Automatic Transmission - 4L60-E

Specifications

Transmission Fluid Temperature (TFT) Sensor Specifications

Temperature °F	Temperature °C	Minimum Resistance Ω	Nominal Resistance Ω	Maximum Resistance Ω	Signal volts
–40	–40	90636	100707	110778	5.00
–22	–30	47416	52684	57952	4.78
–4	–20	25809	28677	31545	4.34
14	–10	14558	16176	17794	3.89
32	0	8481	9423	10365	3.45
50	10	5104	5671	6238	3.01
68	20	3164	3515	3867	2.56
86	30	2013	2237	2461	1.80
104	40	1313	1459	1605	1.10
122	50	876	973	1070	3.25
140	60	600	667	734	2.88
158	70	420	467	514	2.56
176	80	299	332	365	2.24
194	90	217	241	265	1.70
212	100	159	177	195	1.42
230	110	119	132	145	1.15
248	120	89.9	99.9	109.9	0.87
266	130	69.1	76.8	84.5	0.60
284	140	53.8	59.8	65.8	0.32
302	150	42.5	47.2	51.9	0.00

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accumulator Cover to Case Bolt	8.0–14.0 N·m	6–10 lb ft
Case Extension to Case Bolt	42.0–48.0 N·m	35.0–39.4 lb ft
Case Extension to Case Bolt (4WD Shipping)	11.2–22.6 N·m	8.3–16.7 lb ft
Converter Cover Bolt	10 N·m	89 lb in
Converter Housing to Case Screw	65.0–75.0 N·m	48–55 lb ft
Cooler Pipe Connector	35.0–41.0 N·m	26–30 lb ft
Detent Spring to Valve Body Bolt	20.0–27.0 N·m	15–20 lb ft
Floorshift Control Bolt	10 N·m	89 lb in
Flywheel to Torque Converter Bolt	63 N·m	46 lb ft
Forward Accumulator Cover to Valve Body Bolt	8.0–14.0 N·m	6–10 lb ft
Line Pressure Plug	8.0–14.0 N·m	6–10 lb ft
Manual Shaft to Inside Detent Lever Nut	27.0–34.0 N·m	20–25 lb ft
Negative Battery Cable Bolt	15 N·m	11 lb ft
Oil Level Indicator Bolt	47 N·m	35 lb ft
Oil Pan to Transmission Case Bolt	11 N·m	97 lb in
Oil Passage Cover to Case Bolt	8–14.0 N·m	6–10 lb ft
Park Brake Bracket to Case Bolt	27.0–34.0 N·m	20–25 lb ft
Park/Neutral Position Switch Screw	3 N·m	27 lb in

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Fastener Tightening Specifications (cont'd)

Application	Specification	
	Metric	English
Plate to Case Bolt (Shipping)	27.0–34.0 N·m	20–25 lb ft
Plate to Converter Bolt (Shipping)	27.0–34.0 N·m	20–25 lb ft
Plug Assembly, A/Trans Oil Pan (C/K)	30–40 N·m	22.1–29.5 N·m
Plug Assembly, A/Trans Oil Pan (Y)	28–32 N·m	20.7–23.6 N·m
Pressure Control Solenoid Bracket to Valve Body Bolt	8.0–14.0 N·m	6–10 lb ft
Pump Assembly to Case Bolt	26.0–32.0 N·m	19–24 lb ft
Pump Cover to Pump Body Bolt	20.0–27.0 N·m	15–20 lb ft
Shift Cable Grommet Screw	1.7 N·m	15 lb in
Shift Control Cable Attachment	20 N·m	15 lb ft
Speed Sensor Retainer Bolt	10.5–13.5 N·m	7.7–10 lb ft
Stud, A/Trans Case Extension (Y-car)	18.0–22.0 N·m	13–16 lb ft
TCC Solenoid Assembly to Case Bolt	8.0–14.0 N·m	6–10 lb ft
Transmission Fluid Pressure Manual Valve Position Switch to Valve Body Bolt	8.0–14.0 N·m	6–10 lb ft
Transmission Oil Cooler Pipe Fitting	35.0–41.0 N·m	26–30 lb ft
Transmission Oil Pan to Case Bolt	9.5–13.8 N·m	7–10 lb ft
Transmission to Engine Bolt	47 N·m	35 lb ft
Valve Body to Case Bolt	8.0–14.0 N·m	6–10 lb ft

Transmission General Specifications

Name	Hydra-matic 4L60-E
RPO Codes	M30
Production Location	Toledo, Ohio Romulus, MI
Vehicle Platform (Engine/Transmission) Usage	C/K, C/K 800, F, G, M/L, S/T, Y
Transmission Drive	Longitudinally-Mounted Rear Wheel Drive
1st Gear Ratio	3.059:1
2nd Gear Ratio	1.625:1
3rd Gear Ratio	1.000:1
4th Gear Ratio	0.696:1
Reverse	2.294:1
Torque Converter Size (Diameter of Torque Converter Turbine)	245 mm 298 mm
Pressure Taps	Line Pressure
Transmission Fluid Type	DEXRON® III
Transmission Fluid Capacity (Approximate)	245 mm Converter Dry: 7.9L (8.4 qts) 298 mm Converter Dry: 10.6L (11.2 qts)

Transmission General Specifications (cont'd)

Name	Hydra-matic 4L60-E
Transmission Type: 4	Four Forward Gears
Transmission Type: L	Longitudinal Mount
Transmission Type: 60	Product Series
Transmission Type: E	Electronic Controls
Position Quadrant	P, R, N, Ⓓ, D, 2, 1 P, R, N, Ⓓ, 3, 2, 1
Case Material	Die Cast Aluminum
Transmission Weight Dry	245 mm Converter 65.4 kg (144.30 lbs) 298 mm Converter 70.5 kg (155.70 lbs)
Transmission Weight Wet	245 mm Converter 72.4 kg (159.55 lbs) 298 mm Converter 80.5 kg (176.16 lbs)
Maximum Trailer Towing Capacity	6,130 kg (13,500 lbs)
Maximum Gross Vehicle Weight (GVW)	3,900 kg (8,600 lbs)

Fluid Capacity Specifications

Application	Specification	
	Metric	English
Pan Removal	4.7 liters	5 quarts
Overhaul	10.6 liters	11 quarts

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Range Reference

Range	Park	Reverse	Neutral	OD				D			2		1	
Gear				1st	2nd	3rd	4th	1st	2nd	3rd	1st **	2nd	1st	2nd ***
1-2 Shift Solenoid	ON*	ON*	ON*	ON	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	ON	OFF
2-3 Shift Solenoid	ON*	ON*	ON*	ON	ON	OFF	OFF	ON	ON	OFF	ON	ON	ON	ON
2-4 Band	—	—	—	—	A	—	A	—	A	—	—	A	—	A
Reverse Input Clutch	—	A	—	—	—	—	—	—	—	—	—	—	—	—
Overrun Clutch	—	—	—	—	—	—	—	—	—	A	A	A	A	A
Forward Clutch	—	—	—	A	A	A	A	A	A	A	A	A	A	A
Forward Sprag Clutch Assembly	—	—	—	H	H	H	—	H	H	H	H	H	H	H
3-4 Clutch	—	—	—	—	—	A	A	—	—	A	—	—	—	—
Lo/Roller Clutch	—	—	—	H	—	—	—	H	—	—	H	—	H	—
Lo/Rev Clutch	A	A	—	—	—	—	—	—	—	—	—	—	A	—

A = Applied H = Holding ON = The solenoid is energized. OFF = The solenoid is de-energized. *Shift Solenoid state is a function of vehicle speed and may change if the vehicle speed increases sufficiently in Park, Reverse or Neutral. However, this does not affect the operation of the transmission. **Manual Second–First gear is electronically prevented under normal operating conditions. ***Manual First–Second gear is only available above approximately 48–56 km/h (30–35 mph).

Shift Solenoid Valve State and Gear Ratio

Gear	1-2 Shift Solenoid	2-3 Shift Solenoid	Gear Ratio
1	ON	ON	3.059:1
2	OFF	ON	1.625:1
3	OFF	OFF	1.000:1
4	ON	OFF	0.696:1

Shift Speed

		1–2 Shift @ +/– 250 RPM Output Shaft Speed			2–3 Shift @ +/– 200 RPM Output Shaft Speed			3–4 Shift @ +/– 150 RPM Output Shaft Speed			3–1 @ +/– 100 RPM Output Shaft Speed	3–2 @ +/– 100 RPM Output Shaft Speed	3-1 Wide Open Throttle Shift	2–3 Wide Open Throttle Shift	Min TCC Apply @ 12% Throttle (RPM)
% of TPS		12	25	50	12	25	50	12	25	50					
Trans Cal	Axle														
3.8L (L36)															
A	3.08	620	950	1239	1115	1735	2354	1982	2478	4584	N/A	785	1446	5500	1239*
B	3.42	590	953	1226	1090	1725	2315	1998	2633	5039	N/A	772	1453	5700	1226*
5.7L (LS1)															
A	2.73	475	657	1168	840	1205	2154	1205	1825	5475	N/A	657	1460	5900	1570
B	3.23	479	696	1218	870	1262	2219	1262	1871	5829	N/A	696	1523	5900	1566
* 3rd Gear Apply															

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Transmission Fluid Pressure (TFP) Manual Valve Position Switch Logic

Gear Selector Position	Signal A	Signal B	Signal C
Park/Neutral	HI	LOW	HI
Reverse	LOW	LOW	HI
Drive 4	HI	LOW	LOW
Drive 3	HI	HI	LOW
Drive 2	HI	HI	HI
Drive 1	LOW	HI	HI
Invalid	LOW	HI	LOW
	LOW	LOW	LOW

- HI = Ignition voltage
- LOW = 0 voltage

Line Pressure

Pressure Control Solenoid Current (Amp)	Approximate Line Pressure (PSI)
2.2L/3.8L/4.3L	
0.00	169–195
0.10	167–194
0.20	161–190
0.30	155–186
0.40	144–177
0.50	133–167
0.60	120–153
0.70	102–138
0.80	83–119
0.90	62–97
1.00	53–69
1.10	53–68
4.8L/5.0L/5.3L/5.7L	
0.00	198–227
0.10	197–226
0.20	189–221
0.30	181–216
0.40	168–205
0.50	154–193
0.60	137–175
0.70	114–156
0.80	90–132
0.90	64–105
1.00	53–85
1.10	53–68

Component Resistance

Component	Pass Thru Pins	Resistance at 20°C	Resistance at 100°C	Resistance to Ground (Case)
1-2 Shift Solenoid Valve	A, E	19–24 Ω	24–31 Ω	Greater than 250 K Ω
2-3 Shift Solenoid Valve	B, E	19–24 Ω	24–31 Ω	Greater than 250 K Ω
TCC Solenoid Valve	T, E	21–26 Ω	26–33 Ω	Greater than 250 K Ω
TCC PWM Solenoid Valve	U, E	10–11 Ω	13–15 Ω	Greater than 250 K Ω
3-2 Shift Solenoid Valve Assembly	S, E	20–24 Ω	29–32 Ω	Greater than 250 K Ω
Pressure Control Solenoid Valve	C, D	3–5 Ω	4–7 Ω	Greater than 250 K Ω
*Transmission Fluid Temperature (TFT) Sensor	M, L	3088–3942 Ω	159.3–198.0 Ω	Greater than 10 M Ω
Vehicle Speed Sensor	A, B VSS CONN	1377–2220 Ω	1800–3355 Ω	Greater than 10 M Ω

Important: The resistance of this device is necessarily temperature dependent and will therefore vary far more than any other device. Refer to *Transmission Fluid Temperature (TFT) Sensor Specifications.*

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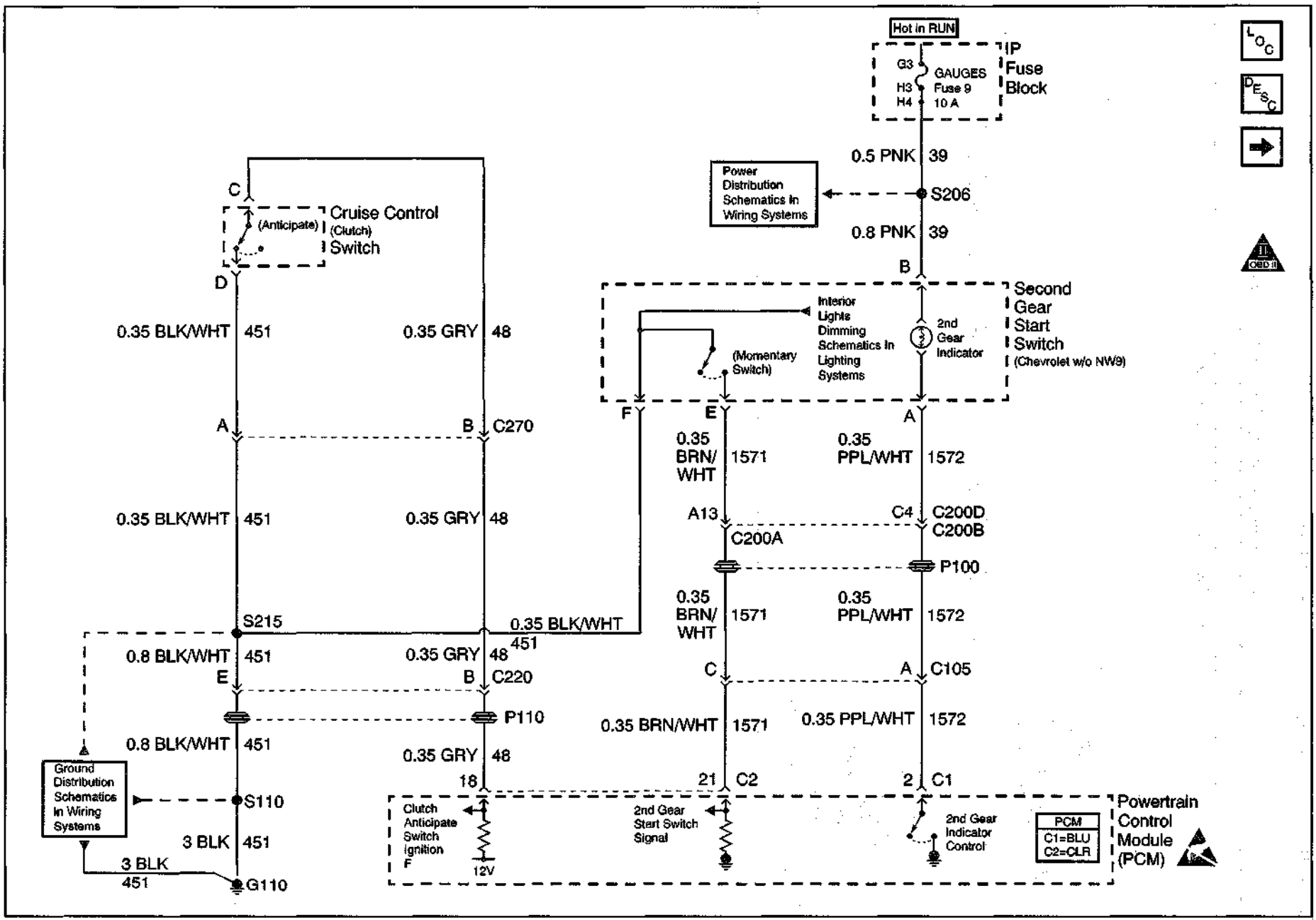
Schematic and Routing Diagrams

Automatic Transmission Schematic Icons

Icon	Icon Definition
 19384	Refer to *ESD Notice* in Cautions and Notices.
 19385	Refer to *OBD II Symbol Description Notice* in Cautions and Notices.

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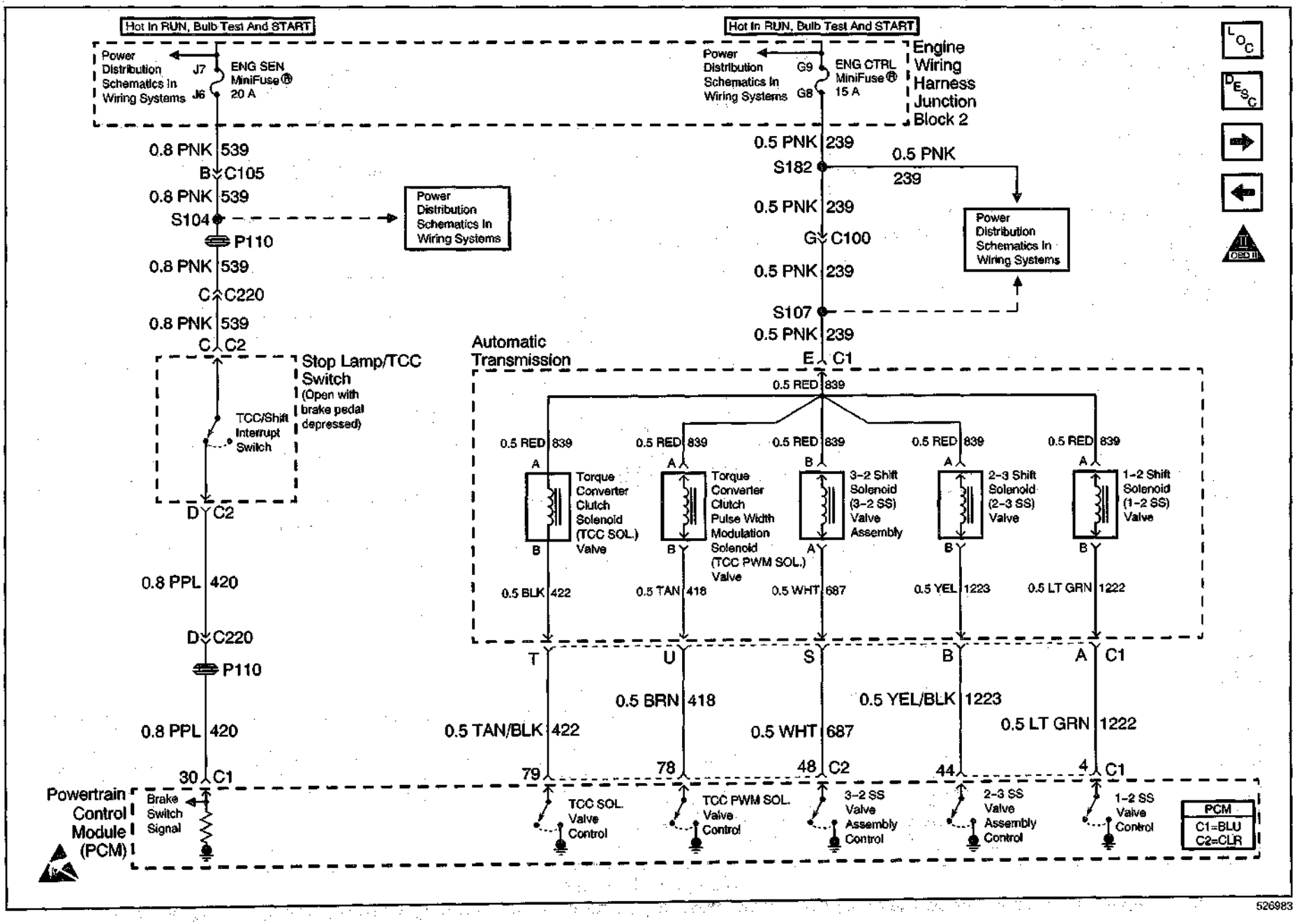
Automatic Transmission Controls Schematics (Second Gear Start Switch, Clutch Anticipate Switch (V6 VIN K))



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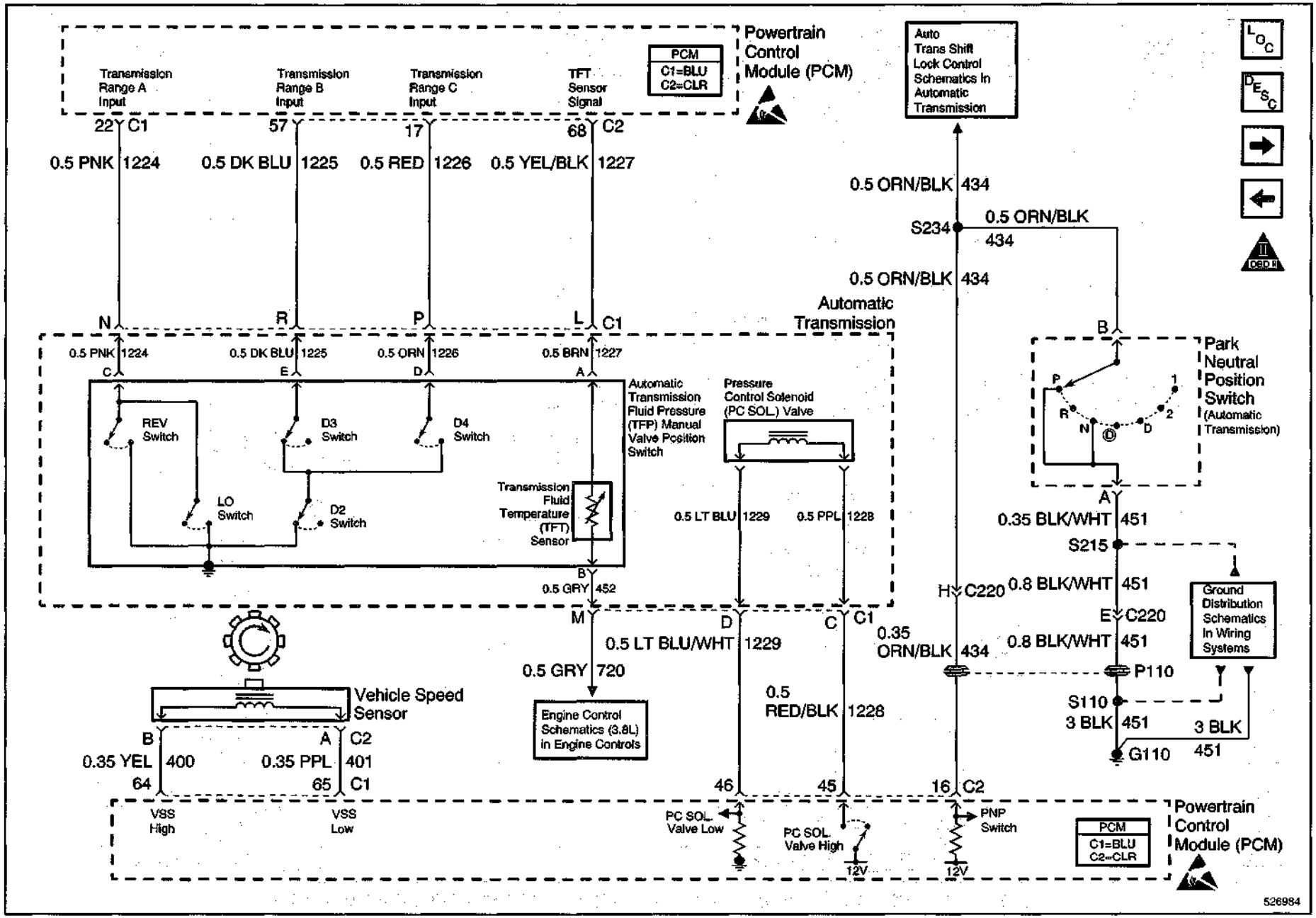
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Automatic Transmission Controls Schematics (Brake Switch, TCC Solenoid (V6 VIN K))



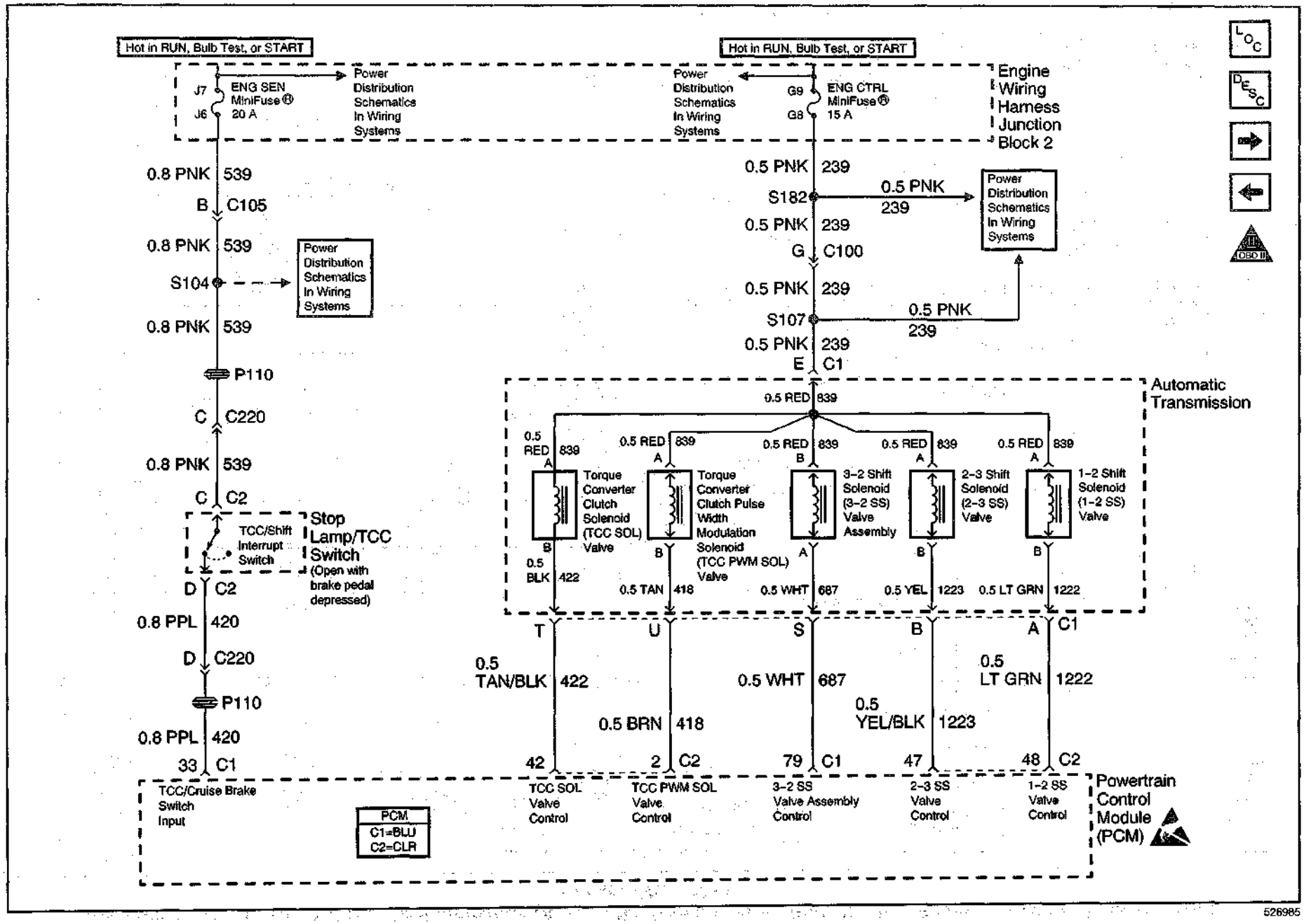
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Automatic Transmission Controls Schematics (Automatic Transmission, Park Neutral Position Switch, Vehicle Speed Sensor (V6 VIN K))



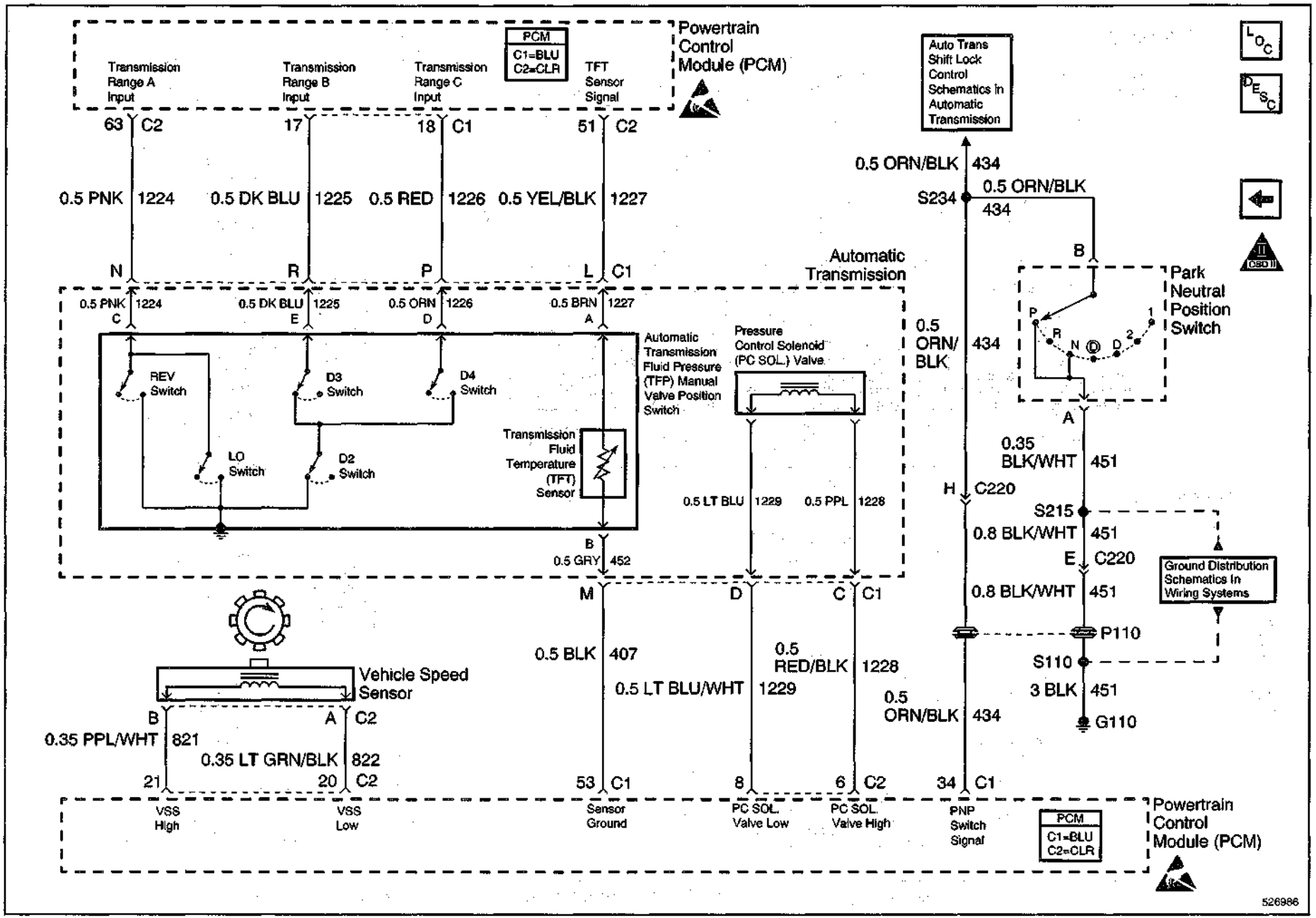
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Automatic Transmission Controls Schematics (Brake Switch, TCC Solenoid (V8 VIN G))



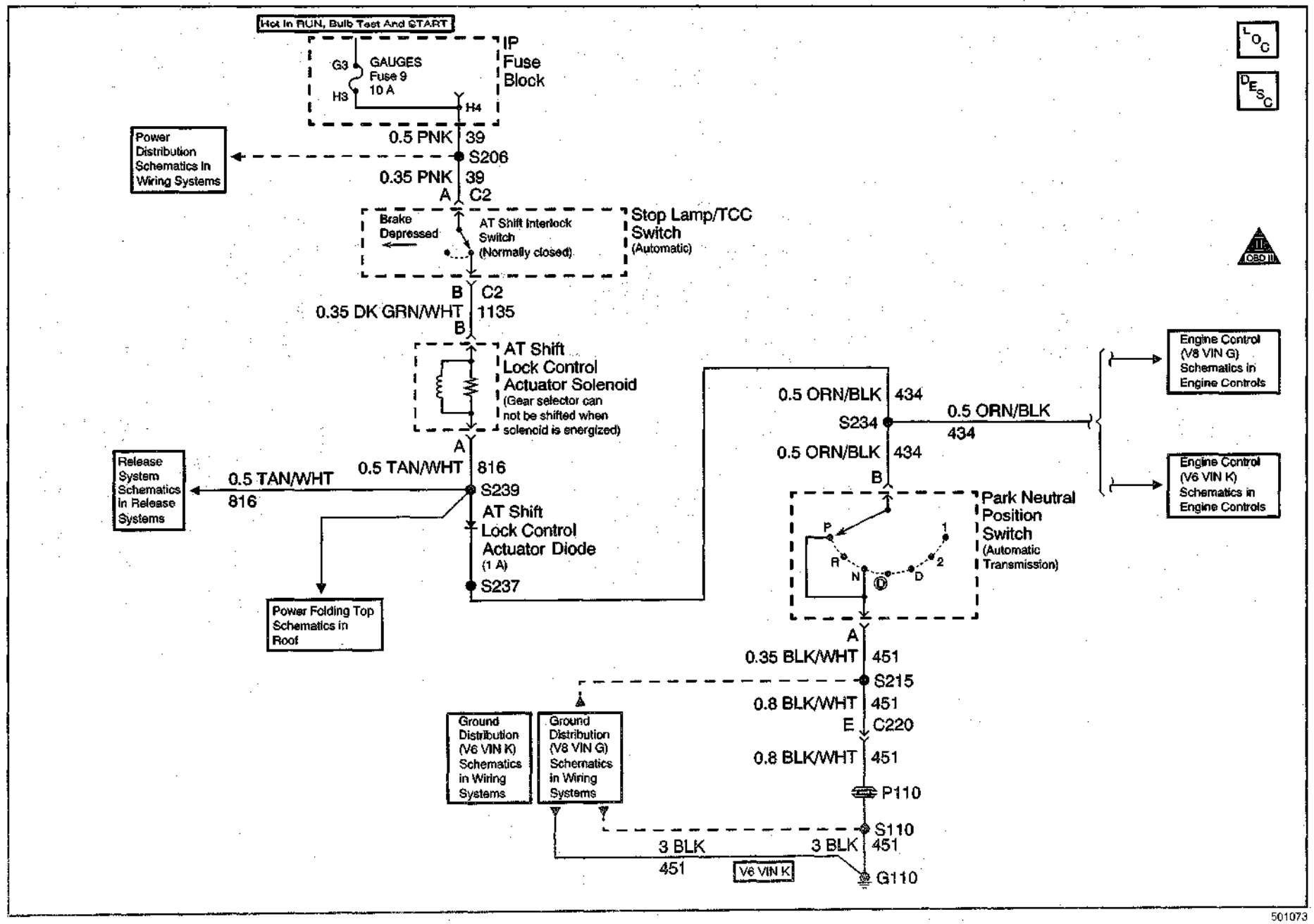
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Automatic Transmission Controls Schematics (Automatic Transmission, Park Neutral Position Switch, Vehicle Speed Sensor (V8 VIN G))



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Automatic Transmission Shift Lock Control Schematics (AT Shift Lock Control Actuator Solenoid, and Diode)



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Component Locator

Automatic Transmission Components

Name	Location	Locator View	Connector End View
AT Shift Lock Control Actuator Diode	In the IP harness, main branch, approximately 6 cm (2.4 in) from the body control module (BCM) breakout	—	—
AT Shift Lock Control Actuator Solenoid	Under the center console, near the shift control lever	*Automatic Transmission Shift Lock Control Component Views*	*Automatic Transmission Inline Harness Connector End View*
Automatic Transmission (V6 VIN K)	Behind the engine	*ABS Component Views* in ABS Traction Control	*Automatic Transmission Inline Harness Connector End View*
Automatic Transmission (V8 VIN)	Behind the engine	*ABS Component Views* in ABS Traction Control	*Automatic Transmission Inline Harness Connector End View*
Engine Wiring Harness Junction Block 2	In the left front corner of the engine compartment	*Power and Grounding Component Views* in Wiring Systems	—
IP Fuse Block	On the left end of the IP carrier	*Instrument Panel, Gauges, and Console Component Views* in Instrument Panel, Gauges and Console	—
Park/Neutral Position Switch	Under the center console, on the base of the shift control lever	*Automatic Transmission Shift Lock Control Component Views* in Automatic Transmission	*Engine Controls Connector End Views* in Engine Controls
Powertrain Control Module (PCM) (V6 VIN K)	On the right side of the engine compartment, rear of the wheelhouse	*Power and Grounding Component Views* in Wiring Systems	*PCM Connector End Views* in Engine Controls
Powertrain Control Module (PCM) (V8 VIN G)	On the right side of the engine compartment, rear of the wheelhouse	*Engine Controls Component Views* in Engine Controls	*PCM Connector End Views* in Engine Controls
Second Gear Start Switch (V6 VIN K) (Chevrolet w/o NW9)	In the center of the IP, above the HVAC control	*ABS Component Views* in ABS Traction Control	*Engine Controls Connector End Views* in Engine Controls
Stop Lamp/TCC Switch (Automatic)	Mounted on the brake pedal bracket	*Cruise Control Component Views* in Cruise Control	*Lighting Systems Connector End Views* in Lighting Systems
Vehicle Speed Sensor (Automatic) (V6 VIN K)	On the rear right side of the transmission	*Instrument Panel, Gauges, and Console Component Views* in Instrument Panel, Gauges and Console	*Engine Controls Connector End Views* in Engine Controls
Vehicle Speed Sensor (Automatic) (V8 VIN G)	On the rear right side of the transmission	*Instrument Panel, Gauges, and Console Component Views* in Instrument Panel, Gauges and Console	*Engine Controls Connector End Views* in Engine Controls
C100 (10 cavities)	Engine to forward lamp harness, in the engine compartment, above the right wheelhouse	*Harness Routing Views* in Wiring Systems	*Inline Harness Connector End Views* in Wiring Systems
C105 (8 cavities)	Engine to forward lamp harness, in the engine compartment, above the right wheelhouse	*Harness Routing Views* in Wiring Systems	*Inline Harness Connector End Views* in Wiring Systems
C200A (17 cavities)	Forward lamp to IP harness, between the left kick panel and the steering column	*Harness Routing Views* in Wiring Systems	*Inline Harness Connector End Views* in Wiring Systems
C200B (18 cavities)	Forward lamp to IP harness, between the left kick panel and the steering column	*Harness Routing Views* in Wiring Systems	*Inline Harness Connector End Views* in Wiring Systems

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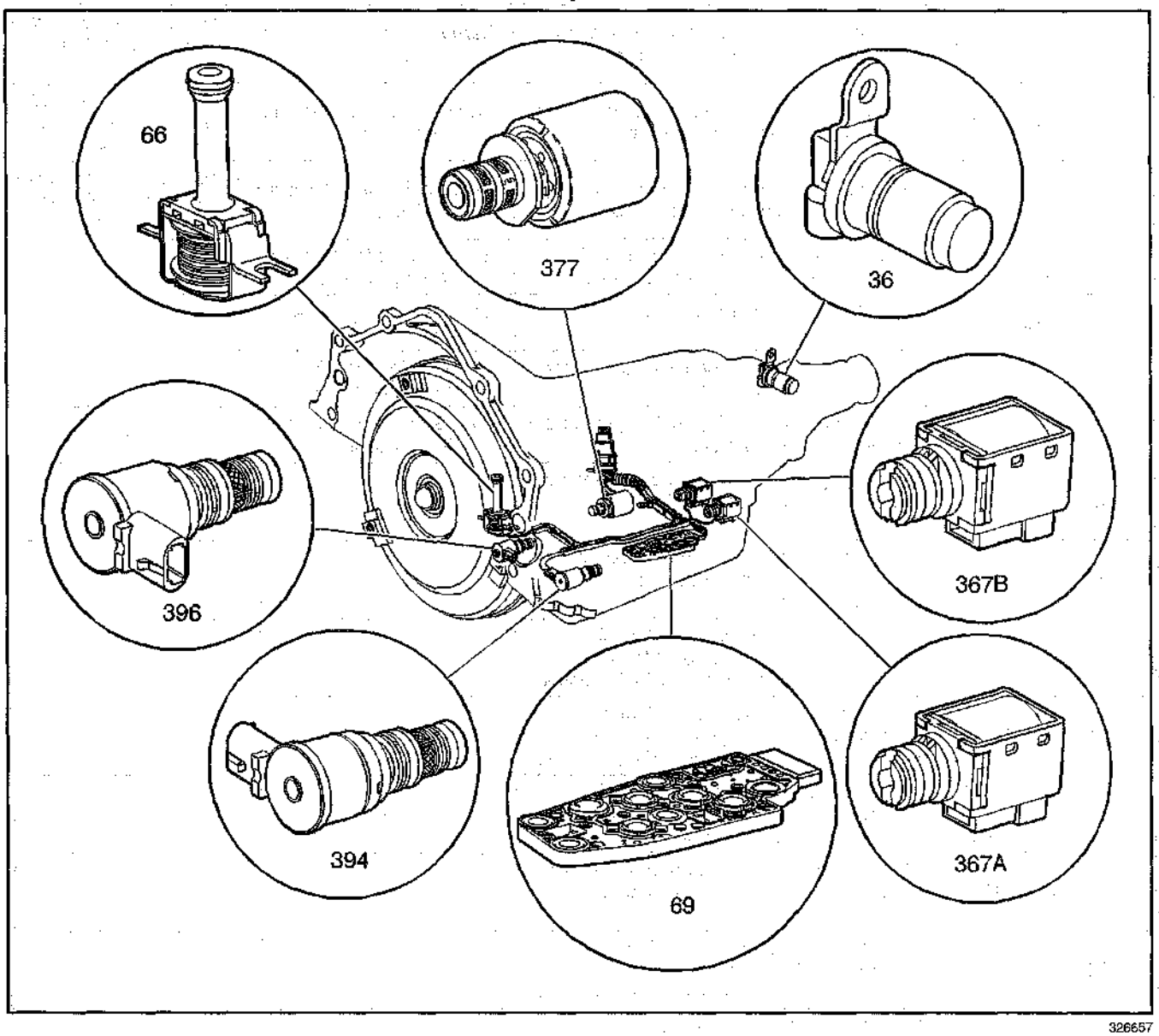
Automatic Transmission Components (cont'd)

Name	Location	Locator View	Connector End View
C200D (48 cavities)	Part of the IP harness, between the left kick panel and the steering column	*Harness Routing Views* in Wiring Systems	*Inline Harness Connector End Views* in Wiring Systems
C220 (10 cavities)	IP to engine harness, under the right side of the IP, behind the knee bolster	*Harness Routing Views* in Wiring Systems	*Inline Harness Connector End Views* in Wiring Systems
C270 (2 cavities)	IP harness of the cruise control harness, near the brake/clutch pedal bracket	*Harness Routing Views* in Wiring Systems	*Inline Harness Connector End Views* in Wiring Systems
G110 (V6 VIN K)	In the front of the engine, bolted to the pulley above the A/C clutch connector	*Harness Routing Views* in Wiring Systems	—
G110 (V8 VIN G)	Attached to the rear of the left cylinder head	*Harness Routing Views* in Wiring Systems	—
P100	Left side in the dash panel, engine to the passenger compartment	*Harness Routing Views* in Wiring Systems	—
P110	Right side in the dash panel, engine to the passenger compartment	*Harness Routing Views* in Wiring Systems	—
S104 (V6 VIN K)	In the engine harness, approximately 7 cm (2.3 in) from the right knock sensor breakout	—	—
S104 (V8 VIN G)	in the engine harness, approximately 14 cm (5.5 in) from the powertrain control module (PCM) breakout	—	—
S107 (V6 VIN K)	In the engine harness, main branch, approximately 21 cm (8.3 in) from the powertrain control module (PCM) breakout	—	—
S107 (V8 VIN G)	In the engine harness, main branch, approximately 7 cm (2.8 in) from the powertrain control module (PCM) breakout	—	—
S108 (V8 VIN G) (Automatic Transmission)	In the engine harness, main branch, approximately 5 cm (2 in) from the automatic transmission breakout	—	—
S110 (V6 VIN K)	In the engine harness, approximately 4 cm (1.6 in) from the powertrain control module (PCM) breakout	—	—
S110 (V8 VIN G)	In the engine harness, main branch, approximately 20 cm (7.9 in) from the powertrain control module (PCM) breakout	—	—
S182	In the forward lamp harness, approximately 15 cm (6 in) from the engine wiring harness junction block 1 breakout	—	—
S206	In the IP harness, at the rear compartment lid release relay breakout	—	—
S215	In the IP harness, main branch, approximately 11 cm (4 in) from the antenna cable breakout	—	—
S234 (Automatic)	In the IP harness, main branch, approximately 5 cm (2 in) from the body control module (BCM) breakout	—	—
S237 (Automatic)	In the IP harness, main branch, approximately 6 cm (2.4 in) from the body control module (BCM) breakout	—	—
S239 (Automatic)	In the IP harness, main branch, approximately 1 cm (0.5 in) from the body control module (BCM) breakout	—	—

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Automatic Transmission Electronic Component Views (Internal)

Electronic Component Locations



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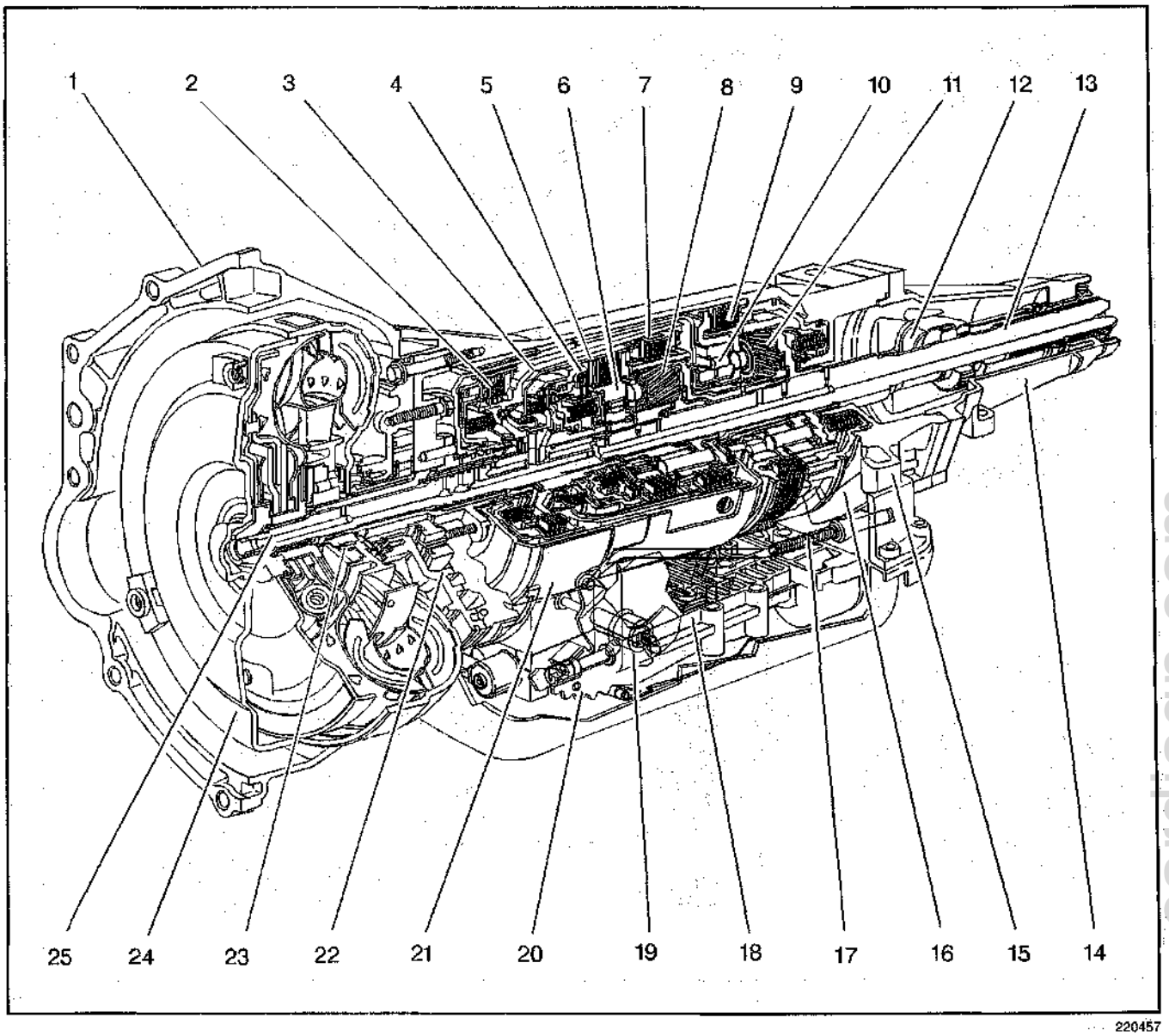
Legend

(36) Vehicle Speed Sensor (VSS)
(66) Torque Converter Clutch (TCC) Solenoid Valve
(69) Automatic Transmission Fluid Pressure (TFP) Manual Valve Position Switch
(367a) 1-2 Shift Solenoid (SS) Valve
(367b) 2-3 Shift Solenoid (SS) Valve
(377) Pressure Control (PC) Solenoid Valve
(394) 3-2 Shift Solenoid (SS) Valve Assembly
(396) Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid Valve

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Transmission Component Location

Component Locator View



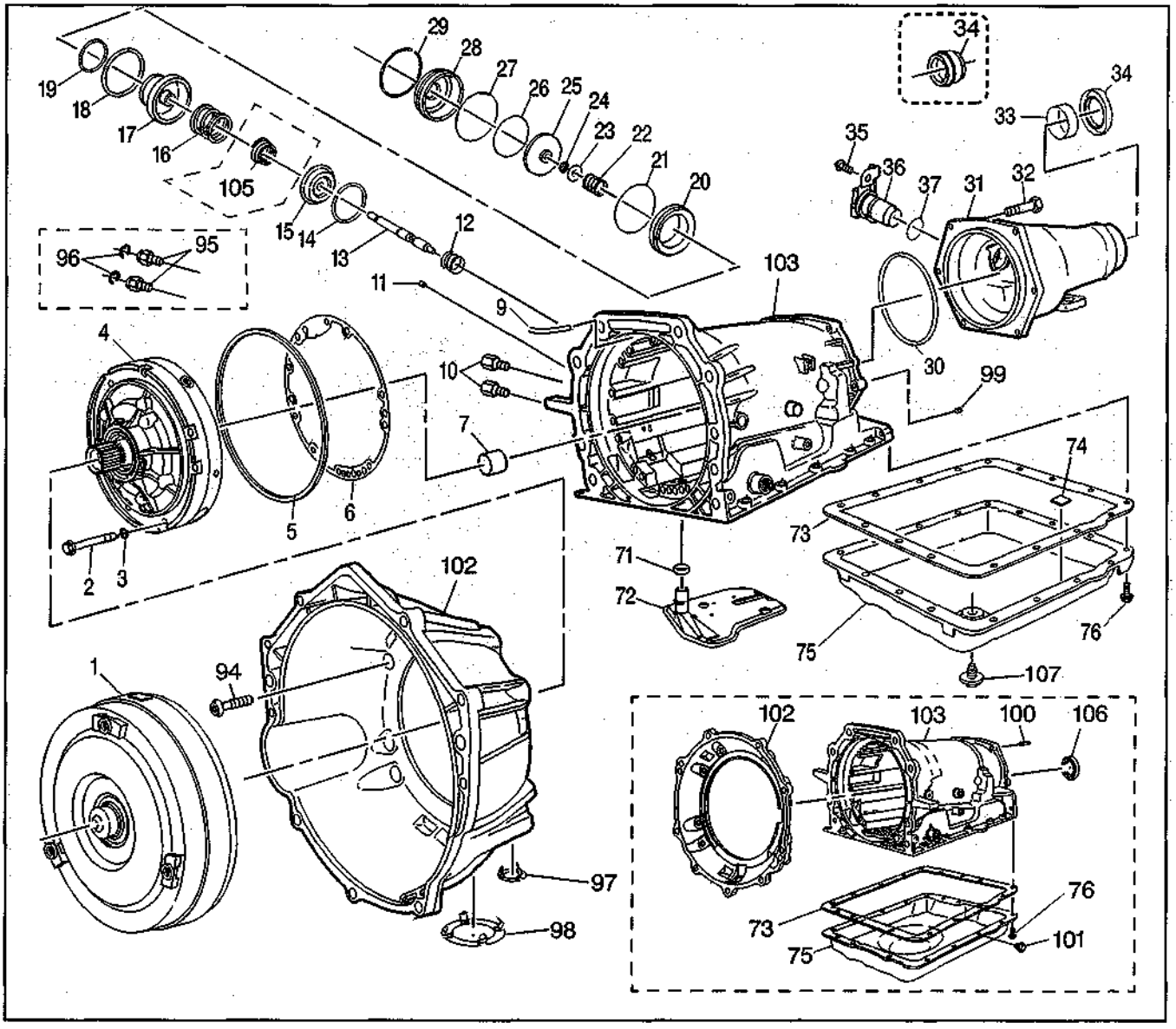
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Legend

(1) Converter Housing
(2) Reverse Input Clutch
(3) Input Clutch Housing
(4) Overrun Clutch
(5) Forward Clutch
(6) Forward Sprag Clutch Assembly
(7) 3-4 Clutch
(8) Input Planetary Gear Set
(9) Lo and Reverse Clutch
(10) Lo Roller Clutch Assembly
(11) Reaction Planetary Gear Set
(12) Speed Sensor
(13) Output Shaft
(14) Case Extension
(15) Main Section Case
(16) Parking Pawl
(17) Parking Lock Actuator Assembly
(18) Control Valve Assembly
(19) Manual Shaft
(20) Inside Detent Lever
(21) 2-4 Band Assembly
(22) Pump Assembly
(23) Stator Roller Clutch
(24) Torque Converter Assembly
(25) Turbine Shaft

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Case and Associated Parts (1 of 2)



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Legend

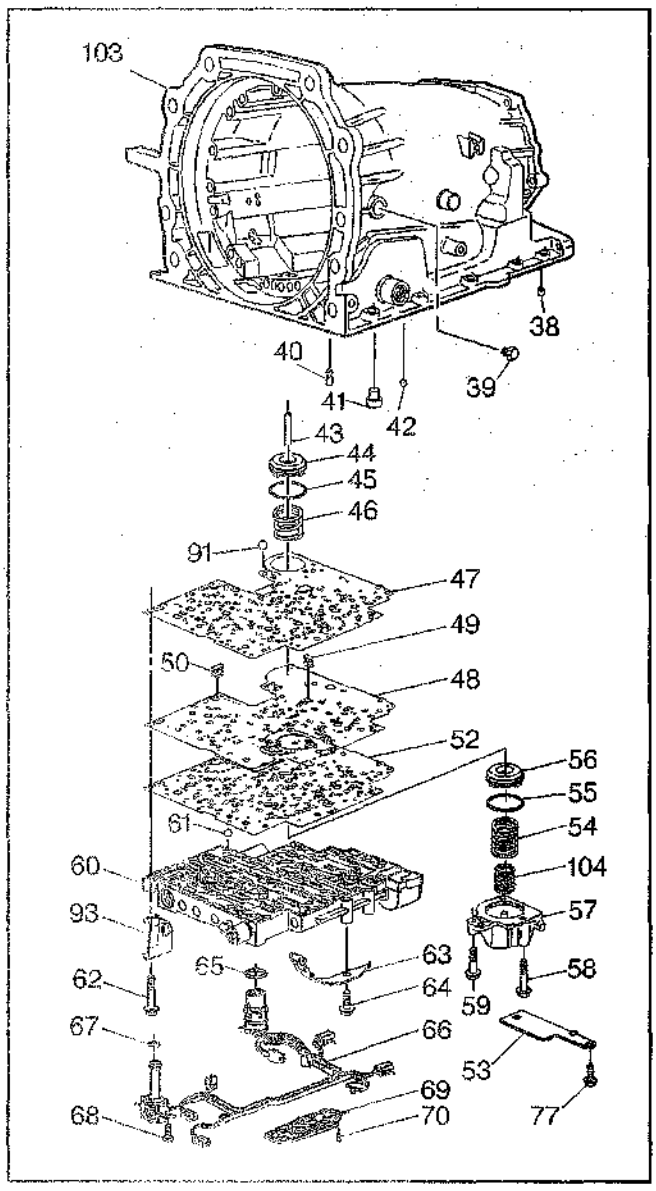
(1) Torque Converter Assembly (Model Dependent)
(2) Pump to Case Bolt
(3) Pump to Case Bolt O-Ring
(4) Oil Pump Assembly
(5) Oil (Pump to Case) Seal
(6) Pump Cover to Case Gasket
(7) Case Bushing
(9) Transmission Vent Assembly
(10) Oil Cooler Pipe (Model Dependent) Connector
(11) Case Servo Plug
(12) Servo Return Spring
(13) 2nd Apply Piston Pin
(14) Retainer (2nd Apply Piston) Ring
(15) Servo Cushion Spring Retainer
(16) Servo Cushion (Outer) Spring
(17) 2nd Apply Piston
(18) Oil Seal (2nd Apply Piston - Outer) Ring
(19) Oil Seal (2nd Apply Piston - Inner) Ring
(20) Servo Piston (Inner) Housing
(21) O-Ring Seal
(22) Servo Apply Pin Spring
(23) Servo Apply Pin Washer
(24) Retainer (Apply Pin) Ring
(25) 4th Apply Piston
(26) Oil Seal (4th Apply Piston - Outer) Ring
(27) O-Ring (2-4 Servo Cover) Seal
(28) 2-4 Servo Cover
(29) Servo Cover Retaining Ring
(30) Case Extension to Case Seal
(31) Case (Model Dependent) Extension

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(32) Case Extension to Case Bolt
(33) Case Extension Bushing
(34) Case Extension Oil (Model Dependent) Seal Assembly
(35) Speed Sensor Retaining Bolt
(36) Internal Transmission Speed Sensor
(37) O-Ring (ITSS to Case Extension) Seal
(71) Filter Seal
(72) Transmission Oil (Model Dependent) Filter Assembly
(73) Transmission Oil Pan Gasket
(74) Chip Collector Magnet
(75) Transmission Oil (Model Dependent) Pan
(76) Transmission Oil Pan Screw
(94) Converter Housing to Case Bolt
(95) Oil Cooler Quick (Model Dependent) Connector
(96) Oil Cooler Quick Connect (Model Dependent) Clip
(97) Converter Housing Access Hole (Model Dependent) Plug
(98) Converter Bolt Inspection (Model Dependent) Plate
(99) Cup D4 Orifice Plug
(100) A/Trans. Case (Y-Car Only) Stud
(101) A/Trans. Oil Pan (Y-Car Only) Plug Asm.
(102) Converter (Model Dependent) Housing
(103) Main Section (Model Dependent) Case
(105) Servo Cushion (Inner) (Model Dependent) Spring
(106) Case Oil (Y-Car Only) Seal Assembly
(107) A/Trans Oil Pan Hex Head (C/K Truck Only) Plug Assembly

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Case and Associated Parts (2 of 2)



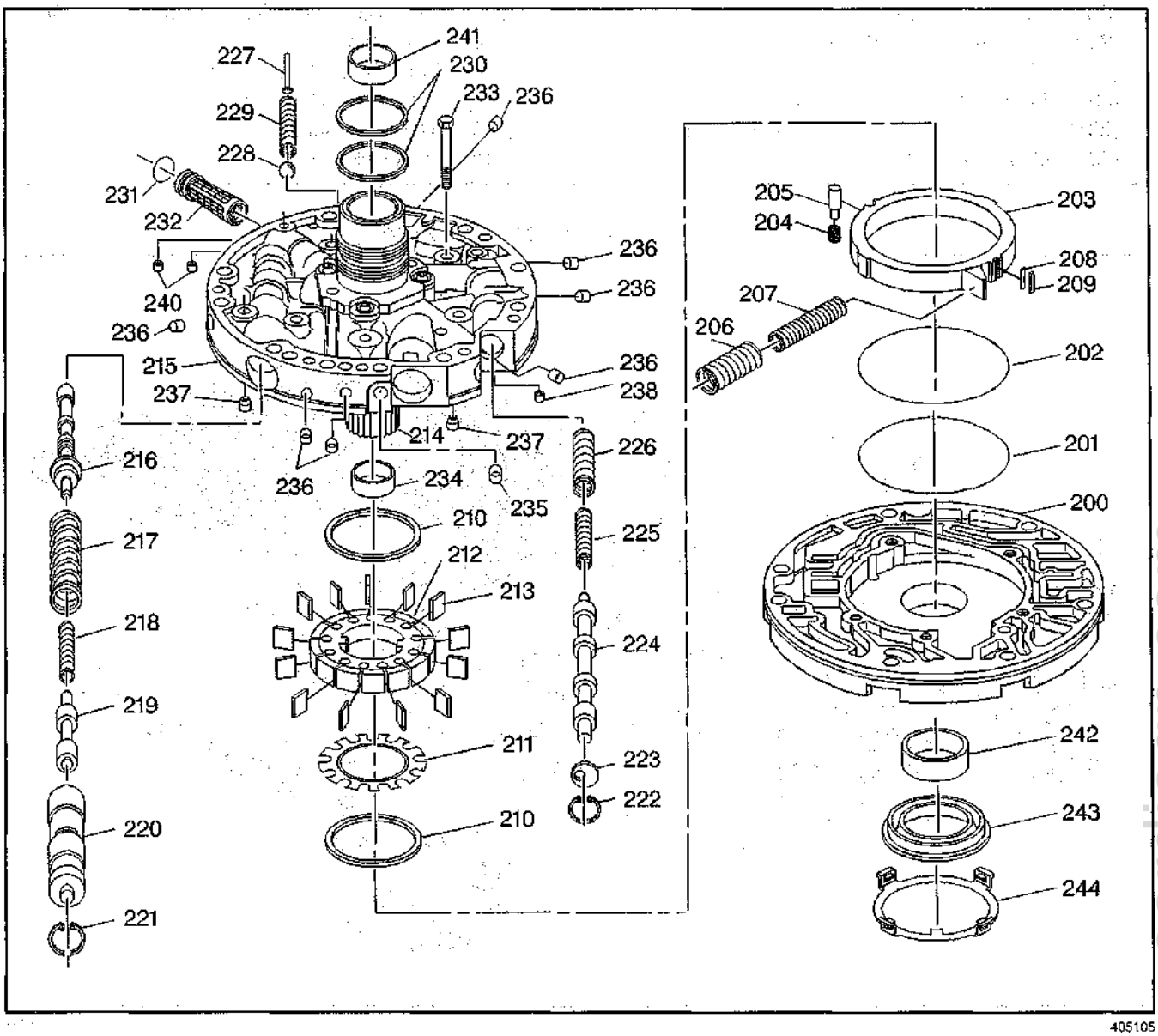
283778

Legend

(38) Transmission Case (Accumulator Bleed) Plug
(39) Pressure Plug
(40) Third Accumulator (#7) Retainer and Ball Assembly
(41) Band Anchor Pin
(42) Retainer and Ball Assembly (Double Orifice) (#10)
(43) Accumulator Piston Pin
(44) 3-4 Accumulator Piston
(45) Oil Seal (3-4 Accumulator Piston) Ring
(46) 3-4 Accumulator (Model Dependent) Spring
(47) Spacer Plate to Case Gasket
(48) Valve Body Spacer Plate
(49) Shift Solenoids Screen
(50) Pressure Control Solenoid Screen
(52) Spacer Plate to Valve Body Gasket
(53) Spacer Plate Support Plate
(54) 1-2 Accumulator (Outer) Spring
(55) Oil Seal (1-2 Accumulator) Ring
(56) 1-2 Accumulator Piston
(57) 1-2 Accumulator Cover and Pin Assembly
(58) Accumulator Cover Bolt
(59) Accumulator Cover Bolt
(60) Control Body Valve Assembly
(61) Checkball (#2, 3, 4, 5, 6, 8, 12)
(62) Valve Body Bolt
(63) Manual Detent Spring Assembly
(64) Manual Detent Spring Bolt
(65) Wiring Harness Pass-through Connector O-Ring Seal
(66) Wiring Harness Solenoid Assembly
(67) O-Ring (Solenoid) Seal
(68) Hex Washer Head (Solenoid) Bolt
(69) Transmission Fluid Pressure Manual Valve Position Switch Assembly
(70) Pressure Switch Assembly Bolt
(77) Spacer Plate Support Bolt
(91) Number 1 Checkball
(93) Dipstick Stop (Model Dependent) Bracket
(103) Main Section (Model Dependent) Case
(104) 1-2 Accumulator (Inner) Spring

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Oil Pump Assembly



405105

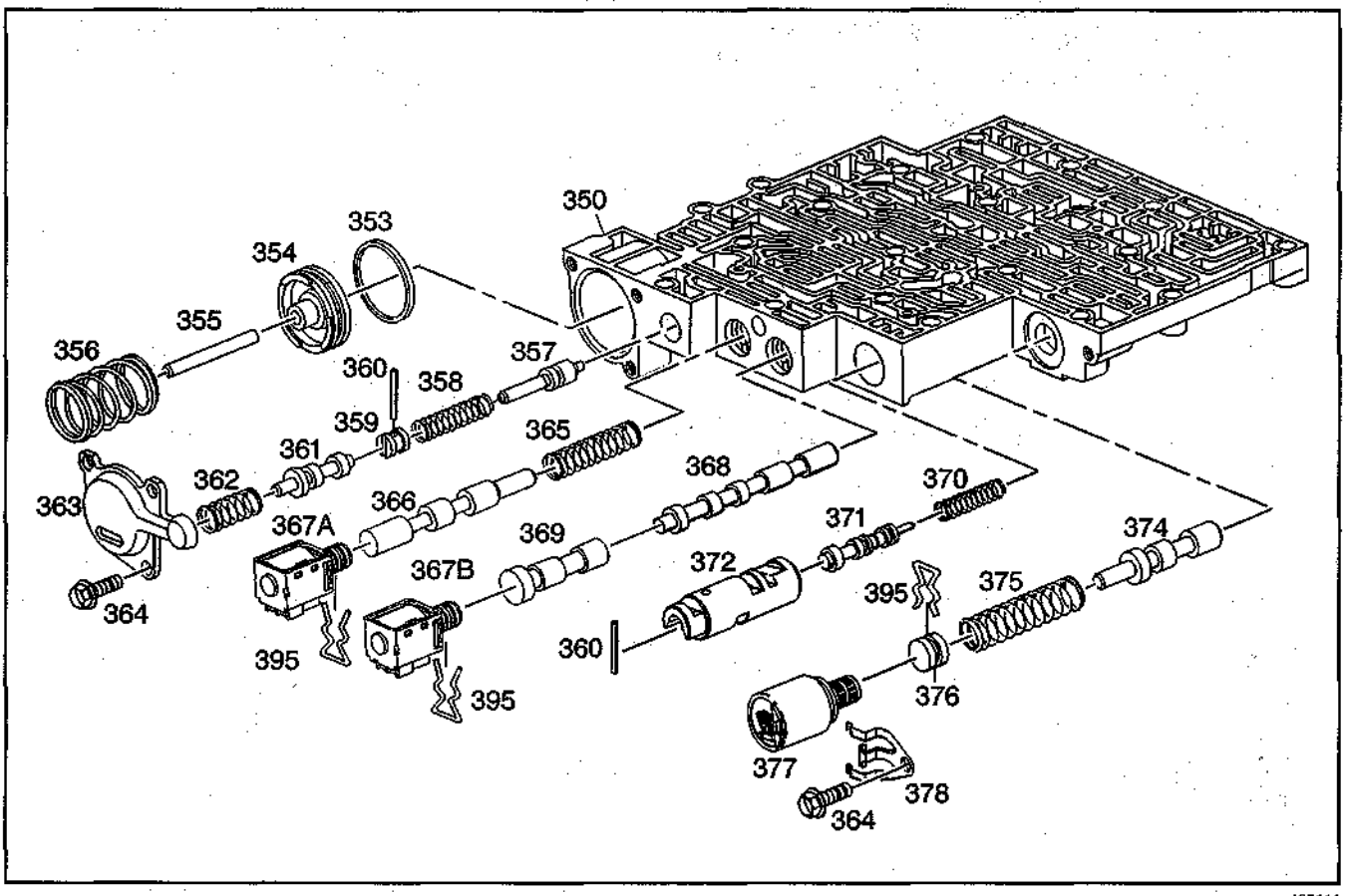
Legend

(200) Pump Body
(201) Oil Seal (Slide to Wear Plate) Ring
(202) O-Ring (Slide Seal Back-Up) Seal
(203) Pump Slide
(204) Pivot Pin Spring
(205) Pivot Slide Pin
(206) Pump Slide (Outer) Spring
(207) Pump Slide (Inner) Spring
(208) Pump Slide Seal Support
(209) Pump Slide Seal
(210) Pump Vane Ring
(211) Rotor Guide
(212) Oil Pump Rotor
(213) Pump Vane
(214) Stator Shaft
(215) Pump Cover
(216) Pressure Regulator Valve
(217) Pressure Regulator Valve Spring
(218) Pressure Regulator Isolator Spring
(219) Reverse Boost Valve
(220) Reverse Boost Valve Sleeve
(221) Oil Pump Reverse Boost Valve Retaining Ring
(222) Oil Pump Converter Clutch Valve Retaining Ring
(223) Stop Valve
(224) Converter Clutch Valve
(225) Converter Clutch Valve (Inner) Spring
(226) Converter Clutch Valve (Outer) Spring
(227) Pressure Relief Bolt Rivet
(228) Pressure Relief Ball
(229) Pressure Relief Spring

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(230) Oil Seal (Stator Shaft) Ring
(231) Oil Pump Cover Screen Seal
(232) Oil Pump Cover Screen
(233) M8 X 1.25 X 40 (Cover to Body) Bolt
(234) Stator Shaft (Front) Bushing
(235) Oil Pump Cover (FWD Clutch Feed) Plug
(236) Oil Pump Cover Plug
(237) Check Valve Retainer and Ball Assembly
(238) Converter Clutch Signal (Cup Plug) Orifice
(240) Cup Orifice Plug
(241) Stator Shaft (Rear) Bushing
(242) Pump Body Bushing
(243) Oil Seal Assembly
(244) Front Helix Retainer

Control Valve Body Assembly (1 of 2)



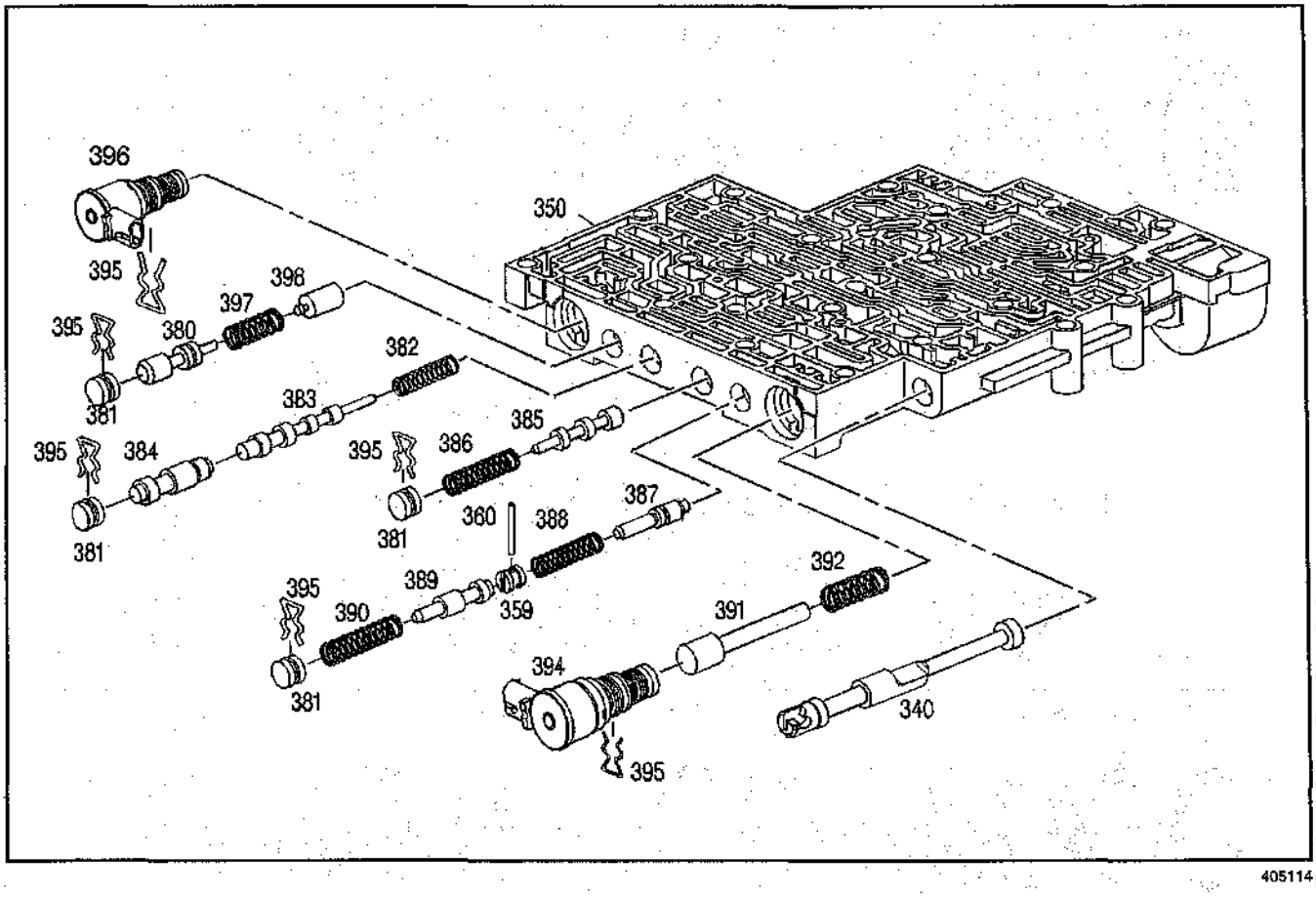
405111

Legend

(350) Control Valve Body Assembly
(353) Forward Accumulator Oil Seal
(354) Forward Accumulator Piston
(355) Forward Accumulator Pin
(356) Forward Accumulator Spring
(357) Forward Abuse Valve
(358) Forward Abuse Valve Spring
(359) Bore Plug
(360) Coiled Spring Pin
(361) Low Overrun Valve
(362) Low Overrun Valve Spring
(363) Forward Accumulator Cover
(364) Forward Accumulator Cover Bolt
(365) 1-2 Shift Valve Spring
(366) 1-2 Shift Valve
(367a) 1-2 Shift Solenoid Valve
(367b) 2-3 Shift Solenoid Valve
(368) 2-3 Shift Valve
(369) 2-3 Shuttle Valve
(370) 1-2 Accumulator Valve Spring
(371) 1-2 Accumulator Valve
(372) 1-2 Accumulator Valve Sleeve
(374) Actuator Feed Limit Valve
(375) Actuator Feed Limit Valve Spring
(376) Bore Plug
(377) Pressure Control Solenoid Valve
(378) Pressure Control Solenoid Retainer
(395) Bore Plug and Solenoid Retainer

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Control Valve Body Assembly (2 of 2)

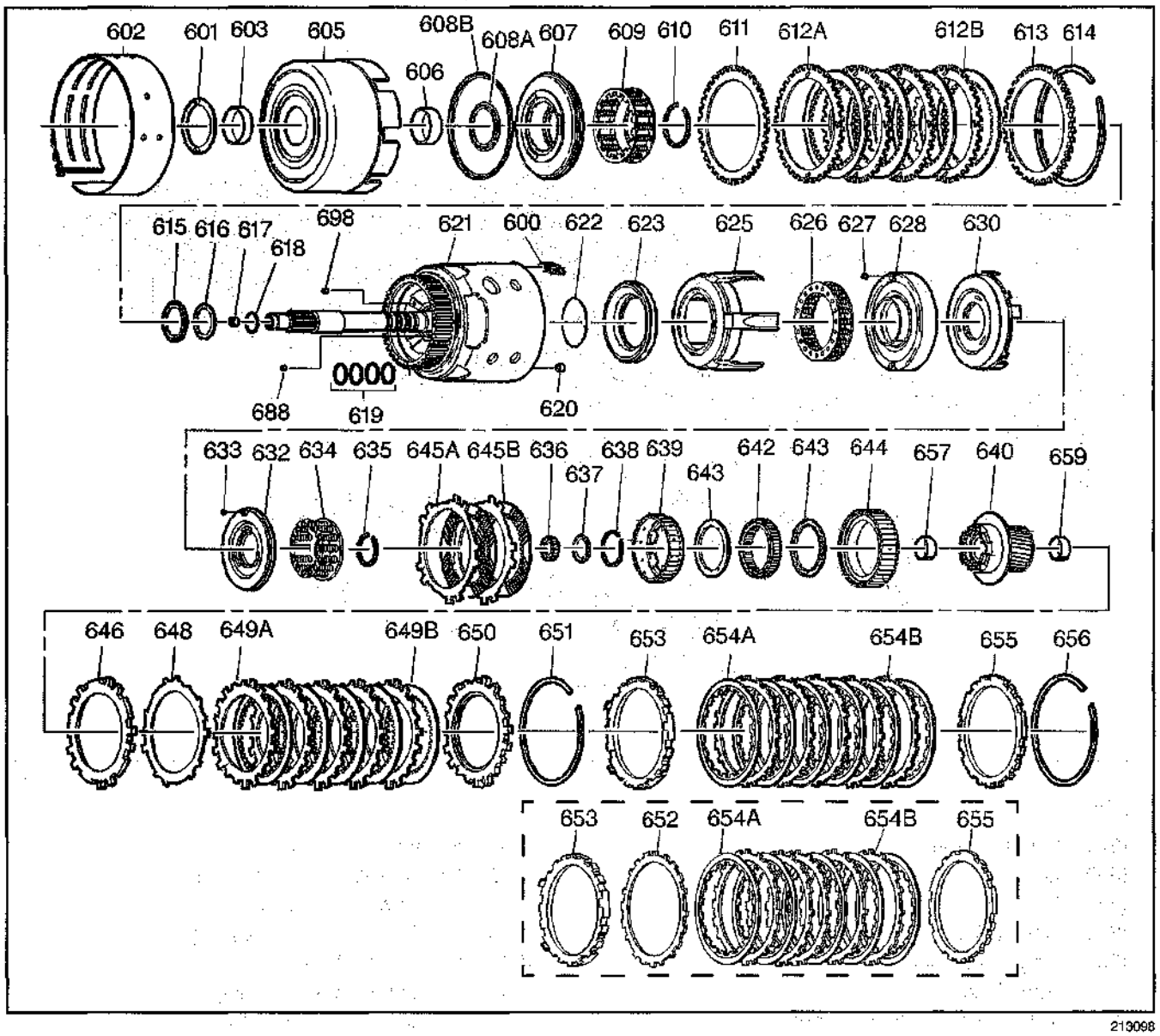


Legend

(340) Manual Valve
(350) Control Valve Body Assembly
(359) Bore Plug
(360) Coiled Spring Pin
(380) Regulator Apply Valve
(381) Bore Plug
(382) 4-3 Sequence Valve Spring
(383) 4-3 Sequence Valve
(384) 3-4 Relay Valve
(385) 3-4 Shift Valve
(386) 3-4 Shift Valve Spring
(387) Reverse Abuse Valve
(388) Reverse Abuse Valve Spring
(389) 3-2 Downshift Valve
(390) 3-2 Downshift Valve Spring
(391) 3-2 Control Valve
(392) 3-2 Control Valve Spring
(394) 3-2 Control Solenoid Valve
(395) Bore Plug and Solenoid Retainer
(396) TCC PWM Solenoid Valve
(397) Regulator Apply Spring
(398) Isolator Valve

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Internal Parts (1 of 2)



213098

Legend

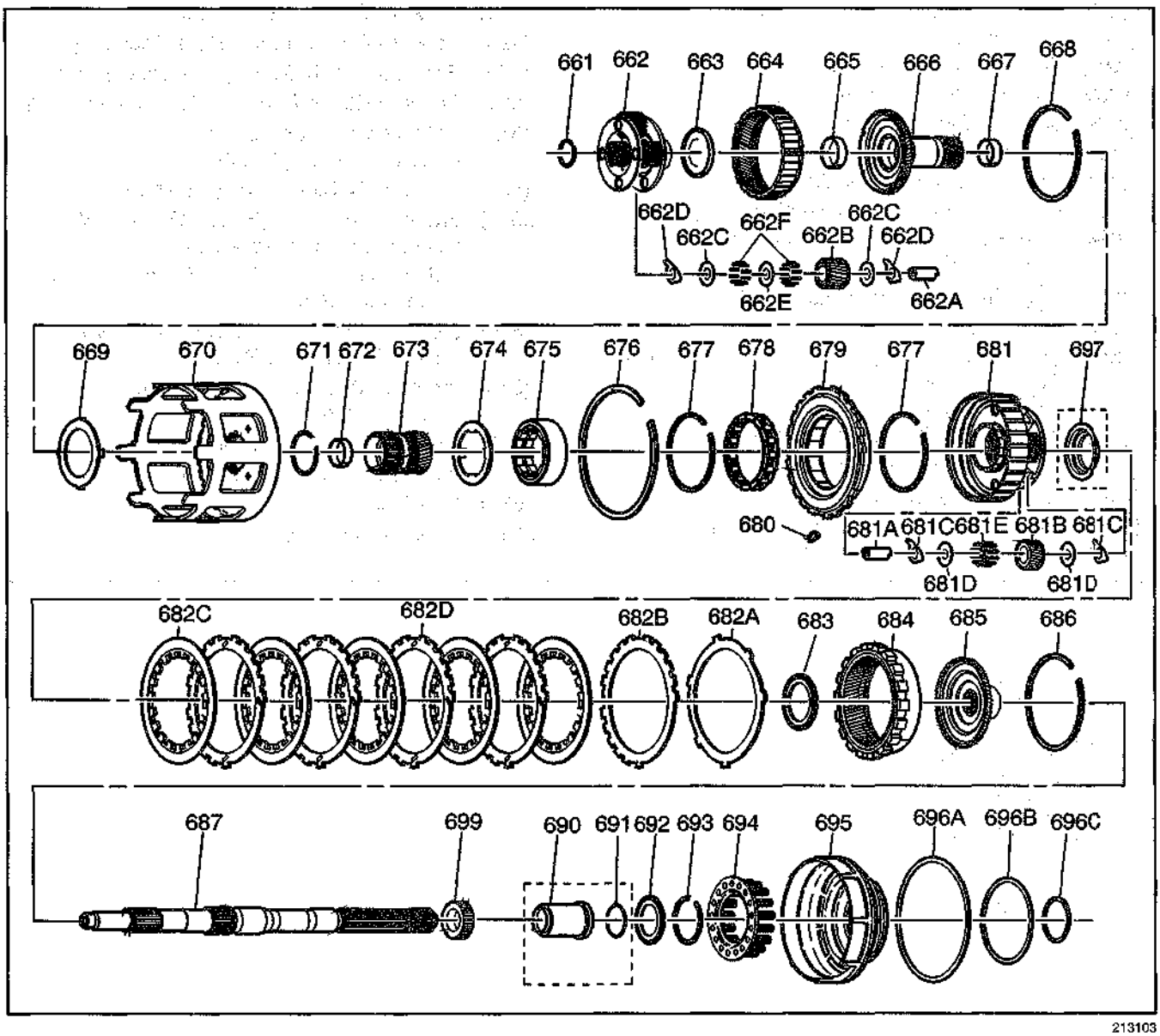
(600) 3-4 Clutch Boost (5) Spring Assembly
(601) Thrust (Pump to Drum) Washer
(602) 2-4 Band Assembly
(603) Reverse Input Clutch (Front) Bushing
(605) Reverse Input Clutch Housing and Drum Assembly
(606) Reverse Input Clutch (Rear) Bushing
(607) Reverse Input Clutch Piston Assembly
(608a) Reverse Input Clutch (Inner) Seal
(608b) Reverse Input Clutch (Outer) Seal
(609) Reverse Input Clutch Spring Assembly
(610) Reverse Input Clutch Spring Retainer Ring
(611) Reverse Input Clutch (Belleville) Plate
(612a) Reverse Input Clutch Turbulator (Steel) Plate
(612b) Reverse Input Clutch (Fiber) Plate Assembly
(613) Reverse Input Clutch Backing (Selective) Plate
(614) Reverse Input Clutch Retaining Ring
(615) Stator Shaft/Selective Washer Bearing Assembly
(616) Thrust (Selective) Washer
(617) Check Valve Retainer and Ball Assembly
(618) O-Ring (Turbine Shaft/Selective Washer) (Model Dependent) Seal
(619) Oil Seal (Solid) Ring
(620) Retainer and Checkball Assembly
(621) Input (Model Dependent) Housing and Shaft Assembly
(622) O-Ring Input to Forward Clutch Housing Seal
(623) 3rd and 4th Clutch Piston
(625) 3rd and 4th Clutch (Apply) Ring

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(626) 3rd and 4th Clutch Spring Assembly
(627) Forward Clutch Housing Retainer and Ball Assembly
(628) Forward Clutch Housing
(630) Forward Clutch Piston
(632) Overrun Clutch Piston
(633) Overrun Clutch Ball
(634) Overrun Clutch Spring Assembly
(635) Overrun Clutch Spring Retainer Snap Ring
(636) Input Housing to Output Shaft Seal
(637) Input Sun Gear Bearing Assembly
(638) Overrun Clutch Hub Retaining Snap Ring
(639) Overrun Clutch Hub
(640) Forward Sprag Clutch Inner Race and Input Sun Gear Assembly
(642) Forward Sprag Assembly
(643) Sprag Assembly Retainer Ring
(644) Forward Clutch (Outer) Race
(645a) Overrun Clutch (Steel) Plate
(645b) Overrun Clutch (Fiber) Plate Assembly
(646) Forward Clutch (Apply) Plate
(648) Forward Clutch (Waved) Plate
(649a) Forward Clutch (Steel) Plate
(649b) Forward Clutch (Fiber) Plate Assembly
(650) Forward Clutch Backing (Selective) Plate
(651) Forward Clutch Backing Plate Retainer Ring
(652) 3rd and 4th Clutch (Steel) (2.2L Engine Only) Plate
(653) 3rd and 4th Clutch Apply (Stepped) Plate
(654a) 3rd and 4th Clutch (Fiber) (Quantity Model Dependent) Plate Assembly
(654b) 3rd and 4th Clutch (Steel) (Quantity Model Dependent) Plate
(655) 3rd and 4th Clutch Backing (Selective) (Model Dependent) Plate
(656) 3rd and 4th Clutch Backing Plate Retainer Ring
(657) Input Sun Gear Front Bushing
(659) Input Sun Gear Rear Bushing
(688) Cup Plug
(698) Orificed Cup Plug

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Internal Parts (2 of 2)



213103

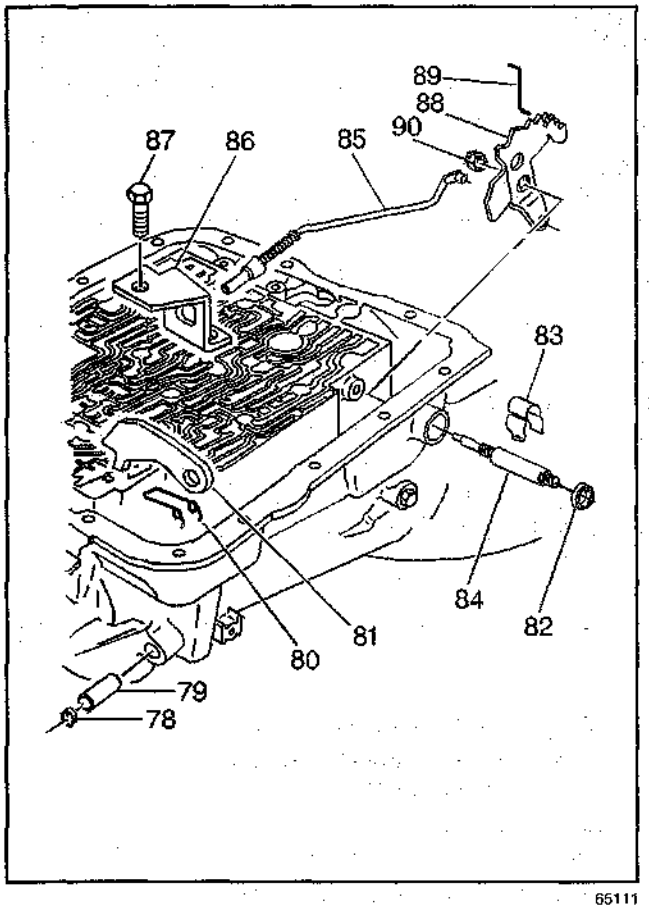
Legend

(661) Output Shaft to Input Carrier Retainer
(662) Input Carrier Assembly
(662a) Input Carrier Pinion Gear Pin
(662b) Input Carrier Pinion Gear
(662c) Input Carrier Pinion Washer
(662d) Input Carrier Pinion Washer
(662e) Input Carrier Spacer
(662f) Input Carrier Pinion/Gear Bearing Roller
(663) Thrust (Input Carrier to Reaction Shaft) Bearing Assembly
(664) Input Internal Gear
(665) Reaction Carrier Shaft Front Bushing
(666) Reaction Carrier Shaft
(667) Reaction Carrier Shaft Rear Bushing
(668) Reaction Shaft/Internal Gear Retainer Ring
(669) Thrust (Reaction Shaft Shell) Washer
(670) Reaction Sun Shell
(671) Reaction Sun Gear Retainer Ring
(672) Reaction Sun Bushing
(673) Reaction Sun Gear
(674) Thrust (Race/Reaction Shell) Washer
(675) Low and Reverse Roller Clutch Race
(676) Low and Reverse Support to Case Retainer Ring
(677) Low and Reverse Roller Assembly (Cam) Retainer Ring
(678) Low and Reverse Roller Clutch Assembly
(679) Low and Reverse Clutch Support Assembly
(680) Low and Reverse Clutch Support Retainer Spring
(681) Reaction Carrier Assembly
(681a) Reaction Carrier Pinion Gear Pin

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(681b) Reaction Carrier Pinion Gear
(681c) Reaction Carrier Pinion Bat Winged Washer
(681d) Reaction Carrier Pinion Washer
(681e) Reaction Carrier Pinion/Gear Needle Roller
(682a) Low and Reverse Clutch (Waved) Plate
(682b) Spacer Low and Reverse Clutch (Selective) Plate
(682c) Low and Reverse Clutch (Fiber) Plate Assembly
(682d) Low and Reverse Clutch Turbulator (Steel) Plate
(683) Thrust (Reaction Carrier/Support) Bearing Assembly
(684) Internal Reaction Gear
(685) Internal Reaction Gear Support
(686) Reaction Gear/Support Retainer Ring
(687) Output Shaft
(690) Output Shaft (Model Dependent) Sleeve
(691) Output Shaft (Model Dependent) Seal
(692) Reaction Gear Support to Case Bearing
(693) Low and Reverse Clutch Retainer Ring
(694) Low and Reverse Clutch Spring Assembly
(695) Low and Reverse Clutch Piston
(696a) Low and Reverse Clutch (Outer) Seal
(696b) Low and Reverse Clutch (Center) Seal
(696c) Low and Reverse Clutch (Inner) Seal
(697) Oil (High Output Models Only) Deflector
(699) Internal Transmission Speed Sensor Rotor

Parking Lock and Manual Shift Shaft Assembly



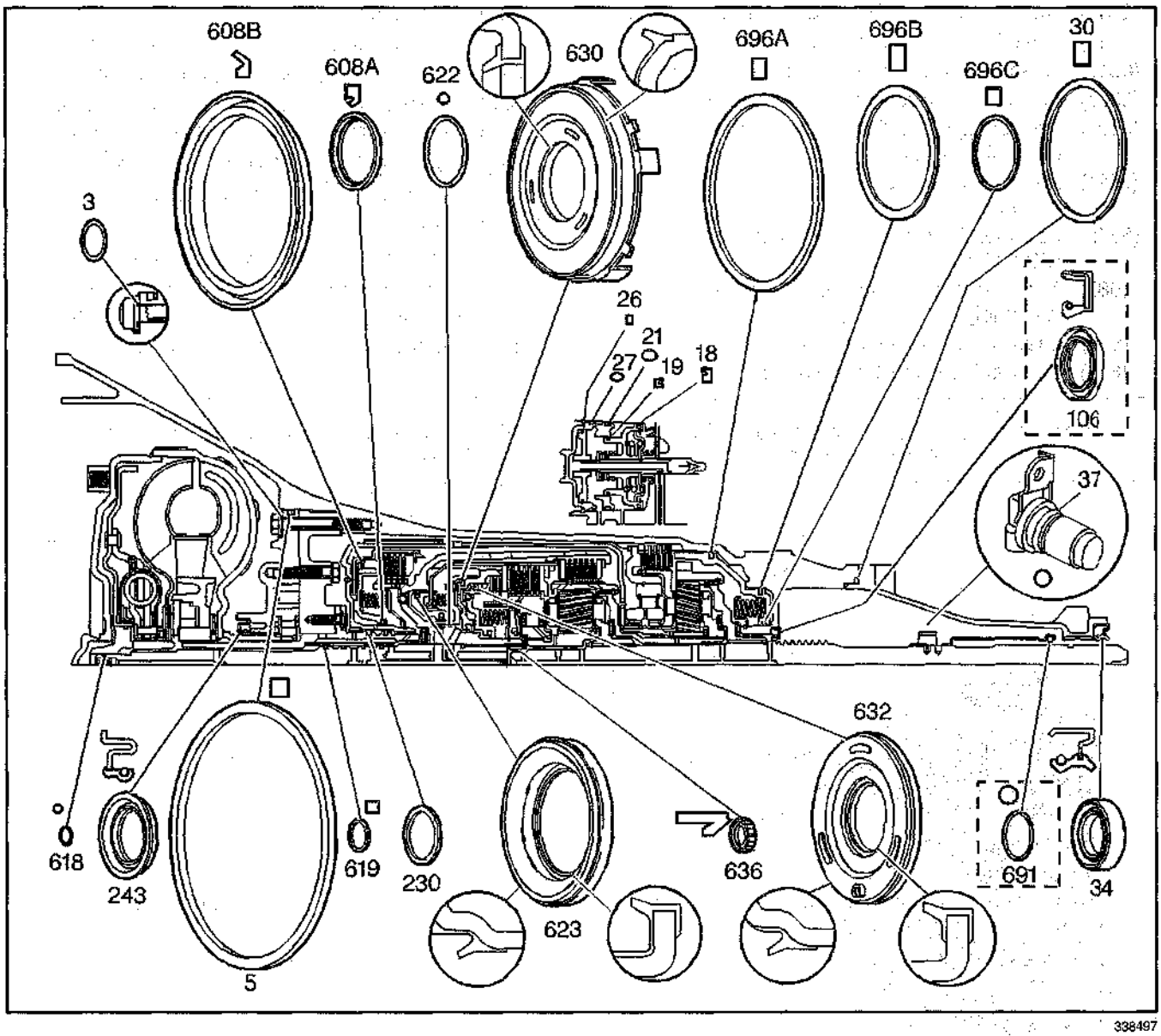
65111

Legend

(78) Steel Cup Plug
(79) Parking Brake Pawl Shaft
(80) Parking Pawl Return Spring
(81) Parking Brake Pawl
(82) Manual Shaft Seal
(83) Manual Shaft Retainer
(84) Manual (Model Dependent) Shaft
(85) Parking Lock Actuator Assembly
(86) Parking Lock Bracket
(87) Parking Lock Bracket (2) Bolt
(88) Inside Detent Lever
(89) Manual Valve Link
(90) Hex Head Nut

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Seal Locations

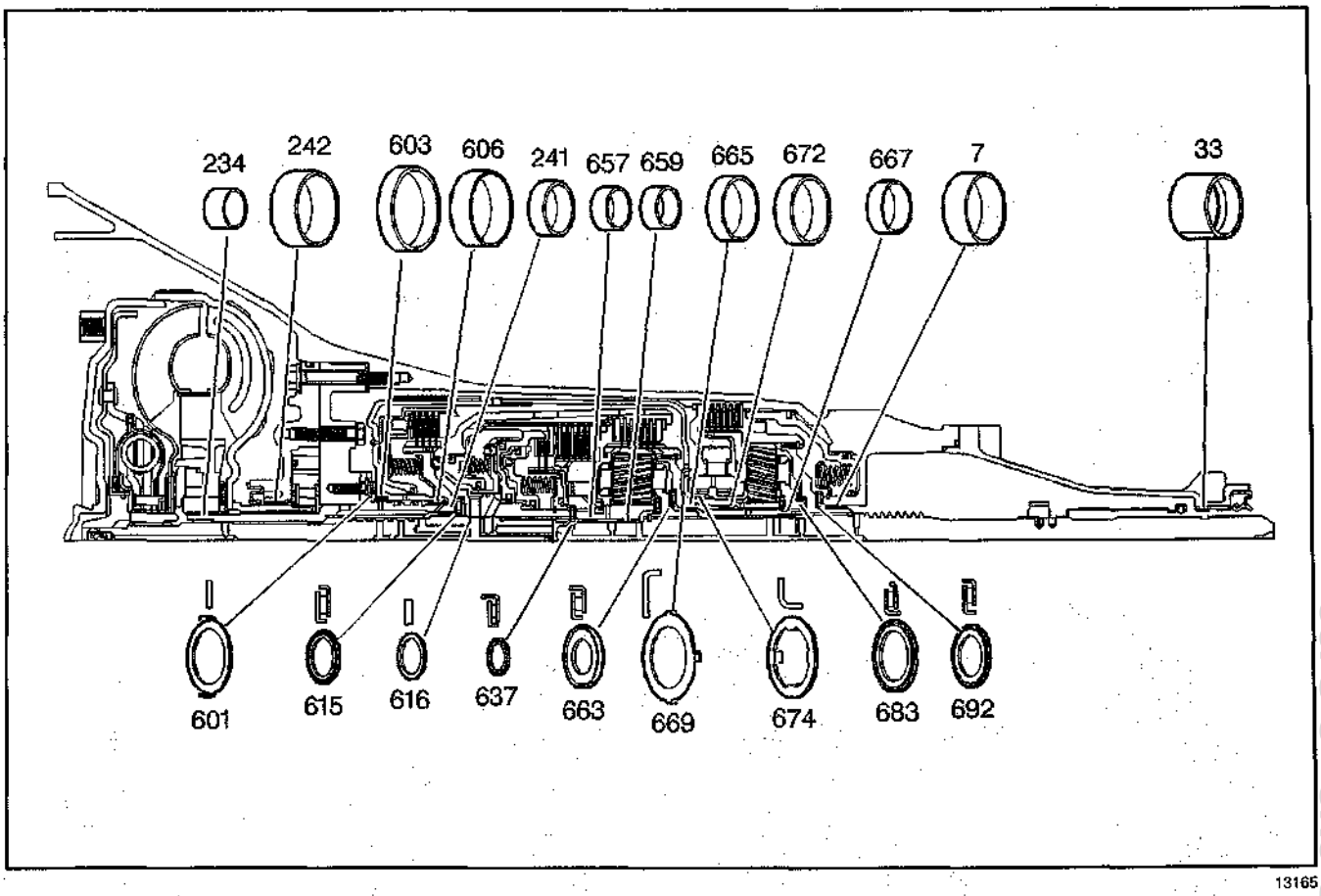


Legend

(3) Pump to Case Bolt O-Ring
(5) Oil (Pump to Case) Seal
(18) Oil Seal (2nd Apply Piston-Outer) Ring
(19) Oil Seal (2nd Apply Piston-Inner) Ring
(21) O-Ring Seal
(26) Oil Seal (4th Apply Piston-Outer) Ring
(27) O-Ring (2-4 Servo Cover) Seal
(30) Case Extension to Case Seal
(34) Case Extension Oil Seal Assembly
(37) O-Ring (ITSS to Case Extension) Seal
(106) Case Oil (Y-Car Only) Seal Assembly
(230) Oil Seal (Stator Shaft) Ring
(243) Oil Seal Assembly
(608a) Reverse Input Clutch (Inner) Seal
(608b) Reverse Input Clutch (Outer) Seal
(618) O-Ring (Turbine Shaft/Selective Washer) Seal
(619) Oil Seal (Solid) Ring
(622) O-Ring Input to Forward Housing Seal
(623) 3rd and 4th Clutch Piston
(630) Forward Clutch Piston
(632) Overrun Clutch Piston
(636) Input Housing to Output Shaft Seal
(691) Output Shaft (Model Dependent) Seal
(696a) Low and Reverse Clutch (Outer) Seal
(696b) Low and Reverse Clutch (Center) Seal
(696c) Low and Reverse Clutch (Inner) Seal

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Bearings and Bushings



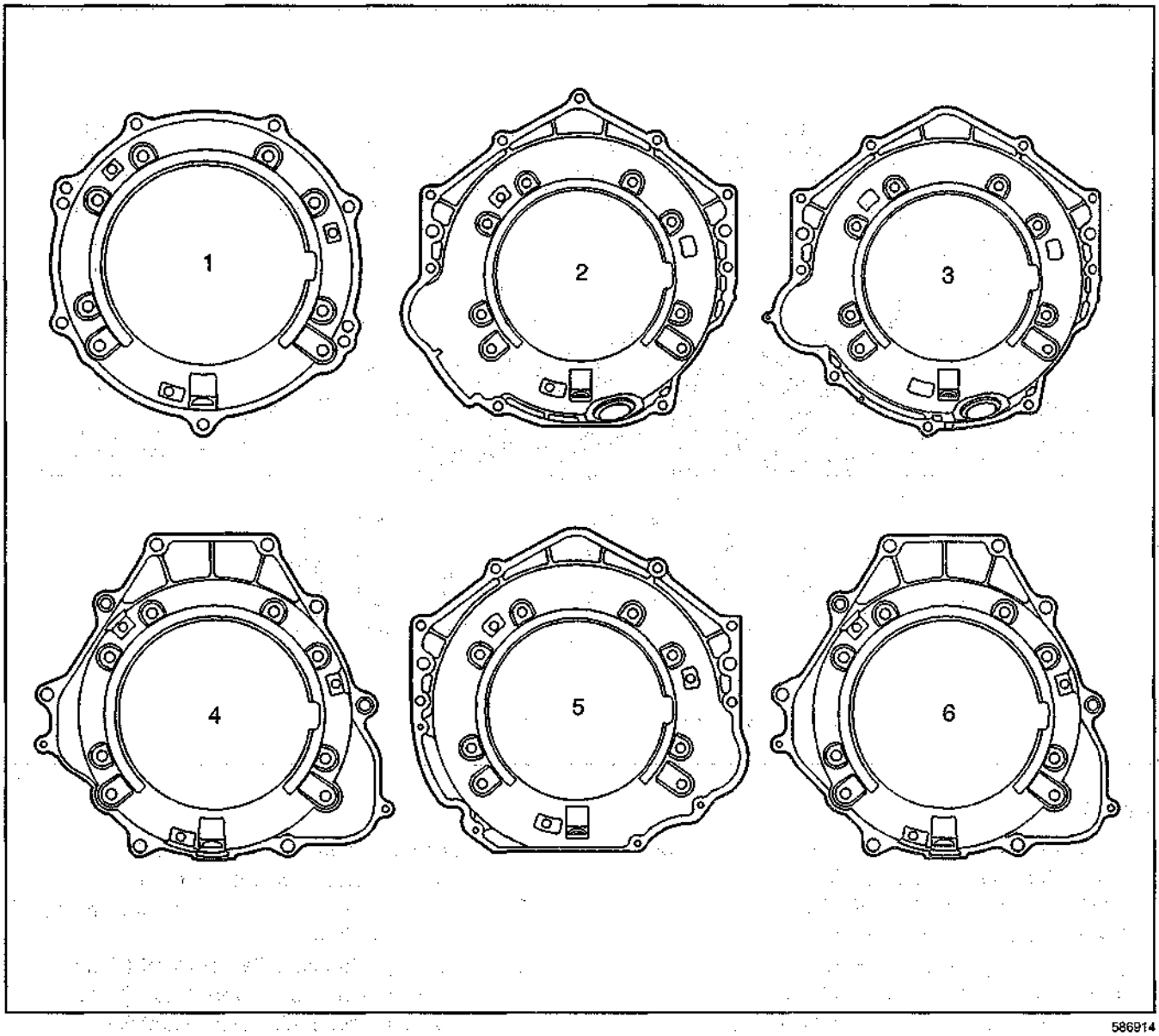
13165

Legend

(7) Bushing, Case
(33) Bushing, Case Extension
(234) Bushing, Stator Shaft (Front)
(241) Bushing, Stator Shaft (Rear)
(242) Bushing, Oil Pump Body
(601) Washer, Thrust (Pump to Drum)
(603) Bushing, Reverse Input Cl. (Front)
(606) Bushing, Reverse Input Clutch (Rear)
(615) Bearing Assembly, Stator Shaft/Selective Washer
(616) Washer, Thrust (Selective)
(637) Bearing Assembly, Input Sun Gear
(657) Bushing, Input Sun Gear (Front)
(659) Bushing, Input Sun Gear (Rear)
(663) Bearing Assembly, Thrust (Input Carrier to Reaction Shaft)
(665) Bushing, Reaction Carrier Shaft (Front)
(667) Bushing, Reaction Carrier Shaft (Rear)
(669) Washer, Thrust (Reaction Shaft/Shell)
(672) Bushing, Reaction Gear
(674) Washer, Thrust (Race/Reaction Shell)
(683) Bearing Assembly, Thrust (Reaction Carrier/Support)
(692) Bearing, Reaction Gear Support to Case

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Torque Converter Housing Identification



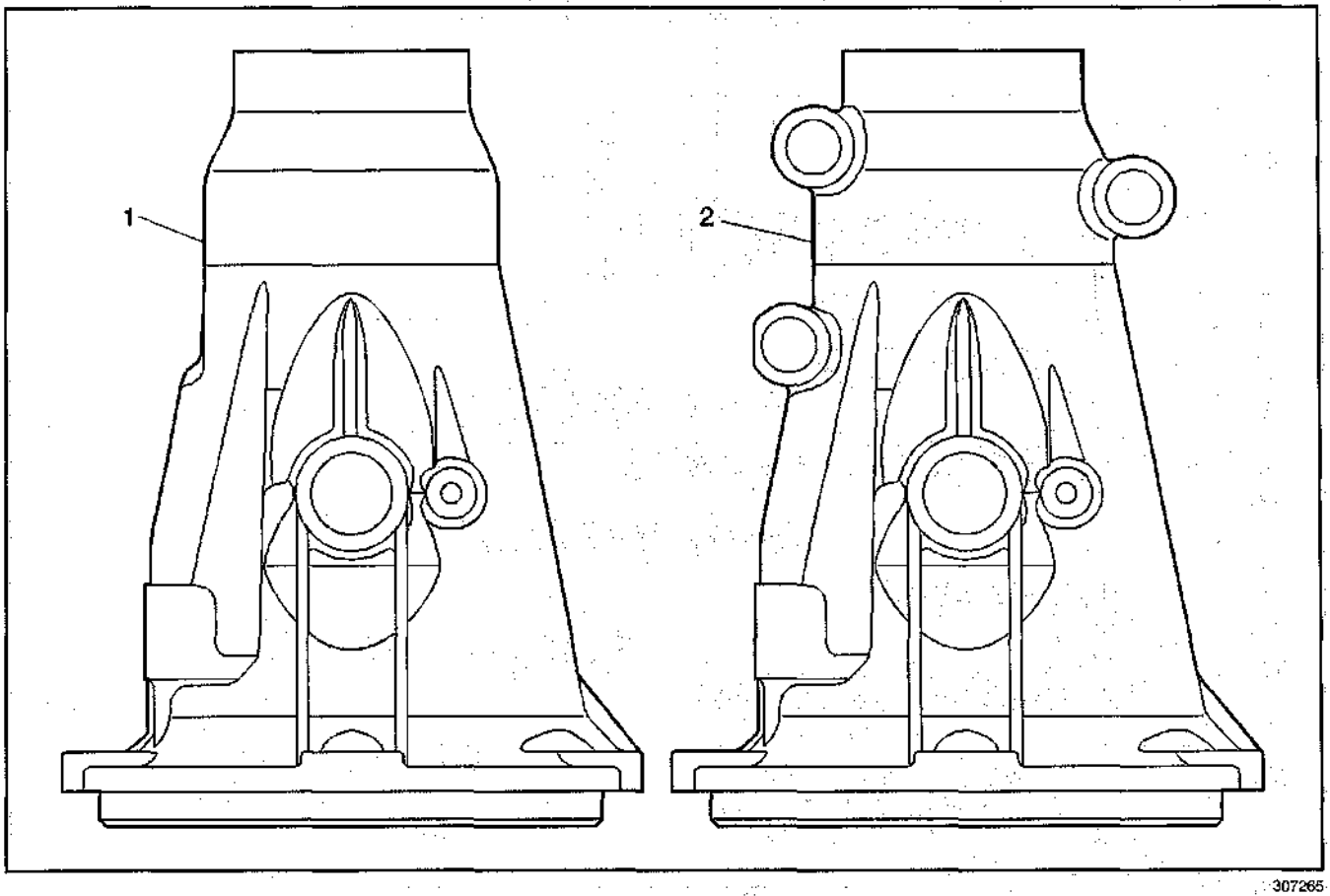
586914

Legend

(1) Domestic Large Bell V-8 (Y-Car)
(2) Domestic Gen III Large Bell V-8 (300 mm)
(3) Domestic Gen I/II Large Bell V-8/V-6
(4) Holden Small Bell V-6
(5) Holden Gen III Large Bell V-8
(6) Domestic Small Bell V-6

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Case Extension Identification



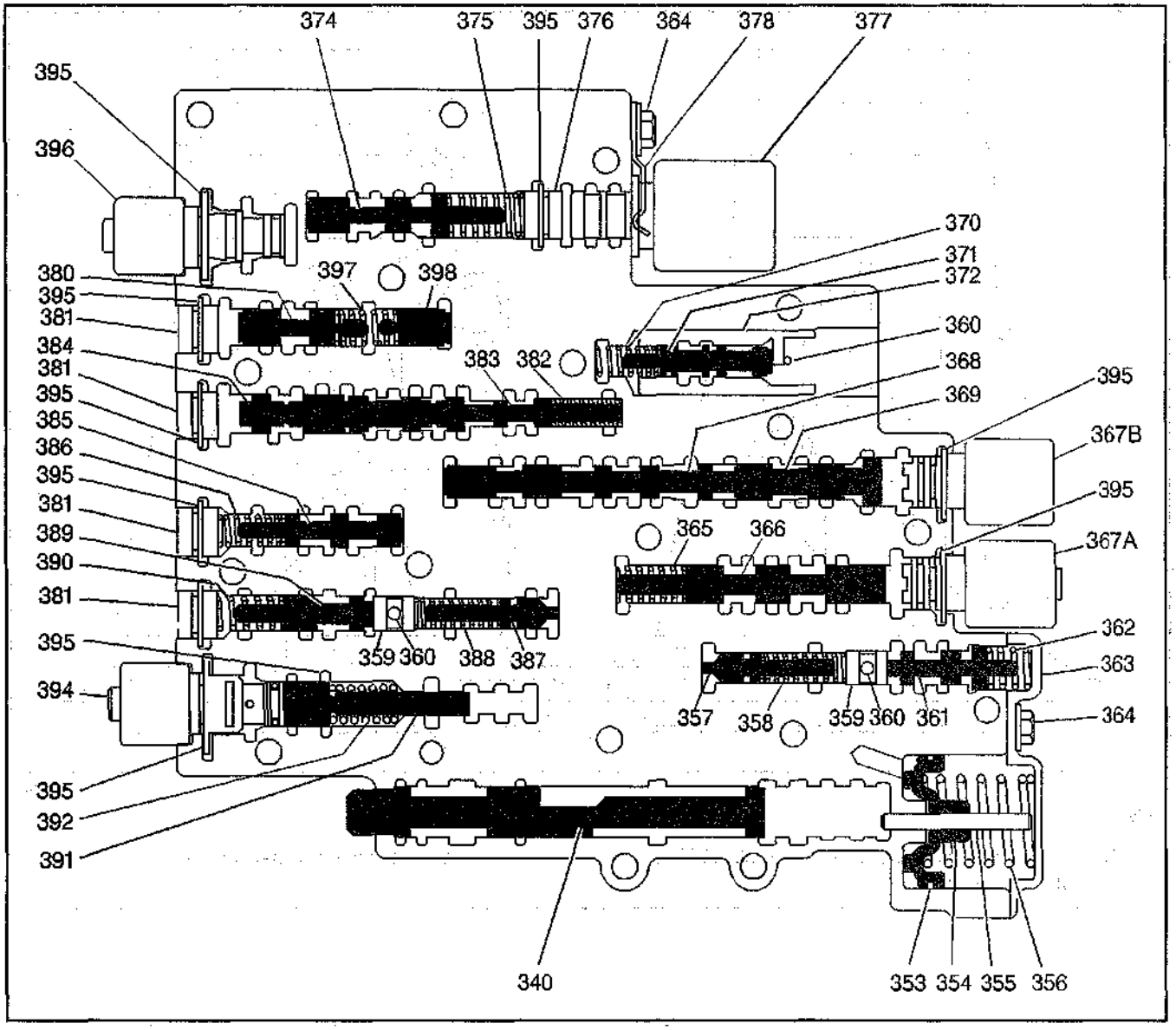
Legend

(1) Case Extension (used on C-Truck, G-Van, M-Van, S-Truck)

(2) Case Extension (used on F-Car)

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Valve Trains



405117

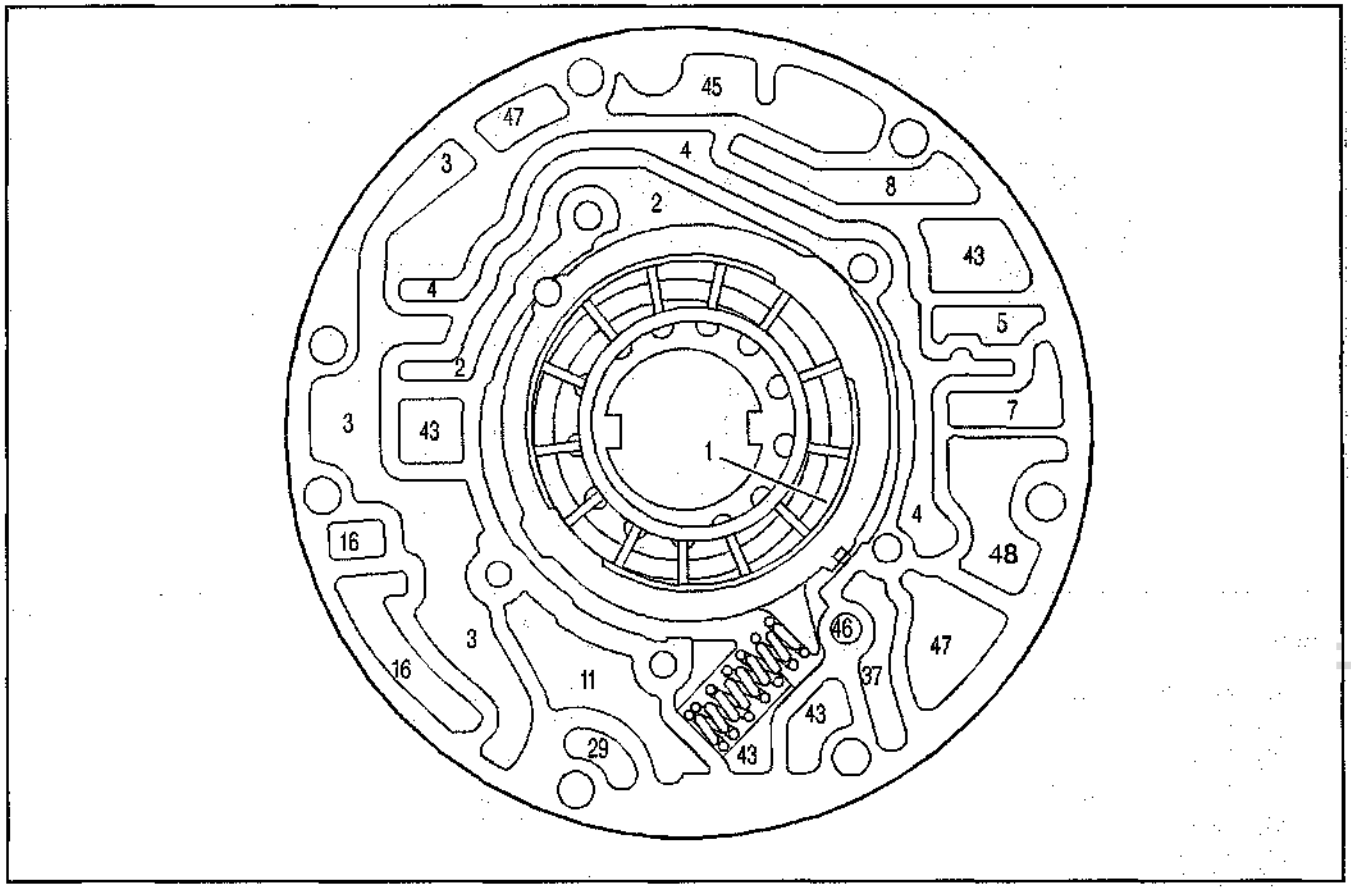
Legend

(340) Manual Valve
(353) Forward Accumulator Oil Seal
(354) Forward Accumulator Piston
(355) Forward Accumulator Pin
(356) Forward Accumulator Spring
(357) Forward Abuse Valve
(358) Forward Abuse Valve Spring
(359) Bore Plug
(360) Coiled Spring Pin
(361) Low Overrun Valve
(362) Low Overrun Valve Spring
(363) Forward Accumulator Cover
(364) Forward Accumulator Cover Bolt
(365) 1-2 Shift Valve Spring
(366) 1-2 Shift Valve
(367a) 1-2 Shift Solenoid Valve
(367b) 2-3 Shift Solenoid Valve
(368) 2-3 Shift Valve
(369) 2-3 Shuttle Valve
(370) 1-2 Accumulator Valve Spring
(371) 1-2 Accumulator Valve
(372) 1-2 Accumulator Valve Sleeve
(374) Actuator Feed Limit Valve
(375) Actuator Feed Limit Valve Spring
(376) Bore Plug
(377) Pressure Control Solenoid Valve
(378) Pressure Control Solenoid Retainer
(380) Regulator Apply Valve
(381) Bore Plug
(382) 4-3 Sequence Valve Spring
(383) 4-3 Sequence Valve
(384) 3-4 Relay Valve

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(385) 3-4 Shift Valve
(386) 3-4 Shift Valve Spring
(387) Reverse Abuse Valve
(388) Reverse Abuse Valve Spring
(389) 3-2 Downshift Valve
(390) 3-2 Downshift Valve Spring
(391) 3-2 Control Valve
(392) 3-2 Control Valve Spring
(394) 3-2 Control Solenoid Valve
(395) Bore Plug and Solenoid Retainer
(396) TCC PWM Solenoid Valve
(397) Regulator Apply Spring
(398) Isolator Valve

Pump Body Fluid Passages (Pump Cover Side)



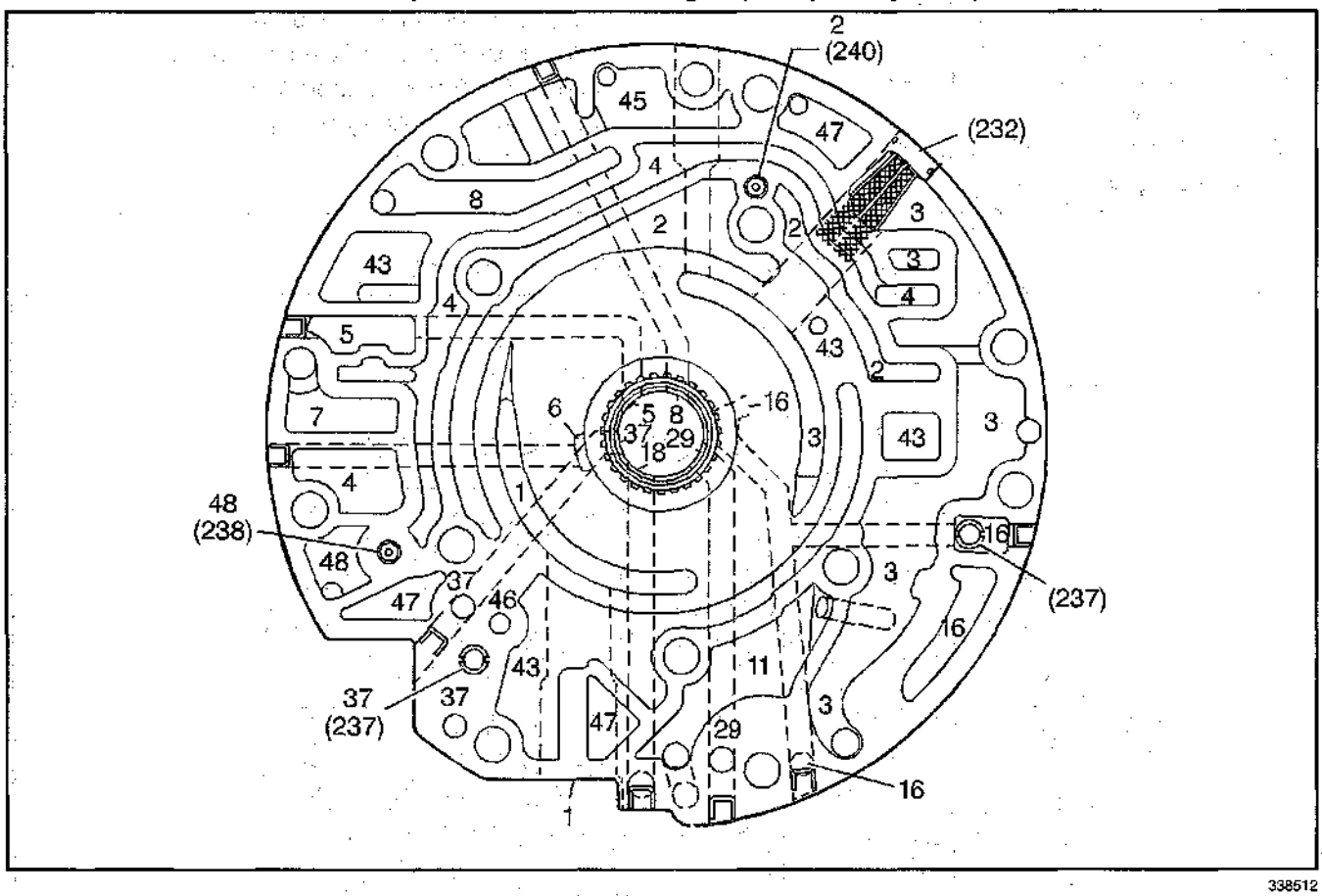
338502

Legend

(1) Suction (intake)
(2) Decrease
(3) Line
(4) Converter Feed
(5) Release
(7) To Cooler
(8) Lube from Cooler
(11) Torque Signal
(16) Reverse Input
(29) 3-4 Clutch
(37) Overrun Clutch
(43) Exhaust
(45) Vent
(46) Seal Drain
(47) Void
(48) Regulated Apply

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Pump Cover Fluid Passages (Pump Body Side)



