

2006 TRANSMISSION**Automatic Transaxle - 4T65-E - Overhaul****SPECIFICATIONS****FASTENER TIGHTENING SPECIFICATIONS****Fastener Tightening Specifications**

Description of Usage	Ref. No.	Qty	Size	Specification	
				Metric	English
2-1 Servo to Case	103	3	M8x1.25x25	25 N.m	18 lb ft
Accumulator Cover to Case	131	11	M6x1.0x28	12 N.m	106 lb in
Case Cover to Case	434	3	M6x1.0x40	12 N.m	106 lb in
Case Cover to Case	436	3	M6x1.0x30	12 N.m	106 lb in
Case Cover to Driven Sprocket Support	435	3	M8x1.25x50	25 N.m	18 lb ft
Case Cover to Driven Sprocket Support (TORX®)	433	1	M6x1.0x32	12 N.m	106 lb in
Case to Drive Sprocket Support	524	4	M8x1.25x23	25 N.m	18 lb ft
Case Extension to Case	5	4	M10x1.5x35	36 N.m	26 lb ft
Case Side Cover to Case	56	9	M8x1.25x25	25 N.m	18 lb ft
Case Side Cover to Case (Stud)	58	4	M8x1.25x25	25 N.m	18 lb ft
Case Side Cover to Case (TORX® Special)	57	4	M8x1.25x21	25 N.m	18 lb ft
Detent Spring to Case Cover	805	1	M6x1.0x16	12 N.m	106 lb in
Forward Band Servo Cover to Case	12	3	M6x1.0x20	12 N.m	106 lb in
Oil Cooler Quick Connector	62	1	9/16-18 UNF	32 N.m	23 lb ft
Oil Cooler Quick Connector	61	1	9/16-18 UNF	32 N.m	23 lb ft
Oil Pan to Case	23	20	M6x1.0x18	14 N.m	10 lb ft

Oil Pressure Test Hole Plug	38	1	1/8-27 NPTF	12 N.m	106 lb in
Pump Body to Case	206	2	M6x1.0x95	16 N.m	11 lb ft
Pump Body to Case	231	9	M6x1.0x87.5	12 N.m	106 lb in
Pump Cover to Case Cover	207	9	M6x1.0x85	12 N.m	106 lb in
Pump Cover to Case Cover	230	2	M6x1.0x95	12 N.m	106 lb in
Pump Cover to Pump Body	205	1	M6x1.0x20	8 N.m	70 lb in
Speed Sensor to Case	9	1	M8x1.25x12	12 N.m	106 lb in
TFP Switch to Case	379	1	M6x1.0x87.5	16 N.m	11 lb ft
TFP Switch to Case Cover	375	2	M6x1.0x60	12 N.m	106 lb in
TFP Switch to Valve Body	381	1	M6x1.0x20	8 N.m	70 lb in
Transfer Case Lower Brace to Transfer Case	903	2	M8x10.9x25	31 N.m	23 lb ft
Transfer Case Side Brace to Transfer Case	903	3	M8x10.9x25	31 N.m	23 lb ft
Transfer Case Side Brace to Transmission	903	2	M8x10.9x25	31 N.m	23 lb ft
Transmission to Transfer Case Lower Brace	904	1	M10x9.8x35	56 N.m	41 lb ft
Transfer Case to Transmission	907	2	M10x9.8x35	40 N.m	30 lb ft
Transfer Case to Transmission					
• First Pass	909	2	M10x10.9x120	35 N.m	26 lb ft
• Final Pass				160 degrees	
Transfer Case to Transmission					
• First Pass	910	1	M10x9.8x35	35 N.m	26 lb ft
• Final Pass				70 degrees	
Valve Body to Case	374	3	M6x1.0x65	12 N.m	106 lb in
Valve Body to Case	384	1	M6x1.0x85	12 N.m	106 lb in
Valve Body to Case Cover	376	1	M6x1.0x30	12 N.m	106 lb in

Valve Body to Case Cover	378	4	M6x1.0x55	12 N.m	106 lb in
Valve Body to Case Cover (TORX®)	377	2	M6x1.0x45	12 N.m	106 lb in
Valve Body to Driven Sprocket Support	380	1	M8x1.25x90	25 N.m	18 lb ft
Reference Number refers to the callout number on the disassembled view.					

END PLAY SPECIFICATIONS

End Play Specifications

ID Number	Dimension (mm)	Dimension (in)	Color
Differential Carrier/Case Thrust Washer (714) Selection Guide			
1	1.40-1.50	0.055-0.059	Orange
2	1.50-1.60	0.059-0.062	White
3	1.60-1.70	0.062-0.066	Blue
4	1.70-1.80	0.066-0.070	Pink
5	1.80-1.90	0.070-0.074	Brown
6	1.90-2.00	0.074-0.078	Green
7	2.00-2.10	0.078-0.082	Black
8	2.10-2.20	0.082-0.086	Purple
9	2.20-2.30	0.086-0.091	Purple/White
10	2.30-2.40	0.091-0.095	Purple/Blue
Bearing/Input Clutch Hub Selective Thrust Washer (630) Selection Guide			
1	2.90-3.00	0.114-0.118	Orange/Green
2	3.05-3.15	0.120-0.124	Orange/Black
3	3.20-3.30	0.126-0.130	No Color
4	3.35-3.45	0.132-0.136	White
5	3.50-3.60	0.138-0.142	Blue
6	3.65-3.75	0.144-0.148	Pink
7	3.80-3.90	0.150-0.154	Brown
8	3.95-4.05	0.156-0.159	Green
9	4.10-4.20	0.161-0.165	Black
10	4.25-4.35	0.167-0.171	Purple
11	4.40-4.50	0.173-0.177	Purple/White

TRANSFER CASE SELECTIVE WASHER SPECIFICATIONS**Transfer Case Selective Washer Specifications**

Dimension A		Dimension B		End Play without Selective Washer		Selective Washer Color	Selective Washer Size	
Metric	English	Metric	English	Metric	English		Metric	English
23.23-23.12 mm	.914-.910 in	19.98-20.23 mm	.786-.796 in	3.25-2.89 mm	.128-.114 in	Light Blue	2.67 mm	.105 in
23.12-23.01 mm	.910-.906 in	19.98-20.23 mm	.786-.796 in	3.14-2.78 mm	.124-.109 in	Light Green	2.56 mm	.100 in
23.01-22.90 mm	.906-.901 in	19.98-20.23 mm	.786-.796 in	3.03-2.67 mm	.119-.105 in	White	2.45 mm	.096 in
22.90-22.79 mm	.901-.897 in	19.98-20.23 mm	.786-.796 in	2.92-2.56 mm	.115-.101 in	Orange	2.34 mm	.092 in
22.79-22.68 mm	.897-.892 in	19.98-20.23 mm	.786-.796 in	2.81-2.45 mm	.110-.096 in	Pink	2.23 mm	.088 in
22.68-22.57 mm	.892-.888 in	19.98-20.23 mm	.786-.796 in	2.70-2.34 mm	.106-.092 in	No Color	2.12 mm	.083 in
22.57-22.46 mm	.888-.884 in	19.98-20.23 mm	.786-.796 in	2.59-2.23 mm	.102-.087 in	Black	2.01 mm	.079 in
23.23-23.12 mm	.914-.910 in	20.23-20.48 mm	.796-.806 in	3.00-2.64 mm	.118-.103 in	White	2.45 mm	.096 in
23.12-23.01 mm	.910-.906 in	20.23-20.48 mm	.796-.806 in	2.89-2.53 mm	.114-.099 in	Orange	2.34 mm	.092 in
23.01-22.90 mm	.906-.901 in	20.23-20.48 mm	.796-.806 in	2.78-2.42 mm	.110-.095 in	Pink	2.23 mm	.088 in
22.90-22.79 mm	.901-.897 in	20.23-20.48 mm	.796-.806 in	2.67-2.31 mm	.105-.090 in	No Color	2.12 mm	.083 in

mm		mm						
22.79- 22.68 mm	.897- .892 in	20.23- 20.48 mm	.796- .806 in	2.56-2.20 mm	.101-.086 in	Black	2.01 mm	.079 in
22.68- 22.57 mm	.892- .888 in	20.23- 20.48 mm	.796- .806 in	2.45-2.09 mm	.096-.082 in	Purple	1.90 mm	.074 in
22.57- 22.46 mm	.888- .884 in	20.23- 20.48 mm	.796- .806 in	2.34-1.98 mm	.092-.077 in	Brown	1.79 mm	.070 in
23.23- 23.12 mm	.914- .910 in	20.48- 20.72 mm	.806- .816 in	2.75-2.40 mm	.108-.094 in	Pink	2.23 mm	.088 in
23.12- 23.01 mm	.910- .906 in	20.48- 20.72 mm	.806- .816 in	2.64-2.29 mm	.104-.090 in	No Color	2.12 mm	.083 in
23.01- 22.90 mm	.906- .901 in	20.48- 20.72 mm	.806- .816 in	2.53-2.18 mm	.100-.085 in	Black	2.01 mm	.079 in
22.90- 22.79 mm	.901- .897 in	20.48- 20.72 mm	.806- .816 in	2.42-2.07 mm	.095-.081 in	Purple	1.90 mm	.074 in
22.79- 22.68 mm	.897- .892 in	20.48- 20.72 mm	.806- .816 in	2.31-1.96 mm	.091-.077 in	Brown	1.79 mm	.070 in
22.68- 22.57 mm	.892- .888 in	20.48- 20.72 mm	.806- .816 in	2.20-1.85 mm	.087-.072 in	Dark Blue	1.68 mm	.066 in
22.57- 22.46 mm	.888- .884 in	20.48- 20.72 mm	.806- .816 in	2.09-1.74 mm	.082-.068 in	Dark Green	1.57 mm	.061 in

TRANSMISSION GENERAL SPECIFICATIONS

Transmission General Specifications

Name	Hydra-matic 4T65-E
RPO Codes	M15/MN7/M76
Production Location	Warren, MI

Vehicle Platform (Engine/Transmission) Usage	H, W, U, B
Transaxle Drive	Transverse Mounted Front Wheel Drive
1st Gear Ratio	2.921:1
2nd Gear Ratio	1.568:1
3rd Gear Ratio	1.000:1
4th Gear Ratio	0.705:1
Reverse	2.385:1
Torque Converter Size (Diameter of Torque Converter Turbine)	245 mm (M15) 258 mm (MN7) 245 mm, 258 mm (M76)
Pressure Taps	Line Pressure
Transaxle Fluid Type	Dexron™ III
Transaxle Fluid Capacity (Approximate)	Bottom Pan Removal: 7.0 L (7.4 qts) Complete Overhaul: 9.5 L (10.0 qts) Dry: 12.7 L (13.4 qts)
Transaxle Type: 4	Four Forward Gears
Transaxle Type: T	Transverse Mount
Transaxle Type: 65	Product Series
Transaxle Type: E	Electronic Controls
Chain Ratios (Designates Number of Teeth on the Drive/Driven Sprockets)	35/35 37/33
Final Drive Ratios	2.86, 3.05, 3.29
Overall Final Drive Ratios	2.86, 3.05, 2.93, 3.29
Position Quadrant	P, R, N, D, 3, 2, 1 or P, R, N, OD, 2, 1
Case Material	Die Cast Aluminum
Transaxle Weight Dry	87.9 kg (194.2 lbs)
Transaxle Weight Wet	97.0 kg (214.4 lbs)
Maximum Trailer Towing Capacity	907 kg (2000 lbs)
Maximum Gross Vehicle Weight (GVW)	2903 kg (6,400 lbs)

FLUID CAPACITY SPECIFICATIONS

Fluid Capacity Specifications

Application	Specification	
	Metric	English
Bottom Pan Removal (2WD)	7.0 L	7.4 qt

Bottom Pan Removal (AWD)	7.4 L	7.8 qt
Complete Overhaul (2WD)	9.5 L	10.0 qt
Complete Overhaul (AWD)	9.9 L	10.4 qt
Dry (2WD)	12.7 L	13.4 qt
Dry (AWD)	13.1 L	13.8 qt

MODEL BUILD INFORMATION (MN7)**Model Build Information (RPO MN7)**

Transmission Model	CAB	CBB	CHB	FCB
Platform	W	W	H	C
Carline	C, P	P	P	B
Engine Displacement	3.8L	3.8L	3.8L	3.8L
Engine RPO	L67	L32	L67	L67
Eng Vin ID	1	-	1	1
Overall	2.93	3.29	2.93	2.93
Sprocket, Drive/Driven	37/33	35/35	37/33	37/33
Final Drive Ratio	3.29	3.29	3.29	3.29
Final Drive	HD	HD	HD	HD
Output Shaft	LONG	LONG	LONG	LONG
Converter Code	-	-	JZFM	JSFM
Converter K-Factor	RI15	RI15	RI15	133K
Converter Type	ECCC	ECCC	ECCC	ECCC
IMS	YES	YES	YES	YES

- HD = Heavy Duty
- IMS = Internal Mode Switch
- SSC = Case Aluminum Structural Side Cover Pan
- STD = Standard
- VSS = Vehicle Speed Sensor
- K-factor = Torque converter numeric rating - combines stall speed and torque multiplication ratings

This table does not identify all unique build items and this table may be subject to change.

MODEL BUILD INFORMATION (M15)

Model Build Information (RPO M15)

Transmission Model	LBB	LCB	LDB	RDB	RNB	BCB
Platform	W	W	W	W	W	B, U
Carline	B, C, P	C	C	C	B	B, C, O, P
Engine Displacement	3.8L	3.8L	3.8L	3.4L	3.1L	3.4L
Engine RPO	L36	L36	L36	LA1	LG8	LA1
Eng Vin ID	K	K	K	E	J	E
Overall	3.05	3.29	3.29	2.86	3.05	3.29
Sprocket, Drive/Driven	35/35	35/35	35/35	35/35	35/35	35/35
Final Drive Ratio	3.05	3.29	3.29	2.86	3.05	3.29
Final Drive	STD	STD	STD	STD	STD	STD
Output Shaft	STD	STD	STD	STD	STD	STD
Converter Code	FLQB	FLQB	FLQB	FDQB	FDKB	FLQB
Converter K-Factor	163K	163K	163K	180K	180K	163K
Converter Type	ECCC	ECCC	ECCC	ECCC	ECCC	ECCC
IMS	YES	YES	YES	YES	YES	YES

- HD = Heavy Duty
- IMS = Internal Mode Switch
- SSC = Case Aluminum Structural Side Cover Pan
- STD = Standard
- VSS = Vehicle Speed Sensor
- K-factor = Torque converter numeric rating - combines stall speed and torque multiplication ratings

This table does not identify all unique build items and this table may be subject to change.

MODEL BUILD INFORMATION (M76)**Model Build Information (RPO M76)**

Transmission Model	VCB	CXB
Platform	B	B, U
Carline	B	C, B, P, O
Engine Displacement	3.6L	3.4L
Engine RPO	LY7	LA1
Eng Vin ID	7	E

Overall	3.29	3.29
Sprocket, Drive/Driven	35/35	35/35
Final Drive Ratio	3.29	3.29
Final Drive	AWD	AWD
Output Shaft	STD	STD
Converter Code	-	FLQB
Converter K-Factor	RI15	163K
Converter Type	ECCC	ECCC
IMS	YES	YES

- HD = Heavy Duty
- IMS = Internal Mode Switch
- SSC = Case Aluminum Structural Side Cover Pan
- STD = Standard
- VSS = Vehicle Speed Sensor
- K-factor = Torque converter numeric rating - combines stall speed and torque multiplication ratings

This table does not identify all unique build items and this table may be subject to change.

COMPONENT LOCATOR

DISASSEMBLED VIEWS

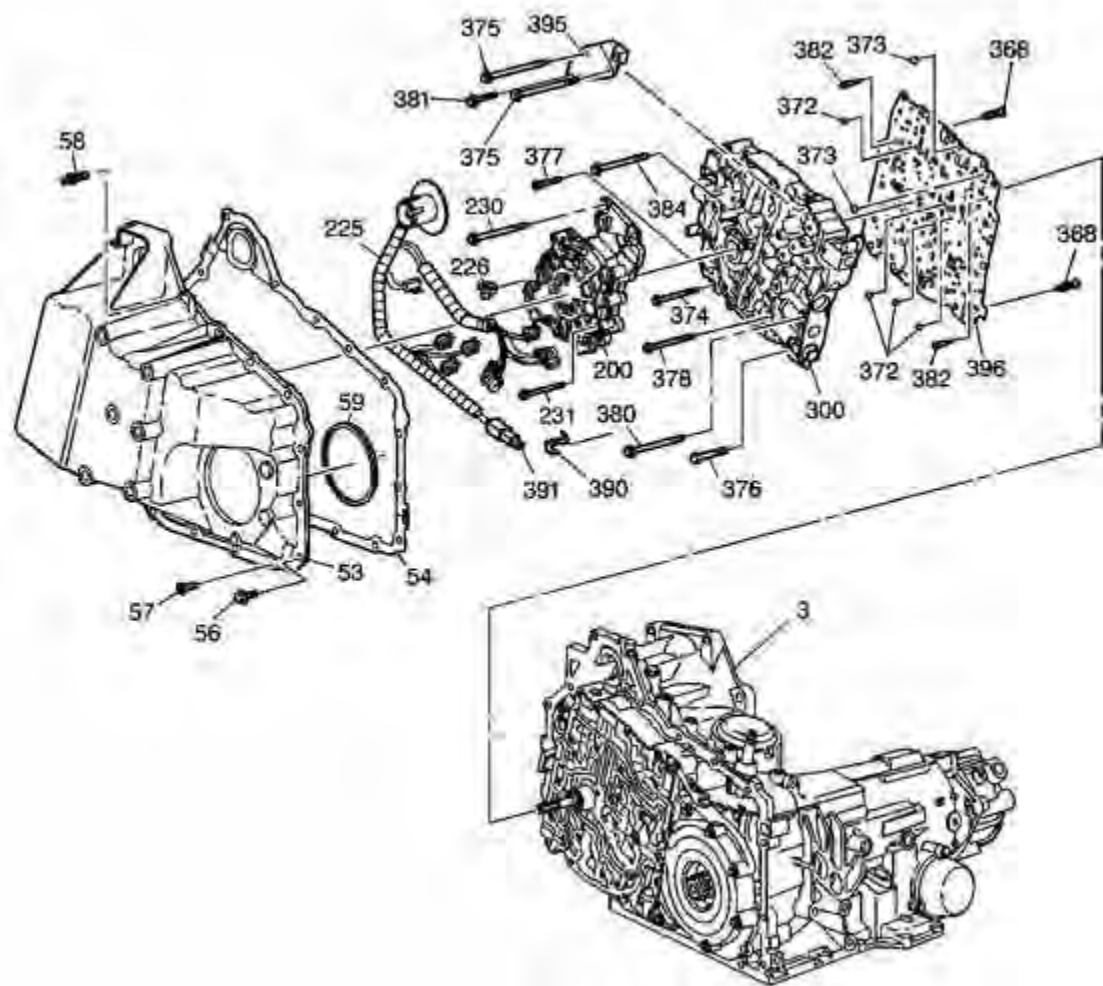


Fig. 1: Case and Associated Parts Disassembled View (1 of 4)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 1

Callout	Component Name
3	Transmission Case Assembly
53	Control Valve Body Cover
54	Control Valve Body Cover Gasket
56	Control Valve Body Cover Bolt M 8 X 1.25 X 25
57	Control Valve Body Cover TORX® Head Bolt M 8 X 1.25 X 21
58	Control Valve Body Cover to Case Stud M 8 X 1.25 X 24
59	Control Valve Body Cover to Case Cover Seal
200	Oil Pump Assembly - Model Dependent

200	Oil Pump Assembly - Model Dependent
225	Wiring Harness Assembly (IMS)
226	Wiring Harness Clip
230	Pump Cover to Case Cover Bolt M 6 X 1.0 X 95.0
231	Pump Body to Case Bolt M6 X 1.0 X 87.5
300	Control Valve Body Assembly - Model Dependent
300	Control Valve Body Assembly - Model Dependent
368	Spacer Plate and Gaskets/Control Valve Body Bolt
368	Spacer Plate and Gaskets/Control Valve Body Bolt
372	1/4 Ball Check Valve
372	5/16 Ball Check Valve
373	Ball Check Valve
373	Ball Check Valve
374	Control Valve Body Bolt M 6 X 1.0 X 65.0
375	Control Valve Body to Case Bolt M 6 X 1.0 X 60.0
375	Control Valve Body to Case Bolt M 6 X 1.0 X 60.0
376	Control Valve Body to Case Bolt M 6 X 1.0 X 30.0
377	Control Valve Body to Case Cover Bolt M 6 X 1.0 X 45.0
378	Control Valve Body to Case Cover Bolt M 6 X 1.0 X 55.0
380	Control Valve Body to Case Bolt M 8 X 1.25 X 90.0
381	Control Valve Body to Case Bolt M 6 X 1 X 20.0
382	TCC Solenoid Valve Screen/Seal Assembly
382	TCC Solenoid Valve Screen/Seal Assembly
384	Control Valve Body to Case Bolt M 6 X 1.0 X 85.0
390	Temperature Sensor Clip
391	Transmission Fluid Temperature Sensor
391	Transmission Fluid Temperature Sensor
395	Transmission Fluid Pressure (TFP) Manual Valve Position Switch Assembly
396	Control Valve Body Spacer Plate and Gasket Assembly



Callout	Component Name
1	Torque Converter Assembly
2	Torque Converter Bushing
3	Transmission Case
4	Right Axle Oil Seal Assembly
5	Case Extension Bolt M 10 X 1.5 X 35.0
6	Case Extension Assembly
7a	Front Differential Carrier Bushing
7b	Output Shaft Bearing Assembly
8	Case Extension Seal

Callout	Component Name
1	Torque Converter Assembly
2	Torque Converter Bushing
3	Transmission Case
4	Right Axle Oil Seal Assembly
5	Case Extension Bolt M 10 X 1.5 X 35.0
6	Case Extension Assembly
7a	Front Differential Carrier Bushing
7b	Output Shaft Bearing Assembly
8	Case Extension Seal

9	Vehicle Speed Sensor Bolt M 8 X 1.25 X 12.0
10	Vehicle Speed Sensor Assembly
11	Vehicle Speed Sensor O-Ring Seal
12	FWD Servo Cover Bolt M 6 X 1.0 X 20.0
13	Forward Band Servo Cover
14	Forward Band Servo Cover Seal
15	Forward Band Servo Pin Retaining Ring
16	Forward Band Servo Piston
18	Forward Band Servo Piston Oil Seal Ring
19	Forward Band Servo Piston Cushion Outer Spring
20	Forward Servo Cushion Spring Retainer
21	Forward Band Servo Piston Apply Pin
22	Forward Band Servo Piston Return Spring
23	Transmission Oil Pan Bolt M 6 X 1.0 X 17.0
24	Transmission Oil Pan
25	Transmission Oil Pan Gasket
26	Transmission Oil Pan Magnet
27	Oil Dam
37	Transmission Vent Assembly
38	Oil Pressure Test Hole Plug 1/8 - 27 NPTF
39	Reverse Band Servo Cover Retaining Ring
40	Reverse Band Servo Cover
41	Reverse Band Servo Cover O-Ring Seal
42	Reverse Band Servo Pin Retaining Ring
43	Reverse Band Servo Piston Oil Seal Ring
44	Reverse Band Servo Piston
45	Reverse Band Servo Piston Cushion Spring
46	Reverse Band Servo Piston Cushion Spring Retainer
47	Reverse Band Servo Piston Cushion Spring Inner
48	Reverse Band Servo Piston Apply Pin
49	Reverse Band Servo Piston Return Spring
60	Clip, Oil Cooler Quick Connect
60	Clip, Oil Cooler Quick Connect
61	Transmission Oil Cooler Pipe Fitting 9/16-18 UNF
62	Transmission Oil Cooler Pipe Fitting 9/16-18 UNF

	Forward Band Servo Piston Cushion Inner Spring
66	Oil Cooler Pipe Fitting O-Ring Seal
100	Transmission Oil Filter Assembly
101	Transmission Oil Filter Seal Assembly
227	Oil Pump Drive Shaft Assembly
228	Oil Pump Drive Shaft Seal
372	Case Cover Ball Check Valve
372	Case Cover Ball Check Valve
400	Complete Case Cover Assembly

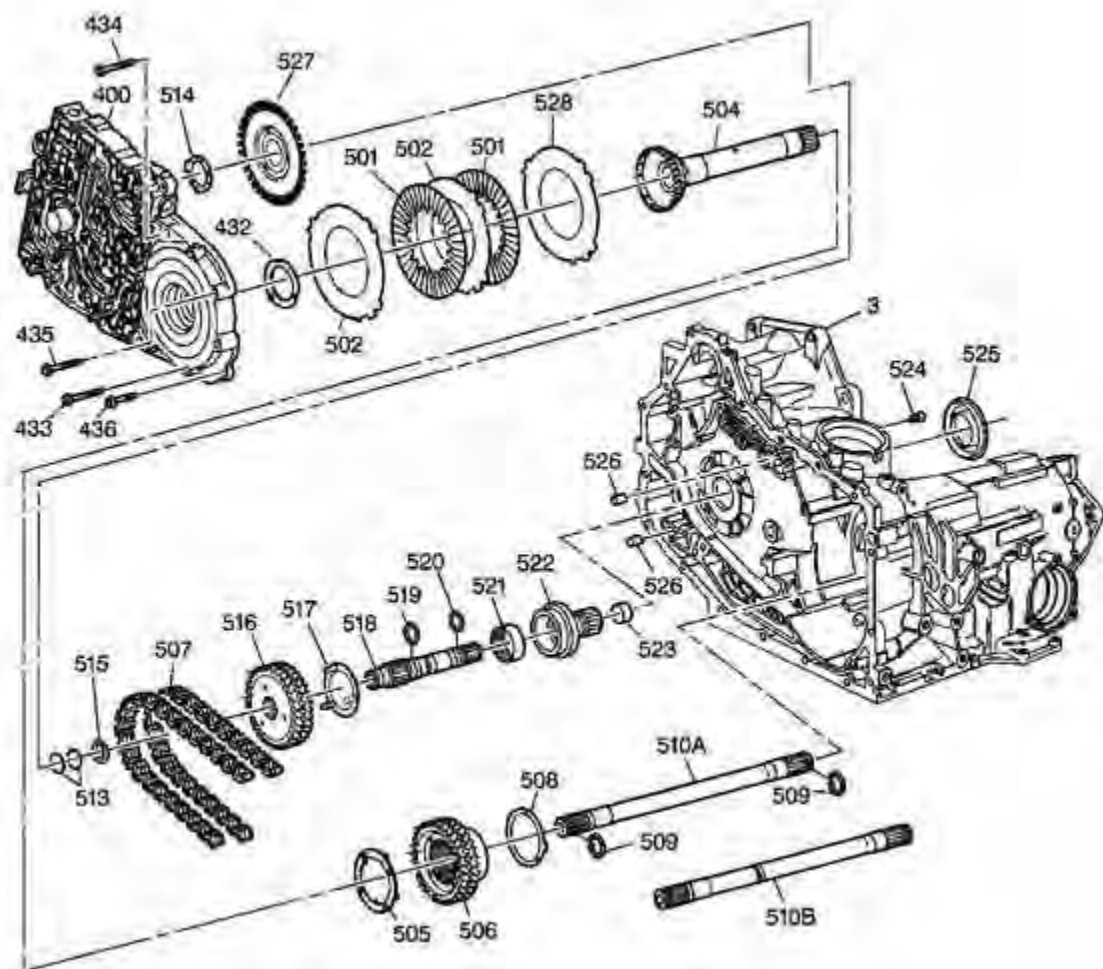


Fig. 3: Case and Associated Parts Disassembled View (3 of 4) - Without Touch Activated Power

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
3	Transmission Case
400	Complete Case Cover Assembly
432	4th Clutch Shaft Thrust Washer
433	Case Cover Bolt/Screw TORX® Special M6 X 1.0 X 32.0
434	Case Cover Bolt/Screw M6 X 1.0 X 40.0
435	Case Cover Bolt/Screw M8 X 1.25 X 50.0
436	Case Cover Bolt/Screw M6 X 1.0 X 30.0
501	4th Clutch Fiber Plate Assembly
501	4th Clutch Fiber Plate Assembly
502	4th Clutch Steel Plate
502	4th Clutch Steel Plate
504	4th Clutch Shaft Assembly
505	4th Clutch Shaft Thrust Washer
506	Driven Sprocket
507	Drive Link Assembly
508	Driven Sprocket Thrust Washer
509	Drive Shaft Retaining Ring
510a	Standard Output Shaft
510b	Heavy Duty Output Shaft
513	Turbine Shaft Oil Seal Ring
514	Drive Sprocket Thrust Washer
515	Drive Sprocket Retaining Ring
516	Drive Sprocket
517	Drive Sprocket Thrust Washer
518	Turbine Shaft
519	Turbine Shaft Oil Seal Ring
520	Turbine Shaft O-Ring Seal
521	Drive Sprocket Support Bearing Assembly
522	Drive Sprocket Support
523	Drive Sprocket Support Bushing
524	Drive Sprocket Support Bolt/Screw M8 X 1.25 X 24.0
525	Torque Converter Oil Seal Assembly
526	Case Cover Pin

526	Case Cover Pin
527	Speed Sensor Reluctor Wheel Assembly
528	4th Clutch Apply Plate

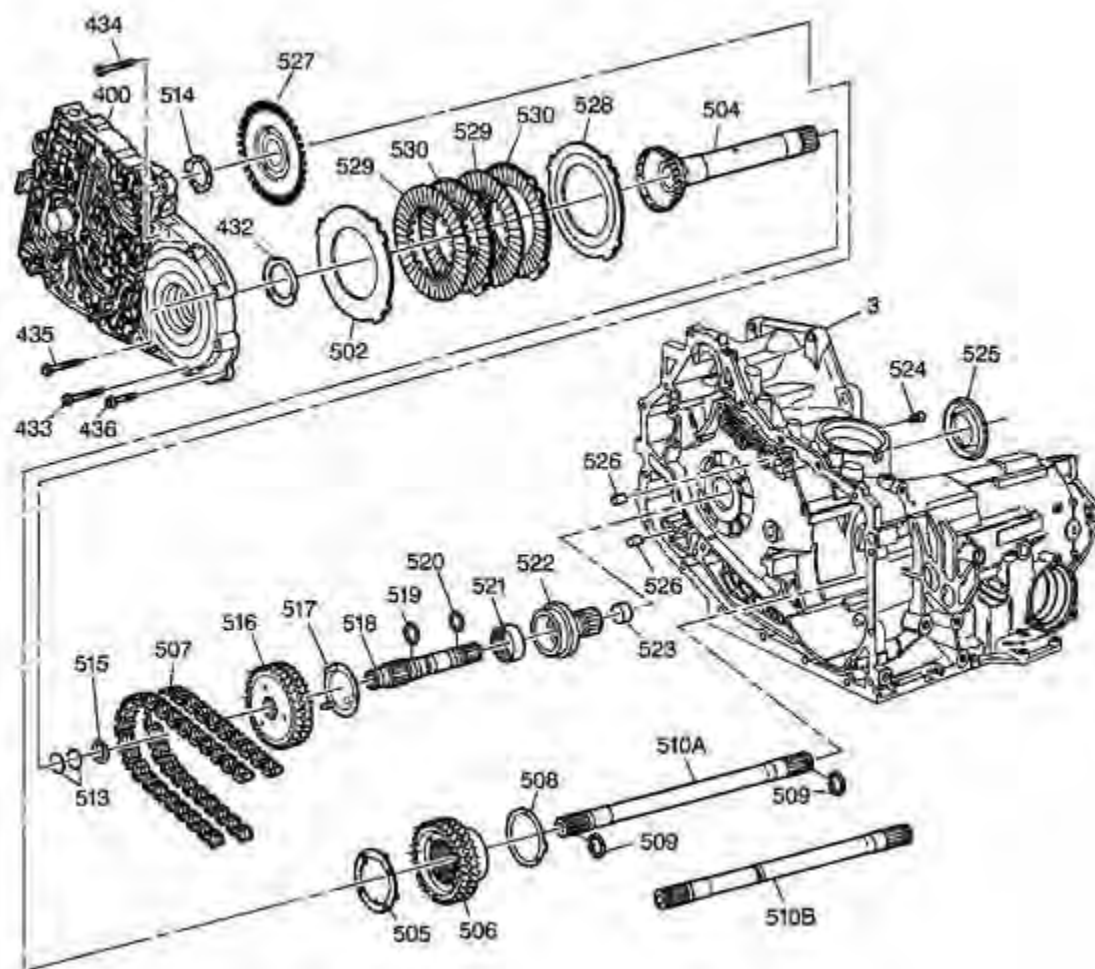


Fig. 4: Case and Associated Parts Disassembled View (3 of 4) - With Touch Activated Power

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
3	Transmission Case
400	Complete Case Cover Assembly
432	4th Clutch Shaft Thrust Washer
433	Case Cover Bolt/Screw TORX® Special M6 X 1.0 X 32.0

434	Case Cover Bolt/Screw M6 X 1.0 X 40.0
435	Case Cover Bolt/Screw M8 X 1.25 X 50.0
436	Case Cover Bolt/Screw M6 X 1.0 X 30.0
502	4th Clutch Steel Plate
504	4th Clutch Shaft Assembly
505	4th Clutch Shaft Thrust Washer
506	Driven Sprocket
507	Drive Link Assembly
508	Driven Sprocket Thrust Washer
509	Drive Shaft Retaining Ring
510a	Standard Output Shaft
510b	Heavy Duty Output Shaft
513	Turbine Shaft Oil Seal Ring
514	Drive Sprocket Thrust Washer
515	Drive Sprocket Retaining Ring
516	Drive Sprocket
517	Drive Sprocket Thrust Washer
518	Turbine Shaft
519	Turbine Shaft Oil Seal Ring
520	Turbine Shaft O-Ring Seal
521	Drive Sprocket Support Bearing Assembly
522	Drive Sprocket Support
523	Drive Sprocket Support Bushing
524	Drive Sprocket Support Bolt/Screw M8 X 1.25 X 24.0
525	Torque Converter Oil Seal Assembly
526	Case Cover Pin
526	Case Cover Pin
527	Speed Sensor Reluctor Wheel Assembly
528	4th Clutch Apply Plate
529	4th Clutch Fiber Plate Assembly
529	4th Clutch Fiber Plate Assembly
530	4th Clutch Steel Plate
530	4th Clutch Steel Plate

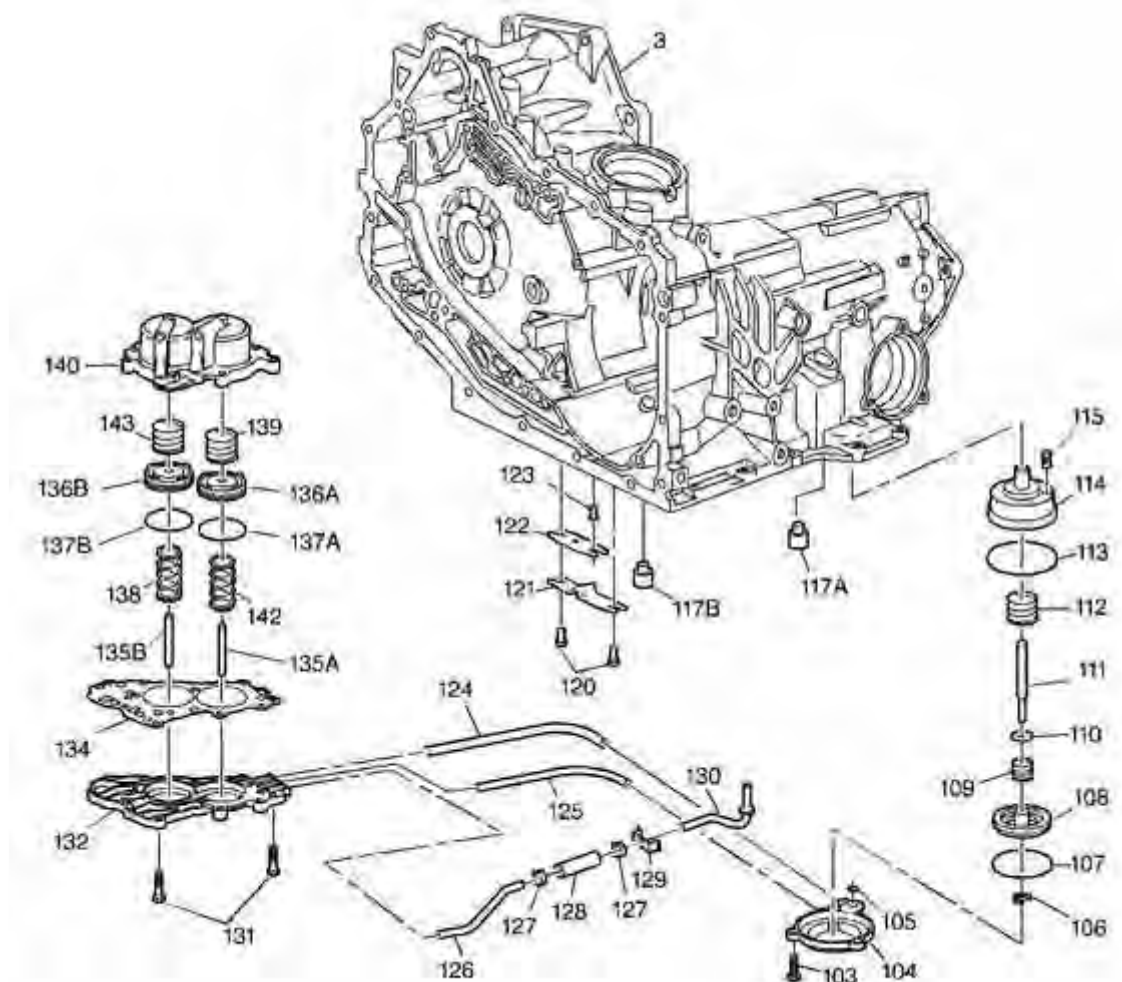


Fig. 5: Case and Associated Parts Disassembled View (4 of 4)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
3	Transmission Case Assembly
103	2-1 Manual Band Servo Cover Bolt/Screw M8 X 1.25 X 25.0 (3)
104	2-1 Manual Band Servo Cover
105	2-1 Manual Band Servo Cover Seal
106	2-1 Manual Band Servo Piston Pin Retaining Ring
107	2-1 Manual Band Servo Piston Seal
108	2-1 Manual Band Servo Piston
109	2-1 Manual Band Servo Piston Cushion Spring

110	2-1 Manual Band Servo Piston Spring Retainer
111	2-1 Manual Band Servo Piston Pin
112	2-1 Manual Band Servo Piston Spring
113	2-1 Manual Band Servo Piston Cylinder O-Ring Seal
114	2-1 Manual Band Servo Piston Cylinder
115	2-1 Manual Band Servo Exhaust Screen Assembly
117a	Forward Band Anchor Pin
117b	Reverse Band Anchor Pin
120	Thermo Element Plate Pin
121	Thermo Element
122	Thermo Element Plate
123	Thermo Element Plate Center Pin
124	Forward Band Servo Oil Pipe
125	2-1 Manual Band Servo Oil Pipe
126	Lube Oil Pipe
127	Lube Oil Hose Clamp
127	Lube Oil Hose Clamp
128	Lube Oil Hose
129	Lube Oil Pipe Retainer
130	Lube Oil Pipe and Washer Assembly
131	Accumulator Cover Bolt/Screw M6 X 1.0 X 28.0 (11)
132	Accumulator Cover
134	Accumulator Cover Spacer Plate Assembly
135a	1-2 Accumulator Piston Pin
135b	2-3 Accumulator Piston Pin
136a	1-2 Accumulator Piston
136b	2-3 Accumulator Piston
137a	1-2 Accumulator Piston Oil Seal Ring
137b	2-3 Accumulator Piston Oil Seal Ring
138	2-3 Accumulator Piston Outer Spring
139	1-2 Accumulator Piston Cushion Spring
140	1-2 and 2-3 Accumulator Housing
142	1-2 Accumulator Piston Outer Spring
143	2-3 Accumulator Piston Cushion Spring

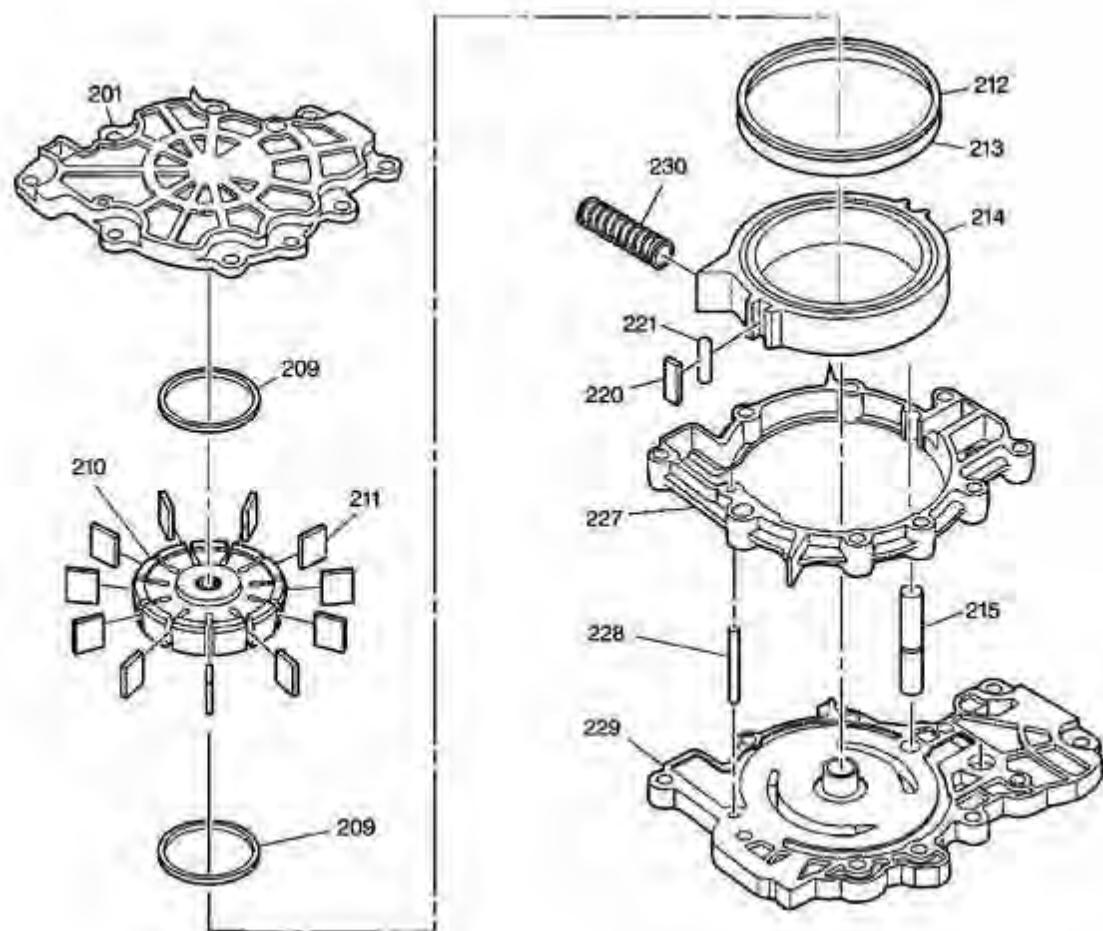


Fig. 6: Oil Pump Assembly
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
201	Pump Cover
209	Oil Pump Vane Ring
209	Oil Pump Vane Ring
210	Oil Pump Selective Rotor
211	Oil Pump Selective Vane
212	Oil Pump Slide Oil Seal Ring
213	Oil Pump Slide O-Ring Seal
214	Oil Pump Selective Slide
215	Oil Pump Slide Pivot Pin
220	Oil Pump Slide Seal

221	Oil Pump Slide Seal Support
227	Oil Pump Body
228	Oil Pump Body Alignment Pin
229	Oil Pump Base
230	Oil Pump Prime Spring

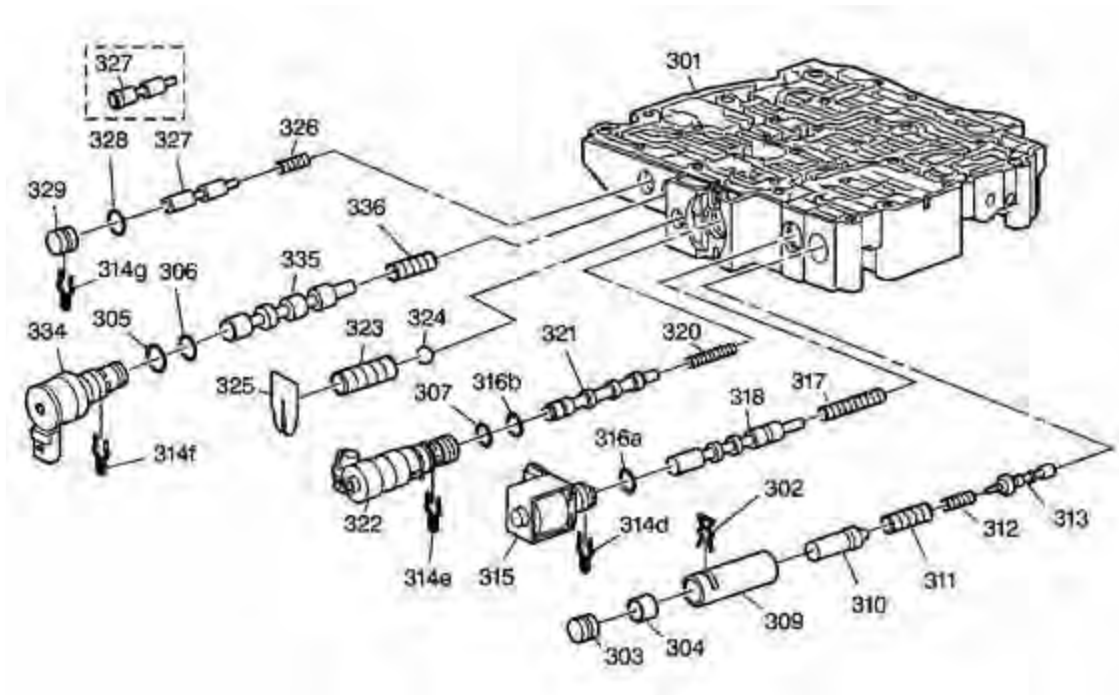


Fig. 7: Control Valve Body Assembly Disassembled View - (1 of 2)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
301	Control Valve Body Machined
302	Line Boost Valve and Bushing Retainer
303	Line Boost Valve Bore Plug
304	Line Boost Valve
305	TCC PWM Solenoid Valve O-Ring Seal
306	TCC PWM Solenoid Valve O-Ring Seal
307	Pressure Control Solenoid Valve O-Ring Seal
309	Reverse Boost Valve Bushing
310	Reverse Boost Valve
311	Pressure Regulator Valve Spring Outer

312	Pressure Regulator Valve Inner Spring
313	Pressure Regulator Valve
314d	1-2, 3-4 Shift Solenoid Valve Retainer
314e	Pressure Control Solenoid Valve Retainer
314f	TCC PWM Solenoid Valve Retainer
314g	TCC Regulator Apply Valve Bore Plug Retainer
315	1-2, 3-4 Shift Solenoid Valve Assembly
316a	1-2, 3-4 Shift Solenoid Valve O-Ring Seal
316b	Pressure Control Solenoid Valve O-Ring Seal
317	1-2 Shift Valve Spring
318	1-2 Shift Valve
320	Torque Signal Regulator Valve Spring
321	Torque Signal Regulator Valve
322	Pressure Control Solenoid Valve Assembly
323	Line Pressure Relief Valve Spring
324	Line Pressure Relief Valve
325	Line Pressure Relief Valve Spring Retainer
326	TCC Regulator Apply Valve Spring
327	TCC Regulator Apply Valve - Some Models have touch activated Power
327	TCC Regulator Apply Valve - Some Models have touch activated Power
328	TCC Regulator Apply Valve Bore Plug O-Ring Seal
329	TCC Regulator Apply Valve Bore Plug
334	TCC PWM Solenoid Valve Assembly
335	TCC Control Valve
336	TCC Control Valve Spring

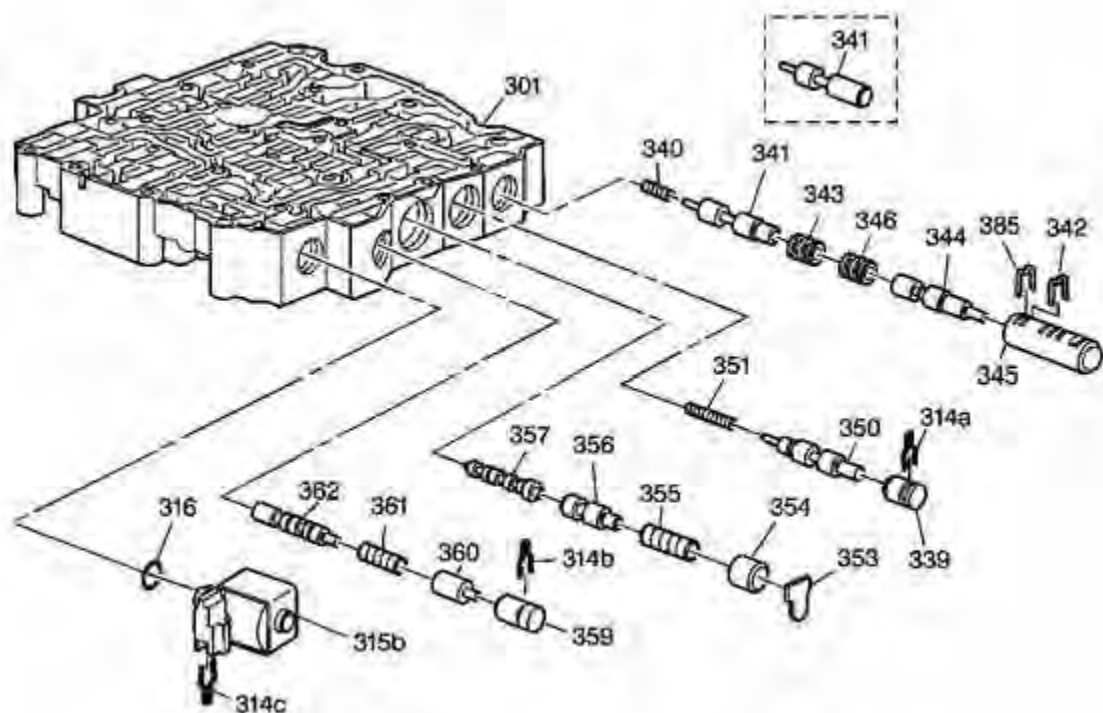


Fig. 8: Control Valve Body Assembly Disassembled View - (2 of 2)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 8

Callout	Component Name
301	Machined Control Valve Body
314a	1-2 Accumulator Valve Retainer
314b	4-3 Manual Downshift Valve Retainer
314c	2-3 Shift Solenoid Valve Retainer
315b	2-3 Shift Solenoid Valve Assembly
316	O-Ring Seal
339	1-2 Accumulator Valve Bore Plug
340	3-4 Accumulator Valve Spring
341	3-4 Accumulator Valve
341	3-4 Accumulator Valve - Some Models
342	2-3 Accumulator Valve Bore Plug Retainer
343	2-3 Accumulator Valve Bore Plug
344	2-3 Accumulator Valve
345	2-3 Accumulator Valve Bushing

346	2-3 Accumulator Valve Spring
350	1-2 Accumulator Valve
351	1-2 Accumulator Valve Spring
353	3-2 Manual Downshift Valve Retainer
354	3-2 Manual Downshift Valve Bore Plug
355	3-2 Manual Downshift Valve Spring
356	3-2 Manual Downshift Valve
357	2-3 Shift Valve
359	4-3 Manual Downshift Valve Bore Plug
360	4-3 Manual Downshift Valve
361	4-3 Manual Downshift Valve Spring
362	3-4 Shift Valve
385	2-3 Accumulator Valve Bushing Assembly Retainer

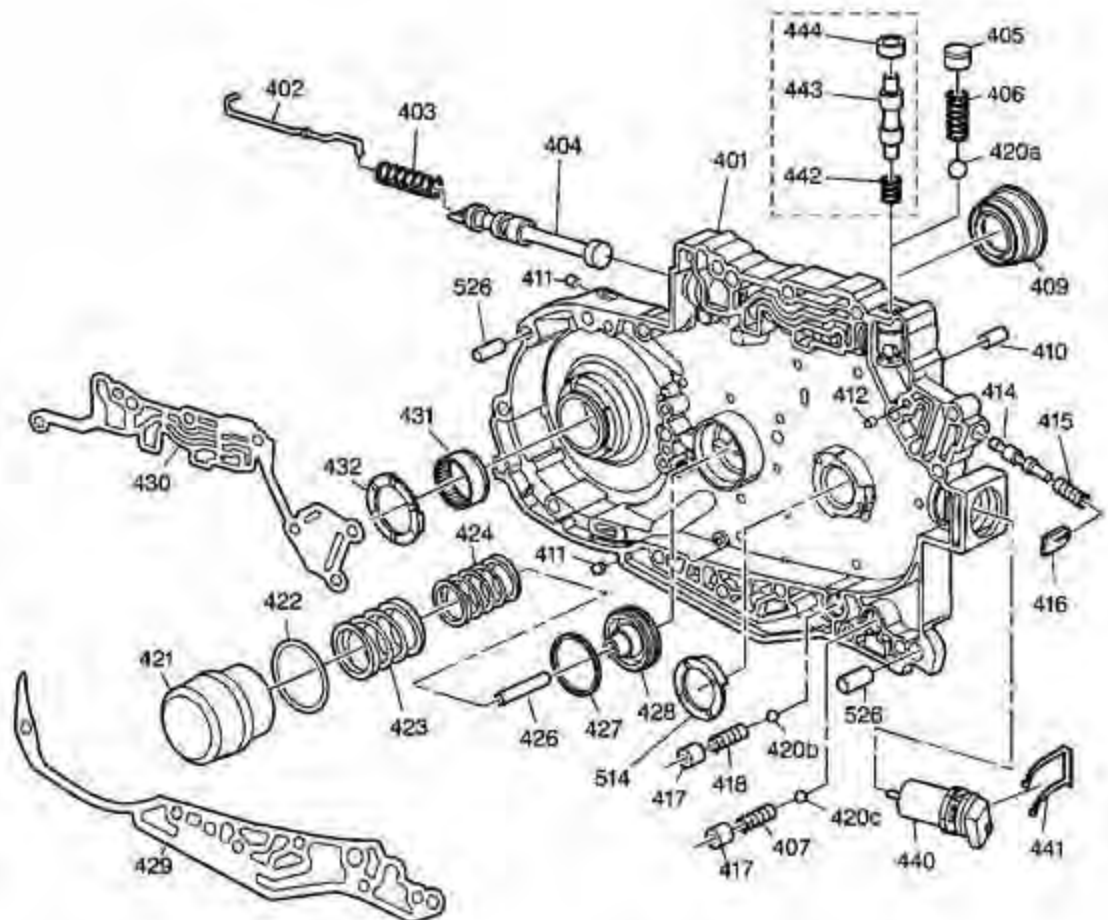


Fig. 9: Identifying Case Cover Assembly
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 9

Callout	Component Name
401	Case Cover
402	Manual Valve Link
403	Manual Valve Link Spring
404	Manual Valve
405	Low Blow Off Ball Valve Bore Plug
406	Low Blow Off Ball Valve Spring
407	Cooler Ball Valve Spring
409	Left Side Axle Oil Seal Assembly
410	Control Valve Body Alignment Sleeve
411	Bore Plug
411	Bore Plug
412	Orificed Cup Plug
414	Actuator Feed Limit Valve
415	Actuator Feed Limit Valve Spring
416	Actuator Feed Limit Valve Spring Retainer
417	Ball Valve Bore Plug
418	TCC Blow Off Ball Valve Spring
420a	Low Blow Off Ball Valve
420b	TCC Blow Off Ball Valve
420c	Cooler Ball Valve
421	3-4 Accumulator Piston Cylinder
422	3-4 Accumulator Piston Cylinder O-Ring Seal
423	3-4 Accumulator Piston Outer Spring
424	3-4 Accumulator Piston Inner Spring
426	3-4 Accumulator Piston Pin
427	3-4 Accumulator Piston Oil Seal Ring
428	3-4 Accumulator Piston
429	Case Cover Lower Gasket
430	Case Cover Upper Gasket
431	Front Wheel Drive Shaft Bearing Assembly

432	Fourth Clutch Shaft Thrust Washer
440	Input Speed Sensor Assembly
441	Input Speed Sensor Clip
442	Low Regulator Valve Spring 3-4 Accumulator Valve - Some Models have touch activated Power
443	Low Regulator Valve 3-4 Accumulator Valve - Some Models have touch activated Power
444	Low Regulator Valve Bore Plug 3-4 Accumulator Valve - Some Models have touch activated Power
514	Drive Sprocket/Case Cover Thrust Washer
526	Case Cover Dowel Pin
526	Case Cover Dowel Pin

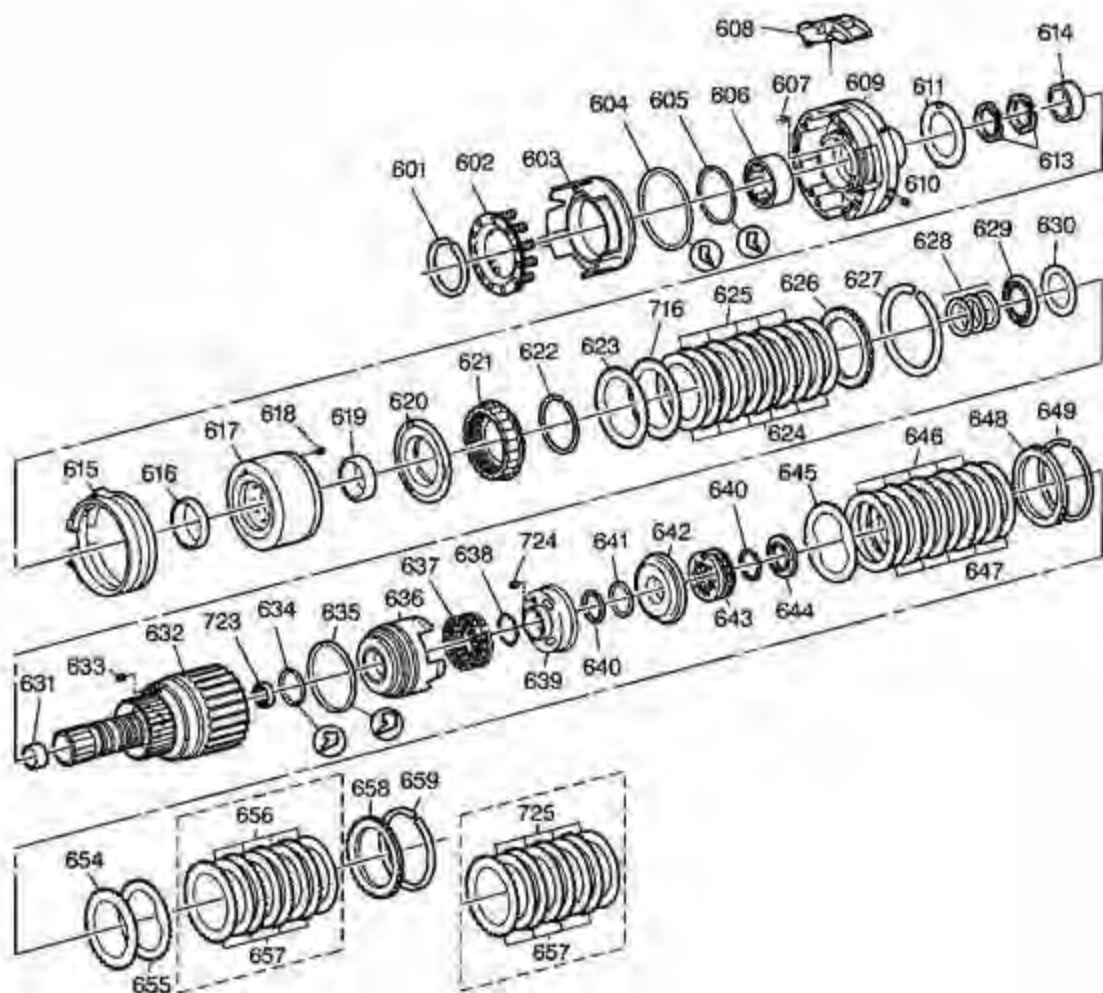


Fig. 10: Internal Components Disassembled View (1 of 2)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 10

Callout	Component Name
601	4th Clutch Spring Retaining Ring
602	4th Clutch Piston Return Spring Assembly
603	4th Clutch Piston Assembly
604	4th Clutch Piston Seal Outer
605	4th Clutch Piston Seal Inner
606	Drawn Cup Bearing Assembly
607	Orificed Cup Plug
608	Drive Link Lube Scoop
609	Driven Sprocket Support Assembly
610	Cup Plug
611	Thrust Washer Driven Sprocket Support 2nd Clutch Drum
613	Oil Seal Ring
614	Driven Sprocket Support Bushing
615	Reverse Band Assembly
616	75.5 OD X 8.0 Bushing
617	2nd Clutch Housing
618	Check Valve Retainer and Ball Assembly 2nd Clutch
619	70.0 OD X 11.0 Bushing
620	2nd Clutch Piston w/Molded Seal
621	2nd Clutch Apply Ring and Release Spring Assembly
622	Retaining Ring
623	2nd Clutch Plate Waved
624	2nd Clutch Plate Assembly Fiber
625	2nd Clutch Reaction Plate Steel
626	Backing Support Ring Plate Steel
627	2nd Clutch Retaining Ring Outer
628	Oil Seal Ring Input Shaft
629	Thrust Bearing Support Sprocket/Thrust Washer
630	Selective Thrust Washer Bearing/Input Clutch Hub
631	Input Shaft Bushing

632	Input Housing Sleeve and Shaft Assembly
633	Check Valve Retainer and Ball Assembly
634	Input Clutch Piston Seal Inner
635	Input Clutch Piston Seal Outer
636	Input Clutch Piston
637	Input Clutch Spring and Retainer Assembly
638	O-Ring Seal
639	3rd Clutch Piston Housing
640	Retaining Ring 3rd Clutch Piston Housing/Input Shaft
640	Retaining Ring 3rd Clutch Piston Housing/Input Shaft
641	3rd Clutch Piston Seal Inner
642	3rd Clutch Piston and Seal Assembly
643	3rd Clutch Spring Retainer and Guide Assembly
644	Thrust Bearing Assembly
645	3rd Clutch Plate Waved
646	3rd Clutch Plate Assembly OD Spline
647	3rd Clutch Plate Assembly ID Spline
648	3rd Clutch Backing Plate
649	3rd Clutch Backing Plate Retaining Ring
654	Input Clutch Apply Plate
655	Input Clutch Plate Waved
656	Input Clutch Plate Assembly Fiber - Sprag Model
657	Input Clutch Plate Steel
657	Input Clutch Plate Steel
658	Input Clutch Backing Plate Steel
659	Input Clutch Backing Plate Retaining Ring
716	2nd Clutch Apply Reaction Plate Tapered
723	4th Clutch Shaft to Input Housing Bearing
724	3rd Clutch Piston Housing Ball Check Valve Assembly
725	Input Clutch Plate Assembly Fiber - Pawl Model

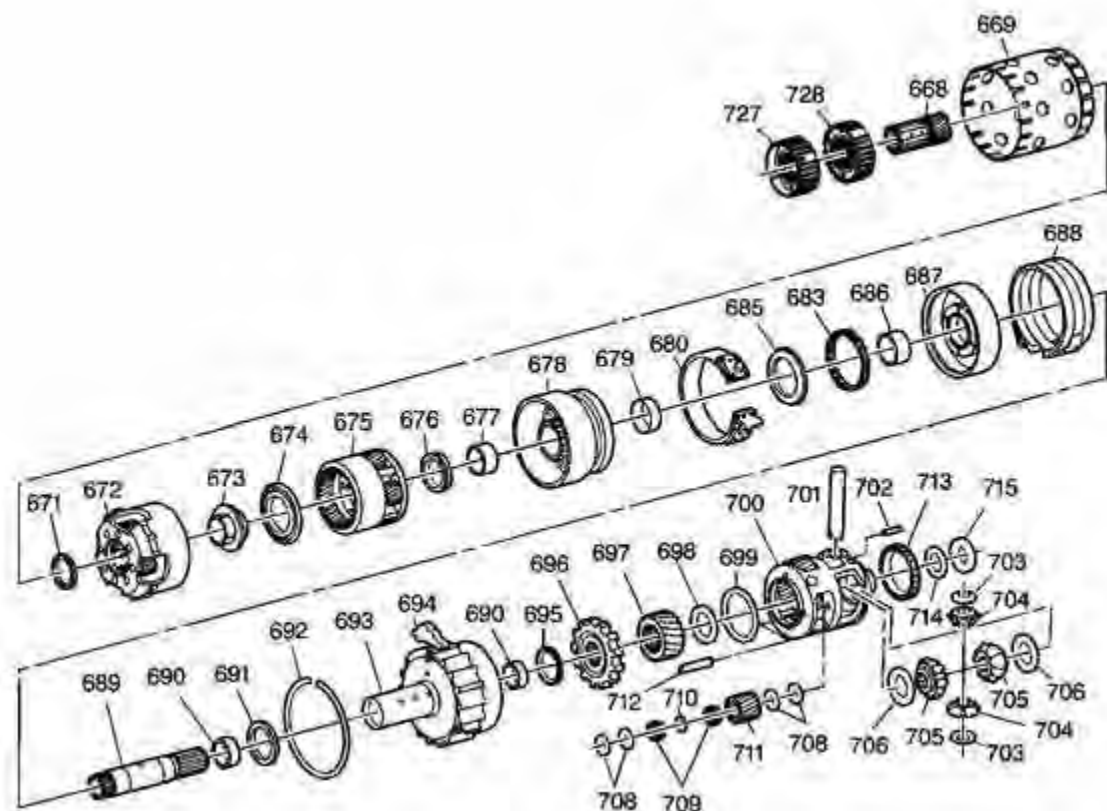


Fig. 11: Internal Components Disassembled View (2 of 2)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 11

Callout	Component Name
668	Input Sun Gear
669	Reverse Reaction Drum
671	Input Sun Gear Thrust Bearing Assembly
672	Input Complete Carrier Assembly
673	Input Carrier/Reaction Carrier Lube Dam
674	Input/Reaction Carrier Thrust Bearing Assembly
675	Reaction Complete Carrier Assembly
676	Reaction Carrier/Sun Gear Thrust Bearing Assembly
677	Left Hand Reaction Sun Gear Bushing
678	Reaction Sun/Drum Gear Assembly
679	Right Hand Reaction Sun Gear Bushing
680	2/1 Manual Band Assembly

683	1/2 Support Roller Clutch Assembly
685	Thrust Bearing Assembly
686	1/2 Support Bushing
687	1/2 Support and Drum
688	Forward Band Assembly
689	Final Drive Sun Gear Shaft
690	Final Drive Internal Gear Bushing
690	Final Drive Internal Gear Bushing
691	Bearing 1/2 Support/Internal Gear
692	Retaining Ring Final Drive Internal Gear
693	Final Drive Internal Gear
694	Park Pawl Assembly
695	Thrust Bearing Assembly Internal Gear/Parking Gear
696	Parking Gear
697	Final Drive Sun Gear
698	Carrier/Sun Gear Thrust Bearing Assembly
699	Spiral Pinion Gear Pin Retaining Ring
700	Differential/Final Drive Carrier Assembly
701	Differential Pinion Shaft
702	Differential Pinion Shaft Retaining Pin
703	Thrust Washer Differential Pinion
703	Thrust Washer Differential Pinion
704	Differential Pinon Gear
704	Differential Pinon Gear
705	Differential Side Gear MN7 has unique left/right gears
705	Differential Side Gear MN7 has unique left/right gears
706	Bronze Thrust Washer Differential Side Gear
706	Bronze Thrust Washer Differential Side Gear
708	Pinion Thrust Washer Steel
708	Pinion Thrust Washer Steel
709	Roller Needle Bearing
710	Pinion Needle Bearing Spacer
711	Final Drive Planetary Pinion Gear
712	Planetary Pinion Gear Pin
713	Vehicle Speed Sensor Reluctor Wheel

	Differential Carrier/Case Washer Thrust
715	Thrust Bearing Assembly
727	3rd Clutch Pawl Assembly
728	Input Clutch Pawl Assembly

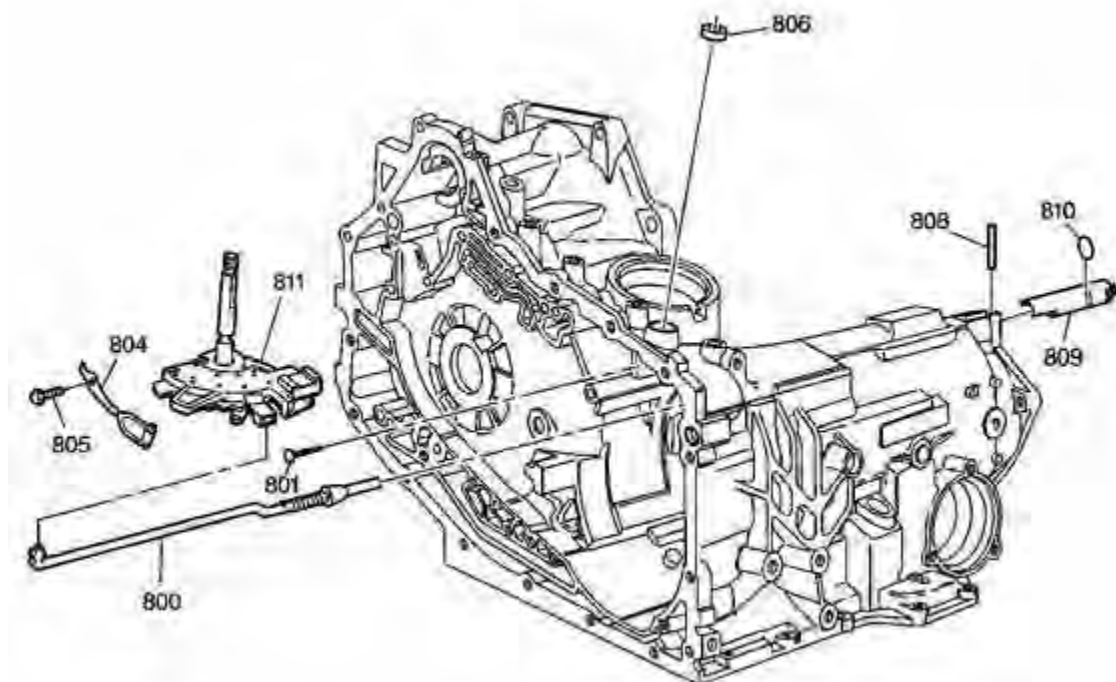


Fig. 12: Manual Shaft and Parking System Assembly Disassembled View
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 12

Callout	Component Name
800	Park Pawl Actuator Assembly
801	Manual Shift Shaft Pin
804	Manual Shift Detent Assembly
805	Manual Shift Detent Bolt/Screw
806	Manual Shift Shaft Seal Assembly
808	Park Pawl Actuator Guide Pin
809	Park Pawl Actuator Guide
810	Park Pawl Actuator Guide O-Ring Seal
811	Lever Assembly-Manual Shaft Detent with Internal Mode Switch (IMS)

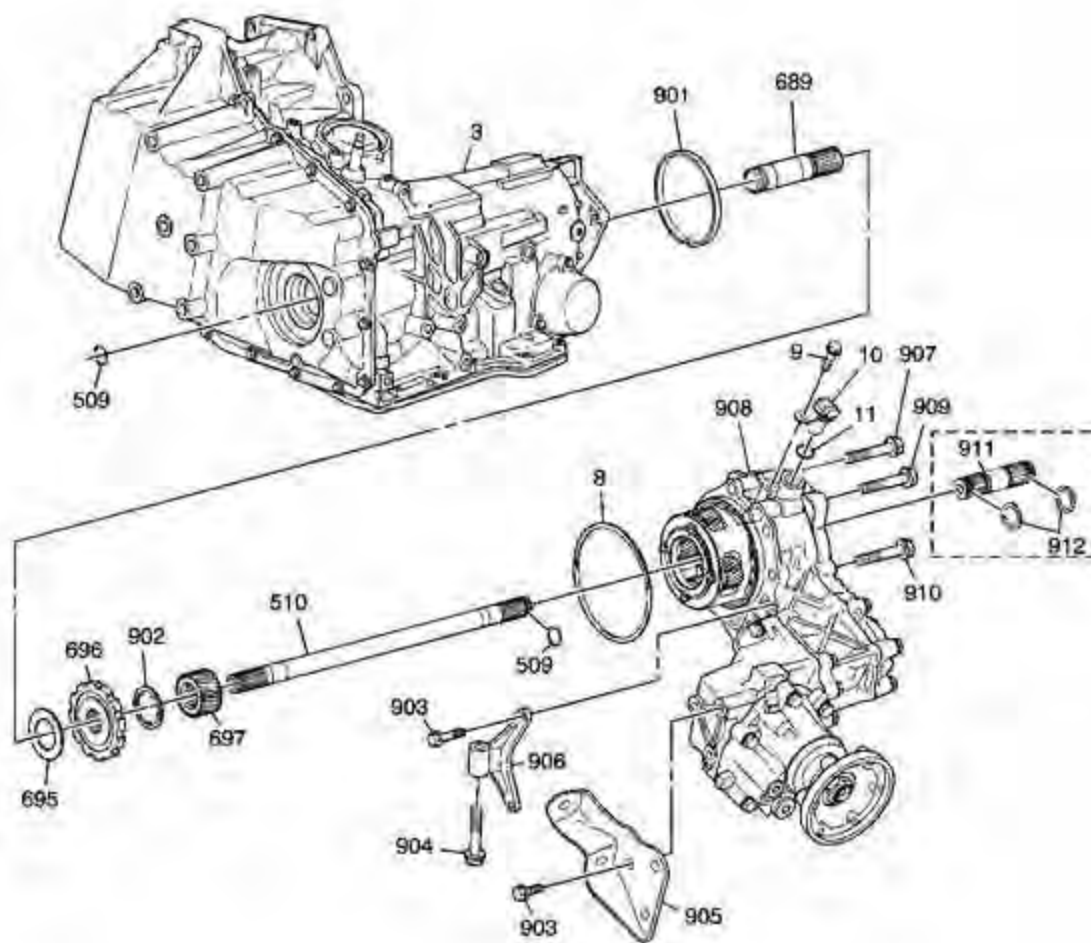


Fig. 13: Transmission to Transfer Case Components Disassembled View
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 13

Callout	Component Name
3	Transmission Case
8	Case Extension Seal
9	Vehicle Speed Sensor Bolt M8 X 1.25 X 12.0
10	Vehicle Speed Sensor Assembly
11	Vehicle Speed Sensor O-Ring Seal
509	Output Shaft Snap Ring
509	Output Shaft Snap Ring
510	Output Shaft
689	Final Drive Sun Gear Shaft

695	Parking Gear Thrust Bearing
696	Parking Gear
697	Final Drive Sun Gear
901	Oil Dam
902	Selective Washer
903	Brace Bolts
903	Brace Bolts
904	Transfer Case Lower Brace Bolt
905	Side Brace
906	Lower Brace
907	Transfer Case to Case Bolts
908	Transfer Case Assembly
909	Transfer Case to Case Bolts
910	Transfer Case to Case Bolts
911	Output Stub Shaft
912	Output Stub Shaft Snap Ring

AUTOMATIC TRANSMISSION ELECTRONIC COMPONENT VIEWS

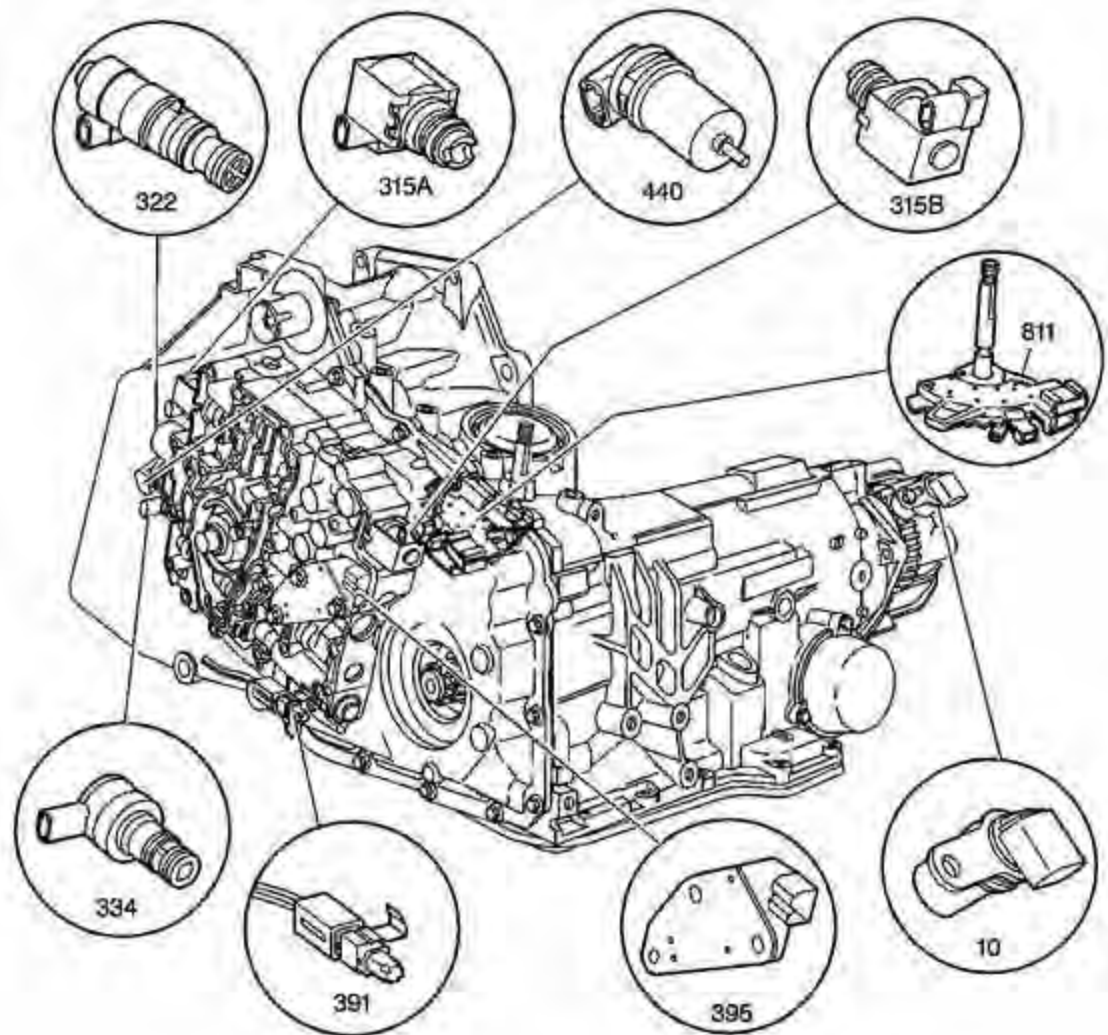


Fig. 14: Internal Electronic Component Locations
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 14

Callout	Component Name
10	Vehicle Speed Sensor (VSS) Assembly
315a	1-2, 3-4 Shift Solenoid (SS) Valve Assembly
315b	2-3 Shift Solenoid (SS) Valve Assembly
322	Pressure Control (PC) Solenoid Valve Assembly
334	Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid Valve Assembly
391	Transmission Fluid Temperature (TFT) Sensor

395	Transmission Fluid Pressure (TFP) Manual Valve Position Switch Assembly
440	Automatic Transmission Input Shaft Speed (A/T ISS) Sensor Assembly
811	Lever Assembly-Manual Shaft Detent with Shift Position Switch - Internal Mode Switch (IMS)

COMPONENT LOCATION

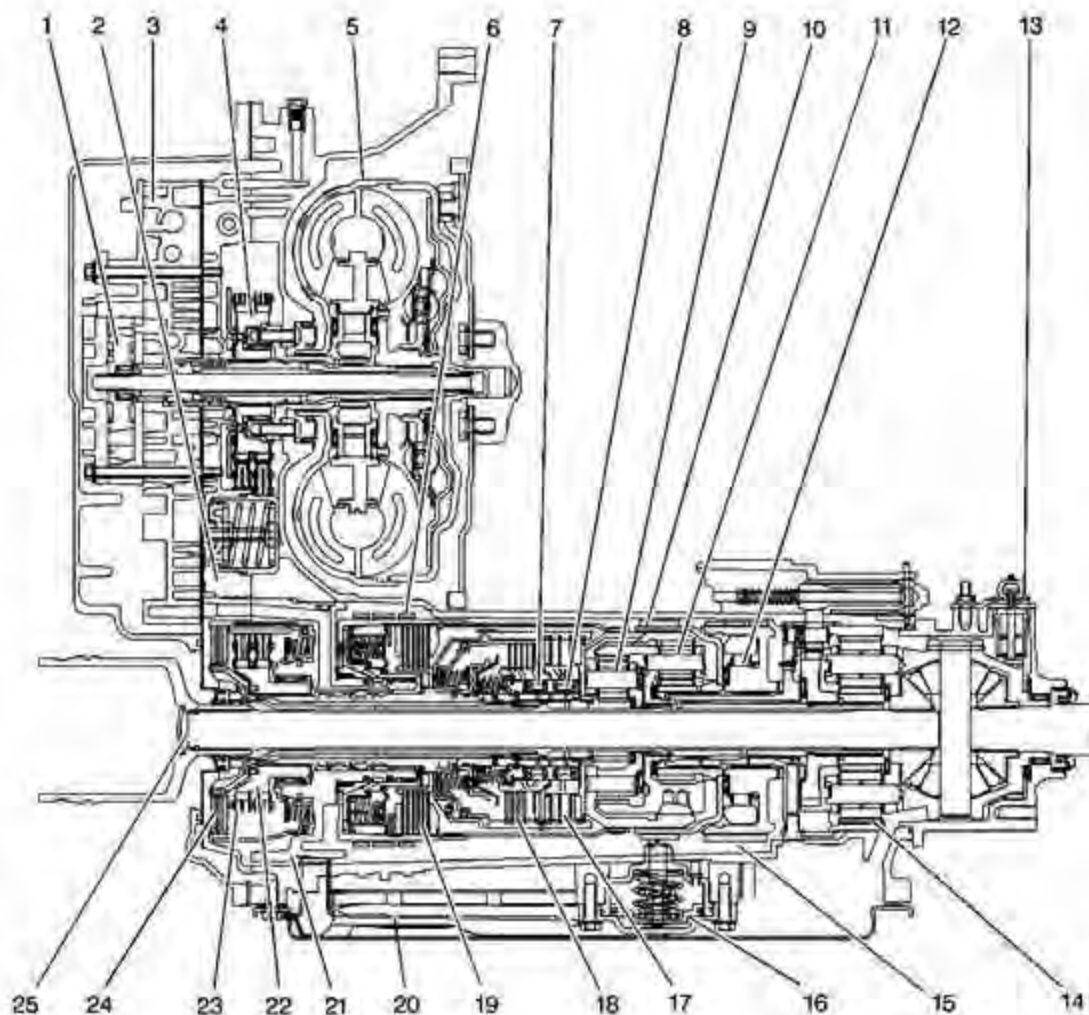


Fig. 15: Transmission Major Components Location
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 15

Callout	Component Name
1	Oil Pump Assembly

2	Case Cover Assembly
3	Control Valve Body Assembly
4	Drive Sprocket
5	Torque Converter Assembly
6	Reverse Band Assembly
7	Third Clutch Pawl Assembly
8	Input Clutch Pawl Assembly
9	Input Carrier Assembly
10	2-1 Manual Band Assembly
11	Reaction Carrier Assembly
12	1/2 Support Roller Clutch Assembly
13	Vehicle Speed Sensor Assembly
14	Final Drive/Differential Carrier Assembly
15	Forward Band Assembly
16	2-1 Manual Band Servo Assembly
17	Input Clutch Assembly
18	Third Clutch Assembly
19	Second Clutch Assembly
20	Oil Filter Assembly
21	Driven Sprocket Support Assembly
22	Driven Sprocket
23	Drive Link Assembly
24	Fourth Clutch Assembly
25	Output Shaft

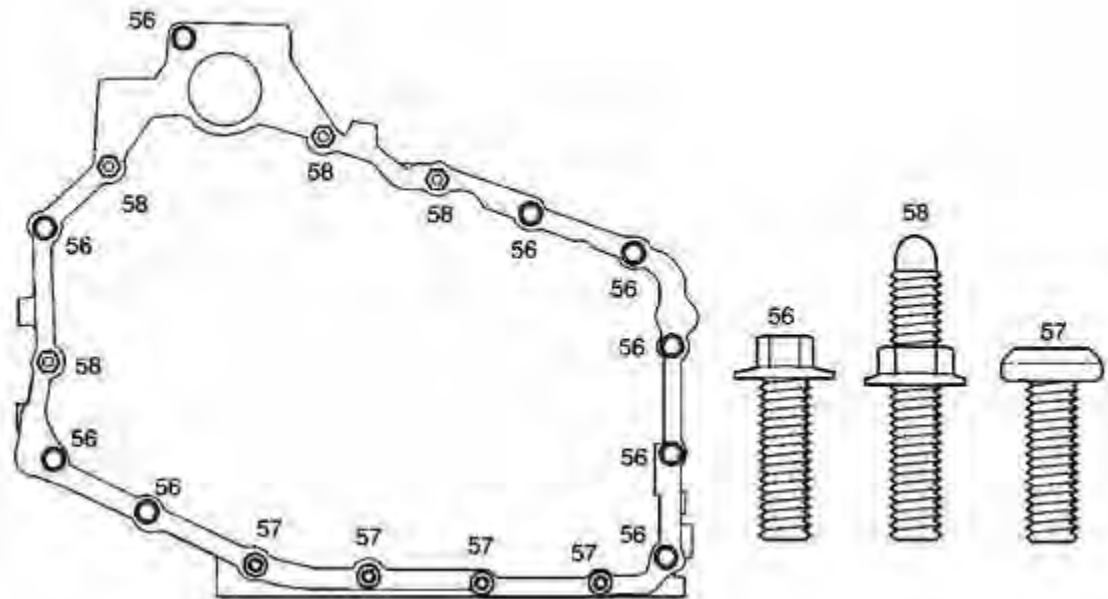


Fig. 16: Case Side Cover Bolts Location
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 16

Callout	Component Name
56	Side Cover Bolt/Screw M8 X 1.25 X 25.0 (9)
57	Side Cover Bolt/Screw M8 X 1.25 X 21.0 (4)
58	Side Cover Bolt/Screw M8 X 1.25 X 24.0 (4)

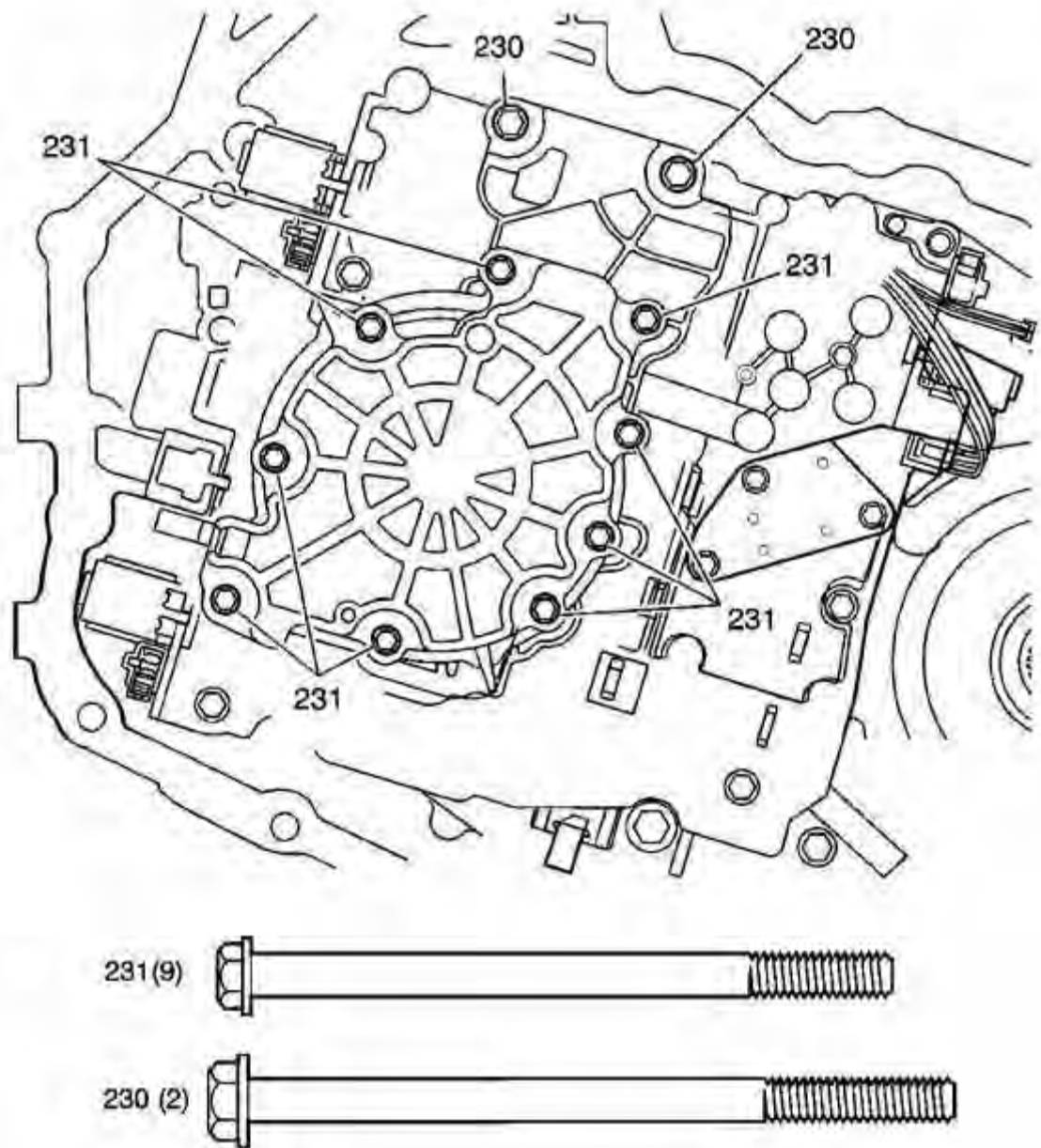


Fig. 17: Oil Pump Bolts Location - 3 Piece Pump
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 17

Callout	Component Name
230	Pump Body to Case Bolt M6 X 1.0 X 95.0 (2)
230	Pump Body to Case Bolt M6 X 1.0 X 95.0 (2)
231	Pump Cover to Case Cover Bolt M6 X 1.0 X 87.5 (9)

231	Pump Cover to Case Cover Bolt M6 X 1.0 X 87.5 (9)
231	Pump Cover to Case Cover Bolt M6 X 1.0 X 87.5 (9)
231	Pump Cover to Case Cover Bolt M6 X 1.0 X 87.5 (9)

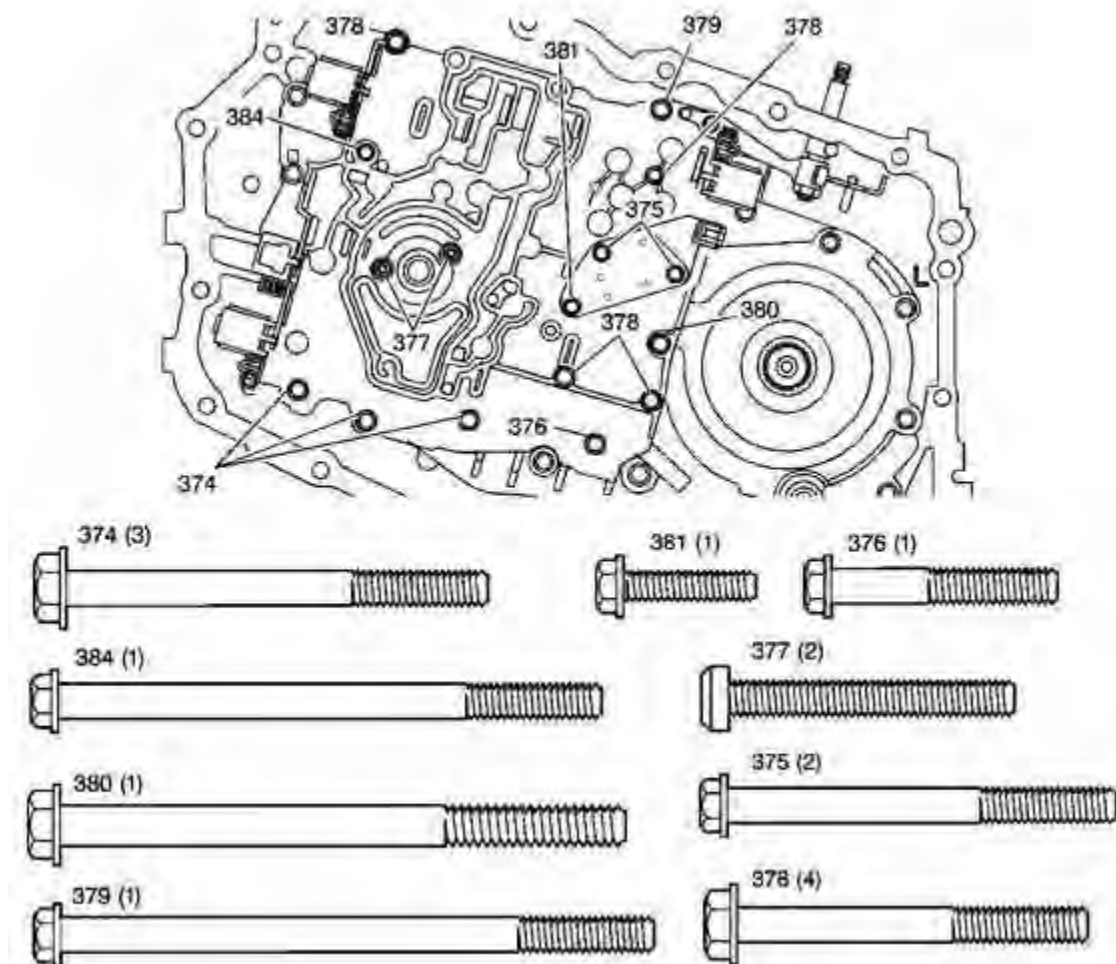


Fig. 18: Control Valve Body Bolts Location
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 18

Callout	Component Name
374	Control Valve Body Bolt/Screw M6 X 1.0 X 65.0 (3)
375	Control Valve Body Bolt/Screw M6 X 1.0 X 60.0 (2)
376	Control Valve Body Bolt/Screw M6 X 1.0 X 30.0 (1)
377	Control Valve Body Bolt/Screw M6 X 1.0 X 45.0 (2)
378	Control Valve Body Bolt/Screw M6 X 1.0 X 55.0 (3)

379	Control Valve Body Bolt/Screw M6 X 1.0 X 87.5 (1)
380	Control Valve Body Bolt/Screw M8 X 1.0 X 90.0 (1)
381	Control Valve Body Bolt/Screw M6 X 1.0 X 20.0 (1)
384	Control Valve Body Bolt/Screw M6 X 1.0 X 85.0 (1)

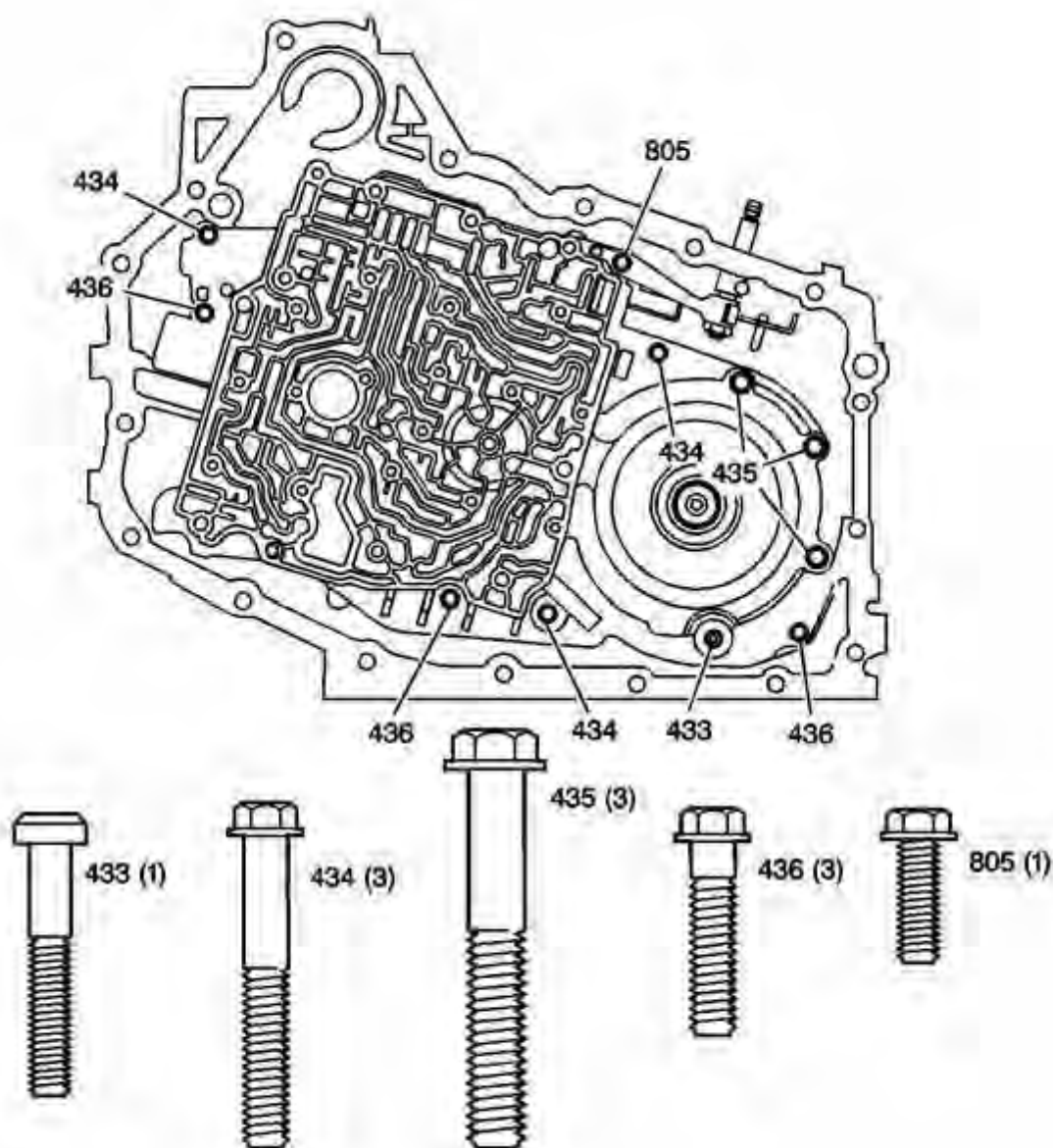


Fig. 19: Case Cover Bolts Location
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 19

Callout	Component Name
433	Case Cover Bolt/Screw TORX® Plus Special M6 X 1.0 X 32.0 (1)
434	Case Cover Bolt/Screw M6 X 1.0 X 40.0 (3)
435	Case Cover Bolt/Screw M8 X 1.25 X 50.0 (3)
436	Case Cover Bolt/Screw M6 X 1.0 X 30.0 (3)
805	Case Cover Bolt/Screw M6 X 1.0 X 16.0 (1)

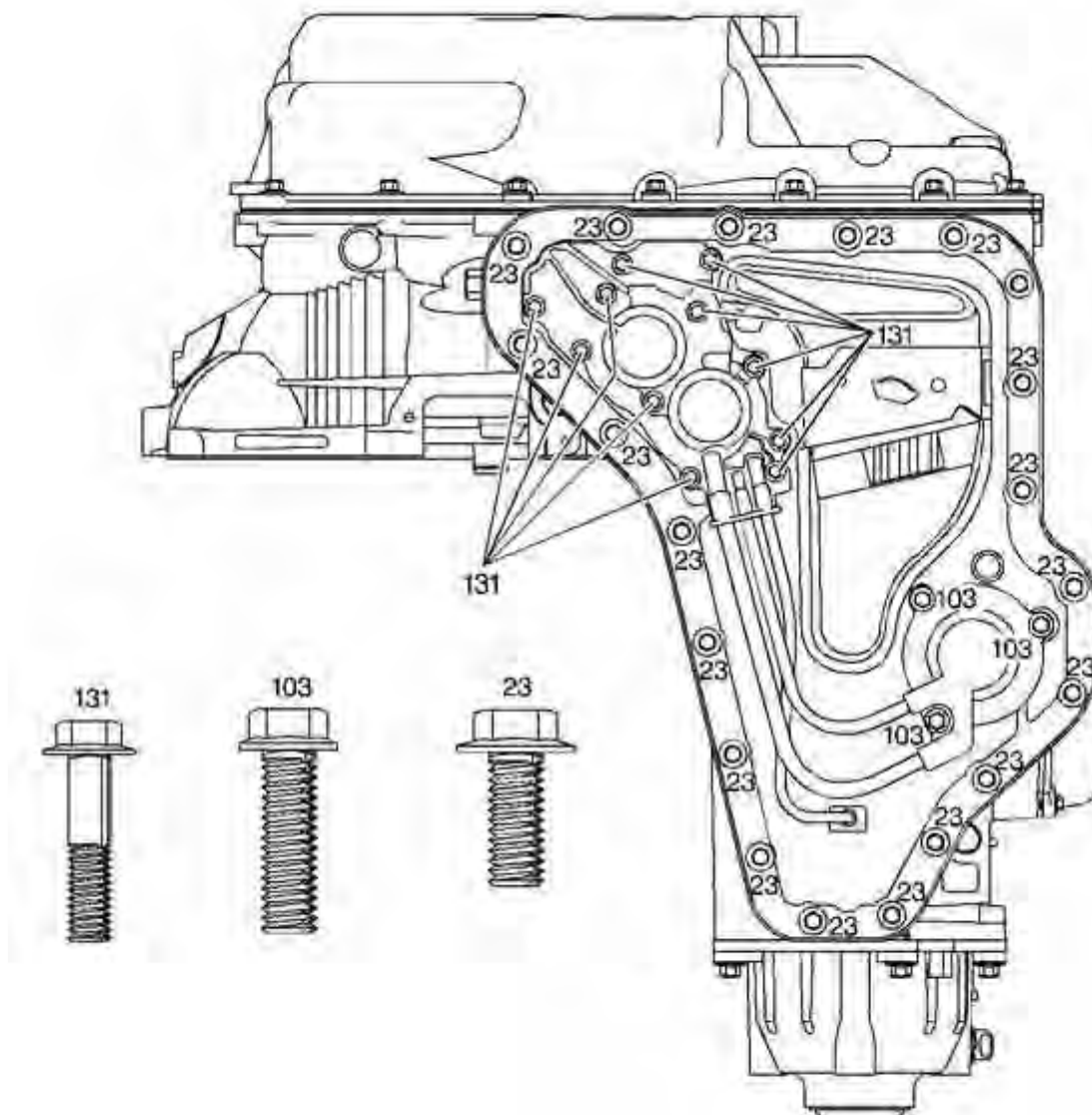


Fig. 20: Bottom Pan, Accumulator Cover and Manual 2-1 Band Servo Cover Bolts Location

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 20

Callout	Component Name
23	Transmission Oil Pan Bolt M6 X 1.0 X 17.0 (20)
103	2-1 Manual Band Servo Cover Bolt/Screw M8 X 1.25 X 25.0 (3)
131	Accumulator Cover Bolt/Screw M6 X 1.0 X 28.0 (11)

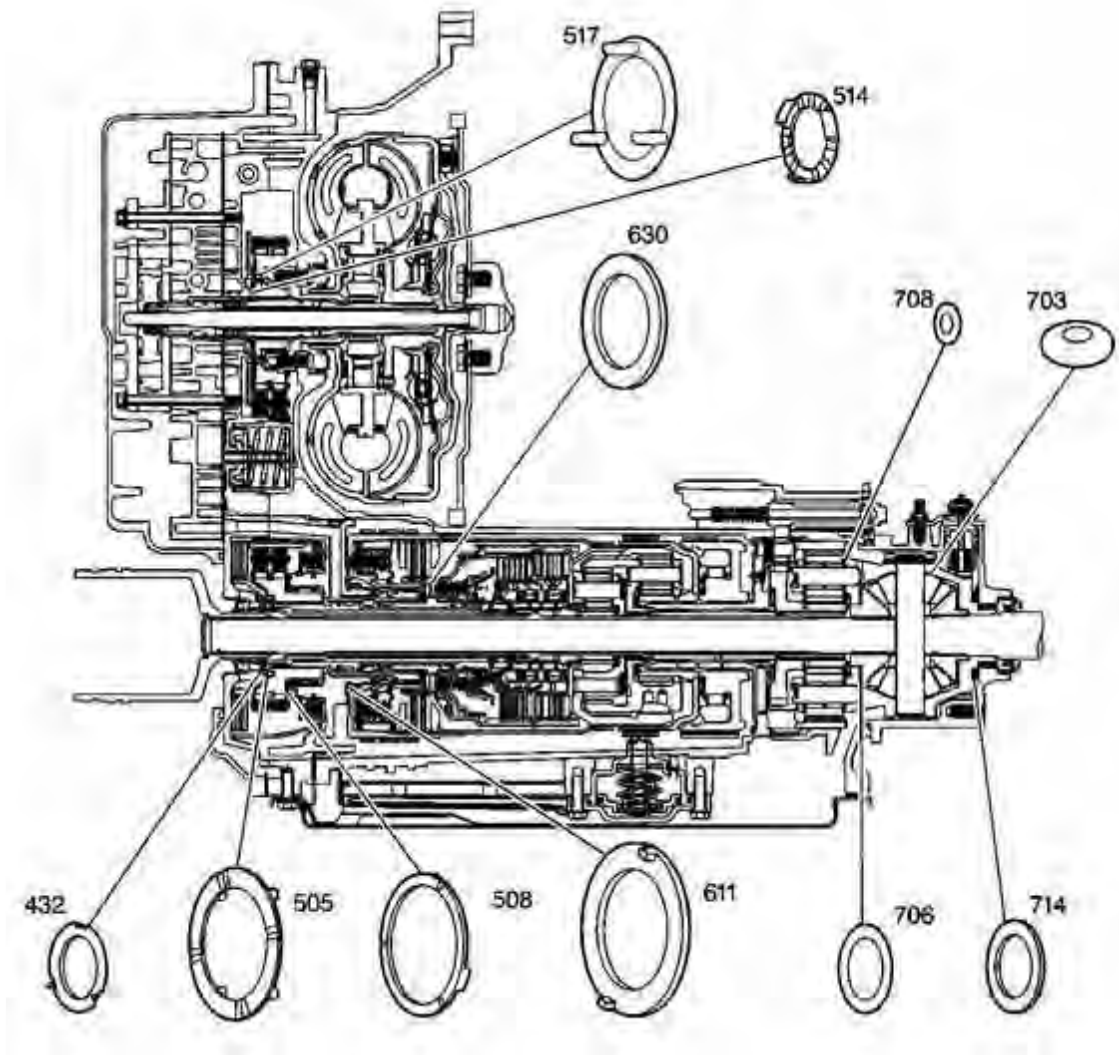


Fig. 21: Thrust Washers

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 21

Callout	Component Name

432	Fourth Clutch Shaft Thrust Washer
505	Fourth Clutch Shaft Thrust Washer
508	Driven Sprocket Thrust Washer
514	Drive Sprocket Thrust Washer
517	Drive Sprocket Thrust Washer
611	Second Clutch Housing Thrust Washer
630	Input Clutch Housing Thrust Washer Selective
703	Differential Pinion Thrust Washer
706	Differential Side Gear Thrust Washer Bronze
708	Planetary Pinion Gear Thrust Washer Steel
714	Differential Carrier/Case Thrust Washer

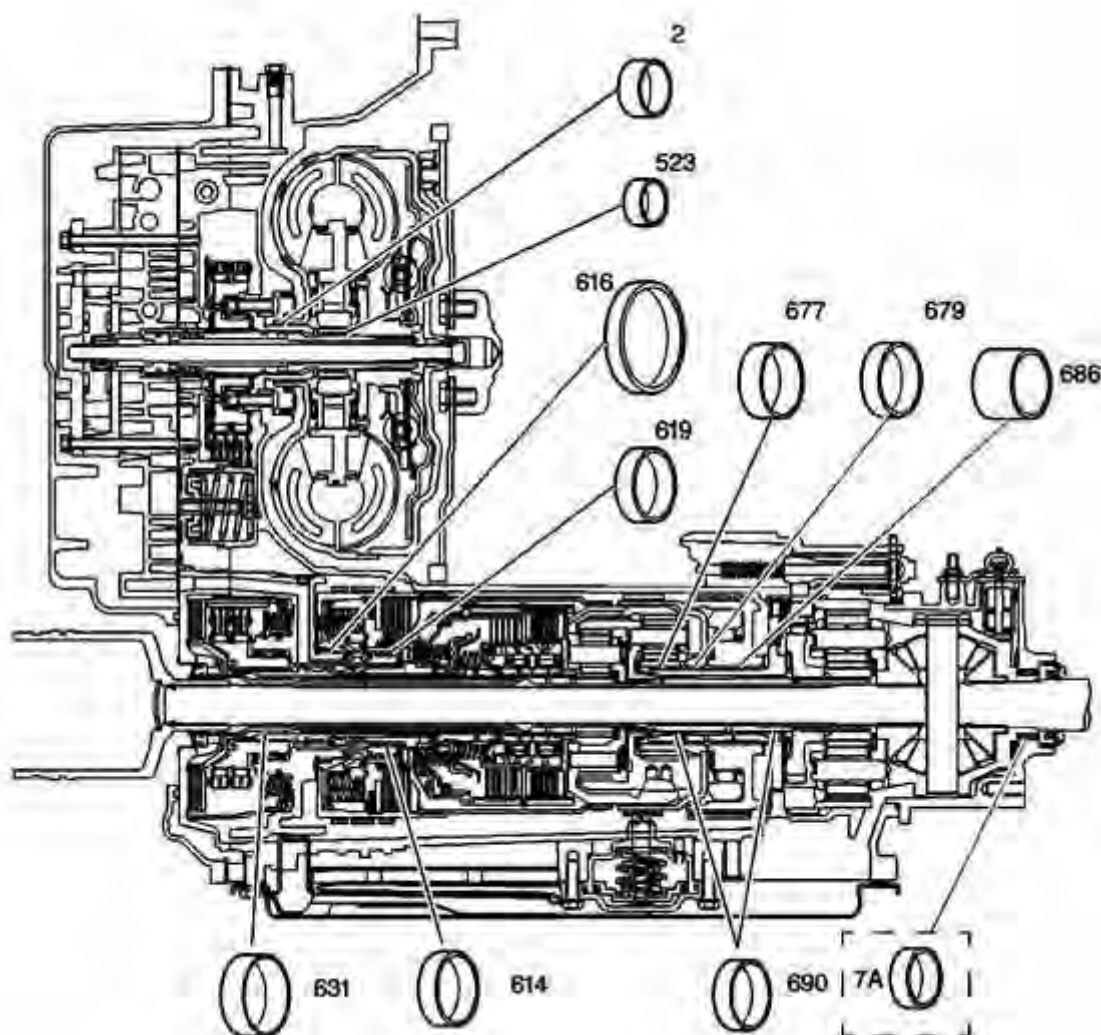


Fig. 22: Bushings Location
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 22

Callout	Component Name
2	Torque Converter Bushing
7a	Front Differential Carrier Bushing M15 and MN3 Models Only
523	Turbine Shaft Bushing
614	Second Clutch Housing Bushing
616	Second Clutch Housing Front Bushing
619	Second Clutch Housing Rear Bushing
631	Input Shaft Bushing
677	Reaction Sun Gear Bushing Left Side
679	Reaction Sun Gear Bushing Right Side
686	1-2 Support Drum Bushing
690	Front Differential Carrier Internal Gear Bushing

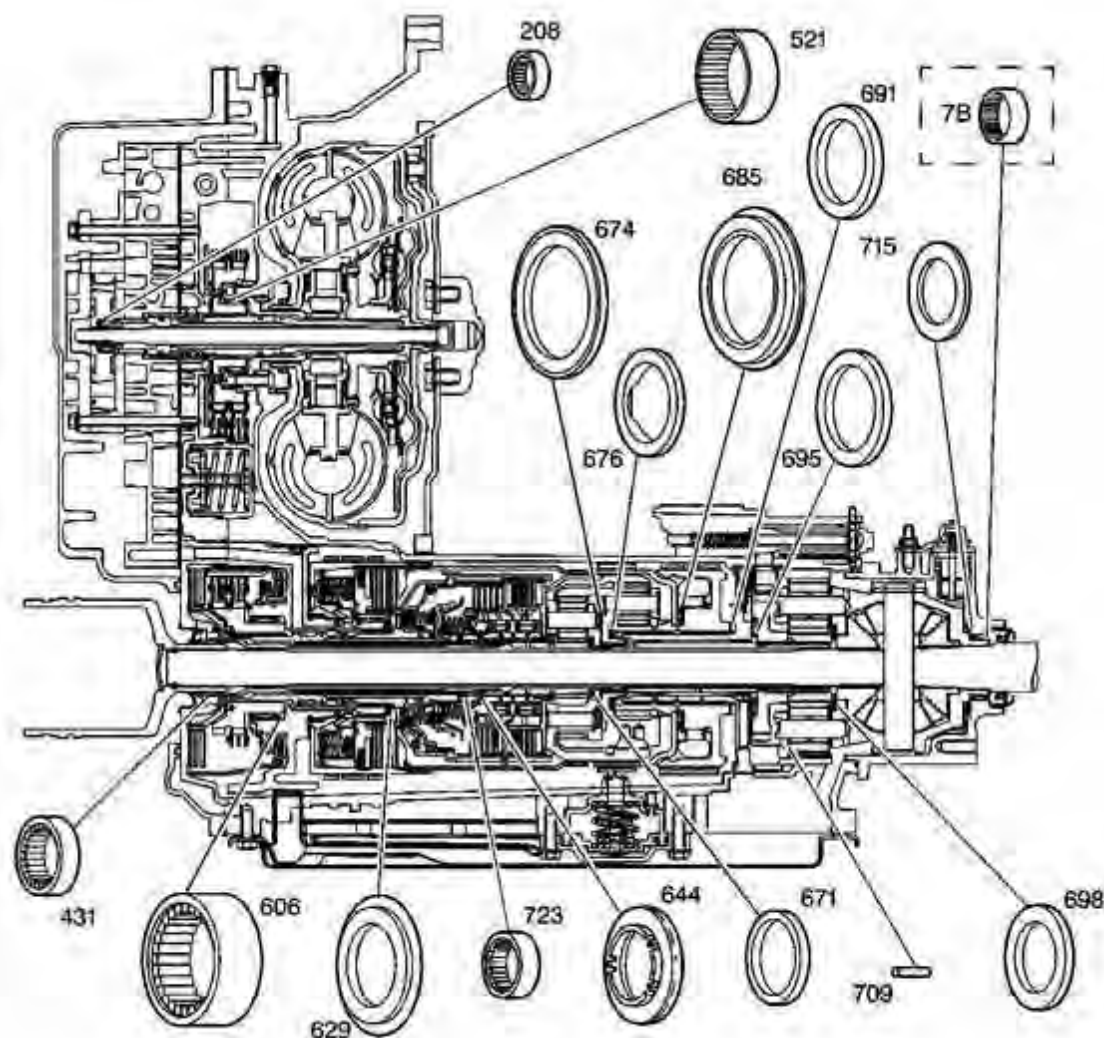


Fig. 23: Identifying Bearings

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 23

Callout	Component Name
7b	Output Shaft Bearing Assembly MN7 Models Only
208	Oil Pump Drive Shaft Bearing
431	Front Wheel Drive Shaft Bearing
521	Drive Sprocket Bearing Assembly
606	Driven Sprocket Bearing Assembly
629	Input Clutch Housing Thrust Bearing Assembly
644	Input Shaft Thrust Bearing Assembly

671	Input Sun Gear Thrust Bearing Assembly
674	Reaction Carrier Thrust Bearing Assembly
676	Reaction Sun Gear Thrust Bearing Assembly
685	1-2 Drum Support Thrust Bearing
691	Final Drive Gear Internal Thrust Bearing
695	Front Differential Carrier Internal Gear Thrust Bearing
698	Front Differential Carrier Sun Gear Thrust Bearing
709	Front Differential Carrier Planetary Pinion Bearing
715	Front Differential Carrier Thrust Bearing
723	Input Clutch Housing Thrust Bearing

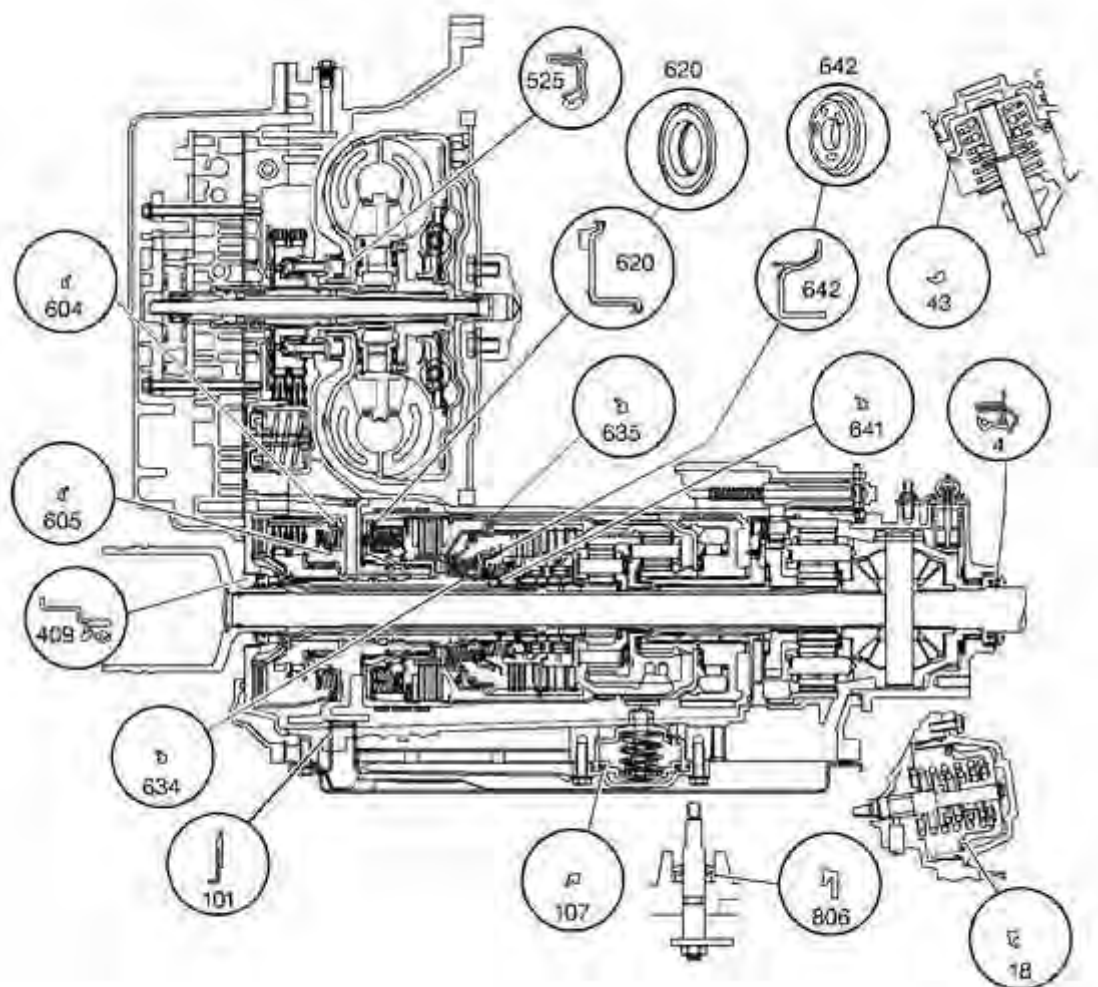


Fig. 24: Lip Seals Location

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 24

Callout	Component Name
4	Front Wheel Drive Shaft Oil Seal Assembly Right Side
18	Forward Band Servo Piston Oil Seal Ring
43	Reverse Band Servo Piston Oil Seal Ring
101	Automatic Transmission Oil Filter Seal
107	Manual 2-1 Band Servo Piston Seal
409	Front Wheel Drive Shaft Oil Seal Assembly Left Side
525	Torque Converter Oil Seal Assembly
604	Fourth Clutch Piston Seal Outer
605	Fourth Clutch Piston Seal Inner
620	Second Clutch Piston and Seal Assembly
620	Second Clutch Piston and Seal Assembly
634	Input Clutch Piston Seal Inner
635	Input Clutch Piston Seal Outer
641	Third Clutch Piston Seal Inner
642	Third Clutch Piston and Seal Assembly
642	Third Clutch Piston and Seal Assembly
806	Manual Shift Shaft Seal

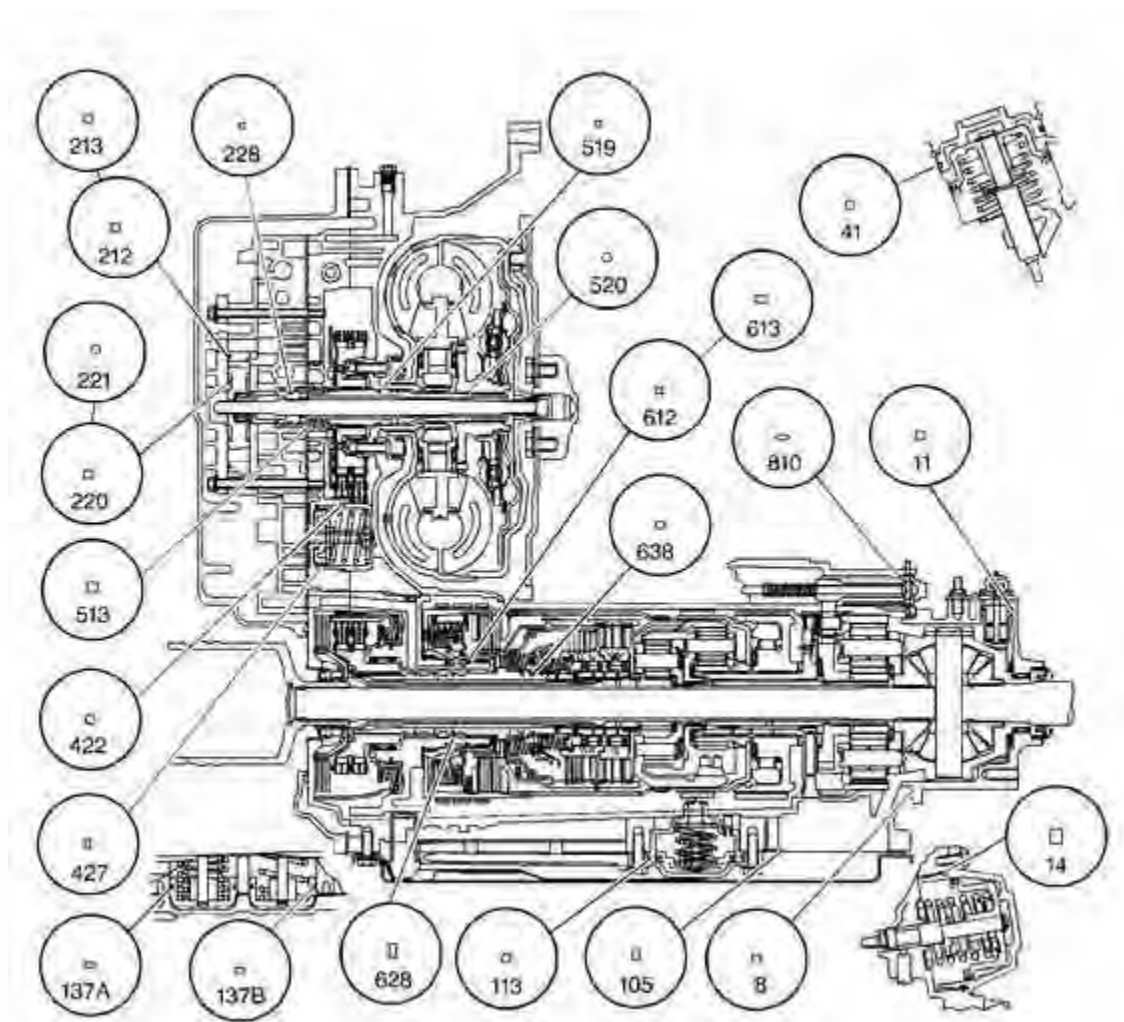


Fig. 25: Square and O-Ring Seals Location
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 25

Callout	Component Name
8	Automatic Transmission Case Extension Seal
11	Vehicle Speed Sensor O-Ring Seal
14	Forward Band Servo Cover Seal
41	Reverse Band Servo Cover O-Ring Seal
105	Manual 2-1 Band Servo Cover Seal
113	Manual 2-1 Band Servo Piston Cylinder O-Ring Seal
137a	1-2 Accumulator Piston Oil Seal Ring
137b	2-3 Accumulator Piston Oil Seal Ring

212	Automatic Transmission Oil Pump Slide Oil Seal Ring
213	Automatic Transmission Oil Pump Slide O-Ring Seal
220	Automatic Transmission Oil Pump Slide Seal
221	Automatic Transmission Oil Pump Slide Seal Support
228	Automatic Transmission Oil Pump Drive Shaft Seal
422	3-4 Accumulator Piston Cylinder O-Ring Seal
427	3-4 Accumulator Piston Oil Seal
513	Turbine Shaft Oil Seal Ring
519	Turbine Shaft Oil Seal Ring
520	Turbine Shaft O-Ring Seal
612	Second Clutch Housing Oil Seal Ring Four Lobe Seal
613	Second Clutch Housing Oil Seal Ring
628	Input Clutch Housing Oil Seal Ring
638	Third Clutch Housing O-Ring Seal
810	Park Pawl Actuator Guide O-Ring Seal

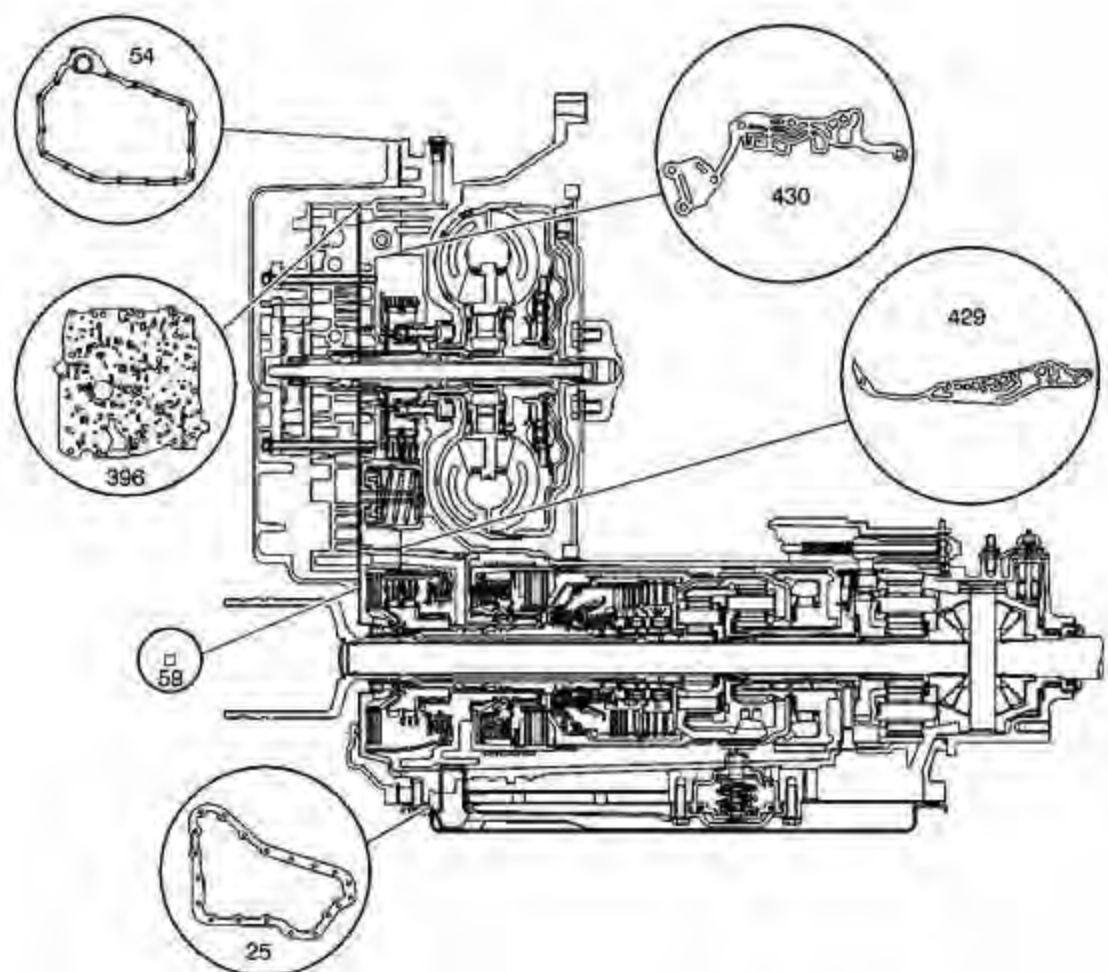


Fig. 26: Gaskets Location
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 26

Callout	Component Name
25	Oil Pan Gasket
54	Case Side Cover Gasket
59	Case Side Cover Inner Gasket
396	Control Valve Body Spacer Plate and Gasket Assembly
429	Case Cover Lower Gasket
430	Case Cover Upper Gasket

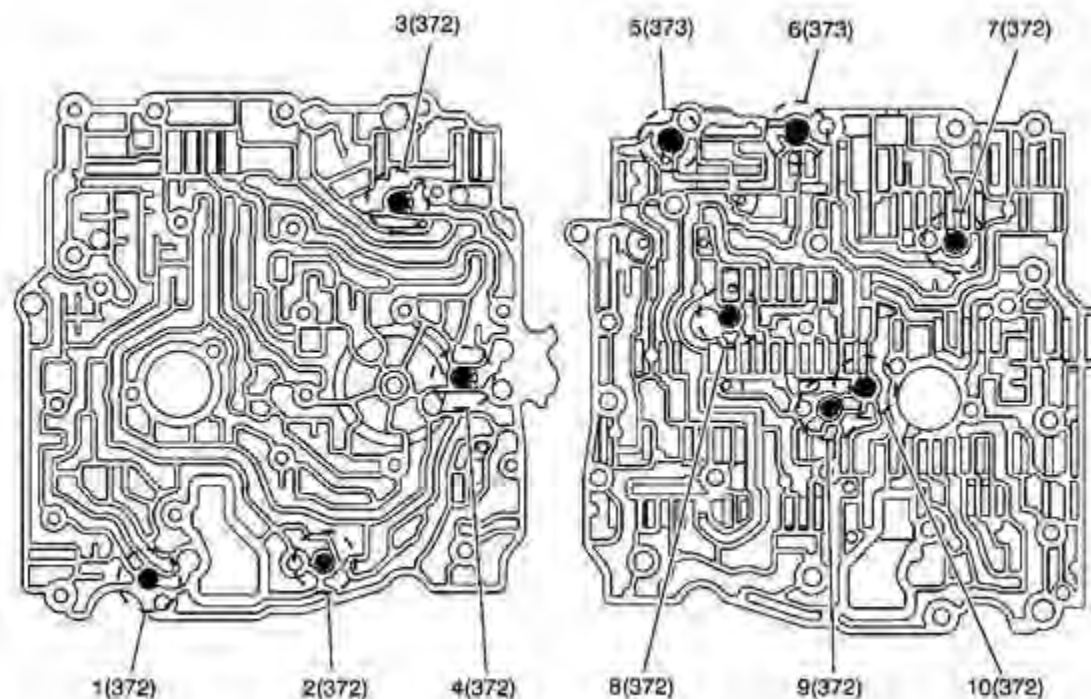


Fig. 27: Ball Check Valves Location

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 27

Callout	Component Name
1	TCC Apply-Release
2	2nd-2nd Clutch
3	Input Clutch-PRN
4	3rd Clutch-Lo/1st
5	Reverse-Reverse Servo Large
6	D4-Servo Apply
7	Lo-Lo/1st
8	D2-Manual 2-1 Servo Feed
9	3rd-3rd Clutch
10	Line-Lo/1st Gear

REPAIR INSTRUCTIONS

TORQUE CONVERTER ASSEMBLY REMOVAL

CAUTION: The torque converter weighs approximately 65 lbs. Personal injury may result if you lift the torque converter improperly.

