressure engage push pin fasteners attaching trim panel to door around perimeter of trim panel (Fig. 24).

(8) Install screw behind inside remote handle and close remote handle trim plug (Fig. 23).

(9) Install screw inside arm rest pull cup and close remote handle trim plug (Fig. 22).

(10) Raise door glass.

(11) Close door.

WATERSHIELD

REMOVAL

(1) Remove door trim panel. (Refer to 23 - BODY/ DOOR - FRONT/TRIM PANEL - REMOVAL).

NOTE: Care must be taken when routing electrical wiring & cables through access holes to prevent tearing of liner material.

(2) Route wiring bundle for power locks, switch bezel, window switch, and memory switch (left door only).

(3) Pull courtesy light wiring through watershield.

(4) Peel watershield away from adhesive around perimeter of inner door panel (Fig. 27).

(5) Remove watershield.

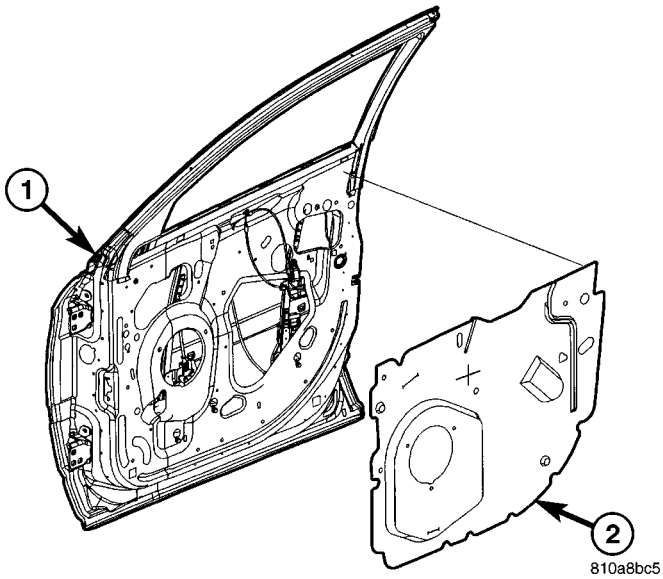


Fig. 27 DOOR WATERSHIELD

1 - DOOR ASSEMBLY
2 - WATERSHIELD

INSTALLATION

(1) Place watershield into position (Fig. 27).

NOTE: Care must be taken when routing electrical wiring & cables through access holes to prevent tearing of liner material.

(2) Pull latch cable, through watershield.

(3) Pull courtesy light wiring, through watershield.

WATERSHIELD (Continued)

(4) Route wiring bundle for power locks, switch bezel, window switch, and memory switch (left door only) through watershield.

(5) Insure that enough adhesive remains to securely retain the watershield to inner door panel. Replace as necessary.

(6) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

WINDOW REGULATOR

REMOVAL

(1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(2) Remove watershield. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - REMOVAL).

(3) Remove inner belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FDR INNER BELT WEATHERSTRIP - REMOVAL).

(4) Remove door glass. (Refer to 23 - BODY/DOOR - FRONT/WINDOW - REMOVAL).

(5) Disconnect wire connector from power window motor (Fig. 28).

(6) Loosen screws attaching front and rear window guide rails to inner door panel (Fig. 29).

(7) Remove screw heads on guide rails from key hole slots in inner door panel.

(8) Loosen screws attaching motor/housing to inner door panel.

(9) Remove regulator from inner door panel.

(10) Extract rear guide rail through inner door panel rear access hole.

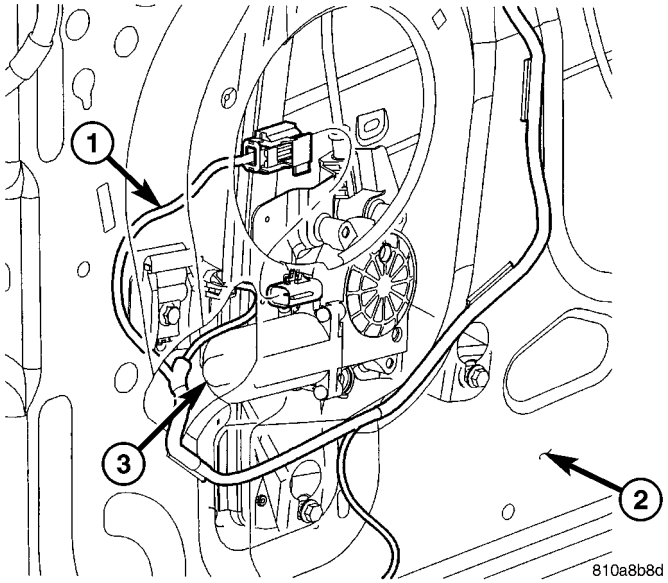


Fig. 28 POWER WINDOW REGULATOR

1 - DOOR WIRE HARNESS
2 - DOOR ASSEMBLY
3 - FRONT DOOR POWER REGULATOR

(11) Extract front guide rail through front access hole (Fig. 30).

INSTALLATION

(1) Insert window regulator through the rear access hole (Fig. 29).

(2) Place window regulator in position on inner door panel.

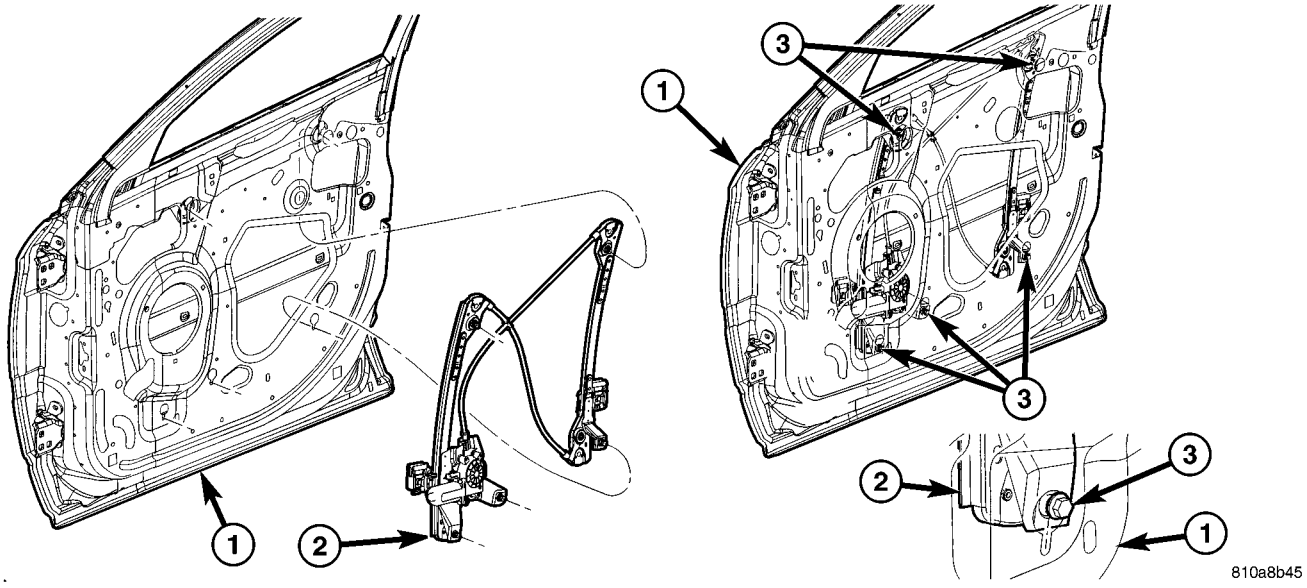


Fig. 29 POWER WINDOW REGULATOR ASSEMBLY

1 - DOOR ASSEMBLY
2 - FRONT DOOR POWER WINDOW REGULATOR
3 - REGULATOR ATTACHING SCREWS

WINDOW REGULATOR (Continued)

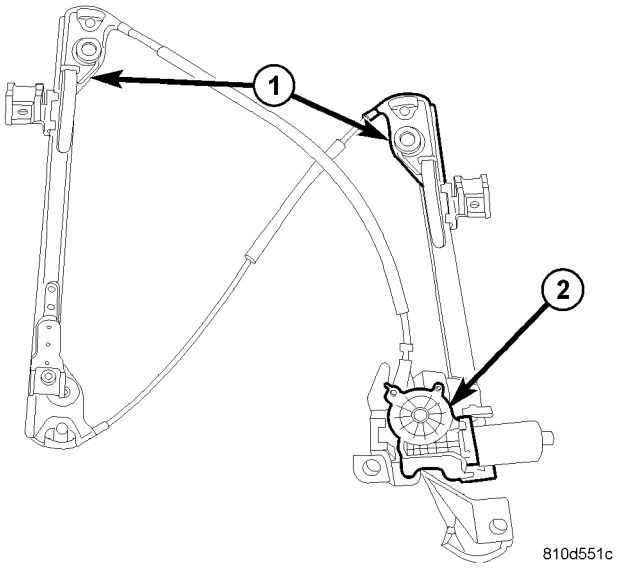


Fig. 30 FRONT DOOR WINDOW REGULATOR

1 - WINDOW REGULATOR
2 - ELECTRIC MOTOR

(3) Place screw heads on guide rails in position through key hole slots in inner door panel.

(4) Tighten screws to attach front and rear guide rails to inner door panel to 9 N·m (80 in. lbs.).

(5) Tighten screws to attach motor/housing to inner door panel to 9 N·m (80 in. lbs.).

(6) Connect wire connector into power window motor (Fig. 28).

(7) Install door glass. (Refer to 23 - BODY/DOOR - FRONT/WINDOW - INSTALLATION).

(8) Verify door glass alignment and operation.

(9) Install inner belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FDR INNER BELT WEATHERSTRIP - INSTALLATION).

(10) Install watershield. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - INSTALLATION).

(11) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

GLASS RUN LOWER CHANNEL

REMOVAL

(1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(2) Remove watershield an necessary. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - REMOVAL).

(3) Loosen screws attaching door glass run lower channel to inner door panel (Fig. 31).

(4) Remove door glass run lower channel from inner door panel.

(5) Extract door glass run lower channel through front access hole.

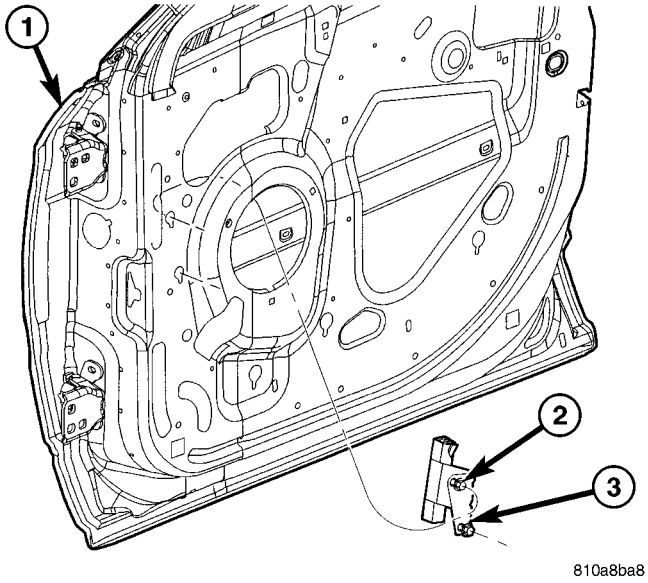


Fig. 31 DOOR GLASS RUN LOWER CHANNEL

1 - DOOR ASSEMBLY
2 - GLASS CHANNEL ATTACHING SCREWS
3 - DOOR GLASS RUN LOWER CHANNEL

INSTALLATION

(1) Place door glass run lower channel through front access hole into key hole slots (Fig. 31).

(2) Tighten screws attaching door glass run lower channel to inner door panel to 6 N·m (55 in. lbs.) torque.

(3) Place watershield into position. (Refer to 23 - BODY/DOOR - FRONT/WATERSHIELD - INSTALLATION).

(4) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

DOORS - REAR

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REAR DOOR APPLIQUE

REMOVAL

REMOVAL - B-PILLAR

(1) Roll door glass down.
(2) Remove outer door belt molding, as necessary.
(3) Remove screws attaching front edge of applique to door frame (Fig. 1).
(4) Remove applique from vehicle.

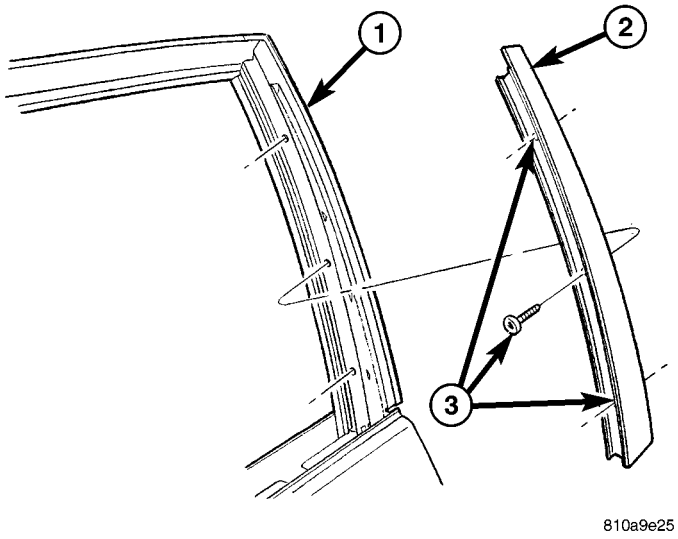


Fig. 1 DOOR B-PILLAR APPLIQUE

1 - B-PILLAR
2 - B-PILLAR APPLIQUE
3 - ATTACHING SCREWS

REMOVAL - C-PILLAR

(1) Roll door glass down.
(2) Remove door trim panel. (Refer to 23 - BODY/DOORS - REAR/DOOR TRIM PANEL - REMOVAL).
(3) Remove rear door inner belt molding weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT MOLDING - REMOVAL).
(4) Remove fixed glass run assembly. (Refer to 23 - BODY/DOORS - REAR/DOOR FIXED GLASS RUN CHANNEL - REMOVAL).
(5) Remove outer door belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR OUTER BELT MOLDING - REMOVAL).
(6) Remove screws attaching front edge of applique to door frame (Fig. 2).
(7) Remove applique from vehicle.

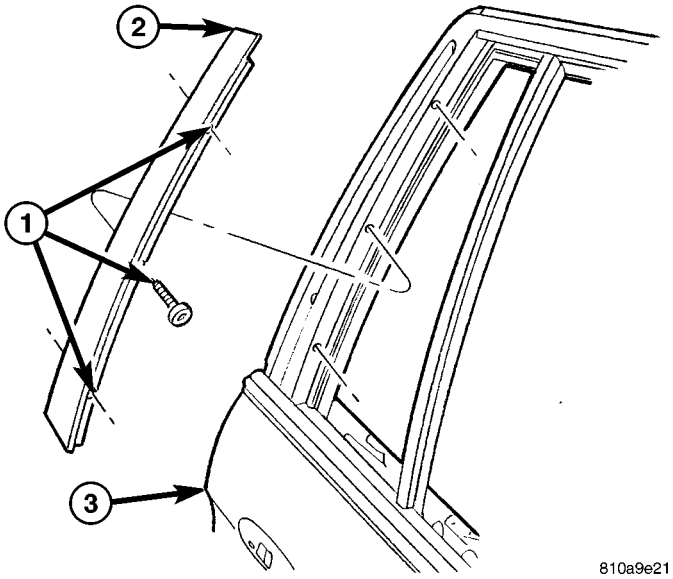


Fig. 2 DOOR C-PILLAR APPLIQUE

1 - ATTACHING SCREWS
2 - C-PILLAR APPLIQUE
3 - DOOR ASSEMBLY

INSTALLATION

INSTALLATION - B-PILLAR

(1) Position applique on vehicle.
(2) Hook rear edge of applique over rear edge of door frame and seat applique bottom edge on sheet metal (Fig. 1).
(3) Install screws attaching applique to door frame.
(4) Install outer door belt molding.

INSTALLATION - C-PILLAR

(1) Position applique on vehicle.
(2) Hook rear edge of applique over rear edge of door frame and seat applique bottom edge on sheet metal (Fig. 2).
(3) Install screws attaching applique to door frame.
(4) Install door fixed glass run channel. (Refer to 23 - BODY/DOORS - REAR/GLASS RUN CHANNEL - INSTALLATION).
(5) Install inner belt molding weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT MOLDING WEATHERSTRIP - INSTALLATION)
(6) Install outer door belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR OUTER BELT MOLDING - INSTALLATION).
(7) Install rear door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).

CHECK STRAP

REMOVAL

(1) Remove screws attaching door check strap to B-pillar (Fig. 3).
(2) Remove check strap from B-pillar.
(3) Remove rear door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).
(4) Remove rear door watershield. (Refer to 23 - BODY/DOORS - REAR/WATERSHIELD - REMOVAL).
(5) Remove rear door speaker, if equipped.
(6) Remove nuts attaching check strap to door end frame (Fig. 4).
(7) Remove check strap from door through speaker hole.

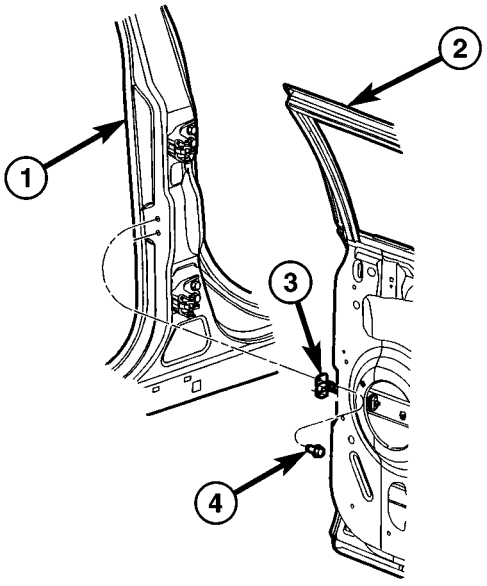


Fig. 3 DOOR OPEN CHECK - B-PILLAR

1 - B-PILLAR
2 - REAR DOOR ASSEMBLY
3 - DOOR HOLD OPEN CHECK ASSEMBLY
4 - CHECK STRAP TO BODY ATTACHING SCREW(S)

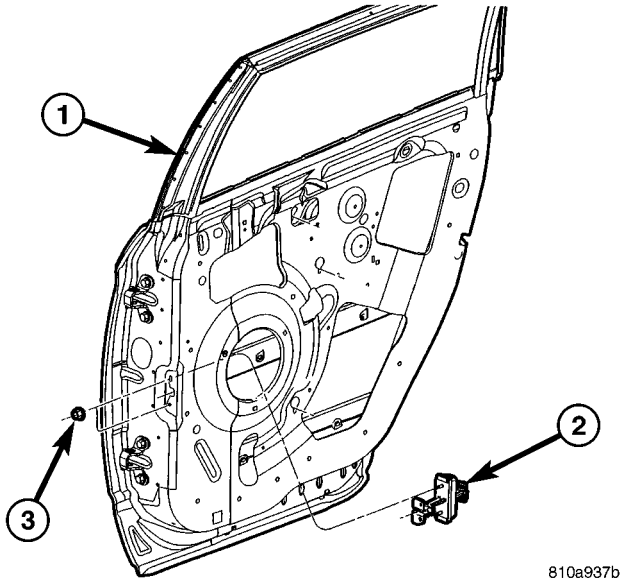


Fig. 4 DOOR HOLD OPEN CHECK

1 - REAR DOOR ASSEMBLY
2 - DOOR HOLD OPEN CHECK ASSEMBLY
3 - ATTACHING NUT(S)

INSTALLATION

(1) Position check strap on door through speaker hole (Fig. 4).
(2) Install nuts attaching check strap to door end frame. Tighten nuts to 11 N·m (90 in. lbs.) torque.
(3) Install door speaker, if equipped.
(4) Install rear door watershield. (Refer to 23 - BODY/DOORS - REAR/WATERSHIELD - INSTALLATION).
(5) Install front door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).
(6) Place check strap into position on B-pillar.
(7) Install screws attaching check strap to B-pillar (Fig. 3). Tighten screws to 12 N·m (105 in. lbs.) torque.

DOOR

REMOVAL

(1) Remove B-pillar upper and lower trim panel, as necessary. (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - REMOVAL) and (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - REMOVAL).

(2) Remove screws attaching door check strap to B-pillar (Fig. 5).

(3) Disengage clips attaching door harness wire connector to inner B-pillar (Fig. 6).

(4) Disconnect positive lock slide on the side of the wire connectors.

(5) Depress lock tab attaching wire connector halves together.

(6) Disconnect door harness from body wiring harness.

(7) Support door on suitable lifting device.

(8) Remove bolts attaching lower hinge to door end frame (Fig. 7).

(9) Steady door on lifting device and remove bolts attaching upper hinge to door end frame.

(10) Remove door from vehicle.

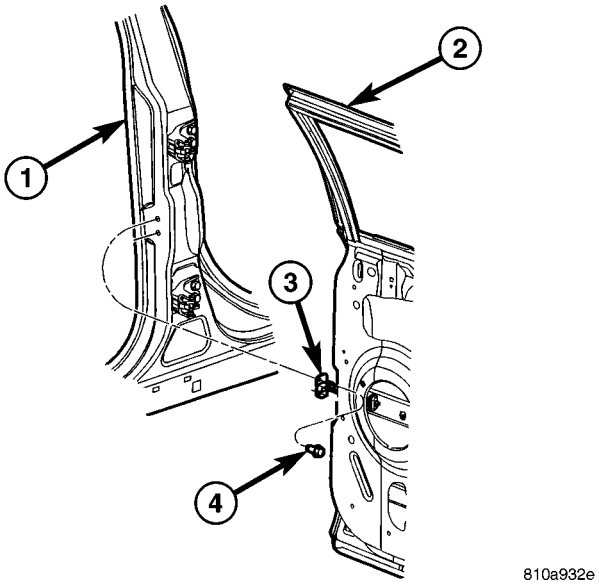


Fig. 5 DOOR HOLD OPEN CHECK AT B-PILLAR

1 - B-PILLAR
2 - REAR DOOR ASSEMBLY
3 - DOOR HOLD OPEN CHECK ASSEMBLY
4 - ATTACHING SCREW(S)

INSTALLATION

(1) Steady door on lifting device and place door into position.

(2) Loosely install bolts attaching upper hinge to door end frame (Fig. 7).

(3) Loosely install bolts attaching lower hinge to door end frame.

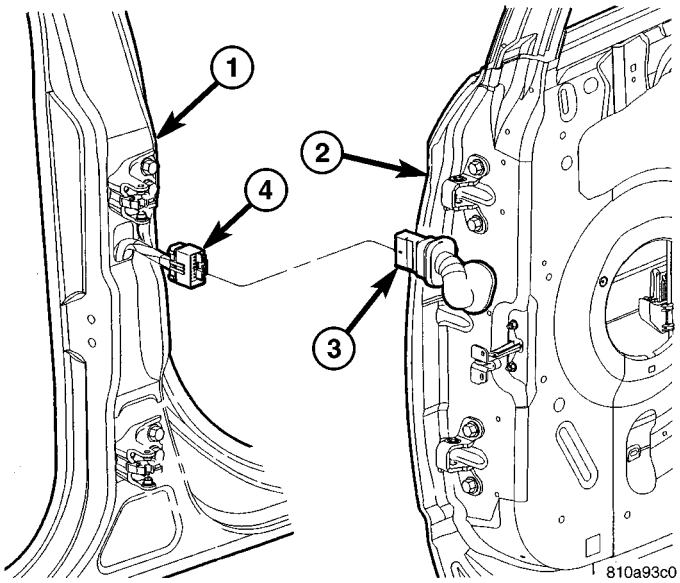


Fig. 6 DOOR WIRE HARNESS CONNECTOR

1 - B-PILLAR
2 - DOOR ASSEMBLY
3 - DOOR WIRING HARNESS
4 - BODY WIRING HARNESS CONNECTOR

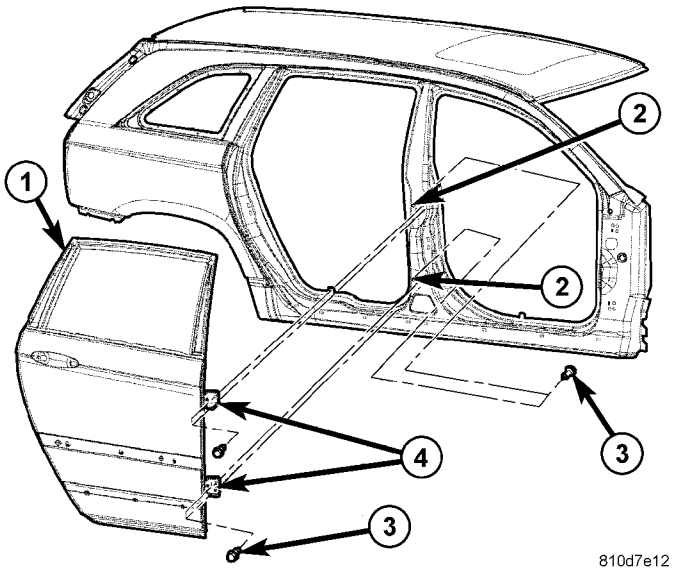


Fig. 7 REAR DOOR REMOVAL

1 - REAR DOOR
2 - SLOT (5.0 MM X 10.0 MM)
3 - ATTACHING BOLTS
4 - DOOR HINGES

(4) Connect door harness to body wiring harness (Fig. 6).

(5) Ensure lock tab attaching wire connector halves together is connected.

(6) Connect positive lock slide on the side of the wire connectors.

(7) Engage clips attaching door harness wire connector to inner fender brace.

DOOR (Continued)

(8) Install screws attaching door check strap to B-pillar (Fig. 5). (Refer to 23 - BODY/DOORS - REAR/CHECK STRAP - INSTALLATION).

(9) Check door for alignment. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

(10) Install upper and lower B-pillar trim panel. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION) and (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - INSTALLATION).

(11) Tighten hinge bolts. (Refer to 23 - BODY/DOORS - REAR/HINGE - INSTALLATION).

ADJUSTMENTS

ADJUSTMENT

NOTE: For vehicles equipped with four doors, it is recommended that you adjust the rear door before adjusting the front door.

- **Door adjustment measurements should be taken from stationary or welded body panels like the roof, rocker or quarter panels.**
- **During adjustment procedures, it is recommended that all the hinge fasteners be loosened except for the upper most fasteners. Adjustments can be made using the upper fasteners to hold the door with final torque of the fasteners occurring after correct door positioning is achieved.**

FORE/AFT

NOTE: Fore/aft (lateral) door adjustment is done by loosening the hinge to the hinge pillar fasteners one hinge at a time and moving the door to the correct position. May require grinding off nubs to float body side

(1) Support the door with a suitable lifting device.

(2) Loosen the hinge to hinge pillar fasteners. (Refer to 23 - BODY/DOORS - REAR/HINGE - REMOVAL).

(3) Adjust the door to the correct position. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

(4) Tighten to hinge pillar fasteners to 27 N·m (20 ft. lbs.) torque. (Refer to 23 - BODY/DOORS - REAR/HINGE - INSTALLATION)

NOTE: Use a suitable body sealer on the hinge to body mating surfaces.

UP/DOWN

NOTE: Up/down door adjustment is done by loosening either the hinge to the hinge pillar fasteners or the hinge to door fasteners and moving the door to the correct position.

NOTE: The body side half of door hinges are keyed to the body with a locator nub embossed in hinge which engages a slot punched in pillar. Hinge can not slide (moved) without removing the nub.

NOTE: When adjustment of the door requires the loosening of the door to hinge fasteners.

(1) Support the door with a suitable lifting device.

(2) Remove the latch striker. (Refer to 23 - BODY/DOORS - REAR/LATCH STRIKER - REMOVAL).

(3) Loosen the hinge to hinge pillar fasteners (Refer to 23 - BODY/DOORS - REAR/HINGE - REMOVAL) or loosen the hinge to door fasteners (Refer to 23 - BODY/DOORS - REAR/DOOR - REMOVAL).

(4) Adjust the door to the correct position. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

(5) Tighten to hinge pillar fasteners or the door to hinges fasteners and fasteners to 27 N·m (20 ft. lbs.). (Refer to 23 - BODY/DOORS - REAR/HINGE - INSTALLATION).

(6) Install the latch striker. (Refer to 23 - BODY/DOORS - REAR/LATCH STRIKER - INSTALLATION).

IN/OUT

NOTE: In/out door adjustment is done by loosening the hinge to door fasteners one hinge at a time and moving the door to the correct position.

NOTE: When adjustment of the door requires the loosening of the door to hinge fasteners.

(1) Support the door with a suitable lifting device.

(2) Remove the latch striker. (Refer to 23 - BODY/DOORS - REAR/LATCH STRIKER - REMOVAL).

(3) Loosen the hinge to door fasteners. (Refer to 23 - BODY/DOORS - REAR/DOOR - REMOVAL).

(4) Adjust the front of the door to the correct position. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

(5) Tighten the door to hinges fasteners to 27 N·m (20 ft. lbs.).

(6) Install the latch striker. (Refer to 23 - BODY/DOORS - REAR/LATCH STRIKER - INSTALLATION).

DOOR FIXED GLASS RUN CHANNEL

REMOVAL

(1) Lower door window glass.

(2) Remove door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).

(3) Remove watershield as necessary. (Refer to 23 - BODY/DOORS - REAR/WATERSHIELD - REMOVAL).

(4) Remove inner belt weatherstrip (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT WEATHERSTRIP - REMOVAL).

(5) Remove screws attaching outer belt molding, one at the inside of the rear door shut face at the B-pillar and one at the inside of the rear door shut face at the C-pillar.

(6) Remove outer belt molding using special tool 9093 (Fig. 8). (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR OUTER BELT MOLDING - REMOVAL).

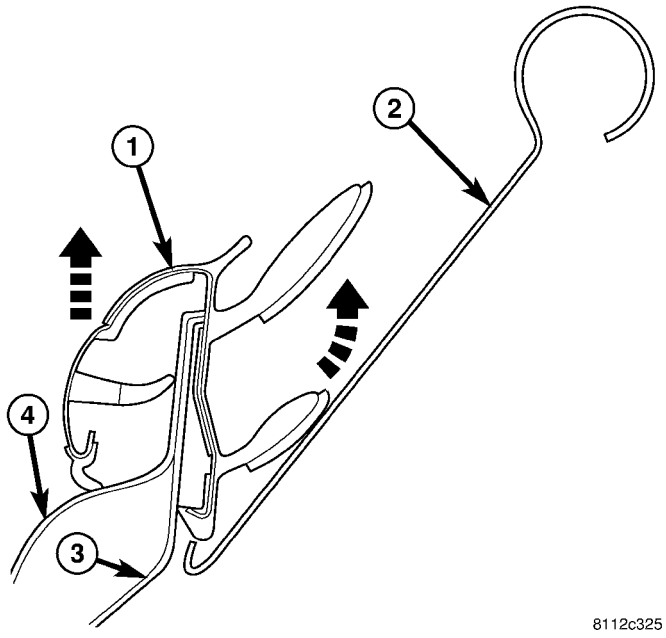


Fig. 8 OUTER BELT MOLDING

1 - OUTER BELT MOLDING
2 - SPECIAL TOOL #9093
3 - RETAINING TAB
4 - DOOR OUTER PANEL

(7) Remove screw attaching glass run to door panel (Fig. 9).

(8) Using a trim stick C-4755 or equivalent and hand pull down on glass run disengage from window frame channel.

(9) Remove fixed glass run channel from door.

(10) Remove quarter glass from fixed glass run channel (Fig. 10) and (Fig. 11).

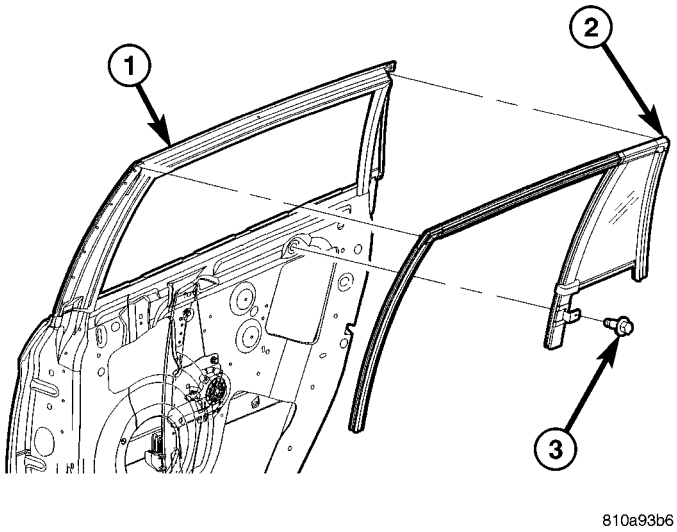


Fig. 9 DOOR FIXED GLASS RUN ASSEMBLY

1 - DOOR ASSEMBLY
2 - DOOR FIXED GLASS RUN ASSEMBLY
3 - ATTACHING SCREW

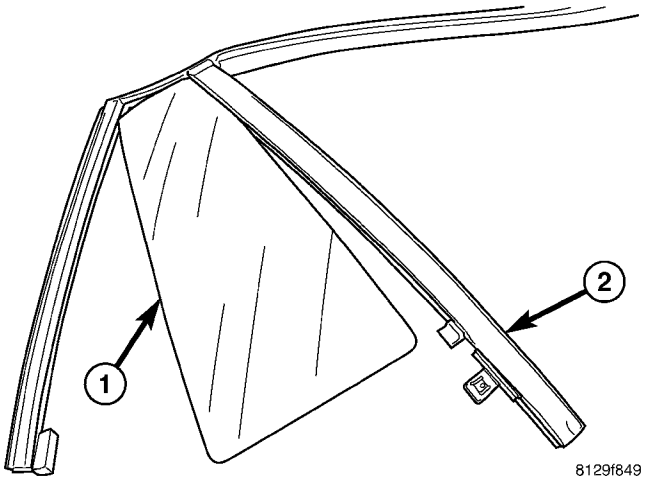


Fig. 10 REAR DOOR QUARTER GLASS REMOVAL

1 - QUARTER GLASS
2 - REAR DOOR FIXED GLASS RUN CHANNEL

DOOR FIXED GLASS RUN CHANNEL (Continued)

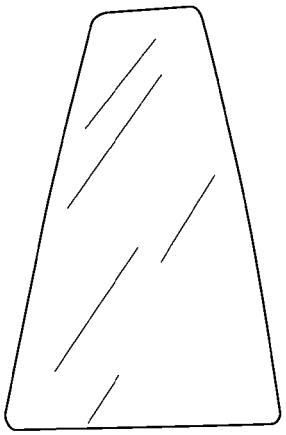


Fig. 11 REAR DOOR QUARTER GLASS

INSTALLATION

(1) Position quarter glass into the fixed glass run channel (Fig. 12) and (Fig. 13).

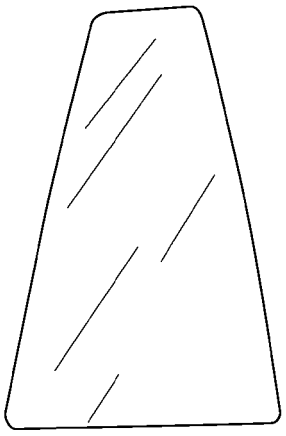


Fig. 12 REAR DOOR QUARTER GLASS

(2) Place fixed glass run channel into position in door.

(3) Install screw attaching glass run to door panel.

(4) Insert glass run into window frame channel (Fig. 14).

(5) Install inner belt weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT WEATHERSTRIP - INSTALLATION).

(6) Install outer belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR OUTER BELT MOLDING - INSTALLATION).

(7) Install outer belt molding attaching screws.

(8) Install watershield. (Refer to 23 - BODY/DOORS - REAR/WATERSHIELD - INSTALLATION).

(9) Install door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).

(10) Raise door window glass.

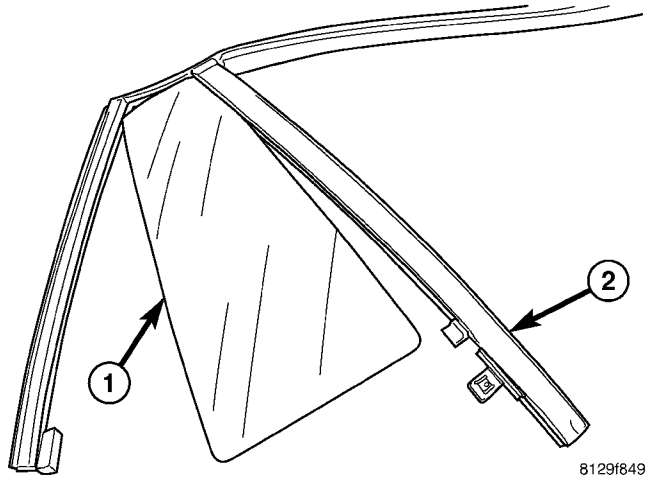


Fig. 13 REAR DOOR QUARTER GLASS REMOVAL

1 - QUARTER GLASS
2 - REAR DOOR FIXED GLASS RUN CHANNEL

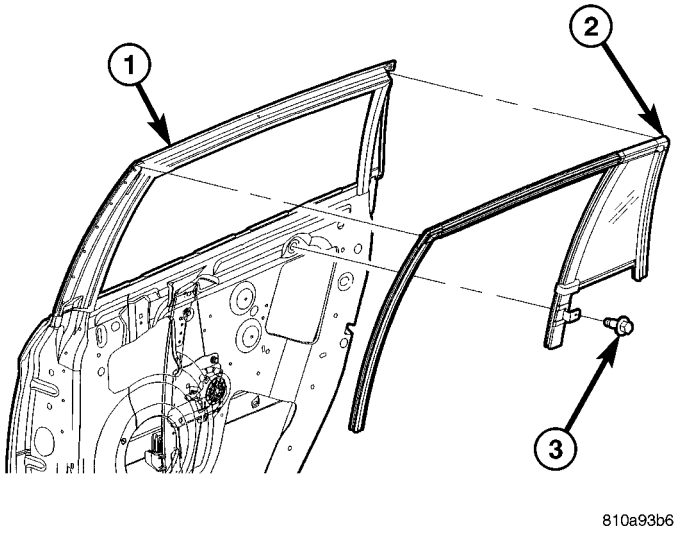


Fig. 14 DOOR FIXED GLASS RUN ASSEMBLY

1 - DOOR ASSEMBLY
2 - DOOR FIXED GLASS RUN ASSEMBLY
3 - ATTACHING SCREW

DOOR GLASS

REMOVAL

(1) Remove door trim panel.
(2) Remove watershield.
(3) Remove speaker.
(4) Remove inner belt weathersrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT WEATHERSTRIP - REMOVAL).
(5) Position glass to gain access to regulator lift plate and spring clip through access holes in door panel (Fig. 15).
(6) Remove screw attaching fixed glass run channel to door panel. (Refer to 23 - BODY/DOORS - REAR/GLASS RUN CHANNEL - REMOVAL).
(7) Remove fixed glass run channel, as necessary.
(8) Using a flat bladed tool to spread regulator lift plate bracket to allow widow glass and lift plate be release (Fig. 16).
(9) Disengage glass from glass run weatherstrip (Fig. 17).
(10) Insert glass between glass run channel and outer door panel.
(11) Lift glass upward and out of exterior side of the opening at top of door.
(12) Remove glass from vehicle.

INSTALLATION

(1) Place glass into inner door panel position (Fig. 17).

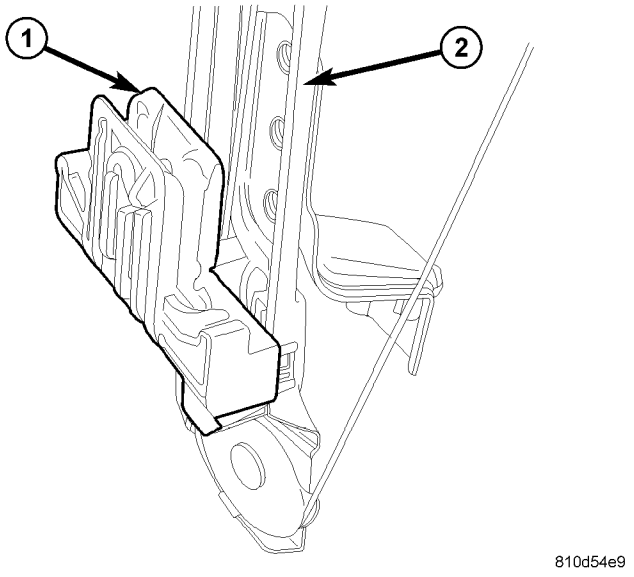


Fig. 16 REGULATOR LIFT PLATE BRACKET

1 - REGULATOR LIFT PLATE BRACKET
2 - REAR DOOR WINDOW REGULATOR

(2) Using care, push down on window glass to lock lift plate into lift plate bracket (Fig. 16).
(3) Install door fixer glass run channel. (Refer to 23 - BODY/DOORS - REAR/GLASS RUN CHANNEL - INSTALLATION).
(4) Ensure window glass is in the glass run channel.

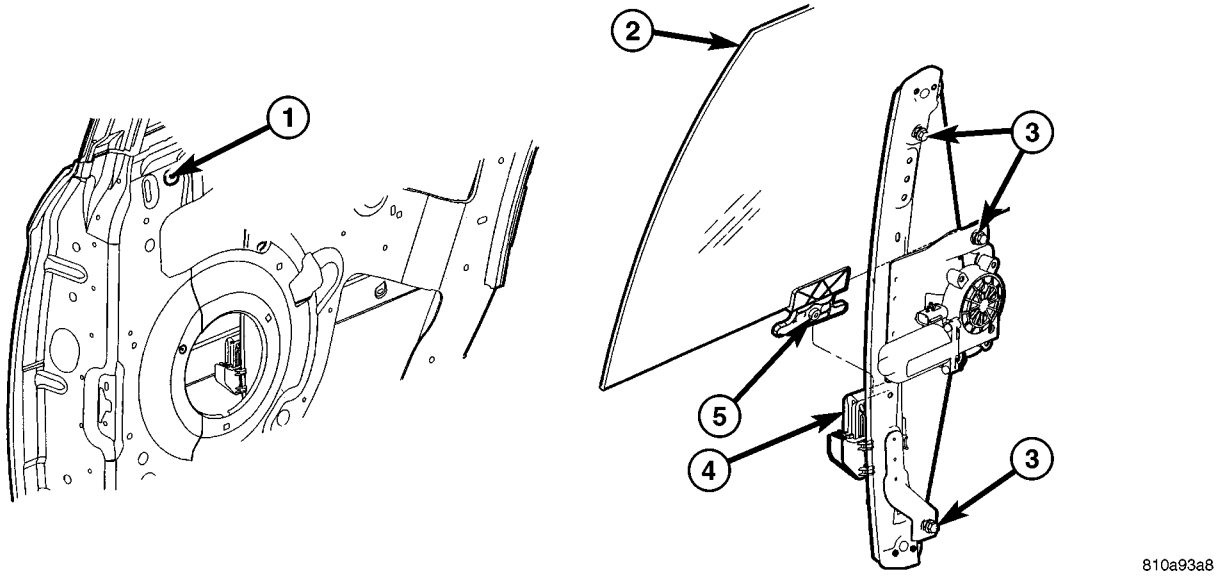
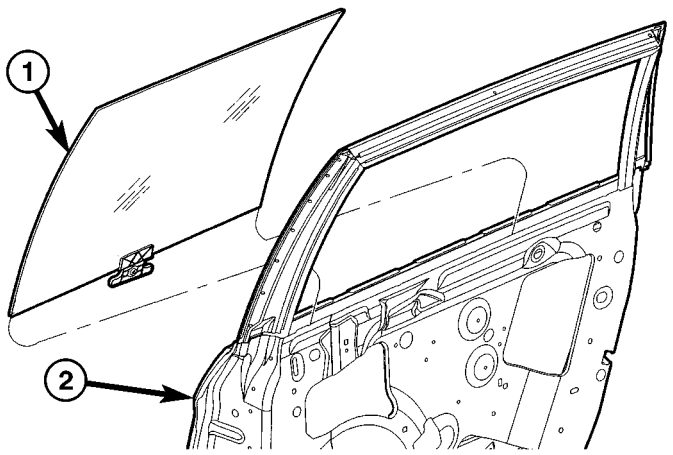


Fig. 15 REGULATOR LIFT PLATE AND SPRING CLIP

1 - INSERT FLAT TOOL TO HOLD GLASS IN THE UP POSITION
2 - DOOR GLASS
3 - ATTACHING REGULATOR SCREW(S) TO INNER DOOR PANEL
4- REAR DOOR REGULATOR LIFT PLATE BRACKET
5 - REGULATOR LIFT PLATE

DOOR GLASS (Continued)



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Fig. 17 GLASS AND LIFT PLATE

1 - GLASS AND LIFT PLATE
2 - DOOR ASSEMBLY

(5) Remove inner belt weathersrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT WEATHERSTRIP - INSTALLATION).

(6) Cycle glass upward and visually check that window is properly seated in glass run.

(7) Install speaker.

(8) Install watershield. (Refer to 23 - BODY/ DOORS - REAR/WATERSHIELD - INSTALLATION).

(9) Install door trim panel. (Refer to 23 - BODY/ DOORS - REAR/TRIM PANEL - INSTALLATION).

(10) Close door.

DOOR HEADER BLACK OUT TAPE

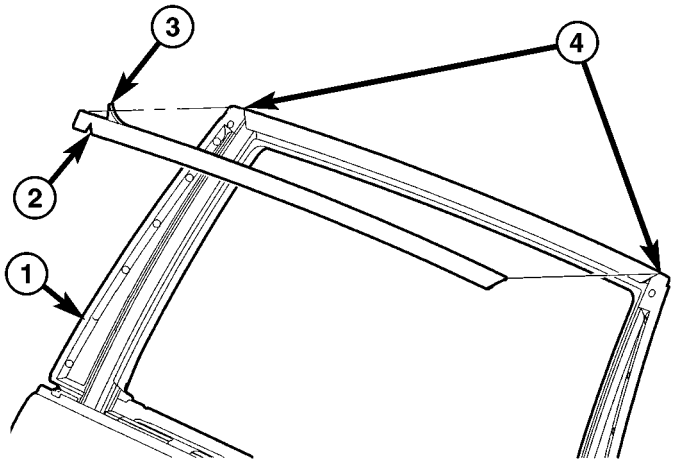
REMOVAL

(1) Warm the door header blackout tape and door metal to approximately 27° C (80° F) using a suitable heat lamp or heat gun (Fig. 18).

(2) Pull stick on blackout tape from painted surface.

(3) Remove adhesive tape residue from painted surface of door.

(4) Use a 3M Scotch-Brite™ Molding Adhesive and Stripe Removal Disc, or equivalent, to clean adhesive residue from painted surfaces. These products are available from automotive paint suppliers. Refer to instructions supplied with the specific product for proper usage.



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Fig. 18 DOOR HEADER BLACK OUT TAPE

1 - C-PILLAR
2 - DOOR HEADER BLACK OUT TAPE
3 - BODY SIDE MOLDING (DOUBLE SIDED) TAPE
4 - ENSURE SURFACE IS CLEAN

INSTALLATION

(1) Door header blackout tape cannot be reused;

(a) Remove tape residue from door.

(b) Clean back of door header blackout tape with Mopar® Super Kleen, or equivalent.

(c) Wipe door header blackout tape dry with lint free cloth.

(d) Apply a single coat of Mopar® TPO Molding Prep to tape side of door header blackout tape and allow to dry thoroughly.

(e) Apply new body side molding (two sided adhesive) tape to back of door header blackout tape (Fig. 18).

(2) Clean body surface with Mopar® Super Kleen, or equivalent. Wipe surface dry with lint free cloth.

(3) Apply door header blackout tape from rear to front of door.

(4) Using a felt pad or clean shop towel apply enough force to assure adhesion. Do not apply excessive force, or damage to door header blackout tape may result.

EXTERIOR HANDLE

REMOVAL

(1) Roll door glass up.

(2) Remove door trim panel. (Refer to 23 - BODY/ DOORS - REAR/TRIM PANEL - REMOVAL).

(3) Remove the watershield as necessary to gain access to the outside door handle. (Refer to 23 -

EXTERIOR HANDLE (Continued)

BODY/DOORS - REAR/WATERSHIELD - REMOVAL).

(4) Remove screw attaching outside door handle cover to outside handle bracket (Fig. 19).

(5) Disengage clip attaching door latch linkage to outer door handle.

(6) Loosen the screw attaching outside door handle cover to outside handle bracket, through access hole in door inner panel.

(7) Remove outside door handle assembly and cover at the same time, by pulling handle towards the rear of vehicle.

(8) Loosen screws attaching outside handle bracket to outer panel.

(9) Remove outside handle assembly from outer door panel.

INSTALLATION

(1) Place outside handle assembly into inner door panel.

(2) Tighten screws attaching outside handle assembly and outside handle bracket to outer door panel. Tighten to 4 N·m (37 in. lbs.) torque.

(3) Install outside door handle and cover assembly into the outer door panel by inserting the pivot leg of the handle into the front access hole (Fig. 19). While inserting the handle pivot leg, move rear of handle towards the outer panel until it makes contact. Push forward on handle until it snaps into position.

(4) Install screw attaching outside door handle cover to outside handle bracket.

(5) Engage clip attaching door lock linkage to outside door handle.

(6) Engage clip attaching door latch linkage to outer door handle.

(7) Check outside handle for proper operation.

(8) Install the watershield as necessary to gain access to the outside door handle. (Refer to 23 - BODY/DOORS - REAR/WATERSHIELD - INSTALLATION).

(9) Install door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).

(10) Verify door handle assembly operation. For adjustment (Refer to 23 - BODY/DOOR - FRONT/LATCH - ADJUSTMENTS).

(11) Make outside door handle adjustment.

FRAME CLOSEOUT MOLDING

REMOVAL

(1) Open door.

(2) Lower door window glass.

(3) Remove rear door trim panel. (Refer to 23 - BODY/DOORS - REAR/DOOR TRIM PANEL - REMOVAL).

(4) Remove door inner belt molding weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT MOLDING - REMOVAL).

(5) Remove door fixed glass run channel. (Refer to 23 - BODY/DOORS - REAR/GLASS RUN CHANNEL - REMOVAL).

(6) Using a trim stick C-4755 or equivalent and hand pull down on front door frame closeout molding to disengage from window frame channel (Fig. 20).

(7) Remove closeout molding from vehicle.

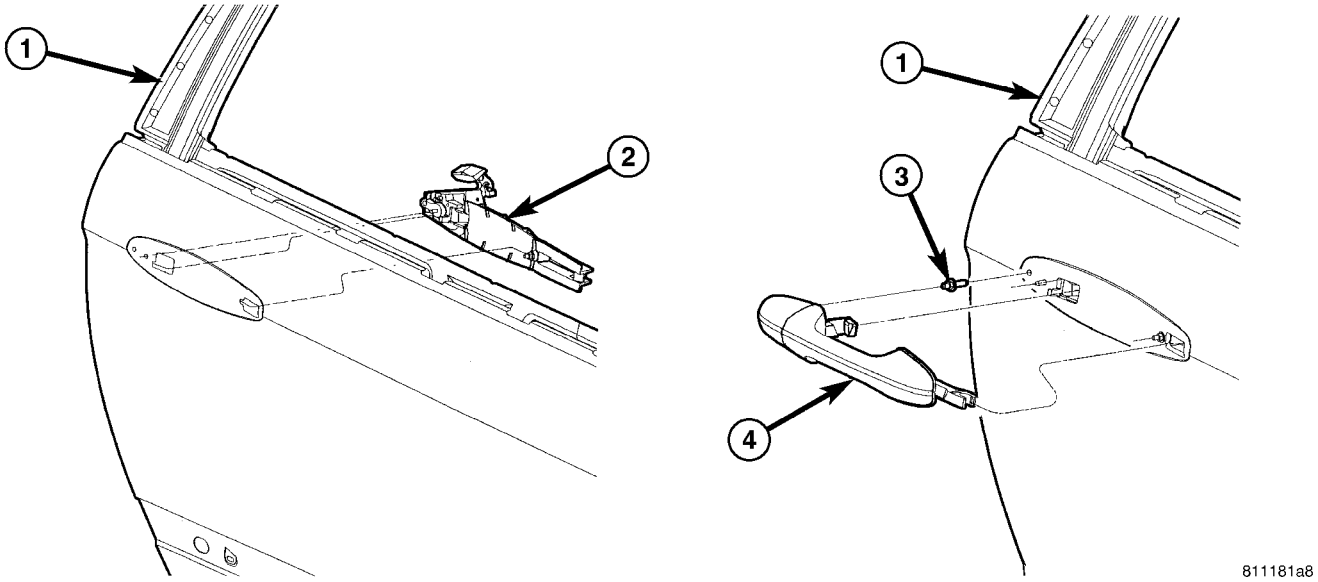


Fig. 19 DOOR OUTSIDE HANDLE ASSEMBLY

1 - DOOR ASSEMBLY
2 - OUTSIDE HANDLE BRACKET ASSEMBLY
3 - STUD
4 - DOOR OUTSIDE HANDLE ASSEMBLY

FRAME CLOSEOUT MOLDING (Continued)

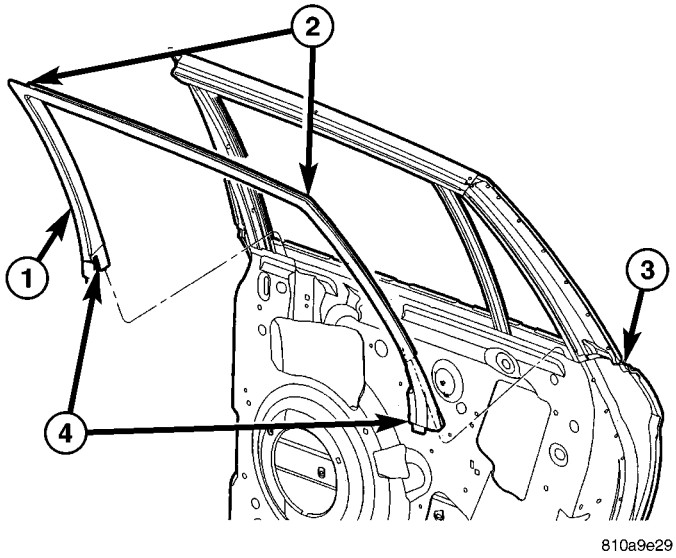


Fig. 20 DOOR FRAME CLOSE OUT MOLDING

1 - FRAME CLOSE OUT MOLDING
2 - OUT BOARD LIP OF MOLDING
3 - DOOR ASSEMBLY
4 - SLOTTED END AT BELT MOLDING

INSTALLATION

(1) Lower door window glass.
(2) Place door frame close out molding into position (Fig. 20).
(3) Starting at C-pillar to corner and work along header to B-pillar belt line. Snapping molding into place, using hand pressure.
(4) Finish inserting molding along C-pillar side of door.
(5) Raise door window glass.
(6) Install door fixed glass run channel. (Refer to 23 - BODY/DOORS - REAR/DOOR FIXED GLASS RUN CHANNEL - INSTALLATION).
(7) Install rear door inner belt molding weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/ REAR DOOR INNER BELT MOLDING - INSTALLATION).
(8) Install rear door trim panel. (Refer to 23 - BODY/DOORS - REAR/DOOR TRIM PANEL - INSTALLATION).

HINGE

REMOVAL

NOTE: It is not necessary to remove the door to replace the hinges if they are replace one at a time.

(1) Release rear door latch and open door.
(2) Mark hinge foot print on both door and pillar to aid when installing door (Fig. 21).
(3) Remove B-pillar trim to access inside/out bolts to pillar.
(4) Support door on suitable lifting device.
(5) Remove bolts attaching hinge to B-pillar.
(6) Remove bolts attaching rear door to door hinge.
(7) Remove door hinge from vehicle.

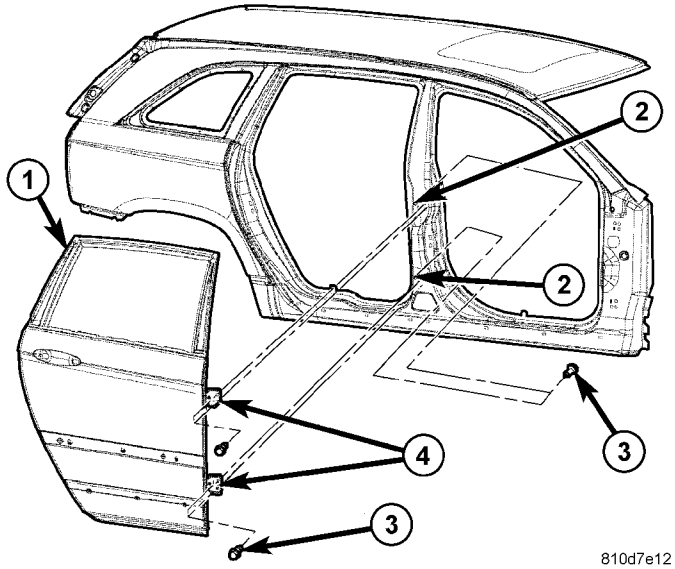


Fig. 21 REAR DOOR REMOVAL

1 - REAR DOOR
2 - SLOT (5.0 MM X 10.0 MM)
3 - ATTACHING BOLTS
4 - DOOR HINGES

INSTALLATION

NOTE: It is not necessary to remove the door to replace the hinges if they are replace one at a time.

(1) Hinge pins can be serviced. remove spring nut and remove pin. Install new pin and install spring nut (Fig. 22).

CAUTION: When installing a new hinge, make sure that the head of each hinge pin is fully seated into the door hinge. Also, remove the plastic shipping clip and replace it with the correct metal retaining clip once the hinge pin is seated.

(2) Paint hinge prior to installation, if necessary.
(3) Position door hinge on vehicle (Fig. 21).
(4) Install bolts attaching hinge to pillar. Tighten hinge bolts to 34 N·m (25 ft. lbs.) torque.
(5) Install bolts attaching rear door to door hinge. Tighten hinge bolts to 34 N·m (25 ft. lbs.) torque.
(6) For proper tighten. sequence refer to (Fig. 23).

HINGE (Continued)

(7) Verify door alignment and operation. Adjust as necessary. (Refer to 23 - BODY/BODY STRUCTURE/ GAP AND FLUSH - SPECIFICATIONS) and (Refer to 23 - BODY/DOORS - REAR/DOOR - INSTALLATION).

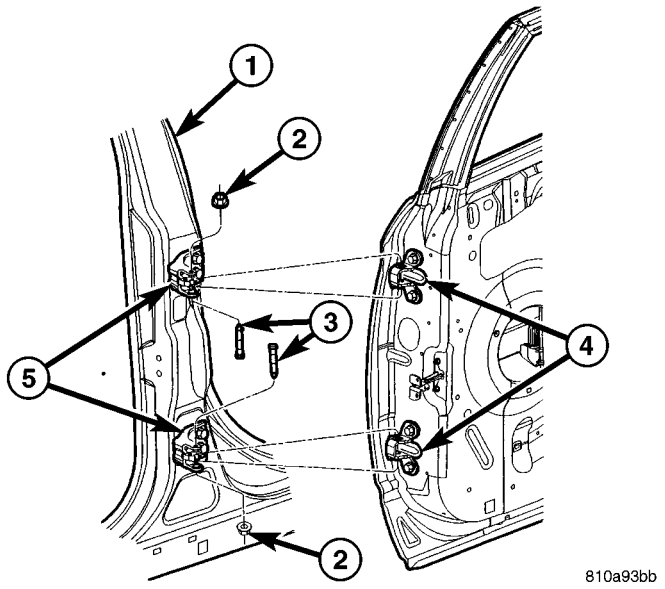


Fig. 22 HINGE PINS

1 - B-PILLAR
2 - PUSH ON SPRING NUT(S)
3 - HINGE ATTACHING PIN(S)
4 - DOOR HALF HINGE
5 - BODY HALF HINGE

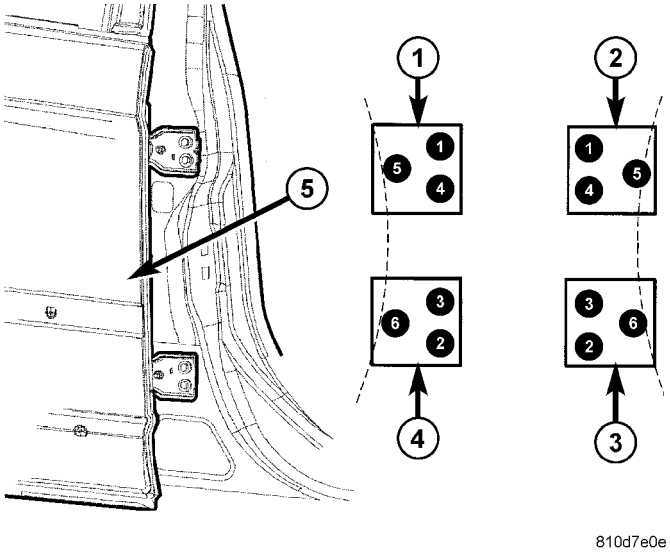


Fig. 23 REAR DOOR HINGE TIGHT SEQUENCE

1 - RIGHT DOOR UPPER HINGE
2 - LEFT DOOR UPPER HINGE
3 - LEFT DOOR LOWER HINGE
4 - RIGHT DOOR LOWER HINGE
5 - REAR DOOR

LATCH

REMOVAL

(1) Remove door trim panel. (Refer to 23 - BODY/ DOORS - REAR/TRIM PANEL - REMOVAL).
(2) Remove watershield. (Refer to 23 - BODY/ DOORS - REAR/WATERSHIELD - REMOVAL).
(3) Raise door glass.
(4) Disconnect clips holding lock and latch rods to outside door handle (Fig. 24).
(5) Disengage wire connector from power door lock motor, if equipped.
(6) Remove screws attaching latch to door end frame.
(7) Remove door latch from door.

INSTALLATION

NOTE: The screws attaching the door latch to the door end frame have nylon patches on the threads. All screws must be replaced when the latch has been removed.

(1) Insert inside handle latch link to door latch and engage clip (Fig. 24).
(2) Place door latch in position on door end frame.
(3) Install screws attaching door latch to door end frame. Tighten screws to 8 N·m (70 in. lbs.) torque.
(4) Insert other linkages to door latch and engage clips.
(5) Connect wire connector into power door lock motor, if equipped.
(6) For proper latch adjustment procedures (Refer to 23 - BODY/DOORS - REAR/LATCH - ADJUSTMENTS).
(7) Verify door latch and power door lock operation.
(8) Install watershield. (Refer to 23 - BODY/ DOORS - REAR/WATERSHIELD - INSTALLATION).
(9) Install front door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).

LATCH (Continued)

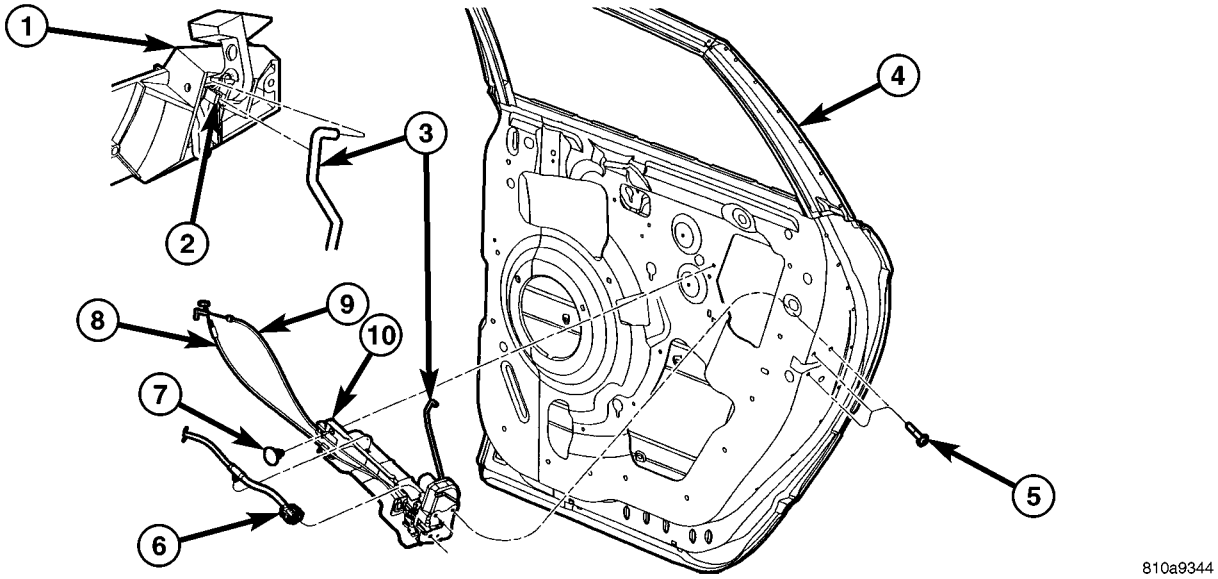


Fig. 24 REAR DOOR LATCH ASSEMBLY

1 - OUTSIDE HANDLE BRACKET ASSEMBLY
2 - LINKAGE ATTACHING CLIP
3 - LATCH TO OUTSIDE HANDLE
4 - DOOR ASSEMBLY
5 - LATCH ATTACHING SCREW(S)
6 - DOOR WIRING HARNESS
7 - LATCH COVER TO INNER PANEL RETAINER
8 - REMOTE LOCK ACTUATOR CABLE
9 - RELEASE HANDLE ACTUATOR CABLE
10 - POWER LOCK LATCH ASSEMBLY

ADJUSTMENTS

ADJUSTMENT

(1) Locate access hole and remove the mylar tape covering it. (Fig. 25)

(2) Insert a 5/32 inch hex-wrench through hole and into adjustment screw. Loosen screw.

(3) Operate outside handle several times to release any restriction because of misalignment.

(4) Tighten adjustment screw to 3 N·m (30 in. lbs.).

(5) Test handle for proper operation.

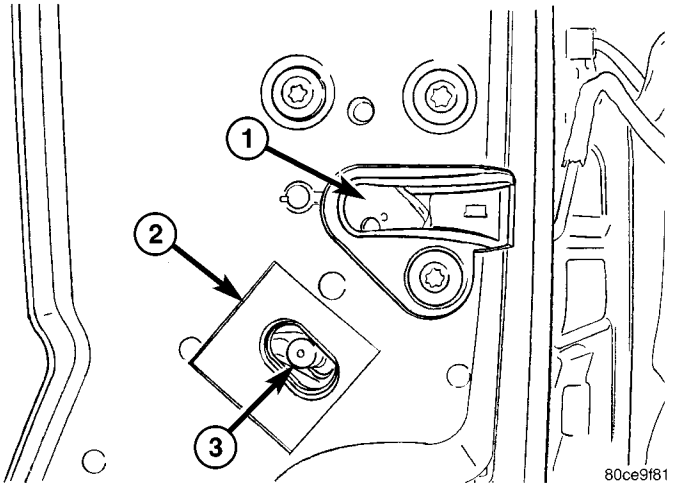


Fig. 25 LATCH ADJUSTMENT SCREW

1 - DOOR LATCH
2 - MYLAR TAPE
3 - ADJUSTMENT SCREW

LATCH STRIKER

REMOVAL

(1) Mark outline of door striker on C-pillar to aid in installation.
(2) Remove screws attaching door latch striker to C-pillar (Fig. 26).
(3) Remove door latch striker from vehicle.
(4) Retrieve any shims found between latch striker and C-pillar.

INSTALLATION

(1) Position latch striker and any shims retrieved on vehicle (Fig. 26).
(2) Loosely install screws attaching latch striker to C-pillar.
(3) Align latch striker to outline on C-pillar made previously.
(4) Tighten fasteners to 26 N·m (19 ft. lbs.) torque.
(5) Verify door fit and operation. Adjust latch striker as necessary.

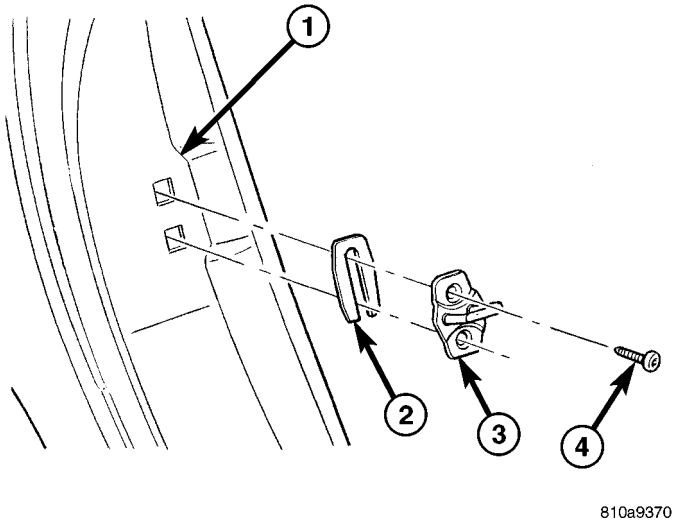


Fig. 26 DOOR LATCH STRIKER

1 - C-PILLAR
2 - DOOR LATCH STRIKER SPACER
3 - DOOR LATCH STRIKER
4 - ATTACHING SCREW(S)

ADJUSTMENTS

ADJUSTMENT

(1) Using a grease pencil or equivalent, mark the position of the striker to aid in adjustment.
(2) Loosen the striker bolts.
(3) Change the striker position to adjust the rear gap and flush measurement. (Refer to 23 - BODY/ BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS)
(4) Tighten fasteners to 26 N·m (19 ft. lbs.) torque.

TRIM PANEL

DESCRIPTION

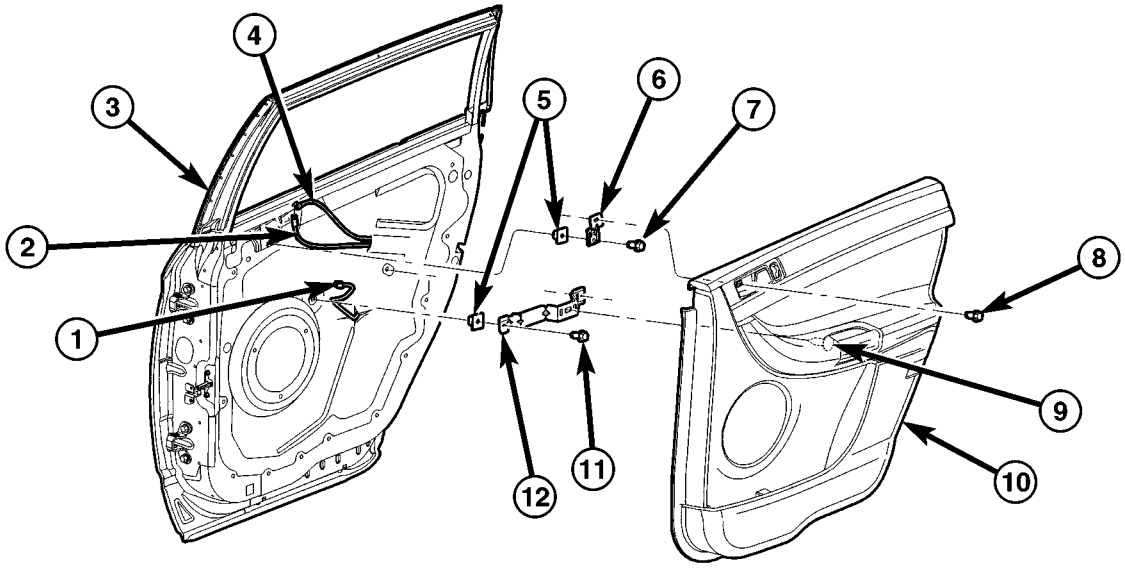


Fig. 27 REMOVE REAR DOOR TRIM PANEL

1 - DOOR WIRE HARNESS
2 - REMOTE LOCK REAR ACTUATOR CABLE
3 - REAR DOOR
4 - RELEASE HANDLE ACTUATOR CABLE
5 - PLASTIC NUT
6 - DOOR INSIDE REMOTE HANDLE BRACKET
7 - REMOTE HANDLE BRACKET TO DOOR SCREW
8 - REMOTE HANDLE BRACKET TO DOOR SCREW
9 - FASTENER CLIP
10 - DOOR TRIM PANEL
11 - PULL HANDLE TO BRACKET SCREW
12 - DOOR PULL CUP BRACKET

REMOVAL

(1) Release door latch and open door.
(2) Lower door glass.
(3) Open remote handle trim plug and remove screw from inside arm rest pull cup (Fig. 27).
(4) Open remote handle trim plug and remove screw from behind inside remote handle (Fig. 28).
(5) Disengage push-in fasteners attaching trim to door panel around perimeter of trim panel (Fig. 29).
(6) Tilt trim panel outward to clear locator pins on backside of trim panel.
(7) Disconnect trim panel from retainer channel in inner belt weatherstrip at top of door by lifting while gently jiggling.

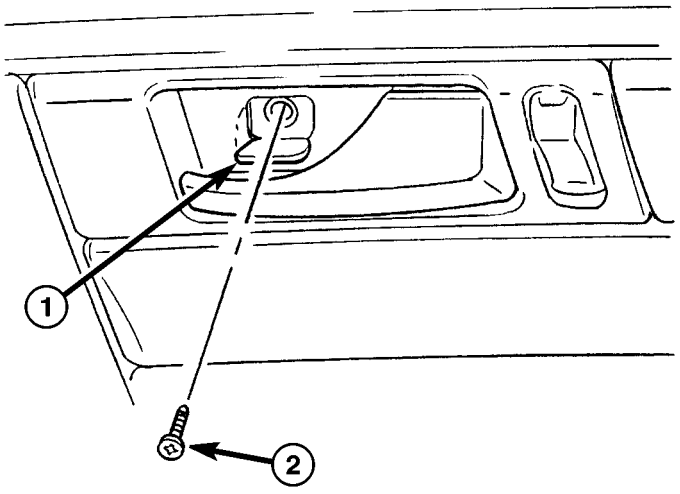


Fig. 28 REMOTE HANDLE ATTACHING SCREW

1 - REMOTE HANDLE TRIM PLUG
2 - REMOTE HANDLE ATTACHING SCREW

TRIM PANEL (Continued)

(8) Move trim panel away from door and disengage actuator cables attaching inside remote handle (Fig. 30) and (Fig. 31).

(9) Disconnect wire connectors to switches.

CAUTION: Do not allow door trim panel to hang by the wire connector or wiring.

(10) Disconnect wire connector from power door lock switch, mirror switch, and power window switch if so equipped.

(11) Remove trim panel from door.

INSTALLATION

(1) Place trim panel in position.

(2) Connect wire connector to power door lock switch, mirror switch, and power window switch if so equipped.

CAUTION: Do not allow door trim panel to hang by the wire connector or wiring.

(3) Move trim panel away from door and engage actuator cables attaching inside remote handle (Fig. 30) and (Fig. 31).

(4) Connect trim panel to retainer channel in inner belt weatherstrip at top of door gently jiggling while lowering into position.

(5) Tilt trim panel outward to align locator pins into position on backside of trim panel (Fig. 29).

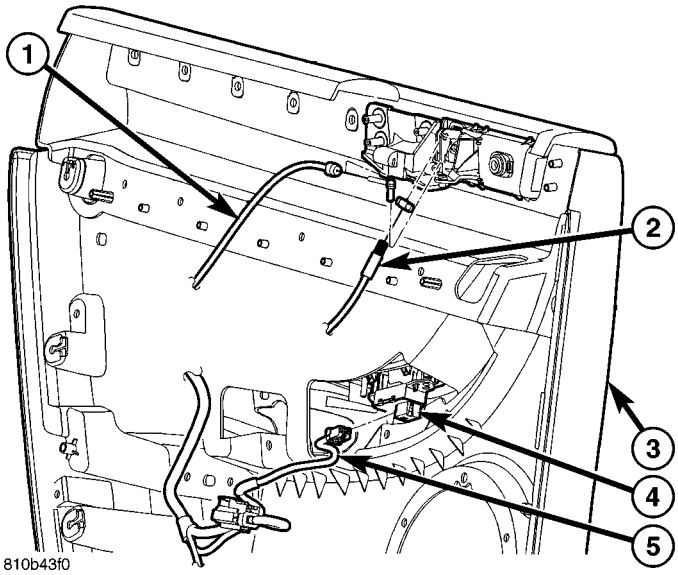


Fig. 30 DISCONNECT REAR DOOR TRIM PANEL

1 - RELEASE HANDLE ACTUATOR
2 - REMOTE LOCK ACTUATOR CABLE
3 - DOOR TRIM PANEL
4 - POWER WINDOW SWITCH CONNECTOR
5 - DOOR WIRE HARNESS

(6) Applying hand pressure engage push pin fasteners attaching trim panel to door around perimeter of trim panel.

(7) Install screw behind inside remote handle and close remote handle trim plug (Fig. 28).

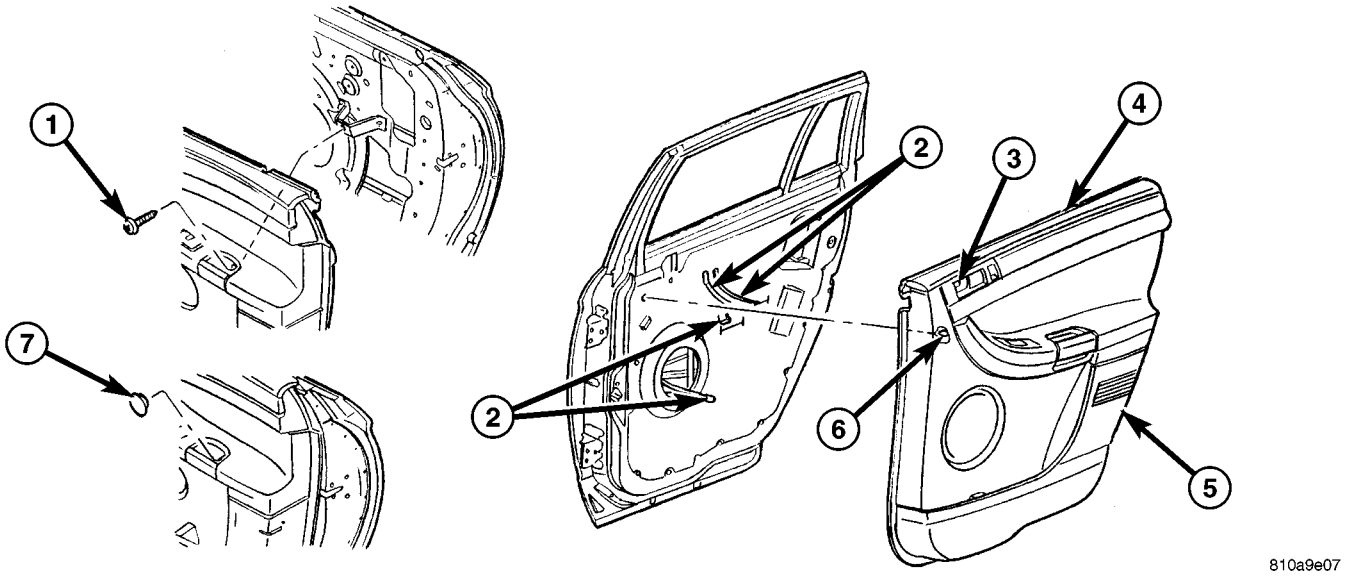


Fig. 29 DOOR TRIM PANEL

1 - ARM REST PULL HANDLE ATTACHING SCREW
2 - ENSURE MECHANICAL, ELECTRICAL AND LOCK CLIP ARE THROUGH INNER PANEL
3 - DOOR TRIM ATTACHING SCREW
4 - TOP EDGE OF DOOR TRIM PANEL
5 - DOOR TRIM PANEL
6 - TRIM PANEL LOCATORS
7 - ARMREST PULL CUP PLUG

TRIM PANEL (Continued)

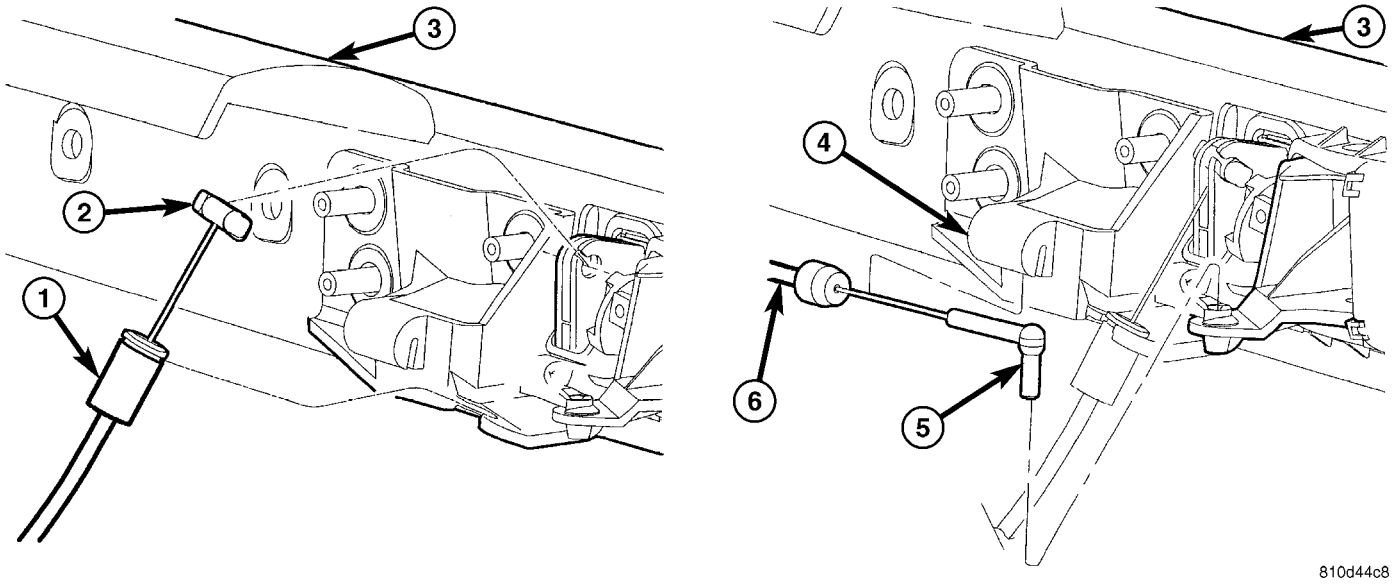


Fig. 31 REAR DOOR TRIM PANEL MECHANICAL CONNECTIONS

1 - MECHANICAL CABLE
2 - FERRULE END OF CABLE
3 - DOOR TRIM PANEL
4 - CABLE SLOT
5 - REMOTE HANDLE CABLE END
6 - REMOTE HANDLE CABLE

(8) Install screw inside arm rest pull cup and close remote handle trim plug (Fig. 27).
(9) Raise door glass.
(10) Close door.

WATERSHIELD

REMOVAL

(1) Remove door trim panel. (Refer to 23 - BODY/ DOORS - REAR/TRIM PANEL - REMOVAL).

NOTE: Care must be taken when routing electrical wiring & cables thorough access holes to prevent tearing of liner material.

(2) Route wiring, window switch, and remote handle cables through watershield.
(3) Pull courtesy light wiring through watershield.
(4) Peel watershield away from adhesive around perimeter of inner door panel (Fig. 32).
(5) Remove watershield.

INSTALLATION

(1) Place watershield into position (Fig. 32).

NOTE: Care must be taken when routing electrical wiring & cables thorough access holes to prevent tearing of liner material.

(2) Pull courtesy light wiring through watershield.

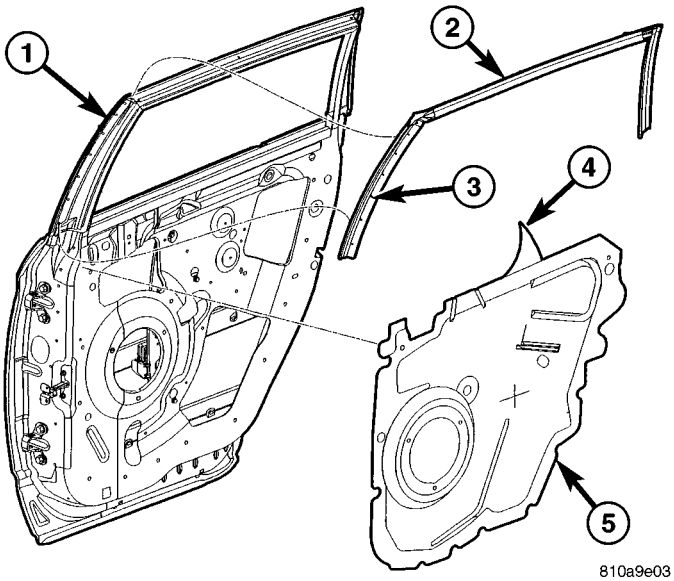


Fig. 32 DOOR WATERSHIELD

1 - REAR DOOR ASSEMBLY
2 - DOOR HEADER WEATHERSTRIP
3 - PUSH PINS ATTACHING WEATHERSTRIP
4 - PAPER BACKING
5 - DOOR WATERSHIELD

(3) Route wiring, switch bezel, window switch, and remote handle cables through watershield.
(4) Insure that enough adhesive remains to securely retain the watershield to inner door panel. Replace as necessary
(5) Install door trim panel. (Refer to 23 - BODY/ DOORS - REAR/TRIM PANEL - INSTALLATION).

WINDOW REGULATOR

REMOVAL

(1) Remove door trim panel. (Refer to 23 - BODY/ DOORS - REAR/TRIM PANEL - REMOVAL).

(2) Remove watershield. (Refer to 23 - BODY/ DOORS - REAR/WATERSHIELD - REMOVAL).

(3) Remove inner belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT WEATHERSTRIP - REMOVAL).

(4) Disconnect door glass from lift plate bracket and tape glass in the up position (Fig. 33). (Refer to 23 - BODY/DOORS - REAR/DOOR GLASS - REMOVAL).

(5) Disconnect wire connector from power window motor (Fig. 34).

(6) Loosen screws attaching regulator and window motor to inner door panel (Fig. 35).

(7) Remove regulator from inner door panel (Fig. 36).

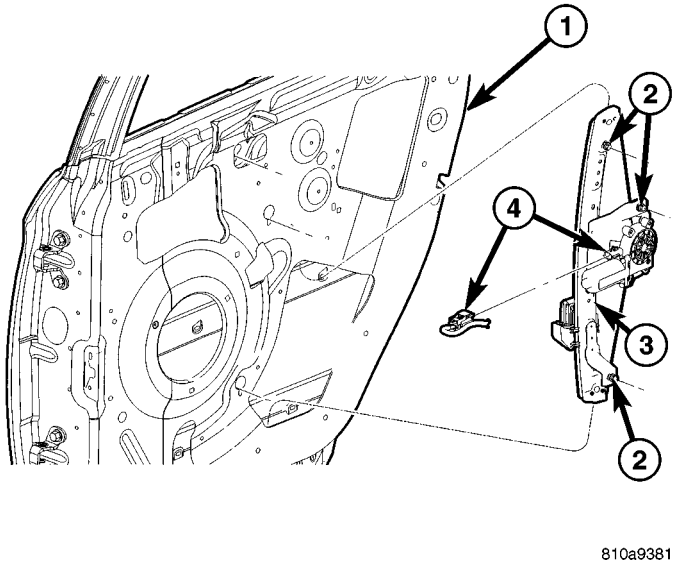


Fig. 34 POWER WINDOW REGULATOR

1 - DOOR ASSEMBLY
2 - ATTACHING SCREW(S)
3 - REAR DOOR POWER WINDOW REGULATOR
4 - DOOR WIRE HARNESS AND WIRE CONNECTOR TO MOTOR

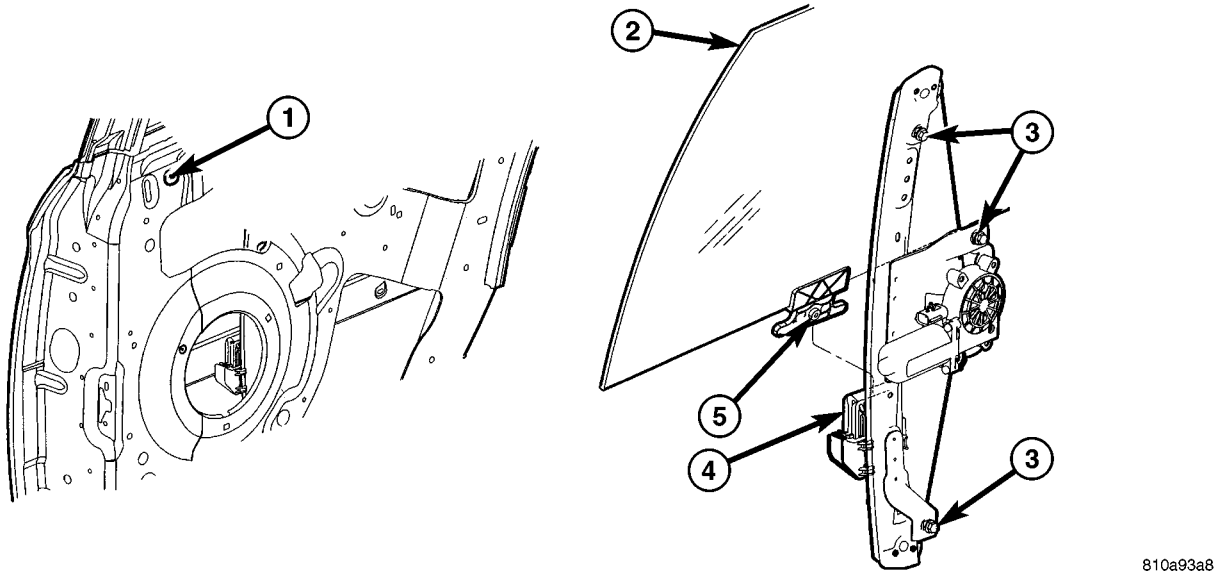


Fig. 33 REGULATOR LIFT PLATE AND SPRING CLIP

1 - INSERT FLAT TOOL TO HOLD GLASS IN THE UP POSITION
2 - DOOR GLASS
3 - ATTACHING REGULATOR SCREW(S) TO INNER DOOR PANEL
4- REAR DOOR REGULATOR LIFT PLATE BRACKET
5 - REGULATOR LIFT PLATE

WINDOW REGULATOR (Continued)

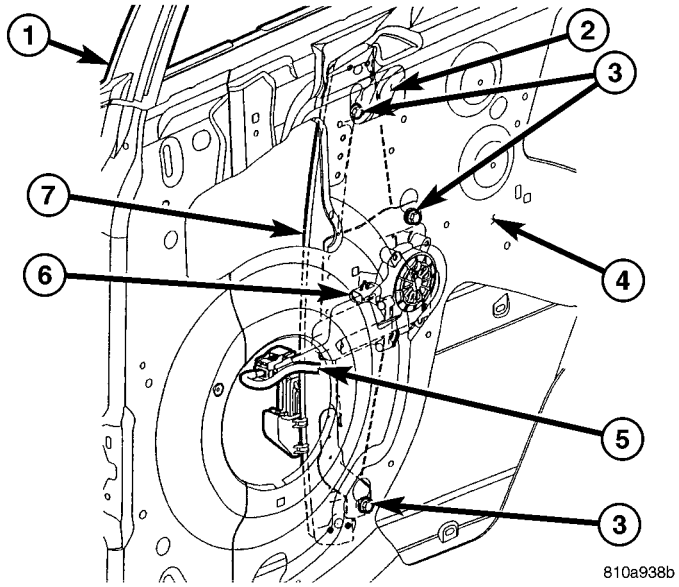


Fig. 35 POWER WINDOW REGULATOR AND MOTOR

1 - DOOR ASSEMBLY
2 - DOOR BELT INNER REINFORCEMENT
3 - REGULATOR TO INNER DOOR PANEL ATTACHING SCREWS
4 - DOOR INNER PANEL
5 - DOOR WIRING HARNESS
6 - WINDOW LIFT MOTOR CONNECTOR
7 - WINDOW REGULATOR

INSTALLATION

(1) Place regulator into inner door panel (Fig. 36).

(2) Tighten screws attaching regulator and window motor to inner door panel (Fig. 35). Tighten screws to 9 N·m (80 in. lbs.) torque.

(3) Connect wire connector to power window motor (Fig. 34).

(4) Connect door glass to lift plate bracket (Fig. 33). (Refer to 23 - BODY/DOORS - REAR/DOOR GLASS - INSTALLATION).

(5) Install inner belt molding. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT WEATHERSTRIP - INSTALLATION).

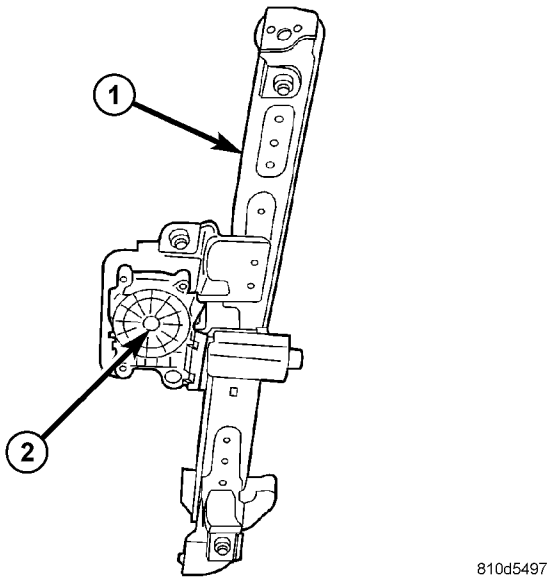


Fig. 36 REAR DOOR WINDOW REGULATOR

1 - REAR DOOR WINDOW REGULATOR
2 - WINDOW MOTOR

(6) Install watershield. (Refer to 23 - BODY/DOORS - REAR/WATERSHIELD - INSTALLATION).

(7) Install door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).

REAR DOOR QUARTER GLASS

REMOVAL

(1) For rear door quarter glass removal (Refer to 23 - BODY/DOORS - REAR/GLASS RUN CHANNEL - REMOVAL).

INSTALLATION

(1) For rear door quarter glass installation (Refer to 23 - BODY/DOORS - REAR/GLASS RUN CHANNEL - INSTALLATION).

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ACCESSORY DRIVE SPLASH SHIELD

REMOVAL

(1) Hoist and support vehicle on safety stands, as necessary.

(2) Move front wheel as necessary to access the splash shield.

(3) Remove four push pins attaching accessory drive splash shield to engine cradle (Fig. 1).

(4) Remove accessory drive splash shield from vehicle.

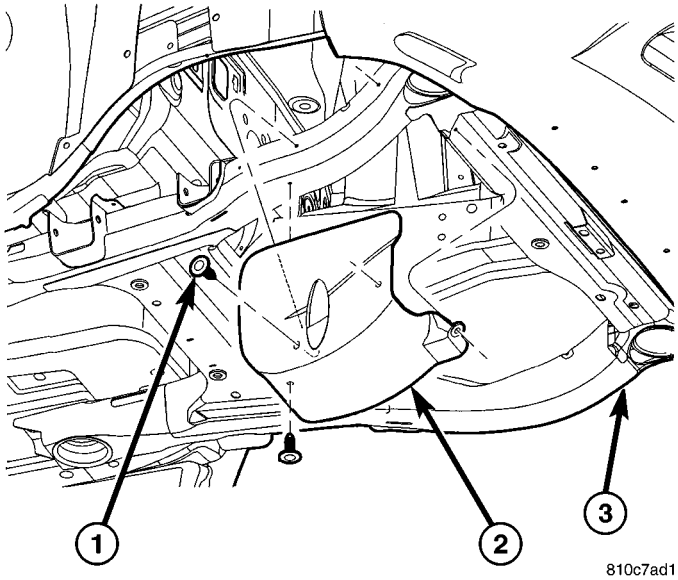


Fig. 1 ACCESSORY DRIVE SPLASH SHIELD

1 - PUSH PIN(S)
2 - ACCESSORY DRIVE SPLASH SHIELD
3 - ENGINE CRADLE

INSTALLATION

(1) Place accessory drive splash shield into position.

(2) Install new push pins attaching accessory drive splash shield to engine cradle (Fig. 1).

(3) Move front wheels straight ahead.

(4) Remove safety stands and lower vehicle, as necessary.

A-PILLAR MOLDING

REMOVAL

(1) Remove A-pillar trim molding (Fig. 2). Pulling trim away from windshield using your hand or a trim tool to disengage the molding from the spring clips. Starting at the top of molding and work downward disengaging all four spring clips. Use care not to damage A-pillar molding.

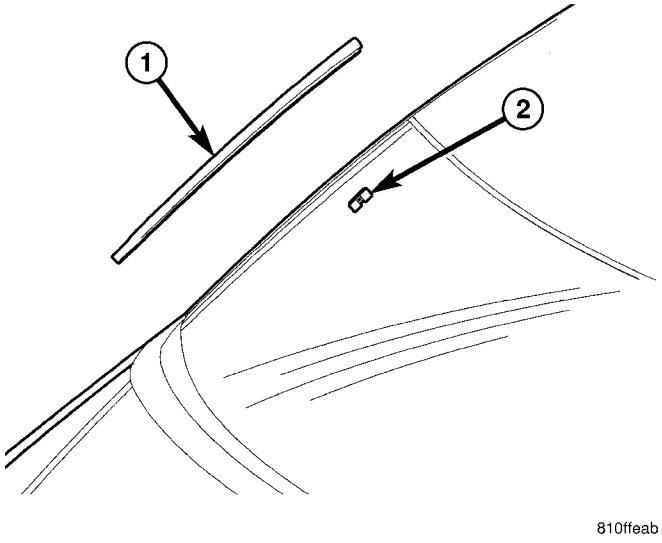


Fig. 2 A-PILLAR MOLDING

1 - A-PILLAR MOLDING
2 - A-PILLAR MOLDING TO WINDSHIELD FRAME CLIP(S)

INSTALLATION

(1) Position A-pillar molding windshield clip into position. Tuck lower end of molding under fender, and align to overlay molding to existing roof molding at top of windshield. Maintain a 2 mm gap to the roof molding for thermal expansion.

(2) Start from the top to the bottom inserting molding into windshield frame clips.

APPLIQUE - OUTSIDE SILL

REMOVAL

(1) Raise and support vehicle (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(2) Remove rear wheel and turn front wheel to access sill outside applique.

(3) Remove splash shield screws attaching the forward end of the front sill outside applique (Fig. 3).

(4) Remove plastic rivets. Starting at the front of the sill outside applique working to the rear.

(5) Remove splash shield screw attaching rearward edge of rear sill outside applique.

(6) Using a trim stick C-4755 or equivalent, disengage the locking tabs and two sided tape attaching sill outside applique.

(7) May need to warm the tape area and body metal to approximately 27° C (80° F) using a suitable heat lamp or heat gun to release tape.

(8) Remove the front and then the rear sill outside applique.

APPLIQUE - OUTSIDE SILL (Continued)

(9) Remove push pin fasteners attaching sill door trim inner seals to the sill outside applique.

(10) Remove sill door inner seals.

(11) Remove adhesive tape residue from painted surface of vehicle.

(12) Use a 3M Scotch-Brite™ Molding Adhesive and Stripe Removal Disc, or equivalent, to clean adhesive residue from painted surfaces. These products are available from automotive paint suppliers. Refer to instructions supplied with the specific product for proper usage.

INSTALLATION

(1) If sill outside applique is to be reused;

(a) Remove tape residue from sill outside applique.

(b) Clean back of molding with Mopar® Super Kleen, or equivalent.

(c) Wipe molding dry with lint free cloth.

(d) Apply a single coat of Mopar® TPO Molding Prep to tape side of molding and allow to dry thoroughly.

(e) Apply new body side molding (two sided adhesive) tape to the rear and front area of sill outside applique.

(2) Clean body surface with Mopar® Super Kleen, or equivalent. Wipe surface dry with lint free cloth.

(3) Remove protective cover from tape on back of applique.

(4) Place rear sill outside applique into position using the self locating tabs (Fig. 3).

(5) Using rivet gun, install plastic rivets and install screw.

(6) Place front sill outside applique position

(7) Using rivet gun, install plastic rivets and install screws.

(8) Using a roller tool, roll the applique taped area with enough force to assure adhesion. Do not apply excessive force, or damage to body panels may result.

NOTE: Replace damage push pins.

(9) Install sill door inner seals. Set push pins into position and press to the lock position.

(10) Install rear wheel and straighten front wheel.

(11) Lower vehicle.

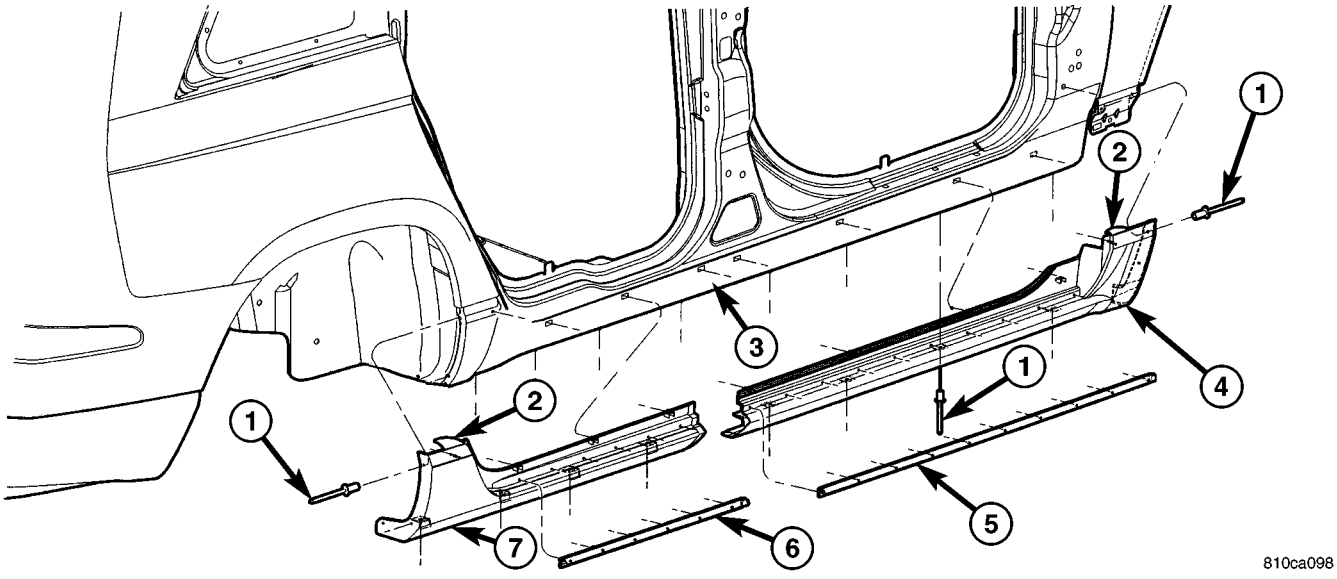


Fig. 3 FRONT AND REAR SILL OUTSIDE APPLIQUE

1 - PLASTIC RIVET
2 - ADHESIVE TAPE BACKING
3 - BODY SIDE OUTER PANEL
4 - FRONT SILL OUTSIDE APPLIQUE
5 - FRONT DOOR SILL TRIM INNER SEAL
6 - REAR DOOR SILL TRIM INNER SEAL
7 - REAR SILL OUTSIDE APPLIQUE

APPLIQUE - ROOF SIDE APERTURE

DESCRIPTION

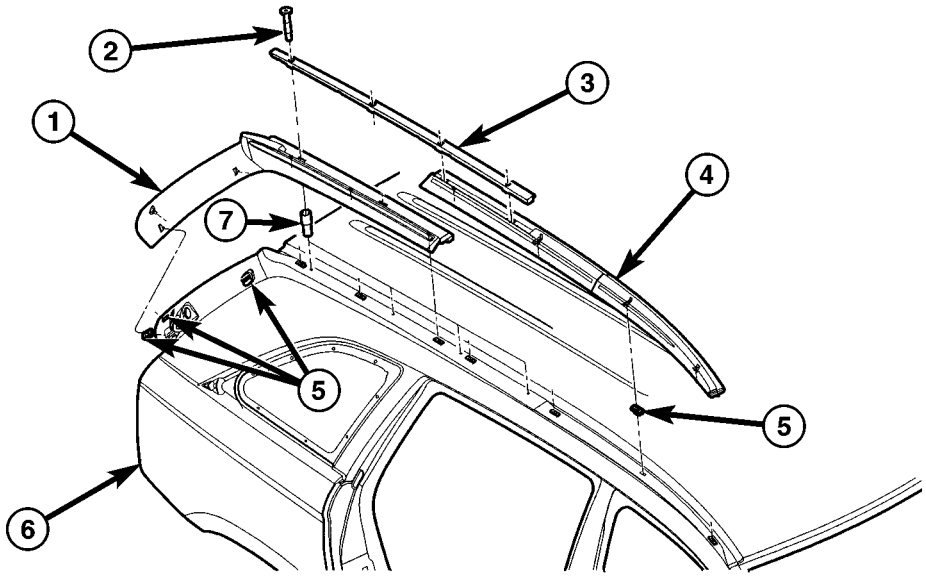


Fig. 4 SIDE, D-PILLAR APERTURE APPLIQUE AND LUGGAGE RACK SIDE RAIL

1 - D-PILLAR ROOF SIDE APERTURE APPLIQUE
2 - TORX SCREW ®
3 - LUGGAGE RACK SIDE RAIL
4 - SIDE APERTURE APPLIQUE
5 - PLASTIC RETAINER(S)
6 - BODY SIDE
7 - RIVET NUT(S)

REMOVAL

(1) Remove side rail right/left (Fig. 4). If equipped with luggage rack, remove luggage rack assembly (Refer to 23 - BODY/EXTERIOR/APPLIQUE - DESCRIPTION) and (Refer to 23 - BODY/EXTERIOR/LUGGAGE RACK - REMOVAL).

(2) Using a trim stick C-4755 or equivalent, disengage the locking tabs and remove side front aperture applique (Fig. 5).

(3) Remove front side aperture applique from vehicle.

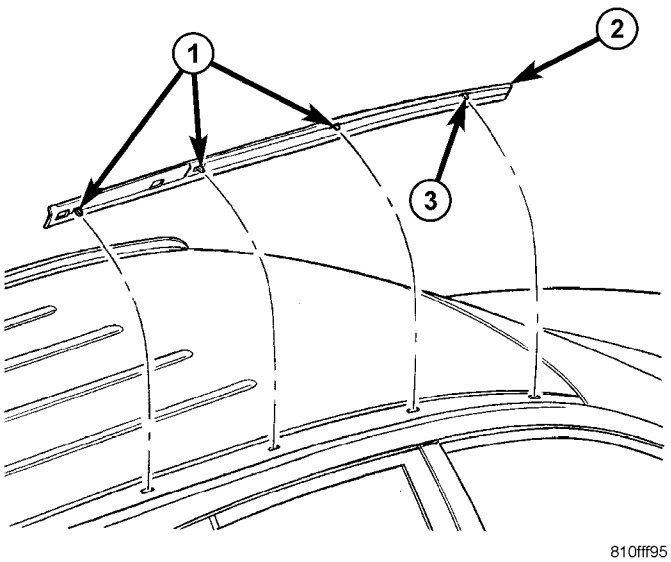


Fig. 5 SIDE APERTURE TO ROOF APPLIQUE

1 - TWO WAY LOCATING PINS
2 - SIDE APERTURE APPLIQUE FRONT
3 - FOUR WAY LOCATING PIN

APPLIQUE - ROOF SIDE APERTURE (Continued)

(4) Disengage the locking tabs along roof and side area to remove D-pillar aperture applique (Fig. 6).

(5) Remove D-pillar aperture applique from vehicle.

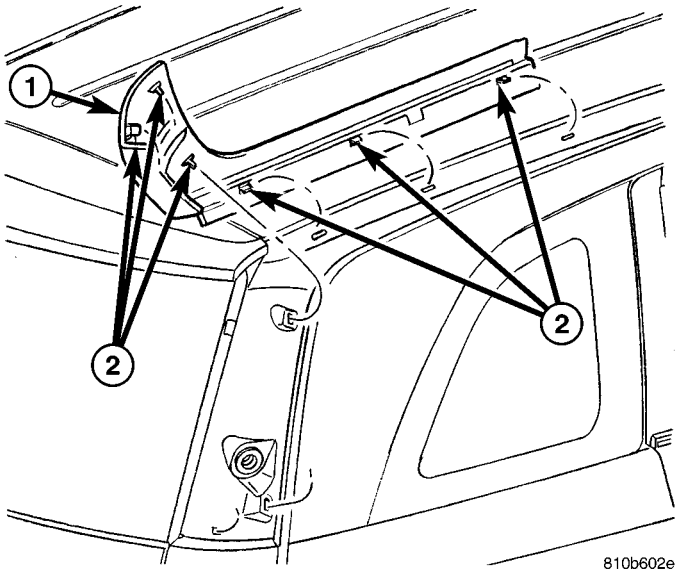


Fig. 6 D-PILLAR APERTURE APPLIQUE

1 - D-PILLAR APERTURE APPLIQUE
2 - LOCATING PINS

INSTALLATION

NOTE: Inspect all grommets for damage and are fully seated prior to installation. In order to prevent water leaks.

(1) Check that all grommets are in position and seated (Fig. 7).

(2) Open liftgate, place D-pillar aperture applique in position over rear corner of aperture panel to locate (Fig. 6).

(3) Start front locator pins into grommets on side area of D-pillar. Press down on applique to lock into position and finish with grommets along roof line.

(4) Place side aperture applique into position (Fig. 5)

(5) Start locator pins into grommets. Press down on applique to lock into position moving to the rear.

(6) Install side rail (Fig. 4). If equipped with luggage rack install luggage rack assembly (Refer to 23 - BODY/EXTERIOR/APPLIQUE - DESCRIPTION) and (Refer to 23 - BODY/EXTERIOR/LUGGAGE RACK - INSTALLATION).

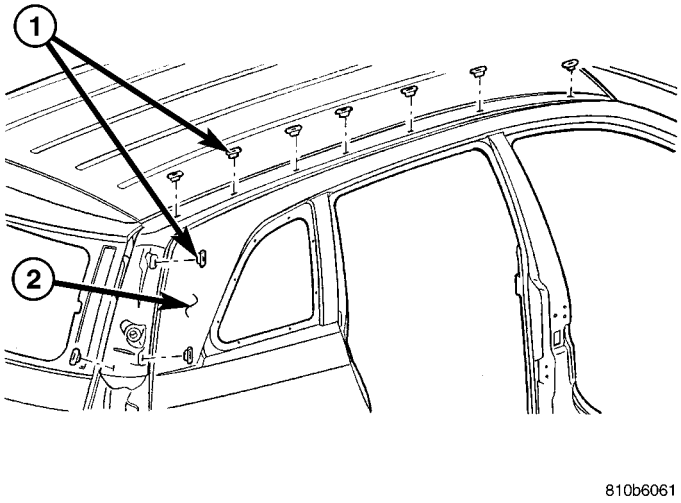


Fig. 7 APPLIQUE PLASTIC FASTENER(S)

1 - PLASTIC RETAINER (10)
2 - D-PILLAR

BODY SIDE CLADDING

REMOVAL

NOTE: If molding is to be re-used, use care when removing.

(1) Warm the affected stick on molding and body metal to approximately 27° C (80° F) using a suitable heat lamp or heat gun (Fig. 8) or (Fig. 9).

(2) Pull stick on molding from painted surface.

(3) Remove adhesive tape residue from painted surface of vehicle.

(4) Use a 3M Scotch-Brite™ Molding Adhesive and Stripe Removal Disc, or equivalent, to clean adhesive residue from painted surfaces. These products are available from automotive paint suppliers. Refer to instructions supplied with the specific product for proper usage.

INSTALLATION

(1) If molding is to be reused;

(a) Remove tape residue from molding.

(b) Clean back of molding with Mopar® Super Kleen, or equivalent.

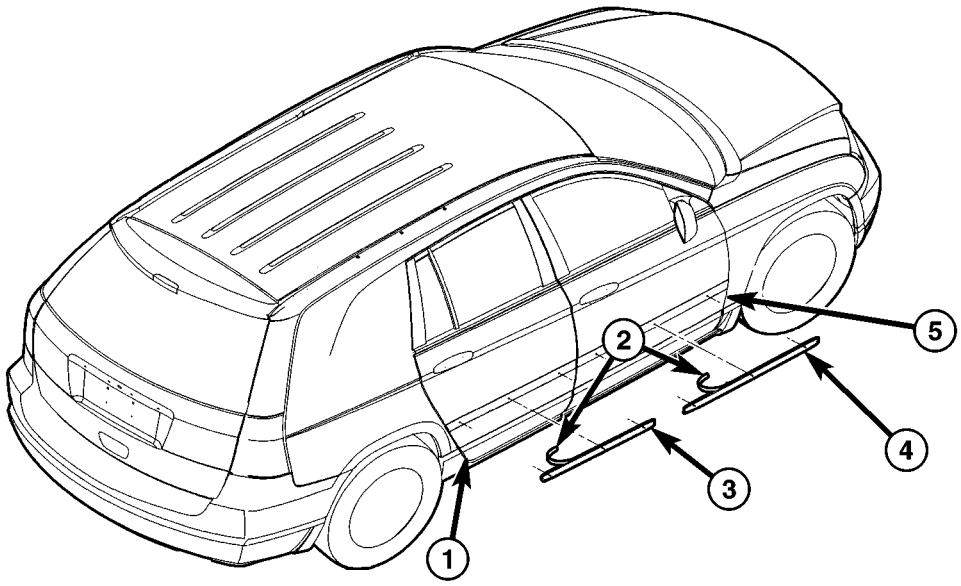
(c) Wipe molding dry with lint free cloth.

(d) Apply a single coat of Mopar® TPO Molding Prep to tape side of molding and allow to dry thoroughly.

(e) Apply new body side molding (two sided adhesive) tape to back of molding.

(2) Clean body surface with Mopar® Super Kleen, or equivalent. Wipe surface dry with lint free cloth.

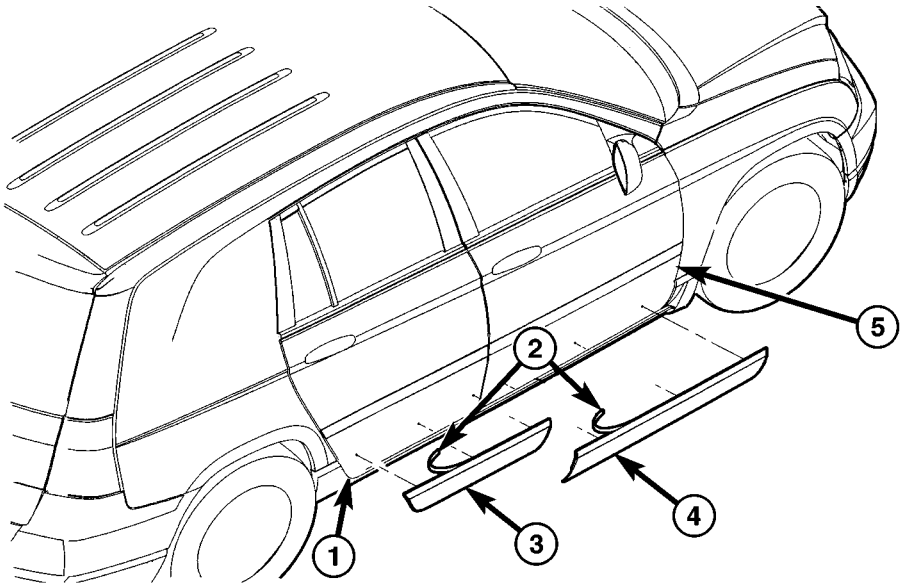
BODY SIDE CLADDING (Continued)



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Fig. 8 FRONT AND REAR DOOR OUTSIDE MOLDING

1 - REAR DOOR PANEL
2 - ADHESIVE TAPE BACKING
3 - REAR DOOR OUTSIDE MOLDING
4 - FRONT DOOR OUTSIDE MOLDING
5 - FRONT DOOR PANEL



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Fig. 9 FRONT AND REAR DOOR OUTSIDE APPLIQUE

1 - REAR DOOR PANEL
2 - ADHESIVE TAPE BACKING
3 - REAR DOOR OUTSIDE APPLIQUE
4 - FRONT DOOR OUTSIDE APPLIQUE
5 - FRONT DOOR PANEL

(3) Remove protective cover from tape on back of molding.

(4) Apply molding to body from front to rear, inserting locator pins into holes in body panel (Fig. 8) or (Fig. 9).

(a) Align front self locating pin to vehicle first.

(b) Then rear locating pins to the 4-way slots

(5) Using a roller tool, roll molding onto body panel with enough force to assure adhesion. Do not apply excessive force, or damage to body panels may result.

COWL PLENUM GRILLE

REMOVAL

(1) Remove wiper arms. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - REMOVAL).

(2) Release hood latch and open hood, as necessary.

(3) Remove the two (2) push pin fasteners securing cowl plenum grille to top cowl plenum panel (Fig. 10).

(4) Using a trim stick C-4755 or equivalent, disengage the locking tabs and remove cowl plenum grill from the body.

CAUTION: To prevent hood scratching of cowl grille before removal, cover outboard exterior ends of cowl plenum grille with masking tape or equivalent method.

NOTE: Do not over bend cowl plenum grille during removal. Bend cowl plenum grille just enough to clear top of wiper pivot shaft and bottom rear corner of hood.

(5) Remove cowl plenum grille from vehicle.

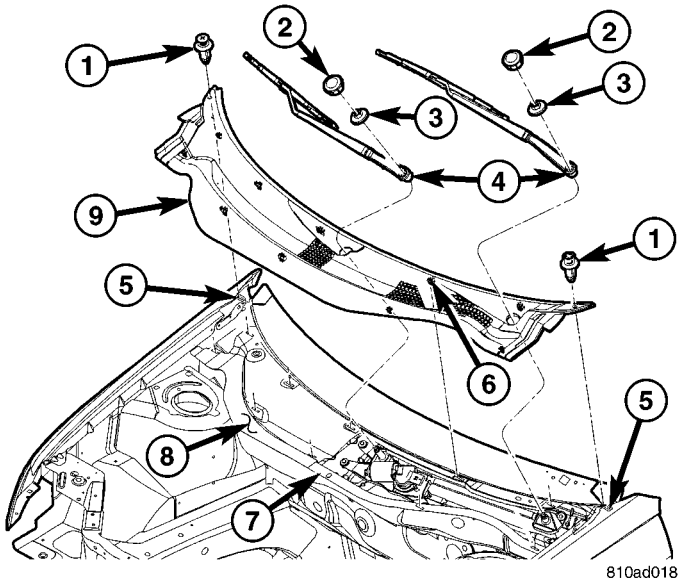


Fig. 10 COWL PLENUM GRILLE

1 - PUSH PIN FASTENER
2 - WIPER ARM NUT CAP
3 - WIPER ARM ATTACHING NUT
4 - WIPER ARM AND BLADE
5 - LOWER HALF HOOD HINGE
6 - COWL PLENUM CLIP(S)
7 - COWL PLENUM FRONT PANEL
8 - TOP COWL PLENUM PANEL
9 - COWL PLENUM GRILLE

INSTALLATION

(1) Open hood, as necessary.

(2) Place cowl plenum grille into position.

(3) Press down on cowl plenum grille to lock the locking tabs.

(4) Install the two (2) push pin fasteners securing cowl plenum grille to top cowl plenum panel (Fig. 10).

(5) Remove wiper arms. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - INSTALLATION).

EXHAUSTER

REMOVAL

(1) Using a trim stick C-4755 or equivalent, pry exhauster grille from the lower center edge of the grille (Fig. 11).

(2) Remove grille from opening.

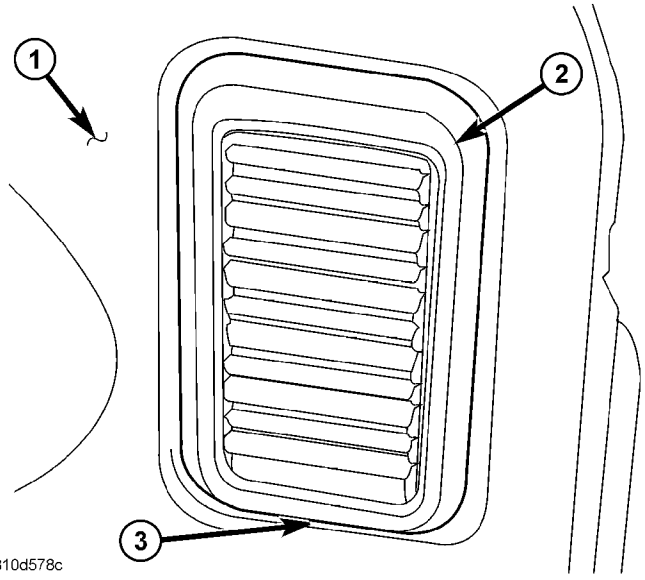


Fig. 11 EXHAUSTER GRILLE

1 - AREA BEHIND REAR FASCIA
2 - EXHAUSTER GRILLE
3 - REMOVAL AREA

INSTALLATION

(1) Place exhauster grille into opening.

(2) Work the exhauster grille lip into position in opening (Fig. 11).

EXTERIOR NAME PLATES - ADHESIVE

REMOVAL

(1) Mark reference points before removing.
(2) Using a heat gun gently apply heat in a circular motion to loosen the adhesive bond.
(3) With your fingernail lift up and peel away name plates/tape from panel, using a heat gun as you go.
(4) Clean off all traces of adhesive from the panel(s) with a general purpose adhesive remover.

INSTALLATION

(1) Clean panel surface with isopropy alcohol.
(2) Remove paper carrier and align name plates/tape to reference points or adjacent panel.
(3) Install and press securely, using a plastic spreader to eliminate all air bubbles.
(4) Remove top protective carrier.
(5) Clean away any reference points.

EXTERIOR NAME PLATES - TAPE

REMOVAL

(1) Mark reference points before removing.
(2) Using a heat gun gently apply heat in a circular motion to loosen the adhesive bond.
(3) Using a nonmetallic prying device, such as a plastic or wood trim stick gently pry up at corners and remove.
(4) Clean off all traces of adhesive or double sided tape from the panel with a general purpose adhesive remover.

INSTALLATION

(1) Clean panel surface with isopropy alcohol.
(2) Align name plates to reference points.
(3) Install and press securely to full adhesive contact
(4) Clean away any reference points.

FRONT FENDER

REMOVAL

(1) Remove headlamp housing. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).
(2) Remove inner splash shield. (Refer to 23 - BODY/EXTERIOR/LF WHEELHOUSE SPLASH SHIELD - REMOVAL).
(3) Remove fender to fascia fasteners.
(4) Remove outboard cowl grille/fender bracket screw (Fig. 12).
(5) Remove fender screws to lower sill panel (Fig. 13).

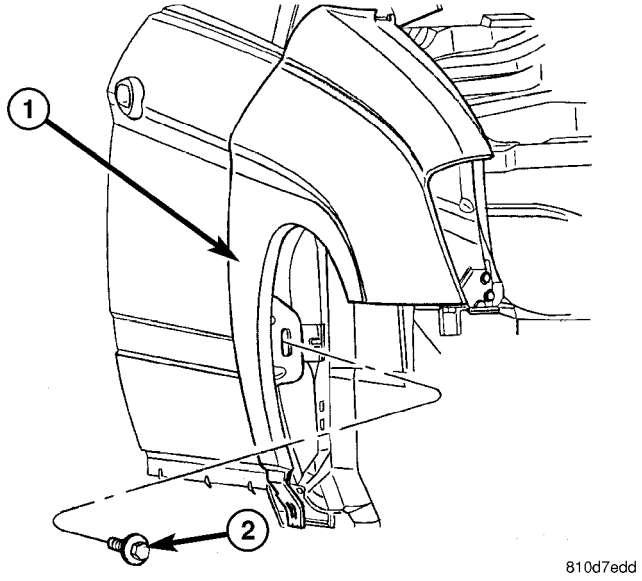


Fig. 12 FENDER BRACKET TO COWL ATTACHING SCREWS

1 - FRONT FENDER
2 - ATTACHING SCREW

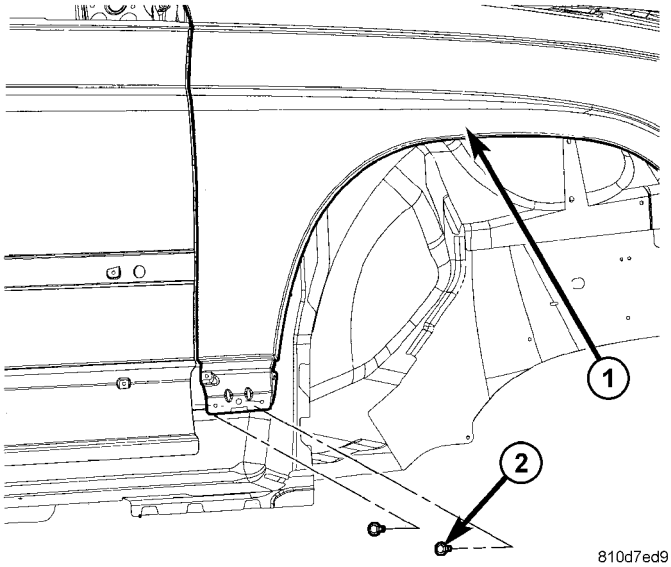


Fig. 13 FENDER TO SILL ATTACHING SCREWS

1 - FRONT FENDER
2 - ATTACHING SCREWS

FRONT FENDER (Continued)

(6) Remove fender screw to A-pillar (Fig. 14).
(7) Pull fascia away from fender.
(8) Remove bolts attaching fender to side shield (Fig. 15).
(9) From inside engine compartment, remove bolts attaching fender to upper rail (Fig. 16).
(10) Remove fender from vehicle.

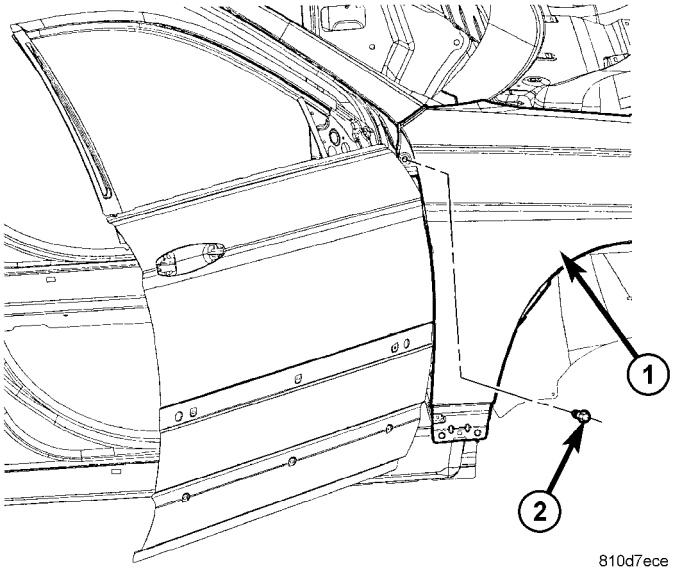


Fig. 14 FENDER TO A-PILLAR ATTACHING SCREWS

1 - FRONT FENDER
2 - ATTACHING SCREW

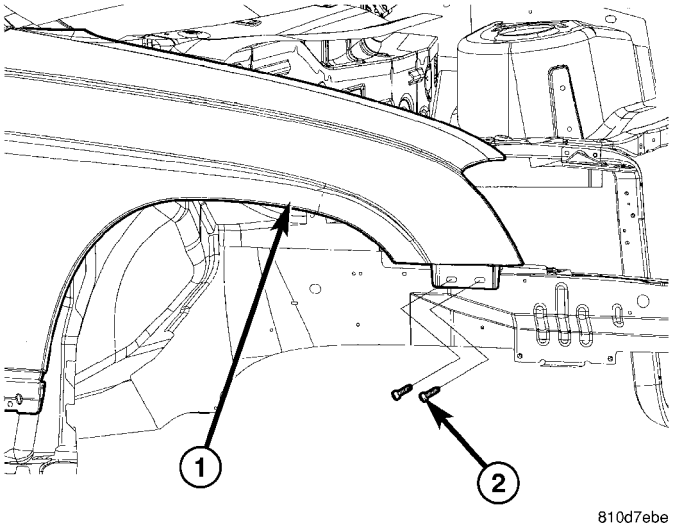


Fig. 15 FENDER TO BODY ATTACHING SCREWS

1 - FRONT FENDER
2 - ATTACHING SCREWS

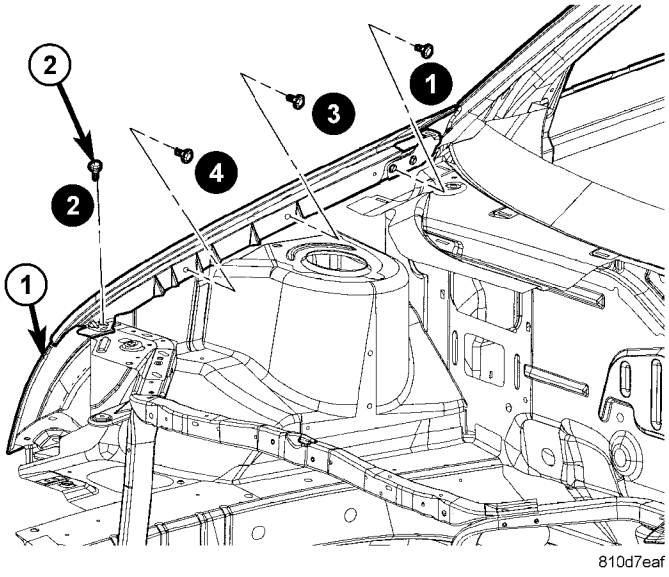


Fig. 16 FRONT FENDER

1 - FRONT FENDER
2 - ATTACHING SCREWS AND TIGHTENING SEQUENCE

INSTALLATION

(1) Place fender in position on vehicle.
(2) From inside engine compartment, start the fender attaching screws to upper rail (Fig. 16).
(3) Pull fascia away from fender.
(4) Start screws attaching fender to side shield (Fig. 15)
(5) Start fender screw to A-pillar (Fig. 14).
(6) Start fender screws to lower sill panel (Fig. 13).
(7) Start outboard cowl grille/fender bracket screw (Fig. 12).
(8) With all screws started check fender for proper alignment. (Refer to 23 - BODY/BODY STRUCTURE/ GAP AND FLUSH - SPECIFICATIONS).
(9) Tighten all fender screws to 9 N·m (80 in. lbs.) torque.

FRONT FENDER (Continued)

(10) Place fender and fascia into position tighten fasteners (Fig. 17).

(11) Install splash shield. (Refer to 23 - BODY/EXTERIOR/LF WHEELHOUSE SPLASH SHIELD - INSTALLATION).

(12) Install headlamp assembly.

FUEL FILL DOOR

REMOVAL

(1) Open fuel filter door.

(2) Remove screws attaching fuel filler tube to filler housing to the rear left side aperture (Fig. 18).

(3) Remove housing from aperture by release locking tabs and pulling outward.

(4) Remove housing from vehicle.

INSTALLATION

(1) Place fuel filter housing into position (Fig. 18).

(2) Pressing on housing to seat the locking tabs.

(3) Install screws attaching fuel filler tube to filler housing.

(4) Close fuel filter door.

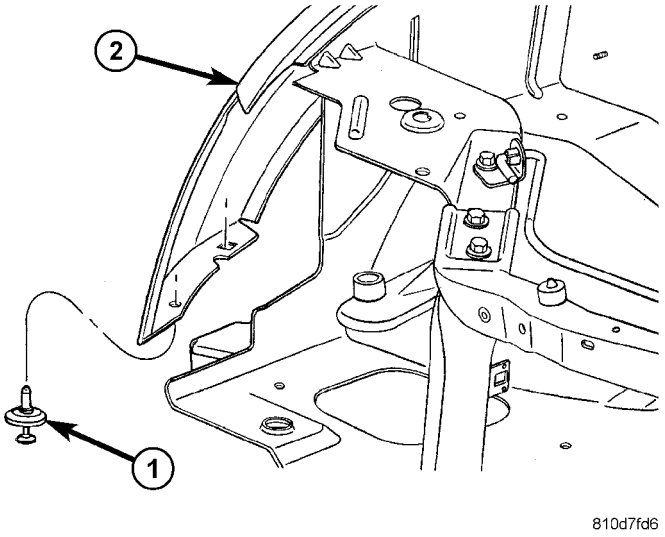


Fig. 17 FASCIA ATTACHING FASTENER

1 - FASCIA ATTACHING FASTENER
2 - FRONT FENDER

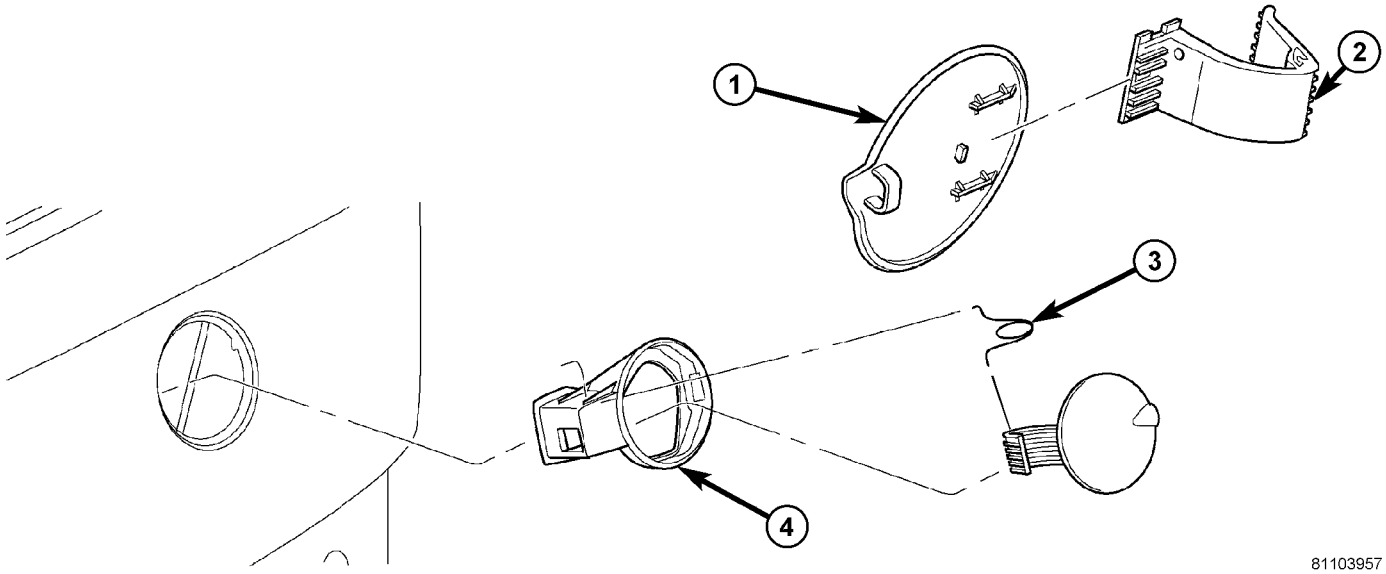


Fig. 18 FUEL FILL DOOR/HINGE AND HOUSING

1 - FUEL DOOR
2 - HINGE ARM
3 - POSITION SPRING
4 - FUEL FILLER HOUSING

GRILLE

REMOVAL

(1) Remove radiator closure (Refer to 23 - BODY/EXTERIOR/CLOSURE PANEL - REMOVAL).

(2) Remove front fascia (Fig. 19) (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).

(3) Remove grille from front fascia (Fig. 20). Using care and depress push pin(s) fasteners to release the grille.

(4) Remove bright chrome molding from Grille (Fig. 21).

(5) Depress molding locking tabs and pull outward to release molding.

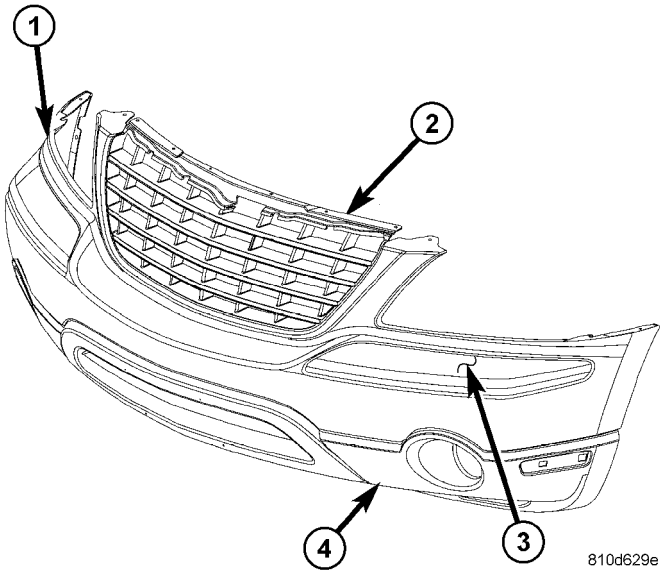


Fig. 19 UPPER FRONT FASCIA

1 - FRONT UPPER FASCIA
2 - GRILLE
3 - BRIGHT CHROME MOLDING
4 - FRONT LOWER FASCIA

INSTALLATION

(1) Place bright chrome molding into position on grille (Fig. 21).

(2) Press molding into the locked position.

(3) Place grille into position on the front fascia (Fig. 20).

(4) Using care, press grille onto push pin(s) fasteners.

(5) Install front fascia (Fig. 19) (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).

(6) Install radiator closure (Refer to 23 - BODY/EXTERIOR/CLOSURE PANEL - INSTALLATION).

(7) Close hood.

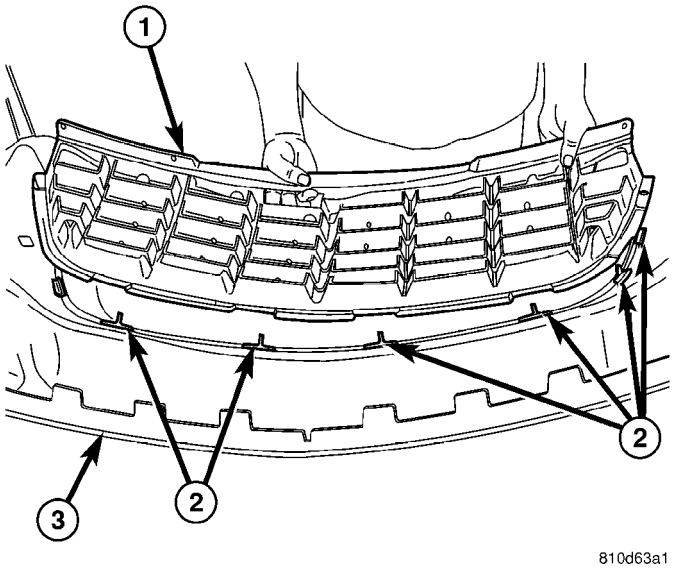


Fig. 20 UPPER FASCIA AND GRILLE

1 - GRILLE
2 - PUSH PIN(S) FASTENER(S)
3 - FRONT UPPER FASCIA

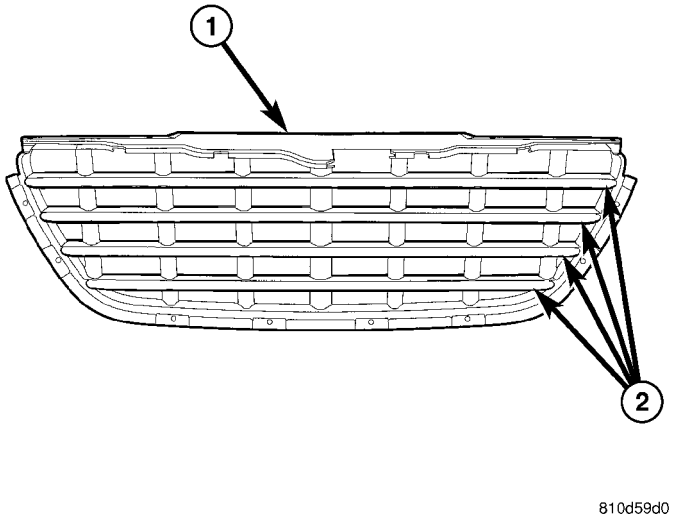


Fig. 21 BRIGHT CHROME MOLDING

1 - GRILLE
2 - BRIGHT CHROME MOLDING

FRONT WHEELHOUSE SPLASH SHIELD

REMOVAL

(1) Hoist and support vehicle on safety stands, as necessary.
(2) Remove front wheel.
(3) Remove five screws and four push pin fasteners attaching splash shield to inner wheelhouse (Fig. 22).
(4) Remove splash shield from vehicle.

INSTALLATION

(1) Place splash shield into position.
(2) Install five screws and four push pin fasteners attaching splash shield to inner wheelhouse (Fig. 22).
(3) Install front wheel.
(4) Remove safety stands and lower vehicle, as necessary.

LUGGAGE RACK

REMOVAL

CAUTION: The luggage rack has to be removed before the cross bars can be remove.

(1) Remove screws attaching side rails (Fig. 23).
(2) Remove luggage rack assembly from vehicle.
(3) Depress crossbar lever down on each side of crossbar to unlock.
(4) Remove crossbar(s) from side rails by sliding bar off the front of the side rails.

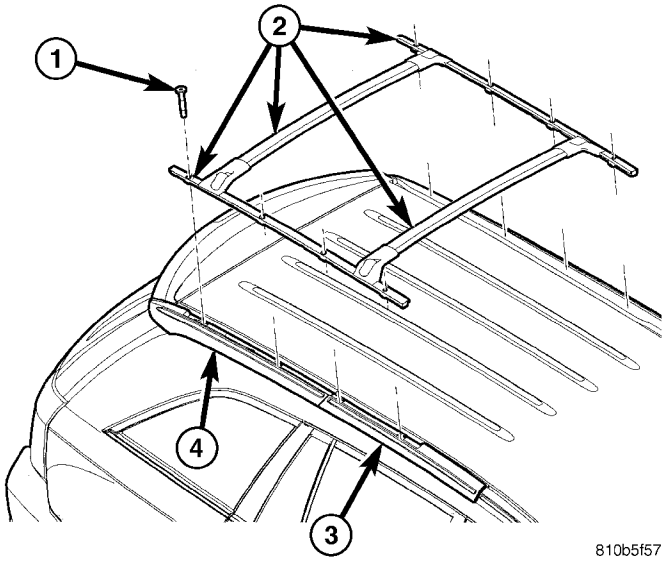


Fig. 23 LUGGAGE RACK ASSEMBLY

1 - ROOF SIDE RAIL ATTACHING SCREW(S)
2 - LUGGAGE RACK ASSEMBLY
3 - APERTURE APPLIQUE
4 - D-PILLAR APPLIQUE

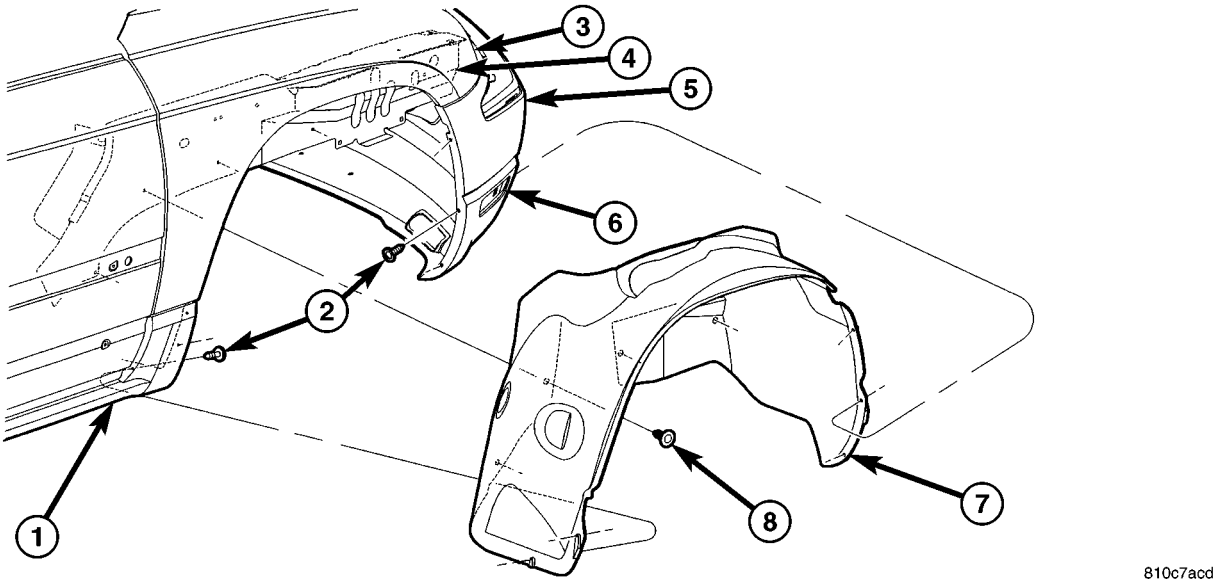


Fig. 22 FRONT WHEELHOUSE SPLASH SHIELD

1 - SILL APPLIQUE
2 - FRONT SPLASH SHIELD TO FRONT FASCIA AND CLADDING
3 - FRONT FENDER
4 - FRONT RAIL
5 - FRONT BUMPER UPPER FASCIA
6 - FRONT BUMPER LOWER FASCIA
7 - FRONT FENDER SPLASH SHIELD
8 - PUSH PIN(S)

LUGGAGE RACK (Continued)

INSTALLATION

NOTE: Cross bars must be install onto the side rails before installing rails.

(1) Place side rails in position on a clean flat surface. Starting at front end of side rails slide crossbars onto side rails.
(2) Place crossbars into position on side rails and press the lower edge of the cross bar lever to lock it into position on each side.
(3) Place luggage rack assembly into position on vehicle (Fig. 23).

NOTE: To ensure proper sealing of the threads, new screws should be used.

(4) Install new attaching screws into the RIV nuts and tighten screws to 6 N·m (55 in. lbs.) torque (Fig. 24).

NOTE: To minimize wind noise, both crossbars should be repositioned to the rear of the vehicle.

LUGGAGE RACK CROSSBAR

REMOVAL

(1) Remove luggage rack assembly (Fig. 23). (Refer to 23 - BODY/EXTERIOR/LUGGAGE RACK - REMOVAL).
(2) Depress crossbar lever down on each side of crossbar to unlock.
(3) Remove crossbar(s) from side rails by sliding bar off the front of the side rails.

INSTALLATION

(1) Place side rails in position on a clean flat surface. Starting at front end of side rails slide cross bars onto side rails.
(2) Place cross bars into position on side rails and press the lower edge of the cross bar lever to lock it into position on each side.
(3) Place luggage rack assembly into position on vehicle.
(4) Install luggage rack assembly (Fig. 24). (Refer to 23 - BODY/EXTERIOR/LUGGAGE RACK - INSTALLATION).
(5) Lock luggage rack crossbars into position. Pull stanchion levers up on both sides into the lock position.
(6) Verify that the crossbars are secure to side rails. If loose remove and reinstall crossbars.

SIDE RAIL

REMOVAL

(1) Remove side rail attaching screws.
(2) Remove side rail from vehicle.

INSTALLATION

(1) Place side rail into position.

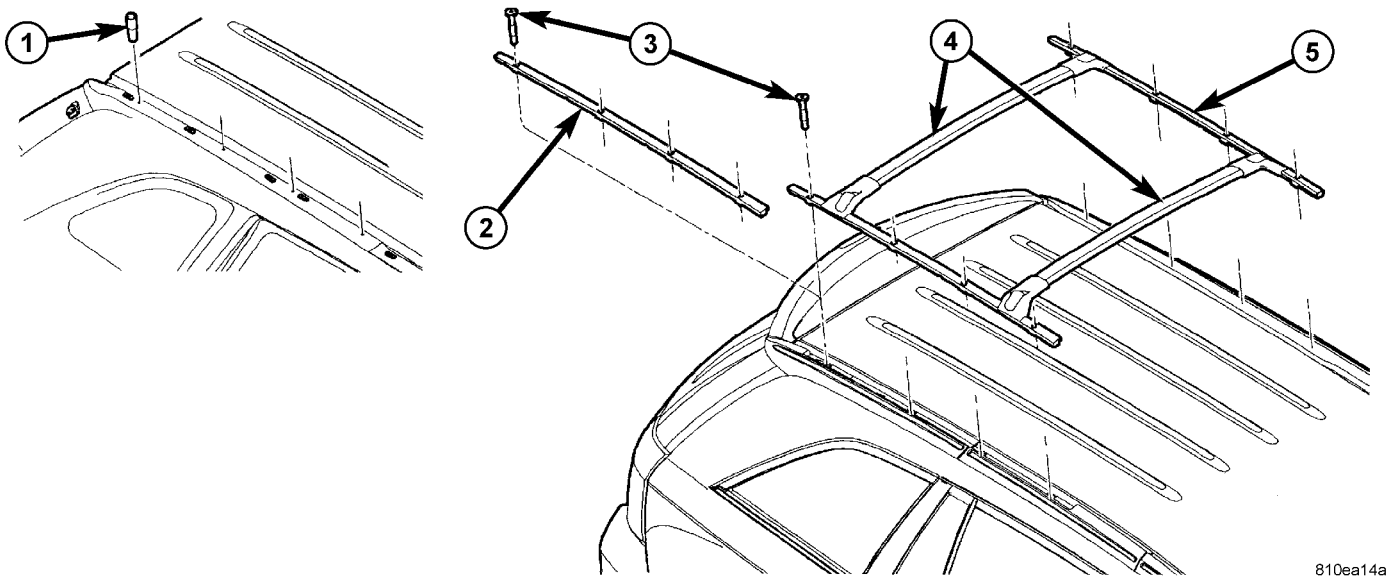


Fig. 24 SIDE RAIL(S)

1 - RIV NUT(S)
2 - SIDE RAIL
3 - ATTACHING SCREW(S)
4 - CROSS RAILS
5 - LUGGAGE RACK ASSEMBLY

SIDE RAIL (Continued)

NOTE: To ensure proper sealing of the threads, new screws should be used.

(2) Install new attaching screws into the RIV nuts and tighten screws to 6 N·m (55 in. lbs.) torque (Fig. 24).

RADIATOR CROSSMEMBER

REMOVAL

(1) Open hood.
(2) Remove upper radiator closure panel. (Refer to 23 - BODY/EXTERIOR/CLOSURE PANEL - REMOVAL).
(3) Remove push pin fasteners attaching the cooling upper seal to radiator crossmember.
(4) Remove screws attaching hood latch to radiator crossmember (Fig. 25).
(5) Disconnect the remote hood latch release cable clip.
(6) Remove radiator two top attaching bolts to radiator crossmember (Fig. 26).
(7) Remove two bolts on each side of radiator crossmember.
(8) Remove radiator crossmember from vehicle.

INSTALLATION

(1) Open hood.
(2) Place radiator crossmember into position.
(3) Install two bolts on each side of radiator crossmember. Tighten bolts to 17 N·m (150 in. lbs.) torque.
(4) Install radiator two top attaching bolts to radiator crossmember (Fig. 26).
(5) Connect the remote hood latch release cable clip.

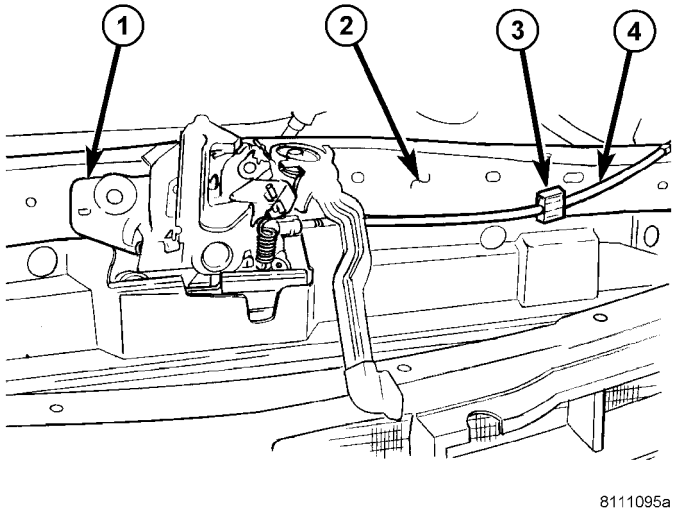


Fig. 25 HOOD LATCH

1 - HOOD LATCH
2 - RADIATOR CROSSMEMBER
3 - REMOTE HOOD LATCH RELEASE CABLE CLIP
4 - REMOTE HOOD LATCH RELEASE CABLE

(6) Install screws attaching hood latch to radiator crossmember (Fig. 25).
(7) Install push pin fasteners attaching the cooling upper seal to radiator crossmember.
(8) Install upper radiator closure panel. (Refer to 23 - BODY/EXTERIOR/CLOSURE PANEL - INSTALLATION).

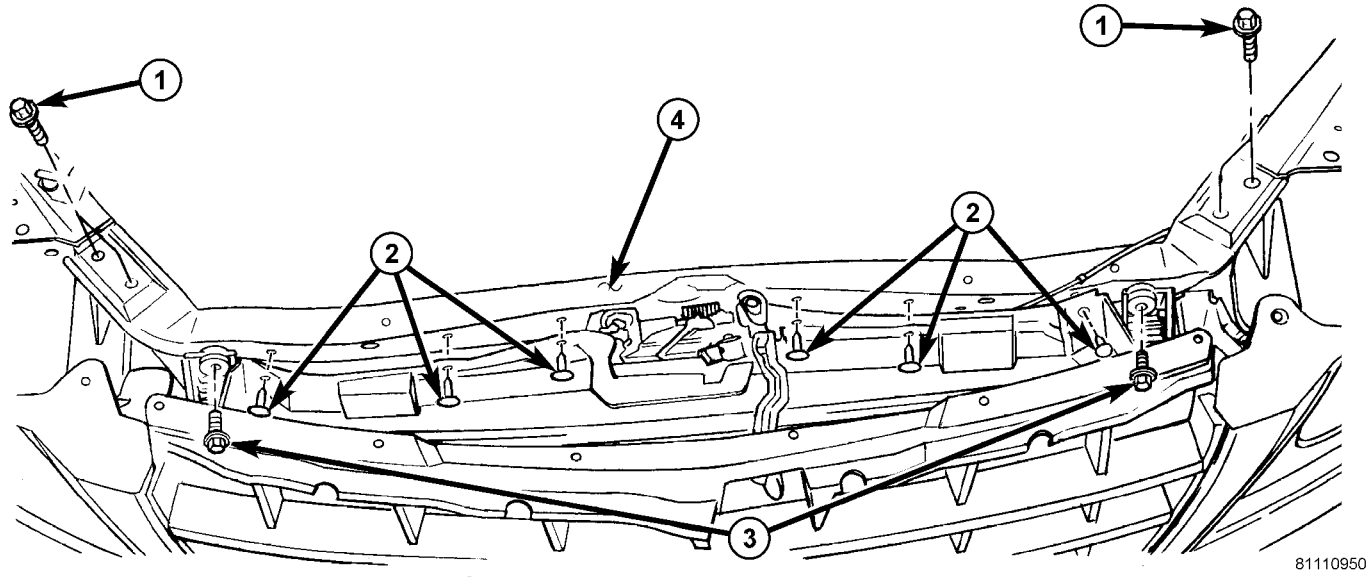


Fig. 26 RADIATOR CROSSMEMBER

1 - ATTACHING BOLTS
2 - PUSH PINS
3 - RADIATOR UPPER BOLTS
4 - RADIATOR CROSSMEMBER

RADIATOR CLOSURE PANEL

REMOVAL

(1) Open hood.
(2) Remove four push pins attaching radiator closure panel to radiator crossmember.
(3) Remove one bolt on each side attaching to radiator crossmember (Fig. 27).
(4) Remove six screws attaching radiator closure to the upper grille.
(5) Remove radiator closure panel from vehicle.

INSTALLATION

(1) Place radiator closure panel into position.
(2) Install one bolt on each side attaching to radiator crossmember (Fig. 27).
(3) Install four push pins attaching radiator closure panel to radiator crossmember.
(4) Install six screws attaching radiator closure to the upper grille.
(5) Close hood.

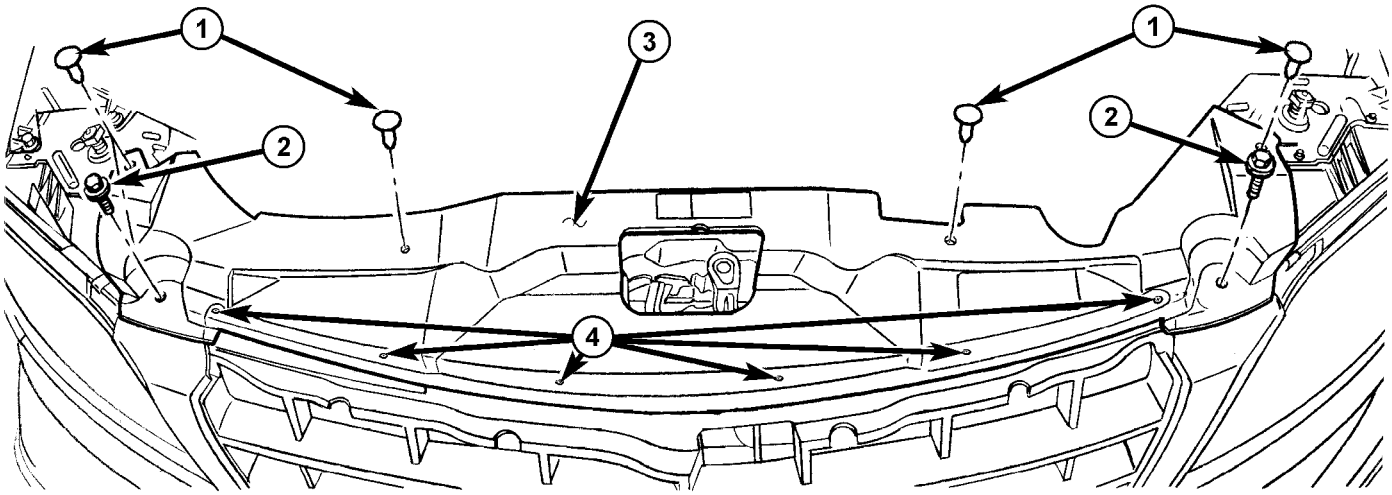


Fig. 27 RADIATOR CLOSURE PANEL

1 - PUSH PINS
2 - ATTACHING BOLTS INTO CROSSMEMBER
3 - RADIATOR CLOSURE PANEL
4 - ATTACHING SCREWS INTO UPPER GRILLE

REAR WHEELHOUSE SPLASH SHIELD

REMOVAL

(1) Hoist and support vehicle on safety stands, as necessary.
(2) Remove rear wheel.
(3) Remove screw attaching rear wheelhouse splash shield to cladding (Fig. 28).
(4) Remove four push pin fasteners attaching splash shield to inner wheelhouse.
(5) Remove two push pin fasteners attaching rear splash shield to rear fascia aperture bracket. (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA APERTURE BRACKET - REMOVAL).
(6) Remove splash shield from vehicle.

INSTALLATION

(1) Place splash shield into position.
(2) Install four new push pin fasteners attaching splash shield to inner wheelhouse (Fig. 28).
(3) Install two new push pin fasteners attaching rear splash shield to rear fascia aperture bracket. (Refer to 13 - FRAME & BUMPERS/BUMPERS/REAR FASCIA APERTURE BRACKET - INSTALLATION).
(4) Install screw attaching rear wheelhouse splash shield to cladding.
(5) Install rear wheel.
(6) Remove safety stands and lower vehicle.

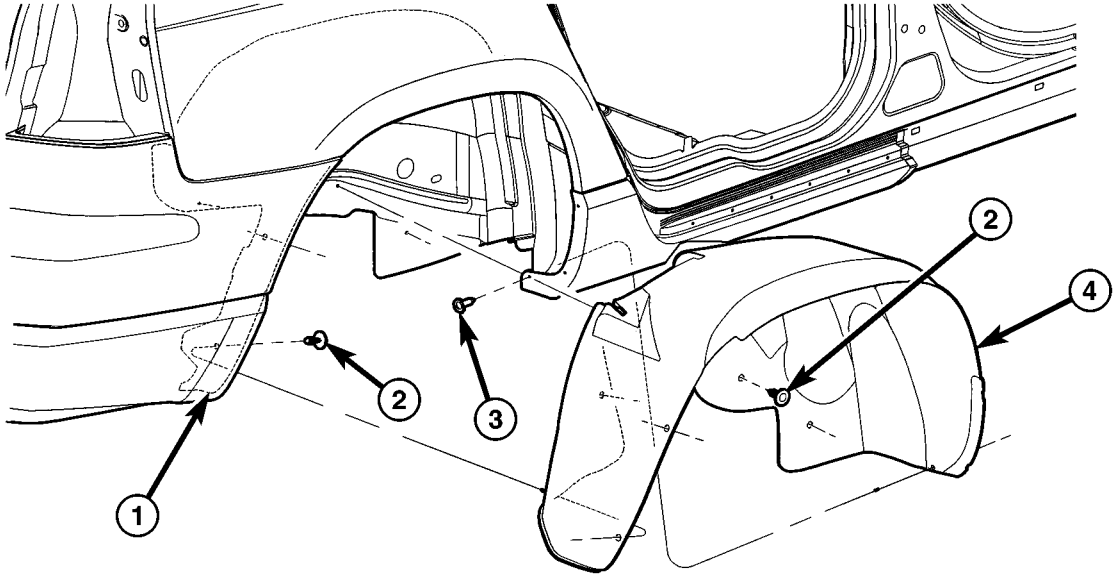


Fig. 28 REAR WHEELHOUSE SPLASH SHIELD

1 - REAR FASCIA ATTACHING BRACKET
2 - PUSH PIN(S)
3 - CLADDING TO REAR SPLASH SHIELD SCREW(S)
4 - REAR WHEELHOUSE SPLASH SHIELD

SIDE VIEW MIRROR

REMOVAL

(1) Using a trim stick C-4755 or equivalent, move the front door frame molding. (Refer to 23 - BODY/ DOOR - FRONT/MOLDING - REMOVAL).

(2) Remove door trim panel and water dam. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Disconnect the electrical connector, if equipped (Fig. 29).

(4) Using a trim stick or equivalent, remove the mirror flag stuffier. (Fig. 30).

(5) Remove the nuts attaching mirror (Fig. 31).

(6) Remove the mirror from the door.

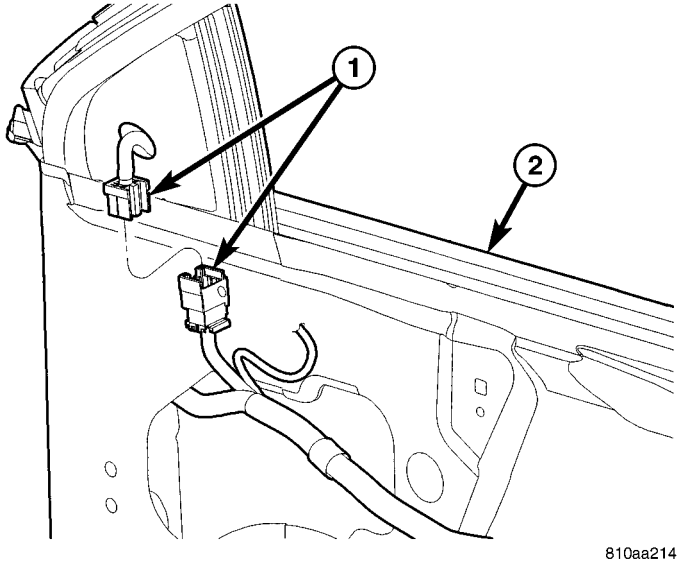


Fig. 29 MIRROR WIRE CONNECTOR

1 - OUTSIDE MIRROR WIRE CONNECTORS
2 - DOOR ASSEMBLY

INSTALLATION

(1) Place outside mirror in position.

(2) Install nuts attaching mirror to door (Fig. 31).

(3) Install mirror flag stuffier into position (Fig. 30).

(4) Connect the electrical connector, if equipped (Fig. 29).

(5) Verify proper mirror operation.

(6) Install front door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

(7) Install front door frame molding. (Refer to 23 - BODY/DOOR - FRONT/MOLDING - INSTALLATION).

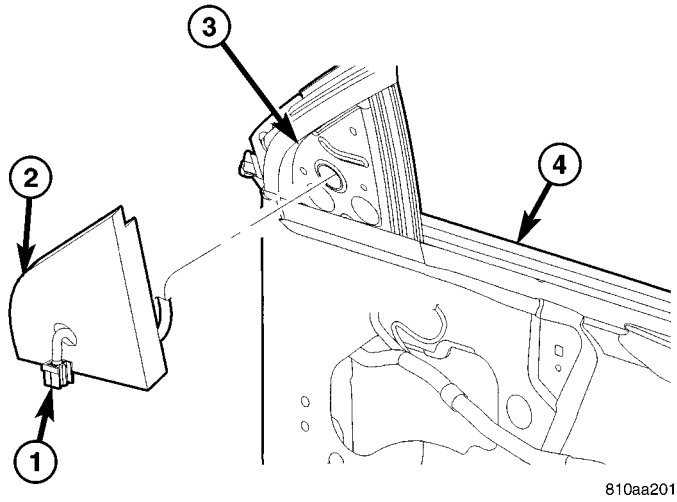


Fig. 30 FOAM STUFFIER

1 - MIRROR WIRE CONNECTOR
2 - FOAM STUFFIER
3 - DOOR MIRROR FLAG REINFORCEMENT
4 - DOOR ASSEMBLY

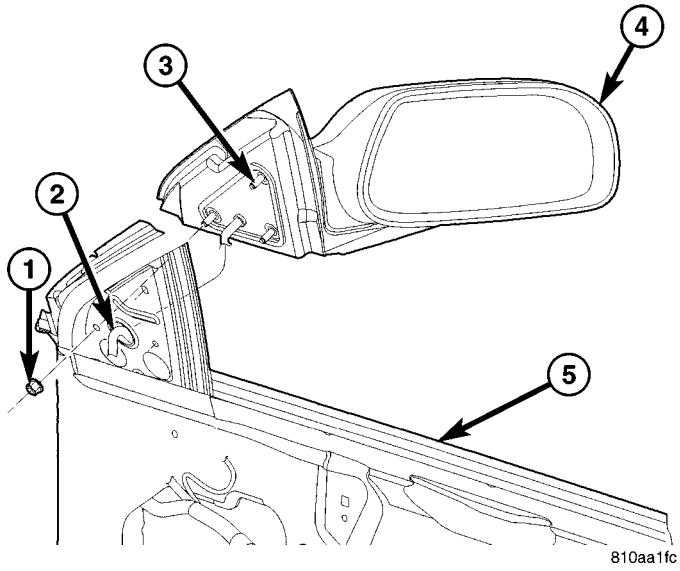


Fig. 31 SIDE VIEW MIRROR

1 - ATTACHING NUT(S)
2 - ACCESS HOLE FOR WIRE CONNECTOR
3 - MIRROR STUDS
4 - OUTSIDE MIRROR ASSEMBLY
5 - DOOR ASSEMBLY

SIDE VIEW MIRROR GLASS

REMOVAL

WARNING: ALWAYS WEAR EYE AND HAND PROTECTION WHEN SERVICING THE MIRROR ASSEMBLY. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY FROM BROKEN GLASS.

(1) Carefully pull/pry the broken glass holder from the mirror assembly.
(2) Disconnect the heated mirror electrical connectors from the terminals on the mirror glass holder, if equipped.

INSTALLATION

CAUTION: It is important to make sure the motor is square to the glass holder (attaching fingers) prior to glass holder attachment, otherwise the glass holder could be installed incorrectly causing poor retention and possible repeat failure.

(1) Position the new mirror glass holder to the mirror assembly.

NOTE: Position the mirror glass holder so that the moisture drain hole on the mirror glass holder assembly is facing downward.

(2) Align the mirror glass holder's attaching fingers to the mirror motor housing.

NOTE: Ensure that the protective rubber cover of the mirror motor housing is positioned correctly around the bottom of the fingers area.

(3) Using one hand, firmly press the mirror glass holder assembly into place while at the same time supporting the housing assembly from the backside with the other hand.

NOTE: Pressure must be applied equally over the center portion of the mirror to engage the mirror glass holder's attaching fingers to the corresponding fingers on the housing assembly. One or more clicks may be heard when finger engagement takes place.

(4) Verify retention of the mirror glass holder assembly by gently pulling outward on the mirror glass holder.

SPOILER

REMOVAL

(1) Open liftgate before disconnecting battery.
(2) Open hood, disconnect and isolate the battery negative cable.
(3) Open liftgate.
(4) Disconnect the power liftgate prop rod.
(5) Remove liftgate trim panel (Refer to 23 - BODY/INTERIOR/LIFTGATE TRIM PANEL - REMOVAL).
(6) Remove the four retaining nuts to spoiler (Fig. 32).
(7) Gently lift spoiler off of outer liftgate panel.
(8) Disconnect the CHMSL electrical connector.
(9) Disconnect the washer hose.
(10) Remove spoiler from vehicle.
(11) If replacing spoiler, transfer CHMSL lamp to new spoiler.
(12) If replacing spoiler, transfer washer nozzle to new spoiler.

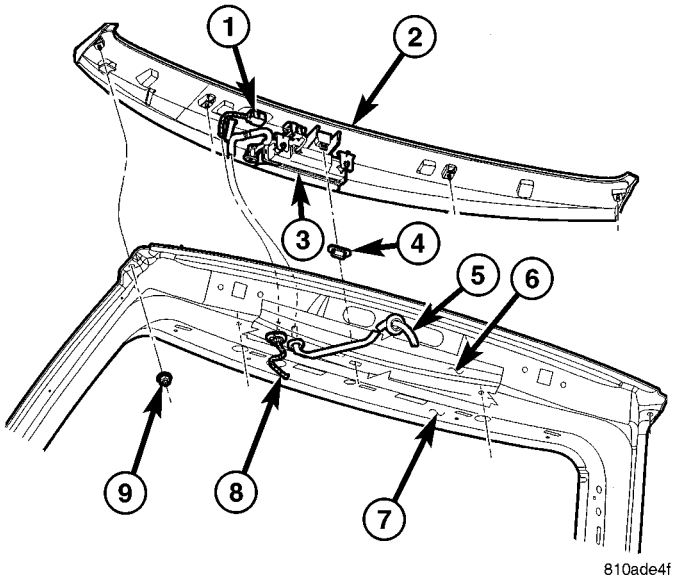


Fig. 32 LIFTGATE SPOILER ASSEMBLY

1 - WIRE HARNESS CONNECTORS TO CHMSL LAMP
2 - LIFTGATE SPOILER ASSEMBLY
3 - CHMSL LAMP
4 - ATTACHING GROMMET
5 - GROMMET AND WASHER HOSE
6 - LIFTGATE OUTER PANEL
7 - LIFTGATE INNER PANEL
8 - WIRE HARNESS
9 - ATTACHING NUT(S)

INSTALLATION

(1) If replacing spoiler, transfer washer nozzle to new spoiler.
(2) If replacing spoiler, transfer CHMSL lamp to new spoiler.

SPOILER (Continued)

(3) Place spoiler into position on outer liftgate panel (Fig. 32).
(4) Connect the washer hose.
(5) Connect the CHMSL electrical connector.
(6) Align the bolts through the holes and press spoiler into place, engaging the center fastener.
(7) Install the four retaining nuts to spoiler.
(8) Install the liftgate trim panel (Refer to 23 - BODY/INTERIOR/LIFTGATE TRIM PANEL - INSTALLATION).
(9) connect the power liftgate prop rod.
(10) Close the liftgate.
(11) Connect the battery negative cable.
(12) Verify vehicle and system operation.
(13) Close hood.

SILENCER

REMOVAL

(1) Hoist and support vehicle on safety stands, as necessary.
(2) Remove front wheel.
(3) Remove front wheelhouse splash shield. (Refer to 23 - BODY/EXTERIOR/LF WHEELHOUSE SPLASH SHIELD - REMOVAL).
(4) Reach into wheelhouse area between the cowl side and fender, pull silencer out (Fig. 33).
(5) Remove silencer from vehicle.

INSTALLATION

(1) Insert silencer between cowl side and fender, forward of wiring, connector and brackets (Fig. 33).

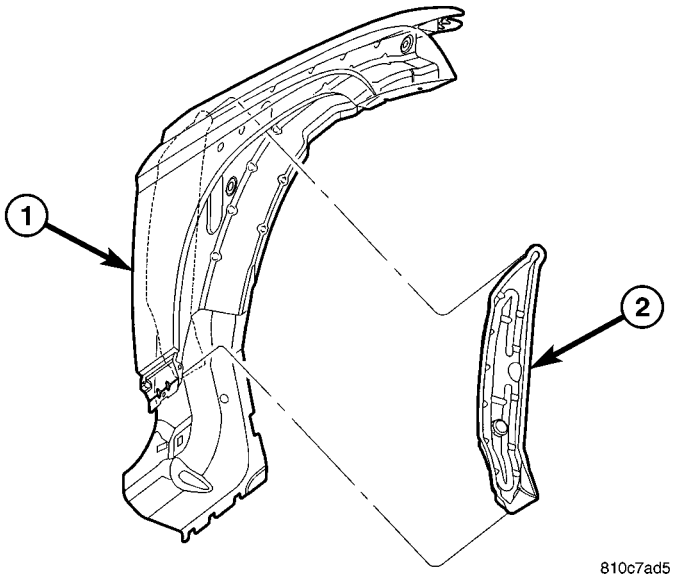


Fig. 33 COWL SIDE TO FENDER SILENCER

1 - FRONT FENDER
2 - COWL SIDE TO FENDER SILENCER

(2) Push silencer rearward until setting to trim edges of body door hinges (upper and lower) and center fender mounting bracket.
(3) Install front wheelhouse splash shield. (Refer to 23 - BODY/EXTERIOR/LF WHEELHOUSE SPLASH SHIELD - INSTALLATION).
(4) Install front wheel.
(5) Remove safety stands and lower vehicle, as necessary.

HOOD

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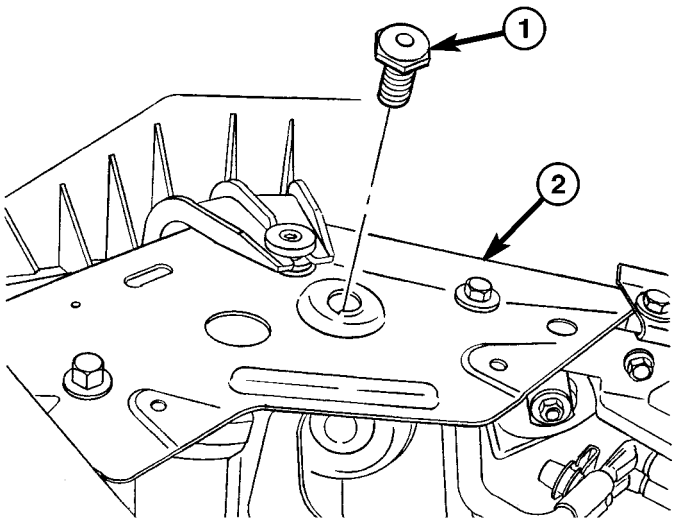
ADJUSTMENT BUMPER

REMOVAL

(1) Open hood.
(2) Turn adjustment bumper out (Fig. 1).
(3) Remove bumper from radiator crossmember bracket.

INSTALLATION

(1) Place adjustment bumper into position (Fig. 1).
(2) Turn adjustment bumper in about half way.
(3) Easily close hood to check height of hood. Check hood gap and flush (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
(4) Adjust as necessary.
(5) Close hood.



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Fig. 1 HOOD ADJUSTMENT BUMPER

1 - HOOD ADJUSTMENT BUMPER
2 - UPPER RADIATOR CROSSMEMBER BRACKET

EMBLEM

REMOVAL

(1) Open hood.
(2) Remove 3 attaching nuts (Fig. 2).
(3) Remove emblem from hood.

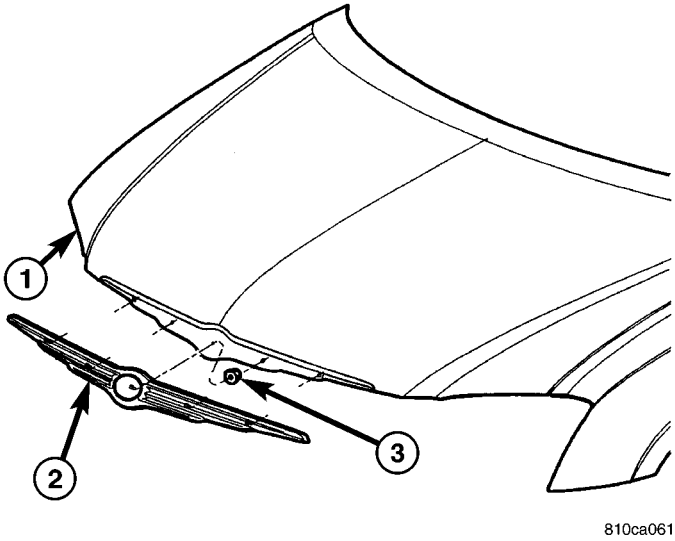


Fig. 2 HOOD OUTER BRIGHT EMBLEM

1 - HOOD
2 - HOOD EMBLEM
3 - ATTACHING NUTS (3)

INSTALLATION

(1) Place hood emblem into position (Fig. 2).
(2) Ensure proper alignment between top edge of emblem and hood.
(3) Install attaching nuts (3).
(4) Close Hood.

HINGE

REMOVAL

(1) Support hood on the side that requires hinge replacement.
(2) Remove cowl plenum grille (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - REMOVAL).
(3) Mark all bolt and hinge attachment locations with a grease pencil or other suitable device to provide reference marks for installation.
(4) Remove pivot bolt and pivot bushing (Fig. 3).
(5) Remove bolts attaching upper and/or lower hinge half (Fig. 4) and/or (Fig. 5).
(6) Remove hood upper or lower half or both halves from vehicle. If necessary, paint new hinge before installation.

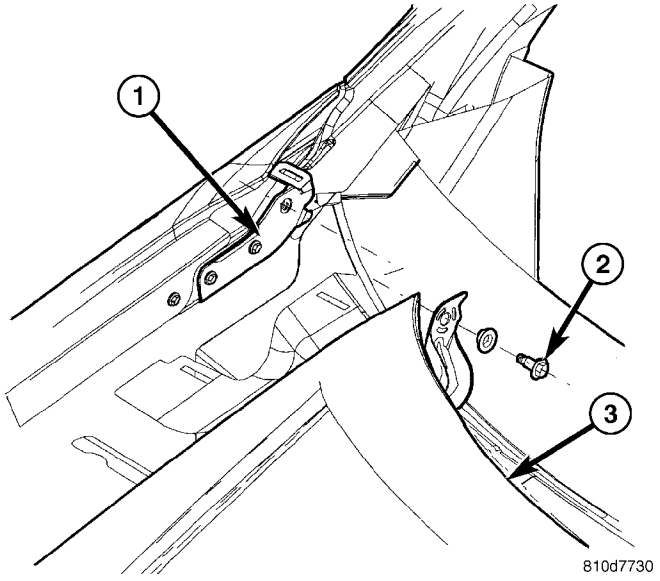


Fig. 3 PIVOT BOLT AND PIVOT BUSHING

1 - HOOD HINGE BODY HALF
2 - PIVOT BOLT AND PIVOT BUSHING
3 - HOOD

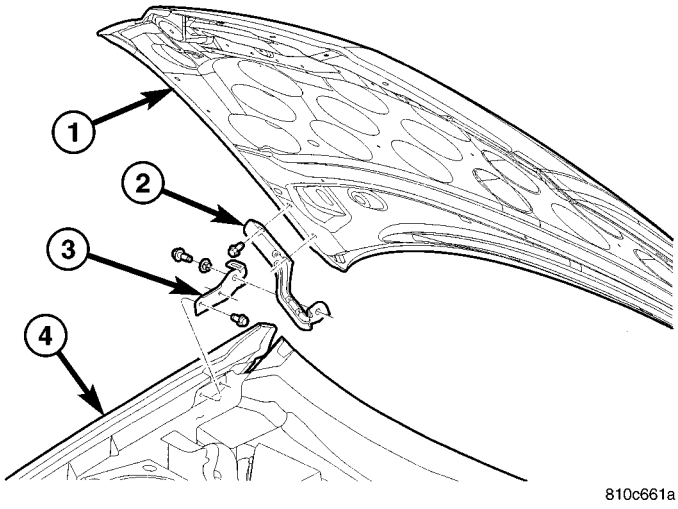


Fig. 4 HOOD HINGE UPPER HALF

1 - HOOD
2 - HOOD HINGE UPPER HALF
3 - HOOD HINGE LOWER HALF
4 - FRONT FENDER

INSTALLATION

(1) If necessary, paint new hinge before installation.
(2) Install upper hood hinge attaching hinge to hood finger tight, if necessary.
(3) Install lower hood hinge attaching hinge to cowl finger tight, if necessary (Fig. 4) and/or (Fig. 5).

HINGE (Continued)

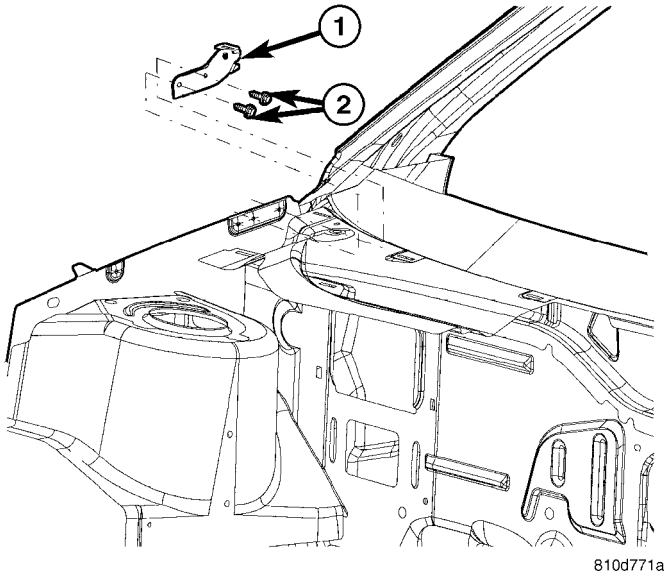


Fig. 5 HOOD HINGE LOWER HALF

1 - HOOD HINGE LOWER HALF
2 - ATTACHING SCREWS

(4) Place hood in position on vehicle. With assistance from a helper at the opposite side of the vehicle to support the hood, install pivot bolts and bushings to hold upper and lower hinge halves together and tighten bolt to 28 N·m (250 in. lbs.) torque. (Fig. 3).

(5) Install cowl plenum grille (Refer to 23 - BODY/EXTERIOR/COWL GRILLE - INSTALLATION).

(6) When installing hood, align all marks and secure bolts. The hood should be aligned. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

(7) Verify hood operation and alignment.

(8) Tighten hinge to body bolts to 9 N·m (80 in. lbs.).

(9) Tighten hinge to hood bolts to 14 N·m (120 in. lbs.).

(10) Close hood.

(11) Remove support from under hood and verify hood operation.

HOOD

REMOVAL

(1) Raise hood to full up position (Fig. 4).

(2) Mark all bolt and hinge attachment locations with a grease pencil or other suitable device to provide reference marks for installation.

(3) Remove the top bolts attaching hood to hinge and loosen the bottom bolts until they can be removed by hand.

(4) With assistance from a helper at the opposite side of the vehicle to support the hood, remove bottom bolts attaching hood to hinge.

(5) Remove the hood from the vehicle.

INSTALLATION

(1) Place hood in position on vehicle. With assistance from a helper at the opposite side of the vehicle to support the hood, install bottom bolts to hold hood to hinge finger tight (Fig. 4).

(2) Install top bolts attaching hood to hinge finger tight.

(3) When installing hood, align all marks and secure bolts. The hood should be aligned. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

(4) Verify hood operation and alignment.

(5) Tighten bolt to 14 N·m (120 in. lbs.).

(6) Close hood.

HOOD SEAL

REMOVAL

(1) Open hood.

(2) Remove hood seal (Fig. 6).

(3) Using a trim stick C-4755 or equivalent, disengage the hood seal push pins from the hood.

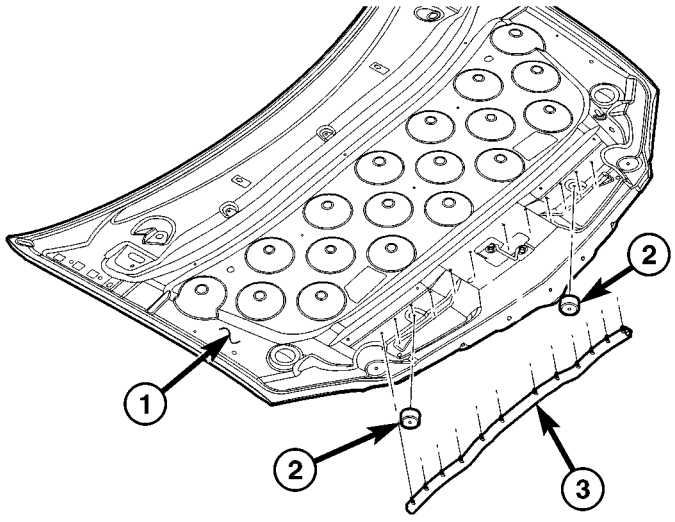


Fig. 6 HOOD SEAL

1 - HOOD INNER PANEL
2 - HOOD OVERSLAM BUMPER
3 - HOOD SEAL

INSTALLATION

(1) Place hood seal into position (Fig. 6).

(2) Press hood seal push pins till locked into position in hood.

(3) Close hood.

LATCH

REMOVAL

(1) Release hood latch and open hood.
(2) Remove radiator closure. (Refer to 23 - BODY/ EXTERIOR/CLOSURE PANEL - REMOVAL).
(3) Remove screws attaching hood latch to radiator crossmember (Fig. 7).
(4) Disconnect release cable.
(5) Remove hood latch from vehicle.

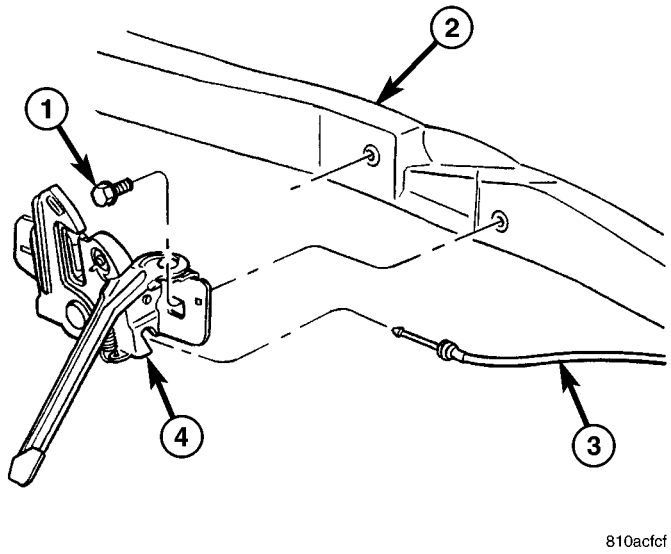


Fig. 7 HOOD LATCH

1 - ATTACHING SCREW(S) AND WASHER(S)
2 - UPPER RADIATOR CROSSMEMBER
3 - REMOTE HOOD RELEASE CABLE
4 - HOOD LATCH

INSTALLATION

NOTE: The latch is keyed to the crossmember with tabs stamped out of the crossmember. Vertical adjustment will require flattening the tabs.

(1) Place hood latch into position (Fig. 7).
(2) Connect hood release cable.
(3) Install hood latch screws. to radiator crossmember.
(4) Tighten latch screws to 14 N·m (120 in. lbs.) torque.
(5) Install radiator closure. (Refer to 23 - BODY/ EXTERIOR/CLOSURE PANEL - INSTALLATION).
(6) Close hood and verify hood operation and alignment.

LATCH RELEASE CABLE

REMOVAL

(1) Unlatch hood and open
(2) Disconnect remote hood release cable from hood latch (Fig. 8). (Refer to 23 - BODY/HOOD/ LATCH - REMOVAL).
(3) Release any remote hood cable attachments and free cable (Fig. 9).
(4) Remove left front cowl trim panel. (Refer to 23 - BODY/INTERIOR/SIDE COWL TRIM - REMOVAL).
(5) Remove screws attaching hood release handle to cowl panel and release cable from clip (Fig. 8).
(6) Disconnect rubber grommet from dash panel behind instrument panel.
(7) Pull release cable through hole in dash panel.
(8) Remove cable and handle from vehicle.

INSTALLATION

(1) Assemble cable and handle onto vehicle.
(2) Push release cable through hole in dash panel (Fig. 8).
(3) Connect rubber grommet into dash panel.
(4) Install screws attaching hood release handle to cowl panel.
(5) Install left front cowl trim panel. (Refer to 23 - BODY/INTERIOR/SIDE COWL TRIM - INSTALLATION).
(6) Connect remote hood release cable to hood latch. (Fig. 8).

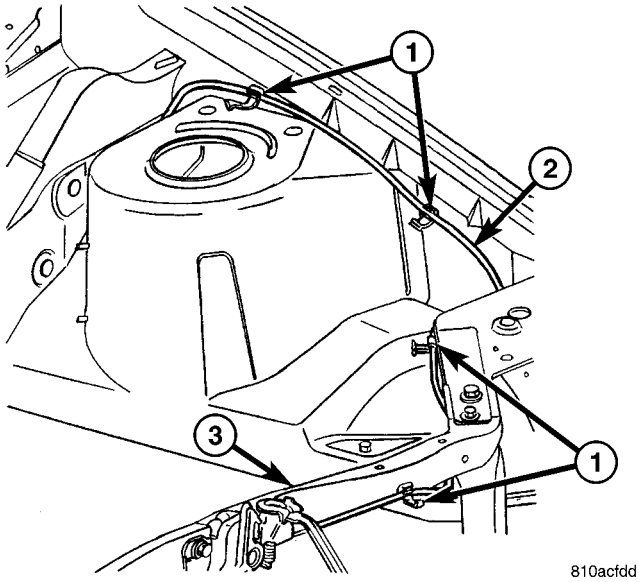


Fig. 9 REMOTE HOOD RELEASE CABLE UNDER HOOD

1 - ATTACHING CLIPS
2 - REMOTE HOOD LATCH RELEASE CABLE
3 - UPPER RADIATOR CROSSMEMBER

(7) Connect remote hood release cable clips (Fig. 9).
(8) Install hood latch (Refer to 23 - BODY/HOOD/ LATCH - INSTALLATION).
(9) Close hood and verify operation.

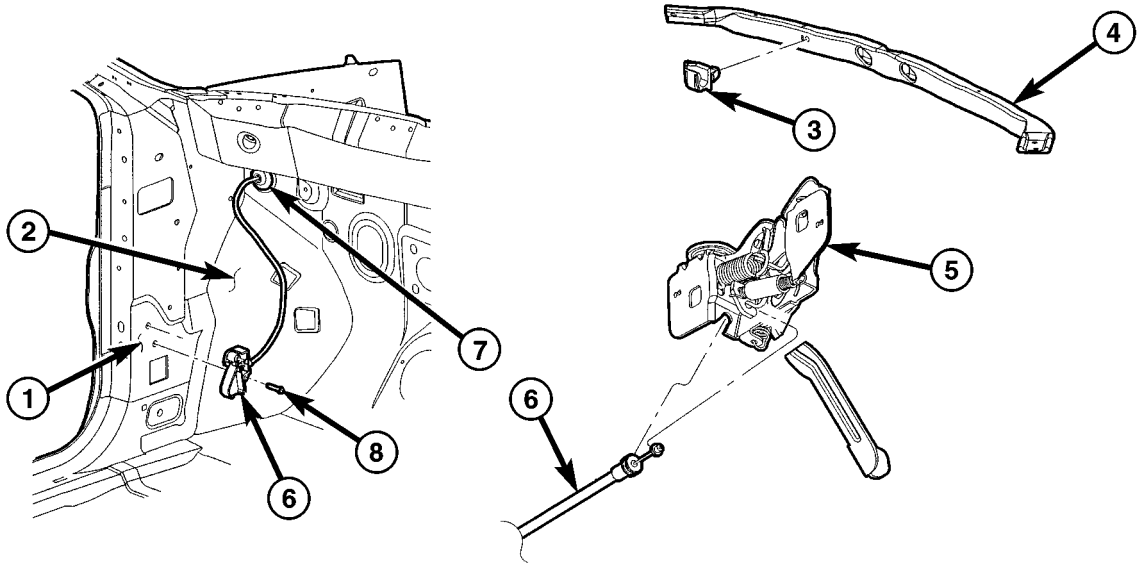


Fig. 8 REMOTE HOOD RELEASE HANDLE AND CABLE

1 - COWL SIDE PANEL
2 - DASH PANEL
3 - HOOD PROP ROD CLIP
4 - UPPER RADIATOR CROSSMEMBER
5 - HOOD LATCH
6 - REMOTE HOOD LATCH HANDLE AND CABLE
7 - GROMMET
8 - ATTACHING SCREW

LATCH STRIKER

REMOVAL

(1) Release hood latch and open hood.
(2) Remove bolts attaching striker to inside of hood.
(3) Remove hood latch striker from vehicle.

INSTALLATION

(1) Position hood latch striker on vehicle.
(2) Install bolts attaching hood latch striker to hood.
(3) Align hood latch striker to engage smoothly into hood latch.
(4) Verify hood operation and alignment. Adjust as necessary.
(5) Tighten attaching bolts to 14 N·m (10 ft. lbs.) torque.

OVERSLAM BUMPER

REMOVAL

(1) Open hood.
(2) Pull and turn to remove (Fig. 6).
(3) Remove overslam bumper from vehicle.

INSTALLATION

(1) Place overslam bumper into position (Fig. 6).
(2) Press and turn to seat bumper.
(3) Close hood.

PROP ROD

REMOVAL

(1) Open hood and use something to support hood.
(2) Remove screw attaching prop rod to radiator crossmember (Fig. 10).
(3) Remove prop rod from vehicle.

INSTALLATION

(1) Place prop rod into position (Fig. 10).
(2) Install screw attaching prop rod to radiator crossmember. Tighten screw to 9 N·m (80 in. lbs.) torque.
(3) Remove support holding hood.
(4) Close hood.

SILENCER PAD

REMOVAL

(1) Open hood.
(2) Remove fasteners attaching hood silencer to hood (Fig. 11).

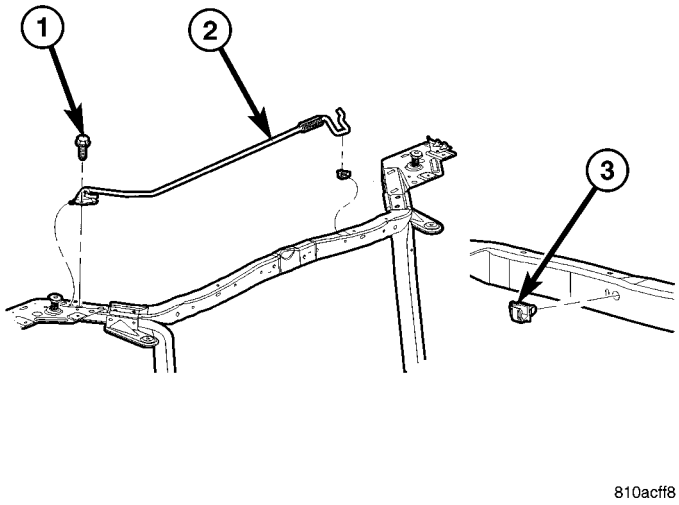


Fig. 10 HOOD PROP ROD

1 - ATTACHING SCREW
2 - HOOD PROP ROD
3 - PROP ROD STORAGE CLIP

(3) Remove hood silencer from vehicle.