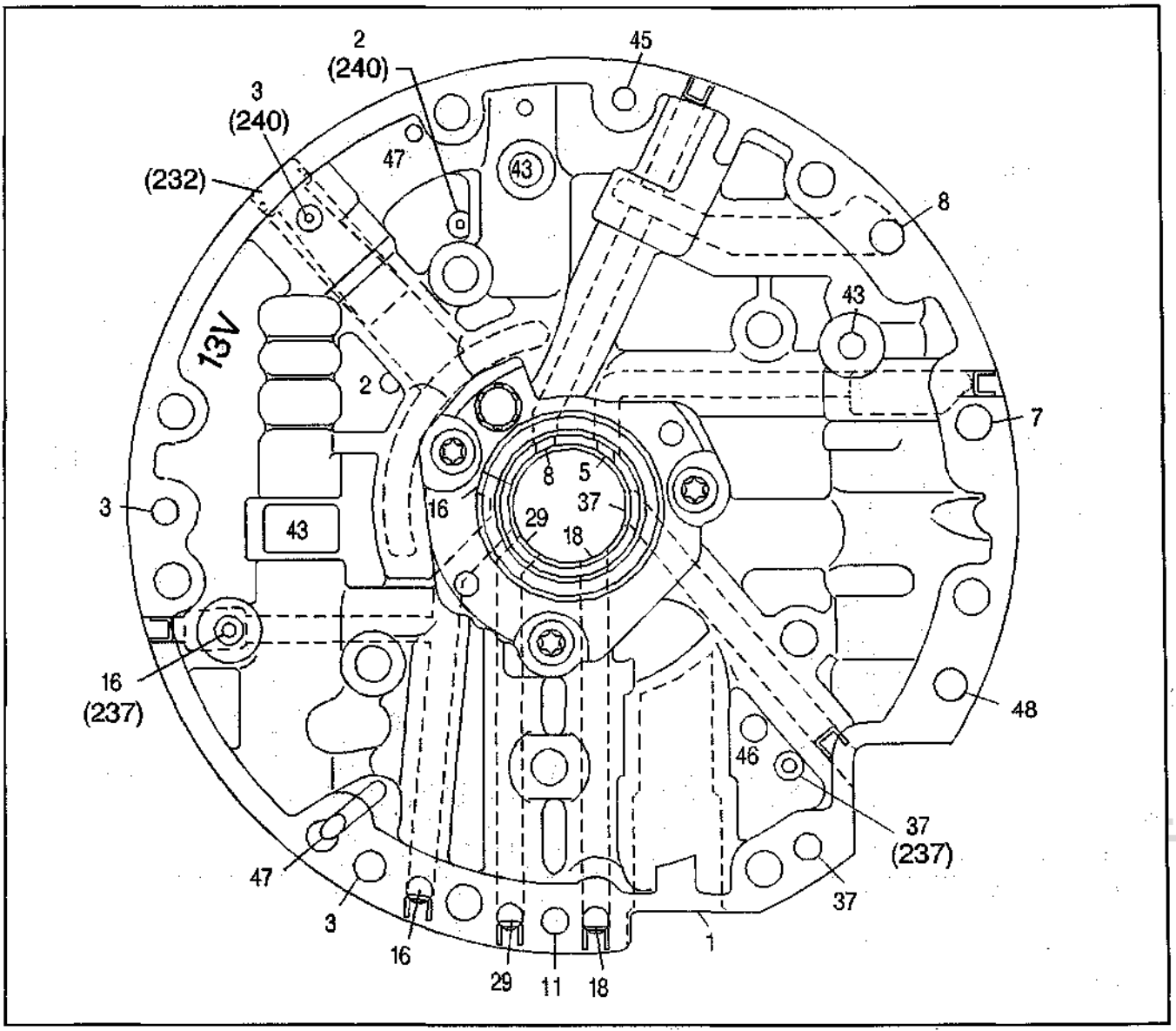
338512

Legend

(1) Suction (intake)
(2) Decrease
(3) Line
(4) Converter Feed
(5) Release
(6) Apply
(7) To Cooler
(8) Lube from Cooler
(11) Torque Signal
(16) Reverse Input
(18) Forward Clutch Feed
(29) 3-4 Clutch
(37) Overrun Clutch
(43) Exhaust
(45) Vent
(46) Seal Drain
(47) Void
(48) Regulated Apply
(232) Oil Pump Cover Screen
(237) Check Valve Retainer and Ball Assembly
(238) Converter Clutch Signal Orificed Cup Plug
(240) Orificed Cup Plug

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Pump Cover Fluid Passages (Case Side)



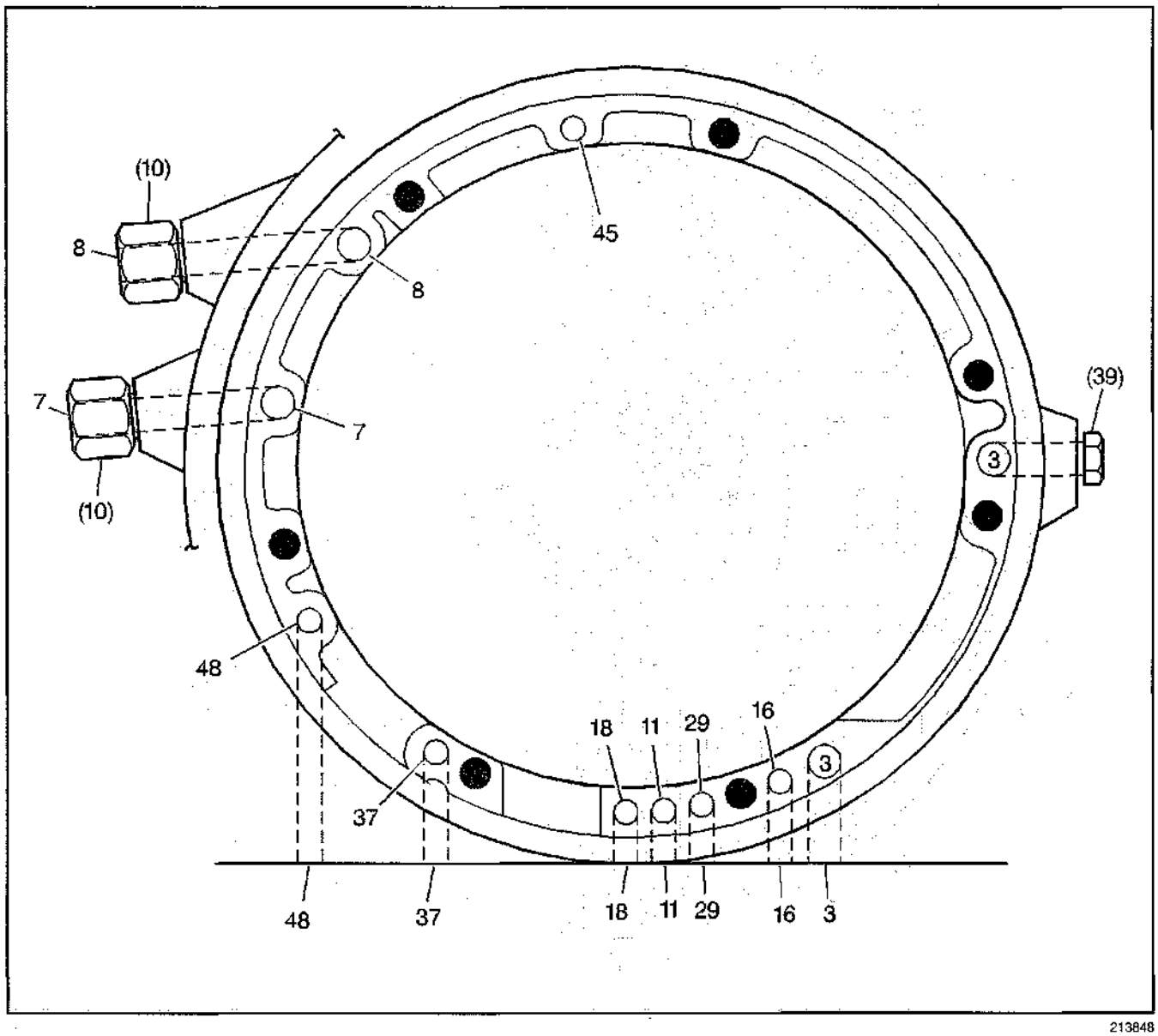
338621

Legend

(1) Suction (Intake)
(2) Decrease
(3) Line
(5) Release
(7) To Cooler
(8) Lube from Cooler
(11) Torque Signal
(16) Reverse Input (Rev. Clutch
(18) Forward Clutch Feed
(29) 3-4 Clutch
(37) Overrun Clutch
(43) Exhaust
(45) Vent
(46) Seal Drain
(47) Void
(48) Regulated Apply
(232) Oil Pump Cover Screen
(237) Check Valve Retainer and Ball Assembly
(240) Orificed Cup Plug

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Case Fluid Passages (Pump Cover Side)



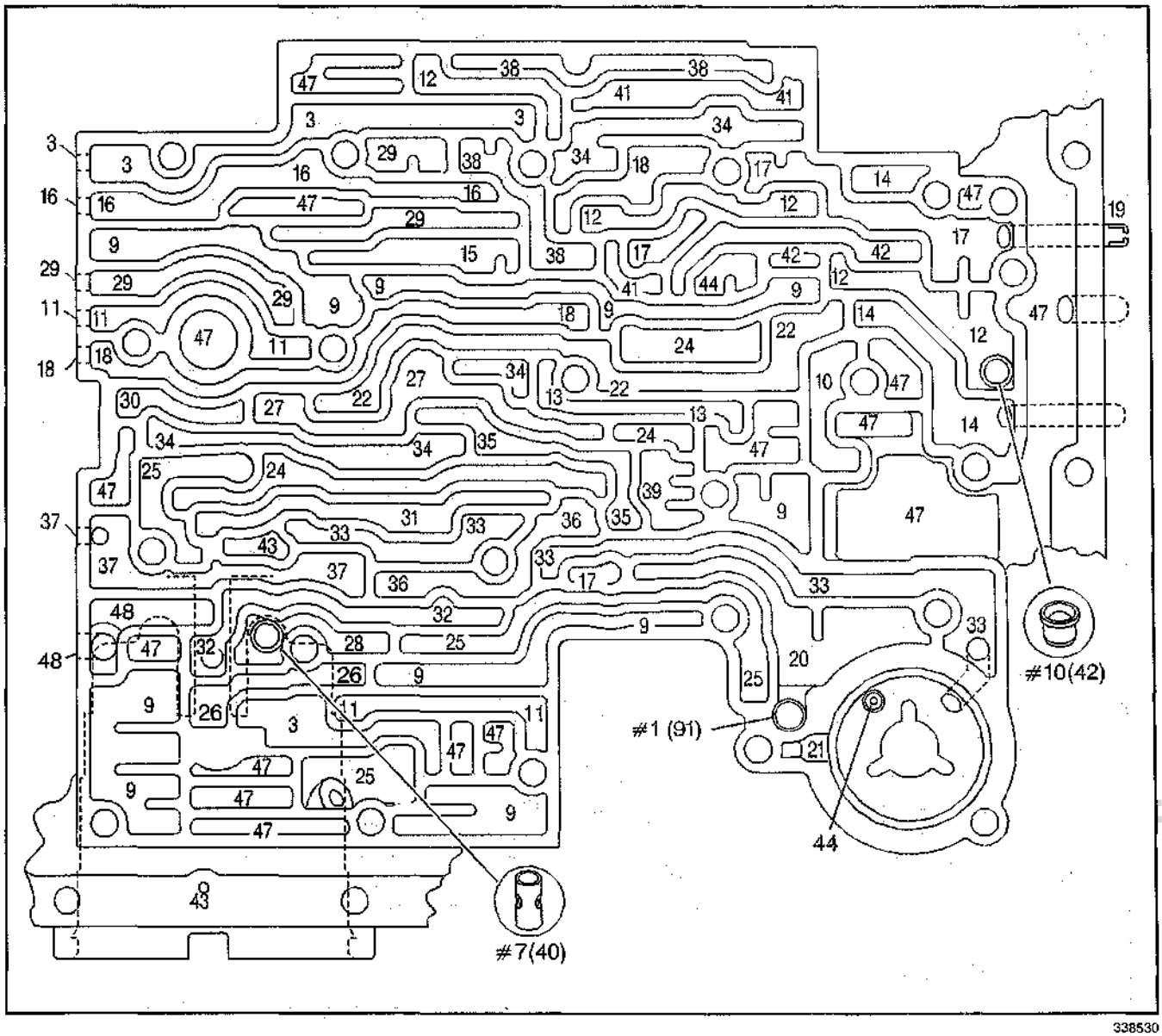
213848

Legend

(3) Line
(7) To Cooler
(8) Lube from Cooler
(10) Oil Cooler Pipe Connector
(11) Torque Signal
(16) Reverse Input
(18) Forward Clutch Feed
(29) 3-4 Clutch
(37) Overrun Clutch
(39) Pressure Plug
(45) Vent
(48) Regulated Apply

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Case Fluid Passages (Control Valve Body Side)



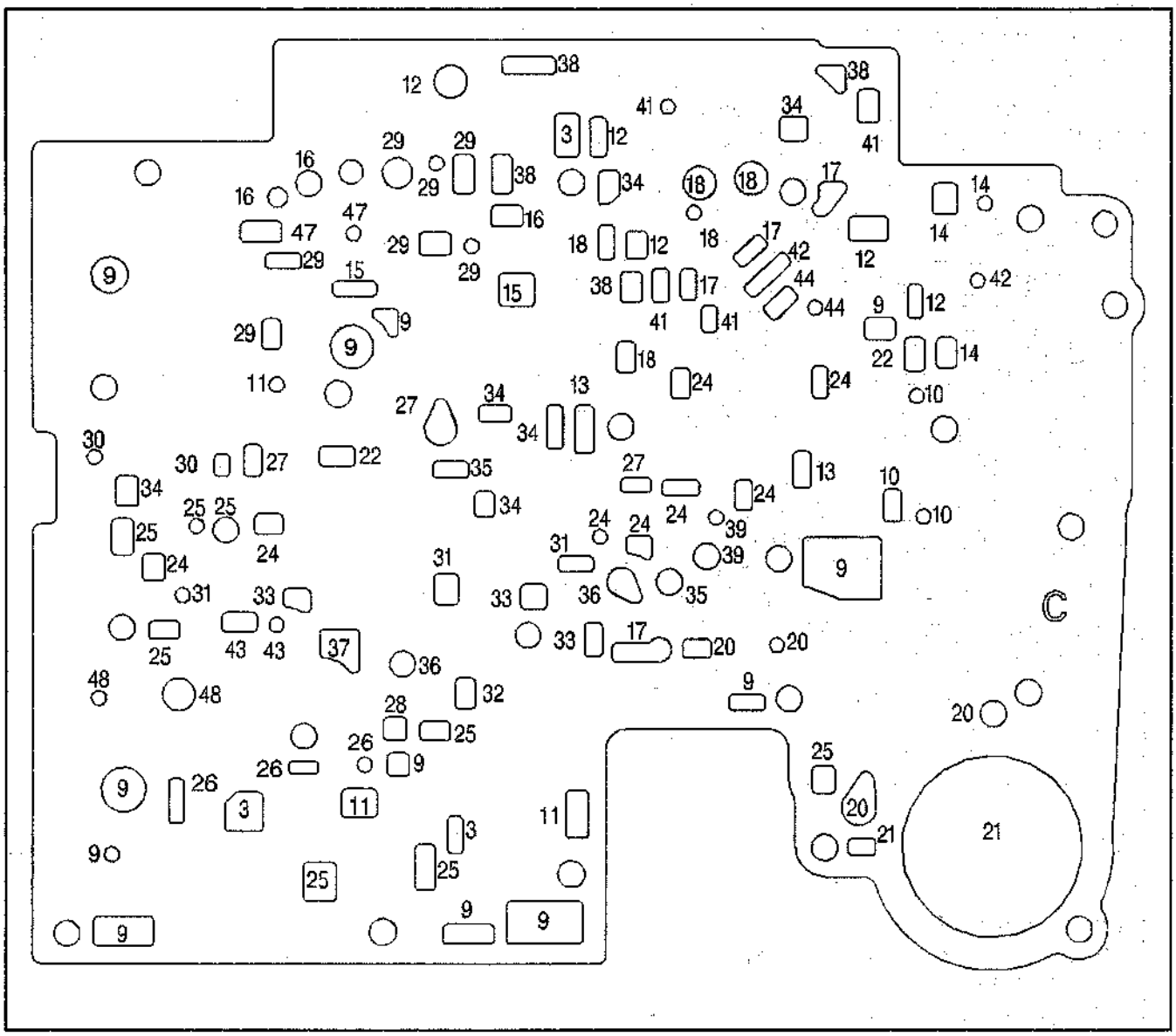
Legend

(#1) Checkball (91)
(#7) 3rd Accumulator Retainer and Ball Assembly (40)
(#10) Checkball (42)
(3) Line
(9) Actuator Feed Limit
(10) Filtered Actuator Feed
(11) Torque Signal
(12) PR
(13) D4-3-2
(14) Lo/Reverse
(15) Reverse
(16) Reverse Input (Rev. Clutch
(17) D4
(18) Forward Clutch Feed
(19) Rear Lube
(20) Accumulator
(21) Orificed Accumulator
(22) Signal A
(24) 2nd
(25) 2nd Clutch
(26) C.C. Signal
(27) 3-4 Signal
(28) 3rd Accumulator
(29) 3-4 Clutch
(30) 4th Signal
(31) Servo Feed
(32) 4th
(33) 3-4 Accumulator
(34) D3
(35) Overrun
(36) Overrun Clutch Feed

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(37) Overrun Clutch
(38) D2
(39) Orificed D2
(41) Lo
(42) Lo/1st
(43) Exhaust
(44) Orificed Exhaust
(47) Void
(48) Regulated Apply

Spacer Plate to Case Gasket



336537

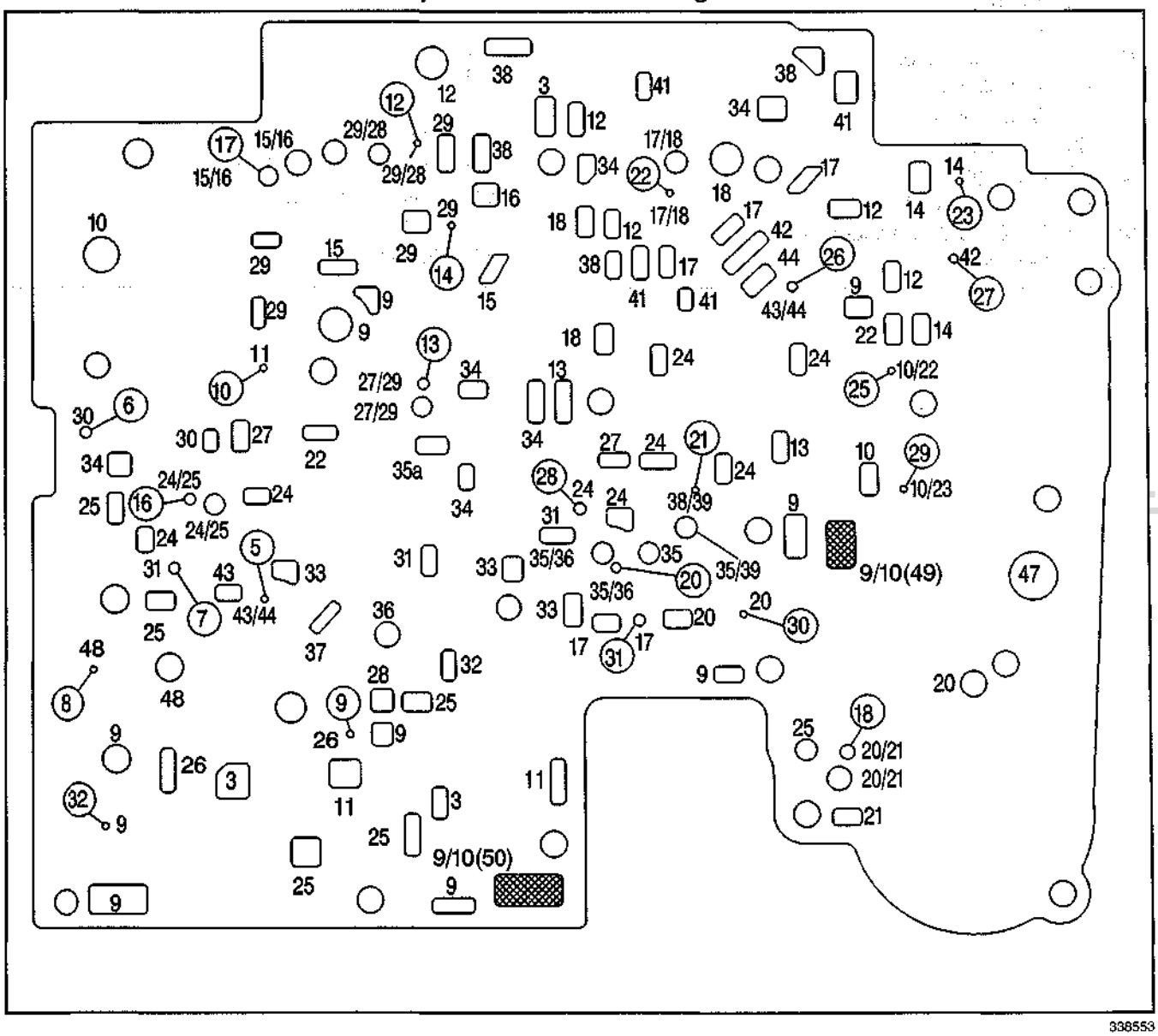
Legend

(3) Line
(9) Actuator Feed Limit
(10) Filtered Actuator Feed
(11) Torque Signal
(12) PR
(13) D4-3-2
(14) Lo/Reverse
(15) Reverse
(16) Reverse Input (Rev. Cl.)
(17) D4
(18) Forward Clutch Feed
(20) Accumulator
(21) Orificed Accumulator
(22) Signal A
(24) 2nd
(25) 2nd Clutch
(26) C.C. Signal
(27) 3-4 Signal

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(28) 3rd Accumulator
(29) 3-4 Clutch
(30) 4th Signal
(31) Servo Feed
(32) 4th
(33) 3-4 Accumulator
(34) D3
(35) Overrun
(36) Overrun Clutch Feed
(37) Overrun Clutch
(38) D2
(39) Orificed D2
(41) Lo
(42) Lo/1st
(43) Exhaust
(44) Orificed Exhaust
(47) Void
(48) Regulated Apply

Spacer Plate Fluid Passages



338553

Legend

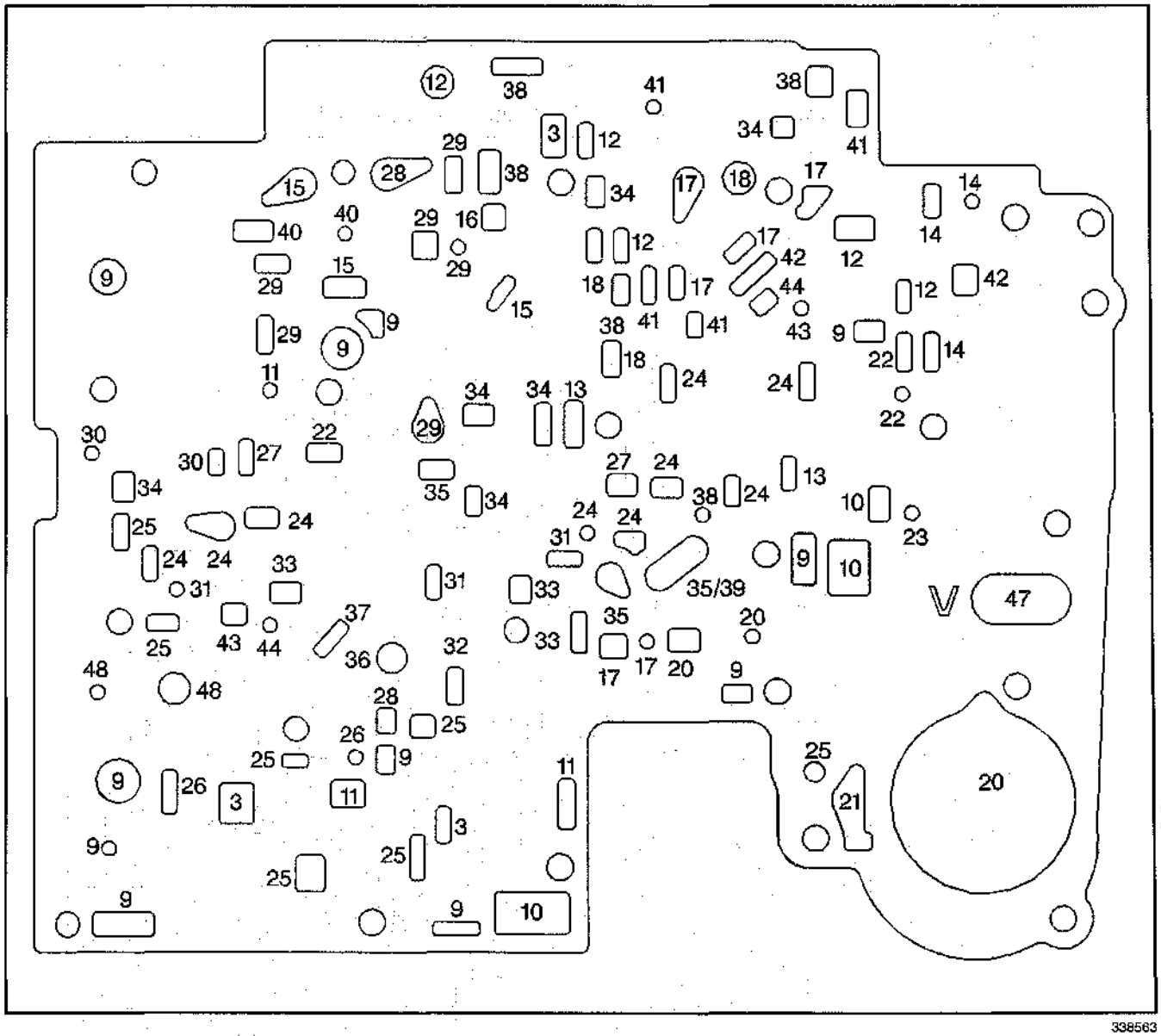
(49) Shift Solenoids Screen
(50) Pressure Control Solenoid Screen
(3) Line
(9) Actuator Feed Limit
(9/10) Actuator Feed Limit/Filtered Actuator Feed
(10) Filtered Actuator Feed
(10/22) Filtered Actuator Feed/Signal A
(10/23) Filtered Actuator Feed/Signal B
(11) Torque Signal
(12) PR

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(13) D4-3-2
(14) Lo/Reverse
(15) Reverse
(15/16) Reverse/Reverse Input (Rev. Clutch
(16) Reverse Input (Rev. Clutch
(17) D4
(17/18) D4
(18) Forward Clutch Feed
(20) Accumulator
(20/21) Accumulator/Orificed Accumulator
(21) Orificed Accumulator
(22) Signal A
(24) 2nd
(24/25) 2nd /2nd Clutch
(25) 2nd Clutch
(26) C.C. Signal
(27) 3-4 Signal
(27/29) 3-4 Signal
(28) 3rd Accumulator
(29/28) 3-4 Clutch/3rd Accumulator
(29) 3-4 Clutch
(30) 4th Signal
(31) Servo Feed
(32) 4th
(33) 3-4 Accumulator
(34) D3
(35a) Overrun
(35) Overrun
(35/36) Overrun/Overrun Clutch Feed
(35/39) Overrun/Orificed D2
(36) Overrun Clutch Feed
(37) Overrun Clutch
(38) D2
(38/39) D2/Orificed D2
(41) Lo
(42) Lo/1st
(43) Exhaust
(43/44) Exhaust/Orificed Exhaust
(44) Orificed Exhaust
(47) Void
(48) Regulated Apply

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Spacer Plate to Control Valve Body Gasket



338563

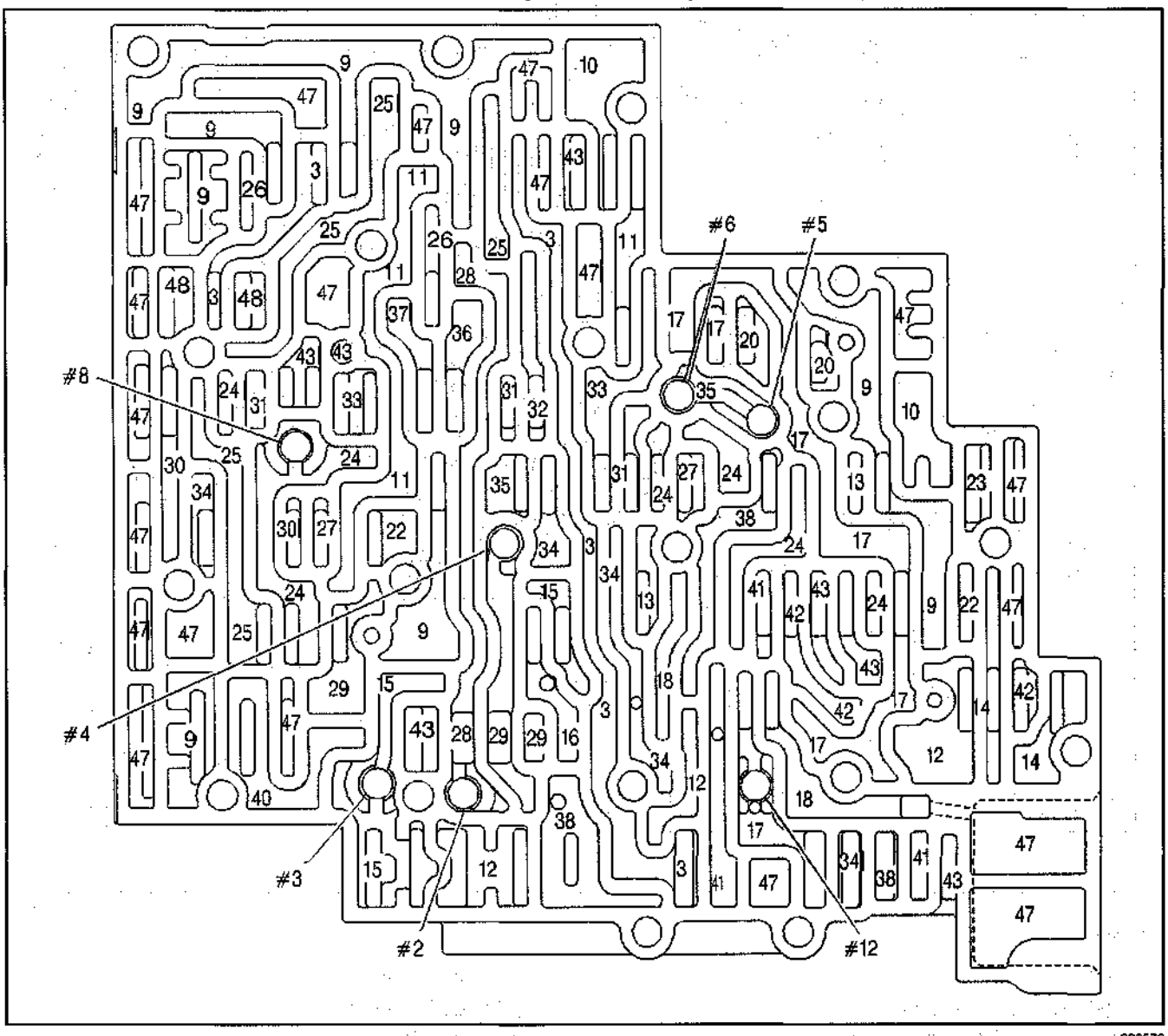
Legend

(3) Line
(9) Actuator Feed Limit
(10) Filtered Actuator Feed
(11) Torque Signal
(12) PR
(13) D4-3-2
(14) Lo/Reverse
(15) Reverse
(16) Reverse Input (Rev. Cl.)
(17) D4
(18) Forward Clutch Feed
(20) Accumulator
(21) Orificed Accumulator
(22) Signal A
(23) Signal B
(24) 2nd
(25) 2nd Clutch
(26) C.C. Signal
(27) 3-4 Signal
(28) 3rd Accumulator
(29) 3-4 Clutch
(30) 4th Signal
(31) Servo Feed
(32) 4th
(33) 3-4 Accumulator
(34) D3
(35) Overrun
(35/39) Overrun/Orificed D2
(36) Overrun Clutch Feed
(37) Overrun Clutch
(38) D2
(40) 3-2 Signal

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(41) Lo
(42) Lo/1st
(43) Exhaust
(44) Orificed Exhaust
(47) Void
(48) Regulated Apply

Control Valve Body Fluid Passages (Case Side)



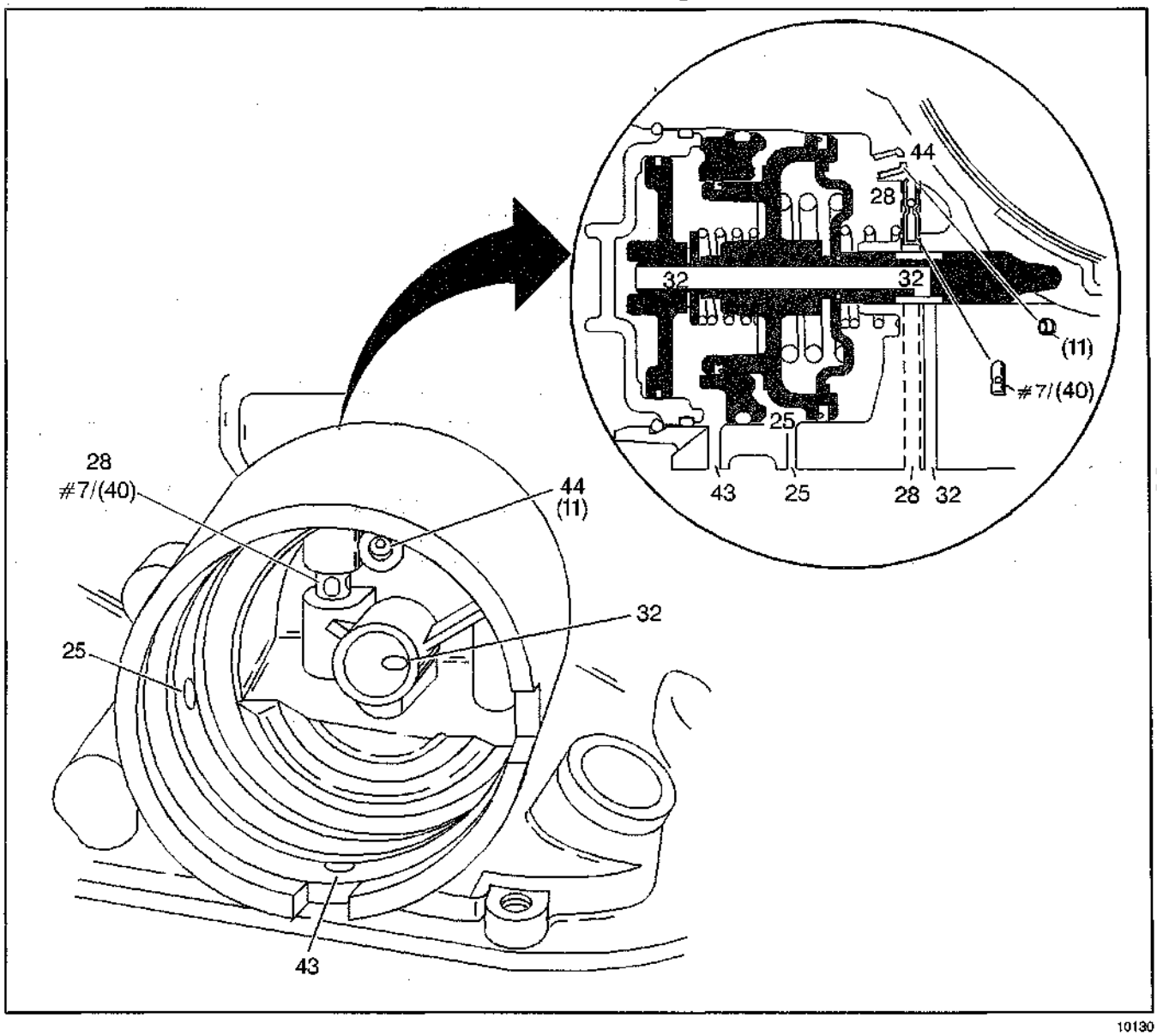
Legend

(#2) Checkball (61)
(#3) Checkball (61)
(#4) Checkball (61)
(#5) Checkball (61)
(#6) Checkball (61)
(#8) Checkball (61)
(#12) Checkball (61)
(3) Line
(9) Actuator Feed Limit
(10) Filtered Actuator Feed
(11) Torque Signal
(12) PR
(13) D4-3-2
(14) Lo/Reverse
(15) Reverse
(16) Reverse Input (Rev. Clutch
(17) D4
(18) Forward Clutch Feed
(20) Accumulator
(22) Signal A
(23) Signal B
(24) 2nd

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(25) 2nd Clutch
(26) C.C. Signal
(27) 3-4 Signal
(28) 3rd Accumulator
(29) 3-4 Clutch
(30) 4th Signal
(31) Servo Feed
(32) 4th
(33) 3-4 Accumulator
(34) D3
(35) Overrun
(36) Overrun Clutch Feed
(37) Overrun Clutch
(38) D2
(40) 3-2 Signal
(41) Lo
(42) Lo/1st
(43) Exhaust
(47) Void
(48) Regulated Apply

2-4 Servo Fluid Passages



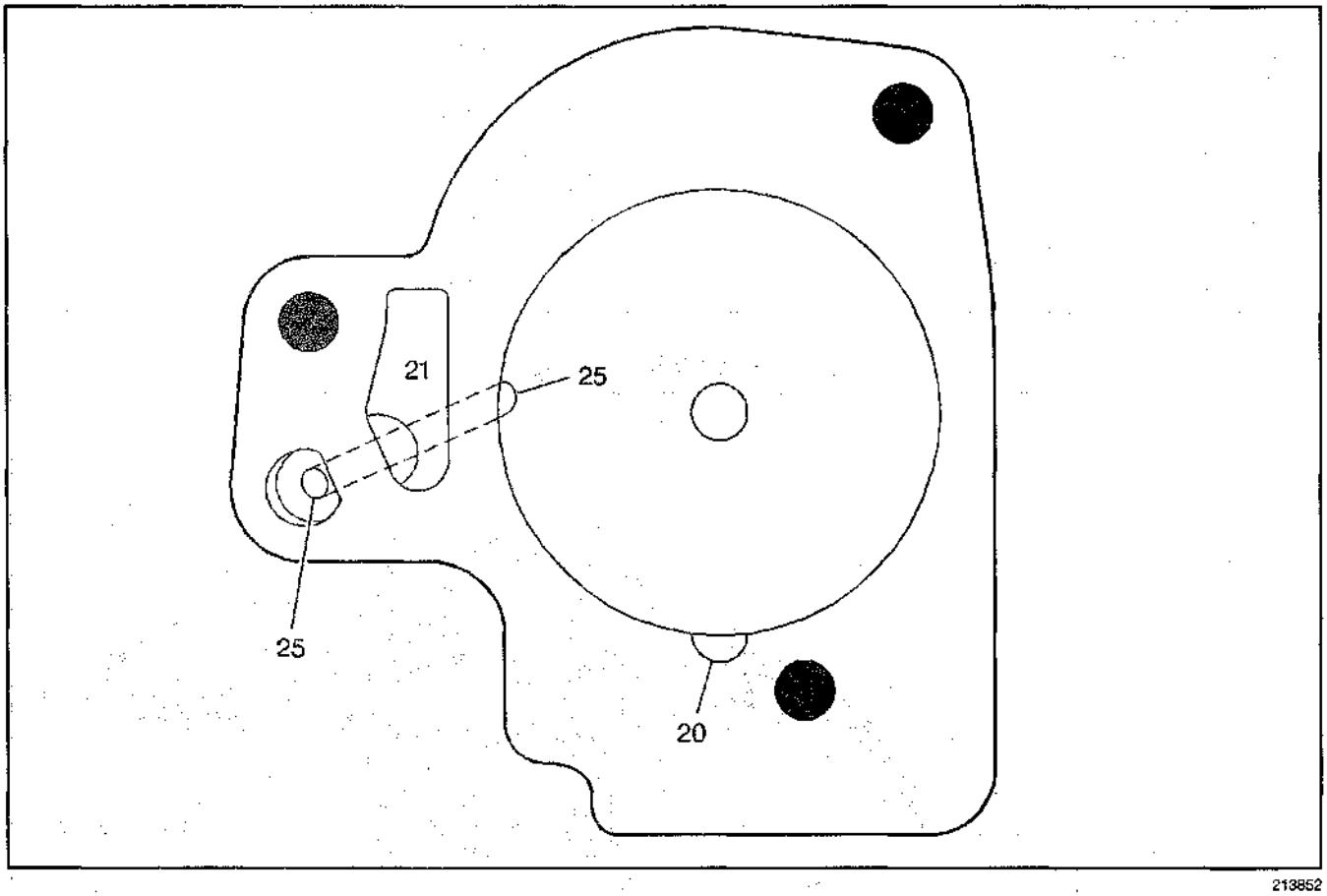
10130

Legend

(#7) 3rd Accumulator Retainer and Ball Assembly (40)
(11) Case Servo Orificed Plug
(25) 2nd Clutch
(28) 3rd Accumulator
(32) 4th
(43) Exhaust
(44) Orificed Exhaust

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1-2 Accumulator Cover Fluid Passages



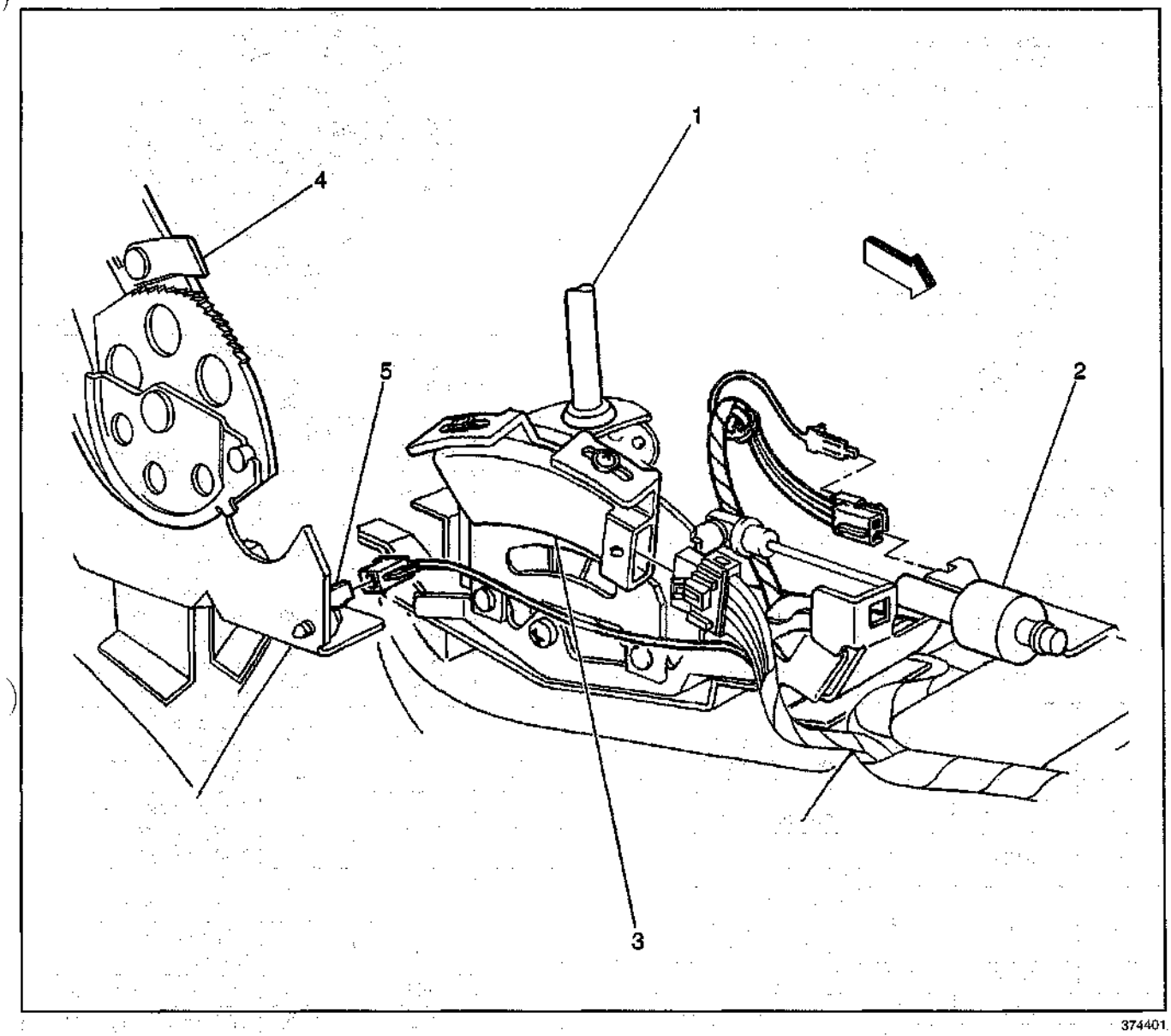
Legend

(20) Accumulator
(21) Orificed Accumulator
(25) 2nd Clutch

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Automatic Transmission Shift Lock Control Component Views

Automatic Transmission Shift Lock Control



374401

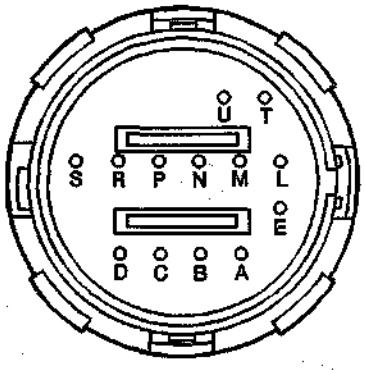
Legend

(1) Shift Control Lever
(2) Automatic Transmission Shift Lock Control Solenoid
(3) Park/Neutral Position Switch
(4) Park Brake
(5) Park Brake Switch

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Automatic Transmission Inline Harness Connector End View

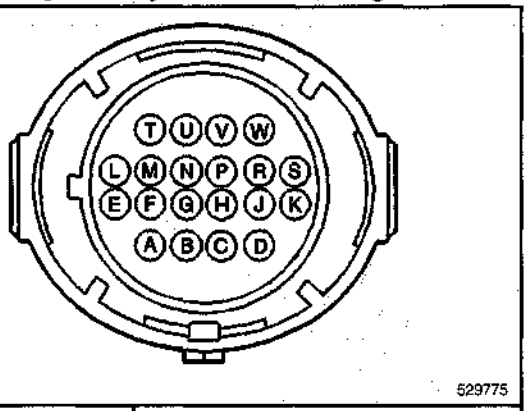
Automatic Transmission Wiring Harness Assembly 20-way Connector, Transmission Side



13270

Connector Part Information		• 12160782 • 20-way F Micro-Pack 100W Series (GRY)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	LT GRN	1222	1-2 Shift Solenoid Valve Control
B	YEL	1223	2-3 Shift Solenoid Valve Control
C	PPL	1228	Pressure Control (PC) Solenoid Valve Controlled Power
D	LT BLU	1229	PC Solenoid Valve Controlled Ground
E	RED	839	Transmission Solenoid Power
L	BRN	1227	Transmission Fluid Temperature (TFT) Sensor Signal
M	GRY	452	TFT Sensor Ground
N	PNK	1224	TFP Switch Signal A
P	ORN	1226	TFP Switch Signal C
R	DK BLU	1225	TFP Switch Signal B
S	WHT	687	3-2 Shift Solenoid Valve Assembly Control
T	BLK	422	Torque Converter Clutch Solenoid Valve Control
U	TAN	418	Torque Converter Clutch Pulse Width Modulation Solenoid Valve Control

Automatic Transmission Wiring Harness Assembly 20-way Connector, Engine Side



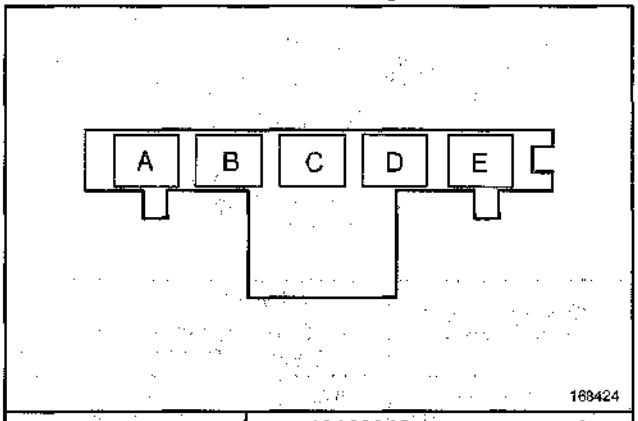
529775

Connector Part Information		• 12160492 • 20-way F Micro-Pack 100W Series (GRY)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	LT GRN	1222	1-2 Shift Solenoid Valve Control
B	YEL/BLK	1223	2-3 Shift Solenoid Valve Control
C	RED/BLK	1228	Pressure Control (PC) Solenoid Valve Controlled Power
D	LT BLU/ WHT	1229	PC Solenoid Valve Controlled Ground
E	PNK	239	Transmission Solenoid Power
F-K	–	–	Not Used
L	YEL/BLK	1227	Transmission Fluid Temperature (TFT) Sensor Signal
M	GRY	720	TFT Sensor Ground (3.8L)
M	BLK	407	TFT Sensor Ground (5.7L)
N	PNK	1224	TFP Switch Signal A
P	RED	1226	TFP Switch Signal C
R	DK BLU	1225	TFP Switch Signal B
S	WHT	687	3-2 Shift Solenoid Valve Assembly Control
T	TAN/BLK	422	Torque Converter Clutch Solenoid Valve Control
U	BRN	418	Torque Converter Clutch Pulse Width Modulation Solenoid Valve Control
V-W	–	–	Not Used

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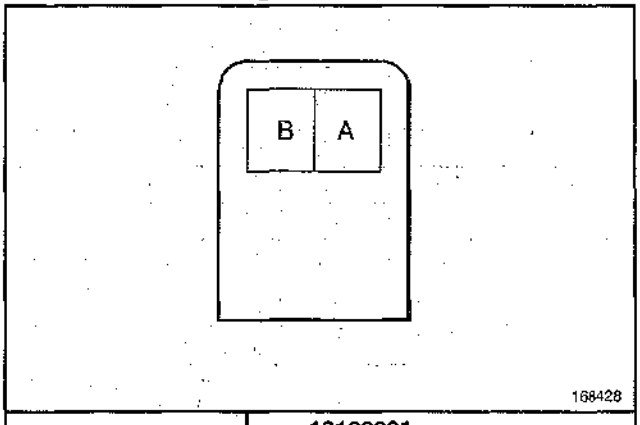
Automatic Transmission Internal Connector End Views

Automatic Transmission Fluid Pressure (TFP) Manual Valve Position Switch Connector, Wiring Harness Side



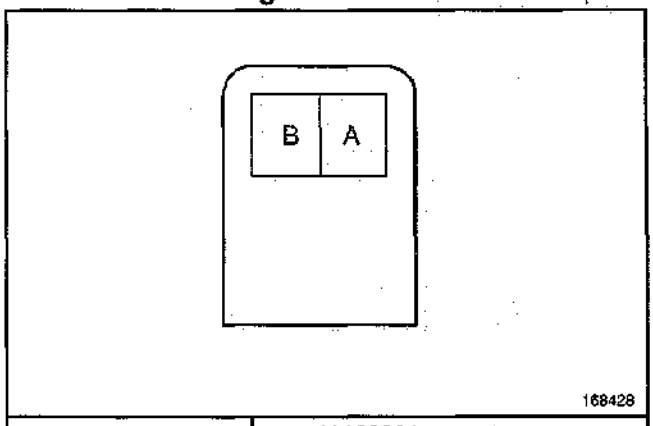
Connector Part Information	• 12162213 • Conn 5F M/P 150.2 P2S (NAT)		
Pin	**Wire Color**	**Circuit No.**	**Function**
A	BRN	1227	Transmission Fluid Temperature (TFT) Sensor Signal
B	GRY	452	TFT Sensor Ground
C	PNK	1224	TFP Switch Signal A
D	ORN	1226	TFP Switch Signal C
E	DK BLU	1225	TFP Switch Signal B

1-2 Shift Solenoid (SS) Valve Connector, Wiring Harness Side



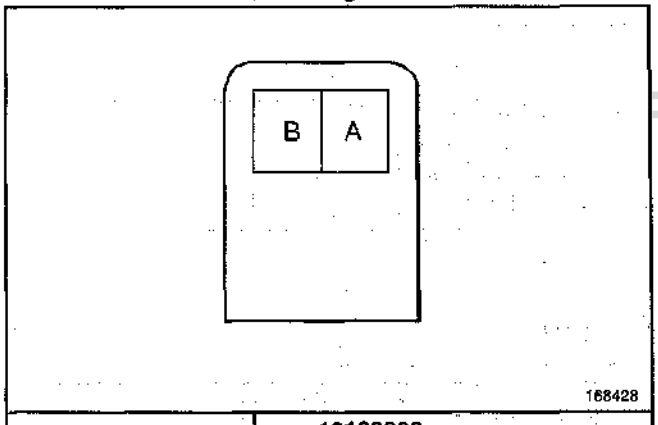
Connector Part Information	• 12162201 • Conn 2F M/P 150.2 P2S (NAT)		
Pin	**Wire Color**	**Circuit No.**	**Function**
A	RED	839B	Transmission Solenoid Power
B	LT GRN	1222	1-2 Shift Solenoid Valve Control

2-3 Shift Solenoid (SS) Valve Connector, Wiring Harness Side



Connector Part Information	• 12162201 • Conn 2F M/P 150.2 P2S (NAT)		
Pin	**Wire Color**	**Circuit No.**	**Function**
A	RED	839A	Transmission Solenoid Power
B	YEL	1223	2-3 Shift Solenoid Valve Control

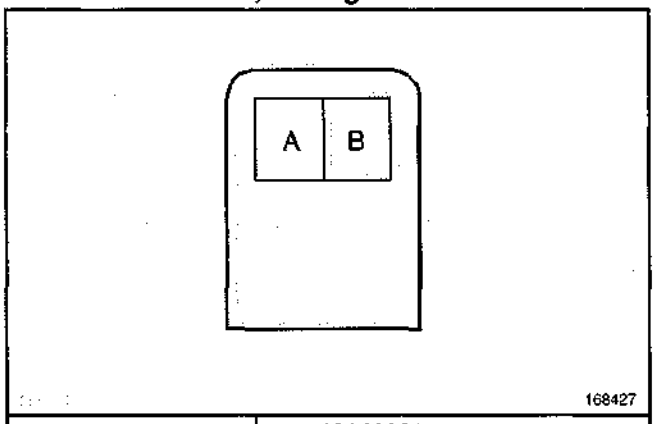
Torque Converter Clutch Pulse Width Modulated (TCC PWM) Solenoid Valve Connector, Wiring Harness Side



Connector Part Information	• 12162202 • Conn 2F M/P 150.2 P2S (BLU)		
Pin	**Wire Color**	**Circuit No.**	**Function**
A	RED	839E	Transmission Solenoid Power
B	TAN	418	Torque Converter Clutch Pulse Width Modulated Solenoid Valve Control

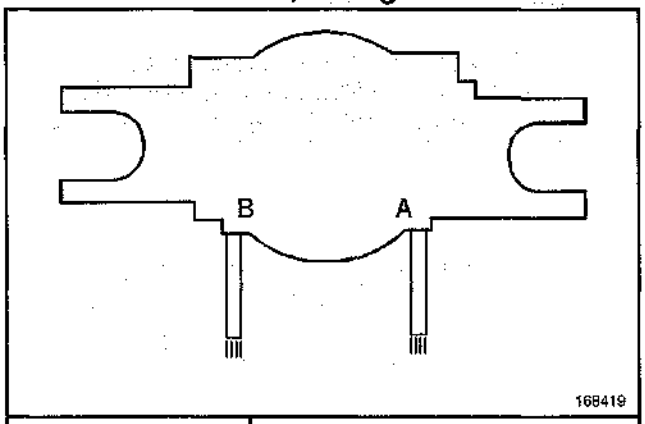
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3-2 Shift Solenoid (SS) Valve Assembly Connector, Wiring Harness Side



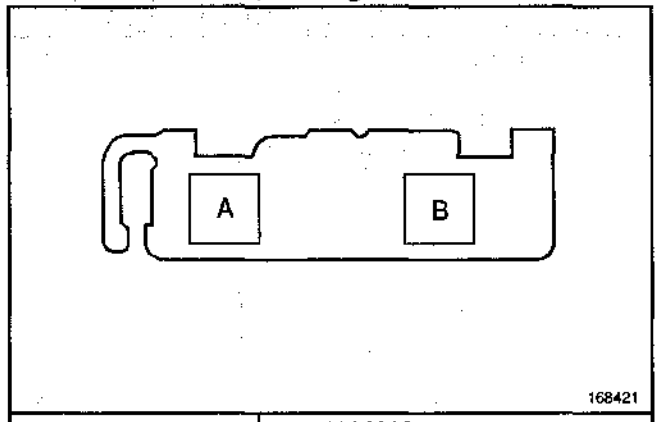
Connector Part Information		• 12146094 • Conn 2F M/P 150.2 P2S (MD GRY)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	WHT	687	3-2 Shift Solenoid Valve Assembly Control
B	RED	839C	Transmission Solenoid Power

Torque Converter Clutch (TCC) Solenoid Valve Connector, Wiring Harness Side



Connector Part Information		• 10478128 • CBL Solenoid Valve	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	RED	839D	Transmission Solenoid Power
B	BLK	422	Torque Converter Clutch Solenoid Valve Control

Pressure Control (PC) Solenoid Valve Connector, Wiring Harness Side

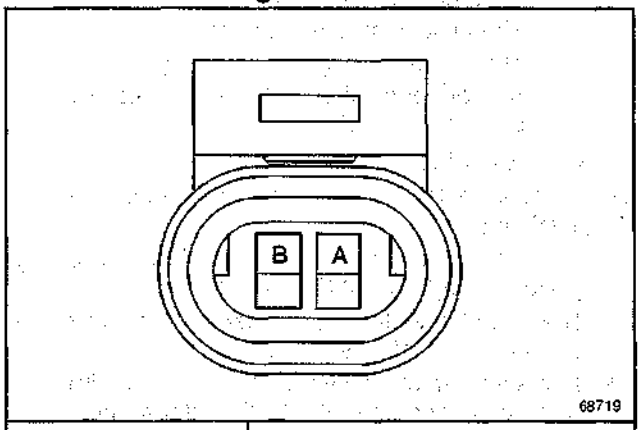


Connector Part Information		• 12146800 • Conn 2F M/P 480 SPL (NAT)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	PPL	1228	Pressure Control (PC) Solenoid Valve Controlled Power
B	LT BLU	1229	PC Solenoid Valve Controlled Ground

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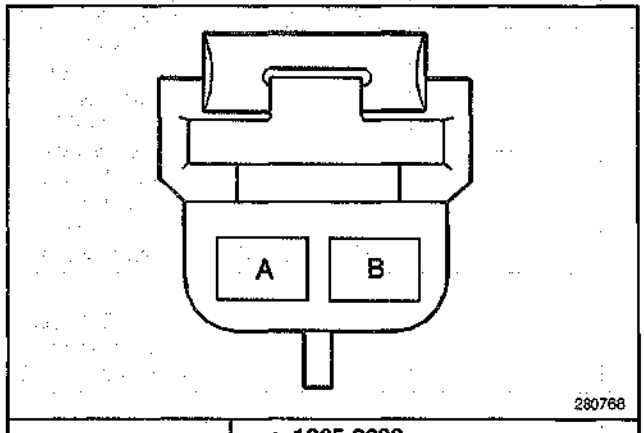
Automatic Transmission Related Connector End Views

Vehicle Speed Sensor Assembly Connector, Wiring Harness Side



Connector Part Information		• 12162195 • Asm Conn 2F M/P 150.2 P2S (BLK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	PPL (3.8L)	401	VSS Ground
	LT GRN/ BLK (5.7L)	822	
B	YEL (3.8L)	400	VSS Input
	PPL/WHT (5.7L)	821	

AT Shift Lock Control Actuator Solenoid



Connector Part Information		• 1205-2832 • 2-Way F Metri-Pack 150 Series (BLK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	TAN/WHT	816	Park Neutral Position Feed Ground Input
B	DK GRN/ WHT	1135	Brake Fused Input Feed

Diagnostic Information and Procedures

A Diagnostic Starting Point - Automatic Transmission

Begin the system diagnosis with *A Powertrain On Board Diagnostic (OBD) System Check* (3.8L) or *A Powertrain On Board Diagnostic (OBD) System Check* (5.7L) in Engine Controls. The Powertrain OBD System Check provides the following information:

- The identification of the control module(s) which commands the system.
- The ability of the control module(s) to communicate through the serial data circuit.
- The identification and status of stored diagnostic trouble codes (DTCs).

The use of *A Powertrain On Board Diagnostic (OBD) System Check* (3.8L) or *A Powertrain On Board Diagnostic (OBD) System Check* (5.7L) in Engine Controls identifies the correct procedure for diagnosing the system and where the procedure is located.

Symptoms

When it has been determined through *A Powertrain On Board Diagnostic (OBD) System Check* (3.8L) or *A Powertrain On Board Diagnostic (OBD) System Check* (5.7L) in Engine Controls that no DTCs are present, begin symptom diagnosis by reviewing the *Transmission Component and System Description.* Reviewing *Transmission Component and System Description* information enables you to understand the operation of the system. This helps you determine if the condition described by the customer is normal or if a malfunction exists. If it is determined that a malfunction exists, identify the concern by referring to the *Symptom Diagnosis* table. The *Symptom Diagnosis* table provides common diagnostic categories which relate directly to diagnostic information or procedures.

A Powertrain On Board Diagnostic (OBD) System Check - Automatic Transmission

Circuit Description

The Automatic Transmission Diagnostic System Check is an organized approach to identify a problem created by an automatic transmission. The Diagnostic System check is the diagnostic starting point for an automatic transmission complaint. The Diagnostic System Check directs you to the next logical step for diagnosing a transmission concern. Perform this check only if there is a driveability complaint or if you have been directed here from another service information section.

Follow the table to help reduce diagnostic time and help prevent unnecessary replacement of good parts.

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Diagnostic Aids

Important:

- Do not clear the DTC unless directed by a diagnostic procedure. Clearing the DTC(s) will erase all Freeze Frame and Failure Records stored in PCM memory.
- Poor engine performance can sometimes be diagnosed as a transmission driveability condition. In order to avoid mis-diagnosis of the automatic transmission, always perform *A Powertrain On Board Diagnostic (OBD) System Check* (3.8L) or *A Powertrain On Board Diagnostic (OBD) System Check* (5.7L) in Engine Controls.
- Use a *Scan Tool* that is known to function correctly. If necessary, test the *Scan Tool* on another vehicle.
- Ensure the *Scan Tool* contains the most current file available.
- The *Scan Tool* will display a loss of communication error message under the following conditions:
  - PCM power is interrupted
  - The ignition switch is turned OFF
  - The battery voltage level is very low
  - A poor connection at the diagnostic link connector (DLC)

Test Description

The numbers below refer to the step numbers on the diagnostic table.

1. This step determines if the *Scan Tool* is receiving power through the DLC connector.
2. The MIL should illuminate whenever the ignition is ON and the engine is not running.
3. This step determines if the PCM is transmitting Class 2 serial data to the DLC and that the Class 2 data circuit is not open or shorted.
4. This step determines if a DTC is current or stored in history.

A Powertrain On Board Diagnostic (OBD) System Check - Automatic Transmission

Step	Action	Value(s)	Yes	No
1	1. Install a *Scan Tool.* **Important:** Check for applicable service bulletins before proceeding with this test. Perform this test only if there is a driveability complaint or if you have been directed to this table from another section in the service information. **Important:** Do not turn the ignition OFF when performing this diagnostic procedure. Do not clear the DTCs unless instructed by this diagnostic procedure. 2. Turn ON the ignition, with the engine OFF. Does the *Scan Tool* turn ON?	—	*Go to Step 2*	Go to *Data Link Connector Diagnosis* (3.8L)
2	Is the MIL ON?	—	*Go to Step 3*	Go to *Malfunction Indicator Lamp (MIL) Inoperative* (3.8L) or No Malfunction Indicator Lamp (5.7L)
3	Attempt to establish communication with the PCM controller module(s). Does the *Scan Tool* communicate with the PCM control module(s)?	—	*Go to Step 4*	Go to *Data Link Connector Diagnosis* (3.8L)
4	**Important:** Diagnostic Trouble Codes (DTCs), engine performance, and transmission default actions can greatly affect the transmission performance. Ensure that these items are not the cause of a transmission concern. Use the *Scan Tool* Capture Info function in order to save or capture (Store Info) any DTC Information. Are there any DTCs present?	—	Go to *Diagnostic Trouble Code (DTC) List/Type*	Go to *Symptom Diagnosis*

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A Diagnostic Starting Point - Automatic Transmission Shift Lock Control

Begin the system diagnosis by reviewing the system Description and Operation. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. Refer to *Symptoms - Automatic Transmission Shift Lock Control* in order to identify the correct procedure for diagnosing the system and where the procedure is located.

Transmission Scan Tool Data List (3.8L)

Use the scan tool data list under the following conditions:

- The Powertrain On-Board Diagnostic (OBD) System Check is complete.
- The on-board diagnostics are functioning properly.
- No DTCs are present.

The values below represent a typical display recorded from a properly functioning system.

Important: Do not use a scan tool that displays faulty data. Report the condition to the scan tool manufacturer. The use of a faulty scan tool can result in misdiagnosis and the unnecessary replacement of parts.

Only the parameters listed below are used in this manual for diagnosing. If a scan tool displays other parameters, the values are not recommended by General Motors for use in diagnosis.

Scan tool values below were recorded under the following conditions:

- Engine at Idle
- Upper radiator hose hot
- Closed throttle
- Transmission in Park
- Closed Loop operation
- Accessories OFF
- Brake pedal not applied

Transmission Scan Tool Data List (3.8L)

Scan Tool Parameter	Data List*	Units Displayed	Typical Data Value
1-2 Shift Error	F2, F7	Seconds	Varies
1-2 Shift Time	F0, F2, F7	Seconds	Varies
1-2 Sol.	F0, F2, F3, F4	On/Off	On
1-2 Sol. Open/Short to GND	F2	Yes/No	No
1-2 Sol. Short to Volts	F2	Yes/No	No
1-2 TAP Cell (4–16)	F7	kPa/Psi	Varies
2-3 Shift Error	F3, F8	Seconds	Varies
2-3 Shift Time	F0, F3, F8	Seconds	Varies
2-3 Sol.	F0, F2, F3, F4	On/Off	On
2-3 Sol. Open/Short to GND	F3	Yes/No	No
2-3 Sol. Short to Volts	F3	Yes/No	No
2-3 TAP Cell (4–16)	F8	kPa/Psi	Varies
2nd Gear Start	F0	Yes/No	No
3-2 Downshift Sol.	F0, F5	On/Off	On
3-2 Sol. Open/Short to GND	F5	Yes/No	No
3-2 Sol. Short to Volts	F5	Yes/No	No
3-4 Shift Error	F4	Seconds	Varies
3-4 Shift Time	F0, F4	Seconds	Varies
Adaptable Shift	F0, F7, F8	Yes/No	No
APP Average	F0, F1, F2, F3, F4, F5	Counts	Varies
APP Indicated Angle	F0, F1, F2, F3, F4, F5	Percent	0%
Current Gear	F0, F1, F2, F3, F4, F5, F6	1,2,3,4	1
Current TAP Cell	F7, F8	4–16	Varies
Current TAP Memory	F7, F8	–16 to +16	Varies
ECT	F0, F1	°C (°F)	Varies
Engine Run Time	F0	Hr/Min/Sec	Varies
Engine Speed	F0, F1, F2, F3, F4, F5, F6	RPM	Varies
Engine Torque	F0, F1	N·m (lb ft)	Varies
Estimated Gear Ratio	F0, F2, F3, F4	Ratio	8.00:1
IAT	F0	°C (°F)	Varies

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Transmission Scan Tool Data List (3.8L) (cont'd)

Scan Tool Parameter	Data List*	Units Displayed	Typical Data Value
Ignition Voltage	F0	Volts	12–14 Volts
PC Sol. Actual Current	F0, F6	Amps	Varies (0.1–1.1 amps)
PC Solenoid Duty Cycle	F0, F6	Percent	Varies
PC Sol. Ref. Current	F0, F6	Amps	Varies (0.1–1.1 amps)
Speed Ratio	F0, F1, F2, F3, F4, F5	Ratio	8.00:1
TCC Brake Switch	F0, F1	Open/Closed	Closed
TCC Duty Cycle	F0, F1	Percent	0%
TCC Duty Cycle Open/Short to GND	F1	Yes/No	No
TCC Duty Cycle Short to Volts	F1	Yes/No	No
TCC Enable	F0, F1	Yes/No	No
TCC Enable Open/Short to GND	F1	Yes/No	No
TCC Enable Short to Volts	F1	Yes/No	No
TCC Slip Speed	F0, F1	RPM	+/–50 RPM from Engine Speed
TFP Sw.	F0	Park/Neutral, Reverse, Drive4, Drive3, Drive2, Drive1 or Invalid	Park/Neutral
TFP Sw. A/B/C	F0	HI/LOW	HI/LOW/HI
TFT Sensor	F0, F1	Volts	Varies
TP Desired Angle	F0, F1, F2, F3, F4, F5	Percent	0–5%
TP Indicated Angle	F0, F1, F2, F3, F4, F5	Percent	0–5%
Trans. Fluid Temp.	F0, F1, F5, F6	°C (°F)	Varies
Transmission Hot Mode	F0, F1	On/Off	Off
Transmission OSS	F0, F1, F2, F3, F4, F5	RPM	0
Vehicle Speed	F0, F1, F2, F3, F4, F5	km/h (mph)	0

***Data List Legend**

- F0: Transmission Data
- F1: TCC Data
- F2: 1-2 Shift Data
- F3: 2-3 Shift Data
- F4: 3-4 Shift Data
- F5: 3-2 Down Shift Data
- F6: PC Solenoid Data
- F7: 1-2 Adapt Data
- F8: 2-3 Adapt Data

Transmission Scan Tool Data List (5.7L)

Use the scan tool data list under the following conditions:

- The Powertrain On-Board Diagnostic (OBD) System Check is complete.
- The on-board diagnostics are functioning properly.
- No DTCs are present.

The values below represent a typical display recorded from a properly functioning system.

Important: Do not use a scan tool that displays faulty data. Report the condition to the scan tool manufacturer. The use of a faulty scan tool can result in misdiagnosis and the unnecessary replacement of parts.

Only the parameters listed below are used in this manual for diagnosing. If a scan tool displays other parameters, the values are not recommended by General Motors for use in diagnosis.

Scan tool values below were recorded under the following conditions:

- Engine at Idle
- Upper radiator hose hot
- Closed throttle
- Transmission in Park
- Closed Loop operation
- Accessories OFF
- Brake pedal not applied

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Transmission Scan Tool Data List (5.7L)

Scan Tool Parameter	Data List*	Units Displayed	Typical Data Value
1-2 Shift Error	F2, F7	Seconds	Varies
1-2 Shift Time	F0, F2	Seconds	Varies
1-2 Sol.	F0, F2, F3, F4	On/Off	On
1-2 Sol. Open/Short to GND	F0, F2	Yes/No	No
1-2 Sol. Short to Volts	F0, F2	Yes/No	No
1-2 TAP Cell (4–16)	F7	kPa/Psi	Varies
2-3 Shift Error	F3, F8	Seconds	Varies
2-3 Shift Time	F0, F3	Seconds	Varies
2-3 Sol.	F0, F2, F3, F4	On/Off	On
2-3 Sol. Open/Short to GND	F0, F3	Yes/No	No
2-3 Sol. Short to Volts	F0, F3	Yes/No	No
2-3 TAP Cell (4–16)	F8	kPa/Psi	Varies
3-2 Downshift Sol.	F0, F5	On/Off	On
3-2 Sol. Open/Short to GND	F0, F5	Yes/No	No
3-2 Sol. Short to Volts	F0, F5	Yes/No	No
3-4 Shift Error	F4	Seconds	Varies
3-4 Shift Time	F0, F4	Seconds	Varies
A/C Clutch	F0	On/Off	Off
Adaptable Shift	F0, F7, F8	Yes/No	No
Cruise	F0	Enabled/Disabled	Disabled
Current Gear	F0, F1, F2, F3, F4, F5, F6	1,2,3,4	1
Current TAP Cell	F7, F8	4–16	Varies
Current TAP Memory	F7, F8	–16 to +16	Varies
ECT	F0, F1	°C (°F)	Varies
Engine Run Time	F0	Hr/Min/Sec	Varies
Engine Speed	F0, F1, F2, F3, F4, F5, F6	RPM	Varies
Engine Torque	F0, F1	N·m (lb ft)	Varies
IAT	F0	°C (°F)	Varies
Ignition Voltage	F0	Volts	12–14 Volts
Latest Shift	F0	Seconds	Varies
PC Sol. Actual Current	F0, F6	Amps	Varies (0.1–1.1 amps)
PC Solenoid Duty Cycle	F0, F6	Percent	Varies
PC Sol. Ref. Current	F0, F6	Amps	Varies (0.1–1.1 amps)
Speed Ratio	F0, F2, F3, F4, F5	Ratio	8.00:1
TCC Brake Switch	F0, F1	Open/Closed	Closed
TCC Duty Cycle	F0, F1	Percent	0%
TCC Duty Cycle Open/Short to GND	F0, F1	Yes/No	No
TCC Duty Cycle Short to Volts	F0, F1	Yes/No	No
TCC Enable	F0, F1	Yes/No	No
TCC Enable Open/Short to GND	F0, F1	Yes/No	No
TCC Enable Short to Volts	F0, F1	Yes/No	No
TCC Mode	F0, F1	0–5	0
TCC Slip Speed	F0, F1	RPM	+/–50 RPM from Engine Speed
TFP Sw.	F0	Park/Neutral, Reverse, Drive4, Drive3, Drive2, Drive1 or Invalid	Park/Neutral

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Transmission Scan Tool Data List (5.7L) (cont'd)

Scan Tool Parameter	Data List*	Units Displayed	Typical Data Value
TFP Sw. A/B/C	F0	HI/LOW	HI/LOW/HI
TFT Sensor	F0, F1	Volts	Varies
TP Angle	F0, F1, F2, F3, F4, F5, F6, F7, F8	Percent	0%
TP Sensor	F0, F1, F2, F3, F4, F5	Volts	0.3–0.9 V
Trans. Fluid Temp.	F0, F1, F5, F6	°C (°F)	Varies
Transmission Hot Mode	F0, F1	On/Off	Off
Transmission OSS	F0, F1, F2, F3, F4, F5, F6	RPM	0
Vehicle Speed	F0, F1, F2, F3, F4, F5	km/h (mph)	0

***Data List Legend**

- F0: Transmission Data
- F1: TCC Data
- F2: 1-2 Shift Data
- F3: 2-3 Shift Data
- F4: 3-4 Shift Data
- F5: 3-2 Down Shift Data
- F6: PC Solenoid Data
- F7: 1-2 Adapt Data
- F8: 2-3 Adapt Data

Transmission Scan Tool Data Definitions (3.8L)

1-2 Shift Error: Displays a range of –6.38 to +6.38 seconds. This parameter is the difference between the desired 1-2 shift time and the actual 1-2 shift time. A positive number indicates a firm or fast shift (the actual shift time was shorter than the desired shift time). A negative number indicates a soft or slow shift (the actual shift time was longer than the desired shift time). This value is only accurate if the shift was adaptable.

1-2 Shift Time: Displays a range of 0.00–6.38 seconds. This parameter is the actual time of the last 1-2 shift. The shift time is based on the engine RPM drop after the commanded 1-2 shift. This value is only accurate if the shift was adaptable.

1-2 Sol.: Displays ON or OFF. This parameter is the commanded state of the 1-2 shift solenoid valve. ON represents a commanded energized state (current is flowing through the solenoid). OFF represents a non-commanded state (current is not flowing through the solenoid).

1-2 Sol. Open/Short to GND: Displays Yes or No. This parameter indicates if an open or short to ground exists in the 1-2 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 1-2 shift solenoid is commanded OFF.

1-2 Sol. Short to Volts: Displays Yes or No. This parameter indicates if a short to voltage exists in the 1-2 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 1-2 shift solenoid is commanded ON.

1-2 Tap Cell (4–16): Displays kPa or psi. This parameter displays the amount of pressure varied from a calibrated base line pressure for shifts. Each TAP Cell is based on a calibrated shift torque value. Each TAP Cell value is calculated from the last shift time. This cell pressure is used in addition to the calibrated base line pressure to adjust the apply of a clutch or band during the next shift.

2-3 Shift Error: Displays a range of –6.38 to +6.38 seconds. This parameter is the difference between the desired 2-3 shift time and the actual 2-3 shift time. A positive number indicates a firm or fast shift (the actual shift time was shorter than the desired shift time). A negative number indicates a soft or slow shift (the actual shift time was longer than the desired shift time). This value is only accurate if the shift was adaptable.

2-3 Shift Time: Displays a range of 0.00–6.38 seconds. This parameter is the actual time of the last 2-3 shift. The shift time is based on the engine RPM drop after the commanded 2-3 shift. This value is only accurate if the shift was adaptable.

2-3 Sol.: Displays ON or OFF. This parameter is the commanded state of the 2-3 shift solenoid valve. ON represents a commanded energized state (current is flowing through the solenoid). OFF represents a non-commanded state (current is not flowing through the solenoid).

2-3 Sol. Open/Short to GND: Displays Yes or No. This parameter indicates if an open or short to ground exists in the 2-3 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 2-3 shift solenoid is commanded OFF.

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2-3 Sol. Short to Volts: Displays Yes or No. This parameter indicates if a short to voltage exists in the 2-3 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 2-3 shift solenoid is commanded ON.

2nd Gear Start: Displays Yes or No. This parameter indicates when a 2nd gear start has been requested. When Yes is displayed, the PCM de-energizes the 1-2 shift solenoid and the vehicle starts off in 2nd gear for increased traction in slippery conditions (following gears will shift as normal). A hard acceleration condition (wide open throttle) overrides the 2nd gear start and the vehicle starts off in 1st gear.

3-2 Downshift Sol.: Displays On or Off. This parameter indicates if the 3-2 shift solenoid valve assembly is currently commanded On or Off. The solenoid commanded state is based on the transmission temperature. The solenoid will change states during a 3-2 downshift to regulate the appropriate pressure. The commanded state of the solenoid occurs at approximately 30 mph with a throttle increase.

3-2 Sol. Open/Short to GND: Displays Yes or No. This parameter indicates if an open or short to ground exists in the 3-2 shift solenoid valve assembly feedback signal to the PCM. This parameter is valid only when the 3-2 shift solenoid is commanded Off.

3-2 Sol. Short to Volts: Displays Yes or No. This parameter indicates if a short to voltage exists in the 3-2 shift solenoid valve assembly feedback signal to the PCM. This parameter is valid only when the 3-2 shift solenoid is commanded On.

3-4 Shift Error: Displays a range of –6.38 to +6.38 seconds. This parameter is the difference between the desired 3-4 shift time and the actual 3-4 shift time. A positive number indicates a firm or fast shift (the actual shift time was shorter than the desired shift time). A negative number indicates a soft or slow shift (the actual shift time was longer than the desired shift time). This value is only accurate if the shift was adaptable.

3-4 Shift Time: Displays a range of 0.00–6.38 seconds. This parameter is the actual time of the last 3-4 shift. The shift time is based on the engine RPM drop after the commanded 3-4 shift. This value is only accurate if the shift was adaptable.

Adaptable Shift: Displays Yes or No. Yes indicates that the proper operating conditions were all within the proper operating range during the last shift and that the shift time was accurate. This shift information is then used through the adaptive function in order to update the adapt cells. No indicates that not all of the operating conditions were met in order to enable this function and that the adapt cells were not updated.

APP Average: Displays a range of 0–125 counts. The TAC module takes the voltages from the three APP sensors, averages them and converts them into counts. This average is displayed on the scan tool. The average will be different on every vehicle.

APP Indicated Angle: Displays a range of 0–100%. This parameter indicates the accelerator pedal position in percentage. When the APP is at rest, 0% is indicated. When the APP is fully depressed, 100% is indicated.

Current Gear: Displays 1, 2, 3 or 4. This parameter indicates the current commanded state of the shift solenoids.

Current TAP (Transmission Adaptive Pressure) Cell: Displays a TP cell range of 0–16. This parameter indicates the current throttle position cell used for line pressure modification (adaptation).

Current TAP (Transmission Adaptive Pressure) Memory: Displays a range of –16 to +16 psi. This parameter is the amount of pressure that is added to base line pressure to adjust the holding effort of a clutch or band, while shifting.

ECT (Engine Coolant Temperature): Displays a range of –40°C to 151°C (–40°F to 304°F). This parameter is the input signal of the engine coolant temperature sensor. The engine coolant temperature is high (151°C) (304°F) when the signal voltage is low (0 V), and the engine coolant temperature is low (–40°C) (–40°F) when the signal voltage is high (5 V).

Engine Run Time: Displays a range of 0:00:00–18:12:15 hr/min/sec. This parameter measures how long the engine has been operating. When the ignition switch is turned OFF, the value is reset to zero.

Engine Speed: Displays a range of 0–8192 RPM. This parameter indicates the rotational speed of the engine expressed as revolutions per minute.

Engine Torque: Displays a range of 0–9999 lb ft. This parameter indicates the amount of torque that is delivered from the engine.

Estimated Gear Ratio: Displays a range of 0.00:1 to 8.00:1. This parameter indicates the estimated turbine speed divided by the transmission output speed. Estimated turbine speed is calculated from engine speed and engine torque.

IAT (Intake Air Temperature): Displays a range of –40°C to 215°C (–40°F to 419°F). The IAT sensor is a thermistor that is used to monitor the temperature of the air entering the intake manifold. The PCM applies 5 volts to the sensor on a 5 volt reference circuit. When the air is cool, the resistance in the sensor will be high. If the air is warm, the sensor resistance will be low and the PCM will sense a low voltage signal. The PCM converts the signal of the IAT sensor to degrees Celsius. Intake air temperature is used by the PCM to adjust fuel delivery and spark timing.

Ignition Voltage: Displays a range of 0.0–25.5 V. This represents the system voltage measured by the PCM at it's ignition feed.

PC Sol. Actual Current: Displays a range of 0.00–1.10 amps. This parameter is the actual current of the pressure control solenoid circuit at the control module. Zero amp (no current flow) indicates actual higher line pressure. Actual lower line pressure is indicated by 1.1 amps (high current flow).

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PC Solenoid Duty Cycle: Displays a range of 0–100%. This parameter is the commanded state of the pressure control solenoid expressed as a percent of energized ON time. Zero percent indicates zero ON time (non-energized) or no current flow. Approximately 60% at idle indicates maximum ON time (energized) or high current flow.

PC Sol. Ref. (Reference) Current: Displays a range of 0.00–1.10 amps. This parameter is the commanded current of the pressure control solenoid circuit. Zero amp (no current flow) indicates commanded higher line pressure. Commanded lower line pressure is indicated by 1.1 amps (high current flow).

Speed Ratio: Displays a range of 0.00:1–8.00:1. This parameter indicates engine speed divided by transmission output speed. This value is used to estimate transmission gear ratio.

TCC Brake Switch: Displays Open or Closed. This parameter indicates the state of the brake switch circuit input. Open indicates a zero voltage input (brake switch open, brake pedal applied). Closed indicates a B+ voltage input (brake switch closed, brake pedal released).

TCC Duty Cycle: Displays a range of 0–100%. This parameter is the commanded percentage of ON time of the TCC PWM solenoid. Approximately 90 percent represents an ON (energized) commanded state. Zero percent represents an OFF (non-energized) commanded state. This commanded state is applied at a vehicle speed between approximately 0–16 km/h (0–10 mph).

TCC Duty Cycle Open/Short to GND: Displays Yes or No. This parameter indicates whether an open or a short to ground exists in the TCC PWM solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC PWM solenoid is commanded OFF (duty cycle is 0%).

TCC Duty Cycle Short to Volts: Displays Yes or No. This parameter indicates whether a short to voltage exists in the TCC PWM solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC PWM solenoid is commanded ON (duty cycle is at maximum).

TCC Enable: Displays Yes or No. This parameter is the commanded state of the TCC solenoid. Yes indicates a commanded energized state (current is flowing through the solenoid). No indicates a commanded non-energized state (current is not flowing through the solenoid). This commanded state occurs at various vehicle speeds between applications.

TCC Enable Open/Short to GND: Displays Yes or No. This parameter indicates whether an open or a short to ground exists in the TCC solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC solenoid is commanded OFF.

TCC Enable Short to Volts: Displays Yes or No. This parameter indicates whether a short to voltage exists in the TCC solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC solenoid is commanded ON.

TCC Slip Speed: Displays a range of –4080 to 4079 RPM. This parameter is the difference between transmission output speed and engine speed. A negative value indicates that the engine speed is less than the output speed (deceleration). A positive value indicates that the engine speed is greater than the output speed (acceleration). A value of zero indicates that the engine speed is equal to the output speed (TCC applied).

TFT (Transmission Fluid Temperature) Sensor: Displays a range of 0.00–5.00 V. When the transmission fluid is cold, the sensor resistance is high and the PCM will sense high signal voltage. As the transmission fluid temperature warms to a normal operating temperature, the sensor resistance becomes less and the voltage decreases.

TFP Sw.: Displays Park/Neutral, Reverse, Drive4, Drive3, Drive2, Drive1 or Invalid. This parameter is the decoded status of the three A/B/C inputs from the automatic transmission fluid pressure manual valve position switch. Invalid is displayed when the PCM does not recognize a valid combination of inputs.

TFP Sw. A/B/C: Displays HI/LOW, HI/LOW, HI/LOW. This parameter indicates the status of the three inputs from the Automatic Transmission Fluid Pressure Manual Valve Position Switch Assembly to the PCM. LOW represents a zero voltage signal. HI represents an ignition voltage signal.

TP Desired Angle: Displays a range of 0–100%. This parameter indicates the PCM's desired throttle angle for operating conditions present at that time.

TP Indicated Angle: Displays a range of 0–100%. This parameter indicates the amount of throttle opening.

Trans. Fluid Temp.: Displays a range of –40°C to 151°C (–40°F to 304°F). This parameter is the input signal of the transmission fluid temperature sensor. Transmission fluid temperature is high (151°C) (304°F) when signal voltage is low (0 V), and transmission fluid temperature is low (–40°C) (–40°F) when signal voltage is high (5 V).

Transmission Hot Mode: Displays On or Off. This parameter monitors transmission temperature. On indicates that the transmission temperature has exceeded 135°C (275°F).

Transmission OSS (Output Speed Sensor): Displays a range of 0–8192 RPM. This parameter indicates the rotational speed of the transmission output shaft expressed as revolutions per minute.

Vehicle Speed: Displays a range of 0–255 km/h (0–158 mph). This parameter is the input signal from the vehicle speed sensor assembly.

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Transmission Scan Tool Data Definitions (5.7L)

1-2 Shift Error: Displays a range of –6.38 to +6.38 seconds. This parameter is the difference between the desired 1-2 shift time and the actual 1-2 shift time. A positive number indicates a firm or fast shift (the actual shift time was shorter than the desired shift time). A negative number indicates a soft or slow shift (the actual shift time was longer than the desired shift time). This value is only accurate if the shift was adaptable.

1-2 Shift Time: Displays a range of 0.00–6.38 seconds. This parameter is the actual time of the last 1-2 shift. The shift time is based on the engine RPM drop after the commanded 1-2 shift. This value is only accurate if the shift was adaptable.

1-2 Sol.: Displays ON or OFF. This parameter is the commanded state of the 1-2 shift solenoid valve. ON represents a commanded energized state (current is flowing through the solenoid). OFF represents a non-commanded state (current is not flowing through the solenoid).

1-2 Sol. Open/Short to GND: Displays Yes or No. This parameter indicates if an open or short to ground exists in the 1-2 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 1-2 shift solenoid is commanded OFF.

1-2 Sol. Short to Volts: Displays Yes or No. This parameter indicates if a short to voltage exists in the 1-2 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 1-2 shift solenoid is commanded ON.

1-2 Tap Cell (4–16): Displays kPa or psi. This parameter displays the amount of pressure varied from a calibrated base line pressure for shifts. Each TAP Cell is based on a calibrated shift torque value. Each TAP Cell value is calculated from the last shift time. This cell pressure is used in addition to the calibrated base line pressure to adjust the apply of a clutch or band during the next shift.

2-3 Shift Error: Displays a range of –6.38 to +6.38 seconds. This parameter is the difference between the desired 2-3 shift time and the actual 2-3 shift time. A positive number indicates a firm or fast shift (the actual shift time was shorter than the desired shift time). A negative number indicates a soft or slow shift (the actual shift time was longer than the desired shift time). This value is only accurate if the shift was adaptable.

2-3 Shift Time: Displays a range of 0.00–6.38 seconds. This parameter is the actual time of the last 2-3 shift. The shift time is based on the engine RPM drop after the commanded 2-3 shift. This value is only accurate if the shift was adaptable.

2-3 Sol.: Displays ON or OFF. This parameter is the commanded state of the 2-3 shift solenoid valve. ON represents a commanded energized state (current is flowing through the solenoid). OFF represents a non-commanded state (current is not flowing through the solenoid).

2-3 Sol. Open/Short to GND: Displays Yes or No. This parameter indicates if an open or short to ground exists in the 2-3 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 2-3 shift solenoid is commanded OFF.

2-3 Sol. Short to Volts: Displays Yes or No. This parameter indicates if a short to voltage exists in the 2-3 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 2-3 shift solenoid is commanded ON.

2-3 Tap Cell (4–16): See 1-2 Tap Cell (4–16)

3-2 Downshift Sol.: Displays On or Off. This parameter indicates if the 3-2 shift solenoid valve assembly is currently commanded On or Off. The solenoid commanded state is based on the transmission temperature. The solenoid will change states during a 3-2 downshift to regulate the appropriate pressure. The commanded state of the solenoid occurs at approximately 30 mph with a throttle increase.

3-2 Downshift Sol. Open/Short to GND: Displays Yes or No. This parameter indicates if an open or short to ground exists in the 3-2 shift solenoid valve assembly feedback signal to the PCM. This parameter is valid only when the 3-2 shift solenoid is commanded OFF.

3-2 Downshift Sol. Short to Volts: Displays Yes or No. This parameter indicates if a short to voltage exists in the 3-2 shift solenoid valve assembly feedback signal to the PCM. This parameter is valid only when the 3-2 shift solenoid is commanded ON.

3-4 Shift Error: Displays a range of –6.38 to +6.38 seconds. This parameter is the difference between the desired 3-4 shift time and the actual 3-4 shift time. A positive number indicates a firm or fast shift (the actual shift time was shorter than the desired shift time). A negative number indicates a soft or slow shift (the actual shift time was longer than the desired shift time). This value is only accurate if the shift was adaptable.

3-4 Shift Time: Displays a range of 0.00–6.38 seconds. This parameter is the actual time of the last 3-4 shift. The shift time is based on the engine RPM drop after the commanded 3-4 shift. This value is only accurate if the shift was adaptable.

A/C Clutch: Displays On or Off. This parameter indicates the commanded state of the A/C control relay. The clutch should be engaged when On displays.

Adaptable Shift: Displays Yes or No. Yes indicates that the proper operating conditions were all within the proper operating range during the last shift and that the shift time was accurate. This shift information is then used through the adaptive function in order to update the adapt cells. No indicates that not all of the operating conditions were met in order to enable this function and that the adapt cells were not updated.

Cruise: Displays Enabled or Disabled. This parameter indicates whether the PCM is allowing cruise operation. The PCM has the ability to disable cruise control under certain conditions.

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Current Gear: Displays 1, 2, 3 or 4. This parameter indicates the current commanded state of the shift solenoids.

Current TAP (Transmission Adaptive Pressure) Cell: Displays a TP cell range of 0–16. This parameter indicates the current throttle position cell used for line pressure modification (adaptation).

Current TAP (Transmission Adaptive Pressure) Memory: Displays a range of –16 to +16 psi. This parameter is the amount of pressure that is added to base line pressure to adjust the holding effort of a clutch or band, while shifting.

ECT (Engine Coolant Temperature): Displays a range of –40°C to 151°C (–40°F to 304°F). This parameter is the input signal of the engine coolant temperature sensor. The engine coolant temperature is high (151°C) (304°F) when the signal voltage is low (0 V), and the engine coolant temperature is low (–40°C) (–40°F) when the signal voltage is high (5 V).

Engine Run Time: Displays a range of 0:00:00–18:12:15 hr/min/sec. This parameter measures how long the engine has been operating. When the ignition switch is turned OFF, the value is reset to zero.

Engine Speed: Displays a range of 0–8192 RPM. This parameter indicates the rotational speed of the engine expressed as revolutions per minute.

Engine Torque: Displays a range of 0–9999 lbs ft. This parameter indicates the amount of torque that is delivered from the engine.

IAT (Intake Air Temperature): Displays a range of –40°C to 215°C (–40°F to 419°F). The IAT sensor is a thermistor that is used to monitor the temperature of the air entering the intake manifold. The PCM applies 5 volts to the sensor on a 5 volt reference circuit. When the air is cool, the resistance in the sensor will be high. If the air is warm, the sensor resistance will be low and the PCM will sense a low voltage signal. The PCM converts the signal of the IAT sensor to degrees Celsius. Intake air temperature is used by the PCM to adjust fuel delivery and spark timing.

Ignition Voltage: Displays a range of 0.0–25.5 V. This represents the system voltage measured by the PCM at it's ignition feed.

Latest Shift: Displays a range of 0.00–6.38 seconds. This parameter is the actual time of the last upshift. This value is only accurate if the shift was adaptable.

PC Sol. Actual Current: Displays a range of 0.00–1.10 amps. This parameter is the actual current of the pressure control solenoid circuit at the control module. Zero amp (no current flow) indicates actual higher line pressure. Actual lower line pressure is indicated by 1.1 amps (high current flow).

PC Sol. Duty Cycle: Displays a range of 0–100%. This parameter is the commanded state of the pressure control solenoid expressed as a percent of energized ON time. Zero percent indicates zero ON time (non-energized) or no current flow. Approximately 60% at idle indicates maximum ON time (energized) or high current flow.

PC Ref. (Reference) Current: Displays a range of 0.00–1.10 amps. This parameter is the commanded current of the pressure control solenoid circuit. Zero amp (no current flow) indicates commanded higher line pressure. Commanded lower line pressure is indicated by 1.1 amps (high current flow).

Speed Ratio: Displays a range of 0.00:1–8.00:1. This parameter indicates engine speed divided by transmission output speed. This value is used to estimate transmission gear ratio.

TCC Brake Switch: Displays Open or Closed. This parameter indicates the state of the brake switch circuit input. Open indicates a zero voltage input (brake switch open, brake pedal applied). Closed indicates a B+ voltage input (brake switch closed, brake pedal released).

TCC Duty Cycle: Displays a range of 0–100%. This parameter is the commanded percentage of ON time of the TCC PWM solenoid. Approximately 90 percent represents an ON (energized) commanded state. Zero percent represents an OFF (non-energized) commanded state. This commanded state is applied at a vehicle speed between approximately 0–16 km/h (0–10 mph).

TCC Duty Cycle Open/Short to GND: Displays Yes or No. This parameter indicates whether an open or a short to ground exists in the TCC PWM solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC PWM solenoid is commanded OFF (duty cycle is 0%).

TCC Duty Cycle Short to Volts: Displays Yes or No. This parameter indicates whether a short to voltage exists in the TCC PWM solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC PWM solenoid is commanded ON (duty cycle is at maximum).

TCC Enable: Displays Yes or No. This parameter is the commanded state of the TCC solenoid. Yes indicates a commanded energized state (current is flowing through the solenoid). No indicates a commanded non-energized state (current is not flowing through the solenoid). This commanded state occurs at various vehicle speeds between applications.

TCC Enable Open/Short to GND: Displays Yes or No. This parameter indicates whether an open or a short to ground exists in the TCC solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC solenoid is commanded OFF.

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TCC Enable Short to Volts: Displays Yes or No. This parameter indicates whether a short to voltage exists in the TCC solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC solenoid is commanded ON.

TCC Mode: Displays a range of 0 through 5. Zero (0) or Off Mode indicates that the PCM commands the TCC OFF at a calibrated minimum throttle. The calibrated minimum throttle is different at low vehicle speeds than it is at high vehicle speeds. Off Mode is also active when the transmission is in the wrong gear range, the engine or the transmission is cold, the brake input indicates that the brakes are ON, a downshift or upshift is initiated, the engine is at idle, the transmission is in Hot Mode or a misfire is detected. One (1) or Release Mode indicates that the PCM commands the release of the TCC. Two (2) or Apply Mode indicates that the PCM commands the apply of the TCC. Apply pressure varies based on normal or performance operations, hot conditions or if the cruise control is active. Apply Mode is used under normal driving conditions. All apply pressure is dependent on throttle position and vehicle speed. Three (3) or Apply Enable Mode indicates that enabling conditions are met for applying the TCC (enabling conditions include vehicle speed, gear selection, transmission temperature, throttle angle, brake switch status, etc.). Four (4) or Locked Mode indicates that the PCM commands full capacity of the TCC when the transmission is in fourth gear and the vehicle speed is greater than a calibrated value. When variable TCC apply pressure stops (Apply Mode), maximum TCC pressure is used. Five (5) or Coast Mode indicates that the PCM commands apply of the TCC when the transmission is in fourth gear and the throttle and vehicle speed are not high enough to enable Apply Mode, but high enough to keep the TCC applied. When Coast Mode is active, TCC apply pressure is set to a predetermined amount.

TCC (Torque Converter Clutch) Slip Speed: Displays a range of –4080 to 4079 RPM. This parameter is the difference between transmission output speed and engine speed. A negative value indicates that the engine speed is less than the output speed (deceleration). A positive value indicates that the engine speed is greater than the output speed (acceleration). A value of zero indicates that the engine speed is equal to the output speed (TCC applied).

TFT (Transmission Fluid Temperature) Sensor: Displays a range of 0.00–5.00 V. When the transmission fluid is cold, the sensor resistance is high and the PCM will sense high signal voltage. As the transmission fluid temperature warms to a normal operating temperature, the sensor resistance becomes less and the voltage decreases.

TFP Sw.: Displays Park/Neutral, Reverse, Drive4, Drive3, Drive2, Drive1 or Invalid. This parameter is the decoded status of the three A/B/C inputs from the automatic transmission fluid pressure manual valve position switch. Invalid is displayed when the PCM does not recognize a valid combination of inputs.

TFP Sw. A/B/C: Displays HI/LOW, HI/LOW, HI/LOW. This parameter indicates the status of the three inputs from the Automatic Transmission Fluid Pressure Manual Valve Position Switch Assembly to the PCM. LOW represents a zero voltage signal. HI represents an ignition voltage signal.

TP (Throttle Position) Angle: Displays a range of 0–100%. The TP angle is computed by the PCM from the TP Sensor voltage. The TP angle should read 0% at idle and 100% at Wide Open Throttle (WOT).

TP (Throttle Position) Sensor: Displays a range of 0.00–5.00 volts. The TP Sensor is used by the PCM to determine the amount of throttle demanded by the driver. Voltage is below 1 volt at idle and above 4 volts at Wide Open Throttle (WOT).

Trans. Fluid Temp.: Displays a range of –40°C to 151°C (–40°F to 304°F). This parameter is the input signal of the transmission fluid temperature sensor. Transmission fluid temperature is high (151°C) (304°F) when signal voltage is low (0 V), and transmission fluid temperature is low (–40°C) (–40°F) when signal voltage is high (5 V).

Transmission Hot Mode: Displays On or Off. This parameter monitors transmission temperature. On indicates that the transmission temperature has exceeded 135°C (275°F).

Transmission OSS (Output Speed Sensor): Displays a range of 0–8192 RPM. This parameter indicates the rotational speed of the transmission output shaft expressed as revolutions per minute.

Vehicle Speed: Displays a range of 0–255 km/h (0–158 mph). This parameter is the input signal from the vehicle speed sensor assembly.

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Diagnostic Trouble Code (DTC) Type Definitions

The DTC Type Definitions contain the characteristics for all types of DTCs. Each DTC type may or may not be found in this section. The DTC type is based on the action that the PCM takes when storing DTC information and whether or not the PCM illuminates a service lamp or displays a message on a driver information center (DIC). The DTC descriptions in the Diagnostic Trouble Code List/Type are listed in numeric order and indicate the DTC types for domestic and export vehicle applications. Each DTC is categorized into one of the following types:

Type A

This DTC is emissions related. The PCM stores the DTC in History, Freeze Frame and Failure Records during the first trip in which the conditions for setting the DTC are met. The PCM also illuminates the malfunction indicator lamp (MIL) during the first trip in which the conditions for setting the DTC are met.

Type B

This DTC is emissions related. The PCM stores the DTC in Failure Records during the first trip in which the conditions for setting the DTC are met. The PCM stores the DTC in History and Freeze Frame during the second consecutive trip in which the conditions for setting the DTC are met. The PCM also illuminates the MIL during the second consecutive trip in which the conditions for setting the DTC are met.

Type C

This DTC is non-emissions related. The PCM stores the DTC in History and Failure Records during the first trip in which the conditions for setting the DTC are met. The PCM does not store the DTC in Freeze Frame and does not illuminate the MIL. For some type C DTCs, a message may be displayed on a DIC, if equipped. For other type C DTCs, a separate service lamp (other than the MIL) may be illuminated. Type C DTCs that do not display a message on the DIC or illuminate a separate service lamp were formerly referred to as type D.

Type X

This DTC is available in the PCM software, but has been disabled, or turned off. In this case, the diagnostic does not run, DTCs are not stored, and the MIL does not illuminate. Type X DTCs are used primarily for export vehicles that do not require MIL illumination or DTC storing.

The service information contained in this manual refers to the domestic (federal) calibration package. Domestic calibrations apply to vehicles sold in the United States, Canada and Japan. Export calibrations exist for both leaded and unleaded vehicles. DTC types may change for some export vehicles, and some DTCs may be turned off for leaded export vehicles. Differences between domestic and export calibrations are not reflected on DTC support information pages. DTC types for export calibrations are referenced only in the Diagnostic Trouble Code List/Type.

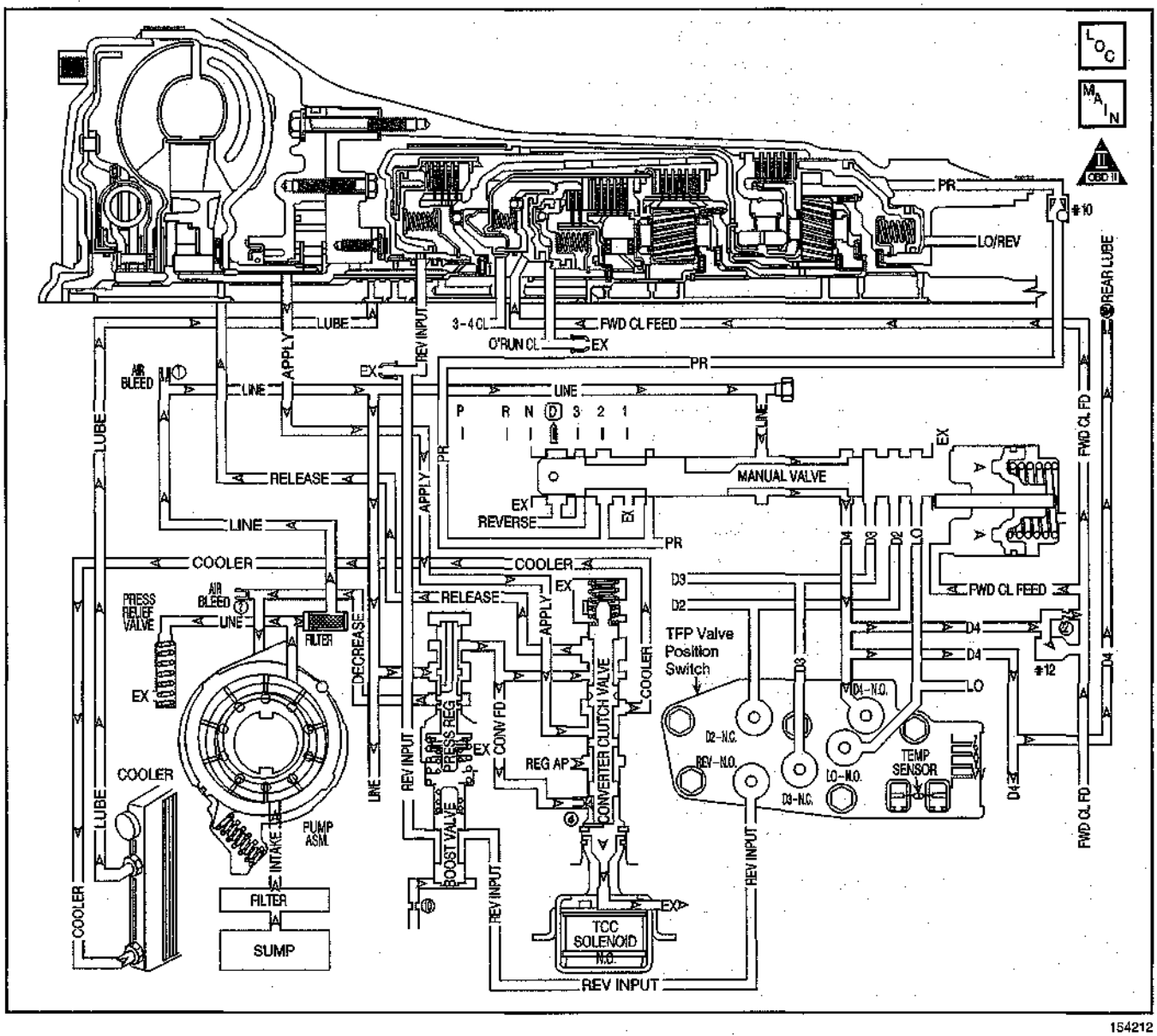
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Diagnostic Trouble Code (DTC) List/Type

DTC Description	Domestic	Unleaded Export	Leaded Export
DTC P0218 Transmission Fluid Overtemperature (3.8L) *DTC P0218 Transmission Fluid Overtemperature (5.7L)*	C	C	C
DTC P0502 Vehicle Speed Sensor (VSS) Circuit Low Input (3.8L) *DTC P0502 Vehicle Speed Sensor (VSS) Circuit Low Input (5.7L)*	B	B	C
DTC P0503 Vehicle Speed Sensor (VSS) Circuit Intermittent (3.8L) *DTC P0503 Vehicle Speed Sensor (VSS) Circuit Intermittent (5.7L)*	B	B	C
DTC P0711 TFT Sensor Circuit Range/Performance (3.8L) *DTC P0711 TFT Sensor Circuit Range/Performance (5.7L)*	C	C	C
DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input (3.8L) *DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input (5.7L)*	C	C	C
DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input (3.8L) *DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input (5.7L)*	C	C	C
DTC P0719 Brake Switch Circuit Low Input (3.8L) *DTC P0719 Brake Switch Circuit Low Input (5.7L)*	C	C	C
DTC P0724 Brake Switch Circuit High Input (3.8L) *DTC P0724 Brake Switch Circuit High Input (5.7L)*	C	C	C
DTC P0740 TCC Enable Solenoid Circuit Electrical (3.8L) *DTC P0740 TCC Enable Solenoid Circuit Electrical (5.7L)*	B	B	C
DTC P0742 TCC System Stuck On (3.8L) *DTC P0742 TCC System Stuck On (5.7L)*	B	B	C
DTC P0748 Pressure Control Solenoid Circuit Electrical (3.8L) *DTC P0748 Pressure Control Solenoid Circuit Electrical (5.7L)*	C	C	C
DTC P0751 1-2 Shift Solenoid Valve Performance - No First or Fourth Gear (3.8L)	B	B	C
DTC P0751 1-2 Shift Solenoid Valve Performance (5.7L)	A	A	C
DTC P0752 1-2 Shift Solenoid Valve Performance - No Second or Third Gear (3.8L)	B	B	C
DTC P0753 1-2 Shift Solenoid Circuit Electrical (3.8L) *DTC P0753 1-2 Shift Solenoid Circuit Electrical (5.7L)*	B	B	C
DTC P0756 2-3 Shift Solenoid Valve Performance - No First or Second Gear (3.8L)	A	A	C
DTC P0756 2-3 Shift Solenoid Valve Performance (5.7L)	A	A	C
DTC P0757 2-3 Shift Solenoid Valve Performance - No Third or Fourth Gear (3.8L)	A	A	C
DTC P0758 2-3 Shift Solenoid Circuit Electrical (3.8L) *DTC P0758 2-3 Shift Solenoid Circuit Electrical (5.7L)*	A	A	C
DTC P0785 3-2 Shift Solenoid Circuit Electrical (3.8L) *DTC P0785 3-2 Shift Solenoid Circuit Electrical (5.7L)*	B	B	C
DTC P1810 TFP Valve Position Switch Circuit (3.8L) *DTC P1810 TFP Valve Position Switch Circuit (5.7L)*	B	B	C
DTC P1860 TCC PWM Solenoid Circuit Electrical (3.8L) *DTC P1860 TCC PWM Solenoid Circuit Electrical (5.7L)*	B	B	C
DTC P1870 Transmission Component Slipping (3.8L) *DTC P1870 Transmission Component Slipping (5.7L)*	B	B	C

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DTC P0218 Transmission Fluid Overtemperature (3.8L)



154212

Circuit Description

The flow of transmission fluid starts in the bottom pan and is drawn through the filter, control valve body assembly, transmission case and into the oil pump assembly. The oil pump assembly pressurizes the fluid and directs it to the pressure regulator valve where it becomes the main supply of fluid to the various components and hydraulic circuits in the transmission. Hot fluid exiting the torque converter flows through the converter clutch apply valve and into the transmission cooler lines to the oil cooler located in the vehicle radiator (and auxiliary cooler if equipped). From the cooler, fluid returns to cool and lubricate the front of the transmission. In forward drive ranges, D4 fluid from the manual valve is routed through an orificed cup plug in the rear of the transmission case to feed the rear lube fluid circuit.

When the powertrain control module (PCM) detects a high transmission fluid temperature (TFT) for a long period of time, then DTC P0218 sets. DTC P0218 is a type C DTC.

Conditions for Running the DTC

- No TFT sensor DTCs P0711, P0712 or P0713.
- The ignition switch is ON for 5 seconds.

Conditions for Setting the DTC

The TFT is greater than 130°C (266°F) for 600 seconds (10 minutes).

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Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0218 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- The scan tool Trans. Fluid Temp. should rise steadily to a normal operating temperature, then stabilize.
- Ask about the customer's driving habits, trailer towing, etc. Trailer towing should occur in D3.
- Refer to *Symptom Diagnosis*.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step checks for air flow restrictions or damage which may result in the transmission overheating.

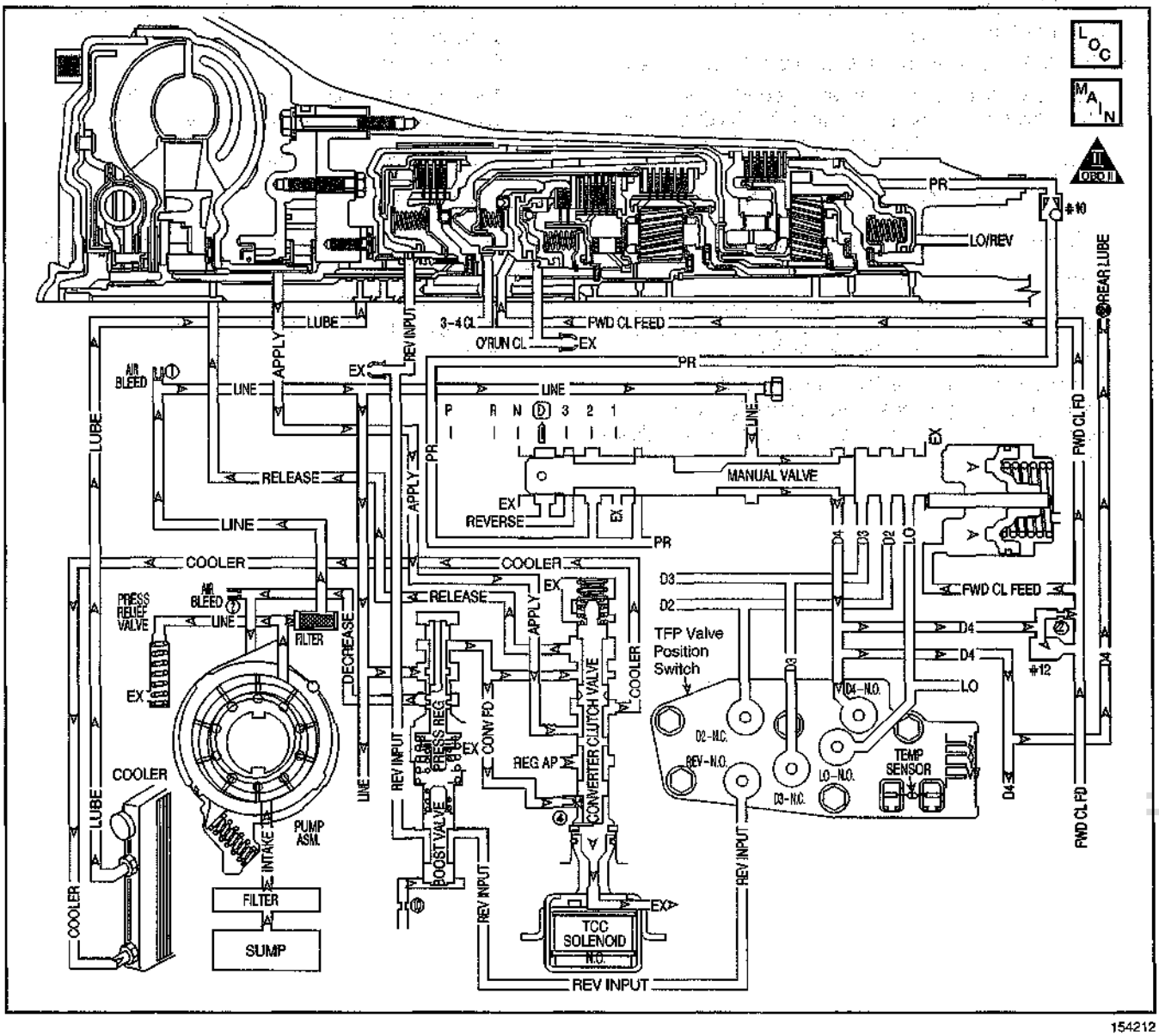
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DTC P0218 Transmission Fluid Overtemperature (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*
3	1. Inspect the engine cooling system and transmission cooling system for the following conditions: • Air flow restrictions • Air flow blockage • Debris 2. Inspect the transmission cooling system for damaged cooler lines. 3. Test the oil cooler flow. Refer to *Automatic Transmission Oil Cooler Flushing and Flow Test.* Did you find and correct the condition?	—	*Go to Step 6*	*Go to Step 4*
4	Test for correct line pressure. Refer to *Line Pressure Check Procedure.* Did you find and correct the condition?	—	*Go to Step 6*	*Go to Step 5*
5	Test the torque converter stator. Refer to *Torque Converter Diagnosis Procedure.* Did you find and correct the condition?	—	*Go to Step 6*	Go to Diagnostic Aids
6	Perform the following procedure in order to verify the repair: 1. Install a *Scan Tool.* 2. Select DTC. 3. Select Clear Info. 4. Start and idle the engine until it reaches normal operating temperature. 5. Monitor Engine Run Time and Trans. Fluid Temp. on the *Scan Tool.* 6. Drive the vehicle for 10 minutes. 7. Ensure that the transmission fluid temperature has stabilized and is less than 129°C (264°F). 8. Select Specific DTC. 9. Enter DTC P0218. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0218 Transmission Fluid Overtemperature (5.7L)



154212

Circuit Description

The flow of transmission fluid starts in the bottom pan and is drawn through the filter, control valve body assembly, transmission case and into the oil pump assembly. The oil pump assembly pressurizes the fluid and directs it to the pressure regulator valve where it becomes the main supply of fluid to the various components and hydraulic circuits in the transmission. Hot fluid exiting the torque converter flows through the converter clutch apply valve and into the transmission cooler lines to the oil cooler located in the vehicle radiator (and auxiliary cooler if equipped). From the cooler, fluid returns to cool and lubricate the front of the transmission. In forward drive ranges, D4 fluid from the manual valve is routed through an orificed cup plug in the rear of the transmission case to feed the rear lube fluid circuit.

When the powertrain control module (PCM) detects a high transmission fluid temperature (TFT) for a long period of time, then DTC P0218 sets. DTC P0218 is a type C DTC.

Conditions for Running the DTC

- No TFT sensor DTCs P0711, P0712 or P0713.
- The ignition switch is ON for 5 seconds.

Conditions for Setting the DTC

The TFT is greater than 130°C (266°F) for 600 seconds (10 minutes).

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Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0218 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- The scan tool Trans. Fluid Temp. should rise steadily to a normal operating temperature, then stabilize.
- Ask about the customer's driving habits, trailer towing, etc. Trailer towing should occur in D3.
- Refer to *Symptom Diagnosis*.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step checks for air flow restrictions or damage which may result in the transmission overheating.

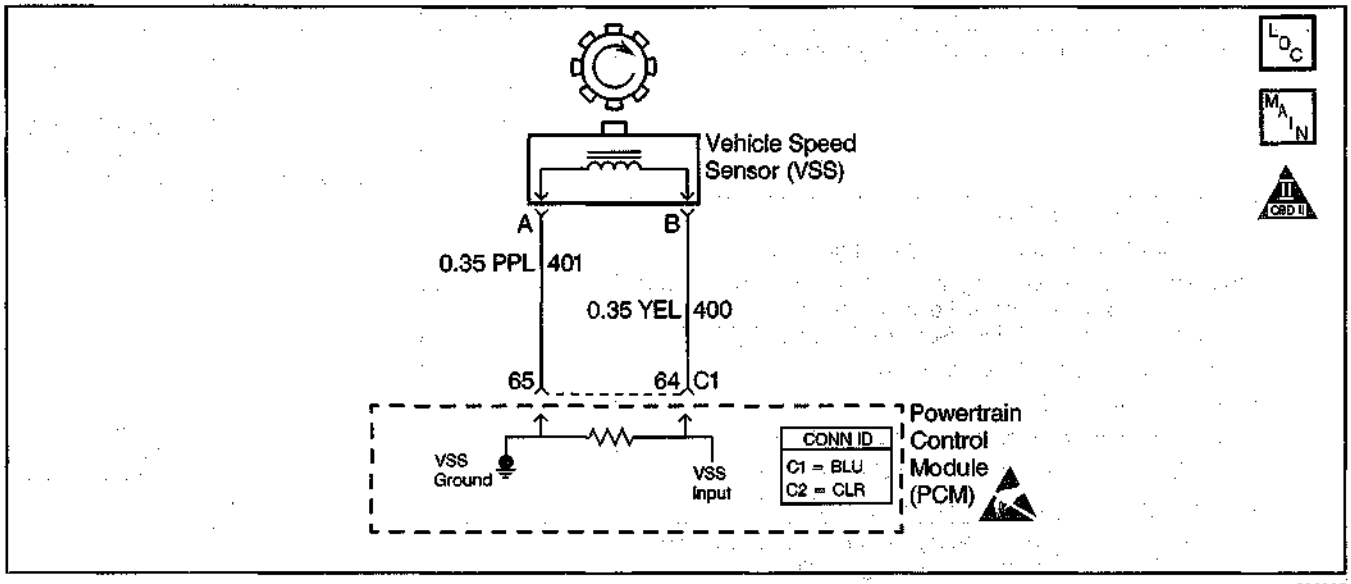
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DTC P0218 Transmission Fluid Overtemperature (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*
3	1. Inspect the engine cooling system and transmission cooling system for the following conditions: • Air flow restrictions • Air flow blockage • Debris 2. Inspect the transmission cooling system for damaged cooler lines. 3. Test the oil cooler flow. Refer to *Automatic Transmission Oil Cooler Flushing and Flow Test.* Did you find and correct the condition?	—	*Go to Step 6*	*Go to Step 4*
4	Test for correct line pressure. Refer to *Line Pressure Check Procedure.* Did you find and correct the condition?	—	*Go to Step 6*	*Go to Step 5*
5	Test the torque converter stator. Refer to *Torque Converter Diagnosis Procedure.* Did you find and correct the condition?	—	*Go to Step 6*	Go to Diagnostic Aids
6	Perform the following procedure in order to verify the repair: 1. Install a *Scan Tool.* 2. Select DTC. 3. Select Clear Info. 4. Start and idle the engine until it reaches normal operating temperature. 5. Monitor Engine Run Time and Trans. Fluid Temp. on the *Scan Tool.* 6. Drive the vehicle for 10 minutes. 7. Ensure that the transmission fluid temperature has stabilized and is less than 129°C (264°F). 8. Select Specific DTC. 9. Enter DTC P0218. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0502 Vehicle Speed Sensor (VSS) Circuit Low Input (3.8L)



536985

Circuit Description

The vehicle speed sensor (VSS) assembly provides vehicle speed information to the powertrain control module (PCM). The VSS assembly is a permanent magnet (PM) generator. The PM generator produces a pulsing AC voltage as rotor teeth on the transmission output shaft pass through the sensor's magnetic field. The AC voltage level and the number of pulses increase as the speed of the vehicle increases. The PCM converts the pulsing voltage to vehicle speed. The PCM uses the vehicle speed signal to determine shift timing and torque converter clutch (TCC) scheduling.

If the PCM detects a low vehicle speed when there is a high engine speed in a drive gear range, then DTC P0502 sets. DTC P0502 is a type B DTC.

Conditions for Running the DTC

- No MAP sensor DTCs P0107 or P0108
- No TP sensor DTCs P0122 or P0123
- No TFP manual valve position switch DTC P1810
- The transmission is not in PARK or NEUTRAL
- The TP angle is greater than 12%.
- The engine vacuum is 0–105 kPa.
- The engine speed is greater than 3000 RPM.
- The engine torque is 40–400 lb ft.

Conditions for Setting the DTC

The transmission output speed is less than 150 RPM for 2.5 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands second gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0502 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

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Diagnostic Aids

- Inspect the connectors at the PCM, the VSS assembly and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests the VSS assembly circuit.
4. This step tests the integrity of the VSS assembly.