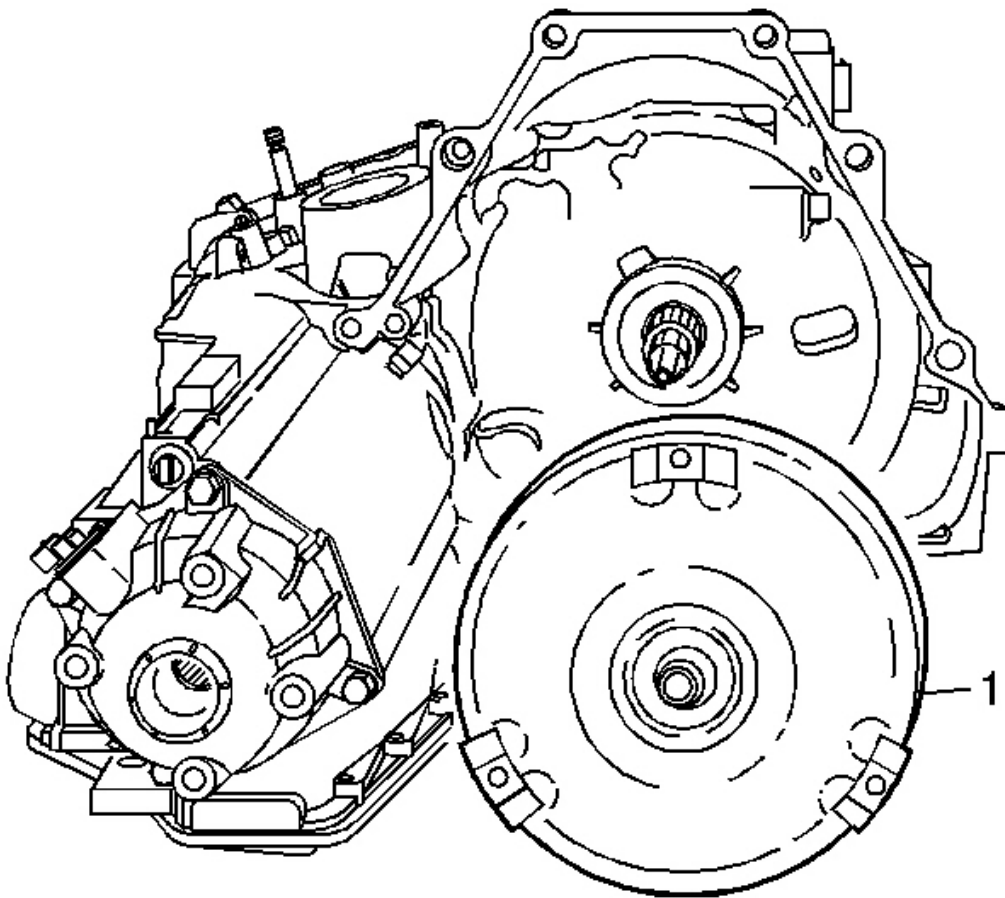


Fig. 28: View Of Torque Converter Assembly
Courtesy of GENERAL MOTORS CORP.

1. Remove the torque converter assembly (1).

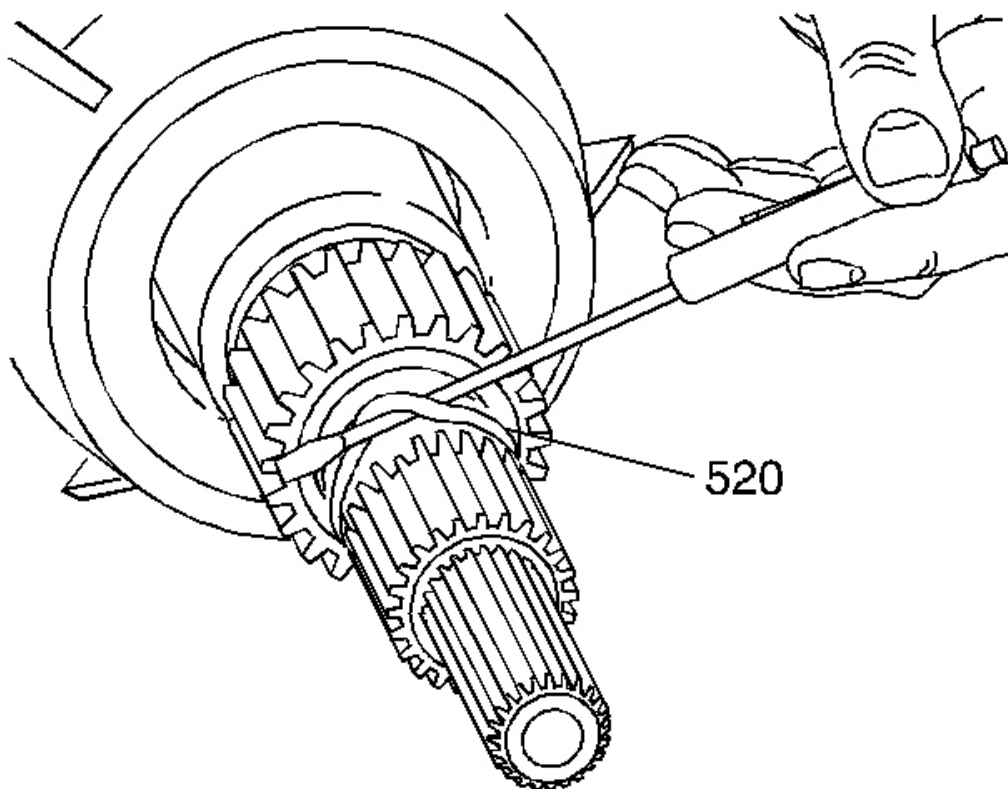


Fig. 29: Identifying Turbine Shaft O-Ring Seal
Courtesy of GENERAL MOTORS CORP.

2. Remove the turbine shaft O-ring seal (520).

TRANSMISSION SUPPORT FIXTURE ASSEMBLE

Tools Required

- **J 3289-20** Holding Fixture Base
- **J 28664-B** Transmission Holding Fixture. See **Special Tools**.
- **J44465** Holding Fixture Adapter. See **Special Tools**.

Procedure

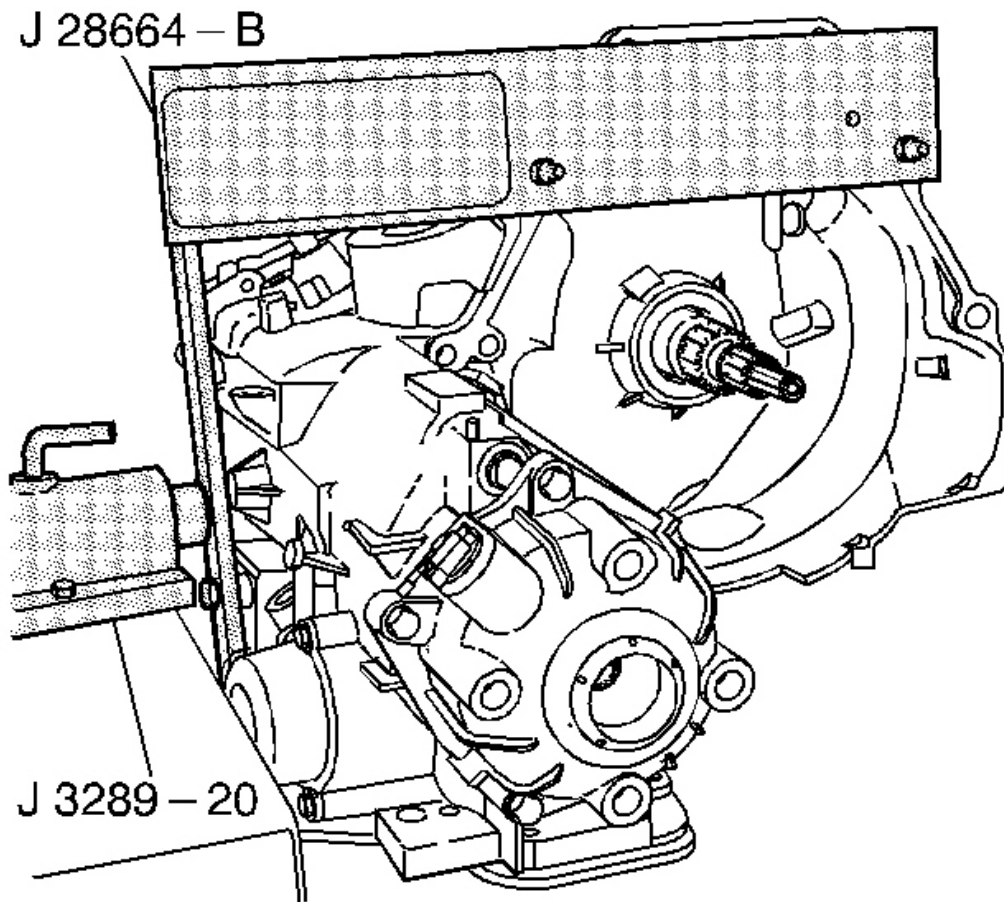


Fig. 30: J 28664-B & J 3289-20 Installed Onto Transmission
Courtesy of GENERAL MOTORS CORP.

1. Install **J44465** onto **J 28664-B** . See **Special Tools**.
2. Install **J 28664-B** onto the transmission. See **Special Tools**.
3. Install the transmission and holding fixture into **J 3289-20** .
4. Insert the pin into **J 3289-20** in order to hold the transmission in the desired position.

TRANSFER CASE REMOVAL

Tools Required

- **J 6125-1B** Slide Hammer

- **J 44467** Output Shaft Assembly Remover and Installer. See **Special Tools**.
- **J 44755** Holding Fixture

Removal Procedure

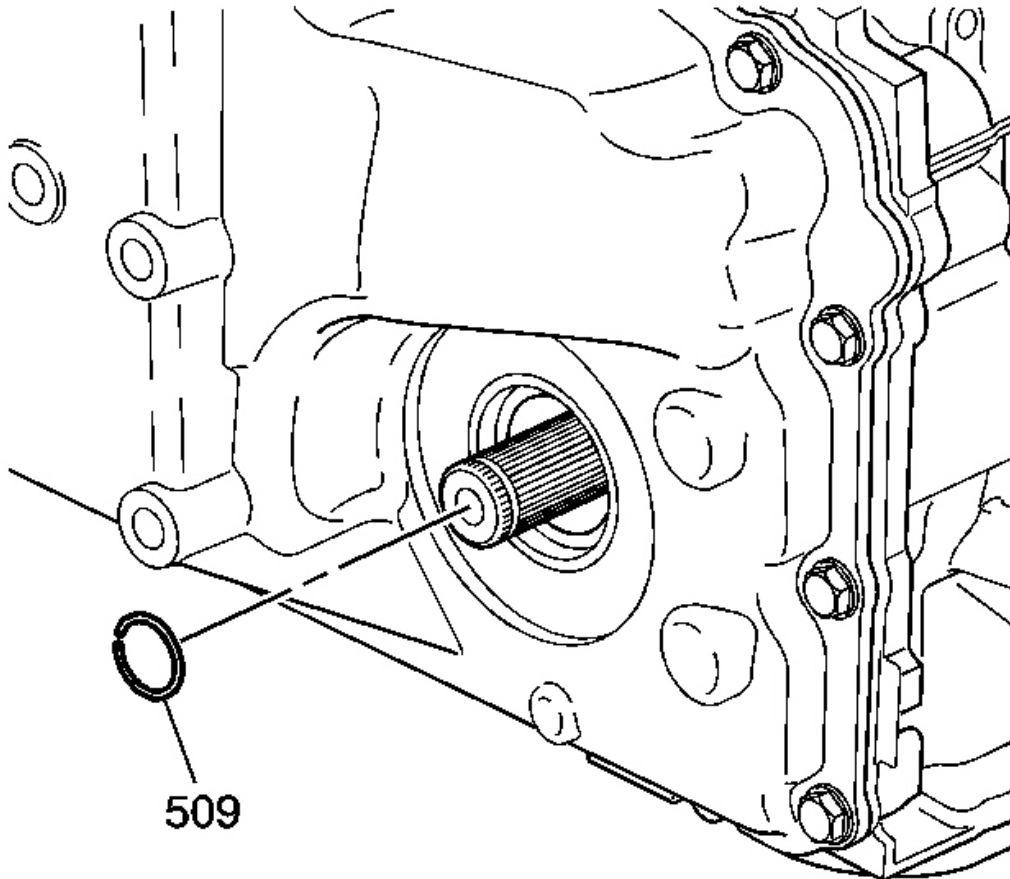


Fig. 31: Identifying Drive Shaft Retaining Ring
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Transmission oil circulates between the transmission assembly and the transfer case. In situations where transmission related failures circulate debris into the transfer case, the transfer case must be disassembled, cleaned and inspected for damage. Refer to Internal

Components Cleaning and Inspection .

1. Remove the drive shaft retaining ring (509).

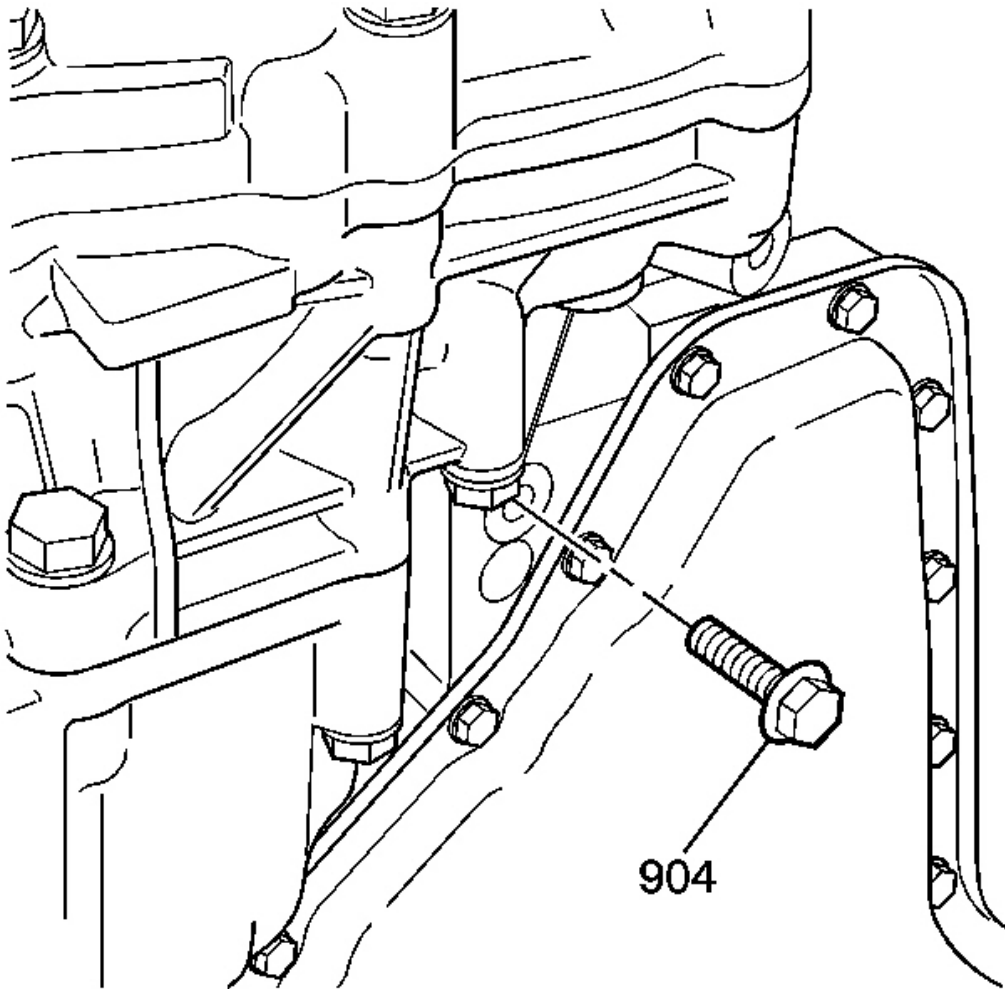


Fig. 32: Identifying Transfer Case Lower Brace To Case Bolt
Courtesy of GENERAL MOTORS CORP.

2. Rotate the transaxle 90 degrees.
3. Remove the transfer case lower brace bolt (904).

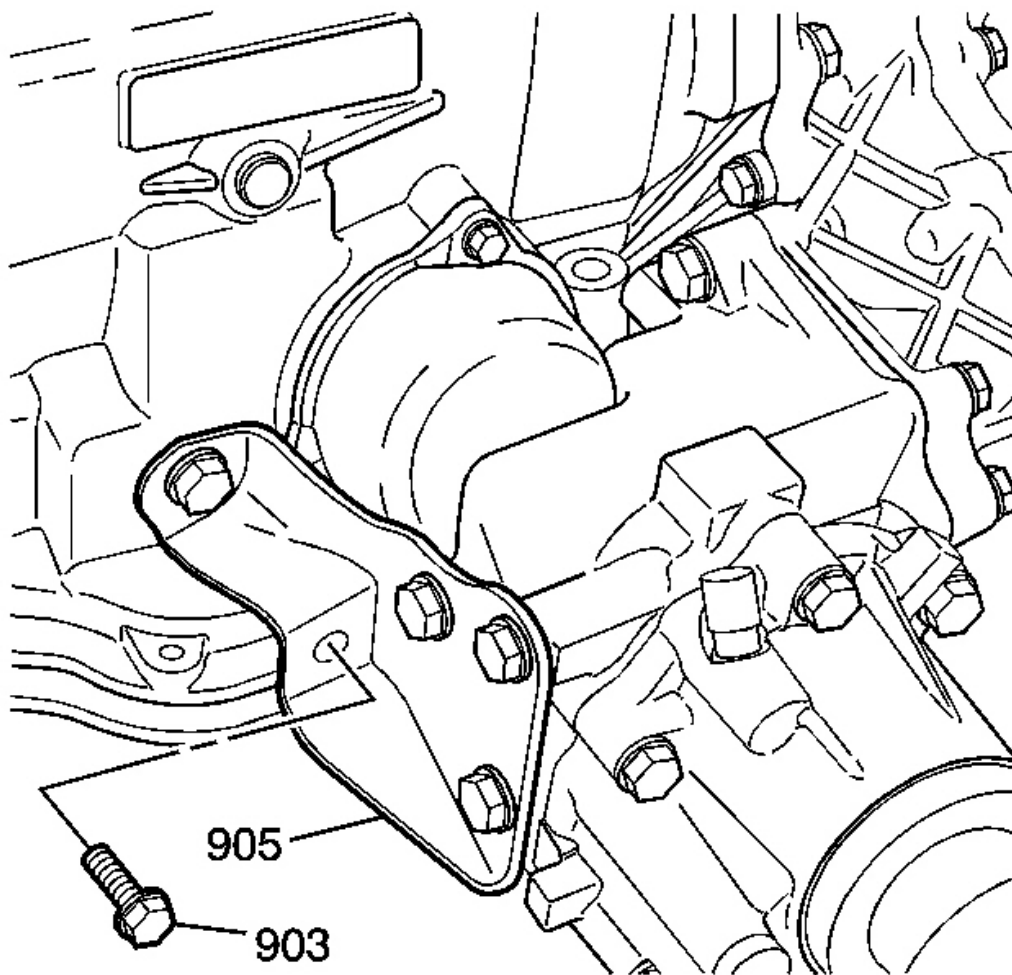


Fig. 33: Locating Transfer Case Side Brace & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Rotate the transaxle 90 degrees.
5. Remove the transfer case side brace bolts (903). Remove the side brace (905).

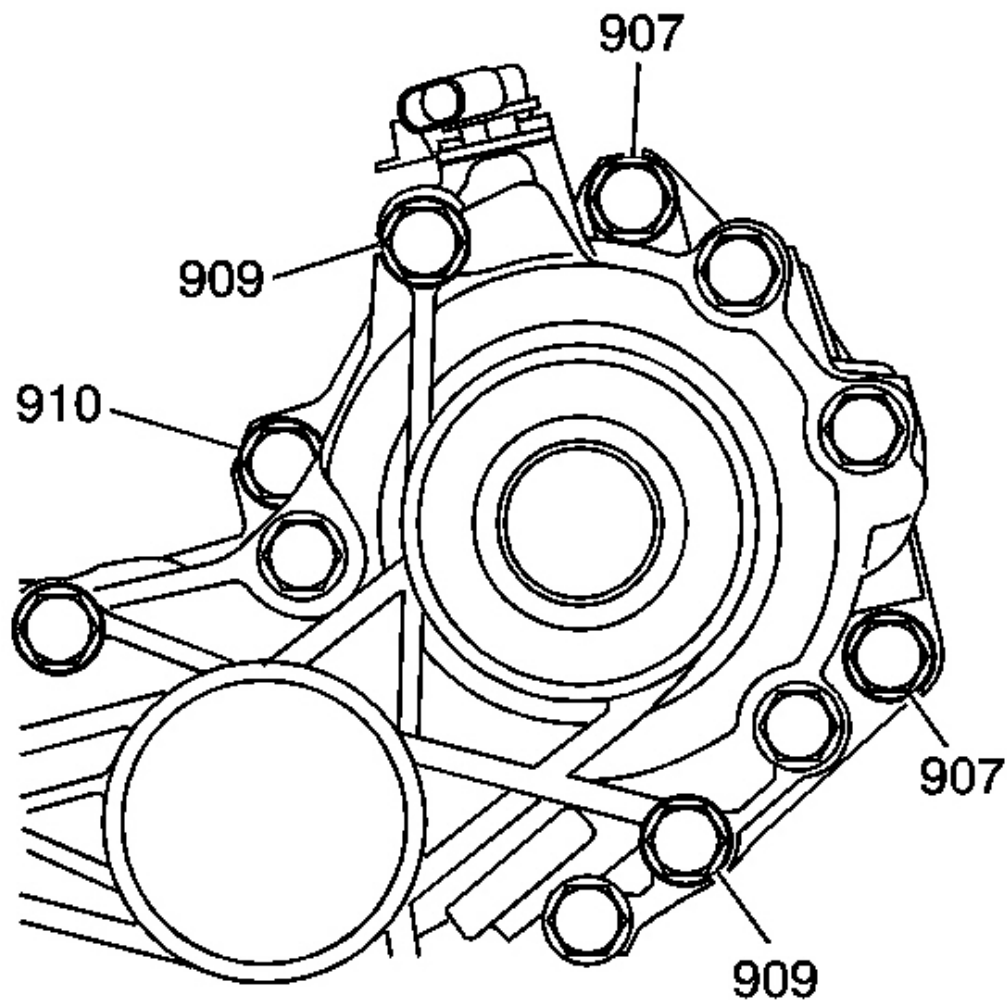


Fig. 34: View Of Transfer Case To Case Bolts
Courtesy of GENERAL MOTORS CORP.

6. Remove the transfer case to case bolts (907, 909, 910).

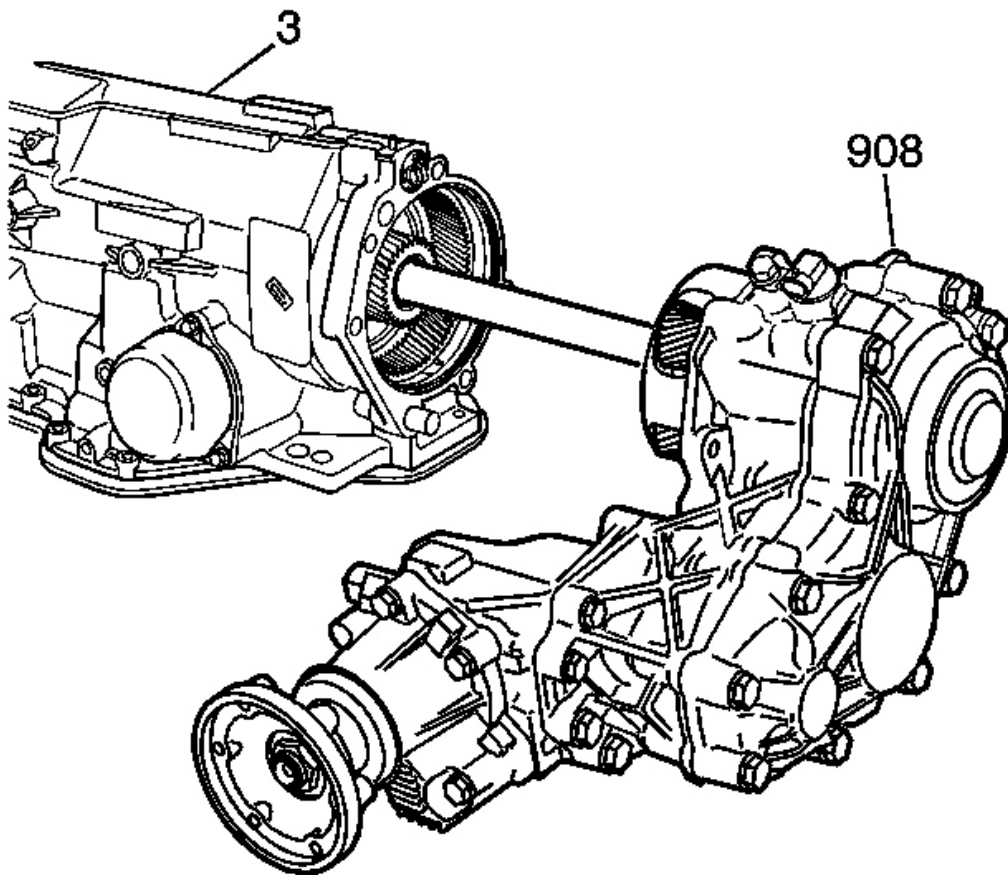


Fig. 35: Removing Transfer Case Assembly From Transmission Case
Courtesy of GENERAL MOTORS CORP.

CAUTION: This component weighs approximately 60 lbs. Personal injury may result if you lift the component improperly.

NOTE: During removal of the transfer case/output shaft, do not use excessive force or damage to the bushings may occur.

7. Remove the transfer case assembly (908) from the transmission case (3).

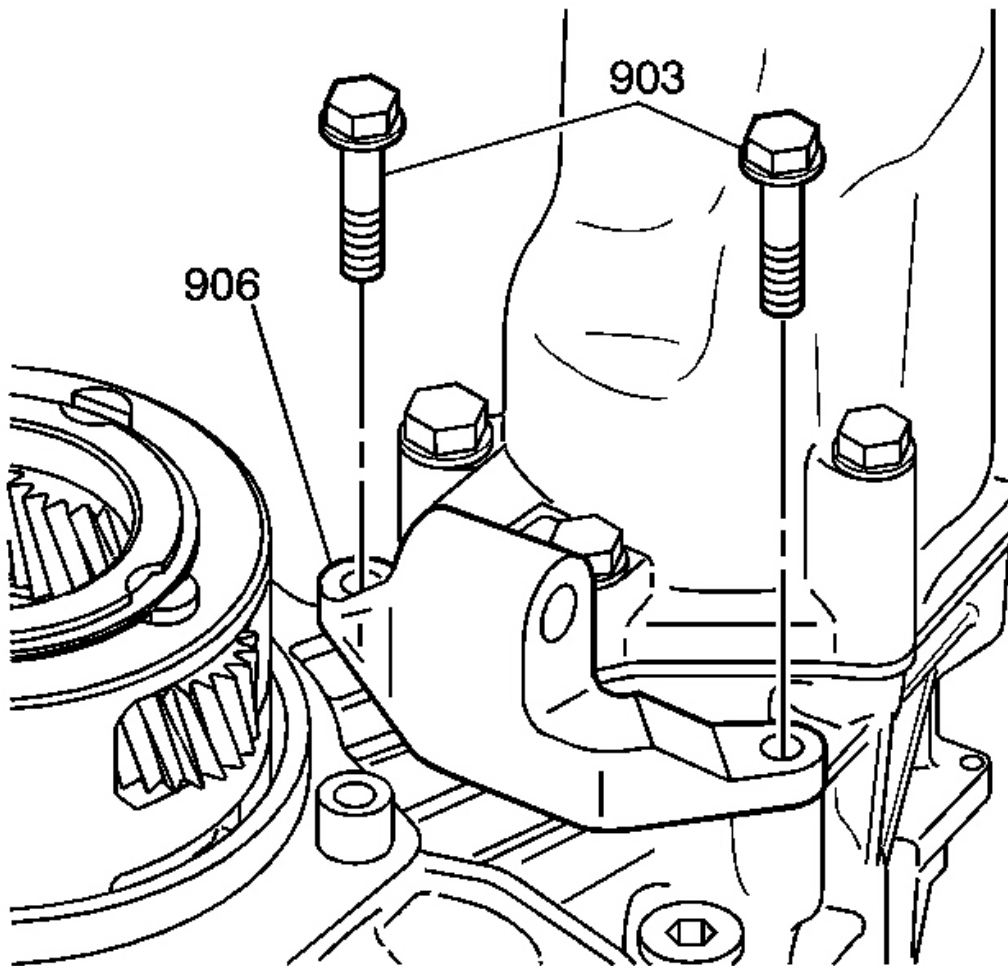


Fig. 36: View Of Transfer Case Lower Brace Bolts & Brace
Courtesy of GENERAL MOTORS CORP.

8. Remove the transfer case lower brace bolts (903).
9. Remove the transfer case lower brace (906).

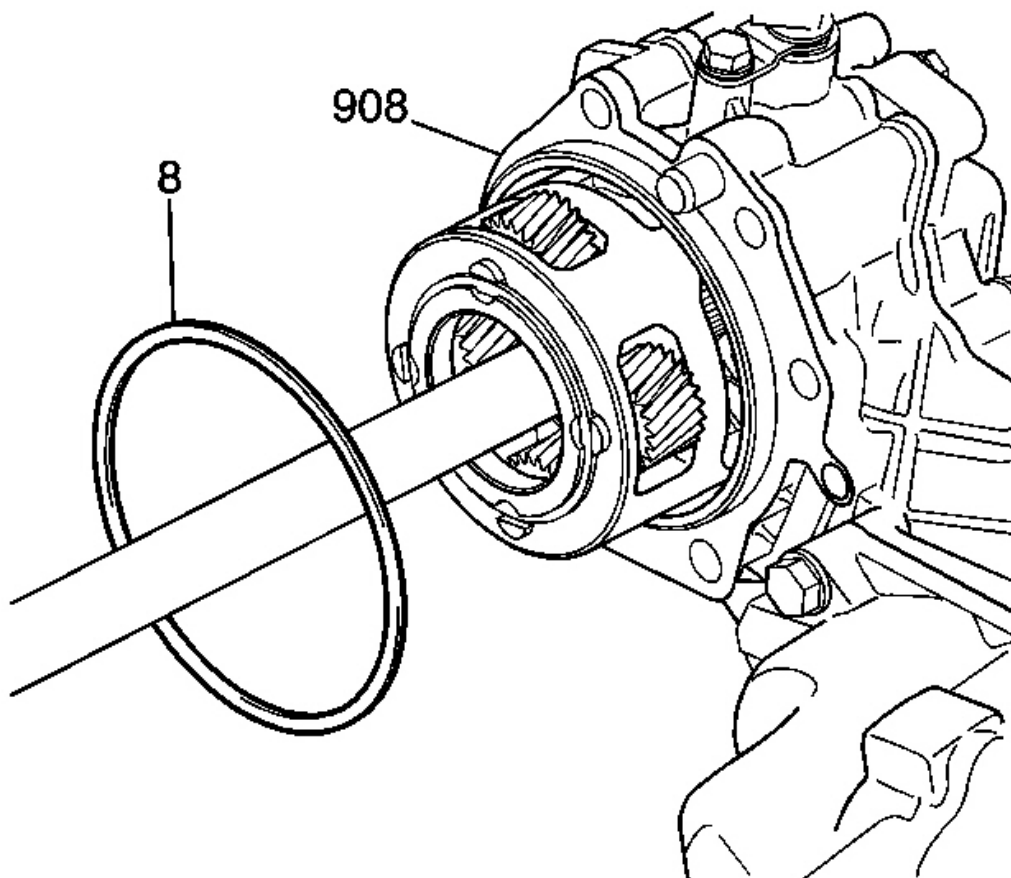


Fig. 37: Locating Case Extension Seal
Courtesy of GENERAL MOTORS CORP.

10. Remove the case extension seal (8) from the transfer case (908).

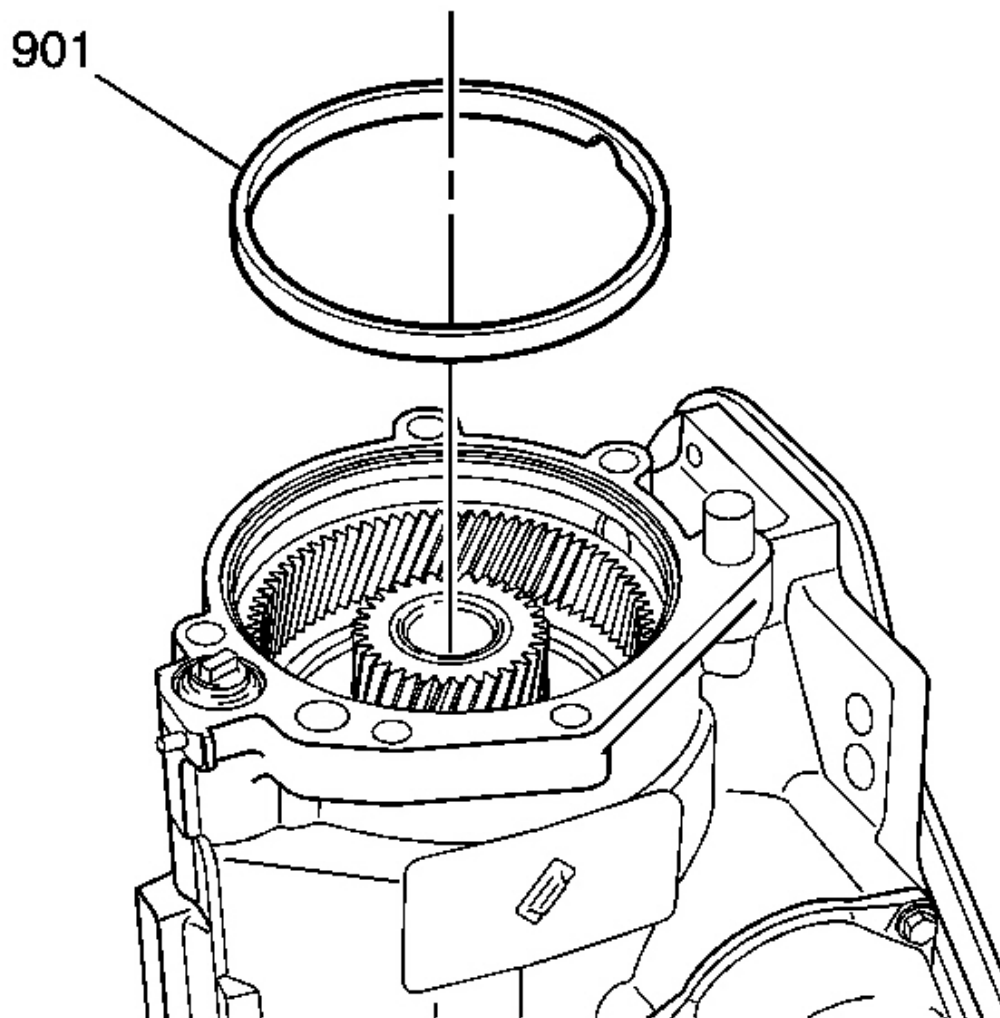


Fig. 38: View Of Oil Dam
Courtesy of GENERAL MOTORS CORP.

11. Position the transaxle so that the case side cover is facing down.
12. Remove the oil dam (901) from the transaxle.

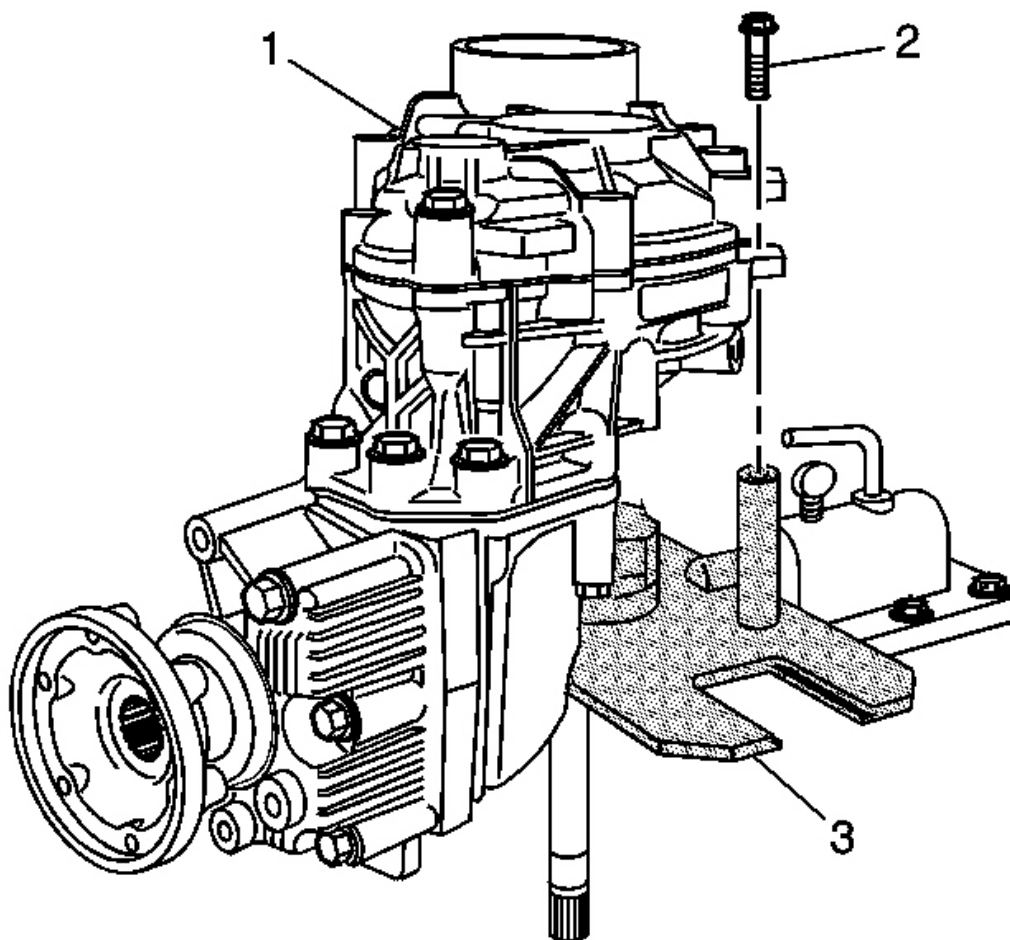


Fig. 39: Identifying J 44755
Courtesy of GENERAL MOTORS CORP.

13. Install the transfer case assembly onto the **J 44755** . Position the carrier onto the post of the fixture.

NOTE: Refer to **FASTENER NOTICE** in Cautions and Notices.

14. Install the retaining bolts.

Tighten: Tighten the retaining bolts to 50 N.m (37 lb ft).

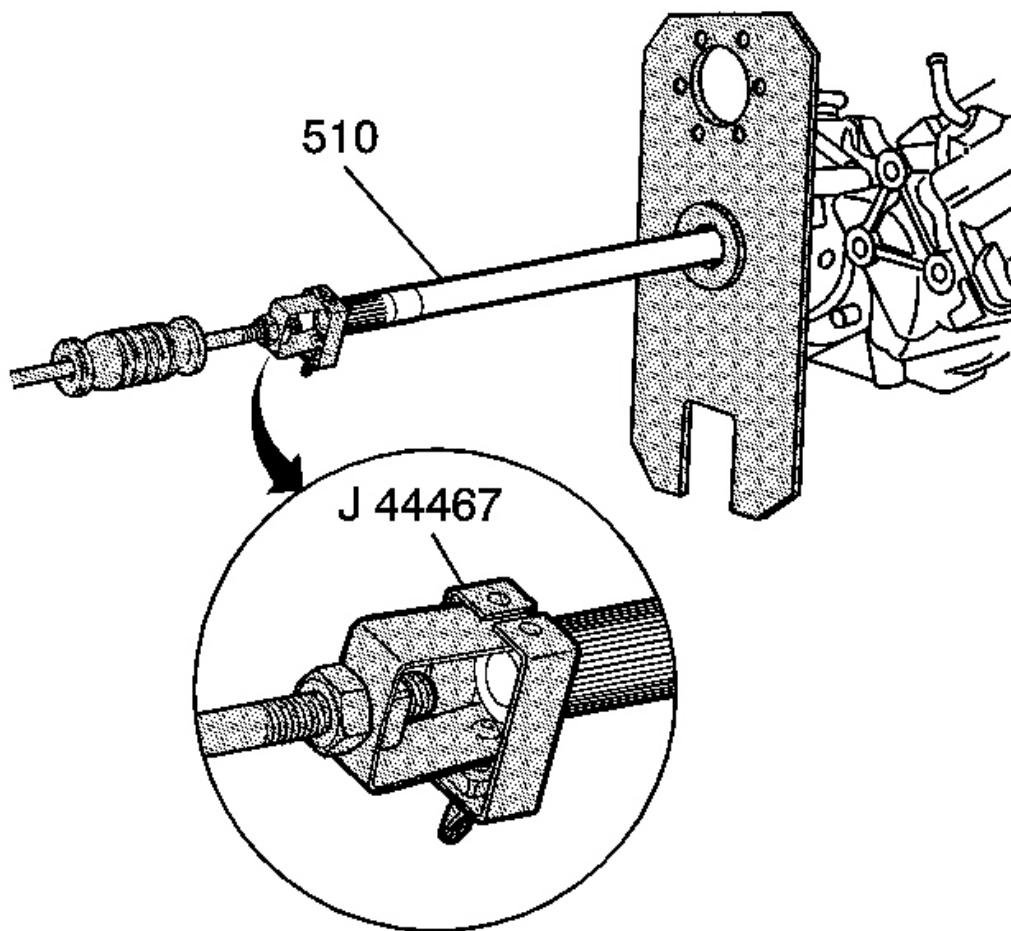


Fig. 40: View Of J 6125-1B & J 44467
Courtesy of GENERAL MOTORS CORP.

15. Attach the **J 6125-1B** to **J 44467** . See **Special Tools**. Install the **J 44467** into the snap ring groove on the output shaft (510). See **Special Tools**. Tighten **J 44467** securely to the output shaft. See **Special Tools**.
16. Remove the output shaft with the slide hammer impact.

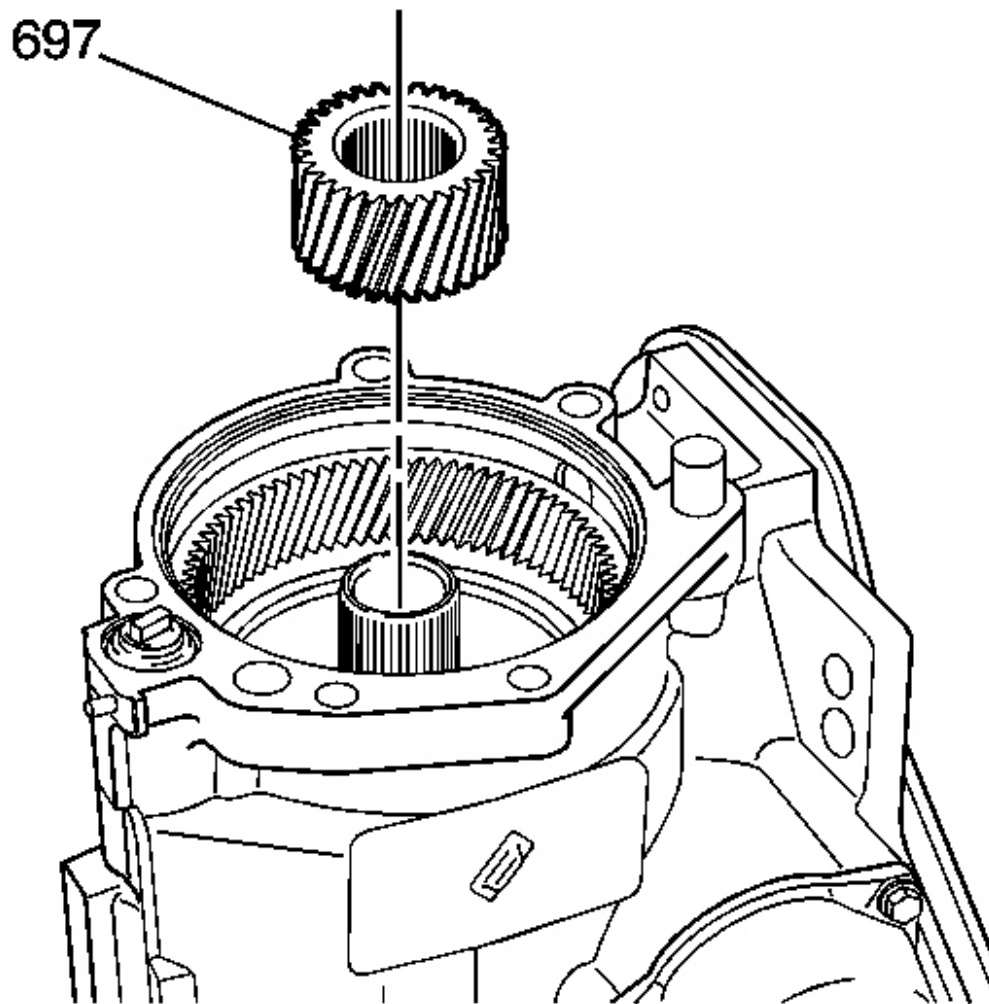


Fig. 41: Locating Final Drive Sun Gear
Courtesy of GENERAL MOTORS CORP.

17. Remove the final drive sun gear (697).

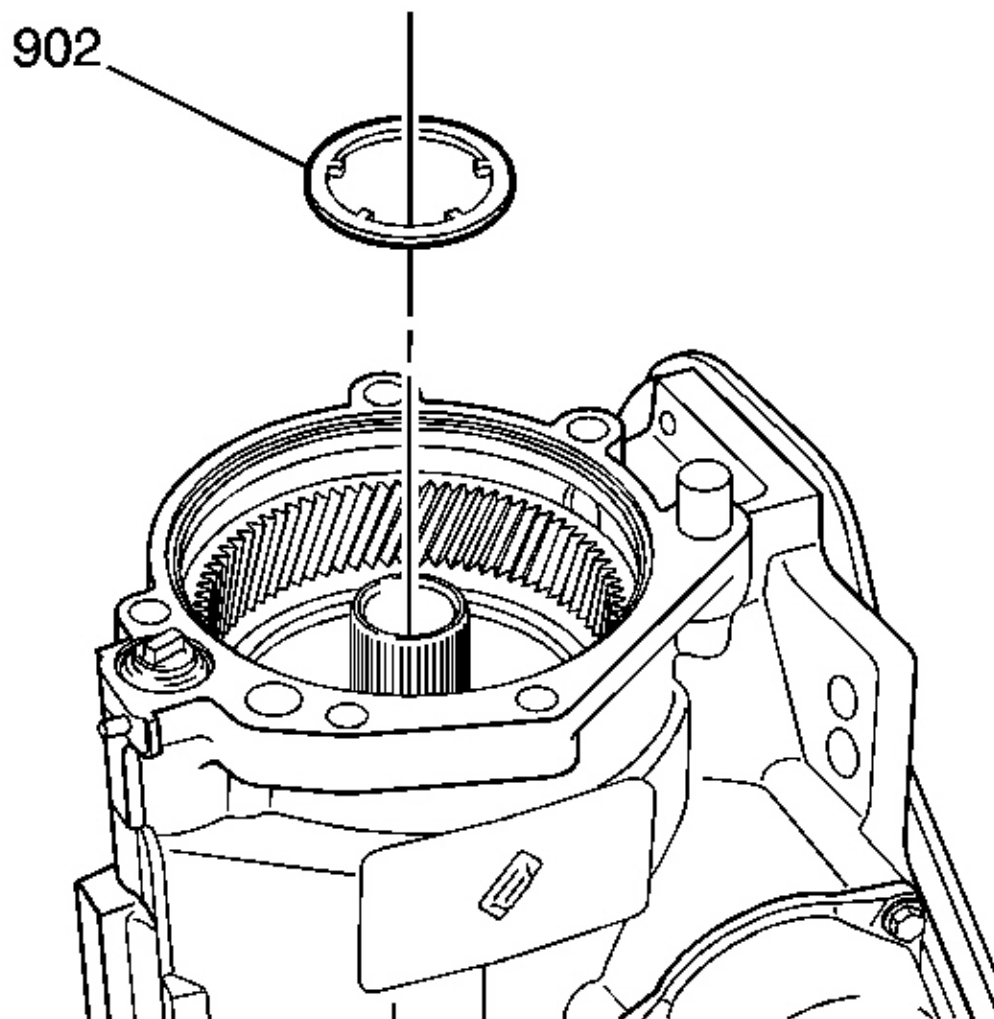


Fig. 42: View Of Selective Washer
Courtesy of GENERAL MOTORS CORP.

18. Remove the selective washer (902).

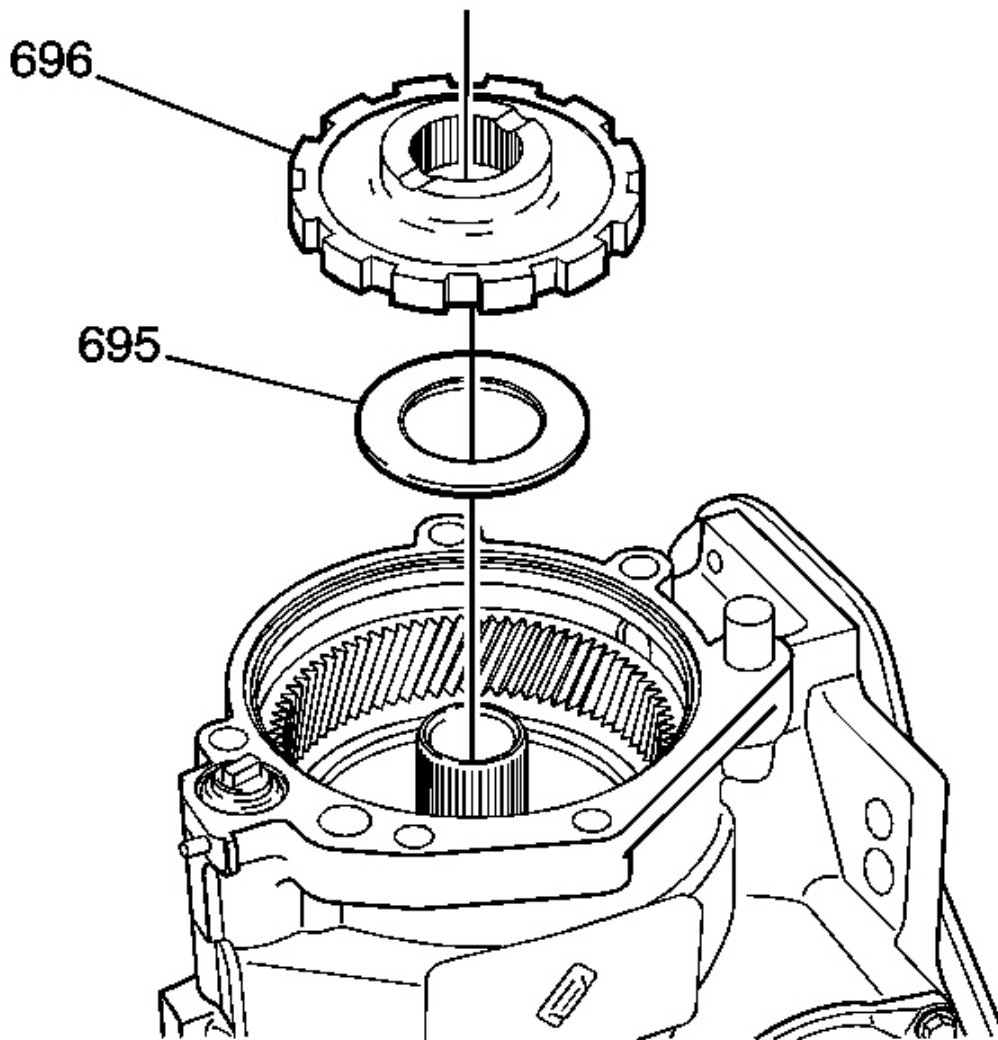


Fig. 43: View Of Park Gear Thrust Bearing & Park Gear
Courtesy of GENERAL MOTORS CORP.

19. Remove the parking gear (696) and the parking gear thrust bearing (695).

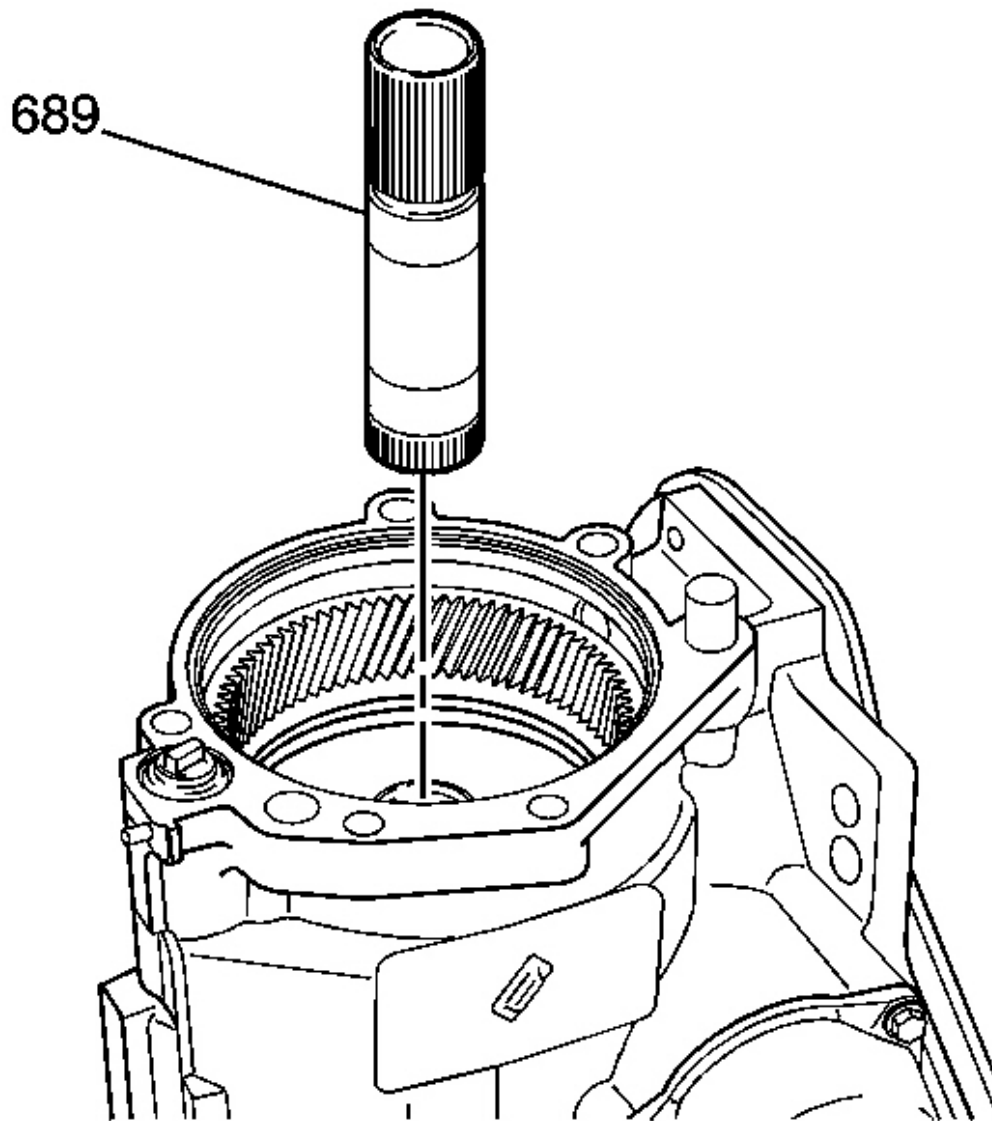


Fig. 44: Identifying Final Drive Sun Gear Shaft
Courtesy of GENERAL MOTORS CORP.

20. Remove the final drive sun gear shaft (689).

REVERSE SERVO REMOVAL

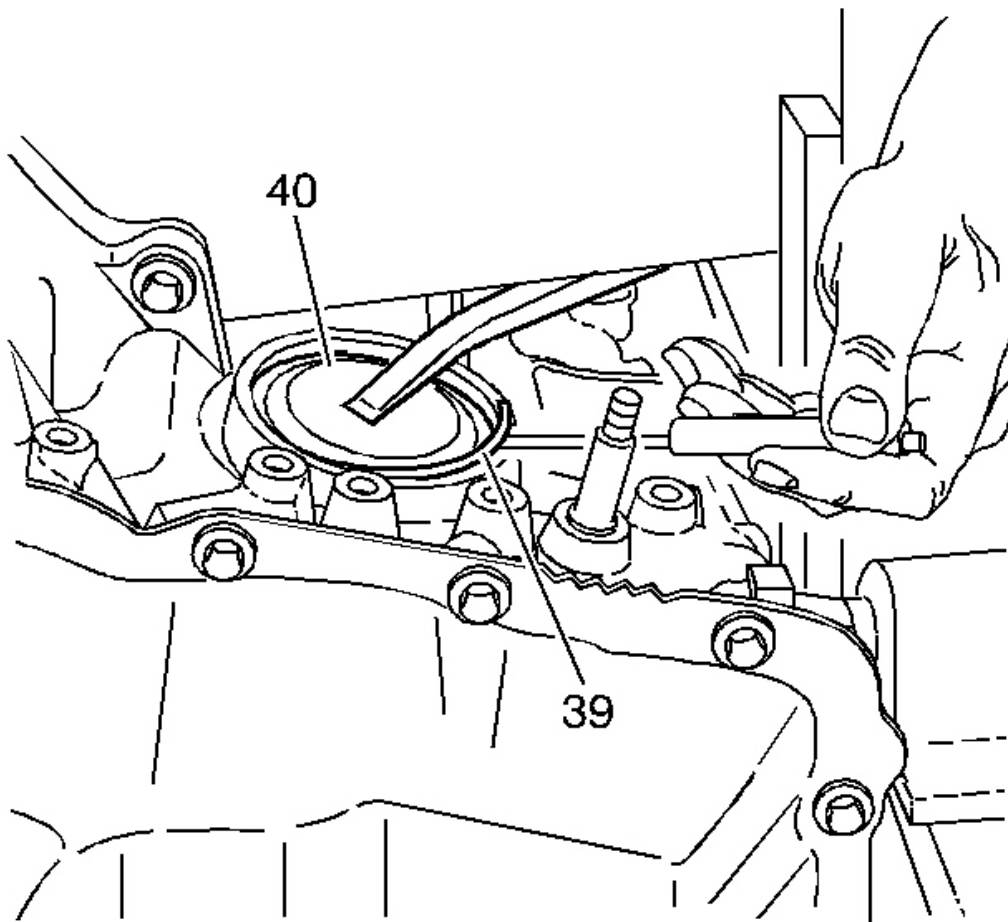
Removal Procedure

Fig. 45: Removing/Installing Reverse Servo Cover Snap Ring
Courtesy of GENERAL MOTORS CORP.

1. Use a long screwdriver in order to depress the reverse band servo cover (40) by prying against the transmission holding fixture.
2. Use a small screwdriver in order to pry out the retaining ring (39) from the reverse band servo cover.

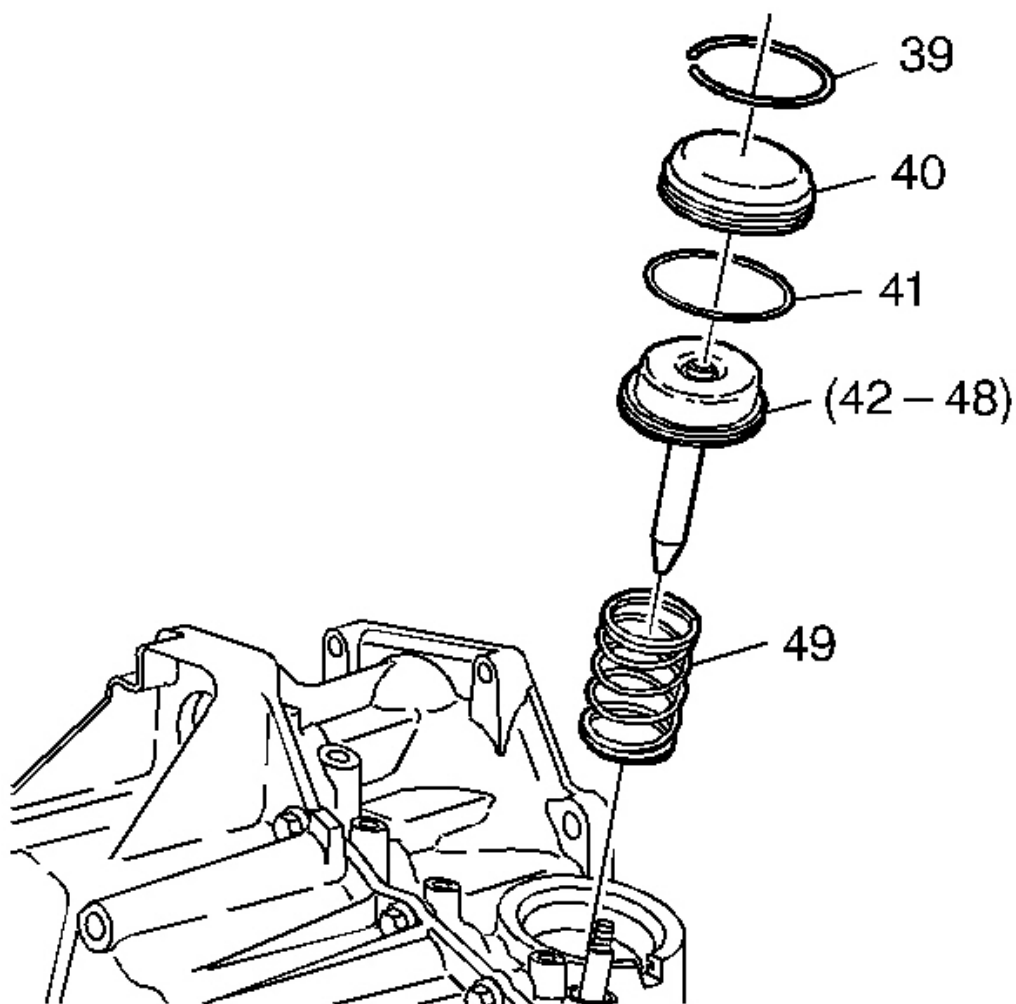


Fig. 46: Identifying Reverse Servo Assembly Components
Courtesy of GENERAL MOTORS CORP.

3. Remove the long screwdriver. The servo assembly will push the servo cover (40) up.
4. Remove the servo cover (40) and the servo cover O-ring seal (41).
5. Remove the reverse band servo assembly (42-48).
6. Remove the reverse band servo piston spring (49).

FORWARD SERVO REMOVAL

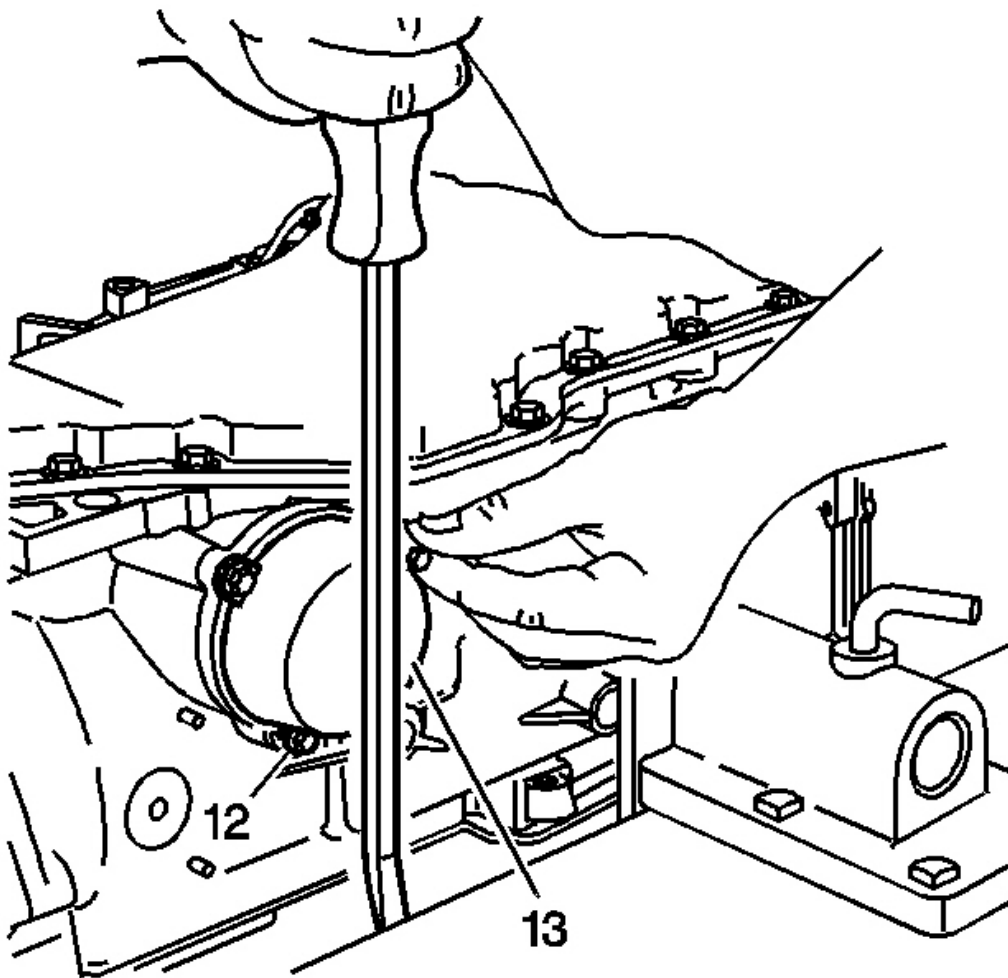
Removal Procedure

Fig. 47: Compressing Forward Band Servo Assembly
Courtesy of GENERAL MOTORS CORP.

1. Position the transmission so that the oil pan is facing up.
2. Use a long screwdriver in order to compress the forward band servo assembly cover (13) by prying against the work bench.
3. Hold the servo assembly compressed.

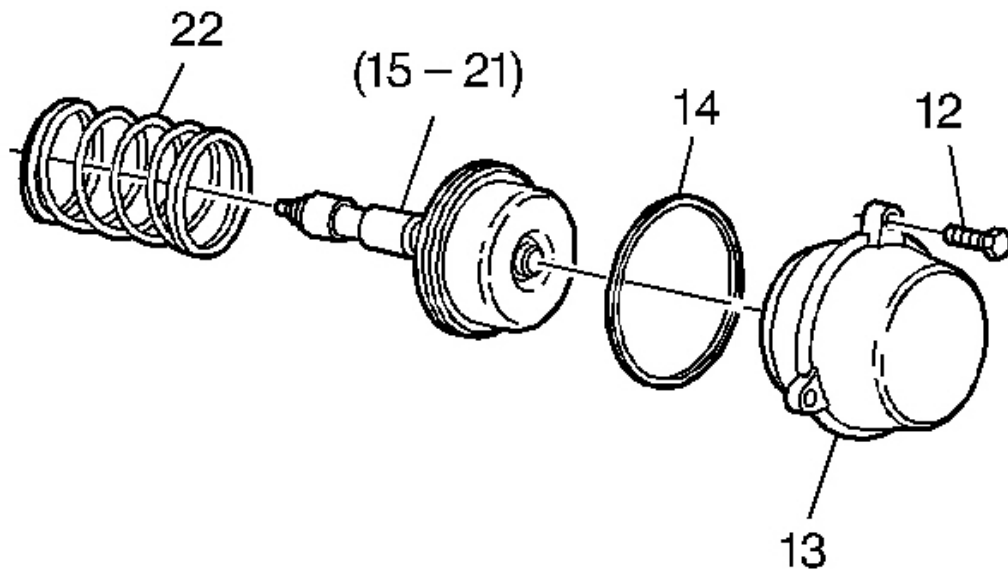


Fig. 48: View Of Servo Assembly
Courtesy of GENERAL MOTORS CORP.

4. Remove the three forward band servo cover bolts (12).
5. Remove the long screwdriver. The servo assembly will push the servo cover out. If the servo cover does not push out, tap it with a rubber mallet.
6. Remove the servo cover (13) and remove the cover seal (14).
7. Remove the servo assembly (15-21).
8. Remove the piston spring (22) from the forward band servo.

PAN AND FILTER ASSEMBLY REMOVAL

Removal Procedure

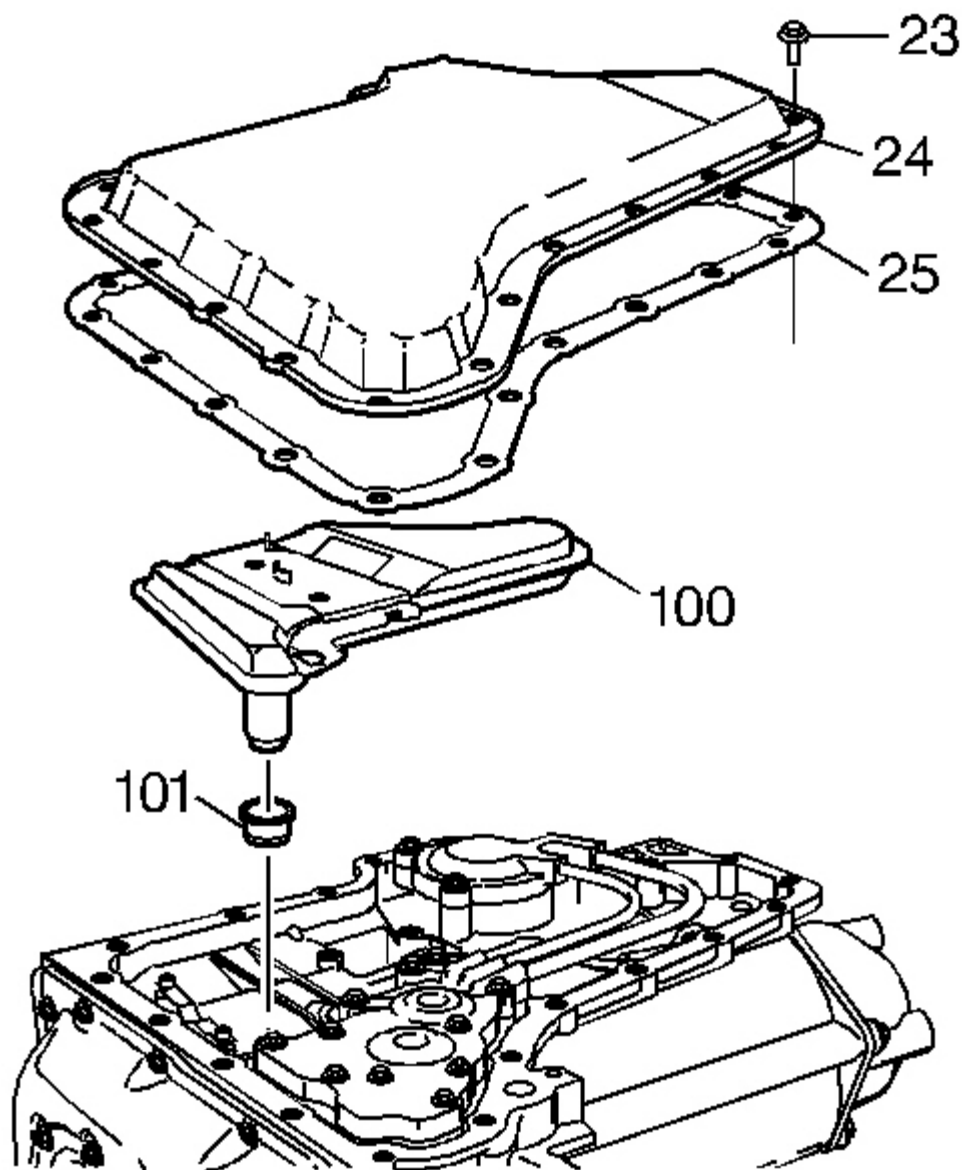


Fig. 49: Removing Oil Pan Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the 20 oil pan bolts (23).
2. Remove the oil pan (24).

3. Remove the oil pan gasket (25).
4. Use a screwdriver in order to pry the oil filter assembly (100) out of the case. Do not damage the case sealing surface.
5. Use a small screwdriver in order to pry the oil filter seal assembly (101) out of the case. Do not damage the case sealing surface.

TRANSMISSION FLUID FILTER INSPECTION

Inspection Procedure

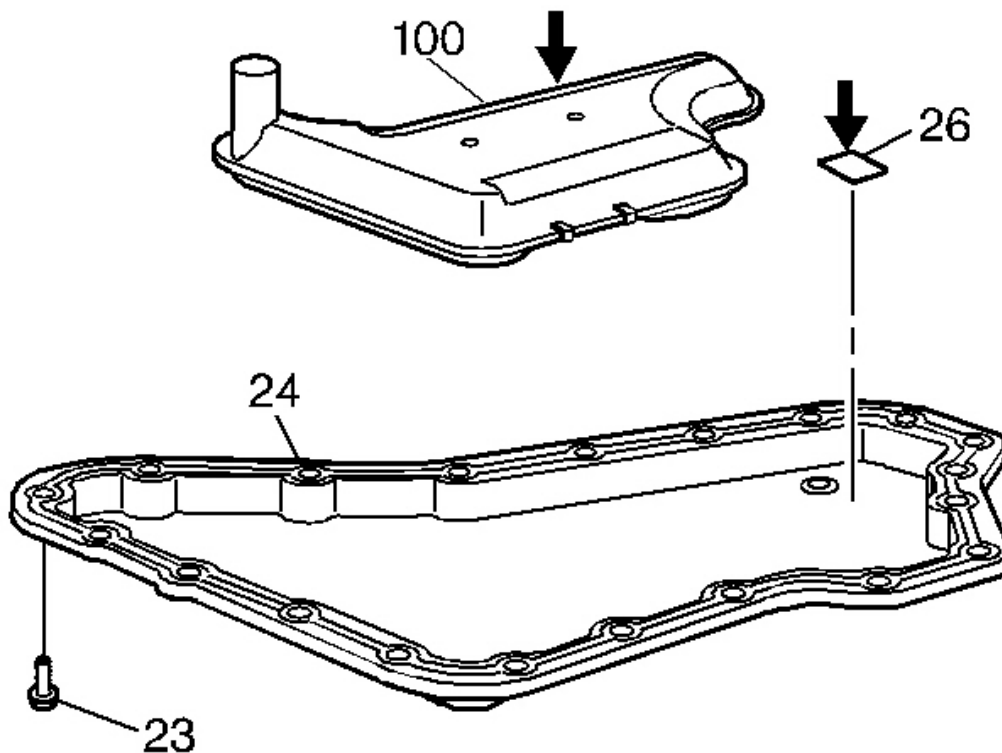


Fig. 50: Inspecting Oil Pan Magnet & Filter
Courtesy of GENERAL MOTORS CORP.

1. Inspect the oil pan magnet (26) for steel particles. Excessive amounts of steel shavings indicate internal transmission damage.
2. Use a screwdriver or side cutters in order to open the oil filter assembly (100), by cutting or

prying the metal crimping away from the top of the filter and by pulling the filter apart.

3. Inspect the filter (100) for excessive amounts of the following:

- Clutch plate assembly fiber material, indicating clutch distress
- Bronze slivers, indicating bushing wear
- Steel particles, indicating internal transmission damage

ACCUMULATOR ASSEMBLY AND 2-1 BAND SERVO REMOVAL

Removal Procedure

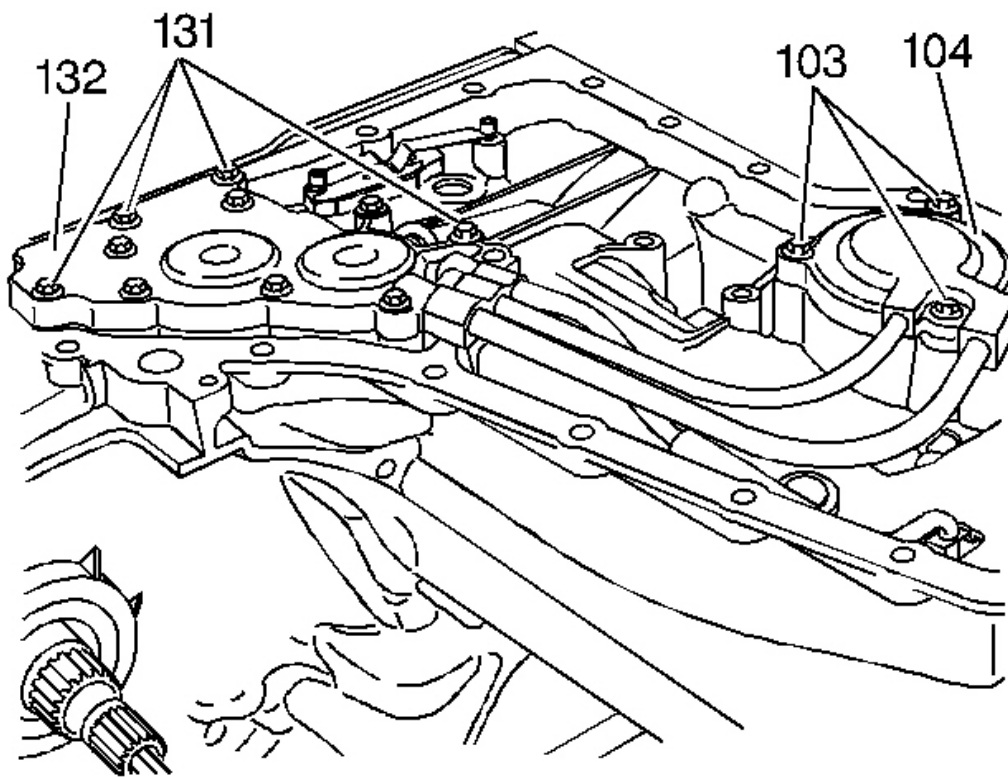


Fig. 51: Removing Accumulator Cover & Manual 2-1 Band Servo Cover Bolts
 Courtesy of GENERAL MOTORS CORP.

1. Remove the four indicated accumulator cover bolts (131) from the 1-2 and 2-3 accumulator cover (132).

2. Remove the three indicated bolts (103) from the manual 2-1 band servo cover (104).

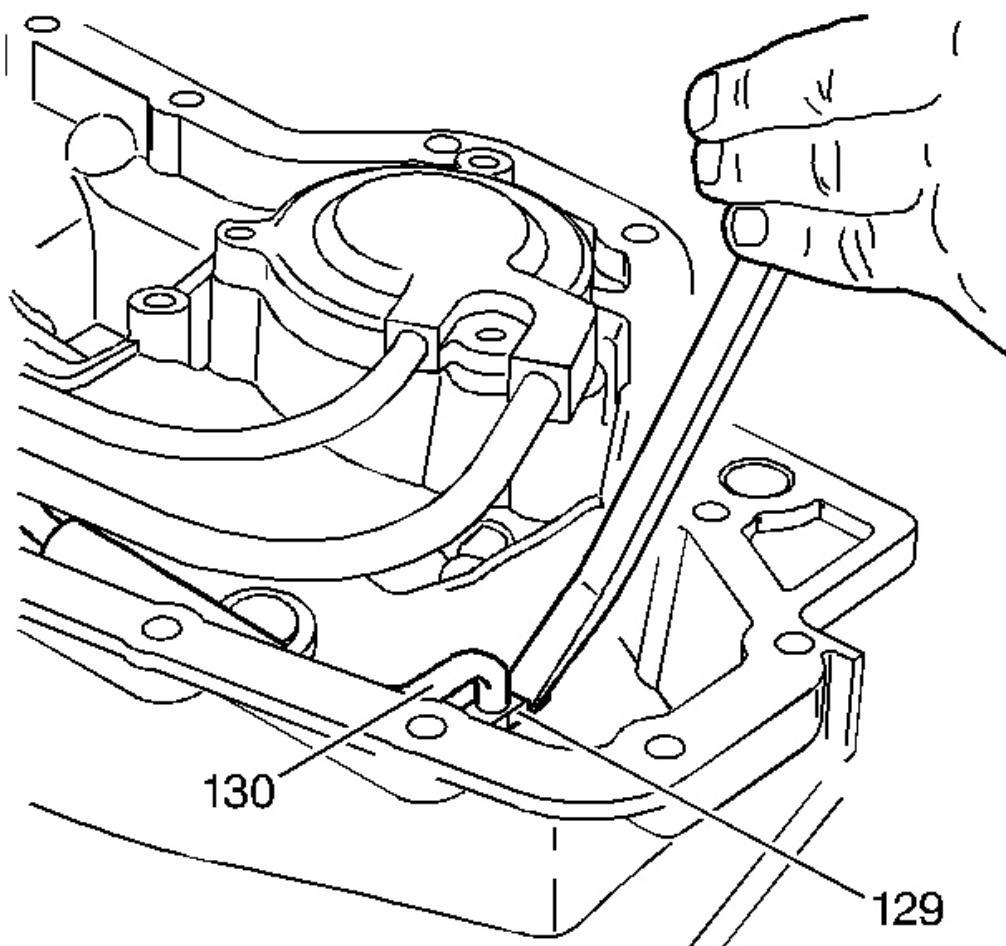


Fig. 52: Prying Out Lube Oil Pipe Retainer
Courtesy of GENERAL MOTORS CORP.

3. Use a large screwdriver in order to gently pry the lube oil pipe retainer (129) from the case.
4. Remove the lube oil pipe (130) from the front differential carrier internal gear lube hole.

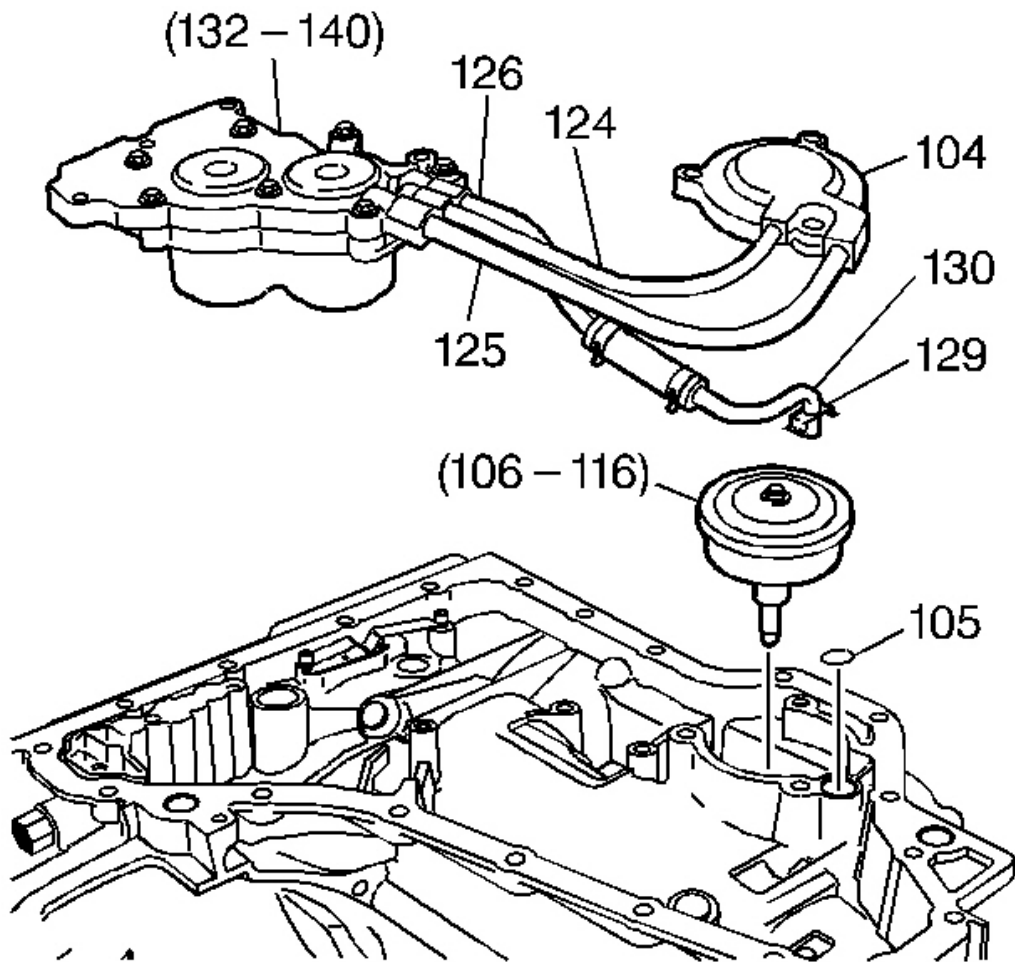


Fig. 53: Disconnecting 1-2 & 2-3 Accumulator Assembly & Manual 2-1 Band Servo Assembly

Courtesy of GENERAL MOTORS CORP.

NOTE: Do not twist or damage the pipe assembly when removing the pipe assembly.

5. Remove the 1-2 and 2-3 accumulator assembly (132-140), the pipe assembly (124-126) and the manual 2-1 band servo cover (104).
6. Remove the manual 2-1 band servo assembly (106-116) out of the case at the same time.
7. Remove the cover seal (105) from the manual 2-1 band servo assembly.

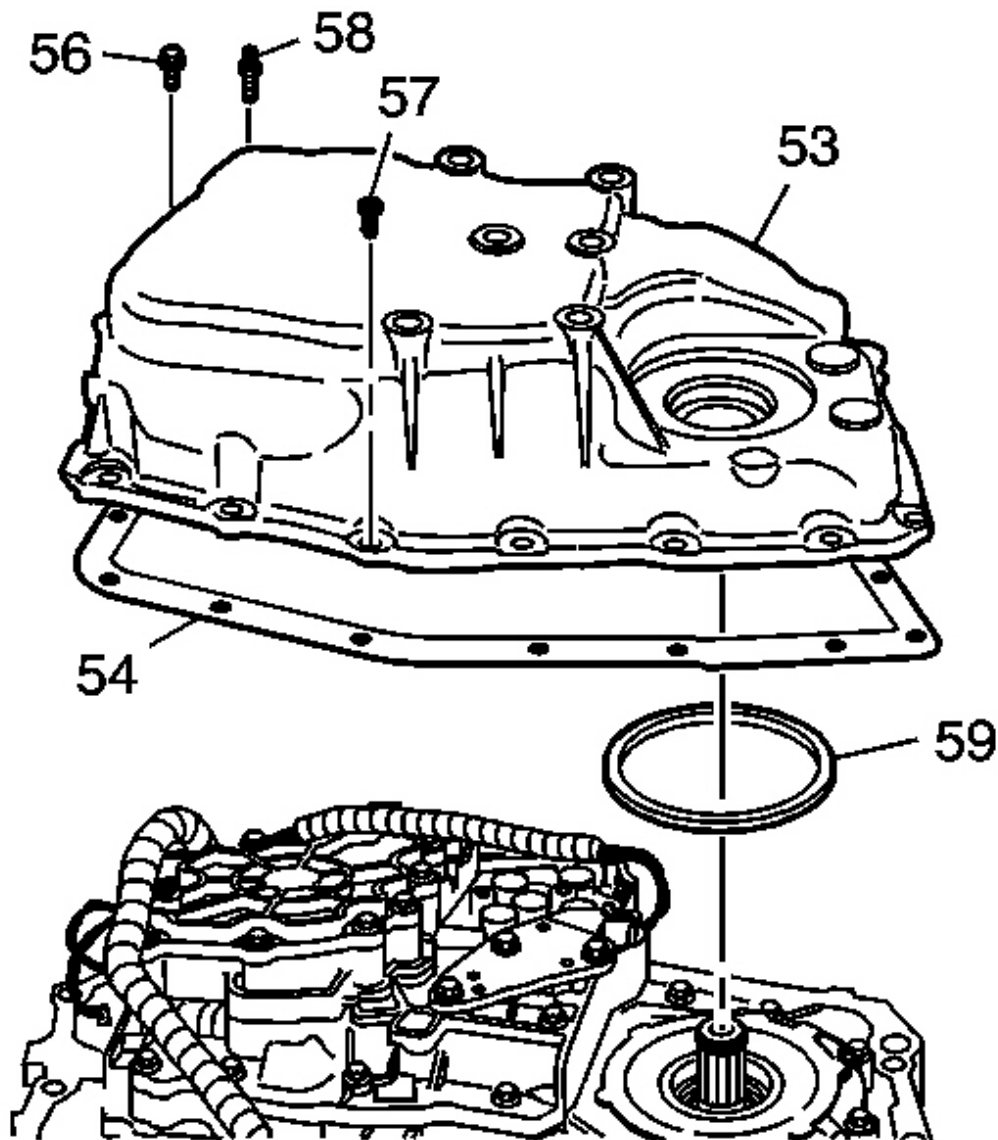
CONTROL VALVE BODY COVER AND GASKETS DISASSEMBLE**Disassembly Procedure**

Fig. 54: View Of Control Valve Body Cover Bolts
Courtesy of GENERAL MOTORS CORP.

1. Position the transaxle so that the control valve body cover (53) is facing up.
2. Remove the 17 control valve body cover bolts:
 - 9 flanged bolts (56)
 - 4 TORX bolts (57)
 - 4 stud bolts (58)
3. Remove the cover (53), outer gasket (54) and inner gasket (59).

WIRING HARNESS REMOVAL

Removal Procedure

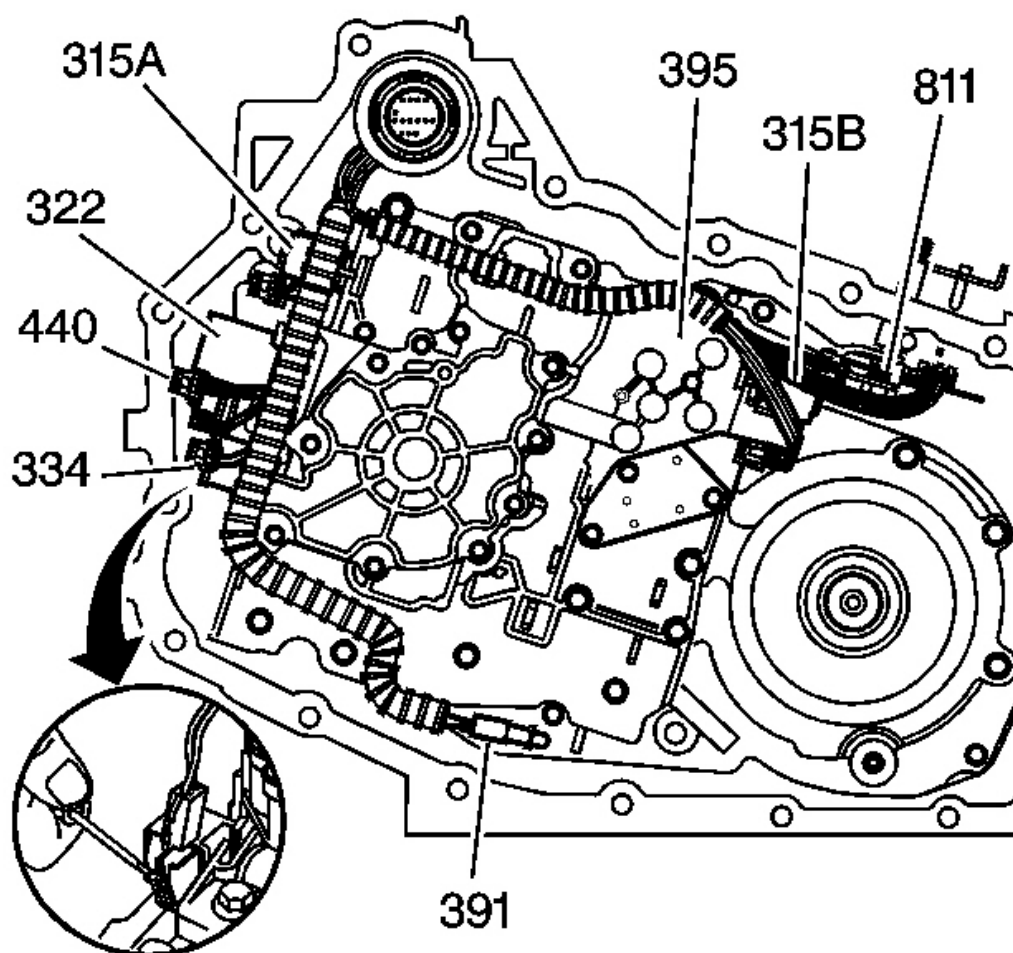


Fig. 55: Disconnecting Wiring Harness Electrical Connectors
Courtesy of GENERAL MOTORS CORP.

1. Using a small screwdriver, pry the wiring harness (224/225) electrical connectors off of the following components:
 - Automatic transaxle fluid pressure manual valve position switch assembly (395)
 - 1-2, 3-4 Shift solenoid valve assembly (315A)
 - 2-3 Shift solenoid valve assembly (315B)
 - TCC PWM solenoid valve assembly (334)
 - Pressure control solenoid valve assembly (322)
 - Automatic transaxle input speed sensor assembly (440)
 - IMS (811)
2. Gently pull the automatic transaxle fluid temperature sensor (391) from it's clip.

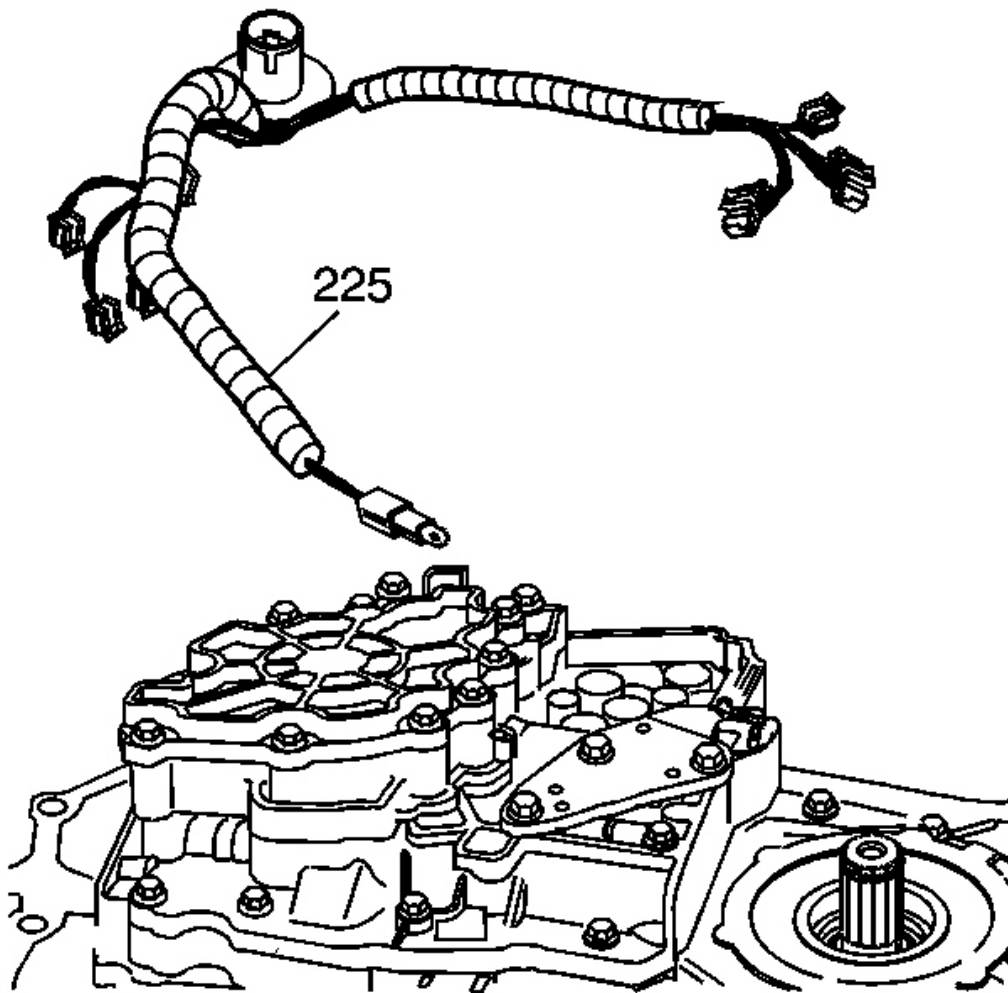


Fig. 56: Identifying Wiring Harness Assembly
Courtesy of GENERAL MOTORS CORP.

3. Lift the wiring harness assembly (225) off of the transaxle.

OIL PUMP REMOVAL

Removal Procedure

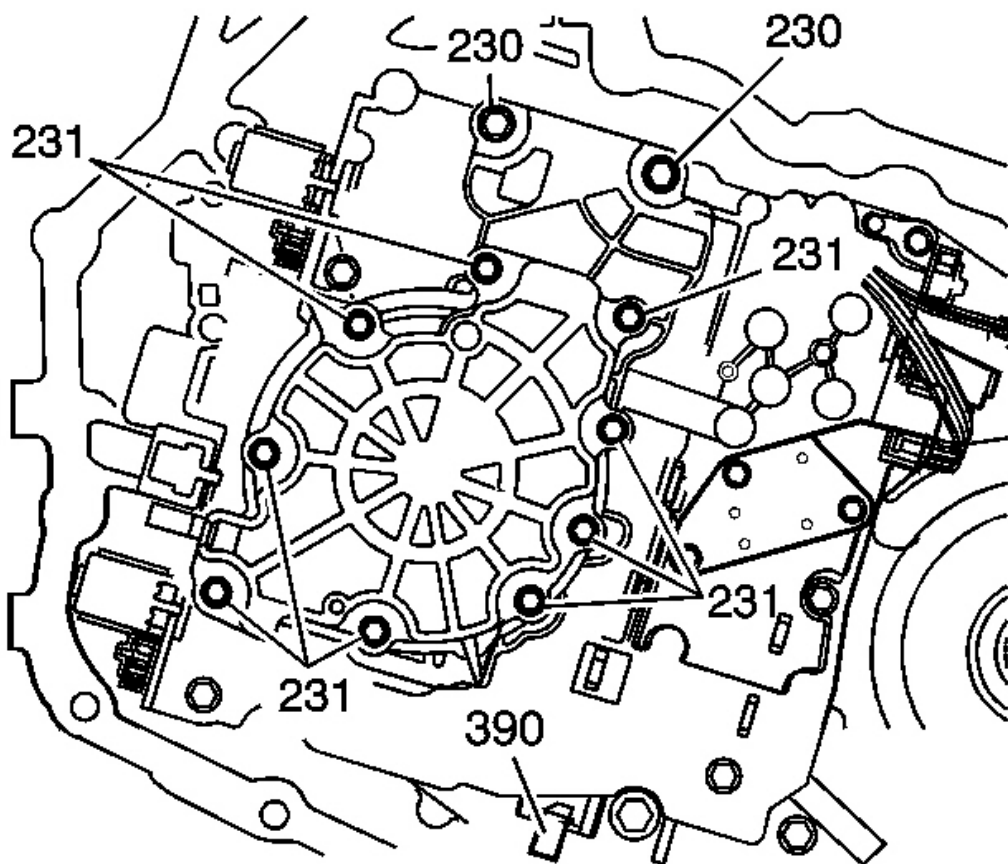


Fig. 57: Locating Oil Pump Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the eleven indicated oil pump bolts (230, 231).
2. Do not remove the one oil pump cover bolt (205) at this time.
3. Remove the one wiring harness clip (390).