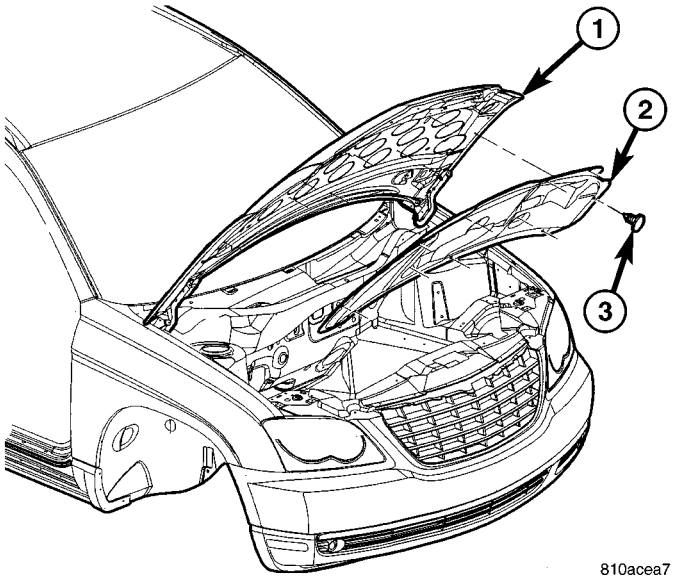


Fig. 11 HOOD INNER PANEL SILENCER

1 - HOOD
2 - HOOD INNER PANEL SILENCER
3 - PUSH PIN FASTENERS

INSTALLATION

(1) Place hood silencer in position on hood (Fig. 11).
(2) Install fastener attaching hood silencer to hood.
(3) Close hood.

INSTRUMENT PANEL

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CLUSTER BEZEL

REMOVAL

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Remove the steering opening cover two retaining screws and cover.

(3) Remove the knee blocker airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - REMOVAL).

(4) Unsnap the left end cover and remove.

(5) Remove the two screws to the left lower instrument panel trim plate.

(6) Remove the instrument panel center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).

(7) Remove the eight retaining screws to the cluster bezel (Fig. 1).

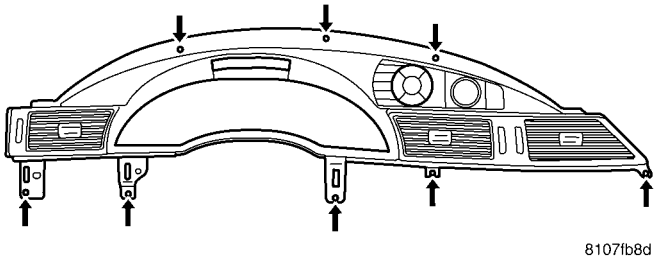


Fig. 1 CLUSTER BEZEL MOUNTING SCREW LOCATION

(8) Using a trim stick or equivalent, gently pry out on cluster bezel around edges and remove from instrument panel (Fig. 2).

(9) Disconnect the electrical connector to the instrument panel switch pod (EVIC, NAV, Clock, and Hazard Switch).

INSTALLATION

(1) Connect the electrical connector to the instrument panel switch pod (EVIC, NAV, Clock, and Hazard Switch).

(2) Position the cluster bezel over retaining slots and firmly snap into place (Fig. 2).

(3) Install the eight retaining screws to the cluster bezel (Fig. 1).

(4) Position the left side instrument panel center stack trim from panel over retaining slots and firmly snap into place.

(5) Install the instrument panel center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

(6) Position the left lower instrument panel trim plate over the retaining slots and firmly snap into place. Install the two screws.

(7) Position the left end cover over the retaining slots and firmly snap into place.

(8) Install the knee blocker airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/KNEE BLOCKER AIRBAG - INSTALLATION).

(9) Position the steering opening cover over retaining and firmly snap into place. Install the two retaining screws.

CLUSTER BEZEL (Continued)

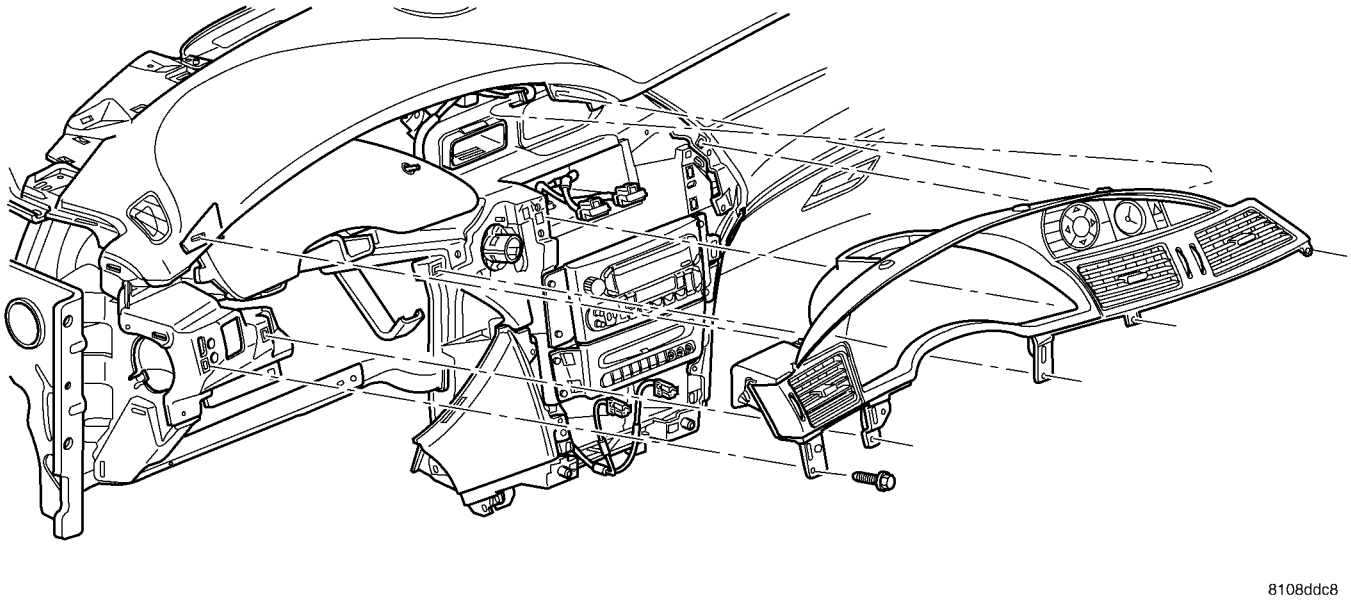


Fig. 2 CLUSTER BEZEL - REMOVE/INSTALL

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. (Refer to 8 - ELECTRICAL/RESTRAINTS - DIAGNOSIS AND TESTING - AIRBAG SYSTEM) FIRST.

(10) Verify vehicle and system operation.

GLOVE BOX

REMOVAL

(1) Open glove box.
(2) Push in on sides of glove box bin and lower door.
(3) Pivot glove box downward and disengage hinge hooks from instrument panel.
(4) Remove glove box.

INSTALLATION

(1) Place glove box in position.
(2) Engage hinge hooks into instrument panel and pivot glove box upward.
(3) Push in sides of glove box bin and snap glove box assembly into instrument panel.
(4) Close glove box door.

GLOVE BOX LATCH

REMOVAL

(1) Open glove box.
(2) Push in on sides of glove box bin and lower door.
(3) Pivot glove box downward and disengage hinge hooks from instrument panel.
(4) Remove glove box.
(5) Remove the assembly screws.
(6) Disassemble the glove box.
(7) Separate the latch from the glove box assembly.

INSTALLATION

(1) Install the latch onto the glove box assembly.
(2) Assemble the glove box.
(3) Install the assembly screws.
(4) Engage hinge hooks into instrument panel and pivot glove box upward.
(5) Push in sides of glove box bin and snap glove box assembly into instrument panel.
(6) Close glove box door.

GLOVE BOX LATCH STRIKER

REMOVAL

(1) Open glove box door.
(2) Remove screws holding lock striker to instrument panel.
(3) Remove glove box latch striker.

INSTALLATION

(1) Install the glove box latch striker.
(2) Install the screws holding latch striker to instrument panel.
(3) Close glove box door.

INSTRUMENT PANEL ASSEMBLY

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove center console closeout panel. (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE CLOSE-OUT PANEL - REMOVAL).

(3) Remove front floor console assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).

(4) Remove floor console base assembly two screws attaching L-brackets to instrument panel. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE BASE ASSEMBLY - REMOVAL).

(5) Remove nuts attaching the floor braces to instrument panel (Fig. 3). (Refer to 23 - BODY/IN-STRUMENT PANEL/INSTRUMENT PANEL FLOOR BRACKET - REMOVAL).

(6) Remove steering column opening cover. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(7) Remove inflatable knee blocker four mounting screws (Fig. 4).

(8) Remove two screws attaching instrument panel trim outlet plate (Fig. 5).

(9) Using a trim stick C-4755 or equivalent, disengage the locking tabs attaching instrument panel trim plate.

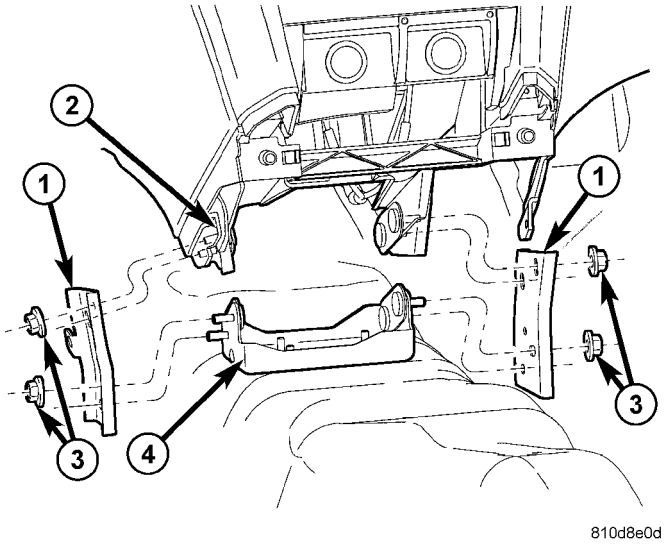


Fig. 3 FLOOR BRACKET AND BRACES TO INSTRUMENT PANEL

1 - FLOOR BRACE TO INSTRUMENT PANEL
2 - INSTRUMENT PANEL CENTER BRACE
3 - ATTACHING NUTS
4 - FLOOR BRACKET

(10) Disengage braking brake handle from brake park release bracket, leave rod engaged.

(11) Remove instrument panel reinforcement (Fig. 6).

(12) Disconnect bulkhead wiring harness connectors.

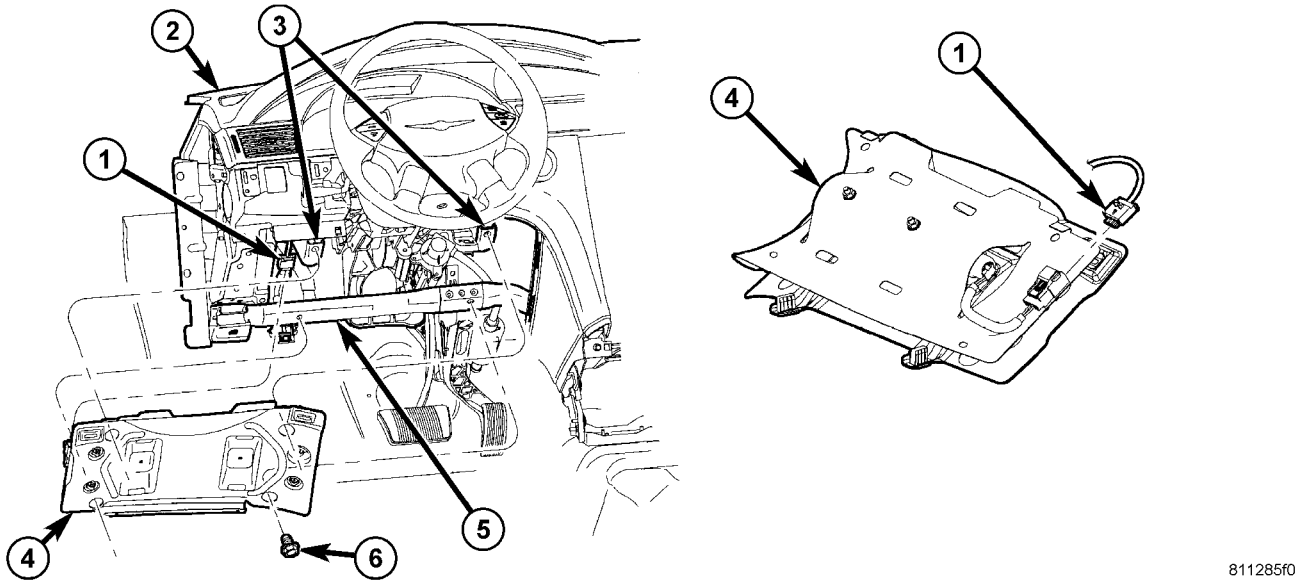


Fig. 4 INFLATABLE KNEE BLOCKER

1 - WIRE CONNECTOR
2 - INSTRUMENT PANEL
3 - INSTRUMENT PANEL BRACKET
4 - INFLATABLE KNEE BLOCKER
5 - INSTRUMENT PANEL REINFORCEMENT
6 - MOUNTING SCREWS

INSTRUMENT PANEL ASSEMBLY (Continued)

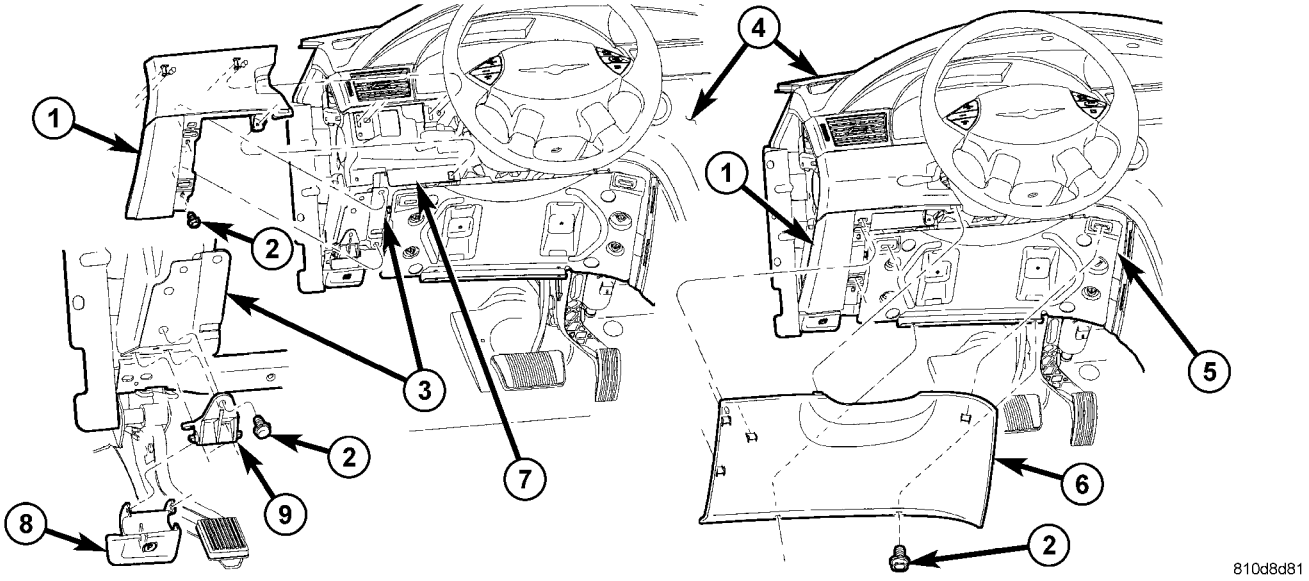


Fig. 5 PARK BRAKE RELEASE HANDLE & STEERING COLUMN OUTER COVER

1 - INSTRUMENT PANEL TRIM OUTLET PLATE
2 - ATTACHING SCREWS
3 - INSTRUMENT PANEL PARKING BRAKE RELEASE HANDLE BRACKET
4 - INSTRUMENT PANEL
5 - INFLATABLE KNEE BLOCKER AIRBAG
6 - INSTRUMENT PANEL STEERING COLUMN OPENING COVER
7 - INSTRUMENT PANEL CLUSTER POCKET
8 - BRAKE RELEASE HANDLE
9 - BRAKE HANDLE BRACKET ASSEMBLY

(13) Disconnect body control module wiring connectors.

(14) Remove upper and lower steering column shrouds. (Refer to 19 - STEERING/COLUMN/LOWER SHROUD - REMOVAL) and (Refer to 19 - STEERING/COLUMN/UPPER SHROUD - REMOVAL).

(15) Disconnect steering column wiring connectors.

(16) Disconnect steering column pinch bolt and retaining nuts (4). (Refer to 19 - STEERING/COLUMN/INTERMEDIATE SHAFT - REMOVAL).

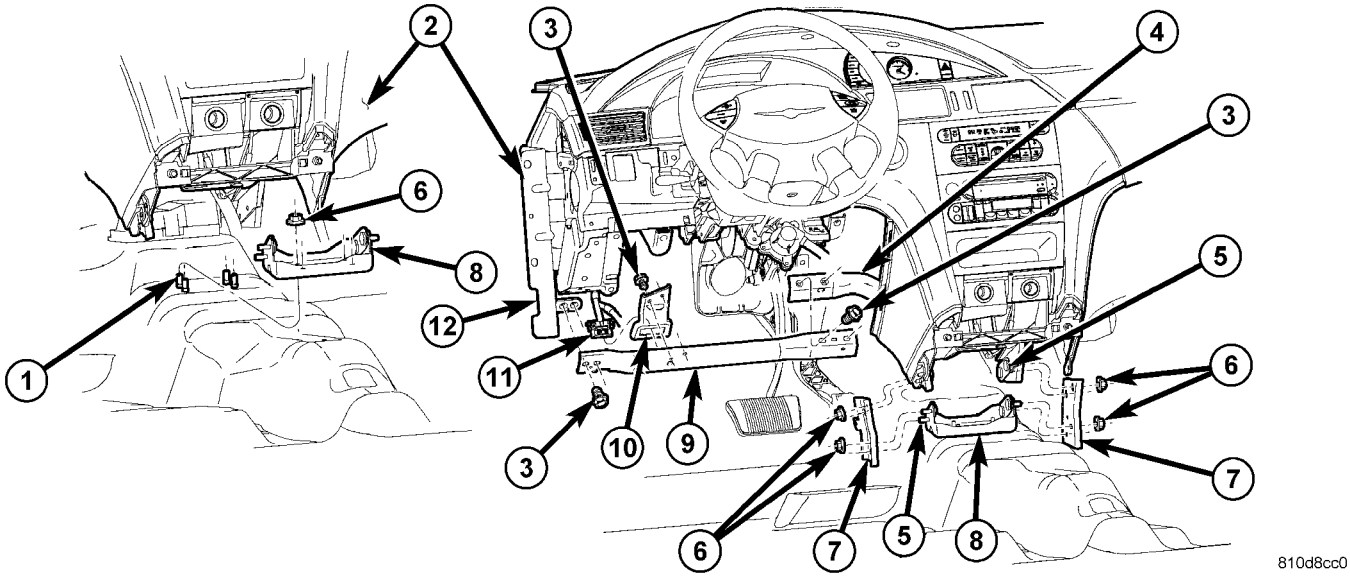


Fig. 6 INSTRUMENT PANEL LOWER REINFORCEMENT

1 - WELD STUDS
2 - INSTRUMENT PANEL
3 - MOUNTING SCREWS
4 - INSTRUMENT PANEL REINFORCEMENT
5 - STUDS
6 - ATTACHING NUTS
7 - INSTRUMENT TO FLOOR BRACKET
8 - INSTRUMENT PANEL BRACE TO FLOOR BRACKET
9 - INSTRUMENT PANEL REINFORCEMENT
10 - DIAGNOSTIC REMOTE CONNECTOR BRACKET
11 - DIAGNOSTIC WIRE CONNECTOR
12 - INSTRUMENT PANEL SIDE COWL BRACKET

INSTRUMENT PANEL ASSEMBLY (Continued)

(17) Disconnect brake light wiring connectors.

(18) Remove steering column retaining nuts (Fig. 7).

(19) Remove shift interlock cable. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT INTERLOCK CABLE - INSTALLATION).

(20) Remove both left and right side A-pillar trim. (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL).

(21) Remove instrument panel end caps. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - REMOVAL).

(22) Remove both front door sill scuff plates. (Refer to 23 - BODY/INTERIOR/FRONT DOOR SCUFF PLATE - REMOVAL).

(23) Remove both cowl side trim panel. (Refer to 23 - BODY/INTERIOR/COWL SIDE TRIM PANEL - REMOVAL).

(24) Disconnect the antenna lead connector. (Refer to 8 - ELECTRICAL/AUDIO/ANTENNA BODY & CABLE - REMOVAL).

(25) Remove the glove box:

(a) Push in on sides of glove box bin and lower door.

(b) Pivot glove box downward and disengage hinge hooks from instrument panel.

(c) Remove glove box from vehicle.

(26) Disconnect the airbag module electrical connector.

(27) Remove top cover (Fig. 8). (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).

(28) Remove mounting screws attaching right instrument panel side cowl bracket (roll down) (Fig. 9).

(29) Disconnect HVAC electrical connectors.

(30) Disconnect (3) electrical connectors behind cowl panel.

(31) Disconnect right side electrical connector from A-pillar.

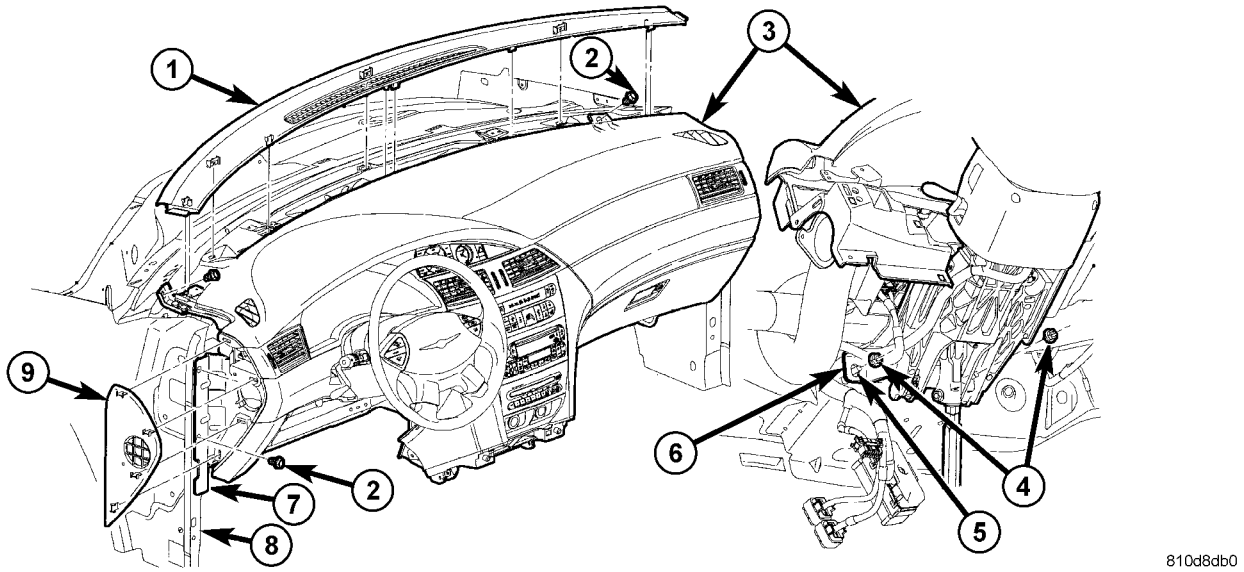


Fig. 7 TOP COVER AND INSTRUMENT PANEL

1 - INSTRUMENT TOP COVER
2 - MOUNTING SCREWS
3 - INSTRUMENT PANEL
4 - ATTACHING NUTS
5 - WELD STUD
6 - STEERING COLUMN ATTACHING BRACKET
7 - INSTRUMENT PANEL SIDE COWL BRACKET
8 - COWL SIDE PANEL
9 - INSTRUMENT PANEL END CAP

INSTRUMENT PANEL ASSEMBLY (Continued)

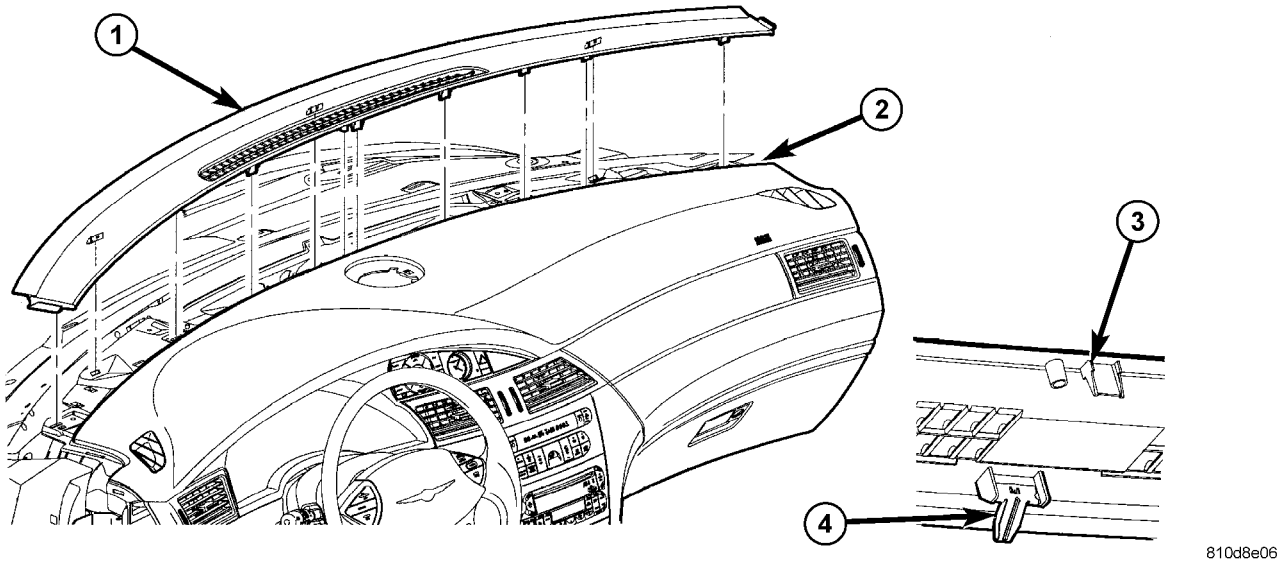


Fig. 8 INSTRUMENT PANEL TOP COVER

1 - INSTRUMENT PANEL TOP COVER
2 - AREA TO CHECK FIT AND FINISH
3 - LOCKING TABS
4 - LOCATING PIN(S)

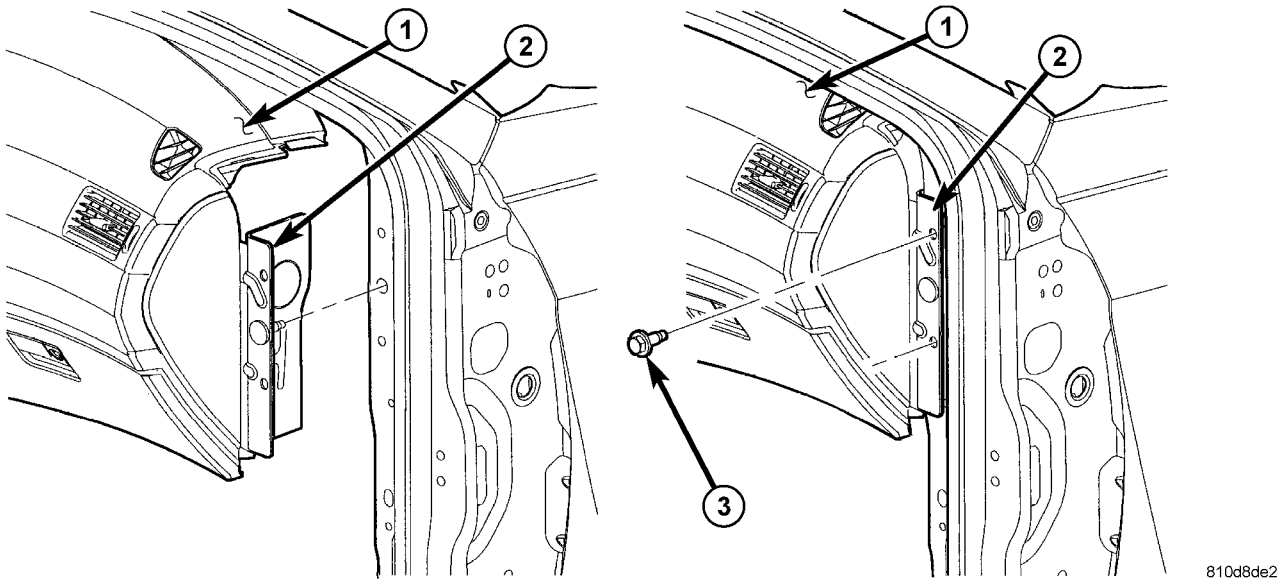


Fig. 9 SIDE COWL ATTACHING BRACKET

1 - INSTRUMENT PANEL
2 - INSTRUMENT PANEL SIDE COWL ATTACHING BRACKET
3 - MOUNTING SCREWS

INSTRUMENT PANEL ASSEMBLY (Continued)

(32) Remove the (2) screws attaching the instrument panel frame to the dash panel below windshield opening. (Fig. 10)

(33) With the help of an assistant remove the instrument panel from vehicle. Lift the instrument panel up off the HVAC so you won't damage the sealing surface of the distribution duct.

If the instrument panel is being replaced, transfer all parts to the new instrument panel assembly.

INSTALLATION

(1) With the help of an assistant place the instrument panel into vehicle inserting instrument panel locator pins into body. As you install the instrument panel, lift the instrument panel up so the duct work does not bind or bend and you can set it down on the HVAC housing to get the proper seal at the distribution duct. Get one bolt started in the dash panel.

(2) Install instrument panel side cowl bracket right and left side mounting screws (Fig. 9).

(3) Install (2) screws attaching the instrument panel frame to the dash panel below windshield opening (Fig. 10).

(4) Connect right side electrical connector at A-pillar.

(5) Connect (3) electrical connectors behind cowl panel.

(6) Connect HVAC electrical connectors.

(7) Install top cover (Fig. 8). (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP PAD - INSTALLATION).

(8) Install the glove box:

(a) Connect glove box lamp through opening.

(b) Set glove box into opening push into position.

(9) Connect the airbag module electrical connector.

(10) Connect the antenna lead connector. (Refer to 8 - ELECTRICAL/AUDIO/ANTENNA BODY & CABLE - INSTALLATION).

(11) Install both cowl side trim panel. (Refer to 23 - BODY/INTERIOR/COWL TRIM - INSTALLATION).

(12) Install both front door sill scuff plates. (Refer to 23 - BODY/INTERIOR/FRONT DOOR SCUFF PLATE - INSTALLATION).

(13) Install instrument panel end caps. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - INSTALLATION).

(14) Install both left and right side A-pillar trim. (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL).

(15) Install shift interlock cable. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT INTERLOCK CABLE - INSTALLATION).

(16) Install steering column retaining nuts (Fig. 7).

(17) Connect brake light wiring connectors.

(18) Install instrument panel reinforcement (Fig. 6).

(19) Connect steering column pinch bolt and retaining nuts (4). (Refer to 19 - STEERING/COLUMN/INTERMEDIATE SHAFT - INSTALLATION).

(20) Connect steering column wiring connectors.

(21) Install upper and lower steering column shrouds. (Refer to 19 - STEERING/COLUMN/LOWER SHROUD - INSTALLATION) and (Refer to 19 - STEERING/COLUMN/UPPER SHROUD - INSTALLATION).

(22) Connect body control module wiring connectors.

(23) Connect bulkhead wiring harness connectors.

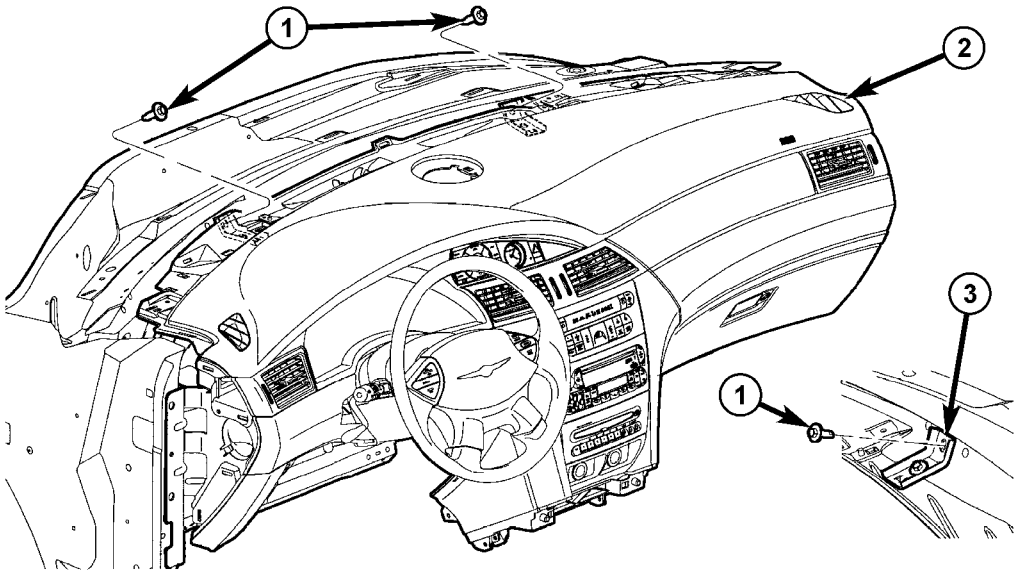


Fig. 10 INSTRUMENT PANEL SLIP BRACKETS

1 - MOUNTING SCREWS
2 - INSTRUMENT PANEL
3 - INSTRUMENT PANEL SLIP BRACKETS

(24) 2Install screws attaching braking brake handle onto brake park release bracket.

(25) Press on instrument panel trim outlet plate to engage clips.

(26) Install two screws attaching instrument panel trim plate (Fig. 5).

(27) Install inflatable knee blocker four mounting screws.

(28) Install steering column opening cover. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(29) Install nuts attaching the floor braces to instrument panel (Fig. 3). (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL FLOOR BRACKET - INSTALLATION)

(30) Install two screws attaching front floor console L-brackets to instrument panel. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE BASE ASSEMBLY - INSTALLATION).

(31) Install screws attaching front floor console to instrument panel. (Refer to 23 - BODY/INTERIOR/FRONT FLOOR CONSOLE - INSTALLATION).

(32) Install center console closeout panels. (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE CLOSEOUT PANEL - INSTALLATION).

(33) Connect battery negative cable.

INSTRUMENT PANEL CENTER BEZEL

REMOVAL

(1) Using a trim stick C-4755 or equivalent, disengage the locking tabs attaching instrument panel center bezel right and/or left side (Fig. 11).

(2) Remove ignition switch bezel.

(3) Remove the instrument panel center bezel(s) from the vehicle.

INSTALLATION

(1) Place instrument panel center bezel(s) right and left side into position (Fig. 11).

(2) Apply pressure on instrument panel center bezel right and/or left side to engage the locking tabs.

(3) Install ignition switch bezel.

INSTRUMENT PANEL FLOOR BRACKET

REMOVAL

(1) Remove center console closeout panel (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE CLOSEOUT PANEL- REMOVAL).

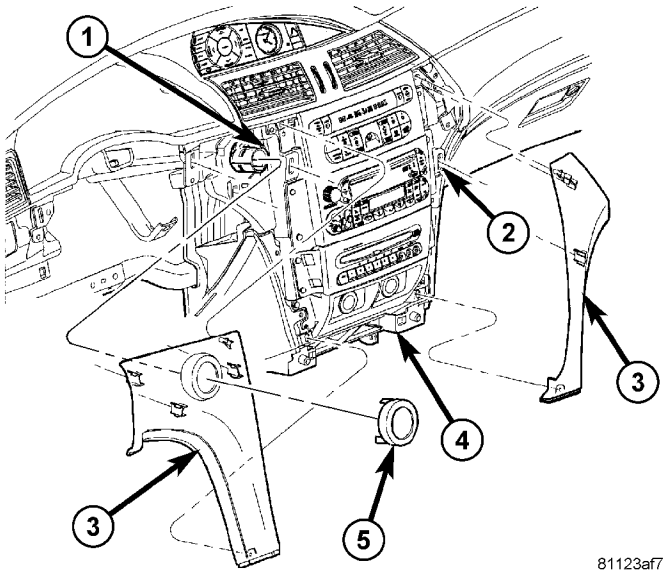


Fig. 11 INSTRUMENT PANEL CENTER BEZEL

1 - IGNITION SWITCH
2 - CENTER STACK PANEL
3 - INSTRUMENT PANEL
4 - INSTRUMENT PANEL CENTER BEZEL LEFT AND RIGHT
5 - IGNITION SWITCH BEZEL

(2) Remove front floor console. (Refer to 23 - BODY/INTERIOR/FRONT FLOOR CONSOLE - REMOVAL).

(3) Remove right and/or left floor brace attaching nuts and remove brace(s) (Fig. 12).

(4) Remove floor bracket attaching nuts and remove bracket.

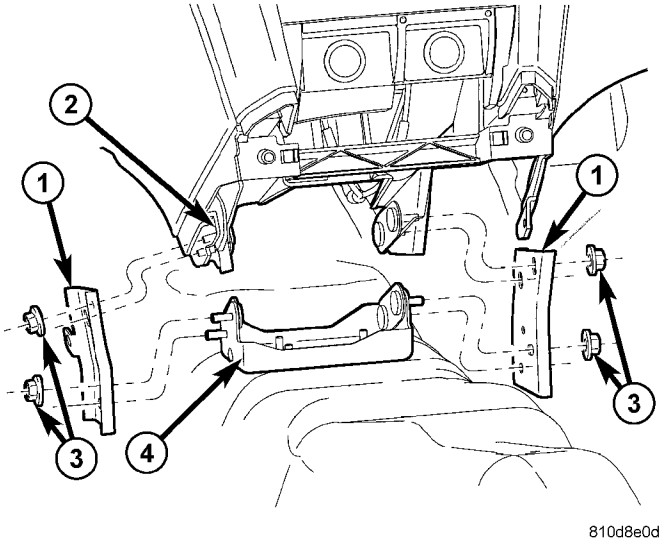


Fig. 12 FLOOR BRACKET AND BRACES TO INSTRUMENT PANEL

1 - FLOOR BRACE TO INSTRUMENT PANEL
2 - INSTRUMENT PANEL CENTER BRACE
3 - ATTACHING NUTS
4 - FLOOR BRACKET

INSTRUMENT PANEL FLOOR BRACKET (Continued)

INSTALLATION

(1) Place floor bracket into position.
(2) Install attaching nuts (Fig. 12).
(3) Place right and/or left floor brace into position.
(4) Install brace(s) attaching nuts.
(5) Install center console closeout panel. (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE CLOSEOUT PANEL - INSTALLATION)
(6) Install front floor console. (Refer to 23 - BODY/INTERIOR/FRONT FLOOR CONSOLE - INSTALLATION).

INSTRUMENT PANEL END CAP

REMOVAL

(1) Open front door.
(2) Using a trim stick C-4755 or equivalent, disengage the locking tabs attaching instrument panel end cap (Fig. 13).
(3) Remove end cap.

INSTALLATION

(1) Place end cap into position.
(2) Apply press on instrument panel end cap to engage the locking tabs (Fig. 15).
(3) Close front door.

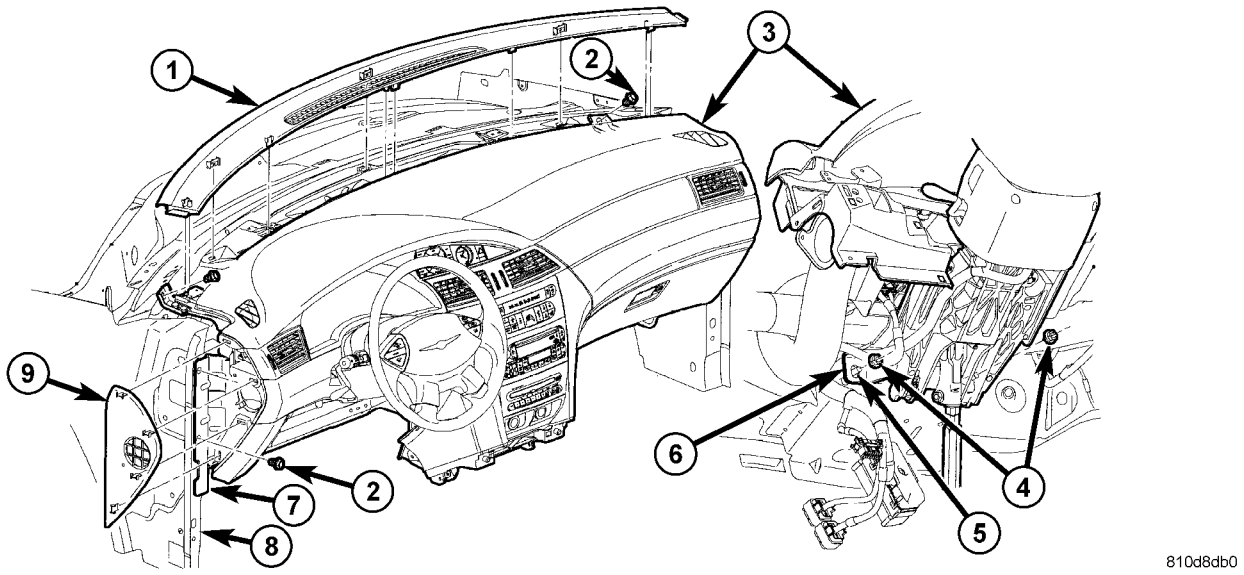


Fig. 13 TOP COVER & INSTRUMENT PANEL

1 - INSTRUMENT TOP COVER
2 - MOUNTING SCREWS
3 - INSTRUMENT PANEL
4 - ATTACHING NUTS
5 - WELD STUD
6 - STEERING COLUMN ATTACHING BRACKET
7 - INSTRUMENT PANEL SIDE COWL BRACKET
8 - COWL SIDE PANEL
9 - INSTRUMENT PANEL END CAP

INSTRUMENT PANEL TOP COVER

REMOVAL

(1) Remove A-pillar trim. (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL).

(2) Using a trim stick C-4755 or equivalent, disengage the locking tabs attaching rear of vehicle edge of top cover to instrument panel (Fig. 14).

NOTE: The Instrument Panel Top Cover may be hard to unsnap from the instrument panel. Use care not to mar, scuff, or damage the instrument panel pad.

(3) Pull top cover upward to disengage mounting clips attaching front of top cover.

(4) Remove top cover from vehicle by pulling rearward to disengage forward clips.

INSTALLATION

(1) Place instrument panel top cover into position (Fig. 14).

(2) Push top cover forward to engage mounting clips front of top cover.

(3) Pulling top cover rearward to engage locking tabs until tight against instrument panel while applying downward hand pressure.

(4) Check for proper fit and finish.

(5) Install A-pillar trim. (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - INSTALLATION).

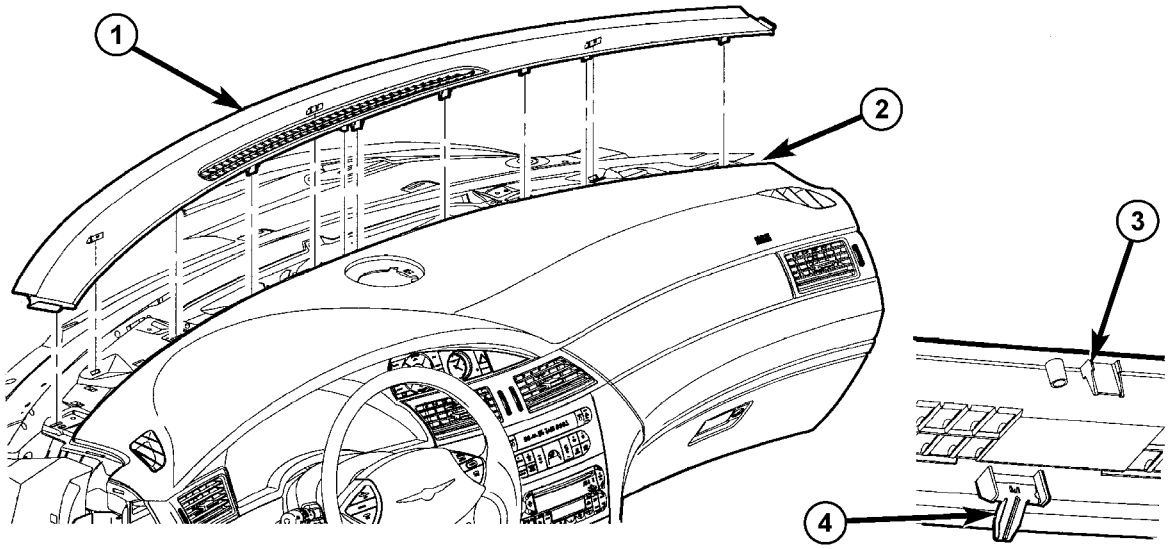


Fig. 14 INSTRUMENT PANEL TOP COVER

1 - INSTRUMENT PANEL TOP COVER
2 - AREA TO CHECK FIT AND FINISH
3 - LOCKING TABS
4 - LOCATING PIN(S)

STEERING COLUMN OPENING COVER

REMOVAL

(1) Remove the two screws attaching the steering column opening cover to instrument panel (Fig. 15).

(2) Pull from bottom rearward to disengage clips and remove steering column opening cover

(3) Remove the steering opening column cover from the vehicle.

INSTALLATION

(1) Place the steering opening column cover into position (Fig. 15).

(2) Install snap tab just left of steering column. Engage locator tab on right. Starting from upper right corner engage clip, at lower right squeeze clip to lower right panel. Engage left clip.

(3) Install two screws attaching the steering column opening cover to instrument panel.

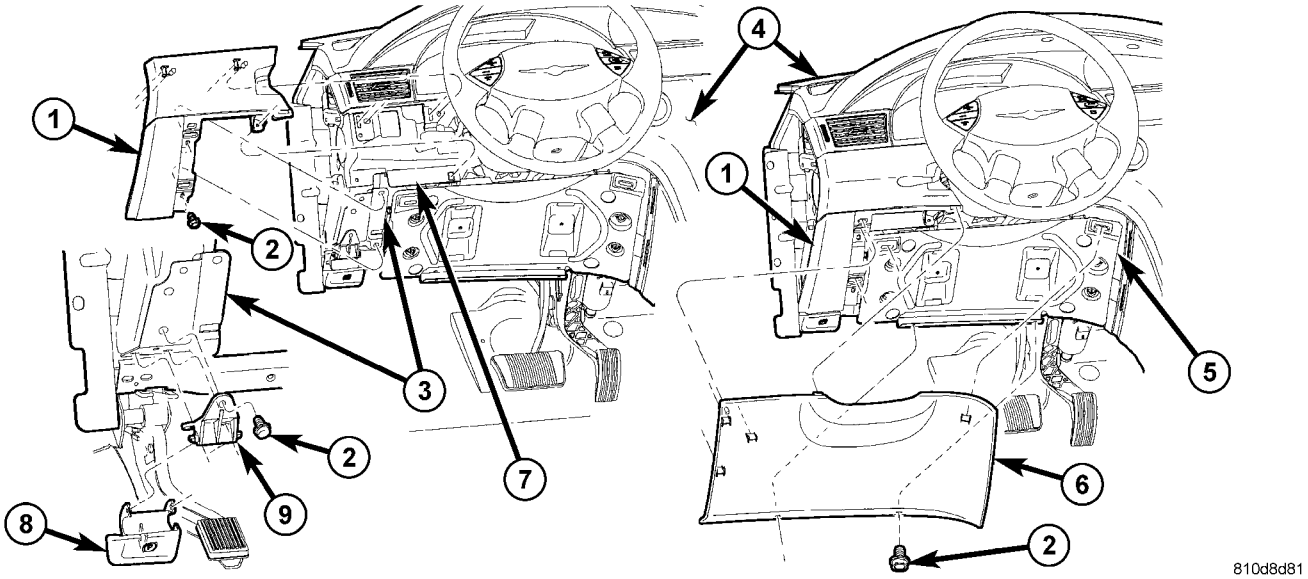


Fig. 15 PARK BRAKE RELEASE HANDLE & STEERING COLUMN OUTER COVER

1 - INSTRUMENT PANEL TRIM OUTLET PLATE
2 - ATTACHING SCREWS
3 - INSTRUMENT PANEL PARKING BRAKE RELEASE HANDLE BRACKET
4 - INSTRUMENT PANEL
5 - INFLATABLE KNEE BLOCKER AIRBAG
6 - INSTRUMENT PANEL STEERING COLUMN OPENING COVER
7 - INSTRUMENT PANEL CLUSTER POCKET
8 - BRAKE RELEASE HANDLE
9 - BRAKE HANDLE BRACKET ASSEMBLY

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A-PILLAR TRIM

REMOVAL

(1) Disengage hidden clips attaching A-pillar trim panel to A-pillar (Fig. 1).

(2) Remove A-pillar trim from vehicle.

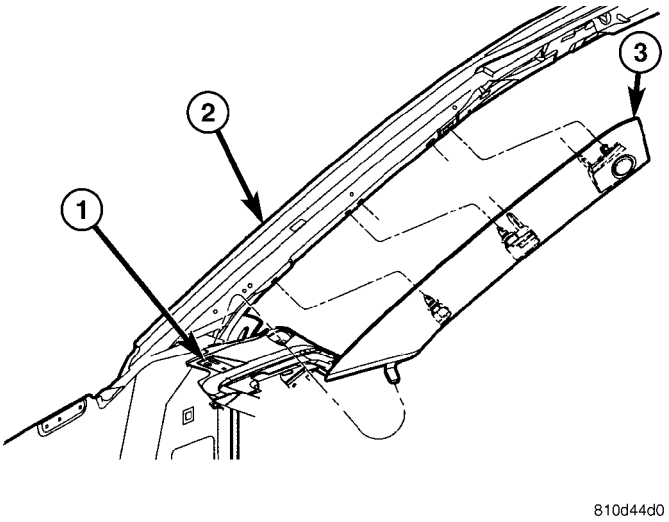


Fig. 1 A-PILLAR TRIM PANEL

1 - INSTRUMENT PANEL UPPER RETAINER PANEL
2 - BODY SIDE ASSEMBLY
3 - A-PILLAR TRIM PANEL

INSTALLATION

(1) Position foot on A-pillar trim panel into instrument panel top cover channel (Fig. 1).

(2) Position A-pillar trim in vehicle.

(3) Align locator pins.

(4) Press on A-pillar trim panel to engage locking clips.

ASSIST HANDLE

REMOVAL

(1) Using a trim stick (C-4755), remove screw access covers from grab handle.

(2) Remove screws holding grab handle to roof rail.

(3) Remove grab handle from vehicle.

INSTALLATION

(1) Place grab-handle in position on vehicle.

(2) Install grab handle attaching screws to roof rail.

(3) Install screw access covers into grab handle.

B-PILLAR LOWER TRIM

REMOVAL

(1) Slide lower seat belt cover rearward to expose anchor bolt.

(2) Remove bolt attaching lower seat belt anchor to floor (Fig. 2).

(3) Remove upper B-pillar trim cover.

(4) Remove access panel from B-pillar trim.

(5) Disengage hidden clips attaching lower trim cover to B-pillar.

(6) Remove lower B-pillar trim cover from vehicle.

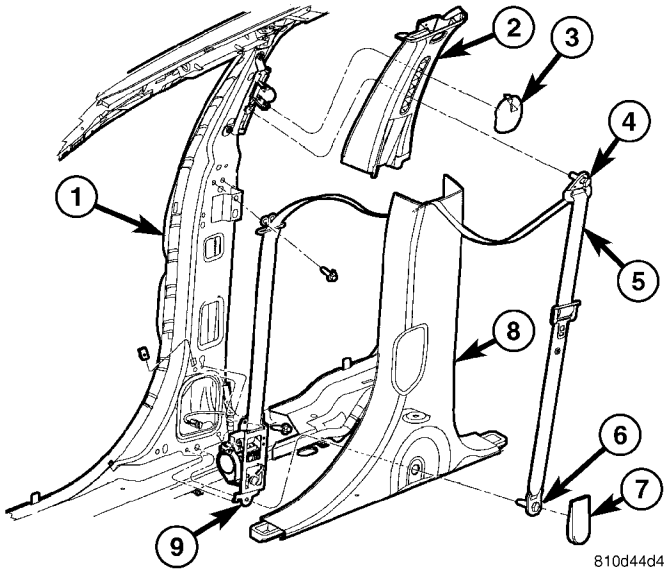


Fig. 2 B-PILLAR LOWER TRIM PANEL

1 - B-PILLAR
2 - B-PILLAR UPPER TRIM PANEL
3 - TURNING LOOP ADJUSTER COVER
4 - B-PILLAR UPPER SEAT BELT BOLT
5 - SEAT BELT ASSEMBLY
6 - B-PILLAR LOWER SEAT BELT BOLT
7 - B-PILLAR LOWER SEAT BELT ANCHOR COVER
8 - B-PILLAR LOWER TRIM PANEL
9 - SEAT BELT RETRACTOR

INSTALLATION

(1) Place lower B-pillar trim cover in position on vehicle (Fig. 2).

(2) Insert seat belt through hole in lower B-pillar trim.

(3) Engage hidden clips attaching lower trim cover to B-pillar.

(4) Install access cover.

(5) Install upper B-pillar trim cover.

(6) Place seat belt anchor in position on floor so webbing is pointed rearward and slightly outboard.

(7) Install bolt attaching lower seat belt anchor to floor. Tighten all seat belt bolts to 39 N·m (29 ft. lbs.) torque.

(8) Verify that seat belt anchor does not interfere with seat track travel.

B-PILLAR UPPER TRIM

REMOVAL

(1) Remove bolt attaching lower seat belt anchor to floor.

(2) Lower shoulder belt height adjuster to the bottom of travel.

(3) Remove shoulder belt turning loop from height adjuster.

(4) Use a Snap-on® Trim Pad Remover tool (A179A), or equivalent, and remove shoulder belt height adjuster knob.

(5) Remove shoulder belt bezel from trim cover (Fig. 3).

(6) Remove screw attaching trim cover to B-pillar from inside bezel cavity.

(7) Disengage hidden clips attaching trim cover to B-pillar.

(8) Remove B-pillar trim cover from vehicle.

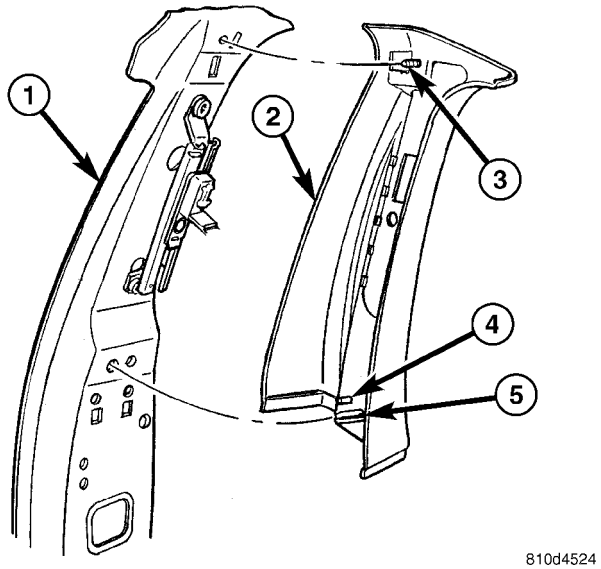


Fig. 3 B-PILLAR UPPER TRIM PANEL

1 - B-PILLAR
2 - B-PILLAR UPPER TRIM PANEL
3 - ATTACHING SCREW
4 - LOCATING PIN
5 - 4-WAY LOCATOR PIN

INSTALLATION

(1) Insert seat belt through B-pillar trim and web guide (Fig. 3).

(2) Place B-pillar trim cover in position on vehicle.

(3) Engage hidden clips attaching trim cover to B-pillar.

(4) Install shoulder belt bezel into trim cover.

(5) Install height adjuster knob.

(6) Install shoulder belt turning loop onto height adjuster. Tighten bolt to 39 N·m (29 ft. lbs.) torque.

(7) Place seat anchor in position on floor so webbing is pointed rearward and slightly outboard.

(8) Install bolt attaching lower seat belt anchor to floor. Tighten seat belt bolt to 39 N·m (29 ft. lbs.) torque.

CARPETS

REMOVAL

(1) Remove front seats. (Refer to 23 - BODY/SEATS/FRONT SEAT - REMOVAL).

(2) Remove first row seats. (Refer to 23 - BODY/SEATS/FIRST ROW SEAT - REMOVAL).

(3) Remove second row seats. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT - REMOVAL).

(4) Remove move shifter knob. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/GEAR SHIFT KNOB - REMOVAL).

(5) Remove front floor console shift bezel. (Refer to 23 - BODY/INTERIOR/SHIFT BEZEL - REMOVAL).

(6) Remove front floor console. (Refer to 23 - BODY/INTERIOR/FRONT FLOOR CONSOLE - REMOVAL).

(7) Remove rear floor console. (Refer to 23 - BODY/INTERIOR/REAR FLOOR CONSOLE - REMOVAL).

(8) Floor console base assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).

(9) Remove front and rear sill scuff plates. (Refer to 23 - BODY/INTERIOR/FRONT DOOR SILL SCUFF PLATE - REMOVAL) and (Refer to 23 - BODY/INTERIOR/REAR DOOR SCUFF PLATE - REMOVAL).

(10) Remove cowl side trim panels. (Refer to 23 - BODY/INTERIOR/COWL SIDE TRIM - REMOVAL).

(11) Remove the floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).

(12) Remove liftgate sill scuff plate. (Refer to 23 - BODY/INTERIOR/LIFTGATE SILL SCUFF PLATE - REMOVAL).

(13) Remove B-pillar lower trim. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - REMOVAL).

(14) Remove quarter trim panel. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - REMOVAL).

(15) Remove fasteners attaching carpet to floor panel (Fig. 4).

CAUTION: Use care when pulling wires and connectors through the carpet.

(16) Pull wire harnesses and connector through carpet.

CARPETS (Continued)

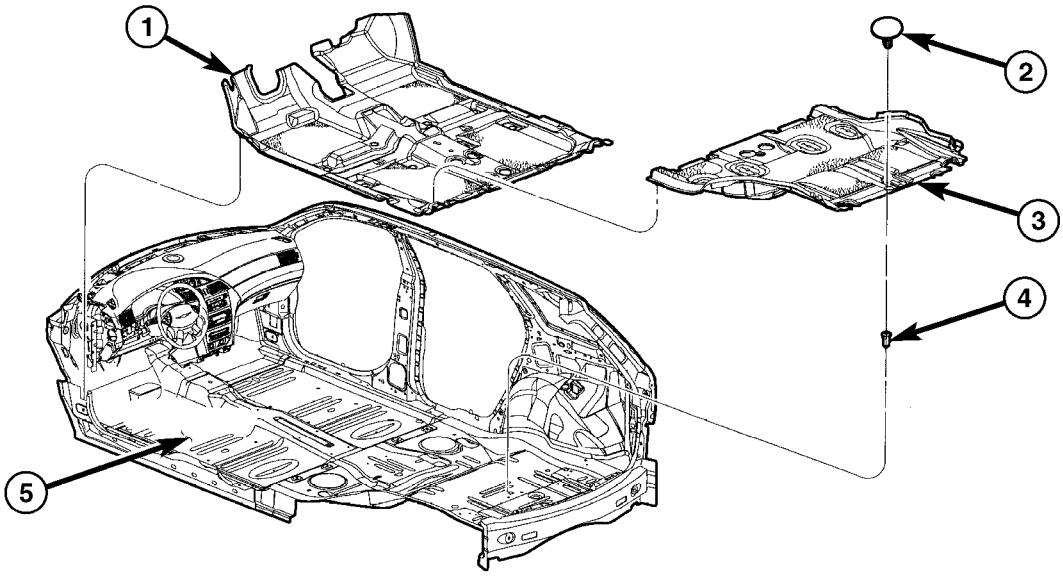


Fig. 4 FLOOR CARPET

1 - FRONT FLOOR CARPET
2 - PUSH PIN(S)
3 - REAR FLOOR CARPET
4 - GROMMET
5 - FRONT FULL FLOOR PANEL

(17) Roll carpet from under instrument panel rearward to rear of vehicle and remove.

(18) Rear floor carpet roll and fold carpet forward away from rear door opening and remove from vehicle.

(19) Remove floor silencer from vehicle (Fig. 5).

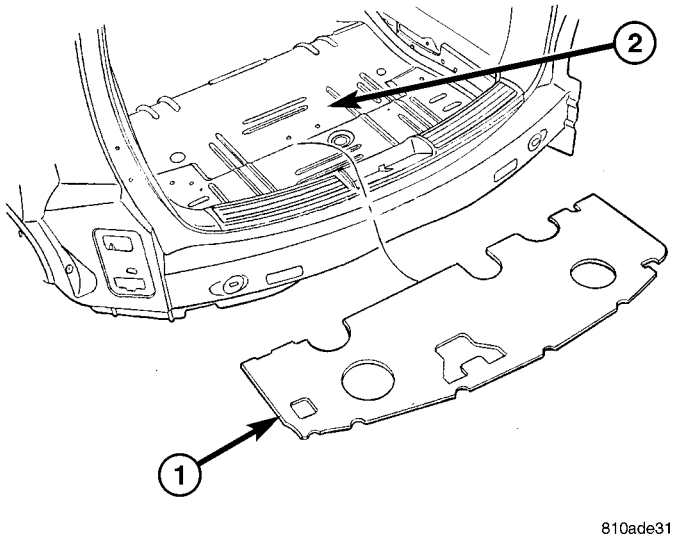


Fig. 5 REAR FLOOR SILENCER

1 - REAR FLOOR SILENCER
2 - REAR FLOOR

INSTALLATION

(1) Place floor silencer into position in vehicle (Fig. 5).

(2) Insert rear floor carpet into position in vehicle.

(3) Insert front carpet. Move carpet into position under instrument panel. Work carpet rearward into position.

CAUTION: Use care when pulling wires and connectors through the carpet.

(4) Pull wire harnesses and connectors through carpet.

(5) Install fasteners attaching carpet to floor (Fig. 4).

(6) Install quarter trim panel. (Refer to 23 - BODY/INTERIOR/QUARTER TRIM PANEL - INSTALLATION).

(7) Install B-pillar lower trim. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION).

(8) Install liftgate sill scuff plate. (Refer to 23 - BODY/INTERIOR/LIFTGATE SILL SCUFF PLATE - INSTALLATION).

(9) Install the floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - INSTALLATION).

(10) Install cowl side trim panels. (Refer to 23 - BODY/INTERIOR/COWL SIDE TRIM - INSTALLATION).

(11) Install front and rear sill scuff plates. (Refer to 23 - BODY/INTERIOR/FRONT DOOR SILL

CARPETS (Continued)

SCUFF PLATE - INSTALLATION), and (Refer to 23 - BODY/INTERIOR/REAR DOOR SILL SCUFF PLATE - INSTALLATION).

(12) Install floor console base assembly. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE BASE ASSEMBLY - INSTALLATION).

(13) Install rear floor console. (Refer to 23 - BODY/INTERIOR/REAR FLOOR CONSOLE - INSTALLATION).

(14) Install front floor console. (Refer to 23 - BODY/INTERIOR/FRONT FLOOR CONSOLE - INSTALLATION).

(15) Install front floor console shift bezel. (Refer to 23 - BODY/INTERIOR/SHIFT BEZEL - INSTALLATION).

(16) Install shifter knob. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/GEAR SHIFT KNOB - INSTALLATION).

(17) Install second row seats. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT - INSTALLATION).

(18) Install first row seats. (Refer to 23 - BODY/SEATS/FIRST ROW SEAT - INSTALLATION).

(19) Install front seats. (Refer to 23 - BODY/SEATS/FRONT SEAT - INSTALLATION).

CENTER CONSOLE CLOSEOUT PANEL

REMOVAL

(1) Remove attaching screw (Fig. 6) and/or (Fig. 7)

(2) Remove center console closeout panel.

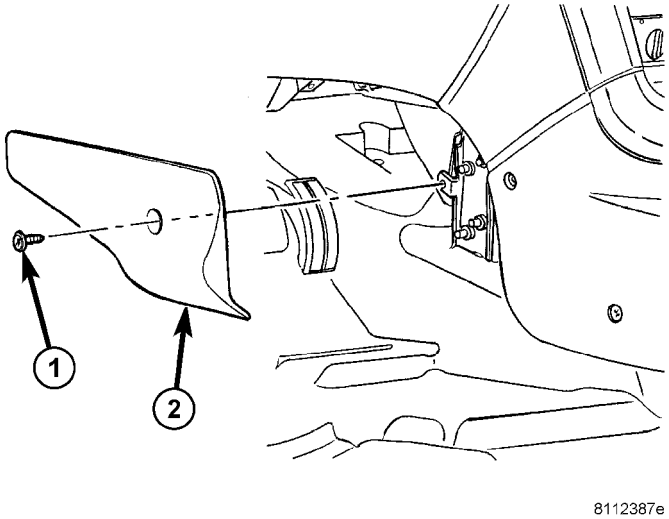


Fig. 6 LEFT CONSOLE CLOSEOUT PANEL

1 - ATTACHING SCREW
2 - LEFT CONSOLE CLOSEOUT PANEL

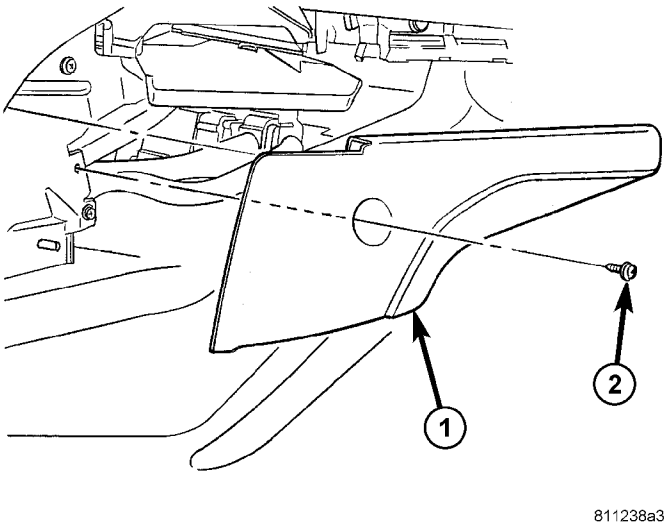


Fig. 7 RIGHT CONSOLE CLOSEOUT PANEL

1 - RIGHT CONSOLE CLOSEOUT PANEL
2 - ATTACHING SCREW

INSTALLATION

(1) Place center console closeout panel into position (Fig. 6) and/or (Fig. 7)

(2) Install attaching screw.

COWL SIDE TRIM PANEL

REMOVAL

(1) Remove instrument panel side cover.
(2) Remove front door sill scuff plate. (Refer to 23 - BODY/INTERIOR/FRONT DOOR SCUFF PLATE - REMOVAL).
(3) Remove A-pillar cowl side trim panel from vehicle by disengaging hidden clips (Fig. 8).

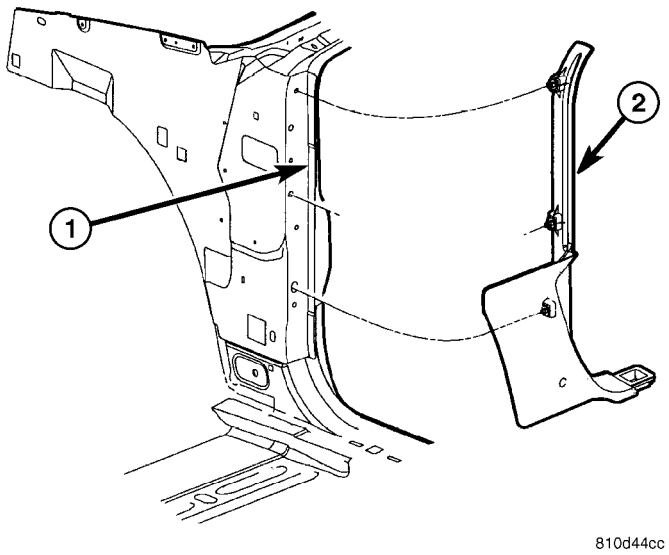


Fig. 8 COWL SIDE TRIM PANEL

1 - A-PILLAR
2 - COWL SIDE TRIM PANEL

INSTALLATION

(1) Place a-pillar cowl side trim panel in position (Fig. 8).
(2) Press on A-pillar trim to engage locking clips.
(3) Install front door sill scuff plate. (Refer to 23 - BODY/INTERIOR/FRONT DOOR SCUFF PLATE - INSTALLATION).

C-PILLAR UPPER TRIM PANEL

REMOVAL

(1) Open rear door and liftgate.
(2) Fold door first row and second row seats to access upper trim panel
(3) Remove rear header trim. (Refer to 23 - BODY/INTERIOR/REAR HEADER TRIM - REMOVAL).
(4) Remove D-pillar trim panel. (Refer to 23 - BODY/INTERIOR/D-PILLAR TRIM - REMOVAL).
(5) Remove lower D-pillar seat belt anchor. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT & RETRACTOR - REMOVAL).
(6) Remove quarter trim bolster to access screws attaching C-pillar upper trim panel (Fig. 9).
(7) Using a trim stick C-4755 or equivalent, disengage the locking tabs and remove C-pillar upper trim panel
(8) Remove trim panel from vehicle.

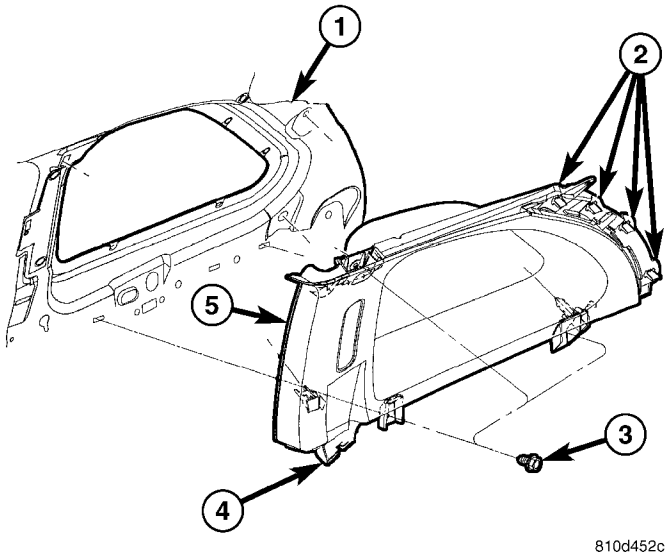


Fig. 9 C-PILLAR UPPER TRIM PANEL

1 - BODY SIDE
2 - LOCATING PINS
3 - ATTACHING SCREW
4 - ROUTE SEAT BELT THROUGH OPENING
5 - C-PILLAR UPPER TRIM PANEL

INSTALLATION

(1) Place trim panel into position.
(2) Align locator pins and press on C-pillar upper trim panel to engage the locking tabs (Fig. 9).
(3) Install screws attaching C-pillar upper trim panel to body side.
(4) Place quarter trim bolster into position and press on bolster to engage the locating tabs.
(5) Install lower D-pillar seat belt anchor. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT & RETRACTOR - INSTALLATION).
(6) Install D-pillar trim panel. (Refer to 23 - BODY/INTERIOR/D-PILLAR TRIM - INSTALLATION).
(7) Install rear header trim. (Refer to 23 - BODY/INTERIOR/REAR HEADER TRIM - INSTALLATION).
(8) Close rear door and liftgate.

D-PILLAR TRIM

REMOVAL

(1) Remove rear header trim cover. (Refer to 23 - BODY/INTERIOR/REAR HEADER TRIM - REMOVAL).

(2) Remove liftgate sill scuff plate. (Refer to 23 - BODY/INTERIOR/LIFTGATE SILL SCUFF PLATE - REMOVAL).

(3) Remove bolt attaching second row seat belt lower anchor to quarter trim panel (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT & RETRACTOR - REMOVAL).

(4) Remove upper trim panel from liftgate, if equipped with power liftgate (Fig. 10). (Refer to 23 - BODY/LIFTGATE/TRIM PANEL - REMOVAL).

(5) Disconnect power liftgate link from ball head bracket, if equipped.

(6) Remove two screw attaching upper D-pillar (Fig. 11).

(7) Disengage locking tabs attaching trim to D-pillar.

(8) Remove D-pillar trim panel from D-pillar.

(9) Pass seat belt through slot in D-pillar trim panel.

(10) Remove D-pillar trim from vehicle.

(11) Remove attaching screw from D-pillar reinforcement molding and remove, if necessary (Fig. 12).

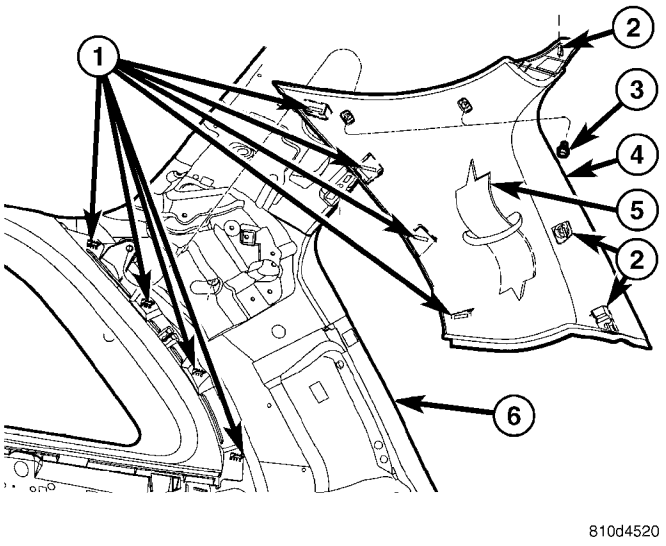


Fig. 11 D-PILLAR UPPER TRIM MOLDING

1 - LOCATING PINS
2 - 4-WAY LOCATING PIN
3 - ATTACHING SCREWS
4 - D-PILLAR UPPER TRIM PANEL
5 - SEAT BELT SLOT IN MOLDING
6 - D-PILLAR

INSTALLATION

(1) Install D-pillar reinforcement molding attaching screw to body side, if necessary (Fig. 12).

(2) Place D-pillar trim into position (Fig. 11).

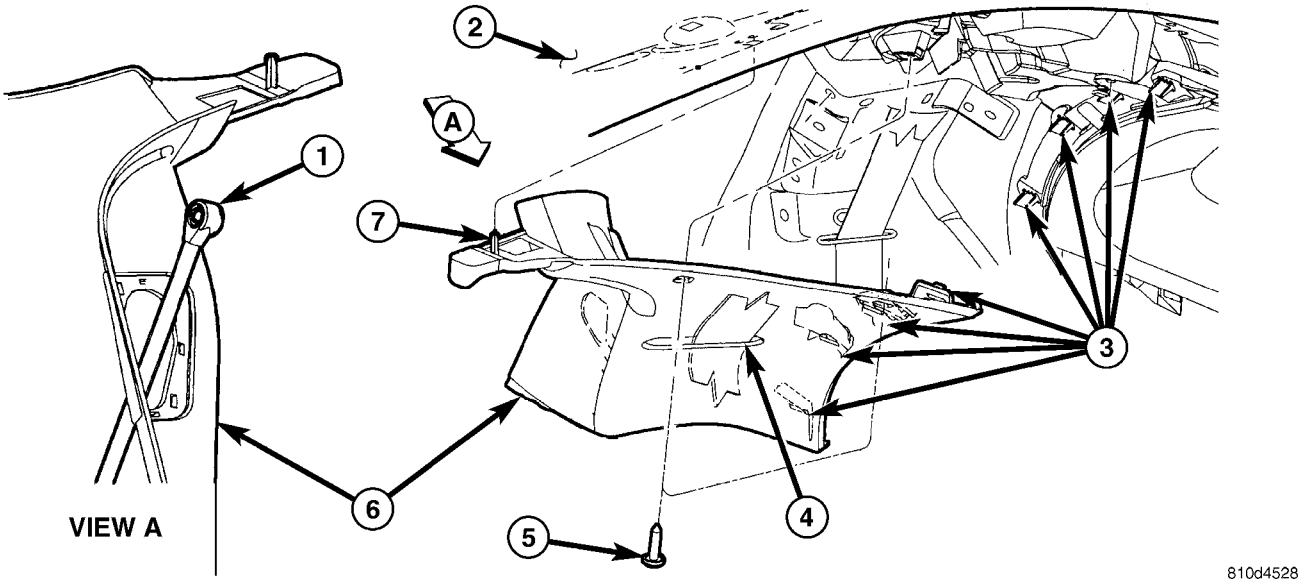


Fig. 10 D-PILLAR LEFT TRIM PANEL WITH POWER LIFTGATE

1 - POWER LIFTGATE LINK
2 - BODY SIDE
3 - LOCATOR PINS
4 - SEAT BELT
5 - ATTACHING SCREWS
6 - D-PILLAR UPPER TRIM MOLDING
7 - 4-WAY LOCATOR PIN

D-PILLAR TRIM (Continued)

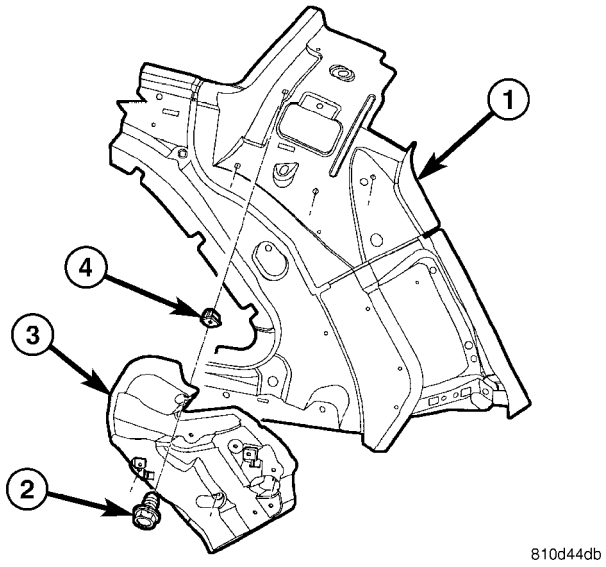


Fig. 12 D-PILLAR REINFORCEMENT MOLDING

1 - D-PILLAR
2 - ATTACHING SCREW
3 - D-PILLAR REINFORCEMENT
4 - PLASTIC NUT

(3) Pass seat belt through slot in D-pillar trim panel.

(4) Press on D-pillar trim to engage locking tabs.

(5) Install two screw attaching upper D-pillar.

(6) Connect power liftgate link from ball head bracket, if equipped.

(7) Install upper trim panel on liftgate, if equipped with power liftgate (Fig. 10). (Refer to 23 - BODY/INTERIOR/INTERIOR TRIM PANELS - INSTALLATION).

(8) Install bolt attaching second row seat belt lower anchor to quarter trim panel (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT & RETRACTOR - INSTALLATION).

(9) Install liftgate sill scuff plate. (Refer to 23 - BODY/INTERIOR/LIFTGATE SCUFF PLATE - INSTALLATION).

(10) Install rear header trim cover. (Refer to 23 - BODY/INTERIOR/REAR HEADER TRIM - INSTALLATION).

FRONT FLOOR CONSOLE

REMOVAL

(1) Remove shift bezel. (Refer to 23 - BODY/INTERIOR/SHIFT BEZEL - REMOVAL).

(2) Remove transmission range indicator surround bezel (Fig. 13).

(3) Remove two screws attaching front floor console to the lower instrument panel (Fig. 14).

(4) Open cup holder and remove two attaching screws to bottom of cup holder.

(5) Open bin and remove two attaching screws to bottom of bin.

(6) Remove front floor console sidewall attaching screws, three per side.

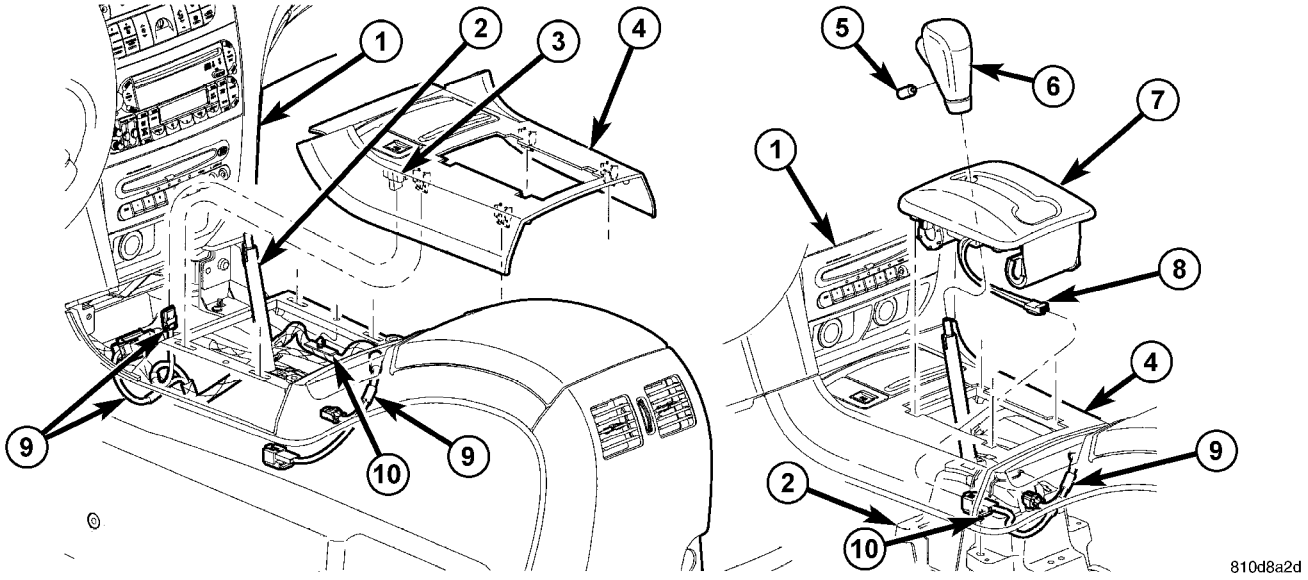


Fig. 13 TRANSMISSION RANGE INDICATOR SURROUND BEZEL

1 - INSTRUMENT PANEL
2 - AUTOSTICK SHIFTER ASSEMBLY
3 - TRACTION CONTROL SWITCH
4 - TRANSMISSION RANGE INDICTOR SURROUND BEZEL
5 - KNOB SET SCREW
6 - SHIFTER KNOB
7 - FLOOR SHIFT BEZEL
8 - WIRE CONNECTOR
9 - INSTRUMENT PANEL WIRING HARNESS
10 - INSTRUMENT PANEL WIRING CLIP

FRONT FLOOR CONSOLE (Continued)

(7) Raise front floor console and disconnect wiring harness.

(8) Remove front floor console from vehicle.

INSTALLATION

(1) Place front floor console into position (Fig. 14).

(2) Raise front floor console and connect wiring harness.

(3) Install front floor console sidewall attaching screws, three per side.

(4) Install two attaching screws to bottom of bin.

(5) Install two attaching screws to bottom of cup holder.

(6) Install two screws attaching front floor console to the lower instrument panel.

(7) Install transmission range indicator surround bezel (Fig. 13).

(8) Install shift bezel. (Refer to 23 - BODY/INTERIOR/SHIFT BEZEL - INSTALLATION).

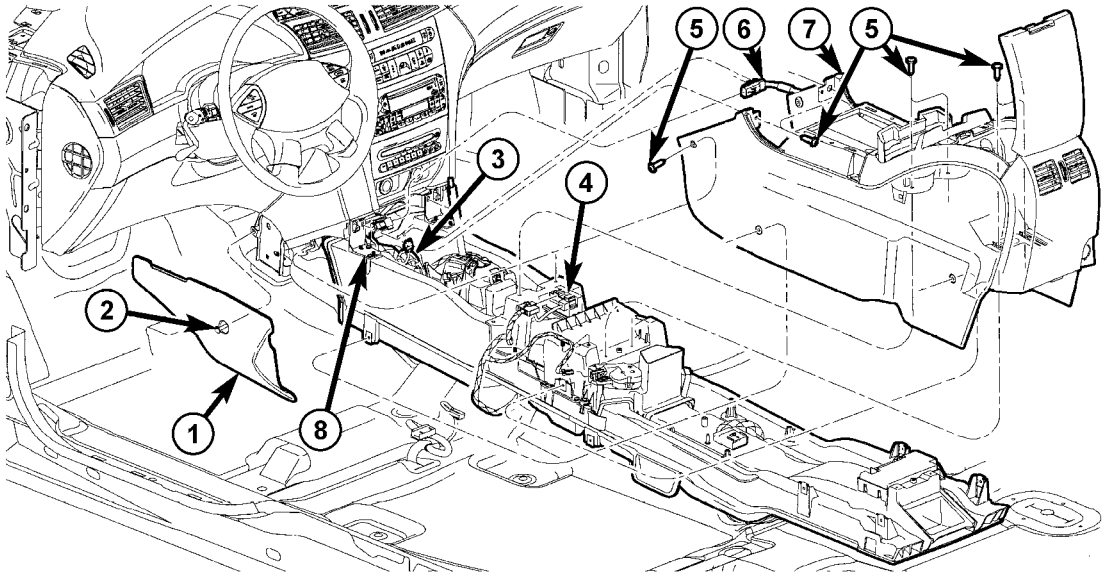


Fig. 14 FRONT FLOOR CONSOLE

1 - FORWARD CONSOLE CLOSEOUT PANEL
2 - CLOSEOUT PANEL PUSH PIN RETAINER
3 - INSTRUMENT PANEL WIRING
4 - FLOOR CONSOLE BASE
5 - FRONT FLOOR CONSOLE ATTACHING SCREWS TO LOWER INSTRUMENT PANE AND BASE
6 - FRONT FLOOR CONSOLE WIRING CONNECTOR
7 - FRONT FLOOR CONSOLE
8 - ATTACHING L-BRACKETS

FLOOR CONSOLE BASE ASSEMBLY

REMOVAL

(1) Remove front and rear floor consoles. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL) and (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).

(2) Remove shift mechanism. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT MECHANISM - REMOVAL).

(3) Remove nine attaching nuts and washers to weld studs (Fig. 15).

(4) Remove two screws attaching L-brackets to instrument panel.

(5) Disconnect wire connectors that are still connected.

(6) Raise floor console base assembly to allow wire harness exit through console base.

(7) Remove floor console base assembly from vehicle.

INSTALLATION

(1) Place floor console base assembly into position (Fig. 15).

(2) Install wire harnesses through console base into position.

(3) Connect wire connectors.

(4) Install two screws attaching L-brackets to instrument panel.

(5) Install nine attaching nuts and washers to weld studs.

(6) Install shift mechanism. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT MECHANISM - INSTALLATION).

(7) Install front and rear floor consoles. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION) and (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).

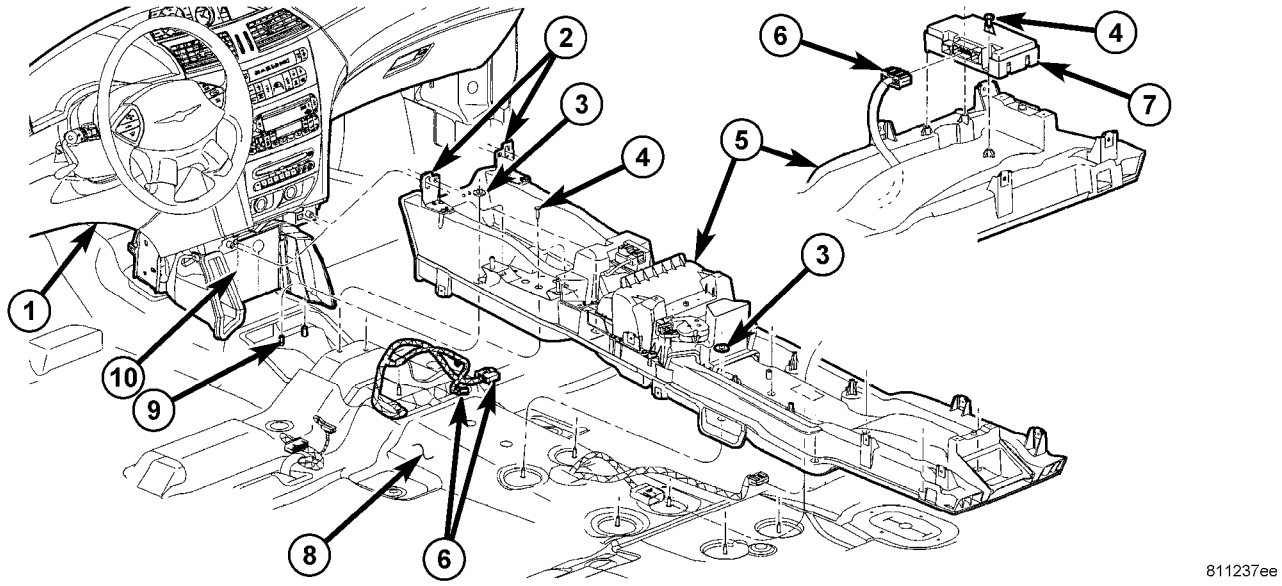


Fig. 15 FRONT FLOOR CONSOLE BASE ASSEMBLY (BLOWER HOUSING)

1 - INSTRUMENT PANEL
2 - ATTACHING L-BRACKETS
3 - ATTACHING NUTS
4 - ATTACHING SCREWS
5 - FRONT FLOOR CONSOLE BASE ASSEMBLY AND BLOWER HOUSING
6 - WIRE CONNECTOR
7 - TELEMATICS COMMUNICATION UNIT
8 - FLOOR PAN
9 - FLOOR PAN STUDS
10 - FLOOR CONSOLE STUFFER

FRONT DOOR SILL SCUFF PLATE

REMOVAL

(1) Using trim stick (C-4755), disengage push pins attaching door sill plate to door sill.

(2) Remove door sill scuff plate from vehicle (Fig. 16).

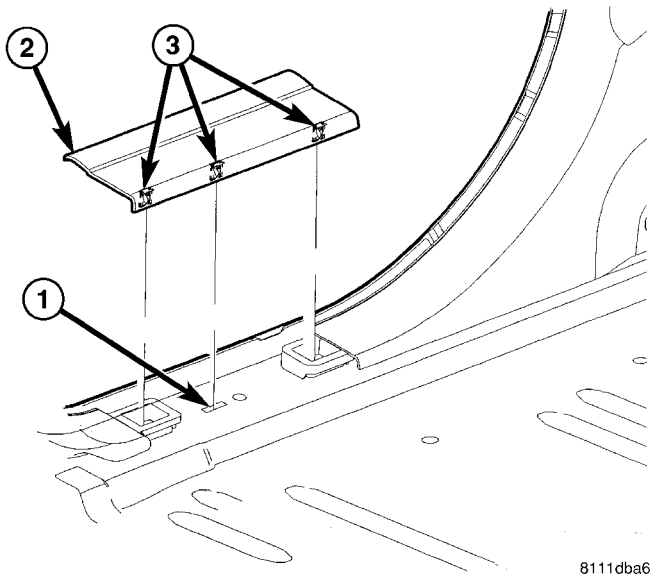


Fig. 16 FRONT DOOR SILL SCUFF PLATE

1 - FRONT DOOR SILL
2 - FRONT DOOR SILL SCUFF PLATE
3 - PUSH PIN

INSTALLATION

(1) Place sill scuff plate in position on vehicle (Fig. 16).

(2) Press sill scuff plate down to engage push pins to door sill.

HEADLINER

REMOVAL

(1) Disconnect and isolate the negative battery cable.

(2) Remove sun visors and vanity mirrors.

(3) Remove sun visor center supports.

(4) Remove assist handles attaching screws and remove, if equipped.

(5) Remove second row dome lamp and coat hook attaching screw and remove, if equipped.

(6) Remove A-pillar trim. (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL).

(7) Remove B-pillar upper trim. (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - REMOVAL).

(8) Remove liftgate header trim. (Refer to 23 - BODY/INTERIOR/REAR HEADER TRIM - REMOVAL).

(9) Remove D-pillar trim. (Refer to 23 - BODY/INTERIOR/D-PILLAR TRIM - REMOVAL).

(10) Remove C-pillar upper trim, as necessary. (Refer to 23 - BODY/INTERIOR/C-PILLAR TRIM - REMOVAL)

(11) Remove overhead console, if equipped. (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(12) Remove overhead DVD video screen, if equipped. (Refer to 8 - ELECTRICAL/AUDIO/VIDEO SCREEN - REMOVAL).

(13) Disconnect wire harness connectors at the left A-pillar (Fig. 17).

(14) Disconnect wire harness connector and wire clips at the right A-pillar (Fig. 18).

(15) Disconnect rear view mirror wire connector from mirror.

(16) Disengage push in fasteners attaching headlining to roof panel (Fig. 19) and (Fig. 20).

(17) Remove headlining from roof.

(18) Remove headlining through liftgate opening.

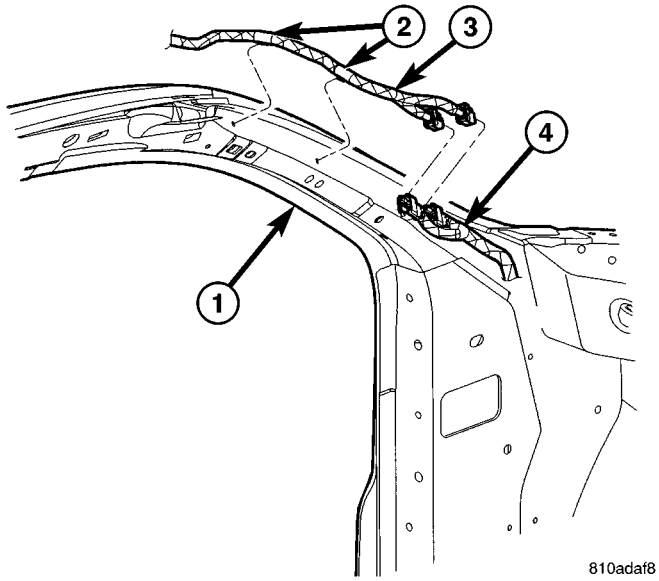


Fig. 17 DOME WIRE HARNESS

1 - A-PILLAR
2 - WIRING HARNESS - DOME LAMPS
3 - DOME WIRE HARNESS
4 - BODY WIRE HARNESS

INSTALLATION

(1) If installing DVD video screen bracket (Fig. 21).

(a) Install u-nuts into roof bows.

(b) Place bracket into position.

(c) Install attaching screws and washers and push pins.

HEADLINER (Continued)

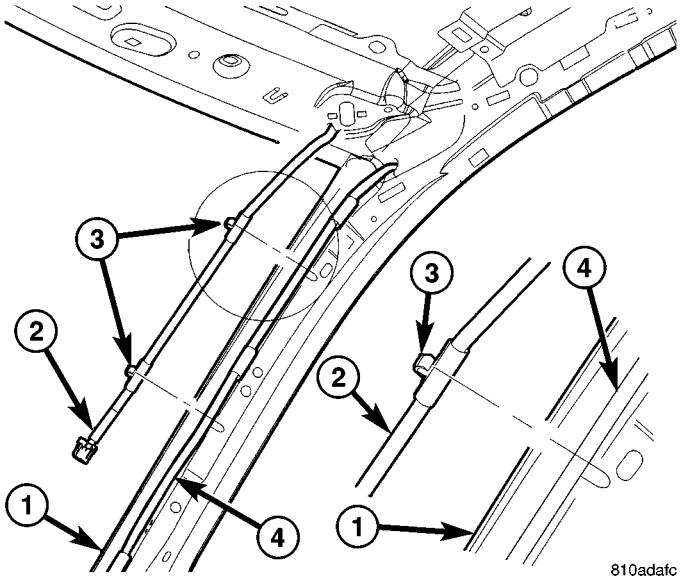


Fig. 18 DVD WIRE HARNESS

1 - A-PILLAR
2 - WIRE HARNESS - DVD
3 - WIRING CLIP(S)
4 - ANTENNA CABLE

(2) Place headlining into vehicle through liftgate opening.

(3) Raise headlining into position.

(4) Engage push in fasteners attaching headlining to roof panel (Fig. 19) and (Fig. 20).

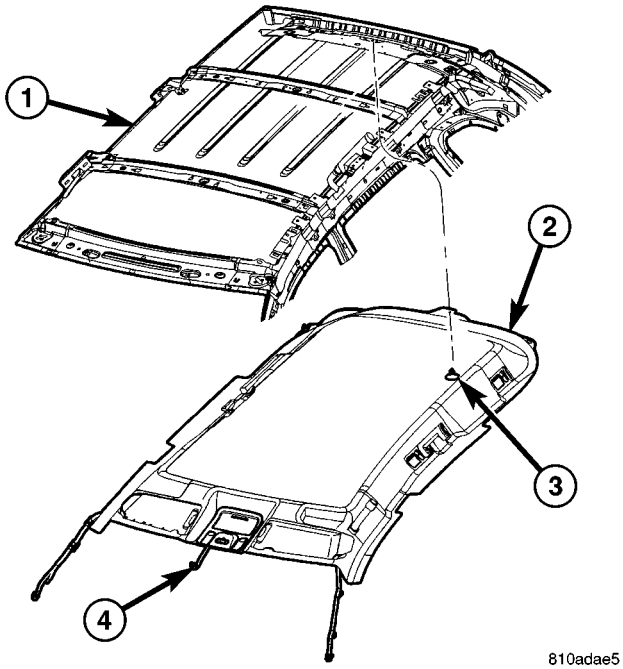


Fig. 20 HEADLINER ASSEMBLY

1 - ROOF PANEL
2 - HEADLINER ASSEMBLY
3 - PUSH PIN FASTENER
4 - REAR VIEW MIRROR CONNECTOR

(5) Disconnect rear view mirror wire connector from mirror.

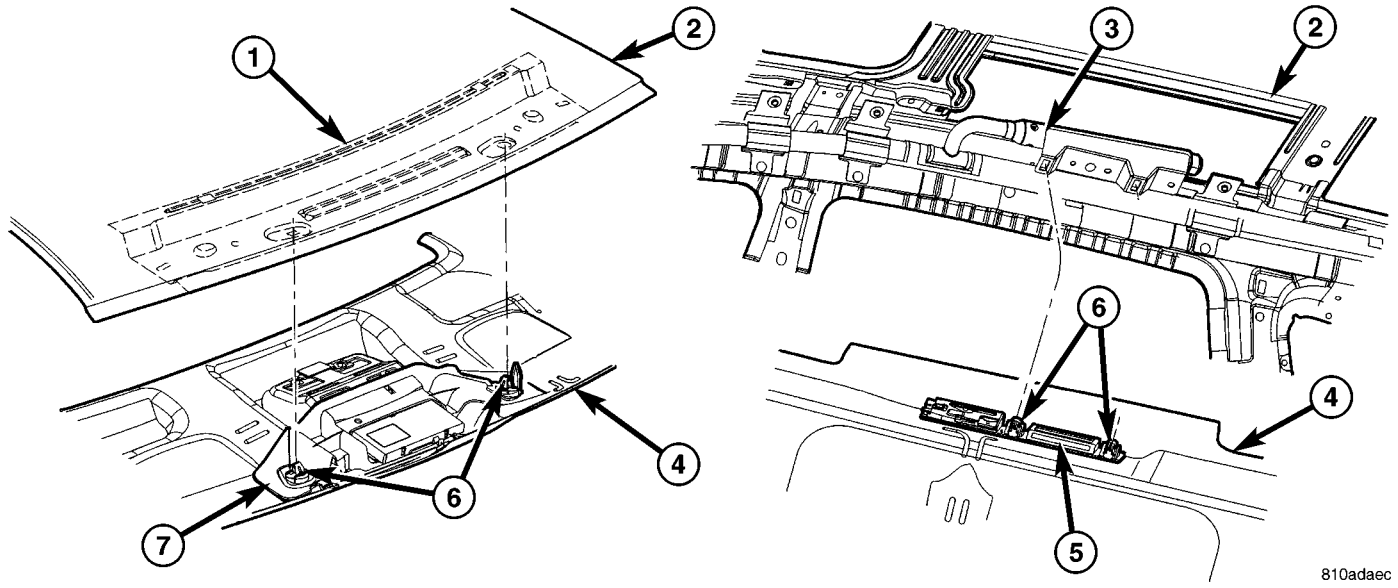


Fig. 19 HEADLINER RETAINER BRACKET

1 - WINDSHIELD OPENING UPPER FRAME
2 - ROOF PANEL
3 - GAS GUIDE (SIDE AIRBAG)
4 - HEADLINER ASSEMBLY
5 - ASSIST HANDLE ANCHOR
6 - PUSH PIN(S)
7 - HEADLINER RETAINER BRACKET

HEADLINER (Continued)

(6) Connect wire harness connector and wire clips at the right A-pillar (Fig. 18).

(7) Connect wire harness connectors at the left A-pillar (Fig. 17).

(8) Install overhead DVD video screen, if equipped. (Refer to 8 - ELECTRICAL/AUDIO/CD CHANGER - INSTALLATION).

(9) Install overhead console, if equipped. (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - INSTALLATION).

(10) Install C-pillar upper trim. (Refer to 23 - BODY/INTERIOR/C-PILLAR TRIM - REMOVAL)

(11) Install D-pillar trim. (Refer to 23 - BODY/INTERIOR/D-PILLAR TRIM - INSTALLATION).

(12) Install liftgate header trim. (Refer to 23 - BODY/INTERIOR/REAR HEADER TRIM - INSTALLATION).

(13) Install B-pillar upper trim. (Refer to 23 - BODY/INTERIOR/B-PILLAR UPPER TRIM - INSTALLATION).

(14) Install A-pillar trim. (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - INSTALLATION).

(15) Install second row dome lamp and coat hook attaching screws, if equipped.

(16) Install assist handles attaching screws, if equipped.

(17) Install sun visor center supports.

(18) Install sun visors and vanity mirrors.

(19) Connect negative battery cable.

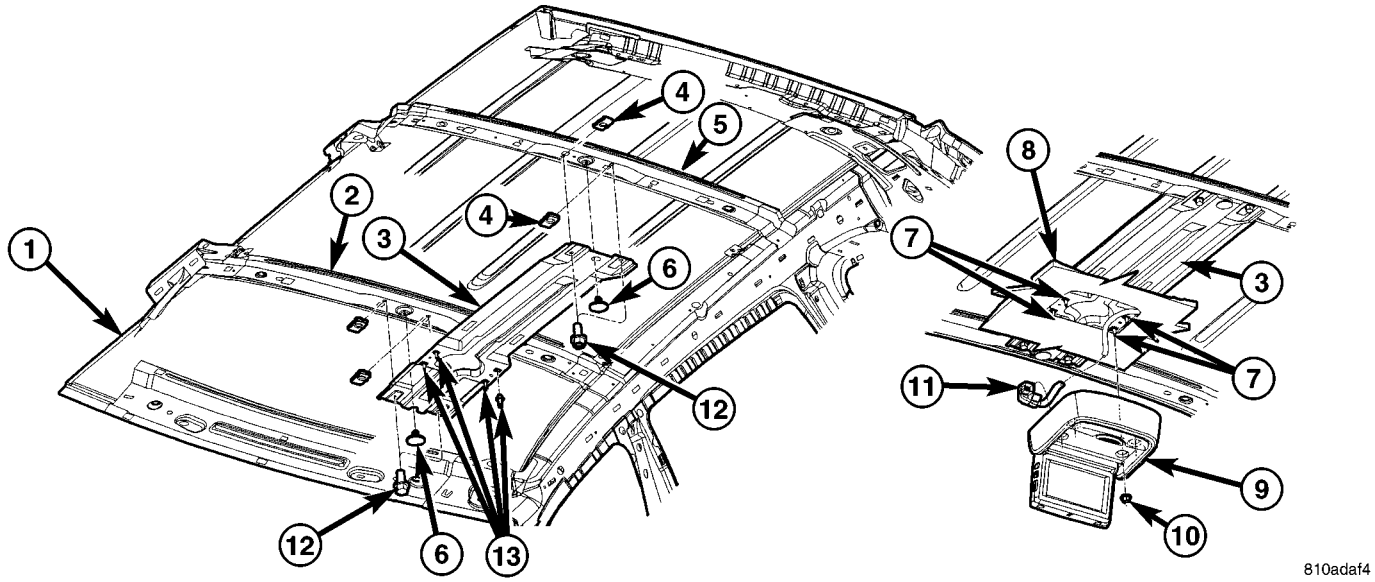


Fig. 21 VIDEO SCREEN MOUNTING BRACKET

1 - ROOF PANEL
2 - ROOF BOW NUMBER ONE
3 - VIDEO SCREEN BRACKET
4 - U-NUT(S)
5 - ROOF BOW NUMBER TWO
6 - PUSH PIN FASTENER
7 - FOAM TAPE
8 - HEADLINE ASSEMBLY
9 - VIDEO SCREEN
10 - WASHER AND NUT(S)
11 - VIDEO DISPLAY CABLE
12 - WASHER AND SCREW(S)
13 - STUD COLLAR FOR VIDEO DISPLAY

LIFTGATE SILL SCUFF PLATE

REMOVAL

(1) Using trim stick (C-4755), disengage push pins attaching liftgate sill scuff plate to liftgate sill.

(2) Remove liftgate sill scuff plate from vehicle (Fig. 22).

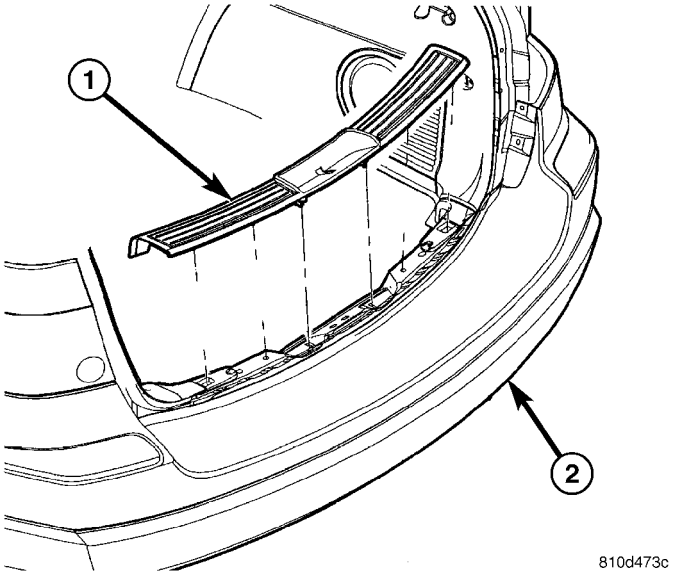


Fig. 22 LIFTGATE SILL SCUFF PANEL

1 - LIFTGATE SILL SCUFF PLATE
2 - REAR BUMPER

INSTALLATION

(1) Place sill scuff plate in position on vehicle (Fig. 22).

(2) Press sill scuff plate down to engage push pins to liftgate sill.

QUARTER TRIM PANEL

REMOVAL

(1) Open rear door.

(2) Open liftgate.

(3) Remove rear door sill scuff plate. (Refer to 23 - BODY/INTERIOR/REAR DOOR SILL SCUFF PLATE - REMOVAL).

(4) Remove liftgate sill scuff plate. (Refer to 23 - BODY/INTERIOR/LIFTGATE SILL SCUFF PLATE - REMOVAL)

(5) Fold the first row seat back down and roll seat forward.

(6) Fold second row seat back down.

(7) Remove rear floor storage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).

(8) Remove second row seat from vehicle to access quarter trim panel. (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).

(9) Remove C-pillar lower seat belt anchor and D-pillar lower seat belt anchor. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT & RETRACTOR - REMOVAL).

(10) Using a trim stick C-4755 or equivalent, disengage the locking tabs and remove quarter trim panel bolster cover (speaker grille). (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - REMOVAL).

(11) Remove screw attaching tie down ring (Fig. 23).

(12) Using a trim stick C-4755 or equivalent, disengage the locking tabs attaching quarter trim panel body side panel.

(13) Pull quarter trim panel free enough to reach behind trim panel to disconnect power outlet connector and speaker connector.

(14) Remove quarter trim panel from vehicle.

INSTALLATION

(1) Place quarter trim panel into position (Fig. 23).

(2) Reach behind trim panel, connect power outlet connector and speaker connector.

(3) Set locators pins into position and pressing on panel to engage the locking tabs attaching quarter trim panel body side panel.

(4) Install screw attaching tie down ring.

(5) Place quarter trim panel bolster cover (speaker grille) into position and press on bolster to engage locking pins. (Refer to 8 - ELECTRICAL/AUDIO/SPEAKER - INSTALLATION).

(6) Install C-pillar lower seat belt anchor and D-pillar lower seat belt anchor. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT & RETRACTOR - INSTALLATION).

(7) Install second row seat into vehicle. (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

(8) Install rear floor storage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - INSTALLATION).

QUARTER TRIM PANEL (Continued)

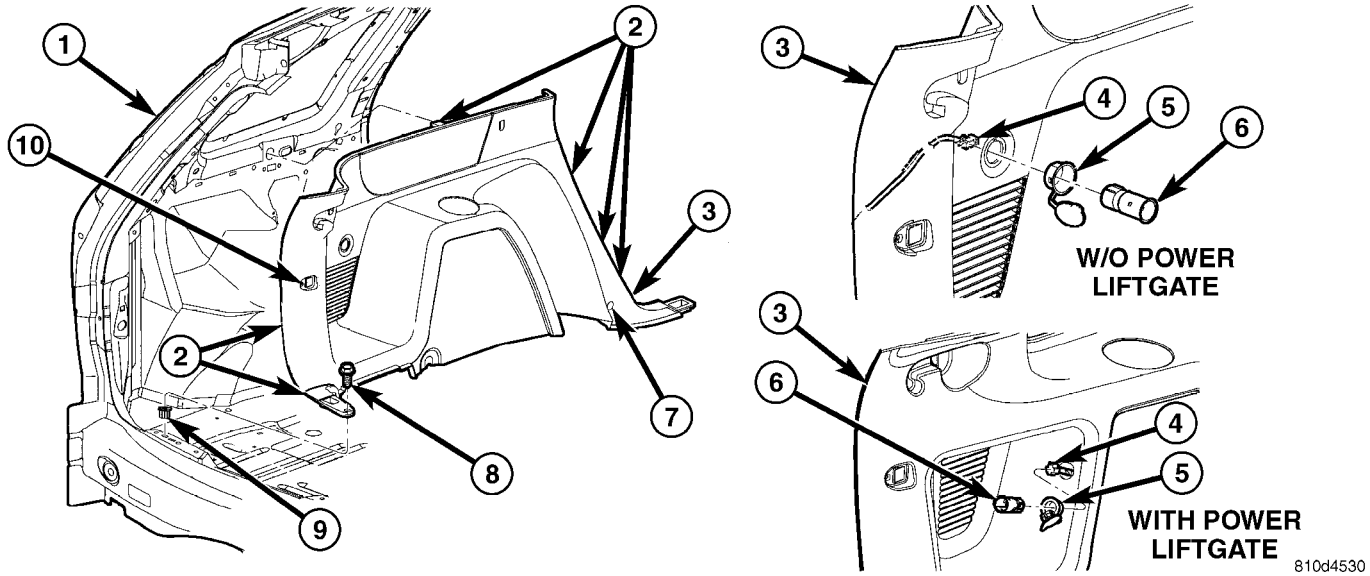


Fig. 23 QUARTER TRIM PANEL

1 - BODY SIDE
2 - LOCATION PINS
3 - QUARTER TRIM PANEL
4 - POWER OUTLET WIRE CONNECTOR
5 - POWER OUTLET MOUNT AND CAP
6 - POWER OUTLET BASE
7 - C-PILLAR LOWER
8 - ATTACHING SCREW
9 - GROMMET
10 - TIE DOWN RING AND SCREW

(9) Install liftgate sill scuff plate. (Refer to 23 - BODY/INTERIOR/LIFTGATE SILL SCUFF PLATE - INSTALLATION).

(10) Install rear door sill scuff plate. (Refer to 23 - BODY/INTERIOR/REAR DOOR SILL SCUFF PLATE - INSTALLATION).

(11) Open rear door and liftgate.

REAR DOOR SCUFF PLATE

REMOVAL

(1) Using trim stick (C-4755), disengage push pins attaching door sill plate to door sill.

(2) Remove door sill scuff plate from vehicle (Fig. 24).

INSTALLATION

(1) Place sill scuff plate in position on vehicle (Fig. 24).

(2) Place 4-way locator pin into position.

(3) Press sill scuff plate down to engage push pins to door sill.

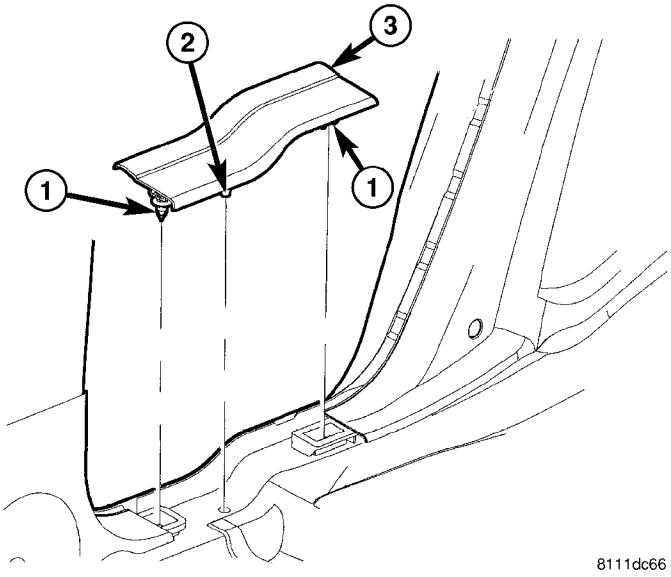


Fig. 24 REAR DOOR SILL SCUFF PLATE

1 - PUSH PINS
2 - 4-WAY LOCATION PIN
3 - REAR DOOR SILL SCUFF PLATE

REAR FLOOR CONSOLE

REMOVAL

(1) Using a trim stick C-4755 or equivalent, disengage the locking tabs and remove floor console scuff plate (Fig. 25).
(2) Remove four attaching screw under scuff plate.
(3) Open cup holder and remove two attaching screws on the bottom.
(4) Remove sidewalls attaching screws, three per side.
(5) Remove rear floor console from vehicle.

INSTALLATION

(1) Place rear floor console into position (Fig. 25).
(2) Install sidewalls attaching screws, three per side.
(3) Instal two attaching screws in bottom of cup holder.
(4) Install four attaching screw under scuff plate.
(5) Place floor console scuff plate into position and press down to engage the locking tabs.

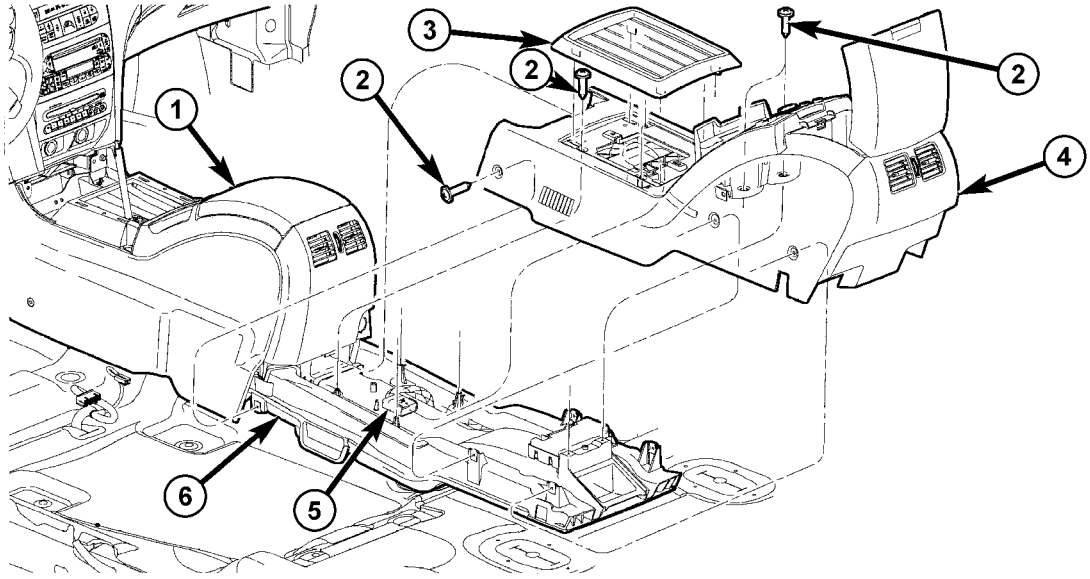


Fig. 25 REAR FLOOR CONSOLE

1 - FRONT FLOOR CONSOLE
2 - ATTACHING SCREWS
3 - FLOOR CONSOLE SCUFF PLATE
4 - REAR FLOOR CONSOLE
5 - REAR FLOOR CONSOLE WIRE CONNECTOR
6 - FLOOR CONSOLE BASE ASSEMBLY

REAR FLOOR STOWAGE BIN

REMOVAL

(1) Open liftgate.
(2) Open rear floor storage bin lid (Fig. 26).
(3) Remove attaching screws (4) in the bottom of bin.
(4) Remove floor storage bin from vehicle.

INSTALLATION

(1) Place floor storage bin into position (Fig. 26).
(2) Install attaching screws (4) in the bottom of bin.
(3) Close rear floor storage bin lid.
(4) Close liftgate.

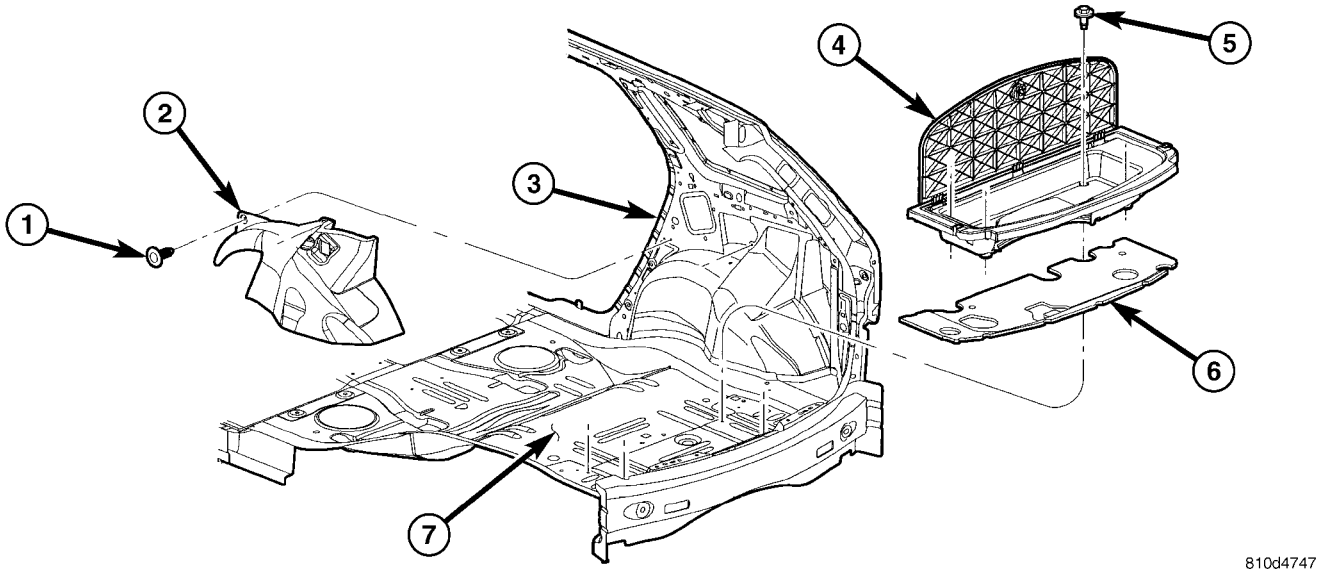


Fig. 26 FLOOR STORAGE BIN

1 - PUSH PIN
2 - WHEELHOUSE SILENCER
3 - BODY SIDE PANEL
4 - FLOOR STORAGE BIN
5 - ATTACHING SCREWS
6 - FLOOR SILENCER
7 - REAR FLOOR PANEL

REAR HEADER TRIM

REMOVAL

(1) Disengage locking tabs attaching rear header trim panel (Fig. 27).

(2) Remove rear header trim from vehicle.

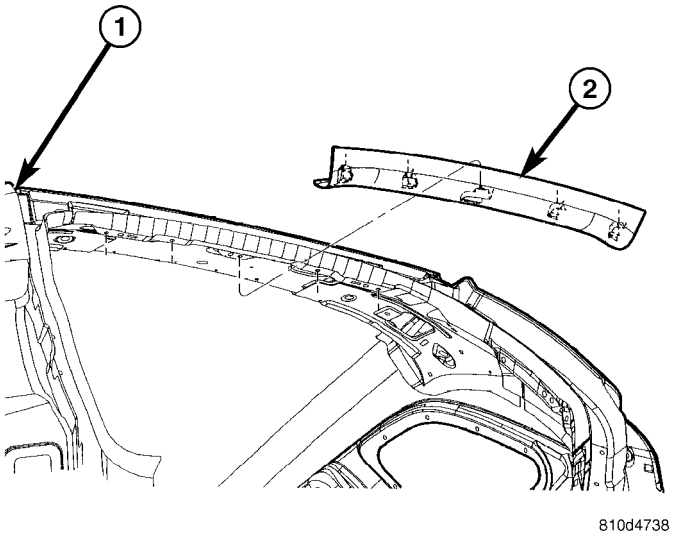


Fig. 27 REAR HEADER TRIM PANEL

1 - BODY ASSEMBLY
2 - REAR HEADER TRIM PANEL

INSTALLATION

(1) Place rear header trim panel into position (Fig. 27).

(2) Press on rear header trim to engage push pins to body assembly.

REAR VIEW MIRROR

REMOVAL

(1) If equipped, disconnect mirror wire connector(s) (Fig. 28).

(2) Loosen the mirror base set screw.

(3) Slide the mirror base upward and off the support button.

INSTALLATION

(1) Position the mirror base at the support button and slide it downward onto the button (Fig. 28).

(2) Tighten the set screw 1 N·m (15 in. lbs.) torque.

(3) If equipped, connect mirror wire connector(s).

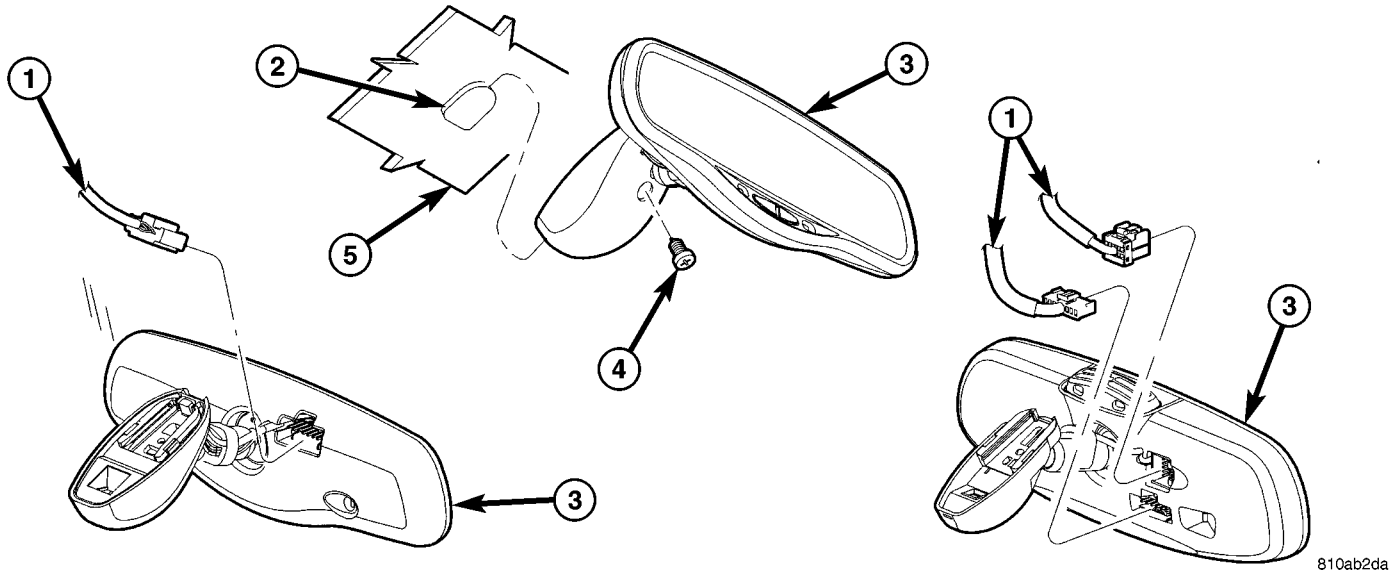


Fig. 28 REAR VIEW MIRROR

1 - MIRROR WIRE CONNECTOR(s)
2 - MIRROR SUPPORT BUTTON
3 - REAR VIEW MIRROR
4 - SET SCREW
5 - WINDSHIELD

SHIFTER BEZEL

REMOVAL

(1) Remove shifter knob. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/GEAR SHIFT KNOB - REMOVAL).

(2) Using a trim stick C-4755 or equivalent, disengage the locking tabs and remove shifter bezel (Fig. 29).

(3) Raise shift bezel and disconnect wire connector.

(4) Remove shift bezel from vehicle.

INSTALLATION

(1) Place shift bezel into position (Fig. 29).

(2) Connect wire connector.

(3) Press on shifter bezel to engage locking tabs.

(4) Install shifter knob. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/GEAR SHIFT KNOB - INSTALLATION).

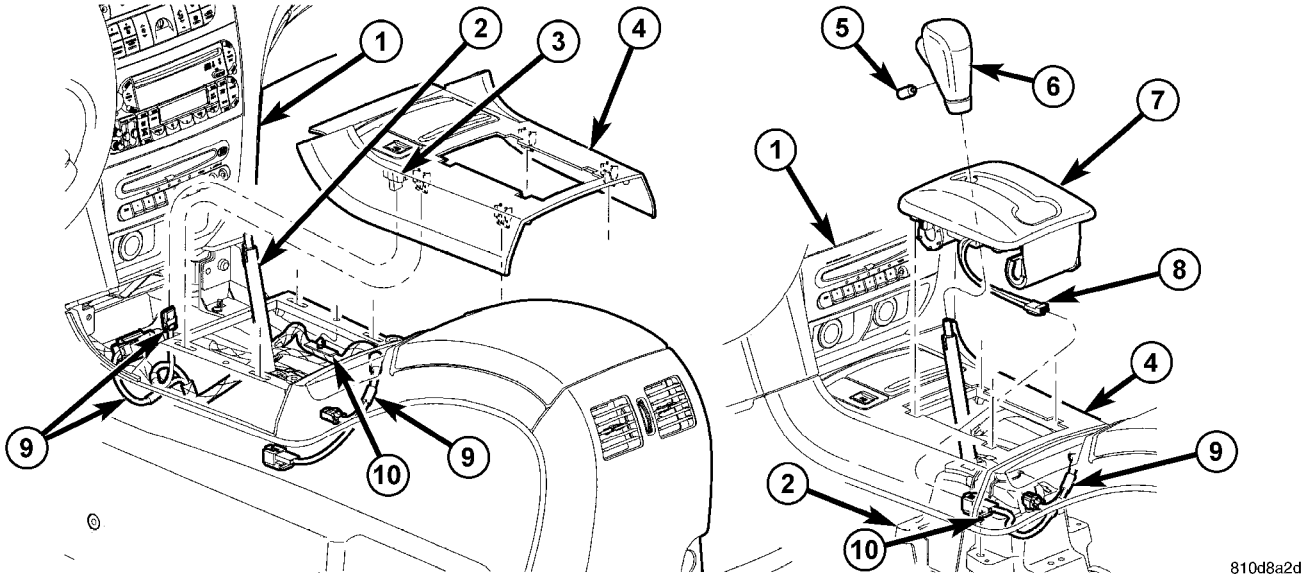


Fig. 29 TRANSMISSION RANGE INDICATOR SURROUND BEZEL

1 - INSTRUMENT PANEL
2 - AUTOSTICK SHIFTER ASSEMBLY
3 - TRACTION CONTROL SWITCH
4 - TRANSMISSION RANGE INDICTOR SURROUND BEZEL
5 - KNOB SET SCREW
6 - SHIFTER KNOB
7 - FLOOR SHIFT BEZEL
8 - WIRE CONNECTOR
9 - INSTRUMENT PANEL WIRING HARNESS
10 - INSTRUMENT PANEL WIRING CLIP

SUN VISOR

REMOVAL

All vehicles with driver and passenger side air bags must have a colored coded five Bullet point air bag warning label applied to the sun visor, verify label availability and ensure the label is installed.

(1) Disengage sun visor from center support.

(2) Remove screws attaching sun visor to roof header (Fig. 30).

(3) Remove sun visor from roof.

(4) If equipped, disconnect illuminated vanity mirror wire connector from body harness.

(5) Remove sun visor from vehicle.

INSTALLATION

All vehicles with driver and passenger side air bags must have a colored coded five Bullet point air bag warning label applied to the sun visor, verify label availability and ensure the label is installed.

(1) Place sun visor in position on vehicle.

(2) Connect illuminated vanity mirror wire connector into body harness, if equipped.

(3) Place sun visor in position on roof.

(4) Install attaching screws sun visor to roof header (Fig. 30).

(5) Engage sun visor into center support.

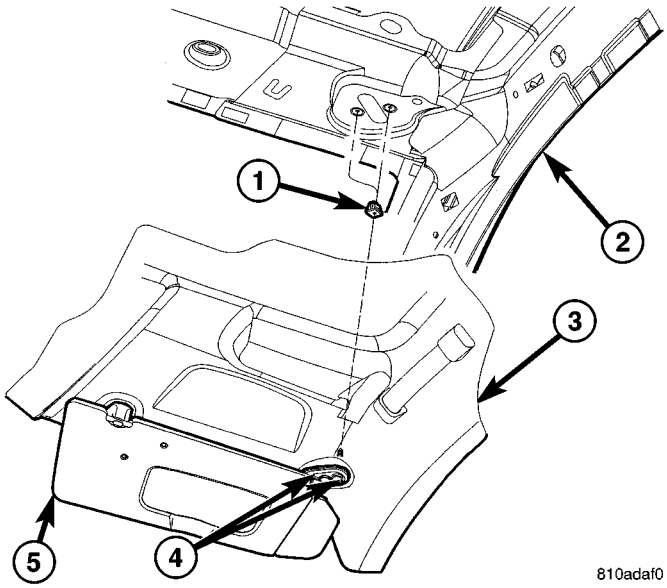


Fig. 30 SUN VISOR AND HEADLINER ATTACHING SCREWS

1 - SPRING NUTS
2 - ROOF PANEL
3 - HEADLINER ASSEMBLY
4 - VISOR AND HEADLINER ATTACHING SCREWS
5 - SUN VISOR AND SUN VISOR CENTER SUPPORT

LIFTGATE

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OUTSIDE HANDLE

REMOVAL

(1) Remove liftgate trim panel. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/ TRIM PANEL - REMOVAL).

(2) Disconnect the exterior handle electrical connectors (Fig. 1).

(3) Remove the two screws attaching liftgate handle to liftgate inner panel.

(4) Remove the exterior handle/license plate light assembly.

INSTALLATION

(1) Route the exterior handle electrical connector through the door and position handle (Fig. 1).

(2) Install the two out screws liftgate handle to liftgate inner panel. Tighten screws to 8 N·m (80 in. lbs.).

(3) Connect the electrical connector.

(4) Install the trim panel. (Refer to 23 - BODY/ TAILGATE/TRIM PANEL - INSTALLATION).

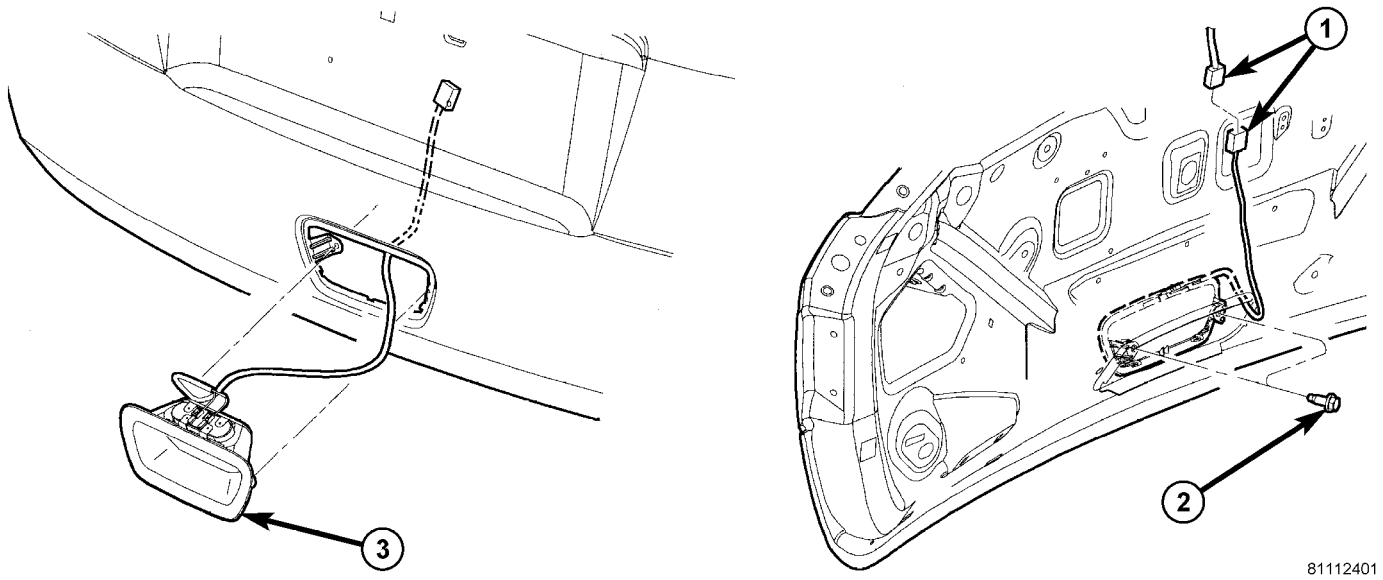


Fig. 1 OUTSIDE HANDLE

1 - WIRE HARNESS
2 - ATTACHING SCREWS
3 - OUTSIDE HANDLE ASSEMBLY

HINGE

REMOVAL

(1) Release liftgate latch and open liftgate.
(2) Support liftgate on a suitable lifting device in the full open position.
(3) Using a grease pencil or equivalent, mark the hinge location.
(4) Remove liftgate header trim panel.
(5) Remove nuts attaching liftgate hinge to roof header (Fig. 2).
(6) Remove bolts attaching hinge to liftgate.
(7) Remove hinge from vehicle.

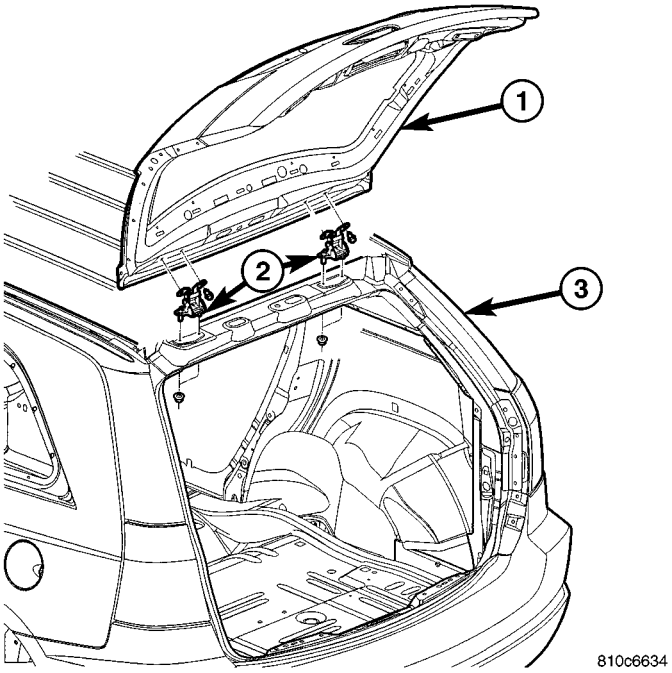


Fig. 2 LIFTGATE HINGE

1 - LIFTGATE
2 - LIFTGATE HINGE
3 - LIFTGATE OPENING

INSTALLATION

NOTE: Use a suitable body sealer on the hinge to body mating surfaces prior to installation.

(1) If necessary, paint replacement hinge before installation.
(2) Place hinge in position on vehicle.
(3) Align hinge to marks on liftgate.
(4) Install bolts attaching hinge to liftgate (Fig. 2). Tighten bolts to 33 N·m (24 ft. lbs.) torque.
(5) Align hinge to marks on roof header.
(6) Install nuts attaching liftgate hinge to roof header. Tighten bolts to 23 N·m (17 ft. lbs.) torque.
(7) Verify liftgate alignment. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).
(8) Install liftgate header trim panel.

LATCH

REMOVAL

(1) Remove liftgate trim panel.
(2) Disengage outside handle link from clip on latch.
(3) Disconnect wire connector from liftgate latch (Fig. 3).
(4) Remove screws attaching latch to liftgate.
(5) Remove latch from vehicle.

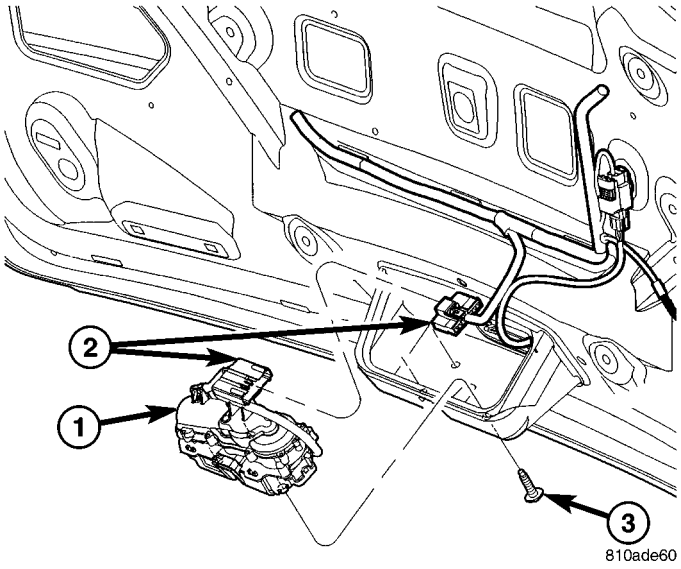


Fig. 3 LIFTGATE LATCH

1 - LIFTGATE LATCH ASSEMBLY
2 - WIRE CONNECTOR - POWER LOCK HARNESS
3 - ATTACHING SCREW(S)

INSTALLATION

(1) Engage link and place latch in position on vehicle (Fig. 3).
(2) Install screws attaching latch to liftgate. Tighten screws to 11 N·m (95 in. lbs.) torque.
(3) Connect wire connector to liftgate latch.
(4) Verify liftgate fit and operation. Adjust as necessary.
(5) Install liftgate trim panel.

LATCH STRIKER

REMOVAL

(1) Open liftgate.
(2) Remove liftgate sill scuff plate. (Refer to 23 - BODY/INTERIOR/LIFTGATE SCUFF PLATE - REMOVAL).
(3) Mark outline of striker on sill to aid installation.
(4) Remove screws attaching striker to sill (Fig. 4).
(5) Remove striker from vehicle.

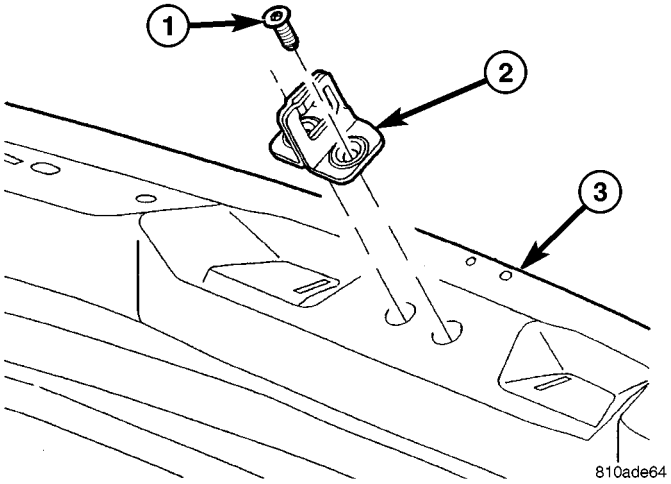


Fig. 4 LIFTGATE LATCH STRIKER

1 - ATTACHING SCREWS
2 - LIFTGATE LATCH STRIKER
3 - LIFTGATE SILL

INSTALLATION

(1) Place striker in position on vehicle (Fig. 4).
(2) Align striker to outline mark on sill.
(3) Install screws attaching striker to sill. Tighten screws to 28 N·m (21 ft. lbs.) torque.
(4) Verify liftgate alignment and operation.
(5) Install liftgate sill scuff plate. (Refer to 23 - BODY/INTERIOR/LIFTGATE SCUFF PLATE - INSTALLATION).

LIFTGATE

REMOVAL

NOTE: The liftgate does not have a outside mechanical release. For any service procedures that require disconnecting battery, open liftgate, if necessary before disconnecting battery .

(1) Release liftgate latch and open liftgate.
(2) Disconnect and isolate the battery negative cable.
(3) Remove upper header trim panel. (Refer to 23 - BODY/INTERIOR/REAR HEADER TRIM - REMOVAL).
(4) Disconnect liftgate wiring and hoses.
(5) Support liftgate on a suitable lifting device.
(6) Disconnect power liftgate link from liftgate.
(7) Disconnect prop rods from liftgate. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/PROP ASSEMBLY - REMOVAL).
(8) Remove bolts attaching liftgate hinge to liftgate. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/HINGE - REMOVAL).
(9) With assistance, remove liftgate from vehicle.

INSTALLATION

(1) With assistance, place liftgate into position.
(2) Support liftgate on a suitable lifting device.

NOTE: Use a suitable body sealer on the hinge to body mating surfaces prior to installation.

(3) Install nuts attaching liftgate hinge to liftgate. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/HINGE - INSTALLATION).
(4) Connect prop rods to liftgate. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/PROP ASSEMBLY - INSTALLATION).
(5) Connect power liftgate link to liftgate.
(6) Connect liftgate wiring and hoses.
(7) Install upper header trim panel. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/LIFTGATE WEATHERSTRIP - INSTALLATION).
(8) Check liftgate for proper alignment. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

ADJUSTMENTS

NOTE: The position of the liftgate can be adjusted upward or downward by the use of slots in the hinge. An inward or outward adjustment is achieved by, opening up holes in the body. If an inward or outward adjustment is needed, use a body sealer on the hinge to body mating surface.

In/out

(1) Remove the upper liftgate header trim. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - REMOVAL).

NOTE: In/Out or Fore/aft (lateral) door adjustment is done by loosening the hinge to the hinge pillar fasteners one hinge at a time and moving the door to the correct position. May require grinding off nubs to float body side

LIFTGATE (Continued)

(2) For the upper liftgate adjustments, loosen the hinge to header nuts and adjust to specifications (Fig. 2). (Refer to 23 - BODY/BODY STRUCTURE/ GAP AND FLUSH - SPECIFICATIONS).

(3) Tighten nuts to 23 N·m (17 ft. lbs.) torque.

(4) For the lower liftgate adjustments, loosen the striker screws and adjust to specifications (Fig. 4). (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS).

(5) Tighten screws to 33 N·m (24 ft. lbs.) torque.

(6) Install the upper liftgate opening trim. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/TRIM PANEL - INSTALLATION).

Up/Down and Left/Right

(1) Loosen the hinge to liftgate bolts (Fig. 2).

(2) Loosen the striker screws (Fig. 4).

(3) Adjust the liftgate up/down position. Tighten bolts to 33 N·m (24 ft. lbs.) torque. (Refer to 23 - BODY/BODY STRUCTURE/GAP AND FLUSH - SPECIFICATIONS)

(4) Confirm the lower liftgate in/out position. Tighten screws to 28 N·m (21 ft. lbs.) torque.

LIFTGATE LIGHT BAR

REMOVAL

NOTE: The liftgate does not have a outside mechanical release. For any service procedures that require disconnecting battery, open liftgate, if necessary before disconnecting battery .

(1) Release liftgate latch and open liftgate.

(2) Open hood, disconnect and isolate the battery negative cable.

(3) Remove liftgate inner trim panel (Refer to 23 - BODY/INTERIOR/LIFTGATE TRIM PANEL - REMOVAL).

(4) Disconnect the liftgate light bar electrical connector.

(5) Remove the four liftgate light bar retaining screws (Fig. 5) and (Fig. 6).

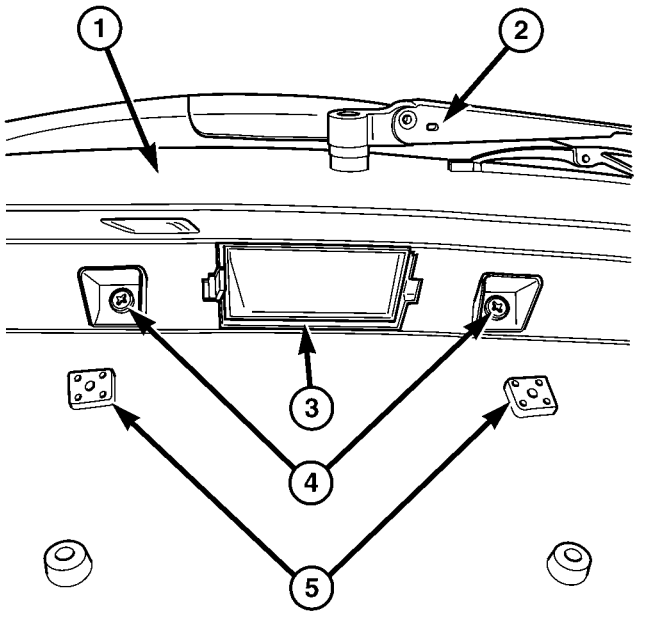


Fig. 5 LIFTGATE LIGHT BAR- LOCATION

1 - LIFTGATE
2 - REAR WIPER ARM
3 - LIFTGATE LIGHT BAR
4 - LIFTGATE LIGHT BAR RETAINING SCREWS
5 - LICENSE PLATE RETAINING GROMMETS

(6) Using a trim stick C-4755 or equivalent, gently pry out wiring grommet to liftgate light bar.

(7) Remove liftgate light bar from vehicle.

LIFTGATE LIGHT BAR (Continued)

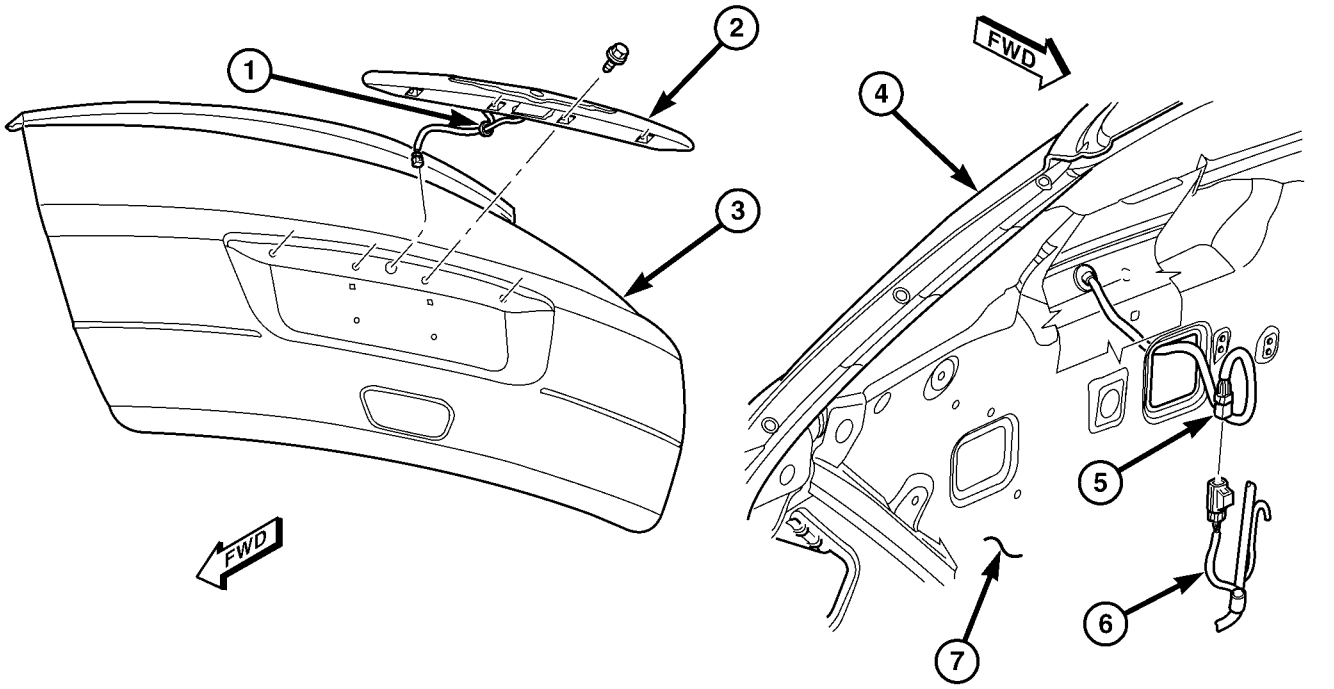


Fig. 6 LIFTGATE LIGHT BAR - REMOVE/INSTALL

1 - LIFTGATE LIGHT BAR HARNESS GROMMET
2 - LIFTGATE LIGHT BAR
3 - LIFTGATE
4 - OUTER LIFTGATE PANEL
5 - LIFTGATE LIGHT BAR ELECTRICAL CONNECTOR
6 - LIFTGATE WIRING HARNESS
7 - INNER LIFTGATE PANEL

INSTALLATION

(1) Place the liftgate light bar wiring harness through liftgate.

(2) Line up the four liftgate light bar retaining screws and install (Fig. 5) and (Fig. 6).

(3) Connect the liftgate light bar electrical connector inside the liftgate.

(4) Install the liftgate inner trim panel (Refer to 23 - BODY/INTERIOR/LIFTGATE TRIM PANEL - INSTALLATION).

(5) Connect the battery negative cable.

(6) Verify vehicle and system operation.

(7) Close hood.

PROP ROD ASSEMBLY

REMOVAL

(1) Open the liftgate and support.

(2) Using a small flat bladed tool, or equivalent, release the retaining clips while pulling the ball socket away from the ball stud. (Fig. 7)

NOTE: Lift the clips only enough to release the ball studs. (Fig. 8)

(3) Remove the support cylinder.

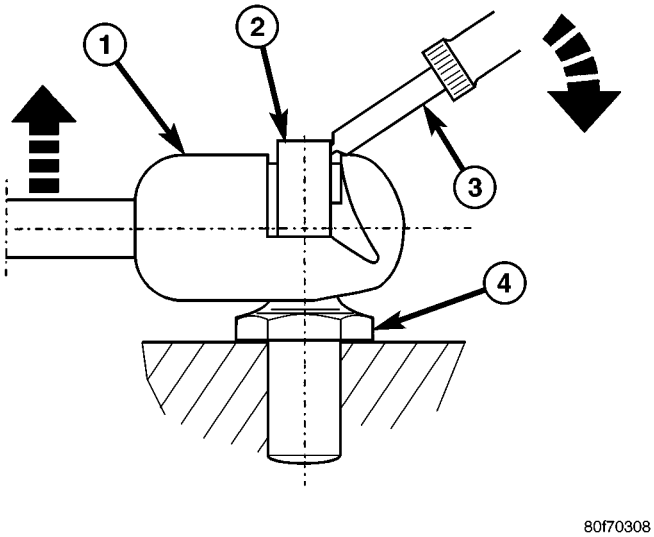


Fig. 7 SUPPORT CYLINDER REMOVAL

1 - BALL SOCKET
2 - RETAINING CLIP
3 - FLAT BLADED TOOL
4 - BALL STUD

PROP ROD ASSEMBLY (Continued)

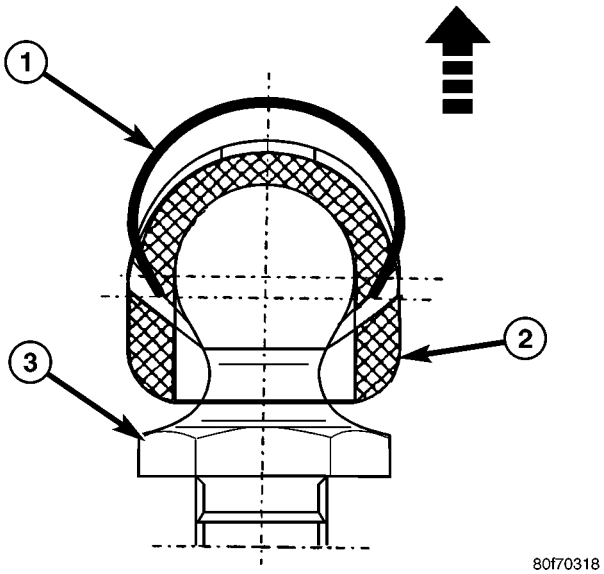


Fig. 8 SUPPORT CYLINDER RETAINING CLIP

1 - RETAINING CLIP
2 - BALL SOCKET
3 - BALL STUD

INSTALLATION

(1) Make sure the retaining clips are seated into the ball socket fully.

(2) Install the support cylinder over the ball studs with the thin end connected to the liftgate and the retaining clips snapping into place.

SLAM BUMPER

REMOVAL

REMOVAL - BODY SIDE

(1) Open liftgate.

(2) Remove liftgate stop bumper body side attaching bolts (Fig. 9).

(3) Remove liftgate stop bumper.

REMOVAL - LIFTGATE SIDE

(1) Open liftgate.

(2) Remove liftgate stop bumper liftgate side attaching rivets by drilling out old rivets (Fig. 9). Recover rivet chips from inside of liftgate to prevent rattles.

(3) Remove liftgate stop bumper.

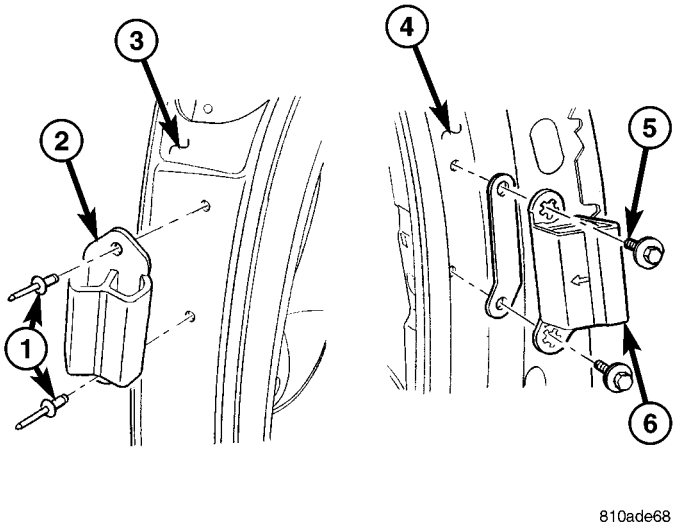


Fig. 9 LIFTGATE BUMPERS

1 - BLIND RIVET REPLACE
2 - LIFTGATE BUMPER
3 - LIFTGATE INNER PANEL
4 - LIFTGATE OPENING DRAIN TROUGH
5 - ATTACHING SCREW(S) AND WASHER(S)
6 - LIFTGATE TROUGH LOW ENGAGEMENT BUMPER

INSTALLATION

INSTALLATION - BODY SIDE

(1) Place liftgate stop bumper into position.

(2) Install screws attaching liftgate stop bumper to body (Fig. 9).

(3) Close liftgate.

INSTALLATION - LIFTGATE SIDE

(1) Place liftgate stop bumper into position.

(2) Install rivets attaching liftgate stop bumper to liftgate (Fig. 9).

(3) Close liftgate.

TRIM PANEL

REMOVAL

REMOVAL - UPPER

(1) Release liftgate latch and open liftgate.
(2) Disconnect power liftgate link from ball head bracket, if equipped (Fig. 10). (Refer to 8 - ELECTRICAL/POWER DOORS/CONTROL ROD - REMOVAL).
(3) Using a trim stick C-4755 or equivalent, disengage the upper trim panel locking tabs.
(4) Remove upper trim panel from liftgate.

REMOVAL - LOWER

(1) Release liftgate latch and open liftgate.
(2) Remove liftgate upper trim panel. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/ TRIM PANEL - REMOVAL).
(3) Remove two (2) upper screws attaching trim panel (Fig. 11).
(4) Remove six (6) lower screws attaching trim panel.
(5) Remove liftgate trim panel from vehicle.
(6) Gently pull trim panel away from liftgate to disengage pins and grommets.
(7) Remove trim panel from vehicle.

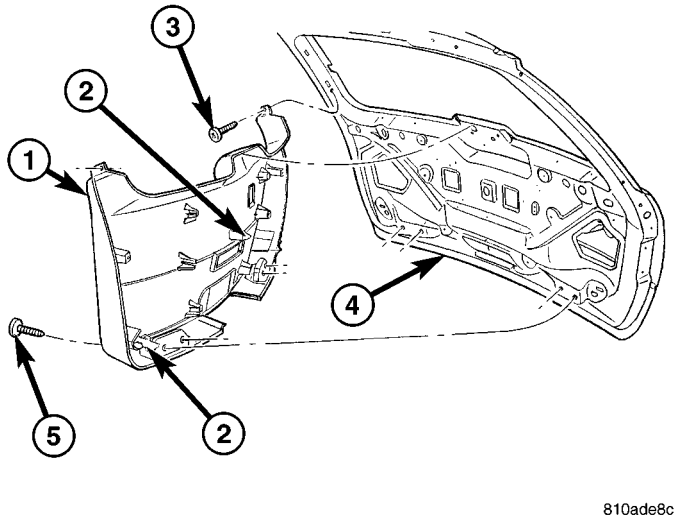


Fig. 11 LIFTGATE LOWER TRIM PANEL

1 - LIFTGATE LOWER TRIM PANEL
2 - LOCATING PIN
3 - LOWER TRIM PANEL UPPER SCREW(S)
4 - LIFTGATE
5 - LOWER TRIM PANEL LOWER SCREW(S)

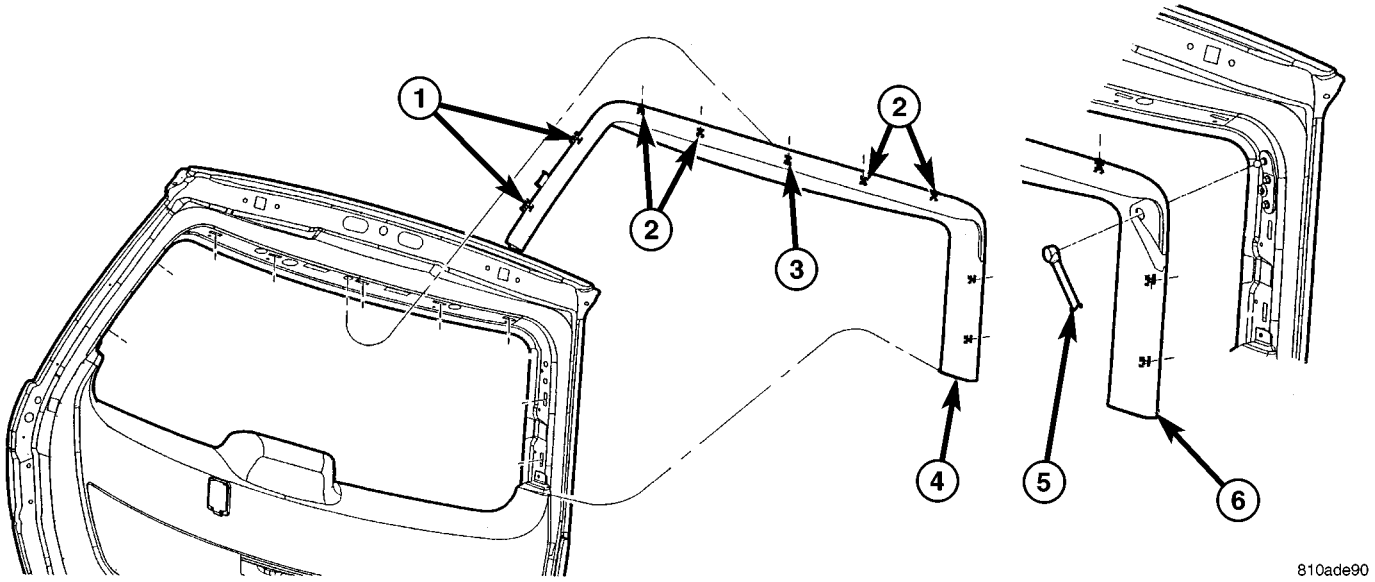


Fig. 10 LIFTGATE UPPER TRIM PANEL

1 - PINS AND GROMMETS
2 - CLIPS
3 - FOUR (4) WAY LOCATOR
4 - UPPER LIFTGATE TRIM PANEL - MANUAL LIFTGATE
5 - POWER LIFTGATE LINK
6 - UPPER LIFTGATE TRIM PANEL - POWER LIFTGATE

TRIM PANEL (Continued)

INSTALLATION

INSTALLATION - UPPER

(1) Place upper trim panel into position.

(2) Press the upper trim panel locking tabs into the locked position (Fig. 10).

(3) Connect power liftgate link onto ball head bracket, if equipped. (Refer to 8 - ELECTRICAL/ POWER DOORS/CONTROL ROD - INSTALLATION).

(4) Close liftgate.

INSTALLATION - LOWER

(1) Check for missing grommets or plastic nuts (Fig. 12).

(2) Place lower trim panel into position (Fig. 11).

(3) Push trim panel against liftgate to engage pins and grommets.

(4) Install six (6) lower screws attaching trim panel.

(5) Install two (2) upper screws attaching trim panel.

(6) Install liftgate upper trim panel. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/ TRIM PANEL - INSTALLATION).

(7) Close liftgate.

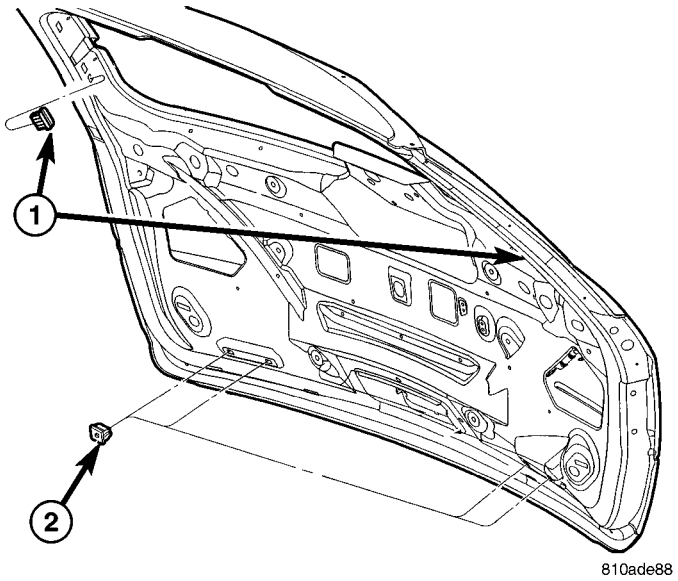


Fig. 12 LIFTGATE TRIM PANEL GROMMETS AND PLASTIC NUTS

1 - GROMMETS
2 - PLASTIC NUTS

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PAINT

SPECIFICATIONS - COLOR CODE CHARTS

EXTERIOR COLORS

EXTERIOR COLOR	DAIMLERCHRYSLER COLOR CODE	EXTERIOR COLOR	DAIMLERCHRYSLER COLOR CODE
ATLANTIC BLUE PEARL COAT	ZBJ	LINEN GOLD PEARL COAT	CYG
BRIGHT SILVER METALLIC CLEAR COAT	WS2	MAGNESIUM PEARL COAT	BPK
BRILLIANT BLACK CRYSTAL PEARL COAT	AXR	MIDNIGHT BLUE PEARL COAT	BB8
BUTANE BLUE METALLIC PEARL COAT	ABE	STONE WHITE CLEAR COAT	SW1
INFERNO RED TINTED PEARL COAT	WEL		

INTERIOR COLORS

INTERIOR COLOR	DAIMLERCHRYSLER COLOR CODE	INTERIOR COLOR	DAIMLERCHRYSLER COLOR CODE
S = DARK SLATE	DV	L = LIGHT TAUPE	L2

PAINT CODE

DESCRIPTION

Exterior vehicle body colors are identified on the Vehicle Certification Label (Refer to VEHICLE DATA/VEHICLE INFORMATION/VEHICLE CERTIFICATION LABEL - DESCRIPTION) or the Body Code Plate (Refer to VEHICLE DATA/VEHICLE INFORMATION/BODY CODE PLATE - DESCRIPTION). The first digit of the paint code listed on the vehicle indicates the sequence of application, i.e.: P = primary coat, Q = secondary coat. The color names provided in the Paint and Trim Code Description chart are the color names used on most repair product containers. (Refer to 23 - BODY/PAINT - SPECIFICATIONS)

BASE COAT/CLEARCOAT FINISH

DESCRIPTION

The original equipment finish is a multi step process that involves cleaning, applying electro de-posi-

tion (E-coat), anti-chip primer, basecoat, and clearcoat steps.

On most vehicles a two-part paint application (basecoat/clearcoat) is used. Color paint that is applied to primer is called basecoat. The clear coat protects the basecoat from ultraviolet light and provides a durable high-gloss finish.

CAUTION: Do not use abrasive chemicals or compounds on painted surfaces. Damage to finish can result.
Do not use harsh alkaline based cleaning solvents on painted surfaces. Damage to finish or color can result.

PAINT TOUCH-UP

DESCRIPTION

When a painted metal surface has been scratched or chipped, it should be touched-up as soon as possible to avoid corrosion. For best results, use MOPAR® Scratch Filler/Primer, Touch-Up Paints and Clear Top Coat. (Refer to VEHICLE DATA/VEHICLE INFORMATION/BODY CODE PLATE - DESCRIPTION) for Body Code Plate information.

WARNING: USE AN OSHA APPROVED RESPIRATOR AND SAFETY GLASSES WHEN SPRAYING PAINT OR SOLVENTS IN A CONFINED AREA. PERSONAL INJURY CAN RESULT.

STANDARD PROCEDURE - PAINT TOUCH-UP

(1) Scrape loose paint and corrosion from inside scratch or chip.

(2) Clean affected area with MOPAR® Tar/Road Oil Remover or equivalent, and allow to dry.

(3) Fill the inside of the scratch or chip with a coat of filler/primer. Do not overlap primer onto good surface finish. The applicator brush should be wet enough to puddle-fill the scratch or chip without running. Do not stroke brush applicator on body surface. Allow the filler/primer to dry hard.

(4) Cover the filler/primer with color touch-up paint. Do not overlap touch-up color onto the original color coat around the scratch or chip. Butt the new color to the original color, if possible. Do not stroke applicator brush on body surface. Allow touch-up paint to dry hard.

(5) On vehicles without clearcoat, the touch-up color can be lightly finesse sanded (1500 grit) and polished with rubbing compound.

(6) On vehicles with clearcoat, apply clear top coat to touch-up paint with the same technique as described in Step 4. Allow clear top coat to dry hard. If desired, Step 5 can be performed on clear top coat.

WARNING: AVOID PROLONGED SKIN CONTACT WITH PETROLEUM OR ALCOHOL – BASED CLEANING SOLVENTS. PERSONAL INJURY CAN RESULT.AVOID PROLONGED SKIN CONTACT WITH PETROLEUM OR ALCOHOL – BASED CLEANING SOLVENTS. PERSONAL INJURY CAN RESULT.

FINESSE SANDING/BUFFING & POLISHING

DESCRIPTION

CAUTION: Do not remove more than .5 mils of clearcoat finish, if equipped. Basecoat paint must retain clearcoat for durability.
Use a Paint Thickness Gauge #PR-ETG-2X or equivalent to determine film thickness before and after the repair.

Minor acid etching, orange peel, or smudging in clearcoat or single-stage finishes can be reduced with light finesse sanding, hand buffing, and polishing. **If the finish has been finesse sanded in the past, it cannot be repeated. Finesse sanding operation should be performed by a trained automotive paint technician.**

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FRONT SEAT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(3) For right side front seat, remove muffler to body heat shield. (Refer to 11 - EXHAUST SYSTEM/HEAT SHIELDS - DESCRIPTION).

(4) For left side front seat, remove vapor canister. (Refer to 25 - EMISSIONS CONTROL/EVAPORATIVE EMISSIONS/VAPOR CANISTER - REMOVAL).

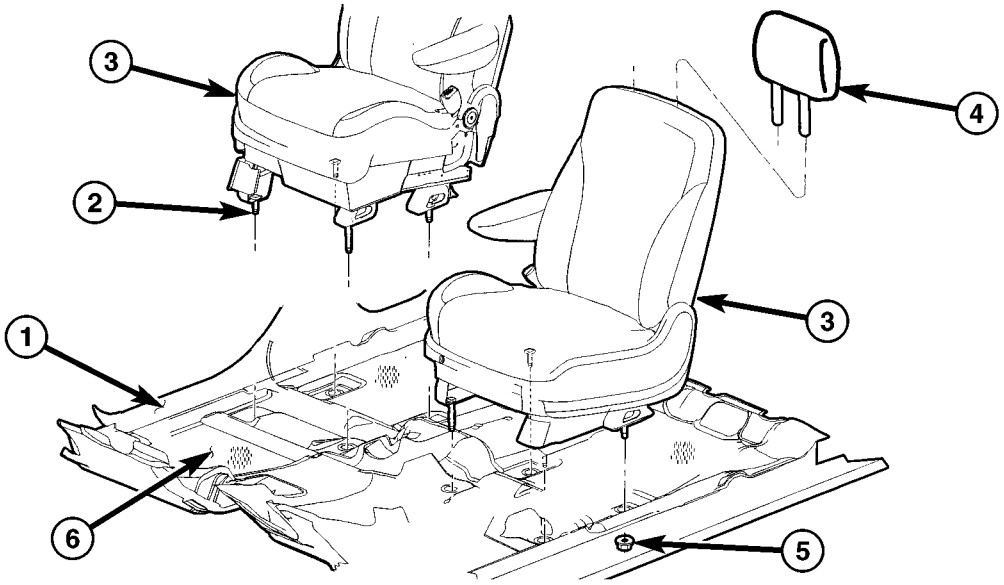
(5) Remove four nuts attaching seat to floor pan (Fig. 1).

(6) Lower vehicle to access the seat.

(7) Remove headrest from seat. (Refer to 23 - BODY/SEATS/HEADREST - REMOVAL).

(8) Raise seat to access wire connector under seat and disconnect wire connectors (Fig. 2).

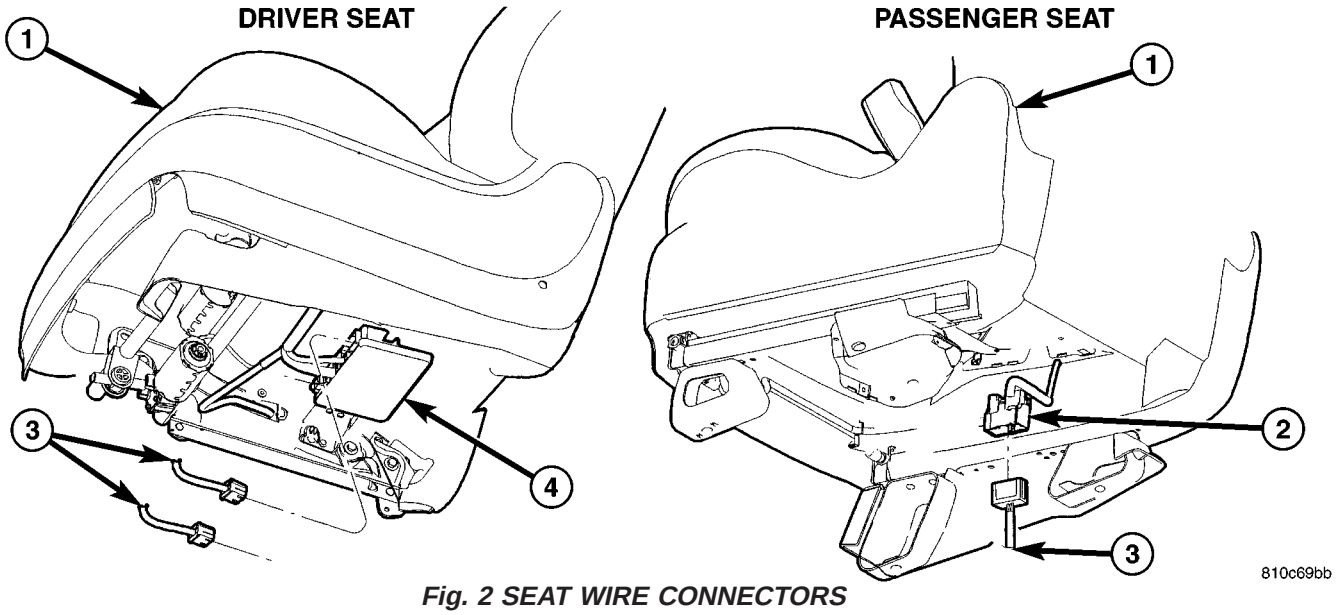
(9) Remove seat from vehicle



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Fig. 1 FRONT SEAT

1 - FLOOR PAN
2 - FRONT SEAT STUD(S)
3 - FRONT SEAT
4 - HEADREST
5 - SEAT ATTACHING NUT(S)
6 - CARPETING



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Fig. 2 SEAT WIRE CONNECTORS

1 - FRONT SEAT
2 - THERMAL PASSENGER SEAT CONNECTOR
3 - BODY WIRE HARNESS CONNECTORS
4 - DRIVE SEAT CONTROL MEMORY MODULE

FRONT SEAT (Continued)

INSTALLATION

(1) Place front seat into vehicle.
(2) Connect wire connectors under seat (Fig. 2).
(3) Place front seat studs into mounting holes.
(4) Raise and support vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).
(5) Install four nuts attaching seat to floor pan (Fig. 1).
(6) Tighten nuts to 88 N·m (65 ft. lbs.) torque.
(7) For right side front seat, install muffler to body heat shield. (Refer to 11 - EXHAUST SYSTEM/HEAT SHIELDS - DESCRIPTION).
(8) For left side front seat, install vapor canister. (Refer to 25 - EMISSIONS CONTROL/EVAPORATIVE EMISSIONS/VAPOR CANISTER - INSTALLATION).
(9) Remove vehicle supports and lower vehicle.
(10) Install front seat headrest. (Refer to 23 - BODY/SEATS/HEADREST - INSTALLATION).
(11) Connect battery negative cable.

FRONT SEAT BACK

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove seat from vehicle. (Refer to 23 - BODY/SEATS/FRONT SEAT - REMOVAL).
(3) Remove the armrest. (Refer to 23 - BODY/SEATS/SEAT ARMREST - REMOVAL).
(4) Remove front seat shields. (Refer to 23 - BODY/SEATS/FRONT SHIELDS - REMOVAL).
(5) Remove front seat inner panel. (Refer to 23 - BODY/SEATS/SEAT INNER - REMOVAL).
(6) Disengage front seat back cover J-straps, to partial detrim seat cover to access inboard and outboard recliner bolts.
(7) Remove inboard and outboard recliner attaching bolts to seat back frame (Fig. 3).
(8) Pull seat back upward from seat assembly to remove seat back (Fig. 4).

INSTALLATION

(1) Position seat back to seat assembly.
(2) Install seat back by slide it downward onto the seat assembly (Fig. 4).
(3) Install seat back recliner attaching bolts. Tighten to 48 N·m (35 ft. lbs.) torque. (Fig. 3).
(4) Position seat back cover and engage J-straps.
(5) Install front seat inner panel. (Refer to 23 - BODY/SEATS/FRONT SEAT INNER PANEL - INSTALLATION)
(6) Install front seat shields. (Refer to 23 - BODY/SEATS/FRONT SHIELDS - INSTALLATION).

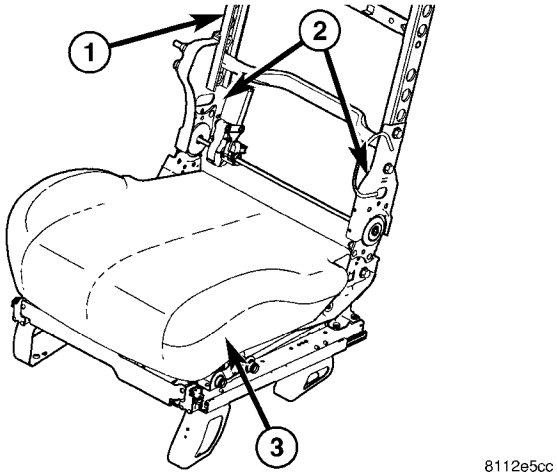


Fig. 3 SEAT BACK MOUNTING SCREWS

1 - SEAT BACK FRAME
2 - RECLINER ASSEMBLY
3 - SEAT CUSHION

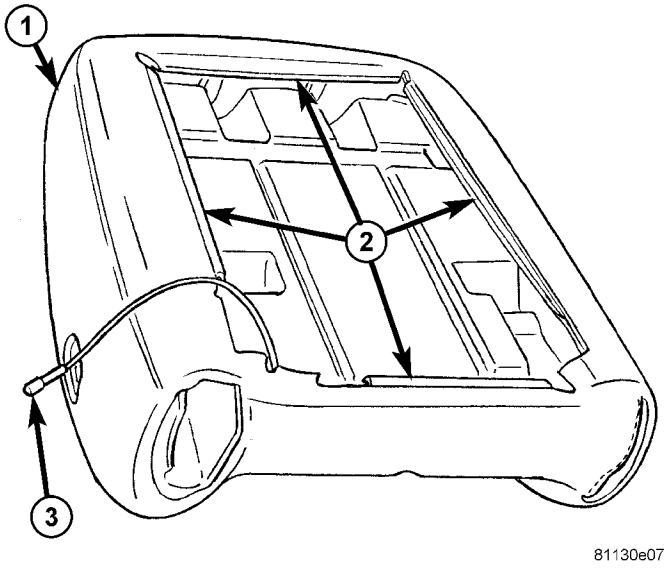


Fig. 4 FRONT SEAT BACK SIDE COVER

1 - FRONT SEAT BACK
2 - J-STRAPS
3 - HEATING ELEMENT WIRE HARNESS

(7) Install armrest. (Refer to 23 - BODY/SEATS/SEAT ARMREST - INSTALLATION).
(8) Install front seat into vehicle. (Refer to 23 - BODY/SEATS/FRONT SEAT - INSTALLATION).
(9) Connect battery negative cable.

FRONT SEAT BACK CUSHION FOAM/COVER

REMOVAL

(1) Remove front seat headrest and sleeves. (Refer to 23 - BODY/SEATS/HEADREST - REMOVAL).

(2) Remove front seat. (Refer to 23 - BODY/SEATS/FRONT SEAT - REMOVAL).

(3) Remove front seat back from seat assembly. (Refer to 23 - BODY/SEATS/FRONT SEAT BACK - REMOVAL).

(4) Remove front seat outer trim ring panel, if equipped (Fig. 5).

(5) Disengage seat back cover J-straps attaching to front seat back frame (Fig. 6).

(6) Remove front seat back foam/cover from front seat back frame

(7) Separate front seat back cushion foam from seat cover. (Fig. 7).

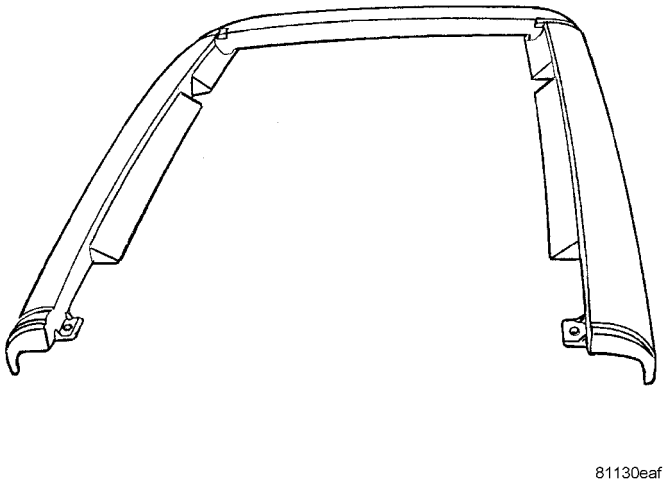


Fig. 5 FRONT SEAT OUTER TRIM RING PANEL

INSTALLATION

(1) Position front seat back cushion foam and seat back cover together (Fig. 7).

(2) Place front seat back foam/cover onto front seat back frame.

(3) Engage J-straps attaching front seat back cover to seat back frame (Fig. 6).

(4) Install front seat back side cushion cover, if equipped (Fig. 5).

(5) Install front seat back to front seat assembly. (Refer to 23 - BODY/SEATS/FRONT SEAT BACK - INSTALLATION).

(6) Install front seat. (Refer to 23 - BODY/SEATS/FRONT SEAT - INSTALLATION).

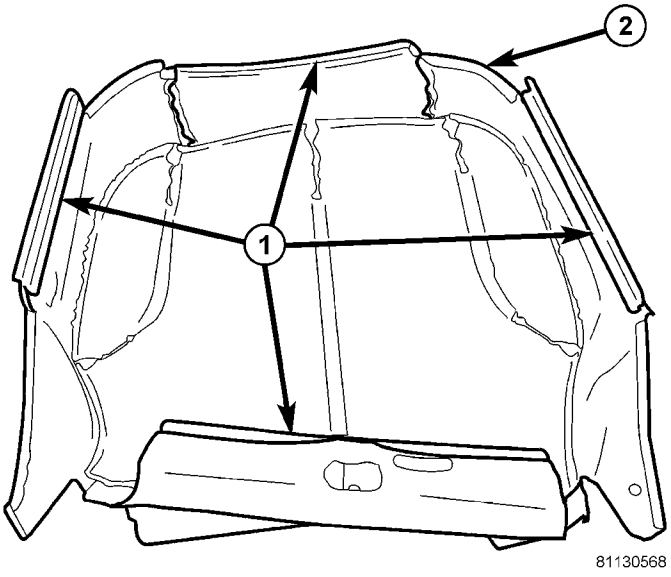


Fig. 6 SEAT BACK COVER

1 - J-STRAPS
2 - FRONT SEAT BACK PANEL

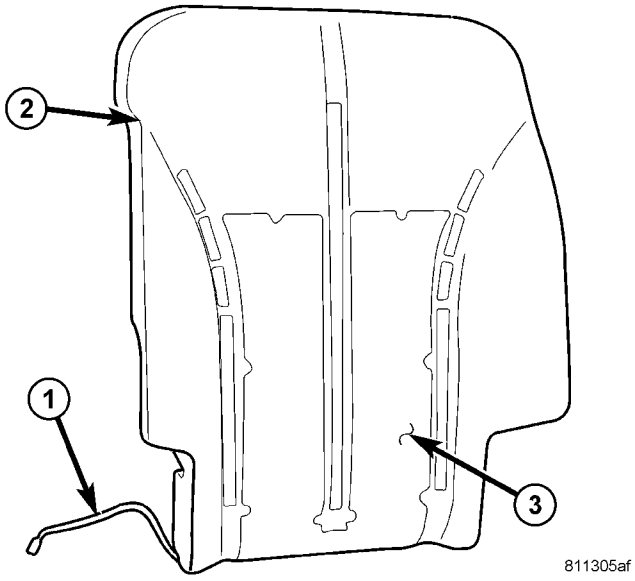


Fig. 7 FRONT SEAT BACK CUSHION

1 - HEATED SEAT BACK WIRE HARNESS
2 - SEAT BACK CUSHION
3 - HEATED ELEMENT

(7) Install front seat headrest sleeves and headrest. (Refer to 23 - BODY/SEATS/HEADREST - INSTALLATION).

FRONT SEAT CUSHION FOAM / COVER

REMOVAL

A non-calibrated Occupant Classification Module (OCM) is the only component of the Occupant Classification System (OCS) that is available for separate service replacement, as outlined in the procedures that follow. The OCS components of the passenger side front seat cushion including the cushion frame, springs, pad, occupant detection bladder, pressure sensor, seat cushion foam and the OCM are a factory-calibrated and assembled unit. Once this unit is connected to a vehicle electrically, the calibration settings are uploaded from the OCM and stored in the memory of the Airbag Control Module (ACM). If only the OCM is subsequently replaced, the new, non-calibrated OCM learns the proper calibration settings from the ACM after it is connected to the vehicle electrically.

If any of the remaining OCS components of the passenger side front seat cushion require replacement, they are serviced only as a factory-calibrated, assembled, and tamper-evident service replacement package. This package includes the assembled frame, springs, pad, bladder, sensor, foam, wiring and a calibrated OCM. When installing this package, always replace all of the existing components with the new components as a unit. Do not attempt to separate or disconnect any of the new OCS components contained in the service replacement package from each other, and do not attempt to reuse any of the replaced components in this or any other vehicle.

Once any of the original factory-installed components except the OCM have been replaced with the service replacement package components, the OCM can only be serviced by replacing the entire passenger side front seat cushion unit with another complete service replacement package.

WARNING: TO AVOID PERSONAL INJURY OR DEATH, ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, AIRBAG, OCCUPANT CLASSIFICATION SYSTEM, SEAT BELT TENSIONER, IMPACT SENSOR, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT.

WARNING: TO AVOID PERSONAL INJURY OR DEATH ON VEHICLES EQUIPPED WITH THE OCCUPANT CLASSIFICATION SYSTEM (OCS), ONLY THE OCCUPANT CLASSIFICATION MODULE (OCM) AND THE SEAT CUSHION TRIM MAY BE SERVICED SEPARATELY. ALL OTHER COMPONENTS OF THE PASSENGER SIDE FRONT SEAT CUSHION ASSEMBLY MUST BE SERVICED ONLY AS A COMPLETE FACTORY-CALIBRATED, ASSEMBLED AND TAMPER-EVIDENT SERVICE REPLACEMENT PACKAGE. THIS PACKAGE INCLUDES THE FRAME, SPRINGS, PAD, BLADDER, SENSOR, FOAM, WIRING AND A CALIBRATED OCM. WHEN INSTALLING THIS PACKAGE ALWAYS REPLACE ALL OF THE EXISTING COMPONENTS WITH THE NEW COMPONENTS AS A UNIT. DO NOT ATTEMPT TO SEPARATE OR DISCONNECT ANY OF THE NEW OCS COMPONENTS IN THE SERVICE REPLACEMENT PACKAGE FROM EACH OTHER, AND DO NOT ATTEMPT TO REUSE ANY OF THE REPLACED COMPONENTS IN THIS OR ANY OTHER VEHICLE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN FAILURE OF THE PASSENGER AIRBAG TO DEPLOY WHEN REQUIRED, OR IN PASSENGER AIRBAG DEPLOYMENT WHEN NOT REQUIRED.

(1) Disconnect and isolate the battery negative cable.

(2) Remove front seat. (Refer to 23 - BODY/SEATS/FRONT SEAT - REMOVAL).

(3) Remove front seat back from seat assembly. (Refer to 23 - BODY/SEATS/FRONT SEAT BACK - REMOVAL).

(4) Disengage seat back cover J-straps and push pins attaching to seat cushion foam/cover to seat pan (Fig. 8).

(5) Remove seat cushion foam/cover from seat pan.

(6) Separate seat cushion foam from seat cover (Fig. 9).

FRONT SEAT CUSHION FOAM / COVER (Continued)

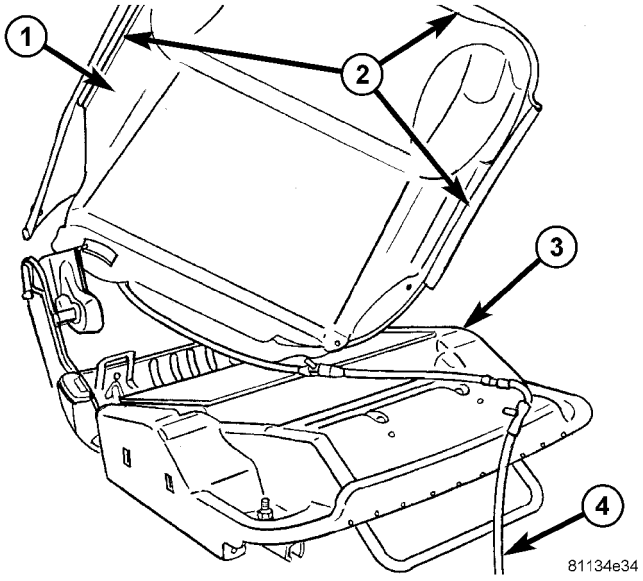


Fig. 8 SEAT CUSHION AND COVER

1 - SEAT CUSHION FOAM AND COVER
2 - J-STRAPS
3 - SEAT PAN
4 - HEATING ELEMENT WIRE HARNESS

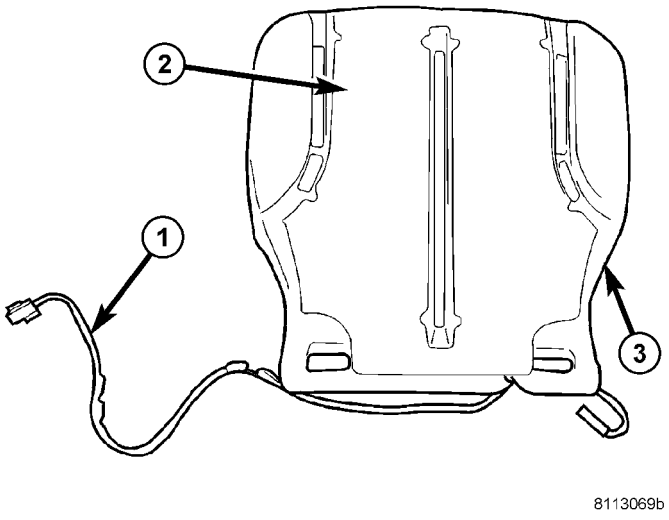


Fig. 9 FRONT SEAT CUSHION FOAM

1 - SEAT HEATING ELEMENT WIRE HARNESS
2 - SEAT HEATING ELEMENT
3 - SEAT CUSHION FOAM

INSTALLATION

A non-calibrated Occupant Classification Module (OCM) is the only component of the Occupant Classification System (OCS) that is available for separate service replacement, as outlined in the procedures that follow. The OCS components of the passenger side front seat cushion including the cushion frame, springs, pad, occupant detection bladder, pressure sensor, seat cushion foam and the OCM are a factory-calibrated and assembled unit. Once this unit is connected to a vehicle electrically, the calibration settings are uploaded from the OCM and stored in the memory of the Airbag Control Module (ACM). If only the OCM is subsequently replaced, the new, non-calibrated OCM learns the proper calibration settings from the ACM after it is connected to the vehicle electrically.

If any of the remaining OCS components of the passenger side front seat cushion require replacement, they are serviced only as a factory-calibrated, assembled, and tamper-evident service replacement package. This package includes the assembled frame, springs, pad, bladder, sensor, foam, wiring and a calibrated OCM. When installing this package, always replace all of the existing components with the new components as a unit. Do not attempt to separate or disconnect any of the new OCS components contained in the service replacement package from each other, and do not attempt to reuse any of the replaced components in this or any other vehicle.

Once any of the original factory-installed components except the OCM have been replaced with the service replacement package components, the OCM can only be serviced by replacing the entire passenger side front seat cushion unit with another complete service replacement package.

WARNING: TO AVOID PERSONAL INJURY OR DEATH, ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, AIRBAG, OCCUPANT CLASSIFICATION SYSTEM, SEAT BELT TENSIONER, IMPACT SENSOR, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE SUPPLEMENTAL RESTRAINT SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT.

FRONT SEAT CUSHION FOAM / COVER (Continued)

WARNING: TO AVOID PERSONAL INJURY OR DEATH ON VEHICLES EQUIPPED WITH THE OCCUPANT CLASSIFICATION SYSTEM (OCS), ONLY THE OCCUPANT CLASSIFICATION MODULE (OCM) AND THE SEAT CUSHION TRIM MAY BE SERVICED SEPARATELY. ALL OTHER COMPONENTS OF THE PASSENGER SIDE FRONT SEAT CUSHION ASSEMBLY MUST BE SERVICED ONLY AS A COMPLETE FACTORY-CALIBRATED, ASSEMBLED AND TAMPER-EVIDENT SERVICE REPLACEMENT PACKAGE. THIS PACKAGE INCLUDES THE FRAME, SPRINGS, PAD, BLADDER, SENSOR, FOAM, WIRING AND A CALIBRATED OCM. WHEN INSTALLING THIS PACKAGE ALWAYS REPLACE ALL OF THE EXISTING COMPONENTS WITH THE NEW COMPONENTS AS A UNIT. DO NOT ATTEMPT TO SEPARATE OR DISCONNECT ANY OF THE NEW OCS COMPONENTS IN THE SERVICE REPLACEMENT PACKAGE FROM EACH OTHER, AND DO NOT ATTEMPT TO REUSE ANY OF THE REPLACED COMPONENTS IN THIS OR ANY OTHER VEHICLE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN FAILURE OF THE PASSENGER AIRBAG TO DEPLOY WHEN REQUIRED, OR IN PASSENGER AIRBAG DEPLOYMENT WHEN NOT REQUIRED.

(1) Position seat cushion foam and seat cover together (Fig. 9).

(2) Place seat cushion foam/cover onto seat pan.

(3) Engage seat cushion cover J-straps and push pins attaching to seat pan (Fig. 8).

(4) Install front seat back to seat assembly. (Refer to 23 - BODY/SEATS/FRONT SEAT BACK - INSTALLATION).

(5) Install front seat. (Refer to 23 - BODY/SEATS/FRONT SEAT - INSTALLATION).

FRONT SEAT BACK PANEL

REMOVAL

(1) Using a trim tool C-4755 or equivalent, disengage the front seat (Fig. 10) and (Fig. 11).

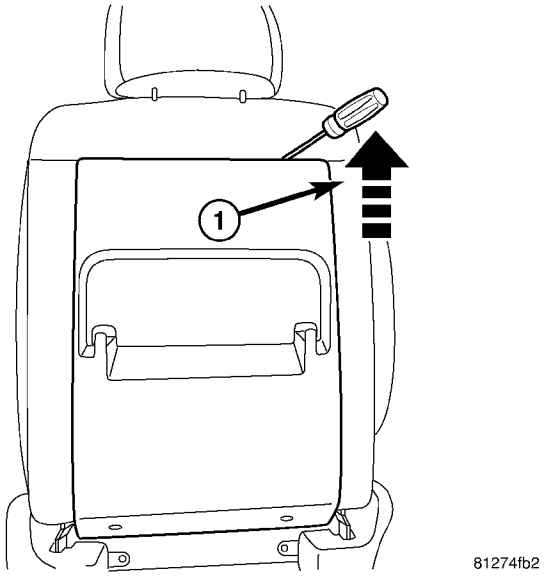


Fig. 10 FRONT SEAT BACK PANEL

1 - PRY SEAT COVER PANEL OUTWARD AND DOWN TO RELEASE HOOKS.

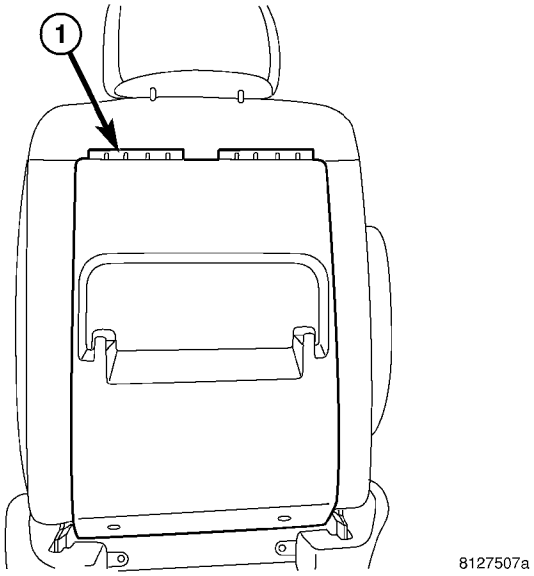


Fig. 11 TOP HOOK

1 - TOP HOOKS EXPOSED

FRONT SEAT BACK PANEL (Continued)

(2) Pushing the top edge of back panel outward and pushing upward that the same time till lower hooks are clear of the lower metal bracket (Fig. 12).