DTC P0502 Vehicle Speed Sensor (VSS) Circuit Low Input (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Raise and support the rear axle assembly. 6. Start the engine. 7. Place the transmission in any drive range. With the drive wheels rotating, does the *Scan Tool* Transmission OSS increase with the drive wheel speed?	—	Go to Diagnostic Aids	*Go to Step 3*
3	1. Turn OFF the ignition. 2. Disconnect the PCM connector C1. 3. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between harness connector terminals C1-64 and C1-65. Does the resistance measure within the specified range?	1377–3355 Ω	*Go to Step 4*	*Go to Step 7*
4	1. Place the transmission in NEUTRAL. 2. Select AC volts. 3. Hold one rear wheel from turning. 4. Rotate the other rear wheel by hand, ensuring that the driveshaft is turning. Does the voltage measure greater than the specified value?	0.5 volts	*Go to Step 5*	*Go to Step 12*
5	Measure the resistance from terminal C1-64 to ground. Does the resistance measure greater the specified value?	50 K Ω	*Go to Step 6*	*Go to Step 9*
6	1. Reconnect the PCM connector C1. 2. Disconnect the engine wiring harness from the VSS assembly. 3. Turn ON the ignition, with the engine OFF. 4. Test the input circuit (CKT 400) of the VSS assembly for a short to power. 5. Test the ground circuit (CKT 401) of the VSS assembly for a short to power. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	*Go to Step 14*

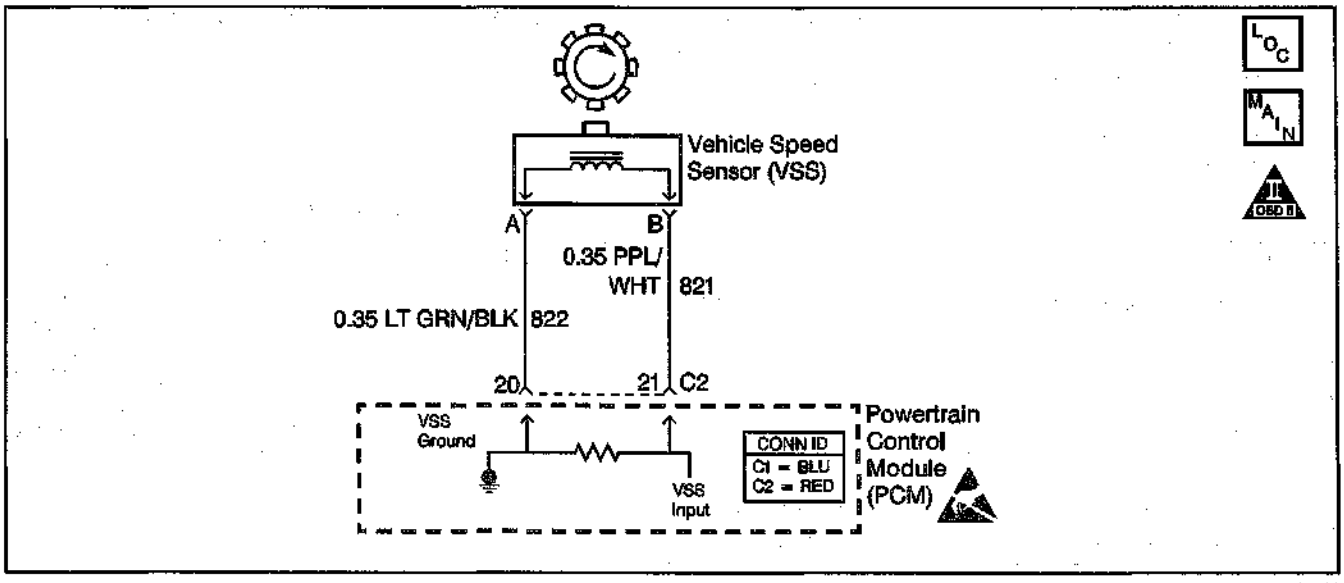
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DTC P0502 Vehicle Speed Sensor (VSS) Circuit Low Input (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
7	1. Disconnect the engine wiring harness from the VSS assembly. 2. Measure the resistance of the VSS assembly. Does the resistance measure within the specified range?	1377–3355 Ω	*Go to Step 8*	*Go to Step 13*
8	Was the resistance measured in Step 3 greater than the specified value?	3355 Ω	*Go to Step 10*	*Go to Step 11*
9	1. Test the input circuit (CKT 400) of the VSS assembly for a short to ground. 2. Test the ground circuit (CKT 401) of the VSS assembly for a short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
10	1. Test the input circuit (CKT 400) of the VSS assembly for an open. 2. Test the ground circuit (CKT 401) of the VSS assembly for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
11	Test the input circuit (CKT 400) and the ground circuit (CKT 401) of the VSS assembly for a short together. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
12	1. Remove the VSS assembly. 2. Inspect the output shaft speed sensor rotor for damage or misalignment. 3. Inspect the case extension bushing for wear. Did you find and correct the condition?	—	*Go to Step 15*	*Go to Step 13*
13	Replace the VSS assembly. Refer to *Vehicle Speed Sensor Replacement.* Did you complete the replacement?	—	*Go to Step 15*	—
14	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 15*	—
15	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle, so that the transmission output speed is greater than 250 RPM for 2 seconds. 4. Select Specific DTC. 5. Enter DTC P0502. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0502 Vehicle Speed Sensor (VSS) Circuit Low Input (5.7L)



Circuit Description

The vehicle speed sensor (VSS) assembly provides vehicle speed information to the powertrain control module (PCM). The VSS assembly is a permanent magnet (PM) generator. The PM generator produces a pulsing AC voltage as rotor teeth on the transmission output shaft pass through the sensor's magnetic field. The AC voltage level and the number of pulses increase as the speed of the vehicle increases. The PCM converts the pulsing voltage to vehicle speed. The PCM uses the vehicle speed signal to determine shift timing and torque converter clutch (TCC) scheduling.

If the PCM detects a low vehicle speed when there is a high engine speed in a drive gear range, then DTC P0502 sets. DTC P0502 is a type B DTC.

Conditions for Running the DTC

- No MAF sensor DTCs P0101, P0102 or P0103.
- No MAP sensor DTCs P0107 or P0108.
- No TP sensor DTCs P0122 or P0123.
- No TFP manual valve position switch DTC P1810.
- The engine vacuum is 0–105 kPa.
- The engine torque is 30–400 lb ft.
- The TP angle is greater than 15%.
- The engine speed is greater than 3000 RPM.
- The transmission is not in PARK or NEUTRAL.

Conditions for Setting the DTC

The transmission output speed is less than 150 RPM for 2.5 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands second gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0502 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the VSS assembly and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.

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Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. Disable the traction control system when performing this step. When the ignition key is cycled to the OFF position and then cycled back ON, the traction control system defaults to ON.
3. This step tests the VSS assembly circuit.
4. This step tests the integrity of the VSS assembly.

DTC P0502 Vehicle Speed Sensor (VSS) Circuit Low Input (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to A *Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Raise and support the rear axle assembly. 6. Start the engine. 7. Disable the traction control system. 8. Place the transmission in any drive range. With the drive wheels rotating, does the *Scan Tool* Transmission OSS increase with the drive wheel speed?	—	Go to Diagnostic Aids	*Go to Step 3*
3	1. Turn OFF the ignition. 2. Disconnect the PCM connector C2. 3. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between harness connector terminals C2-20 and C2-21. Does the resistance measure within the specified range?	1377–3355 Ω	*Go to Step 4*	*Go to Step 7*
4	1. Place the transmission in NEUTRAL. 2. Select AC volts. 3. Prevent one rear wheel from turning. 4. Rotate the other rear wheel by hand, ensuring that the driveshaft is turning. Does the voltage measure greater than the specified value?	0.5 volts	*Go to Step 5*	*Go to Step 12*
5	Measure the resistance from terminal C2-21 to ground. Does the resistance measure greater than the specified value?	50 K Ω	*Go to Step 6*	*Go to Step 9*
6	1. Reconnect the PCM connector C2. 2. Disconnect the engine wiring harness from the VSS assembly. 3. Turn ON the ignition, with the engine OFF. 4. Test the input circuit (CKT 821) of the VSS assembly for a short to power. 5. Test the ground circuit (CKT 822) of the VSS assembly for a short to power. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	*Go to Step 14*

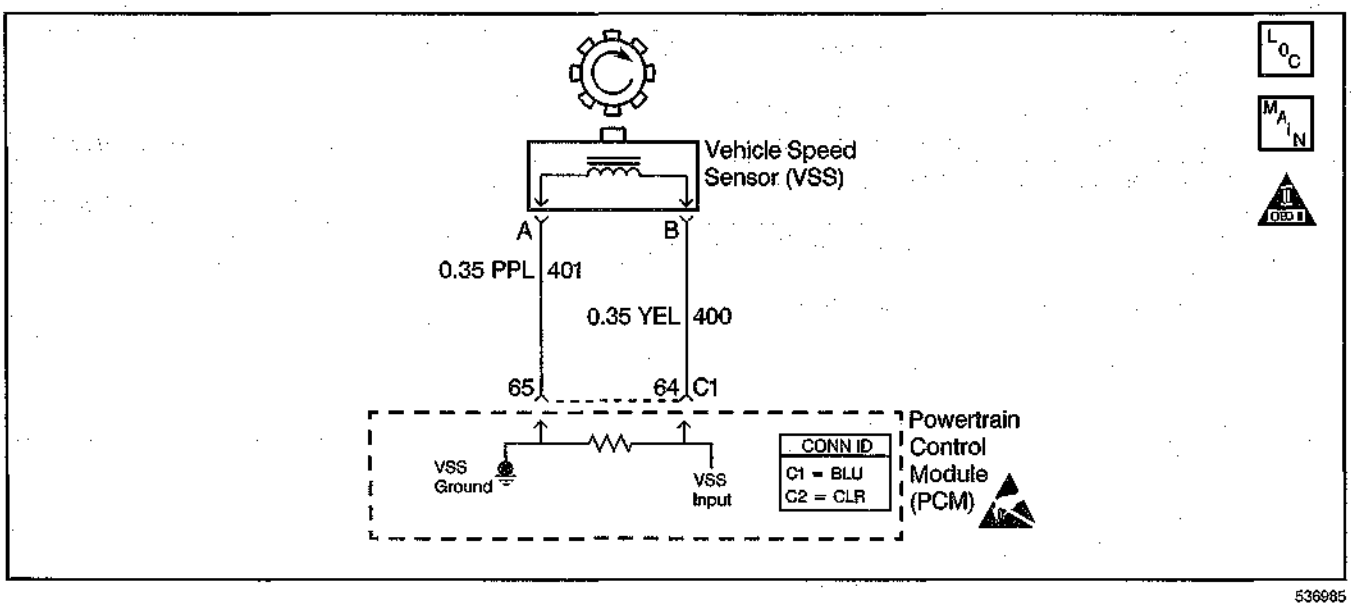
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DTC P0502 Vehicle Speed Sensor (VSS) Circuit Low Input (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
7	1. Disconnect the engine wiring harness from the VSS assembly. 2. Measure the resistance of the VSS assembly. Does the resistance measure within the specified range?	1377–3355 Ω	*Go to Step 8*	*Go to Step 13*
8	Was the resistance measured in Step 3 greater than the specified value?	3355 Ω	*Go to Step 10*	*Go to Step 11*
9	1. Test the input circuit (CKT 821) of the VSS assembly for a short to ground. 2. Test the ground circuit (CKT 822) of the VSS assembly for a short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
10	1. Test the input circuit (CKT 821) of the VSS assembly for an open. 2. Test the signal circuit (CKT 822) of the VSS assembly for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
11	Test the input circuit (CKT 821) and the ground circuit (CKT 822) of the VSS assembly for a short together. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
12	1. Remove the VSS assembly. 2. Inspect the output shaft speed sensor rotor for damage or misalignment. 3. Inspect the case extension bushing for wear. Did you find and correct the condition?	—	*Go to Step 15*	*Go to Step 13*
13	Replace the VSS assembly. Refer to *Vehicle Speed Sensor Replacement.* Did you complete the replacement?	—	*Go to Step 15*	—
14	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 15*	—
15	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle, so that the transmission output speed is greater than 250 RPM for 2 seconds. 4. Select Specific DTC. 5. Enter DTC P0502. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0503 Vehicle Speed Sensor (VSS) Circuit Intermittent (3.8L)



536985

Circuit Description

The vehicle speed sensor (VSS) assembly provides vehicle speed information to the powertrain control module (PCM). The VSS assembly is a permanent magnet (PM) generator. The PM generator produces a pulsing AC voltage as rotor teeth on the transmission output shaft pass through the sensor's magnetic field. The AC voltage level and the number of pulses increase as the speed of the vehicle increases. The PCM converts the pulsing voltage to vehicle speed. The PCM uses the vehicle speed signal to determine shift timing and torque converter clutch (TCC) scheduling.

When the PCM detects an unrealistically large drop in the vehicle speed, then DTC P0503 sets. DTC P0503 is a type B DTC.

Conditions for Running the DTC

- No TFP manual valve position switch DTC P1810.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The time since the last gear range change is greater than 6 seconds.
- The transmission output speed rise does not exceed 250 RPM within 2 seconds.

Conditions for Setting the DTC

The transmission output speed drops by greater than 1300 RPM for 3 seconds when the transmission is not in PARK or NEUTRAL.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands a soft landing to second gear when the engine speed is less than 2500 RPM.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0503 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the VSS assembly and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- Inspect for ABS DTCs. A faulty ABS condition may contribute to setting DTC P0503.

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Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests the VSS assembly circuit.
4. This step tests the integrity of the VSS assembly.

DTC P0503 Vehicle Speed Sensor (VSS) Circuit Intermittent (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Raise and support the rear axle assembly. 6. Start the engine. 7. Disable the traction control system, if equipped. 8. Place the transmission in D3 range. 9. With the drive wheels rotating, slowly accelerate to 2000 engine RPM and hold. Road test the vehicle if necessary. Does the *Scan Tool* Transmission OSS drop or fluctuate more than the specified value?	1300 RPM	*Go to Step 3*	Go to Diagnostic Aids
3	1. Turn OFF the ignition. 2. Disconnect the PCM connector C1. 3. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between harness connector terminals C1-64 and C1-65. Does the resistance measure within the specified range?	1377–3355 Ω	*Go to Step 4*	*Go to Step 7*
4	1. Place the transmission in NEUTRAL. 2. Select AC volts. 3. Hold one rear wheel from turning. 4. Rotate the other rear wheel by hand, ensuring that the driveshaft is turning. Does the voltage measure greater than the specified value?	0.5 volts	*Go to Step 5*	*Go to Step 12*
5	Measure the resistance from terminal C1-64 to ground. Does the resistance measure greater than the specified value?	50 K Ω	*Go to Step 6*	*Go to Step 9*
6	1. Reconnect the PCM connector C1. 2. Disconnect the engine wiring harness from the VSS assembly. 3. Turn ON the ignition, with the engine OFF. 4. Test the input circuit (CKT 400) of the VSS assembly for a short to power. 5. Test the ground circuit (CKT 401) of the VSS assembly for a short to power. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	*Go to Step 14*

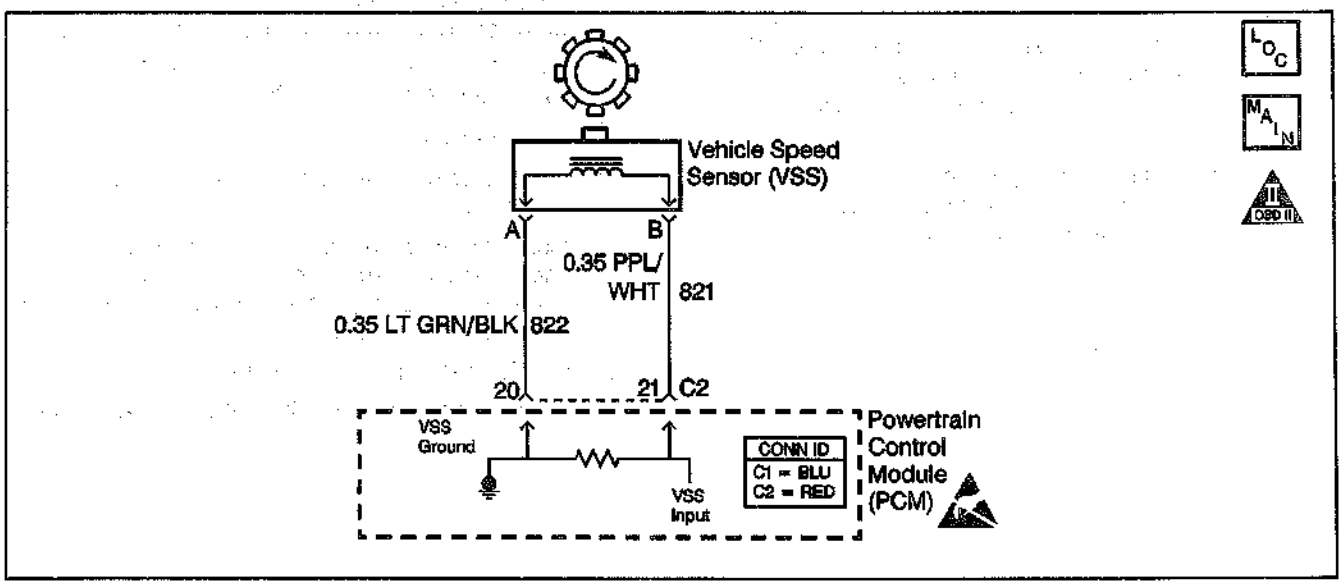
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DTC P0503 Vehicle Speed Sensor (VSS) Circuit Intermittent (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
7	1. Disconnect the engine wiring harness from the VSS assembly. 2. Measure the resistance of the VSS assembly. Does the resistance measure within the specified range?	1377–3355 Ω	*Go to Step 8*	*Go to Step 13*
8	Was the resistance measured in Step 3 greater than the specified value?	3355 Ω	*Go to Step 10*	*Go to Step 11*
9	1. Test the input circuit (CKT 400) of the VSS assembly for a short to ground. 2. Test the ground circuit (CKT 401) of the VSS assembly for a short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
10	1. Test the input circuit (CKT 400) of the VSS assembly for an open. 2. Test the ground circuit (CKT 401) of the VSS assembly for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
11	Test the input circuit (CKT 400) and the ground circuit (CKT 401) of the VSS assembly for a short together. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
12	1. Remove the VSS assembly. 2. Inspect the output shaft speed sensor rotor for damage or misalignment. 3. Inspect the case extension bushing for wear. Did you find and correct the condition?	—	*Go to Step 15*	*Go to Step 13*
13	Replace the VSS assembly. Refer to *Vehicle Speed Sensor Replacement.* Did you complete the replacement?	—	*Go to Step 15*	—
14	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 15*	—
15	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle, ensuring that the transmission output speed drop is less than 250 RPM for 2 seconds and output speed is greater than 300 RPM for 2 seconds. 4. Select Specific DTC. 5. Enter DTC P0503. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0503 Vehicle Speed Sensor (VSS) Circuit Intermittent (5.7L)



537109

Circuit Description

The vehicle speed sensor (VSS) assembly provides vehicle speed information to the powertrain control module (PCM). The VSS assembly is a permanent magnet (PM) generator. The PM generator produces a pulsing AC voltage as rotor teeth on the transmission output shaft pass through the sensor's magnetic field. The AC voltage level and the number of pulses increase as the speed of the vehicle increases. The PCM converts the pulsing voltage to vehicle speed. The PCM uses the vehicle speed signal to determine shift timing and torque converter clutch (TCC) scheduling.

When the PCM detects an unrealistically large drop in vehicle speed, then DTC P0503 sets. DTC P0503 is a type B DTC.

Conditions for Running the DTC

- No TFP manual valve position switch DTC P1810.
- The time since the last gear range change is greater than 6 seconds.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The transmission output speed rise does not exceed 600 RPM within 6 seconds.

Conditions for Setting the DTC

The transmission output speed drop is greater than 1300 RPM for 3 seconds when the transmission is not in PARK or NEUTRAL.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands a soft landing to second gear.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0503 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

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Diagnostic Aids

- Inspect the connectors at the PCM, the VSS assembly and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- Test circuits 821 and 822 for electromagnetic interferences (EMI) induced by a wiring harness incorrectly routed too near the spark plug wires.
- Inspect for ABS DTCs. A faulty ABS condition may contribute to setting DTC P0503.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. Disable the traction control system when performing this step. When the ignition switch is cycled OFF and then back ON, the traction control system defaults to ON.
3. This step tests the VSS assembly circuit.
4. This step tests the integrity of the VSS assembly.

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DTC P0503 Vehicle Speed Sensor (VSS) Circuit Intermittent (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Raise and support the rear axle assembly. 6. Start the engine. 7. Disable the traction control system. 8. Place the transmission in D3 range. 9. With the drive wheels rotating, slowly accelerate to 2000 engine RPM and hold. (Road test the vehicle if necessary). Does the *Scan Tool* Transmission OSS drop or fluctuate more than the specified value?	1300 RPM	*Go to Step 3*	Go to Diagnostic Aids
3	1. Turn OFF the ignition. 2. Disconnect the PCM connector C2. 3. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between harness connector terminals C2-20 and C2-21. Does the resistance measure within the specified range?	1377–3355 Ω	*Go to Step 4*	*Go to Step 7*
4	1. Place the transmission in NEUTRAL. 2. Select AC volts. 3. Prevent one rear wheel from turning. 4. Rotate the other rear wheel by hand, ensuring that the driveshaft is turning. Does the voltage measure greater than the specified value?	0.5 volts	*Go to Step 5*	*Go to Step 12*
5	Measure the resistance from terminal C2-21 to ground. Does the resistance measure greater than the specified value?	50 K Ω	*Go to Step 6*	*Go to Step 9*
6	1. Reconnect the PCM connector C2. 2. Disconnect the engine wiring harness from the VSS assembly. 3. Turn ON the ignition, with the engine OFF. 4. Test the input circuit (CKT 821) of the VSS assembly for a short to power. 5. Test the ground circuit (CKT 822) of the VSS assembly for a short to power. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	*Go to Step 14*
7	1. Disconnect the engine wiring harness from the VSS assembly. 2. Measure the resistance of the VSS assembly. Does the resistance measure within the specified range?	1377–3355 Ω	*Go to Step 8*	*Go to Step 13*
8	Was the resistance measured in Step 3 greater than the specified value?	3355 Ω	*Go to Step 10*	*Go to Step 11*

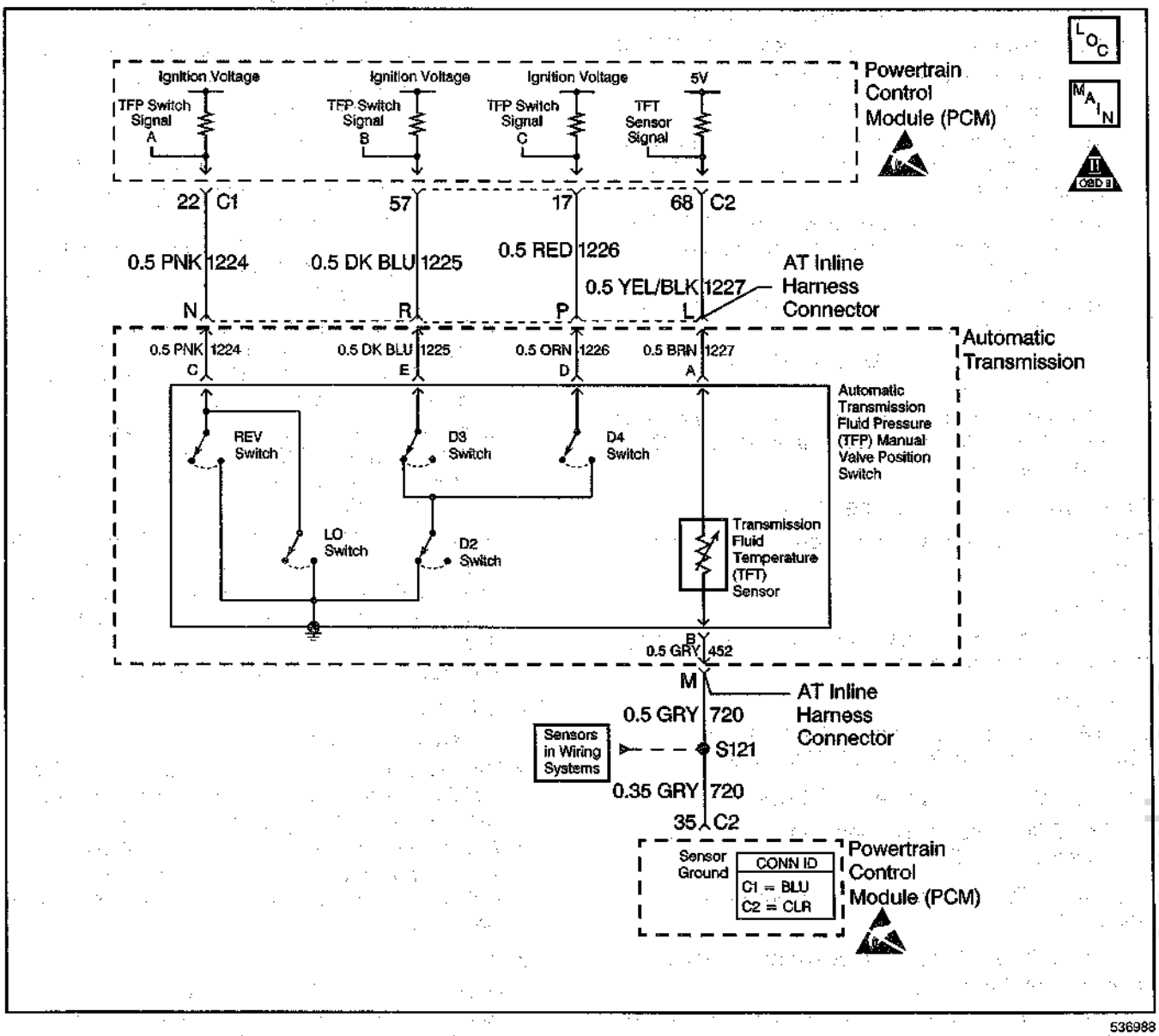
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DTC P0503 Vehicle Speed Sensor (VSS) Circuit Intermittent (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
9	1. Test the input circuit (CKT 821) of the VSS assembly for a short to ground. 2. Test the ground circuit (CKT 822) of the VSS assembly for a short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
10	1. Test the input circuit (CKT 821) of the VSS assembly for an open. 2. Test the signal circuit (CKT 822) of the VSS assembly for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
11	Test the input circuit (CKT 821) and the ground circuit (CKT 822) of the VSS assembly for a short together. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 15*	—
12	1. Remove the VSS assembly. 2. Inspect the output shaft speed sensor rotor for damage or misalignment. 3. Inspect the case extension bushing for wear. Did you find and correct the condition?	—	*Go to Step 15*	*Go to Step 13*
13	Replace the VSS assembly. Refer to *Vehicle Speed Sensor Replacement*. Did you complete the replacement?	—	*Go to Step 15*	—
14	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 15*	—
15	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle, ensuring that the transmission output speed drop is less than 500 RPM for 3 seconds and output speed is greater than 600 RPM for 3 seconds. 4. Select Specific DTC. 5. Enter DTC P0503. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0711 TFT Sensor Circuit Range/Performance (3.8L)



536988

Circuit Description

The automatic transmission fluid temperature (TFT) sensor is part of the automatic transmission fluid pressure (TFP) manual valve position switch. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases, and as the temperature decreases, the resistance increases. The powertrain control module (PCM) supplies a 5-volt reference signal to the sensor on circuit 1227 and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the PCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The PCM uses this information to control shift quality and torque converter clutch apply.

When the PCM detects one of the following unusual conditions, then DTC P0711 sets.

- An unrealistically large change in transmission temperature
- A transmission temperature which remains constant for a period of time in which a measurable amount of change is expected

DTC P0711 is a type C DTC.

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Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- No transmission component slipping DTC P1870.
- The system voltage is 8–18 volts.
- The engine is running for 409 seconds.
- The vehicle speed is greater than 8 km/h (5 mph) for 409 seconds cumulative during the current ignition cycle.
- The TCC slip speed is greater than 120 RPM for 409 seconds cumulative during the current ignition cycle.
- The TFT at startup is between –40 and +21°C (–40 and +70°F).
- The TFT is between –38 and +151°C (–36 and +304°F).
- The engine coolant temperature (ECT) is greater than 70°C (158°F) and has changed by 50°C (90°F) since startup.

Conditions for Setting the DTC

DTC P0711 sets if one of the following conditions occurs:

Condition 1

The TFT does not change more than 1.50°C (2.7°F) for 409 seconds since startup.

Condition 2

The TFT changes more than 20°C (36°F) in 200 milliseconds 14 times within 7 seconds.

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).

Important: The scan tool does not indicate the default TFT.

Important: The actions listed below are in order of highest to lowest priority.

- The PCM determines a default TFT using one of the following:
  1. If any ECT DTCs P0117 or P0118 are set, then the default TFT is equal to 135°C (275°F).
  2. If the ECT is 125°C (257°F) or more, then the default TFT is equal to 135°C (275°F).
  3. If the engine run time is less than 300 seconds and:
     - No intake air temperature (IAT) DTCs P0112 or P0113 are set and IAT is available, then the default TFT is equal to IAT.
     - Any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to 90°C (194°F).
  4. If the engine run time is greater than 300 seconds and No IAT DTCs P0112 or P0113 are set and IAT is available and ECT is between 40 and 125°C (104 and 257°F) and:
     - IAT at startup is less than 15°C (59°F), then the default TFT is equal to the ECT plus 5°C (8°F).
     - IAT at startup is greater than 35°C (95°F), then the default TFT is equal to the ECT plus 10°C (16°F).
     - IAT at startup is between 15 and 35°C (59 and 95°F), then the default TFT is equal to the ECT.
  5. If the engine run time is greater than 300 seconds and any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to the ECT.
  6. If the engine run time is greater than 300 seconds and ECT is less than 40°C (104°F) or more, then the default TFT is equal to 60°C (140°F).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0711 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the TFT sensor and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests for an intermittent short or open condition in the engine wiring harness. The test lamp is used as a resistor in the circuit.
6. This step determines if the PCM or the TFT sensor is causing a steady, unchanging TFT reading.

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DTC P0711 TFT Sensor Circuit Range/Performance (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*
3	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Select Trans. Fluid Temp. on the *Scan Tool.* 6. Drive the vehicle and observe the *Scan Tool* for either of the following conditions: • The Trans. Fluid Temp. does not change more than 1.50°C (2.7°F) in 409 seconds since startup • The Trans. Fluid Temp. changes more than 20°C (36°F) in 200 milliseconds 14 times within 7 seconds (unrealistic change). Did either of the conditions occur?	—	*Go to Step 4*	Go to Diagnostic Aids
4	Did the *Scan Tool* display a condition in which the Trans. Fluid Temp. does not change by more than the specified value in 409 seconds since startup?	1.50°C (2.7°F)	*Go to Step 6*	*Go to Step 5*
5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal L to terminal M of the *J 44152.* Refer to *Automatic Transmission Inline Harness Connector End View.* 5. Turn ON the ignition, with the engine OFF. 6. While observing the *Scan Tool* display, move or wiggle the engine wiring harness from PCM connector C2 to the AT inline 20-way connector. Does the *Scan Tool* Trans. Fluid Temp. change by more than the specified value?	20°C (36°F)	*Go to Step 7*	*Go to Step 8*
6	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector. 3. Turn ON the ignition, with the engine OFF. Does the *Scan Tool* display the same condition as in Step 4?	—	*Go to Step 11*	*Go to Step 10*

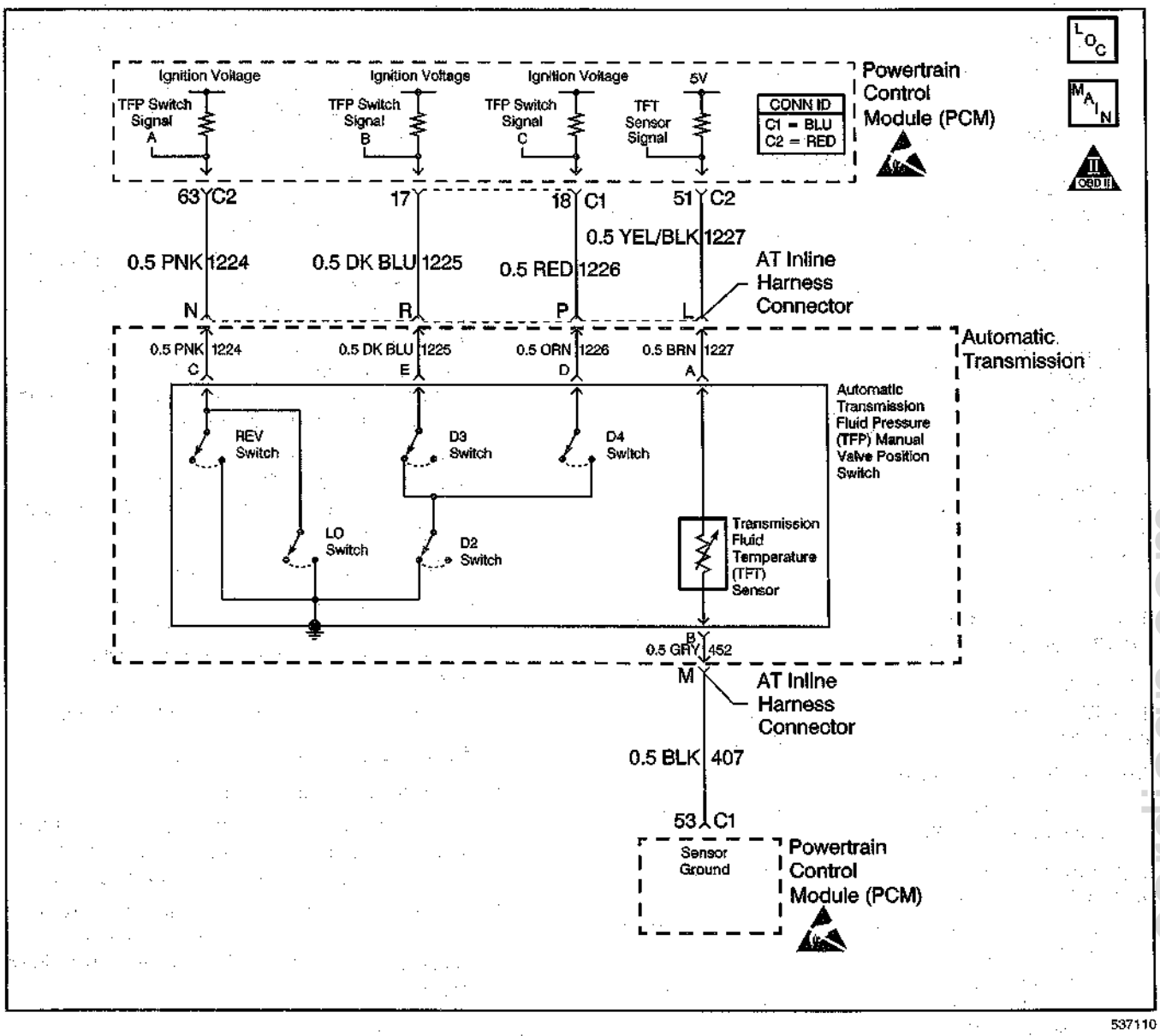
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DTC P0711 TFT Sensor Circuit Range/Performance (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
7	1. Test the signal circuit (CKT 1227) of the TFT sensor for an intermittent open or short condition between the PCM connector C2 and the AT inline 20-way connector. 2. Test the ground circuit (CKT 720) of the TFT sensor for an intermittent open or short condition. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 12*	*Go to Step 11*
8	1. Test the signal circuit (CKT 1227) of the TFT sensor for an intermittent open or short condition between the AT inline 20-way connector and the TFT sensor. 2. Test the ground circuit (CKT 452) of the TFT sensor for an intermittent open or short condition. Refer to *Circuit Testing* in Wiring Systems. Did you find an intermittent open or shorted condition?	—	*Go to Step 9*	*Go to Step 10*
9	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness* Replacement. Did you complete the replacement?	—	*Go to Step 12*	—
10	Replace the TFT sensor (this sensor is a part of the TFP manual valve position switch). Refer to *Valve Body and Pressure Switch Replacement.* Did you complete the replacement?	—	*Go to Step 12*	—
11	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 12*	—
12	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle and ensure that the following conditions are met: • The Trans. Fluid Temp. changes by more than 2.25°C (4°F) for 11 seconds since startup • The Trans. Fluid Temp. does not change by more than 20°C (36°F) within 200 milliseconds for a period of at least 11 seconds 4. Select Specific DTC. 5. Enter DTC P0711. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0711 TFT Sensor Circuit Range/Performance (5.7L)



537110

Circuit Description

The automatic transmission fluid temperature (TFT) sensor is part of the automatic transmission fluid pressure (TFP) manual valve position switch. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases, and as the temperature decreases, the resistance increases. The powertrain control module (PCM) supplies a 5-volt reference signal to the sensor on circuit 1227 and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the PCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The PCM uses this information to control shift quality and torque converter clutch apply.

When the PCM detects one of the following unusual conditions, then DTC P0711 sets.

- An unrealistically large change in transmission temperature
- A transmission temperature which remains constant for a period of time in which a measurable amount of change is expected

DTC P0711 is a type C DTC.

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Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- No Transmission Component Slipping DTC P1870.
- The system voltage is 8–18 volts.
- The engine is running for 409 seconds.
- The engine coolant temperature (ECT) is greater than 70°C (158°F) and the temperature has changed by 50°C (90°F) since startup.
- The vehicle speed is greater than 8 km/h (5 mph) for 409 seconds cumulative during the current ignition cycle.
- The TFT at startup is between –40 and +21°C (–40 and +70°F).
- The TFT is between –38 and +151°C (–36 and +304°F).
- The TCC slip speed is greater than 120 RPM for 409 seconds cumulative during the current ignition cycle.

Conditions for Setting the DTC

DTC P0711 sets if one of the following conditions occurs:

Condition 1

The TFT does not change more than 1.50°C (2.7°F) for 409 seconds since startup.

Condition 2

The TFT changes more than 20°C (36°F) in 200 milliseconds 14 times within 7 seconds.

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).

Important: The actions listed below are in order of highest to lowest priority.

- The PCM determines a default TFT using one of the following:
  1. If any ECT DTCs P0117 or P0118 are set, then the default TFT is equal to 135°C (275°F).
  2. If the ECT is 125°C (257°F) or more, then the default TFT is equal to 135°C (275°F).
  3. If the engine run time is less than 300 seconds and:
     - No intake air temperature (IAT) DTCs P0112 or P0113 are set and IAT is available, then the default TFT is equal to IAT.
     - Any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to 90°C (194°F).
  4. If the engine run time is greater than 300 seconds and no IAT DTCs P0112 or P0113 are set and IAT is available and ECT is between 40 and 125°C (104 and 257°F) and:
     - IAT at startup is less than 15°C (59°F), then the default TFT is equal to the ECT plus 5°C (8°F).
     - IAT at startup is greater than 35°C (95°F), then the default TFT is equal to the ECT plus 10°C (16°F).
     - IAT at startup is between 15 and 35°C (59 and 95°F), then the default TFT is equal to the ECT.
  5. If the engine run time is greater than 300 seconds and any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to the ECT.
  6. If the engine run time is greater than 300 seconds and ECT is less than 40°C (104°F) or more, then the default TFT is equal to 60°C (140°F).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0711 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the TFT sensor and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5. This step tests for an intermittent short or open condition in the engine wiring harness. The test lamp is used as a resistor in the circuit.
6. This step determines if the PCM or the TFT sensor is causing a steady, unchanging TFT reading.

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DTC P0711 TFT Sensor Circuit Range/Performance (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*
3	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Select Trans. Fluid Temp. on the *Scan Tool.* 6. Drive the vehicle and observe the *Scan Tool* for either of the following conditions: • The Trans. Fluid Temp. does not change more than 1.50°C (2.7°F) in 409 seconds since startup • The Trans. Fluid Temp. changes more than 20°C (36°F) in 200 milliseconds 14 times within 7 seconds Did either of the conditions occur?	—	*Go to Step 4*	Go to Diagnostic Aids
4	Did the *Scan Tool* display a condition in which the Trans. Fluid Temp. does not change by more than the specified value in 409 seconds since startup?	1.50°C (2.7°F)	*Go to Step 6*	*Go to Step 5*
5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal L to terminal M of the *J 44152.* Refer to *Automatic Transmission Inline Harness Connector End View.* 5. Turn ON the ignition, with the engine OFF. 6. While observing the *Scan Tool* display, move or wiggle the engine wiring harness from PCM connectors C1 and C2 to the AT inline 20-way connector. Does the *Scan Tool* Trans. Fluid Temp. change by more than the specified value?	20°C (36°F)	*Go to Step 7*	*Go to Step 8*
6	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector. 3. Turn ON the ignition, with the engine OFF. Does the *Scan Tool* display the same condition as in Step 4?	—	*Go to Step 11*	*Go to Step 10*

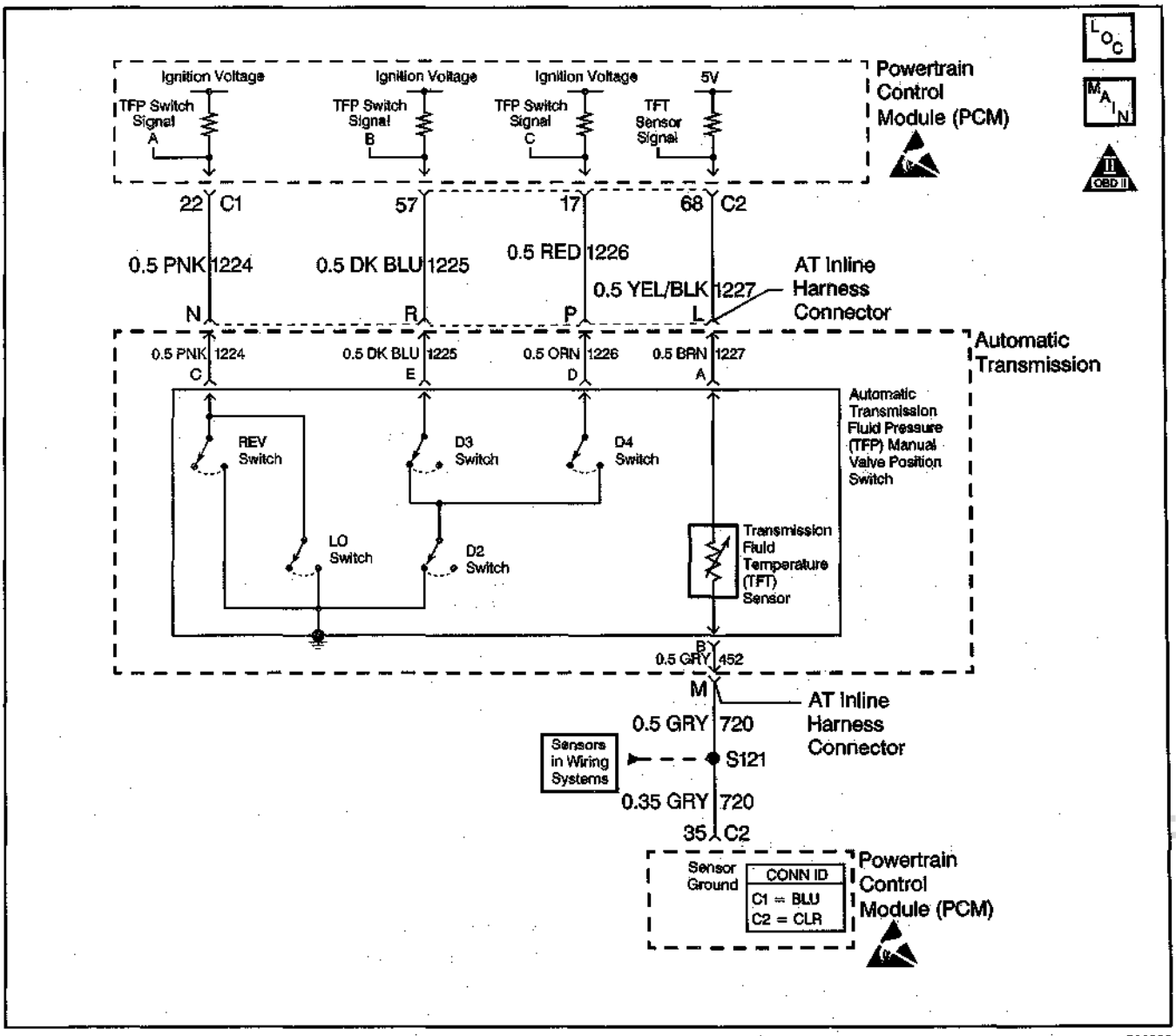
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DTC P0711 TFT Sensor Circuit Range/Performance (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
7	1. Test the signal circuit (CKT 1227) of the TFT sensor for an intermittent open or short condition between the PCM connector C2 and the AT inline 20-way connector. 2. Test the ground circuit (CKT 407) of the TFT sensor for an intermittent open or short condition. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 12*	*Go to Step 11*
8	1. Test the signal circuit (CKT 1227) of the TFT sensor for an intermittent open or short condition between the AT inline 20-way connector and the TFT sensor. 2. Test the ground circuit (CKT 452) of the TFT sensor for an intermittent open or short condition. Refer to *Circuit Testing* in Wiring Systems. Did you find an intermittent open or short condition?	—	*Go to Step 9*	*Go to Step 10*
9	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 12*	—
10	Replace the TFT sensor (this sensor is part of the TFP manual valve position switch). Refer to *Valve Body and Pressure Switch Replacement.* Did you complete the replacement?	—	*Go to Step 12*	—
11	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 12*	—
12	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle and ensure that the following conditions are met: • The Trans. Fluid Temp. changes by more than 2.25°C (4°F) for 11 seconds since startup • The Trans. Fluid Temp. does not change by more than 20°C (36°F) within 200 milliseconds for a period of at least 11 seconds 4. Select Specific DTC. 5. Enter DTC P0711. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input (3.8L)



536988

Circuit Description

The automatic transmission fluid temperature (TFT) sensor is part of the automatic transmission fluid pressure (TFP) manual valve position switch. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases, and as the temperature decreases, the resistance increases. The powertrain control module (PCM) supplies a 5-volt reference signal to the sensor on circuit 1227 and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the PCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The PCM uses this information to control shift quality and torque converter clutch apply.

When the PCM detects a continuous short to ground in the TFT signal circuit or in the TFT sensor, then DTC P0712 sets. DTC P0712 is a type C DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The ignition is ON.

Conditions for Setting the DTC

The TFT sensor indicates a signal voltage less than 0.2 volts for 10 seconds.

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Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).

Important: The scan tool does not indicate the default TFT.

Important: The actions listed below are in order of highest to lowest priority.

- The PCM determines a default TFT using one of the following:
  1. If any ECT DTCs P0117 or P0118 are set, then the default TFT is equal to 135°C (275°F).
  2. If the ECT is 125°C (257°F) or more, then the default TFT is equal to 135°C (275°F).
  3. If the engine run time is less than 300 seconds and:
     - No intake air temperature (IAT) DTCs P0112 or P0113 are set and IAT is available, then the default TFT is equal to IAT.
     - Any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to 90°C (194°F).
  4. If the engine run time is greater than 300 seconds and No IAT DTCs P0112 or P0113 are set and IAT is available and ECT is between 40 and 125°C (104 and 257°F):
     - IAT at startup is less than 15°C (59°F), then the default TFT is equal to the ECT plus 5°C (8°F).
     - IAT at startup is greater than 35°C (95°F), then the default TFT is equal to the ECT plus 10°C (16°F).
     - IAT at startup is between 15 and 35°C (59 and 95°F), then the default TFT is equal to the ECT.
  5. If the engine run time is greater than 300 seconds and any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to the ECT.
  6. If the engine run time is greater than 300 seconds and ECT is less than 40°C (104°F) or more, then the default TFT is equal to 60°C (140°F).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0712 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the TFT sensor and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- The scan tool also displays the transmission fluid temperature in degrees. After the transmission is operating, the fluid temperature should rise steadily to a normal operating temperature, then stabilize.
- Verify customer driving habits, trailer towing, etc. Trailer towing should occur in D3.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests for a short to ground condition.
4. This step tests for an internal fault in the transmission by creating an open.

DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure*. Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*

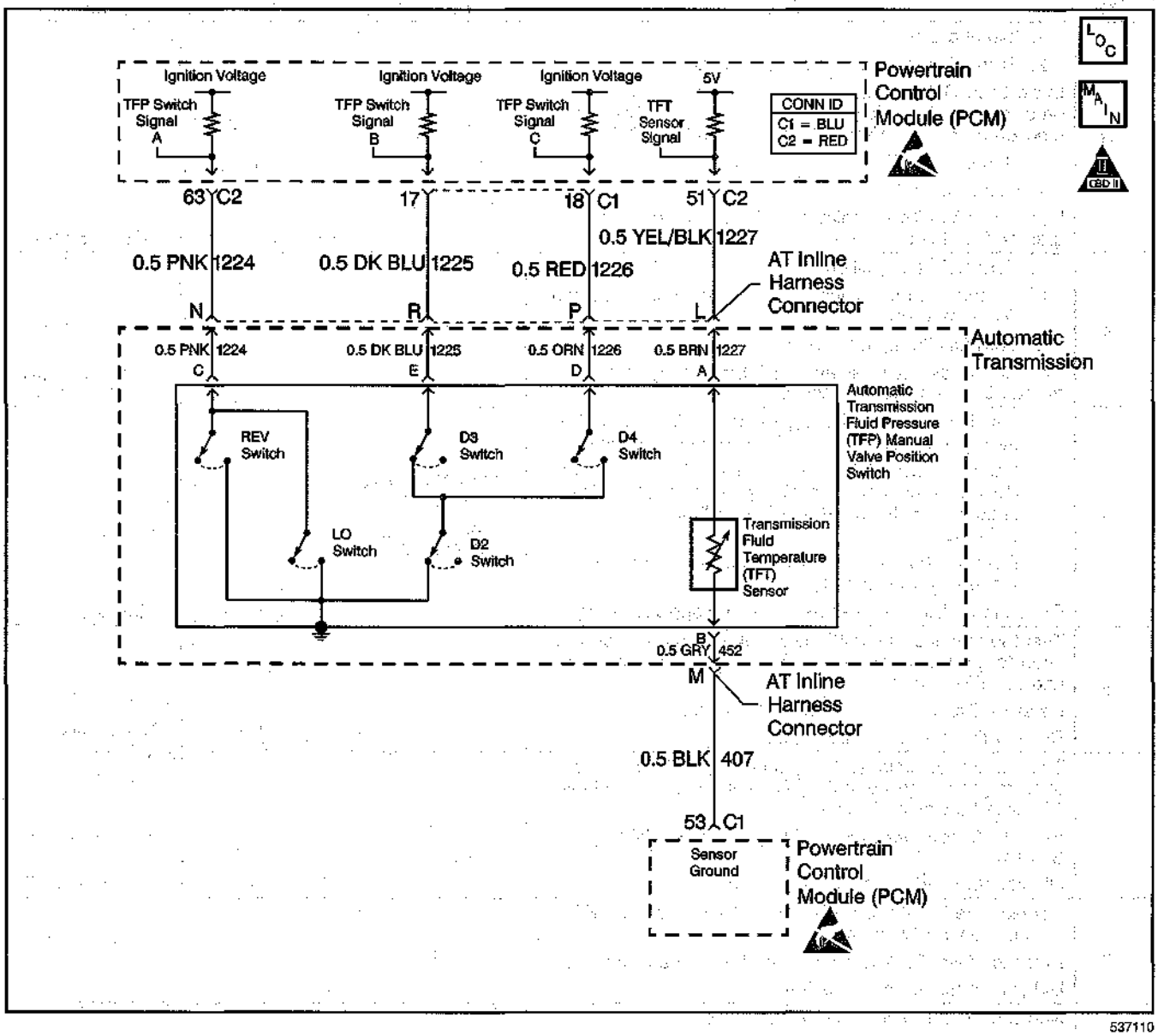
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DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
3	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. Does the *Scan Tool* display a TFT Sensor signal voltage greater than the specified value?	0.2 V	Go to Diagnostic Aids	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Turn ON the ignition, with the engine OFF. Does the *Scan Tool* display a TFT Sensor signal voltage greater than the specified value?	4.92 V	*Go to Step 5*	*Go to Step 7*
5	1. Install the *J 44152* jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between terminals L and M of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	3088–3942 Ω at 20°C (68°F) 159–198 Ω at 100°C (212°F)	Go to Diagnostic Aids	*Go to Step 6*
6	Test the signal circuit (CKT 1227) of the TFT sensor for a short to ground between the AT inline 20-way connector and the TFT sensor. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 9*	*Go to Step 8*
7	Test the signal circuit (CKT 1227) of the TFT sensor for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 11*	*Go to Step 10*
8	Replace the TFT sensor (this sensor is part of the TFP manual valve position switch). Refer to *Valve Body and Pressure Switch Replacement*. Did you complete the replacement?	—	*Go to Step 11*	—
9	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness*. Did you complete the replacement?	—	*Go to Step 11*	—
10	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 11*	—
11	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Verify that the *Scan Tool* indicates a TFT Sensor signal voltage greater than 0.2 volts for 10 seconds. 5. Select Specific DTC. 6. Enter DTC P0712. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input (5.7L)



537110

Circuit Description

The automatic transmission fluid temperature (TFT) sensor is part of the automatic transmission fluid pressure (TFP) manual valve position switch. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases, and as the temperature decreases, the resistance increases. The powertrain control module (PCM) supplies a 5-volt reference signal to the sensor on circuit 1227 and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the PCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The PCM uses this information to control shift quality and torque converter clutch apply.

When the PCM detects a continuous short to ground in the TFT signal circuit or in the TFT sensor, then DTC P0712 sets. DTC P0712 is a type C DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The ignition is ON.

Conditions for Setting the DTC

The TFT sensor indicates a signal voltage less than 0.2 volts for 10 seconds.

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Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).

Important: The actions listed below are in order of highest to lowest priority.

- The PCM determines a default TFT using one of the following:
  1. If any ECT DTCs P0117 or P0118 are set, then the default TFT is equal to 135°C (275°F).
  2. If the ECT is 125°C (257°F) or more, then the default TFT is equal to 135°C (275°F).
  3. If the engine run time is less than 300 seconds and:
     - No intake air temperature (IAT) DTCs P0112 or P0113 are set and IAT is available, then the default TFT is equal to IAT.
     - Any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to 90°C (194°F).
  4. If the engine run time is greater than 300 seconds and no IAT DTCs P0112 or P0113 are set and IAT is available and ECT is between 40 and 125°C (104 and 257°F) and:
     - IAT at startup is less than 15°C (59°F), then the default TFT is equal to the ECT plus 5°C (8°F).
     - IAT at startup is greater than 35°C (95°F), then the default TFT is equal to the ECT plus 10°C (16°F).
     - IAT at startup is between 15 and 35°C (59 and 95°F), then the default TFT is equal to the ECT.
  5. If the engine run time is greater than 300 seconds and any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to the ECT.
  6. If the engine run time is greater than 300 seconds and ECT is less than 40°C (104°F) or more, then the default TFT is equal to 60°C (140°F).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0712 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the TFT sensor and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- The scan tool displays the transmission fluid temperature in degrees. After the transmission is operating, the fluid temperature should rise steadily to a normal operating temperature, then stabilize.
- Verify the customer's driving habits, trailer towing, etc. Trailer towing should occur in D3.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests for a short to ground condition.
4. This step tests for an internal fault within the transmission by creating an open.

DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*

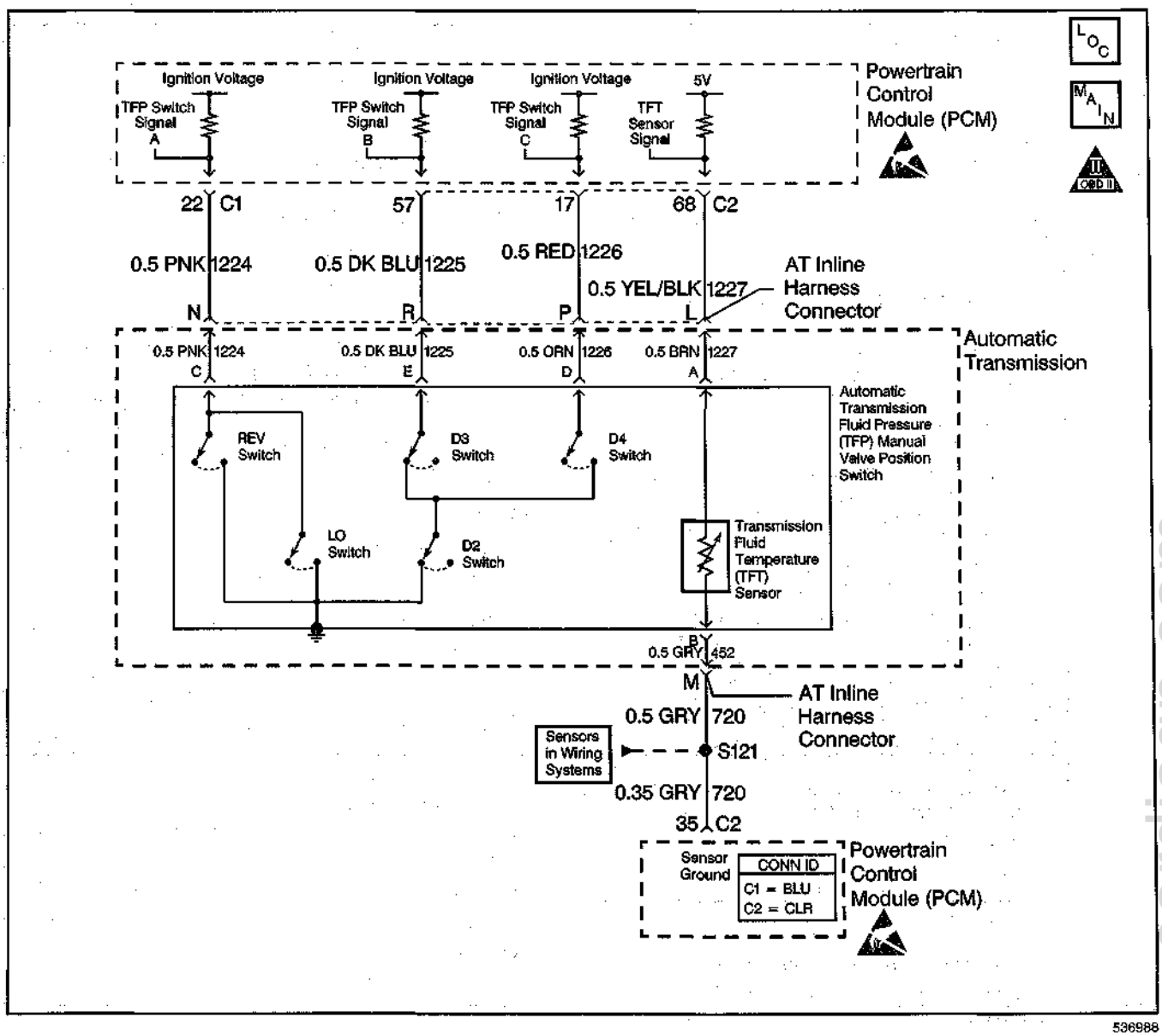
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DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
3	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. Does the *Scan Tool* display a TFT Sensor signal voltage greater than the specified value?	0.2 V	Go to Diagnostic Aids	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Turn ON the ignition, with the engine OFF. Does the *Scan Tool* display a TFT Sensor signal voltage greater than the specified value?	4.92 V	*Go to Step 5*	*Go to Step 7*
5	1. Install the *J 44152* jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between terminals L and M of the *J 44152.* Refer to *Automatic Transmission Inline Harness Connector End View.* Does the resistance measure within the specified range?	3088–3942 Ω at 20°C (68°F) 159–198 Ω at 100°C (212°F)	Go to Diagnostic Aids	*Go to Step 6*
6	Test the signal circuit (CKT 1227) of the TFT sensor for a short to ground between the AT inline 20-way connector and the TFT sensor. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 9*	*Go to Step 8*
7	Test the signal circuit (CKT 1227) of the TFT sensor for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 11*	*Go to Step 10*
8	Replace the TFT sensor (this sensor is part of the TFP manual valve position switch). Refer to *Valve Body and Pressure Switch Replacement.* Did you complete the replacement?	—	*Go to Step 11*	—
9	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 11*	—
10	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 11*	—
11	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Verify that the *Scan Tool* indicates a TFT Sensor signal voltage greater than 0.2 volts for 10 seconds. 5. Select Specific DTC. 6. Enter DTC P0712. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input (3.8L)



536988

Circuit Description

The automatic transmission fluid temperature (TFT) sensor is part of the automatic transmission fluid pressure (TFP) manual valve position switch. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases, and as the temperature decreases, the resistance increases. The powertrain control module (PCM) supplies a 5-volt reference signal to the sensor on circuit 1227 and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the PCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The PCM uses this information to control shift quality and torque converter clutch apply.

When the PCM detects a continuous open or short to power in the TFT signal circuit or the TFT sensor, then DTC P0713 sets. DTC P0713 is a type C DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The ignition is ON.

Conditions for Setting the DTC

The TFT sensor indicates a signal voltage greater than 4.92 volts for 409 seconds (6.8 minutes).

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Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).

Important: The scan tool does not indicate the default TFT.

Important: The actions listed below are in order of highest to lowest priority.

- The PCM determines a default TFT using one of the following:
  1. If any ECT DTCs P0117 or P0118 are set, then the default TFT is equal to 135°C (275°F).
  2. If the ECT is 125°C (257°F) or more, then the default TFT is equal to 135°C (275°F).
  3. If the engine run time is less than 300 seconds and:
     - No intake air temperature (IAT) DTCs P0112 or P0113 are set and IAT is available, then the default TFT is equal to IAT.
     - Any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to 90°C (194°F).
  4. If the engine run time is greater than 300 seconds and No IAT DTCs P0112 or P0113 are set and IAT is available and ECT is between 40 and 125°C (104 and 257°F) and:
     - IAT at startup is less than 15°C (59°F), then the default TFT is equal to the ECT plus 5°C (8°F).
     - IAT at startup is greater than 35°C (95°F), then the default TFT is equal to the ECT plus 10°C (16°F).
     - IAT at startup is between 15 and 35°C (59 and 95°F), then the default TFT is equal to the ECT.
  5. If the engine run time is greater than 300 seconds and any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to the ECT.
  6. If the engine run time is greater than 300 seconds and ECT is less than 40°C (104°F) or more, then the default TFT is equal to 60°C (140°F).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0713 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the TFT sensor and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- The scan tool also displays the transmission fluid temperature in degrees. After the transmission is operating, the fluid temperature should rise steadily to a normal operating temperature, then stabilize.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step verifies a condition in the TFT sensor circuit.
4. This step simulates a TFT sensor DTC P0712. If the PCM recognizes low signal voltage (high temperature), the PCM and wiring are functioning normally.
5. This step tests the TFT sensor and automatic transmission (AT) wiring harness assembly.

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DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*
3	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. Does the *Scan Tool* display a TFT Sensor signal voltage less than the specified value?	4.92 V	Go to Diagnostic Aids	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Connect a fused jumper wire between terminal L and terminal M of the *J 44152.* Refer to *Automatic Transmission Inline Harness Connector End View.* 5. Turn ON the ignition, with the engine OFF. Does the TFT Sensor signal voltage drop to less than the specified value?	0.2 V	*Go to Step 5*	*Go to Step 8*
5	1. Turn OFF the ignition. 2. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 3. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between terminal L and terminal M of the *J 44152.* Refer to *Automatic Transmission Inline Harness Connector End View.* Does the resistance measure within the specified range?	3088–3942 Ω at 20°C (68°F) 159–198 Ω at 100°C (212°F)	Go to Diagnostic Aids	*Go to Step 6*
6	Test the signal circuit (CKT 1227) and ground circuit (CKT 452) of the TFT sensor for an open between the AT inline 20-way connector and the TFT sensor. Refer to *Circuit Testing* in Wiring Systems. Did you find an open condition?	—	*Go to Step 10*	*Go to Step 7*
7	Replace the TFT sensor (this sensor is part of the TFP manual valve position switch). Refer to *Valve Body and Pressure Switch Replacement.* Did you complete the replacement?	—	*Go to Step 12*	—
8	Test the signal circuit (CKT 1227) of the TFT sensor for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 12*	*Go to Step 9*
9	Test the ground circuit (CKT 720) of the TFT sensor for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 12*	*Go to Step 11*

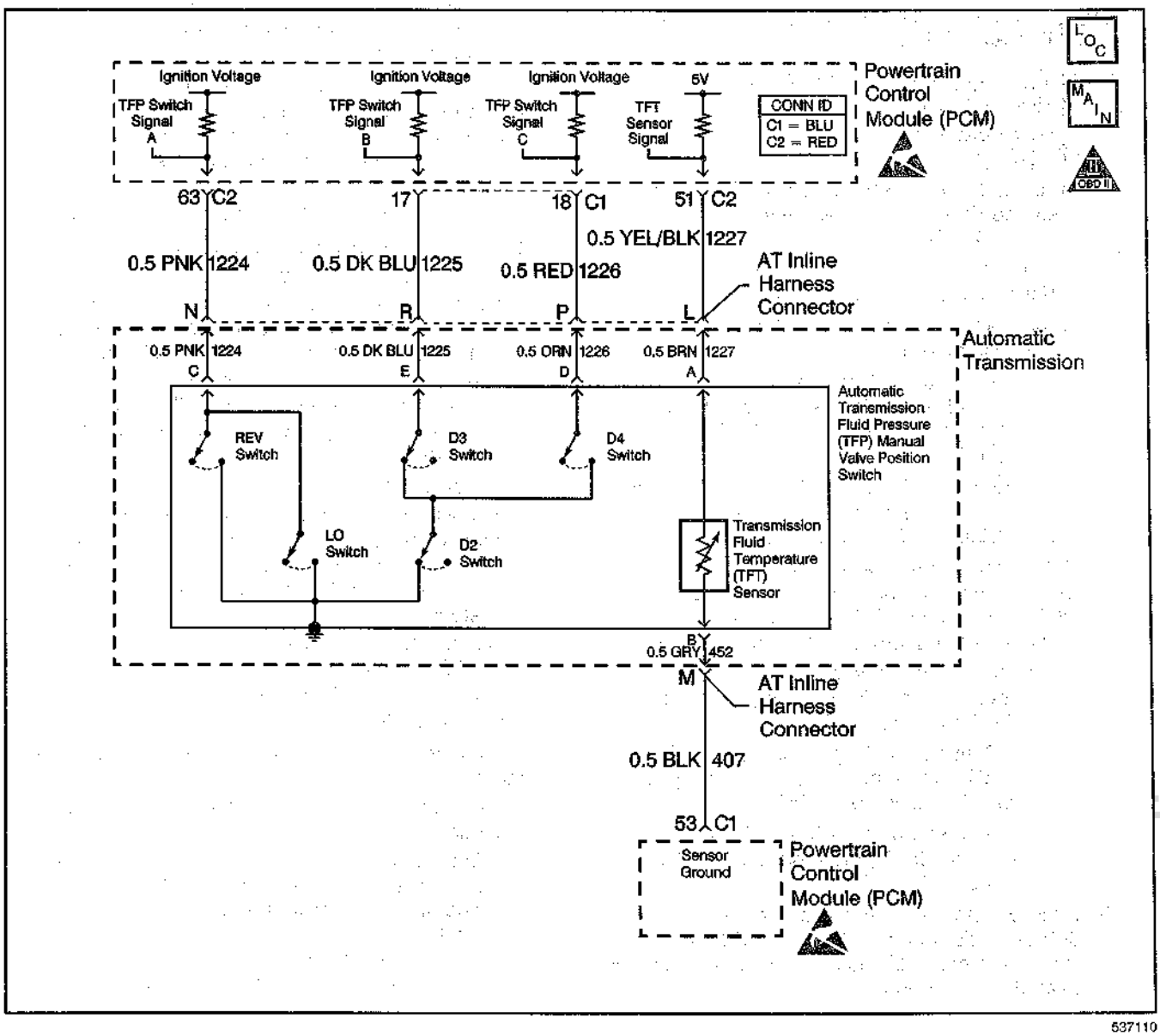
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DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
10	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 12*	—
11	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 12*	—
12	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Verify that the *Scan Tool* indicates a TFT Sensor signal voltage less than 4.92 volts for 409 seconds (6.8 minutes). 5. Select Specific DTC. 6. Enter DTC P0713. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input (5.7L)



537110

Circuit Description

The automatic transmission fluid temperature (TFT) sensor is part of the automatic transmission fluid pressure (TFP) manual valve position switch. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases, and as the temperature decreases, the resistance increases. The powertrain control module (PCM) supplies a 5-volt reference signal to the sensor on circuit 1227 and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the PCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The PCM uses this information to control shift quality and torque converter clutch apply.

When the PCM detects a continuous open or short to power in the TFT signal circuit or the TFT sensor, then DTC P0713 sets. DTC P0713 is a type C DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The ignition is ON.

Conditions for Setting the DTC

The TFT sensor indicates a signal voltage greater than 4.92 volts for 409 seconds (6.8 minutes).

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Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).

Important: The actions listed below are in order of highest to lowest priority.

- The PCM determines a default TFT using one of the following:
  1. If any ECT DTCs P0117 or P0118 are set, then the default TFT is equal to 135°C (275°F).
  2. If the ECT is 125°C (257°F) or more, then the default TFT is equal to 135°C (275°F).
  3. If the engine run time is less than 300 seconds and:
     - No intake air temperature (IAT) DTCs P0112 or P0113 are set and IAT is available, then the default TFT is equal to IAT.
     - Any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to 90°C (194°F).
  4. If the engine run time is greater than 300 seconds and no IAT DTCs P0112 or P0113 are set and IAT is available and ECT is between 40 and 125°C (104 and 257°F) and:
     - IAT at startup is less than 15°C (59°F), then the default TFT is equal to the ECT plus 5°C (8°F).
     - IAT at startup is greater than 35°C (95°F), then the default TFT is equal to the ECT plus 10°C (16°F).
     - IAT at startup is between 15 and 35°C (59 and 95°F), then the default TFT is equal to the ECT.
  5. If the engine run time is greater than 300 seconds and any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to the ECT.
  6. If the engine run time is greater than 300 seconds and ECT is less than 40°C (104°F) or more, then the default TFT is equal to 60°C (140°F).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0713 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the TFT sensor and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step verifies a condition in the TFT sensor circuit.
4. This step simulates a TFT sensor DTC P0712. If the PCM recognizes low signal voltage (high temperature), the PCM and wiring are functioning normally.
5. This step tests the TFT sensor and automatic transmission (AT) wiring harness assembly.

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DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*
3	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. Does the *Scan Tool* display a TFT Sensor signal voltage less than the specified value?	4.92 V	Go to Diagnostic Aids	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Connect a fused jumper wire between terminal L and terminal M of the *J 44152.* Refer to *Automatic Transmission Inline Harness Connector End View.* 5. Turn ON the ignition, with the engine OFF. Does the TFT Sensor signal voltage drop to less than the specified value?	0.2 V	*Go to Step 5*	*Go to Step 8*
5	1. Turn OFF the ignition. 2. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 3. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between terminal L and terminal M of the *J 44152.* Refer to *Automatic Transmission Inline Harness Connector End View.* Does the resistance measure within the specified range?	3088–3942 Ω at 20°C (68°F) 159–198 Ω at 100°C (212°F)	Go to Diagnostic Aids	*Go to Step 6*
6	Test the signal circuit (CKT 1227) and ground circuit (CKT 452) of the TFT sensor for an open between the AT inline 20-way connector and the TFT sensor. Refer to *Circuit Testing* in Wiring Systems. Did you find an open condition?	—	*Go to Step 10*	*Go to Step 7*
7	Replace the TFT sensor (this sensor is part of the TFP manual valve position switch). Refer to *Valve Body and Pressure Switch Replacement.* Did you complete the replacement?	—	*Go to Step 12*	—
8	Test the signal circuit (CKT 1227) of the TFT sensor for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 12*	*Go to Step 9*
9	Test the ground circuit (CKT 407) of the TFT sensor for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 12*	*Go to Step 11*

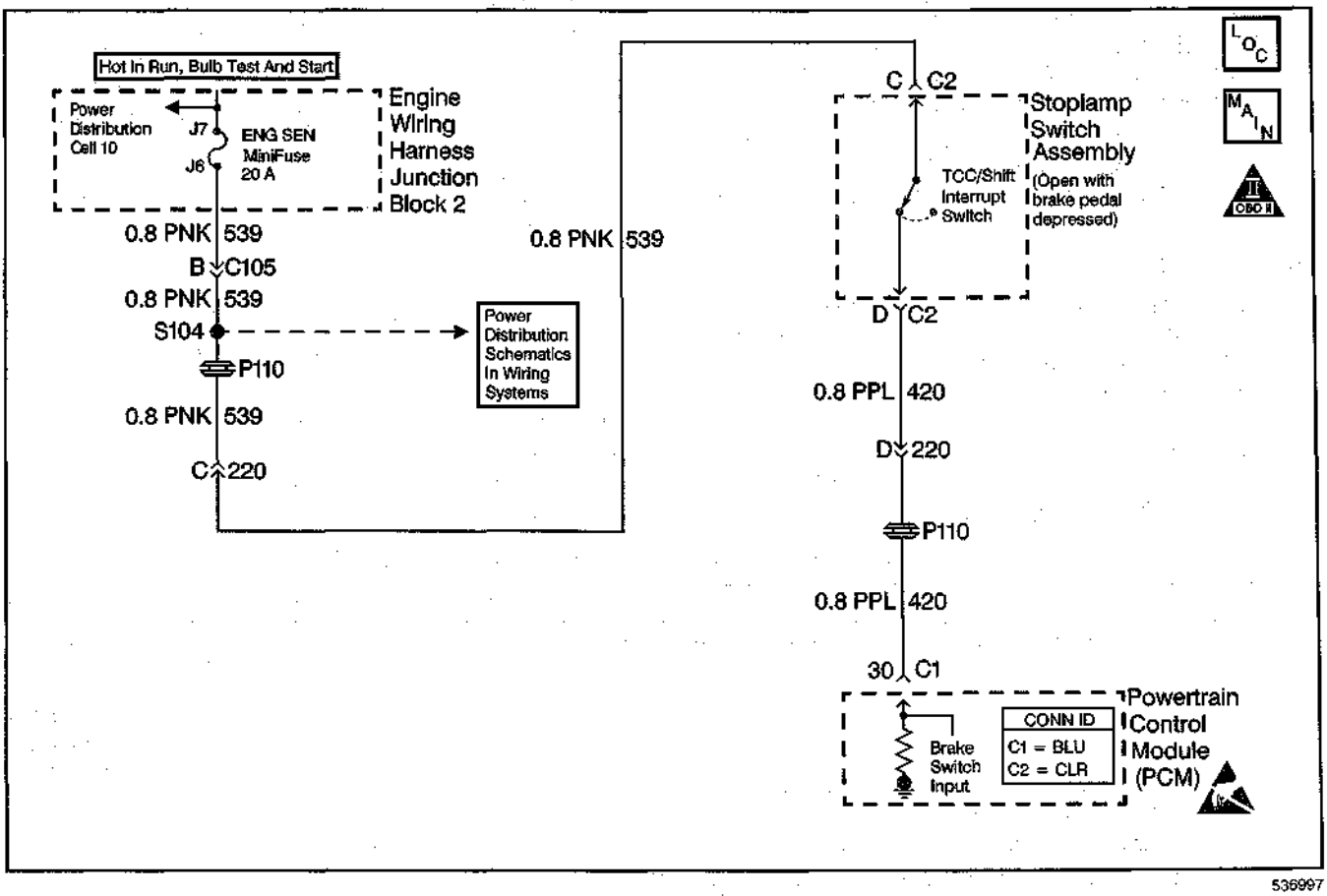
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DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
10	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 12*	—
11	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 12*	—
12	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Verify that the *Scan Tool* indicates a TFT Sensor signal voltage less than 4.92 volts for 409 seconds (6.8 minutes). 5. Select Specific DTC. 6. Enter DTC P0713. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0719 Brake Switch Circuit Low Input (3.8L)



Circuit Description

The brake switch indicates brake pedal status to the powertrain control module (PCM). The brake switch is a normally-closed switch that supplies battery voltage on circuit 420 to the PCM. Applying the brake pedal opens the switch, interrupting voltage to the PCM. When the brake pedal is released, the PCM receives a constant voltage signal. If the PCM receives a zero voltage signal at the brake switch input, and the torque converter clutch (TCC) is engaged, the PCM de-energizes the TCC solenoid valve. The PCM disregards the brake switch input for TCC scheduling if there is a brake switch circuit fault (Refer to Diagnostic Aids).

When the PCM detects an open brake switch circuit (0 volts, low input) during accelerations, then DTC P0719 sets. DTC P0719 is a type C DTC.

Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- The ignition is ON.

Conditions for Setting the DTC

The PCM detects an open brake switch or circuit (0 volts) for 15 minutes without changing for 2 seconds, and the following events occur eight times:

- The vehicle speed is less than 8 km/h (5 mph);
- then the vehicle speed is 8–32 km/h (5–20 mph) for 4 seconds;
- then the vehicle speed is greater than 32 km/h (20 mph) for 6 seconds.

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PCM disregards the brake switch input for TCC scheduling.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0719 in PCM history.

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Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the brake switch and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- If the PCM detects a brake switch fault, then the brake switch input is disregarded for TCC scheduling. The PCM then uses throttle position and vehicle speed to determine TCC application and release. Use of these inputs may result in a noticeable harsh apply or abrupt release of the TCC.
- Ask about the customer's driving habits. Ask about unusual driving conditions (e.g. stop and go, expressway, etc.).
- Inspect the brake switch for proper mounting and operation.
- Inspect for ABS DTCs. A faulty ABS condition may contribute to setting DTC P0719.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step isolates the brake switch as a source for setting the DTC.

DTC P0719 Brake Switch Circuit Low Input (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Select TCC Brake Switch on the *Scan Tool.* 6. Disconnect the brake switch connector from the brake switch. 7. Connect a test lamp from terminal C of the brake switch connector to ground. Does the test lamp illuminate?	—	*Go to Step 3*	*Go to Step 4*
3	Connect a fused jumper wire between terminal C and terminal D of the brake switch connector. Did the TCC Brake Switch status on the *Scan Tool* change from Open to Closed?	—	*Go to Step 7*	*Go to Step 9*
4	Inspect the ENG SEN fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 5*	*Go to Step 8*
5	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 539) of the brake switch for a short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 11*	*Go to Step 6*

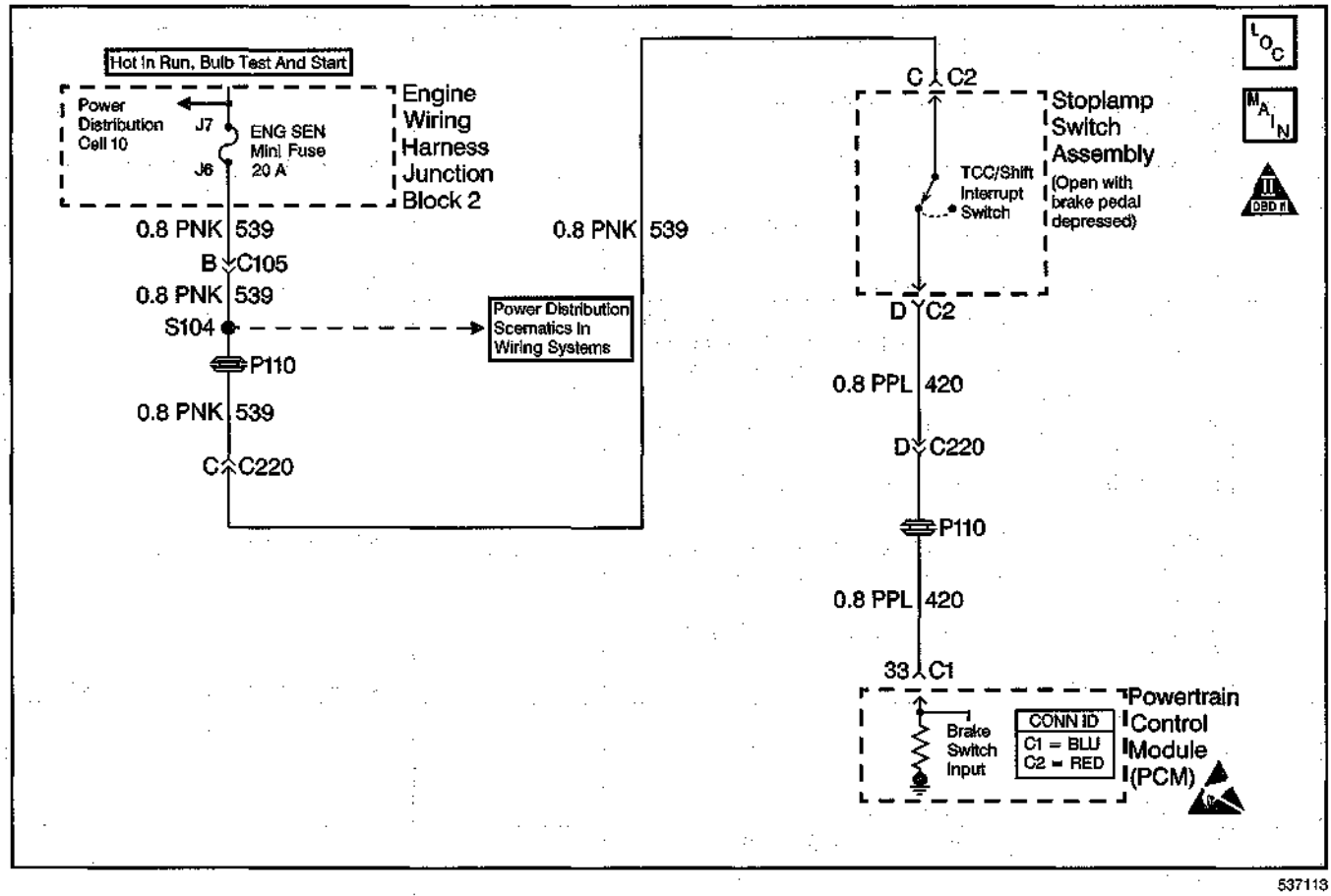
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DTC P0719 Brake Switch Circuit Low Input (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
6	Test input circuit (CKT 420) of the brake switch for a short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 11*	*Go to Step 10*
7	Replace the brake switch. Refer to *Stoplamp Switch Replacement* in Hydraulic Brakes. Did you complete the replacement?	—	*Go to Step 11*	—
8	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 539) of the brake switch for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 11*	—
9	Test the input circuit (CKT 420) of the brake switch for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 11*	*Go to Step 10*
10	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 11*	—
11	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Apply and release the brake pedal. 5. Verify that the *Scan Tool* TCC Brake Switch status indicates Closed (12 volts) for 2 seconds. 6. Select Specific DTC. 7. Enter DTC P0719. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0719 Brake Switch Circuit Low Input (5.7L)



Circuit Description

The brake switch indicates brake pedal status to the powertrain control module (PCM). The brake switch is a normally-closed switch that supplies battery voltage on circuit 420 to the PCM. Applying the brake pedal opens the switch, interrupting voltage to the PCM. When the brake pedal is released, the PCM receives a constant voltage signal. If the PCM receives a zero voltage signal at the brake switch input, and the torque converter clutch (TCC) is engaged, the PCM de-energizes the TCC solenoid valve. The PCM disregards the brake switch input for TCC scheduling if there is a brake switch circuit fault (Refer to Diagnostic Aids).

When the PCM detects an open brake switch circuit (0 volts, low input) during accelerations, then DTC P0719 sets. DTC P0719 is a type C DTC.

Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- The ignition is ON.

Conditions for Setting the DTC

The PCM detects an open brake switch or circuit (0 volts) for 15 minutes without changing for 2 seconds, and the following events occur seven times:

- The vehicle speed is less than 8 km/h (5 mph);
- then the vehicle speed is 8–32 km/h (5–20 mph) for 4 seconds;
- then the vehicle speed is greater than 32 km/h (20 mph) for 6 seconds.

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PCM disregards the brake switch input for TCC scheduling.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0719 in PCM history.

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Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the brake switch and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- If the PCM detects a brake switch fault, then the brake switch input is disregarded for TCC scheduling. The PCM then uses throttle position and vehicle speed to determine TCC application and release. Use of these inputs may result in a noticeable harsh apply or abrupt release of the TCC.
- Ask about the customer's driving habits. Ask about unusual driving conditions (e.g. stop and go, expressway, etc.).
- Inspect the brake switch for proper mounting and operation.
- Inspect for ABS DTCs. A faulty ABS condition may contribute to setting DTC P0719.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step isolates the brake switch as a source for setting the DTC.

DTC P0719 Brake Switch Circuit Low Input (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Select TCC Brake Switch on the *Scan Tool*. 6. Disconnect the brake switch connector from the brake switch. 7. Connect a test lamp from terminal C of the brake switch connector to ground. Does the test lamp illuminate?	—	*Go to Step 3*	*Go to Step 4*
3	Connect a fused jumper wire between terminal C and terminal D of the brake switch connector. Did the TCC Brake Switch status on the *Scan Tool* change from Open to Closed?	—	*Go to Step 7*	*Go to Step 9*
4	Inspect the ENG SEN fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 5*	*Go to Step 8*
5	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 539) of the brake switch for a short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 11*	*Go to Step 6*

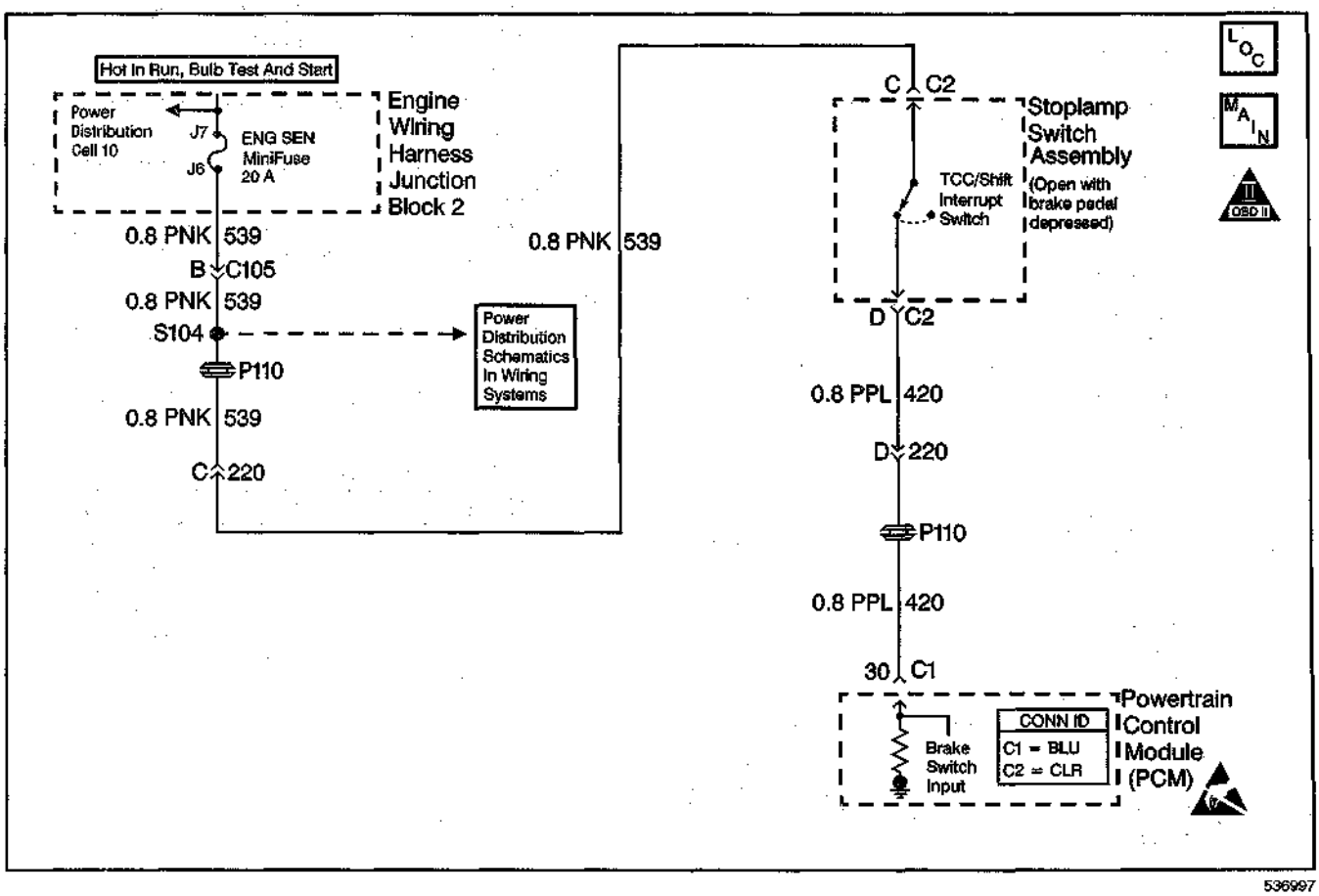
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DTC P0719 Brake Switch Circuit Low Input (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
6	Test input circuit (CKT 420) of the brake switch for a short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 11*	*Go to Step 10*
7	Replace the brake switch. Refer to *Stoplamp Switch Replacement* in Hydraulic Brakes. Did you complete the replacement?	—	*Go to Step 11*	—
8	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 539) of the brake switch for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 11*	—
9	Test the input circuit (CKT 420) of the brake switch for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 11*	*Go to Step 10*
10	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 11*	—
11	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Apply and release the brake pedal. 5. Verify that the *Scan Tool* TCC Brake Switch status indicates Closed (12 volts) for 2 seconds. 6. Select Specific DTC. 7. Enter DTC P0719. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0724 Brake Switch Circuit High Input (3.8L)



Circuit Description

The brake switch indicates brake pedal status to the powertrain control module (PCM). The brake switch is a normally-closed switch that supplies battery voltage on circuit 420 to the PCM. Applying the brake pedal opens the switch, interrupting voltage to the PCM. When the brake pedal is released, the PCM receives a constant voltage signal. If the PCM receives a zero voltage signal at the brake switch input, and the torque converter clutch (TCC) is engaged, the PCM de-energizes the TCC solenoid valve. The PCM disregards the brake switch input for TCC scheduling if there is a brake switch circuit fault.

When the PCM detects a closed brake switch circuit (12 volts, high input) during decelerations, then DTC P0724 sets. DTC P0724 is a type C DTC.

Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- The ignition is ON.

Conditions for Setting the DTC

The PCM detects a closed brake switch circuit (12 volts) without changing for 2 seconds and the following events occur eight times:

- The vehicle speed is greater than 32 km/h (20 mph) for 6 seconds;
- then the vehicle speed is between 8–32 km/h (5–20 mph) for 4 seconds;
- then the vehicle speed is less than 8 km/h (5 mph).

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0724 in PCM history.

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Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the brake switch and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- Ask about the customer's driving habits. Ask about unusual driving conditions (e.g. stop and go, expressway, etc.).
- Inspect the brake switch for proper mounting and operation.
- Inspect for ABS DTCs. A faulty ABS condition may contribute to setting DTC P0724.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

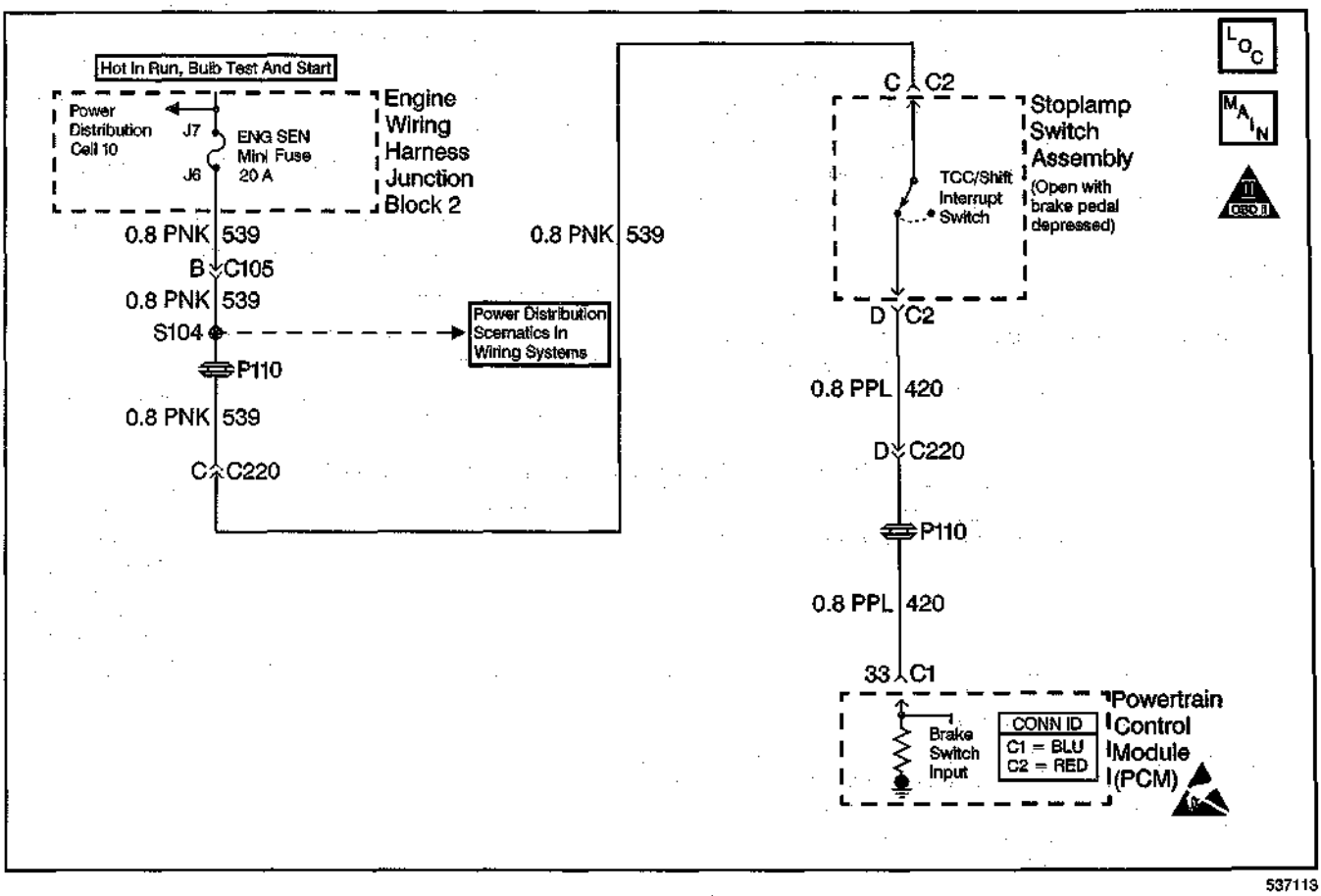
2. This step isolates the brake switch as a source for setting the DTC.

DTC P0724 Brake Switch Circuit High Input (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Select TCC Brake Switch on the *Scan Tool.* 6. Disconnect the brake switch connector from the brake switch. Did the TCC Brake Switch status change from Closed to Open?	—	*Go to Step 3*	*Go to Step 4*
3	Replace the brake switch. Refer to *Stoplamp Switch Replacement* in Hydraulic Brakes. Did you complete the replacement?	—	*Go to Step 6*	—
4	Test input circuit (CKT 420) of the brake switch for a short to power. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 6*	*Go to Step 5*
5	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 6*	—
6	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Apply and release the brake pedal. 5. Verify that the *Scan Tool* TCC Brake Switch status indicates Open (0 volts) for 2 seconds. 6. Select Specific DTC. 7. Enter DTC P0724. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0724 Brake Switch Circuit High Input (5.7L)



Circuit Description

The brake switch indicates brake pedal status to the powertrain control module (PCM). The brake switch is a normally-closed switch that supplies battery voltage on circuit 420 to the PCM. Applying the brake pedal opens the switch, interrupting voltage to the PCM. When the brake pedal is released, the PCM receives a constant voltage signal. If the PCM receives a zero voltage signal at the brake switch input, and the torque converter clutch (TCC) is engaged, the PCM de-energizes the TCC solenoid valve. The PCM disregards the brake switch input for TCC scheduling if there is a brake switch circuit fault.

When the PCM detects a closed brake switch circuit (12 volts, high input) during decelerations, then DTC P0724 sets. DTC P0724 is a type C DTC.

Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- The ignition is ON.

Conditions for Setting the DTC

The PCM detects a closed brake switch circuit (12 volts) without changing for 2 seconds and the following events occur seven times:

- The vehicle speed is greater than 32 km/h (20 mph) for 6 seconds;
- then the vehicle speed is between 8–32 km/h (5–20 mph) for 4 seconds;
- then the vehicle speed is less than 8 km/h (5 mph).

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0724 in PCM history.

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Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the brake switch and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- Ask about the customer's driving habits. Ask about unusual driving conditions (e.g. stop and go, expressway, etc.).
- Inspect the brake switch for proper mounting and operation.
- Inspect for ABS DTCs. A faulty ABS condition may contribute to setting DTC P0724.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

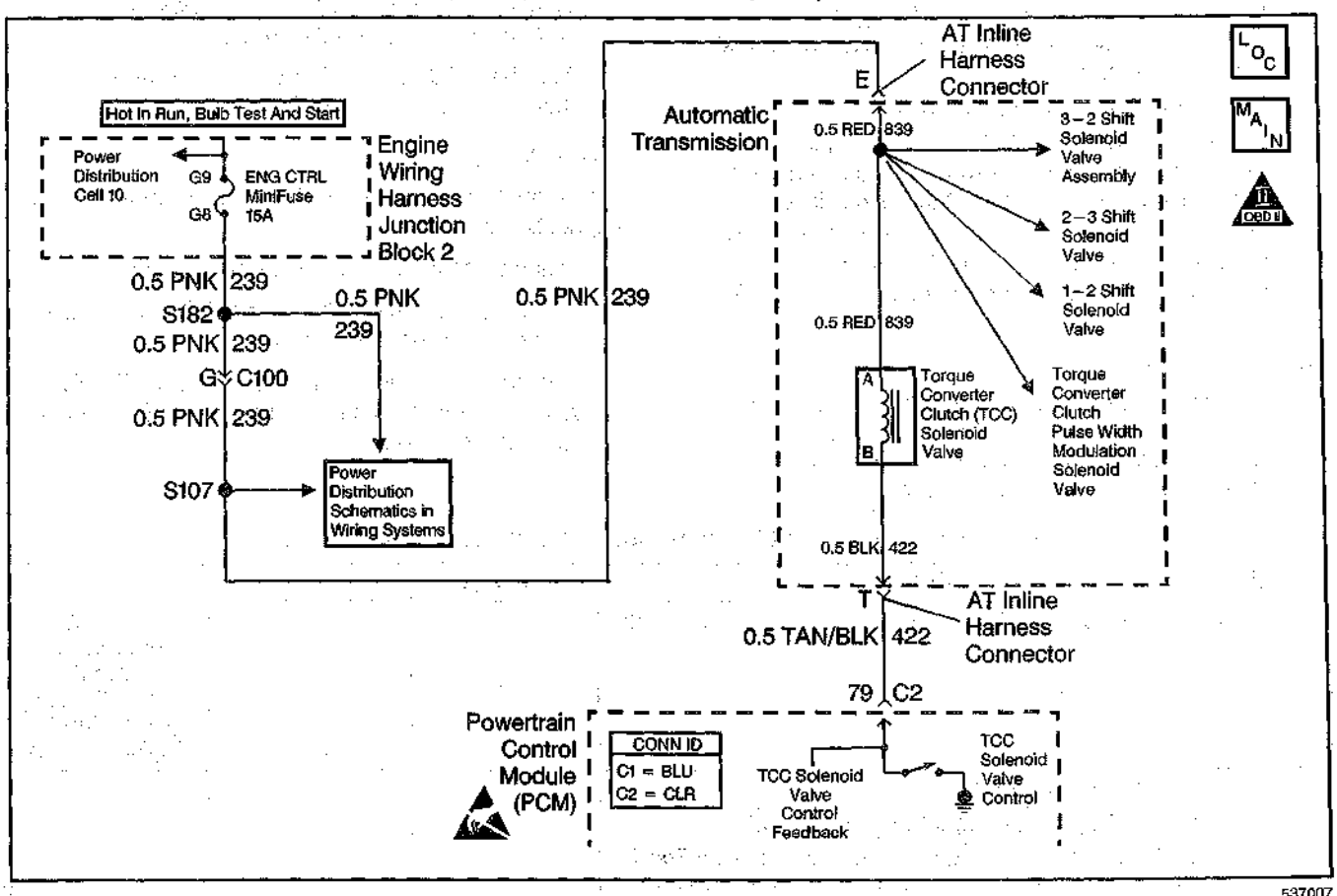
2. This step isolates the brake switch as a source for setting the DTC.

DTC P0724 Brake Switch Circuit High Input (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Select TCC Brake Switch on the *Scan Tool.* 6. Disconnect the brake switch connector from the brake switch. Did the TCC Brake Switch status change from Closed to Open?	—	*Go to Step 3*	*Go to Step 4*
3	Replace the brake switch. Refer to *Stoplamp Switch Replacement* in Hydraulic Brakes. Did you complete the replacement?	—	*Go to Step 6*	—
4	Test input circuit (CKT 420) of the brake switch for a short to power. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 6*	*Go to Step 5*
5	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 6*	—
6	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Apply and release the brake pedal. 5. Verify that the *Scan Tool* TCC Brake Switch status indicates Open (0 volts) for 2 seconds. 6. Select Specific DTC. 7. Enter DTC P0724. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0740 TCC Enable Solenoid Circuit Electrical (3.8L)



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Circuit Description

The torque converter clutch (TCC) solenoid valve is an electrical device that is used with the torque converter clutch pulse width modulation (TCC PWM) solenoid valve in order to control TCC apply and release. The TCC solenoid valve attaches to the transmission case assembly extending into the pump cover. The TCC solenoid valve receives ignition voltage through circuit 239. The powertrain control module (PCM) controls the solenoid by providing the ground path on circuit 422. The PCM monitors the throttle position (TP) voltage, the vehicle speed and other inputs in order to determine when to energize the TCC solenoid valve.

When the PCM detects a continuous open, short to ground or short to power in the TCC solenoid valve circuit, then DTC P0740 sets. DTC P0740 is a type B DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0740 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high (B+).

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low (0 volt).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0740 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

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Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connector at the PCM and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- With the TCC engaged, the TCC slip speed should be –20 to +40 RPM.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests for voltage to the solenoid.
5. This step tests the ability of the PCM and wiring to control the ground circuit.
7. This step tests the resistance of the TCC solenoid valve and the automatic transmission (AT) wiring harness assembly.

DTC P0740 TCC Enable Solenoid Circuit Electrical (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0753 • P0758 • P0785 • P1860	—	*Go to Step 3*	*Go to Step 4*
3	Inspect the ENG CTRL fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 9*	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal E of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View.* Does the test lamp illuminate?	—	*Go to Step 5*	*Go to Step 12*

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DTC P0740 TCC Enable Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
5	1. Connect the test lamp from terminal E to terminal T of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. 2. Use the *Scan Tool* in order to command the TCC solenoid valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	—	*Go to Step 7*	*Go to Step 6*
6	Is the test lamp always ON?	—	*Go to Step 13*	*Go to Step 14*
7	1. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between terminals T and E of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	21–33 Ω	*Go to Step 8*	*Go to Step 15*
8	1. Measure the resistance from terminal E of the *J 44152* to ground. 2. Measure the resistance from terminal T of the *J 44152* to ground. Do both readings measure greater than the specified value?	250 K Ω	Go to Diagnostic Aids	*Go to Step 15*
9	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the TCC solenoid valve for a short to ground between the engine wiring harness junction block 2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	*Go to Step 10*
10	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 839) of the TCC solenoid valve for a short to ground between the AT inline 20-way connector and the TCC solenoid valve. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 15*	*Go to Step 11*
11	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	—	*Go to Step 17*	—
12	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the TCC solenoid valve for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	—

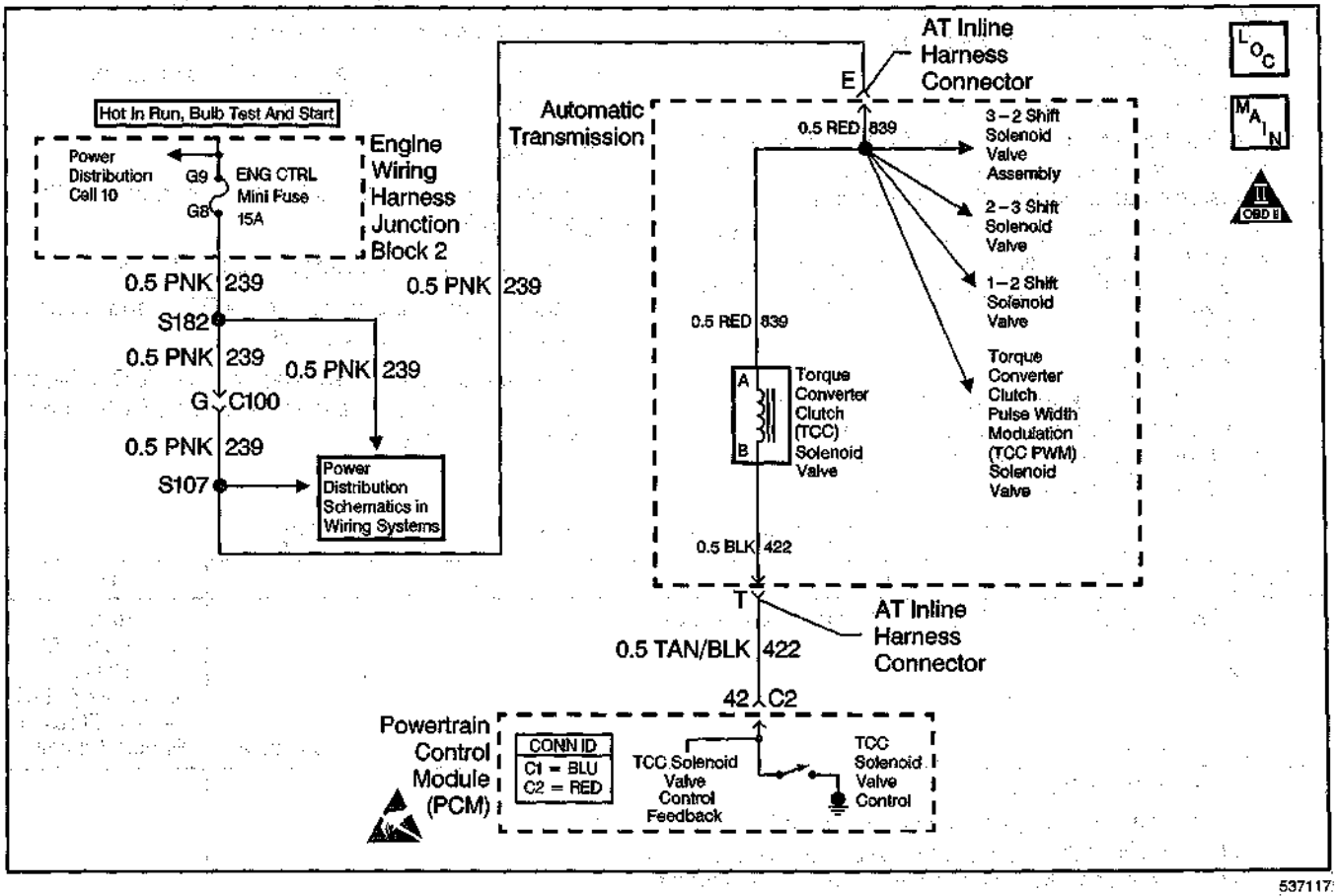
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DTC P0740 TCC Enable Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
13	Test the control circuit (CKT 422) of the TCC solenoid valve for a short to ground between the PCM180 connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	*Go to Step 16*
14	Test the control circuit (CKT 422) of the TCC solenoid valve for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	*Go to Step 16*
15	Replace the AT wiring harness assembly (this includes the TCC solenoid valve). Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 17*	—
16	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 17*	—
17	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 with the TCC ON and OFF. Ensure the following conditions are met: • The PCM commands the TCC solenoid valve ON, and the voltage feedback drops to zero. • The PCM commands the TCC solenoid valve OFF, and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0740. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0740 TCC Enable Solenoid Circuit Electrical (5.7L)



Circuit Description

The torque converter clutch (TCC) solenoid valve is an electrical device that is used with the torque converter clutch pulse width modulation (TCC PWM) solenoid valve in order to control TCC apply and release. The TCC solenoid valve attaches to the transmission case assembly extending into the pump cover. The TCC solenoid valve receives ignition voltage through circuit 239. The powertrain control module (PCM) controls the solenoid by providing the ground path on circuit 422. The PCM monitors the throttle position (TP) voltage, the vehicle speed and other inputs in order to determine when to energize the TCC solenoid valve.

When the PCM detects a continuous open, short to ground or short to power in the TCC solenoid valve circuit, then DTC P0740 sets. DTC P0740 is a type B DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0740 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high (B+).

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low (0 volt).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0740 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

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Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connector at the PCM and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- With the TCC engaged, the TCC slip speed should be –20 to +40 RPM.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests for voltage to the solenoid.
5. This step tests the ability of the PCM and wiring to control the ground circuit.
7. This step tests the resistance of the TCC solenoid valve and the automatic transmission (AT) wiring harness assembly.

DTC P0740 TCC Enable Solenoid Circuit Electrical (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0753 • P0758 • P0785 • P1860	—	*Go to Step 3*	*Go to Step 4*
3	Inspect the ENG CTRL fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 9*	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal E of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View.* Does the test lamp illuminate?	—	*Go to Step 5*	*Go to Step 12*

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DTC P0740 TCC Enable Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
5	1. Connect the test lamp from terminal E to terminal T of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. 2. Use the *Scan Tool* in order to command the TCC solenoid valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	—	*Go to Step 7*	*Go to Step 6*
6	Is the test lamp always ON?	—	*Go to Step 13*	*Go to Step 14*
7	1. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between terminals T and E of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	21–33 Ω	*Go to Step 8*	*Go to Step 15*
8	1. Measure the resistance from terminal E of the *J 44152* to ground. 2. Measure the resistance from terminal T of the *J 44152* to ground. Do both readings measure greater than the specified value?	250 K Ω	Go to Diagnostic Aids	*Go to Step 15*
9	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the TCC solenoid valve for a short to ground between the engine wiring harness junction block 2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	*Go to Step 10*
10	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 839) of the TCC solenoid valve for a short to ground between the AT inline 20-way connector and the TCC solenoid valve. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 15*	*Go to Step 11*
11	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	—	*Go to Step 17*	—
12	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the TCC solenoid valve for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	—

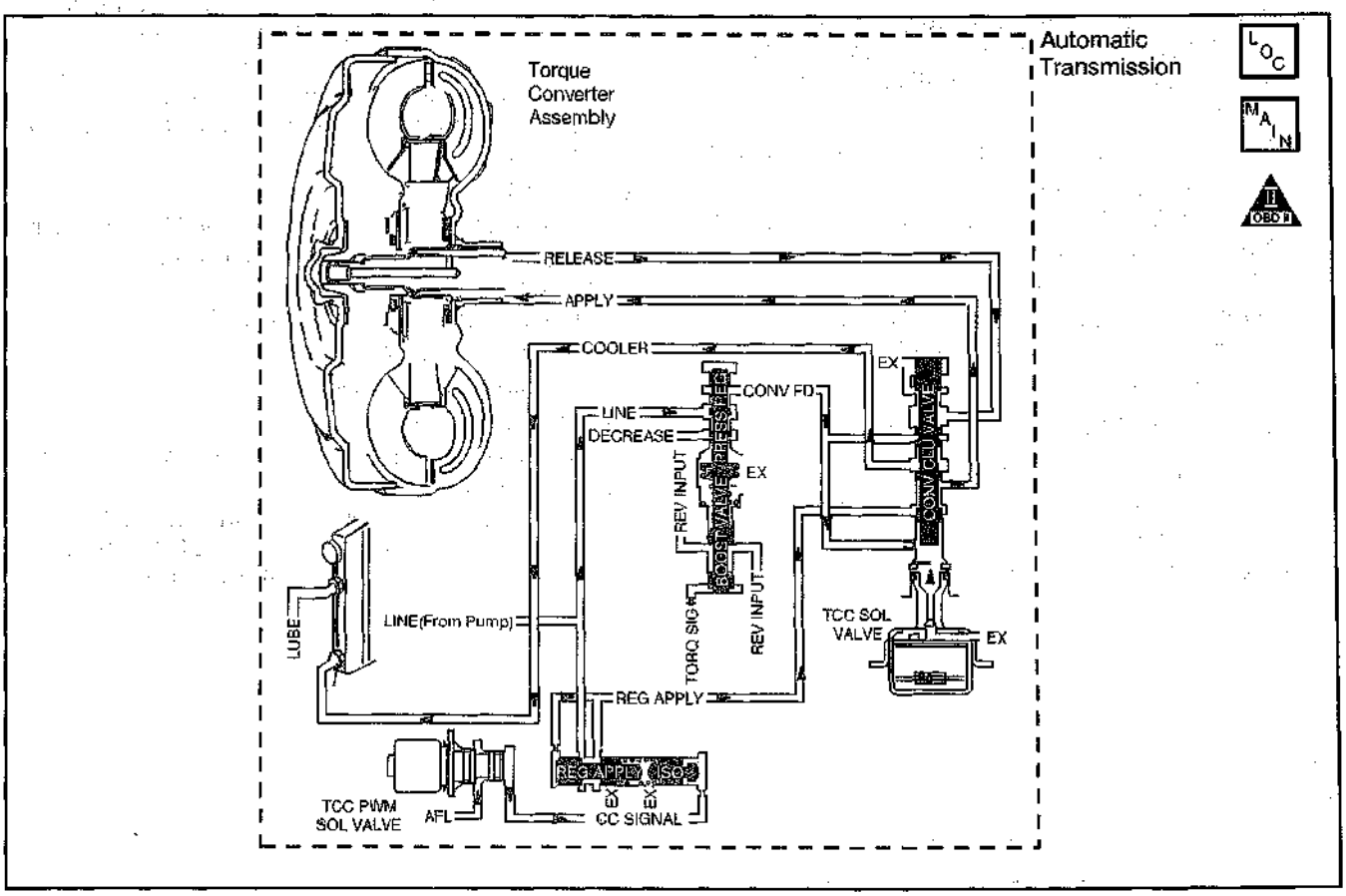
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DTC P0740 TCC Enable Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
13	Test the control circuit (CKT 422) of the TCC solenoid valve for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	*Go to Step 16*
14	Test the control circuit (CKT 422) of the TCC solenoid valve for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	*Go to Step 16*
15	Replace the AT wiring harness assembly (this includes the TCC solenoid valve). Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 17*	—
16	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 17*	—
17	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 with the TCC ON and OFF. Ensure the following conditions are met: • The PCM commands the TCC solenoid valve ON, and the voltage feedback drops to zero. • The PCM commands the TCC solenoid valve OFF, and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0740. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0742 TCC System Stuck On (3.8L)



Circuit Description

The torque converter clutch (TCC) solenoid valve is a normally-open exhaust valve that is used with the torque converter clutch pulse width modulation (TCC PWM) solenoid valve in order to control fluid acting on the converter clutch apply valve. The TCC solenoid valve attaches to the transmission case assembly extending into the pump cover. When grounded (energized) by the powertrain control module (PCM), the TCC solenoid valve stops converter signal oil from exhausting. This causes converter signal oil pressure to increase and move the converter clutch apply valve against spring force and into the apply position. In this position, release fluid is open to an exhaust port and converter feed fluid fills the apply fluid circuit. The converter feed fluid applies the TCC. When the PCM no longer provides a ground path, the TCC solenoid valve de-energizes and apply fluid exhausts, releasing the TCC.

When the PCM detects low torque converter slip when the PCM commands the TCC OFF, then DTC P0742 sets. DTC P0742 is a type B DTC.

Conditions for Running the DTC

- No MAF sensor DTCs P0101, P0102 or P0103
- No MAP sensor DTCs P0107 or P0108.
- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P1860.
- The TP angle is 13–99%.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The engine torque is 50–400 lbs ft.
- The engine vacuum is 0–105 kPa.
- The engine speed is 1000–3000 RPM.
- The speed ratio is 0.95–1.7 (the speed ratio is engine speed divided by output speed).
- The vehicle speed is 32–120 km/h (20–75 mph).
- The commanded gear is not 1st .
- The gear range is D4.
- The gear range does not change within 6 seconds.
- The TCC is commanded OFF.

Conditions for Setting the DTC

DTC P0742 sets if the following condition occurs three times.

The TCC slip speed is –20 to +50 RPM for 3.8 seconds.

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Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0742 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

The TCC fluid hydraulically applies the TCC, possibly causing an engine stall, under the following conditions:

- The TCC is hydraulically stuck ON
- The parking brake is applied
- Any gear range is selected

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests the hydraulic state of the TCC. When the PCM commands the TCC solenoid valve OFF, the slip speed should increase.

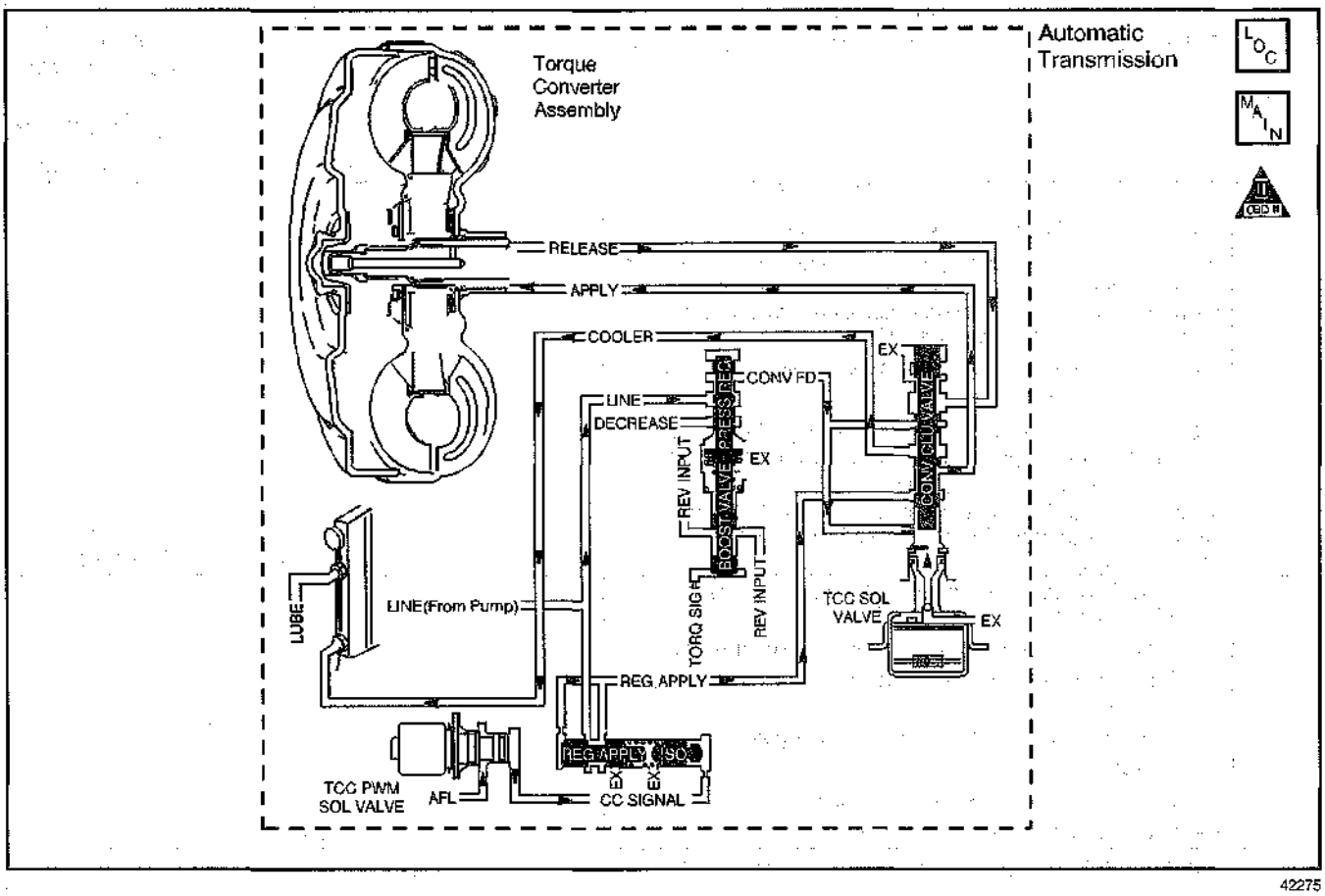
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DTC P0742 TCC System Stuck On (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in the D4 drive range in second, third or fourth gear under steady acceleration, with a TP angle greater than 20%. While the *Scan Tool* TCC Enable status is No, does the *Scan Tool* display a TCC Slip Speed within the specified range?	−20 to +50 RPM	*Go to Step 3*	Go to Diagnostic Aids
3	The TCC is hydraulically stuck ON. Inspect for the following conditions: • A clogged exhaust orifice in the TCC solenoid valve. • The converter clutch apply valve is stuck in the apply position. • A misaligned or damaged valve body gasket. • A restricted release passage. • A restricted transmission cooler line. Did you find and correct the condition?	—	*Go to Step 4*	—
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 under the following conditions: Hold the throttle at 25% and accelerate to 88 km/h (55 mph). Ensure that the *Scan Tool* TCC Slip Speed is 100 to +2000 RPM for 2 seconds, with the TCC OFF. 4. Select Specific DTC. 5. Enter DTC P0742. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0742 TCC System Stuck On (5.7L)



Circuit Description

The torque converter clutch (TCC) solenoid valve is a normally-open exhaust valve that is used with the torque converter clutch pulse width modulation (TCC PWM) solenoid valve in order to control fluid acting on the converter clutch apply valve. The TCC solenoid valve attaches to the transmission case assembly extending into the pump cover. When grounded (energized) by the powertrain control module (PCM), the TCC solenoid valve stops converter signal oil from exhausting. This causes converter signal oil pressure to increase and move the converter clutch apply valve against spring force and into the apply position. In this position, release fluid is open to an exhaust port and converter feed fluid fills the apply fluid circuit. The converter feed fluid applies the TCC. When the PCM no longer provides a ground path, the TCC solenoid valve de-energizes and apply fluid exhausts, releasing the TCC.

When the PCM detects low torque converter slip when the PCM commands the TCC OFF, then DTC P0742 sets. DTC P0742 is a type B DTC.

Conditions for Running the DTC

- No MAF sensor DTCs P0101, P0102 or P0103.
- No MAP sensor DTCs P0107 or P0108.
- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P1860.
- The TP angle is 10–45%.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The engine torque is 40–400 lbs ft.
- The engine vacuum is 0–105 kPa.
- The engine speed is 1000–3500 RPM.
- The speed ratio is 0.65–1.30 (the speed ratio is engine speed divided by output speed).
- The vehicle speed is 32–88 km/h (20–55 mph).
- The commanded gear is not 1st .
- The gear range is D4.
- The gear range does not change within 6 seconds.
- The TCC is commanded OFF.

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Conditions for Setting the DTC

DTC P0742 sets if the following condition occurs three times.

The TCC slip speed is –20 to +30 RPM for 4 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0742 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

The TCC fluid hydraulically applies the TCC, possibly causing an engine stall, under the following conditions:

- The TCC is hydraulically stuck ON
- The parking brake is applied
- Any gear range is selected

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests the hydraulic state of the TCC. When the PCM commands the TCC solenoid valve OFF, the slip speed should increase.