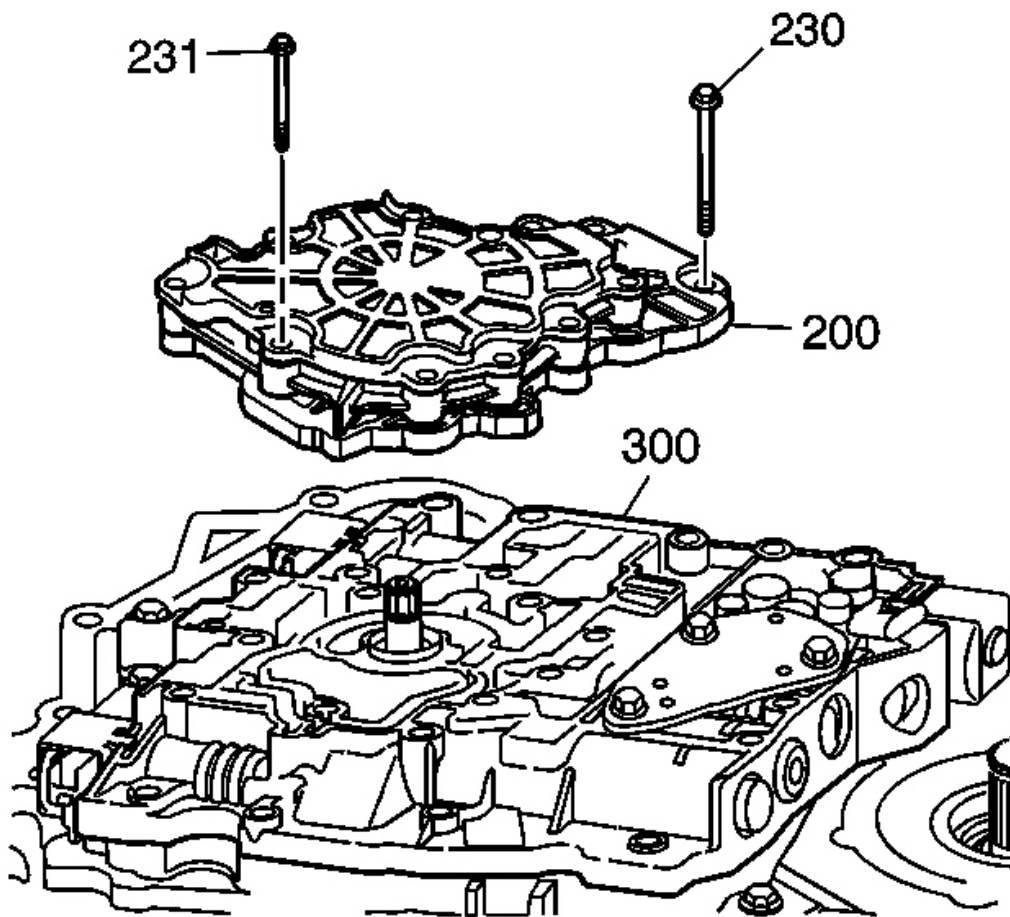


Fig. 58: Locating Oil Pump Assembly
Courtesy of GENERAL MOTORS CORP.

4. Lift the oil pump assembly (200) off of the control valve body (300).
5. Set the oil pump assembly (200) on its cover.

CONTROL VALVE BODY ASSEMBLY REMOVAL

Removal Procedure

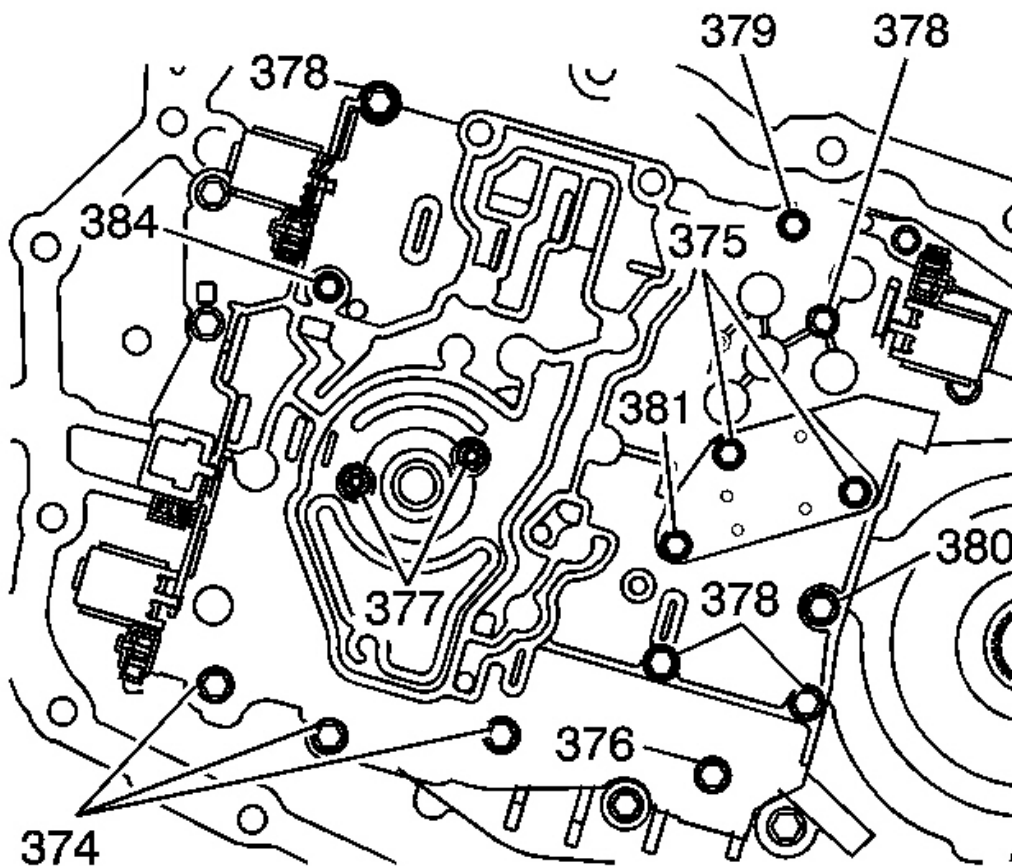


Fig. 59: Installing Valve Body Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the indicated control valve body bolts (374-381, 384).

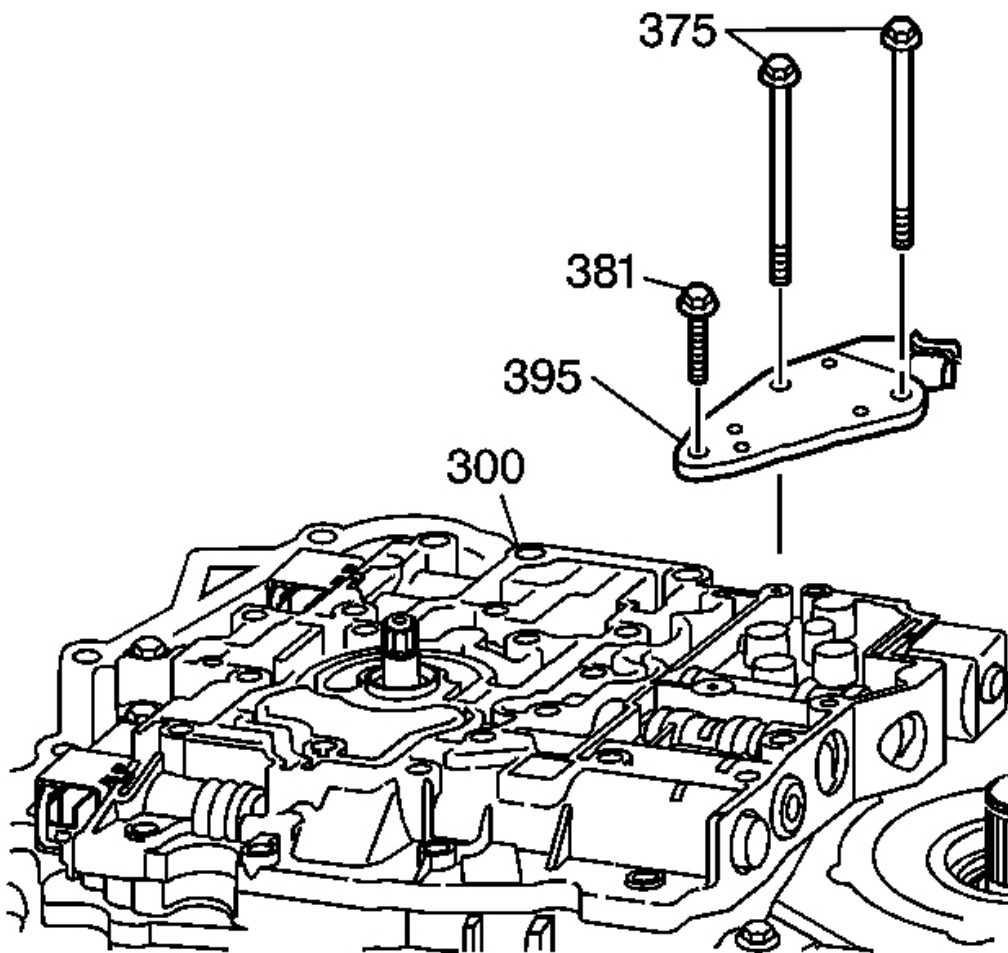


Fig. 60: Removing/Installing Transmission Fluid Pressure (TFP) Manual Valve
Courtesy of GENERAL MOTORS CORP.

2. Carefully lift the fluid pressure manual valve position switch assembly (395) off of the control valve body (300). Handle the switch assembly carefully, it is very delicate.

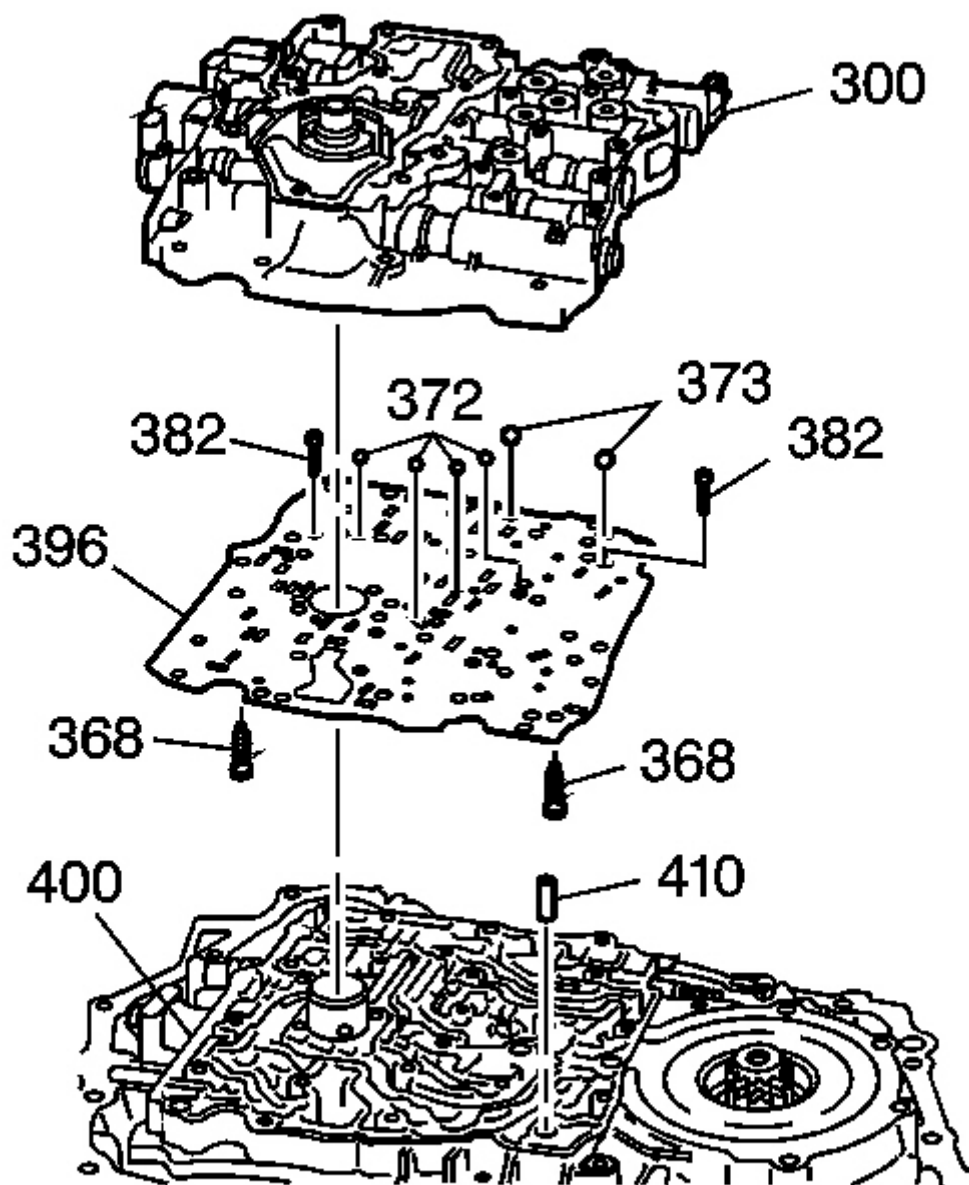


Fig. 61: Identifying Control Valve Body Assembly Components
Courtesy of GENERAL MOTORS CORP.

3. Remove the control valve body assembly (300).
4. Remove the two retainers (368) from the valve body assembly.

IMPORTANT: The bonded spacer plate gasket assembly is not re-useable and should be replaced any time it is removed from the transmission.

5. Remove the spacer plate and gasket assembly (396) and discard with the two screen/seal assemblies (382) from the valve body (300).
 - Remove the six ball check valves (372, 373) from the valve body (300).
 - Remove the case cover pin (410).

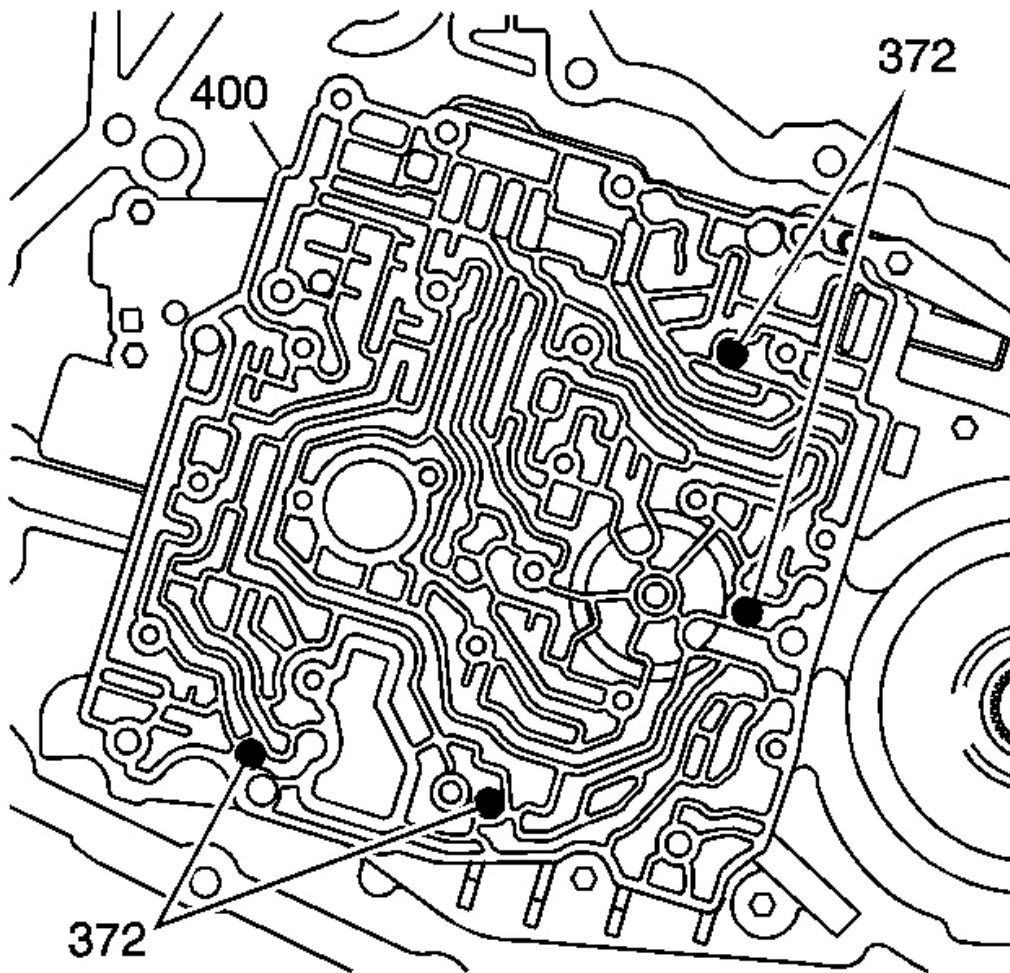


Fig. 62: Locating Ball Check Valves In Case Cover
Courtesy of GENERAL MOTORS CORP.

6. Remove the four ball check valves (372) from the case cover (400).

OIL PUMP DRIVE SHAFT REMOVAL

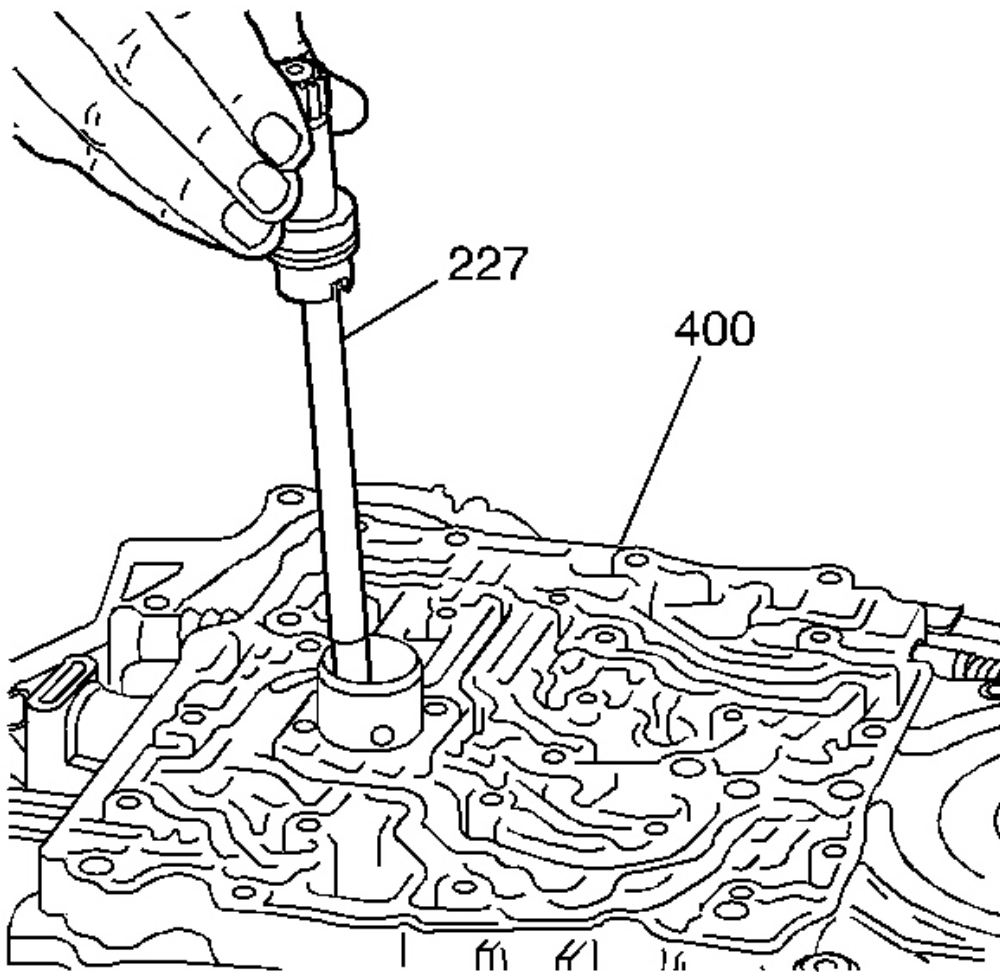


Fig. 63: Removing Oil Pump Drive Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

Remove the oil pump drive shaft assembly (227) from the case cover (400).

VEHICLE SPEED SENSOR REMOVAL

Removal Procedure

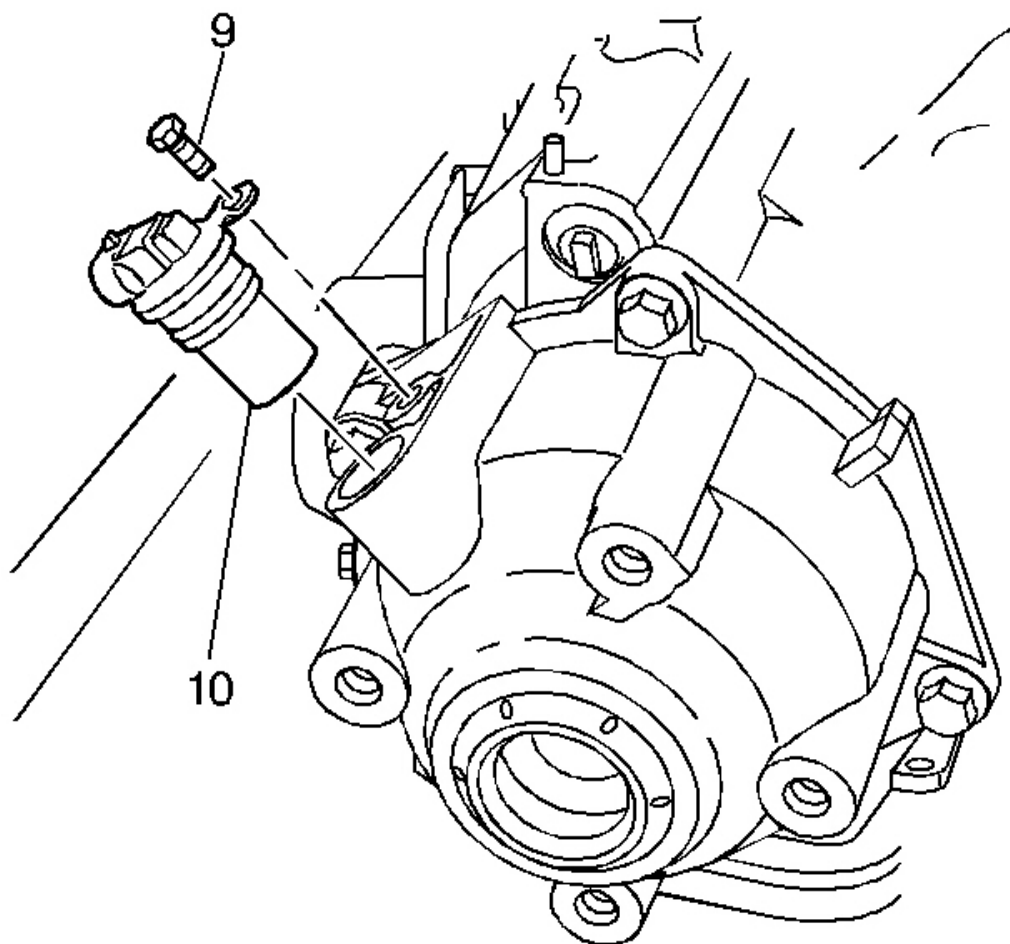


Fig. 64: Identifying Vehicle Speed Sensor (VSS)
Courtesy of GENERAL MOTORS CORP.

1. Position the transmission so that the vehicle speed sensor (10) is facing up.
2. Remove the vehicle speed sensor bolt (9).

IMPORTANT: Handle the speed sensor carefully.

3. Remove the vehicle speed sensor (10).

OUTPUT SHAFT REMOVAL

Tools Required

J 42562 Axle Removal Wedge. See **Special Tools**.

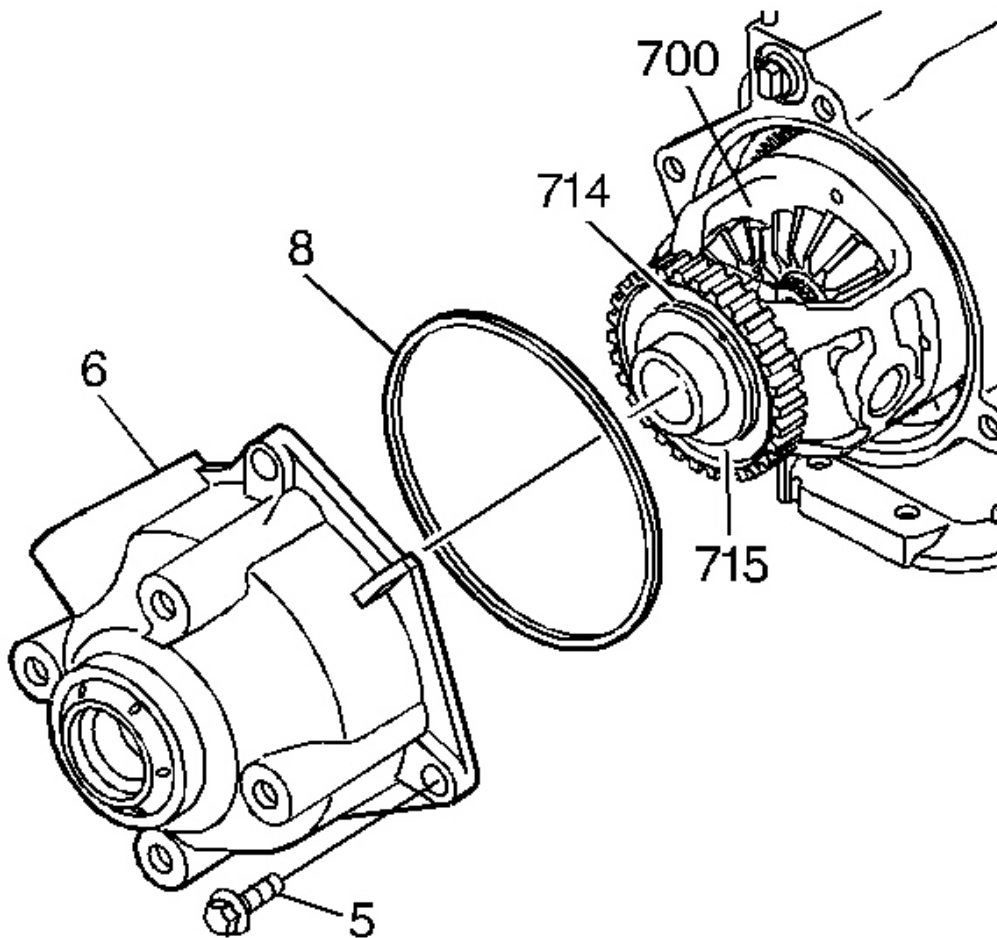
Removal Procedure

Fig. 65: View Of Case Extension Assembly & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the four case extension bolts (5).
2. Remove the case extension assembly (6) and remove the extension seal (8).
3. Leave the differential carrier thrust washer (714) and the bearing (715) on the carrier.

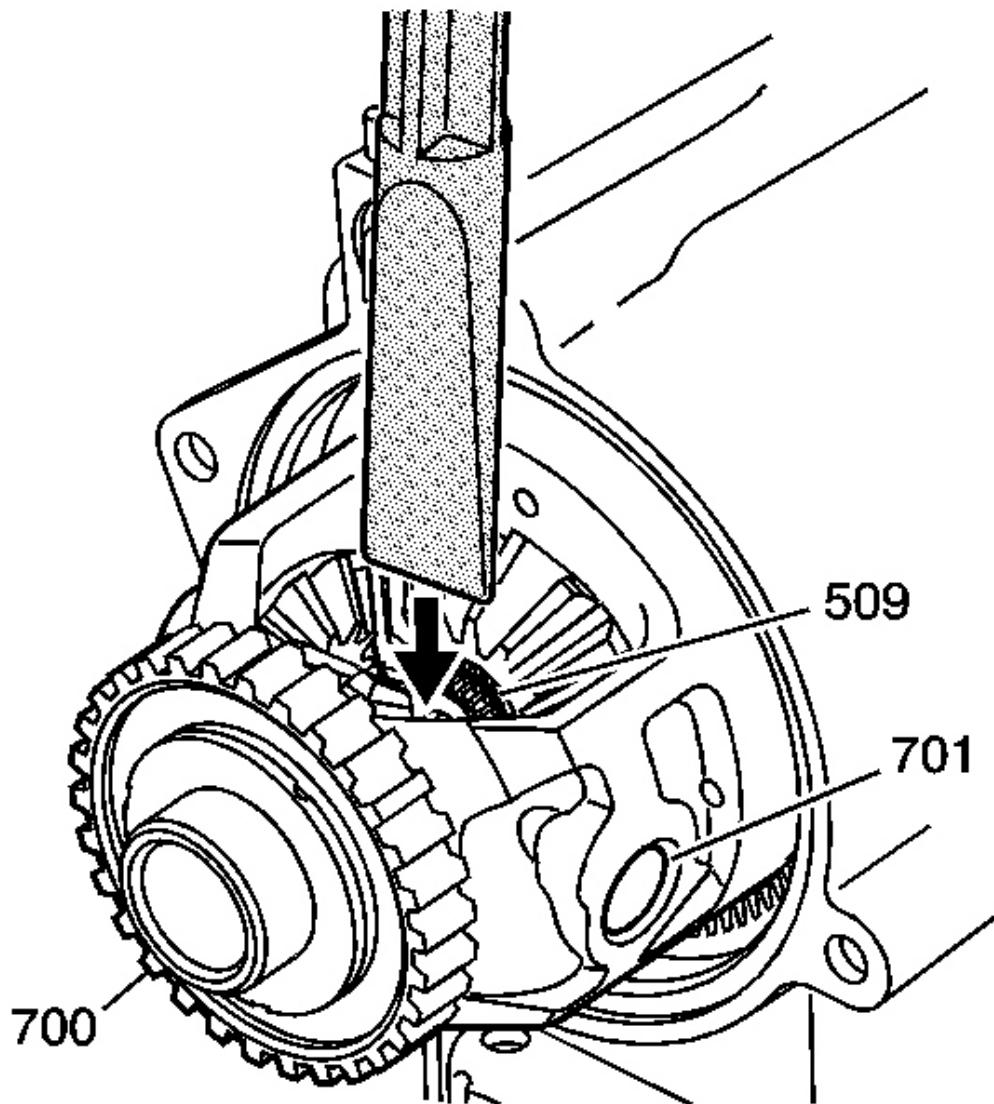


Fig. 66: View Of Compression Ring, Pinion Shaft And Speed Sensor Trigger
Courtesy of GENERAL MOTORS CORP.

4. Rotate the differential carrier until the end of the output shaft can be seen and the differential pinion shaft (701) is in a horizontal position.
5. Place the **J 42562** Axle Removal Wedge between the end of the output shaft and the differential pinion shaft. See **Special Tools**.

6. Using a hammer, hit the end of the axle removal tool in order to compress the output shaft compression ring (509) and push the output shaft through the differential side gear.

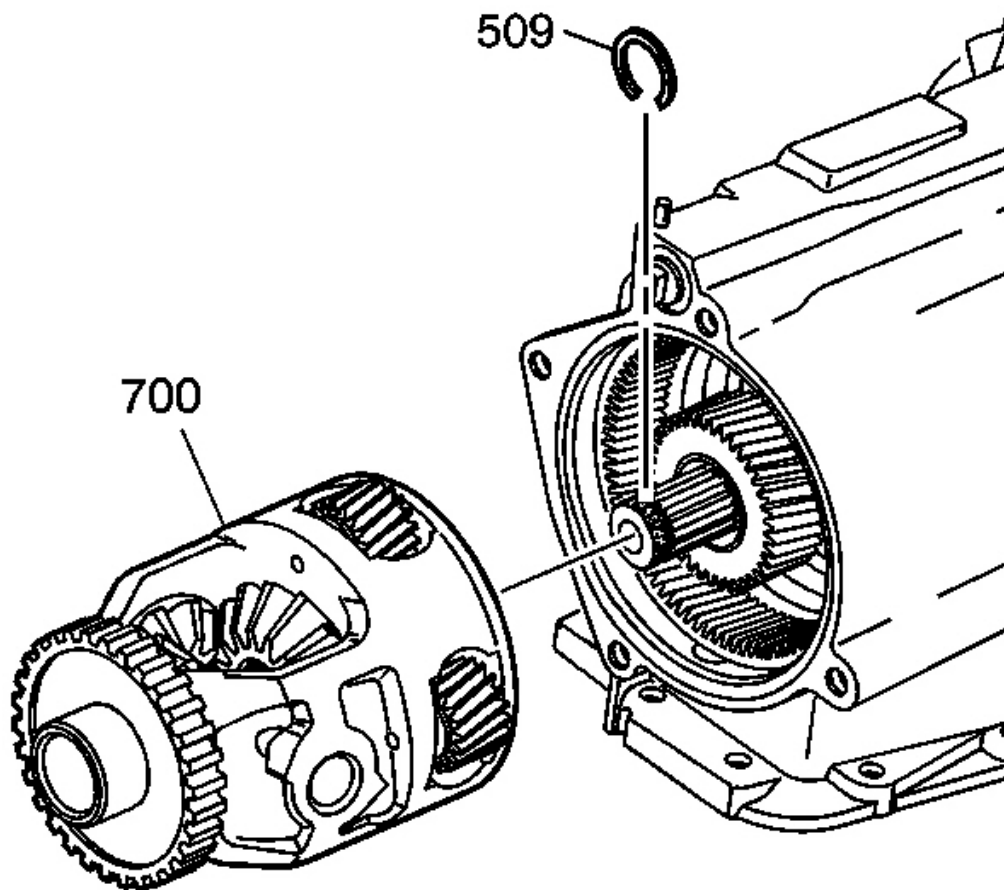


Fig. 67: Identifying Output Shaft Differential Carrier & Compression Ring
Courtesy of GENERAL MOTORS CORP.

7. Remove the differential carrier assembly (700).
8. Using snap ring pliers remove the compression ring (509) from the output shaft.

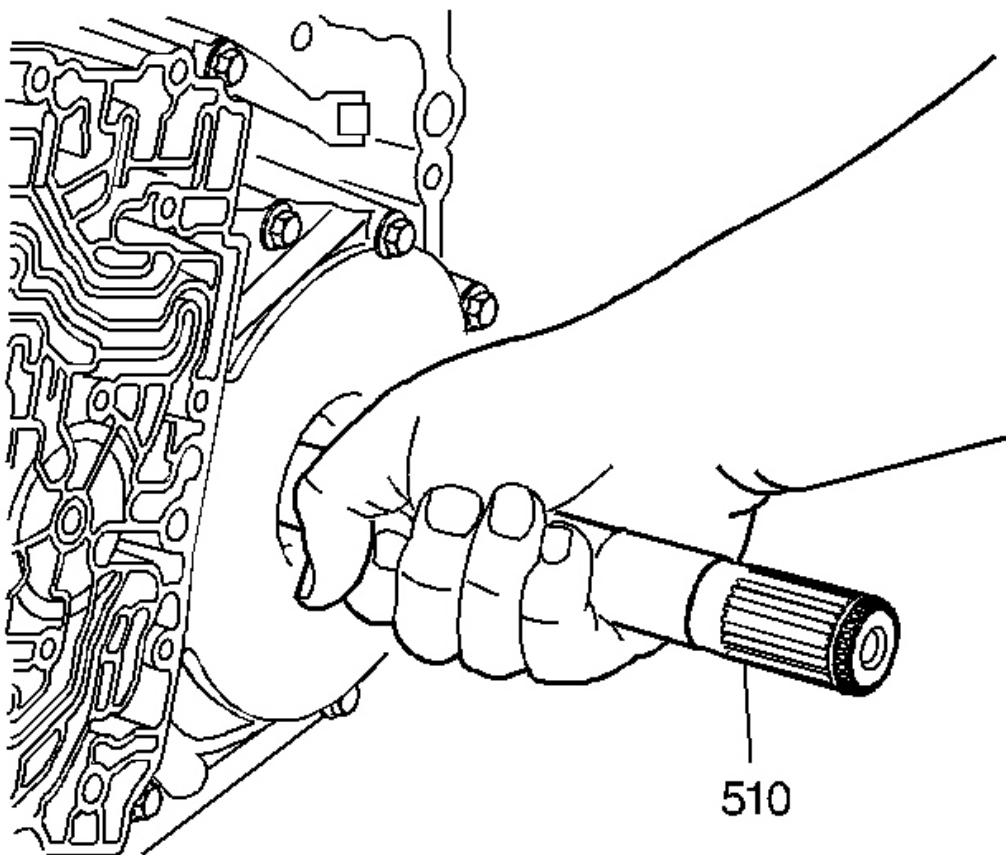


Fig. 68: Removing/Installing Output Shaft
Courtesy of GENERAL MOTORS CORP.

9. Pull the output shaft (510) out of the transmission.

FRONT DIFFERENTIAL CARRIER END PLAY CHECK (FWD ONLY)

Tools Required

- **J 8001** Dial Indicator Set
- **J 25025-8** Dial Indicator Mounting Post. See **Special Tools**.
- **J 26958-10A** Adapter Plug
- **J 28585** Snap Ring Remover

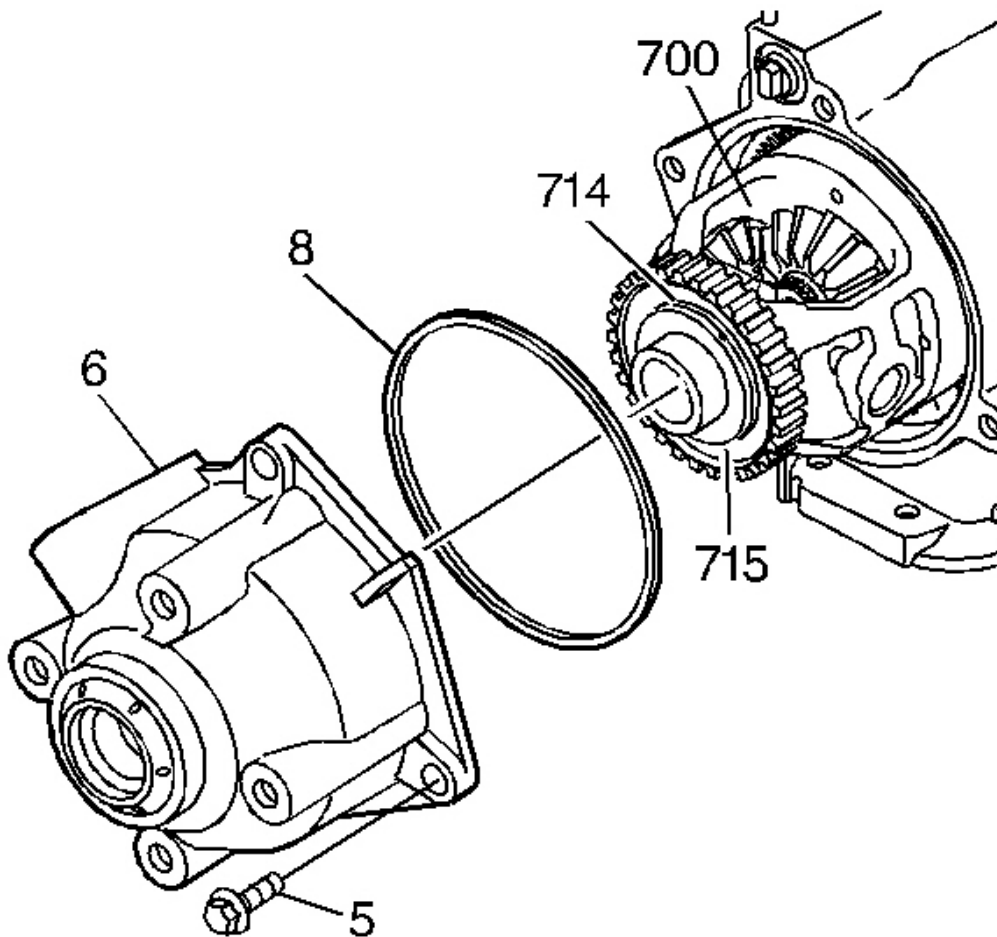
Procedure

Fig. 69: View Of Case Extension Assembly & Bolts
Courtesy of GENERAL MOTORS CORP.

1. If the final drive assembly (700) has been removed it must be reinstalled.
2. Make sure that the thrust washer (714) and the bearing (715) are still on the differential carrier.
3. Install the case extension seal (8) onto the case extension (6).
4. Install the case extension assembly (6) onto the transmission case.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

5. Install only two of the four case extension bolts (5).

Tighten: Do not torque the bolts. Tighten them only until the case extension is fully seated.

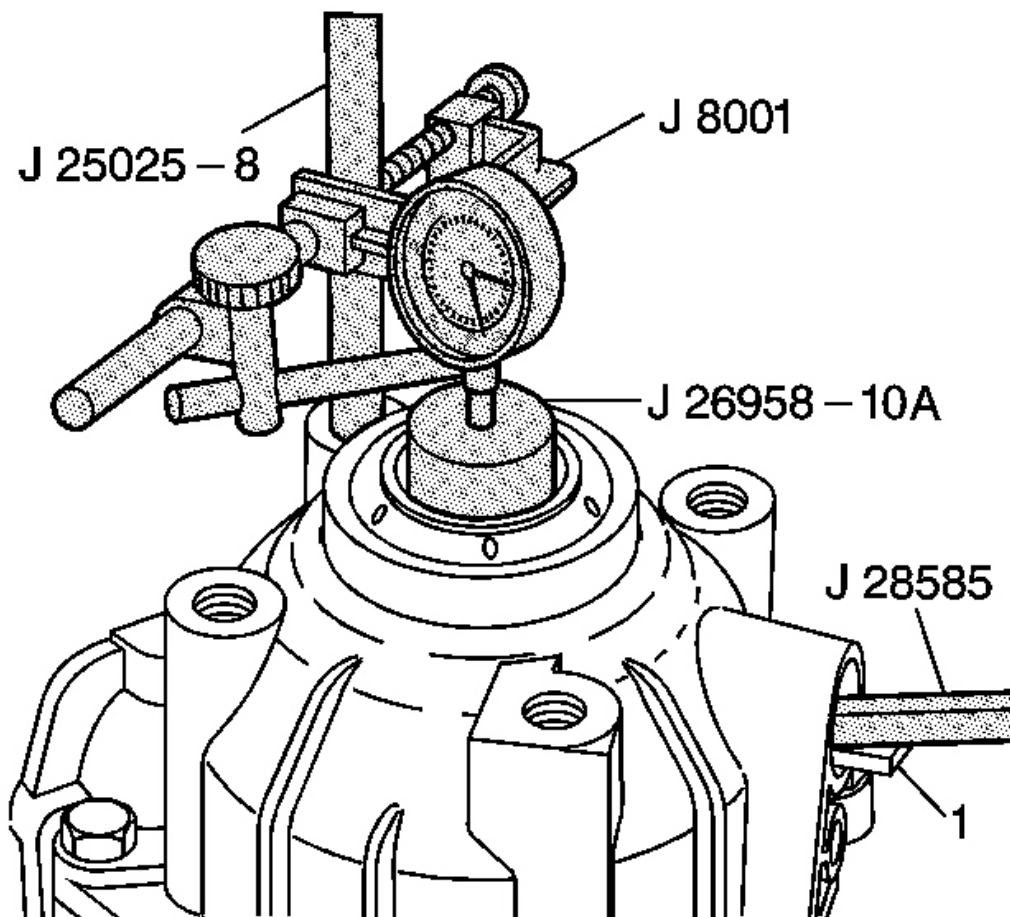


Fig. 70: Installing J 25025-8, J 26958-10A & J 8001 To Transmission Case
Courtesy of GENERAL MOTORS CORP.

6. Position the transmission so that the case extension is facing upward.
7. Install **J 25025-8** , **J 26958-10A** and **J 8001** .
8. Set the dial indicator to zero.

NOTE: Use a piece of wood or rubber while prying with J 28585 or a large screwdriver, to prevent damage to VSS bore.

9. Use **J 28585** or a large screwdriver in order to lift the differential carrier. Pry up on the vehicle speed sensor reluctor wheel through the sensor hole in the case extension.

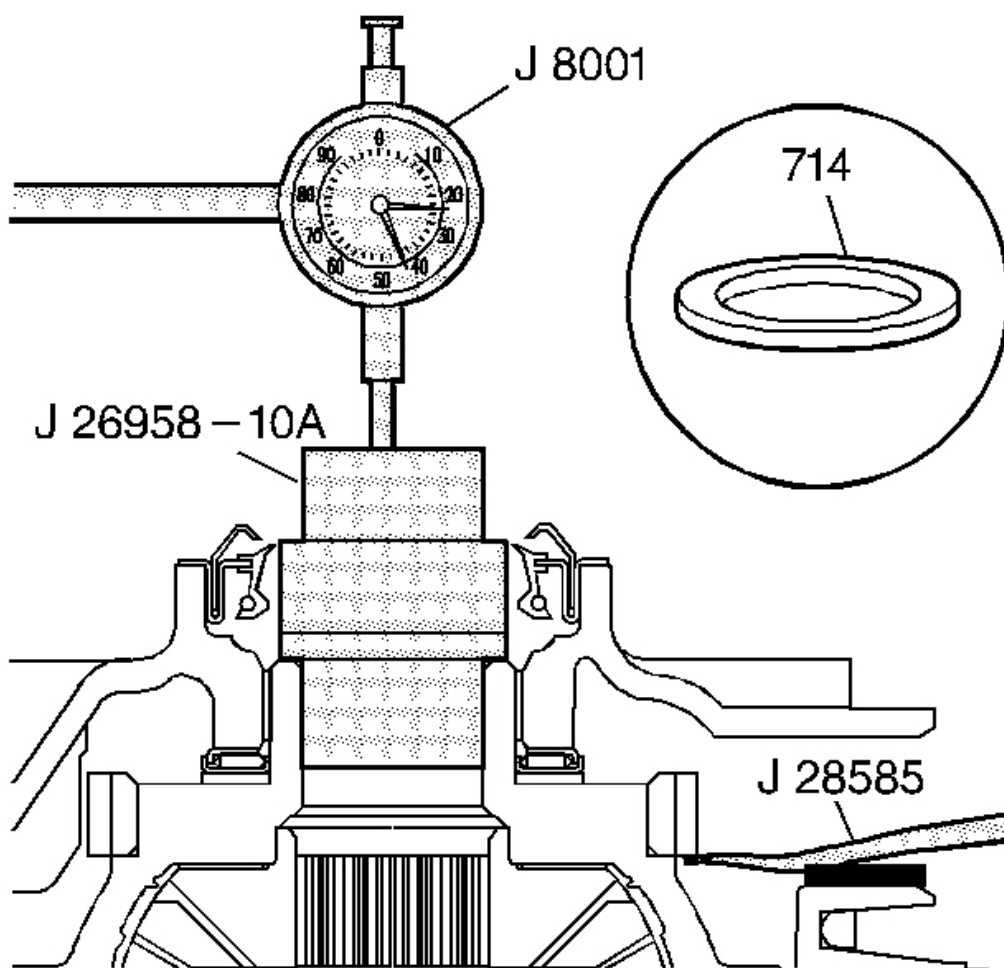


Fig. 71: Measuring Differential Carrier/Case Thrust Washer
Courtesy of GENERAL MOTORS CORP.

10. Note the dial indicator reading before changing the carrier thrust washer (714).
 - If the dial indicator reading is less than 0.12 mm (0.005 in), install the next smaller

size thrust washer, then recheck.

- If the dial indicator reading is greater than 0.62 mm (0.025 in), install the next larger size thrust washer, then recheck.
- If the dial indicator reading is 0.12-0.62 mm (0.005-0.025 in), the thrust washer is correct.

Refer to the Differential Carrier/Case Thrust Washer (714) Selection Guide in **End Play Specifications** .

11. Remove **J 8001** , **J 25025-8** and **J 26958-10A** . See **Special Tools**.

MANUAL VALVE LINK AND OIL DAM REMOVAL

Removal Procedure

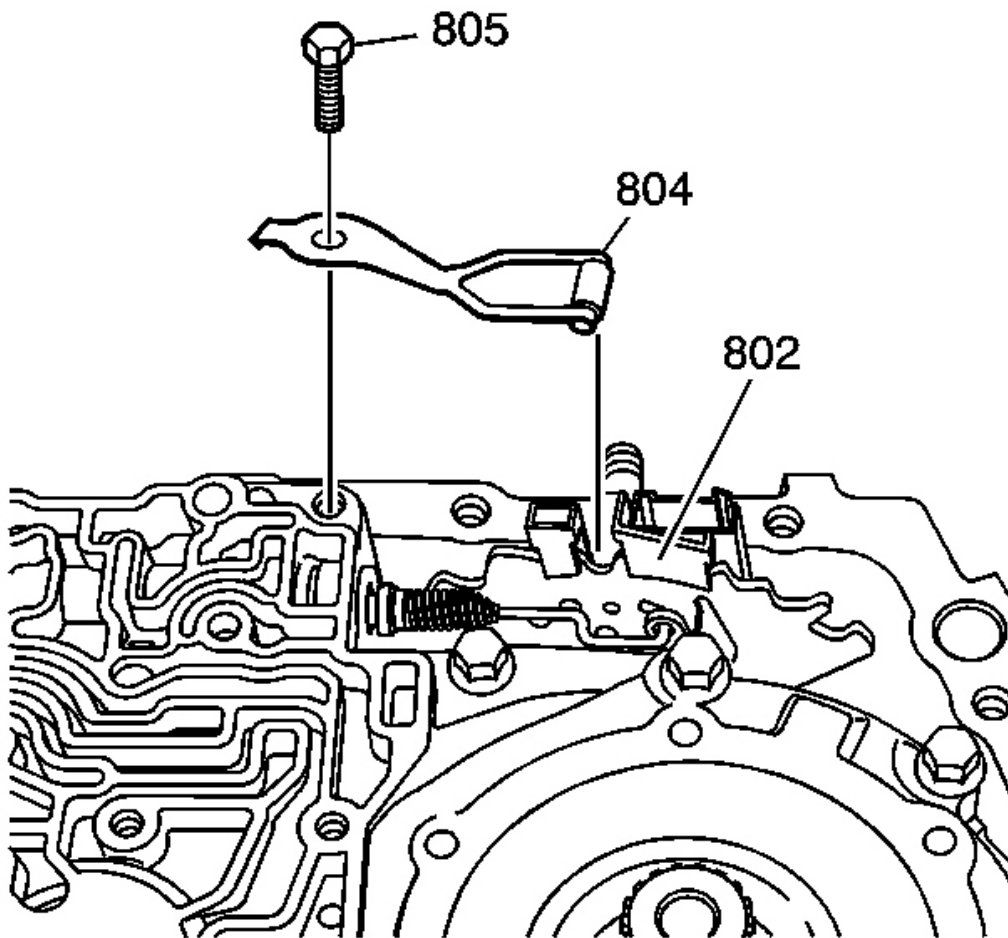


Fig. 72: Locating Manual Shift Detent Assembly
Courtesy of GENERAL MOTORS CORP.

1. Remove the manual shift detent bolt (805).
2. Remove the manual shift detent assembly (804).

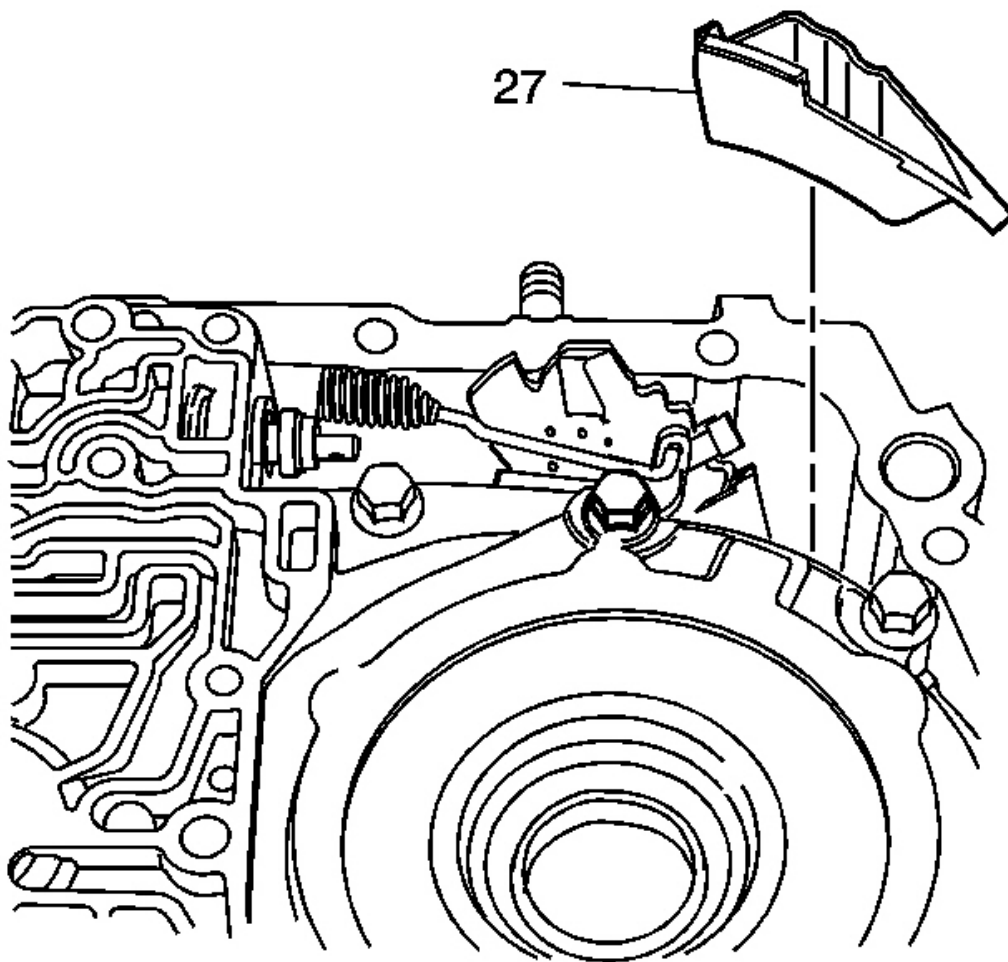


Fig. 73: View Of Oil Dam

Courtesy of GENERAL MOTORS CORP.

3. Compress the manual valve link spring (403) from the manual valve (404).
4. Lift the manual valve link (402) off of the manual valve (404).
5. Position the manual valve link (402) so that the valve will not interfere with the case cover removal.
6. Remove the oil dam (27) from the case.

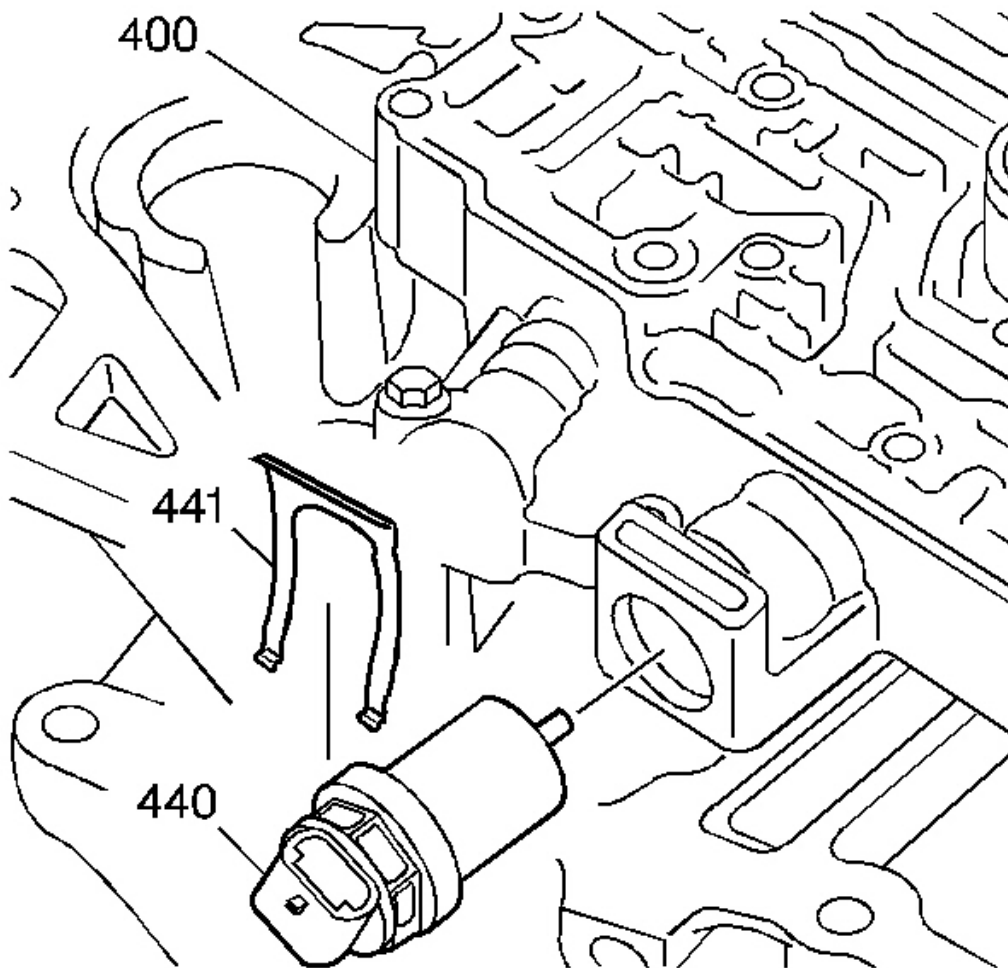


Fig. 74: View Of Input Speed Sensor
Courtesy of GENERAL MOTORS CORP.

7. Using a small screwdriver, pry the input speed sensor clip (441) out of the case cover (400).

IMPORTANT: Handle the speed sensor carefully.

8. Carefully pull the input speed sensor (440) out of the case cover (400).

DRIVE AXLE OIL SEAL REMOVAL - LEFT SIDE

Tools Required

- **J 23129** Seal Remover
- **J 6125-1B** Slide Hammer

Removal Procedure

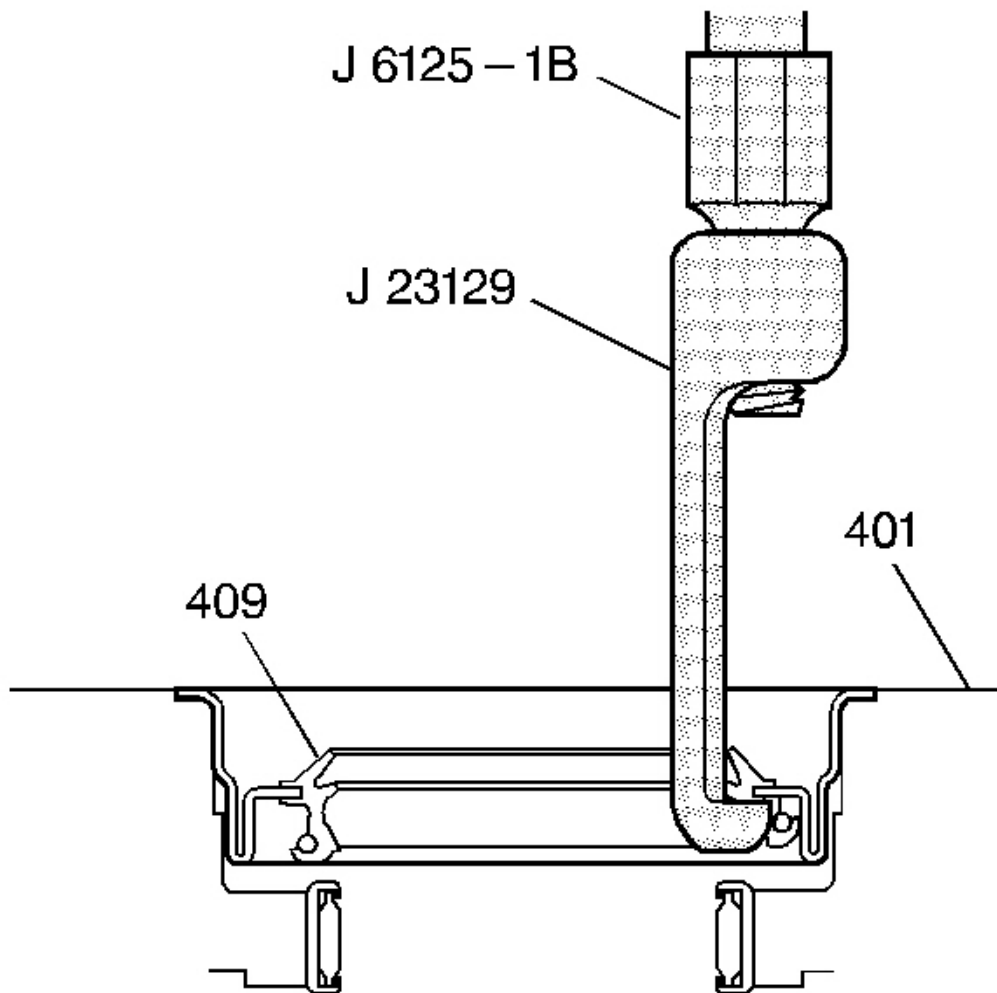


Fig. 75: Removing Left Front Wheel Drive Shaft Oil Seal
Courtesy of GENERAL MOTORS CORP.

Use **J 23129** and **J 6125-1B** in order to remove the axle oil seal assembly (409) from the case cover (401).

CASE COVER REMOVAL

Tools Required

J44538 Torx® 30+. See **Special Tools**.

Removal Procedure

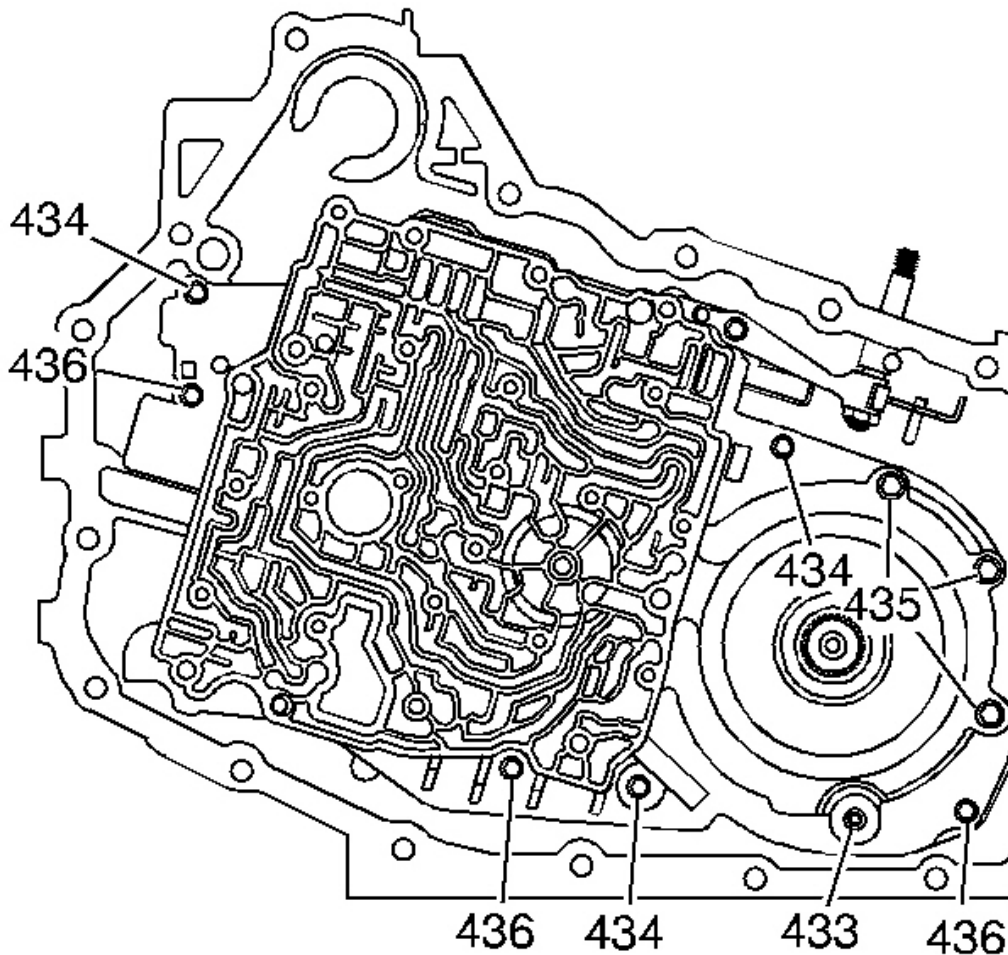


Fig. 76: Identifying Transaxle Case Cover Bolts Locations
Courtesy of GENERAL MOTORS CORP.

1. Remove the indicated case cover bolts (434-436).

2. Use **J44538** to remove case cover bolt (433). See **Special Tools**.

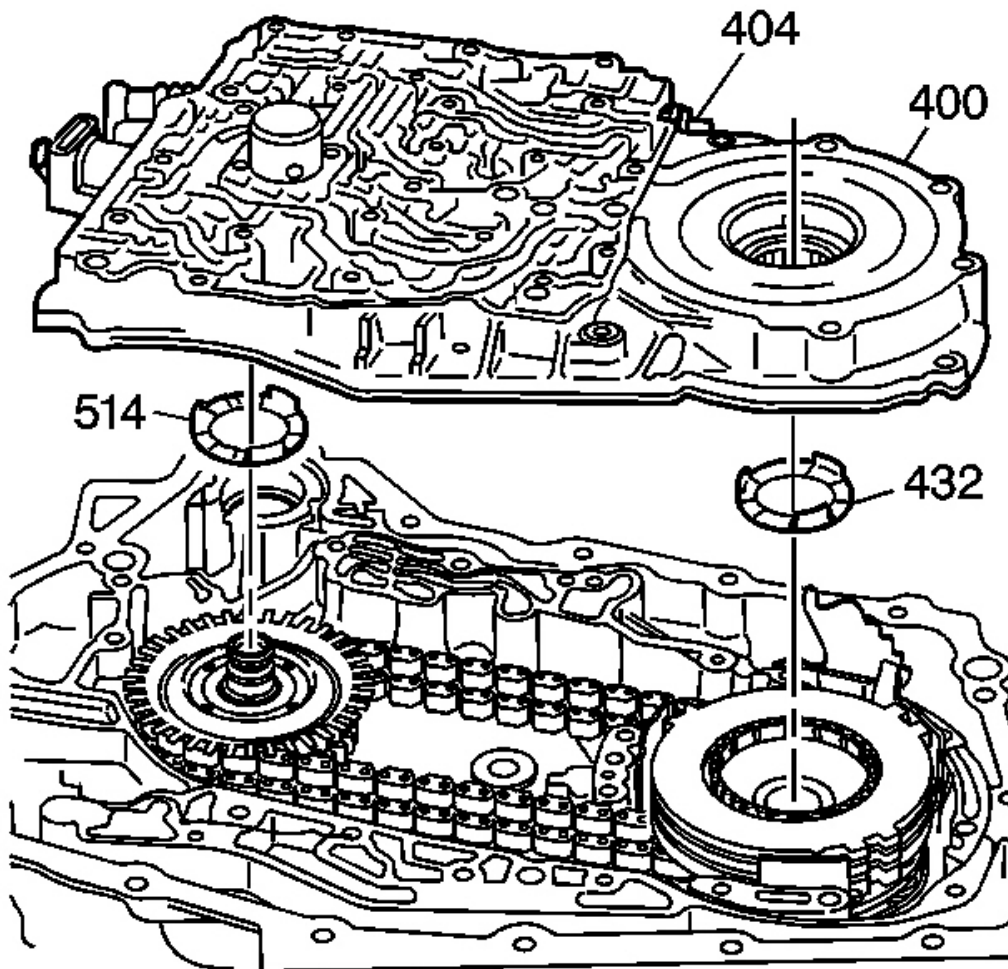


Fig. 77: Identifying Fourth Clutch Shaft Thrust Washer & Drive Sprocket/Case Cover Thrust Washer
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Be sure to hold the manual valve (404) in place.

3. Lift the case cover assembly (400) off of the case.
4. Remove the thrust washer (432).

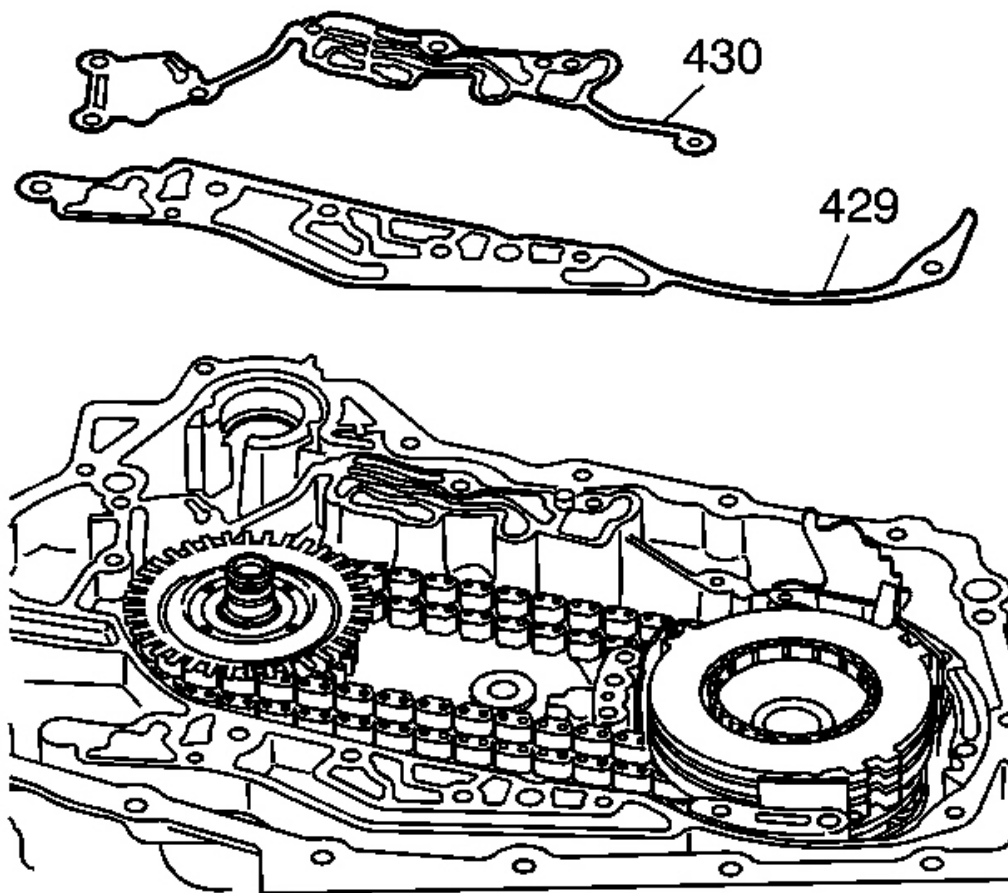


Fig. 78: View Of Case Cover Upper & Lower Gasket
Courtesy of GENERAL MOTORS CORP.

5. Remove the upper (430) and the lower (429) case cover gaskets.

FOURTH CLUTCH COMPONENTS REMOVAL

Removal Procedure

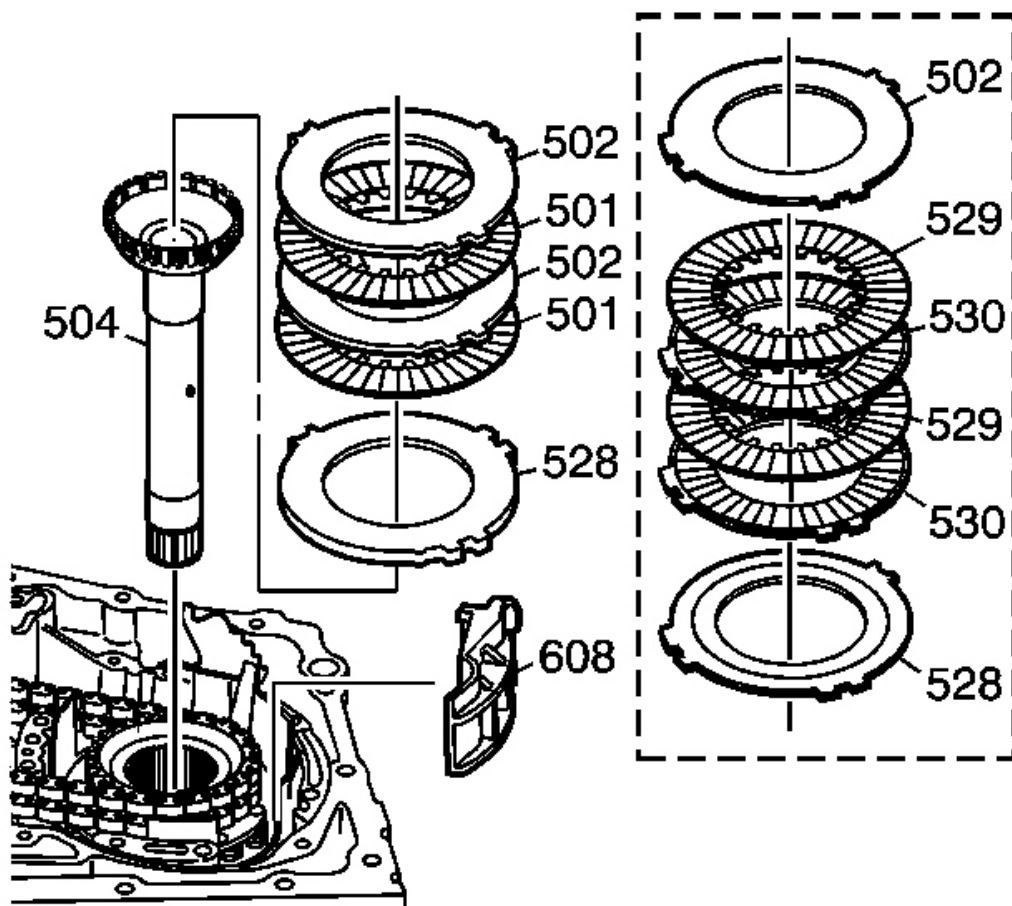


Fig. 79: Identifying Fourth Clutch Components
Courtesy of GENERAL MOTORS CORP.

1. Remove the fourth clutch fiber and steel plates (501, 502) or (529, 530), some models.
2. Remove the fourth clutch apply plate (528).
3. Remove the fourth clutch shaft assembly (504).
4. Remove the drive link lube scoop (608).

DRIVE LINK STRETCH CHECK

Checking Procedure

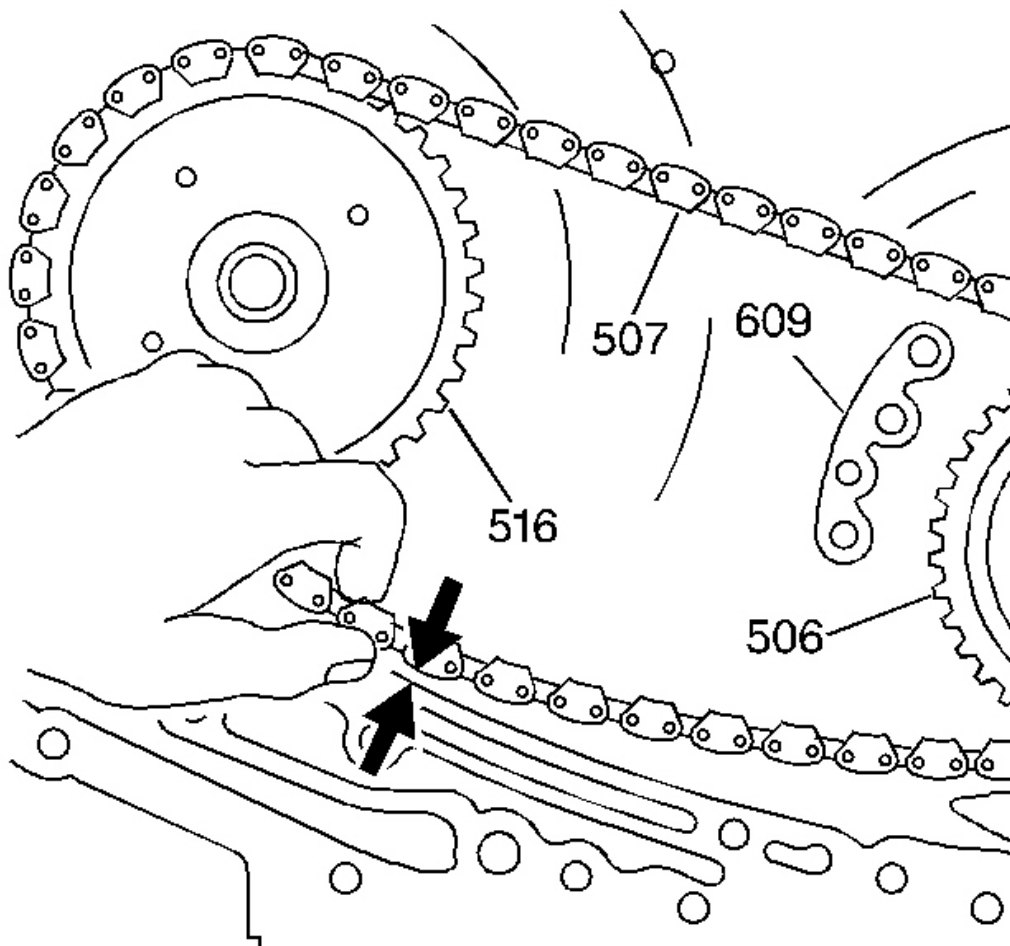


Fig. 80: Measuring Drive Link Stretch
Courtesy of GENERAL MOTORS CORP.

1. Make sure that the driven sprocket support (609) and both sprockets (506, 516) are fully seated.
2. Pull the drive link assembly (507) toward the case at the indicated location.
3. Measure the distance between the case and the drive link assembly (507):
 - If the measurement is 3.2 mm (1/8 in) or greater, reuse the drive link assembly (507).
 - If the measurement is less than 3.2 mm (1/8 in), replace the drive link assembly (507).

DRIVE SPROCKET, DRIVEN SPROCKET AND DRIVE LINK REMOVAL

Removal Procedure

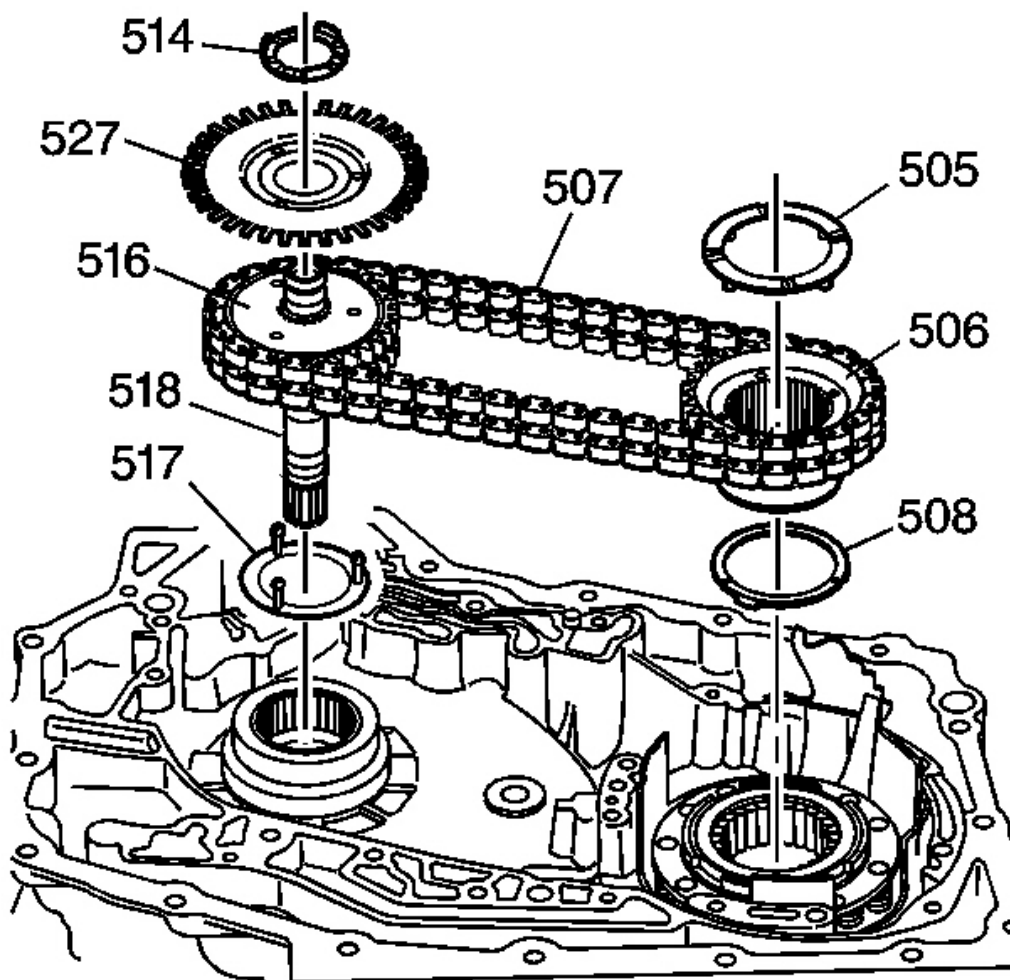


Fig. 81: View Of Drive Sprocket, Driven Sprocket and Drive Link Components
Courtesy of GENERAL MOTORS CORP.

1. Remove the fourth clutch shaft thrust washer (505).
2. Remove the drive sprocket thrust washer (514). It may be stuck to the case cover
3. Remove the speed sensor reluctor wheel (527).
4. Note the location of the master link on the drive link assembly (507).
 - It is the one link that is a different color than the rest.

- It may be facing up or down towards the case.
 - The drive link assembly (507) must be in the same position during assembly.
5. Lift the drive and driven sprockets (516, 506) with the drive link assembly (507) out of the case.
 - Lift both sides evenly
 - It may be necessary to tap the turbine shaft (518) up gently with a rubber mallet
 6. Remove the drive and driven sprocket thrust washers (517, 508). They may be stuck to the sprockets

DRIVEN SPROCKET SUPPORT ASSEMBLY REMOVAL

Removal Procedure

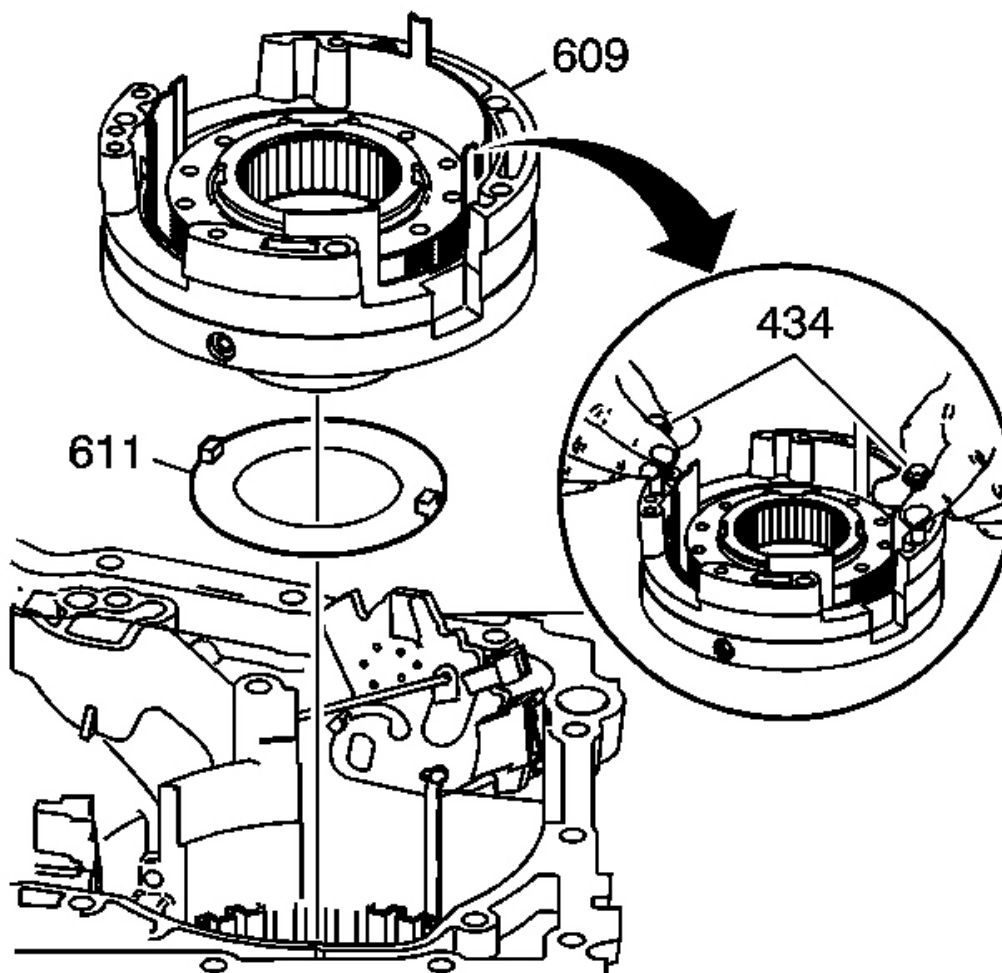


Fig. 82: Identifying Driven Sprocket Support Assembly
Courtesy of GENERAL MOTORS CORP.

1. With your fingers, insert two 13 mm channel plate bolts (434) into the driven sprocket support assembly (609).
2. Grasp the bolts and lift the support assembly from the case.
3. Remove the thrust washer (611) from the second clutch housing. The washer may be stuck to the support assembly.

SECOND CLUTCH AND INPUT CLUTCH REMOVAL

Tool Required:

J 33381-A Clutch Assembly Remover/Installer. See **Special Tools**.

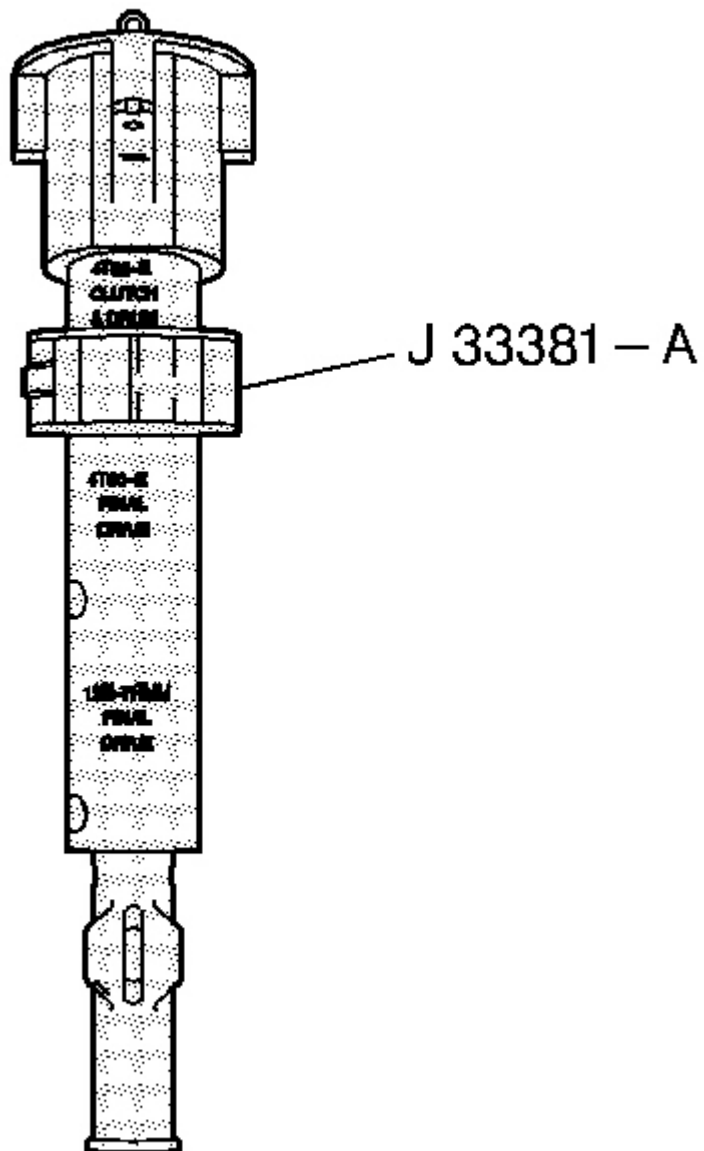
Removal Procedure

Fig. 83: View Of J 33381-A
Courtesy of GENERAL MOTORS CORP.

1. Adjust the collar on tool **J 33381-A** to the 4T65-E CLUTCH & DRUM setting. See **Special Tools**. Make sure that the threaded rod is fully loosened.

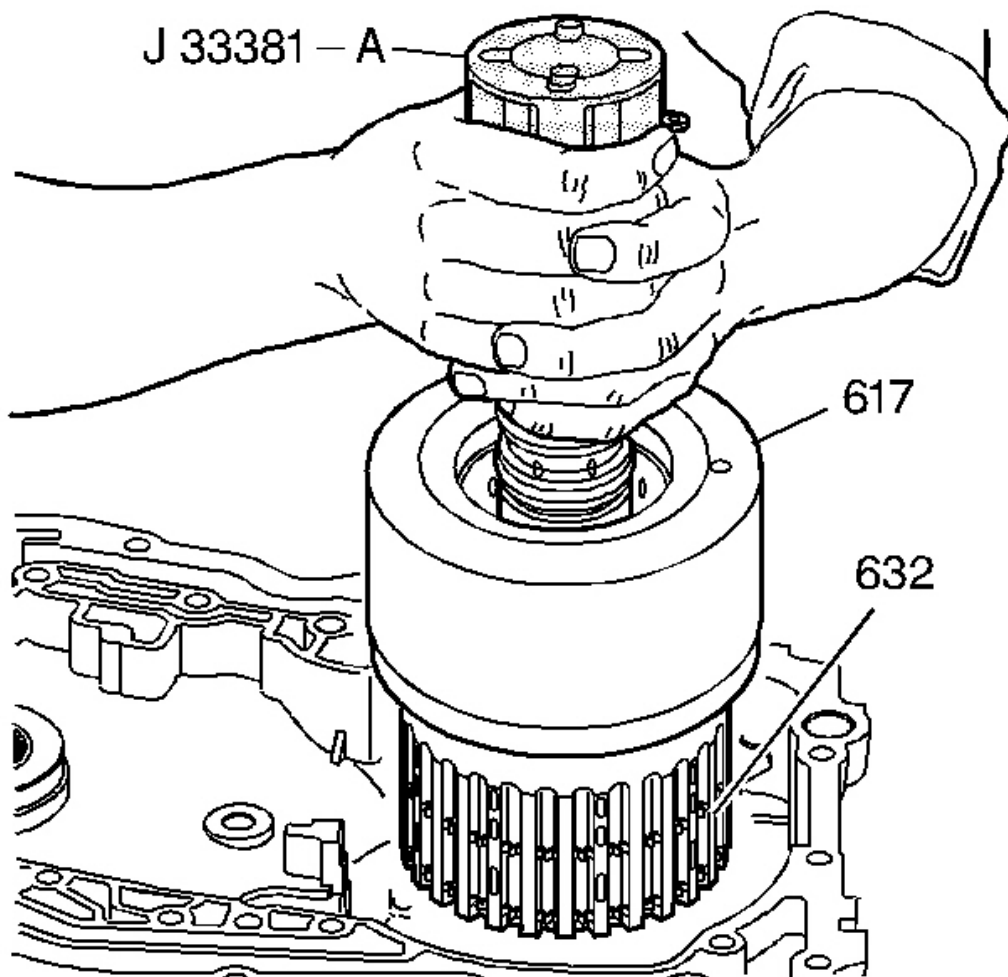


Fig. 84: Installing J 33381-A Onto Input Clutch Housing Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install **J 33381-A** into the second clutch housing assembly (617). See **Special Tools**.
3. Tighten the threaded rod of **J 33381-A** until the rod is finger tight. See **Special Tools**.

4. Lift up **J 33381-A** with the second clutch housing (617) and the input clutch housing (632) attached. See **Special Tools**. The sprag clutch assemblies will also be attached.
5. Place the complete assembly on the bench.
6. Loosen the threaded rod of **J 33381-A** . See **Special Tools**.
7. Remove **J 33381-A** from the assembly. See **Special Tools**.

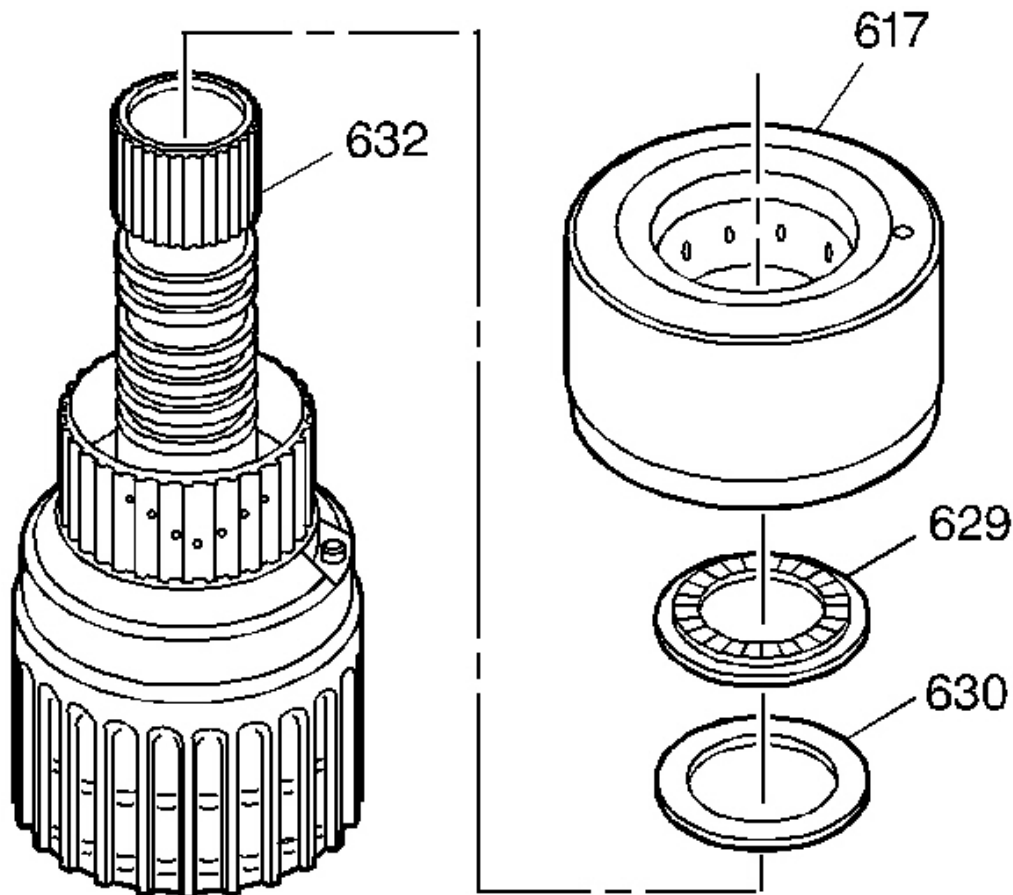


Fig. 85: Identifying Second Clutch Housing & Input Clutch Components
 Courtesy of GENERAL MOTORS CORP.

8. Lift the second clutch housing (617) off of the input clutch housing.
9. Remove the input clutch housing thrust bearing (629) from the input housing.

10. Remove the selective thrush washer (630) from the input clutch housing (632).

REVERSE BAND REMOVAL

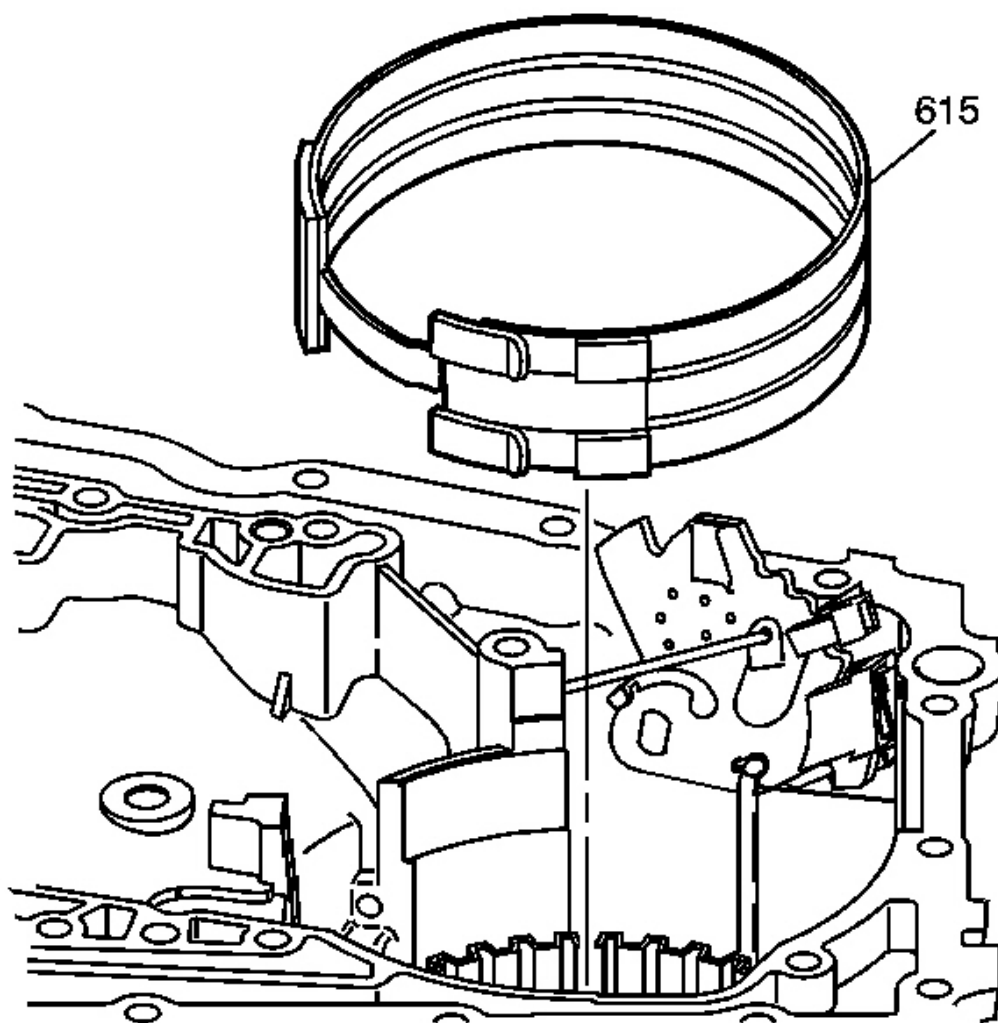


Fig. 86: View Of Reverse Band Assembly
Courtesy of GENERAL MOTORS CORP.

Tilt the band in order to disengage the band from the anchor pin in the case. Remove the reverse band assembly (615).

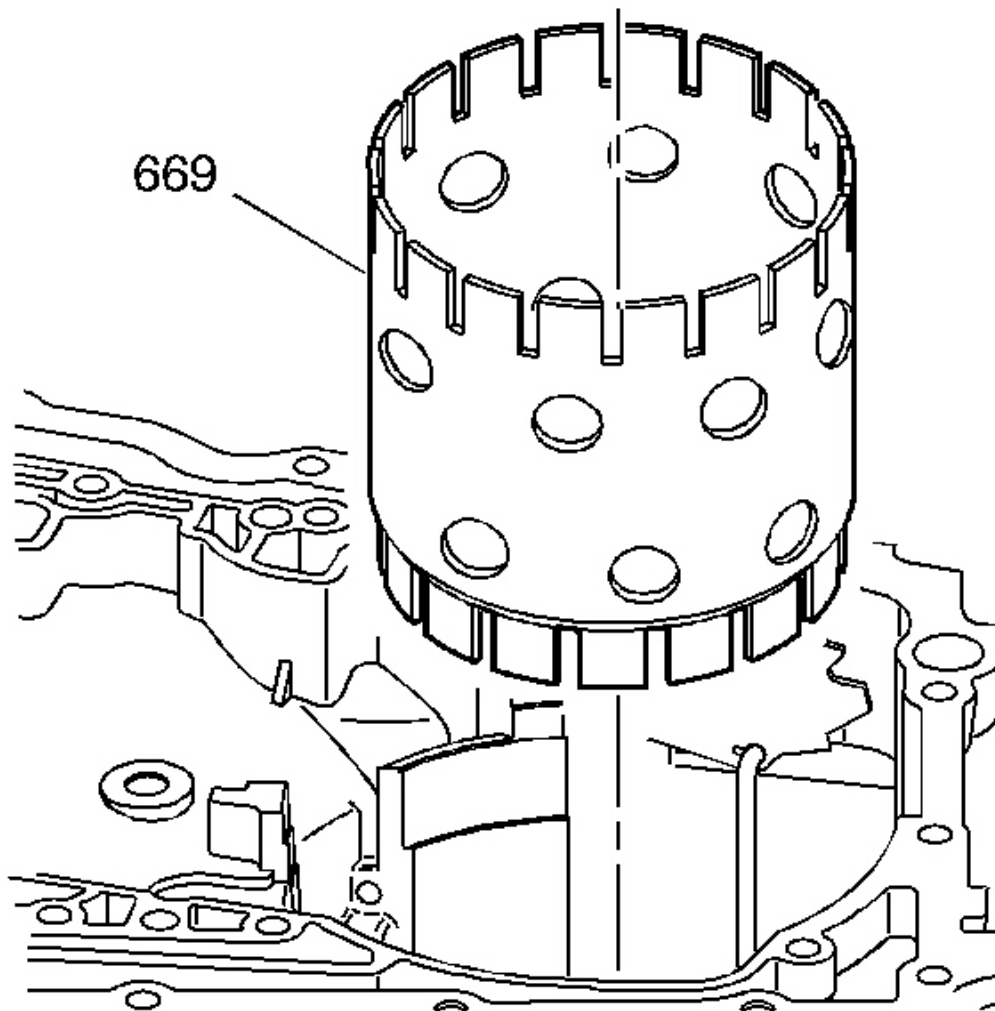
REVERSE REACTION DRUM REMOVAL

Fig. 87: View Of Reverse Reaction Drum
Courtesy of GENERAL MOTORS CORP.

Remove the reverse reaction drum (669).

CASE EXTENSION ASSEMBLY REMOVAL**Removal Procedure**

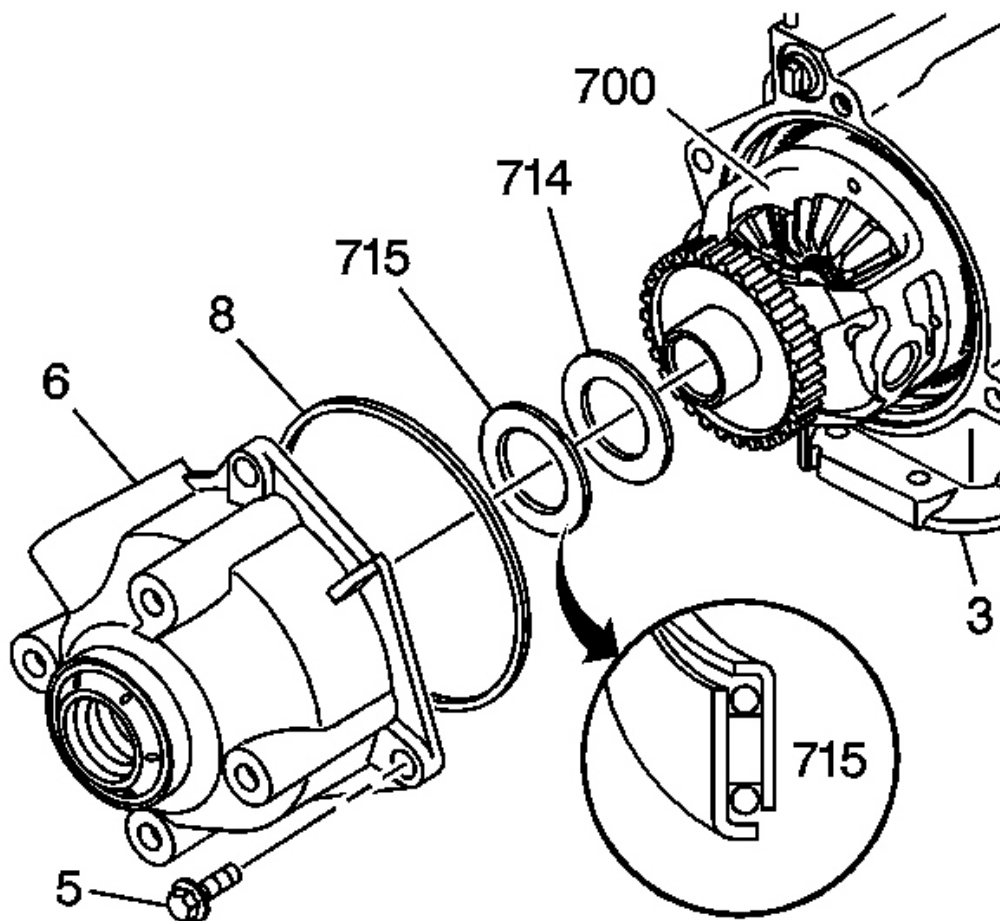


Fig. 88: Locating Differential/Final Drive Carrier Assembly Thrust Bearing
Courtesy of GENERAL MOTORS CORP.

1. Remove the two case extension bolts (5).
2. Remove the case extension assembly (6) and remove the seal (8).
3. Remove the differential carrier thrust washer (715).
4. Remove the differential carrier thrust bearing (714).

DIFFERENTIAL CARRIER AND COMPONENTS REMOVAL

Removal Procedure

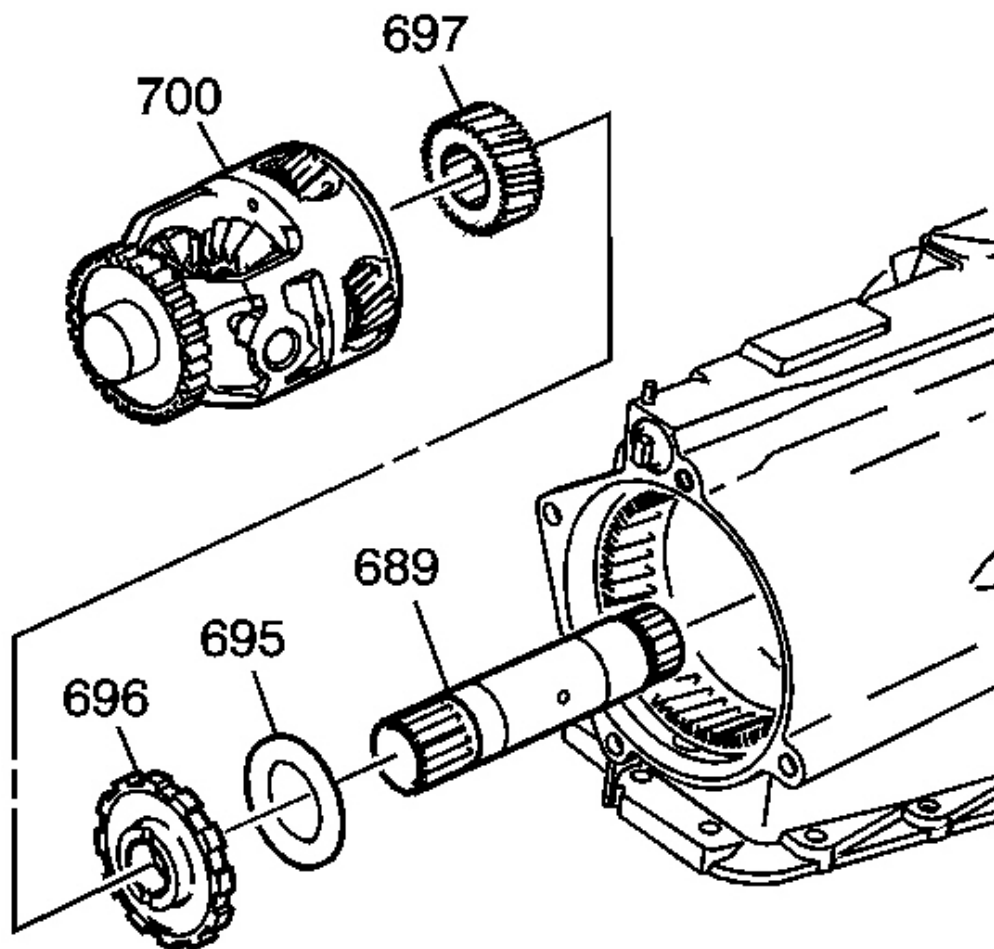


Fig. 89: View Of Differential Assembly
Courtesy of GENERAL MOTORS CORP.

1. Remove the differential carrier assembly (700).
2. Remove the differential carrier sun gear (697).
3. Remove the park gear (696).
4. Remove the thrust bearing (695) from the differential carrier internal gear.
5. Remove the shaft differential carrier sun gear (689).

INPUT AND REACTION CARRIER REMOVAL

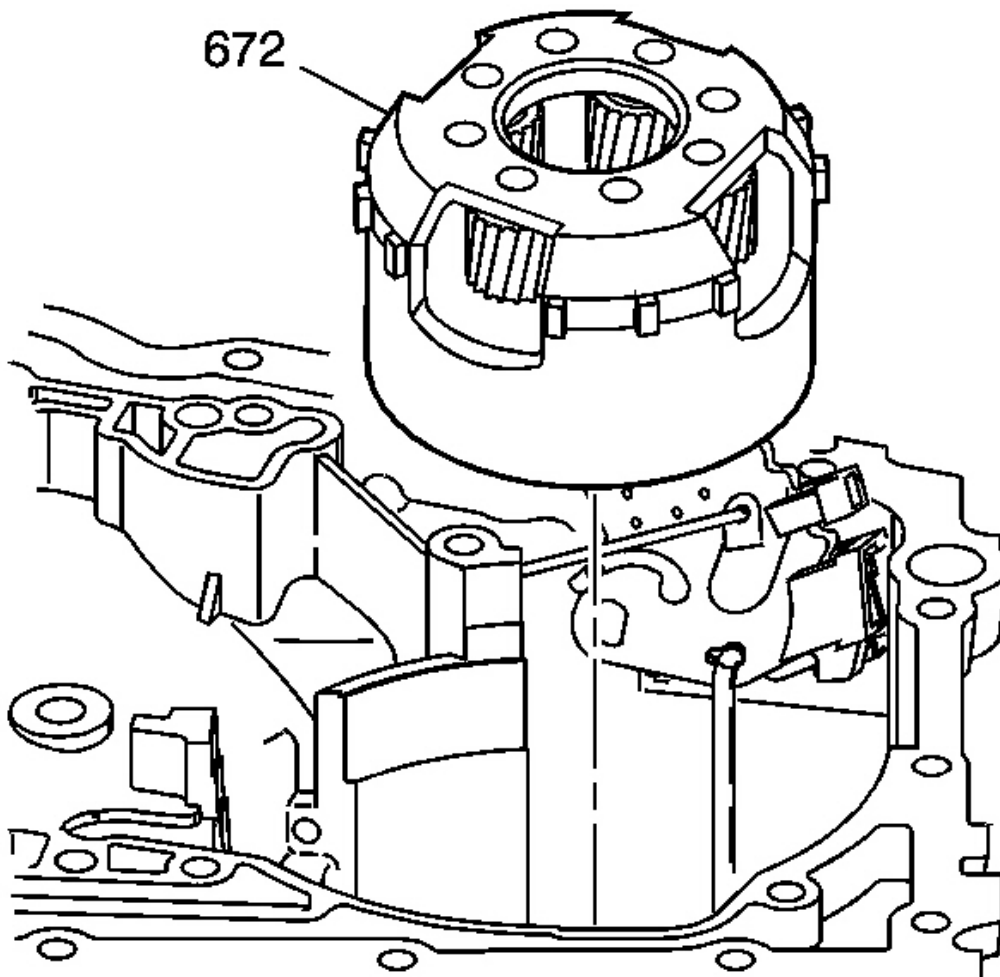
Removal Procedure

Fig. 90: Identifying Input Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

1. Position the transmission so that the case cover joint is facing upward.
2. Remove the input carrier assembly (672).

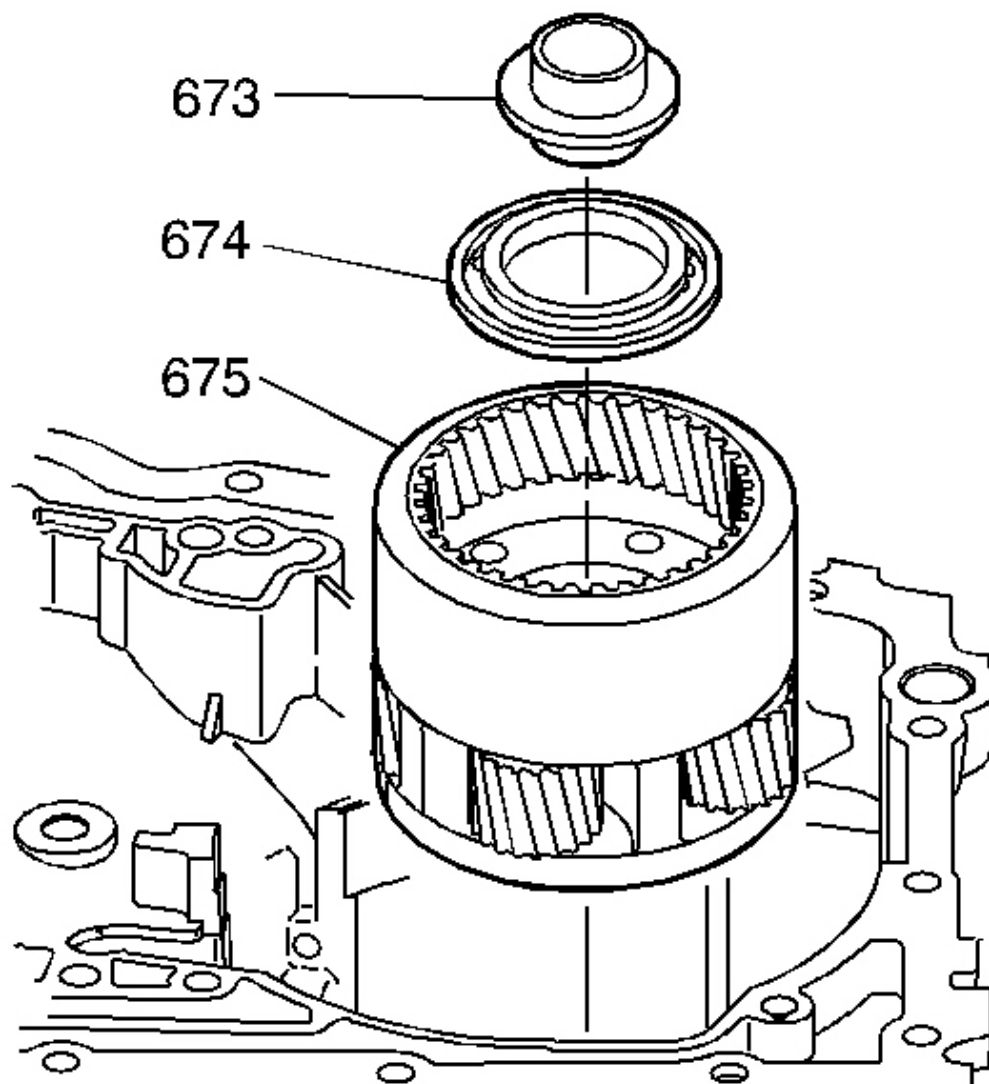


Fig. 91: Locating Reaction Carrier Lube Dam & Thrust Bearing
Courtesy of GENERAL MOTORS CORP.

3. Remove the input carrier, reaction carrier lube dam (673). The dam may be stuck to the input carrier assembly.
4. Remove the thrust bearing (674) from the reaction carrier.
5. Remove the reaction carrier assembly (675).

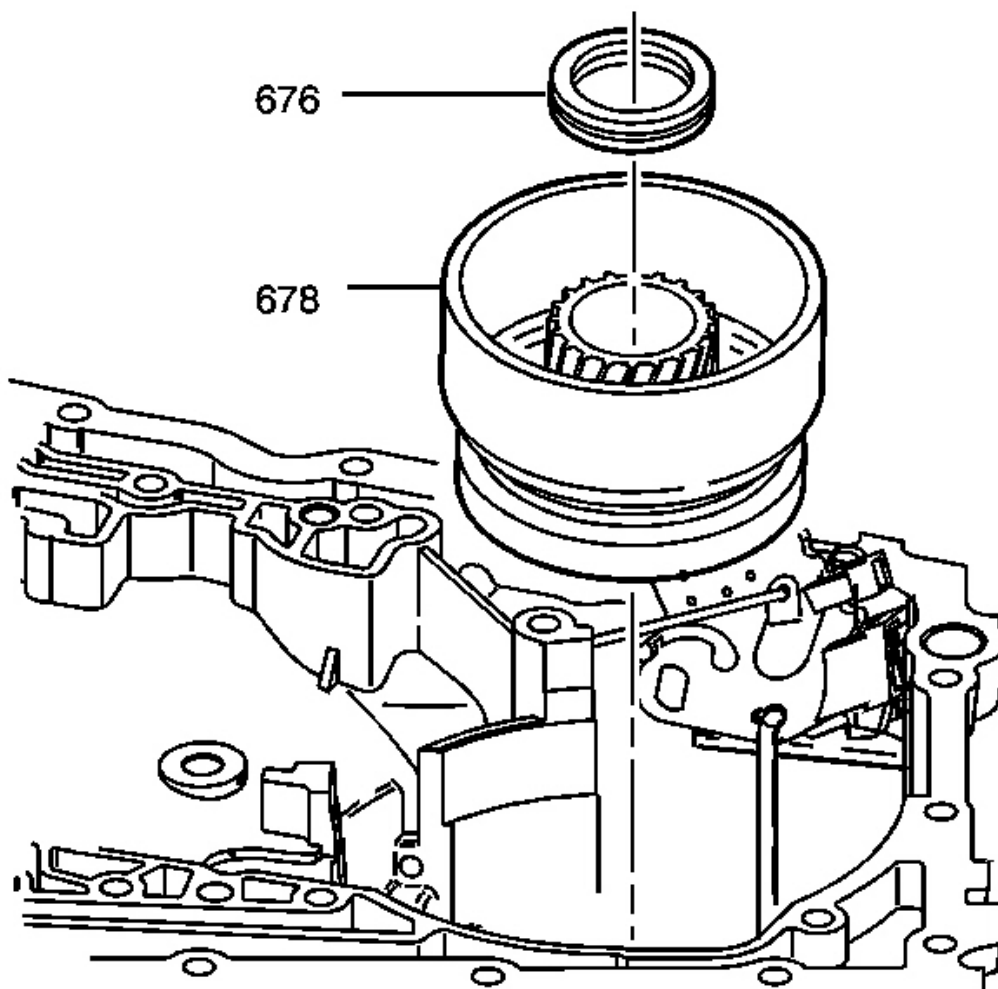
REACTION SUN GEAR AND MANUAL 2-1 BAND REMOVAL**Removal Procedure**

Fig. 92: Identifying Reaction Sun Gear Assembly & Thrust Bearing
Courtesy of GENERAL MOTORS CORP.