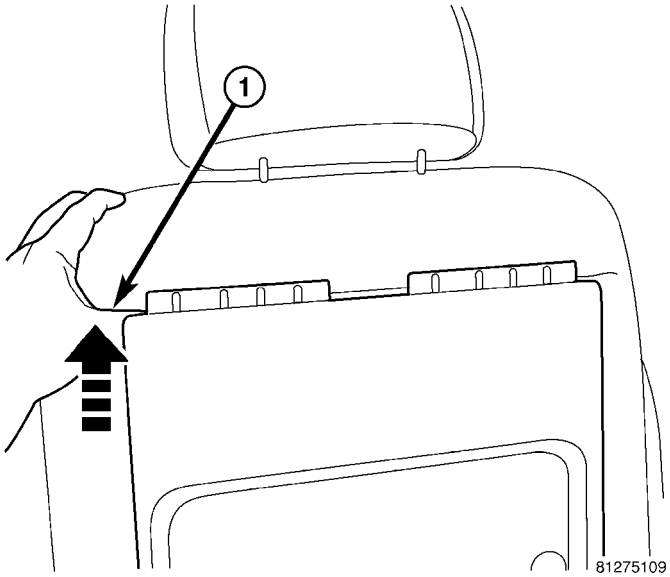


Fig. 12 RELEASE LOWER HOOKS

1 - PUSHING OUTWARD AND UPWARD

(3) Gently rotate the seat back panel clockwise until upper left hook and lower right hook disengage from trim ring (Fig. 13).

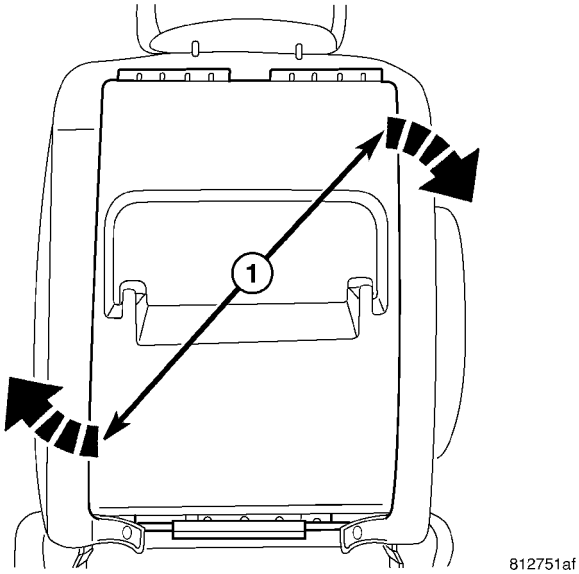


Fig. 13 ROTATE SEAT BACK PANEL CLOCKWISE

1 - ROTATE CLOCKWISE

(4) Gently rotate the seat back panel counter clockwise until upper right hook and lower left hook disengage from trim ring and remove front seat back panel for seat back (Fig. 14).

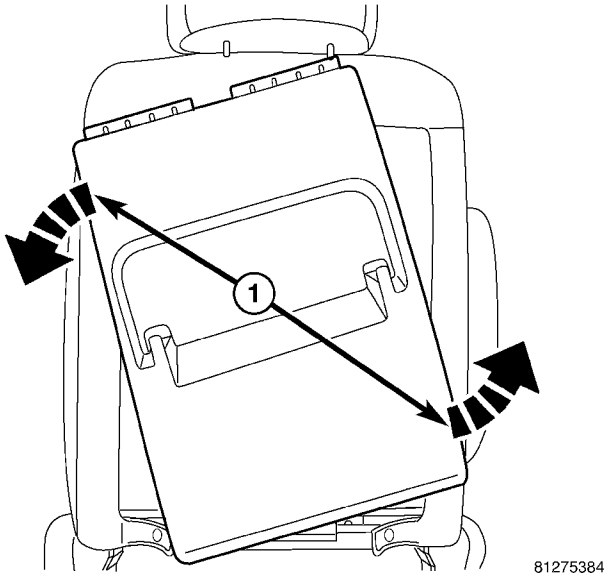


Fig. 14 ROTATE SEAT BACK PANEL COUNTER CLOCKWISE

1 - ROTATE COUNTER CLOCKWISE

INSTALLATION

(1) Place front seat back panel into position and start lower hooks.

(2) Push on front seat back panel to engage locking clips.

(3) Grasp the top of the seat back panel and push downward to engage the top hooks.

FRONT SEAT OUTER TRIM RING PANEL

REMOVAL

(1) Remove front seat inner panel. (Refer to 23 - BODY/SEATS/FRONT SEAT INNER PANEL - REMOVAL).

(2) Remove front seat outer trim ring panel four attaching screws, if equipped (Fig. 15).

(3) Remove outer trim ring panel from rear of seat.

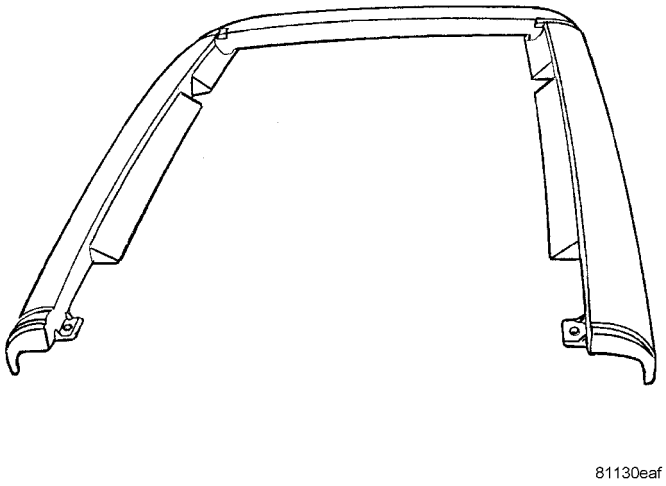


Fig. 15 FRONT SEAT OUTER TRIM RING PANEL

INSTALLATION

(1) Place seat outer trim ring panel into position on rear of seat.

(2) Install seat outer trim ring panel four attaching screws, if equipped (Fig. 15).

(3) Install front seat inner panel. (Refer to 23 - BODY/SEATS/FRONT SEAT INNER PANEL - INSTALLATION).

FRONT SEAT SHIELDS

REMOVAL

The front seat shield positions and attachment points (Fig. 16).

UPPER ADJUSTER INBOARD AND REAR SHIELD

(1) Remove upper adjuster inboard attaching screw (Fig. 16).

(2) Pull rear edge away from upper adjuster inboard rear shield to release locking tab.

(3) Remove upper adjuster inboard rear shield attaching screw and remove shield.

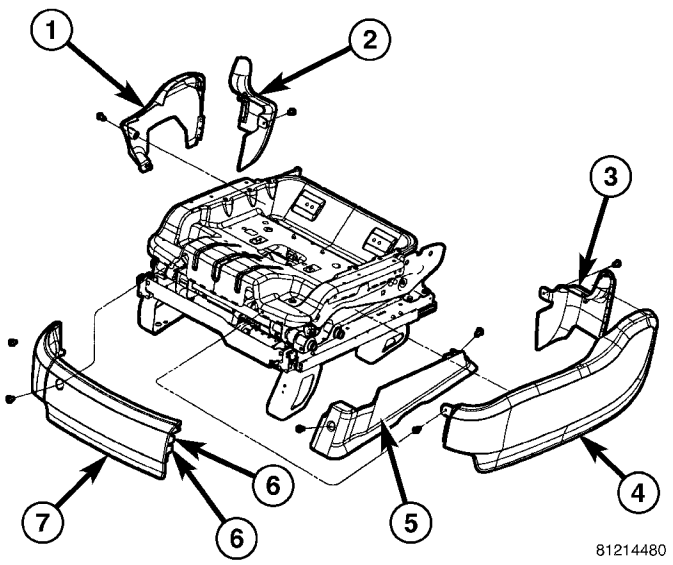


Fig. 16 FRONT SEAT SHIELDS

1 - UPPER ADJUSTER INBOARD SHIELD
2 - UPPER ADJUSTER INBOARD REAR SHIELD
3 - UPPER ADJUSTER OUTBOARD REAR SHIELD
4 - UPPER ADJUSTER OUTBOARD SHIELD
5 - LOWER RISER OUTBOARD SHIELD
6 - LOCKING TABS
7 - FRONT SHIELD

FRONT SHIELD

(1) Remove front shield attaching screws (Fig. 17).

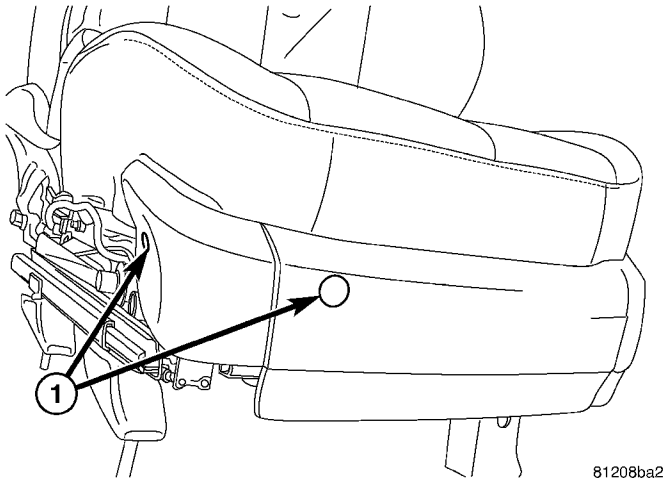


Fig. 17 FRONT SEAT FRONT SHIELD

1 - ATTACHING SCREWS

(2) Pull forward on front shield edge by the upper adjuster outboard shield to disengage locking tabs (Fig. 16) and (Fig. 18).

(3) Remove front shield.

UPPER ADJUSTER OUTBOARD AND REAR SHIELD

(1) Remove front attaching screw (Fig. 16).

FRONT SEAT SHIELDS (Continued)

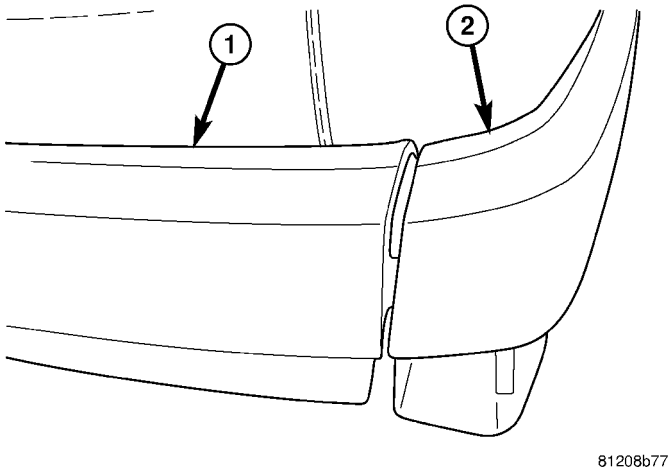


Fig. 18 FRONT SEAT FRONT SHIELD LOCKING TABS

1 - UPPER ADJUSTER OUTBOARD SHIELD
2 - FRONT SHIELD

(2) Pull rear edge away from upper adjuster outboard rear shield to release locking tab.

(3) Remove upper adjuster outboard rear shield attaching screw and remove shield.

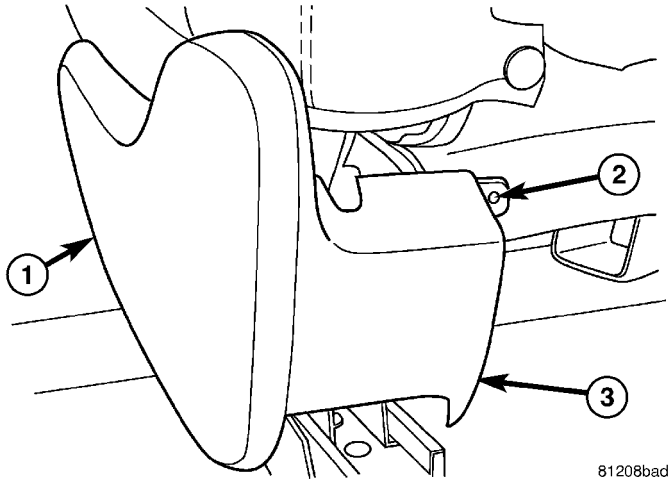


Fig. 19 UPPER ADJUSTER OUTBOARD REAR SHIELD

1 - UPPER ADJUSTER OUTBOARD SHIELD
2 - ATTACHING SCREW
3 - UPPER ADJUSTER OUTBOARD REAR SHIELD

LOWER RISER SHIELD

(1) Remove front and rear attaching screws (Fig. 16).

(2) Remove lower riser shield.

INSTALLATION

UPPER ADJUSTER INBOARD AND REAR SHIELD

(1) Place upper adjuster inboard rear shield into position and install attaching screw (Fig. 16).

(2) Press on rear edge upper adjuster inboard shield locking tabs to upper adjuster inboard rear shield to engage locking tabs.

(3) Install upper adjuster inboard attaching screw.

FRONT SHIELD

(1) Place front shield in position.

(2) Press on front shield edge by the upper adjuster outboard shield to engage locking tabs (Fig. 16) and (Fig. 18).

(3) Install front shield attaching screws (Fig. 17).

UPPER ADJUSTER OUTBOARD AND REAR SHIELD

(1) Place upper adjuster outboard rear shield into position and install attaching screw (Fig. 16) and (Fig. 19).

(2) Place upper adjuster outboard shield into position.

(3) Press on rear edge upper adjuster outboard shield locking tabs to upper adjuster outboard rear shield to engage locking tabs.

(4) Install front attaching screw.

LOWER RISER SHIELD

(1) Place lower riser shield into position (Fig. 16).

(2) Install front and rear attaching screws.

HEADREST

REMOVAL

(1) Lift head restraint to top of travel.

(2) Depress locking button on side of sleeve at top of seat back (Fig. 20).

(3) Pull head restraint from top of seat back.

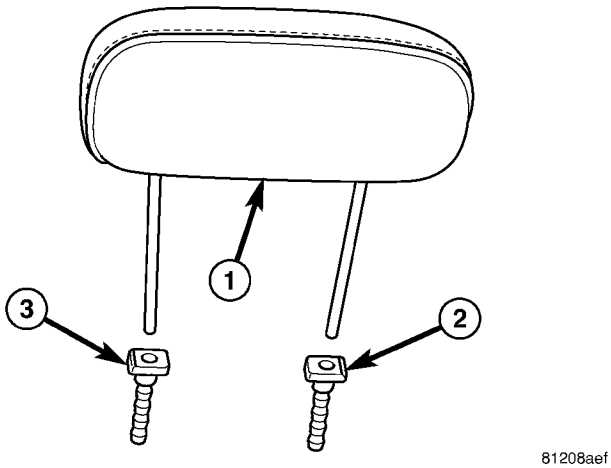


Fig. 20 HEADREST AND SLEEVES

1 - HEADREST
2 - NON-LOCKING SLEEVE
3 - LOCKING SLEEVE

HEADREST (Continued)

(4) Using trim tool, remove headrest sleeve(s) (Fig. 21).

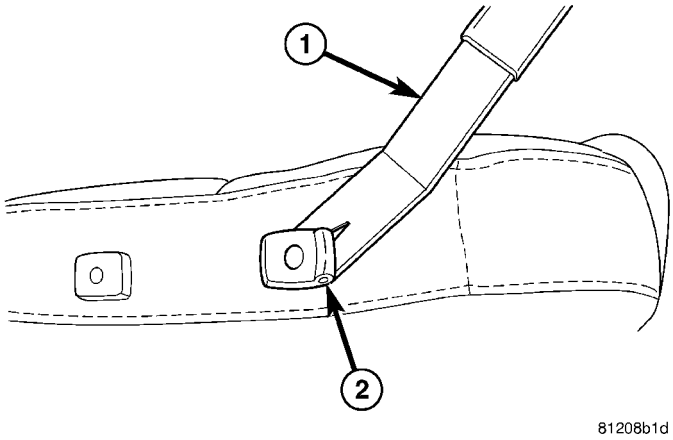


Fig. 21 REMOVING HEADREST SLEEVE

1 - TRIM TOOL
2 - HEADREST SLEEVE

INSTALLATION

(1) Place headrest sleeve(s) into position.
(2) Press down on headrest sleeve to lock into position.
(3) Place head restraint in position (Fig. 20).
(4) Depress lock button on side of sleeve at top of seat back.
(5) Push heat restraint down into position.

RECLINER HANDLE

REMOVAL

(1) Remove screw holding recliner handle to recliner spline shaft (Fig. 22).
(2) Remove recliner handle from spline shaft.

INSTALLATION

(1) Place recliner handle in position on spline shaft.
(2) Install screw to hold recliner handle to recliner spline shaft (Fig. 22).

SEAT ARMREST

REMOVAL

(1) Using a small flat blade, pry cap from side of armrest (Fig. 23).
(2) Remove bolt attaching armrest to seat back.
(3) Remove armrest from seat back.

INSTALLATION

(1) Place armrest in position on seat back.

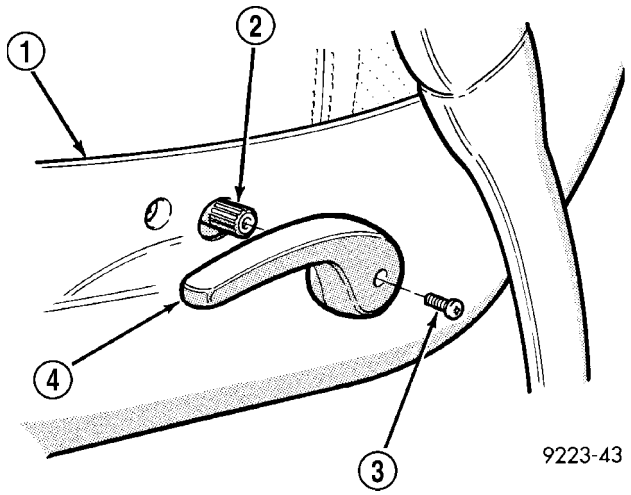


Fig. 22 RECLINER HANDLE - MANUAL

1 - CUSHION SIDE COVER
2 - RECLINER SPLINE
3 - SCREW
4 - RECLINER HANDLE

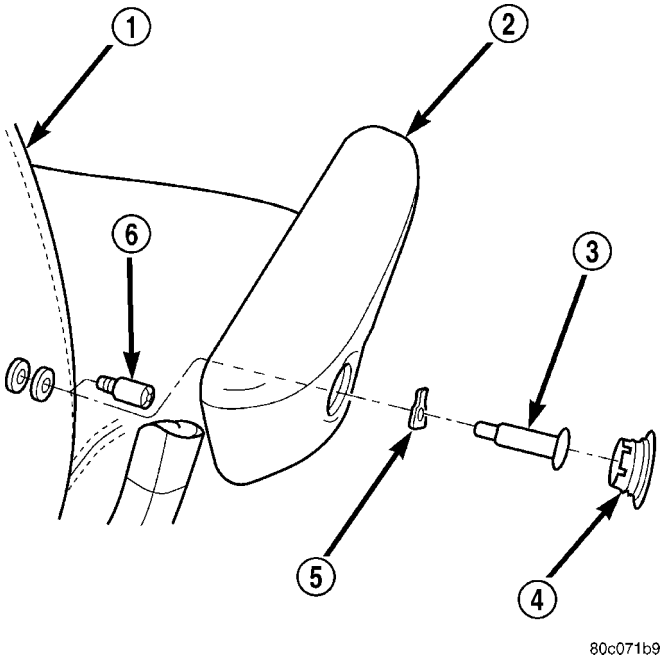


Fig. 23 ARMREST

1 - SEAT BACK
2 - ARMREST
3 - SHOULDER BOLT
4 - CAP
5 - WASHER
6 - STOP SCREW

(2) Install bolt attaching armrest to seat back. Tighten bolt to 29 N·m (21 ft. lbs.) torque.
(3) Install side cap into the side of the armrest.

SEAT TOWEL BAR

REMOVAL

(1) From the underside of the seat, squeeze ends of towel bar inward to release from pivot studs (Fig. 24).

(2) Remove towel bar from seat track.

INSTALLATION

(1) Place towel bar into position under seat (Fig. 24).

(2) Squeeze ends of towel bar inward to install on pivot studs.

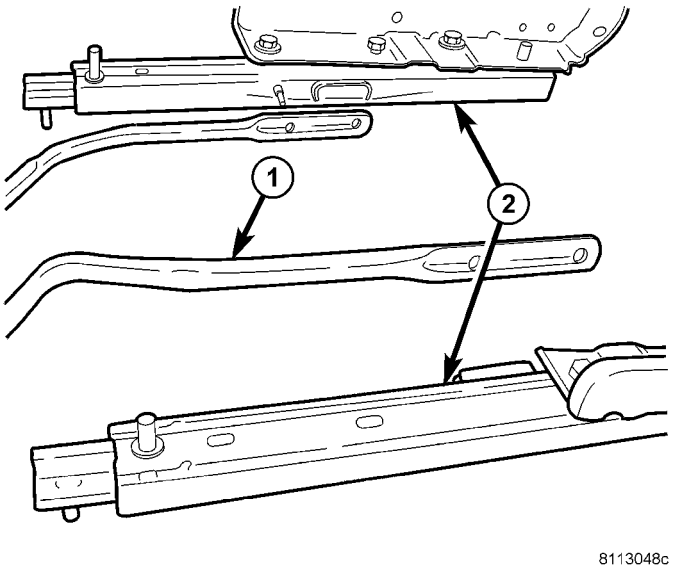


Fig. 24 SEAT TOWEL BAR

1 - TOWEL BAR
2 - SEAT TRACK

SECOND ROW SEAT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove two nuts attaching seat to floor pan (Fig. 25).

(3) Tilt seat forward and disconnect heated seat wire connector (Fig. 26).

(4) Remove seat from vehicle.

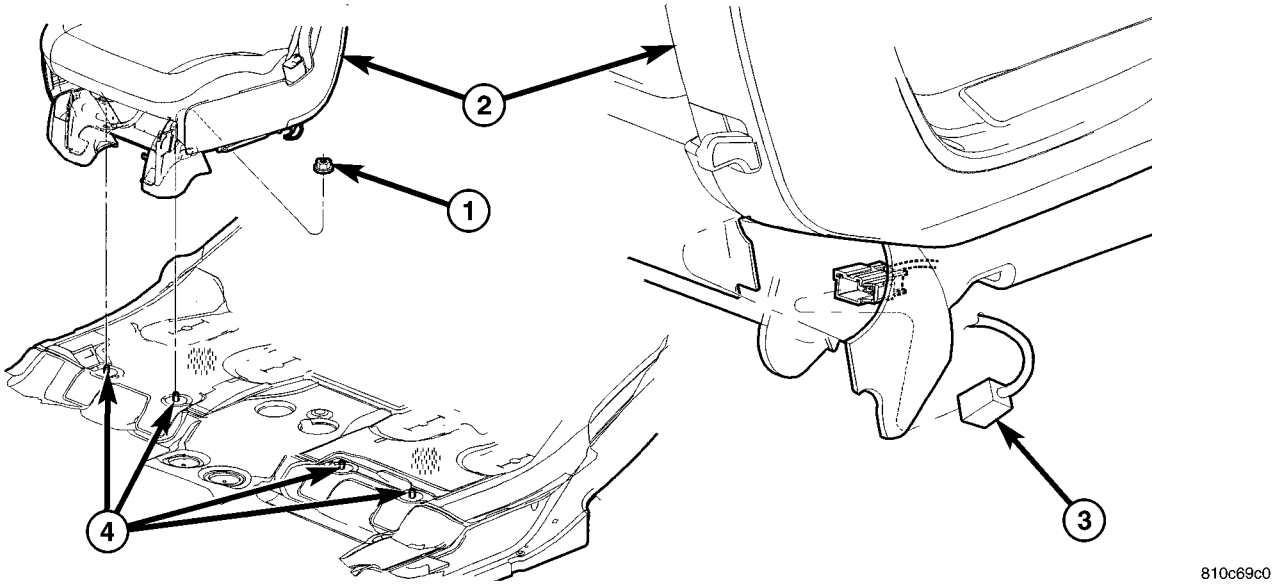


Fig. 25 SECOND ROW SEATS

1 - SEAT TO FLOOR WASHER AND NUT(S)
2 - SECOND ROW BUCKET SEAT
3 - WIRE CONNECTOR
4 - WELD STUDS

SECOND ROW SEAT (Continued)

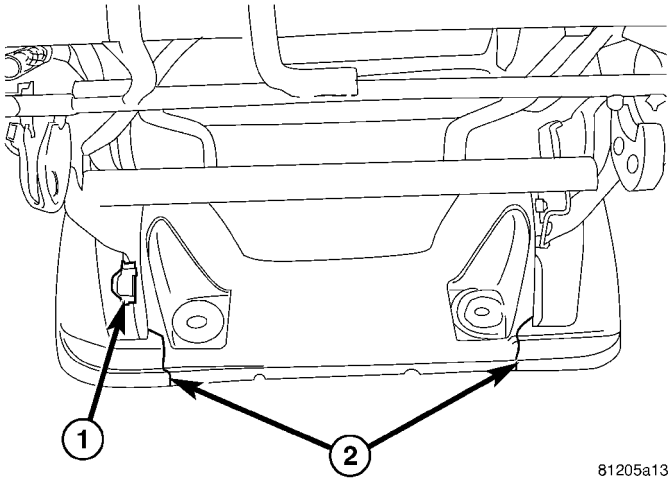


Fig. 26 SECOND ROW DISCONNECT HEATED SEAT WIRE CONNECTOR

1 - DISCONNECT HEATED CONNECTOR
2 - RELAY LOCK TABS

INSTALLATION

(1) Place second row seat into position in vehicle.
(2) Connect heated seat wire connector (Fig. 26).
(3) Install two nuts attaching seat to floor pan. Tighten nuts to 54 N·m (40 ft. lbs.) torque. (Fig. 25).
(4) Install headrest. (Refer to 23 - BODY/SEATS/HEADREST - INSTALLATION).
(5) Connect battery negative cable.

SECOND ROW SEAT BACK CUSHION FOAM/COVER

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove headrest and sleeves. (Refer to 23 - BODY/SEATS/HEADREST - REMOVAL).
(3) Remove second row seat. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT - REMOVAL).
(4) Disconnect heat element wire harness.
(5) Remove armrest. (Refer to 23 - BODY/SEATS/SEAT ARMREST - REMOVAL).
(6) Remove seat inner panel. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT INNER PANEL - REMOVAL).
(7) Remove outboard side handle (lift on back side of handle where it engages retainer tab and pull off).
(8) Remove two screws attaching inboard side shield.
(9) Remove three screws attaching outboard side shield.
(10) Disengage outer J-straps at seat back (Fig. 27).
(11) Remove screws attaching trim ring to seat back frame (Fig. 28) and (Fig. 29).

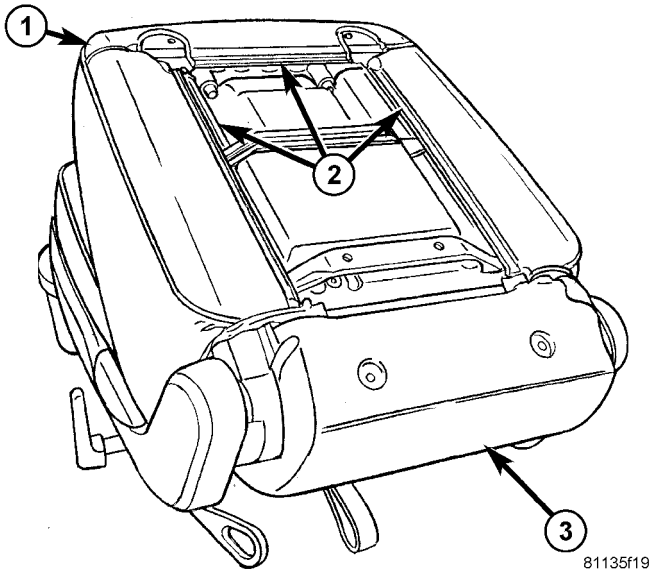


Fig. 27 SECOND ROW SEAT BACK COVER

1 - SECOND ROW SEAT BACK COVER
2 - J-STRAPS
3 - SECOND ROW SEAT ASSEMBLY

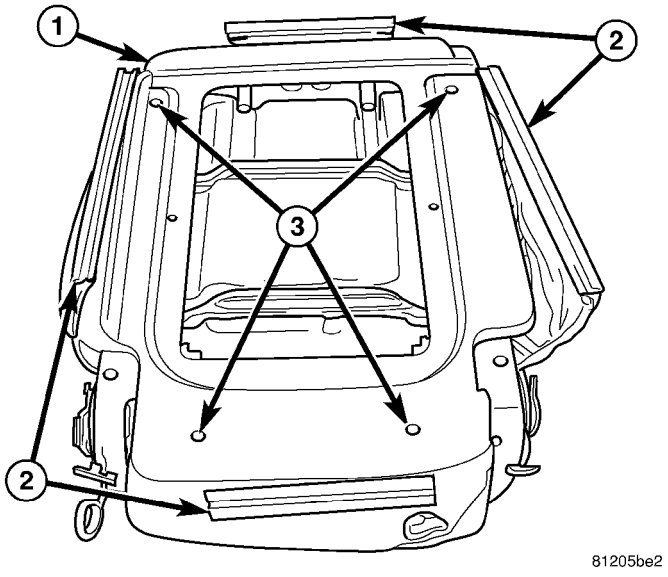


Fig. 28 SECOND ROW SEAT BACK TRIM RING

1 - TRIM RING
2 - J-STRAPS
3 - ATTACHING SCREWS

SECOND ROW SEAT BACK CUSHION FOAM/COVER (Continued)

(12) Remove trim ring (Fig. 29).

(13) Disengage inner J-straps from trim ring (Fig. 30).

(14) Disconnect wiring harness (for heated seats) at inner shield and feed back harness through hole in shield.

(15) Remove seat back foam/cover and heating harness assembly together (keep trim attached to foam pad).

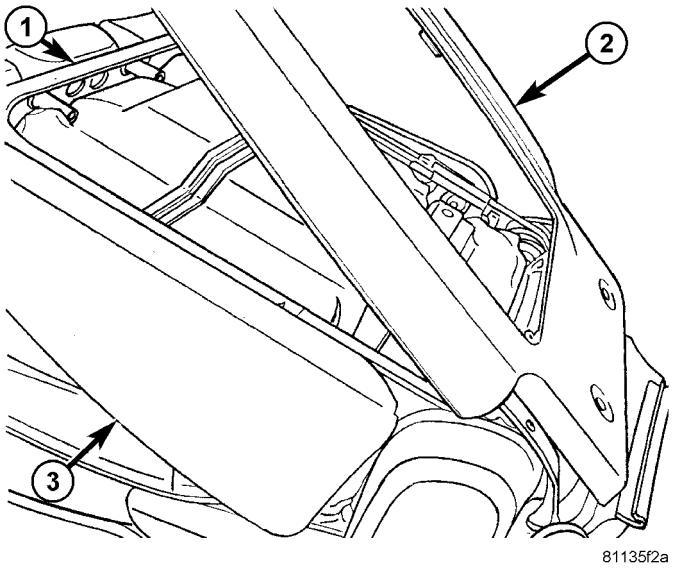


Fig. 29 TRIM RING FOR SEAT BACK FRAME

1 - SECOND ROW SEAT BACK FRAME
2 - TRIM RING FOR SEAT BACK FRAME
3 - SEAT BACK CUSHION

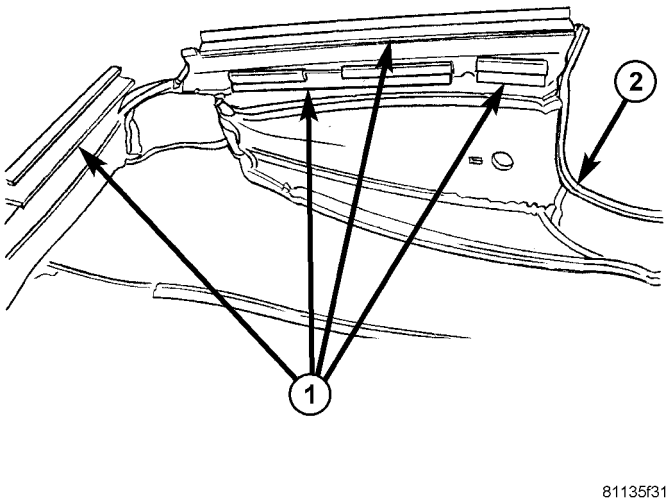


Fig. 30 SEAT BACK J-STRAPS

1 - J-STRAPS
2 - SECOND ROW SEAT BACK COVER

NOTE: Use care not to damage wire harness during removal procedure.

(16) Disconnect heat seat wire harness from three attachments and route to under side of cushion pad.

(17) Remove cushion and cover from seat back frame (Fig. 31).

(18) Work the foam and cover under recliner torque rod and remove seat foam/cover (Fig. 32).

(19) Separate seat cover from foam.

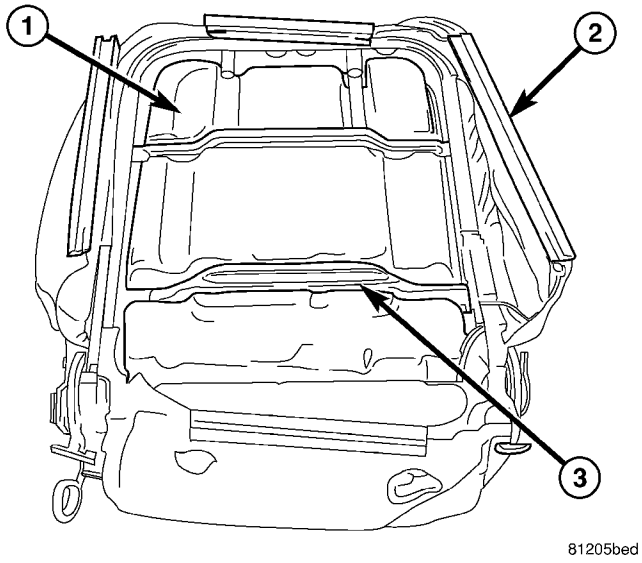


Fig. 31 SECOND ROW SEAT BACK FRAME AND COVER

1 - SEAT BACK FOAM PAD
2 - SEAT BACK COVER
3 - SEAT BACK FRAME

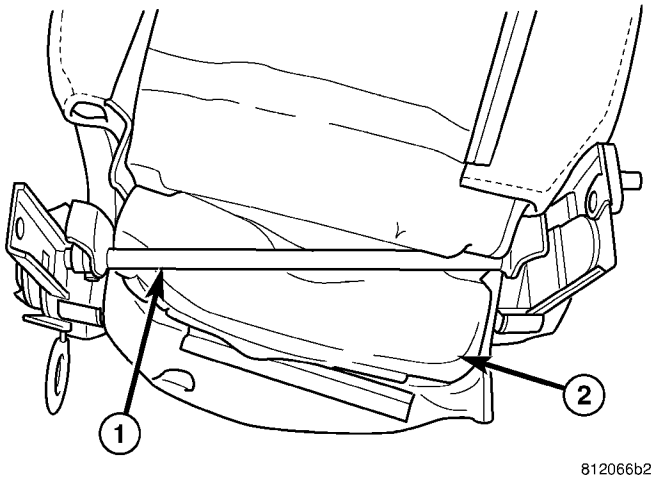


Fig. 32 SECOND ROW SEAT BACK CUSHION AND COVER REMOVAL

1 - SECOND ROW SEAT RECLINER TORQUE ROD
2 - SEAT BACK FOAM/COVER

SECOND ROW SEAT BACK CUSHION FOAM/COVER (Continued)

INSTALLATION

(1) Place seat back foam and cover together.
(2) Work the foam and cover under recliner torque rod (Fig. 32).
(3) Place seat foam/cover onto seat frame (Fig. 31).
(4) Route to under side of cushion pad and connect heat seat wire harness three attachments.

NOTE: Use care not to damage wire harness during install procedure.

(5) Remove seat back foam/cover and heating harness assembly together (keep trim attached to foam pad).
(6) Feed back harness through hole in shield and connect wiring harness (for heated seats) at inner shield.
(7) Install trim ring (Fig. 29).
(8) Engage inner J-straps to trim ring (Fig. 30).
(9) Install screws attaching trim ring to seat back frame (Fig. 28) and (Fig. 29).
(10) Engage outer J-straps at seat back (Fig. 27).
(11) Install three screws attaching outboard side shield.
(12) Install two screws attaching inboard side shield.
(13) Push outboard side handle on retainer tab till it locks.
(14) Install cushion and cover onto seat pan.
(15) Install three screws attaching inner side shield hinge area.
(16) Install two screws attaching outer side shield buckle side.
(17) Install seat inner panel. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT INNER PANEL - INSTALLATION)
(18) Install armrest. (Refer to 23 - BODY/SEATS/SEAT ARMREST - INSTALLATION).
(19) Connect heat element wire harness.
(20) Install second row seat. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT - INSTALLATION).
(21) Install headrest and sleeves (Refer to 23 - BODY/SEATS/HEADREST - INSTALLATION).
(22) Connect battery negative cable.

SECOND ROW SEAT LOAD FLOOR PANEL

REMOVAL

(1) Fold second row seat down flat (Fig. 33).
(2) Using a trim stick C-4755 or equivalent, disengage the seat back load floor panel push pins by pulling away from seat back.

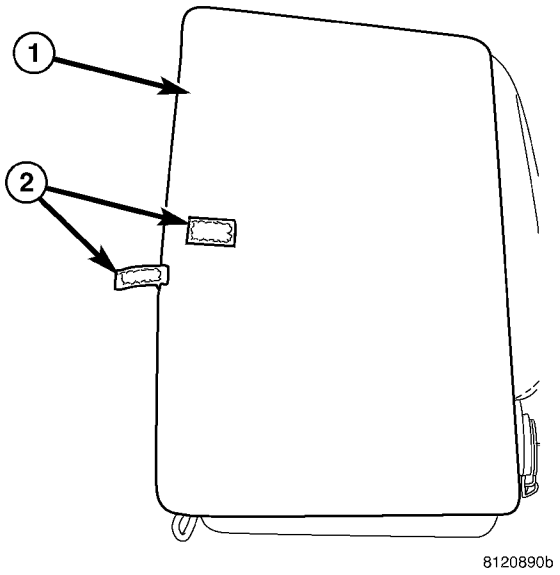


Fig. 33 SEAT BACK LOAD FLOOR PANEL

1 - LOAD FLOOR PANEL
2 - HOOK AND LOOP WITH STRAP

INSTALLATION

(1) Place second row seat load floor panel into position (Fig. 33).
(2) Press on seat back load floor panel to engage push pins to seat back frame.

SECOND ROW SEAT BACK FRAME/RECLINER/TORQUE ROD/CRAS ASSEMBLY

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove headrest and sleeves. (Refer to 23 - BODY/SEATS/HEADREST - REMOVAL).
(3) Remove second row seat. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT - REMOVAL).
(4) Disconnect heat element wire harness.
(5) Remove armrest. (Refer to 23 - BODY/SEATS/SEAT ARMREST - REMOVAL).
(6) Remove seat inner panel. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT INNER PANEL - REMOVAL).
(7) Remove outboard side handle (lift on back side of handle where it engages retainer tab and pull off).
(8) Remove two screws attaching inboard side shield.
(9) Remove three screws attaching outboard side shield.
(10) Disengage outer J-straps at seat back (Fig. 34).

SECOND ROW SEAT BACK FRAME/RECLINER/TORQUE ROD/CRAS ASSEMBLY (Continued)

(11) Remove screws attaching trim ring to seat back frame (Fig. 35) and (Fig. 36).

(12) Remove trim ring (Fig. 36).

(13) Disengage inner J-straps from trim ring (Fig. 37).

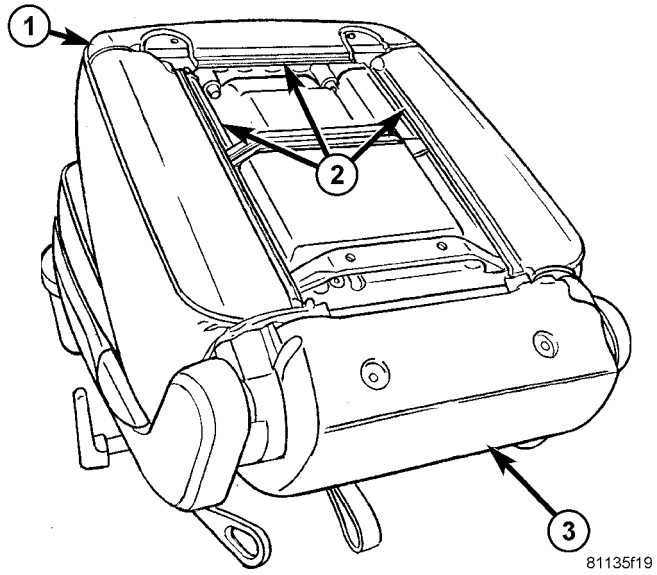


Fig. 34 SECOND ROW SEAT BACK COVER

1 - SECOND ROW SEAT BACK COVER
2 - J-STRAPS
3 - SECOND ROW SEAT ASSEMBLY

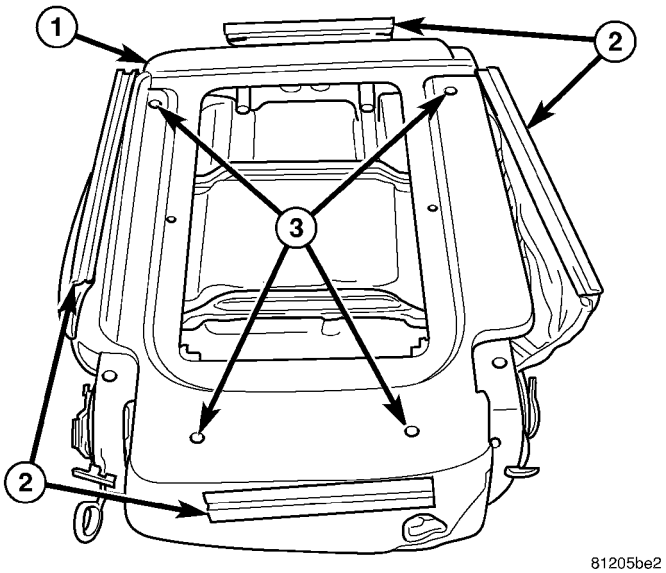


Fig. 35 SECOND ROW SEAT BACK TRIM RING

1 - TRIM RING
2 - J-STRAPS
3 - ATTACHING SCREWS

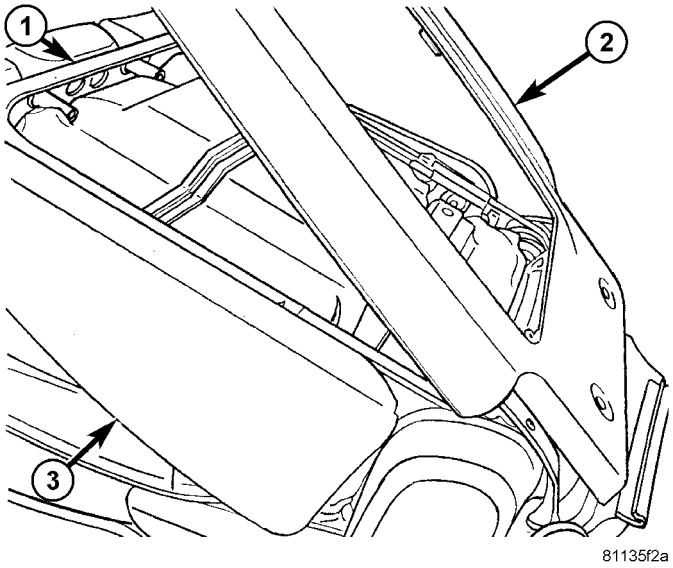


Fig. 36 TRIM RING FOR SEAT BACK FRAME

1 - SECOND ROW SEAT BACK FRAME
2 - TRIM RING FOR SEAT BACK FRAME
3 - SEAT BACK CUSHION

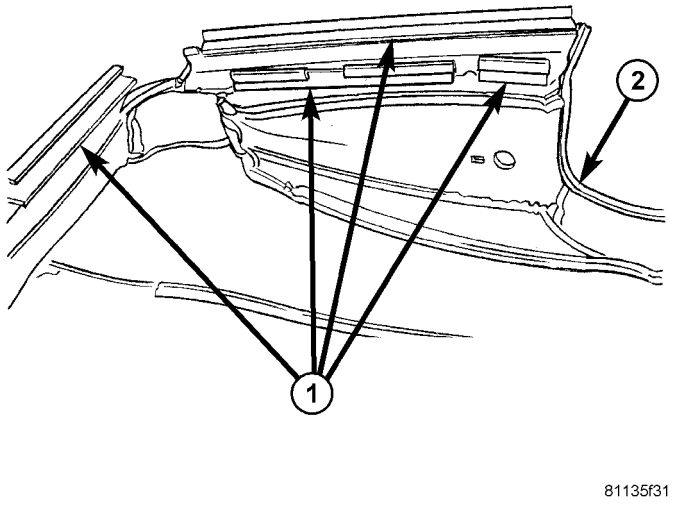


Fig. 37 SEAT BACK J-STRAPS

1 - J-STRAPS
2 - SECOND ROW SEAT BACK COVER

SECOND ROW SEAT BACK FRAME/RECLINER/TORQUE ROD/CRAS ASSEMBLY (Continued)

(14) Disconnect wiring harness (for heated seats) at inner shield and feed back harness through hole in shield (Fig. 38).

(15) Remove seat back foam/cover and heating harness assembly together (keep trim attached to foam pad).

(16) Work the foam and cover under recliner torque rod and remove seat foam/cover (Fig. 39) and (Fig. 40).

(17) Remove upper recliner bolts to seat back frame (Fig. 41) and (Fig. 42).

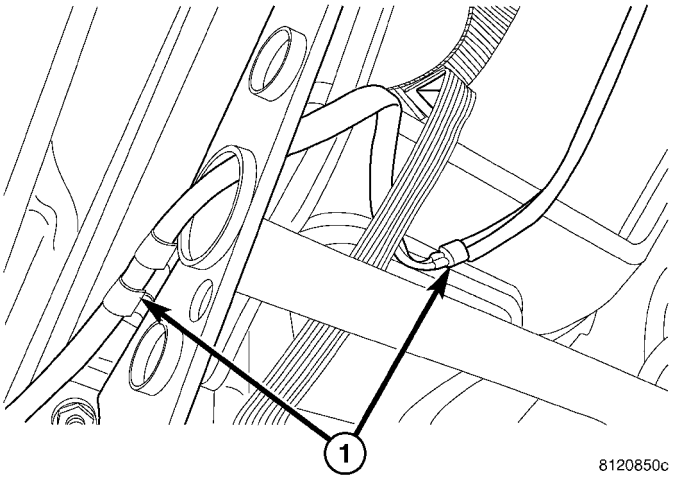


Fig. 38 HEATED SEAT WIRE HARNESS

1 - Wire harness fasteners

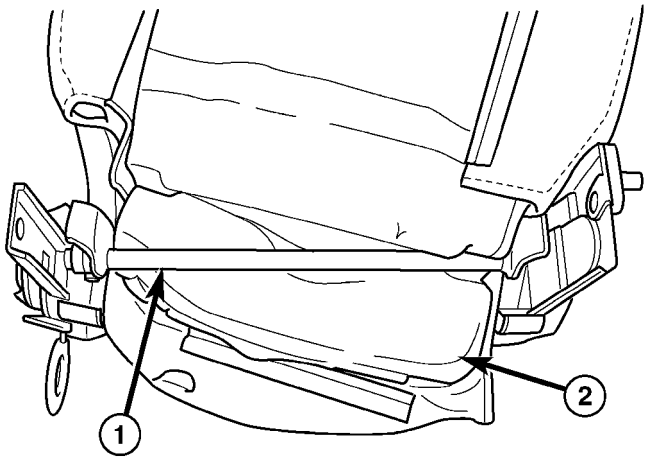


Fig. 39 SECOND ROW SEAT BACK CUSHION AND COVER REMOVAL

1 - SECOND ROW SEAT RECLINER TORQUE ROD
2 - SEAT BACK FOAM/COVER

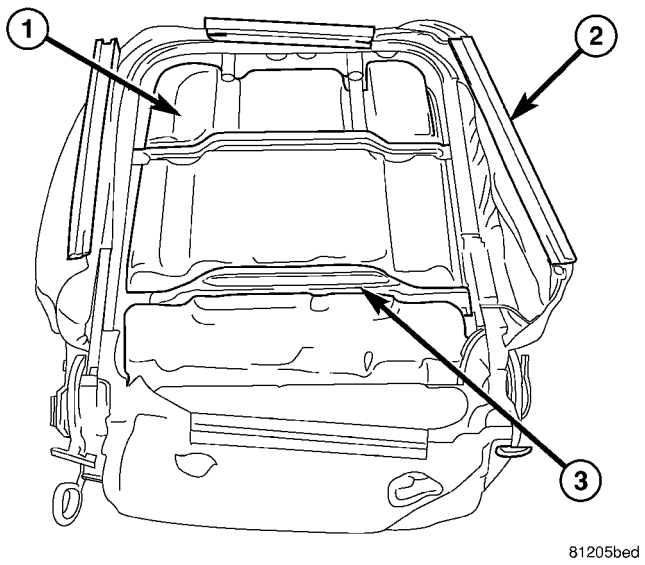


Fig. 40 SECOND ROW SEAT BACK FRAME AND COVER

1 - SEAT BACK FOAM PAD
2 - SEAT BACK COVER
3 - SEAT BACK FRAME

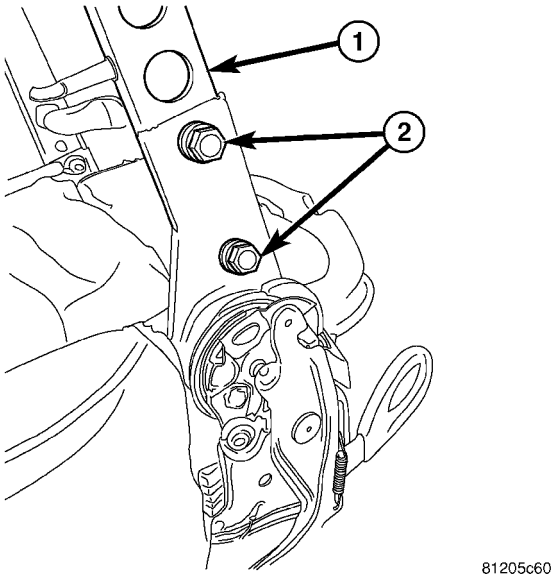


Fig. 41 SECOND ROW SEAT BACK FRAME OUTBOARD SIDE BOLTS

1 - SEAT BACK FRAME
2 - ATTACHING BOLTS

SECOND ROW SEAT BACK FRAME/RECLINER/TORQUE ROD/CRAS ASSEMBLY (Continued)

NOTE: Use care not to damage wire harness during removal procedure.

(18) Disconnect heat seat wire harness from three attachments and route to under side of cushion pad.

(19) Disconnect the J-strap and push pin fasteners at the rear of seat cushion pan (Fig. 43) and (Fig. 44).

(20) Remove cushion foam and cover from seat pan (Fig. 45).

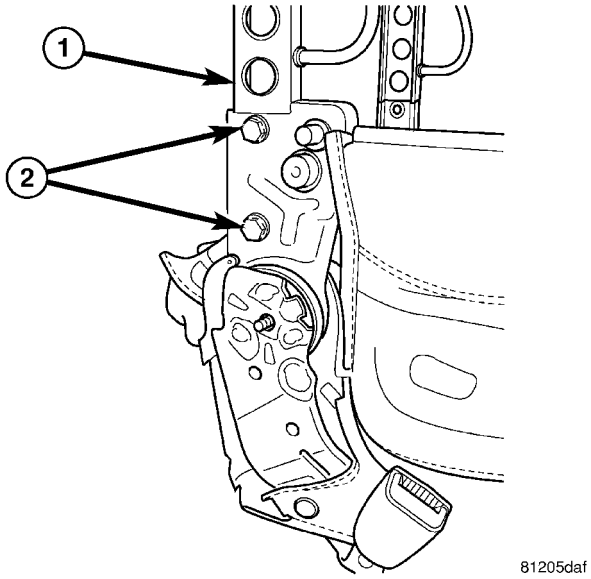


Fig. 42 SECOND ROW SEAT BACK FRAME INBOARD SIDE BOLTS

1 - SEAT BACK FRAME
2 - INBOARD ATTACHING BOLTS

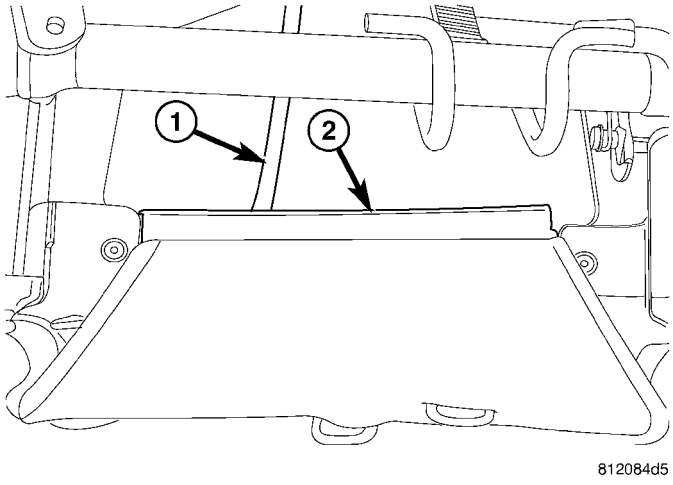


Fig. 43 SEAT CUSHION REAR J-STRAP

1 - HEATED SEAT WIRE HARNESS
2 - J-STRAP

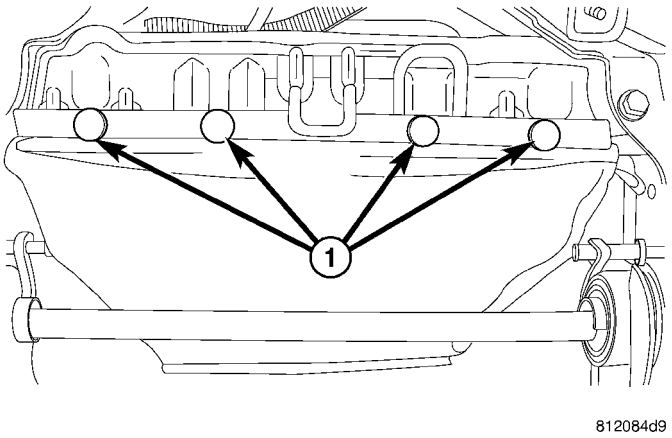


Fig. 44 SEAT CUSHION REAR PUSH PINS

1 - PUSH PIN FASTENERS

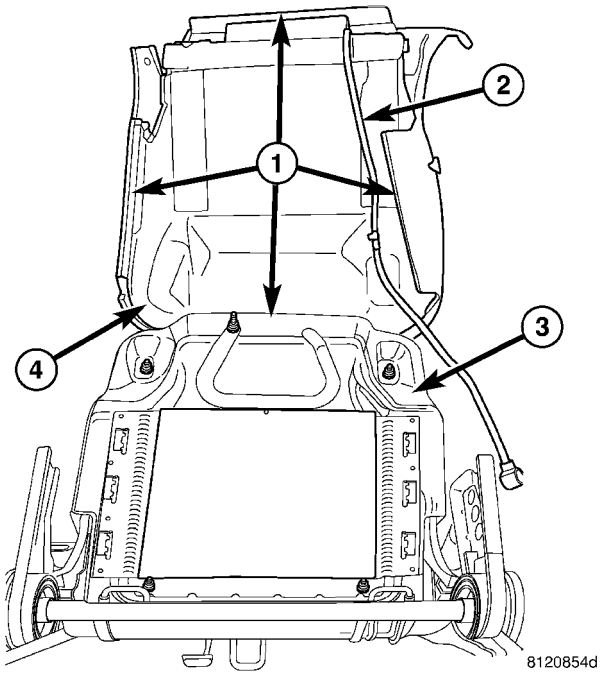


Fig. 45 SEAT CUSHION COVER AND FOAM PAD

1 - J-STRAPS
2 - HEATED SEAT WIRE HARNESS
3 - SEAT CUSHION PAN ASSEMBLY
4 - SEAT CUSHION FOAM AND COVER

(21) Remove four seat cushion pan nuts (Fig. 46).
(22) Remove seat cushion pan.
(23) Remove two bolts and five nuts attaching lower recliner bracket to riser and leg assembly (Fig. 47).
(24) Remove seat back frame/recliners/CRAS bracket and torque rod.

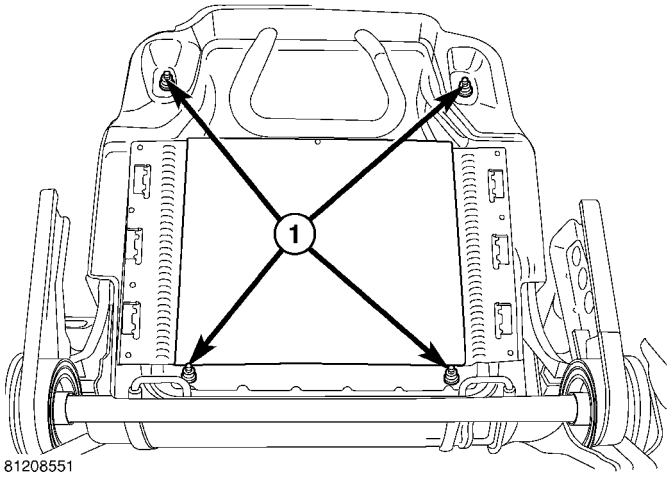


Fig. 46 SEAT CUSHION PAN

1 - ATTACHING NUTS

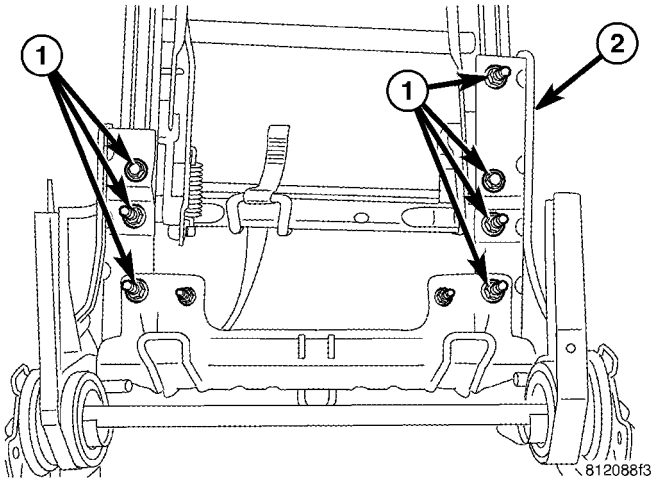


Fig. 47 SECOND ROW BACK FRAME/RECLINER/ CRAS BRACKET, AND TORQUE ROD

1 - ATTACHING NUTS AND BOLTS
2 - LOWER RECLINER ASSEMBLY

INSTALLATION

(1) Place seat back frame/recliners/CRAS bracket and torque rod in position on riser and leg assembly.
(2) Install two bolts and five nuts attaching lower recliner bracket to riser and leg assembly (Fig. 47). Tighten nuts to 48 N·m (35 ft. lbs.) torque, and tighten bolts to 29 N·m (35 ft. lbs.) torque.
(3) Place seat cushion pan into position.
(4) Install four seat cushion pan nuts (Fig. 46).
(5) Place seat cushion foam and cover in position on seat pan (Fig. 45).
(6) Connect the J-strap and install push pin fasteners at the rear of seat cushion pan (Fig. 43) and (Fig. 44).
(7) Route to under side of cushion pad and connect heat seat wire harness and three attachments.

NOTE: Use care not to damage wire harness during install procedure.

(8) Install upper recliner bolts to seat back frame, and tighten bolts to 48 N·m (35 ft. lbs.) torque (Fig. 41) and (Fig. 42).
(9) Place seat foam/cover in position and work the foam and cover under recliner torque rod (Fig. 39) and (Fig. 40).
(10) Feed seat back harness through hole in shield. Connect wiring harness (for heated seats) at inner shield and feed back harness through hole in shield (Fig. 38).
(11) Engage inner J-straps (Fig. 37).
(12) Install trim ring (Fig. 36).
(13) Install screws attaching trim ring to seat back frame (Fig. 35) and (Fig. 36).
(14) Engage outer J-straps at seat back (Fig. 34).
(15) Install three screws attaching outboard side shield.
(16) Install two screws attaching inboard side shield.
(17) Press outboard side handle on retainer tab till it engages.
(18) Install two screws attaching outer side shield buckle side.
(19) Install seat inner panel. (Refer to 23 - BODY/ SEATS/SECOND ROW SEAT INNER PANEL - INSTALLATION)
(20) Install armrest. (Refer to 23 - BODY/SEATS/ SEAT ARMREST - INSTALLATION).
(21) Connect heat element wire harness.
(22) Install second row seat. (Refer to 23 - BODY/ SEATS/SECOND ROW SEAT - INSTALLATION).
(23) Install headrest and sleeves (Refer to 23 - BODY/SEATS/HEADREST - INSTALLATION).
(24) Connect battery negative cable.

SECOND ROW SEAT CUSHION FOAM/COVER

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove headrest. (Refer to 23 - BODY/SEATS/ HEADREST - REMOVAL).

SECOND ROW SEAT CUSHION FOAM/COVER (Continued)

(3) Remove second row seat. (Refer to 23 - BODY/SEATS/FIRST ROW SEAT - REMOVAL).
(4) Disconnect heat element wire harness.
(5) Remove two screws attaching outer side shield buckle side.
(6) Remove screw attaching floor dump release handle and remove handle.
(7) Remove front recliner handle (snaps on).
(8) Remove three screws attaching side shield at recliner handle side.
(9) Remove three screws attaching inner side shield hinge area.
(10) Remove hinge to floor plastic cover.
(11) Remove four screws attaching lower plastic cover, under side of seat.
(12) Disengage J-straps and push pins at cushion cover (Fig. 48).
(13) Remove cushion and cover from seat pan.
(14) Remove cover from cushion.

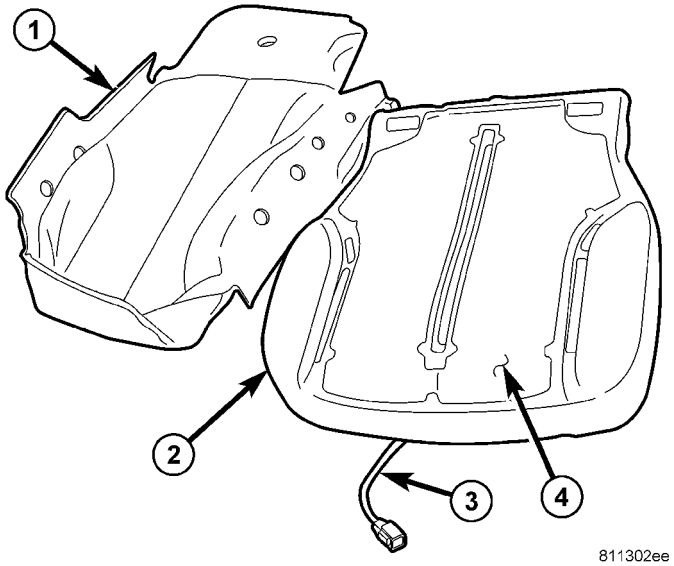


Fig. 48 SEAT BACK CUSHION

1 - SECOND ROW SEAT CUSHION COVER
2 - SECOND ROW SEAT CUSHION
3 - SEAT HEATING ELEMENT WIRE HARNESS
4 - SEAT HEATING ELEMENT

INSTALLATION

(1) Place cover on cushion (Fig. 48).
(2) Install cushion and cover to seat pan.
(3) Engage J-straps and push pins to seat pan.
(4) Install four screws attaching lower plastic cover, to under side of seat.
(5) Install hinge to floor plastic cover.
(6) Install three screws attaching inner side shield hinge area.
(7) Install three screws attaching side shield at recliner handle side.
(8) Push on front recliner handle to lock into position.
(9) Install screw attaching floor dump release handle.
(10) Install two screws attaching outer side shield buckle side.
(11) Connect heat element wire harness.
(12) Install first row seat. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT - INSTALLATION).
(13) Install headrest. (Refer to 23 - BODY/SEATS/HEADREST - INSTALLATION).
(14) Connect battery negative cable.

SECOND ROW SEAT RISER

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove headrest. (Refer to 23 - BODY/SEATS/HEADREST - REMOVAL).
(3) Remove second row seat. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT - REMOVAL).
(4) Disconnect heat element wire harness.
(5) Turn seat over (Fig. 49).
(6) Remove four nuts attaching seat base to seat assembly.
(7) Remove seat base.

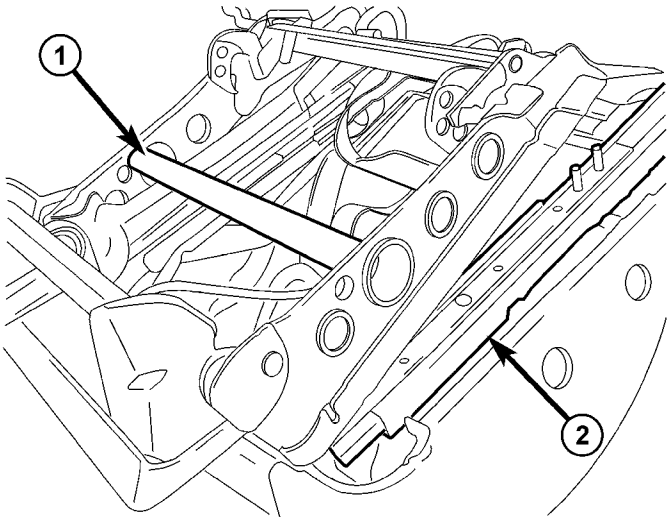


Fig. 49 SEAT RAISER

1 - SEAT BASE
2 - SECOND ROW SEAT ASSEMBLY

INSTALLATION

(1) Place seat base into position on second seat assembly.
(2) Install four nuts attaching seat base to seat assembly (Fig. 49).
(3) Place seat into position.
(4) Connect heating element wire harness.

SECOND ROW SEAT RISER (Continued)

(5) Install second row seat. (Refer to 23 - BODY/SEATS/SECOND ROW SEAT - INSTALLATION).

(6) Install headrest. (Refer to 23 - BODY/SEATS/HEADREST - INSTALLATION).

(7) Disconnect and isolate the battery negative cable.

SECOND ROW SEAT SIDE SHIELD

REMOVAL

(1) Fold seat flat and tilt seat forward to access screw.

(2) Remove screw attaching second row seat side shield (Fig. 50).

(3) Remove side shield.

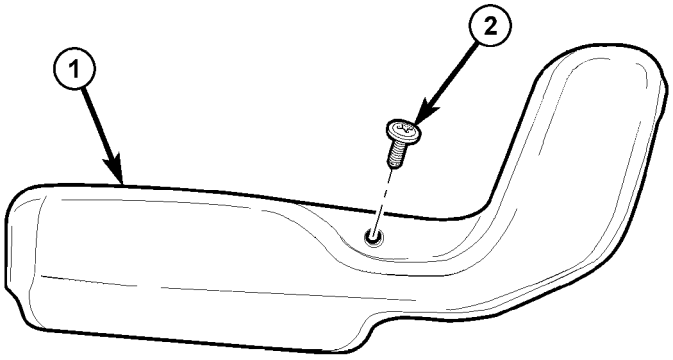


Fig. 50 SEAT CUSHION SIDE SHIELD

1 - SECOND ROW SEAT SIDE SHIELD
2 - ATTACHING SCREW

INSTALLATION

(1) Place side shield into position.

(2) Install screw attaching second row seat side shield (Fig. 50).

THIRD ROW SEAT

REMOVAL

(1) Open liftgate.

(2) Remove rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).

(3) Remove third row seat rear two attaching bolts (Fig. 51).

(4) Remove third row seat front covers. (Fig. 52).

(5) Remove the third row seat front two attaching bolts.

(6) Remove seat from vehicle.

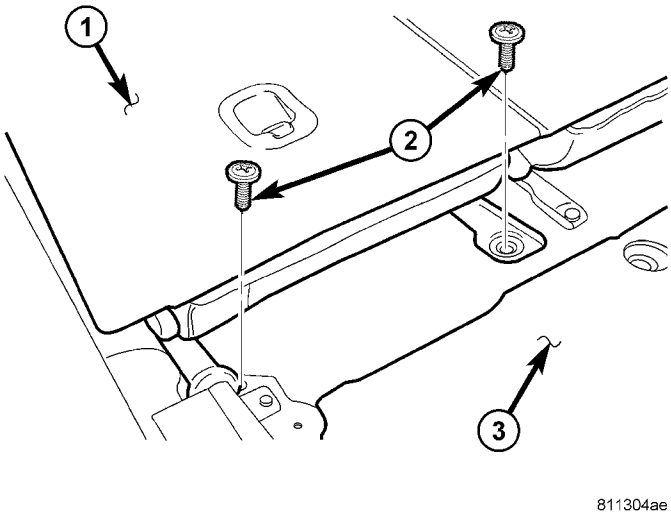


Fig. 51 THIRD ROW SEAT - REAR SCREWS

1 - THIRD ROW SEAT BACK
2 - REAR ATTACHING BOLTS
3 - REAR FLOOR STOWAGE BIN

THIRD ROW SEAT (Continued)

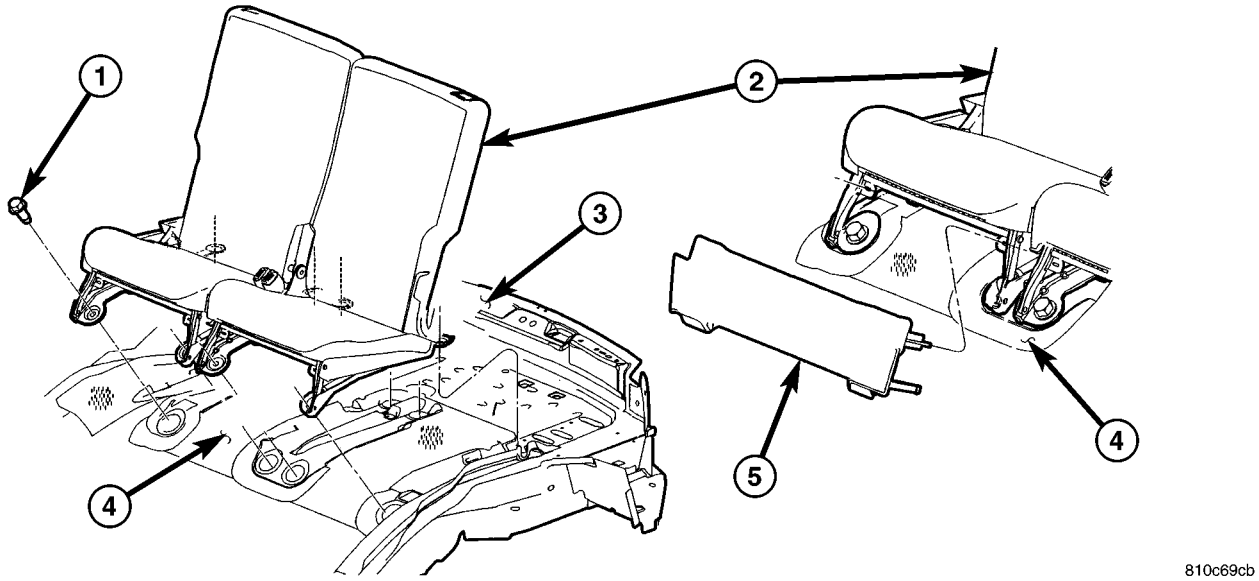


Fig. 52 THIRD ROW SEATS

1 - ATTACHING WASHERS AND BOLTS
2 - THIRD ROW BUCKET SEATS
3 - FLOOR PAN
4 - CARPETING
5 - THIRD ROW SEAT FRONT COVER

INSTALLATION

(1) Place seat into position in vehicle.

(2) Install third row seat front two attaching bolts and tighten to 88 N·m (65 ft. lbs.) torque (Fig. 52).

(3) Install third row seat front covers.

(4) Install third row seat two rear attaching bolts and tighten to 88 N·m (65 ft. lbs.) torque (Fig. 51).

(5) Install rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - INSTALLATION).

THIRD ROW SEAT BACK CUSHION FOAM/ COVER

REMOVAL

(1) Open liftgate.

(2) Remove rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).

(3) Remove third row seat. (Refer to 23 - BODY/ SEATS/THIRD ROW SEAT - REMOVAL).

(4) Using finger, disengage fold flat cable from handle (Fig. 53).

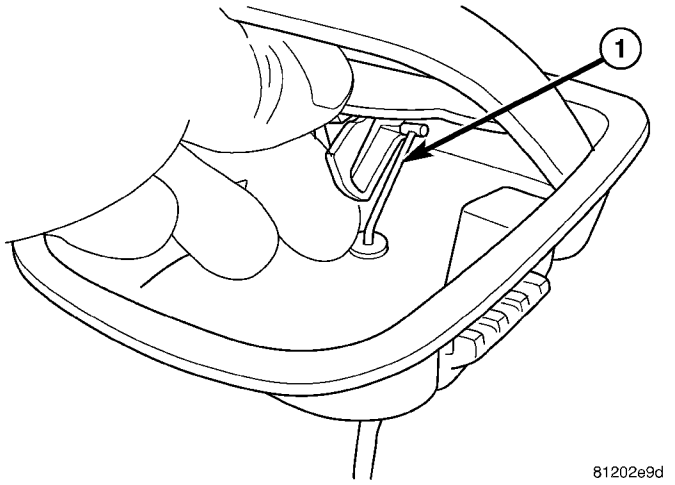


Fig. 53 FOLD FLAT CABLE

1 - RELEASE CABLE

THIRD ROW SEAT BACK CUSHION FOAM/ COVER (Continued)

(5) Release tab attaching fold flat handle to load floor panel (Fig. 54).

(6) Disconnect fold flat cable from handle and remove handle.

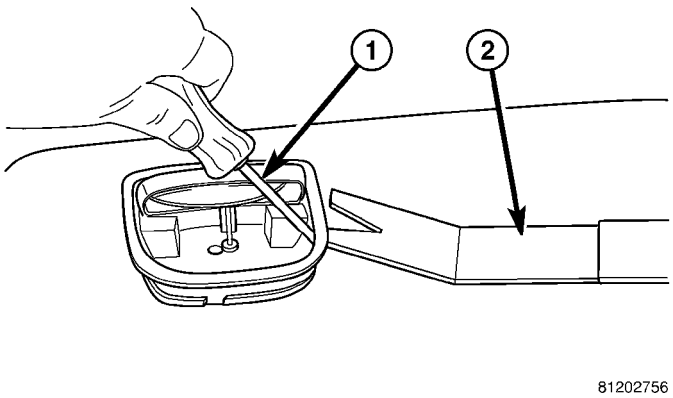


Fig. 54 REMOVE FOLD FLAT HANDLE

1 - PRY TAB INWARD
2 - TRIM TOOL

(7) Remove load floor panel by using a trim tool and lifting up the edges to disengage the push pins (Fig. 55).

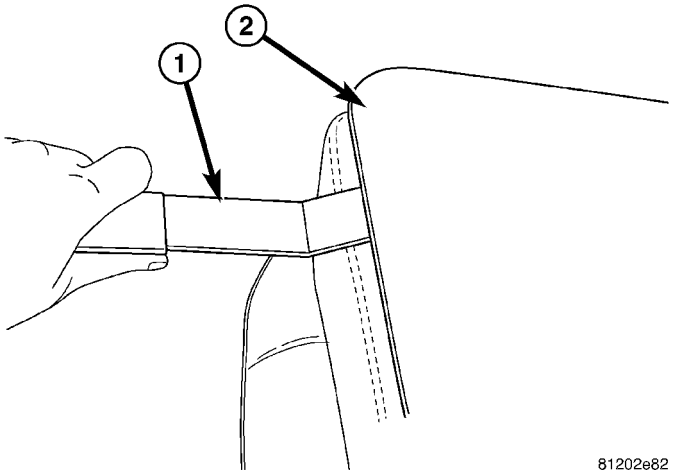


Fig. 55 REMOVE LOAD FLOOR PANEL

1 - TRIM TOOL
2 - LOAD FLOOR PANEL

(8) Remove two bolts (on outboard side of seat) attaching drive link assembly (Fig. 56).

(9) Remove drive link assembly.

(10) Remove outboard seat back shield.

(11) Remove one screw (on inboard side of seat) attaching inboard shield.

(12) Remove inboard shield.

(13) Remove two bolts attaching outer seat back to outboard latch assembly.

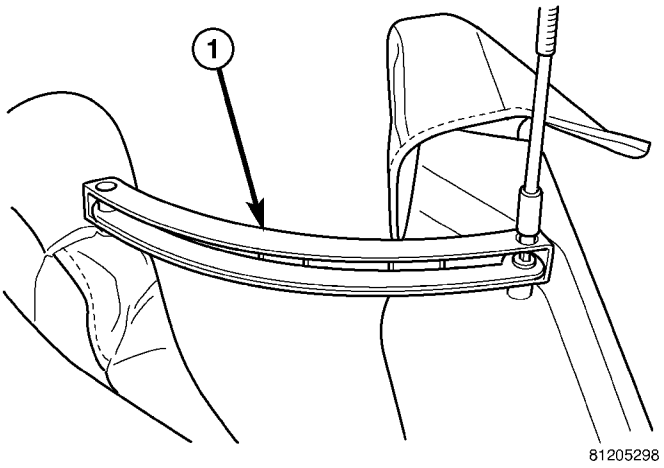


Fig. 56 DRIVE LINK AND SHIELD

1 - DRIVE LINK AND SHIELD

(14) Remove two bolts attaching inner seat back to inboard free pivot assembly.

(15) Disengage J-straps (Fig. 57).

(16) Remove seat back cover and foam pad from the seat back frame.

(17) Remove seat back cover from foam pad.

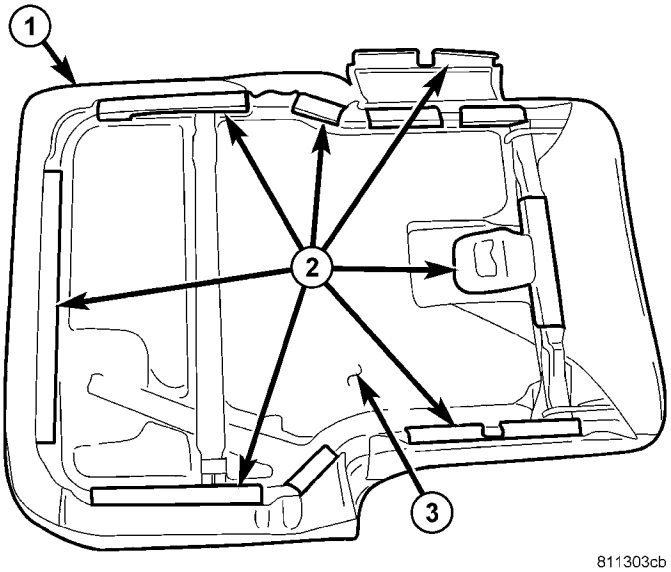


Fig. 57 SEAT BACK - THIRD ROW

1 - THIRD ROW SEAT BACK
2 - J-STRAPS
3 - SEAT BACK FOAM

INSTALLATION

(1) Place seat back cover onto cushion.

(2) Install seat back cover and cushion to seat back frame.

(3) Engage J-straps (Fig. 57).

THIRD ROW SEAT BACK CUSHION FOAM/ COVER (Continued)

(4) Install two bolts attaching inner seat back to inboard free pivot assembly. Tighten to 48 N·m (35 ft. lbs.) torque.

(5) Install two bolts attaching outer seat back to outboard fold flat mechanism. Tighten to 48 N·m (35 ft. lbs.) torque.

(6) Install outboard seat back shield.

(7) Install one screw attaching inboard shield.

(8) Install two bolts attaching drive link assembly. Tighten to 10 N·m (7 ft. lbs.) torque.

(9) Align load floor panel and push pins fasteners with holes in seat frame and press into position.

(10) Connect fold flat cable to handle and press handle into position on load floor panel.

(11) Install third row seat. (Refer to 23 - BODY/ SEATS/THIRD ROW SEAT - INSTALLATION).

(12) Install rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).

THIRD ROW SEAT CUSHION / COVER

REMOVAL

(1) Open liftgate.

(2) Remove rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).

(3) Remove third row seat. (Refer to 23 - BODY/ SEATS/THIRD ROW SEAT - REMOVAL).

(4) Remove two bolts (on outboard side of seat) attaching drive link assembly (Fig. 58).

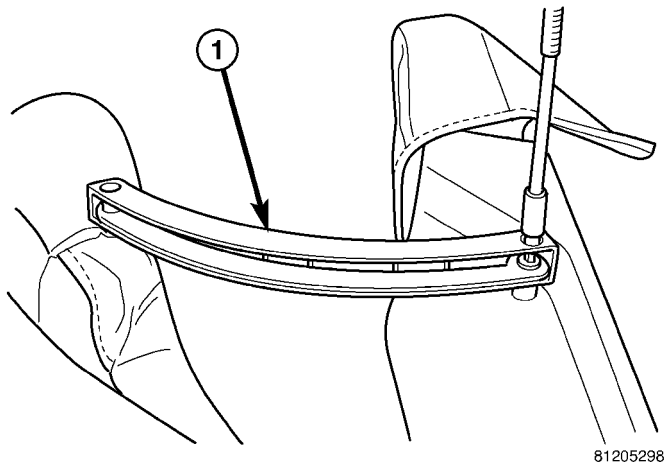


Fig. 58 DRIVE LINK AND SHIELD

1 - DRIVE LINK AND SHIELD

(5) Remove drive link assembly.

(6) Remove two bolts attaching front cushion pan to link and riser assemblies (Fig. 59).

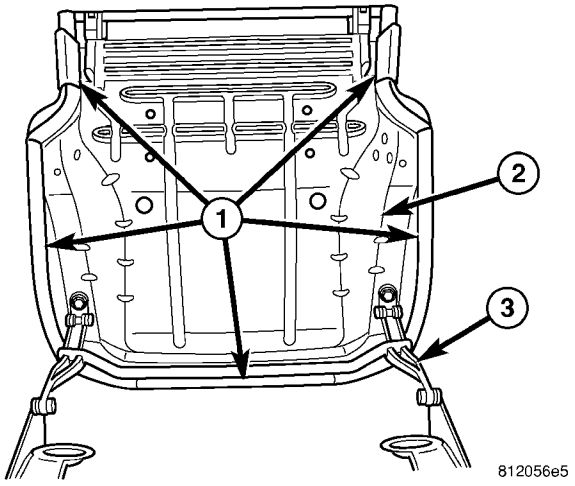


Fig. 59 THIRD ROW SEAT PAN

1 - J-STRAP
2 - SEAT PAN
3 - FRONT LINK ASSEMBLY

(7) Remove cushion assembly by sliding the front links off of the riser pins and twisting the cushion assembly to disengage the rear sliders from the riser tracks (Fig. 60).

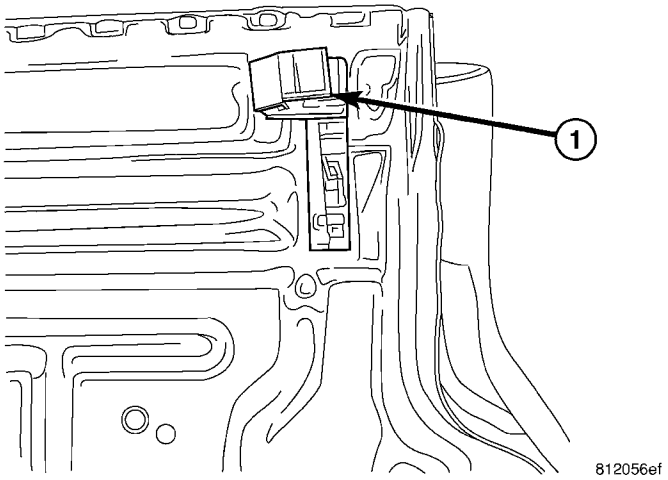


Fig. 60 THIRD ROW SEAT SLIDER

1 - SLIDER

(8) Disengage J-straps.

(9) Remove seat cushion cover and foam pad from the seat pan (Fig. 62) and (Fig. 63).

(10) Remove seat cushion cover from foam pad.

INSTALLATION

(1) Place seat cushion cover onto cushion foam pad (Fig. 64).

(2) Install seat cushion cover and foam pad seat pan (Fig. 63).

(3) Engage J-straps (Fig. 62) and (Fig. 61).

(4) Install cushion assembly onto the seat risers.

THIRD ROW SEAT CUSHION / COVER (Continued)

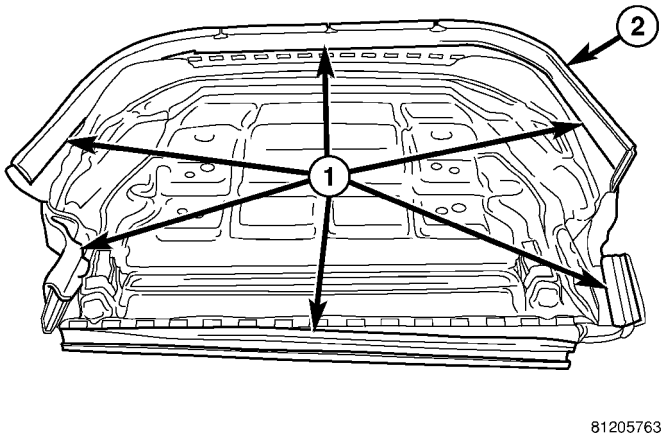


Fig. 61 THIRD ROW SEAT CUSHION COVER AND PAN

1 - J-STRAPS
2 - SEAT CUSHION COVER

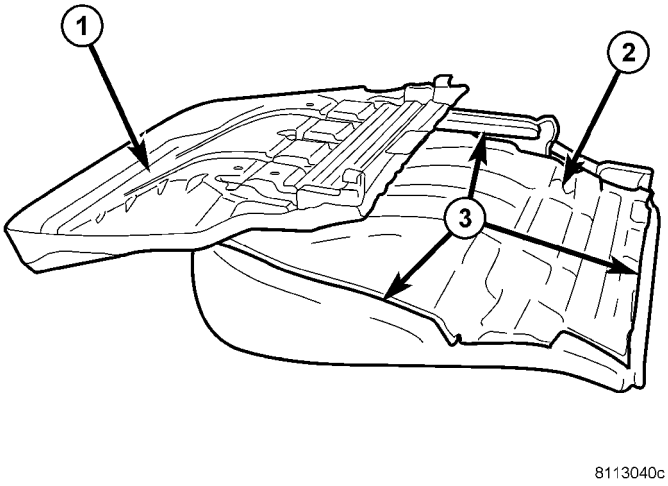


Fig. 62 THIRD ROW SEAT CUSHION

1 - SEAT CUSHION PAN
2 - SEAT CUSHION FOAM AND COVER
3 - J-STRAPS

(5) Install cushion assembly by sliding the front links onto the riser pins and twisting the cushion assembly to engage the rear sliders onto the riser tracks (Fig. 60).

(6) Install two bolts attaching front cushion pan to link and risers (Fig. 59). Tighten to 29 N·m (21 ft. lbs.) torque.

(7) Install drive link assembly.

(8) Install two bolts attaching drive link assembly (Fig. 58). Tighten to 10 N·m (7 ft. lbs.) torque.

(9) Install third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - INSTALLATION).

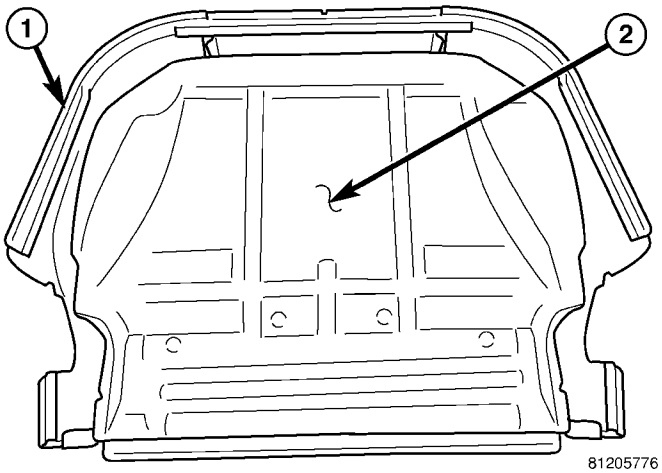


Fig. 63 THIRD ROW SEAT CUSHION FOAM PAD

1 - SEAT CUSHION COVER
2 - SEAT CUSHION FOAM PAD

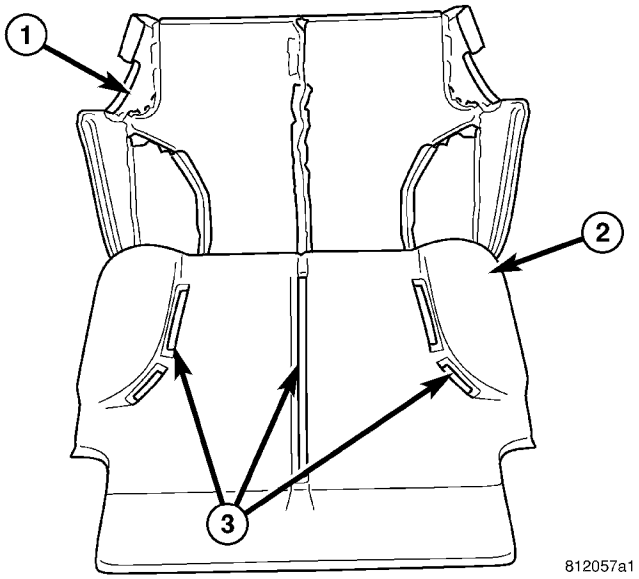


Fig. 64 THIRD ROW SEAT CUSHION COVER

1 - SEAT CUSHION COVER
2 - SEAT CUSHION FOAM PAD
3 - HOOK AND LOOP FASTENER

(10) Install rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).

(11) Close liftgate.

THIRD ROW FOLD FLAT HANDLE

REMOVAL

(1) Open liftgate.
(2) Using finger, disengage fold flat cable from handle (Fig. 65).

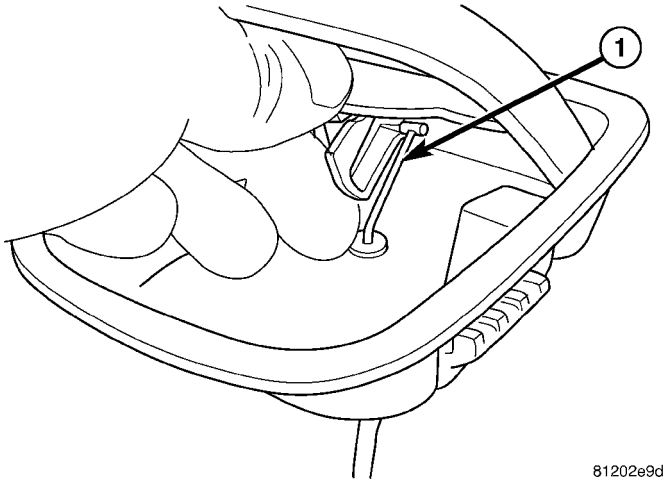


Fig. 65 FOLD FLAT CABLE

1 - RELEASE CABLE

(3) Release tab attaching fold flat handle to load floor panel (Fig. 66).
(4) Disconnect fold flat cable from handle and remove handle from load floor panel.

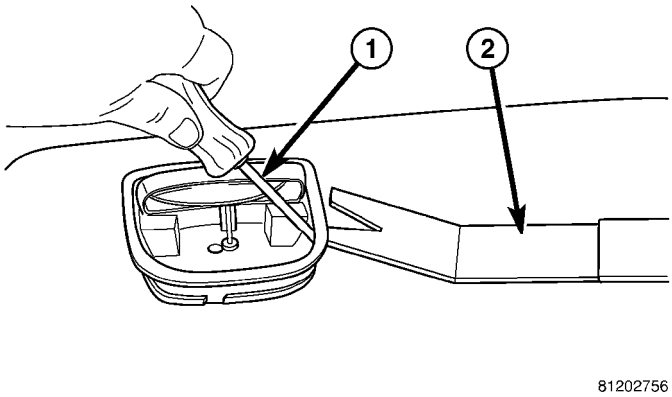


Fig. 66 REMOVE FOLD FLAT HANDLE

1 - PRY TAB INWARD
2 - TRIM TOOL

INSTALLATION

(1) Connect fold flat cable to handle (Fig. 53).
(2) Place handle into position on load floor panel (Fig. 67).

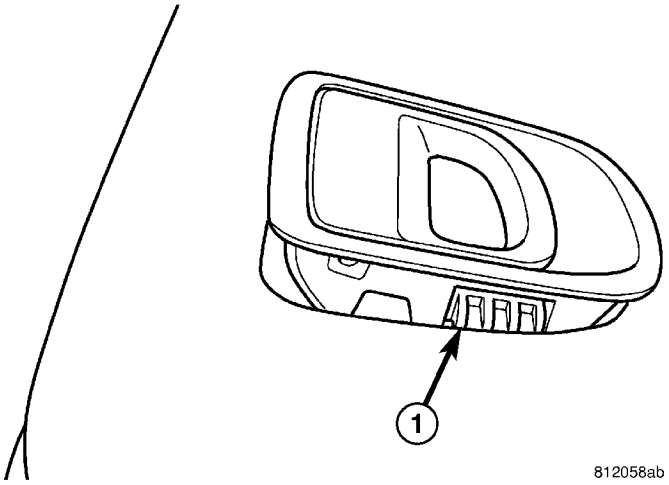


Fig. 67 INSTALL FOLD FLAT HANDLE

1 - DEPRESS TAB

(3) Depress tab and press handle into seated position.

THIRD ROW FOLD FLAT HANDLE AND CABLE

REMOVAL

(1) Open liftgate.
(2) Remove rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).
(3) Remove third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - REMOVAL).
(4) Using finger, disengage fold flat cable from handle (Fig. 68).

NOTE: Use care not to stretch or kink cable.

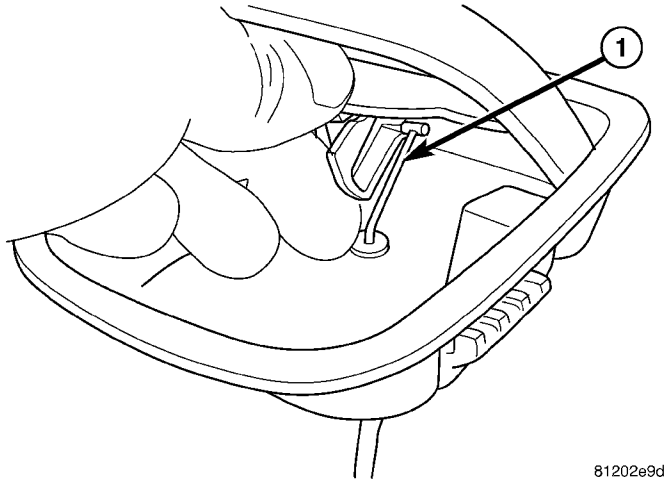


Fig. 68 FOLD FLAT CABLE

1 - RELEASE CABLE

THIRD ROW FOLD FLAT HANDLE AND CABLE (Continued)

(5) Release tab attaching fold flat handle to load floor panel (Fig. 69).

(6) Disconnect fold flat cable from handle and remove handle from load floor panel.

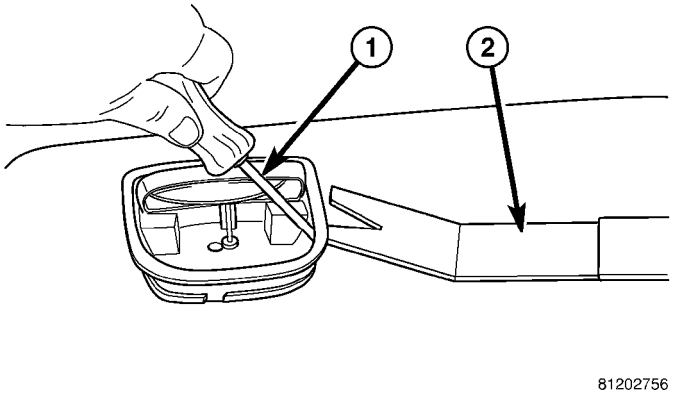


Fig. 69 REMOVE FOLD FLAT HANDLE

1 - PRY TAB INWARD
2 - TRIM TOOL

(7) Remove load floor panel (Refer to 23 - BODY/SEATS/SEAT BACK - REMOVAL).

(8) Remove two bolts (on outboard side of seat) attaching drive link assembly (Fig. 70).

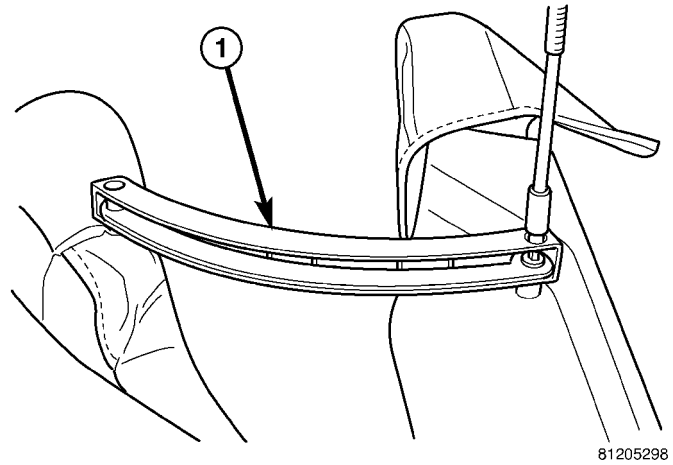


Fig. 70 DRIVE LINK AND SHIELD

1 - DRIVE LINK AND SHIELD

(9) Remove drive link assembly.

(10) Remove outboard seat back shield (Fig. 71).

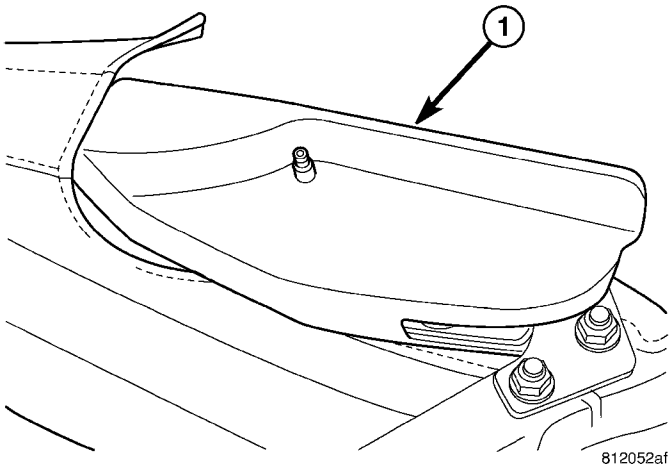


Fig. 71 OUTBOARD SEAT BACK SHIELD

1 - SHIELD

(11) Disconnect fold flat cable from outboard fold flat mechanism (Fig. 72).

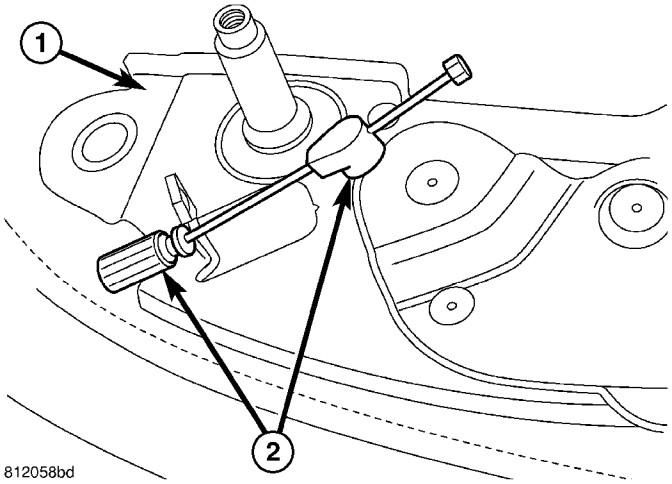


Fig. 72 FOLD FLAT CABLE ATTACHING POINTS

1 - FOLD FLAT MECHANISM
2 - FOLD FLAT CABLE ATTACHING POINTS

THIRD ROW FOLD FLAT HANDLE AND CABLE (Continued)

(12) Remove fold flat cable from seat back (Fig. 73).

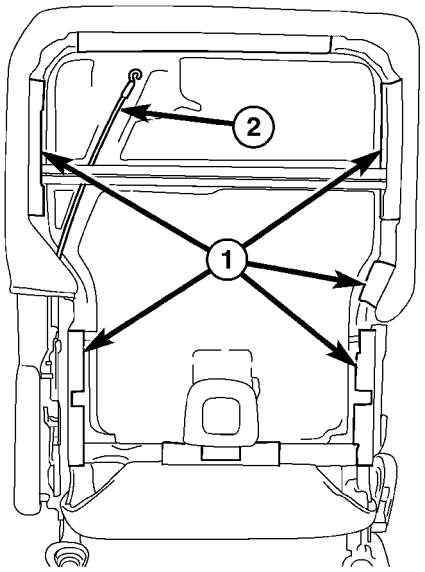


Fig. 73 FOLD FLAT CABLE IN SEAT BACK

1 - J-STRAPS
2 - FOLD FLAT CABLE

INSTALLATION

(1) Install fold flat cable (Fig. 74).

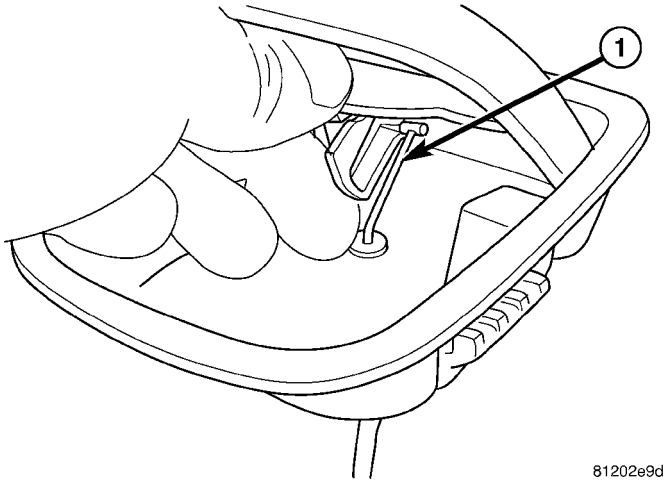


Fig. 74 FOLD FLAT CABLE

1 - RELEASE CABLE

(2) Connect fold flat cable to outboard fold flat mechanism (Fig. 90).

(3) Install outboard seat back shield (Fig. 89).

(4) Place drive link assembly into position.

(5) Install two bolts (on outboard side of seat) attaching drive link assembly (Fig. 58). Tighten to 10 N·m (7 ft. lbs.) torque.

(6) Connect fold flat cable to handle (Fig. 53).

(7) Place handle into position on load floor panel (Fig. 75).

(8) Depress tab and press handle into seated position.

(9) Install third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - INSTALLATION).

(10) Install rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).

(11) Close liftgate.

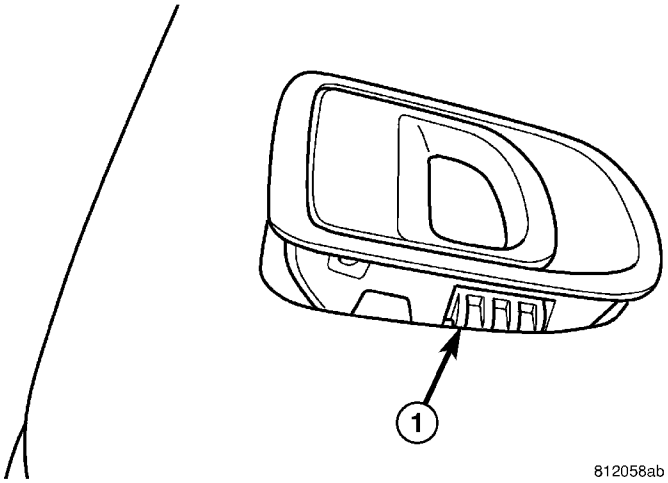


Fig. 75 INSTALL FOLD FLAT HANDLE

1 - DEPRESS TAB

THIRD ROW LOAD FLOOR PANEL

REMOVAL

(1) Open liftgate.

(2) Using finger, disengage fold flat cable from handle (Fig. 76).

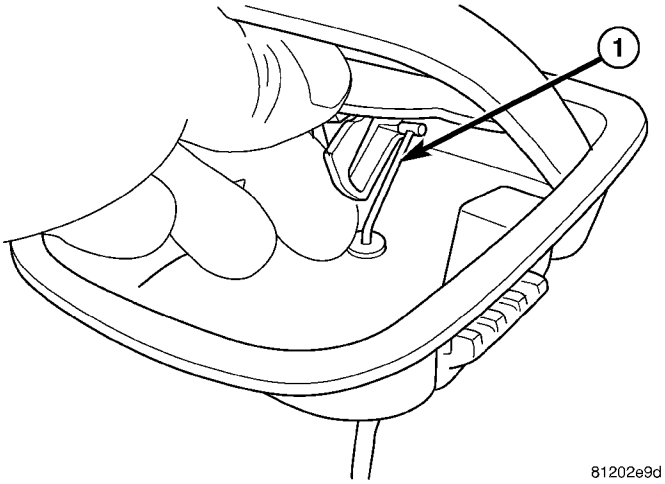


Fig. 76 FOLD FLAT CABLE

1 - RELEASE CABLE

THIRD ROW LOAD FLOOR PANEL (Continued)

(3) Release tab attaching fold flat handle to load floor panel (Fig. 77).

(4) Disconnect fold flat cable from handle and remove handle from load floor panel.

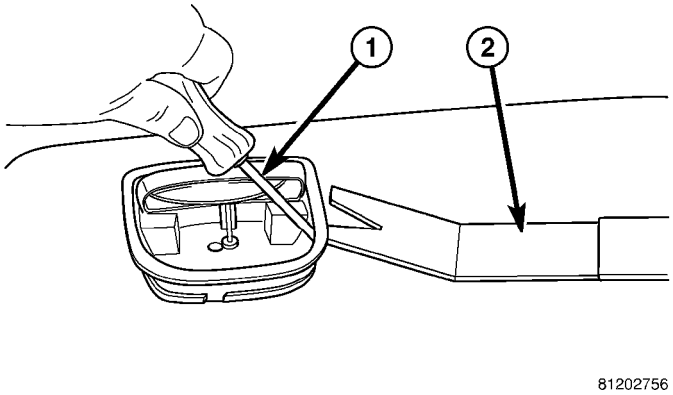


Fig. 77 REMOVE FOLD FLAT HANDLE

1 - PRY TAB INWARD
2 - TRIM TOOL

(5) Remove load floor panel by using a trim tool and lifting up the edges to disengage the push pins (Fig. 78).

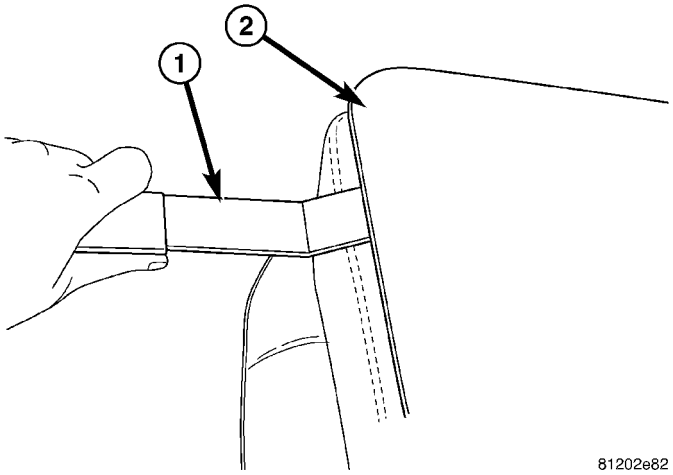


Fig. 78 REMOVE LOAD FLOOR PANEL

1 - TRIM TOOL
2 - LOAD FLOOR PANEL

(6) Remove load floor panel from seat back frame.

(7) Remove child seat tether bezel, if equipped (Fig. 79).

INSTALLATION

(1) Align load floor panel and push pins fasteners with holes in seat frame and press into position.

(2) Connect fold flat cable to handle.

(3) Place handle into position on load floor panel.

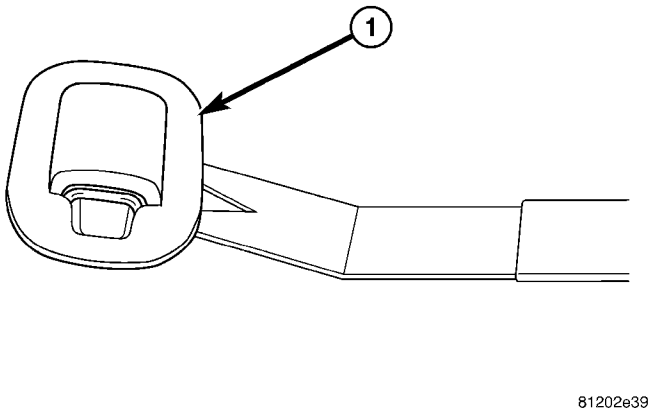


Fig. 79 REMOVE CHILD SEAT TETHER BEZEL

1 - CHILD SEAT TETHER BEZEL

(4) Press handle into full seated position.

(5) Place third row child seat tether bezel into position.

(6) Press bezel into the full seated position.

THIRD ROW CHILD SEAT TETHER BEZEL

REMOVAL

(1) Using trim tool, remove child seat tether bezel from third row seat load floor panel (Fig. 80)

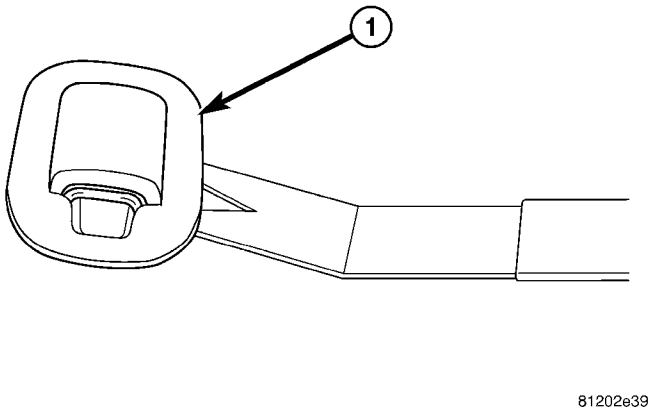


Fig. 80 REMOVE CHILD SEAT TETHER BEZEL

1 - CHILD SEAT TETHER BEZEL

INSTALLATION

(1) Place third row child seat tether bezel into position.

(2) Press bezel into the full seated position.

THIRD ROW CUSHION SLIDER

REMOVAL

(1) Open liftgate.

(2) Remove rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).

(3) Remove third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - REMOVAL).

(4) Remove two bolts (on outboard side of seat) attaching drive link assembly (Fig. 81).

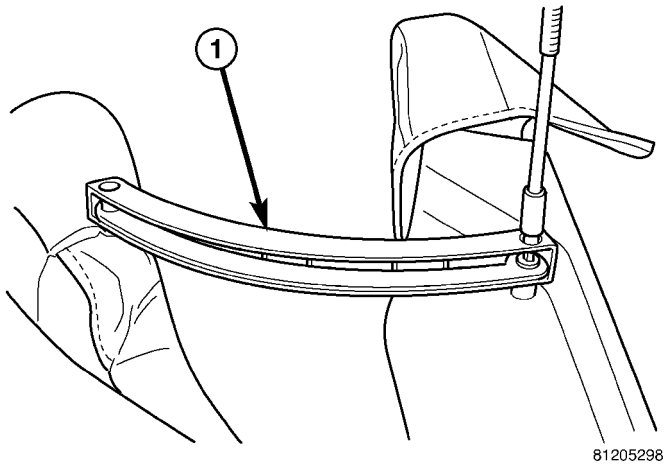


Fig. 81 DRIVE LINK AND SHIELD

1 - DRIVE LINK AND SHIELD

(5) Remove drive link assembly.

(6) Remove two bolts attaching front cushion pan to link and riser assemblies (Fig. 82).

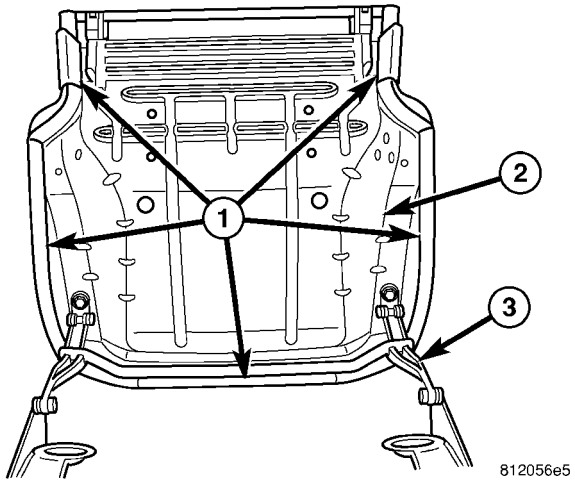


Fig. 82 THIRD ROW SEAT PAN

1 - J-STRAP
2 - SEAT PAN
3 - FRONT LINK ASSEMBLY

(7) Remove cushion assembly by sliding the front links off of the riser pins and twisting the cushion assembly to disengage the rear sliders from the riser tracks (Fig. 83).

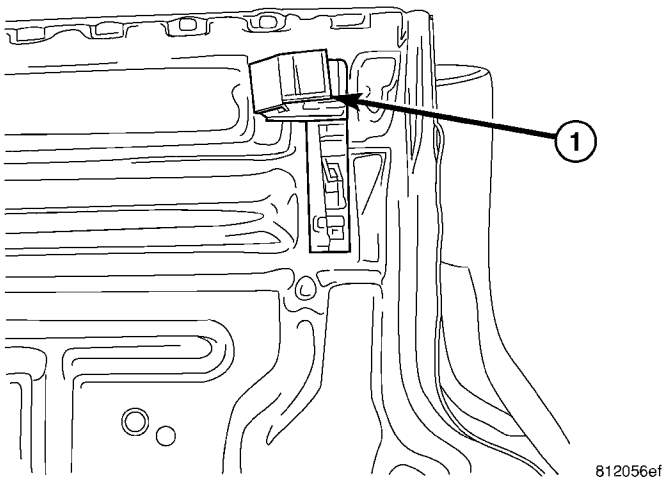


Fig. 83 THIRD ROW SEAT SLIDER

1 - SLIDER

(8) Disengage J-straps (Fig. 84).

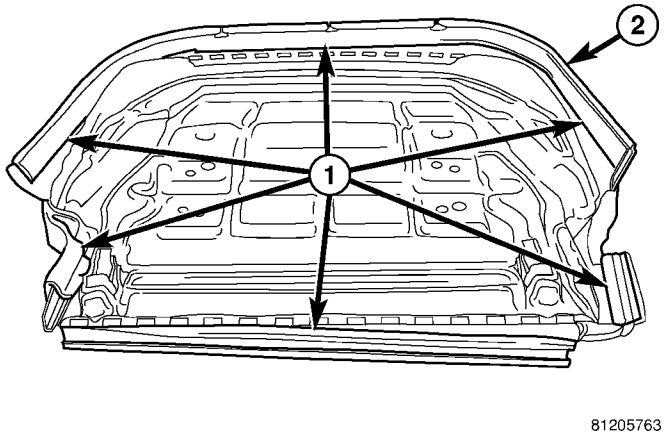


Fig. 84 THIRD ROW SEAT CUSHION COVER AND PAN

1 - J-STRAPS
2 - SEAT CUSHION COVER

THIRD ROW CUSHION SLIDER (Continued)

(9) Remove seat cushion cover and foam pad from the seat pan (Fig. 85) and (Fig. 86).

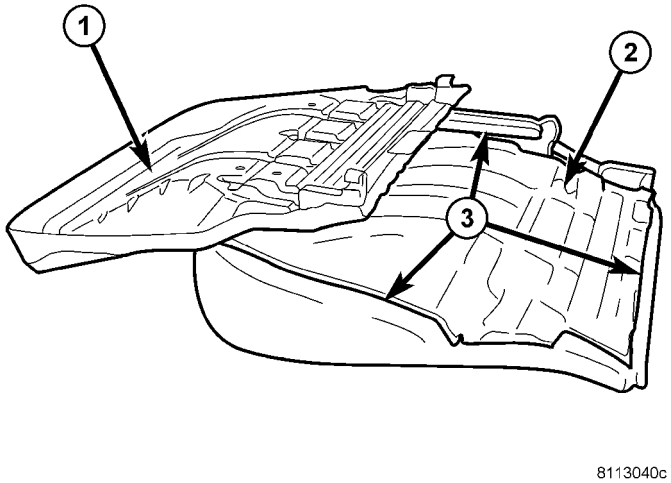


Fig. 85 THIRD ROW SEAT CUSHION

1 - SEAT CUSHION PAN
2 - SEAT CUSHION FOAM AND COVER
3 - J-STRAPS

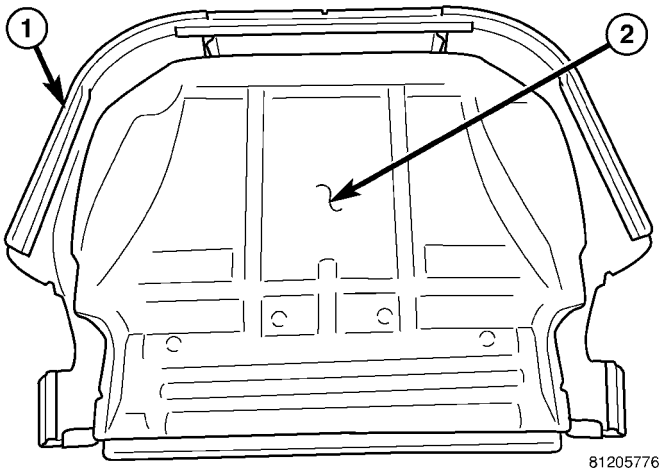


Fig. 86 THIRD ROW SEAT CUSHION FOAM PAD

1 - SEAT CUSHION COVER
2 - SEAT CUSHION FOAM PAD

(10) Remove one screw (at the rear of the cushion pan) attaching the cushion slider (Fig. 87).

(11) Remove cushion slider.

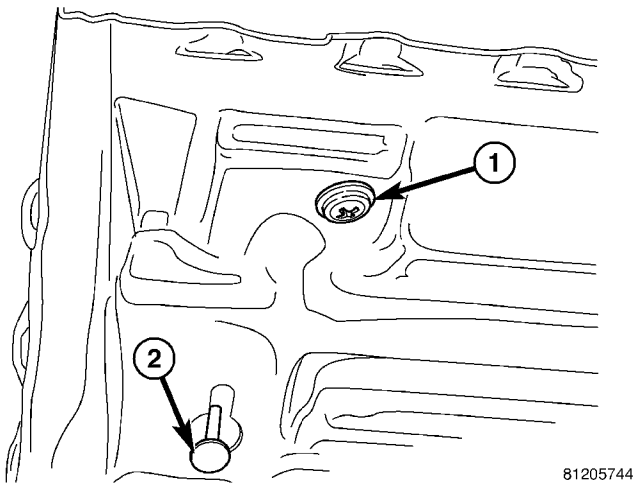


Fig. 87 THIRD ROW SEAT SLIDER ATTACHING SCREW

1 - ATTACHING SCREW
2 - SLIDER GUIDE PIN

INSTALLATION

(1) Place cushion slider into position (Fig. 87).

(2) Install cushion attaching screw to cushion pan.

(3) Install seat cushion cover and foam pad onto seat pan (Fig. 85) and (Fig. 86).

(4) Engage J-straps (Fig. 84).

(5) Install cushion assembly onto the seat risers.

(6) Install cushion assembly by sliding the front links onto the riser pins and twisting the cushion assembly to engage the rear sliders onto the riser tracks (Fig. 83).

(7) Install two bolts attaching front cushion pan to link and risers (Fig. 81). Tighten to 29 N·m (21 ft. lbs.) torque.

(8) Install drive link assembly.

(9) Install two bolts attaching drive link assembly (Fig. 81). Tighten to 10 N·m (7 ft. lbs.) torque.

(10) Install third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - INSTALLATION).

(11) Install rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).

(12) Close liftgate.

THIRD ROW OUTBOARD LATCH ASSEMBLY

REMOVAL

(1) Open liftgate.

(2) Remove rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).

(3) Remove third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - REMOVAL).

(4) Remove two bolts (on outboard side of seat) attaching drive link assembly (Fig. 88).

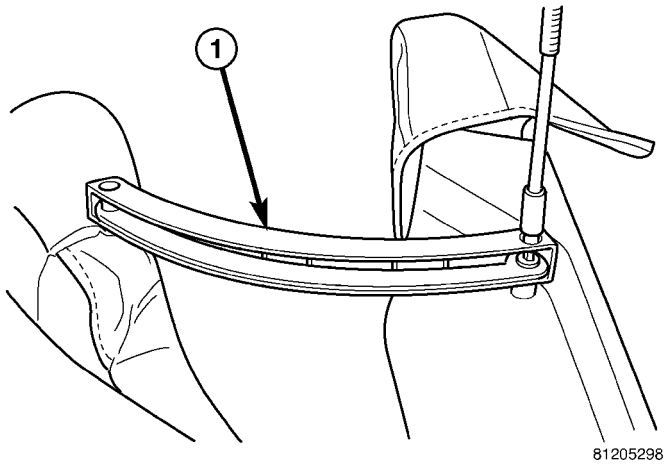


Fig. 88 DRIVE LINK AND SHIELD

1 - DRIVE LINK AND SHIELD

(5) Remove drive link assembly.

(6) Remove outboard seat back shield (Fig. 89).

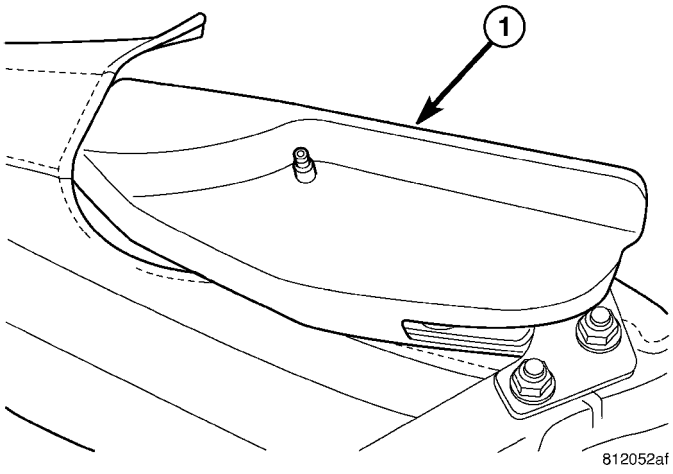


Fig. 89 OUTBOARD SEAT BACK SHIELD

1 - SHIELD

(7) Disconnect fold flat cable from outboard fold flat mechanism (Fig. 90).

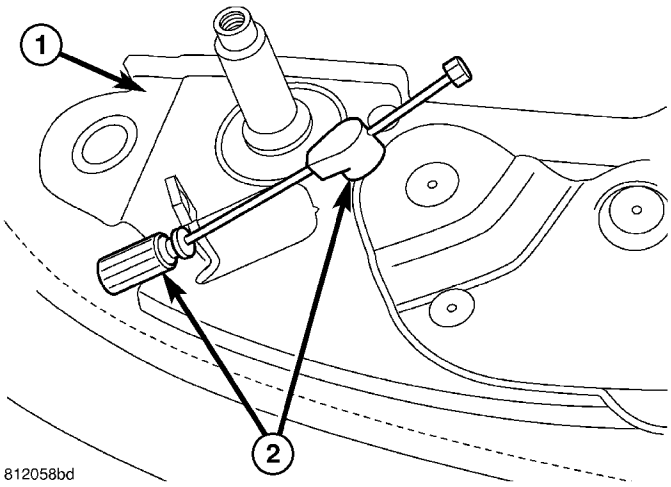


Fig. 90 FOLD FLAT CABLE ATTACHING POINTS

1 - FOLD FLAT MECHANISM
2 - FOLD FLAT CABLE ATTACHING POINTS

(8) Remove two bolts attaching outboard fold flat mechanism to outer seat back. Remove two nuts attaching outboard fold flat mechanism to outboard riser (Fig. 91).

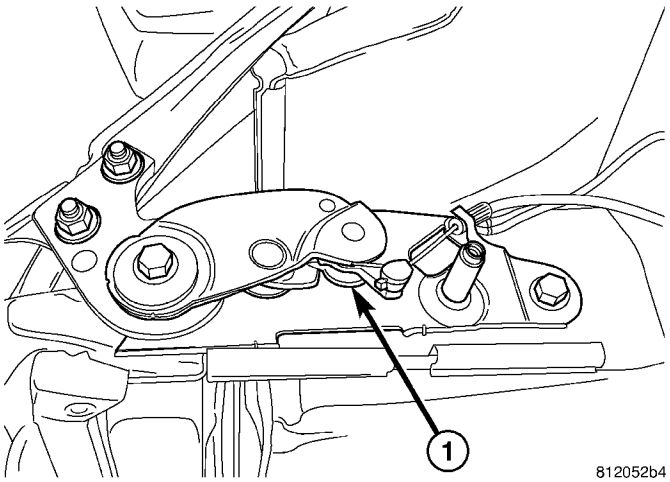


Fig. 91 FOLD FLAT MECHANISM

1 - FOLD FLAT MECHANISM

(9) Remove outboard fold flat mechanism.

INSTALLATION

(1) Place outboard fold flat mechanism into position.

(2) Install two bolts attaching outboard fold flat mechanism to outer seat back. Install two nuts attaching outboard fold flat mechanism to outboard riser (Fig. 91).

(3) Connect fold flat cable to outboard fold flat mechanism (Fig. 90).

(4) Install outboard seat back shield (Fig. 89).

(5) Place drive link assembly into position.

(6) Install two bolts (on outboard side of seat) attaching drive link assembly (Fig. 88). Tighten to 10 N·m (7 ft. lbs.) torque.

(7) Install third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - INSTALLATION).

(8) Install rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).

(9) Close liftgate.

THIRD ROW INBOARD PIVOT

REMOVAL

(1) Open liftgate.

(2) Remove rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).

(3) Remove third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - REMOVAL).

(4) Using finger, disengage fold flat cable from handle (Fig. 92).

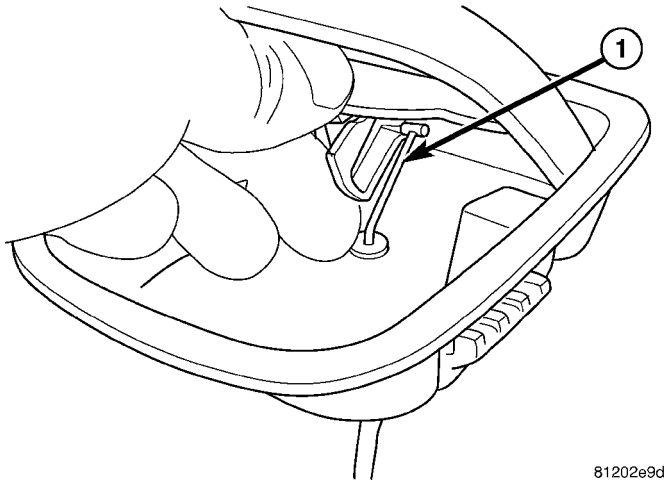


Fig. 92 FOLD FLAT CABLE

1 - RELEASE CABLE

(5) Release tab attaching fold flat handle to load floor panel (Fig. 93).

(6) Disconnect fold flat cable from handle and remove handle.

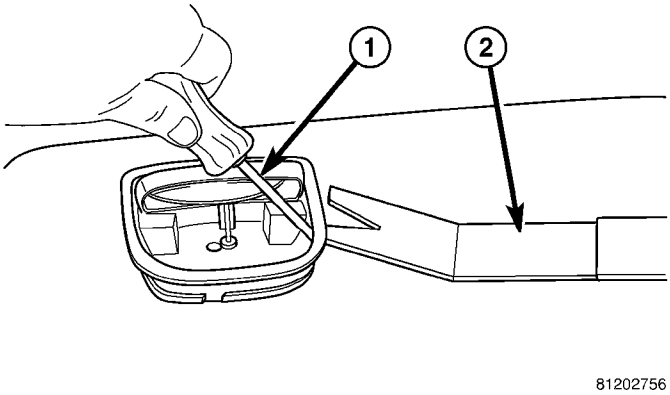


Fig. 93 REMOVE FOLD FLAT HANDLE

1 - PRY TAB INWARD
2 - TRIM TOOL

(7) Remove load floor panel by using a trim tool and lifting up the edges to disengage the push pins (Fig. 94).

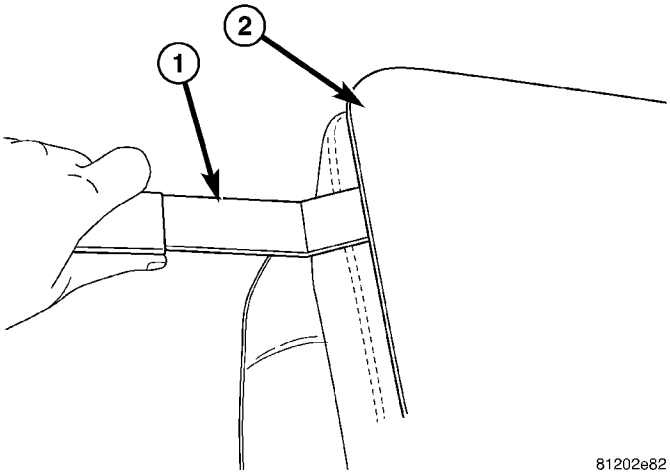


Fig. 94 REMOVE LOAD FLOOR PANEL

1 - TRIM TOOL
2 - LOAD FLOOR PANEL

THIRD ROW INBOARD PIVOT (Continued)

(8) Remove inboard pivot drive shield screw (Fig. 95).

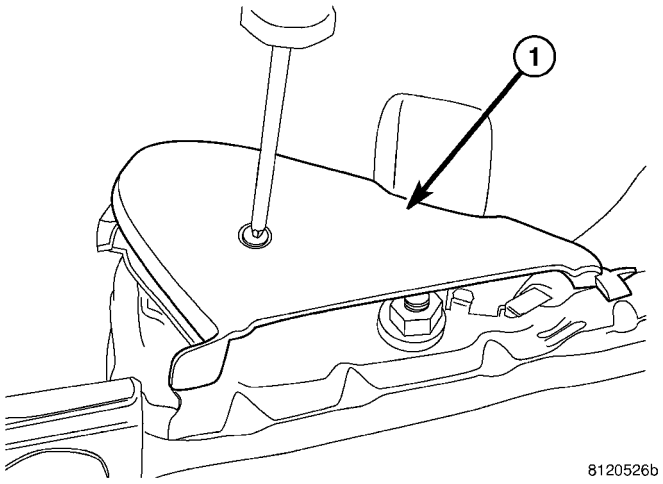


Fig. 95 INBOARD PIVOT DRIVE SHIELD

1 - SHIELD

(9) Disengage J-straps to uncover inboard pivot (Fig. 96).

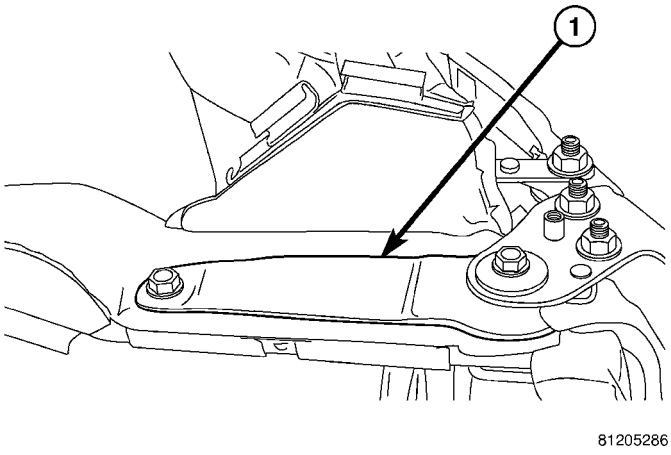


Fig. 96 FREE PIVOT ASSEMBLY

1 - INBOARD FREE PIVOT

(10) Remove two bolts attaching inboard free pivot to inner seat back. Remove two nuts attaching inboard free pivot to inboard riser

(11) Remove inboard free pivot assembly.

INSTALLATION

(1) Place inboard free pivot assembly into position (Fig. 92).

(2) Install two bolts attaching inboard free pivot to inner seat back. Install two nuts attaching inboard free pivot to inboard riser.

(3) Engage seat cover J-straps.

(4) Install inboard pivot drive shield (Fig. 93).

(5) Align load floor panel and push pins fasteners with holes in seat frame and press into position (Fig. 92).

(6) Connect fold flat cable to handle and press handle into position on load floor panel.

(7) Install third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - INSTALLATION).

(8) Install rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).

THIRD ROW OUTBOARD LINK/SHIELD

REMOVAL

(1) Open liftgate.

(2) Remove rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).

(3) Remove third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - REMOVAL).

(4) Remove two bolts (on outboard side of seat) attaching drive link assembly (Fig. 97).

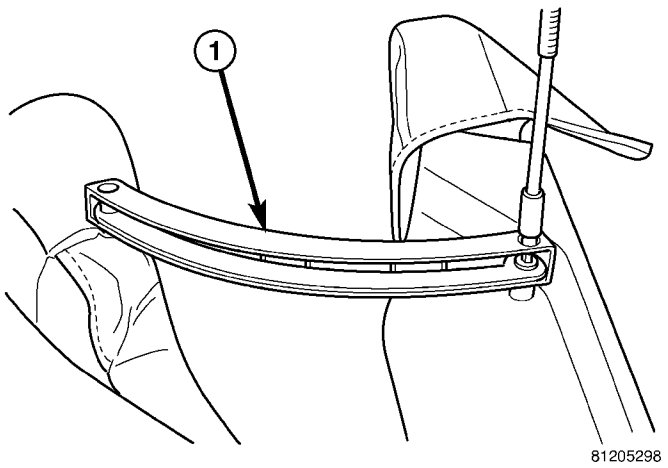


Fig. 97 DRIVE LINK AND SHIELD

1 - DRIVE LINK AND SHIELD

(5) Remove drive link and shield assembly.

INSTALLATION

(1) Place drive link/shield assembly into position.

(2) Install two bolts (on outboard side of seat) attaching drive link assembly (Fig. 58). Tighten to 10 N·m (7 ft. lbs.) torque.

(3) Install third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - INSTALLATION).

(4) Install rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).

(5) Close liftgate.

THIRD ROW OUTBOARD SEAT BACK SHIELD

REMOVAL

(1) Open liftgate.
(2) Remove rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).
(3) Remove third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - REMOVAL).
(4) Remove two bolts (on outboard side of seat) attaching drive link assembly (Fig. 98).

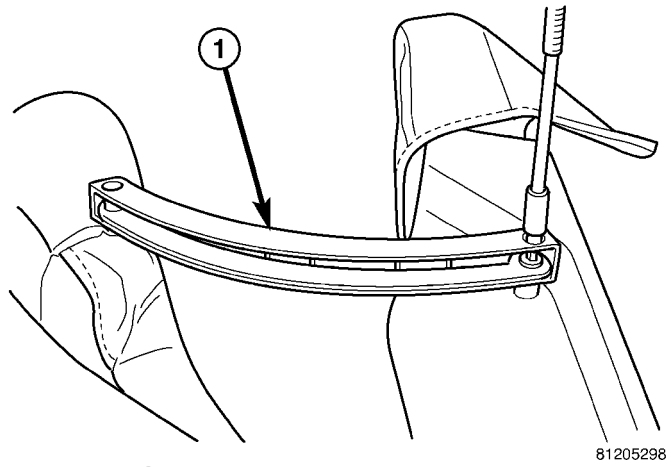


Fig. 98 DRIVE LINK AND SHIELD

1 - DRIVE LINK AND SHIELD

(5) Remove drive link and shield assembly.
(6) Remove outboard seat back shield (Fig. 99).

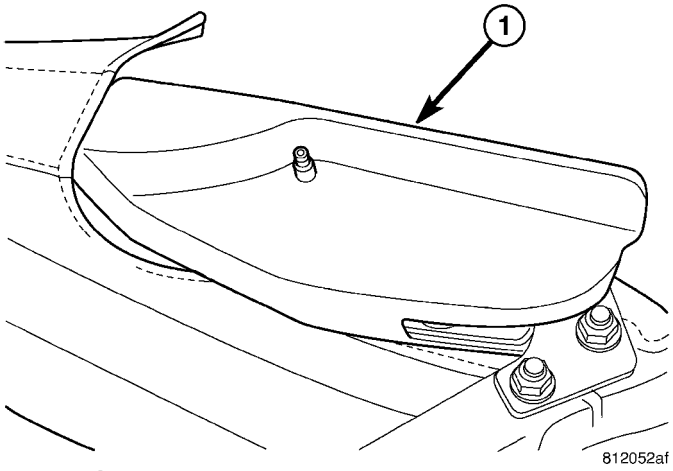


Fig. 99 OUTBOARD SEAT BACK SHIELD

1 - SHIELD

INSTALLATION

(1) Install outboard seat back shield (Fig. 99).
(2) Place drive link and shield assembly into position.
(3) Install two bolts (on outboard side of seat) attaching drive link assembly (Fig. 98). Tighten to 10 N·m (7 ft. lbs.) torque.
(4) Install third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - INSTALLATION).
(5) Install rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).
(6) Close liftgate.

THIRD ROW INBOARD PIVOT SHIELD

REMOVAL

(1) Open liftgate.
(2) Remove rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE BIN - REMOVAL).
(3) Remove third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - REMOVAL).
(4) Remove inboard pivot drive shield screw (Fig. 100).

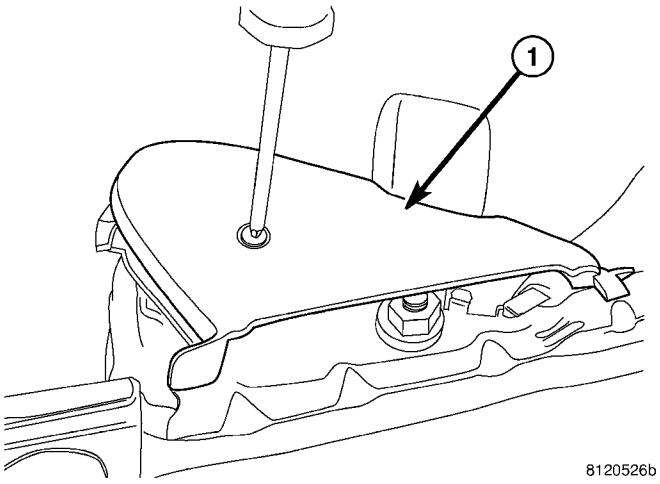


Fig. 100 INBOARD PIVOT DRIVE SHIELD

1 - SHIELD

(5) Remove inboard pivot drive shield.

INSTALLATION

(1) Place inboard pivot shield into position.
(2) Install inboard pivot drive shield screw (Fig. 100).
(3) Align load floor panel and push pins fasteners with holes in seat frame and press into position
(4) Connect fold flat cable to handle and press handle into position on load floor panel.
(5) Install third row seat. (Refer to 23 - BODY/SEATS/THIRD ROW SEAT - INSTALLATION).
(6) Install rear floor stowage bin. (Refer to 23 - BODY/INTERIOR/REAR FLOOR STOWAGE TRAY - INSTALLATION).
(7) Close liftgate

STATIONARY GLASS

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STATIONARY GLASS

WARNING

WINDSHIELD SAFETY PRECAUTIONS

WARNING: DO NOT OPERATE THE VEHICLE WITHIN 24 HOURS OF WINDSHIELD INSTALLATION. IT TAKES AT LEAST 24 HOURS FOR URETHANE ADHESIVE TO CURE. IF IT IS NOT CURED, THE WINDSHIELD MAY NOT PERFORM PROPERLY IN AN ACCIDENT.
URETHANE ADHESIVES ARE APPLIED AS A SYSTEM. USE GLASS CLEANER, GLASS PREP SOLVENT, GLASS PRIMER, PVC (VINYL) PRIMER AND PINCH WELD (FENCE) PRIMER PROVIDED BY THE ADHESIVE MANUFACTURER. IF NOT, STRUCTURAL INTEGRITY COULD BE COMPROMISED.
DAIMLERCHRYSLER DOES NOT RECOMMEND GLASS ADHESIVE BY BRAND. TECHNICIANS SHOULD REVIEW PRODUCT LABELS AND TECHNICAL DATA SHEETS, AND USE ONLY ADHESIVES THAT THEIR MANUFACTURES WARRANT WILL RESTORE A VEHICLE TO THE REQUIREMENTS OF FMVSS 212. TECHNICIANS SHOULD ALSO INSURE THAT PRIMERS AND CLEANERS ARE COMPATIBLE WITH THE PARTICULAR ADHESIVE USED.
BE SURE TO REFER TO THE URETHANE MANUFACTURER'S DIRECTIONS FOR CURING TIME SPECIFICATIONS, AND DO NOT USE ADHESIVE AFTER ITS EXPIRATION DATE.
VAPORS THAT ARE EMITTED FROM THE URETHANE ADHESIVE OR PRIMER COULD CAUSE PERSONAL INJURY. USE THEM IN A WELL-VENTILATED AREA.
SKIN CONTACT WITH URETHANE ADHESIVE SHOULD BE AVOIDED. PERSONAL INJURY MAY RESULT.
ALWAYS WEAR EYE AND HAND PROTECTION WHEN WORKING WITH GLASS.

CAUTION: Protect all painted and trimmed surfaces from coming in contact with urethane or primers. Be careful not to damage painted surfaces when removing moldings or cutting urethane around windshield.

QUARTER WINDOW

REMOVAL

(1) Open liftgate
(2) Remove upper quarter panel trim (Refer to 23 - BODY/INTERIOR/C-PILLAR TRIM - REMOVAL).
(3) Remove nuts and washers from quarter window glass assembly (Fig. 1).

WARNING: WEAR EYE AND HAND PROTECTION WHEN HANDLING SAFETY GLASS. PERSONAL INJURY CAN RESULT.

CAUTION: Do not damage body or trim finish when cutting out glass or applying fence primer.

(4) Unplug antenna wire (right side only), if equipped.
(5) Remove the quarter window glass from the vehicle by pushing on glass from inside of vehicle.

INSTALLATION

The temperature of the vehicle should be at least 21° C (70° F) before removing quarter glass. Butyl sealer becomes more pliable at high temperatures.
The stationary glass fence should be cleaned of all old butyl sealer.
(1) Apply a 6 mm (0.25 in.) butyl tape around perimeter of glass assembly encapsulation track.

QUARTER WINDOW (Continued)

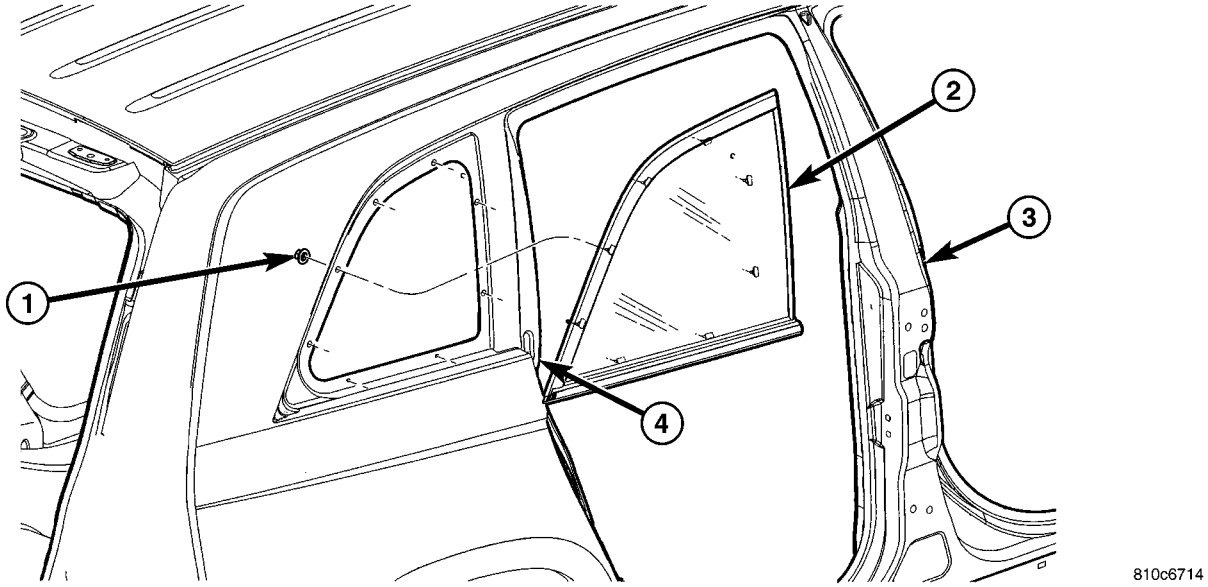


Fig. 1 QUARTER WINDOW GLASS

1 - NUT(S) AND WASHER(S)
2 - QUARTER WINDOW GLASS
3 - BODY ASSEMBLY
4 - C-PILLAR

Ensure that the butyl tape is wrapped around the mounting studs.

(2) Place quarter window glass into position and insert mounting studs through holes in fence (Fig. 1).

(3) Start the nuts and washers. Tighten nuts in sequence. Starting with the lower C-pillar nut and working around glass and tightening to 3 N·m (30 in. lbs.) torque.

(4) Water test quarter window glass to verify repair.

(5) Connect antenna wire (right side only).

(6) Install the C-pillar trim panel. (Refer to 23 - BODY/INTERIOR/C-PILLAR TRIM - INSTALLATION).

LIFTGATE GLASS

REMOVAL

Refer to the Safety Precautions in this section for description of tools and adhesive systems that are recommended for use in this procedure. (Refer to 23 - BODY/STATIONARY GLASS - WARNING).

LIFTGATE GLASS REMOVAL – EXTERIOR METHOD

(1) Remove rear wiper arm.

(2) Remove interior trim covers.

(3) Disconnect wires for electrically heated window, if equipped (Fig. 2).

(4) Using a sharp cold knife, cut urethane adhesive attaching the liftgate glass to the liftgate. A power cutting device can be used if available (Fig. 3).

(5) Remove liftgate glass from vehicle.

LIFTGATE GLASS REMOVAL – INTERIOR METHOD

(1) Remove rear wiper arm.

(2) Remove interior trim covers.

(3) Disconnect wires for electrically heated window, if equipped (Fig. 2).

(4) Using a reciprocating or oscillating power knife, cut urethane adhesive holding the liftgate glass to the liftgate. Refer to instructions provided with the equipment being used (Fig. 3).

(5) Remove liftgate glass from vehicle.

INSTALLATION

Refer to the Safety Precautions in this section for description of tools and adhesive systems that are recommended for use in this procedure. (Refer to 23 - BODY/STATIONARY GLASS - WARNING).

CAUTION: Open the left front door glass before installing liftgate glass to avoid pressurizing the passenger compartment. If a door is slammed before urethane bonding is cured, water leaks can result.
Allow the urethane at least 24 hours to cure before returning the vehicle to use.
To avoid stressing the replacement liftgate glass, the urethane bonding material on the liftgate glass fence should be smooth and consistent to the shape of the replacement glass.

(1) Place replacement glass into liftgate glass opening.

LIFTGATE GLASS (Continued)

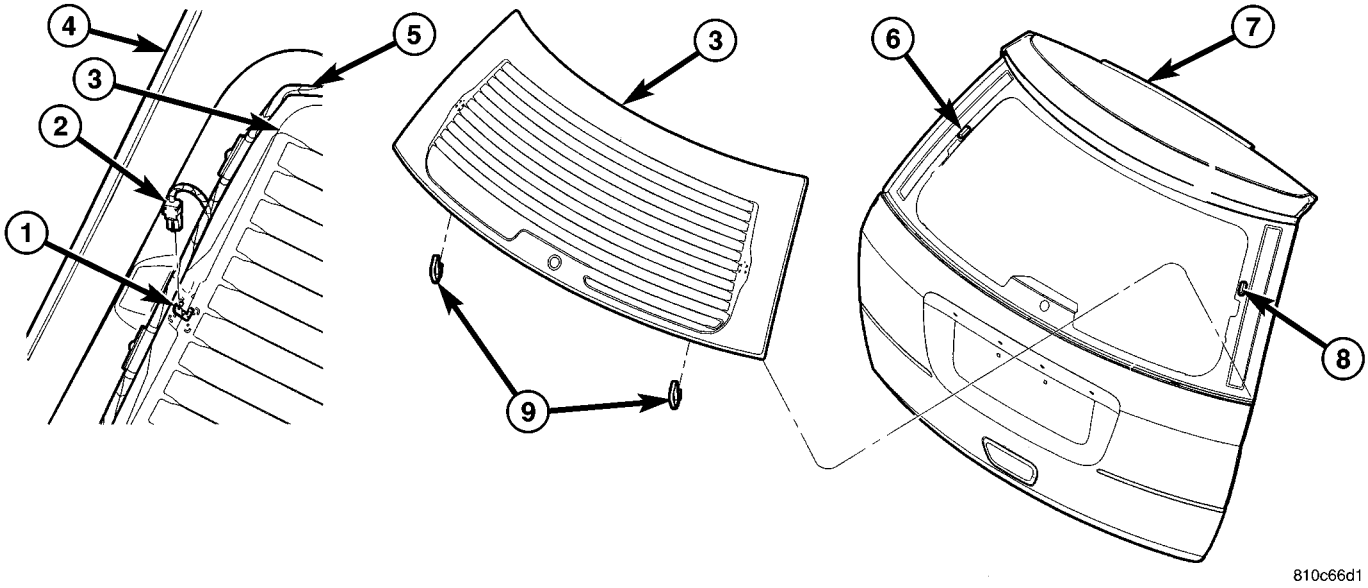


Fig. 2 LIFTGATE GLASS

1 - REAR DEFOGGER CONNECTOR
2 - BODY WIRE CONNECTOR
3 - LIFTGATE GLASS ASSEMBLY
4 - LIFTGATE INNER
5 - BODY WIRE HARNESS
6 - GLASS SPACER
7 - LIFTGATE OUTER VIEW
8 - GLASS SPACER
9 - GLASS SPACERS

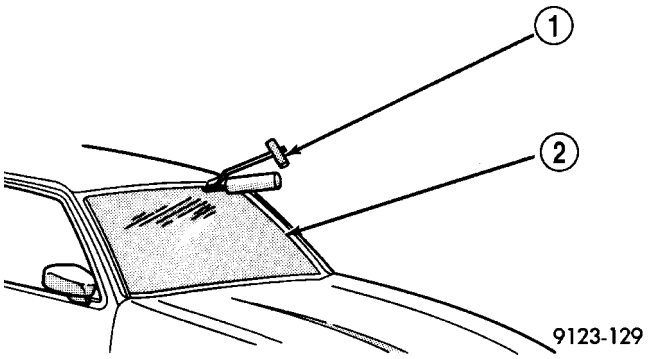


Fig. 3 CUT URETHANE AROUND WINDSHIELD

1 - COLD KNIFE
2 - WINDSHIELD

(2) Verify the glass lays evenly against the pinch weld fence at the sides, top and bottom of the replacement liftgate glass. If not, the fence must be formed to the shape of the new glass.

(3) Using a grease pencil, mark the glass and liftgate in several locations to aid installation.

(4) Remove replacement glass from liftgate opening.

(5) Position the liftgate glass inside up on a suitable work surface with two padded, wood 10 cm by 10 cm by 50 cm (4 in. by 4 in. by 20 in.) blocks, placed parallel 75 cm (2.5 ft.) apart (Fig. 4).

WARNING: DO NOT USE SOLVENT BASED GLASS CLEANER TO CLEAN LIFTGATE GLASS BEFORE APPLYING GLASS PREP AND PRIMER. POOR ADHESION CAN RESULT.

(6) Clean inside of liftgate glass with ammonia based glass cleaner and lint-free cloth.

(7) Apply Glass Prep adhesion promoter 25 mm (1 in.) wide around perimeter of liftgate glass and wipe with clean/dry lint-free cloth until no streaks are visible (Fig. 5).

(8) Apply Glass Primer 26 mm (1 in.) wide around perimeter of liftgate glass. Allow at least three minutes drying time.

(9) Apply Pinch weld Primer 19 mm (0.75 in.) wide around the liftgate glass fence. Allow at least three minutes drying time.

(10) If a low viscosity urethane adhesive is used, install compression spacers on the fence around the liftgate glass opening.

(11) Apply a 15 mm (0.6 in.) bead of urethane along center line of liftgate glass fence.

CAUTION: Be careful so that spacers do not contaminate urethane bead.

(12) Apply 2 glass spacer clips to bottom edge of glass, approximately 15 mm (0.6 in) inboard from each corner.

(13) With the aid of a helper, position the liftgate glass over the liftgate glass opening and align the reference marks.

(14) Slowly lower glass to liftgate glass opening fence. Ensure spacers on bottom edge of glass contact

LIFTGATE GLASS (Continued)

sheet metal ledge. Then, push glass inward until flush to liftgate surface.

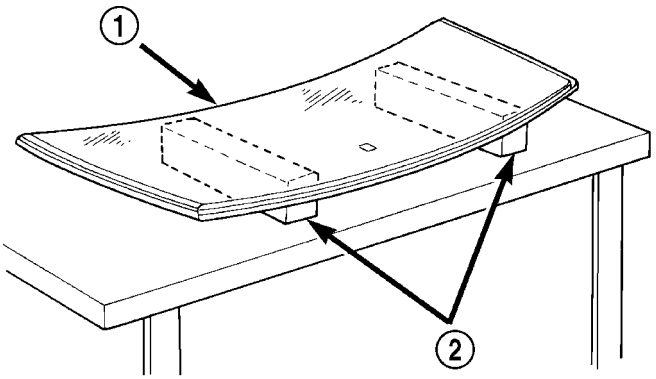
(15) Clean excess urethane from exterior with Mopar® Super Kleen, or equivalent.

(16) Apply 150 mm (6 in.) lengths of 50 mm (2 in.) masking tape spaced 250 mm (10 in.) apart to hold molding in place until urethane cures.

(17) Install liftgate glass wiper arm.

(18) Install interior trim.

(19) After urethane has cured, remove tape strips, slide out bottom spacer clips, and then water test liftgate glass to verify repair.



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Fig. 4 WORK SURFACE SET UP AND MOLDING INSTALLATION

1 - WINDSHIELD AND MOLDINGS
2 - BLOCKS

WINDSHIELD

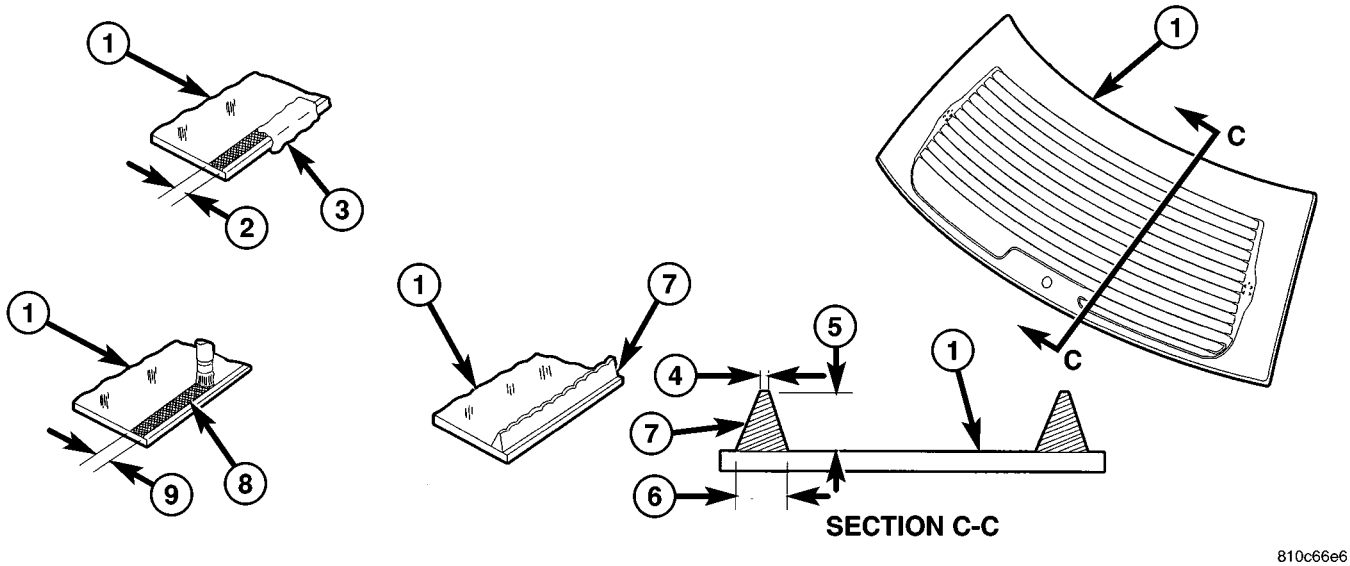
DESCRIPTION

The windshield is attached to the window frame with urethane adhesive. The urethane adhesive is applied cold and seals the surface area between the window opening and the glass. The primer adheres the urethane adhesive to the windshield.

It is difficult to salvage a windshield during the removal operation. The windshield is part of the structural support for the roof. The urethane bonding used to secure the windshield to the fence is difficult to cut or clean from any surface. If the moldings are set in urethane, it would also be unlikely they could be salvaged. Before removing the windshield, check the availability of the windshield and moldings from the parts supplier.

REMOVAL

Refer to the Safety Precautions in this section for description of tools and adhesive systems that are recommended for use in this procedure. (Refer to 23 - BODY/STATIONARY GLASS - WARNING).



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Fig. 5 LIFTGATE GLASS PREPARATION FOR INSTALLATION

1 - LIFTGATE GLASSSGLASS
2 - 15.0 mm (6.0 in.)
3 - NAPTHA
4 - 3.0 mm (0.1 in.)
5 - 12.7 mm (0.5 in.)
6 - 9.5 mm (0.4 in.)
7 - URETHANE SEALER
8 - BLACKOUT GLASS PRIMER PAINT
9 - 15.0 mm (0.6 in.)

WINDSHIELD (Continued)

WINDSHIELD REMOVAL – EXTERIOR METHOD

The urethane adhesive holding the windshield to the opening pinch weld (fence) can be cut using a sharp cold knife from the exterior of the vehicle. Using the cold knife method is effective if the windshield is already broken. If the glass must be salvaged, cutting the urethane adhesive from the interior of the vehicle using a reciprocating or oscillating power knife is recommended.

(1) Remove inside rear view mirror.
(2) Remove windshield wiper arms.
(3) Remove cowl cover.
(4) Remove A-pillar exterior molding.
(5) Remove A-pillar trim panels and side moldings. (Refer to 23 - BODY/EXTERIOR/MOLDING - REMOVAL).
(6) Place protective covers over instrument panel and hood.
(7) Using a sharp cold knife, cut urethane adhesive holding the windshield to the A-pillars, roof header and cowl pinch weld fences (Fig. 6). A power cutting device can be used if available.
(8) Remove windshield from vehicle.

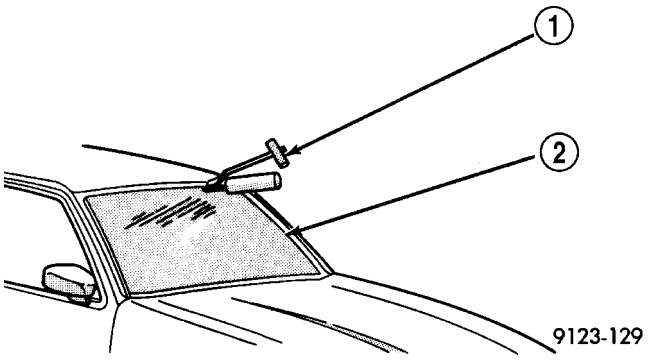


Fig. 6 CUT URETHANE AROUND WINDSHIELD

1 - COLD KNIFE
2 - WINDSHIELD

WINDSHIELD REMOVAL – INTERIOR METHOD

(1) Remove inside rear view mirror.
(2) Remove instrument panel top cover. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).
(3) Remove A-pillar trim covers.
(4) Remove A-pillar exterior molding.
(5) Place protective covers over instrument panel and hood.
(6) Using a reciprocating or oscillating power knife, cut urethane adhesive holding the windshield to the A-pillars, roof header and cowl pinch weld fences. Refer to instructions provided with the equipment being used.
(7) Remove windshield from vehicle.

INSTALLATION

Refer to the Safety Precautions in this section for description of tools and adhesive systems that are recommended for use in this procedure. (Refer to 23 - BODY/STATIONARY GLASS - WARNING).

The urethane adhesive holding the windshield to the opening pinch weld (fence) can be cut using a sharp cold knife from the exterior of the vehicle. Using the cold knife method is effective if the windshield is already broken. If the glass must be salvaged, cutting the urethane adhesive from the interior of the vehicle using a reciprocating or oscillating power knife is recommended.

CAUTION: Open the left front door glass before installing windshield to avoid pressurizing the passenger compartment. If a door is slammed before urethane bonding is cured, water leaks can result. Allow the urethane at least 24 hours to cure before returning the vehicle to use.
To avoid stressing the replacement windshield, the urethane bonding material on the windshield fence should be smooth and consistent to the shape of the replacement windshield. The support spacers should be cleaned and properly installed on weld studs or repair screws at bottom of windshield opening.

(1) Place replacement windshield into windshield opening and position glass in the center of the opening against the compression spacers.
(2) Verify the glass lays evenly against the pinch weld fence at the sides, top and bottom of the replacement windshield. If not, the pinch weld fence must be formed to the shape of the new glass.
(3) Remove replacement windshield from windshield opening.

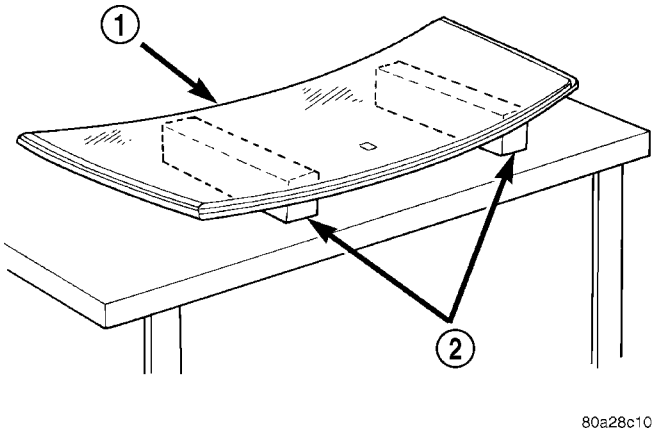


Fig. 7 WORK SURFACE SET UP AND MOLDING INSTALLATION

1 - WINDSHIELD AND MOLDINGS
2 - BLOCKS

WINDSHIELD (Continued)

(4) Position the windshield inside up on a suitable work surface with two padded, wood 10 cm by 10 cm by 50 cm (4 in. by 4 in. by 20 in.) blocks, placed parallel 75 cm (2.5 ft.) apart (Fig. 7).

WARNING: DO NOT USE SOLVENT BASED GLASS CLEANER TO CLEAN WINDSHIELD BEFORE APPLYING GLASS PREP AND PRIMER. POOR ADHESION CAN RESULT.

(5) Clean inside of windshield with ammonia based glass cleaner and lint-free cloth.

(6) Install molding to perimeter of windshield (Fig. 8).

(7) Apply Glass Prep adhesion promoter 15 mm (0.6 in.) wide around perimeter of windshield and wipe with clean/dry lint-free cloth until no streaks are visible.

(8) Apply Glass Primer 15 mm (0.6 in.) wide around perimeter of windshield. Allow at least three minutes drying time (Fig. 9).

(9) Using a razor knife, remove as much original urethane as possible. Do not damage paint on windshield fence.

(10) Apply pinch weld primer 19 mm (0.75 in.) wide around the windshield fence. Allow at least three minutes drying time.

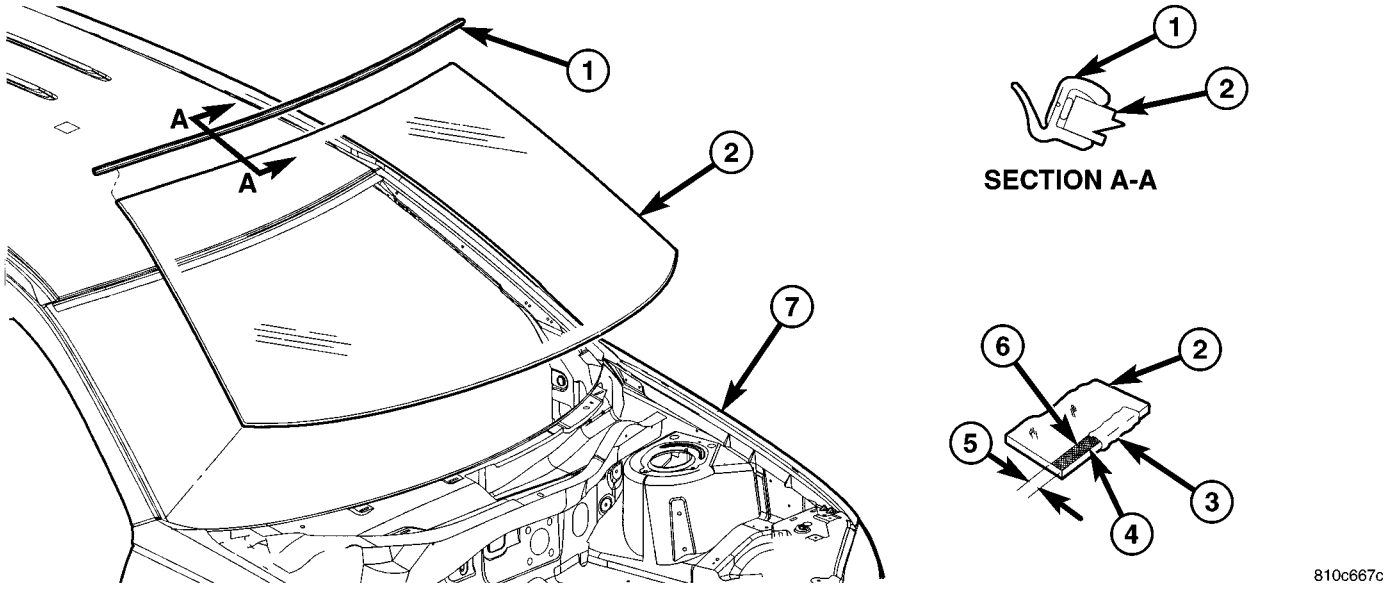


Fig. 8 WINDSHIELD GLASS

1 - WINDSHIELD GLASS MOLDING
2 - WINDSHIELD GLASS
3 - GLASS PRIMER CLEANER
4 - EDGE OF GLASS
5 - 15 mm (0.6 in.) WIDE
6 - NAPTHA VMP1316
7 - BODY ASSEMBLY

WINDSHIELD (Continued)

(11) If a low viscosity urethane adhesive is used, install compression spacers on the fence around the windshield opening (Fig. 10).

(12) Apply a 9.5 mm (0.4 in.) bead of urethane on center line of windshield fence.

(13) With the aid of a helper, position the windshield over the windshield opening.

(14) Slowly lower windshield glass to windshield opening fence. Guide the molding into proper position as necessary. Push windshield inward until molding is flush to roof line and A-pillars.

(15) Clean access urethane from exterior with Mopar® Super Kleen or equivalent.

(16) Apply 150 mm (6 in.) lengths of 50 mm (2 in.) masking tape spaced 250 mm (10 in.) apart to hold molding in place until urethane cures.

(17) Install A-pillar trim panels and side moldings. (Refer to 23 - BODY/EXTERIOR/MOLDING - INSTALLATION).

(18) Install cowl cover and wipers.

(19) Install inside rear view mirror.

(20) After urethane has cured, remove tape strips and water test windshield to verify repair.

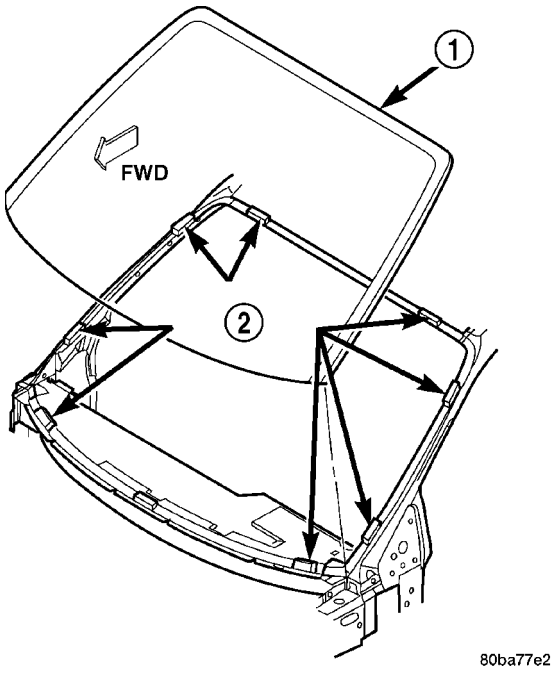


Fig. 10 LOWER WINDSHIELD INTO POSITION

1 - WINDSHIELD
2 - COMPRESSION SPACERS

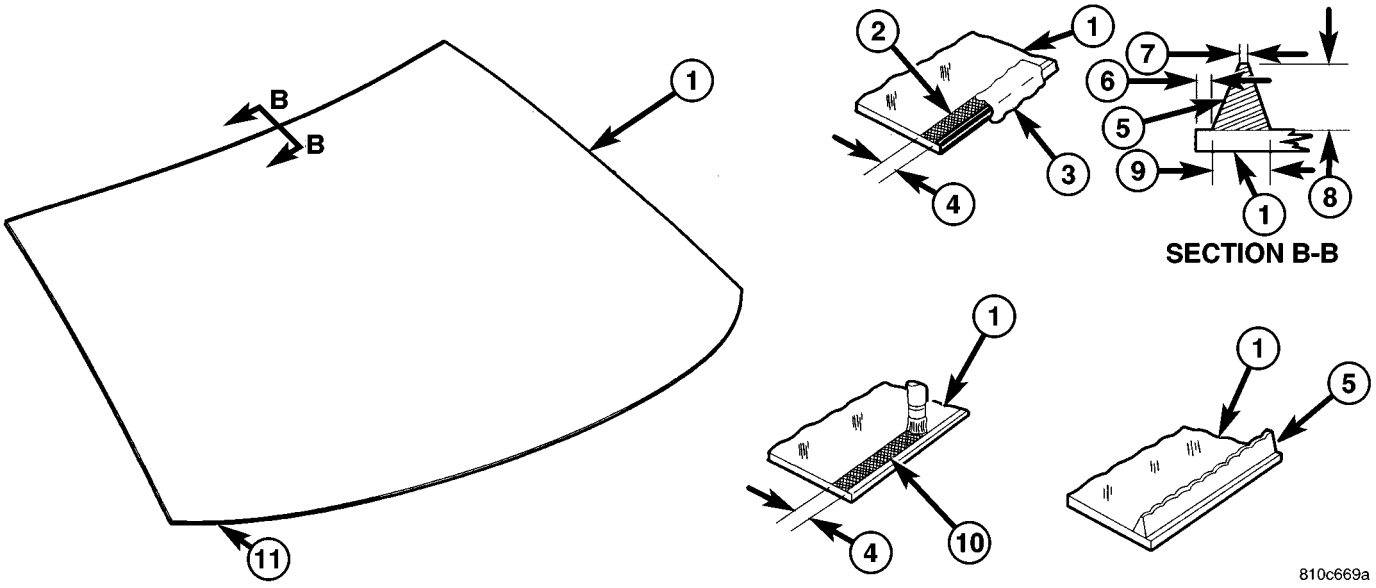


Fig. 9 WINDSHIELD PREPARATION FOR INSTALLATION

1 - WINDSHIELD GLASS
2 - GLASS PRIMER CLEANER MSCF 128
3 - NAPTHA VMP 1316
4 - 15 mm (0.6 in.) WIDE
5 - URETHANE SEALER MSCD 927
6 - 5.0 mm (0.2 in.) WIDE
7 - 3.0 mm (0.1 in) WIDE
8 - 12.7 mm (0.5 in.) WIDE
9 - 9.5 mm (0.4 in.) WIDE
10 - PAINT PRIMER BLACK GLASS MSCF 136
11 - BOTTOM EDGE OF GLASS

SUNROOF

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SUNROOF

DESCRIPTION

WARNING: Keep fingers and other body parts out of sunroof opening at all times.

The sun roof features consists of: (Fig. 1)
- Sun roof glass
- Sun roof sun shade

The sunroof power sliding glass panel and sunshade can be positioned anywhere along its travel, rearward of glass panel front edge.

The sunroof is electrically operated from a switch located in the overhead console. To operate the sunroof the ignition switch must be in the Accessory or On/Run position. Both switches are a rocker style design that open or close the sunroof. When pressing and releasing the open button once, the sunroof will express open to the comfort stop and the wind deflector will raise. If the button is pressed a second time, the sunroof will continue to open to full travel unless the button is released, at which time it will stop in that position. Pressing and holding the close button will close the sunroof. If the close button is released before the glass fully closes, the sunroof will stop in that position. The vent switch operates in a similar manor. The sunroof will also operate for up to fifteen minutes after the ignition key is turned off for customer comfort and convenance while parking.

SUNROOF (Continued)

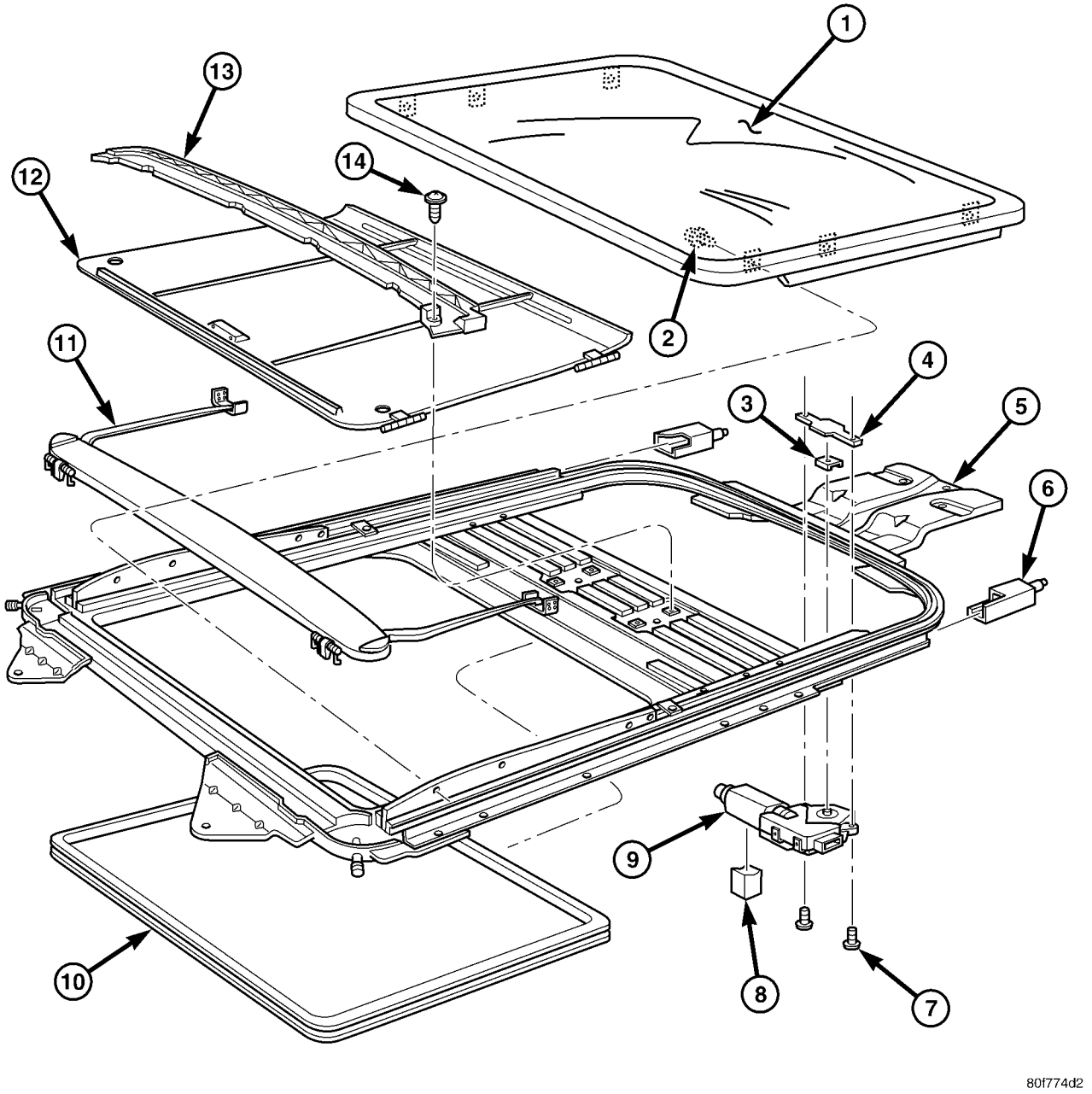


Fig. 1 SUN ROOF ASSEMBLY

1 - Glass Assembly
2 - Screw(s)
3 - Motor Clip
4 - Motor Cover
5 - U-Frame Assembly
6 - Rear Drain Covers
7 - Screw(s)
8 - Insulator
9 - Motor
10 - Lace
11 - Wind Deflector
12 - Sun Shade
13 - Water Channel
14 - Screw(s)

SUNROOF (Continued)

DIAGNOSIS AND TESTING - SUNROOF

Refer to Sunroof Diagnostic Chart for possible causes. Before beginning sunroof diagnostics verify that all other power accessories are in proper operating condition. If not, a common electrical problem may exist. Refer to Wiring Diagrams, in this publication for circuit, splice and component descriptions. Check the condition of the circuit protection (20 amp circuit breaker in the Junction Block). Inspect all wiring connector pins for proper engagement and continuity. Check for battery voltage at the power sunroof controller, refer to Wiring Diagrams, for circuit information. If battery voltage of more than 10 volts is detected at the controller, proceed with the following tests (the controller will not operate at less than 10 volts).

Before beginning diagnosis for wind noise or water leaks, verify that the problem was not caused by releasing the control switch before the sunroof was fully closed. The sunroof module has a water-management system. If however, the sunroof glass is in a partial closed position, high pressure water may be forced beyond the water management system boundaries and onto the headlining.

SUNROOF DIAGNOSIS CHART

SYMPTOM	POSSIBLE CAUSE
Sunroof motor inoperative.	Faulty control switch. Faulty circuit ground between sunroof module, control switch, and body harness. Faulty power circuit between sunroof module, control switch, and body harness. Faulty sunroof drive motor. Faulty sunroof module.
Audible whine when switch is depressed, sunroof does not operate.	Faulty sunroof drive motor. Binding cable.
Audible clicking or ratcheting when switch is pressed, sunroof does not operate.	Broken or worn drive cable. Worn drive motor gear. Mechanisms not synchronized.
Sunroof vents and opens, but does not close.	Broken or disengaged trough guide Binding cable. Faulty circuit. Faulty control switch. Faulty sunroof module. Faulty drive motor.
Sunroof vents, but does not open.	Binding cable or mechanism. Faulty circuit. Faulty switch. Faulty sunroof module.
Sunroof does not vent	Binding cable or mechanism. Faulty circuit. Faulty control switch. Faulty sunroof module.

SUNROOF (Continued)

SYMPTOM	POSSIBLE CAUSE
Sunroof water leak.	Drain tubes clogged or kinked or disconnected from the sunroof. Glass panel improperly adjusted. Faulty glass panel seal.
Gurgling sound from sunroof	Low spot in drain hose routing, allowing water to stand.
Wind noise from sunroof.	Glass panel compression to the roof opening not consistent. Wind deflector not deploying properly. Glass not installed or adjusted properly. Faulty glass panel seal.
Buzz, Squeak, Rattles from sunroof	Loose or broken attaching hardware. No lubrication in track. Worn or broken mechanism. Cables bunched or kinked
Sunshade will not function or does not operate smoothly	Sunshade feet are missing, broken or loose. No lubrication in track. Track obstructions or interference.
Glass movement not consistent or glass does not operate smoothly	Glass and Track timing. Glass and Track alignment Cables and Guide alignment

WATER DRAINAGE AND WIND NOISE DIAGNOSIS

The sliding glass panel is designed to seal water entry with a snug fit between the roof and the seal. The fit can be checked by inserting a piece of paper between the roof and the seal. The piece of paper should have some resistance when pulled out when the glass panel is in the closed position. The sunroof housing will drain off a minimum amount of water. Excessive wind noise could result if the gap clearances are exceeded. The sunroof glass panel may need to be adjusted. (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS)

Adequate drainage is provided by a drain trough in the sunroof housing which encircles the sliding glass panel and leads to drain hoses. If a wet headliner or other water leak complaints are encountered, before performing any adjustments, first ensure that the drainage system is not plugged or disconnected. Use a pint container to pour water into the sunroof housing drain trough. If water flow is restricted, use compressed air to blow out any material plugging the drain system. Retest system again.

To further check for a disconnected drain hose:

(1) Remove A-pillar trim. (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL)

(2) Remove the sun visors. (Refer to 23 - BODY/INTERIOR/SUN VISOR - REMOVAL)

(3) Remove the map lamps/mini console.

(4) Remove sunroof opening trim lace.

NOTE: Care must be taken not to fold or kink the headliner upon removal.

(5) Lower headliner as necessary to gain access to sunroof housing drain tubes. (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL)

(6) Repair as necessary.

CONTROL SWITCH

REMOVAL

(1) Disconnect the negative battery cable.
(2) Separate the overhead console from the headliner, by carefully pulling down on the front portion, toward the windshield, to release the retaining clips (Fig. 2).
(3) Release the sunroof switch retaining tab, disconnect the electrical connector and remove the switch from the console (Fig. 2).

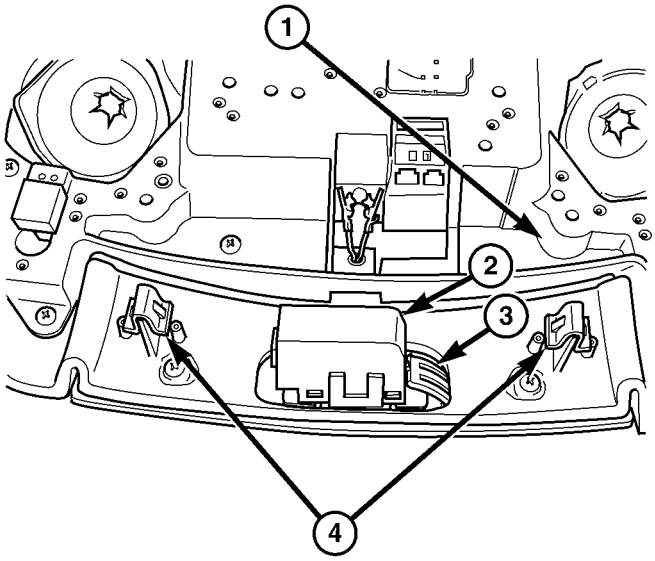


Fig. 2 OVERHEAD CONSOLE

1 - OVERHEAD CONSOLE
2 - POWER SUNROOF SWITCH
3 - SUNROOF SWITCH RETAINING CLIP (PART OF CONSOLE)
4 - OVERHEAD CONSOLE RETAINING CLIPS

INSTALLATION

(1) Position the switch against the overhead console and push the switch to seat properly in retaining clip.
(2) Install the overhead console.
(3) Connect the negative battery cable.

DRAIN TUBE

REMOVAL

FRONT HOSES

(1) Move glass panel to the fully closed position.
(2) Disconnect negative battery cable.
(3) Remove headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
(4) Disconnect the drain hose from the sunroof housing (Fig. 3).
(5) Drain any liquid from hose connection.
(6) Repair or remove tube, as necessary (Fig. 4) or (Fig. 5).

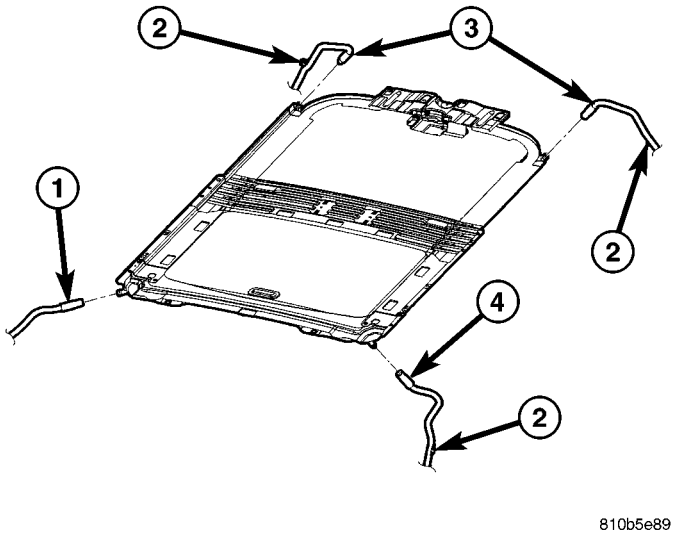


Fig. 3 DRAIN TUBES CONNECTION AT SUNROOF MODULE

1 - FRONT LEFT DRAIN TUBE
2 - DRAIN TUBES TO WIRE CLIPS
3 - REAR DRAIN TUBES
4 - FRONT RIGHT DRAIN TUBE

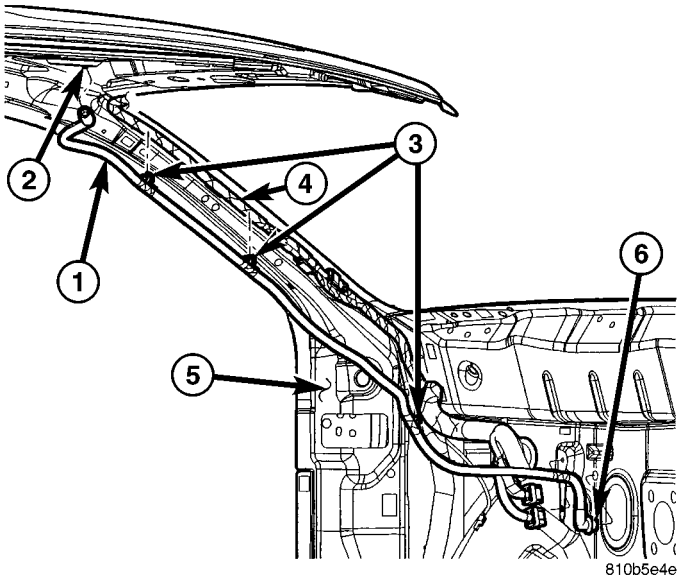


Fig. 4 FRONT LEFT DRAIN TUBE

1 - FRONT LEFT DRAIN TUBE
2 - SUNROOF FRAME DRAIN NIPPLE
3 - DRAIN TUBE TO WIRE CLIP
4 - BODY HARNESS
5 - BODY SIDE INNER PANEL
6 - GROMMET

DRAIN TUBE (Continued)

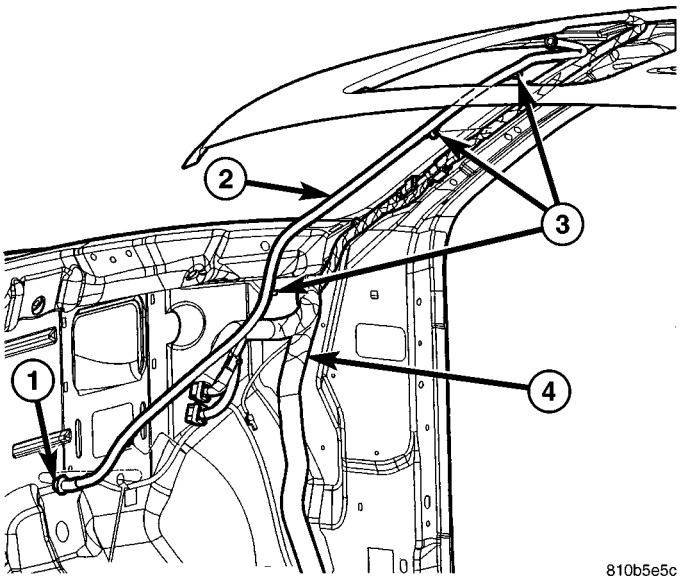


Fig. 5 FRONT RIGHT DRAIN TUBE

1 - GROMMET
2 - FRONT RIGHT DRAIN TUBE
3 - DRAIN TUBE TO WIRE CLIP
4 - BODY WIRE HARNESS

REAR HOUSING HOSE

(1) Move glass panel to the fully closed position.
(2) Disconnect negative battery cable.
(3) Remove headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
(4) Remove third seat or seats from vehicle.
(5) Remove second seat belt lower anchor.
(6) Remove third seat lower anchor.
(7) Remove quarter trim bolster.
(8) Remove trim panel screws.
(9) Remove quarter trim panel
(10) Disconnect the drain hose from the sunroof housing.
(11) Drain any liquid from hose connection, if necessary.
(12) Repair or remove tube, as necessary (Fig. 6).

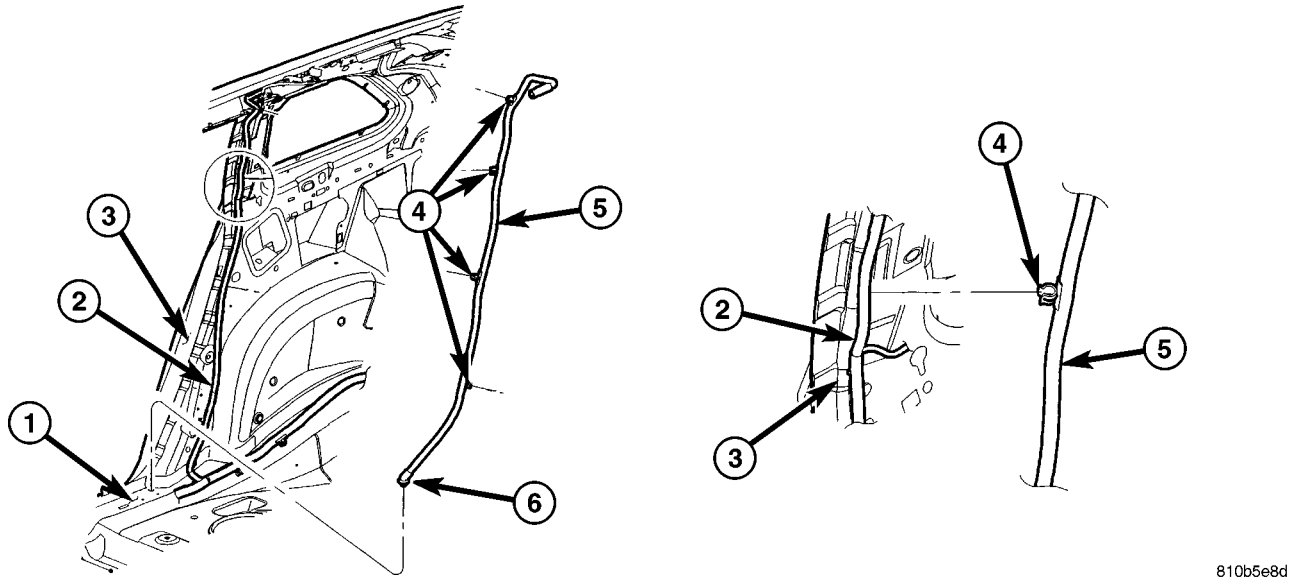


Fig. 6 REAR RIGHT/LEFT DRAIN TUBE

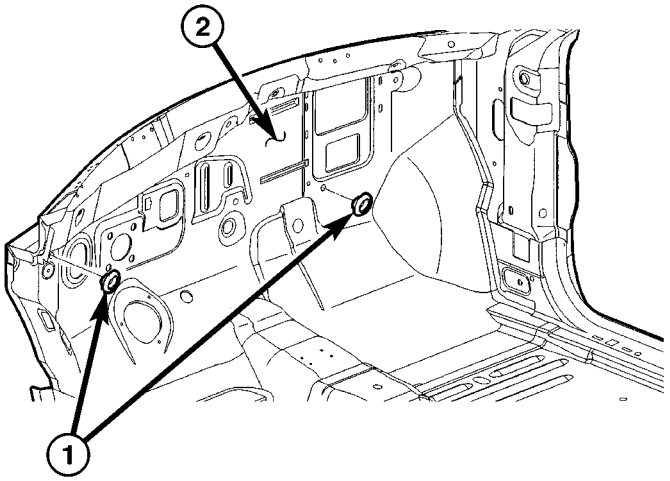
1 - BODY SIDE SILL PANEL
2 - BODY WIRE HARNESS
3 - BODY SIDE INNER PANEL
4 - DRAIN TUBE TO WIRE CLIP(S)
5 - REAR RIGHT DRAIN TUBE
6 - GROMMET

DRAIN TUBE (Continued)

INSTALLATION

FRONT HOSES

(1) Install new grommets if necessary (Fig. 7)
(2) Connect the new drain hose to the sunroof housing and test drainage (Fig. 3).
(3) Install headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
(4) Install sunroof opening trim lace.
(5) Connect the control switch wire connector and install control switch.
(6) Verify sunroof operation and alignment.



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Fig. 7 DRAIN TUBE GROMMET LOCATION

1 - SUNROOF DRAIN HOLE GROMMET
2 - DASH PANEL

REAR HOUSING HOSE

(1) Connect the new drain hose to the sunroof housing and test drainage (Fig. 3).
(2) Install headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
(3) Install sunroof opening trim lace.
(4) Connect the control switch wire connector and install control switch.
(5) Verify sunroof operation and alignment.

DRIVE MOTOR

REMOVAL

(1) Remove the sunroof (Refer to 23 - BODY/SUNROOF/MODULE ASSEMBLY - REMOVAL).
(2) Remove the sunroof motor retaining bolts and remove motor (Fig. 1).

INSTALLATION

CAUTION: THE SUNROOF MOTOR MUST BE TIMED WITH THE SUNROOF ASSEMBLY. FAILURE TO DO SO WILL RESULT IN IMPROPER SUNROOF OPERATION AND POSSIBLE LEAKAGE OR DAMAGE TO THE ASSEMBLY.

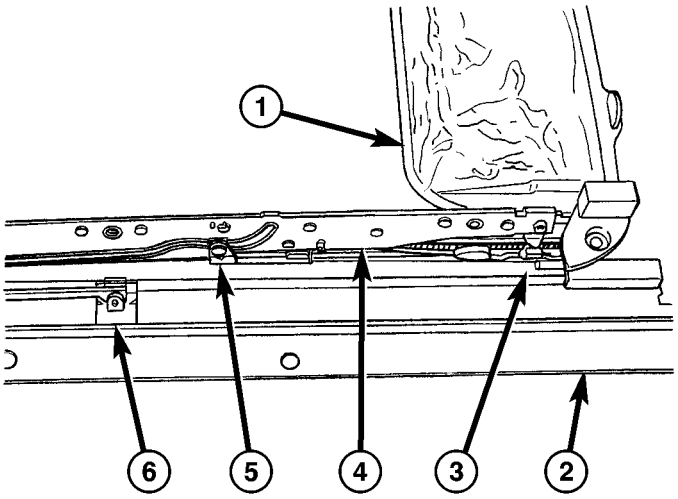
(1) Assure proper sunroof motor timing before installation (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - ADJUSTMENTS).
(2) Position the sunroof motor to the sunroof assembly and install the retaining bolts (Fig. 1). Tighten sunroof motor retaining bolts to 4.2 N·m (40 lbs. in.) torque.
(3) Connect the timed sunroof assembly to a power source and assure proper operation before installing the sunroof assembly into the vehicle.