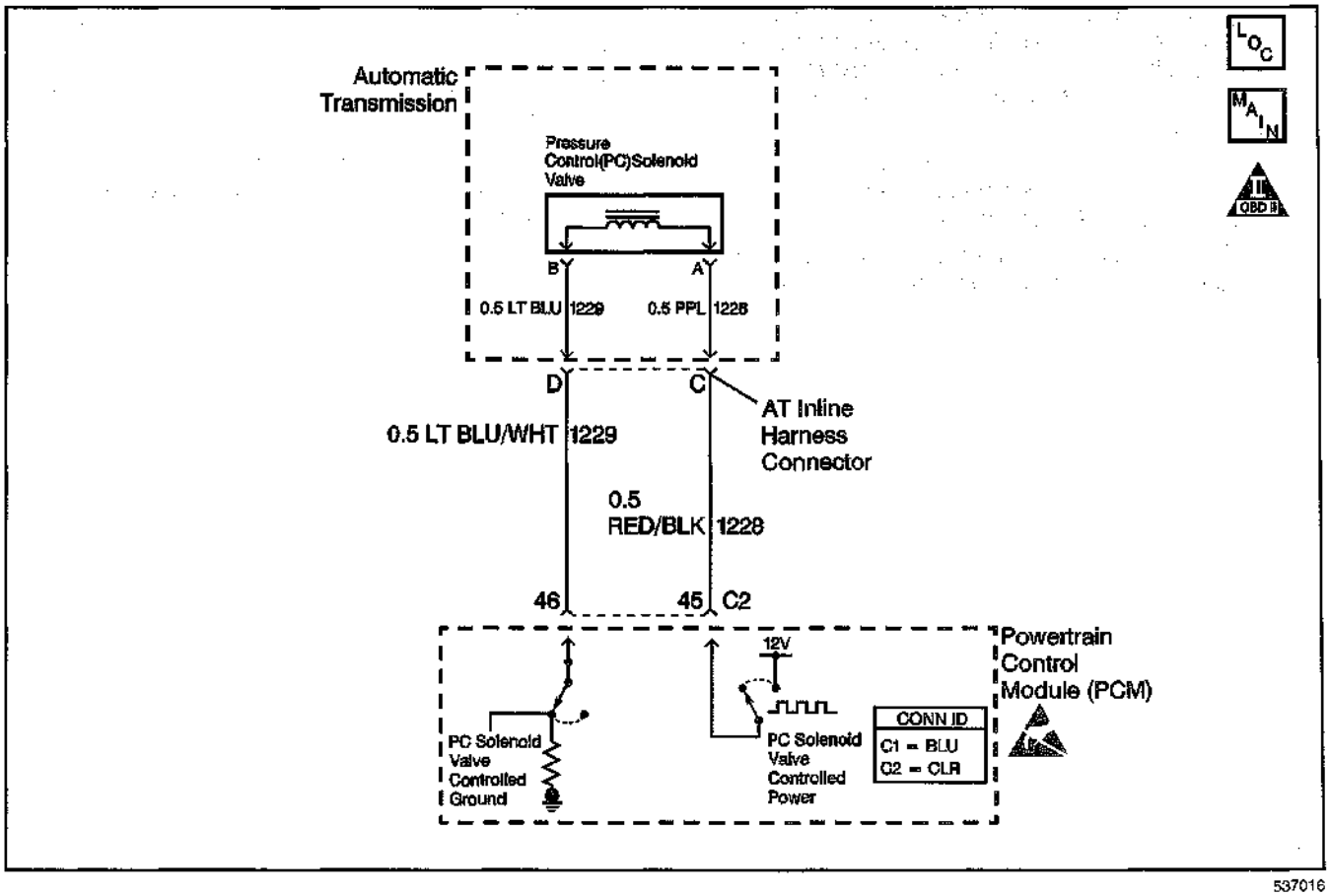
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DTC P0742 TCC System Stuck On (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in the D4 drive range in second, third or fourth gear under steady acceleration, with a TP angle at 20%. While the *Scan Tool* TCC Enable status is No, does the *Scan Tool* display a TCC Slip Speed within the specified range?	–20 to +30 RPM	*Go to Step 3*	Go to Diagnostic Aids
3	The TCC is hydraulically stuck ON. Inspect for the following conditions: • A clogged exhaust orifice in the TCC solenoid valve. • The converter clutch apply valve is stuck in the apply position. • A misaligned or damaged valve body gasket. • A restricted release passage. • A restricted transmission cooler line. Did you find and correct the condition?	—	*Go to Step 4*	—
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 under the following conditions: Hold the throttle at 25 percent and accelerate to 88 km/h (55 mph). Ensure that the *Scan Tool* TCC Slip Speed is 130 to 2000 RPM for 4 seconds, with the TCC OFF. 4. Select Specific DTC. 5. Enter DTC P0742. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0748 Pressure Control Solenoid Circuit Electrical (3.8L)



Circuit Description

The pressure control (PC) solenoid valve is an electronic device that regulates transmission line pressure based on the current flow through its coil winding. The magnetic field produced by the coil moves the solenoid's internal valve which varies pressure to the pressure regulator valve. The powertrain control module (PCM) controls the PC solenoid valve by applying a varying amount of amperage to the solenoid. The applied amperage can vary from 0.1 to 1.1 amps. Low amperage (0.1 amp) indicates high line pressure. High amperage (1.1 amps) indicates low line pressure. The duty cycle of the PC solenoid valve is expressed as a percentage of energized ON time. Zero percent indicates zero ON time (non-energized) or no current flow. Approximately 60% at idle indicates maximum ON time (energized) or high current flow. The PCM determines the appropriate line pressure for a given load by comparing the throttle position (TP) voltage, the engine speed and other inputs.

When the PCM detects a continuous open or short in the PC solenoid valve circuit, then DTC P0748 sets. DTC P0748 is a type C DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine is running.

Conditions for Setting the DTC

The PC solenoid valve duty cycle reaches its high limit (approximately 95%) or low limit (approximately 0%).

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PC solenoid valve is OFF.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0748 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

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Diagnostic Aids

- Inspect the connectors at the PCM, the PC solenoid and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- DTC P0748 may set under low voltage conditions caused by high electrical system demands.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests the ability of the PCM to command the PC solenoid valve.
3. This step tests the PC solenoid valve and automatic transmission (AT) wiring harness assembly for incorrect resistance.

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DTC P0748 Pressure Control Solenoid Circuit Electrical (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Use the *Scan Tool* in order to command 0.1 amp through 1.0 amp while observing PC Sol. Ref. Current and PC Sol. Actual Current. Is the PC Sol. Actual Current always within the specified value of the PC Sol. Ref. Current?	0.16 amp	Go to Diagnostic Aids	*Go to Step 3*
3	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector. 3. Install the *J 44152* jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 4. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between terminals C and D of the *J 44152.* Refer to *Automatic Transmission Inline Harness Connector End View.* Does the resistance measure within the specified range?	3–7 Ω	*Go to Step 5*	*Go to Step 4*
4	Does the resistance measure greater than the specified value?	7 Ω	*Go to Step 9*	*Go to Step 10*
5	Measure the resistance from terminal C of the *J 44152* to the transmission case. Refer to *Automatic Transmission Inline Harness Connector End View.* Does the resistance measure greater than the specified value?	250 K Ω	*Go to Step 6*	*Go to Step 11*
6	1. Disconnect the *J 44152* from the transmission side of the AT inline 20-way connector. 2. Reconnect the transmission AT inline 20-way connector. 3. Disconnect the PCM connector C2. 4. Using the *J 39200* DMM and the *J 35616-A*, measure the resistance between PCM connector terminal C2-45 and terminal C2-46. Does the resistance measure within the specified range?	3–7 Ω	*Go to Step 8*	*Go to Step 7*
7	Does the resistance measure greater than the specified value?	7 Ω	*Go to Step 12*	*Go to Step 13*
8	Using the *J 39200* DMM and the *J 35616-A*, measure the resistance from PCM connector terminal C2-45 to ground. Does the resistance measure greater than the specified value?	250 K Ω	*Go to Step 17*	*Go to Step 14*
9	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for an open between the AT inline 20-way connector and the PC solenoid. Refer to *Circuit Testing* in Wiring Systems. Did you find an open condition?	—	*Go to Step 16*	*Go to Step 15*

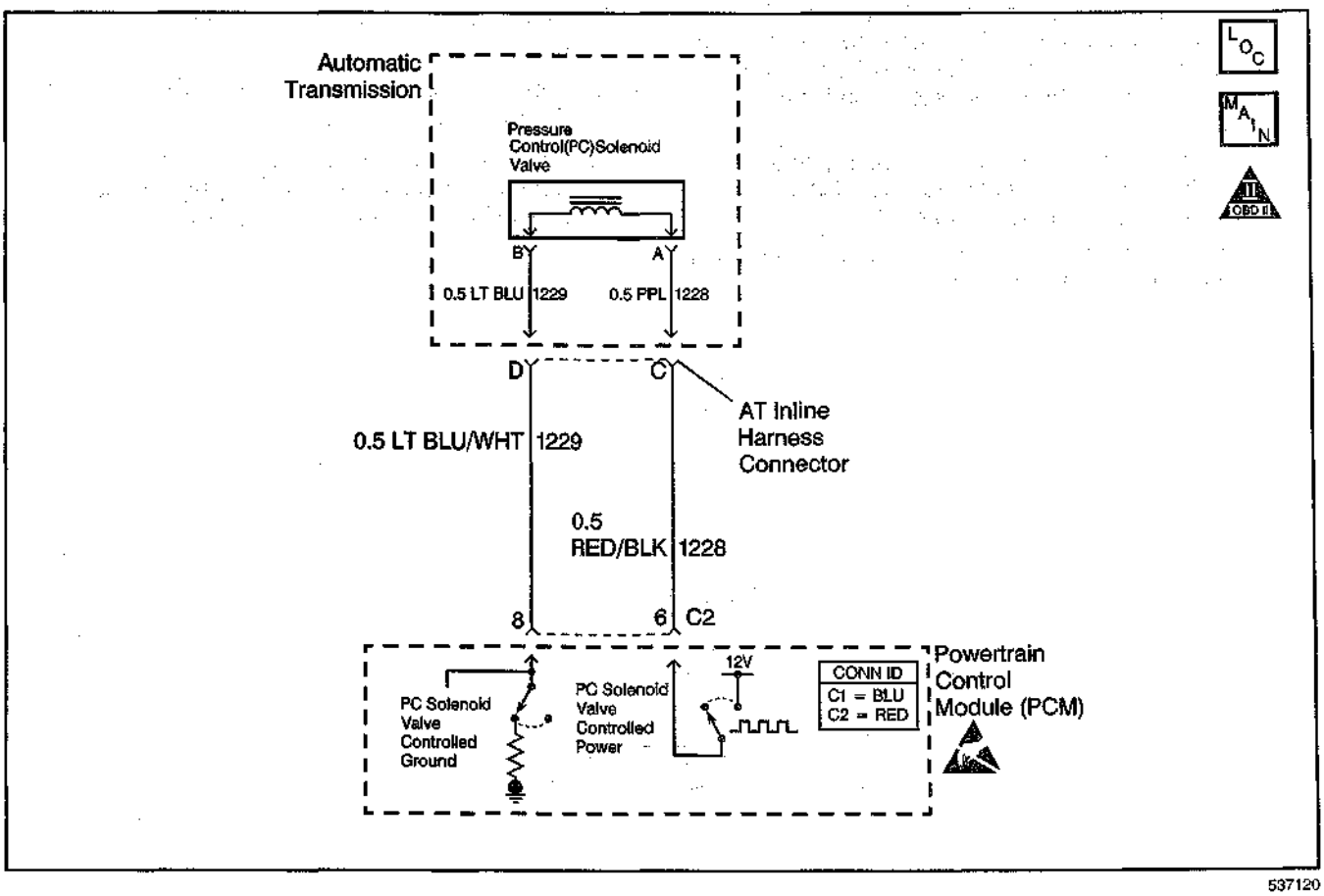
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DTC P0748 Pressure Control Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
10	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for a shorted together condition between the AT inline 20-way connector and the PC solenoid. Refer to *Circuit Testing* in Wiring Systems. Did you find a shorted together condition?	—	*Go to Step 16*	*Go to Step 15*
11	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for a short to ground between the AT inline 20-way connector and the PC solenoid. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 16*	*Go to Step 15*
12	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for an open between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 18*	—
13	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for a shorted together condition between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 18*	—
14	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 18*	—
15	Replace the PC solenoid valve. Refer to *Control and Shift Solenoids Replacement.* Did you complete the replacement?	—	*Go to Step 18*	—
16	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 18*	—
17	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 18*	—
18	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Start the engine and ensure that the following condition is met: The difference between the *Scan Tool* PC Sol. Actual Current and the PC Sol. Ref. Current is less than 0.16 amp. 4. Select Specific DTC. 5. Enter DTC P0748. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0748 Pressure Control Solenoid Circuit Electrical (5.7L)



Circuit Description

The pressure control (PC) solenoid valve is an electronic device that regulates transmission line pressure based on the current flow through its coil winding. The magnetic field produced by the coil moves the solenoid's internal valve which varies pressure to the pressure regulator valve. The powertrain control module (PCM) controls the PC solenoid valve by applying a varying amount of amperage to the solenoid. The applied amperage can vary from 0.1 to 1.1 amps. Low amperage (0.1 amp) indicates high line pressure. High amperage (1.1 amps) indicates low line pressure. The duty cycle of the PC solenoid valve is expressed as a percentage of energized ON time. Zero percent indicates zero ON time (non-energized) or no current flow. Approximately 60% at idle indicates maximum ON time (energized) or high current flow. The PCM determines the appropriate line pressure for a given load by comparing the throttle position (TP) voltage, the engine speed and other inputs.

When the PCM detects a continuous open or short in the PC solenoid valve circuit, then DTC P0748 sets. DTC P0748 is a type C DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine is running.

Conditions for Setting the DTC

The PC solenoid valve duty cycle reaches its high limit (approximately 95%) or low limit (approximately 0%).

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PC solenoid valve is OFF.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0748 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

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Diagnostic Aids

- Inspect the connectors at the PCM, the PC solenoid and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- DTC P0748 may set under low voltage conditions caused by high electrical system demands.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests the ability of the PCM to command the PC solenoid valve.
3. This step tests the PC solenoid valve and automatic transmission (AT) wiring harness assembly for incorrect resistance.

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DTC P0748 Pressure Control Solenoid Circuit Electrical (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Use the *Scan Tool* in order to command 0.1 amp through 1.0 amp while observing PC Sol. Ref. Current and PC Sol. Actual Current. Is the PC Sol. Actual Current always within the specified value of the PC Sol. Ref. Current?	0.16 amp	Go to Diagnostic Aids	*Go to Step 3*
3	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector. 3. Install the *J 44152* jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 4. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the resistance between terminals C and D of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	3–7 Ω	*Go to Step 5*	*Go to Step 4*
4	Does the resistance measure greater than the specified value?	7 Ω	*Go to Step 9*	*Go to Step 10*
5	Measure the resistance from terminal C of the *J 44152* to the transmission case. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure greater than the specified value?	250 K Ω	*Go to Step 6*	*Go to Step 11*
6	1. Disconnect the *J 44152* from the transmission side of the AT inline 20-way connector. 2. Reconnect the transmission AT inline 20-way connector. 3. Disconnect the PCM connector C2. 4. Measure the resistance between PCM connector terminal C2-6 and terminal C2-8. Does the resistance measure within the specified range?	3–7 Ω	*Go to Step 8*	*Go to Step 7*
7	Does the resistance measure greater than the specified value?	7 Ω	*Go to Step 12*	*Go to Step 13*
8	Using the *J 39200* DMM and the *J 35616-A*, measure the resistance from PCM connector terminal C2-6 to ground. Does the resistance measure greater than the specified value?	250 K Ω	*Go to Step 17*	*Go to Step 14*
9	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for an open between the AT inline 20-way connector and the PC solenoid. Refer to *Circuit Testing* in Wiring Systems. Did you find an open condition?	—	*Go to Step 16*	*Go to Step 15*

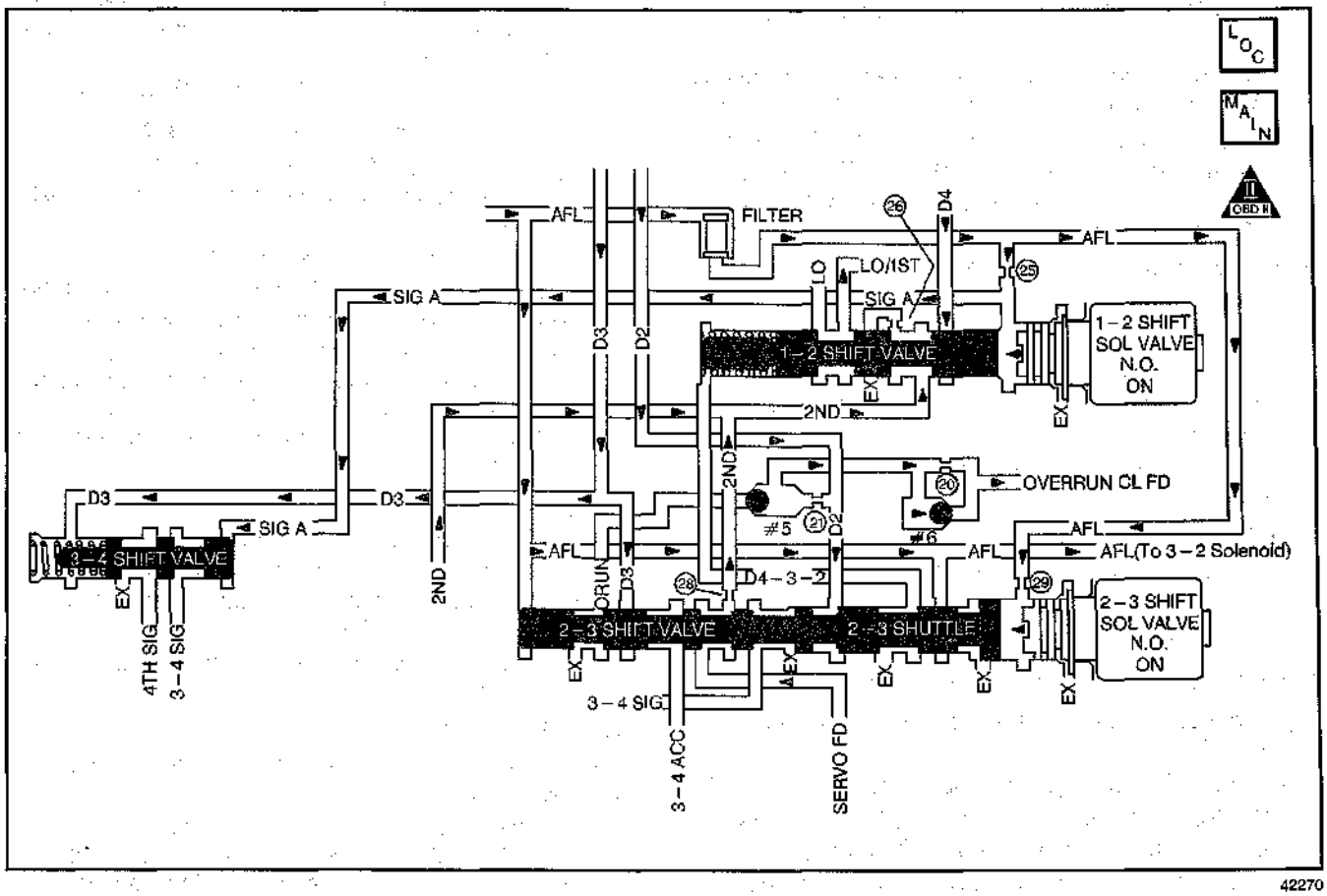
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DTC P0748 Pressure Control Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
10	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for a shorted together condition between the AT inline 20-way connector and the PC solenoid. Refer to *Circuit Testing* in Wiring Systems. Did you find a shorted together condition?	—	*Go to Step 16*	*Go to Step 15*
11	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for a short to ground between the AT inline 20-way connector and the PC solenoid. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 16*	*Go to Step 15*
12	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for an open between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 18*	—
13	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for a shorted together condition between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 18*	—
14	Test the controlled power feed circuit (CKT 1228) and the controlled ground circuit (CKT 1229) of the PC solenoid for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 18*	—
15	Replace the PC solenoid valve. Refer to *Control and Shift Solenoids Replacement.* Did you complete the replacement?	—	*Go to Step 18*	—
16	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 18*	—
17	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 18*	—
18	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Start the engine and ensure that the following condition is met: The difference between the *Scan Tool* PC Sol. Actual Current and the PC Sol. Ref. Current is less than 0.16 amp. 4. Select Specific DTC. 5. Enter DTC P0748. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0751 1-2 Shift Solenoid Valve Performance (5.7L)



42270

Circuit Description

The 1-2 shift solenoid (SS) valve controls the fluid flow acting on the 1-2 and 3-4 shift valves. The 1-2 SS valve is a normally-open exhaust valve that is used with the 2-3 SS valve, in order to allow four different shifting combinations.

When the PCM detects a 1-1-4-4 or a 2-2-3-3 shift pattern, depending on the state of the mechanical failure, then DTC P0751 sets. DTC P0751 is a type A DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P1860.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The TP angle is 10–35%.
- The TP angle is constant +/–5%.
- The gear range is D4.
- The transmission fluid temperature is 20–130°C (68–266°F).
- The PCM commands a 1–2, 2–3, and 3–4 shift.
- The TCC is commanded ON.
- The vehicle speed is greater than 8 km/h (5 mph).

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Conditions for Setting the DTC

DTC P0751 sets if the following conditions occur three times:

- Within 2 seconds, the engine speed in 2nd gear is 80 RPM greater than the last speed in 1st gear.
- Within 2 seconds, the engine speed in 3rd gear is 50 RPM less than the last speed in 2nd gear.
- Within 2 seconds, the engine speed in 4th gear is 10 RPM greater than the last speed in 3rd gear.

All of the above conditions are met and one of the following conditions occurs:

Condition 1

- The speed ratio is 0.95 to 1.2 (speed ratio is engine speed divided by transmission output speed).
- The TCC slip speed is 200–1000 RPM for 4 seconds.

Condition 2

- The speed ratio is 0.65 to 0.8.
- The TCC slip speed is –20 to +40 RPM for 4 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands D2 line pressure.
- The PCM inhibits 3–2 downshifts if the vehicle speed is greater than 48 km/h (30 mph).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0751 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the *Shift Speed* table.
- Other internal transmission failures may cause more than one shift to occur.
- Refer to the *Shift Solenoid Valve State and Gear Ratio* table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests that the PCM commanded all shifts, that all shift solenoid valves responded correctly, but that all the shifts did not occur.

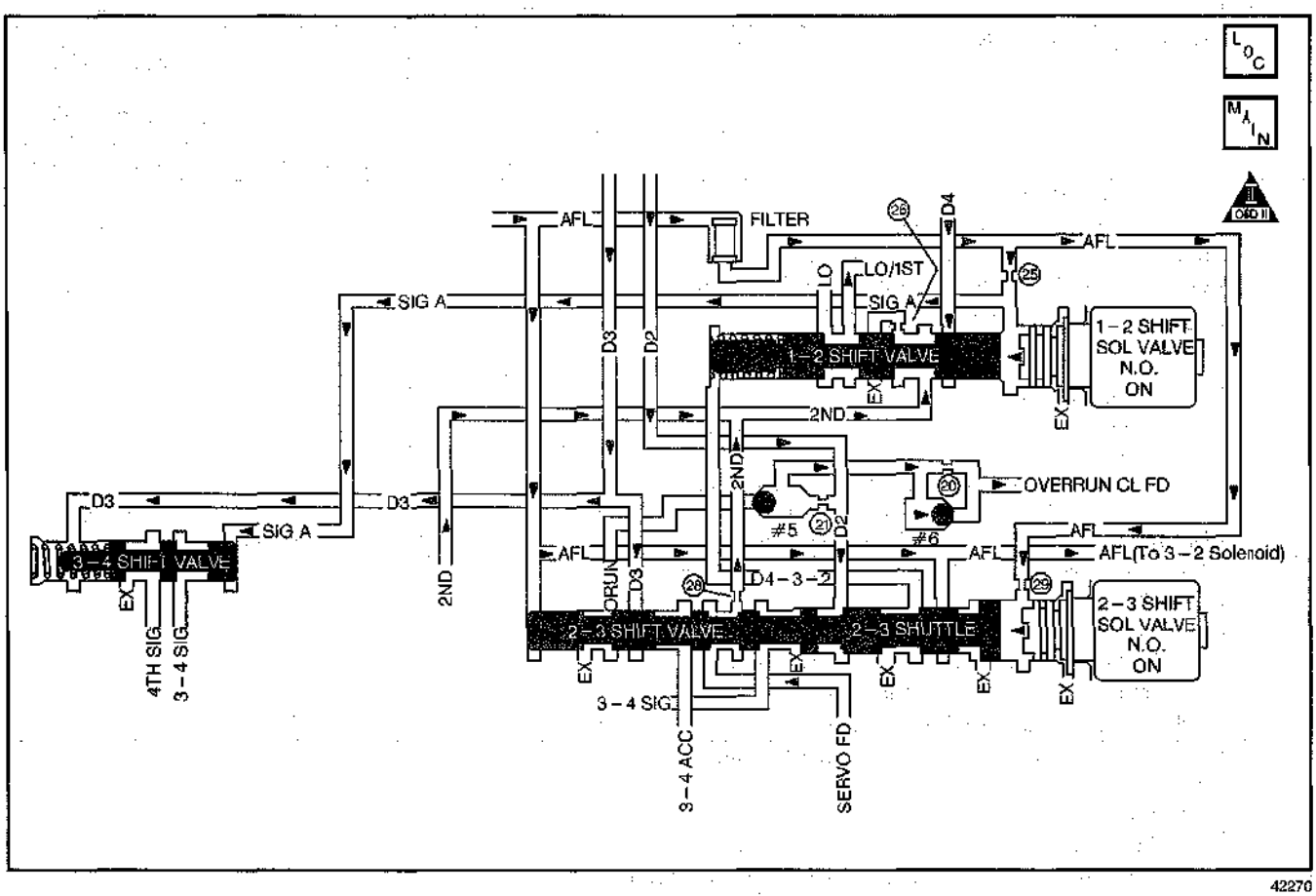
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DTC P0751 1-2 Shift Solenoid Valve Performance (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in D4 range under the following conditions: Accelerate the vehicle, ensuring that the PCM commands 1st , 2nd , 3rd and 4th gears. Did you detect a 1-1-4-4 or 2-2-3-3 shift pattern?	—	*Go to Step 3*	Go to Diagnostic Aids
3	Check the shift solenoid/hydraulic circuit for the following conditions: • An internal malfunction. • Damaged seals on the shift solenoid valve. Refer to *Shift Solenoid Leak Test*. Did you find and correct the condition?	—	*Go to Step 4*	—
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 under the following conditions (only if traffic and road conditions permit): • Hold the throttle at 20% and accelerate to 88 km/h (55 mph). • If the throttle moves more than 5%, stop the vehicle and start over. 4. Select Specific DTC. 5. Enter DTC P0751. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0751 1-2 Shift Solenoid Valve Performance - No First or Fourth Gear (3.8L)



42270

Circuit Description

The 1-2 shift solenoid (SS) valve controls the fluid flow acting on the 1-2 and 3-4 shift valves. The 1-2 SS valve is a normally-open exhaust valve that is used with the 2-3 SS valve, in order to allow four different shifting combinations.

When the PCM detects a 2-2-3-3 shift pattern, then DTC P0751 sets. DTC P0751 is a type B DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P1860.
- No transmission component slipping DTC P1870.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The gear range is D4, D3, D2 or D1.
- The TP angle is greater than 9 percent.
- The transmission fluid temperature is 20–130°C (68–266°F).
- The system voltage is 8–18 volts.
- The engine torque is 50–400 lbs ft.
- The transmission output speed is greater than 150 RPM.

Conditions for Setting the DTC

DTC P0751 sets if both of the following conditions occur twice:

Condition 1

- The PCM commands first gear for 2 seconds.
- The engine speed is greater than 2.95 times the TCC slip speed.
- The estimated gear ratio is 1.2 to 1.825.
- All conditions are met for 0.5 second.

Condition 2

- The PCM commands fourth gear for 1 second.
- The engine speed is greater than 2.44 times the TCC slip speed.
- The estimated gear ratio is 0.95 to 1.15.
- All conditions are met for 6 seconds.

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Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands D2 line pressure.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0751 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the *Shift Speed* table.
- Other internal transmission failures may cause more than one shift to occur.
- Refer to the *Shift Solenoid Valve State and Gear Ratio* table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

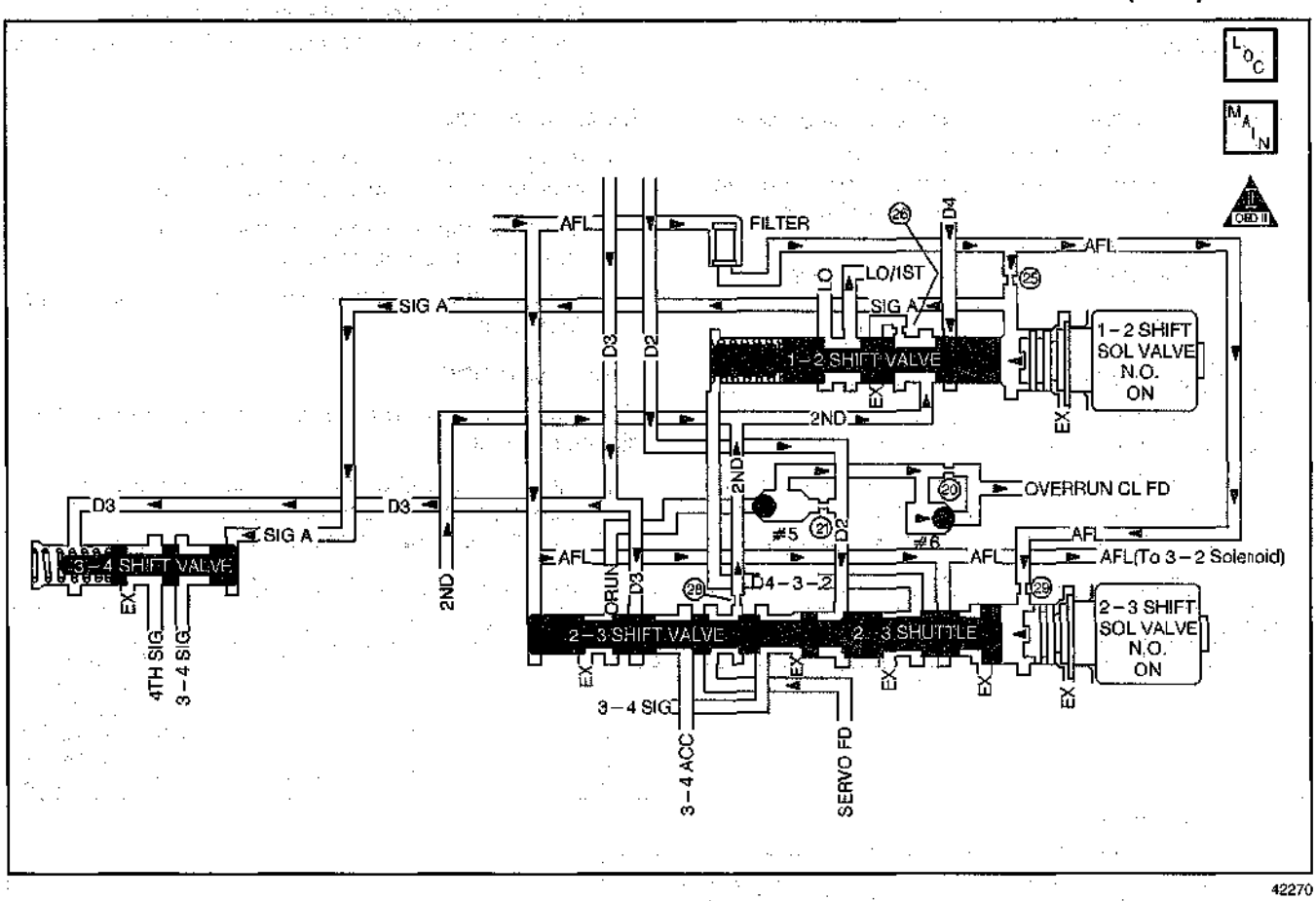
2. This step tests that the PCM commanded all shifts, that all shift solenoid valves responded correctly, but that all the shifts did not occur.

DTC P0751 1-2 Shift Solenoid Valve Performance - No First or Fourth Gear (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in D4 range under the following conditions: Accelerate the vehicle, ensuring that the PCM commands 1st , 2nd , 3rd and 4th gears. Did you detect a 2-2-3-3 shift pattern?	—	*Go to Step 3*	Go to Diagnostic Aids
3	Check the shift solenoid/hydraulic circuit for the following conditions: • An internal malfunction. • Damaged seals on the shift solenoid valve. Refer to *Shift Solenoid Leak Test*. Did you find and correct the condition?	—	*Go to Step 4*	—
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 range under the following conditions (only if traffic and road conditions permit): Hold the throttle at 20% and accelerate to 88 km/h (55 mph). 4. Select Specific DTC. 5. Enter DTC P0751. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0752 1-2 Shift Solenoid Valve Performance - No Second or Third Gear (3.8L)



Circuit Description

The 1-2 shift solenoid (SS) valve controls the fluid flow acting on the 1-2 and 3-4 shift valves. The 1-2 SS valve is a normally-open exhaust valve that is used with the 2-3 SS valve, in order to allow four different shifting combinations.

When the PCM detects a 1-1-4-4 shift pattern, then DTC P0752 sets. DTC P0752 is a type B DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P1860.
- No transmission component slipping DTC P1870.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The gear range is D4, D3, D2 or D1.
- The TP angle is greater than 9 percent.
- The transmission fluid temperature is 20–130°C (68–266°F).
- The system voltage is 8–18 volts.
- The transmission output speed is greater than 150 RPM.

Conditions for Setting the DTC

DTC P0752 sets if both of the following conditions occur twice:

Condition 1

- The PCM commands second gear for 1 second.
- The engine torque is 25–400 lbs ft.
- The engine speed is greater than 1.36 times the TCC slip speed.
- The estimated gear ratio is 2.9 to 3.26.
- All conditions are met for 2 seconds.

Condition 2

- The PCM commands third gear for 1 second.
- The engine torque is 50–400 lbs ft.
- The engine speed is greater than 3.55 times the TCC slip speed.
- The estimated gear ratio is 0.645 to 0.895.
- All conditions are met for 2 seconds.

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Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands D2 line pressure.
- The PCM inhibits 3-2 downshifts if the vehicle speed is greater than 48 km/h (30 mph).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0752 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the *Shift Speed* table.
- Other internal transmission failures may cause more than one shift to occur.
- Refer to the *Shift Solenoid Valve State and Gear Ratio* table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

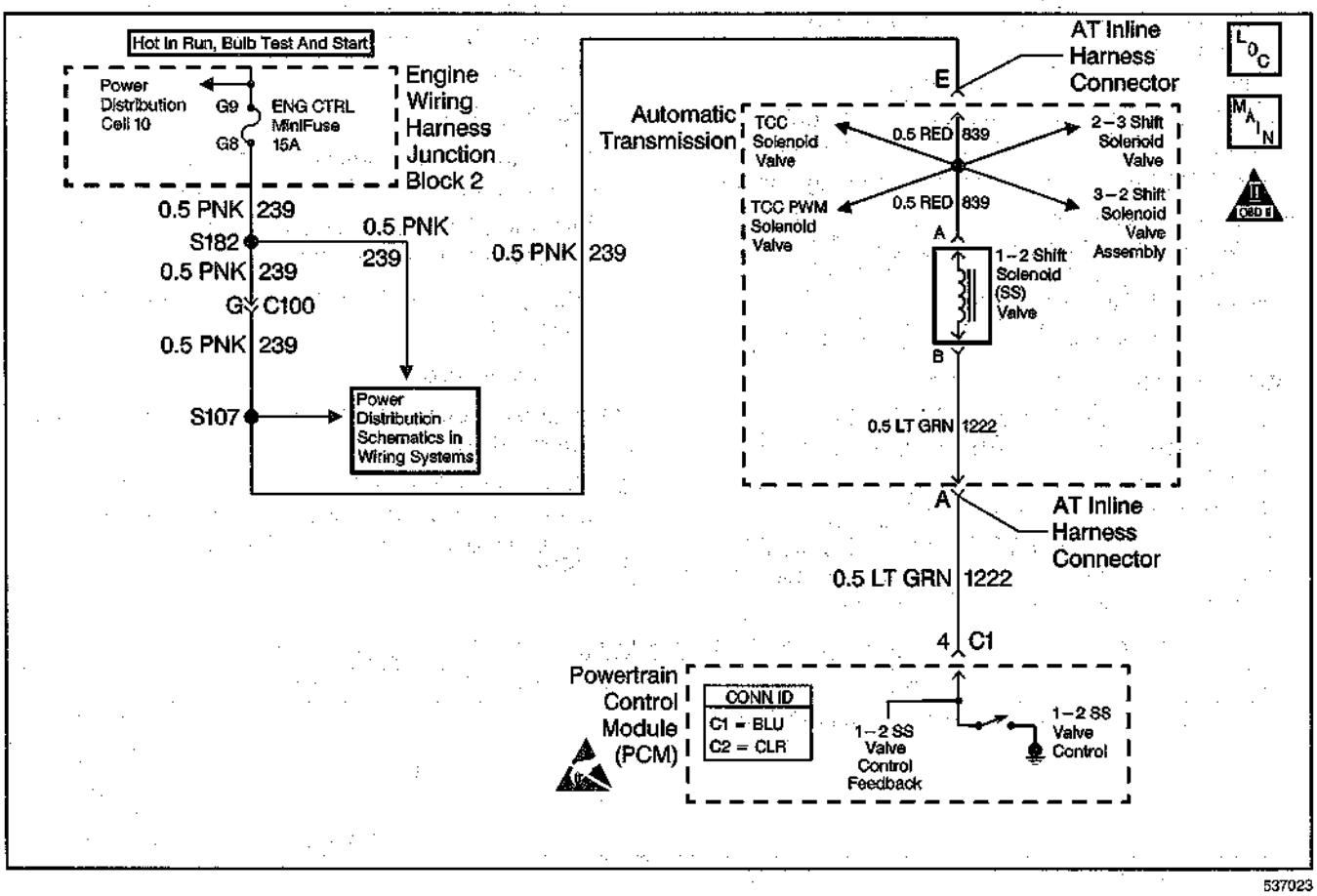
2. This step tests that the PCM commanded all shifts, that all shift solenoid valves responded correctly, but that all the shifts did not occur.

DTC P0752 1-2 Shift Solenoid Valve Performance - No Second or Third Gear (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in D4 range under the following conditions: Accelerate the vehicle, ensuring that the PCM commands 1st , 2nd , 3rd and 4th gears. Did you detect a 1-1-4-4 shift pattern?	—	*Go to Step 3*	Go to Diagnostic Aids
3	Check the shift solenoid/hydraulic circuit for the following conditions: • An internal malfunction. • Damaged seals on the shift solenoid valve. Refer to *Shift Solenoid Leak Test*. Did you find and correct the condition?	—	*Go to Step 4*	—
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 range under the following conditions (only if traffic and road conditions permit): Hold the throttle at 20% and accelerate to 88 km/h (55 mph). 4. Select Specific DTC. 5. Enter DTC P0752. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0753 1-2 Shift Solenoid Circuit Electrical (3.8L)



Circuit Description

The 1-2 shift solenoid (SS) valve controls the fluid flow acting on the 1-2 and 3-4 shift valves. The 1-2 SS valve is a normally-open exhaust valve that is used with the 2-3 SS valve in order to allow four different shifting combinations. The solenoid attaches to the control valve body within the transmission. The 1-2 SS valve receives ignition voltage through circuit 239. The powertrain control module (PCM) controls the solenoid by providing the ground path on circuit 1222.

When the PCM detects a continuous open, short to ground or short to power in the 1-2 SS valve circuit, then DTC P0753 sets. DTC P0753 is a type B DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0753 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high (B+).

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low (0 volts).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands D2 line pressure.
- The PCM inhibits 3–2 downshifts if the vehicle speed is greater than 48 km/h (30 mph).
- The PCM freezes shifts adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0753 in the PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

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Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the 1-2 SS valve and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- Refer to the *Shift Solenoid Valve State and Gear Ratio* table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests the function of the 1-2 SS valve and the automatic transmission (AT) wiring harness assembly.
5. This step tests for power to the 1-2 SS valve from the ignition through the fuse.
6. This step tests the ability of the PCM and the wiring to control the ground circuit.
8. This step measures the resistance of the AT wiring harness assembly and the 1-2 SS valve.

DTC P0753 1-2 Shift Solenoid Circuit Electrical (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0758 • P0785 • P1860	—	*Go to Step 3*	*Go to Step 4*
3	Inspect the ENG CTRL fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 12*	*Go to Step 5*
4	Use the *Scan Tool* in order to command the 1-2 SS valve ON and OFF three times while listening to the bottom of the transmission pan (a stethoscope may be necessary). Does the solenoid click when commanded?	—	Go to Diagnostic Aids	*Go to Step 5*
5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal E of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the test lamp illuminate?	—	*Go to Step 6*	*Go to Step 15*

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DTC P0753 1-2 Shift Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
6	1. Connect a test lamp between terminal E and terminal A of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. 2. Use the *Scan Tool* in order to command the 1-2 SS valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	—	*Go to Step 8*	*Go to Step 7*
7	Is the test lamp always ON?	—	*Go to Step 16*	*Go to Step 17*
8	1. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* DMM and the *J 35616-A*, measure the resistance between terminal A and terminal E of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	19–31 Ω	*Go to Step 9*	*Go to Step 10*
9	Measure the resistance from terminal A to ground, and from terminal E to ground. Do both readings measure greater than the specified value?	250 K Ω	Go to Diagnostic Aids	*Go to Step 11*
10	1. Disconnect the AT wiring harness assembly from the 1-2 SS valve. 2. Measure the resistance of the 1-2 SS valve. Does the resistance measure within the specified range?	19–31 Ω	*Go to Step 18*	*Go to Step 19*
11	1. Disconnect the AT wiring harness assembly from the 1-2 SS valve. 2. Measure the resistance from the component's terminals to ground. Do both readings measure greater than the specified value?	250 K Ω	*Go to Step 18*	*Go to Step 19*
12	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 1–2 SS valve for a short to ground between the engine wiring harness junction block 2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 13*
13	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 839) of the 1–2 SS valve for a short to ground between the AT inline 20-way connector and the 1–2 SS valve. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 18*	*Go to Step 14*
14	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	—	*Go to Step 21*	—

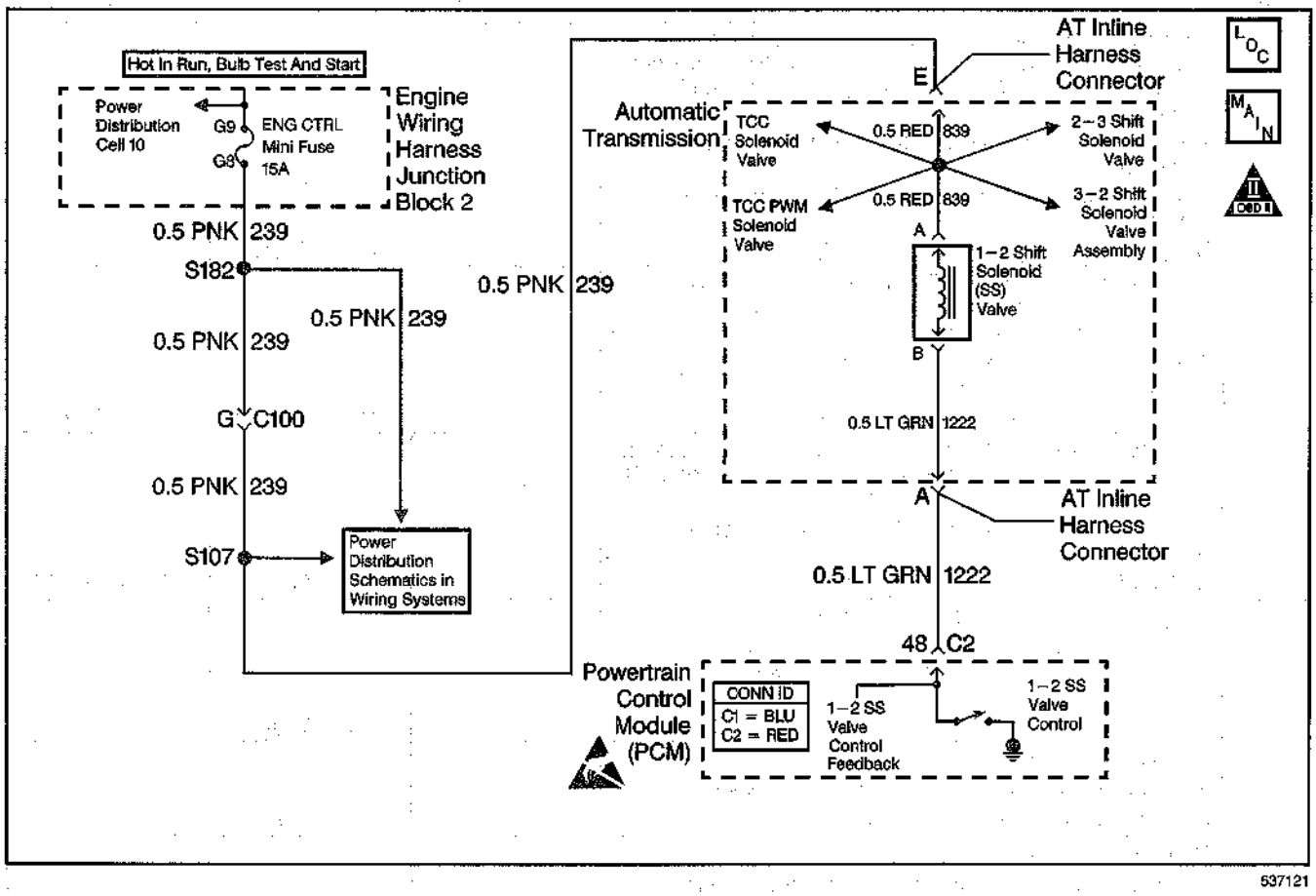
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DTC P0753 1-2 Shift Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
15	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 1–2 SS valve for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	—
16	Test the control circuit (CKT 1222) of the 1–2 SS valve for a short to ground between the PCM connector C1 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
17	Test the control circuit (CKT 1222) of the 1–2 SS valve for an open or short to power between the PCM connector C1 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
18	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 21*	—
19	Replace the 1-2 SS valve. Refer to *Control and Shift Solenoids Replacement.* Did you complete the replacement?	—	*Go to Step 21*	—
20	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 21*	—
21	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 and ensure the following conditions are met: • The PCM commands the 1-2 SS valve ON and the voltage feedback drops to zero. • The PCM commands the 1-2 SS valve OFF and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0753. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0753 1-2 Shift Solenoid Circuit Electrical (5.7L)



Circuit Description

The 1-2 shift solenoid (SS) valve controls the fluid flow acting on the 1-2 and 3-4 shift valves. The 1-2 SS valve is a normally-open exhaust valve that is used with the 2-3 SS valve in order to allow four different shifting combinations. The solenoid attaches to the control valve body within the transmission. The 1-2 SS valve receives ignition voltage through circuit 239. The powertrain control module (PCM) controls the solenoid by providing the ground path on circuit 1222.

When the PCM detects a continuous open, short to ground or short to power in the 1-2 SS valve circuit, then DTC P0753 sets. DTC P0753 is a type B DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0753 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high (B+).

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low (0 volts).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands D2 line pressure.
- The PCM inhibits 3–2 downshifts if the vehicle speed is greater than 48 km/h (30 mph).
- The PCM freezes shifts adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0753 in the PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

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Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the 1-2 SS valve and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- Refer to the *Shift Solenoid Valve State and Gear Ratio* table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests the function of the 1-2 SS valve and the automatic transmission (AT) wiring harness assembly.
5. This step tests for power to the 1-2 SS valve from the ignition through the fuse.
6. This step tests the ability of the PCM and the wiring to control the ground circuit.
8. This step measures the resistance of the AT wiring harness assembly and the 1-2 SS valve.

DTC P0753 1-2 Shift Solenoid Circuit Electrical (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0758 • P0785 • P1860	—	*Go to Step 3*	*Go to Step 4*
3	Inspect the ENG CTRL fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 12*	*Go to Step 5*
4	Use the *Scan Tool* in order to command the 1-2 SS valve ON and OFF three times while listening to the bottom of the transmission pan (a stethoscope may be necessary). Does the solenoid click when commanded?	—	Go to Diagnostic Aids	*Go to Step 5*
5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal E of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the test lamp illuminate?	—	*Go to Step 6*	*Go to Step 15*

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DTC P0753 1-2 Shift Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
6	1. Connect a test lamp between terminal E and terminal A of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. 2. Use the *Scan Tool* in order to command the 1-2 SS valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	—	*Go to Step 8*	*Go to Step 7*
7	Is the test lamp always ON?	—	*Go to Step 16*	*Go to Step 17*
8	1. Install the *J 44152* jumper harness (20 pins) on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* DMM and the *J 35616-A* connector test adapter kit, measure the resistance between terminal A and terminal E of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	19–31 Ω	*Go to Step 9*	*Go to Step 10*
9	Measure the resistance from terminal A to ground, and from terminal E to ground. Do both readings measure greater than the specified value?	250 K Ω	Go to Diagnostic Aids	*Go to Step 11*
10	1. Disconnect the AT wiring harness assembly from the 1-2 SS valve. 2. Measure the resistance of the 1-2 SS valve. Does the resistance measure within the specified range?	19–31 Ω	*Go to Step 18*	*Go to Step 19*
11	1. Disconnect the AT wiring harness assembly from the 1-2 SS valve. 2. Measure the resistance from the component's terminals to ground. Do both readings measure greater than the specified value?	250 K Ω	*Go to Step 18*	*Go to Step 19*
12	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 1–2 SS valve for a short to ground between the engine wiring harness junction block 2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 13*
13	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 839) of the 1–2 SS valve for a short to ground between the AT inline 20-way connector and the 1–2 SS valve. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 18*	*Go to Step 14*
14	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	—	*Go to Step 21*	—

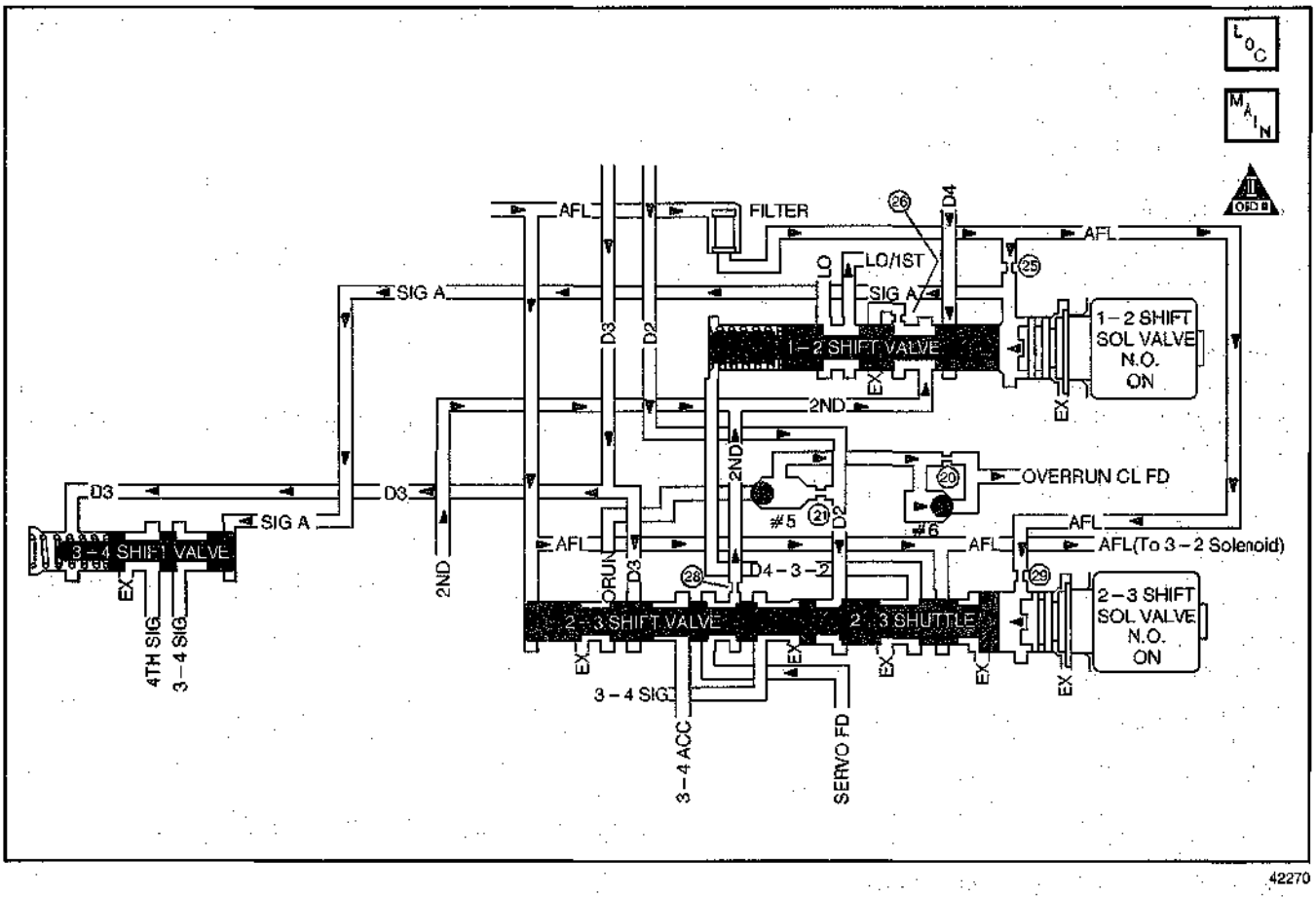
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DTC P0753 1-2 Shift Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
15	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 1–2 SS valve for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	—
16	Test the control circuit (CKT 1222) of the 1–2 SS valve for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
17	Test the control circuit (CKT 1222) of the 1–2 SS valve for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
18	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 21*	—
19	Replace the 1-2 SS valve. Refer to *Control and Shift Solenoids Replacement.* Did you complete the replacement?	—	*Go to Step 21*	—
20	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 21*	—
21	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 and ensure the following conditions are met: • The PCM commands the 1-2 SS valve ON and the voltage feedback drops to zero. • The PCM commands the 1-2 SS valve OFF and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0753. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0756 2-3 Shift Solenoid Valve Performance (5.7L)



Circuit Description

The 2-3 shift solenoid (SS) valve controls the fluid flow acting on the 2-3 shift valves. The 2-3 SS valve is a normally-open exhaust valve that is used with the 1-2 SS valve in order to allow four different shifting combinations.

When the PCM detects a 1-2-2-1 or a 4-3-3-4 shift pattern, depending on the state of the mechanical failure, then DTC P0756 sets. DTC P0756 is a type A DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P1860.
- The vehicle speed is greater than 8 km/h (5 mph).
- The engine vacuum is 0–105 kPa.
- The engine torque is 40–400 lb ft.
- The TP angle is 10–50%.
- The TP angle is constant within +/–7%.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The gear range is D4.
- The transmission fluid temperature is 20–130°C (68–266°F).
- The PCM commands a 1–2, 2–3, and 3–4 shift.

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Conditions for Setting the DTC

DTC P0756 sets if the following conditions occur three times:

- Third gear is commanded for 2 to 6 seconds.
- The speed ratio in 3rd gear does not drop more than 0.3 from the last speed ratio in 2nd gear (speed ratio is engine speed divided by transmission output speed).
- The TCC slip speed in 3rd gear remains 400 RPM higher than the last TCC slip speed in 2nd gear.

All of the above conditions are met for 1.5 seconds and one of the following conditions occurs:

Condition 1

- The engine torque is 0–400 lb ft.
- First gear is commanded.
- The TP angle is greater than 25%.
- The transmission output speed is 400–1500 RPM.
- The speed ratio is 0.7 to 3.0.
- The TCC slip speed is –2000 to 0 RPM.
- All conditions are met for 1.5 seconds.

Condition 2

- Fourth gear is commanded for 1.5 seconds.
- The transmission output speed is 1000–3000 RPM.
- The speed ratio is 1.68 to 3.0.
- The TCC slip speed is 1000 to 3000 RPM.
- All conditions are met for 1 second.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands 3rd gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0756 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the *Shift Speed* table.
- Other internal transmission failures may cause more than one shift to occur.
- Refer to the *Shift Solenoid Valve State and Gear Ratio* table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step verifies that the PCM commanded all shifts, and all shift solenoids responded correctly, but all the shifts did not occur.

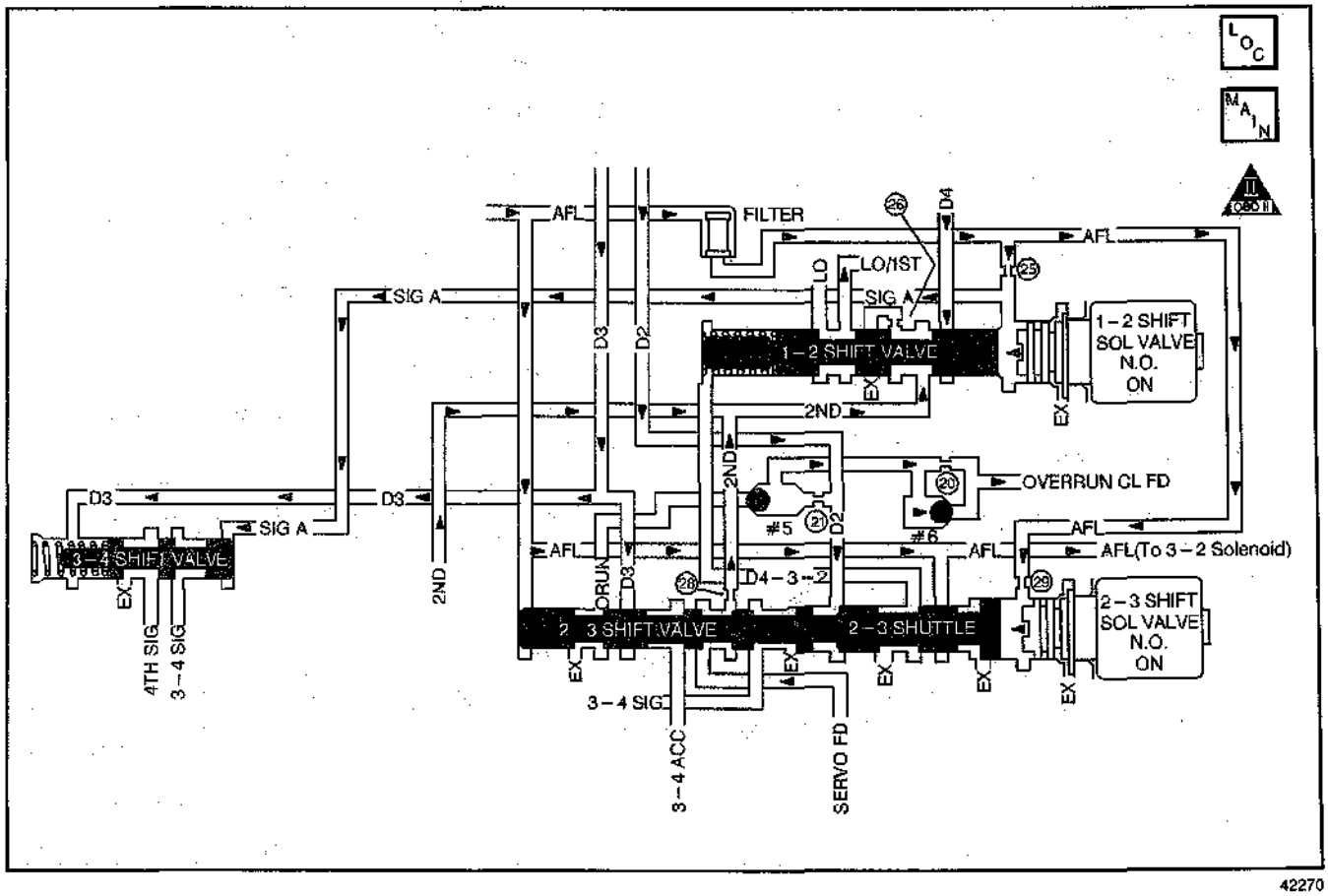
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DTC P0756 2-3 Shift Solenoid Valve Performance (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in D4 range under the following conditions: Accelerate the vehicle, ensuring that the PCM commands 1st , 2nd , 3rd and 4th gears. Did you detect a 1-2-2-1 or 4-3-3-4 shift pattern?	—	*Go to Step 3*	Go to Diagnostic Aids
3	Inspect the shift solenoid/hydraulic circuit for the following conditions: • An internal malfunction • Damaged seals on the shift solenoid valve. Refer to *Shift Solenoid Leak Test*. Did you find and correct the condition?	—	*Go to Step 4*	—
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 under the following conditions (only if traffic and road conditions permit): • Hold the throttle at 40% and accelerate to 64 km/h (40 mph). • Stop the vehicle, engine idling. • Hold the throttle at 15% and accelerate to 80 km/h (55 mph). 4. Select Specific DTC. 5. Enter DTC P0756. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0756 2-3 Shift Solenoid Valve Performance - No First or Second Gear (3.8L)



42270

Circuit Description

The 2-3 shift solenoid (SS) valve controls the fluid flow acting on the 2-3 shift valves. The 2-3 SS valve is a normally-open exhaust valve that is used with the 1-2 SS valve in order to allow four different shifting combinations.

When the PCM detects a 4-3-3-4 shift pattern, then DTC P0756 sets. DTC P0756 is a type A DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P1860.
- No transmission component slipping DTC P1870.
- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The engine torque is 50–400 lb ft.
- The TP angle is greater than 9 percent.
- The vehicle speed is greater than 8 km/h (5 mph).
- The gear range is D4, D3, D2 or D1.
- The transmission fluid temperature is 20–130°C (68–266°F).
- The transmission output speed is greater than 150 RPM.

Conditions for Setting the DTC

DTC P0756 sets if both of the following conditions occur:

Condition 1

- The PCM commands first gear for 2 seconds.
- The engine speed is greater than the TCC slip speed.
- The transmission output speed is greater than 200 RPM.
- The TCC slip speed is –3000 to 200 RPM.
- The estimated gear ratio is 0.0 to 0.895.
- All conditions are met for 1 second.

Condition 2

- The PCM commands second gear for 1 second.
- The engine speed is greater than 5.26 times the TCC slip speed.
- The estimated gear ratio is 0.9 to 1.2.
- All conditions are met for 2 seconds.

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Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands 3rd gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0756 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the *Shift Speed* table.
- Other internal transmission failures may cause more than one shift to occur.
- Refer to the *Shift Solenoid Valve State and Gear Ratio* table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

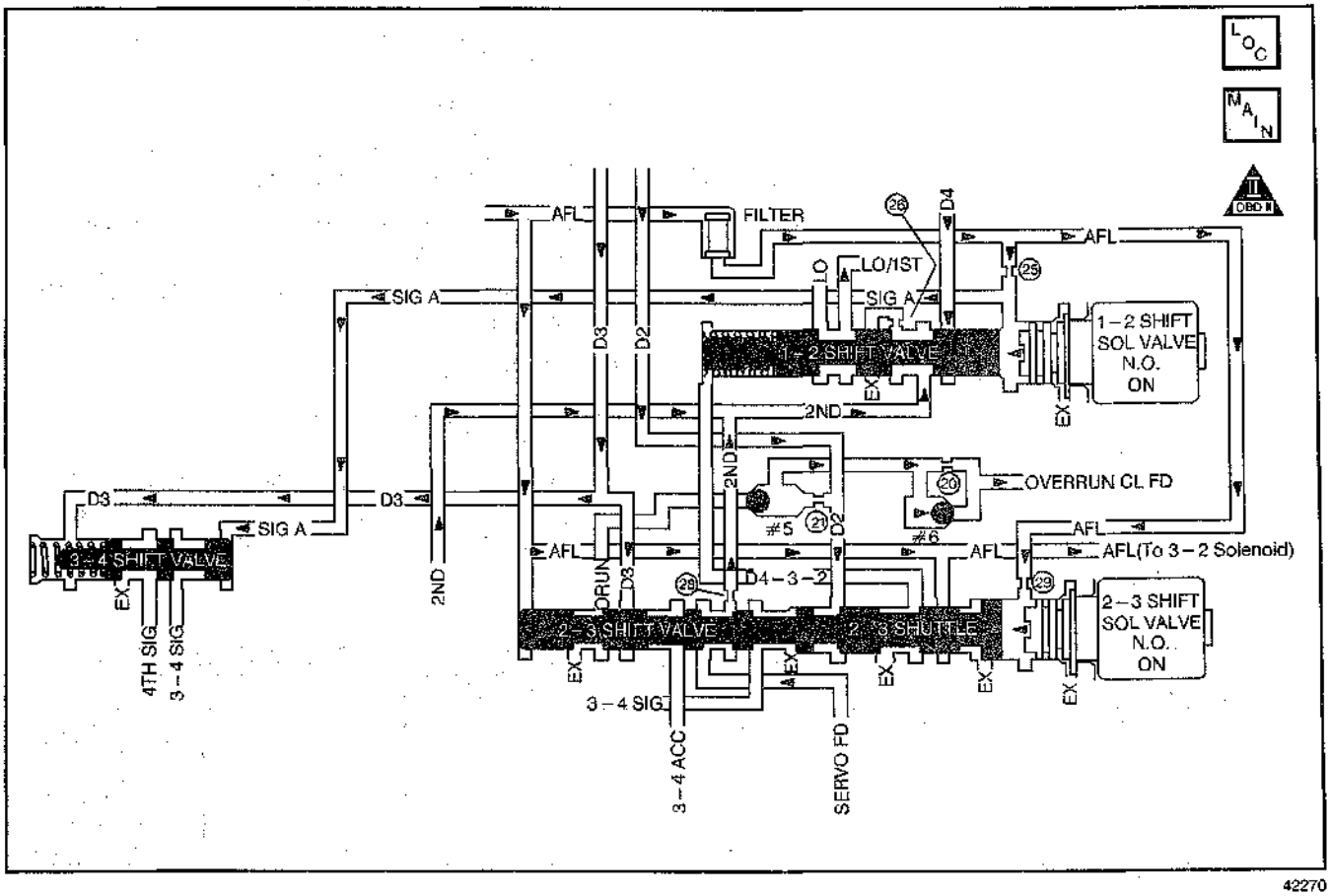
2. This step tests that the PCM commanded all shifts, that all shift solenoid valves responded correctly, but that all the shifts did not occur.

DTC P0756 2-3 Shift Solenoid Valve Performance - No First or Second Gear (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in D4 range under the following conditions: Accelerate the vehicle, ensuring that the PCM commands 1st , 2nd , 3rd and 4th gears. Did you detect a 4-3-3-4 shift pattern?	—	*Go to Step 3*	Go to Diagnostic Aids
3	Inspect the shift solenoid/hydraulic circuit for the following conditions: • An internal malfunction • Damaged seals on the shift solenoid valves Refer to *Shift Solenoid Leak Test*. Did you find and correct the condition?	—	*Go to Step 4*	—
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 range under the following conditions (only if traffic and road conditions permit): Hold the throttle at 40% and accelerate to 64 km/h (40 mph). 4. Select Specific DTC. 5. Enter DTC P0756. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0757 2-3 Shift Solenoid Valve Performance - No Third or Fourth Gear (3.8L)



42270

Circuit Description

The 2-3 shift solenoid (SS) valve controls the fluid flow acting on the 2-3 shift valves. The 2-3 SS valve is a normally-open exhaust valve that is used with the 1-2 SS valve in order to allow four different shifting combinations.

When the PCM detects a 1-2-2-1 shift pattern, then DTC P0757 sets. DTC P0757 is a type A DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P1860.
- No transmission component slipping DTC P1870.
- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The engine vacuum is 0–105 kPa.
- The engine torque is 0–400 lb ft.
- The TP angle is greater than 9 percent.
- The vehicle speed is greater than 8 km/h (5 mph).
- The gear range is D4, D3, D2 or D1.
- The transmission fluid temperature is 20–130°C (68–266°F).
- The transmission output speed is greater than 150 RPM.

Conditions for Setting the DTC

DTC P0757 sets if both of the following conditions occur:

Condition 1

- The PCM commands third gear for 1 second.
- The engine torque is 50–400 lb ft.
- The engine speed is greater than 1.44 times the TCC slip speed.
- The estimated gear ratio is 1.575 to 1.825.
- All conditions are met for 2 seconds.

Condition 2

- The PCM commands fourth gear for 1 second.
- The engine torque is 0–400 lb ft.
- The engine speed is greater than 1.13 times the TCC slip speed.
- The estimated gear ratio is 1.8 to 3.26.
- All conditions are met for 2 seconds.

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Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands 3rd gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0757 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the *Shift Speed* table.
- Other internal transmission failures may cause more than one shift to occur.
- Refer to the *Shift Solenoid Valve State and Gear Ratio* table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

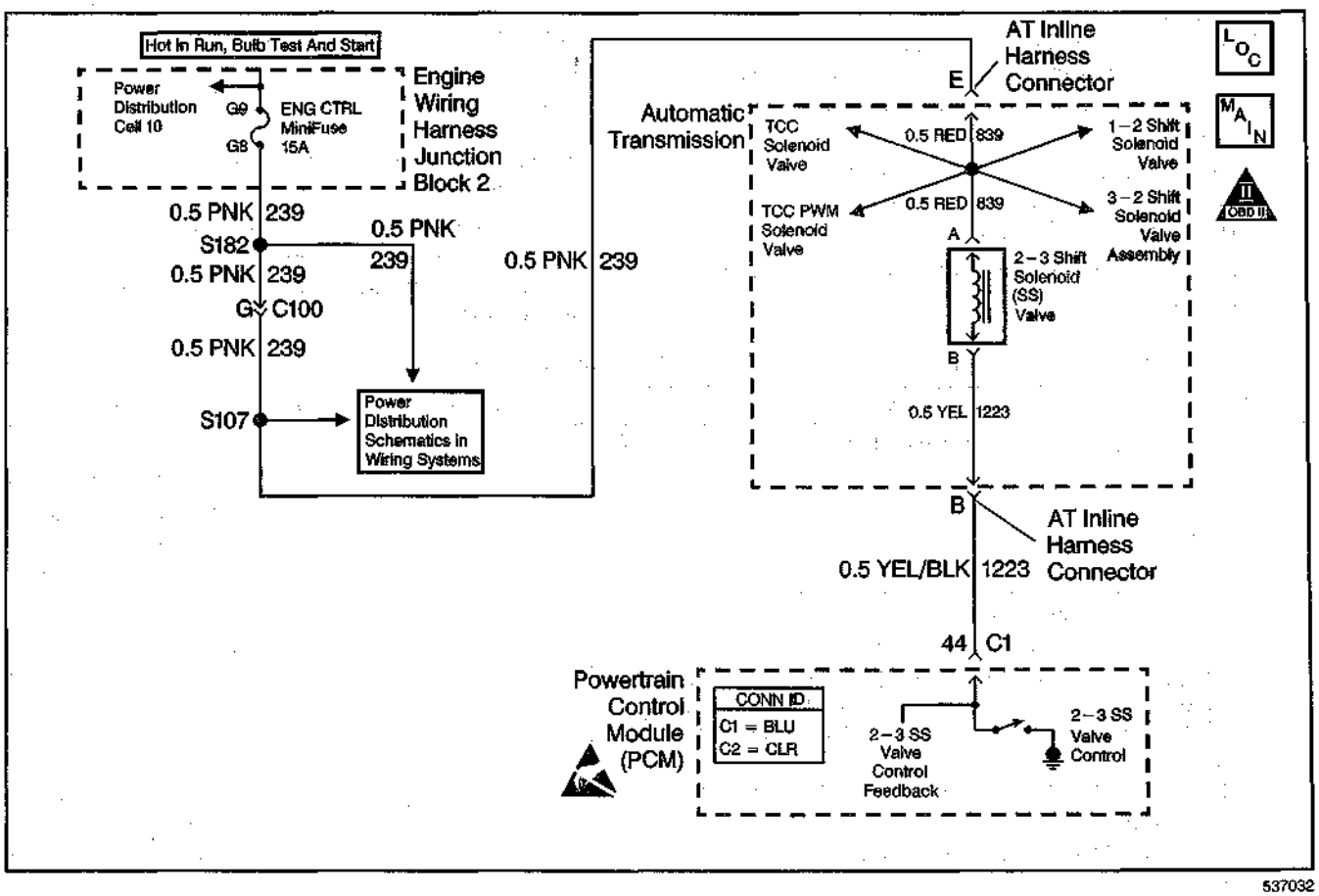
2. This step tests that the PCM commanded all shifts, that all shift solenoid valves responded correctly, but that all the shifts did not occur.

DTC P0757 2-3 Shift Solenoid Valve Performance - No Third or Fourth Gear (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in D4 range under the following conditions: Accelerate the vehicle, ensuring that the PCM commands 1st , 2nd , 3rd and 4th gears. Did you detect a 1-2-2-1 shift pattern?	—	*Go to Step 3*	Go to Diagnostic Aids
3	Inspect the shift solenoid/hydraulic circuit for the following conditions: • An internal malfunction • Damaged seals on the shift solenoid valve Refer to *Shift Solenoid Leak Test.* Did you find and correct the condition?	—	*Go to Step 4*	—
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 range under the following conditions (only if traffic and road conditions permit): Hold the throttle at 15% and accelerate to 80 km/h (55 mph). 4. Select Specific DTC. 5. Enter DTC P0757. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0758 2-3 Shift Solenoid Circuit Electrical (3.8L)



Circuit Description

The 2-3 shift solenoid (SS) valve controls the fluid flow acting on the 2-3 shift valves. The 2-3 SS valve is a normally-open exhaust valve that is used with the 1-2 SS valve in order to allow four different shifting combinations. The solenoid attaches to the control valve body within the transmission. The 2-3 SS valve receives ignition voltage through circuit 239. The powertrain control module (PCM) controls the solenoid by providing the ground path on circuit 1223.

When the PCM detects a continuous open, short to ground or short to power in the 2-3 SS valve circuit, then DTC P0758 sets. DTC P0758 is a type A DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine speed is 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0758 sets if one of the following conditions occurs for 5 seconds.

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high (B+).

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low (0 volts).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands third gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0758 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

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Diagnostic Aids

- Inspect the connectors at the PCM, the 2–3 SS valve and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- Refer to the *Shift Solenoid Valve State and Gear Ratio* table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests the function of the 2-3 SS valve and the automatic transmission (AT) wiring harness assembly.
5. This step tests for power to the 2-3 SS valve from the ignition through the fuse.
6. This step tests the ability of the PCM and the wiring to control the ground circuit.
8. This step measures the resistance of the AT wiring harness assembly and the 2-3 SS valve.

DTC P0758 2-3 Shift Solenoid Circuit Electrical (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0753 • P0785 • P1860	—	*Go to Step 3*	*Go to Step 4*
3	Inspect the ENG CTRL fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 12*	*Go to Step 5*
4	Use the *Scan Tool* in order to command the 2-3 SS valve ON and OFF three times while listening to the bottom of the transmission pan (a stethoscope may be necessary). Does the solenoid click when commanded?	—	Go to Diagnostic Aids	*Go to Step 5*
5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal E of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the test lamp illuminate?	—	*Go to Step 6*	*Go to Step 15*

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DTC P0758 2-3 Shift Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
6	1. Connect a test lamp between terminal E and terminal B of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. 2. Use the *Scan Tool* in order to command the 2-3 SS valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	—	*Go to Step 8*	*Go to Step 7*
7	Is the test lamp always ON?	—	*Go to Step 16*	*Go to Step 17*
8	1. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* DMM and *J 35616-A*, measure the resistance between terminal B and terminal E of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	19–31 Ω	*Go to Step 9*	*Go to Step 10*
9	Measure the resistance from terminal B to ground, and from terminal E to ground. Do both readings measure greater than the specified value?	250 K Ω	Go to Diagnostic Aids	*Go to Step 11*
10	1. Disconnect the AT wiring harness assembly from the 2-3 SS valve. 2. Measure the resistance of the 2-3 SS valve. Does the resistance measure within the specified range?	19–31 Ω	*Go to Step 18*	*Go to Step 19*
11	1. Disconnect the AT wiring harness assembly from the 2-3 SS valve. 2. Measure the resistance from the component's terminals to ground. Do both readings measure greater than the specified value?	250 K Ω	*Go to Step 18*	*Go to Step 19*
12	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 2–3 SS valve for a short to ground between the engine wiring harness junction block 2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 13*
13	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 839) of the 2–3 SS valve for a short to ground between the AT inline 20-way connector and the 2–3 SS valve. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 18*	*Go to Step 14*
14	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	—	*Go to Step 21*	—

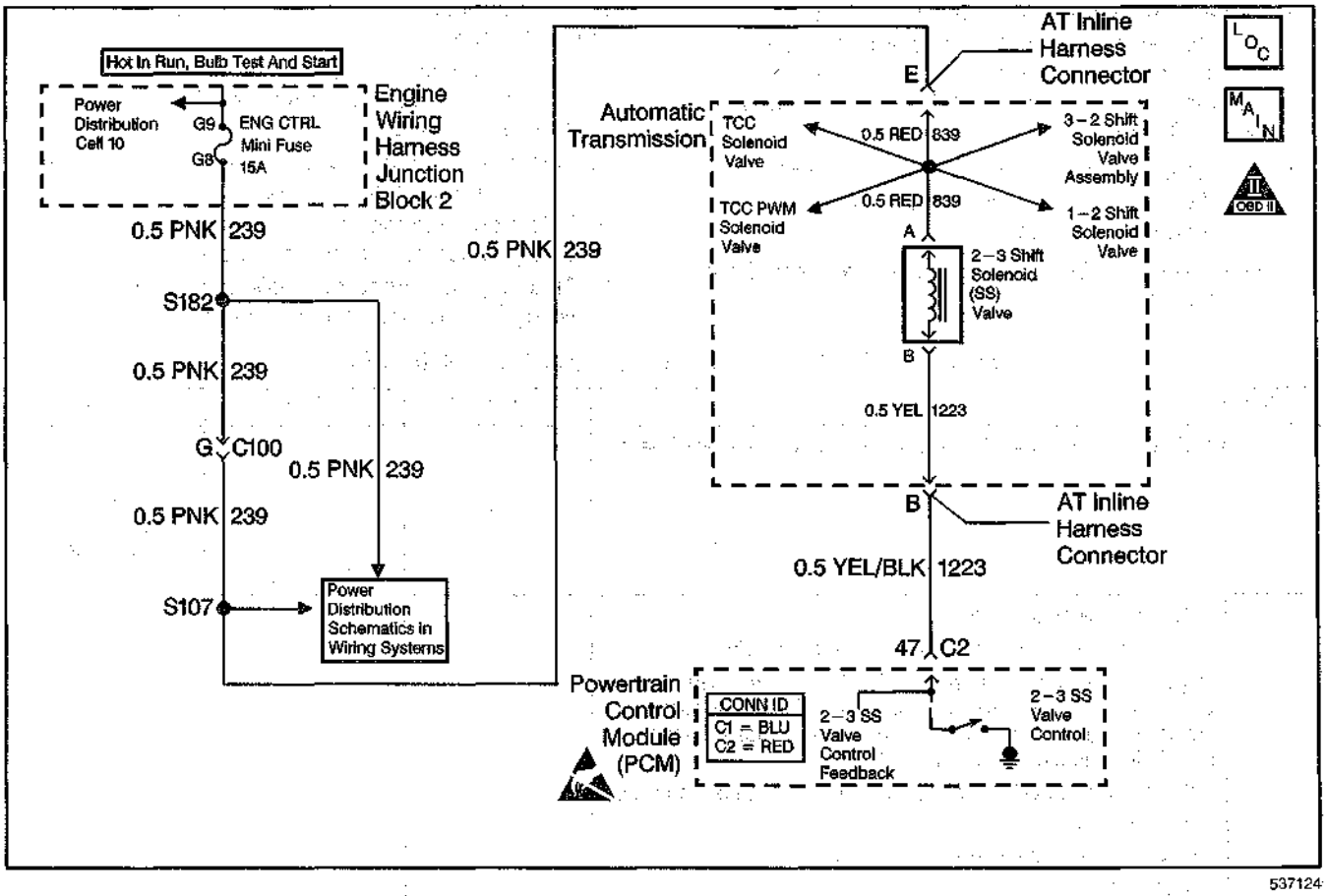
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DTC P0758 2-3 Shift Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
15	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 2–3 SS valve for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	—
16	Test the control circuit (CKT 1223) of the 2–3 SS valve for a short to ground between the PCM connector C1 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
17	Test the control circuit (CKT 1223) of the 2–3 SS valve for an open or short to power between the PCM connector C1 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
18	Replace the AT wiring harness assembly. Refer *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 21*	—
19	Replace the 2-3 SS valve. Refer to *Control and Shift Solenoids Replacement.* Did you complete the replacement?	—	*Go to Step 21*	—
20	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 21*	—
21	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 and ensure the following conditions are met: • The PCM commands the 2-3 SS valve ON and the voltage feedback drops to zero. • The PCM commands the 2-3 SS valve OFF and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0758. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0758 2-3 Shift Solenoid Circuit Electrical (5.7L)



537124

Circuit Description

The 2-3 shift solenoid (SS) valve controls the fluid flow acting on the 2-3 shift valves. The 2-3 SS valve is a normally-open exhaust valve that is used with the 1-2 SS valve in order to allow four different shifting combinations. The solenoid attaches to the control valve body within the transmission. The 2-3 SS valve receives ignition voltage through circuit 239. The powertrain control module (PCM) controls the solenoid by providing the ground path on circuit 1223.

When the PCM detects a continuous open, short to ground or short to power in the 2-3 SS valve circuit, then DTC P0758 sets. DTC P0758 is a type A DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine speed is 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0758 sets if one of the following conditions occurs for 5 seconds.

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high (B+).

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low (0 volts).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands third gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0758 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

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Diagnostic Aids

- Inspect the connectors at the PCM, the 2–3 SS valve and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- Refer to the *Shift Solenoid Valve State and Gear Ratio* table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests the function of the 2-3 SS valve and the automatic transmission (AT) wiring harness assembly.
5. This step tests for power to the 2-3 SS valve from the ignition through the fuse.
6. This step tests the ability of the PCM and the wiring to control the ground circuit.
8. This step measures the resistance of the AT wiring harness assembly and the 2-3 SS valve.

DTC P0758 2-3 Shift Solenoid Circuit Electrical (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0753 • P0785 • P1860	—	*Go to Step 3*	*Go to Step 4*
3	Inspect the ENG CTRL fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 12*	*Go to Step 5*
4	Use the *Scan Tool* in order to command the 2-3 SS valve ON and OFF three times while listening to the bottom of the transmission pan (a stethoscope may be necessary). Does the solenoid click when commanded?	—	Go to Diagnostic Aids	*Go to Step 5*
5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal E of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the test lamp illuminate?	—	*Go to Step 6*	*Go to Step 15*

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DTC P0758 2-3 Shift Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
6	1. Connect a test lamp between terminal E and terminal B of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. 2. Use the *Scan Tool* in order to command the 2-3 SS valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	—	*Go to Step 8*	*Go to Step 7*
7	Is the test lamp always ON?	—	*Go to Step 16*	*Go to Step 17*
8	1. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* DMM and *J 35616-A*, measure the resistance between terminal B and terminal E of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	19–31 Ω	*Go to Step 9*	*Go to Step 10*
9	Measure the resistance from terminal B to ground, and from terminal E to ground. Do both readings measure greater than the specified value?	250 K Ω	Go to Diagnostic Aids	*Go to Step 11*
10	1. Disconnect the AT wiring harness assembly from the 2-3 SS valve. 2. Measure the resistance of the 2-3 SS valve. Does the resistance measure within the specified range?	19–31 Ω	*Go to Step 18*	*Go to Step 19*
11	1. Disconnect the AT wiring harness assembly from the 2-3 SS valve. 2. Measure the resistance from the component's terminals to ground. Do both readings measure greater than the specified value?	250 K Ω	*Go to Step 18*	*Go to Step 19*
12	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 2–3 SS valve for a short to ground between the engine wiring harness junction block 2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 13*
13	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 839) of the 2–3 SS valve for a short to ground between the AT inline 20-way connector and the 2–3 SS valve. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 18*	*Go to Step 14*
14	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	—	*Go to Step 21*	—

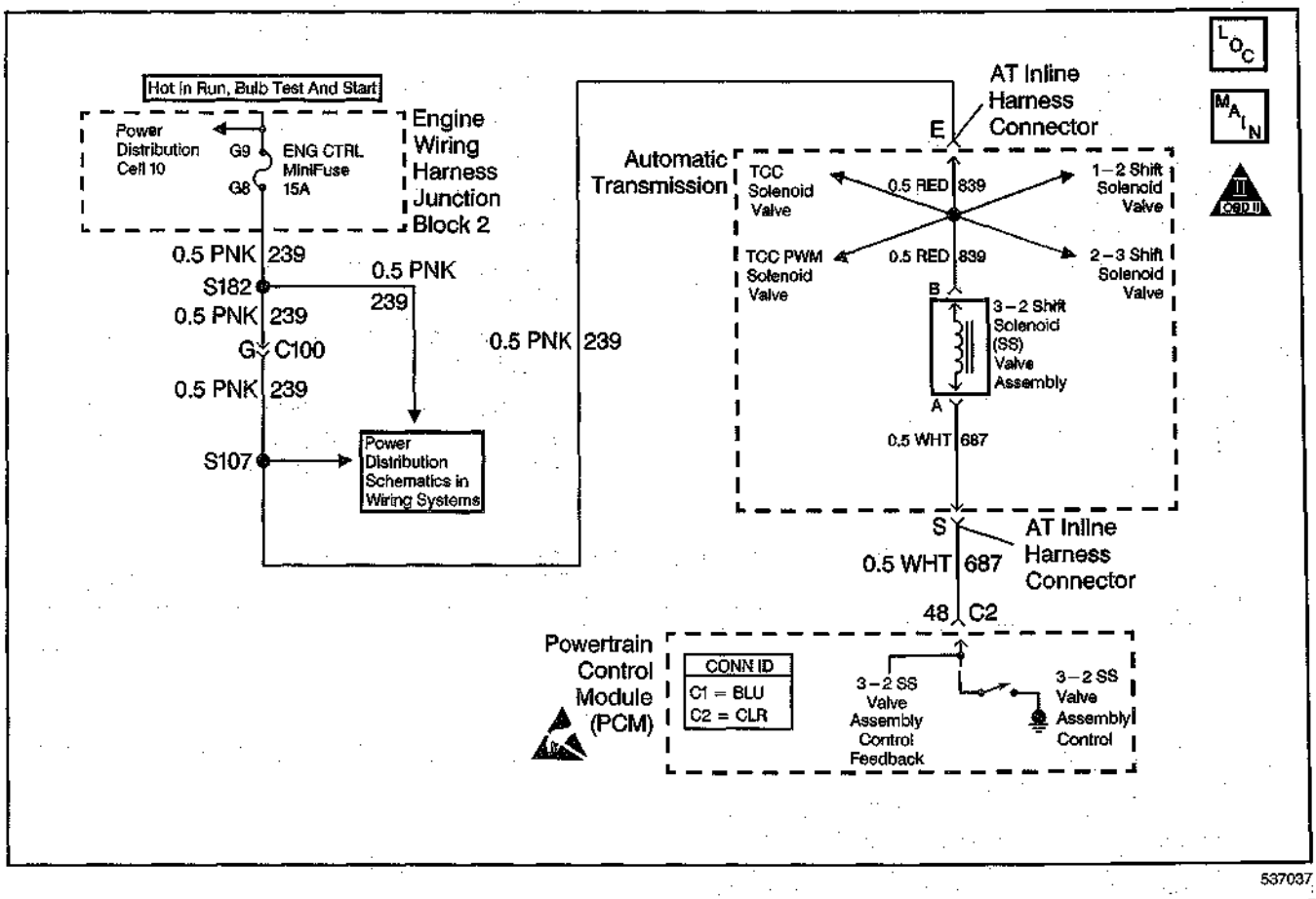
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DTC P0758 2-3 Shift Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
15	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 2–3 SS valve for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	—
16	Test the control circuit (CKT 1223) of the 2–3 SS valve for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
17	Test the control circuit (CKT 1223) of the 2–3 SS valve for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
18	Replace the AT wiring harness assembly. Refer *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 21*	—
19	Replace the 2-3 SS valve. Refer to *Control and Shift Solenoids Replacement.* Did you complete the replacement?	—	*Go to Step 21*	—
20	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 21*	—
21	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 and ensure the following conditions are met: • The PCM commands the 2-3 SS valve ON and the voltage feedback drops to zero. • The PCM commands the 2-3 SS valve OFF and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0758. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0785 3-2 Shift Solenoid Circuit Electrical (3.8L)



537037

Circuit Description

The 3-2 shift solenoid (SS) valve assembly is a normally-closed, 3-port, on/off device that controls the 3-2 downshift. The solenoid attaches to the control valve body within the transmission. The solenoid receives ignition voltage through circuit 239. The powertrain control module (PCM) controls the solenoid by providing a ground path on circuit 687. During a 3-2 downshift, the 2-4 band applies as the 3-4 clutch releases. The PCM varies the timing between the 3-4 clutch release and the 2-4 band apply depending on the vehicle speed and the throttle position.

When the PCM detects a continuous open, short to ground or short to power in the 3-2 SS valve assembly circuit, then DTC P0785 sets. DTC P0785 is a type B DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0785 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high (B+).

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low (0 volts).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands a soft landing to third gear.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM inhibits fourth gear if the transmission is in hot mode.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0785 in the PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

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Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the 3–2 SS valve and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests the ability of the PCM to control the solenoid.
5. This step tests for power to the 3-2 SS valve assembly.
6. This step tests the ability of the PCM and wiring to control the ground circuit.
8. This step measures resistance of the automatic transmission (AT) wiring harness assembly and the 3-2 SS valve assembly.

DTC P0785 3-2 Shift Solenoid Circuit Electrical (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0753 • P0758 • P1860	—	*Go to Step 3*	*Go to Step 4*
3	Inspect the ENG CTRL fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 12*	*Go to Step 5*
4	Use the *Scan Tool* in order to command the 3-2 SS valve assembly ON and OFF three times, while listening to the bottom of the transmission pan (a stethoscope may be necessary). Does the solenoid click when commanded?	—	Go to Diagnostic Aids	*Go to Step 5*
5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal E of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View.* Does the test lamp illuminate?	—	*Go to Step 6*	*Go to Step 15*

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DTC P0785 3-2 Shift Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
6	1. Connect a test lamp between terminal E and terminal S of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. 2. Use the *Scan Tool* in order to command the 3-2 SS valve assembly ON and OFF three times. Does the test lamp turn ON and OFF with each command?	—	*Go to Step 8*	*Go to Step 7*
7	Is the test lamp always ON?	—	*Go to Step 16*	*Go to Step 17*
8	1. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* DMM and the *J 35616-A*, measure the resistance between the terminal E and terminal S of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	20–32 Ω	*Go to Step 9*	*Go to Step 10*
9	1. Measure the resistance from terminal S to ground. 2. Measure the resistance from terminal E to ground. Do both readings measure greater than the specified value?	250 K Ω	Go to Diagnostic Aids	*Go to Step 11*
10	1. Disconnect the AT wiring harness assembly from the 3-2 SS valve assembly. 2. Measure the resistance of the 3-2 SS valve assembly. Does the resistance measure within the specified range?	20–32 Ω	*Go to Step 18*	*Go to Step 19*
11	1. Disconnect the AT wiring harness assembly from the 3-2 SS valve assembly. 2. Measure the resistance from the component's terminals to ground. Do both readings measure greater than the specified value?	250 K Ω	*Go to Step 18*	*Go to Step 19*
12	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 3–2 SS valve assembly for a short to ground between the engine wiring harness junction block 2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 13*
13	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 839) of the 3–2 SS valve assembly for a short to ground between the AT inline 20-way connector and the 3–2 SS valve assembly. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 18*	*Go to Step 14*
14	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	—	*Go to Step 21*	—

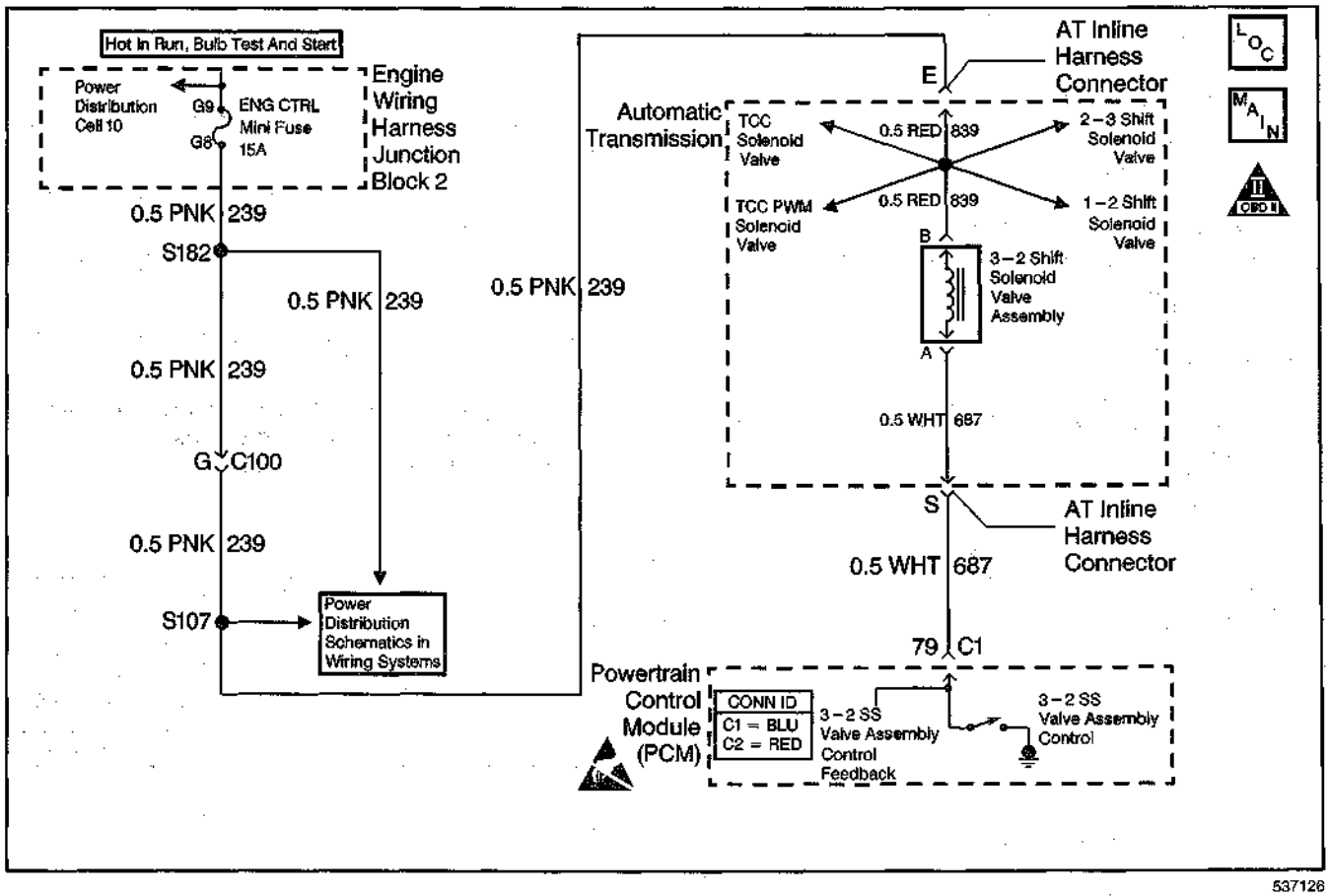
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DTC P0785 3-2 Shift Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
15	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 3–2 SS valve assembly for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	—
16	Test the control circuit (CKT 687) of the 3–2 SS valve assembly for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
17	Test the control circuit (CKT 687) of the 3–2 SS valve assembly for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
18	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 21*	—
19	Replace the 3-2 SS valve assembly. Refer to *Control and Shift Solenoids Replacement.* Did you complete the replacement?	—	*Go to Step 21*	—
20	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 21*	—
21	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D3 or D4 and perform a 3-2 downshift. Ensure the following conditions are met: • The PCM commands the 3-2 SS valve assembly ON and the voltage feedback drops to zero. • The PCM commands the 3-2 SS valve assembly OFF and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0785. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P0785 3-2 Shift Solenoid Circuit Electrical (5.7L)



Circuit Description

The 3-2 shift solenoid (SS) valve assembly is a normally-closed, 3-port, on/off device that controls the 3-2 downshift. The solenoid attaches to the control valve body within the transmission. The solenoid receives ignition voltage through circuit 239. The powertrain control module (PCM) controls the solenoid by providing a ground path on circuit 687. During a 3-2 downshift, the 2-4 band applies as the 3-4 clutch releases. The PCM varies the timing between the 3-4 clutch release and the 2-4 band apply depending on the vehicle speed and the throttle position.

When the PCM detects a continuous open, short to ground or short to power in the 3-2 SS valve assembly circuit, then DTC P0785 sets. DTC P0785 is a type B DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0785 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high (B+).

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low (0 volts).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands a soft landing to third gear.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM inhibits fourth gear if the transmission is in hot mode.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0785 in the PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

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Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the 3–2 SS valve and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests the ability of the PCM to control the solenoid.
5. This step tests for power to the 3-2 SS valve assembly.
6. This step tests the ability of the PCM and wiring to control the ground circuit.
8. This step measures resistance of the automatic transmission (AT) wiring harness assembly and the 3-2 SS valve assembly.

DTC P0785 3-2 Shift Solenoid Circuit Electrical (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0753 • P0758 • P1860	—	*Go to Step 3*	*Go to Step 4*
3	Inspect the ENG CTRL fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 12*	*Go to Step 5*
4	Use the *Scan Tool* in order to command the 3-2 SS valve assembly ON and OFF three times, while listening to the bottom of the transmission pan (a stethoscope may be necessary). Does the solenoid click when commanded?	—	Go to Diagnostic Aids	*Go to Step 5*
5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal E of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View.* Does the test lamp illuminate?	—	*Go to Step 6*	*Go to Step 15*

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DTC P0785 3-2 Shift Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
6	1. Connect a test lamp between terminal E and terminal S of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View.* 2. Use the *Scan Tool* in order to command the 3-2 SS valve assembly ON and OFF three times. Does the test lamp turn ON and OFF with each command?	—	*Go to Step 8*	*Go to Step 7*
7	Is the test lamp always ON?	—	*Go to Step 16*	*Go to Step 17*
8	1. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* DMM and the *J 35616-A*, measure the resistance between the terminal E and terminal S of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View.* Does the resistance measure within the specified range?	20–32 Ω	*Go to Step 9*	*Go to Step 10*
9	1. Measure the resistance from terminal S to ground. 2. Measure the resistance from terminal E to ground. Do both readings measure greater than the specified value?	250 K Ω	Go to Diagnostic Aids	*Go to Step 11*
10	1. Disconnect the AT wiring harness assembly from the 3-2 SS valve assembly. 2. Measure the resistance of the 3-2 SS valve assembly. Does the resistance measure within the specified range?	20–32 Ω	*Go to Step 18*	*Go to Step 19*
11	1. Disconnect the AT wiring harness assembly from the 3-2 SS valve assembly. 2. Measure the resistance from the component's terminals to ground. Do both readings measure greater than the specified value?	250 K Ω	*Go to Step 18*	*Go to Step 19*
12	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 3–2 SS valve assembly for a short to ground between the engine wiring harness junction block 2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 13*
13	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 839) of the 3–2 SS valve assembly for a short to ground between the AT inline 20-way connector and the 3–2 SS valve assembly. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 18*	*Go to Step 14*
14	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	—	*Go to Step 21*	—

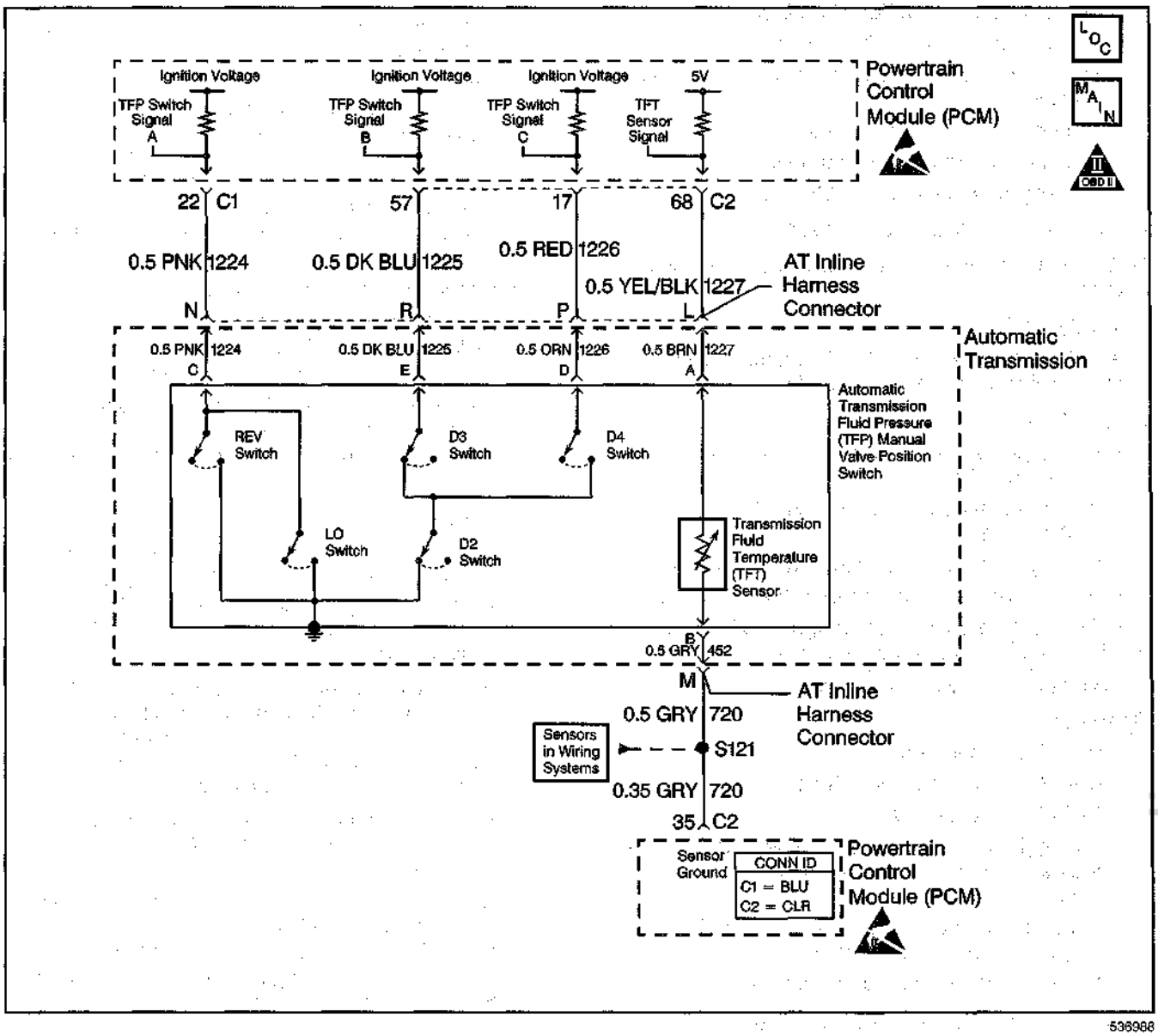
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DTC P0785 3-2 Shift Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
15	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the 3–2 SS valve assembly for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	—
16	Test the control circuit (CKT 687) of the 3–2 SS valve assembly for a short to ground between the PCM connector C1 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
17	Test the control circuit (CKT 687) of the 3–2 SS valve assembly for an open or short to power between the PCM connector C1 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 21*	*Go to Step 20*
18	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 21*	—
19	Replace the 3-2 SS valve assembly. Refer to *Control and Shift Solenoids Replacement.* Did you complete the replacement?	—	*Go to Step 21*	—
20	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 21*	—
21	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D3 or D4 and perform a 3-2 downshift. Ensure the following conditions are met: • The PCM commands the 3-2 SS valve assembly ON and the voltage feedback drops to zero. • The PCM commands the 3-2 SS valve assembly OFF and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0785. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P1810 TFP Valve Position Switch Circuit (3.8L)



536988

Circuit Description

The automatic transmission fluid pressure (TFP) manual valve position switch consists of five pressure switches (two normally-closed and three normally-open) and a transmission fluid temperature (TFT) sensor combined into one unit. The combined unit mounts on the valve body.

The powertrain control module (PCM) supplies ignition voltage for each range signal. By grounding one or more of the circuits through various combinations of the pressure switches, the PCM detects which manual valve position you select. The PCM compares the actual voltage combination of the switches to a TFP manual valve position switch combination table stored in memory.

The TFP manual valve position switch cannot distinguish between PARK and NEUTRAL because the monitored valve body pressures are identical. With the engine OFF and the ignition switch in the RUN position, the TFP manual valve position switch indicates PARK or NEUTRAL. Disconnecting the AT inline 20-way connector removes the ground potential for the three range signals to the PCM. In this case, with the engine OFF, and the ignition switch in the RUN position, D2 will be indicated.

When the PCM detects an invalid state of the TFP manual valve position switch circuit by deciphering the TFP manual valve position switch inputs, then DTC P1810 sets. DTC P1810 is a type B DTC.

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Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The engine torque is 50–450 lb ft.
- The engine vacuum is 0–105 kPa.

Conditions for Setting the DTC

DTC P1810 sets if any of the following conditions occurs:

Condition 1

The PCM detects an invalid TFP manual valve position switch state for 60 seconds.

Condition 2

- The engine speed is less than 100 RPM for 0.1 second; then

  the engine speed is 100–600 RPM for 0.02 second; then

  the engine speed is greater than 600 RPM.
- The vehicle speed is less than 3 km/h (2 mph).
- The PCM detects a gear range of D2, D4 or REVERSE during an engine start.
- All conditions are met for 5 seconds

Condition 3

- The TP angle is 7–50%.
- The PCM commands fourth gear.
- The TCC is locked ON.
- The speed ratio is 0.65–0.75 (speed ratio is the engine speed divided by transmission output speed).
- The PCM detects a gear range is PARK or NEUTRAL when operating in D4.
- All conditions are met for 10 seconds

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands D2 line pressure.
- The PCM commands a D4 shift pattern.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P1810 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Refer to the *Transmission Fluid Pressure (TFP) Manual Valve Position Switch Logic* table for the normal range signals and the invalid combinations. On the table, LOW is 0 volts, HI is ignition voltage.
- Inspect the connectors at the PCM, the TFP manual valve position switch and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- Sediment in the valve body may cause improper operation of the TFP manual valve position switch. If sediment intrusion is suspected, clean the valve body and replace the TFP manual valve position switch.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step compares the indicated range signal to the selected manual valve position.
5. This step tests for correct voltage from the PCM to the AT inline 20-way connector.

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DTC P1810 TFP Valve Position Switch Circuit (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*
3	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine and idle at normal operating temperature. 6. Apply the brake pedal. 7. Select each transmission range: P, R, N, D4, D3, D2 and D1. Does each selected transmission range match the *Scan Tool* TFP Sw. display?	—	Go to Diagnostic Aids	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Turn ON the ignition, with the engine OFF. Does the *Scan Tool* TFP Sw. A/B/C parameter indicate HI for all range signal states?	—	*Go to Step 5*	*Go to Step 9*
5	1. Turn OFF the ignition. 2. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 3. Turn ON the ignition, with the engine OFF. 4. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the voltage from terminal N of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View.* 5. Measure the voltage from terminal R of the *J 44152* to ground. 6. Measure the voltage from terminal P of the *J 44152* to ground. Does the voltage measure within the specified range at all three terminals?	10–12 Volts	*Go to Step 6*	*Go to Step 10*
6	Connect a fused jumper wire from terminal N of the *J 44152* (signal circuit A) to ground while monitoring the *Scan Tool* TFP Sw. A/B/C parameter. When signal circuit A (CKT 1224) is grounded, do any other signal circuits indicate LOW?	—	*Go to Step 11*	*Go to Step 7*
7	Connect a fused jumper wire from terminal R of the *J 44152* (signal circuit B) to ground while monitoring the *Scan Tool* TFP Sw. A/B/C parameter. When signal circuit B (CKT 1225) is grounded, do any other signal circuits indicate LOW?	—	*Go to Step 11*	*Go to Step 8*
8	Connect a fused jumper wire from terminal P of the *J 44152* (signal circuit C) to ground while monitoring the *Scan Tool* TFP Sw. A/B/C parameter. When signal circuit C (CKT 1226) is grounded, do any other signal circuits indicate LOW?	—	*Go to Step 11*	*Go to Step 12*

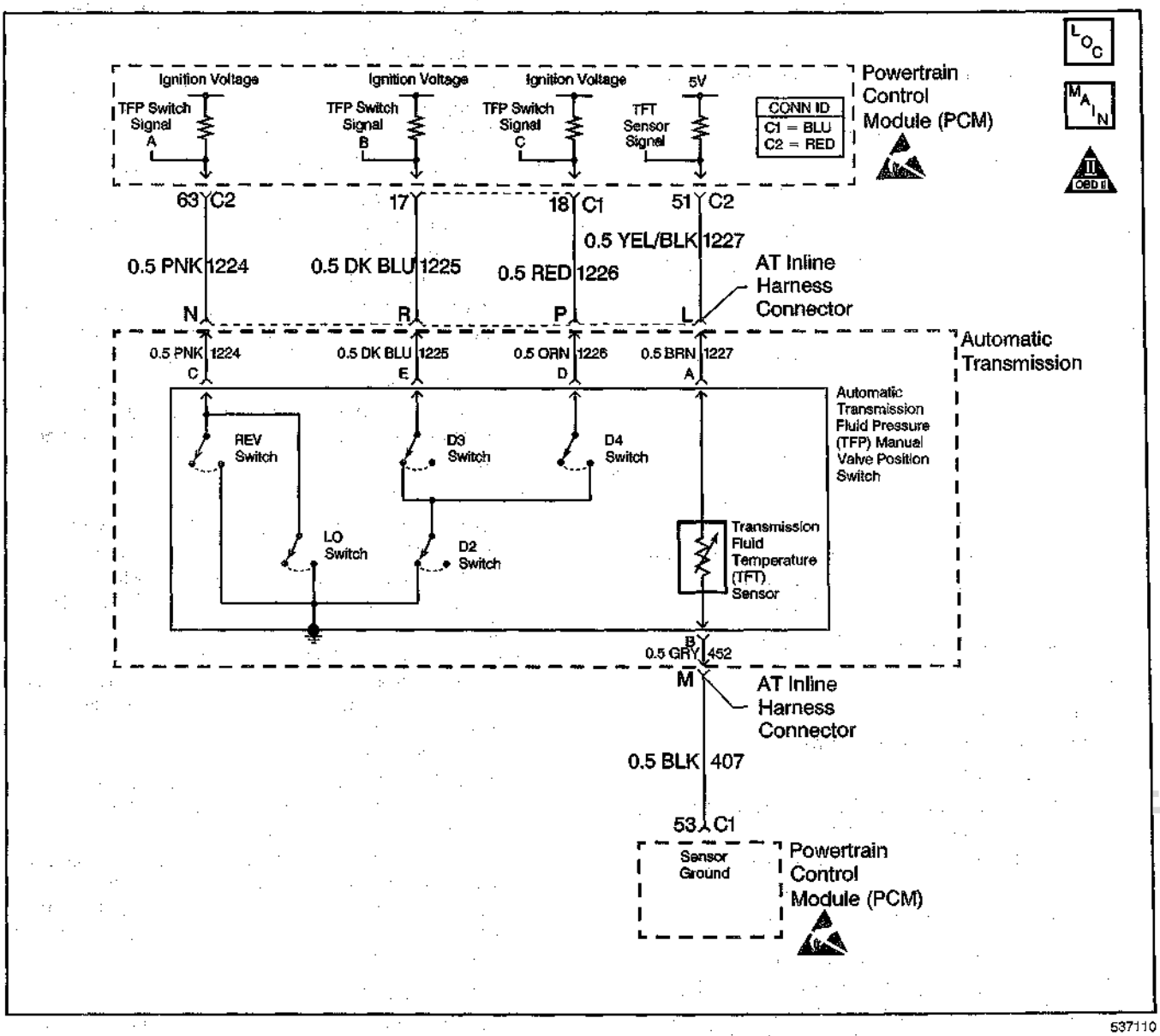
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DTC P1810 TFP Valve Position Switch Circuit (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
9	Test the signal circuits (CKTs 1224, 1225 and 1226) of the TFP manual valve position switch that did not indicate HI for a short to ground between the PCM connector C1 and C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Repairs. Did you find and correct the condition?	—	*Go to Step 16*	*Go to Step 15*
10	Test the signal circuits (CKTs 1224, 1225 and 1226) of the TFP manual valve position switch that did not indicate ignition voltage for an open between the PCM connector C1 and C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Repairs. Did you find and correct the condition?	—	*Go to Step 16*	*Go to Step 15*
11	Test the affected signal circuits of the TFP manual valve position switch for a shorted together condition between the PCM connector C1 and C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Repairs. Did you find and correct the condition?	—	*Go to Step 16*	*Go to Step 15*
12	Test the signal circuits (CKTs 1224, 1225 and 1226) of the TFP manual valve position switch for an open or shorted condition between the TFP manual valve position switch and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Repairs. Did you find a condition?	—	*Go to Step 13*	*Go to Step 14*
13	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 16*	—
14	Replace the TFP manual valve position switch. Refer to *Valve Body and Pressure Switch Replacement.* Did you complete the replacement?	—	*Go to Step 16*	—
15	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 16*	—
16	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle under the following conditions: 3.1. Turn ON the ignition, with the engine OFF for at least 2 seconds. 3.2. Start the vehicle and idle for 5 seconds. 3.3. Drive in D4 until the TCC locks for 10 seconds. 3.4. Continue to run the engine for at least 60 seconds from startup. 4. Select Specific DTC. 5. Enter DTC P1810. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P1810 TFP Valve Position Switch Circuit (5.7L)



537110

Circuit Description

The automatic transmission fluid pressure (TFP) manual valve position switch consists of five pressure switches (two normally-closed and three normally-open) and a transmission fluid temperature (TFT) sensor combined into one unit. The combined unit mounts on the valve body.

The powertrain control module (PCM) supplies ignition voltage for each range signal. By grounding one or more of the circuits through various combinations of the pressure switches, the PCM detects which manual valve position you select. The PCM compares the actual voltage combination of the switches to a TFP manual valve position switch combination table stored in memory.

The TFP manual valve position switch cannot distinguish between PARK and NEUTRAL because the monitored valve body pressures are identical. With the engine OFF and the ignition switch in the RUN position, the TFP manual valve position switch indicates PARK/NEUTRAL. Disconnecting the AT inline 20–way connector removes the ground potential for the three range signals to the PCM. In this case, with the engine OFF, and the ignition switch in the RUN position, D2 will be indicated.

When the PCM detects an invalid state of the TFP manual valve position switch circuit by deciphering the TFP manual valve position switch inputs, then DTC P1810 sets. DTC P1810 is a type B DTC.

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Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The engine torque is 40–400 lb ft.
- The engine vacuum is 0–105 kPa.

Conditions for Setting the DTC

DTC P1810 sets if any of the following conditions occurs:

Condition 1

The PCM detects an invalid TFP manual valve position switch state for 60 seconds.

Condition 2

- The engine speed is less than 80 RPM for 0.1 second; then the engine speed is 80–550 RPM for 0.07 second; then the engine speed is greater than 550 RPM.
- The vehicle speed is less than 3 km/h (2 mph).
- The PCM detects a gear range of D2, D4 or REVERSE during an engine start.
- All conditions are met for 5 seconds.

Condition 3

- The TP angle is 8–45%.
- The PCM commands fourth gear.
- The TCC is locked ON.
- The speed ratio is 0.65–0.8 (speed ratio is engine speed divided by transmission output speed).
- The PCM detects a gear range of PARK or NEUTRAL when operating in D4.
- All conditions are met for 10 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands D2 line pressure.
- The PCM commands a D4 shift pattern.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P1810 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Refer to the *Transmission Fluid Pressure (TFP) Manual Valve Position Switch Logic* table for the normal range signals and the invalid combinations. On the table, LOW is 0 volts, HI is ignition voltage.
- Inspect the connectors at the PCM, the TFP manual valve position switch and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.
- Sediment in the valve body may cause improper operation of the TFP manual valve position switch. If sediment intrusion is suspected, clean the valve body and replace the TFP manual valve position switch.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step compares the indicated range signal to the selected manual valve position.
5. This step tests for correct voltage from the PCM to the AT inline 20-way connector.

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DTC P1810 TFP Valve Position Switch Circuit (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*
3	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine and idle at normal operating temperature. 6. Apply the brake pedal. 7. Select each transmission range: P, R, N, D4, D3, D2 and D1. Does each selected transmission range match the *Scan Tool* TFP Sw. display?	—	Go to Diagnostic Aids	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Turn ON the ignition, with the engine OFF. Does the *Scan Tool* TFP Sw. A/B/C parameter indicate HI for all range signal states?	—	*Go to Step 5*	*Go to Step 9*
5	1. Turn OFF the ignition. 2. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 3. Turn ON the ignition, with the engine OFF. 4. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A* connector test adapter kit, measure the voltage from terminal N of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View.* 5. Measure the voltage from terminal R of the *J 44152* to ground. 6. Measure the voltage from terminal P of the *J 44152* to ground. Does the voltage measure within the specified range at all three terminals?	10–12 Volts	*Go to Step 6*	*Go to Step 10*
6	Connect a fused jumper wire from terminal N of the *J 44152* (signal circuit A) to ground while monitoring the *Scan Tool* TFP Sw. A/B/C parameter. When signal circuit A (CKT 1224) is grounded, do any other signal circuits indicate LOW?	—	*Go to Step 11*	*Go to Step 7*
7	Connect a fused jumper wire from terminal R of the *J 44152* (signal circuit B) to ground while monitoring the *Scan Tool* TFP Sw. A/B/C parameter. When signal circuit B (CKT 1225) is grounded, do any other signal circuits indicate LOW?	—	*Go to Step 11*	*Go to Step 8*
8	Connect a fused jumper wire from terminal P of the *J 44152* (signal circuit C) to ground while monitoring the *Scan Tool* TFP Sw. A/B/C parameter. When signal circuit C (CKT 1226) is grounded, do any other signal circuits indicate LOW?	—	*Go to Step 11*	*Go to Step 12*

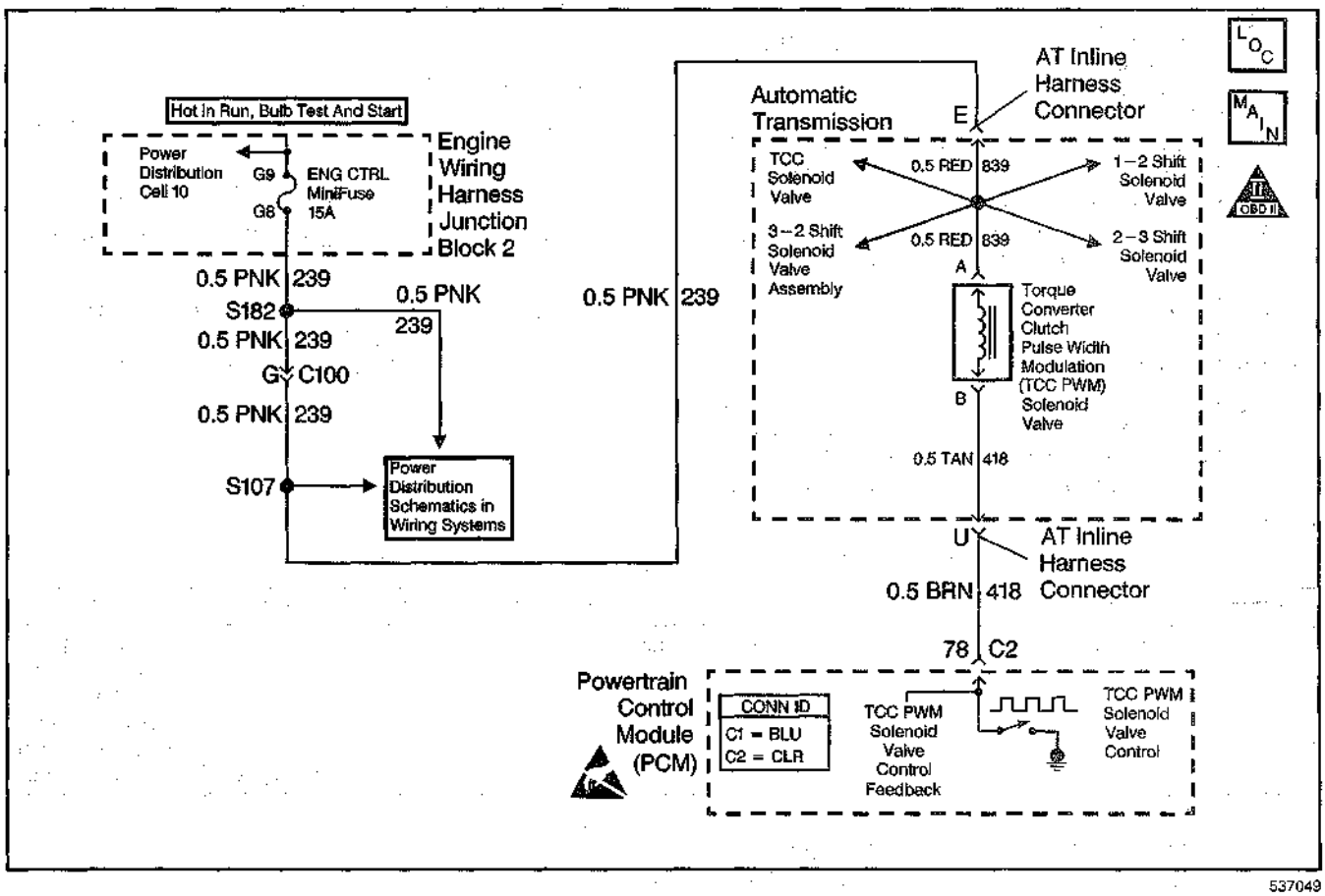
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DTC P1810 TFP Valve Position Switch Circuit (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
9	Test the signal circuits (CKTs 1224, 1225 and 1226) of the TFP manual valve position switch that did not indicate HI for a short to ground between the PCM connector C1 and C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Repairs. Did you find and correct the condition?	—	*Go to Step 16*	*Go to Step 15*
10	Test the signal circuits (CKTs 1224, 1225 and 1226) of the TFP manual valve position switch that did not indicate ignition voltage for an open between the PCM connector C1 and C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Repairs. Did you find and correct the condition?	—	*Go to Step 16*	*Go to Step 15*
11	Test the affected signal circuits of the TFP manual valve position switch for a shorted together condition between the PCM connector C1 and C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Repairs. Did you find and correct the condition?	—	*Go to Step 16*	*Go to Step 15*
12	Test the signal circuits (CKTs 1224, 1225 and 1226) of the TFP manual valve position switch for an open or shorted condition between the TFP manual valve position switch and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Repairs. Did you find a condition?	—	*Go to Step 13*	*Go to Step 14*
13	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 16*	—
14	Replace the TFP manual valve position switch. Refer to *Valve Body and Pressure Switch Replacement.* Did you complete the replacement?	—	*Go to Step 16*	—
15	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 16*	—
16	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle under the following conditions: 3.1. Turn ON the ignition, with the engine OFF for at least 2 seconds. 3.2. Start the vehicle and idle for 5 seconds. 3.3. Drive in D4 until the TCC locks for 10 seconds. 3.4. Continue to run the engine for at least 60 seconds from startup. 4. Select Specific DTC. 5. Enter DTC P1810. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P1860 TCC PWM Solenoid Circuit Electrical (3.8L)



537049

Circuit Description

The torque converter clutch pulse width modulation (TCC PWM) solenoid valve controls the fluid acting on the converter clutch valve. The converter clutch valve controls the TCC application and release. The solenoid attaches to the control valve body within the transmission. The solenoid receives ignition voltage through circuit 239. The powertrain control module (PCM) controls the solenoid by providing a ground path on circuit 418. Current flows through the solenoid coil according to the duty cycle (percentage of ON and OFF time). The TCC PWM solenoid valve provides a smooth engagement of the torque converter clutch by operating during a duty cycle percent of ON time.

When the PCM detects a continuous open, short to ground or short to power in the TCC PWM solenoid valve circuit, then DTC P1860 sets. DTC P1860 is a type B DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The PCM commands first gear.
- The TCC duty cycle is less than 10% or greater than 90%.

Conditions for Setting the DTC

DTC P1860 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON (90%) and the voltage feedback remains high (B+).

Condition 2

The PCM commands the solenoid OFF (0%) and the voltage feedback remains low (0 volt).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P1860 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

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Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the TCC PWM solenoid valve and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests for voltage to the solenoid.
5. This step tests the ability of the PCM and wiring to control the ground circuit.
7. This step tests the resistance of the TCC PWM solenoid valve and the automatic transmission (AT) wiring harness assembly.