1. Remove the thrust bearing (676) from the reaction sun gear.
2. Remove the reaction sun gear assembly (678).

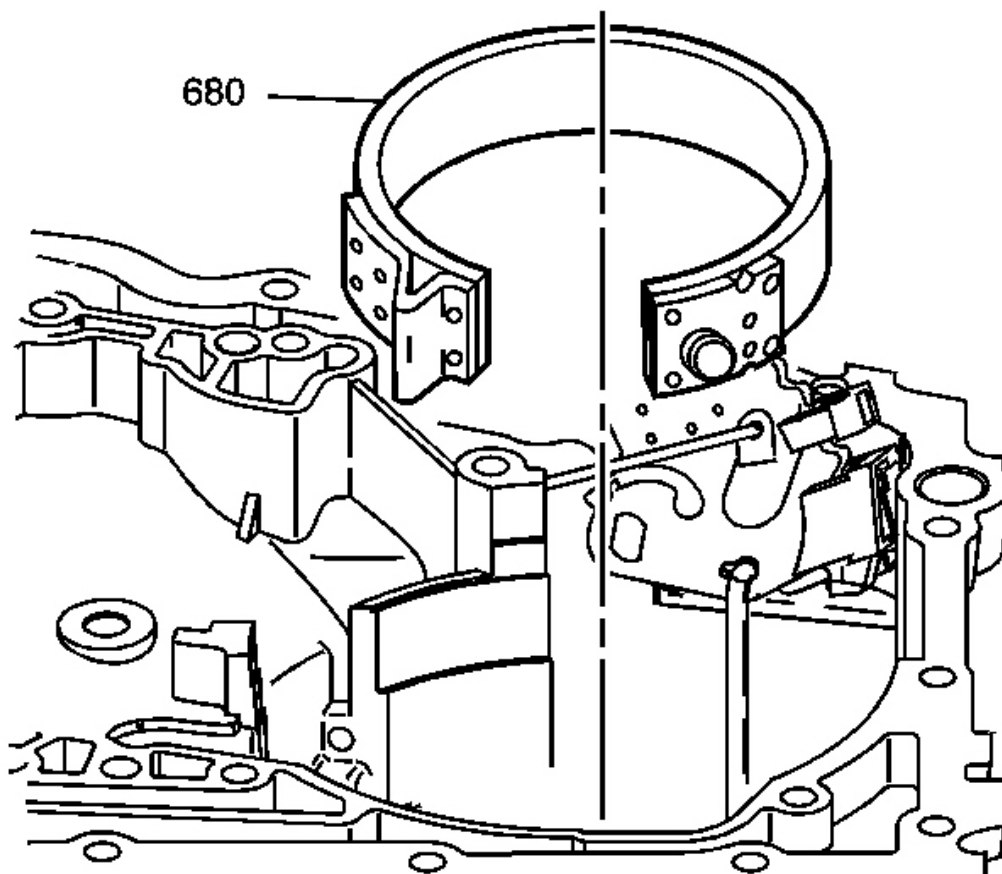


Fig. 93: View Of Manual 2-1 Band Assembly
Courtesy of GENERAL MOTORS CORP.

3. Tilt the band in order to disengage the manual 2-1 band assembly (680) from the anchor pin. Remove the manual 2-1 band assembly from the case.

1-2 SUPPORT DRUM AND FORWARD BAND REMOVAL

Tools Required

J 38358-A 1-2 Support Remover and Installer

Removal Procedure

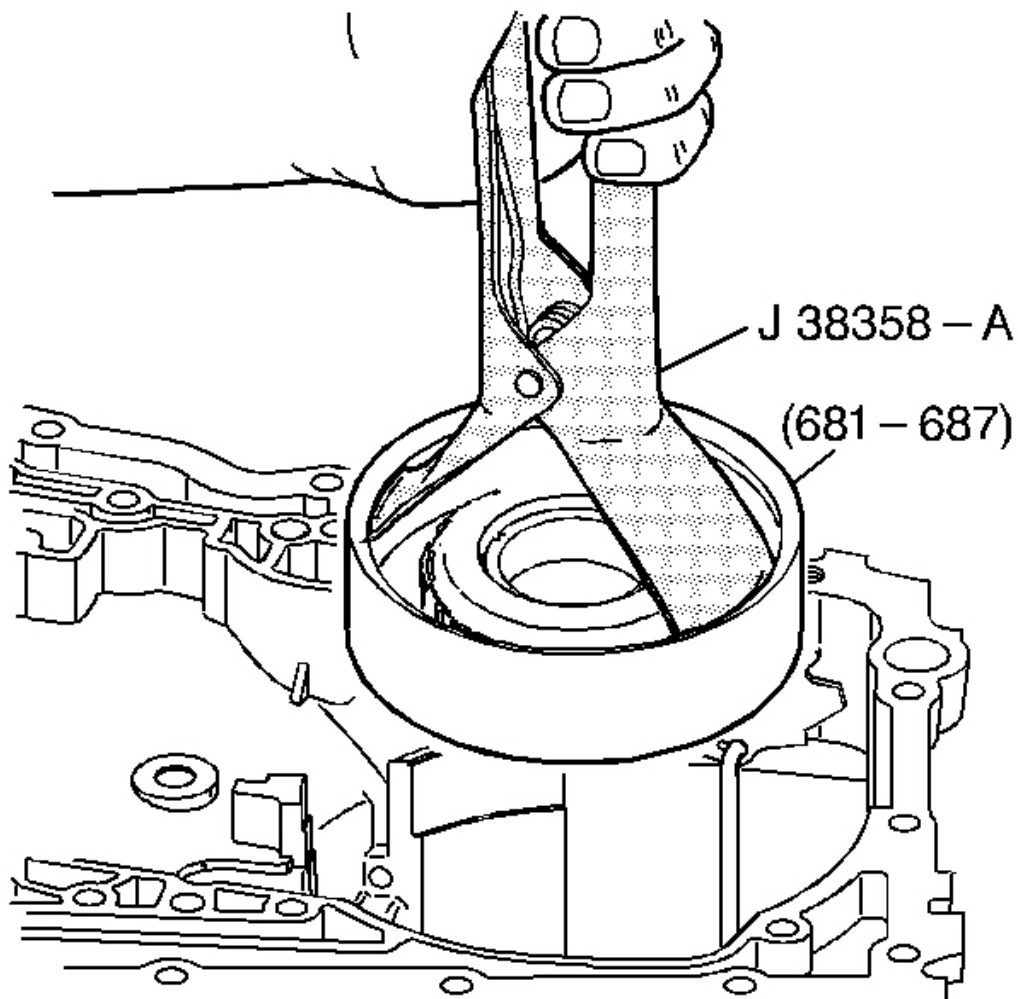


Fig. 94: Removing 1-2 Support Drum Out Of The Case Using J 38358-A
Courtesy of GENERAL MOTORS CORP.

1. Install **J 38358-A** onto the 1-2 support drum assembly (681-687).
2. Lift **J 38358-A** with the 1-2 support drum out of the case.

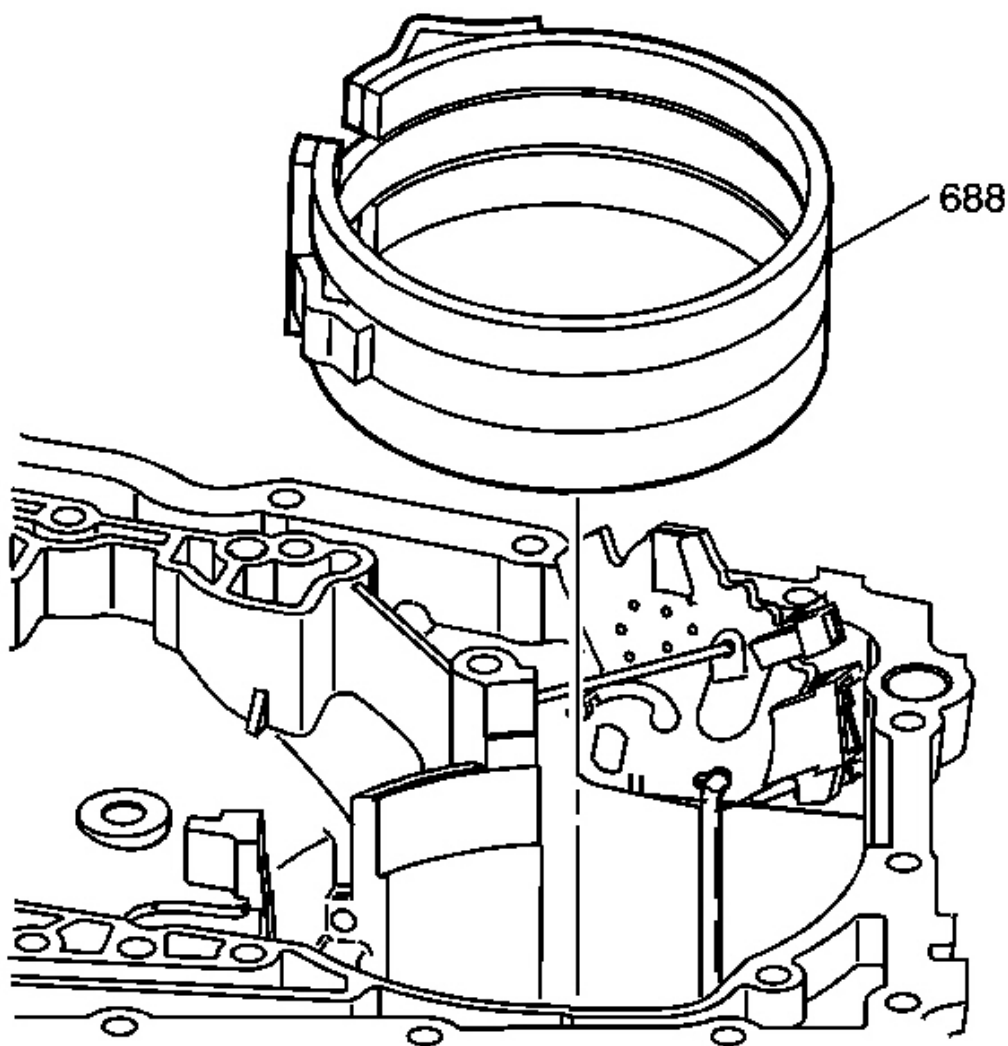


Fig. 95: Locating Forward Band Assembly
Courtesy of GENERAL MOTORS CORP.

3. Tilt the forward band assembly (688) in order to disengage the band from the anchor pin in the case. Remove the forward band assembly.

DIFFERENTIAL CARRIER INTERNAL GEAR REMOVAL

Tools Required

J 28585 Snap Ring Remover

Removal Procedure

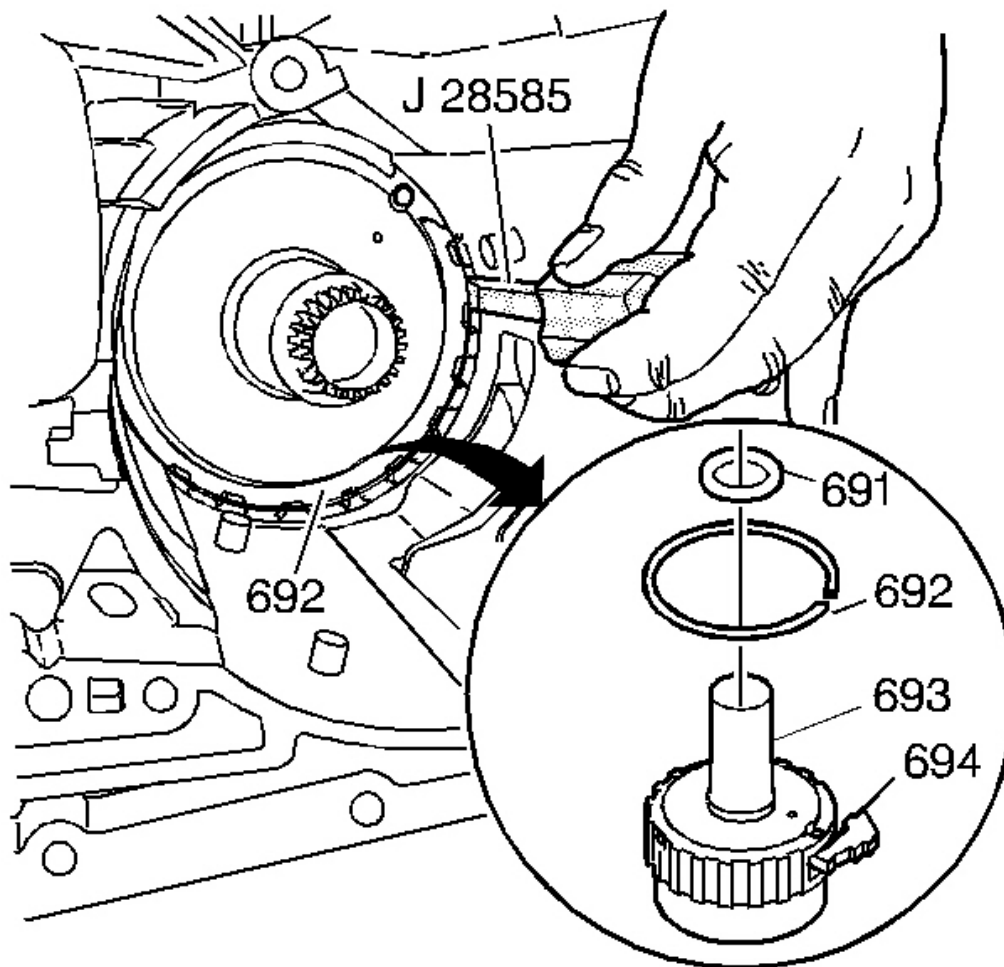


Fig. 96: View Of Differential Carrier Internal Gear Snap Ring & Thrust Washer
Courtesy of GENERAL MOTORS CORP.

1. Remove the bearing (691) from the differential carrier internal gear.
2. Use **J 28585** or a large screwdriver in order to remove the differential carrier internal gear snap ring (692).

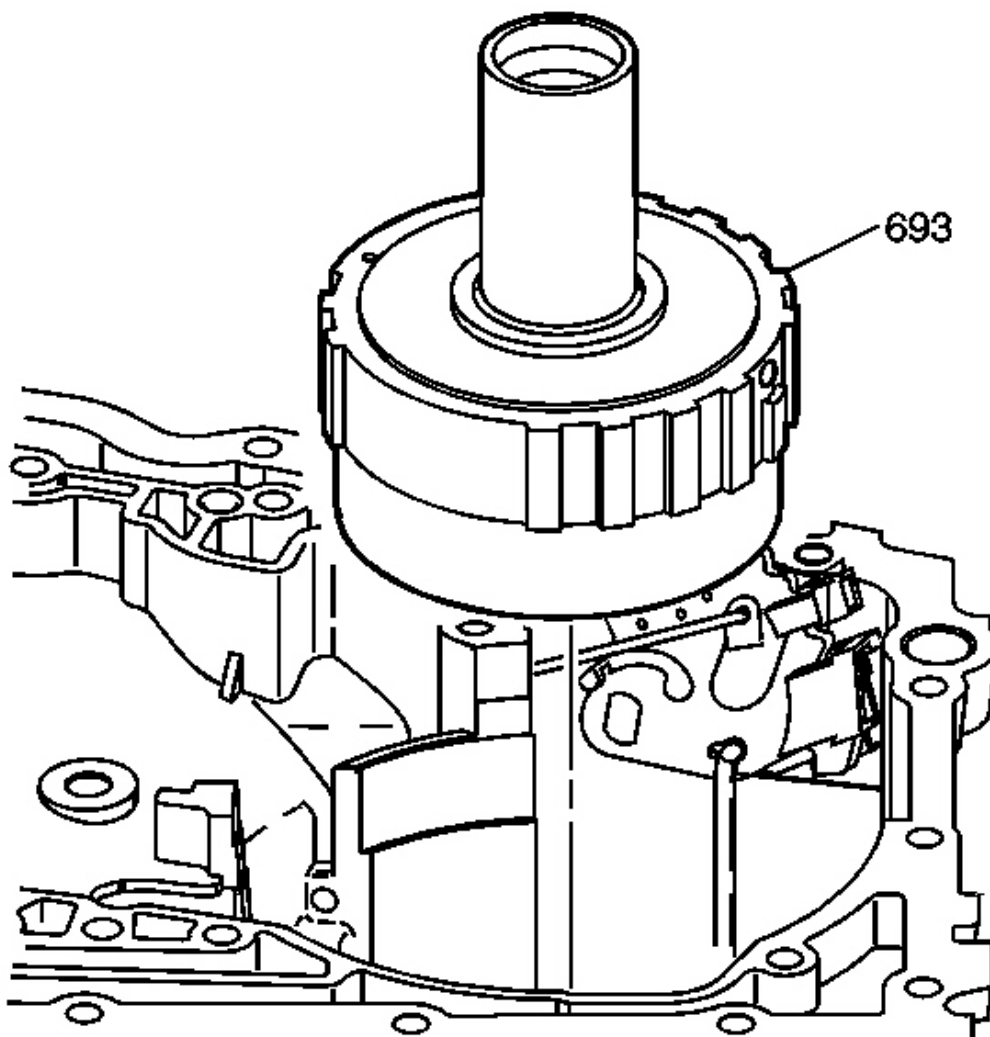


Fig. 97: Removing Differential Carrier Internal Gear Assembly
Courtesy of GENERAL MOTORS CORP.

3. Lift the differential carrier internal gear assembly (693) out of the case by depressing the park pawl assembly in order to clear the case.

MANUAL SHIFT SHAFT POSITION (INTERNAL MODE) SWITCH AND PARKING SYSTEM COMPONENTS REMOVAL

Removal Procedure

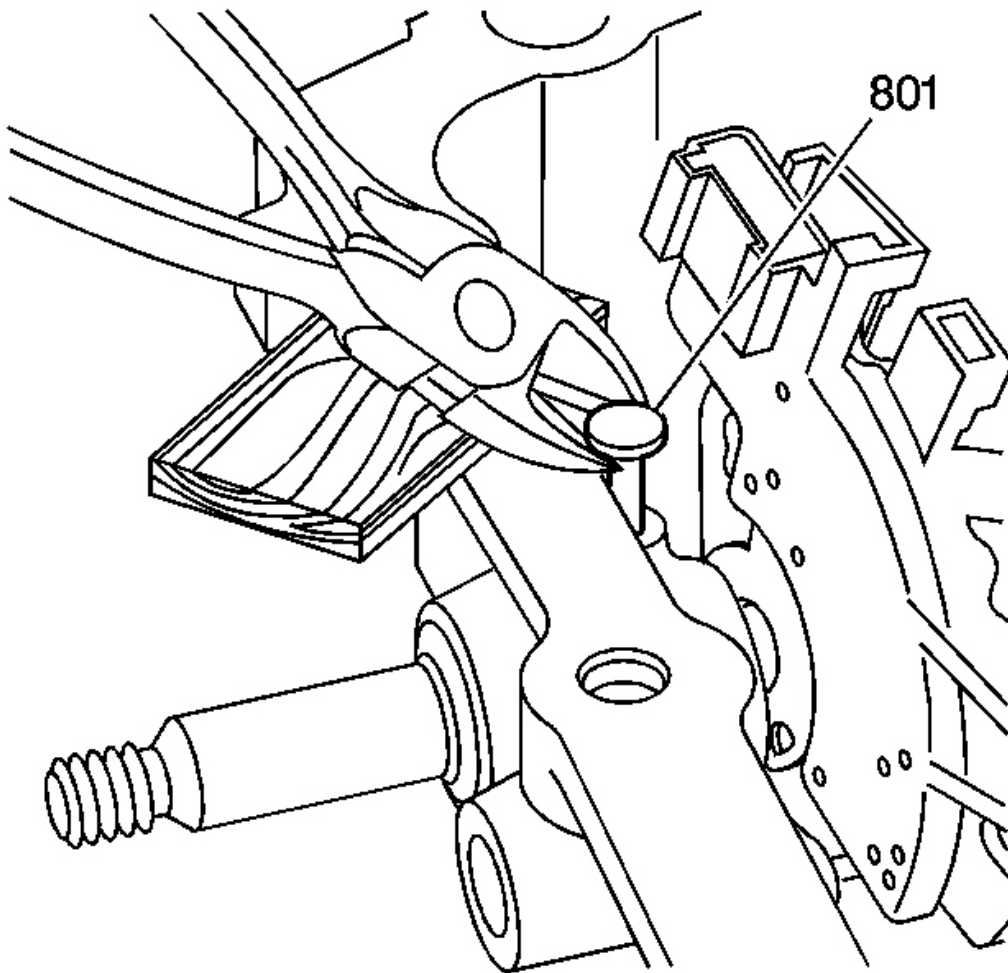


Fig. 98: Removing Manual Shift Shaft Pin
Courtesy of GENERAL MOTORS CORP.

NOTE: Use a piece of wood or rubber when prying with side cutters to remove the manual shaft pin, to prevent damage to the case.

1. Use side cutting pliers in order to remove the manual shift shaft pin (801).

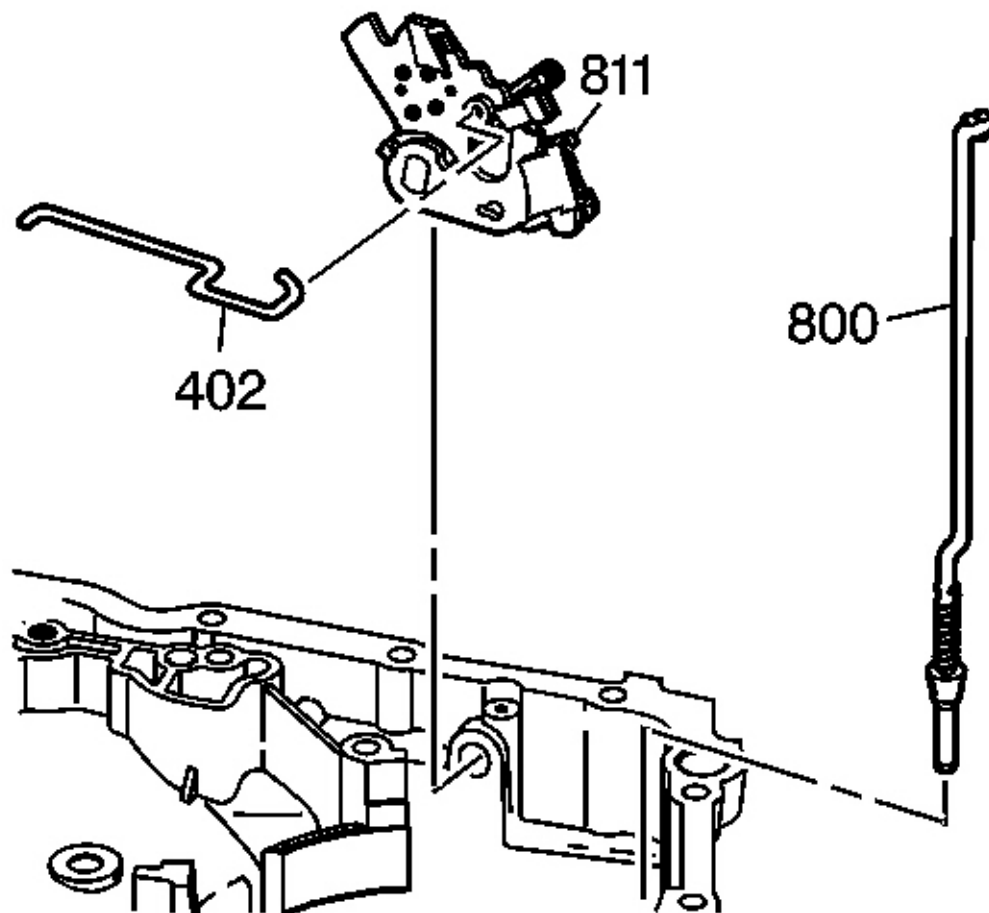


Fig. 99: Removing IMS/Detent Lever Assembly & Park Pawl Actuator Assembly
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the manual valve link (402) from the IMS/detent lever assembly (811).

IMPORTANT: The IMS/detent lever (811) should be removed as an assembly.

3. Remove the internal mode switch (IMS)/detent lever (811) and remove the park pawl actuator assembly (800).

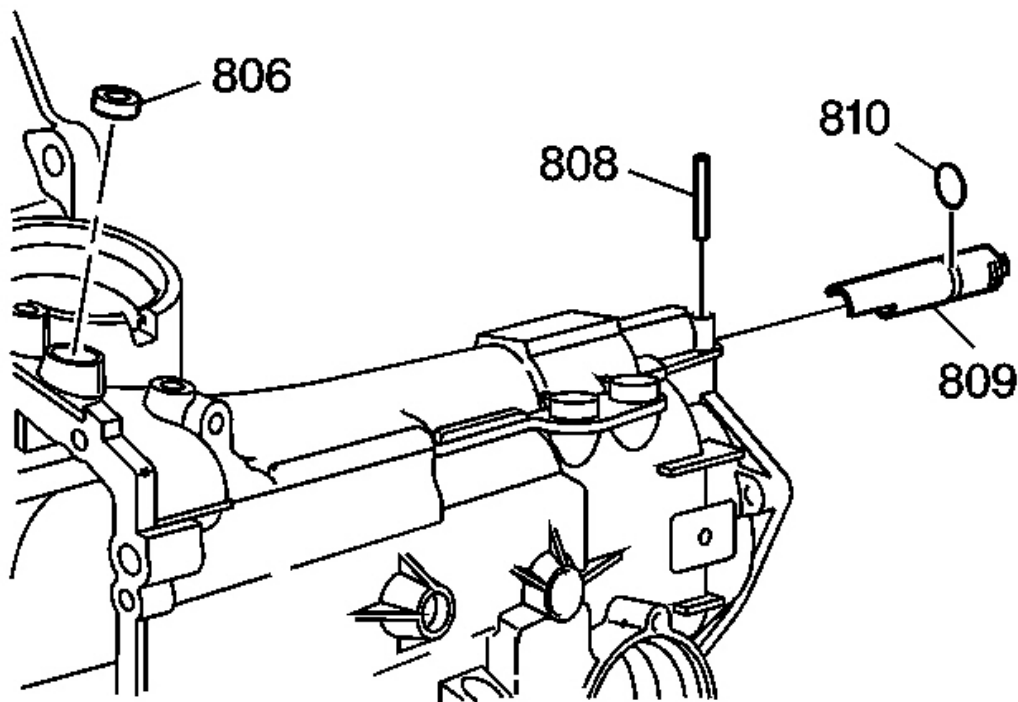


Fig. 100: Locating Park Pawl Actuator Components
Courtesy of GENERAL MOTORS CORP.

4. Position the transmission so that the reverse band servo bore is facing upward.
5. Use a small screwdriver in order to pry the manual shift shaft seal (806) from the case.
6. Remove the park pawl actuator guide pin (808).
7. Remove the park pawl actuator guide assembly (809) from the case.
8. Remove the actuator guide seal (810) from the guide.

CASE ASSEMBLY INSPECTION

Inspection Procedure

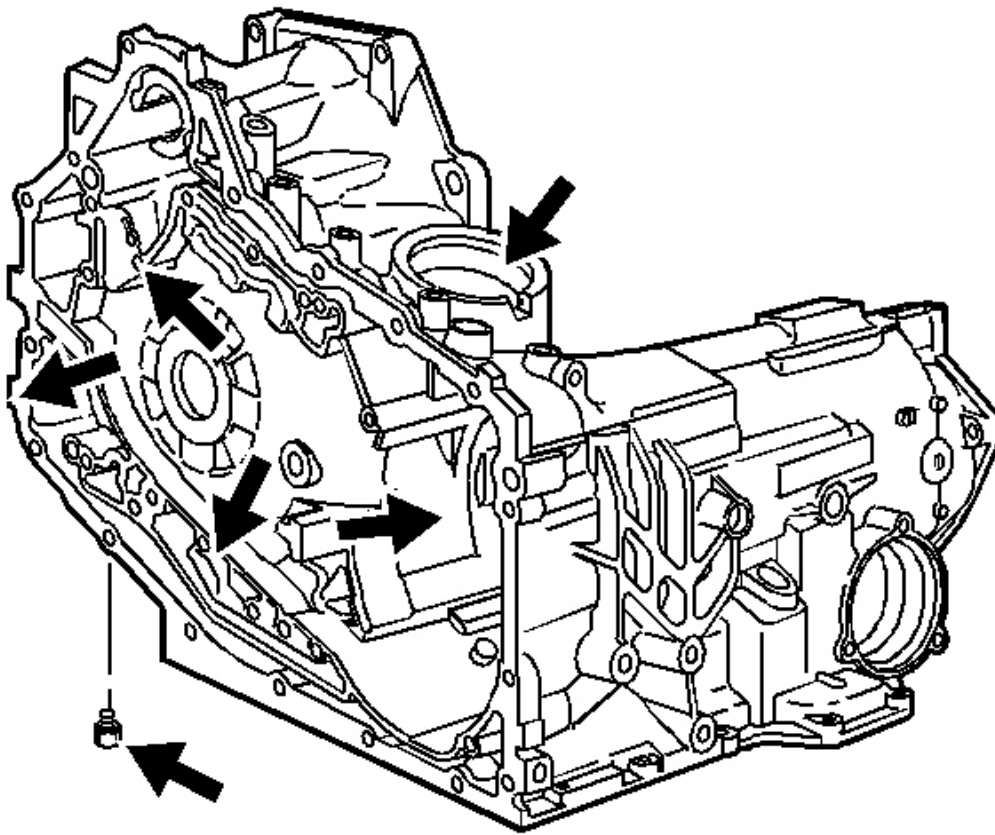


Fig. 101: Transmission Case Inspection Points
Courtesy of GENERAL MOTORS CORP.

1. Inspect the components that are still on the transmission case for the following conditions:
 - Loose, cross-threaded or damaged pipe fittings on the transmission oil cooler
 - A loose, missing or damaged transmission name plate
2. Inspect the transmission case for the following conditions:
 - Gasket sealing surfaces that are damaged or which have porosity
 - Bolt or screw holes that are stripped or damaged (repair with a thread insert)
 - Damaged or porous case oil passages
 - Damaged snap ring grooves or housing splines
 - Loose, missing or damaged band anchor pins

- Damaged or porous case surfaces
- Plugged drain back holes for the torque converter oil seal

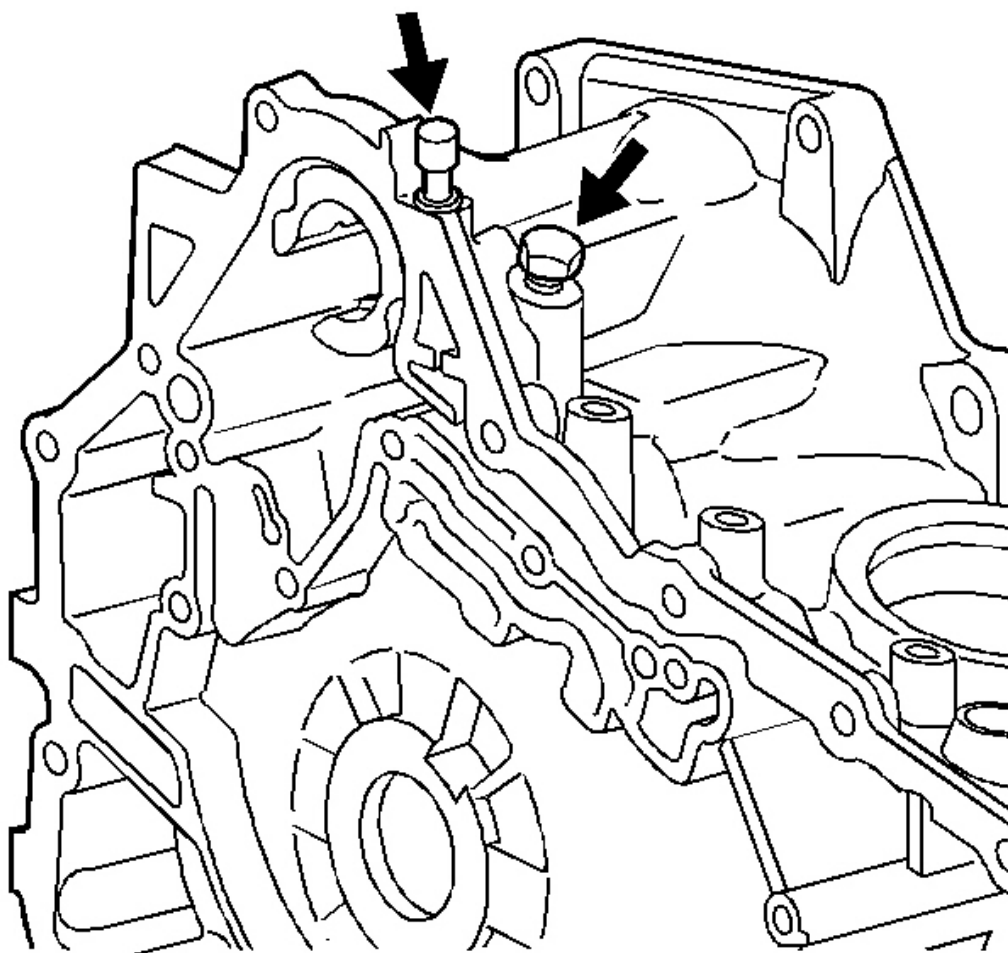


Fig. 102: View Of Vent Assembly & Oil Pressure Test Hole Plug
Courtesy of GENERAL MOTORS CORP.

3. Inspect the components that are still on the transmission case for the following conditions:
 - A loose, plugged or damaged transmission vent assembly
 - A loose, cross-threaded or damaged oil pressure test hole plug

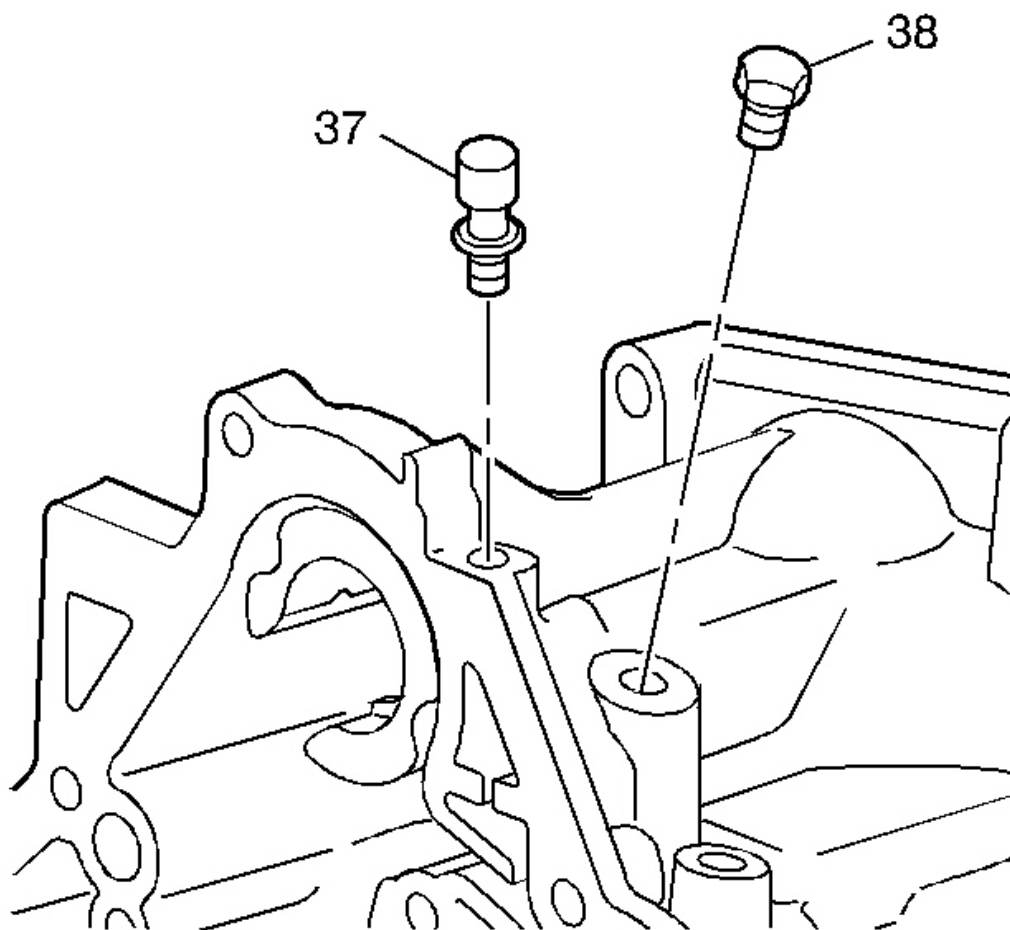
Disassembly Procedure

Fig. 103: View Of Vent Assembly & Oil Pressure Test Hole Plug
Courtesy of GENERAL MOTORS CORP.

1. Inspect the vent for damage or being plugged. If the vent is damaged, use channel locks and a large screwdriver in order to remove the vent assembly (37).
2. Remove the oil pressure test hole plug (38).

CASE COMPONENTS ASSEMBLE**Assembly Procedure**

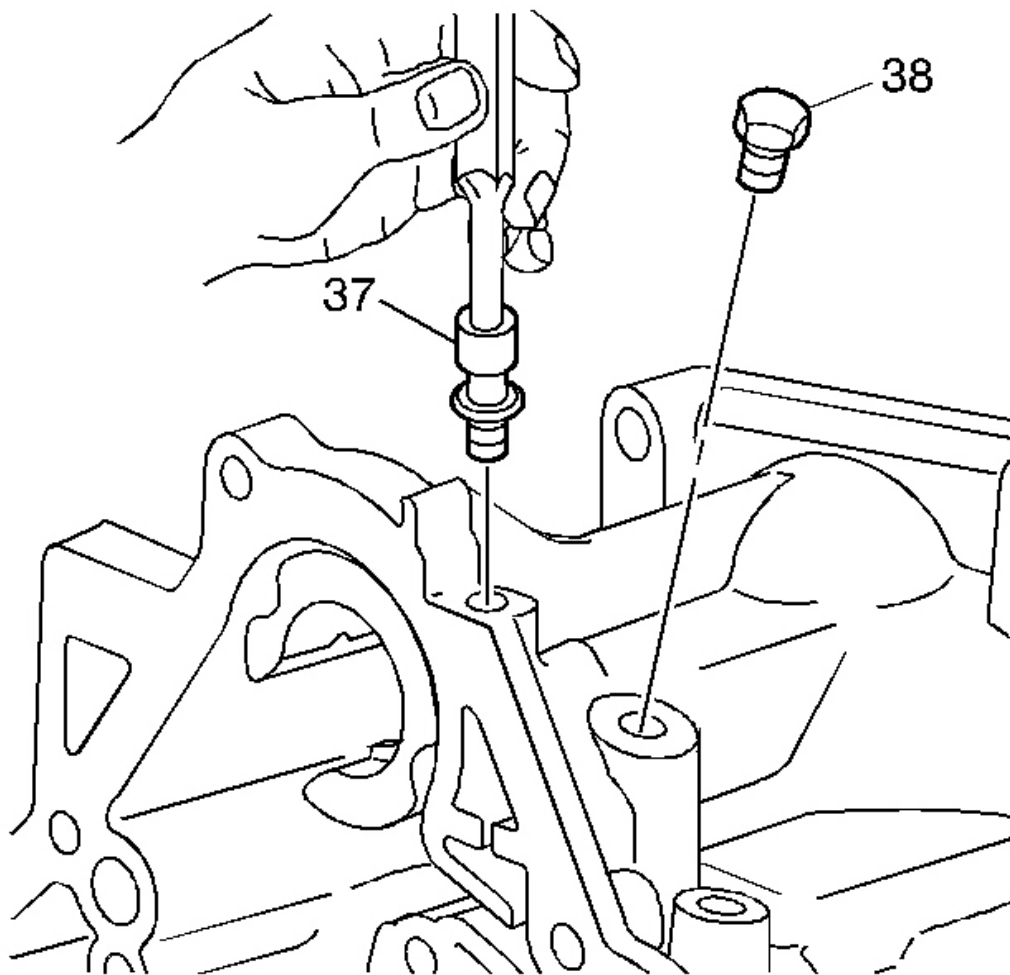


Fig. 104: Installing Oil Pressure Test Hole Plug & Vent Assembly
Courtesy of GENERAL MOTORS CORP.

1. Use a hammer and a punch in order to install the vent assembly (37), if necessary.
2. Apply sealant GM P/N 12345382 to the oil pressure test hole plug (38).

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

3. Install the oil pressure test hole plug (38).

Tighten: Tighten the oil pressure test hole plug (38) to 12 N.m (106 lb in).

TORQUE CONVERTER OIL SEAL REMOVAL

Tools Required

- **J 41103** Torque Converter Seal Remover Set
- **J 41103-1** Torque Converter Seal Puller Legs
- **J 41103-2** Torque Converter Seal Puller Bridge
- **J 41103-3** Torque Converter Seal Support Body

Removal Procedure

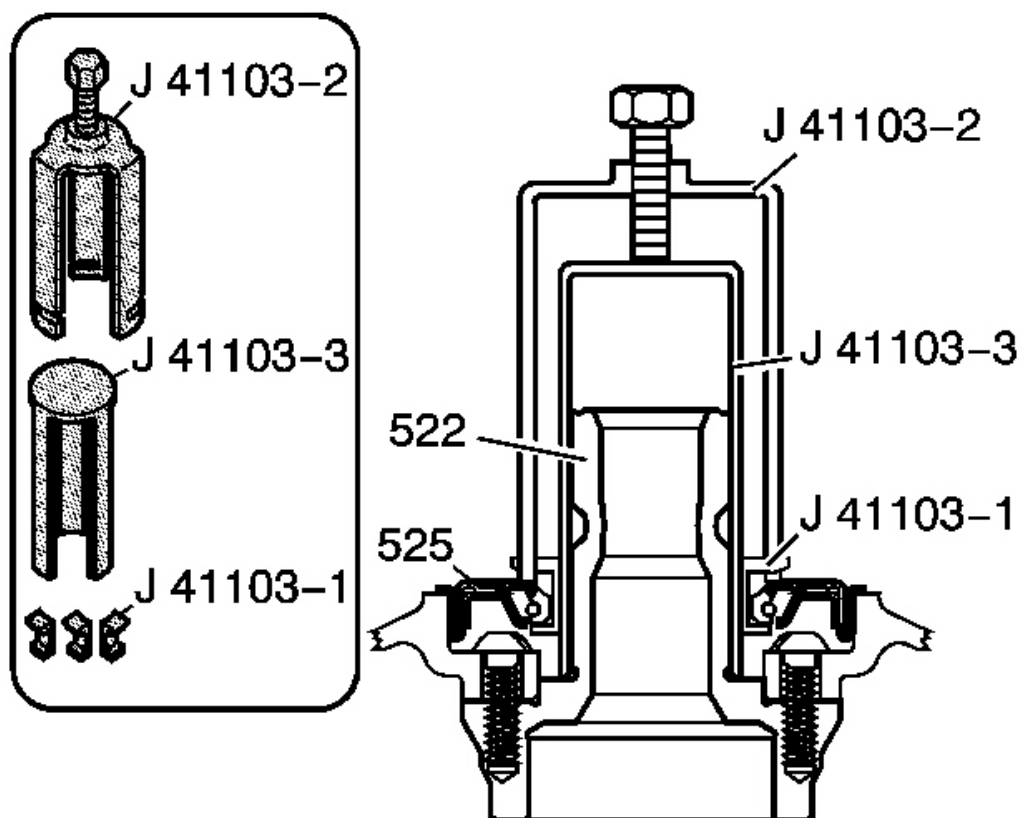


Fig. 105: Cross Sectional View Of J 41103 Components
 Courtesy of GENERAL MOTORS CORP.

1. Insert the three **J 41103-1** puller legs under the Torque Converter Seal (525).

2. Insert the **J 41103-3** support body over the drive sprocket support (522).
3. Insert the **J 41103-2** puller bridge over the **J 41103-3** support body. Connect the **J 41103-1** puller legs into the slots on the **J 41103-2** bridge.

**IMPORTANT: The puller legs will damage the torque converter seal (525).
Discard the torque converter seal (525) after removal.**

4. Tighten the forcing screw on the **J 41103-2** puller bridge until the **J 41103-1** puller legs remove the torque converter seal (525).

DRIVE SPROCKET SUPPORT REMOVAL

Tools Required

- **J 23907** Universal Slide Hammer and Puller
- **J 26941** Drive Sprocket Support Bearing Remover

Removal Procedure

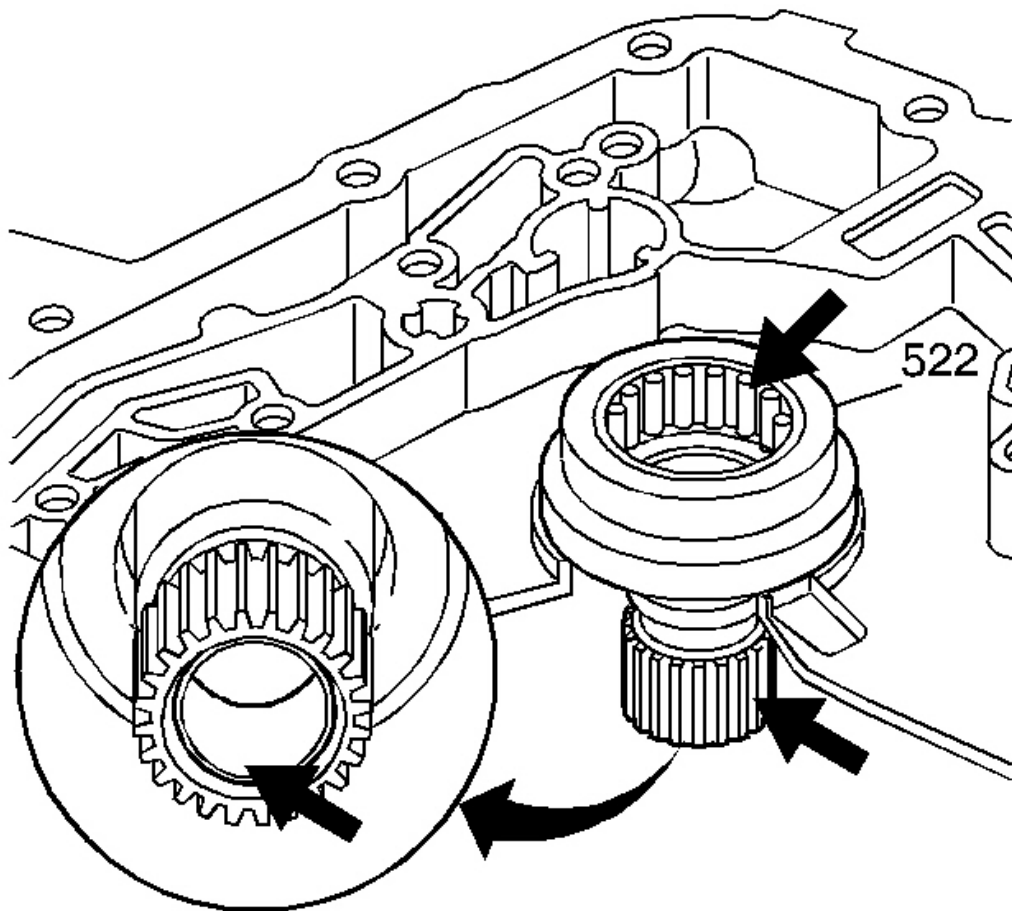


Fig. 106: Inspection Areas On Drive Sprocket Support
Courtesy of GENERAL MOTORS CORP.

1. Inspect the drive sprocket support (522) for the following conditions:
 - Damaged splines
 - A damaged drive sprocket support bearing
 - A damaged turbine shaft bushing (pressed inside the support)
2. Remove the drive sprocket support bearing only if the bearing is damaged.
3. Remove the drive sprocket support assembly only if the support is damaged.

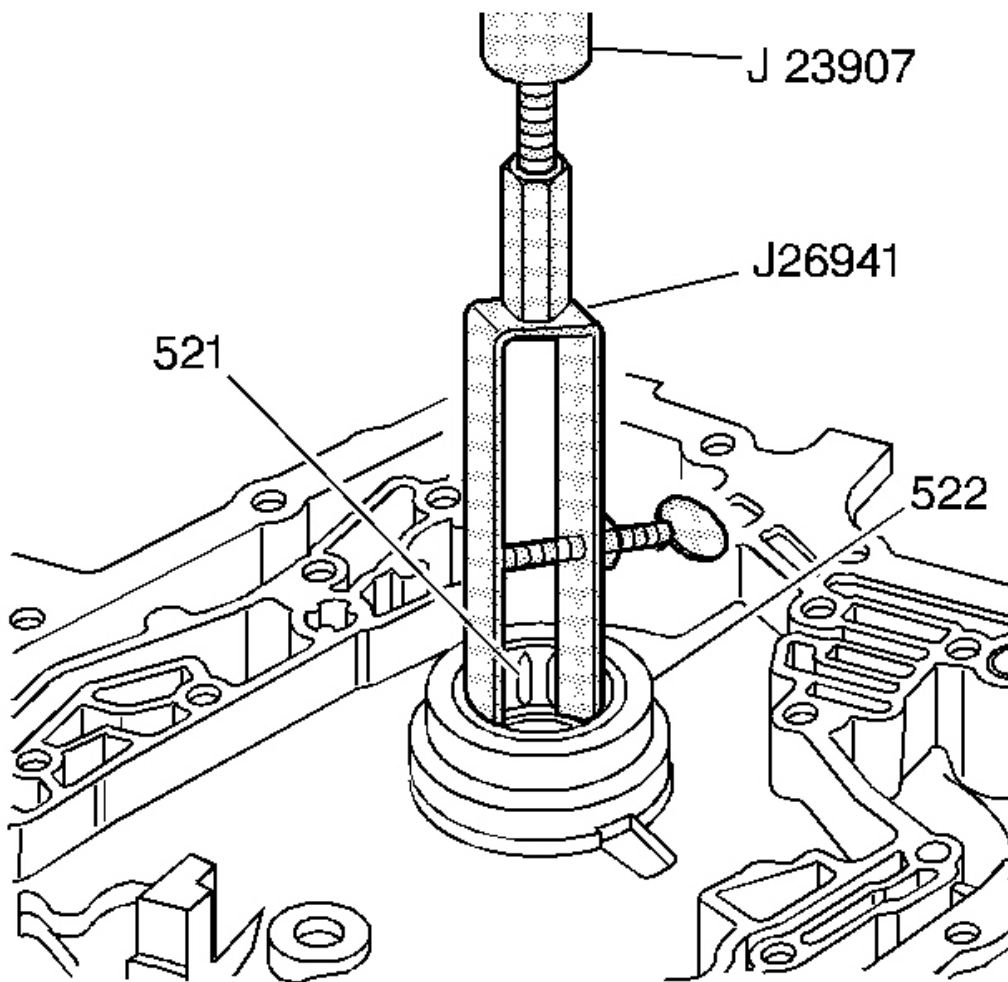


Fig. 107: Removing Bearing Assembly From Drive Sprocket Support
Courtesy of GENERAL MOTORS CORP.

4. Assemble **J 23907** and **J 26941** .
5. Use **J 23907** and **J 26941** in order to remove the bearing assembly (521) from the drive sprocket support.

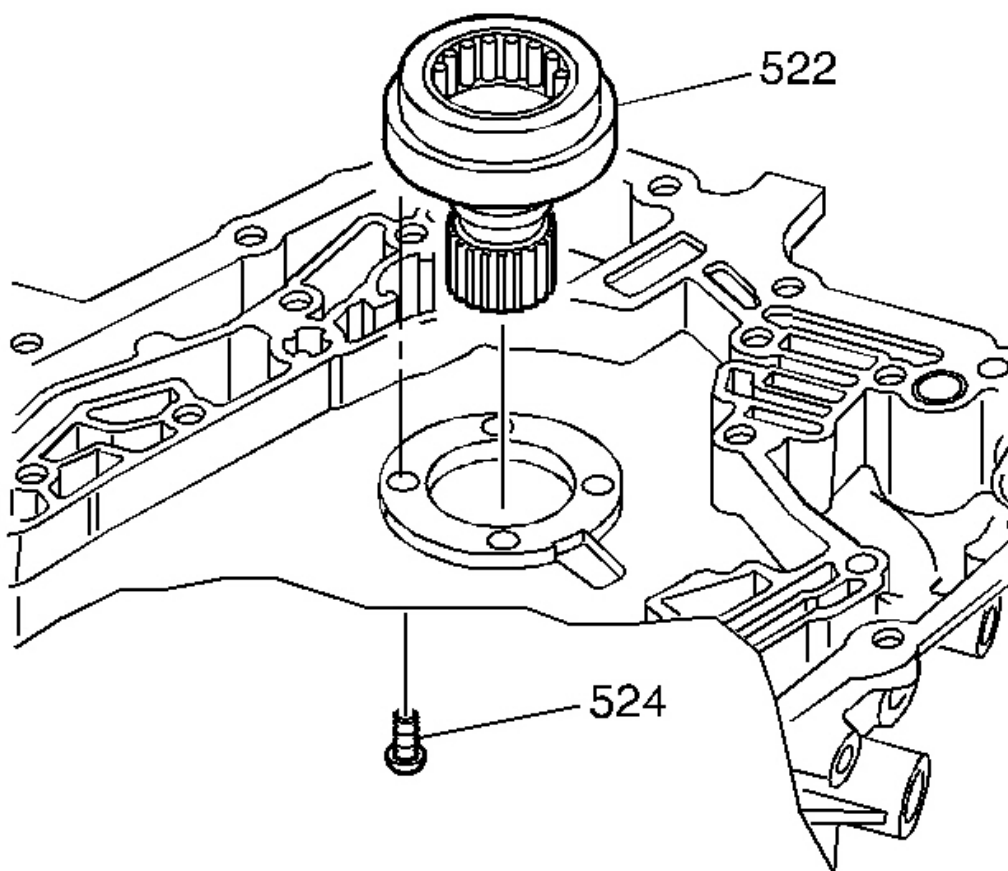


Fig. 108: Locating Drive Sprocket Support Assembly
Courtesy of GENERAL MOTORS CORP.

6. Remove the four drive sprocket support bolts (524).
7. Remove the drive sprocket support assembly (522).

DRIVE SPROCKET SUPPORT ASSEMBLY

Tools Required

- **J 8092** Driver Handle
- **J 28677** Drive Sprocket Support Bearing Installer. See **Special Tools**.
- **J 36850** Transmission Assembly Lubricant

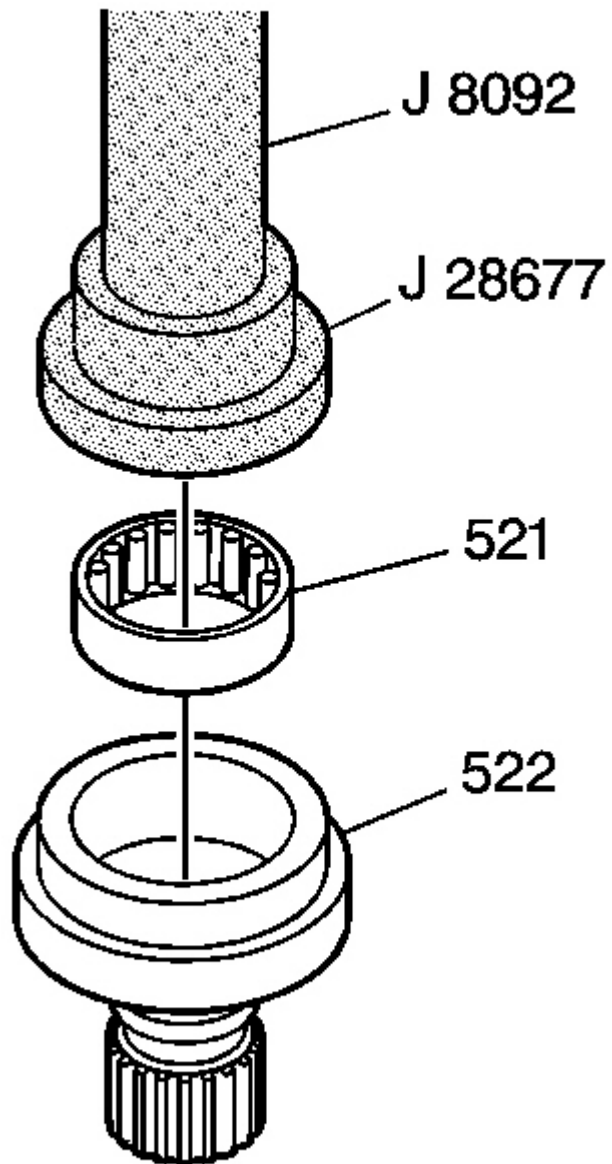
Assembly Procedure

Fig. 109: Pressing In Drive Sprocket Support Bearing With J 8092 & J 28677
Courtesy of GENERAL MOTORS CORP.

1. Assemble J 28677 and J 8092 . See **Special Tools**.

2. Lubricate drive sprocket support bearing (521) with **J 36850** .

IMPORTANT: When installing the new bearing the part number should be visible (facing upward).

3. Using the assembled tool, press in the drive sprocket support bearing (521).

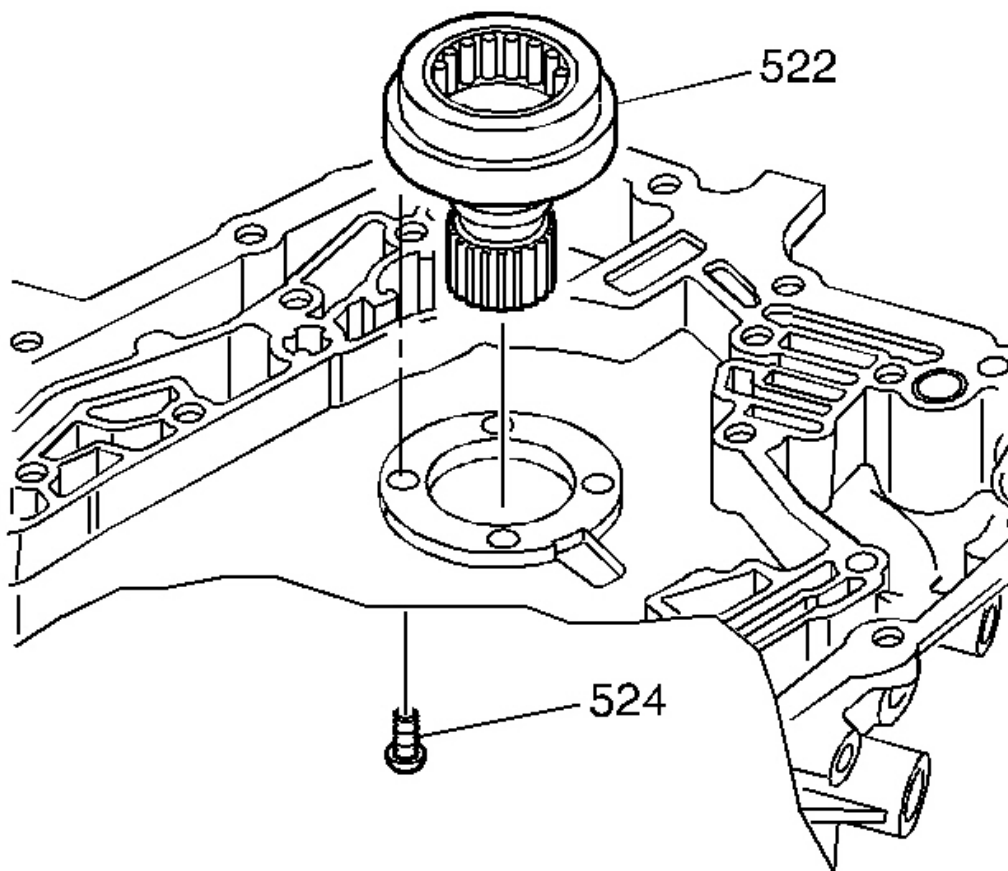


Fig. 110: Locating Drive Sprocket Support Assembly
Courtesy of GENERAL MOTORS CORP.

4. Install the drive sprocket support assembly (522).

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

5. Install the four drive sprocket support bolts (524).

Tighten: Tighten the bolts to 25 N.m (18 lb ft).

TORQUE CONVERTER OIL SEAL ASSEMBLY

Tools Required

J 28540-A Converter Seal Installer

Assembly Procedure

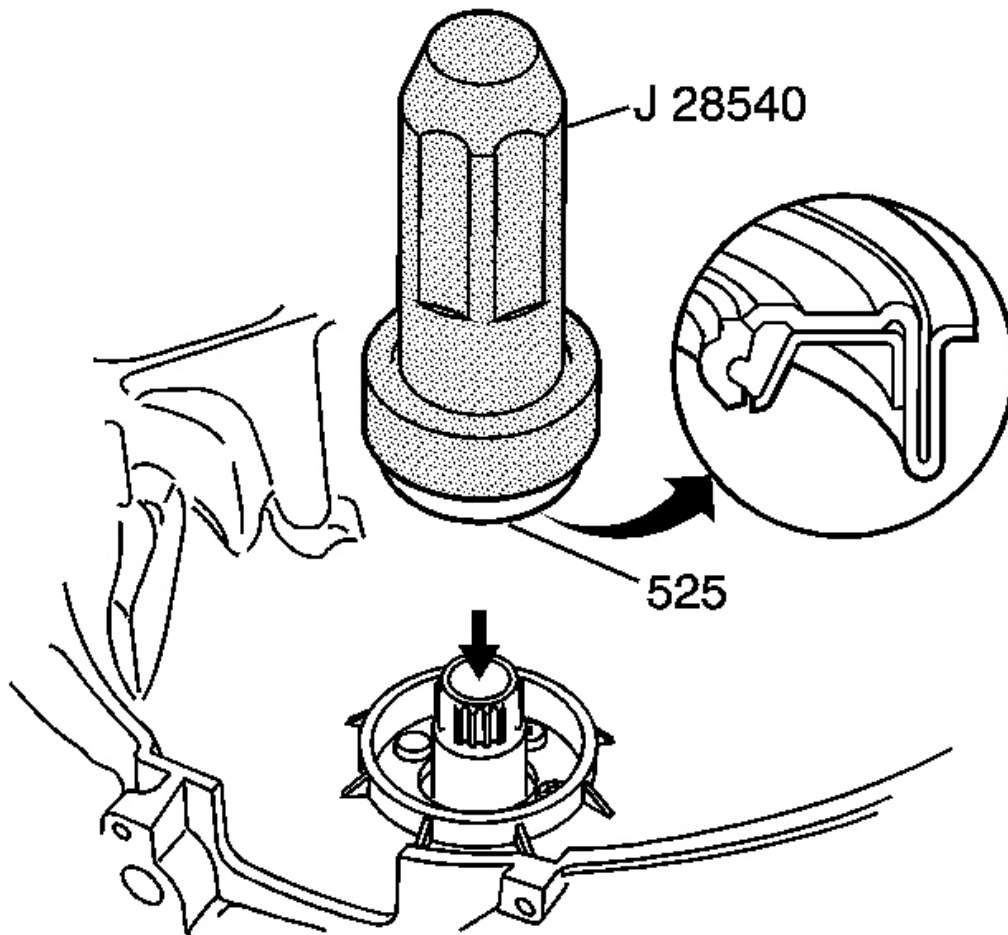


Fig. 111: Identifying J 28540-A

Courtesy of GENERAL MOTORS CORP.

NOTE: Install the seal onto the tool before installing into the case to prevent damage to the seal.

Use **J 28540-A** and a mallet in order to install the torque converter oil seal (525).

MANUAL SHIFT SHAFT POSITION (INTERNAL MODE) SWITCH AND PARKING SYSTEM COMPONENTS INSTALLATION

Installation Procedure

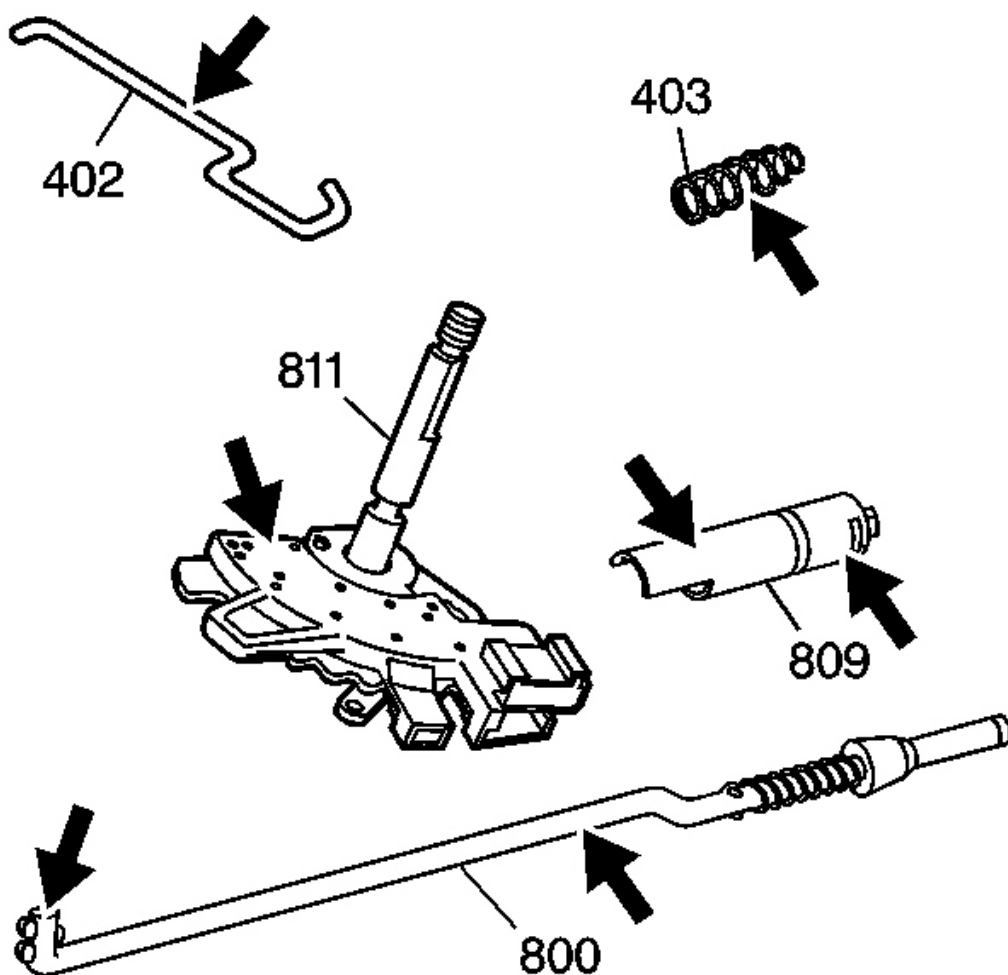


Fig. 112: Locating Inspection Areas In Park System Components
Courtesy of GENERAL MOTORS CORP.

1. Inspect the park system components for the following conditions:
 - A worn park pawl actuator guide (809)
 - A damaged or bent park pawl actuator assembly (800)
 - A damaged internal mode switch (IMS) detent lever (811)
 - A bent or damaged manual valve link (402)
 - A kinked or bent manual valve link spring (403)

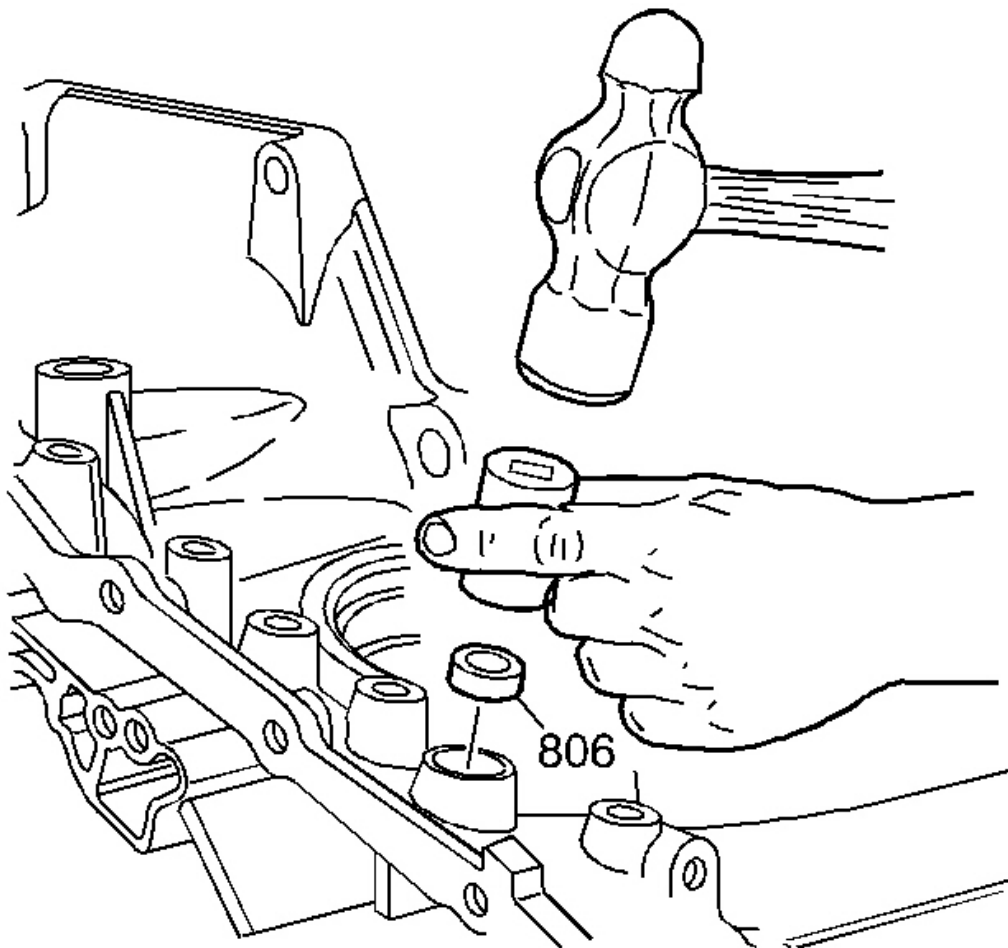


Fig. 113: Installing Manual Shift Shaft Seal Assembly

Courtesy of GENERAL MOTORS CORP.

2. Use a 9/16 inch socket and a hammer in order to install the manual shift shaft seal assembly (806) into the case.

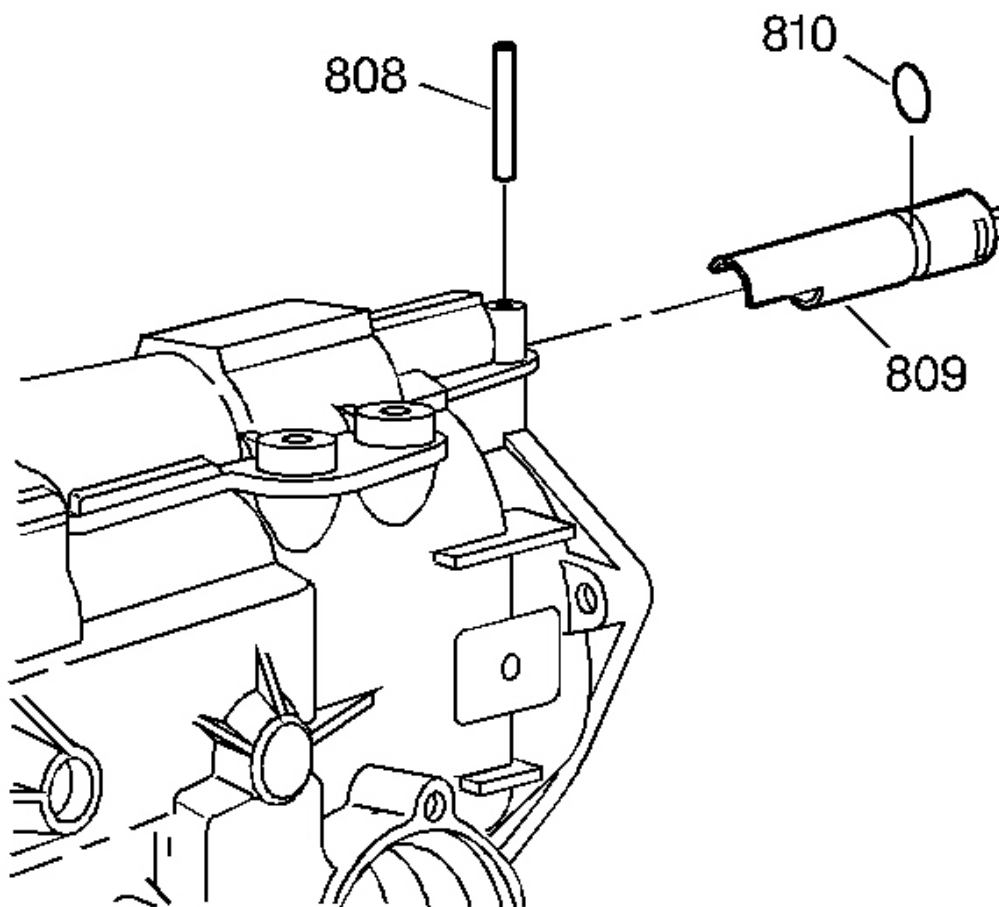


Fig. 114: View Of Park Pawl Actuator Guide O-Ring Seal
Courtesy of GENERAL MOTORS CORP.

3. Install a new park pawl actuator guide O-ring seal (810) onto the park pawl actuator guide (809).
4. Install the actuator guide assembly into the case.
5. Align the slot for the actuator guide pin (808) in the park pawl with the pin hole in the case.

6. Use a mallet in order to install the actuator guide pin (808).

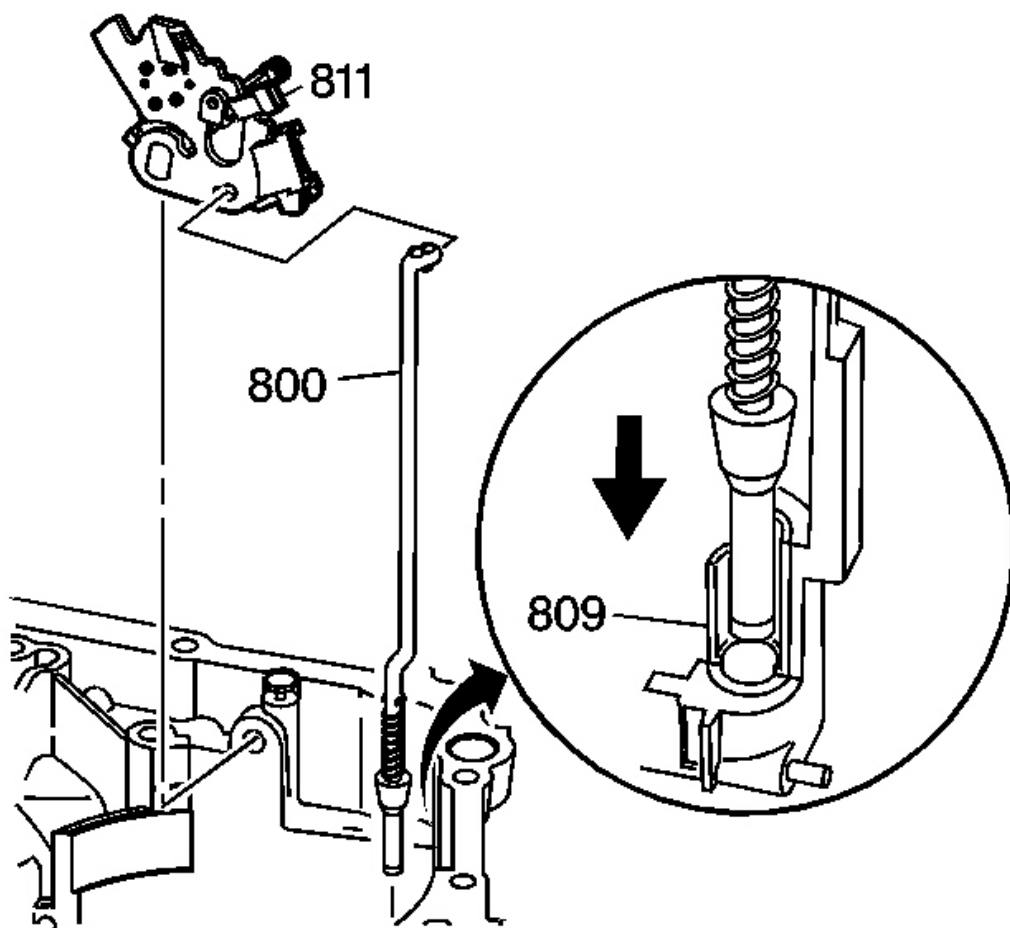


Fig. 115: Expanded View Of Park Pawl Actuator Assembly
Courtesy of GENERAL MOTORS CORP.

7. Assemble the IMS (811) onto the park pawl actuator assembly (800).
8. Install the IMS detent lever assembly (811) and the park pawl actuator assembly (800) into the case.

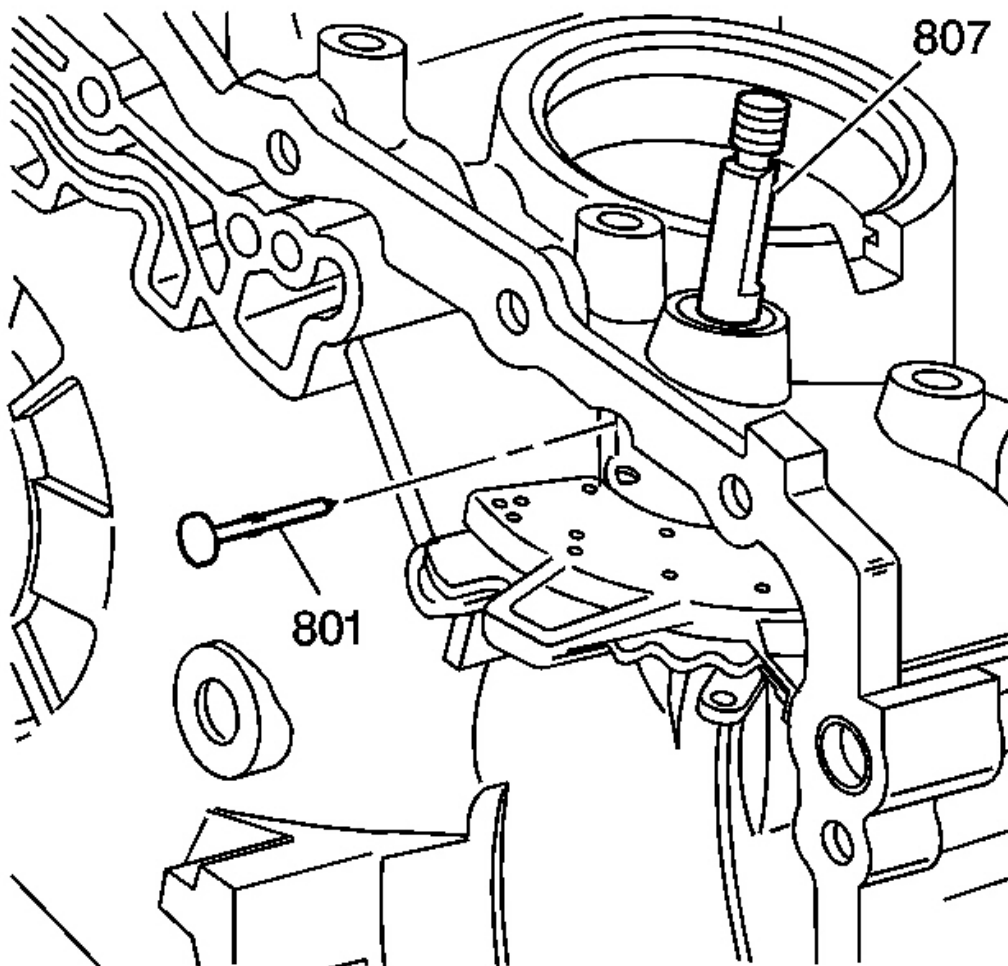


Fig. 116: Installing Manual Shift Shaft Pin
Courtesy of GENERAL MOTORS CORP.

9. Align the groove for the manual shift shaft pin with the pin hole in the case.
10. Use a mallet in order to install the manual shift shaft pin (801).

DIFFERENTIAL CARRIER INTERNAL GEAR ASSEMBLY

Tools Required

J 28585 Snap Ring Remover

Assembly Procedure

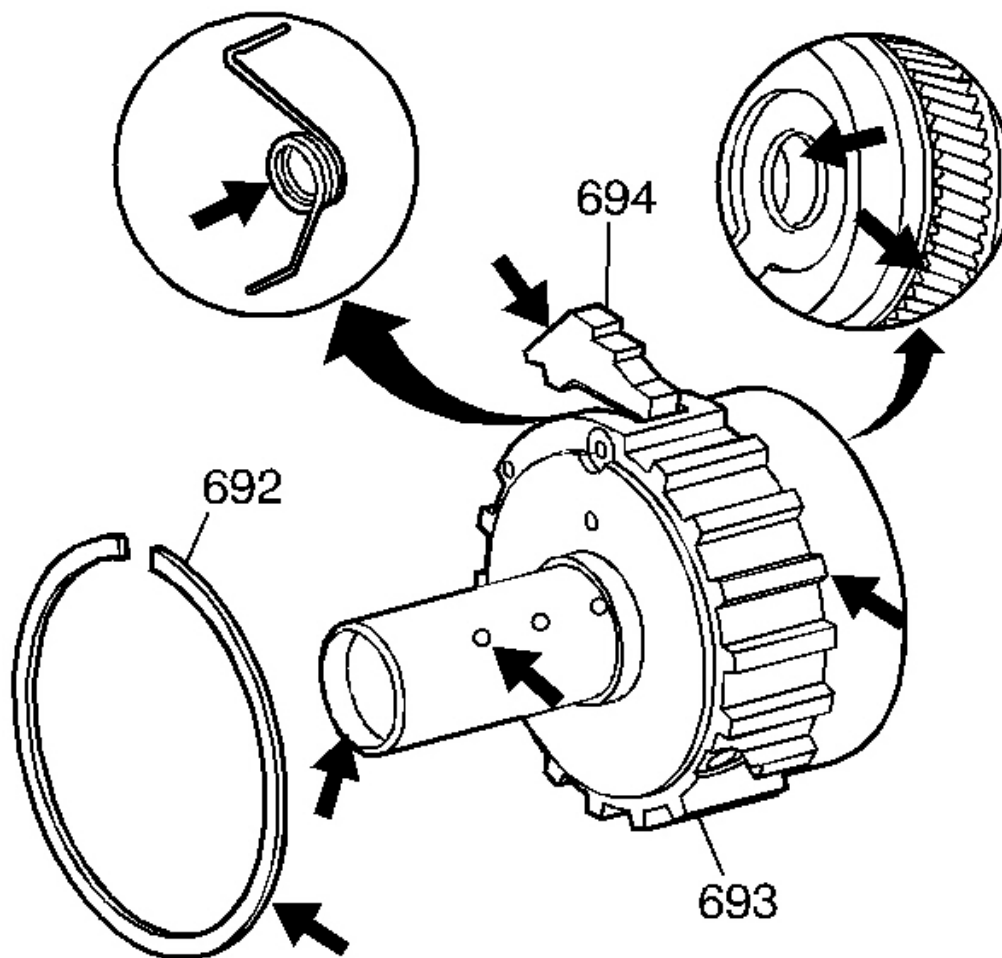


Fig. 117: Identifying Differential Carrier Internal Gear Assembly Inspection Areas
Courtesy of GENERAL MOTORS CORP.

1. Inspect the differential carrier internal gear assembly (693) for the following conditions:
 - Damaged or worn bushings
 - Plugged lube oil holes
 - Damaged case splines
 - Damaged or worn gear teeth
 - A damaged or worn park pawl assembly (694)

- A damaged snap ring (692)

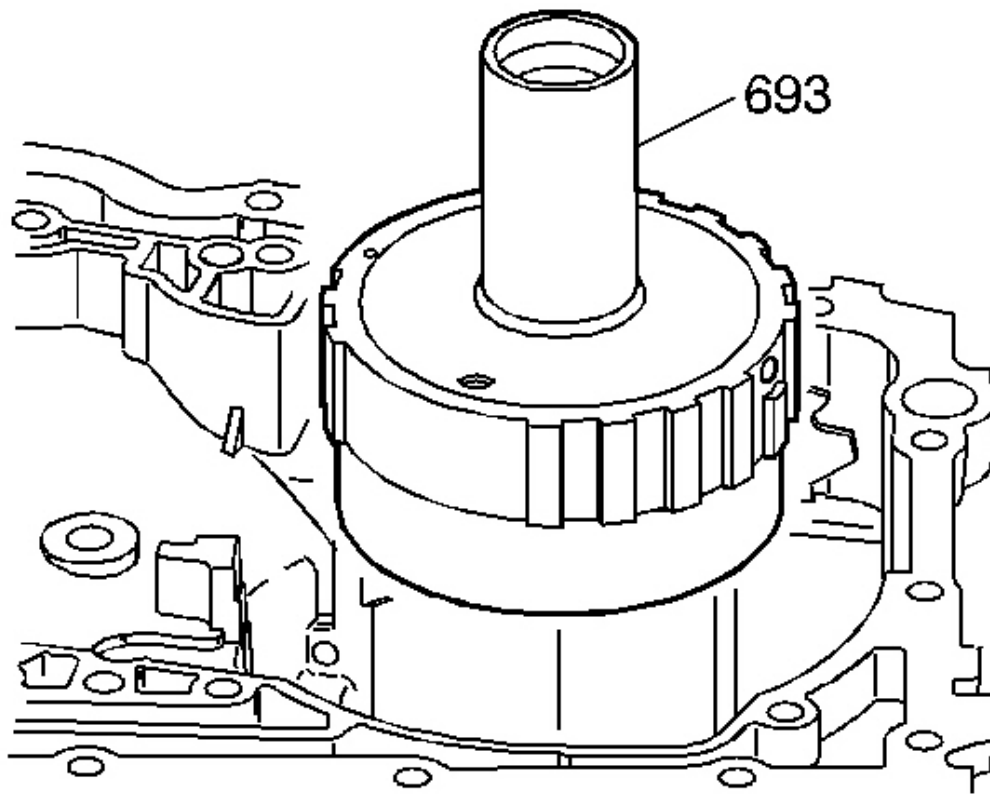


Fig. 118: View Of Differential Carrier Internal Gear Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the differential carrier internal gear assembly (693) into the case. Align the park pawl assembly with the park pawl actuator assembly.

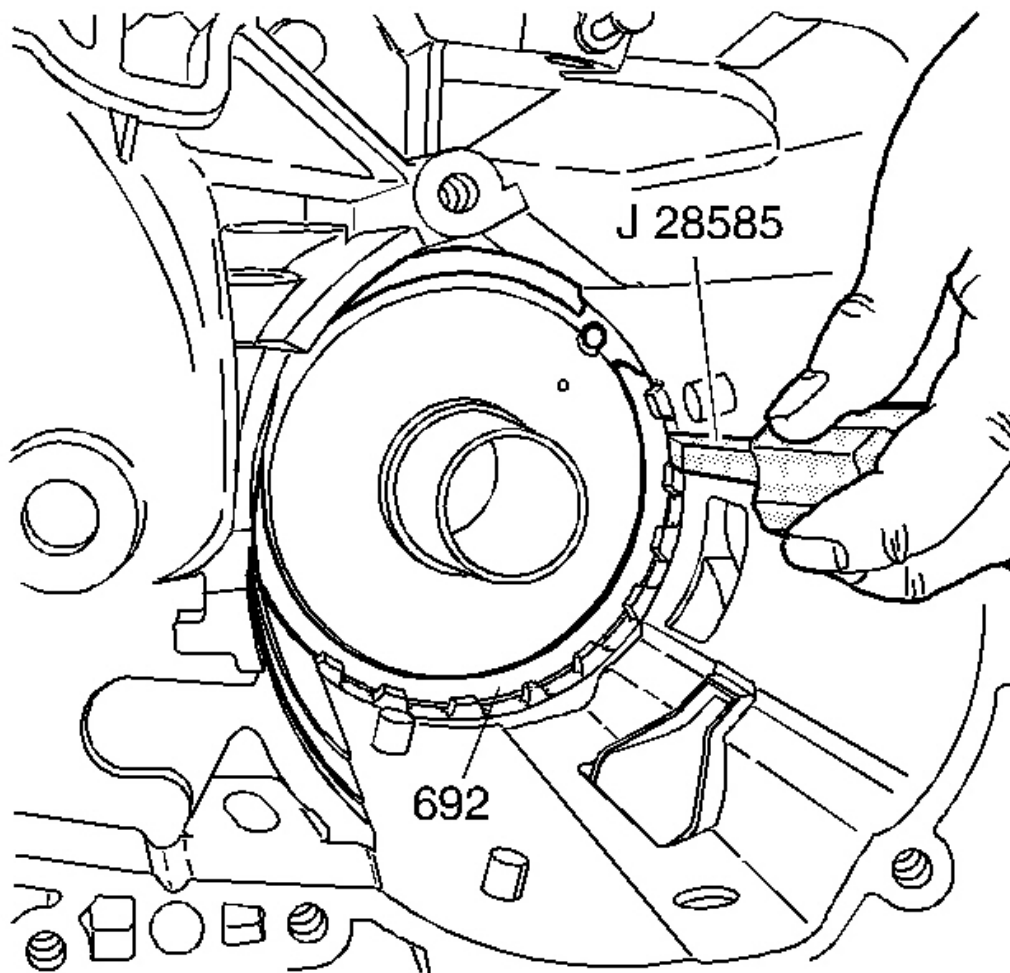


Fig. 119: Using J 28585 To Install The Snap Ring Into The Case
Courtesy of GENERAL MOTORS CORP.

3. Use **J 28585** or a long screwdriver in order to install the snap ring (692) into the case as shown.

DIFFERENTIAL CARRIER INSPECTION (FWD ONLY)

Inspection Procedure

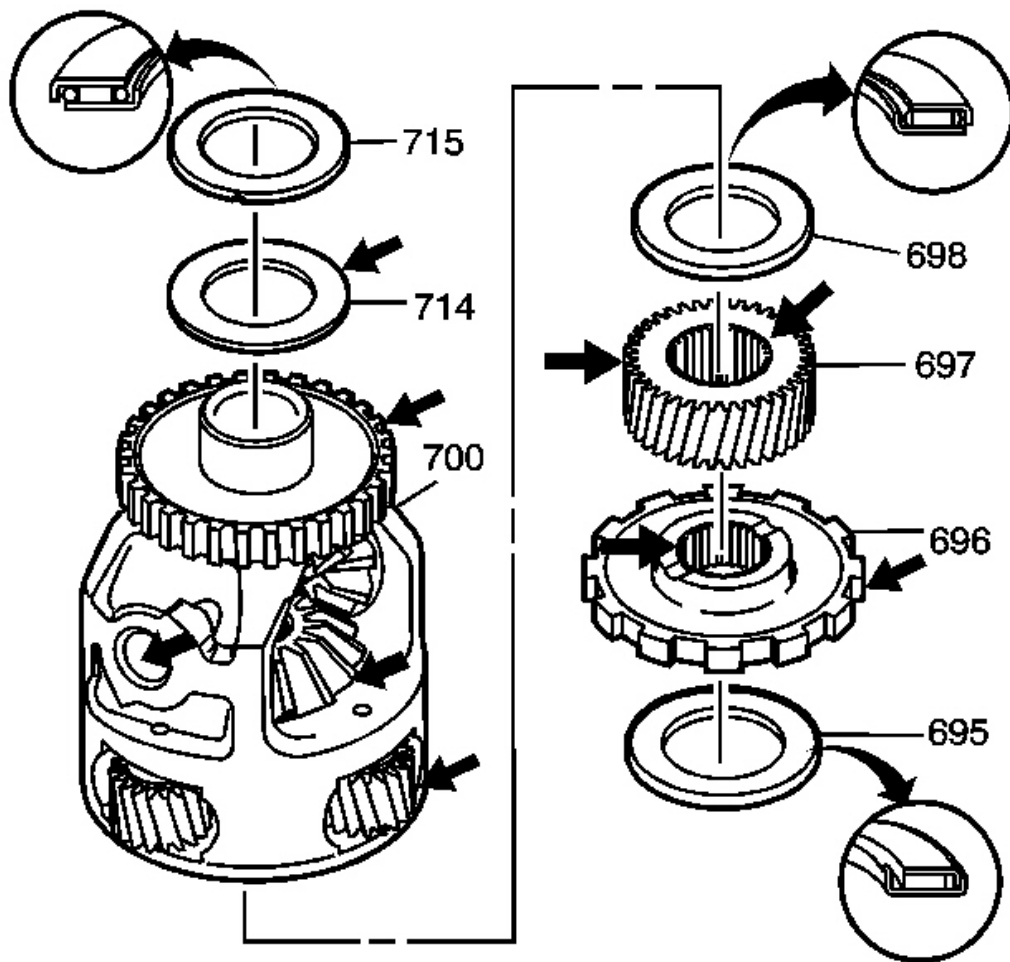


Fig. 120: Exploded View Of Differential Carrier Assembly (FWD Only)
Courtesy of GENERAL MOTORS CORP.

1. Inspect the differential carrier assembly (700) for the following conditions:
 - Damaged or worn teeth, bearing rollers, washers or pins on the differential planetary pinion gear
 - Damaged or worn teeth or splines on the final drive sun gear (697)
 - Damaged or worn teeth, splines or thrust washers on the differential side gear
 - Damaged or worn teeth, thrust washers or shaft on the differential pinion gear
 - Damaged or worn lugs or splines on the parking gear (695)

- A damaged vehicle speed sensor reluctor wheel
- Damaged internal gear/parking gear thrust bearing (695), differential carrier/sun gear thrust bearing (698) or differential carrier/case thrust bearing (715)
- A damaged or worn differential carrier/case selective thrust washer (714)
- A damaged differential/final drive carrier housing (700)

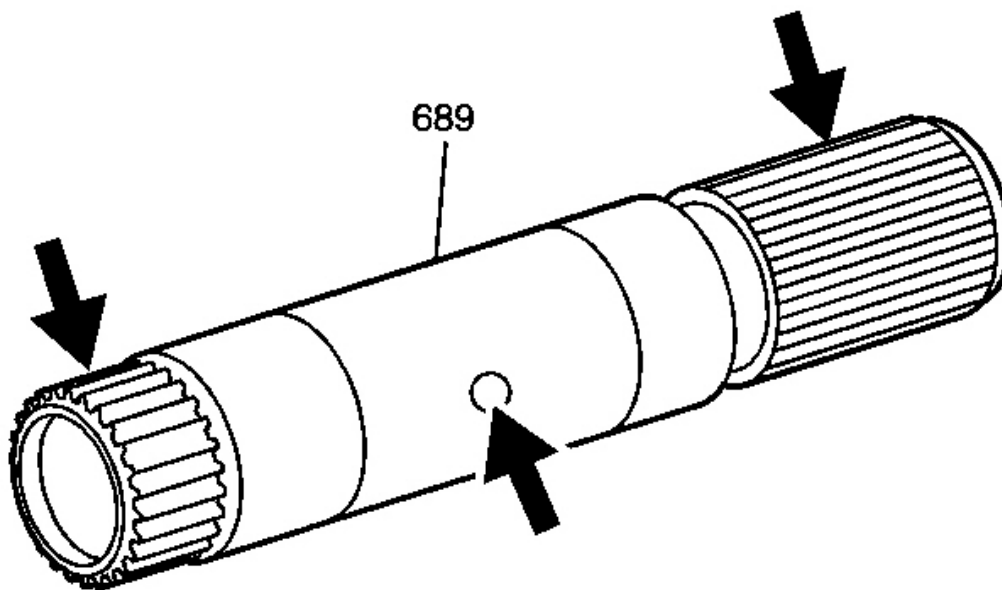


Fig. 121: Inspecting Sun Gear Shaft
Courtesy of GENERAL MOTORS CORP.

2. Inspect the final drive sun gear shaft (689) for the following conditions:
 - Damaged or worn splines
 - Cracks at lube oil holes
 - Damaged or worn bearing journals

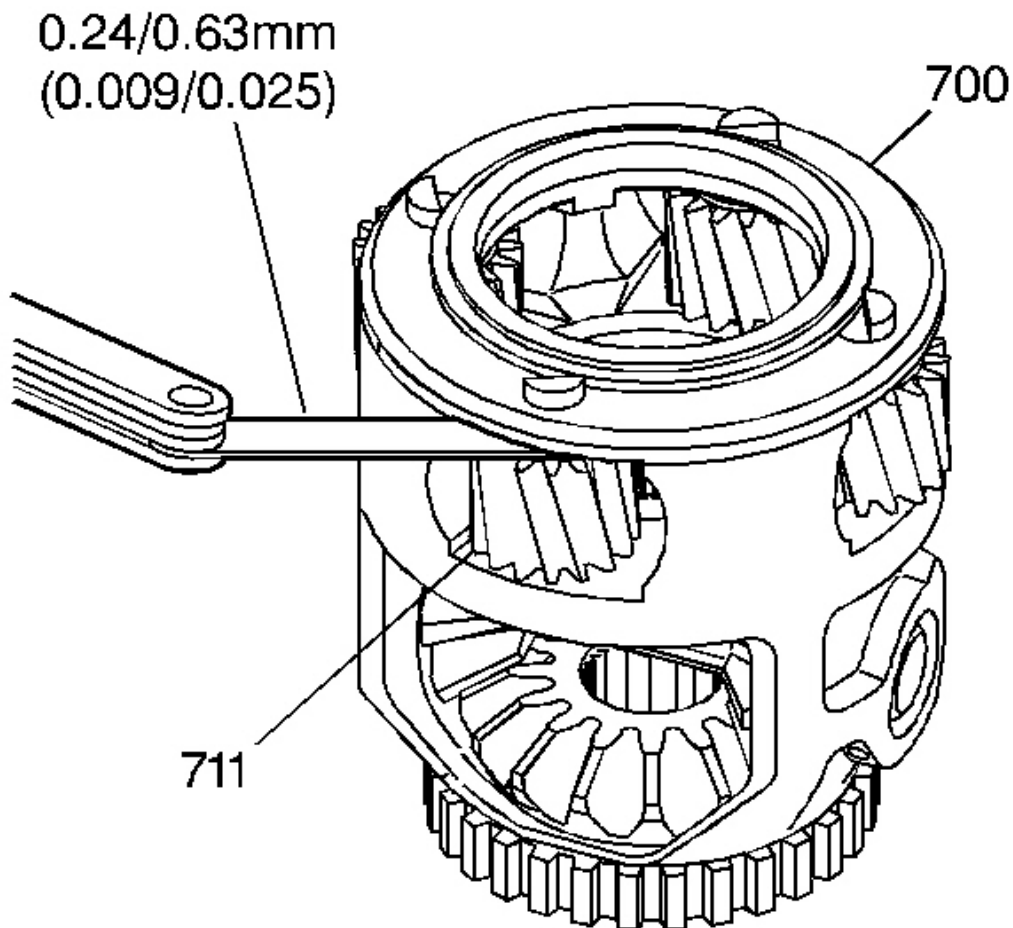


Fig. 122: Measuring Differential Carrier Planetary Pinion Gear End Play
Courtesy of GENERAL MOTORS CORP.

3. Use a feeler gauge in order to measure the end play of the differential carrier planetary pinion gear.

Specification: End play should be 0.24-0.63 mm (0.009-0.025 in).

4. If the end play check or the component inspection indicates a condition, repair the differential/final drive carrier assembly (700).

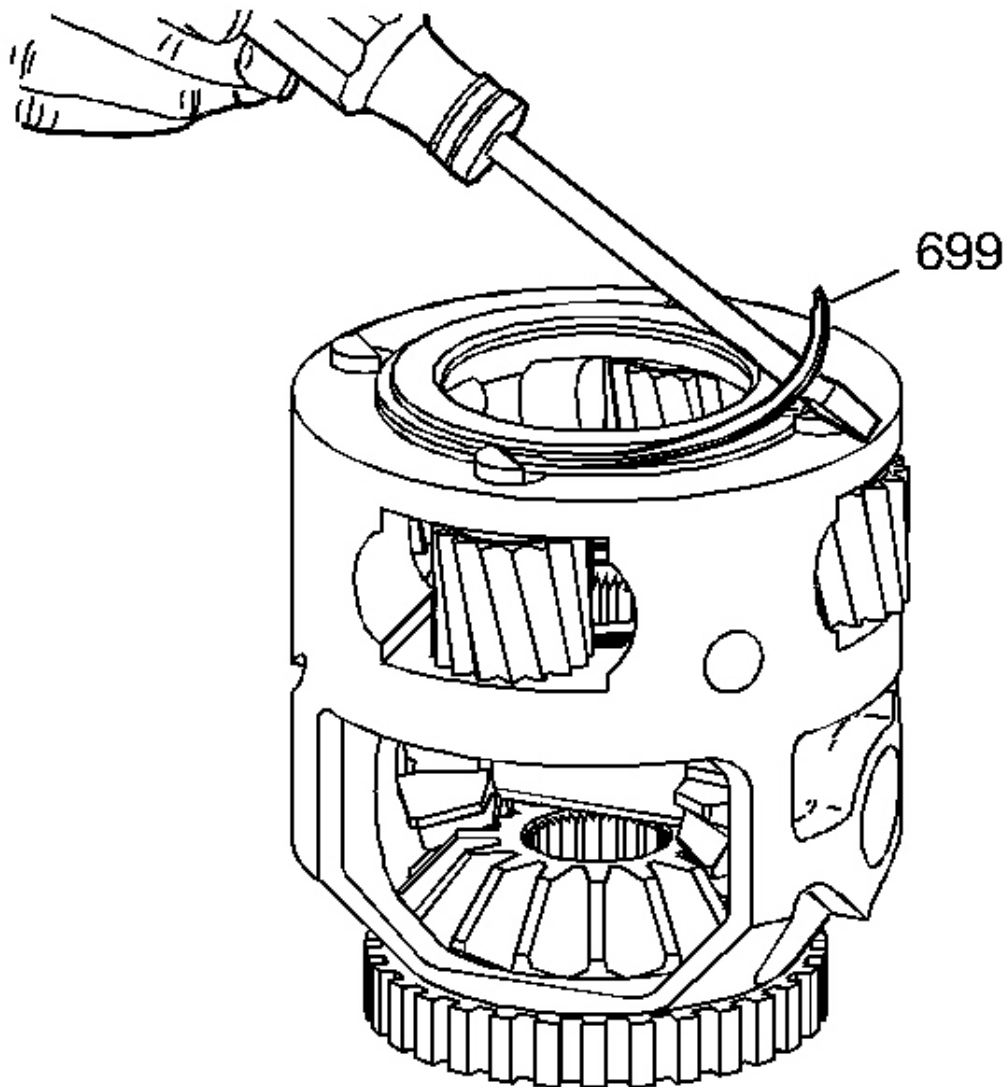
Disassembly Procedure

Fig. 123: Using Screwdriver To Remove Front Differential Carrier Snap Ring
Courtesy of GENERAL MOTORS CORP.

1. Use a screwdriver in order to remove the snap ring (699) from the front differential carrier.

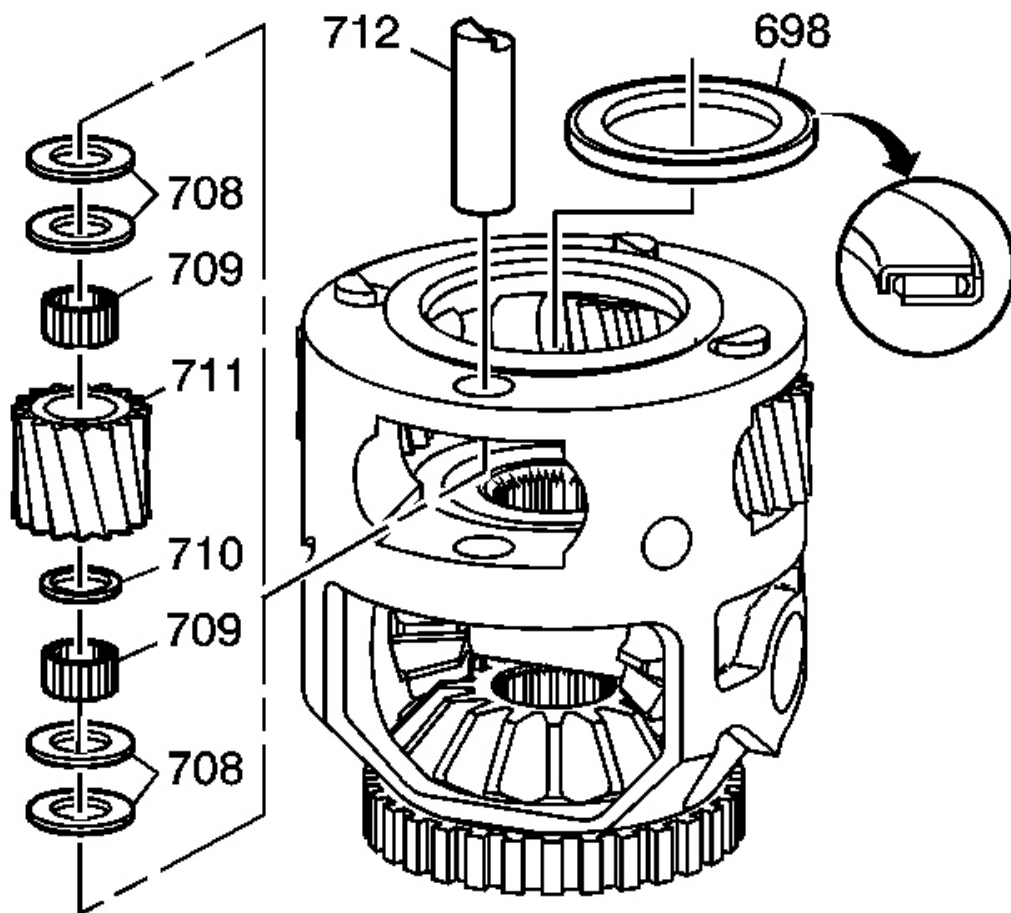


Fig. 124: Exploded View Of Pinion Gears, Washers and Bearings
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Keep all washers and bearings together with the planetary pinion gear and pin. The pinion gears, washers and bearings must be reinstalled in the original locations.

2. Remove the first planetary pinion by removing the following parts:
 1. The planetary pinion gear pin (712)
 2. The pinion thrust washers (708)
 3. The pinion gear roller bearings (709)

4. The bearing roller spacer (710)
5. The pinion (711)
3. Remove the remaining planetary pinions in the same way.
4. Remove the differential carrier sun gear thrust bearing assembly (698).

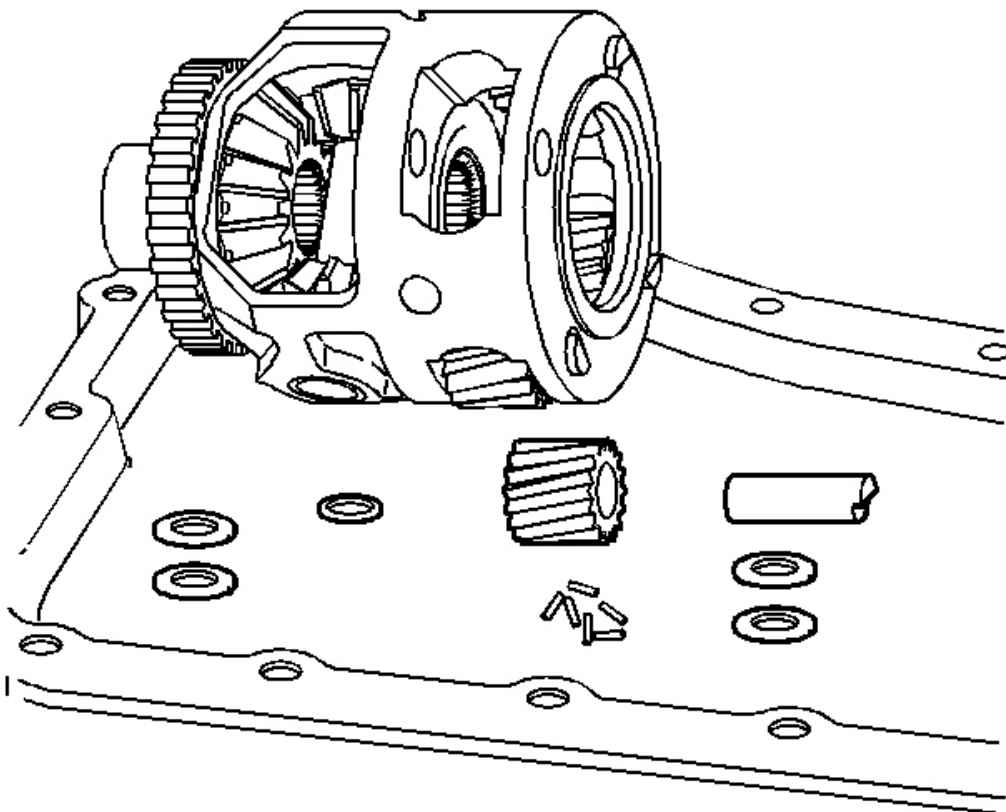


Fig. 125: Ensuring Containment Of Final Drive Carrier Components
Courtesy of GENERAL MOTORS CORP.

5. Place the final drive carrier components into an oil pan in order to make sure that none of the bearing rollers are lost.

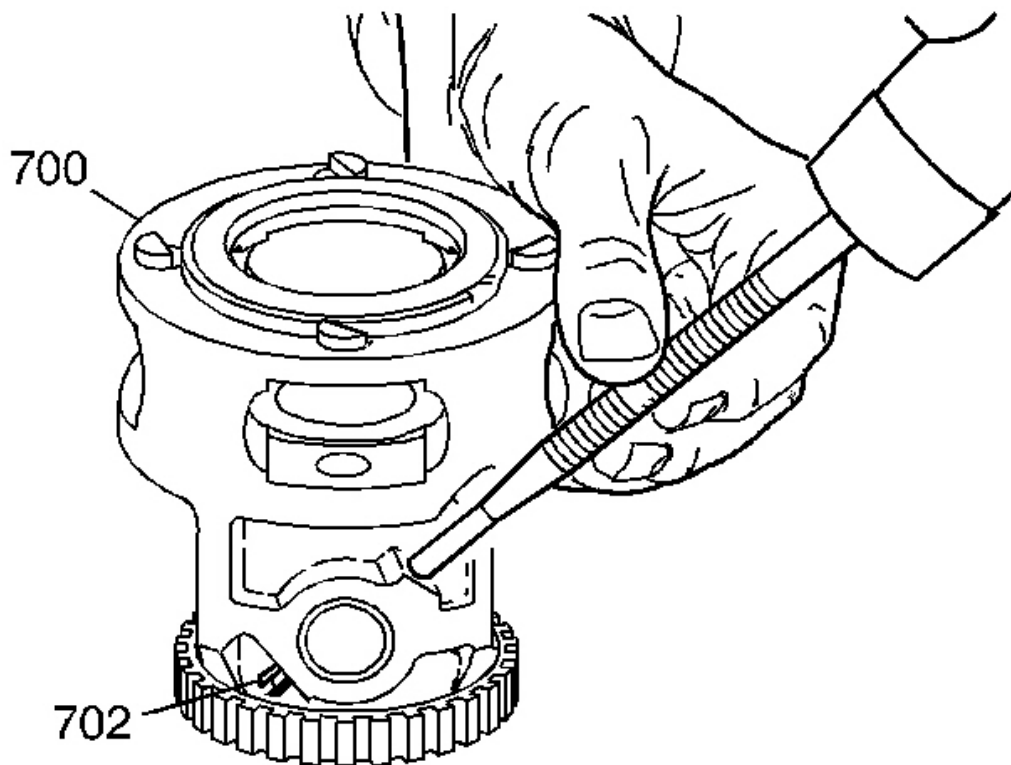


Fig. 126: Removing Differential Pinion Gear Shaft Pin With Drift Punch
Courtesy of GENERAL MOTORS CORP.

6. Use a drift punch and a mallet in order to remove the differential pinion gear shaft pin (702).

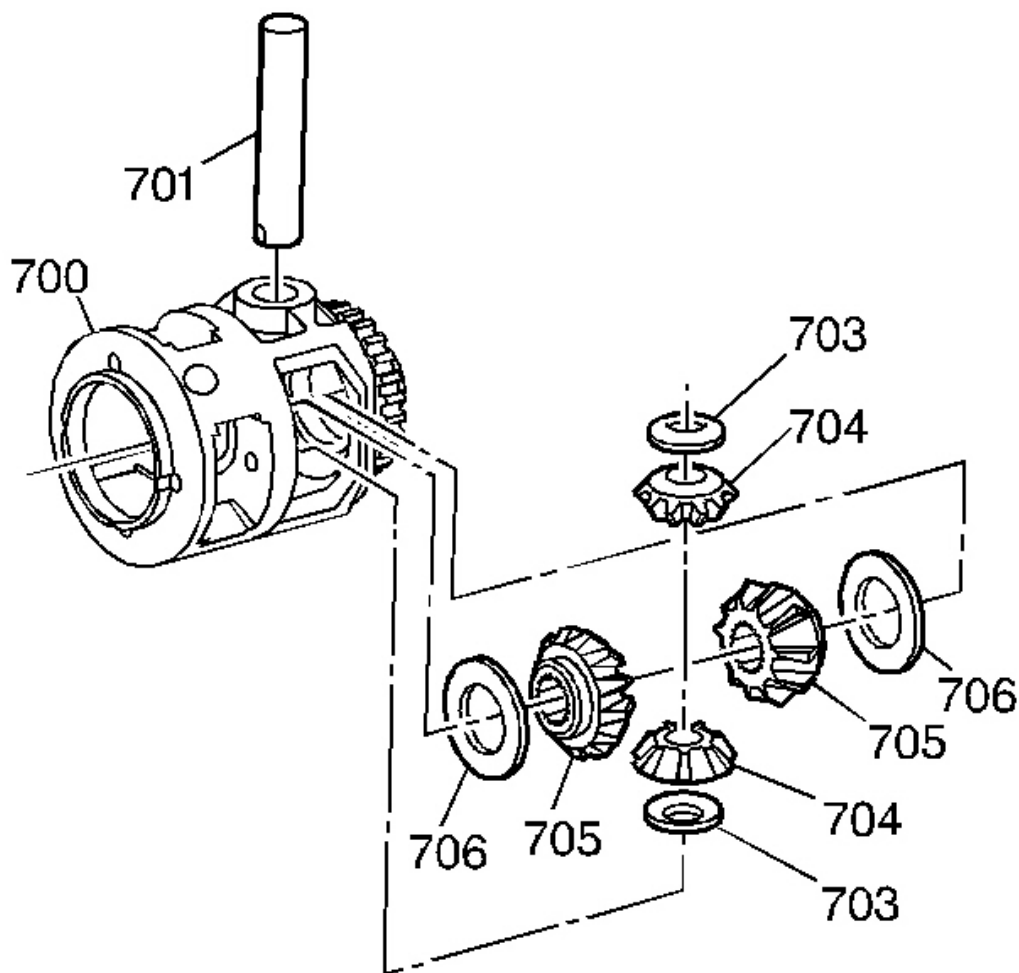


Fig. 127: Expanded View Of Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

7. Remove the differential pinion shaft (701).
8. Remove the differential pinion gears (704).
9. Remove the differential pinion gear thrust washers (703).
10. Remove the differential side gears (705).
11. Remove the differential side gear thrust washers (706).