ADJUSTMENTS

ADJUSTMENT

CAUTION: THE IS NO ADJUSTMENT AVAILABLE FOR A NORMALLY OPERATING SUNROOF. THIS PROCEDURE IS USE TO SET SUNROOF MOTOR TO SUNROOF ASSEMBLY TIMING.

(1) Manually push the sunroof guide assembly to the full forward position until it is locked into position. This is verified by attempting to push the guide assembly rearward. (Fig. 8)



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Fig. 8 SUNROOF GUIDE LOCK POSITION

1 - SUN SHADE
2 - U-FRAME
3 - U-FRAME SLOT
4 - GUIDE RAIL
5 - GUIDE RAIL PIVOT
6 - WIND DEFLECTOR

DRIVE MOTOR (Continued)

NOTE: The guide rail will be raised above the U-frame assembly when in the lock position.

(2) Remove the sunroof glass (Refer to 23 - BODY/SUNROOF/GLASS PANEL - REMOVAL).

(3) Manually move the guide pivot inside the guide rail cam slot until it is centered between the etched timing marks on both rails. (Fig. 9)

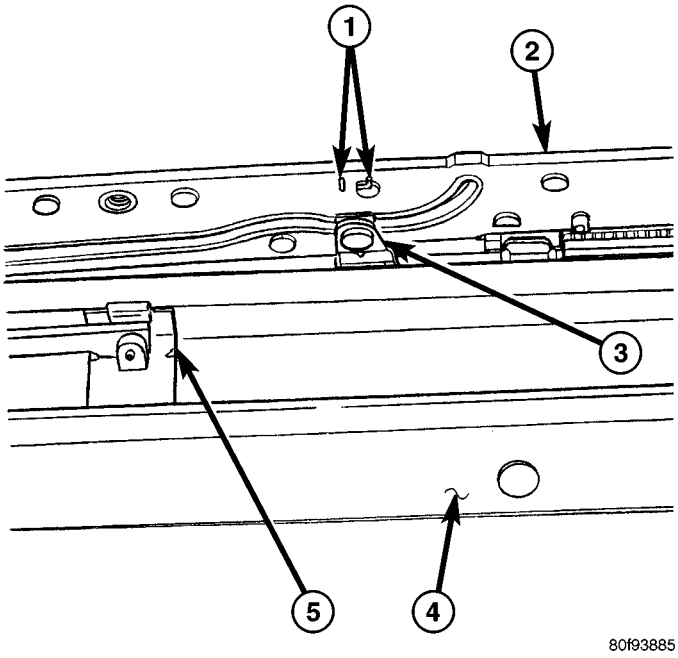


Fig. 9 SUNROOF GUIDE PIVOT

1 - TIMING MARKS
2 - GUIDE RAIL
3 - GUIDE RAIL PIVOT
4 - U-FRAME
5 - WIND DEFLECTOR

(4) Verify that the white marking is visible in the new motor window. If the mark is not visible, connect a power source to the motor and cycle the switch until the motor is in the closed position (white mark in window). (Fig. 10)

(5) Install the sunroof motor and verify proper sunroof operation (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - INSTALLATION).

(6) Install the sunroof glass, leaving the retaining bolts loose.

(7) Install the sunroof assembly into the vehicle (Refer to 23 - BODY/SUNROOF/MODULE ASSEMBLY - INSTALLATION).

(8) Flush the sunroof glass into the vehicle roof opening and check sunroof glass alignment (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS).

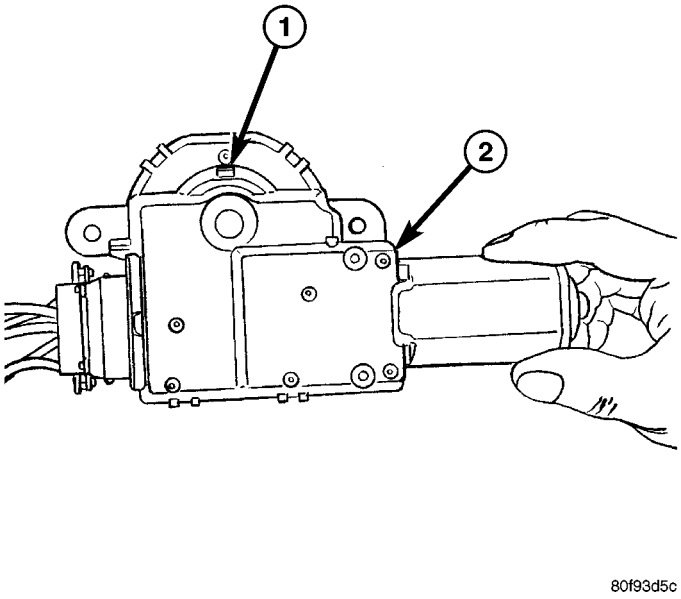


Fig. 10 SUNROOF MOTOR

1 - SUNROOF MOTOR TIMING WINDOW
2 - SUNROOF MOTOR

GLASS PANEL

REMOVAL

(1) Move the glass panel to the vent position.
(2) Slide sunshade rearward to the open position.
(3) Remove the glass panel screws (Fig. 1).
(4) Lift off glass panel and remove from vehicle.

INSTALLATION

(1) Position glass panel on to mechanism lift arms.
(2) Start the attaching screws, and hand tighten (Fig. 1).
(3) Adjust sunroof glass to fit flush with roof line (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS).
(4) Verify sunroof operation and alignment.

ADJUSTMENTS

SUNROOF GLASS PANEL ADJUSTMENT

(1) Move the sunshade rearward to the open position.
(2) Move the sunroof glass panel to the fully closed position.
(3) Loosen the forward attaching screws on each side enough to make the front of the glass to adjust up or down.

GLASS PANEL (Continued)

(4) Adjust the front surface of the sunroof glass panel 0.00 mm to 1.75 mm (0.00 in. to 0.07 in.) below the top surface of the roof.

(5) Tighten the front glass panel attaching screws to 3.5 N·m (31 in. lbs.) torque (Fig. 1).

(6) Loosen the rear screws on each side enough to make the rear adjustment (Fig. 1).

(7) Adjust the rear surface of the sunroof glass panel 0.00 mm to 1.75 mm (0.03 in. to 0.07 in.) above the top surface of the roof.

(8) Tighten the rear glass panel attaching screws to 3.5 N·m (31 in. lbs.) torque (Fig. 1).

(9) Check for proper fit. If not OK, repeat glass panel adjustment.

MODULE ASSEMBLY

REMOVAL

(1) Move glass panel to the fully closed position.

(2) Disconnect battery negative cable.

(3) Remove headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(4) Disconnect the four drain tubes from sunroof housing. (Refer to 23 - BODY/SUNROOF/DRAIN TUBE - REMOVAL).

(5) Disconnect sunroof wire connector (Fig. 11)

(6) Loosen fasteners attaching sunroof assembly (Fig. 12).

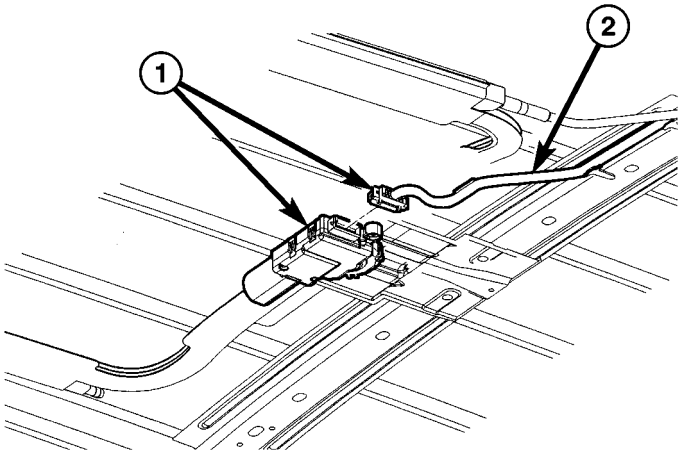


Fig. 11 SUNROOF WIRE CONNECTOR

1 - WIRE CONNECTOR TO SUNROOF MODULE
2 - BODY WIRE HARNESS

(7) With the aid of a helper, support the sunroof and remove the fasteners attaching sunroof assembly to roof panel.

(8) Remove sunroof from vehicle.

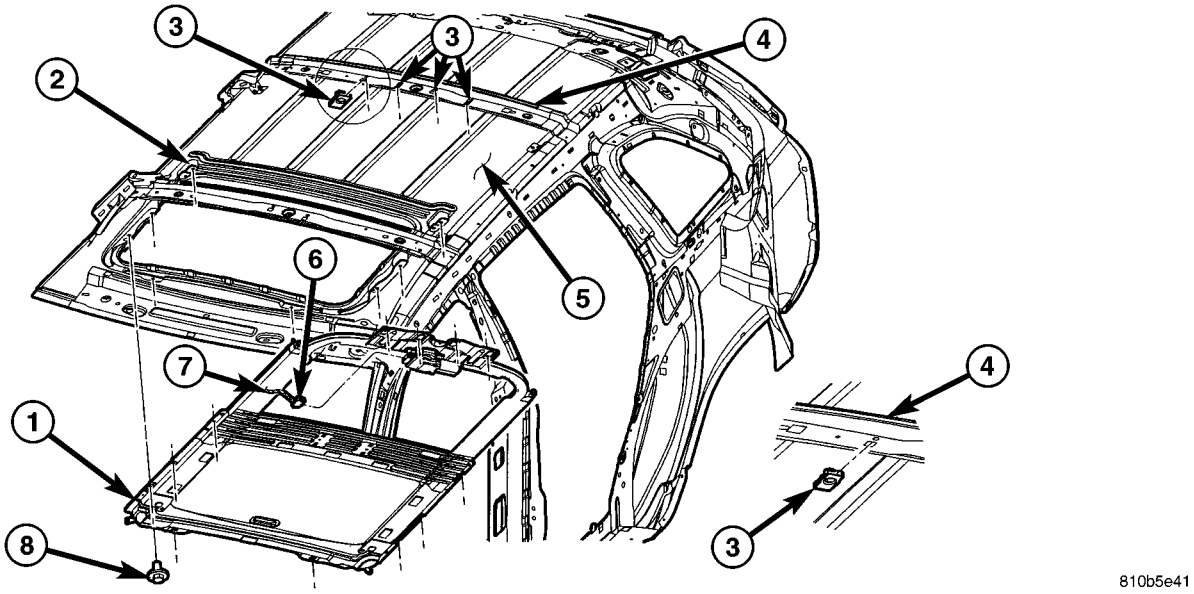


Fig. 12 SUNROOF MODULE

1 - SUNROOF ASSEMBLY
2 - SUNROOF MODULE IN POSITION
3 - SUNROOF MODULE TO ROOF U-NUTS
4 - ROOF BOW #2
5 - ROOF PANEL
6 - SUNROOF WIRE CONNECTOR
7 - BODY WIRE HARNESS
8 - SUNROOF MODULE TO ROOF ATTACHING SCREW(S) AND WASHER(S)

MODULE ASSEMBLY (Continued)

INSTALLATION

(1) Ensure that u-nuts are in position in the roof bow #2 (Fig. 13).

(2) Raise sunroof module assembly and guide it carefully into position (Fig. 12).

(3) While supporting the sunroof assembly start the attaching screws. Tighten the attaching screws in sequence to 6 N·m (53 in. lbs.) torque (Fig. 14).

(4) Connect sunroof wire connector (Fig. 11).

(5) Connect the drain tubes to the sunroof (Refer to 23 - BODY/SUNROOF/DRAIN TUBE - INSTALLATION).

(6) Connect battery negative cable.

(7) Test sunroof operation, adjust as necessary (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS).

(8) Install headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).

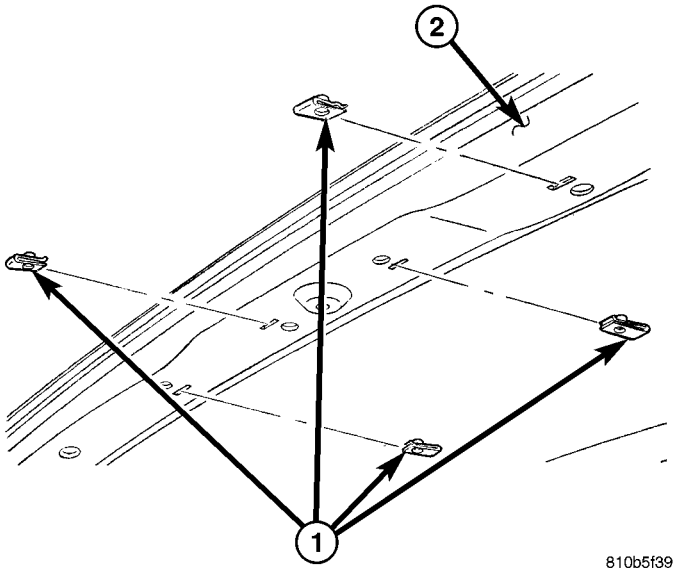


Fig. 13 ATTACHING U-NUTS

1 - U-NUTS
2 - ROOF BOW #2

SUNSHADE

REMOVAL

(1) Place the sunroof glass panel in the vent position.

(2) Remove glass panel (Refer to 23 - BODY/SUNROOF/GLASS PANEL - REMOVAL).

(3) Remove water channel (Fig. 1).

(4) Cycle sunroof motor to the open position.

(5) Move sunshade towards the closed position stopping three to four inches from the closed position.

(6) Depress the spring feet clips on one side of the sun shade.

(7) Remove sunshade.

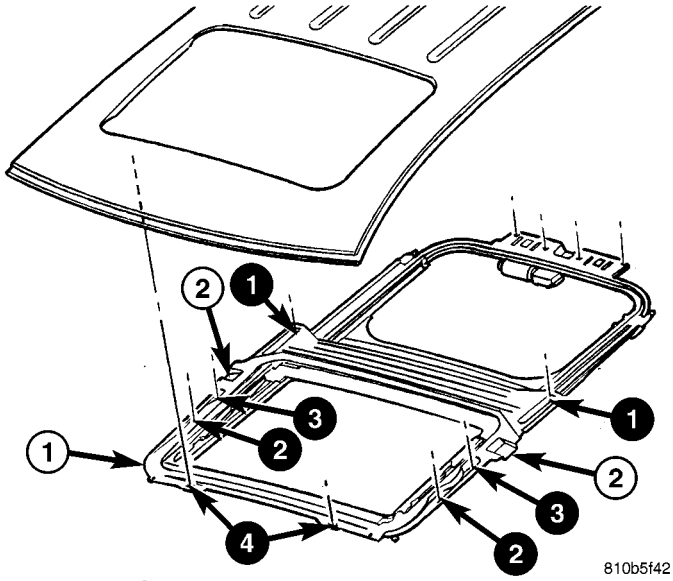


Fig. 14 TIGHTENING SEQUENCE

1 - POWER SUNROOF MODULE
2 - LOCATION(S)

INSTALLATION

(1) Place one side of the sunshade spring feet clips into the top track U-frame.

(2) Depress the both releasing clips on the other side to allow them to go into the top track U-frame.

(3) Move sunshade to the open position.

(4) Install water channel (Fig. 1).

(5) Verify that the sunshade move back and forth properly.

(6) Cycle sunroof towards the closed position.

(7) Install glass panel (Refer to 23 - BODY/SUNROOF/GLASS PANEL - INSTALLATION).

WATER CHANNEL

REMOVAL

(1) Remove glass panel (Refer to 23 - BODY/SUNROOF/GLASS PANEL - REMOVAL).

(2) Remove the retaining screws (Fig. 1).

(3) Carefully slide water channel forward to release tabs from U-frame and remove from vehicle.

INSTALLATION

(1) Carefully place water channel onto U-frame and slide it rearward to lock tabs (Fig. 1).

(2) Install the water channel attaching screws (Fig. 1).

(3) Position glass panel on to mechanism lift arms.

(4) Start the glass attaching screws, and hand tighten.

(5) Adjust sunroof glass (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS).

(6) Verify sunroof operation and alignment.

WIND DEFLECTOR

REMOVAL

(1) Fully open sunroof glass panel.
(2) Disconnect negative battery cable.
(3) Remove sunroof assembly (Refer to 23 - BODY/SUNROOF/MODULE ASSEMBLY - REMOVAL).
(4) Depress the front deflector retaining tabs. (Fig. 15)
(5) Remove wind deflector.

INSTALLATION

(1) Place wind deflector arms in upward position engage the wind deflector blade into the U-frame (Fig. 15).
(2) Engage the retaining clips (Fig. 1).
(3) Verify wind deflector operation.
(4) Install the sun roof assembly (Refer to 23 - BODY/SUNROOF/MODULE ASSEMBLY - INSTALLATION).

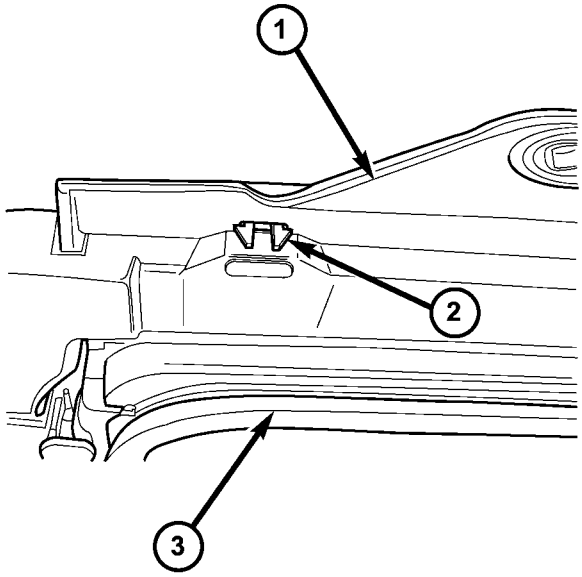


Fig. 15 WIND DEFLECTOR

1 - Sun Roof
2 - Retaining Clip
3 - Sun Roof Assembly Trim

WEATHERSTRIP/SEALS

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WEATHERSTRIP/SEALS

DESCRIPTION

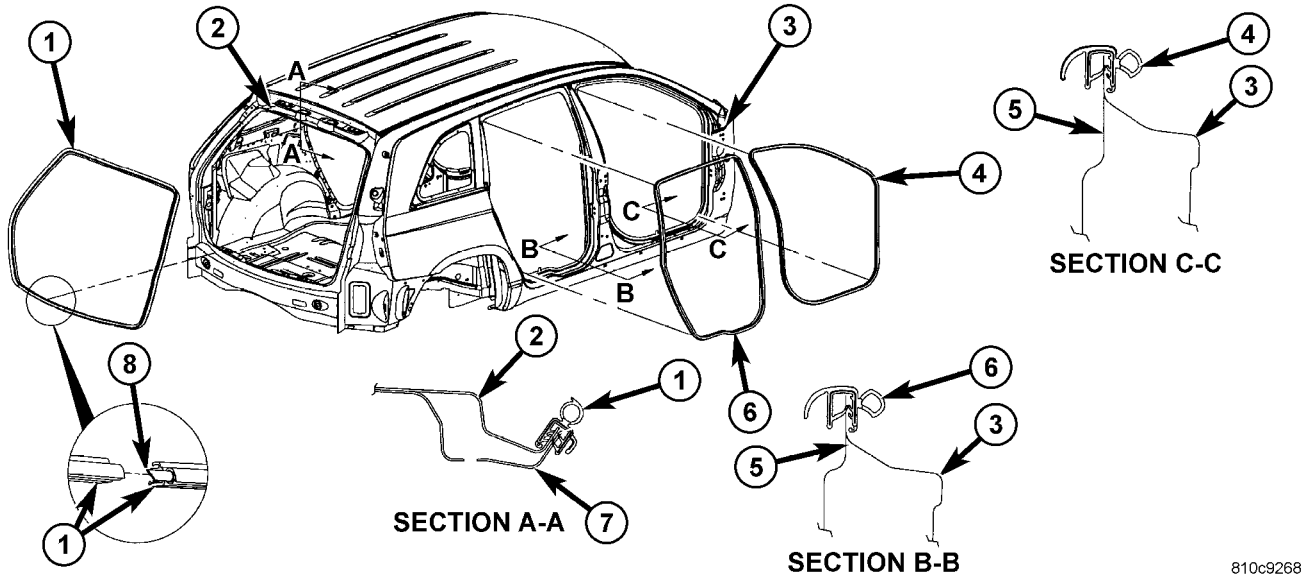


Fig. 1 DOOR AND LIFTGATE OPENING WEATHERSTRIPS

1 - LIFTGATE OPENING WEATHERSTRIP
2 - LIFTGATE OPENING FRAME REINFORCEMENT
3 - BODY SIDE OUTER PANEL
4 - FRONT DOOR BODY MOUNTED WEATHERSTRIP
5 - BODY SIDE INNER PANEL
6 - REAR DOOR MOUNTED WEATHERSTRIP
7 - LIFTGATE OPENING FRAME REINFORCEMENT
8 - STUFFER

DOOR OPENING SEAL - INNER

REMOVAL

(1) Open door.
(2) Using a trim stick C-4755 or equivalent, disengage the push pins attaching door trim inner seal to door sill (Fig. 2).
(3) Remove door trim inner seal from vehicle.

INSTALLATION

(1) Place door trim inner seal into position.
(2) Press on door inner seal and push pins to engage into door sill (Fig. 2).
(3) Close door.

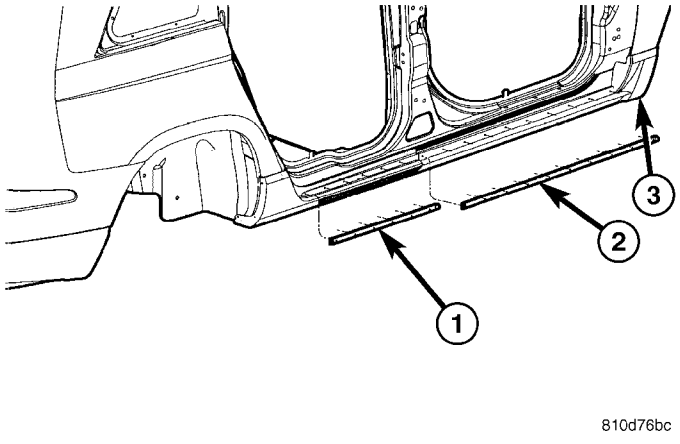


Fig. 2 DOOR TRIM INNER SEAL AND PUSH PIN(S)

1 - REAR DOOR TRIM INNER SEAL AND PUSH PINS
2 - FRONT DOOR TRIM INNER SEAL AND PUSH PINS
3 - DOOR SILL

FRONT DOOR HEADER WEATHERSTRIP

REMOVAL

(1) Open front door.
(2) Using a trim stick C-4755 or equivalent, disengage the plastic pins attaching front door header weatherstrip to door frame (Fig. 3).
(3) Remove weatherstrip from door.

INSTALLATION

(1) Place weatherstrip into position.
(2) Press on attaching plastic pins to engage front door header weatherstrip to door frame (Fig. 3).
(3) Close front door.

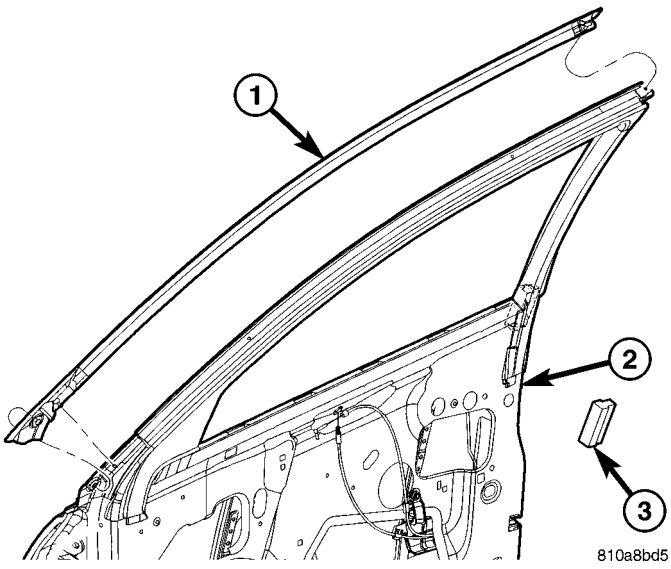


Fig. 3 DOOR HEADER WEATHERSTRIP

1 - FRONT DOOR WEATHERSTRIP
2 - DOOR ASSEMBLY
3 - CHANNEL STUFFER

FRONT DOOR OPENING WEATHERSTRIP

REMOVAL

(1) Open front door.
(2) Remove front door sill scuff plate.
(3) Pull front door weatherstrip from door opening fence (Fig. 1) and (Fig. 4).
(4) Remove door opening weatherstrip from vehicle.

INSTALLATION

(1) Place front door opening weatherstrip into position starting at the upper rear corner of the B-pillar (Fig. 1) and (Fig. 4).
(2) Work the weatherstrip down the B-pillar to the floor pan. Leave slack to ensure completion of the weatherstrip throughout the entire opening.

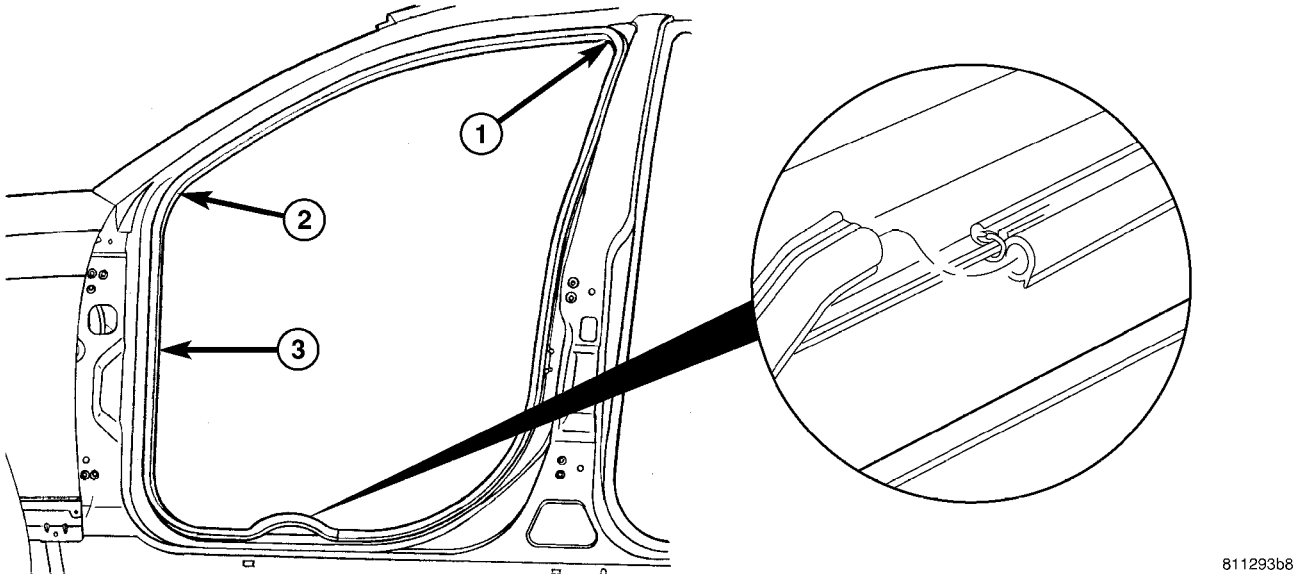


Fig. 4 FRONT DOOR OPENING WEATHERSTRIP

1 - B-PILLAR STARTING POINT
2 - VERIFY INSTALLATION OF A-PILLAR CORNER AND BELTLINE
3 - FRONT DOOR OPENING WEATHERSTRIP

FRONT DOOR OPENING WEATHERSTRIP (Continued)

(3) Starting at B-pillar going along the under side of the header and down the A-pillar leaving slack to ensure proper installation of the bottom portion of the weatherstrip.

(4) Joint the two end of the weatherstrip together and ensure complete seating of weatherstrip.

(5) Install front door sill scuff plate.

(6) Close front door.

FRONT DOOR OUTER BELT WEATHERSTRIP

REMOVAL

(1) Lower window completely.

(2) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Remove front inner molding weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FRONT DOOR INNER BELT WEATHERSTRIP - REMOVAL).

(4) Remove frame closeout molding. (Refer to 23 - BODY/DOOR - FRONT/FRAME CLOSEOUT MOLDING - REMOVAL).

(5) Remove foam stuffer in mirror flag area.

(6) Remove side view mirror. (Refer to 23 - BODY/EXTERIOR/SIDE VIEW MIRROR - REMOVAL).

(7) Remove screw attaching outer belt molding, one at the inside of the front door shut face at the B-pillar.

(8) Insert special tool #9093 between belt molding and glass at rear and then slide tool forward approximately 14 cm (5.5 in.) (Fig. 5) and (Fig. 6).

(9) Push down on outer belt molding and rotate upper part of tool outward from vehicle approximately 6 - 8 cm (2.5 - 3 in.) then lift up on molding to disengage from locking tab.

(10) Repeat step 3 and 4 at as necessary till outer belt molding is free.

(11) Remove outer belt molding weatherstrip.

INSTALLATION

(1) Place outer belt molding weatherstrip into position (Fig. 5).

(2) Press down or tap lightly on outer belt molding until fully seated.

(3) Install screw attaching outer belt molding, one at the inside of the front door shut face at the B-pillar.

(4) Install side view mirror. (Refer to 23 - BODY/EXTERIOR/SIDE VIEW MIRROR - INSTALLATION).

(5) Install foam stuffer in mirror flag area.

(6) Install frame closeout molding. (Refer to 23 - BODY/DOOR - FRONT/FRAME CLOSEOUT MOLDING - INSTALLATION).

(7) Install front inner molding weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FRONT DOOR INNER BELT WEATHERSTRIP - INSTALLATION).

(8) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/DOOR TRIM PANEL - INSTALLATION).

(9) Close window.

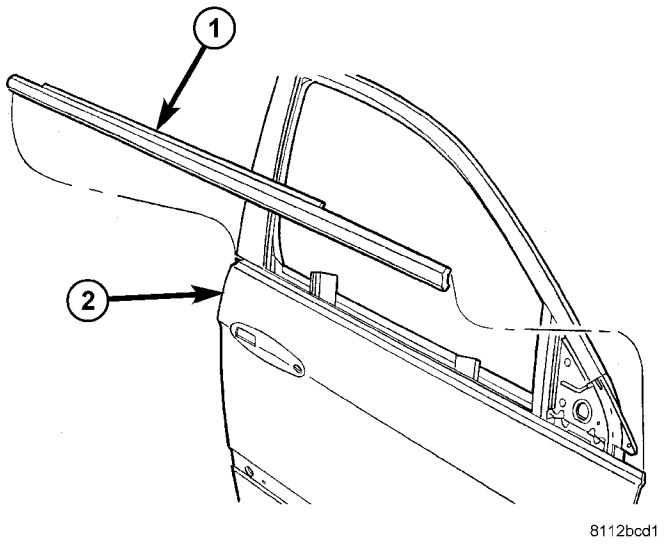


Fig. 5 FRONT DOOR OUTER BELT MOLDING WEATHERSTRIP

1 - DOOR OUTER BELT WEATHERSTRIP
2 - FRONT DOOR ASSEMBLY

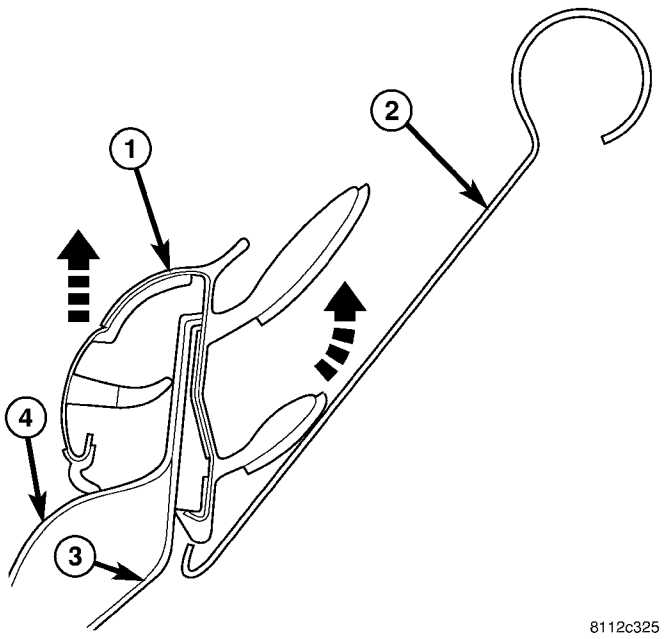


Fig. 6 OUTER BELT MOLDING

1 - OUTER BELT MOLDING
2 - SPECIAL TOOL #9093
3 - RETAINING TAB
4 - DOOR OUTER PANEL

FRONT DOOR MOUNTED WEATHERSTRIP

REMOVAL

(1) Open front door.

(2) Using a trim stick C-4755 or equivalent, disengage the push pins attaching front door mounted weatherstrip to door frame (Fig. 7).

(3) Remove weatherstrip from door frame.

INSTALLATION

(1) Place front door mounted weatherstrip into position (Fig. 7).

(2) Press on attaching push pins fasteners to attach weatherstrip to lower door and engage upper front door mounted weatherstrip to door frame.

(3) Close front door.

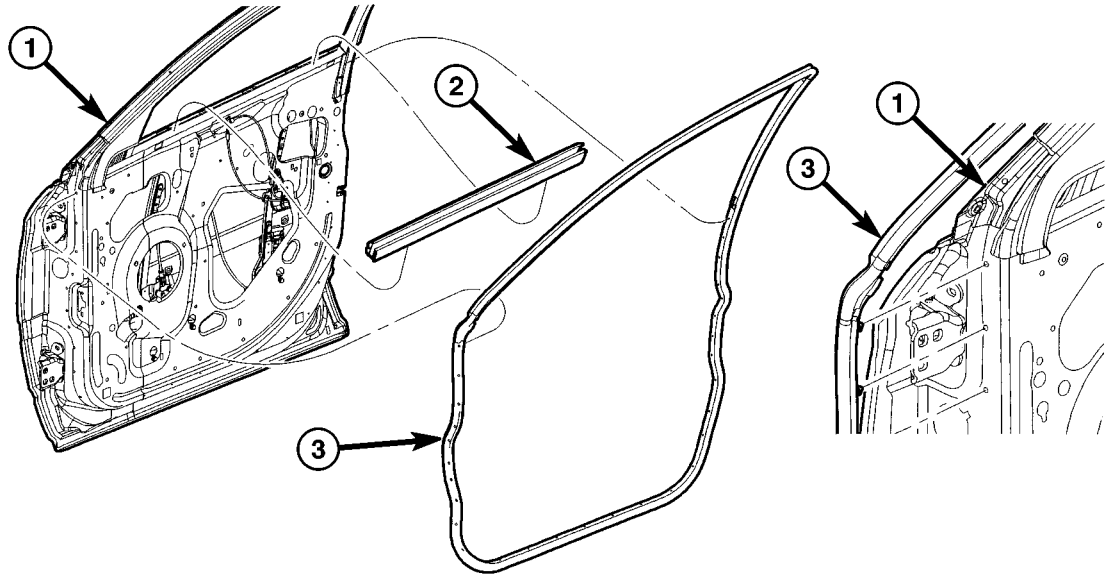


Fig. 7 DOOR BELT INNER AND MOUNTED WEATHERSTRIP

1 - DOOR ASSEMBLY
2 - FRONT DOOR BELT INNER WEATHERSTRIP
3 - FRONT DOOR MOUNTED WEATHERSTRIP

FRONT INNER BELT MOLDING WEATHERSTRIP

REMOVAL

(1) Remove the door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(2) Rotate the inner belt molding outboard while pulling up to disengage the retention tabs (Fig. 8).

(3) Remove inner belt molding from door.

INSTALLATION

(1) Place inner belt molding into position.

(2) Press down on inner belt molding to engage the retention tabs (Fig. 8).

(3) Install the door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

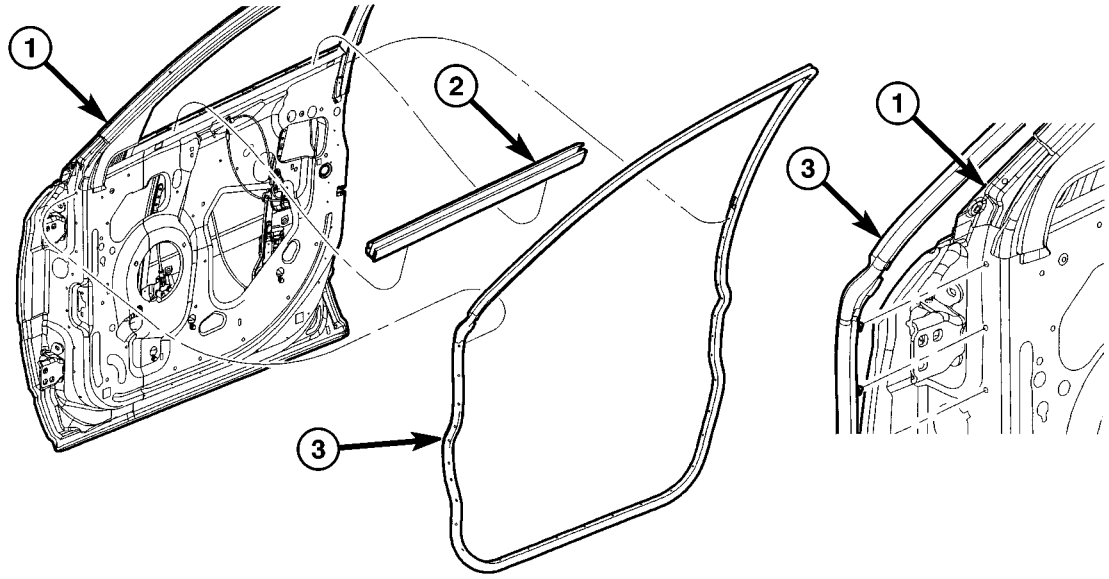


Fig. 8 DOOR BELT INNER AND MOUNTED WEATHERSTRIP

1 - DOOR ASSEMBLY
2 - FRONT DOOR BELT INNER WEATHERSTRIP
3 - FRONT DOOR MOUNTED WEATHERSTRIP

LIFTGATE OPENING WEATHERSTRIP

REMOVAL

(1) Open liftgate door.
(2) Remove liftgate sill scuff plate.
(3) Pull Liftgate door weatherstrip from liftgate opening fence (Fig. 9).
(4) Remove liftgate opening weatherstrip from vehicle.

INSTALLATION

(1) Place liftgate opening weatherstrip into position locate non plug end of weatherstrip to bottom of liftgate opening at left of center. Align end of weatherstrip to second slot left of striker hole (Fig. 9).
(2) Secure weatherstrip to liftgate opening in a counterclockwise direction around left side of opening including the left lower and upper corners of the fence flange.
(3) Align the paint dot on the inner side of weatherstrip with right side upper corner of liftgate opening. Be sure to leave slack in the weatherstrip between the two upper corners of opening.
(4) Secure weatherstrip down the right side of opening including the upper and lower right side corners.
(5) Secure weatherstrip to upper portion of liftgate opening between the left and right upper corners.
(6) Joint the two end of the weatherstrip together and ensure complete seating of weatherstrip.
(7) Install liftgate sill scuff plate.
(8) Close liftgate door.

LIFTGATE UPPER SECONDARY WEATHERSTRIP

REMOVAL

(1) Warm the affected stick on upper secondary weatherstrip and body metal to approximately 27° C (80° F) using a suitable heat lamp or heat gun.
(2) Pull stick on weatherstrip from painted surface.
(3) Remove adhesive tape residue from painted surface of vehicle.
(4) Use a 3M Scotch-Brite™ Molding Adhesive and Stripe Removal Disc, or equivalent, to clean adhesive residue from painted surfaces. These products are available from automotive paint suppliers. Refer to instructions supplied with the specific product for proper usage.

INSTALLATION

(1) If upper secondary weatherstrip is to be reused,
(a) Remove tape residue from molding.
(b) Clean back of molding with Mopar® Super Kleen, or equivalent.
(c) Wipe molding dry with lint free cloth.
(d) Apply a single coat of Mopar® TPO Molding Prep to tape side of molding and allow to dry thoroughly.
(e) Apply new body side molding (two sided adhesive) tape to back of weatherstrip.

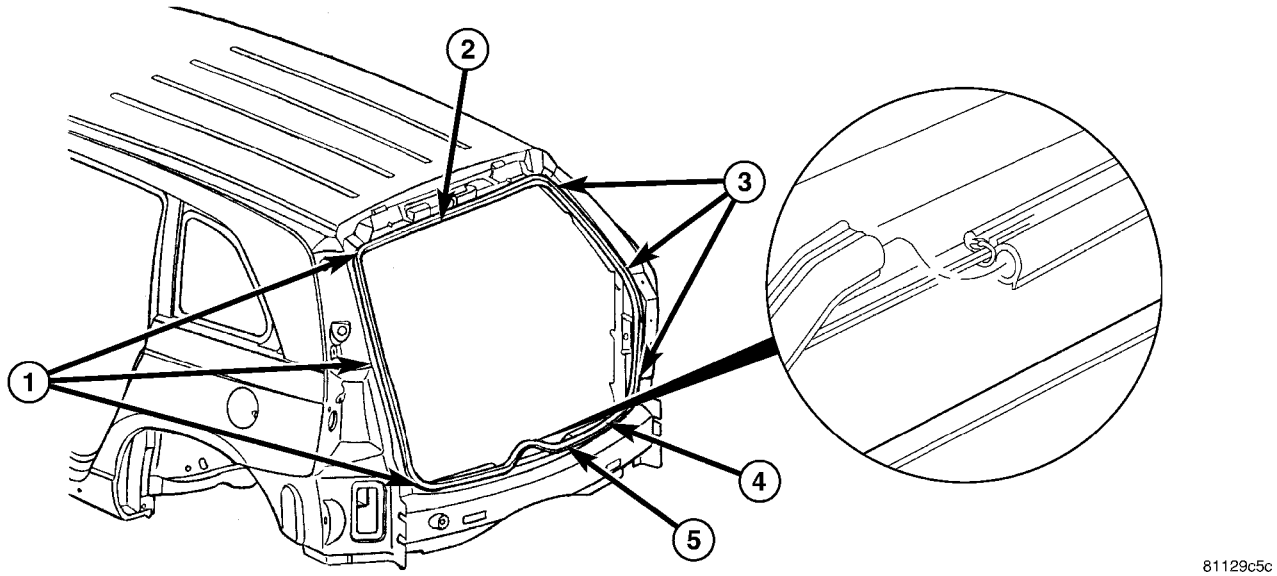


Fig. 9 LIFTGATE OPENING WEATHERSTRIP

1 - LEFT SIDE STARTING POINT
2 - UPPER LIFTGATE OPENING
3 - SECURE UPPER AND LOWER CORNERS
4 - LOWER RIGHT SIDE CORNER AND CONNECTION POINT
5 - ALIGN END OF WEATHERSTRIP TO SECOND SLOT LEFT OF STRIKER HOLE

LIFTGATE UPPER SECONDARY WEATHERSTRIP (Continued)

(2) Clean liftgate surface with Mopar® Super Kleen, or equivalent. Wipe surface dry with lint free cloth.

(3) Remove protective cover from tape on back of upper secondary weatherstrip.

(4) Apply weatherstrip to liftgate between liftgate hinges. There is less than 1/8 in. clearance between the hinges.

(5) Using a roller tool, roll weatherstrip onto liftgate with enough force to assure adhesion. Do not apply excessive force, or damage to weatherstrip may result.

REAR DOOR HEADER WEATHERSTRIP

REMOVAL

(1) Open rear door.

(2) Using a trim stick C-4755 or equivalent, disengage the push pins attaching rear door header weatherstrip to door frame (Fig. 10).

(3) Remove weatherstrip from door.

INSTALLATION

(1) Place weatherstrip into position.

(2) Press on weatherstrip push pins to engage rear door header weatherstrip to door frame (Fig. 10).

(3) Close rear door.

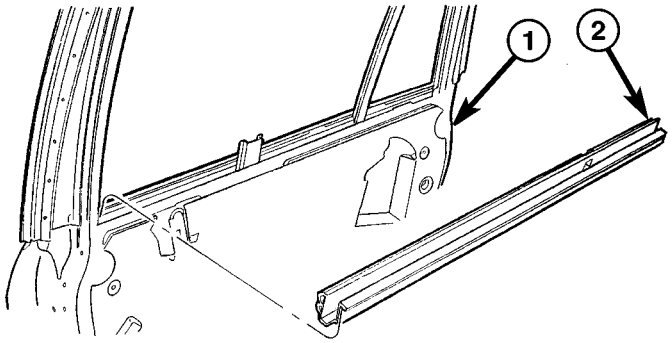
REAR DOOR INNER BELT MOLDING WEATHERSTRIP

REMOVAL

(1) Remove the door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).

(2) Rotate the inner belt molding outboard while pulling up to disengage the retention tabs (Fig. 11).

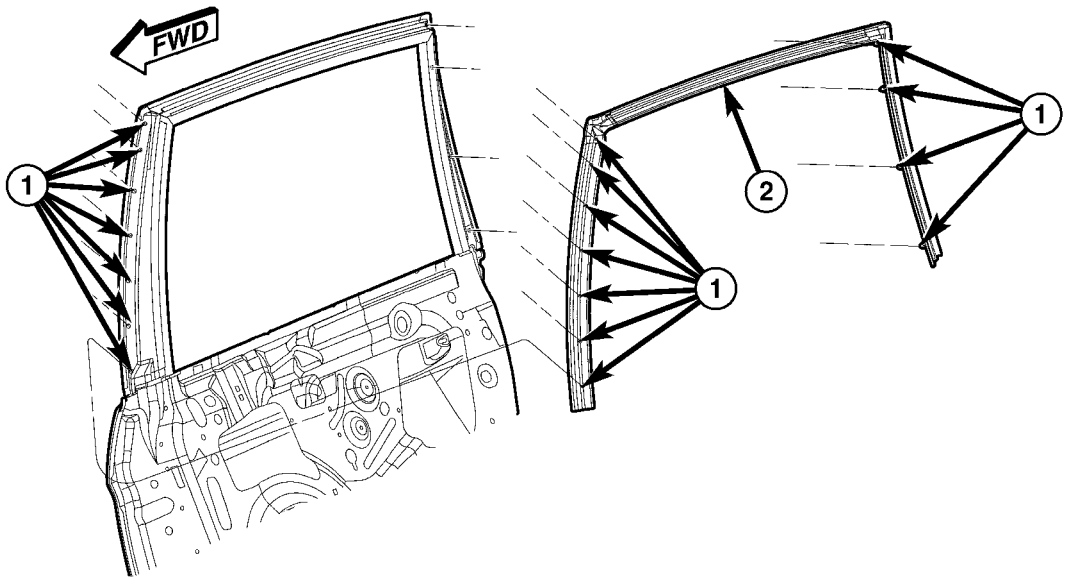
(3) Remove inner belt molding from door.



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Fig. 11 REAR DOOR INNER BELT WEATHERSTRIP

1 - REAR DOOR ASSEMBLY
2 - INNER BELT MOLDING



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Fig. 10 DOOR HEADER WEATHERSTRIP

1 - PUSH PINS
2 - HEADER WEATHERSTRIP

REAR DOOR INNER BELT MOLDING WEATHERSTRIP (Continued)

INSTALLATION

(1) Place inner belt molding into position.

(2) Press down on inner belt molding to engage the retention tabs (Fig. 11).

(3) Install the door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).

REAR DOOR MOUNTED WEATHERSTRIP

REMOVAL

(1) Open front door.

(2) Using a trim stick C-4755 or equivalent, disengage the push pins attaching rear door mounted weatherstrip to door frame (Fig. 12).

(3) Remove weatherstrip from door frame.

INSTALLATION

(1) Place rear door mounted weatherstrip into position (Fig. 12).

(2) Press on attaching push pins fasteners to attach weatherstrip to lower door and engage upper rear door mounted weatherstrip to door frame.

(3) Close front door.

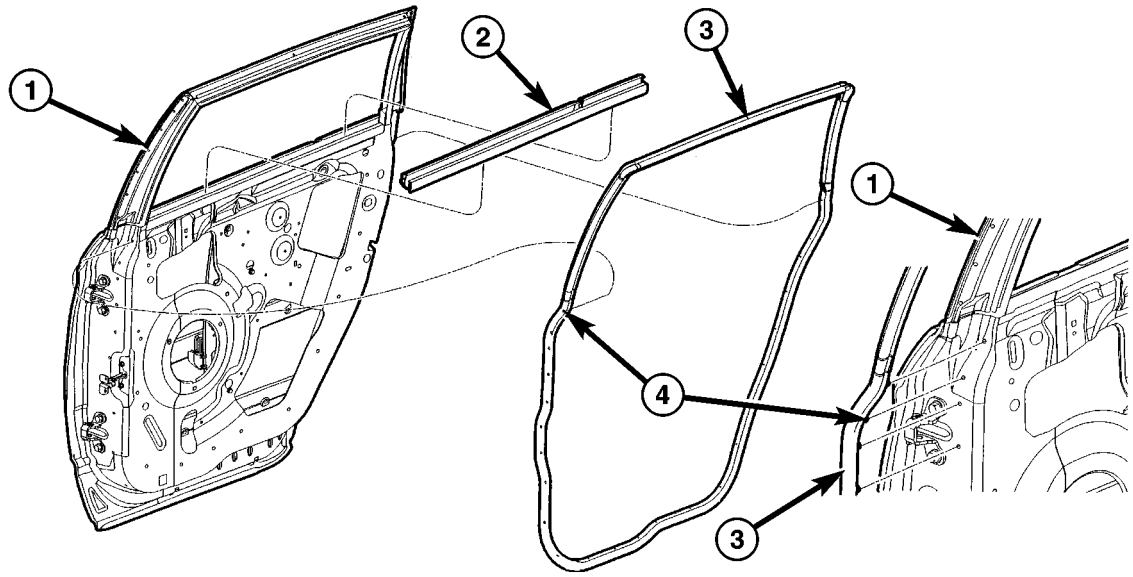


Fig. 12 DOOR MOUNTED WEATHERSTRIP

1 - REAR DOOR ASSEMBLY
2 - REAR DOOR BELT INNER WEATHERSTRIP
3 - REAR DOOR MOUNTED WEATHERSTRIP
4 - WEATHERSTRIP PUSH PINS (25)

REAR DOOR OUTER BELT MOLDING

REMOVAL

(1) Lower window completely.
(2) Remove rear inner molding weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT MOLDING - REMOVAL).
(3) Remove fixed glass run channel. (Refer to 23 - BODY/DOORS - REAR/REAR DOOR FIXED GLASS RUN CHANNEL - REMOVAL).
(4) Remove fixed glass run channel.
(5) Remove screws attaching outer belt molding, one at the inside of the rear door shut face at the B-pillar and one at the inside of the rear door shut face at the C-pillar.
(6) Insert special tool #9093 between belt molding and glass at rear and then slide tool forward approximately 14 cm (5.5 in.) (Fig. 13) and (Fig. 14).
(7) Push down on outer belt molding and rotate upper part of tool outward from vehicle approximately 6 - 8 cm (2.5 - 3 in.) then lift up on molding to disengage from locking tab.
(8) Repeat step 3 and 4 at as necessary till outer belt molding is free.
(9) Remove outer belt molding weatherstrip.

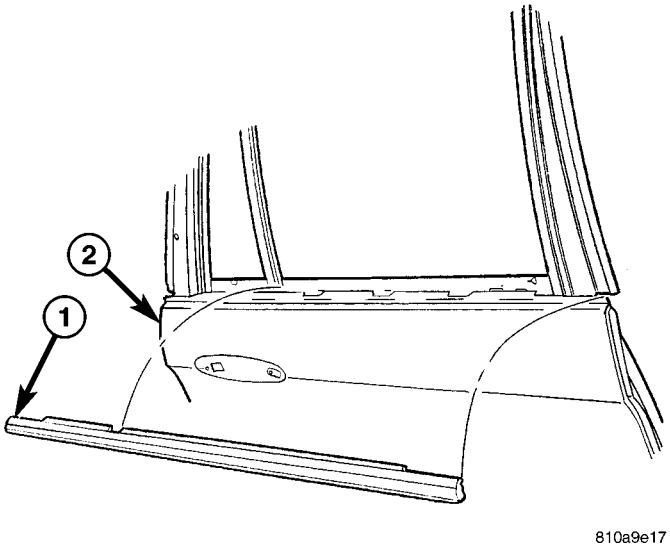


Fig. 13 DOOR OUTER BELT MOUNTING

1 - OUTER BELT MOLDING
2 - DOOR ASSEMBLY

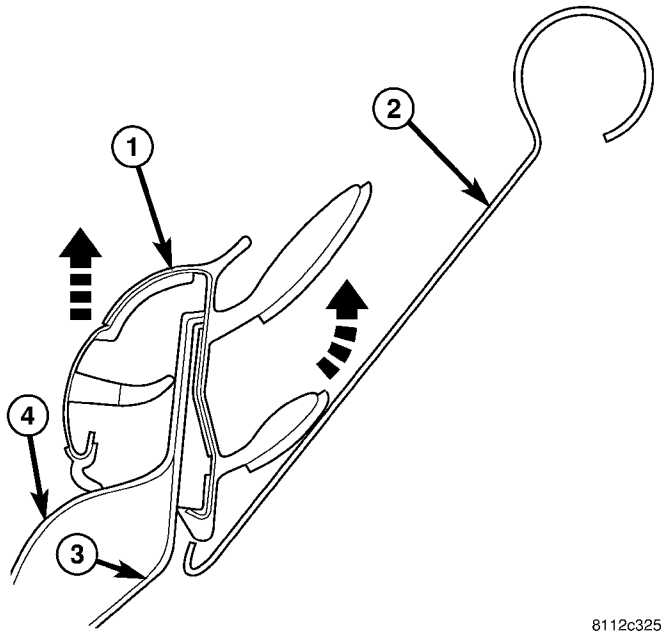


Fig. 14 OUTER BELT MOLDING

1 - OUTER BELT MOLDING
2 - SPECIAL TOOL #9093
3 - RETAINING TAB
4 - DOOR OUTER PANEL

INSTALLATION

(1) Place outer belt molding weatherstrip into position (Fig. 13).
(2) Press down or tap lightly on outer belt molding until fully seated.
(3) Install screws attaching outer belt molding, one at the inside of the rear door shut face at the B-pillar and one at the inside of the rear door shut face at the C-pillar.
(4) Install fixed glass run channel.
(5) Install rear inner molding weatherstrip. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR INNER BELT MOLDING - INSTALLATION).
(6) Install door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).
(7) Close window.

REAR DOOR OPENING WEATHERSTRIP

REMOVAL

(1) Open front door.
(2) Remove rear door sill scuff plate.
(3) Pull rear door weatherstrip from door opening fence (Fig. 15).
(4) Remove door opening weatherstrip from vehicle.

INSTALLATION

(1) Place rear door opening weatherstrip into position starting at the upper rear corner of the C-pillar (Fig. 4).
(2) Work the weatherstrip down the C-pillar to the floor pan. Leave slack to ensure completion of the weatherstrip throughout the entire opening.
(3) Starting at B-pillar going along the under side of the header and down the B-pillar leaving slack to ensure proper installation of the bottom portion of the weatherstrip.
(4) Joint the two end of the weatherstrip together and ensure complete seating of weatherstrip.
(5) Install rear door sill scuff plate.
(6) Close front door.

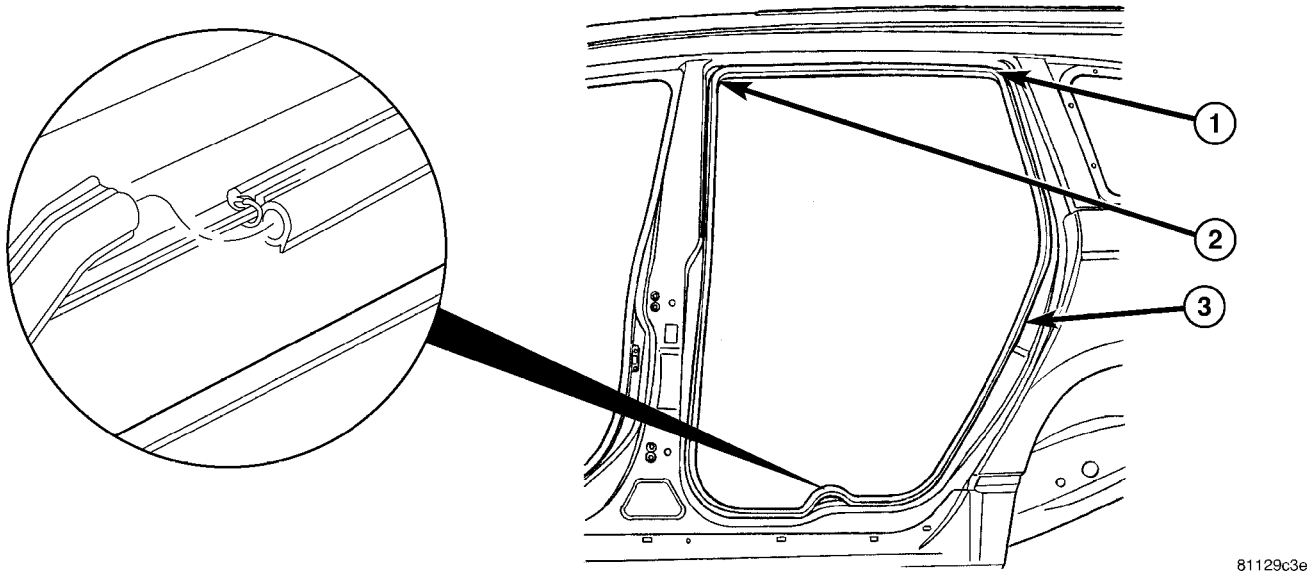


Fig. 15 REAR DOOR OPENING WEATHERSTRIP

1 - C-PILLAR STARTING POINT
2 - B-PILLAR CORNER
3 - REAR DOOR OPENING WEATHERSTRIP

BODY STRUCTURE

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GAP AND FLUSH

SPECIFICATIONS - GAP AND FLUSH MEASUREMENTS

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GAP AND FLUSH (Continued)

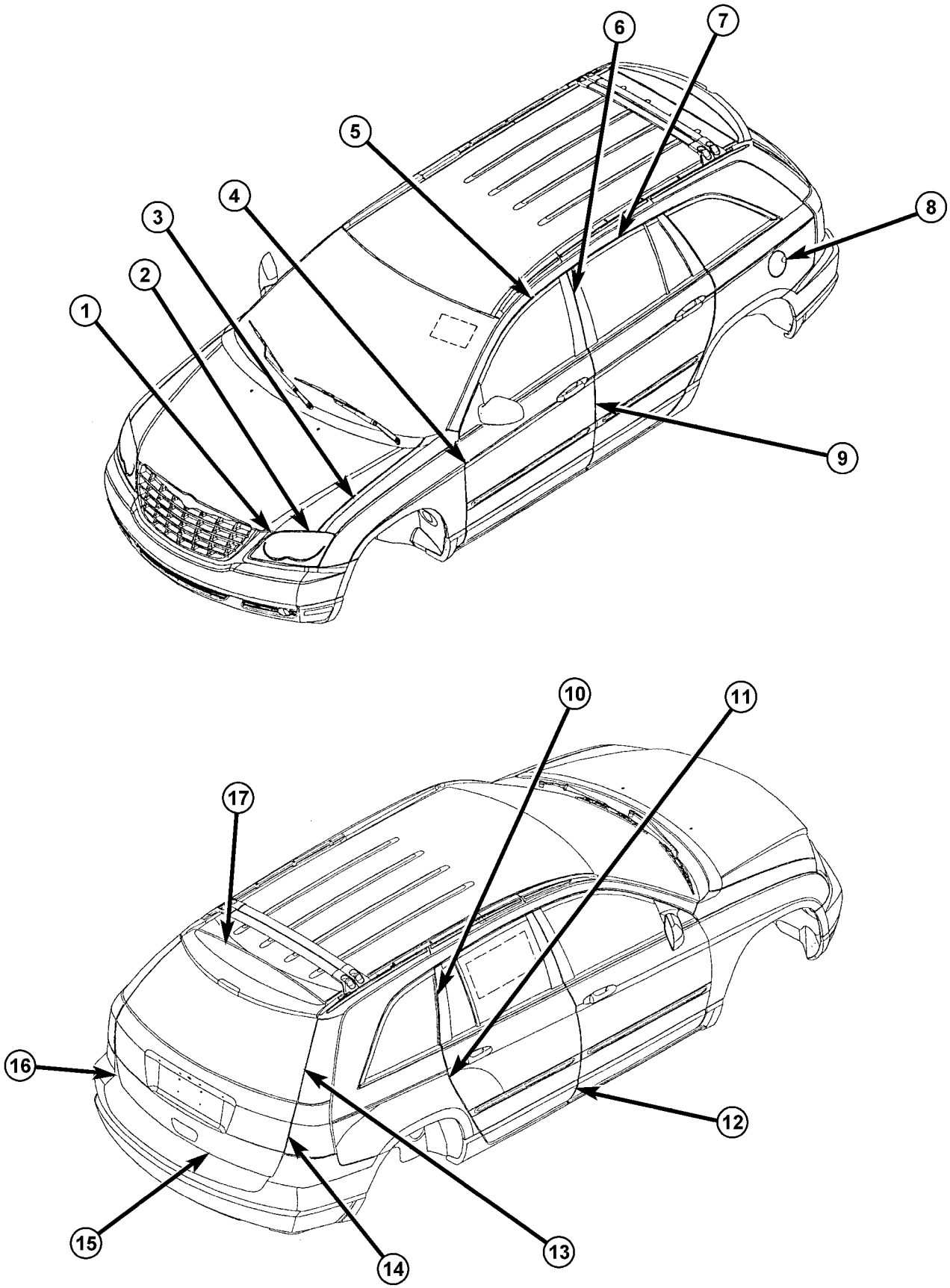


Fig. 1 GAP AND FLASH MEASUREMENTS

GAP AND FLUSH (Continued)

SPECIFICATIONS

ITEM	LOCATION	GAP	FLUSH
1	HOOD TO FASCIA	6.5 ± 2.0 PARALLEL WITHIN 2.0 RIGHT TO LEFT	
2	HEADLAMP MODULE TO HOOD	6.5 ± 2.0 PARALLEL WITHIN 2.0 RIGHT TO LEFT	
3	HOOD TO FENDER	4.0 ± 1.5 PARALLEL WITHIN 2.0 RIGHT TO LEFT	FENDER 0.5 OVER FLUSH TO HOOD ± 2.0 CONSISTENT WITHIN 1.5
4	FENDER TO DOOR	4.5 ± 1.5 PARALLEL WITHIN 2.0	FENDER 0.5 OVER FLUSH TO HOOD ± 1.5 CONSISTENT WITHIN 2.0
5	FRONT DOOR TO A-PILLAR		FLUSH ± 2.0
6	FRONT DOOR APPLIQUE TO REAR DOOR APPLIQUE (ABOVE BELT LINE)	5.5 ± 2.0 PARALLEL WITHIN 1.5	FRONT DOOR APPLIQUE 0.5 OVER FLUSH TO REAR DOOR APPLIQUE ± 2.5 CONSISTENT WITHIN 2.0
7	REAR DOOR TO APERTURE (AT ROOF)		FLUSH ± 2.0
8	FUEL FILLER DOOR TO BODY SIDE APERTURE	3.0 ± 1.0 UNIFORM WITHIN 1.5	FUEL DOOR 0.5 UNDER FLUSH TO BODY SIDE APERTURE ± 1.0 CONSISTENT WITHIN 1.0
9	FRONT DOOR TO REAR DOOR (BELOW BELT LINE)	4.5 ± 1.5 PARALLEL WITHIN 1.5	FRONT DOOR 0.5 OVER FLUSH TO REAR DOOR ± 1.5 CONSISTENT WITHIN 1.5
10	REAR DOOR APPLIQUE TO QUARTER GLASS (ABOVE BELT LINE)	4.5 ± 1.5 PARALLEL WITHIN 1.5	REAR DOOR APPLIQUE 6.5 OVER FLUSH TO QUARTER GLASS ± 2.5 CONSISTENT WITHIN 1.5
11	REAR DOOR TO REAR QUARTER (BELOW BELT LINE)	4.5 ± 1.5 PARALLEL WITHIN 1.5	REAR DOOR 0.5 OVER FLUSH TO REAR QUARTER CONSISTENT WITHIN 1.5
12	FRONT DOOR CLADDING TO REAR DOOR CLADDING	6.75 ± 2.0 PARALLEL WITHIN 2.0	FLUSH ± 2.0
13	D-PILLAR APPLIQUE TO LIFTGATE GLASS	5.0 ± 2.0 PARALLEL WITHIN 2.0	
14	TAIL LAMP LENS TO LIFTGATE	5.0 ± 2.0 PARALLEL WITHIN 2.0 LEFT TO RIGHT	TAIL LAMP 2.8 OVER FLASH TO LIFTGATE CONSISTENT WITHIN 3.0 LEFT TO RIGHT
15	LIFTGATE TO FASCIA (UP/DOWN)	8.0 ± 2.5 PARALLEL WITHIN 3.0	
16	LIFTGATE TO FASCIA (CROSS CAR)	5.0 ± 2.0 PARALLEL WITHIN 2.0 LEFT TO RIGHT	
17	LIFTGATE TO ROOF	8.0 ± 2.5	LIFTGATE 1.0 UNDER FLUSH TO ROOF +1.0/-2.0

NOTE: All measurements are in mm.

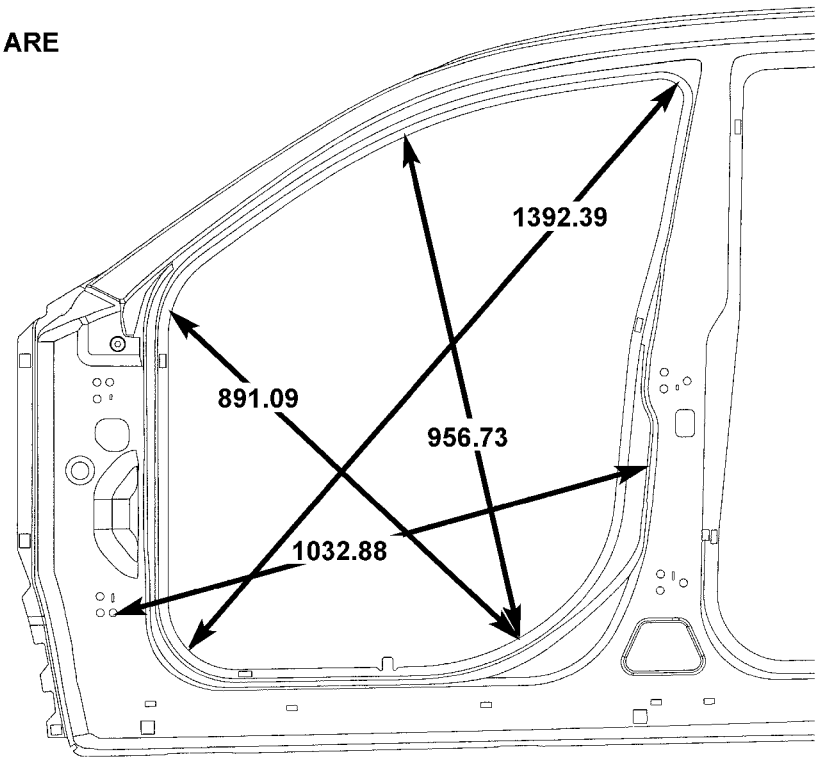
OPENING DIMENSIONS

SPECIFICATIONS - BODY OPENING DIMENSIONS

INDEX

DESCRIPTION	FIGURE
FRONT DOOR	2
LIFTGATE	3
LIFTGATE WINDOW	4
REAR DOOR	5
REAR QUARTER WINDOW	6
WINDSHIELD	7

ALL DIMENSIONS ARE IN MILLIMETERS



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Fig. 2 FRONT DOOR

OPENING DIMENSIONS (Continued)

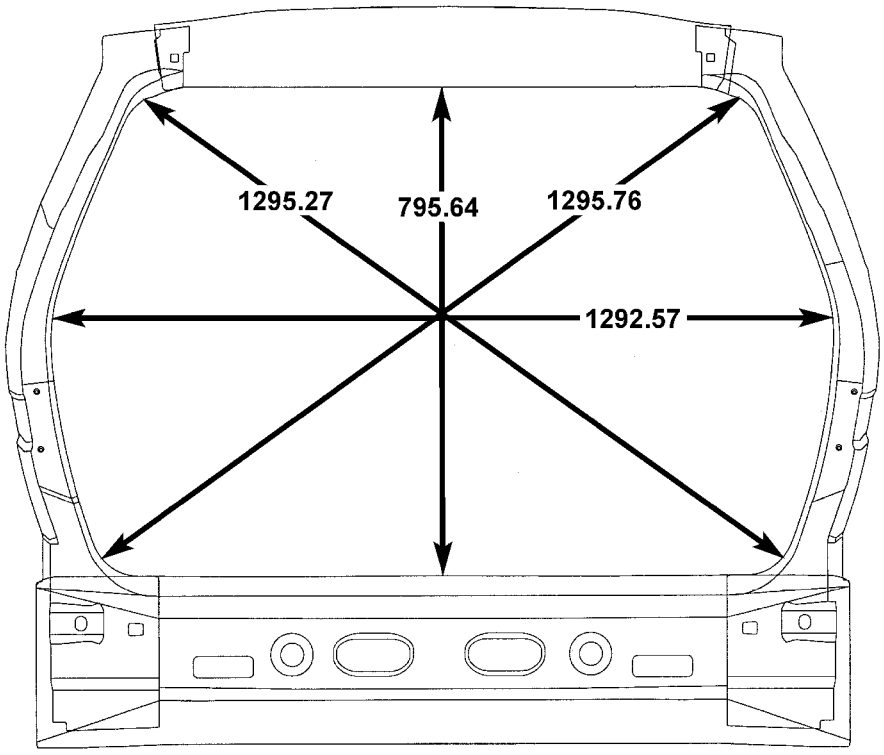


Fig. 3 LIFTGATE

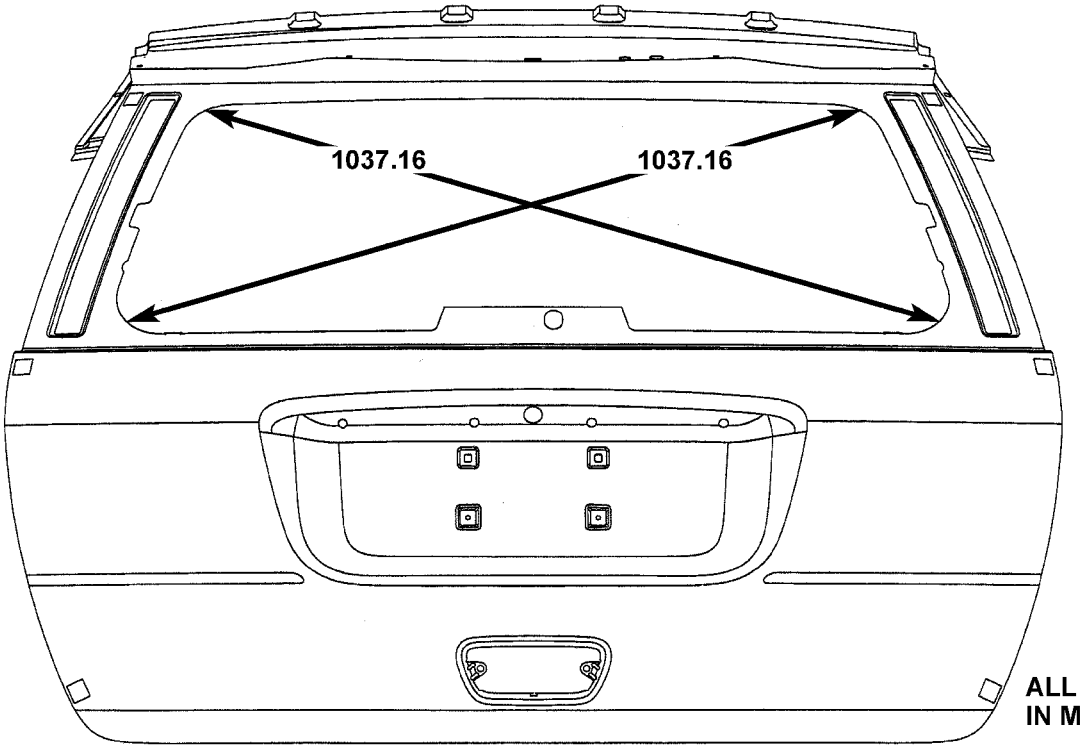


Fig. 4 LIFTGATE WINDOW

OPENING DIMENSIONS (Continued)

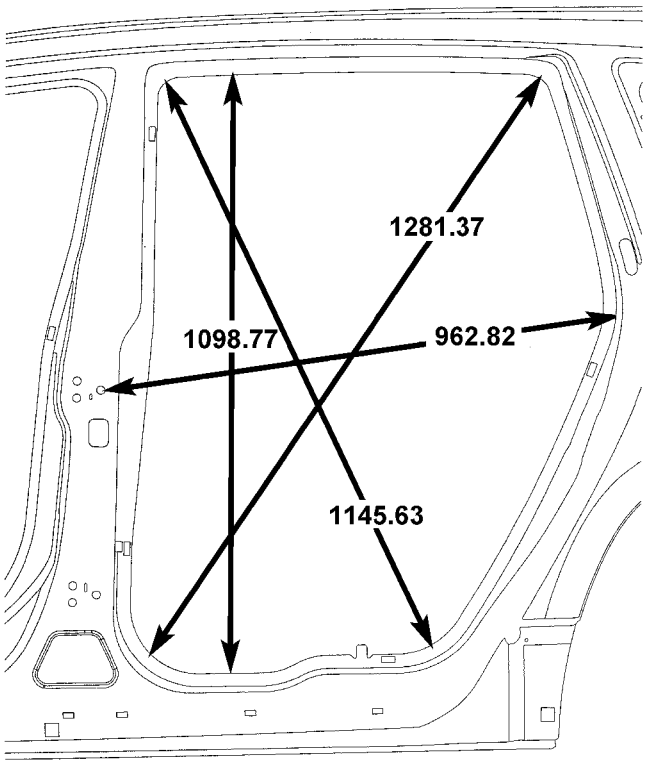


Fig. 5 REAR DOOR

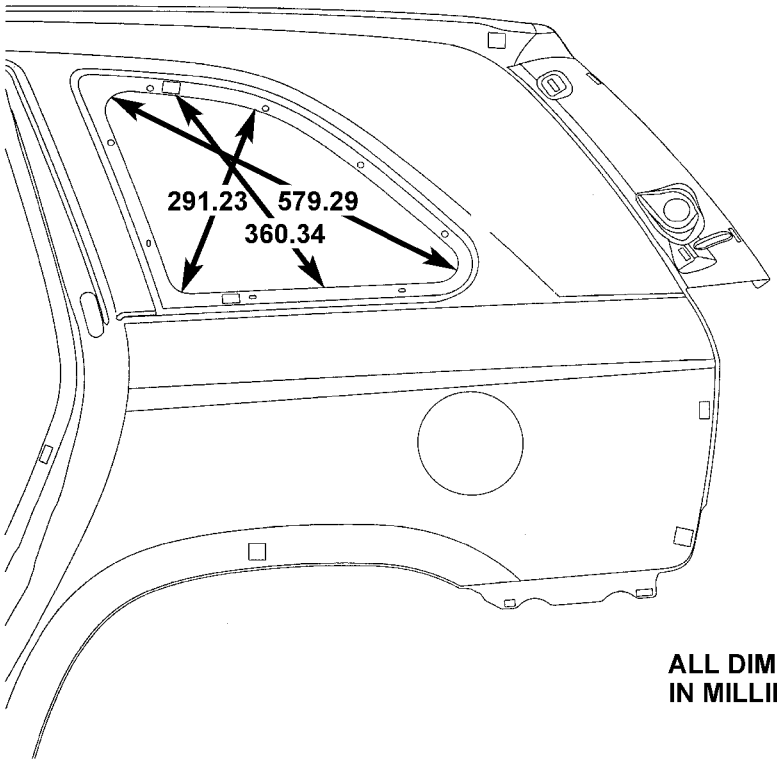


Fig. 6 REAR QUARTER WINDOW

OPENING DIMENSIONS (Continued)

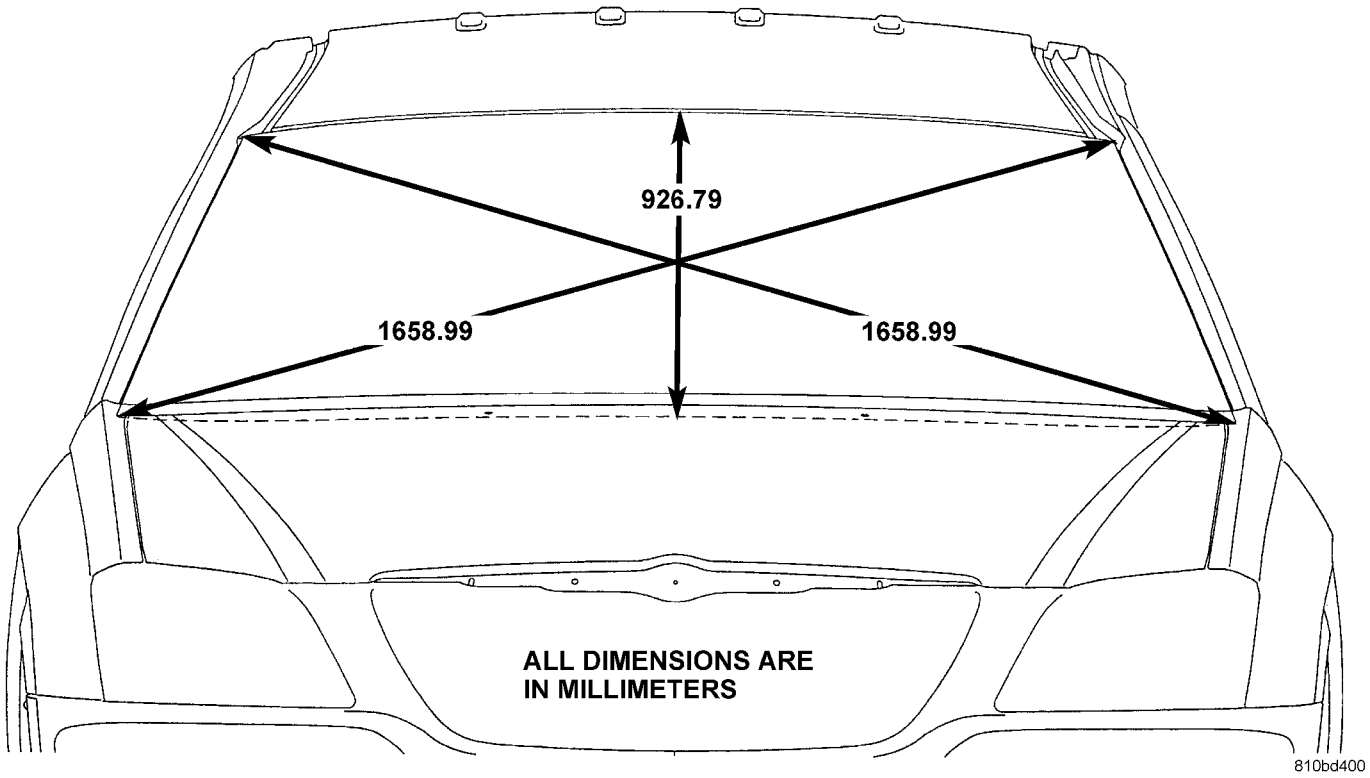


Fig. 7 WINDSHIELD

SEALER LOCATIONS

SPECIFICATIONS - BODY SEALING LOCATIONS

INDEX

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DASH PANEL (4 OF 4)	11
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INNER REAR QUARTER PANEL (2 OF 2)	14

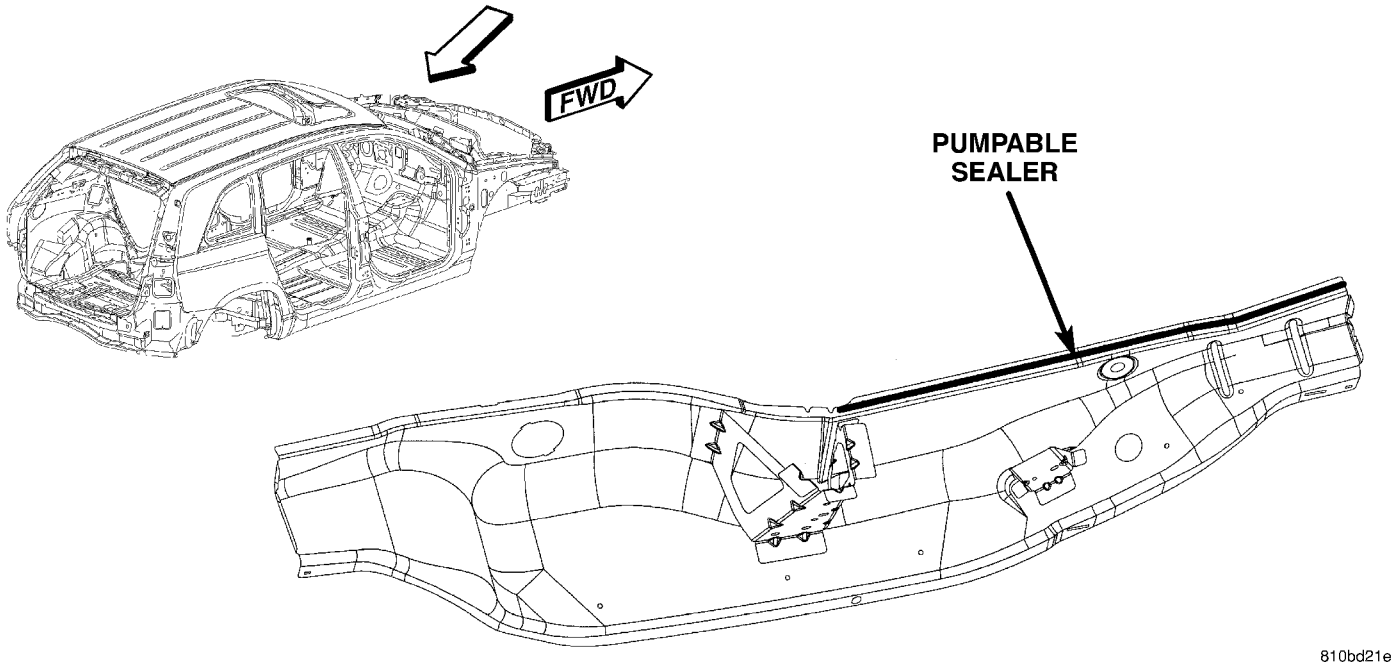


Fig. 8 DASH PANEL (1 OF 4)

SEALER LOCATIONS (Continued)

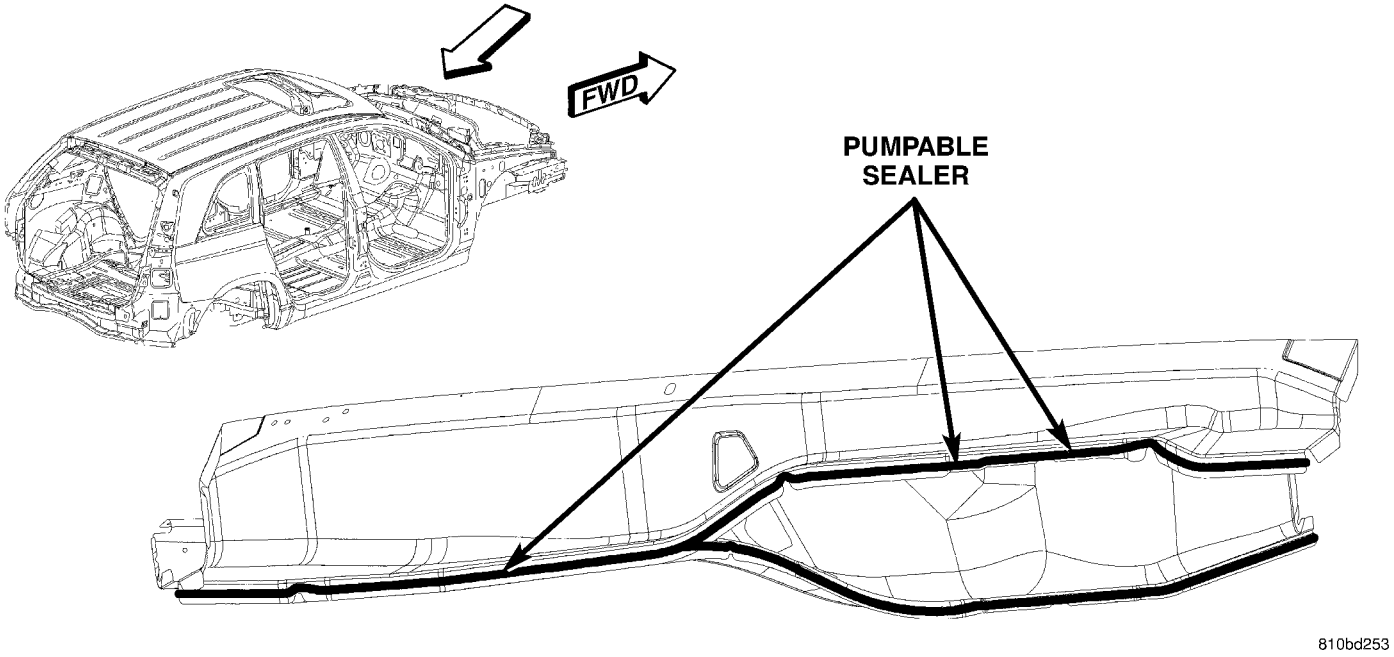


Fig. 9 DASH PANEL (2 OF 4)

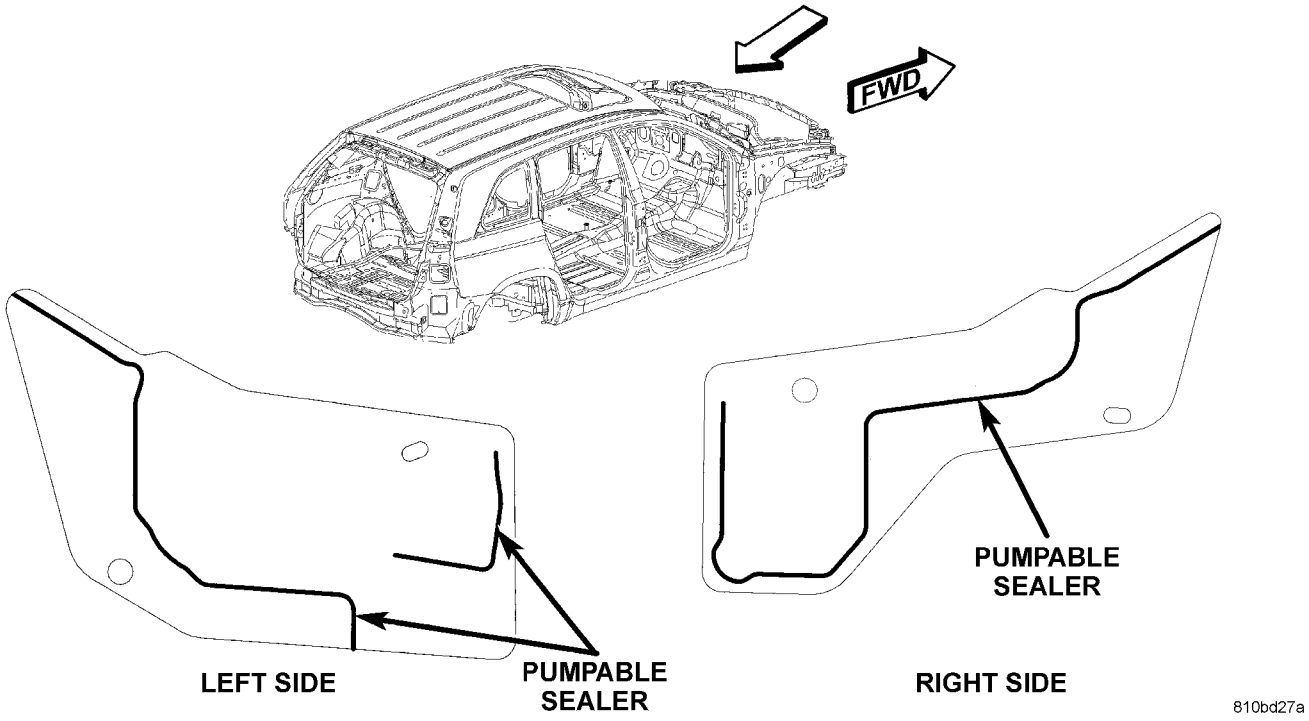


Fig. 10 DASH PANEL (3 OF 4)

SEALER LOCATIONS (Continued)

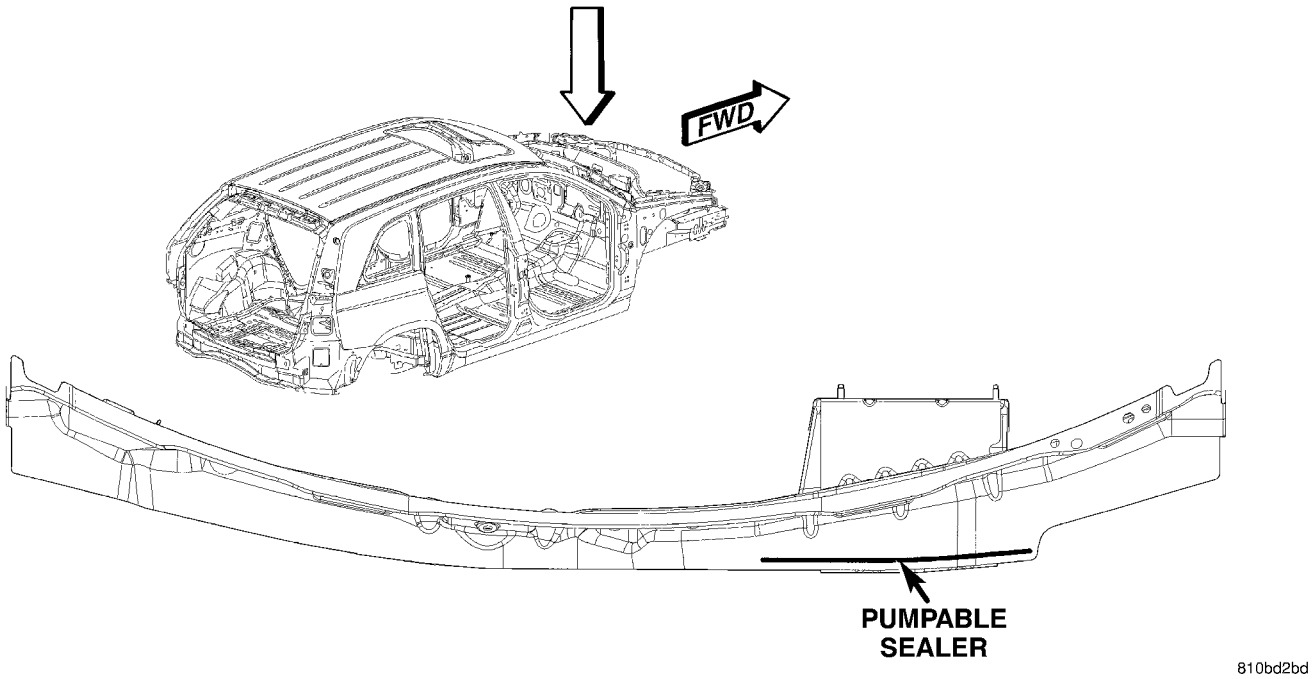


Fig. 11 DASH PANEL (4 OF 4)

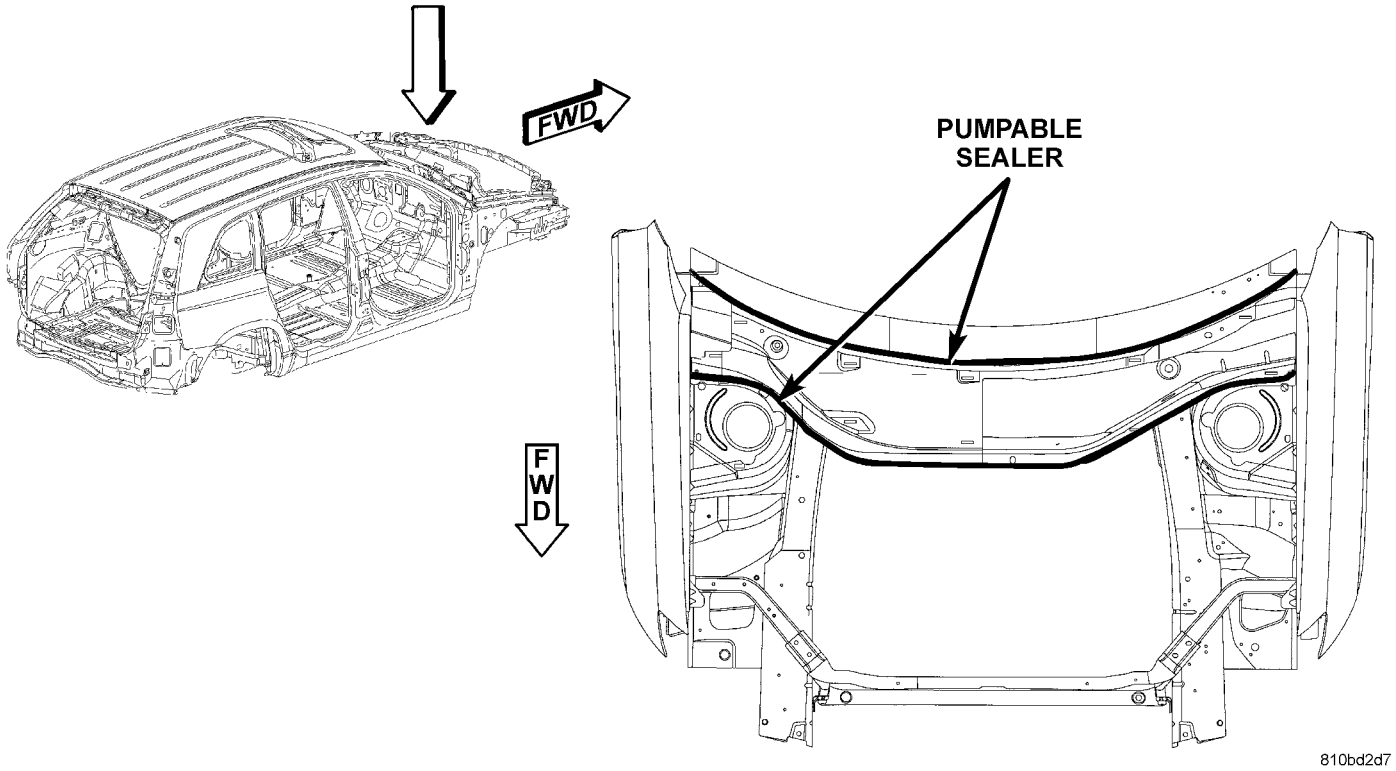


Fig. 12 ENGINE BOX

SEALER LOCATIONS (Continued)

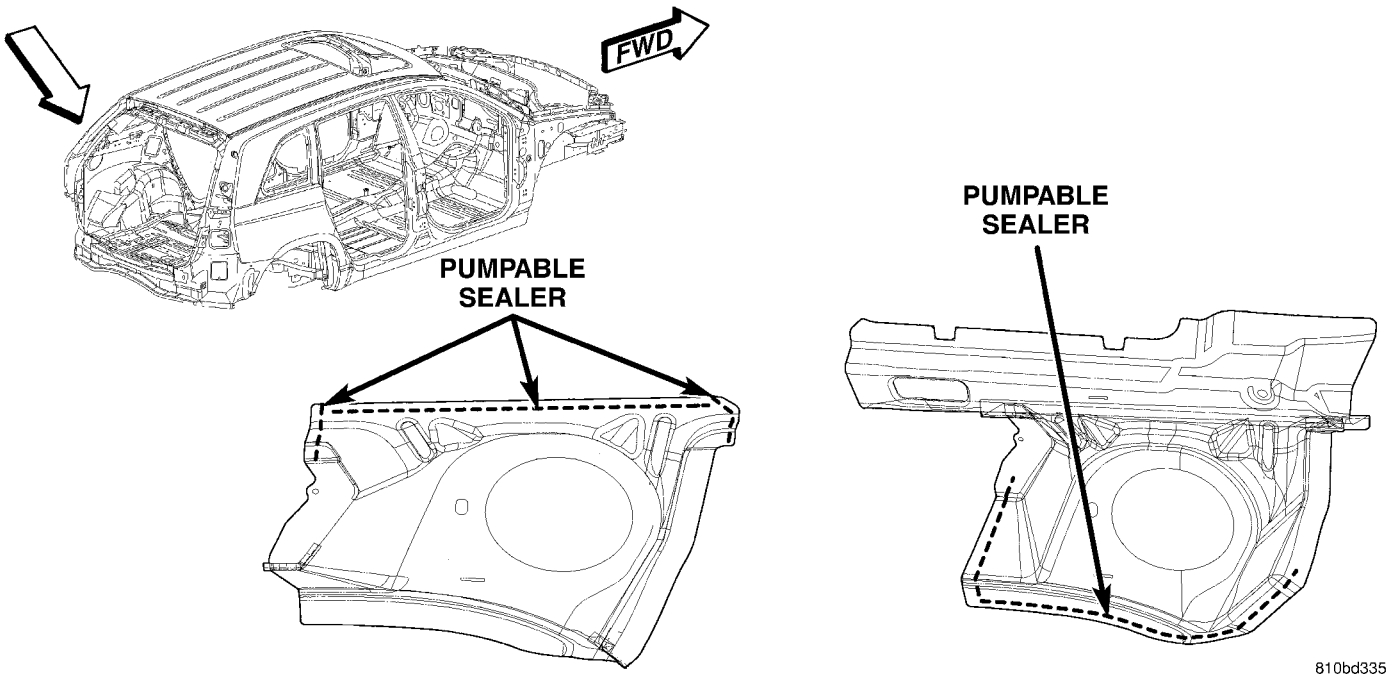


Fig. 13 INNER REAR QUARTER PANEL (1 OF 2)

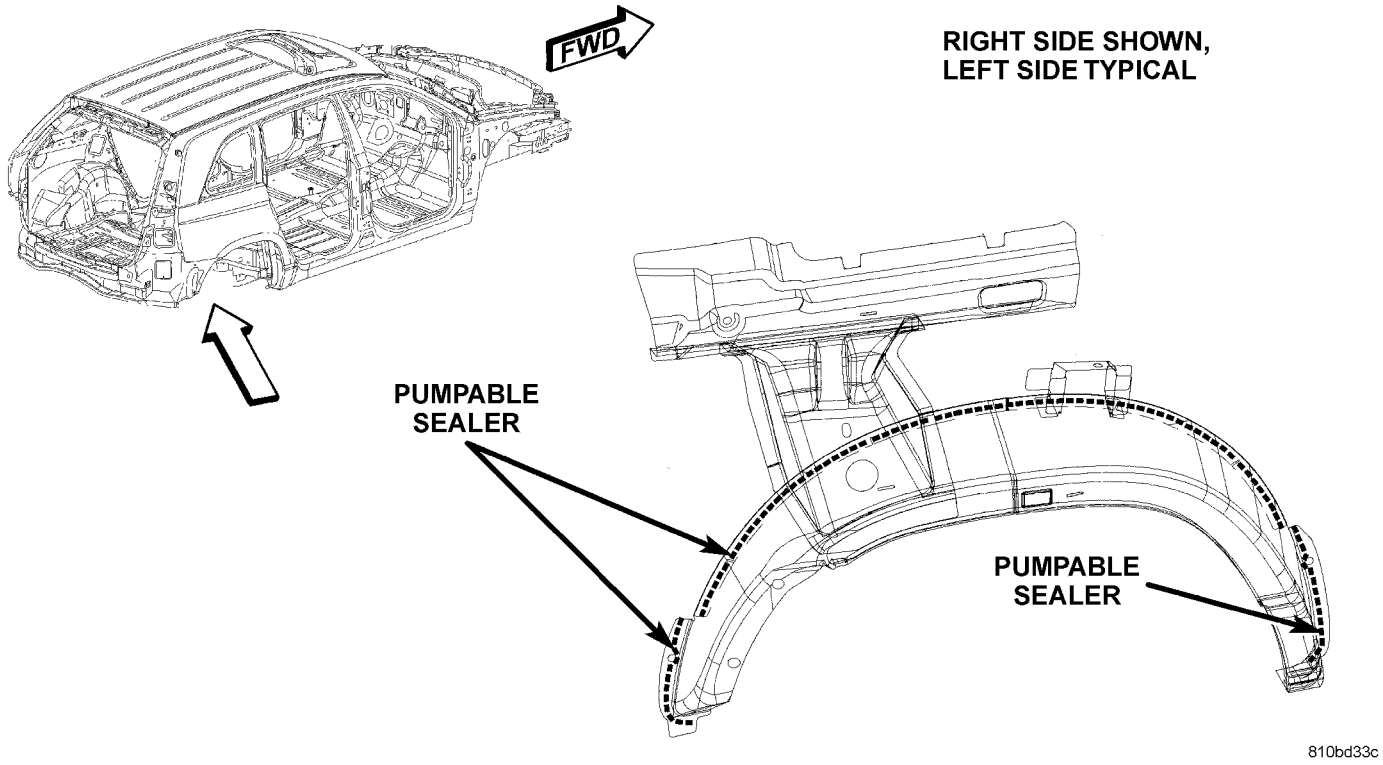


Fig. 14 INNER REAR QUARTER PANEL (2 OF 2)

STRUCTURAL ADHESIVE LOCATIONS

SPECIFICATIONS - STRUCTURAL ADHESIVE LOCATIONS

NOTE:
There are two types of Structural Adhesives used. A high strength epoxy and a high expansion lower strength antiflutter material. High strength epoxy is used on all except areas mark with a * in the index Description.

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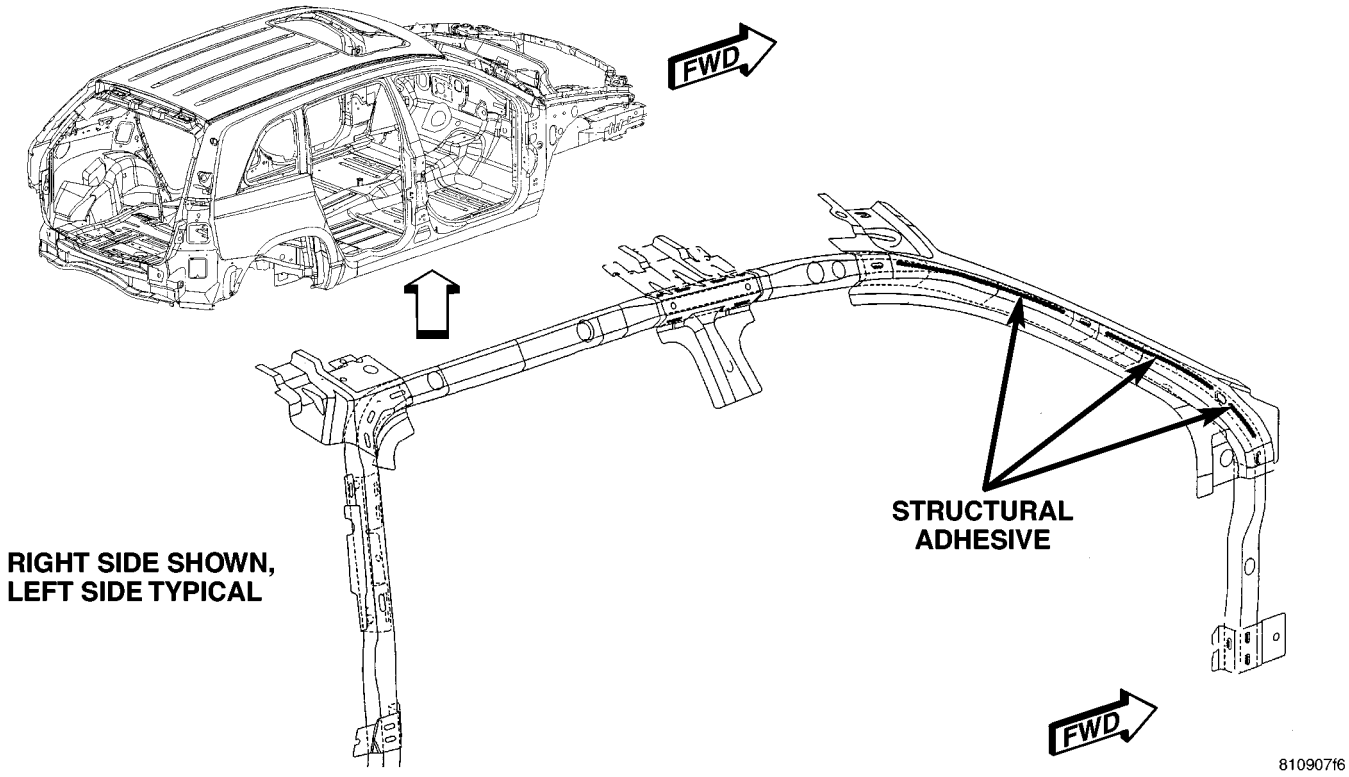


Fig. 15 A - PILLAR

STRUCTURAL ADHESIVE LOCATIONS (Continued)

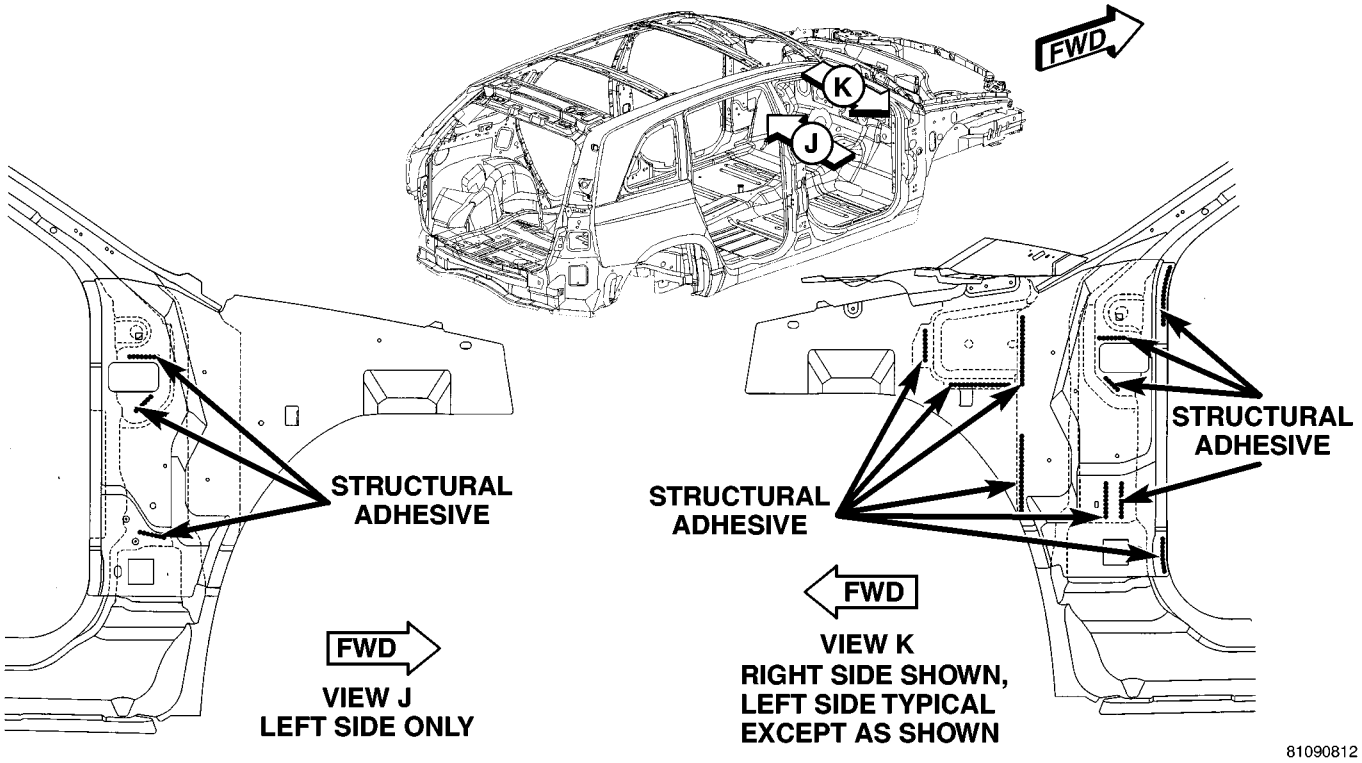


Fig. 16 BODY COMPLETE (1 OF 4)

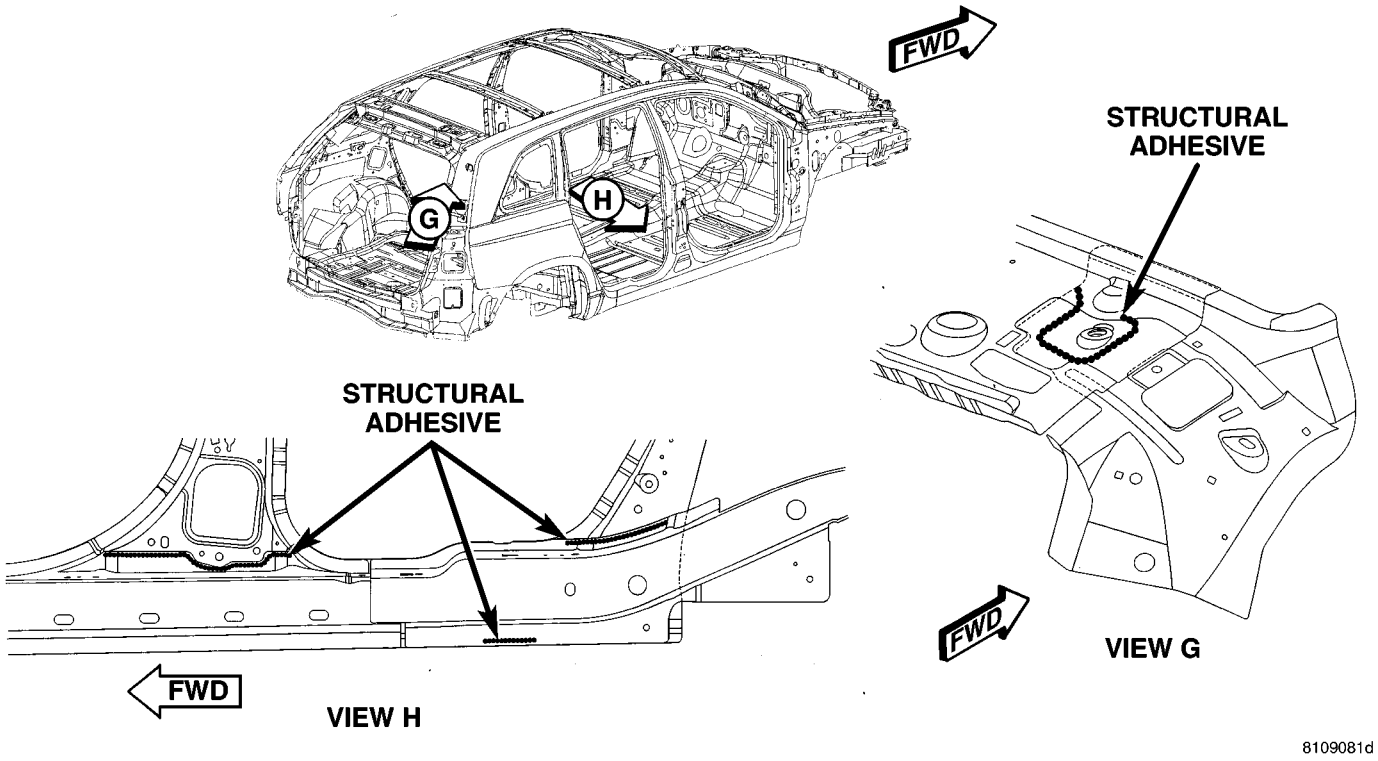


Fig. 17 BODY COMPLETE (2 OF 4)

STRUCTURAL ADHESIVE LOCATIONS (Continued)

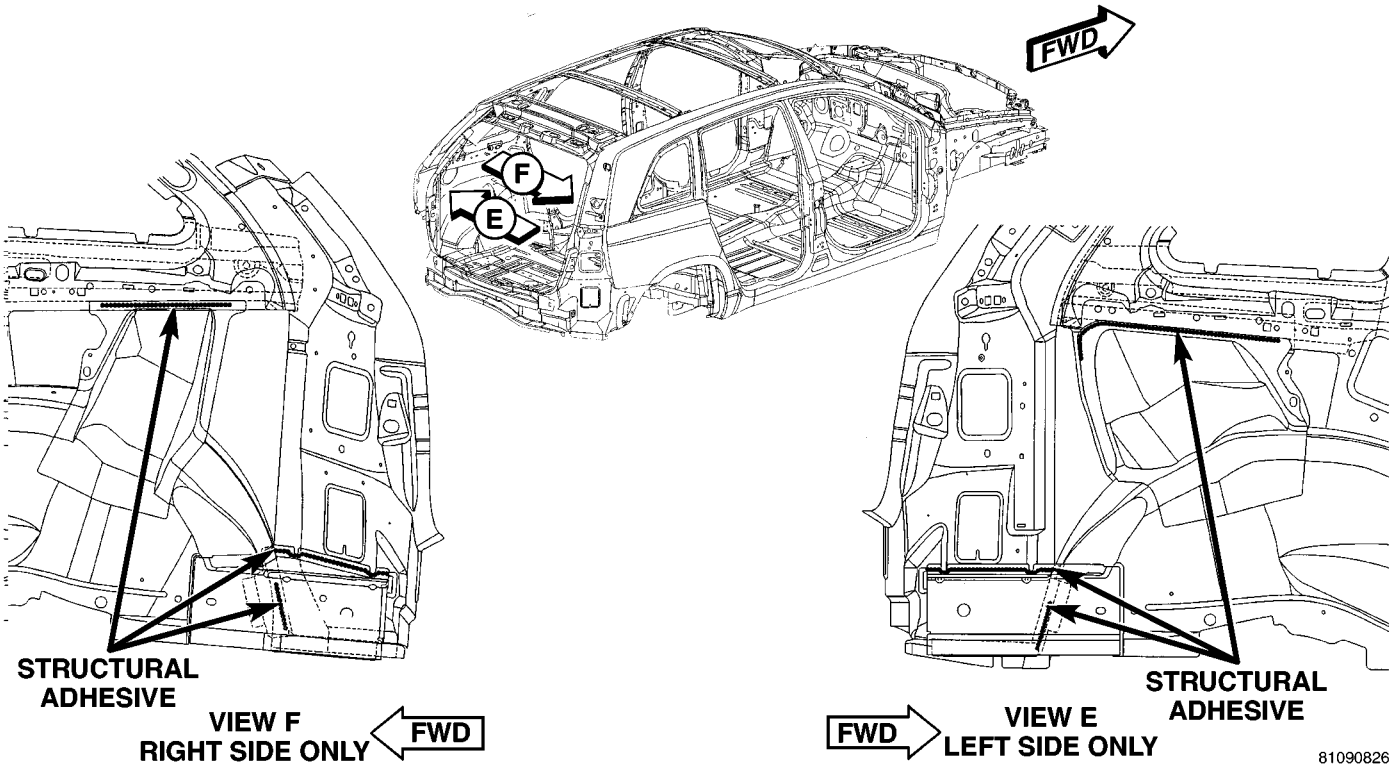


Fig. 18 BODY COMPLETE (3 OF 4)

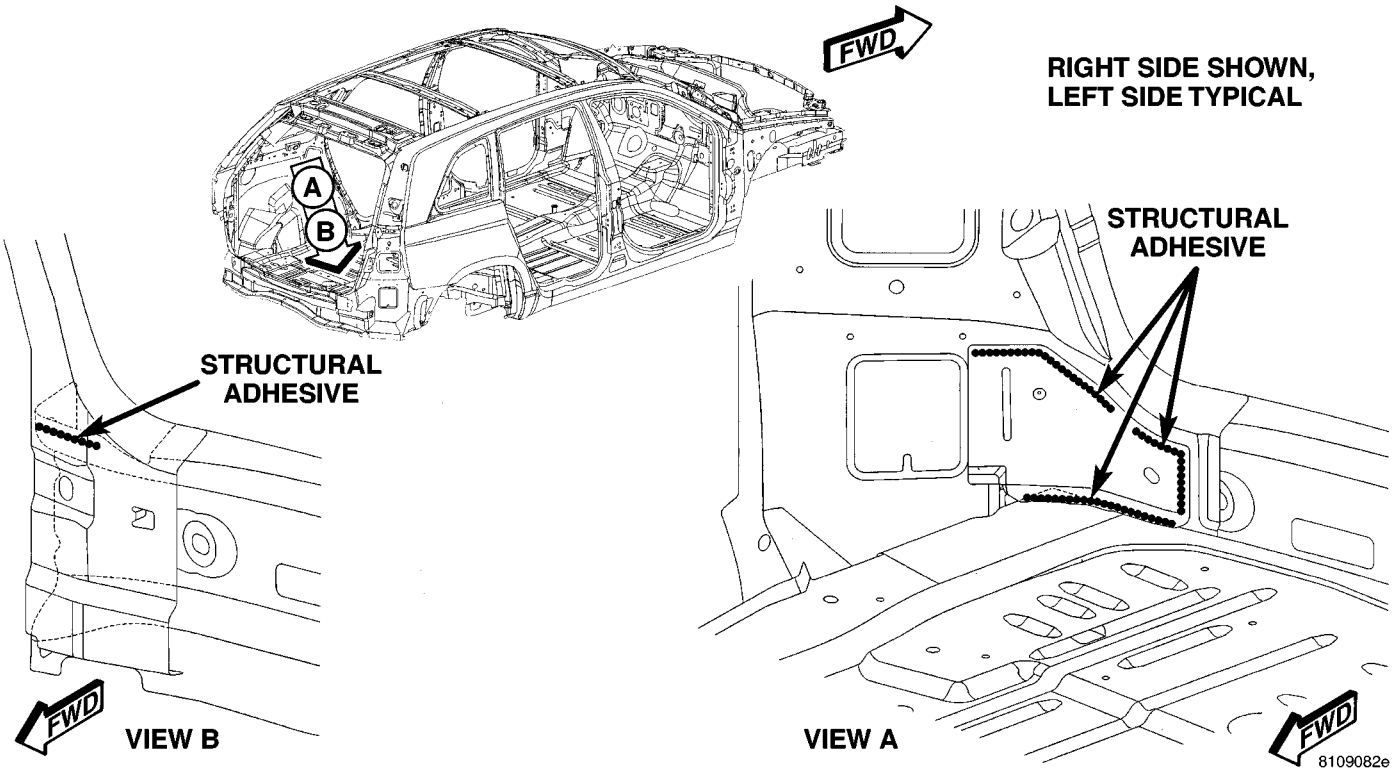


Fig. 19 BODY COMPLETE (4 OF 4)

STRUCTURAL ADHESIVE LOCATIONS (Continued)

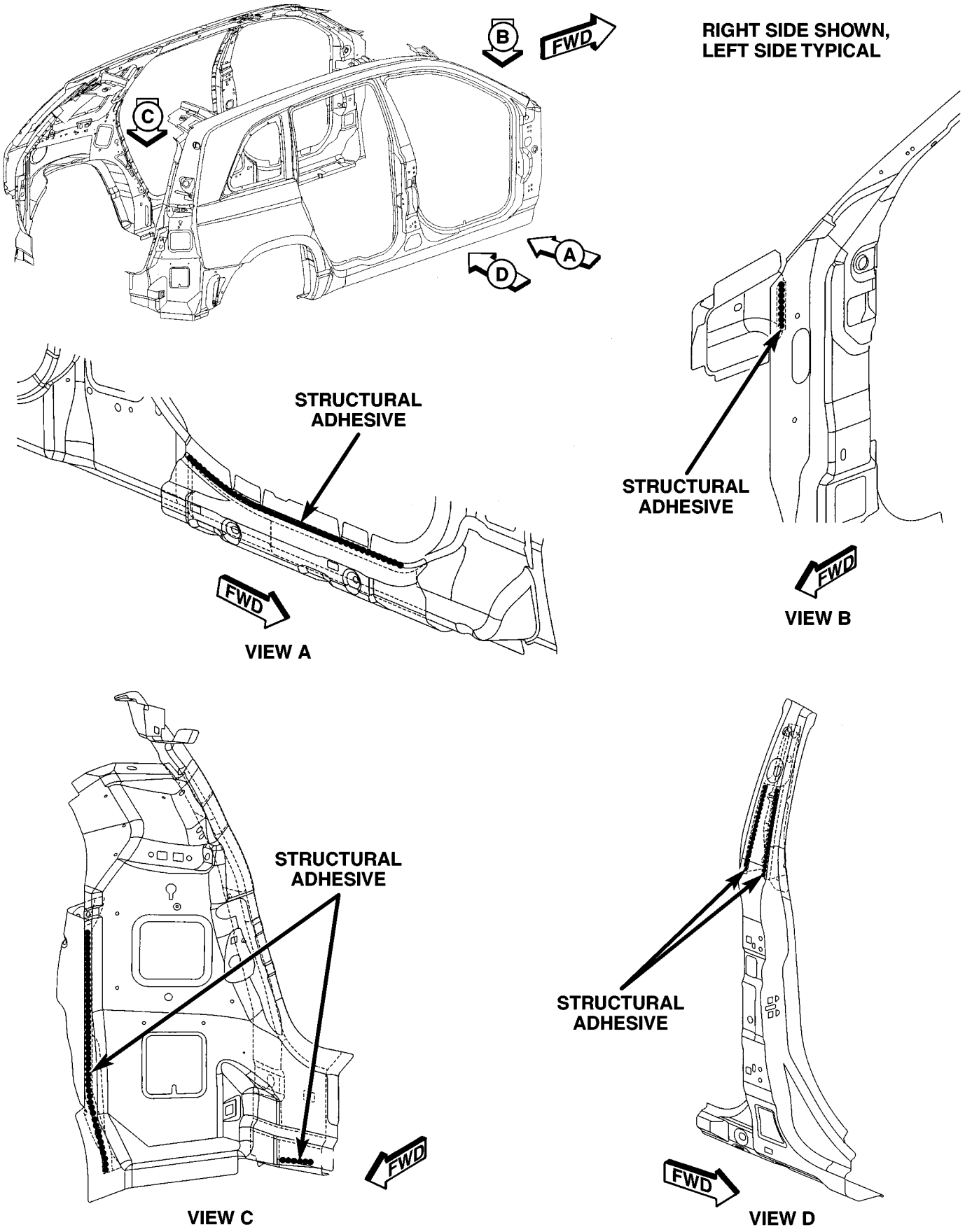


Fig. 20 BODY SIDE APERTURE COMPLETE (1 OF 2)

STRUCTURAL ADHESIVE LOCATIONS (Continued)

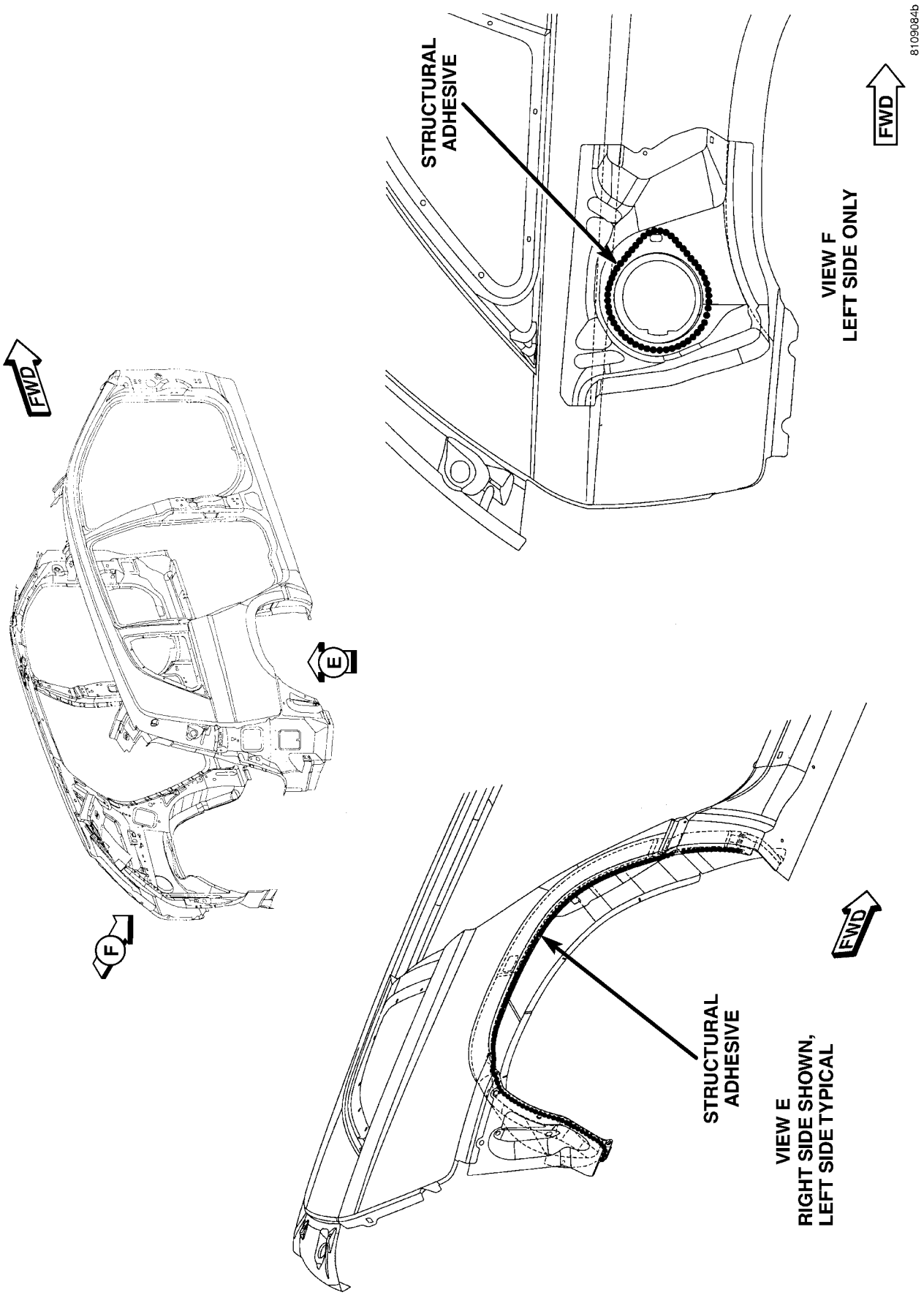


Fig. 21 BODY SIDE APERTURE COMPLETE (2 OF 2)

STRUCTURAL ADHESIVE LOCATIONS (Continued)

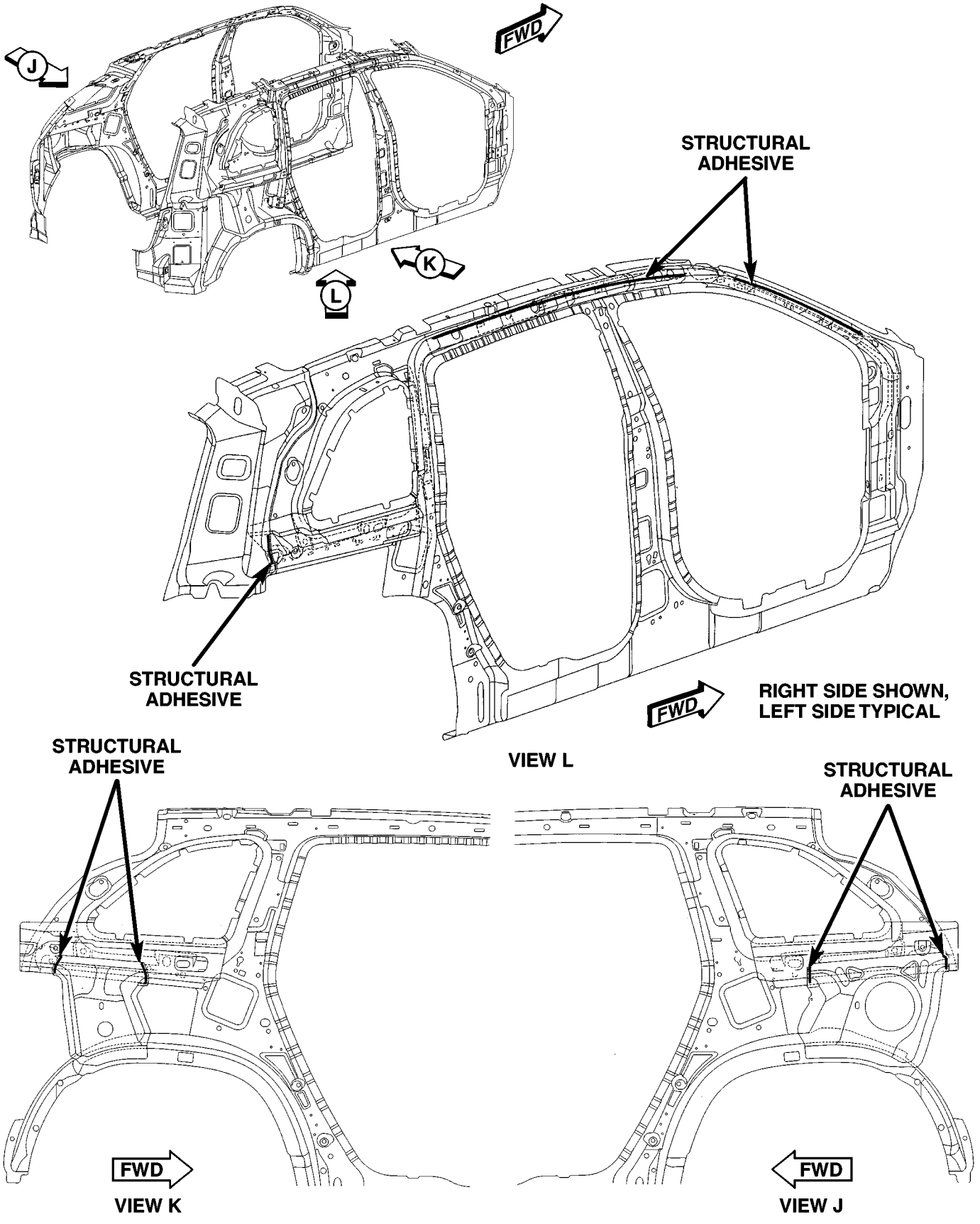
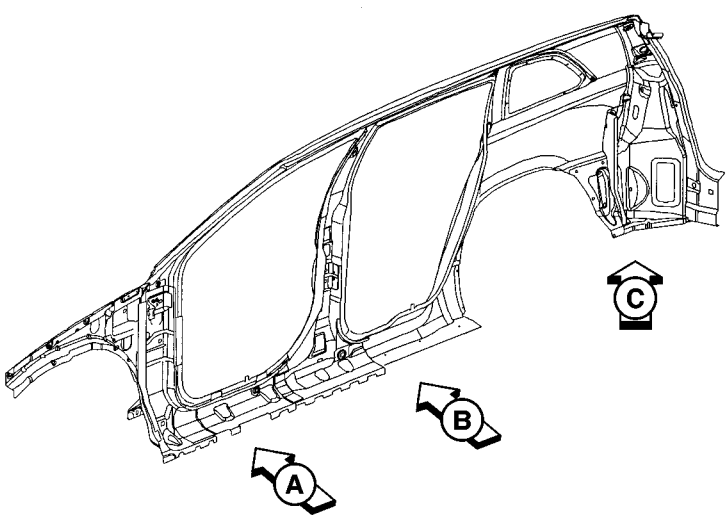
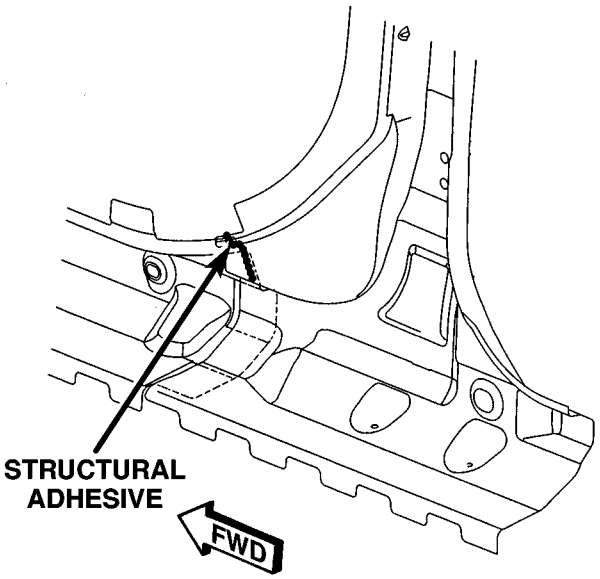


Fig. 22 BODY SIDE APERTURE COMPLETE INNER

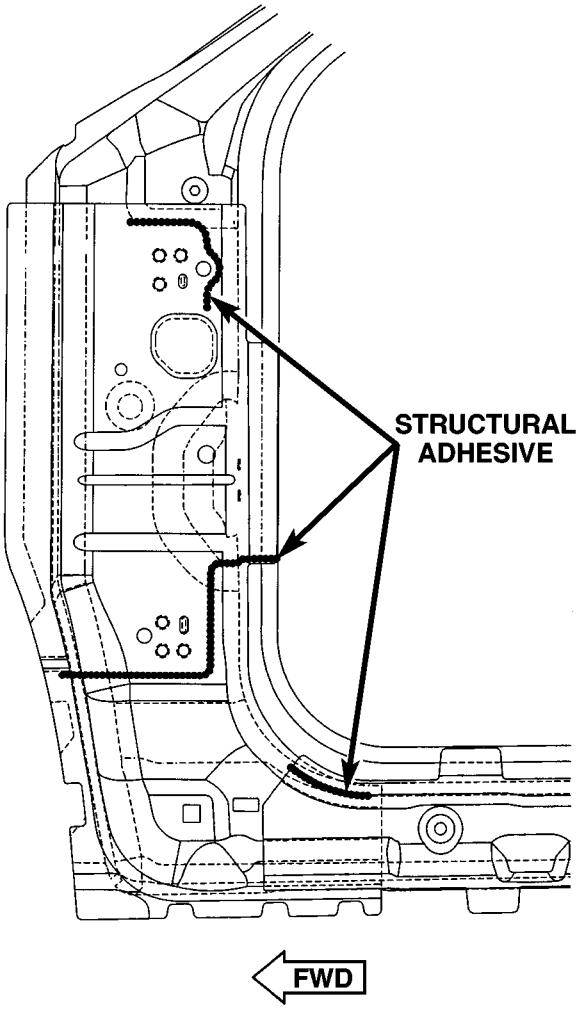
STRUCTURAL ADHESIVE LOCATIONS (Continued)



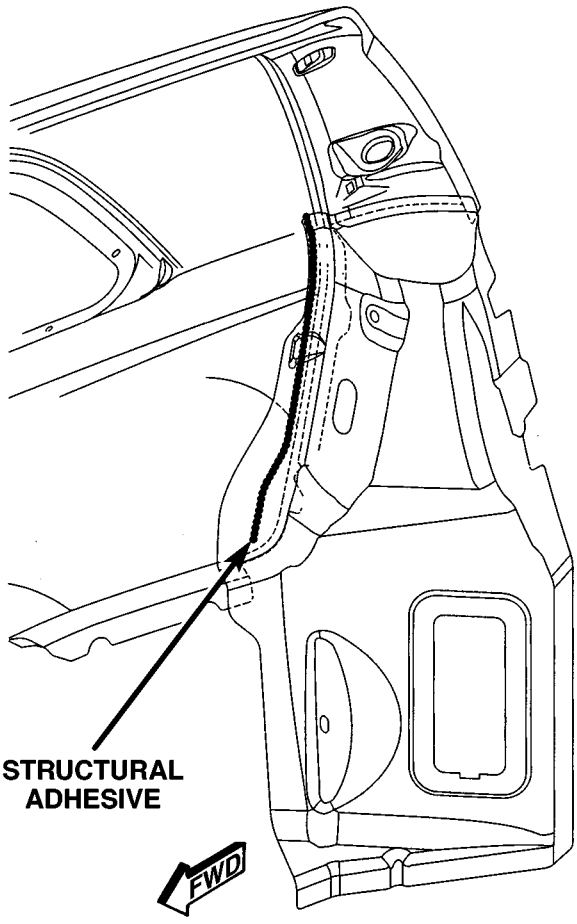
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL



VIEW B



VIEW A



VIEW C

8109085a

Fig. 23 BODY SIDE APERTURE COMPLETE OUTER

STRUCTURAL ADHESIVE LOCATIONS (Continued)

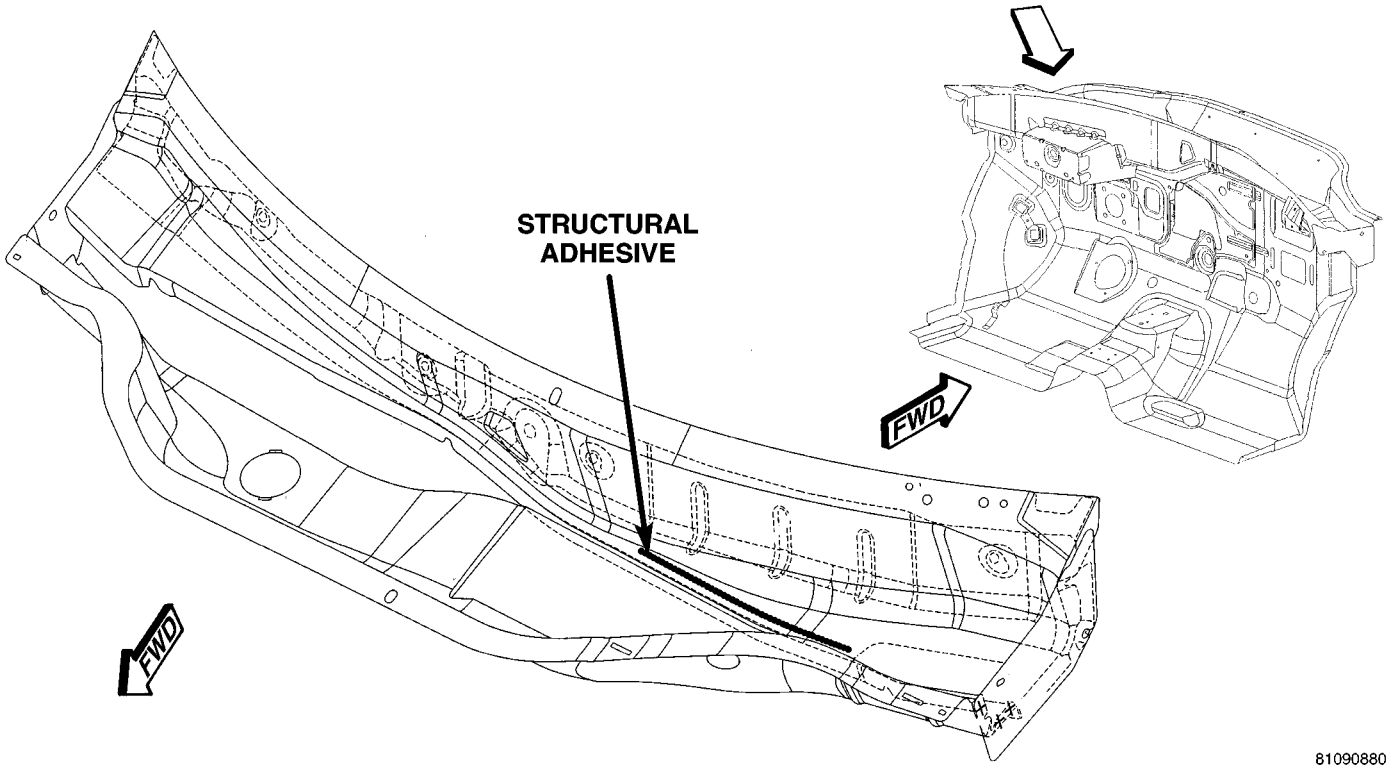


Fig. 24 DASH ASSEMBLY

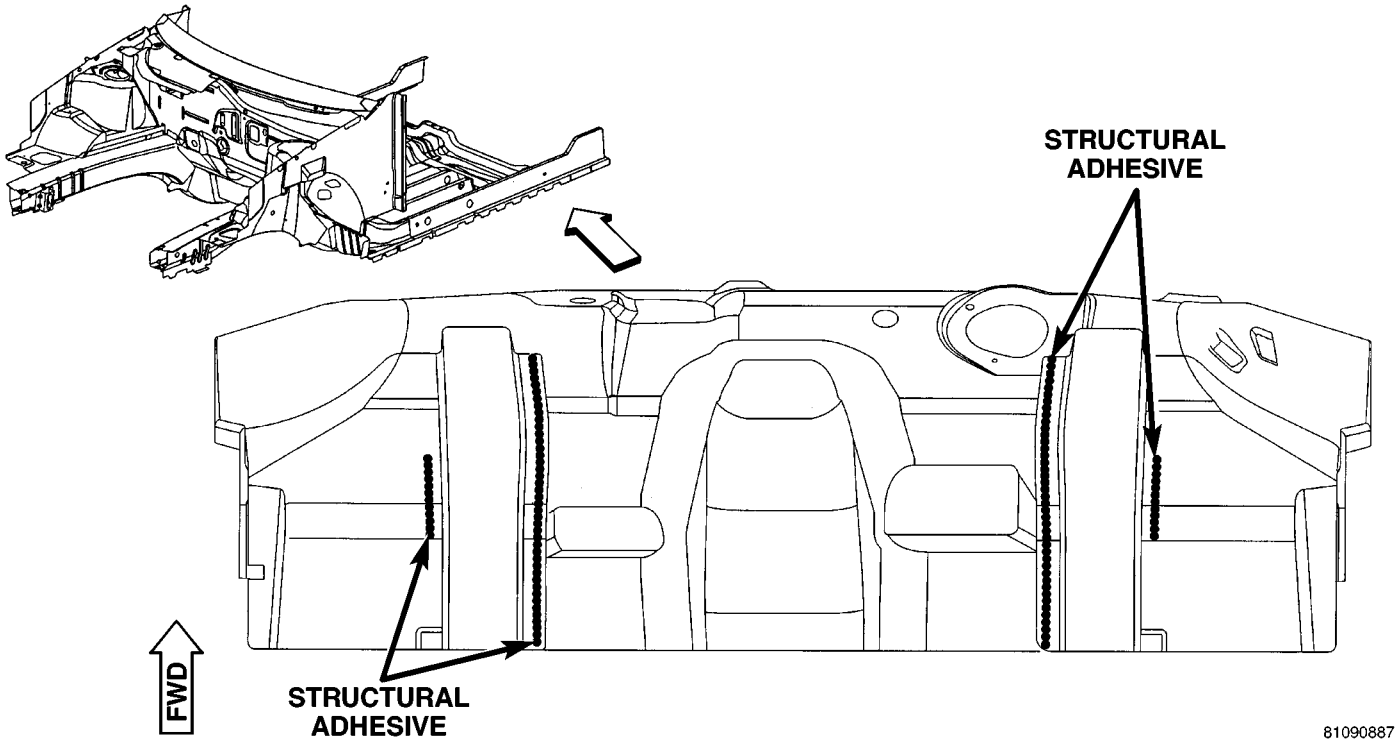


Fig. 25 ENGINE BOX COMPLETE

STRUCTURAL ADHESIVE LOCATIONS (Continued)

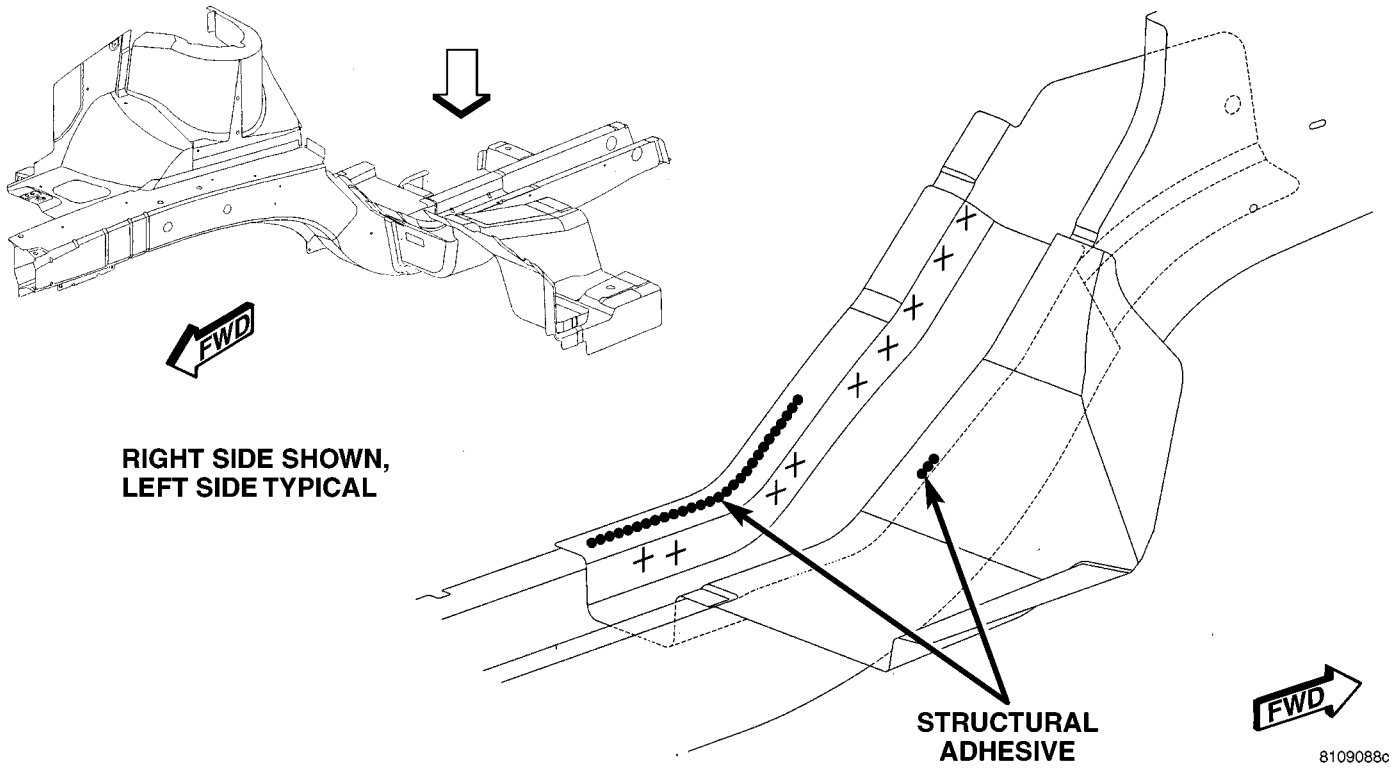


Fig. 26 FRONT RAILS

STRUCTURAL ADHESIVE LOCATIONS (Continued)

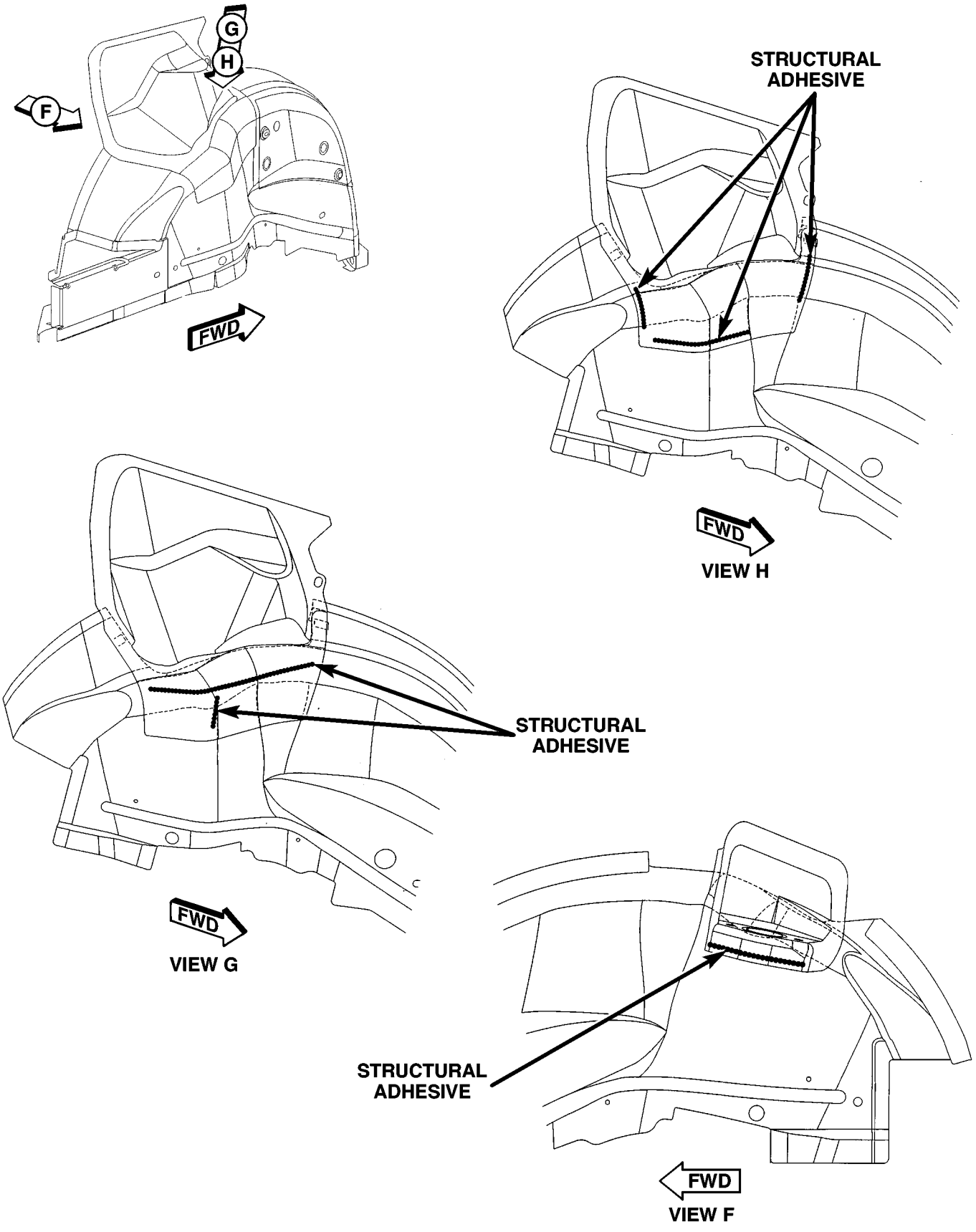


Fig. 27 INNER REAR WHEELHOUSE LEFT SIDE

STRUCTURAL ADHESIVE LOCATIONS (Continued)

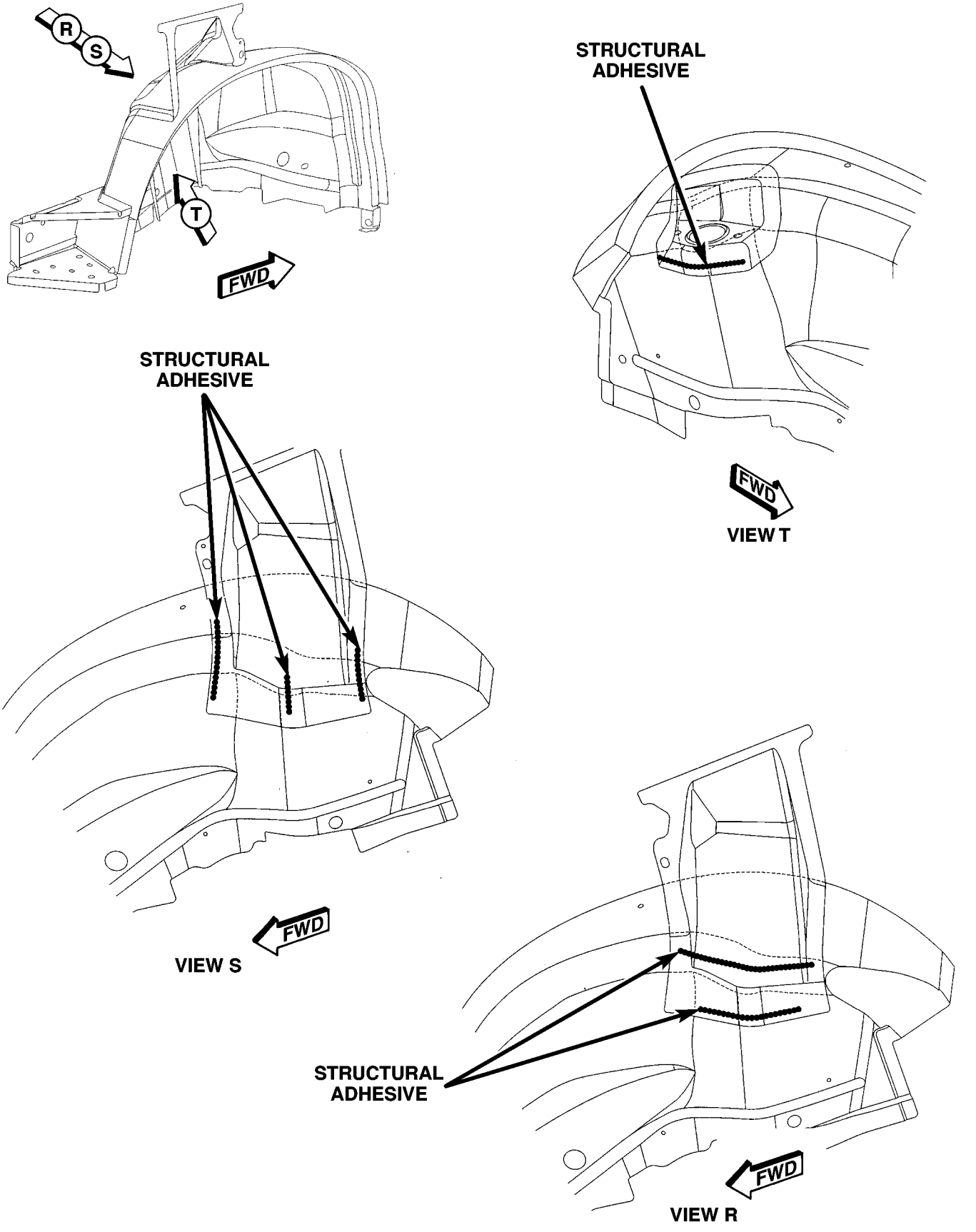


Fig. 28 INNER REAR WHEELHOUSE RIGHT SIDE

STRUCTURAL ADHESIVE LOCATIONS (Continued)

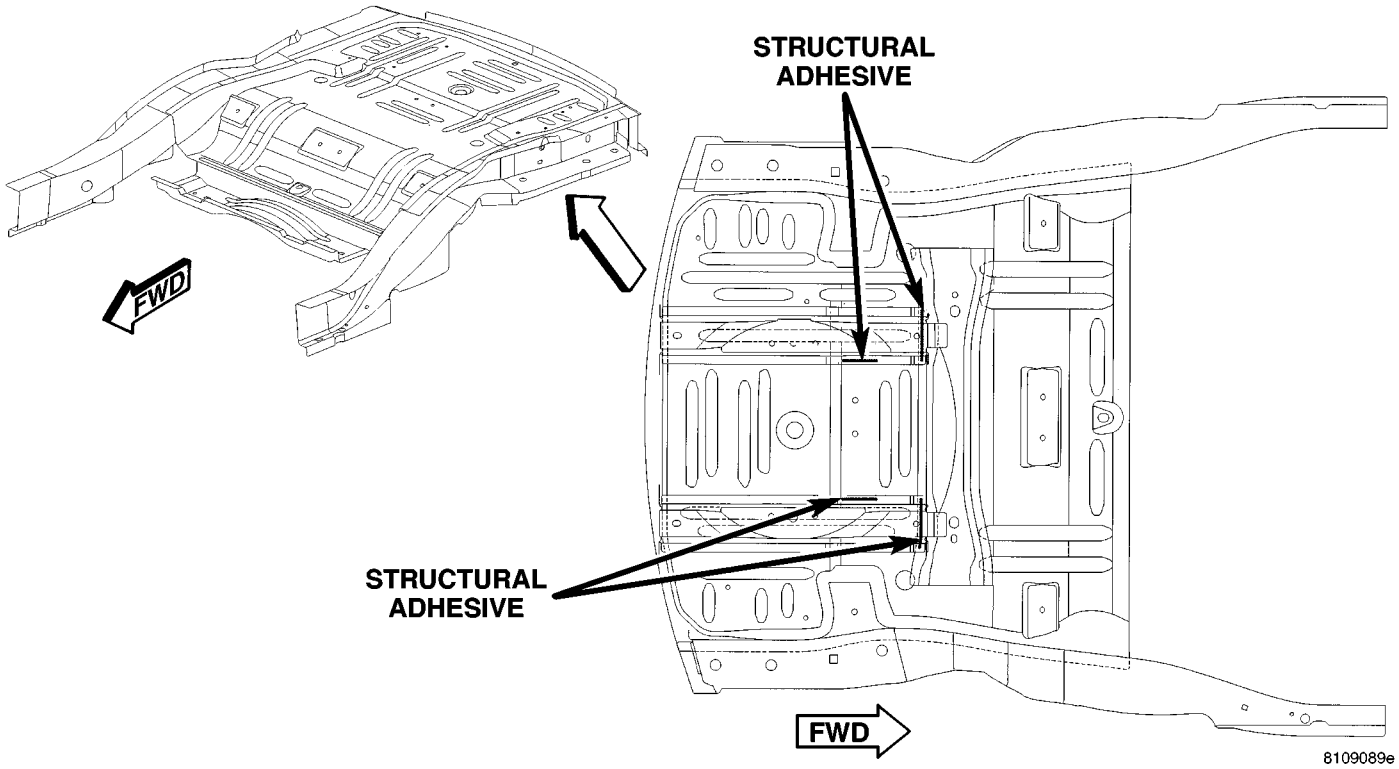


Fig. 29 REAR FLOOR TO LADDER

STRUCTURAL ADHESIVE LOCATIONS (Continued)

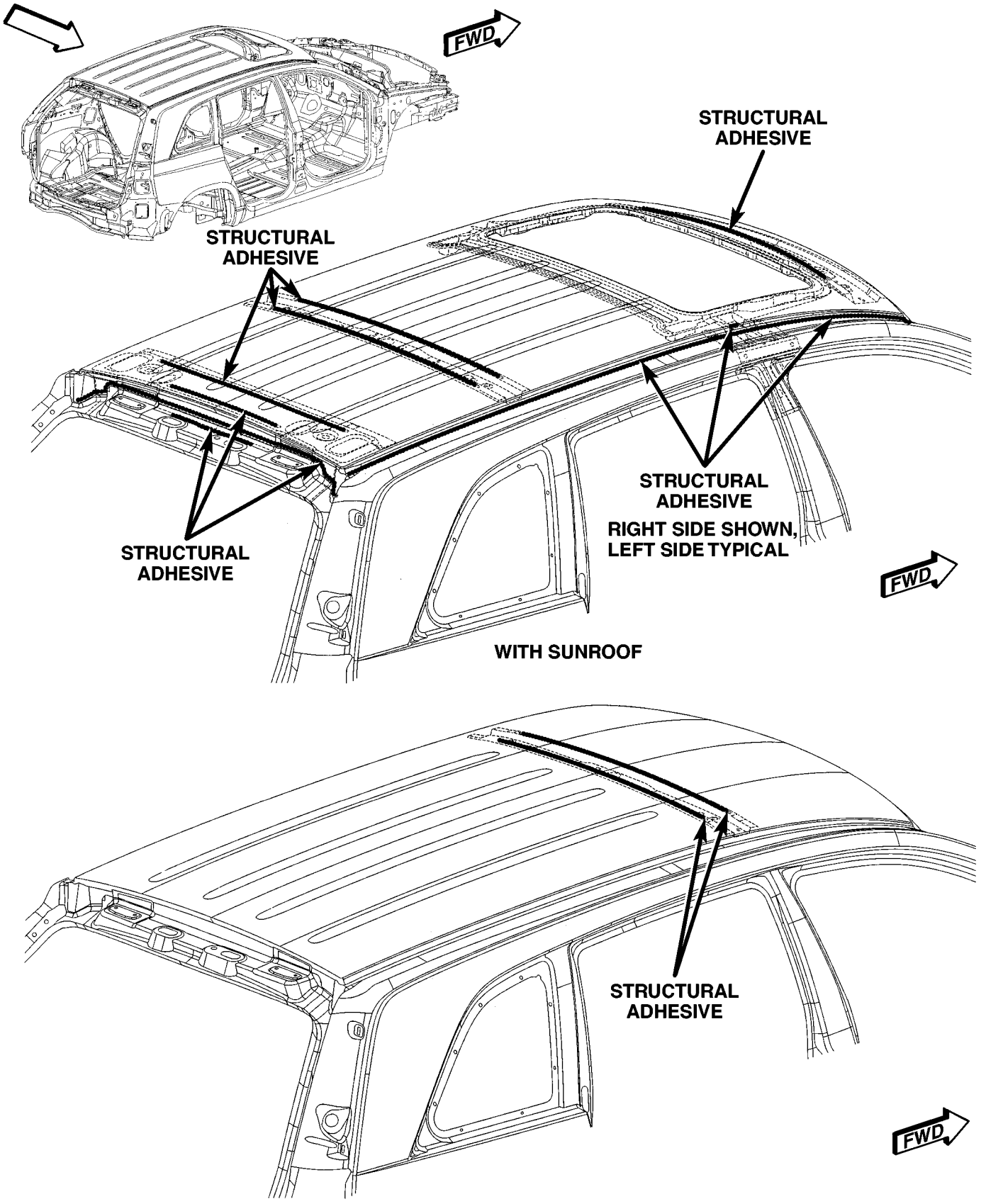


Fig. 30 ROOF (1 OF 2)

STRUCTURAL ADHESIVE LOCATIONS (Continued)

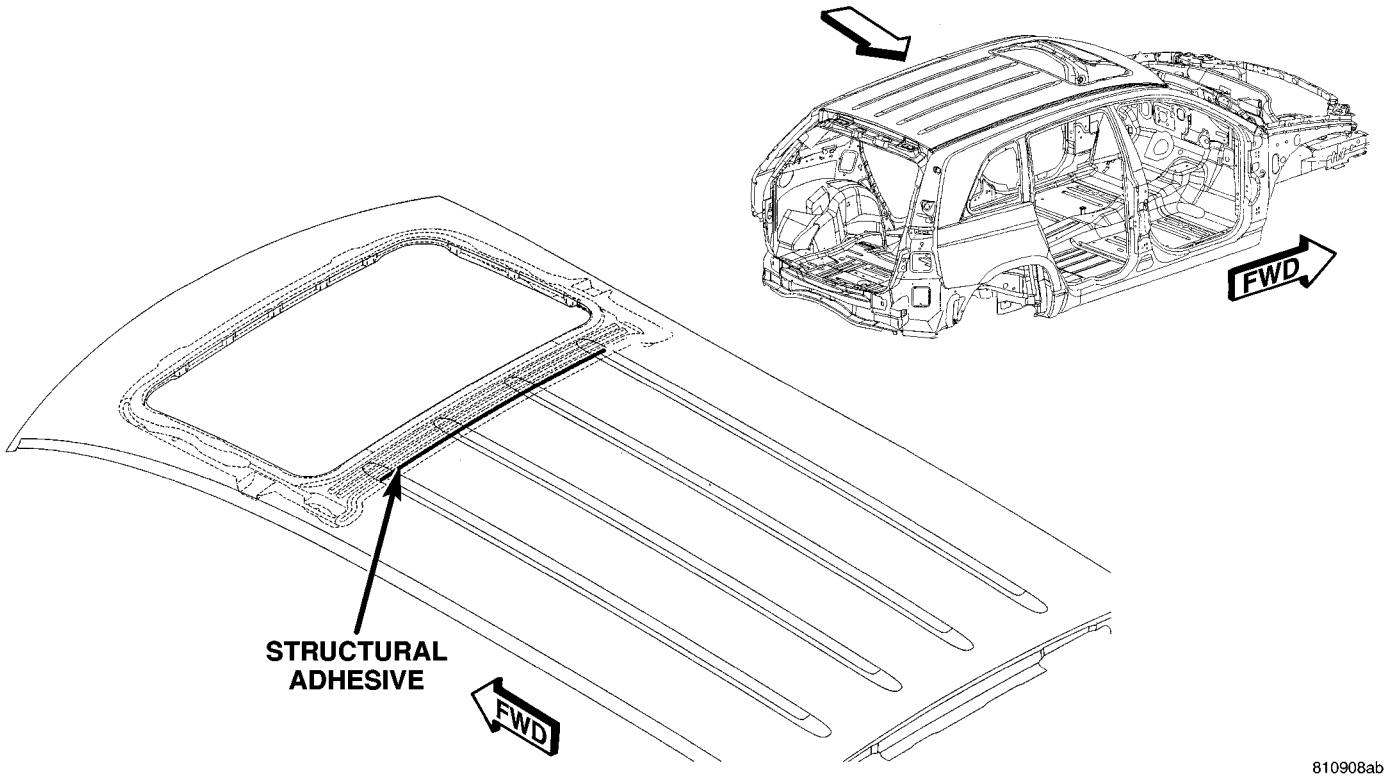


Fig. 31 ROOF (2 OF 2)

STRUCTURAL ADHESIVE LOCATIONS (Continued)

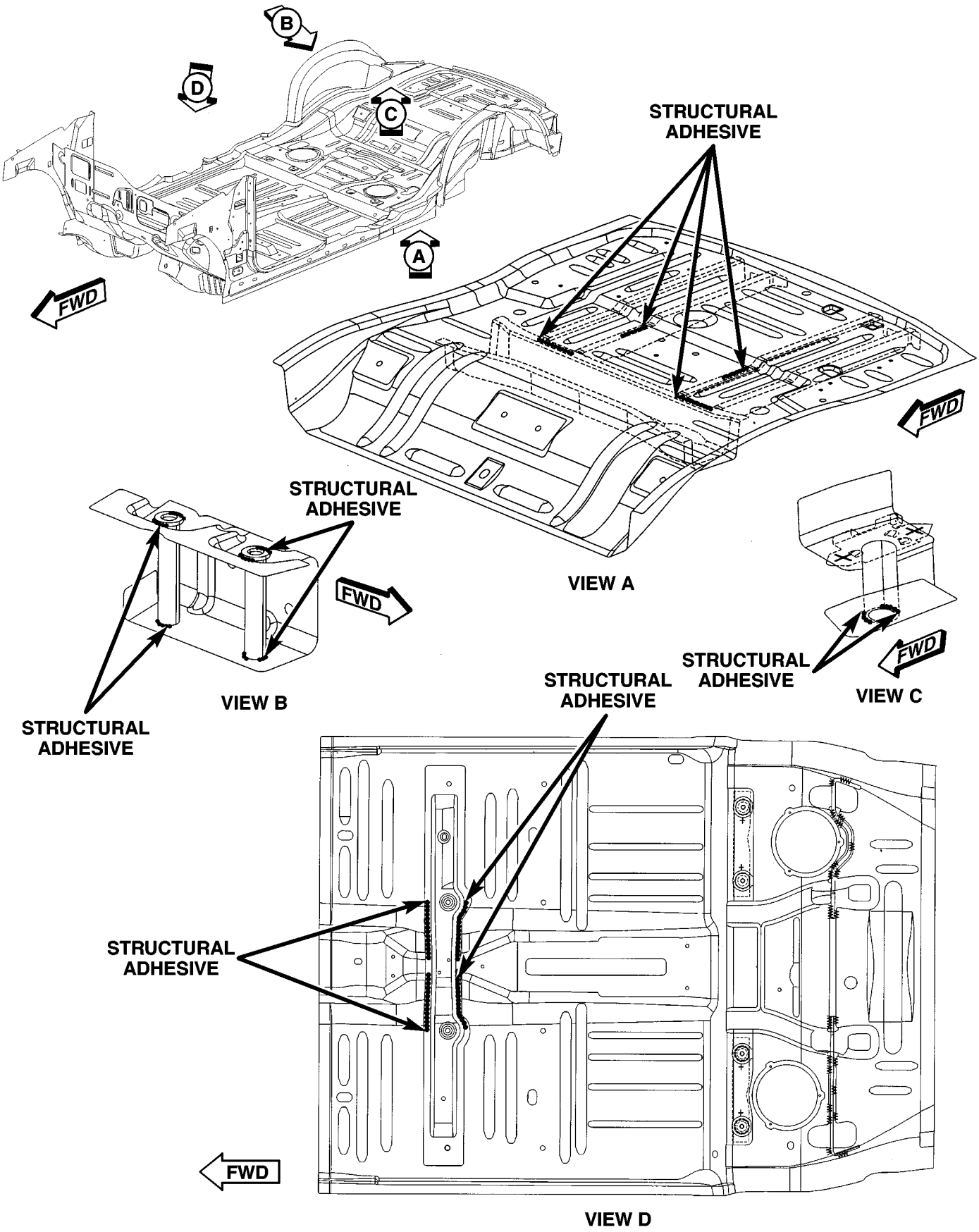


Fig. 32 UNDERBODY

STRUCTURAL ADHESIVE LOCATIONS (Continued)

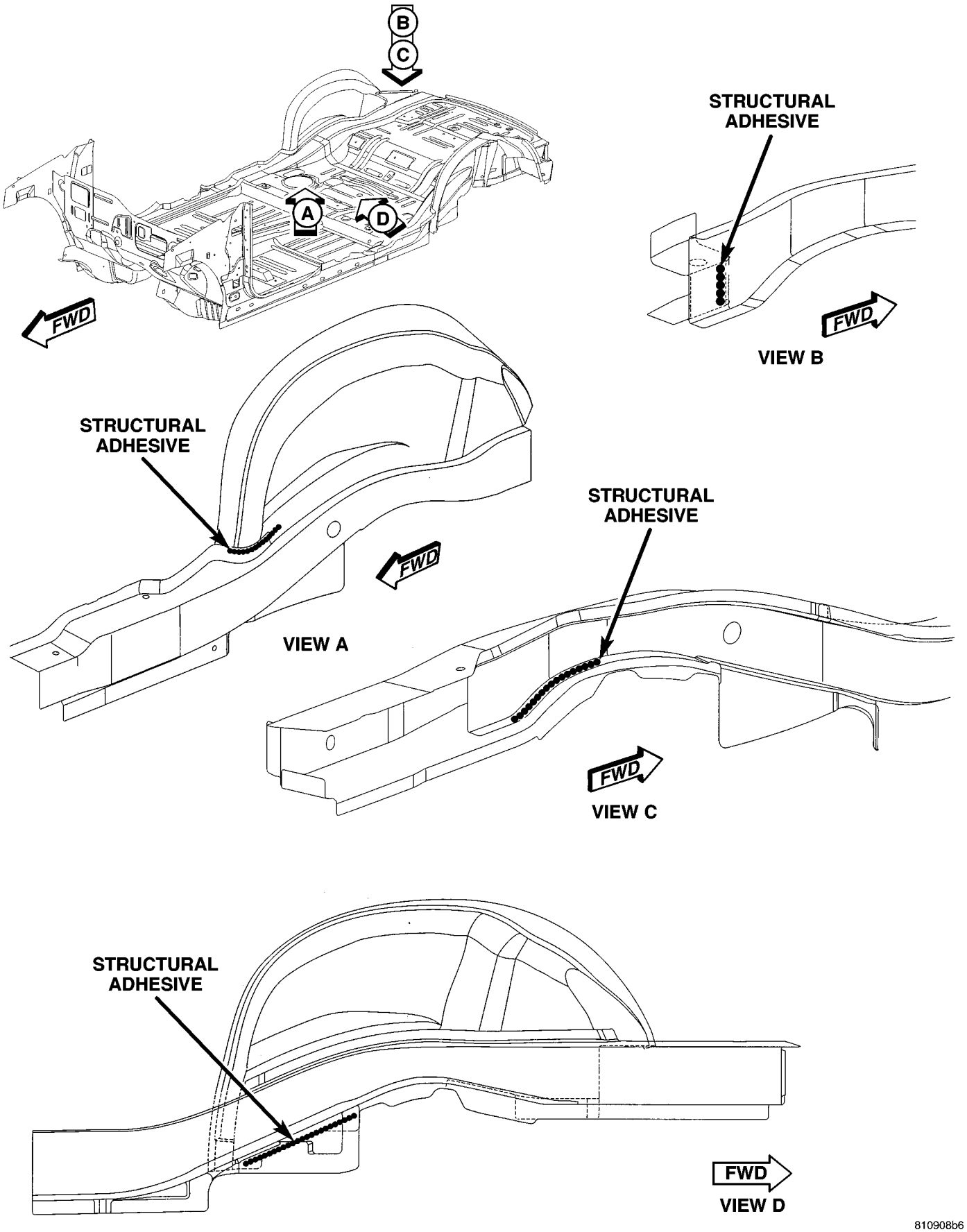


Fig. 33 UNDERBODY COMPLETE (1 OF 4)

STRUCTURAL ADHESIVE LOCATIONS (Continued)

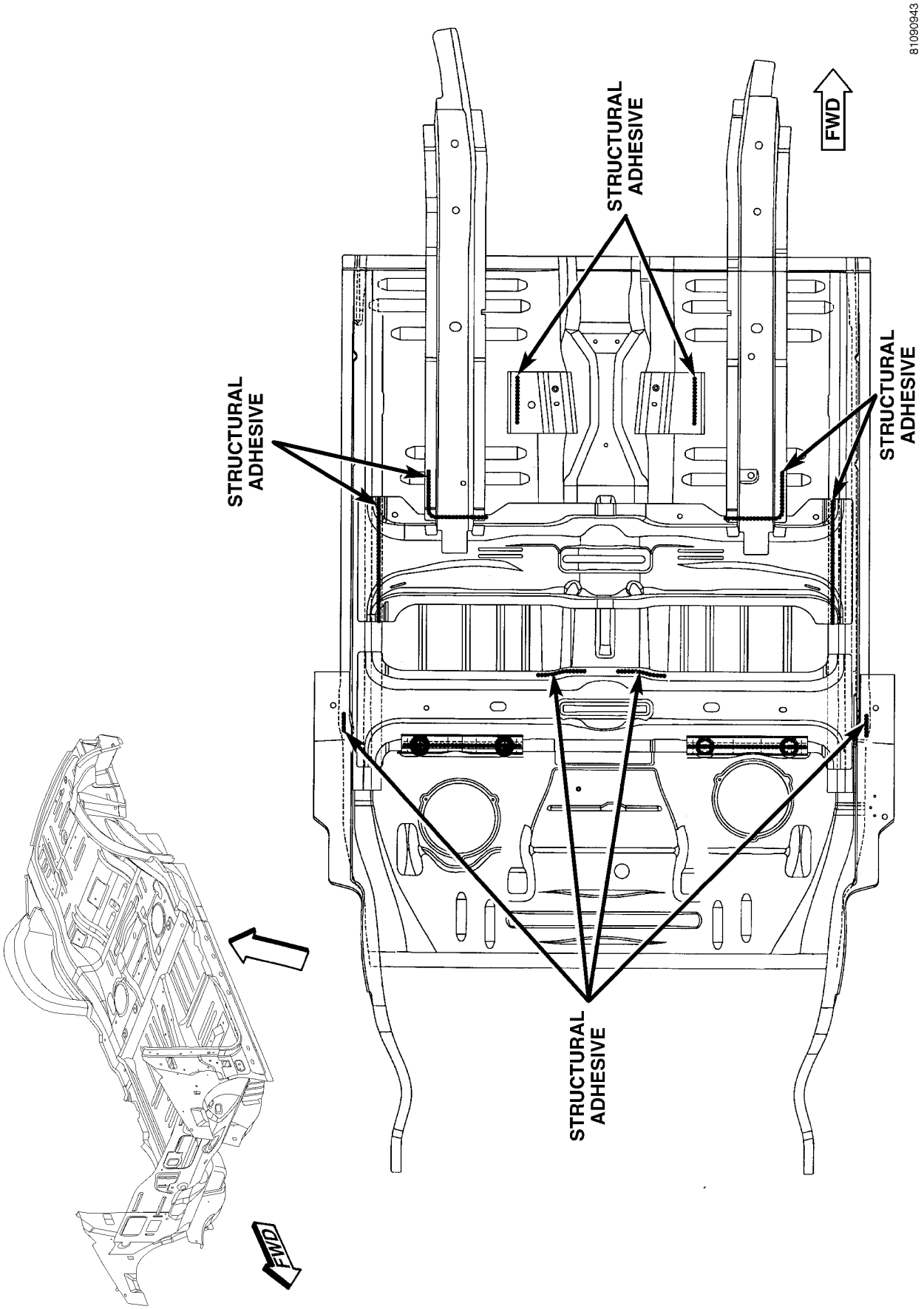


Fig. 34 UNDERBODY COMPLETE (2 OF 4)

STRUCTURAL ADHESIVE LOCATIONS (Continued)

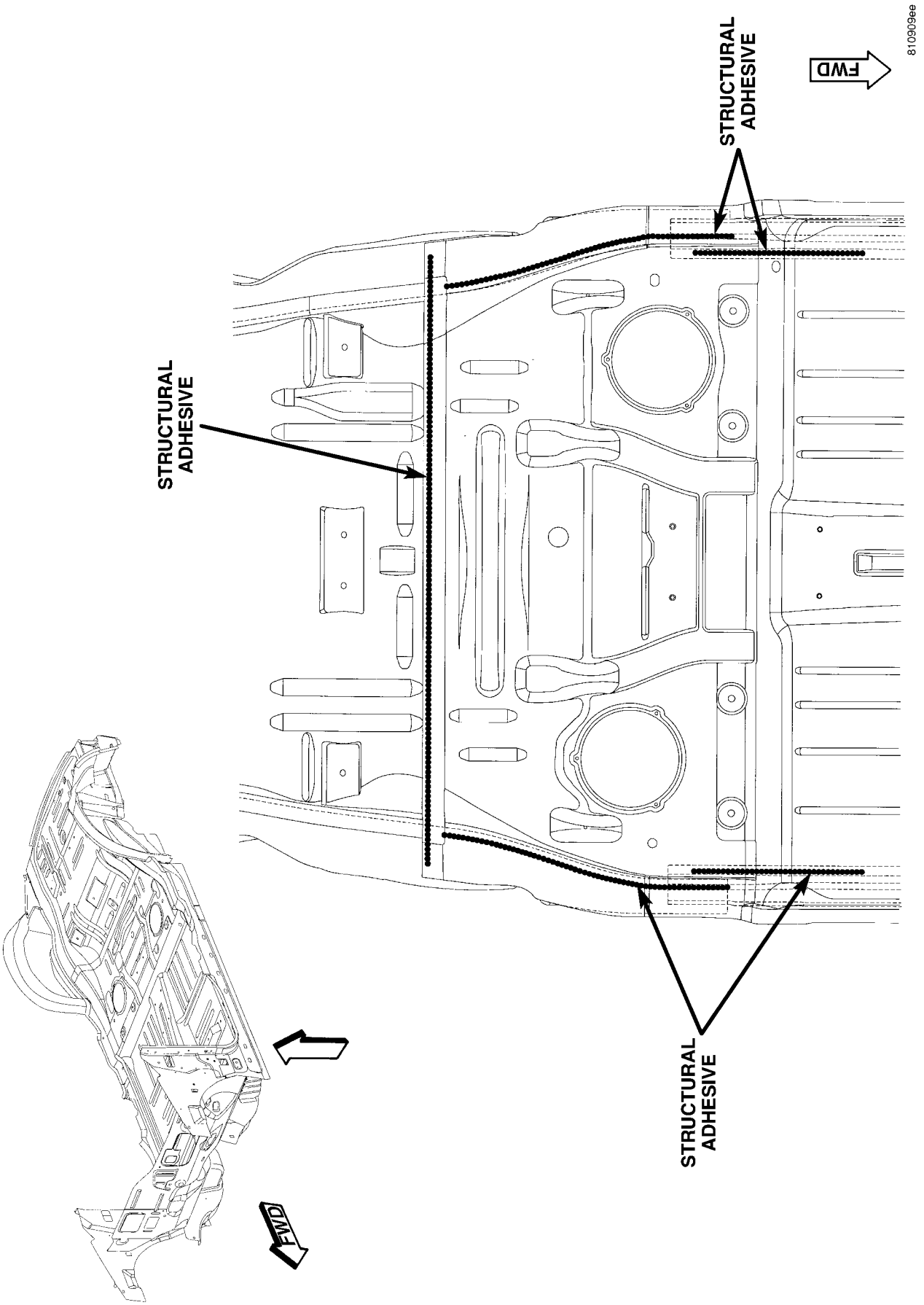


Fig. 35 UNDERBODY COMPLETE (3 OF 4)

STRUCTURAL ADHESIVE LOCATIONS (Continued)

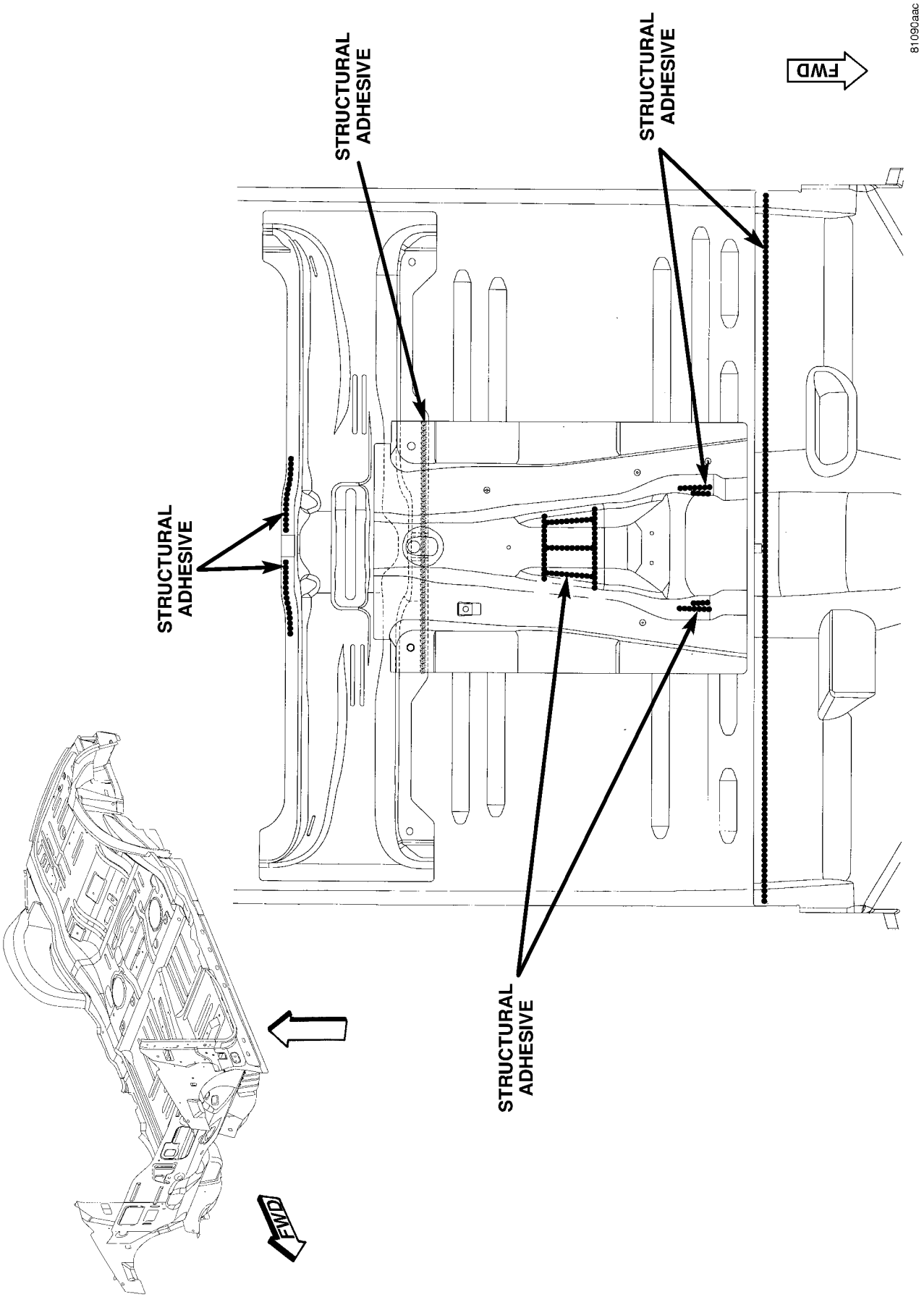


Fig. 36 UNDERBODY COMPLETE (4 OF 4)

WELD LOCATIONS

SPECIFICATIONS - WELD LOCATION

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WELD LOCATIONS (Continued)

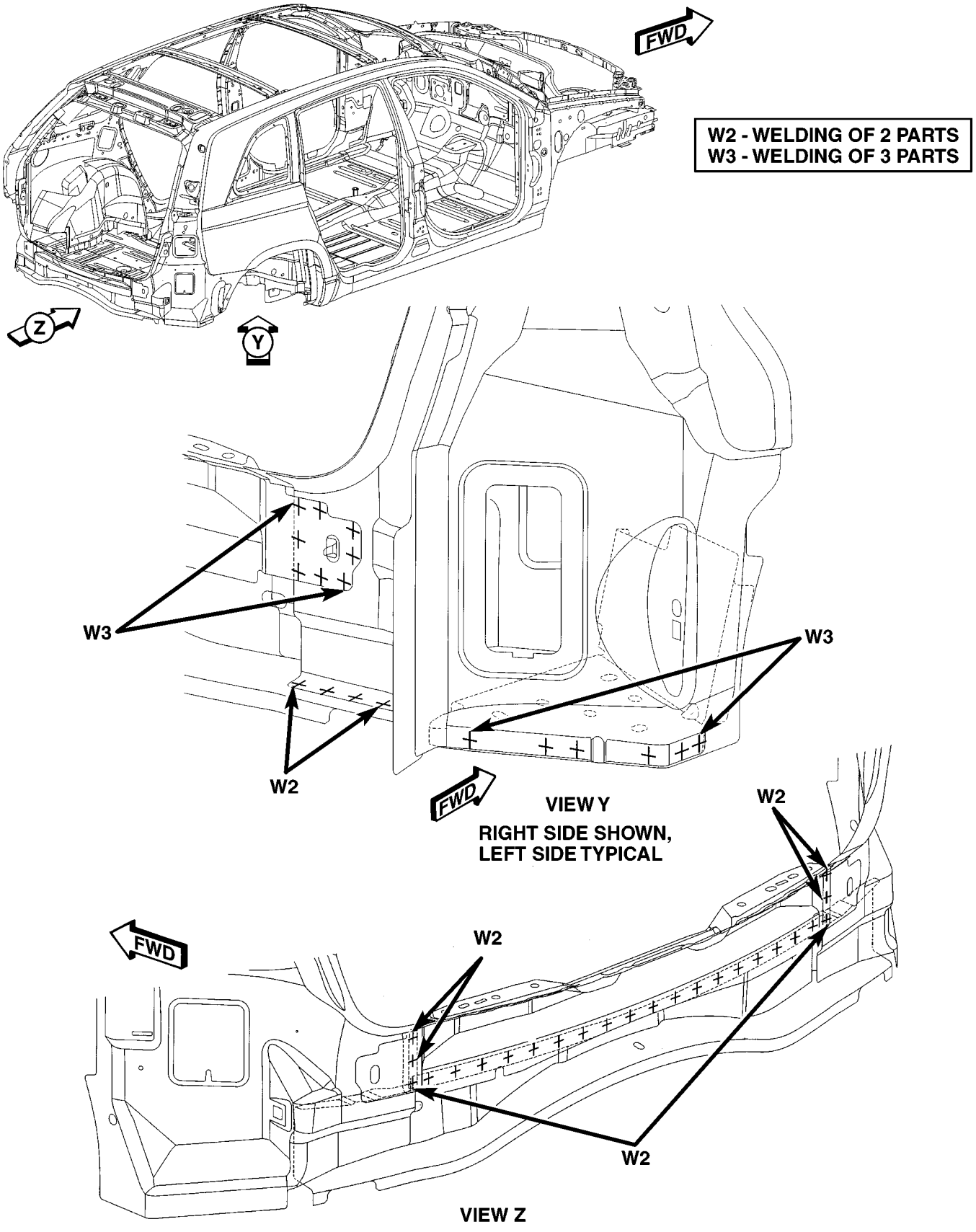


Fig. 37 BODY COMPLETE (1 OF 8)

WELD LOCATIONS (Continued)

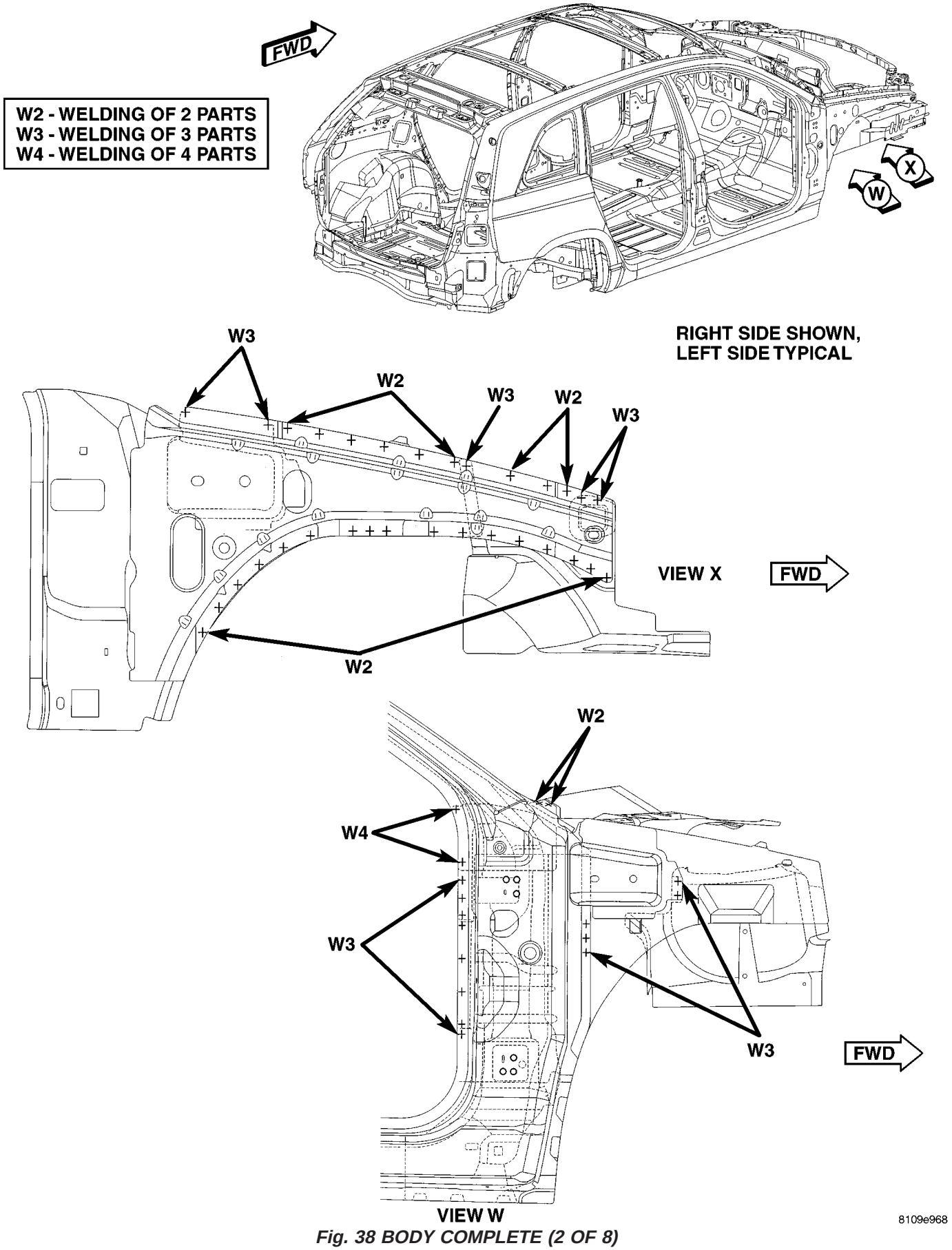


Fig. 38 BODY COMPLETE (2 OF 8)

WELD LOCATIONS (Continued)

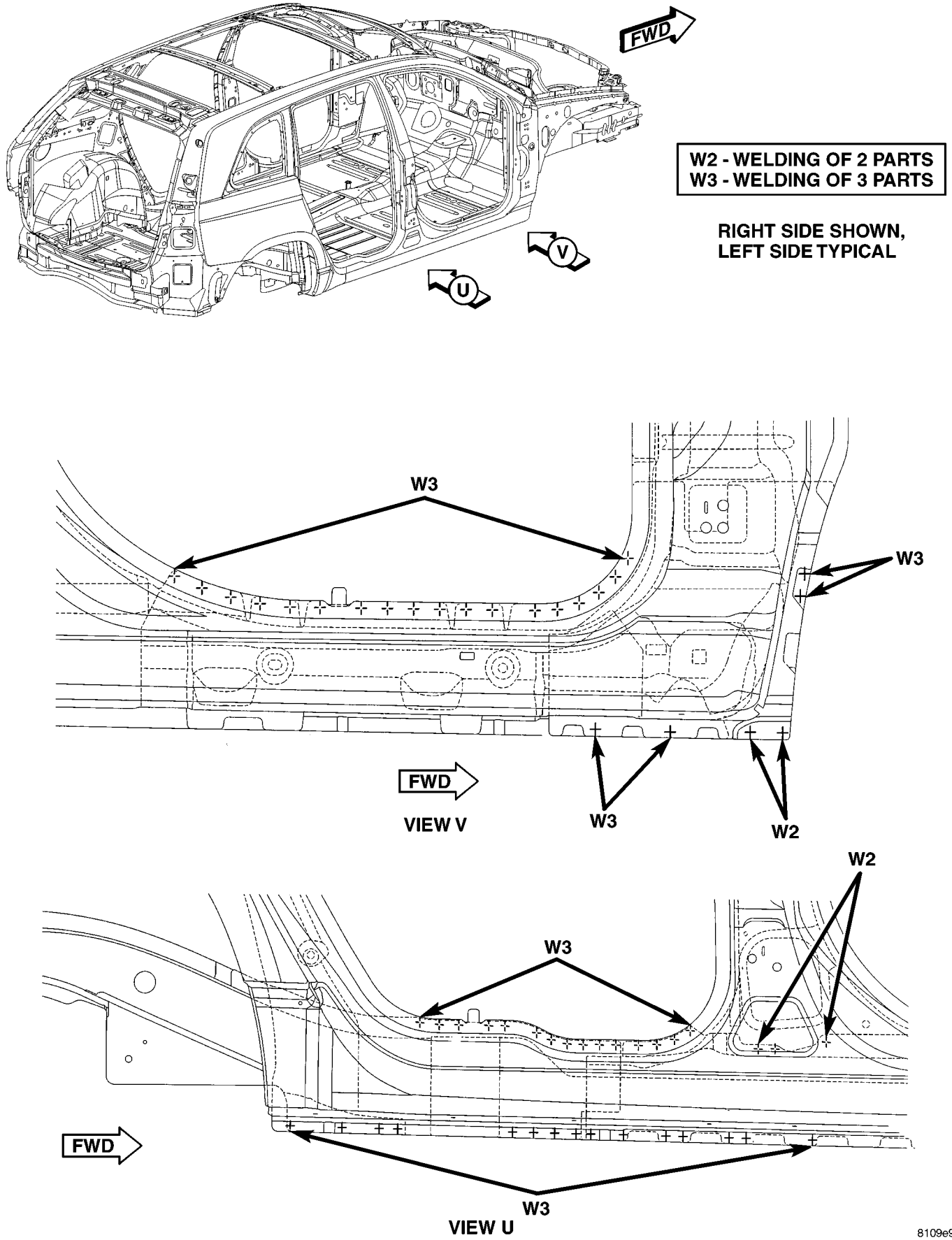


Fig. 39 BODY COMPLETE (3 OF 8)