DTC P1860 TCC PWM Solenoid Circuit Electrical (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0753 • P0758 • P0785	—	*Go to Step 3*	*Go to Step 4*
3	Inspect the ENG CTRL fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 11*	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal E of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View.* Does the test lamp illuminate?	—	*Go to Step 5*	*Go to Step 14*

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DTC P1860 TCC PWM Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
5	1. Connect the test lamp between terminal E and terminal U of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. 2. Use the *Scan Tool* in order to command the TCC PWM solenoid valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	—	*Go to Step 7*	*Go to Step 6*
6	Is the test lamp always ON?	—	*Go to Step 15*	*Go to Step 16*
7	1. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A*, measure the resistance between terminal E and terminal U of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	10–15 Ω	*Go to Step 8*	*Go to Step 9*
8	Measure the resistance from terminal E to ground, and from terminal U to ground. Do both readings measure greater than the specified value?	250 K Ω	Go to Diagnostic Aids	*Go to Step 10*
9	1. Disconnect the AT wiring harness assembly from the TCC PWM solenoid valve. 2. Measure the resistance of the TCC PWM solenoid valve. Does the resistance measure within the specified range?	10–15 Ω	*Go to Step 17*	*Go to Step 18*
10	1. Disconnect the AT wiring harness assembly from the TCC PWM solenoid valve. 2. Measure the resistance from each of the component terminals to ground. Do both readings measure greater than the specified value?	250 K Ω	*Go to Step 17*	*Go to Step 18*
11	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the TCC PWM solenoid valve for a short to ground between the engine wiring harness junction block 2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 20*	*Go to Step 12*
12	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 839) of the TCC PWM solenoid valve for a short to ground between the AT inline 20-way connector and the TCC PWM solenoid valve. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 17*	*Go to Step 13*
13	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	—	*Go to Step 20*	—

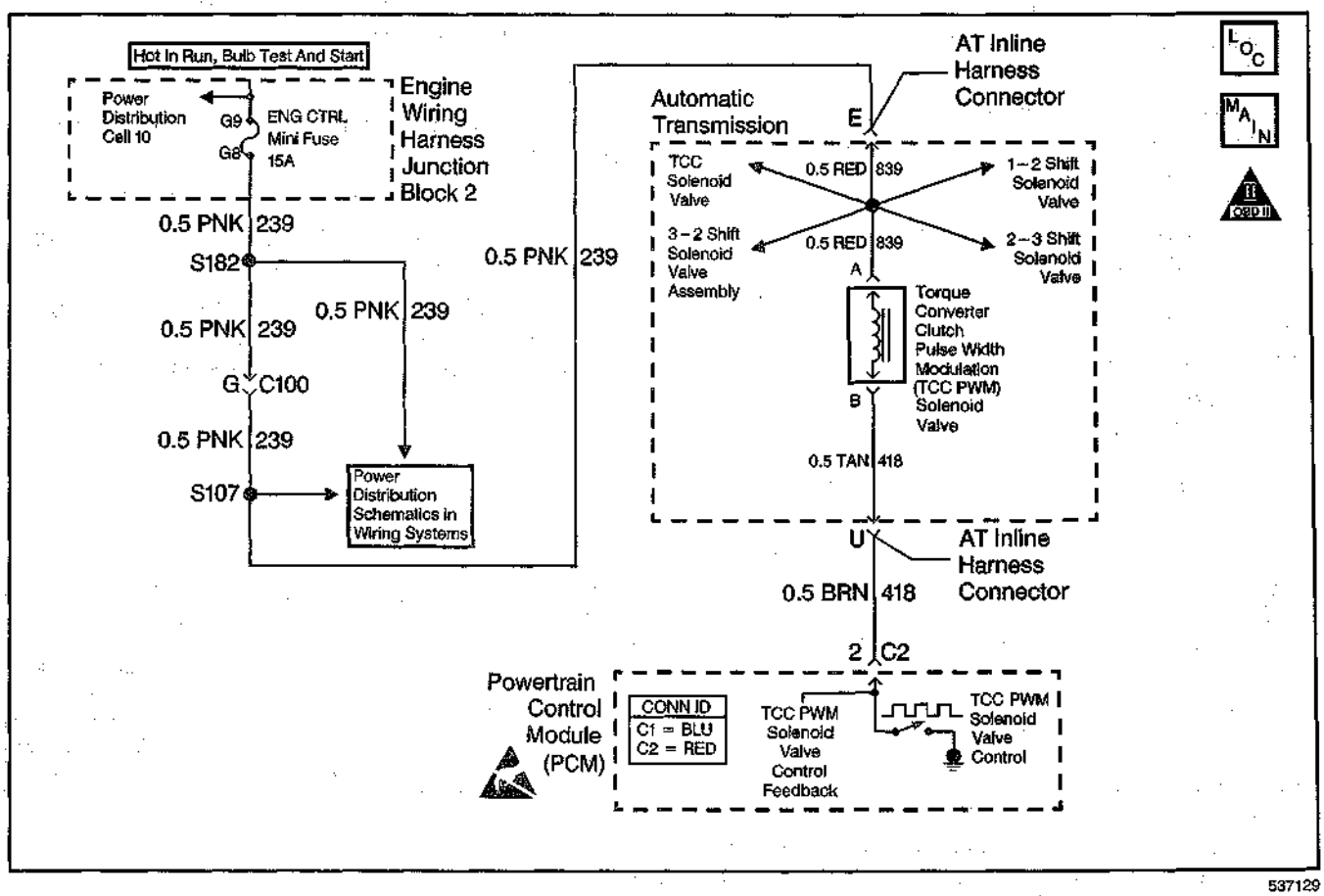
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DTC P1860 TCC PWM Solenoid Circuit Electrical (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
14	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the TCC PWM solenoid valve for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 20*	—
15	Test the control circuit (CKT 418) of the TCC PWM solenoid valve for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 20*	*Go to Step 19*
16	Test the control circuit (CKT 418) of the TCC PWM solenoid valve for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 20*	*Go to Step 19*
17	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 20*	—
18	Replace the TCC PWM solenoid valve. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 20*	—
19	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 20*	—
20	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 with the TCC ON. Ensure the following conditions are met: • The PCM commands the TCC PWM solenoid valve ON, and the voltage feedback drops to zero. • The PCM commands the TCC PWM solenoid valve OFF, and the voltage feedback increases to B+. • All conditions met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P1860. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P1860 TCC PWM Solenoid Circuit Electrical (5.7L)



537129

Circuit Description

The torque converter clutch pulse width modulation (TCC PWM) solenoid valve controls the fluid acting on the converter clutch valve. The converter clutch valve controls the TCC application and release. The solenoid attaches to the control valve body within the transmission. The solenoid receives ignition voltage through circuit 239. The powertrain control module (PCM) controls the solenoid by providing a ground path on circuit 418. Current flows through the solenoid coil according to the duty cycle (percentage of ON and OFF time). The TCC PWM solenoid valve provides a smooth engagement of the torque converter clutch by operating during a duty cycle percent of ON time.

When the PCM detects a continuous open, short to ground or short to power in the TCC PWM solenoid valve circuit, then DTC P1860 sets. DTC P1860 is a type B DTC.

Conditions for Running the DTC

- The system voltage is 8–18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The PCM commands first gear.
- The TCC duty cycle is less than 10% or greater than 90%.

Conditions for Setting the DTC

DTC P1860 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON (90%) and the voltage feedback remains high (B+).

Condition 2

The PCM commands the solenoid OFF (0%) and the voltage feedback remains low (0 volt).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P1860 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

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Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the connectors at the PCM, the TCC PWM solenoid valve and all other circuit connecting points for an intermittent condition. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.
- Inspect the circuit wiring for an intermittent condition. Refer to *Testing for Electrical Intermittents* in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests for voltage to the solenoid.
5. This step tests the ability of the PCM and wiring to control the ground circuit.
7. This step tests the resistance of the TCC PWM solenoid valve and the automatic transmission (AT) wiring harness assembly.

DTC P1860 TCC PWM Solenoid Circuit Electrical (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0753 • P0758 • P0785	—	*Go to Step 3*	*Go to Step 4*
3	Inspect the ENG CTRL fuse for an open. Refer to *General Electrical Diagnosis Procedures* in Wiring Systems. Is the fuse open?	—	*Go to Step 11*	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector (additional DTCs may set). 3. Install the *J 44152* jumper harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the *J 35616-A* connector test adapter kit, connect a test lamp from terminal E of the *J 44152* to ground. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the test lamp illuminate?	—	*Go to Step 5*	*Go to Step 14*

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DTC P1860 TCC PWM Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
5	1. Connect the test lamp between terminal E and terminal U of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. 2. Use the *Scan Tool* in order to command the TCC PWM solenoid valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	—	*Go to Step 7*	*Go to Step 6*
6	Is the test lamp always ON?	—	*Go to Step 15*	*Go to Step 16*
7	1. Install the *J 44152* on the transmission side of the AT inline 20-way connector. 2. Using the *J 39200* digital multimeter (DMM) and the *J 35616-A*, measure the resistance between terminal E and terminal U of the *J 44152*. Refer to *Automatic Transmission Inline Harness Connector End View*. Does the resistance measure within the specified range?	10–15 Ω	*Go to Step 8*	*Go to Step 9*
8	Measure the resistance from terminal E to ground, and from terminal U to ground. Do both readings measure greater than the specified value?	250 K Ω	Go to Diagnostic Aids	*Go to Step 10*
9	1. Disconnect the AT wiring harness assembly from the TCC PWM solenoid valve. 2. Measure the resistance of the TCC PWM solenoid valve. Does the resistance measure within the specified range?	10–15 Ω	*Go to Step 17*	*Go to Step 18*
10	1. Disconnect the AT wiring harness assembly from the TCC PWM solenoid valve. 2. Measure the resistance from each of the component terminals to ground. Do both readings measure greater than the specified value?	250 K Ω	*Go to Step 17*	*Go to Step 18*
11	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the TCC PWM solenoid valve for a short to ground between the engine wiring harness junction block 2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 20*	*Go to Step 12*
12	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 839) of the TCC PWM solenoid valve for a short to ground between the AT inline 20-way connector and the TCC PWM solenoid valve. Refer to *Circuit Testing* in Wiring Systems. Did you find a short to ground condition?	—	*Go to Step 17*	*Go to Step 13*
13	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	—	*Go to Step 20*	—

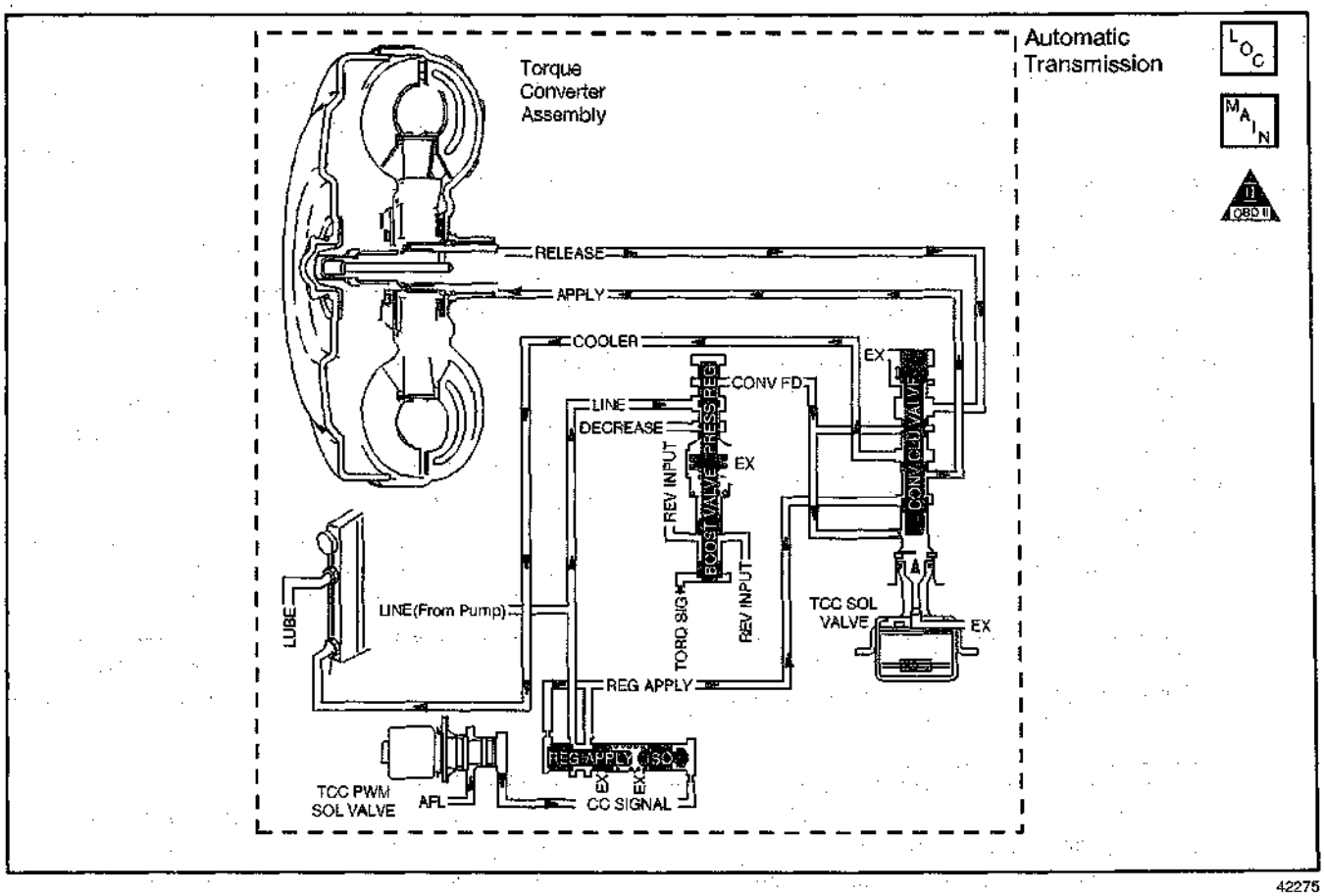
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DTC P1860 TCC PWM Solenoid Circuit Electrical (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
14	**Important:** The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to *Power Distribution Schematics* in Wiring Systems for complete circuit distribution. Test the power feed circuit (CKT 239) of the TCC PWM solenoid valve for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 20*	—
15	Test the control circuit (CKT 418) of the TCC PWM solenoid valve for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 20*	*Go to Step 19*
16	Test the control circuit (CKT 418) of the TCC PWM solenoid valve for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 20*	*Go to Step 19*
17	Replace the AT wiring harness assembly. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 20*	—
18	Replace the TCC PWM solenoid valve. Refer to *Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness.* Did you complete the replacement?	—	*Go to Step 20*	—
19	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 20*	—
20	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 with the TCC ON. Ensure the following conditions are met: • The PCM commands the TCC PWM solenoid valve ON, and the voltage feedback drops to zero. • The PCM commands the TCC PWM solenoid valve OFF, and the voltage feedback increases to B+. • All conditions met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P1860. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P1870 Transmission Component Slipping (3.8L)



Circuit Description

The powertrain control module (PCM) monitors the difference between engine speed and transmission output speed. In D3 drive range with the TCC engaged, the engine speed should closely match the transmission output speed. In D4 drive range, with the TCC engaged, the TCC slip speed should be –20 to +40 RPM.

When the PCM detects excessive TCC slip when the TCC should be engaged, then DTC P1870 sets. DTC P1870 is a type B DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TCC PWM solenoid valve DTC P1860.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The TP angle is 8–35%.
- The engine torque is 40–450 lbs ft.
- The vehicle speed is 48–131 km/h (30–82 mph).
- The speed ratio is 0.65–0.98 (speed ratio is engine speed divided by transmission output speed).
- The engine speed is 1000–3000 RPM.
- The gear range is D4.
- The commanded gear is not 1st gear
- The TFT is between 20–130°C (68–266°F).
- The shift solenoid performance diagnostic counters are zero.
- The TCC is commanded ON for 5 seconds.

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Conditions for Setting the DTC

DTC P1870 sets if the following conditions occur for three TCC cycles.

- The TCC is at maximum duty cycle for 5 seconds.
- The TCC slip speed is 200–800 RPM for 7 seconds.

Important: The following actions may occur before the DTC sets.

- If 4th gear is commanded, the TCC is commanded ON and at maximum duty cycle for 5 seconds, the TP angle is 7–40%, and the transmission slip counter has incremented to either 1 or 2 (out of 3 to increment the fail counter for the current ignition cycle), then the following slip conditions and actions may increment the fail counter for the current ignition cycle:

  These conditions must occur sequentially.

  - **Condition 1:** If the TCC slip speed is 200–800 RPM for 7 seconds, then the PCM commands maximum line pressure and freezes shift adapts from being updated.
  - **Condition 2:** If Condition 1 is met and the TCC slip speed is 200–800 RPM for 10 seconds, then the PCM commands the TCC OFF for 1.5 seconds.
  - **Condition 3:** If Condition 2 is met and the TCC slip speed is 200–800 RPM for 15 seconds, then the fail counter on the current ignition cycle is incremented.

  The above slip conditions and actions may be disregarded if the TCC is commanded OFF at any time as a result of a driving maneuver (sudden acceleration or deceleration).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P1870 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Bronze material found in the transmission oil pan may indicate stator shaft bushing wear. If bushing wear is suspected, inspect the stator shaft and the input (turbine) shaft for damage.
- Refer to *Symptom Diagnosis* for more information.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests the torque converter for slippage while in a commanded lock-up state.

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4

DTC P1870 Transmission Component Slipping (3.8L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*
3	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. **Important:** It may be necessary to allow multiple TCC cycles to occur in order to verify a slipping condition. It may also be necessary to ensure the transmission is warm before performing this step. 5. Drive the vehicle in 4th gear with the TCC commanded ON. Does the *Scan Tool* TCC Slip Speed measure within the specified range for 7 seconds?	200–800 RPM	*Go to Step 4*	Go to Diagnostic Aids
4	1. Inspect the torque converter clutch (TCC) solenoid valve for the following conditions: • Internal malfunction (such as sediment or damage) • Damaged seals 2. Inspect the torque converter clutch pulse width modulation (TCC PWM) solenoid valve for the following conditions: • Internal malfunction (such as sediment or damage) • Damaged seals Did you find and correct the condition?	—	*Go to Step 14*	*Go to Step 5*
5	1. Inspect the 1-2 shift solenoid (SS) valve for the following conditions: • Internal malfunction (such as sediment or damage) • Damaged seals Refer to *Shift Solenoid Leak Test.* 2. Inspect the 2-3 SS valve for the following conditions: • Internal malfunction (such as sediment or damage) • Damaged seals Refer to *Shift Solenoid Leak Test.* 3. Inspect the 3-2 shift solenoid valve assembly for the following conditions: • Internal malfunction (such as sediment or damage) • Damaged seals Refer to *Shift Solenoid Leak Test.* Did you find and correct the condition?	—	*Go to Step 14*	*Go to Step 6*
6	1. Inspect the valve body assembly for a stuck regulator apply valve. 2. Inspect the valve body assembly for a scored regulator apply valve body. Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 7*

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DTC P1870 Transmission Component Slipping (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
7	Inspect the torque converter assembly for the following conditions: • Front stator shaft bushing for wear • Stator roller clutch not holding • External damage/leaks Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 8*
8	Inspect the oil pump assembly for the following conditions: • Stuck converter clutch valve • Converter clutch valve assembled backwards • Mispositioned converter clutch valve retaining ring • Cocked converter clutch outer valve spring • Mispositioned pump to case gasket • Restricted orifice cup plugs • Damaged orifice cup plugs • Over-tightened, or unevenly tightened pump body to cover bolts Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 9*
9	Inspect the input housing and shaft assembly for the following conditions: • Cut turbine shaft O-ring seal • Damaged turbine shaft O-ring seal • Restricted turbine shaft retainer and ball assembly • Damaged turbine shaft retainer and ball assembly Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 10*
10	Inspect the 2-4 band assembly for the following conditions: • Worn 2-4 band • Damaged 2-4 band • Mispositioned 2-4 band • Misassembled 2-4 band • The band anchor pin is not engaged. • Restricted apply passages in the 2-4 servo assembly • Blocked apply passages in the 2-4 servo assembly • Nicks or burrs on the servo pin • Nicks or burrs on the pin bore in the case • Damaged fourth servo piston • Misassembled fourth servo piston • Damaged band apply pin • Incorrect band apply pin • Damaged servo bore in the case • Missing piston seals • Cut piston seals • Damaged piston seals • Porosity in the pistons • Porosity in the cover • Porosity in the case • Damaged piston seal grooves • Plugged orifice cup plug • Missing orifice cup plug Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 11*

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DTC P1870 Transmission Component Slipping (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
11	Inspect the forward clutch assembly for the following conditions: • Worn clutch plates • Porosity in the forward clutch piston • Damaged forward clutch piston • Missing forward clutch piston inner and outer seals • Cut forward clutch piston inner and outer seals • Damaged forward clutch piston inner and outer seals • Missing input housing to forward clutch housing O-ring seal • Cut input housing to forward clutch housing O-ring seal • Damaged input housing to forward clutch housing O-ring seal • Damaged forward clutch housing • Damaged forward clutch housing retainer and ball assembly • Forward clutch housing retainer and ball assembly is not sealing. Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 12*
12	Inspect the 3-4 clutch assembly for the following conditions: • Worn clutch plates • Porosity in the 3-4 clutch piston • Damaged 3-4 clutch piston • Missing 3-4 clutch inner and outer seals • Cut 3-4 clutch inner and outer seals • Damaged 3-4 clutch inner and outer seals • Damaged 3-4 clutch spring assembly • Damaged 3-4 clutch apply ring • Damaged piston seal grooves • Plugged orifice cup plug • Missing orifice cup plug Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	Go to Diagnostic Aids

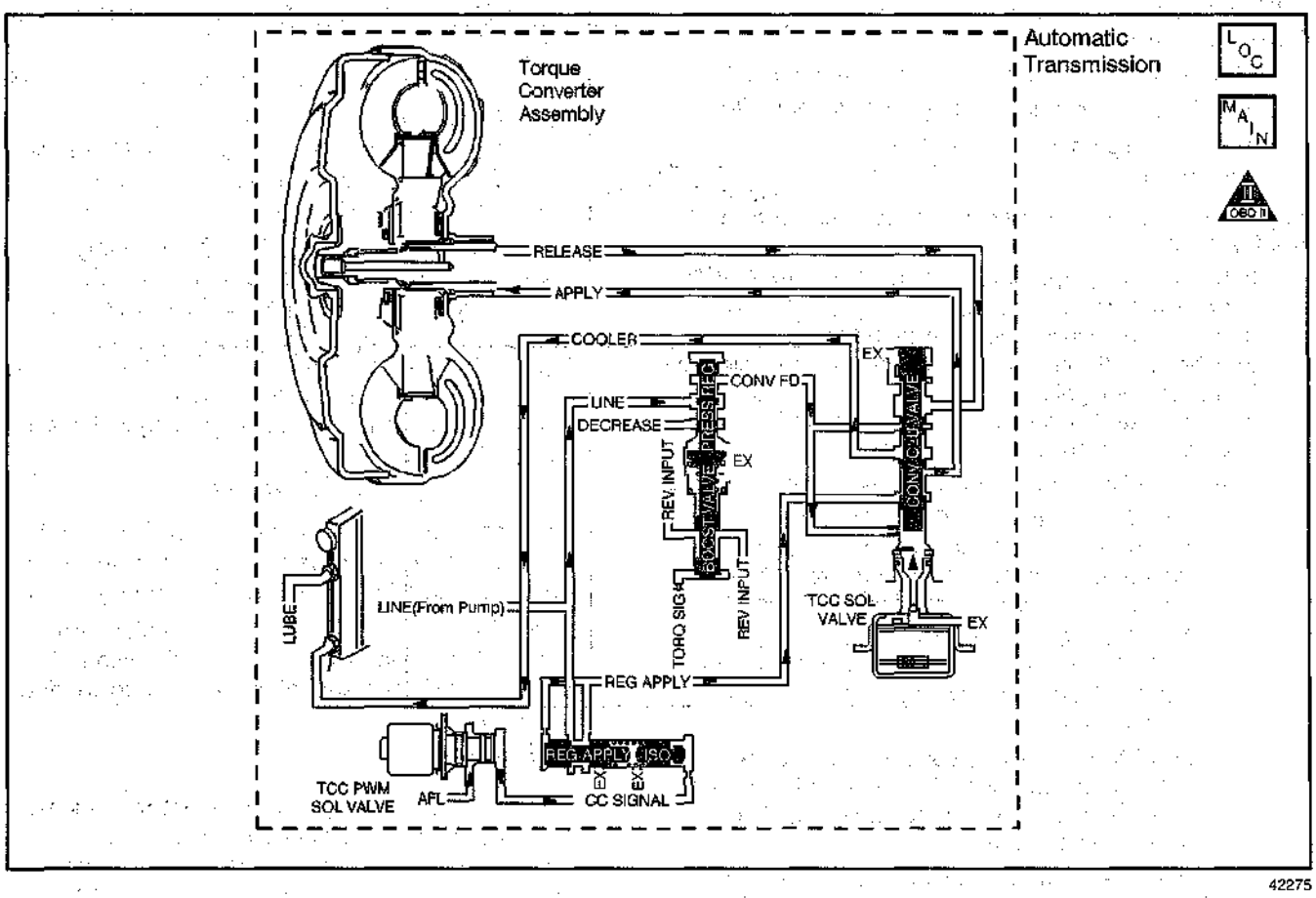
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DTC P1870 Transmission Component Slipping (3.8L) (cont'd)

Step	Action	Value(s)	Yes	No
13	1. Change the AT fluid and filter. 2. Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure*. 3. Add new AT fluid as necessary. **Important:** The Clear TAPS function will clear all adapt cells. This may affect transmission performance. The PCM will update the transmission adapt cell values as the vehicle is driven. 4. Using the *Scan Tool*, perform the Clear TAPS function. Did you complete the above procedure?	—	*Go to Step 14*	—
14	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle under the following conditions: • Drive the vehicle in D4, with the TCC ON, and a throttle position of 8–35%. • Ensure that the *Scan Tool* TCC Slip Speed is –20 to +40 RPM for at least 7 seconds. 4. Select Specific DTC. 5. Enter DTC P1870. Has the test run and passed?	—	System OK	*Go to Step 1*

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DTC P1870 Transmission Component Slipping (5.7L)



Circuit Description

The powertrain control module (PCM) monitors the difference between engine speed and transmission output speed. In D3 drive range with the TCC engaged, the engine speed should closely match the transmission output speed. In D4 drive range, with the TCC engaged, the TCC slip speed should be –20 to +40 RPM.

When the PCM detects excessive TCC slip when the TCC should be engaged, then DTC P1870 sets. DTC P1870 is a type B DTC.

Conditions for Running the DTC

- No MAF sensor DTCs P0101, P0102 or P0103.
- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TCC PWM solenoid valve DTC P1860.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The engine torque is 40–400 lbs ft.
- The TP angle is 10–50%.
- The vehicle speed is 56–131 km/h (35–82 mph).
- The speed ratio is 0.67–0.90 (the speed ratio is the engine speed divided by the transmission output speed).
- The engine speed is 1200–3500 RPM.
- The gear range is D4.
- The commanded gear is not 1st gear.
- The TFT is between 20–150°C (68–302°F).
- The shift solenoid performance diagnostic counters are zero.

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Conditions for Setting the DTC

DTC P1870 sets if the following conditions occur for three TCC cycles.

- The TCC is commanded ON for 5 seconds.
- The TCC is at maximum duty cycle for 8 seconds.
- The TCC slip speed is 80–800 RPM for 7 seconds.

Important: The following actions may occur before the DTC sets.

- If the TCC is commanded ON and at maximum duty cycle for 5 seconds, the TP angle is 10–40%, and the transmission slip counter has incremented to either 1 or 2 (out of 3 to increment the fail counter for the current ignition cycle), then the following slip conditions and actions may increment the fail counter for the current ignition cycle:

  These conditions must occur sequentially.

  - **Condition 1:** If the TCC slip speed is 80–800 RPM for 7 seconds, then the PCM commands maximum line pressure and freezes shift adapts from being updated.
  - **Condition 2:** If Condition 1 is met and the TCC slip speed is 80–800 RPM for 7 seconds, then the PCM commands the TCC OFF for 1.5 seconds.
  - **Condition 3:** If Condition 2 is met and the TCC slip speed is 80–800 RPM for 7 seconds, then the fail counter on the current ignition cycle is incremented.

  The above slip conditions and actions may be disregarded if the TCC is commanded OFF at any time as a result of a driving maneuver (sudden acceleration or deceleration).

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P1870 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Bronze material found in the transmission oil pan may indicate stator shaft bushing wear. If bushing wear is suspected, inspect the stator shaft and the input (turbine) shaft for damage.
- Refer to *Symptom Diagnosis* for more information.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3. This step tests the torque converter for slippage while in a commanded lock-up state.

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DTC P1870 Transmission Component Slipping (5.7L)

Step	Action	Value(s)	Yes	No
1	Did you perform the Powertrain Diagnostic System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls
2	Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure*. Did you perform the fluid checking procedure?	—	*Go to Step 3*	Go to *Transmission Fluid Checking Procedure*
3	1. Install a *Scan Tool*. 2. Turn ON the ignition, with the engine OFF. **Important:** Before clearing the DTC, use the *Scan Tool* in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM. 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. **Important:** It may be necessary to allow multiple TCC cycles to occur in order to verify a slipping condition. It may also be necessary to ensure the transmission is warm before performing this step. 5. Drive the vehicle in 4th gear with the TCC commanded ON. Does the *Scan Tool* TCC Slip Speed measure within the specified range for 7 seconds?	80–800 RPM	*Go to Step 4*	Go to Diagnostic Aids
4	1. Inspect the torque converter clutch (TCC) solenoid valve for the following conditions: • Internal malfunction (such as sediment or damage) • Damaged seals 2. Inspect the torque converter clutch pulse width modulation (TCC PWM) solenoid valve for the following conditions: • Internal malfunction (such as sediment or damage) • Damaged seals Did you find and correct the condition?	—	*Go to Step 14*	*Go to Step 5*
5	1. Inspect the 1-2 shift solenoid (SS) valve for the following conditions: • Internal malfunction (such as sediment or damage) • Damaged seals Refer to *Shift Solenoid Leak Test*. 2. Inspect the 2-3 shift solenoid (SS) valve for the following conditions: • Internal malfunction (such as sediment or damage) • Damaged seals Refer to *Shift Solenoid Leak Test*. 3. Inspect the 3-2 shift solenoid valve assembly for the following conditions: • Internal malfunction (such as sediment or damage) • Damaged seals Refer to *Shift Solenoid Leak Test*. Did you find and correct the condition?	—	*Go to Step 14*	*Go to Step 6*
6	1. Inspect the valve body assembly for a stuck regulator apply valve. 2. Inspect the valve body assembly for a scored regulator apply valve body. Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 7*

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DTC P1870 Transmission Component Slipping (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
7	Inspect the torque converter assembly for the following conditions: • Front stator shaft bushing for wear • Stator roller clutch not holding • External damage/leaks Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 8*
8	Inspect the oil pump assembly for the following conditions: • A stuck converter clutch valve • The converter clutch valve is assembled backwards • A mispositioned converter clutch valve retaining ring • A cocked converter clutch outer valve spring • A mispositioned pump to case gasket • Restricted orifice cup plugs • Damaged orifice cup plugs • Over-tightened, or unevenly tightened pump body to cover bolts Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 9*
9	Inspect the input housing and shaft assembly for the following conditions: • Cut turbine shaft O-ring seal • Damaged turbine shaft O-ring seal • Restricted turbine shaft retainer and ball assembly • Damaged turbine shaft retainer and ball assembly Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 10*
10	Inspect the 2-4 band assembly for the following conditions: • Worn 2-4 band • Damaged 2-4 band • Mispositioned 2-4 band • Misassembled 2-4 band • The band anchor pin is not engaged. • Restricted apply passages in the 2-4 servo assembly • Blocked apply passages in the 2-4 servo assembly • Nicks or burrs on the servo pin • Nicks or burrs on the pin bore in the case • Damaged fourth servo piston • Misassembled fourth servo piston • Damaged band apply pin • Incorrect band apply pin • Damaged servo bore in the case • Missing piston seals • Cut piston seals • Damaged piston seals • Porosity in the pistons • Porosity in the cover • Porosity in the case • Damaged piston seal grooves • Plugged orifice cup plug • Missing orifice cup plug Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 11*

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DTC P1870 Transmission Component Slipping (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
11	Inspect the forward clutch assembly for the following conditions: • Worn clutch plates • Porosity in the forward clutch piston • Damaged forward clutch piston • Missing forward clutch piston inner and outer seals • Cut forward clutch piston inner and outer seals • Damaged forward clutch piston inner and outer seals • Missing input housing to forward clutch housing O-ring seal • Cut input housing to forward clutch housing O-ring seal • Damaged input housing to forward clutch housing O-ring seal • Damaged forward clutch housing • Damaged forward clutch housing retainer and ball assembly • Forward clutch housing retainer and ball assembly is not sealing. Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	*Go to Step 12*
12	Inspect the 3-4 clutch assembly for the following conditions: • Worn clutch plates • Porosity in the 3-4 clutch piston • Damaged 3-4 clutch piston • Missing 3-4 clutch inner and outer seals • Cut 3-4 clutch inner and outer seals • Damaged 3-4 clutch inner and outer seals • Damaged 3-4 clutch spring assembly • Damaged 3-4 clutch apply ring • Damaged piston seal grooves • Plugged orifice cup plug • Missing orifice cup plug Refer to *Transmission Overhaul Procedure* in the 4L60–E Section of the Transmission Unit Repair Manual. Did you find and correct the condition?	—	*Go to Step 13*	Go to Diagnostic Aids

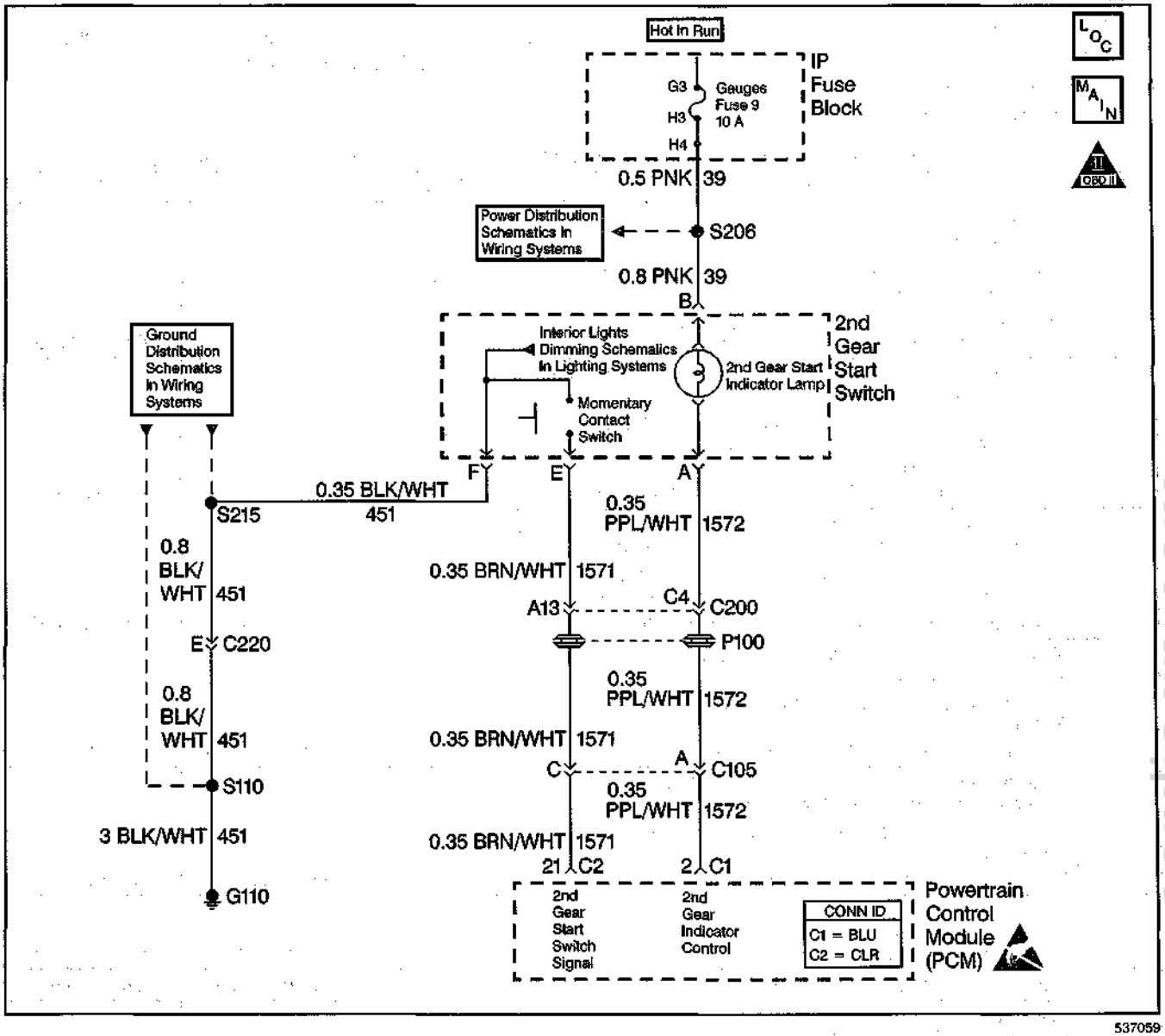
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DTC P1870 Transmission Component Slipping (5.7L) (cont'd)

Step	Action	Value(s)	Yes	No
13	1. Change the AT fluid and filter. 2. Inspect for correct transmission fluid level. Refer to *Transmission Fluid Checking Procedure.* 3. Add new AT fluid as necessary. **Important:** The Clear TAPS function will clear all adapt cells. This may affect transmission performance. The PCM will update the transmission adapt cell values as the vehicle is driven. 4. Using the *Scan Tool*, perform the Clear TAPS function. Did you complete the above procedure?	—	*Go to Step 14*	—
14	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle under the following conditions: • Drive the vehicle in D4, with the TCC ON, and a throttle position of 9–35%. • Ensure that the *Scan Tool* TCC Slip Speed is –20 to +50 RPM for at least 7 seconds. 4. Select Specific DTC. 5. Enter DTC P1870. Has the test run and passed?	—	System OK	*Go to Step 1*

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Second Gear Start Switch/Indicator Always On or Inoperative (3.8L only)



Circuit Description

The 2nd gear start switch enables the operator to select a 2nd gear start for increased traction in slippery driving conditions. When the operator selects a 2nd gear start, the 2nd gear start switch input signal momentarily toggles to zero volts. The PCM then turns ON the 2nd gear start indicator lamp and de-energizes the 1-2 shift solenoid valve, enabling second gear. The 2nd gear start indicator lamp is located within the 2nd gear start switch.

During light and medium acceleration conditions, the vehicle starts in 2nd gear when the 2nd gear start is selected. However, 2nd gear starts are overridden and 1st gear starts occur if a hard acceleration condition (wide open throttle) is requested. A normal 1st gear start is obtained by toggling the 2nd gear start switch again, or when the ignition switch is cycled OFF, then ON.

Diagnostic Aids

If the electrical circuit checks are OK and 2nd gear starts are not correct, then a mechanical/hydraulic malfunction may exist.

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Test Description

The numbers below refer to the step numbers on the diagnostic table.

1. This step tests the second gear start switch circuits.
2. This step tests for a voltage input from the PCM to the 2nd gear start switch.
3. This step tests for a faulty 2nd gear start switch.
8. This step tests for a voltage input from the fuse to the 2nd gear start switch.
9. This step tests for a faulty indicator lamp circuit within the 2nd gear start switch.

Second Gear Start Switch/Indicator Always On or Inoperative (3.8L only)

Step	Action	Value(s)	Yes	No
1	1. Install a *Scan Tool.* 2. Turn ON the ignition, with the engine OFF. 3. Cycle the 2nd gear start switch while observing 2nd Gear Start on the *Scan Tool.* Does Yes display when the switch is first pressed, and then No when the switch is pressed again?	—	*Go to Step 6*	*Go to Step 2*
2	1. Disconnect the 2nd gear start switch connector from the 2nd gear start switch. 2. Using the *J 39200* digital multimeter (DMM), test the voltage input at terminal E of the 2nd gear start switch connector. Does the voltage measure within the specified value?	10–12 V	*Go to Step 3*	*Go to Step 5*
3	1. Connect a fused jumper wire between terminals E and F of the 2nd gear start switch connector. 2. Connect and disconnect the fused jumper lead at terminal F while observing the *Scan Tool* display. Does the *Scan Tool* status change between YES and NO?	—	*Go to Step 15*	*Go to Step 4*
4	Test the ground circuit (CKT 451) of the 2nd gear start switch for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	*Go to Step 16*
5	Test the signal circuit (CKT 1571) of the 2nd gear start switch for an open or short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	*Go to Step 16*
6	Does the 2nd gear start indicator lamp illuminate when the switch is first pressed, and then turn Off when the switch is pressed a second time?	—	System OK	*Go to Step 7*
7	Does the lamp illuminate at all times?	—	*Go to Step 13*	*Go to Step 8*
8	Install a test lamp to ground and probe terminal B of the second gear start switch connector. Does the test lamp illuminate?	—	*Go to Step 9*	*Go to Step 10*
9	Install a test lamp to ground and probe terminal A of the second gear start switch connector. Does the test lamp illuminate?	—	*Go to Step 14*	*Go to Step 15*
10	1. Inspect the GAUGES fuse for an open. 2. Replace the fuse if necessary. Is the fuse open?	—	*Go to Step 11*	*Go to Step 12*
11	Test the power feed circuit (CKT 39) of the 2nd gear start switch for a short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	—
12	Test the power feed circuit (CKT 39) of the 2nd gear start switch for an open condition. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	—

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Second Gear Start Switch/Indicator Always On or Inoperative (3.8L only) (cont'd)

Step	Action	Value(s)	Yes	No
13	Test the control circuit (CKT 1572) of the 2nd gear start switch for a short to ground. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	*Go to Step 16*
14	Test the control circuit (CKT 1572) of the 2nd gear start switch for an open. Refer to *Circuit Testing* and *Wiring Repairs* in Wiring Systems. Did you find and correct the condition?	—	*Go to Step 17*	*Go to Step 16*
15	Replace the 2nd gear start switch. Did you complete the replacement?	—	*Go to Step 17*	—
16	Replace the PCM. Refer to *PCM Replacement/Programming* in Engine Controls. Did you complete the replacement?	—	*Go to Step 17*	—
17	After the repair is complete, observe 2nd Gear Start on the *Scan Tool* display, while pressing the 2nd gear start switch. Does Yes display when the switch is first pressed, and then No when the switch is pressed again? And, does the 2nd gear start switch indicator lamp turn On after the second gear start switch is first pressed, and then turn Off after the 2nd gear start switch is pressed again?	—	System OK	*Go to Step 1*

Transmission Fluid Checking Procedure

1. Start the engine and operate the vehicle for 15 minutes or until the transmission fluid reaches an operating temperature of 82–93°C (180–200°F).
2. Park the vehicle on a level surface.
3. With your foot on the brake, move the shift lever through each gear range. Pause for about three seconds in each range, ending in Park.
4. Apply the parking brake and let the engine idle for three minutes.
5. Remove the transmission fluid level indicator. Wipe the indicator clean. Reinsert the indicator. Give the indicator a full twist in order to close.
6. Wait three seconds and remove the indicator.
7. Read both sides of the indicator. The fluid must be within the hot cross-hatched area using the lowest level reading.

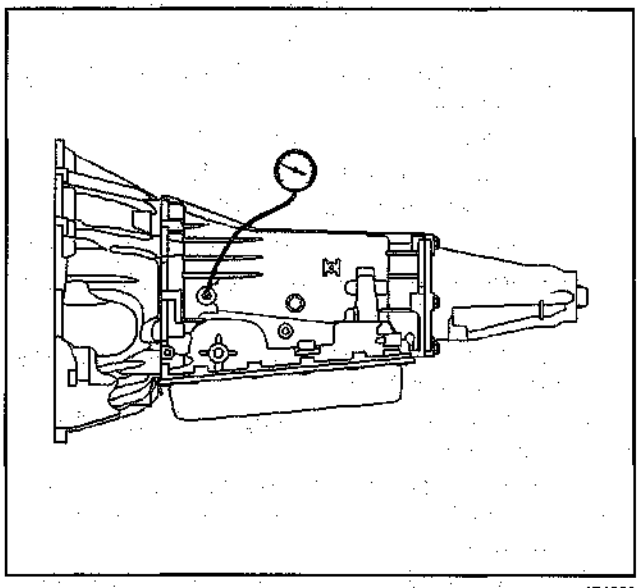
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Transmission Fluid Checking Procedure

Step	Action	Value(s)	Yes	No
1	Check the fluid color. Is the fluid color red?	—	*Go to Step 2*	*Go to Step 11*
2	Is the fluid level satisfactory?	—	*Go to Step 19*	*Go to Step 3*
3	Check the fluid. Is the fluid foamy?	—	*Go to Step 8*	*Go to Step 4*
4	Check the fluid level. The proper fluid level should be in the middle of the X-hatch. Is the level high?	—	*Go to Step 9*	*Go to Step 5*
5	Fluid will be low. Add fluid to the proper fluid level. Is the fluid level satisfactory?	—	*Go to Step 6*	—
6	Check for external leaks. Refer to *Fluid Leak Diagnosis.* Did you find any leaks?	—	*Go to Step 7*	*Go to Step 19*
7	Correct the leak condition. Did you correct the leak condition?	—	*Go to Step 19*	—
8	Is the fluid level too high?	—	*Go to Step 9*	*Go to Step 10*
9	Remove excess fluid to the proper fluid level. Is the fluid level satisfactory?	—	*Go to Step 19*	—
10	1. Check for contaminants in the fluid. 2. Drain the fluid to determine the source of the contamination. Did you drain the fluid?	—	*Go to Step 15*	—
11	Is the fluid color non-transparent pink?	—	*Go to Step 12*	*Go to Step 13*
12	Replace the cooler. Is the replacement complete?	—	*Go to Step 15*	—
13	**Important:** Transmission fluid may turn dark with normal use. This does not always indicate oxidation or contamination. The fluid color should be light brown. Is the fluid color light brown?	—	*Go to Step 14*	—
14	**Important:** A very small amount of material in the bottom pan is a normal condition, but large pieces of metal or other material in the bottom pan require a transmission overhaul. Drain the fluid to determine if the fluid is contaminated. Was the fluid contaminated?	—	*Go to Step 15*	*Go to Step 18*
15	Overhaul the transmission. Refer to *Transmission Overhaul Procedure* in the 4L60-E section of the Transmission Unit Repair Manual. Is the overhaul complete?	—	*Go to Step 16*	—
16	Flush the cooler. Has the cooler been flushed?	—	*Go to Step 17*	—
17	Add new fluid. Is the procedure complete?	—	*Go to Step 19*	—
18	Change the fluid and the filter. Is this procedure complete?	—	*Go to Step 19*	—
19	Check and correct the fluid level as necessary. Is the fluid level satisfactory?	—	System OK	*Go to Step 1*

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Line Pressure Check Procedure



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Line pressures are calibrated for two sets of gear ranges—Drive-Park-Neutral and Reverse. This allows the transmission line pressure to be appropriate for different pressure needs in different gear ranges:

Gear Range	Line Pressure Range
Drive, Park or Neutral	55–189 psi
Reverse	64–324 psi

Before performing a line pressure check, verify that the pressure control (PC) solenoid for the transmission is receiving the correct electrical signal from the PCM:

1. Install a *Scan Tool*.

Caution: Keep the brakes applied at all times in order to prevent unexpected vehicle motion. Personal injury may result if the vehicle moves unexpectedly.

Notice: The transmission may experience harsh, soft or mushy shifts for up to two days later.

2. Start the engine and set the parking brake.
3. Check for diagnostic trouble codes, including a stored diagnostic code for the PC solenoid.
4. Repair the vehicle if necessary. Include the following areas:
   - Inspect the fluid level
   - Inspect the manual linkage at the transmission
   - Install or connect the *Scan Tool*.
   - Install or connect the oil pressure gauge at the line pressure tap.
5. Put the gear selector in Park and set the parking brake.
6. Start the engine and allow the engine to warm up at idle.
7. Access the PCS Control test on the *Scan Tool*.
8. Increase DESIRED PCS in 0.1 amp increments. Read the corresponding line pressure on the pressure gauge. Allow the pressure to stabilize for five seconds after each current charge.
9. Compare your data to the Drive-Park-Neutral line pressure table below.

If your pressure readings differ greatly from the line pressure table, refer to the Diagnosis Tables.

The *Scan Tool* is only able to control the PC solenoid in Park and Neutral with the vehicle stopped. This protects the clutches from extremely high or low pressures in Drive or Reverse ranges.

Refer to the *Line Pressure* table. The pressures in the table assume an engine speed of 1500 RPM and a temperature of 66°C (150°F). The pressure will vary with a change in temperature.

Road Test Procedure

Important: The Road Test Procedure should be performed only as part of the Symptom Diagnosis. Refer to *Symptom Diagnosis*.

The following test provides a method of evaluating the condition of the automatic transmission. The test is structured so that most driving conditions would be achieved. The test is divided into the following parts:

- Electrical Function Check
- Upshift Control and Torque Converter Clutch (TCC) Apply
- Part Throttle Detent Downshifts
- Full Throttle Detent Downshifts
- Manual Downshifts
- Coasting Downshifts
- Manual Gear Range Selection
  - REVERSE
  - Manual FIRST
  - Manual SECOND
  - Manual THIRD

Important: Complete the test in the sequence given. Incomplete testing cannot guarantee an accurate evaluation.

Before the road test, ensure the following:

- The engine is performing properly.
- Transmission fluid level is correct. Refer to the *Transmission Fluid Checking Procedure*.
- Tire pressure is correct.

During the road test:

- Perform the test only when traffic conditions permit.
- Operate the vehicle in a controlled, safe manner.
- Observe all traffic regulations.
- View the scan tool data while conducting this test. Take along qualified help in order to operate the vehicle safely.
- Observe any unusual sounds or smells.

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After the road test, check the following:

- Transmission fluid level. Refer to the *Transmission Fluid Checking Procedure*.
- Diagnostic Trouble Codes (DTCs) that may have set during the testing. Refer to the applicable DTC.
- Scan tool data for any abnormal readings or data.

Electrical Function Check

Perform this check first, in order to ensure the electronic transmission components are connected and functioning properly. If these components are not checked, a simple electrical condition could be mis-diagnosed.

1. Connect the scan tool.
2. Ensure the gear selector is in PARK and set the parking brake.
3. Start the engine.
4. Verify that the following scan tool data can be obtained and is functioning properly.

   Refer to *Transmission Scan Tool Data List (3.8L)* or *Transmission Scan Tool Data List (5.7L)* for typical data values. Data that is questionable may indicate a concern.

   - Engine Speed
   - Transmission output speed
   - Vehicle speed
   - TFP manual valve position switch
   - Transmission range (engine list)
   - Commanded gear (current gear)
   - PC solenoid reference current
   - PC solenoid actual current
   - PC solenoid duty cycle
   - Brake switch
   - Engine coolant temperature
   - Transmission fluid temperature
   - Throttle angle
   - Ignition voltage
   - 1-2 shift solenoid
   - 2-3 shift solenoid
   - TCC solenoid duty cycle
   - TCC slip speed
5. Monitor the brake switch signal while depressing and releasing the brake pedal. The scan tool should display:
   - Closed when the brake pedal is released.
   - Open when the brake pedal is depressed.
6. Check the garage shifts.
   - 6.1. Apply the brake pedal and ensure that the parking brake is set.
   - 6.2. Move the gear selector through the following ranges:
     - 6.2.1. PARK to REVERSE
     - 6.2.2. REVERSE to NEUTRAL
     - 6.2.3. NEUTRAL to DRIVE
   - 6.3. Pause 2 to 3 seconds in each gear position.
   - 6.4. Verify the gear engagements are immediate and not harsh.

Important: Harsh engagement may be caused by any of the following conditions:

- High idle speed. Compare engine idle speed to desired idle speed.
- Commanded low PC solenoid current. Compare PC solenoid reference current to PC solenoid actual current.
- A default condition caused by certain DTCs that result in maximum line pressure to prevent slippage.

Important: Soft or delayed engagement may be caused by any of the following conditions:

- Low idle speed. Compare engine idle speed to desired idle speed.
- Low fluid level.
- Commanded high PC solenoid current. Compare PC solenoid reference current to PC solenoid actual current.
- Cold transmission fluid. Check for low transmission fluid temperature.

7. Monitor transmission range on the scan tool (engine list).
   - 7.1. Apply the brake pedal and ensure the parking brake is set.
   - 7.2. Move the gear selector through all ranges.
   - 7.3. Pause 2 to 3 seconds in each range.
   - 7.4. Return gear selector to PARK.
   - 7.5. Verify that all selector positions match the scan tool display.
8. Check throttle angle input.
   - 8.1. Apply the brake pedal and ensure that the parking brake is set.
   - 8.2. Ensure the gear selector is in PARK.
   - 8.3. Monitor throttle angle while increasing and decreasing engine speed with the throttle pedal. The scan tool throttle angle should increase and decrease with engine speed.

If any of the above checks do not perform properly, record the result for reference after completion of the road test.

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Upshift Control and Torque Converter Clutch (TCC) Apply

The PCM calculates the upshift points based primarily on two inputs: throttle angle and vehicle speed. When the PCM determines that conditions are met for a shift to occur, the PCM commands the shift by closing or opening the ground circuit for the appropriate solenoid.

Perform the following steps:

1. Refer to the *Shift Speed* table in this section and choose a throttle position of 12%, 25% or 50%. All throttle angles shown should be tested to cover the normal driving range.
2. Monitor the following scan tool parameters:
   - Throttle angle
   - Vehicle speed
   - Engine speed
   - Output shaft speed
   - Commanded gear
   - Slip speed
   - Solenoid states
3. Place the gear selector in the OVERDRIVE position.
4. Accelerate the vehicle using the chosen throttle angle. Hold the throttle steady.
5. As the transmission upshifts, note the vehicle speed when the shift occurs for each gear change. There should be a noticeable shift feel or engine speed change within 1 to 2 seconds of the commanded gear change.
6. Compare the shift speeds to the Shift Speed table. Refer to *Shift Speed*. Shift speeds may vary slightly due to transmission fluid temperature or hydraulic delays in responding to electronic controls.
   - Note any harsh, soft or delayed shifts or slipping.
   - Note any noise or vibration.
7. Repeat steps 1 through 6 to complete all throttle angles.

Important: This transmission is equipped with an electronically controlled capacity clutch (ECCC). The pressure plate does not fully lock to the torque converter cover. Instead, the pressure plate maintains a small amount of slippage (about 20 RPM) in SECOND, THIRD and FOURTH gears, depending on the vehicle application. ECCC was developed to reduce the possibility of noise, vibration or chuggle caused by TCC apply. Typical apply speeds are 49–52 km/h (30–32 mph) in THIRD gear and 65–73 km/h (40–45 mph) in FOURTH gear. Full lockup is available at highway speeds on some applications.

Important: The TCC will not engage until the engine is in closed loop operation and the vehicle speed is as shown in the Shift Speed table. Refer to *Shift Speed*. The vehicle must be in a near-cruise condition (not accelerating or coasting) and on a level road surface.

8. Check for TCC apply in THIRD and FOURTH gear.
   - Note the TCC apply point. When the TCC applies there should be a noticeable drop in engine speed and a drop in slip speed to below 100 RPM. If the TCC apply can not be detected:
     - Check for DTCs.
     - Refer to *Torque Converter Diagnosis Procedure*.
   - Refer to the *Shift Speed* table for the correct apply speeds.
   - Lightly tap and release the brake pedal. The TCC will release on most applications.

Part Throttle Detent Downshift

1. Place the gear selector in the OVERDRIVE position.
2. Accelerate the vehicle to 64–88 km/h (40–55 mph) in FOURTH gear.
3. Quickly increase throttle angle to greater than 50%.
4. Verify the following:
   - The TCC releases
   - The transmission downshifts immediately to THIRD gear

Full Throttle Detent Downshift

1. Place the gear selector in the OVERDRIVE position.
2. Accelerate the vehicle to speeds of 64–88 km/h (40–55 mph) in FOURTH gear.
3. Quickly increase throttle angle to 100% (WOT).
4. Verify the following:
   - The TCC releases
   - The transmission downshifts immediately to SECOND gear

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Manual Downshifts

The shift solenoid valves do not control the initial downshift for the 4-3 or the 3-2 manual downshifts. The 4-3 and the 3-2 manual downshifts are hydraulic. The 2-1 manual downshift is electronic. The solenoid states should change during or shortly after a manual downshift is selected.

Manual 4–3 Downshift

1. Place the gear selector in the OVERDRIVE position.
2. Accelerate the vehicle to 64–88 km/h (40–55 mph) in FOURTH gear.
3. Release the throttle while moving the gear selector to THIRD.
4. Verify the following:
   - The TCC releases
   - The transmission downshifts immediately to THIRD gear
   - The engine slows the vehicle

Manual 4–2 Downshift

1. Place the gear selector in the OVERDRIVE position.
2. Accelerate the vehicle to 64–72 km/h (40–45 mph).
3. Release the throttle while moving the gear selector to SECOND.
4. Verify the following:
   - The TCC releases
   - The transmission downshifts immediately to SECOND gear
   - The engine slows the vehicle

Manual 4–1 Downshift

1. Place the gear selector in the OVERDRIVE position.
2. Accelerate the vehicle to 48 km/h (30 mph).
3. Release the throttle while moving the gear selector to FIRST.
4. Verify the following:
   - The TCC releases
   - The transmission downshifts immediately to FIRST gear.
   - The engine slows the vehicle.

Coasting Downshifts

1. Place the gear selector in the OVERDRIVE position.
2. Accelerate the vehicle to FOURTH gear with the TCC applied.
3. Release the throttle and lightly apply the brakes.
4. Verify the following:
   - The TCC releases
   - Downshifts occur at speeds shown in the Shift Speed table. Refer to *Shift Speed*.

Manual Gear Range Selection

The shift solenoids control the upshifts in the manual gear ranges.

Perform the following tests using 10 to 15% throttle angle.

Reverse

1. With the vehicle stopped, move the gear selector to REVERSE.
2. Slowly accelerate the vehicle.
3. Verify that there is no noticeable slip, noise or vibration.

Manual First

1. With the vehicle stopped, move the gear selector to FIRST.
2. Accelerate the vehicle to 32 km/h (20 mph).
3. Verify the following:
   - No upshifts occur
   - The TCC does not apply
   - There is no noticeable slip, noise, or vibration

Manual Second

1. With the vehicle stopped, move the gear selector to SECOND.
2. Accelerate the vehicle to 57 km/h (35 mph).
3. Verify the following:
   - The 1-2 shift occurs
   - The 2-3 shift does not occur
   - There is no noticeable slip, noise or vibration

Manual Third

1. With the vehicle stopped, move the gear selector to THIRD.
2. Accelerate the vehicle to 64 km/h (40 mph).
3. Verify the following:
   - The 1-2 shift occurs
   - The 2-3 shift occurs
   - There is no noticeable slip, noise or vibration

Torque Converter Diagnosis Procedure

The Torque Converter Clutch (TCC) is applied by fluid pressure, which is controlled by a PWM solenoid valve. This solenoid valve is located inside of the automatic transmission assembly. The solenoid valve is controlled through a combination of computer controlled switches and sensors.

Torque Converter Stator

The torque converter stator roller clutch can have two different malfunctions.

- The stator assembly freewheels in both directions.
- The stator assembly remains locked up at all times.

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Poor Acceleration at Low Speed

If the stator is freewheeling at all times, the car tends to have poor acceleration from a standstill. At speeds above 50–55 km/h (30–35 mph), the car may act normally. For poor acceleration, you should first determine that the exhaust system is not blocked, and the transmission is in First gear when starting out.

If the engine freely accelerates to high RPM in NEUTRAL, you can assume that the engine and the exhaust system are normal. Check for poor performance in DRIVE and REVERSE to help determine if the stator is freewheeling at all times.

Poor Acceleration at High Speed

If the stator is locked up at all times, performance is normal when accelerating from a standstill. Engine RPM and car speed are limited or restricted at high speeds. Visual examination of the converter may reveal a blue color from overheating.

If the converter has been removed, you can check the stator roller clutch by inserting a finger into the splined inner race of the roller clutch and trying to turn the race in both directions. You should be able to freely turn the inner race clockwise, but you should have difficulty in moving the inner race counterclockwise or you may be unable to move the race at all.

Noise

Important: Do not confuse this noise with pump whine noise, which is usually noticeable in PARK, NEUTRAL and all other gear ranges. Pump whine will vary with line pressure.

You may notice a torque converter whine when the vehicle is stopped and the transmission is in DRIVE or REVERSE. This noise will increase as you increase the engine RPM. The noise will stop when the vehicle is moving or when you apply the torque converter clutch, because both halves of the converter are turning at the same speed.

Perform a stall test to make sure the noise is actually coming from the converter:

1. Place your foot on the brake.
2. Put the gear selector in DRIVE.

Notice: You may damage the transmission if you depress the accelerator for more than six seconds.

3. Depress the accelerator to approximately 1,200 RPM for no more than six seconds.

A torque converter noise will increase under this load.

Torque Converter Clutch Shudder

The key to diagnosing Torque Converter Clutch (TCC) shudder is to note when it happens and under what conditions.

TCC shudder which is caused by the transmission should only occur during the apply or the release of the converter clutch. Shudder should never occur after the TCC plate is fully applied.

If Shudder Occurs During TCC Apply or Release

If the shudder occurs while the TCC is applying, the problem can be within the transmission or the torque converter. Something is causing one of the following conditions to occur:

- Something is not allowing the clutch to become fully engaged.
- Something is not allowing the clutch to release.
- The clutch is releasing and applying at the same time.

One of the following conditions may be causing the problem to occur:

- Leaking turbine shaft seals
- A restricted release orifice
- A distorted clutch or housing surface due to long converter bolts
- Defective friction material on the TCC plate

If Shudder Occurs After TCC has Applied

If shudder occurs after the TCC has applied, most of the time there is nothing wrong with the transmission!

The TCC is not likely to slip after the TCC has been applied. Engine problems may go unnoticed under light throttle and load, but they become noticeable after the TCC apply when going up a hill or accelerating. This is due to the mechanical coupling between the engine and the transmission.

Once TCC is applied, there is no torque converter (fluid coupling) assistance. Engine or driveline vibrations could be unnoticeable before TCC engagement.

Inspect the following components in order to avoid misdiagnosis of TCC shudder. An inspection will also avoid the unnecessary disassembly of a transmission or the unnecessary replacement of a torque converter.

- Spark plugs – Inspect for cracks, high resistance or a broken insulator.
- Plug wires – Look in each end. If there is red dust (ozone) or a black substance (carbon) present, then the wires are bad. Also look for a white discoloration of the wire. This indicates arcing during hard acceleration.
- Coil – Look for a black discoloration on the bottom of the coil. This indicates arcing while the engine is misfiring.
- Fuel injector – The filter may be plugged.
- Vacuum leak – The engine will not get a correct amount of fuel. The mixture may run rich or lean depending on where the leak occurs.
- EGR valve – The valve may let in too much or too little unburnable exhaust gas and could cause the engine to run rich or lean.
- MAP/MAF sensor – Like a vacuum leak, the engine will not get the correct amount of fuel for proper engine operation.
- Carbon on the intake valves – Carbon restricts the proper flow of air/fuel mixture into the cylinders.

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- Flat cam – Valves do not open enough to let the proper fuel/air mixture into the cylinders.
- Oxygen sensor – This sensor may command the engine too rich or too lean for too long.
- Fuel pressure – This may be too low.
- Engine mounts – Vibration of the mounts can be multiplied by TCC engagement.
- Axle joints – Check for vibration.
- TP Sensor – The TCC apply and release depends on the TP Sensor in many engines. If the TP Sensor is out of specification, TCC may remain applied during initial engine loading.
- Cylinder balance – Bad piston rings or poorly sealing valves can cause low power in a cylinder.
- Fuel contamination – This causes poor engine performance.

Replace the torque converter if any of the following conditions exist:

- External leaks appear in the hub weld area.
- The converter hub is scored or damaged.
- The converter pilot is broken, damaged, or fits poorly into the crankshaft.
- You discover steel particles after flushing the cooler and the cooler lines.
- The pump is damaged, or you discover steel particles in the converter.
- The vehicle has TCC shudder and/or no TCC apply. Replace the torque converter only after all hydraulic and electrical diagnoses have been made. The converter clutch material may be glazed.
- The converter has an imbalance which cannot be corrected. Refer to *Flexplate/Torque Converter Vibration Test.*
- The converter is contaminated with engine coolant which contains antifreeze.
- An internal failure occurs in the stator roller clutch.
- You notice excessive end play.
- Overheating produces heavy debris in the clutch.
- You discover steel particles or clutch lining material in the fluid filter or on the magnet, when no internal parts in the unit are worn or damaged. This condition indicates that lining material came from the converter.

Do Not Replace the Torque Converter if you discover any of the following symptoms:

- The oil has an odor or the oil is discolored, even though metal or clutch facing particles are not present.
- The threads in one or more of the converter bolt holds are damaged. Correct the condition with a new thread inset.
- Transmission failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in the unit and inside the fluid filter.
- The vehicle has been exposed to high mileage only. An exception may exist where the lining of the torque converter clutch dampener plate has seen excess wear by vehicles operated in heavy and/or constant traffic, such as taxi, delivery, or police use.

Flexplate/Torque Converter Vibration Test

Isolating Vibration

Notice: Some engine/transaxle combinations cannot be balanced in this manner due to limited clearances between the torque converter bolts and the engine. Ensure that the bolts do not bottom out in the lug nuts or the torque converter cover could be dented and cause internal damage.

To isolate and correct a flywheel or torque converter vibration, separate the torque converter from the flywheel to determine if vibration is in the engine or transmission.

1. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration.
2. Turn the engine OFF.
3. Raise and suitably support the vehicle.

   Refer to *Lifting and Jacking the Vehicle* in General Information.
4. Remove the transmission converter cover bolts and the cover.

   Refer to *Torque Converter Cover Replacement (3.8 L)* or *Torque Converter Cover Replacement (5.7 L).*
5. Mark the relationship of the converter to the flywheel.
6. Remove the bolts attaching the converter to the flywheel.

   Refer to *Flywheel to Torque Converter Bolts.*
7. Slide the torque converter away from the flywheel.
8. Rotate the flywheel and torque converter to inspect for defects or missing balance weights.

   Refer to *Engine Flywheel Clean and Inspect (Automatic Transmission)* (3.8L) or *Engine Flywheel Clean and Inspect (Manual Transmission)* (3.8L) or *Engine Flywheel Clean and Inspect* (5.7L) in Engine Mechanical.
9. Lower the vehicle.
10. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration.

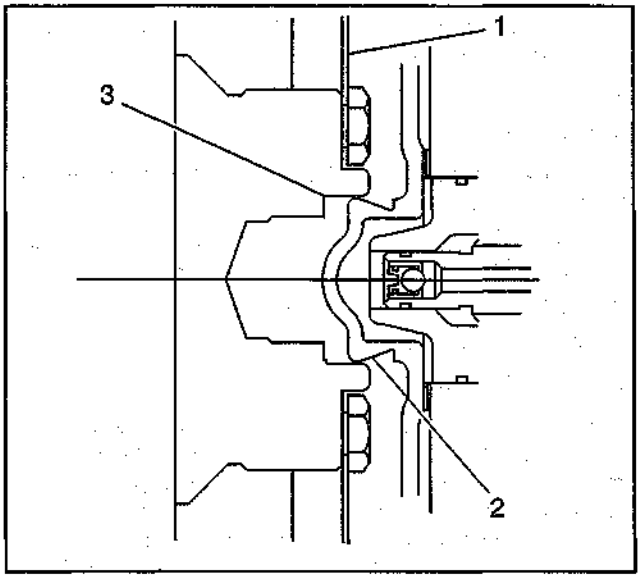
    Refer to *Engine Related Vibration* in Vibration Diagnosis and Correction.
11. Turn the engine OFF.

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Indexing Torque Converter

To determine and correct a torque converter vibration, the following procedure may have to be performed several times to achieve the best possible torque converter to flywheel balance.

1. Raise and suitably support the vehicle.
   Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Rotate the torque converter one bolt position.



3. Align the torque converter hub (2) in the engine crankshaft (3) and install the torque converter to flywheel bolts.
   Refer to *Flywheel to Torque Converter Bolts.*
4. Lower the vehicle.
5. With the engine at idle speed and the transmission in PARK or NEUTRAL, observe the vibration.
   Refer to *Noise and Vibration Analysis.*
   Repeat this procedure until you obtain the best possible balance.
6. Install the transmission converter cover bolts and the cover.
   Refer to *Torque Converter Cover Replacement (3.8 L)* or *Torque Converter Cover Replacement (5.7 L).*

Noise and Vibration Analysis

A noise or vibration that is noticeable when the vehicle is in motion MAY NOT be the result of the transmission.

If noise or vibration is noticeable in PARK and NEUTRAL with the engine at idle, but is less noticeable as RPM increases, the cause may be from poor engine performance.

- Inspect the tire for the following:
  - Uneven wear
  - Imbalance
  - Mixed sizes
  - Mixed radial and bias ply. Refer to Tires and Wheels
- Inspect the suspension components for the following:
  - Alignment and wear
  - Loose fasteners

  Refer to Front Suspension.
- Inspect the engine and transmission mounts for damage and loose bolts.
- Inspect the transmission case mounting holes for the following:
  - Missing bolts, nuts, and studs
  - Stripped threads
  - Cracks
- Inspect the flywheel for the following:
  - Missing or loose bolts
  - Cracks
  - Imbalance
- Inspect the torque converter for the following:
  - Missing or loose bolts or lugs
  - Missing or loose balance weights
  - Imbalance

Clutch Plate Diagnosis

Composition Plates

Dry the plates and inspect the plates for the following conditions:

- Pitting
- Flaking
- Wear
- Glazing
- Cracking
- Charring
- Chips or metal particles embedded in the lining

Replace a composition plate which shows any of these conditions.

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Steel Plates

Important: If the clutch shows evidence of extreme heat or burning, replace the springs.

Wipe the plates dry and check the plates for heat discoloration. If the surfaces are smooth, even if color smear is indicated, you can reuse the plate. If the plate is discolored with heat spots or if the surface is scuffed, replace the plate.

Causes of Burned Clutch Plates

The following conditions can result in a burned clutch plate:

- Incorrect usage of clutch plates
- Engine coolant in the transmission fluid
- A cracked clutch piston
- Damaged or missing seals
- Low line pressure
- Valve body conditions
  - The valve body face is not flat
  - Porosity between channels
  - The valve bushing clips are improperly installed
  - The checkballs are misplaced
- The Teflon® seal rings are worn or damaged

Engine Coolant in Transmission

Notice: The antifreeze will deteriorate the Viton O-ring seals and the glue that bonds the clutch material to the pressure plate. Both conditions may cause damage to the transmission.

If the transmission oil cooler has developed a leak allowing engine coolant to enter the transmission, perform the following:

1. Disassemble the transmission.
2. Replace all of the rubber type seals. (The coolant will attack the seal material which will cause leakage.)
3. Replace the composition-faced clutch plate assemblies. (The facing material may separate from the steel center portion.)
4. Replace all of the nylon parts (washers).
5. Replace the torque converter.
6. Thoroughly clean and rebuild the transmission, using new gaskets and oil filter.
7. Flush the cooler lines after the transmission cooler has been properly repaired or replaced.

Fluid Leak Diagnosis

General Method

1. Verify that the leak is transmission fluid.
2. Thoroughly clean the suspected leak area.
3. Operate the vehicle for 24 km (15 mi), or until normal operating temperatures are reached.
4. Park the vehicle over clean paper or cardboard.
5. Shut OFF the engine.
6. Look for fluid spots on the paper.
7. Make the necessary repairs.

Powder Method

1. Thoroughly clean the suspected leak area with solvent.
2. Apply an aerosol type powder, such as foot powder, to the suspected leak area.
3. Operate the vehicle for 24 km (15 mi), or until normal operating temperatures are reached.
4. Shut OFF the engine.
5. Inspect the suspected leak area.
6. Trace the leak path through the powder in order to find the source of the leak.
7. Make the necessary repairs.

Dye and Black Light Method

A fluid dye and black light kit is available from various tool manufacturers.

1. Follow the manufacturer's instructions in order to determine the amount of dye to use.
2. Detect the leak with the black light.
3. Make the necessary repairs.

Find the Cause of the Leak

Pinpoint the leak and trace the leak back to the source. You must determine the cause of the leak in order to repair the leak properly. For example, if you replace a gasket, but the sealing flange is bent, the new gasket will not repair the leak. You must also repair the bent flange. Before you attempt to repair a leak, check for the following conditions, and make repairs as necessary:

Gaskets

- Fluid level/pressure is too high
- Plugged vent or drain-back holes
- Improperly tightened fasteners
- Dirty or damaged threads
- Warped flanges or sealing surface
- Scratches, burrs, or other damage to the sealing surface
- Damaged or worn gasket
- Cracking or porosity of the component
- Improper sealant used, where applicable
- Incorrect gasket

Seals

- Fluid level/pressure is too high
- Plugged vent or drain-back holes
- Damaged seal bore
- Damaged or worn seal
- Improper installation
- Cracks in component
- Manual or output shaft surface is scratched, nicked, or damaged
- Loose or worn bearing causing excess seal wear

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Possible Points of Fluid Leaks

Transmission Oil Pan

- Incorrectly tightened oil pan bolts.
- Improperly installed or damaged oil pan gasket.
- Damaged oil pan or mounting face.
- Incorrect oil pan gasket.

Case Leak

- Damaged or missing fill tube seal.
- Mislocated fill tube bracket.
- Damaged vehicle speed sensor seal.
- Damaged manual shaft seal.
- Loose or damaged oil cooler connector fittings.
- Worn or damaged propeller shaft oil seal.
- Loose line pressure pipe plug.
- Porous casting.

Leak at the Torque Converter End

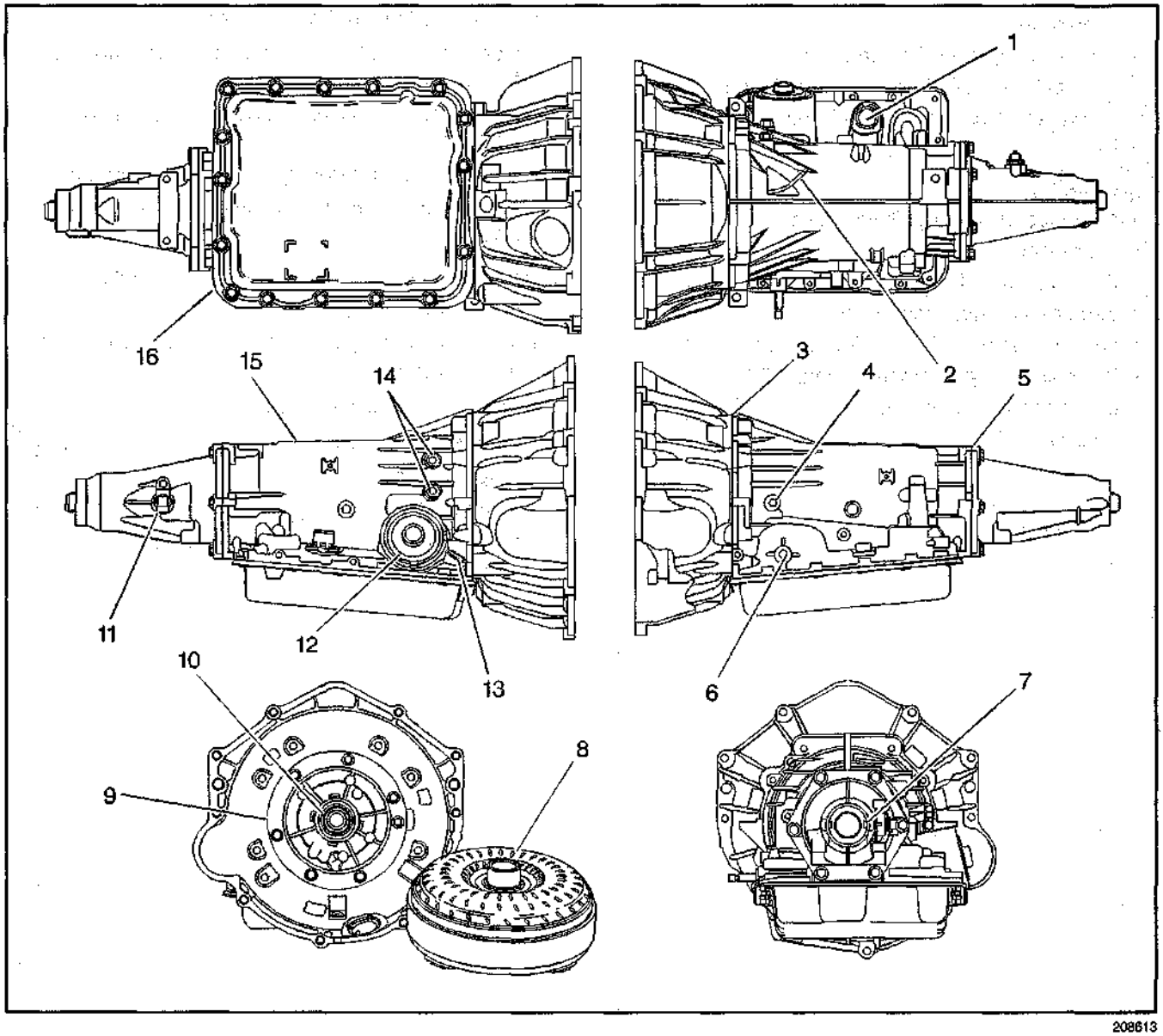
- Converter leak in the weld area.
- Converter seal lip cut. Check the converter hub for damage.
- Converter seal bushing moved forward and damaged.
- Converter seal garter spring missing from the seal.
- Porous casting of the transmission case or the oil pump.

Leak at the Vent Pipe or the Fluid Fill Tube

- Overfilled system.
- Water or coolant in the fluid. The fluid will appear milky.
- Transmission case porous.
- Incorrect fluid level indicator.
- Plugged vent.
- Drain-back holes plugged.
- Mispositioned oil pump to case gasket, if equipped.

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Leak Inspection Points



Legend

(1) Wiring Harness Pass-Through Connector O-Ring Seal
(2) Transmission Vent Assembly
(3) Converter Housing to Case Joint (Pump to Case Oil Seal)
(4) Line Pressure Plug
(5) Case Extension to Case Seal
(6) Manual Shaft Seal
(7) Case Extension Oil Seal Assembly
(8) Torque Converter Assembly
(9) Pump to Case Oil Seal
(10) Pump Oil Seal Assembly
(11) Internal Transmission Speed Sensor to Case O-Ring Seal
(12) 2-4 Servo Cover O-Ring Seal
(13) Oil Fill Tube Seal
(14) Oil Cooler Pipe Connectors
(15) Transmission Case
(16) Transmission Oil Pan Gasket

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Case Porosity Repair

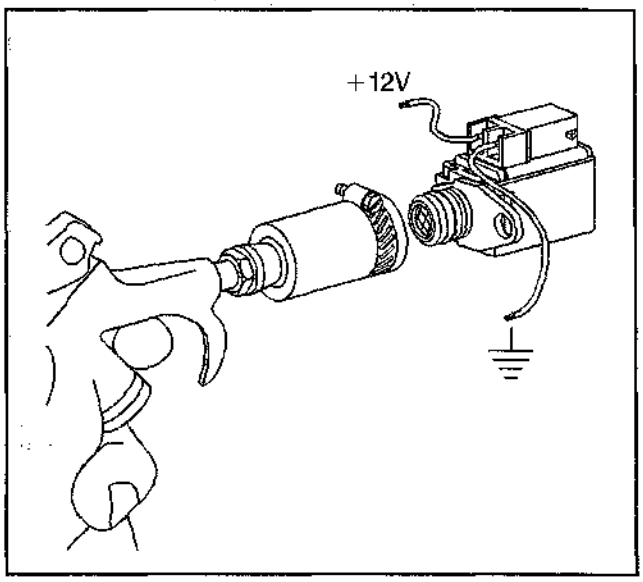
Some external leaks are caused by case porosity in non-pressurized areas. You can usually repair these leaks with the transmission in the car.

1. Thoroughly clean the area to be repaired with a deaning solvent. Air dry the area.

Caution: Epoxy adhesive may cause skin irritations and eye damage. Read and follow all information on the container label as provided by the manufacturer.

2. Using instructions from the manufacturer, mix a sufficient amount of epoxy, GM P/N 1052533 or equivalent, to make the repair.
3. While the transmission case is still hot, apply the epoxy. You can use a clean, dry soldering acid brush to clean the area and also to apply the epoxy cement. Make certain that the area to be repaired is fully covered.
4. Allow the epoxy cement to cure for three hours before starting the engine.
5. Repeat the fluid leak diagnosis procedures.

Shift Solenoid Leak Test



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1. Clamp a piece of 1/2 inch ID rubber hose over the fluid inlet end of the solenoid.
2. Connect a wire from one of the solenoid terminals to the negative terminal (ground) of the battery.
3. Apply compressed air to the rubber hose. Do not use air pressure in excess of 120 psi. Excessive pressure will not allow the solenoid ball check valve to seat properly.
4. Connect a wire from the other solenoid terminal to the positive terminal (12 volts) of the battery.
5. Observe air flow through the solenoid. Replace the solenoid if there is an air leak when the solenoid is energized.

Automatic Transmission Oil Cooler Flushing and Flow Test

Preparation

Tools Required

- *J 35944-A* Transmission Oil Cooler and Line Flusher
- *J 35944-20* Cooler Flushing Fluid

1. After the repaired or replacement transmission is installed in the vehicle, do not reconnect the oil cooler pipes.
2. Remove the fill cap on the *J 35944-A* Transmission Oil Cooler and Line Flusher and fill the can with 0.6 L (20–21 oz.) of *J 35944-20* Cooler Flushing Fluid. Do not overfill.
3. Install the fill cap on the *J 35944-A* and pressurize the flusher can, using a shop air supply regulated at 550–700 kPa (80–100 psi).
4. Connect the *J 35944-A* discharge hose to the oil cooler return pipe.
5. Clip the discharge hose onto the oil drain container.
6. Attach the *J 35944-A* to the undercarriage of the vehicle with the hook provided and connect the hose from the *J 35944-A* to the other (feed) oil cooler pipe.
7. With the water valve on the *J 35944-A* in the OFF position, connect the water hose from the water supply to the *J 35944-A.*
8. Turn ON the water supply at the faucet.

Initial Flush

1. Turn the water valve on the *J 35944-A* to the ON position and allow the water to flow through the oil cooler pipes for 10 seconds to remove any remaining transmission fluid. If the water does not flow through the cooler and pipes, the cause of the blockage must be diagnosed and the plugged component must be repaired or replaced. Continue with the cooler flushing and flow check procedure once the blockage is corrected.
2. Turn the water supply on the *J 35944-A* to the OFF position and clip the discharge hose onto the five gallon pail with a lid.
3. Turn the water valve on the *J 35944-A* to the ON position and depress the trigger to mix cooler flushing solution into the water flow. Use the clip provided on the handle to hold the trigger down. The discharge will foam vigorously when the solution is introduced into the water stream.
4. Flush the oil cooler and pipes with water and solution for two minutes. During this flush, attach the air supply to the air valve located on the *J 35944-A* for 3 to 5 seconds at the end of every 15 to 20 second interval to create a surge action.
5. Release the trigger and turn the water valve on the *J 35944-A* to the off position.

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Back Flush

1. Disconnect both hoses from the oil cooler pipes and then connect them to the opposite oil cooler pipe. This will allow the oil cooler and pipes to be back flushed.
2. Repeat steps 3 and 4 on the Initial Flush Procedure.
3. Release the trigger on the *J 35944-A* and allow water only to rinse the oil cooler and pipes for one minute.
4. Turn OFF the water supply at the faucet.
5. Attach the air supply to the valve on the *J 35944-A* and blow out the water from the oil cooler and pipes. Continue until no water comes out of the discharge hose.

Flow Check

1. Disconnect both hoses from the oil cooler pipes. Connect the oil cooler feed pipe to the transmission and the return pipe to the discharge hose. Clip the discharge hose onto the empty oil drain container.
2. Confirm the transmission is filled with automatic transmission fluid. Refer to *Transmission General Specifications* for the correct automatic transmission fluid capacity.
3. Start the engine with the transmission in PARK range and run for 30 seconds. A minimum of 1.9 L (2 quarts) must be discharged during this 30 second run time.
   - If fluid flow is greater than 1.9 L (2 quarts) in 30 seconds, go to step 7.
   - If fluid flow is less than 1.9 L (2 quarts) in 30 seconds, perform the following diagnosis:
4. Disconnect the oil cooler feed line at the radiator.
5. Connect the discharge hose to the cooler feed line. Clip the discharge hose onto the empty oil drain container.
6. Start the engine with the transmission in PARK and run for 30 seconds. A minimum of 1.9 L (2 quarts) must discharge during the 30 second run time. Do the following according to flow rate:
   - Insufficient feed flow: Inspect the transmission.
   - Sufficient feed flow: Inspect the cooler return pipe and the cooler.
7. Remove the discharge hose, reconnect the cooler feed and return pipes to the transmission and refill the unit to the proper fluid level Refer to *Transmission General Specifications* for the correct automatic transmission fluid capacity.

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Symptom Diagnosis

Diagnostic Category	Diagnostic Information
The following table consists of eight diagnostic categories that are located in the left-hand column. Using this column, choose the appropriate category based on the operating conditions of the vehicle or transmission. After selecting a category, use the right-hand column to locate the specific symptom diagnostic information.	
Fluid Diagnosis This category contains the following topics: • Fluid condition (appearance, contaminants, smell, overheating) • Line pressure (high or low) • Fluid leaks	• Refer to *Transmission Fluid Checking Procedure.* • Refer to *Oil Pressure High or Low.* • Refer to *Fluid Leak Diagnosis* (procedure). • Refer to *Oil Out the Vent.* • Refer to *Front Oil Leak.*
Noise and Vibration Diagnosis This category contains the following topics: • Ratcheting noise • Noise (drive gear, final drive, whine, growl, rattle, buzz, popping) • Vibration	• Refer to *Ratcheting Noise.* • Refer to *Vibration in Reverse and Whining Noise in Park.*
Range Performance Diagnosis This category contains the following topics: • Drives in Neutral • No Park • No Reverse • No Drive • No engine braking	• Refer to *Drives in Neutral.* • Refer to *No Park.* • Refer to *No Reverse or Slips in Reverse.* • Refer to *No Drive in All Ranges.* • Refer to *No Drive in Drive Range.* • Refer to *No Overrun Braking - Manual 3-2-1.*
Shift Quality (Feel) Diagnosis This category contains the following topic: • Harsh, soft or slipping shifts • Harsh, soft or delayed engagement • Shift shudder, flare or tie-up	• Refer to *Harsh Shifts.* • Refer to *Slipping or Harsh 1-2 Shift.* • Refer to *No 2-3 Shift or 2-3 Shift Slips, Rough or Hunting.* • Refer to *No 3-4 Shift, Slips or Rough 3-4 Shift.* • Refer to *Harsh Garage Shift.* • Refer to *Delay in Drive and Reverse.* • Refer to *3-2 Flare or Tie-Up.*
Shift Pattern This category contains the following topics: • One forward gear only • Two forward gears only • Gear missing or slipping • No upshift or slipping upshift • No downshifts • Non-First gear start	• Refer to *First Gear Range Only - No Upshift.* • Refer to *Third Gear Only.* • Refer to *Second/Third Gear Only or First/Fourth Gears Only.* • Refer to *Slips in First Gear.* • Refer to *Slipping or Harsh 1-2 Shift.* • Refer to *No 2-3 Shift or 2-3 Shift Slips, Rough or Hunting.* • Refer to *No 3-4 Shift, Slips or Rough 3-4 Shift.* • Refer to *No Part Throttle or Delayed Downshifts.* • Refer to *Second Gear Start.*
Shift Speed Diagnosis This category contains the following topic: Inaccurate or inconsistent shift points	Refer to *Inaccurate Shift Points.*
Torque Converter Diagnosis This category contains the following topics: • Torque converter diagnosis • TCC does not apply • TCC does not release • TCC apply/release quality	• Refer to *Torque Converter Diagnosis Procedure.* • Refer to *No Torque Converter Clutch (TCC) Apply (300 RPM Slip).* • Refer to *No Torque Converter Clutch (TCC) Release.* • Refer to *Torque Converter Clutch (TCC) Shudder.*
If Symptom Not Found	• Refer to *Transmission Fluid Checking Procedure.* • Refer to *Road Test Procedure.* • Refer to *Line Pressure Check Procedure.*

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Transmission Overheats

Checks	Causes
TCC Circuit	Blockage during apply or release
Pump Cover (215)	Cross channel leakage
Pressure Regulator Valve (216)	The valve is stuck in a high demand position
Oil Cooler	The cooler or the cooler lines are blocked
Gasket (73)	The gasket is damaged
Turbine Shaft O-ring (618)	The O-ring is damaged
Turbine Shaft Seals (619)	The seals are damaged
Stator Shaft Bushings (234/241)	The bushing is worn or damaged
Fluid	The fluid level is low
Radiator	Air flow is restricted

Oil Pressure High or Low

Checks	Causes
Oil Pump Assembly	• Pressure regulator valve stuck • Pressure regulator valve spring • Rotor guide omitted or misassembled • Rotor cracked or broken • Reverse boost valve or sleeve stuck, damaged or incorrectly assembled • Orifice hole in pressure regulator valve plugged • Sticking slide or excessive rotor clearance • Pressure relief ball not seated or damaged • Porosity in pump cover or body • Wrong pump cover • Pump faces not flat • Excessive rotor clearance
Oil Filter	• Intake pipe restricted by casting flash • Cracks in filter body or intake pipe • O-ring seal missing, cut or damaged • Wrong grease used on rebuild
Control Valve Body	• Manual valve scored or damaged • Spacer plate or gaskets incorrect, misassembled or damaged • Face not flat • 2-3 Shift valve stuck • Checkballs omitted or misassembled
Pressure Control Solenoid	Damage to pins
Transmission Fluid Pressure Manual Valve Position Switch	• Contamination • Damaged seals
Case	Case to control valve body face not flat
System Voltage	• 12 volts not supplied to transmission • Electrical short (pinched solenoid wire) • Solenoid not grounded

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Harsh Shifts

Checks	Causes
Throttle Position Sensor	Open or shorted circuit
Vehicle Speed Sensor	Open or shorted circuit
Automatic Transmission Fluid Pressure (TFP)	• Contamination • Damaged seals
Trans Fluid Temperature Sensor	Open or shorted circuit
Engine Coolant Temperature Sensor	Open or shorted circuit
Pressure Control Solenoid	• Damage to pins • Contamination

Inaccurate Shift Points

Checks	Causes
Oil Pump Assembly	• Stuck pressure regulator valve • Sticking pump slide
Valve Body Assembly	Spacer plate or gaskets misassembled, damaged or incorrect
Case	• Porous or damaged valve body pad • 2-4 Servo Assembly – 2-4 accumulator porosity – Damaged servo piston seals – Apply pin damaged or improper length • 2-4 Band Assembly – Burned – Anchor pin not engaged
Throttle Position Sensor	• Disconnected • Damage
Vehicle Speed Sensor	• Disconnected • Damaged • Bolt not tightened
4WD Low Switch	• Disconnected • Damaged

First Gear Range Only - No Upshift

Checks	Causes
Control Valve Body	• The 1-2 Shift valve is sticking • The spacer plate or gaskets are mispositioned or damaged
Case	The case to valve body face is damaged or is not flat
Shift Solenoid Valves	• Stuck or damaged • Faulty electrical connection
2-4 Servo Assembly	• The apply passage case is restricted or blocked • Nicks or burrs on the servo pin or on the pin bore in the case • Fourth servo piston is installed backwards
2-4 Band Assembly	• The 2-4 band is worn or damaged • The band anchor pin is not engaged

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Slips in First Gear

Checks	Causes
Forward Clutch Assembly	• Clutch plates worn • Porosity or damage in forward clutch piston • Forward clutch piston inner and outer seals missing, cut or damaged • Damaged forward clutch housing • Forward clutch housing retainer and ball assembly not sealing or damaged
Forward Clutch Accumulator	• Piston seal missing, cut or damaged • Piston out of its bore • Porosity in the piston or valve body • Stuck abuse valve
Input Housing and Shaft Assembly	Turbine shaft seals missing, cut or damaged
Valve Body	• 1-2 Accumulator valve stuck • Face not flat, damaged lands or interconnected passages • Spacer plate or gaskets incorrect, mispositioned or damaged
Low Roller Clutch	• Damage to lugs to inner ramps • Rollers not free moving • Inadequate spring tension • Damage to inner splines • Lube passage plugged
Torque Converter	Stator roller clutch not holding
1-2 Accumulator Assembly	• Porosity in piston or 1-2 Accumulator cover and pin assembly • Damaged ring grooves on piston • Piston seal missing, cut or damaged • Valve body to spacer plate gasket at 1-2 Accumulator cover, missing or damaged • Leak between piston and pin • Broken 1-2 Accumulator spring
Line Pressure	Refer to *Oil Pressure High or Low*
2-4 Servo Assembly	4th Servo piston in backwards

Slipping or Harsh 1-2 Shift

Checks	Causes
Valve Body Assembly	• 1-2 Shift valve train stuck • Gaskets or spacer plate incorrect, mispositioned or damaged • 1-2 Accumulator valve stuck • Face not flat • 4-3 sequence valve stuck • #1 or #8 checkball missing or mis-located • 1-2 accumulator valve bushing rotated 180°
2-4 Servo Assembly	• Apply pin too long or too short • 2nd servo apply piston seal missing, cut or damaged • Restricted or missing oil passages • Servo bore in case damaged
2nd Accumulator	• Porosity in 1-2 accumulator cover or piston • Piston seal or groove damaged • Nicks or burrs in 1-2 accumulator housing • Missing or restricted oil passage • 1-2 accumulator piston spring not seated • Rough finish in 1-2 accumulator bore in case
2-4 Band	Worn or mispositioned
Oil Pump Assembly or Case	Faces not flat

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No 2-3 Shift or 2-3 Shift Slips, Rough or Hunting

Checks	Causes
Converter	Internal damage
Oil Pump	Stator shaft bushings scored or off location
Valve Body Assembly	• 2-3 Shift valve train stuck • Gaskets or spacer plate incorrect, mispositioned or damaged • 2-3 Accumulator valve stuck • Face not flat
Input Housing Assembly	• 3-4 clutch or forward clutch plates worn • Excessive clutch plate travel • Cut or damaged 3-4 clutch or forward clutch piston seals • Porosity in input clutch housing or piston • 3-4 clutch piston checkball stuck, damaged or not sealing • Restricted apply passages • Forward clutch piston retainer and ball assembly not seating • Sealing balls loose or missing
Case	3rd accumulator retainer and ball assembly not seating
2-4 Servo Assembly	2nd apply piston seals missing, cut or damaged

Second/Third Gear Only or First/Fourth Gears Only

Checks	Causes
1-2 Shift Solenoid Valve (367A)	• Sediment is in the valves • The electrical connection is faulty • Damaged seal

No First or Second Gear/No Third or Fourth Gear

Checks	Causes
2-3 Shift Solenoid Valve (367B)	• Sediment is in the valves • The electrical connection is faulty • Damaged seal

No Second Gear, No Fourth Gear, and No Reverse Gear

Checks	Causes
Reaction Sun Shell	Broken spline on reaction sun shell/replace shell.

Third Gear Only

Checks	Causes
System Voltage	• 12 volts not supplied to transmission • Electrical short (pinched solenoid wire) • Solenoid not grounded

3-2 Flare or Tie-Up

Checks	Causes
3-2 Shift Solenoid Valve Assembly	• Shorted or damaged • Contamination • Damaged Seal • Check ball not seating

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No 3-4 Shift, Slips or Rough 3-4 Shift

Checks	Causes
Oil Pump Assembly	• Pump cover retainer and ball assembly omitted or damaged • Faces not flat
Valve Body Assembly	• Valves stuck – 2-3 Shift valve train – Accumulator valve – 1-2 Shift valve train – 3-2 Shift solenoid valve assembly • Spacer plate or gaskets incorrect, mispositioned or damaged
2-4 Servo Assembly	• Incorrect band apply pin • Missing or damaged servo seals • Porosity in piston, cover or case • Damaged piston seal grooves • Plugged or missing orifice cup plug
Case	• 3rd Accumulator retainer and ball assembly leaking • Porosity in 3-4 accumulator piston or bore • 3-4 Accumulator piston seal or seal grooves damaged • Plugged or missing orifice cup plug • Restricted oil passage
Input Housing Assembly	Refer to Slipping 2-3 Shift
2-4 Band Assembly	Worn or misassembled

No Reverse or Slips in Reverse

Checks	Causes
Input Housing Assembly	• 3-4 Apply ring stuck in applied position • Forward clutch not releasing • Turbine shaft seals missing, cut or damaged
Manual Valve Link	Disconnected
Valve Body Assembly	• 2-3 Shift valve stuck • Manual linkage not adjusted • Spacer plate and gaskets incorrect, mispositioned or damaged • Lo overrun valve stuck • Orificed cup plug restricted, missing or damaged
Reverse Input Clutch Assembly	• Clutch plate worn • Reverse input housing and drum assembly cracked at weld • Clutch plate retaining ring out of groove • Return spring assembly retaining ring out of groove • Seals cut or damaged • Restricted apply passage • Porosity in piston • Belleville plate installed incorrectly • Excessive clutch plate travel • Oversized housing
Lo and Reverse Clutch	• Clutch plates worn • Porosity in piston • Seals damaged • Return spring assembly retaining ring mispositioned • Restricted apply passage

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No Part Throttle or Delayed Downshifts

Checks	Causes
Input Housing Assembly	• 3-4 Apply ring stuck in applied position • Forward clutch not releasing • Turbine shaft seals missing, cut or damaged
Manual Valve Link	Disconnected
Valve Body Assembly	• 2-3 Shift valve stuck • Manual linkage not adjusted • Spacer plate and gaskets incorrect, mispositioned or damaged • Lo overrun valve stuck • Orificed cup plug restricted, missing or damaged
Reverse Input Clutch Assembly	• Clutch plate worn • Reverse input housing and drum assembly cracked at weld • Clutch plate retaining ring out of groove • Return spring assembly retaining ring out of groove • Seals cut or damaged • Restricted apply passage • Porosity in piston • Belleville plate installed incorrectly • Excessive clutch plate travel • Oversized housing
Lo and Reverse Clutch	• Clutch plates worn • Porosity in piston • Seals damaged • Return spring assembly retaining ring mispositioned • Restricted apply passage

Harsh Garage Shift

Checks	Causes
Valve Body Assembly	• Orifice cup plug missing • Checkball missing

No Overrun Braking - Manual 3-2-1

Checks	Causes
External Linkage	Not adjusted properly
Valve Body Assembly	• 4-3 Sequence valve stuck • Checkball mispositioned • Spacer plate and gaskets incorrect, damaged or mispositioned
Input Clutch Assembly	• Turbine shaft oil passages plugged or not drilled • Turbine shaft seal rings damaged • Turbine shaft sealing balls loose or missing • Turbine shaft sealing balls loose or missing • Porosity in forward or overrun clutch piston • Overrun piston seals cut or damaged • Overrun piston checkball not sealing

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No Torque Converter Clutch (TCC) Apply (300 RPM Slip)

Checks	Causes
Valve Body Assembly	• Regulator apply valve side loading • Stuck converter clutch valve • TCC apply valve stuck closed (debris in bore) • TCC/PWM solenoid broken/cracked • Turbine shaft O-ring omitted • TCC/PWM solenoid leaking
Input Housing and Turbine Shaft Assembly	• Turbine shaft hole not drilled to full depth • Scratched turbine shaft journals • Turbine shaft O-ring omitted/damaged • Turbine shaft retainer and ball assembly restricted or damaged
Electrical	• 12 volts not supplied to transmission • Outside electrical connector damaged • Inside electrical connector damaged • Wire harness damaged • TCC solenoid damaged • Electrical short (pinched wire) • TCC solenoid not grounded
Torque Converter Clutch	Internal damage (blue or distorted)
Oil Pump Assembly	• TCC outer spring cocked • Orifice cup plug restricted or damaged • Pump to case gasket mispositioned • Converter clutch valve retaining ring mispositioned • Converter clutch valve stuck or assembled backwards
Transmission Fluid Pressure Manual Valve Position Switch	• Contamination • Damaged seals
Solenoid Screen	Blocked
TCC Solenoid Valve	Internal damage
Engine Speed Sensor	Internal damage
Engine Coolant Temperature Sensor	Internal damage
Automatic Transmission Fluid Temperature Sensor	Internal damage
Brake Switch	Internal damage
VCM	Internal damage
TCC PWM Solenoid	Internal damage

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Torque Converter Clutch (TCC) Shudder

Checks	Causes
Electrical	• 12 volts not supplied to transmission • Outside electrical connector damaged • Inside electrical connector, wiring harness or solenoid damaged • Electrical short (pinched solenoid wire) • Solenoid not grounded
Converter	Internal damage
Oil Pump Assembly	• Converter clutch valve stuck or assembled backwards • Converter clutch valve retaining ring mispositioned • Pump to case gasket mispositioned • Orifice cup plug restricted or damaged • Solenoid O-ring seal cut or damaged • High or uneven bolt torque (pump body to cover)
Input Housing and Shaft	• Turbine shaft O-ring seal cut or damaged • Turbine shaft retainer and ball assembly restricted or damaged
Pressure Switch Assembly	• Contamination • Damaged seals
Valve Body Assembly	• TCC signal valve stuck • Solenoid O-ring leaking
Solenoid Screen	Blocked

No Torque Converter Clutch (TCC) Release

Checks	Causes
TCC Solenoid Valve	• External ground • Clogged exhaust orifice
Converter	Internal damage
Valve Body Assembly	The converter clutch apply valve is stuck in the apply position
Oil Pump Assembly	The converter clutch valve is stuck
PCM	External ground

Torque Converter Clutch (TCC) Slip - 100 RPM Slip

Checks	Causes
Valve Body Assembly	• TCC apply valve stuck open • TCC/PWM solenoid leaks • Regulator apply valve or converter clutch shift valve sticking or side loading • TCC solenoid leaking
Oil Pump Assembly	• Stator shaft bushings worn, due to scratched turbine shaft journal (replace bushings and input housing assembly) • TCC apply valve is stuck
Input Housing and Turbine Shaft Assembly	• Scratched journal on turbine shaft • Turbine shaft O-ring cut • Turbine shaft hole not drilled to full depth

Torque Converter Clutch (TCC) Slip with Stall/Stumble

Checks	Causes
TCC Apply Valve	Stuck open

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Torque Converter Clutch (TCC) Intermittent - OK Cold/Slips Hot

Checks	Causes
PWM Solenoid	Leaks
Regulator Apply Valve	Sticking valve
Converter Clutch Shift Valve	Sticking valve

No Fourth Gear, or Slips in Fourth Gear

Checks	Causes
Check Ball	Wrong location or extra checkball
Orificed Cup Plug	Not fully pressed in

Slip/Flare in Any Gear

Checks	Causes
Pump Slide Inner/Outer Spring	Omitted

No Third Gear

Checks	Causes
Orificed Cup Plug	Missing or blown out

Drives in Neutral

Checks	Causes
Forward Clutch	The clutch does not release
Manual Valve Link	Disconnected
Case	• The face is not flat • Internal leakage exists

Second Gear Start

Checks	Causes
Forward Clutch Sprag Assembly	The sprag assembly is installed backwards

No Park

Checks	Causes
Parking Linkage	• Actuator rod assembly bent or damaged • Actuator rod spring binding or improperly crimped • Actuator rod not attached to inside detent lever • Parking lock bracket damaged or not torqued properly • Inside detent lever not torqued properly • Parking pawl binding or damaged

Oil Out the Vent

Checks	Causes
Oil Pump	Chamber in pump body rotor pocket
Miscellaneous	Fluid level—overfilled

Vibration in Reverse and Whining Noise in Park

Checks	Causes
Oil Pump	Chamber in pump body rotor pocket
Miscellaneous	Fluid level—overfilled

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Ratcheting Noise

Checks	Causes
Parking Pawl	The parking pawl return spring is weak, damaged, or misassembled

No Drive in All Ranges

Checks	Causes
Torque Converter	The converter to flex plate bolts are missing

No Drive in Drive Range

Checks	Causes
Torque Converter	• The stator roller clutch is not holding • The converter is not bolted to the flex plate

Shift Lever Indicates Wrong Gear

Checks	Causes
Manual Valve	Not engaged to detent lever
Detent Roller Pin	Missing or damaged
Detent Roller	Broken or disconnected
Detent Spring	Broken or disconnected
Manual Valve Link	Loose or missing
Manual Shaft	Flats not parallel
Indicator Linkage	Misadjusted

No Gear Selection

Checks	Causes
Detent Lever	Nut loose or missing
Manual Valve	Stuck
Spacer Plate/Gaskets	Blocked holes
Control Valve Body Case	Blocked channels

Engine Starts in Gear

Checks	Causes
Manual Valve	Not engaged to detent lever
Transmission Range Switch	Not working or mispositioned

Front Oil Leak

Checks	Causes
Torque Converter	• The welded seam is leaking • The converter hub is damaged
Torque Converter Seal	• The seal assembly is damaged • The garter spring is missing
Pump Assembly	Stator shaft bushings moved or worn

Delay in Drive and Reverse

Checks	Causes
Torque Converter	Converter drainback

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Symptoms - Automatic Transmission Shift Lock Control

Important: Review the system description in order to familiarize yourself with the system functions. Refer to *Automatic Transmission Shift Lock Control Circuit Description.*

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the Automatic Transmission Shift Lock Control System. Refer to *Checking Aftermarket Accessories* in Wiring Systems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to *Testing for Intermittent and Poor Connections* in Wiring Systems.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- *Automatic Transmission Shift Lock Control Inoperative*
- *Automatic Transmission Shift Lock Control Always On with Ignition in Run*

Automatic Transmission Shift Lock Control Inoperative

Step	Action	Value(s)	Yes	No
1	Did you review the system operation and perform the necessary inspections?	—	Go to *Step 2*	Go to *Symptoms - Automatic Transmission Shift Lock Control*
2	Turn the ignition to the RUN position. Is the gear shifter locked in park?	—	Go to *Testing for Intermittent and Poor Connections* in Wiring Systems	Go to *Step 3*
3	1. Make sure that the park neutral position switch is in the PARK position. 2. Disconnect the AT shift lock control actuator solenoid connector. 3. Turn the ignition switch to the RUN position. 4. Connect a test lamp between the AT shift lock control actuator solenoid connector terminal B and ground. Refer to *Circuit Testing* in Wiring Systems. Does the test lamp illuminate?	—	Go to *Step 4*	Go to *Step 7*
4	Connect a test lamp between the AT shift lock control actuator solenoid connector terminal A and terminal B. Refer to *Circuit Testing* in Wiring Systems. Does the test lamp illuminate?	—	Go to *Step 5*	Go to *Step 6*
5	Replace the AT shift lock control actuator solenoid. Refer to *BTSI Solenoid Replacement.* Did you complete the replacement?	—	Go to *Step 13*	—
6	Repair a poor connection or an open in the supply voltage circuit of the park neutral position switch. Refer to *Connector Repairs* or *Wiring Repairs* in Wiring Systems. Did you complete the repair?	—	Go to *Step 13*	—
7	Connect a test lamp between the stop lamp/TCC switch connector C2 terminal B and ground. Refer to *Circuit Testing* in Wiring Systems. Does the test lamp illuminate?	—	Go to *Step 8*	Go to *Step 9*
8	Repair a poor connection or an open in the supply voltage circuit of the A/T shift lock control actuator solenoid. Refer to *Connector Repairs* or *Wiring Repairs* in Wiring Systems. Did you complete the repair?	—	Go to *Step 13*	—
9	Connect a test lamp between the stop lamp/TCC switch connector C2 terminal A and ground. Refer to *Circuit Testing* in Wiring Systems. Does the test lamp illuminate?	—	Go to *Step 10*	Go to *Step 12*

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Automatic Transmission Shift Lock Control Inoperative (cont'd)

Step	Action	Value(s)	Yes	No
10	Test for and repair a poor connection at the stoplamp/TCC switch. Refer to *Testing for Intermittent and Poor Connections* and *Connector Repairs* in Wiring Systems. Did you find and repair a poor connection?	—	Go to *Step 13*	Go to *Step 11*
11	Replace the stop lamp/TCC switch. Refer to *Stoplamp Switch Replacement* in Hydraulic Brakes. Did you complete the replacement?	—	Go to *Step 13*	—
12	Repair a poor connection or an open in the ignition 1 voltage circuit of the stoplamp/TCC switch between the stop lamp/TCC switch and S206. Refer to *Connector Repairs* or *Wiring Repairs* in Wiring Systems. Did you complete the repair?	—	Go to *Step 13*	—
13	Operate the system in order to verify the repair. Did you correct the condition?	—	System OK	Go to *Step 3*

Automatic Transmission Shift Lock Control Always On with Ignition in Run

Step	Action	Value(s)	Yes	No
1	Did you review the system operation and perform the necessary inspections?	—	Go to *Step 2*	Go to *Symptoms - Automatic Transmission Shift Lock Control*
2	1. Turn the ignition to the RUN position. 2. Depress the brake pedal. Does the gear shifter move from the PARK or the NEUTRAL position?	—	Go to *Testing for Intermittent and Poor Connections* in Wiring Systems	Go to *Step 3*
3	1. Disconnect the stop lamp/TCC switch connector C2. 2. Turn the ignition switch to the RUN position. 3. Connect a test lamp between the stop lamp/TCC switch connector C2 terminal B and ground. Refer to *Circuit Testing* in Wiring Systems. Does the test lamp illuminate?	—	Go to *Step 4*	Go to *Step 5*
4	Repair the short to battery voltage in the supply voltage circuit of the AT shift lock control actuator solenoid. Refer to *Wiring Repairs* in Wiring Systems. Did you complete the repair?	—	Go to *Step 10*	—
5	1. Turn the ignition switch to the OFF position. 2. Reconnect the stop lamp/TCC switch connector C2. 3. Turn the ignition switch to the RUN position. 4. Connect a test lamp between the stop lamp/TCC switch connector C2 terminal B and ground. Refer to *Circuit Testing* in Wiring Systems. 5. Depress the brake pedal. Does the test lamp illuminate?	—	Go to *Step 6*	Go to *Step 8*
6	Test for and repair a poor connection at the stop lamp/TCC switch. Refer to *Testing for Intermittent and Poor Connections* and *Connector Repairs* in Wiring Systems. Did you find and repair a poor connection?	—	Go to *Step 10*	Go to *Step 7*

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Automatic Transmission Shift Lock Control Always On with Ignition in Run (cont'd)

Step	Action	Value(s)	Yes	No
7	Replace the stop lamp/TCC switch. Refer to *Stoplamp Switch Replacement* in Hydraulic Brakes. Did you complete the replacement?	—	Go to *Step 10*	—
8	Test for and repair a poor connection at the AT shift lock control actuator solenoid. Refer to *Testing for Intermittent and Poor Connections* and *Connector Repairs* in Wiring Systems. Did you find and repair a poor connection?	—	Go to *Step 10*	Go to *Step 9*
9	Replace the AT shift lock control actuator solenoid. Refer to *BTSI Solenoid Replacement.* Did you complete the replacement?	—	Go to *Step 10*	—
10	Operate the system in order to verify the repair. Did you correct the condition?	—	System OK	Go to *Step 3*

Repair Instructions

Parts Cleaning and Inspection

Service Precautions

- Use the following safety equipment as appropriate:
  - Safety glasses
  - Safety shoes
  - Gloves
- Keep the work area clean.
- Keep the tools clean.
- Clean the exterior of the transmission before removing any parts.
- Do not use wipe cloths or rags.
- Do not use solvents on:
  - Rubber seals
  - Plastic/Teflon® thrust washers or seals
- Blow out all of the passages with compressed air.
- Clean out the small passages with a fine wire.
- Handle the parts carefully in order to prevent damage.

Notice: The assembly of some components will require the use of an assembly lube. Always use J 36850 Transjel™ or petroleum jelly during assembly. Greases other than the recommended assembly lube will change the transmission fluid characteristics and cause undesirable shift conditions and/or filter clogging.

- When installing screws, bolts or studs into aluminum, always dip the threads into transmission fluid.
- Always use a torque wrench for the proper torque.
- Recondition damaged or stripped aluminum threads with thread inserts.
- Replace all of the gaskets and O-ring seals. Do not use gasket cement or sealers.
- Replace the Teflon® and the rubber lip seals only when necessary. Always use the appropriate seal installers.

Inspection Procedure

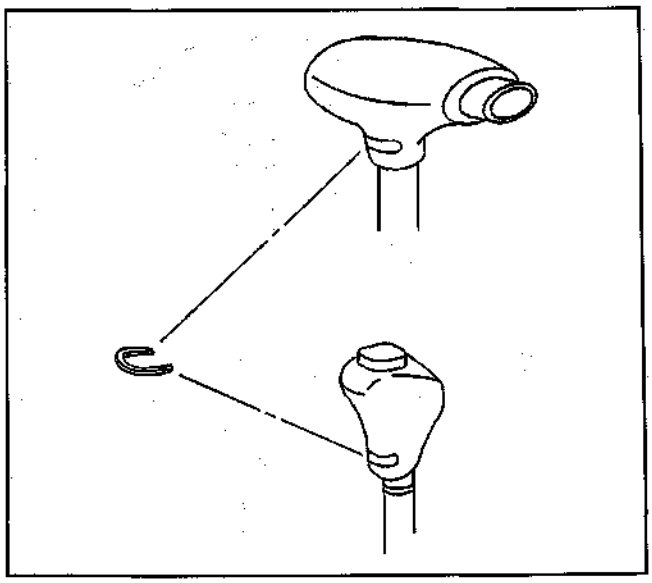
- Inspect the manual linkage for the following:
  - Wear at the pivoting points
  - Shift cable binding
  - Proper shift cable attachment
- Inspect the seals, gaskets, O-ring seals and mating surfaces for the following:
  - Nicks
  - Cuts
  - Damage
- Inspect the snap rings for the following:
  - Expansion or compression
  - Distortion
  - Nicks
  - Proper ring to groove fit
- Inspect the bearings and thrust surfaces for the following defects:
  - Wear
  - Scoring
  - Pitting

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Floor Shift Control Knob Replacement

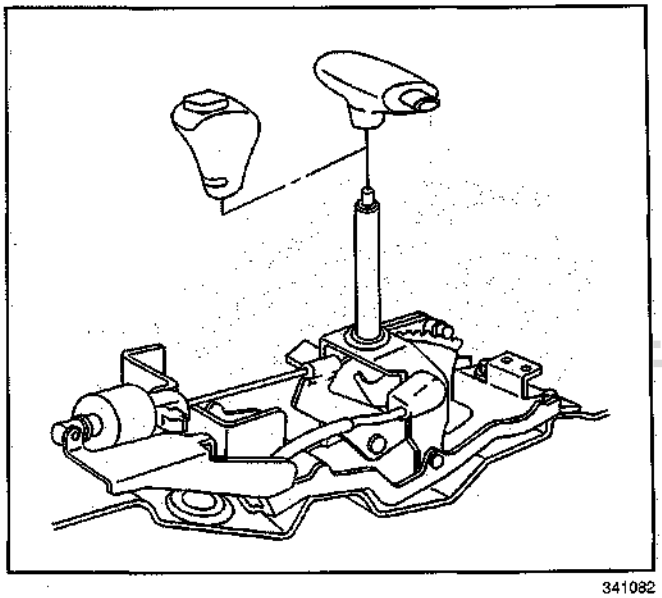
Removal Procedure

1. Using a small flat-bladed screwdriver, carefully pry the staple clip from the control lever knob.



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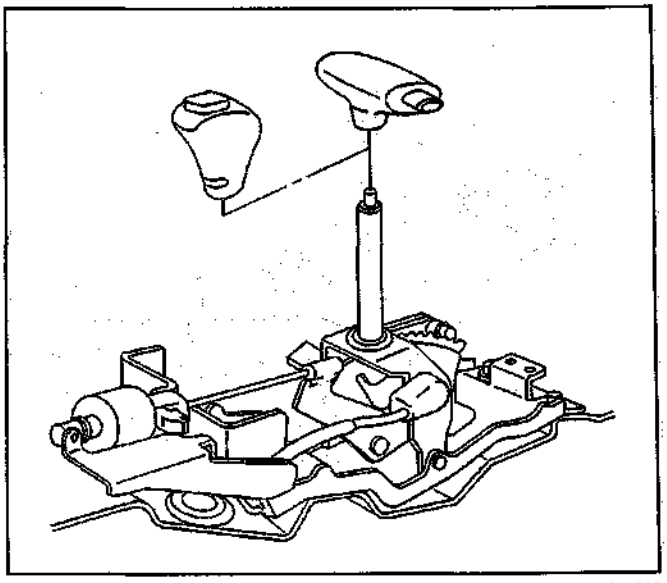
2. Pull up to remove the knob from the transmission control.



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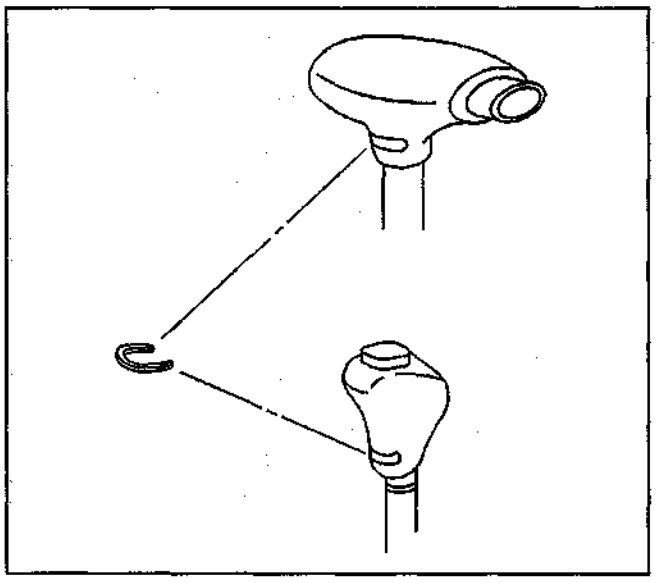
Installation Procedure

1. Install the control lever knob onto the transmission control.



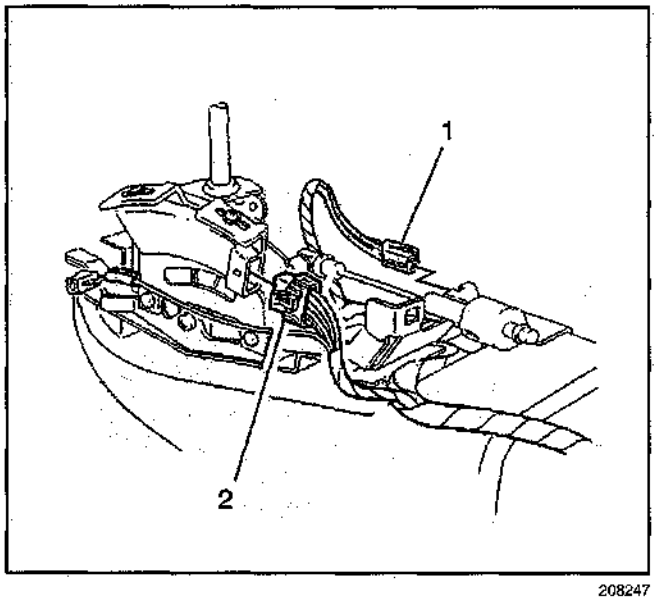
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2. Install the staple clip.
3. Push in the staple clip to retain the control knob.

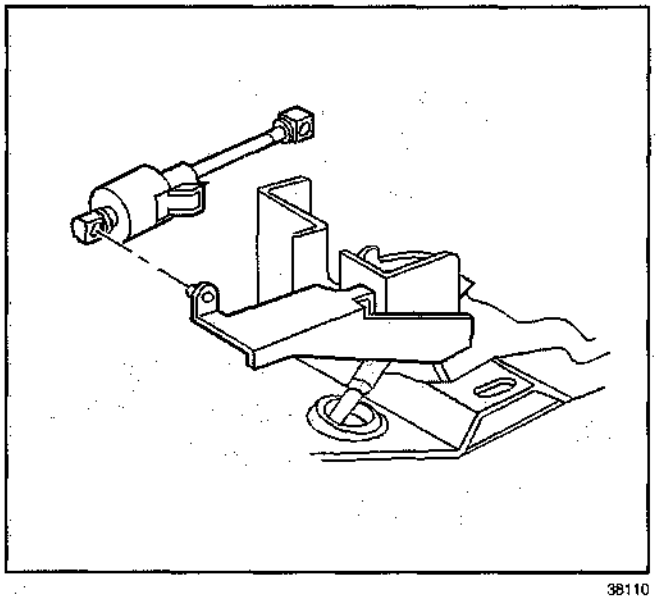


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BTSI Solenoid Replacement

Removal Procedure

1. Remove the front floor console trim plate. Refer to *Trim Plate Replacement - Front Floor Console (Automatic)* in Instrument Panel, Gauges, and Console.
2. Disconnect the brake transmission shift interlock (BTSI) solenoid electrical connector (1).



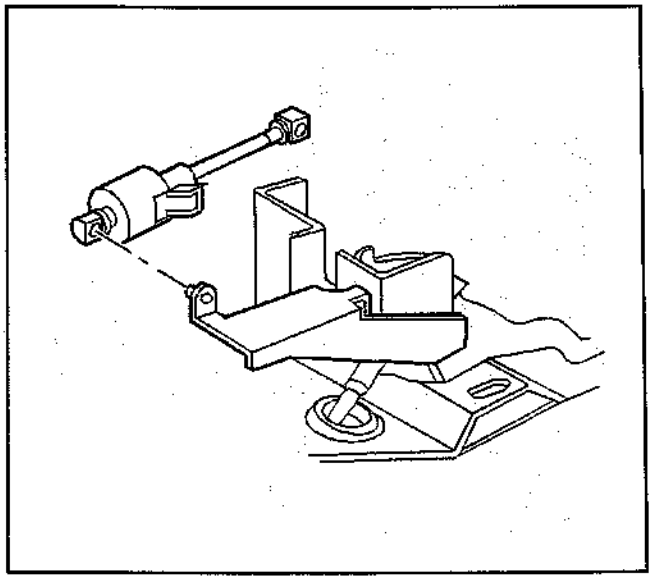
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3. Unsnap the BTSI solenoid from the transmission control base.

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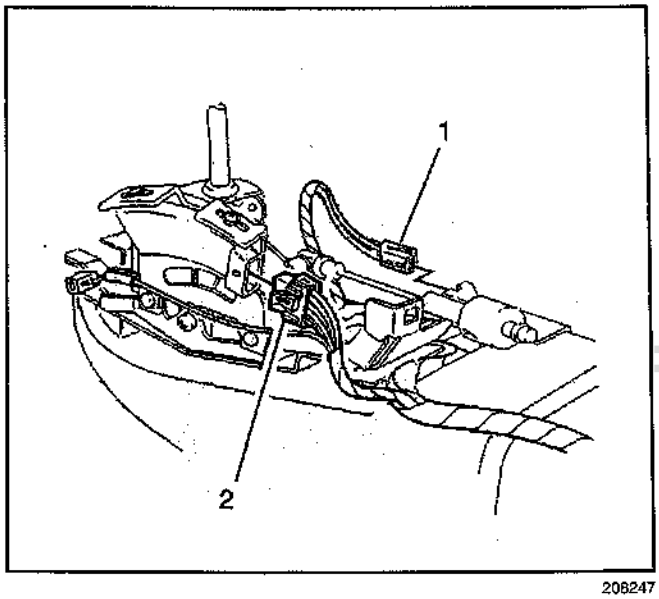
Installation Procedure

1. Snap the BTSI solenoid to the transmission control base.



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2. Connect the BTSI solenoid electrical connector (1).
3. Install the front floor console trim plate. Refer to *Trim Plate Replacement - Front Floor Console (Automatic)* in Instrument Panel, Gauges, and Console.