DIFFERENTIAL CARRIER ASSEMBLY (FWD ONLY)

Tools Required

J 36850 Assembly Lubricant (or equivalent)

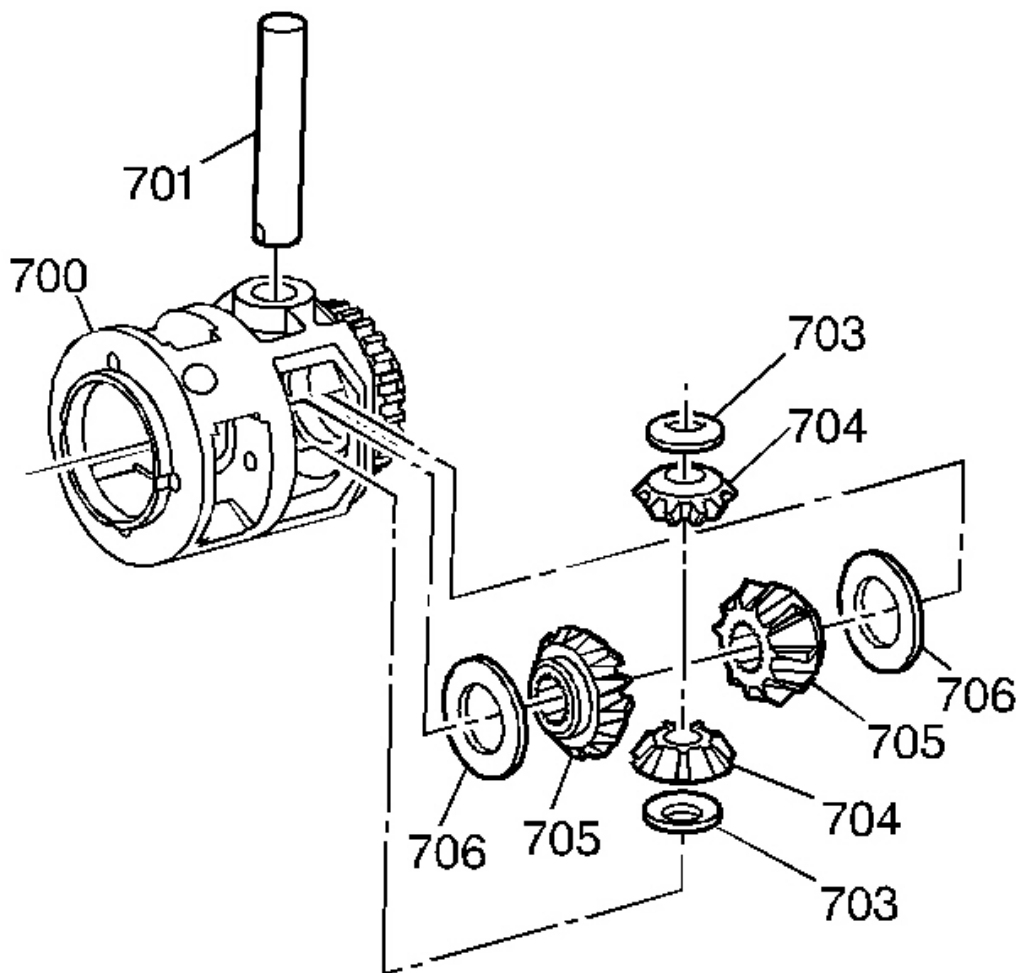
Assembly Procedure

Fig. 128: Expanded View Of Differential Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

1. Affix the differential side gear thrust washers (706) to the side gears (705). Apply **J 36850** or equivalent.
2. Install the side gears (705) with the thrust washers into the differential carrier housing

(700).

3. Affix the differential pinion thrust washers (703) to the pinion gears (704). Apply **J 36850** or equivalent.
4. Install the pinion gears with thrust washers into the differential carrier housing (700). Rotate the pinion gears into position.
5. Install the differential pinion shaft (701) into the differential carrier housing.

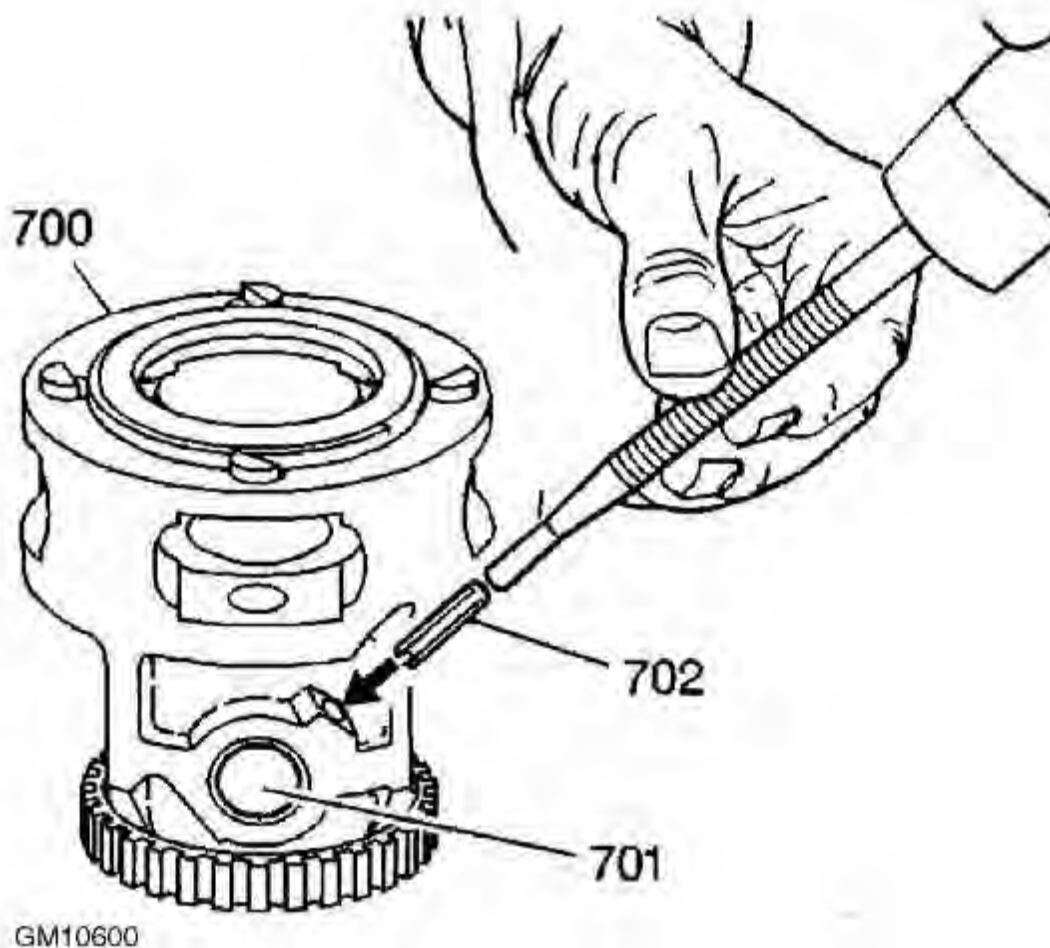


Fig. 129: Installing Pinion Gear Shaft Pin
Courtesy of GENERAL MOTORS CORP.

6. Align the hole in the pinion gear shaft (701) to the hole in the differential carrier housing (700).
7. Use a drift punch and a mallet in order to install the pinion gear shaft pin (702) into the

differential carrier housing (700).

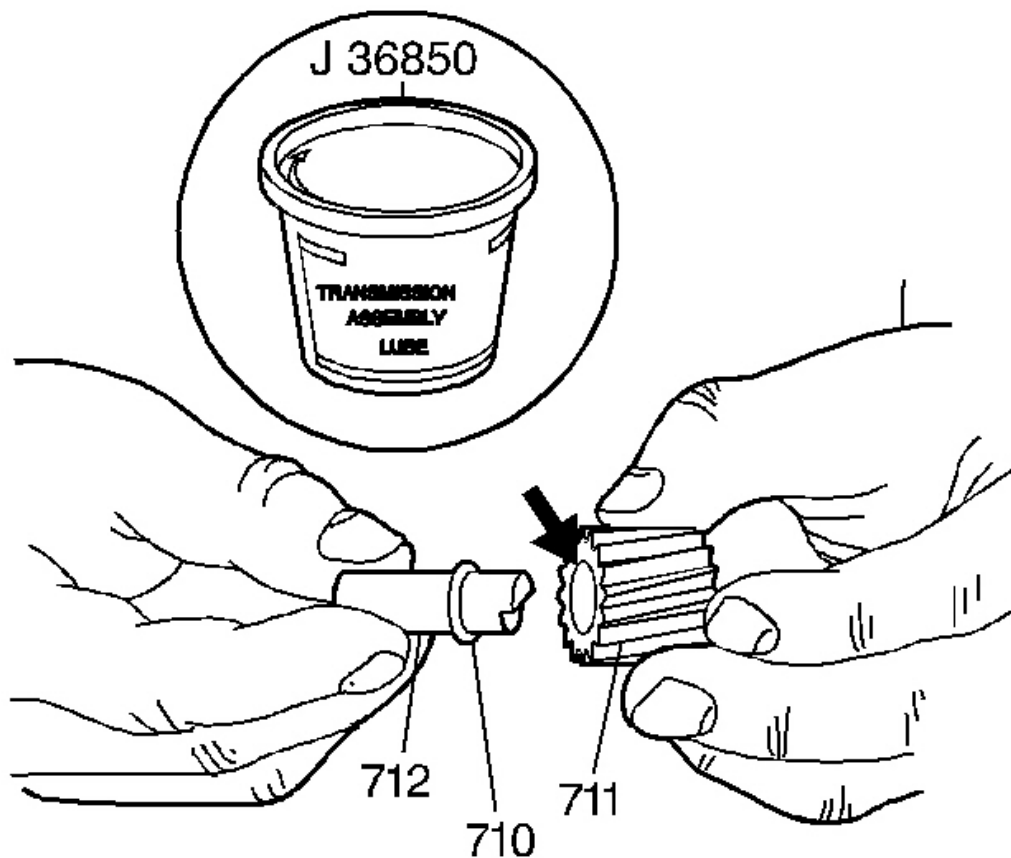


Fig. 130: Inserting Bearing Roller Spacer Onto The Pin Planetary Pinion Gear
Courtesy of GENERAL MOTORS CORP.

8. Apply **J 36850** or equivalent to the inside of a differential carrier planetary pinion gear (711).
9. For each planetary pinion gear, insert a bearing roller spacer (710) onto the pin (712). The spacer must be inserted between the two rows of bearing rollers.

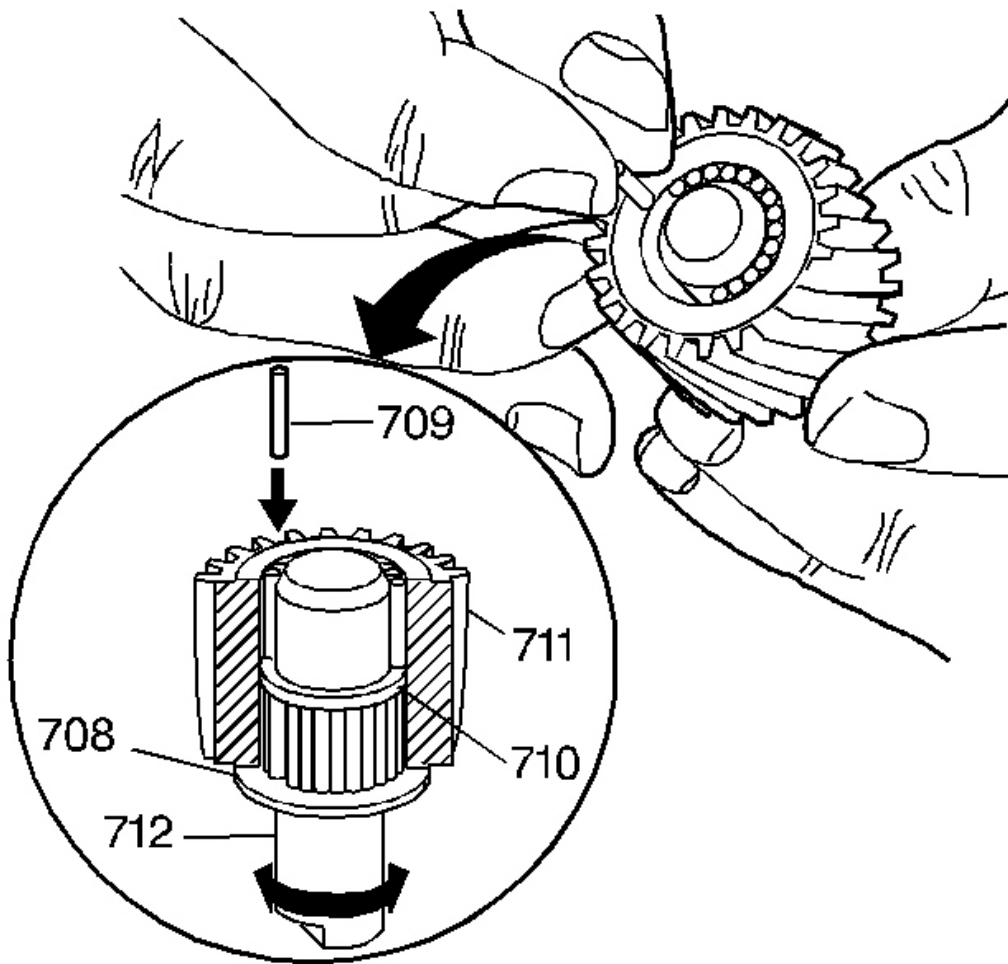


Fig. 131: Assembling Bearing Rollers
Courtesy of GENERAL MOTORS CORP.

10. For each planetary pinion gear, assemble the bearing rollers (709) into the gear (711) one at a time.
 - Use plenty of **J 36850** or equivalent in order to aid assembly
 - Use a washer (708) on the bottom of the pinion gear (711) in order to help hold the bearing rollers (709) in place.
 - The number of rollers in the pinion gear is model dependent:
 - The 3.05/3.06 and 3.29/3.33 ratio differential carriers have two rows of 22

rollers (44 total)

- The 2.86/2.84 ratio differential carriers have two rows of 18 rollers (36 total)
- Occasionally twist the pinion gear pin (712) in order to help align the rollers

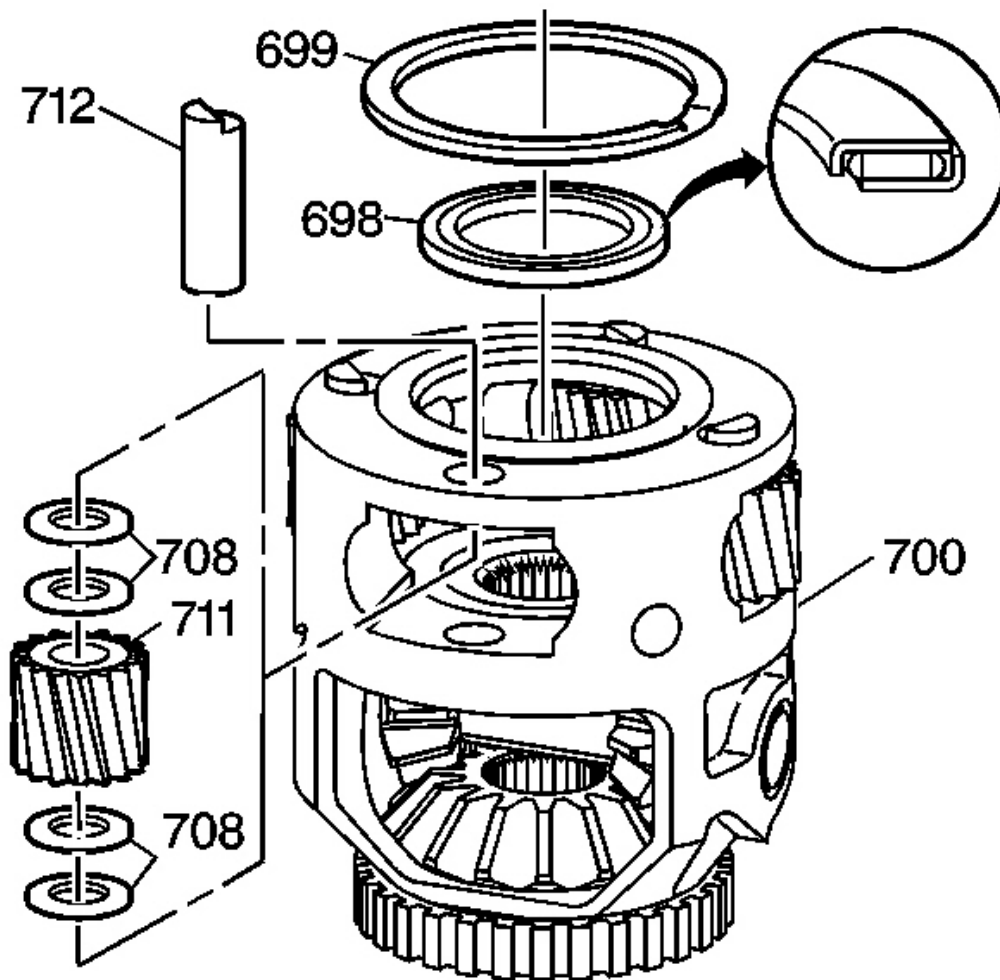


Fig. 132: Installing Differential Carrier Sun Gear Thrust Bearing
 Courtesy of GENERAL MOTORS CORP.

11. Install the differential carrier sun gear thrust bearing (698) into the carrier housing.
12. Remove each planetary pinion gear pin (712) from its pinion gear (711). Be careful not to move the rollers out of position.

13. Affix two pinion gear thrust washers (708) on each side of the pinion gear (711). Apply **J 36850** or equivalent.

IMPORTANT: Make sure that the pinion is installed in the same way that it was removed. If the gear is installed upside down, noise may result, because of the change in the gear wear pattern.

14. Install the pinion gear assemblies (711) into the carrier housing (700).
15. Install each planetary pinion gear pin (712).
16. Install the snap ring (699) over the planetary pinion gear pins.

VEHICLE SPEED SENSOR RELUCTOR WHEEL DISASSEMBLE (FWD ONLY)

Tools Required

J 22888-D Universal Bearing Puller. See **Special Tools**.

Disassembly Procedure

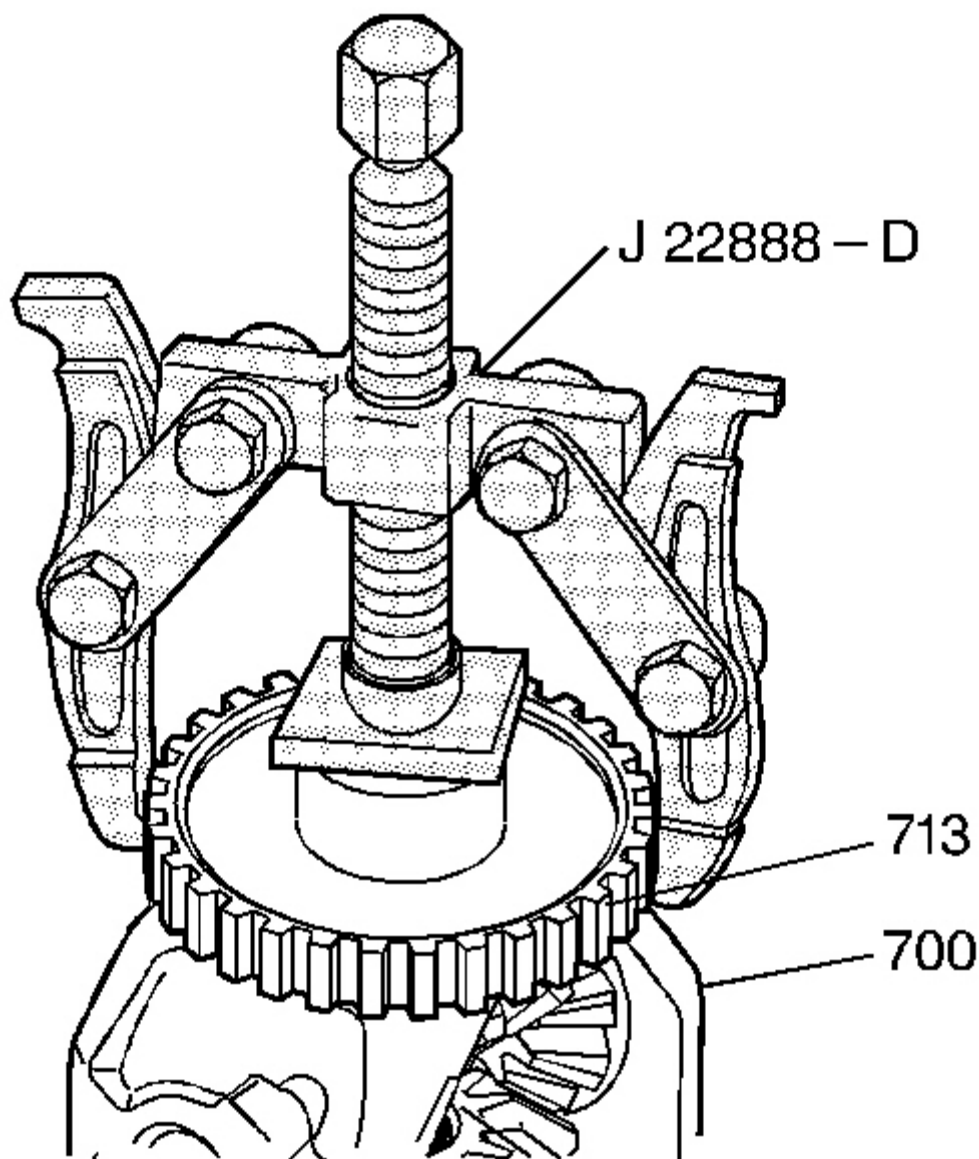


Fig. 133: Removing Vehicle Speed Sensor Reluctor Wheel
Courtesy of GENERAL MOTORS CORP.

1. Do not remove the vehicle speed sensor reluctor wheel (713) unless the wheel is damaged.
2. Use J 22888-D and a piece of flat metal stock in order to remove the vehicle speed sensor

reluctor wheel (713). See **Special Tools**.

VEHICLE SPEED SENSOR RELUCTOR WHEEL ASSEMBLY (FWD ONLY)

Assembly Procedure

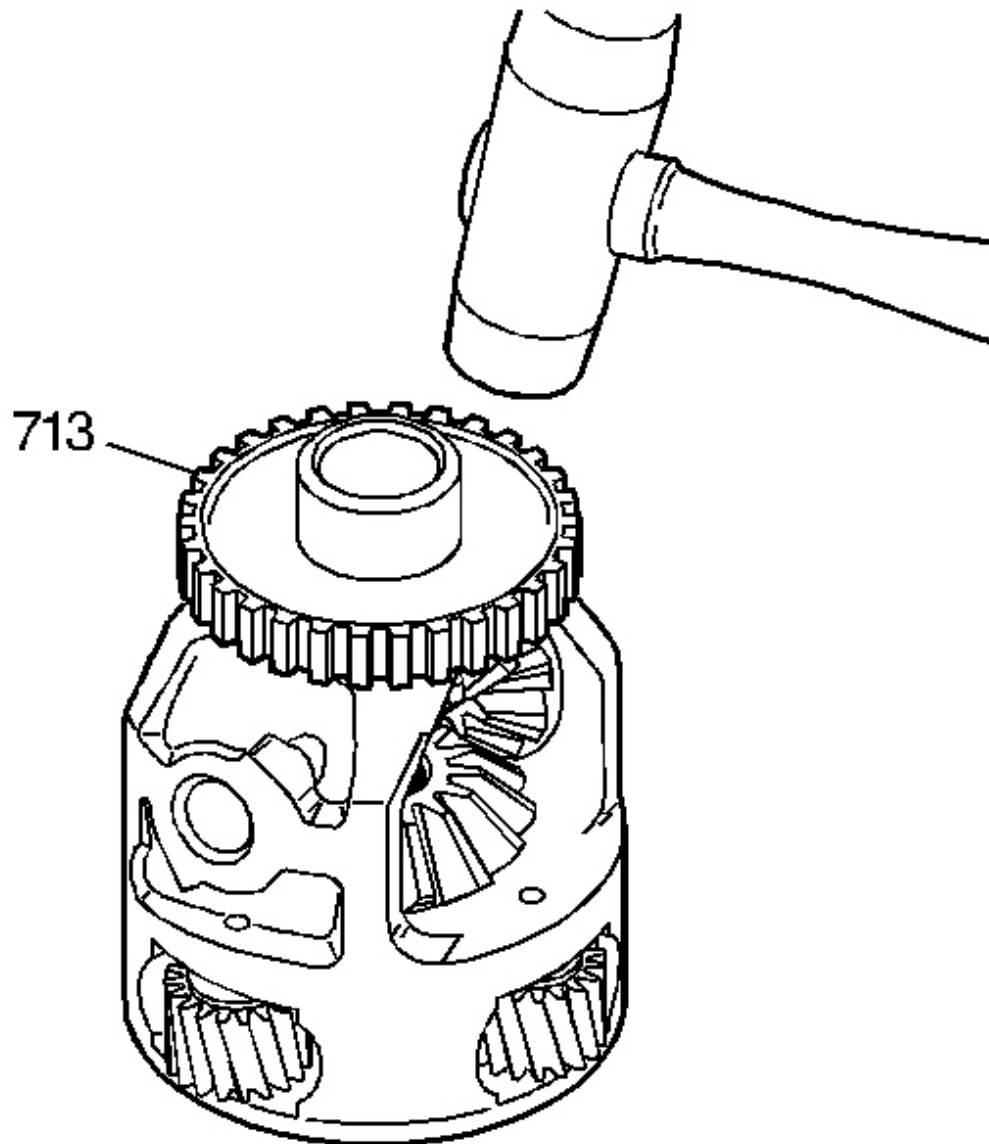


Fig. 134: Installing Vehicle Speed Sensor Reluctor Wheel

Courtesy of GENERAL MOTORS CORP.

1. Warm the vehicle speed sensor reluctor wheel before installation
2. Use a plastic mallet in order to install the vehicle speed sensor reluctor wheel (713) onto the differential carrier housing. Tap evenly around the reluctor wheel with the mallet until fully seated.

DIFFERENTIAL CARRIER COMPONENTS ASSEMBLE (FWD ONLY)

Tools Required

J 36850 Assembly Lubricant (or equivalent)

Assembly Procedure

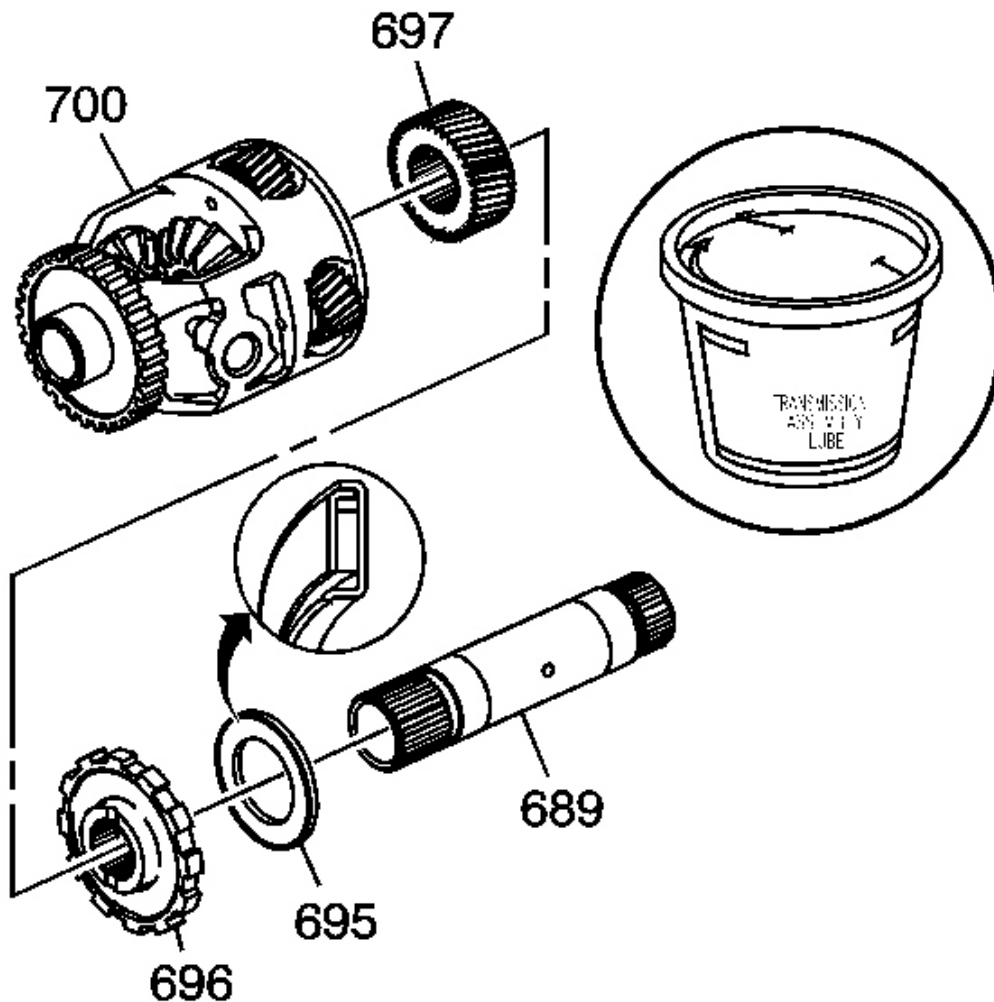


Fig. 135: Assembling Differential Carrier
Courtesy of GENERAL MOTORS CORP.

1. Assemble the final drive sun gear (697) with the chamfered side toward the parking gear (696) into the differential/final drive carrier assembly (700).
2. Assemble the parking gear (696) onto the final drive sun gear shaft (689)
3. Assemble the final drive sun gear shaft/parking gear assembly (689/696) into the final drive sun gear (697).

IMPORTANT: Apply J 36850 or equivalent to the parking gear side of the bearing (695).

4. Assemble the internal gear/parking gear thrust bearing (695) to the parking gear (696).

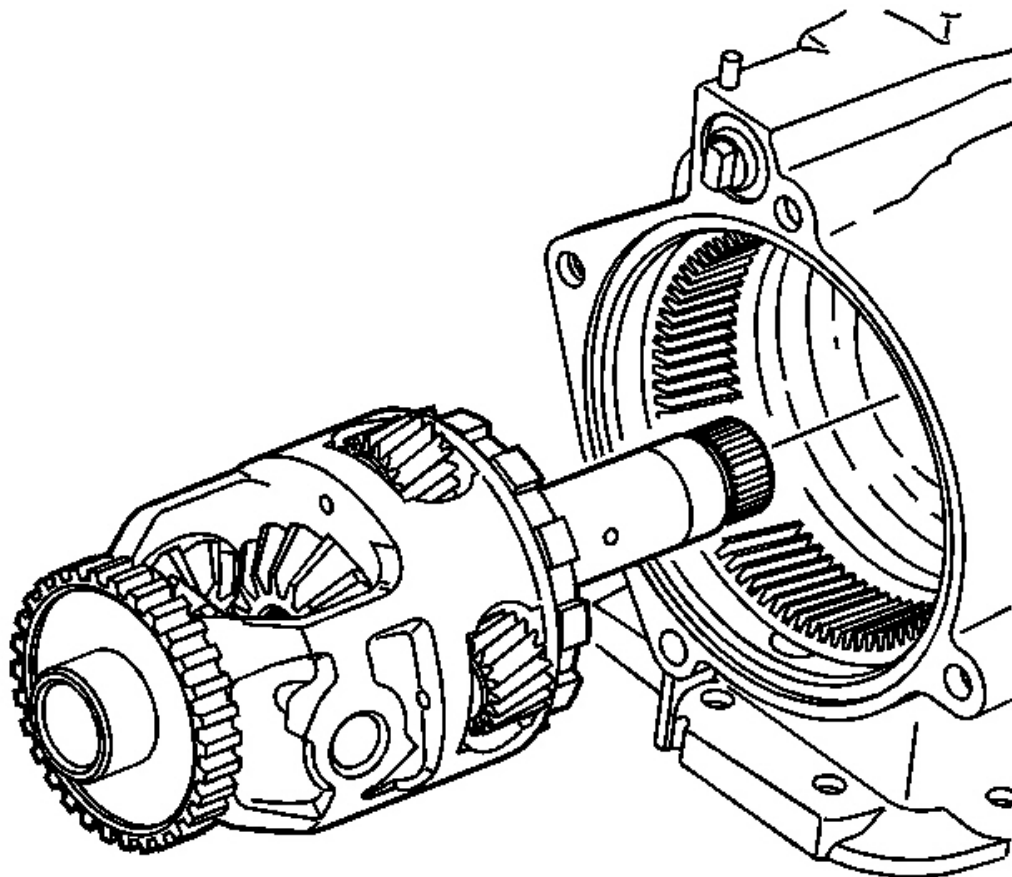


Fig. 136: Installing Differential Carrier
Courtesy of GENERAL MOTORS CORP.

5. Install the differential/final drive carrier assembly into the case.

CASE EXTENSION ASSEMBLY (FWD ONLY)

Assembly Procedure

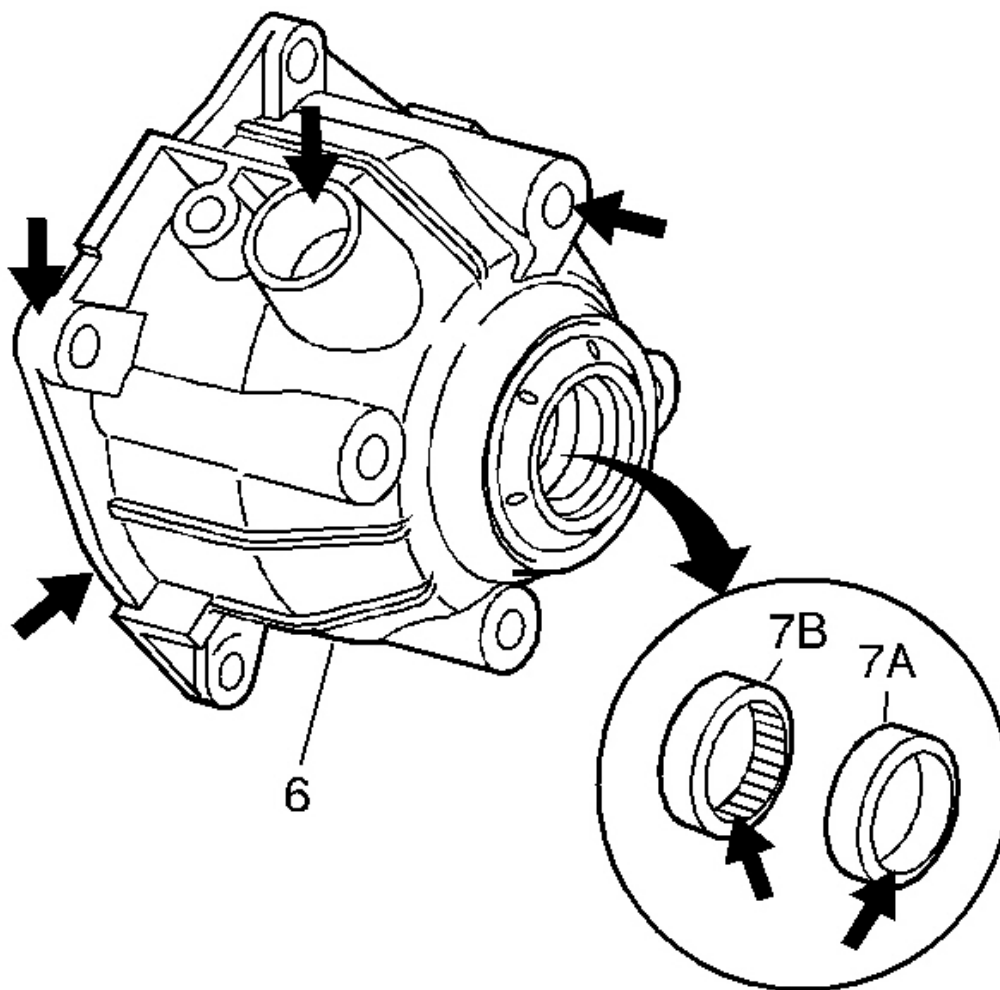


Fig. 137: Inspecting Case Extension Housing
Courtesy of GENERAL MOTORS CORP.

1. Inspect the case extension assembly (6) for the following conditions:
 - A damaged or porous sealing surface for the case extension seal
 - A damaged or porous sealing surface for the vehicle speed sensor
 - A damaged or porous sealing surface for the right drive shaft oil seal assembly
 - Damaged bolt holes
 - A worn or damaged front differential carrier bushing (7A) or output shaft bearing

assembly (7B)

- A porous or damaged case extension housing

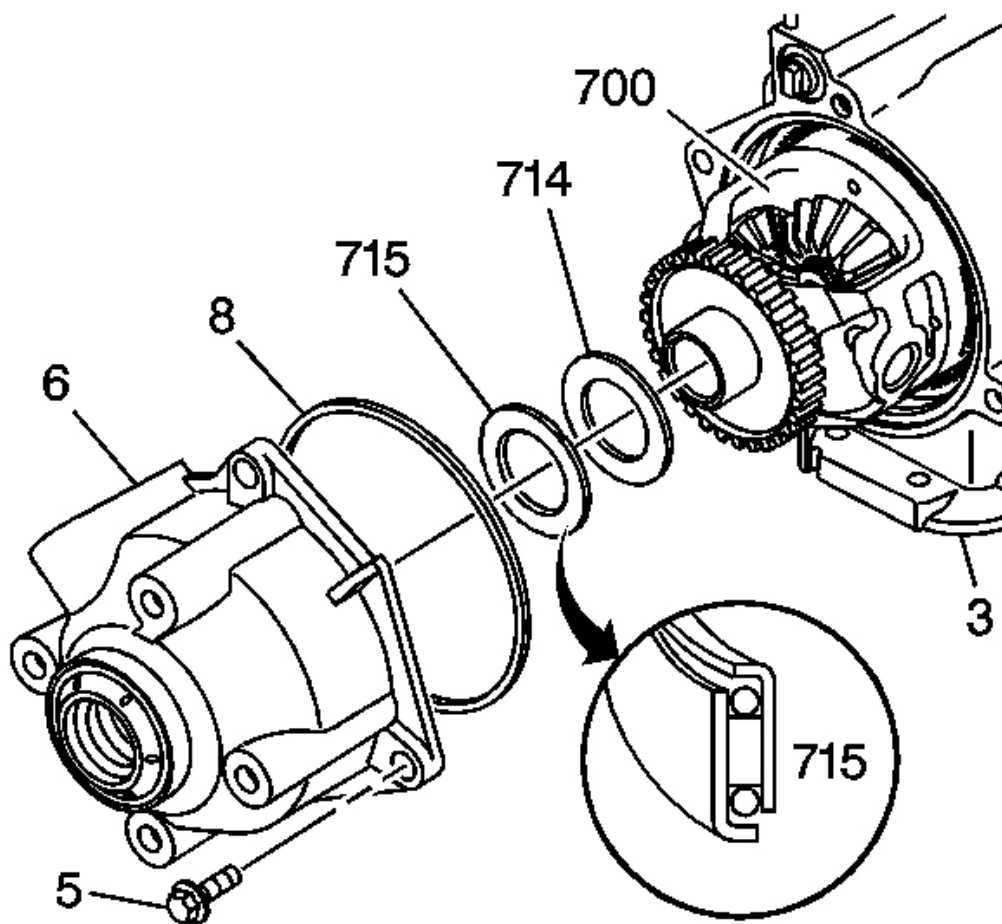


Fig. 138: Locating Differential/Final Drive Carrier Assembly Thrust Bearing
Courtesy of GENERAL MOTORS CORP.

2. Install the differential carrier/case selective thrust washer (714) onto the differential/final drive carrier assembly (700).
3. Install the thrust bearing (715) onto the differential/final drive carrier assembly (700).
4. Affix the seal (8) onto the case extension (6).
5. Install the case extension assembly (6) onto the case (3).

NOTE: Refer to **FASTENER NOTICE** in Cautions and Notices.

6. Install only two case extension bolts (5) for later removal.

Tighten: Tighten the bolts until the extension is flush to the case.

7. Perform end play check, refer to **Differential Carrier End Play Check (FWD Only)**.

FORWARD BAND ASSEMBLE

Assembly Procedure

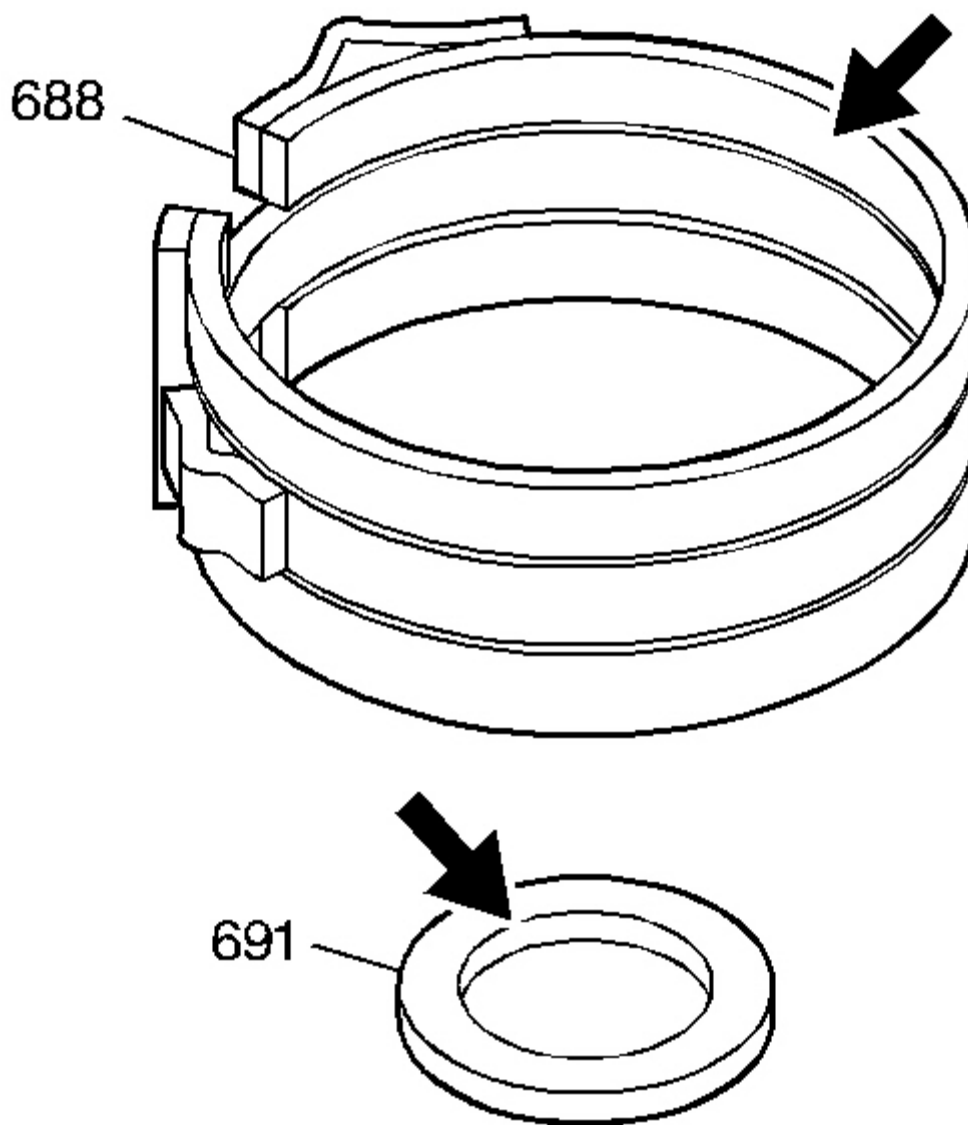


Fig. 139: View Of Forward Band Assembly Inspection Areas
Courtesy of GENERAL MOTORS CORP.

1. Inspect the forward band assembly (688) for the following conditions:
 - Damaged or severely worn friction material
 - Damaged apply or anchor pin features

2. Inspect the bearing (691) from the differential carrier internal gear for damage.

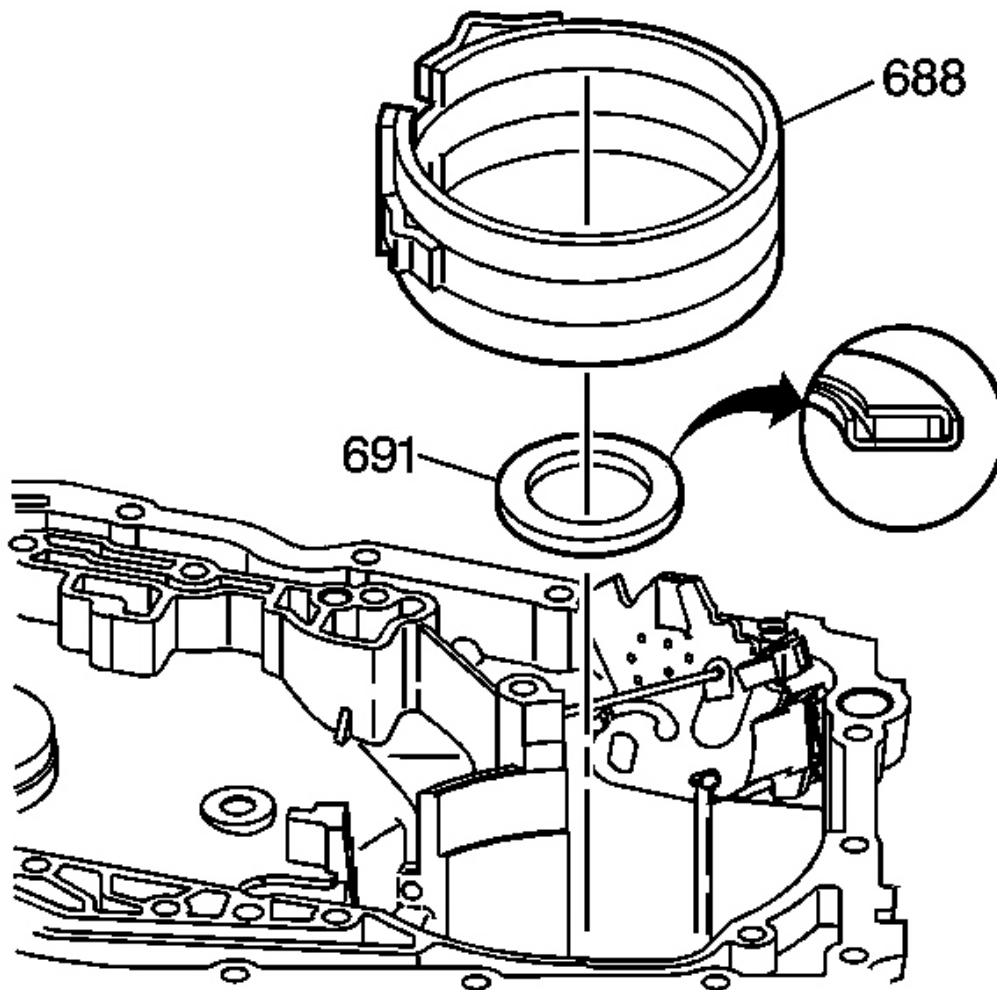


Fig. 140: Identifying Forward Band Assembly & Bearing
Courtesy of GENERAL MOTORS CORP.

3. Position the transmission case so that the flange for the case cover is facing up.
4. Install the bearing (691) for the differential carrier internal gear into the case. Position as indicated.
5. Install the forward band assembly (688) into the case.
 - Locate the band assembly onto the forward band anchor pin

- Position the band apply pin feature in the opening of the case

1-2 SUPPORT ROLLER CLUTCH DISASSEMBLE

Disassembly Procedure

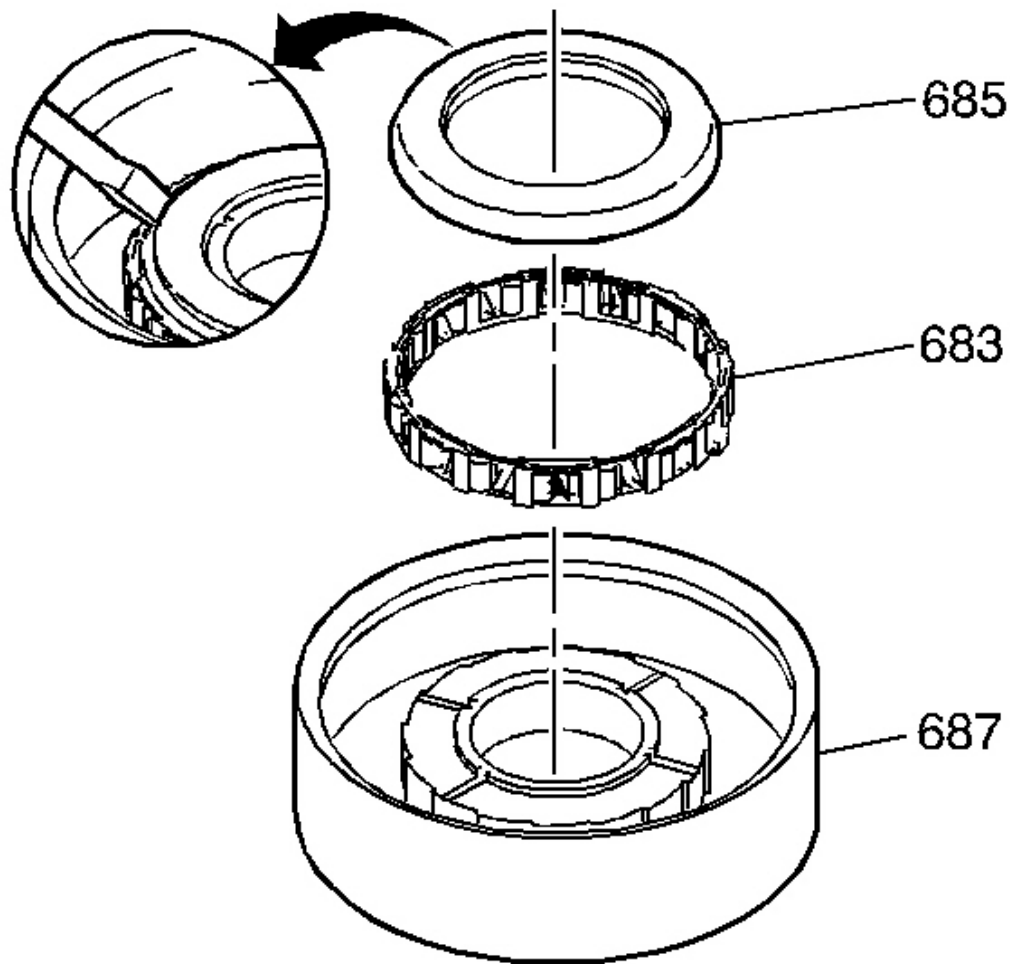


Fig. 141: Prying Thrust Bearing Off 1-2 Support Drum
Courtesy of GENERAL MOTORS CORP.

1. Use a small screwdriver in order to gently pry the thrust bearing (685) off of the 1-2 support drum (687).

2. Lift the 1-2 clutch roller assembly (683) out of the 1-2 support drum.

1-2 SUPPORT ROLLER CLUTCH ASSEMBLE

Assembly Procedure

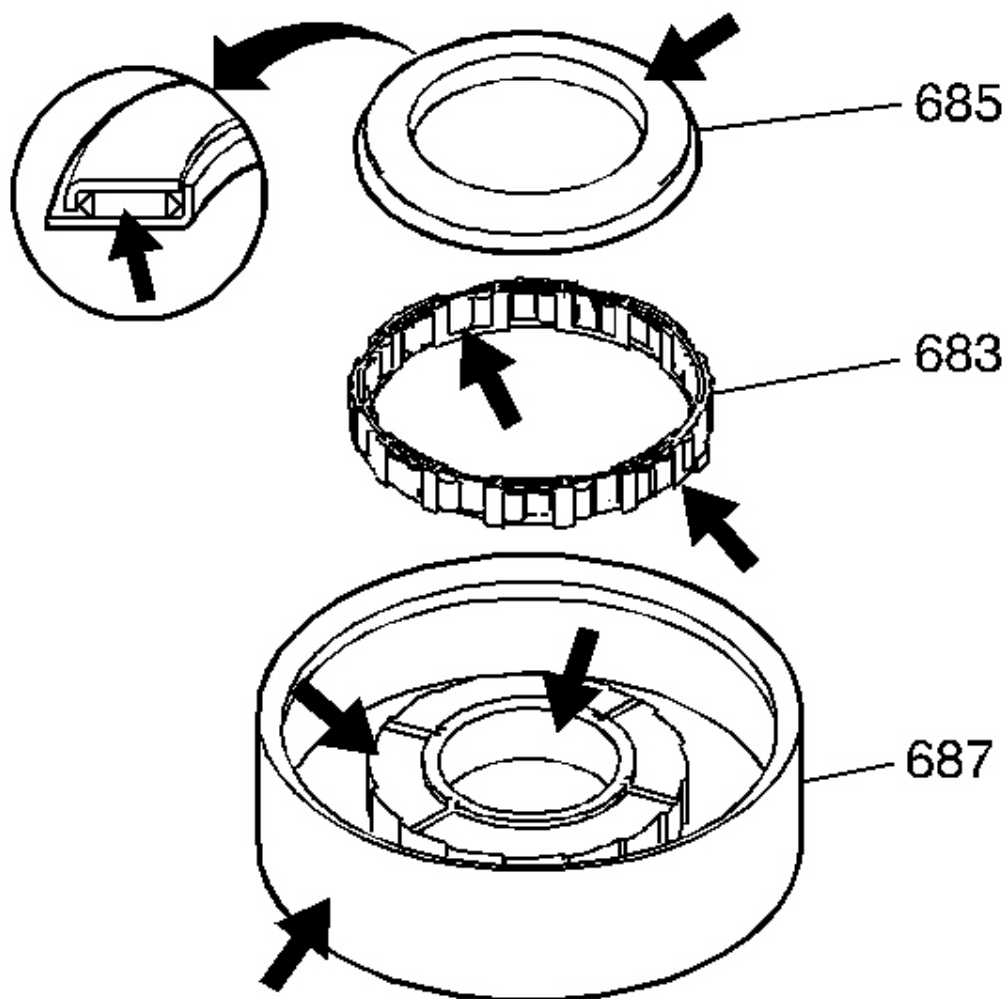


Fig. 142: Locating Inspection Areas On 1-2 Support Roller Clutch Components
Courtesy of GENERAL MOTORS CORP.

1. Inspect the 1-2 support roller clutch components for the following conditions:

- A scored or burned contact surface for the manual 2-1 band on the 1-2 support drum (687)
- A damaged or worn forward drum bushing
- A damaged or worn inner race of the 1-2 support roller clutch
- A damaged or worn 1-2 clutch roller assembly (683)
- A damaged thrust bearing (685)

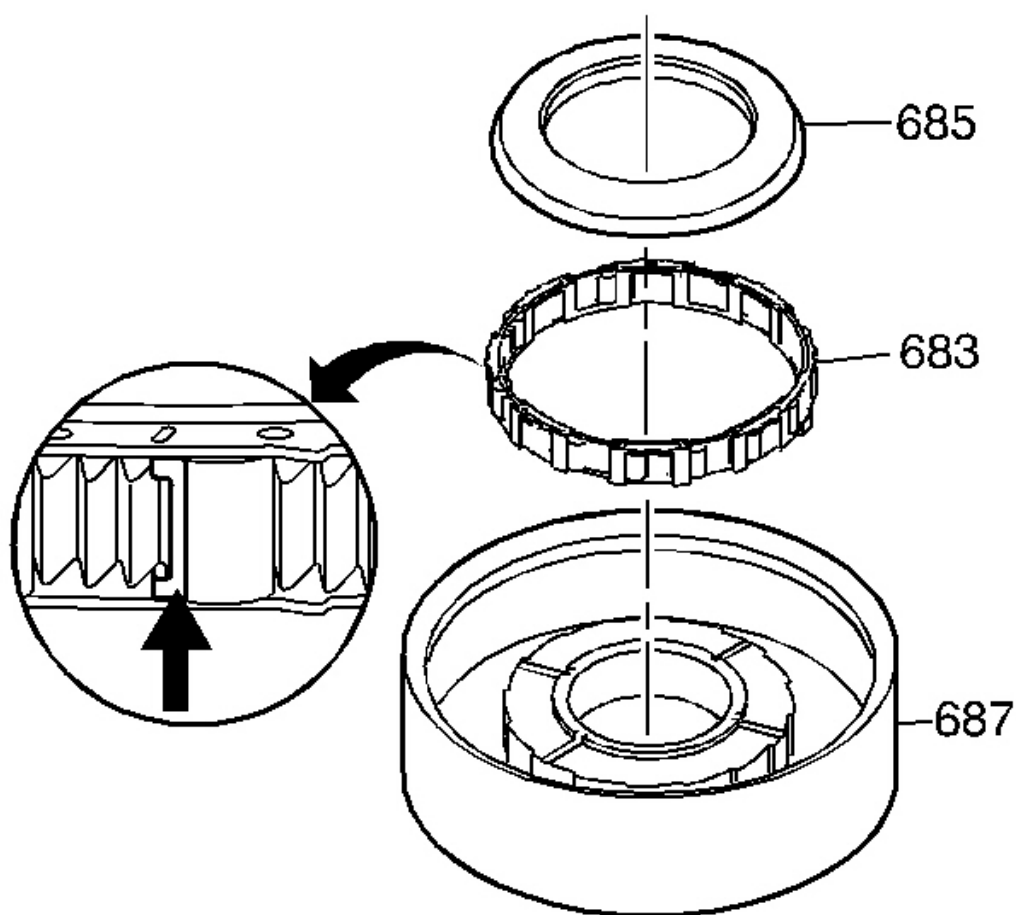


Fig. 143: Expanded View Of 1-2 Clutch Roller Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Note the position of the cage assembly to the inner race.

2. Install the 1-2 clutch roller assembly (683) into the 1-2 support drum.
3. Install the thrust bearing (685) onto the 1-2 support drum (687). Press down with hand pressure only.

1-2 SUPPORT ROLLER CLUTCH FUNCTIONAL CHECK

Checking Procedure

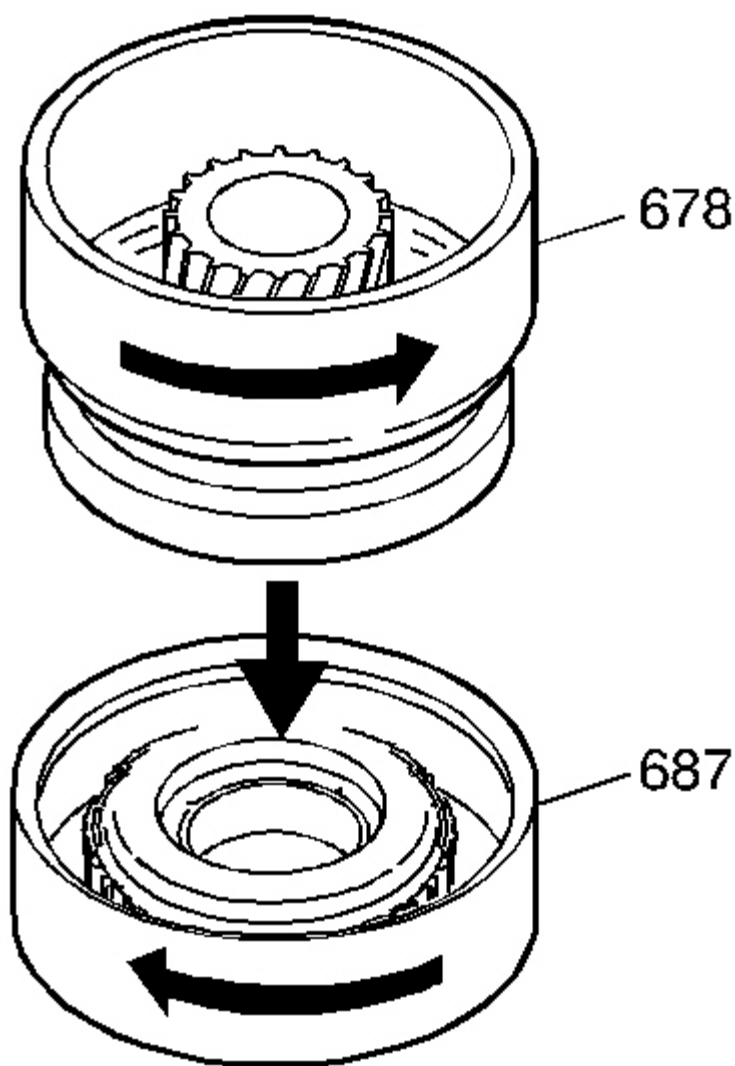


Fig. 144: Identifying 1-2 Support Drum Assembly
Courtesy of GENERAL MOTORS CORP.

1. Position the 1-2 support drum assembly (687) on the bench as shown.
2. Install the reaction sun gear assembly (678) into the 1-2 support drum (687).
3. Rotate the components as indicated by the arrows:
 - The roller clutch should move freely in the indicated directions
 - The roller clutch should lock in the direction opposite of that indicated
4. If the roller clutch does not function as described, reassemble the clutch correctly or replace the assembly.

1-2 SUPPORT DRUM ASSEMBLE

Tools Required

J 38358-A 1-2 Support Remover/Installer

Assembly Procedure

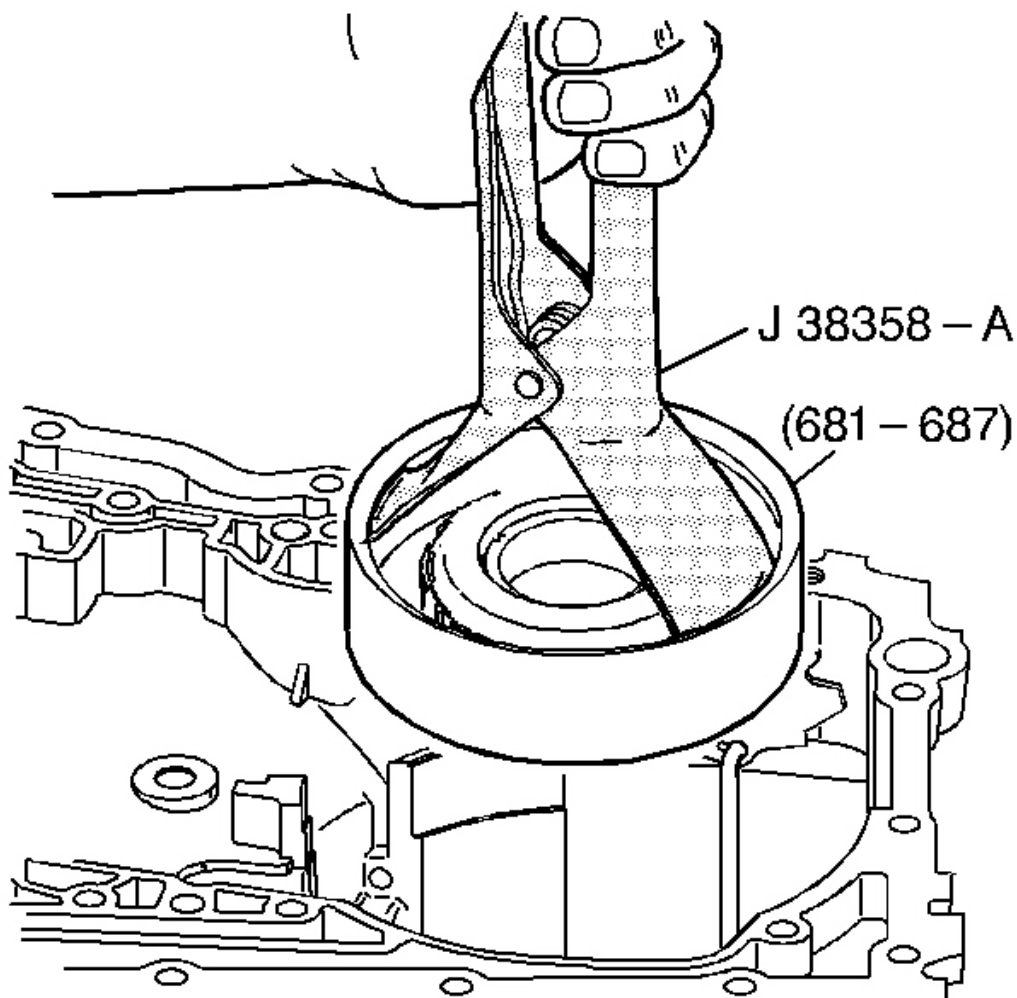


Fig. 145: Removing 1-2 Support Drum Out Of The Case Using J 38358-A
Courtesy of GENERAL MOTORS CORP.

Use **J 38358-A** in order to assemble the 1-2 support drum assembly (681-687) into the case.

2-1 MANUAL BAND ASSEMBLE

Assembly Procedure

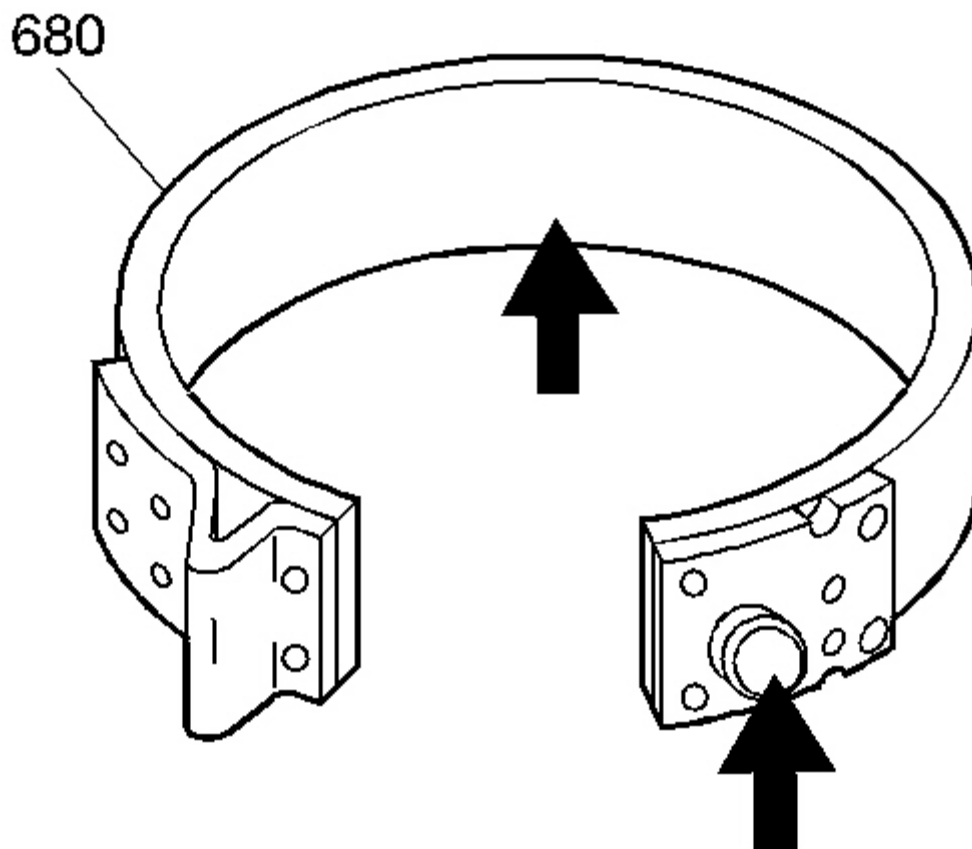


Fig. 146: Identifying Inspection Areas On 2-1 Manual Band
Courtesy of GENERAL MOTORS CORP.

1. Inspect the 2-1 manual band (680) for the following:
 - Cracked or separated friction material
 - Burnt friction material
 - Cracks around the apply lugs

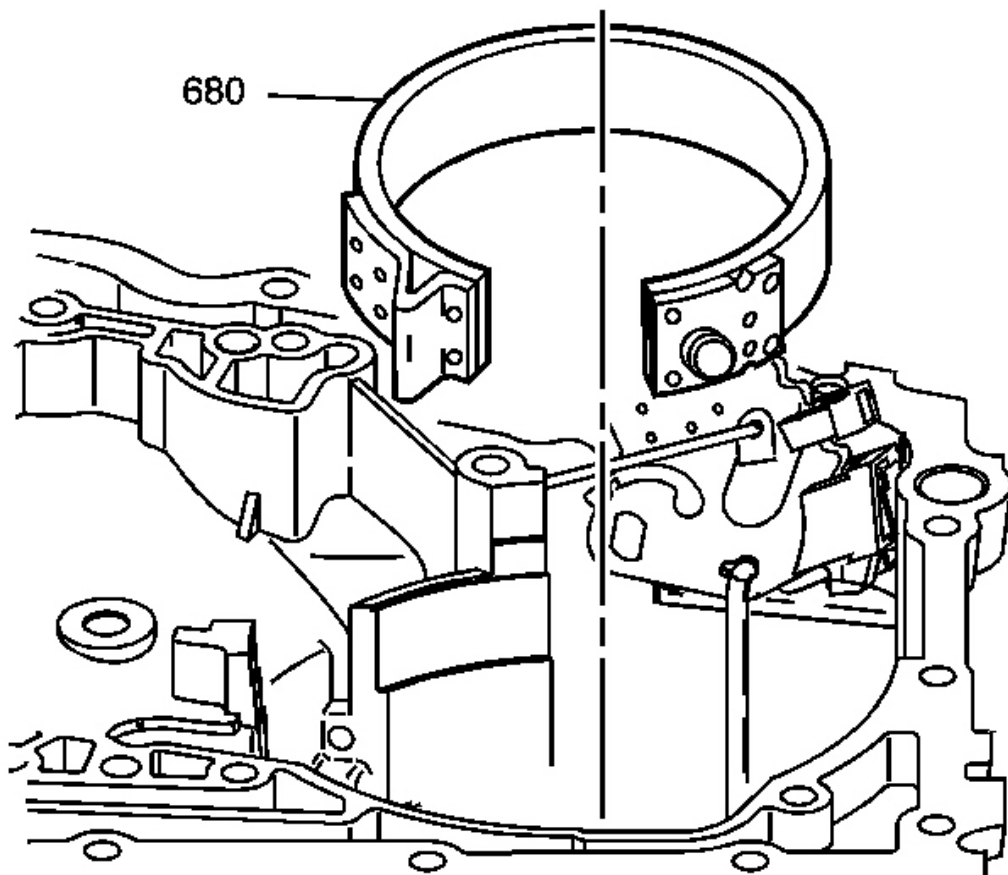


Fig. 147: View Of Manual 2-1 Band Assembly
Courtesy of GENERAL MOTORS CORP.

2. Squeeze the manual 2-1 band assembly (680) and install the assembly into the case.
3. Position the band on the anchor pin.

REACTION SUN GEAR AND DRUM ASSEMBLE

Assembly Procedure

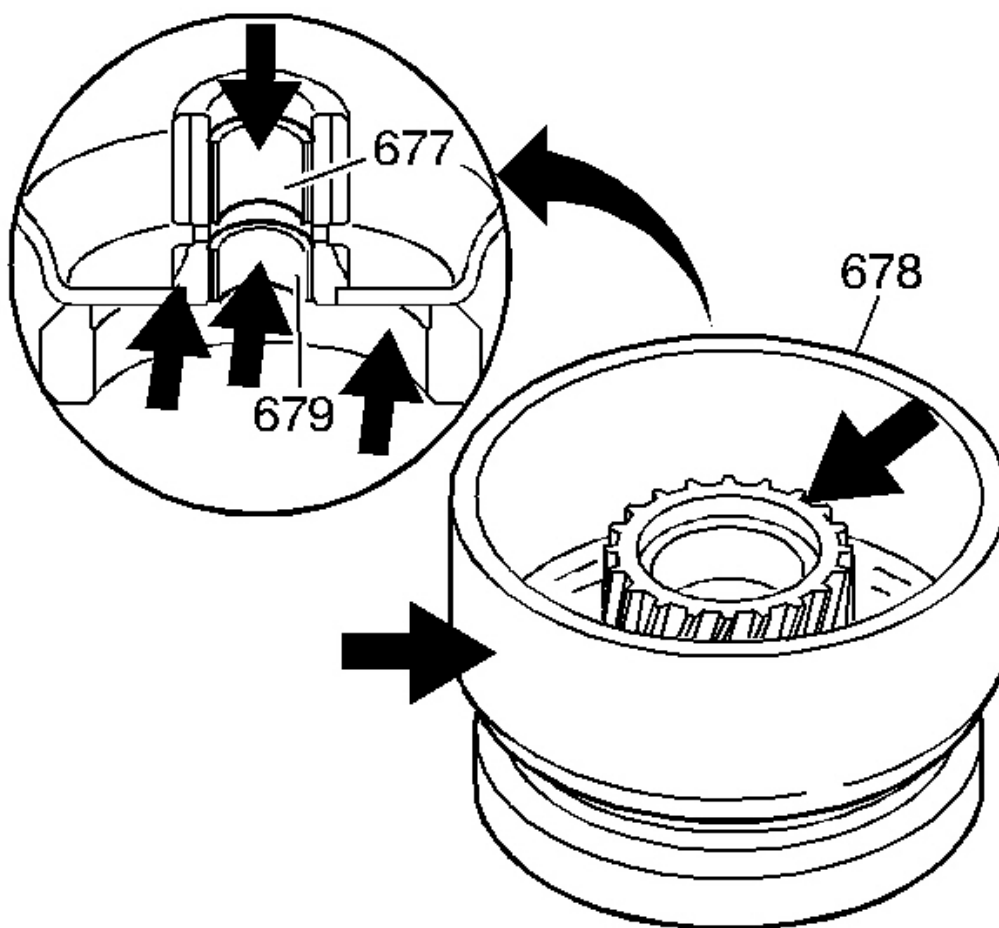


Fig. 148: Locating Inspection Areas On Reaction Sun Gear and Drum
Courtesy of GENERAL MOTORS CORP.

1. Inspect the reaction sun gear and drum assembly (678) for the following:
 - Worn or scored bushings
 - Damaged reaction sun gear teeth
 - The band apply area of the drum for discoloration or wear
 - The welds connecting the sun gear to the drum for voids or cracks
 - A worn or damaged 1-2 support outer race

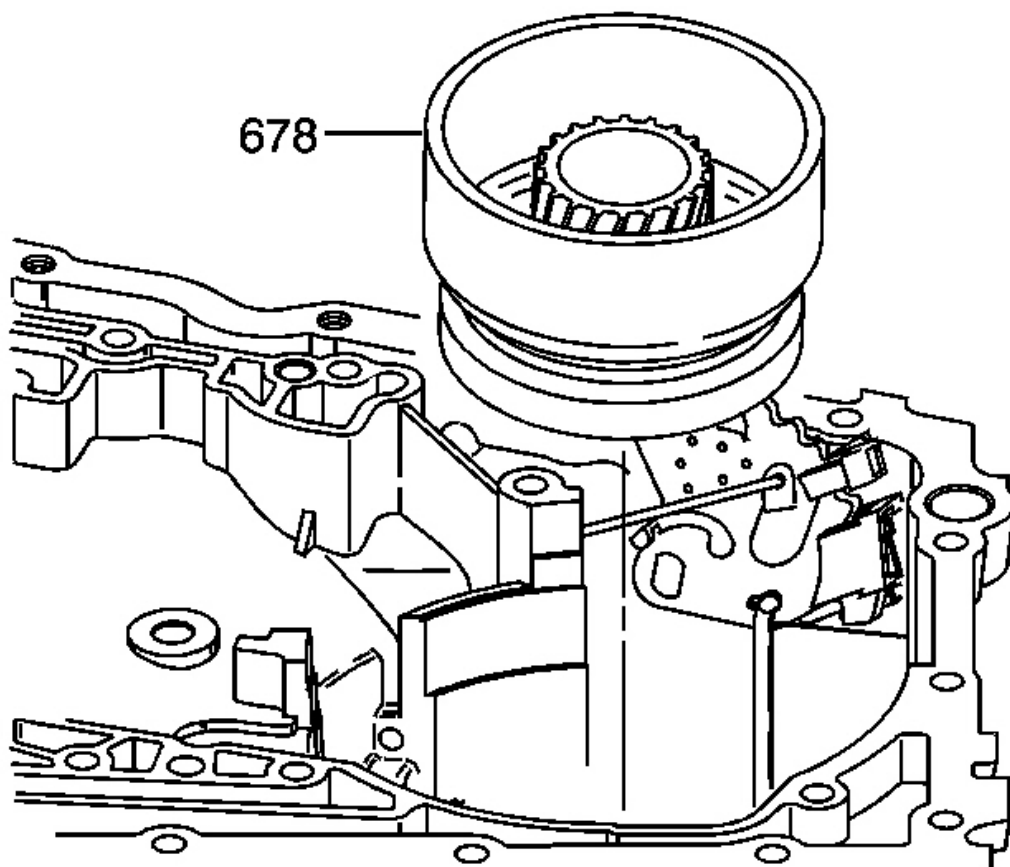


Fig. 149: Installing Reaction Sun Gear And Drum Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the reaction sun gear and drum assembly (678) into the case.
3. Check that the lugs engage with the 1-2 support roller clutch inner race.

INPUT AND REACTION CARRIER PINION END PLAY CHECK

Checking Procedure

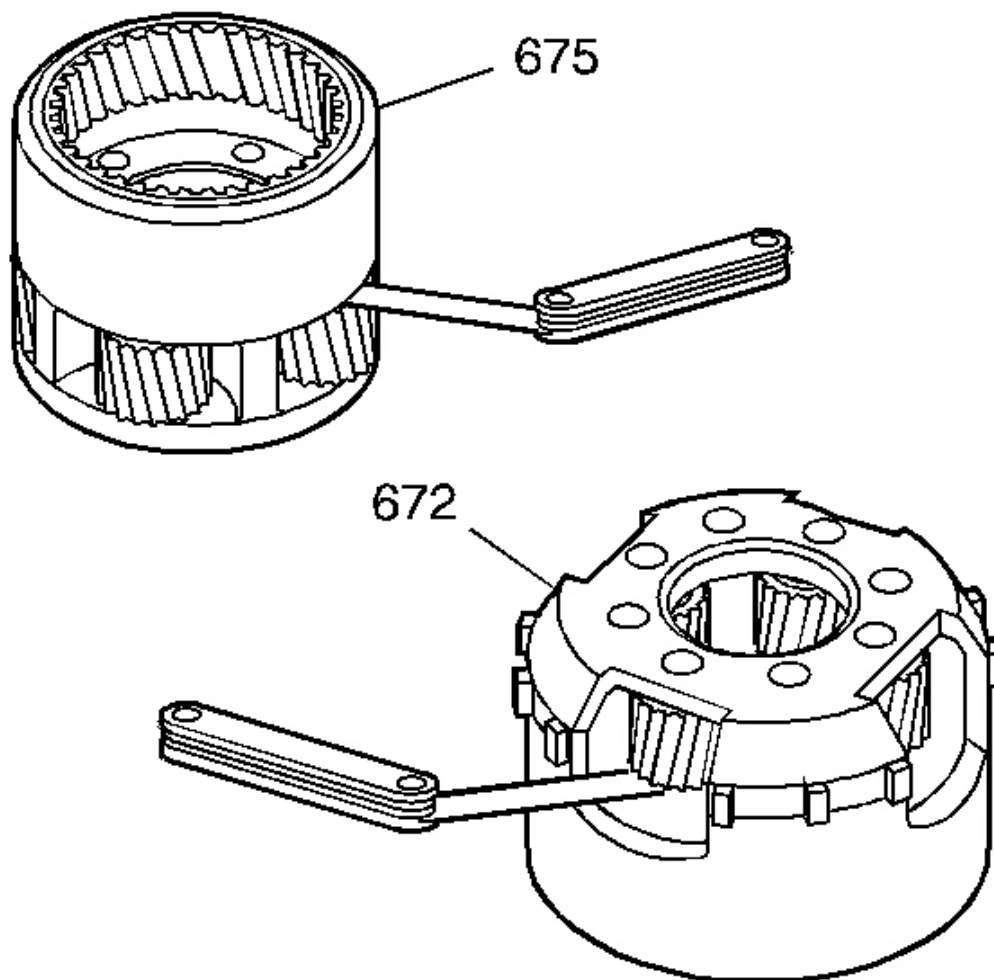


Fig. 150: Checking Input and Reaction Carrier Pinion End Play With Feeler Gage
Courtesy of GENERAL MOTORS CORP.

1. Use feeler gages in order to check for excessive pinion gear end play in the input carrier assembly (672) and in the reaction carrier assembly (675).
2. End play should measure 0.23-0.77 mm (0.009-0.030 in).

INPUT AND REACTION CARRIER ASSEMBLE

Tool Required

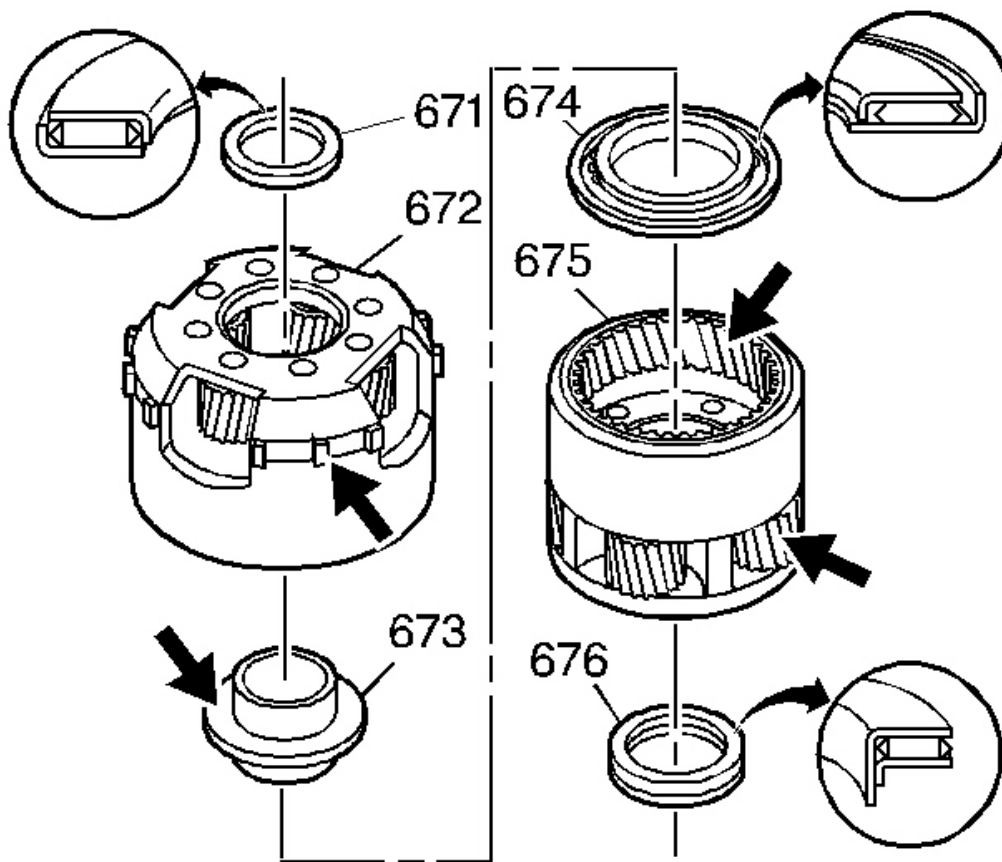
J 36850 Assembly Lubricant (or equivalent)**Assembly Procedure**

Fig. 151: Input & Reaction Carrier Components Inspection Areas
Courtesy of GENERAL MOTORS CORP.

1. Inspect the thrust bearings (671, 674, 676) for the following:
 - A damaged cage
 - Damaged or missing rollers
2. Inspect the reaction carrier assembly (675) for the following:
 - Damage to the pinion teeth
 - Damage to the internal gear teeth

3. Inspect the input carrier assembly (672) for the following:

- Damage to the pinion teeth
- Damage to the spline teeth

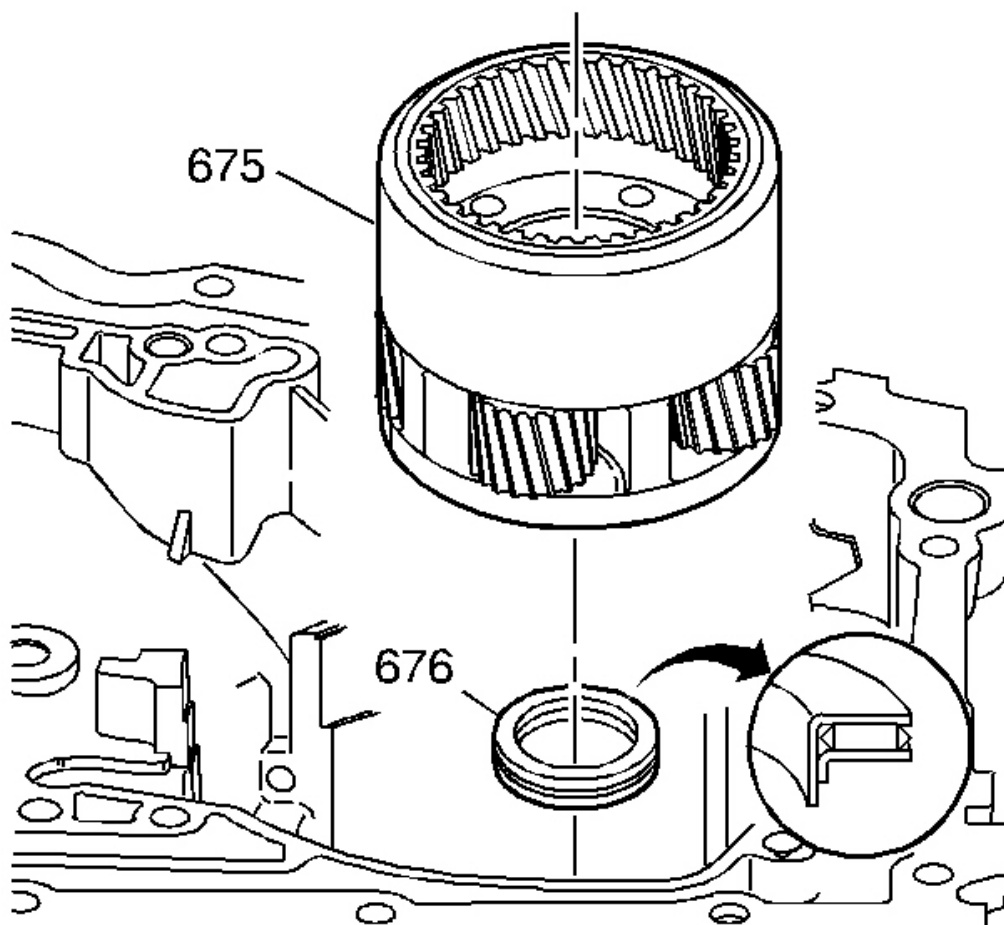


Fig. 152: Identifying Reaction Carrier/Sun Gear Thrust Bearing
Courtesy of GENERAL MOTORS CORP.

4. Install the reaction carrier/sun gear thrust bearing (676) into the reaction carrier assembly (675). Use **J 36850** or equivalent in order to retain the bearing.
5. Install the reaction carrier assembly (675) into the case and rotate the carrier so that the pinions engage the reaction sun gear.

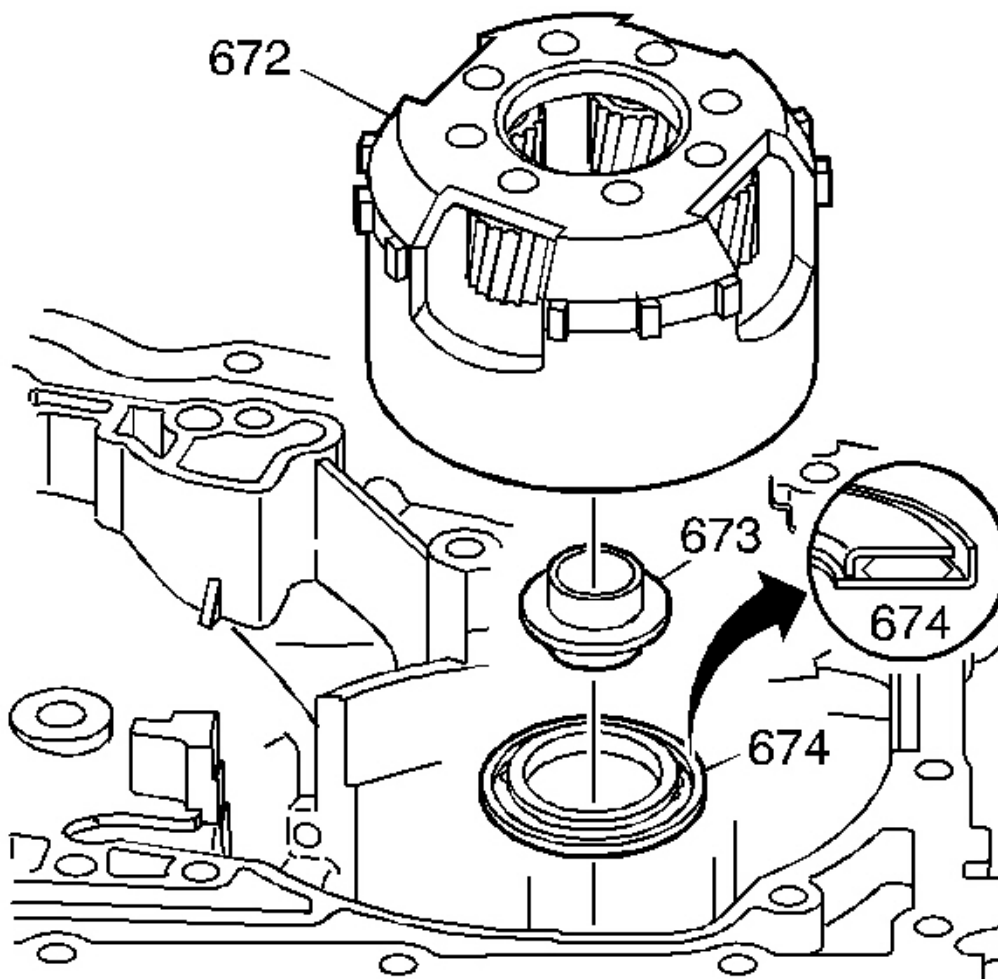


Fig. 153: Installing Input/Reaction Carrier Thrust Bearing
Courtesy of GENERAL MOTORS CORP.

6. Install the input/reaction carrier thrust bearing (674) into the input carrier assembly (672). Use **J 36850** or equivalent in order to retain the bearing.
7. Install the input carrier/reaction carrier lube dam (673) into the input carrier assembly (672). Use **J 36850** or equivalent in order to retain the lube dam.
8. Insert the input carrier assembly (672) into the case and rotate the carrier so that the pinions engage the reaction carrier internal gear.

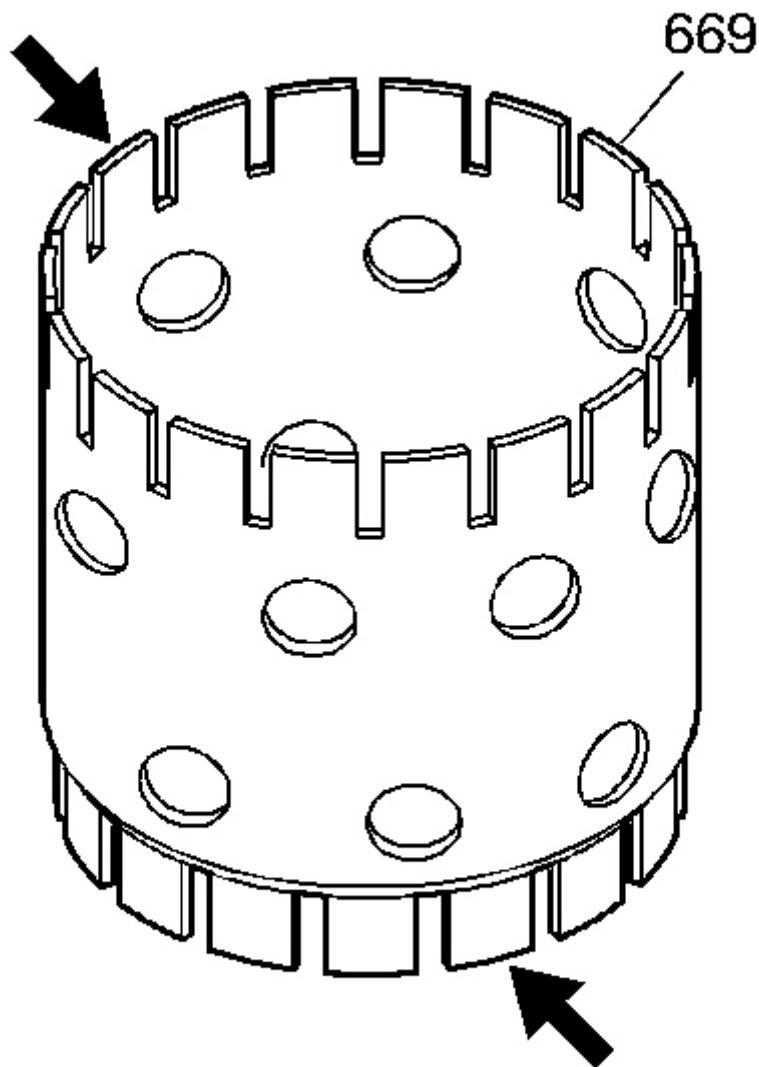
REVERSE REACTION DRUM ASSEMBLY**Assembly Procedure**

Fig. 154: Inspection Areas On Reverse Reaction Drum
Courtesy of GENERAL MOTORS CORP.

1. Inspect the reverse reaction drum (669) for the following:

- Cracks
- Damaged splines
- Distortion

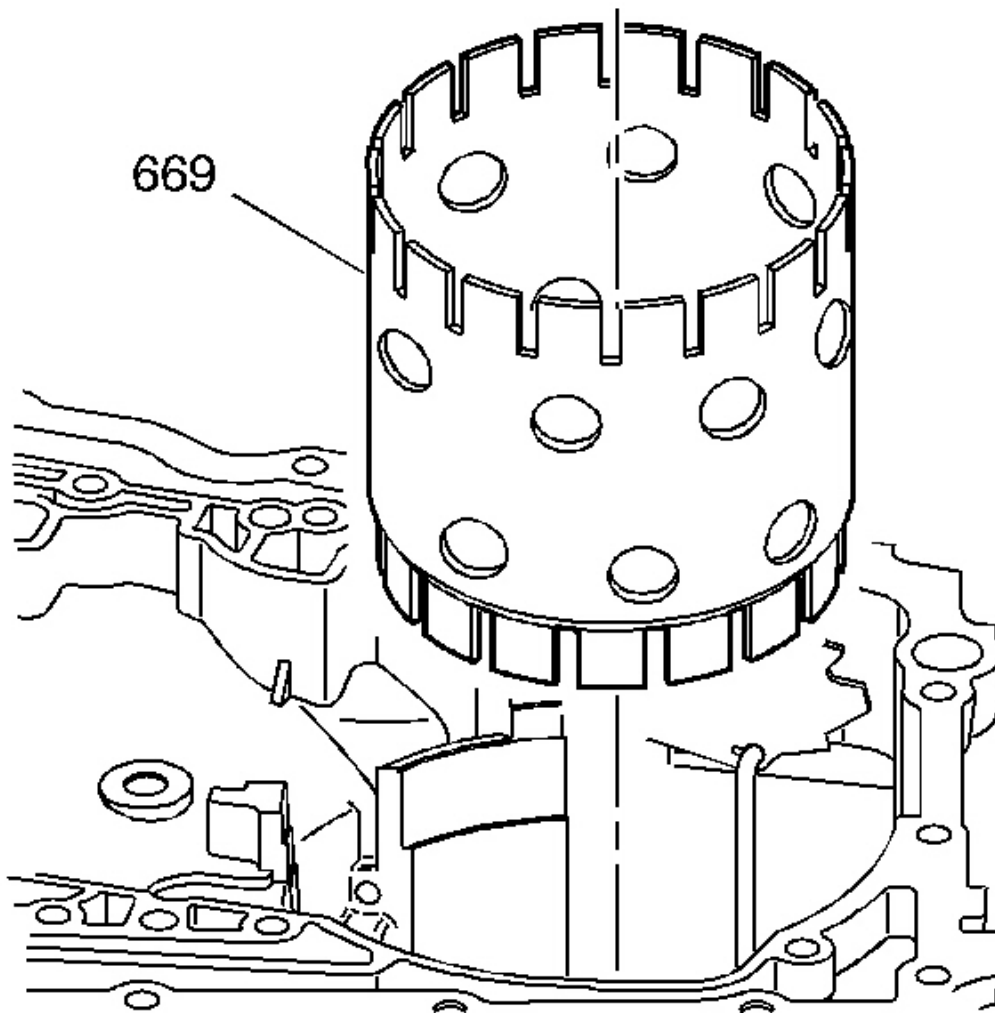


Fig. 155: View Of Reverse Reaction Drum
Courtesy of GENERAL MOTORS CORP.

2. Install the reverse reaction drum (669) into the case and engage the drum onto the input carrier splines.

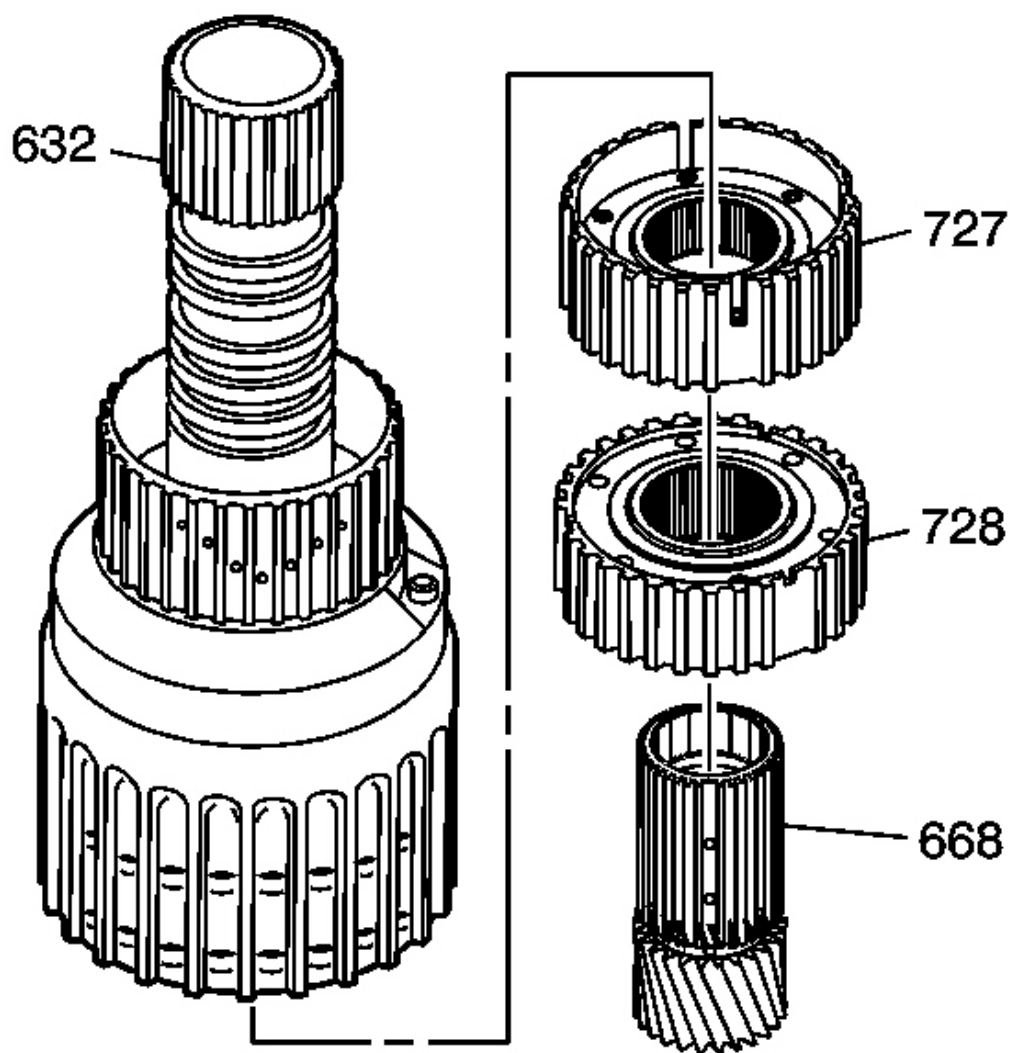
INPUT AND THIRD CLUTCH PAWL DISASSEMBLE

Fig. 156: View Of Sprag Clutch Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The third and input clutch pawl assemblies (727, 728) are serviced as assemblies, do not disassemble.

Disassemble the third and input clutch pawl assemblies (727, 728) and input sun gear shaft (668)

from the input clutch housing assembly (632).

INPUT AND THIRD CLUTCH PAWL ASSEMBLY

Assembly Procedure

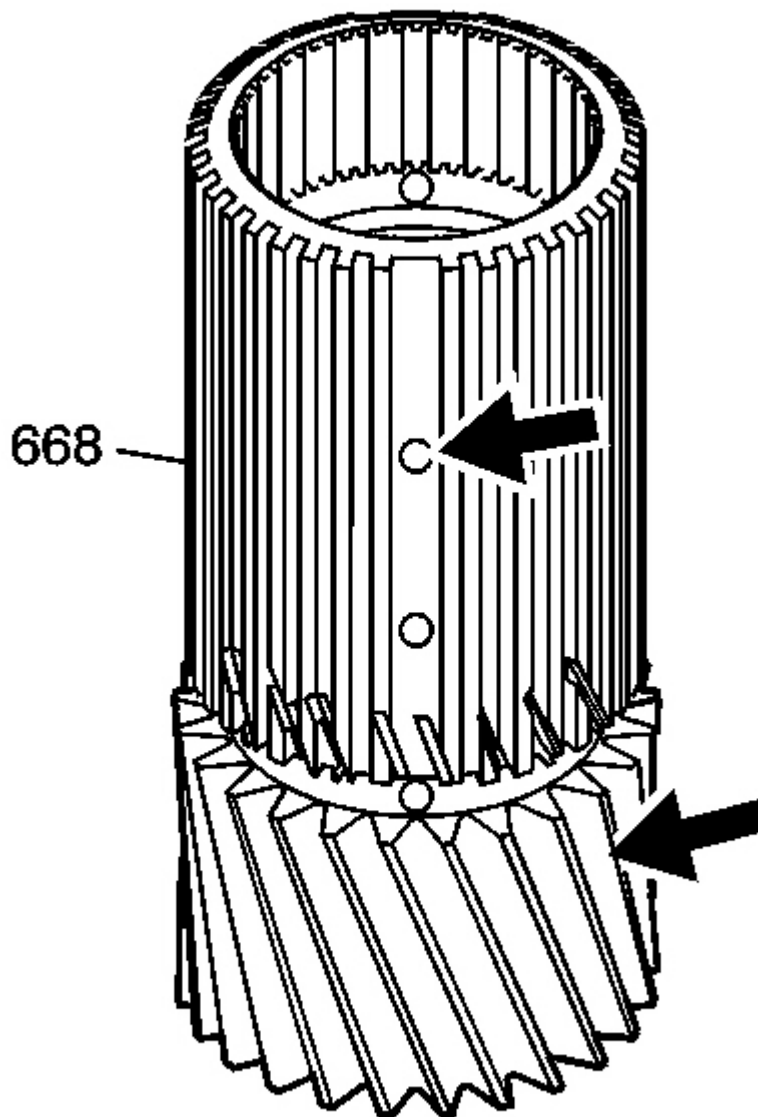


Fig. 157: Identifying Input Sun Gear

Courtesy of GENERAL MOTORS CORP.

1. Inspect the input sun gear (668) for the following:
 - Worn or damaged splines
 - Plugged lube holes or cracks

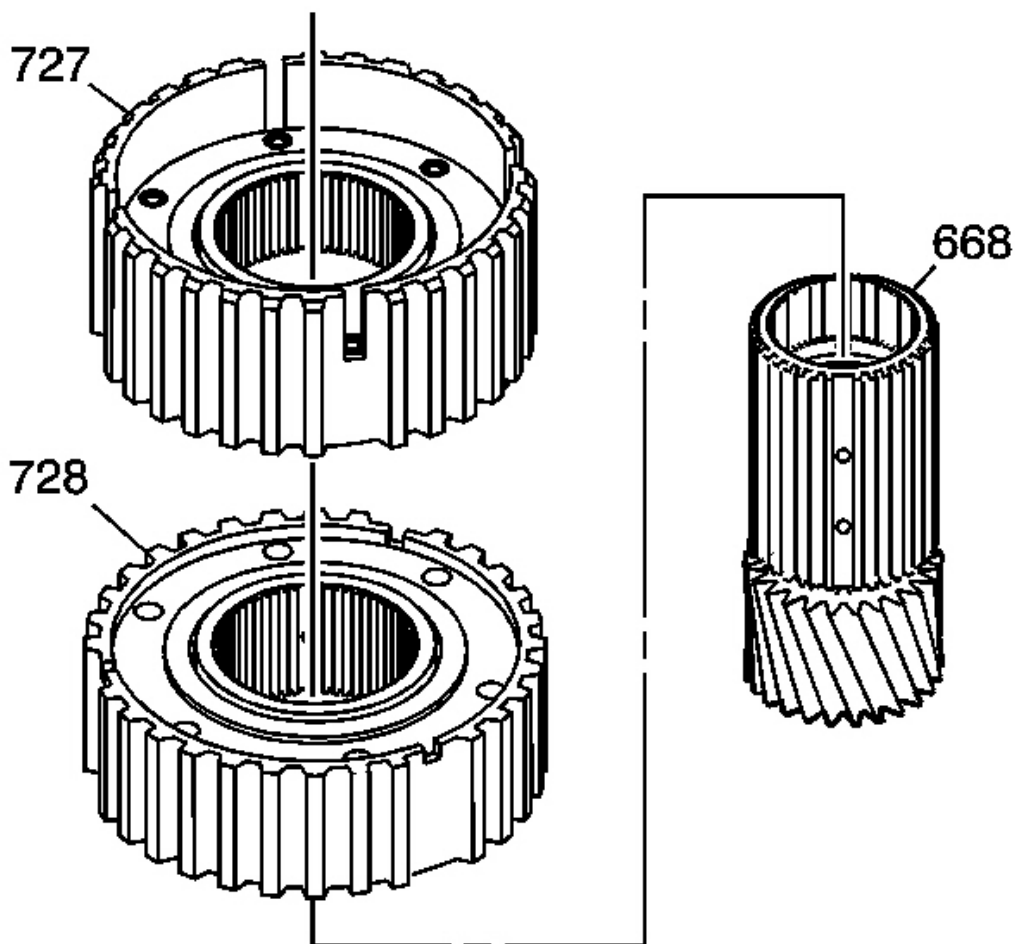


Fig. 158: Inspecting Third And Input Pawl Clutches
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The third and input clutch pawl assemblies are serviced as assemblies.

2. Inspect the third and input clutches pawl for the following:
 - Worn or damaged splines
 - Wear or cracks
3. Install the input clutch pawl assembly (728) onto the input sun gear shaft (668).
4. Install the third clutch pawl assembly (727) onto the input sun gear (668).

INPUT AND THIRD CLUTCH PAWL FUNCTIONAL CHECK

Checking Procedure

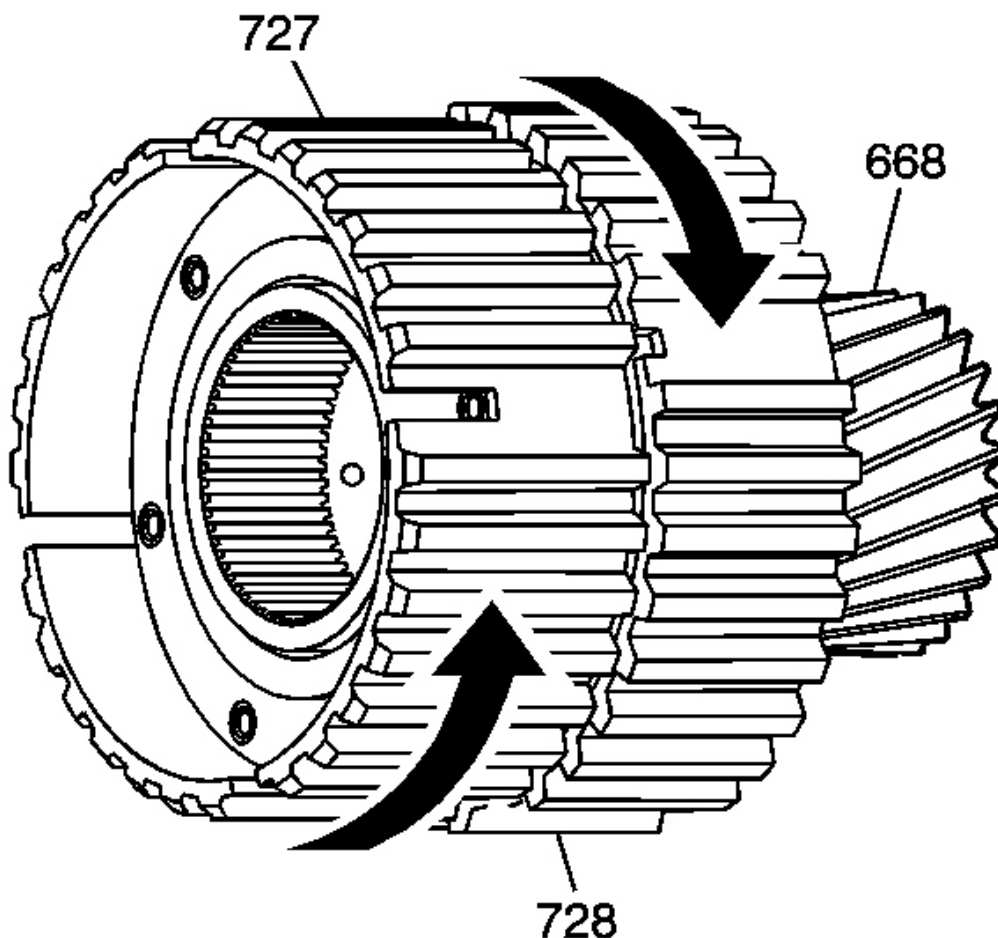


Fig. 159: Identifying Input & Third Clutch Pawl Components

Courtesy of GENERAL MOTORS CORP.

1. Hold the input sun gear (668) stationary in the position shown.
2. The third clutch pawl outer race (727) should rotate only in the direction shown by the arrow and not in the opposite direction.
3. The input clutch pawl assembly (728) should rotate only in the direction shown by the arrow and not in the opposite direction.

INPUT CLUTCH AND THIRD CLUTCH DISASSEMBLE**Tools Required**

- **J 23327** Clutch Spring Compressor
- **J 25018-A** Clutch Spring Compressor Adapter
- **J 8059** Snap Ring Pliers. See **Special Tools**.

Disassembly Procedure

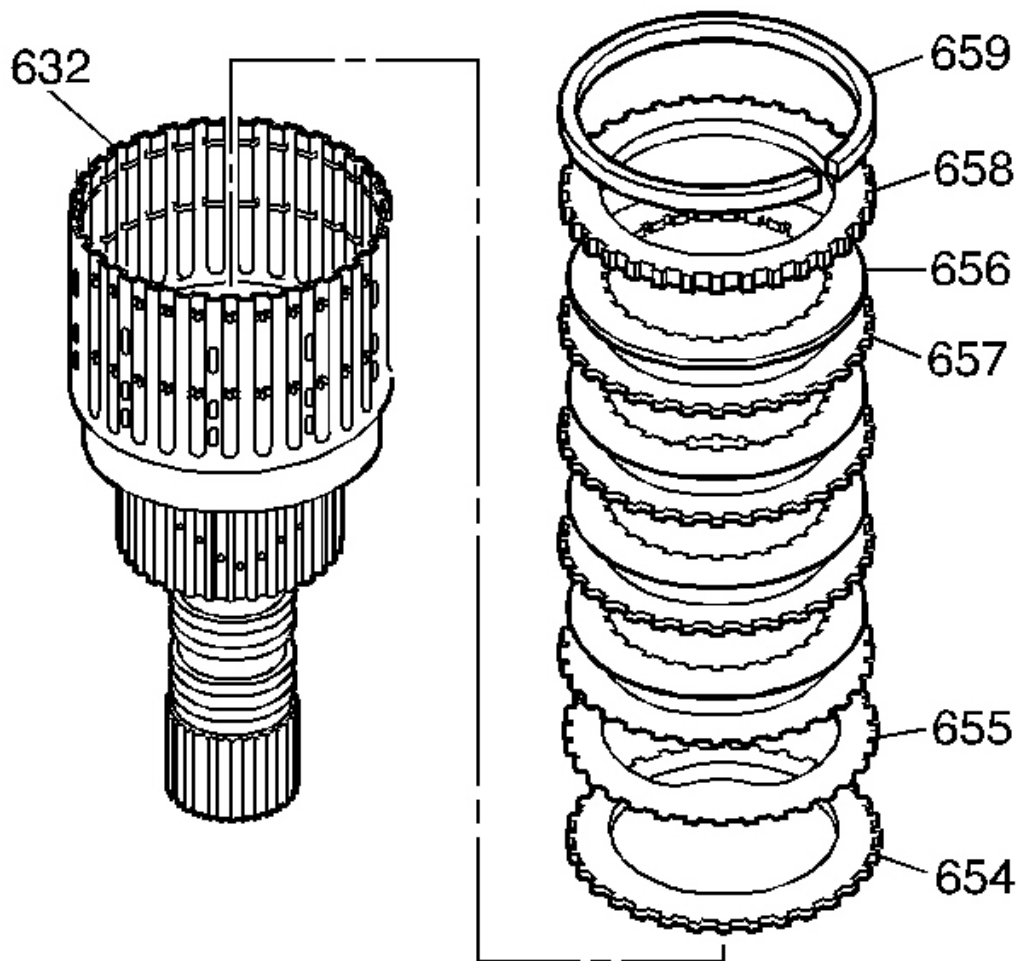


Fig. 160: View Of Input Clutch Plate Assemblies
Courtesy of GENERAL MOTORS CORP.

1. Use a flat blade screwdriver in order to remove the retaining ring (659) from the input shaft and housing assembly (632).
2. Remove the input clutch backing plate (658).
3. Remove all of the input clutch plate assemblies (656, 657).
4. Remove the input clutch waved plate (655) and the input clutch apply plate (654).

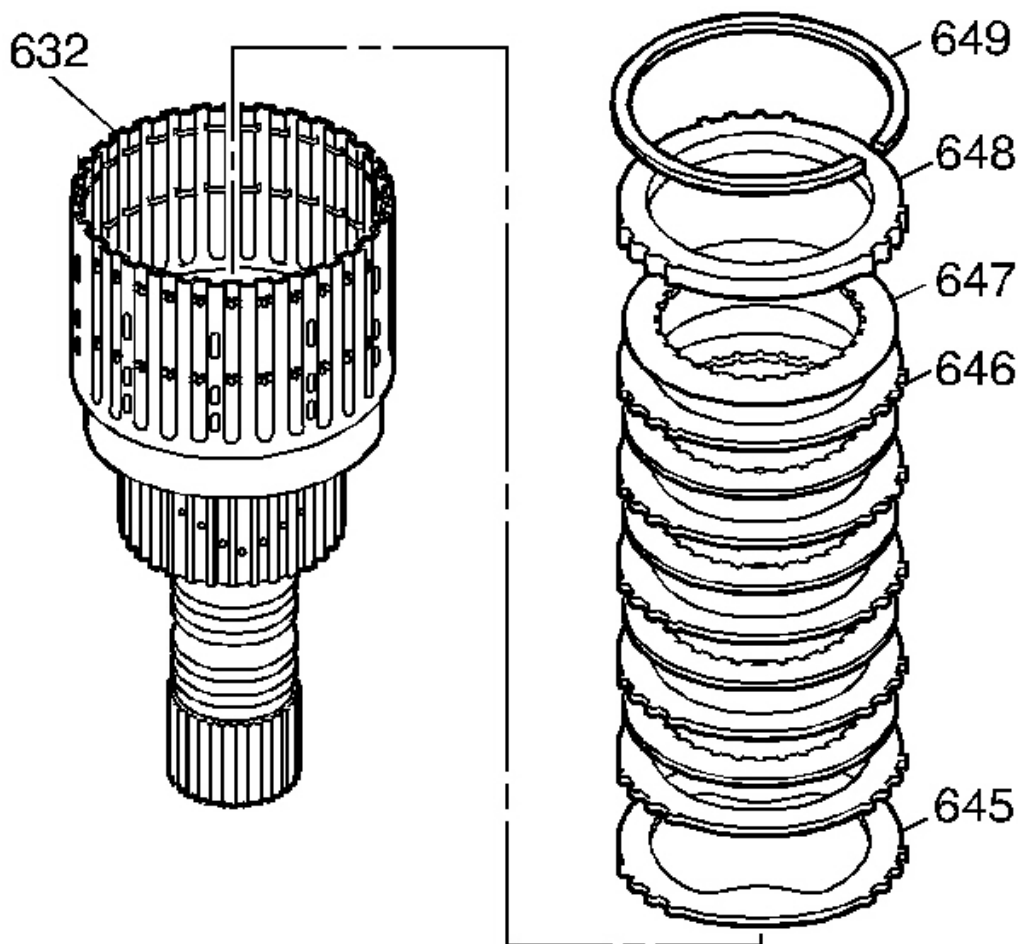


Fig. 161: Identifying Third Clutch Plates Assemblies
Courtesy of GENERAL MOTORS CORP.