WELD LOCATIONS (Continued)

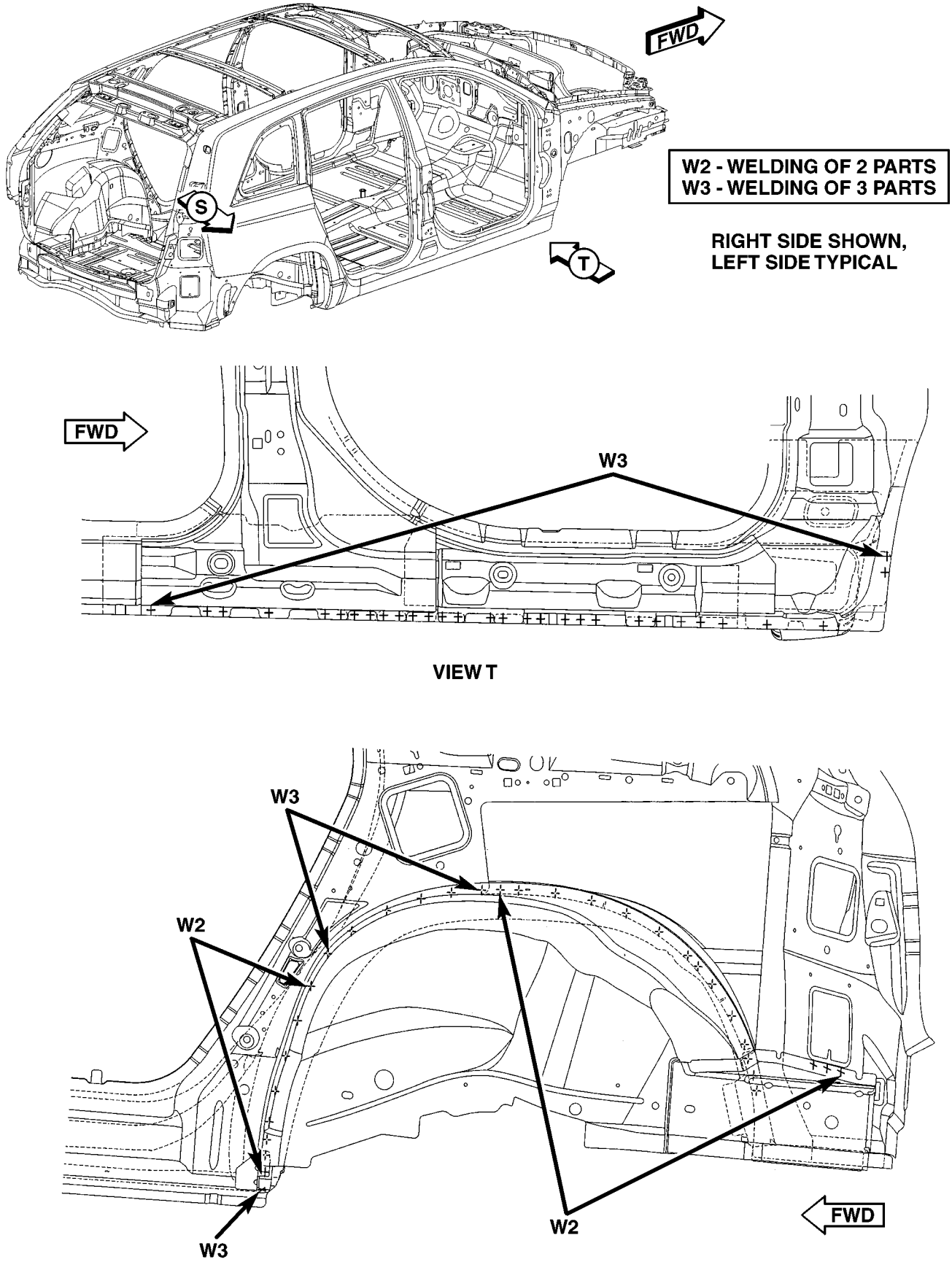


Fig. 40 BODY COMPLETE (4 OF 8)

WELD LOCATIONS (Continued)

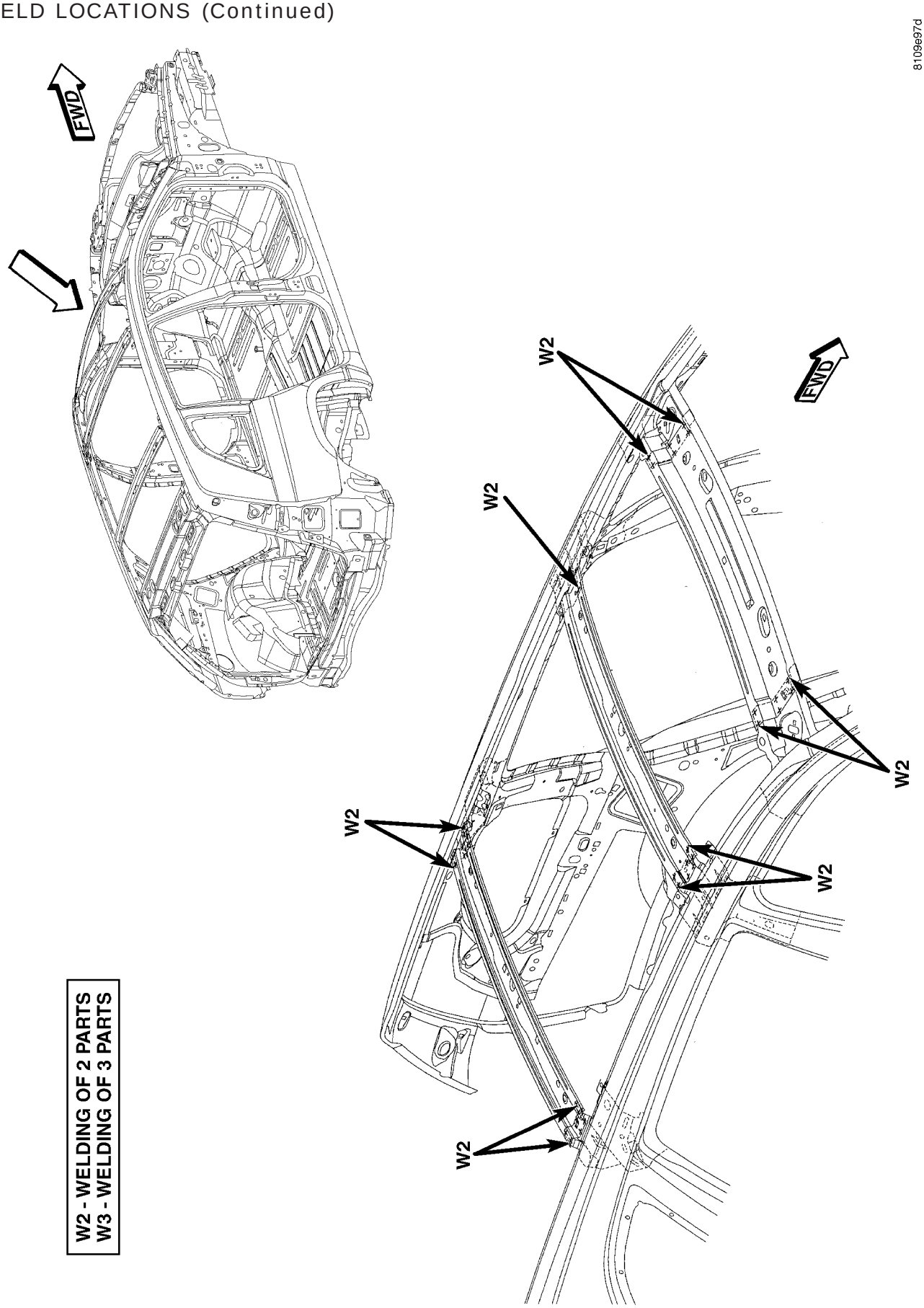
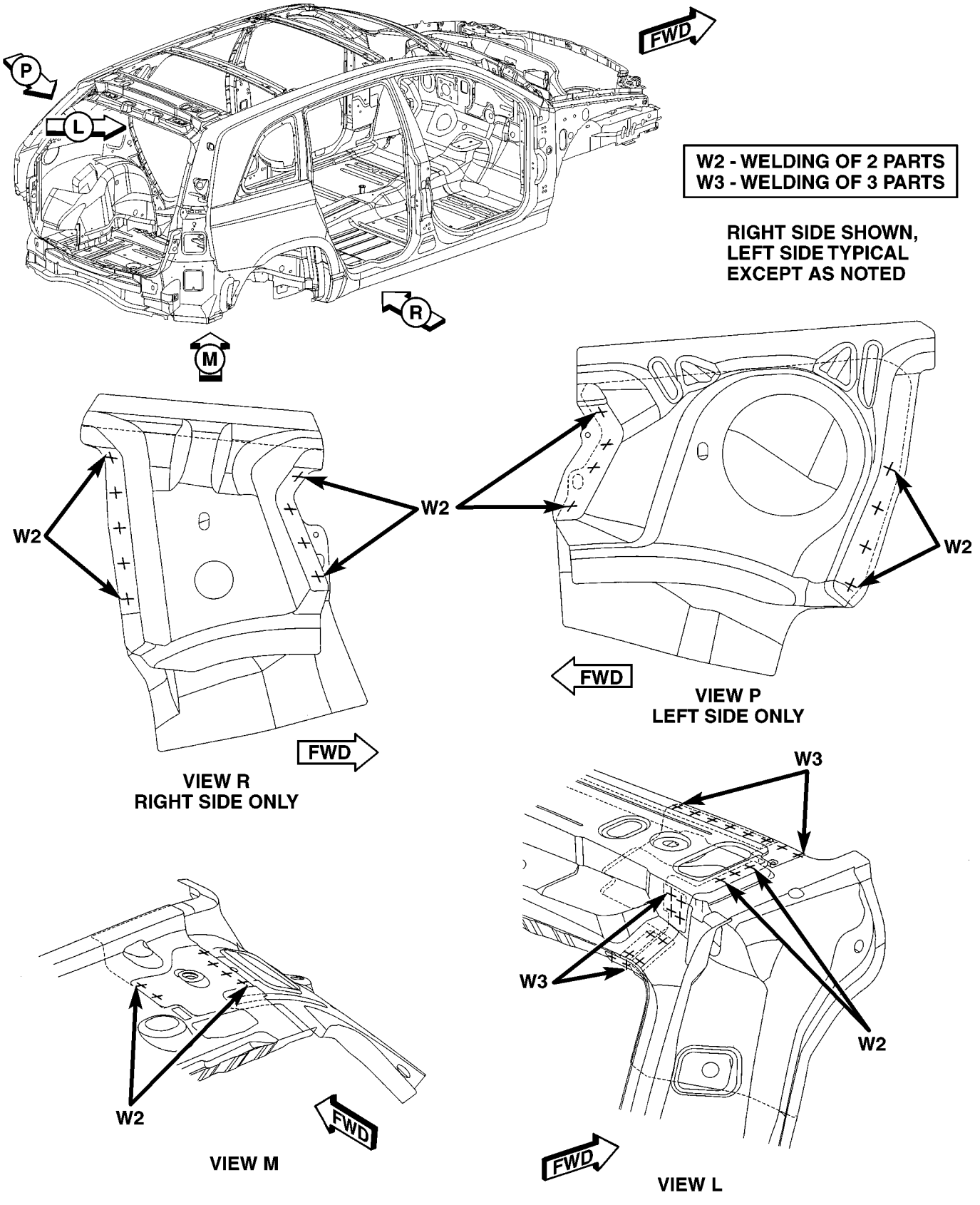


Fig. 41 BODY COMPLETE (5 OF 8)

WELD LOCATIONS (Continued)



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Fig. 42 BODY COMPLETE (6 OF 8)

WELD LOCATIONS (Continued)

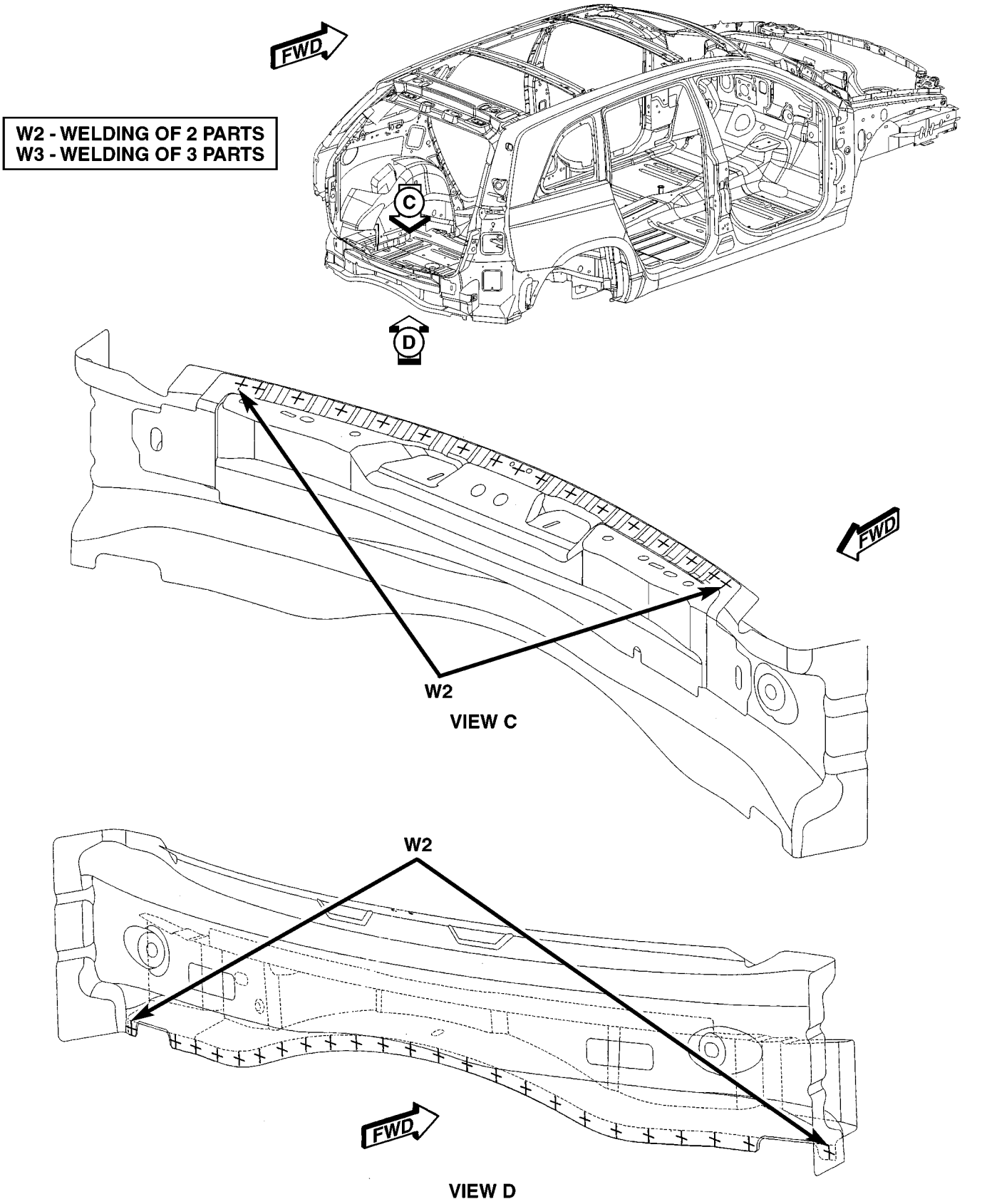


Fig. 43 BODY COMPLETE (7 OF 8)

WELD LOCATIONS (Continued)

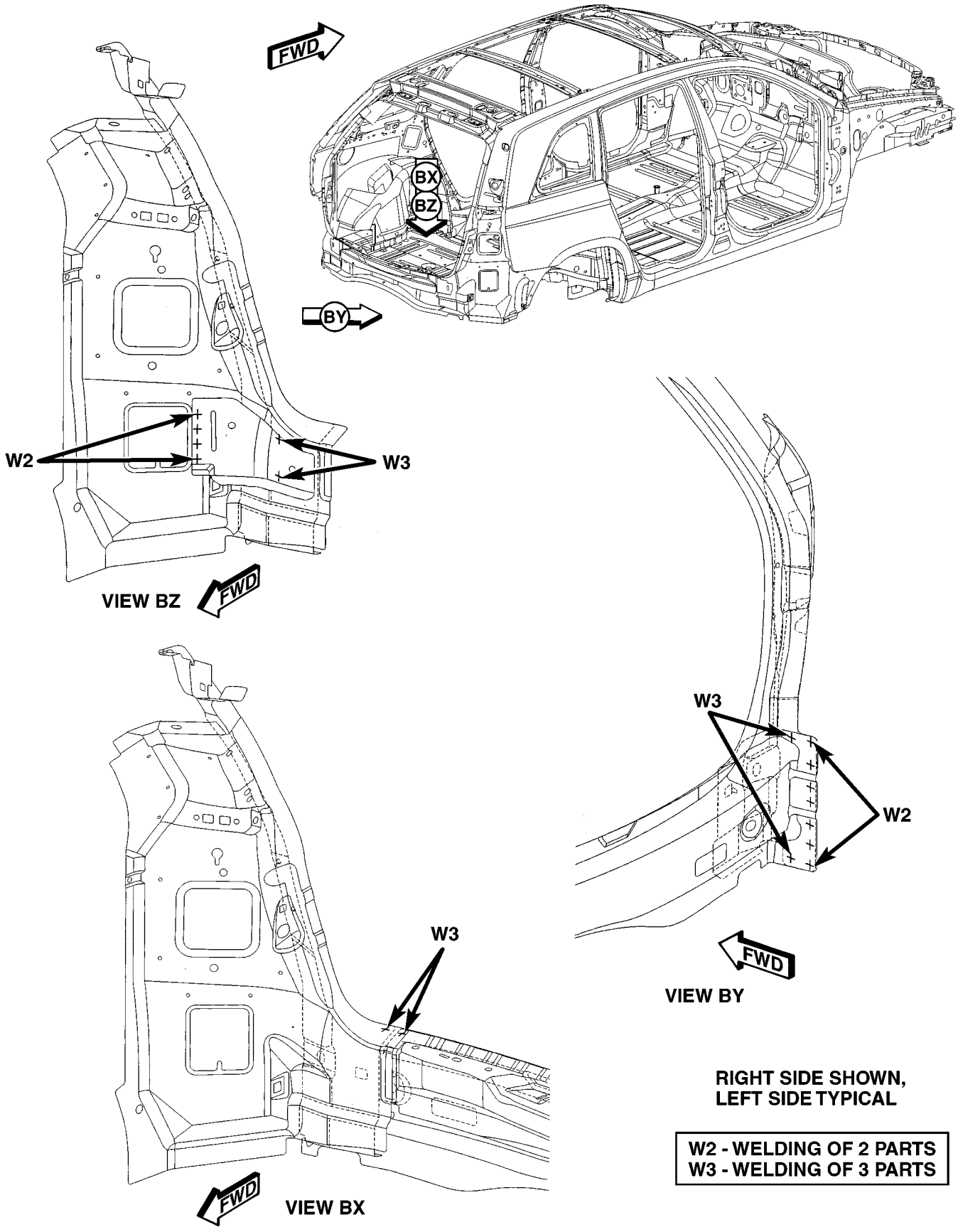


Fig. 44 BODY COMPLETE (8 OF 8)

WELD LOCATIONS (Continued)

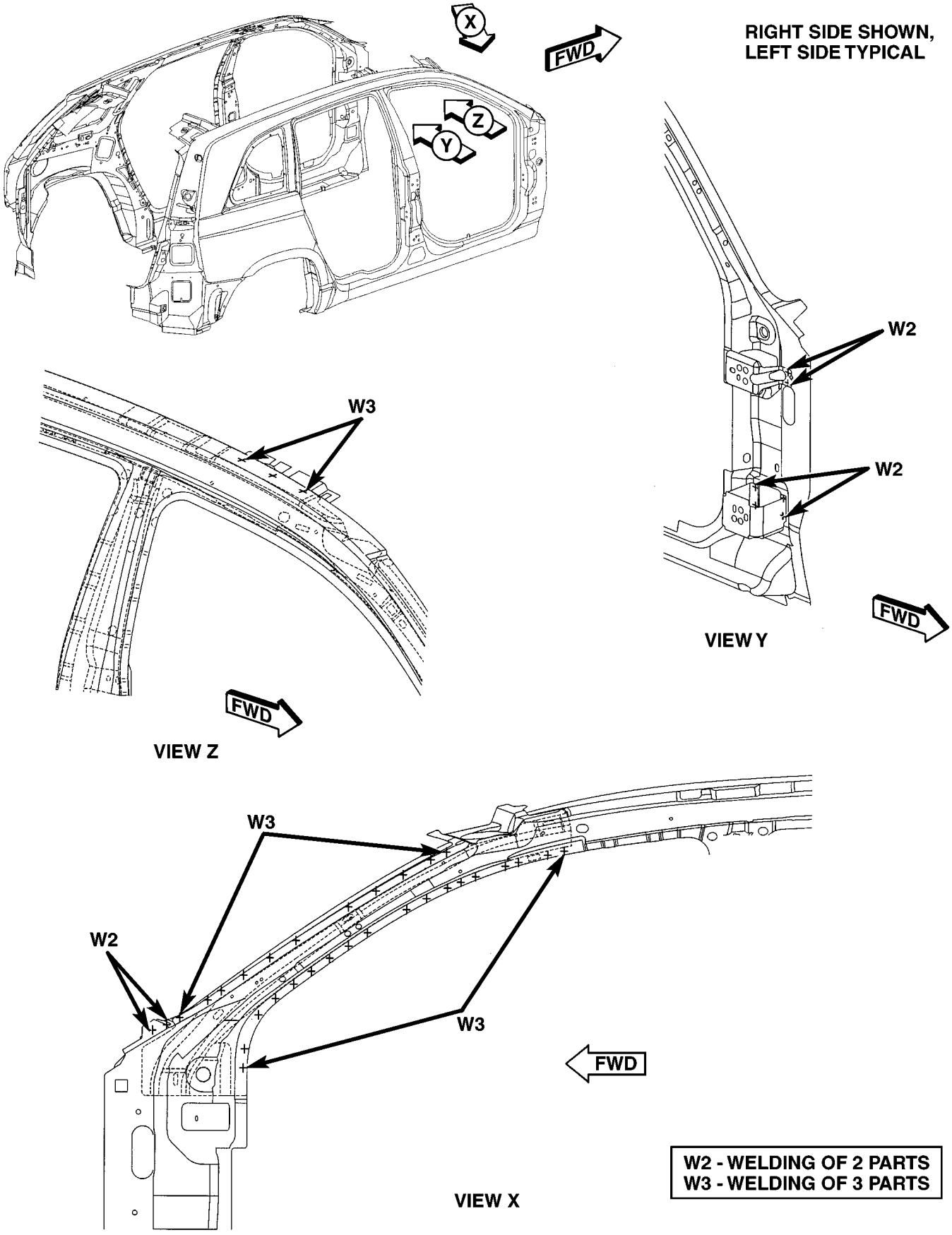


Fig. 45 BODY SIDE APERTURE - COMPLETE (1 OF 8)

WELD LOCATIONS (Continued)

Fig. 46 BODY SIDE APERTURE - COMPLETE (2 OF 8)

WELD LOCATIONS (Continued)

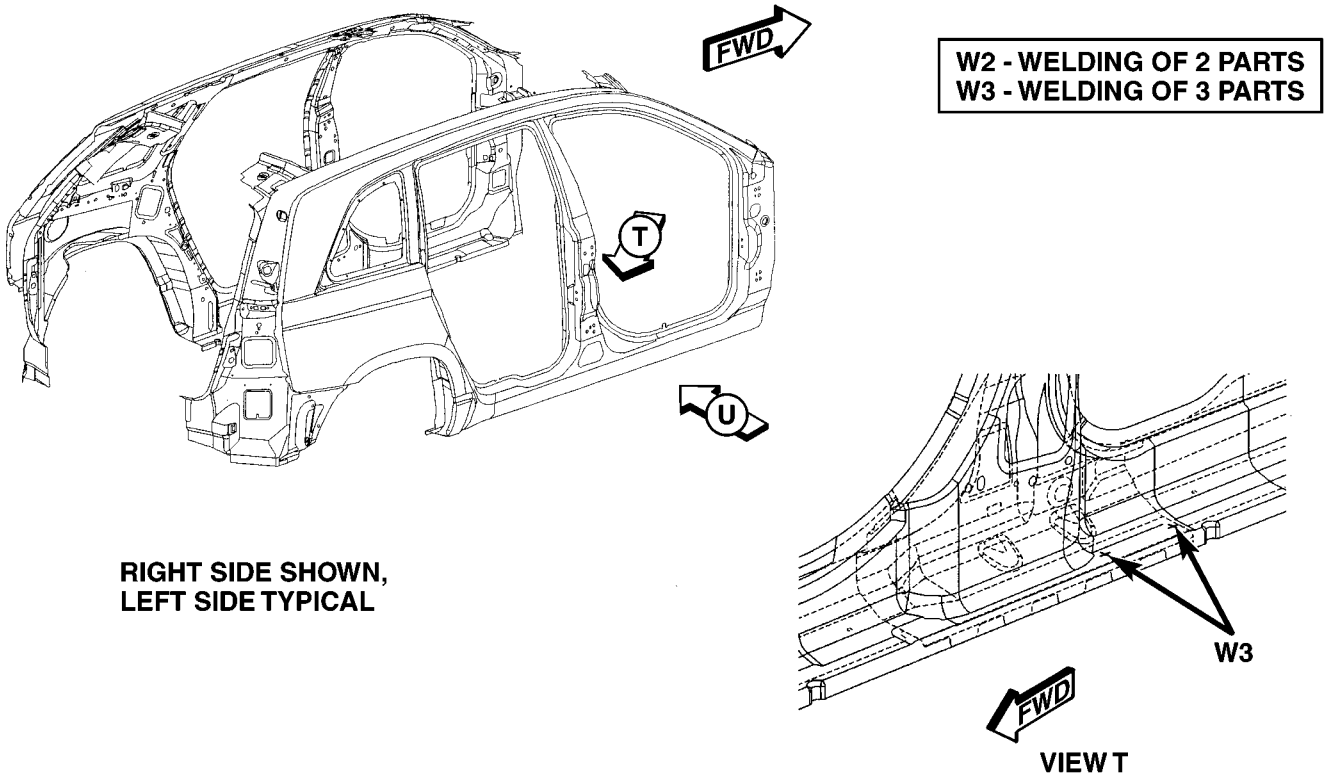


Fig. 47 BODY SIDE APERTURE - COMPLETE (3 OF 8)

WELD LOCATIONS (Continued)

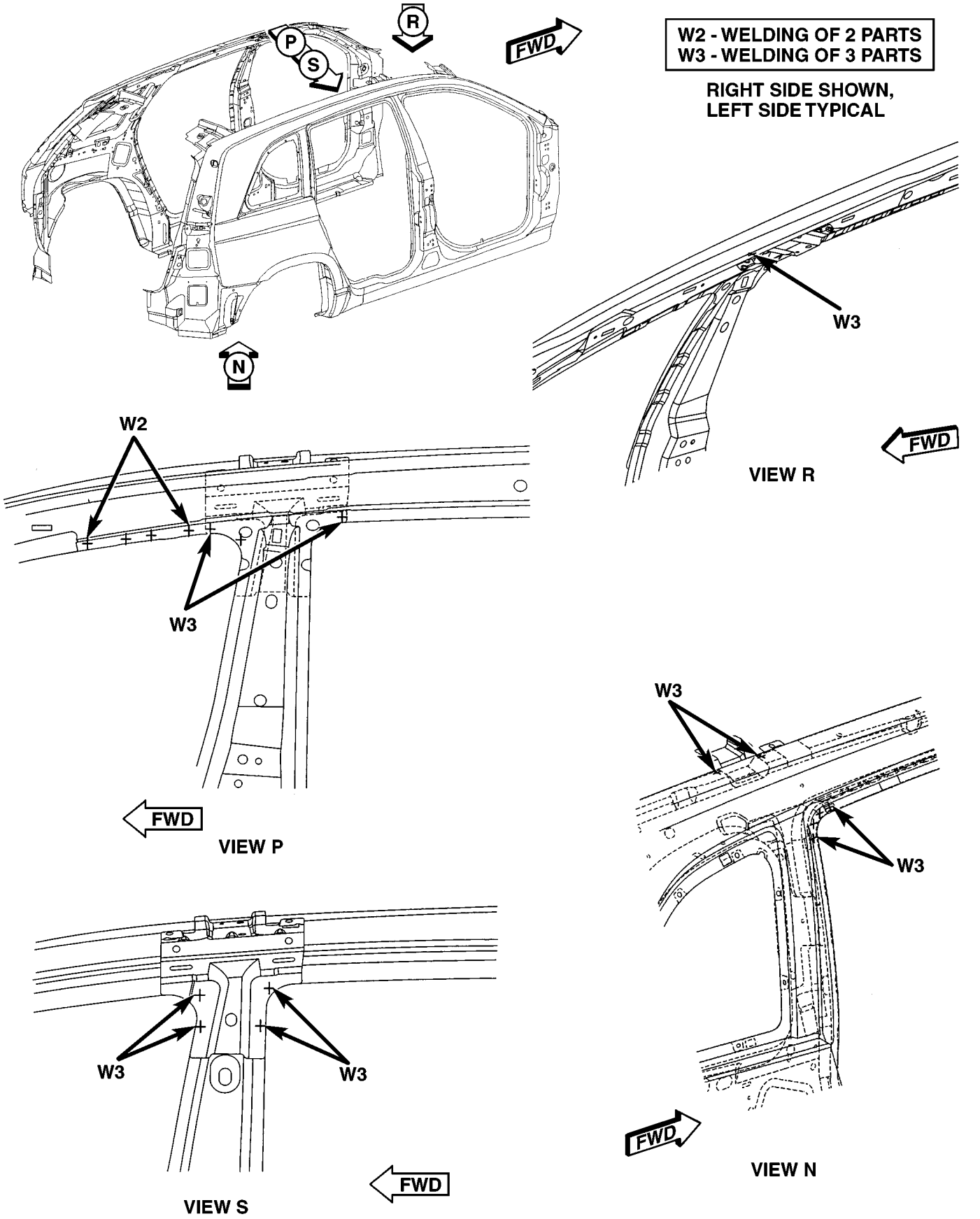


Fig. 48 BODY SIDE APERTURE - COMPLETE (4 OF 8)

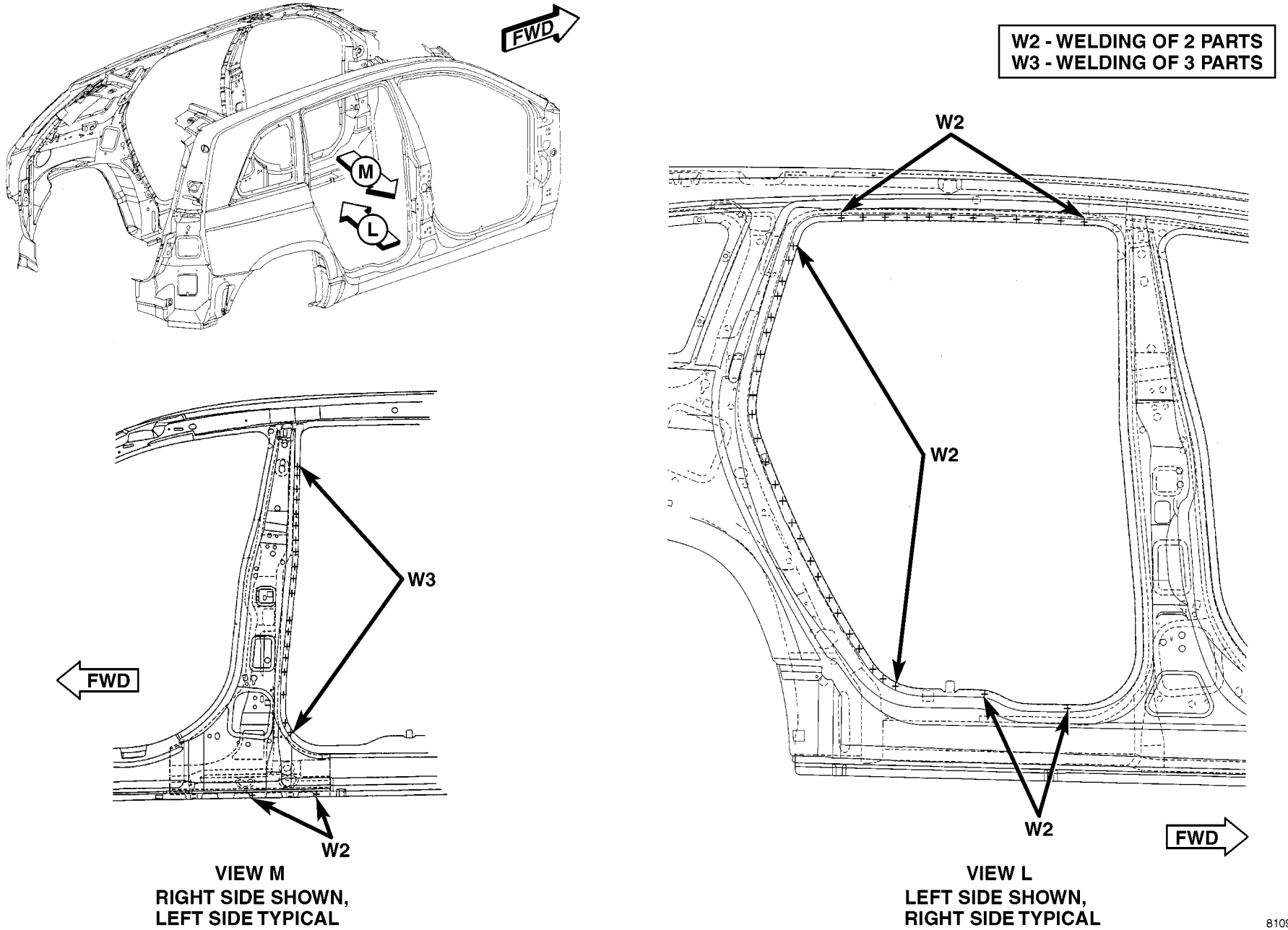
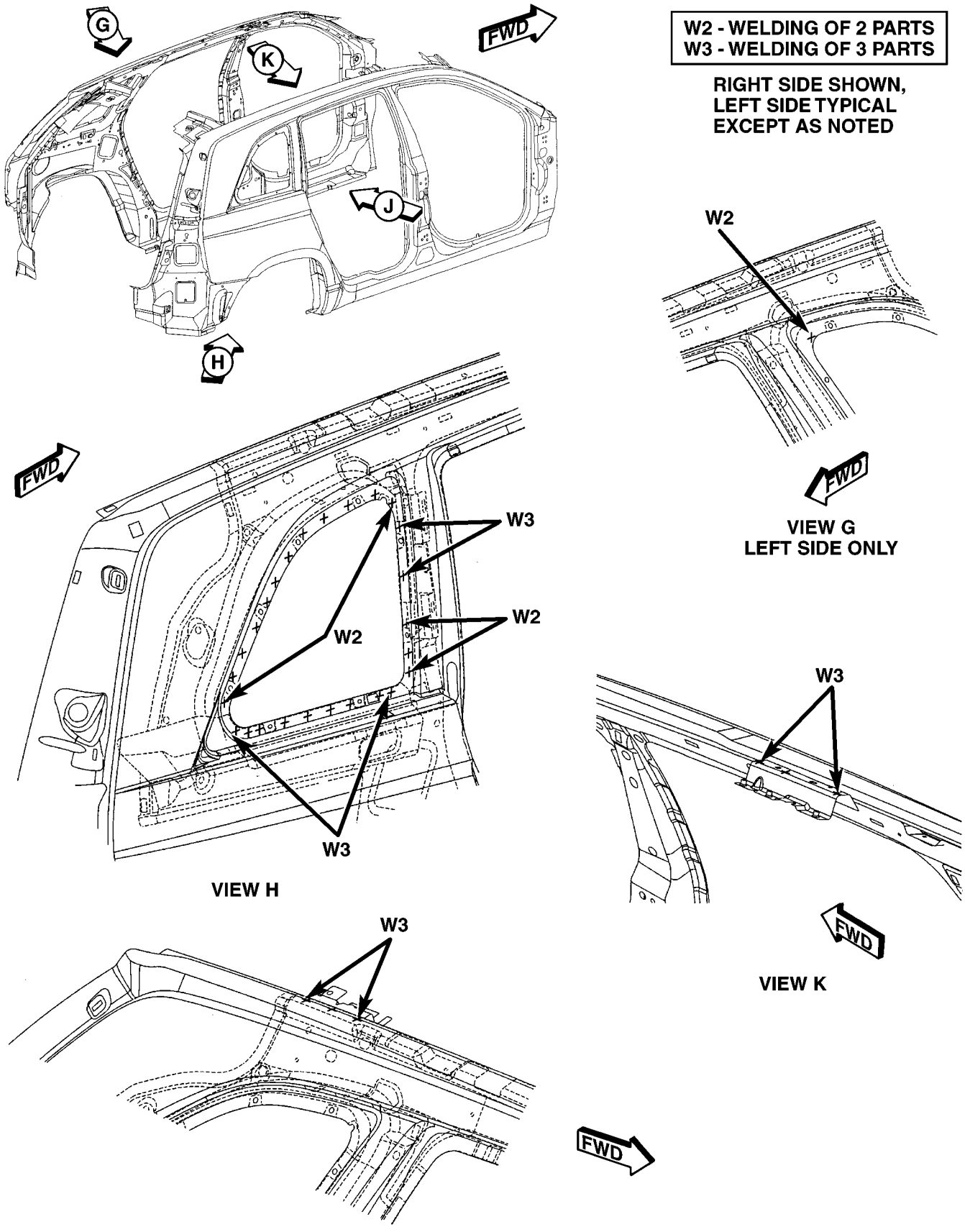


Fig. 49 BODY SIDE APERTURE - COMPLETE (5 OF 8)

WELD LOCATIONS (Continued)



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Fig. 50 BODY SIDE APERTURE - COMPLETE (6 OF 8)

WELD LOCATIONS (Continued)

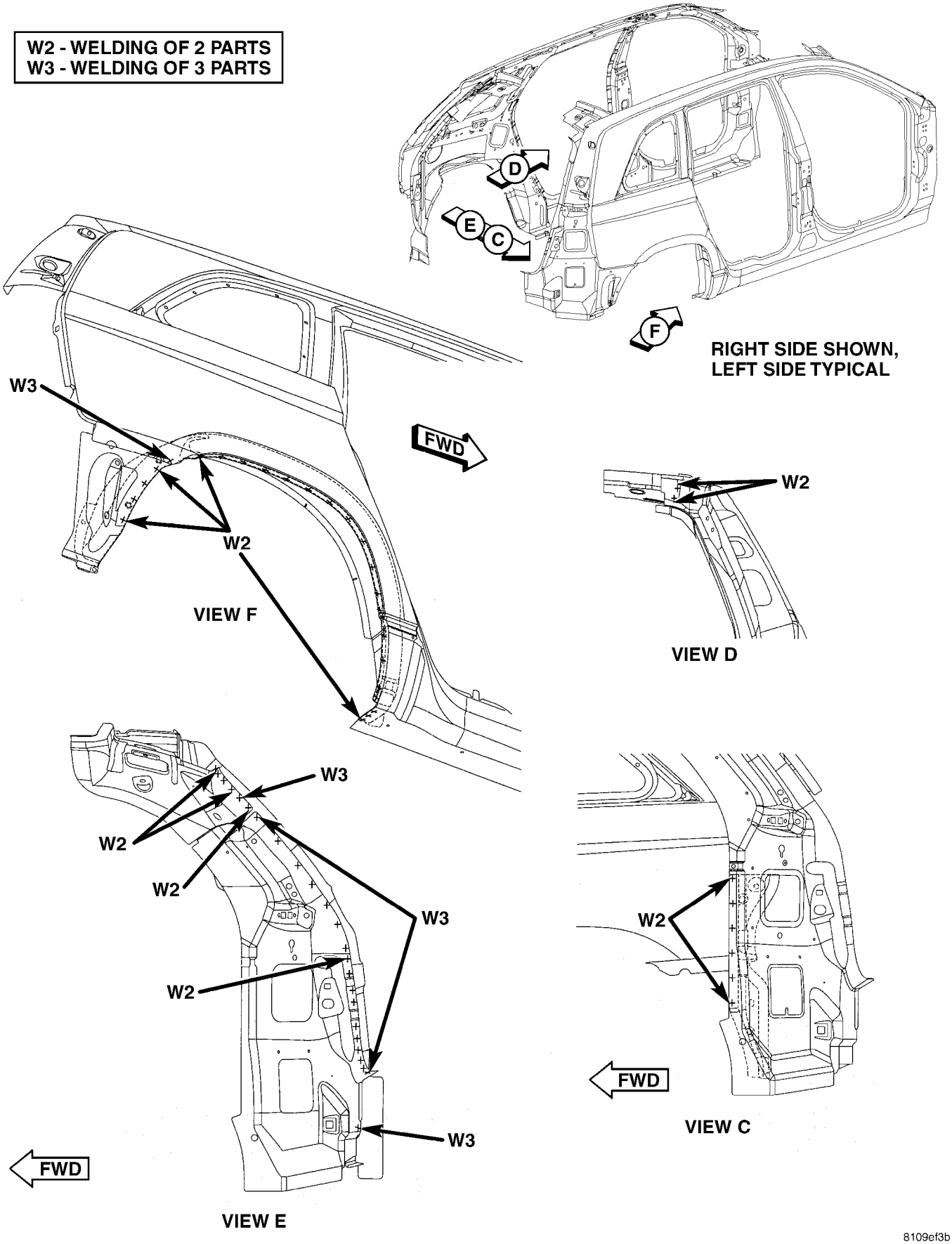


Fig. 51 BODY SIDE APERTURE - COMPLETE (7 OF 8)

WELD LOCATIONS (Continued)

Fig. 52 BODY SIDE APERTURE - COMPLETE (8 OF 8)

WELD LOCATIONS (Continued)

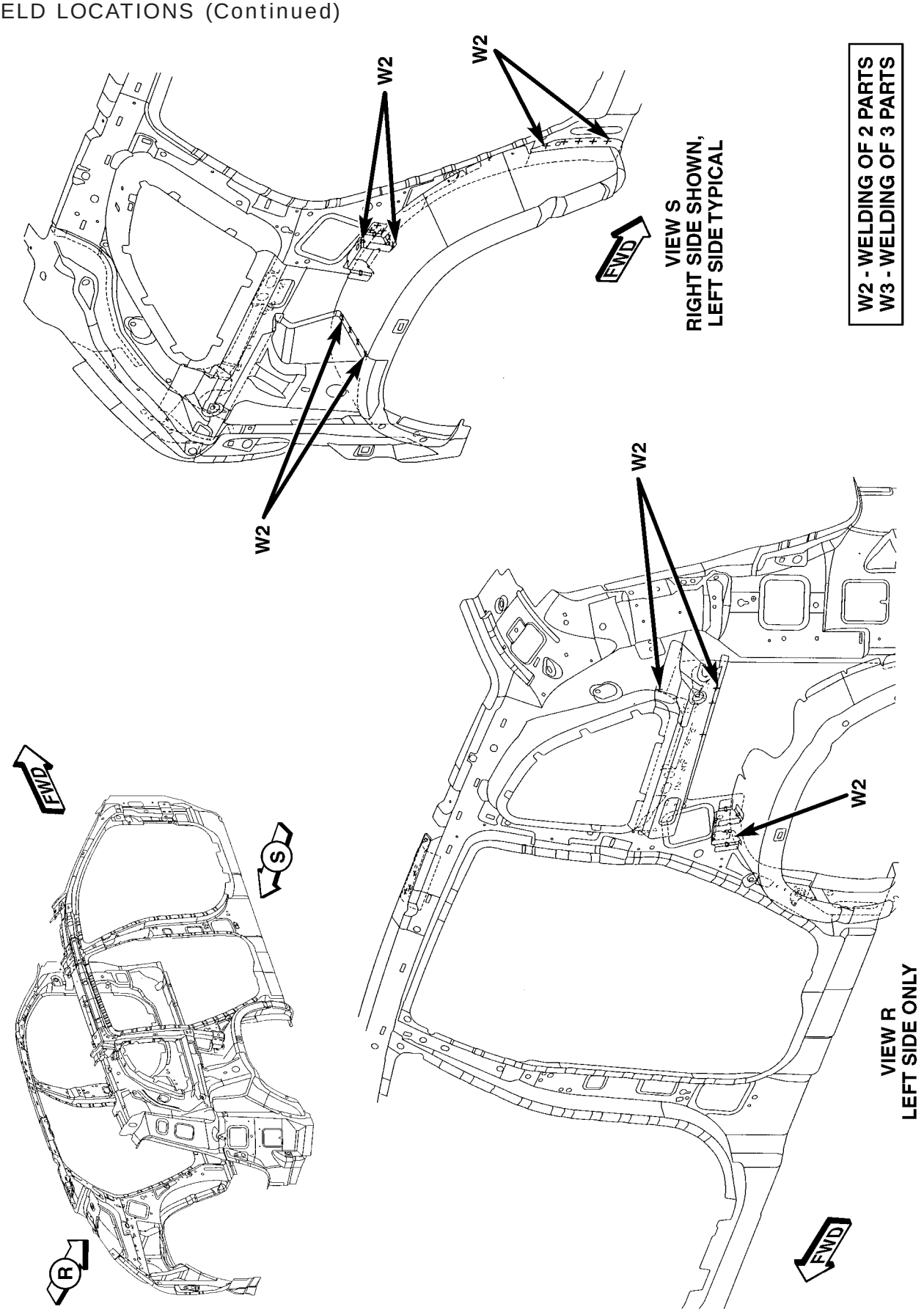
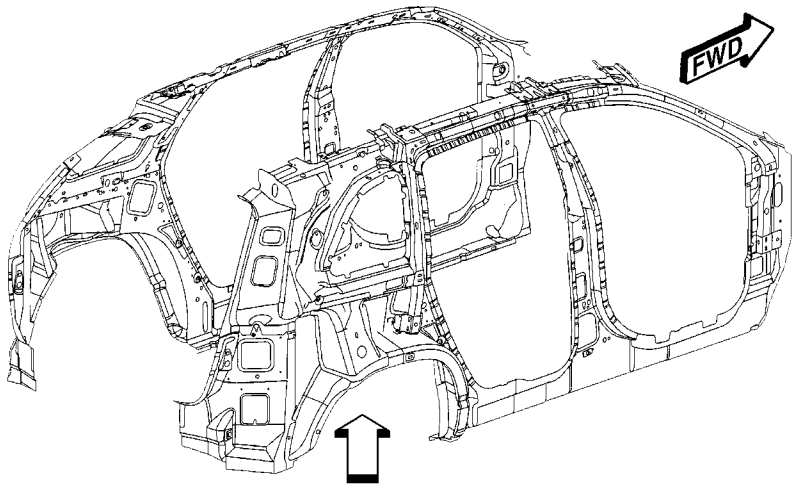


Fig. 53 BODY SIDE APERTURE COMPLETE - INNER (1 OF 6)

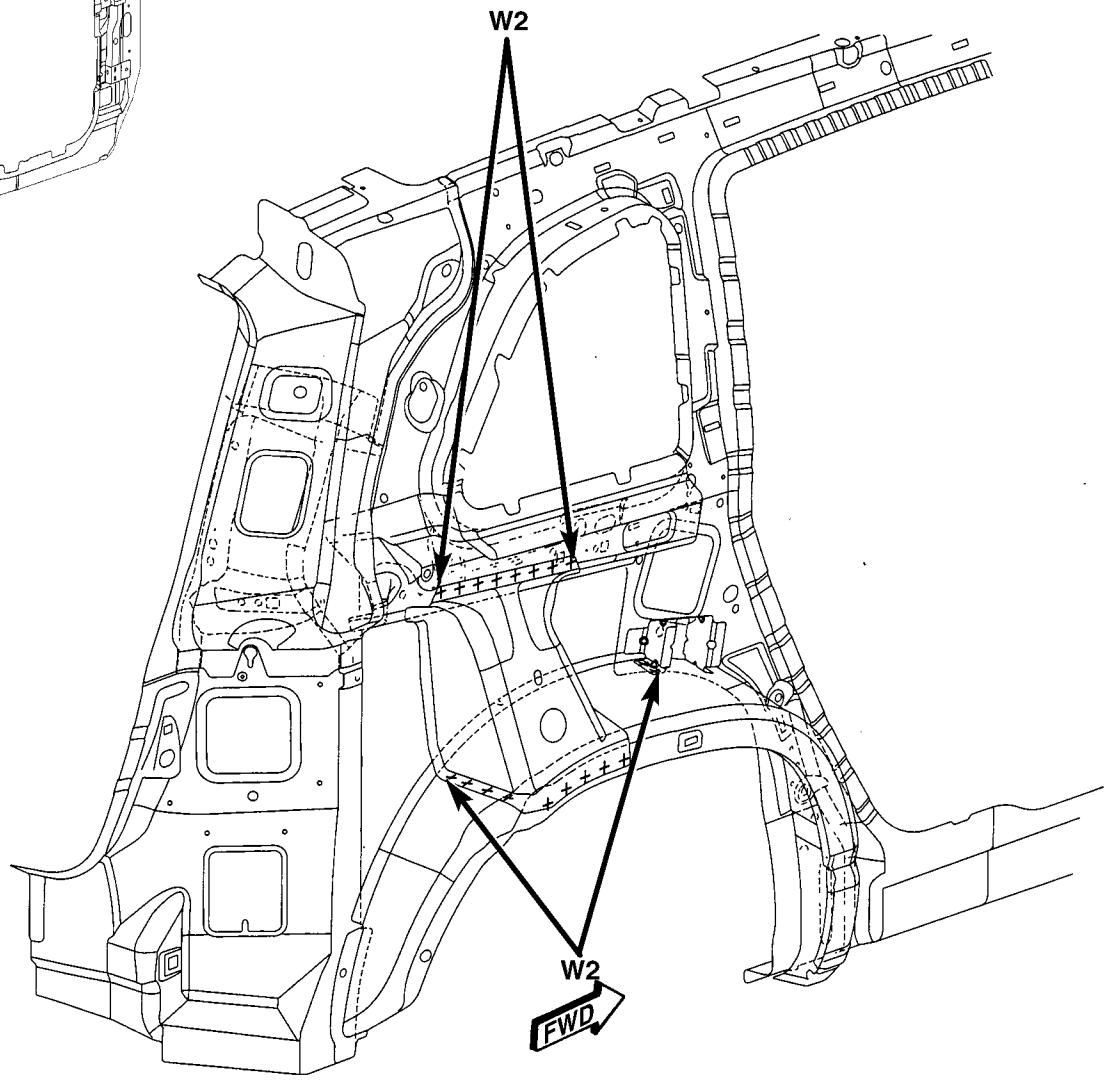
WELD LOCATIONS (Continued)

Fig. 54 BODY SIDE APERTURE COMPLETE - INNER (2 OF 6)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS

RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL



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Fig. 55 BODY SIDE APERTURE COMPLETE - INNER (3 OF 6)

WELD LOCATIONS (Continued)

Fig. 56 BODY SIDE APERTURE COMPLETE - INNER (4 OF 6)

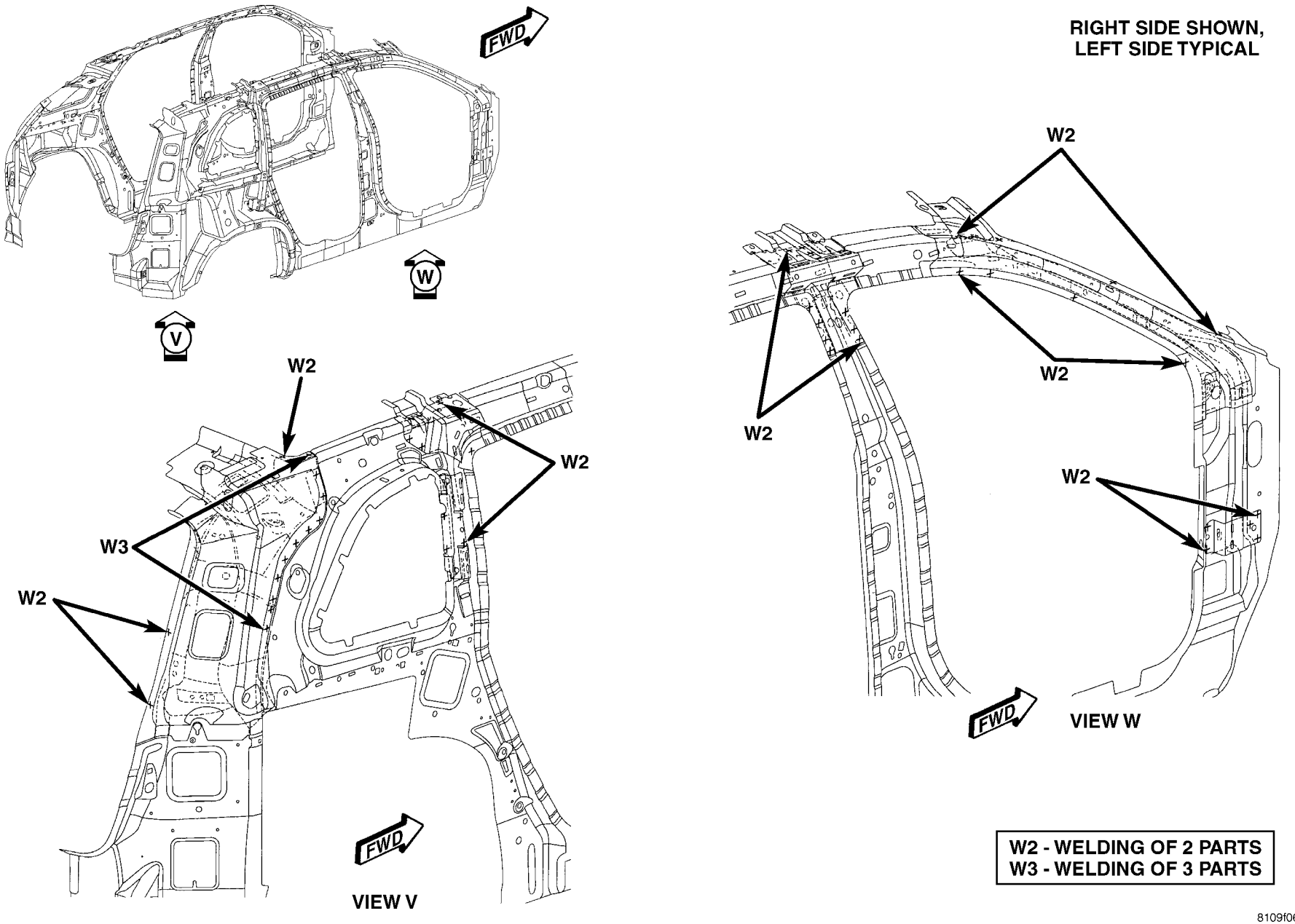


Fig. 57 BODY SIDE APERTURE COMPLETE - INNER (5 OF 6)

WELD LOCATIONS (Continued)

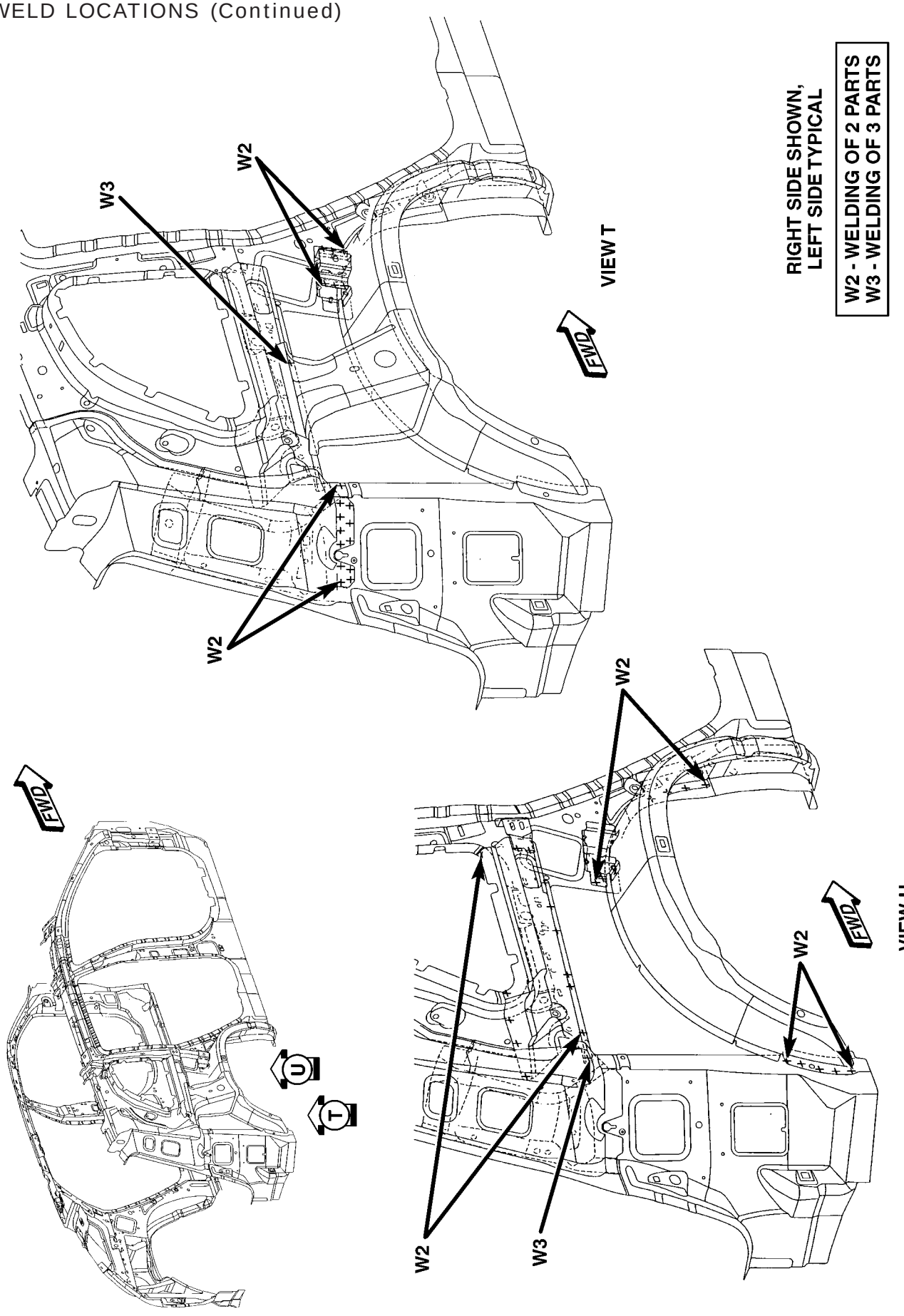


Fig. 58 BODY SIDE APERTURE COMPLETE - INNER (6 OF 6)

WELD LOCATIONS (Continued)

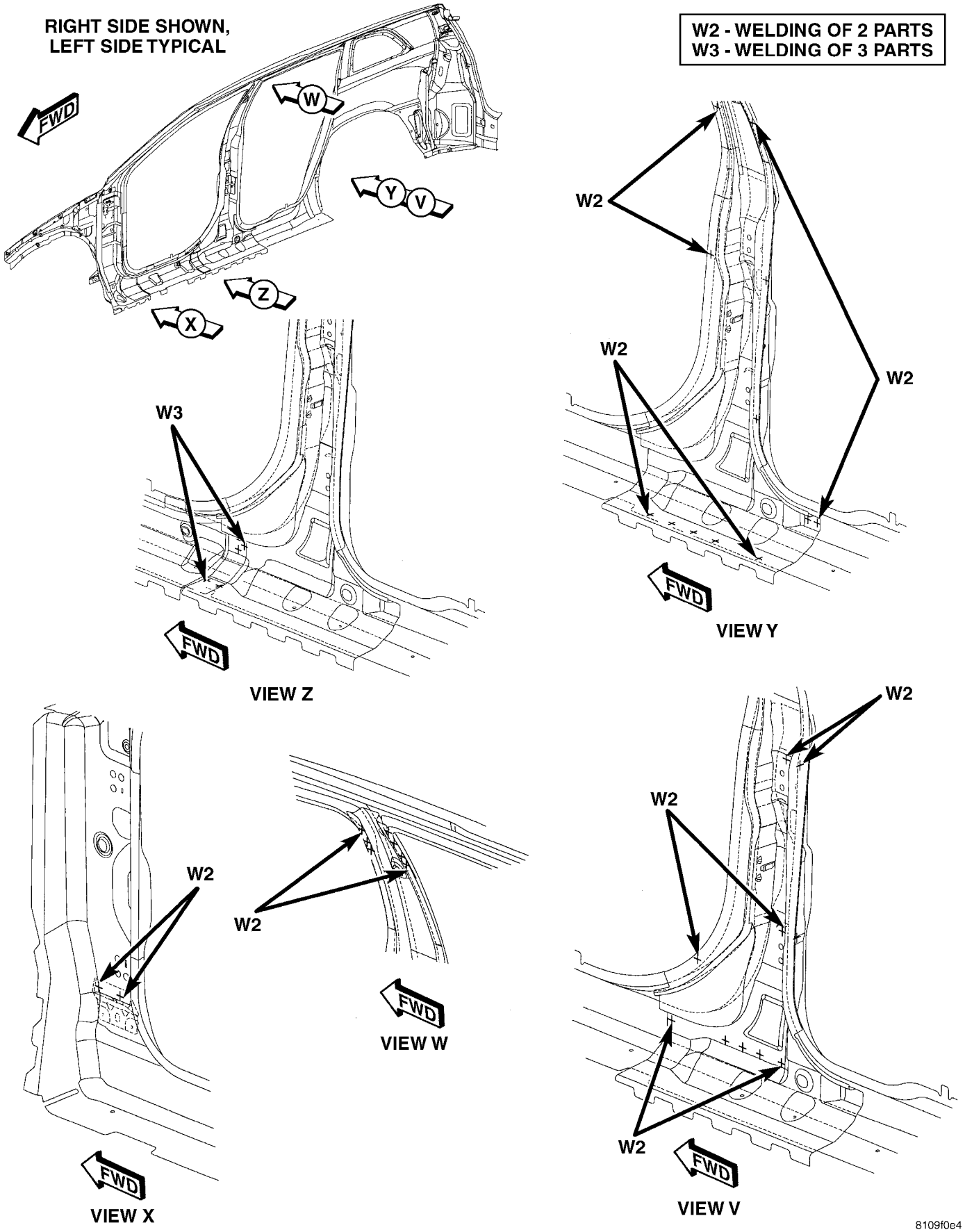


Fig. 59 BODY SIDE APERTURE - OUTER COMPLETE (1 OF 6)

WELD LOCATIONS (Continued)

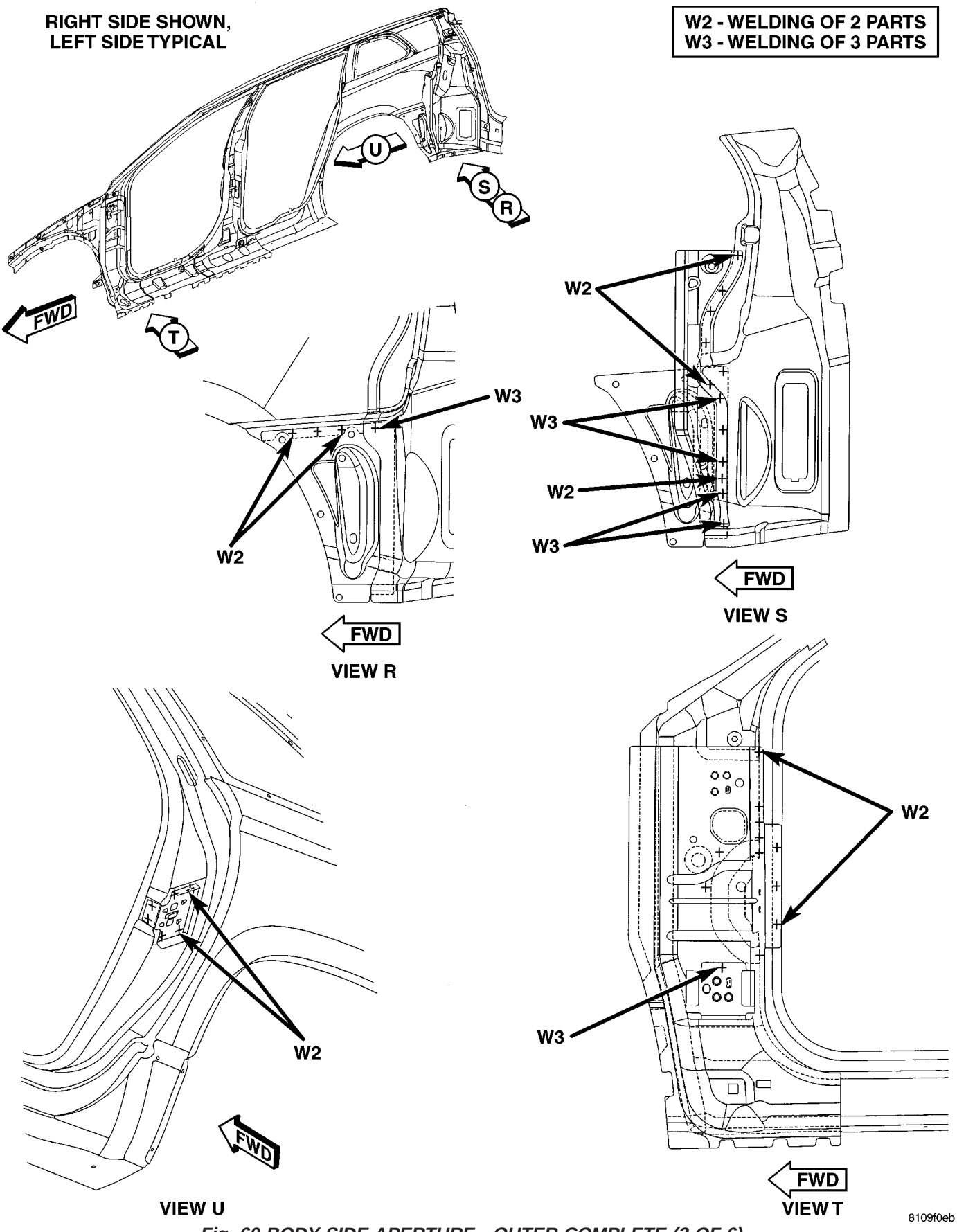


Fig. 60 BODY SIDE APERTURE - OUTER COMPLETE (2 OF 6)

WELD LOCATIONS (Continued)

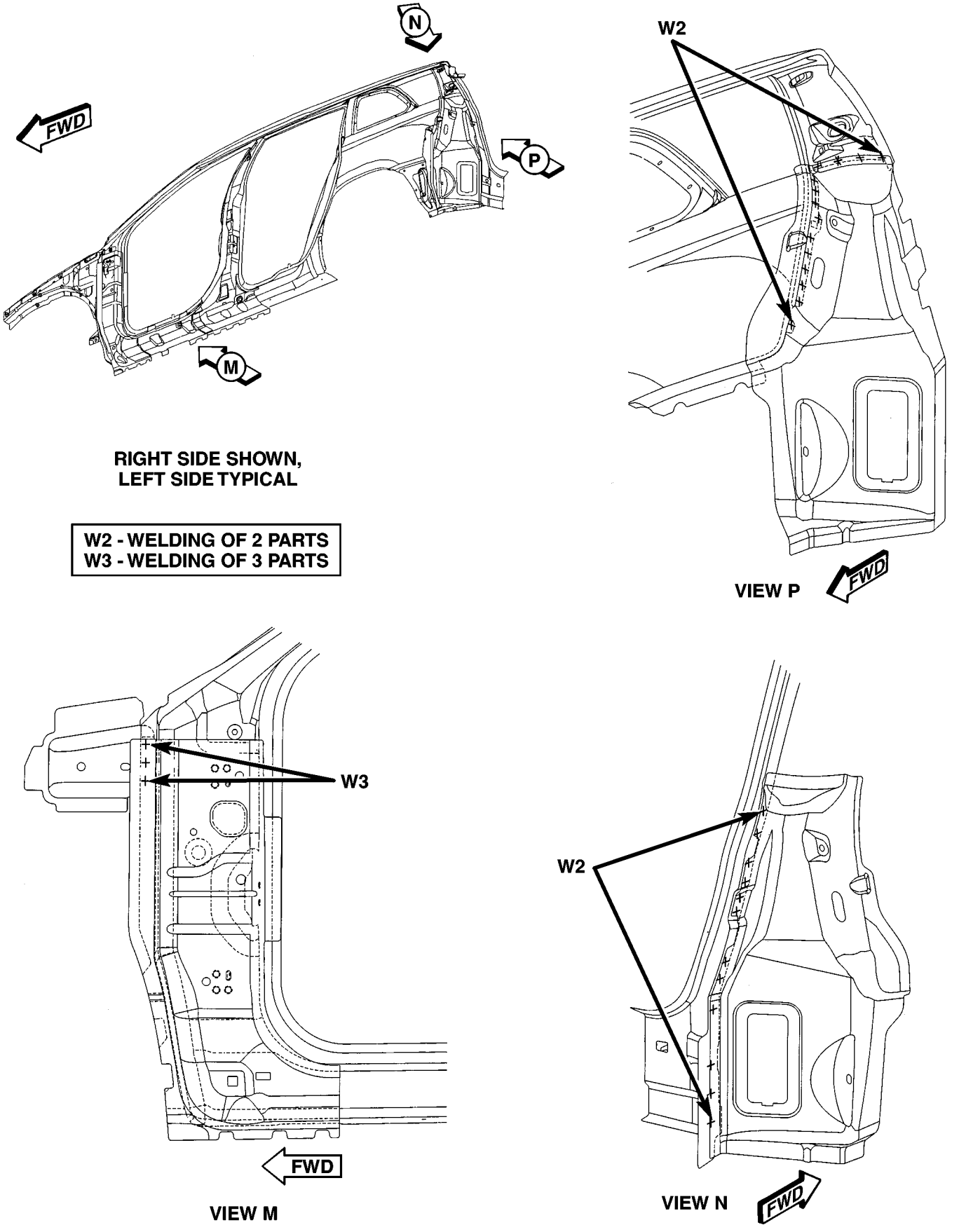
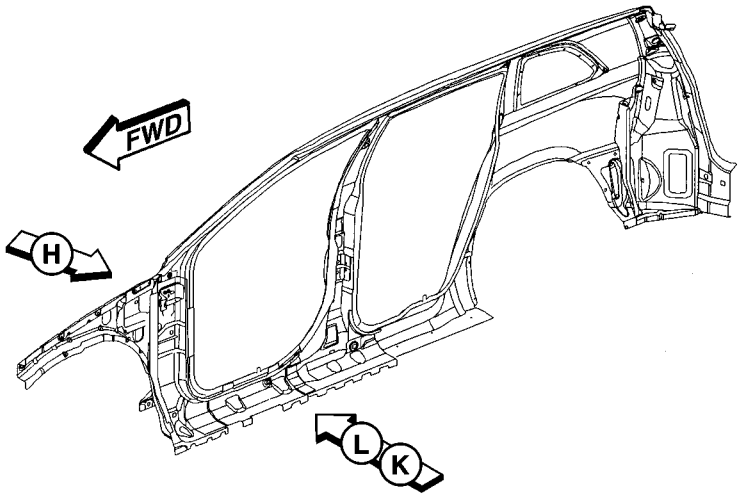
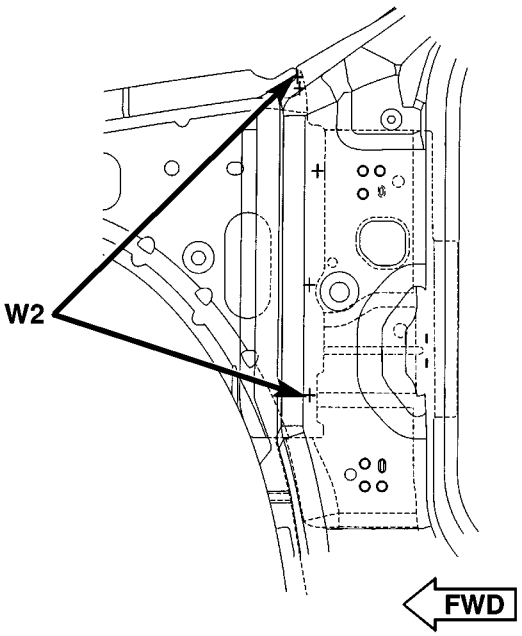


Fig. 61 BODY SIDE APERTURE - OUTER COMPLETE (3 OF 6)

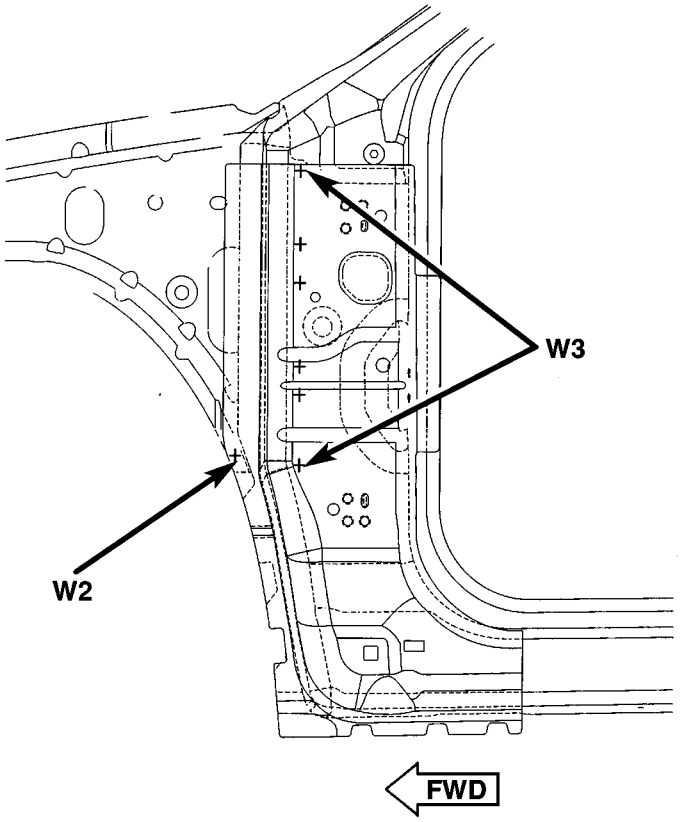
WELD LOCATIONS (Continued)



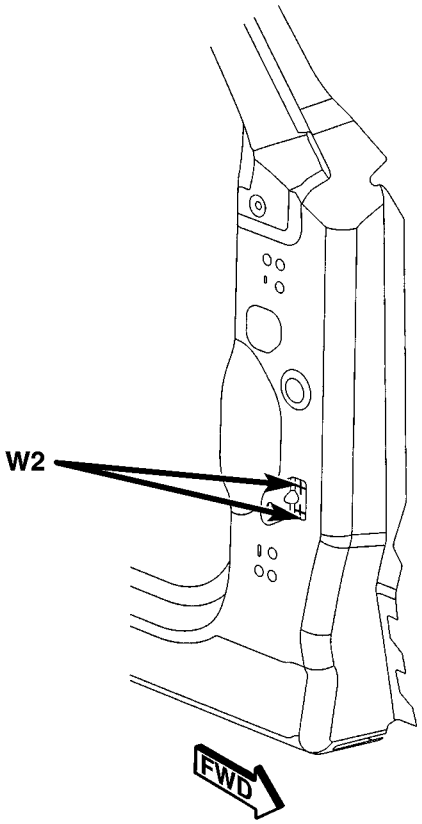
RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL



VIEW K



VIEW L



VIEW H

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS

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Fig. 62 BODY SIDE APERTURE - OUTER COMPLETE (4 OF 6)

WELD LOCATIONS (Continued)

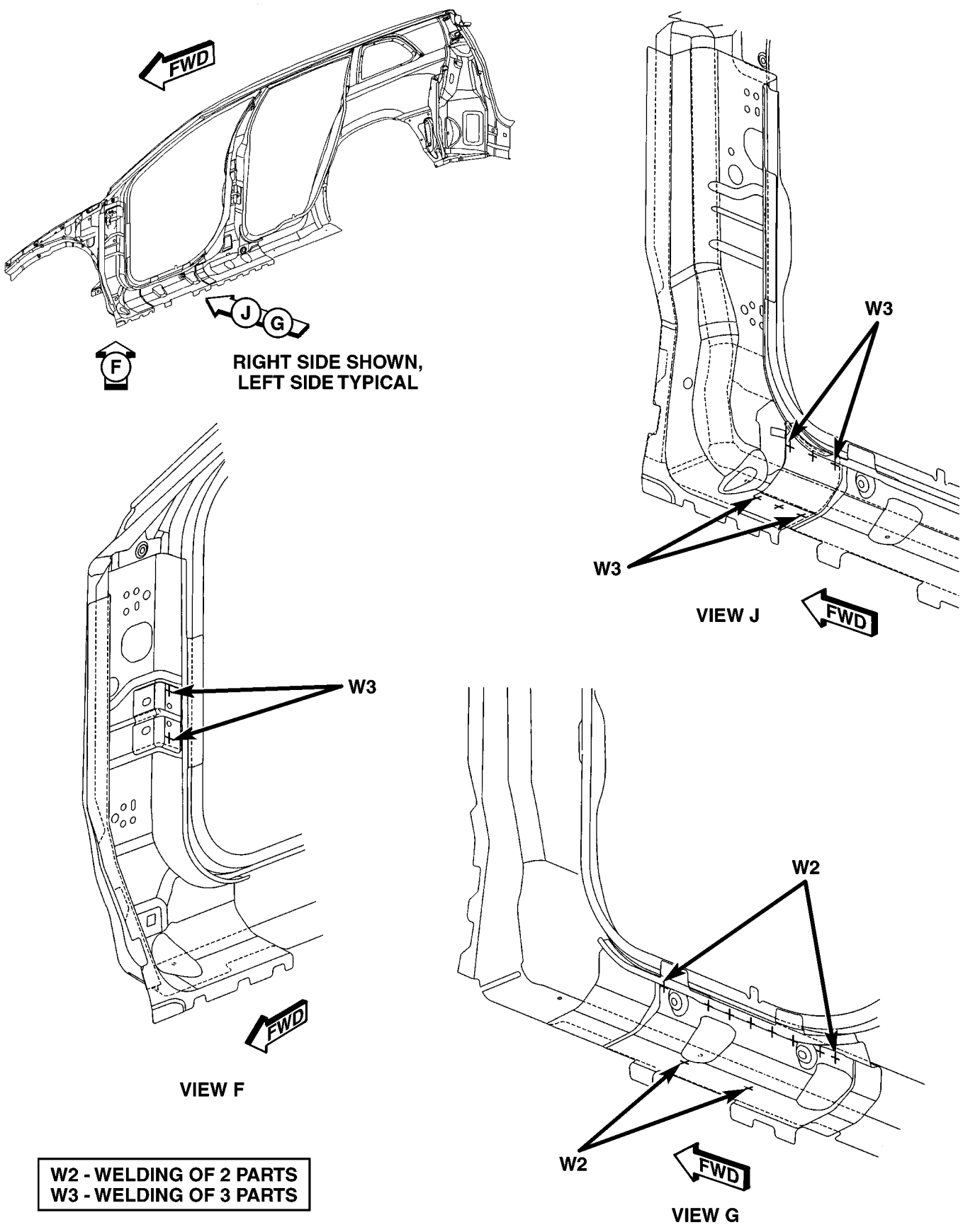


Fig. 63 BODY SIDE APERTURE - OUTER COMPLETE (5 OF 6)

WELD LOCATIONS (Continued)

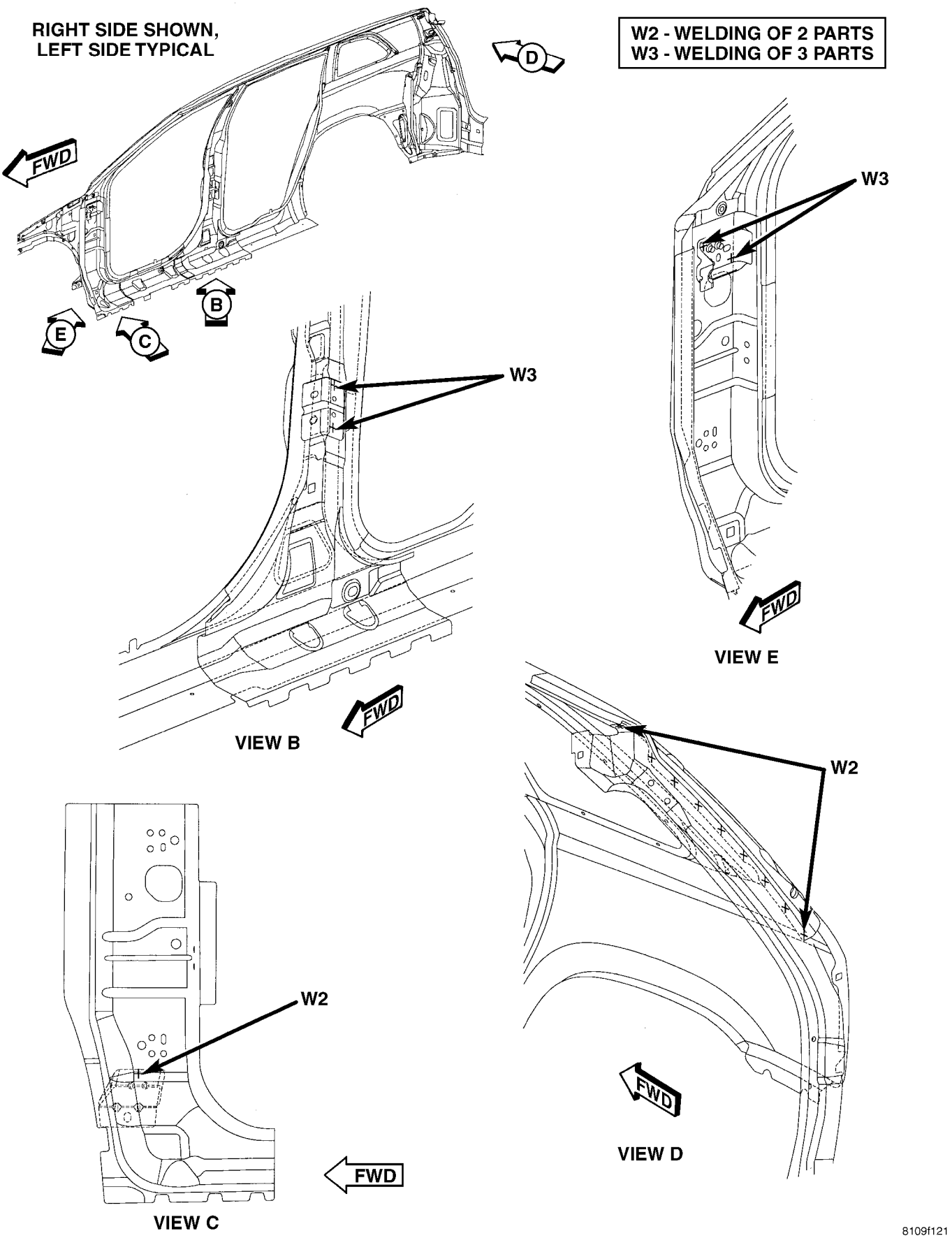


Fig. 64 BODY SIDE APERTURE - OUTER COMPLETE (6 OF 6)

WELD LOCATIONS (Continued)

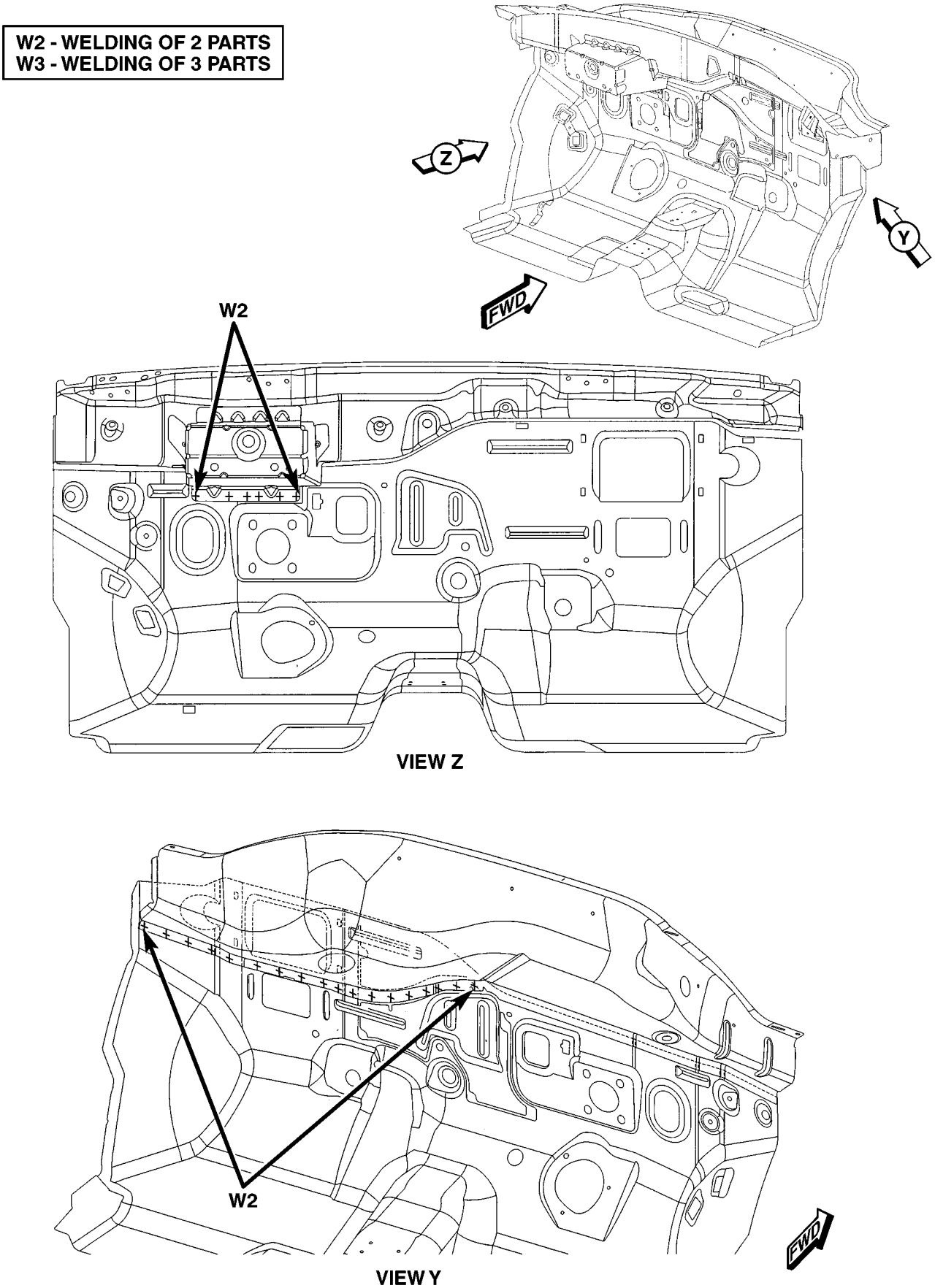


Fig. 65 DASH ASSEMBLY (1 OF 3)

WELD LOCATIONS (Continued)

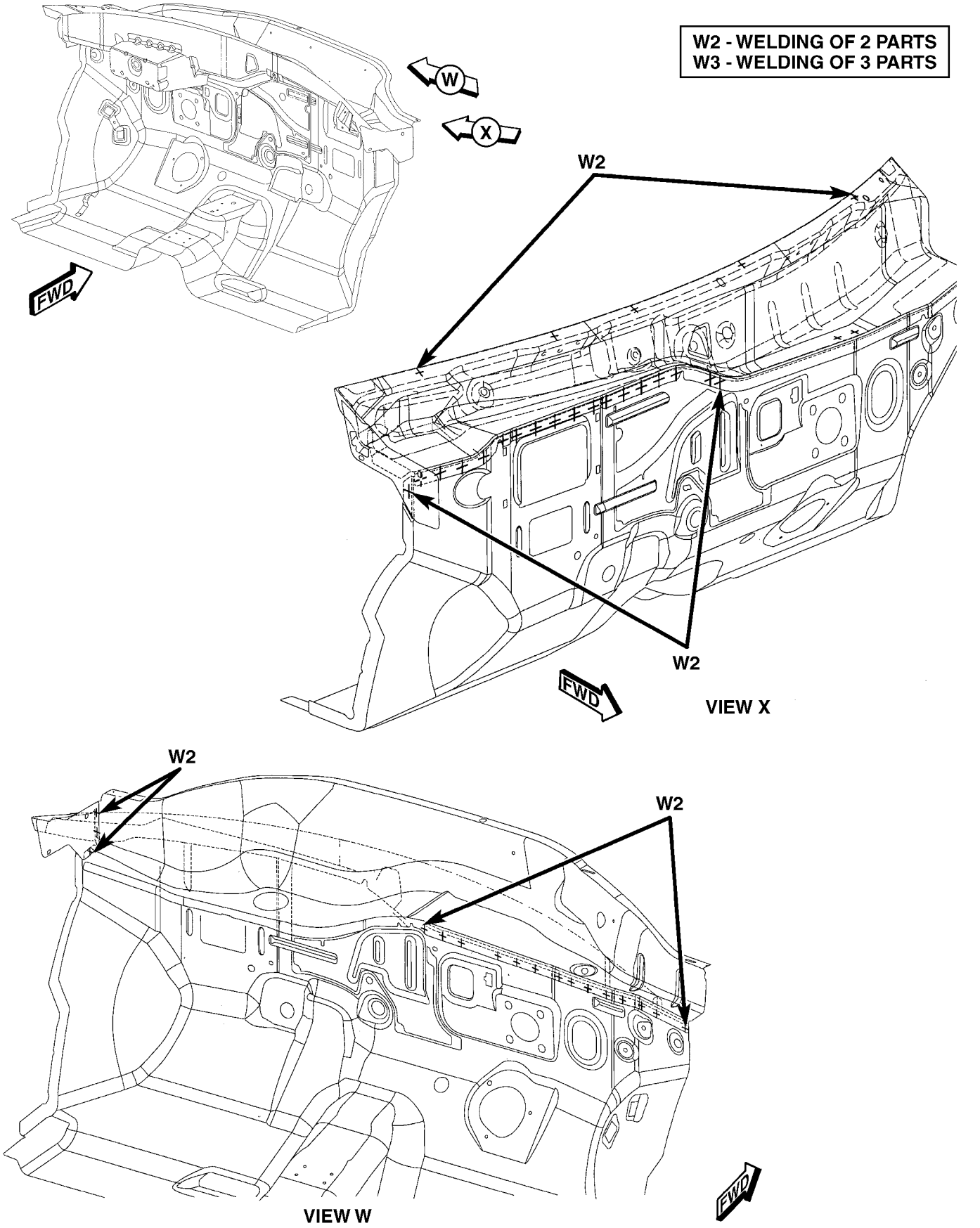


Fig. 66 DASH ASSEMBLY (2 OF 3)

WELD LOCATIONS (Continued)

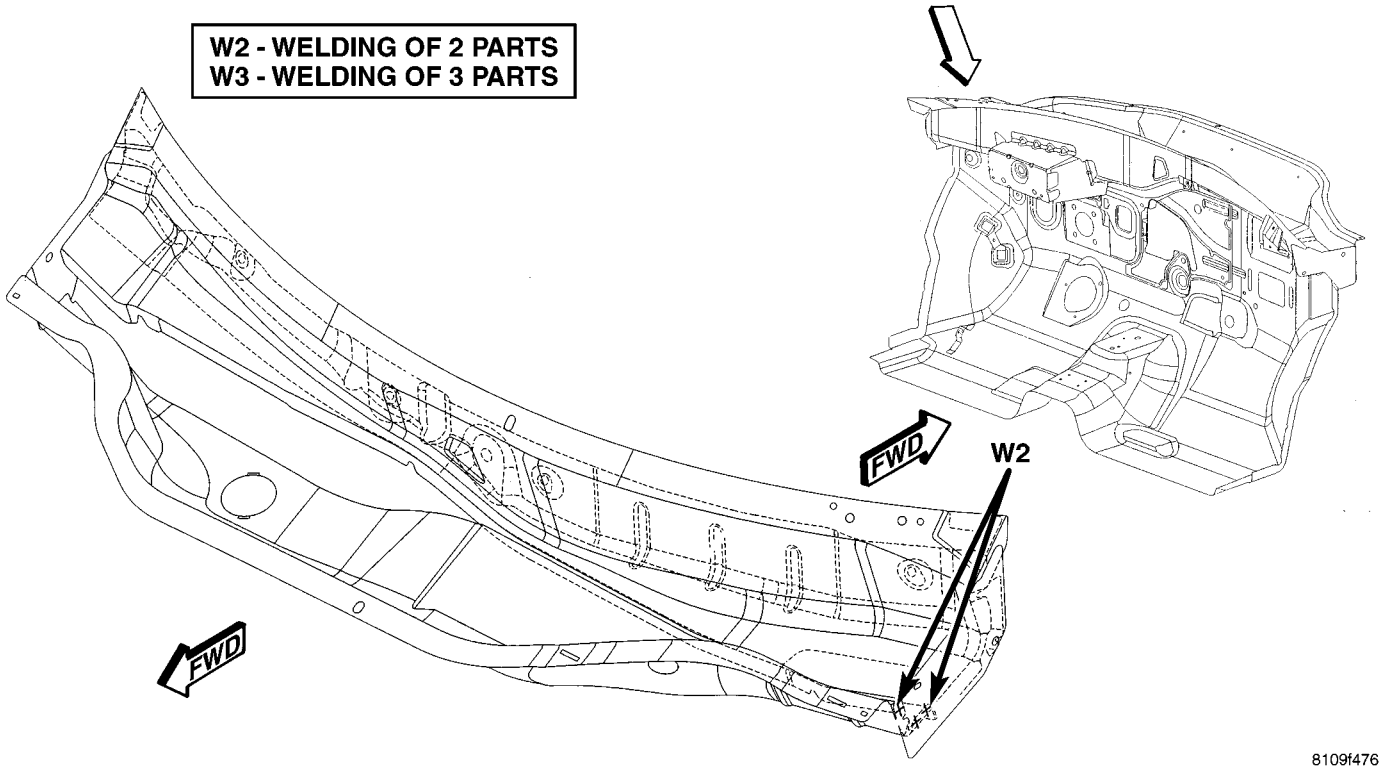


Fig. 67 DASH ASSEMBLY (3 OF 3)

WELD LOCATIONS (Continued)

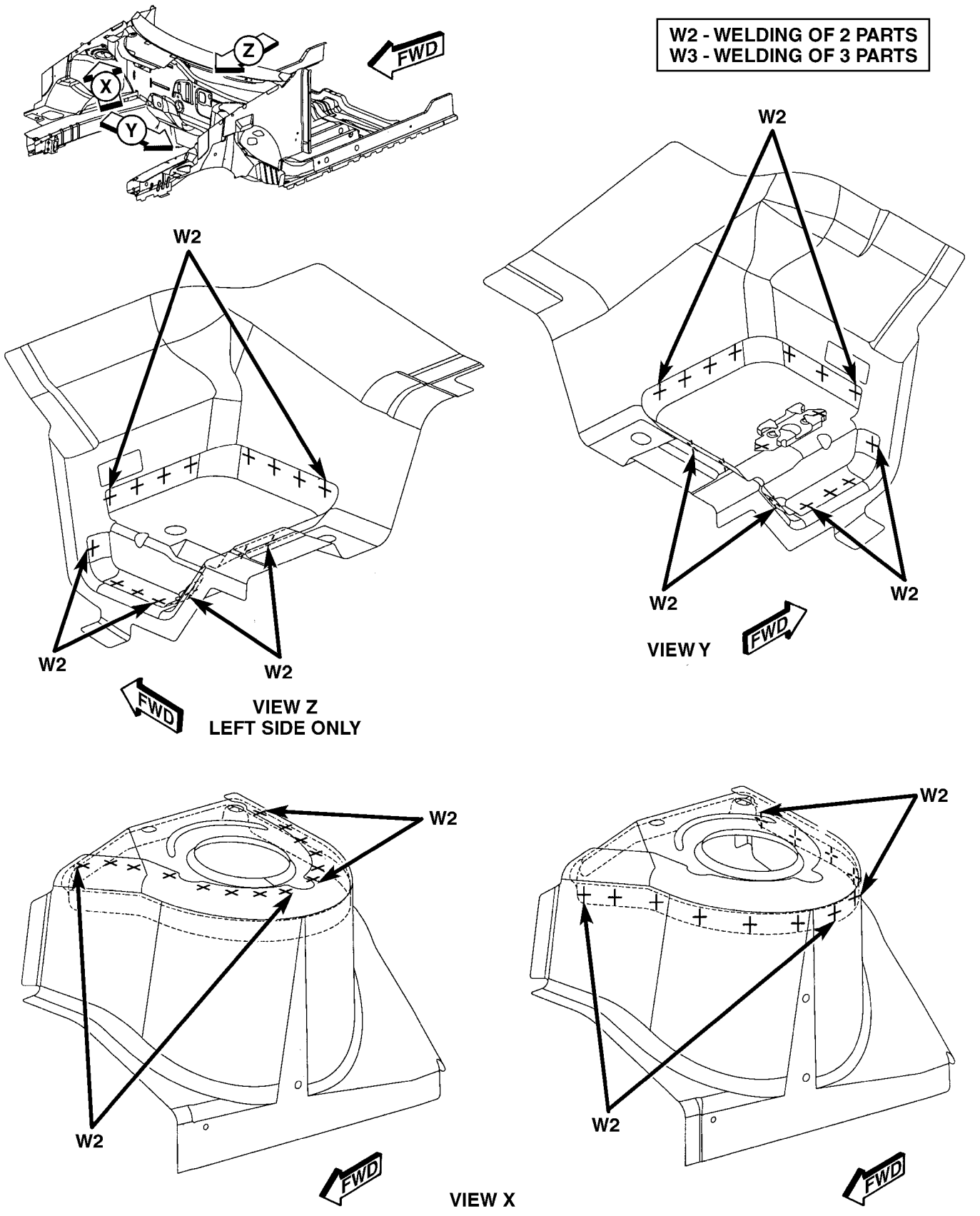


Fig. 68 ENGINE BOX (1 OF 15)

WELD LOCATIONS (Continued)

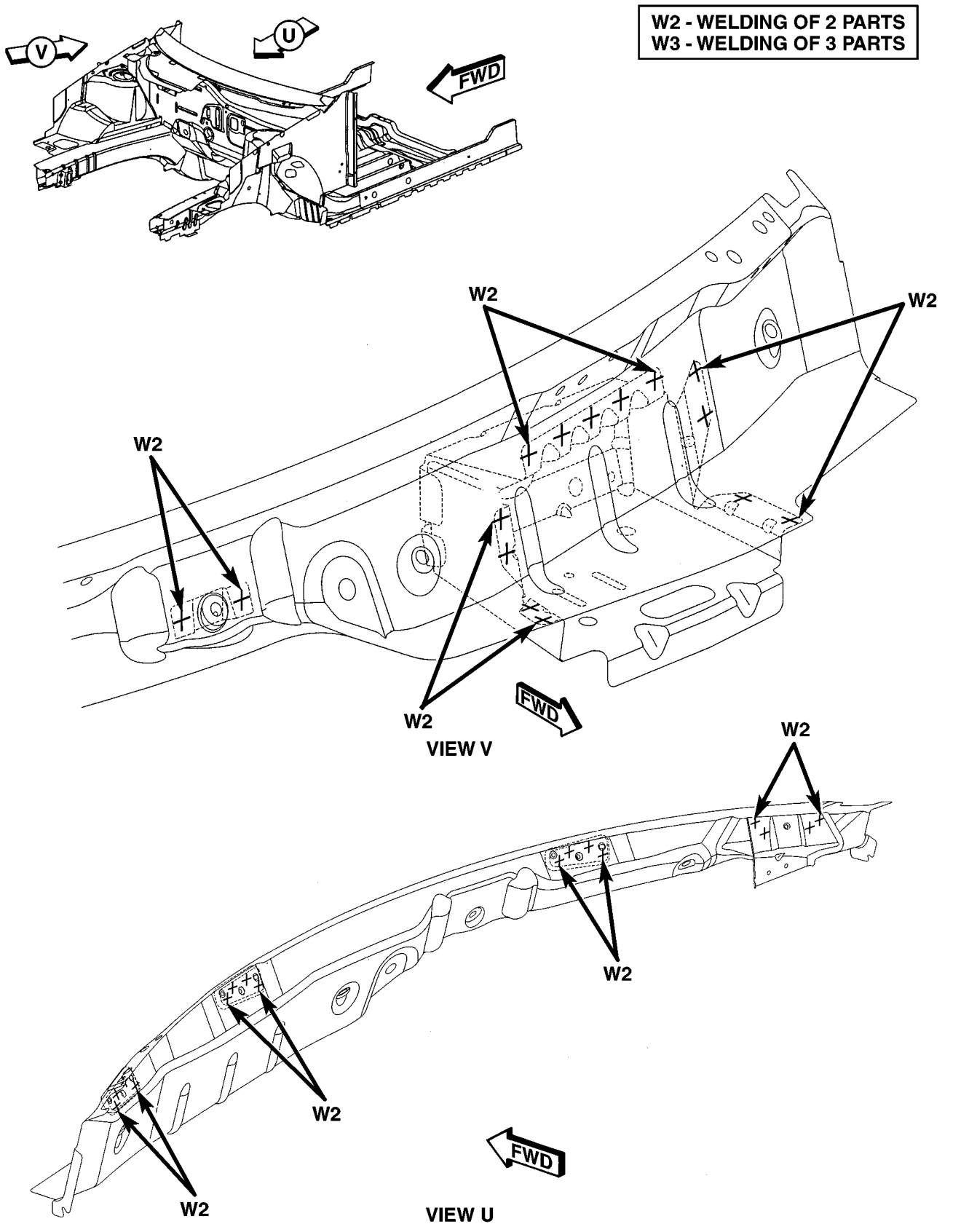


Fig. 69 ENGINE BOX (2 OF 15)

WELD LOCATIONS (Continued)

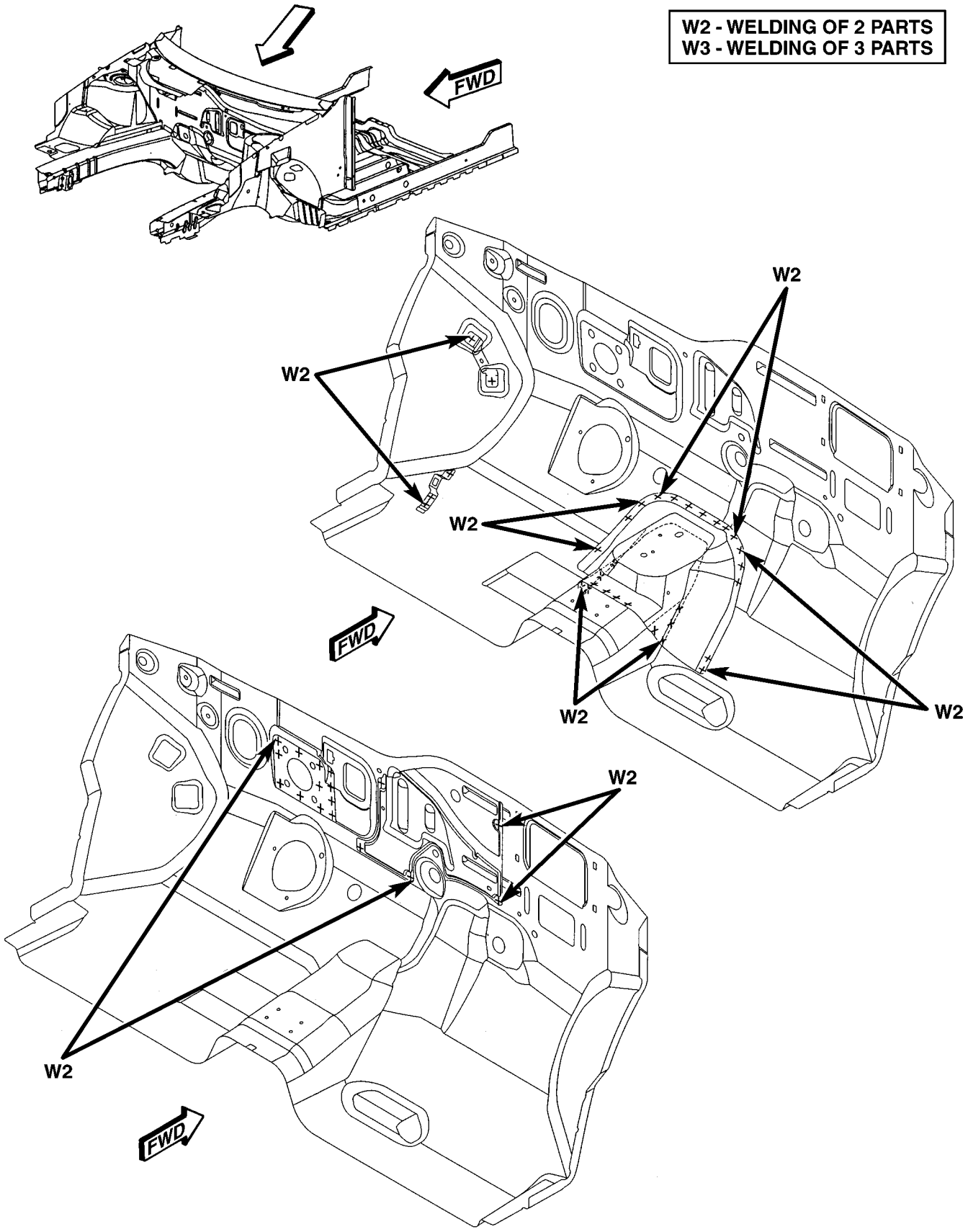


Fig. 70 ENGINE BOX (3 OF 15)

WELD LOCATIONS (Continued)

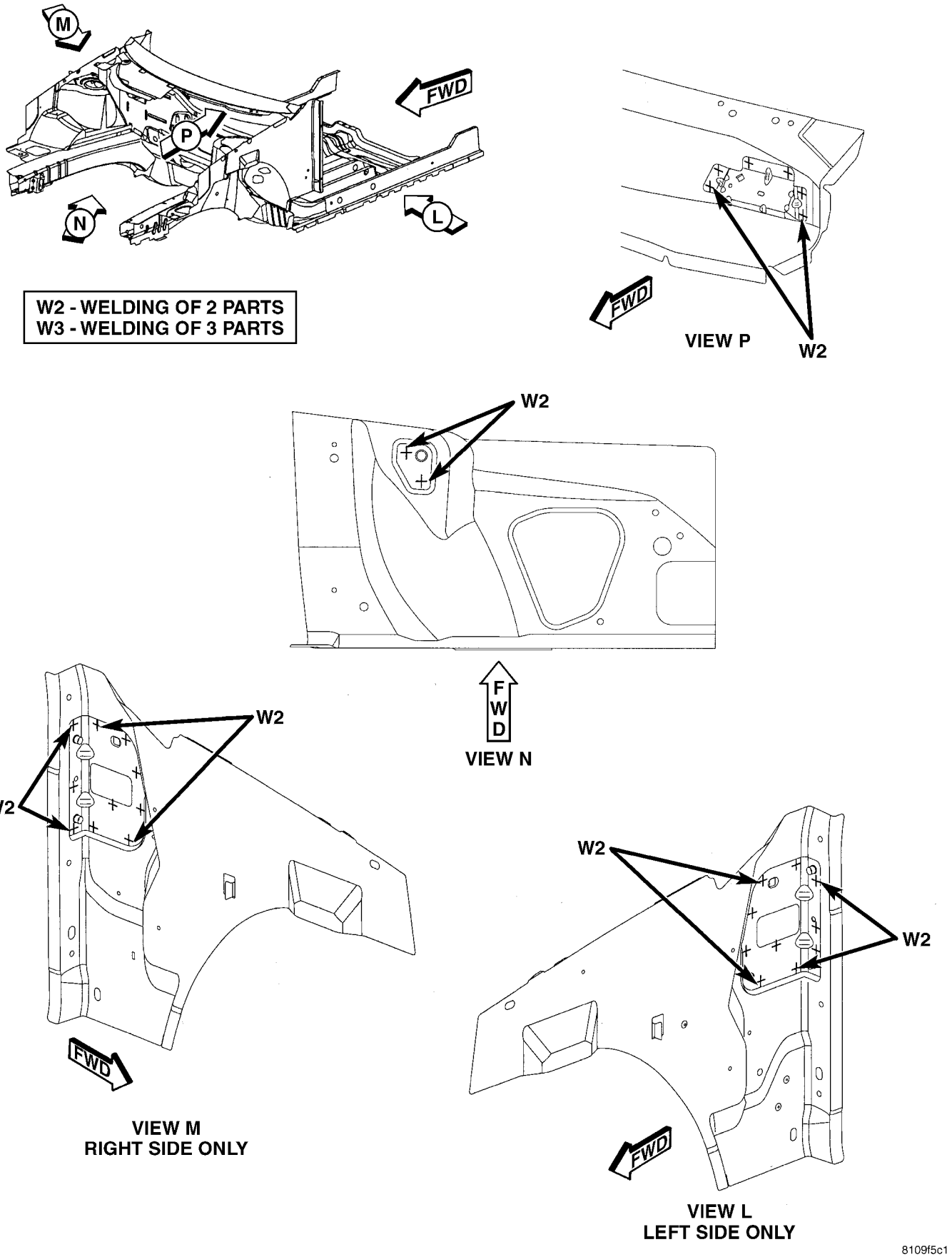


Fig. 71 ENGINE BOX (4 OF 15)

WELD LOCATIONS (Continued)

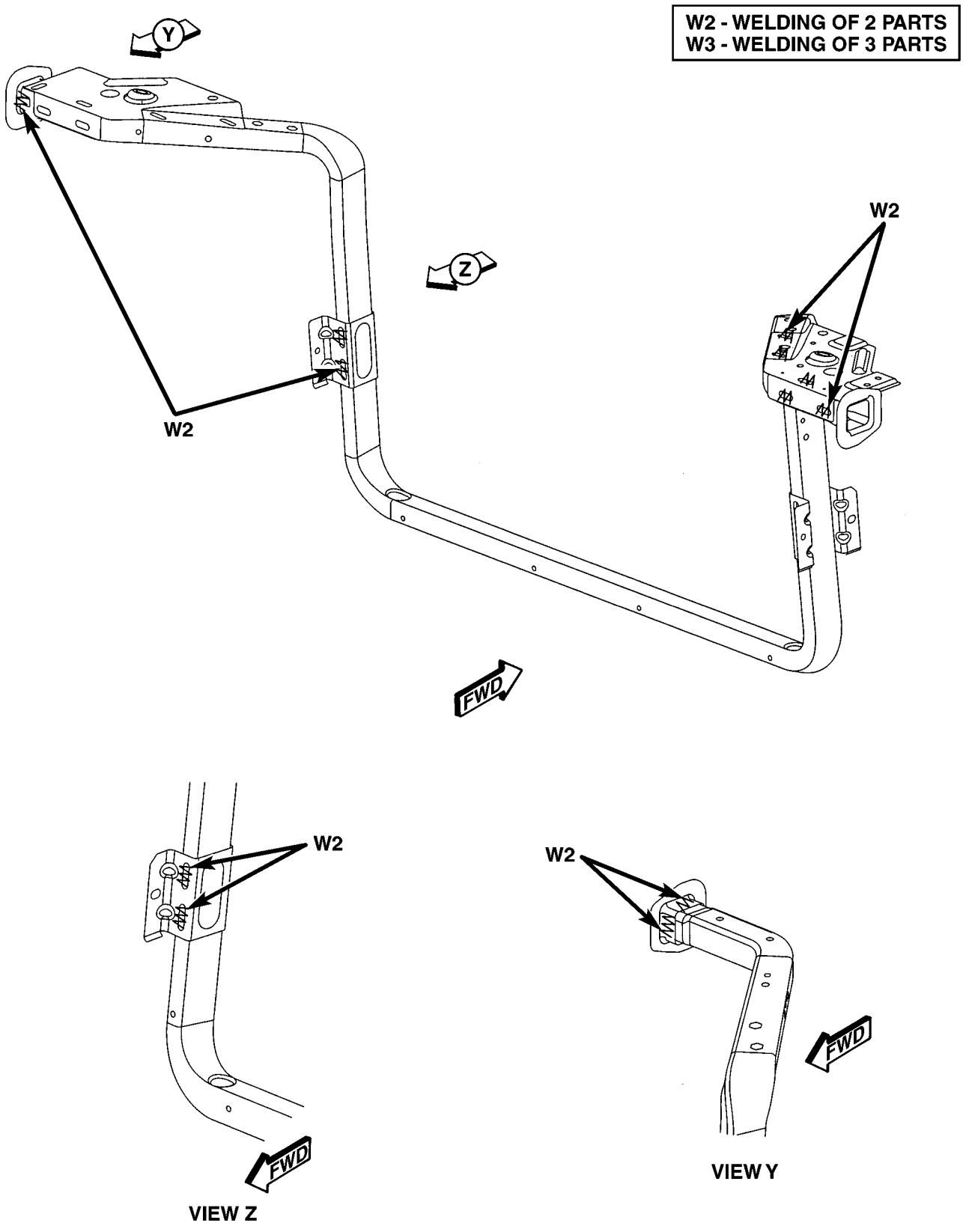
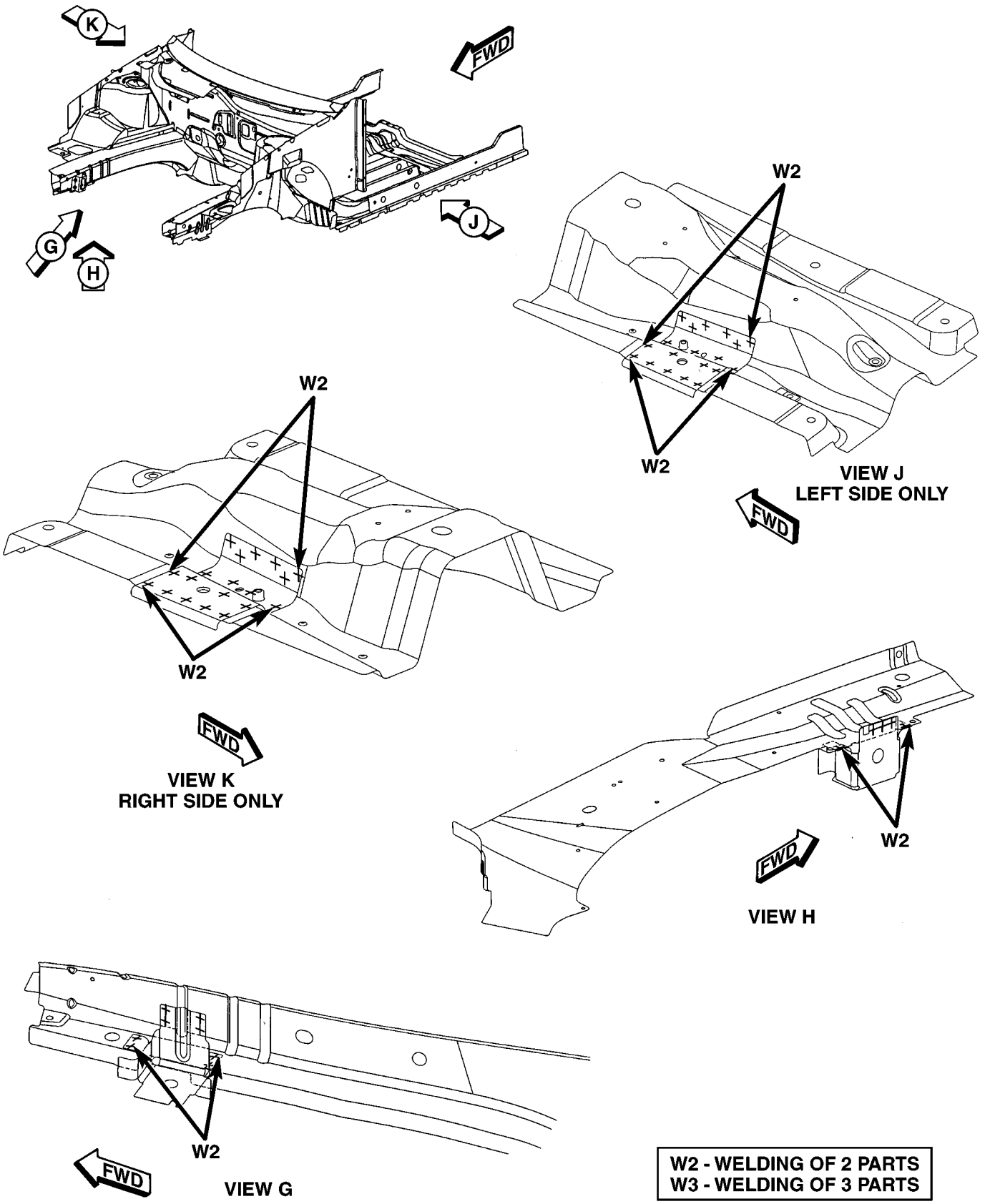


Fig. 72 ENGINE BOX (5 OF 15)

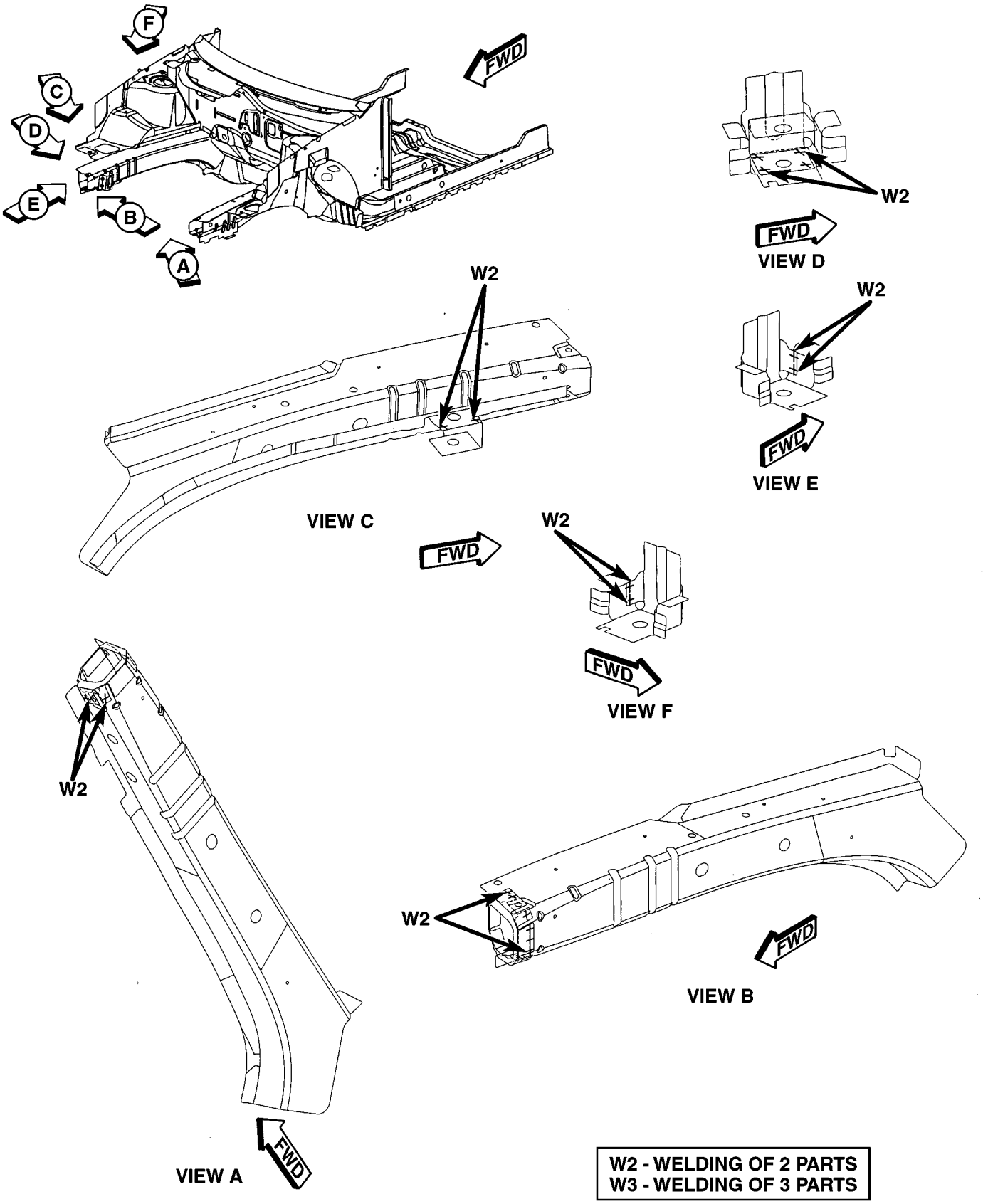
WELD LOCATIONS (Continued)



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Fig. 73 ENGINE BOX (6 OF 15)

WELD LOCATIONS (Continued)



8109f5cd

Fig. 74 ENGINE BOX (7 OF 15)

WELD LOCATIONS (Continued)

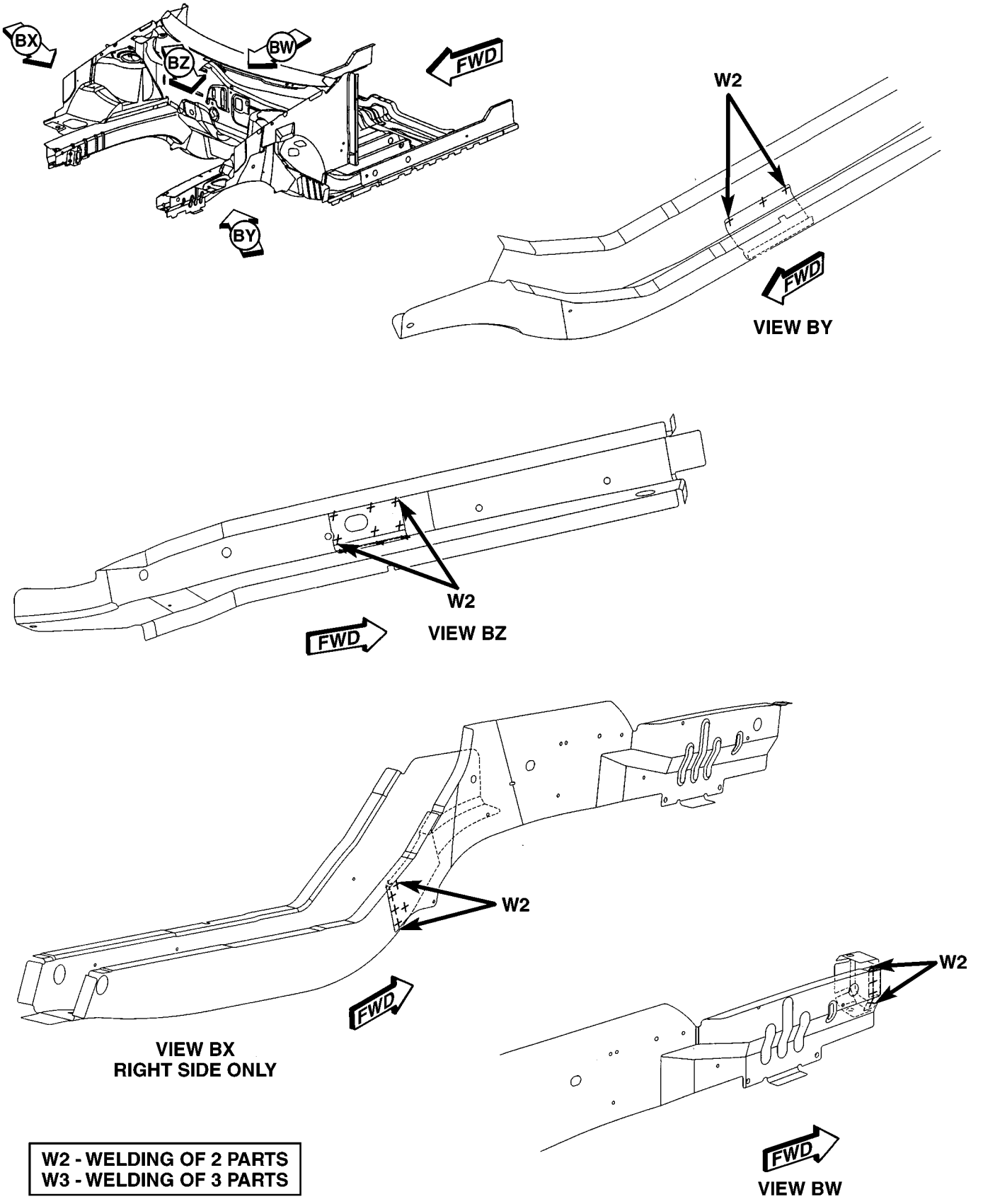


Fig. 75 ENGINE BOX (8 OF 15)

WELD LOCATIONS (Continued)

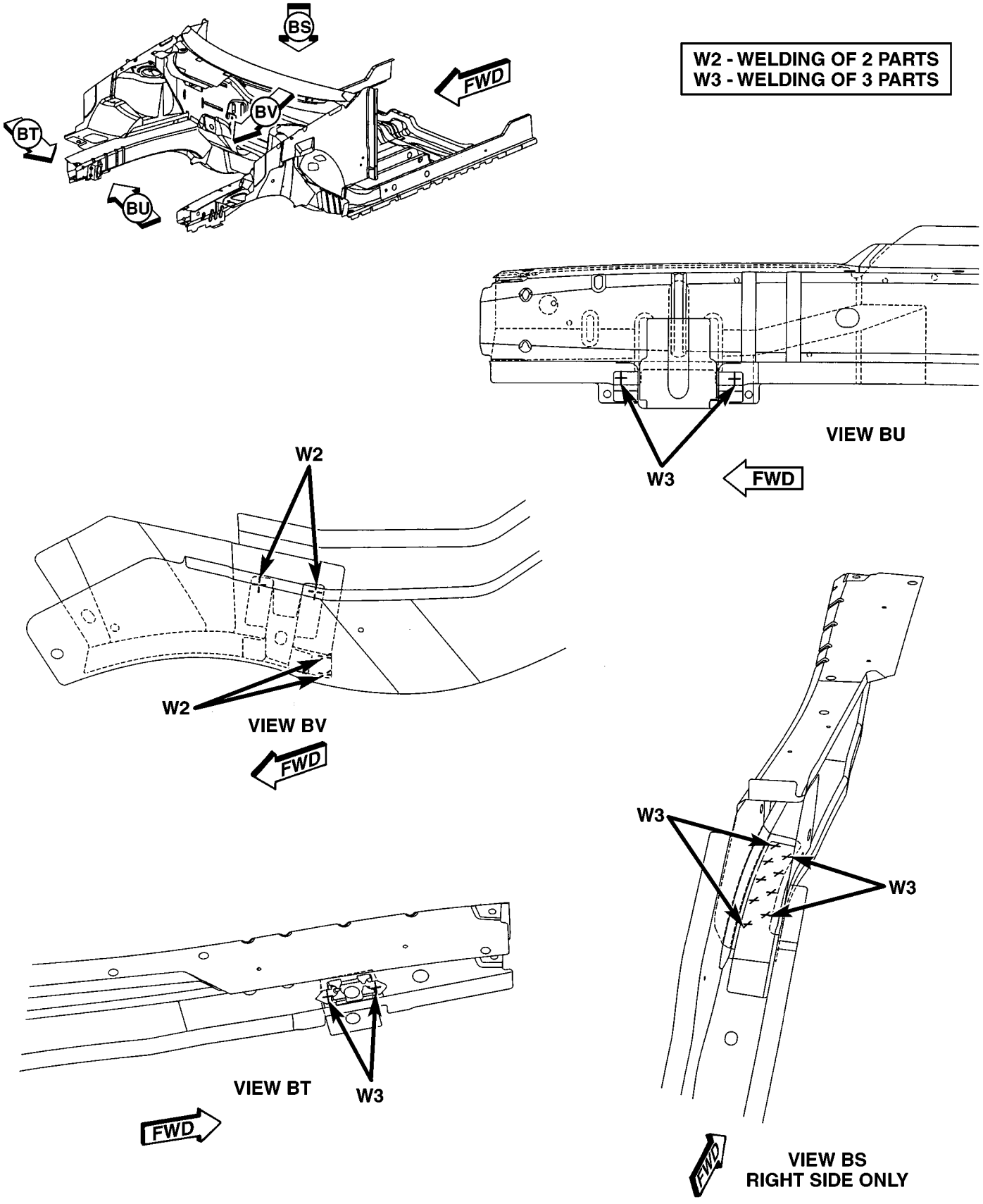
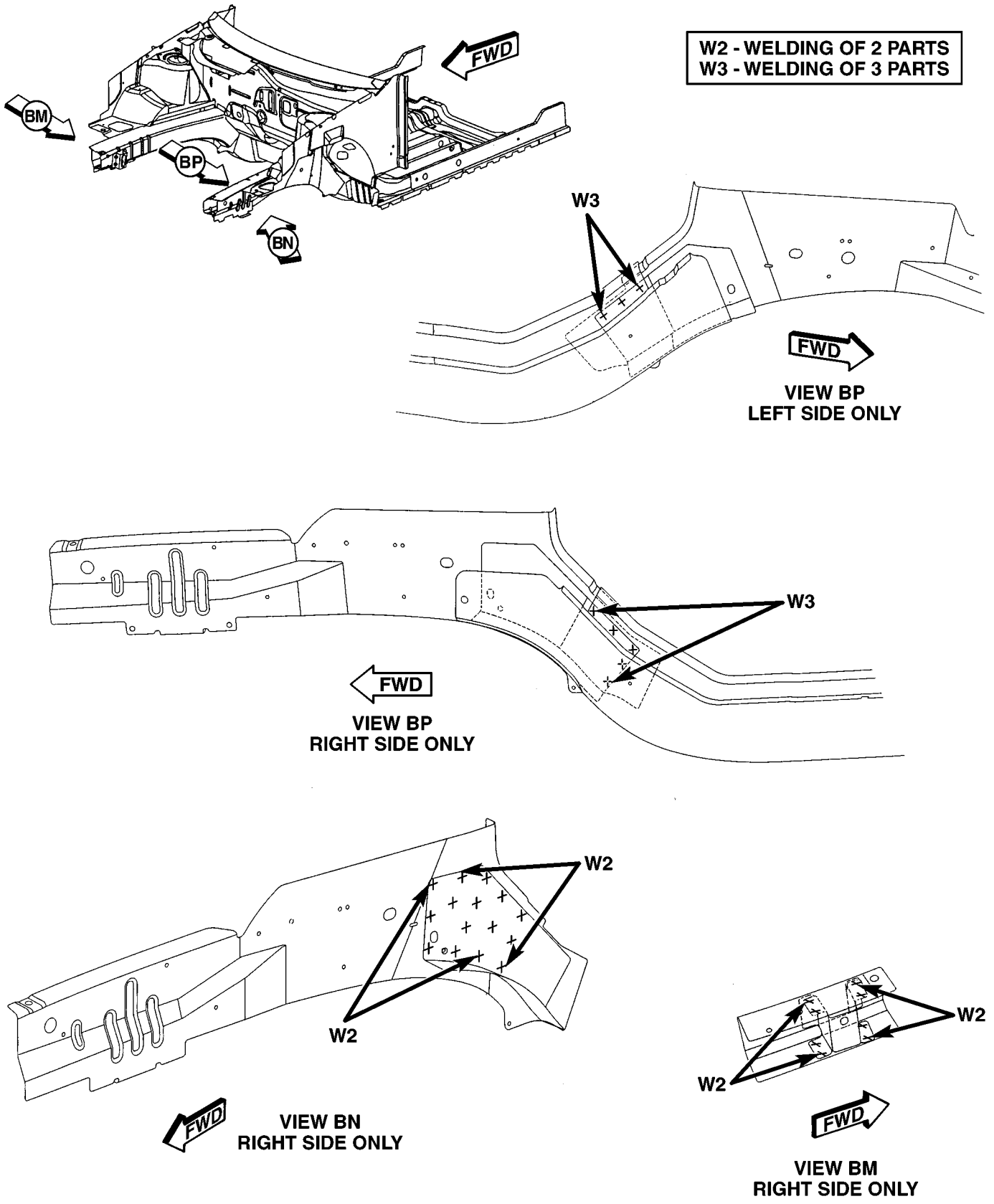


Fig. 76 ENGINE BOX (9 OF 15)

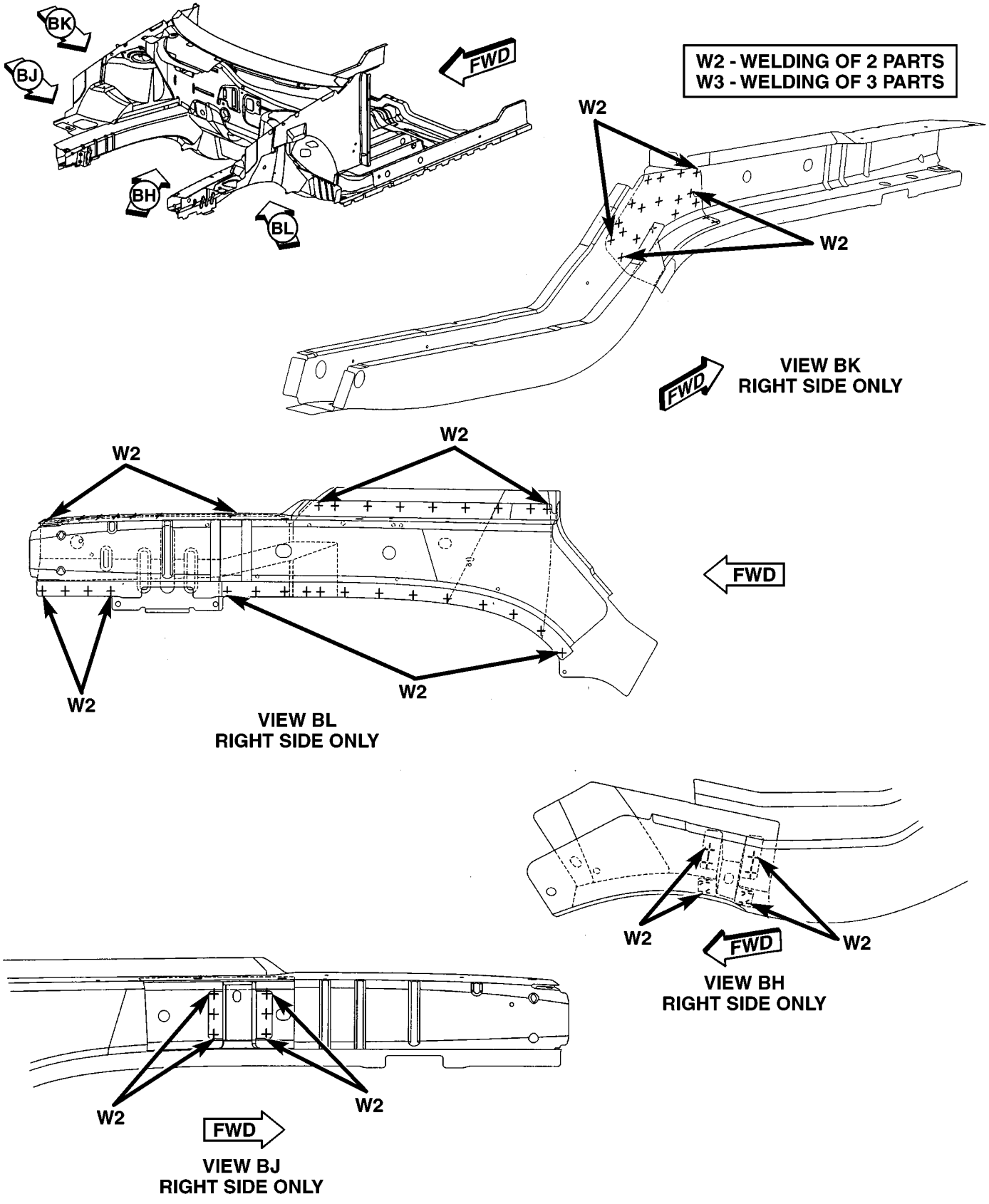
WELD LOCATIONS (Continued)



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Fig. 77 ENGINE BOX (10 OF 15)

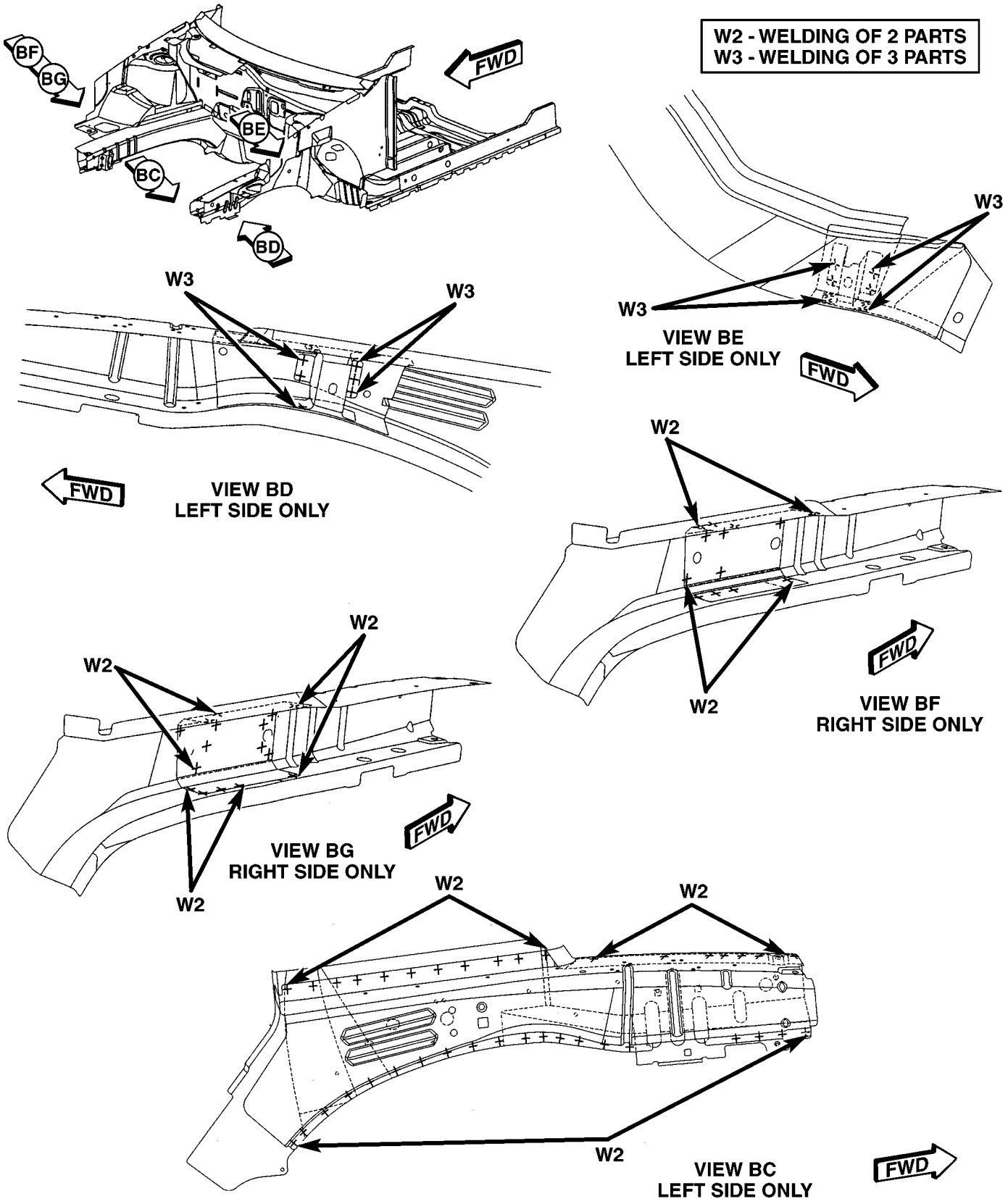
WELD LOCATIONS (Continued)



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Fig. 78 ENGINE BOX (11 OF 15)

WELD LOCATIONS (Continued)



8109f5e6

Fig. 79 ENGINE BOX (12 OF 15)

WELD LOCATIONS (Continued)

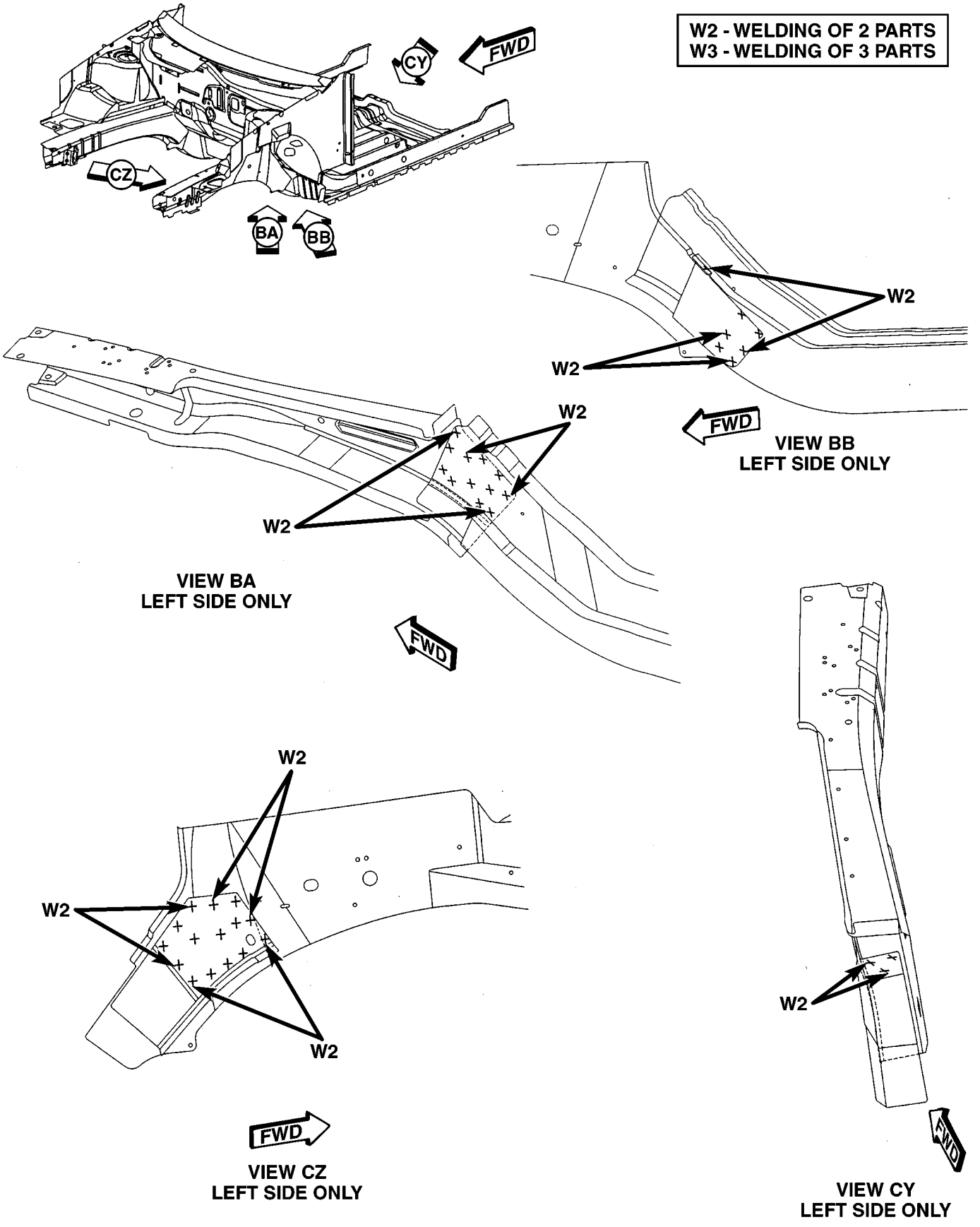


Fig. 80 ENGINE BOX (13 OF 15)

WELD LOCATIONS (Continued)

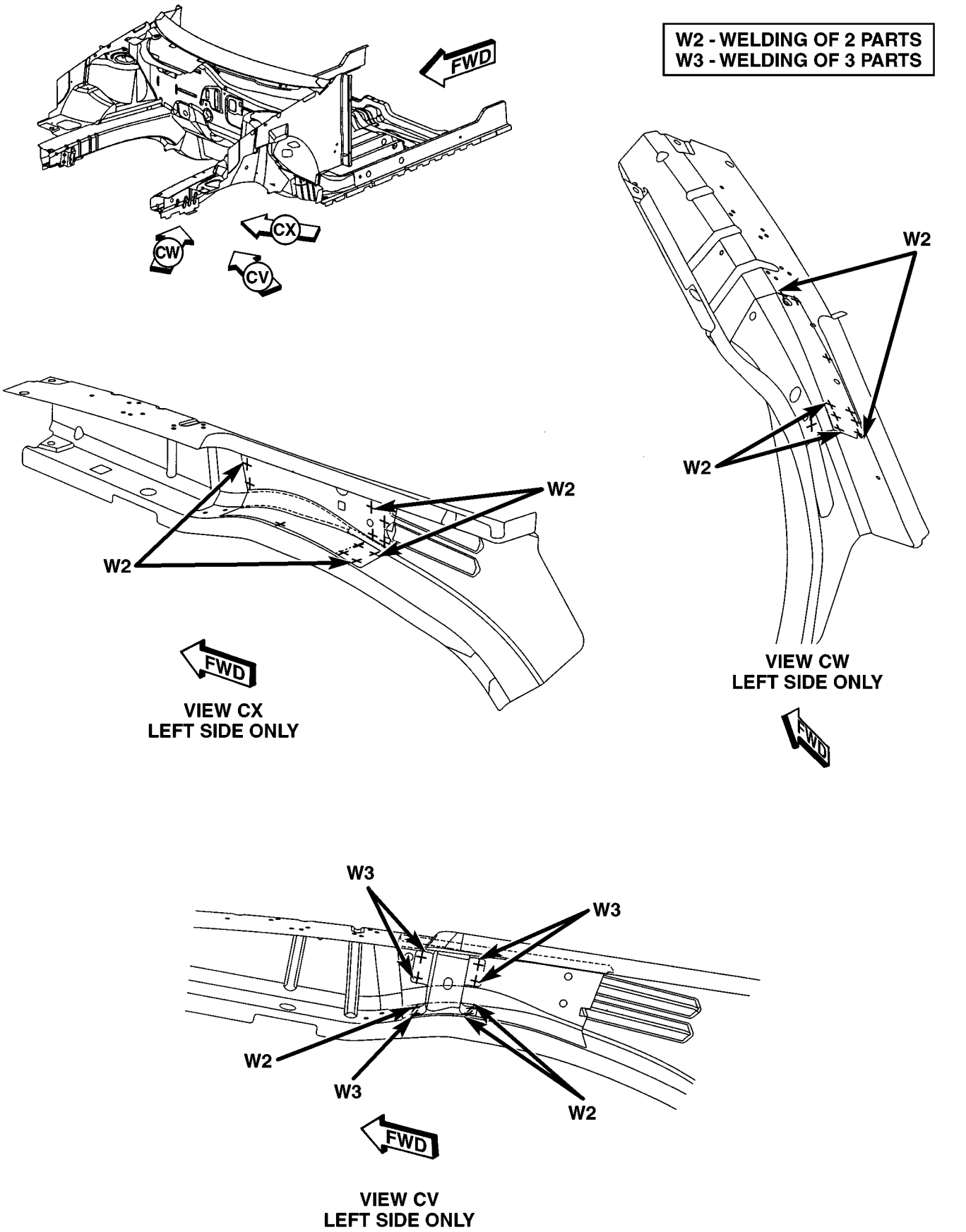


Fig. 81 ENGINE BOX (14 OF 15)

WELD LOCATIONS (Continued)

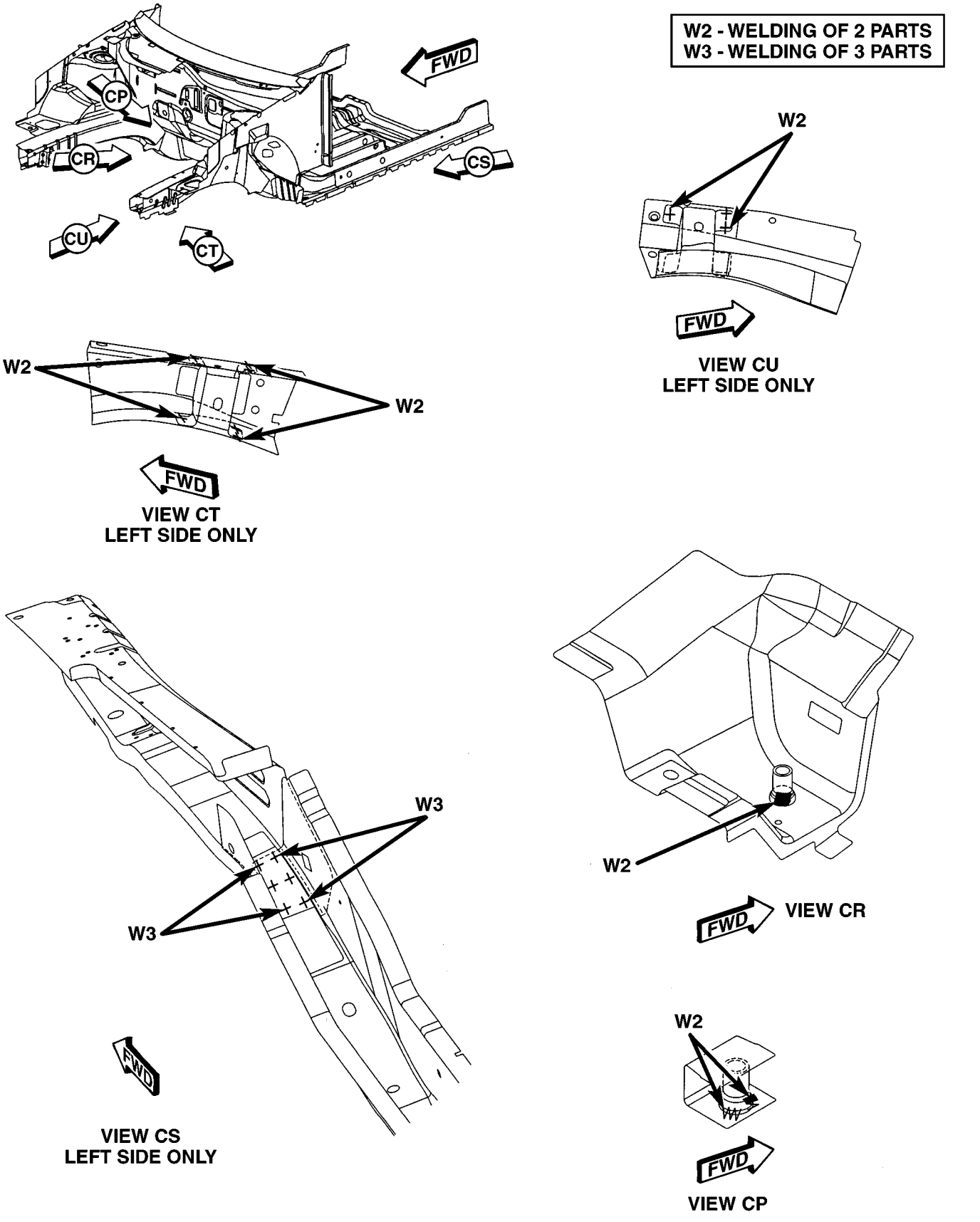


Fig. 82 ENGINE BOX (15 OF 15)

WELD LOCATIONS (Continued)

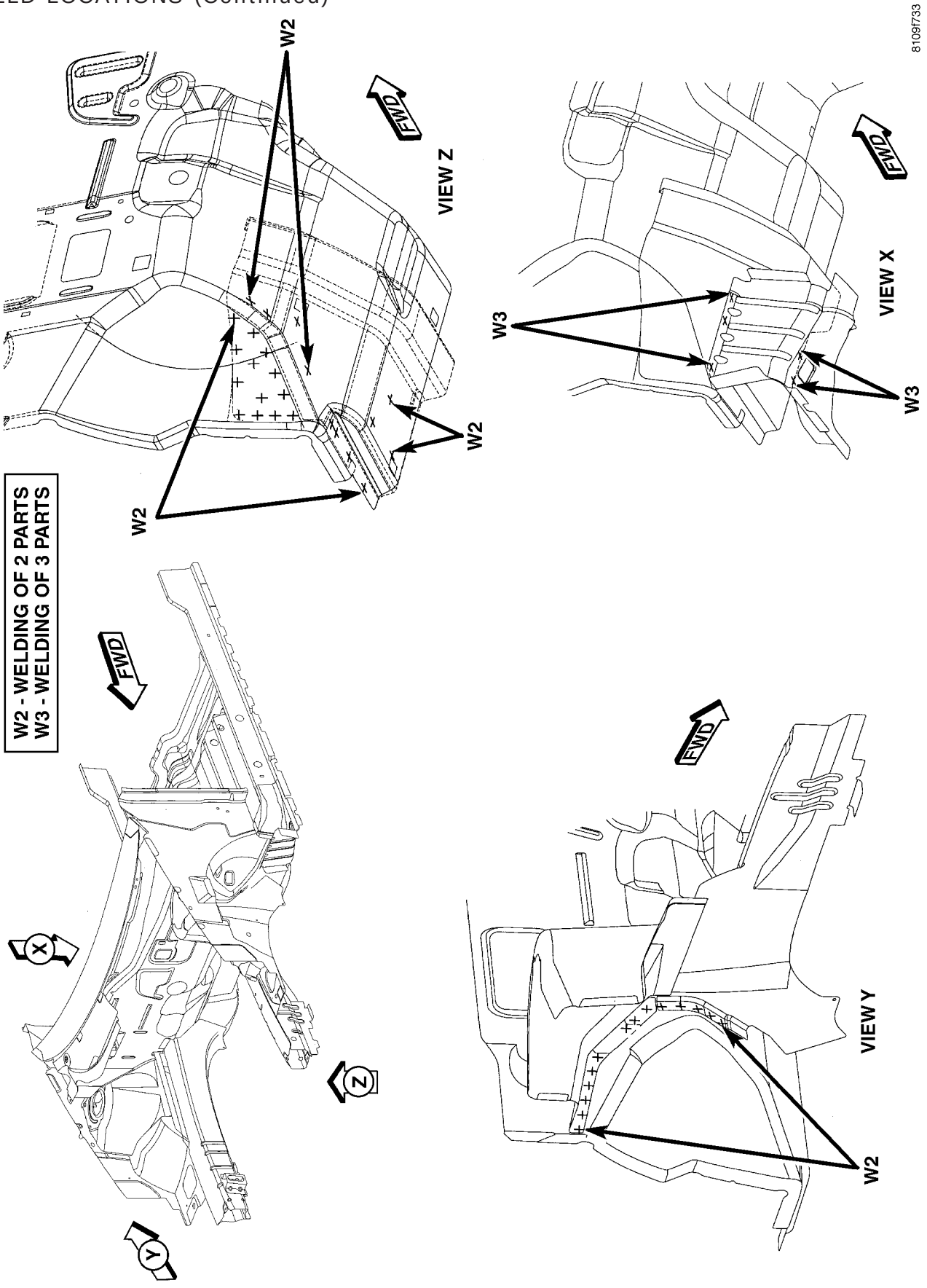


Fig. 83 ENGINE BOX COMPLETE (1 OF 6)

WELD LOCATIONS (Continued)

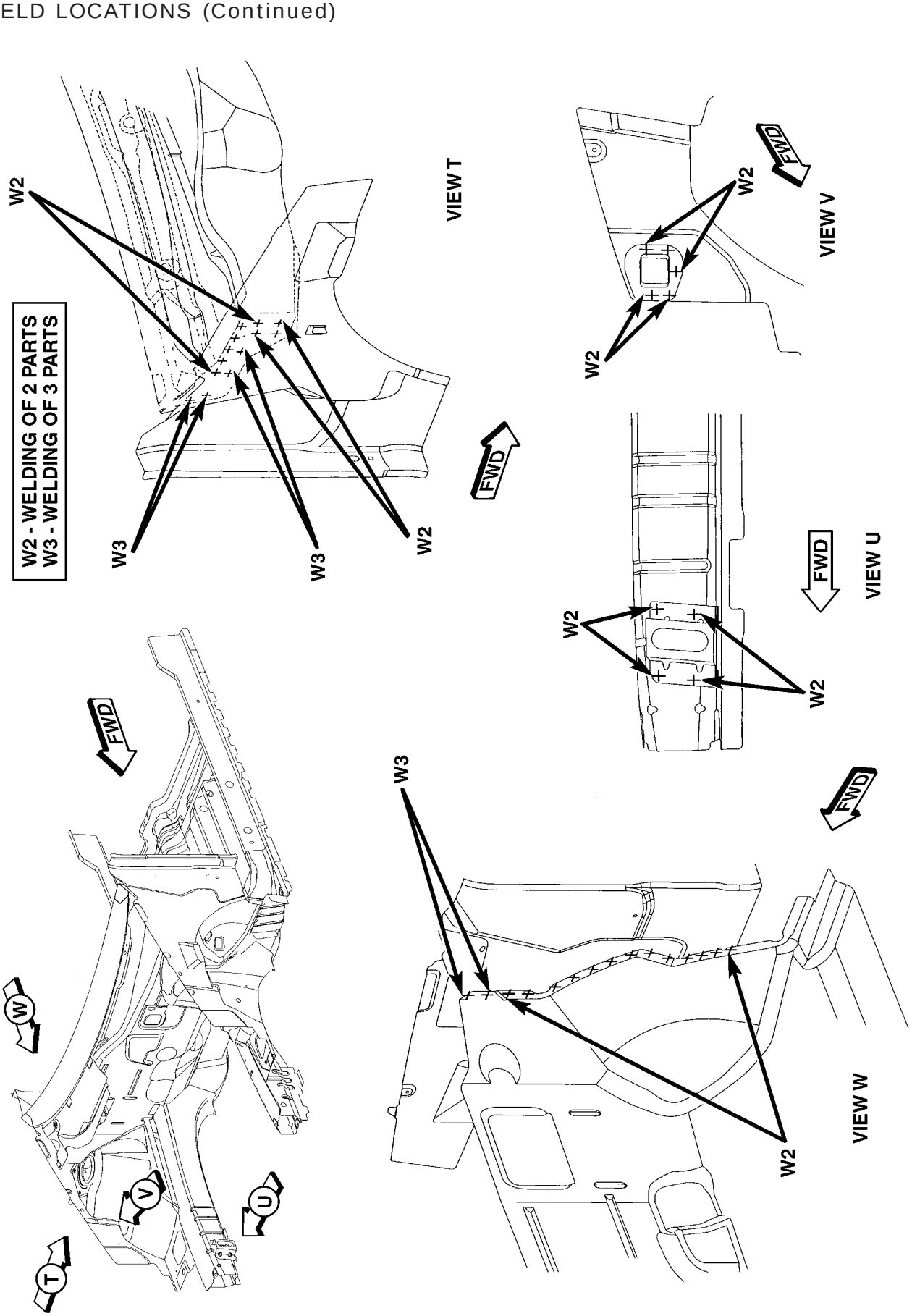


Fig. 84 ENGINE BOX COMPLETE (2 OF 6)

WELD LOCATIONS (Continued)

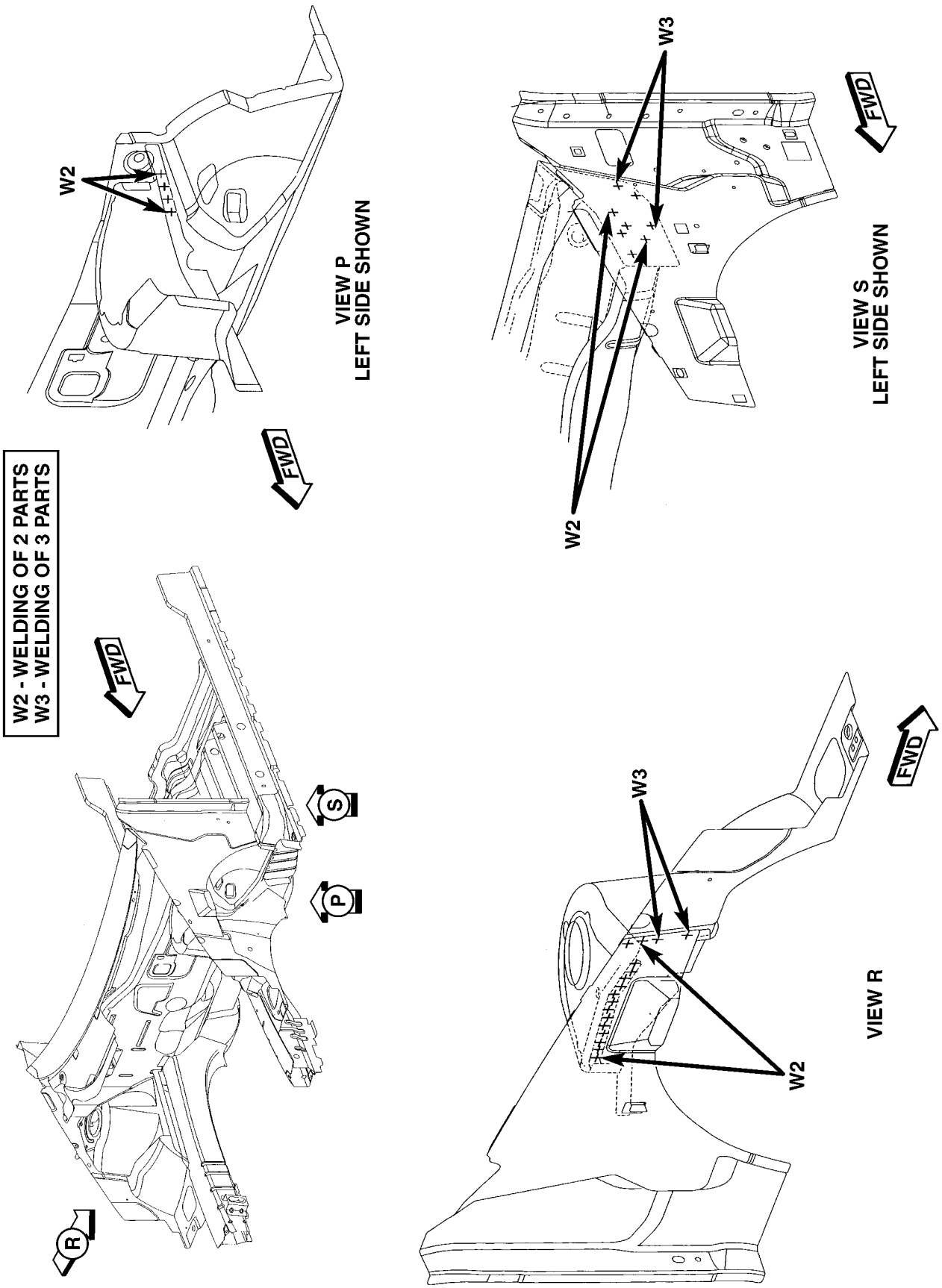


Fig. 85 ENGINE BOX COMPLETE (3 OF 6)

WELD LOCATIONS (Continued)

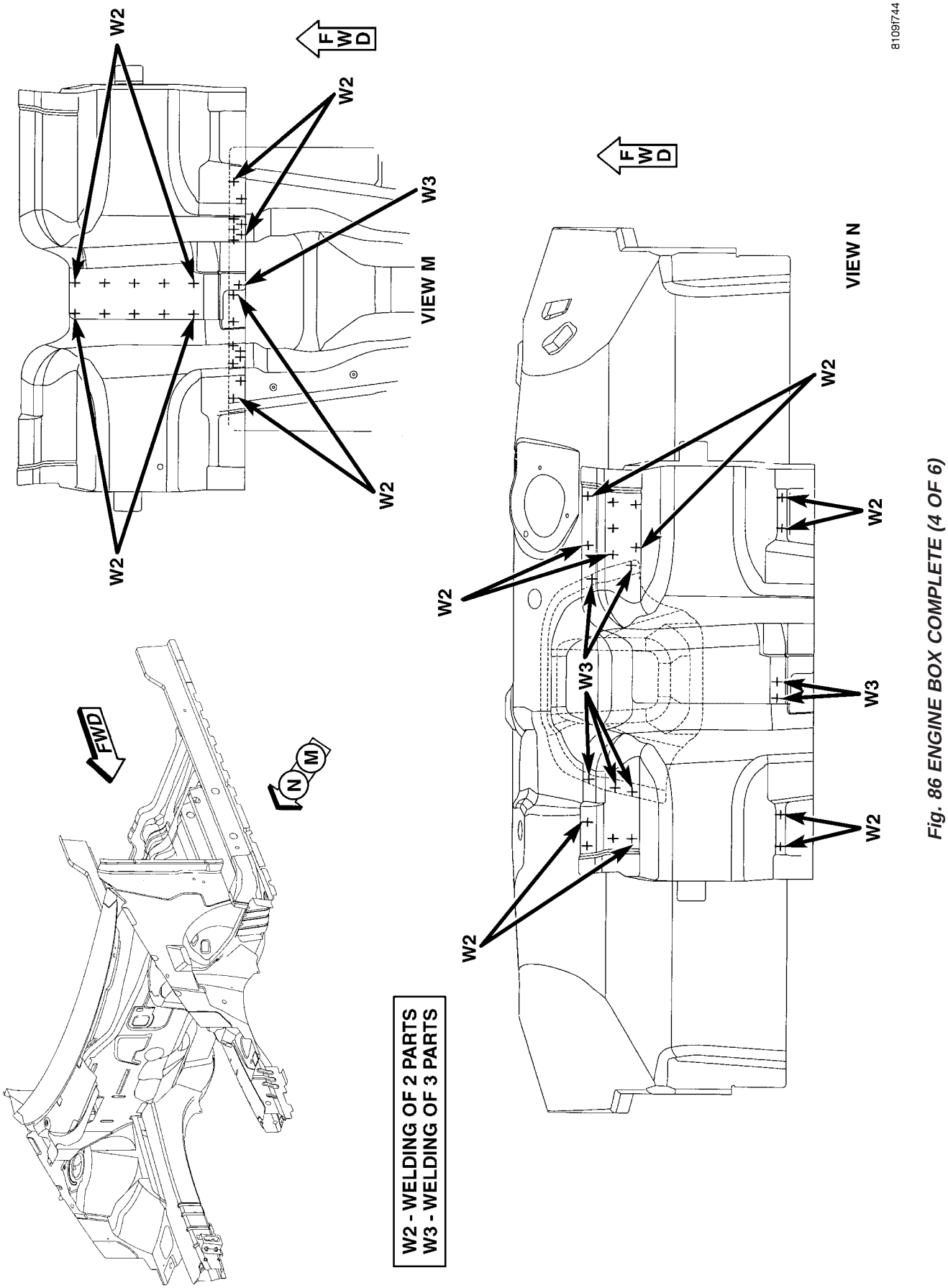


Fig. 86 ENGINE BOX COMPLETE (4 OF 6)

WELD LOCATIONS (Continued)

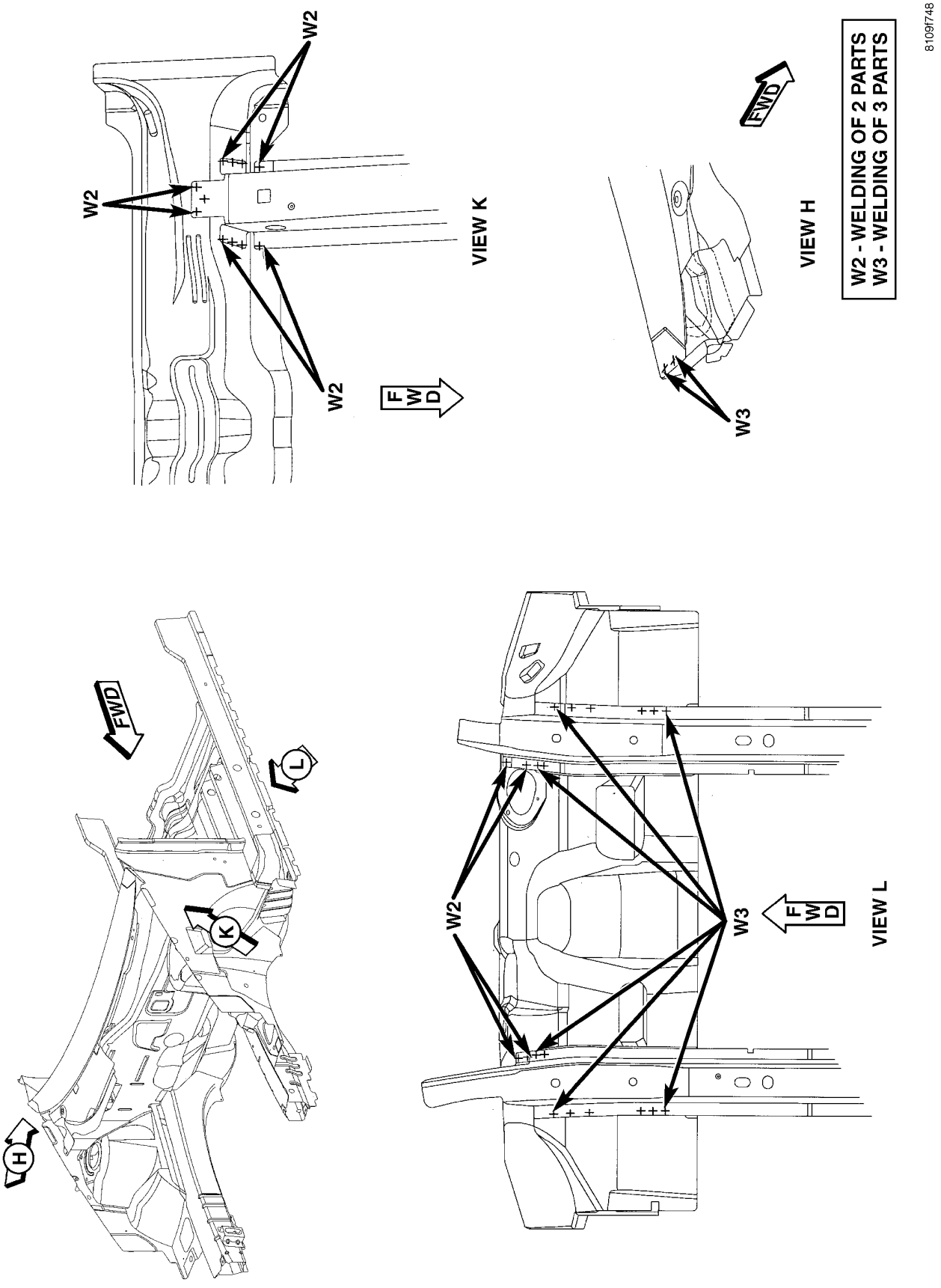


Fig. 87 ENGINE BOX COMPLETE (5 OF 6)

WELD LOCATIONS (Continued)

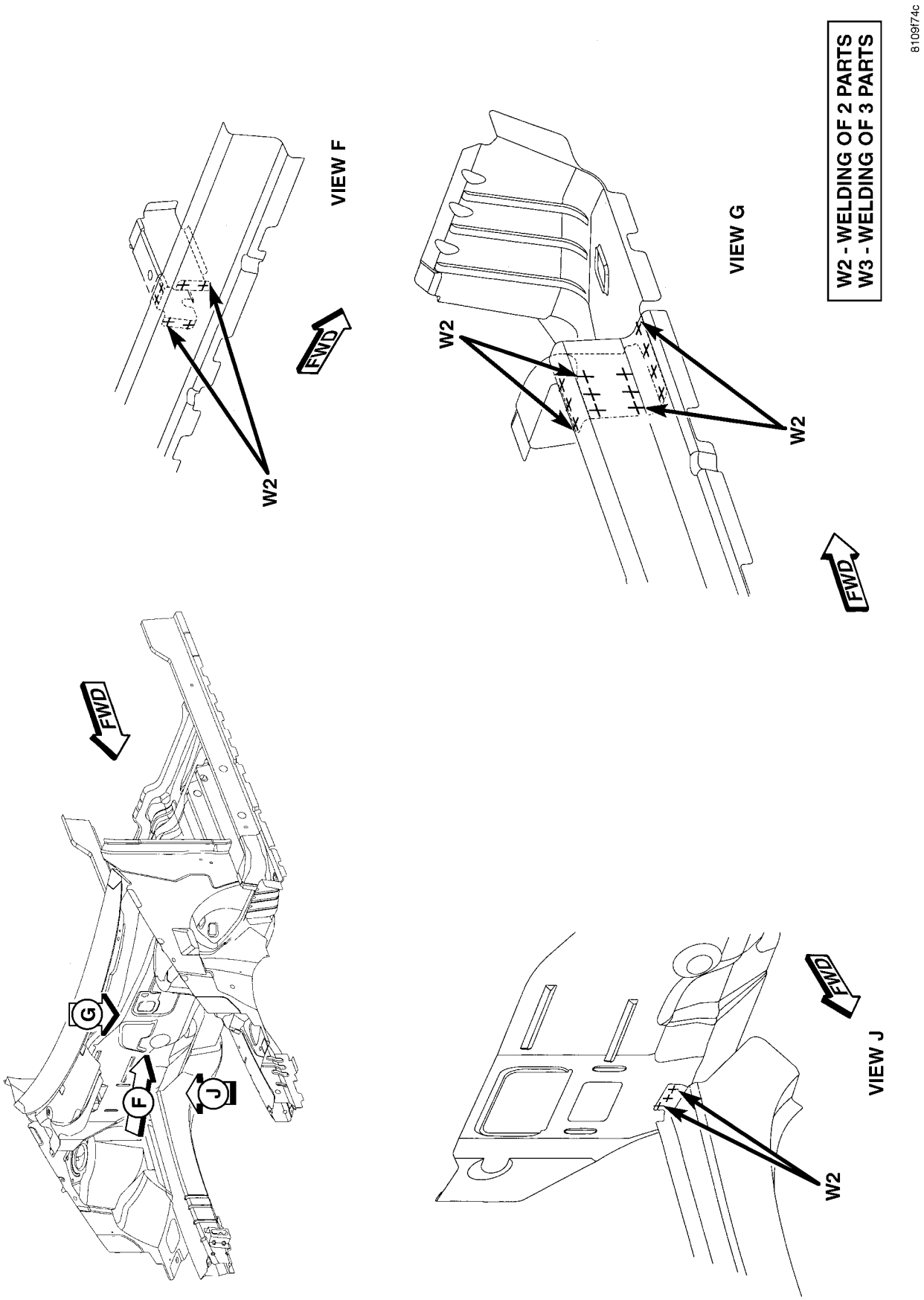


Fig. 88 ENGINE BOX COMPLETE (6 OF 6)

WELD LOCATIONS (Continued)

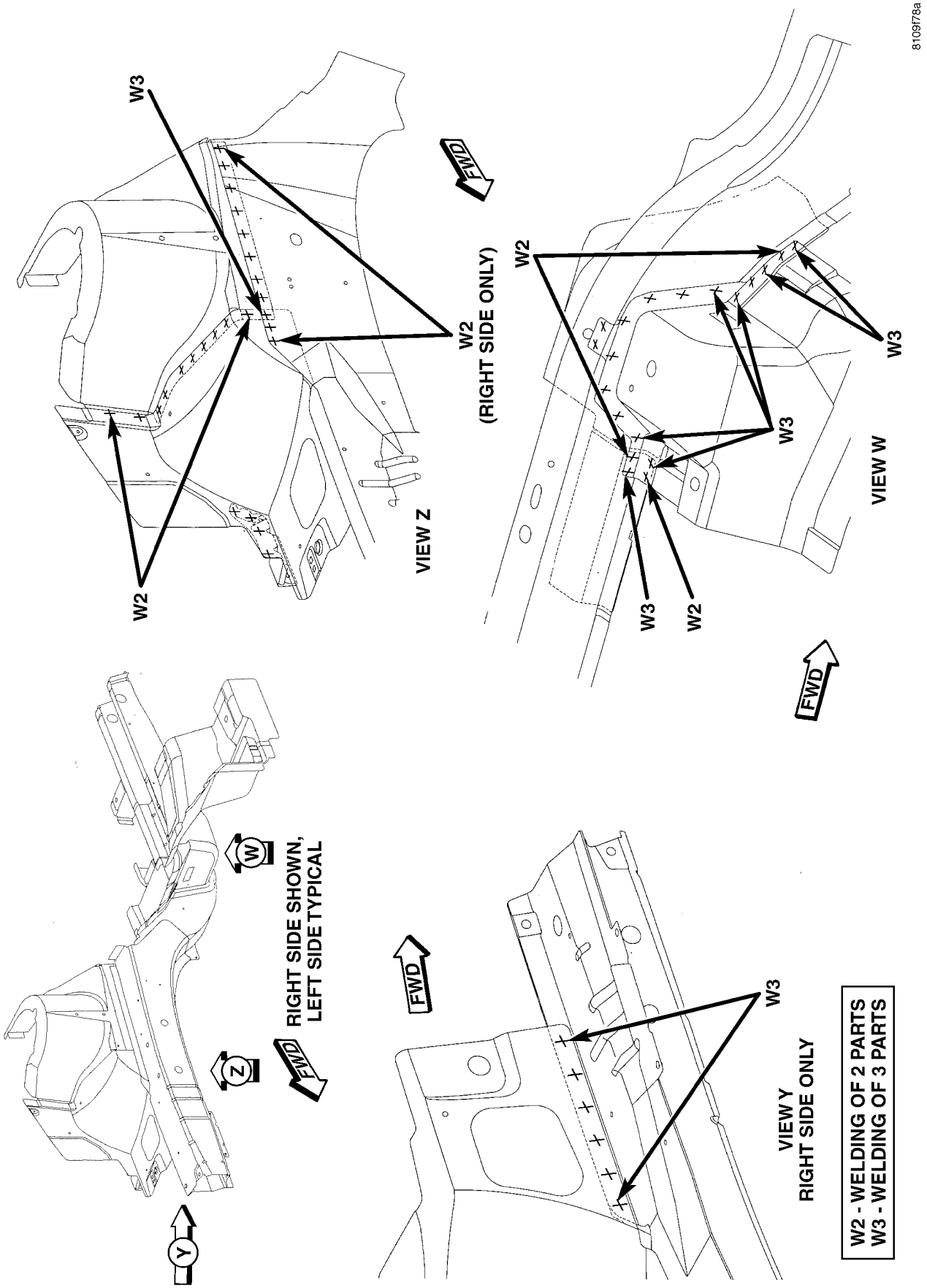


Fig. 89 FRONT RAILS (1 OF 3)

WELD LOCATIONS (Continued)

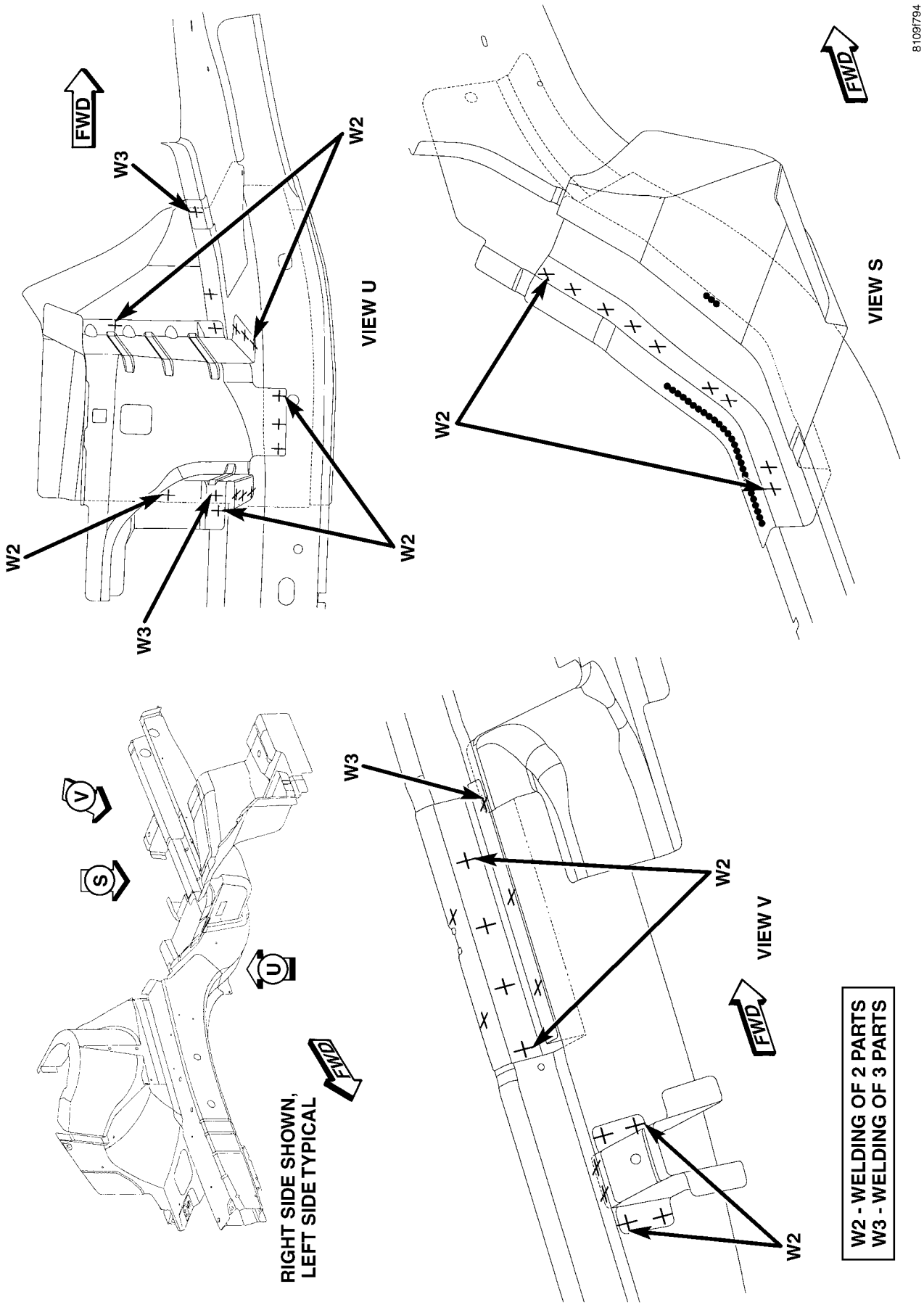


Fig. 90 FRONT RAILS (2 OF 3)

WELD LOCATIONS (Continued)

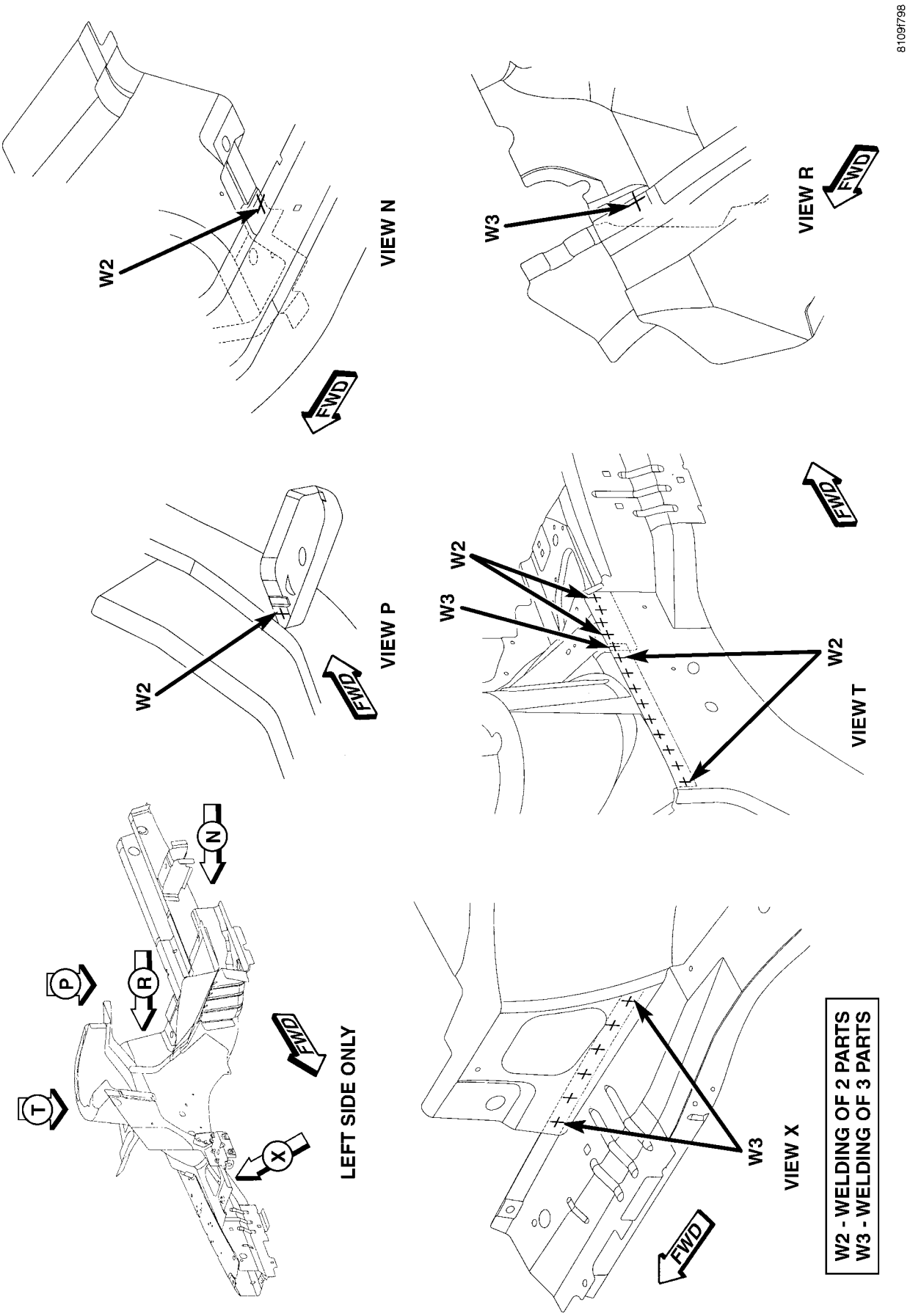


Fig. 91 FRONT RAILS (3 OF 3)

WELD LOCATIONS (Continued)

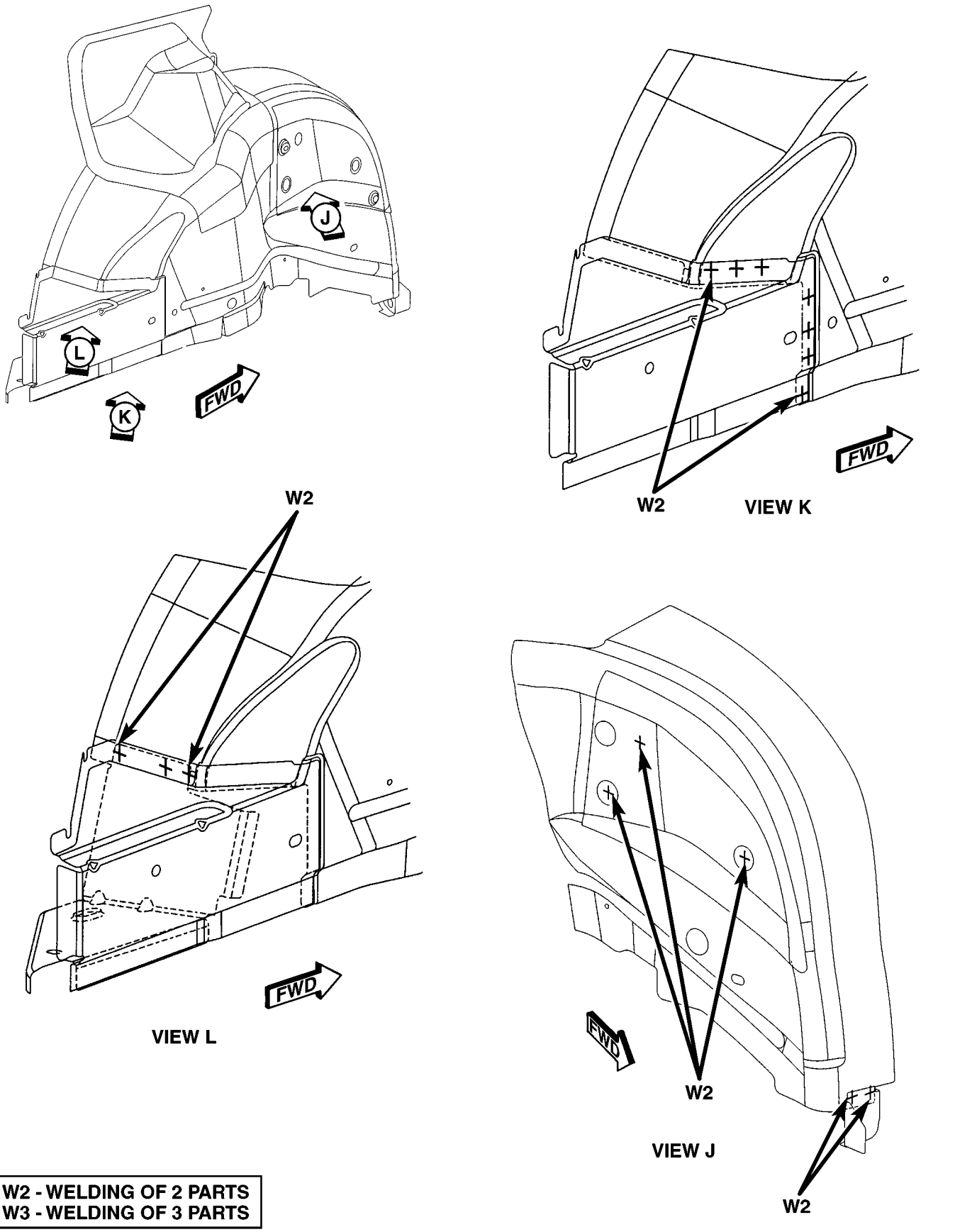


Fig. 92 INNER REAR WHEELHOUSE LEFT SIDE (1 OF 2)

WELD LOCATIONS (Continued)

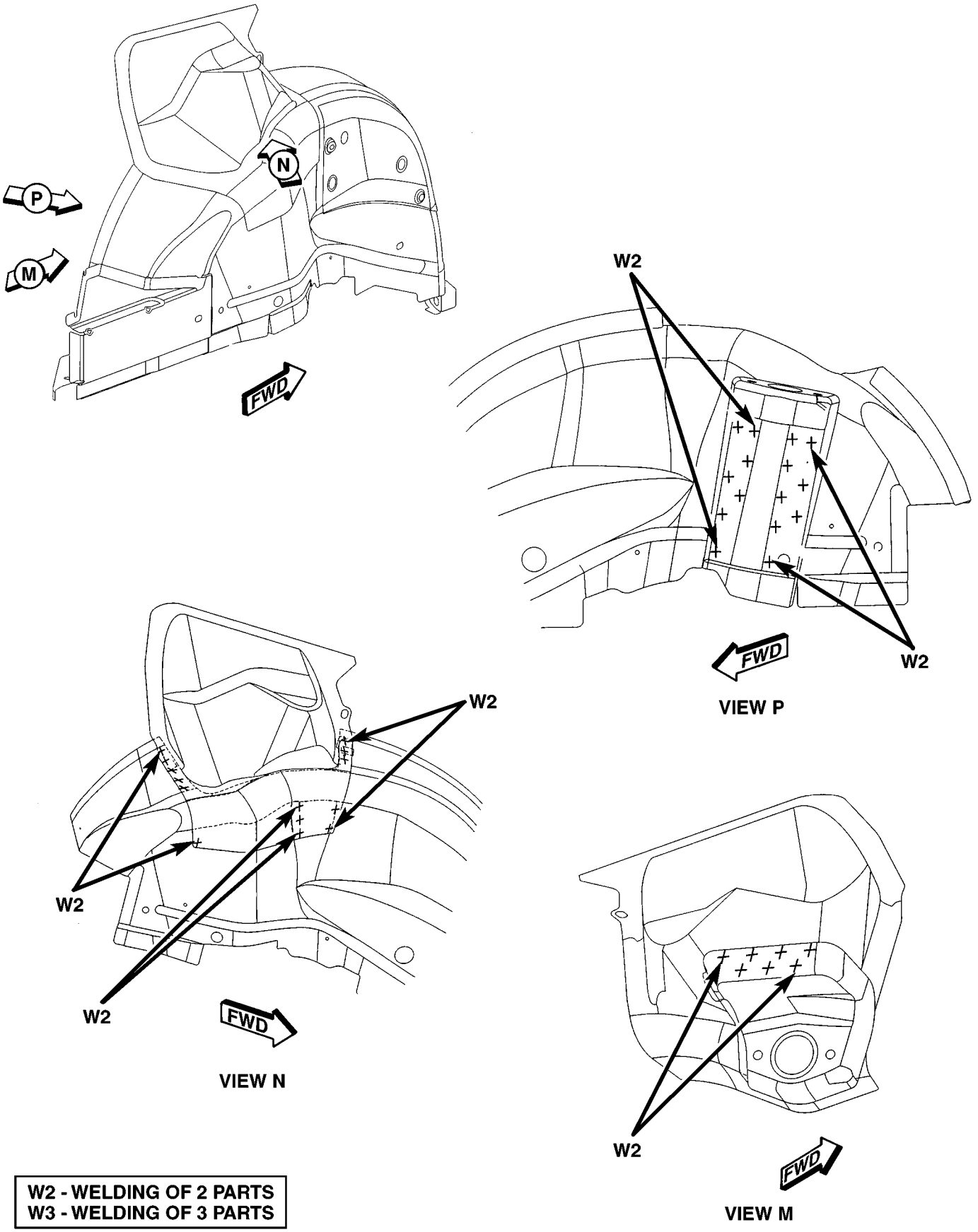


Fig. 93 INNER REAR WHEELHOUSE LEFT SIDE (2 OF 2)

WELD LOCATIONS (Continued)