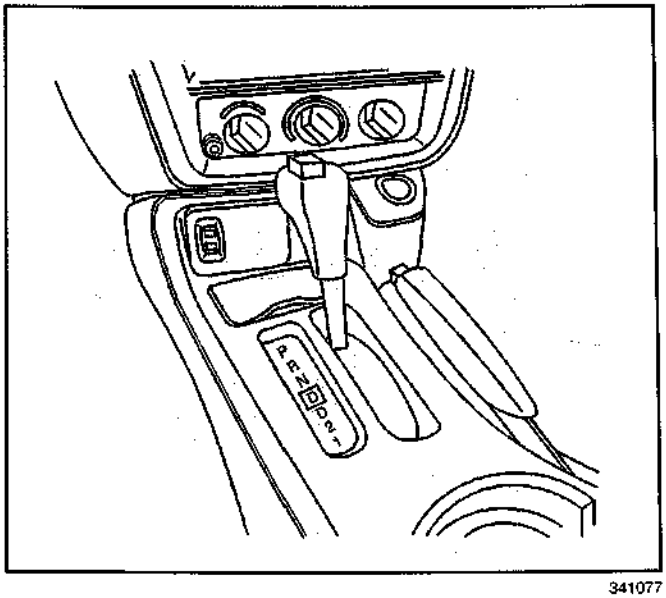


208247

Park Lock Cable Replacement

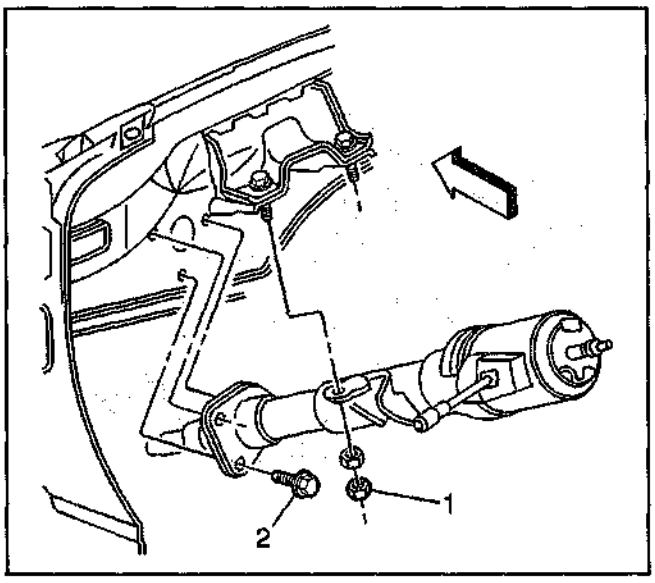
Removal Procedure

1. Disable the supplemental inflatable restraint (SIR) system. Refer to *Disabling the SIR System* in SIR.
2. Remove the left side instrument panel insulator. Refer to *Closeout/Insulator Panel Replacement - Left* in Instrument Panel, Gauges and Console.
3. Remove the instrument panel driver knee bolster and deflector. Refer to *Knee Bolster Replacement - Left* in Instrument Panel, Gauges and Console.
4. Remove the front floor console. Refer to *Console Replacement - Front Floor* in Instrument Panel, Gauges and Console.
5. Remove the body hinge pillar trim panel. Refer to *Trim Replacement - Hinge Pillar* in Interior Trim.
6. Place the transmission control into the PARK position.



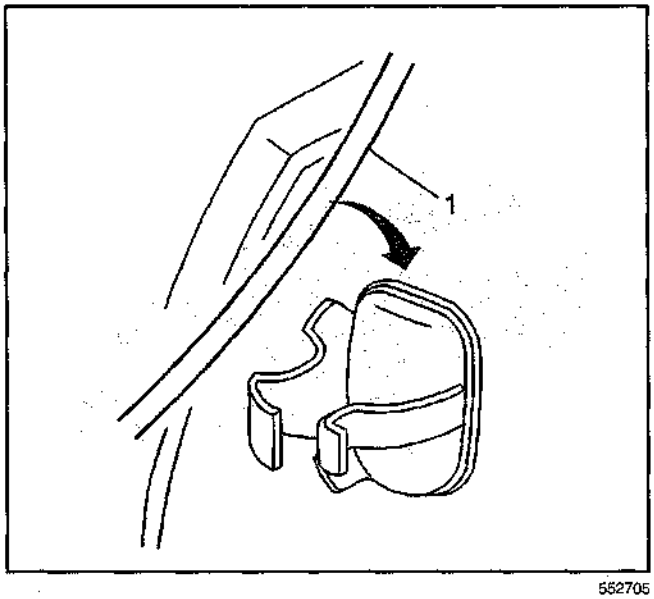
341077

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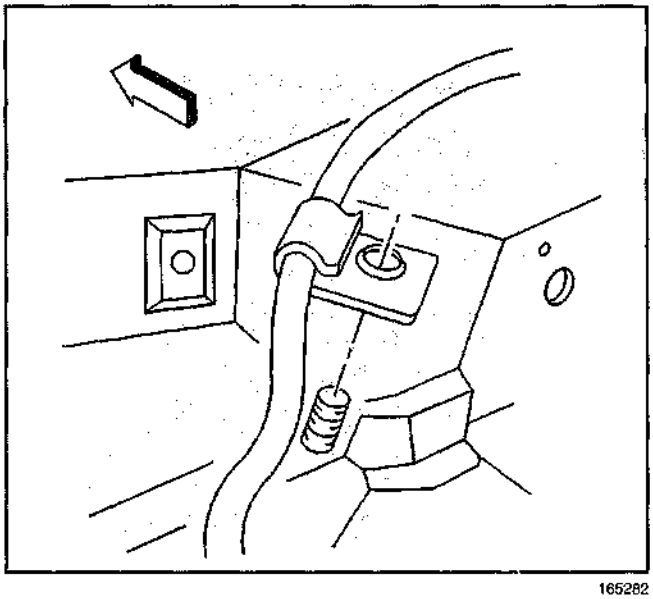
553197

7. Remove the steering column mounting bolts (2).
8. Remove the steering column mounting nuts (1).
9. Lower the steering column.
10. Reposition the floor carpet until the retaining clip on the tunnel is accessible.



552705

11. Open the retaining clip on the driver side of the tunnel and remove the park lock cable (1).

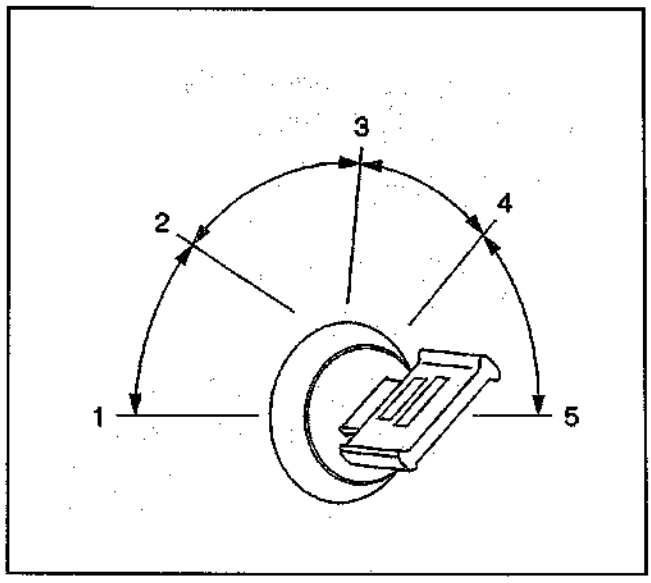

165282

12. Remove the park lock cable clip from the stud on the front of dash.

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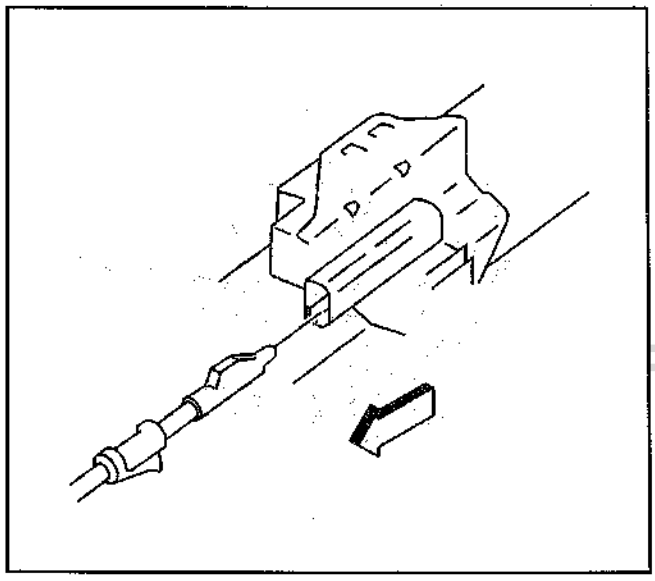
Important: Do not proceed to the next step with the ignition key in any other position.

13. Turn the ignition key to the RUN (4) position.

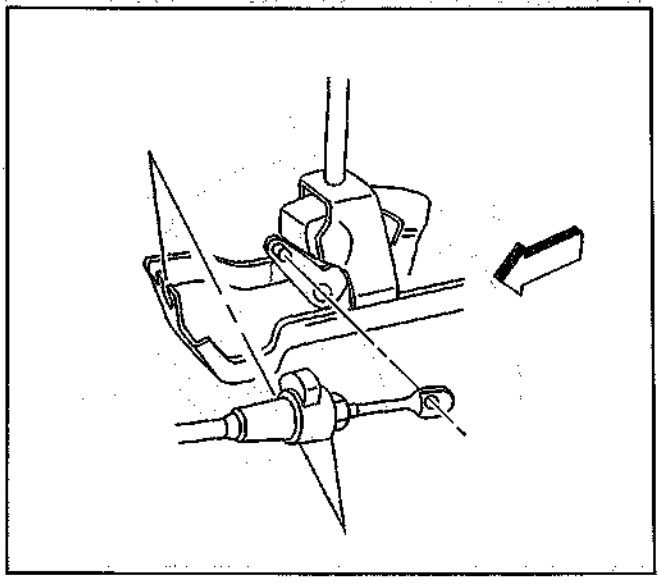


341078

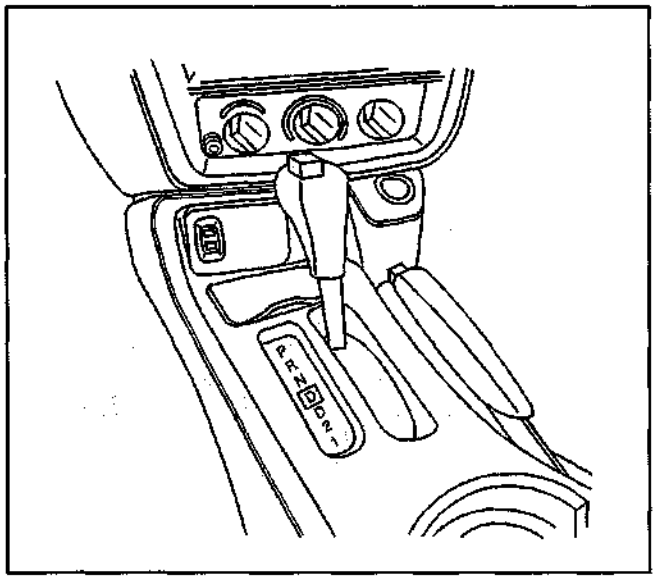
14. Release the park lock cable from the inhibitor attached to the steering column.
    - 14.1. Insert a small flat bladed screwdriver into the inhibitor slot.
    - 14.2. Depress the park lock cable latch.
    - 14.3. Gently pull the park lock cable from the inhibitor.


206257

15. Disconnect the park lock cable from the control lever pin.
16. Remove the park lock cable from the transmission control base.
17. Remove the park lock cable from the vehicle.


165285

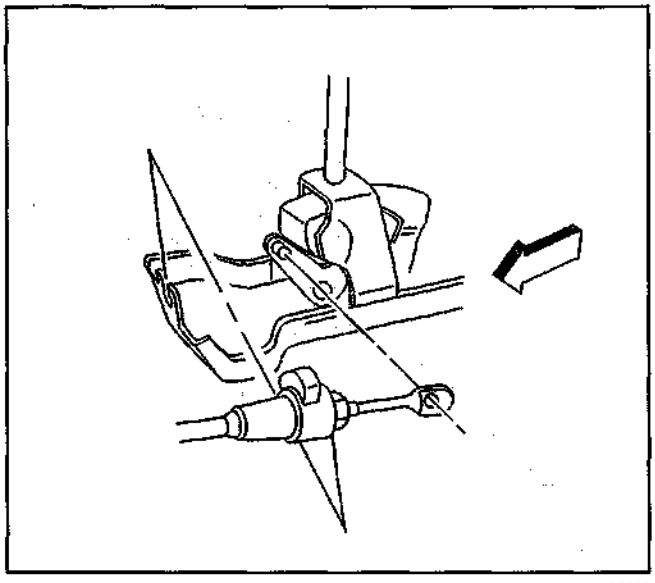
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341077

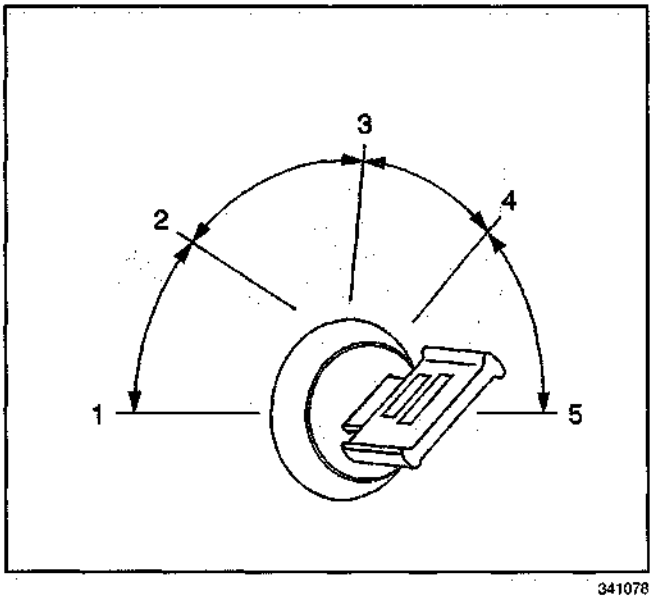
Installation Procedure

1. Install the park lock cable to the vehicle.
2. Place the transmission control into the PARK position.
3. Snap the cable connector lock button to the UP position.



165285

4. Install the park lock cable to the transmission control base.



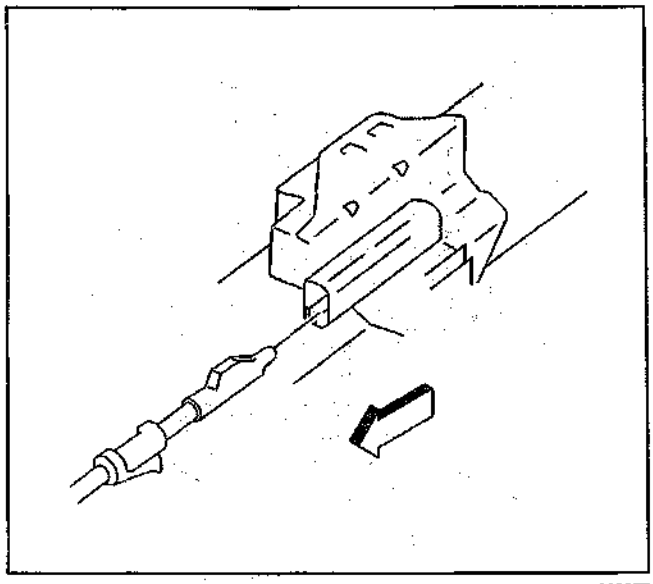
341078

Important: Do not proceed to the next step with the ignition key in any other position.

5. Turn the ignition key to the RUN (4) position.

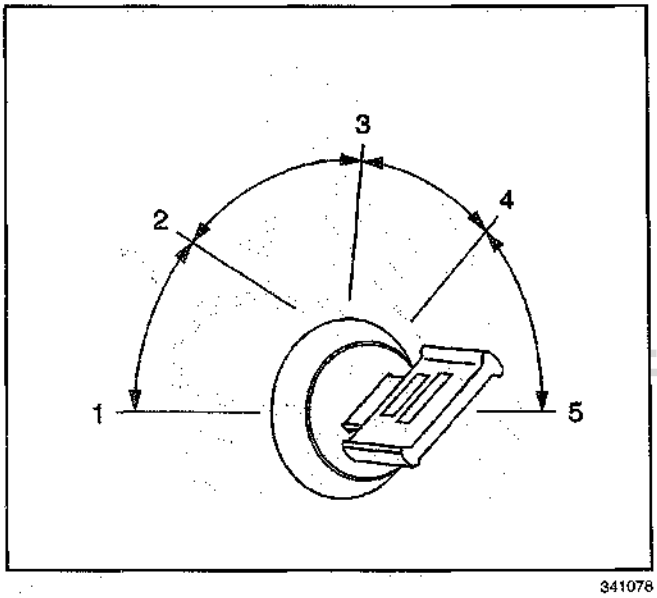
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6. Snap the park lock cable into the inhibitor on the steering column.



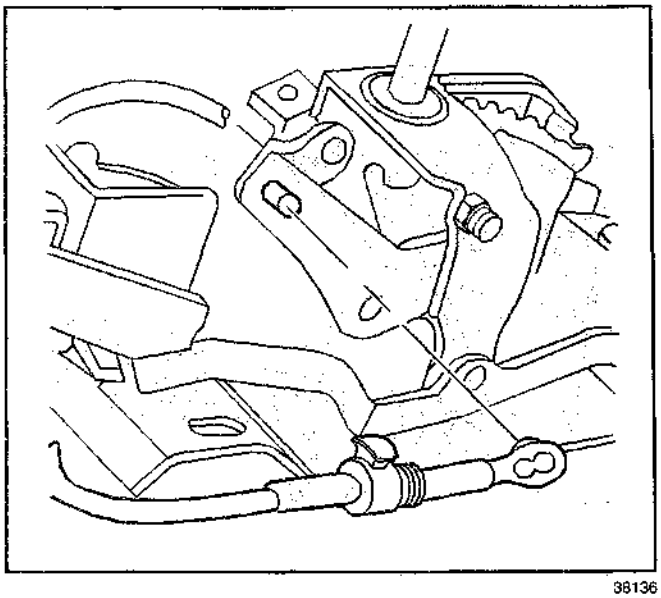
208257

7. Turn the ignition key to the LOCK position.



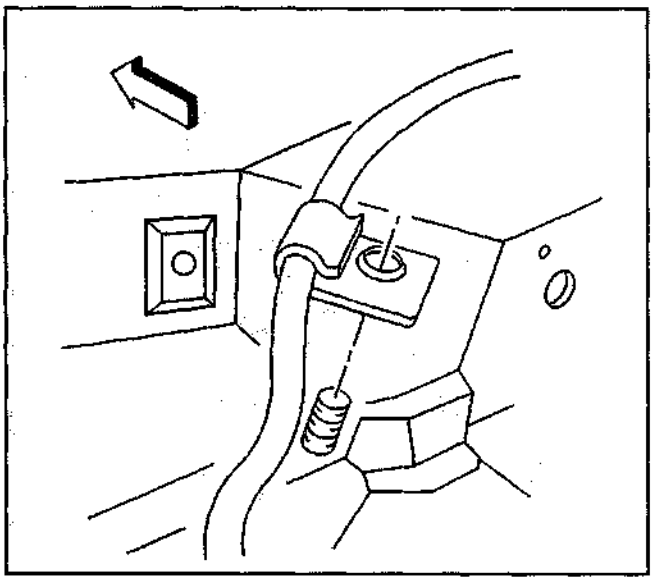
341078

8. Connect the park lock cable to the control lever pin.
9. Push the cable connector forward in order to remove slack.
10. With no load applied to the connector nose, snap the cable connector lock button down.



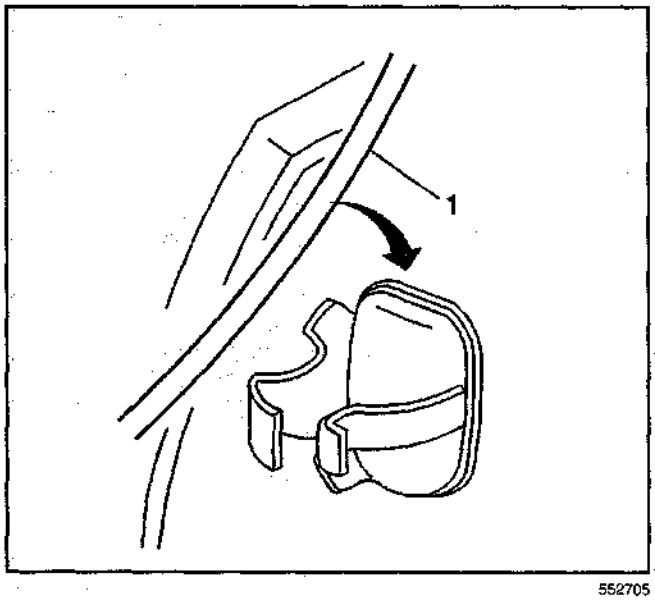
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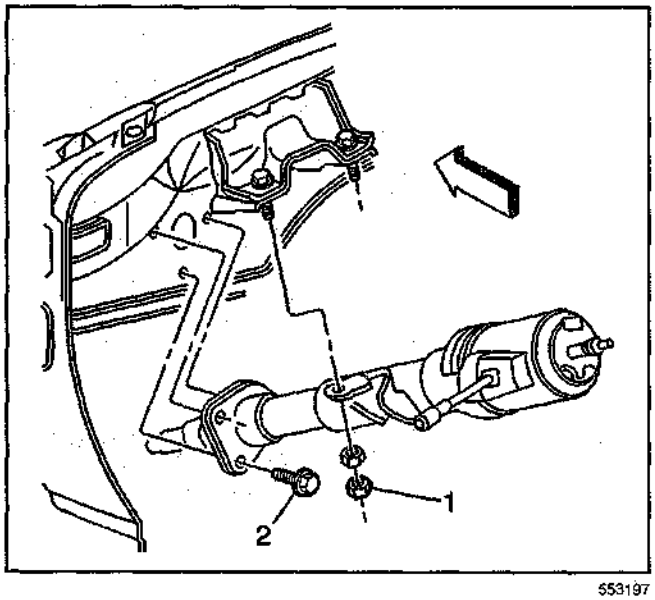
165282

11. Install the park lock cable clip to the stud on the front of dash.



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12. Install the park lock cable (1) to the retaining clip on the driver side of the tunnel. Close the clip.
13. Reinstall the floor carpet.



553197

14. Raise the steering column.
15. Install the shim to the outboard bracket stud.
16. Finger start the steering column mounting nuts (1).

Notice: Refer to *Fastener Notice* in Cautions and Notices.

17. Install the steering column mounting bolts (2).

    Tighten

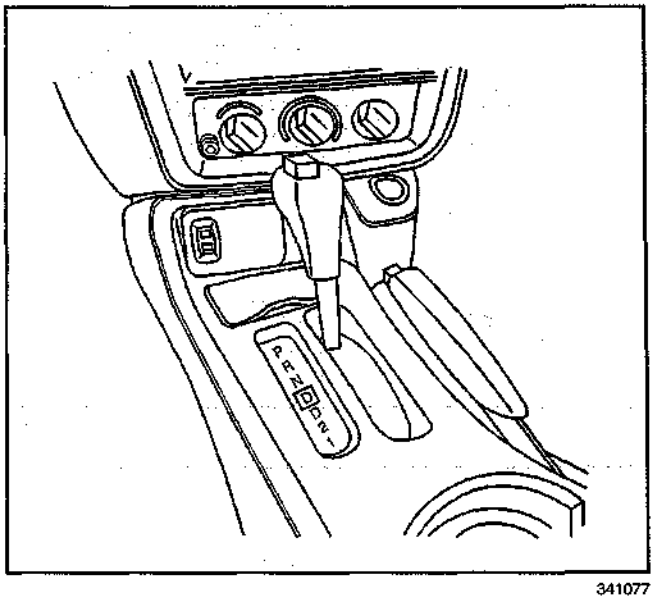
    Tighten the steering column mounting nuts (1) and bolts (2) to 10 N·m (89 lb in).
18. Install the front floor console. Refer to *Console Replacement - Front Floor* in Instrument Panel, Gauges, and Console.
19. Install the instrument panel driver knee bolster and deflector. Refer to *Knee Bolster Replacement - Left* in Instrument Panel, Gauges, and Console.

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20. Install the left side instrument panel insulator. Refer to *Closeout/Insulator Panel Replacement - Left* in Instrument Panel, Gauges, and Console.
21. Enable the SIR system. Refer to *Enabling the SIR System* in SIR.

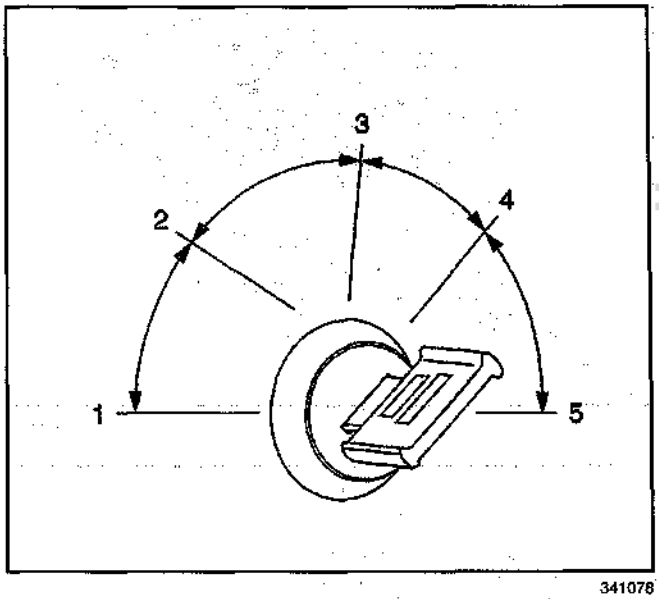
Functional Operation

1. Place the transmission control in the PARK position.



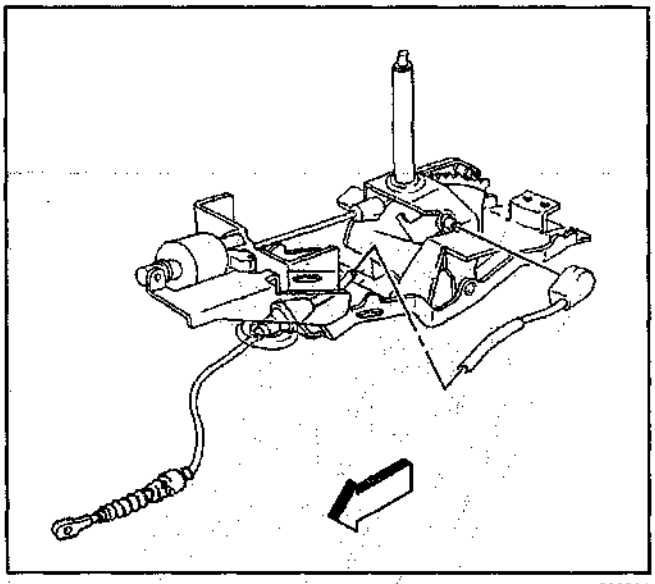
341077

2. Turn the ignition key to the LOCK position (2).
3. Transmission control should not be able to be moved to another position.
4. The ignition key should be able to be removed from the ignition.
5. Turn the ignition key to the RUN position.
6. Place the transmission control in the NEUTRAL position.
7. The ignition key should not be able to be removed from the ignition.
8. If the above functional checks were met, the adjustment is complete.
9. If the ignition key can be removed in NEUTRAL, snap connector lock button to the UP position and repeat steps 9 and 10.
10. If the ignition key cannot be removed in the PARK position, snap the connector lock button to the UP position.
11. Move the cable connector nose rearward until the ignition key can be removed from the ignition.
12. Snap the lock button down.



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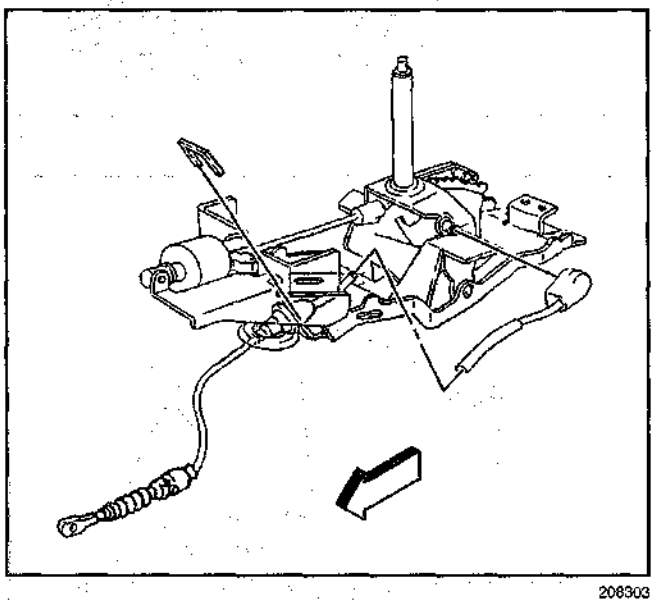


206301

Shift Cable Replacement

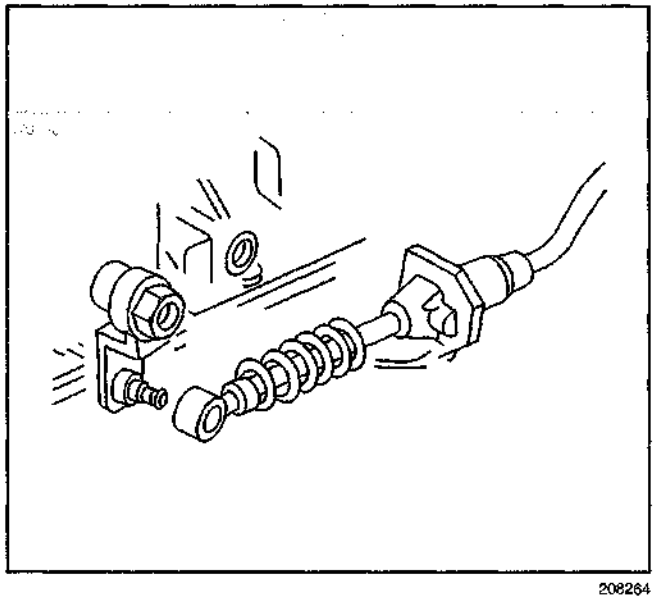
Removal Procedure

1. Remove the front floor console trim plate. Refer to *Trim Plate Replacement - Front Floor Console (Automatic)* in Instrument Panel, Gauges, and Console.
2. Unsnap the range selector lever cable from the transmission control.



206303

3. Remove the retainer and the cable grommet from the base of the transmission control.
4. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.

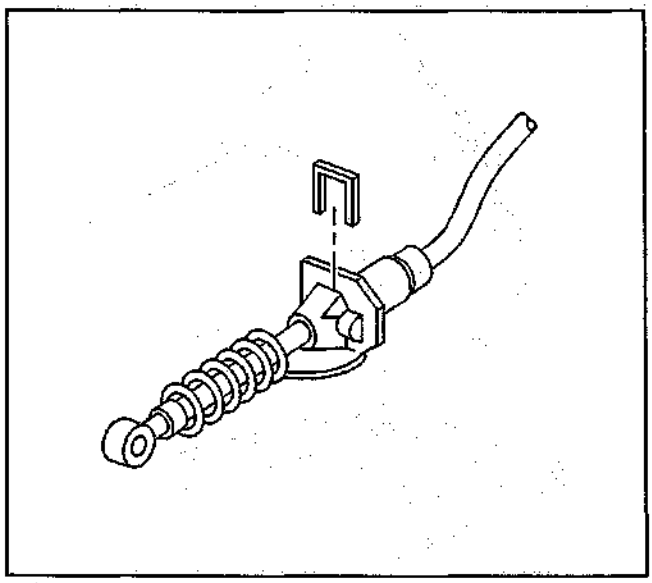


206264

5. Unsnap the transmission range selector lever cable from the range selector lever on the transmission.

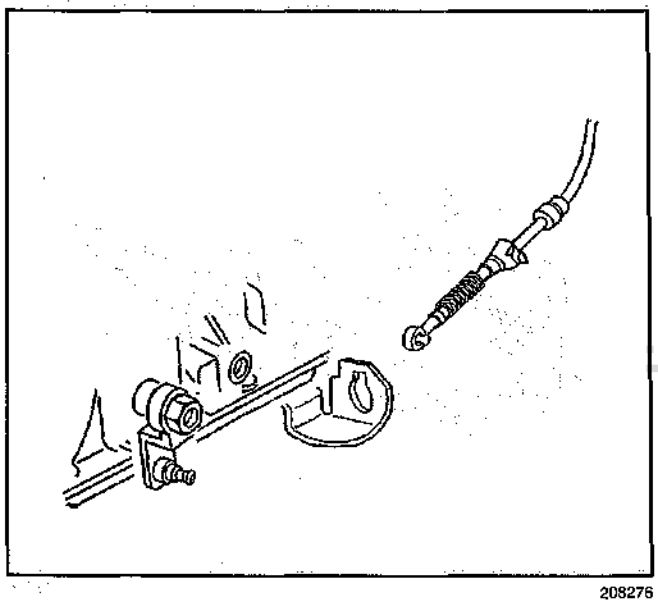
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6. Remove the retainer from the range selector lever cable.



341079

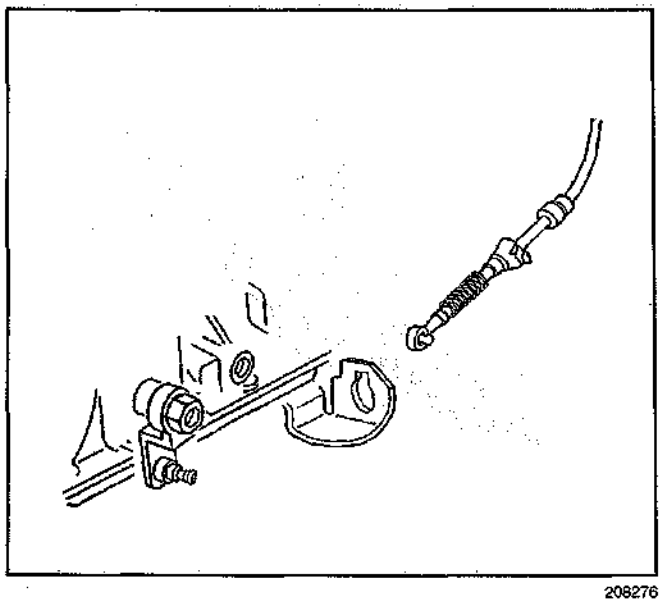
7. Remove the range selector lever cable from the cable bracket.
8. Pull the cable through the hole in the front compartment floor pan.
9. Remove the shift cable from the vehicle.



208276

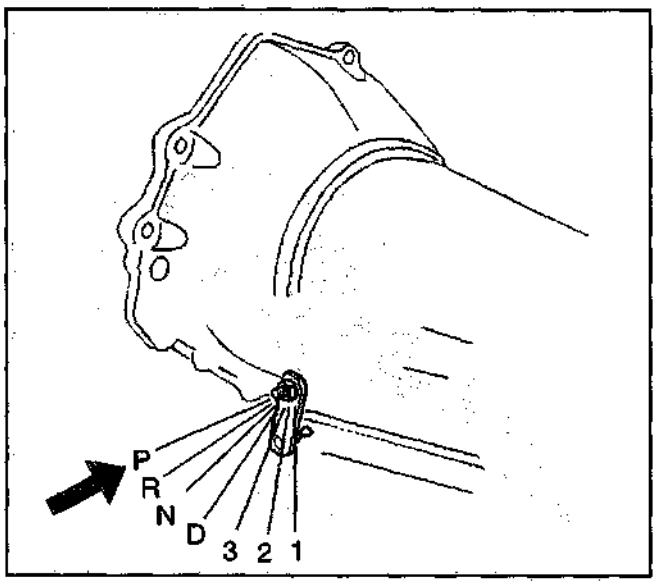
Installation Procedure

1. Route the cable through the hole in the front compartment floor pan.
2. Install the cable grommet to the base of the transmission control.
3. Install the range selector lever cable to the cable bracket.



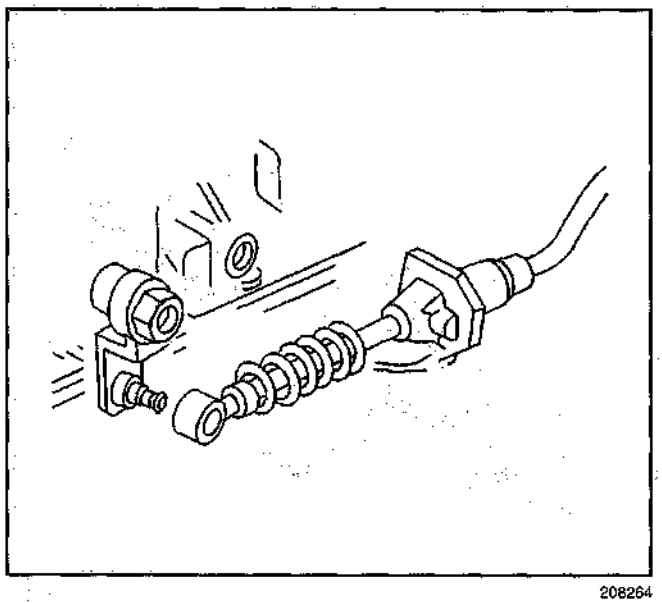
208276

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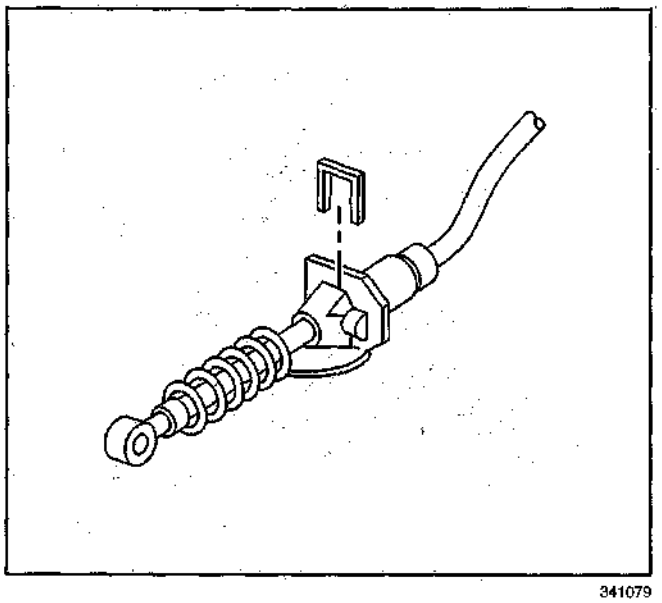
552701

4. Move the range selector lever into the neutral position. Rotate the lever counterclockwise from park through reverse and into neutral.



208264

5. Install the range selector lever cable to the range selector lever on the transmission.



341079

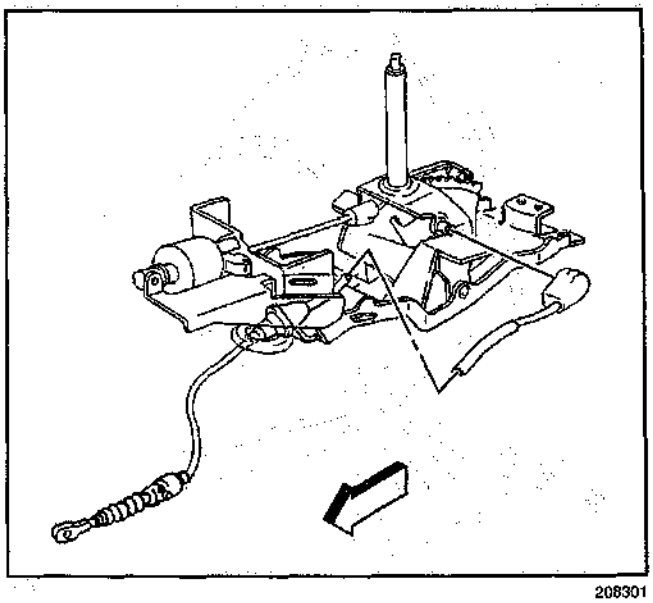
6. Install the range selector lever cable retainer to the range selector lever on the transmission.
7. Lower the vehicle.

Important: The transmission control must remain in the neutral position until the cable installation is complete.

8. Place the transmission control in neutral.

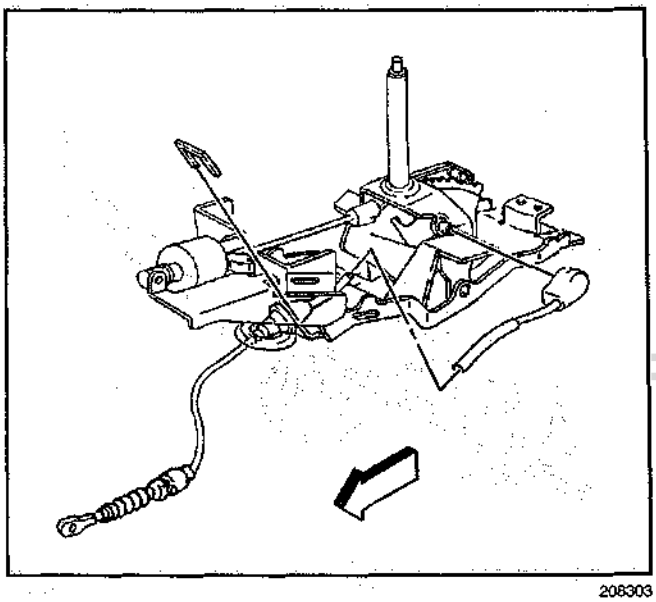
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9. Install the range selector lever cable to the transmission control.



208301

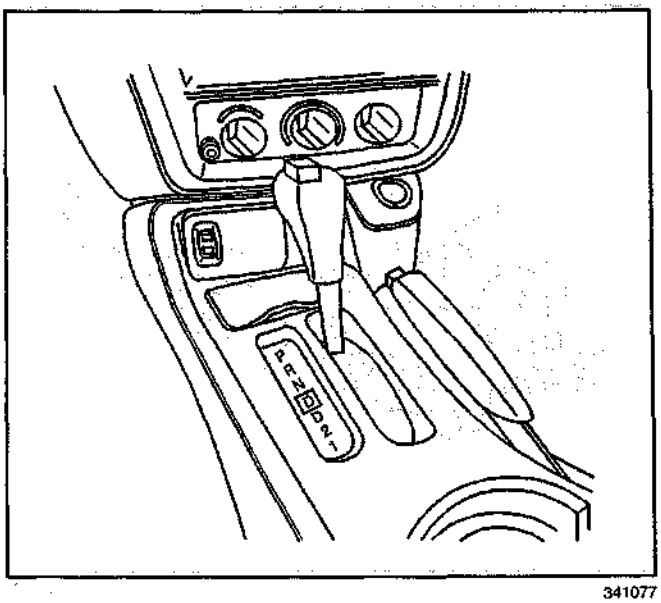
10. Install the lock adjustment button on the cable to the range selector bracket. Turn the lock adjustment button counterclockwise.
11. Install the front floor console trim plate. Refer to *Trim Plate Replacement - Front Floor Console (Automatic)* in Instrument Panel, Gauges, and Console.



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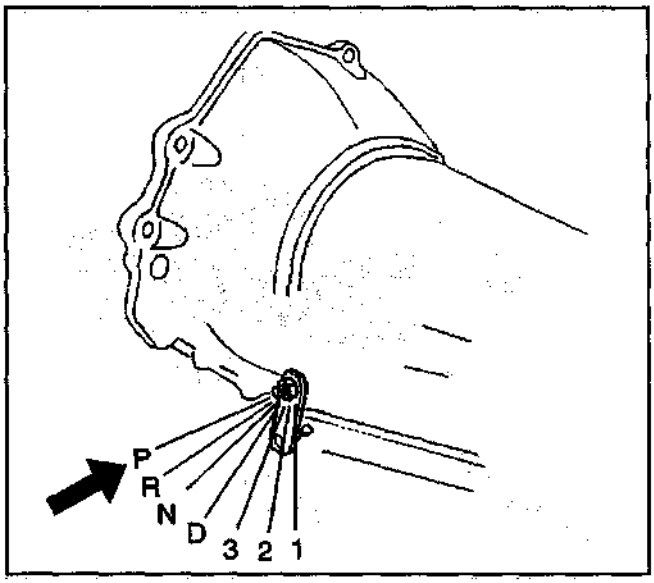
Shift Cable Adjustment

1. Position the transmission shift control lever into park.
2. Apply the park brake.
3. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.



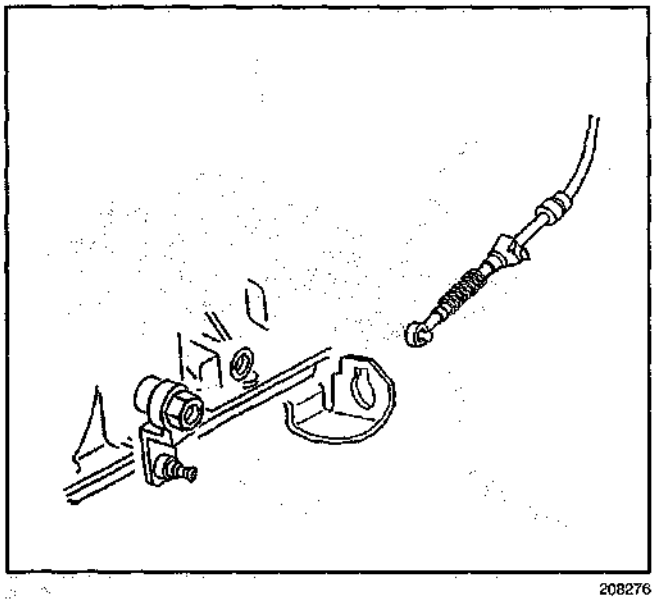
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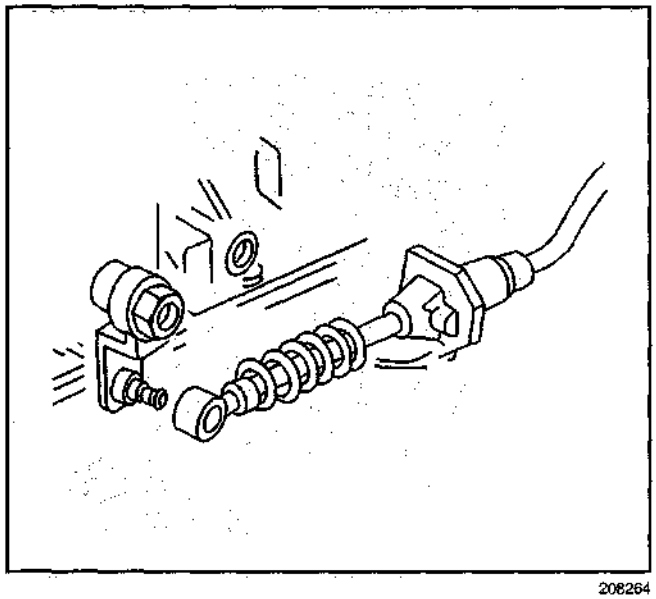


552701

4. Position the transmission range selector lever to park. Rotate the range select lever clockwise until it reaches the full mechanical stop position.


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5. Snap the transmission shift cable into the bracket with the cable adjustment button up.


208264

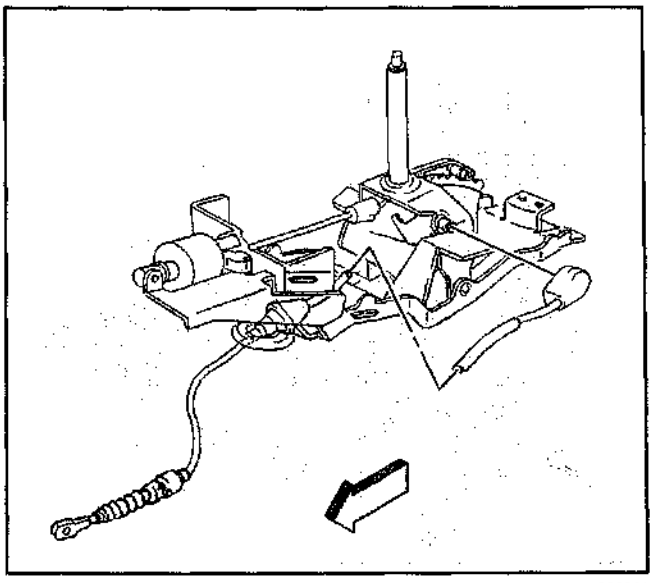
6. Snap the shift cable onto the range selector lever pin.
7. Press cable adjustment button down.
8. Insert the retainer to the fitting of the shift cable.
9. Remove the safety stands.
10. Lower the vehicle.

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Floor Shift Control Replacement

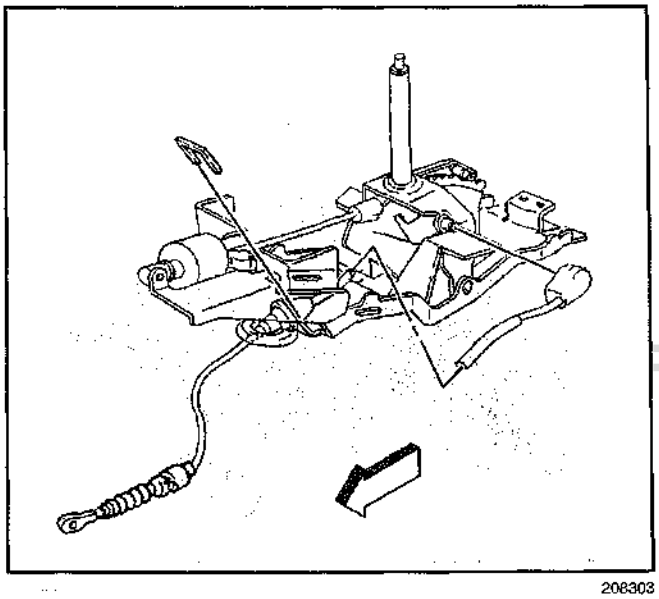
Removal Procedure

1. Disable the supplemental inflatable restraint (SIR) system. Refer to *Disabling the SIR System* in SIR.
2. Remove the front floor console. Refer to *Console Replacement - Front Floor* in Instrument Panel, Gauges and Console.
3. Remove the brake transmission shift interlock solenoid. Refer to *BTSI Solenoid Replacement*.
4. Remove the park neutral position switch. Refer to *Park/Neutral Position Switch Replacement*.
5. Unsnap the range selector lever cable from the transmission control.



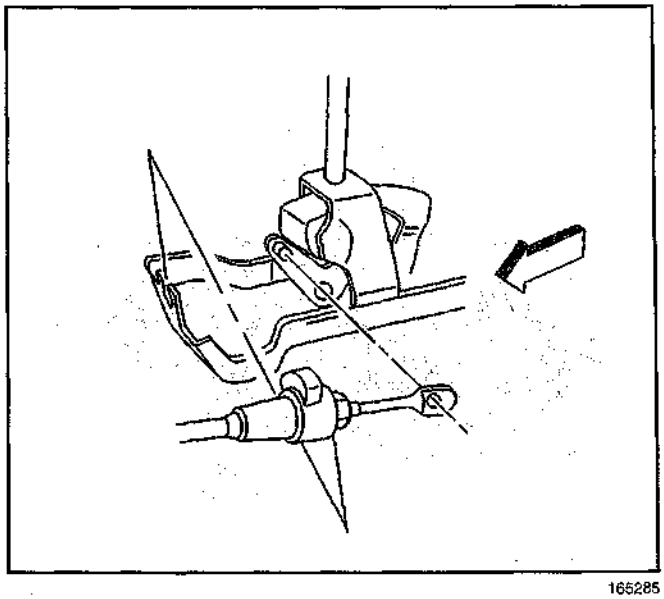
208301

6. Remove the retainer and the cable grommet from the transmission control base.



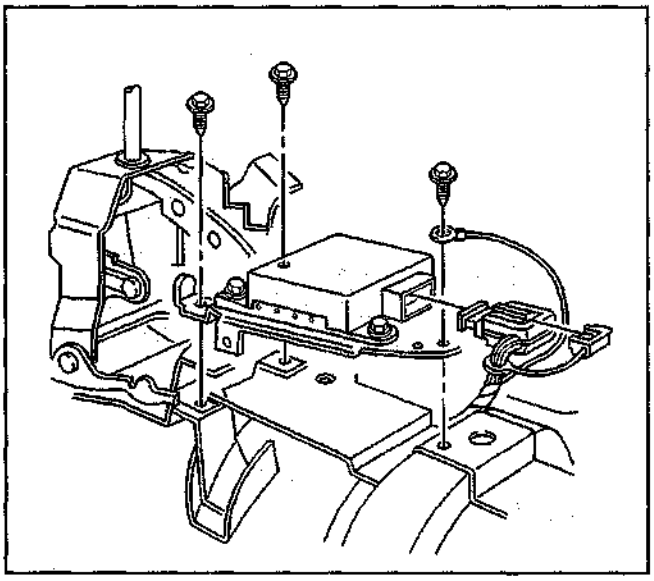
208303

7. Disconnect the park lock cable end from the park lock lever pin.
8. Remove the park lock cable from the transmission control base.

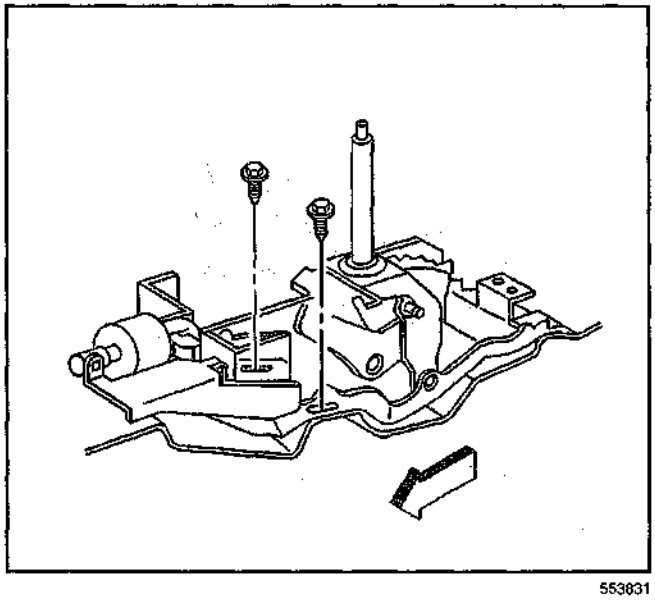


165285

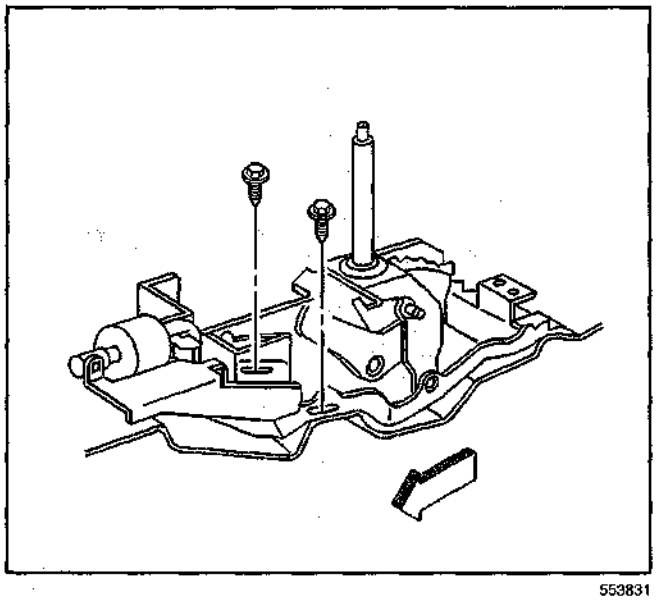
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553836

9. Remove the connector position assurance (CPA) retainer from the electrical connector.
10. Disconnect the inflatable restraint sensing and diagnostic module (SDM) electrical connector.
11. Remove the SDM bracket bolts.
12. Remove the SDM with bracket.


553631

13. Remove the transmission control bolts.
14. Remove the transmission control.


553831

Installation Procedure

1. Install the transmission control.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

2. Install the transmission control bolts.

Tighten

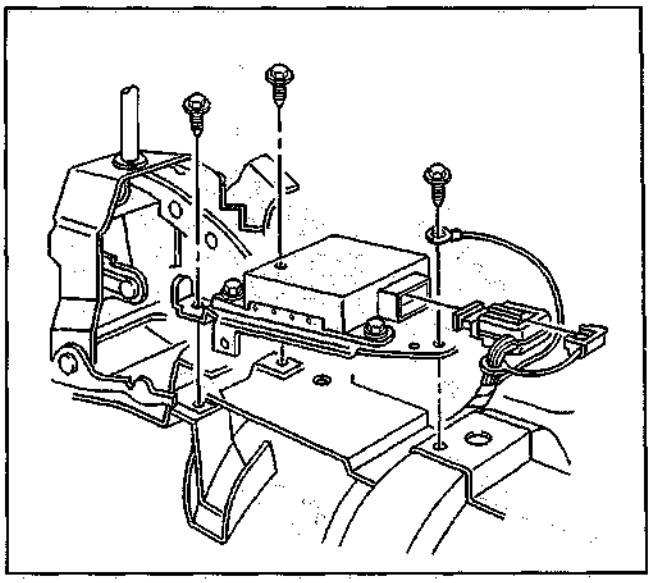
Tighten the transmission control bolts to 8 N·m (71 lb in).

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3. Install the SDM with bracket.
4. Install the SDM bracket bolts.

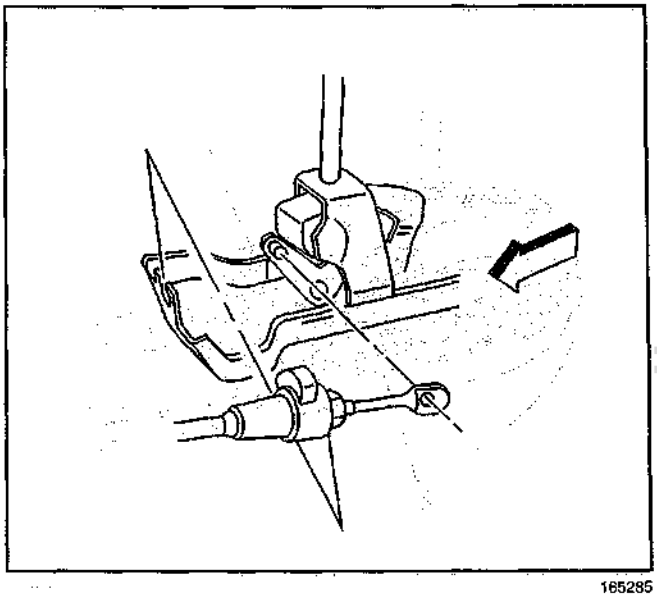
   Tighten

   Tighten the SDM bracket bolts to 12 N·m (106 lb in).
5. Connect the SDM electrical connector.
6. Install the CPA retainer to the electrical connector.



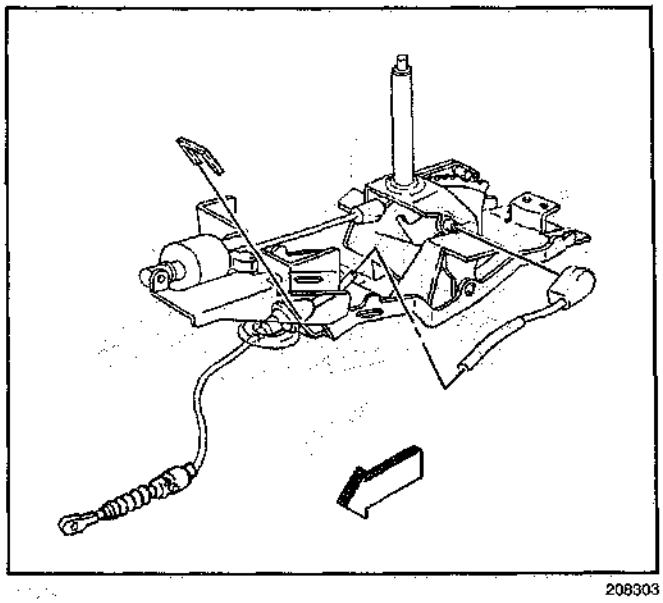
553836

7. Install the park lock cable to the transmission control base.
8. Snap the park lock cable end to the park lock lever pin.



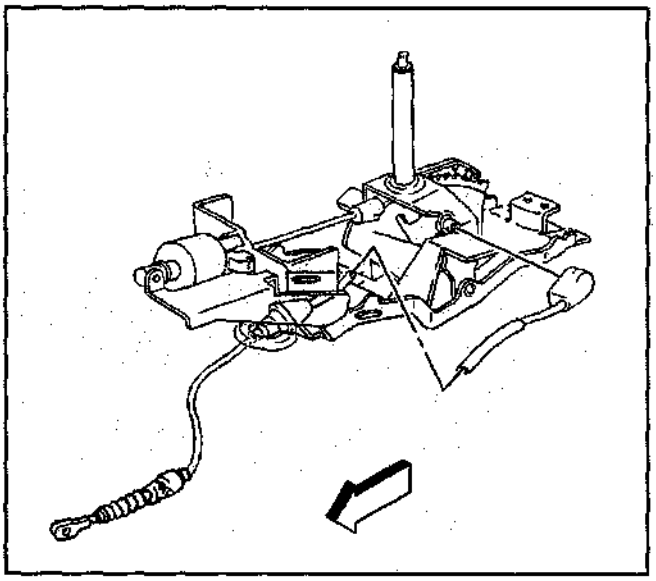
165285

9. Install the cable grommet and retainer to the transmission control base.



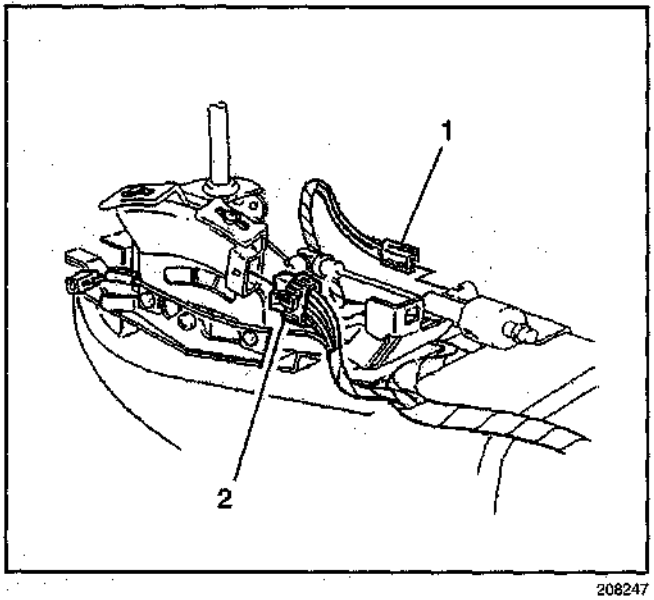
208303

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208301

10. Install the transmission range select lever cable.
11. Install the park neutral position switch. Refer to *Park/Neutral Position Switch Replacement.*
12. Install the brake transmission shift interlock solenoid. Refer to *BTSI Solenoid Replacement.*
13. Install the front floor console. Refer to *Console Replacement - Front Floor* in Instrument Panel, Gauges and Console.
14. Enable the SIR system. Refer to *Enabling the SIR System* in SIR.

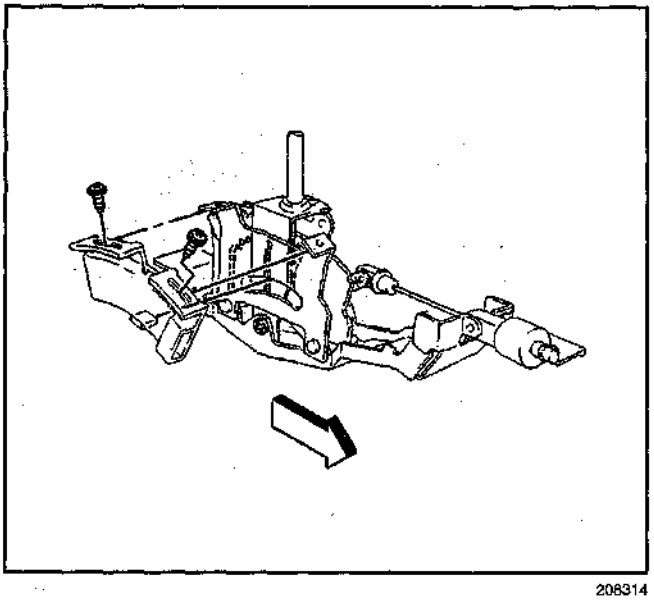


208247

Park/Neutral Position Switch Replacement

Removal Procedure

1. Remove the front floor console. Refer to *Console Replacement - Front Floor* in Instrument Panel, Gauges, and Console.
2. Disconnect the park neutral position switch electrical connector (2).



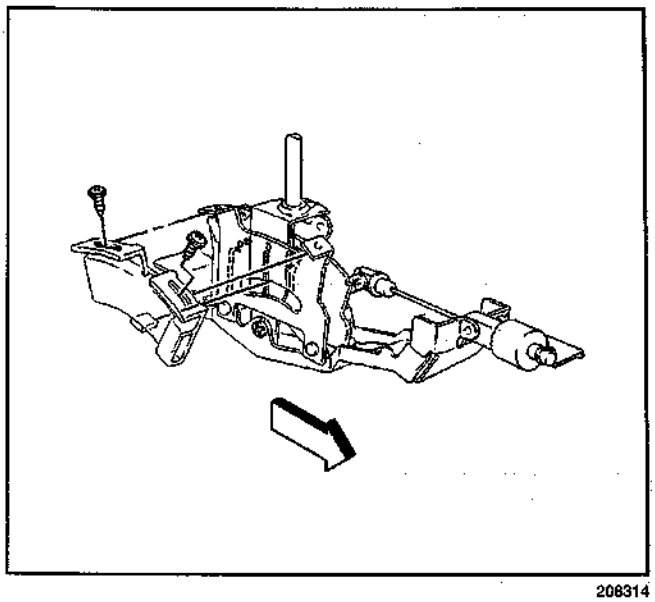
208314

3. Remove the park neutral position switch bolts.
4. Remove the park neutral position switch from the transmission control.

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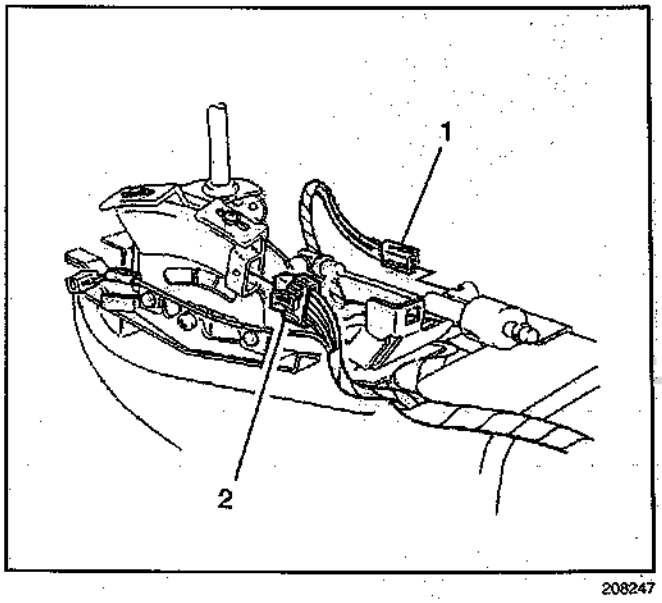
Installation Procedure

1. Ensure that the transmission control is still in the NEUTRAL position.
2. Install the tang on the park neutral position switch, into the slot on the transmission control.
3. Adjust the park neutral switch. Refer to *Park/Neutral Position Switch Adjustment*.



208314

4. Connect the park neutral position switch electrical connector (2).
5. Install the front floor console. Refer to *Console Replacement - Front Floor* in Instrument Panel, Gauges, and Console.

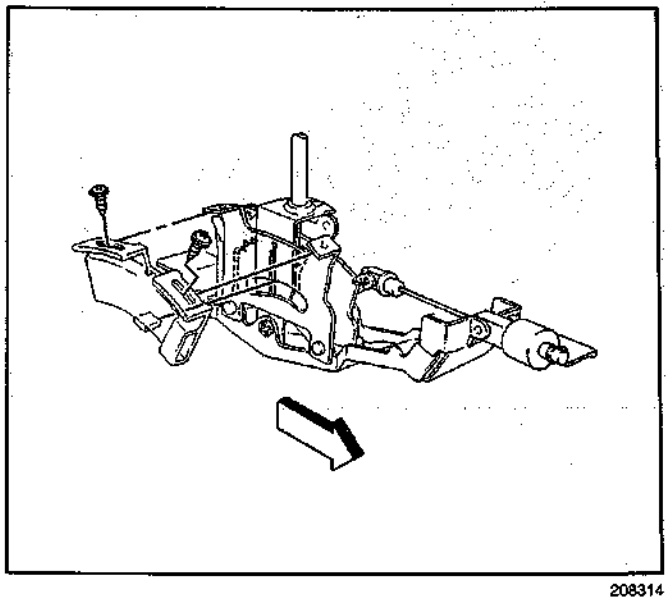


208247

Park/Neutral Position Switch Adjustment

Using A New Switch

1. Align the holes in the park/neutral position switch with the holes in the transmission control.
2. Ensure that the transmission control is still in the Neutral position.
3. Do not rotate the switch.



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4. The switch is pinned in the neutral position. If the switch has been rotated and the pin is broken, adjust the switch using the old switch procedure below.

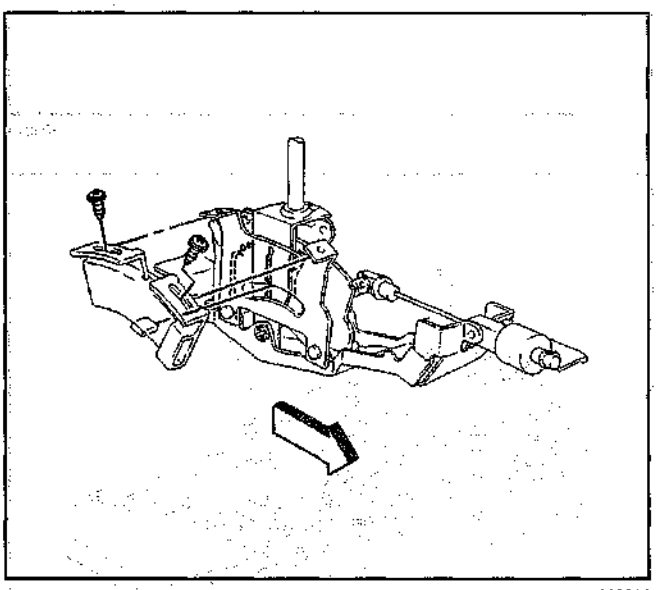
Notice: Refer to *Fastener Notice* in Cautions and Notices.

Important: Ensure that the vehicle will only start in the park or neutral position. Readjust the switch if the engine will start in any other position.

5. Install the park/neutral position switch bolts to the transmission control.

   Tighten

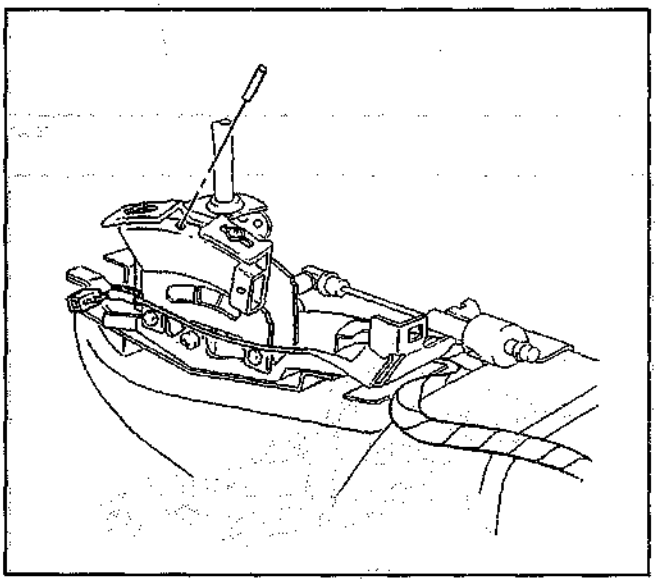
   Tighten the park/neutral position switch bolts to 2.2 N·m (19 lb in).



208314

Using The Old Switch

1. Loosely, install the park/neutral position switch screws to the transmission control.



208319

Important: Ensure that the vehicle will only start in the park or the neutral position. Readjust the switch, if the vehicle will start in any other position.

2. Insert a 2.34 mm (0.094 in) gage pin into the service adjustment hole. slide the switch until the gage pin drops to 15 mm (0.59 in) depth.

   Tighten

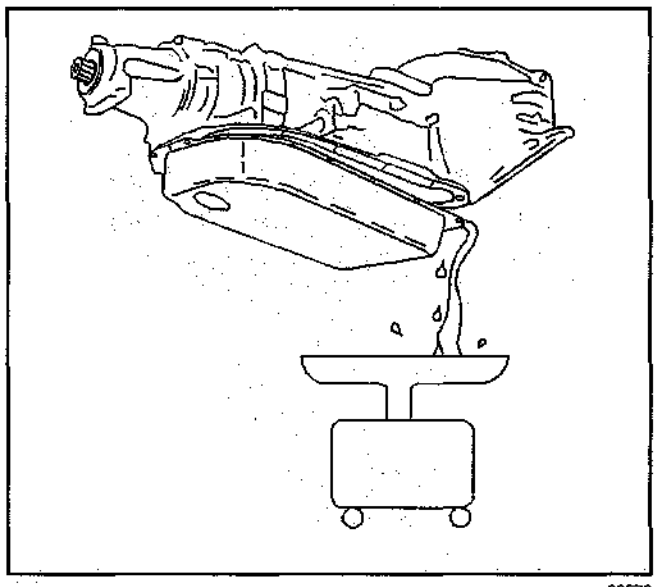
   Tighten the park/neutral position switch screws to 2.2 N·m (19 lb in).

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Automatic Transmission Fluid/Filter Changing

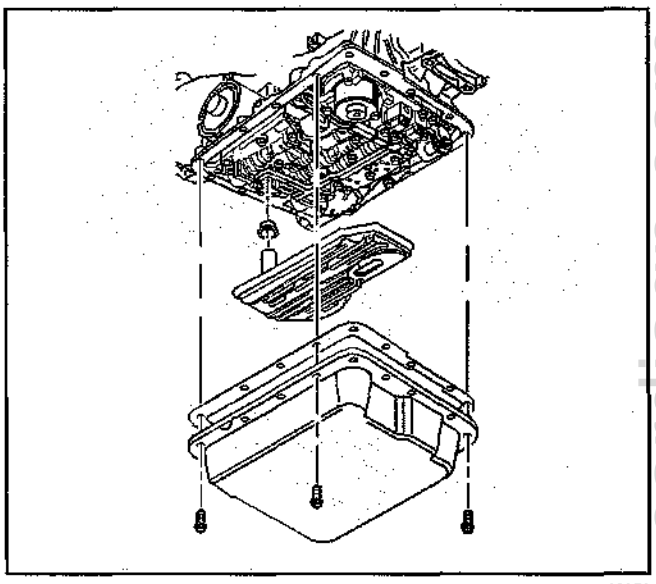
Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Place a drain pan under the transmission oil pan.
3. Remove the oil pan bolts from the front and sides of the pan only.
4. Loosen the rear oil pan bolts approximately 4 turns.
5. Lightly tap the oil pan with a rubber mallet in order to loosen the pan to allow the fluid to drain.



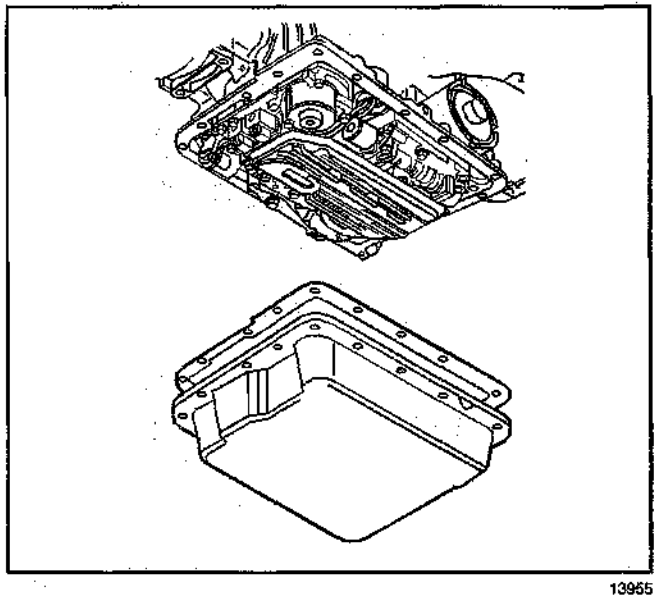
23578

6. Remove the remaining oil pan bolts.



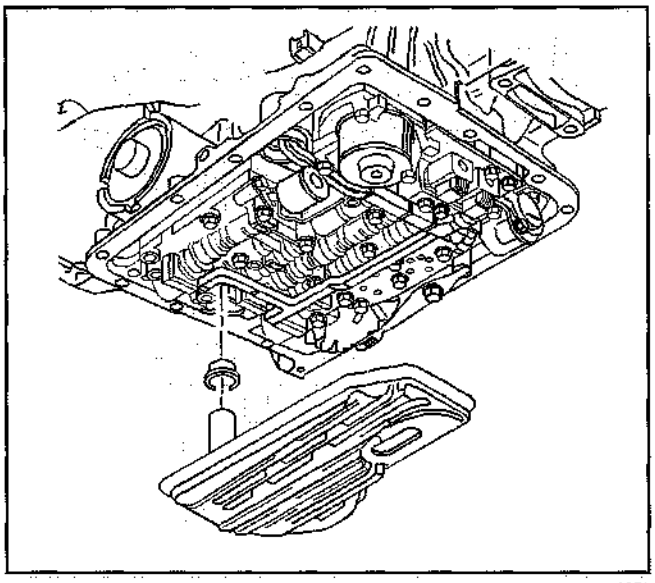
13952

7. Remove the oil pan and the gasket.

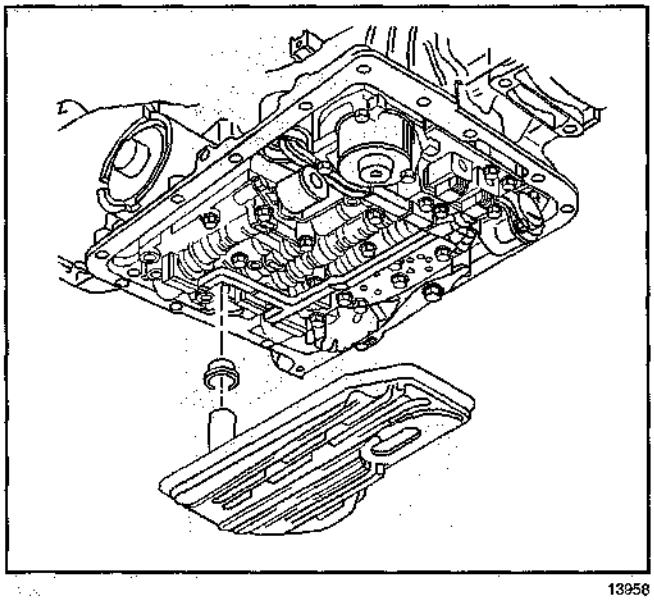


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13958

8. Remove the fluid filter and the seal. The seal may stick in the transmission case.
9. Inspect the fluid color.
10. Inspect the filter. Pry the metal crimping away from the top of the filter and pull apart. The filter may contain the following evidence for root cause diagnosis:
    - Clutch material
    - Bronze slivers indicating bushing wear
    - Steel particles
11. Clean the transmission case and the oil pan gasket surfaces with solvent, and air dry. You must remove all traces of the old gasket material.

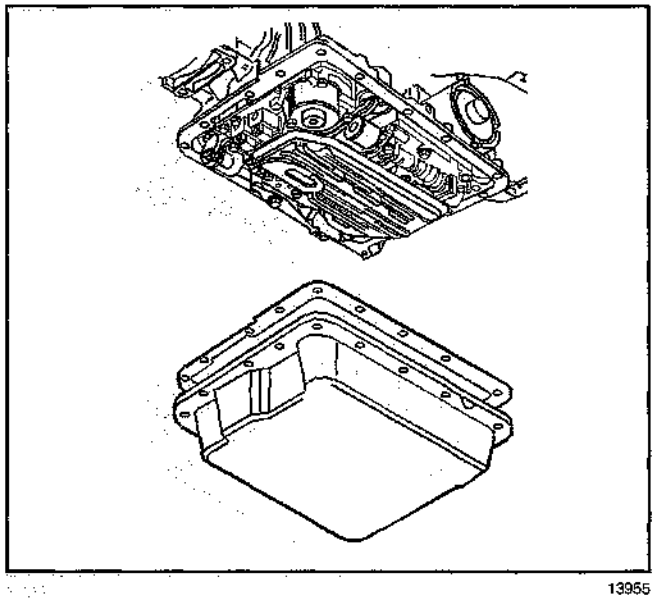

13958

Installation Procedure

Tools Required

J 36850 Transjel™ Lubricant

1. Coat the new filter neck seal with a small amount of *J 36850*, or equivalent.
2. Install the new filter neck seal into the transmission case. Tap the seal into place using a suitable size socket.
3. Install the new filter into the case.


13955

4. Install the oil pan and a new gasket.

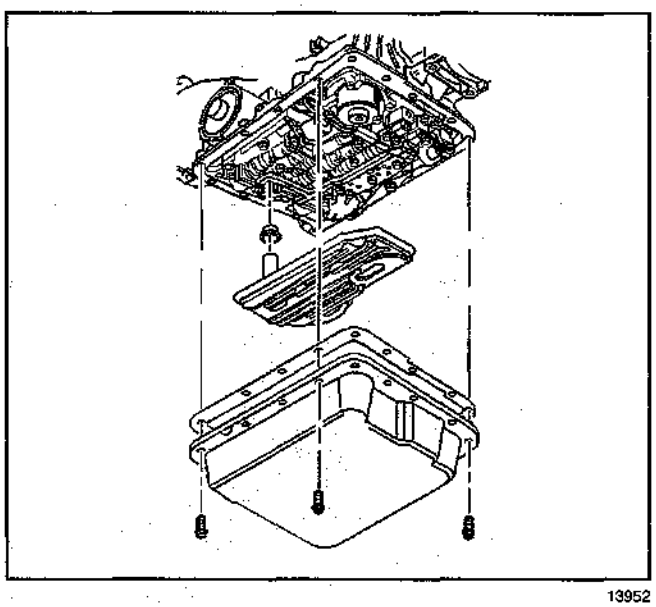
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Notice: Refer to *Fastener Notice* in Cautions and Notices.

5. Install the oil pan bolts.

   Tighten

   Oil pan to transmission case bolts alternately and evenly to 11 N·m (97 lb in).
6. Lower the vehicle.
7. Fill the transmission to the proper level. Use DEXRON® III, or if unavailable, DEXRON® IIE.
8. Check the COLD fluid level reading for initial fill only.
9. Inspect the oil pan gasket for leaks.

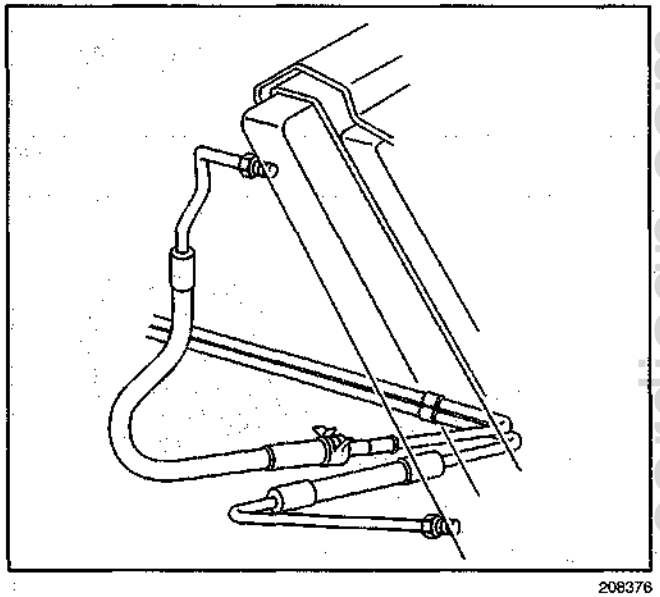


13952

Oil Cooler Line Replacement

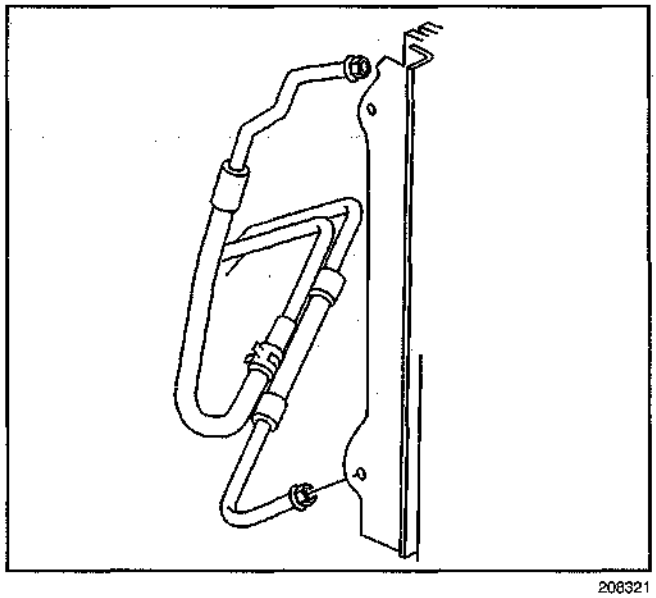
Removal Procedure

1. Disconnect the upper oil cooler line fitting at the radiator.
2. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.



208376

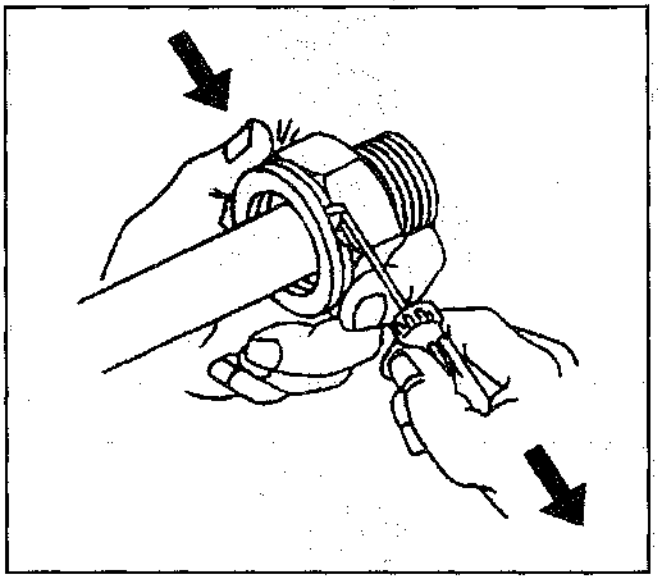
3. Disconnect the lower oil cooler line fitting at the radiator.
4. Remove the propeller shaft. Refer to *Propeller Shaft Replacement - One Piece* or *Propeller Shaft Replacement - Two Piece* in Propeller Shaft.
5. Remove the rear axle torque arm. Refer to *Torque Arm Replacement* in Rear Suspension.
6. Remove the catalytic converter hanger. Refer to *Converter Hanger Assembly Replacement (3.8 L Automatic), Converter Hanger Assembly Replacement (3.8 L Manual)* or *Converter Hanger Assembly Replacement (5.7 L).*
7. Support the transmission with a transmission jack.
8. Remove the transmission support. Refer to *Transmission Support Replacement* in Frame and Underbody.



206321

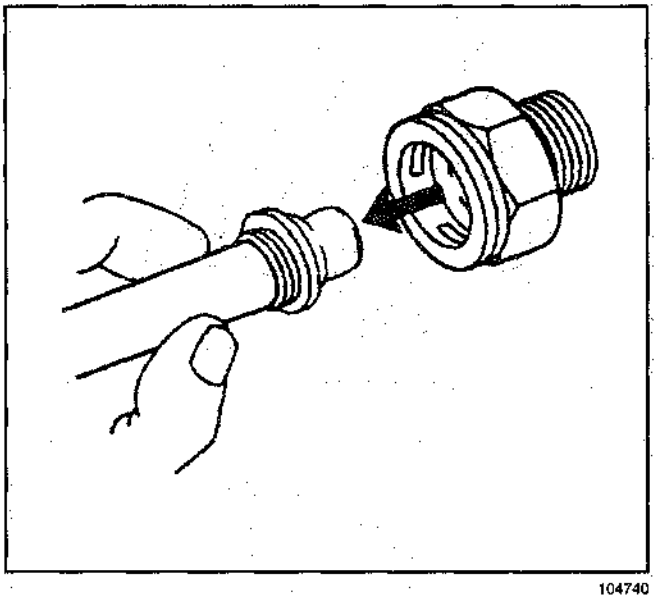
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9. Lower the transmission jack slightly. This will allow access to the oil cooler fittings on the transmission.
10. Pull the plastic cap back from the quick connect fitting and down along the cooler line about two inches.
11. Using a bent-tip screwdriver, pull on one of the ends of the E-clip until the clip is out of position and can be completely removed.
12. Remove the E-clip from the quick connect fitting.
13. Discard the E-clip.



104739

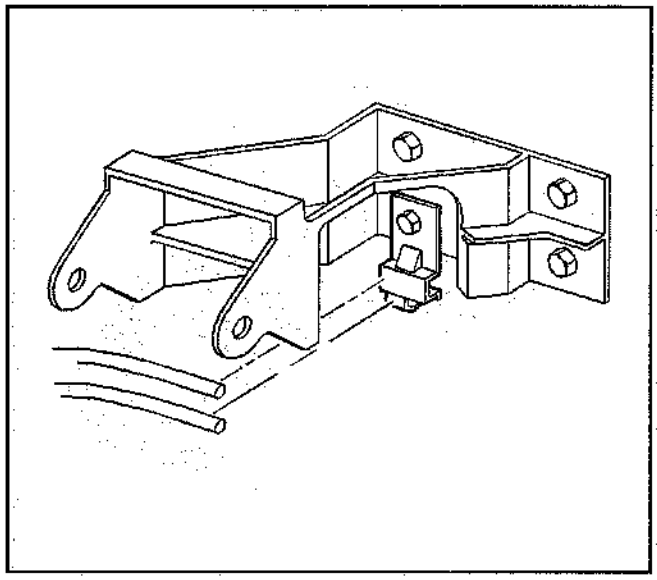
14. Pull the cooler line straight out from the quick connect fitting.



104740

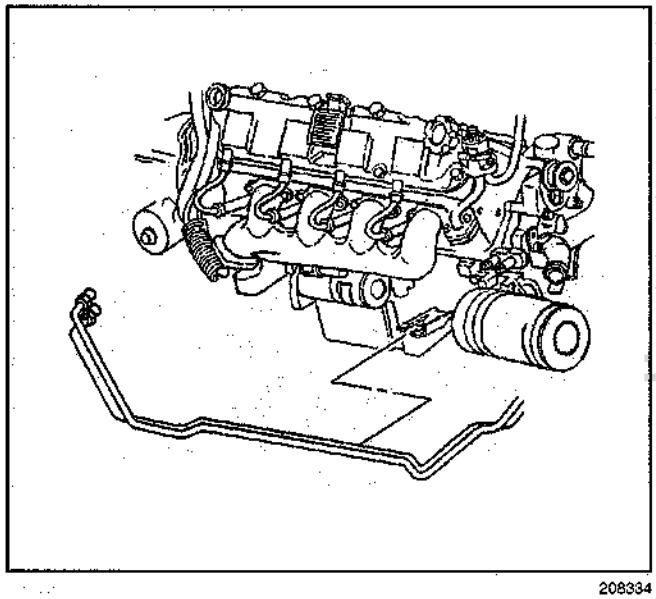
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15. On the 3.8 L remove the oil cooler pipes from the clip at the engine mount.



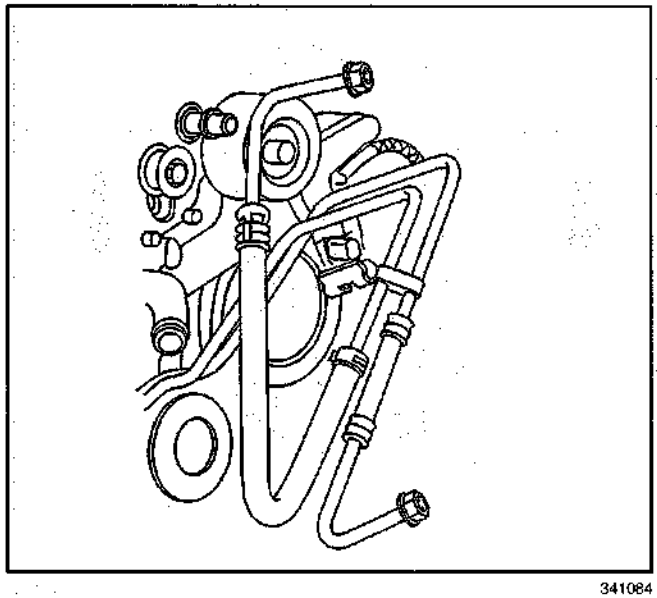
46662

16. On the 5.7 L remove the oil cooler pipes from the clip at the oil pan.
17. Remove the cooler lines from the vehicle.



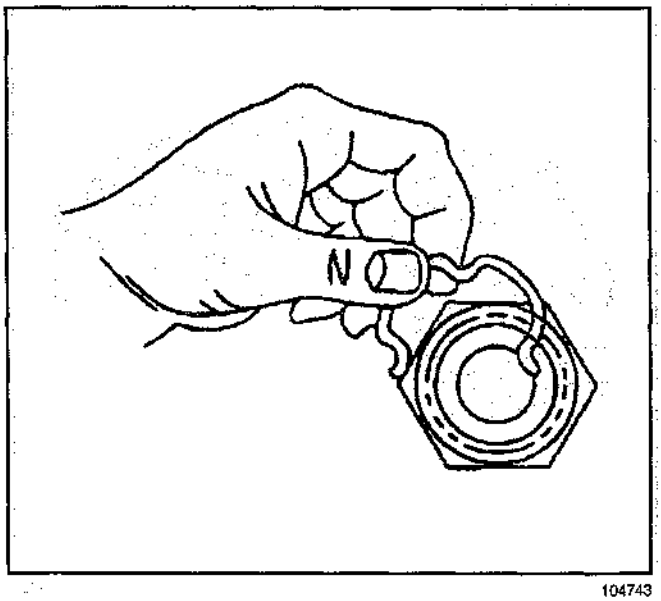
208334

18. On the 5.7 L remove the oil cooler lines from the clip at the generator bracket.



341084

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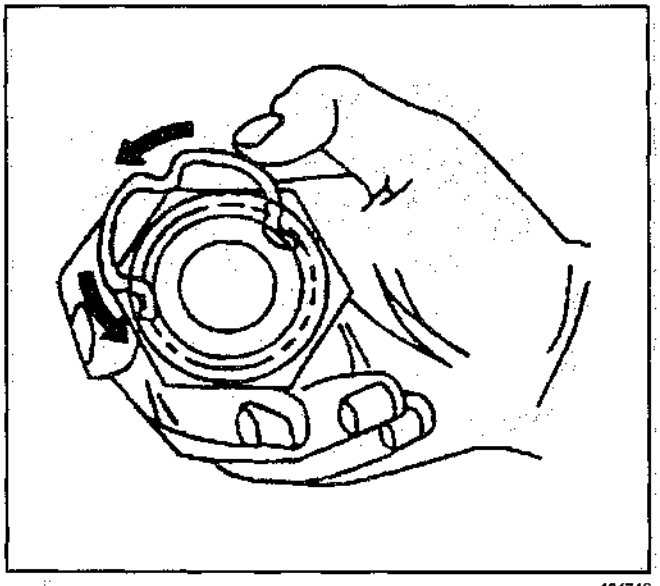


104743

Installation Procedure

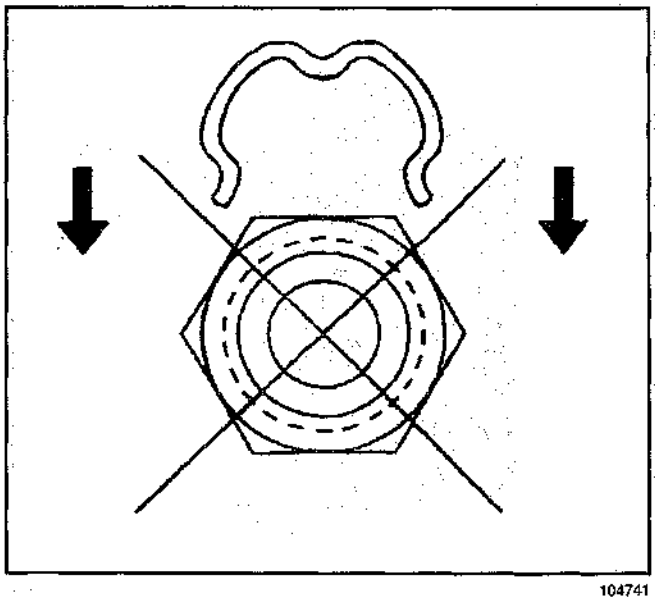
Important: Do not reuse any of the existing E-clips that were removed from the existing quick connect fittings. All clips being installed must be new.

1. Install a new E-clip into the quick connect fitting.
2. Hook one of the open ends of the E-clips in one of the slots in the quick connect fitting.



104746

3. Rotate the E-clip around the fitting until the clip is positioned with all three ears through the three slots on the fitting.



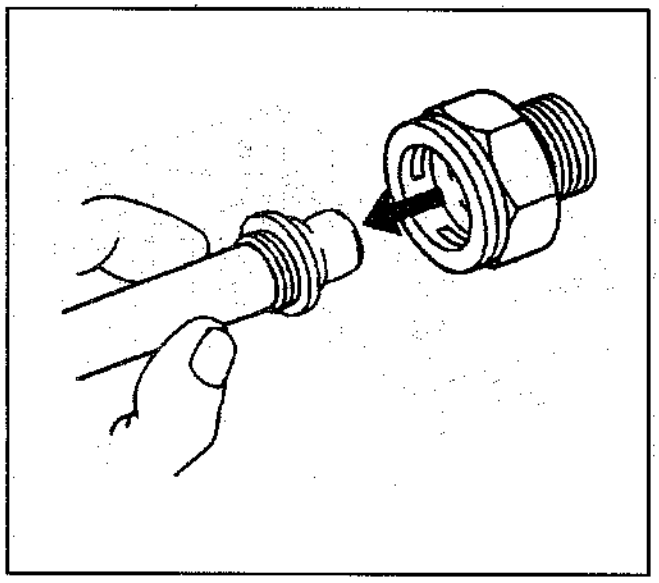
104741

4. Do not install the new E-clip onto the fitting by pushing the clip straight down.
5. Ensure that the three retaining ring ears are seen from inside the fitting and that the retaining ring moves freely in the fitting slots.

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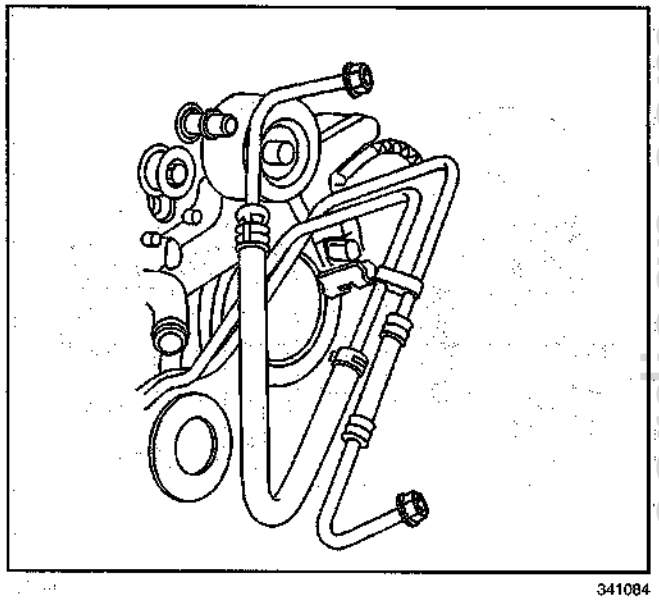
Notice: Ensure that the cooler line being installed has a plastic cap on each end that connects to a quick connect fitting. If no plastic cap exists, or the plastic cap is damaged, obtain a new plastic cap and position on to the cooler line prior to the cooler line installation.

6. Install the transmission oil cooler line to the vehicle.
7. Insert the cooler line end into the quick connect fitting until a click is either heard or felt.



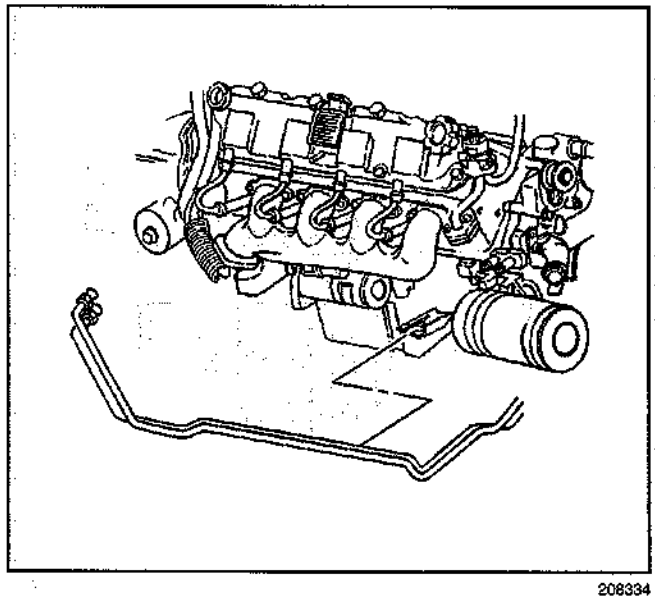
104740

8. On the 5.7 L install the oil cooler lines to the clip at the generator bracket.



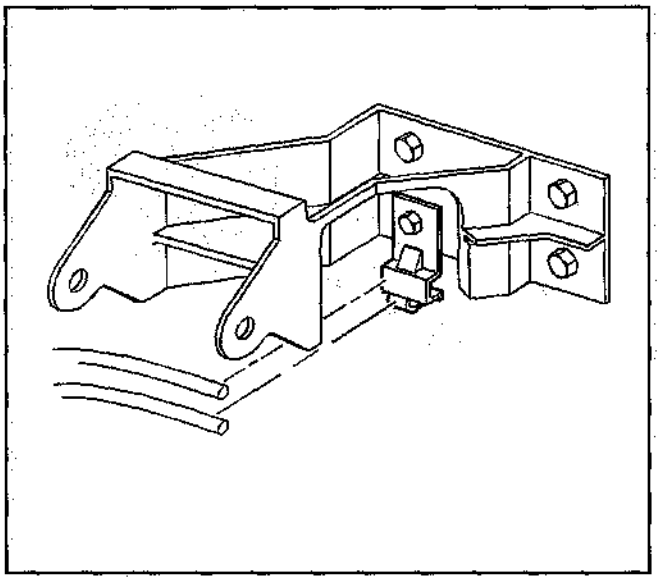
341084

9. On the 5.7 L install the oil cooler pipes to the clip at the oil pan.



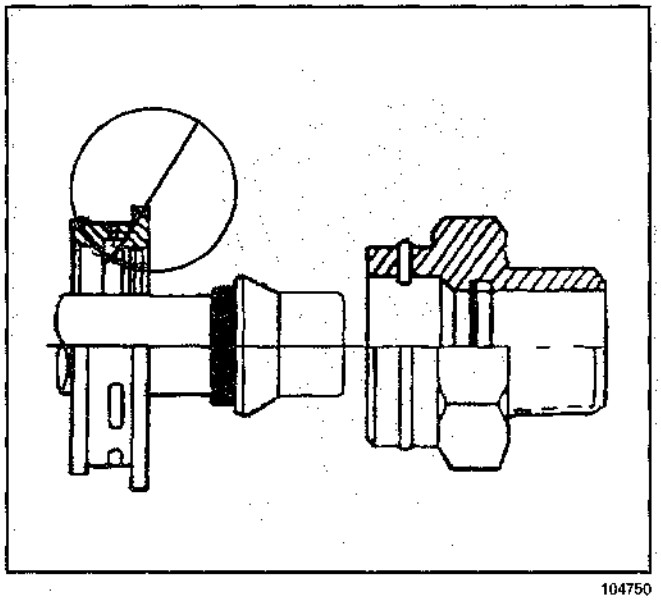
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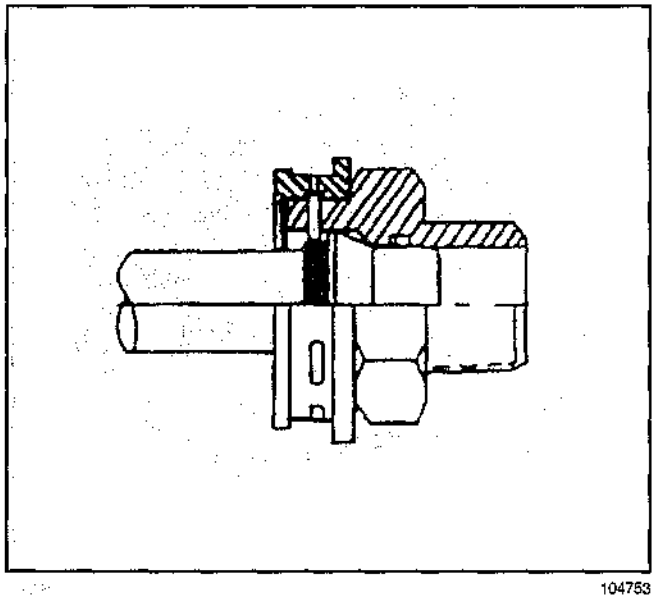
46662

10. On the 3.8 L install the oil cooler pipes to the clip at the engine mount.



104750

11. Do not use the plastic cap on the cooler line in order to install the cooler line into the fitting.



104753

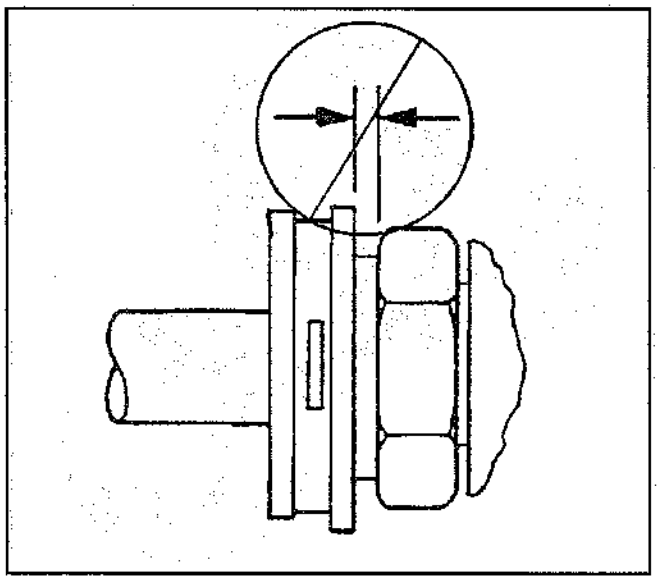
12. Position (snap) the plastic cap onto the fitting. Do not manually depress the retaining ring when installing the plastic cap onto the quick connect fitting.
13. Ensure that the plastic cap is fully seated against the fitting.

Important: If you cannot position the plastic cap against the fitting, remove the retaining ring from the quick connect fitting per Step 5 of the cooler line removal procedure. Check the retaining ring and the tube end in order to ensure neither is bent. Replace the cooler line or the retaining ring if necessary, and reinstall per Step 2 of the cooler line installation procedure.

14. Pull back sharply on the cooler line in order to ensure that the cooler line is fastened into the quick connect fitting.

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15. Ensure that no gap is present between the cap and the fitting.
16. Raise the transmission jack.
17. Install the transmission support. Refer to *Transmission Support Replacement* in Frame and Underbody.
18. Remove the transmission jack.
19. Install the catalytic converter hanger. Refer to *Converter Hanger Assembly Replacement (3.8 L Automatic)*, *Converter Hanger Assembly Replacement (3.8 L Manual)* or *Converter Hanger Assembly Replacement (5.7 L)*.
20. Install the rear axle torque arm. Refer to *Torque Arm Replacement* in Rear Suspension.
21. Install the propeller shaft. Refer to *Propeller Shaft Replacement - One Piece* or *Propeller Shaft Replacement - Two Piece* in Propeller Shaft.

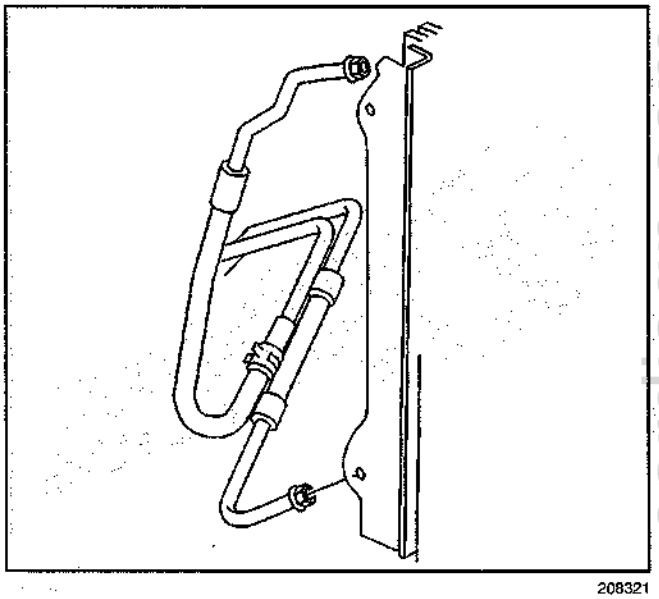

104754

Notice: Refer to *Fastener Notice* in Cautions and Notices.

22. Connect the lower oil cooler line fitting to the radiator.

    Tighten

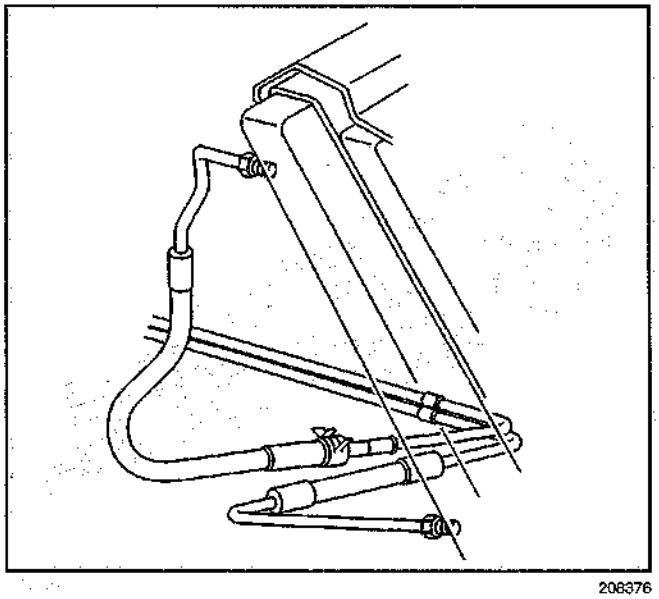
    Tighten the low oil cooler line fitting to 27 N·m (20 lb ft).


208321

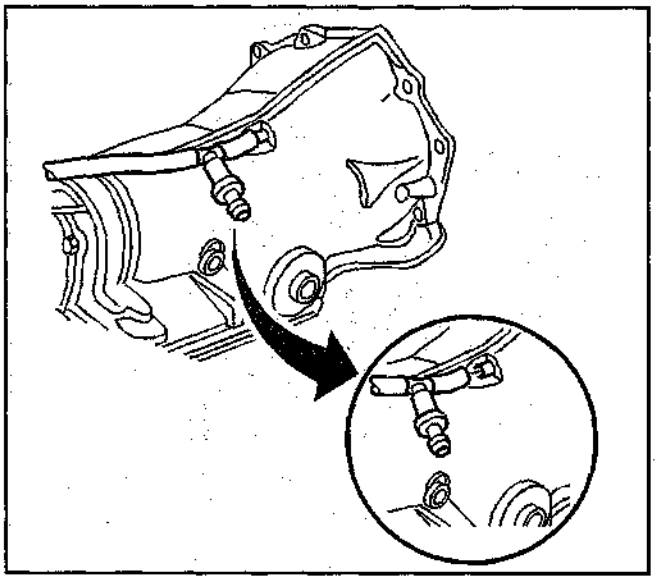
23. Connect the upper oil cooler pipe fitting to the radiator.

    Tighten

    Tighten the upper oil cooler pipe fitting to 27 N·m (20 lb ft).
24. Lower the vehicle.
25. Check the transmission fluid.


208376

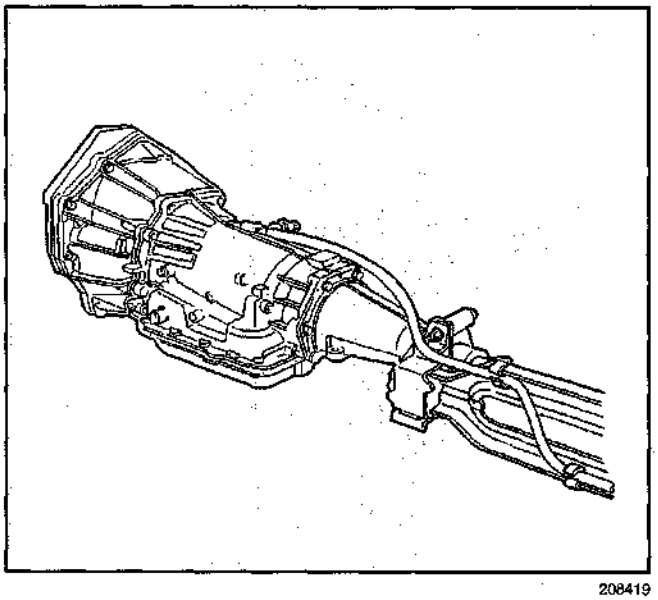
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208402

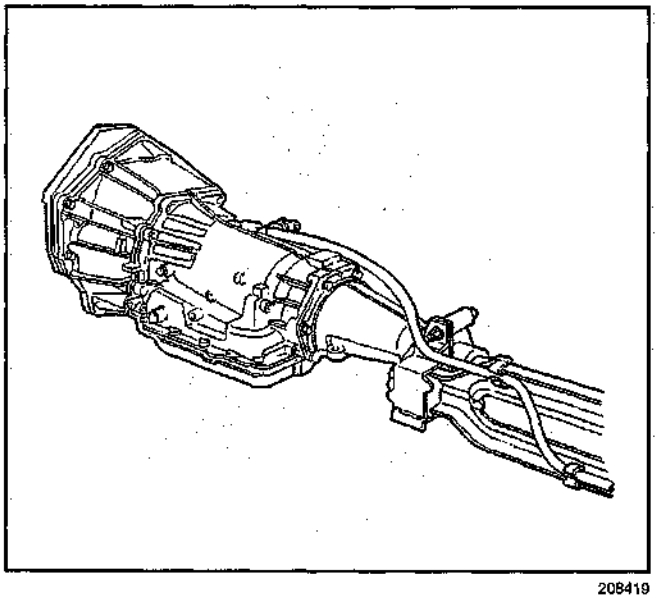
Vent Hose Replacement

Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Remove the transmission support. Refer to *Transmission Support Replacement* in Frame and Underbody.
3. Slowly lower the transmission.
4. Remove the ventilation hose from the ventilation tube at the transmission.


208419

5. Remove the ventilation hose clips from the torque arm.
6. Remove the ventilation hose from the vehicle.

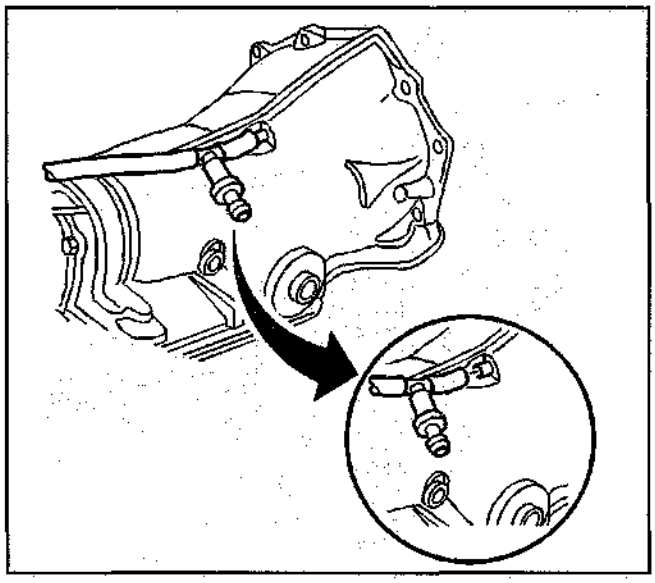

208419

Installation Procedure

1. Install the ventilation hose to the vehicle.
2. Install the first vent hose clip 100 mm (4 inch) behind the rear edge of the torque arm bracket.
3. Install the lower vent hose clip onto the bottom edge of the torque arm.

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4. Install the vent hose to the transmission ventilation tube at the transmission.
5. Install the transmission support member. Refer to *Transmission Support Replacement* in Frame and Underbody.
6. Remove the transmission jack.
7. Lower the vehicle.



208402

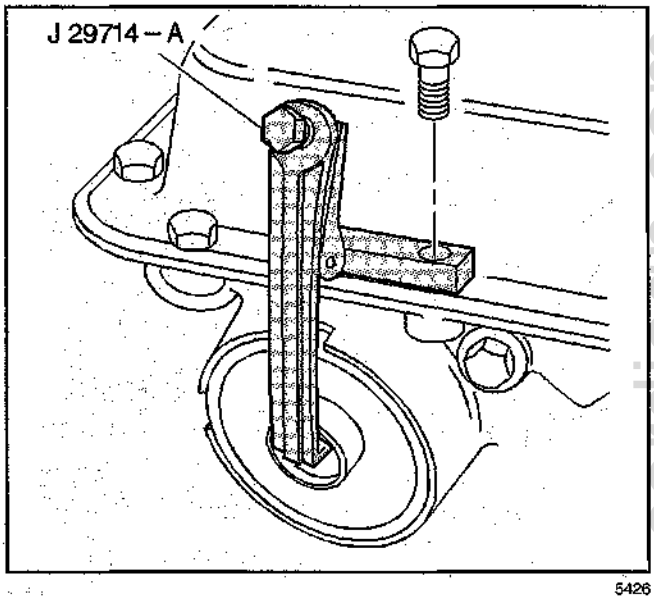
2-4 Servo

Removal Procedure

Tools Required

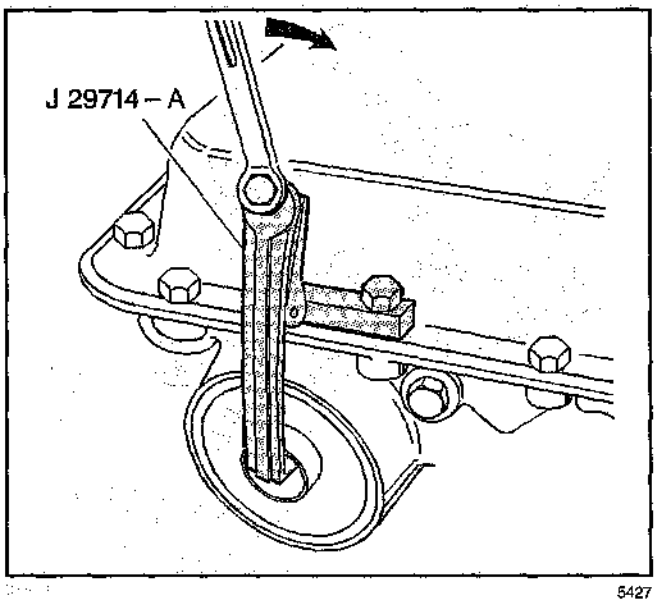
J 29714-A Servo Cover Depressor

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Remove the propeller shaft. Refer to *Propeller Shaft Replacement - One Piece* or *Propeller Shaft Replacement - Two Piece* in Propeller Shaft.
3. Remove the torque arm. Refer to *Torque Arm Replacement* in Rear Suspension.
4. Remove the transmission support. Refer to *Transmission Support Replacement* in Frame and Underbody.
5. Remove the catalytic converter heat shield. Refer to *Converter Heat Shield Replacement* in Engine Exhaust.
6. Lower the transmission.
7. Remove the two oil pan bolts below the 2-4 servo cover.
8. Install the *J 29714-A* to the oil pan rail.



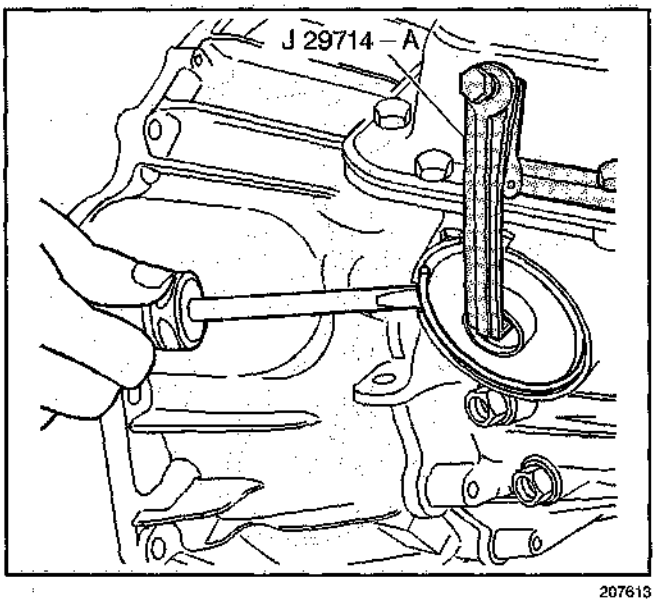
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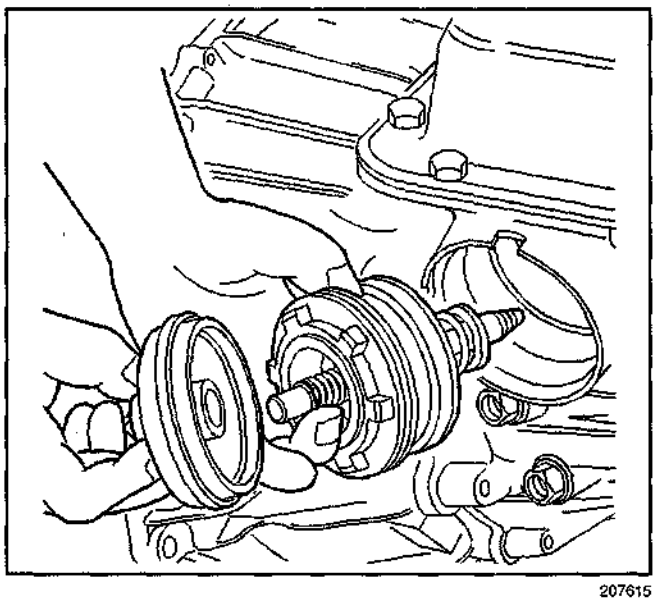
5427

9. Tighten the bolt on the *J 29714-A* to compress the servo cover.



207613

10. Remove the servo cover retaining ring.
11. Loosen the bolt on the *J 29714-A* to release tension on the servo cover.


207615

12. Remove the servo cover and O-ring seal. If the cover seems to be hung up on the seal, cut and remove the O-ring seal before removing the cover.
13. Remove the 2-4 servo from the transmission.
14. Inspect the 4th apply piston, 2-4 servo converter, 2nd apply piston, and the servo piston inner housing for the following defects:
    - Cracks
    - Scoring
    - Burrs and nicks

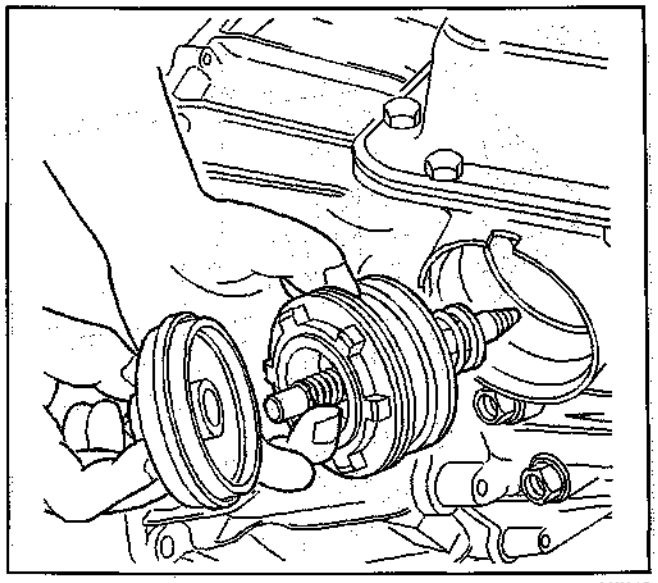
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Installation Procedure

Tools Required

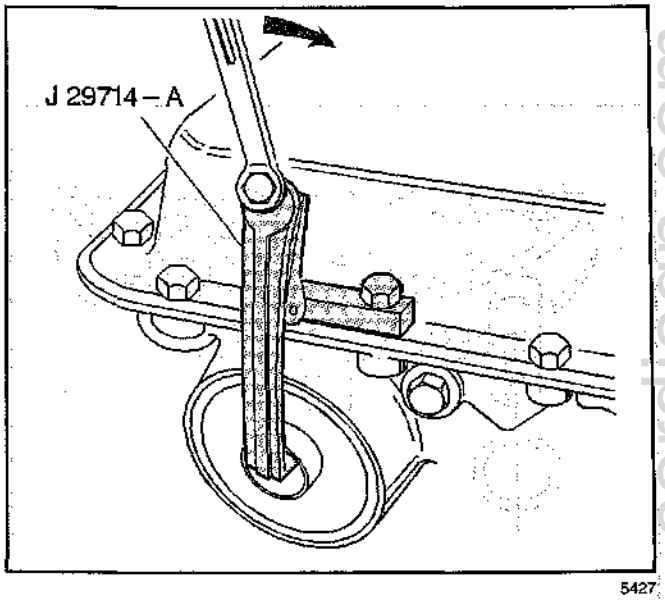
J 29714-A Servo Cover Depressor

1. Install new seals on the servo pistons and the servo cover.
2. Install the 2-4 servo to the transmission.
3. Install the servo cover and O-ring seal.