5. Use a flat blade screwdriver in order to remove the retaining ring (649) from the input shaft and housing assembly (632).
6. Remove the third clutch backing plate (648)
7. Remove the third clutch plate assemblies (646, 647).
8. Remove the third clutch waved plate (645).

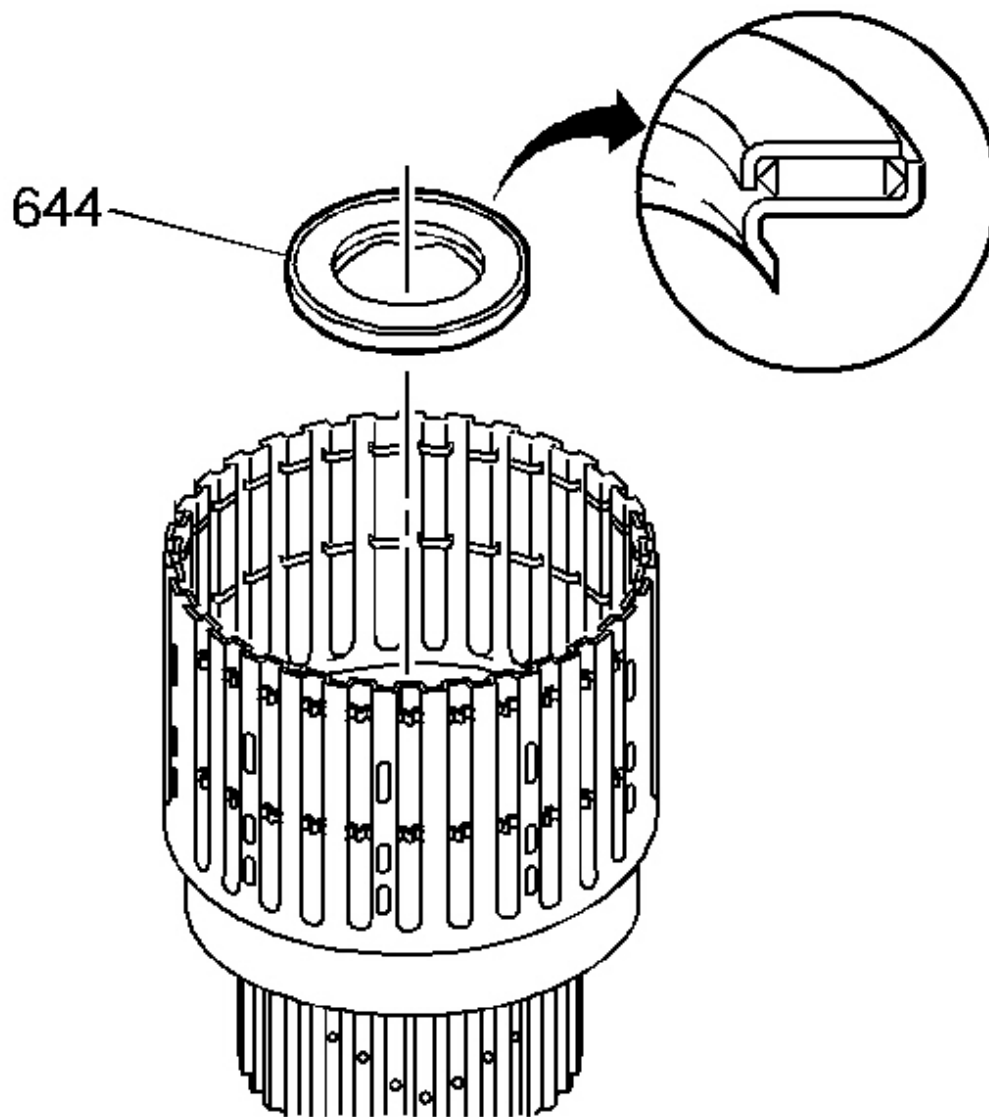


Fig. 162: Locating Input Shaft Thrust Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

9. Remove the input shaft thrust bearing assembly (644).

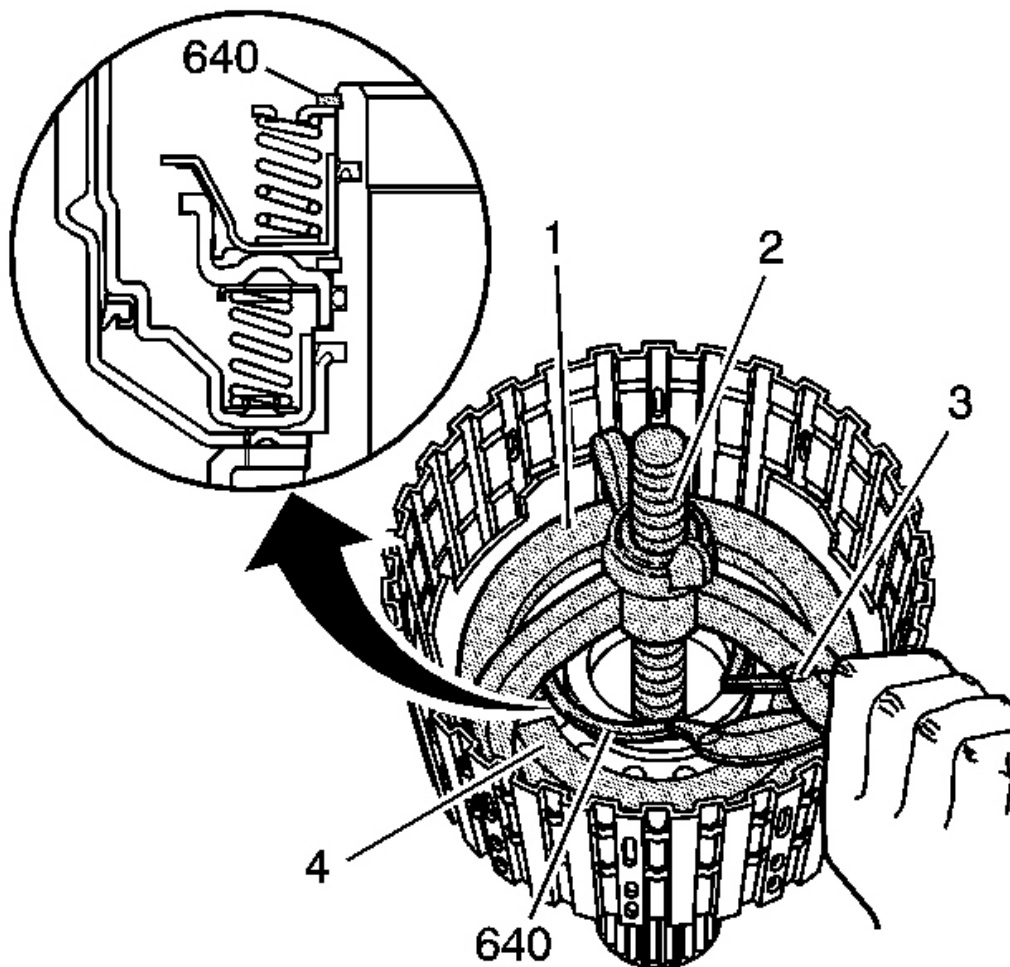


Fig. 163: Compressing The Third Clutch Spring Retainer And Guide Assembly Using J 23327, J 25018-A & J 8059
Courtesy of GENERAL MOTORS CORP.

10. Use **J 23327** and **J 25018-A** in order to compress the third clutch spring retainer and guide assembly.

IMPORTANT: Do not overexpand the retaining ring during removal.

11. Use **J 8059** in order to remove the retaining ring (640) from the input shaft and housing assembly. See **Special Tools**.

12. Remove **J 23327** and **J 25018-A** from the input shaft and housing assembly.

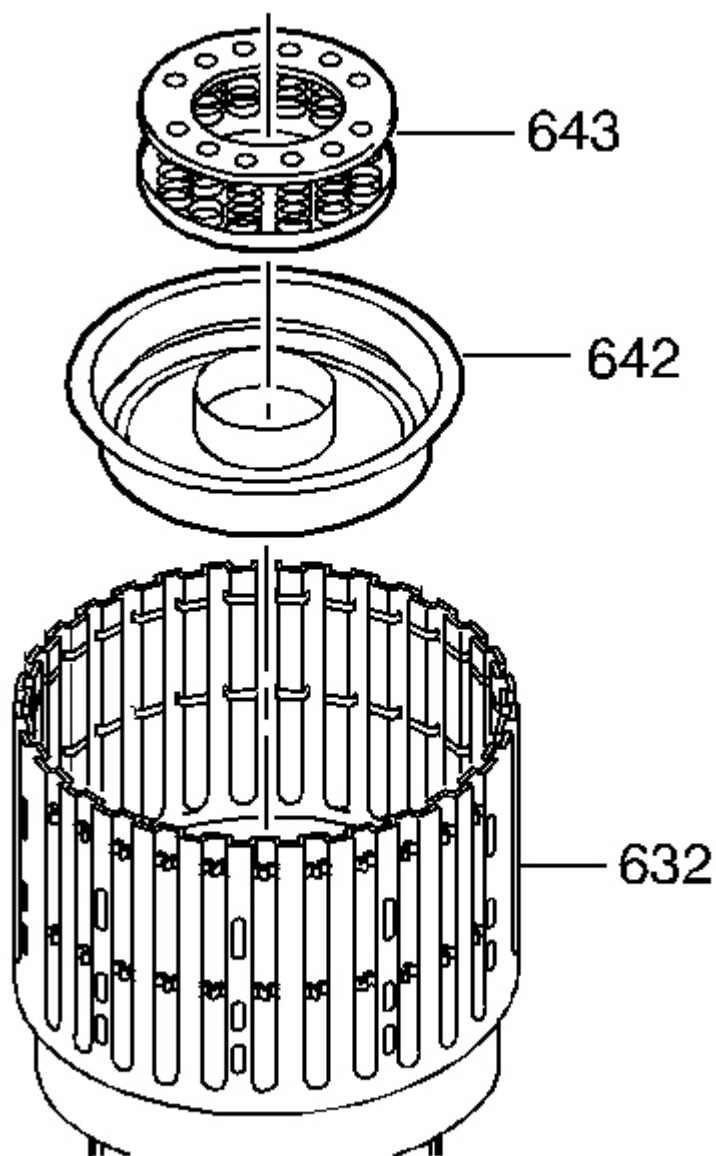


Fig. 164: Locating Third Clutch Piston And Seal Assembly
Courtesy of GENERAL MOTORS CORP.

13. Remove the third clutch retainer and guide spring assembly (643).

14. Remove the third clutch piston and seal assembly (642).

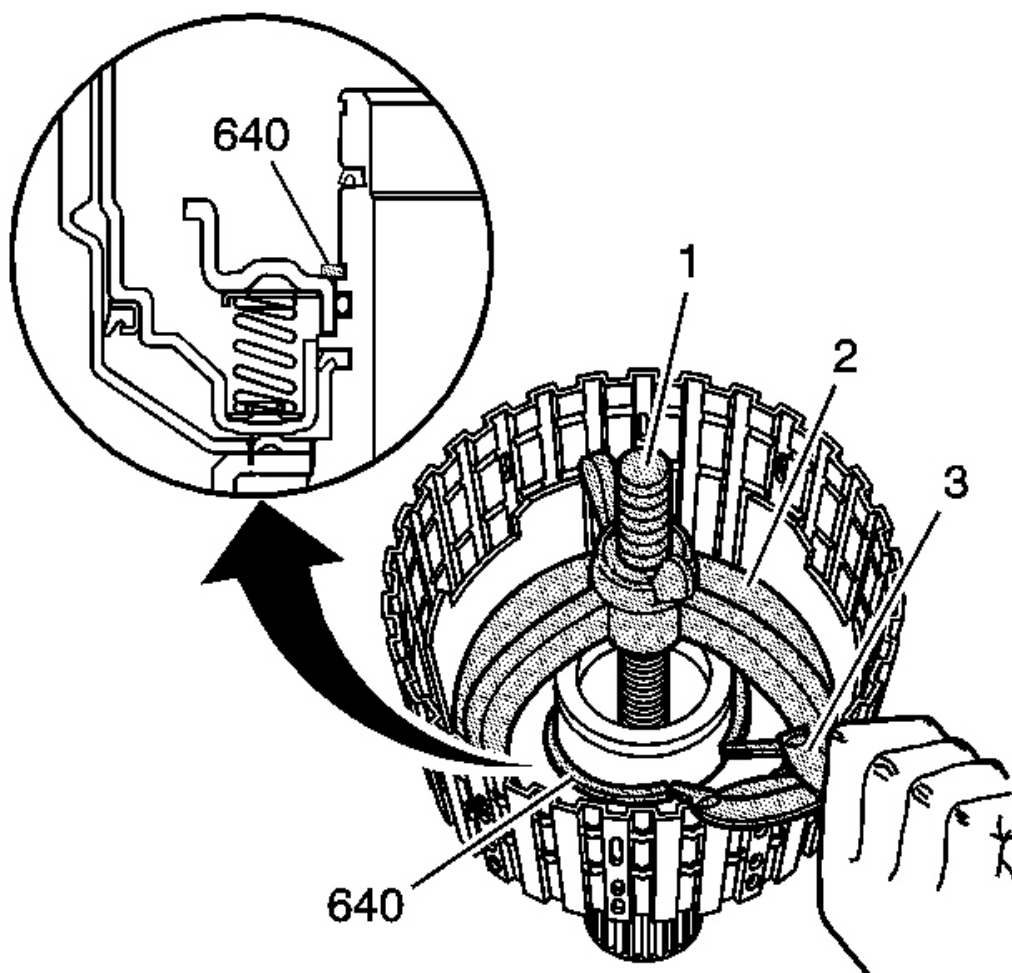


Fig. 165: Compressing The Input Clutch Spring And Retainer Assembly Using J 23327 & J 8059

Courtesy of GENERAL MOTORS CORP.

15. Use J 23327 in order to compress the input clutch spring and retainer assembly.

IMPORTANT: Do not overexpand the retainer ring during removal.

16. Use J 8059 in order to remove the retainer ring (640) from the input shaft and housing

assembly. See **Special Tools**.

17. Remove **J 23327** from the input shaft and housing assembly.

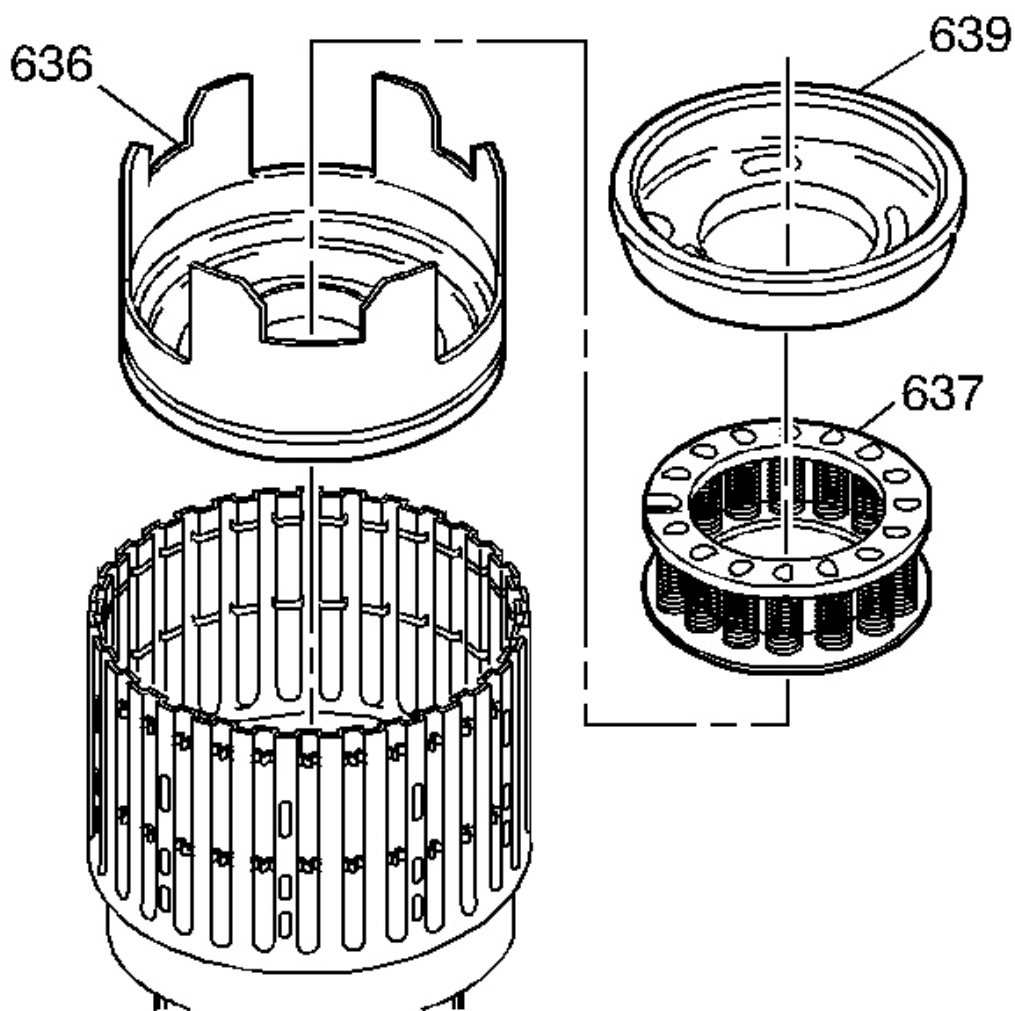


Fig. 166: View Of Input Clutch Piston Assembly
Courtesy of GENERAL MOTORS CORP.

18. Remove the third clutch piston housing (639).
19. Remove the input clutch spring and retainer assembly (637).
20. Remove the input clutch piston assembly (636).

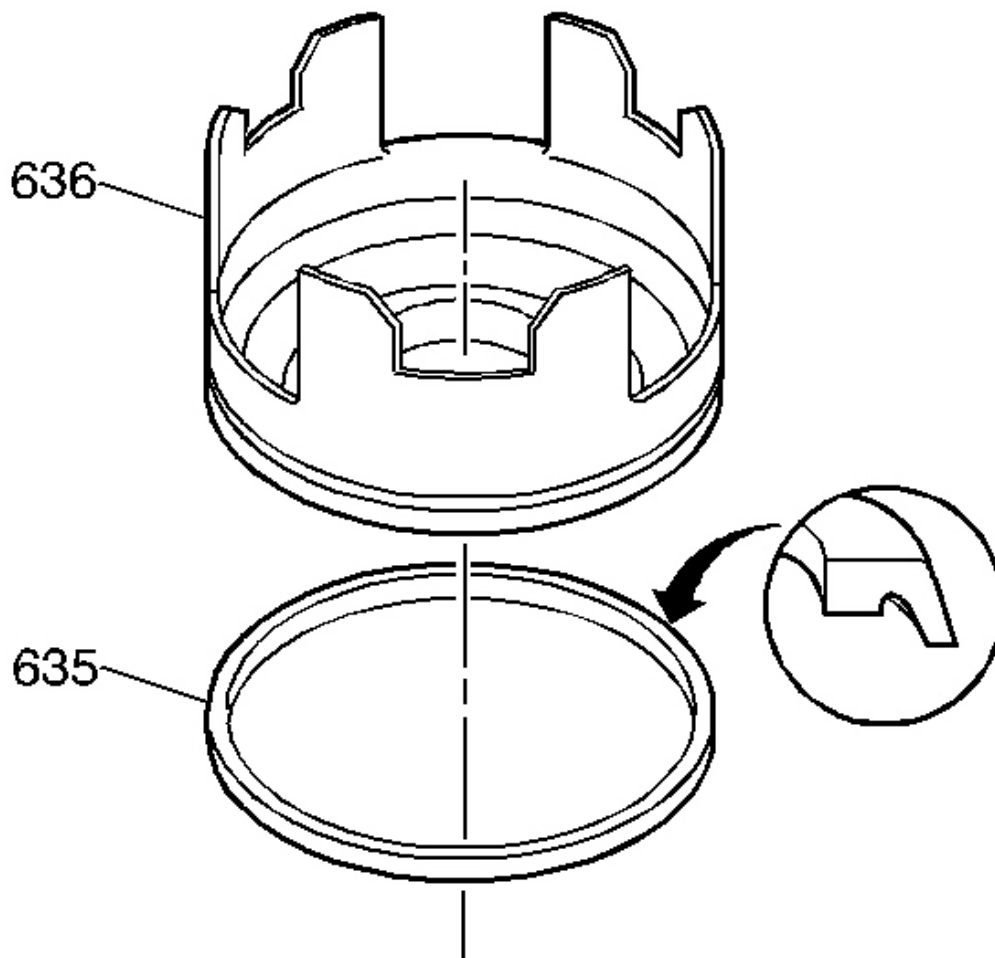


Fig. 167: Identifying Input Clutch Piston Outer Seal
Courtesy of GENERAL MOTORS CORP.

21. Remove the input clutch piston outer seal (635).

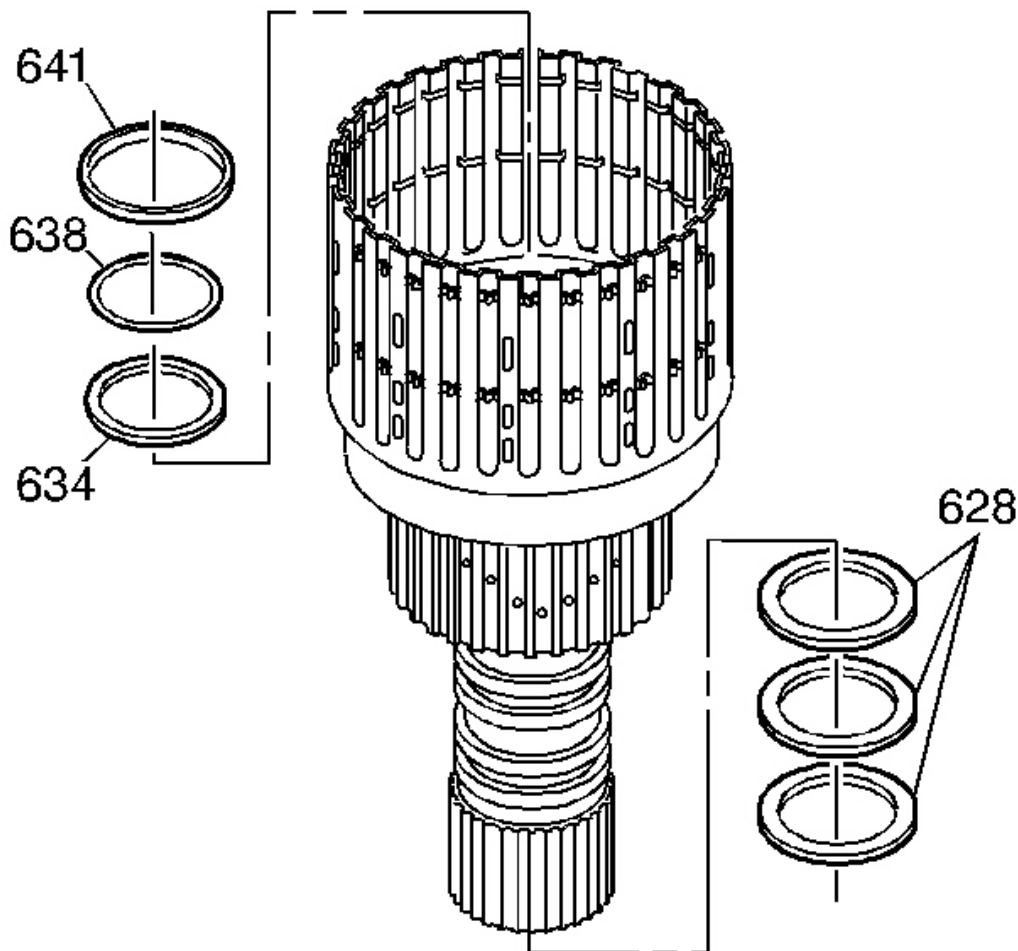


Fig. 168: Identifying Third & Input Clutch Components
Courtesy of GENERAL MOTORS CORP.

22. Remove the third clutch piston inner seal (641).
23. Remove the third clutch housing O-ring seal (638).
24. Remove the input clutch piston inner seal (634).

NOTE: Do not damage the grooves on the shaft, when removing the oil seal rings.

25. Cut the input shaft oil seal rings (628).

26. Remove the input shaft oil seal rings (628).

INPUT CLUTCH HOUSING ASSEMBLY INSPECTION

Inspection Procedure

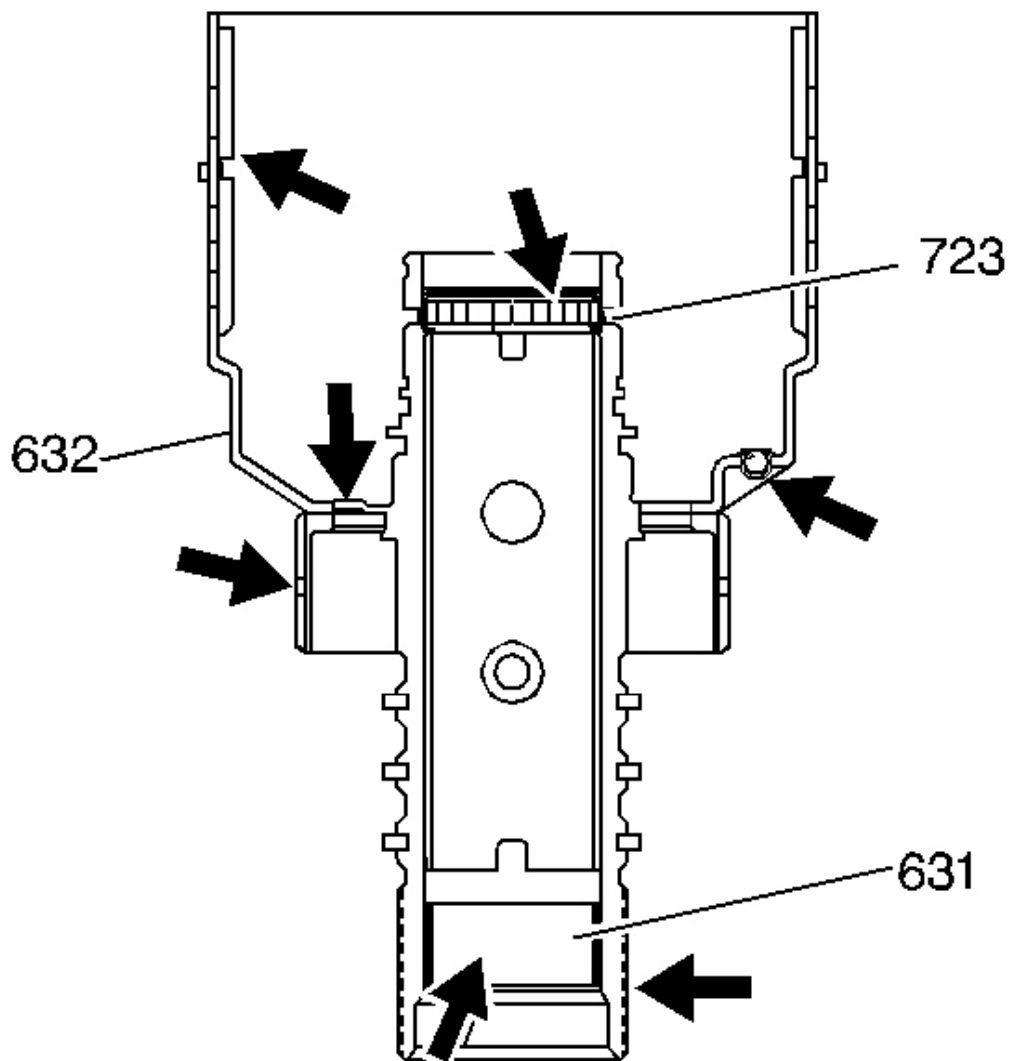


Fig. 169: Cross Sectional View Of Inspection Areas In Input Clutch Housing
Courtesy of GENERAL MOTORS CORP.

1. Inspect the input clutch housing assembly (632) for the following:
 - Plugged feed passages
 - Worn or damaged splines
 - Input shaft bushing (631) wear
 - Seal ring groove nicks or burrs
 - Cracks or blocked fluid passages in the input shaft
 - Damage or wear to the thrust bearing (723) in the input clutch housing
2. With the ball check valve assembly in its seated position in transmission fluid, inspect the assembly for leaks.

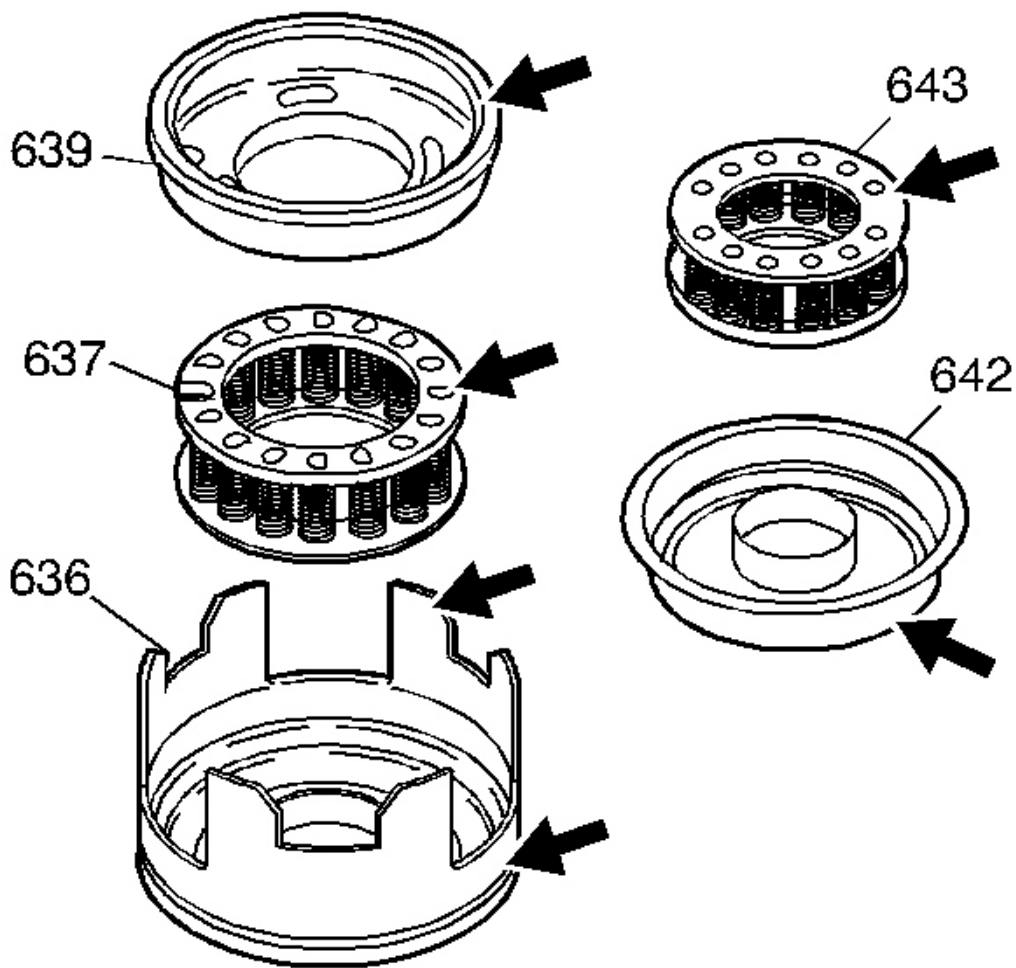


Fig. 170: Inspection Areas On Input Clutch Piston Components
Courtesy of GENERAL MOTORS CORP.

3. Inspect the input clutch piston (636) for the following:
 - Cracks or damage to seal grooves
 - Wear on piston lugs
4. Inspect the input clutch spring and retainer assembly (637) for a damaged cage and distorted or missing springs.
5. Inspect the third clutch piston housing (639) for damage.
6. Inspect the third clutch spring retainer and guide assembly (643) for a damaged cage and

distorted or missing springs.

IMPORTANT: Do not attempt to reuse the third clutch piston and seal assembly.

7. Replace the third clutch piston and seal assembly (642).

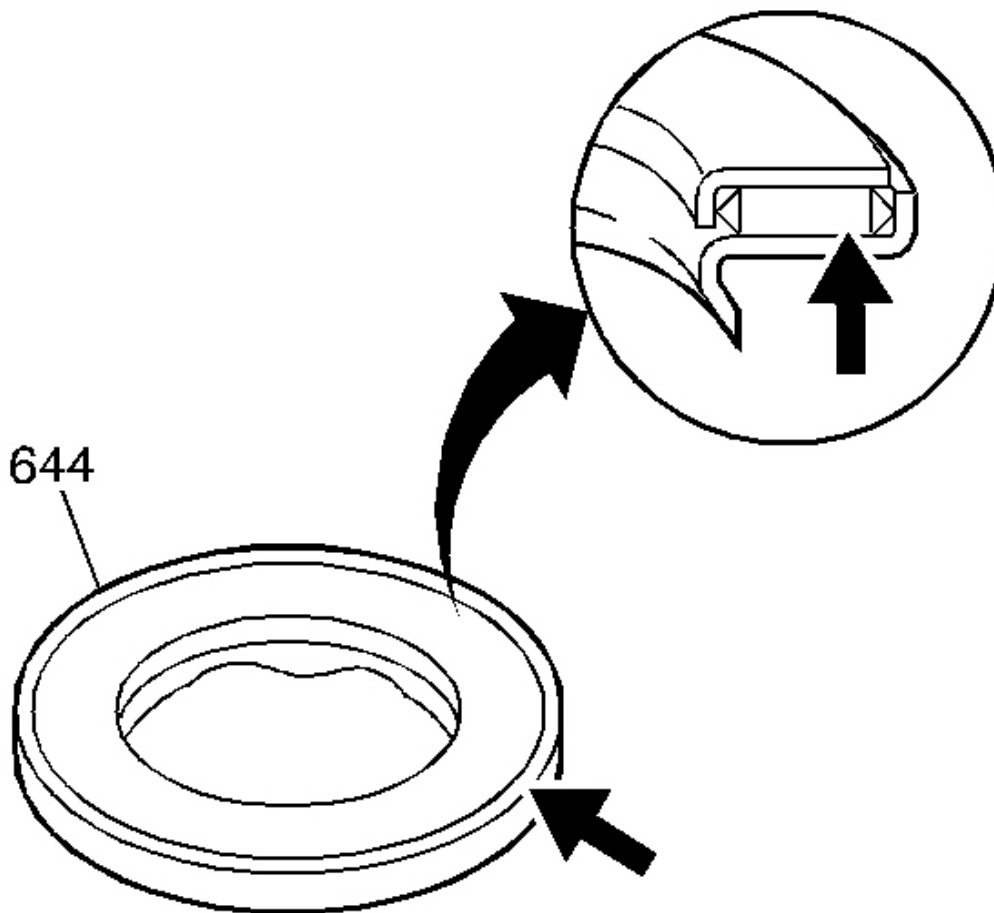


Fig. 171: View Of Input Shaft Thrust Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

8. Inspect the input shaft thrust bearing assembly (644) for damage or wear.

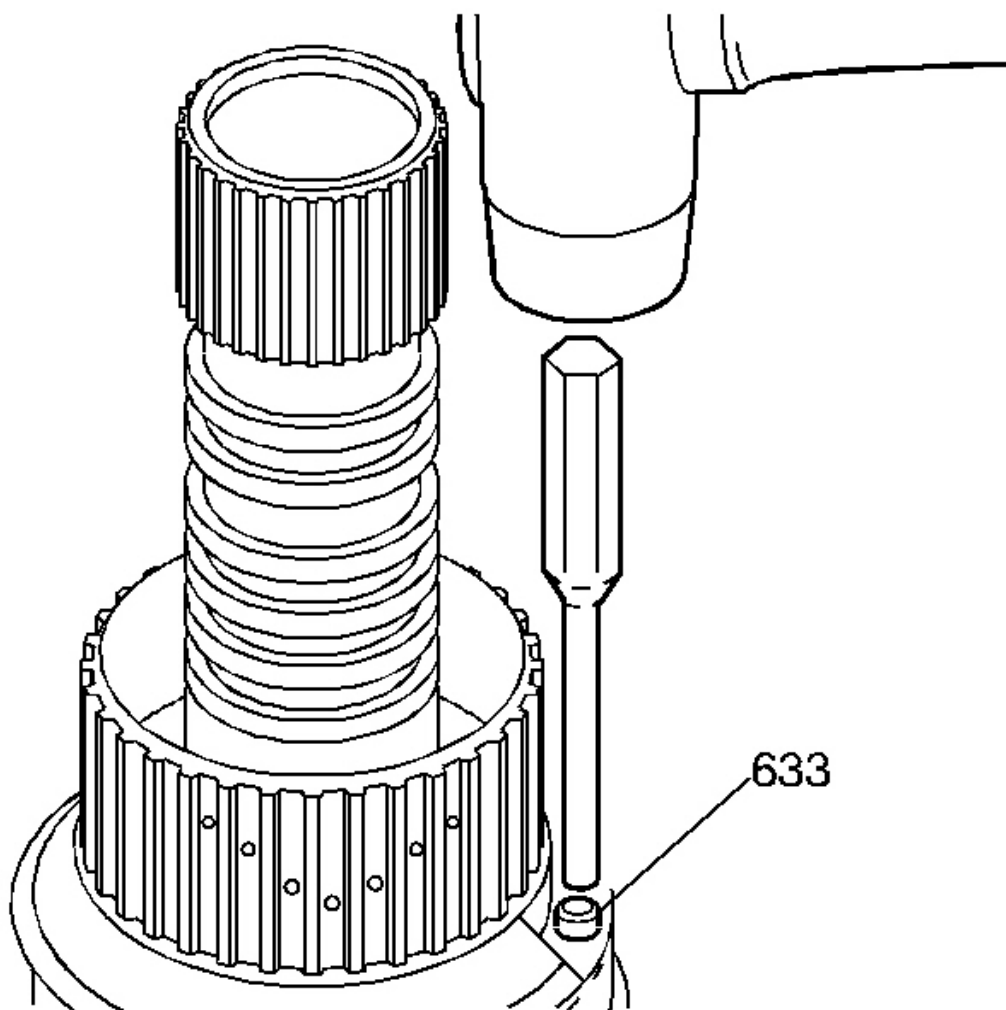
INPUT CLUTCH HOUSING BALL CHECK VALVE DISASSEMBLE

Fig. 172: Removing Input Clutch Housing Ball Check Valve
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Perform this procedure only if the inspection or leak check procedure indicated a problem.

Use a 6.25 mm (1/4 in) drift and mallet in order to remove the ball check valve assembly (633) from the input clutch housing.

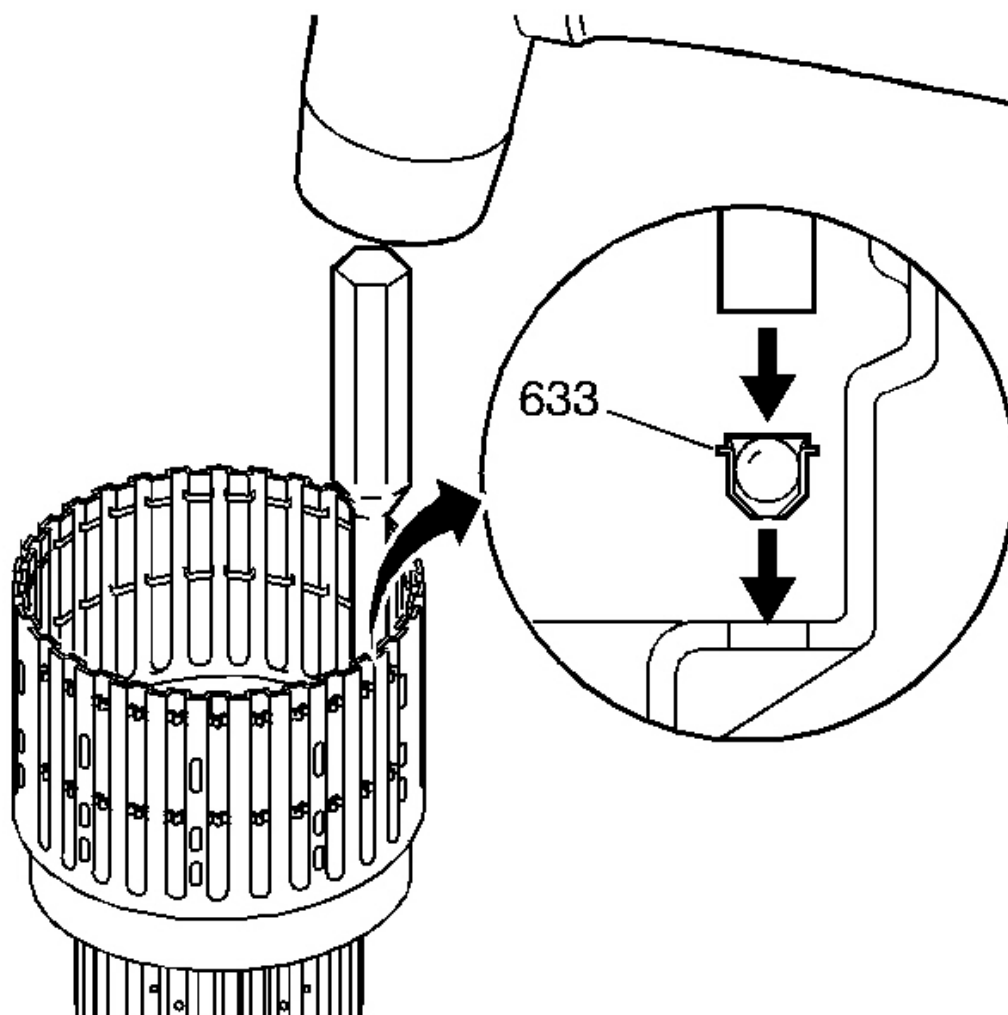
INPUT CLUTCH HOUSING BALL CHECK VALVE ASSEMBLE

Fig. 173: Inserting Input Clutch Housing Ball Check Valve
Courtesy of GENERAL MOTORS CORP.

Use a 9.5 mm (3/8 in) drift punch and mallet in order to assemble a new ball check valve assembly (633) into the input clutch housing.

INPUT CLUTCH AND THIRD CLUTCH ASSEMBLE**Tools Required**

- **J 8059** Snap Ring Pliers. See **Special Tools**.
- **J 23327** Clutch Spring Compressor
- **J 25018-A** Clutch Spring Compressor Adapter
- **J 37361** Input Clutch Inner Piston Seal Protector. See **Special Tools**.
- **J 37362** Third Clutch Inner Piston Seal Protector. See **Special Tools**.

Assembly Procedure

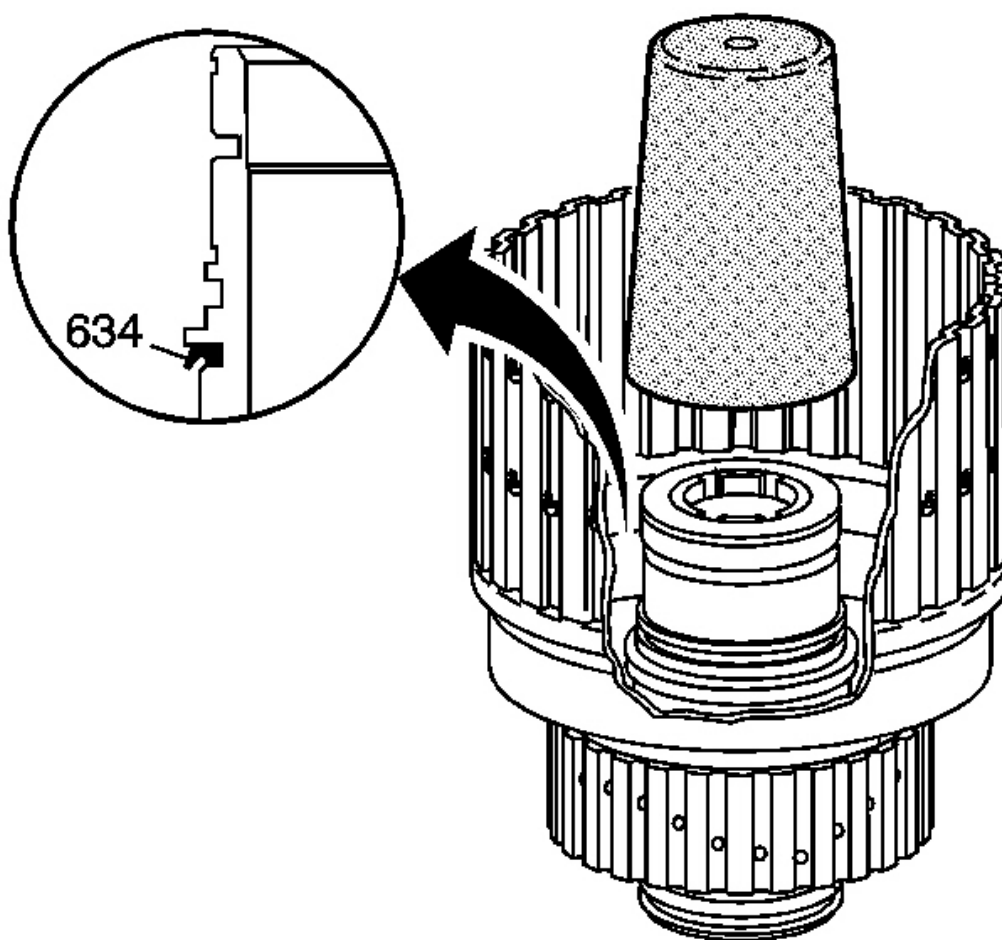


Fig. 174: Identifying Input Clutch Piston Inner Seal
Courtesy of GENERAL MOTORS CORP.

1. Use transmission fluid in order to lubricate the new input clutch piston inner seal (634).
2. Use **J 37361** in order to install the new seal. See **Special Tools**.

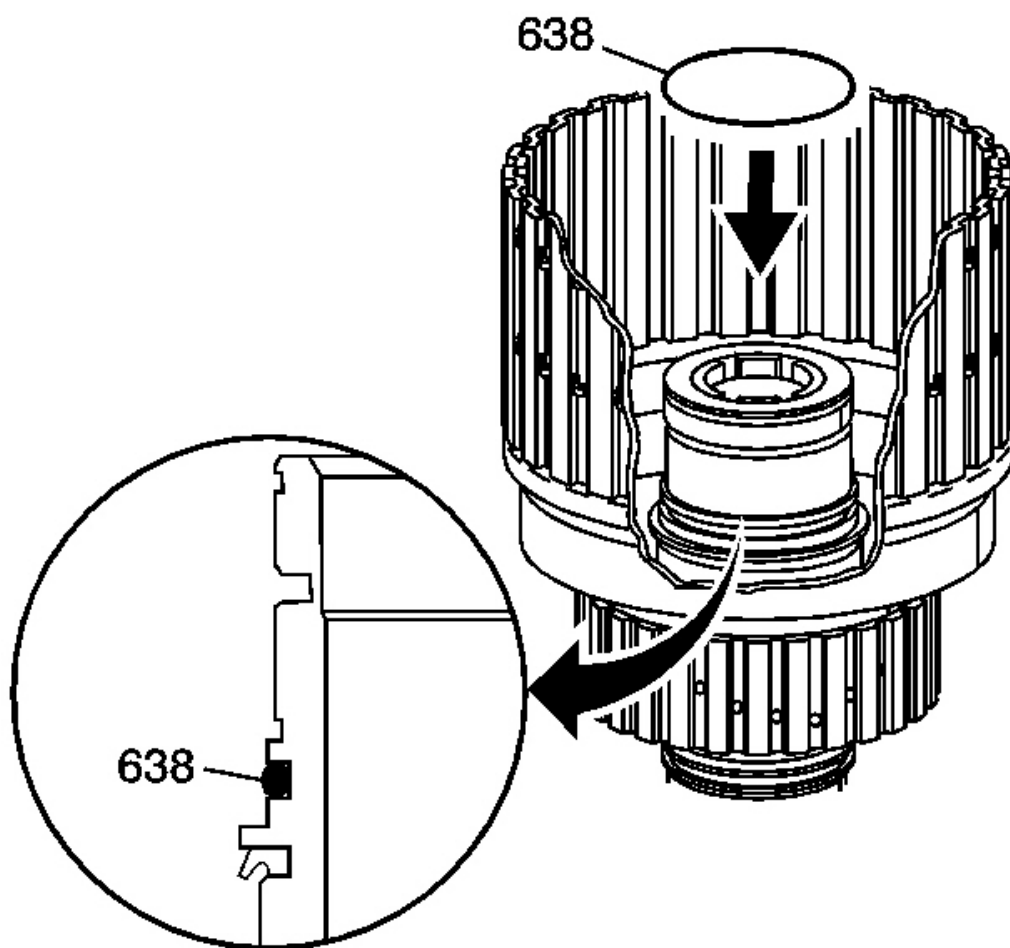


Fig. 175: View Of Third Clutch Housing O-Ring Seal
Courtesy of GENERAL MOTORS CORP.

3. Insert a new third clutch housing O-ring seal (638) in the input shaft and housing assembly.

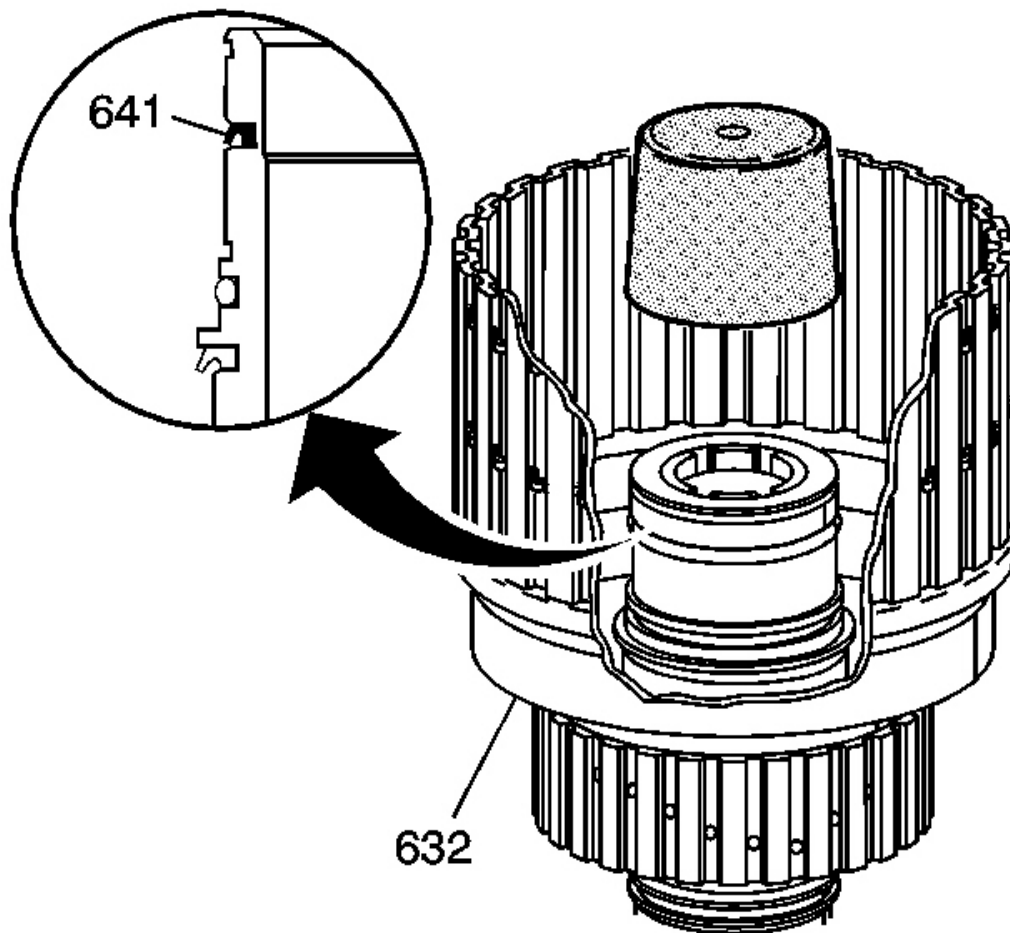


Fig. 176: Locating Clutch Piston Inner Seal
Courtesy of GENERAL MOTORS CORP.

4. Use transmission fluid in order to lubricate the new third clutch piston inner seal (641).
5. Use **J 37362** in order to install the seal in the input shaft and housing assembly (632). See **Special Tools**.

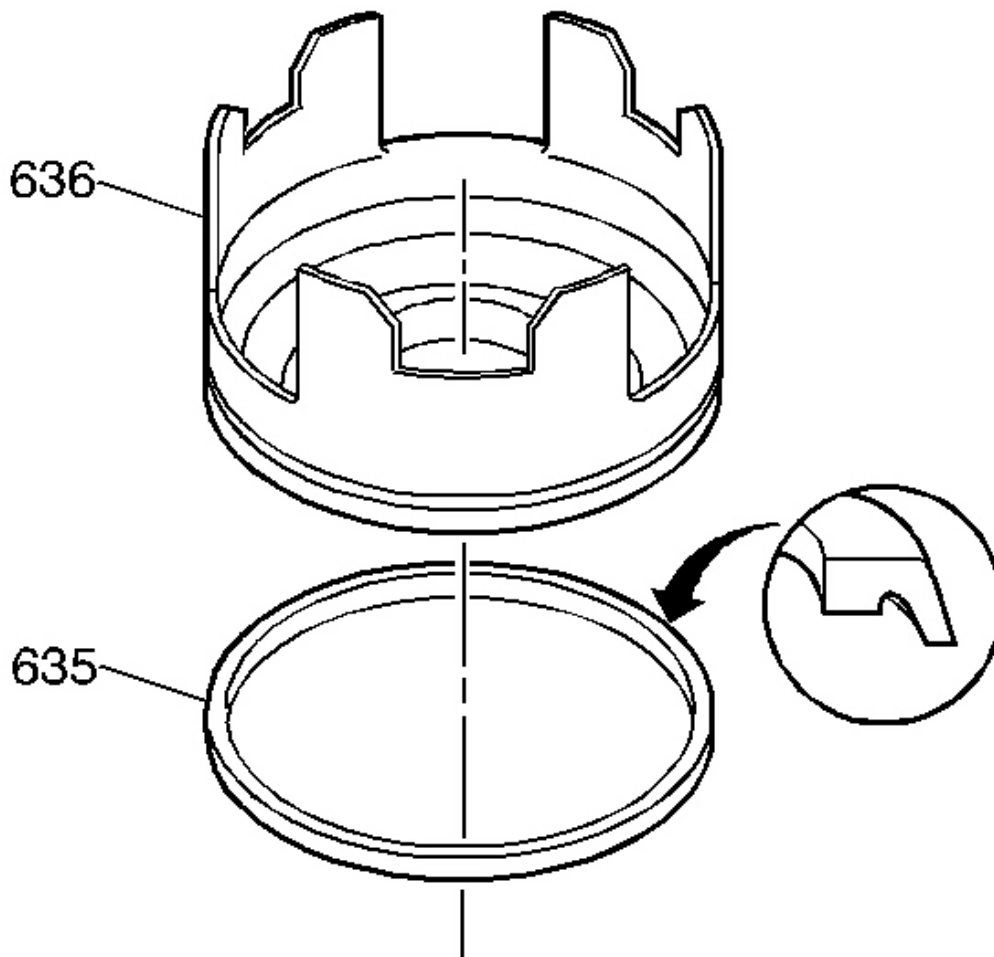


Fig. 177: Identifying Input Clutch Piston Outer Seal
Courtesy of GENERAL MOTORS CORP.

6. Use transmission fluid in order to lubricate the new input clutch piston outer seal (635).
7. Insert the new seal onto the input clutch piston assembly (636).

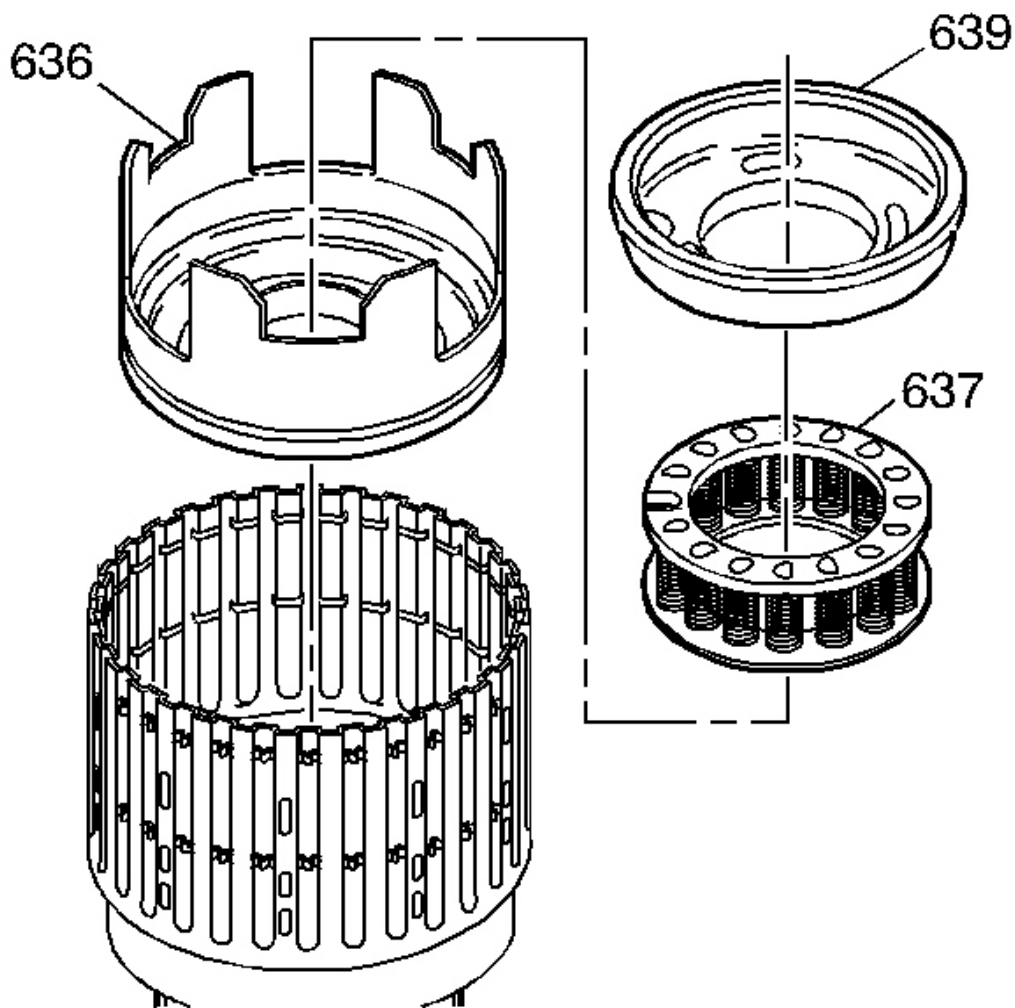


Fig. 178: View Of Input Clutch Piston Assembly
Courtesy of GENERAL MOTORS CORP.

8. Install the input clutch piston assembly (636) into the input shaft and housing assembly.
9. Install the input clutch spring and retainer assembly (637) into the input shaft and housing assembly.
10. Install the third clutch piston housing (639) into the input shaft and housing assembly.

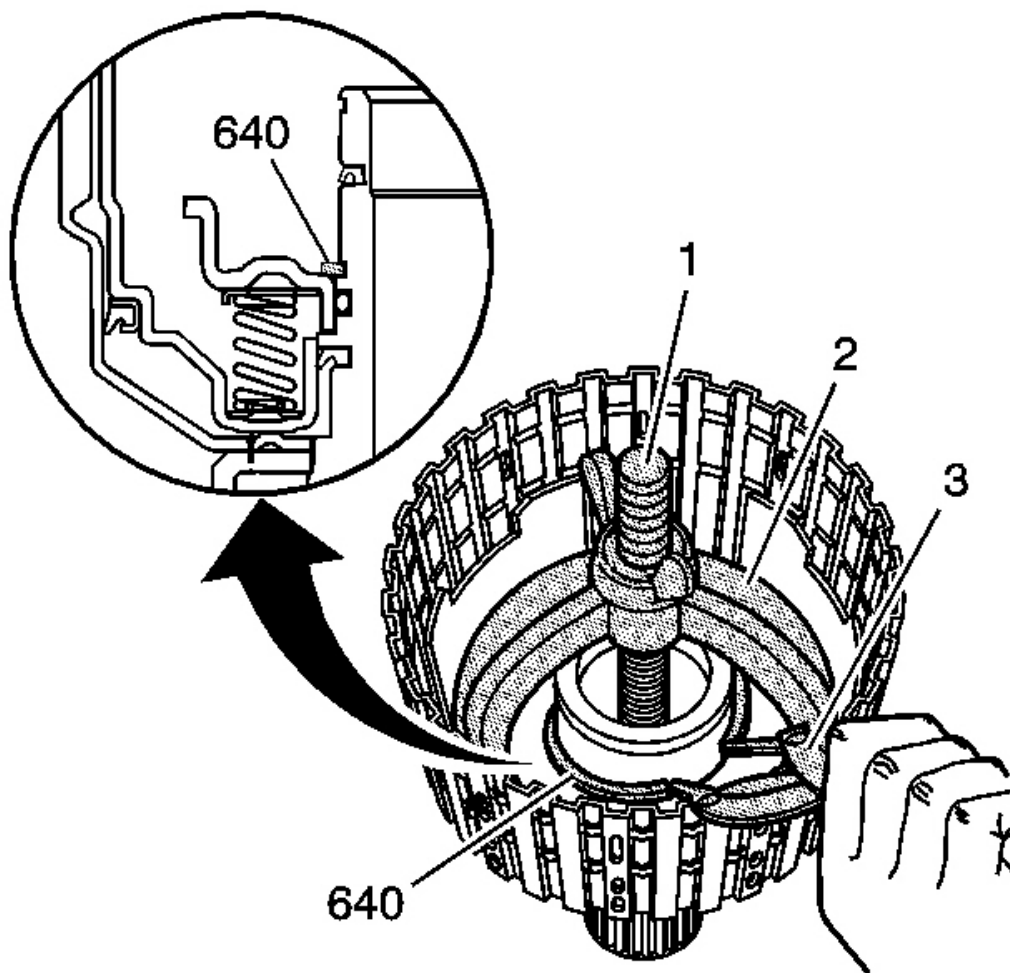


Fig. 179: Compressing The Input Clutch Spring And Retainer Assembly Using J 23327 & J 8059

Courtesy of GENERAL MOTORS CORP.

11. Use **J 23327** (1,2) and **J 8059** (3) in order to install the third clutch piston housing retaining ring (640) in the input shaft and housing assembly. See **Special Tools**.
12. Remove the **J 23327** (1,2).

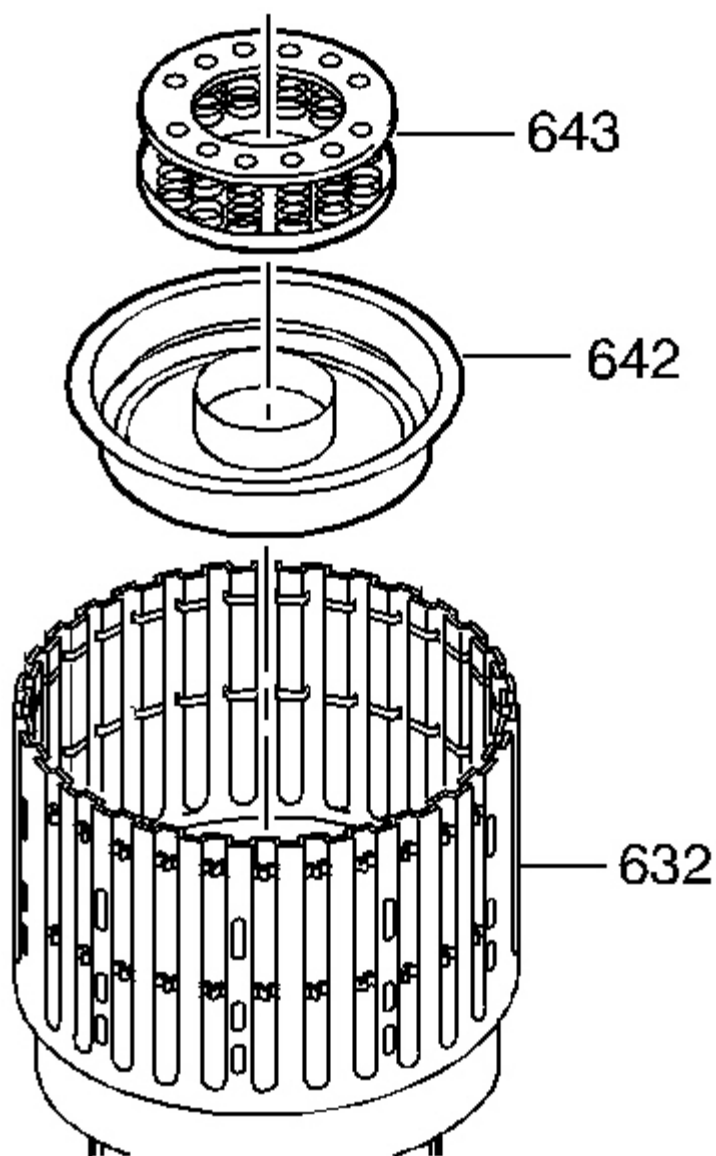


Fig. 180: Locating Third Clutch Piston And Seal Assembly
Courtesy of GENERAL MOTORS CORP.

13. Use transmission fluid in order to lubricate the new third clutch piston and seal assembly (642). Install the third clutch piston and seal assembly (642) into the input shaft and housing assembly (632).

14. Install the third clutch spring retainer and guide assembly (643) into the input shaft and housing assembly (632).

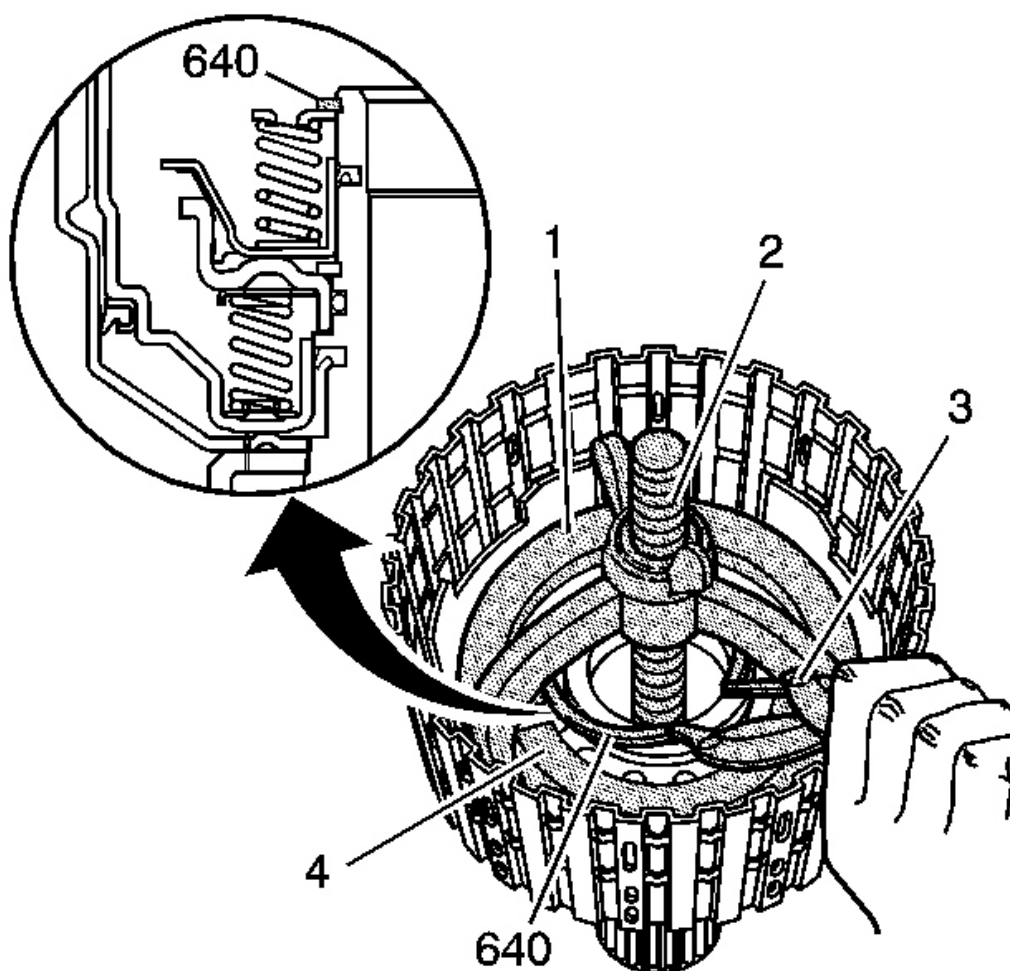


Fig. 181: Compressing The Third Clutch Spring Retainer And Guide Assembly Using J 23327, J 25018-A & J 8059
Courtesy of GENERAL MOTORS CORP.

15. Use J 23327 (1,2), J 25018-A (4) and J 8059 (3) in order to install the third clutch spring retainer and guide assembly retaining ring (640). See **Special Tools**.
16. Remove the J 23327 (1,2).

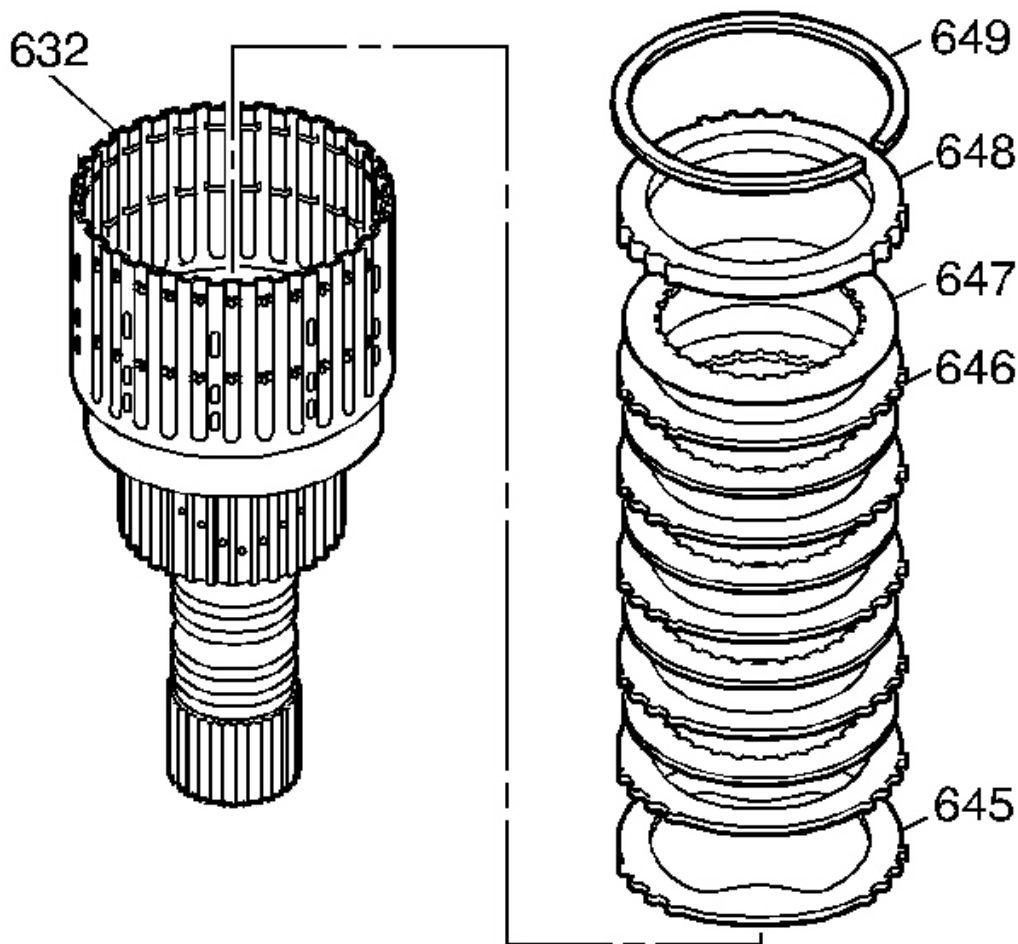


Fig. 182: Identifying Third Clutch Plates Assemblies
Courtesy of GENERAL MOTORS CORP.

17. Insert the third clutch waved plate (645) into the input shaft and housing assembly (632).

IMPORTANT: Place the first externally splined plate with its steel side against the waved plate. Place the fiber side of all plates face upward.

18. Insert the third clutch plates assemblies into the input housing. Start by inserting a third clutch plate (646) with external splines. Alternate with the internally splined clutch plates (647).

19. Insert the third clutch backing plate (648) with the word UP facing upward.
20. Insert the retaining ring (649) into the input shaft and housing assembly (632).

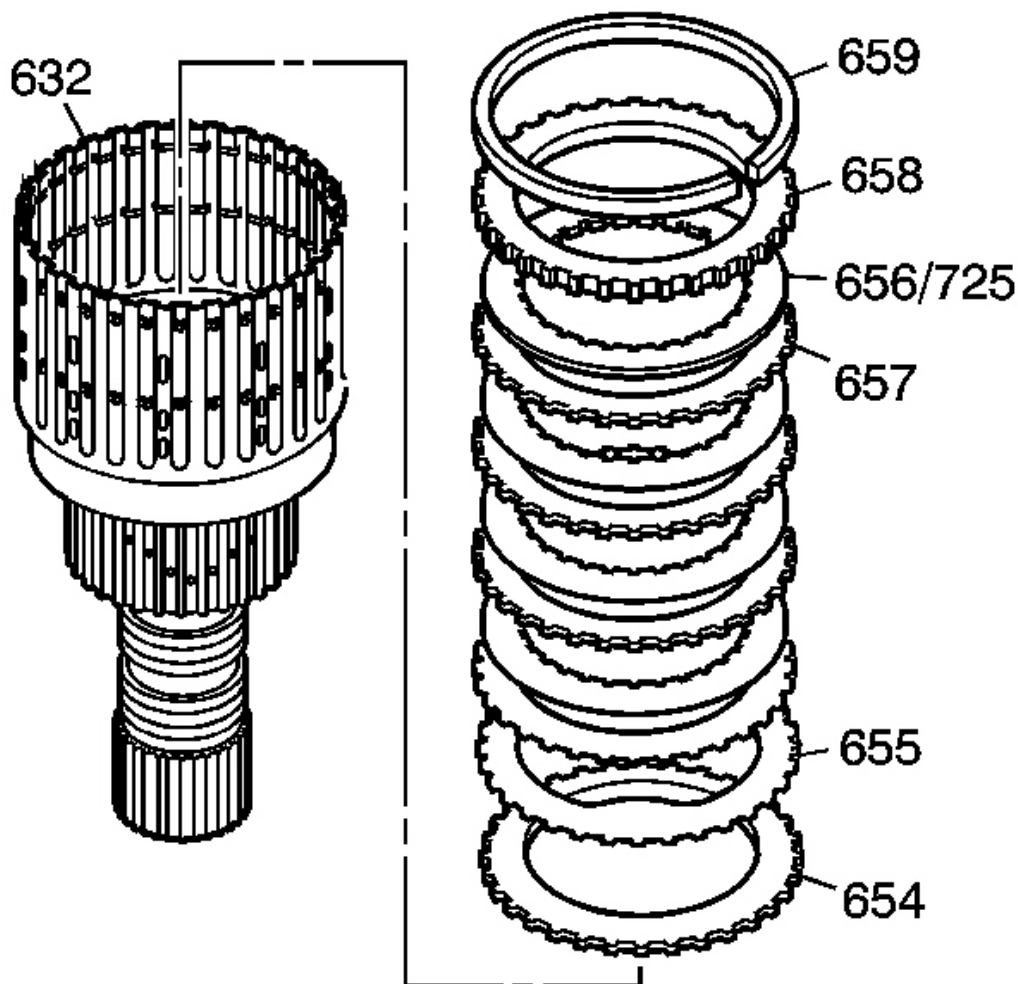


Fig. 183: View Of Sprag Clutch Assembly Plates
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Models using the input clutch pawl assembly requires specific clutch plates (725), with 30 teeth. The sprag clutch assembly plates (656) have 32 teeth.

21. Insert the input clutch apply plate (654) into the input shaft and housing assembly (632), so that the notched side of the teeth are facing downward against the retaining ring on the third clutch backing plate.
22. Install the input clutch waved plate (655).
23. Install the input clutch plates (656/725, 657) starting with an input clutch steel plate (657) and alternating with input clutch fiber plate assemblies (656).
24. Insert the input clutch backing plate (658) with the tapered side of the teeth facing upward.
25. Insert the retaining ring (659) in the input shaft and housing assembly (632).

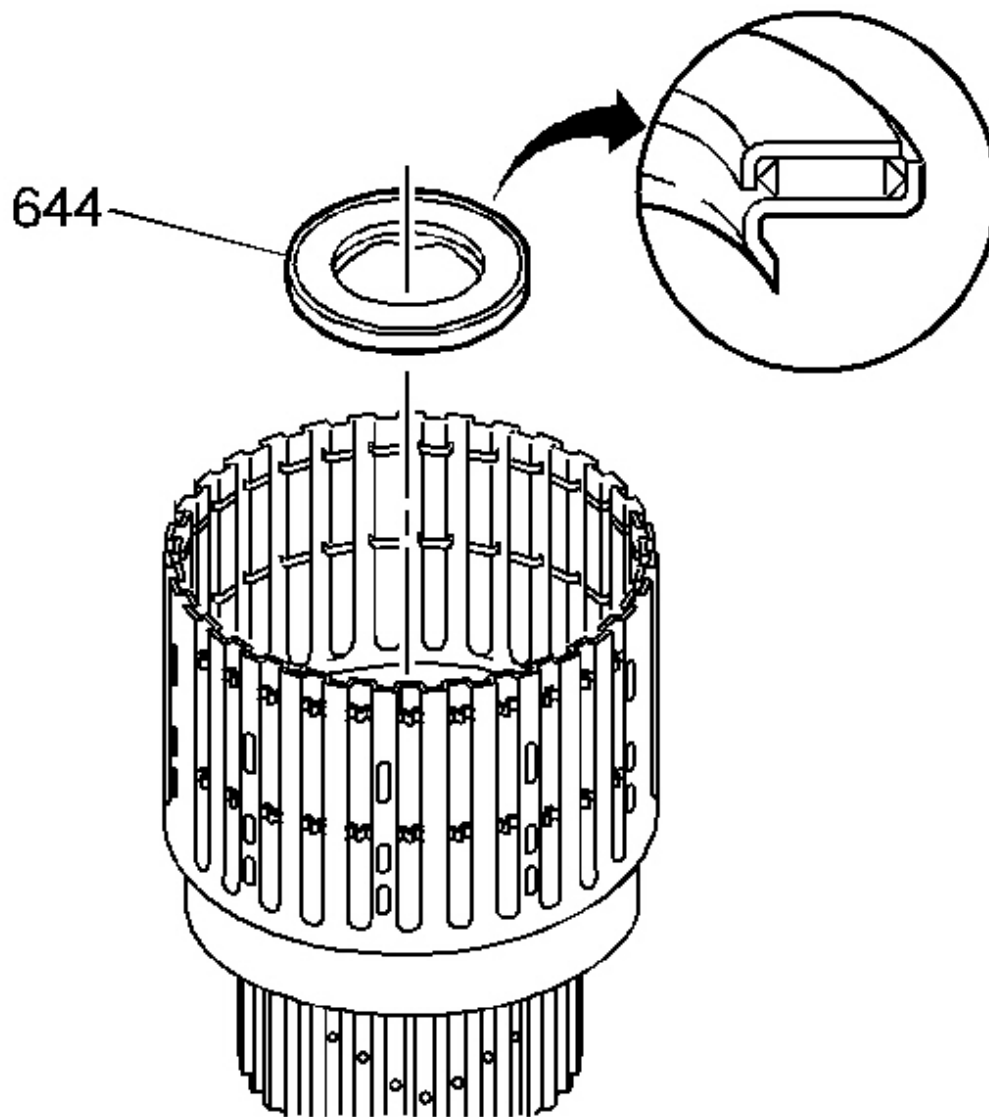


Fig. 184: Locating Input Shaft Thrust Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

26. Insert the input shaft thrust bearing assembly (644).

INPUT CLUTCH AND THIRD CLUTCH FUNCTIONAL AIR CHECK

Checking Procedure

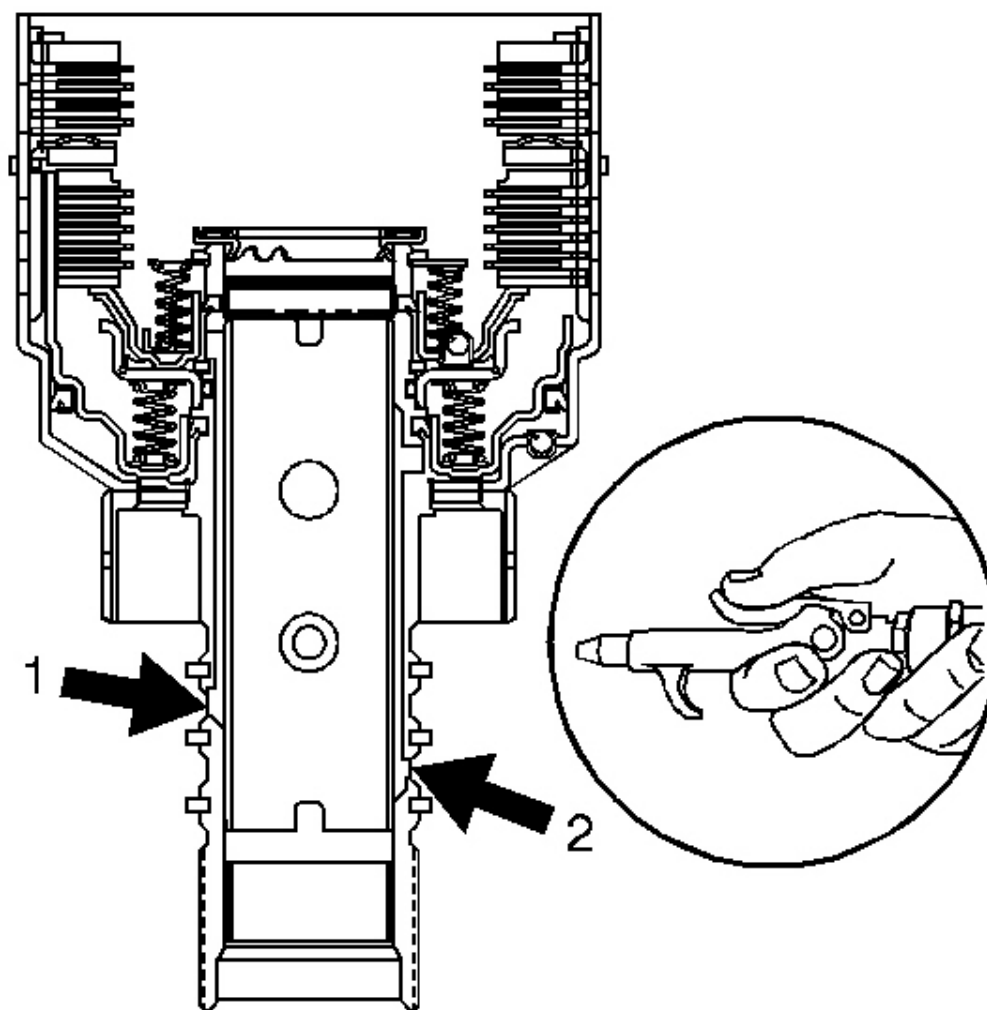


Fig. 185: Locating Fluid Passages
Courtesy of GENERAL MOTORS CORP.

NOTE: Do not exceed the recommended amount of air pressure or it may damage or cause seals to roll.

1. Use a rubber tipped air nozzle in order to apply a maximum 138 kPa (20 psi) at each indicated fluid passage.

2. Listen for the following:

- The third clutch (1) assembly to apply
- The input clutch (2) assembly to apply

INPUT CLUTCH HOUSING OIL SEAL RINGS ASSEMBLE

Tools Required

J 34741-A Input Seal Installer contains:. See **Special Tools**.

- **J 34741-1** Adjustable Seal Protector. See **Special Tools**.
- **J 34741-2** Seal Pusher. See **Special Tools**.
- **J 34741-3** Seal Sizer. See **Special Tools**.

Assembly Procedure

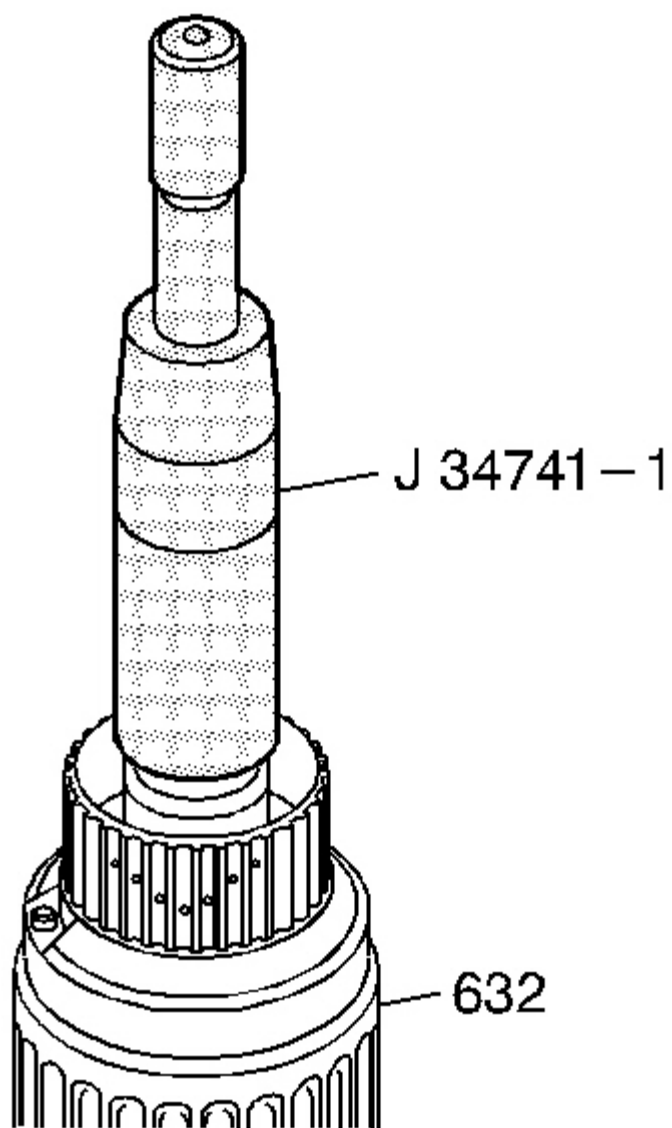


Fig. 186: Installing J 34741-1 Into The Input Clutch Housing
Courtesy of GENERAL MOTORS CORP.

1. Install J 34741-1 into the input clutch housing (632). See **Special Tools**. Adjust J 34741-1 so that the bottom of the seal installer aligns with the lowest seal ring groove. See **Special Tools**.

2. Use transmission fluid in order to lubricate the oil seal ring for the input clutch housing. Position the ring on the **J 34741-1** . See **Special Tools**.

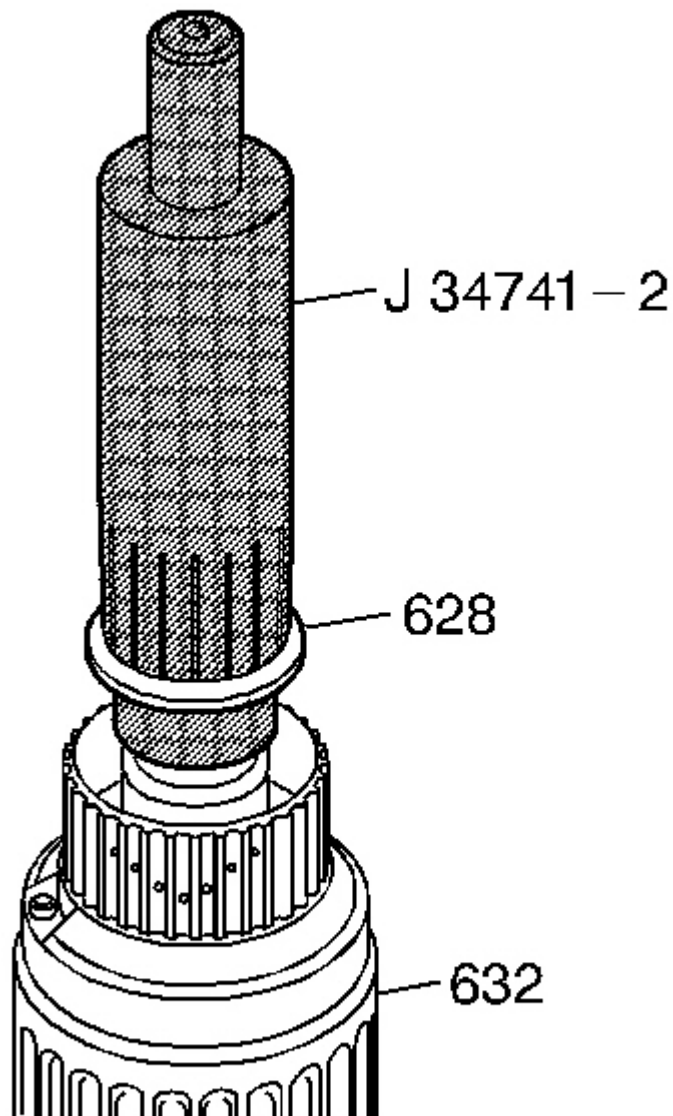


Fig. 187: Using J 34741-2 & J 34741-1 To Install Seal Rings
Courtesy of GENERAL MOTORS CORP.

3. Position **J 34741-2** onto the **J 34741-1** . See **Special Tools**. Push the seal (628) into the seal ring groove.

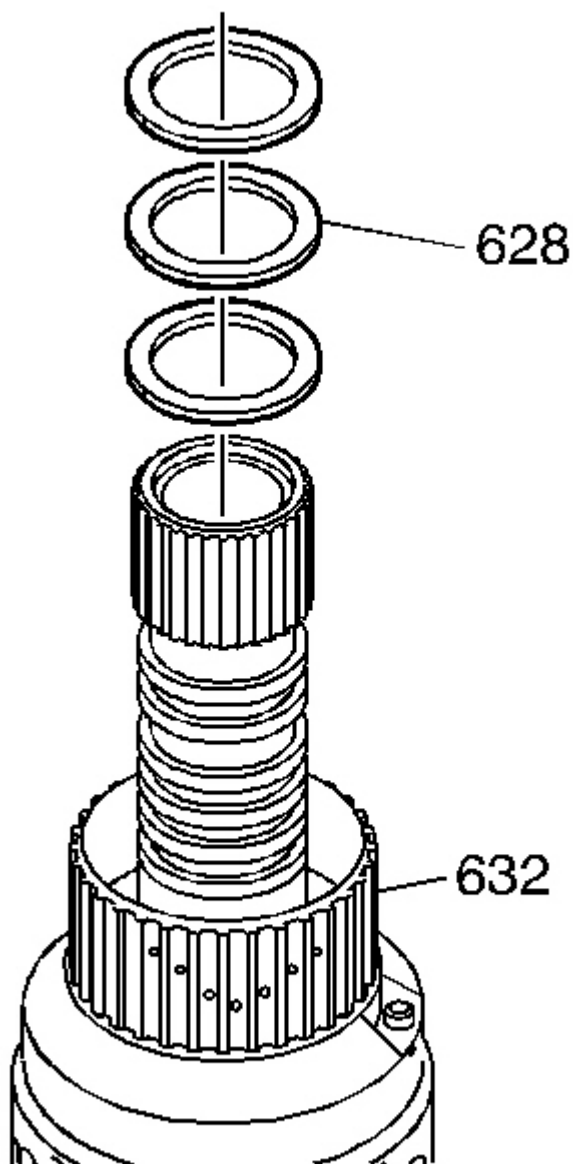


Fig. 188: Locating Second & Third Seal Rings
Courtesy of GENERAL MOTORS CORP.

4. Repeat this procedure for the second and the third seal rings (628).

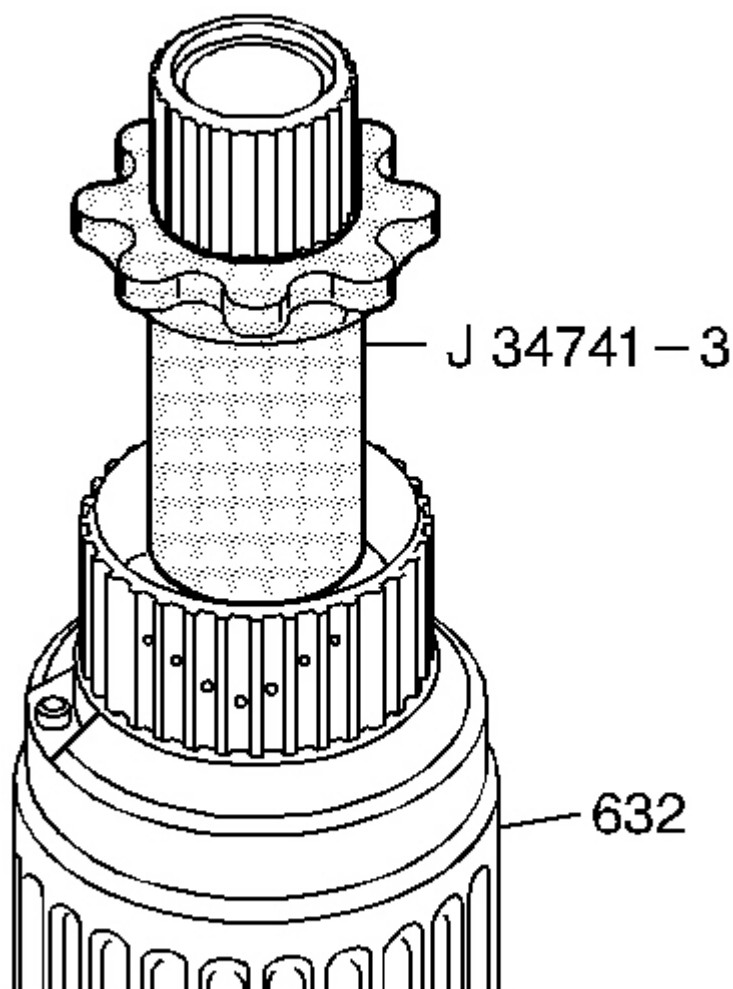


Fig. 189: Installing J 34741-3 Over The Seals
Courtesy of GENERAL MOTORS CORP.

5. Remove the input seal installer.
6. Use a twisting motion in order to assemble **J 34741-3** over the seals. See **Special Tools**.
7. Leave **J 34741-3** in place until the input clutch housing assembly (632) is assembled into the transmission. See **Special Tools**.

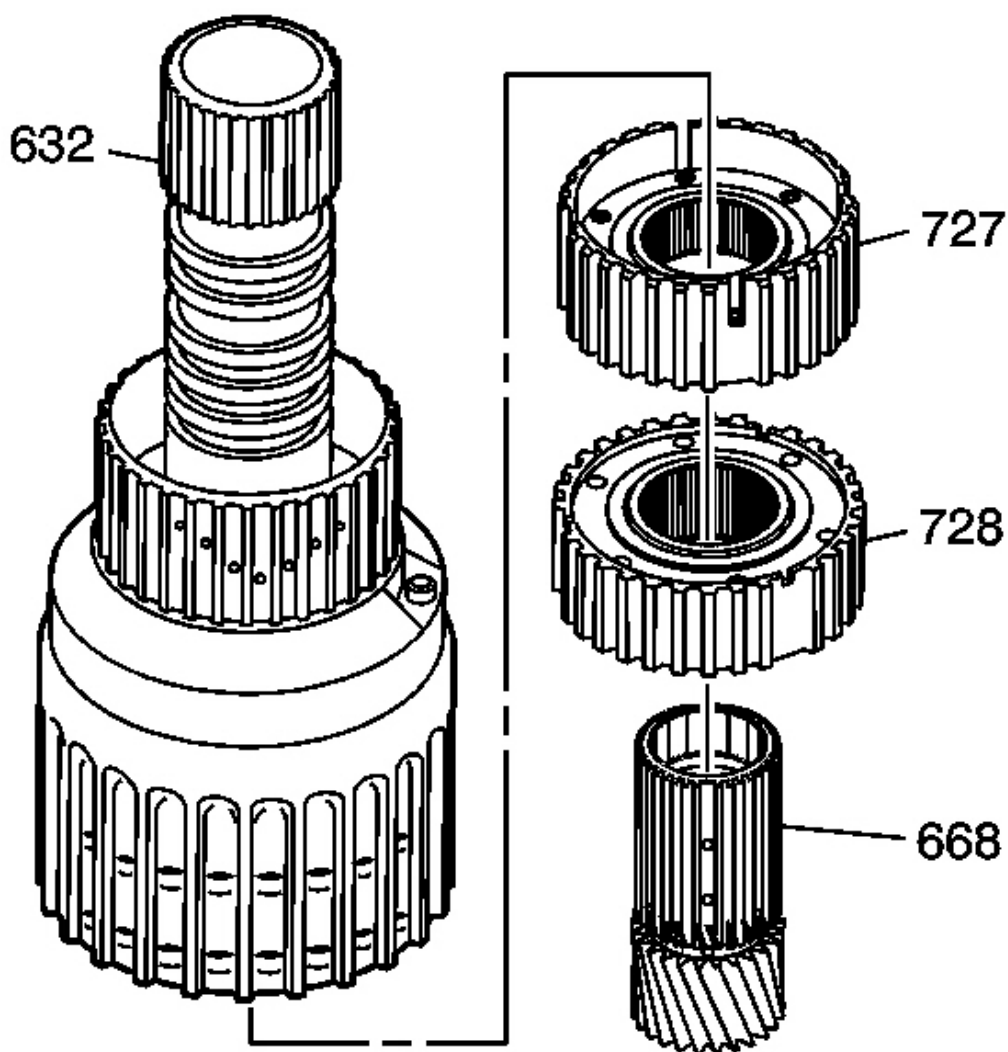
INPUT CLUTCH HOUSING, INPUT CLUTCH PAWL AND THIRD CLUTCH PAWL ASSEMBLE**Assembly Procedure**

Fig. 190: View Of Sprag Clutch Assembly
Courtesy of GENERAL MOTORS CORP.

1. Use a small screwdriver in order to align the teeth of the input clutch plate assembly and the third clutch plate assembly. This will ease installation of the clutch pawl assembly.

IMPORTANT: Make sure that the clutch pawl assembly is fully seated into the housing.

2. Insert the combined input clutch pawl (728), third clutch pawl (727) and input sun gear (668) assembly into the input clutch housing assembly (632).

INPUT CLUTCH HOUSING END PLAY CHECK (FWD ONLY)

Tools Required

- **J 26958** Output Shaft Loading and Aligning Tool. See **Special Tools**.
- **J 26958-10B** Adapter Plug. See **Special Tools**.
- **J 33381-A** Final Drive Remover and Installer. See **Special Tools**.
- **J 33386-A** Input Shaft End Play Tool. See **Special Tools**.
- **J 38385** Output Shaft Loading Tool Adapter. See **Special Tools**.
- **J 43425** Output Shaft Loading Tool Adapter. See **Special Tools**.

Checking Procedure

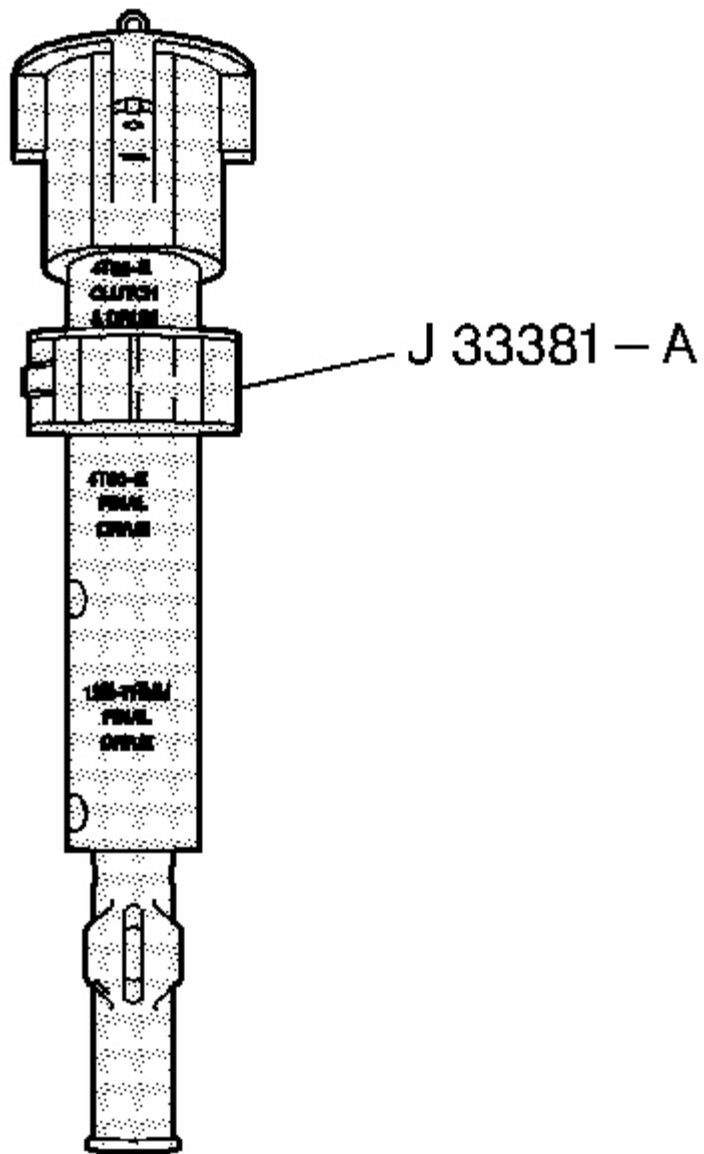


Fig. 191: View Of J 33381-A

Courtesy of GENERAL MOTORS CORP.

1. Adjust the collar on tool **J 33381-A** to the 4T65-E CLUTCH & DRUM setting. See **Special Tools**.

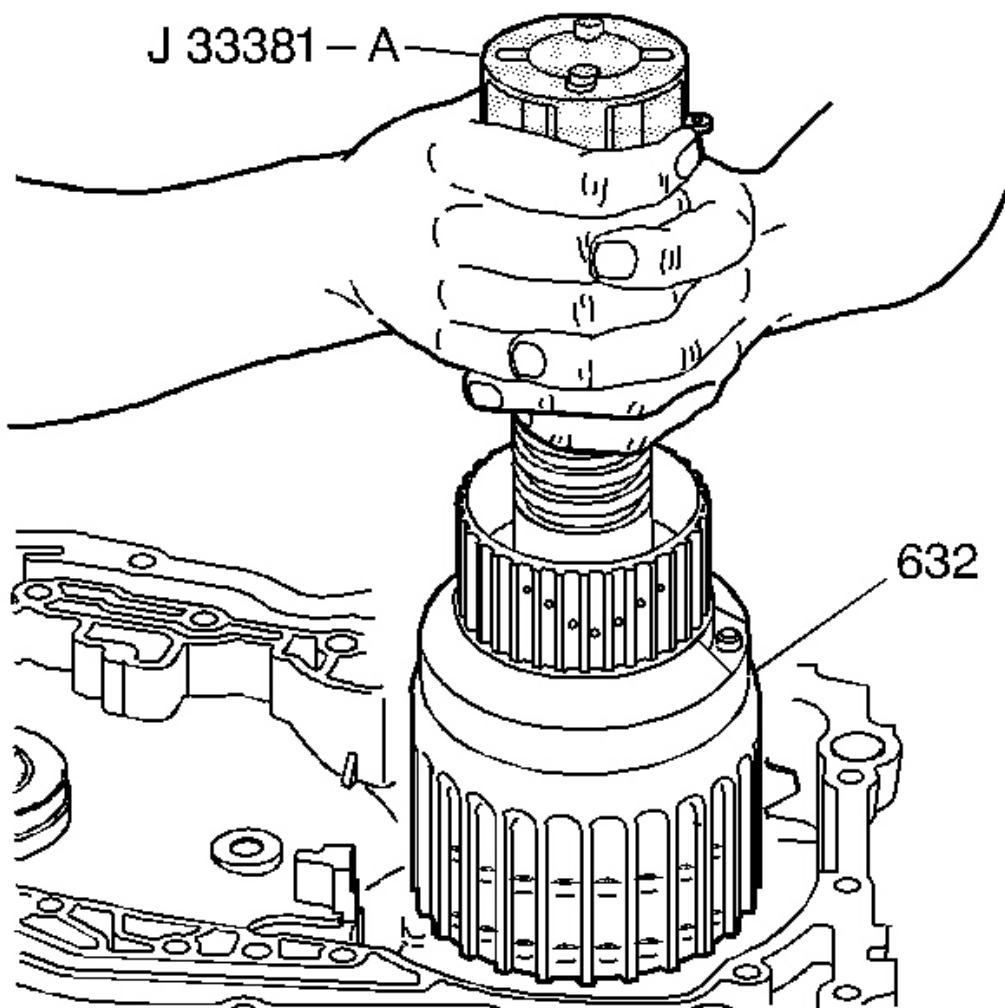


Fig. 192: Installing J 33381-A Into Input Clutch Housing
Courtesy of GENERAL MOTORS CORP.

2. Install **J 33381-A** into the input clutch housing assembly (632). See **Special Tools**.
3. Tighten the threaded rod of **J 33381-A** until the rod is finger tight. See **Special Tools**.
4. Use **J 33381-A** in order to lift the input clutch housing assembly (632). See **Special Tools**. The sprag clutch assemblies will also be attached.
5. Install the assembly (632) into the case. Be sure that the assembly is down all the way.
6. Remove **J 33381-A** from the assembly. See **Special Tools**.

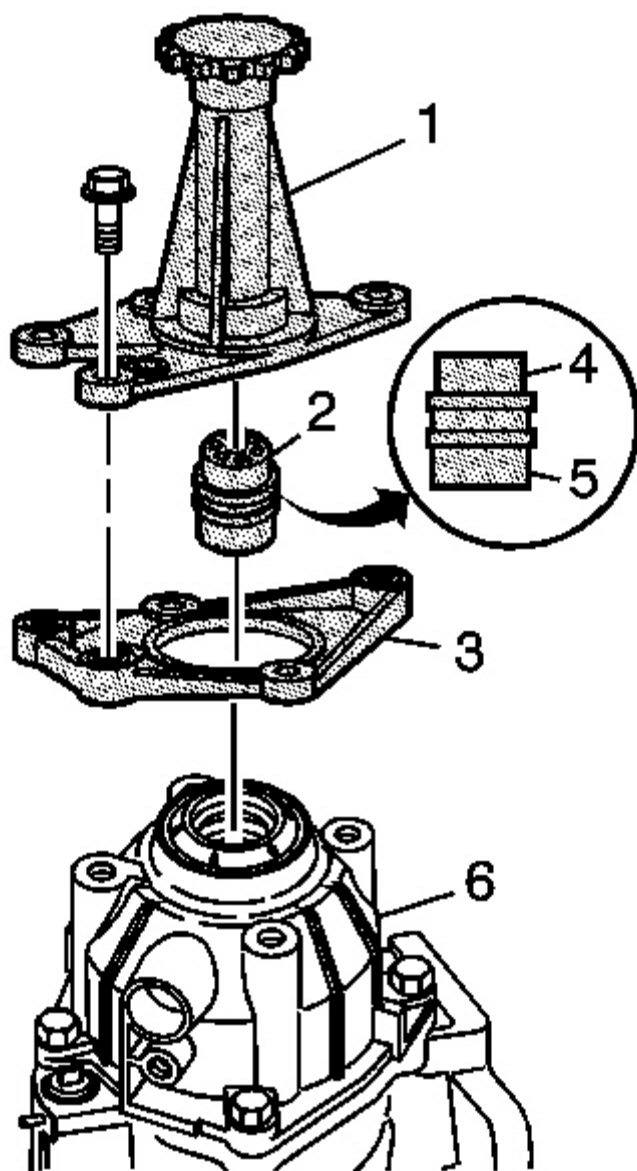


Fig. 193: View Of J 26958, J 26958-10B & J 38385 Or J 43425
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The tool J 38385 (3) is used on a standard duty transmission and J 43425 (3) is used on a heavy duty transmission. See

Special Tools.

7. Install **J 38385** (3) for a standard duty transmission or **J 43425** (3) for a heavy duty transmission. See **Special Tools.**

IMPORTANT: The tool **J 26958-10B** (2) is model specific and can be used on a standard duty and a heavy duty transmission. See **Special Tools.** This tool has a small end (4) and a larger end (5). Standard duty would use the smaller end (4) facing down and a heavy duty would use the larger end (5) facing down.

8. Install **J 26958-10B** (2) depending on model. See **Special Tools.** Standard duty uses this tool with the smaller end (4) facing down. Heavy duty uses this tool with the larger end (5) facing down.

IMPORTANT: Install bolts and tighten securely to prevent tool deflection during end play measurement.

9. Install **J 26958** (1) onto the case extension (6). See **Special Tools.**

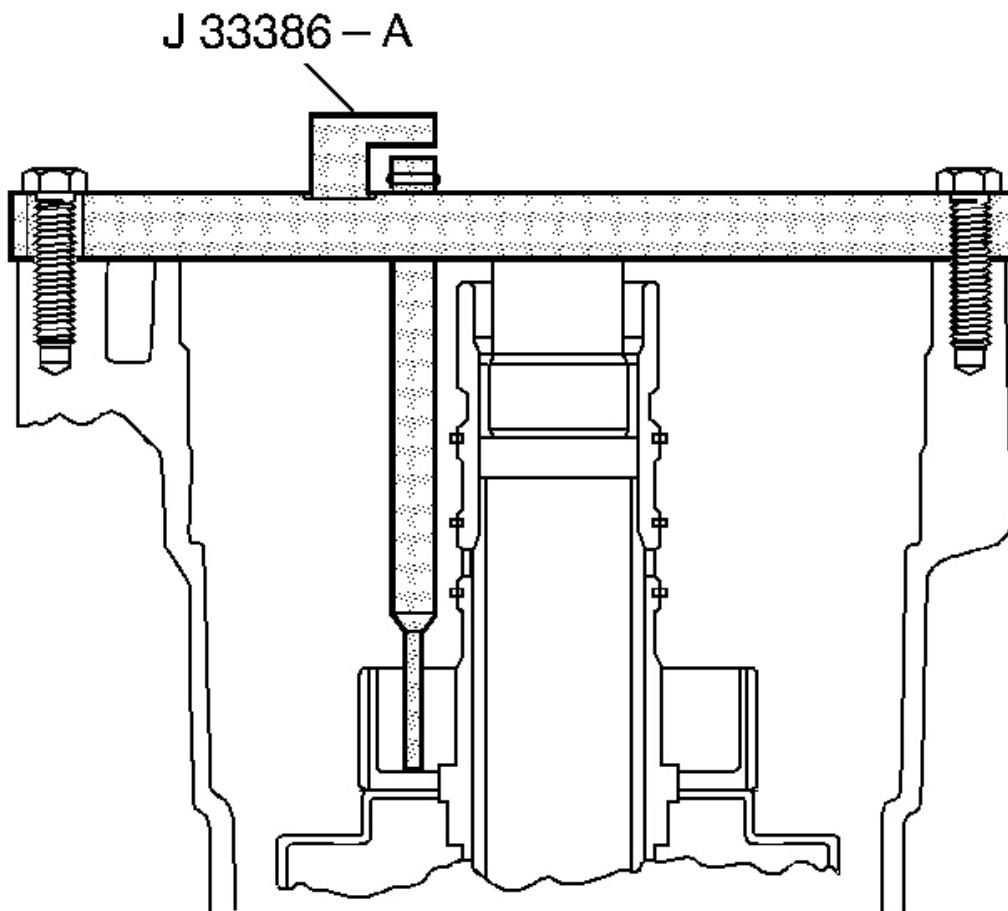


Fig. 194: View Of J 33386-A Installed Onto Transmission Case
Courtesy of GENERAL MOTORS CORP.

10. Using two bolts, install **J 33386-A** onto the case. See **Special Tools**.
11. Tighten the bolts in order to securely hold **J 33386-A** . See **Special Tools**.
12. Tighten **J 26958** finger tight in order to eliminate differential carrier end play. See **Special Tools**.

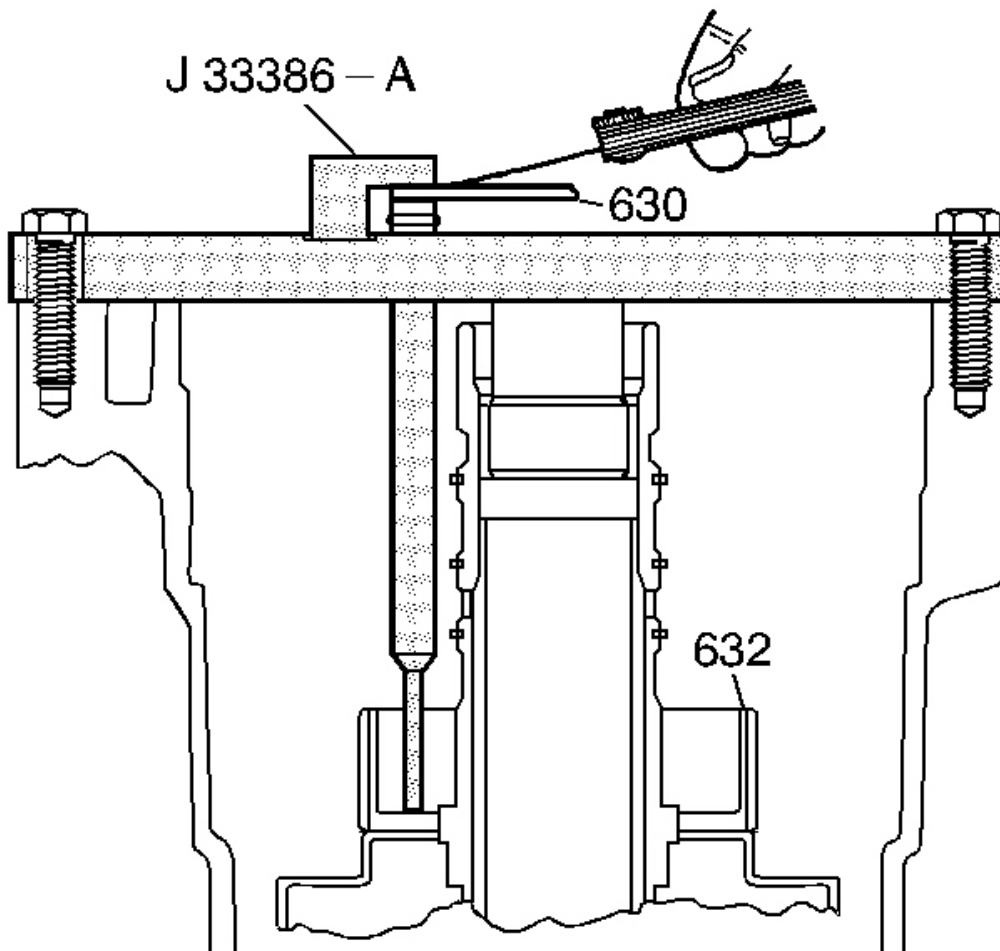


Fig. 195: Measuring Clearance Between J 33386-A & Thrust Washer
Courtesy of GENERAL MOTORS CORP.

13. Insert the thrust washer (630) from the input clutch housing into J 33386-A as indicated. See **Special Tools**. If the thrust washer will not fit into J 33386-A, select the next size smaller thrust washer and recheck. See **Special Tools**.
14. Use a feeler gauge in order to measure the clearance between J 33386-A and the thrust washer (630). See **Special Tools**.
 - If the clearance is less than 0.0521 mm (0.006 in), use the current size thrust washer.
 - If the clearance is 0.0521 mm (0.006 in) or more, select the next size larger thrust washer and recheck.

Refer to the Bearing/Input Clutch Hub Selective Thrust Washer (630) Selection Guide in **End Play Specifications** .