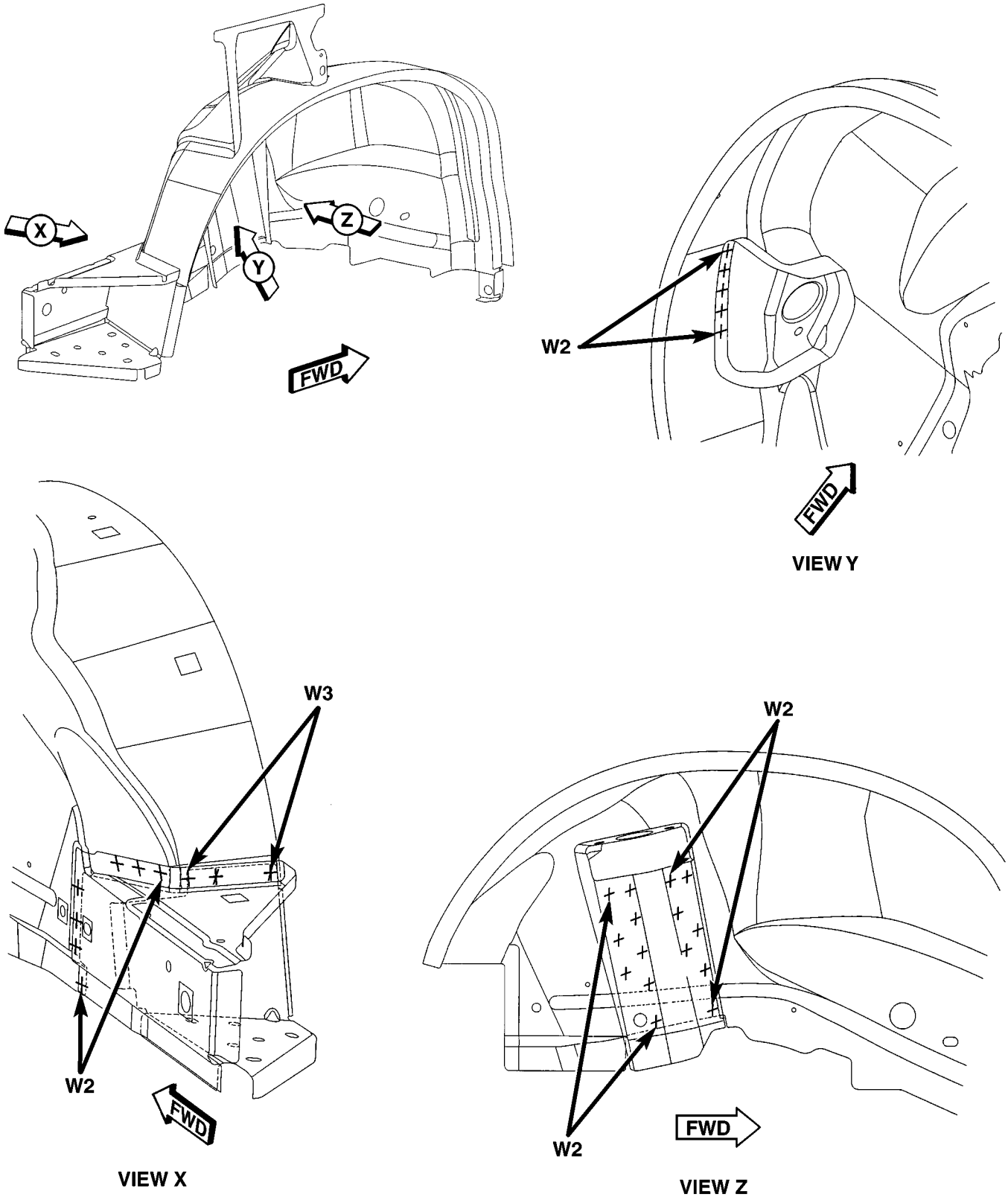


Fig. 94 INNER REAR WHEELHOUSE RIGHT SIDE (1 OF 2)

WELD LOCATIONS (Continued)

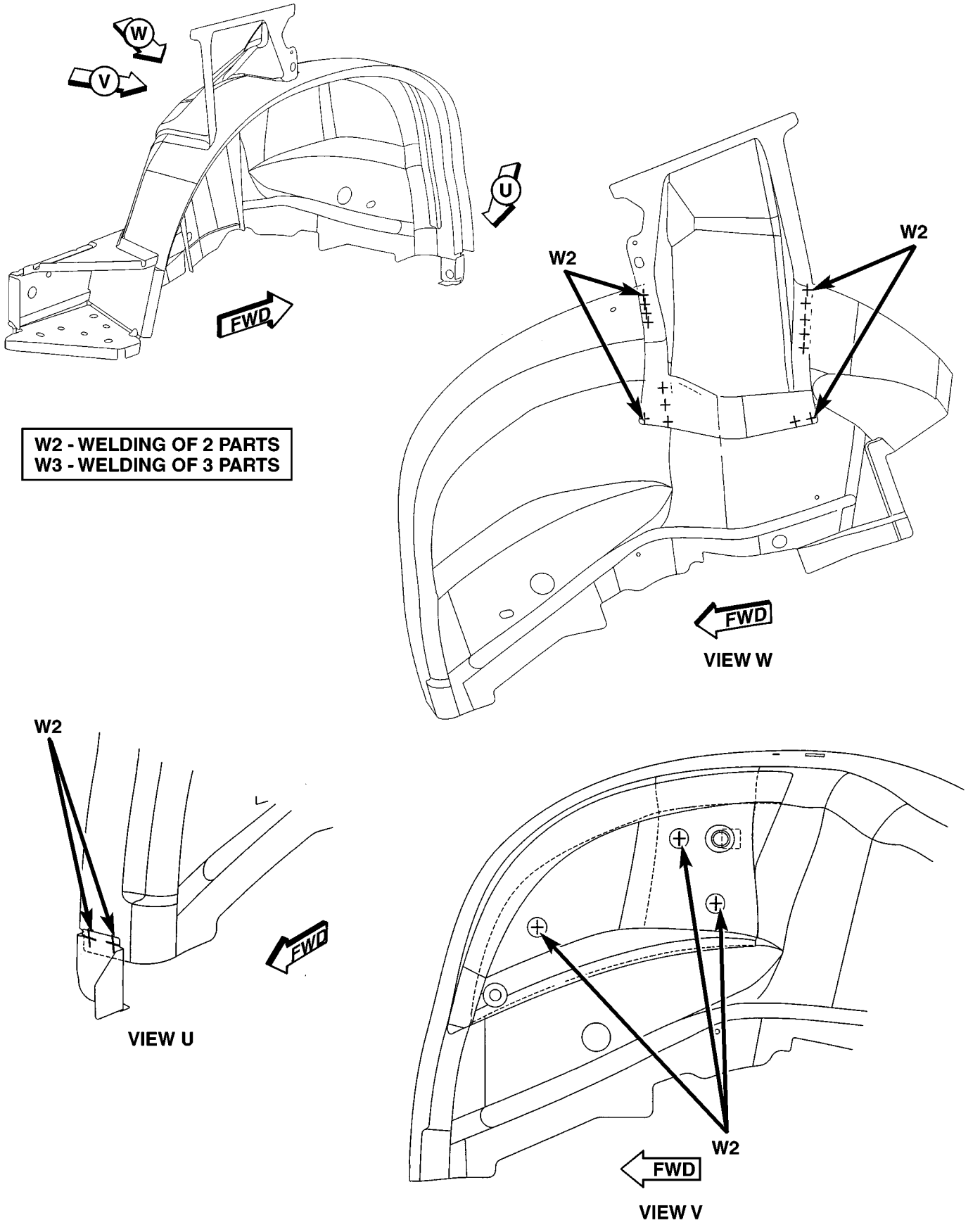


Fig. 95 INNER REAR WHEELHOUSE RIGHT SIDE (2 OF 2)

WELD LOCATIONS (Continued)

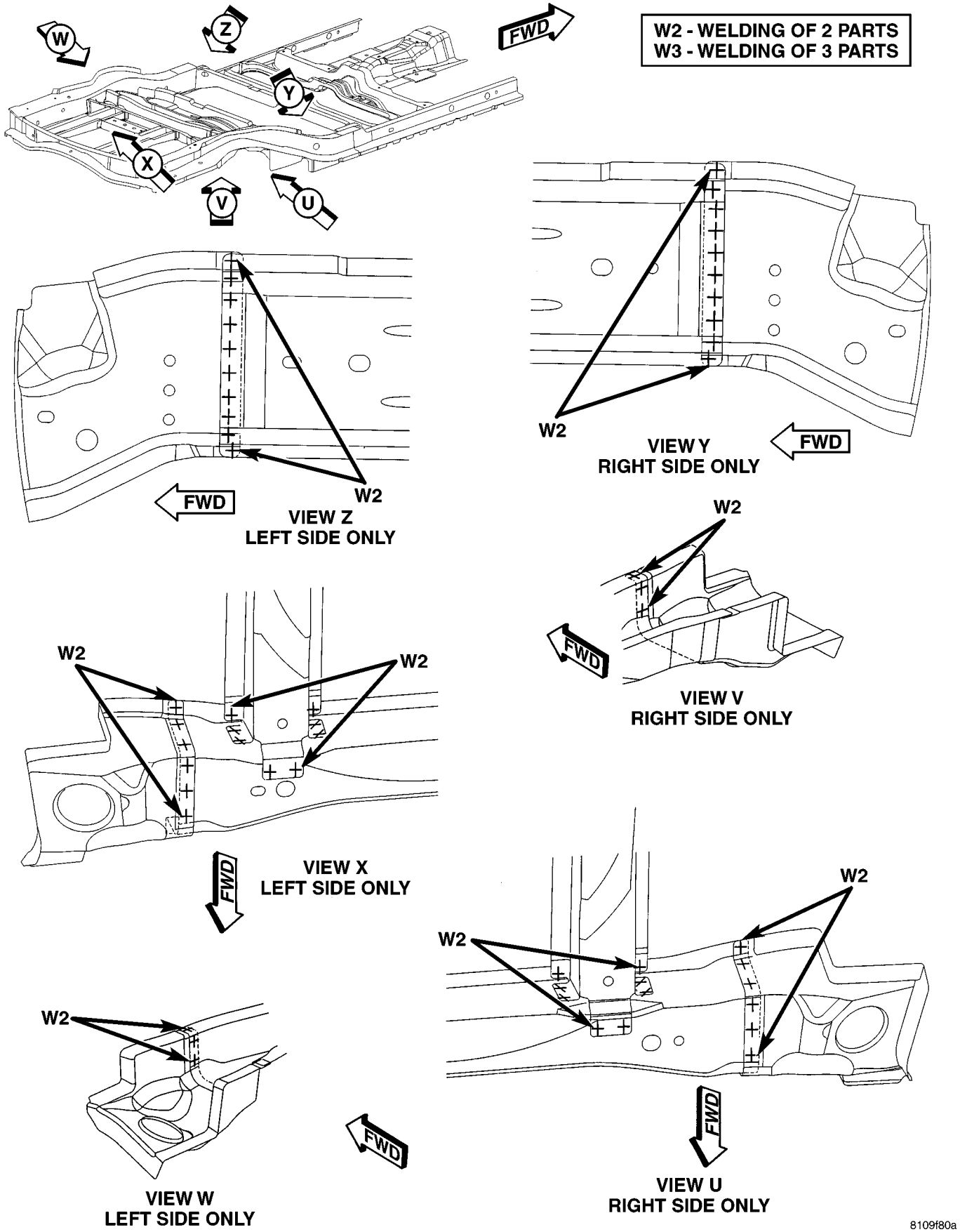


Fig. 96 LADDER COMPLETE (1 OF 4)

WELD LOCATIONS (Continued)

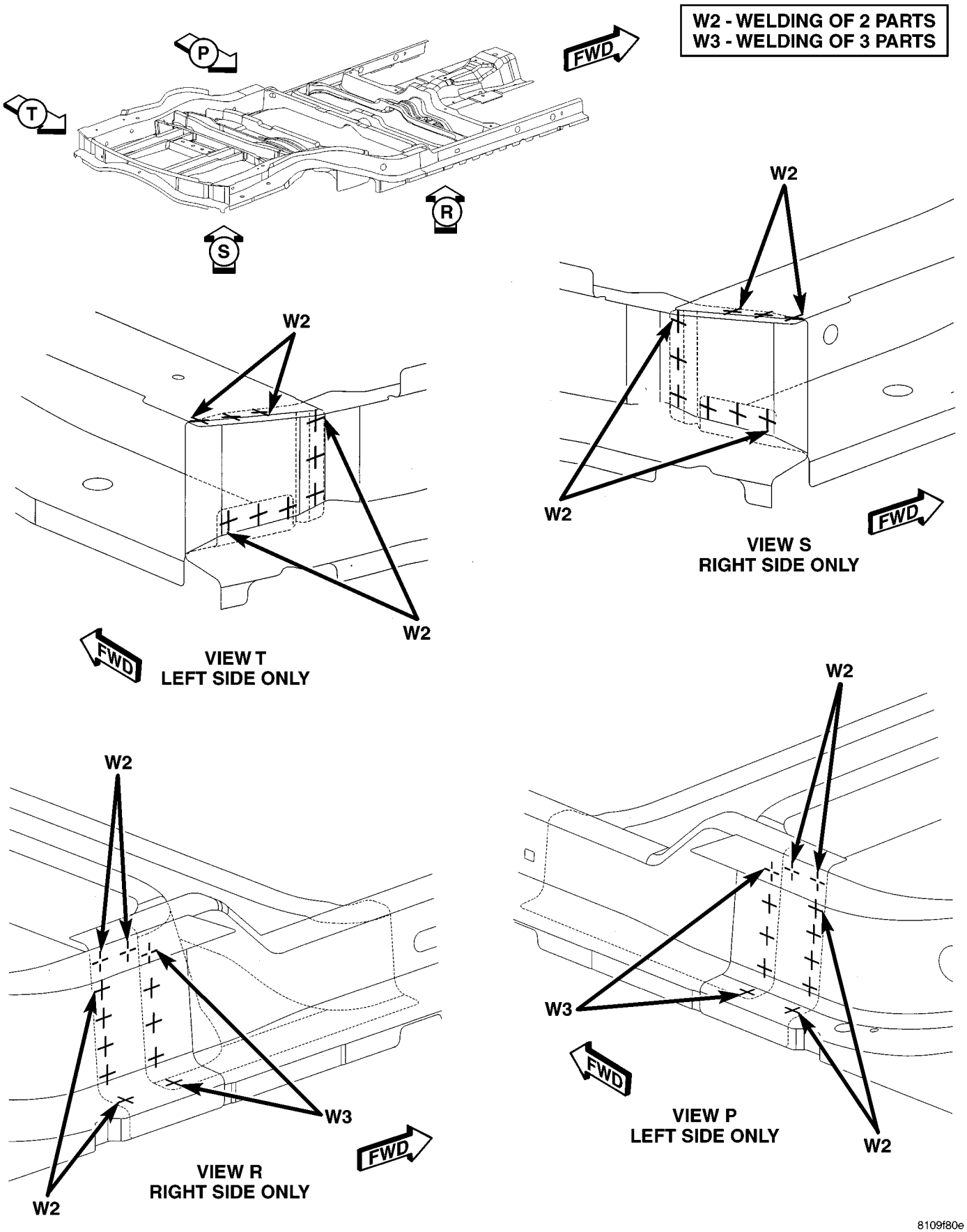


Fig. 97 LADDER COMPLETE (2 OF 4)

WELD LOCATIONS (Continued)

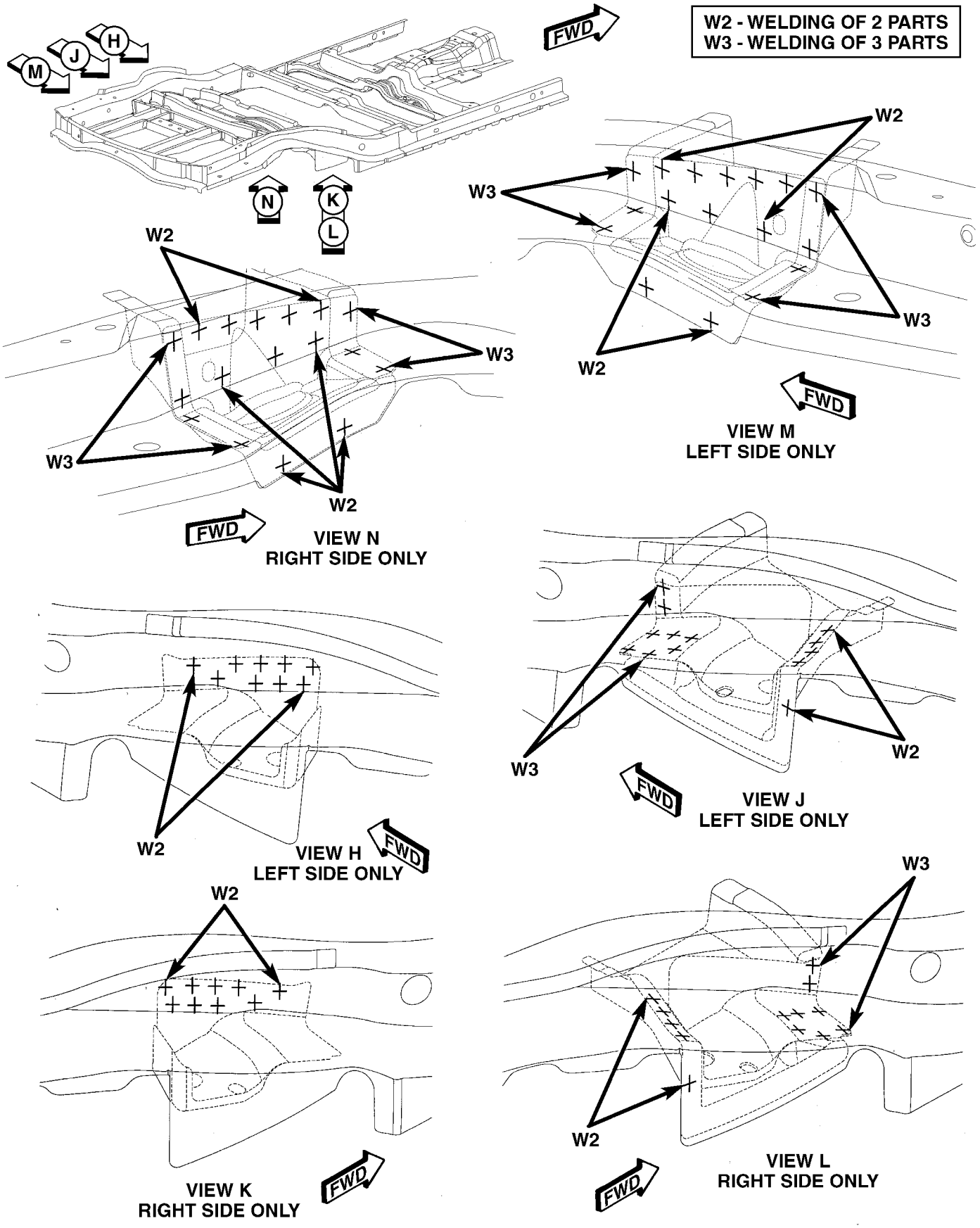


Fig. 98 LADDER COMPLETE (3 OF 4)

WELD LOCATIONS (Continued)

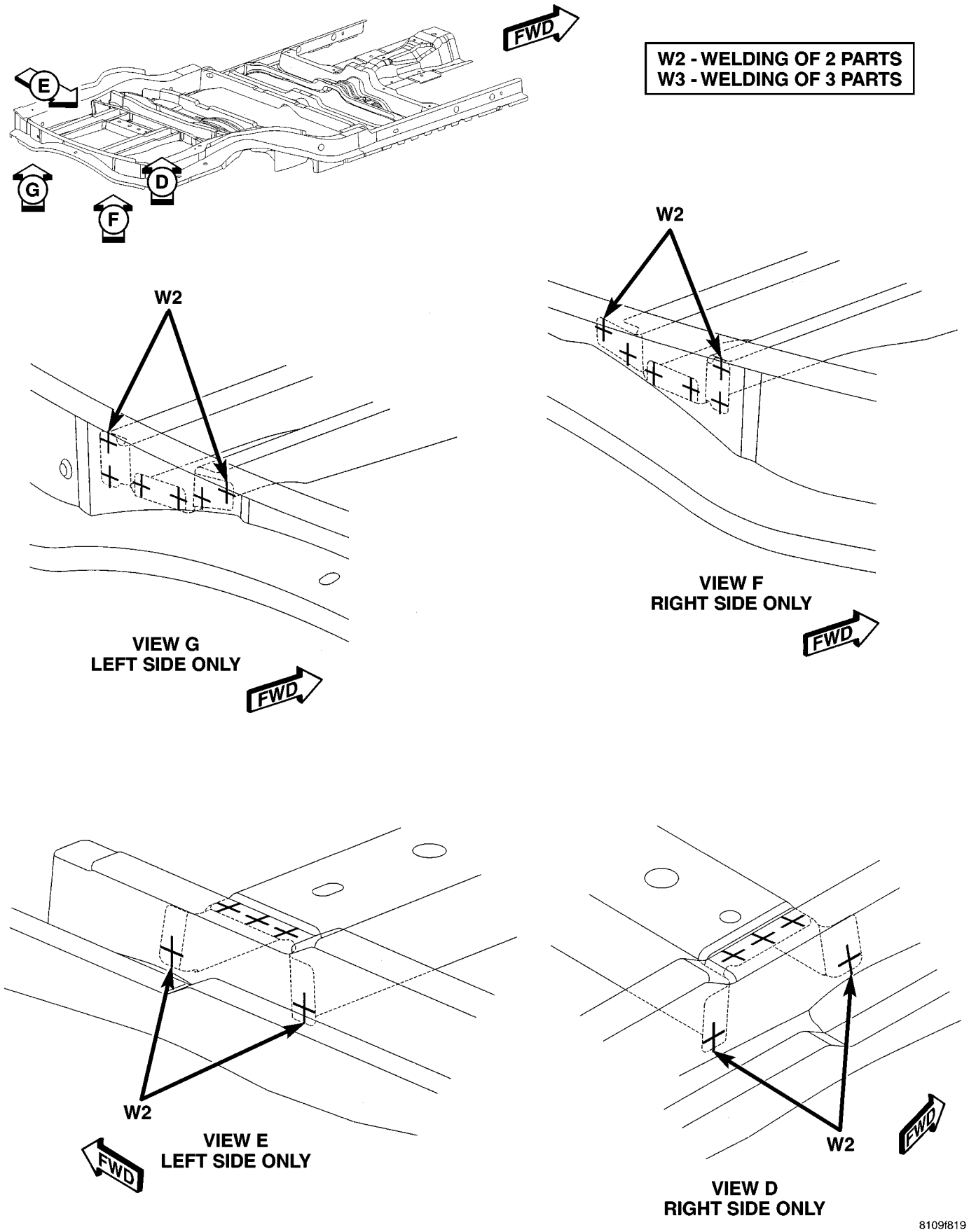


Fig. 99 LADDER COMPLETE (4 OF 4)

WELD LOCATIONS (Continued)

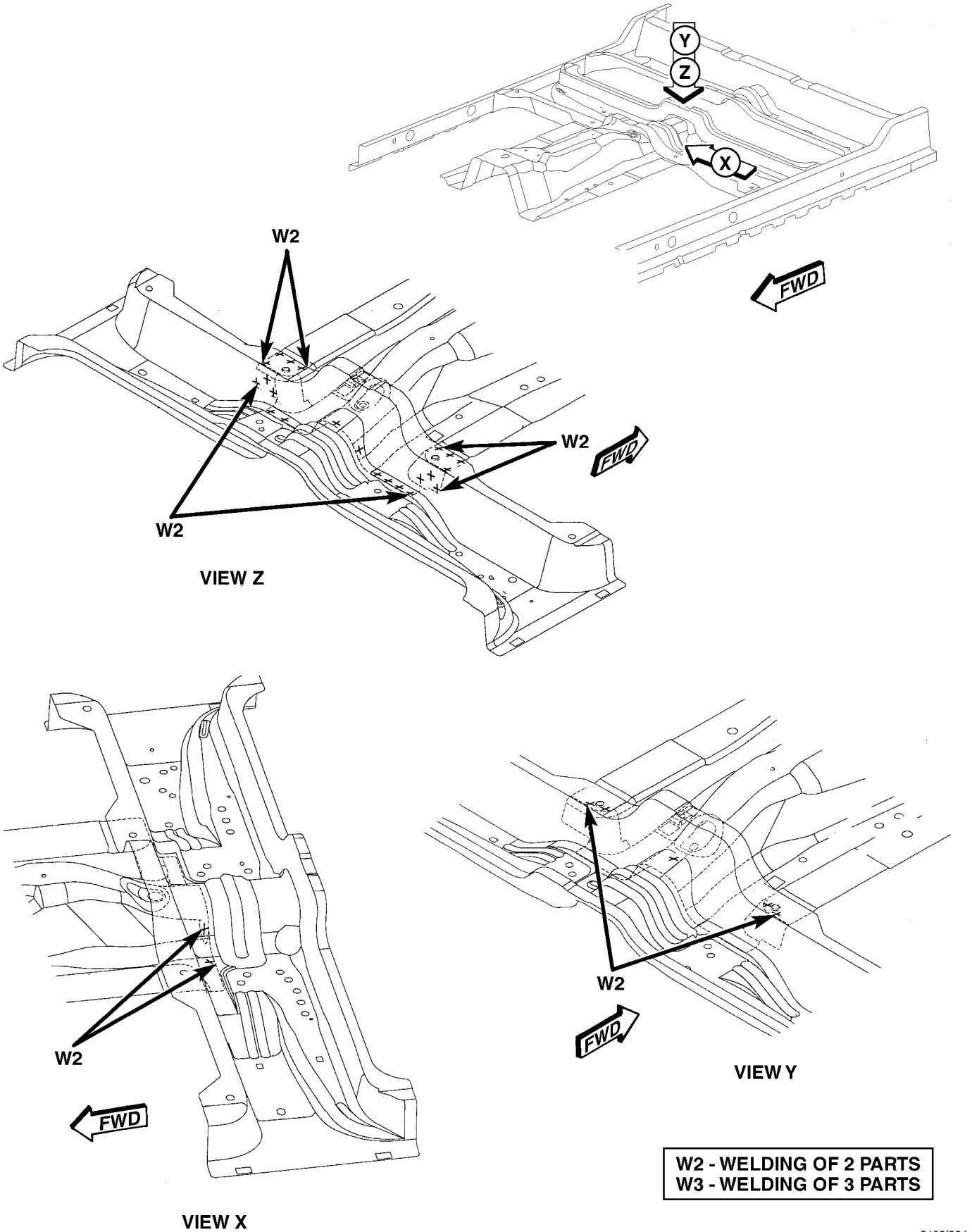


Fig. 100 MID LADDER ASSEMBLY (1 OF 3)

WELD LOCATIONS (Continued)

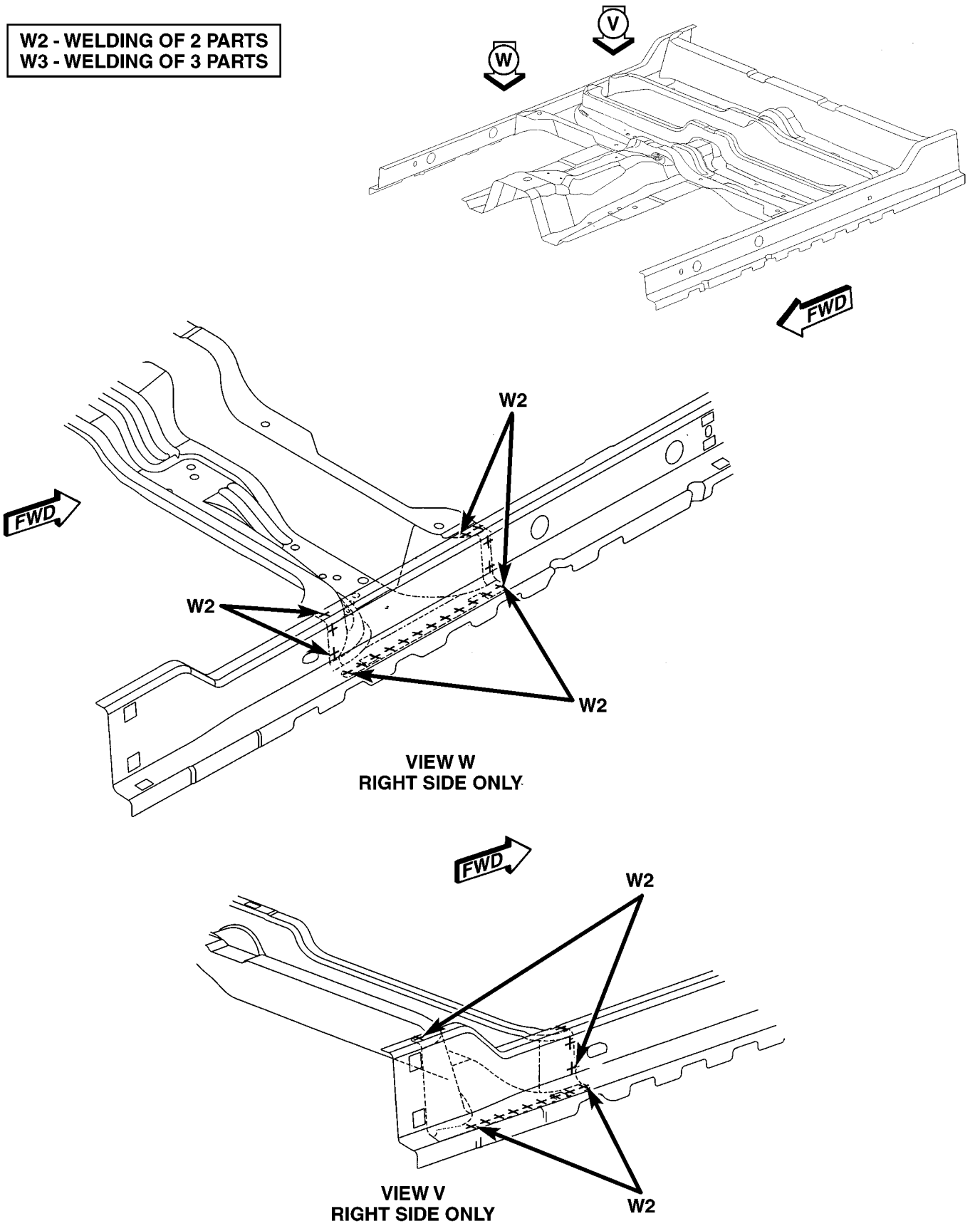


Fig. 101 MID LADDER ASSEMBLY (2 OF 3)

WELD LOCATIONS (Continued)

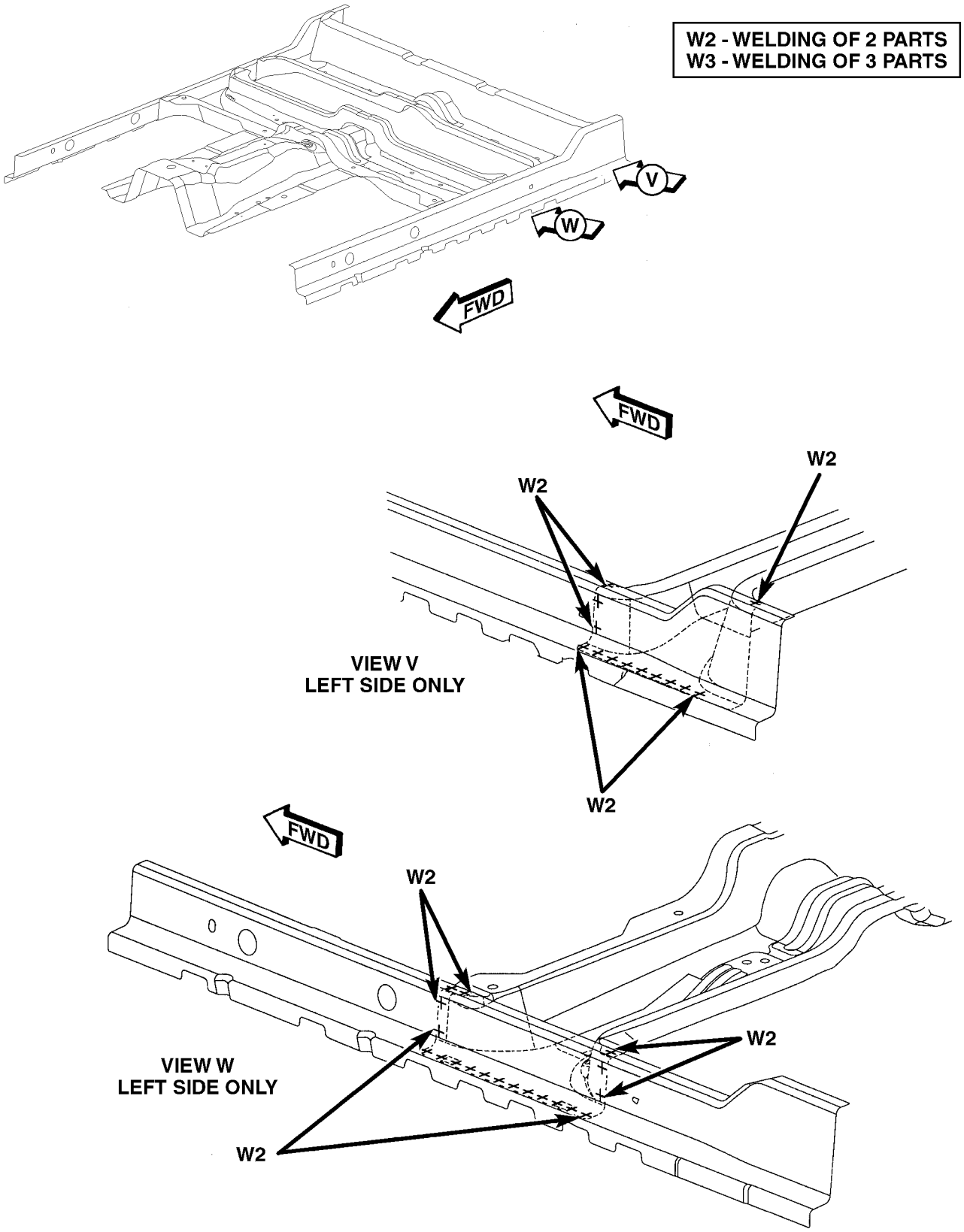


Fig. 102 MID LADDER ASSEMBLY (3 OF 3)

WELD LOCATIONS (Continued)

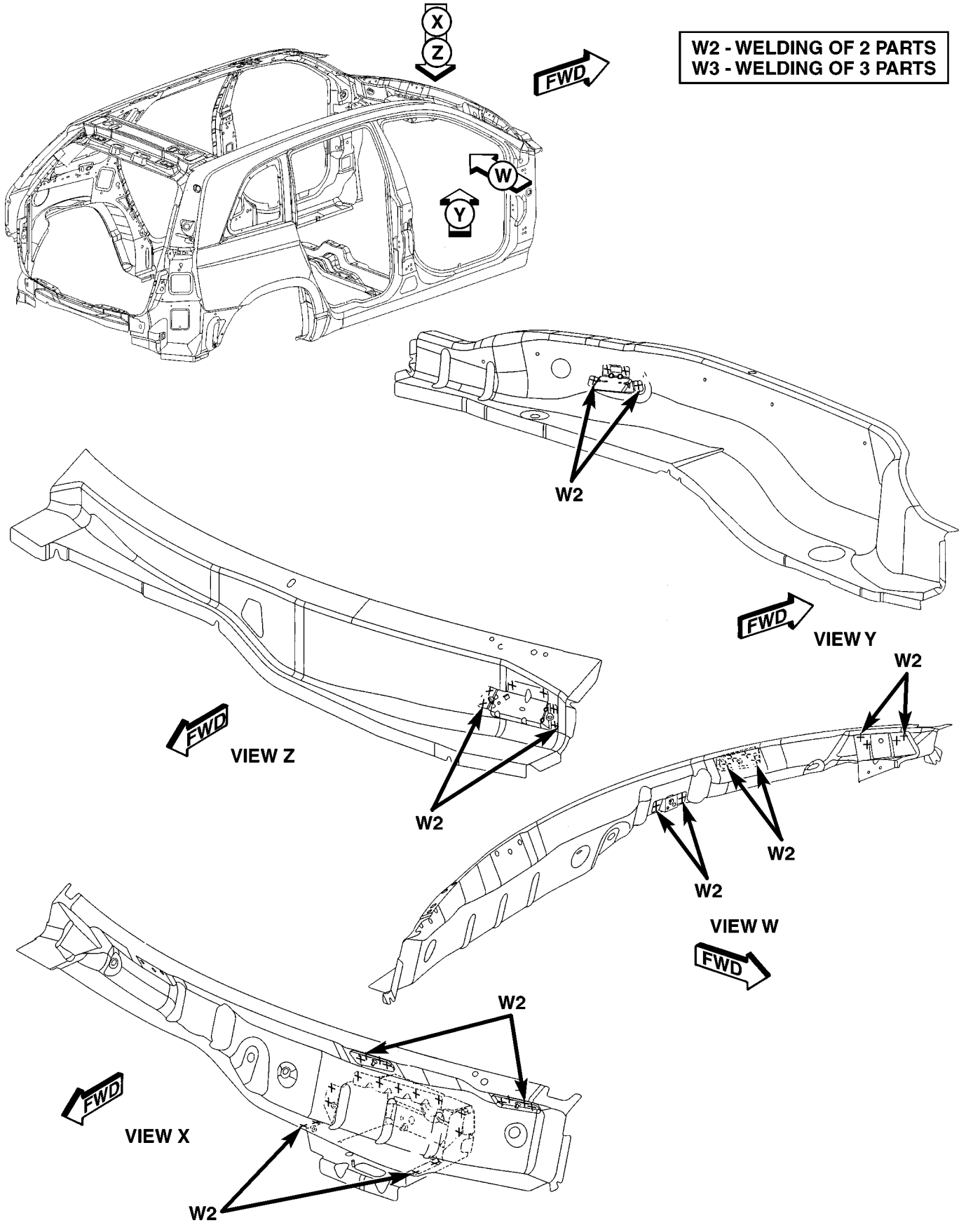
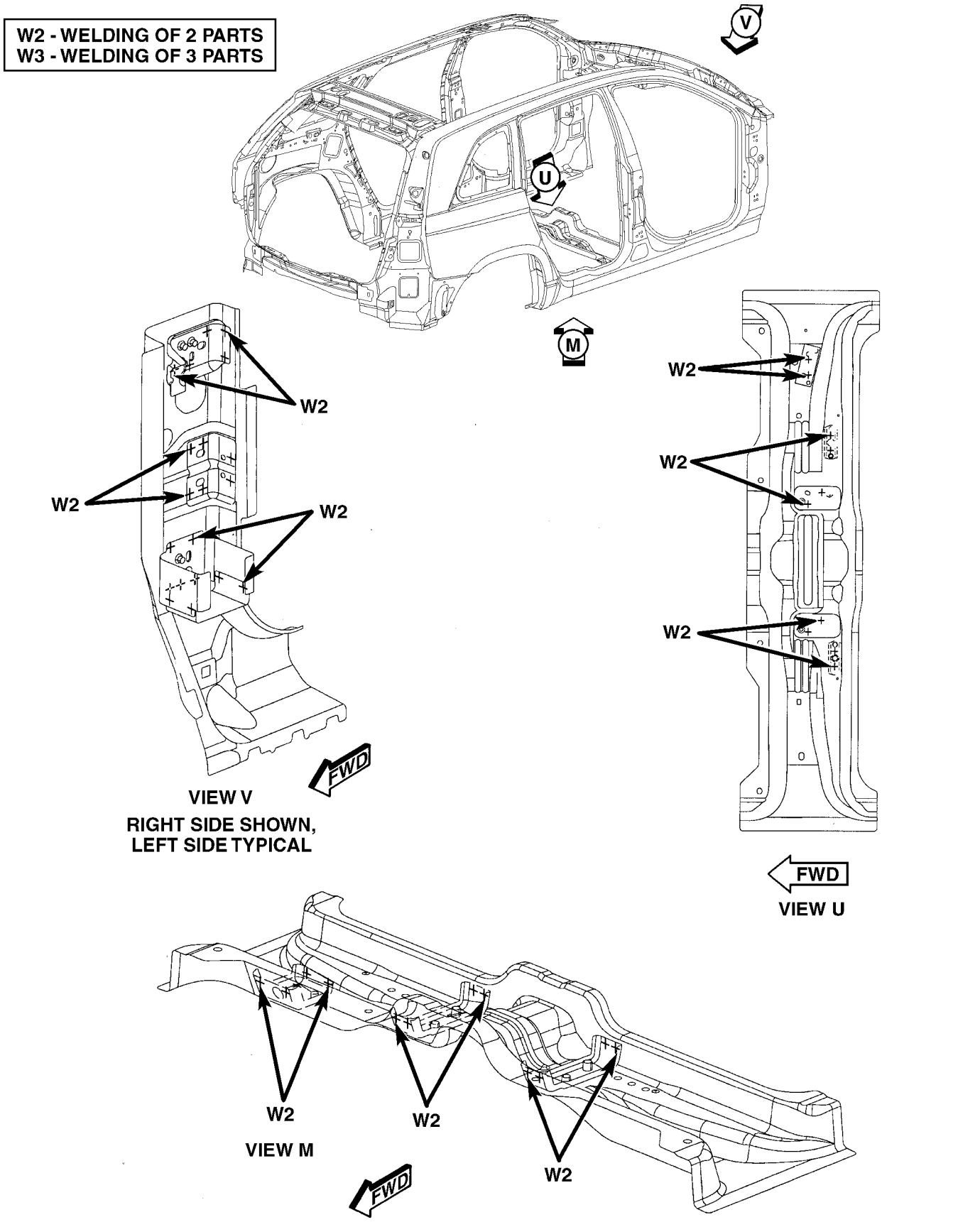


Fig. 103 MISCELLANEOUS - COWL PLENUM

WELD LOCATIONS (Continued)



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Fig. 104 MISCELLANEOUS - FRONT HINGE PILLAR/B-PILLAR CROSSMEMBER

WELD LOCATIONS (Continued)

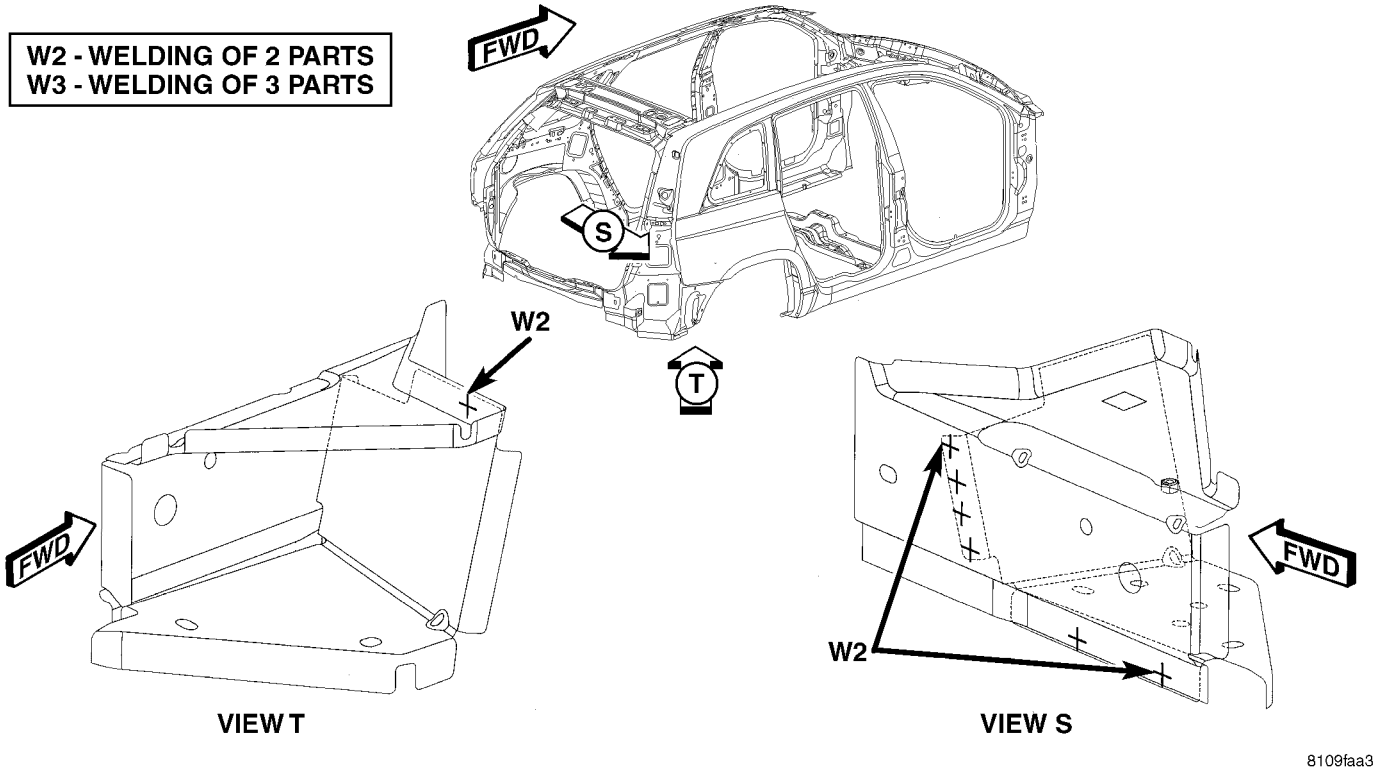
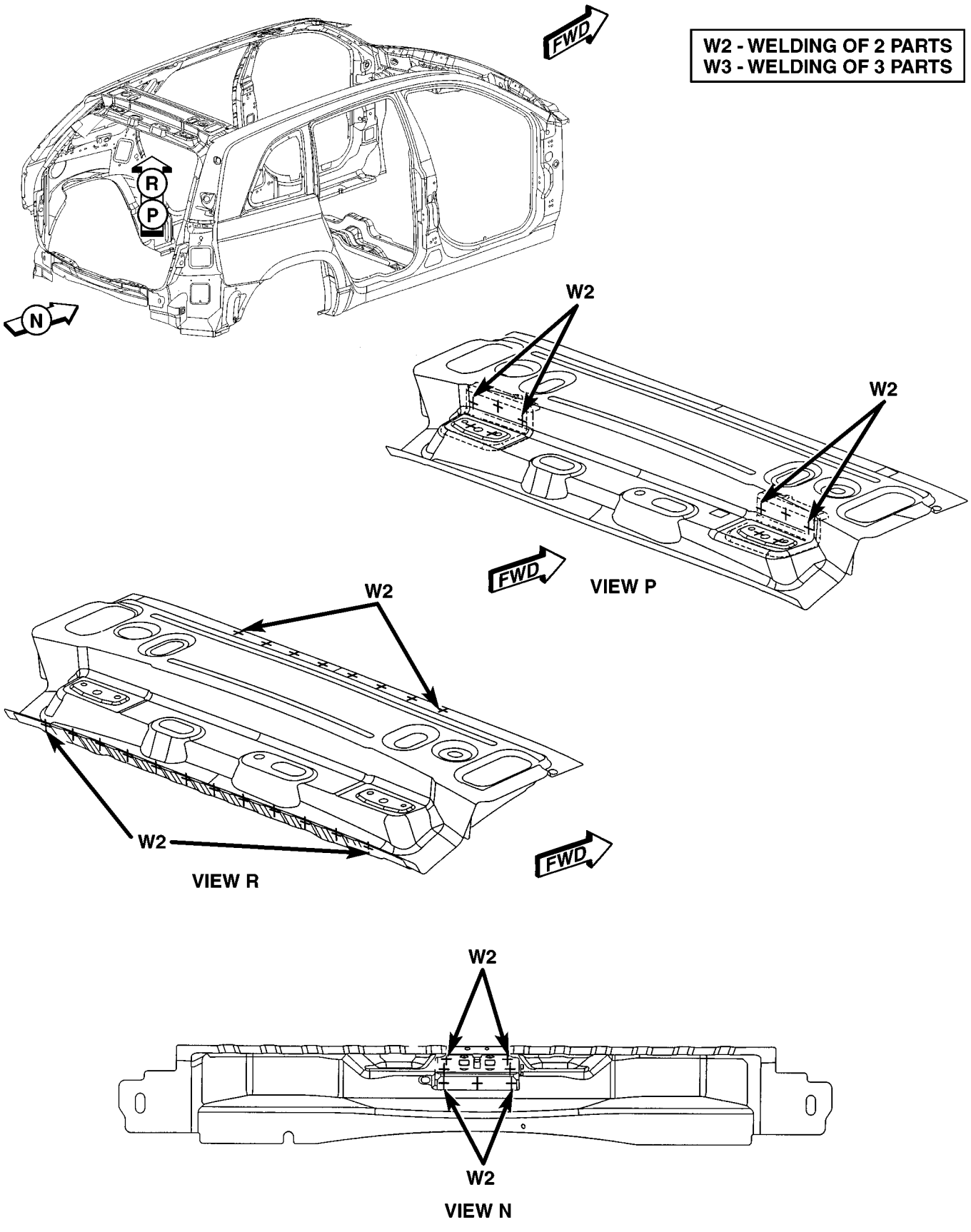


Fig. 105 MISCELLANEOUS - REAR RAIL CLOSE - OUT

WELD LOCATIONS (Continued)



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Fig. 106 MISCELLANEOUS - UPPER AND LOWER LIFTGATE FRAME

WELD LOCATIONS (Continued)

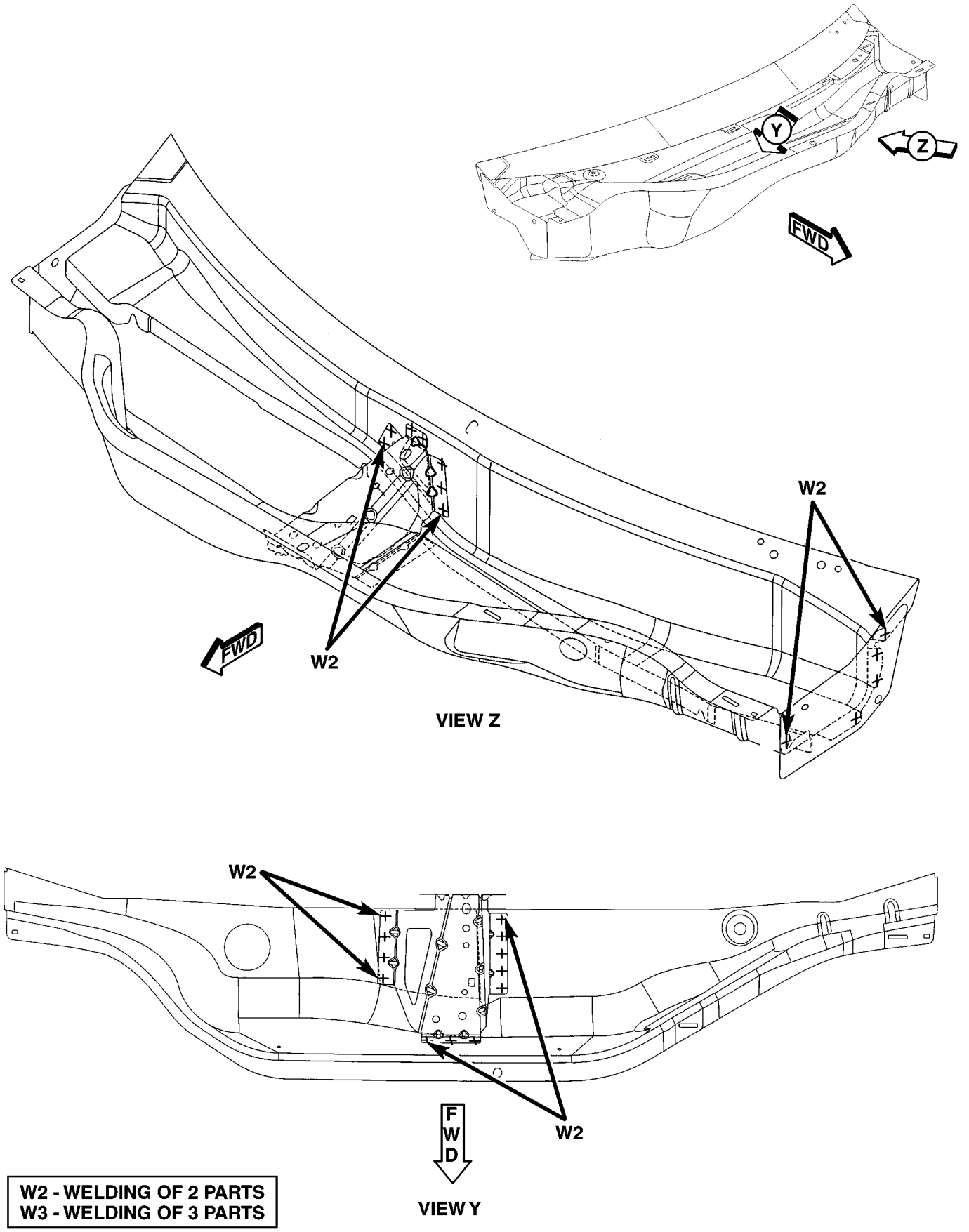


Fig. 107 PLENUM (1 OF 3)

WELD LOCATIONS (Continued)

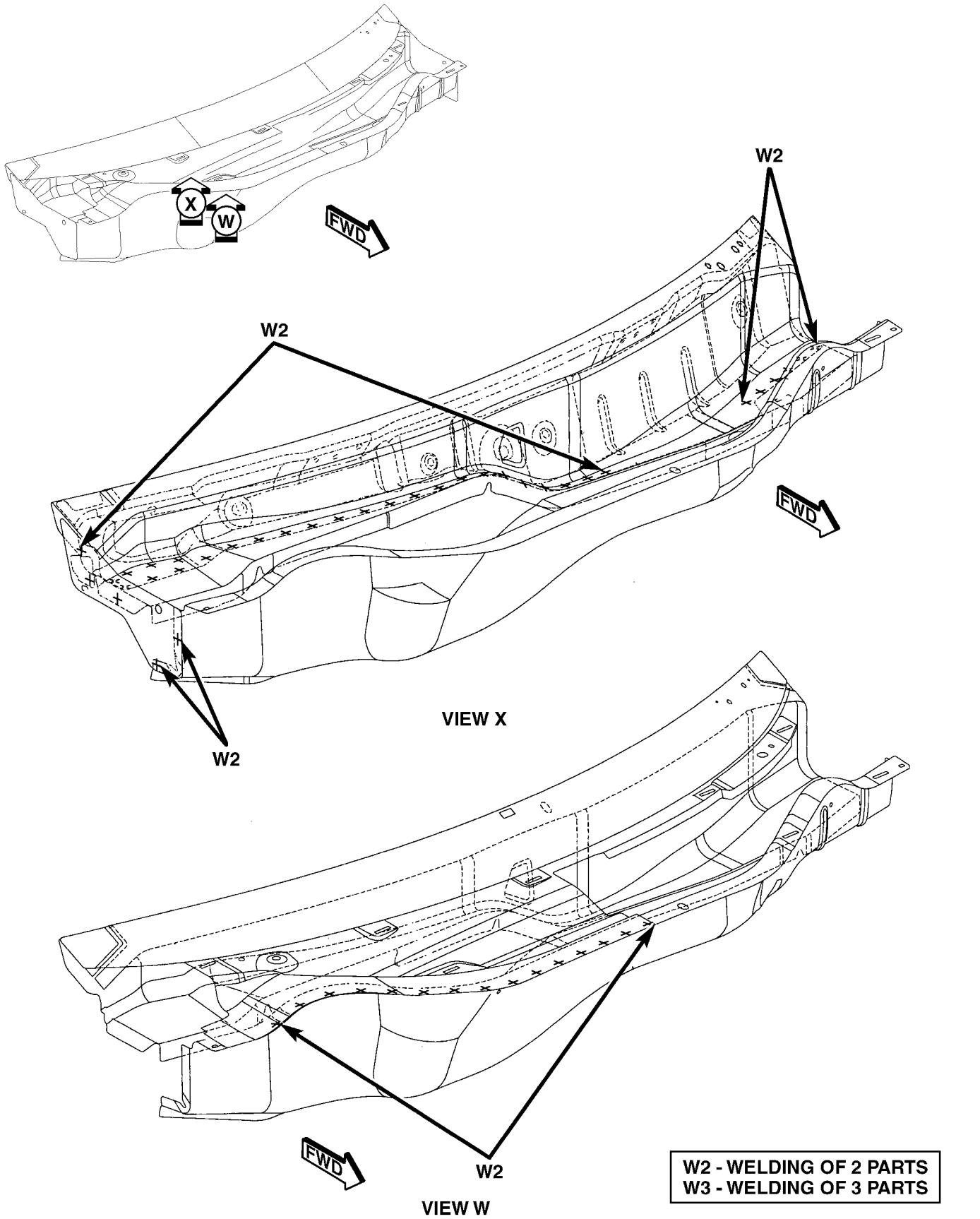


Fig. 108 PLENUM (2 OF 3)

WELD LOCATIONS (Continued)

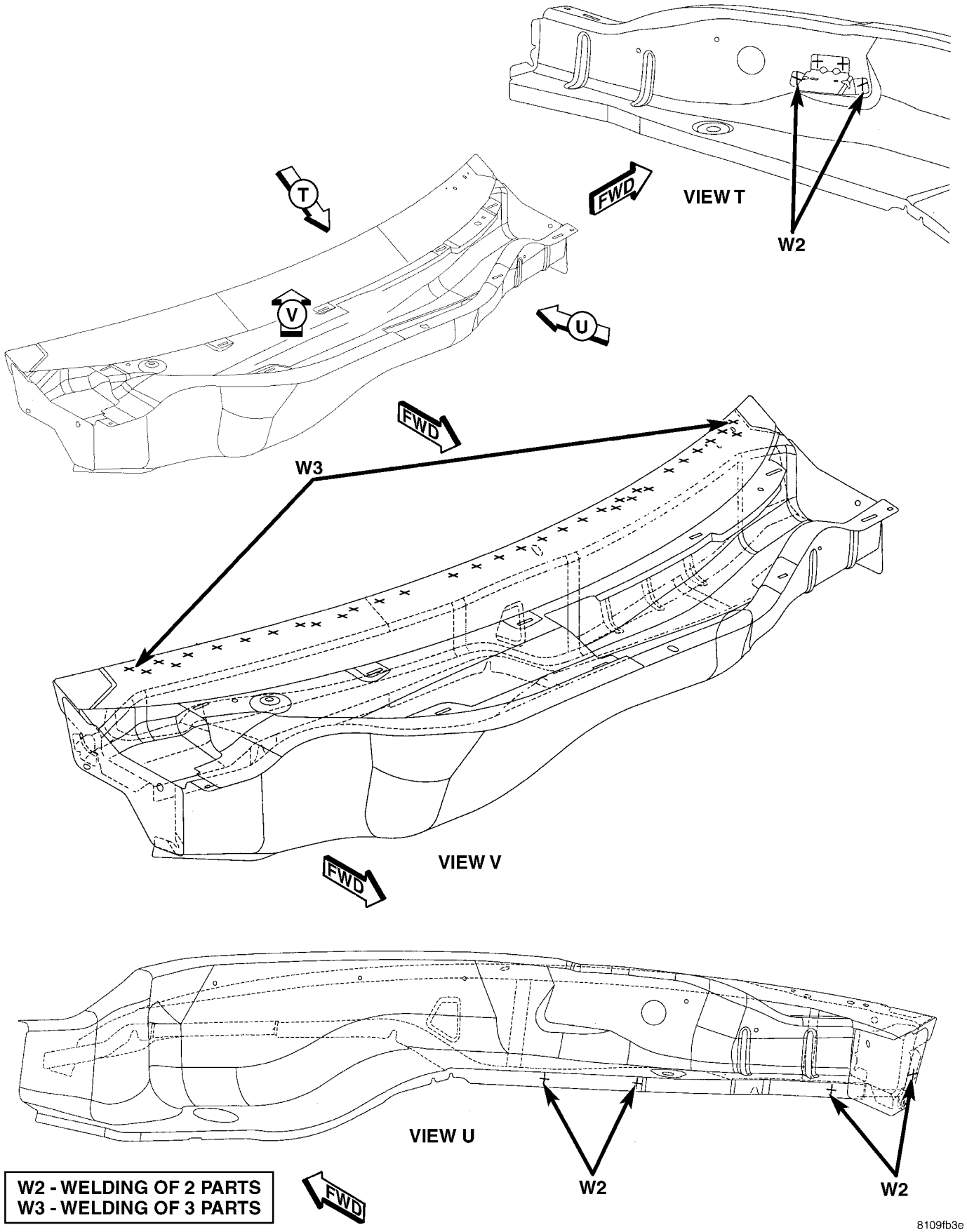


Fig. 109 PLENUM (3 OF 3)

WELD LOCATIONS (Continued)

Fig. 110 REAR FLOOR TO LADDER (1 OF 4)

WELD LOCATIONS (Continued)

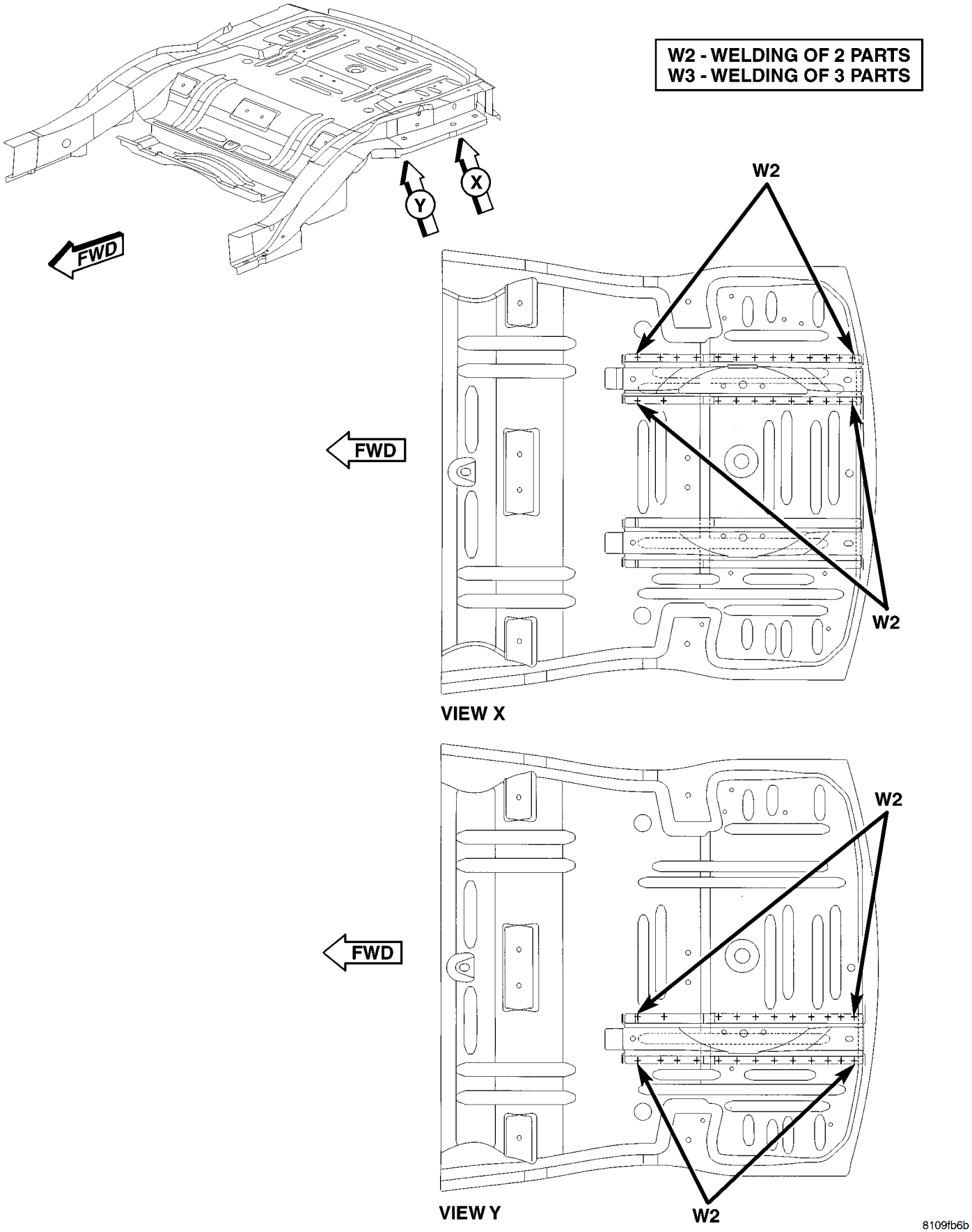


Fig. 111 REAR FLOOR TO LADDER (2 OF 4)

WELD LOCATIONS (Continued)

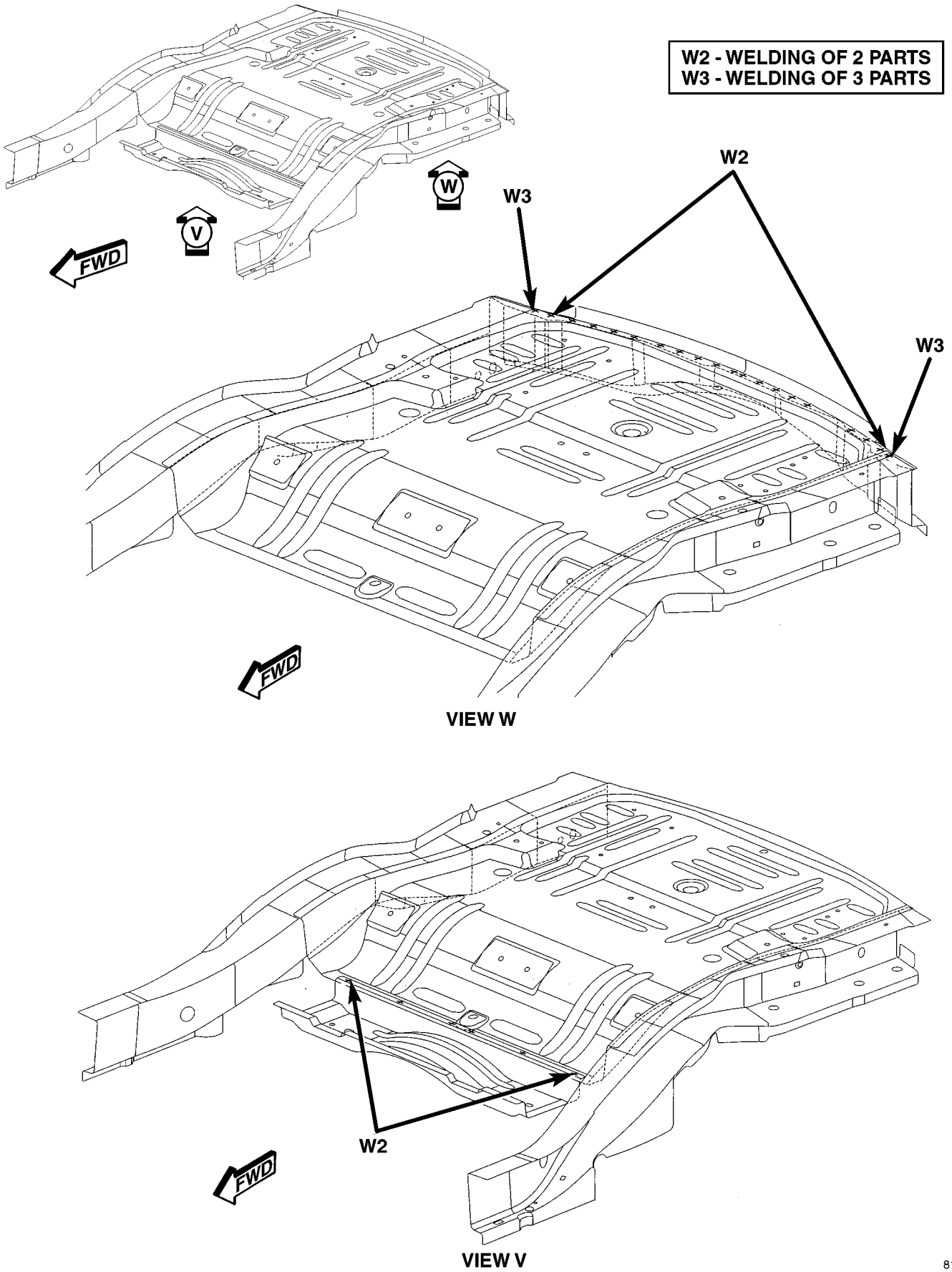


Fig. 112 REAR FLOOR TO LADDER (3 OF 4)

WELD LOCATIONS (Continued)

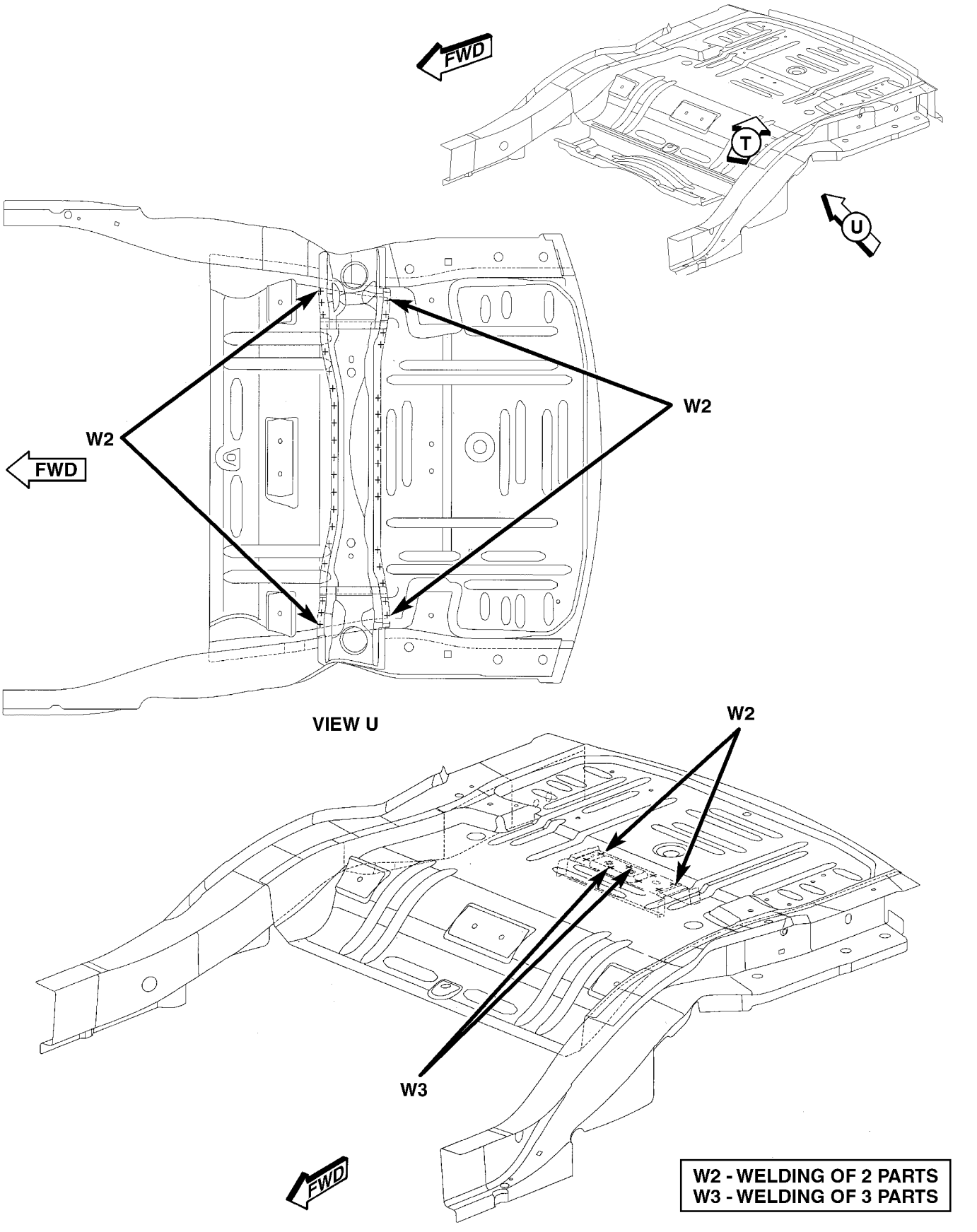


Fig. 113 REAR FLOOR TO LADDER (4 OF 4)

WELD LOCATIONS (Continued)

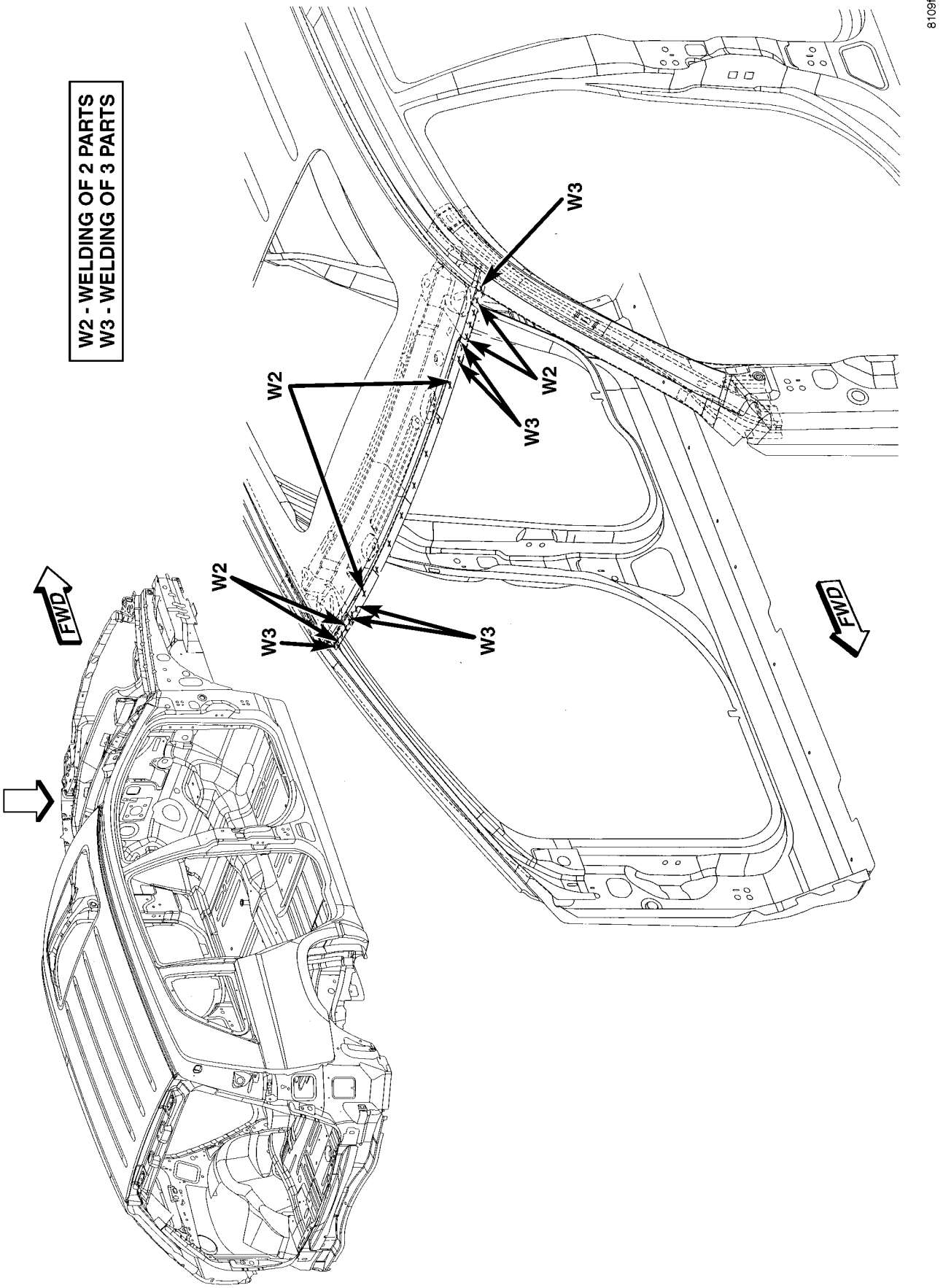


Fig. 114 ROOF (1 OF 3)

WELD LOCATIONS (Continued)

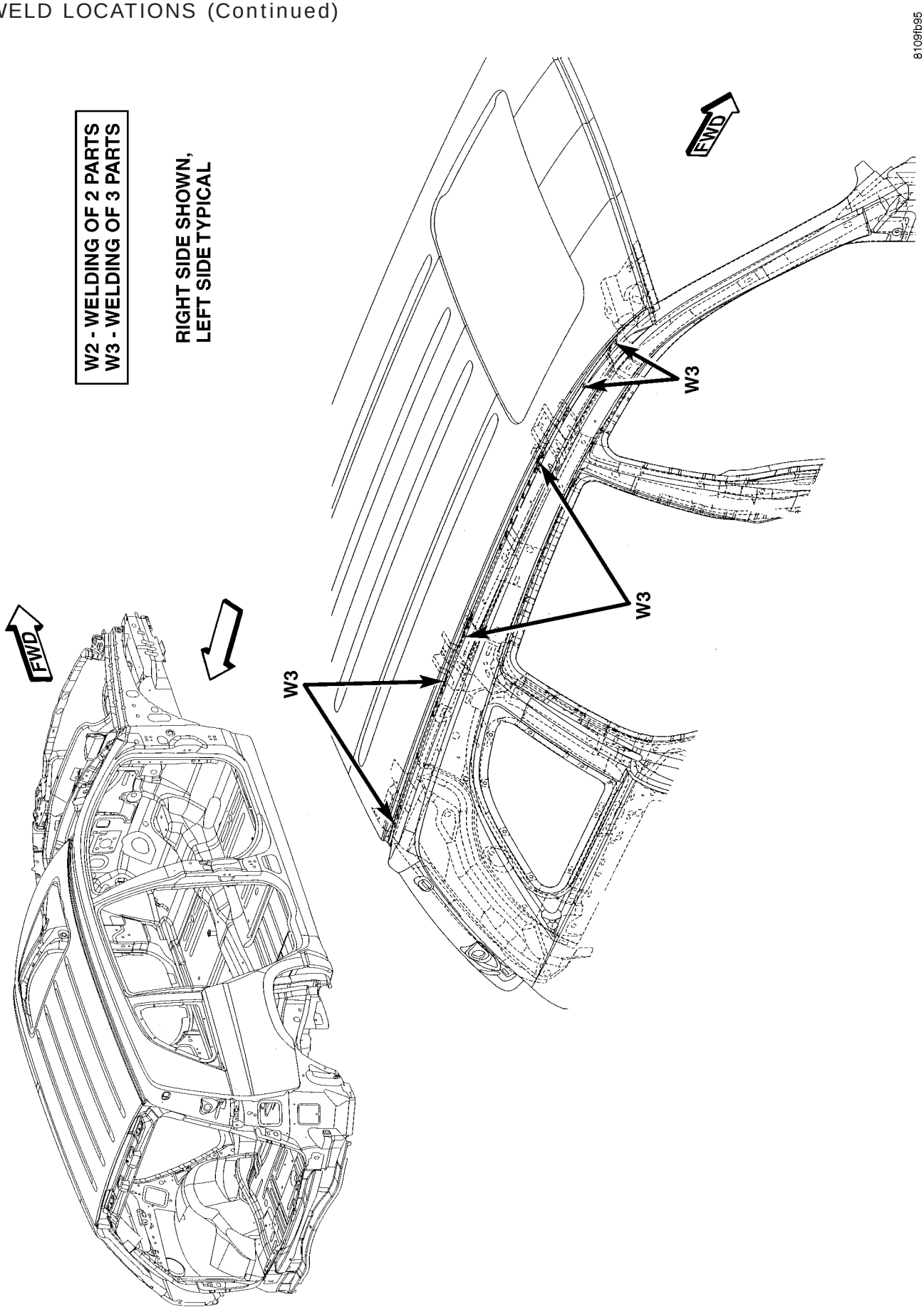


Fig. 115 ROOF (2 OF 3)

WELD LOCATIONS (Continued)

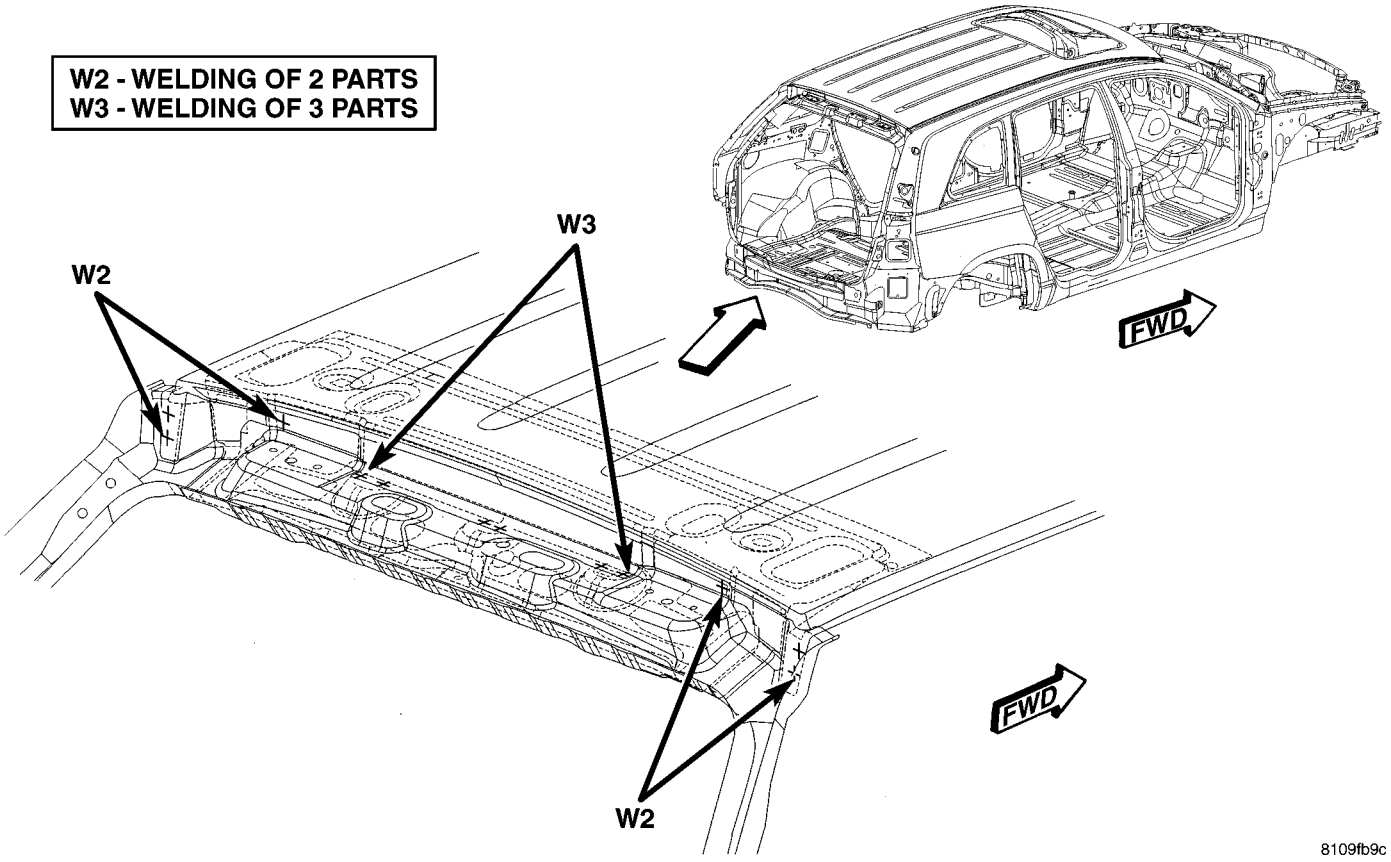


Fig. 116 ROOF (3 OF 3)

WELD LOCATIONS (Continued)

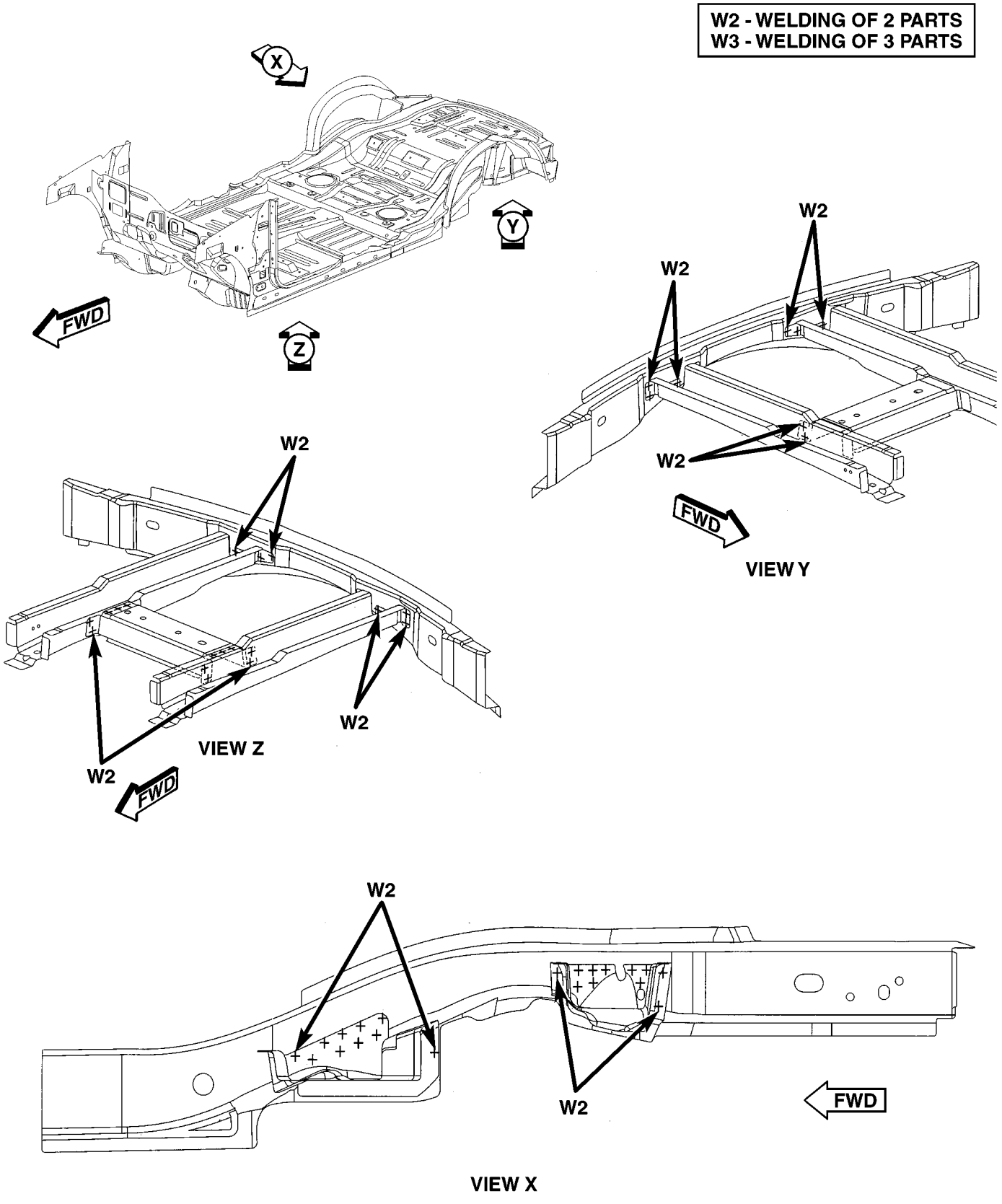
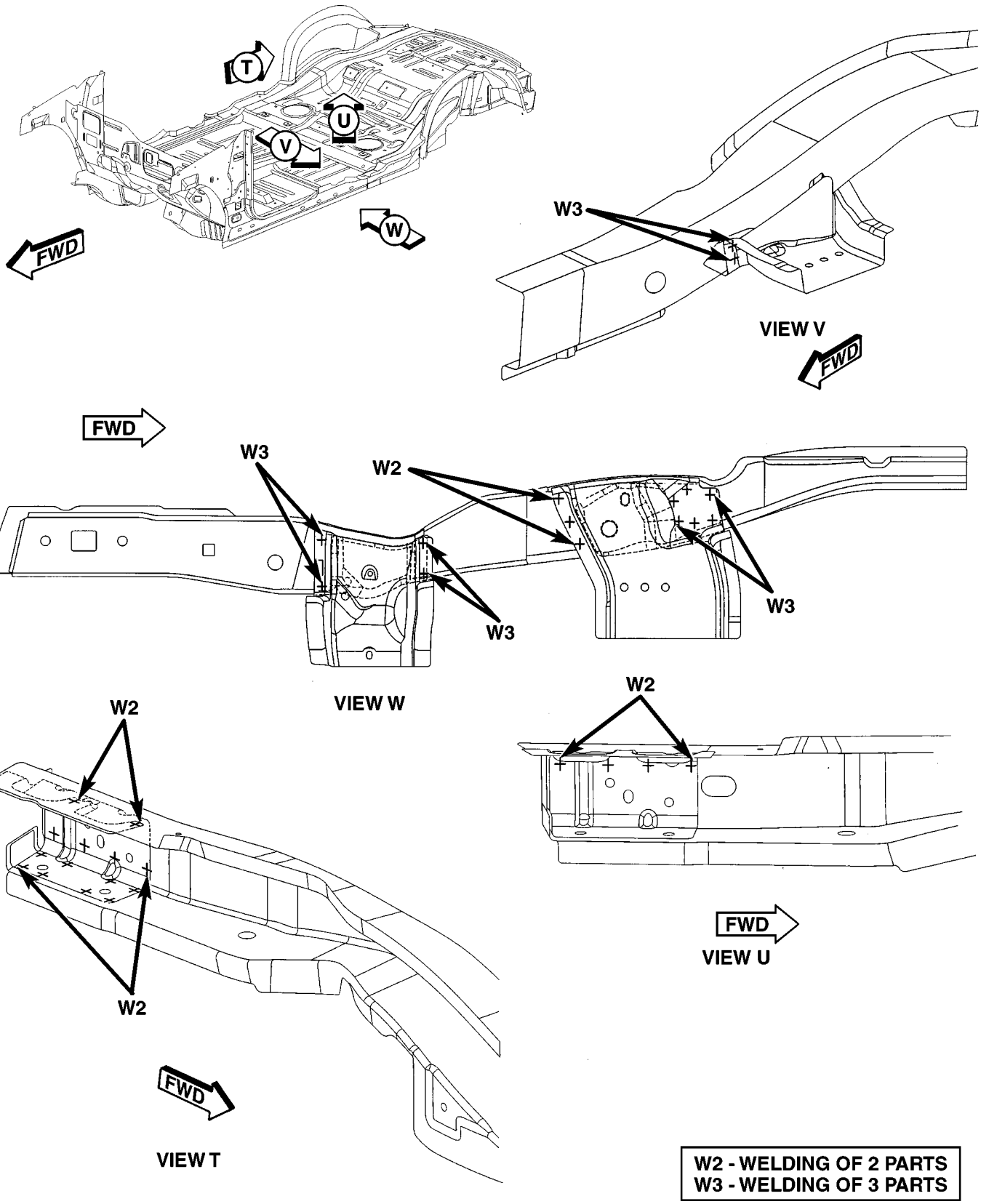


Fig. 117 UNDERBODY (1 OF 10)

WELD LOCATIONS (Continued)



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Fig. 118 UNDERBODY (2 OF 10)

WELD LOCATIONS (Continued)

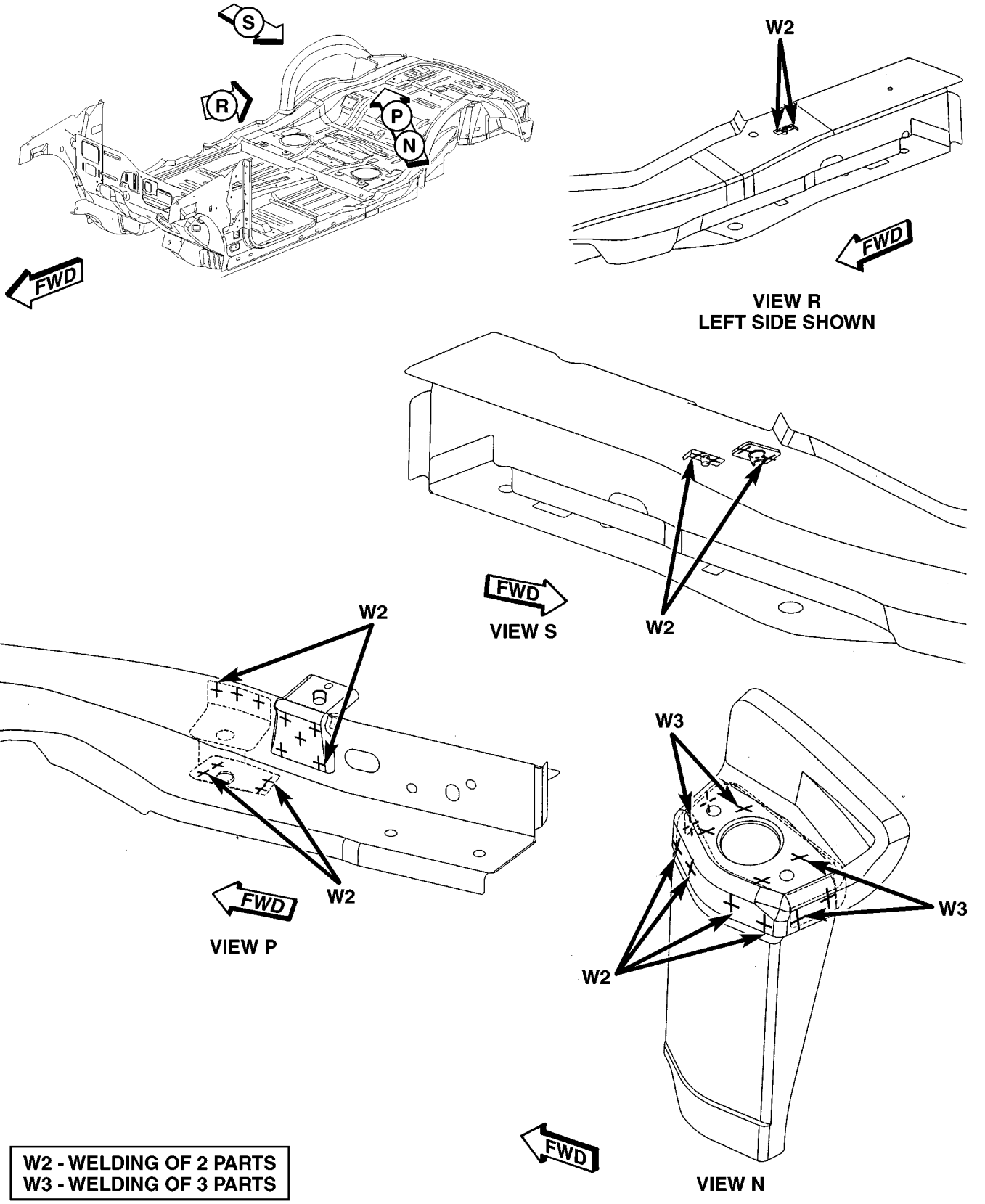


Fig. 119 UNDERBODY (3 OF 10)

WELD LOCATIONS (Continued)

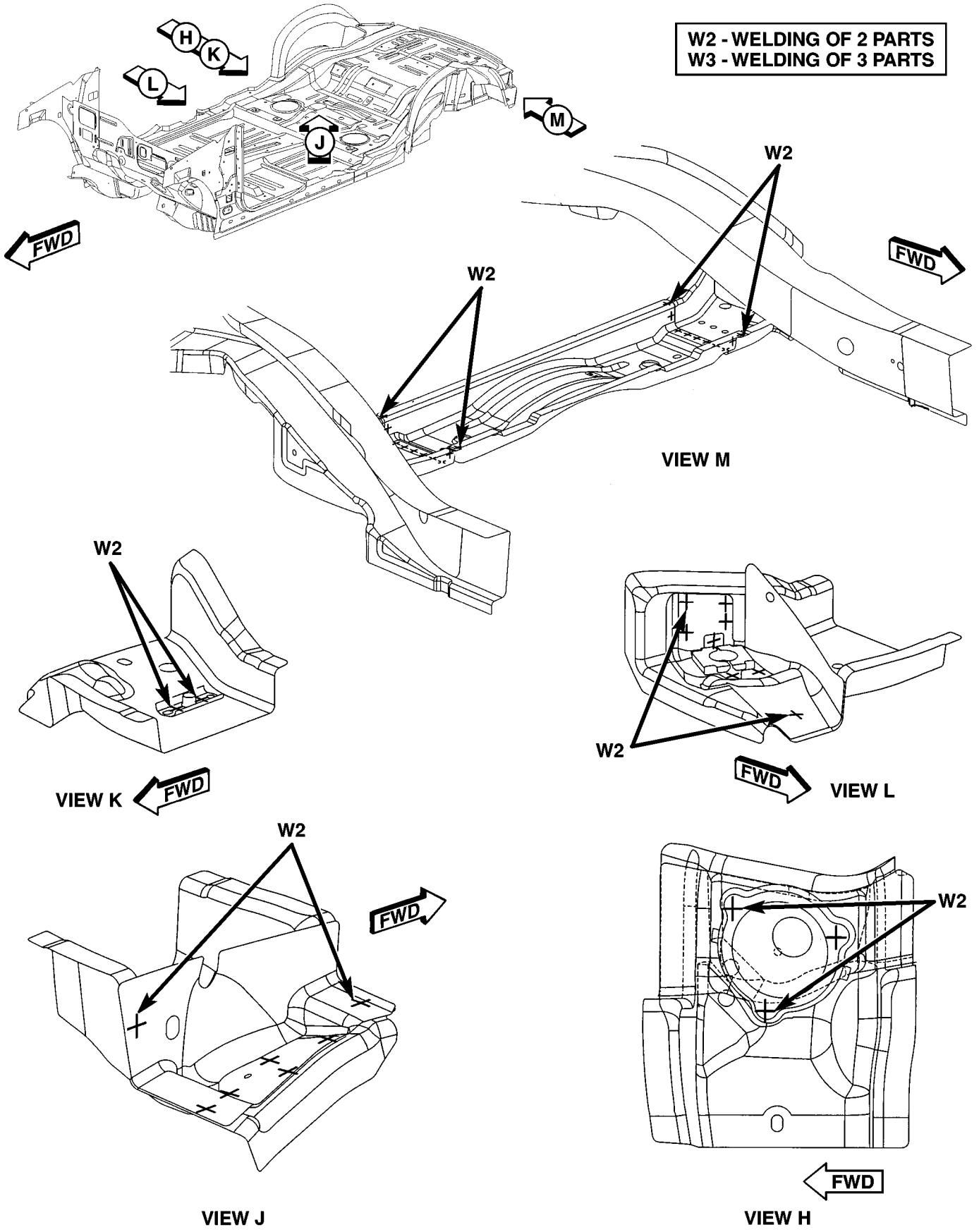


Fig. 120 UNDERBODY (4 OF 10)

WELD LOCATIONS (Continued)

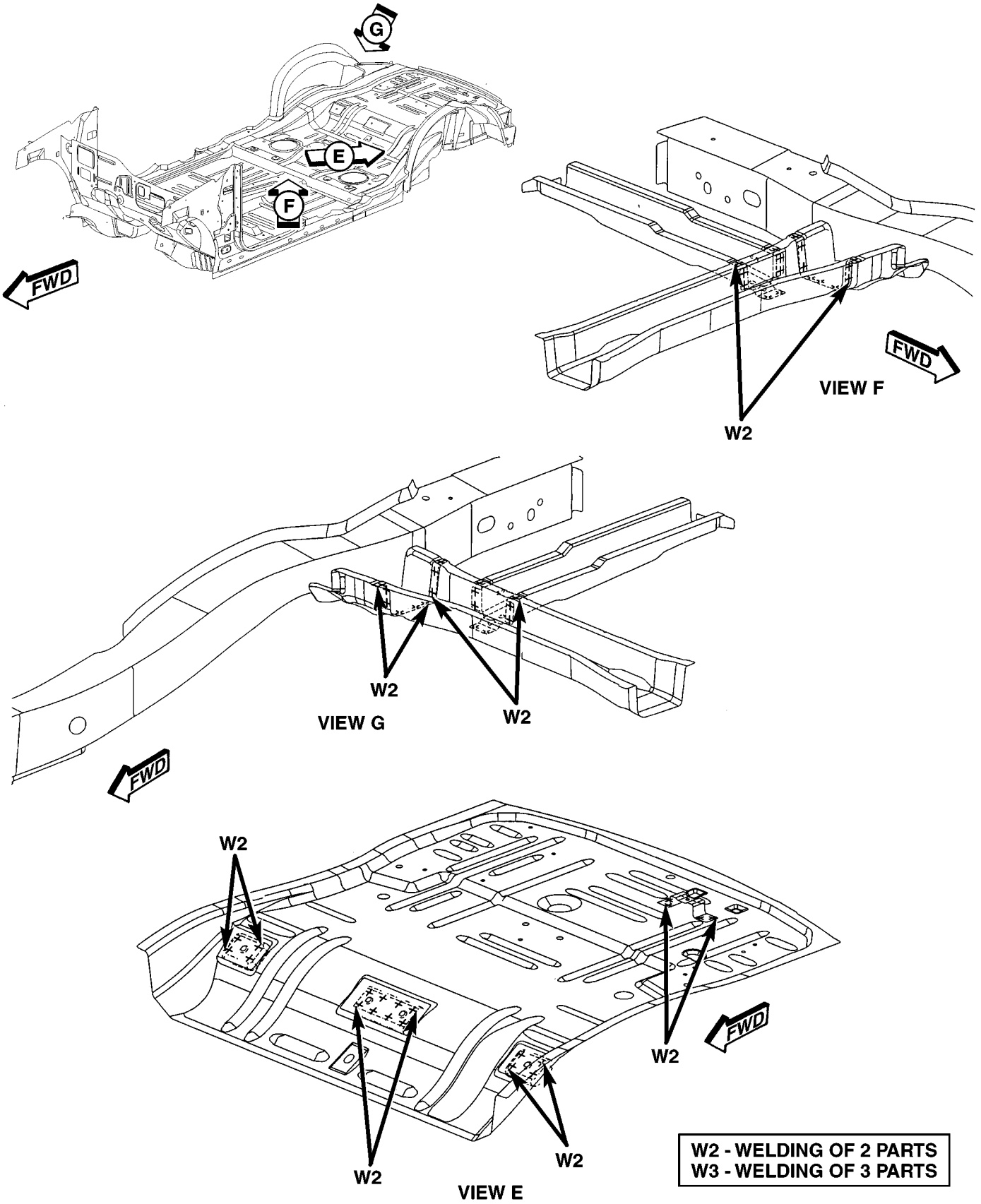


Fig. 121 UNDERBODY (5 OF 10)

WELD LOCATIONS (Continued)

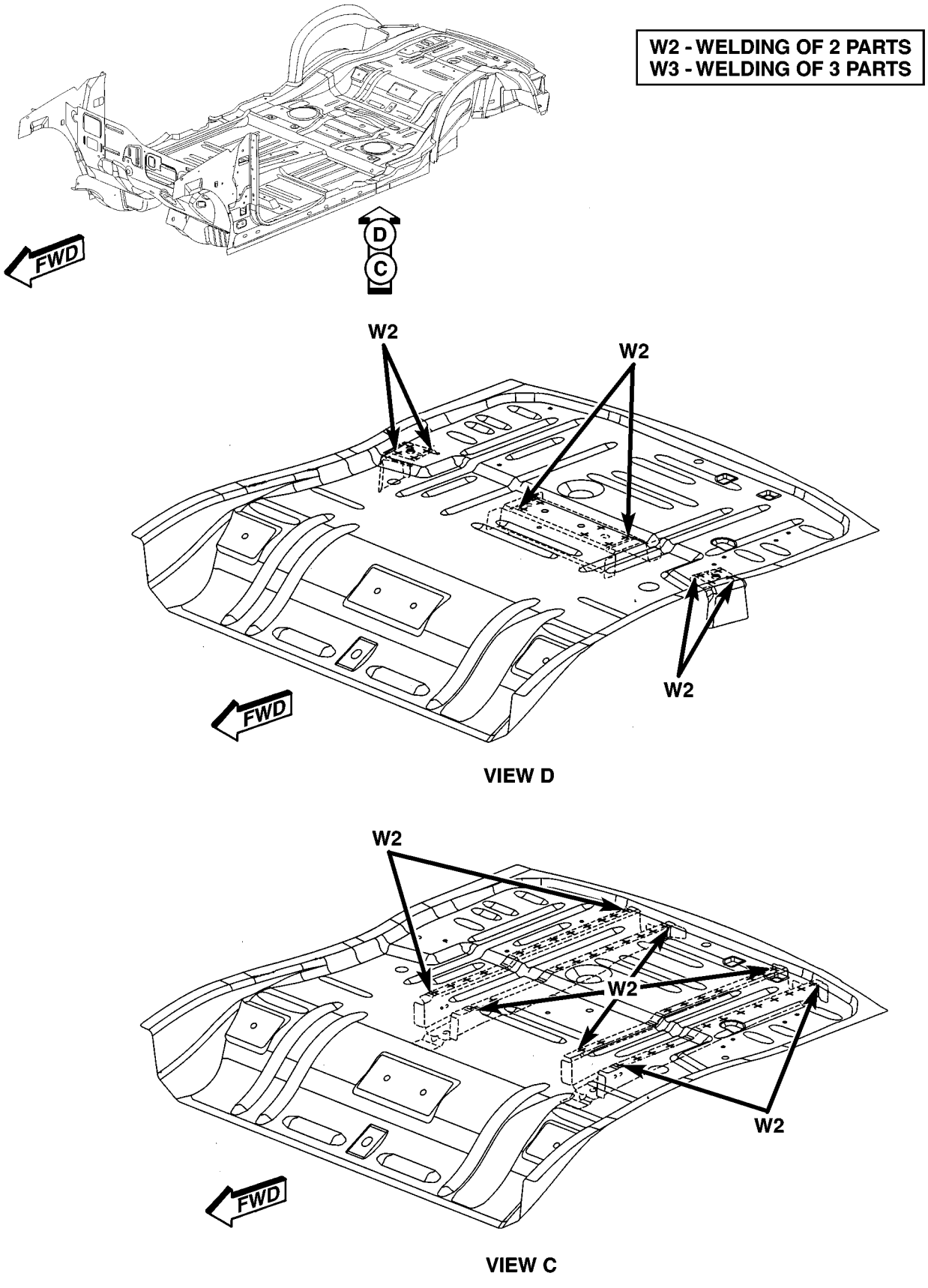


Fig. 122 UNDERBODY (6 OF 10)

WELD LOCATIONS (Continued)

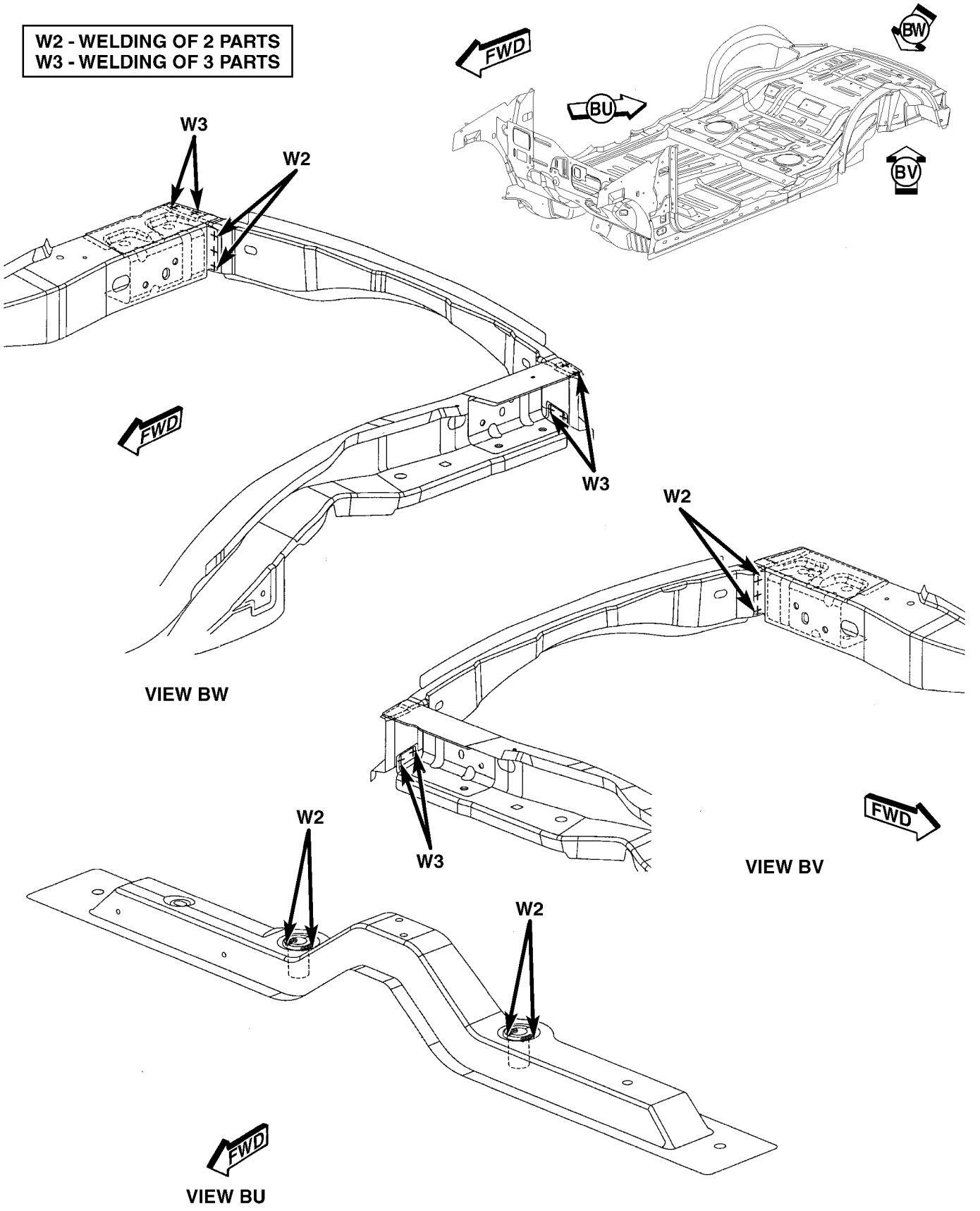


Fig. 123 UNDERBODY (7 OF 10)

WELD LOCATIONS (Continued)

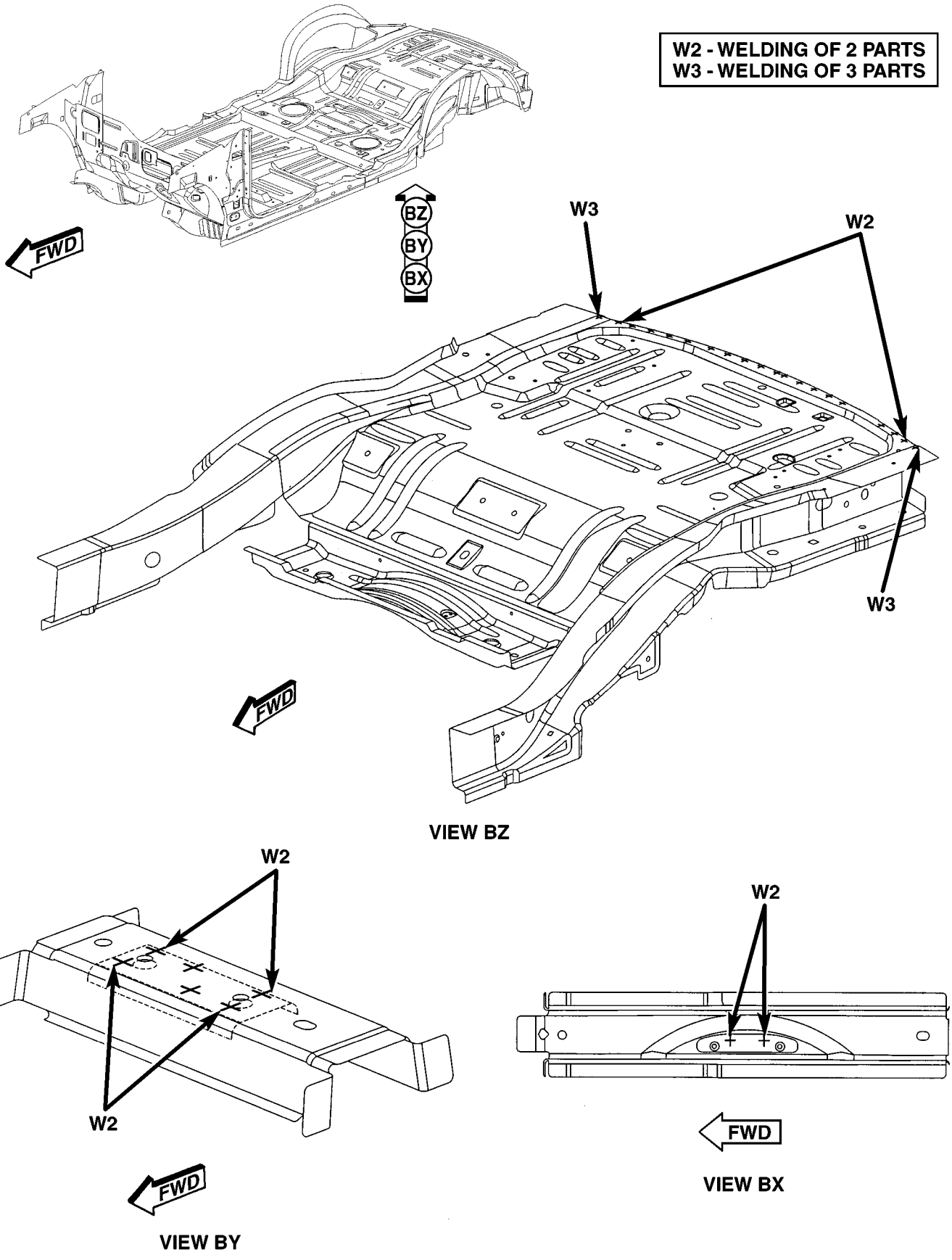


Fig. 124 UNDERBODY (8 OF 10)

WELD LOCATIONS (Continued)

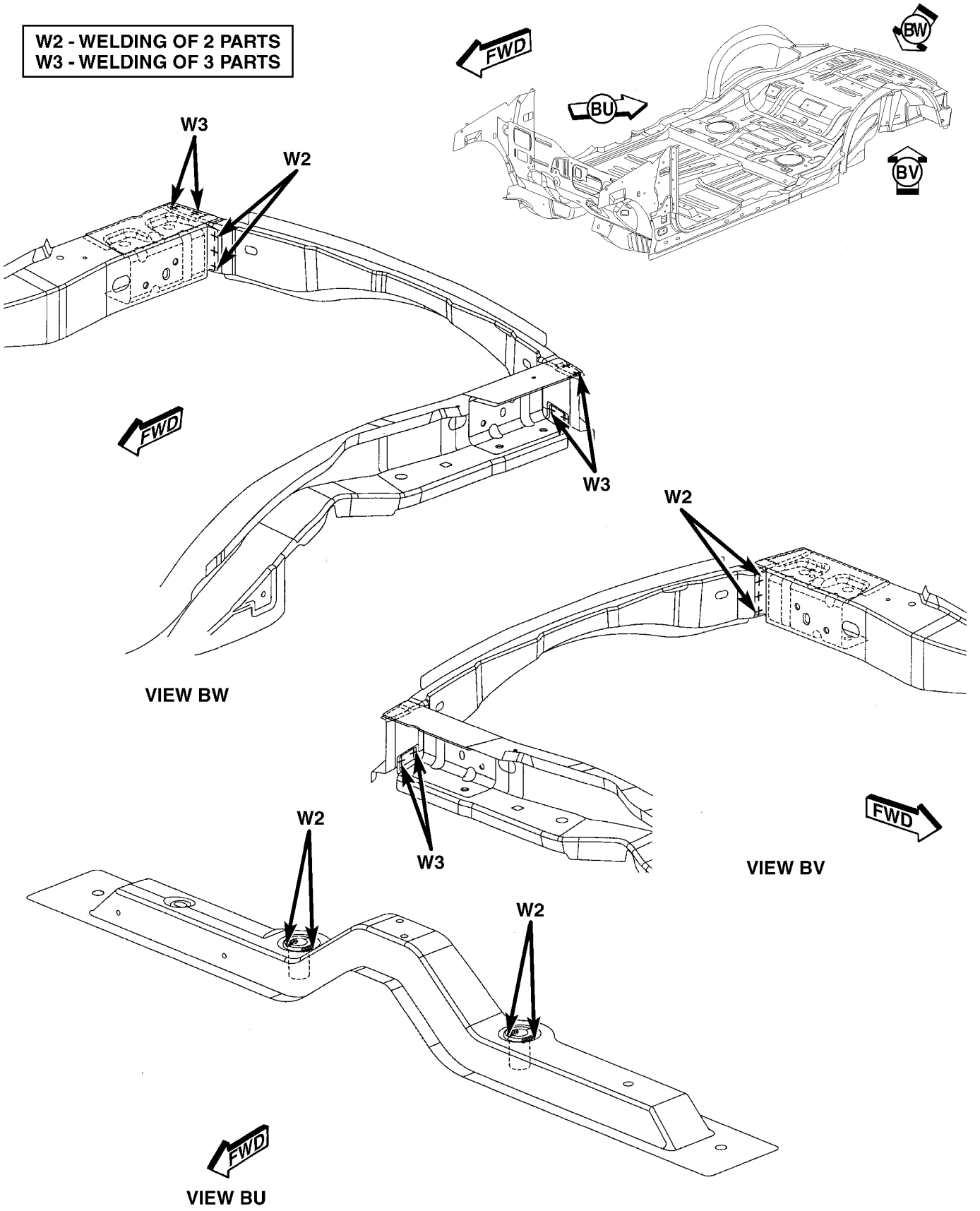


Fig. 125 UNDERBODY (9 OF 10)

WELD LOCATIONS (Continued)

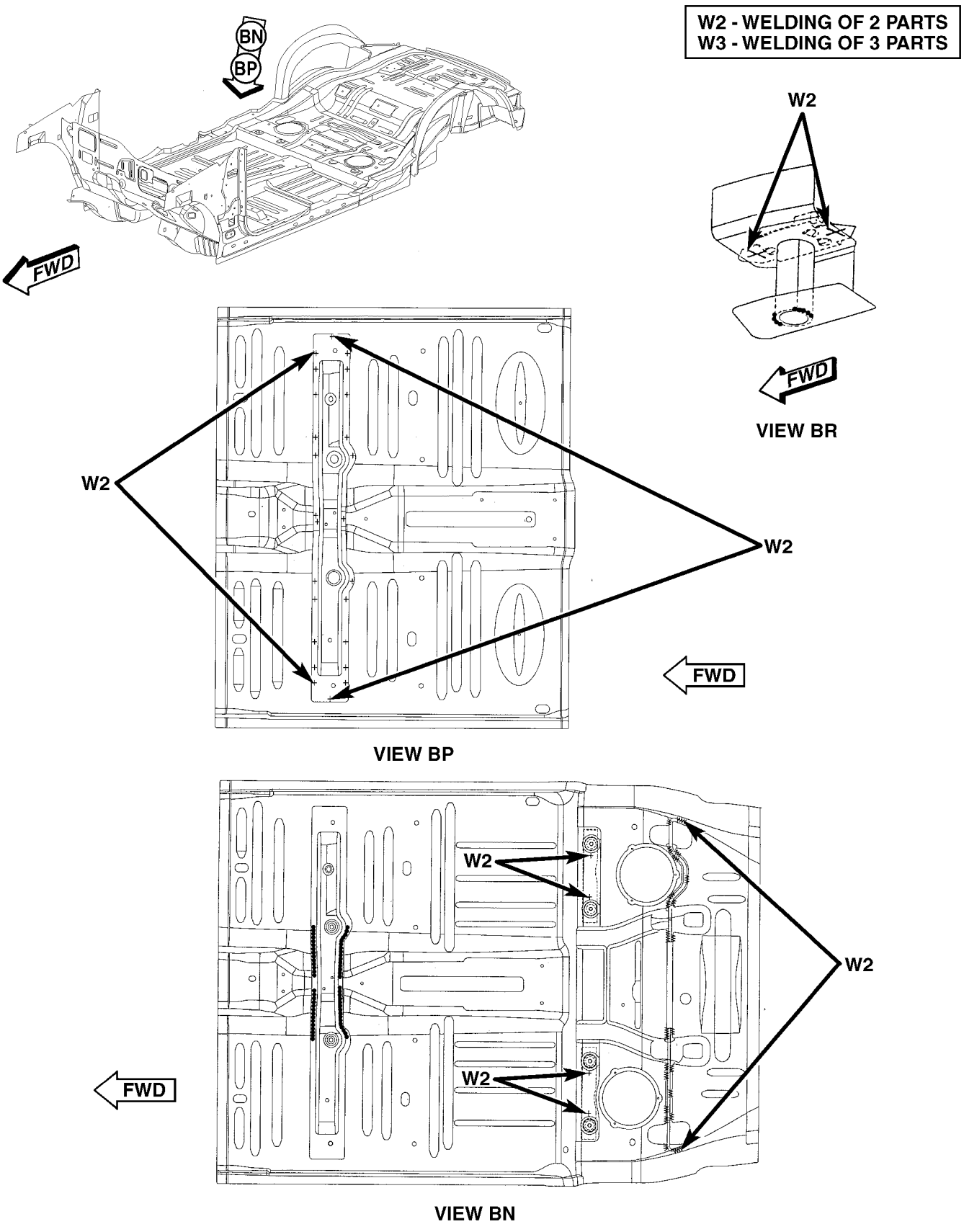


Fig. 126 UNDERBODY (10 OF 10)

WELD LOCATIONS (Continued)

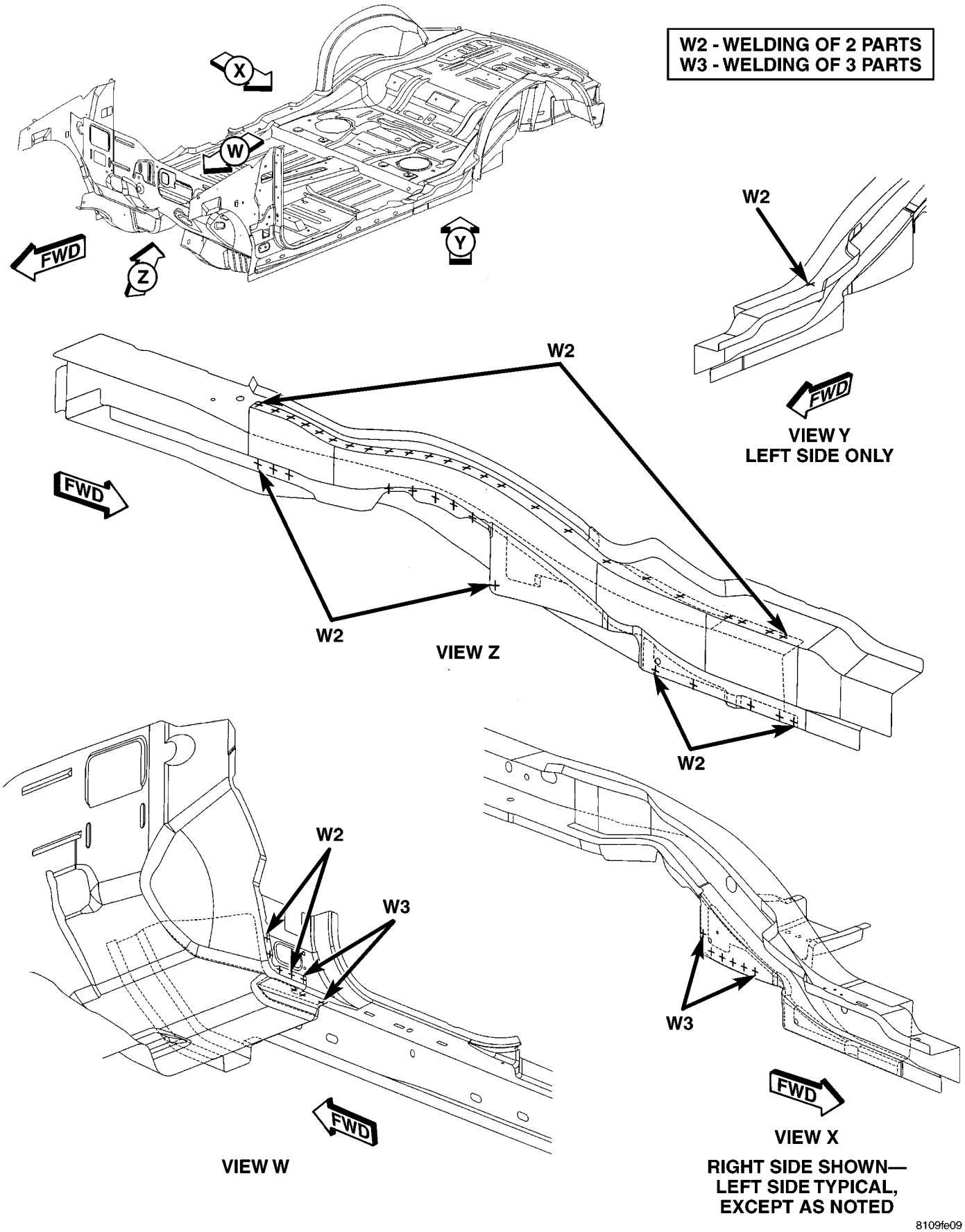


Fig. 127 UNDERBODY COMPLETE (1 OF 9)

WELD LOCATIONS (Continued)

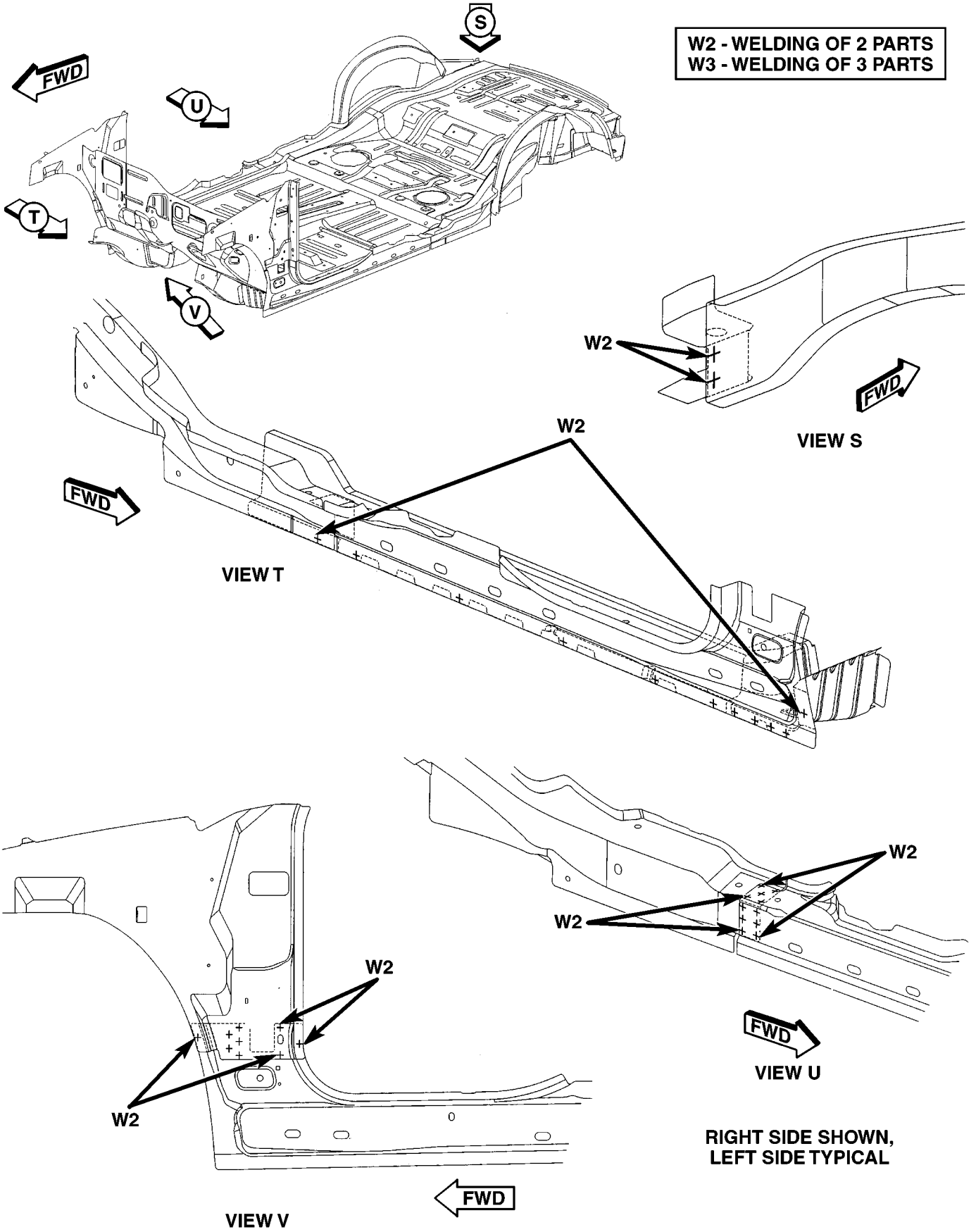


Fig. 128 UNDERBODY COMPLETE (2 OF 9)

WELD LOCATIONS (Continued)

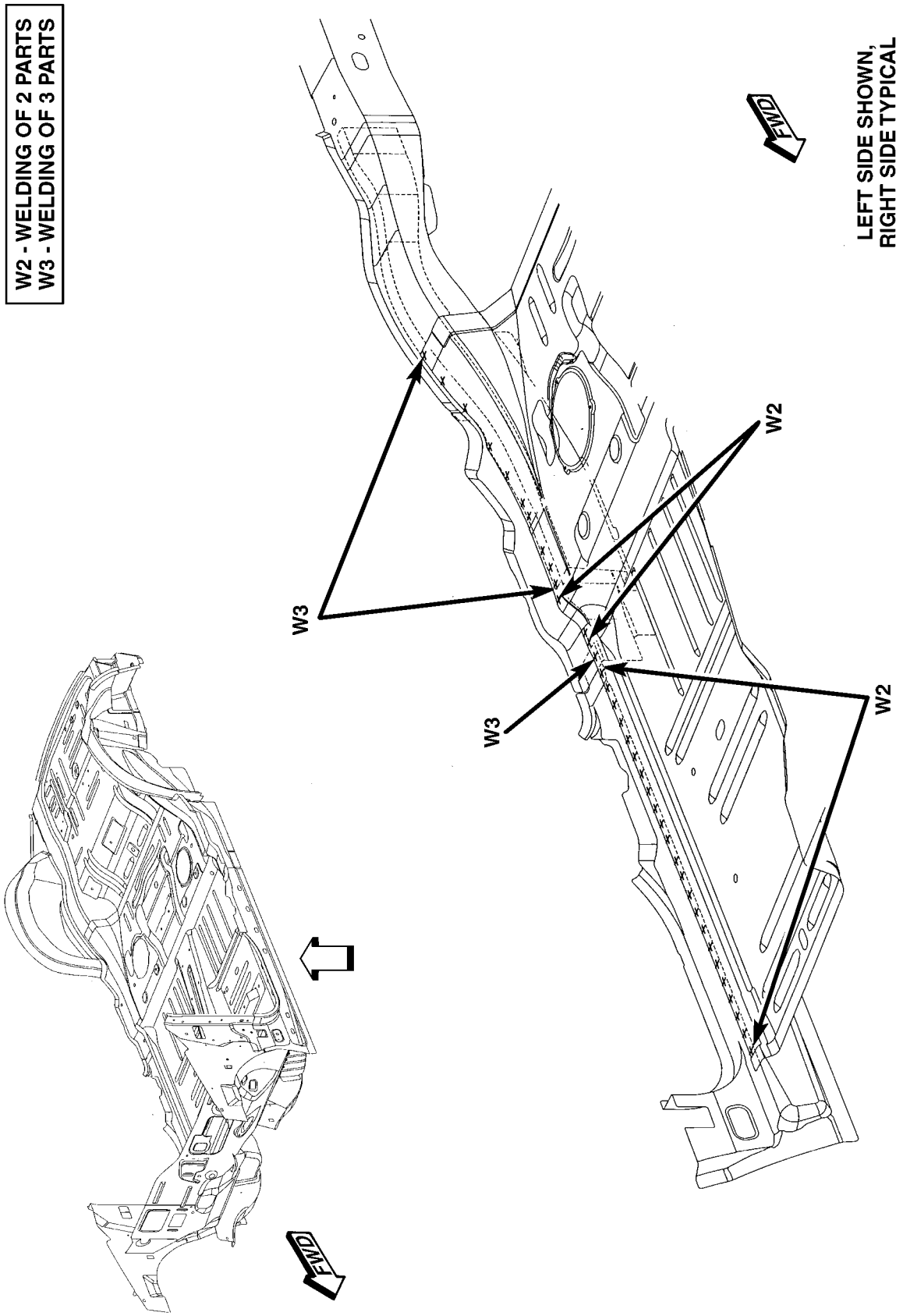


Fig. 129 UNDERBODY COMPLETE (3 OF 9)

WELD LOCATIONS (Continued)

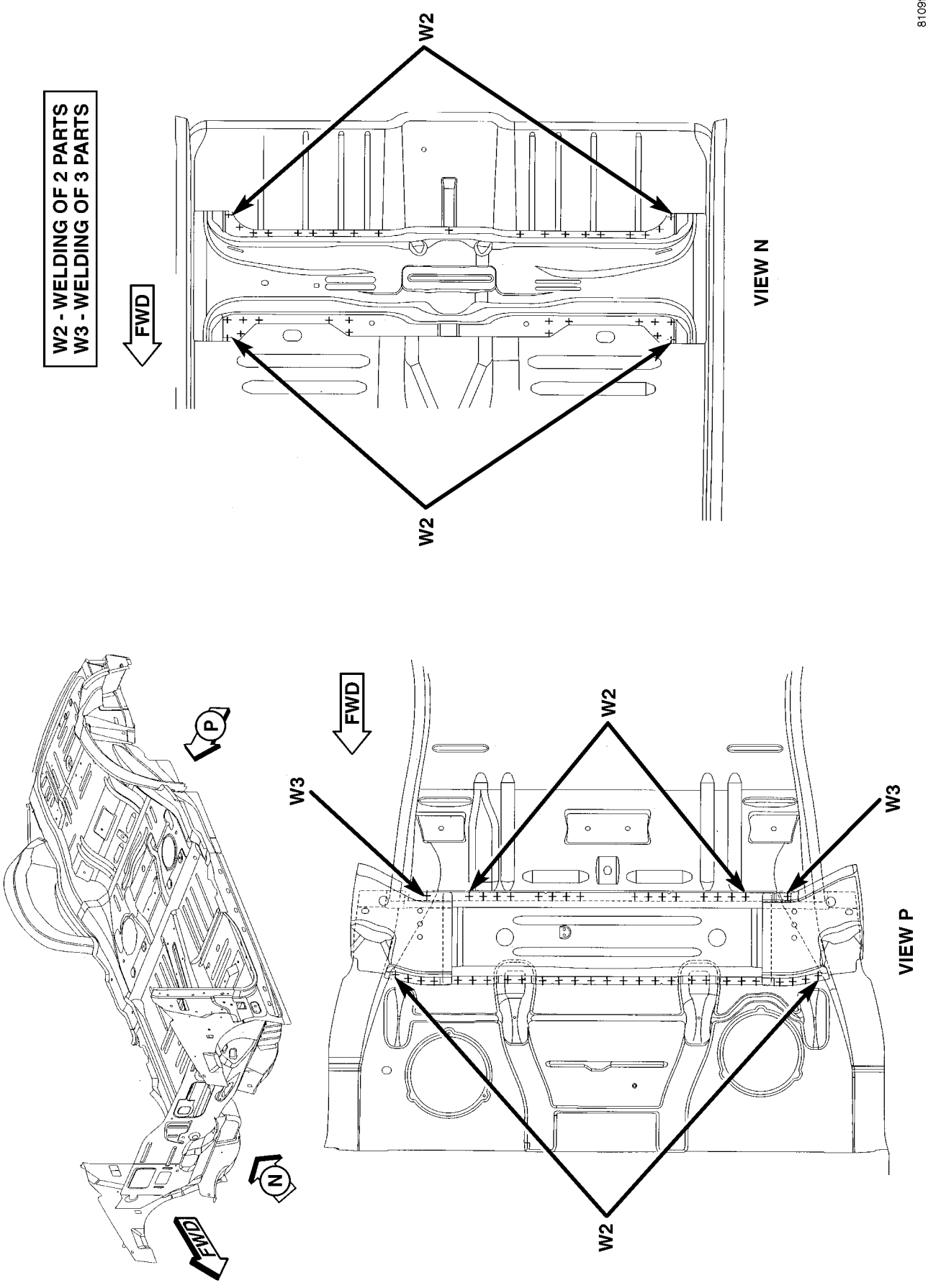


Fig. 130 UNDERBODY COMPLETE (4 OF 9)

WELD LOCATIONS (Continued)

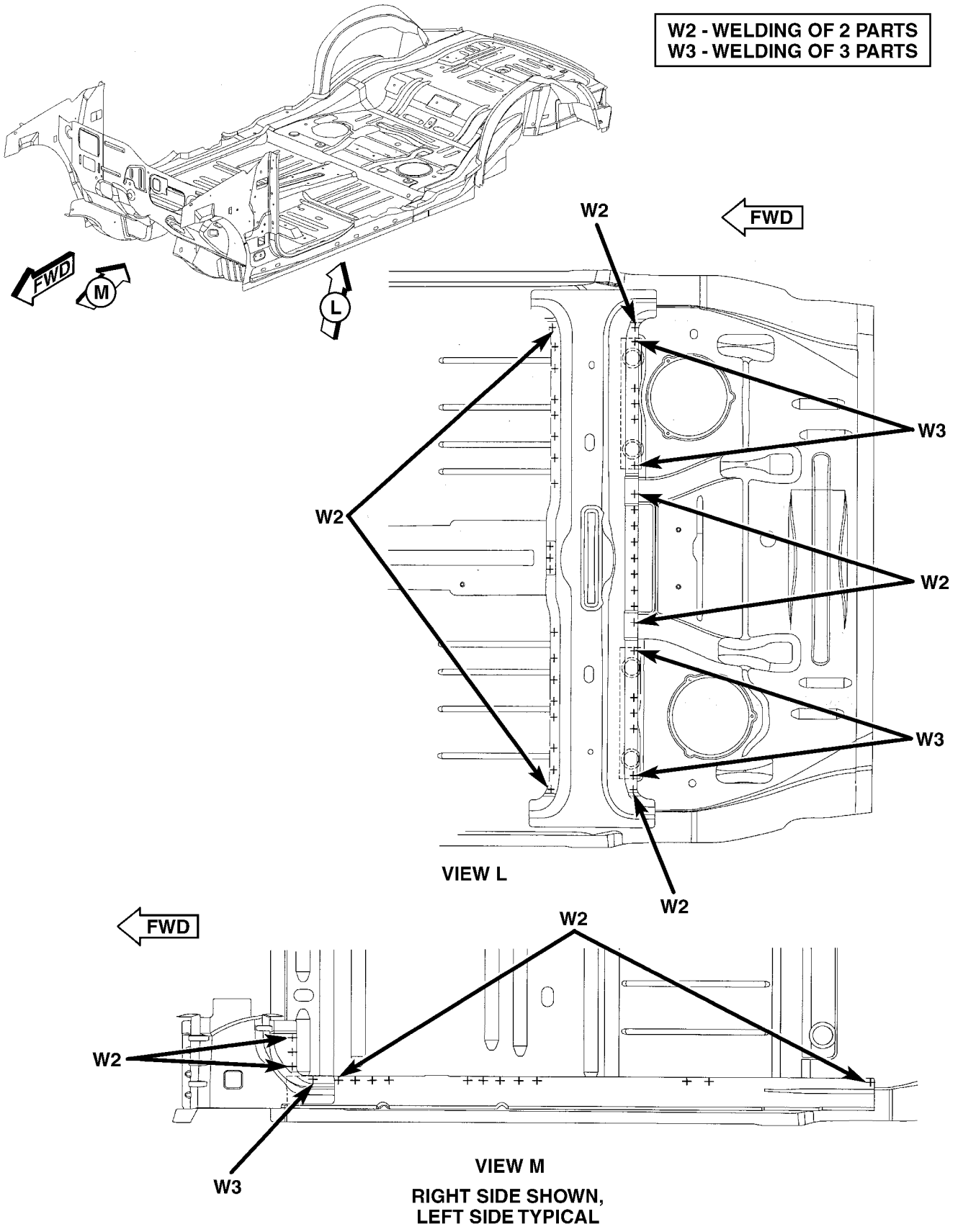


Fig. 131 UNDERBODY COMPLETE (5 OF 9)

WELD LOCATIONS (Continued)

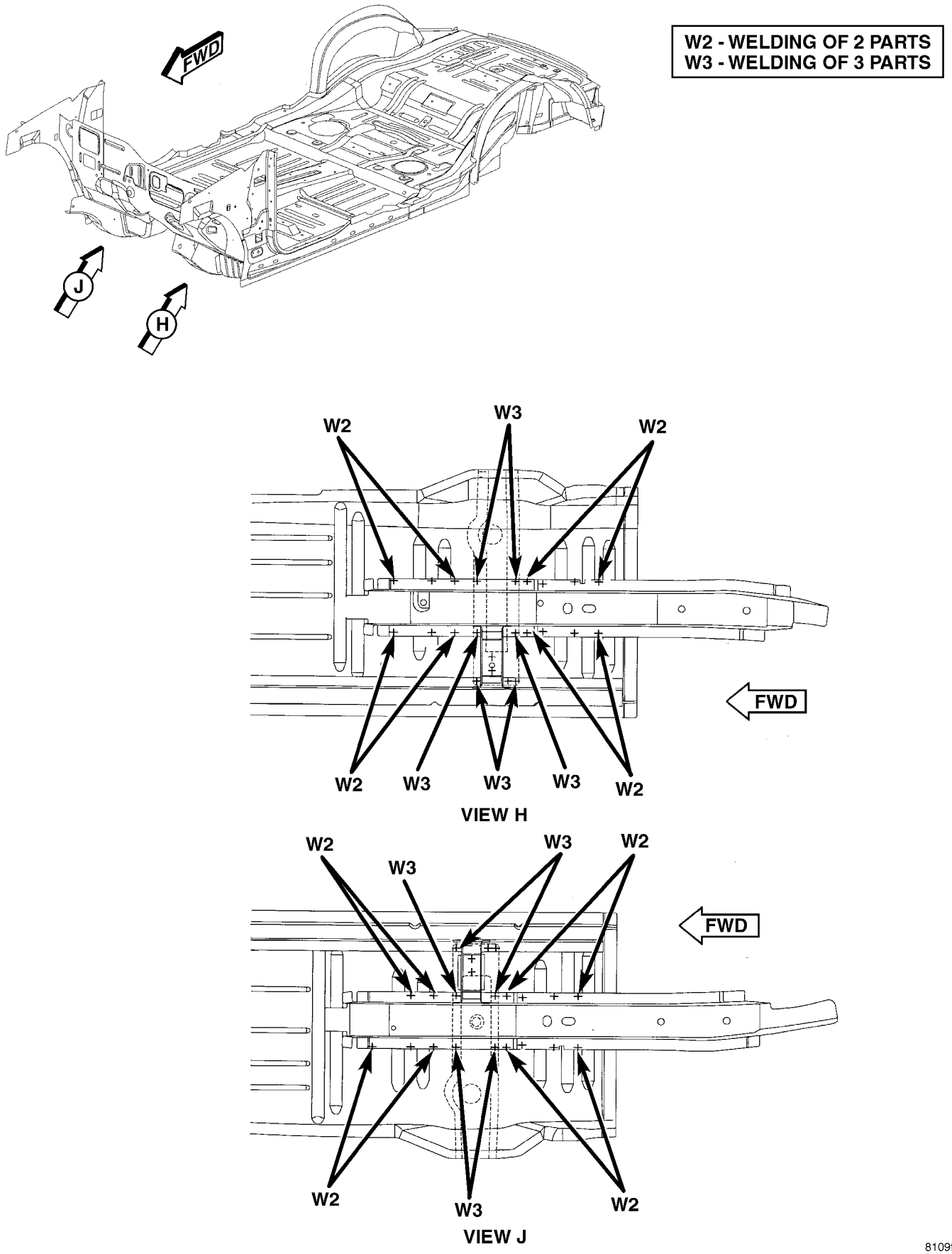


Fig. 132 UNDERBODY COMPLETE (6 OF 9)

WELD LOCATIONS (Continued)

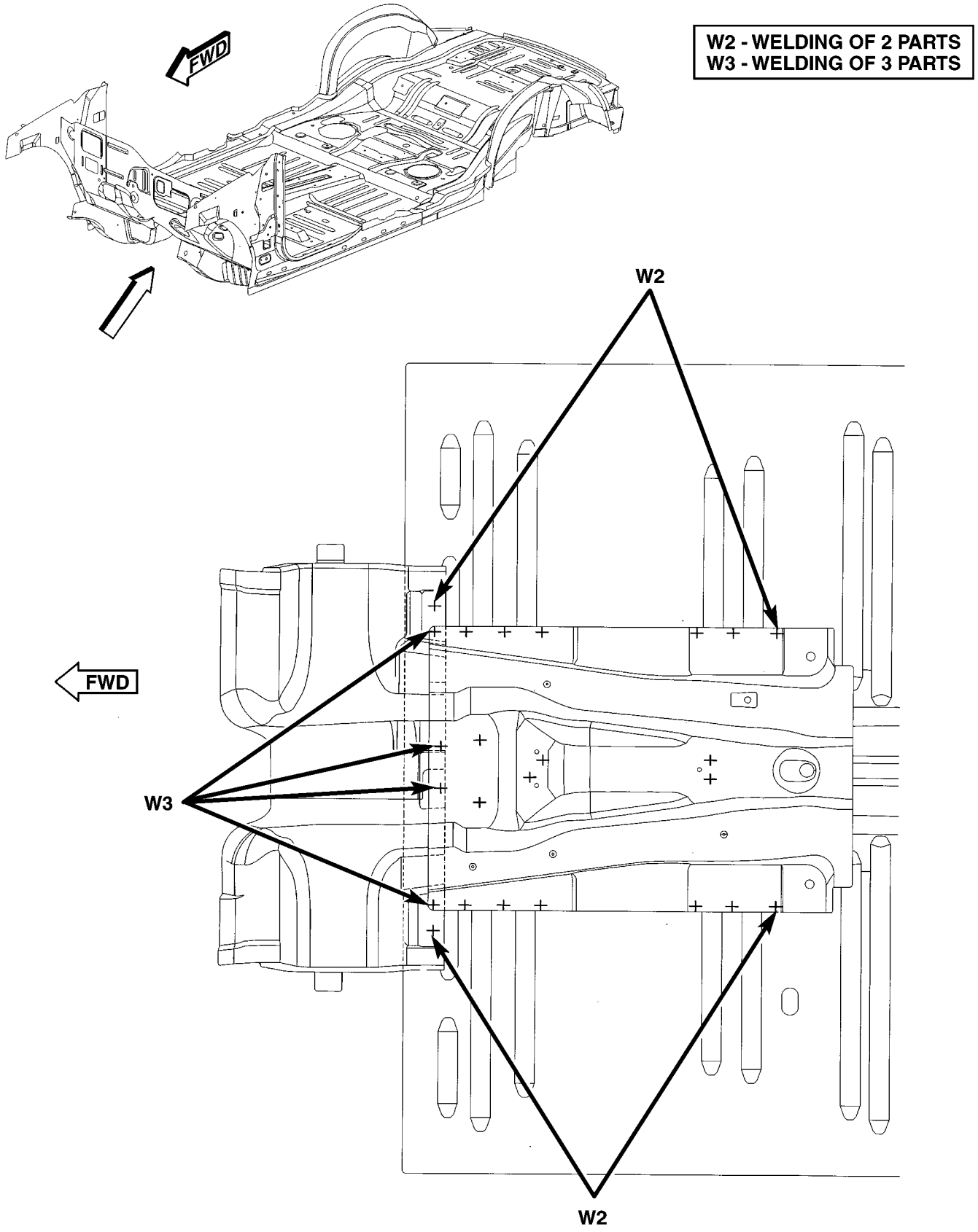


Fig. 133 UNDERBODY COMPLETE (7 OF 9)

WELD LOCATIONS (Continued)

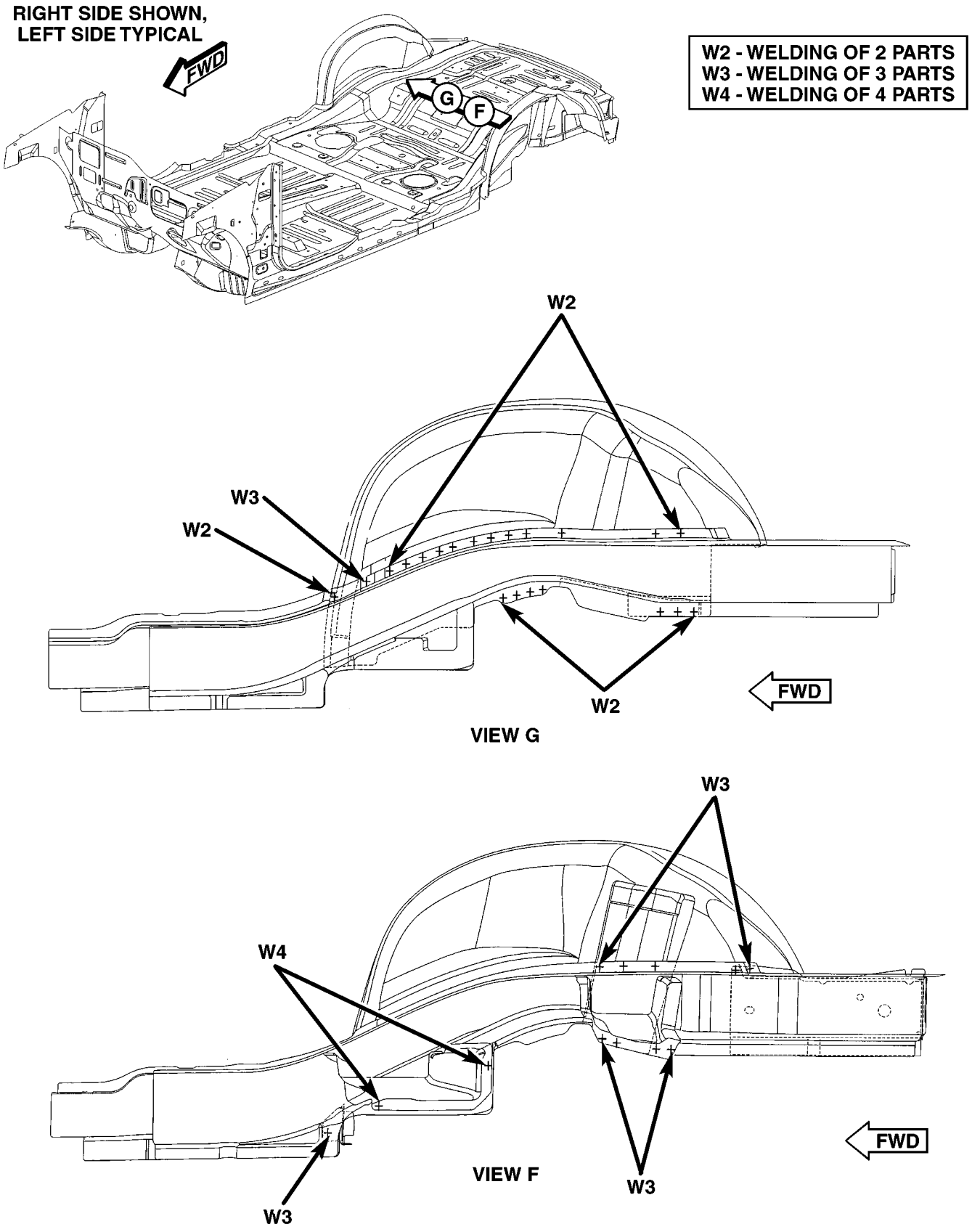


Fig. 134 UNDERBODY COMPLETE (8 OF 9)

WELD LOCATIONS (Continued)

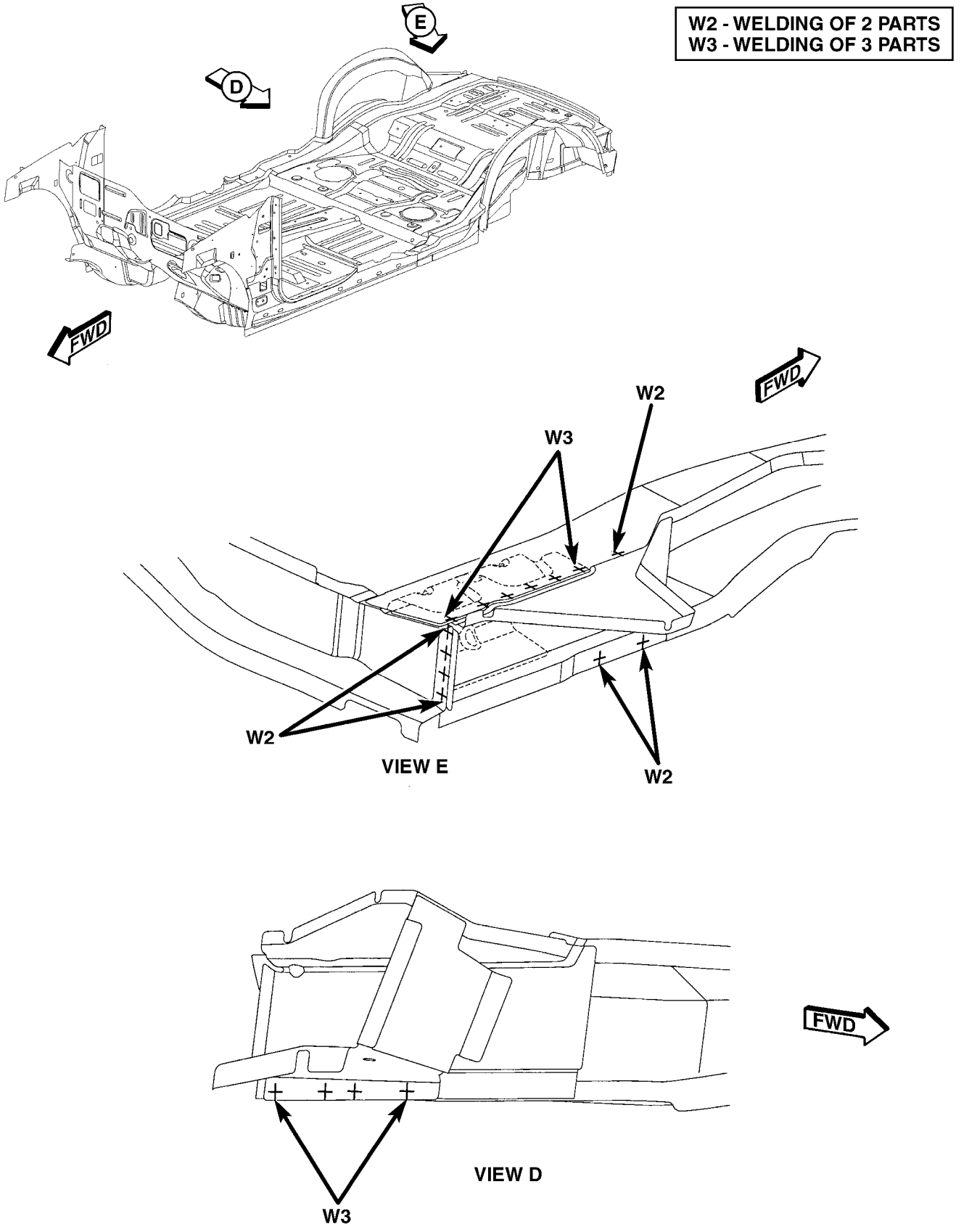


Fig. 135 UNDERBODY COMPLETE (9 OF 9)

WELD LOCATIONS (Continued)

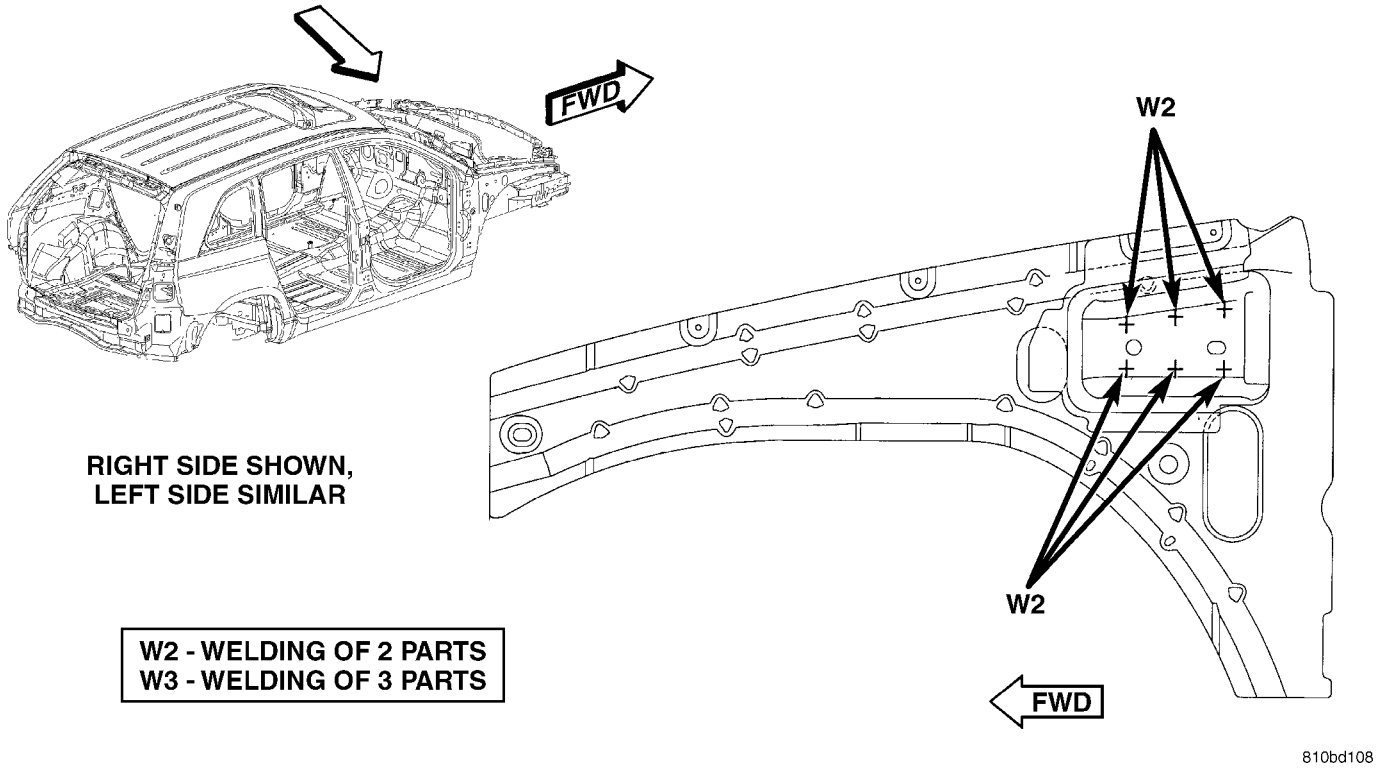


Fig. 136 FRONT FENDER BEAM REINFORCEMENT

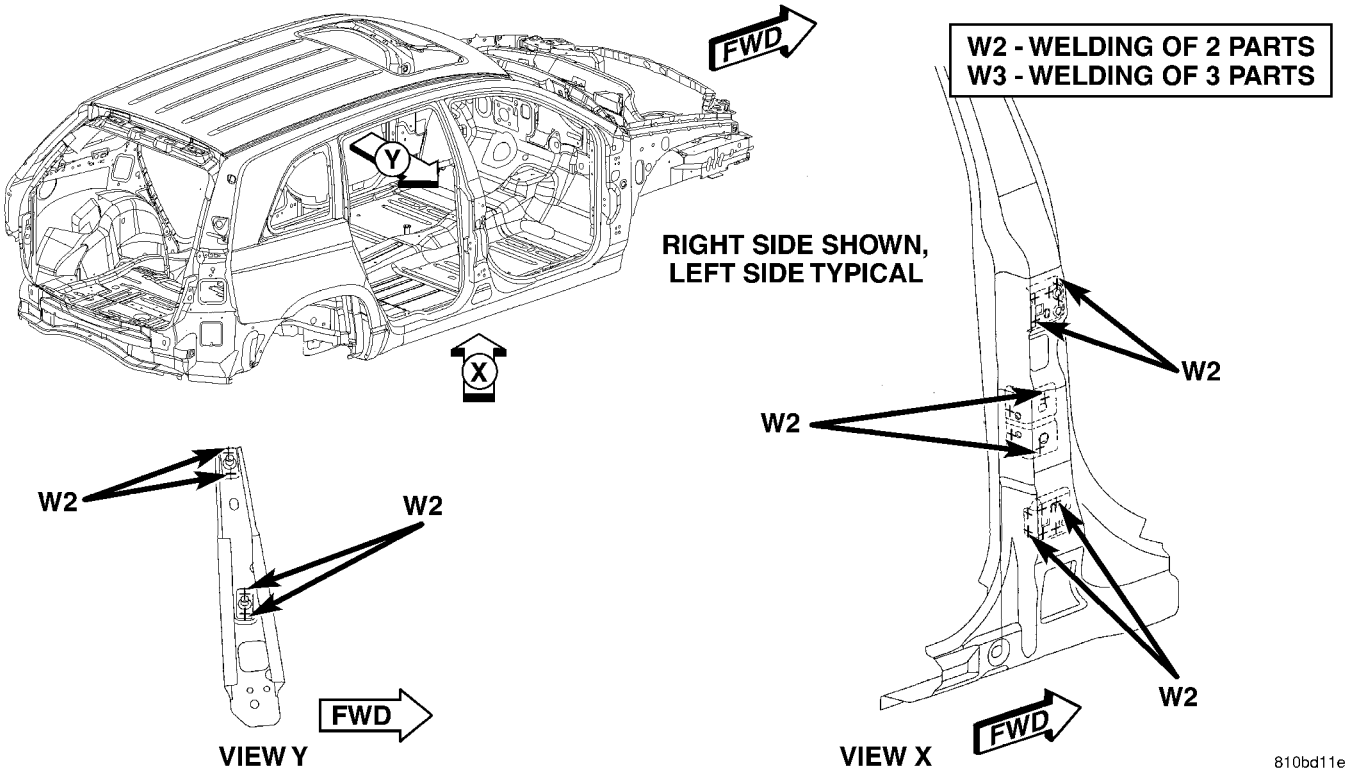


Fig. 137 B-PILLAR TAPPING PLATES & REINFORCEMENT

WELD LOCATIONS (Continued)

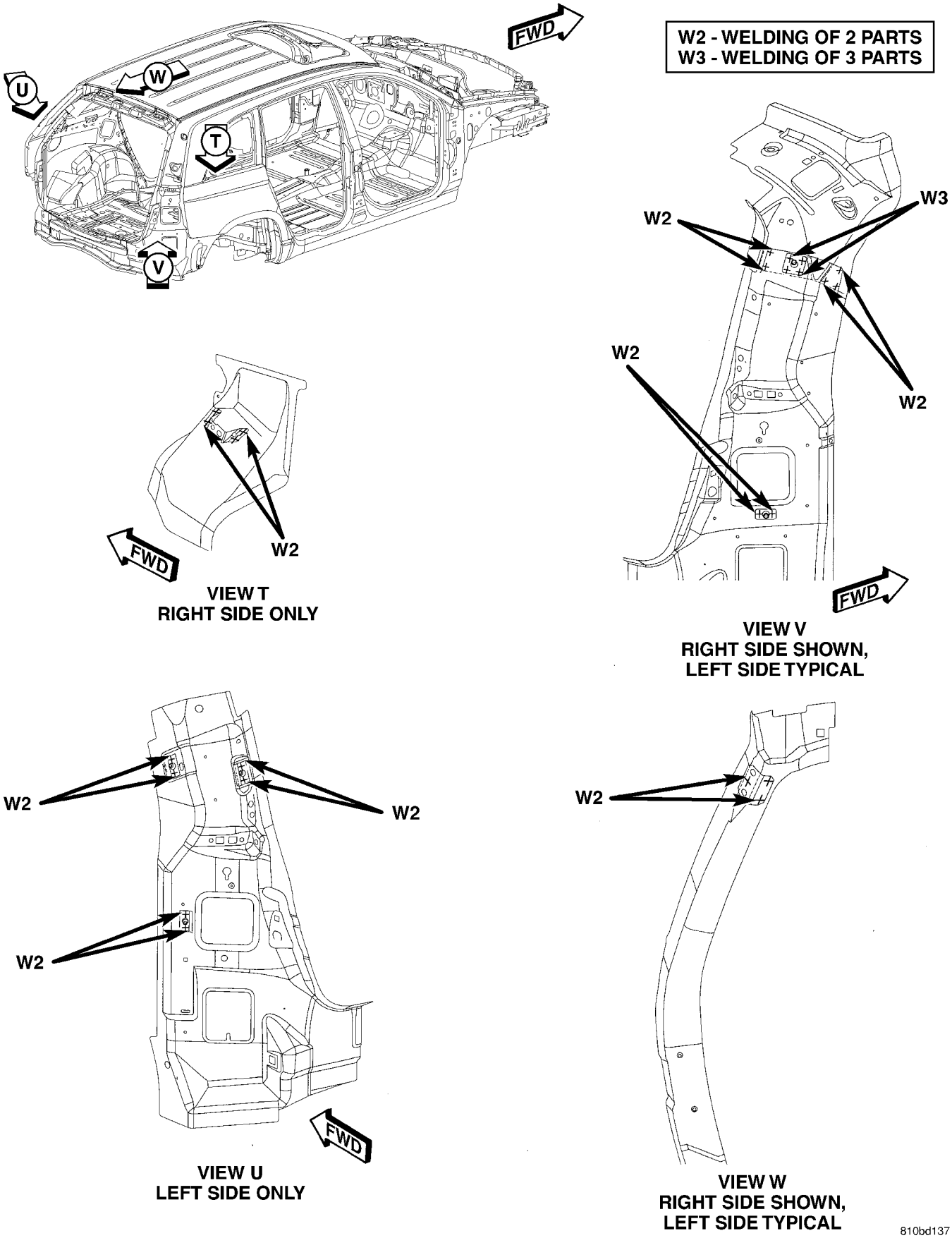


Fig. 138 C-PILLAR NUT PLATES & TAPPING PLATES

WELD LOCATIONS (Continued)

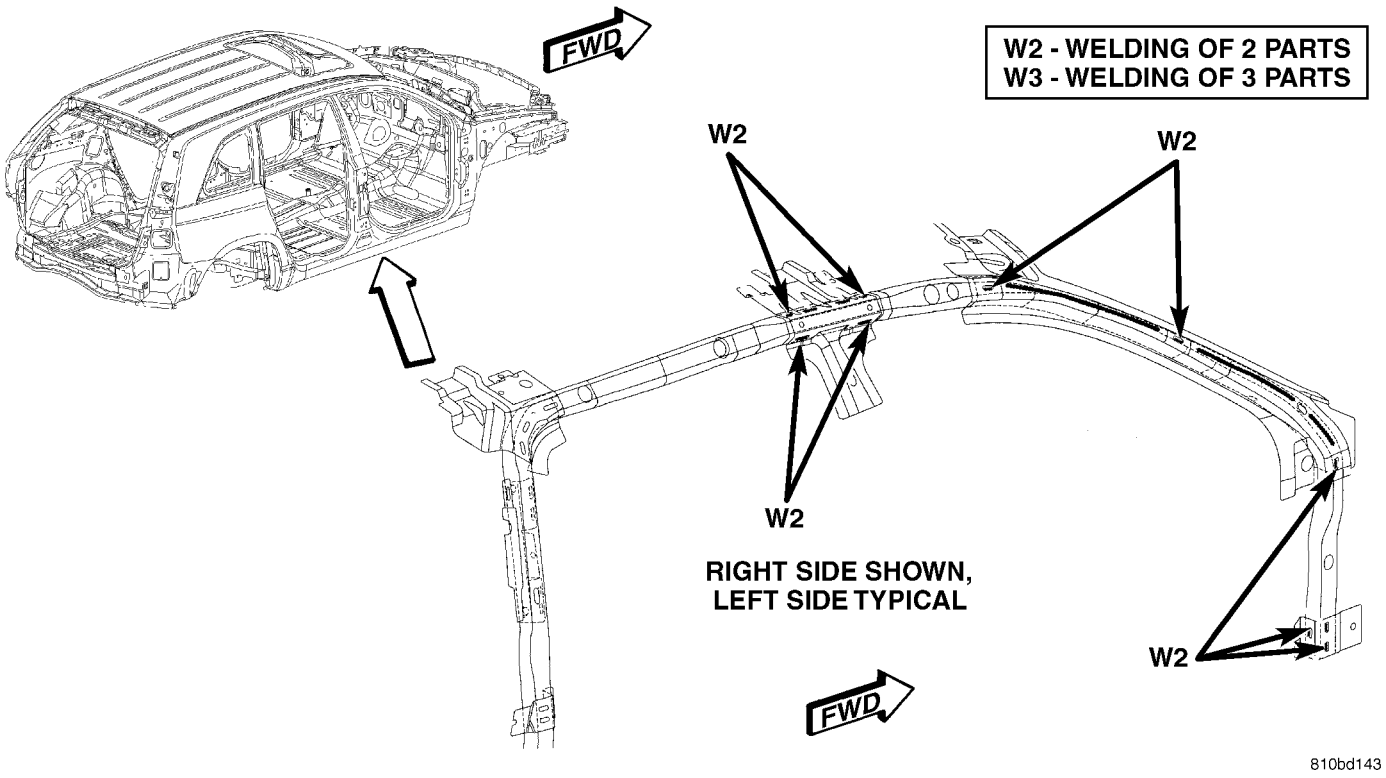


Fig. 139 ROOF RAIL - B-PILLAR REINFORCEMENT

WELD LOCATIONS (Continued)

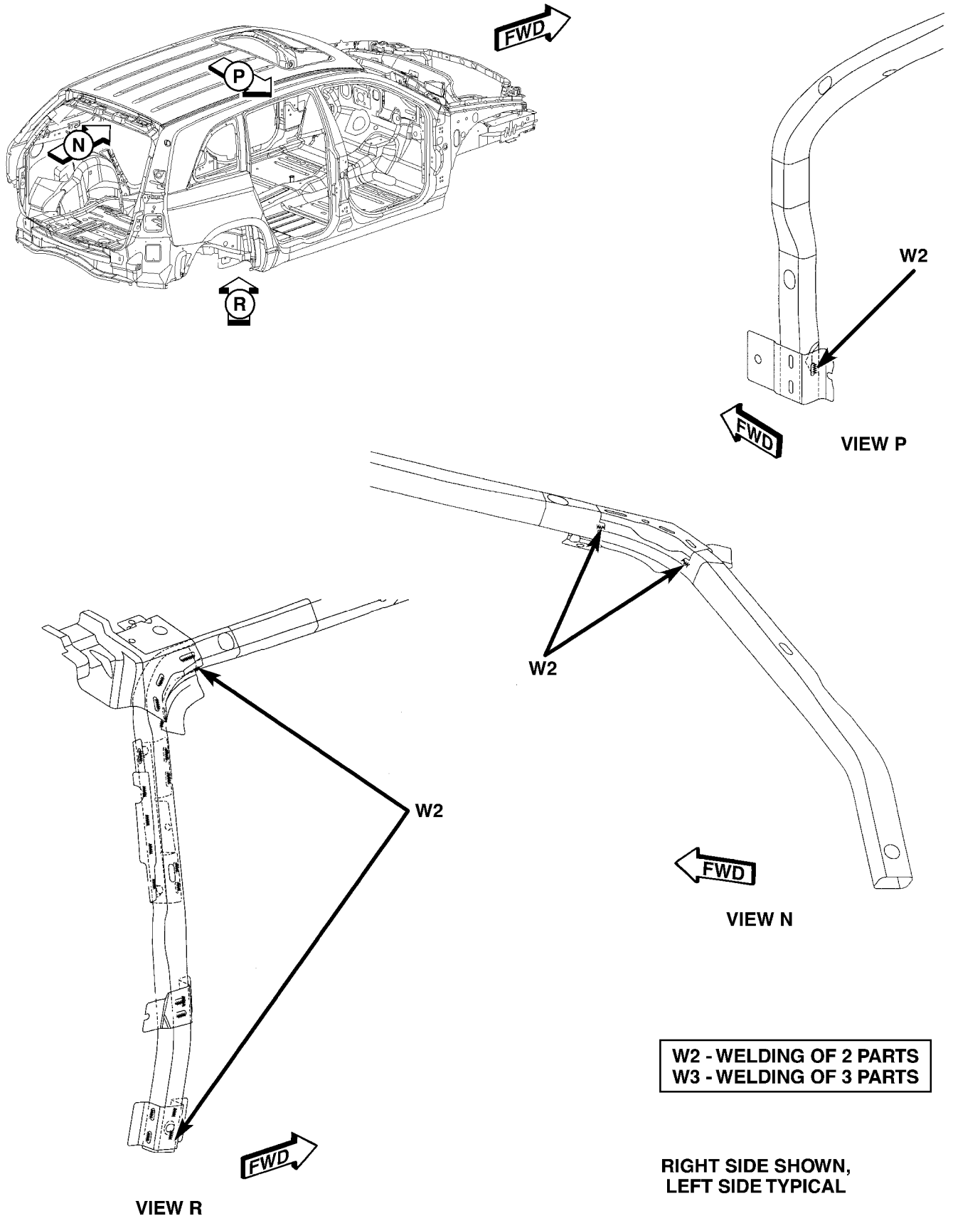


Fig. 140 C-PILLAR REINFORCEMENT & BRACKETS

WELD LOCATIONS (Continued)

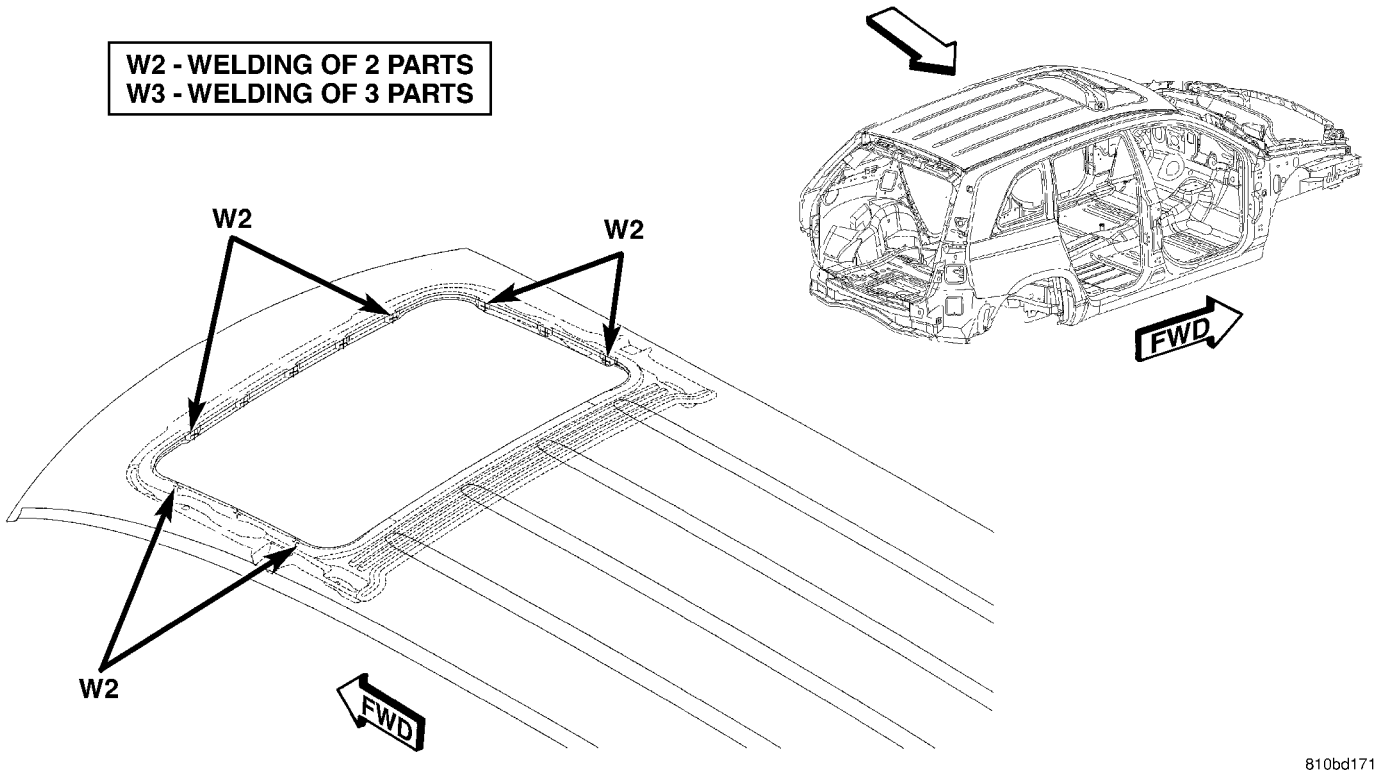


Fig. 141 SUN ROOF OPENING REINFORCEMENT

HEATING & AIR CONDITIONING

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HEATING & AIR CONDITIONING

DESCRIPTION

HEATING AND A/C SYSTEMS

A manually controlled dual zone heating-A/C system and an automatically controlled dual zone heating-A/C system with rear blower controls is available on this model.

To maintain the performance level of the heating, ventilation and air conditioning (HVAC) system, the engine cooling system must be properly maintained. The use of a bug screen is not recommended. Any obstructions in front of the radiator or A/C condenser will reduce the performance of the A/C and engine cooling systems.

The engine cooling system includes the radiator, thermostat, radiator hoses and the engine coolant pump. Refer to 7 - Cooling for more information before opening or attempting any service to the engine cooling system.

All vehicles are equipped with a common heater, ventilation and air conditioning (HVAC) housing (Fig. 1). The system combines air conditioning, heating, and ventilating capabilities in a single housing mounted within the passenger compartment under the instrument panel. The HVAC housing includes:

- A/C Evaporator
- Evaporator temperature sensor
- Blower motor
- Recirculation-air door and actuator
- Blower motor resistor or power module (depending on application)
- Blend-air doors and actuators
- Heater core
- Mode-air doors and actuator

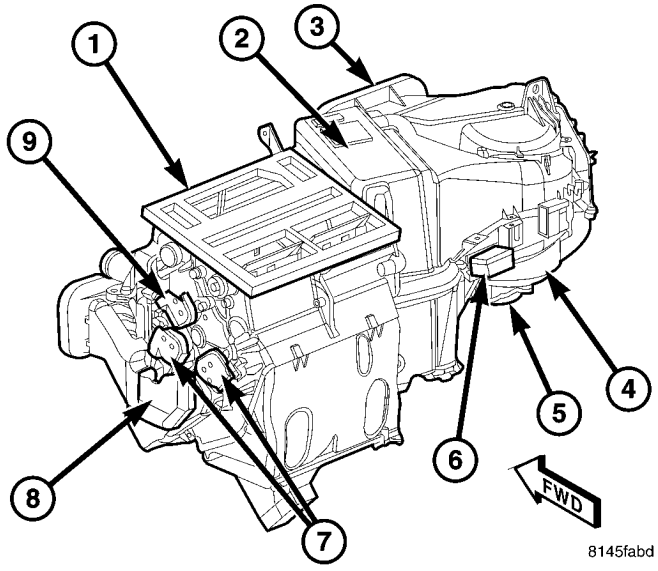


Fig. 1 HVAC Housing

1 - HVAC HOUSING
2 - A/C EVAPORATOR
3 - EVAPORATOR TEMPERATURE SENSOR
4 - BLOWER MOTOR
5 - RECIRCULATION DOOR ACTUATOR
6 - BLOWER POWER MODULE/RESISTOR BLOCK
7 - BLEND DOOR ACTUATORS
8 - HEATER CORE
9 - MODE DOOR ACTUATOR

HEATING & AIR CONDITIONING (Continued)

Based upon the system and mode selected, conditioned air can exit the HVAC housing through one or a combination of the three main housing outlets: defrost, panel or floor. The defrost and the panel outlets are located on the top of the housing and, the floor outlet is located on the bottom of the housing. Once the conditioned air exits the HVAC housing, it is further directed through molded plastic ducts to the various outlets within the vehicle interior. These outlets and their locations are as follows:

- **Defroster Outlet** - A dual, centrally mounted outlet delivers air for defrosting the large windshield. An integral grid is molded into the center of the instrument panel top cover to prevent objects from falling into the duct.
- **Demister Outlets** - There are two side window demisters that aid in defogging and defrosting the front door windows. One demister outlet is located at each outboard end of the instrument panel top pad, near the belt line at the A-pillars.
- **Instrument Panel Outlets** - There are four panel outlets in the instrument panel, one located near each outboard end of the instrument panel facing the rear of the vehicle, and two located near the top of the instrument panel center bezel.
- **Front Floor Outlets** - There are two front floor outlets, one located above each side of the floor panel center tunnel below the instrument panel.
- **Rear Floor Outlets** Rear passenger vents are located in the center floor console and have separate blower fan control switch.

AUTOMATIC TEMPERATURE CONTROL (ATC) - DUAL ZONE

The dual zone automatic temperature control (ATC) heating-A/C system allows completely independent side-to-side temperature control of the discharge air.

The dual zone ATC system includes a dust and odor filter. The particulate air filter element is the same size as the A/C evaporator to ensure ample capacity. A door at the base of the HVAC housing below the glove box provides easy access to the particular air filter element.

FRONT A/C-HEATER CONTROL

The ATC A/C-heater control (Fig. 2) is located in the instrument panel and contains:

- two temperature set controls for completely independent side-to-side temperature control of the discharged air. The full range of temperature that the system can produce in any mode is available on either side of the vehicle by independently adjusting the controls.
- a power on/off switch. Allows the heating-A/C system to be completely turned Off. The display indicates only the outside temperature when the system is off.
- a display screen to indicate the heating-A/C system operational modes and inside and outside temperatures.
- a dual zone control. Allows the selection of either single (driver) or dual (driver and passenger) temperature control mode.
- a separate front window defogger on/off switch. Contains an LED that illuminates to indicate when the front widow defroster is manually selected.
- a rear window defogger on/off switch. Contains an LED that illuminates to indicate when the EBL system is On.
- an air conditioning on/off switch. Contains an LED that illuminates to indicate when the A/C mode is manually selected.
- an air recirculation on/off switch. Contains an LED that illuminates to indicate when the Recirculation mode is manually selected.
- a manual mode switch. Allows the operator to manually select the air delivery mode.
- two infrared temperature sensors which independently measure the surface temperature of the driver and front seat passenger.
- a manual blower fan speed switch. Allows the operator to manually select six different fan speeds.
- a outside temperature switch. Allows the operator to select either outside air or passenger set temperatures.
- a rear blower fan switch. Allows the operator to set the rear blower fan speed to AUTO for automatic speed adjustment, or to REAR to give control to the intermediate seat occupants, or OFF to shut the rear blower motor down.
- an auto high and an auto low switch. Allows various modes of automatic temperature control operation. Contains LEDs that illuminate to indicate when operational.

The Computer logic remembers the settings of the A/C-heater controls when the ignition is turned to Off and, retains those settings after a restart, etc. The computer logic also provides variable air recirculation under high temperature and humidity conditions. Recirculation mode is initially accompanied by outside air to help remove any humidity within the passenger compartment and will gradually approach full recirculation over a broad range of temperatures.

REAR A/C-HEATER CONTROL

Primary controls for the rear compartment is on the instrument panel. The front A/C-heater control allows the driver to set the rear compartment blower fan speed, turn the rear unit off, or to give control to the intermediate seat occupants by switching to the REAR position. When the rear system is controlled

HEATING & AIR CONDITIONING (Continued)

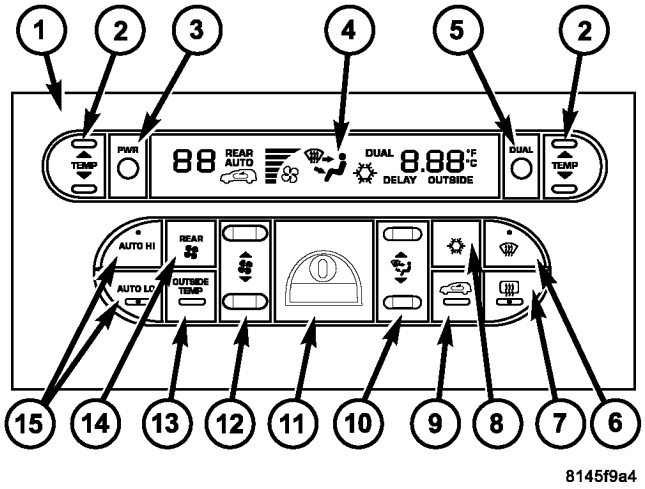


Fig. 2 ATC Dual Zone Front A/C-Heater Control

1 - A/C-HEATER CONTROL (ATC DUAL ZONE)
2 - INDEPENDENT TEMPERATURE CONTROLS
3 - POWER SWITCH
4 - DISPLAY SCREEN
5 - ZONE MODE CONTROL
6 - MANUAL FRONT WINDOW DEFROSTER SWITCH
7 - REAR WINDOW DEFROSTER (EBL) SWITCH
8 - MANUAL A/C MODE SWITCH
9 - MANUAL RECIRCULATION MODE SWITCH
10 - MANUAL AIR DELIVERY MODE SWITCH
11 - INFRARED TEMPERATURE SENSORS
12 - MANUAL BLOWER FAN SPEED SWITCH
13 - OUTSIDE TEMPERATURE SWITCH
14 - REAR BLOWER FAN SPEED SWITCH
15 - AUTO HIGH/LOW CONTROL SWITCHES

from the instrument panel, rear blower fan speed is automatically controlled based on the front A/C-heater control temperature setting. Air flow through the floor console is directed through upper or lower outlets based on the front mode settings.

The rear rotary blower fan control is centrally mounted on the center floor console between the second row seats and allows control of the rear blower fan speed by intermediate seat passengers.

MANUAL TEMPERATURE CONTROL (MTC) - DUAL ZONE

The dual zone manual temperature control (MTC) heating-A/C system allows completely independent side-to-side temperature control of the discharge air.

The MTC A/C-heater control (Fig. 3) is located in the instrument panel and contains:

- a power on/off switch. Contains an LED that illuminates to indicate when the heating-A/C system is On.
- a rear window defogger on/off switch. Contains an LED that illuminates to indicate when the EBL system is On.
- slide controls for completely independent side-to-side temperature control of the discharged air. The full range of temperature that the heating-A/C system can produce in any mode is available on either side of the vehicle by independently positioning the slide controls on the instrument panel.
- an air recirculation on/off switch. Contains an LED that illuminates to indicate when the heating-A/C system is in the Recirculation mode.
- an air conditioning on/off switch. Contains an LED that illuminates to indicate when the heating-A/C system is in the A/C mode.
- a rotary control to manually select the air delivery mode.
- a rotary control to manually select the blower fan speed.

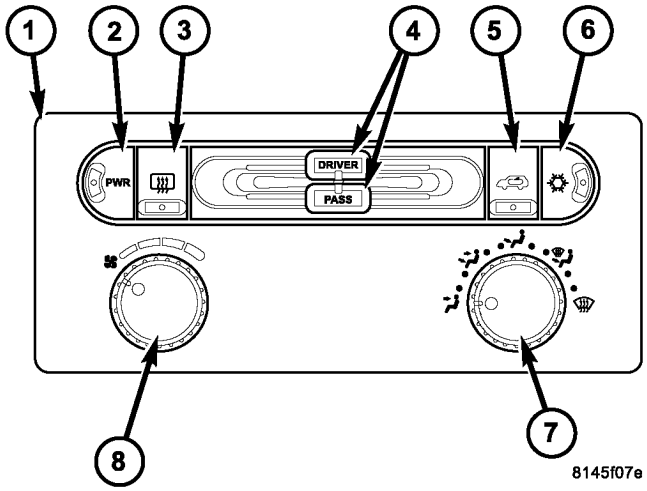


Fig. 3 MTC Dual Zone A/C-Heater Control

1 - A/C-HEATER CONTROL
2 - POWER SWITCH
3 - REAR WINDOW DEFOGGER (EBL) SWITCH
4 - TEMPERATURE CONTROLS
5 - RECIRCULATION MODE SWITCH
6 - A/C MODE SWITCH
7 - AIR DELIVERY CONTROL
8 - BLOWER FAN SPEED CONTROL

OPERATION

HEATING AND A/C SYSTEMS

Both the dual zone manual temperature control (MTC) and the dual zone automatic temperature control (ATC) heating-A/C systems are blend-air type systems. In a blend-air heating-A/C system (Fig. 4), a blend-air door controls the amount of conditioned air that is allowed to flow through, or around, the heater core. In the dual zone systems used on this model, two blend-air doors are used to provide completely independent side-to-side temperature control of the

discharge air. The temperature controls determines the discharge air temperatures by operating the two blend door actuators, which move the blend-air doors. This design allows almost immediate control of output air temperatures.

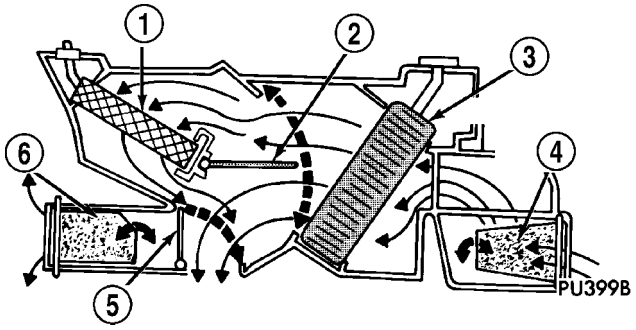


Fig. 4 Typical Blend-Air HVAC System

1 - HEATER CORE
2 - BLEND-AIR DOOR (2 DOORS IN DUAL ZONE)
3 - A/C EVAPORATOR
4 - RECIRCULATION-AIR DOOR
5 - FLOOR MODE-AIR DOOR
6 - PANEL/DEFROST MODE-AIR DOOR

The heating-A/C systems pulls outside (ambient) air through the cowl opening at the base of the windshield, then into the air inlet housing above the heating, ventilation and air conditioning (HVAC) housing. From the air inlet housing the air passes through the A/C evaporator and then can be directed either through or around the heater core. This is done by adjusting the blend-air doors with the temperature controls located on the front A/C-heater control in the instrument panel. The air flow can then be directed from the panel, floor and defrost outlets in various combinations using the mode control located on the A/C-heater control. Air flow velocity can be adjusted with the blower fan speed control located on the A/C-heater control.

On all models, the outside air intake can be shut off by selecting the Recirculation Mode. This will operate a electrically actuated recirculation-air door that closes off the fresh air intake and recirculates the air that is already inside the vehicle.

The A/C compressor can be engaged in any mode by pressing the snowflake, A/C on/off button. It can also be engaged by placing the mode control in the mix to defrost positions. This will remove heat and humidity from the air before it is directed through or around the heater core. The mode control on the A/C-heater control is used to also direct the conditioned air to the selected system outlets. The mode control uses an electric actuator to control the mode-air doors.

The defroster outlet receives airflow from the HVAC housing through the molded plastic defroster duct, which connects to the HVAC housing defroster outlet. The airflow from the defroster outlets is directed by fixed vanes in the defroster outlet grille and cannot be adjusted.

The side window demister outlets receive airflow from the HVAC housing through the molded plastic defroster duct and molded plastic demister ducts. The airflow from the side window demister outlets is directed by fixed vanes in the demister outlet grilles and cannot be adjusted. The demisters direct air from the HVAC housing through the outlets located on the top corners of the instrument panel. The demisters operate when the mode control knob is positioned in the floor-defrost and defrost-only settings. Some air may be noticeable from the demister outlets when the mode control is in the bi-level to floor positions or when in automatic mode (depending on application).

The panel outlets receive airflow from the HVAC housing through a molded plastic main panel duct, center panel duct and two end panel ducts. The two end panel ducts direct airflow to the left and right instrument panel outlets, while the center panel duct directs airflow to the two center bezel outlets. Each of these outlets can be individually adjusted to direct the flow of air.

The floor outlets receive airflow from the HVAC housing through the floor distribution duct. The front floor outlets are integral to the molded plastic floor distribution duct, which is secured to the bottom of the housing. The front floor outlets cannot be adjusted. When equipped, the rear console outlets receive air flow through a duct which is integral to the floor console. The floor console outlets can be individually adjusted to direct the flow of air.

NOTE: It is important to keep the air intake opening clear of debris. Leaf particles and other debris that is small enough to pass through the cowl opening screen can accumulate within the HVAC housing. The closed, warm, damp and dark environment created within the housing is ideal for the growth of certain molds, mildews and other fungi. Any accumulation of decaying plant matter provides an additional food source for fungal spores, which enter the housing with the fresh intake-air. Excess debris, as well as objectionable odors created by decaying plant matter and growing fungi can be discharged into the passenger compartment during heater-A/C operation if the air intake opening is not kept clear of debris.

The A/C system on models so equipped is designed for the use of non-CFC, R-134a refrigerant and uses an A/C expansion valve to meter the flow of refrigerant to the A/C evaporator. The A/C evaporator cools and dehumidifies the incoming air prior to blending it with the heated air. To maintain minimum evapo-

rator temperature and prevent evaporator freezing, an evaporator temperature sensor is used to supply an evaporator temperature message to the A/C-heater control. In turn, the powertrain control module (PCM) cycles the A/C compressor clutch off and on as necessary to protect the A/C system from evaporator freezing and optimize A/C system performance.

AUTOMATIC TEMPERATURE CONTROL (ATC) - DUAL ZONE

The dual zone automatic temperature control (ATC) system automatically maintains the interior comfort level desired by the driver and front seat passenger. This is accomplished by using two infrared sensors within the A/C-heater control which is located at the center of the instrument panel. The two infrared sensors independently measure the surface temperature of the driver and front seat passenger. Based on the sensor input, the system automatically adjusts the air temperature, the airflow volume, the airflow distribution, and amount of inside air recirculation to maintain front seat occupant comfort, even under changing outside weather conditions.

When DUAL is displayed on the A/C-heater control, the driver and passenger air outlet temperatures can be individually adjusted from the two independent TEMP buttons. When a front seat passenger is not present, pressing the DUAL button will:

- disable the passenger side infrared sensor and control the entire system based only on the driver side temperature setting.
- replace the passenger side temperature setting in the display to the outside temperature reading.

Pressing the DUAL button a second time or adjusting the passenger side TEMP button will:

- reactivate the passenger side infrared sensor.
- return the system to dual independent temperature operation.

This ATC system offers several manual override features. The indicator light in both the AUTO HI or AUTO LO buttons will turn off when the system is being used in the manual mode. The fan speed, airflow distribution, and outside air/recirculated air can be manually adjusted.

The front blower fan control can be set to any fixed blower fan speed by pressing the rocker switch up or down. This allows the front occupants to control the volume of air circulated in the vehicle and cancel the auto mode. The fan will now operate at a fixed speed until additional speeds are selected or until either the AUTO HI or AUTO LO buttons are pressed. The system will continue to automatically adjust air temperature and airflow distribution.

When the outside air contains smoke, odors, high humidity, or if rapid cooling is desired, interior air can be recirculated by pressing the recirculation button. The recirculate symbol will illuminate in the display when this button is selected.

The outside temperature can be shown in the A/C-heater control display by pressing the OUTSIDE TEMP button. After pressing this button, the front seat passenger side temperature setting display will be replaced with the current outside temperature. Pressing the OUTSIDE TEMP button again or pressing the passenger side TEMP button will return the display to the passenger side temperature setting.