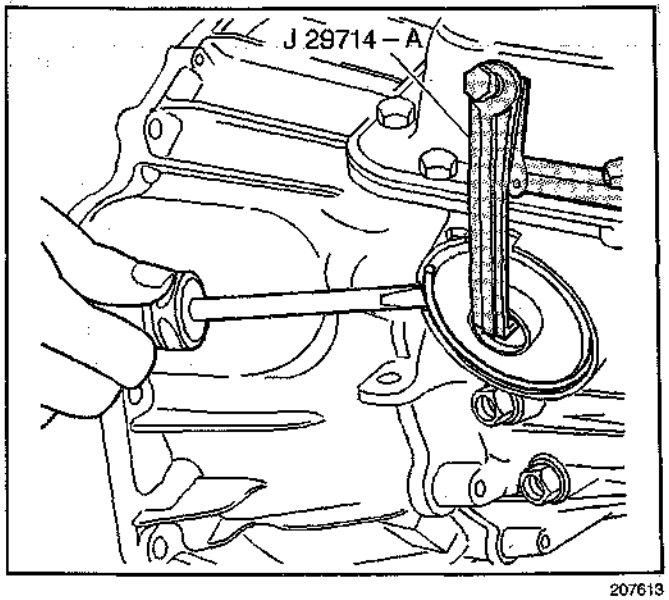
207615

4. Tighten the bolt on the *J 29714-A* to compress the servo cover.



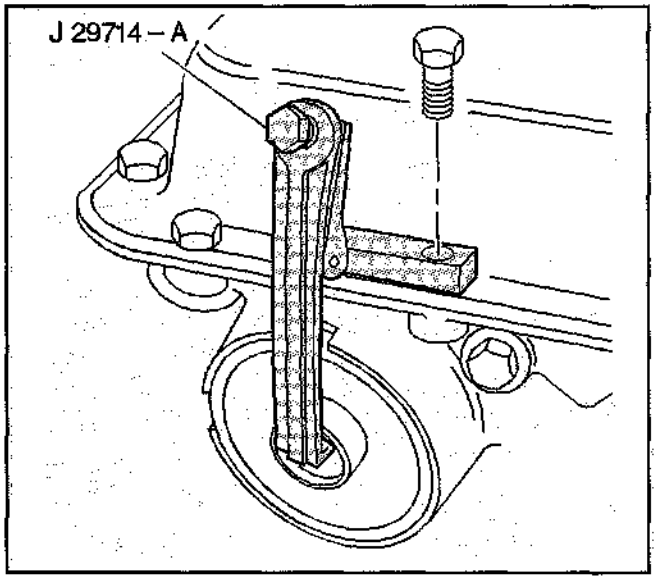
5427

5. Install the servo cover retaining ring.
6. Loosen the bolt on the *J 29714-A* to release tension on the servo cover.

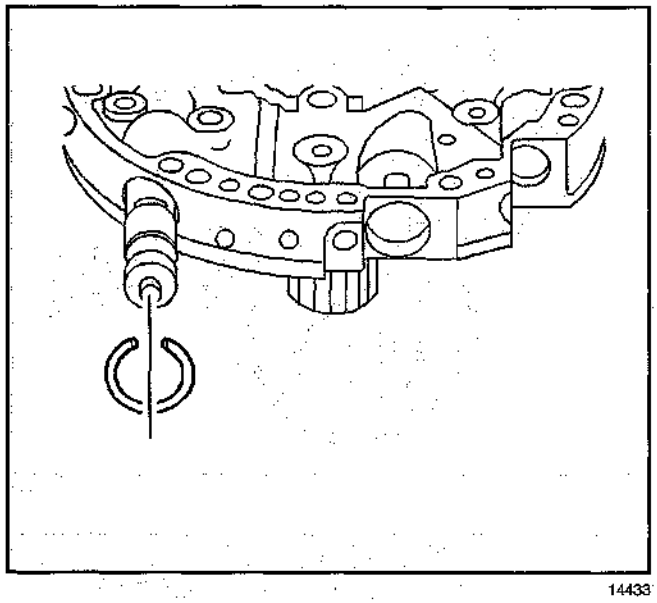


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14433

7. Remove the *J 29714-A* from the oil pan rail.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

8. Install the two oil pan bolts below the 2-4 servo cover.

   Tighten

   Tighten the oil pan bolts to 11 N·m (97 lb in).

9. Raise the transmission.
10. Install the catalytic converter heat shield. Refer to *Converter Heat Shield Replacement* in Engine Exhaust.
11. Install the transmission support. Refer to *Transmission Support Replacement* in Frame and Underbody.
12. Remove the transmission jack.
13. Install the torque arm. Refer to *Torque Arm Replacement* in Rear Suspension.
14. Install the propeller shaft. Refer to *Propeller Shaft Replacement - One Piece* or *Propeller Shaft Replacement - Two Piece* in Propeller Shaft.
15. Lower the vehicle.

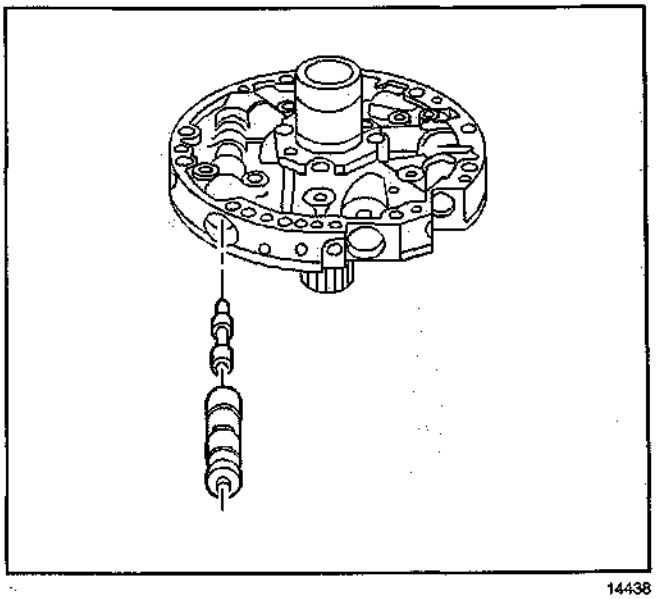
Pressure Regulator Replacement

Removal Procedure

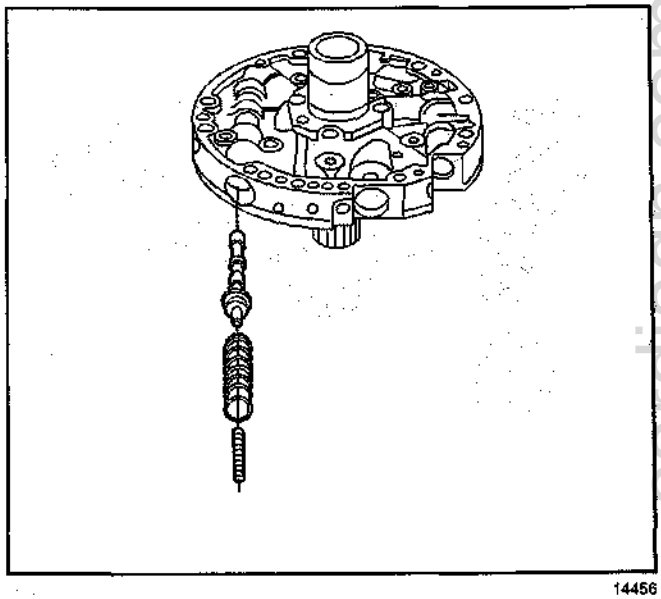
1. Remove the transmission oil pan. Refer to *Oil Pan Replacement.*
2. Compress the reverse boost valve sleeve and the related components with a small screwdriver.
3. Remove the reverse boost valve retaining ring.
4. Slowly release the spring pressure.

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5. Remove the reverse boost valve sleeve.
6. Remove the reverse boost valve.


14438

7. Remove the pressure regulator isolator spring.
8. Remove the pressure regulator valve spring.
9. Remove the pressure regulator valve.

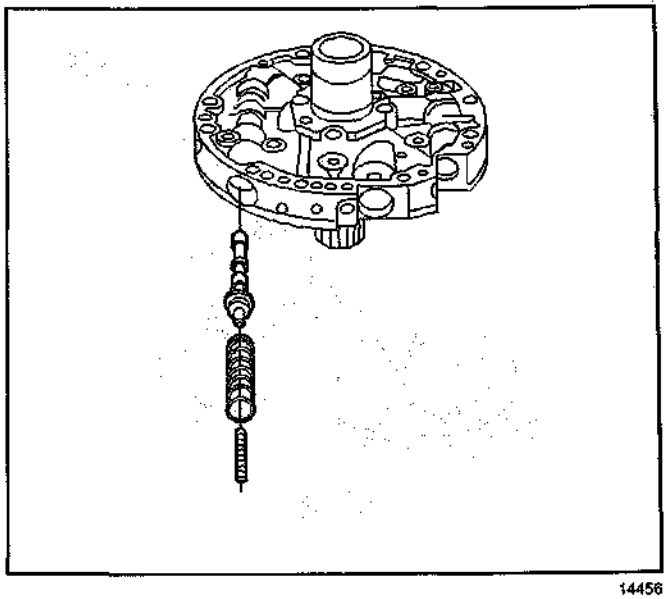

14456

Installation Procedure

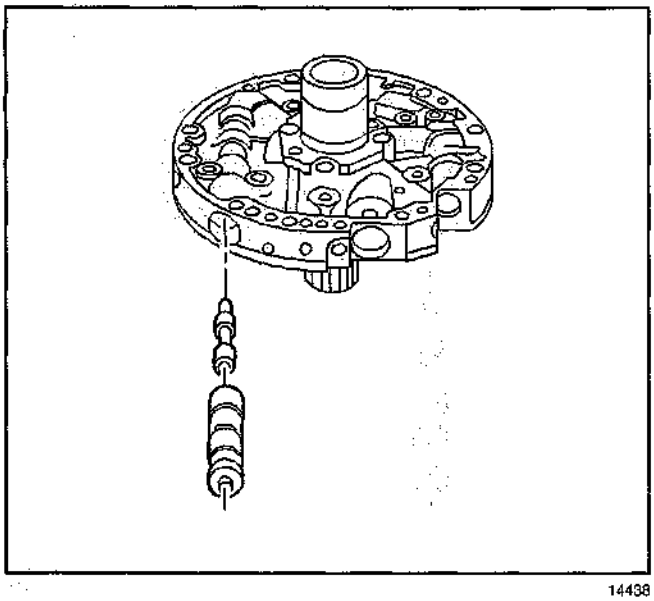
Tools Required

J 36850 Transmission Assembly Lube

1. Install the pressure regulator valve into the oil pump cover bore.
2. Install the pressure regulator valve spring.
3. Install the pressure regulator isolator spring.

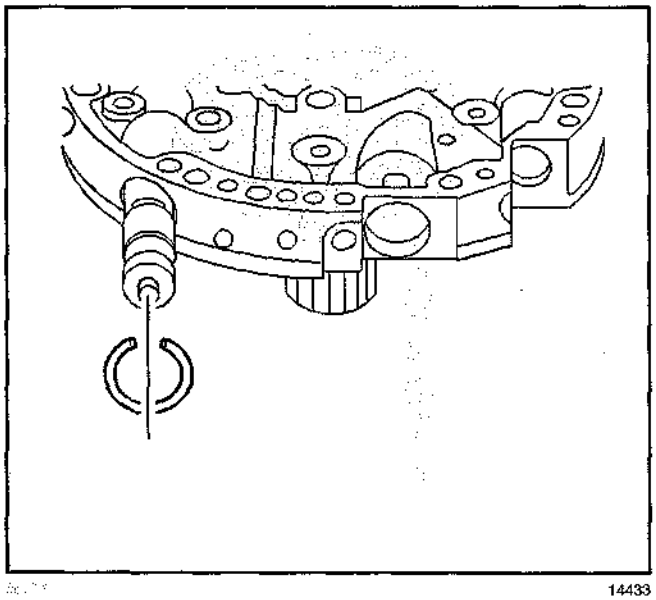

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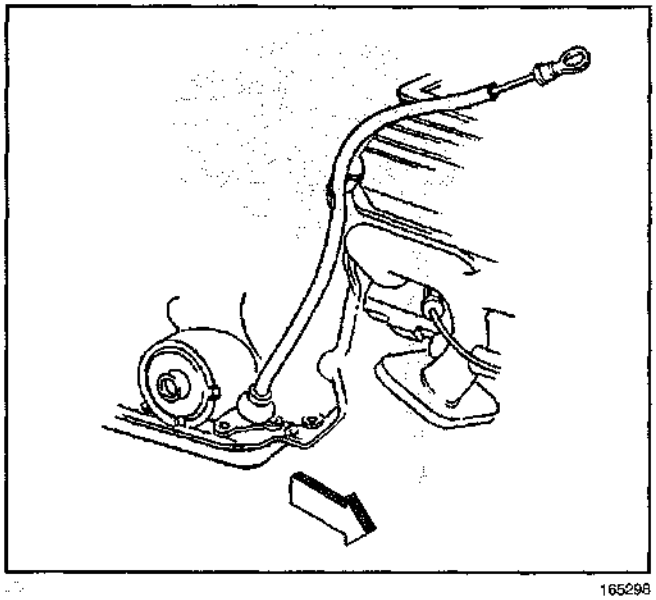
14438

4. Install the reverse boost valve and reverse boost valve sleeve and other related components. Retain with *J 36850*, or equivalent.



14433

5. Compress the reverse boost valve sleeve and the related components. Using a small screwdriver.
6. Install the reverse boost valve retaining ring into the oil pump cover bore.
7. Install the automatic transmission oil pan. Refer to *Oil Pan Replacement*.



165298

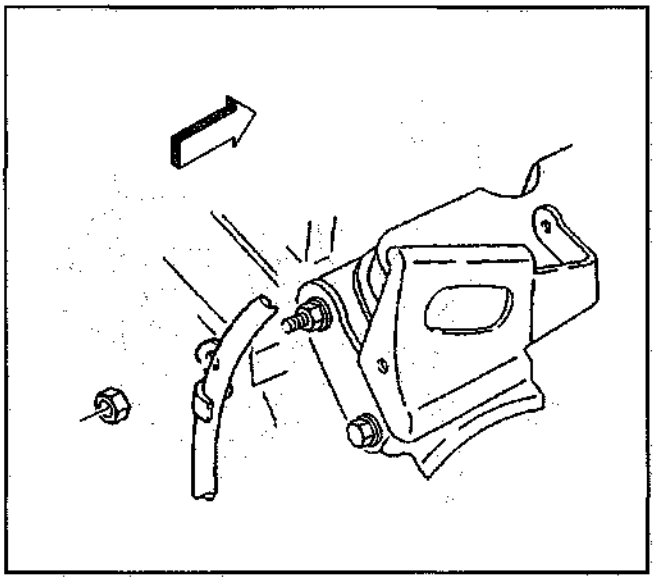
Filler Tube Replacement (3.8 L)

Removal Procedure

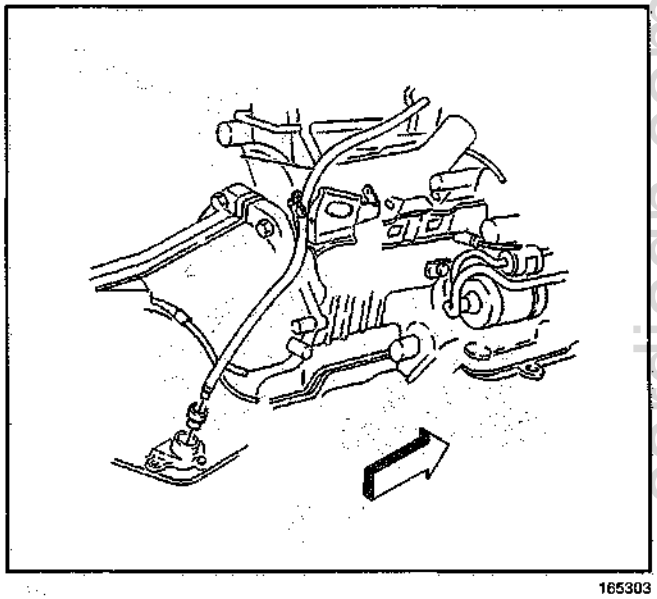
1. Remove the transmission fluid level indicator.
2. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.

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3. Remove the nut attaching the fill tube to the transmission.
4. Loosen the fill tube from the transmission.
5. Place a drain pan under the transmission to catch any dripping fluid.
6. Lower the vehicle.

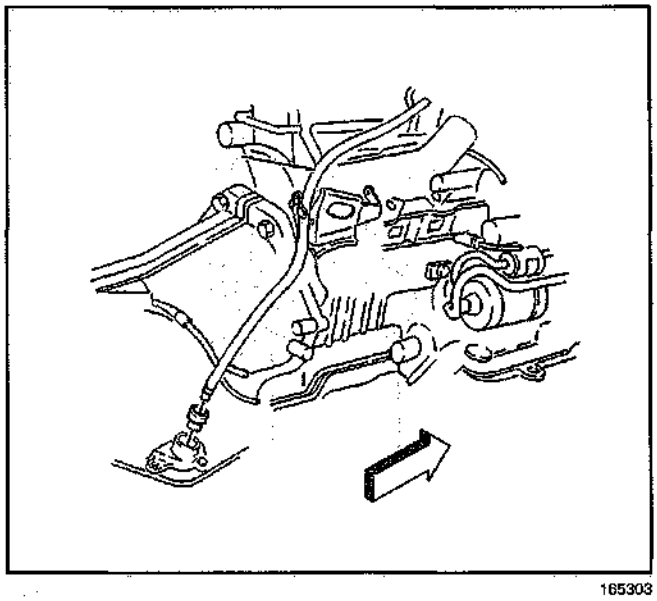

165305

7. Remove the fill tube and seal from the transmission through the engine compartment.

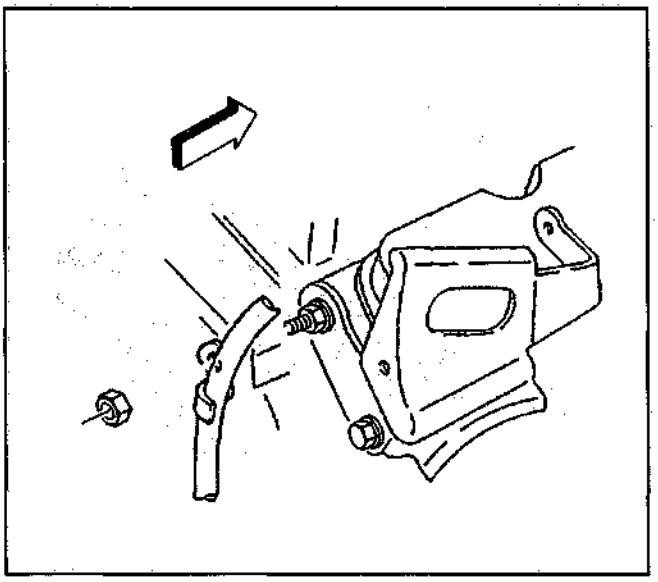

165303

Installation Procedure

1. Place the fill tube to the transmission through the engine compartment.
2. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
3. Install the seal and the fill tube to the transmission.


165303

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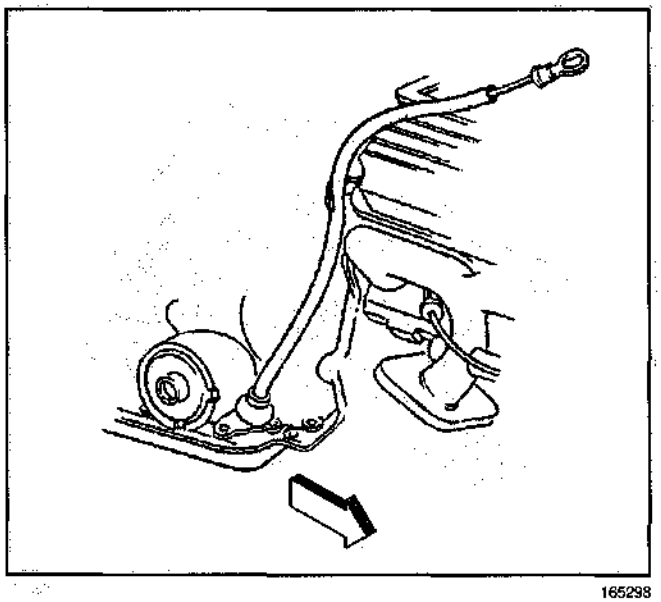
165305

Notice: Refer to *Fastener Notice* in Cautions and Notices.

4. Install the nut attaching the fill tube to the transmission.

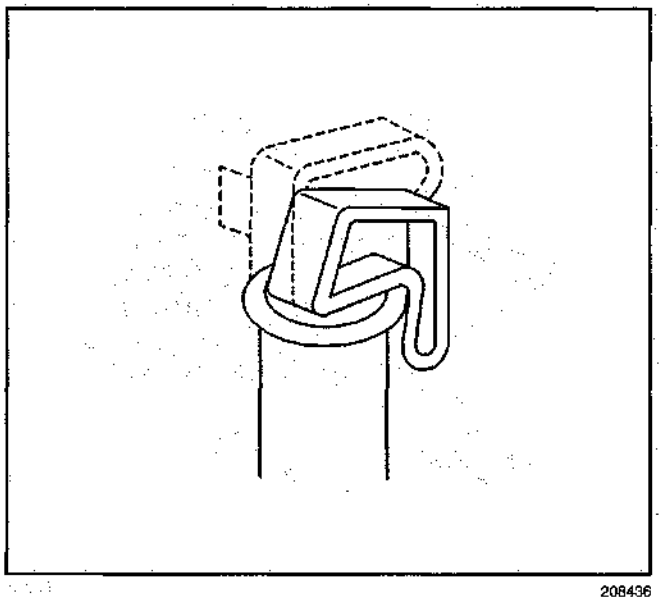
   Tighten

   Tighten the fill tube nut to 25 N·m (18 lb ft).
5. Lower the vehicle.



165298

6. Install the transmission fluid level indicator.
7. Check the transmission fluid level.



208436

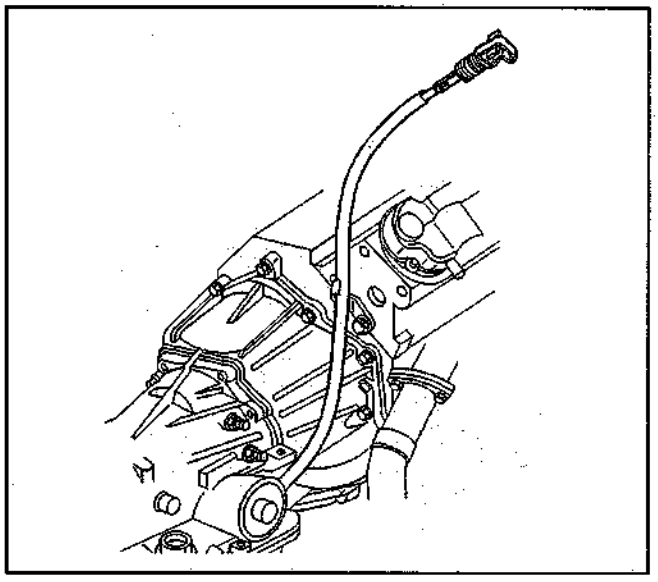
Filler Tube Replacement (5.7 L)

Removal Procedure

1. Lift the fluid level indicator handle lock up.

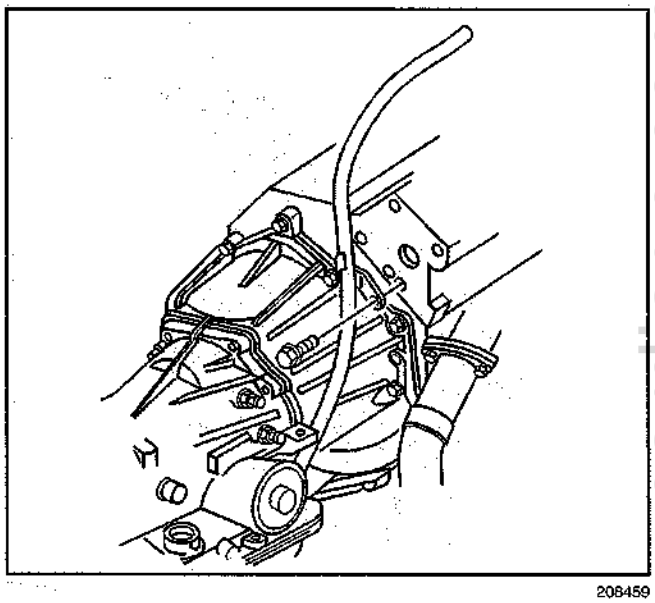
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2. Remove the fluid level indicator.
3. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.



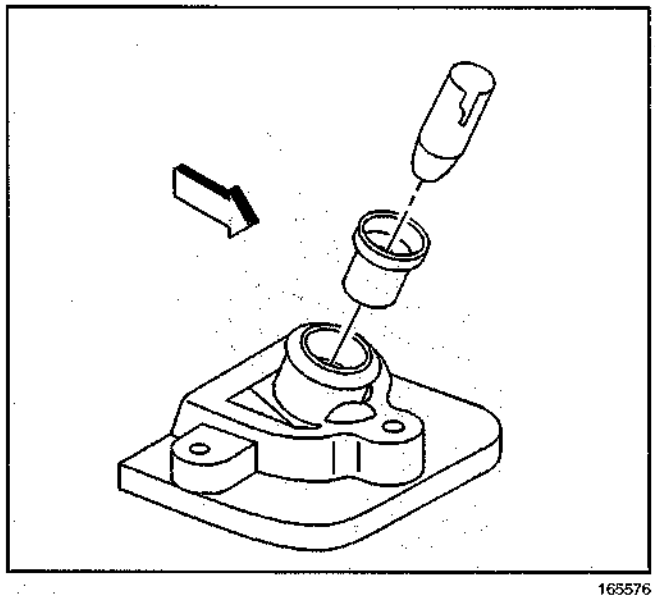
208423

4. Remove the bolt attaching the fill tube to the cylinder head.
5. Remove the transmission. Refer to *Transmission Replacement (5.7 L)*.
6. Place a drain pan under the transmission.



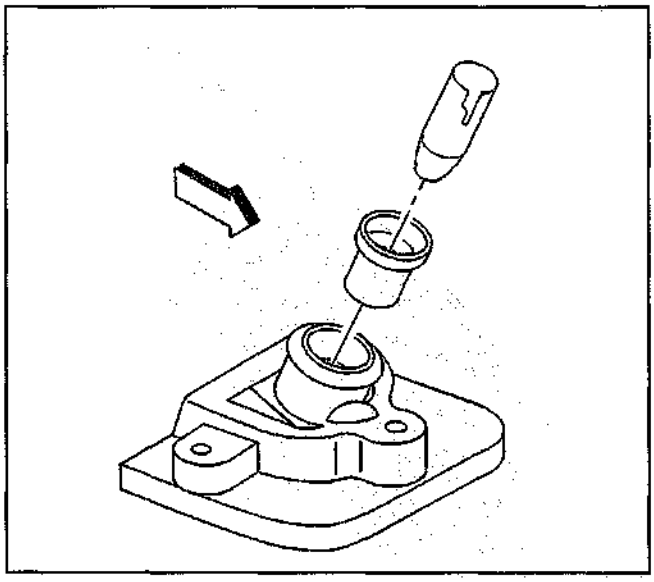
208459

7. Remove the fill tube and seal from the transmission.



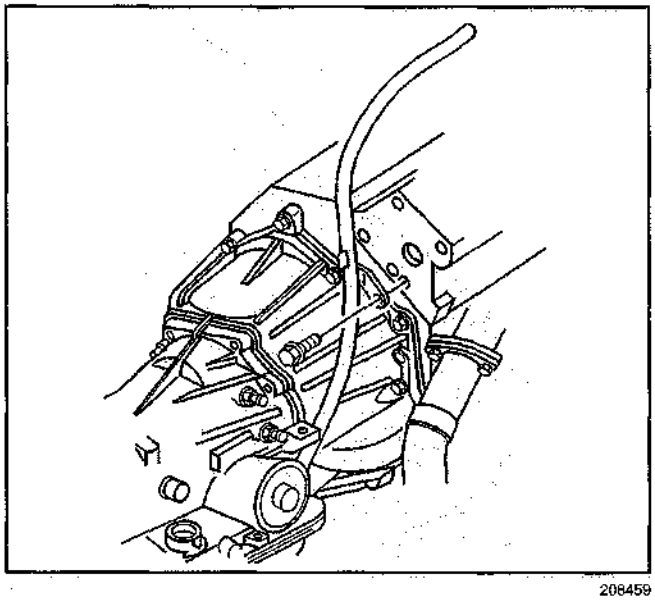
165576

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165576

Installation Procedure

1. Insert the seal into the automatic transmission case hole.
2. Install the fill tube to the transmission.
3. Install the transmission. Refer to *Transmission Replacement (5.7 L)*.

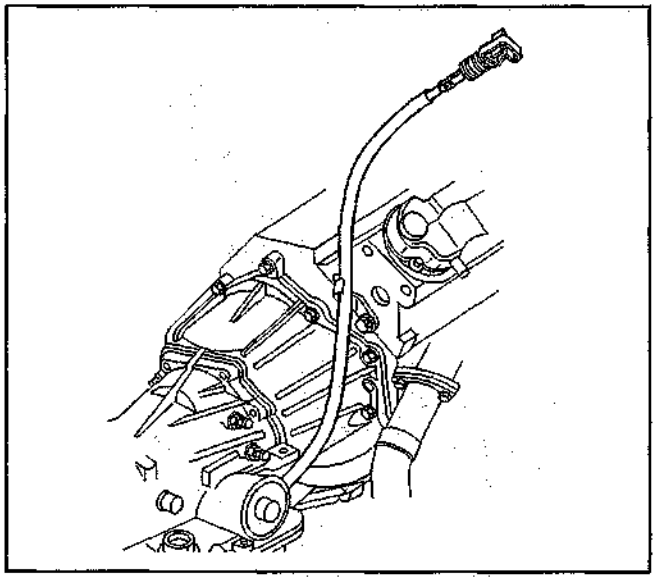

208459

Notice: Refer to *Fastener Notice* in Cautions and Notices.

4. Install the transmission bolt attaching the fill tube to the cylinder head.

   Tighten

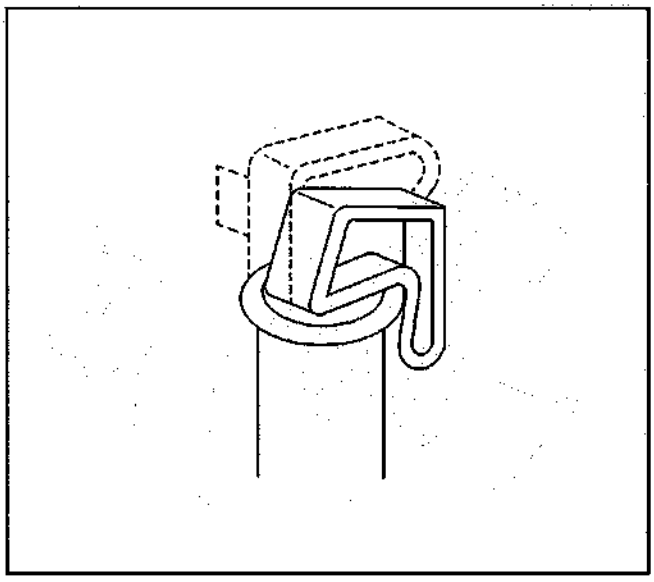
   Tighten the fill tube bolt to 50 N·m (37 lb ft).
5. Lower the vehicle.


208423

6. Install the fluid level indicator.
7. Check the transmission fluid level.

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8. Push the fluid level indicator handle lock down.

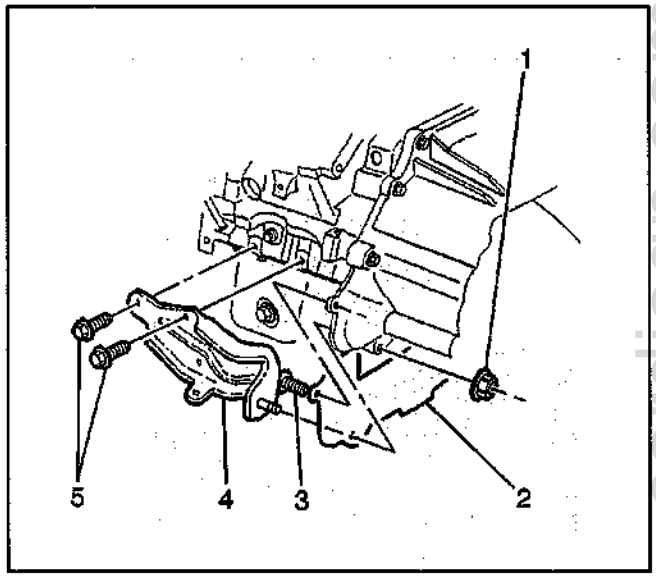


208436

Torque Converter Cover Replacement (3.8 L)

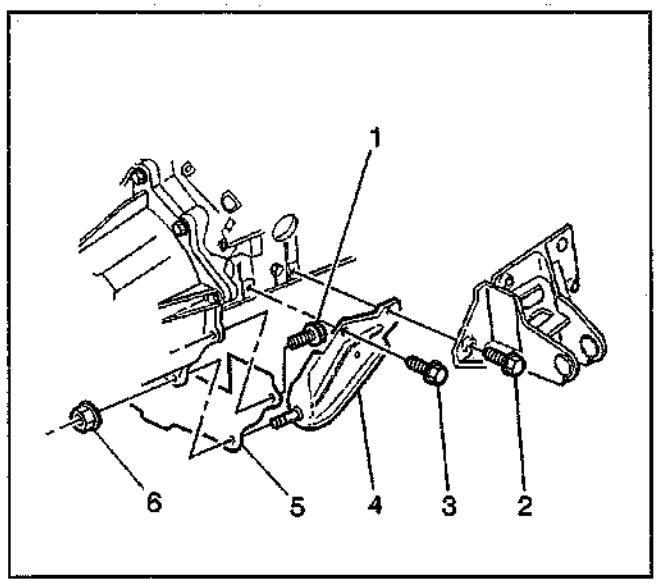
Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* In General Information.
2. Remove the starter motor. Refer to *Starter Motor Replacement (3.8 L)* in Engine Electrical.
3. Remove the transmission brace bolts (5) attaching the left brace (4) to the engine block.
4. Remove the transmission brace nut (1) attaching the left brace (4) to the transmission.
5. Remove the left side transmission brace (4).
6. Remove the transmission converter cover bolt (3).



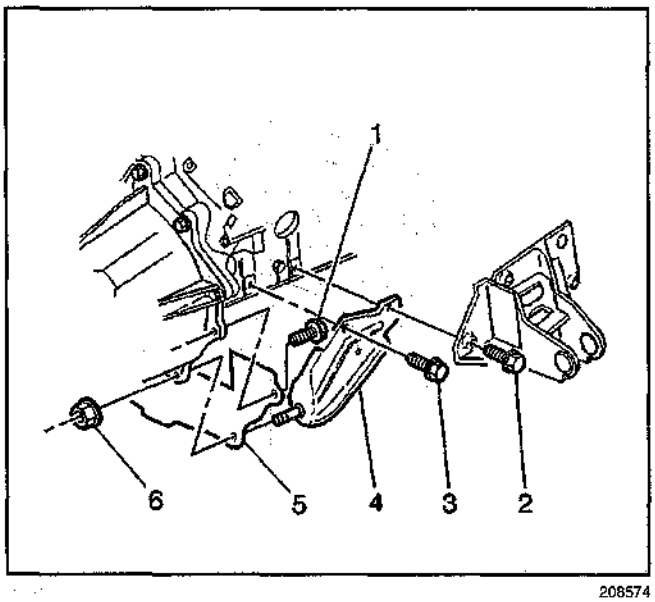
208577

7. Remove the transmission brace bolts (2, 3) attaching the right brace (4) to the engine block.
8. Remove the transmission brace nut (6) attaching the right brace (4) to the transmission.
9. Remove the right side transmission brace (4).
10. Remove the transmission converter cover bolt (1).
11. Remove the transmission converter cover (5) from the vehicle.

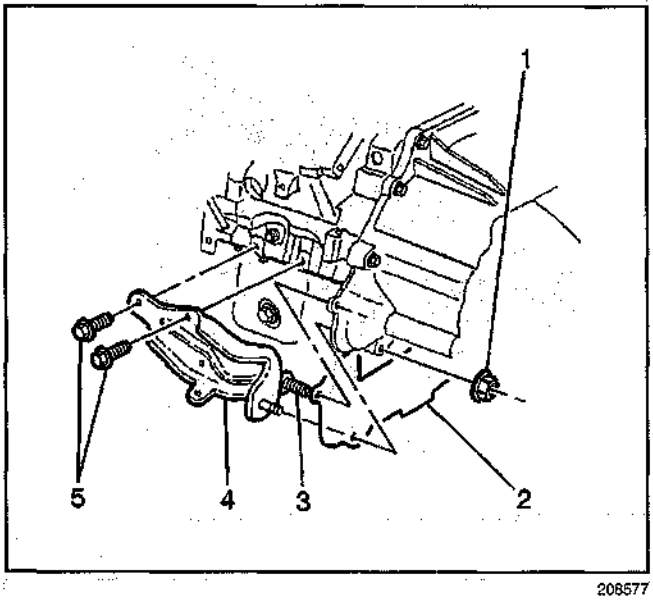


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208574



208577

Installation Procedure

1. Install the transmission converter cover (5) to the vehicle.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

2. Install the transmission converter cover bolt (1).

   Tighten

   Tighten the transmission converter cover bolt (1) to 8.5 N·m (75 lb in).
3. Install the right side brace (4).
4. Install the transmission brace nut (6) to the right side brace (4).

   Tighten

   Tighten the transmission brace nut (6) to 80 N·m (59 lb ft).
5. Install the transmission brace bolts (2, 3) to the right brace (4) and engine block.

   Tighten

   Tighten the transmission brace bolts (2, 3) to 50 N·m (37 lb ft).
6. Install the transmission converter cover bolt (3).

   Tighten

   Tighten the transmission converter cover bolt (3) to 8.5 N·m (75 lb in).
7. Install the left side brace (4) to the transmission.
8. Install the transmission brace nut (1) attaching the left brace (4) to the transmission.

   Tighten

   Tighten the transmission nut to 80 N·m (59 lb ft).
9. Install the transmission brace bolts (5) attaching the left brace (4) to the engine block.

   Tighten

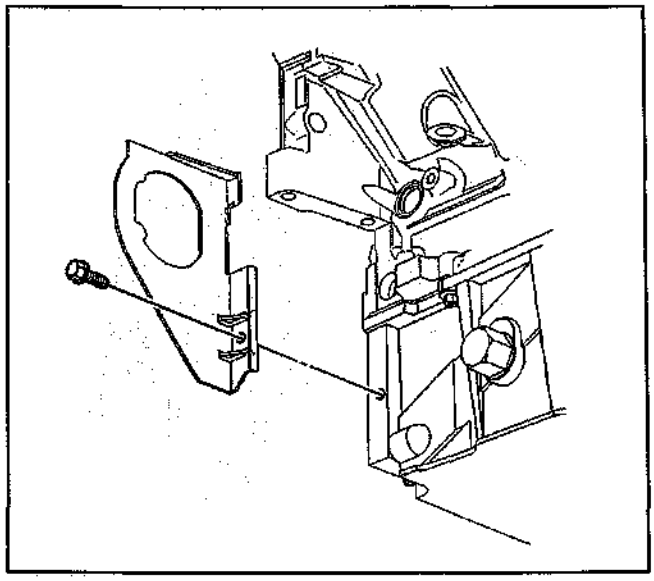
   Tighten the transmission brace bolts (5) to engine block to 28 N·m (21 lb ft).
10. Install the starter motor. Refer to *Starter Motor Replacement (3.8 L)* in Engine Electrical.
11. Lower the vehicle.

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Torque Converter Cover Replacement (5.7 L)

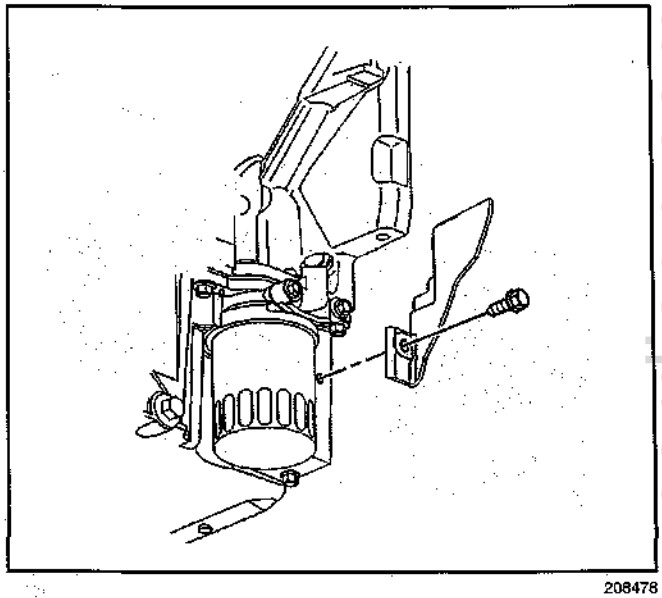
Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Remove the starter motor, If servicing the right side transmission cover only. Refer to *Starter Motor Replacement (5.7 L)* in Engine Electrical.
3. Remove the right side transmission cover bolt.
4. Remove the right side transmission cover.



208464

5. Remove the left side transmission cover bolt
6. Remove the right side converter cover.



208478

Installation Procedure

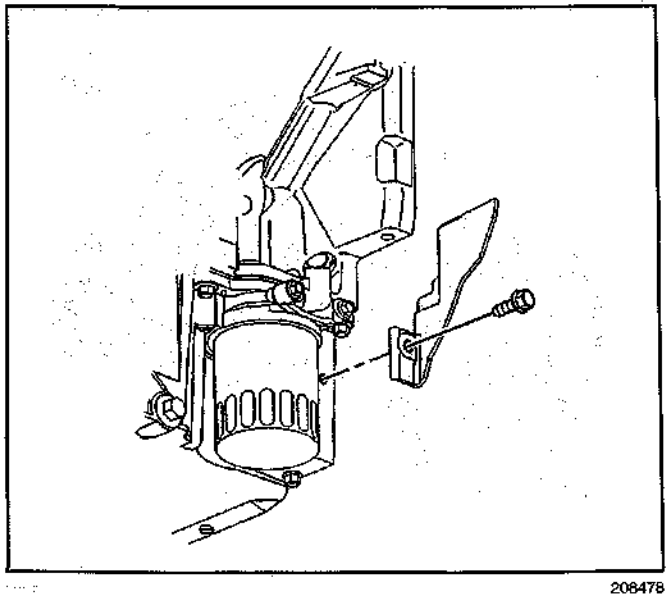
1. Install the left side converter cover.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

2. Install the left side converter cover bolt

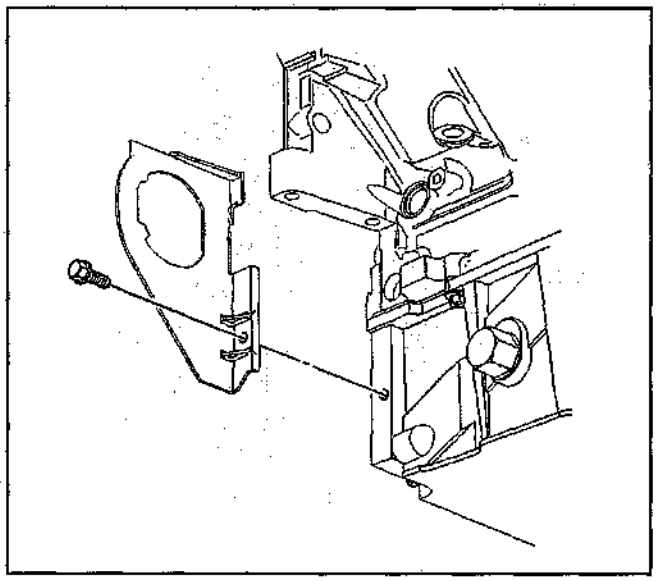
   Tighten

   Tighten the left side converter cover bolt to 12 N·m (106 lb in).



208478

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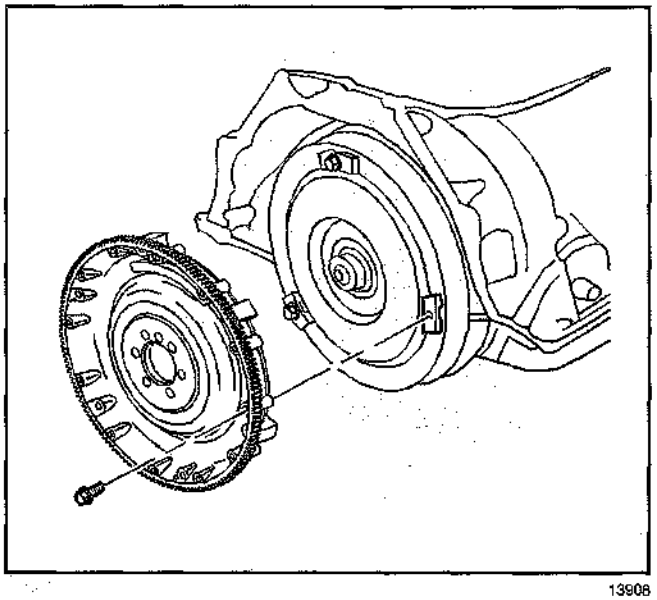


208464

3. Install the right side converter cover.
4. Install the right side converter cover bolt.

   Tighten

   Tighten the right side converter cover bolt to 12 N·m (106 lb in).
5. Install the starter motor, if removed. Refer to *Starter Motor Replacement (5.7 L)* in Engine Electrical.
6. Lower the vehicle.



13908

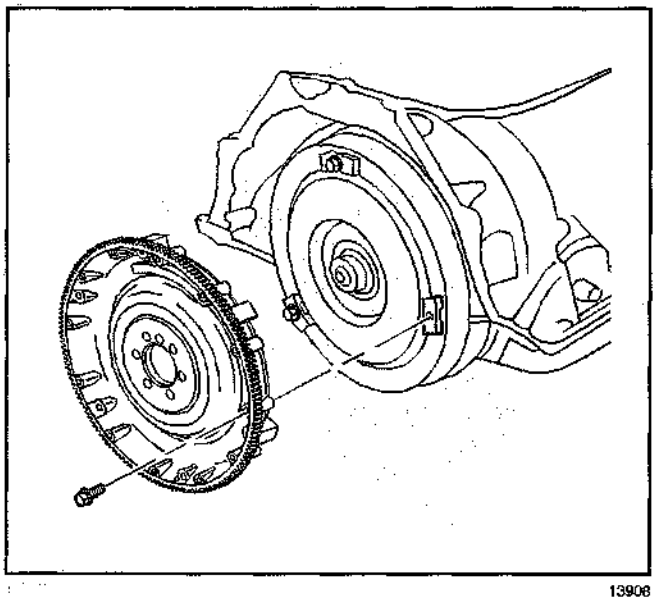
Flywheel to Torque Converter Bolts

Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.

Important: Mark the alignment of the flywheel and the torque converter in order to retain a proper balance.

2. Remove the torque converter cover. Refer to *Torque Converter Cover Replacement (3.8 L)* or *Torque Converter Cover Replacement (5.7 L)*.
3. Remove the flywheel to torque converter bolts.



13906

Installation Procedure

Notice: Refer to *Fastener Notice* in Cautions and Notices.

Important: All flywheel to torque converter bolts should be hand started before tightening in order to ensure proper alignment, and in order to avoid cross-threading.

1. Install the flywheel to torque converter bolts. Hand start the bolts.

   Tighten

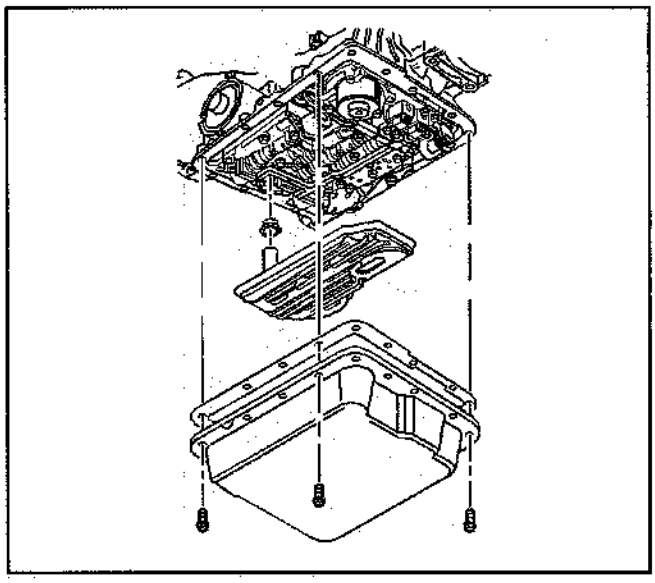
   - Tighten the torque converter bolts for the 3.8L to 63 N·m (46 lb ft).
   - Tighten the torque converter bolts for the 5.7L to 60 N·m (44 lb ft).
2. Install the torque converter cover. Refer to *Torque Converter Cover Replacement (3.8 L)* or *Coolant Heater Cord Replacement (3.8 L)*.
3. Lower the vehicle.

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Oil Pan Replacement

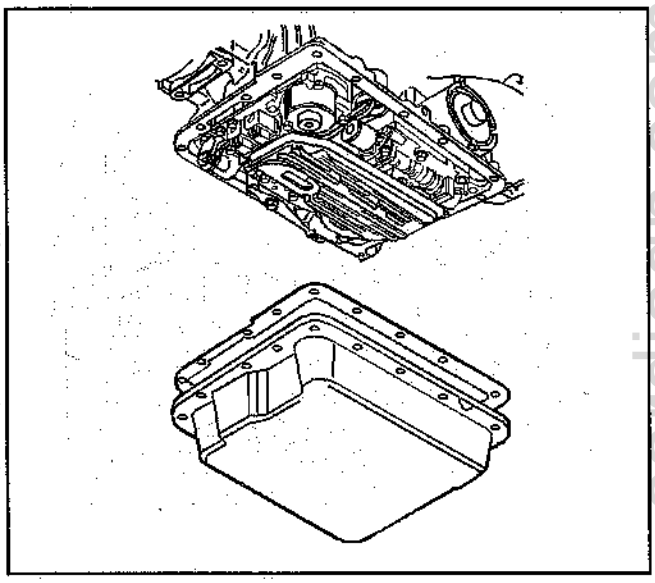
Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Place a drain pan under the transmission oil pan.
3. Remove the oil pan bolts from the front and the sides of the pan only.
4. Loosen the rear oil pan bolts approximately four turns.
5. Lightly tap the oil pan with a rubber mallet to loosen the pan to allow the fluid to drain.
6. Remove the remaining oil pan bolts.



13952

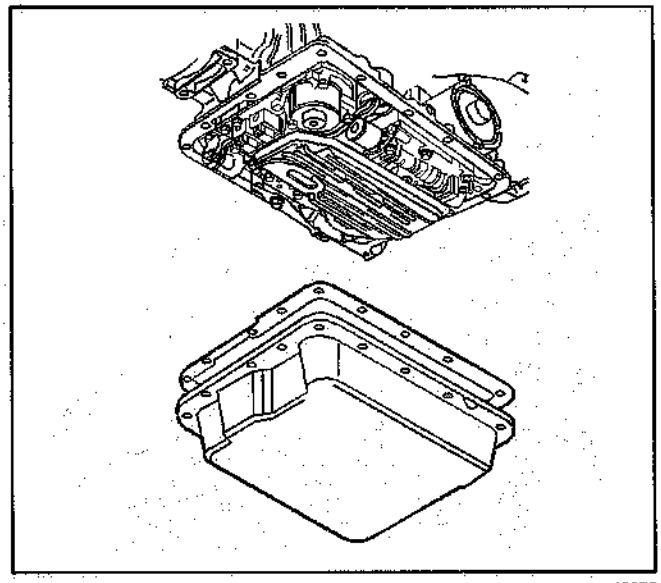
7. Remove the oil pan and the gasket.
8. Clean the transmission case and the oil pan gasket surfaces with solvent, and air dry. You must remove all traces of the old gasket material.



13955

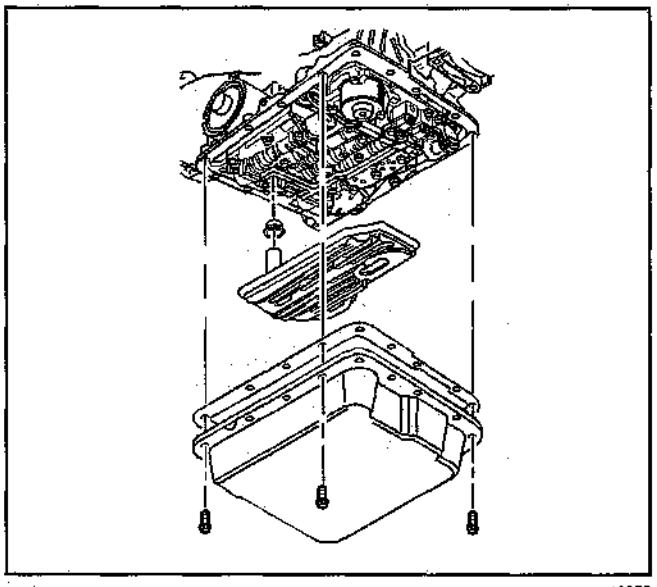
Installation Procedure

1. Install the oil pan and a new gasket.



13955

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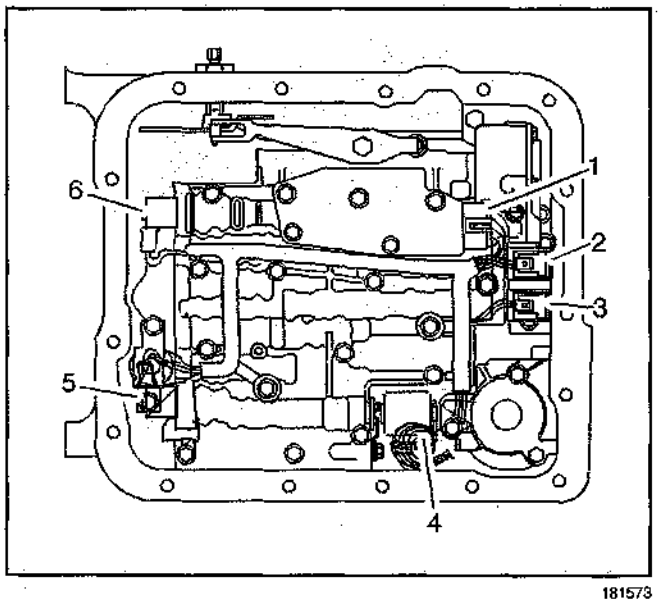
13952

Notice: Refer to *Fastener Notice* in Cautions and Notices.

2. Install the oil pan bolts.

   Tighten

   Tighten the oil pan bolts alternately, and evenly to 11 N·m (97 lb in).
3. Lower the vehicle.
4. Fill the transmission fluid to the proper level. Use DEXRON® III, or if unavailable, DEXRON® IIE.
5. Inspect the oil pan gasket for leaks.

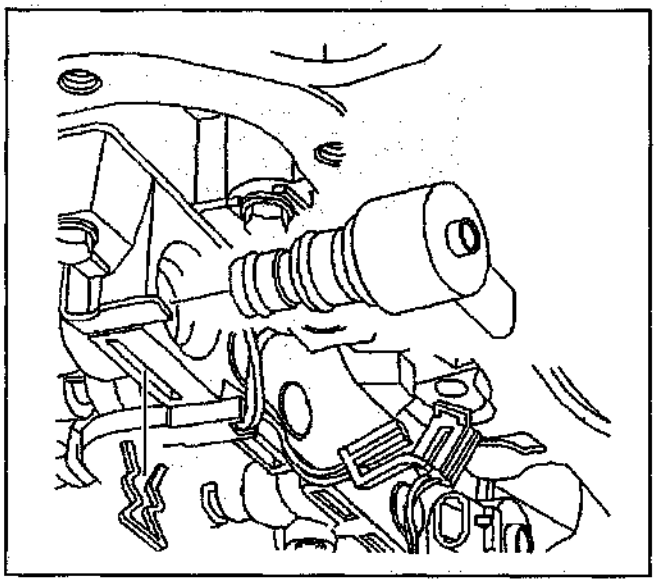


181573

Valve Body and Pressure Switch Replacement

Removal Procedure

1. Remove the transmission oil pan and filter. Refer to *Automatic Transmission Fluid/Filter Changing*.
2. Disconnect the internal wiring harness electrical connectors from the following components:
   - Transmission fluid pressure switch (1)
   - 1-2 shift control solenoid (2)
   - 2-3 shift control solenoid (3)
   - Pressure control solenoid (4)
   - TCC PWM solenoid (5)
   - 3-2 control solenoid (6)

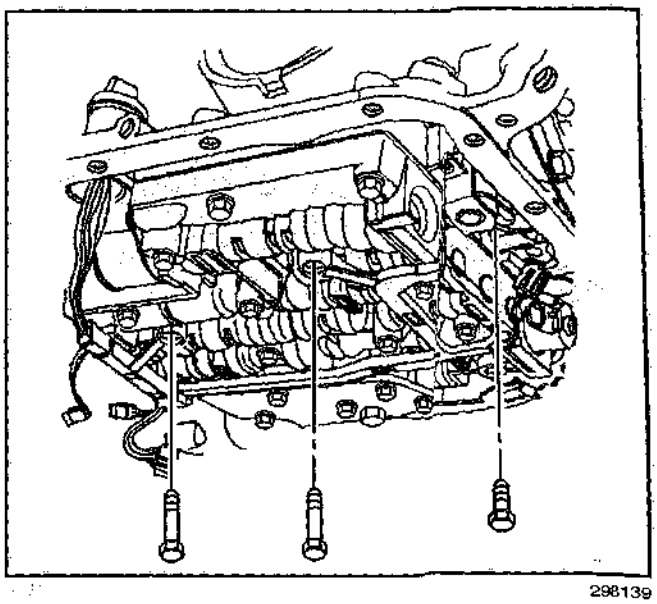


298154

3. Remove the TCC PWM solenoid retainer.
4. Remove the TCC PWM solenoid in order to access one of the TCC solenoid retaining bolts.

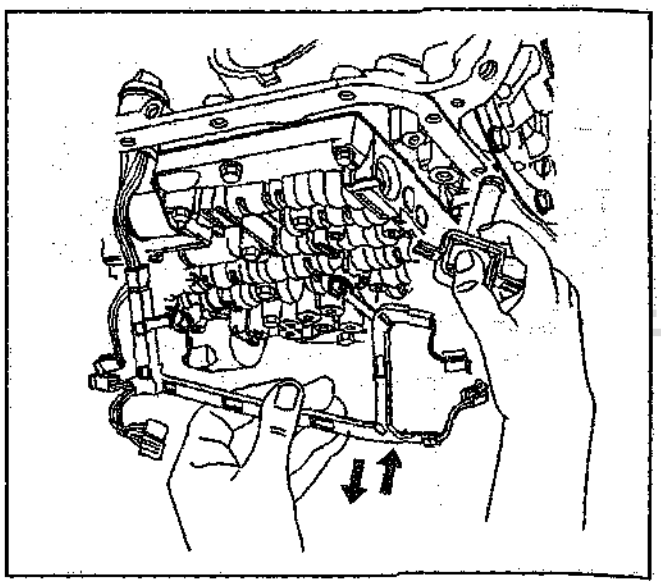
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5. Remove the TCC solenoid retaining bolts and the valve body bolts which retain the internal wiring harness.



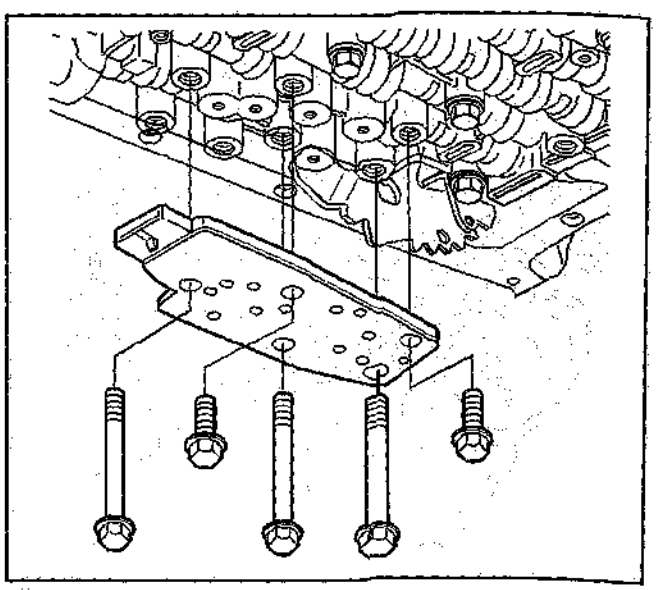
298139

6. Remove the TCC solenoid (with O-ring seal) and wiring harness from the control valve body.
7. Reposition the harness to the side of the transmission case.



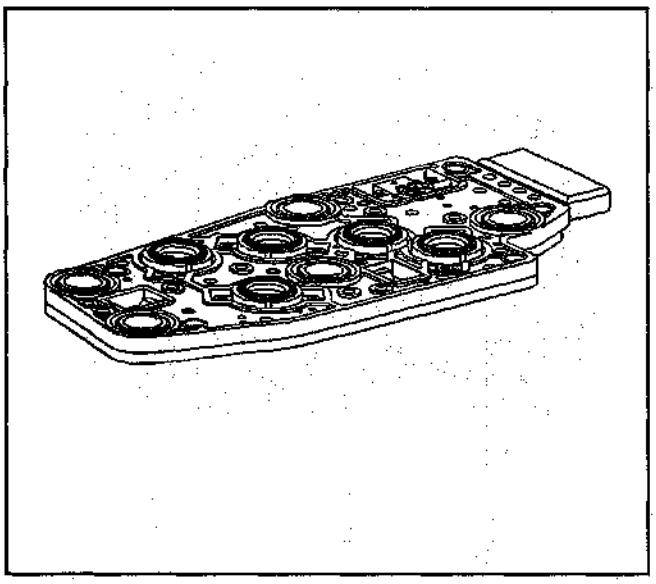
71463

8. Remove the control valve body bolts which retain the transmission fluid pressure switch to the control valve body.
9. Remove the transmission fluid pressure switch.



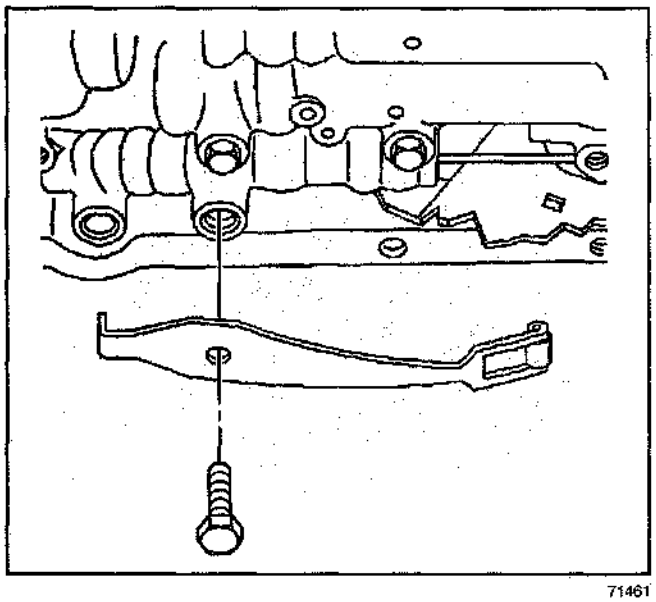
29454

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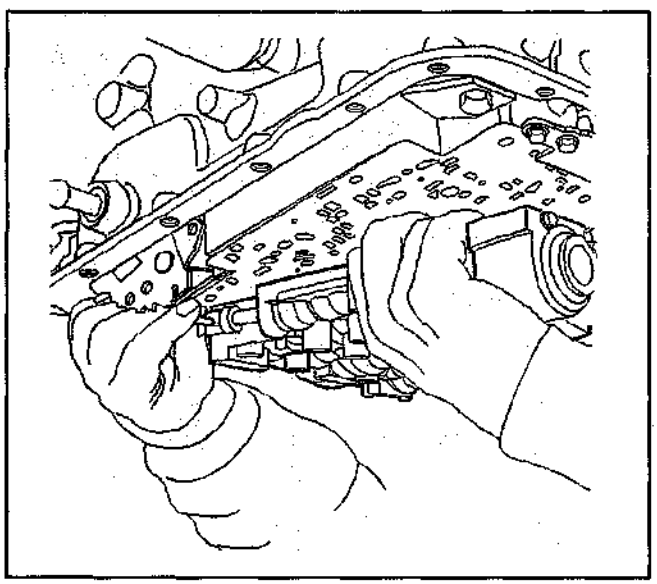
8889

10. Inspect the transmission fluid pressure switch for damage or debris.



71461

11. Remove the manual detent spring retaining bolt.
12. Remove the manual detent spring.
13. Inspect the manual detent spring for cracks or damage.



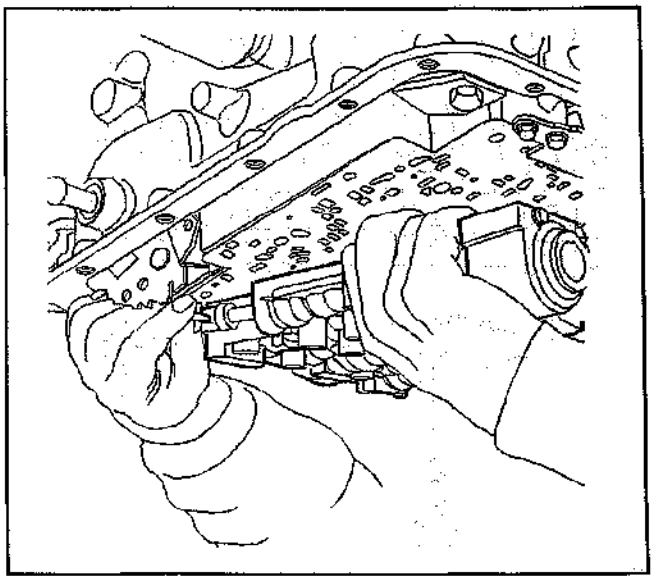
29460

14. Remove the remaining control valve body bolts.
15. Carefully begin to lower the control valve body down from the transmission case, disconnect the manual valve link, then remove the control valve body from the transmission case.
16. Inspect the control valve body. Refer to the Transmission/Transaxle/Transfer Case Unit Repair Manual for the control valve body cleaning, inspection and repair procedures.

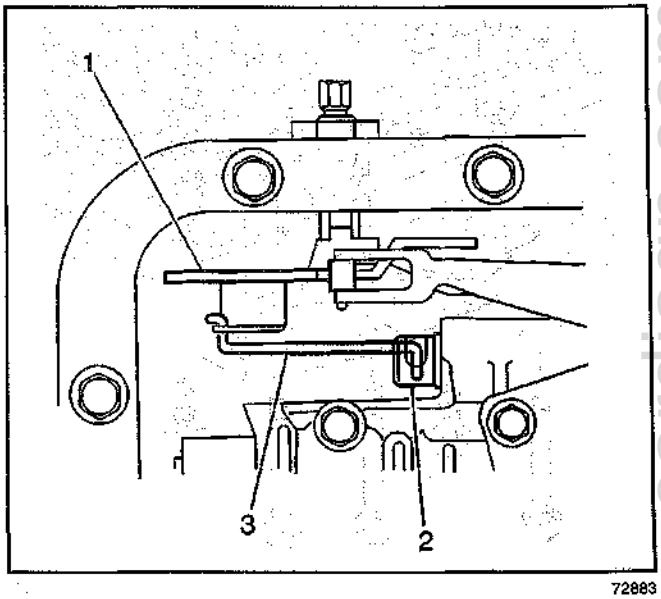
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Installation Procedure

1. Install the control valve body to the transmission case and connect the manual valve link to the inside detent lever.


29460

2. Verify that the manual valve link (3) is installed properly to the inside detent lever (1) and the manual valve (2).



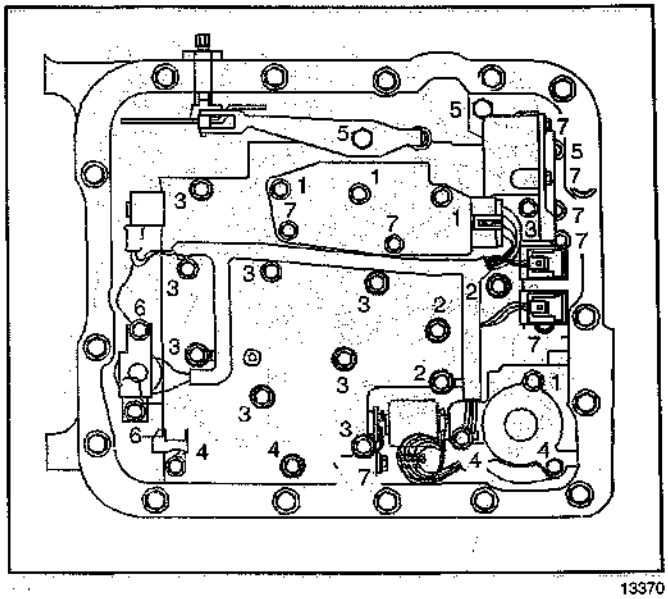
72883

Important: When installing bolts throughout this procedure, be sure to use the correct bolt size and length in the correct location as specified.

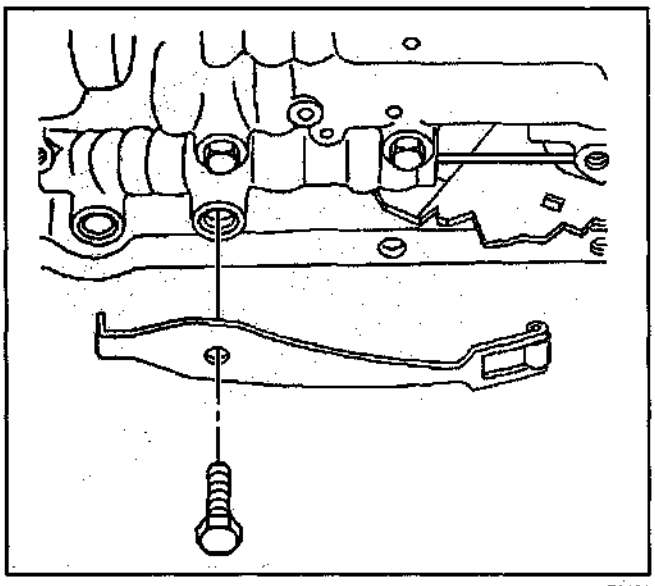
3. Install but do not tighten the control valve body bolts which retain only the valve body directly.

   Each numbered bolt location corresponds to a specific bolt size and length, as indicated by the following:

   - M6 X 1.0 X 65.0 (1)
   - M6 X 1.0 X 54.4 (2)
   - M6 X 1.0 X 47.5 (3)
   - M6 X 1.0 X 35.0 (4)
   - M8 X 1.0 X 20.0 (5)
   - M6 X 1.0 X 12.0 (6)
   - M6 X 1.0 X 18.0 (7)

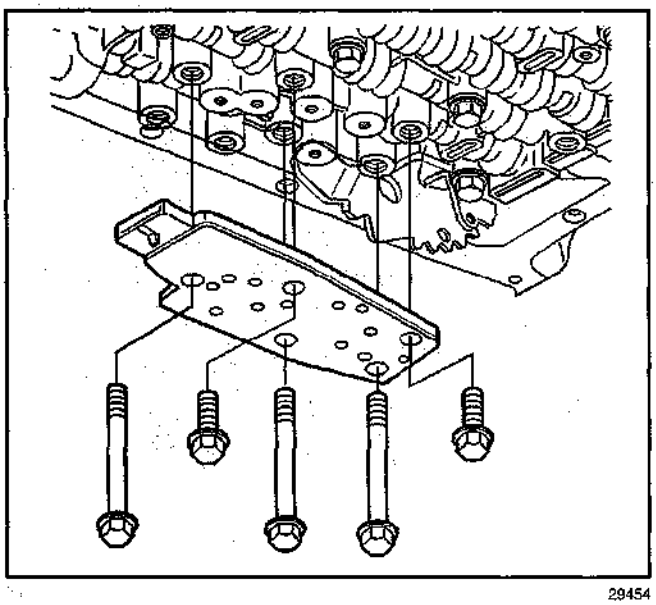

13370

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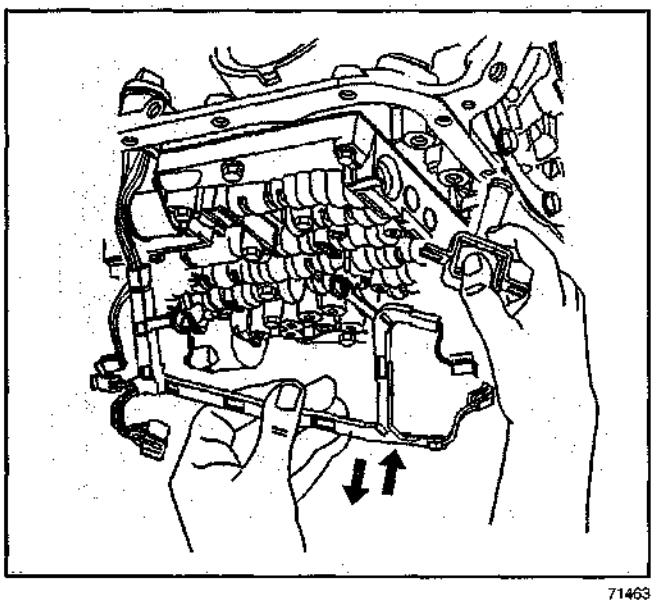
71461

4. Install the manual detent spring.
5. Install but do not tighten the manual detent spring retaining bolt.



29454

6. Install the transmission fluid pressure switch.
7. Install but do not tighten the control valve body bolts which retain the transmission fluid pressure switch to the control valve body.



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8. Install the wiring harness and TCC solenoid with a new O-ring seal to the valve body.

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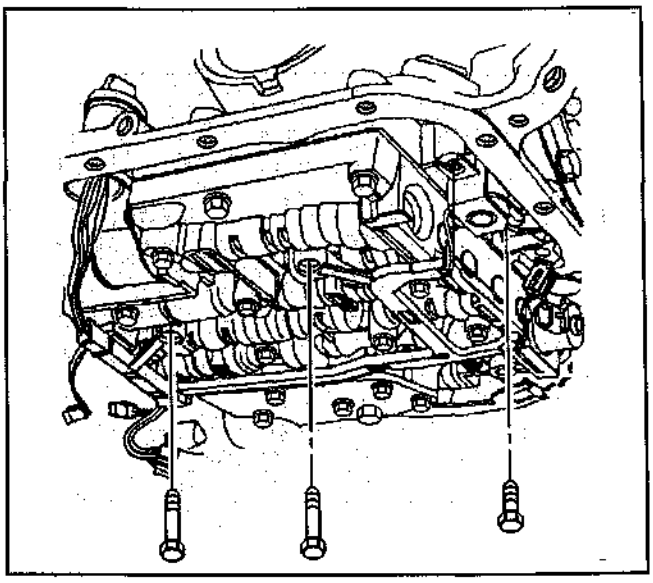
9. Install but do not tighten the valve body bolts which retain the internal wiring harness.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

10. Install the TCC solenoid retaining bolts.

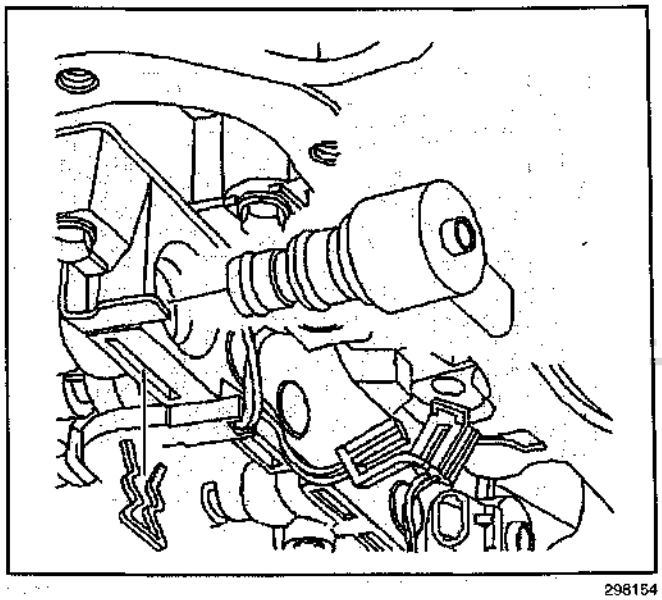
    Tighten

    Tighten the TCC solenoid retaining bolts to 11 N·m (97 lb in).



298139

11. Install the TCC PWM solenoid to the control valve body.
12. Install the TCC PWM solenoid retainer.



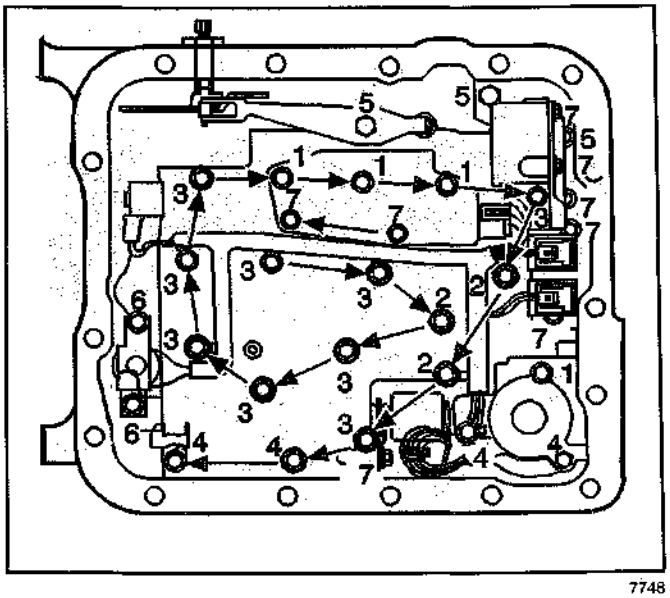
298154

Notice: Torque valve body bolts in a spiral pattern starting from the center. If the bolts are torqued at random, valve bores may be distorted and inhibit valve operation.

13. Tighten the control valve body bolts in a spiral pattern starting from the center, as indicated by the arrows.

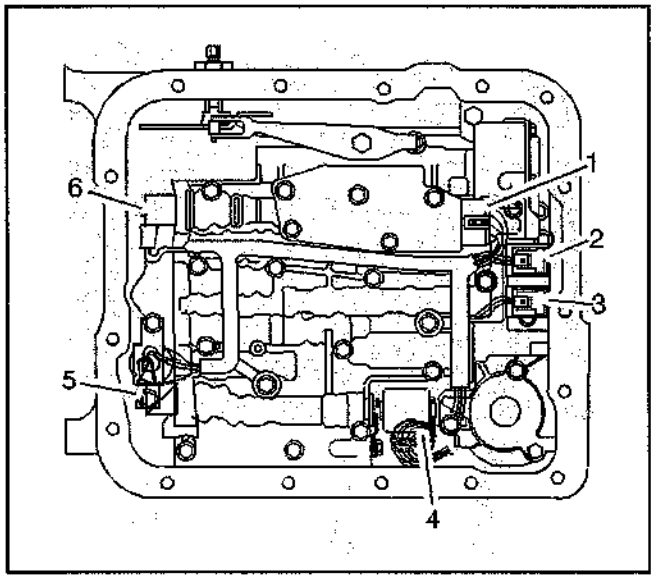
    Tighten

    Tighten the control valve body bolts (in sequence) to 11 N·m (97 lb in).



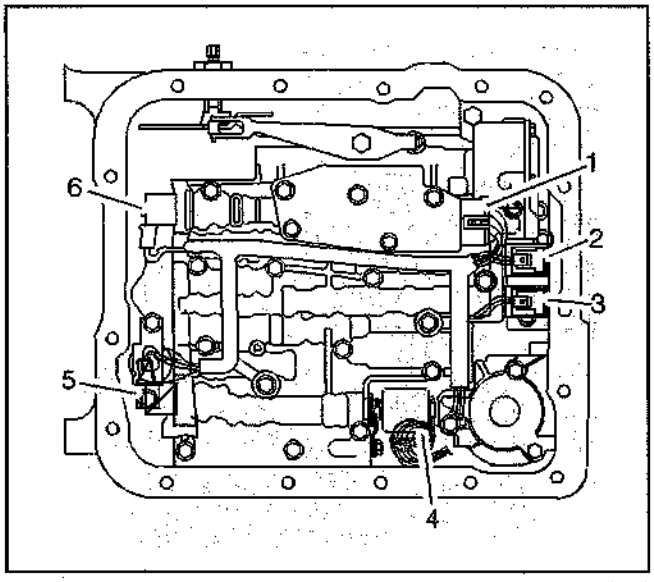
7748

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181573

14. Connect the internal wiring harness electrical connectors to the following components:
    - Transmission fluid pressure switch (1)
    - 1-2 shift control solenoid (2)
    - 2-3 shift control solenoid (3)
    - Pressure control solenoid (4)
    - TCC PWM solenoid (5)
    - 3-2 control solenoid (6)
15. Install the transmission oil pan and filter. Refer to *Automatic Transmission Fluid/Filter Changing*.

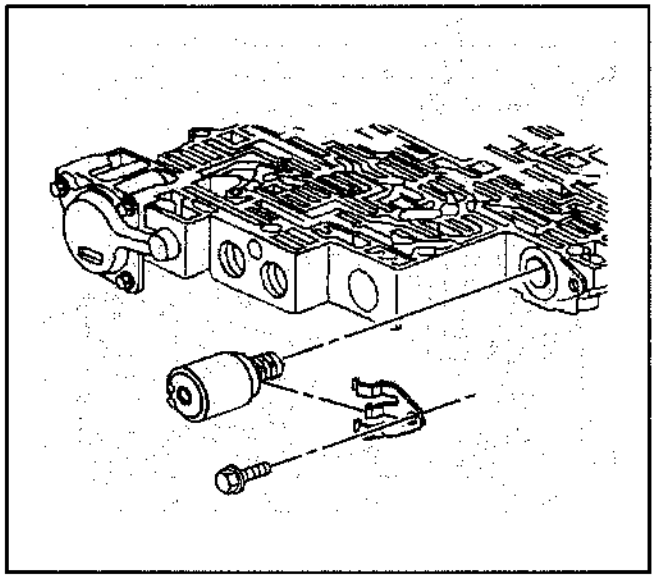


181573

Control and Shift Solenoids Replacement

Removal Procedure

1. Remove the transmission oil pan and filter. Refer to *Automatic Transmission Fluid/Filter Changing*.
2. Remove the 1-2 accumulator. Refer to *Accumulator Assembly, Spacer Plate, and Gaskets*.
3. Disconnect the internal wiring harness electrical connectors from the following components:
    - Transmission fluid pressure switch (1)
    - 1-2 shift control solenoid (2)
    - -2–3 shift control solenoid (3)
    - Pressure control solenoid (4)
    - TCC PWM solenoid (5)
    - 3-2 control solenoid (6)

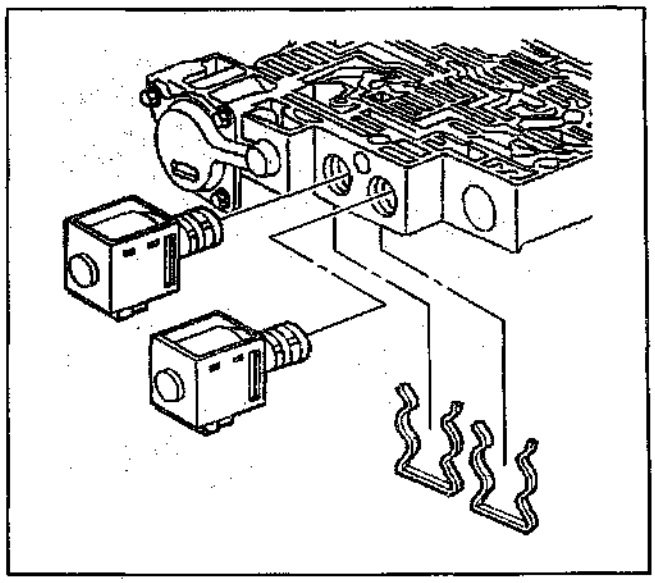


296162

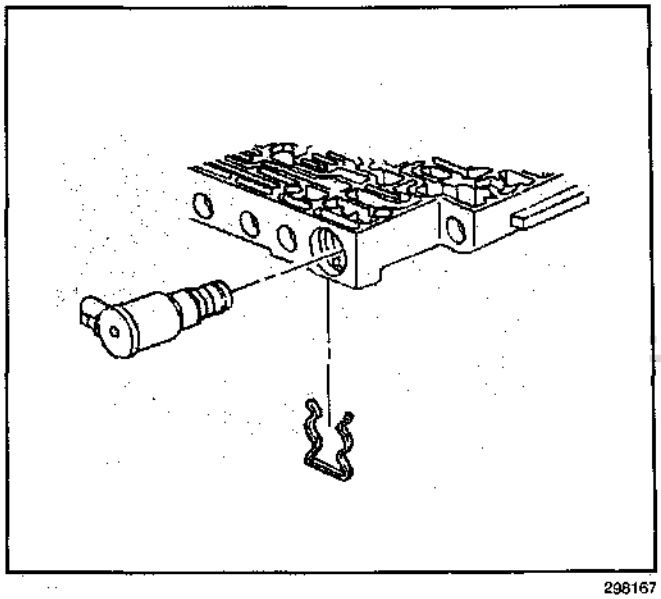
4. Remove the pressure control solenoid retainer.
5. Remove the pressure control solenoid.

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6. Remove the 1-2 and 2-3 shift solenoid retainers.
7. Remove the 1-2 and 2-3 shift solenoids.

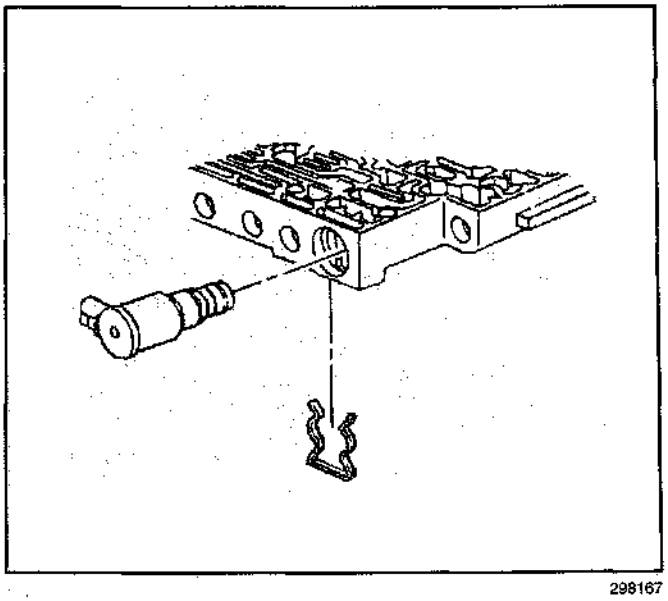

298169

8. Remove the 3-2 control solenoid retainer.
9. Remove the 3-2 control solenoid.

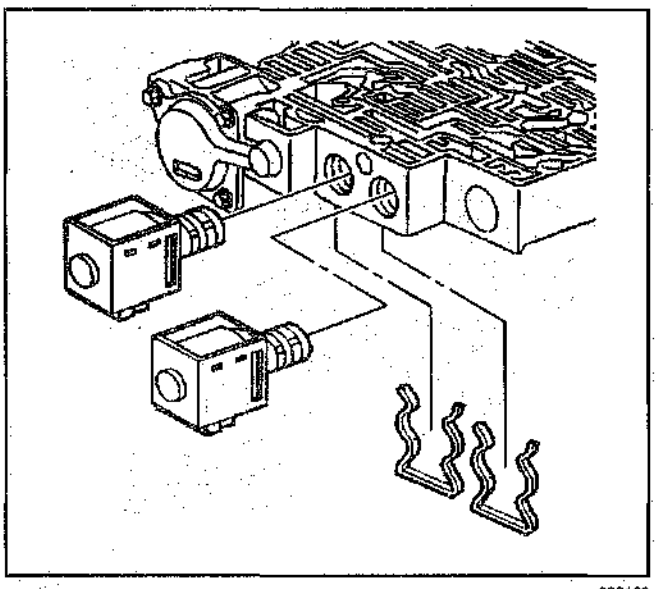

298167

Installation Procedure

1. Install the 3-2 control solenoid.
2. Install the 3-2 control solenoid retainer.

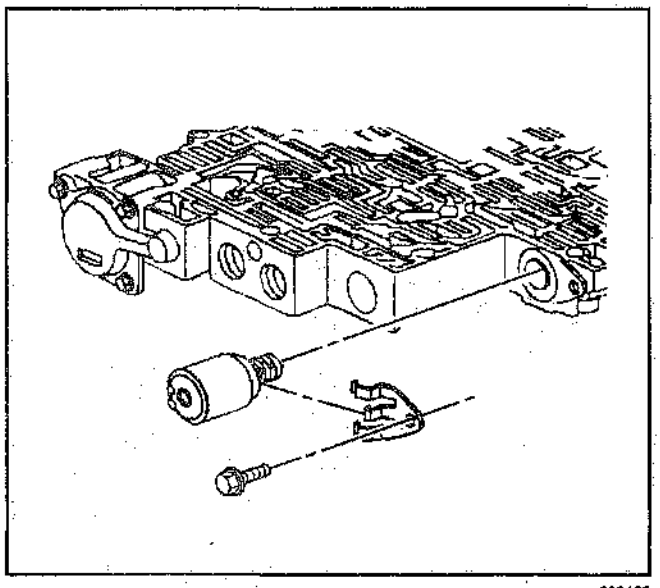

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298169

3. Install the 1-2 and 2-3 shift solenoids.
4. Install the 1-2 and 2-3 shift solenoid retainers.



298162

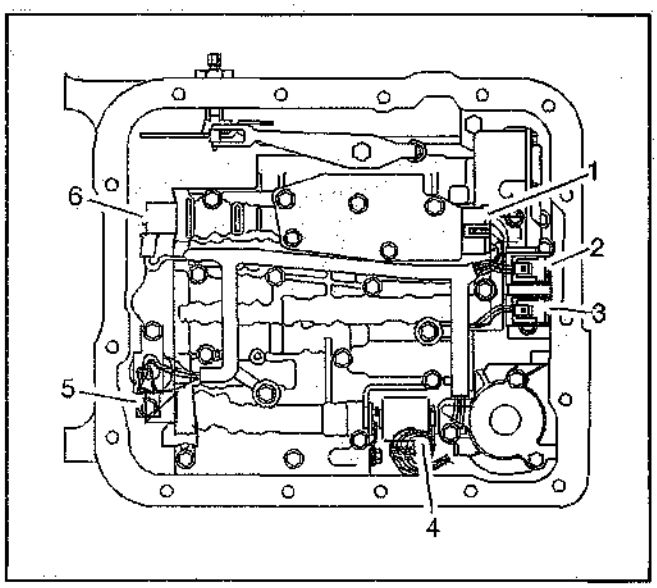
5. Install the pressure control solenoid.
   Ensure that the electrical tabs are facing outboard.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

6. Install the pressure control solenoid retainer and retaining bolt.

   Tighten

   Tighten the pressure control solenoid retaining bolt to 11 N·m (97 lb in).



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7. Connect the internal wiring harness electrical connectors to the following components:
   - Transmission fluid pressure switch (1)
   - 1-2 shift control solenoid (2)
   - 2-3 shift control solenoid (3)
   - Pressure control solenoid (4)
   - TCC PWM solenoid (5)
   - 3-2 control solenoid (6)
8. Install the 1-2 accumulator. Refer to *Accumulator Assembly, Spacer Plate, and Gaskets.*
9. Install the transmission oil pan and filter. Refer to *Automatic Transmission Fluid/Filter Changing.*

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Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness

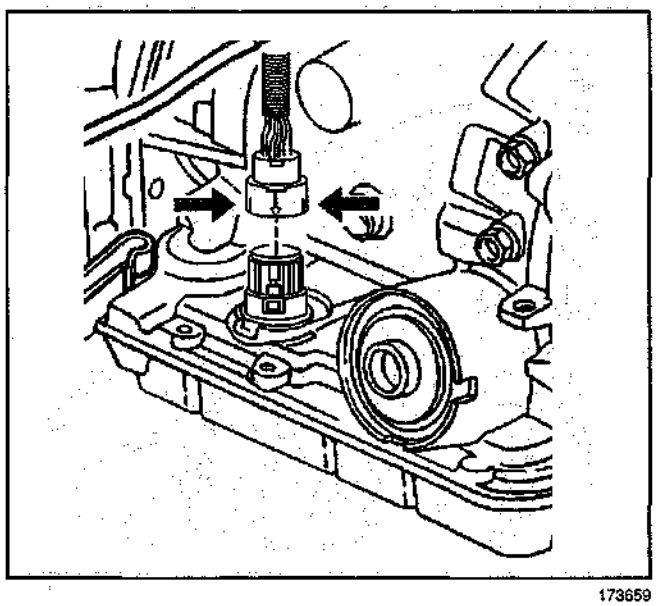
Removal Procedure

Tools Required

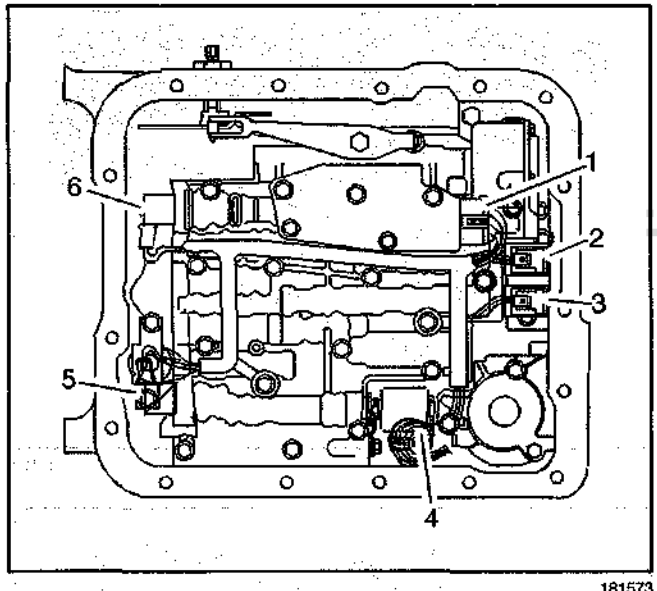
J 28458 Power Piston Seal Protector and Diaphragm Retainer Installer

1. Remove the catalytic converter. Refer to *Catalytic Converter Replacement (3.8 L)* or *Oxidation Catalytic Converter Replacement (5.7 L Right)* in Engine Exhaust.
2. Remove the transmission oil pan and the filter. Refer to *Automatic Transmission Fluid/Filter Changing*.
3. Disconnect the transmission harness 20-way connector from the transmission internal harness pass-through connector.

   Depress both tabs on the connector and pull straight up; do not pry the connector.
4. Remove the 1-2 accumulator. Refer to *Accumulator Assembly, Spacer Plate, and Gaskets*.
5. Disconnect the internal wiring harness electrical connectors from the following components:
   - Transmission fluid pressure switch (1)
   - 1-2 shift control solenoid (2)
   - 2-3 shift control solenoid (3)
   - Pressure control solenoid (4)
   - TCC PWM solenoid (5)
   - 3-2 control solenoid (6)

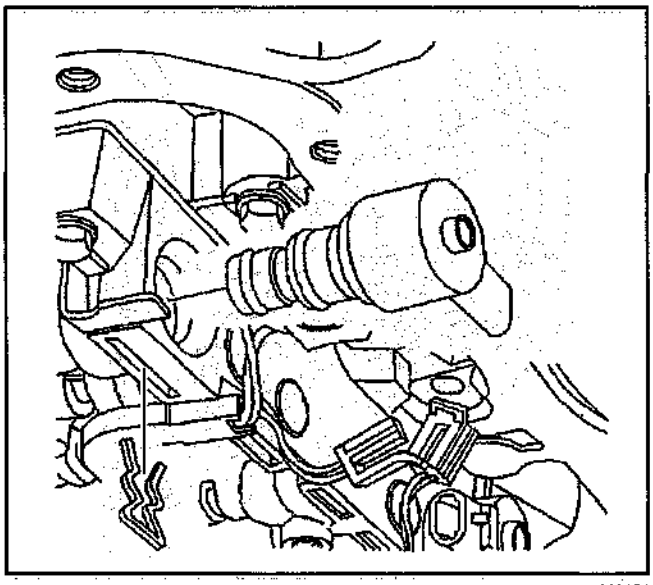


173659



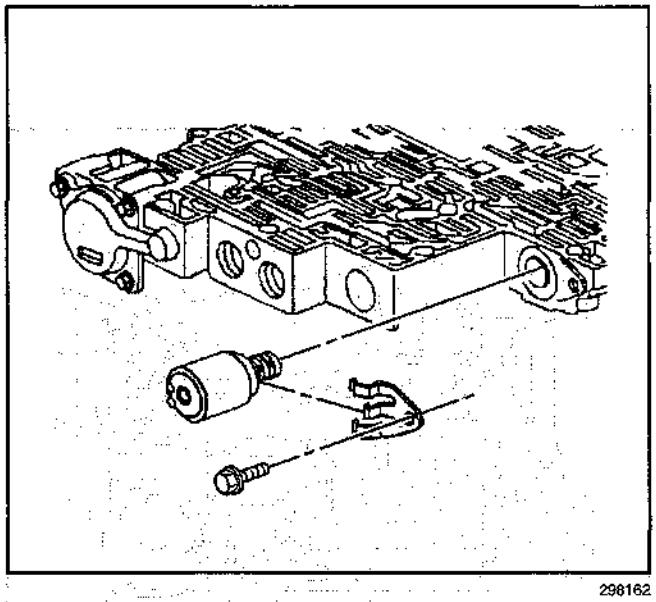
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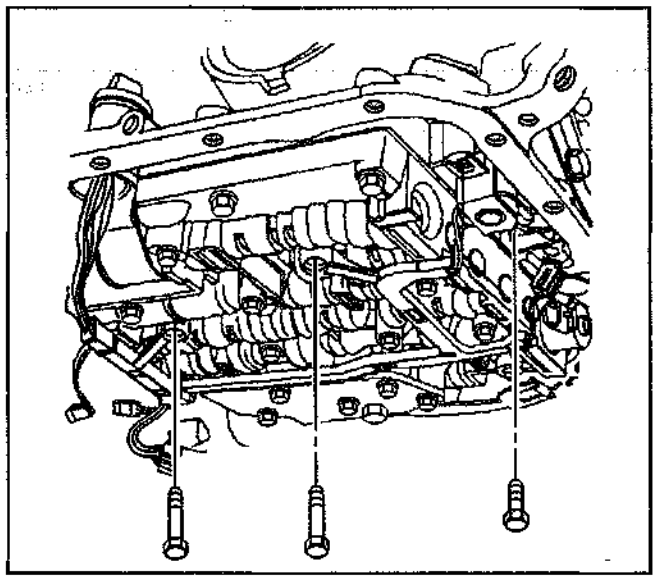
298154

6. Remove the TCC PWM solenoid retainer.
7. Remove the TCC PWM solenoid in order to access one of the TCC solenoid retaining bolts.



298162

8. Remove the pressure control solenoid retainer.
9. Remove the pressure control solenoid.

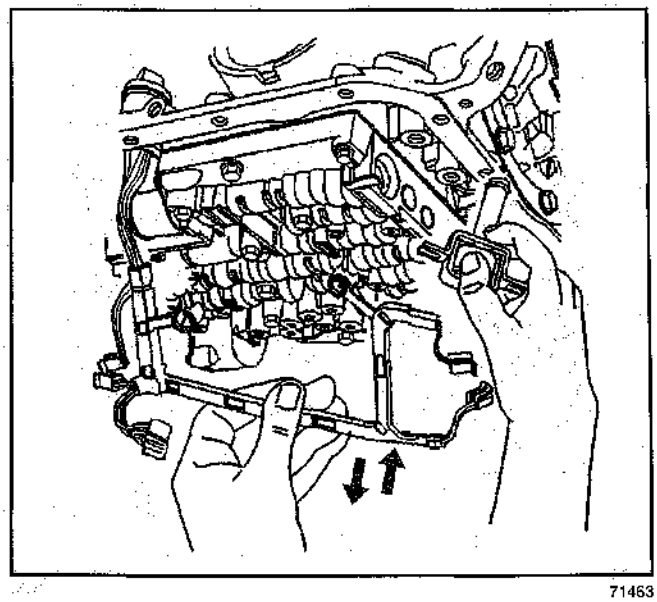


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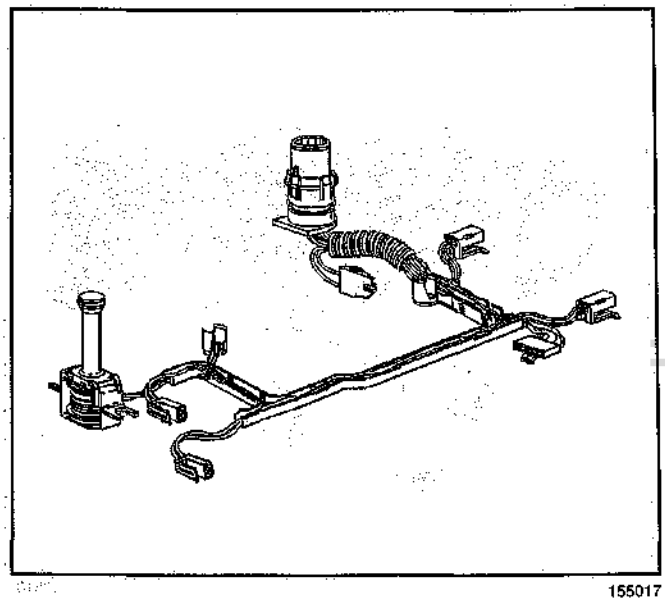
10. Remove the TCC solenoid retaining bolts and the valve body bolts which retain the internal wiring harness.

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11. Using *J 28458*, release the pass-through electrical connector from the transmission case.
    11.1. Use the small end of the *J 28458* over the top of the connector.
    11.2. Twist in order to release the four tabs retaining the connector.
    11.3. Pull the harness connector down through the transmission case.
12. Remove the TCC solenoid (with O-ring seal) and wiring harness assembly from the transmission case.

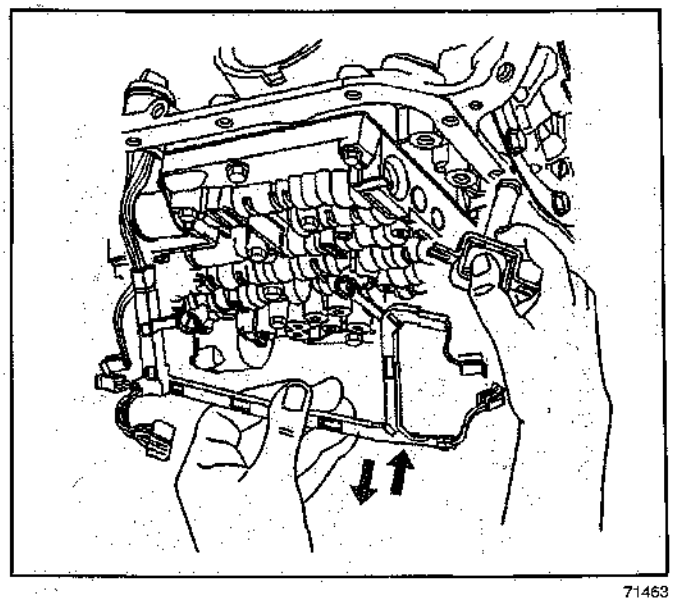

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13. Inspect the TCC solenoid and wiring harness assembly for the following defects:
    - Damage
    - Cracked connectors
    - Exposed wires
    - Loose pins

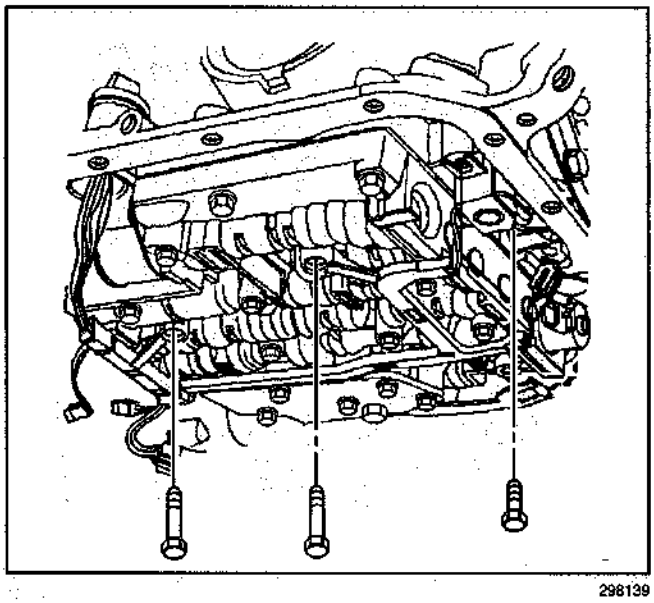

155017

Installation Procedure

1. Install the wiring harness and TCC solenoid assembly with a new O-ring seal to the valve body.
2. Install the pass-through electrical connector to the transmission case.


71463

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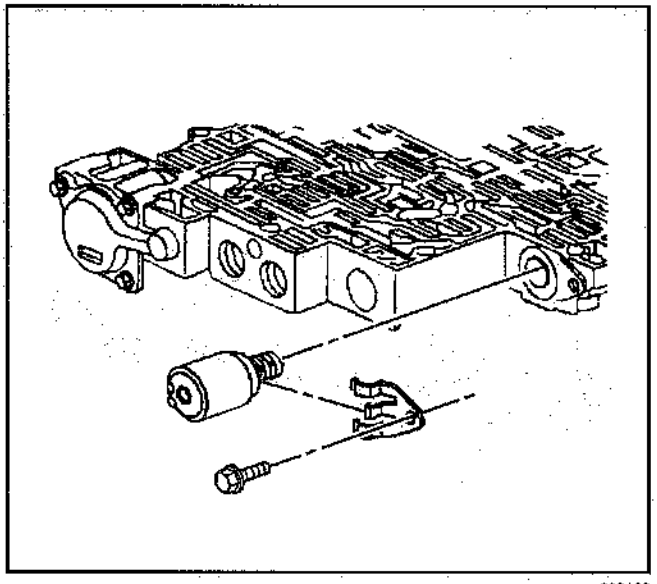
298139

Notice: Refer to *Fastener Notice* in Cautions and Notices.

3. Install the valve body bolts which retain the internal wiring harness and install the TCC solenoid retaining bolts.

   Tighten

   - Tighten the control valve body retaining bolts to 11 N·m (97 lb in).
   - Tighten the TCC solenoid retaining bolts to 11 N·m (97 lb in).



298162

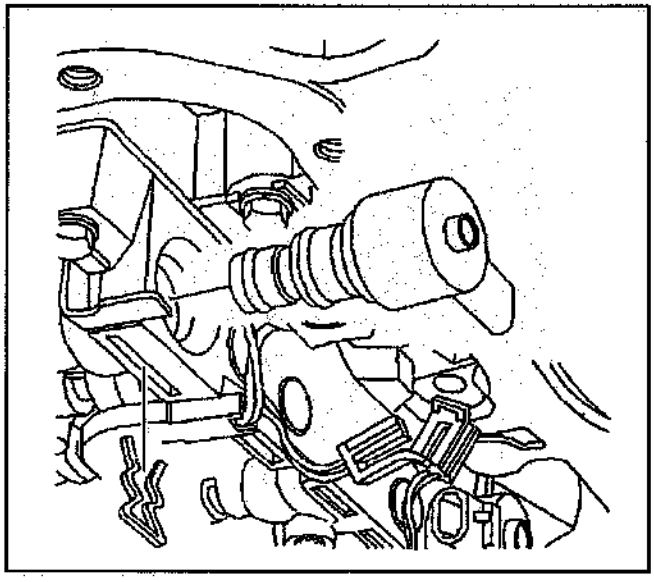
4. Install the pressure control solenoid.

   Ensure that the electrical tabs are facing outboard.

5. Install the pressure control solenoid retainer and retaining bolt.

   Tighten

   Tighten the pressure control solenoid retaining bolt to 11 N·m (97 lb in).

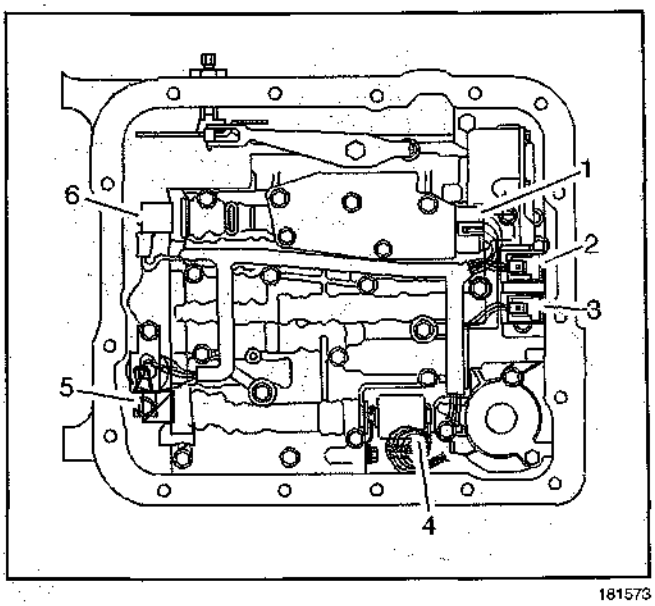


298154

6. Install the TCC PWM solenoid to the control valve body.
7. Install the TCC PWM solenoid retainer.

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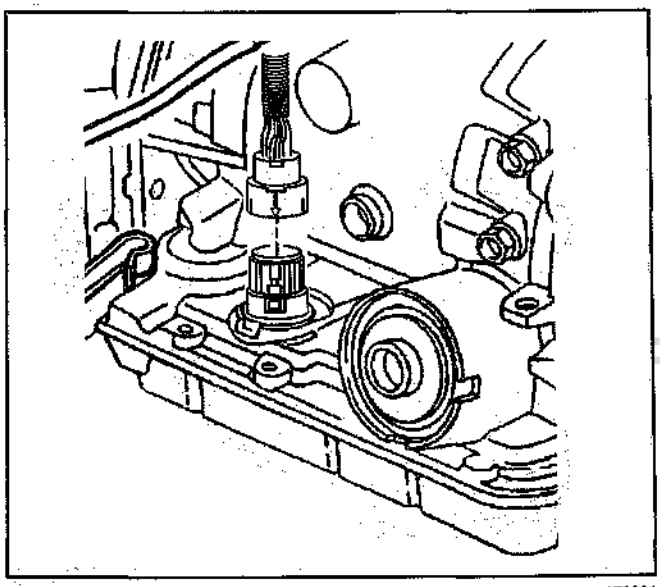
8. Connect the internal wiring harness electrical connectors to the following components:
   - Transmission fluid pressure switch (1)
   - 1-2 shift control solenoid (2)
   - 2-3 shift control solenoid (3)
   - Pressure control solenoid (4)
   - TCC PWM solenoid (5)
   - 3-2 control solenoid (6)
9. Install the 1-2 accumulator. Refer to *Accumulator Assembly, Spacer Plate, and Gaskets.*



181573

10. Connect the transmission harness 20-way connector to the transmission pass-through connector.

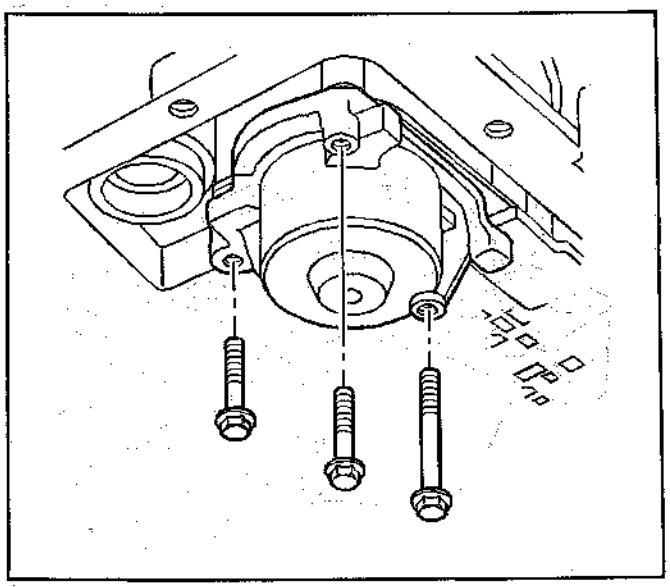
    Align the arrows on each half of the connector and insert straight down.
11. Install the transmission oil pan and filter. Refer to *Automatic Transmission Fluid/Filter Changing.*
12. Install the catalytic converter. Refer to *Catalytic Converter Replacement (3.8 L)* or *Oxidation Catalytic Converter Replacement (5.7 L Right)* in Engine Exhaust.


173661

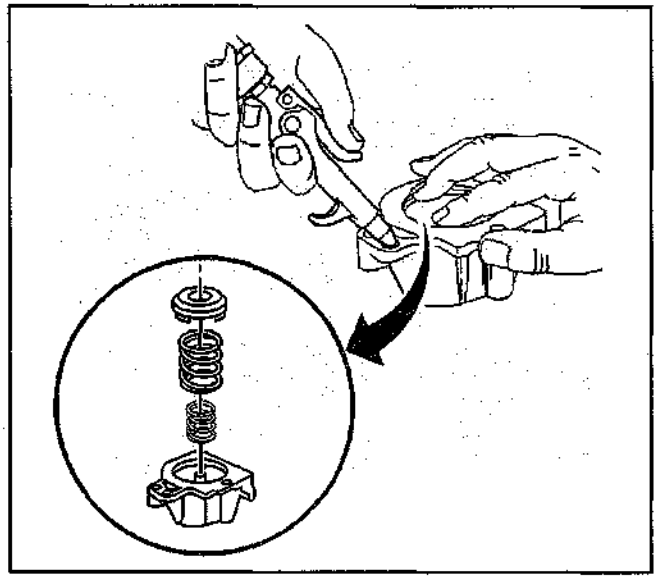
Accumulator Assembly, Spacer Plate, and Gaskets

Removal Procedure

1. Remove the transmission oil pan and filter. Refer to *Automatic Transmission Fluid/Filter Changing.*
2. Remove the control valve body. Refer to *Valve Body and Pressure Switch Replacement.*
3. Remove the accumulator cover retaining bolts.
4. Remove the 1-2 accumulator cover and pin.

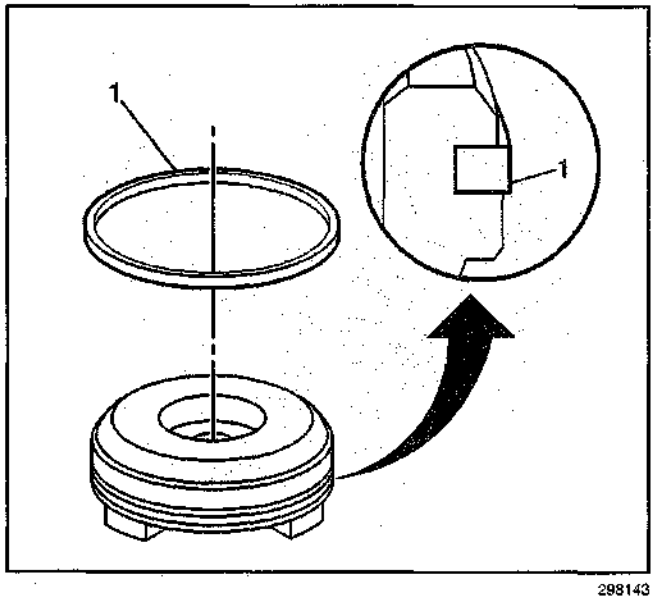

14464

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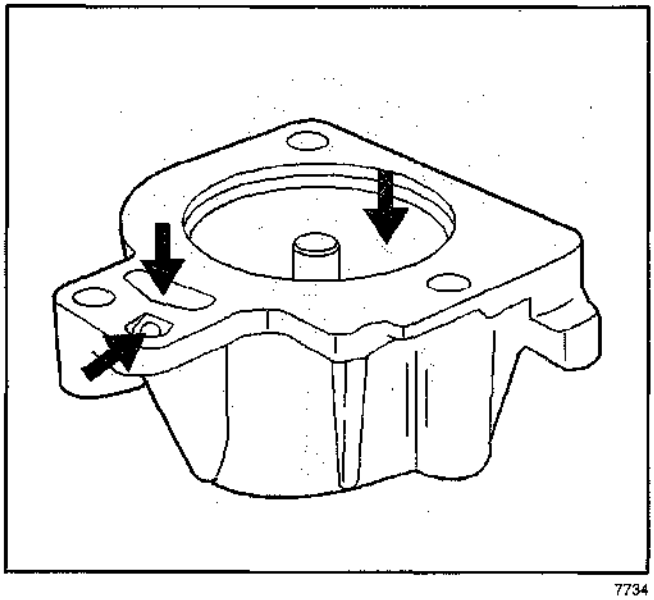
298151

5. Disassemble the 1-2 accumulator.
   5.1. Blow compressed air into the 1-2 accumulator cover, as shown, to remove the 1-2 accumulator piston.
   5.2. Remove the 1-2 accumulator inner and outer springs.
6. Inspect the 1-2 accumulator inner and outer springs for cracks.



298143

7. Remove the 1-2 accumulator piston seal (1) from the 1-2 accumulator piston.
8. Inspect the 1-2 accumulator piston for the following defects:
   - Porosity
   - Cracks
   - Scoring
   - Nicks and scratches

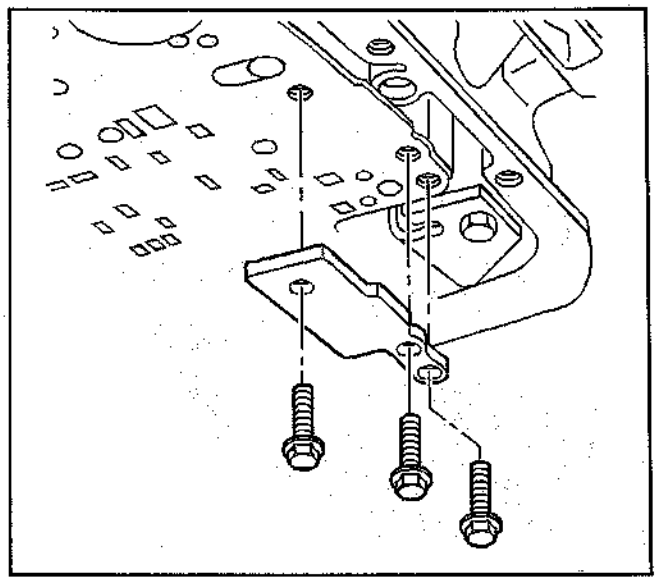


7734

9. Inspect the 1-2 accumulator cover for the following defects:
   - Porosity
   - Cracks
   - Scoring
   - Nicks and scratches

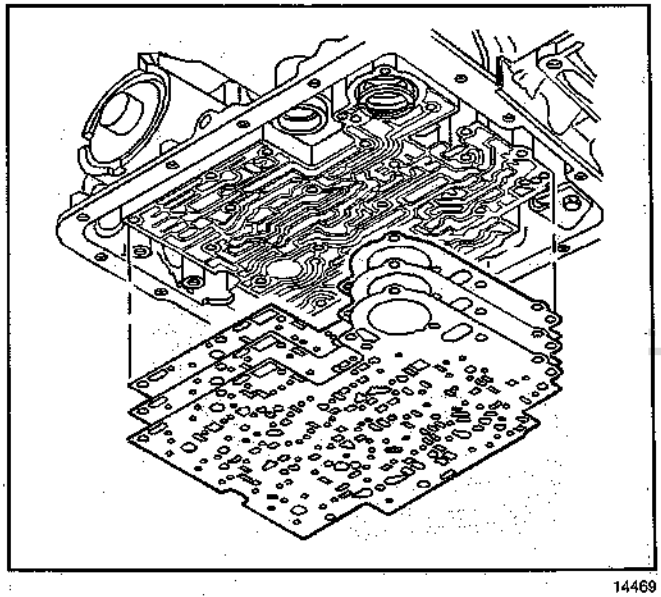
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10. Remove the spacer plate support retaining bolts.
11. Remove the spacer plate support.