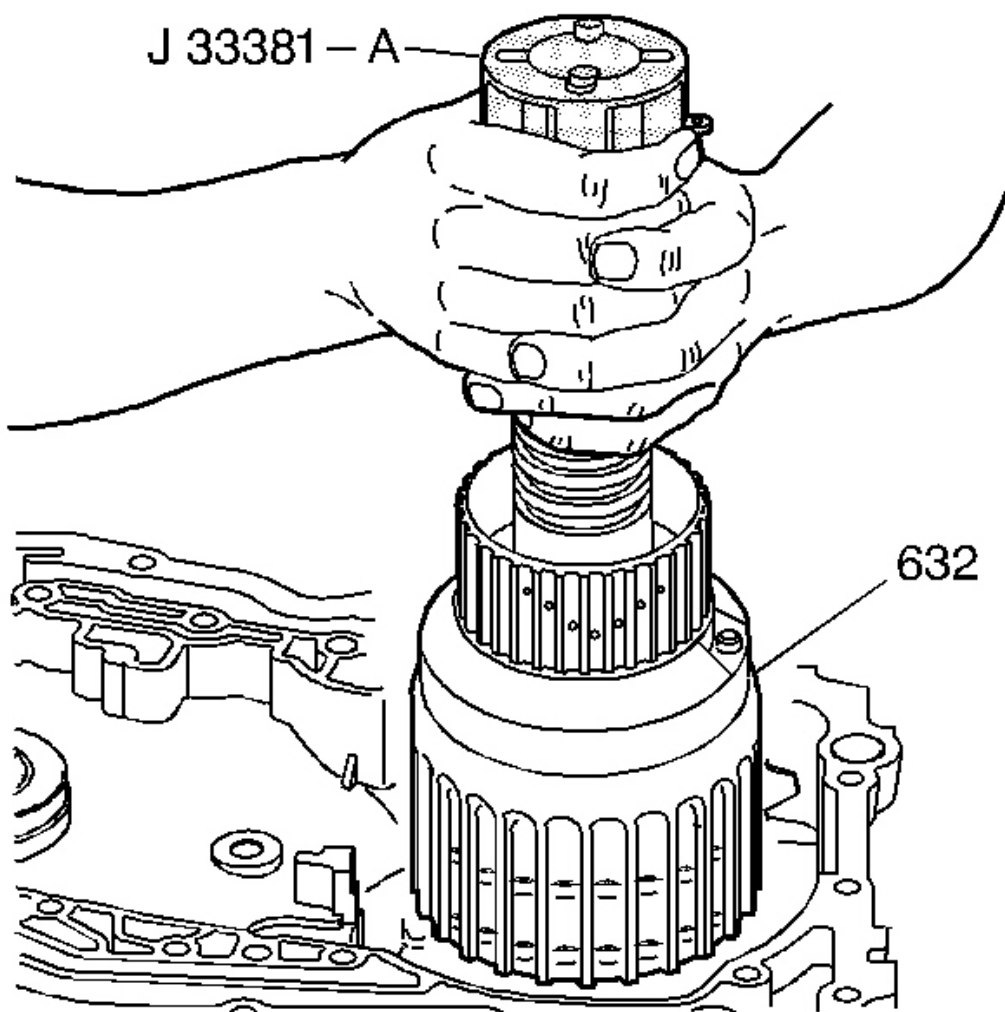


Fig. 196: Installing J 33381-A Into Input Clutch Housing
Courtesy of GENERAL MOTORS CORP.

15. Remove J 33386-A . See **Special Tools**.
16. Adjust the collar on tool J 33381-A to the 4T65-E CLUTCH & DRUM setting. See **Special Tools**. Make sure that the threaded rod is fully loosened.
17. Install J 33381-A into the input clutch housing (632). See **Special Tools**.

18. Tighten the threaded rod of **J 33381-A** until the rod is finger tight. See **Special Tools**.
19. Use **J 33381-A** in order to lift the input clutch housing assembly (632). See **Special Tools**. The sprag clutch assemblies will also be attached.
20. Remove the assembly (632) from the case.

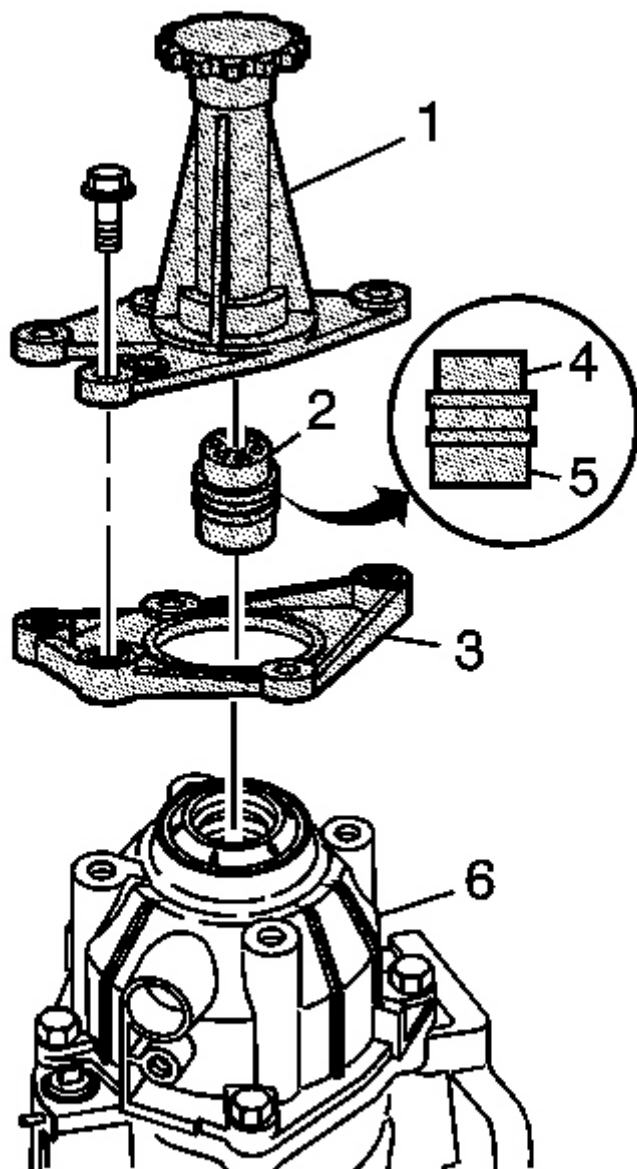


Fig. 197: View Of J 26958, J 26958-10B & J 38385 Or J 43425
Courtesy of GENERAL MOTORS CORP.

21. Position the transmission so that the oil pan is facing down.
22. Remove **J 26958** (1), **J 26958-10B** (2) and **J 38385** (3) or **J 43425** (3). See **Special Tools**.

INPUT CLUTCH HOUSING END PLAY CHECK (FWD ONLY)

Tools Required

- **J 33381-A** Final Drive Remover and Installer. See **Special Tools**.
- **J 33386-A** Input Shaft End Play Tool. See **Special Tools**.
- **J 36850** Assembly Lubricant
- **J 44472** End Play Checking Tool. See **Special Tools**.

Checking Procedure

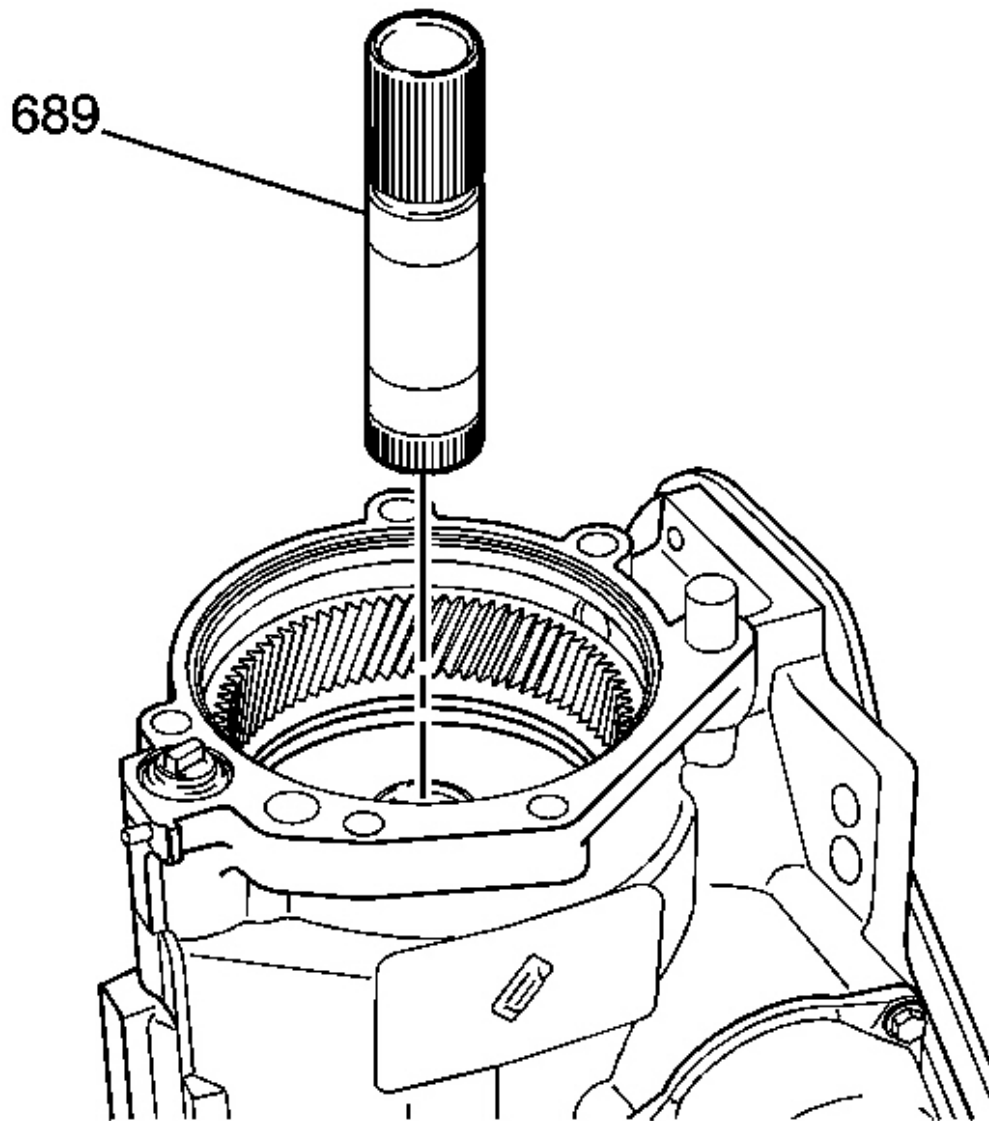


Fig. 198: Identifying Final Drive Sun Gear Shaft
Courtesy of GENERAL MOTORS CORP.

1. Install the final drive sun gear shaft (689).

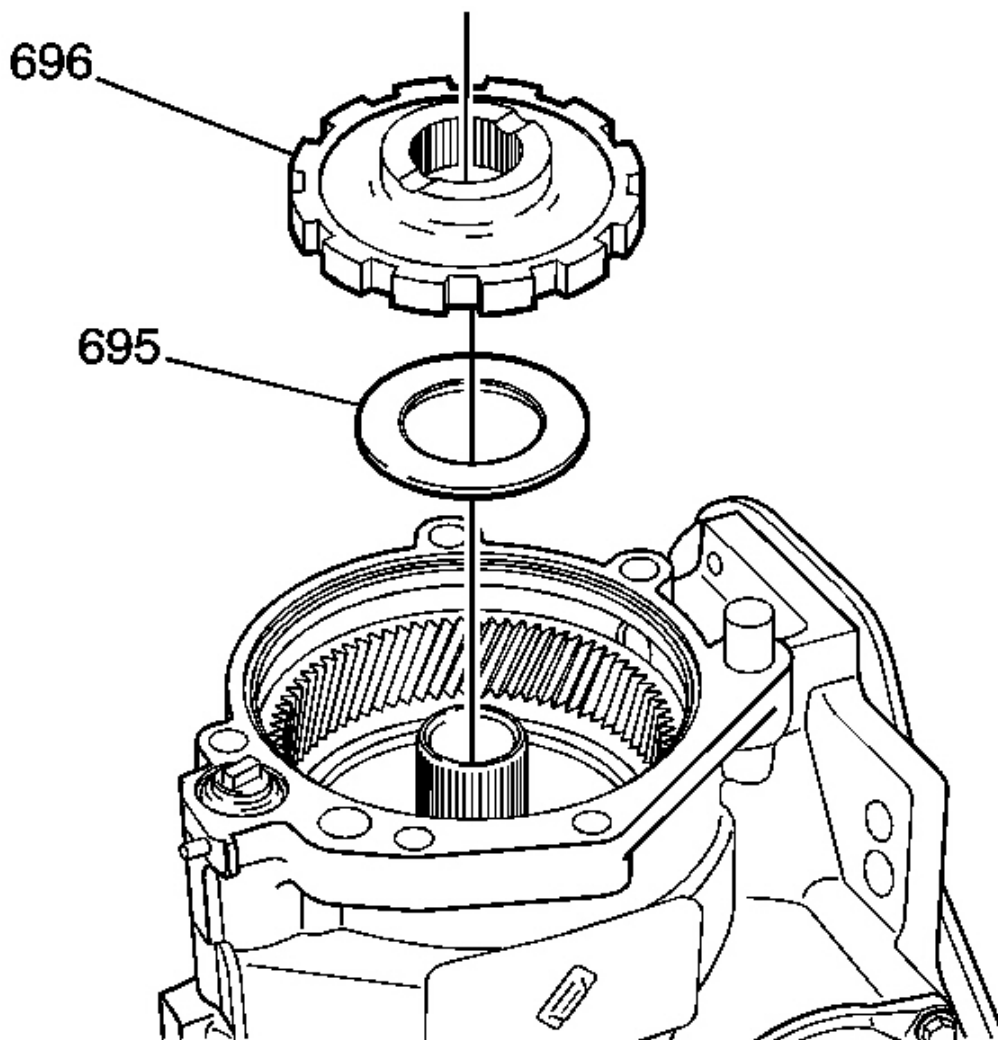


Fig. 199: View Of Park Gear Thrust Bearing & Park Gear
Courtesy of GENERAL MOTORS CORP.

2. Use **J 36850** or equivalent in order to retain the parking gear thrust bearing (695) to the parking gear (696).
3. Install the parking gear thrust bearing (695) and the parking gear (696).

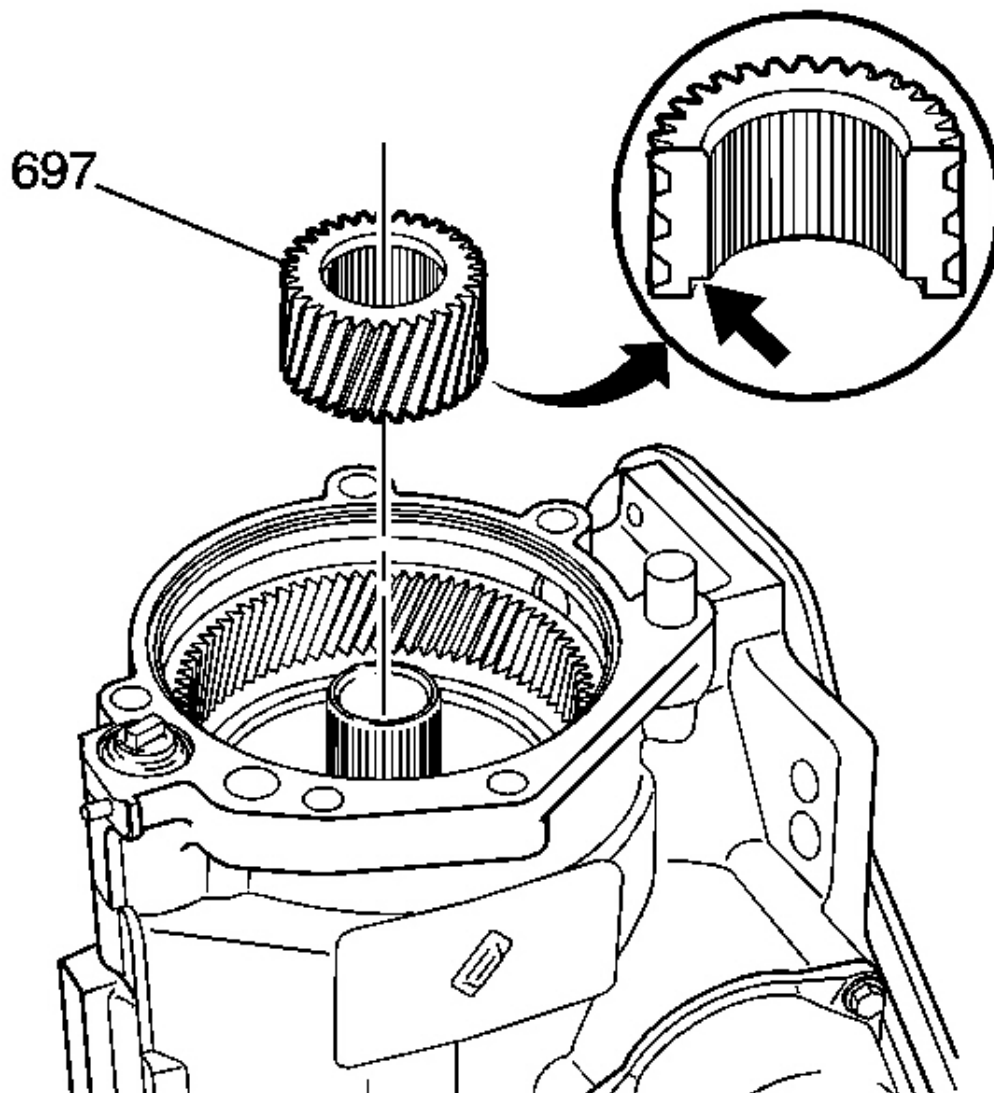


Fig. 200: Identifying Final Drive Sun Gear
Courtesy of GENERAL MOTORS CORP.

4. Install the final drive sun gear (697).

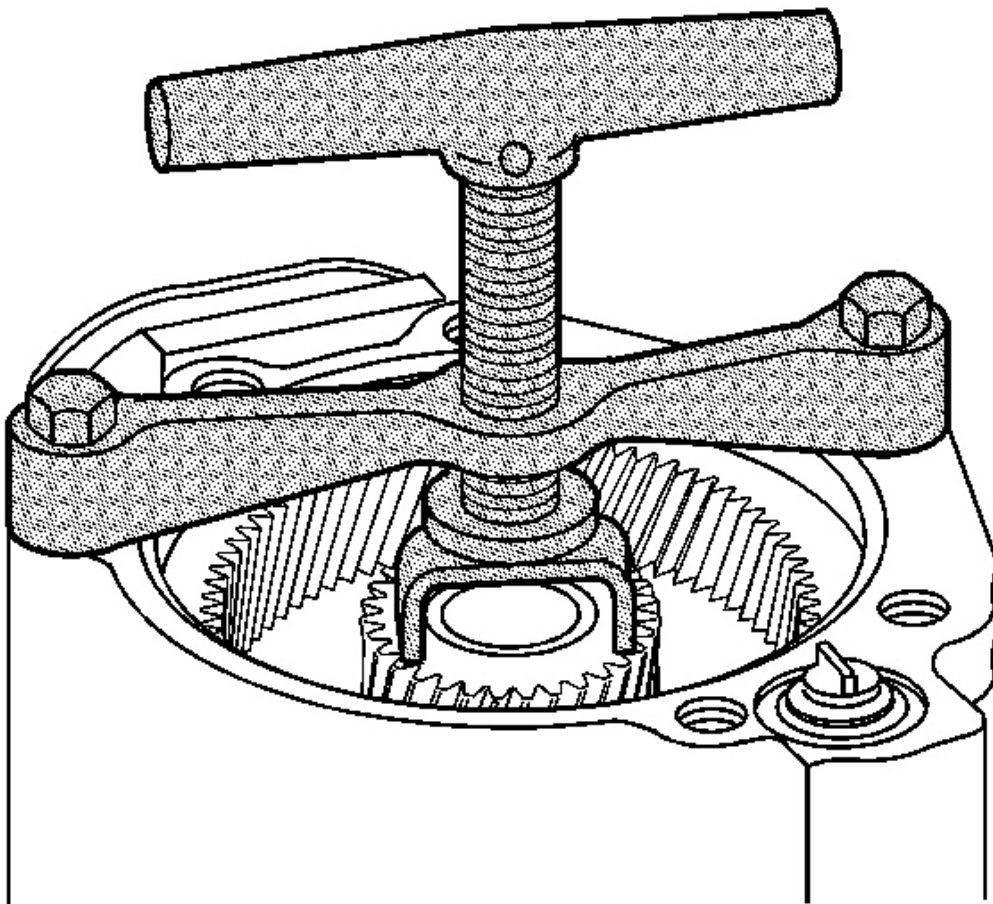


Fig. 201: J 44472 Installed Onto Transmission Case
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Install bolts and tighten securely to prevent tool deflection during end play measurement.

5. Install J 44472 . See Special Tools.

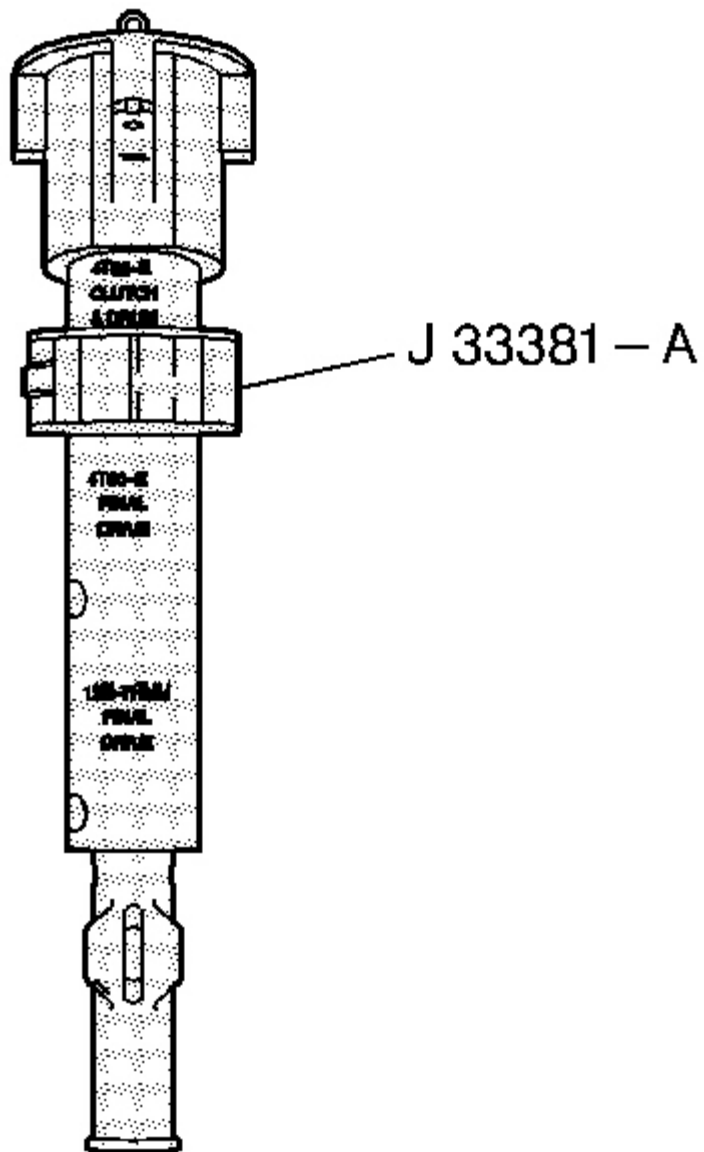


Fig. 202: View Of J 33381-A

Courtesy of GENERAL MOTORS CORP.

6. Adjust the collar on tool **J 33381-A** to the 4T65-E CLUTCH & DRUM setting. See Special Tools.

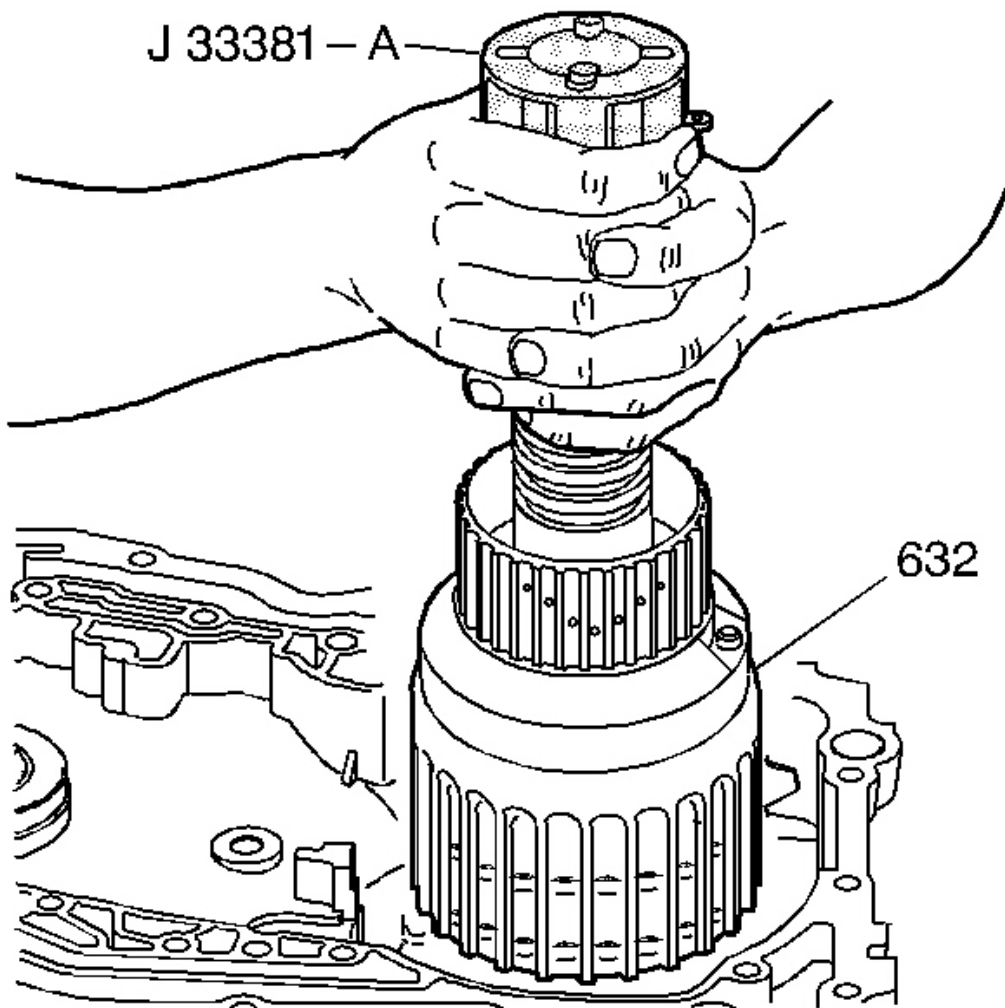


Fig. 203: Installing J 33381-A Into Input Clutch Housing
Courtesy of GENERAL MOTORS CORP.

7. Install **J 33381-A** into the input clutch housing assembly (632). See **Special Tools**.
8. Tighten the threaded rod of **J 33381-A** until the rod is finger tight. See **Special Tools**.
9. Use **J 33381-A** in order to lift the input clutch housing assembly (632). See **Special Tools**. The sprag clutch assemblies will also be attached.
10. Install the assembly (632) into the case. Be sure that the assembly is down all the way.
11. Remove **J 33381-A** from the assembly. See **Special Tools**.

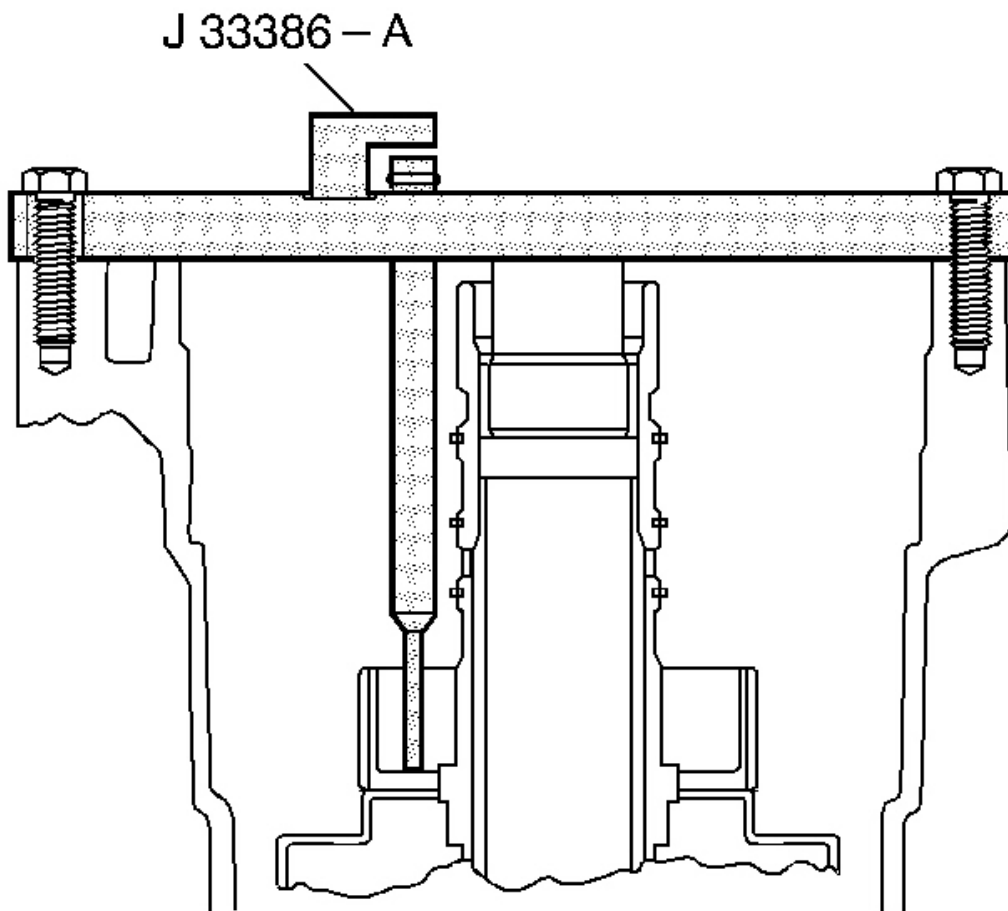


Fig. 204: View Of J 33386-A Installed Onto Transmission Case
Courtesy of GENERAL MOTORS CORP.

12. Using two bolts, install **J 33386-A** onto the case. See **Special Tools**.
13. Tighten the bolts in order to securely hold **J 33386-A** . See **Special Tools**.
14. Tighten **J 44472** finger tight in order to eliminate differential carrier end play. See **Special Tools**.

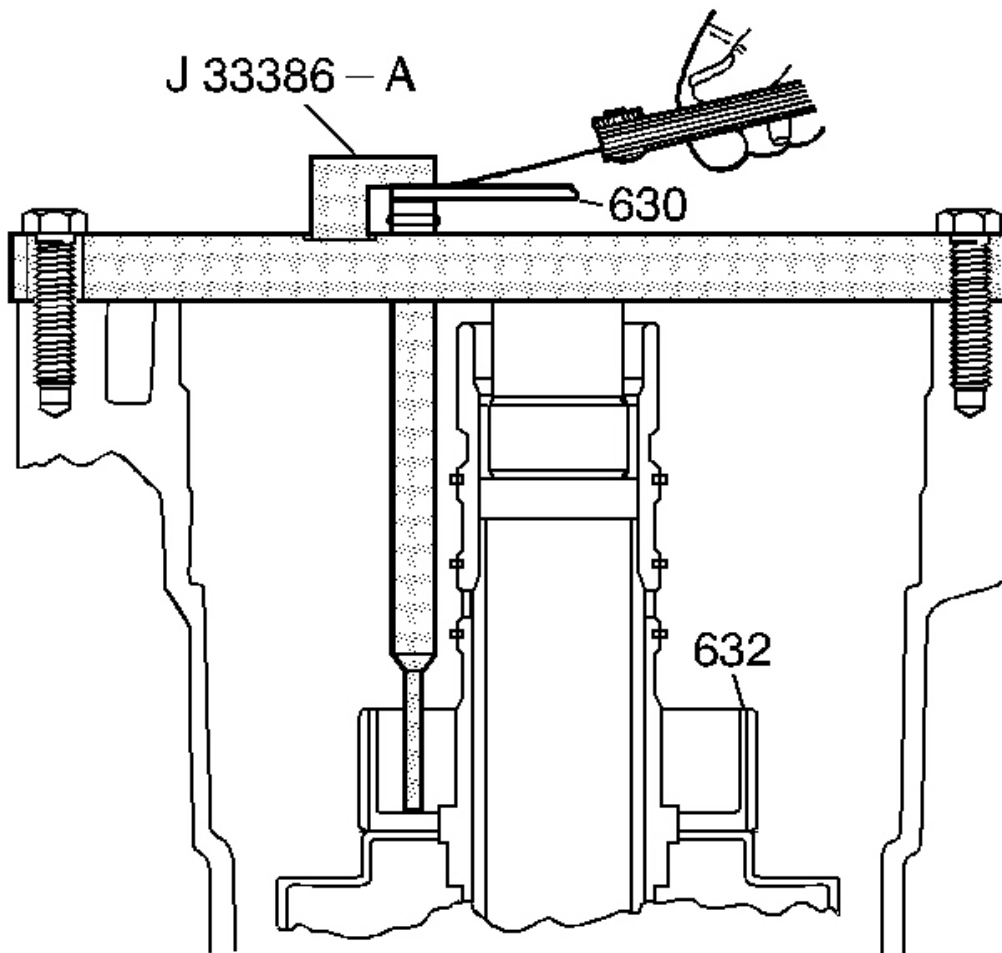


Fig. 205: Measuring Clearance Between J 33386-A & Thrust Washer
Courtesy of GENERAL MOTORS CORP.

15. Insert the thrust washer (630) from the input clutch housing into **J 33386-A** as indicated. See **Special Tools**. If the thrust washer will not fit into **J 33386-A**, select the next size smaller thrust washer and recheck. See **Special Tools**.
16. Use a feeler gauge in order to measure the clearance between **J 33386-A** and the thrust washer (630). See **Special Tools**.
 - If the clearance is less than 0.0521 mm (0.006 in), use the current size thrust washer.
 - If the clearance is 0.0521 mm (0.006 in) or more, select the next size larger thrust washer and recheck.

Refer to the Bearing/Input Clutch Hub Selective Thrust Washer (630) Selection Guide in **End Play Specifications** .

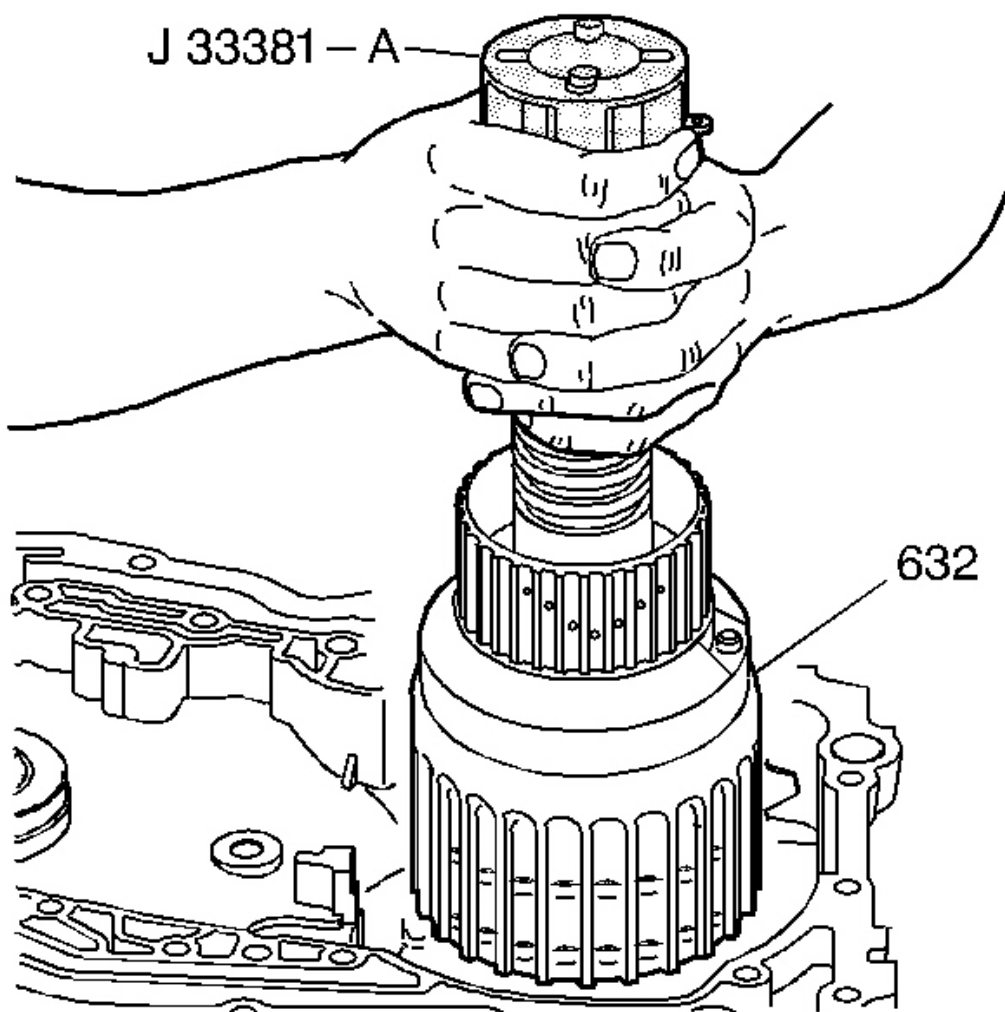


Fig. 206: Installing J 33381-A Into Input Clutch Housing
Courtesy of GENERAL MOTORS CORP.

17. Remove J 33386-A . See **Special Tools**.
18. Adjust the collar on tool J 33381-A to the 4T65-E CLUTCH & DRUM setting. See **Special Tools**. Make sure that the threaded rod is fully loosened.
19. Install J 33381-A into the input clutch housing (632). See **Special Tools**.

20. Tighten the threaded rod of **J 33381-A** until the rod is finger tight. See **Special Tools**.
21. Use **J 33381-A** in order to lift the input clutch housing assembly (632). See **Special Tools**. The sprag clutch assemblies will also be attached.
22. Remove the assembly (632) from the case.

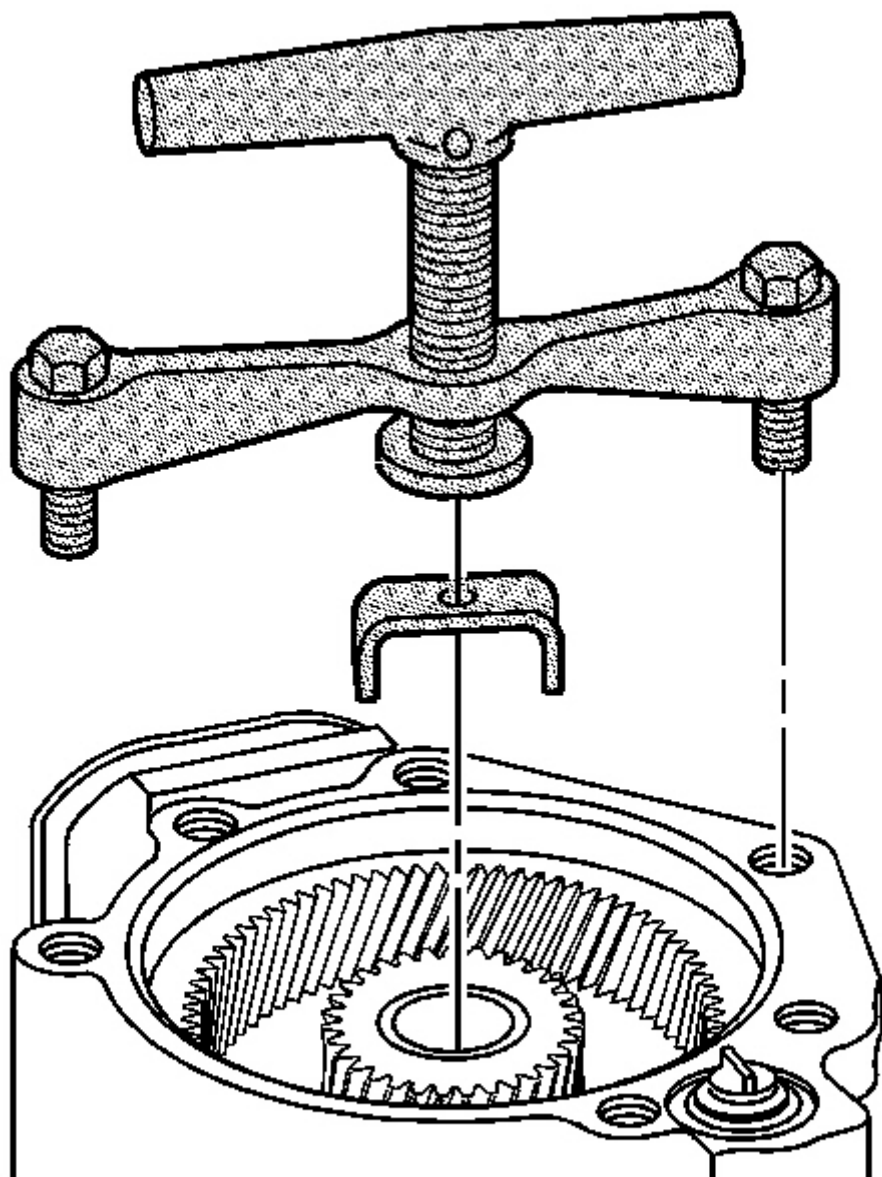
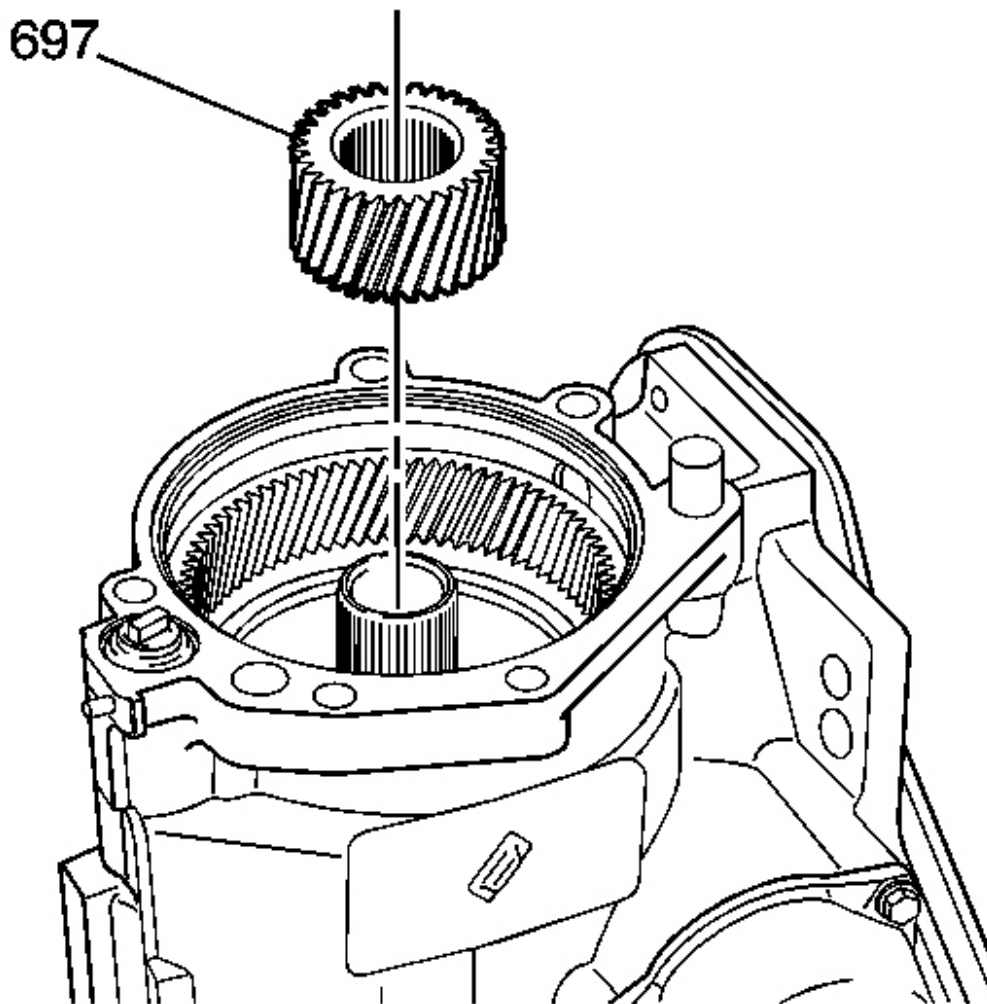


Fig. 207: View Of J 44472**Courtesy of GENERAL MOTORS CORP.**

23. Position the transmission so that the oil pan is facing down.
24. Remove J 44472 . See **Special Tools**.

**Fig. 208: Locating Final Drive Sun Gear****Courtesy of GENERAL MOTORS CORP.**

25. Remove the final drive sun gear (697).

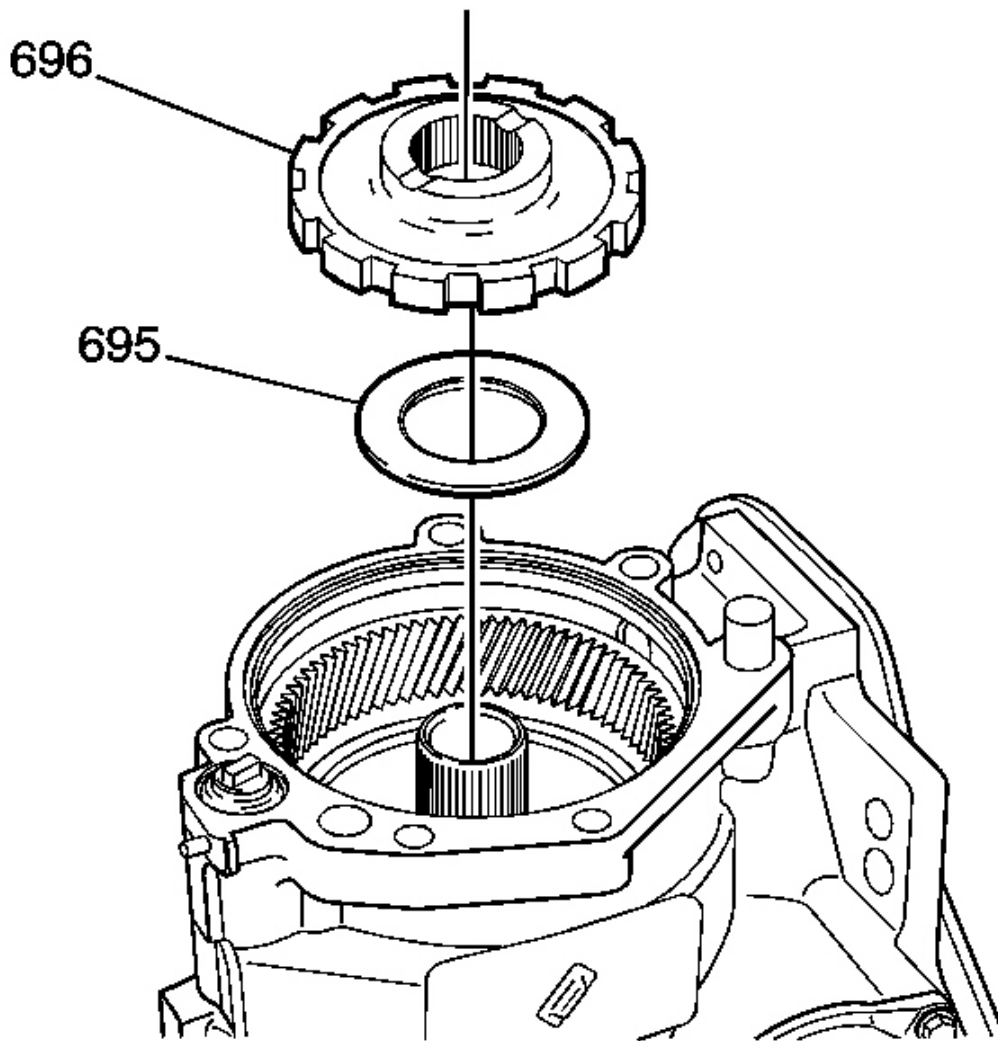


Fig. 209: View Of Park Gear Thrust Bearing & Park Gear
Courtesy of GENERAL MOTORS CORP.

26. Remove the parking gear (696) and the parking gear thrust bearing (695).

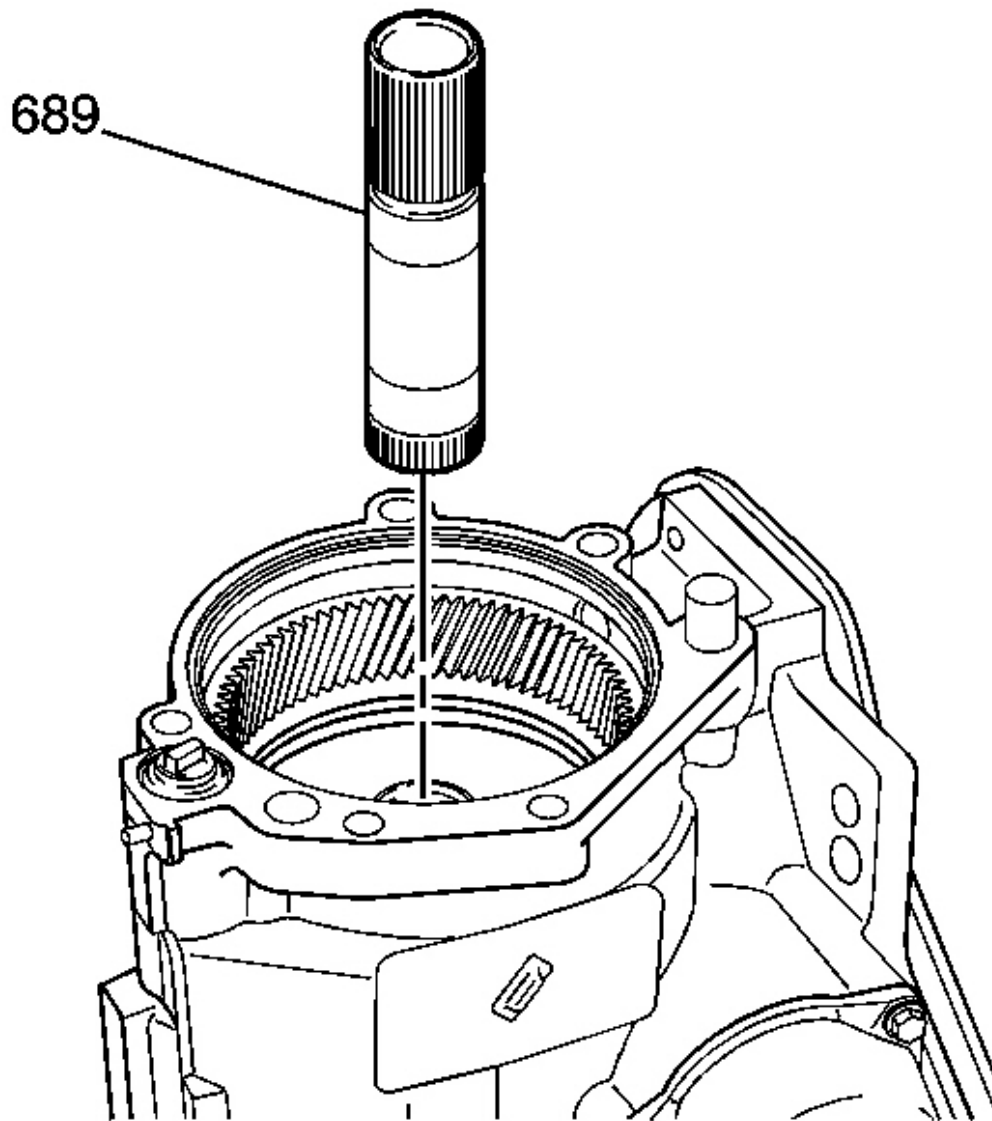


Fig. 210: Identifying Final Drive Sun Gear Shaft
Courtesy of GENERAL MOTORS CORP.

27. Remove the final drive sun gear shaft (689).

SECOND CLUTCH DISASSEMBLE

Tools Required:

- **J 23327** Clutch Spring Compressor
- **J 38734** Spring Compressor Adapter

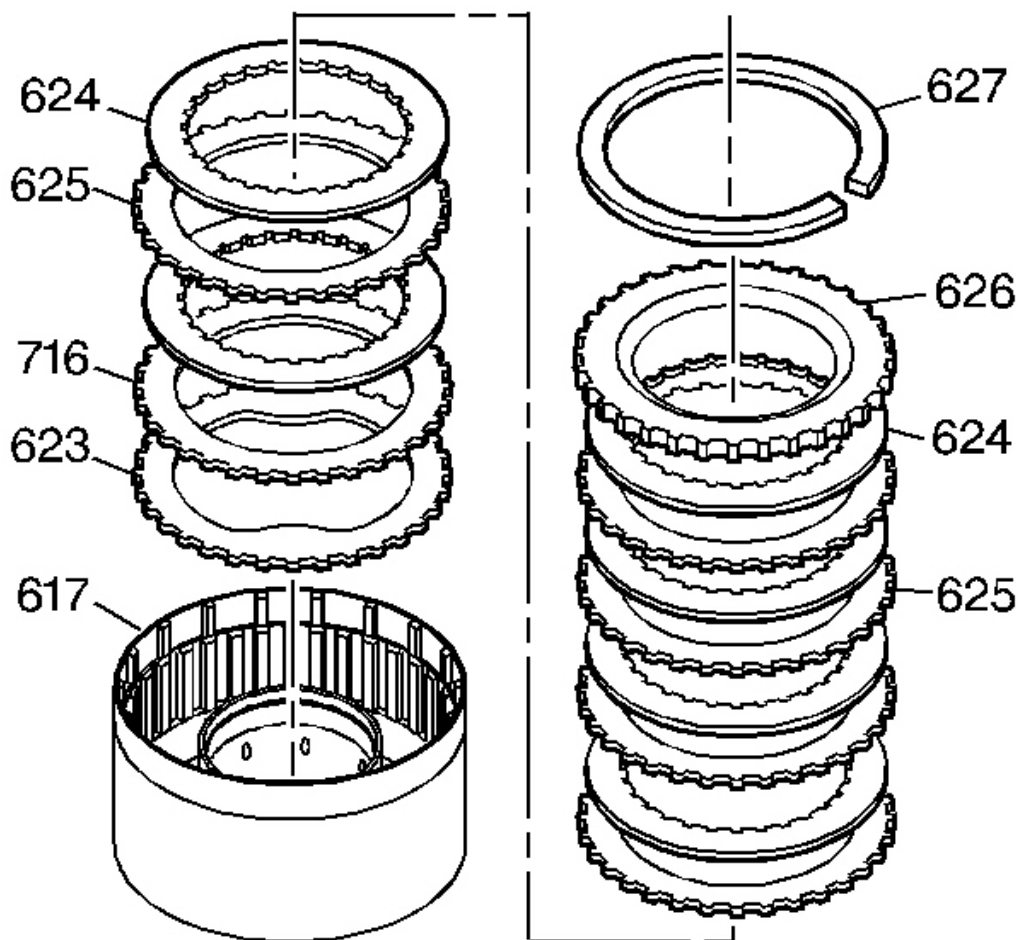
Disassembly Procedure

Fig. 211: View Of Second Clutch Plate Assembly
Courtesy of GENERAL MOTORS CORP.

1. Use a flat blade screwdriver in order to remove the retaining ring (627) from the second clutch housing.

2. Remove the second clutch backing plate (626). Remove the alternating second clutch fiber plates (624). Remove the second clutch steel plates (625).
3. Remove the second clutch apply plate (716). Remove the second clutch waved plate (623).

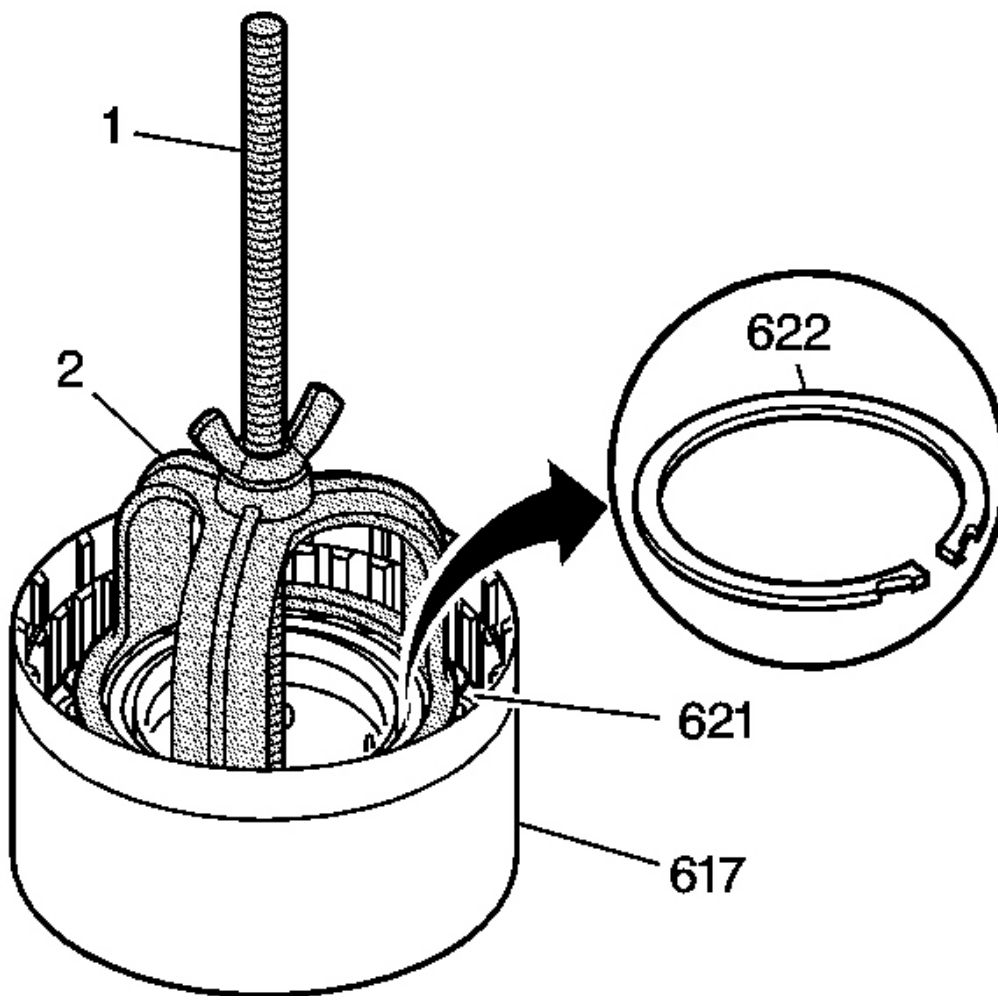


Fig. 212: Using J 23327 & J 38734 To Compress The Second Clutch Piston Spring
Courtesy of GENERAL MOTORS CORP.

4. Use J 23327 (1) and J 38734 (2) in order to compress the second clutch piston spring (621).
5. Remove the retaining ring (622).

6. Remove **J 23327** and **J 38734** from the second clutch housing (617).

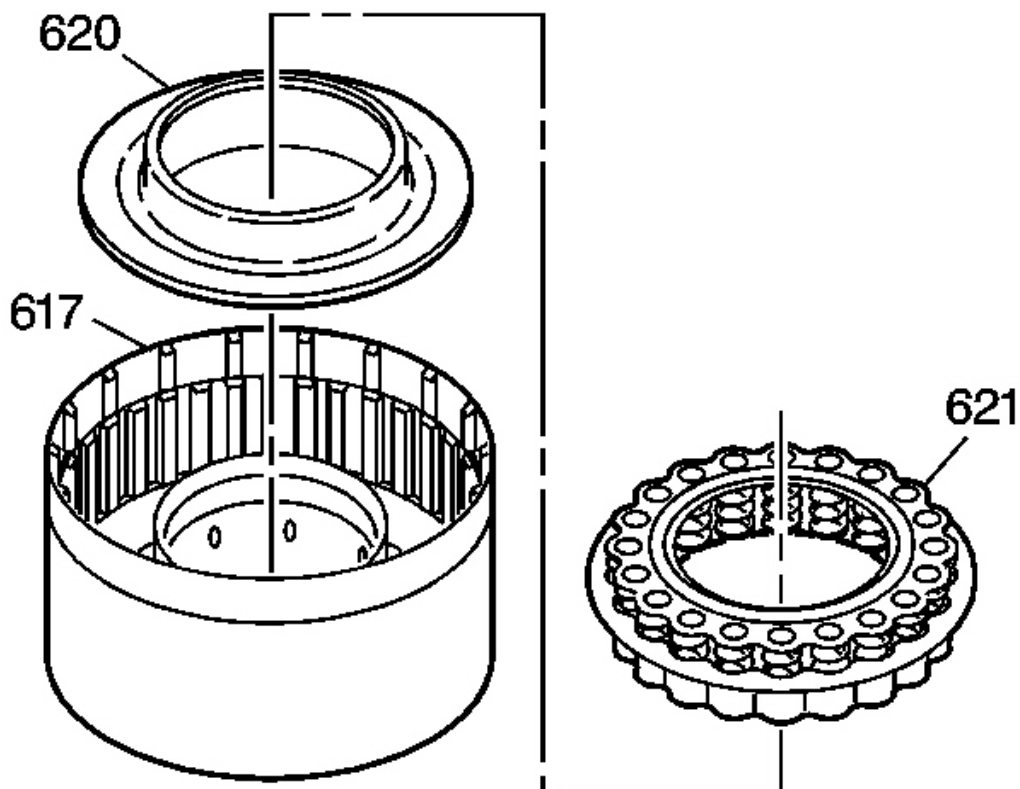


Fig. 213: Identifying Second Clutch Spring Assembly
Courtesy of GENERAL MOTORS CORP.

7. Remove the second clutch spring assembly (621).
8. Remove the second clutch piston assembly (620).

SECOND CLUTCH HOUSING ASSEMBLY INSPECTION

Inspection Procedure

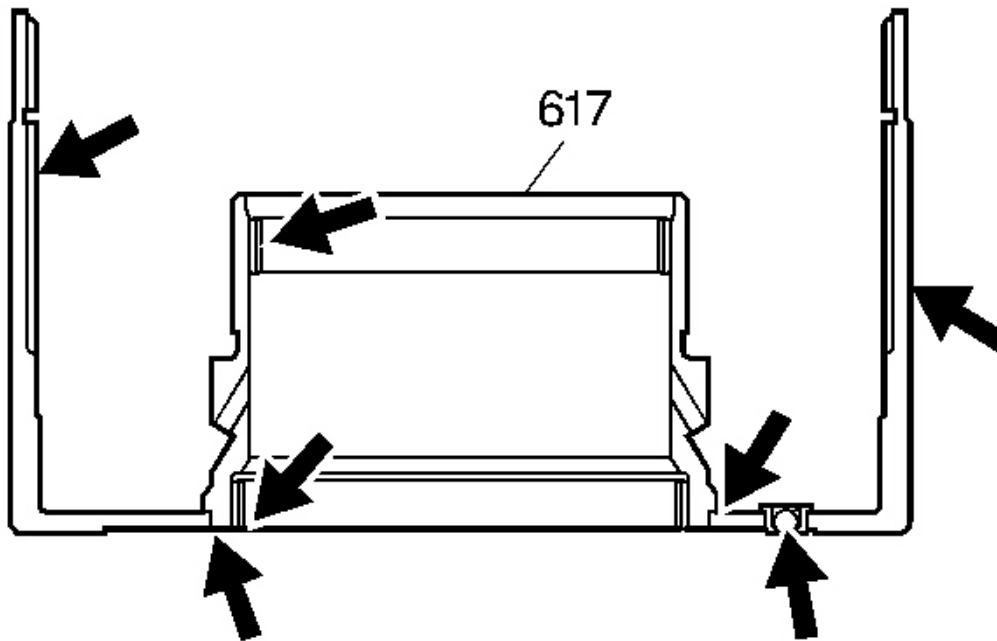


Fig. 214: Locating Inspection Areas On Second Clutch Housing Assembly
Courtesy of GENERAL MOTORS CORP.

1. Inspect the second clutch housing assembly (617) for the following:
 - A leaking or damaged ball check valve in the second clutch housing. Turn the housing in order to seat the check ball. Use transmission fluid in order to check for leaks.
 - Scored or worn bushings
 - Discolored band surface or wear on the drum caused by excess heat
 - Flatness of the band surface on the drum
 - Damaged reverse reaction drum splines
 - Cracks in welds

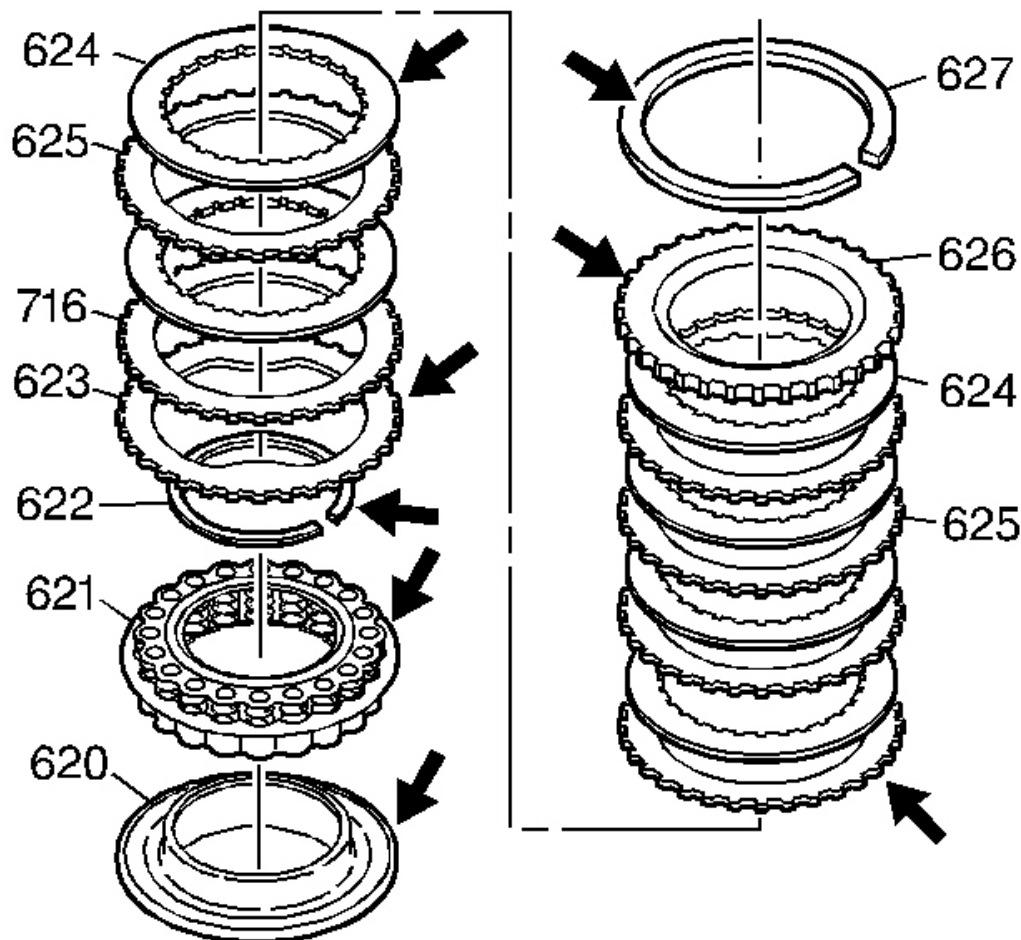


Fig. 215: Inspection Areas On Second Clutch Assembly
Courtesy of GENERAL MOTORS CORP.

2. Inspect the backing plate (626) and the waved plate (623) of the second clutch for cracks or heat spots.
3. Inspect the steel plates (625) and the apply plate (716) of the second clutch for wear.
4. Inspect the fiber plates (624) of the second clutch for wear, flaking or lining separation.
5. Inspect the spring assembly (621) of the second clutch for damage to the ring cage. Check for distorted or missing springs.
6. Inspect the spring snap ring (622) of the second clutch for damage. Inspect the snap ring (627) of the second clutch backing plate for damage.

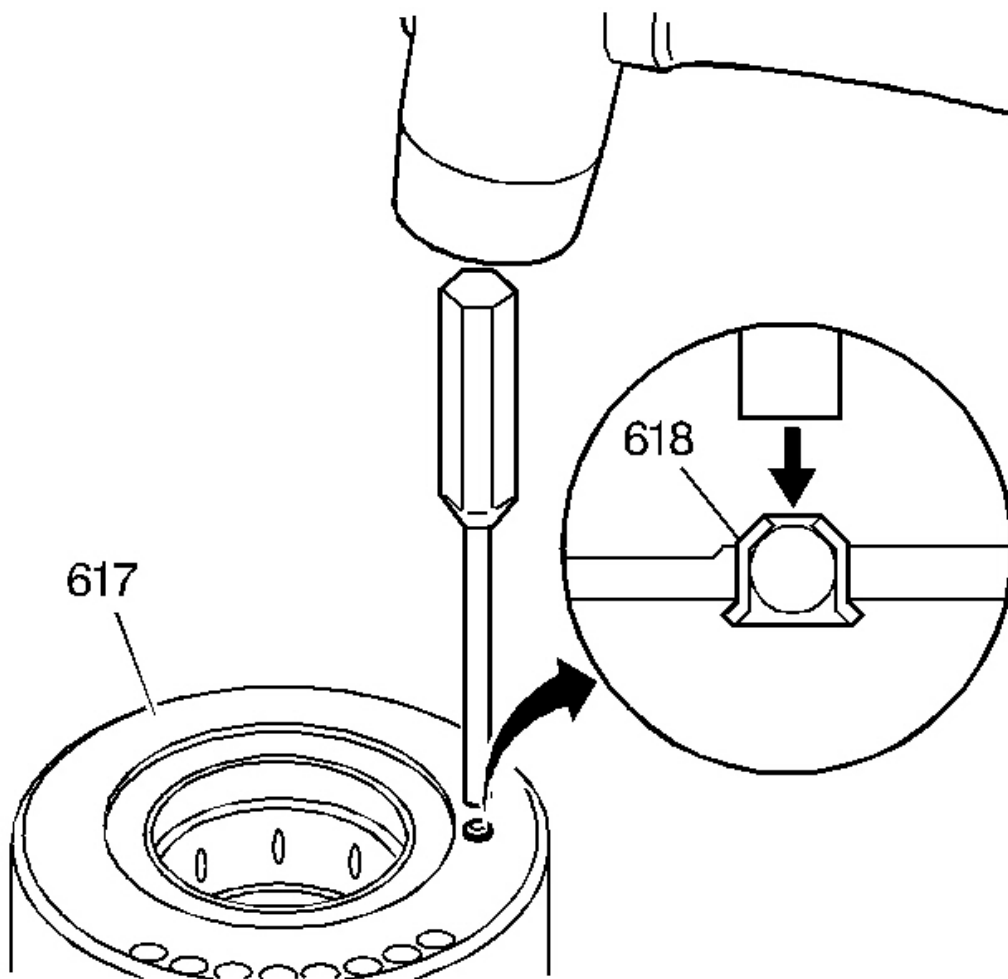
SECOND CLUTCH HOUSING BALL CHECK VALVE DISASSEMBLE

Fig. 216: Removing Ball Check Valve Assembly In Second Clutch Housing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the ball check valve assembly (618) does not leak, do not remove the assembly.

Use a 6.25 mm (1/4 in) drift and a mallet in order to remove the ball check valve assembly (618) from the second clutch housing (617).

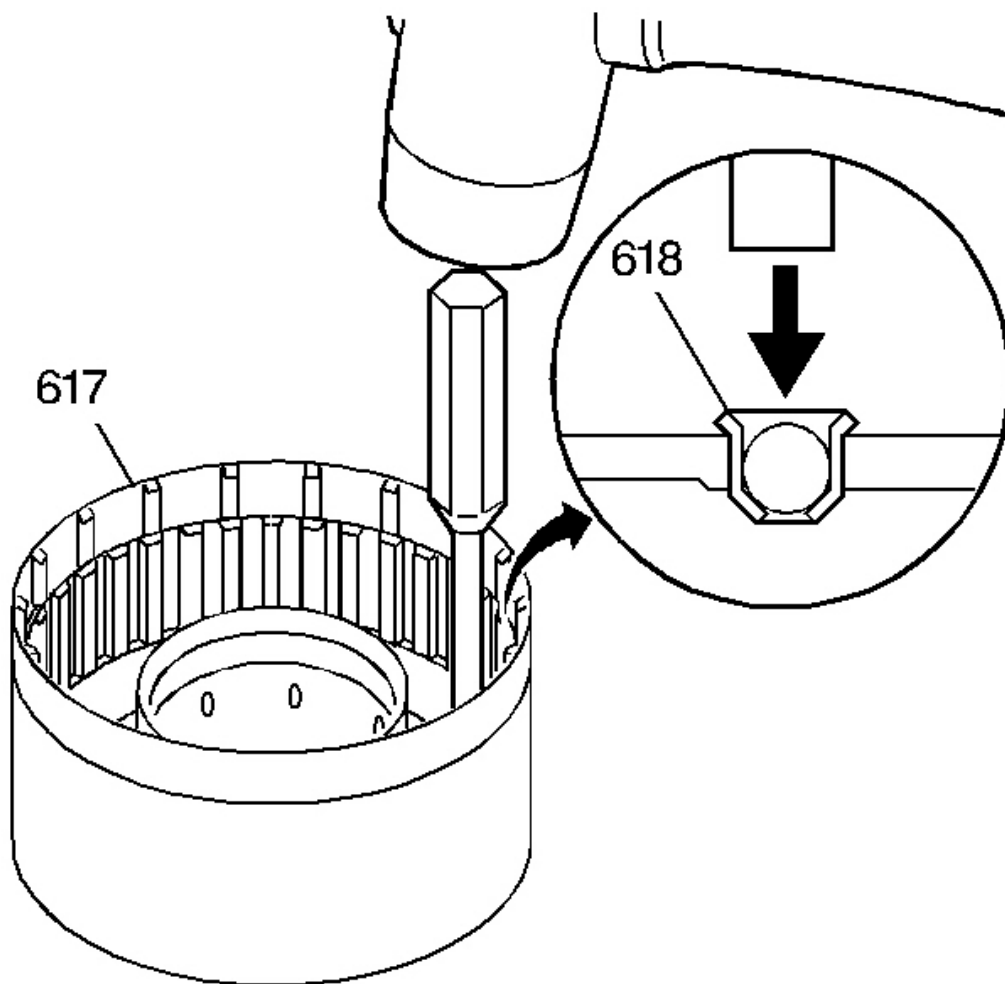
SECOND CLUTCH HOUSING BALL CHECK VALVE ASSEMBLE

Fig. 217: Identifying Ball Check Valve Assembly In Second Clutch Housing
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: If the ball check valve assembly (618) does not leak, do not remove the assembly.

Use a 6.25 mm (1/4 in) drift and a mallet in order to remove the ball check valve assembly (618) from the second clutch housing (617).

SECOND CLUTCH ASSEMBLE

Tools Required:

- **J 23327** Clutch Spring Compressor
- **J 38734** Spring Compressor Adapter
- **J 41992-1** Protector. See **Special Tools**.
- **J 41992-2** Adapter. See **Special Tools**.
- **J 41992-3** Installer. See **Special Tools**.

Assembly Procedure

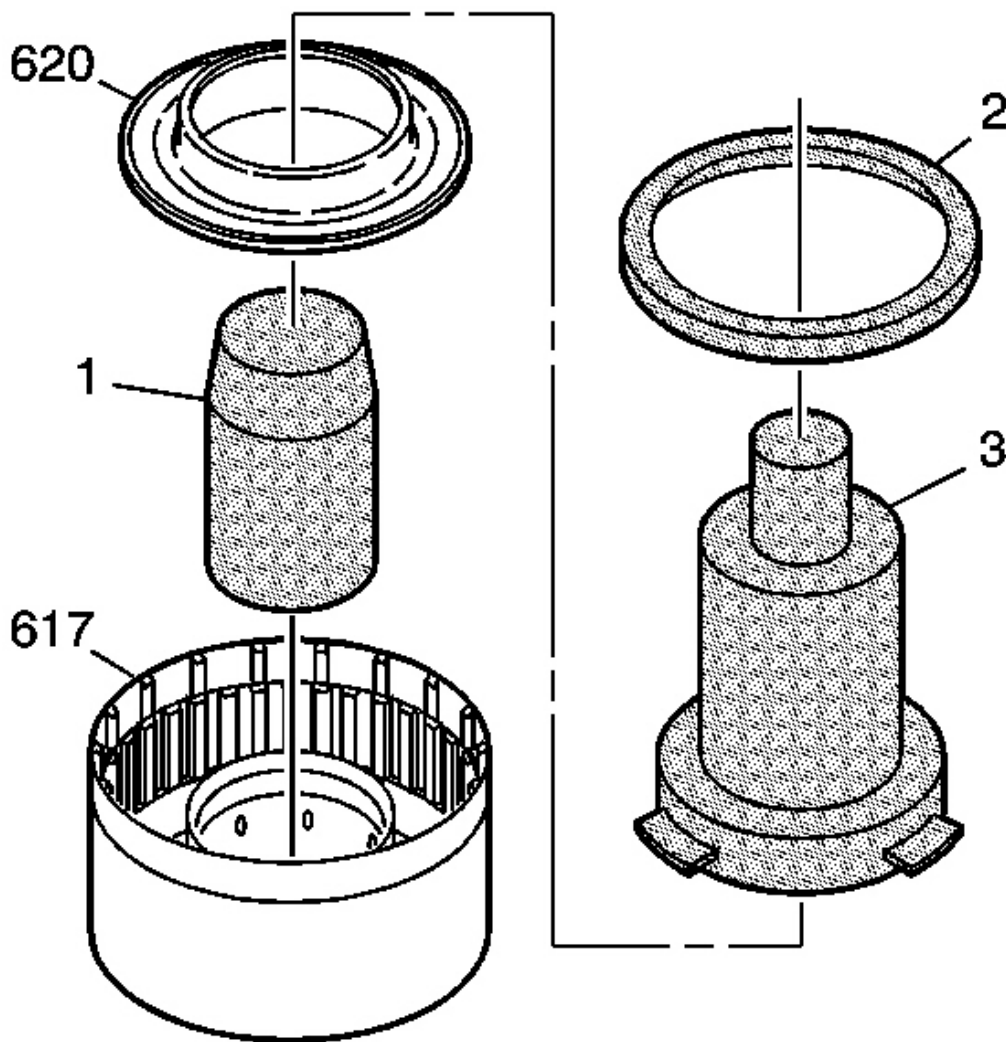


Fig. 218: Installing Second Clutch Piston
Courtesy of GENERAL MOTORS CORP.

1. Install **J 41992-2 (1)** into the second clutch housing (617). See **Special Tools**.
2. Install the second clutch piston (620) and **J 41992-3 (3)** into **J 41992-1 (2)** protector. See **Special Tools**.
3. Install the second clutch piston and tool assembly into the second clutch housing assembly (617).

4. Use hand pressure to press down on **J 41992-3 (3)** until the second clutch piston (620) is seated. See **Special Tools**.
5. Remove **J 41992-1 (2)**, **J 41992-2 (1)** and **J 41992-3 (3)**. See **Special Tools**. If necessary, gently tap with a punch through the center of the second clutch housing to remove the tools.

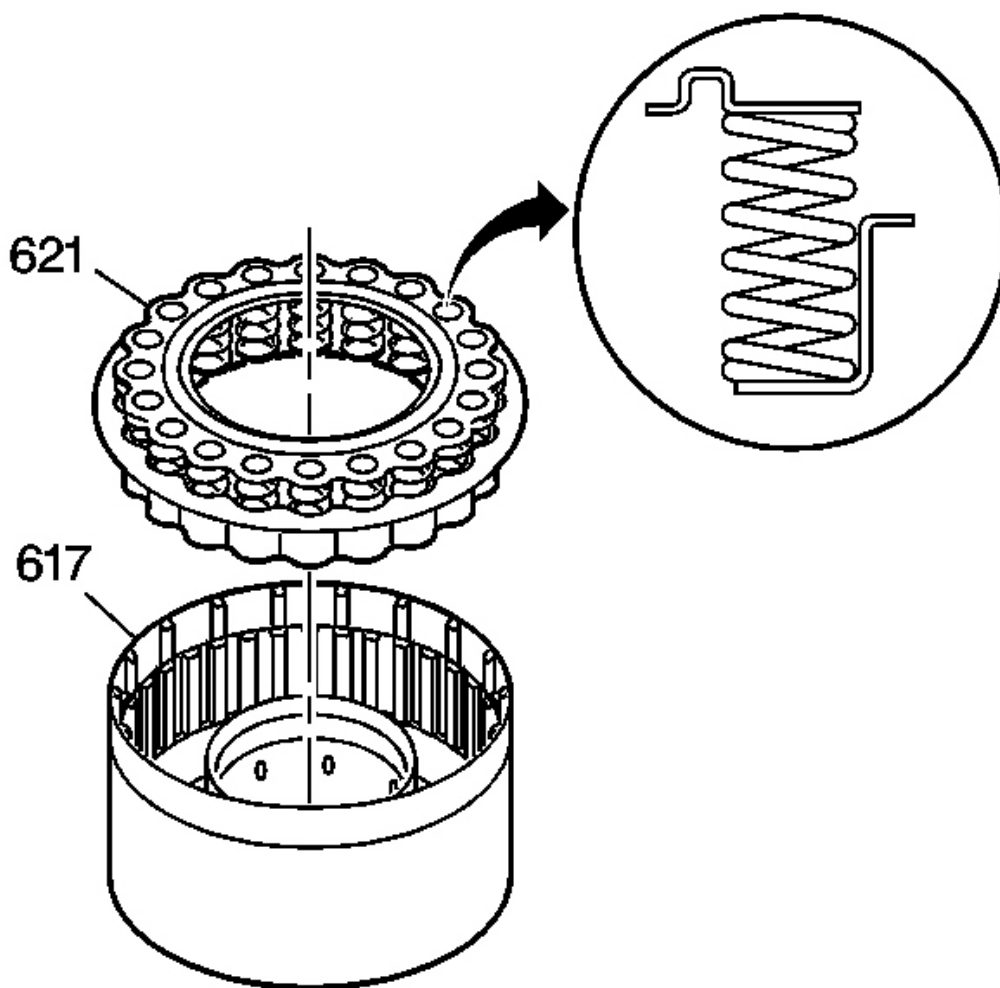


Fig. 219: View Of Second Clutch Spring Assembly
Courtesy of GENERAL MOTORS CORP.

6. Assemble the second clutch spring assembly (621) into the second clutch housing assembly (617).

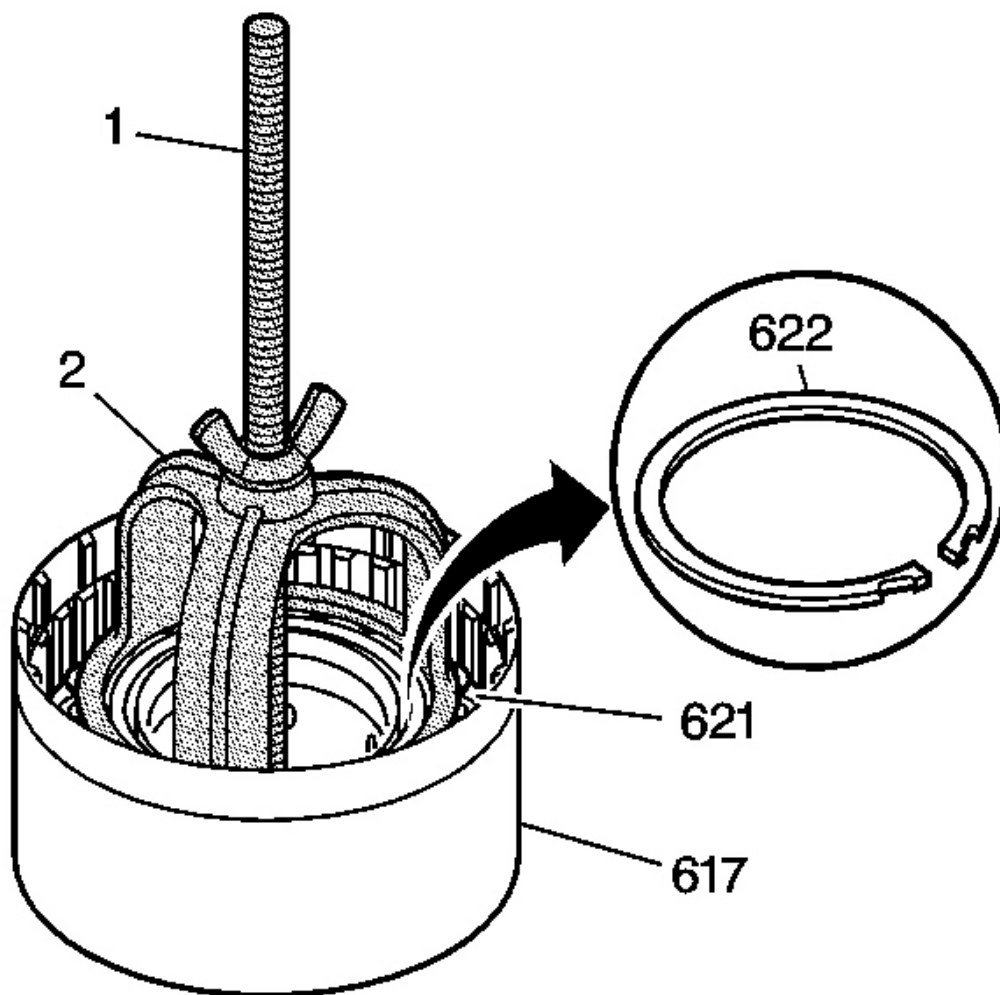


Fig. 220: Using J 23327 & J 38734 To Compress The Second Clutch Piston Spring
Courtesy of GENERAL MOTORS CORP.

7. Use **J 23327** (1) and **J 38734** (2) in order to compress the second clutch piston spring (621).
8. Install the second clutch spring assembly retainer ring (622).
9. Remove **J 23327** and **J 38734** from the second clutch housing (617).

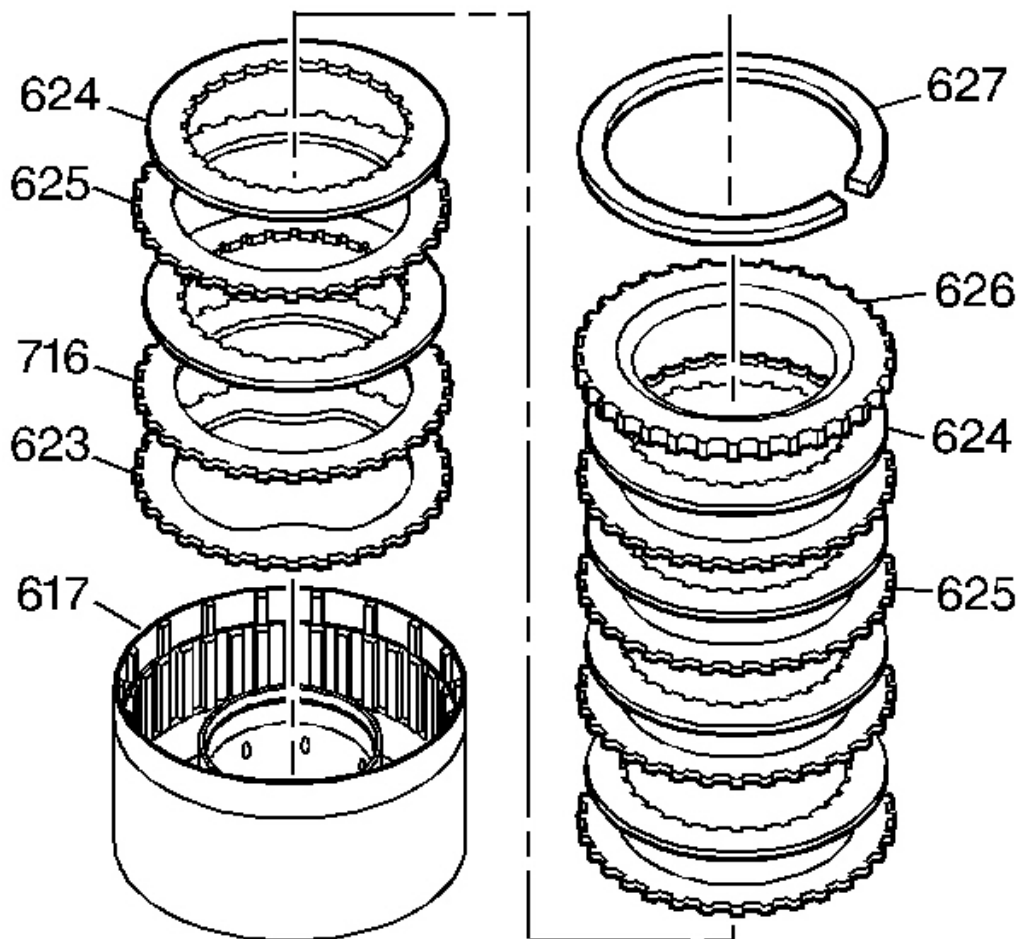


Fig. 221: View Of Second Clutch Plate Assembly
Courtesy of GENERAL MOTORS CORP.

10. Install the second clutch waved plate (623) into the second clutch housing (617).
11. Install the second clutch apply plate (716) into the second clutch housing (617) with the marking DN or DOWN toward the piston.
12. Install the second clutch fiber plate assemblies (624) and the second clutch steel plates (625), starting with a fiber plate assembly.
13. Assemble the remaining plates, alternating between steel and fiber.
14. Install the second clutch backing plate (626) into the housing.
15. Install the second clutch backing plate retaining ring (627).

REVERSE BAND ASSEMBLY

Assembly Procedure

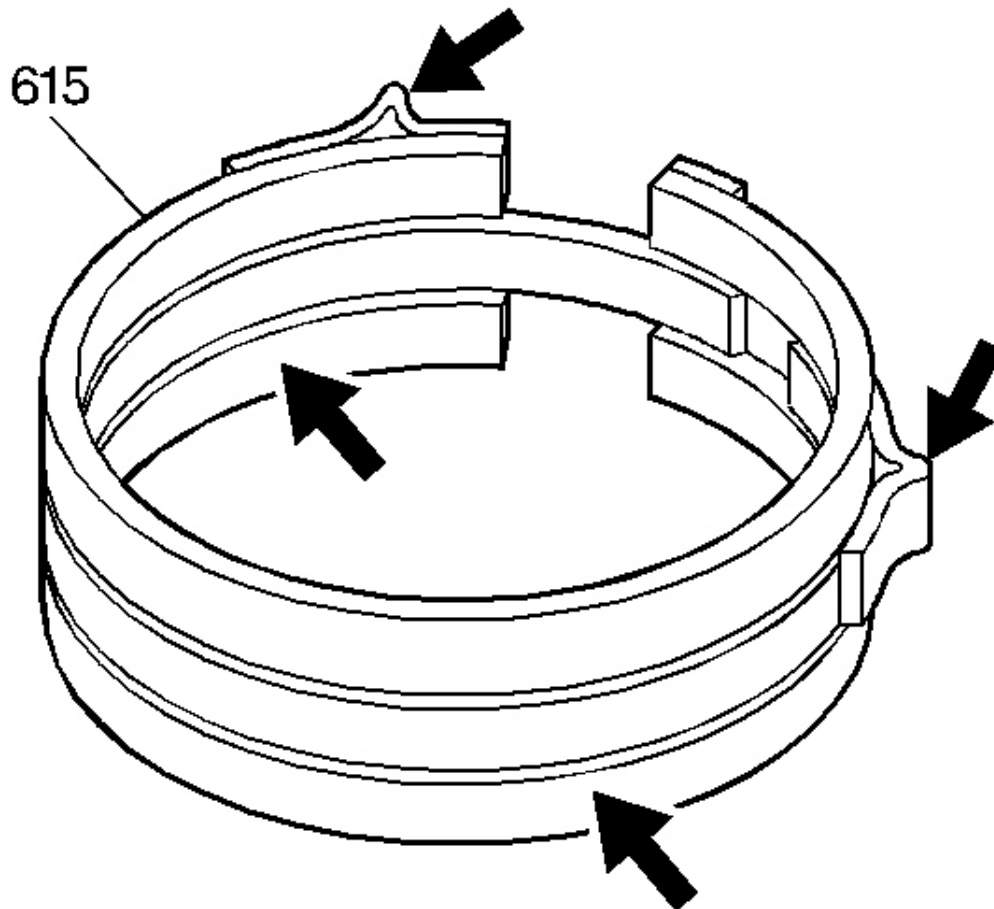


Fig. 222: Reverse Band Assembly Inspection Areas
Courtesy of GENERAL MOTORS CORP.

1. Inspect the reverse band assembly (615) for the following:
 - Cracks
 - Scoring
 - Lining separation
 - Wear of the fiber material

2. Inspect the apply lug for cracks.

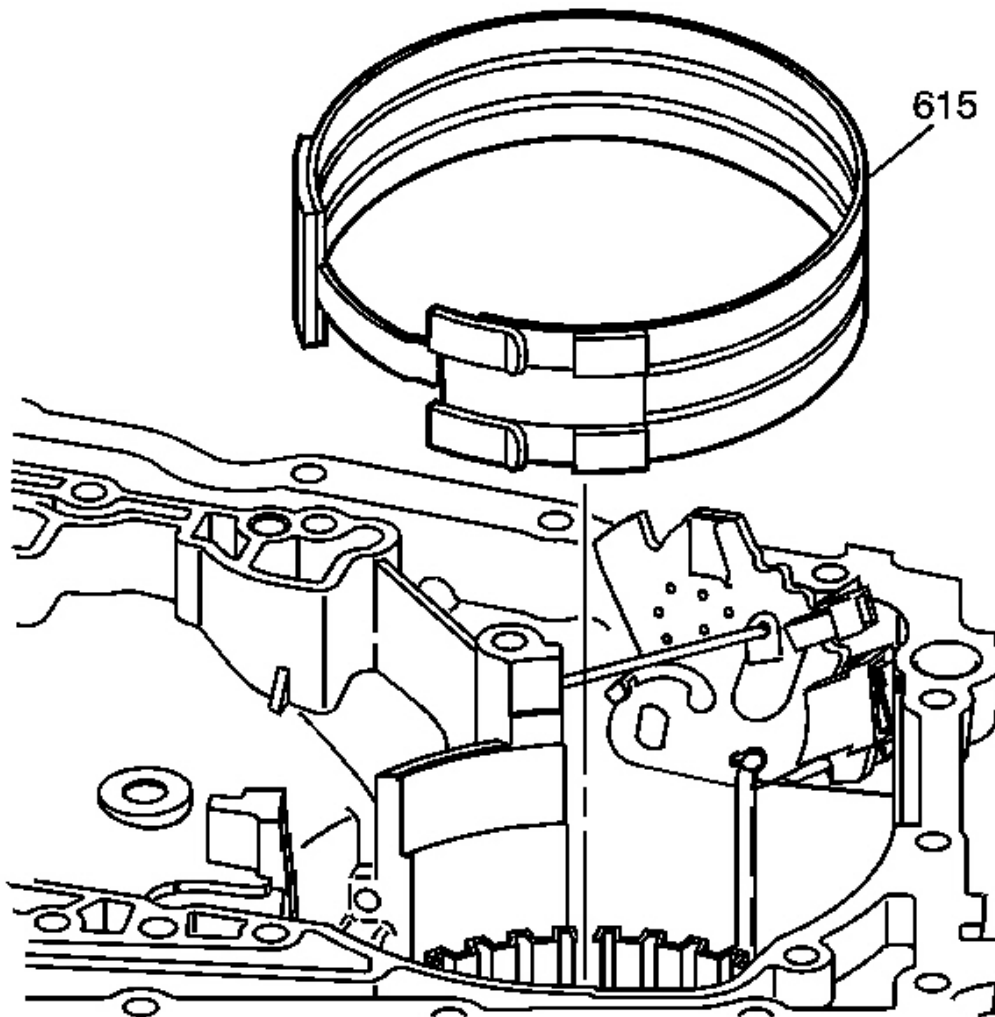


Fig. 223: View Of Reverse Band Assembly
Courtesy of GENERAL MOTORS CORP.

3. Install the reverse band assembly (615) into the case with the band end aligned on the anchor pin in the case.

Tools Required

J 4670-01 Clutch Spring Compressor. See **Special Tools**.

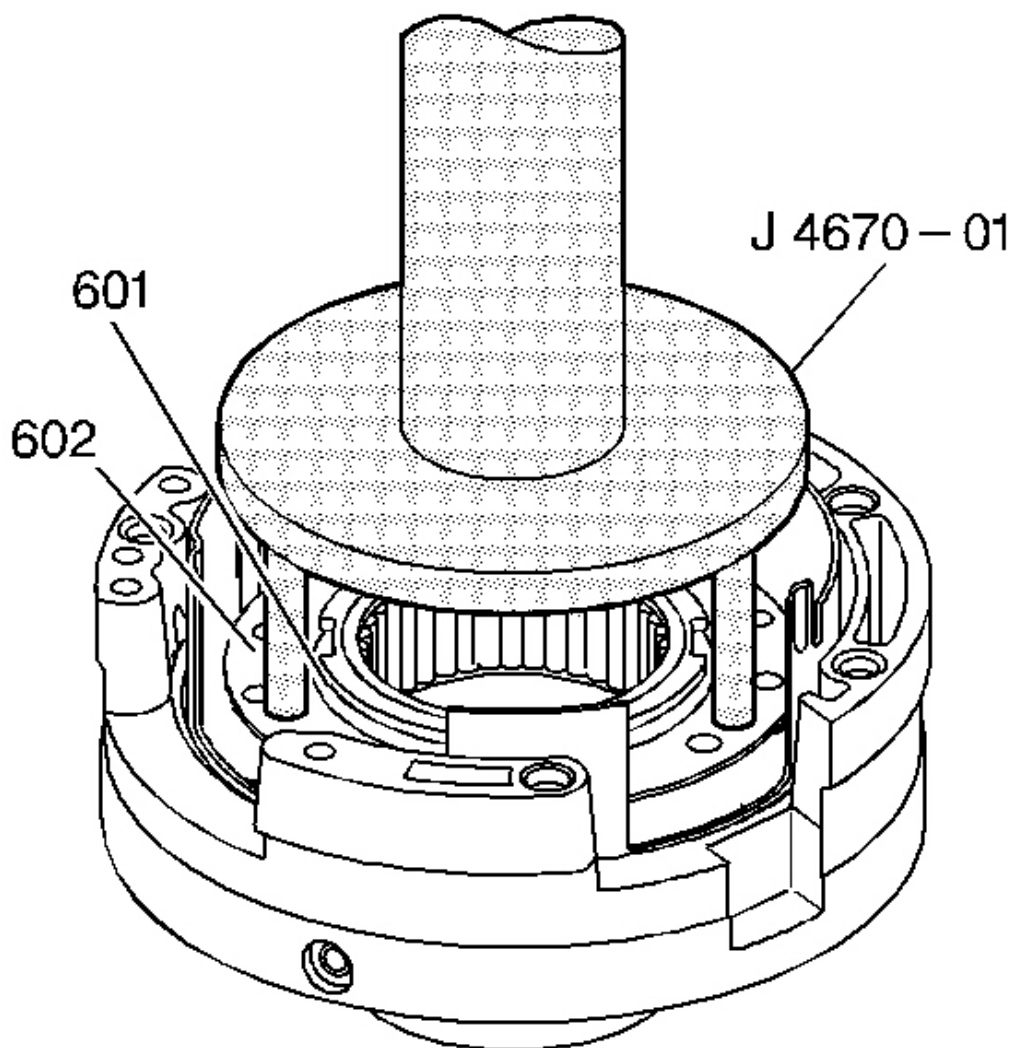
Disassembly Procedure

Fig. 224: Using J 4670-01 To Compress The Fourth Clutch Spring Assembly
Courtesy of GENERAL MOTORS CORP.

1. Use **J 4670-01** clutch spring compressor in order to compress the fourth clutch spring

assembly (602). See **Special Tools**. Remove the snap ring (601) from the driven sprocket support assembly.

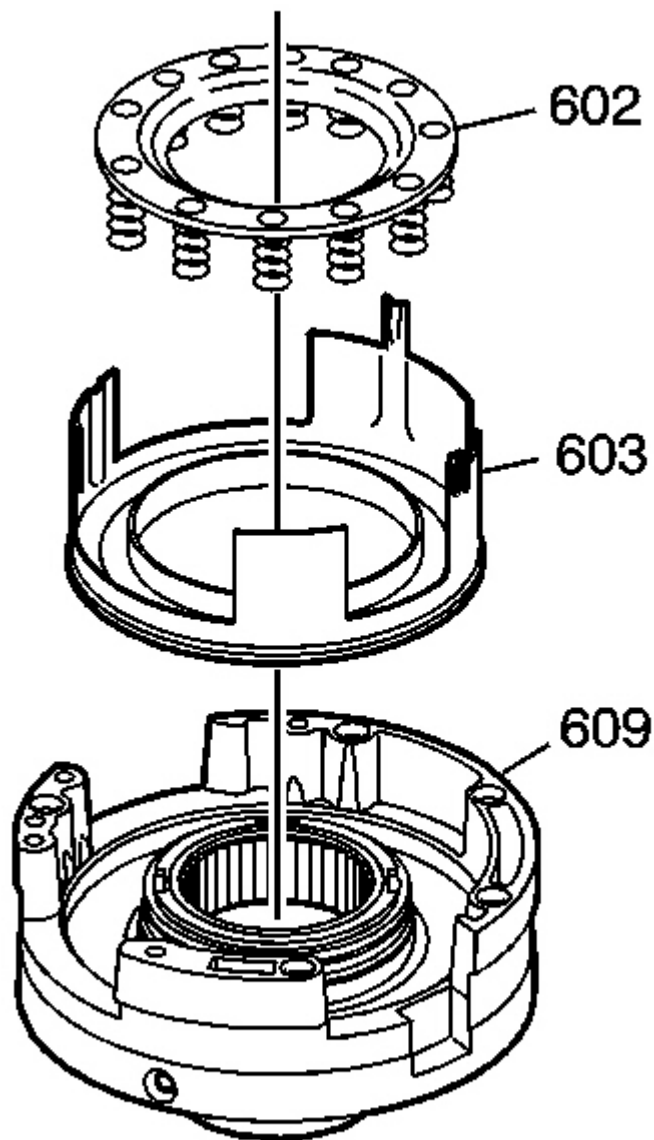


Fig. 225: Removing Spring Assembly & Fourth Clutch Piston Assembly
Courtesy of GENERAL MOTORS CORP.

2. Remove the spring assembly (602) and remove the fourth clutch piston assembly (603) from the driven sprocket support assembly (609).

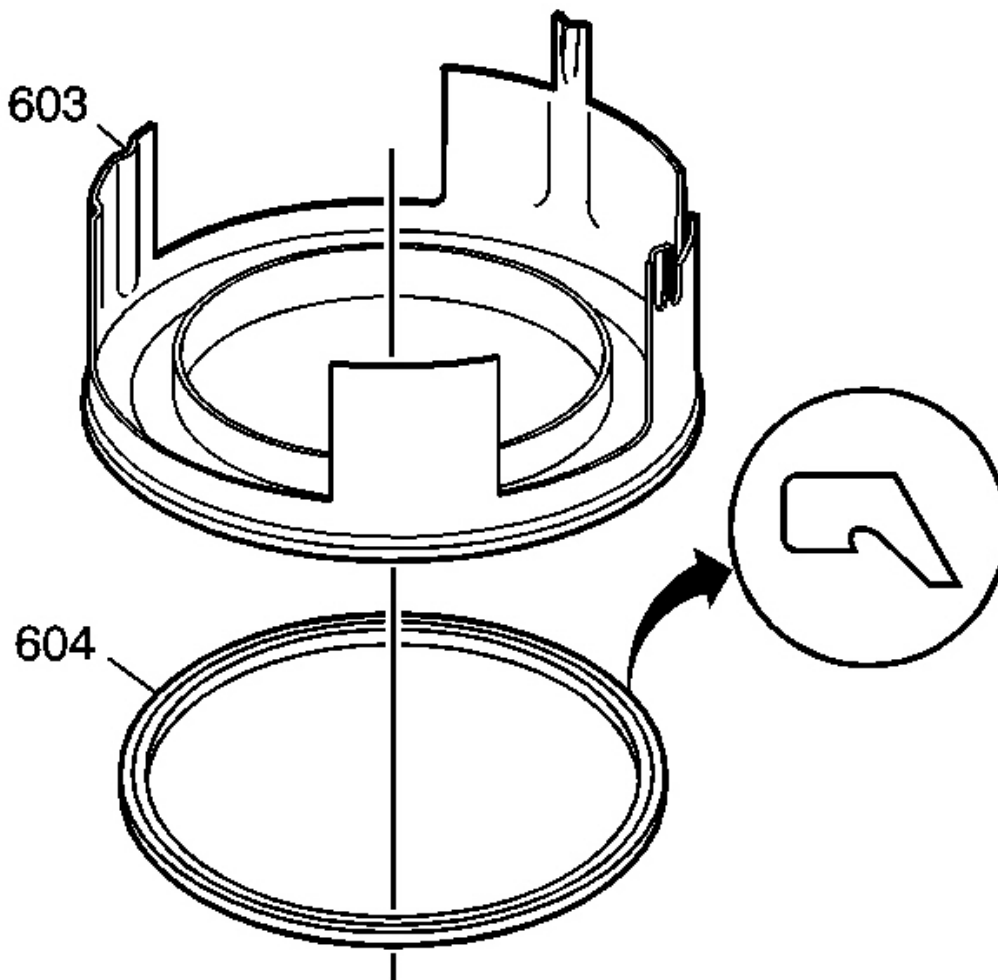


Fig. 226: Locating Fourth Clutch Piston Outer Seal
Courtesy of GENERAL MOTORS CORP.

3. Remove the outer seal (604) from the fourth clutch piston (603).

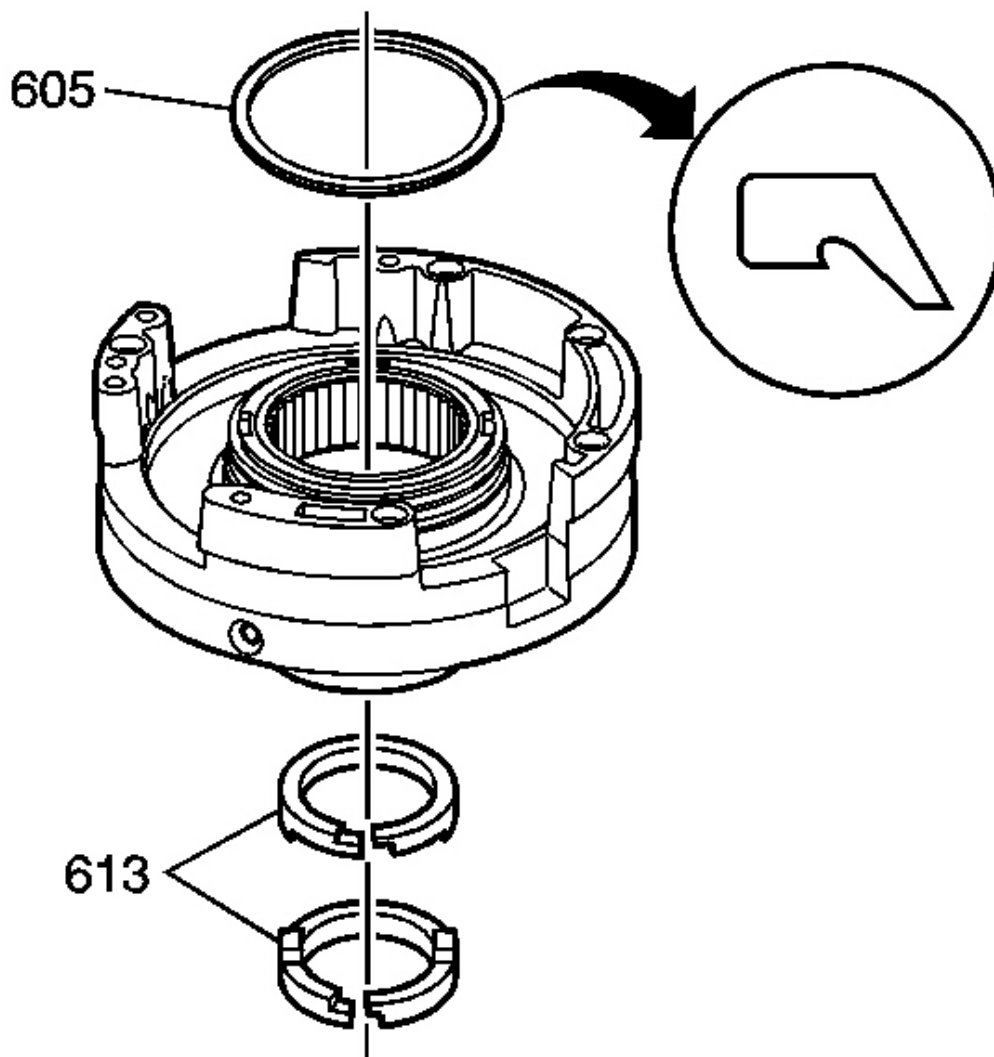


Fig. 227: Removing Inner Seal & Oil Seal Rings From Driven Sprocket Support
Courtesy of GENERAL MOTORS CORP.

4. Remove the inner seal (605) for the fourth clutch piston from the driven sprocket support assembly hub.
5. Remove the oil seal rings (613) from the driven sprocket support.

Inspection Procedure

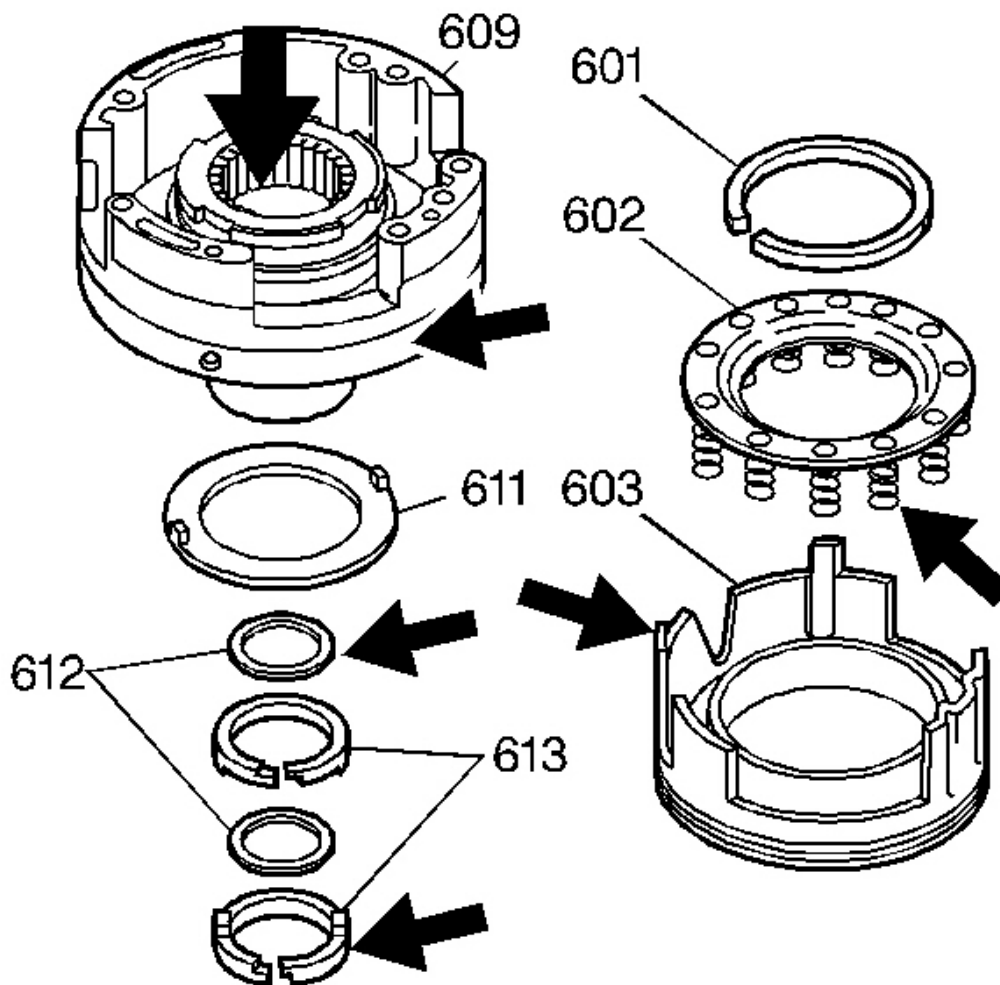


Fig. 228: Inspection Areas On Driven Sprocket Support Assembly
Courtesy of GENERAL MOTORS CORP.

1. Inspect the driven sprocket support assembly (609) for the following:
 - Worn or cut oil seal rings (612)
 - Rolled or cut second clutch housing oil seal ring seals (613)
 - Damage to the piston seal surface in the driven sprocket support assembly
 - Blocked or porous oil passages in the driven sprocket support assembly

- A leaking or missing cup plug
2. Inspect the fourth clutch piston (603) for damage.
 3. Inspect the thrust washer (611) from the second clutch housing for cracks or distortion.
 4. Inspect the fourth clutch spring assembly (602) for distorted or missing springs.
 5. Inspect the driven sprocket bearing assembly for foreign material and missing, flat or damaged rollers.
 6. Replace the Teflon® seal rings (613) under the following conditions:
 - The rings are cut or damaged
 - You are performing a complete overhaul
 7. Inspect all seal ring grooves for debris, burrs or damage.

DRIVEN SPROCKET SUPPORT BEARING DISASSEMBLE

Tools Required

- **J 34129** Bearing Remover. See **Special Tools**.
- **J 8092** Driver Handle

Disassembly Procedure

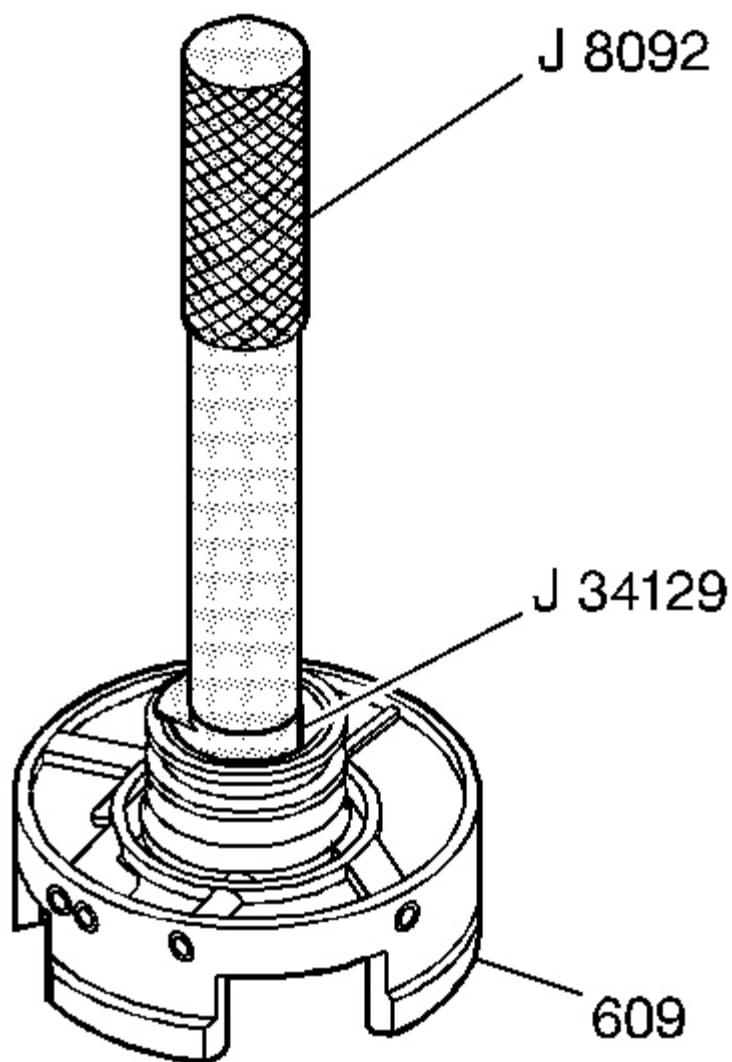


Fig. 229: Removing Driven Sprocket Support Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

Use **J 34129** , **J 8092** and a hammer in order to remove the driven sprocket support bearing assembly from the driven sprocket support assembly (609).