- The system automatically adjusts the temperature, mode and fan speed.
- When the heating- A/C system is off, the recirculation door is automatically closed to prevent outside air from entering the passenger compartment.
- Air conditioning is available in any mode by pressing the snowflake, A/C on/off, button.

To provide maximum comfort in the automatic mode during cold start-ups, the blower fan will remain off and DELAY will appear in the display until the engine warms up. The estimated the time remaining until the DELAY is complete will appear periodically in the display. However, the fan will engage immediately if the defrost mode is selected or by pushing the blower switch and manually adjusting the fan speed.

MANUAL TEMPERATURE CONTROL (MTC) - DUAL ZONE

- The two slide controls enable continuously variable proportioning of the conditioned air.
- The mode control knob enables continuously variable proportioning of air flow between modes and has detents adjacent to each icon.
- The blower control provides four separate speeds and an Off position.
- When the heater-A/C system is off, the HVAC computer closes the recirculation door to prevent outside air from entering the passenger compartment.
- Interior air may be recirculated to speed up heating or cooling in all modes except defrost and mix by pressing the Recirculate button on the A/C-heater control.
- To reduce humidity for rapid defogging, the A/C compressor runs automatically in modes from “mix” to full defrost when outside temperatures are above freezing.
- Air conditioning is available in any mode by pressing the snowflake, A/C on/off button.

DIAGNOSIS AND TESTING

A/C COOL DOWN TEST

The A/C-heater control module can perform an A/C cool down test, which is a test performed during the manufacturing process to confirm that the air conditioning system is performing satisfactorily. This test can also provide a quick confirmation of air conditioning system performance to the service technician. If the test is completed satisfactorily, no further service is required. If the test is failed, proceed to the A/C Performance Test to confirm the A/C system is operating properly, or use a DRBIII® scan tool to diagnose the A/C system control and distribution systems. Refer to the appropriate diagnostic information.

MANUAL TEMPERATURE CONTROL

The blower fan speed must be set to High and the evaporator temperature sensor must be greater than 13° C (55° F) or the test will fail immediately. The test is activated by depressing the A/C and PWR buttons simultaneously and holding them depressed for no less than five seconds. The A/C and PWR button LEDs will blink on and off until the test is complete. If the LEDs stop blinking before two minutes, then the cool down test has been completed successfully. If the two minutes expire without the expansion valve temperature reaching -6° C (20° F) less than the outside air temperature, then the cool down test has been failed and further A/C system diagnosis is required. If the test is failed, the LEDs will continue to blink until the vehicle has been driven for greater than 13 km (8 miles).

AUTOMATIC TEMPERATURE CONTROL

The ambient air temperature in the room where the vehicle will be tested must be a minimum of 21° C (70°F) for this test. The test is activated by depressing the A/C and PWR buttons simultaneously and holding them depressed for no less than four seconds. The snowflake icon and the DELAY text in the A/C-heater control display will blink on and off alternately until the test is complete. If the snowflake icon and the DELAY text stop blinking before two minutes, then the cool down test has been completed successfully. If the two minutes expire without the evaporator temperature reaching 11° C (20° F) less than the evaporator initial temperature, then the cool down test has been failed and further A/C system diagnosis is required. If the test is failed, the snowflake icon and the DELAY text will continue to blink across ignition cycles until the vehicle has been driven for greater than 12 km (8 miles).

A/C PERFORMANCE TEST

The A/C system is designed to provide the passenger compartment with low temperature and low humidity air. The A/C evaporator, located in the HVAC housing is cooled to temperatures near the freezing point. As warm damp air passes over the fins of the A/C evaporator, the air transfers its heat to the refrigerant in the evaporator coils and the moisture in the air condenses on the evaporator fins. During periods of high heat and humidity, an A/C system will be more effective in the Recirculation mode (max-A/C). With the system in the Recirculation mode, only air from the passenger compartment passes through the A/C evaporator. As the passenger compartment air dehumidifies, the A/C system performance levels rise.

Humidity has an important bearing on the temperature of the air delivered to the interior of the vehicle. It is important to understand the effect that humidity has on the performance of the A/C system. When humidity is high, the A/C evaporator has to perform a double duty. It must lower the air temperature, and it must lower the temperature of the moisture in the air that condenses on the evaporator fins. Condensing the moisture in the air transfers heat energy into the evaporator fins and coils. This reduces the amount of heat the A/C evaporator can absorb from the air. High humidity greatly reduces the ability of the A/C evaporator to lower the temperature of the air.

However, evaporator capacity used to reduce the amount of moisture in the air is not wasted. Wringing some of the moisture out of the air entering the vehicle adds to the comfort of the passengers. Although, an owner may expect too much from their A/C system on humid days. A performance test is the best way to determine whether the system is performing up to design standards. This test also provides valuable clues as to the possible cause of trouble with the A/C system. The ambient air temperature in the location where the vehicle will be tested must be a minimum of 21° C (70° F) for this test.

PERFORMANCE TEST PROCEDURE

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

HEATING & AIR CONDITIONING (Continued)

NOTE: When connecting the service equipment coupling to the line fitting, verify that the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection.

(1) Connect a tachometer to monitor the engine speed.

(2) Remove the caps from the refrigerant system service ports and attach a manifold gauge set to monitor the refrigerant system pressures.

(3) Set the A/C-heater control so that the compressor is engaged, the air within the vehicle is being recirculated, the output air is directed through the panel outlets, the temperature control is in the full cool position or the ATC temperature set points are set to LO, and the blower motor is operating at its highest speed.

(4) Start the engine and allow the engine to operate for about five minutes or until it reaches normal operating temperature. Then hold the engine speed at 1000 rpm with the compressor clutch engaged. If the compressor clutch does not engage, proceed with diagnosis of the compressor clutch coil (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C COMPRESSOR CLUTCH COIL - DIAGNOSIS AND TESTING).

(5) Close all the vehicle windows and doors.

(6) Insert a thermometer in the left center panel outlet and operate the engine for five minutes.

(7) With the compressor clutch engaged, record the left center panel air outlet discharge temperature, the discharge pressure (high side service port) and the suction pressure (low side service port). The compressor clutch may cycle, depending upon the ambient temperature and humidity. If the clutch cycles, use the readings obtained before the clutch disengaged.

(8) Compare the air temperature at the center panel air outlet and the A/C compressor discharge pressure (high side) to the A/C Performance Temperature and Pressure chart.

A/C PERFORMANCE TEMPERATURE AND PRESSURE

Ambient Temperature	21° C (70° F)	27° C (80° F)	32° C (90° F)	38° C (100° F)	43° C (110° F)
Left Center Panel Outlet Discharge Air Temperature	1 to 8° C (34 to 46° F)	3 to 9° C (37 to 49° F)	4 to 10°C (39 to 50° F)	6 to 11°C (43 to 52° F)	7 to 18° C (45 to 65° F)
Discharge Pressure (High Side Service Port)	1034 to 1724 kPa (150 to 250 psi)	1517 to 2275 kPa (220 to 330 psi)	1999 to 2620 kPa (290 to 380 psi)	2068 to 2965 kPa (300 to 430 psi)	2275 to 3421 kPa (330 to 450 psi)
Suction Pressure (Low Side Service Port)	103 to 207 kPa (15 to 30 psi)	117 to 221 kPa (17 to 32 psi)	138 to 241 kPa (20 to 35 psi)	172 to 269 kPa (25 to 39 psi)	207 to 345 kPa (30 to 50 psi)

(9) If the air outlet temperature fails to meet the specifications in the A/C Performance Temperature and Pressure chart, or if the A/C compressor discharge pressure is high, refer to the A/C Pressure Diagnosis chart.

A/C PRESSURE DIAGNOSIS

Condition	Possible Causes	Correction
Constant compressor engagement and warm air from passenger vents.	1. Low refrigerant system charge.	1. See Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
Equal pressures, but the compressor clutch does not engage.	1. No refrigerant in the refrigerant system.	1. See Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.

HEATING & AIR CONDITIONING (Continued)

Condition	Possible Causes	Correction
	2. Faulty fuse.	2. Check the fuses in the integrated power module (IPM). Repair the shorted circuit or component and replace the fuses, if required.
	3. Faulty A/C compressor clutch coil.	3. See A/C Compressor Clutch Coil in this group. Test the compressor clutch coil and replace, if required.
	4. Faulty A/C compressor clutch relay.	4. See A/C Compressor Clutch Relay in this group. Test the compressor clutch relay and relay circuits. Repair the circuits or replace the relay, if required.
	5. Improperly installed or faulty Evaporator Temperature Sensor.	5. See Evaporator Temperature Sensor in this group. Reinstall or replace the sensor as required.
	6. Faulty A/C pressure transducer.	6. See A/C pressure transducer in this group. Test the switch and replace, if required.
	7. Faulty Powertrain Control Module (PCM).	7. (Refer to Appropriate Diagnostic Information). Test the PCM and replace, if required.
Normal pressures, but A/C Performance Test air temperatures at center panel outlet are too high.	1. Excessive refrigerant oil in system.	1. See Refrigerant Oil Level in this group. Recover the refrigerant from the refrigerant system and inspect the refrigerant oil content. Restore the refrigerant oil to the proper level, if required.
	2. Blend-air door inoperative or sealing improperly.	2. See HVAC Housing in this group. Inspect the blend-air door for proper operation and sealing and correct, if required.
	3. Blend door actuator faulty or inoperative.	3. Perform blend door actuator diagnosis, replace if faulty.
The low side pressure is normal or slightly low, and the high side pressure is too low.	1. Low refrigerant system charge.	1. See Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
	2. Refrigerant flow through the receiver/drier is restricted.	2. See Receiver/Drier in this group. Replace the restricted receiver/drier, if required.
	3. Refrigerant flow through the evaporator coil is restricted.	3. See A/C Evaporator in this group. Replace the restricted evaporator coil, if required.
	4. Faulty compressor.	4. See A/C Compressor in this group. Replace the compressor, if required.
The low side pressure is normal or slightly high, and the high side pressure is too high.	1. Condenser air flow restricted.	1. Check the A/C condenser for damaged fins, foreign objects obstructing air flow through the condenser fins, and missing or improperly installed air seals. Refer to Cooling for more information on air seals. Clean, repair, or replace components as required.
	2. Inoperative cooling fan.	2. Refer to Cooling for more information. Test the cooling fan and replace, if required.

HEATING & AIR CONDITIONING (Continued)

Condition	Possible Causes	Correction
	3. Refrigerant system overcharged.	3. See Refrigerant System Charge in this group. Recover the refrigerant from the refrigerant system. Charge the refrigerant system to the proper level, if required.
	4. Air in the refrigerant system.	4. See Refrigerant System Leaks in this group. Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required.
	5. Engine overheating.	5. Refer to Cooling for more information. Test the cooling system and repair, if required.
The low side pressure is too high, and the high side pressure is too low.	1. Accessory drive belt slipping.	1. Refer to Cooling for more information. Inspect the accessory drive belt condition and tension. Tighten or replace the accessory drive belt, if required.
	2. Faulty expansion valve.	2. See A/C Expansion Valve in this group. Replace the expansion valve, if required.
	3. Faulty compressor.	3. See A/C Compressor in this group. Replace the compressor, if required.
The low side pressure is too low, and the high side pressure is too high.	1. Restricted refrigerant flow through the refrigerant lines.	1. See Liquid, Suction, and Discharge Line in this group. Inspect the refrigerant lines for kinks, tight bends or improper routing. Correct the routing or replace the refrigerant line, if required.
	2. Restricted refrigerant flow through the expansion valve.	2. See A/C Expansion Valve in this group. Replace the expansion valve, if required.
	3. Restricted refrigerant flow through the condenser.	3. See A/C Condenser in this group. Replace the restricted condenser, if required.

HEATER PERFORMANCE TEST

WARNING: Review safety precautions and warnings in this group before performing this procedure (Refer to 24 - HEATING & AIR CONDITIONING/ PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

Check the coolant level, drive belt tension, radiator air flow and fan operation. Start engine and allow to warm up to normal operating temperature.

WARNING: Do not remove radiator cap when engine is hot, personal injury can result.

If vehicle has been run recently, wait 15 minutes before removing the radiator cap. Place a rag over the cap and turn it to the first safety stop. Allow pressure to escape through the overflow tube. When the system pressure stabilizes, remove the cap completely.

MAXIMUM HEATER OUTPUT: TEST AND ACTION

Engine coolant is provided to the heater system by two heater hoses. With the engine idling at normal operating temperature, set the temperature control to maximum heat, the mode control to the floor position, and the blower in the highest speed position. Using a test thermometer, check the temperature of the air being discharged from the floor outlets. Compare the test thermometer reading to the Heater Temperature Reference chart.

HEATER TEMPERATURE REFERENCE

Ambient Temperature		Minimum Floor Outlet Temperature	
Celsius	Fahrenheit	Celsius	Fahrenheit
15.5°	60°	62.2°	144°
21.1°	70°	63.8°	147°
26.6°	80°	65.5°	150°
32.2°	90°	67.2°	153°

If the floor outlet air temperature is insufficient, check that the cooling system is operating to specifications (Refer to 7 - COOLING/ENGINE - DIAGNOSIS AND TESTING). Both heater hoses should be HOT to the touch (the coolant return hose should be slightly cooler than the supply hose). If the coolant return hose is much cooler than the supply hose, locate and repair the engine coolant flow obstruction in heater system.

OBSTRUCTED COOLANT FLOW Possible locations or causes of obstructed coolant flow are as follows:

- Pinched or kinked heater hoses.
- Improper heater hose routing.
- Plugged heater hoses or supply and return ports at the cooling system connections.
- Plugged heater core.

If proper coolant flow through the cooling system is verified, and heater outlet air temperature is insufficient, a mechanical problem may exist.

MECHANICAL PROBLEMS

Possible causes of insufficient heat due to mechanical problems are as follows:

- Faulty engine thermostat.
- Faulty blend door actuator.
- Obstructed fresh air intake.
- Obstructed heater system outlets.
- Faulty blend-air door.

TEMPERATURE CONTROL

If the heater outlet air temperature cannot be adjusted with the temperature control on the A/C-heater control panel, the following could require service:

- Faulty blend door actuator.
- Faulty A/C-heater control.
- Faulty related wiring harness or connectors.
- Faulty blend-air door.

SPECIFICATIONS

HEATING-A/C SYSTEM

A/C SYSTEM

Item	Description	Notes
A/C Compressor	Denso 10S17 (3.8L engine) Denso 10S20 (3.5L engine)	Uses ND-8 PAG Oil
Low PSI Control	A/C Pressure Transducer	Liquid line mounted - voltage input to powertrain control module (PCM) - PCM opens compressor clutch relay below 0.451 volts
High PSI Control	A/C Pressure Transducer	Liquid line mounted - input to PCM - PCM opens compressor clutch relay above 4.519 volts
	High Pressure Relief Valve	A/C Compressor mounted - opens at a discharge pressure over 3445 - 4135 kPa (500 - 600 psi)

HEATING & AIR CONDITIONING (Continued)

Item	Description	Notes
Refrigerant Charge Capacity	Refer to the A/C Underhood Specification Label located in the engine compartment	R-134a refrigerant
A/C Clutch Coil Draw	Denso 10S17 – 3.3 amps Denso 10S20 – 2.2 amps	@ 11.5 - 12V @ 21° C (70° F)
A/C Clutch Air Gap	0.35 - 0.60 mm (0.014 - 0.024 in.)	

FASTENER TORQUE

Description	N·m	Ft. Lbs.	In. Lbs.
All Screws NOT Listed Below	2	–	17
A/C Compressor Bolts	33	25	–
A/C Compressor Mounting Bracket Bolts	115	85	–
A/C Compressor Shaft Nut	17.5	13	155
Condenser Mounting Bracket Bolts	5	–	45
Discharge Line to Condenser Nut	23	17	–
Discharge Line to Compressor Nut	23	17	–
Expansion Valve Bolts	11	–	100
Receiver/Drier Mounting Bracket Nuts	10	–	89
Floor Console Base Nuts and Bolts	5	–	45
Front Fascia to Closure Panel Crossmember Bolts	6	–	53
HVAC Housing Bracket Bolt and Nut	3	–	26
HVAC Housing Stud Nuts	7	–	62
Heater Core Tube Sealing Plate Screws	3	–	27
Heater Inlet Tube Bolts	10	–	89
Hood Latch Bolts	14	10	123
Liquid Line to Condenser Nut	23	17	–
Liquid Lines to Receiver/Drier Bolts	11	–	100
Suction Line to Compressor Nut	23	17	–
Suction and Liquid Line to Expansion Valve Nut	23	17	–
Transmission Oil Cooler Bolts	5	–	45

SPECIAL TOOLS

HEATING-A/C SYSTEM

Snap Ring Pliers C-4574 (Fig. 5) are required to service the A/C clutch and field coil.

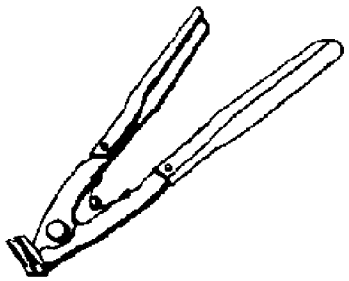


Fig. 5

CONTROLS - FRONT

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A/C COMPRESSOR CLUTCH/ COIL

DESCRIPTION

The A/C compressor clutch assembly consists of a stationary electromagnetic A/C clutch field coil with a zener diode, a pulley bearing and pulley assembly, and a clutch plate (Fig. 1). These components provide the means to engage and disengage the A/C compressor from the engine accessory drive belt.

The A/C clutch field coil and the pulley bearing and pulley assembly are both retained on the nose of the A/C compressor with snap rings. The clutch plate is splined to the compressor shaft and secured with a bolt.

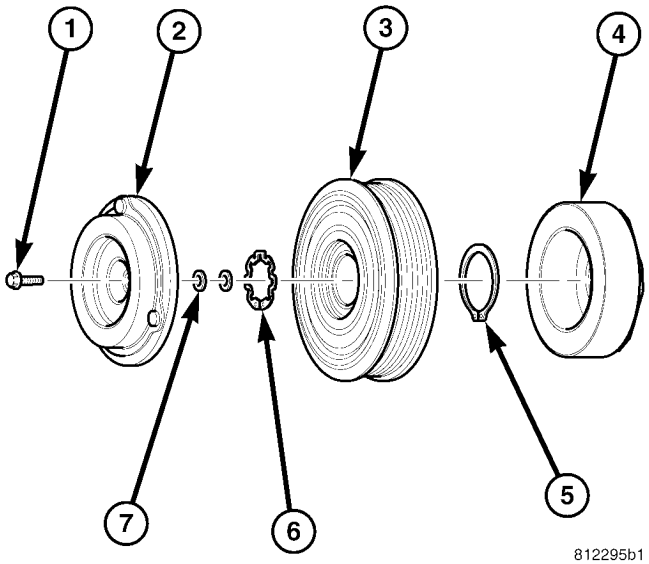


Fig. 1 A/C Compressor Clutch

1 - BOLT
2 - CLUTCH PLATE
3 - PULLEY AND BEARING
4 - FIELD COIL
5 - SNAP RING (2)
6 - SHIM

OPERATION

The A/C compressor clutch components provide the means to engage and disengage the compressor from the engine serpentine accessory drive belt. When the electromagnetic A/C clutch field coil is energized, it magnetically draws the clutch plate into contact with the clutch pulley and drives the compressor shaft. When the coil is not energized, the pulley freewheels on the clutch hub bearing, which is part of the pulley.

A zener diode is connected in parallel with the A/C clutch field coil. This diode controls the dissipation of voltage induced into the coil windings by the collapsing of the electromagnetic fields that occurs when the compressor clutch is disengaged. The zener diode dissipates this induced voltage by regulating a current path to ground. This arrangement serves to protect other circuits and components from potentially damaging voltage spikes in the vehicle electrical system that might occur if the voltage induced in the clutch coil windings could not be dissipated.

The A/C compressor clutch engagement is controlled by several components: the heater-A/C controls in the passenger compartment, the A/C pressure transducer on the liquid line, the evaporator temperature sensor on the A/C expansion valve, the powertrain control module (PCM) in the engine compartment, and the A/C compressor clutch relay in the integrated power module (IPM). The PCM may delay compressor clutch engagement for up to thirty seconds (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION - PCM OPERATION).

DIAGNOSIS AND TESTING

A/C COMPRESSOR CLUTCH COIL

The A/C compressor clutch coil electrical circuit is controlled by the powertrain control module (PCM) through the A/C clutch relay. The A/C clutch coil can be tested by either measuring cluch field coil resistance or by measuring current draw. Begin testing of a suspected compressor clutch coil problem by performing the preliminary checks.

PRELIMINARY CHECKS

(1) If the A/C compressor clutch will not engage, verify the refrigerant charge level (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - DIAGNOSIS AND TESTING - REFRIGERANT CHARGE LEVEL). If the refrigerant charge level is OK, go to Step 2. If the refrigerant charge level is not OK, adjust the refrigerant charge as required.

(2) If the A/C compressor clutch still will not engage, disconnect the headlamp and dash wire harness connector for the A/C pressure transducer and check for battery current at the connector with the engine running and the A/C-heater control set to the A/C mode. If OK, go to TESTS. If not OK, refer toBody Diagnostic Procedures to perform further diagnosis.

TESTS

(1) Verify the battery state of charge (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - DIAGNOSIS AND TESTING).

(2) Connect an ammeter (0 to 10 ampere scale selected) in series with the clutch coil feed terminal. Connect a voltmeter (0 to 20 volt scale selected) to measure voltage across the battery and the clutch coil.

(3) With the heater-A/C control in the A/C mode and the blower at low speed, start the engine and allow it to run at a normal idle speed.

(4) The compressor clutch should engage immediately, and the clutch coil voltage should be within two volts of the battery voltage. If the coil voltage is not within two volts of battery voltage, test the clutch coil feed circuit for excessive voltage drop. If the compressor clutch does not engage, refer to Body Diagnostic Procedures to perform further diagnosis.

(5) For the acceptable A/C clutch coil current draw specifications refer to 24 - HEATING & AIR CONDITIONING - SPECIFICATIONS. Specifications apply for a work area temperature of 21° C (70° F). If voltage is more than 12.5 volts, add electrical loads by turning on electrical accessories until voltage reads below 12.5 volts.

(a) If the compressor clutch coil current reading is zero, the coil is open and must be replaced.

(b) If the compressor clutch coil current reading is four amperes or more, the coil is shorted and must be replaced.

STANDARD PROCEDURE

A/C CLUTCH INSPECTION

NOTE: The A/C clutch can be serviced in the vehicle. The refrigerant system can remain fully-charged during compressor clutch, pulley and bearing assembly, or coil replacement.

Examine the friction surfaces of the clutch pulley and the clutch plate for wear (Fig. 2). The pulley and plate should be replaced if there is excessive wear or scoring.

If the friction surfaces are oily, inspect the shaft and nose area of the A/C compressor for refrigerant oil. If refrigerant oil is found, the compressor shaft seal is leaking and the A/C compressor must be replaced.

Check the clutch pulley bearing for roughness or excessive leakage of grease. Replace the pulley and bearing assembly, if required.

A/C CLUTCH BREAK-IN

After a new A/C compressor clutch has been installed, cycle the compressor clutch approximately twenty times (five seconds on, then five seconds off). During this procedure, set the A/C-heater controls to the A/C Recirculation Mode, the blower motor in the highest speed position, and the engine speed at 1500 to 2000 rpm. This procedure (burnishing) will seat the opposing friction surfaces and provide a higher compressor clutch torque capability.

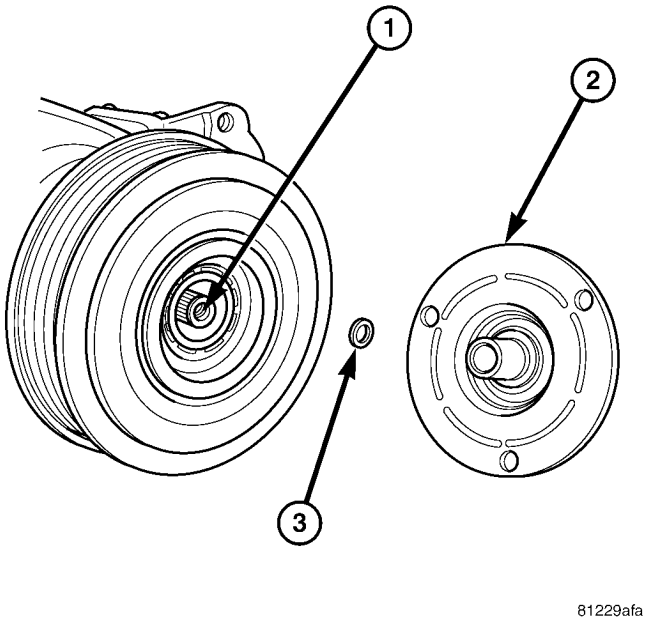


Fig. 2 Clutch Plate and Shim(s)

1 - A/C COMPRESSOR SHAFT
2 - CLUTCH PLATE
3 - SHIM

REMOVAL

NOTE: The compressor clutch can be serviced in the vehicle. The refrigerant system can remain fully-charged during compressor clutch, pulley, or coil replacement.

(1) Disconnect and isolate the negative battery cable.

(2) Remove the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(3) Raise and support the vehicle.

(4) Disconnect the engine wire harness connector from the clutch coil connector located on the top of the A/C compressor.

(5) On models with the 3.3L and 3.8L engines, disengage the engine wire harness connector retainer from the bracket located on the top of the A/C compressor.

(6) On models with the 2.4L, 2.5L and 2.8L engines, remove all of the compressor mounting bolts except the upper left (rear of the A/C compressor), which should only be loosened. Allow the front (pulley end) of the A/C compressor to tilt downward far enough to access the clutch for removal, then tighten the loosened upper left compressor mounting bolt.

(7) On models with the 3.3L and 3.8L engines, remove the two bolts and two nuts that secure the A/C compressor to the engine. Disengage the mount-

A/C COMPRESSOR CLUTCH/COIL (Continued)

ing ear at the front of the A/C compressor from the stud on the engine, allow the front (pulley end) of the A/C compressor to tilt downward far enough to access the clutch for removal, then reinstall and tighten the upper left compressor mounting bolt.

(8) Remove the compressor shaft bolt (Fig. 3). A band-type oil filter wrench or a strap wrench may be used to secure the clutch during bolt removal.

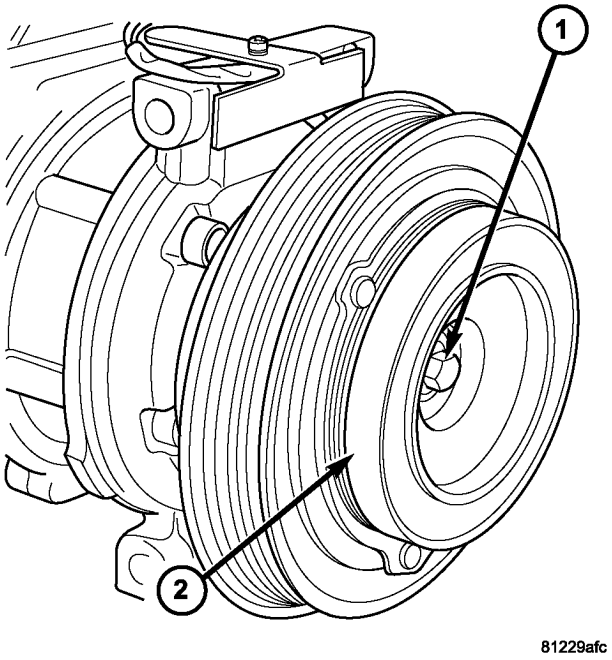


Fig. 3 A/C Compressor Shaft Bolt

1 - BOLT
2 - COMPRESSOR CLUTCH PLATE

(9) Tap the clutch plate lightly with a plastic mallet to release it from the splines on the compressor shaft. Remove the clutch plate and shim(s) from the compressor shaft (Fig. 4).

NOTE: Use care not to lose any of the shim(s).

CAUTION: Do not pry between the clutch plate unit and the pulley to remove the clutch plate from the compressor shaft as this may damage the clutch plate.

(10) Using snap ring pliers (Special Tool C-4574 or equivalent), remove the external snap ring that secures the pulley to the front cover of the A/C compressor, then slide the pulley off of the compressor (Fig. 5).

(11) Remove the screw that secures the clutch coil wire lead connector bracket and ground clip to the top of the compressor housing.

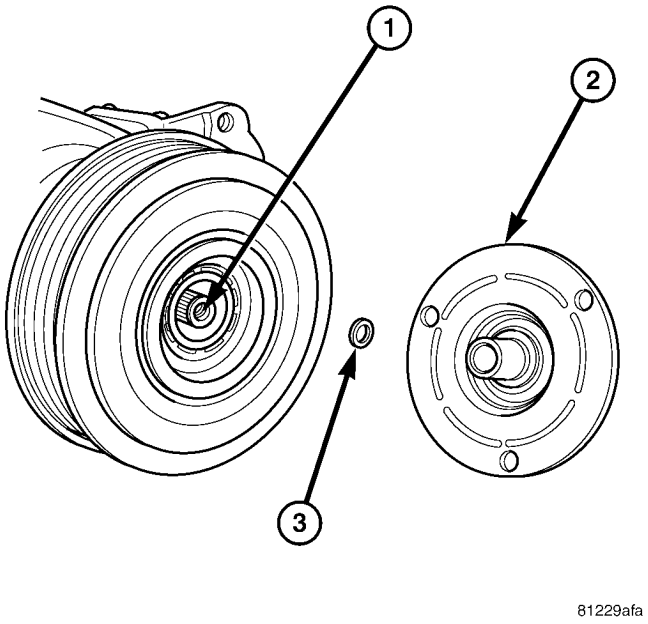


Fig. 4 Clutch Plate and Shim(s)

1 - A/C COMPRESSOR SHAFT
2 - CLUTCH PLATE
3 - SHIM

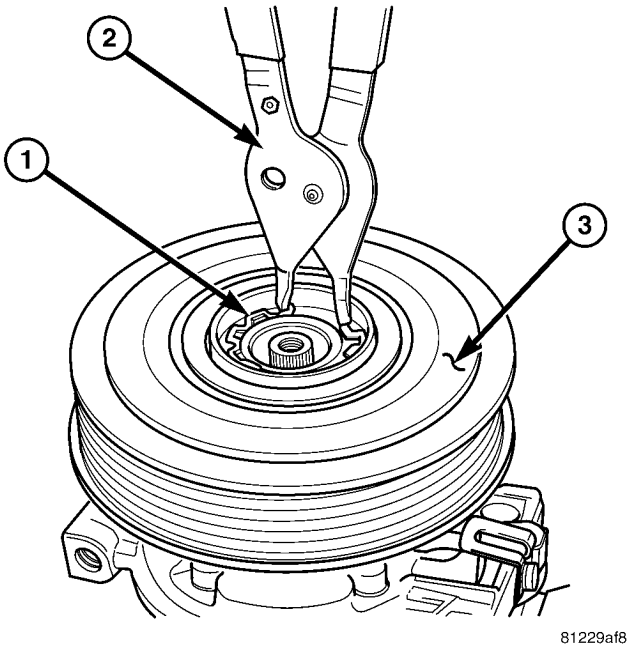


Fig. 5 Clutch Pulley Snap Ring

1 - SNAP RING
2 - SNAP RING PLIERS
3 - CLUTCH PULLEY AND BEARING

A/C COMPRESSOR CLUTCH/COIL (Continued)

(12) Using snap ring pliers (Special Tool C-4574 or equivalent), remove the external snap ring that secures the clutch coil to the front cover of the compressor housing, then slide the clutch coil off of the A/C compressor (Fig. 6).

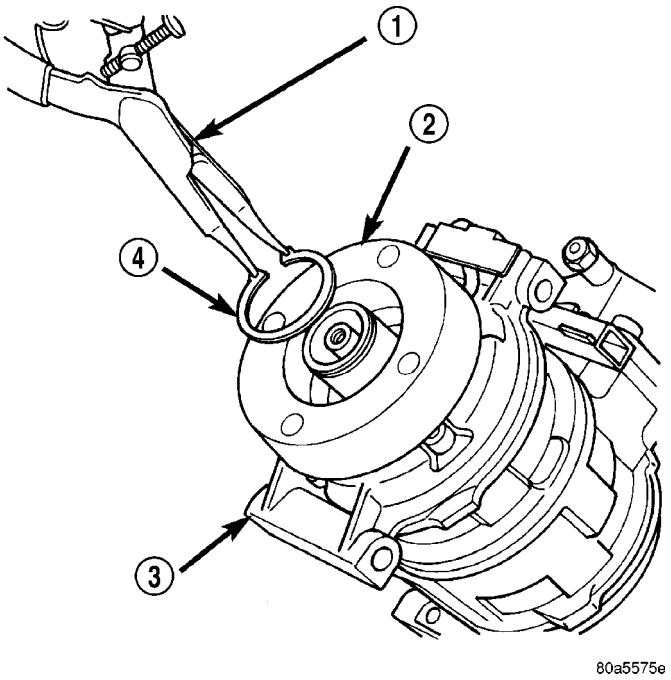


Fig. 6 Remove Clutch Coil Snap Ring

1 - SNAP RING PLIERS
2 - CLUTCH COIL
3 - COMPRESSOR
4 - SNAP RING

INSTALLATION

(1) Align the dowel pin on the back of the clutch coil with the hole in the compressor front cover and position the clutch coil onto the A/C compressor. Be certain that the clutch coil pigtail wires are properly oriented and routed so that they are not pinched between the compressor front cover and the clutch coil.

NOTE: A new snap ring must be used to secure the clutch coil to the A/C compressor. The bevel side of the snap ring must face outward.

(2) Using snap ring pliers (Special Tool C-4574 or equivalent), install the external snap ring that secures the clutch coil to the front cover of the A/C compressor. The bevel side of the snap ring must face outward and both snap ring eyelets must be oriented to the right or the left of the clutch coil dowel pin location on the A/C compressor. Be certain that the snap ring is fully and properly seated in the groove.

CAUTION: If the snap ring is not fully seated in the groove it will vibrate out, resulting in a clutch failure and severe damage to the compressor front cover.

(3) Install and securely tighten the screw that secures the clutch coil pigtail wire connector bracket and ground clip to the top of the compressor housing.

(4) Install the pulley onto the front cover of the A/C compressor. If necessary, tap the pulley gently with a block of wood placed on the pulley friction surface (Fig. 7).

CAUTION: Do not mar the friction surfaces of the pulley.

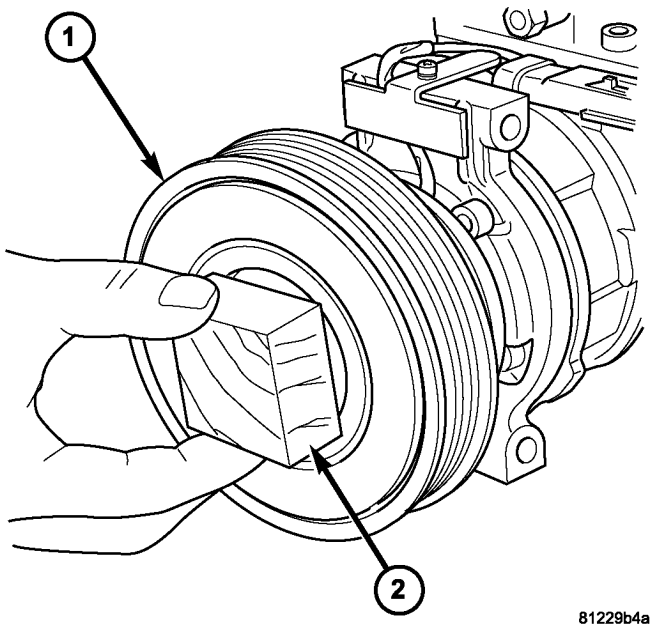


Fig. 7 Clutch Pulley - Installation

1 - PULLEY AND BEARING
2 - WOOD BLOCK

NOTE: A new snap ring must be used to secure the clutch pulley to the A/C compressor. The bevel side of the snap ring must face outward.

(5) Using snap ring pliers (Special Tool C-4574 or equivalent), install the external snap ring (bevel side facing outward) that secures the clutch pulley to the front cover of the A/C compressor. Be certain that the snap ring is fully and properly seated in the groove.

(6) If the original clutch plate and clutch pulley are to be reused, reinstall the original shim(s) on the compressor shaft against the shoulder. If a new clutch plate and/or clutch pulley are being used, install a trial stack of shims 2.54 mm (0.010 in.) thick on the compressor shaft against the shoulder.

(7) Install the clutch plate onto the compressor shaft.

A/C COMPRESSOR CLUTCH/COIL (Continued)

NOTE: The shims may compress after tightening the shaft bolt. Check the air gap in four or more places to verify the air gap is still correct. Spin the pulley before performing a final check of the air gap.

(8) With the clutch plate assembly tight against the shim(s), measure the air gap between the clutch plate and the pulley face with feeler gauges. The air gap should be between 0.35 - 0.60 mm (0.014 - 0.024 in.). If the proper air gap is not obtained, add or subtract shims as needed until the desired air gap is obtained.

(9) Install the compressor shaft bolt. Tighten the bolt to 17.5 N·m (155 in. lbs.).

(10) On models with the 2.4L, 2.5L and 2.8L engines, loosely install the four bolts that secure the A/C compressor to the mounting bracket on the engine (2.4L), or the cylinder block (2.5L/2.8L). Tighten the bolts to 28 N·m (21 ft. lbs.).

(11) On models with the 3.3L and 3.8L engines, loosely install the two bolts and two nuts that secure the A/C compressor to the engine. Tighten each of the fasteners to 54 N·m (40 ft. lbs.) using the following sequence:

- The upper nut at the front of the compressor.
- The lower nut at the front of the compressor.
- The upper bolt at the rear of the compressor.
- The lower bolt at the rear of the compressor.

(12) On models with the 3.3L and 3.8L engines, engage the retainer on the engine wire harness compressor clutch coil take out with the bracket on the top of the A/C compressor.

(13) Connect the engine wire harness connector to the A/C compressor clutch coil.

(14) Install the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(15) Lower the vehicle.

(16) Reconnect the negative battery cable.

A/C COMPRESSOR CLUTCH RELAY

DESCRIPTION

The A/C clutch relay (Fig. 8) is a International Standards Organization (ISO) micro-relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal functions and patterns. The ISO micro-relay terminal functions are the same as a conventional ISO relay. However, the ISO micro-relay terminal pattern (or footprint) is different, the current capacity is lower, and the physical dimensions are smaller than those of the conventional ISO relay.

The A/C clutch relay is located in the integrated power module (IPM) in the engine compartment.

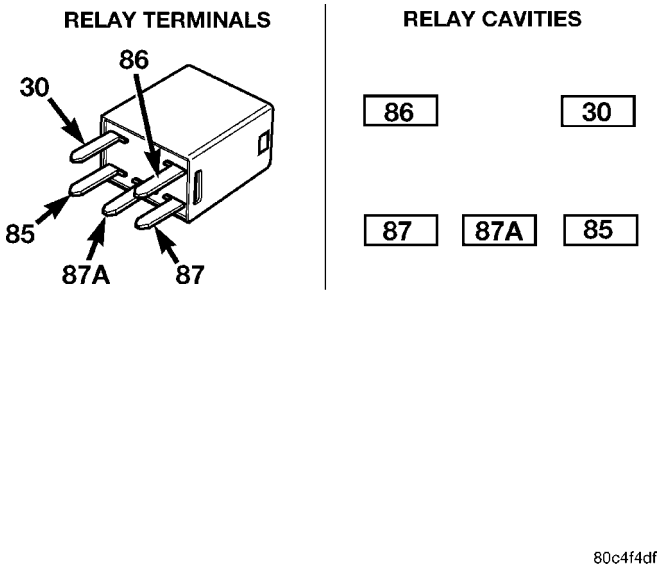


Fig. 8 A/C Compressor Clutch Relay

OPERATION

The ISO-standard A/C clutch micro-relay is an electromechanical switch that uses a low current input controlled by the powertrain control module (PCM) to control the high current output to the A/C clutch field coil. The movable, common feed relay contact is held against the fixed, normally closed relay contact by spring pressure. When the electromagnetic relay coil is energized, it draws the movable common feed relay contact away from the fixed, normally closed relay contact and, holds it against the fixed, normally open relay contact. This action allows high current to flow to the A/C clutch field coil.

When the relay coil is de-energized, spring pressure returns the movable relay contact back against the fixed, normally closed contact point. The resistor or diode is connected in parallel with the relay coil, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The A/C clutch relay terminals are connected to the vehicle electrical system through a receptacle in the integrated power module (IPM). The inputs and outputs of the A/C compressor clutch relay include:

- The common feed terminal (30) receives a battery current input from a fuse in the IPM through a fused B(+) circuit at all times.
- The coil ground terminal (85) receives a ground input from the PCM through the compressor clutch relay control circuit only when the PCM electronically pulls the control circuit to ground.
- The coil battery terminal (86) receives a battery current input from the PCM through a fused ignition

A/C COMPRESSOR CLUTCH RELAY (Continued)

switch output (run-start) circuit only when the ignition switch is in the On or Start positions.

- The normally open terminal (87) provides a battery current output to the compressor clutch coil through the compressor clutch relay output circuit only when the compressor clutch relay coil is energized.
- The normally closed terminal (87A) is not connected to any circuit in this application, but provides a battery current output only when the compressor clutch relay coil is de-energized.

The A/C clutch relay cannot be repaired and, if faulty or damaged, it must be replaced. Refer to the appropriate wiring information for diagnosis and testing of the ISO-standard micro-relay and for complete HVAC wiring diagrams.

REMOVAL

(1) Disconnect and isolate the negative battery cable.

(2) Remove the cover from the integrated power module (IPM) located in the engine compartment (Fig. 9).

NOTE: Refer to the fuse and relay map on the inside of the IPM cover for A/C compressor clutch relay location.

(3) Remove the A/C compressor clutch relay from the IPM.

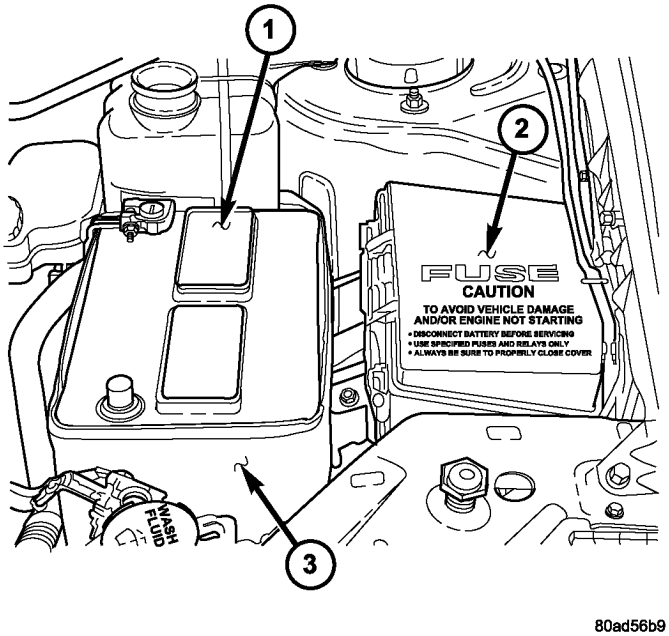


Fig. 9 Integrated Power Module (IPM)

1 - BATTERY
2 - INTEGRATED POWER MODULE (IPM)
3 - BATTERY THERMAL GUARD

INSTALLATION

NOTE: Refer to the fuse and relay map on the inside of the integrated power module (IPM) cover for A/C compressor clutch relay location.

(1) Position the A/C compressor clutch relay into the receptacle in the IPM.

(2) Align the A/C compressor clutch relay terminals with the terminal cavities in the IPM receptacle and push down firmly on the relay until the terminals are fully seated.

(3) Install the cover onto the IPM.

(4) Reconnect the negative battery cable.

A/C HEATER CONTROL

DESCRIPTION

The front A/C-heater control is located at the center of the instrument panel and uses electrical controls. These controls provide the vehicle operator with a number of setting options to help control the climate and comfort within the vehicle.

The front A/C-heater control allows both the driver and the front seat passenger the ability to individually regulate air temperature for their side of the vehicle. All controls are identified by ISO graphic symbols.

The front A/C-heater control module must be recalibrated each time an actuator motor or the A/C-heater control is replaced (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

The A/C-heater control cannot be repaired. If faulty or damaged, the entire unit must be replaced. The control knobs are available for service replacement.

STANDARD PROCEDURE

A/C-HEATER CONTROL CALIBRATION

The A/C-heater control module must be recalibrated each time an actuator motor or the A/C-heater control is replaced. If the vehicle is so equipped, the calibration procedure also includes rear HVAC positions for each actuator motor.

(1) Turn the ignition switch to the On position.

(2) If equipped with the manual temperature control (MTC) system, press and hold the Power and Recirculation buttons for at least five seconds. If equipped with the automatic temperature control (ATC) systen, simultaneously press and hold the Power and Recirculation buttons on the A/C-heater control for at least five seconds. The MTC A/C-heater control Power button light emitting diode (LED) and

A/C HEATER CONTROL (Continued)

Recirculation button LED, or the ATC A/C-heater control Delay and Recirculation graphics will begin to flash when the calibration procedure has begun.

(3) The calibration procedure should take less than two minutes to complete for the manual A/C-heater control, and less than twenty seconds for the ATC A/C-heater control. When the LEDs or graphics stop flashing, the calibration procedure is complete.

(4) If the LEDs or graphics continue to flash beyond the two minute (manual) or twenty second (ATC) calibration time, it indicates that the A/C-heater control has detected a failure and a Diagnostic Trouble Code (DTC) has been set. Refer to Body Diagnostic Procedures to perform further diagnosis. The LEDs or graphics will continue to flash even after the ignition switch is cycled Off and On, until a successful calibration is completed or until the vehicle has been driven about 13 kilometers (8 miles).

REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

(1) Disconnect and isolate the negative battery cable.

(2) Remove the center bezel from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/ INSTRUMENT PANEL CENTER BEZEL - REMOVAL).

(3) Remove the three screws that secure the A/C-heater control to the instrument panel (Fig. 10).

(4) Remove the A/C-heater control from the instrument panel and disconnect the two wire harness connectors from the control.

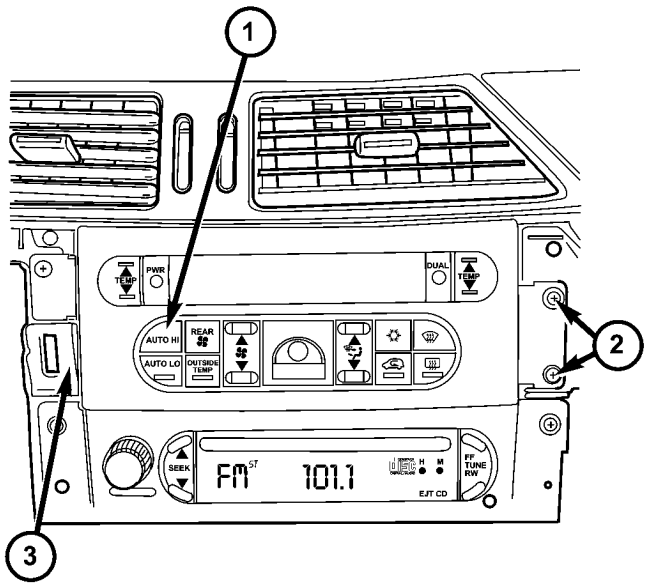


Fig. 10 A/C-Heater Control

1 - A/C-HEATER CONTROL
2 - SCREW (3)
3- INSTRUMENT PANEL

INSTALLATION

(1) Position the A/C-heater control to the instrument panel.

(2) Connect the two wire harness connectors to the back of the A/C-heater control.

(3) Install the A/C-heater control into the instrument panel.

(4) Install the three screws that secure the A/C-heater control to the instrument panel. Tighten the screws to 2 N·m (17 in. lbs.).

(5) Reconnect the negative battery cable and calibrate the A/C-heater control (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

A/C PRESSURE TRANSDUCER

DESCRIPTION

The A/C pressure transducer (Fig. 11) is a switch that is installed on a fitting located on the liquid line. An internally threaded hex fitting on the A/C pressure transducer connect it to the externally threaded Schrader-type fitting on the liquid line. A rubber O-ring seals the connection between the A/C pressure transducer and the liquid line fitting.The A/C pressure transducer is connected to the vehicle electrical system by a molded plastic connector with three terminals.

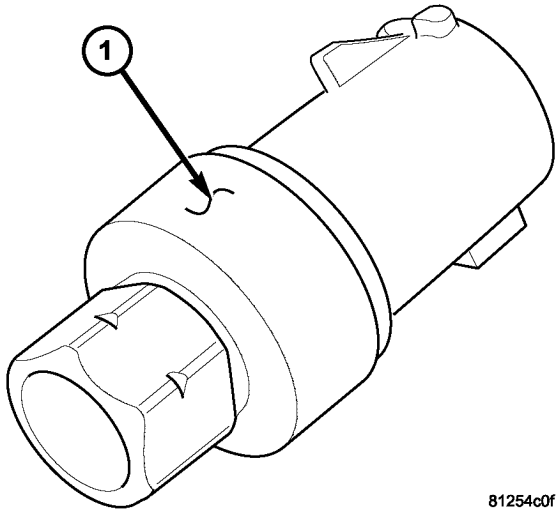


Fig. 11 A/C Pressure Transducer

1 - A/C PRESSURE TRANSDUCER

OPERATION

The A/C pressure transducer monitors the pressures in the high side of the refrigerant system through its connection to a fitting on the liquid line. The A/C pressure transducer will change its internal resistance in response to the pressures it monitors. The Schrader-type valve in the liquid line fitting permits the A/C pressure transducer to be removed or installed without disturbing the refrigerant in the system.

The powertrain control module (PCM) provides a five volt reference signal and a sensor ground to the A/C pressure transducer, then monitors the output voltage of the A/C pressure transducer on a sensor return circuit to determine refrigerant pressure. The PCM is programmed to respond to the A/C pressure transducer and other sensor inputs by controlling the operation of the A/C compressor clutch and the radiator cooling fan to help optimize A/C system performance and to protect the system components from damage. The PCM will disengage the A/C compressor clutch when high side pressure rises above 3082 kPa (447 psi) and re-engage the clutch when high side pressure drops below 2937 kPa (426 psi). The A/C pressure transducer will also disengage the A/C compressor clutch if the high side pressure drops below 110 kPa (16 psi) and will re-engage the clutch when the high side pressure rises above 221 kPa (32 psi). If the refrigerant pressure rises above 1655 kPa (240 psi), the PCM will actuate the cooling fan. The A/C pressure transducer input to the PCM will also prevent the A/C compressor clutch from engaging when ambient temperatures are below about 4.5° C (40° F) due to the pressure/temperature relationship of the refrigerant.

The A/C pressure transducer is diagnosed using a DRBIII® scan tool. Refer to 9 - Engine Electrical Diagnostics for more information.

The A/C pressure transducer cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

A/C PRESSURE TRANSDUCER (Continued)

DIAGNOSIS AND TESTING

A/C PRESSURE TRANSDUCER

The A/C pressure transducer is tested using a DRBIII® scan tool. Refer to the appropriate diagnostic information. Before testing the A/C pressure transducer, be certain that the transducer wire harness connection is clean of corrosion and properly connected. For the A/C to operate, an A/C pressure transducer voltage reading between 0.451 and 4.519 volts is required. Voltages outside this range indicate a low or high refrigerant system pressure condition to the powertrain control module (PCM). The PCM is programmed to respond to a low or high refrigerant system pressure by suppressing operation of the A/C compressor. Refer to the A/C Pressure Transducer Voltage chart for the possible conditions indicated by the transducer voltage reading.

A/C PRESSURE TRANSDUCER VOLTAGE

Voltage	Possible Indication
0.0	1. No sensor supply voltage from PCM. 2. Shorted sensor circuit. 3. Faulty transducer.
0.150 TO 0.450	1. Ambient temperature below 10° C (50° F). 2. Low refrigerant system pressure.
0.451 TO 4.519	1. Normal refrigerant system pressure.
4.520 TO 4.850	1. High refrigerant system pressure.
5.0	1. Open sensor circuit. 2. Faulty transducer.

REMOVAL

NOTE: It is not necessary to discharge the refrigerant system to replace the A/C pressure transducer.

(1) Disconnect and isolate the negative battery cable.

(2) Disconnect the wire harness connector from the A/C pressure transducer located on the liquid line (Fig. 12).

(3) Remove the A/C pressure transducer from the fitting on the liquid line and remove and discard the O-ring seal.

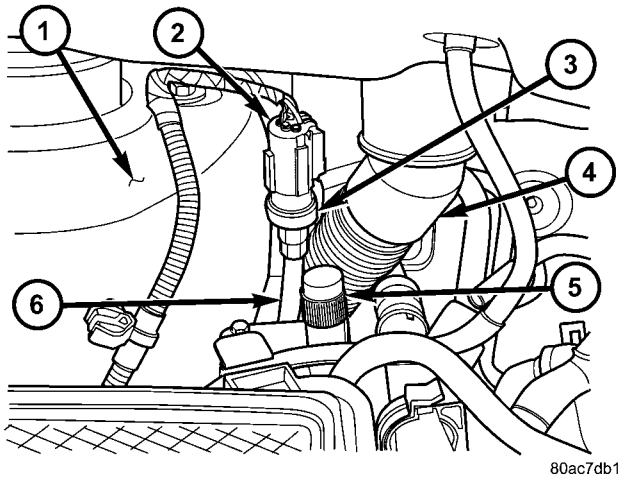


Fig. 12 A/C Pressure Transducer - Typical

1 - RIGHT FRONT STRUT TOWER
2 - WIRE HARNESS CONNECTOR
3 - A/C PRESSURE TRANSDUCER
4 - WIPER MODULE DRAIN TUBE
5 - HIGH SIDE SERVICE PORT
6 - LIQUID LINE

INSTALLATION

NOTE: Use only the specified O-ring as it is made of special material for R-134a. Use only refrigerant oil of the type required for the A/C compressor.

(1) Lubricate a new rubber O-ring seal with clean refrigerant oil and install it on the liquid line fitting.

(2) Install the A/C pressure transducer onto the liquid line. Tighten the A/C pressure transducer securely.

(3) Connect the wire harness connector to the A/C pressure transducer.

(4) Reconnect the negative battery cable.

BLEND DOOR ACTUATOR

DESCRIPTION

The two blend door actuators for the dual zone heating-A/C system are reversible, 12-volt Direct Current (DC), servo motors (Fig. 13).

For this dual zone heating-A/C system, one blend door actuator is mechanically connected to only the driver side blend-air door, while a second separate blend door actuator is mechanically connected to only the passenger side blend-air door.

The blend door actuators are interchangeable with each other, as well as with the actuator for the mode-air doors and the recirculation-air door. Each actuator is contained within an identical black molded plastic housing with an integral wire connector receptacle. Each actuator also has an identical output shaft with splines that connects it to its respective door linkage and two integral mounting tabs that allow the actuator to be

BLEND DOOR ACTUATOR (Continued)

secured to the HVAC housing. The blend door actuators do not require mechanical indexing to the blend-air doors, as they are electronically calibrated by the A/C-heater control.

The A/C-heater control must be recalibrated each time an actuator motor is replaced (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

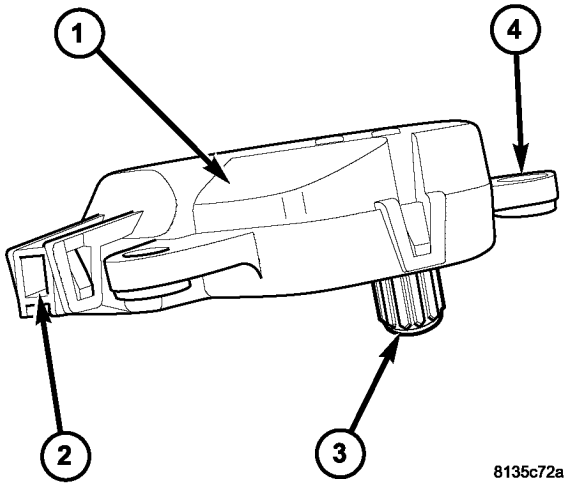


Fig. 13 Blend Door Actuator

1 - ACTUATOR MOTOR
2 - WIRE CONNECTOR RECEPTACLE
3 - OUTPUT SHAFT
4 - MOUNTING TAB (2)

OPERATION

Each blend door actuator is connected to the A/C-heater control through the vehicle electrical system by a dedicated two-wire lead and connector from the HVAC wire harness. The blend door actuator can move the blend-air door in two directions. When the A/C-heater control pulls the voltage on one side of the motor connection high and the other connection low, the blend-air door will move in one direction. When the A/C-heater control reverses the polarity of the voltage to the motor, the blend-air door moves in the opposite direction. When the A/C-heater control makes the voltage to both connections high or both connections low, the blend-air door stops and will not move. The motor connections also provide a feedback signal to the A/C-heater control. This feedback signal allows the A/C-heater control to monitor the operation and relative positions of the blend door actuator and the blend-air door. The A/C-heater control learns the blend door stop positions during the calibration procedure and will store a diagnostic trouble code (DTC) for any problems it detects in the blend door actuator circuits.

The blend door actuator(s) can be diagnosed using a DRBIII® scan tool. Refer to Body Diagnostic Procedures for more information.

The blend door actuator(s) cannot be adjusted or repaired and, if damaged or faulty, they must be replaced.

REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: The dual zone system has two blend door actuators, one for the driver side blend-air door and one for the passenger side blend-air door.

(1) Disconnect and isolate the negative battery cable.

(2) Remove the silencer from beneath the driver side end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - REMOVAL).

(3) Disconnect the wire harness connector from the blend door actuator being serviced (Fig. 14).

(4) Remove the two screws that secure the blend door actuator being serviced to the HVAC air distribution housing and remove the actuator.

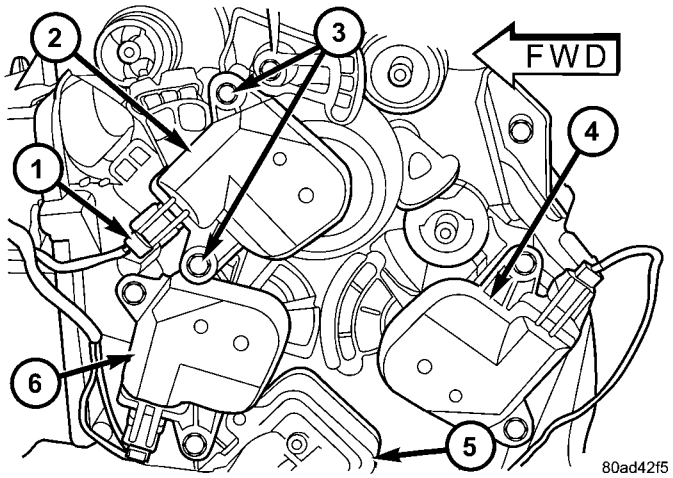


Fig. 14 Blend Door Actuator

1 - WIRE HARNESS CONNECTOR
2 - MODE DOOR ACTUATOR
3 - SCREW (2)
4 - DRIVER BLEND DOOR ACTUATOR (DUAL-ZONE)
5 - HEATER CORE
6 - BLEND DOOR ACTUATOR

BLEND DOOR ACTUATOR (Continued)

INSTALLATION

(1) Position the blend door actuator being serviced onto the air distribution housing. If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those in the blend air door linkage.

(2) Install the two screws that secure the blend door actuator to the air distribution housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Connect the HVAC wire harness connector to the blend door actuator being serviced.

(4) Install the silencer under the driver side end of the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - INSTALLATION).

(5) Reconnect the negative battery cable and calibrate the A/C-heater control (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

BLOWER MOTOR POWER MODULE

DESCRIPTION

A front blower motor power module is used on this model when it is equipped with the automatic temperature control (ATC) heating-A/C system (Fig. 15). Models equipped with the manual temperature control (MTC) heating-A/C system use a blower motor resistor, instead of the blower motor power module (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS-FRONT/RESISTOR-BLOWER MOTOR - DESCRIPTION).

The front blower motor power module is mounted to the rear of the front HVAC housing, directly behind the glove box. The blower motor power module consists of a molded plastic mounting plate with two integral connector receptacles (1). Concealed behind the mounting plate is the power module electronic circuitry and a large finned heat sink (2). The front blower motor power module is accessed for service by removing the glove box.

OPERATION

The front blower motor power module is connected to the vehicle electrical system through a dedicated lead and connector of the front HVAC wire harness. A second connector receptacle receives the wire harness connector from the front blower motor. The front blower motor power module allows the microprocessor-based automatic temperature control (ATC) A/C-heater control to calculate and provide infinitely variable blower motor speeds based upon either manual blower switch input or the ATC programming using a pulse width modulated (PWM) circuit strategy.

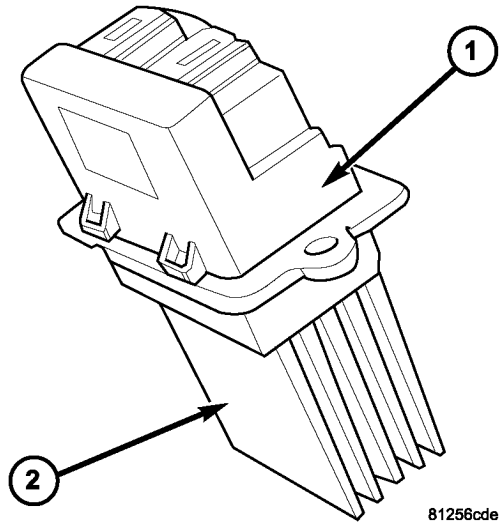


Fig. 15 Front Blower Motor Power Module

1 - BLOWER MOTOR POWER MODULE
2 - HEAT SINK

The PWM voltage is applied to a comparator circuit which compares the PWM signal voltage to the front blower motor feedback voltage. The resulting output drives the power module circuitry, which provides a linear output voltage to change or maintain the desired blower speed.

The front blower motor power module is diagnosed using a DRBIII® scan tool. Refer to Body Diagnostic Procedures.

The front blower motor power module cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

WARNING: The heat sink for the blower motor power module may get very hot during normal operation. If the blower motor was turned on prior to servicing the blower motor power module, wait five minutes to allow the heat sink to cool before performing diagnosis or service. Failure to take this precaution can result in possible personal injury.

(1) Disconnect and isolate the negative battery cable.

(2) Remove the glove box from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/ GLOVE BOX - REMOVAL).

(3) Disconnect the two wire harness connectors from the front blower motor power module (Fig. 16).

(4) Remove the two screws that secure the front blower motor power module to the front HVAC housing and remove the power module.

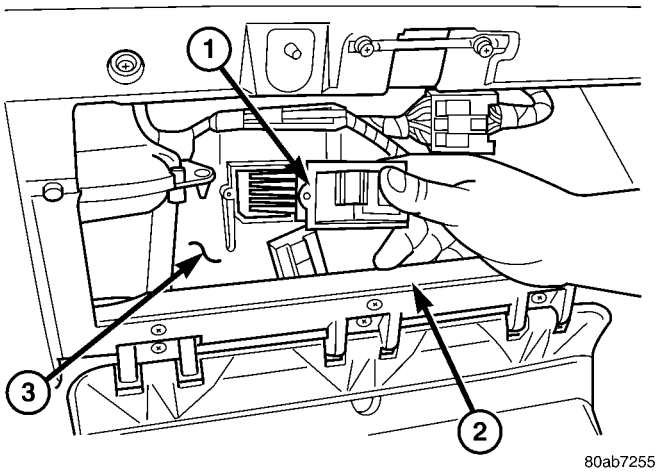


Fig. 16 Front Blower Motor Power Module

1 - FRONT BLOWER MOTOR POWER MODULE
2 - LOWER GLOVE BOX OPENING REINFORCEMENT
3 - FRONT HVAC HOUSING

INSTALLATION

(1) Position the front blower motor power module into the front HVAC housing.

(2) Install the two screws that secure the front blower motor power module to the front HVAC housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Connect the two wire connectors to the front blower motor power module.

(4) Install the glove box (Refer to 23 - BODY/INSTRUMENT PANEL/GLOVE BOX - INSTALLATION).

(5) Reconnect the negative battery cable.

BLOWER MOTOR RELAY

DESCRIPTION

The blower motor relay for the front heating-A/C system is an International Standards Organization (ISO)-type relay (Fig. 17). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal functions and patterns.

The front blower motor relay is located in the integrated power module (IPM) in the engine compartment.

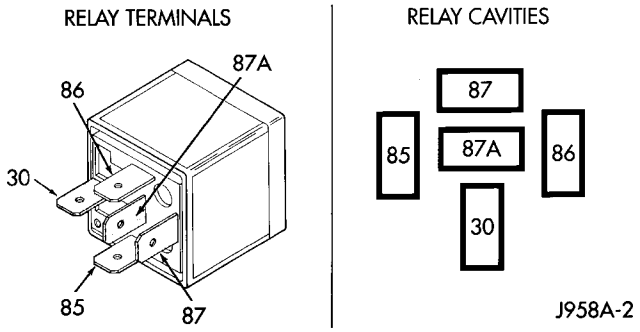


Fig. 17 Front Blower Motor Relay

30	COMMON FEED
85	COIL BATTERY
86	COIL GROUND
87	NORMALLY OPEN
87A	NORMALLY CLOSED

OPERATION

The front blower motor relay is an electromechanical switch that uses a low current input from the integrated power module (IPM) to control the high current output to the blower motor resistor (manual temperature control) or the blower motor power module (automatic temperature control). The movable, common feed relay contact is held against the fixed, normally closed relay contact by spring pressure. When the electromagnetic relay coil is energized, it draws the movable common feed relay contact away from the fixed, normally closed relay contact and, holds it against the fixed, normally open relay contact. This action allows high current to flow to the blower motor.

When the relay coil is de-energized, spring pressure returns the movable relay contact back against the fixed, normally closed contact point. The resistor or diode is connected in parallel with the relay coil, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The blower motor relay terminals are connected to the vehicle electrical system through a receptacle in the IPM. The inputs and outputs of the blower motor relay include:

BLOWER MOTOR RELAY (Continued)

- The common feed terminal (30) receives a battery current input from the battery through a B(+) circuit at all times.
- The coil ground terminal (85) receives a ground input through the front/rear blower motor relay control circuit only when the IPM electronically pulls the control circuit to ground.
- The coil battery terminal (86) receives a battery current input from the battery through a B(+) circuit at all times.
- The normally open terminal (87) provides a battery current output to the blower motor resistor (manual temperature control) or blower motor power module (automatic temperature control) through a fuse in the IPM on the fused front blower motor relay output circuit only when the blower motor relay coil is energized.
- The normally closed terminal (87A) is not connected to any circuit in this application, but provides a battery current output only when the blower motor relay coil is de-energized.

The blower motor relay cannot be repaired and, if faulty or damaged, it must be replaced. Refer to the appropriate wiring information for diagnosis and testing of the ISO-standard relay and for complete HVAC wiring diagrams.

REMOVAL

(1) Disconnect and isolate the negative battery cable.

(2) Remove the cover from the integrated power module (IPM) located in the engine compartment (Fig. 18).

NOTE: Refer to the fuse and relay map on the IPM cover for front blower motor relay location.

(3) Remove the front blower motor relay from the IPM.

INSTALLATION

NOTE: Refer to the fuse and relay map on the cover of the integrated power module (IPM) for front blower motor relay location.

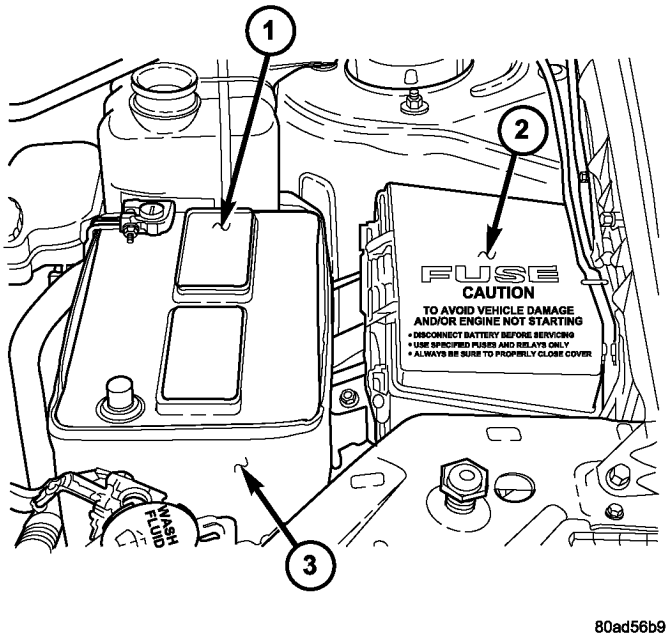


Fig. 18 Integrated Power Module (IPM)

1 - BATTERY
2 - INTEGRATED POWER MODULE (IPM)
3 - BATTERY THERMAL GUARD

(1) Position the front blower motor relay to the proper receptacle in the IPM.

(2) Align the front blower motor relay terminals with the terminal cavities in the IPM receptacle and push down firmly on the relay until the terminals are fully seated.

(3) Install the cover onto the IPM.

(4) Reconnect the negative battery cable.

BLOWER MOTOR RESISTOR

DESCRIPTION

A blower motor resistor is used on vehicles equipped with the manual temperature control (MTC) heating-A/C system (Fig. 19). Vehicles equipped with the automatic temperature control (ATC) heating-A/C system use a blower motor power module, instead of the blower motor resistor (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/BLOWER MOTOR POWER MODULE - DESCRIPTION).

The blower motor resistor is mounted to the rear of the HVAC housing, directly behind the glove box. The blower motor resistor consists of a molded plastic mounting plate with an integral wire connector receptacle. Concealed behind the mounting plate are coiled resistor wires contained within a ceramic heat sink.

The blower motor resistor is accessed for service by removing the glove box.

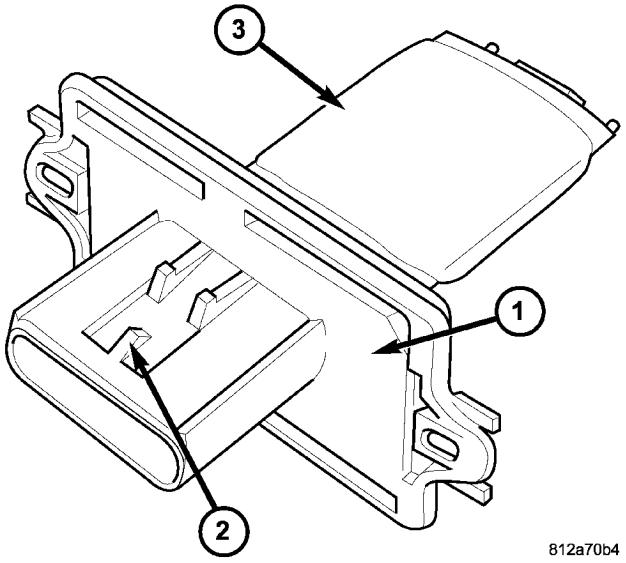


Fig. 19 Blower Motor Resistor - Typical

1 - BLOWER MOTOR RESISTOR
2 - WIRE CONNECTOR RECEPTICAL
3 - RESISTORS AND HEAT SINK

OPERATION

The blower motor resistor is connected to the vehicle electrical system through a dedicated wire lead and connector of the HVAC wire harness. The blower motor resistor has multiple resistor wires, each of which will reduce the current flow through the blower motor to change the blower motor speed.

The blower motor control in the manual temperature control (MTC) heating-A/C system directs the ground path for the blower motor through the correct resistor wire to obtain the selected speed. With the blower motor control in the lowest speed position, the ground path for the blower motor is applied through all of the resistor wires. Each higher speed selected with the blower motor control applies the blower motor ground path through fewer of the resistor wires, increasing the blower motor speed.

The blower motor resistor cannot be adjusted or repaired and, if faulty or damaged (such as a cracked ceramic heat sink), it must be replaced.

DIAGNOSIS AND TESTING

FRONT BLOWER MOTOR RESISTOR

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: For circuit descriptions and diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pinout and location views for the various wire harness connectors, splices and grounds.

(1) Disconnect and isolate the negative battery cable.

(2) Disconnect the wire harness connector from the blower motor resistor (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS-FRONT/BLOWER MOTOR RESISTOR - REMOVAL).

(3) Using an ohmmeter, check for continuity between all of the blower motor resistor terminals. In each case there should be continuity. If OK, repair the wire harness circuits between the blower motor switch and the blower motor resistor or blower motor as required. If not OK, replace the faulty blower motor resistor.

BLOWER MOTOR RESISTOR (Continued)

REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

WARNING: The blower motor resistor may get very hot during normal operation. If the blower motor was turned on prior to servicing the blower motor resistor, wait five minutes to allow the blower motor resistors to cool before performing diagnosis or service. Failure to take this precaution can result in possible personal injury.

CAUTION: Do not operate the blower motor with the blower motor resistor removed from the circuit. Failure to take this precaution can result in vehicle damage.

(1) Disconnect and isolate the negative battery cable.

(2) Remove the glove box from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/GLOVE BOX - REMOVAL).

(3) Disconnect the two wire harness connectors from the blower motor resistor (Fig. 20).

(4) Remove the two screws that secure the blower motor resistor to the HVAC housing and remove the resistor.

INSTALLATION

(1) Position the blower motor resistor into the HVAC housing.

(2) Install the two screws that secure the blower motor resistor to the HVAC housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Connect the two wire connectors to the blower motor resistor.

(4) Install the glove box (Refer to 23 - BODY/INSTRUMENT PANEL/GLOVE BOX - INSTALLATION).

(5) Reconnect the negative battery cable.

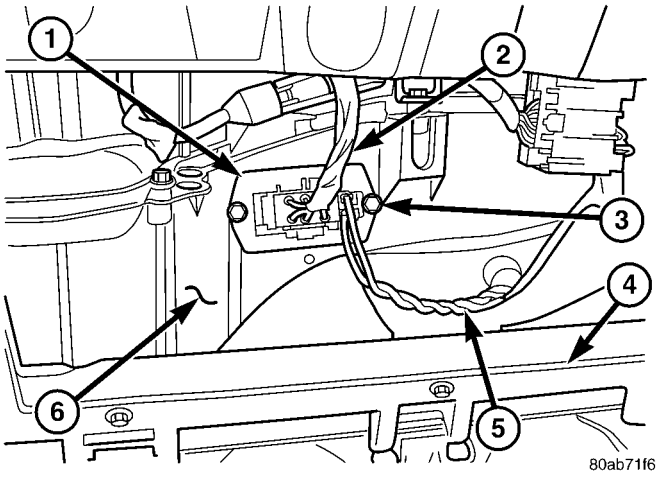


Fig. 20 Blower Motor Resistor

1 - BLOWER MOTOR RESISTOR
2 - INSTRUMENT PANEL WIRE HARNESS
3 - SCREW (2)
4 - GLOVE BOX OPENING REINFORCEMENT
5 - BLOWER MOTOR PIGTAIL WIRE HARNESS
6 - HVAC HOUSING

EVAPORATOR TEMPERATURE SENSOR

DESCRIPTION

The evaporator temperature sensor is a switch that is installed on the top of the expansion valve in the right rear corner of the engine compartment. The sensor has a small probe that is inserted in a small well in the body of the expansion valve that is filled with a special silicone-based thermal grease. A small molded plastic push-in retainer secures the sensor to a threaded hole in the top surface of the expansion valve. Two terminals within a molded plastic connector receptacle on the sensor connect it to the vehicle electrical system through a take out and connector of the HVAC wire harness.

The evaporator temperature sensor cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

The evaporator temperature sensor monitors the temperature of the evaporator through its connection to the top of the expansion valve. The sensor will change its internal resistance in response to the temperatures it monitors. The A/C-heater control module is connected to the sensor through a sensor ground circuit and a sensor signal circuit. As the evaporator temperature increases, the resistance of the sensor decreases and the voltage monitored by the module decreases. The module uses this monitored voltage reading to an indication of the evaporator temperature. The A/C-heater control module is programmed

to respond to this input by sending electronic messages to the powertrain control module (PCM) over the programmable communications interface (PCI) data bus, and the PCM then cycles the air conditioning compressor clutch as necessary to optimize air conditioning system performance and to protect the system from evaporator freezing. The external location of the sensor and the use of a retainer allows the sensor to be removed or installed from the expansion valve without disturbing the refrigerant in the system. The evaporator temperature sensor is diagnosed using a DRBIII® scan tool. Refer to Body Diagnostic Procedures.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the air cleaner housing from the right side of the engine compartment.

(3) Remove the temperature sensor retainer from the expansion valve (Fig. 21).

(4) Pull the evaporator temperature sensor away from the expansion valve far enough to access the red release ring on the wiring connector. Push the red ring toward the connector to release the lock and remove the wire harness connector from the evaporator temperature sensor.

(5) Remove the evaporator temperature sensor from the engine compartment.

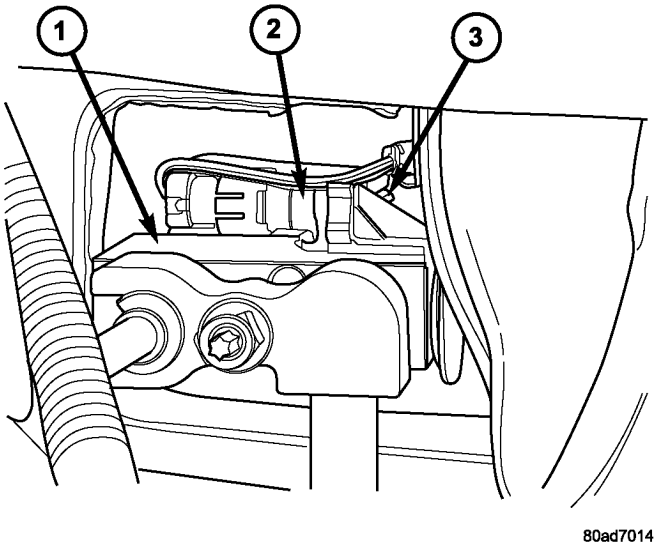


Fig. 21 Evaporator Temperature Sensor

1 - EXPANSION VALVE
2 - EVAPORATOR TEMPERATURE SENSOR
3 - RETAINER

INSTALLATION

NOTE: Any grease removed with the evaporator temperature sensor must be replaced. Failure to do so could result in poor A/C performance.

(1) Position the evaporator temperature sensor into the right rear corner of the engine compartment.

(2) Reconnect the wire harness connector to the evaporator temperature sensor.

(3) Position the evaporator temperature sensor onto the top of the expansion valve with the sensor probe inserted into the well in the expansion valve.

(4) Install the temperature sensor retainer.

(5) Reinstall the air cleaner housing into the right side of the engine compartment.

(6) Reconnect the battery negative cable.

(7) Run the HVAC Cool Down test to verify system is operating properly (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING).

INFRARED TEMPERATURE SENSOR

DESCRIPTION

The infrared temperature sensor consists of two infrared transducers that are concealed behind a clear lens located within the instrument panel mounted A/C-heater control (Fig. 22). These sensors are used only on models equipped with the automatic temperature control (ATC) heating-A/C system.

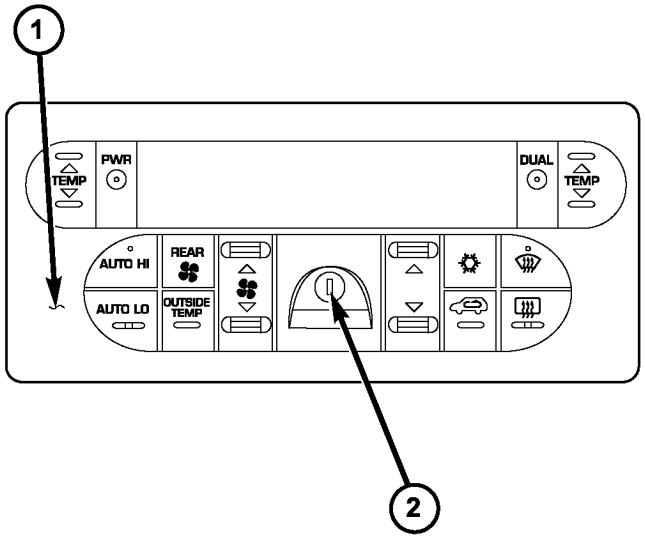


Fig. 22 Infrared Temperature Sensor

1 - ATC A/C-HEATER CONTROL
2 - INFRARED TEMPERATURE SENSOR

INFRARED TEMPERATURE SENSOR (Continued)

OPERATION

The dual infrared temperature sensors provide independent measurement inputs to the automatic temperature control (ATC) A/C-heater control module that indicates the surface temperature of the driver seat and front seat passenger seat occupants. By using a surface temperature measurement, rather than an air temperature measurement, the ATC system is able to adjust itself to the comfort level as perceived by the occupant. This allows the system to detect and compensate for other ambient conditions affecting comfort levels, such as solar heat gain or evaporative heat loss. The ATC system logic responds to the infrared sensor inputs by calculating and adjusting the air flow temperature and air flow rate needed to properly obtain and maintain the individually selected comfort level temperatures of both the driver and passenger seat occupants.

The ATC A/C-heater control module continually monitors the infrared sensor circuits, and will store a diagnostic trouble code (DTC) for any problem it detects. The infrared temperature sensor is diagnosed using a DRBIII® scan tool. Refer to Body Diagnostic Procedures.

The infrared sensors cannot be adjusted or repaired and, if faulty or damaged, the A/C-heater control must be replaced.

MODE DOOR ACTUATOR

DESCRIPTION

The mode door actuator for the heating-A/C system is a reversible, 12-volt Direct Current (DC), servo motor (Fig. 23). The single mode door actuator is located on the driver side end of the HVAC air distribution housing, close to the top of the housing. The mode door actuator is mechanically connected to the mode-air doors.

The mode door actuator is interchangeable with the actuators for the blend-air doors and the recirculation-air door. Each actuator is contained within an identical black molded plastic housing with an integral wire connector receptacle. Each actuator also has an identical output shaft with splines that connects it to its respective door linkage and two integral mounting tabs that allow the actuator to be secured to the HVAC housing. The mode door actuator does not require mechanical indexing to the mode-air doors, as it is electronically calibrated by the A/C-heater control.

The A/C-heater control must be recalibrated each time an actuator motor is replaced (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

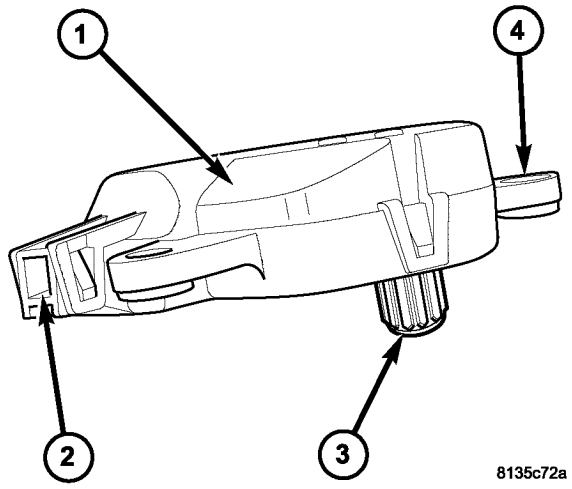


Fig. 23 Mode Door Actuator

1 - ACTUATOR MOTOR
2 - WIRE CONNECTOR RECEPTACLE
3 - OUTPUT SHAFT
4 - MOUNTING TAB (2)

OPERATION

The mode door actuator is connected to the A/C-heater control through the vehicle electrical system by a dedicated two-wire lead and connector of the HVAC wire harness. The mode door actuator can move the mode-air doors in two directions. When the A/C-heater control pulls the voltage on one side of the motor connection high and the other connection low, the mode-air doors will move in one direction. When the A/C-heater control reverses the polarity of the voltage to the motor, the mode-air doors move in the opposite direction.

When the A/C-heater control makes the voltage to both connections high or both connections low, the mode-air doors stop and will not move.

The A/C-heater control uses a feedback signal positioning system to monitor the operation and relative position of the mode door actuator and the mode-air doors. The A/C-heater control learns the mode-air doors stop positions during the calibration procedure and will store a diagnostic trouble code (DTC) for any problems it detects in the mode door actuator circuits.

The mode door actuator is diagnosed using a DRBIII® scan tool. Refer to 9 - Engine Electrical Diagnostics for more information.

The mode door actuator cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

MODE DOOR ACTUATOR (Continued)

REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

(1) Disconnect and isolate the negative battery cable.

(2) Remove the silencer from beneath the driver side end of the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - REMOVAL).

(3) Disconnect the wire harness connector from the mode door actuator (Fig. 24).

(4) Remove the two screws that secure the mode door actuator to the HVAC air distribution housing and remove the actuator.

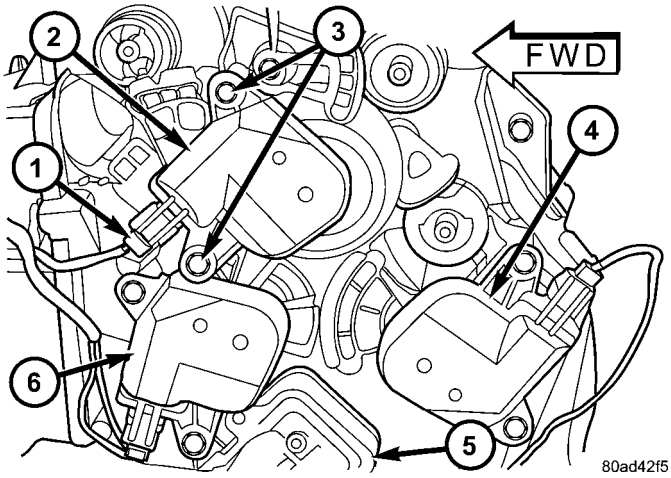


Fig. 24 Mode Door Actuator

1 - WIRE HARNESS CONNECTOR
2 - MODE DOOR ACTUATOR
3 - SCREW (2)
4 - DRIVER BLEND DOOR ACTUATOR (DUAL-ZONE)
5 - HEATER CORE
6 - BLEND DOOR ACTUATOR

INSTALLATION

(1) Position the mode door actuator onto the HVAC air distribution housing. If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those in the mode door linkage.

(2) Install the two screws that secure the mode door actuator to the air distribution housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Connect the wire harness connector to the mode door actuator.

(4) Install the silencer under the driver side end of the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL SILENCER - INSTALLATION).

(5) Reconnect the negative battery cable and calibrate the A/C-heater control (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

RECIRCULATION DOOR ACTUATOR

DESCRIPTION

The recirculation door actuator is a reversible, 12 volt direct current (DC), servo motor (Fig. 25). The recirculation door actuator is located on the bottom of the HVAC air inlet housing and is directly connected to the pivot shaft of the recirculation-air door.

The recirculation door actuator is interchangeable with the actuators for the blend-air door(s) and the mode-air doors. Each actuator is contained within an identical black molded plastic housing with an integral wire connector receptacle. Each actuator also has an identical output shaft with splines that connects it to its door linkage and two integral mounting tabs that allow the actuator to be secured to the air inlet housing. The recirculation door actuator does not require mechanical indexing to the recirculation-air door, as it is electronically calibrated by the A/C-heater control.

The A/C-heater control must be recalibrated each time an actuator motor is replaced (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

OPERATION

The recirculation door actuator is connected to the A/C-heater control through the vehicle electrical system by a dedicated two-wire lead and connector of the HVAC wire harness. The recirculation door actuator can move the recirculation-air door in two directions. When the A/C-heater control pulls the voltage on one side of the motor connection high and the other connection low, the recirculation-air door will move in one direction. When the A/C-heater control reverses the polarity of the voltage to the motor, the recirculation-air door moves in the opposite direction.

RECIRCULATION DOOR ACTUATOR (Continued)

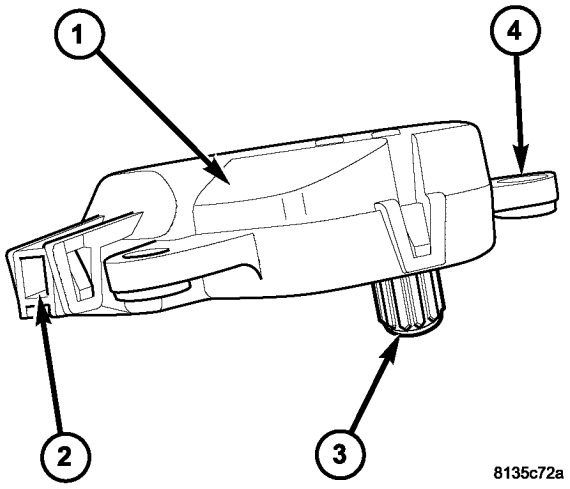


Fig. 25 Recirculation Door Actuator

1 - ACTUATOR MOTOR
2 - WIRE CONNECTOR RECEPTACLE
3 - OUTPUT SHAFT
4 - MOUNTING TAB (2)

When the A/C-heater control makes the voltage to both connections high or both connections low, the recirculation-air door stops and will not move.

The A/C-heater control uses a feedback signal positioning system to monitor the operation and relative position of the recirculation door actuator and the recirculation-air door. The A/C-heater control learns the recirculation-air door stop positions during the calibration procedure and will store a diagnostic trouble code (DTC) for any problems it detects in the recirculation door actuator circuits.

The recirculation door actuator is diagnosed using a DRBIII® scan tool. Refer to 9 - Engine Electrical Diagnostics for more information.

The recirculation door actuator cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

(1) Disconnect and isolate the negative battery cable.

(2) Pull the carpet on the passenger side front floor away from the dash panel far enough to access the recirculation door actuator.

(3) Disconnect the HVAC wire harness connector from the recirculation door actuator (Fig. 26).

(4) Remove the two screws that secure the recirculation door actuator to the air inlet housing and remove the actuator.

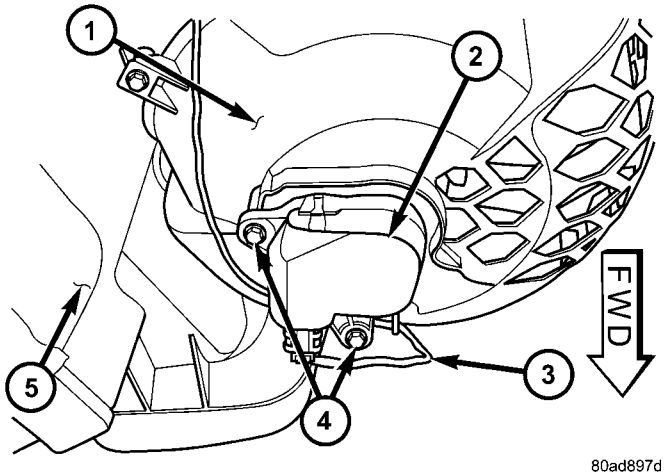


Fig. 26 Recirculation Door Actuator

1 - AIR INLET HOUSING
2 - RECIRCULATION DOOR ACTUATOR
3 - HVAC WIRE HARNESS
4 - SCREW (2)
5 - LOWER HVAC HOUSING

INSTALLATION

(1) Position the recirculation door actuator onto the air inlet housing. If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those in the recirculation-air door pivot shaft.

(2) Install the two screws that secure the recirculation door actuator to the air inlet housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Connect the HVAC wire harness connector to the recirculation door actuator.

(4) Reposition the carpet on the passenger side front floor back up to the dash panel.

(5) Reconnect the negative battery cable and calibrate the A/C-heater control (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

CONTROLS - REAR

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BLOWER MOTOR RELAY

DESCRIPTION

The rear blower motor relay used in the rear center floor console when equipped with the automatic temperature control (ATC) heating-A/C system is a International Standards Organization (ISO)-type relay (Fig. 1). Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal functions and patterns.

The rear blower motor relay is located in the integrated power module (IPM) in the engine compartment.

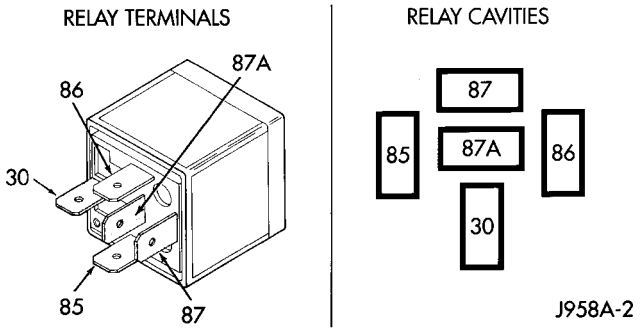


Fig. 1 Rear Blower Motor Relay

30	COMMON FEED
85	COIL BATTERY
86	COIL GROUND
87	NORMALLY OPEN
87A	NORMALLY CLOSED

OPERATION

The rear blower motor relay is an electromechanical switch that uses a low current input from the front control module (FCM) to control the high current output to the rear blower motor power module. The movable, common feed relay contact is held against the fixed, normally closed relay contact by spring pressure. When the electromagnetic relay coil is energized, it draws the movable common feed relay contact away from the fixed, normally closed relay contact and, holds it against the fixed, normally open relay contact. This action allows high current to flow to the rear blower motor.

When the relay coil is de-energized, spring pressure returns the movable relay contact back against the fixed, normally closed contact point. The resistor or diode is connected in parallel with the relay coil, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The rear blower motor relay terminals are connected to the vehicle electrical system through a receptacle in the integrated power module (IPM). The inputs and outputs of the rear blower motor relay include:

- The common feed terminal (30) receives a battery current input from the battery through a B(+) circuit at all times.
- The coil ground terminal (85) receives a ground input through the front/rear blower motor relay control circuit only when the FCM electronically pulls the control circuit to ground.
- The coil battery terminal (86) receives a battery current input from the battery through a B(+) circuit at all times.
- The normally open terminal (87) provides a battery current output to the rear blower motor power module through a fuse in the IPM on the fused rear blower motor relay output circuit only when the rear blower motor relay coil is energized.
- The normally closed terminal (87A) is not connected to any circuit in this application, but provides a battery current output only when the rear blower motor relay coil is de-energized.

BLOWER MOTOR RELAY (Continued)

Refer to the appropriate wiring information for diagnosis and testing of the micro-relay and for complete HVAC wiring diagrams.

REMOVAL

(1) Disconnect and isolate the negative battery cable.

(2) Remove the cover from the integrated power module (IPM) located in the engine compartment (Fig. 2).

NOTE: Refer to the fuse and relay map on the IPM cover for rear blower motor relay location.

(3) Remove the rear blower motor relay from the IPM.

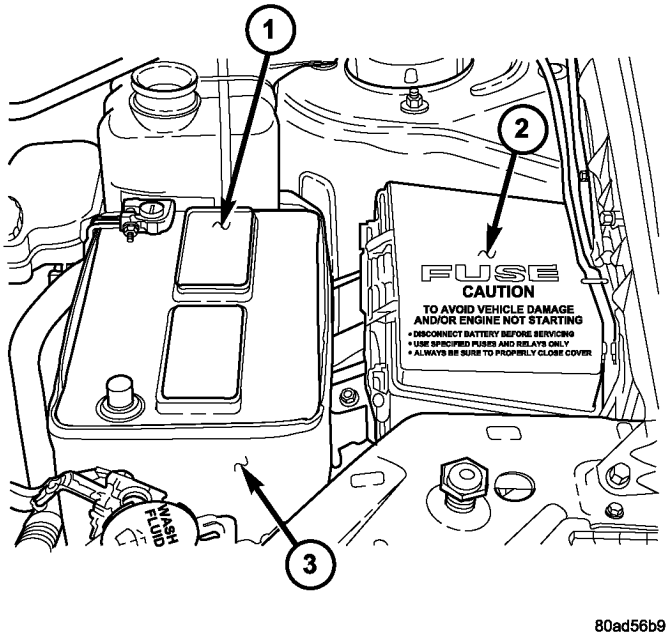


Fig. 2 Integrated Power Module (IPM)

1 - BATTERY
2 - INTEGRATED POWER MODULE (IPM)
3 - BATTERY THERMAL GUARD

INSTALLATION

NOTE: Refer to the fuse and relay map on the cover of the integrated power module (IPM) for rear blower motor relay location.

(1) Position the rear blower motor relay to the proper receptacle in the IPM.

(2) Align the rear blower motor relay terminals with the terminal cavities in the IPM receptacle and push down firmly on the relay until the terminals are fully seated.

(3) Install the cover onto the IPM.

(4) Reconnect the negative battery cable.

BLOWER MOTOR SWITCH

DESCRIPTION

The rear blower motor is controlled by a rotary-type blower motor switch, mounted in the rear center console (Fig. 3). The rear blower motor switch allows the selection of rear blower motor speeds, Auto and an Off position when the front A/C-heater control is set to the Rear position, otherwise the front A/C-heater control operates both the front and rear blower motors.

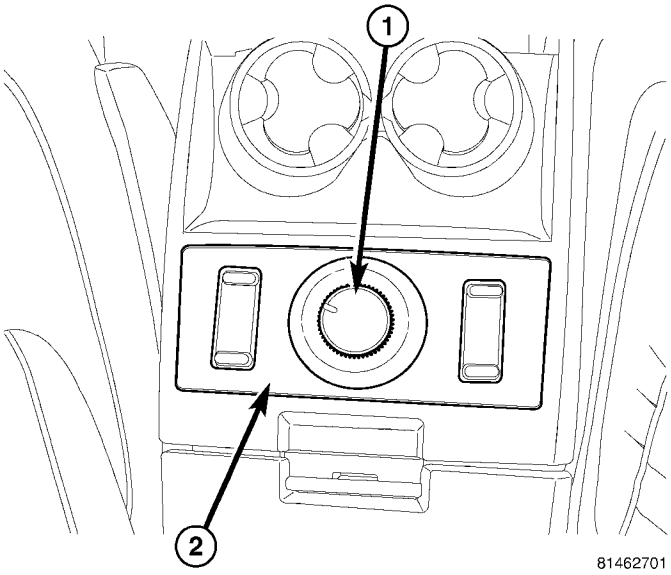


Fig. 3 Rear Blower Motor Switch

1 - REAR BLOWER MOTOR SWITCH
2 - REAR CONTROL PANEL

OPERATION

When the front A/C-heater control display for the automatic temperature control (ATC) heating-A/C system reads REAR AUTO or when the rear blower fan is off, the switch located in the center console between the second row seats is not functional. When the front A/C-heater control display reads REAR, only the rear seat occupants control the rear blower fan speed from the rear switch. When in the Rear mode, the rear occupants can set the rear switch to any fan speed including OFF or AUTO. While in the Auto position, the rear fan speed will be automatically controlled. Refer to Body Diagnostic Procedures for further diagnostic information.

REMOVAL

NOTE: The rear blower motor switch and the rear floor console switch bezel are serviced only as an assembly.

(1) Disconnect and isolate the negative battery cable.

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BLOWER MOTOR SWITCH (Continued)

(2) Remove the rear floor console (Refer to 23 - BODY/INTERIOR/REAR FLOOR CONSOLE - REMOVAL).

(3) Remove the rear floor console switch bezel by releasing the retaining tab located at each end of the switch bezel and pushing it out through the front surface of the console (Fig. 4).

(4) Disconnect the wire harness connectors from the rear blower motor switch and the rear heated seat switches.

(5) Remove the rear heated seat switches from the rear floor console switch bezel by gently prying the switches free from the back of the switch bezel (Refer to 8 - ELECTRICAL/HEATED SEATS/HEATED SEAT SWITCH-2ND ROW- REMOVAL).

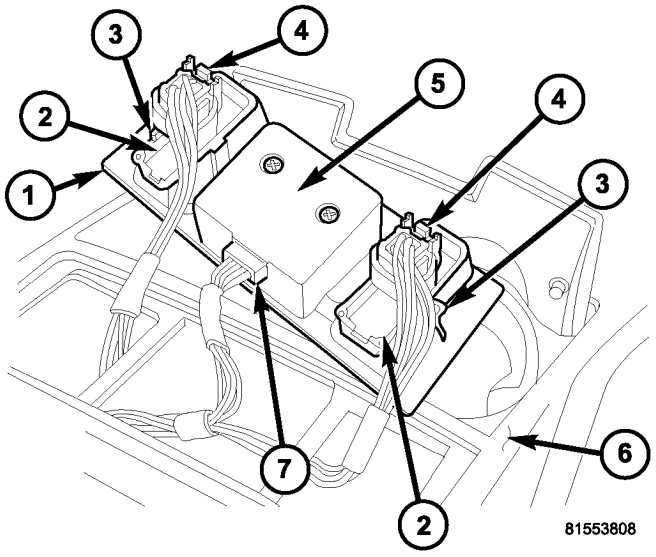


Fig. 4 Rear Blower Motor Switch

1 - REAR FLOOR CONSOLE SWITCH BEZEL
2 - REAR HEATED SEAT SWITCH (2)
3 - SWITCH BEZEL RETAINING TAB (2)
4 - HEATED SEAT SWITCH WIRE CONNECTOR (2)
5 - REAR BLOWER SWITCH (INTEGRAL TO BEZEL)
6 - REAR FLOOR CONSOLE
7 - REAR BLOWER SWITCH WIRE CONNECTOR

INSTALLATION

(1) Install the rear heated seat switches into the back of the rear floor console switch bezel. Make sure that the switch retaining tabs are fully engaged to the bezel (Refer to 8 - ELECTRICAL/HEATED SEATS/ HEATED SEAT SWITCH-2ND ROW - INSTALLATION).

(2) Connect the wire harness connectors to the rear blower motor switch and the rear heated seat switches.

(3) Install the rear floor console switch bezel into the rear floor console by pushing it in through the front surface of the console. Make sure that the bezel retaining tabs are fully engaged to the console.

(4) Install the rear floor console (Refer to 23 - BODY/INTERIOR/REAR FLOOR CONSOLE - INSTALLATION).

(5) Reconnect the negative battery cable.

MODE DOOR ACTUATOR

DESCRIPTION

The mode door actuator used in the rear center floor console when equipped with the automatic temperature control (ATC) heating-A/C system, is a reversible, 12-volt direct current (DC), servo motor (Fig. 5). The rear mode door actuator is located in the rear blower motor housing within the center floor console. The rear mode door actuator is mechanically connected to the two floor console mode-air doors.

The rear mode door actuator is interchangeable with the actuator for the front mode-air doors, front blend-air doors and the recirculation-air door. Each actuator is contained within an identical black molded plastic housing with an integral wire connector receptacle. Each actuator also has an identical output shaft with splines that connects it to its respective door linkage and two integral mounting tabs that allow the actuator to be secured to the rear blower motor housing. The rear mode door actuator does not require mechanical indexing to the rear mode-air door linkage, as it is electronically calibrated by the A/C-heater control.

The A/C-heater control must be recalibrated each time an actuator motor is replaced (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

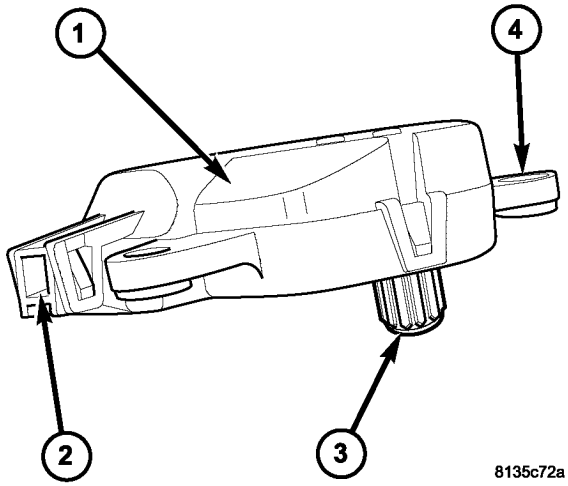


Fig. 5 Mode Door Actuator

1 - ACTUATOR MOTOR
2 - WIRE CONNECTOR RECEPTACLE
3 - OUTPUT SHAFT
4 - MOUNTING TAB (2)

OPERATION

The mode door actuator for the center floor console is connected to the A/C-heater control through the vehicle electrical system by a dedicated two-wire lead and connector of the body wire harness. The rear mode door actuator can move the two floor console mode-air doors in two directions. When the A/C-heater control pulls the voltage on one side of the

motor connection high and the other connection low, the mode-air doors will move in one direction. When the A/C-heater control reverses the polarity of the voltage to the motor, the mode-air doors move in the opposite direction.

When the A/C-heater control makes the voltage to both connections high or both connections low, the mode-air doors stop and will not move.

The A/C-heater control uses a feedback signal positioning system to monitor the operation and relative position of the rear mode door actuator and the mode-air doors. The A/C-heater control learns the mode-air doors stop positions during the calibration procedure and will store a diagnostic trouble code (DTC) for any problems it detects in the rear mode door actuator circuits.

The rear mode door actuator is diagnosed using a DRBIII® scan tool. Refer to 9 - Engine Electrical Diagnostics for more information.

The rear mode door actuator cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

REMOVAL

(1) Remove the front center floor console cover (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - REMOVAL).

(2) Disconnect and isolate the negative battery cable.

(3) Disconnect the body wire harness connector from the rear mode door actuator (Fig. 6).

(4) Remove the two screws that secure the mode door actuator to the rear blower motor housing and remove the actuator.

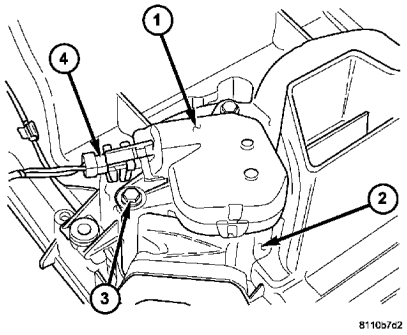


Fig. 6 Mode Door Actuator - Floor Console

1 - MODE DOOR ACTUATOR
2 - REAR BLOWER MOTOR HOUSING
3 - SCREW (2)
4 - WIRE HARNESS CONNECTOR

INSTALLATION

(1) Position the rear mode door actuator onto the rear blower motor housing. If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those in the mode door linkage.

(2) Install the two screws that secure the rear mode door actuator to the blower motor housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Connect the wire harness connector to the rear mode door actuator.

(4) Reconnect the negative battery cable.

(5) Install the front center floor console cover (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - INSTALLATION).

(6) Calibrate the A/C-heater control (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

BLOWER MOTOR POWER MODULE

DESCRIPTION

A rear blower motor power module is used on this model when it is equipped with the automatic temperature control (ATC) heating-A/C system (Fig. 7). The blower motor power module is installed in the rear blower motor housing, which is located within the center floor console. The power module consists of a molded plastic mounting plate with two integral wire harness connector receptacles. Concealed behind the mounting plate within the blower motor housing is the power module electronic circuitry and a large finned, heat sink. The module mounting plate is secured with two screws to the rear blower motor housing and is accessed for service by removing the front center floor console.

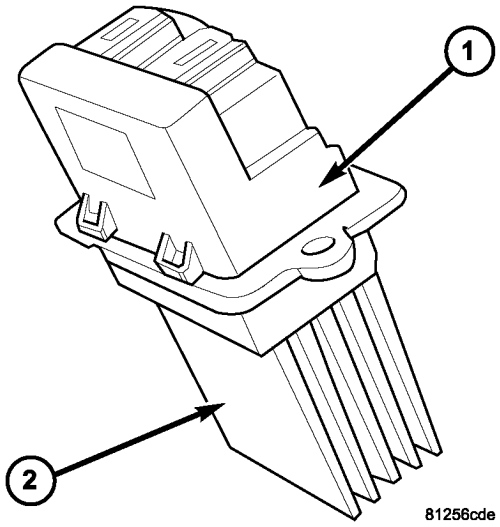


Fig. 7 Blower Motor Power Module

1 - BLOWER MOTOR POWER MODULE
2 - HEAT SINK

OPERATION

The rear blower motor power module is connected to the vehicle electrical system through a dedicated wire harness lead and connector of the body wire harness. A second connector receptacle receives the wire harness connector from the rear blower motor. The rear blower motor power module allows the microprocessor-based automatic temperature control (ATC) A/C-heater control to calculate and provide infinitely variable blower motor speeds based upon either manual blower switch input or the ATC programming using a pulse width modulated (PWM) circuit strategy.

The PWM voltage is applied to a comparator circuit which compares the PWM signal voltage to the rear blower motor feedback voltage. The resulting output drives the power module circuitry, which adjusts the voltage output received from the rear blower motor relay to change or maintain the desired rear blower motor speed.

The rear blower motor power module is diagnosed using a DRBIII® scan tool. Refer to Body Diagnostic Procedures.

The rear blower motor power module cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

REMOVAL

(1) Remove the rear center console upper cover (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - REMOVAL).

(2) Disconnect and isolate the negative battery cable.

(3) Disconnect the body wire harness connector from the rear blower motor power module (Fig. 8).

(4) Disconnect the rear blower motor wire harness connector from the power module.

(5) Remove the two screws that secure the power module to the rear blower motor housing.

(6) Remove the power module from the blower motor housing.

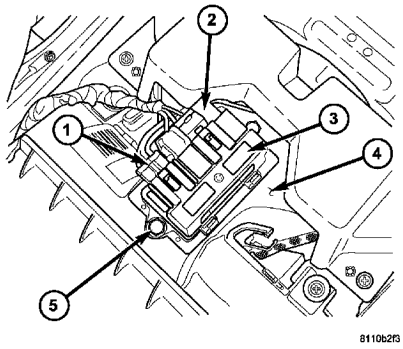


Fig. 8 Rear Blower Motor Power Module

1 - BLOWER MOTOR WIRE CONNECTOR
2 - BODY HARNESS WIRE CONNECTOR
3 - REAR BLOWER MOTOR POWER MODULE
4 - REAR BLOWER MOTOR HOUSING
5 - SCREW (2)

INSTALLATION

(1) Position the rear blower motor power module into the rear blower motor housing.

(2) Install the two screws that secure the power module to the blower motor housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Reconnect the blower motor wire harness connector to the power module.

(4) Reconnect the body wire harness connector to the power module.

(5) Reconnect the negative battery cable.

(6) Install the front center floor console cover (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - INSTALLATION).

DISTRIBUTION - FRONT

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AIR FILTER

DESCRIPTION

A dust and odor air filter is available on some models (Fig. 1). The particulate air filter element is the same size as the A/C evaporator to ensure ample filtering capacity. A removable door on the bottom of the HVAC housing below the glove box provides easy access to the particulate air filter element for replacement. The particulate air filter element should be checked and replaced at least once every 24,000 km (15,000 miles) and checked if heater-A/C system performance seems lower than expected.

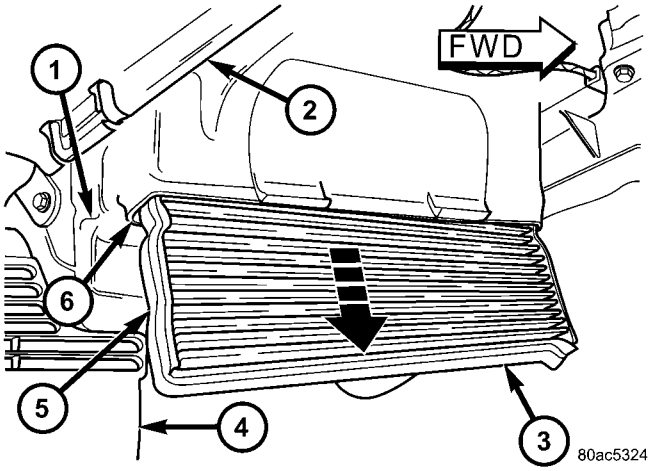


Fig. 1 Particulate Air Filter

1 - LOWER FRONT HVAC HOUSING
2 - LOWER EDGE OF INSTRUMENT PANEL
3 - AIR FILTER (IF EQUIPPED)
4 - CENTER FLOOR BRACKET COVER
5 - FILTER SEALING EDGES (IF EQUIPPED)
6 - AIR FILTER OPENING (IF EQUIPPED)

AIR FILTER (Continued)

REMOVAL

(1) Locate the air filter door on the bottom of the lower front HVAC housing just outboard of the passenger side of the instrument panel center stack (Fig. 2).

(2) Slide the air filter door latch toward the rear of the vehicle until it engages the opened stop on the door.

(3) Pull the air filter door straight downward to disengage it from the air filter opening of the HVAC housing.

(4) Use your fingers to reach through the air filter opening of the HVAC housing far enough to grasp the air filter.

(5) Pull the air filter straight down and out of the HVAC housing.

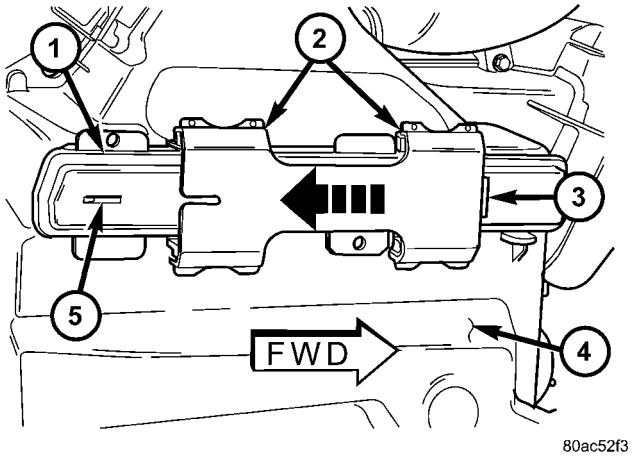


Fig. 2 Air Filter Door - Typical

1 - AIR FILTER DOOR
2 - LATCH
3 - CLOSED STOP
4 - LOWER FRONT HVAC HOUSING
5 - OPENED STOP

INSTALLATION

NOTE: The particulate air filter is labeled with "Airflow" and an arrow to indicate air flow direction through the filter. This arrow should always be oriented towards the center of the vehicle. Make sure to properly install the particulate air filter. Failure to properly install the filter will result in the need to replace the filter sooner than required by design.

(1) Install the filter fully upward into the HVAC housing through the air filter opening with the "Airflow" arrow oriented towards the center of the vehicle.

(2) With the latch still positioned against its opened stop, install the air filter door onto the lower HVAC housing air filter opening.

(3) Slide the air filter door latch toward the front of the vehicle until it contacts the closed stop on the door.

AIR OUTLETS

REMOVAL

CENTER AIR OUTLETS

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: The two center air outlets located above the instrument panel center bezel are serviced as an assembly.

(1) Disconnect and isolate the negative battery cable.

(2) Remove the center bezel from the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).

(3) Remove the two screws that secure the bottom of the center air outlet to the instrument panel (Fig. 3).

(4) Roll the bottom of the center air outlet upward and disengage the retaining clips that secure the top of the air outlet to the instrument panel and remove the outlet.

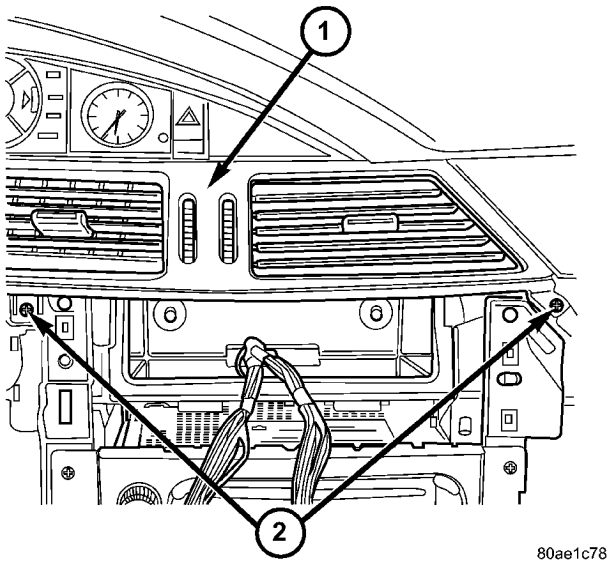


Fig. 3 Center Air Outlets

1 - CENTER AIR OUTLET
2 - SCREW (2)

AIR OUTLETS (Continued)

INSTRUMENT PANEL AIR OUTLETS

(1) If servicing the right instrument panel air outlet, use a trim stick C-4755 or equivalent and gently pry the outer perimeter of the center trim panel from the right side of the instrument panel and remove the trim panel. If servicing the left instrument panel air outlet, remove the instrument cluster bezel (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - REMOVAL).

(2) Remove the instrument panel end cap from the end of the instrument panel being serviced (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - REMOVAL).

(3) Remove the two screws that secure the instrument panel air outlet to the instrument panel and remove the outlet (Fig. 4).

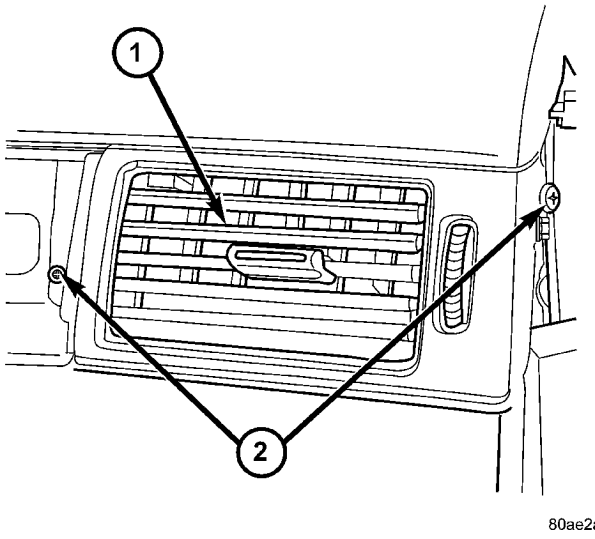


Fig. 4 Instrument Panel Outlet - Right Side Shown

1 - INSTRUMENT PANEL AIR OUTLET
2 - SCREW (2)

INSTALLATION

CENTER AIR OUTLETS

(1) Position the center air outlet onto the instrument panel.

(2) Engage the retaining tabs at the top of the center air outlet to the top of the opening in the instrument panel, then roll the center air outlet downward.

(3) Install the two screws that secure the bottom of the center air outlet to the instrument panel. Tighten the screws to 2 N·m (17 in. lbs.).

(4) Install the center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

(5) Reconnect the negative battery cable.

INSTRUMENT PANEL AIR OUTLETS

(1) Position the instrument panel air outlet into opening in the instrument panel.

(2) Install the two screws that secure the instrument panel air outlet to the instrument panel. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Install the instrument panel end cap (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - INSTALLATION).

(4) If servicing the left instrument panel air outlet, install the instrument cluster bezel (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - INSTALLATION). If servicing the right instrument panel air outlet, install the right trim panel firmly and evenly onto the instrument panel until the retaining tabs are fully engaged.

BLOWER MOTOR

DESCRIPTION

The blower motor is a 12-volt, direct current (DC) motor mounted within a plastic housing with a squirrel cage-type blower wheel that is secured to the blower motor shaft and an integral wire harness with a grommet and connector (Fig. 5). The blower motor and wheel is located in the air inlet housing at the passenger side end of the HVAC housing.

The blower motor can be accessed for service from underneath the instrument panel.

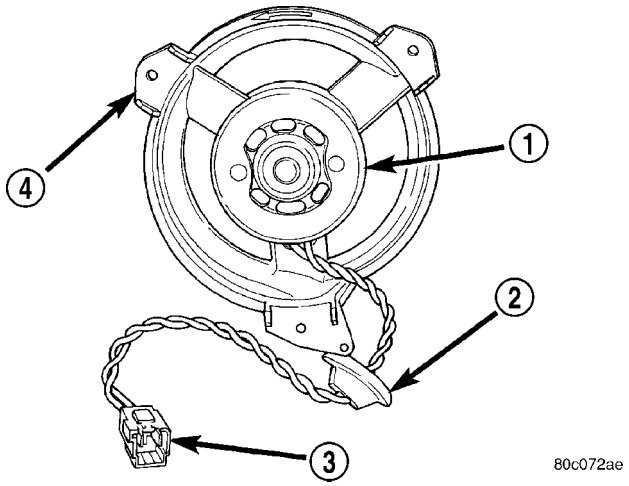


Fig. 5 Blower Motor

1 - BLOWER MOTOR
2 - RUBBER GROMMET
3 - BLOWER MOTOR CONNECTOR
4 - MOUNTING TABS

BLOWER MOTOR (Continued)

OPERATION

The front blower motor is used to control the velocity of air moving through the front HVAC housing by spinning the blower wheel within the housing at the selected or programed speed (depending on application).

On models equipped with the manual temperature control (MTC) heating-A/C system, the front blower motor will operate whenever the ignition switch is in the On position and the blower control switch is in any position except Off. On models equipped with the automatic temperature control (ATC) heating-A/C system, the front blower motor will operate whenever the ignition switch is in the On position and the A/C-heater control power is turned on.

The front blower motor relay output circuit is protected by a fuse in the integrated power module (IPM) located in the engine compartment. In the MTC system, the front blower motor speed is controlled by regulating the path to ground through the blower control switch and the blower motor resistor. In the ATC system, the front blower motor speed is controlled by an electronic blower motor power module, which uses a pulse width modulated input from the A/C-heater control and a feedback signal from the blower motor to regulate the blower motor ground path. On both systems, the front blower motor receives battery current whenever the front blower motor relay is energized.

The front blower motor and blower motor wheel are factory balanced and cannot be adjusted or repaired. If faulty or damaged, the front blower motor and blower wheel must be replaced as an assembly.

DIAGNOSIS AND TESTING

BLOWER MOTOR

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

For circuit descriptions and diagrams, refer to Air Conditioning/Heater in Group 8W - Wiring Diagrams. Possible causes of an inoperative front or rear blower motor include:

- Faulty fuse (the fuse is located in the integrated power module (IPM) in the engine compartment)
- Faulty blower motor circuit wiring or wire harness connectors
- Faulty blower motor resistor or power module (depending on application)
- Faulty blower motor relay
- Faulty blower motor switch
- Faulty blower motor.

VIBRATION

Possible causes of front or rear blower motor vibration include:

- Improper blower motor mounting
- Improper blower wheel mounting
- Blower wheel out of balance or deformed
- Foreign material in blower wheel causing out of balance condition
- Blower motor faulty.

NOISE

To determine if the front or rear blower motor is the source of the noise, simply switch the front or rear blower motor from Off to On. To verify that the blower motor is the source of the noise, unplug the blower motor wire harness connector and operate the heating-A/C system. If the noise goes away, possible causes include:

- Foreign material in the HVAC housing
- Improper blower motor mounting
- Improper blower wheel mounting
- Blower motor faulty.

REMOVAL

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in an accidental airbag deployment and possible personal injury or death or death.

NOTE: The blower motor is located on the passenger side of the vehicle under the instrument panel. The blower motor can be removed from the vehicle without having to remove the HVAC housing.

(1) Disconnect and isolate the negative battery cable.

(2) Remove the passenger side cowl trim panel (Refer to 23 - BODY/INTERIOR/COWL TRIM - REMOVAL).

BLOWER MOTOR (Continued)

(3) Pull back the carpet to access the front upper screw that secures the air inlet housing.

(4) Remove the recirculation door actuator (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/RECIRCULATION DOOR ACTUATOR - REMOVAL).

(5) Remove the recirculation door actuator wire lead from the routing clip located on the lower air inlet housing and position the wire lead aside.

(6) Disconnect the blower motor wire lead connector from the blower motor resistor or power module, depending on application.

(7) Remove the one screw (from the top) that secures the lower air inlet housing to the upper air inlet housing (Fig. 6).

(8) Remove the four screws (from the bottom) that secure the lower air inlet housing to the upper air inlet housing and remove the lower HVAC housing.

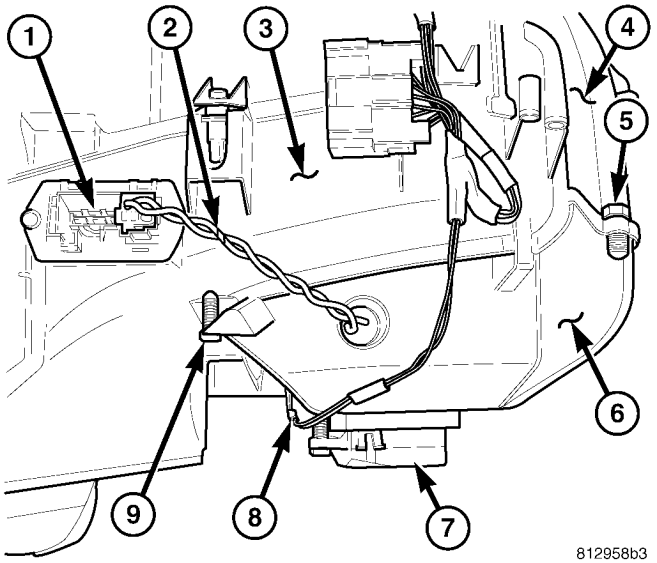


Fig. 6 Lower Air Inlet Housing

1 - BLOWER MOTOR RESISTOR/POWER MODULE
2 - BLOWER MOTOR WIRE LEAD
3 - LOWER HVAC HOUSING
4 - UPPER AIR INLET HOUSING
5 - UPPER SCREW (1)
6 - LOWER AIR INLET HOUSING
7 - RECIRCULATION DOOR ACTUATOR
8 - ACTUATOR WIRE LEAD
9 - LOWER SCREW (4)

(9) Push the rubber blower motor wire lead grommet through the opening in the lower air inlet housing (Fig. 7).

(10) Feed the blower motor wire lead through the opening in the lower air inlet housing and remove the lower air inlet housing from the vehicle.

(11) Position the recirculation-air door as necessary to access and remove the three screws that secure the blower motor to the lower half of the HVAC housing.

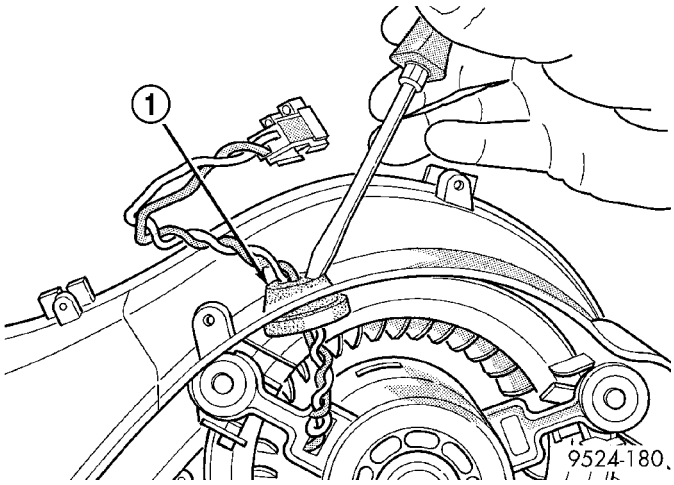


Fig. 7 Blower Motor Wire Lead Grommet

1 - BLOWER MOTOR WIRE LEAD GROMMET

(12) Gently flex the recirculation air door far down enough to remove the blower motor and wheel from the HVAC housing.

(13) Remove the blower motor and wheel from the HVAC housing. Note the position of the blower motor mounting tabs (Fig. 8).

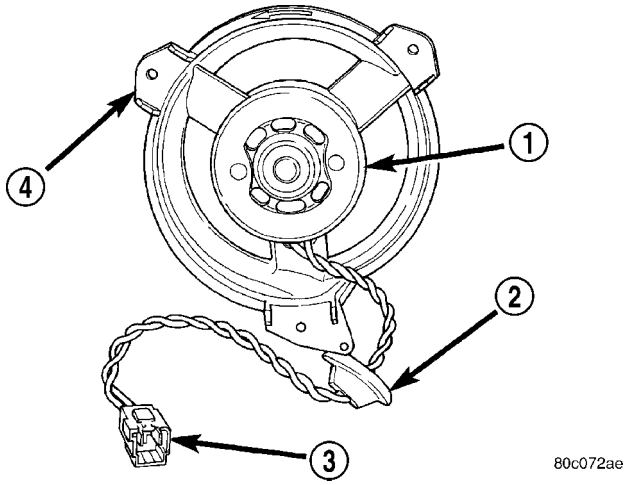


Fig. 8 Blower Motor Mounting Tabs

1 - BLOWER MOTOR
2 - RUBBER GROMMET
3 - BLOWER MOTOR CONNECTOR
4 - MOUNTING TABS

INSTALLATION

(1) Position the blower motor and wheel to the lower half of the HVAC housing. Align the blower motor mounting tabs to the correct location on the HVAC housing.

(2) Gently flex the recirculation-air door far down enough to install the blower motor and wheel into the HVAC housing.

(3) Position the recirculation-air door as necessary to install the three screws that secure the blower

BLOWER MOTOR (Continued)

motor to the HVAC housing. Tighten the screws to 2 N·m (17 in. lbs.).

(4) Feed the blower motor wire lead through the opening in the lower air inlet housing and seat the rubber grommet into the lower air inlet housing.

(5) Position the recirculation-air door pivot into the lower air inlet housing.

(6) Install the four screws (from the bottom) that secure the lower air inlet housing to the upper air inlet housing and the lower HVAC housing. Tighten the screws to 2 N·m (17 in. lbs.).

(7) Install the one screw (from the top) that secures the lower air inlet housing to the upper air inlet housing. Tighten the screws to 2 N·m (17 in. lbs.).

(8) Connect the blower motor wire lead connector to the blower motor resistor or power module, depending on application.

(9) Install the recirculation door actuator wire lead into the routing clip located on the lower air inlet housing.

(10) Install the recirculation door actuator (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/RECIRCULATION DOOR ACTUATOR - INSTALLATION).

(11) Reinstall the carpet.

(12) Install the passenger side cowl trim panel (Refer to 23 - BODY/INTERIOR/COWL TRIM - INSTALLATION).

(13) Reconnect the negative battery cable.

(14) Perform the heater-A/C control calibration procedure (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C-HEATER CONTROL - STANDARD PROCEDURE - HEATER-A/C CONTROL CALIBRATION).

FLOOR DISTRIBUTION DUCT

REMOVAL

(1) Remove the center console assembly to access the front floor distribution duct (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - REMOVAL).

(2) Remove the screws that secure the floor distribution duct to the bottom of the HVAC housing.

(3) Pull the floor distribution duct rearward far enough to disengage the floor distribution duct from the outlet on the bottom of the HVAC housing.

(4) Remove the floor distribution duct from the vehicle (Fig. 9).

INSTALLATION

(1) Position the floor distribution duct under the instrument panel center stack and engage the center floor distribution duct with the outlet on the bottom of the HVAC housing.

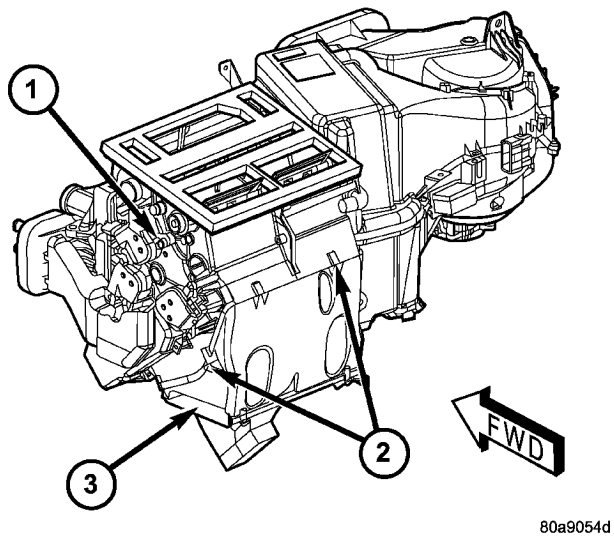


Fig. 9 Floor Distribution Duct Assembly

1 - HVAC HOUSING
2 - SCREWS
3 - FLOOR DISTRIBUTION DUCT

(2) Install the floor distribution duct screws. Tighten screws to 2 N·m (17 in. lbs.).

(3) Reinstall the center console (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - INSTALLATION).

HVAC HOUSING

DESCRIPTION

All models are equipped with a common HVAC housing assembly that combines A/C and heating capabilities into a single unit mounted within the passenger compartment (Fig. 10). The HVAC housing assembly consists of three separate housings:

- **HVAC housing** — The HVAC housing is mounted to the dash panel behind the instrument panel and contains the A/C evaporator and the blower motor resistor or power model (depending on application) and the particulate air filter (if equipped). The HVAC housing consists of a upper and a lower housing that are attached together and has mounting provisions for the air inlet housing, blower motor, air distribution housing and the HVAC wire harness.
- **Air inlet housing** — The air inlet housing is mounted to the right end of the HVAC housing and contains the recirculation-air door and actuator.
- **Air distribution housing** — The air distribution housing is mounted to the rear of the HVAC housing and contains the heater core, blend-air doors and actuators, mode-air doors and actuator and door linkage.

HVAC HOUSING (Continued)

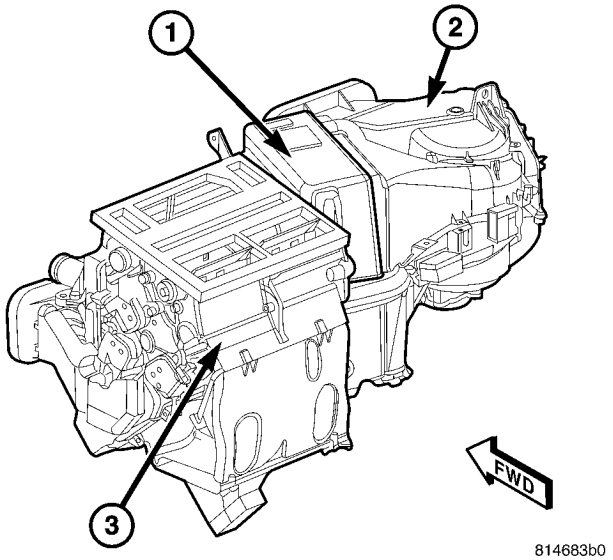


Fig. 10 HVAC Housing Assembly

1 - HVAC HOUSING
2 - AIR INLET HOUSING
3 - AIR DISTRIBUTION HOUSING

The heating-A/C system is a blend-air type system. The blend-air doors control the amount of conditioned air that is allowed to flow through, or around, the heater core. The dual zone heating A/C system uses two blend door actuators.

The A/C system is designed for the use of a non-CFC, R-134a refrigerant and uses an A/C evaporator to cool and dehumidify the incoming air prior to blending it with the heated air. A temperature control determines the discharge air temperature by operating the blend door actuators, which moves the blend-air doors. This allows an almost immediate control of the output air temperature of the system. The mode door actuator operates the mode-air doors which direct the flow of the conditioned air out the various air outlets, depending on the mode selected. The recirculation door actuator operates the recirculation-air door which closes off the fresh air intake and recirculates the air already inside the vehicle. The electric door actuators are connected to the vehicle electrical system by the HVAC wire harness. The blower motor controls the velocity of air flowing through the HVAC housing assembly by spinning the blower wheel within the HVAC housing at the selected speed by use of the blower motor resistor or power model, depending on application.

The air distribution housing must be removed from the HVAC housing and disassembled for service of the mode-air and blend-air doors. The air inlet housing must be removed from HVAC housing and disassembled for service of the recirculation-air door. The HVAC housing must be removed from the vehicle and disassembled for service of the A/C evaporator.

REMOVAL

AIR DISTRIBUTION HOUSING

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: The air distribution housing must be removed from the HVAC housing and disassembled for service of the mode-air and blend-air doors.

(1) Remove the HVAC housing from the vehicle and place it on a workbench (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - REMOVAL).

(2) Disconnect the HVAC wire harness connectors from the mode door actuator and the two blend door actuators located on the driver side of the air distribution housing and position the HVAC wire harness out of the way (Fig. 11).

(3) Remove the foam seal from the heater core tubes and the flange located at the front of the HVAC housing (Fig. 12). If the seal is deformed or damaged, it must be replaced.

(4) Remove the plastic retaining strap that secures the heater core tubes to the front of the HVAC housing.

NOTE: Take the proper precautions to protect against spilled engine coolant. Have absorbent toweling readily available to clean up any spills.

(5) Remove the bolt that secures the heater core tube sealing plate to the heater core.

(6) Disconnect the heater core tubes from the heater core and remove and discard the O-ring seals.

HVAC HOUSING (Continued)

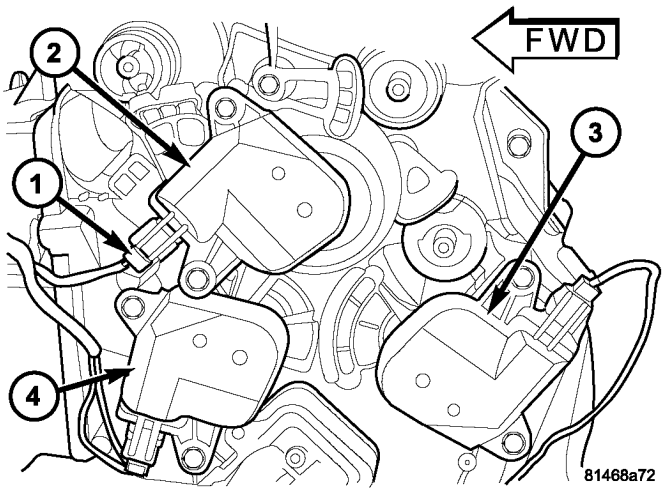


Fig. 11 Actuator - Wire Harness Connections

1 - ACTUATOR WIRE HARNESS CONNECTOR (3)
2 - MODE DOOR ACTUATOR
3 - DRIVER BLEND DOOR ACTUATOR
4 - PASSENGER BLEND DOOR ACTUATOR

(7) Install plugs in, or tape over the opened heater core ports.

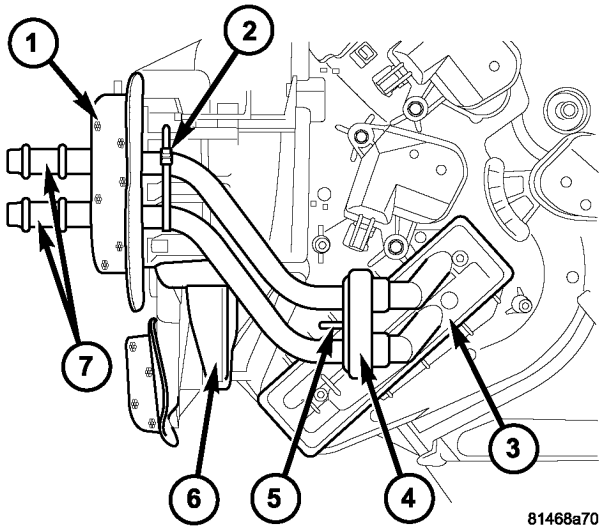


Fig. 12 Heater Core Tubes

1 - FOAM SEAL
2 - RETAINING STRAP
3 - HEATER CORE
4 - SEALING PLATE
5 - SCREW
6 - HVAC HOUSING
7 - HEATER CORE TUBES

(8) Remove the four screws that secure the air distribution housing to the rear of the HVAC housing (Fig. 13).

(9) Tilt the top of the air distribution housing rearward to disconnect the distribution housing from the two tab-and-slot type retainers located at the bottom of the housing and remove the distribution housing.

(10) If required, disassemble the air distribution housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - AIR DISTRIBUTION HOUSING - DISASSEMBLY).

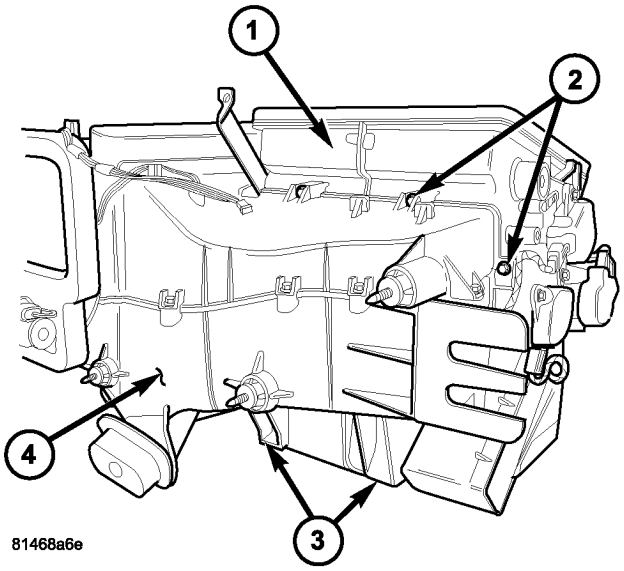


Fig. 13 Retainers - Air Distribution Housing

1 - AIR DISTRIBUTION HOUSING
2 - SCREWS (4)
3 - TAB-AND-SLOT RETAINERS (2)
4 - HVAC HOUSING

AIR INLET HOUSING

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

HVAC HOUSING (Continued)

NOTE: The air inlet housing must be removed from HVAC housing for service of the recirculation-air door.

(1) Remove the HVAC housing assembly (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - REMOVAL).

(2) Remove the recirculation door actuator (Fig. 14) (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/RECIRCULATION DOOR ACTUATOR - REMOVAL).

(3) Remove the recirculation door actuator wire lead from the routing clip located on the lower air inlet housing and position the wire lead aside.

(4) Disconnect the blower motor wire lead connector from the blower motor resistor or power module, depending on application.

(5) Remove the one screw (from the top) that secures the lower air inlet housing to the upper air inlet housing.

(6) Remove the four screws (from the bottom) that secure the lower air inlet housing to the upper air inlet housing and remove the lower HVAC housing.

(7) Push the rubber blower motor wire lead grommet through the opening in the lower air inlet housing (Fig. 15).

(8) Feed the blower motor wire lead through the opening in the lower air inlet housing and remove the lower air inlet housing from the vehicle.

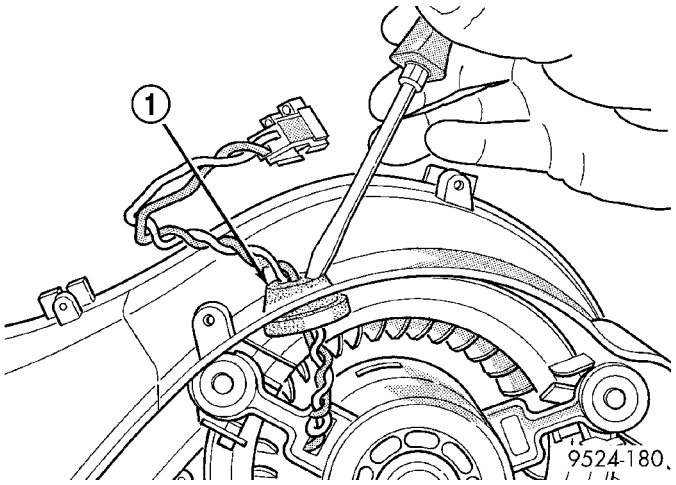


Fig. 15 Blower Motor Wire Lead Grommet

1 - BLOWER MOTOR WIRE LEAD GROMMET

(9) Carefully cut the foam seal along the parting line of the upper air inlet housing (Fig. 16). If the seal is deformed or damaged, it must be replaced.

(10) Remove the three screws that secure the upper air inlet housing to HVAC housing.

(11) Remove the upper air inlet housing and recirculation-air door from the HVAC housing.

(12) If required, remove the screw that secures the recirculation-air door to the upper air inlet housing and remove the air door.

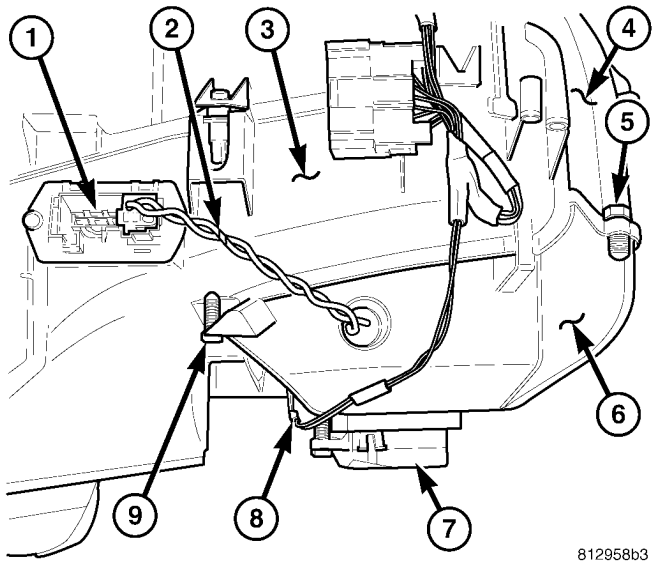


Fig. 14 Lower Air Inlet Housing

1 - BLOWER MOTOR RESISTOR/POWER MODULE
2 - BLOWER MOTOR WIRE LEAD
3 - LOWER HVAC HOUSING
4 - UPPER AIR INLET HOUSING
5 - UPPER SCREW (1)
6 - LOWER AIR INLET HOUSING
7 - RECIRCULATION DOOR ACTUATOR
8 - ACTUATOR WIRE LEAD
9 - LOWER SCREW (4)

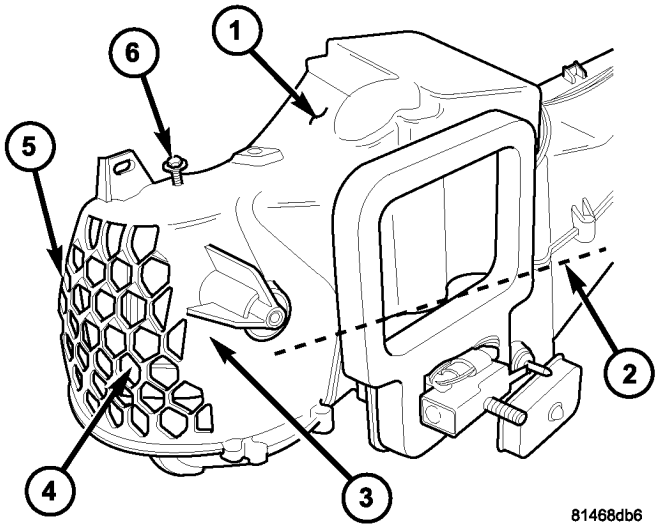


Fig. 16 Upper Air Inlet Housing

1 - HVAC HOUSING
2 - PARTING LINE
3 - UPPER AIR INLET HOUSING
4 - RECIRCULATION-AIR DOOR
5 - SCREW (3)
6 - SCREW

HVAC HOUSING (Continued)

HVAC HOUSING

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: The HVAC housing must be removed from the vehicle and disassembled for service of the air inlet housing, air distribution housing and the A/C evaporator.

NOTE: Take the proper precautions to protect the front face of the instrument panel from cosmetic damage while performing this procedure.

(1) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).

(2) Drain the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM DRAIN).

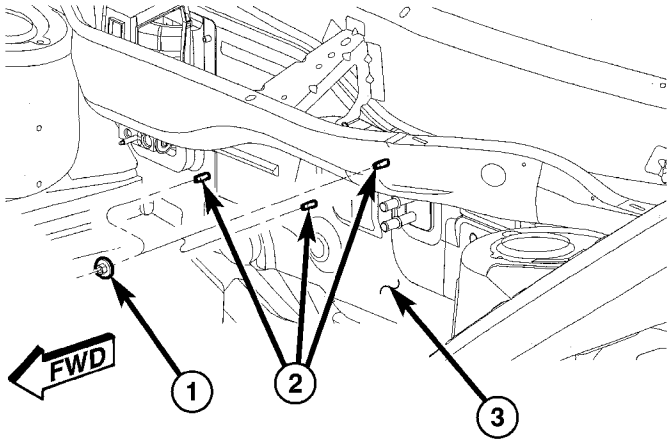
(3) Disconnect and isolate the negative battery cable.

(4) Disconnect the liquid and suction lines from the A/C expansion valve (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/LIQUID LINE - REMOVAL).

(5) Disconnect the heater hoses from the heater core (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER INLET HOSE - REMOVAL) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER RETURN HOSE - REMOVAL).

(6) Remove the three nuts that secure the HVAC housing to the engine compartment side of the dash panel (Fig. 17).

(7) Remove the instrument panel from the passenger compartment (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).



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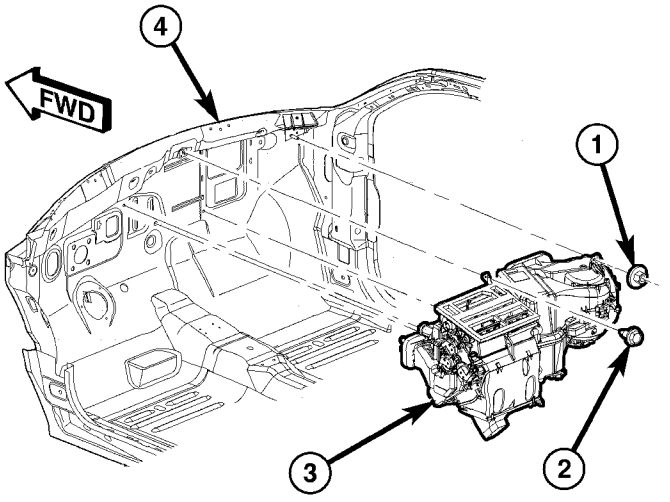
Fig. 17 HVAC Housing-Engine Compartment

1 - NUT (3)
2 - HVAC HOUSING MOUNTING STUDS
3 - DASH PANEL

(8) Remove the nut and bolt that secure the HVAC housing to the passenger compartment side of the dash panel (Fig. 18).

(9) Pull the HVAC housing rearward to clear the dash panel and remove the HVAC housing from the passenger compartment.

(10) If required, disassemble the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION -FRONT/HVAC HOUSING - DISASSEMBLY).



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Fig. 18 HVAC Housing-Passenger Compartment

1 - NUT
2 - BOLT
3 - HVAC HOUSING ASSEMBLY
4 - DASH PANEL

HVAC HOUSING (Continued)

DISASSEMBLY

AIR DISTRIBUTION HOUSING

NOTE: The air distribution housing must be removed from the HVAC housing and disassembled for service of the mode-air and blend-air doors.

(1) Remove the air distribution housing from the HVAC housing and place it on a workbench (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - AIR DISTRIBUTION HOUSING - REMOVAL).

(2) Remove the two screws that secure the heater core to the driver side of the air distribution housing and carefully remove the heater core (Fig. 19).

(3) Remove the screws that secure the mode door actuator and the two blend door actuators to the driver side of the air distribution housing and remove the actuators.

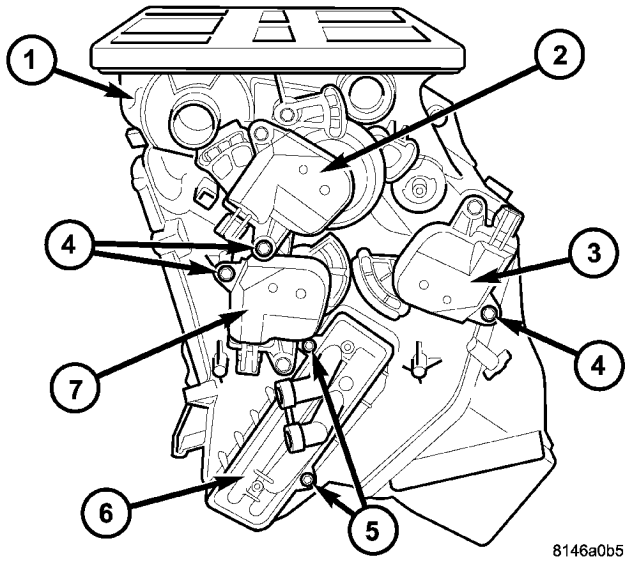


Fig. 19 Actuators and Heater Core

1 - AIR DISTRIBUTION HOUSING
2 - MODE DOOR ACTUATOR
3 - BLEND DOOR ACTUATOR (DRIVER)
4 - SCREW (2)
5 - SCREWS
6 - HEATER CORE
7 - BLEND DOOR ACTUATOR (PASSENGER)

(4) Remove the defrost door linkage arm, instrument panel door linkage arm, mode door cam, floor door gear, driver side blend door gear and the passenger side blend door stop from the driver side of the air distribution housing (Fig. 20).

(5) Remove the six screws that secure the floor distribution ducts to the air distribution housing and remove the ducts (Fig. 21).

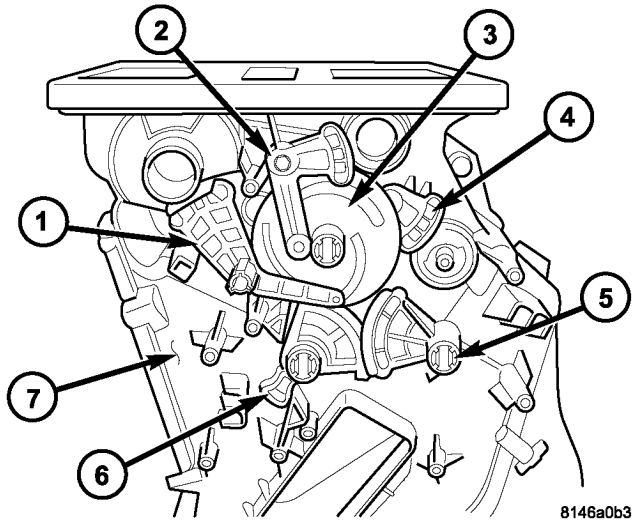


Fig. 20 Air Door Linkage

1 - DEFROST DOOR LINKAGE ARM
2 - INSTRUMENT PANEL DOOR LINKAGE ARM
3 - MODE DOOR CAM
4 - FLOOR DOOR GEAR
5 - DRIVER SIDE BLEND DOOR GEAR
6 - PASSENGER SIDE BLEND DOOR STOP
7 - AIR DISTRIBUTION HOUSING

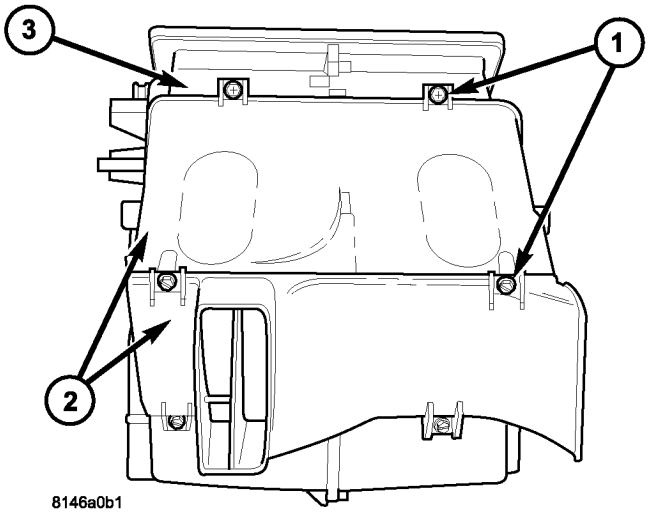


Fig. 21 Front Floor Distribution Duct

1 - SCREWS (6)
2 - FLOOR DISTRIBUTION DUCTS
3 - HVAC HOUSING

HVAC HOUSING (Continued)

(6) Remove the screw from the center of the driver side of the air distribution housing (Fig. 22).

(7) Carefully cut the foam seal along the parting line of the two halves of the air distribution housing. If the seal is deformed or damaged, it must be replaced.

(8) Remove the seven screws that secure the two halves of the air distribution housing together and carefully separate the housing.

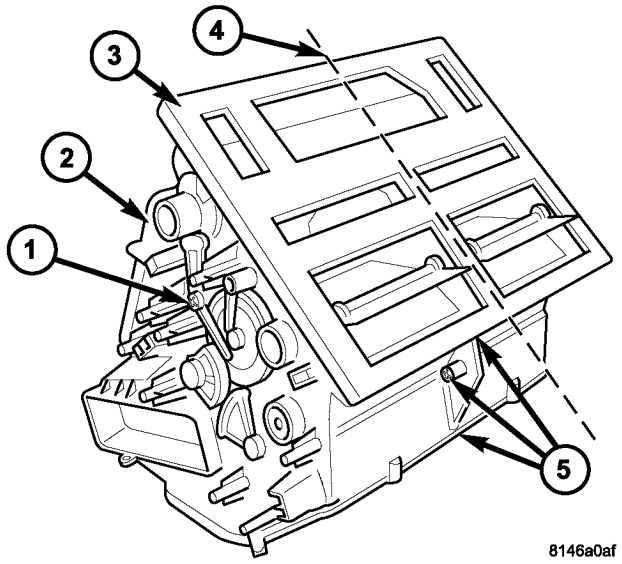


Fig. 22 Air Distribution Housing Screws

1 - SCREW
2 - AIR DISTRIBUTION HOUSING
3 - FOAM SEAL
4 - PARTING LINE
5 - SCREWS (7)

(9) Push down on the retaining tab of the blend door gear and carefully pull the gear out of the blend door pivot shaft (Fig. 23).

NOTE: If the seal on the air door is deformed or damaged, the air door must be replaced.

(10) Remove the blend-air door from the driver side of the air distribution housing.

(11) Remove the screw that secures the driver side air vane to the passenger side of the air distribution housing and remove the vane (Fig. 24).

NOTE: If the seal on any air door is deformed or damaged, the air door must be replaced.

(12) Remove the air doors and the partition from the air distribution housing.

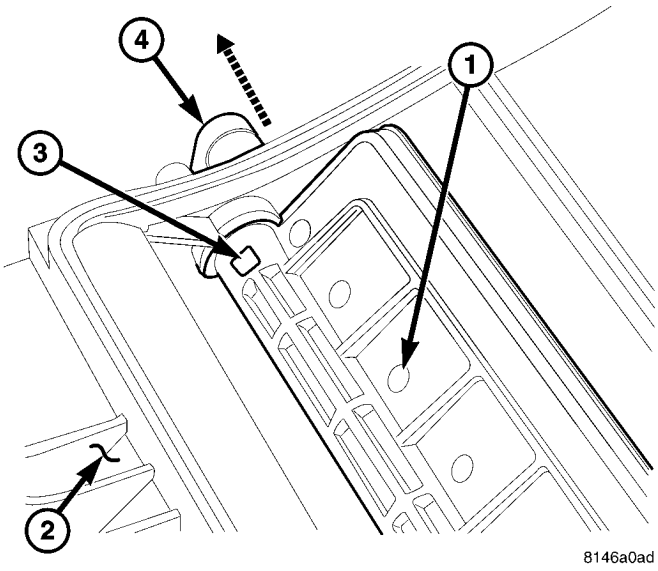


Fig. 23 Dual Zone Driver Side Blend-Air Door

1 - BLEND-AIR DOOR (DRIVER SIDE)
2 - AIR DISTRIBUTION HOUSING
3 - GEAR RETAINING TAB
4 - BLEND DOOR GEAR

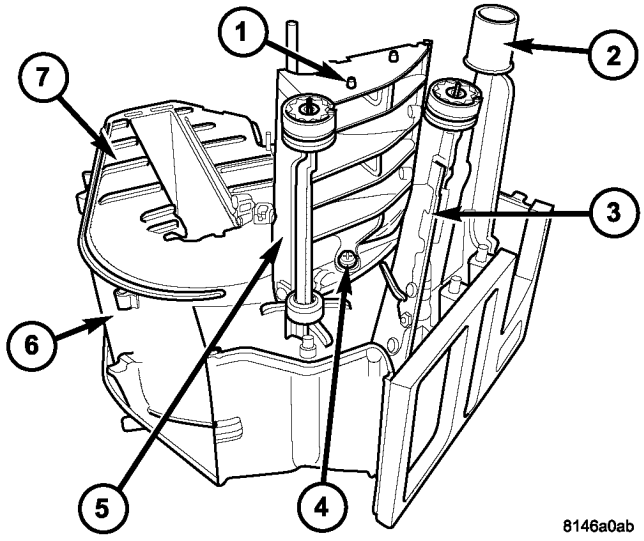


Fig. 24 Air Doors and Partition - Driver Side

1 - AIR VANE (DRIVER SIDE)
2 - DEFROST-AIR DOORS
3 - PANEL-AIR DOOR (DRIVER SIDE)
4 - SCREW
5 - FLOOR-AIR DOOR (DRIVER SIDE)
6 - AIR DISTRIBUTION HOUSING (PASSENGER SIDE)
7 - PARTITION

HVAC HOUSING (Continued)

(13) Remove the screw that secures the passenger side air vane to the passenger side of the air distribution housing and remove the vane (Fig. 25).

NOTE: If the seal on any air door is deformed or damaged, the air door must be replaced.

(14) Remove the air doors from the passenger side of the air distribution housing.

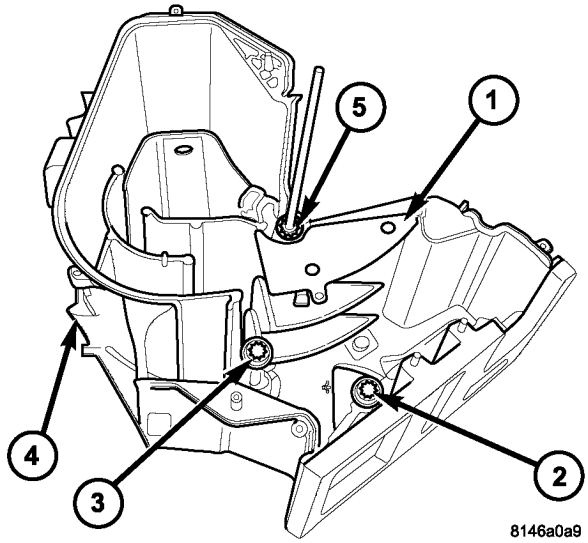


Fig. 25 Air Doors and Vane - Passenger Side

1 - AIR VANE (PASSENGER SIDE)
2 - PANEL-AIR DOOR (PASSENGER SIDE)
3 - FLOOR-AIR DOOR (PASSENGER SIDE)
4 - AIR DISTRIBUTION HOUSING (PASSENGER SIDE)
5 - BLEND-AIR DOOR (PASSENGER SIDE)

HVAC HOUSING

NOTE: The HVAC housing must be removed from the vehicle and disassembled for service of the A/C evaporator.

(1) Remove the HVAC housing from the vehicle and place it on a workbench (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/ HVAC HOUSING - REMOVAL).

(2) Remove the air distribution housing from the HVAC housing (Fig. 26) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/ HVAC HOUSING - AIR DISTRIBUTION HOUSING - REMOVAL).

(3) Remove the air inlet housing from the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - AIR INLET HOUSING - REMOVAL).

(4) Remove the A/C expansion valve from the A/C evaporator (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C EXPANSION VALVE - REMOVAL).

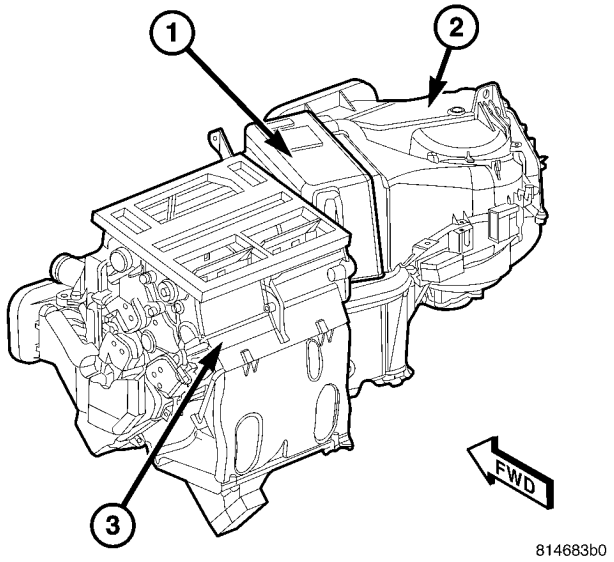


Fig. 26 HVAC Housing Assembly

1 - HVAC HOUSING
2 - AIR INLET HOUSING
3 - AIR DISTRIBUTION HOUSING

(5) Disconnect the HVAC wiring harness from the blower motor resistor or power module (depending on application) (Fig. 27).

(6) Disengage the HVAC wire harness from the routing clips on the HVAC housing and remove the wire harness from the housing.

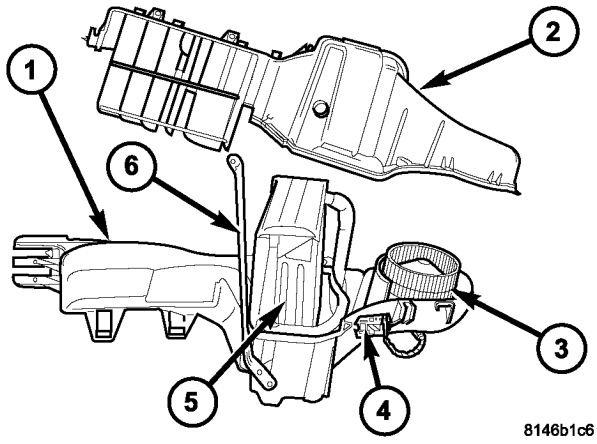


Fig. 27 HVAC Housing

1 - LOWER HVAC HOUSING
2 - UPPER HVAC HOUSING
3 - BLOWER MOTOR
4 - BLOWER MOTOR RESISTOR/POWER MODULE
5 - A/C EVAPORATOR
6 - SUPPORT BRACKET

HVAC HOUSING (Continued)

(7) If required, remove three screws that secure the blower motor to the HVAC housing and remove the blower motor.

(8) If required, remove two screws that secure the blower motor resistor or power module (depending on application) to the HVAC housing and remove the resistor or module.

(9) If required, remove two screws that secure the support bracket to the HVAC housing and remove the bracket.

(10) Remove the thirteen screws that secure the upper HVAC housing half to the lower half of the HVAC housing.

(11) Separate the two halves of the HVAC housing.

(12) Carefully lift the A/C evaporator and insulator out of the lower half of the HVAC housing.

ASSEMBLY

AIR DISTRIBUTION HOUSING

NOTE: The air distribution housing must be removed from the HVAC housing and disassembled for service of the mode-air and blend-air doors.

(1) Install the air doors into the passenger side of the air distribution housing as required. Align the air doors with the pivot shaft holes in the housing.

(2) Install the air vane and retaining screw to the passenger side of the air distribution housing. Tighten the screw to 2 N·m (17 in. lbs.).

(3) Align the air door pivot shafts with the pivot holes in the center partition and install the partition onto the passenger side of the air distribution housing.

(4) Install the driver side air vane and retaining screw to the center partition. Tighten the screw to 2 N·m (17 in. lbs.).

(5) Install the blend-air door to the driver side of the air distribution housing. Align the air door with the pivot shaft hole in the housing.

(6) Align and install the blend door gear into the pivot shaft of the driver side blend-air door. Make sure that the retaining tab on the door gear is securely engaged to the pivot shaft.

(7) Align the air door pivot shafts to each other and carefully install the driver side half of the air distribution housing to the passenger side half of the housing.

(8) Install the seven screws that secure the two halves of the air distribution housing together. Tighten the screws to 2 N·m (17 in. lbs.).

(9) Inspect the foam seal, especially at the parting line. If the seal is deformed or damaged, it must be replaced.

(10) Install the screw to the center of the driver side air distribution housing. Tighten the screw to 2 N·m (17 in. lbs.).

(11) Position the floor distribution ducts onto the air distribution housing.

(12) Install the six screws that secure the floor distribution ducts to the air distribution housing. Tighten the screws to 2 N·m (17 in. lbs.).

NOTE: Align the guide pin on the linkage arms with the guides on the mode door cam during installation of the floor door gear and linkage arms.

(13) Install the passenger side blend door stop, driver side blend door gear, floor door gear, mode door cam, instrument panel door linkage arm and the defrost door linkage arm onto the driver side of the air distribution housing.

(14) Position the mode door and blend door actuators onto the driver side of the air distribution housing. If necessary, rotate the actuators slightly to align the splines on the actuator output shaft with those in the air door linkage.

(15) Install the two screws that secure each actuator to the air distribution housing. Tighten the screws to 2 N·m (17 in. lbs.).

(16) Carefully install the heater core into the driver side of the air distribution housing.

(17) Install the two screws that secure the heater core to the air distribution housing. Tighten the screw to 2 N·m (17 in. lbs.).

(18) Install the air distribution housing onto the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - AIR DISTRIBUTION HOUSING - INSTALLATION).

HVAC HOUSING

(1) Install the A/C evaporator into the lower half of the HVAC housing. Make sure that the evaporator drain within the HVAC housing is clean and unrestricted and that the insulator around the A/C evaporator is properly installed.

(2) Install the upper half of the HVAC housing onto the lower half of the HVAC housing.

(3) Install the thirteen screws that secure the two halves of the HVAC housing together. Tighten the screws to 2 N·m (17 in lbs.).

(4) If removed, install the support bracket and the two retaining screws. Tighten the screws to 2 N·m (17 in lbs.).

(5) If removed, install the blower motor resistor or power module (depending on application) and the two retaining screws. Tighten the screws to 2 N·m (17 in lbs.).

HVAC HOUSING (Continued)

(6) If removed, install the blower motor and the three retaining screws. Tighten the screws to 2 N·m (17 in lbs.).

(7) Install the HVAC wiring harness (1). Make sure the harness is routed through all wiring retainers.

(8) Engage the HVAC wire harness into the routing clips on the HVAC housing.

(9) Connect the HVAC wire harness connector to the blower motor resistor or power module (depending on application).

(10) Install the A/C expansion valve (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C EXPANSION VALVE - INSTALLATION).

(11) Install the air inlet housing onto the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - AIR INLET HOUSING - INSTALLATION).

(12) Install the air distribution housing onto the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - AIR DISTRIBUTION HOUSING - INSTALLATION).

(13) Install the HVAC housing into the vehicle (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - INSTALLATION).

INSTALLATION

AIR DISTRIBUTION HOUSING

NOTE: The air distribution housing must be removed from the HVAC housing and disassembled for service of the mode-air and blend-air doors.

(1) Install the air distribution housing onto the rear of the HVAC housing by inserting the two tabs on the bottom of the distribution housing into the slots located on the bottom of the HVAC housing and tipping the distribution housing forward until it is properly aligned with the HVAC housing.

(2) Install the four screws that secure the air distribution housing to the HVAC housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Remove the tape or plugs from the heater core ports.

(4) Lubricate new rubber O-ring seals with clean engine coolant and install them onto the heater core tube fittings. Use only the specified O-ring as they are made of a special material for the engine cooling system.

(5) Position both heater core tubes and the sealing plate simultaneously onto the heater core.

NOTE: The heater core tubes each have a slot that must be indexed to a location tab within each of the heater core ports. Adjust the position of the tubes as required so that the sealing plate fits flush against the heater core supply and return ports, which indicates that the tubes are properly indexed.

(6) Index both heater core tubes to the heater core ports.

(7) Install the bolt that secures the heater core tube sealing plate to the heater core. Tighten the bolt to 3 N·m (27 in. lbs.).

(8) Install the plastic retaining clamp that secures the heater core tubes to the front of the HVAC housing.

(9) Install the foam seal onto the heater core tubes and the flange located at the front of the HVAC housing.

(10) Position the HVAC wire harness onto the air distribution housing.

(11) Connect the HVAC wire harness connectors to the mode door actuator and the two blend door actuators located on the driver side of the air distribution housing.

(12) Install the HVAC housing assembly (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - INSTALLATION).

AIR INLET HOUSING

NOTE: The air inlet housing must be removed from HVAC housing for service of the recirculation-air door.

(1) If removed, install the recirculation-air door into the upper air inlet housing and install the retaining screw. Tighten the screw to 2 N·m (17 in. lbs.).

(2) Position the air inlet housing and recirculation-air door onto the HVAC housing.

CAUTION: Make sure that the recirculation-air door pivot shaft is properly seated in the pivot seats.

(3) Install the three screws that secure the upper air inlet housing to the HVAC housing. Tighten the screws to 2 N·m (17 in. lbs.).

(4) Inspect the foam seal along the parting line. If the seal is deformed or damaged, it must be replaced.

(5) Feed the blower motor wire lead through the opening in the lower air inlet housing and seat the rubber grommet into the lower air inlet housing.

(6) Position the recirculation-air door pivot into the lower air inlet housing.

(7) Install the four screws (from the bottom) that secure the lower air inlet housing to the upper air

inlet housing and the lower HVAC housing. Tighten the screws to 2 N·m (17 in. lbs.).

(8) Install the one screw (from the top) that secures the lower air inlet housing to the upper air inlet housing. Tighten the screws to 2 N·m (17 in. lbs.).

(9) Connect the blower motor wire lead connector to the blower motor resistor or power module, depending on application.

(10) Install the recirculation door actuator wire lead into the routing clip located on the lower air inlet housing.

(11) Install the recirculation door actuator (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/RECIRCULATION DOOR ACTUATOR - INSTALLATION).

(12) Install the HVAC housing assembly (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - INSTALLATION).

HVAC HOUSING

NOTE: The HVAC housing must be removed from the vehicle and disassembled for service of the air inlet housing, air distribution housing and the A/C evaporator.

(1) Position the HVAC housing against the dash panel in the passenger compartment with the three mounting studs located in their proper holes. Make sure that the condensate drain tube protrudes through its opening.

(2) Loosely install the nut and bolt that secures the HVAC housing to the passenger compartment side of the dash panel.

(3) Install the three nuts that secure the HVAC housing to the engine compartment side of the dash panel. Tighten the nuts to 7 N·m (62 in. lbs.).

(4) Tighten the nut and bolt that secures the HVAC housing to the passenger compartment side of the dash panel to 3 N·m (26 in. lbs.).

(5) Install the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

(6) Connect the heater hoses to the heater core (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER INLET HOSE - INSTALLATION) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER RETURN HOSE - INSTALLATION).

(7) Connect the suction and liquid lines to the A/C expansion valve (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/LIQUID LINE - INSTALLATION).

(8) Reconnect the negative battery cable.

(9) If the heater core is being replaced, flush the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM CLEANING/REVERSE FLUSHING).

(10) Refill the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM REFILL).

(11) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

(12) Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

(13) Calibrate the A/C-heater control (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

DISTRIBUTION - REAR

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BLOWER MOTOR

DESCRIPTION

Vehicles equipped with 4 passenger seating and automatic temperature control (ATC) heating-A/C system, use a 12-volt, direct current (DC) rear blower motor. The rear blower motor has an integral wire harness and two squirrel cage-type blower wheels that are secured to the blower motor shaft (Fig. 1). The blower motor and wheels are contained within the two halves of the rear blower motor housing, which is located under the front center floor console cover.

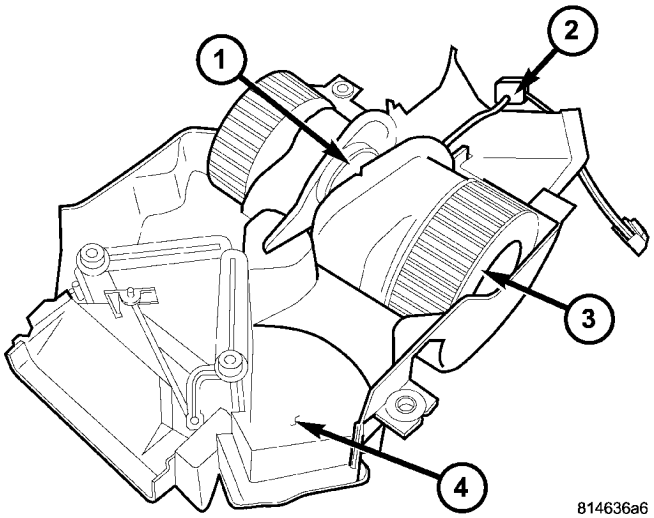


Fig. 1 Rear Blower Motor

1 - REAR BLOWER MOTOR
2 - WIRE HARNESS
3 - BLOWER WHEEL (2)
4 - LOWER REAR BLOWER MOTOR HOUSING

OPERATION

The rear blower motor and wheels are used to control the velocity of air moving through the center floor console ducts by spinning the blower wheels within the housing at the selected or programmed speed (depending on application).

The rear blower motor will operate whenever the ignition switch is in the On position and the power for the A/C-heater control of the automatic temperature control (ATC) heating-A/C system is turned on. When the ATC A/C-heater control display reads REAR AUTO or when the rear blower motor is off, the switch located in the center console between the second row seats is not functional. When the A/C-heater control display reads REAR, only the rear seat occupants control the rear blower motor speed from the rear switch. When in the Rear mode, the rear occupants can set the rear switch to any blower motor speed including OFF or AUTO. While in the Auto position, the rear blower motor speed will be automatically controlled.

The rear blower motor speed is controlled by an electronic blower motor power module, which uses a pulse width modulated input from the ATC A/C-heater control and feedback signal from the rear blower motor to regulate the blower motor ground path. The rear blower motor receives battery current whenever the rear blower motor relay is energized.

For diagnosis and testing of the rear blower motor, refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/BLOWER MOTOR - DIAGNOSIS AND TESTING.

The rear blower motor and blower motor wheels are factory balanced and cannot be adjusted or repaired. If faulty or damaged, the rear blower motor and blower wheels must be replaced as an assembly.

BLOWER MOTOR (Continued)

REMOVAL

NOTE: The rear blower motor and blower wheels are serviced only as a balanced unit. If either component is faulty or damaged, the entire blower motor and wheel assembly must be replaced.

(1) Remove the front center floor console cover (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - REMOVAL).

(2) Disconnect and isolate the negative battery cable.

(3) Disconnect the body wire harness connectors from the rear blower motor power module and the rear mode door actuator (Fig. 2).

(4) Remove the body wire harness bracket from the console support bracket.

(5) Remove the eight screws and the two console support brackets from the floor console base and duct assembly

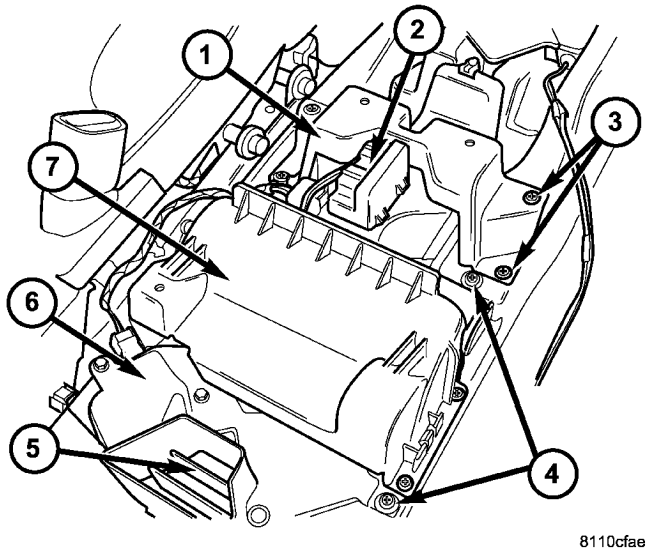


Fig. 2 Rear Blower Motor Housing

1 - SUPPORT BRACKET (FRONT)
2 - POWER MODULE
3 - SCREWS (8)
4 - SCREWS (4)
5 - REAR BLOWER MOTOR HOUSING
6 - REAR MODE DOOR ACTUATOR
7 - SUPPORT BRACKET (REAR)

(6) Remove the four screws that secure the rear blower motor housing to the floor console base and duct assembly.

(7) Remove the rear blower motor housing and place it on a bench.

(8) Disconnect the rear blower motor wire harness connector from the power module.

(9) Remove the eleven retaining clips and three screws that secure the housing together.

(10) Carefully separate the two halves of the housing.

(11) Remove the blower motor wire harness and grommet from the housing and remove the blower motor (Fig. 3).

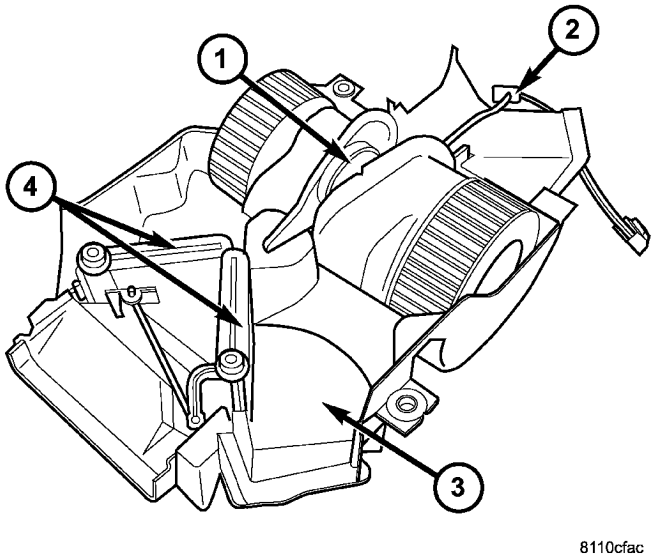


Fig. 3 Rear Blower Motor

1 - REAR BLOWER MOTOR
2 - WIRE HARNESS GROMMET
3 - REAR BLOWER MOTOR HOUSING
4 - CENTER CONSOLE MODE DOORS

INSTALLATION

(1) Position the rear blower motor into the housing and install the blower motor wire harness and grommet.

(2) Assemble the two halves of the rear blower motor housing and install the eleven retaining clips and three screws. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Connect the rear blower motor wire harness connector to the rear blower motor power module.

(4) Position the rear blower motor housing into the floor console.

(5) Install the four screws that secure the rear blower motor housing to the floor console base. Tighten the screws to 2 N·m (17 in. lbs.).

(6) Position the two console support brackets onto the floor console base.

(7) Install the eight screws that secure the support brackets to the floor console base. Tighten the screws to 2 N·m (17 in. lbs.).

(8) Install the body wire harness bracket onto the console rear support bracket.

(9) Connect the body wire harness connectors to the rear blower motor power module and the rear mode door actuator.

(10) Reconnect the negative battery cable.

BLOWER MOTOR (Continued)

(11) Install the front center floor console (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - INSTALLATION).

(12) Calibrate the A/C-heater control (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C HEATER CONTROL - STANDARD PROCEDURE -A/C-HEATER CONTROL CALIBRATION).

FLOOR CONSOLE DUCTS

REMOVAL

4 PASSENGER SEATING

(1) Remove the front and rear center floor console covers (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - REMOVAL).

(2) Disconnect and isolate the negative battery cable.

(3) Disconnect the body wire harness connectors from the rear blower motor power module, floor console mode door actuator and the hands-free module (Fig. 4).

(4) Remove the body wire harness bracket from the console support bracket.

(5) Remove the gear shift assembly (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT MECHANISM - REMOVAL).

(6) If necessary, remove the two support brackets, the rear blower motor housing and the hands-free module from the floor console base and duct assembly.

(7) Remove the nine nuts and two bolts that secure the floor console base and duct assembly to the center floor panel and remove the base and duct assembly.

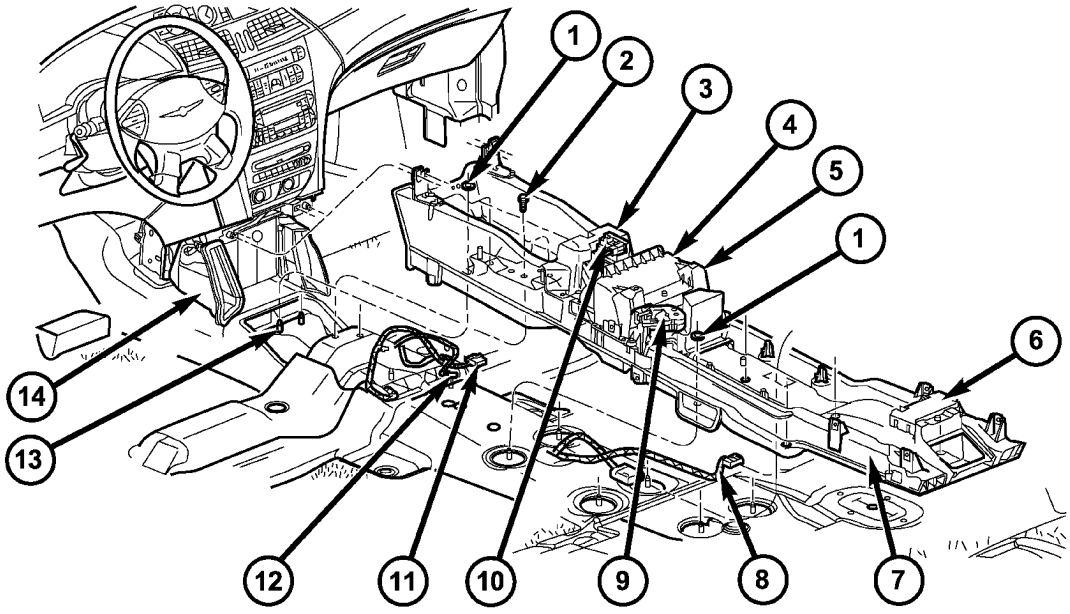


Fig. 4 Floor Console Base and Duct Assembly

1 - NUT (9)
2 - BOLT (2)
3 - SUPPORT BRACKET (FRONT)
4 - REAR BLOWER MOTOR HOUSING
5 - SUPPORT BRACKET (REAR)
6 - HANDS-FREE MODULE
7 - FLOOR CONSOLE BASE AND DUCT ASSEMBLY
8 - HANDS-FREE MODULE WIRE CONNECTOR
9 - MODE DOOR ACTUATOR
10 - POWER MODULE
11 - POWER MODULE WIRE CONNECTOR
12 - MODE DOOR ACTUATOR WIRE CONNECTOR
13 - WELD STUD (9)
14- FLOOR DISTRIBUTION DUCT

FLOOR CONSOLE DUCTS (Continued)

5 PASSENGER SEATING

(1) Remove the two screws that secure the rear floor outlet assembly to the rear of the center floor console and remove the floor outlet assembly (Fig. 5).

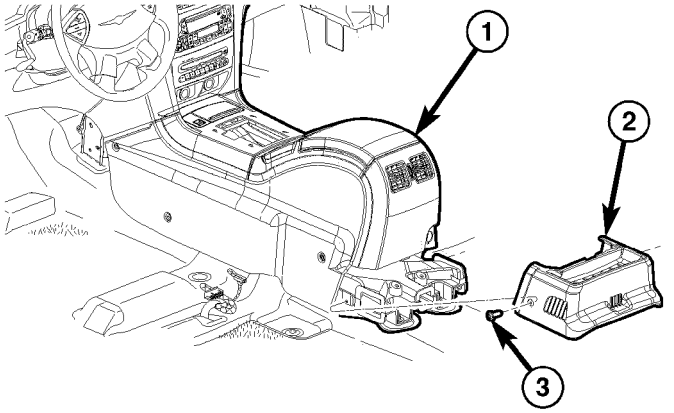


Fig. 5 Rear Floor Outlet Assembly

1 - CENTER FLOOR CONSOLE
2 - REAR FLOOR OUTLET ASSEMBLY
3 - SCREW (2)

(2) Remove the center floor console cover (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - REMOVAL).

(3) Remove the gear shift assembly (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT MECHANISM - REMOVAL).

(4) Remove the five nuts and two bolts that secure the floor console base and duct assembly to the floor panel and remove the base and duct assembly (Fig. 6).

INSTALLATION

4 PASSENGER SEATING

(1) Position the floor console base and duct assembly into the vehicle.

(2) Install the nine nuts and two bolts that secure the floor console base and duct assembly to the center floor panel. Tighten the nuts and bolts to 5 N·m (45 in. lbs.).

(3) If removed, install the two support brackets, the rear blower motor housing and the hands-free module. Tighten the screws to 2 N·m (17 in. lbs.).

(4) Install the gear shift assembly (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT MECHANISM - INSTALLATION).

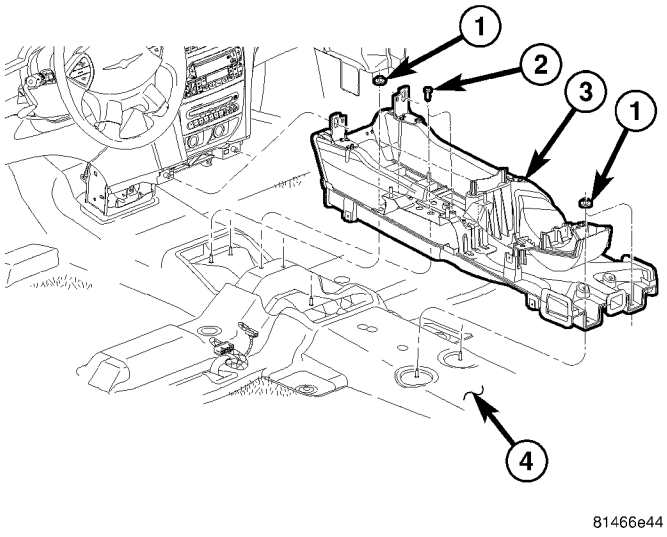


Fig. 6 Floor Console Base and Duct Assembly

1 - NUT (5)
2 - BOLT (2)
3 - BASE AND DUCT ASSEMBLY
4 - CENTER FLOOR PANEL

(5) Install the body wire harness bracket onto the console support bracket.

(6) Connect the body wire harness connectors to the rear blower motor power module, floor console mode door actuator and the hands-free module.

(7) Reconnect the negative battery cable.

(8) Install the front and rear center floor console covers (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - INSTALLATION).

5 PASSENGER SEATING

(1) Position the floor console base and duct assembly into the vehicle.

(2) Install the five nuts and two bolts that secure the floor console base and duct assembly to the center floor panel. Tighten the nuts and bolts to 5 N·m (45 in. lbs.).

(3) Install the gear shift assembly (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT MECHANISM - INSTALLATION).

(4) Install the center floor console cover (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE - INSTALLATION).

(5) Install the rear floor outlet assembly onto the rear of the center floor console.

(6) Install the two screws that secure the rear floor outlet assembly to the center floor console. Tighten the screws to 2 N·m (17 in. lbs.).

PLUMBING

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PLUMBING

DESCRIPTION

The A/C refrigerant lines and hoses are used to carry the refrigerant between the various A/C system components. The refrigerant lines and hoses for the R-134a system on this vehicle consist of a barrier-hose design with a nylon tube sandwiched between rubber layers. The nylon tube helps to contain the R-134a refrigerant, which has a smaller molecular structure than R-12 refrigerant. The ends of the refrigerant lines are made from lightweight aluminum or steel, and commonly use braze-less fittings.

Any kinks or sharp bends in the refrigerant lines and hoses will reduce the capacity of the entire A/C system and can reduce the flow of refrigerant in the system. The radius of all bends in the flexible hose refrigerant lines should be at least ten times the diameter of the hose and the refrigerant lines should be routed so they are at least 80 millimeters (3 inches) away from the exhaust manifold(s) and exhaust pipe(s).

OPERATION

High pressures are produced in the refrigerant system when the A/C compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

The refrigerant lines and hoses are coupled to other A/C system components with block-type fittings. An O-ring seal, or a flat steel gasket with an integral O-ring (dual plane seal), is used to mate the refrigerant line fittings with A/C system components to ensure the integrity of the refrigerant system.

The refrigerant lines and hoses cannot be repaired and, if faulty or damaged, they must be replaced.

WARNINGS

WARNING: The A/C system contains refrigerant under high pressure. Repairs should only be performed by qualified service personnel. Severe personal injury or death may result from improper service procedures.

WARNING: Avoid breathing the refrigerant and refrigerant oil vapor or mist. Exposure may irritate the eyes, nose, and/or throat. Wear eye protection when servicing the A/C refrigerant system. Serious eye injury can result from direct contact with the refrigerant. If eye contact occurs, seek medical attention immediately.

WARNING: Do not expose the refrigerant to open flame. Poisonous gas is created when refrigerant is burned. An electronic leak detector is recommended. Severe personal injury or death may result from improper service procedures.

WARNING: If accidental system discharge occurs, ventilate the work area before resuming service. Large amounts of refrigerant released in a closed work area will displace the oxygen and cause suffocation and death.

WARNING: The evaporation rate of R-134a refrigerant at average temperature and altitude is extremely high. As a result, anything that comes in contact with the refrigerant will freeze. Always protect the skin or delicate objects from direct contact with the refrigerant.

WARNING: The R-134a service equipment or the vehicle refrigerant system should not be pressure tested or leak tested with compressed air. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures are potentially dangerous, and may result in fire or explosion causing property damage, personal injury or death.

WARNING: The engine cooling system is designed to develop internal pressures of 97 to 123 kilopascals (14 to 18 pounds per square inch). Do not remove or loosen the coolant pressure cap, cylinder block drain plugs, radiator drain, radiator hoses, heater hoses, or hose clamps while the engine cooling system is hot and under pressure. Allow the vehicle to cool for a minimum of 15 minutes before opening the cooling system for service. Failure to observe this warning can result in serious burns from the heated engine coolant.

CAUTIONS

CAUTION: Never add R-12 to a refrigerant system designed to use R-134a. Do not use R-12 equipment or parts on a R-134a A/C system. These refrigerants are not compatible and damage to the A/C system will result.

CAUTION: Never use R-12 refrigerant oil in a A/C system designed to use R-134a refrigerant oil. These refrigerant oils are not compatible and damage to the A/C system will result.

CAUTION: The use of A/C system sealers may result in damage to A/C refrigerant recovery/evacuation/recharging equipment and/or A/C system. Many federal, state/provincial and local regulations prohibit the recharge of A/C systems with known leaks. DaimlerChrysler recommends the detection of A/C system leaks through the use of approved leak detectors and fluorescent leak detection dyes. Vehicles found with A/C system sealers should be treated as contaminated and replacement of the entire A/C refrigerant system is recommended. A/C systems found to be contaminated with A/C system sealers, A/C stop-leak products or seal conditioners voids the warranty for the A/C system.

CAUTION: Recover the refrigerant before opening any fitting or connection. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

CAUTION: If equipped, do not remove the secondary retention clip from any spring-lock coupler connection while the refrigerant system is under pressure. Recover the refrigerant before removing the secondary retention clip. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

CAUTION: The internal parts of the A/C system will remain stable as long as moisture-free refrigerant and refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability. This may cause operational troubles or even serious damage if present in more than very small quantities. Before disconnecting a component, clean the outside of the fittings thoroughly to prevent contamination from entering the refrigerant system. Keep service tools and the work area clean. Do not open the refrigerant system or uncap a replacement component until you are ready to service the system. Immediately after disconnecting a component from the refrigerant system, seal the open fittings with a cap or plug. This will prevent contamination from entering the A/C system.

CAUTION: Refrigerant oil will absorb moisture from the atmosphere if left uncapped. Do not open a container of refrigerant oil until you are ready to use it. Replace the cap on the oil container immediately after using. Store refrigerant oil only in a clean, airtight, and moisture-free container.

CAUTION: Do not overcharge the refrigerant system. Overcharging will cause excessive compressor head pressure and can cause compressor noise and A/C system failure.

DIAGNOSIS AND TESTING

REFRIGERANT SYSTEM LEAKS

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

If the A/C system is not cooling properly, determine if the refrigerant system is fully-charged (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - DIAGNOSIS AND TESTING - REFRIGERANT SYSTEM CHARGE LEVEL).

If the refrigerant system is low or empty; a leak at a refrigerant line, connector fitting, component, or component seal is likely. While an oily residue on or near refrigerant system lines, connector fittings, components, or component seals can indicate the general location of a possible refrigerant leak, the exact leak location should be confirmed with an electronic leak detector prior to component repair or replacement. An electronic leak detector designed for R-134a refrigerant is recommended for locating and confirming refrigerant system leaks. See the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

To detect a leak in the refrigerant system, perform one of the following procedures as indicated by the results of the refrigerant system charge level test.

SYSTEM EMPTY

(1) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

(2) Connect and dispense 0.283 kilograms (0.625 pounds or 10 ounces) of R-134a refrigerant into the evacuated refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

(3) Proceed to the SYSTEM LOW procedures.

PLUMBING (Continued)

SYSTEM LOW

(1) Position the vehicle in a wind-free work area. This will aid in detecting small leaks.

(2) Bring the refrigerant system up to operating temperature and pressure. This is done by allowing the engine to run at idle under the following conditions for five minutes, then turning the engine off.

(a) Front windows are open.

(b) Transaxle in Park.

(c) Front heater-A/C controls set to outside air, panel mode, blower high, and compressor engaged.

(3) Wait five to seven minutes and, with the engine not running, use a electronic R-134a leak detector and search for leaks. Because R-134a refrigerant is heavier than air, the leak detector probe should be moved slowly along the bottom side of all refrigerant lines, connector fittings and components.

(4) To inspect an evaporator for leaks, insert the electronic leak detector probe into a floor outlet or the recirculation air intake.

REFRIGERANT SYSTEM CHARGE LEVEL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: Always refer to the underhood HVAC Specification Label for the refrigerant fill capacity of the vehicle being serviced.