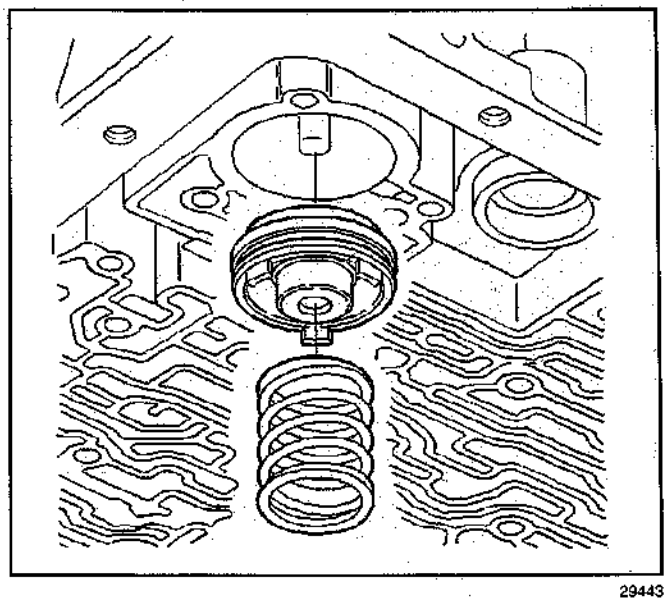
14468

12. Remove the spacer plate to valve body gasket, the spacer plate and the spacer plate to transmission case gasket.



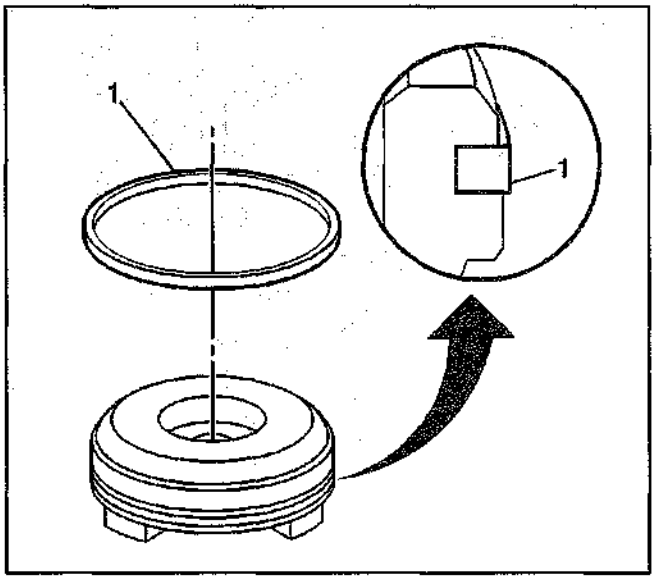
14469

13. Remove the 3-4 accumulator spring and the 3-4 accumulator piston.
14. Inspect the 3-4 accumulator spring for cracks.



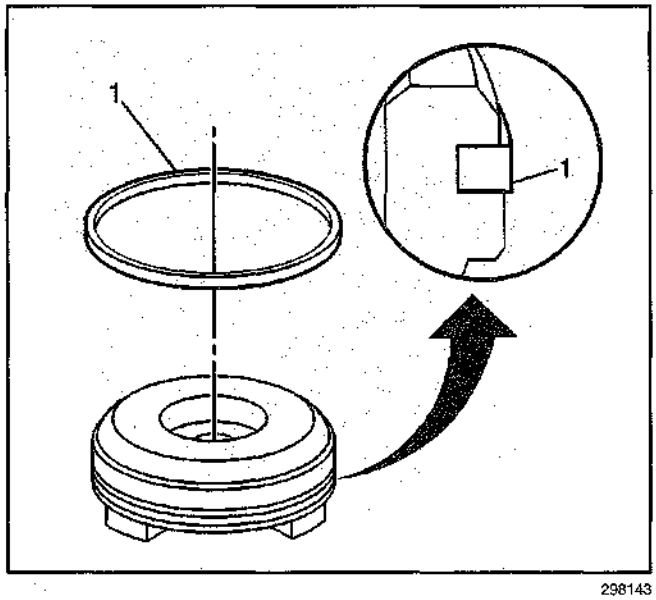
29443

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298143

15. Remove the 3-4 accumulator piston seal (1) from the 3-4 accumulator piston.
16. Inspect the 3-4 accumulator piston for the following defects:
    - Porosity
    - Cracks
    - Scoring
    - Nicks and scratches



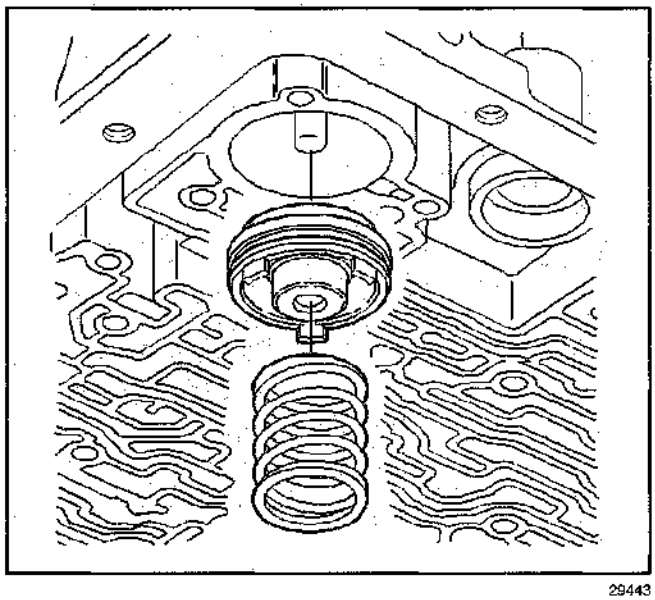
298143

Installation Procedure

Tools Required:

- *J 25025-B* Guide Pin Set
- *J 36850* Transmission Assembly Lubricant

1. Install a new 3-4 accumulator piston seal (1) to the 3-4 accumulator piston.


29443

2. Install the 3-4 accumulator piston onto the pin in the transmission case.

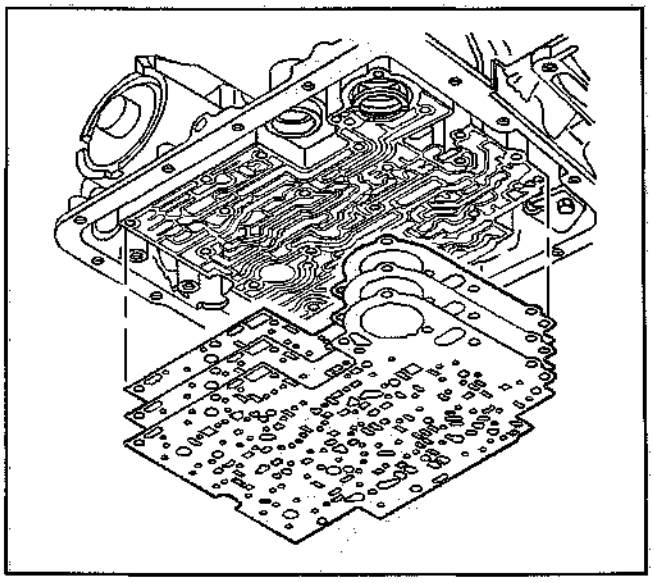
   Ensure that the 3-4 accumulator piston legs face away from the transmission case.
3. Install the 3-4 accumulator piston spring.

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4. Install the *J 25025-B* to the transmission case.
5. Install the spacer plate to transmission case gasket and the spacer plate to valve body gasket to the spacer plate; use the *J 36850* in order to retain the gaskets to the spacer plate.
   - The case gasket is identified by a C.

     Be sure to place the case gasket on the transmission case side of the spacer plate.
   - The valve body gasket is identified by a V.

     Be sure to place the valve body gasket on the valve body side of the spacer plate.
6. Install the spacer plate to transmission case gasket, the spacer plate and the spacer plate to valve body gasket to the transmission case.

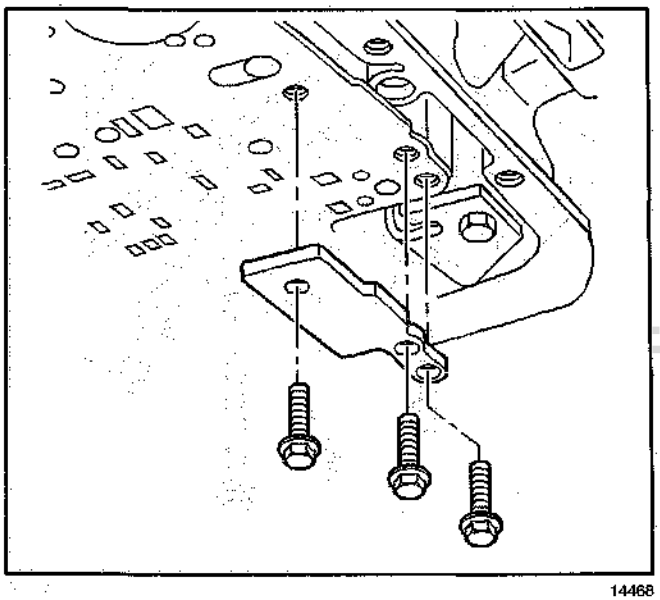

14469

Notice: Refer to *Fastener Notice* in Cautions and Notices.

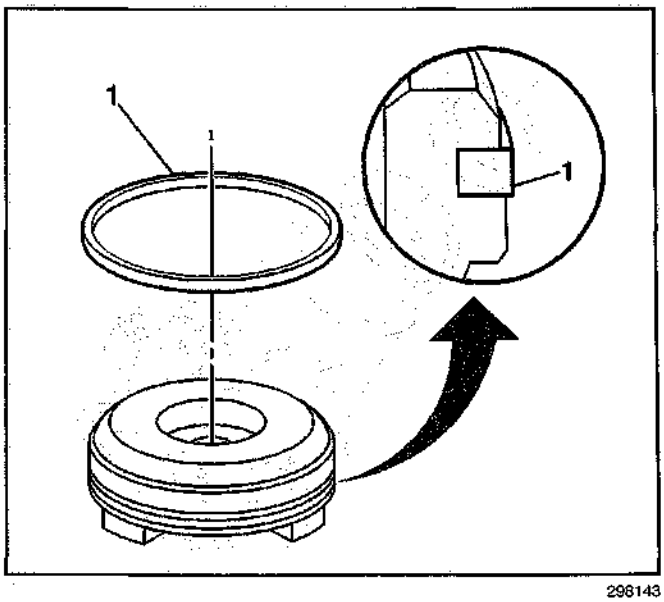
7. Install the spacer plate support and the spacer plate support retaining bolts.

   Tighten

   Tighten the spacer plate support retaining bolts to **11 N·m (97 lb in)**.

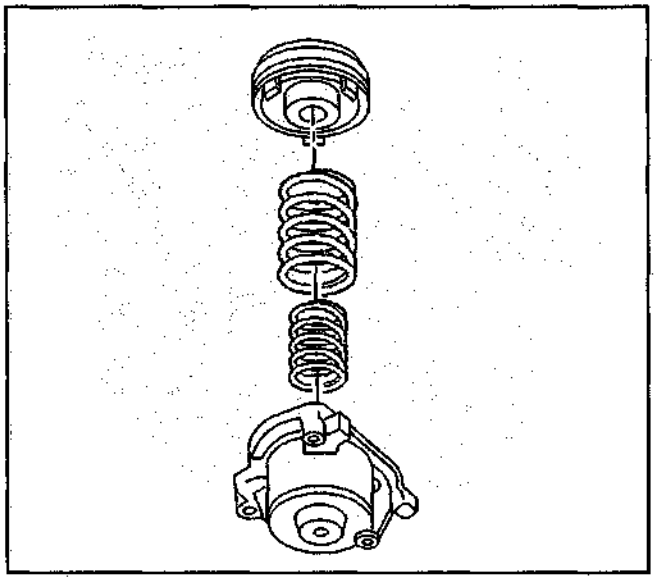

14468

8. Install a new 1-2 accumulator piston seal (**1**) to the 1-2 accumulator piston.



298143

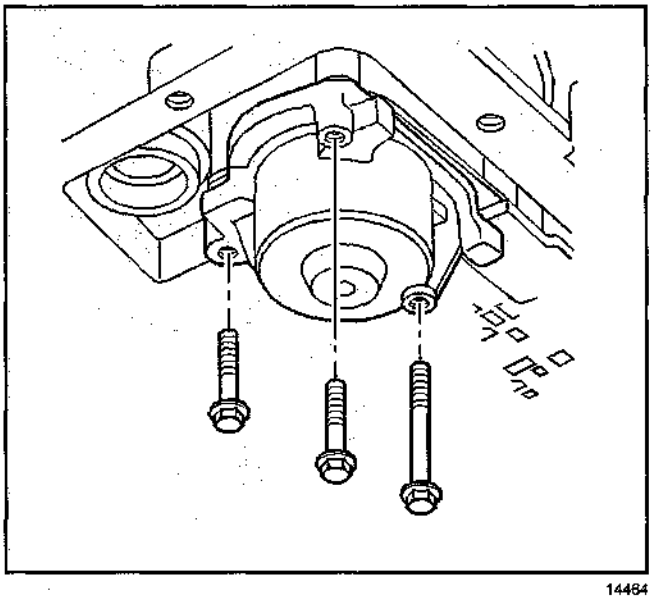
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71462

9. Install the 1-2 accumulator inner and outer springs to the 1-2 accumulator cover.
10. Install the 1-2 accumulator piston onto the pin in the 1-2 accumulator cover.

    Ensure that the piston legs face the accumulator cover.

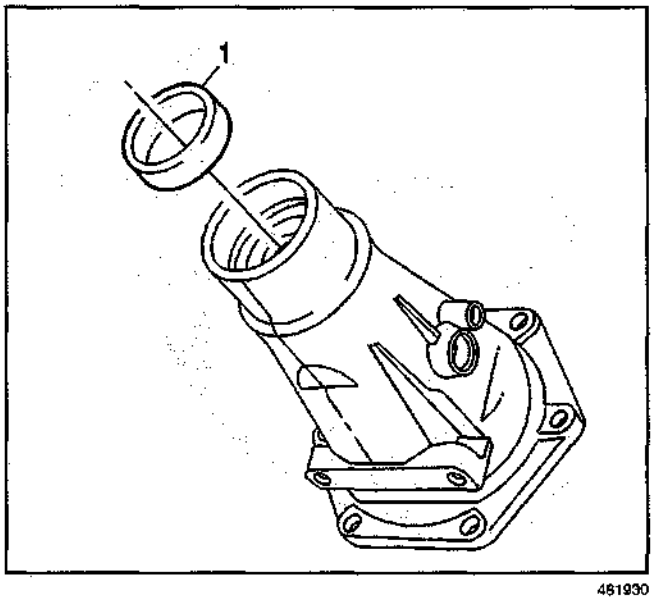


14464

11. Install the 1-2 accumulator cover and the accumulator cover retaining bolts.

    Tighten

    Tighten the accumulator cover retaining bolts to 11 N·m (97 lb in).
12. Remove the *J 25025-B* from the transmission case.
13. Install the control valve body. Refer to *Valve Body and Pressure Switch Replacement.*
14. Install the transmission oil pan and filter. Refer to *Automatic Transmission Fluid/Filter Changing.*



461930

Extension Housing Rear Oil Seal

Removal Procedure

1. Remove the propeller shaft. Refer to *Propeller Shaft Replacement - One Piece* or *Propeller Shaft Replacement - Two Piece* in Propeller Shaft.
2. Remove the case extension oil seal (1).

   Use a flat bladed tool to pry the seal (1) from the housing.

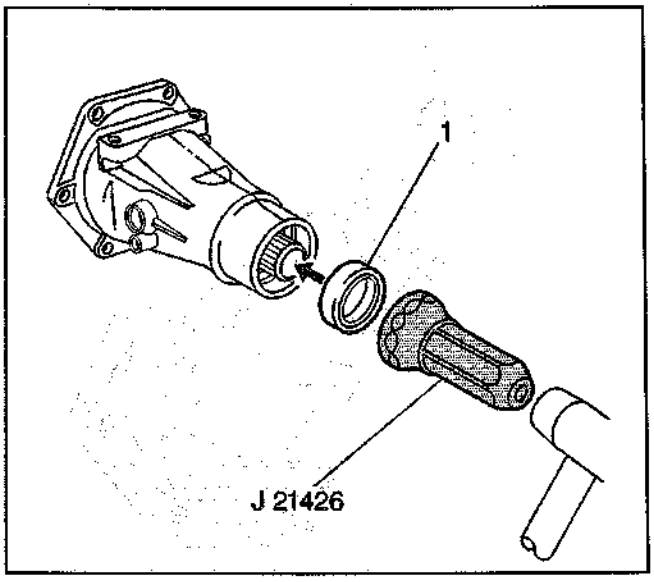
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Installation Procedure

Tools Required

J 21426 Extension Housing Seal Installer

1. Use the *J 21426* and a soft face hammer, install the case extension oil seal (1).
2. Install the propeller shaft. Refer to *Propeller Shaft Replacement - One Piece* or *Propeller Shaft Replacement - Two Piece* in Propeller Shaft.
3. Check the transmission fluid level.

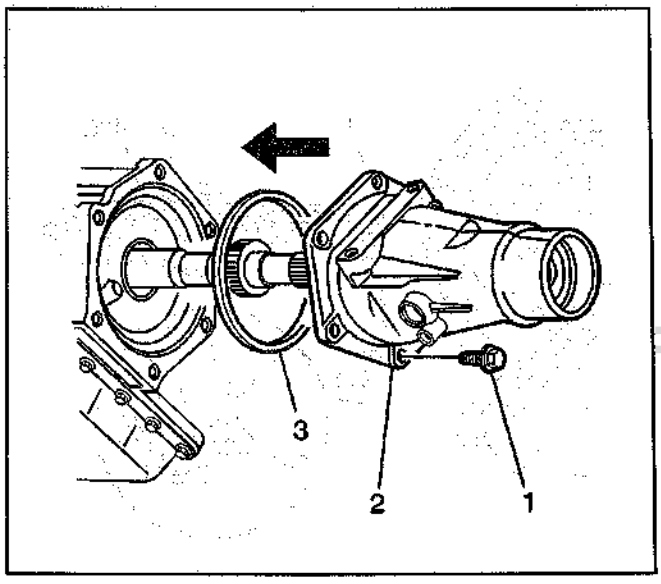


481931

Case Extension Assembly

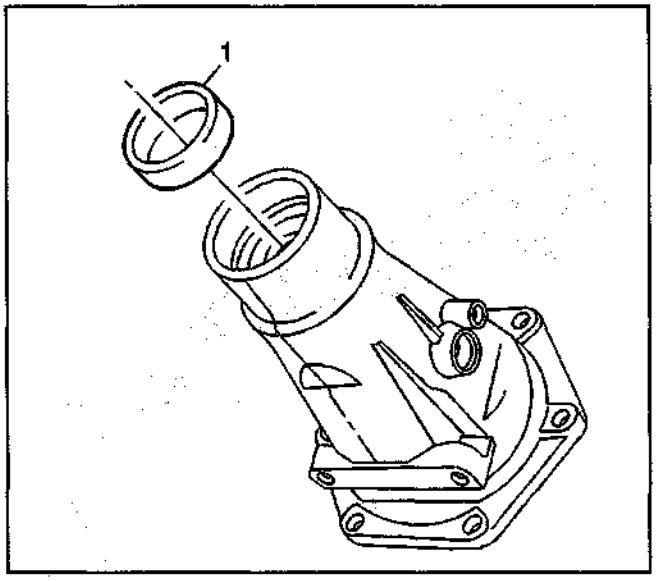
Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Remove the propeller shaft. Refer to *Propeller Shaft Replacement - One Piece* or *Propeller Shaft Replacement - Two Piece* in Propeller Shaft.
3. Remove the rear axle torque arm. Refer to *Torque Arm Replacement* in Rear Suspension.
4. Remove the catalytic converter hanger. Refer to *Converter Hanger Assembly Replacement (3.8 L Automatic)*, *Converter Hanger Assembly Replacement (3.8 L Manual)* or *Converter Hanger Assembly Replacement (5.7 L)* in Engine Exhaust.
5. Remove the case extension bolts (1).
6. Remove the case extension (2).
7. Remove the case extension seal (3). Discard the seal (3).



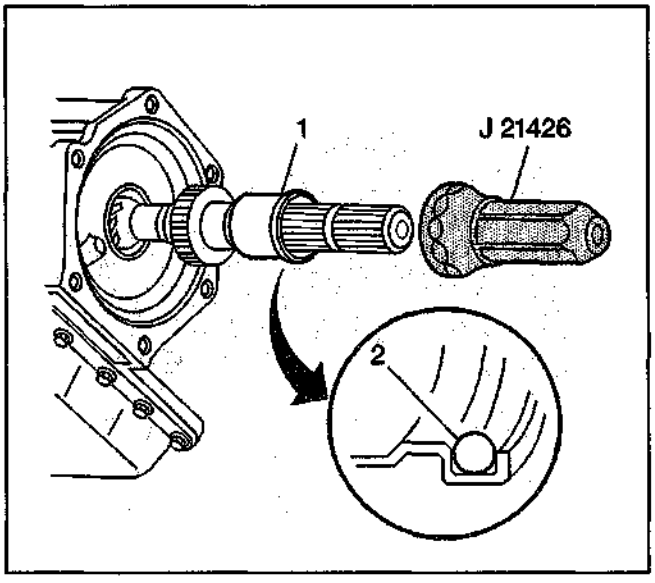
481933

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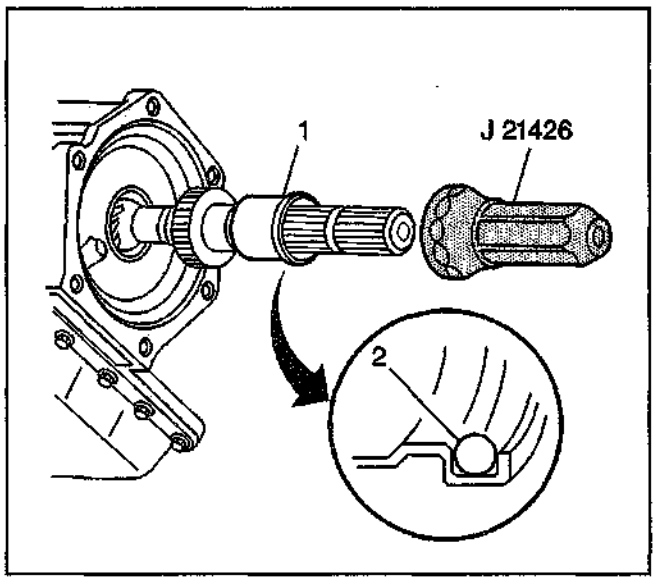
481930

8. Remove the case extension seal (1).



481935

9. Remove the output shaft sleeve (1), if necessary.
10. Remove the output shaft seal (2), if necessary.



481935

Installation Procedure

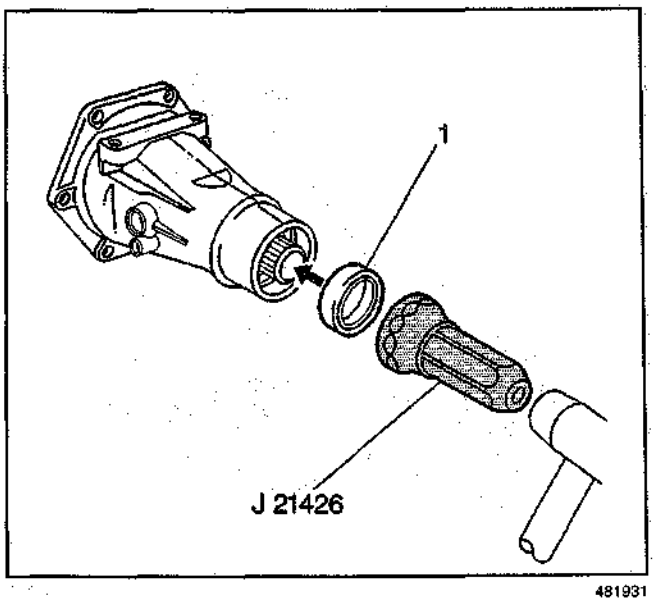
Tools Required

J 21426 Case Extension Oil Seal Installer

1. Install the output shaft sleeve seal (2), if necessary.
2. Install the output shaft (1) using *J 21426*, if necessary.

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3. Install a new case extension seal (1) using a soft face hammer and *J 21426*.



481931

4. Install a new case extension seal (3).
5. Install the case extension (2).

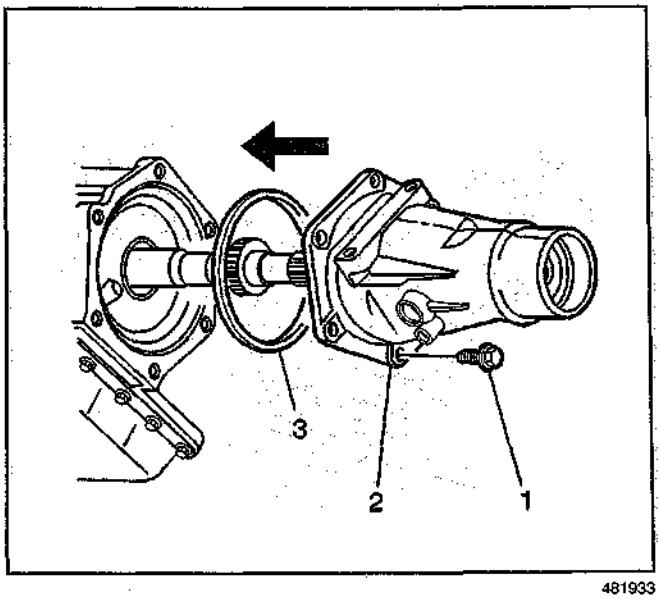
Notice: Refer to *Fastener Notice* in Cautions and Notices.

6. Install the case extension bolts (1).

   Tighten

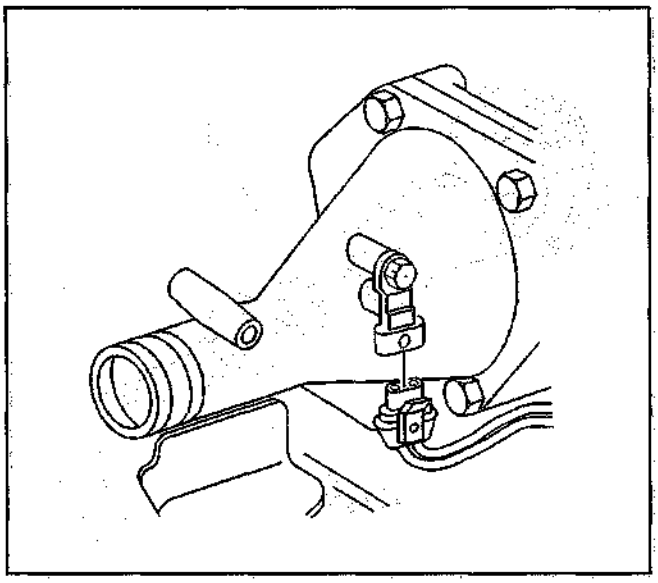
   Tighten the case extension bolts (1) to 35 N·m (26 lb ft).

7. Install the rear axle torque arm. Refer to *Torque Arm Replacement* in Rear Suspension.
8. Install the propeller shaft. Refer to *Propeller Shaft Replacement - One Piece* or *Propeller Shaft Replacement - Two Piece* in Propeller Shaft.
9. Install the catalytic converter hanger. Refer to *Converter Hanger Assembly Replacement (3.8 L Automatic)*, *Converter Hanger Assembly Replacement (3.8 L Manual)* or *Converter Hanger Assembly Replacement (5.7 L)* in Engine Exhaust.
10. Lower the vehicle.



481933

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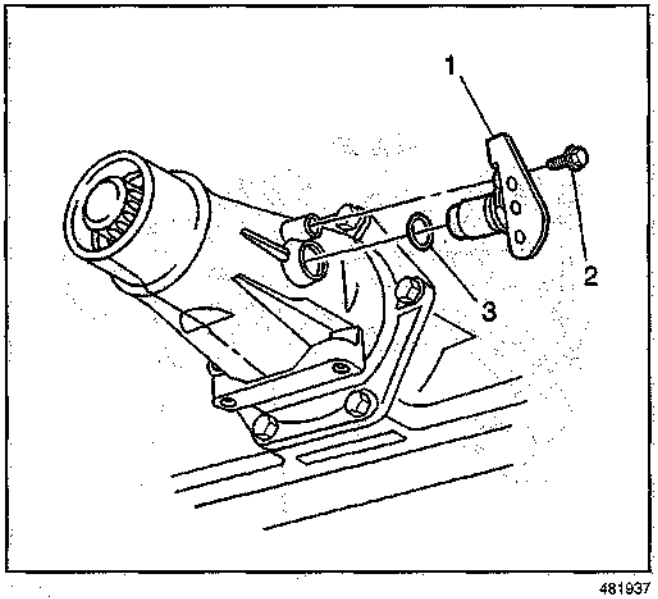


206480

Vehicle Speed Sensor Replacement

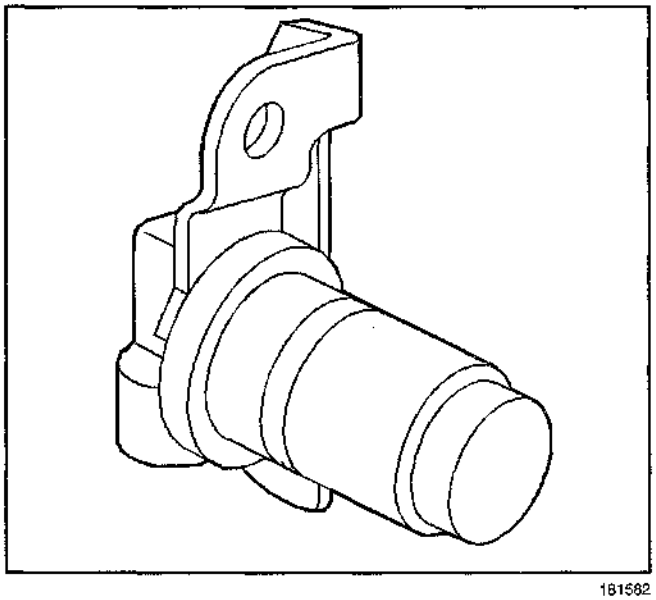
Removal Procedure

1. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
2. Disconnect the vehicle speed sensor electrical connector.



481937

3. Remove the vehicle speed sensor bolt (1).
4. Remove the vehicle speed sensor (2) and the O-ring seal (3).
   Use a suitable container in order to catch any transmission fluid that may spill.



181582

5. Inspect the transmission speed sensor for the following defects:
   - Cracks
   - Nicks
   - Damage

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Installation Procedure

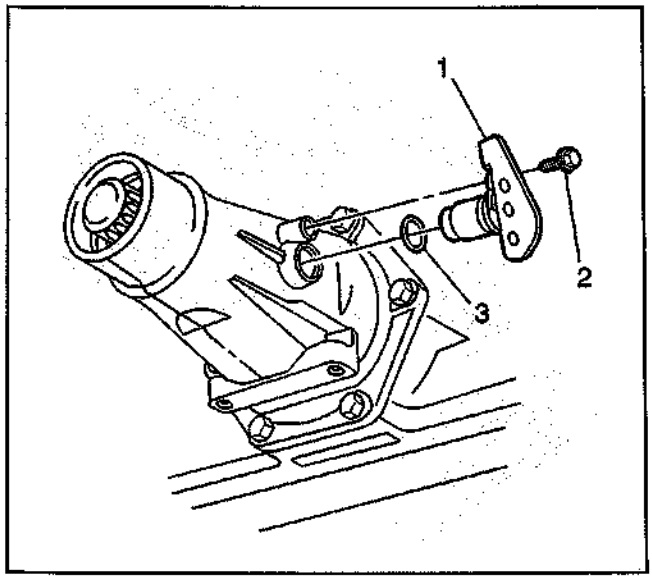
1. Install the vehicle speed sensor (2) with a new O-ring seal (3).

Notice: Refer to *Fastener Notice* in Cautions and Notices.

2. Install the vehicle speed sensor bolt (1).

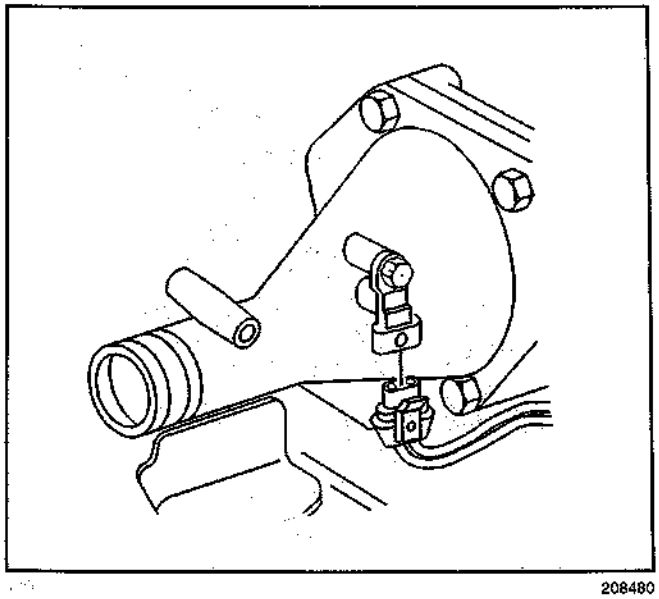
   Tighten

   Tighten the vehicle speed sensor bolt (1) to 11 N·m (97 lb in).



481937

3. Connect the vehicle speed sensor electrical connector.
4. Lower the vehicle.
5. Check transmission fluid, add as required.


208480

Transmission Replacement (3.8 L)

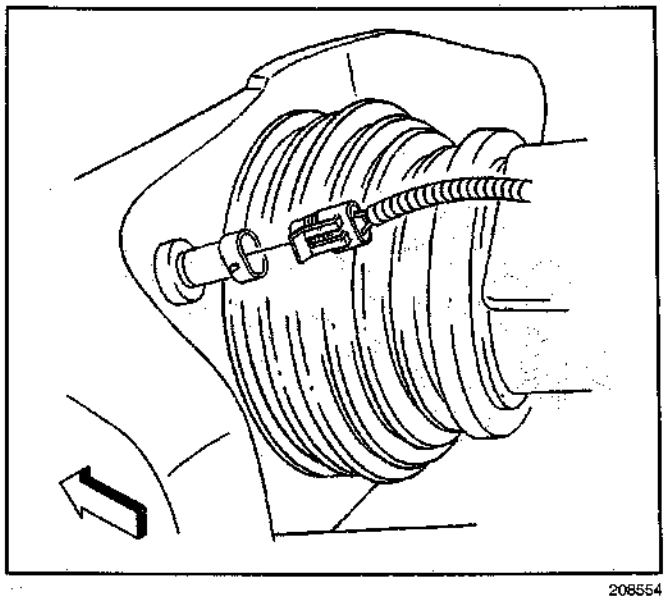
Removal Procedure

Tools Required

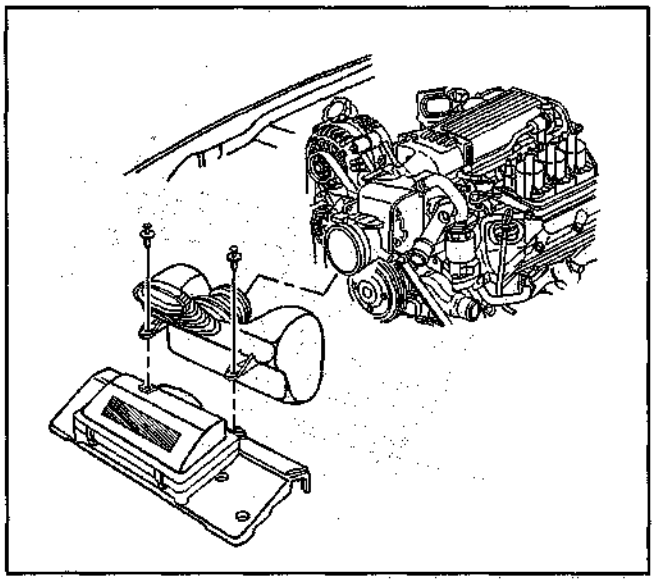
J 21366 Converter Holding Strap

Perform a pressure test before removing the transmission, this will help to aid in the diagnosis.

1. Disconnect the intake air temperature (IAT) sensor electrical connector.

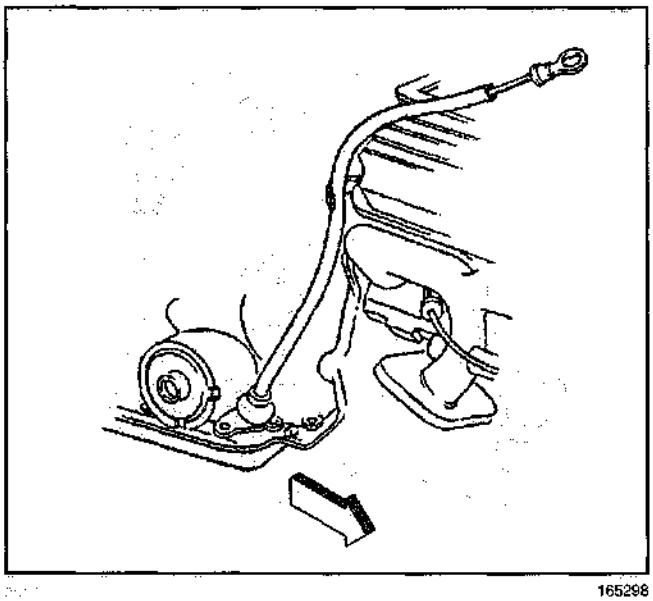

208554

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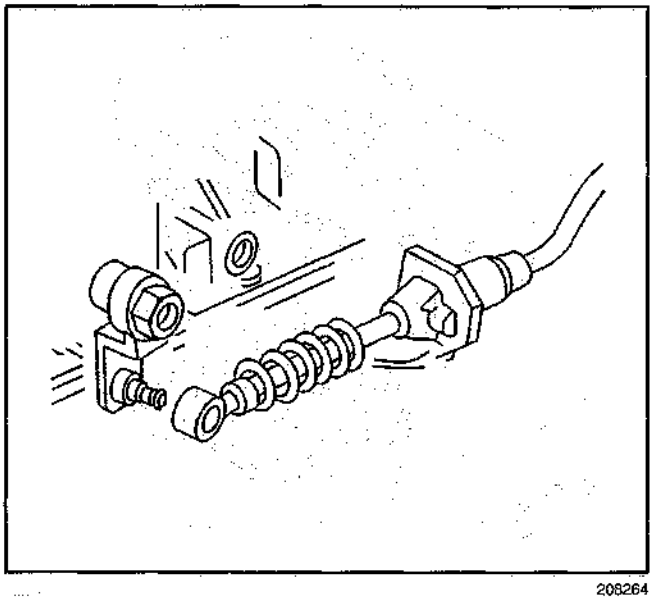
554755

2. Remove the air intake duct.



165298

3. Remove the transmission fluid level indicator.
4. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
5. Remove the 3 way catalytic converter. Refer to *Catalytic Converter Replacement (3.8 L)* in Engine Exhaust.

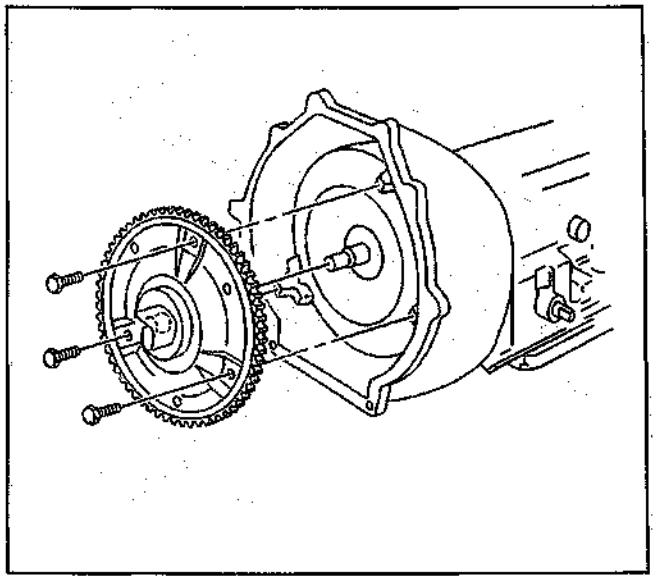


208264

6. Unsnap the range selector lever cable from the transmission.
7. Remove the propeller shaft. Refer to *Propeller Shaft Replacement - Two Piece* in Propeller Shaft.
8. Support the rear axle with jack stands.
9. Remove the rear axle torque arm. Refer to *Torque Arm Replacement* in Rear Suspension.
10. Remove the torque converter cover. Refer to *Torque Converter Cover Replacement (3.8 L)*.

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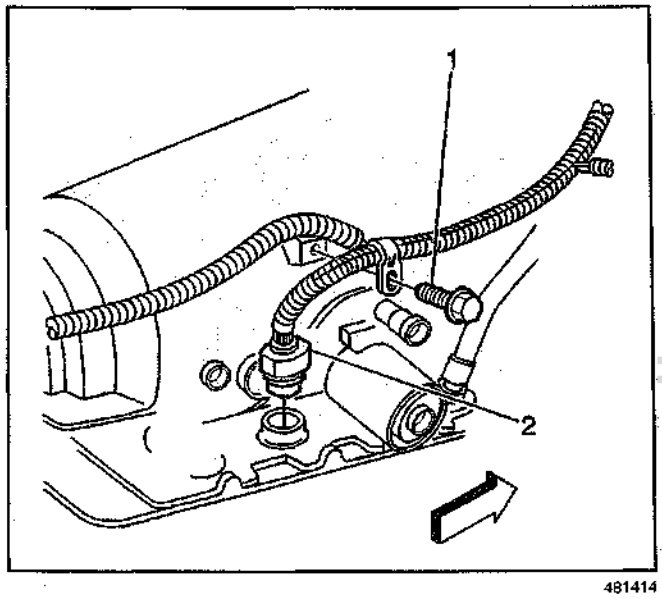
11. Remove the torque converter bolts.
12. Remove the transmission oil cooler pipes. Refer to *Oil Cooler Line Replacement*.



208580

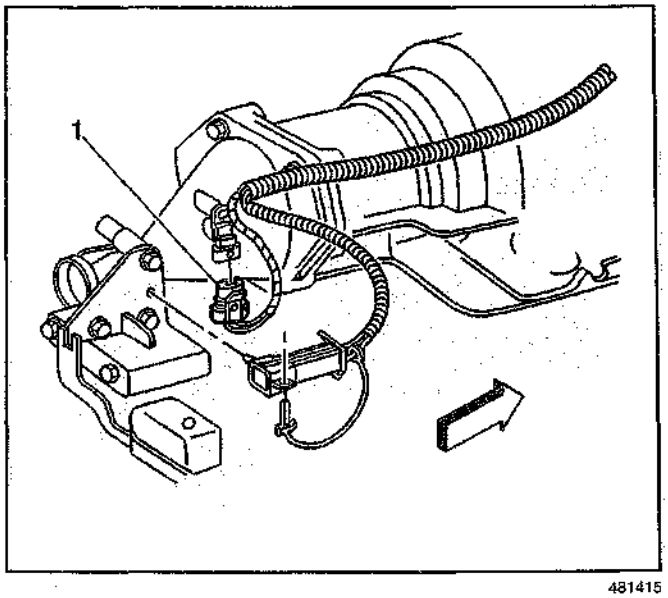
13. Remove the wiring harness clamp bolt (1) attaching the clamp the transmission.
14. Disconnect the transmission 20-way electrical connector (2).

    Depress both tabs on the connector and pull straight up; do not pry the connector.



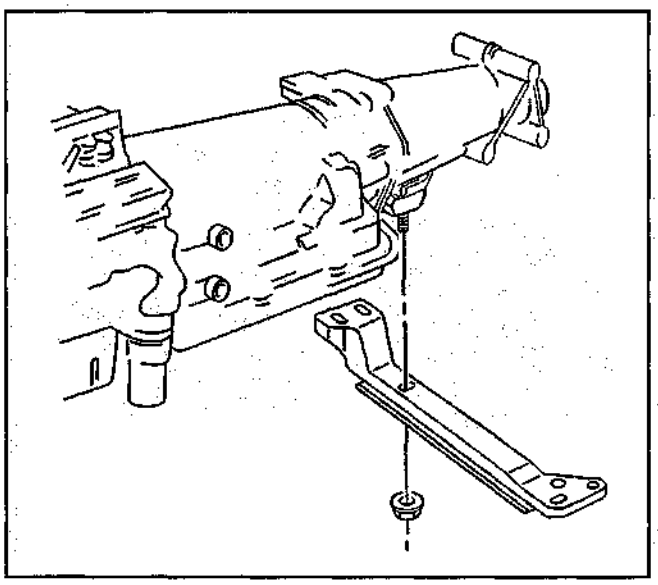
481414

15. Disconnect the vehicle speed sensor electrical connector (1).
16. Support the transmission using a transmission jack.

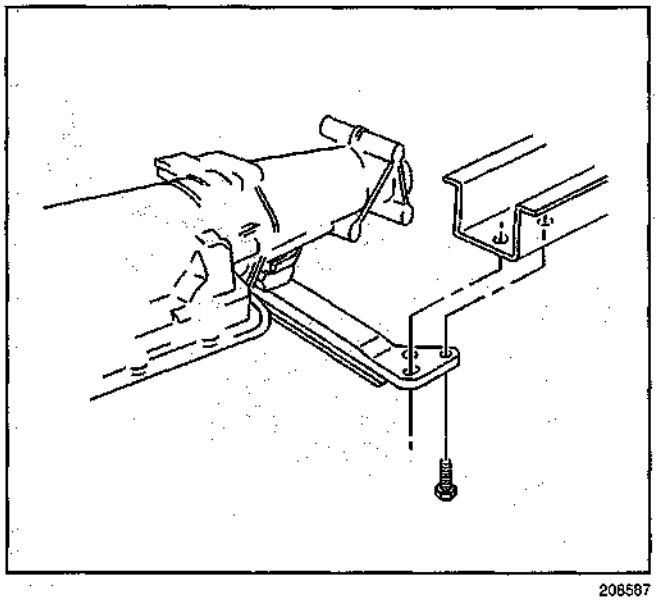


481415

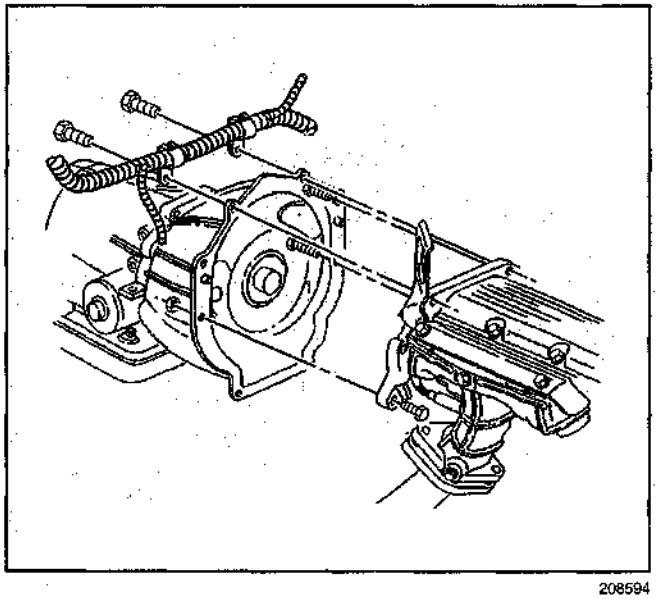
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208583

17. Remove the transmission mount nut.


208587

18. Remove the support bolts and the support from the rail.
19. Lower the tail section of the transmission slightly.


208594

20. Remove the transmission bolts and nuts.
21. Remove the transmission fluid fill tube.
22. Separate the transmission from the engine.
23. Attach the *J 21366* to the transmission.
24. Lower the transmission from the vehicle.

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Installation Procedure

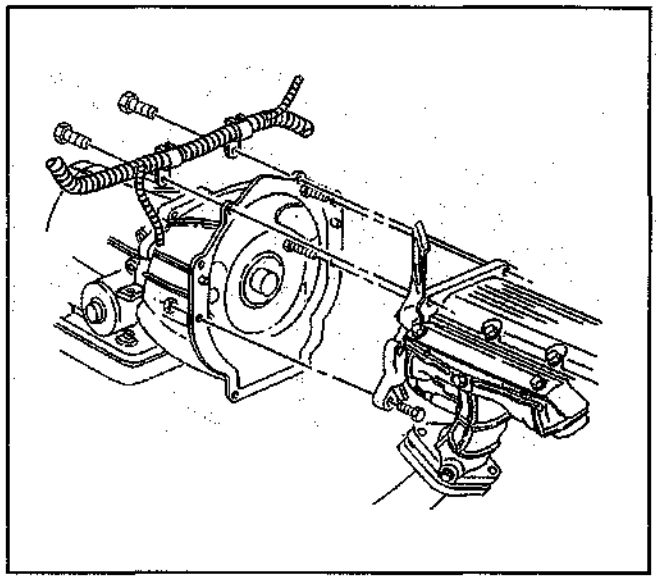
1. Raise the transmission into the vehicle.
2. Remove the *J 21366* from the transmission.
3. Align the transmission to the engine.
4. Install the transmission fluid fill tube.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

5. Install the transmission bolts and nuts.

   Tighten

   Tighten the transmission bolts and nuts to 95 N·m (70 lb ft).

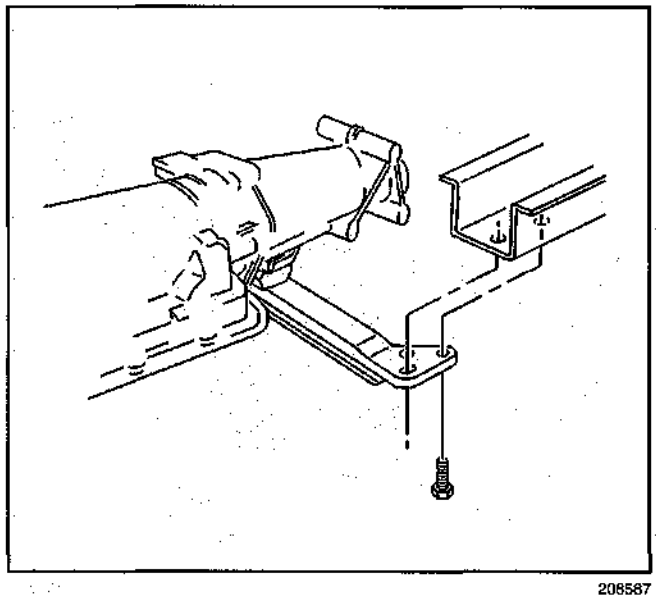


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6. Install the transmission support and support bolts to the rail.

   Tighten

   Tighten the transmission support bolts to 90 N·m (66 lb ft).



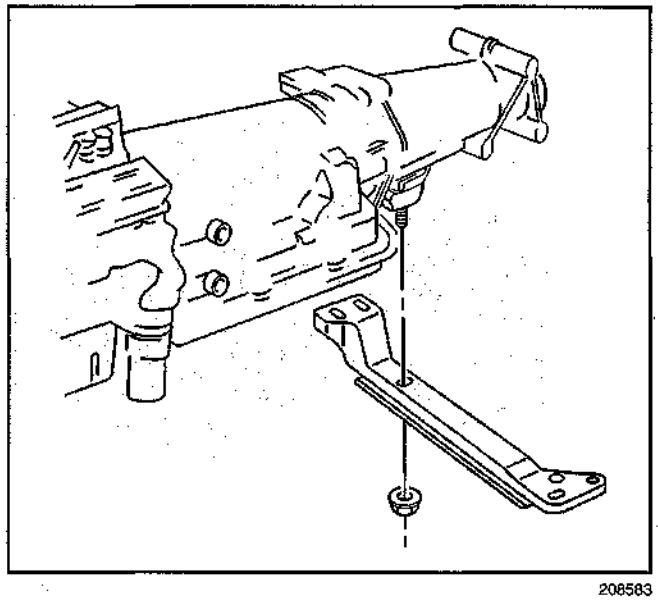
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7. Install the transmission mount nut.

   Tighten

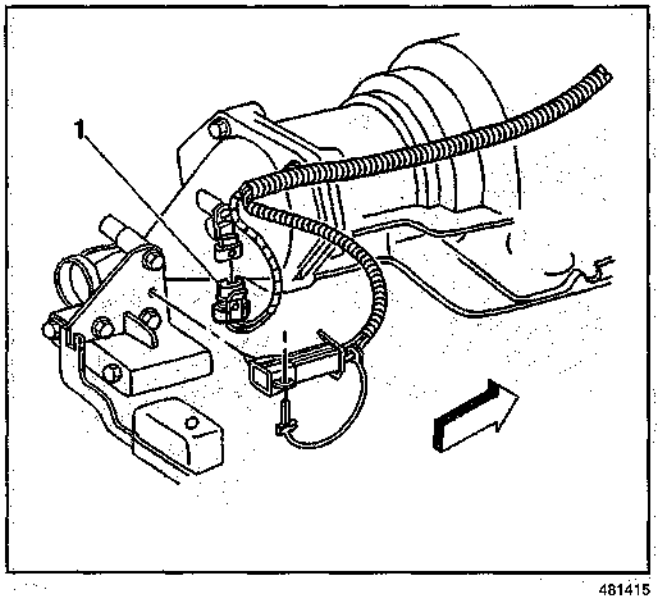
   Tighten the transmission mount nut to 57 N·m (42 lb ft).

8. Remove the transmission support.



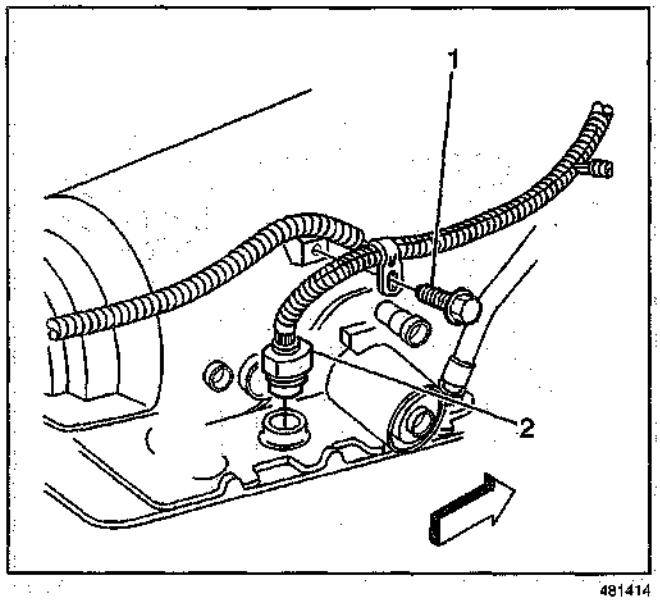
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9. Connect the vehicle speed sensor electrical connector (1).

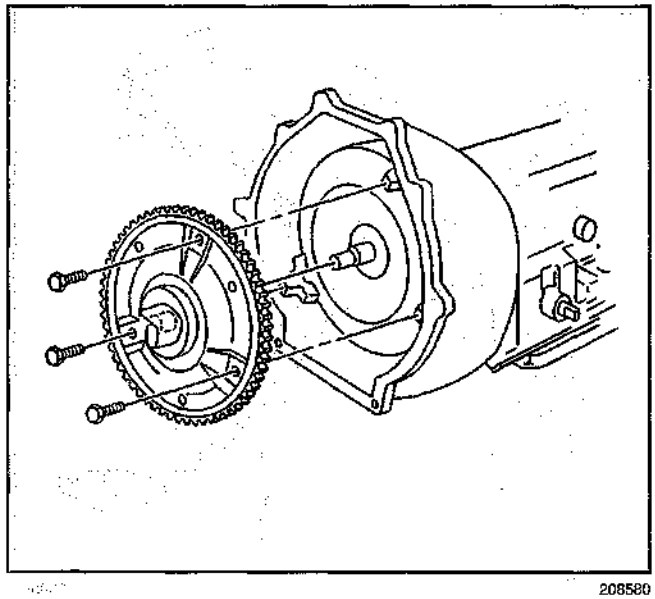


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10. Connect the 20-way electrical connector (2).
11. Install the wiring harness clamp bolt (1) attaching the clamp to the transmission.

    Tighten

    Tighten the wiring harness clamp bolt to 2.5 N·m (22 lb in).


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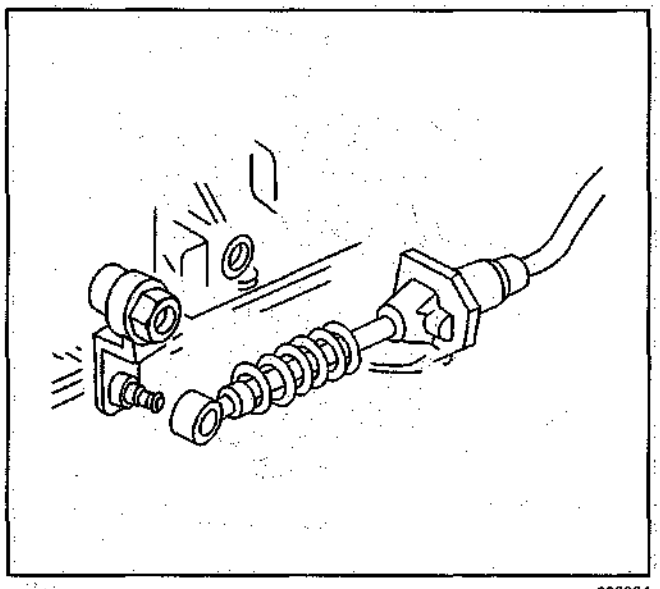
12. Install the torque converter bolts.

    Tighten

    Tighten the torque converter bolts to 63 N·m (47 lb ft).
13. Install the torque converter cover. Refer to *Torque Converter Cover Replacement (3.8 L)*.
14. Install the rear axle torque arm. Refer to *Torque Arm Replacement* in Rear Suspension.
15. Remove the rear axle jack stands.
16. Install the propeller shaft. Refer to *Propeller Shaft Replacement - Two Piece* in Propeller Shaft.

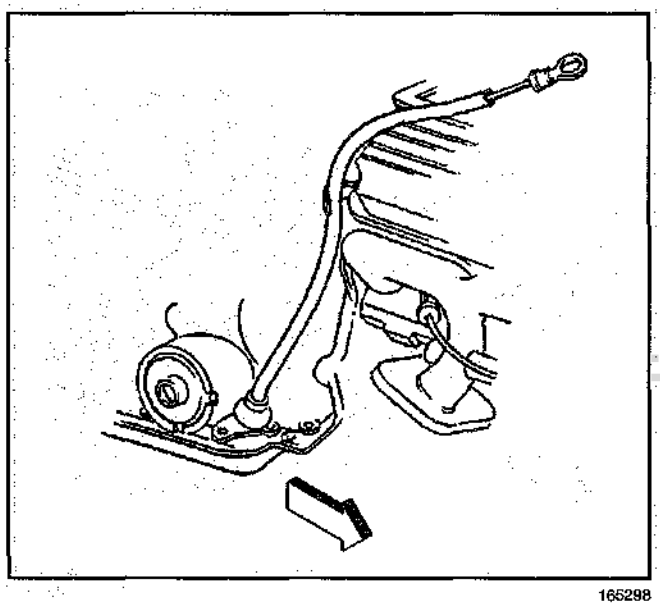
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17. Connect the range selector lever cable to the transmission.
18. Install the 3 way catalytic converter. Refer to *Catalytic Converter Replacement (3.8 L)* in Engine Exhaust.
19. Lower the vehicle.



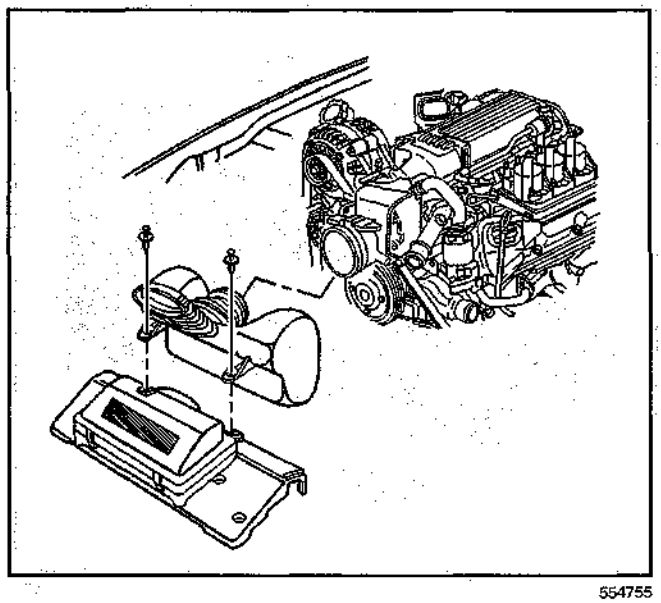
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20. Install the transmission fluid level indicator.



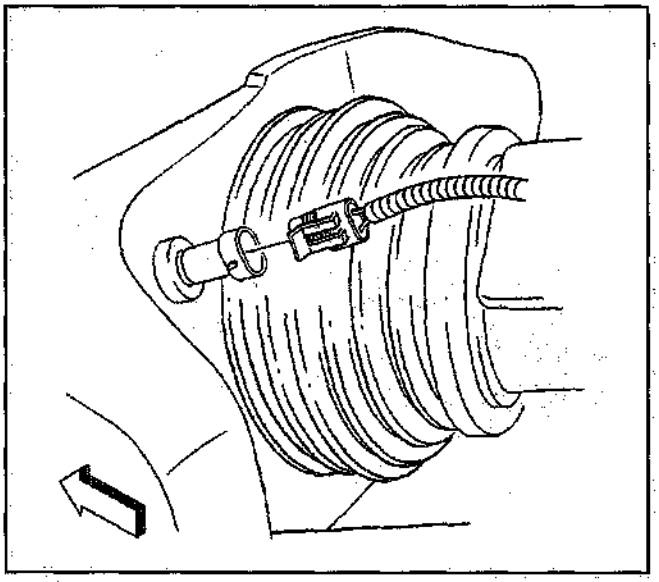
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21. Connect the air intake duct.



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22. Connect the IAT sensor electrical connector.
23. Adjust the automatic transmission shift control lever cable. Refer to *Shift Cable Adjustment*.

Notice: Whenever you remove the transmission for service, you must perform the automatic transmission oil cooler flushing procedure in order to remove the existing fluid which may be contaminated. This will prevent contamination of the new fluid. You must perform the flushing procedure after the installation of the overhauled or replacement transmission.

24. Flush the transmission oil cooler, oil cooler pipes and the hoses. Refer to *Automatic Transmission Oil Cooler Flushing and Flow Test*.
25. Install the transmission oil cooler lines. Refer to *Oil Cooler Line Replacement*.
26. Check the transmission fluid level.

Transmission Replacement (5.7 L)

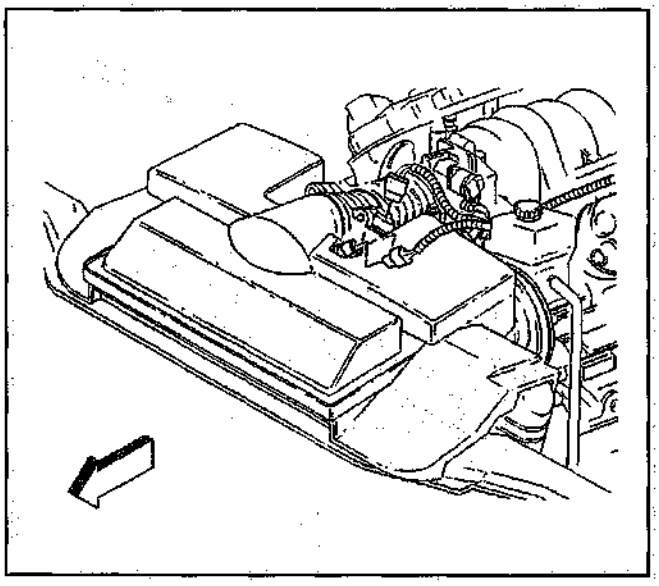
Removal Procedure

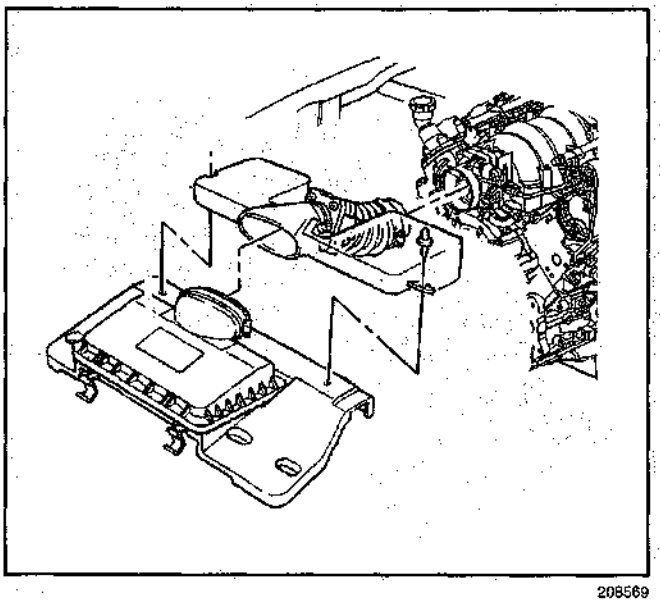
Tools Required

J 21366 Converter Holding Strap

Perform a pressure test on the transmission before servicing, this will help to aid in the diagnosis.

1. Disconnect the intake air temperature (IAT) sensor electrical connector.
2. Disconnect the mass air flow (MAF) sensor electrical connector.

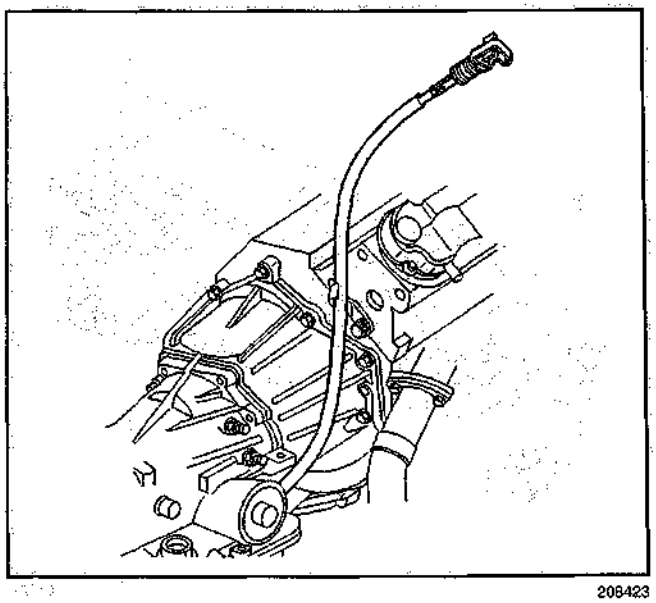

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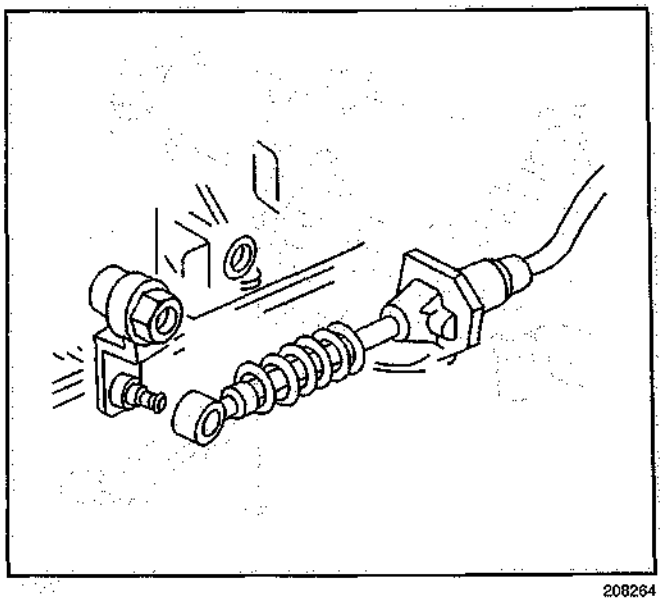
3. Remove the air intake duct.

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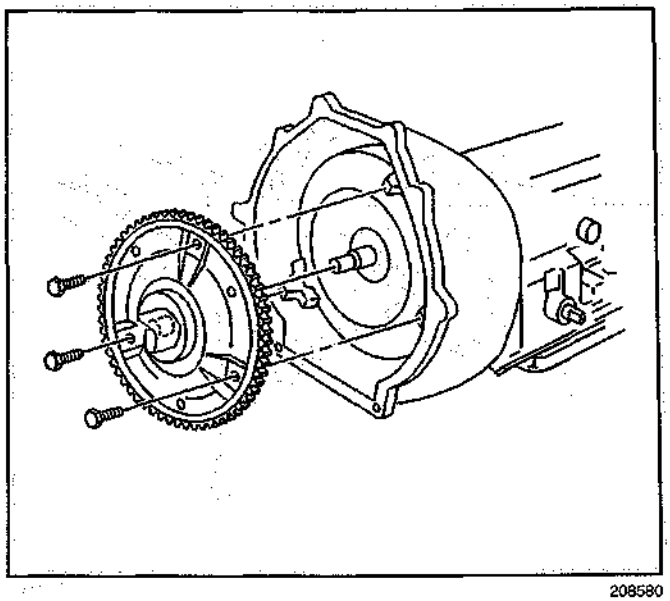
4. Remove the transmission fluid level indicator.
5. Raise and suitably support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
6. Remove the oxidation catalytic converter, refer to *Oxidation Catalytic Converter Replacement (5.7 L Left)* and *Oxidation Catalytic Converter Replacement (5.7 L Right)* in Engine Exhaust.


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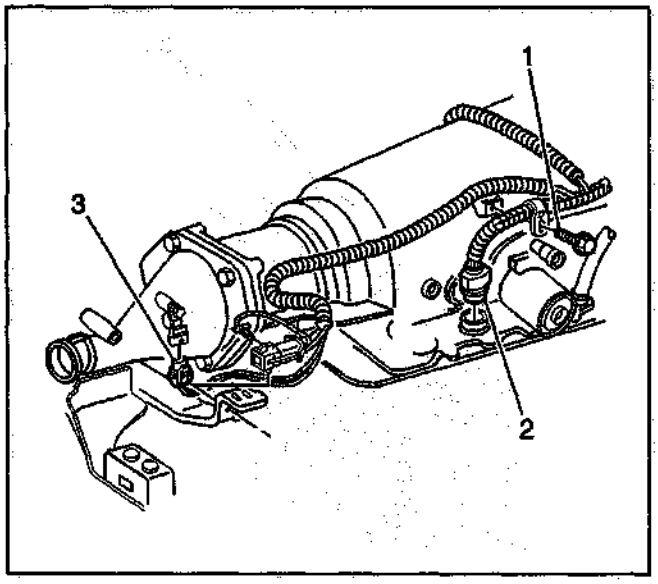
7. Unsnap the range selector lever cable from the transmission.
8. Remove the propeller shaft. Refer to *Propeller Shaft Replacement - One Piece* in Propeller Shaft.
9. Support the rear axle with a suitable jack.
10. Remove the rear axle torque arm. Refer to *Torque Arm Replacement* in Rear Suspension.
11. Remove the torque converter covers. Refer to *Torque Converter Cover Replacement (5.7 L)*.


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12. Remove the torque converter bolts.
13. Remove the transmission oil cooler pipes. Refer to *Oil Cooler Line Replacement*.

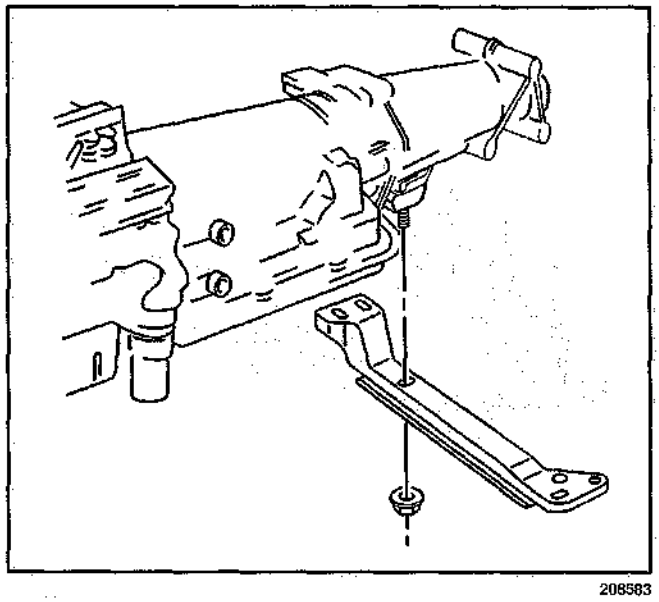

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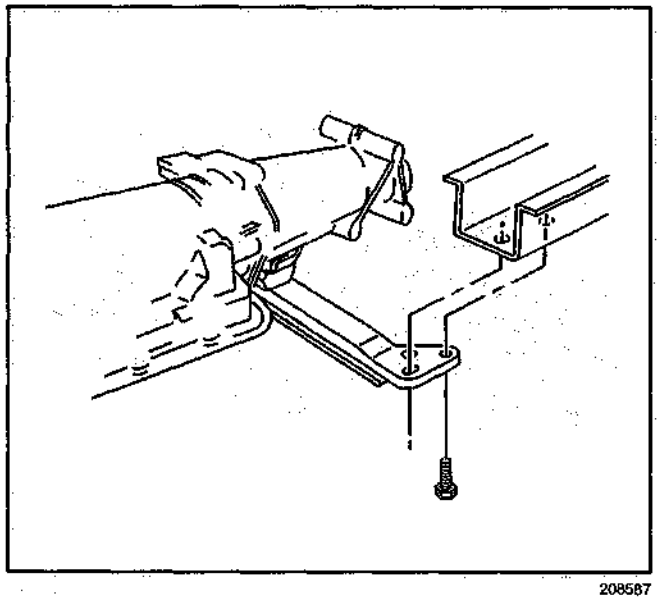


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14. Remove the wiring harness clamp bolt (1) attaching the clamp to the transmission.
15. disconnect the transmission 20-way electrical connector (2).
    Depress both tabs on the connector and pull straight up; do not pry the connector.
16. Disconnect the vehicle speed sensor electrical connector (3).
17. Support the transmission using a transmission jack.


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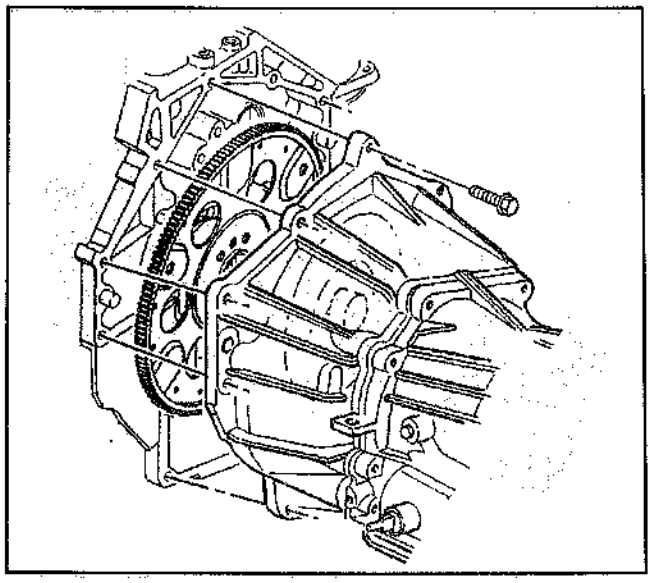
18. Remove the transmission mount nut.


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19. Remove the support bolts and the support from the rail.
20. Lower the tail section of the transmission slightly.

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21. Remove the transmission bolts.
22. Separate the transmission from the engine.
23. Attach the *J 21366* to the transmission.
24. Lower the transmission from the vehicle.
25. Remove the transmission fluid fill tube, if necessary.


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Installation Procedure

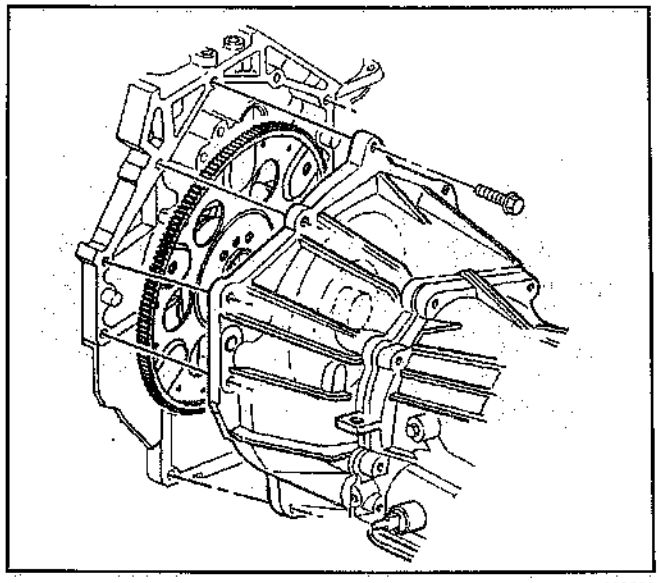
1. Install the transmission fluid fill tube, if necessary.
2. Raise the transmission into the vehicle.
3. Remove the *J 21366* from the transmission.
4. Align and install the transmission to the engine.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

5. Install the transmission bolts.

   Tighten

   Tighten the transmission bolts to 50 N·m (37 lb ft).

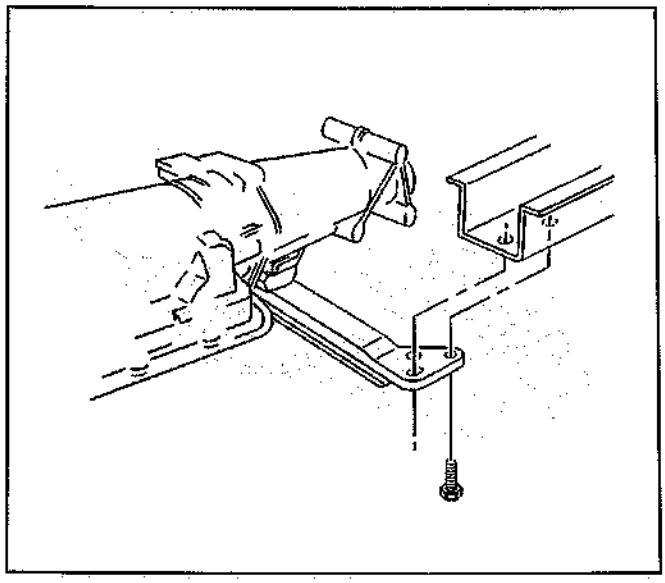

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6. Install the transmission support and bolts to the rail.

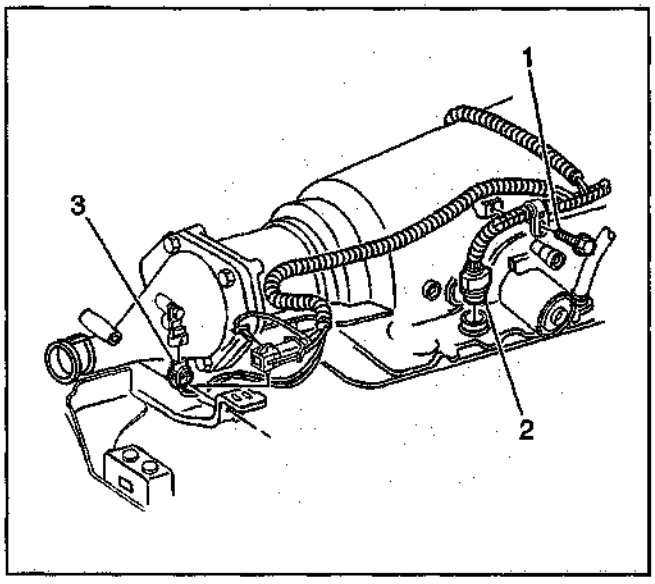
   Tighten

   Tighten the transmission mount nut to 105 N·m (77 lb ft).

7. Remove the transmission support.


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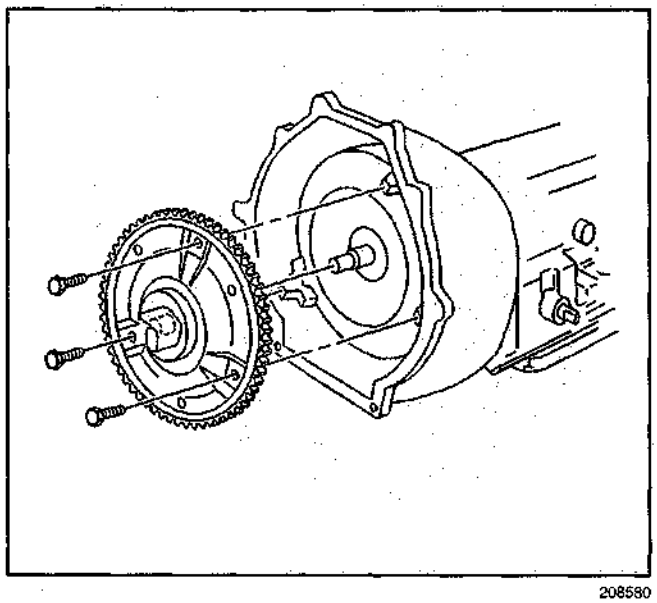


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8. Connect the vehicle speed sensor electrical connector (3).
9. Connect the 20-way electrical connector (2).
10. Install the wiring harness clamp bolt (1) attaching the clamp to the transmission.

    Tighten

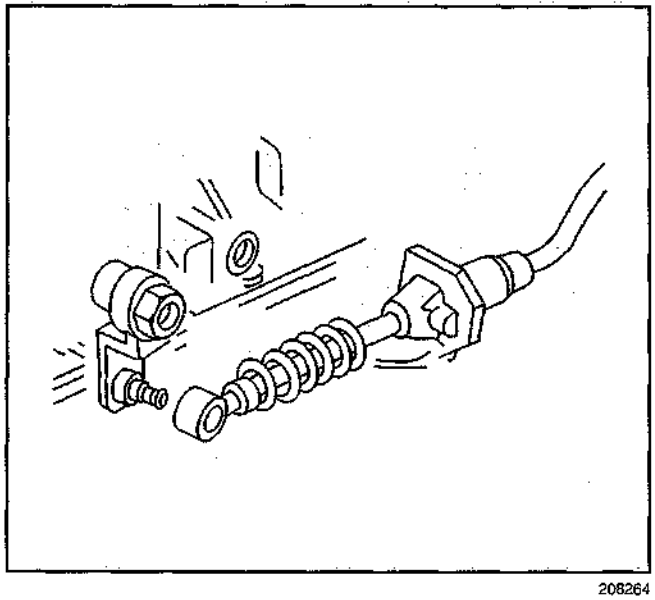
    Tighten the wiring harness clamp bolt (1) to 2.5 N·m (22 lb in).


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11. Install the transmission torque converter bolts.

    Tighten

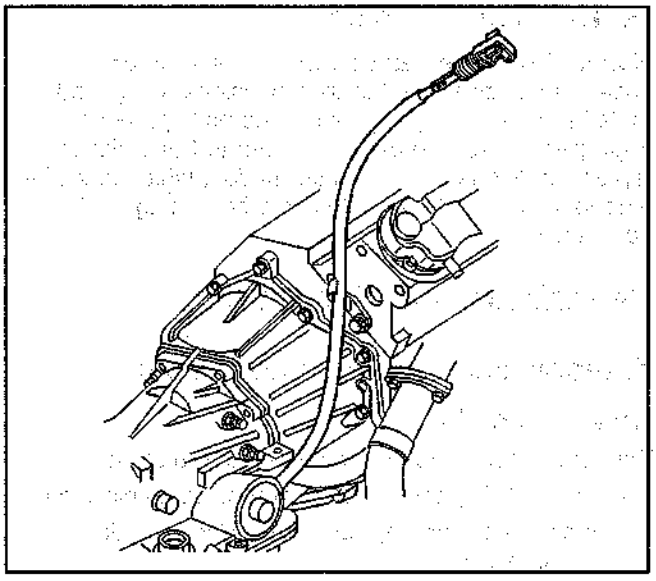
    Tighten the transmission torque converter bolts to 60 N·m (44 lb ft).
12. Install the torque converter covers. Refer to *Torque Converter Cover Replacement (5.7 L)*.
13. Install the rear axle torque arm. Refer to *Torque Arm Replacement* in Rear Suspension.
14. Remove the rear axle support.
15. Install the propeller shaft. Refer to *Propeller Shaft Replacement - One Piece* in Propeller Shaft.


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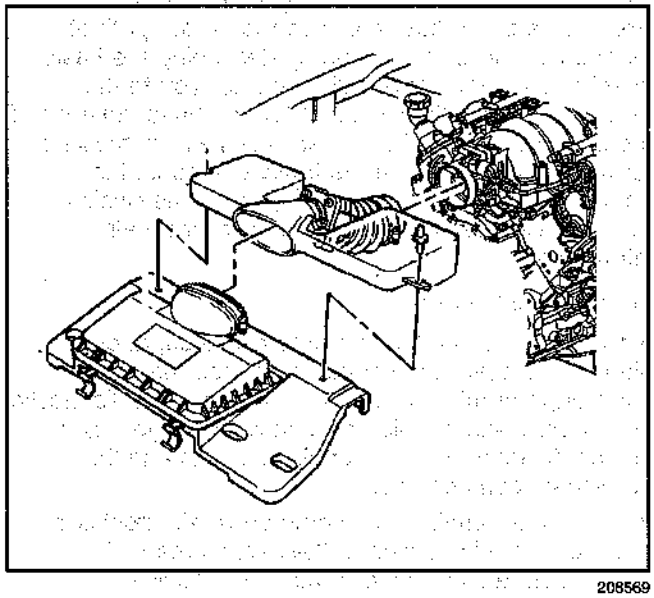
16. Connect the range selector lever cable to the transmission.
17. Install the oxidation catalytic converter for the left side, refer to *Oxidation Catalytic Converter Replacement (5.7 L Left)* and *Oxidation Catalytic Converter Replacement (5.7 L Right)* in Engine Exhaust.
18. Lower the vehicle.

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19. Install the transmission fluid level indicator.


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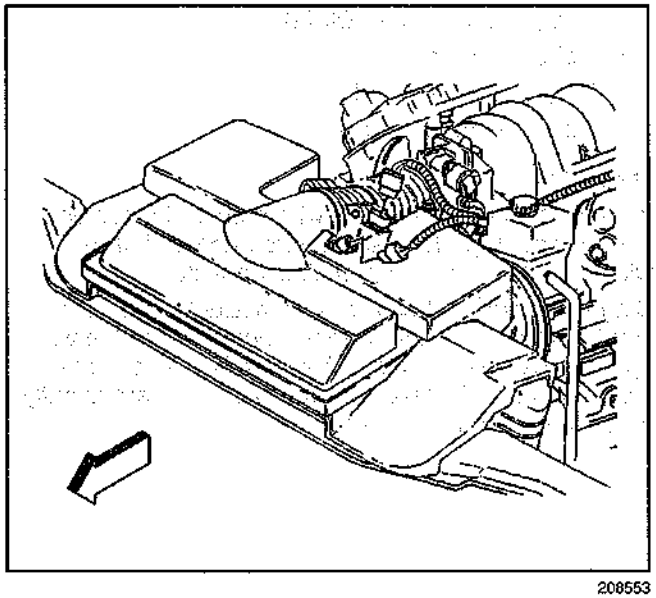
20. Install the air intake duct.


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21. Connect the IAT sensor electrical connector.
22. Connect the MAF sensor electrical connector.
23. Adjust the automatic transmission shift control lever cable. Refer to *Shift Cable Adjustment*.

Notice: Whenever you remove the transmission for service, you must perform the automatic transmission oil cooler flushing procedure in order to remove the existing fluid which may be contaminated. This will prevent contamination of the new fluid. You must perform the flushing procedure after the installation of the overhauled or replacement transmission.

24. Flush the transmission oil cooler, oil cooler pipes and the hoses. Refer to *Automatic Transmission Oil Cooler Flushing and Flow Test*.
25. Install the transmission oil cooler lines. Refer to *Oil Cooler Line Replacement*.
26. Check the transmission fluid level.


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Do Not Use Air Tools

Notice: Do not use air powered tools in order to assemble or disassemble transmissions. Use hand tools in order to properly determine bolt tightness. Improper bolt torque can contribute to transmission repair conditions, and this information, which is vital to diagnosis, can only be detected when using hand tools.

Description and Operation

Transmission General Information

How to Use This Section

This section provides the following information:

- General diagnosis information on transmissions
- Procedures for diagnosing the Hydra-matic transmission

When you diagnose any condition of the Hydra-matic transmission, begin with A Diagnostic Starting Point. This procedure indicates the proper path of diagnosing the transmission by describing the basic checks. This procedure will then refer you to the locations of specific checks. After you have determined the cause of a condition, refer to Repair Instructions for repair procedures. If the faulty component is not serviceable without removing the transmission from the vehicle, refer to Unit Repair for repair information.

Basic Knowledge

Notice: Do not, under any circumstances, attempt to diagnose a powertrain condition without basic knowledge of this powertrain. If you perform diagnostic procedures without this basic knowledge, you may incorrectly diagnose the condition or damage the powertrain components.

You must be familiar with some basic electronics in order to use this section of the service manual. You should also be able to use the following special tools:

- A Digital Multimeter (DMM)
- A circuit tester
- Jumper wires or leads
- A line pressure gage set

Diagnosis

Notice: If you probe a wire with a sharp instrument and do not properly seal the wire afterward, the wire corrodes and an open circuit results.

Diagnostic test probes are now available that allow you to probe individual wires without leaving the wire open to the environment. These probe devices are inexpensive and easy to install, and they permanently seal the wire from corrosion.

Definitions and Abbreviations

Throttle Positions

Engine Braking: A condition where the engine is used to slow the vehicle by manually downshifting during a zero throttle coastdown.

Full Throttle Detent Downshift: A quick apply of the accelerator pedal to its full travel, forcing a downshift.

Heavy Throttle: Approximately 3/4 of accelerator pedal travel (75 percent throttle position).

Light Throttle: Approximately 1/4 of accelerator pedal travel (25 percent throttle position).

Medium Throttle: Approximately 1/2 of accelerator pedal travel (50 percent throttle position).

Minimum Throttle: The least amount of throttle opening required for an upshift.

Wide Open Throttle (WOT): Full travel of the accelerator pedal (100 percent throttle position).

Zero Throttle Coastdown: A full release of the accelerator pedal while the vehicle is in motion and in drive range.

Shift Condition Definitions

Bump: A sudden and forceful apply of a clutch or a band.

Chuggle: A bucking or jerking. This condition may be most noticeable when the converter clutch is engaged. It is similar to the feel of towing a trailer.

Delayed: A condition where a shift is expected but does not occur for a period of time. This could be described as a clutch or band engagement that does not occur as quickly as expected during a part throttle or wide open throttle apply of the accelerator, or during manual downshifting to a lower range. This term is also defined as LATE or EXTENDED.

Double Bump (Double Feel): Two sudden and forceful applies of a clutch or a band.

Early: A condition where the shift occurs before the car has reached proper speed. This condition tends to labor the engine after the upshift.

End Bump: A firmer feel at the end of a shift than at the start of the shift. This is also defined as END FEEL or SLIP BUMP.

Firm: A noticeably quick apply of a clutch or band that is considered normal with a medium to heavy throttle. This apply should not be confused with HARSH or ROUGH.

Flare: A quick increase in engine RPM along with a momentary loss of torque. This most generally occurs during a shift. This condition is also defined as SLIPPING.

Harsh (Rough): A more noticeable apply of a clutch or band than FIRM. This condition is considered undesirable at any throttle position.

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Hunting: A repeating quick series of upshifts and downshifts that causes a noticeable change in engine RPM, such as a 4-3-4 shift pattern. This condition is also defined as BUSYNESS.

Initial Feel: A distinctly firmer feel at the start of a shift than at the finish of the shift.

Late: A shift that occurs when the engine RPM is higher than normal for a given amount of throttle.

Shudder: A repeating jerking condition similar to CHUGGLE but more severe and rapid. This condition may be most noticeable during certain ranges of vehicle speed.

Slipping: A noticeable increase in engine RPM without a vehicle speed increase. A slip usually occurs during or after initial clutch or band apply.

Soft: A slow, almost unnoticeable clutch or band apply with very little shift feel.

Surge: A repeating engine related condition of acceleration and deceleration that is less intense than CHUGGLE.

Tie-Up: A condition where two opposing clutch and/or bands are attempting to apply at the same time causing the engine to labor with a noticeable loss of engine RPM.

Noise Conditions

Drive Link Noise: A whine or growl that increases or fades with vehicle speed, and is most noticeable under a light throttle acceleration. It may also be noticeable in PARK or NEUTRAL operating ranges with the vehicle stationary.

Final Drive Noise: A hum related to vehicle speed which is most noticeable under a light throttle acceleration.

Planetary Gear Noise: A whine related to vehicle speed, which is most noticeable in FIRST gear, SECOND gear, FOURTH gear or REVERSE. The condition may become less noticeable, or go away, after an upshift.

Pump Noise: A high pitched whine that increases in intensity with engine RPM. This condition may also be noticeable in all operating ranges with the vehicle stationary or moving.

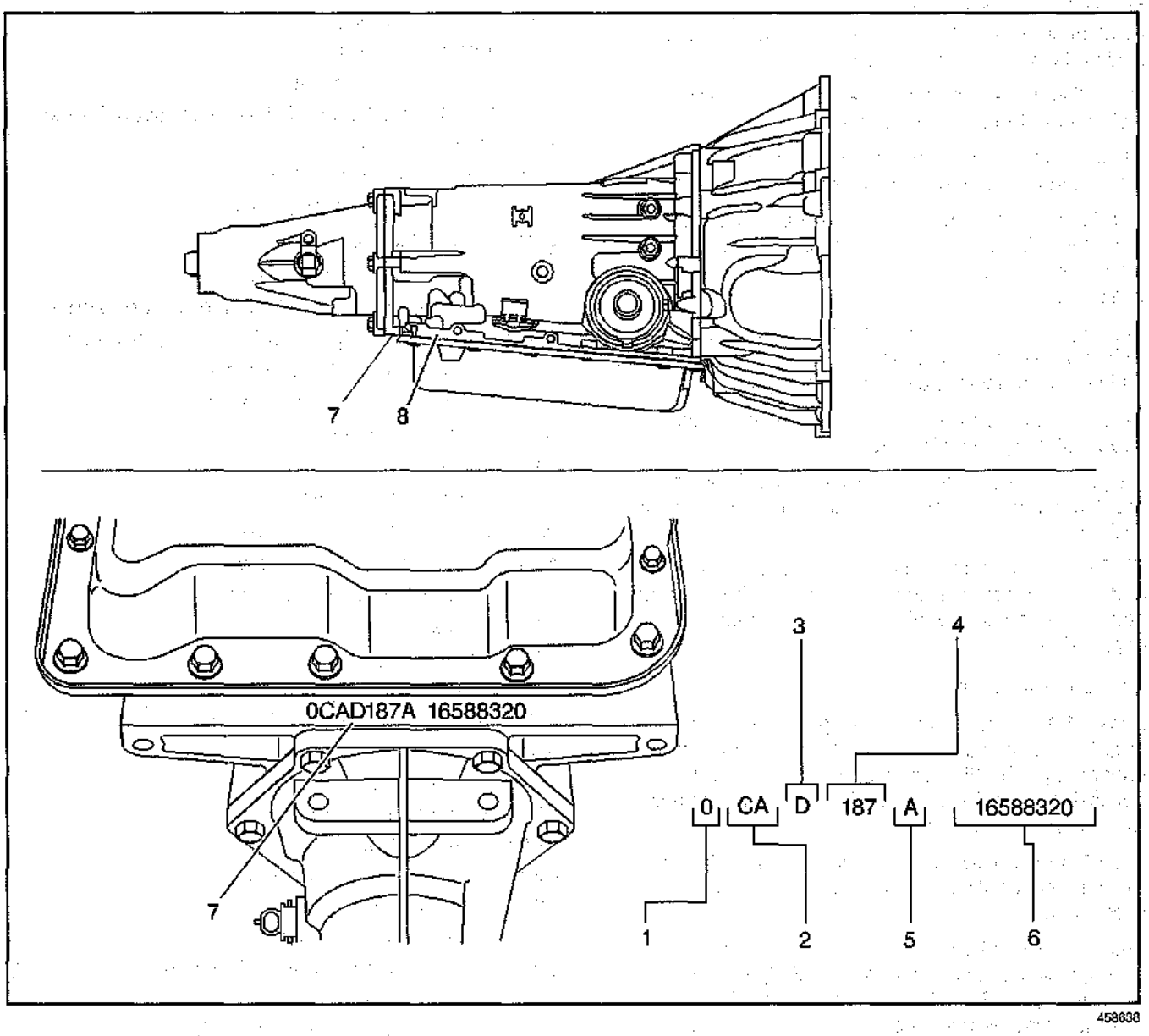
Torque Converter Noise: A whine usually noticed when a vehicle is stopped, and the transmission is in DRIVE or REVERSE. The noise will increase with engine RPM.

Transmission Abbreviations

A/C: Air Conditioning
AC: Alternating Current
AT: Automatic Transmission
CCDIC: Climate Control Driver Information Center
DC: Direct Current
DIC: Driver Information Center
DLC: Diagnostic Link Connector
DMM: Digital Multimeter
DTC: Diagnostic Trouble Code
EBTCM: Electronic Brake/Traction Control Module
ECCC: Electronically-Controlled Capacity Clutch
ECT: Engine Coolant Temperature
EMI: Electromagnetic Interference
IAT: Intake Air Temperature
IGN: Ignition
IMS: Internal Mode Switch
ISS: Input (Shaft) Speed Sensor
MAP: Manifold Absolute Pressure
MIL: Malfunction Indicator Lamp
NC: Normally Closed
NO: Normally Open
OBD: On Board Diagnostic
OSS: Output (Shaft) Speed Sensor
PC: Pressure Control
PCM: Powertrain Control Module
PM: Permanent Magnet
PWM: Pulse Width Modulation
RPM: Revolutions Per Minute
SS: Shift Solenoid
STL: Service Transmission Lamp
TAP: Transmission Adaptive Pressure
TCC: Torque Converter Clutch
TCM: Transmission Control Module
TFP: Transmission Fluid Pressure
TFT: Transmission Fluid Temperature
TP: Throttle Position
TV: Throttle Valve
VCM: Vehicle Control Module
VSS: Vehicle Speed Sensor
WOT: Wide Open Throttle
4WD: Four-Wheel Drive

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Transmission Identification Information



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Legend

(1) (0 = 2000)
(2) Model
(3) Hydra-Matic 4L60-E
(4) Julian Date (or Day of the Year)
(5) Shift Built (A, B, J = First Shift; C, H, W = Second Shift)
(6) Serial Number
(7) Transmission ID Location
(8) Optional Transmission ID Location

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Automatic Transmission Shift Lock Control Circuit Description

- The AT shift lock control requires that the brake pedal be depressed and the ignition switch be placed in the RUN position or the START position before the transmission may be shifted from the PARK position. When the ignition is in the RUN position or the START position, voltage is supplied to the AT shift lock control actuator solenoid through the GAUGES Fuse 9 (10A), circuit 39, the stop lamp/TCC switch, and circuit 1135. When the AT shift lock control actuator solenoid is energized, there is a restrictor arm that holds the shift lever arm in place. When the brake pedal is depressed, the switch within the stop lamp/TCC switch opens cutting off voltage to the AT shift lock control solenoid. When the AT shift lock control actuator solenoid is de-energized, the restrictor arm moves clear of the shift lever arm. This allows movement of the park neutral position switch from the PARK position to any other position.
- If the vehicle is in the NEUTRAL position, the gear selector will not shift until the brake pedal is depressed. This is similar to the PARK position as described above.
- In order to override the AT shift lock control, turn the ignition switch to the OFF position. This removes battery voltage from the AT shift lock control actuator solenoid, de-energizing the solenoid and allowing the vehicle to shift.

Transmission Component and System Description

The mechanical components of the 4L60-E are as follows:

- Torque converter assembly
- Servo assembly and 2–4 band assembly
- Reverse input clutch and housing
- Overrun clutch
- Forward clutch
- 3–4 clutch
- Forward sprag clutch assembly
- Lo and reverse roller clutch assembly
- Lo and reverse clutch assembly
- Two planetary gear sets: Input and Reaction
- Oil pump assembly
- Control valve body assembly

The electrical components of the 4L60-E are as follows:

- 1-2 and 2-3 shift solenoid valves
- 3-2 shift solenoid valve assembly
- Transmission pressure control (PC) solenoid
- Torque converter clutch (TCC) solenoid valve
- TCC pulse width modulation (PWM) solenoid valve
- Automatic transmission fluid pressure (TFP) manual valve position switch
- Automatic transmission fluid temperature (TFT) sensor
- Vehicle speed sensor assembly

For more information refer to *Electronic Component Description*.

Adapt Function

The 4L60-E transmission utilizes a line pressure control system during upshifts to compensate for the normal wear of transmission components. By adjusting the line pressure, the PCM can maintain acceptable transmission shift times. This process is known as "adaptive learning" or "shift adapts" and is similar to the closed loop fuel control system used for the engine.

In order for the PCM to perform a "shift adapt," it must first identify if an upshift is acceptable to analyze. For example, upshifts that occur during cycling of the A/C compressor or under extreme throttle changes could cause the PCM to incorrectly adjust line pressure. When an upshift is initiated, a number of contingencies (such as throttle position, transmission temperature, and vehicle speed) are checked in order to determine if the actual shift time is valid to compare to a calibrated desired shift time. If all the contingencies are met during the entire shift, then the shift is considered valid and the adapt function may be utilized if necessary.

Once an adaptable shift is identified, the PCM compares the actual shift time to the desired shift time and calculates the difference between them. This difference is known as the shift error. The actual shift time is determined from the time that the PCM commands the shift to the start of the engine RPM drop initiated by the shift. If the actual shift time is longer than the calibrated desired shift time (a soft feel or slow engagement), then the PCM decreases current to the pressure control (PC) solenoid in order to increase line pressure for the next (same) upshift under identical conditions. If the actual shift time is shorter than the calibrated desired shift time (a firm engagement), then the PCM increases current to the PC solenoid in order to decrease line pressure for the next (same) upshift under identical conditions.

The purpose of the adapt function is to automatically compensate the shift quality for the various vehicle shift control systems. It is a continuous process that will help to maintain optimal shift quality throughout the life of the vehicle.

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Clearing Transmission Adaptive Pressure (TAP)

Transmission adaptive pressure (TAP) information is displayed and may be reset using a scan tool.

The adapt function is a feature of the PCM that either adds or subtracts line pressure from a calibrated base line pressure in order to compensate for normal transmission wear. The TAP information is divided into 13 units, called cells. The cells are numbered 4 through 16. Each cell represents a given torque range. TAP cell 4 is the lowest adaptable torque range and TAP cell 16 is the highest adaptable torque range. It is normal for TAP cell values to display zero or negative numbers. This indicates that the PCM has adjusted line pressure at or below the calibrated base line pressure.

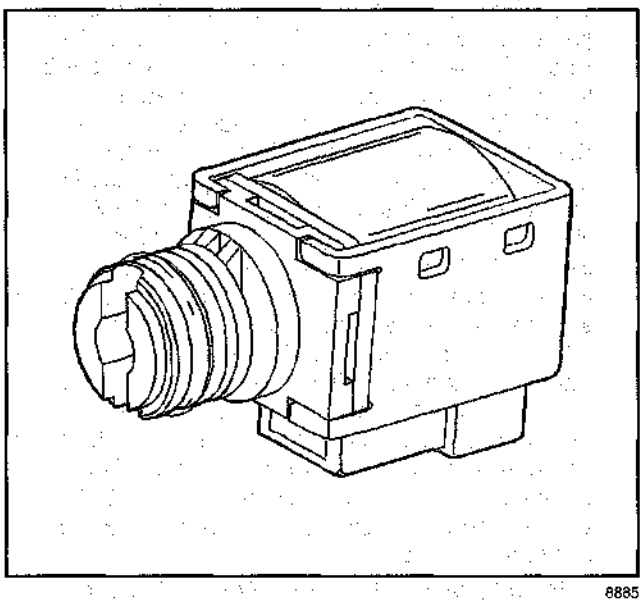
Updating TAP information is a learning function of the PCM designed to maintain acceptable shift times. It is not recommended that TAP information be reset unless one of the following repairs has been made:

- Transmission overhaul or replacement
- Repair or replacement of an apply or release component (clutch, band, piston, servo)
- Repair or replacement of a component or assembly which directly affects line pressure

Resetting the TAP values using a scan tool will erase all learned values in all cells. As a result, the PCM will need to relearn TAP values. Transmission performance may be affected as new TAPs are learned. Learning can only take place when the PCM has determined that an acceptable shift has occurred. The PCM must also relearn TAP values if it is replaced.

Electronic Component Description

1-2 and 2-3 Shift Solenoid Valves



8885

The 1-2 and 2-3 shift solenoid valves (also called A and B solenoids) are identical devices that control the movement of the 1-2 and 2-3 shift valves (the 3-4 shift valve is not directly controlled by a shift solenoid). The solenoids are normally-open exhaust valves that work in four combinations to shift the transmission into different gears.

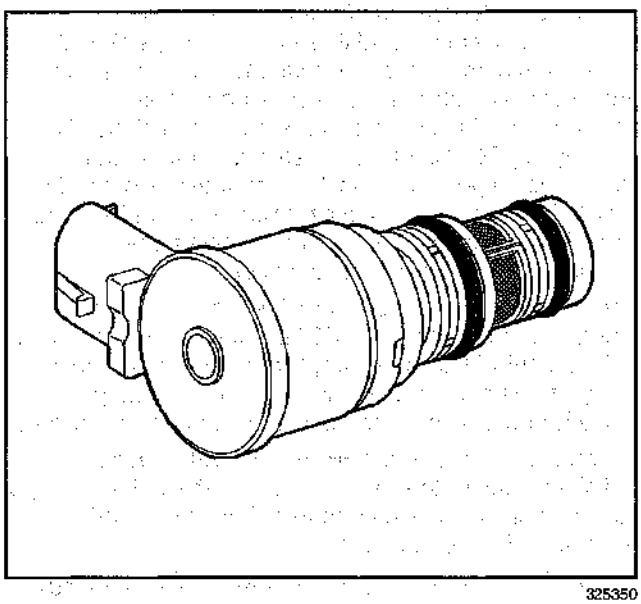
The PCM energizes each solenoid by grounding the solenoid through an internal quad driver. This sends current through the coil winding in the solenoid and moves the internal plunger out of the exhaust position. When ON, the solenoid redirects fluid to move a shift valve.

Important: The manual valve hydraulically can override the shift solenoids. Only in D4 do the shift solenoid states totally determine what gear the transmission is in. In the other manual valve positions, the transmission shifts hydraulically and the shift solenoid states CATCH UP when the throttle position and the vehicle speed fall into the correct ranges.

The PCM-controlled shift solenoids eliminate the need for TV and governor pressures to control shift valve operation.

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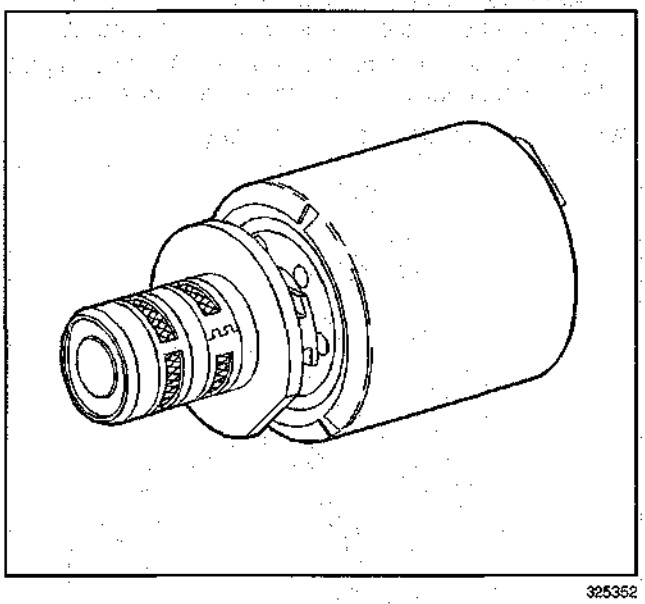
3-2 Shift Solenoid Valve Assembly



325350

The 3-2 shift solenoid valve assembly is a normally-closed, 3-port, ON/OFF device that is used in order to improve the 3-2 downshift. The solenoid regulates the release of the 3-4 clutch and the 2-4 band apply.

Transmission Pressure Control Solenoid



325352

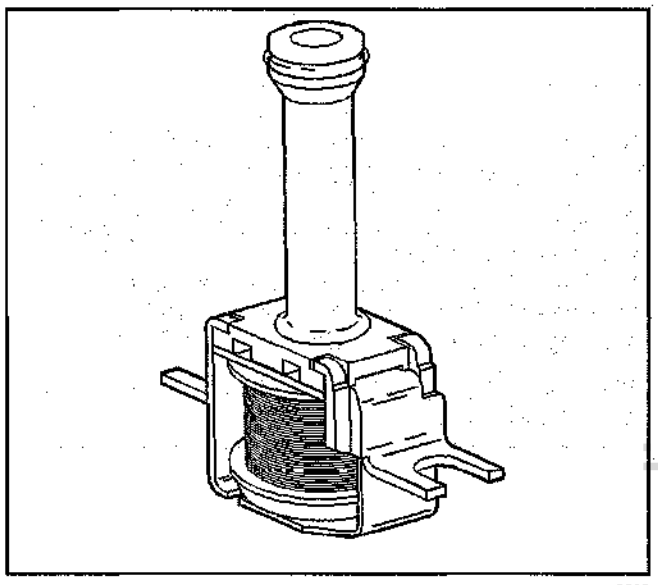
The transmission pressure control solenoid is an electronic pressure regulator that controls pressure based on the current flow through its coil winding. The magnetic field produced by the coil moves the solenoid's internal valve which varies pressure to the pressure regulator valve.

The PCM controls the pressure control solenoid by commanding current between 0.1 and 1.1 amps. This changes the duty cycle of the solenoid, which can range between 5 percent and 95 percent (typically less than 60 percent). High amperage (1.1 amps) corresponds to minimum line pressure, and low amperage (0.1 amp) corresponds to maximum line pressure (if the solenoid loses power, the transmission defaults to maximum line pressure).

The PCM commands the line pressure values, using inputs such as engine speed and throttle position voltage.

The pressure control solenoid takes the place of the throttle valve or the vacuum modulator that was used on past model transmissions.

Torque Converter Clutch Solenoid Valve

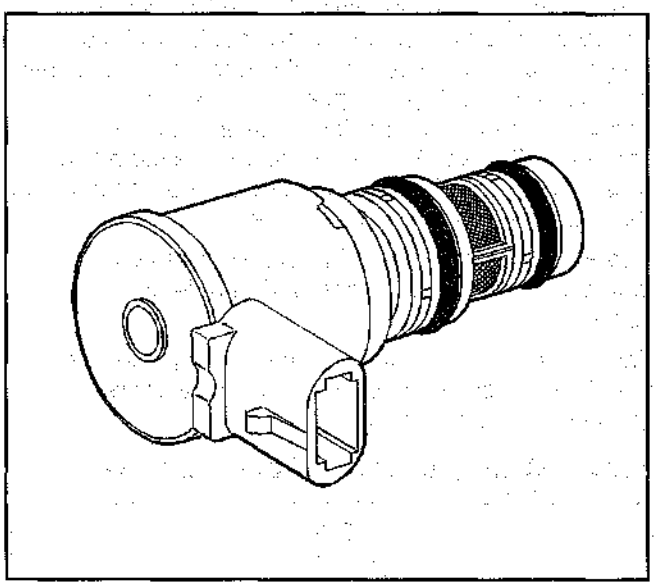


8882

The torque converter clutch solenoid valve is a normally-open exhaust valve that is used to control torque converter clutch apply and release. When grounded (energized) by the PCM, the TCC solenoid valve stops converter signal oil from exhausting. This causes converter signal oil pressure to increase and move the TCC solenoid valve into the apply position.

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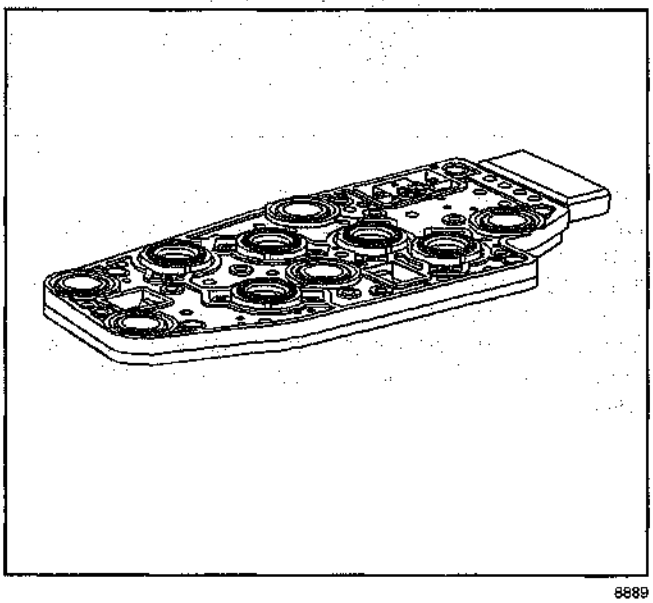
Torque Converter Clutch PWM Solenoid Valve



325365

The torque converter clutch PWM solenoid valve controls the fluid acting on the converter clutch valve. The converter clutch valve controls the TCC apply and release. This solenoid is attached to the control valve body assembly within the transmission. The TCC PWM solenoid valve provides a smooth engagement of the torque converter clutch by operating during a duty cycle percent of ON time.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch



8889

Important: Seven valid combinations and two invalid combinations are available from the TFP manual valve position switch. Refer to the *Transmission Fluid Pressure (TFP) Manual Valve Position Switch Logic* table for valid/invalid combinations for range signal circuits A, B and C.

The transmission fluid pressure (TFP) manual valve position switch consists of five pressure switches (two normally-closed and three normally-open) on the control valve body that sense whether fluid pressure is present in five different valve body passages. The combination of switches that are open and closed is used by the PCM in order to determine the actual manual valve position. The TFP manual valve position switch, however, cannot distinguish between PARK and NEUTRAL because the monitored valve body pressures are identical in both cases.

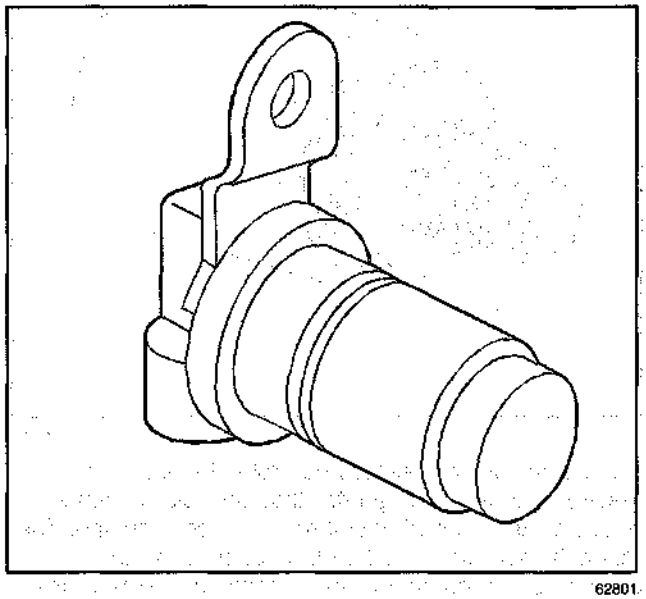
The switches are wired to provide three signal lines that are monitored by the PCM. These inputs are used to help control line pressure, torque converter clutch apply and shift solenoid valve operation. Voltage at each of the signal lines is either zero or twelve volts.

In order to monitor the TFP manual valve position switch operation, the PCM compares the actual voltage combination of the switches to a TFP combination table stored in its memory.

The TFP manual valve position switch signal voltage can be measured from each pin-to-ground and compared to the combination table. On the automatic transmission (AT) wiring harness assembly, pin N is signal A, pin R is signal B, and pin P is signal C. With the AT wiring harness assembly connected and the engine running, a voltage measurement of these three lines will indicate a high reading (near 12 volts) when a circuit is open, and a low reading (zero volts) when the circuit is switched to ground.

The transmission fluid temperature (TFT) sensor is part of the TFP manual valve position switch assembly.

Vehicle Speed Sensor Assembly



62801

The vehicle speed sensor (VSS) assembly provides vehicle speed information to the PCM. The VSS assembly is a permanent magnet (PM) generator. The PM generator produces a pulsing AC voltage as rotor teeth on the transmission output shaft pass through the sensor's magnetic field. The AC voltage level and the number of pulses increase as the speed of the vehicle increases. Output voltage varies with

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speed from a minimum of 0.5 volts at 100 RPM to more than 100 volts at 8000 RPM. The PCM converts the pulsing voltage to vehicle speed. The PCM uses the vehicle speed signal to determine shift timing and TCC scheduling.

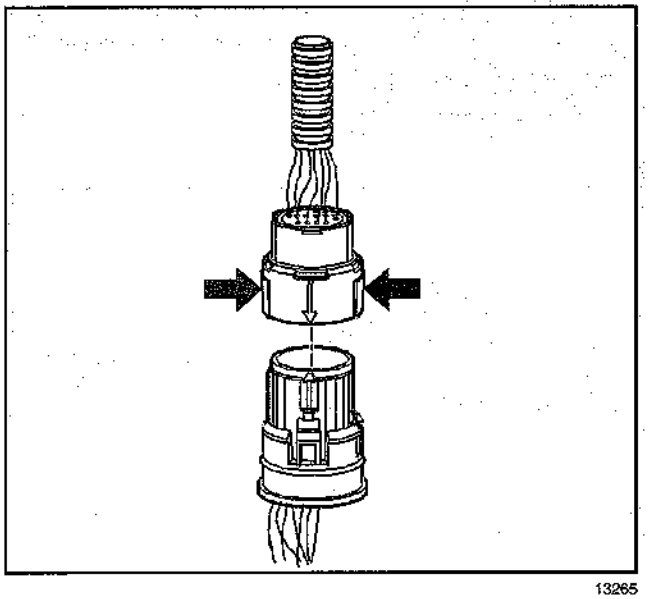
Automatic Transmission Fluid Temperature Sensor

The automatic transmission fluid temperature (TFT) sensor is part of the automatic transmission fluid pressure (TFP) manual valve position switch. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases and as the temperature decreases, the resistance increases.

The PCM supplies a 5-volt reference signal to the TFT sensor and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the PCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. Refer to TFT Sensor Specifications for a complete comparison of sensor resistance, temperature and signal voltage.

The PCM uses the TFT sensor information to control shift quality and TCC application.

Electrical Connector



13265

The transmission electrical connector is an important part of the transmission operating system. Any interference with the electrical connection can cause the transmission to set Diagnostic Trouble Codes (DTCs) or affect proper operation.

The following items can affect the electrical connection:

- Bent pins in the connector from rough handling during connection and disconnection
- Wires backing away from the pins or coming uncrimped (in either the internal or the external wiring harness)
- Dirt contamination entering the connector when disconnected
- Pins in the internal wiring connector backing out of the connector or pushed out of the connector during reconnection
- Excessive transmission fluid leaking into the connector, wicking up into the external wiring harness and degrading the wire insulation
- Moisture intrusion in the connector
- Low pin retention in the external connector from excessive connection and disconnection of the wiring connector assembly
- Pin corrosion from contamination
- Damaged connector assembly

Remember the following points:

- In order to remove the connector, squeeze the two tabs toward each other and pull straight up without pulling by the wires.
- Limit twisting or wiggling the connector during removal. Bent pins can occur.
- Do not pry the connector off with a screwdriver or other tool.
- Visually inspect the seals to ensure that they are not damaged during handling.
- In order to reinstall the external wiring connector, first orient the pins by lining up the arrows on each half of the connector. Push the connector straight down into the transmission without twisting or angling the mating parts.
- The connector should click into place with a positive feel and/or noise.
- Whenever the transmission external wiring connector is disconnected from the internal harness and the engine is operating, DTCs will set. Clear these DTCs after reconnecting the external connector.

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Special Tools and Equipment

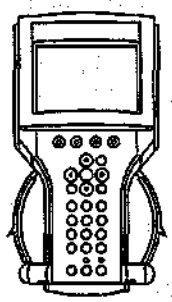
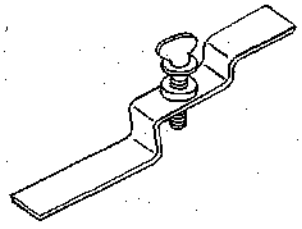
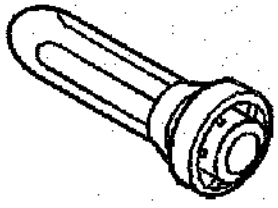
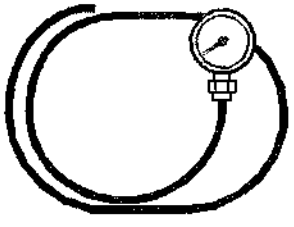
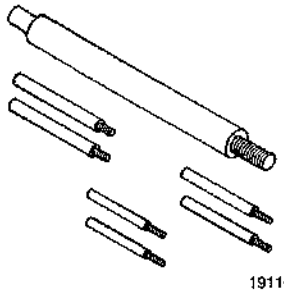
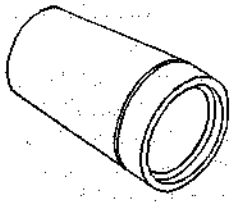
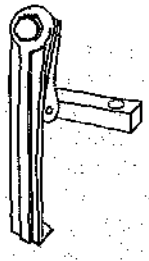
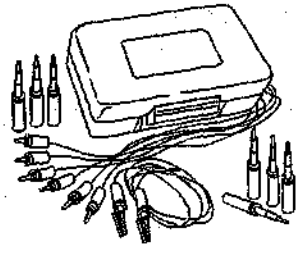
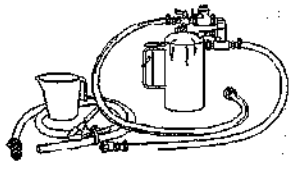
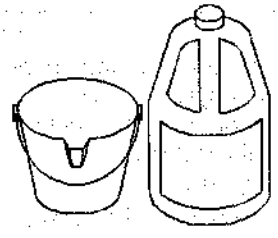
Illustration	Tool Number/Description
 59260	Scan Tool
 9353	J 21366 Converter Holding Strap
 1338	J 21426 Extension Housing Oil Seal Installer
 29339	J 21867 Pressure Gauge
 19110	J 25025-B Pump and Valve Body Alignment

Illustration	Tool Number/Description
 1010	J 28458 Power Piston Seal Protector
 9202	J 29714-A Servo Cover Compressor
 8917	J 35616-A Connector Test Adapter Kit
 9210	J 35944-A Transmission Oil Cooler and Line Flushing Tool
 15015	J 35944-20 Cooler Flushing Fluid

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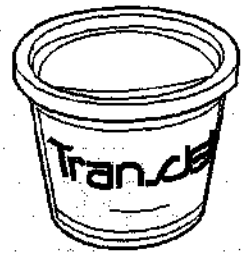
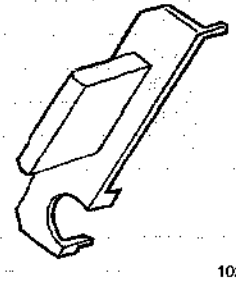
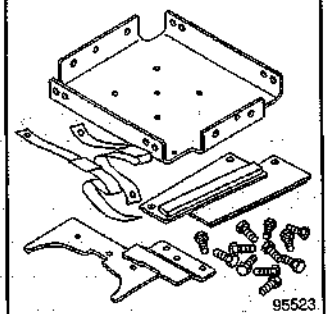
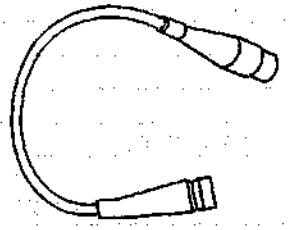
Illustration	Tool Number/Description
 24825	J 36850 Transmission Assembly Lubricant
 3430	J 39200 Digital Multimeter (DMM)
 102613	J 41364-A Neutral Position Adjustment Tool

Illustration	Tool Number/Description
 95523	J 42055 Transmission Support Fixture
 99089	J 42386-A Flywheel Holding Tool
 537322	J 44152 Jumper Harness (20 pins)

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