The procedure that follows should be used to determine whether the refrigerant system contains the proper refrigerant charge. Symptoms of an improper refrigerant charge (low) include: poor A/C performance, fog emitted from the air outlets, a hissing sound from the A/C expansion valve/evaporator area. There are two different methods with which the refrigerant charge level may be tested:

1. Using a DRBIII® scan tool, a thermocouple and the Charge Determination Chart (Fig. 1). Refer to the appropriate diagnostic information.

2. Using a manifold gauge set, a thermocouple and the Charge Determination Chart (Fig. 1).

A temperature probe is required to measure liquid line temperature. The clamp-on, Type K thermocouple temperature probe used in this procedure is available through the DaimlerChrysler Professional Service Equipment (PSE) program. This probe (PSE #66-324-0014 or #80PK-1A) is compatible with temperature-measuring instruments that accept Type K thermocouples, and have a miniature connector input. Other temperature probes are available through aftermarket sources; however, all references in this procedure will reflect the use of the probe made available through the PSE program.

In order to use the temperature probe, a digital thermometer will also be required. If a digital thermometer is not available, an adapter is available through the PSE program that will convert any standard digital multimeter into a digital thermometer. This adapter is designed to accept any standard Type K thermocouple. If a digital multimeter is not available, this tool is also available through the PSE program.

NOTE: When connecting the service equipment couplings to the refrigerant system service ports, be certain that the valve of each coupling is fully closed. This will reduce the amount of effort required to make the connection.

(1) Remove the caps from the refrigerant system service ports and attach a manifold gauge set or a R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 to the refrigerant system.

(2) Attach a clamp-on thermocouple to the A/C liquid line. The thermocouple must be placed as close to the A/C pressure transducer as possible to accurately observe liquid line temperature.

(3) Bring the refrigerant system up to operating temperature and pressure. This is done by allowing the engine to run at idle under the following conditions for five minutes.

(a) Front windows are open.

(b) Transaxle in Park.

(c) Front A/C-heater controls set to fresh air, full cool, panel mode, high blower speed and the A/C compressor engaged.

(4) Raise the liquid line (discharge) pressure to about 1793 kPa (260 psi) by placing a piece of cardboard over part of the front of the A/C condenser. To place the cardboard properly, remove the upper radiator sight shield from the front fascia. Cover only enough of the A/C condenser to raise and maintain the liquid line pressure at the specified level.

(5) Observe the liquid line (discharge) pressure and liquid line temperature. Using the Charge Determination Chart (Fig. 1), determine whether the refrigerant system is operating within the proper charge range.

(a) If the refrigerant system is operating in the undercharged area of the chart, add 0.057 kilogram (0.125 pound or 2 ounces) of R-134a refrigerant to the system.

(b) If the refrigerant system is operating in the overcharged area of the chart, reclaim 0.057 kilogram (0.125 pound or 2 ounces) of refrigerant from the system.

PLUMBING (Continued)

(6) Recheck the refrigerant system charge level following each refrigerant level adjustment. Continue this process until the refrigerant system readings are in the proper charge range area on the Charge Determination Chart.

STANDARD PROCEDURE

REFRIGERANT SYSTEM SERVICE EQUIPMENT

WARNING: Eye protection must be worn when servicing an air conditioning refrigerant system. Turn off (rotate clockwise) all valves on the equipment being used before connecting to, or disconnecting from the refrigerant system. Failure to observe these warnings may result in personal injury or death.

WARNING: Review the warnings and cautions in the front of this section before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS).

RECOVERY/RECYCLING STATION

When servicing the A/C system, a R-134a refrigerant recovery/recycling/charging station that meets SAE standard J2210 must be used (Fig. 2). Contact an automotive service equipment supplier for refrigerant recovery/recycling/charging equipment. Refer to the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

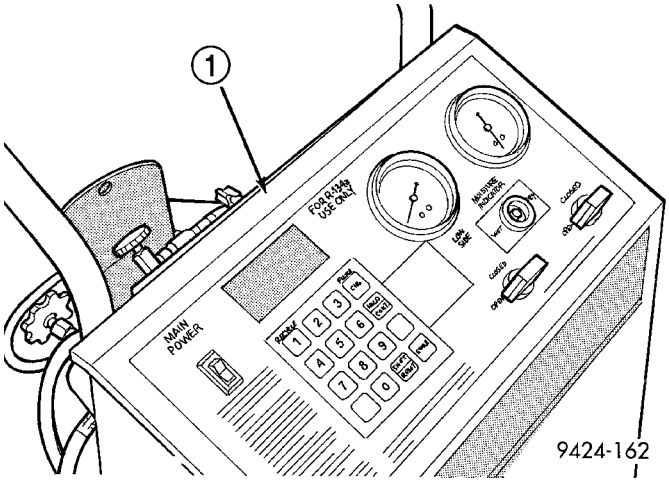


Fig. 2 Refrigerant Recovery/Recycling Station - Typical

1 - R-134a REFRIGERANT STATION

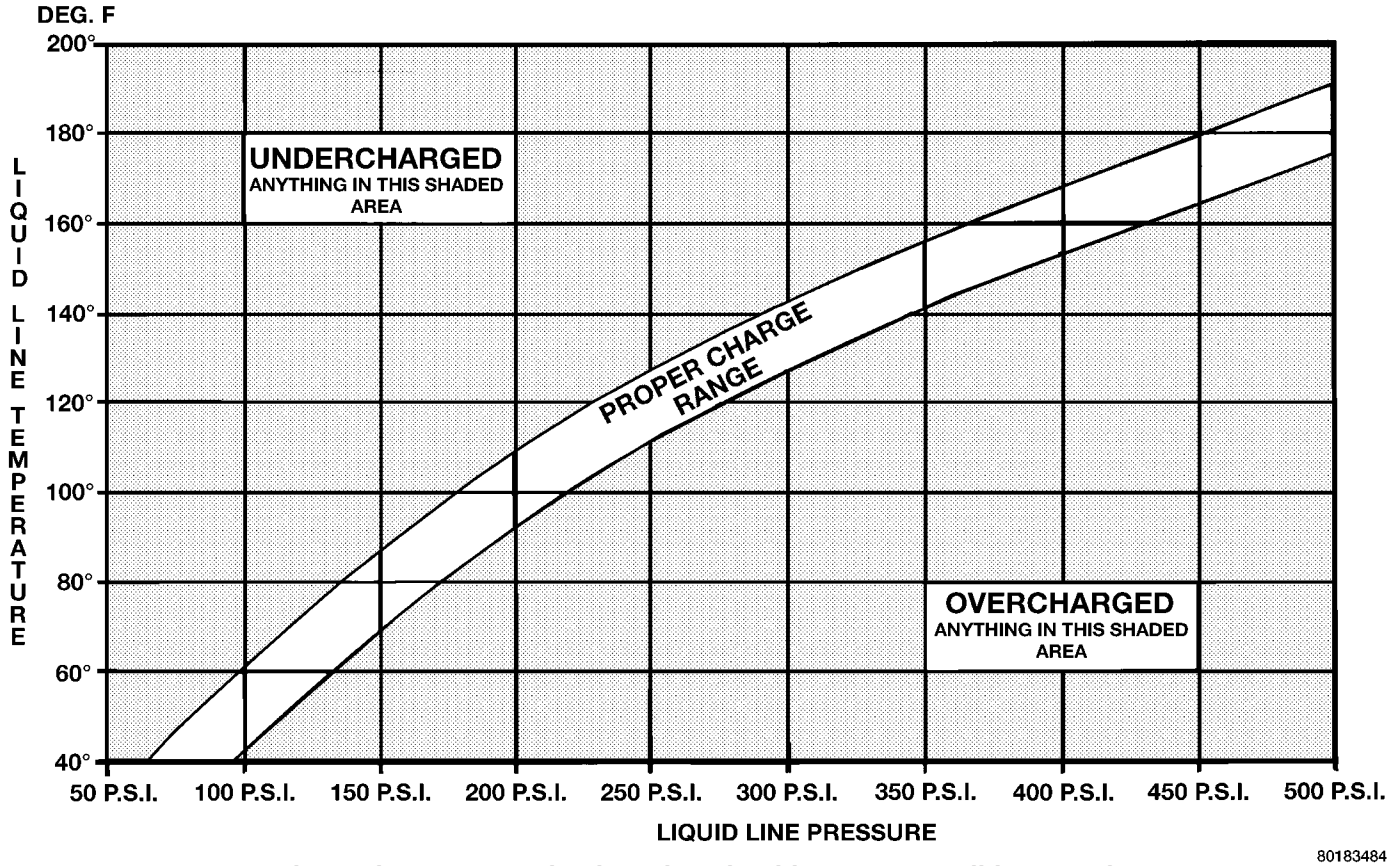


Fig. 1 Charge Determination Chart (Ambient Test Condition 85° F)

PLUMBING (Continued)

MANIFOLD GAUGE SET

CAUTION: Do not use an R-12 manifold gauge set on an R-134a system. The refrigerants are not compatible and system damage will result.

A manifold gauge set (Fig. 3) may be needed with some recovery/recycling/charging equipment. The manifold gauge set should have manual shut-off valves, or automatic back-flow valves located at the service port connector end of the manifold gauge set hoses. This will prevent refrigerant from being released into the atmosphere.

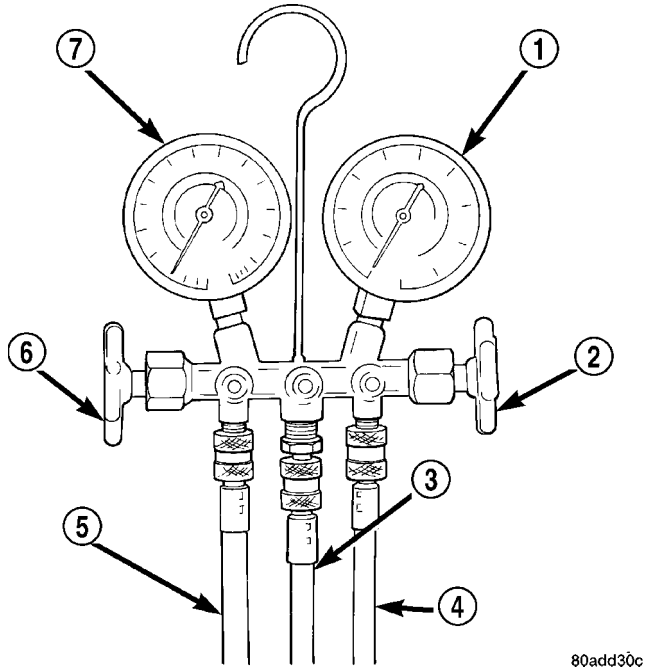


Fig. 3 Manifold Gauge Set - Typical

1 - HIGH PRESSURE GAUGE
2 - VALVE
3 - VACUUM/REFRIGERANT HOSE (YELLOW W/BLACK STRIPE)
4 - HIGH PRESSURE HOSE (RED W/BLACK STRIPE)
5 - LOW PRESSURE HOSE (BLUE W/BLACK STRIPE)
6 - VALVE
7 - LOW PRESSURE GAUGE

MANIFOLD GAUGE SET CONNECTIONS

CAUTION: Do not use an R-12 manifold gauge set on an R-134a system. The refrigerants are not compatible and system damage will result.

- **LOW PRESSURE GAUGE HOSE** - The low pressure hose (Blue with Black stripe) attaches to the suction (low side) service port. This port is on the A/C suction line located near the A/C expansion valve at the rear of the engine compartment.
- **HIGH PRESSURE GAUGE HOSE** - The high pressure hose (Red with Black stripe) attaches to the discharge (high side) service port. This port is on the liquid line fitting located at the top of the receiver/drier near the right strut tower.
- **RECOVERY, RECYCLING, EVACUATION AND CHARGING HOSE** - The center manifold hose (Yellow, or White, with Black stripe) is used to recover, evacuate, and charge the refrigerant system. When the low or high pressure valves on the manifold gauge set are opened, the refrigerant in the system will escape through this hose.

REFRIGERANT SYSTEM RECOVERY

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

A R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to recover the refrigerant from an R-134a refrigerant system. Refer to the operating instructions supplied by the equipment manufacturer for the proper care and use of this equipment.

REFRIGERANT SYSTEM EVACUATE

NOTE: Special effort must be used to prevent moisture from entering the A/C system oil. Moisture in the oil is very difficult to remove and will cause a reliability problem with the compressor.

If an A/C compressor designed to use R-134a refrigerant is left open to the atmosphere for an extended period of time, it is recommended that the refrigerant oil be drained and replaced with new oil or a new compressor be used. This will eliminate the possibility of contaminating the A/C refrigerant system.

If the refrigerant system has been open to the atmosphere, it must be evacuated before the refrigerant system can be filled. Moisture and air mixed with the refrigerant system will raise the compressor head pressure above acceptable operating levels. This will reduce the performance of the A/C system and damage the A/C compressor. Moisture will boil at near room temperature when exposed to vacuum. A R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to evacuate the refrigerant system. See the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment. To evacuate the refrigerant system, use the following procedure:

PLUMBING (Continued)

NOTE: When connecting the service equipment couplings to the refrigerant system service ports, be certain that the valve of each coupling is fully closed. This will reduce the amount of effort required to make the connection.

(1) Recover the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).
(2) Connect a suitable charging station, refrigerant recovery machine or a manifold gauge set with vacuum pump and refrigerant recovery equipment.
(3) Open the suction and discharge valves and start the vacuum pump. The vacuum pump should run a minimum of 45 minutes prior to charge to eliminate all moisture within the refrigerant system. When the suction gauge reads -88 kPa (-26 in. Hg) vacuum or greater for 30 minutes, close all valves and turn off vacuum pump. If the refrigerant system fails to reach the specified vacuum, the refrigerant system likely has a leak that must be corrected. If the refrigerant system maintains specified vacuum for at least 30 minutes, start the vacuum pump, open the suction and discharge valves. Then allow the system to evacuate an additional 10 minutes.
(4) Close all valves. Turn off and disconnect the vacuum pump.
(5) Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

REFRIGERANT SYSTEM CHARGE

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: Always refer to the A/C Underhood Specification Label for the refrigerant fill capacity of the vehicle being serviced.

After all refrigerant system leaks have been repaired and the refrigerant system has been evacuated, a refrigerant charge can be injected into the system. For the proper amount of the refrigerant charge, always refer to the A/C Underhood Specification Label located in the engine compartment. An R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to charge the refrigerant system with R-134a refrigerant. See the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

CHARGING PROCEDURE

CAUTION: A small amount of refrigerant oil is removed from the A/C system each time the refrigerant system is recovered and evacuated. Before charging the A/C system, you MUST replenish any oil lost during the recovery process. Refer the equipment manufacturer instructions for more information.

(1) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).
(2) A manifold gauge set and a R-134a refrigerant recovery/recycling/charging station that meets SAE standard J2210 should still be connected to the A/C refrigerant system.
(3) Measure the proper amount of R-134a refrigerant and heat it to 52° C (125° F) with the charging station. See the operating instructions supplied by the equipment manufacturer for proper use of this equipment.
(4) Open both the suction and discharge valves, then open the charge valve to allow the heated refrigerant to flow into the system.
(5) When the transfer of refrigerant has stopped, close both the suction and discharge valves.
(6) If all of the refrigerant charge did not transfer from the dispensing device, open all of the windows in the vehicle and set the A/C-heater controls so that the A/C compressor is engaged and the blower motor is operating at its lowest speed setting. Run the engine at a steady high idle (about 1400 rpm). If theA/C compressor will not engage, test the compressor clutch control circuit and repair as required.
(7) Open the suction valve to allow the remaining refrigerant to transfer to the refrigerant system.

WARNING: Take care not to open the discharge (high pressure) valve at this time.

(8) Close the suction valve and test the A/C system performance (Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE - A/C PERFORMANCE TEST).
(9) Disconnect the charging station and manifold gauge set from the refrigerant system service ports.
(10) Install the caps onto the refrigerant system service ports.
(11) Run the HVAC Control Cooldown test to verify proper operation (Refer to 24 - HEATING & AIR

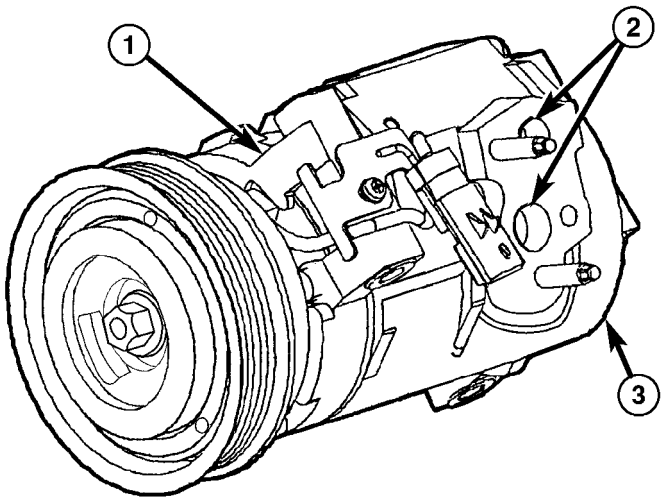
CONDITIONING - DIAGNOSIS AND TESTING - A/C COOLDOWN TEST).

A/C COMPRESSOR

DESCRIPTION

DESCRIPTION

Vehicles equipped with the 3.8L gasoline engine use the Denso 10S17 A/C compressor. Vehicles equipped with the 3.5L gasoline engine use the Denso 10S20 A/C compressor. Both A/C compressors include an integral high pressure relief valve. The A/C compressor (Fig. 4) is secured to a mounting bracket.



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Fig. 4 Denso Compressor -Typical

1 - A/C COMPRESSOR
2 - REFRIGERANT LINE PORTS
3 - HIGH PRESSURE RELIEF VALVE

HIGH PRESSURE RELIEF VALVE

A high pressure relief valve is located on the rear of the A/C compressor. This mechanical valve is designed to vent refrigerant from the A/C system to protect against damage to the compressor and other system components, caused by condenser air flow restriction or an overcharge of refrigerant.

OPERATION

A/C COMPRESSOR

The A/C compressor is driven by the engine through an electric clutch, drive pulley and belt arrangement. The A/C compressor is lubricated by refrigerant oil that is circulated throughout the refrigerant system with the refrigerant.

The A/C compressor draws in low-pressure refrigerant vapor from the A/C evaporator through its suction port. It then compresses the refrigerant into a high-pressure, high-temperature refrigerant vapor. The A/C compressor pumps the high-pressure refrigerant vapor to the A/C condenser through the compressor discharge port.

The A/C compressor cannot be repaired and, if faulty or damaged, the entire compressor assembly must be replaced. The compressor clutch, pulley and clutch coil are available for service.

HIGH PRESSURE RELIEF VALVE

The high pressure relief valve vents refrigerant from the A/C system when a discharge pressure of 3445 to 4135 kPa (500 to 600 psi) or above is reached. The relief valve closes when a minimum discharge pressure of 2756 kPa (400 psi) is reached.

The high pressure relief valve vents only enough refrigerant to reduce the A/C system pressure, and then re-seats itself. The majority of the refrigerant is conserved in the A/C system. If the relief valve vents refrigerant, it does not necessarily mean that the valve is faulty.

The high pressure relief valve is a factory-calibrated unit. The relief valve cannot be adjusted or repaired, and must not be removed or otherwise disturbed. The relief valve is only serviced as a part of the A/C compressor assembly.

DIAGNOSIS AND TESTING

A/C COMPRESSOR NOISE

When investigating an A/C system related noise, you must first know the conditions under which the noise occurs. These conditions include: weather, vehicle speed, transmission in gear or neutral, engine speed, engine temperature, and any other special conditions. Noises that develop during A/C operation can often be misleading. For example: What sounds like a failed front engine bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets or a loose compressor clutch assembly.

Drive belts are speed sensitive. At different engine speeds and depending upon drive belt tension, drive belts can develop noises that are mistaken for an A/C compressor noise. Improper drive belt tension can cause a misleading noise when the compressor clutch is engaged, which may not occur when the compressor clutch is disengaged. Check the accessory drive belt condition and tension as described in Cooling before beginning this procedure.

A/C COMPRESSOR (Continued)

(1) Select a quiet area for testing. Duplicate the complaint conditions as much as possible. Turn the A/C compressor On and Off several times to clearly identify the compressor noise. Listen to the A/C compressor while the clutch is engaged and disengaged. Probe the A/C compressor with an engine stethoscope or a long screwdriver with the handle held to your ear to better localize the source of the noise.

(2) Loosen all of the compressor mounting hardware and retighten. Check the compressor clutch retainer. Be certain that the clutch field coil is mounted securely to the A/C compressor, and that the clutch plate and pulley are properly aligned and have the correct air gap (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/CLUTCH-A/C COMPRESSOR - INSTALLATION).

(3) To duplicate a high-ambient temperature conditions (high head pressure), restrict the air flow through the A/C condenser. Install a manifold gauge set or a scan tool to be certain that the discharge pressure does not exceed 2760 kPa (400 psi).

(4) Check the refrigerant system plumbing for incorrect routing, rubbing or interference, which can cause unusual noises. Also check the refrigerant lines and hoses for kinks or sharp bends that will restrict refrigerant flow, which can cause noises (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - DESCRIPTION - REFRIGERANT LINES)

(5) If the noise is from opening and closing of the high pressure relief valve, recover, evacuate and recharge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY), (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

(6) If the high pressure relief valve still does not seat properly, replace the A/C compressor (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - FRONT/COMPRESSOR-A/C - REMOVAL).

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

(1) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).

(2) Disconnect and isolate the negative battery cable.

(3) Remove the radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).

(4) Remove the nuts that secures the suction and discharge lines to the A/C compressor.

(5) Disconnect the suction and discharge lines from the A/C compressor and remove and discard the O-ring seals and gaskets.

(6) Install plugs in, or tape over the opened refrigerant line fittings and compressor ports.

(7) Remove the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(8) Disconnect the engine wire harness from the field coil connector located on the top of the A/C compressor (Fig. 5).

(9) Disengage the engine wire harness from the wiring bracket located on the top of the A/C compressor.

(10) Remove the four bolts that secure the A/C compressor to the mounting bracket and support the compressor.

(11) Raise and support the vehicle.

(12) Remove the underside compressor splash shield push pins and the splash shield.

(13) Remove the A/C compressor from the compressor mounting bracket.

(14) If required, remove the four bolts that secure the compressor mounting bracket to the engine and remove the bracket.

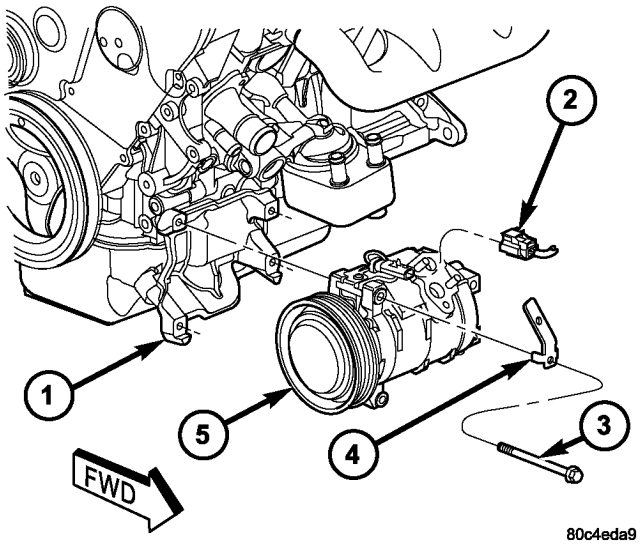


Fig. 5 A/C Compressor

1 - COMPRESSOR MOUNTING BRACKET
2 - WIRE HARNESS CONNECTOR
3 - A/C COMPRESSOR BOLT (4)
4 - WIRING BRACKET
5 - A/C COMPRESSOR

A/C COMPRESSOR (Continued)

INSTALLATION

NOTE: If a replacement A/C compressor is being installed, be certain to drain and measure the refrigerant oil contained in the old compressor. This will determine how much refrigerant oil the replacement A/C compressor must contain before it is installed (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - STANDARD PROCEDURE - REFRIGERANT OIL LEVEL).

NOTE: The receiver/drier should always be replaced when the A/C compressor is replaced. This will help remove any contaminants including moisture from the system.

(1) If removed, position the compressor mounting bracket onto the engine and install the four retaining bolts. Tighten the bolts to 115 N·m (85 ft. lbs.).

(2) Position the A/C compressor onto the compressor mounting bracket and support the compressor.

(3) Install the underside compressor splash shield and the push-pin retainers.

(4) Lower the vehicle.

(5) Loosely install the four bolts that secure the A/C compressor to the compressor mounting bracket. Tighten each of the bolts using the following sequence to 33 N·m (25 ft. lbs.).

- The upper bolt at the front of the compressor.
- The lower bolt at the front of the compressor.
- The upper bolt at the rear of the compressor.
- The lower bolt at the rear of the compressor.

(6) Engage the engine wire harness lead to the wiring bracket located on the top of the A/C compressor.

(7) Connect the engine wire harness to the field coil connector.

(8) Install the accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(9) Remove the plugs or tape from the refrigerant line fittings and the compressor ports.

(10) Lubricate new rubber O-ring seals with clean refrigerant oil and install them and a new gasket onto the suction and discharge line.

(11) Connect the suction and discharge lines to the A/C compressor.

(12) Install the nuts that secure the suction and discharge lines to the A/C compressor. Tighten the nuts to 23 N·m (17 ft. lbs.).

(13) Install the radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).

(14) Connect the negative battery cable.

(15) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

(16) Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

A/C COMPRESSOR MOUNT

REMOVAL

(1) Remove A/C compressor from the compressor mounting bracket and support the compressor (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - REMOVAL).

NOTE: It is not necessary to remove A/C compressor from vehicle to remove bracket from engine.

(2) Raise and support the vehicle.

(3) Remove the underside compressor splash shield push pins and the splash shield.

(4) Remove four bolts that secure the compressor mounting bracket to the engine and remove the bracket (Fig. 6).

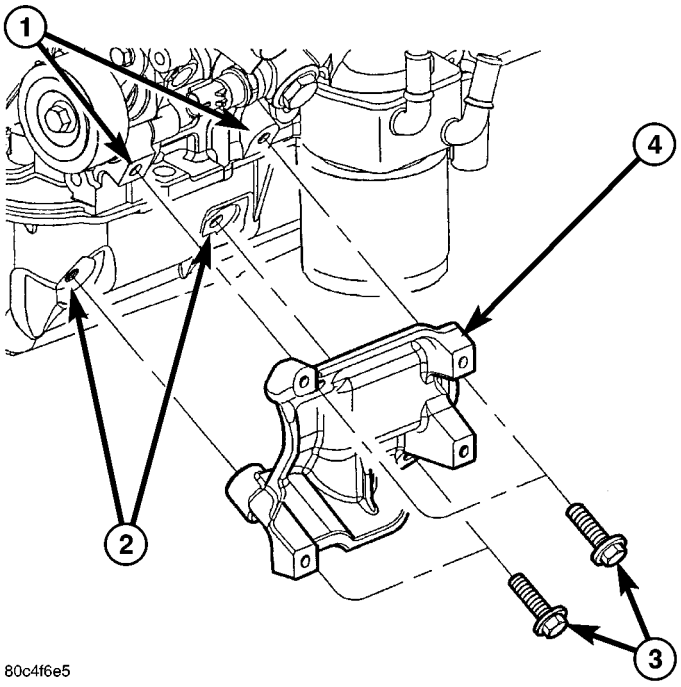


Fig. 6 Compressor Mounting Bracket

1 - ENGINE BLOCK MOUNTING POINTS
2 - OIL PAN MOUNTING POINTS
3 - BOLTS (4)
4 - COMPRESSOR MOUNTING BRACKET

INSTALLATION

(1) Position the compressor mounting bracket to the engine.

A/C COMPRESSOR MOUNT (Continued)

(2) Install the four bolts that secure the compressor mounting bracket to the engine. Tighten the bolts to 115 N·m (85 ft. lbs.).

(3) Position the A/C compressor onto the compressor mounting bracket and support the compressor.

(4) Install the underside compressor splash shield and the push-pin retainers.

(5) Lower the vehicle.

(6) Install the A/C compressor onto the compressor mounting bracket (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - INSTALLATION).

A/C CONDENSER

DESCRIPTION

The A/C condenser (Fig. 7) is located in the front of the engine compartment behind the front fascia. The A/C condenser is a heat exchanger that allows the high-pressure refrigerant gas being discharged by the A/C compressor to give up its heat to the air passing over the condenser fins, which causes the refrigerant to cool and change to a liquid state.

The A/C condenser is equipped with mounting provisions for the automatic transmission fluid cooler.

The A/C condenser may be removed for service without removing the radiator from the vehicle.

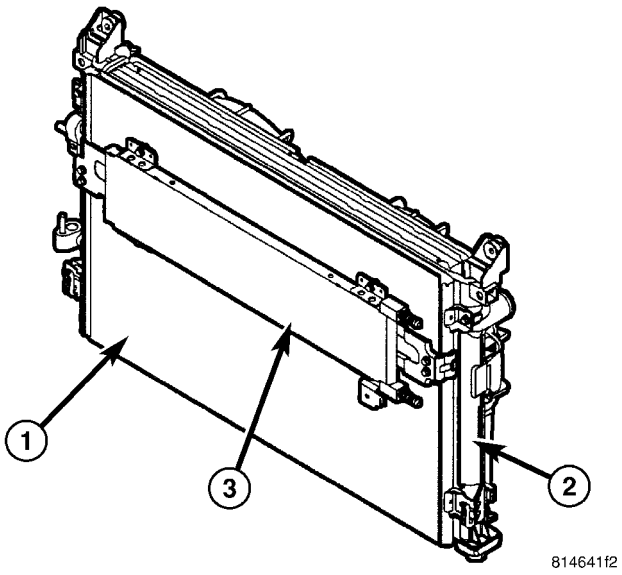


Fig. 7 A/C Condenser

1 - A/C CONDENSER
2 - RADIATOR
3 - TRANSMISSION FLUID COOLER

OPERATION

When air passes through the fins of the A/C condenser, the high-pressure refrigerant gas within the A/C condenser gives up its heat. The refrigerant then condenses as it leaves the A/C condenser and becomes a high-pressure liquid. The volume of air flowing over the condenser fins is critical to the proper cooling performance of the A/C system. Therefore, it is important that there are no objects placed in front of the radiator grille openings at the front of the vehicle or foreign material on the condenser fins that might obstruct proper air flow. Also, any factory-installed air seals or shrouds must be properly reinstalled following radiator or A/C condenser service.

The A/C condenser cannot be repaired and, if faulty or damaged, it must be replaced.

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: Before removing the A/C condenser, note the location of each of the radiator and condenser air seals. These seals are used to direct air through the A/C condenser and the radiator. The air seals must be reinstalled in their proper locations in order for the A/C and engine cooling systems to perform as designed.

(1) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).

(2) Remove the front fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).

A/C CONDENSER (Continued)

(3) Remove the four radiator sight shield retaining pins and the radiator sight shield.

(4) Remove the radiator air seal retaining pins and the air seals (Fig. 8).

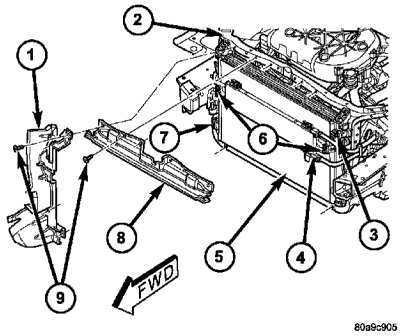


Fig. 8 Radiator Air Seals

1 - AIR SEAL (RT SIDE SHOWN, LT SIDE SIMILAR)
2 - UPPER RADIATOR CROSSMEMBER
3 - UPPER CONDENSER MOUNTING BOLT (2)
4 - TRANSMISSION FLUID OIL COOLER
5 - A/C CONDENSER
6 - BOLTS (4)
7 - LOWER CONDENSER MOUNT (2)
8 - UPPER AIR SEAL
9 - PUSH PINS (12)

(5) Note the hood latch location on the upper radiator crossmember. Mark the location of latch for reinstallation.

(6) Remove the two bolts that secure the hood latch to the upper radiator crossmember and position the latch out of the way.

(7) Remove the four bolts that secure the transmission fluid oil cooler to the A/C condenser and position the fluid cooler out of the way (Refer to 7 - COOLING/TRANSMISSION/TRANS COOLER - REMOVAL).

(8) Remove the nuts that secure the discharge and liquid lines to the A/C condenser (Fig. 9).

(9) Disconnect the discharge and liquid lines from the A/C condenser and remove the O-ring seals and gaskets.

(10) Install plug in, or tape over the opened refrigerant line fittings and the condenser ports.

(11) Remove the two bolts that secure the A/C condenser to the radiator.

(12) Lift the A/C condenser and disengage the lower condenser mounting brackets from the radiator.

(13) Remove the A/C condenser from the engine compartment.

INSTALLATION

NOTE: If the A/C condenser is being replaced, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

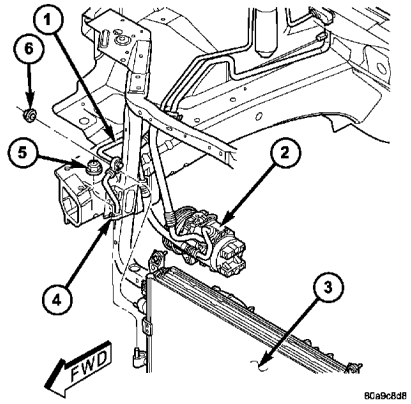


Fig. 9 Condenser Lines

1 - DISCHARGE LINE
2 - A/C COMPRESSOR
3 - CONDENSER
4 - LIQUID LINE
5 - NUT
6 - NUT

NOTE: Be certain that each of the radiator and condenser air seals are reinstalled in their proper locations. These air seals are required in order for the A/C and engine cooling systems to perform as designed.

(1) Position the A/C condenser into the engine compartment.

(2) Engage the lower condenser mounting brackets to the radiator.

(3) Install the two bolts that secure the A/C condenser to the radiator. Tighten the bolts to 5 N·m (45 in. lbs.).

(4) Remove the tape or plug from the opened refrigerant line fittings the condenser ports.

(5) Lubricate a new rubber O-ring seal with clean refrigerant oil and install it and a new gasket onto the discharge and liquid line fittings.

(6) Connect the discharge and liquid lines to the A/C condenser..

(7) Install the nuts that secure the discharge and liquid lines to the A/C condenser. Tighten the nuts to 23 N·m (17 ft. lbs.).

(8) Postion the transmission fluid oil cooler onto the A/C condenser and install the four retaining bolts. Tighten the bolts to 5 N·m (45 in. lbs.).

(9) Position the hood latch to the front of the upper radiator crossmember.

(10) Loosely install the two bolts that secure the hood latch to the upper radiator crossmember. Check and adjust the hood latch position as required. Tighten the bolts to 14 N·m (123 in. lbs.).

A/C CONDENSER (Continued)

(11) Install the radiator air seals and the air seal retaining pins.

(12) Install the radiator sight shield and the sight shield retaining pins.

(13) Install the front fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).

(14) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

(15) Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

A/C DISCHARGE LINE

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: Before removing the A/C condenser, note the location of each of the radiator and condenser air seals. These seals are used to direct air through the A/C condenser and the radiator. The air seals must be reinstalled in their proper locations in order for the A/C and engine cooling systems to perform as designed.

(1) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).

(2) Remove the front fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).

(3) Remove the four radiator sight shield retaining pins and the radiator sight shield.

(4) Remove the radiator air seal retaining pins and the air seals (Fig. 10).

(5) Remove the nut that secures the A/C discharge line to the A/C condenser (Fig. 11).

(6) Disconnect the A/C discharge line from the A/C condenser and remove and discard the O-ring seal and gasket.

(7) Install plug in, or tape over the opened discharge line fitting and the condenser port.

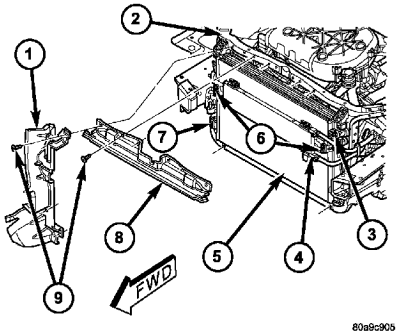


Fig. 10 Radiator Air Seals

1 - AIR SEAL (RT SIDE SHOWN, LT SIDE SIMILAR)
2 - UPPER RADIATOR CROSSMEMBER
3 - UPPER CONDENSER MOUNTING BOLT (2)
4 - TRANSMISSION FLUID OIL COOLER
5 - A/C CONDENSER
6 - BOLTS (4)
7 - LOWER CONDENSER MOUNT (2)
8 - UPPER AIR SEAL
9 - PUSH PINS (12)

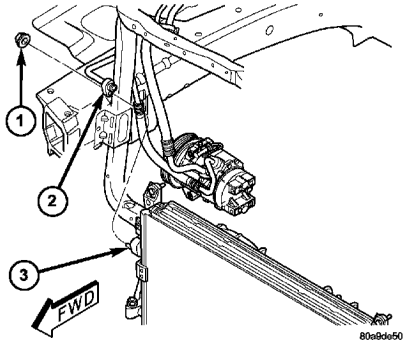


Fig. 11 Discharge Line to Condenser

1 - NUT
2 - LIQUID LINE FITTING
3 - CONDENSER OUTLET PORT

(8) Remove the nut that secures the A/C discharge line to the A/C compressor (Fig. 12).

(9) Disconnect the A/C discharge line from the A/C compressor and remove and discard the O-ring seal and gasket.

(10) Install plug in, or tape over the opened discharge line fitting and the compressor port.

(11) Remove the A/C discharge line from the engine compartment.

INSTALLATION

(1) Position the A/C discharge line into the engine compartment.

(2) Remove the tape or plugs from the discharge line fitting and the compressor port.

(3) Lubricate a new rubber O-ring seal with clean refrigerant oil and install it and a new gasket onto the discharge line fitting.

A/C DISCHARGE LINE (Continued)

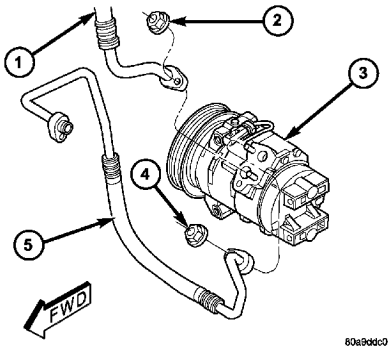


Fig. 12 Discharge Line to A/C Compressor

1 - A/C SUCTION LINE
2 - NUT
3 - A/C COMPRESSOR
4 - NUT
5 - A/C DISCHARGE LINE

(4) Connect the A/C discharge line to the A/C compressor.

(5) Install the nut that secures the A/C discharge line to the A/C compressor. Tighten the nut to 23 N·m (17 ft. lbs.).

(6) Remove the tape or plugs from the discharge line fitting and the condenser port.

(7) Lubricate a new rubber O-ring seal with clean refrigerant oil and install it and a new gasket onto the discharge line fitting.

(8) Connect the A/C discharge line to the A/C condenser.

(9) Install the nut that secures the A/C discharge line to the A/C condenser. Tighten the nut to 23 N·m (17 ft. lbs.).

(10) Install the radiator air seals and the air seal retaining pins.

(11) Install the radiator sight shield and the sight shield retaining pins.

(12) Install the front fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).

(13) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

A/C EVAPORATOR

DESCRIPTION

The A/C evaporator (Fig. 13) is located within the HVAC housing, behind the instrument panel. The A/C evaporator and insulator are positioned in the HVAC housing so that all air entering the housing must pass over the evaporator fins before it is distributed through the heating-A/C system ducts and outlets. However, air passing over the evaporator fins will only be conditioned when the A/C compressor is engaged and circulating refrigerant through the A/C evaporator.

The A/C evaporator tubes are connected and sealed to the A/C expansion valve by use of rubber O-rings and a tapping block.

The A/C evaporator can only be serviced by removing and disassembling the HVAC housing.

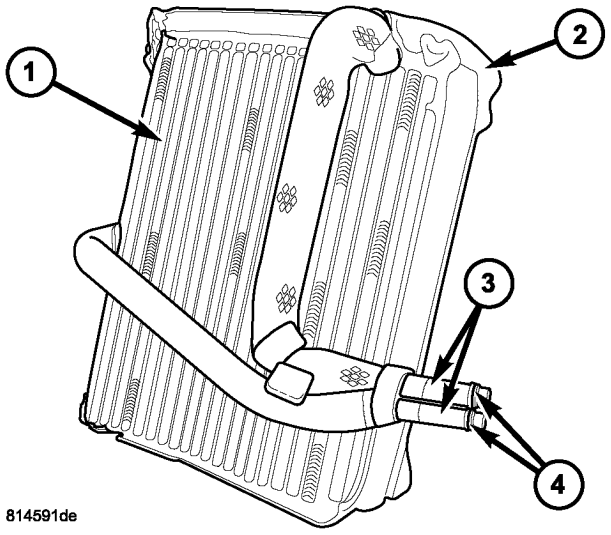


Fig. 13 A/C Evaporator

1 - A/C EVAPORATOR
2 - INSULATOR
3 - EVAPORATOR TUBES
4 - O-RING SEALS

OPERATION

Refrigerant enters the A/C evaporator from the A/C expansion valve as a low-temperature, low-pressure mixture of liquid and gas. As air flows over the fins of the A/C evaporator, the humidity in the air condenses on the fins, and the heat from the air is absorbed by the refrigerant. Heat absorption causes the refrigerant to boil and vaporize. The refrigerant becomes a low-pressure gas when it leaves the A/C evaporator.

The A/C evaporator cannot be repaired and, if faulty or damaged, it must be replaced.

REMOVAL

(1) Remove the HVAC housing (Fig. 14) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - REMOVAL).

(2) Disassemble the HVAC housing as necessary to access the A/C evaporator (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - DISASSEMBLY).

A/C EVAPORATOR (Continued)

(3) Open the rubber flange seal and carefully lift the A/C evaporator and insulator out of the lower half of the HVAC housing.

NOTE: If the insulator is deformed or damaged, it must be replaced.

(4) If required, remove the insulator from the A/C evaporator.

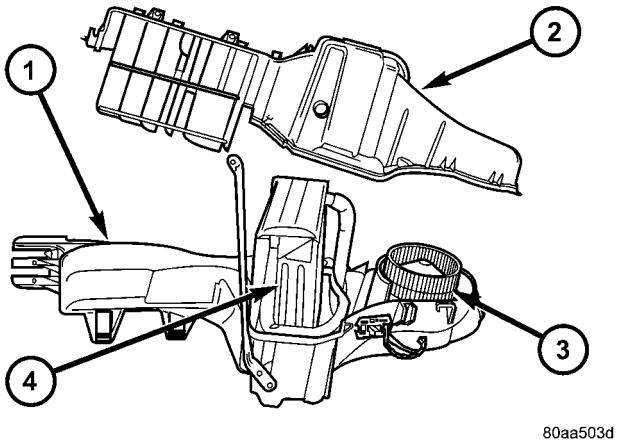


Fig. 14 A/C Evaporator

1 - LOWER HVAC HOUSING
2 - UPPER HVAC HOUSING
3 - BLOWER MOTOR
4 - A/C EVAPORATOR

INSTALLATION

NOTE: If the A/C evaporator is being replaced, add 50 milliliters (1.7 fluid ounces) of refrigerant oil to the refrigerant system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

(1) If removed, install the insulator over the A/C evaporator.

NOTE: Make sure that the evaporator drain within the HVAC housing is clean and unrestricted and that the insulator and the rubber flange seal are properly positioned.

(2) Install the A/C evaporator into the lower half of the HVAC housing and close the rubber flange seal.

(3) Assemble the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - ASSEMBLY).

(4) Install the HVAC housing (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION - FRONT/HVAC HOUSING - INSTALLATION).

EXPANSION VALVE

DESCRIPTION

The A/C expansion valve (Fig. 15) controls the amount of refrigerant entering the A/C evaporator. The A/C expansion valve is of a thermostatic expansion valve (TXV) design and consists of an aluminum H-valve type body with an integral thermal sensor. The A/C expansion valve is located in the engine compartment at the dash panel, between the A/C refrigerant lines and the A/C evaporator.

The evaporator temperature sensor is installed on the top of the A/C expansion valve (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/EVAPORATOR TEMPERATURE SENSOR - DESCRIPTION).

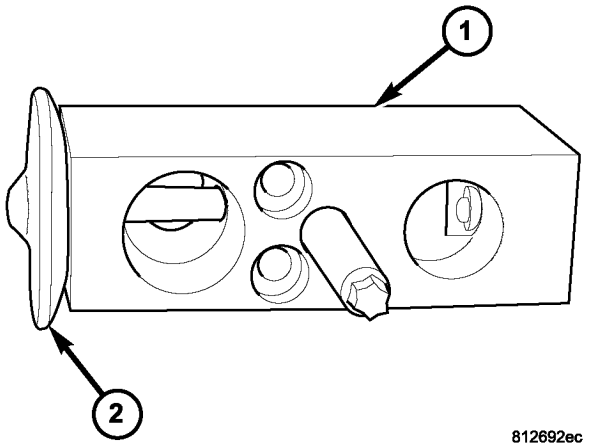


Fig. 15 A/C Expansion Valve-Typical

1 - A/C EXPANSION VALVE
2 - THERMAL SENSOR

OPERATION

The A/C expansion valve controls the high-pressure, low temperature liquid refrigerant from the liquid line and converts it into a low-pressure, low-temperature mixture of liquid and gas before it enters the A/C evaporator. A mechanical sensor in the A/C expansion valve monitors the temperature and pressure of the refrigerant leaving the A/C evaporator through the suction line, and adjusts the orifice size at the liquid line port to let the proper amount of refrigerant into the A/C evaporator to meet the vehicle A/C cooling requirements. Controlling the refrigerant flow through the A/C evaporator ensures that none of the refrigerant leaving the A/C evaporator is still in a liquid state, which could damage the A/C compressor.

The A/C expansion valve is a factory calibrated unit and cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

EXPANSION VALVE (Continued)

DIAGNOSIS AND TESTING

A/C EXPANSION VALVE

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: The A/C expansion valve should only be tested following testing of the A/C compressor.

NOTE: Liquid CO^2 is required to test the A/C expansion valve. This material is available from most welding supply facilities. Liquid CO^2 is also available from companies which service and sell fire extinguishers.

When testing the A/C expansion valve, the work area and the vehicle temperature must be 21° to 27° C (70° to 85° F). To test the expansion valve:

(1) Connect a charging station or manifold gauge set to the refrigerant system service ports. Verify the refrigerant charge level.

(2) Close all doors, windows and vents to the passenger compartment.

(3) Set the A/C-heater controls so that the A/C compressor is operating, the temperature control is in the highest temperature position, the mode-air doors is directing air output to the floor and the blower motor operating is operating at the highest speed.

(4) Start the engine and allow it to idle. After the engine has reached normal operating temperature, allow the passenger compartment to heat up. This will create the need for maximum refrigerant flow into the A/C evaporator.

(5) If the refrigerant charge is sufficient, the discharge (high pressure) gauge should read 965 kPa to 1655 kPa (140 psi to 240 psi). The suction (low pressure) gauge should read 138 kPa to 207 kPa (20 psi to 30 psi). If OK, go to Step 6. If not OK, replace the faulty A/C expansion valve.

WARNING:
Protect the skin and eyes from exposure to liquid CO^2 or personal injury can result.

(6) If the suction (low pressure) gauge reads within the specified range, freeze the A/C expansion valve for 30 seconds using liquid CO^2 or another suitable super-cold material.**Do not spray R-134a or R-12 refrigerant on the A/C expansion valve for this test.** The suction (low pressure) gauge reading should drop by 69 kPa (10 psi). If OK, go to Step 7 If not OK, replace the faulty A/C expansion valve.

(7) Allow the expansion valve control head to thaw. The suction (low pressure) gauge reading should stabilize at 138 kPa to 207 kPa (20 psi to 30 psi). If not OK, replace the faulty A/C expansion valve.

(8) When expansion valve testing is complete, test the overall A/C system performance (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - A/C PERFORMANCE TEST).

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

(1) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).

(2) Disconnect and isolate the negative battery cable.

(3) Remove the air cleaner housing and the air inlet tube (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

(4) Remove the drain tube from the right end of the wiper module.

(5) Disconnect the wire harness connector from the A/C pressure transducer (Fig. 16).

(6) Remove the screw that secures the liquid line to the receiver/drier outlet port.

(7) Disconnect the liquid line from the receiver/drier outlet port and remove and discard the seal.

(8) Install plugs in, or tape over the opened liquid line fitting and the receiver/drier outlet port.

(9) Remove the nut that secures the suction line and liquid line fittings to the stud on the A/C expansion valve.

(10) Disconnect the A/C suction and liquid line fittings from the A/C expansion valve and remove and discard the seals.

(11) Install plugs in, or tape over the opened suction line and liquid line fittings and both expansion valve ports.

(12) Disconnect the HVAC wire harness connector from the evaporator temperature sensor.

EXPANSION VALVE (Continued)

(13) Remove the two screws that secure the A/C expansion valve to the evaporator tube tapping plate and remove the expansion valve.

(14) Remove the seals from the evaporator inlet and outlet tube fittings and discard.

(15) Install plugs in, or tape over the opened evaporator inlet and outlet tube fittings and both expansion valve ports.

(16) Remove the retaining screw and evaporator temperature sensor from the A/C expansion valve, if required (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/EVAPORATOR TEMPERATURE SENSOR - REMOVAL).

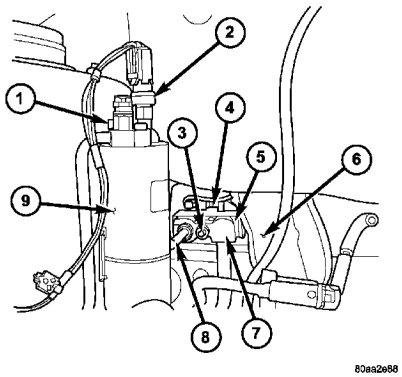


Fig. 16 A/C Expansion Valve

1 - LIQUID LINE FITTING BOLT
2 - A/C PRESSURE TRANSDUCER
3 - NUT
4 - EVAPORATOR TEMPERATURE SENSOR
5 - A/C EXPANSION VALVE
6 - DRAIN TUBE
7 - A/C SUCTION LINE
8 - A/C LIQUID LINE (REAR SECTION)
9 - RECEIVER/DRIER

INSTALLATION

NOTE: Any grease removed with the evaporator temperature sensor must be replaced. Failure to do so could result in poor A/C performance.

(1) If removed, install the evaporator temperature sensor and retaining screw onto the A/C expansion valve (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/EVAPORATOR TEMPERATURE SENSOR - INSTALLATION).

(2) Remove the tape or plugs from the evaporator inlet and outlet tube fittings and both ports on the back of the A/C expansion valve.

(3) Lubricate new rubber O-ring seals with clean refrigerant oil and install them on the evaporator inlet and outlet tube fittings.

(4) Position the A/C expansion valve onto the evaporator inlet and outlet tube fittings.

(5) Install the two screws that secure the A/C expansion valve to the evaporator tube tapping plate plate. Tighten the screws to 11 N·m (97 in. lbs.).

(6) Connect the HVAC wire harness connector to the evaporator temperature sensor.

(7) Remove the tape or plugs from the front liquid line rear section and suction line fittings for the expansion valve and both ports on the front of the expansion valve.

(8) Lubricate new rubber O-ring seals with clean refrigerant oil and install them on the front liquid line rear section and suction line fittings for the expansion valve.

(9) Connect the A/C liquid and suction lines to the expansion valve.

(10) Install the nut that secures the A/C liquid and suction lines to the expansion valve. Tighten the nut to 23 N·m (17 ft. lbs.).

(11) Remove the tape or plugs from the liquid line rear section fitting and the receiver/drier outlet port.

(12) Lubricate a new rubber O-ring seal with clean refrigerant oil and install it on the liquid line fitting.

(13) Connect the liquid line fitting to the receiver/drier outlet port.

(14) Install the screw that secures the liquid line fitting to the receiver/drier. Tighten the screw to 11 N·m (97 in. lbs.).

(15) Connect the wire harness connector to the A/C pressure transducer.

(16) Install the drain tube to the wiper module.

(17) Install the air cleaner housing and air inlet tube (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).

(18) Reconnect the negative battery cable.

(19) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

(20) Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

HEATER CORE

DESCRIPTION

The heater core (Fig. 17) is mounted into the HVAC air distribution housing, located behind the instrument panel. The heater core is a heat exchanger made of rows of tubes and fins. The heater core tubes are attached to the heater core by a sealing plate and bolt.

The heater core can be serviced without removing the air distribution housing from the vehicle.

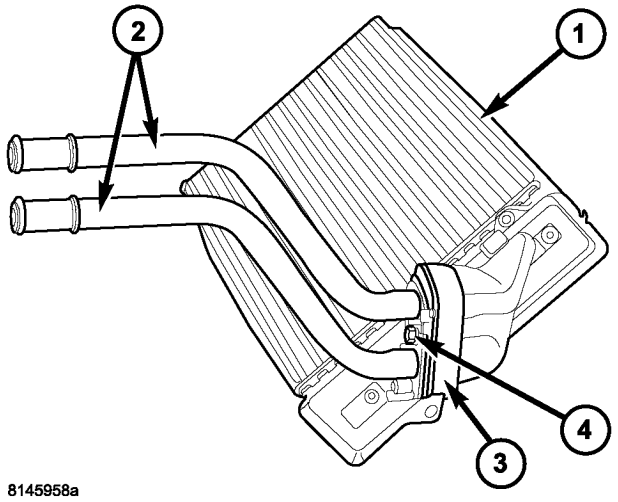


Fig. 17 Heater Core

1 - HEATER CORE
2 - HEATER CORE TUBES
3 - SEALING PLATE
4 - BOLT

OPERATION

Engine coolant is circulated through the heater hoses to the heater core at all times. As the coolant flows through the heater core, heat is removed from the engine and is transferred to the heater core tubes and fins. Air directed through the heater core picks up the heat from the heater core fins. The blend-air door(s) allows control of the heater output air temperature by regulating the amount of air flowing through the heater core. The blower motor speed controls the volume of air flowing through the HVAC housing.

The heater core cannot be repaired and, if faulty or damaged, it must be replaced.

REMOVAL

HEATER CORE TUBES

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

(1) Drain the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM DRAIN).

(2) Disconnect and isolate the negative battery cable.

(3) Disconnect the heater hoses from the heater core tubes (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER INLET HOSE - REMOVAL) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER RETURN HOSE - REMOVAL).

(4) Remove the silencer from beneath the driver side end of the instrument panel.

NOTE: Take the proper precautions to protect the carpeting below the heater core from spilled engine coolant and have absorbent toweling readily available to clean up any spills.

(5) Remove the bolt that secures the heater core tube sealing plate to the heater core (Fig. 18).

(6) Push both heater core tubes simultaneously toward the dash panel to disengage the tubes from the heater core and remove and discard the O-ring seals.

(7) Install plugs in, or tape over the opened heater core tube fittings and both heater core ports.

(8) Pull both heater core tubes simultaneously away from the distribution housing and rearward to disengage tubes from the dash panel seal and remove the tubes.

HEATER CORE (Continued)

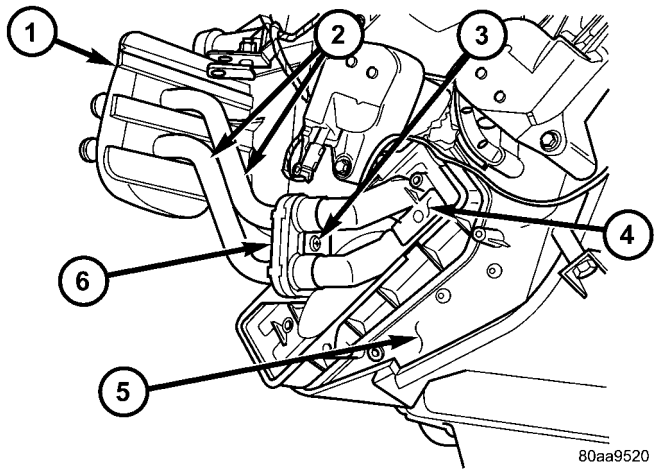


Fig. 18 Heater Core Tubes

1 - SEAL
2 - HEATER CORE TUBES
3 - SCREW
4 - HEATER CORE
5 - DISTRIBUTION HOUSING
6 - SEALING PLATE

HEATER CORE

WARNING: On vehicles equipped with airbags, disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

(1) Remove the silencer boot fasteners located around the base of the lower steering shaft from the dash panel so that it may be pushed aside.

(2) Remove the brake lamp switch from its mounting bracket (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - REMOVAL).

(3) Disconnect the power brake booster input rod (push rod) from the pin on the brake pedal arm (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL/POWER BRAKE BOOSTER - REMOVAL).

NOTE: Take the proper precautions to protect the carpeting below the heater core from spilled engine coolant and have absorbent toweling readily available to clean up any spills.

(4) Remove the heater core tubes (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER CORE - HEATER CORE TUBES - REMOVAL).

(5) Remove the two screws that secure the heater core mounting plate to the HVAC air distribution housing.

(6) While pulling the accelerator pedal upward (Fig. 19) and pushing the brake pedal downward (Fig. 20) for clearance, remove the heater core from the air distribution housing.

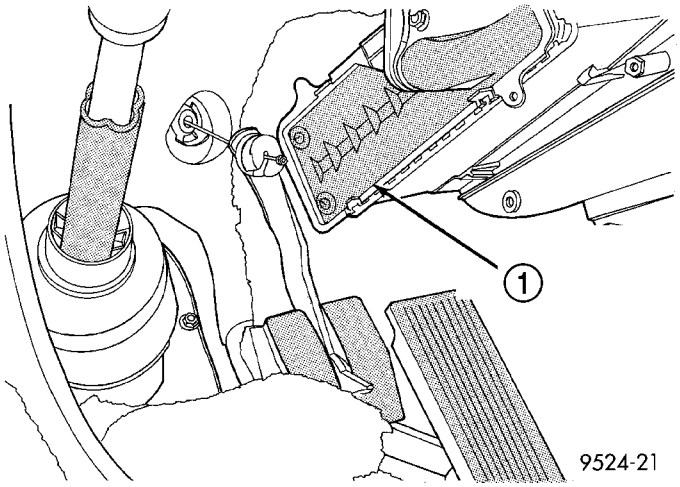


Fig. 19 Accelerator Pedal

1 - HEATER CORE

INSTALLATION

HEATER CORE TUBES

(1) Remove the plugs or tape from both heater core tube fittings and both heater core ports.

(2) Lubricate new rubber O-ring seals with clean engine coolant and install them onto the heater core tube fittings. Use only the specified O-ring as they are made of a special material for the engine cooling system.

(3) Position the heater core tubes and sealing plate to the dash panel, below the instrument panel.

(4) Install both heater core tubes simultaneously through the dash panel seal.

(5) Position both heater core tubes and the sealing plate simultaneously onto the heater core.

HEATER CORE (Continued)

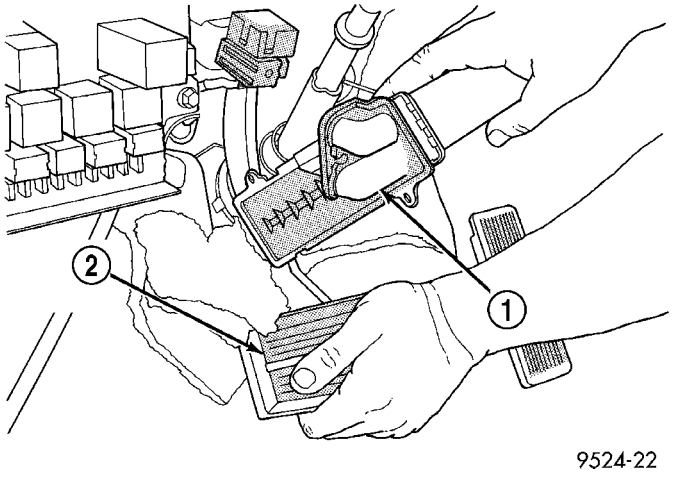


Fig. 20 Brake Pedal

1 - HEATER CORE
2 - BRAKE PEDAL

NOTE: The heater core tubes each have a slot that must be indexed to a location tab within each of the heater core ports. Adjust the position of the tubes as required so that the sealing plate fits flush against the heater core supply and return ports, which indicates that the tubes are properly indexed.

(6) Index both heater core tubes to the heater core ports.

(7) Install the bolt that secures the heater core tube sealing plate to the heater core. Tighten the bolt to 3 N·m (27 in. lbs.).

(8) Install the silencer under the driver side end of the instrument panel.

(9) Connect the heater hoses to the heater hose tubes (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER INLET HOSE - INSTALLATION) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER RETURN HOSE - INSTALLATION).

(10) Reconnect the negative battery cable.

(11) Refill the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM REFILL).

HEATER CORE

(1) While pushing the brake pedal downward and pulling the accelerator pedal upward for clearance, install the heater core into the HVAC air distribution housing.

(2) Install the two screws that secure the heater core to the air distribution housing. Tighten the screws to 2 N·m (17 in. lbs.).

(3) Install the heater core tubes (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/HEATER CORE - INSTALLATION).

(4) Connect the power brake booster input rod (push rod) to the pin on the brake pedal arm (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/POWER BRAKE BOOSTER - INSTALLATION).

(5) Install the brake lamp switch into its mounting bracket (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - INSTALLATION).

(6) Install the silencer boot around the base of the lower steering shaft on the dash panel.

(7) Reconnect the negative battery cable.

(8) If the heater core is being replaced, flush the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM CLEANING/REVERSE FLUSHING).

(9) Refill the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM REFILL).

HEATER INLET HOSE

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: The heater inlet hose is constructed from formed steel tubing and rubber hoses. Depending on application, the ends are secured to the heater core, engine oil cooler or the engine by spring tension clamps.

(1) Drain the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM DRAIN).

(2) Using spring tension clamp pliers, compress and slide the clamps off of each end of the hose being removed (Fig. 21).

CAUTION: DO NOT apply excessive pressure on heater tubes or connections when removing heater hoses. Excessive pressure may damage or deform the tubes/heater core, causing an engine coolant leak.

(3) Disconnect each hose end by carefully twisting the hose back and forth on the tube, while gently pulling it away from the end of the tube.

HEATER INLET HOSE (Continued)

NOTE: Replacement of the heater inlet tube will be required if the hose ends are cut for removal.

(4) If necessary, carefully cut the hose end and peel the hose off of the tube.

(5) Remove the two heater inlet tube retaining bolts and remove the inlet tube.

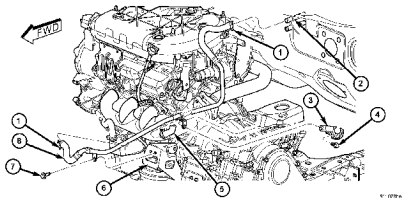


Fig. 21 Heater Inlet Tube

1 - SPRING CLAMP (2)
2 - HEATER CORE INLET TUBE
3 - CABLE BRACKET
4 - BOLT
5 - COOLANT RESERVOIR HOSE
6 - MOTOR MOUNT
7 - BOLT
8 - HEATER INLET TUBE

INSTALLATION

(1) Position the heater inlet tube into the engine compartment and install the two heater inlet tube retaining bolts. Tighten the bolts to 10 N·m (89 in. lbs.).

(2) Using spring tension clamp pliers, compress and slide each clamp away from the end of the hose being installed.

CAUTION:
DO NOT apply excessive pressure on heater tubes or connections when install the heater inlet hose. Excessive pressure may damage or deform the heater tubes or connections, causing an engine coolant leak.

(3) Install each hose by carefully twisting the hose back and forth while gently pushing it onto the tube end.

(4) Using spring tension clamp pliers, compress and slide the clamps onto each end of the hose being installed.

(5) Refill the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM REFILL).

HEATER RETURN HOSE

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: The heater return tube is constructed from formed steel tubing and rubber hoses. Depending on application, the ends are secured to the heater core, engine oil cooler or the engine by spring tension clamps.

(1) Drain the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM DRAIN).

(2) Using spring tension clamp pliers, compress and slide the clamps off of each end of the heater return hose. (Fig. 22).

CAUTION: DO NOT apply excessive pressure on heater tubes or connections when removing heater hoses. Excessive pressure may damage or deform the tubes/heater core, causing an engine coolant leak.

(3) Disconnect each hose end by carefully twisting the hose back and forth on the tube, while gently pulling it away from the end of the tube.

NOTE: Replacement of the heater return hose will be required if the hose ends are cut for removal.

(4) If necessary, carefully cut the hose end and peel the hose off of the tube.

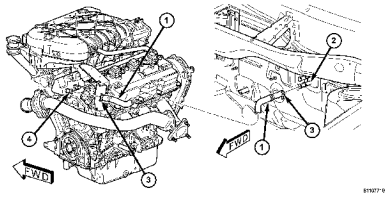


Fig. 22 Heater Return Hose

1 - HEATER RETURN HOSE
2 - HEATER CORE OUTLET TUBE
3 - SPRING CLAMP (2)
4 - INTAKE MANIFOLD TUBE

INSTALLATION

(1) Using spring tension clamp pliers, compress and slide the clamp away from the end of the heater return hose.

HEATER RETURN HOSE (Continued)

CAUTION:
DO NOT apply excessive pressure on heater tubes or connections when install the heater return hose. Excessive pressure may damage or deform the heater tubes or connections, causing an engine coolant leak.

(2) Install each hose end by carefully twisting the hose back and forth while gently pushing it onto the tube.

(3) Using spring tension clamp pliers, compress and slide the clamps onto each end of the heater return hose.

(4) Refill the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

LIQUID LINE

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: The A/C liquid line is serviced in two sections. The front section connects between the A/C condenser and the receiver/drier and includes the high side service port. The rear section connects between the receiver/drier and the A/C expansion valve and includes the fitting for the A/C pressure transducer.

FRONT SECTION

(1) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).

(2) Disconnect and isolate the negative battery cable.

(3) Remove the air cleaner housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

(4) Remove the front fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).

(5) Remove the four radiator sight shield retaining pins and the radiator sight shield.

(6) Remove the right side radiator air seal retaining pins and the air seal (Fig. 23).

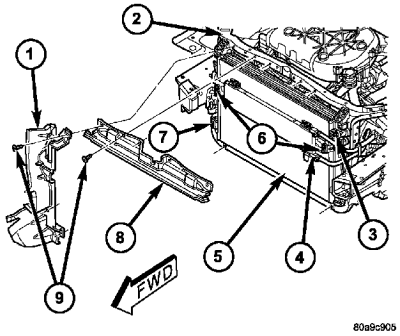


Fig. 23 Radiator Air Seals

1 - AIR SEAL (RT SIDE SHOWN, LT SIDE SIMILAR)
2 - UPPER RADIATOR CROSSMEMBER
3 - UPPER CONDENSER MOUNTING BOLT (2)
4 - TRANSMISSION FLUID OIL COOLER
5 - A/C CONDENSER
6 - BOLTS (4)
7 - LOWER CONDENSER MOUNT (2)
8 - UPPER AIR SEAL
9 - PUSH PINS (12)

(7) Remove the nut that secures the A/C liquid line to the A/C condenser (Fig. 24).

(8) Disconnect the A/C liquid line from the A/C condenser and remove and discard the O-ring seal and gasket.

(9) Install plug in, or tape over the opened liquid line fitting and the condenser port.

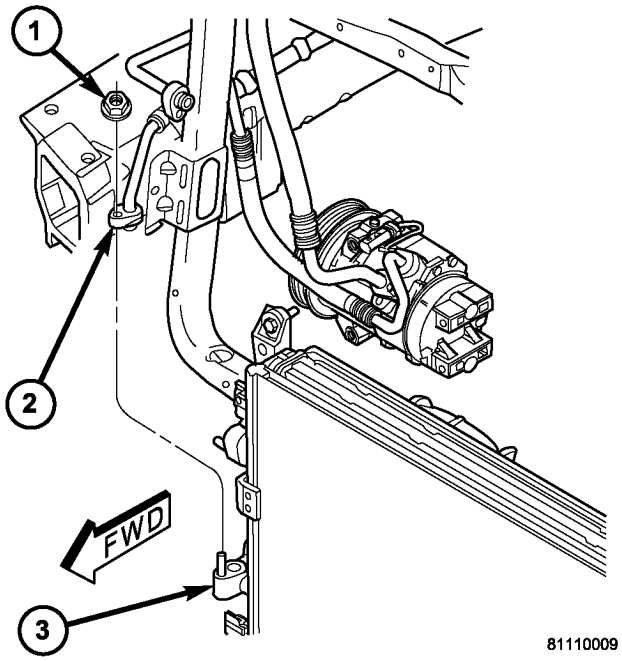


Fig. 24 Condenser Outlet Connection

1 - NUT
2 - LIQUID LINE FITTING
2 - CONDENSER OUTLET PORT

(10) Disengage the refrigerant line routing clip located on top of the right frame rail (Fig. 25).

LIQUID LINE (Continued)

(11) Remove the bolt that secures the front section of the A/C liquid line to the receiver/drier.

(12) Disconnect the front section of the A/C liquid line from the receiver/drier and remove and discard the O-ring seal.

(13) Install plug in, or tape over the opened liquid line fitting and the receiver/drier port.

(14) Remove the front section of the A/C liquid line from the engine compartment.

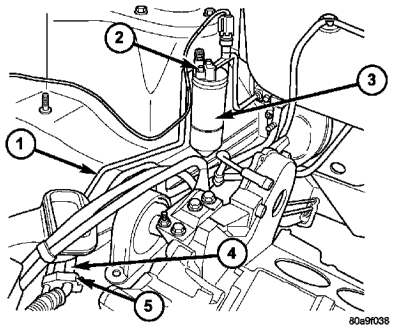


Fig. 25 A/C Liquid Line (Front Section)

1 - A/C LIQUID LINE (FRONT SECTION)
2 - BOLT
3 - RECEIVER/DRIER
4 - A/C SUCTION LINE
5 - ROUTING CLIP

REAR SECTION

(1) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).

(2) Disconnect and isolate the negative battery cable.

(3) Remove the air cleaner housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

(4) Remove the A/C pressure transducer (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS - FRONT/A/C PRESSURE TRANSDUCER - REMOVAL).

(5) Remove the nut that secures the suction and liquid line to the A/C expansion valve (Fig. 26)

(6) Disconnect the suction and liquid line from the A/C expansion valve and remove the O-ring seals.

(7) Remove the bolt that secures the rear section of the A/C liquid line to the receiver/drier.

(8) Disconnect the rear section of the A/C liquid line from the receiver/drier and the A/C expansion valve and remove and discard the O-ring seals.

(9) Install plugs in, or tape over the opened liquid and suction line fittings, the receiver/drier port and both expansion valve ports.

(10) Remove the rear section of the A/C liquid line from the engine compartment.

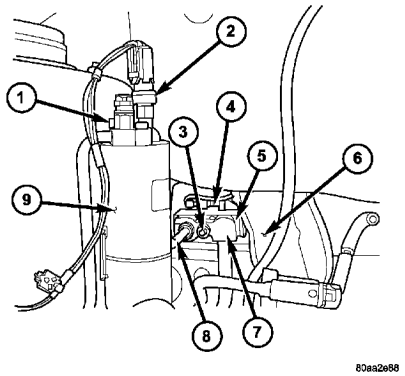


Fig. 26 A/C Liquid Line (Rear Section)

1 - LIQUID LINE FITTING BOLT
2 - A/C PRESSURE TRANSDUCER
3 - NUT
4 - EVAPORATOR TEMPERATURE SENSOR
5 - A/C EXPANSION VALVE
6 - DRAIN TUBE
7 - A/C SUCTION LINE
8 - A/C LIQUID LINE (REAR SECTION)
9 - RECEIVER/DRIER

INSTALLATION

NOTE: The A/C liquid line is serviced in two sections. The front section connects between the A/C condenser and the receiver/drier and includes the high side service port. The rear section connects between the receiver/drier and the A/C expansion valve and includes the fitting for the A/C pressure transducer.

FRONT SECTION

(1) Position the front section of the A/C liquid line into the engine compartment.

(2) Remove the tape or plugs from the liquid line fitting and the receiver/drier port.

(3) Lubricate a new rubber O-ring seal with clean refrigerant oil and install it on the liquid line fitting.

(4) Connect the front section of the A/C liquid line to the receiver/drier.

(5) Install the bolt that secures the A/C liquid line to the receiver/drier. Tighten the bolt to 11 N·m (100 in. lbs.).

(6) Engage the front section of the A/C liquid line into the routing clip on top of the right frame rail.

(7) Remove the tape or plugs from the condenser port and the liquid line fitting.

(8) Lubricate a new rubber O-ring seal with clean refrigerant oil and install it on the liquid line fitting.

(9) Connect the A/C liquid line to the A/C condenser.

(10) Install the nut that secures the A/C liquid line to the A/C condenser. Tighten the nut to 23 N·m (17 ft. lbs.).

LIQUID LINE (Continued)

(11) Install the right side radiator air seal and the air seal retaining pins.

(12) Install the radiator sight shield and the sight shield retaining pins.

(13) Install the front fascia (Refer to 13 - FRAME & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).

(14) Install the air cleaner housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).

(15) Reconnect the negative battery cable.

(16) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

(17) Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

REAR SECTION

(1) Position the rear section of the A/C liquid line into the engine compartment.

(2) Remove the tape or plugs from the liquid and suction line fittings, the receiver/drier port and both expansion valve ports.

(3) Lubricate new rubber O-ring seals with clean refrigerant oil and install them on the suction and liquid line fittings.

(4) Connect the liquid and suction lines to the A/C expansion valve.

(5) Install the nut that secures the liquid and suction lines to the A/C expansion valve. Tighten the nut to 23 N·m (17 ft. lbs.).

(6) Lubricate a new rubber O-ring seal with clean refrigerant oil and install it on the liquid line fitting.

(7) connect the A/C liquid line to the receiver/drier.

(8) Install the bolt that secures the A/C liquid line to the receiver/drier. Tighten the bolt to 11 N·m (100 in. lbs.).

(9) Install the A/C pressure transducer (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C PRESSURE TRANSDUCER - INSTALLATION).

(10) Install the air cleaner housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).

(11) Reconnect the negative battery cable.

(12) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

(13) Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

RECEIVER / DRIER

DESCRIPTION

The receiver/drier stores unnecessary refrigerant, filters the refrigerant, helps remove moisture from the refrigerant and retains any refrigerant vapor that may leave the A/C condenser until it becomes a liquid. The receiver/drier is installed on the high-side of the A/C system between the front and rear sections of the A/C liquid line (Fig. 27). The receiver/drier can be serviced by removing the air cleaner housing.

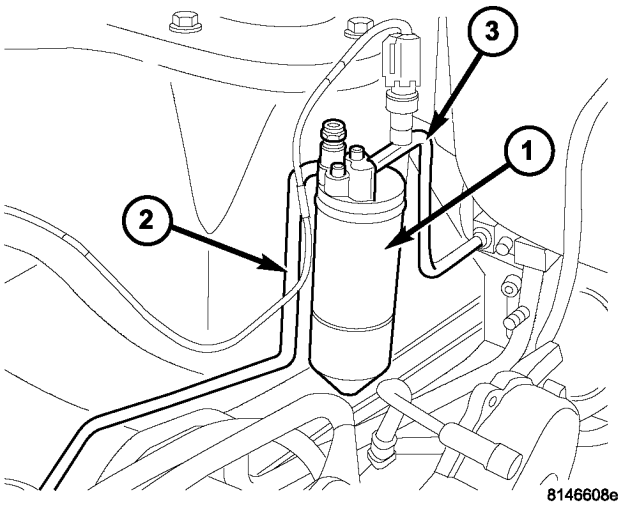


Fig. 27 Receiver/Drier

1 - RECEIVER/DRIER
2 - A/C LIQUID LINE (FRONT)
3 - A/C LIQUID LINE (REAR)

OPERATION

The receiver/drier performs a filtering action to prevent foreign material in the refrigerant from contaminating the A/C expansion valve. Refrigerant enters the receiver/drier as a high-pressure, low temperature liquid. Desiccant inside the receiver/drier absorbs any moisture which may have entered and become trapped within the refrigerant system. In addition, during periods of high demand operation of the A/C system, the receiver/drier acts as a reservoir to store surplus refrigerant.

The receiver/drier cannot be repaired. If the receiver/drier is faulty or damaged, or if the refrigerant system has been contaminated or left open to the atmosphere for an indeterminable period or if the A/C compressor has failed, it must be replaced.

RECEIVER / DRIER (Continued)

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

(1) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).

(2) Remove the air cleaner housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

(3) Remove the bolts that secures the front and rear sections of the A/C liquid line to the receiver/drier (Fig. 28).

(4) Disconnect the A/C liquid lines from the receiver/drier and remove and discard the O-ring seals.

(5) Install a plug in, or tape over the opened liquid line fittings and the receiver/drier ports.

(6) Remove the two nuts that secure the receiver/drier to the right strut tower and remove the receiver/drier.

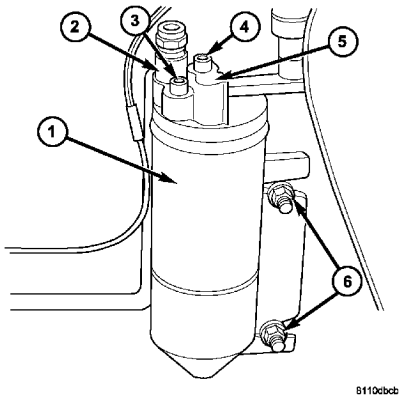


Fig. 28 Receiver/Drier

1 - RECEIVER/DRIER
2 - LIQUID LINE (FRONT SECTION)
3 - BOLT
4 - BOLT
5 - LIQUID LINE (REAR SECTION)
6 - NUT (2)

INSTALLATION

NOTE: If the receiver/drier is being replaced, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

(1) Position the receiver/drier onto the weld studs on the right strut tower.

(2) Install the two nuts that secure the receiver/drier to the right strut tower. Tighten the nuts to 10 N·m (89 in. lbs.).

(3) Remove the tape or plugs from the liquid line fittings and the receiver/drier ports.

(4) Lubricate new rubber O-ring seals with clean refrigerant oil and install them on the liquid line fittings.

(5) Connect the front and rear sections of the A/C liquid line to the receiver/drier.

(6) Install the bolts that secures the A/C liquid lines to the receiver/drier. Tighten the bolts to 11 N·m (100 in. lbs.).

(7) Install the air cleaner housing (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).

(8) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

(9) Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

REFRIGERANT

DESCRIPTION

The refrigerant used in this air conditioning system is a HydroFluoroCarbon (HFC), type R-134a. Unlike R-12, which is a ChloroFluoroCarbon (CFC), R-134a refrigerant does not contain ozone-depleting chlorine. R-134a refrigerant is a non-toxic, non-flammable, clear, and colorless liquefied gas.

Even though R-134a does not contain chlorine, it must be reclaimed and recycled just like CFC-type refrigerants. This is because R-134a is a greenhouse gas and can contribute to global warming.

OPERATION

R-134a refrigerant is not compatible with R-12 refrigerant in an A/C system. Even a small amount of R-12 refrigerant added to an R-134a refrigerant system will cause A/C compressor failure, refrigerant oil sludge or poor A/C system performance. In addition, the polyalkylene glycol (PAG) synthetic refrigerant oils used in an R-134a refrigerant system are not compatible with the mineral-based refrigerant oils used in an R-12 refrigerant system.

R-134a refrigerant system service ports, service tool couplers and refrigerant dispensing bottles have all been designed with unique fittings to ensure that an R-134a refrigerant system is not accidentally con-

REFRIGERANT (Continued)

taminated with the wrong refrigerant (R-12). There are also labels posted in the engine compartment of the vehicle and on the A/C compressor to identify that the A/C system is equipped with R-134a refrigerant.

REFRIGERANT OIL

DESCRIPTION

The refrigerant oil used in R-134a refrigerant systems is a synthetic-based, polyalkylene glycol (PAG), wax-free lubricant. Mineral-based R-12 refrigerant oils are not compatible with PAG oils, and should never be introduced to an R-134a refrigerant system.

There are different PAG oils available, and each contains a different additive package. The Denso 10S17 and 10S20 A/C compressors used in this vehicle are designed to use ND-8 PAG refrigerant oil. Use only this type of refrigerant oil the refrigerant system.

OPERATION

After performing any refrigerant recovery or recycling operation, always replenish the refrigerant system with the same amount of the recommended refrigerant oil as was removed. Too little refrigerant oil can cause A/C compressor damage, and too much can reduce A/C system performance.

PAG refrigerant oil is more hygroscopic than mineral oil, and will absorb any moisture it comes into contact with, even moisture in the air. The PAG oil container should always be kept tightly capped until it is ready to be used. After use, recap the oil container immediately to prevent moisture contamination.

STANDARD PROCEDURE

REFRIGERANT OIL LEVEL

When an A/C system is assembled at the factory, all components except the A/C compressor are refrigerant oil free. After the refrigerant system has been charged and operated, the refrigerant oil in the A/C compressor is dispersed throughout the refrigerant system. The receiver/drier, A/C evaporator, A/C condenser and the A/C compressor will each retain a significant amount of the needed refrigerant oil.

It is important to have the correct amount of refrigerant oil in the A/C system. This ensures proper lubrication of the A/C compressor. Too little oil will result in damage to the A/C compressor, while too much oil will reduce the cooling capacity of the A/C system and consequently result in higher discharge air temperatures.

CAUTION: The oil used in the Denso 10S17 and 10S20 A/C compressors is ND-8 PAG R-134a refrigerant oil. Only refrigerant oil of the same type should be used to service the A/C system. Do not use any other refrigerant oil. The oil container should be kept tightly capped until it is ready for use and then tightly capped after use to prevent contamination from dirt and moisture. Refrigerant oil will quickly absorb any moisture it comes in contact with, therefore, special effort must be used to keep all R-134a system components moisture-free. Moisture in the refrigerant oil is very difficult to remove and will cause a reliability problem with the A/C compressor.

NOTE: Most reclaim/recycling equipment will measure the lubricant being removed during recovery. This amount of lubricant should be added back into the system. Refer to the reclaim/recycling equipment manufacturers instructions.

It will not be necessary to check the oil level in the A/C compressor or to add oil, unless there has been an oil loss. An oil loss may occur due to a rupture or leak from a refrigerant line, a connector fitting, a component, or a component seal. If a leak occurs, add 30 milliliters (1 fluid ounce) of refrigerant oil to the refrigerant system after the repair has been made. Refrigerant oil loss will be evident at the leak point by the presence of a wet, shiny surface around the leak.

Refrigerant oil must be added when a receiver/drier, A/C evaporator or A/C condenser is replaced. See the Refrigerant Oil Capacities chart. When an A/C compressor is replaced, the refrigerant oil must be drained from the old compressor and measured. Drain all of the refrigerant oil from the new A/C compressor, then fill the new compressor with the same amount of refrigerant oil that was drained out of the old compressor.

REFRIGERANT OIL CAPACITIES

COMPONENT NAME	ml.	oz.
Total System Fill	150 ml.	5.0 oz.
A/C Condenser	30 ml.	1.0 oz.
A/C Evaporator	60 ml.	2.0 oz.
Receiver/drier	30 ml.	1.0 oz.
A/C Compressor	Drain and measure the oil from the old compressor. See text.	

SERVICE PORT VALVE CORE

DESCRIPTION

Refrigerant system service ports are used to recover, recycle, evacuate , charge and test the A/C refrigerant system. Unique sizes are used on the two service ports for the R-134a refrigerant system to ensure the system is not accidentally contaminated with R-12 refrigerant or by service equipment used for R-12 refrigerant.

The high side service port is on the liquid line fitting located on the receiver/drier. The low side service port is on the A/C suction line located near the A/C expansion valve (Fig. 29). Only the low side service port valve core is serviceable.

NOTE: The protective caps aids in service port sealing and help protects the refrigerant system from contamination. Remember to always reinstall the protective caps onto the service ports when refrigerant system service is complete.

Each of the service ports has a threaded plastic protective cap installed over it from the factory. The service port caps are serviceable items.

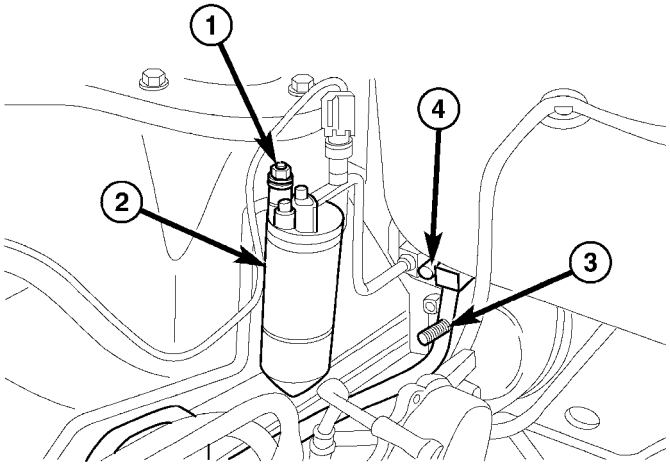


Fig. 29 Refrigerant System Service Ports

1 - HIGH SIDE SERVICE PORT
2 - RECEIVER/DRIER
3 - LOW SIDE SERVICE PORT
4 - A/C EXPANSION VALVE

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

(1) Remove the protective caps from the low and high side service ports (Fig. 30).

(2) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).

CAUTION: Only the low side service port valve core can be replaced. Do not attempt to replace the valve core for the high side service port. If the high side service port valve core requires service, replacement of the A/C liquid line is required.

(3) Using a standard Schrader-type valve core tool, remove the valve core from the low side service port only.

(4) Install a plug in or tape over the opened low side service port.

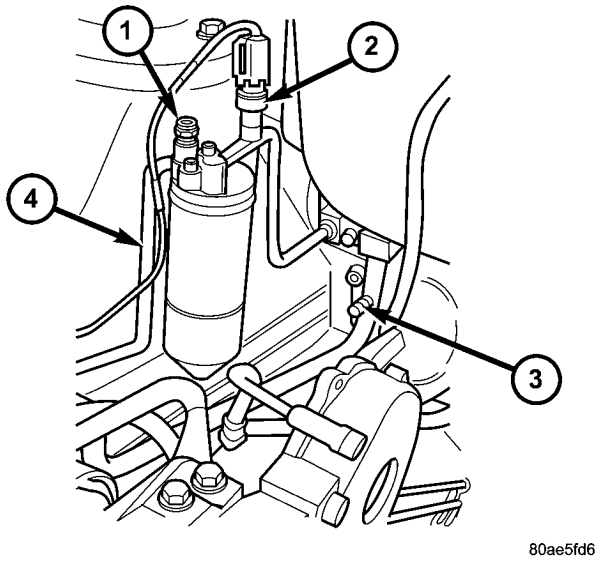


Fig. 30 A/C Service Ports

1 - HIGH SIDE PORT (NOT SERVICEABLE)
2 - A/C PRESSURE TRANSDUCER
3 - LOW SIDE PORT (SERVICEABLE)
4 - A/C LIQUID LINE (FRONT SECTION)

INSTALLATION

(1) Lubricate the A/C service port valve core with clean refrigerant oil prior to installation. Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.

(2) Remove the tape or plug from the low side service port.

SERVICE PORT VALVE CORE (Continued)

CAUTION: Only the low side service port valve core can be replaced. Do not attempt to replace the valve core for the high side service port. If the high side service port valve core requires service, replacement of the A/C liquid line is required.

(3) Using a standard Schrader-type valve core tool, install and tighten the replacement valve core into the low side service port.

CAUTION: A valve core that is not fully seated in the A/C service port can result in damage to the valve during refrigerant system evacuation and charge. Such damage may result in a loss of system refrigerant while uncoupling the charge adapters.

(4) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

(5) Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

(6) Install the protective caps onto the A/C service ports.

SUCTION LINE

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNINGS) and (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTIONS). Failure to follow the warnings and cautions could result in possible personal injury or death.

NOTE: The A/C suction line includes the low side service port located on the section of the line near the A/C expansion valve.

(1) Recover the refrigerant from the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM RECOVERY).

(2) Disconnect and isolate the negative battery cable.

(3) Remove the air cleaner housing and the air inlet tube (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - REMOVAL).

(4) Remove the drain tube from the right end of the wiper module.

(5) Remove the radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL).

(6) Remove the nut that secures the A/C suction line to the A/C compressor (Fig. 31).

(7) Disconnect the A/C suction line from the A/C compressor and remove and discard the O-ring seal and gasket.

(8) Install a plug in, or tape over the opened suction line fitting and the compressor port.

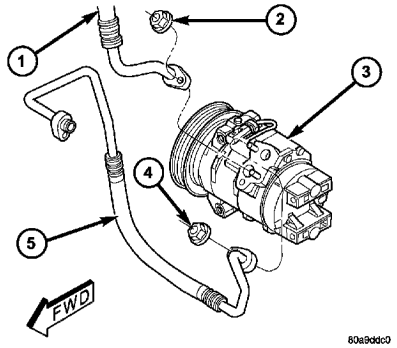


Fig. 31 A/C Suction Line to A/C Compressor

1 - A/C SUCTION LINE
2 - NUT
3 - A/C COMPRESSOR
4 - NUT
5 - A/C DISCHARGE LINE

(9) Disengage the suction line from the routing clip located on top of the right frame rail (Fig. 32).

(10) Remove the nut that secures the suction and liquid lines to the A/C expansion valve.

(11) Disconnect the suction and liquid lines from the A/C expansion valve and remove and discard the O-ring seals.

(12) Install a plug in, or tape over the opened suction and liquid line fittings and expansion valve ports.

(13) Remove the A/C suction line from the engine compartment.

INSTALLATION

(1) Position the A/C suction line into the engine compartment.

(2) Remove the tape or plugs from the suction and liquid line fittings and expansion valve ports.

(3) Lubricate new rubber O-ring seals with clean refrigerant oil and install them on the suction and liquid line fittings.

(4) Connect the suction and liquid lines to the A/C expansion valve.

(5) Install the nut that secures the suction and liquid lines to the A/C expansion valve. Tighten the nut to 23 N·m (17 ft. lbs.).

(6) Engage the suction line to the routing clip located on top of the right frame rail.

SUCTION LINE (Continued)

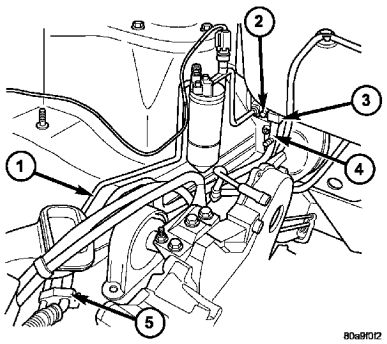


Fig. 32 A/C Suction Line to A/C Expansion Valve

1 - LIQUID LINE (FRONT SECTION)
2 - NUT
3 - EXPANSION VALVE
4 - SUCTION LINE
5 - ROUTING CLIP

(7) Remove the tape or plugs from the suction line fitting and compressor port.

(8) Lubricate a new rubber O-ring seal with clean refrigerant oil and install it and a new gasket onto the suction line fitting.

(9) Install the A/C suction line on to the A/C compressor.

(10) Install the nut that secures the A/C suction line to the A/C compressor. Tighten the nut to 23 N·m (17 ft. lbs.).

(11) Install the radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).

(12) Install the drain tube to the wiper module.

(13) Install the air cleaner housing and air inlet tube (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER HOUSING - INSTALLATION).

(14) Reconnect the negative battery cable.

(15) Evacuate the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE).

(16) Charge the refrigerant system (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE).

EMISSIONS CONTROL

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EMISSIONS CONTROL

DESCRIPTION

VEHICLE EMISSION CONTROL INFORMATION LABEL

All models have a Vehicle Emission Control Information (VECI) Label. Chrysler permanently attaches the label in the engine compartment. It cannot be removed without defacing information and destroying the label.

The label contains the vehicle's emission specifications and vacuum hose routings. All hoses must be connected and routed according to the label.

TRIP DEFINITION

A "Trip" means vehicle operation (following an engine-off period) of duration and driving mode such that all components and systems are monitored at least once by the diagnostic system. The monitors must successfully pass before the PCM can verify that a previously malfunctioning component is meeting the normal operating conditions of that component. For misfire or fuel system malfunction, the MIL may be extinguished if the fault does not recur when monitored during three subsequent sequential driving cycles in which conditions are similar to those under which the malfunction was first determined.

Anytime the MIL is illuminated, a DTC is stored. The DTC can self erase only after the MIL has been extinguished. Once the MIL is extinguished, the PCM must pass the diagnostic test for the most recent DTC for 40 warm-up cycles (80 warm-up cycles for the Fuel System Monitor and the Misfire Monitor). A warm-up cycle can best be described by the following:

- The engine must be running
- A rise of 40°F in engine temperature must occur from the time when the engine was started
- Engine coolant temperature must crossover 160°F
- A "driving cycle" that consists of engine start up and engine shut off.

Once the above conditions occur, the PCM is considered to have passed a warm-up cycle. Due to the conditions required to extinguish the MIL and erase the DTC, it is most important that after a repair has been made, all DTC's be erased and the repair verified by running 1–good trip.

NON-MONITORED CIRCUITS

The PCM does not monitor all circuits, systems and conditions that could have malfunctions causing driveability problems. However, problems with these systems may cause the PCM to store diagnostic trouble codes for other systems or components. For example, a fuel pressure problem will not register a fault directly, but could cause a rich/lean condition or misfire. This could cause the PCM to store an oxygen sensor or misfire diagnostic trouble code.

The major non-monitored circuits are listed below along with examples of failures modes that do not directly cause the PCM to set a DTC, but for a system that is monitored.

FUEL PRESSURE

The fuel pressure regulator controls fuel system pressure. The PCM cannot detect a clogged fuel pump inlet filter, clogged in-line fuel filter, or a pinched fuel supply or return line. However, these could result in a rich or lean condition causing the PCM to store an oxygen sensor, fuel system, or misfire diagnostic trouble code.

SECONDARY IGNITION CIRCUIT

The PCM cannot detect an inoperative ignition coil, fouled or worn spark plugs, ignition cross firing, or open spark plug cables. The misfire will however, increase the oxygen content in the exhaust, deceiving the PCM in to thinking the fuel system is too lean. Also see misfire detection. There are DTC's that can detect misfire and Ionization shorts in the secondary ignition circuit, refer to the Powertrain Diagnostic manual for more information

CYLINDER COMPRESSION

The PCM cannot detect uneven, low, or high engine cylinder compression. Low compression lowers O2 content in the exhaust. Leading to fuel system, oxygen sensor, or misfire detection fault.

EXHAUST SYSTEM

The PCM cannot detect a plugged, restricted or leaking exhaust system. It may set a EGR (if equipped) or Fuel system or O2S fault.

FUEL INJECTOR MECHANICAL MALFUNCTIONS

The PCM cannot determine if a fuel injector is clogged, the needle is sticking or if the wrong injector is installed. However, these could result in a rich or lean condition causing the PCM to store a diagnostic trouble code for either misfire, an oxygen sensor, or the fuel system.

EXCESSIVE OIL CONSUMPTION

Although the PCM monitors engine exhaust oxygen content when the system is in closed loop, it cannot determine excessive oil consumption.

THROTTLE BODY AIR FLOW

The PCM cannot detect a clogged or restricted air cleaner inlet or filter element.

VACUUM ASSIST

The PCM cannot detect leaks or restrictions in the vacuum circuits of vacuum assisted engine control system devices. However, these could cause the PCM to store a MAP sensor diagnostic trouble code and cause a high idle condition.

PCM SYSTEM GROUND

The PCM cannot determine a poor system ground. However, one or more diagnostic trouble codes may be generated as a result of this condition. The module should be mounted to the body at all times, including when diagnostics are performed.

PCM CONNECTOR ENGAGEMENT

The PCM may not be able to determine spread or damaged connector pins. However, it might store diagnostic trouble codes as a result of spread connector pins.

MONITORED SYSTEMS

There are new electronic circuit monitors that check fuel, emission, engine and ignition performance. These monitors use information from various sensor circuits to indicate the overall operation of the fuel, engine, ignition and emission systems and thus the emissions performance of the vehicle.

The fuel, engine, ignition and emission systems monitors do not indicate a specific component problem. They do indicate that there is an implied problem within one of the systems and that a specific problem must be diagnosed.

If any of these monitors detect a problem affecting vehicle emissions, the Malfunction Indicator (Check Engine) Lamp will be illuminated. These monitors generate Diagnostic Trouble Codes that can be displayed with the a scan tool.

The following is a list of the system monitors:

- EGR Monitor (if equipped)
- Misfire Monitor
- Fuel System Monitor
- Oxygen Sensor Monitor
- Oxygen Sensor Heater Monitor
- Catalyst Monitor
- Evaporative System Leak Detection Monitor (if equipped)

Following is a description of each system monitor, and its DTC.

Refer to the appropriate Powertrain Diagnostics Procedures manual for diagnostic procedures.

OXYGEN SENSOR (O2S) MONITOR

Effective control of exhaust emissions is achieved by an oxygen feedback system. The most important element of the feedback system is the O2S. The O2S is located in the exhaust path. Once it reaches operating temperatures of 300° to 350°C (572° to 662°F), the sensor generates a voltage that is inversely proportional to the amount of oxygen in the exhaust. The information obtained by the sensor is used to calculate the fuel injector pulse width. The PCM is programmed to maintain the optimum air/fuel ratio. At this mixture ratio, the catalyst works best to remove hydrocarbons (HC), carbon monoxide (CO) and nitrous oxide (NOx) from the exhaust.

The O2S is also the main sensing element for the EGR (if equipped), Catalyst and Fuel Monitors.

The O2S may fail in any or all of the following manners:

- Slow response rate
- Reduced output voltage
- Dynamic shift

EMISSIONS CONTROL (Continued)

- Shorted or open circuits

Response rate is the time required for the sensor to switch from lean to rich once it is exposed to a richer than optimum A/F mixture or vice versa. As the sensor starts malfunctioning, it could take longer to detect the changes in the oxygen content of the exhaust gas.

The output voltage of the O2S ranges from 0 to 1 volt (voltages are offset by 2.5 volts on NGC vehicles). A good sensor can easily generate any output voltage in this range as it is exposed to different concentrations of oxygen. To detect a shift in the A/F mixture (lean or rich), the output voltage has to change beyond a threshold value. A malfunctioning sensor could have difficulty changing beyond the threshold value.

OXYGEN SENSOR HEATER MONITOR

If there is an oxygen sensor (O2S) DTC as well as a O2S heater DTC, the O2S heater fault MUST be repaired first. After the O2S fault is repaired, verify that the heater circuit is operating correctly.

Effective control of exhaust emissions is achieved by an oxygen feedback system. The most important element of the feedback system is the O2S. The O2S is located in the exhaust path. Once it reaches operating temperatures of 300° to 350°C (572 ° to 662°F), the sensor generates a voltage that is inversely proportional to the amount of oxygen in the exhaust. The information obtained by the sensor is used to calculate the fuel injector pulse width. This maintains a 14.7 to 1 Air Fuel (A/F) ratio. At this mixture ratio, the catalyst works best to remove hydrocarbons (HC), carbon monoxide (CO) and nitrogen oxide (NOx) from the exhaust.

The voltage readings taken from the O2S are very temperature sensitive. The readings are not accurate below 300°C. Heating of the O2S is done to allow the engine controller to shift to closed loop control as soon as possible. The heating element used to heat the O2S must be tested to ensure that it is heating the sensor properly.

The O2S circuit is monitored for a drop in voltage. The sensor output is used to test the heater by isolating the effect of the heater element on the O2S output voltage from the other effects.

EGR MONITOR (if equipped)

The Powertrain Control Module (PCM) performs an on-board diagnostic check of the EGR system.

The EGR monitor is used to test whether the EGR system is operating within specifications. The diagnostic check activates only during selected engine/driving conditions. When the conditions are met, the EGR is turned off (solenoid energized) and the O2S compensation control is monitored. Turning off the EGR shifts the air fuel (A/F) ratio in the lean direction. The O2S data should indicate an increase in the O2 concentration in the combustion chamber when the exhaust gases are no longer recirculated. While this test does not directly measure the operation of the EGR system, it can be inferred from the shift in the O2S data whether the EGR system is operating correctly. Because the O2S is being used, the O2S test must pass its test before the EGR test. Also looks at EGR linear potentiometer for feedback.

MISFIRE MONITOR

Excessive engine misfire results in increased catalyst temperature and causes an increase in HC emissions. Severe misfires could cause catalyst damage. To prevent catalytic convertor damage, the PCM monitors engine misfire.

The Powertrain Control Module (PCM) monitors for misfire during most engine operating conditions (positive torque) by looking at changes in the crankshaft speed. If a misfire occurs the speed of the crankshaft will vary more than normal.

FUEL SYSTEM MONITOR

To comply with clean air regulations, vehicles are equipped with catalytic converters. These converters reduce the emission of hydrocarbons, oxides of nitrogen and carbon monoxide. The catalyst works best when the air fuel (A/F) ratio is at or near the optimum of 14.7 to 1.

The PCM is programmed to maintain the optimum air/fuel ratio. This is done by making short term corrections in the fuel injector pulse width based on the O2S output. The programmed memory acts as a self calibration tool that the engine controller uses to compensate for variations in engine specifications, sensor tolerances and engine fatigue over the life span of the engine. By monitoring the actual air-fuel ratio with the O2S (short term) and multiplying that with the program long-term (adaptive) memory and comparing that to the limit, it can be determined whether it will pass an emissions test. If a malfunction occurs such that the PCM cannot maintain the optimum A/F ratio, then the MIL will be illuminated.

CATALYST MONITOR

To comply with clean air regulations, vehicles are equipped with catalytic converters. These converters reduce the emission of hydrocarbons, oxides of nitrogen and carbon monoxide.

Normal vehicle miles or engine misfire can cause a catalyst to decay. A meltdown of the ceramic core can cause a reduction of the exhaust passage. This can increase vehicle emissions and deteriorate engine performance, driveability and fuel economy.

The catalyst monitor uses dual oxygen sensors (O2S's) to monitor the efficiency of the converter. The

dual O2S's strategy is based on the fact that as a catalyst deteriorates, its oxygen storage capacity and its efficiency are both reduced. By monitoring the oxygen storage capacity of a catalyst, its efficiency can be indirectly calculated. The upstream O2S is used to detect the amount of oxygen in the exhaust gas before the gas enters the catalytic converter. The PCM calculates the A/F mixture from the output of the O2S. A low voltage indicates high oxygen content (lean mixture). A high voltage indicates a low content of oxygen (rich mixture).

When the upstream O2S detects a lean condition, there is an abundance of oxygen in the exhaust gas. A functioning converter would store this oxygen so it can use it for the oxidation of HC and CO. As the converter absorbs the oxygen, there will be a lack of oxygen downstream of the converter. The output of the downstream O2S will indicate limited activity in this condition.

As the converter loses the ability to store oxygen, the condition can be detected from the behavior of the downstream O2S. When the efficiency drops, no chemical reaction takes place. This means the concentration of oxygen will be the same downstream as upstream. The output voltage of the downstream O2S copies the voltage of the upstream sensor. The only difference is a time lag (seen by the PCM) between the switching of the O2S's.

To monitor the system, the number of lean-to-rich switches of upstream and downstream O2S's is counted. The ratio of downstream switches to upstream switches is used to determine whether the catalyst is operating properly. An effective catalyst will have fewer downstream switches than it has upstream switches i.e., a ratio closer to zero. For a totally ineffective catalyst, this ratio will be one-to-one, indicating that no oxidation occurs in the device.

The system must be monitored so that when catalyst efficiency deteriorates and exhaust emissions increase to over the legal limit, the MIL (Check Engine lamp) will be illuminated.

NATURAL VACUUM LEAK DETECTION (NVLD) (if equipped)

The Natural Vacuum Leak Detection (NVLD) system is the next generation evaporative leak detection system that will first be used on vehicles equipped with the Next Generation Controller (NGC). This new system replaces the leak detection pump as the method of evaporative system leak detection. This is to detect a leak equivalent to a 0.020″ (0.5 mm) hole. This system has the capability to detect holes of this size very dependably.

The basic leak detection theory employed with NVLD is the ″Gas Law″. This is to say that the pressure in a sealed vessel will change if the temperature of the gas in the vessel changes. The vessel will only see this effect if it is indeed sealed. Even small leaks will allow the pressure in the vessel to come to equilibrium with the ambient pressure. In addition to the detection of very small leaks, this system has the capability of detecting medium as well as large evaporative system leaks.

The NVLD seals the canister vent during engine off conditions. If the EVAP system has a leak of less than the failure threshold, the evaporative system will be pulled into a vacuum, either due to the cool down from operating temperature or diurnal ambient temperature cycling. The diurnal effect is considered one of the primary contributors to the leak determination by this diagnostic. When the vacuum in the system exceeds about 1″ H2O (0.25 KPA), a vacuum switch closes. The switch closure sends a signal to the NGC. The NGC, via appropriate logic strategies (described below), utilizes the switch signal, or lack thereof, to make a determination of whether a leak is present.

The NVLD device is designed with a normally open vacuum switch, a normally closed solenoid, and a seal, which is actuated by both the solenoid and a diaphragm. The NVLD is located on the atmospheric vent side of the canister. The NVLD assembly may be mounted on top of the canister outlet, or in-line between the canister and atmospheric vent filter. The normally open vacuum switch will close with about 1″ H2O (0.25 KPA) vacuum in the evaporative system. The diaphragm actuates the switch. This is above the opening point of the fuel inlet check valve in the fill tube so cap off leaks can be detected. Submerged fill systems must have recirculation lines that do not have the in-line normally closed check valve that protects the system from failed nozzle liquid ingestion, in order to detect cap off conditions.

The normally closed valve in the NVLD is intended to maintain the seal on the evaporative system during the engine off condition. If vacuum in the evaporative system exceeds 3″ to 6″ H2O (0.75 to 1.5 KPA), the valve will be pulled off the seat, opening the seal. This will protect the system from excessive vacuum as well as allowing sufficient purge flow in the event that the solenoid was to become inoperative.

The solenoid actuates the valve to unseal the canister vent while the engine is running. It also will be used to close the vent during the medium and large leak tests and during the purge flow check. This solenoid requires initial 1.5 amps of current to pull the valve open but after 100 ms. will be duty cycled down to an average of about 150 mA for the remainder of the drive cycle.

Another feature in the device is a diaphragm that will open the seal in the NVLD with pressure in the evaporative system. The device will ″blow off″ at about 0.5″ H2O (0.12 KPA) pressure to permit the

venting of vapors during refueling. An added benefit to this is that it will also allow the tank to ″breathe″ during increasing temperatures, thus limiting the pressure in the tank to this low level. This is beneficial because the induced vacuum during a subsequent declining temperature will achieve the switch closed (pass threshold) sooner than if the tank had to decay from a built up pressure.

The device itself has 3 wires: Switch sense, solenoid driver and ground. The NGC utilizes a high-side driver to energize and duty-cycle the solenoid.

OPERATION

SYSTEM

The Powertrain Control Module (PCM) monitors many different circuits in the fuel injection, ignition, emission and engine systems. If the PCM senses a problem with a monitored circuit often enough to indicate an actual problem, it stores a Diagnostic Trouble Code (DTC) in the PCM's memory. If the code applies to a non-emissions related component or system, and the problem is repaired or ceases to exist, the PCM cancels the code after 40 warmup cycles. Diagnostic trouble codes that affect vehicle emissions illuminate the Malfunction Indicator Lamp (MIL). Refer to Malfunction Indicator Lamp in this section.

Certain criteria must be met before the PCM stores a DTC in memory. The criteria may be a specific range of engine RPM, engine temperature, and/or input voltage to the PCM.

The PCM might not store a DTC for a monitored circuit even though a malfunction has occurred. This may happen because one of the DTC criteria for the circuit has not been met. **For example** , assume the diagnostic trouble code criteria requires the PCM to monitor the circuit only when the engine operates between 750 and 2000 RPM. Suppose the sensor's output circuit shorts to ground when engine operates above 2400 RPM (resulting in 0 volt input to the PCM). Because the condition happens at an engine speed above the maximum threshold (2000 rpm), the PCM will not store a DTC.

There are several operating conditions for which the PCM monitors and sets DTC's. Refer to Monitored Systems, Components, and Non-Monitored Circuits in this section.

NOTE: Various diagnostic procedures may actually cause a diagnostic monitor to set a DTC. For instance, pulling a spark plug wire to perform a spark test may set the misfire code. When a repair is completed and verified, use the scan tool to erase all DTC's and extinguish the MIL.

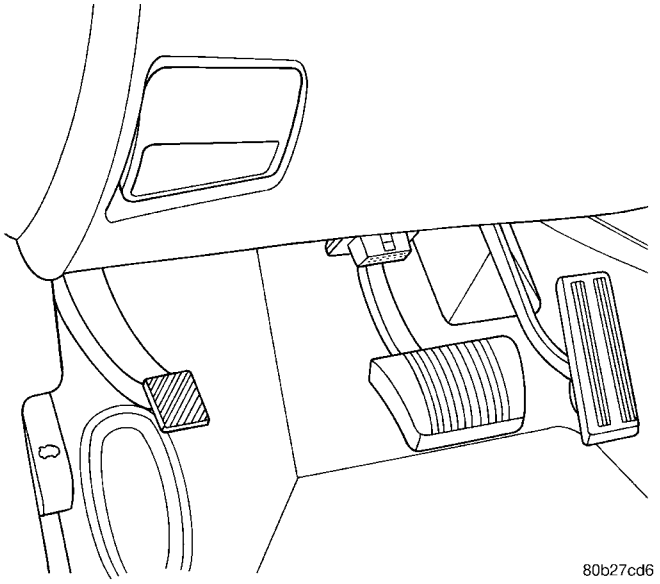


Fig. 1 Data Link Connector

Technicians can display stored DTC's. For obtaining the DTC information, use the Data Link Connector with the scan tool (Fig. 1).

DRB III® STATE DISPLAY TEST MODE

OPERATION

The switch inputs to the Powertrain Control Module (PCM) have two recognized states; HIGH and LOW. For this reason, the PCM cannot recognize the difference between a selected switch position versus an open circuit, a short circuit, or a defective switch. If the State Display screen shows the change from HIGH to LOW or LOW to HIGH, assume the entire switch circuit to the PCM functions properly. From the state display screen, access either State Display Inputs and Outputs or State Display Sensors.

EMISSIONS CONTROL (Continued)

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Vapor Canistor Bracket to Frame	10.1		90
Vapor Canistor Mounting Nuts			
Filter to Frame Bolt	10.1		90

EVAPORATIVE EMISSIONS

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EVAPORATIVE EMISSIONS

OPERATION - EVAPORATION CONTROL SYSTEM

The evaporation control system prevents the emission of fuel tank vapors into the atmosphere. When fuel evaporates in the fuel tank, the vapors pass through vent hoses or tubes to an activated carbon filled evaporative canister. The canister temporarily holds the vapors. The Powertrain Control Module (PCM) allows intake manifold vacuum to draw vapors into the combustion chambers during certain operating conditions (Fig. 1).

All engines use a proportional purge solenoid system. The PCM controls vapor flow by operating the purge solenoid. Refer to Proportional Purge Solenoid in this section.

NOTE: The evaporative system uses specially manufactured hoses. If they need replacement, only use fuel resistant hose. Also the hoses must be able to pass an Ozone compliance test.

NOTE: For more information on Onboard Refueling Vapor Recovery (ORVR), refer to the Fuel Delivery section.

EVAPORATIVE EMISSIONS (Continued)

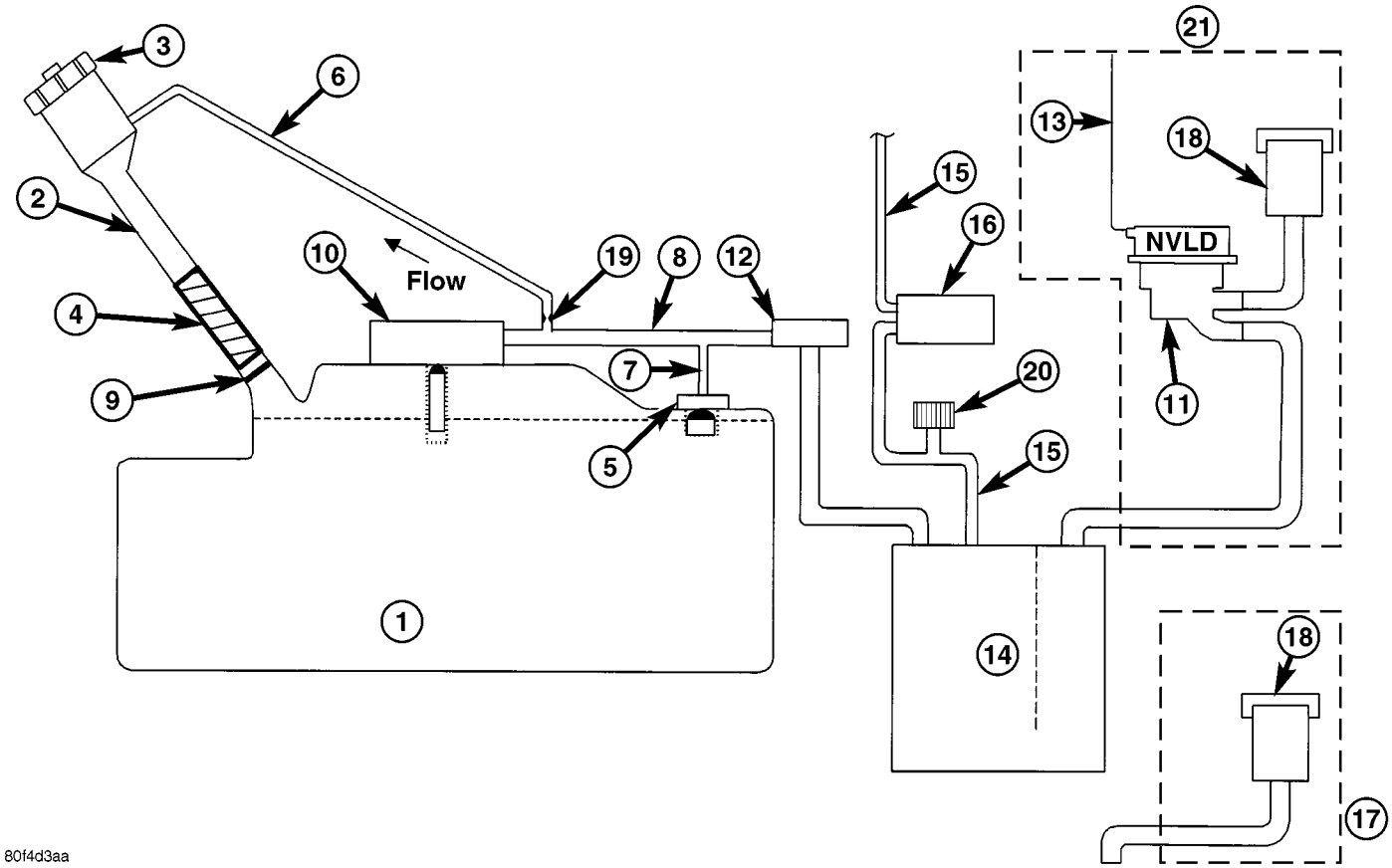


Fig. 1 ORVR System Schematic (PZEV)

1 - FUEL TANK (PLASTIC)
2 - FUEL FILLER TUBE
3 - FUEL CAP (PRESSURE/RELIEF)
4 - FILL TUBE TO FUEL TANK CONNECTOR (ELASTOMERIC)
5 - TANK VENT/ROLLOVER VALVE(S)
6 - VAPOR RECIRCULATION LINE
7 - TANK VAPOR LINE
8 - VAPOR LINE TO CANISTER
9 - CHECK VALVE (N/C)
10 - CONTROL VALVE
11 - NATURAL VACUUM LEAD DETECTION (NVLD)
12 - LIQUID SEPARATOR (IF EQUIPPED)
13 - ENGINE WIRING HARNESS TO NVLD
14 - VAPOR CANISTER
15 - PURGE LINE
16 - PURGE DEVICE
17 - WITHOUT NVLD
18 - BREATHER ELEMENT
19 - FLOW CONTROL ORIFICE
20 - SERVICE PORT
21 - WITH NVLD

EVAP/PURGE SOLENOID

REMOVAL

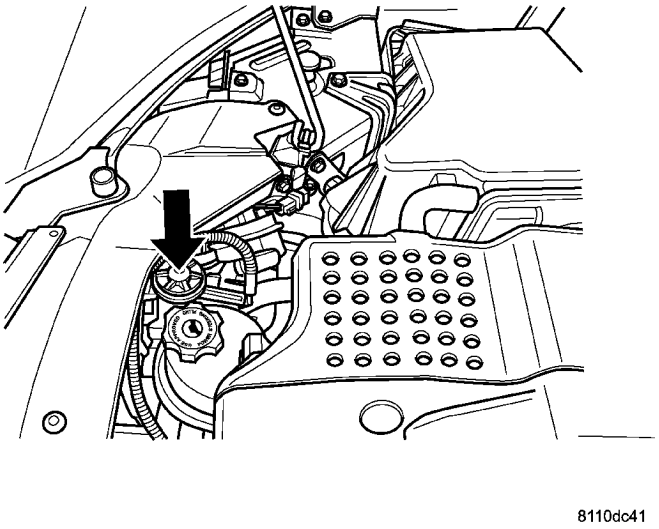


Fig. 2 EVAP PURGE SOLENOID

(1) Disconnect the negative battery cable.
(2) Unlock and disconnect the electrical connector (Fig. 2).

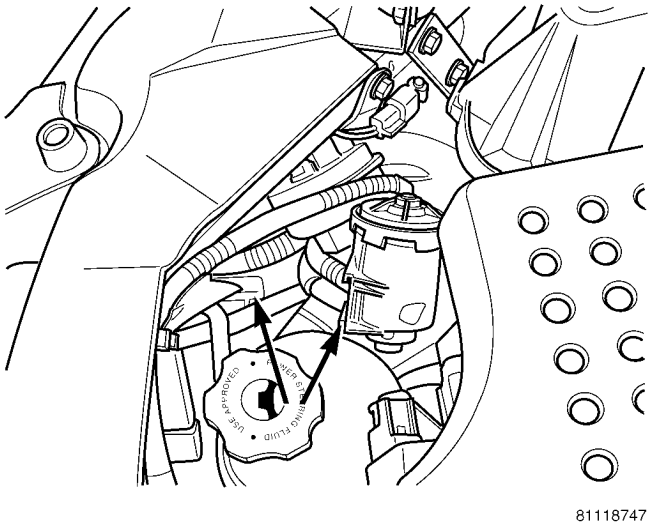


Fig. 3 PURGE SOLENOID REMOVED

(3) Release tab and pull solenoid from bracket (Fig. 3).
(4) Remove the vacuum lines from solenoid.

INSTALLATION

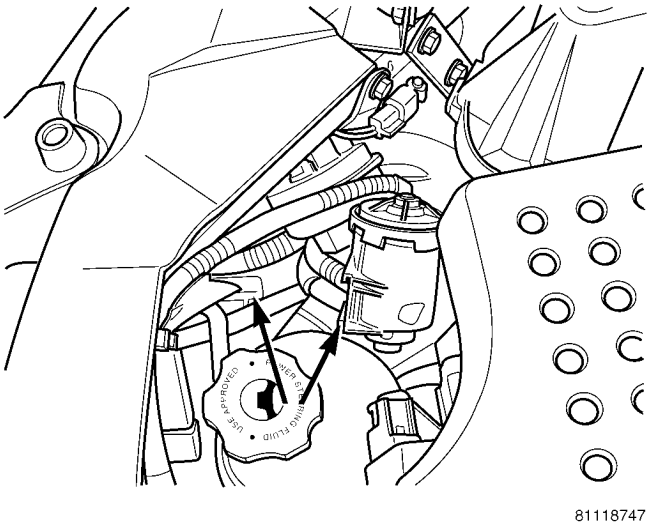


Fig. 4 PURGE SOLENOID REMOVED

(1) Connect the vacuum lines to solenoid (Fig. 4).
(2) Install solenoid to bracket.

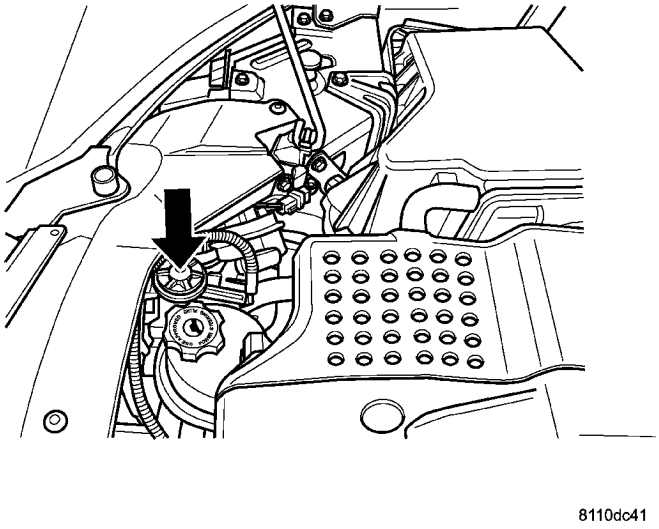


Fig. 5 EVAP PURGE SOLENOID

(3) Connect the electrical connector to the solenoid and lock (Fig. 5).
(4) Connect the negative battery cable.

FUEL FILLER CAP

DESCRIPTION

The plastic fuel fill cap is threaded/quarter turn onto the end of the fuel filler tube. It's purpose is to retain vapors and fuel in the fuel tank.

OPERATION

The fuel filler cap incorporates a two-way relief valve that is closed to atmosphere during normal operating conditions. The relief valve is calibrated to open when a pressure of 17 kPa (2.5 psi) or vacuum of 2 kPa (0.6 in. Hg) occurs in the fuel tank. When the pressure or vacuum is relieved, the valve returns to the normally closed position.

CAUTION: Remove the fuel filler cap to release fuel tank pressure before disconnecting any fuel system component.

NATURAL VAC LEAK DETECTION ASSY

OPERATION

The Natural Vacuum Leak Detection (NVLD) system is the next generation evaporative leak detection system that will first be used on vehicles equipped with the Next Generation Controller (NGC). This new system replaces the leak detection pump as the method of evaporative system leak detection. This is to detect a leak equivalent to a 0.020″ (0.5 mm) hole. This system has the capability to detect holes of this size very dependably.

The basic leak detection theory employed with NVLD is the ″Gas Law″. This is to say that the pressure in a sealed vessel will change if the temperature of the gas in the vessel changes. The vessel will only see this effect if it is indeed sealed. Even small leaks will allow the pressure in the vessel to come to equilibrium with the ambient pressure. In addition to the detection of very small leaks, this system has the capability of detecting medium as well as large evaporative system leaks.

A vent valve seals the canister vent during engine off conditions. If the vapor system has a leak of less than the failure threshold, the evaporative system will be pulled into a vacuum, either due to the cool down from operating temperature or diurnal ambient temperature cycling. The diurnal effect is considered one of the primary contributors to the leak determination by this diagnostic. When the vacuum in the system exceeds about 1″ H2O (0.25 KPA), a vacuum switch closes. The switch closure sends a signal to the NGC. The NGC, via appropriate logic strategies (described below), utilizes the switch signal, or lack thereof, to make a determination of whether a leak is present.

The NVLD device is designed with a normally open vacuum switch, a normally closed solenoid, and a seal, which is actuated by both the solenoid and a diaphragm. The NVLD is located on the atmospheric vent side of the canister. The NVLD assembly may be mounted on top of the canister outlet, or in-line between the canister and atmospheric vent filter. The normally open vacuum switch will close with about 1″ H2O (0.25 KPA) vacuum in the evaporative system. The diaphragm actuates the switch. This is above the opening point of the fuel inlet check valve in the fill tube so cap off leaks can be detected. Submerged fill systems must have recirculation lines that do not have the in-line normally closed check valve that protects the system from failed nozzle liquid ingestion, in order to detect cap off conditions.

The normally closed valve in the NVLD is intended to maintain the seal on the evaporative system during the engine off condition. If vacuum in the evaporative system exceeds 3″ to 6″ H2O (0.75 to 1.5 KPA), the valve will be pulled off the seat, opening the seal. This will protect the system from excessive vacuum as well as allowing sufficient purge flow in the event that the solenoid was to become inoperative.

The solenoid actuates the valve to unseal the canister vent while the engine is running. It also will be used to close the vent during the medium and large leak tests and during the purge flow check. This solenoid requires initial 1.5 amps of current to pull the valve open but after 100 ms. will be duty cycled down to an average of about 150 mA for the remainder of the drive cycle.

Another feature in the device is a diaphragm that will open the seal in the NVLD with pressure in the evaporative system. The device will ″blow off″ at about 0.5″ H2O (0.12 KPA) pressure to permit the venting of vapors during refueling. An added benefit to this is that it will also allow the tank to ″breathe″ during increasing temperatures, thus limiting the pressure in the tank to this low level. This is beneficial because the induced vacuum during a subsequent declining temperature will achieve the switch closed (pass threshold) sooner than if the tank had to decay from a built up pressure.

The device itself has 3 wires: Switch sense, solenoid driver and ground. The NGC utilizes a high-side driver to energize and duty-cycle the solenoid.

NATURAL VAC LEAK DETECTION ASSY (Continued)

REMOVAL

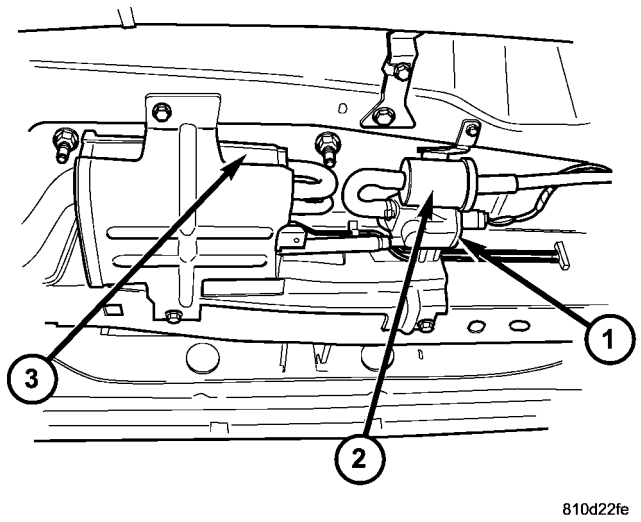


Fig. 6 EVAP CANISTER AND NVLD

1 - Natural Vacuum Leak Detection Pump
2 - Pump Filter
3 - EVAP Canister

(1) Disconnect the negative battery cable.
(2) Raise vehicle and support.
(3) Unlock and disconnect the electrical connector (Fig. 6).

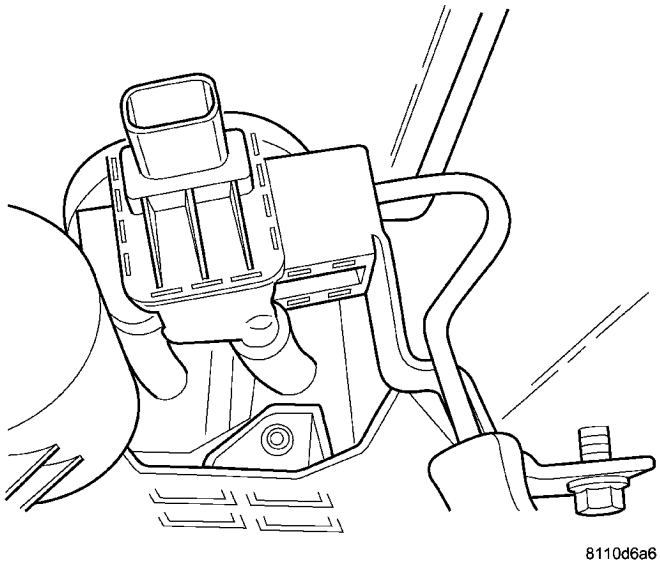


Fig. 7 UNLOCKING TAB FOR NVLD

(4) Remove clamps and remove hoses.

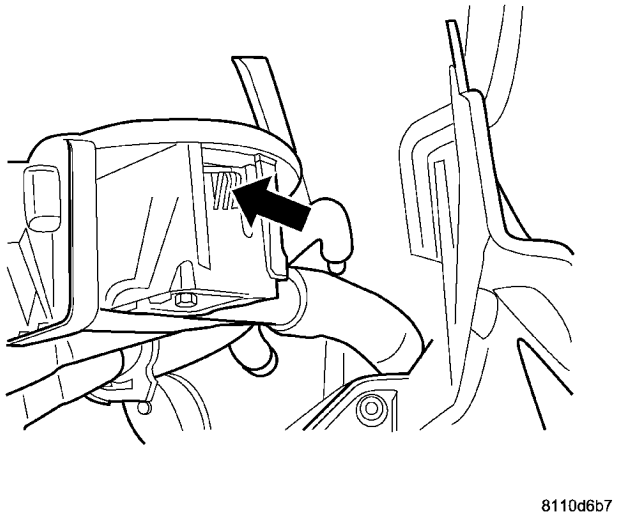


Fig. 8 LOCKING TAB

(5) Press tab (Fig. 8) and release Natural Vacuum Leak Detection pump (Fig. 7).

INSTALLATION

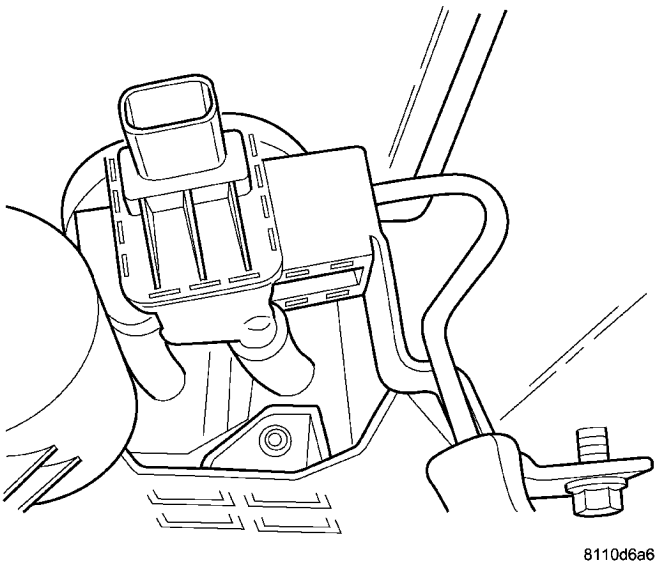


Fig. 9 UNLOCKING TAB FOR NVLD

(1) Slide (Fig. 9) the Natural Vacuum Leak Detection pump (Fig. 10) onto the bracket and make sure that the tab locks into the bracket.



Fig. 10 LOCKING TAB

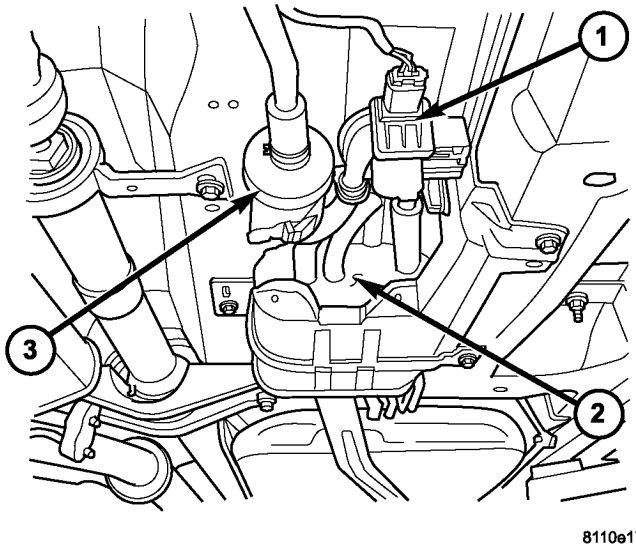


Fig. 11 NVLD/EVAP CANISTER ASSEMBLY

(2) Install hoses and clamps.

(3) Connect the electrical connector (Fig. 11) and lock.

(4) Lower vehicle.

(5) Connect the negative battery cable.

ORVR

OPERATION

The emission control principle used in the ORVR system is that the fuel flowing into the filler tube (appx. 1" I.D.) creates an aspiration effect which draws air into the fill tube (Fig. 12). During refueling, the fuel tank is vented to the vapor canister to capture escaping vapors. With air flowing into the filler tube, there are no fuel vapors escaping to the atmosphere. Once the refueling vapors are captured by the canister, the vehicle's computer controlled purge system draws vapor out of the canister for the engine to burn. The vapors flow is metered by the purge solenoid so that there is no or minimal impact on driveability or tailpipe emissions.

As fuel starts to flow through the fill tube, it opens the normally closed check valve and enters the fuel tank. Vapor or air is expelled from the tank through the control valve to the vapor canister. Vapor is absorbed in the canister until vapor flow in the lines stops, either following shut-off or by having the fuel level in the tank rise high enough to close the control valve. The control valve (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - OPERATION) contains a float that rises to seal the large diameter vent path to the canister. At this point in the fueling of the vehicle, the tank pressure increases, the check valve closes (preventing tank fuel from spitting back at the operator), and fuel then rises up the filler tube to shut-off the dispensing nozzle.

If the engine is shut-off while the On-Board diagnostics test is running, low level tank pressure can be trapped in the fuel tank and fuel can not be added to the tank until the pressure is relieved. This is due to the leak detection pump closing the vapor outlet from the top of the tank and the one-way check valve not allowing the tank to vent through the fill tube to atmosphere. Therefore, when fuel is added, it will back-up in the fill tube and shut off the dispensing nozzle. The pressure can be eliminated in two ways: 1. Vehicle purge must be activated and for a long enough period to eliminate the pressure. 2. Removing the fuel cap and allowing enough time for the system to vent thru the recirulation tube.

ORVR (Continued)

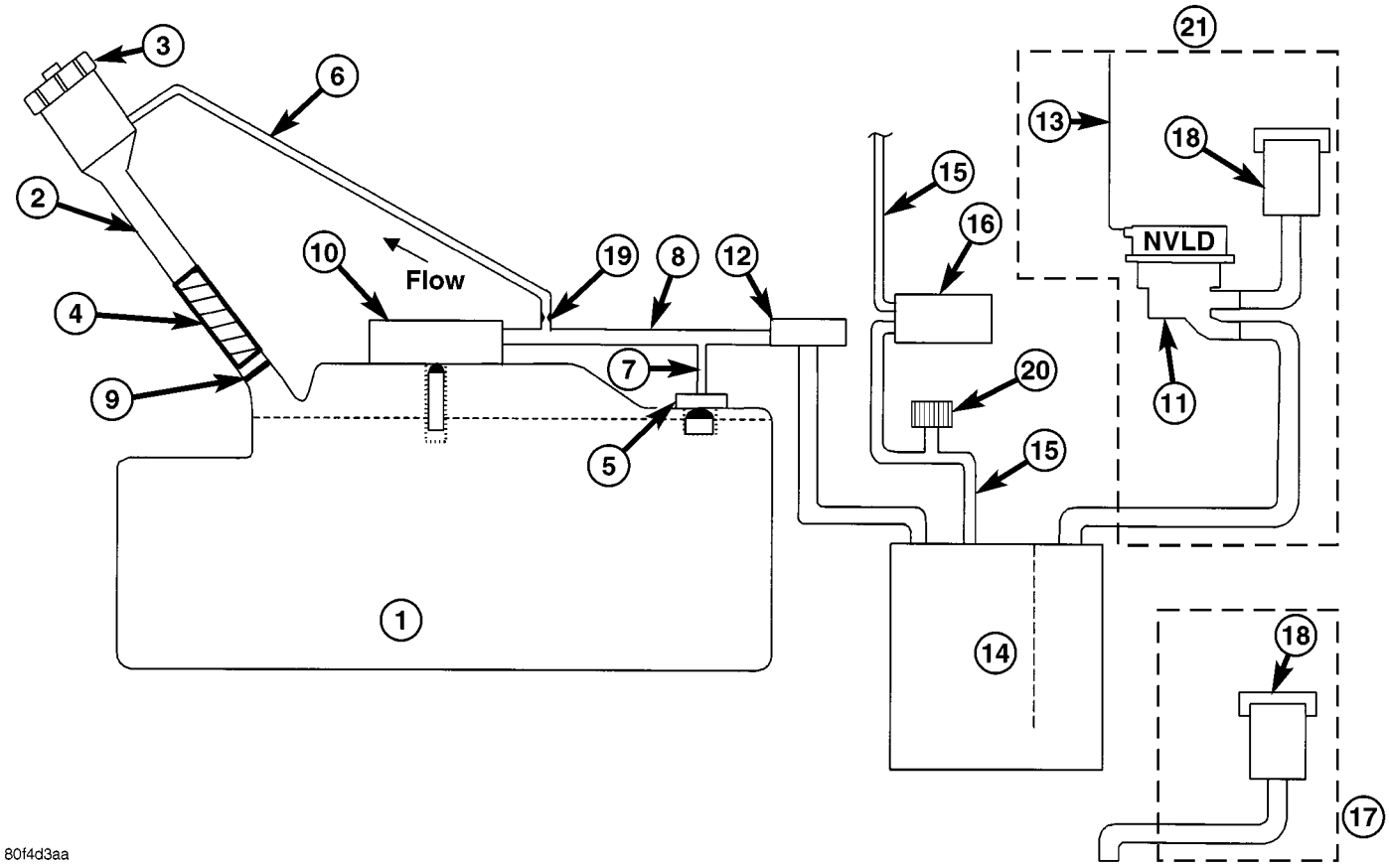


Fig. 12 ORVR System Schematic

1 - FUEL TANK (PLASTIC)
2 - FUEL FILLER TUBE
3 - FUEL CAP (PRESSURE/RELIEF)
4 - FILL TUBE TO FUEL TANK CONNECTOR (ELASTOMERIC)
5 - TANK VENT/ROLLOVER VALVE(S)
6 - VAPOR RECIRCULATION LINE
7 - TANK VAPOR LINE
8 - VAPOR LINE TO CANISTER
9 - CHECK VALVE (N/C)
10 - CONTROL VALVE
11 - NATURAL VACUUM LEAD DETECTION (NVLD)
12 - LIQUID SEPARATOR (IF EQUIPPED)
13 - ENGINE WIRING HARNESS TO NVLD
14 - VAPOR CANISTER
15 - PURGE LINE
16 - PURGE DEVICE
17 - WITHOUT NVLD
18 - BREATHER ELEMENT
19 - FLOW CONTROL ORIFICE
20 - SERVICE PORT
21 - WITH NVLD

ORVR (Continued)

DIAGNOSIS AND TESTING - VEHICLE DOES NOT FILL

CONDITION	POSSIBLE CAUSES	CORRECTION
Pre-Mature Nozzle Shut-Off	Defective fuel tank assembly components.	Fill tube improperly installed (sump) Fill tube hose pinched. Check valve stuck shut. Control valve stuck shut.
	Defective vapor/vent components.	Vent line from control valve to canister pinched. Vent line from canister to vent filter pinched. Canister vent valve failure (requires double failure, plugged to NVLD and atmosphere). Leak detection pump failed closed. Leak detection pump filter plugged.
	On-Board diagnostics evaporative system leak test just conducted.	Canister vent valve vent plugged to atmosphere. Engine still running when attempting to fill (System designed not to fill).
	Defective fill nozzle.	Try another nozzle.
Fuel Spits Out Of Filler Tube.	During fill.	See Pre-Mature Shut-Off.
	At conclusion of fill.	Defective fuel handling component. (Check valve stuck open).
		Defective vapor/vent handling component.
		Defective fill nozzle.

PCV VALVE

DESCRIPTION

The PCV valve contains a spring loaded plunger. The plunger meters the amount of crankcase vapors routed into the combustion chamber based on intake manifold vacuum.

DIAGNOSIS AND TESTING - PCV SYSTEM

WARNING: APPLY PARKING BRAKE AND/OR BLOCK WHEELS BEFORE PERFORMING ANY TEST OR ADJUSTMENT WITH THE ENGINE OPERATING.

(1) With engine idling, remove the hose from the PCV valve. If the valve is not plugged, a hissing noise will be heard as air passes through the valve. A strong vacuum should also be felt when a finger is placed over the valve inlet.

(2) Install hose on PCV valve. Remove the make-up air hose from the air plenum at the rear of the engine. Hold a piece of stiff paper (parts tag) loosely over the end of the make-up air hose.

(3) After allowing approximately one minute for crankcase pressure to reduce, the paper should draw up against the hose with noticeable force. If the engine does not draw the paper against the grommet after installing a new valve, replace the PCV valve hose.

(4) Turn the engine off. Remove the PCV valve from intake manifold. The valve should rattle when shaken.

(5) Replace the PCV valve and retest the system if it does not operate as described in the preceding tests. **Do not attempt to clean the old PCV valve.**

REMOVAL

(1) Remove hose from PCV valve. The valve is on the rear valve cover (Fig. 13).

(2) Unscrew the PCV valve.

(3) Remove PCV valve.

INSTALLATION

(1) Install PCV valve and tighten (Fig. 14).

(2) Install PCV hose.

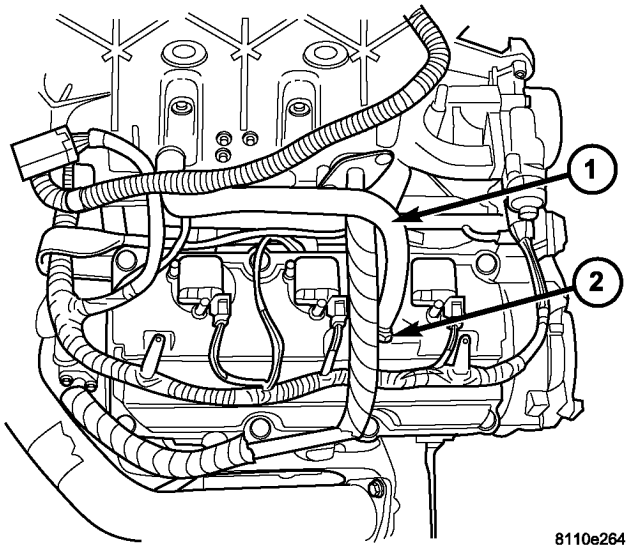


Fig. 13 PCV VALVE AND HOSE

1 - PCV Hose
2 - PCV valve

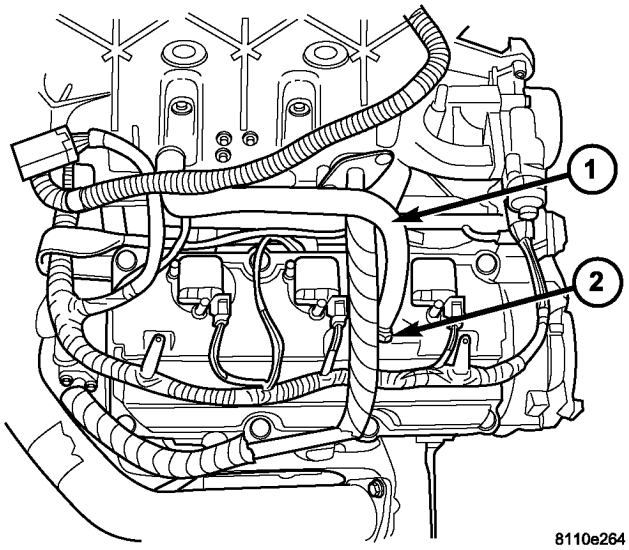


Fig. 14 PCV VALVE AND HOSE

1 - PCV Hose
2 - PCV valve

VAPOR CANISTER

OPERATION

All vehicles use a maintenance free, evaporative (EVAP) canister. Fuel tank vapors vent into the canister. The canister temporarily holds the fuel vapors until intake manifold vacuum draws them into the combustion chamber. The Powertrain Control Module (PCM) purges the canister through the proportional purge solenoid. The PCM purges the canister at predetermined intervals and engine conditions.

Purge Free Cells

Purge-free memory cells are used to identify the fuel vapor content of the evaporative canister. Since the evaporative canister is not purged 100% of the time, the PCM stores information about the evaporative canister's vapor content in a memory cell.

The purge-free cells are constructed similar to certain purge-normal cells. The purge-free cells can be

VAPOR CANISTER (Continued)

monitored by the DRB III® Scan Tool. The only difference between the purge-free cells and normal adaptive cells is that in purge-free, the purge is completely turned off. This gives the PCM the ability to compare purge and purge-free operation.

REMOVAL

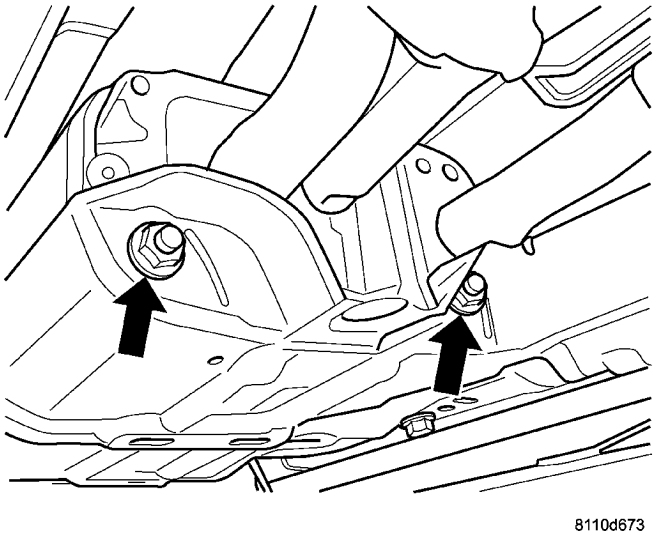


Fig. 15 EVAP CANISTER MOUNTING NUTS

(1) Raise vehicle and support.
(2) Remove the hoses from the EVAP canister.
(3) Remove the 2 mounting nuts (Fig. 15).
(4) Remove the inboard screw from the mounting bracket.
(5) Loosen the 2 other screws.
(6) Remove the canister.

INSTALLATION

(1) Install canister into bracket (Fig. 16).
(2) Tighten 2 mounting nuts.
(3) Install inboard screw and tighten all 3 bracket mounting screws.
(4) Connect the EVAP canister hoses.
(5) Lower vehicle.

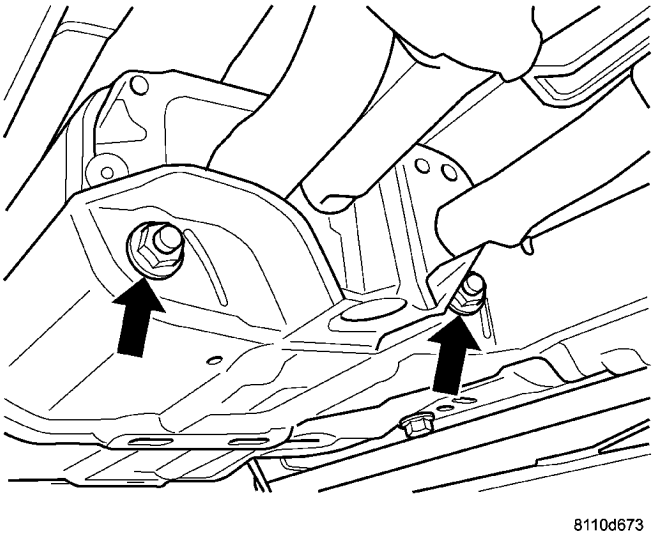


Fig. 16 EVAP CANISTER MOUNTING NUTS

EXHAUST GAS RECIRCULATION

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TUBE

REMOVAL

3.5L

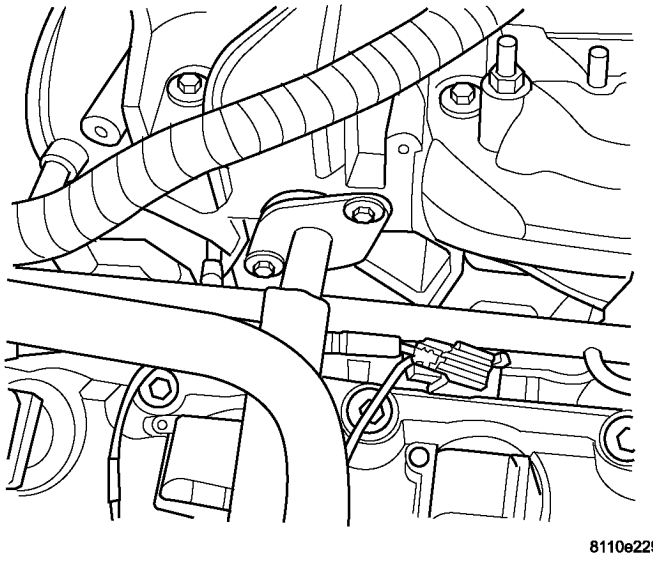


Fig. 1 EGR AT INTAKE MANIFOLD

(1) Remove the 2 bolts from tube flange at rear of intake manifold (Fig. 1).
(2) Remove the tube bracket bolt (Fig. 2).
(3) Remove the 2 flange bolts at EGR valve (Fig. 3).

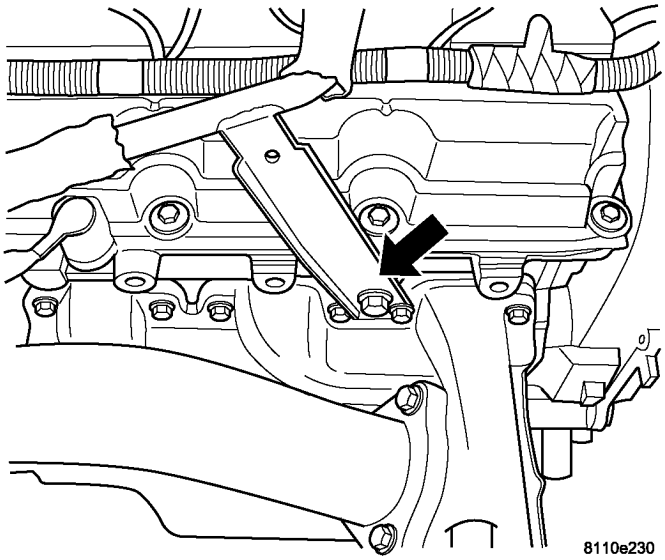


Fig. 2 TUBE BRACKET

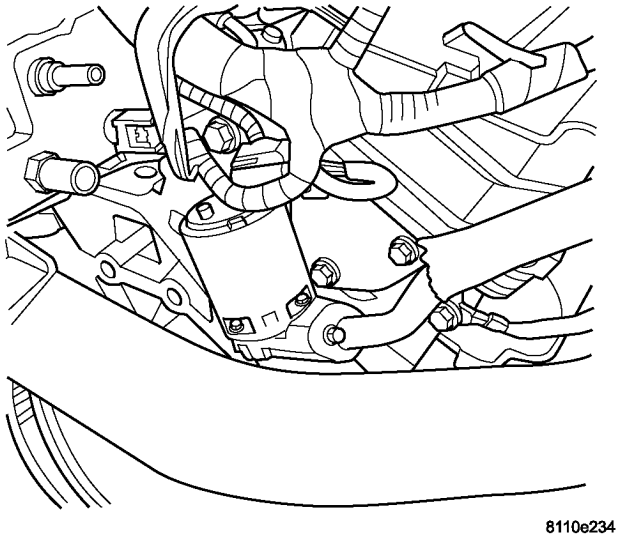


Fig. 3 EGR VALVE AND TUBE

TUBE (Continued)

3.8L

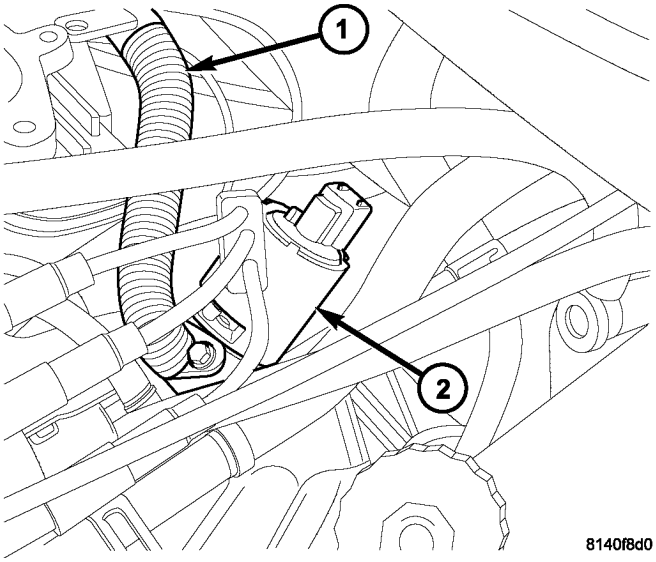


Fig. 4 EGR VALVE LOCATION & TUBE

(1) Remove the 2 flange bolts at EGR valve (Fig. 4).

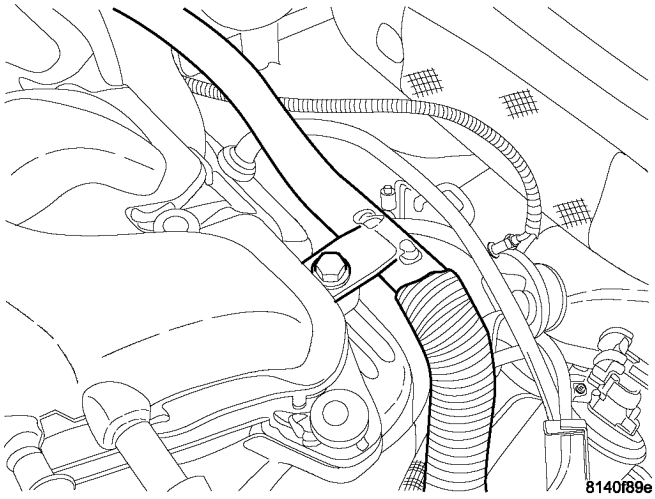


Fig. 5 EGR TUBE BRACKET

(2) Remove the tube bracket bolt (Fig. 5)

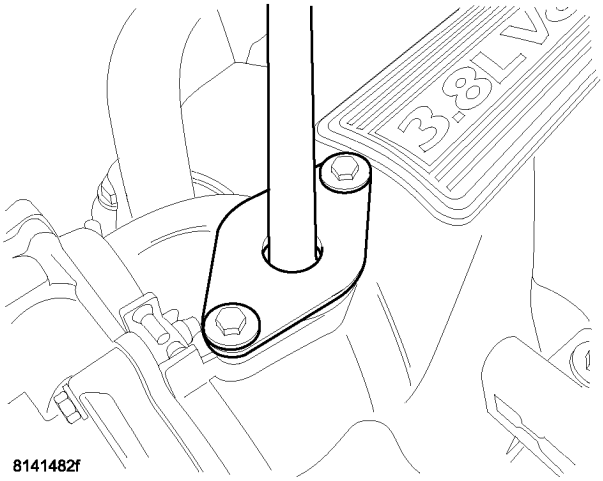


Fig. 6 INTAKE GASKET

(3) Remove the 2 bolts from tube flange at intake manifold (Fig. 6).

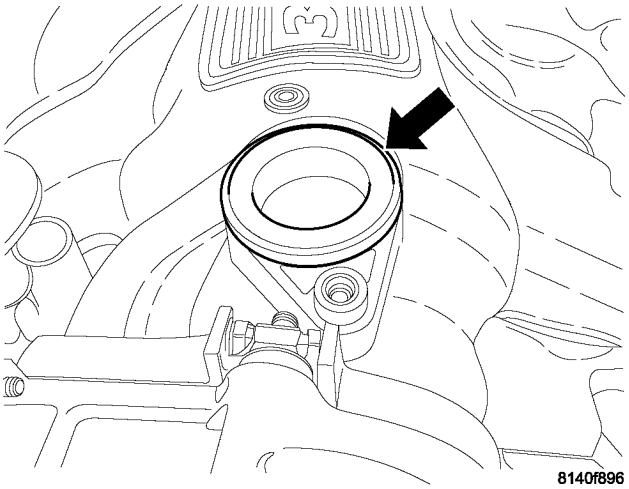


Fig. 7 INTAKE GASKET

TUBE (Continued)

(4) Remove EGR tube from gasket (Fig. 7).

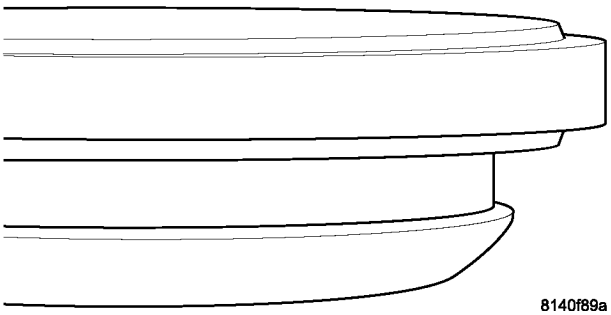


Fig. 8 GASKET PROFILE

(5) Remove gasket (Fig. 8).

INSTALLATION

3.5L

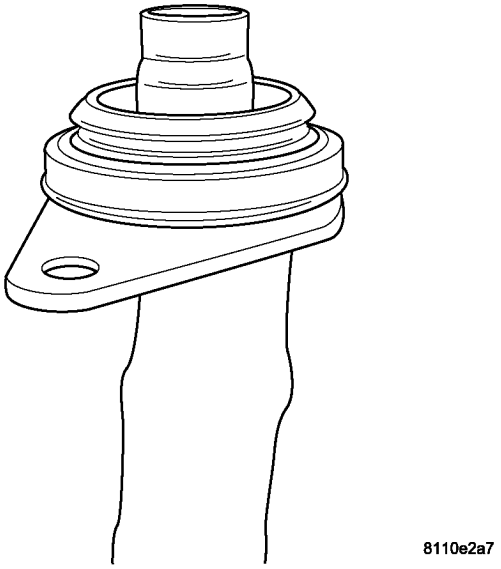


Fig. 9 EGR TUBE GASKET

(1) Inspect rubber silicone seals on intake manifold end of EGR tube.

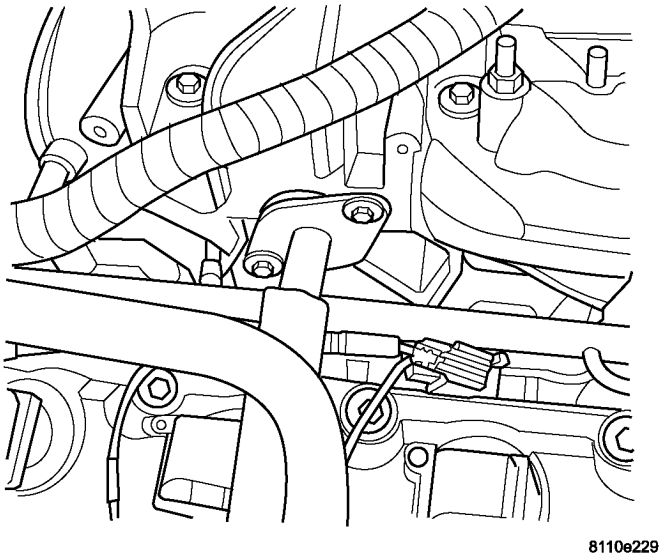


Fig. 10 EGR AT INTAKE MANIFOLD

(2) Install upper tube into the intake manifold (Fig. 10), being careful that the silicone rubber seals are correctly installed and undamaged (Fig. 9).

(3) Tighten the EGR upper tube to EGR valve bolts to 11.3 N·m (100 in. lbs.) torque (Fig. 3).

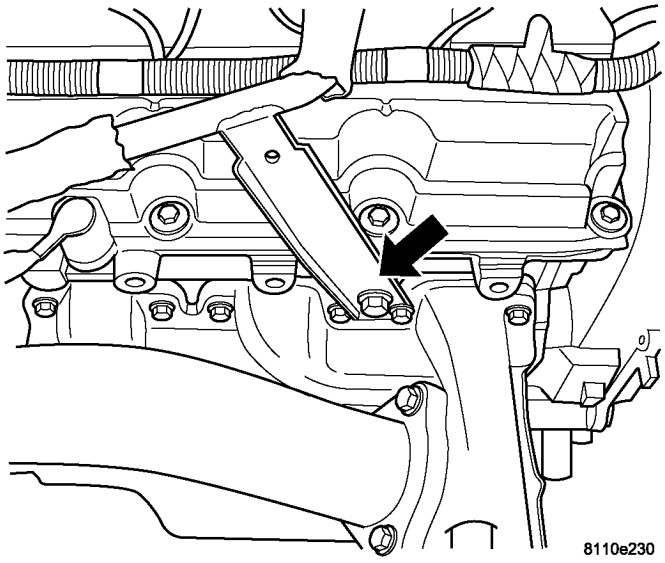


Fig. 11 TUBE BRACKET

(4) Install the EGR tube bracket bolt and tighten (Fig. 11).

TUBE (Continued)

3.8L

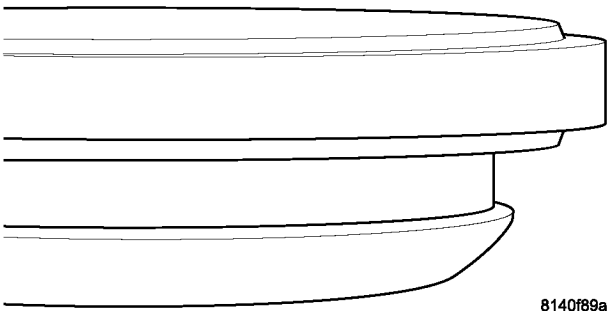


Fig. 12 GASKET PROFILE

(1) Inspect rubber silicone seals on intake manifold end of EGR tube (Fig. 12).

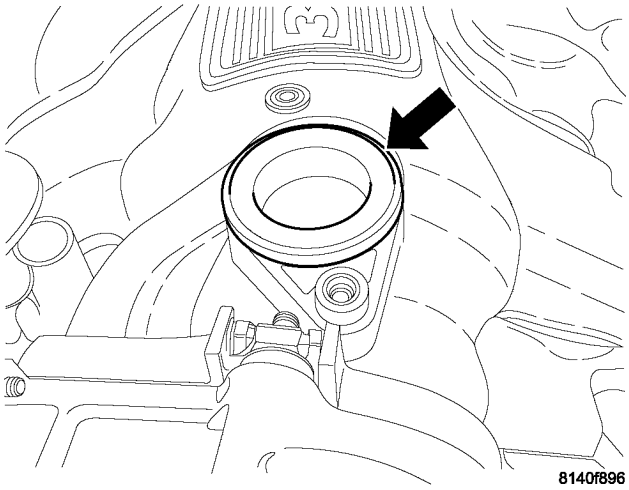


Fig. 13 INTAKE GASKET

(2) Install upper tube into the intake manifold (Fig. 13), being careful that the silicone rubber seals are correctly installed and undamaged.

(3) Tighten the tube to intake manifold bolts to 5.6 N·m (50 in. lbs.) torque

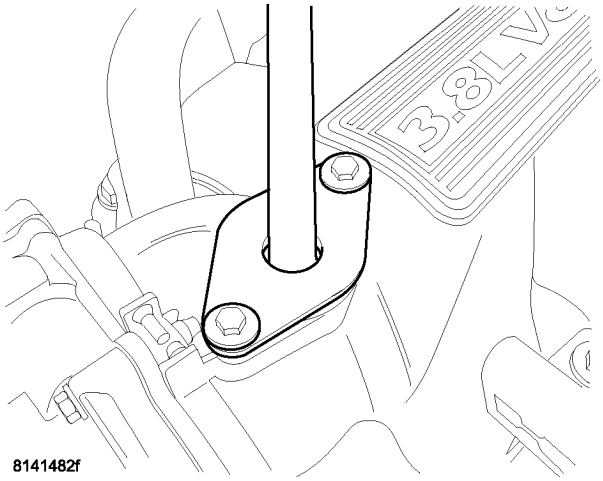


Fig. 14 EGR TUBE AT INTAKE MANIFOLD

(4) Install bracket and screws (Fig. 14).

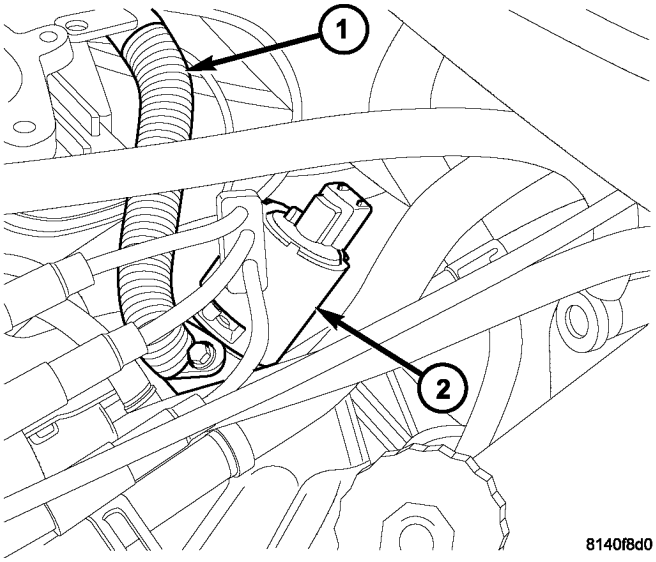


Fig. 15 EGR VALVE LOCATION & TUBE

(5) Tighten the EGR upper tube to EGR valve bolts to 11.3 N·m (100 in. lbs.) torque (Fig. 15).

TUBE (Continued)

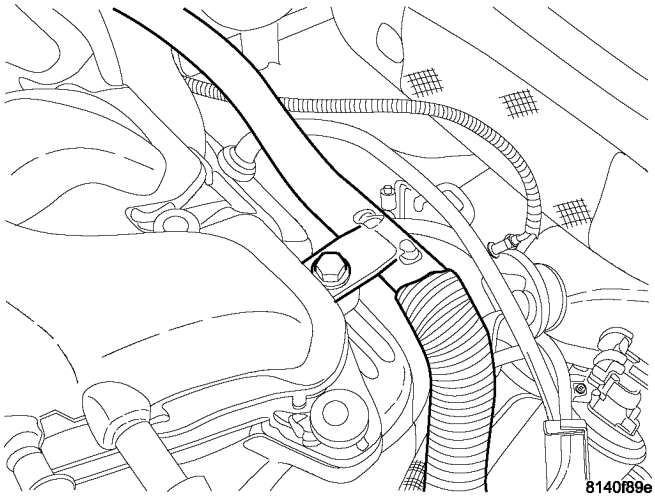


Fig. 16 EGR TUBE BRACKET

(6) Tighten tube bracket bolts to 5.6 N·m (50 in. lbs.) torque (Fig. 16).

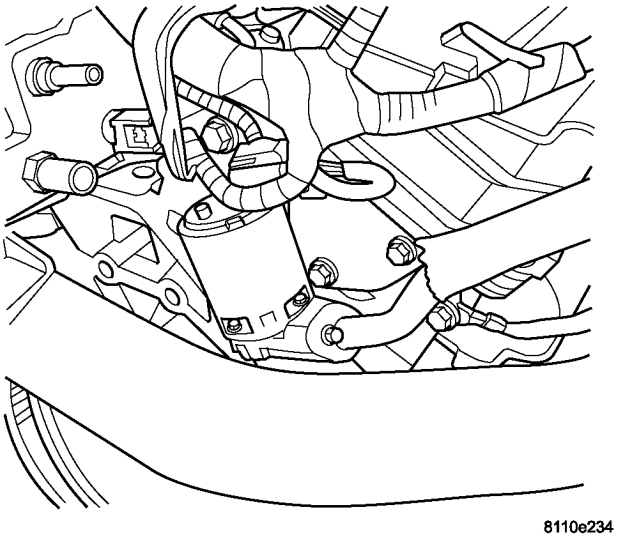


Fig. 18 EGR VALVE AND TUBE

(4) Remove the 2 EGR tube bolts (Fig. 18).

VALVE

REMOVAL

3.5L

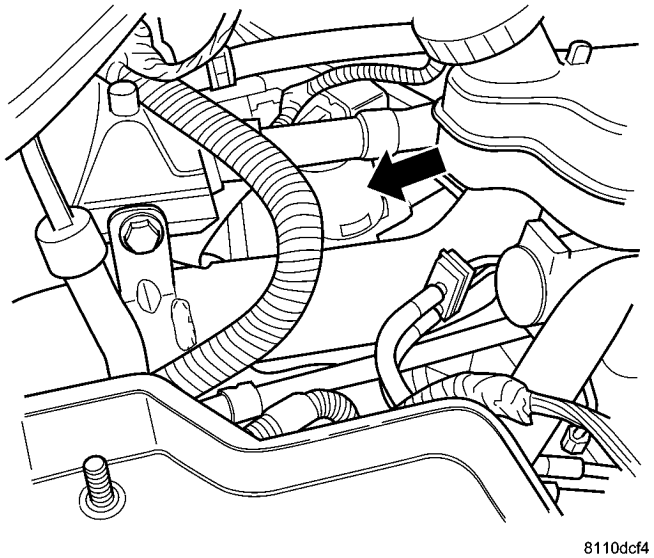


Fig. 17 EGR VALVE

(1) Disconnect the negative and then the positive battery cable.

(2) Remove battery.

(3) Unlock and disconnect the electrical connector from the EGR valve (Fig. 17).

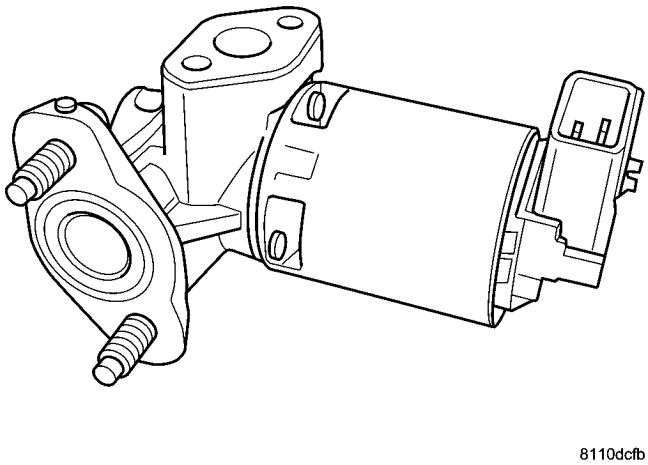


Fig. 19 EGR VALVE REMOVED

(5) Remove the 2 mounting bolts for the EGR valve and gasket (Fig. 19).

VALVE (Continued)

3.8L

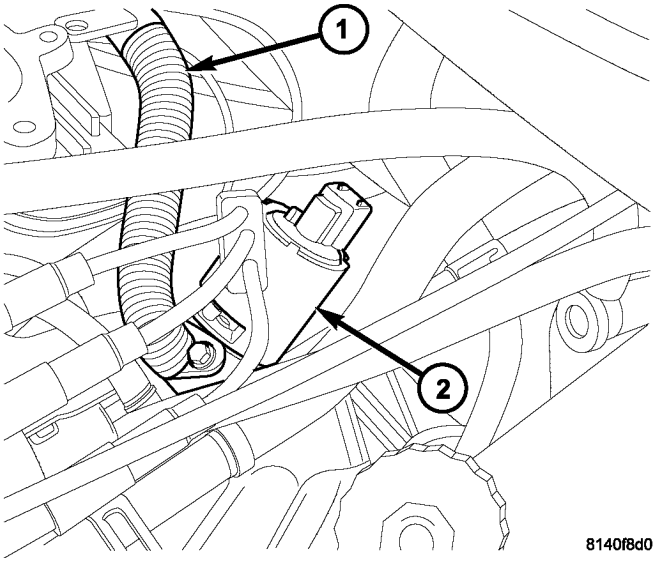


Fig. 20 EGR VALVE LOCATION & TUBE

(1) Disconnect negative battery cable.
(2) Unlock and disconnect the electrical connector from the EGR valve (Fig. 20).

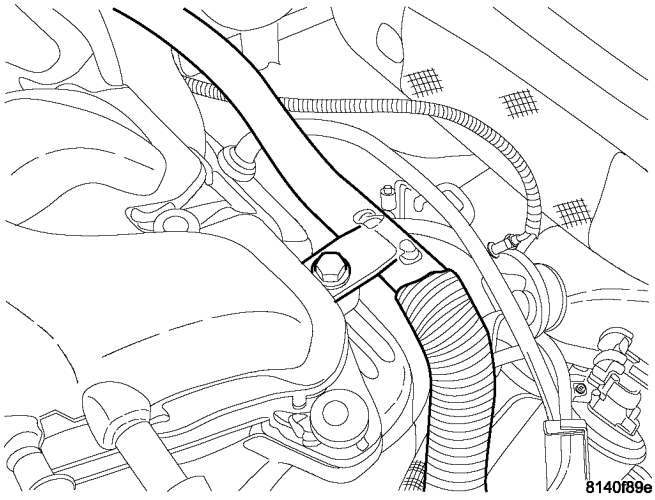


Fig. 21 EGR TUBE BRACKET

(3) Remove EGR tube bracket bolt (Fig. 21).

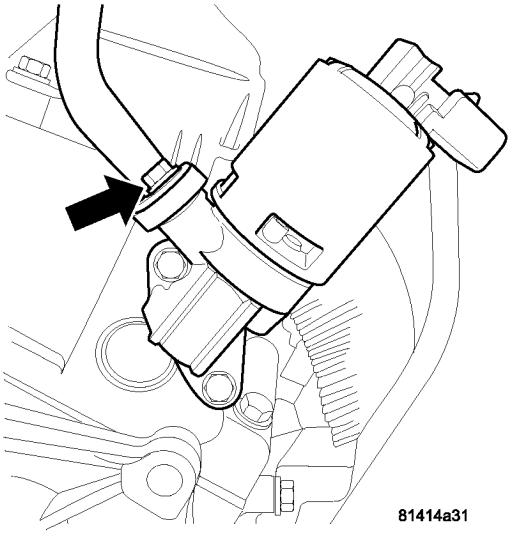


Fig. 22 EGR VALVE MOUNTED

(4) Remove the 2 EGR tube bolts (Fig. 22).

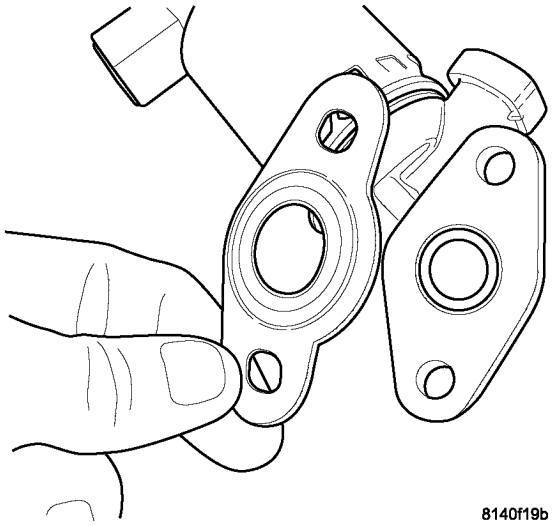


Fig. 23 EGR VALVE GASKET

(5) Remove the 2 mounting bolts for the EGR valve and gasket (Fig. 23).

VALVE (Continued)

INSTALLATION

3.5L

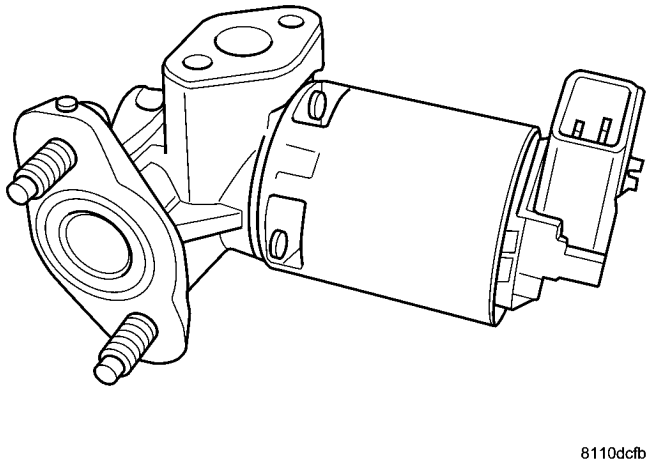


Fig. 24 EGR VALVE REMOVED

(1) Install the 2 mounting bolts into the EGR valve and gasket (Fig. 24).

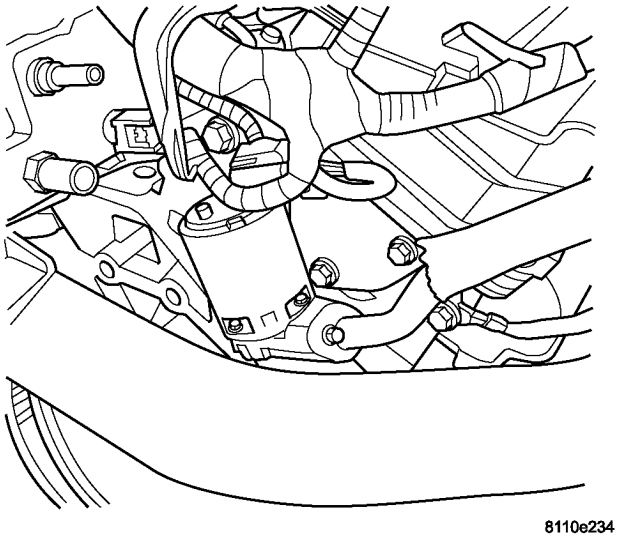


Fig. 25 EGR VALVE AND TUBE

(2) Loose install the EGR valve to cylinder head.
(3) Loose install the EGR tube to EGR valve (Fig. 25).
(4) Tighten the EGR upper tube to EGR valve bolts to 11.3 N·m (100 in. lbs.) torque.

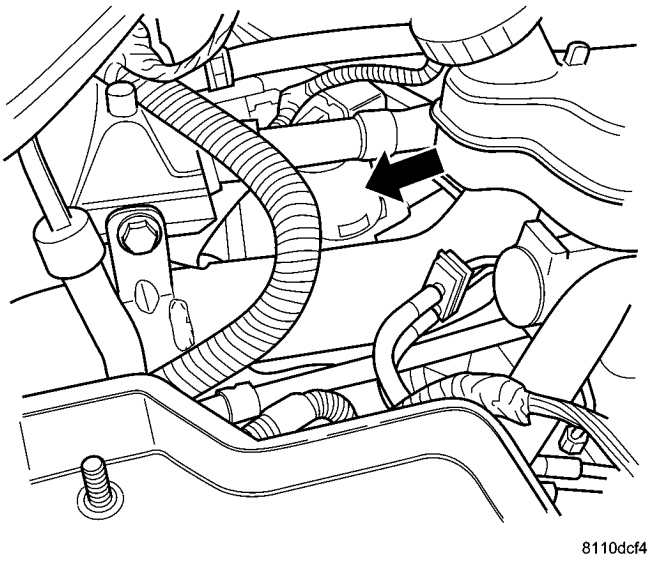


Fig. 26 EGR VALVE

(5) Connect and lock the electrical connector for the EGR valve (Fig. 26).
(6) Install the battery.
(7) Connect the positive then the negative battery cable.

3.8L

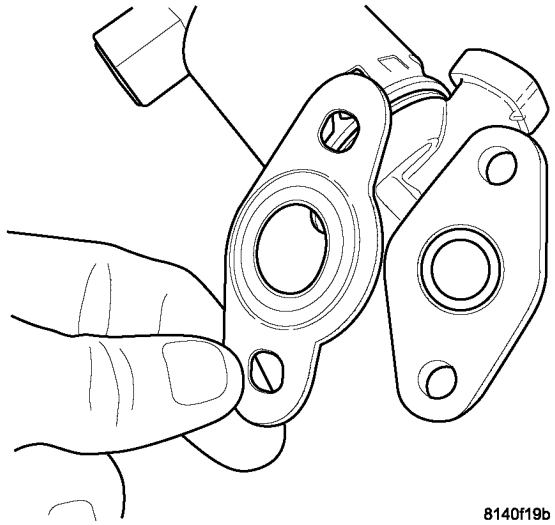


Fig. 27 EGR VALVE GASKET

(1) Install the 2 mounting bolts into the EGR valve and gasket (Fig. 27).

VALVE (Continued)

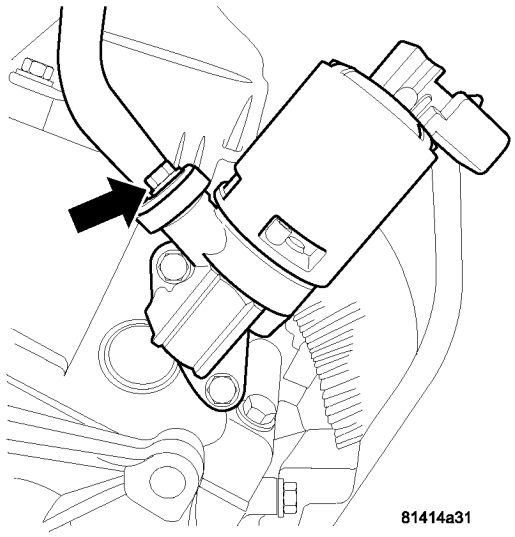


Fig. 28 EGR VALVE MOUNTED

(2) Loose install the EGR valve to cylinder head (Fig. 28).

(3) Loose install the EGR tube to EGR valve.

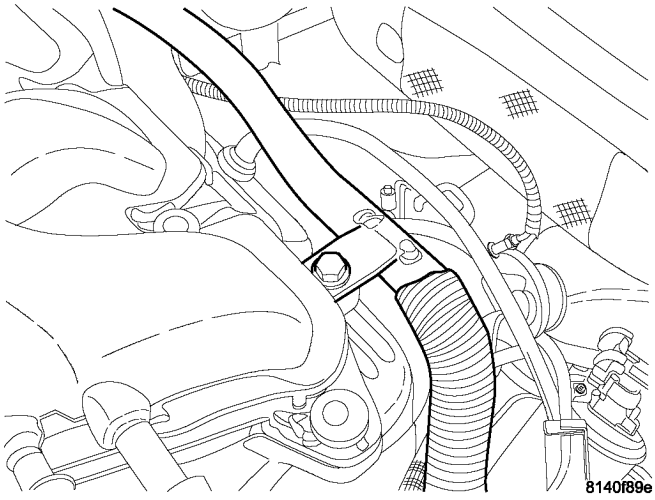


Fig. 29 EGR TUBE BRACKET

(4) Install and tighten EGR tube bracket bolt (Fig. 29).

(5) Tighten the EGR tube to EGR valve bolts to 11.3 N·m (100 in. lbs.) torque.

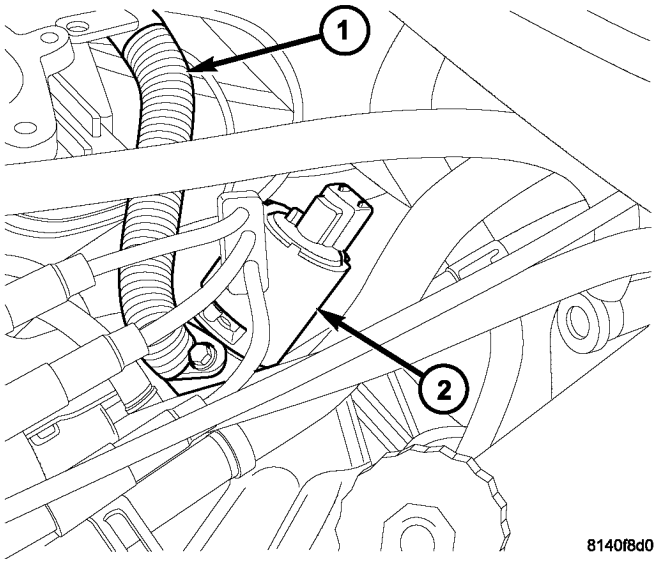


Fig. 30 EGR VALVE LOCATION & TUBE

(6) Connect and lock the electrical connector for the EGR valve (Fig. 30).

(7) Install the battery.

(8) Connect the positive then the negative battery cable.

ON-BOARD DIAGNOSTICS

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TASK MANAGER

DESCRIPTION

The PCM is responsible for efficiently coordinating the operation of all the emissions-related components. The PCM is also responsible for determining if the diagnostic systems are operating properly. The software designed to carry out these responsibilities is call the “Task Manager”.

OPERATION

The Task Manager determines when tests happen and when functions occur. Many of the diagnostic steps required by OBD II must be performed under specific operating conditions. The Task Manager software organizes and prioritizes the diagnostic procedures. The job of the Task Manager is to determine if conditions are appropriate for tests to be run, monitor the parameters for a trip for each test, and record the results of the test. Following are the responsibilities of the Task Manager software:

- Test Sequence
- MIL Illumination
- Diagnostic Trouble Codes (DTCs)
- Trip Indicator
- Freeze Frame Data Storage
- Similar Conditions Window

Test Sequence

In many instances, emissions systems must fail diagnostic tests more than once before the PCM illuminates the MIL. These tests are known as 'two trip monitors.' Other tests that turn the MIL lamp on after a single failure are known as 'one trip monitors.' A trip is defined as 'start the vehicle and operate it to meet the criteria necessary to run the given monitor.'

Many of the diagnostic tests must be performed under certain operating conditions. However, there are times when tests cannot be run because another test is in progress (conflict), another test has failed (pending) or the Task Manager has set a fault that may cause a failure of the test (suspend).

- **Pending**

Under some situations the Task Manager will not run a monitor if the MIL is illuminated and a fault is stored from another monitor. In these situations, the Task Manager postpones monitors **pending** resolution of the original fault. The Task Manager does not run the test until the problem is remedied.

For example, when the MIL is illuminated for an Oxygen Sensor fault, the Task Manager does not run the Catalyst Monitor until the Oxygen Sensor fault is remedied. Since the Catalyst Monitor is based on signals from the Oxygen Sensor, running the test would produce inaccurate results.

- **Conflict**

There are situations when the Task Manager does not run a test if another monitor is in progress. In these situations, the effects of another monitor running could result in an erroneous failure. If this **conflict** is present, the monitor is not run until the conflicting condition passes. Most likely the monitor will run later after the conflicting monitor has passed.

For example, if the Fuel System Monitor is in progress, the Task Manager does not run the catalyst Monitor. Since both tests monitor changes in air/fuel ratio and adaptive fuel compensation, the monitors will conflict with each other.

- **Suspend**

Occasionally the Task Manager may not allow a two trip fault to mature. The Task Manager will **suspend** the maturing of a fault if a condition exists that may induce an erroneous failure. This prevents illuminating the MIL for the wrong fault and allows more precise diagnosis.

For example, if the PCM is storing a one trip fault for the Oxygen Sensor and the catalyst monitor, the Task Manager may still run the catalyst Monitor but will suspend the results until the Oxygen Sensor Monitor either passes or fails. At that point the Task Manager can determine if the catalyst system is actually failing or if an Oxygen Sensor is failing.

MIL Illumination

The PCM Task Manager carries out the illumination of the MIL. The Task Manager triggers MIL illumination upon test failure, depending on monitor failure criteria.

TASK MANAGER (Continued)

The Task Manager Screen shows both a Requested MIL state and an Actual MIL state. When the MIL is illuminated upon completion of a test for a good trip, the Requested MIL state changes to OFF. However, the MIL remains illuminated until the next key cycle. (On some vehicles, the MIL will actually turn OFF during the thirdgood trip) During the key cycle for the third good trip, the Requested MIL state is OFF, while the Actual MIL state is ON. After the next key cycle, the MIL is not illuminated and both MIL states read OFF.

Diagnostic Trouble Codes (DTCs)

With OBD II, different DTC faults have different priorities according to regulations. As a result, the priorities determine MIL illumination and DTC erasure. DTCs are entered according to individual priority. DTCs with a higher priority overwrite lower priority DTCs.

Priorities

- Priority 0 —Non-emissions related trouble codes.
- Priority 1 — One trip failure of a two trip fault for non-fuel system and non-misfire. (MIL Off)
- Priority 2 — One trip failure of a two trip fault for fuel system (rich/lean) or misfire. (MIL Off)
- Priority 3 — Two trip failure for a non-fuel system and non-misfire or matured one trip comprehensive component fault. (MIL On)
- Priority 4 — Two trip failure or matured fault for fuel system (rich/lean) and misfire or one trip catalyst damaging misfire. Catalyst damage misfire is a 2 trip MIL. The MIL flashes on the first trip when catalyst damage misfire levels are present. (MIL On)

Non-emissions related failures have no priority. One trip failures of two trip faults have low priority. Two trip failures or matured faults have higher priority. One and two trip failures of fuel system and misfire monitor take precedence over non-fuel system and non-misfire failures.

DTC Self Erasure

With one trip components or systems, the MIL is illuminated upon test failure and DTCs are stored.

Two trip monitors are components requiring failure in two consecutive trips for MIL illumination. Upon failure of the first test, the Task Manager enters a maturing code. If the component fails the test for a second time the code matures and a DTC is set.

After three good trips the MIL is extinguished and the Task Manager automatically switches the trip counter to a warm-up cycle counter. DTCs are automatically erased following 40 warm-up cycles if the component does not fail again.

For misfire and fuel system monitors, the component must pass the test under a Similar Conditions Window in order to record a good trip. A Similar Conditions Window is when engine RPM is within ±375 RPM and load is within ±20% of when the fault occurred.

NOTE: It is important to understand that a component does not have to fail under a similar window of operation to mature. It must pass the test under a Similar Conditions Window when it failed to record a Good Trip for DTC erasure for misfire and fuel system monitors.

DTCs can be erased anytime with a scan tool. Erasing the DTC with the scan tool erases all OBD II information. The scan tool automatically displays a warning that erasing the DTC will also erase all OBD II monitor data. This includes all counter information for warm-up cycles, trips and Freeze Frame.

Trip Indicator

The **Trip** is essential for running monitors and extinguishing the MIL. In OBD II terms, a trip is a set of vehicle operating conditions that must be met for a specific monitor to run. All trips begin with a key cycle.

Good Trip

The Good Trip counters are as follows:

- Global Good Trip
- Fuel System Good Trip
- Misfire Good Trip
- Alternate Good Trip (appears as a Global Good Trip on scan tool)
  - Comprehensive Components
  - Major Monitor
- Warm-Up Cycles

Global Good Trip

To increment a Global Good Trip, the Oxygen sensor and Catalyst efficiency monitors must have run and passed, and 2 minutes of engine run time.

Fuel System Good Trip

To count a good trip (three required) and turn off the MIL, the following conditions must occur:

- Engine in closed loop
- Operating in Similar Conditions Window
- Short Term multiplied by Long Term less than threshold
- Less than threshold for a predetermined time

If all of the previous criteria are met, the PCM will count a good trip (three required) and turn off the MIL.

Misfire Good Trip

If the following conditions are met the PCM will count one good trip (three required) in order to turn off the MIL:

- Operating in Similar Condition Window
- 1000 engine revolutions with no misfire

Alternate Good Trip

TASK MANAGER (Continued)

Alternate Good Trips are used in place of Global Good Trips for Comprehensive Components and Major Monitors. If the Task Manager cannot run a Global Good Trip because a component fault is stopping the monitor from running, it will attempt to count an Alternate Good Trip.

The Task Manager counts an Alternate Good Trip for Comprehensive components when the following conditions are met:

- Two minutes of engine run time, idle or driving
- No other faults occur

The Task Manager counts an Alternate Good Trip for a Major Monitor when the monitor runs and passes. Only the Major Monitor that failed needs to pass to count an Alternate Good Trip.

Warm-Up Cycles

Once the MIL has been extinguished by the Good Trip Counter, the PCM automatically switches to a Warm-Up Cycle Counter that can be viewed on the scan tool. Warm-Up Cycles are used to erase DTCs and Freeze Frames. Forty Warm-Up cycles must occur in order for the PCM to self-erase a DTC and Freeze Frame. A Warm-Up Cycle is defined as follows:

- Engine coolant temperature must start below and rise above 160° F
- Engine coolant temperature must rise by 40° F
- No further faults occur

Freeze Frame Data Storage

Once a failure occurs, the Task Manager records several engine operating conditions and stores it in a Freeze Frame. The Freeze Frame is considered one frame of information taken by an on-board data recorder. When a fault occurs, the PCM stores the input data from various sensors so that technicians can determine under what vehicle operating conditions the failure occurred.

The data stored in Freeze Frame is usually recorded when a system fails the first time for two trip faults. Freeze Frame data will only be overwritten by a different fault with a higher priority.

CAUTION: Erasing DTCs, either with the scan tool; or by disconnecting the battery, also clears all Freeze Frame data.

Similar Conditions Window

The Similar Conditions Window displays information about engine operation during a monitor. Absolute MAP (engine load) and Engine RPM are stored in this window when a failure occurs. There are two different Similar conditions Windows: Fuel System and Misfire.

FUEL SYSTEM

- **Fuel System Similar Conditions Window** — An indicator that 'Absolute MAP When Fuel Sys Fail' and 'RPM When Fuel Sys Failed' are all in the same range when the failure occurred. Indicated by switching from 'NO' to 'YES'.
- **Absolute MAP When Fuel Sys Fail** — The stored MAP reading at the time of failure. Informs the user at what engine load the failure occurred.
- **Absolute MAP** — A live reading of engine load to aid the user in accessing the Similar Conditions Window.
- **RPM When Fuel Sys Fail** — The stored RPM reading at the time of failure. Informs the user at what engine RPM the failure occurred.
- **Engine RPM** — A live reading of engine RPM to aid the user in accessing the Similar Conditions Window.
- **Adaptive Memory Factor** — The PCM utilizes both Short Term Compensation and Long Term Adaptive to calculate the Adaptive Memory Factor for total fuel correction.
- **Upstream O2S Volts** — A live reading of the Oxygen Sensor to indicate its performance. For example, stuck lean, stuck rich, etc.
- **SCW Time in Window (Similar Conditions Window Time in Window)** — A timer used by the PCM that indicates that, after all Similar Conditions have been met, if there has been enough good engine running time in the SCW without failure detected. This timer is used to increment a Good Trip.
- **Fuel System Good Trip Counter** — A Trip Counter used to turn OFF the MIL for Fuel System DTCs. To increment a Fuel System Good Trip, the engine must be in the Similar Conditions Window, Adaptive Memory Factor must be less than calibrated threshold and the Adaptive Memory Factor must stay below that threshold for a calibrated amount of time.
- **Test Done This Trip** — Indicates that the monitor has already been run and completed during the current trip.

MISFIRE

- **Same Misfire Warm-Up State** — Indicates if the misfire occurred when the engine was warmed up (above 160° F).
- **In Similar Misfire Window** — An indicator that 'Absolute MAP When Misfire Occurred' and 'RPM When Misfire Occurred' are all in the same range when the failure occurred. Indicated by switching from 'NO' to 'YES'.
- **Absolute MAP When Misfire Occurred** — The stored MAP reading at the time of failure. Informs the user at what engine load the failure occurred.

TASK MANAGER (Continued)

- **Absolute MAP** — A live reading of engine load to aid the user in accessing the Similar Conditions Window.
- **RPM When Misfire Occurred** — The stored RPM reading at the time of failure. Informs the user at what engine RPM the failure occurred.
- **Engine RPM** — A live reading of engine RPM to aid the user in accessing the Similar Conditions Window.
- **Adaptive Memory Factor** — The PCM utilizes both Short Term Compensation and Long Term Adaptive to calculate the Adaptive Memory Factor for total fuel correction.
- **200 Rev Counter** — Counts 0–100 720 degree cycles.
- **SCW Cat 200 Rev Counter** — Counts when in similar conditions.
- **SCW FTP 1000 Rev Counter** — Counts 0–4 when in similar conditions.
- **Misfire Good Trip Counter** — Counts up to three to turn OFF the MIL.

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WIPERS/WASHERS	8R-1
WIRING DIAGRAM INFORMATION	8W-01-1

SERVICE MANUAL COMMENTS

What errors(s) have you found?

_____

_____

_____

_____

In order for us to assist you, please include as much details as possible when reporting an error

Comments / Suggestions

_____

_____

_____

_____

☐ **Dealership Technician**
Dealer Code: _____

Retail Customer ☐

Manual Title, Year, Number and Page: _____

_____

Your Name: _____

Address: _____

_____

_____

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