DRIVEN SPROCKET SUPPORT BEARING ASSEMBLE

Tools Required

- **J 34126** Bearing Installer. See **Special Tools**.
- **J 8092** Driver Handle

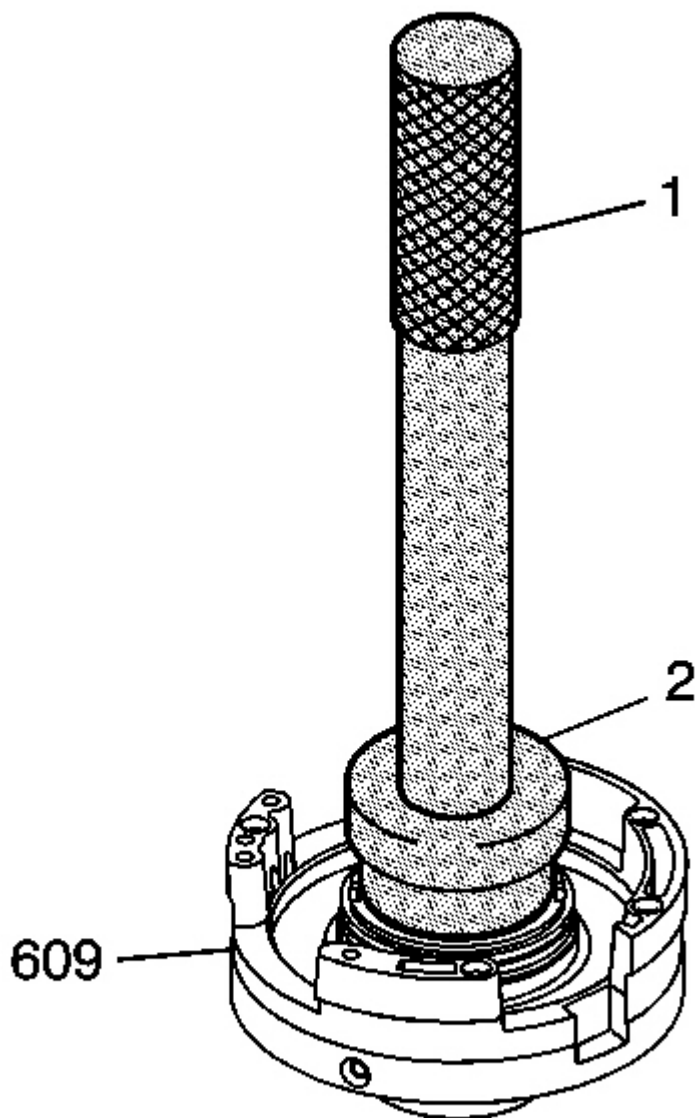
Assembly Procedure

Fig. 230: Using J 34126 & J 8092 To Install Driven Sprocket Support Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Position the driven sprocket support bearing assembly so that markings on the edge are facing up.

Use **J 34126** , **J 8092** and a hammer in order to seat the driven sprocket support bearing assembly flush with or below the driven sprocket support assembly (609) hub.

DRIVEN SPROCKET SUPPORT COMPONENTS ASSEMBLE

Tools Required

J 4670-01 Clutch Spring Compressor. See **Special Tools**.

Assembly Procedure

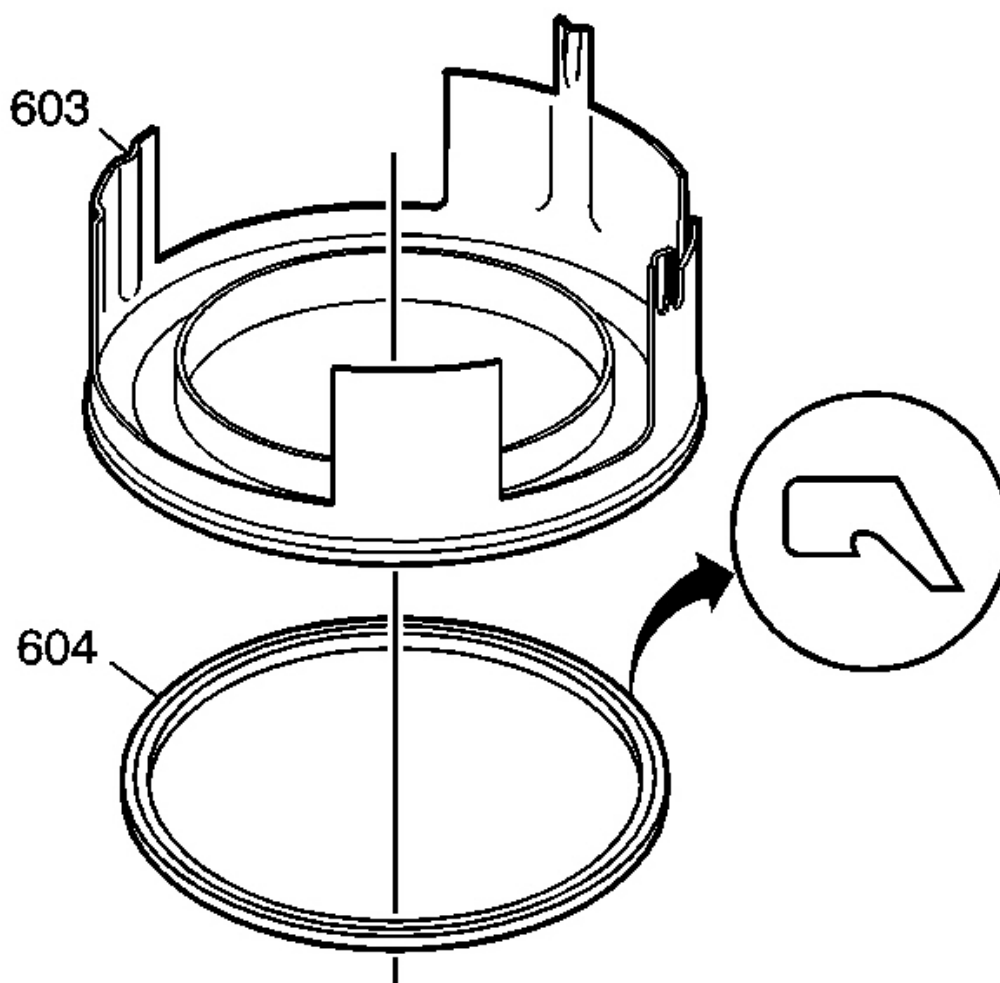


Fig. 231: Locating Fourth Clutch Piston Outer Seal
Courtesy of GENERAL MOTORS CORP.

1. Use transmission fluid in order to lubricate a new fourth clutch piston outer seal (604). Install the seal onto the fourth clutch piston assembly (603).

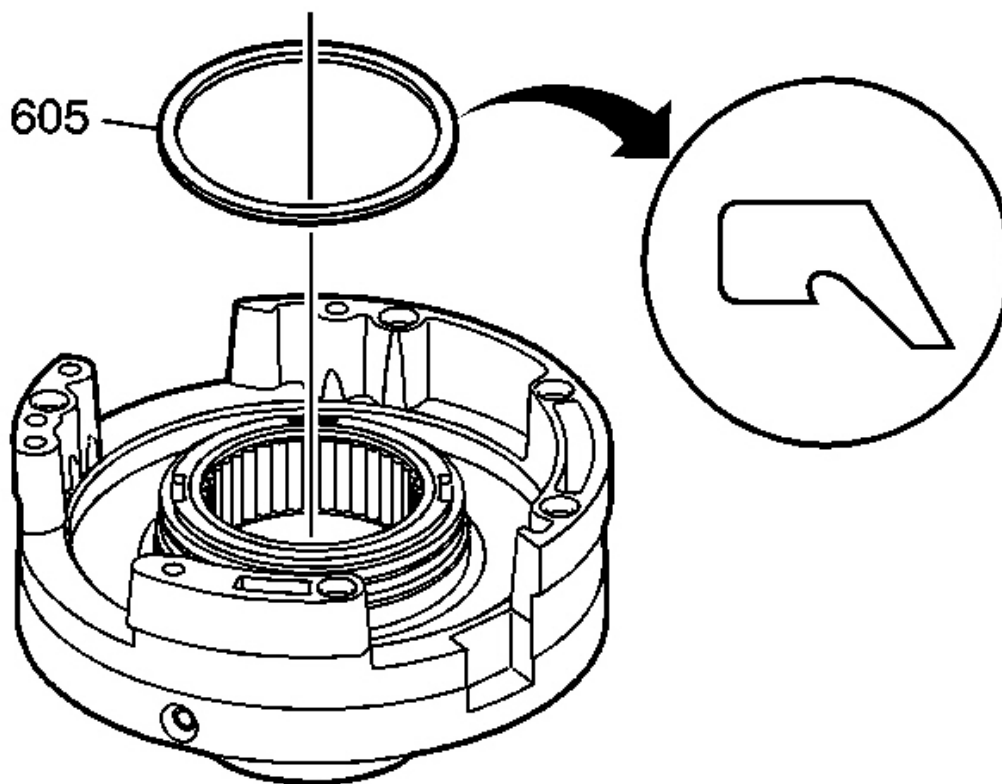


Fig. 232: Identifying Fourth Clutch Piston Inner Seal
Courtesy of GENERAL MOTORS CORP.

2. Use transmission fluid in order to lubricate a new fourth clutch piston inner seal (605). Install the seal into the driven sprocket support hub.

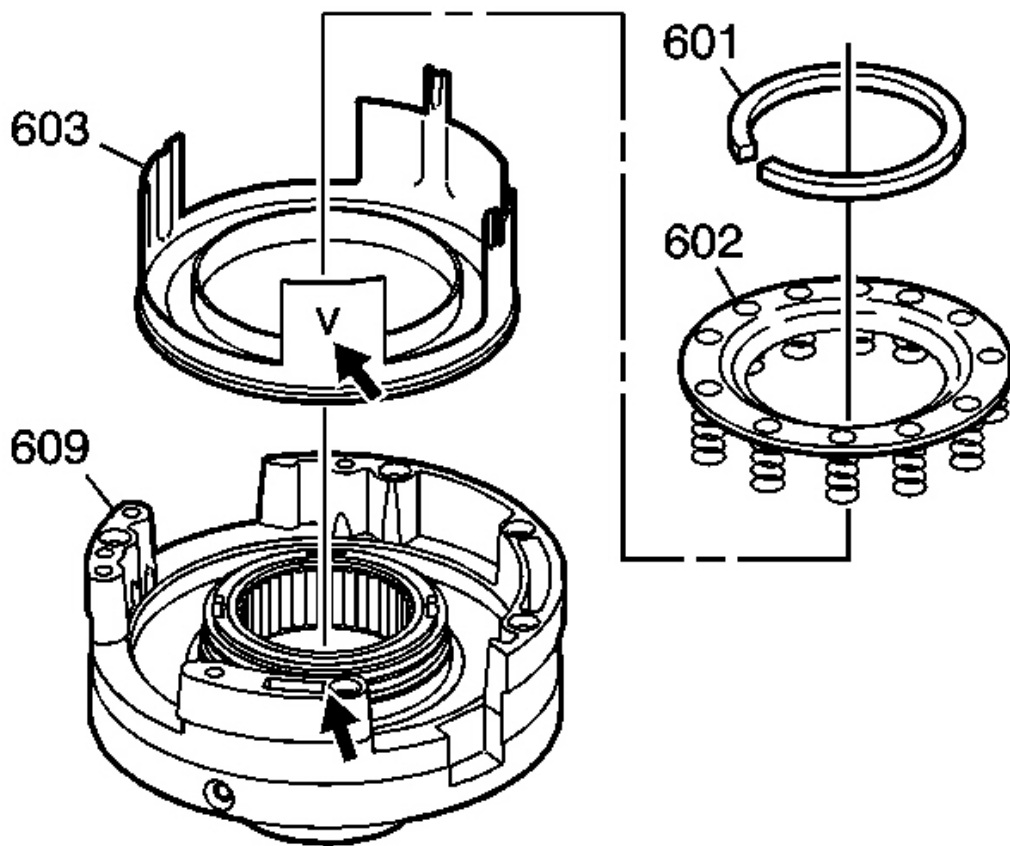


Fig. 233: Assembling Fourth Clutch Piston Assembly Into Driven Sprocket Support
Courtesy of GENERAL MOTORS CORP.

3. Insert the fourth clutch piston assembly (603) into the driven sprocket support (609) and align as shown.
4. Insert the fourth clutch return spring assembly (602) into the piston.

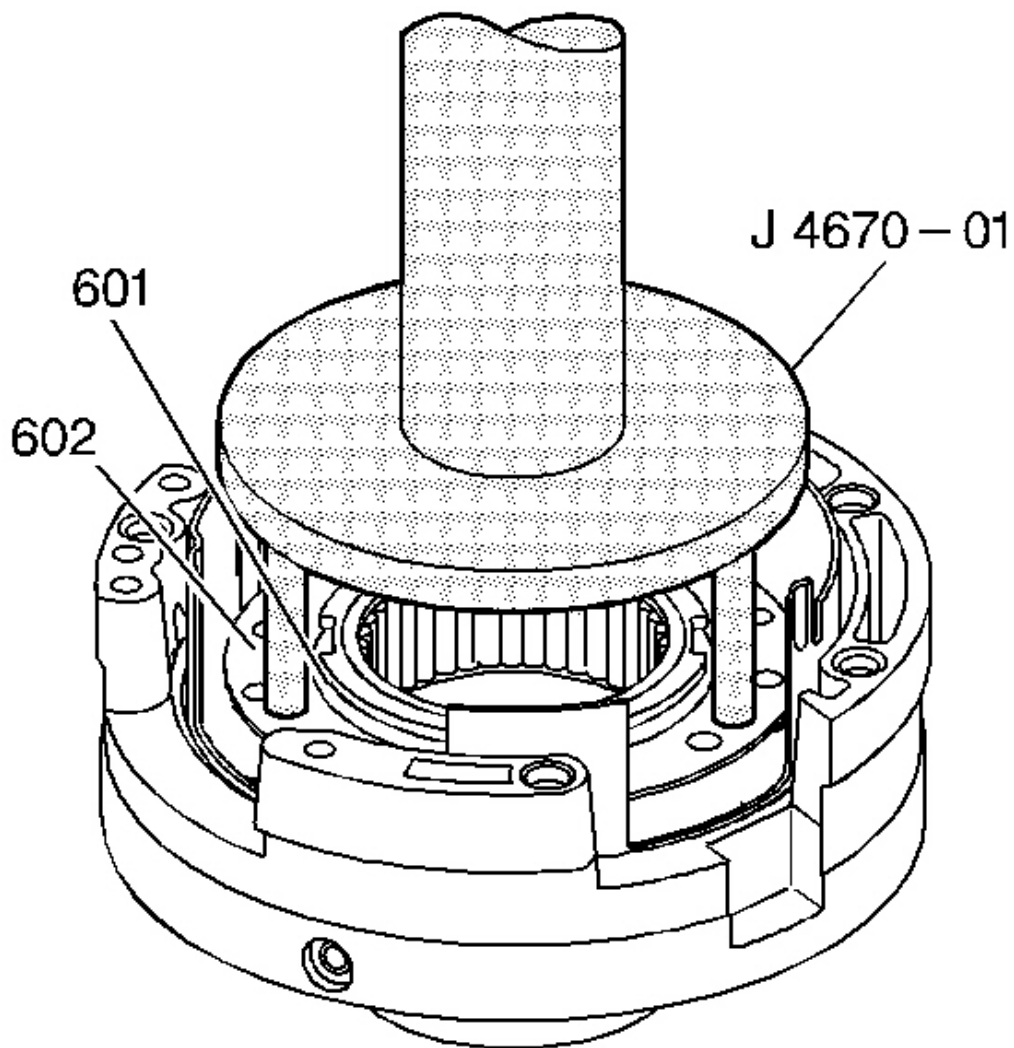


Fig. 234: Using J 4670-01 To Compress The Fourth Clutch Spring Assembly
Courtesy of GENERAL MOTORS CORP.

5. Use **J 4670-01** in order to install the fourth clutch spring retaining ring (601). See **Special Tools**.

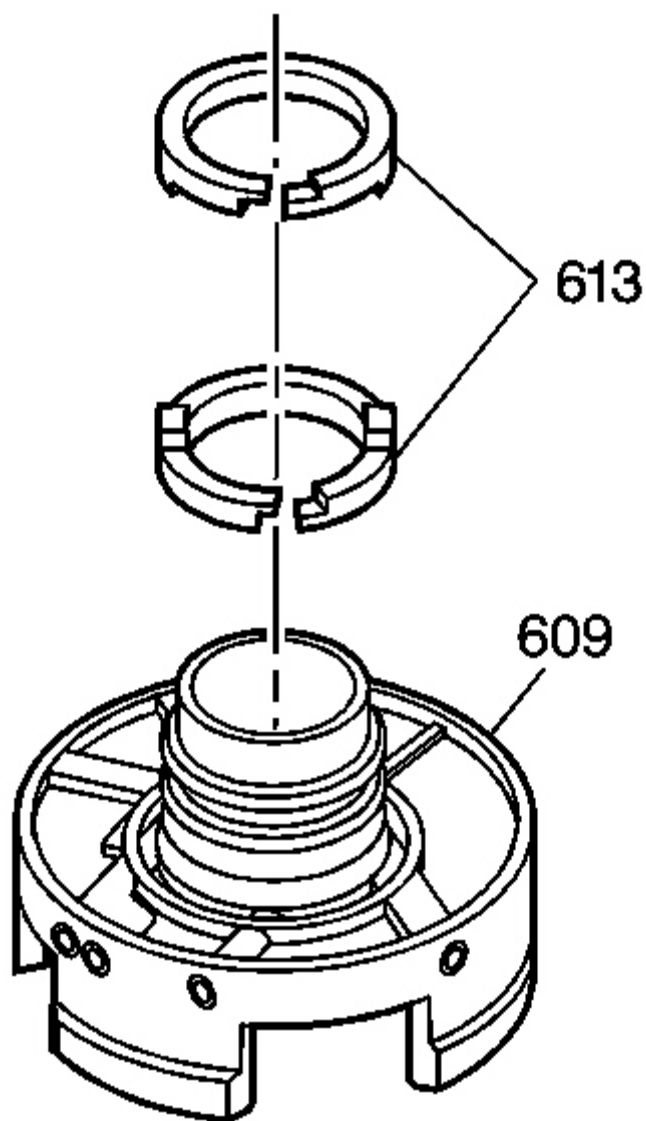


Fig. 235: Installing Second Clutch Housing Oil Seal Rings
Courtesy of GENERAL MOTORS CORP.

6. If you are installing new second clutch housing oil seal rings (613), lubricate the rings. Install the oil seal rings (613) onto the driven sprocket support hub (609).

Checking Procedure

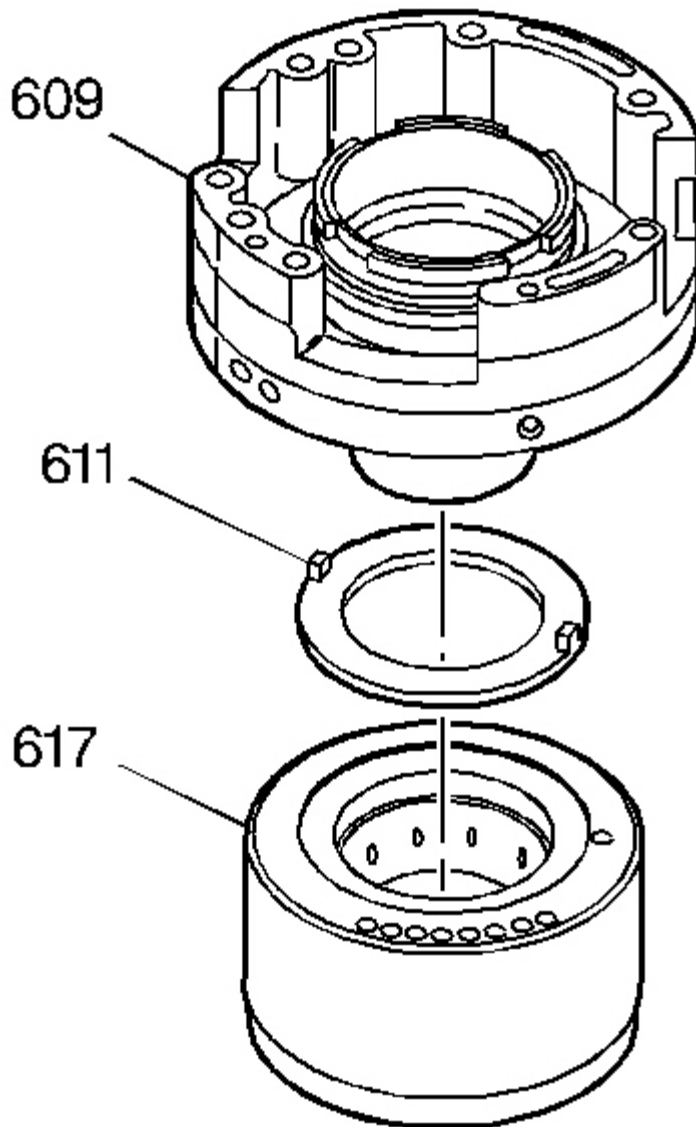


Fig. 236: Identifying Second Clutch Housing Thrust Washer
Courtesy of GENERAL MOTORS CORP.

1. For the purposes of this test, attach the driven sprocket support assembly (609) and the second clutch housing thrust washer (611) onto the second clutch housing assembly (617).

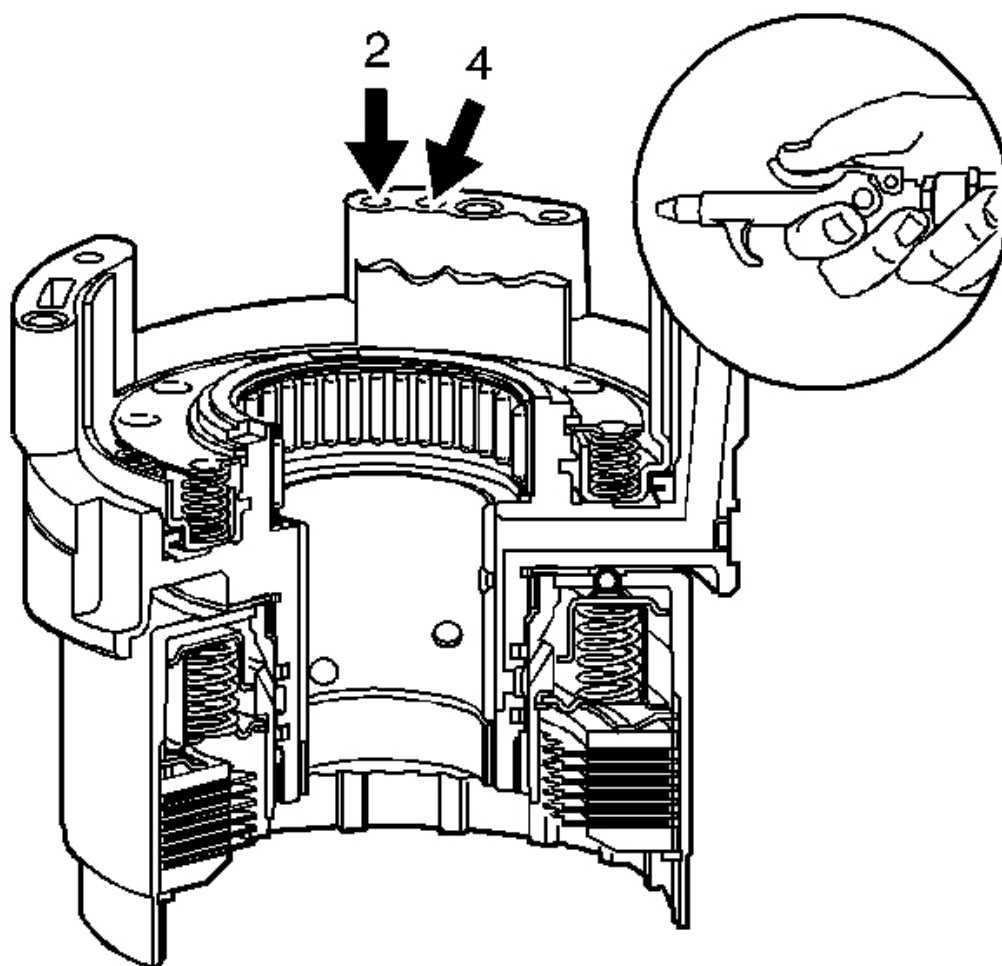


Fig. 237: Blowing Air Into Feed Holes
Courtesy of GENERAL MOTORS CORP.

NOTE: Do not exceed the recommended amount of air pressure or it may damage or cause seals to roll.

2. Apply 138 kPa (20 psi) to the feed holes marked 2 and 4 and listen for the second and fourth clutches to apply.
3. Hold the pressure for five seconds. If the clutches do not apply and hold, then disassemble the driven sprocket support components. Inspect all of the seals and clutches for proper assembly. When finished, repeat the functional check.

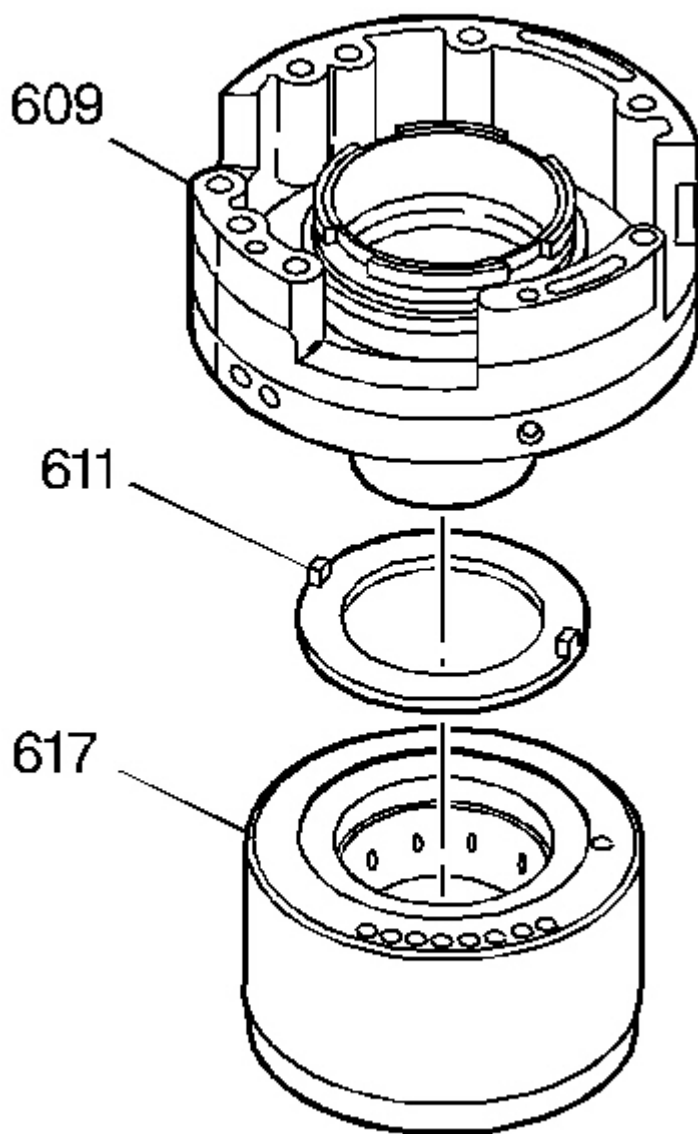


Fig. 238: Identifying Second Clutch Housing Thrust Washer
Courtesy of GENERAL MOTORS CORP.

4. When the clutches apply and hold correctly, remove the driven sprocket support assembly (609) and the second clutch housing thrust washer (611) from the second clutch housing assembly (617).

SECOND, INPUT, THIRD AND SPRAG CLUTCHES ASSEMBLE

Tools Required

J 33381-A Clutch Assembly Remover/Installer. See **Special Tools**.

Assembly Procedure

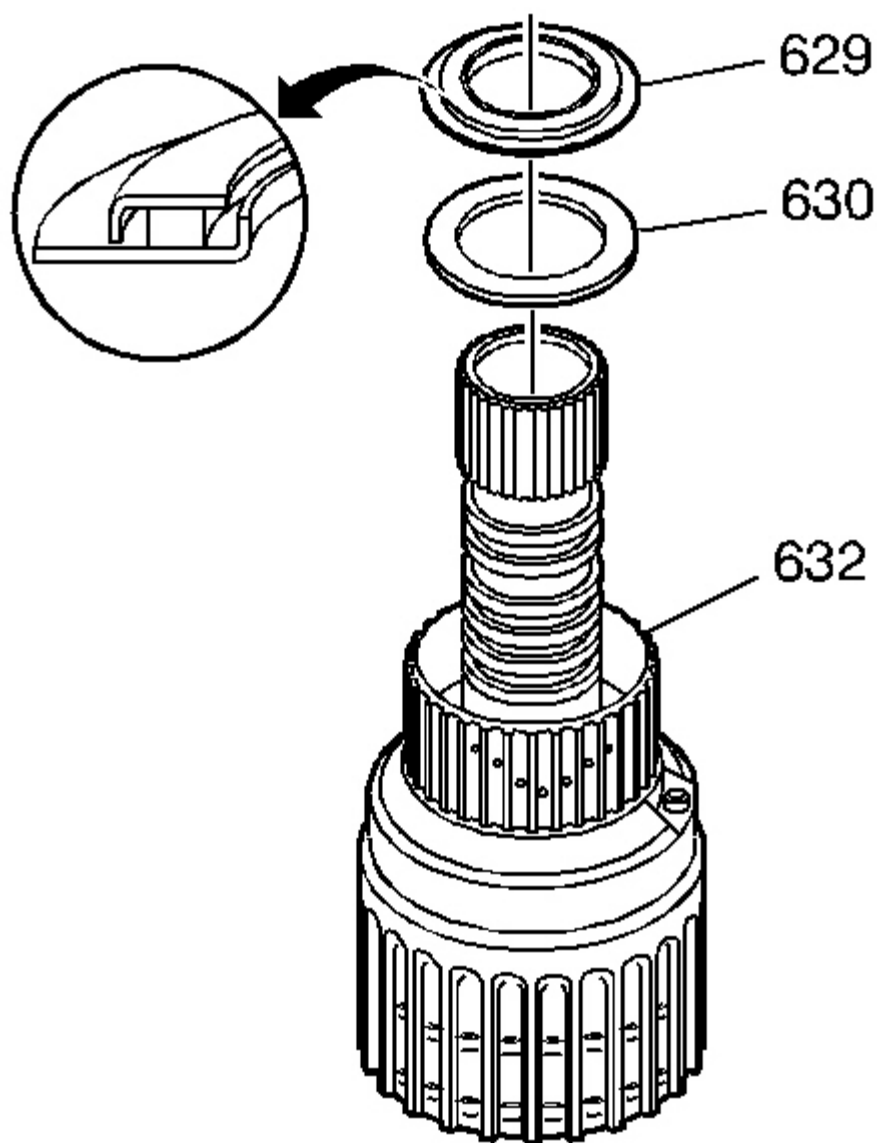


Fig. 239: Installing Thrust Bearing Assembly & Selective Thrust Washer
Courtesy of GENERAL MOTORS CORP.

1. Install the selective thrust washer (630) and the thrust bearing assembly (629) onto the input clutch housing assembly (632).

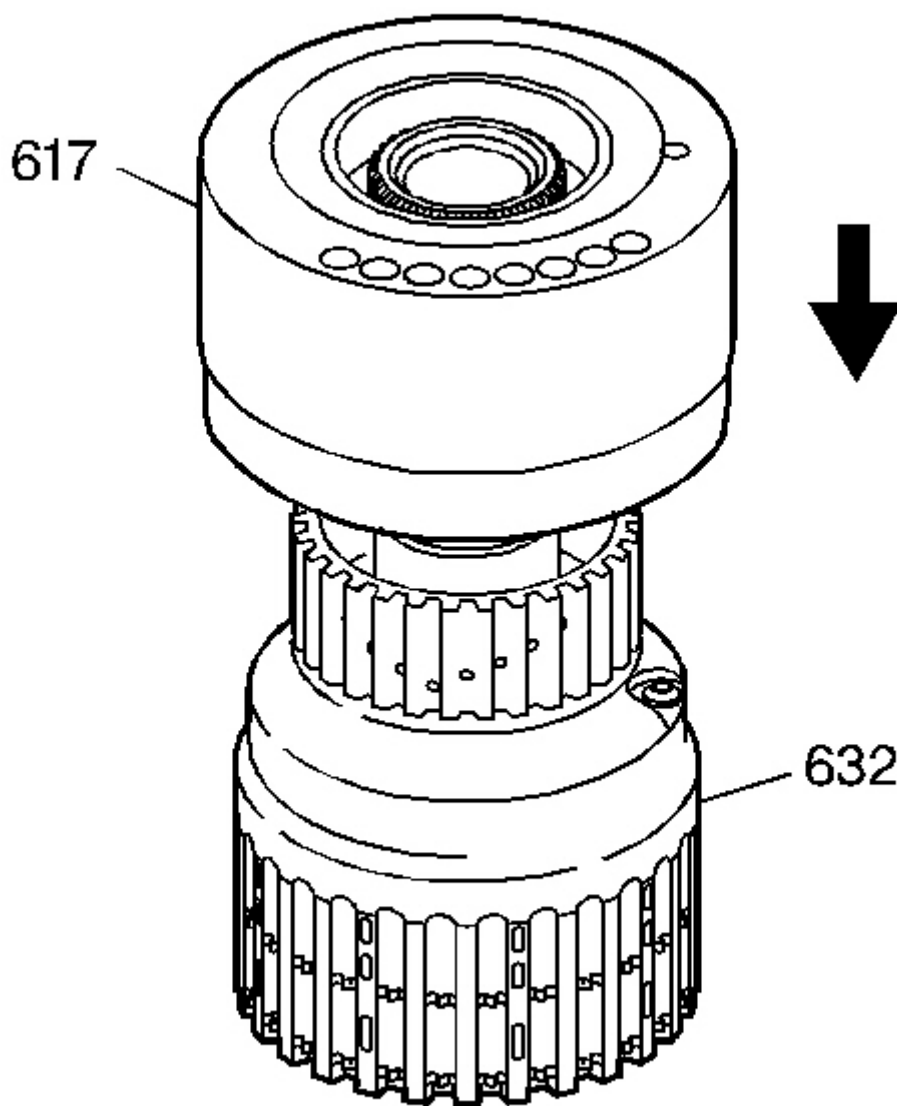


Fig. 240: Installing Second Clutch Housing Assembly Onto Second Clutch Hub
Courtesy of GENERAL MOTORS CORP.

2. Use a small screwdriver in order to align the second clutch teeth so that they slide onto the second clutch hub of the input clutch housing assembly (632).
3. Install the second clutch housing assembly (617) onto the second clutch hub of the input clutch housing assembly (632).

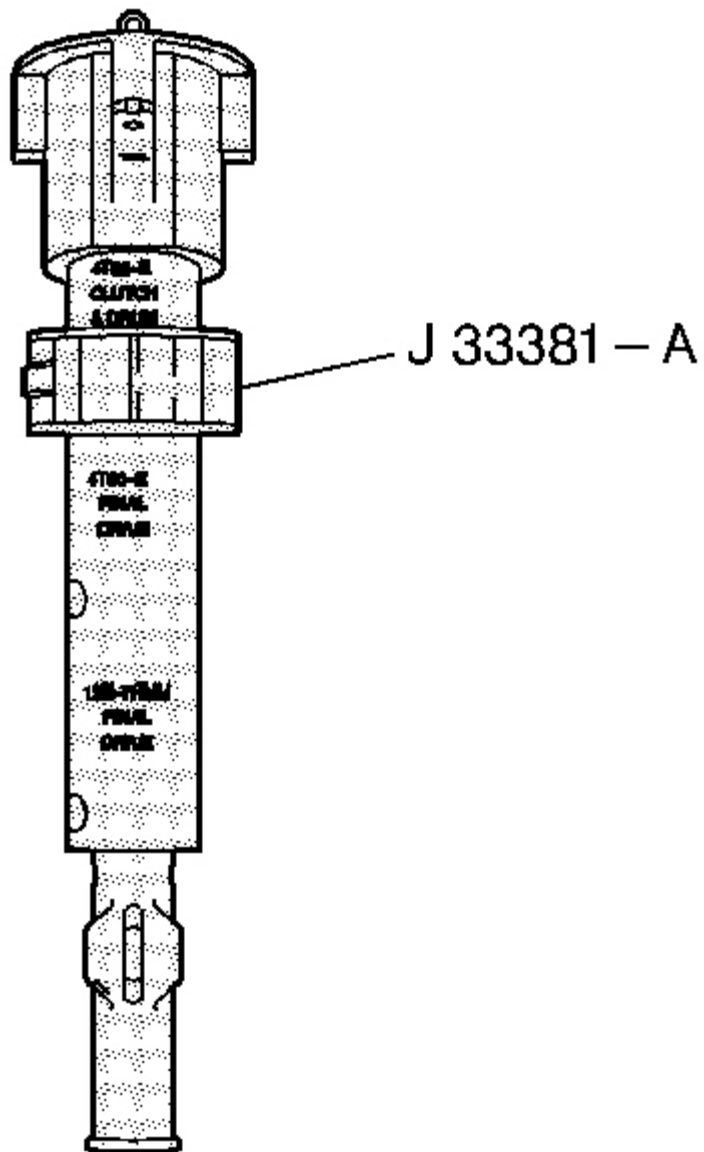


Fig. 241: View Of J 33381-A
Courtesy of GENERAL MOTORS CORP.

4. Adjust the collar on **J 33381-A** to 4T65-E CLUTCH & DRUM. See **Special Tools**. Make sure that the threaded rod is fully loosened.

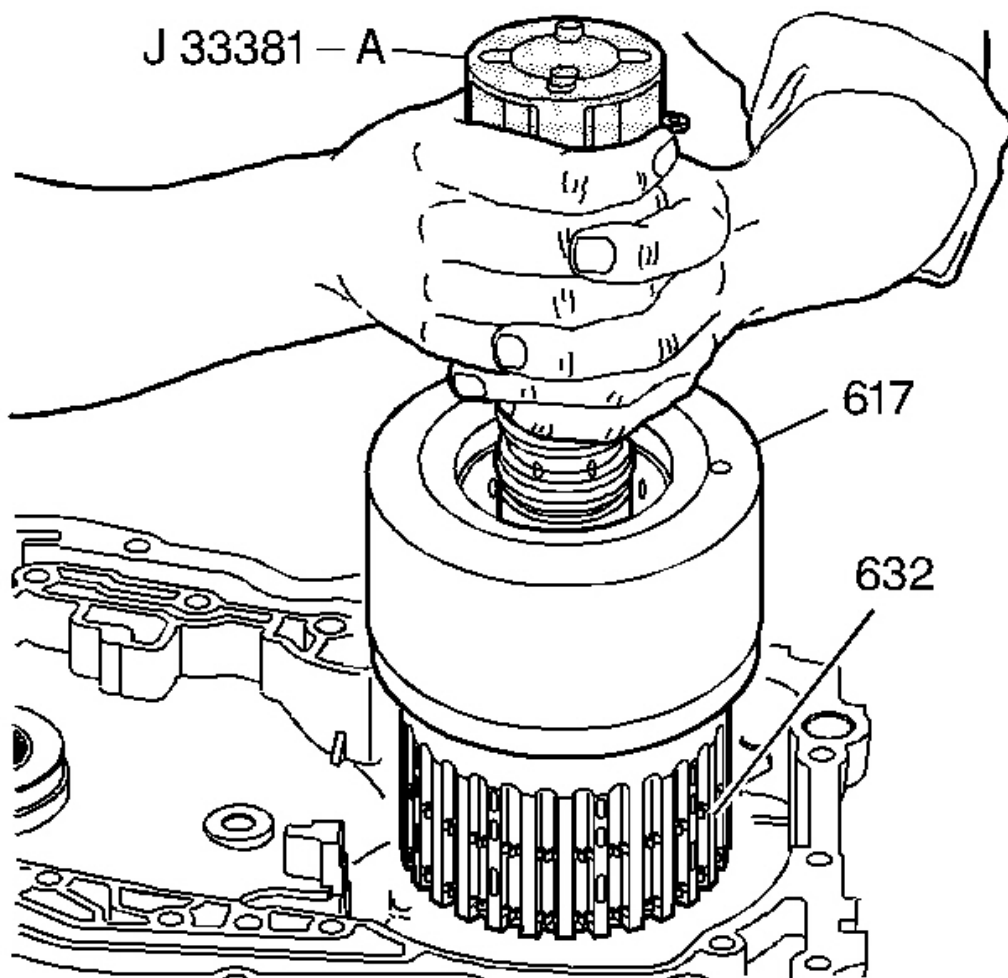


Fig. 242: Installing J 33381-A Onto Input Clutch Housing Assembly
Courtesy of GENERAL MOTORS CORP.

5. Install **J 33381-A** into the input clutch housing assembly (632). See **Special Tools**.
6. Tighten the threaded rod of **J 33381-A** until the rod is finger tight. See **Special Tools**.
7. Use **J 33381-A** in order to lift the input and second clutch housing assembly (617, 632). See **Special Tools**. The sprag clutch assemblies will also be attached.

IMPORTANT: After you have installed the input and second clutch housing assembly, confirm that the top of the second clutch housing

(617) is approximately 1/2 inch above the top of the reverse band assembly.

8. Install the input and second clutch housing assembly (617, 632) into the case. Be sure that the assembly is down all the way.

DRIVEN SPROCKET SUPPORT ASSEMBLE

Tools Required

J 36850 Assembly Lubricant (or equivalent)

Assembly Procedure

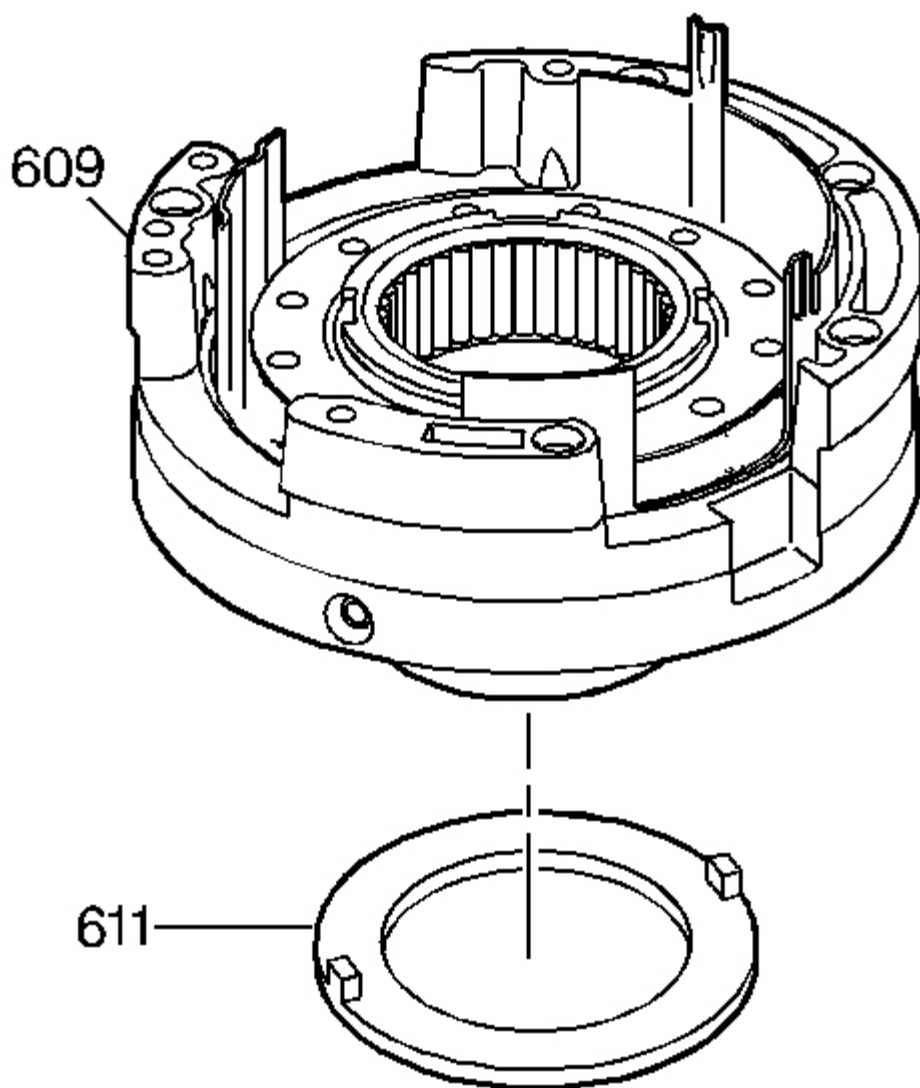


Fig. 243: View Of Second Clutch Housing Thrust Washer
Courtesy of GENERAL MOTORS CORP.

1. Use **J 36850** or equivalent in order to secure the second clutch housing thrust washer (611) to the driven sprocket support assembly (609).

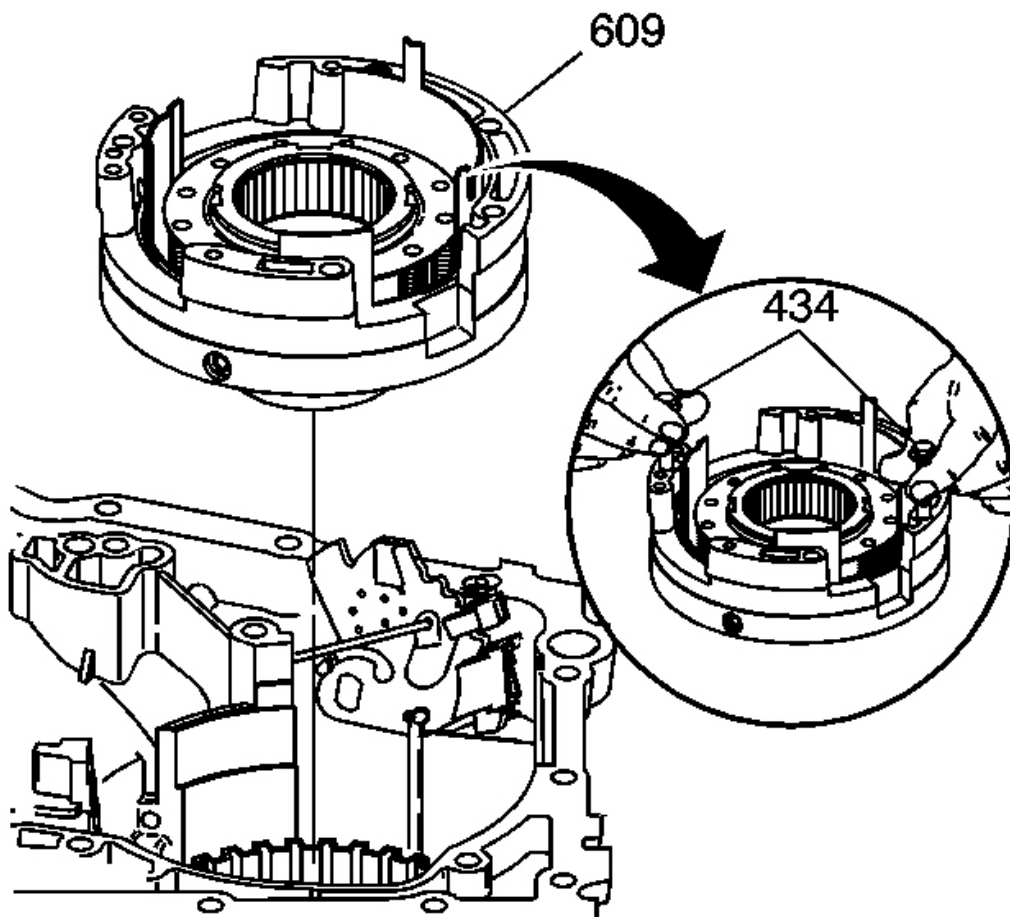


Fig. 244: Installing Case Cover Bolts Into Driven Sprocket Support Assembly
Courtesy of GENERAL MOTORS CORP.

2. Finger start two 13 mm case cover bolts (434) into the driven sprocket support assembly (609).

IMPORTANT: If the driven sprocket support assembly (609) is not flush with or slightly below the case, then one of the clutches is not fully seated.

3. Using the bolts (434), lift the driven sprocket support assembly (609) into the case and align as shown. The top of the driven sprocket support assembly (609) should be flush with the case.

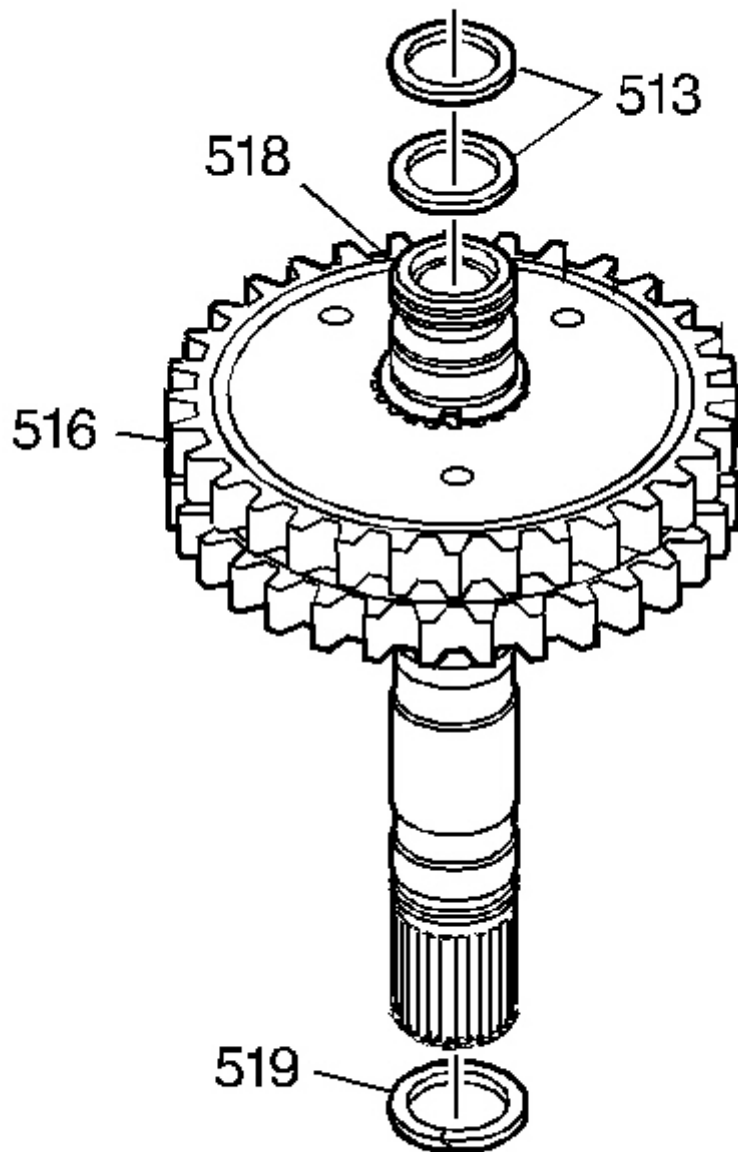
DRIVE SPROCKET AND TURBINE SHAFT DISASSEMBLE**Disassembly Procedure**

Fig. 245: Removing Oil Seal Rings From Turbine Shaft
Courtesy of GENERAL MOTORS CORP.

NOTE: Do not damage the grooves on the shaft, when removing the oil seal rings.

1. Cut the oil seal rings (513, 519) from the turbine shaft (518).
2. Remove the oil seal rings (513, 519).

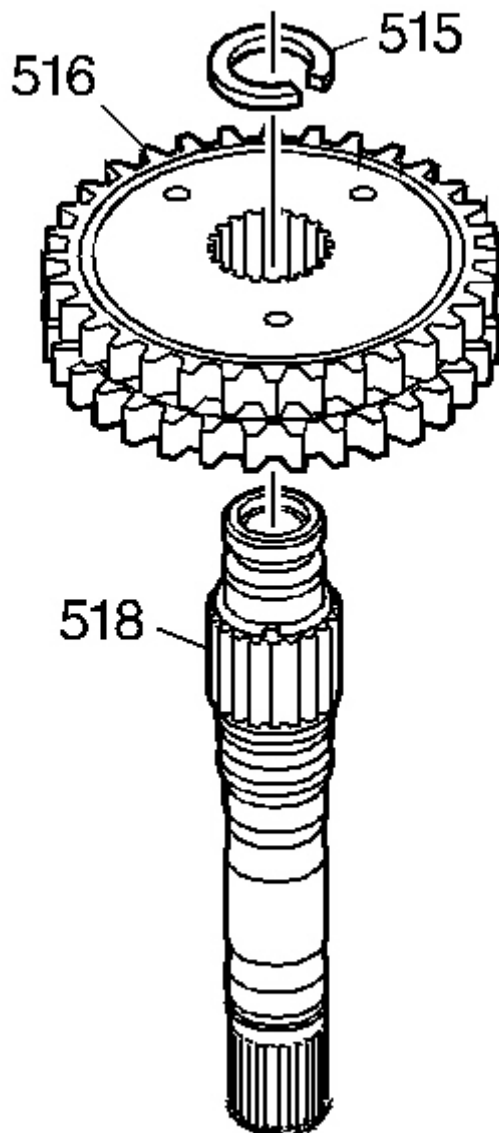


Fig. 246: View Of Turbine Drive Sprocket & Retaining Ring
Courtesy of GENERAL MOTORS CORP.

3. Remove the drive sprocket retaining ring (515).
4. Remove the drive sprocket (516) from the turbine shaft (518).

DRIVE SPROCKET AND TURBINE SHAFT ASSEMBLE

Tools Required

- **J 29569-1** Turbine Shaft Seal Installer (Chain Side) Expander
- **J 29569-2** Turbine Shaft Seal Installer (Chain Side) Compressor
- **J 29829-1A** Turbine Shaft Seal Installer (Converter Side) Expander. See **Special Tools**.
- **J 29829-2** Turbine Shaft Seal Installer (Converter Side) Compressor. See **Special Tools**.
- **J 36850** Assembly Lubricant (or equivalent)

Assembly Procedure

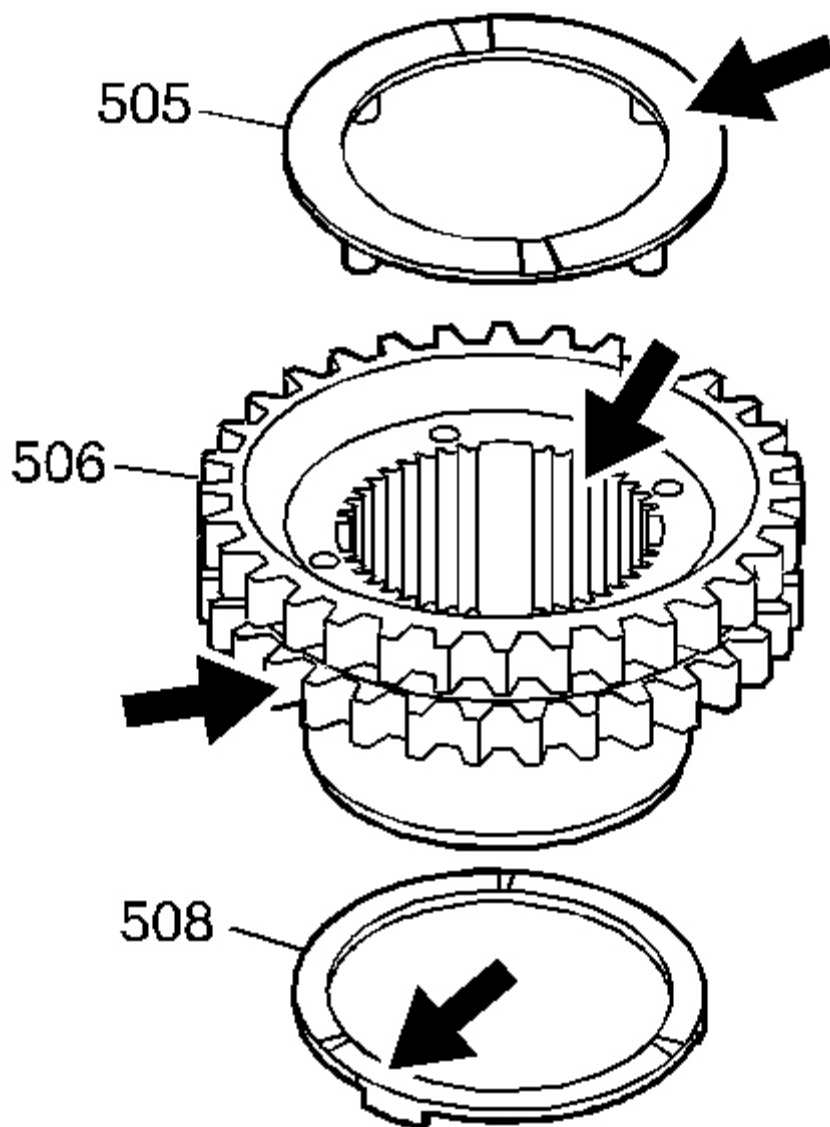


Fig. 247: Identifying Driven Sprockets Inspection Areas
Courtesy of GENERAL MOTORS CORP.

1. Inspect the driven sprocket (506) for the following:
 - Worn or chipped teeth
 - Uniform teeth size

- Stripped or damaged splines
 - Bearing surface damage
2. Inspect the fourth clutch shaft thrust washer (505) and the driven sprocket thrust washer (508) for wear or cracks.

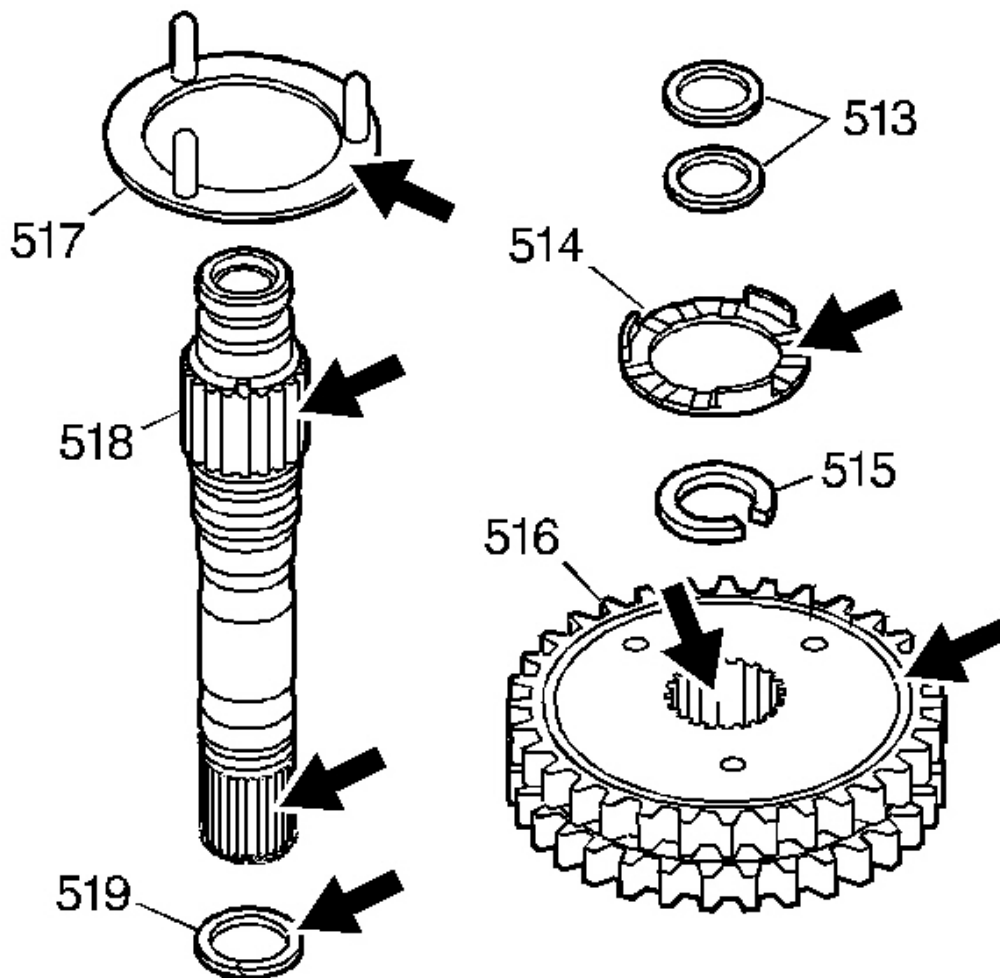


Fig. 248: Drive Sprocket & Components Inspection Areas
Courtesy of GENERAL MOTORS CORP.

3. Inspect the drive sprocket (516) for the following:
- Worn or chipped teeth

- Uniform teeth size
 - Stripped or damaged splines
 - Bearing surface damage
4. Inspect the turbine shaft (518) for the following:
 - A cracked sleeve
 - Damaged bushing journals
 - Stripped or damaged splines
 5. Inspect the drive sprocket thrust washers (514, 517) for wear or cracks.

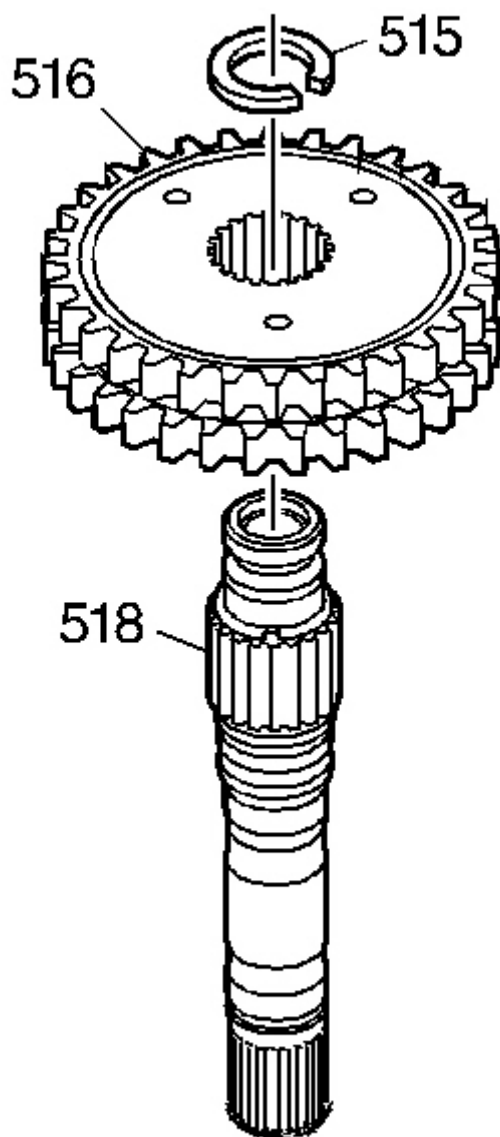


Fig. 249: View Of Turbine Drive Sprocket & Retaining Ring
Courtesy of GENERAL MOTORS CORP.

6. Insert the turbine shaft (518) into the drive sprocket (516) and attach the drive sprocket retaining ring (515).

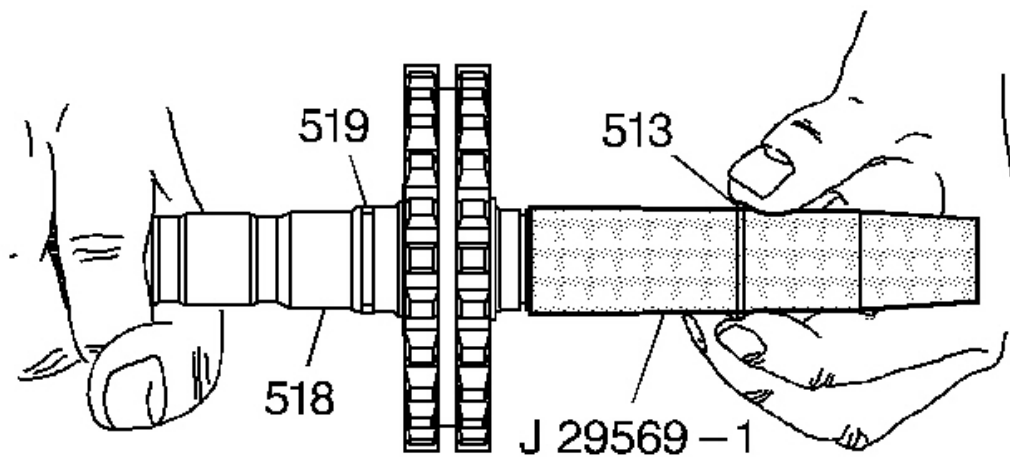


Fig. 250: Sliding Turbine Shaft Oil Seal Rings Into Position
Courtesy of GENERAL MOTORS CORP.

7. Install **J 29569-1** onto the turbine shaft (518). Coat the tool shaft with **J 36850** or equivalent.
8. Slide the turbine shaft oil seal rings (513) into position.

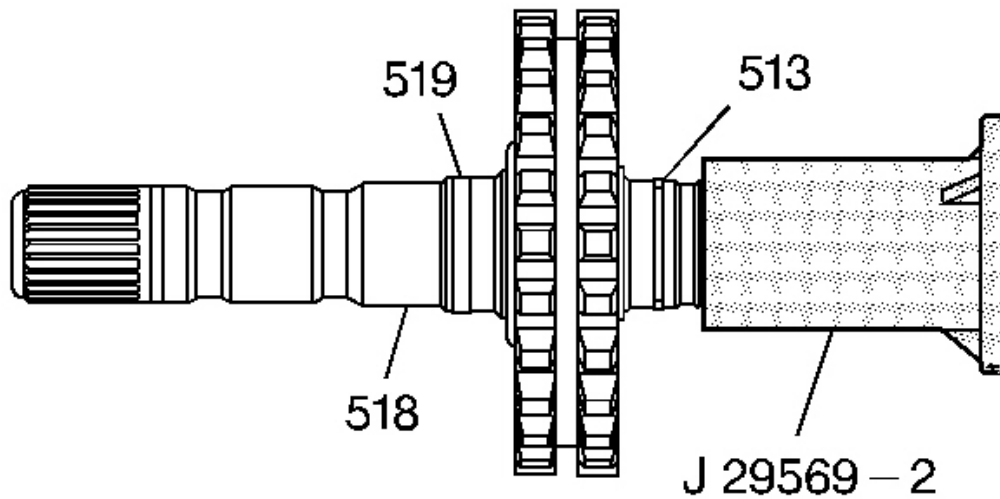


Fig. 251: Sizing Turbine Shaft Oil Seal Rings With J 29569-2
Courtesy of GENERAL MOTORS CORP.

9. Use **J 29569-2** in order to size the turbine shaft oil seal rings (513).

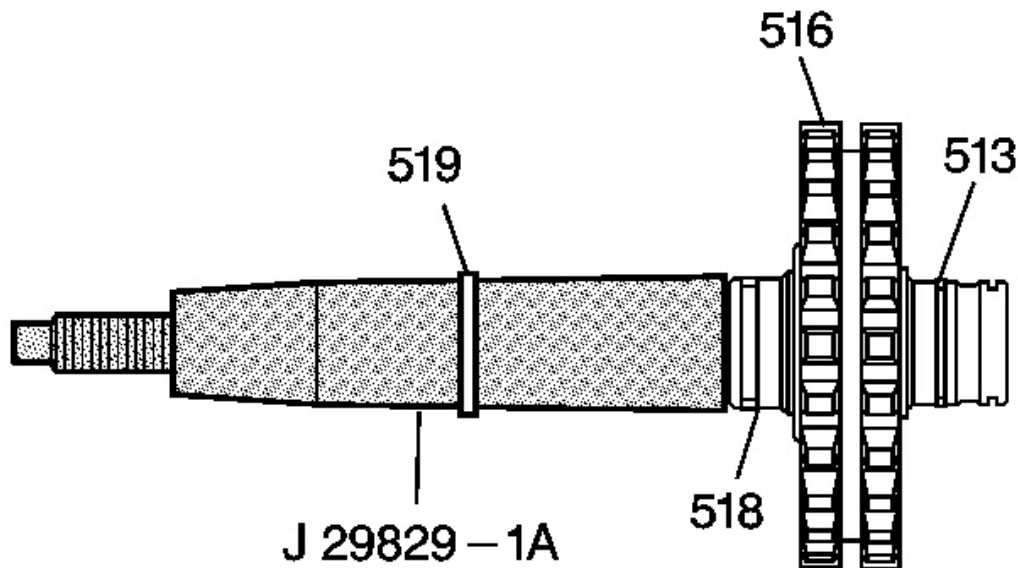


Fig. 252: Installing J 29829-1A On Turbine Shaft
Courtesy of GENERAL MOTORS CORP.

10. Install **J 29829-1A** onto the turbine shaft (518). See **Special Tools**. Coat the tool shaft with **J 36850** or equivalent.
11. Slide the turbine shaft oil seal ring (519) into position.

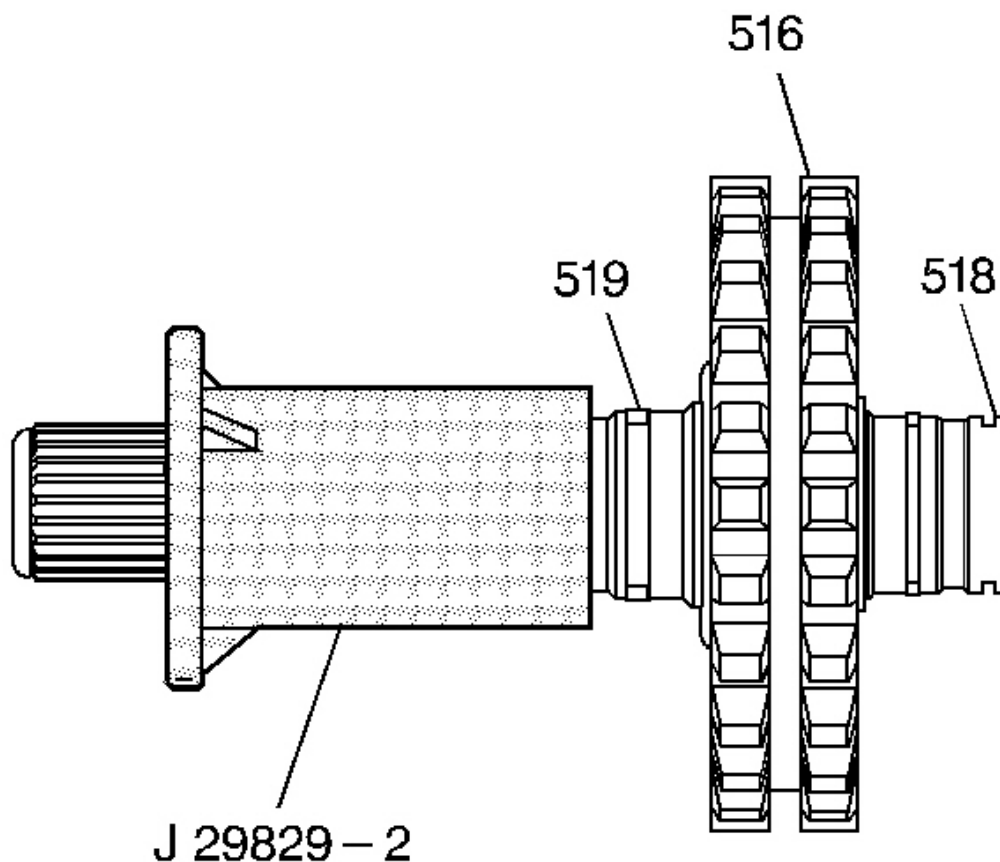


Fig. 253: Using J 29829-2 To Size The Turbine Shaft Oil Seal Ring
Courtesy of GENERAL MOTORS CORP.

12. Use **J 29829-2** in order to size the turbine shaft oil seal ring (519). See **Special Tools**.

DRIVE AND DRIVEN SPROCKET COMPONENTS ASSEMBLE

Tools Required

J 36850 Assembly Lubricant (or equivalent)

Assembly Procedure

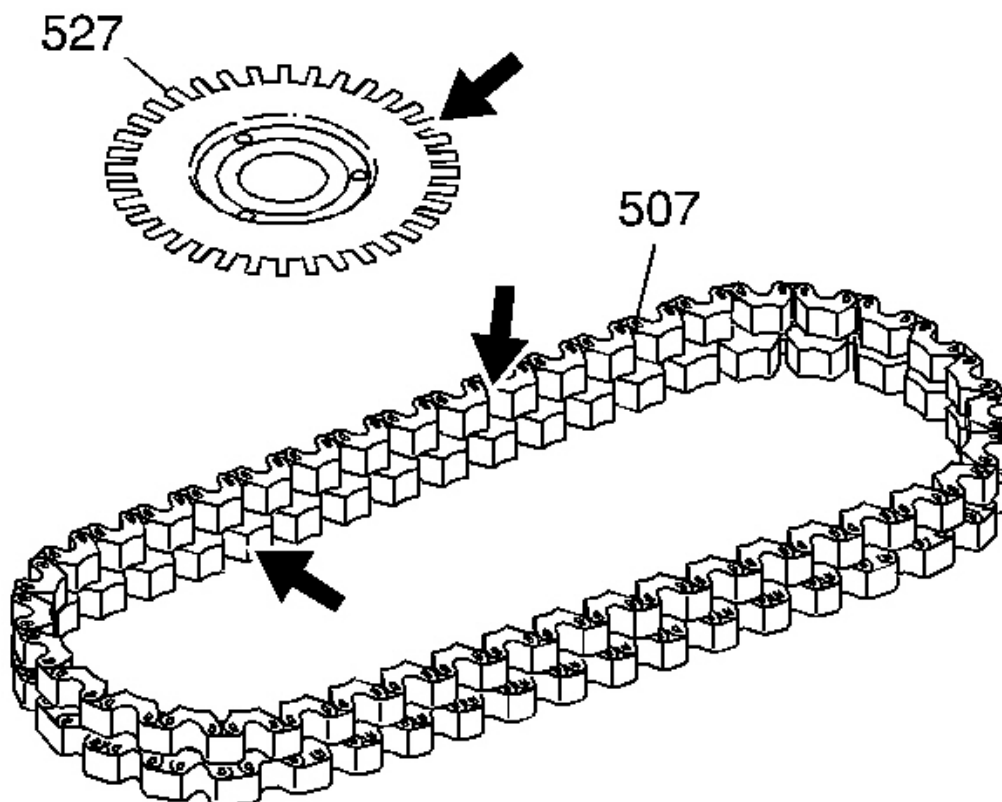


Fig. 254: Inspection Areas On Drive Link Assembly
Courtesy of GENERAL MOTORS CORP.

1. Inspect the drive link assembly (507) for damaged, cracked or binding links.
2. Inspect the input speed sensor reluctor wheel (527) for damaged reluctor teeth, worn or damaged thrust surface or damaged or missing locating pins.

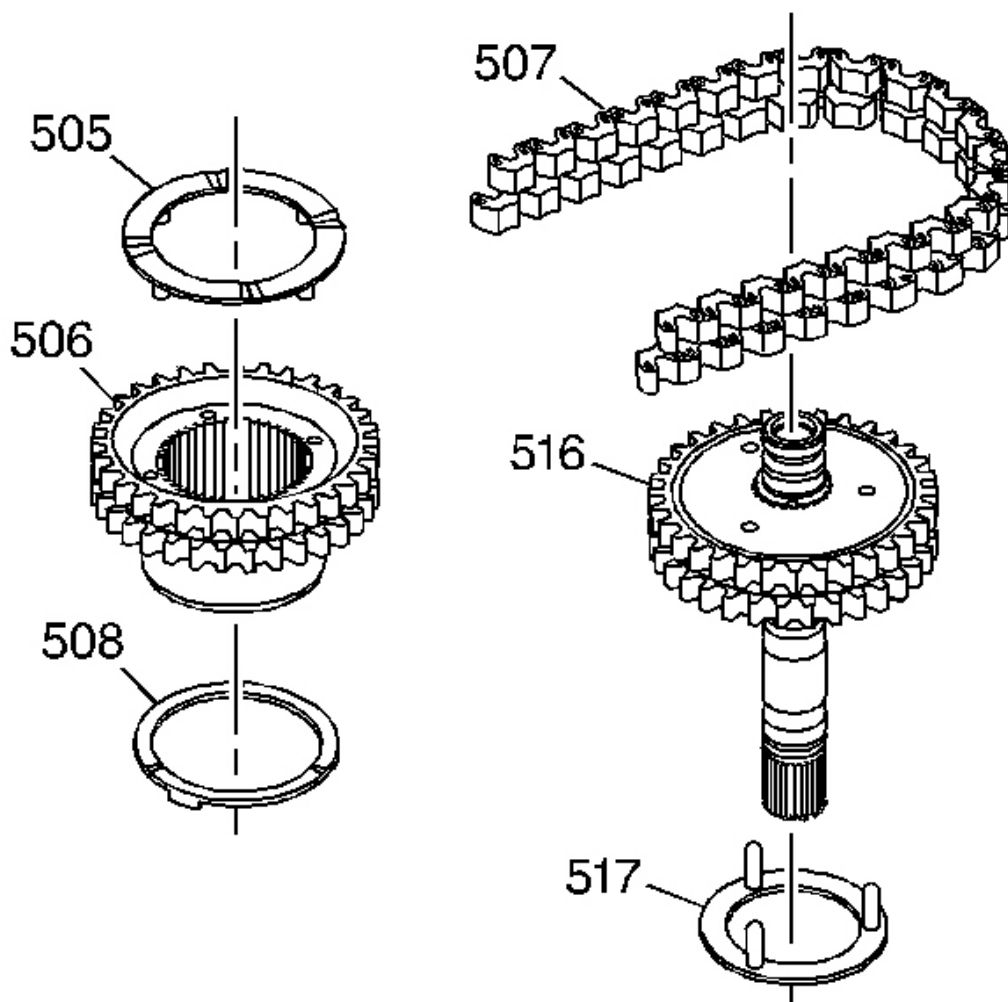


Fig. 255: Installing Drive & Driven Sprockets Into Drive Link Assembly
Courtesy of GENERAL MOTORS CORP.

3. Use **J 36850** or equivalent in order to retain the drive sprocket thrust washer (517) onto the drive sprocket (516).
4. Use **J 36850** or equivalent in order to retain the driven sprocket thrust washer (508) onto the driven sprocket (506).

IMPORTANT: The drive link assembly must be installed correctly.

5. Assemble the drive (516) and driven (506) sprockets into the drive link assembly (507) according to one of the following criteria:
- If the old drive link is being reinstalled, position both drive link assemblies with the master link (different color) facing up or down, whichever way it was found during disassembly
 - If a new drive link assembly is being installed, position both drive link assemblies with the master link facing upward.

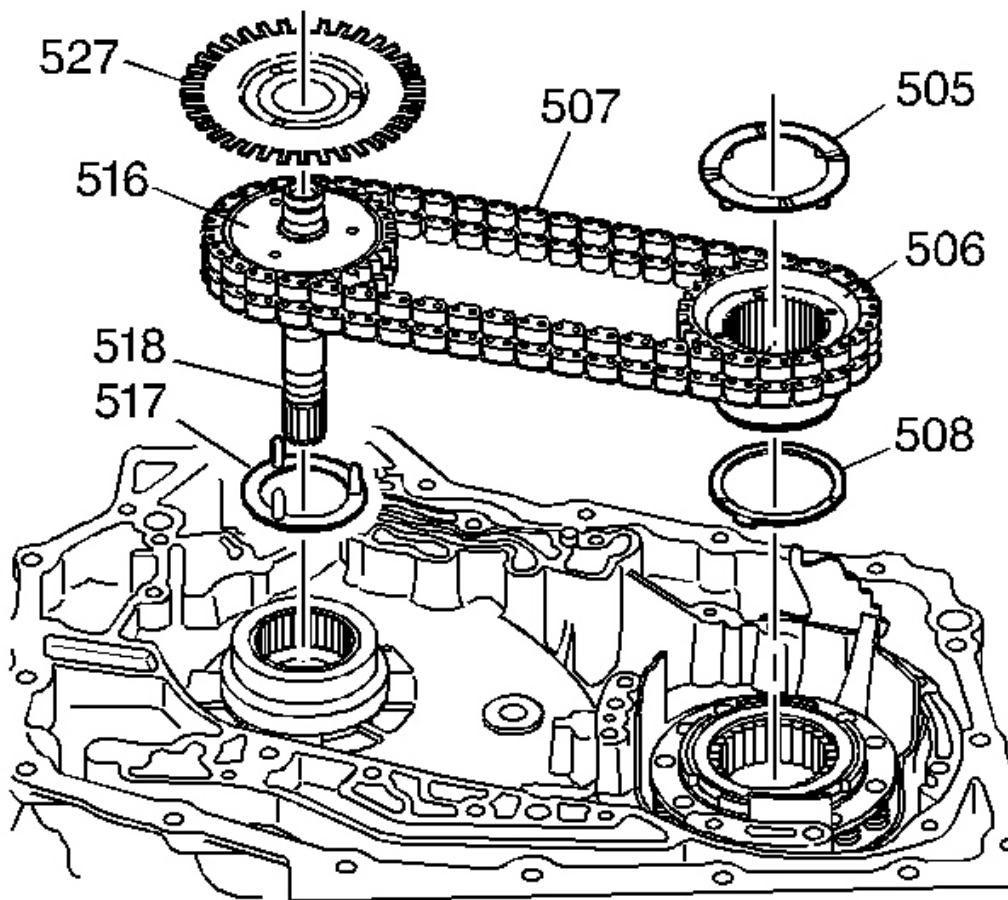


Fig. 256: View Of Drive Link Assembly & Sprockets
Courtesy of GENERAL MOTORS CORP.

6. Install the drive link assembly (507) and the sprockets (506, 516) into the case by hand. A

slight rocking motion may be required in order to work the sprockets into place.

7. Install the input speed sensor reluctor wheel (527) onto the drive sprocket (516).
8. Install the 4th clutch shaft thrust washer (505) onto the driven sprocket (506).

FOURTH CLUTCH COMPONENTS ASSEMBLE

Assembly Procedure

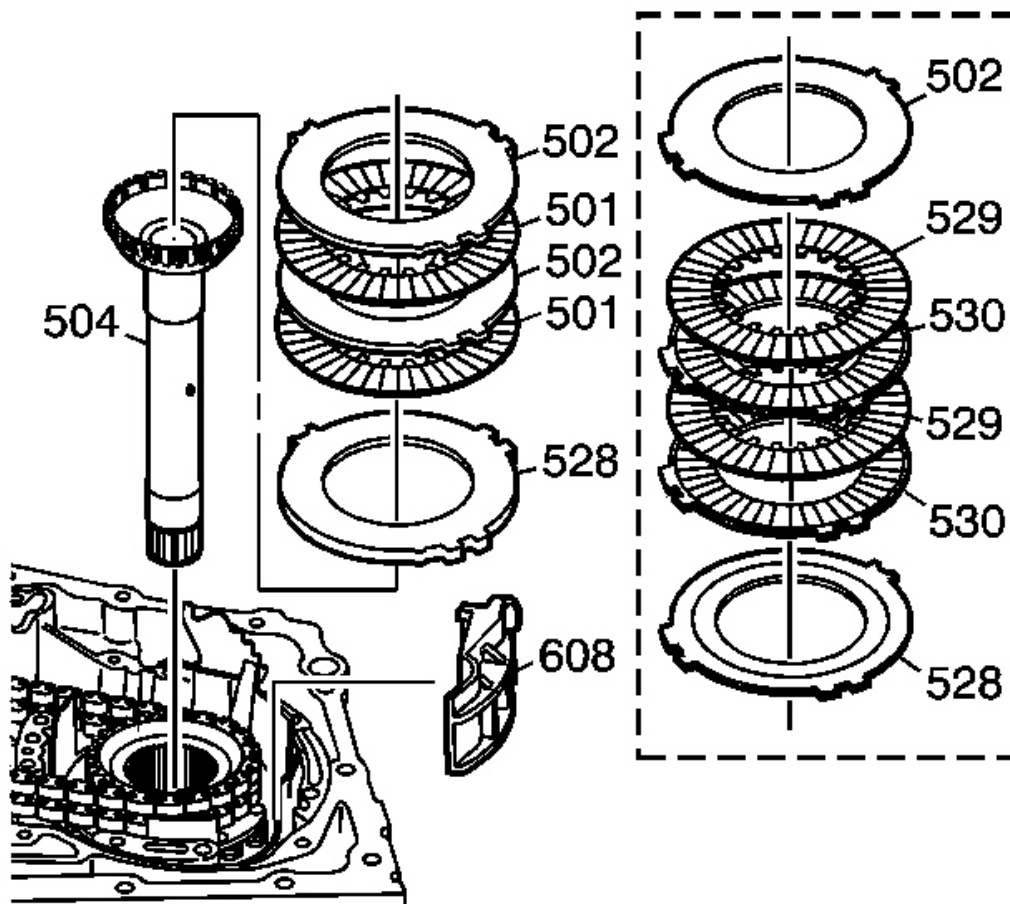


Fig. 257: Identifying Fourth Clutch Assembly
Courtesy of GENERAL MOTORS CORP.

1. Inspect the fourth clutch assembly for the following conditions:
 - Wear or damage to the steel plates (502, 528)

- Peened splines, flaking or worn fiber on the fiber plate assemblies (501), (529) and (530)
2. Inspect the fourth clutch shaft assembly (504) for the following conditions:
- Cut or worn fourth clutch plate splines
 - Stripped input sun gear splines
 - A damaged bushing journal
 - Cracks or damage to the hub or shaft

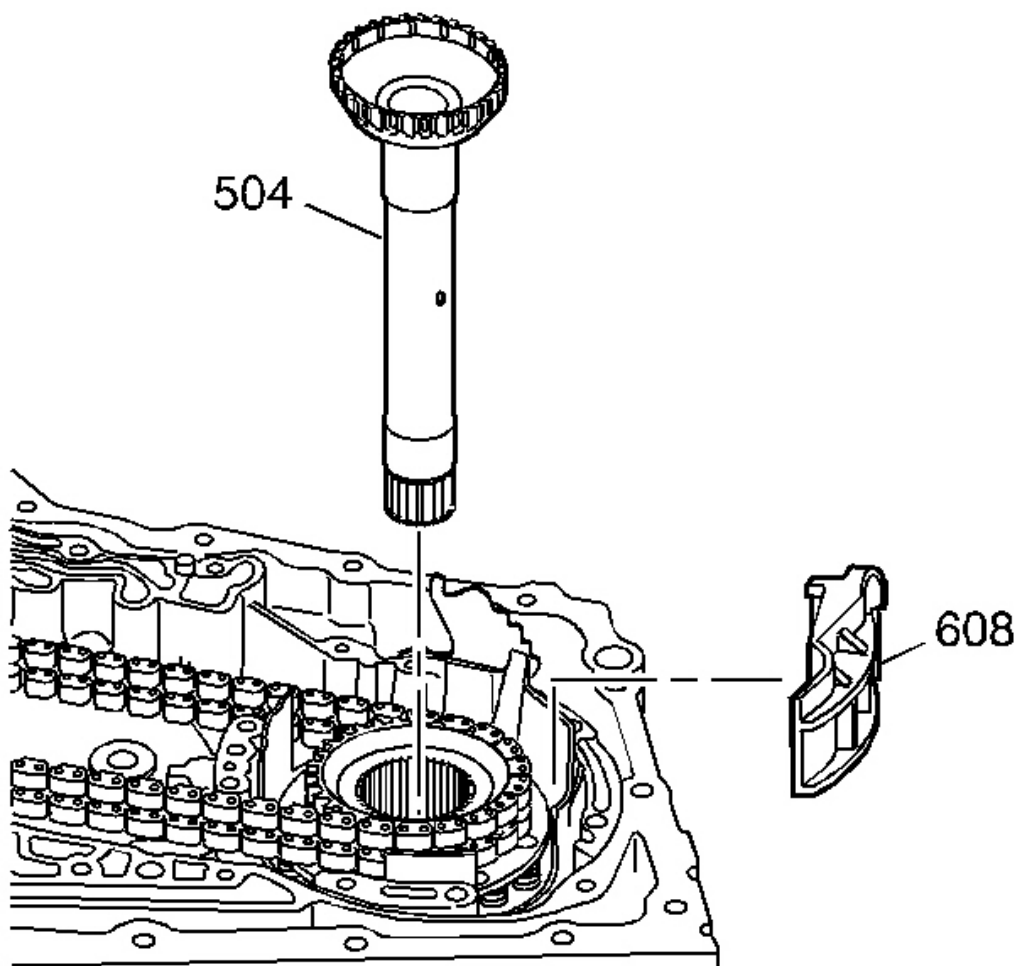


Fig. 258: Locating Fourth Clutch Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

3. Install the fourth clutch shaft assembly (504) into the case through the driven sprocket. The fourth clutch shaft assembly (504) must fully seat into the input sun gear.
4. Install the drive link lube scoop (608) into the case.

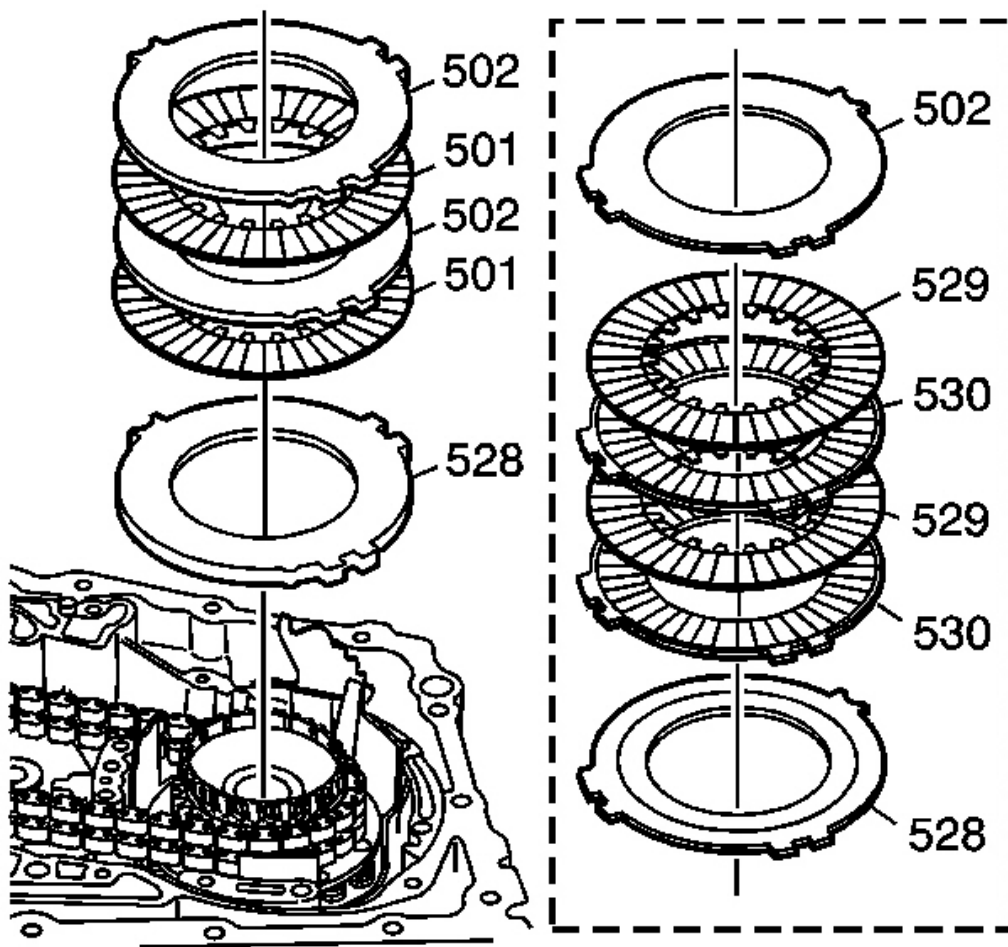


Fig. 259: Identifying Fourth Clutch Components
 Courtesy of GENERAL MOTORS CORP.

5. Install the fourth clutch apply plate (528) over the fourth clutch shaft assembly and into the driven sprocket support with the machined side towards the driven sprocket.
6. Install the remaining fourth clutch plates, starting with a fiber plate assembly (501) and alternating with steel plates (502). Some models use fiber on one side of each inner and

outer plate (529, 530). Install with the fiber side up.

7. The fourth clutch steel plates (502, 528) should align with the driven sprocket support as shown.

CASE COVER COMPONENTS DISASSEMBLE (WITHOUT TOUCH ACTIVATED POWER)

Disassembly Procedure

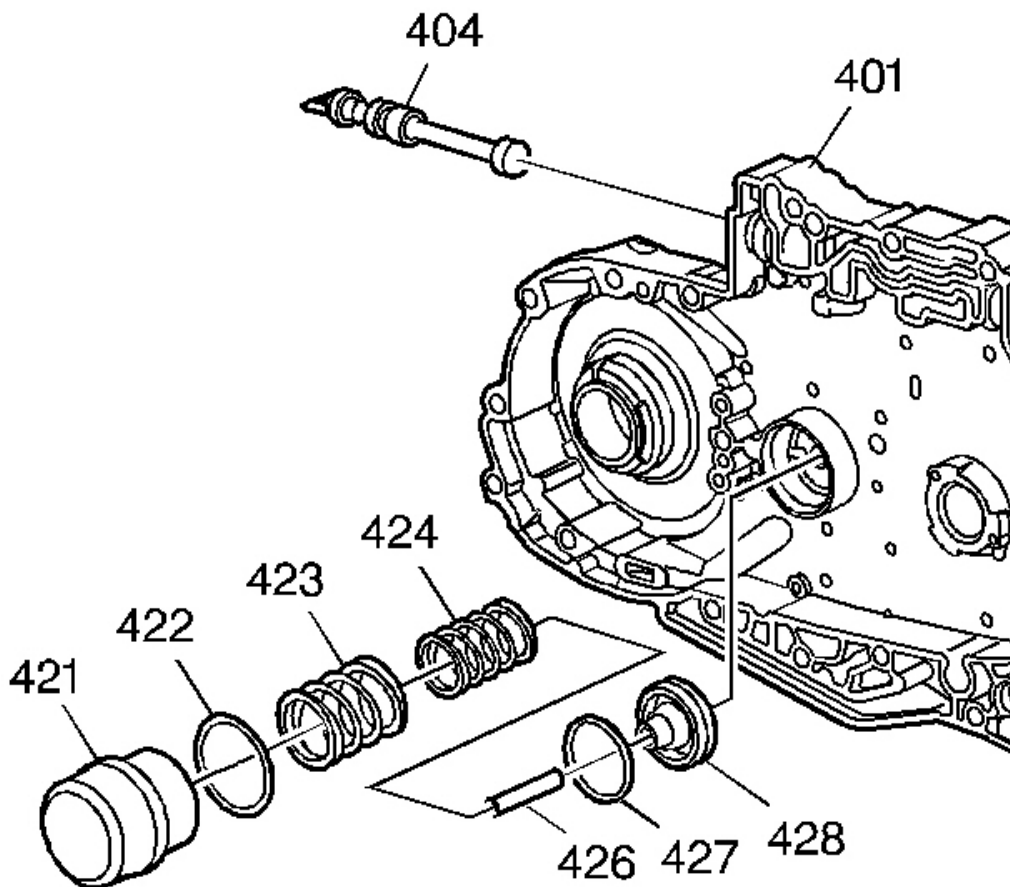


Fig. 260: Locating 3-4 Accumulator Piston Components
 Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not remove any of the bore plugs unless inspection indicates that replacement is necessary.

1. Remove the manual valve (404).
2. Remove the 3-4 accumulator piston cylinder (421) and the 3-4 accumulator piston O-ring seal (422). Use low pressure compressed air from the valve body side if necessary for removal.
3. Remove the 3-4 accumulator piston outer spring (423) and inner spring (424).
4. Remove the 3-4 accumulator piston (428).
5. Remove the 3-4 accumulator piston pin (426) from the valve body side of the case cover (401).

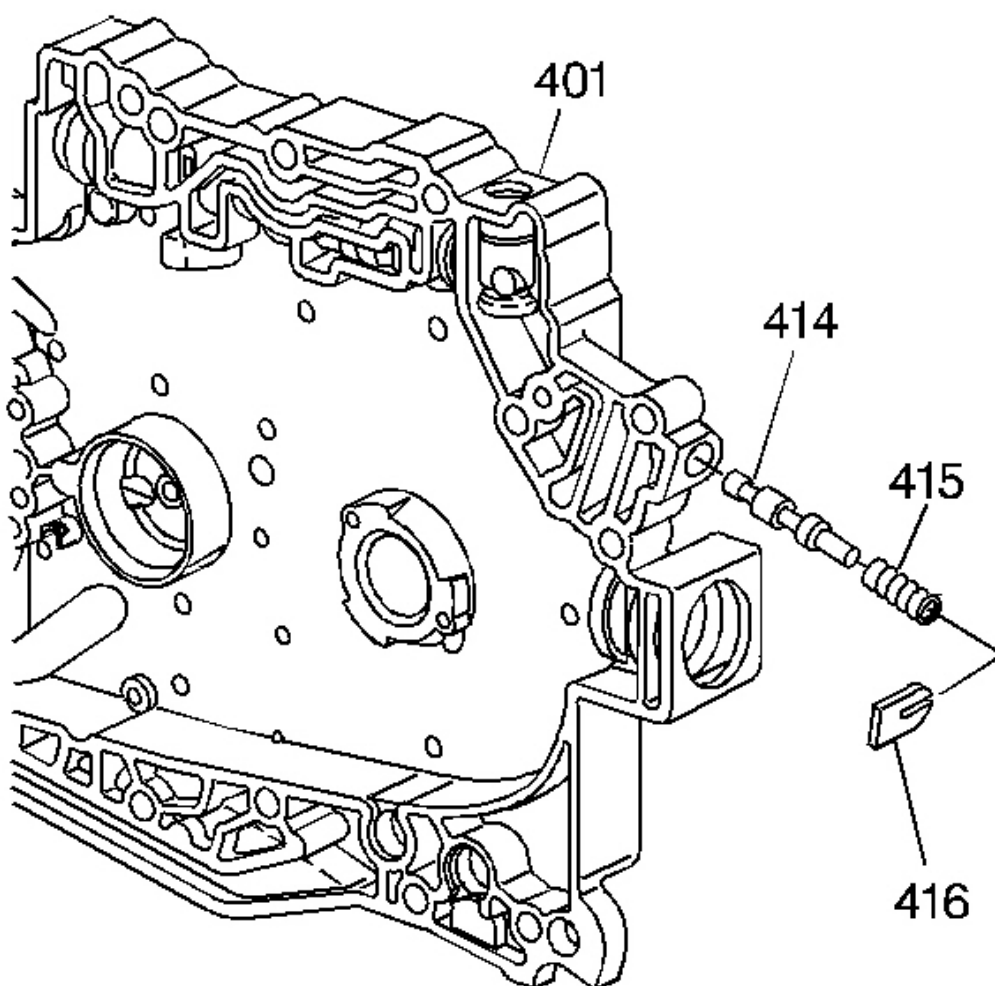


Fig. 261: Identifying 3-4 Accumulator Piston Pin, Valve Body & Case Cover
Courtesy of GENERAL MOTORS CORP.

CAUTION: Valve Springs can be tightly compressed. Use care when removing retainers and plugs. Personal injury could result.

6. Remove the actuator feed limit valve spring retainer (416).
7. Remove the actuator feed limit valve spring (415).
8. Remove the actuator feed limit valve (414).

CASE COVER COMPONENTS DISASSEMBLE (WITH TOUCH ACTIVATED POWER)

Disassembly Procedure

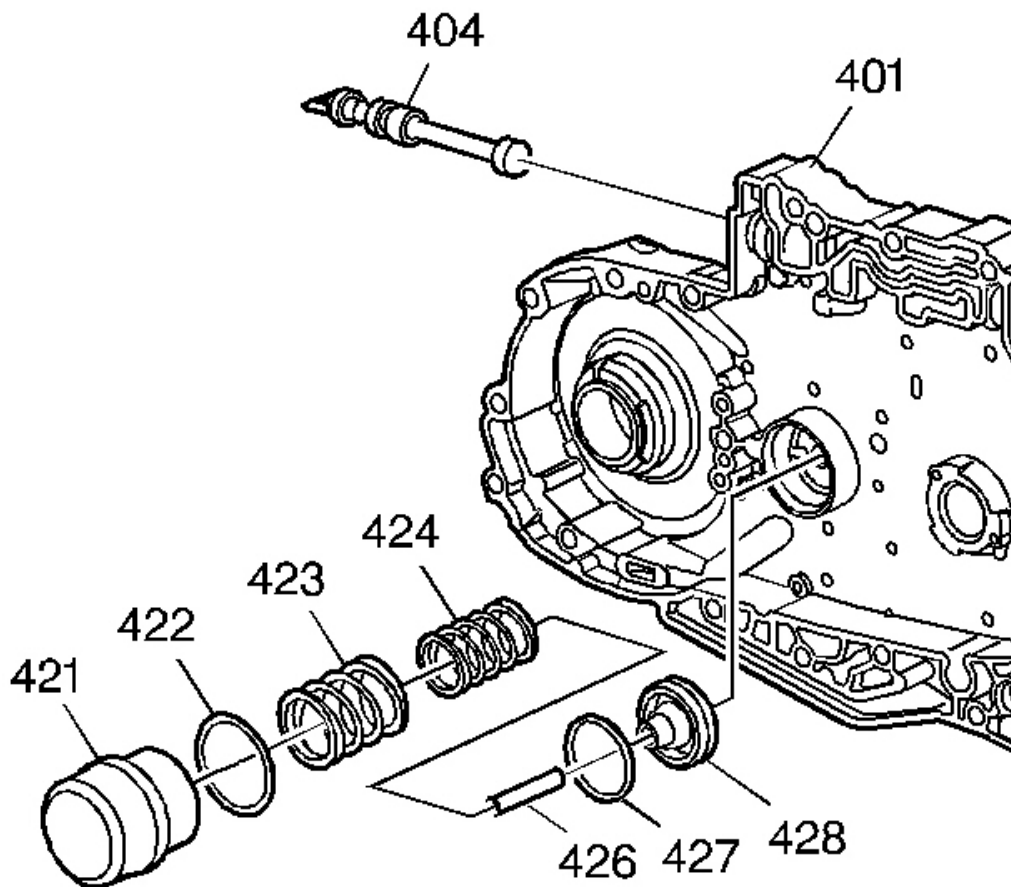


Fig. 262: Locating 3-4 Accumulator Piston Components
 Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not remove any of the bore plugs unless inspection indicates that replacement is necessary.

1. Remove the manual valve (404).
2. Remove the 3-4 accumulator piston cylinder (421) and the 3-4 accumulator piston O-ring seal (422). Use low pressure compressed air from the valve body side if necessary for removal.
3. Remove the 3-4 accumulator piston outer spring (423) and inner spring (424).
4. Remove the 3-4 accumulator piston (428).

5. Remove the 3-4 accumulator piston pin (426) from the valve body side of the case cover (401).

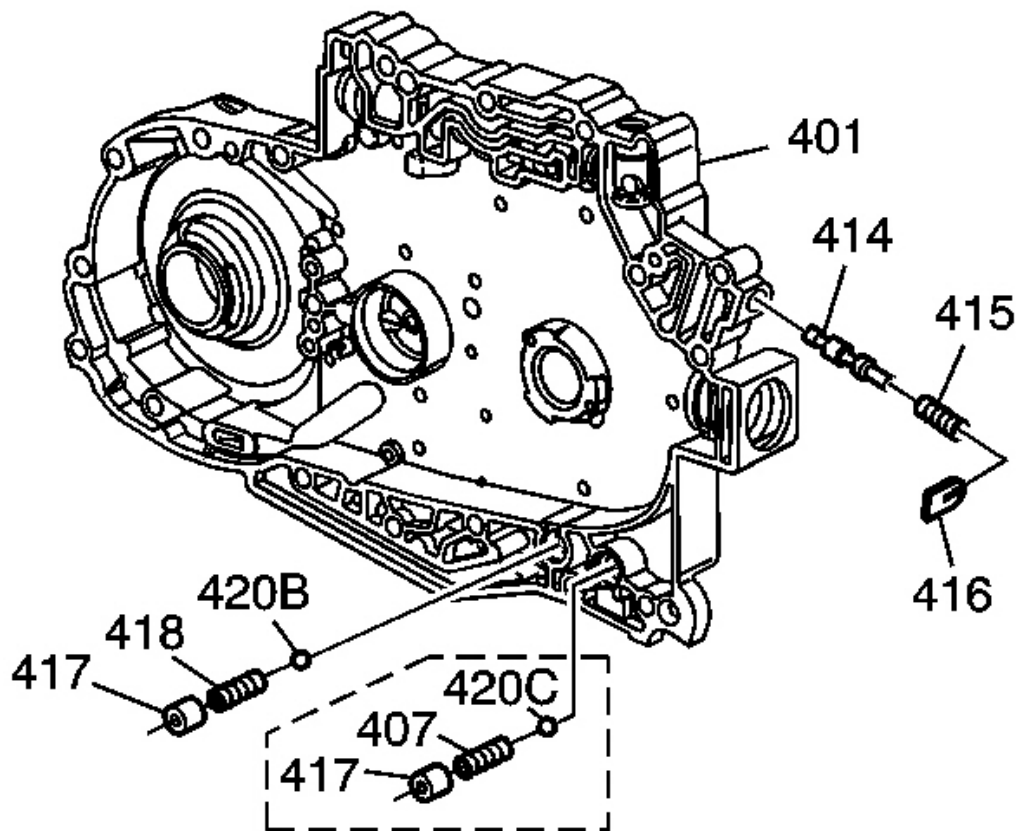


Fig. 263: Expanded View Of Case Cover Components
 Courtesy of GENERAL MOTORS CORP.

CAUTION: Valve Springs can be tightly compressed. Use care when removing retainers and plugs. Personal injury could result.

6. Remove the actuator feed limit valve spring retainer (416).
7. Remove the actuator feed limit valve spring (415).
8. Remove the actuator feed limit valve (414).

9. Remove the low regulator valve bore plug (444).
10. Remove the low regulator valve (443).
11. Remove the low regulator valve spring (442).

CASE COVER COMPONENTS INSPECTION (WITHOUT TOUCH ACTIVATED POWER)

Inspection Procedure

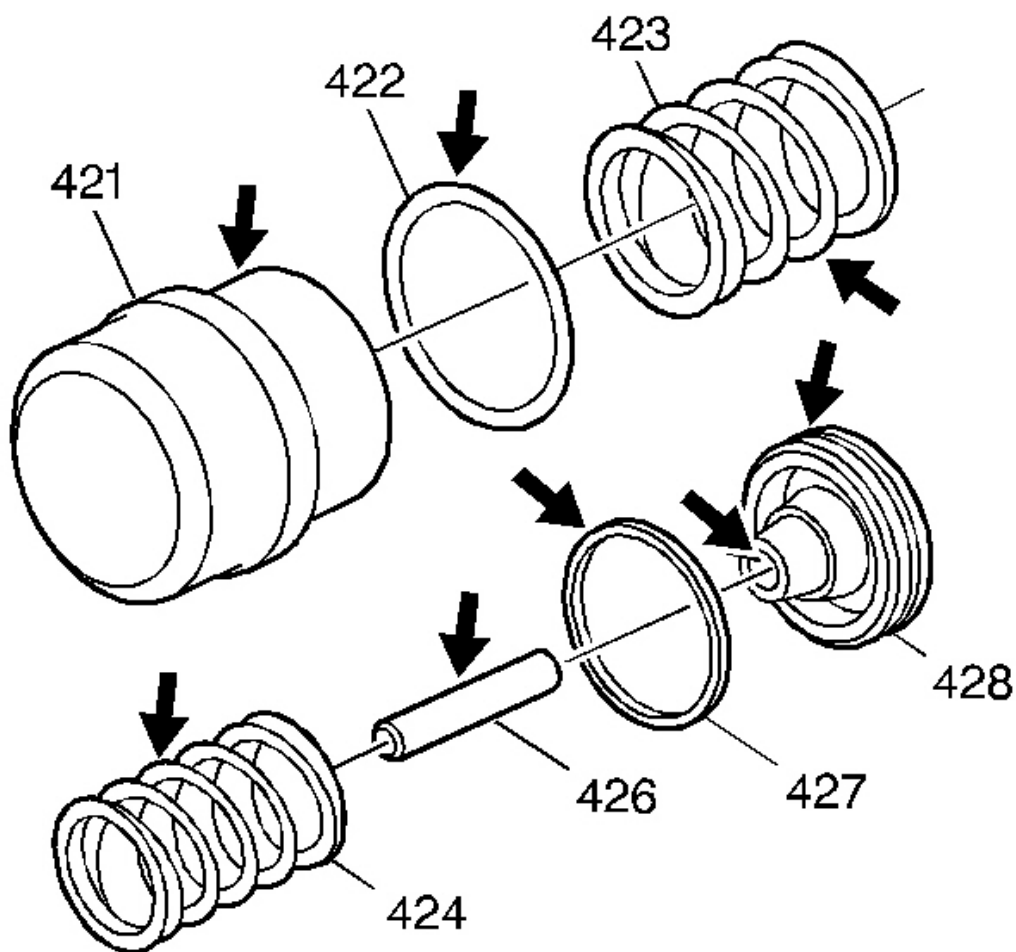


Fig. 264: Identifying 3-4 accumulator piston Inspection Areas
 Courtesy of GENERAL MOTORS CORP.

1. Inspect the 3-4 accumulator piston (428) for the following conditions:

- Porosity
 - A scored pin bore
 - A nicked piston seal groove
2. Inspect the 3-4 accumulator piston pin (426) for scoring and free movement in the 3-4 accumulator piston bore.
 3. Inspect the 3-4 accumulator outer spring (423) and inner spring (424) for distorted or broken coils.
 4. Inspect the 3-4 accumulator piston cylinder (421) for the following conditions:
 - Porosity or cracks
 - A rough or scored seal surface
 - A cut seal (422)

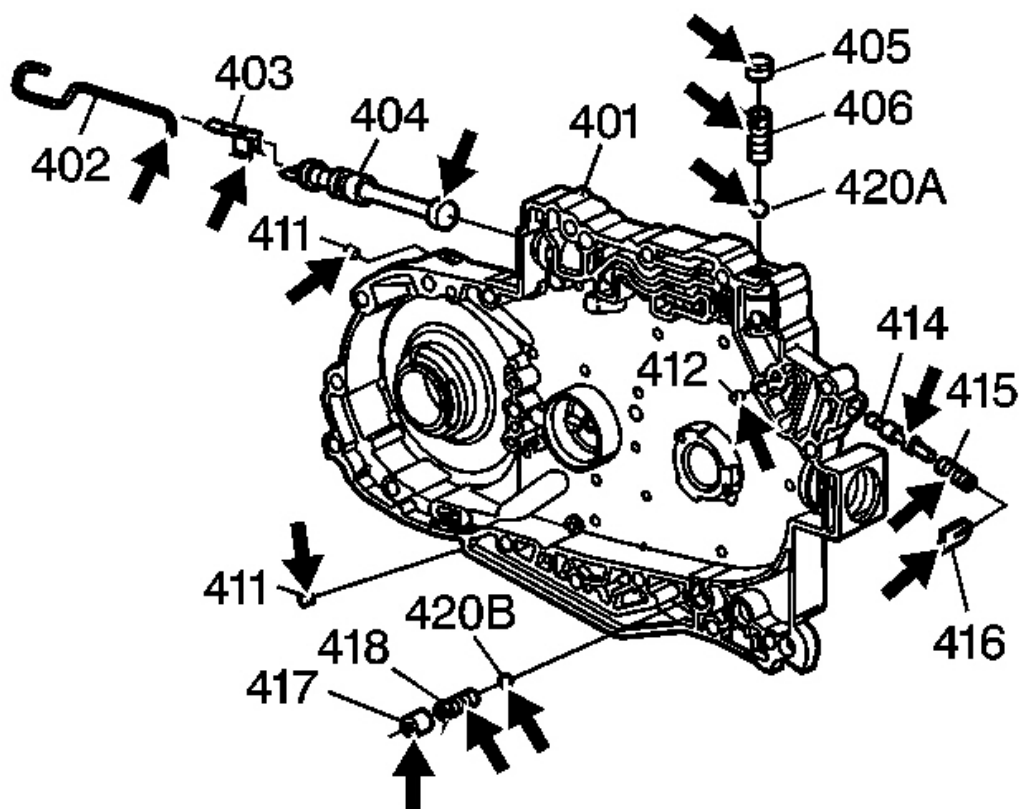


Fig. 265: Identifying Case Cover Components

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not remove the blowoff valves unless the ball valves are damaged.

5. Inspect the low blow off ball valve (420A), the low blow off ball valve spring (406) and the low blow off ball valve bore plug (405).
6. Inspect the TCC blow off ball valve (420B), the TCC blow off ball valve spring (418) and the TCC blow off ball valve bore plug (417).
7. Inspect the manual valve (404), the manual valve link (402) and the manual valve clip (403) for damage.
8. Inspect the manual valve (404) for binding or looseness in the case cover assembly (401).
9. Inspect the case cover bore plugs (411) and the orificed cup plug (412). Correct the following conditions:
 - Plug is loose
 - Plug is missing
 - Orifice is plugged

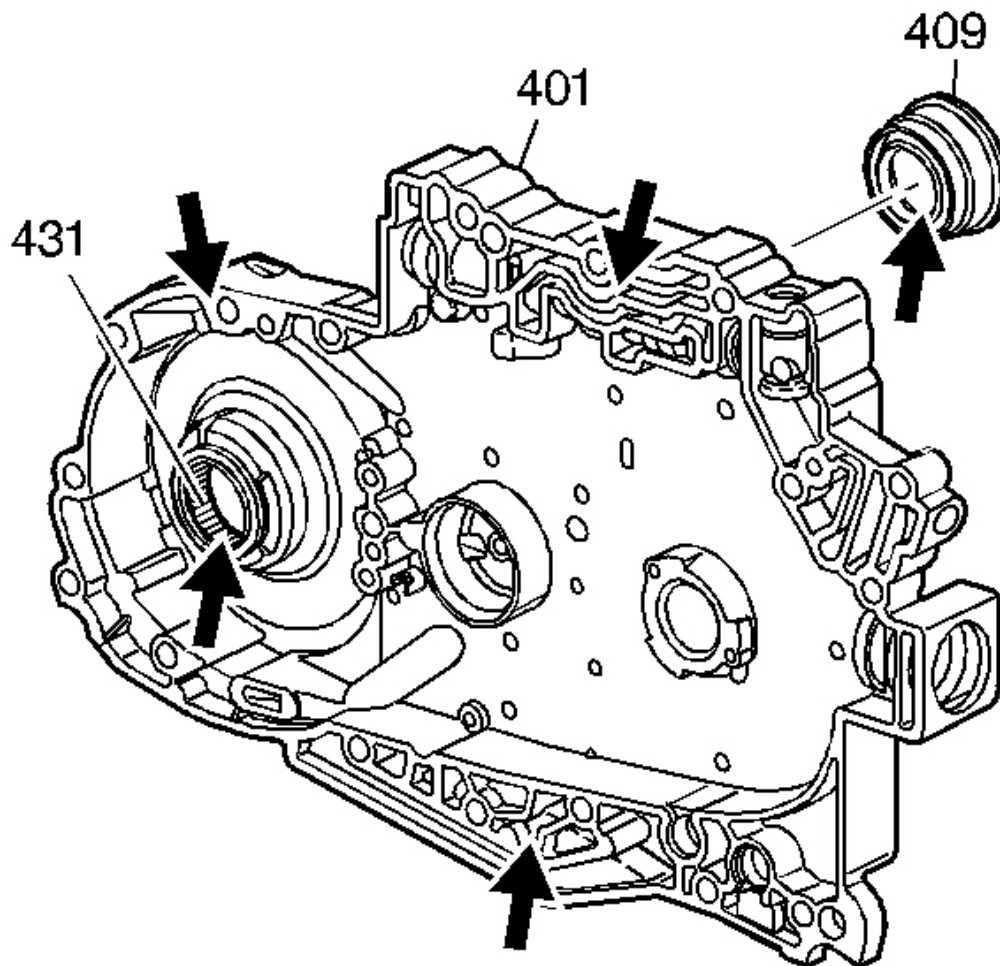


Fig. 266: Locating Inspection Areas On Drive Shaft Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not remove the drive shaft bearing (431) unless the bearing is damaged.

10. Inspect the drive shaft bearing assembly (431).
11. Inspect the axle oil seal assembly (409) for a missing garter spring or for a cut lip seal.
12. Inspect the case cover (401) for the following:
 - Porosity

- Interconnected fluid passages
- Cracks or rough machined surfaces

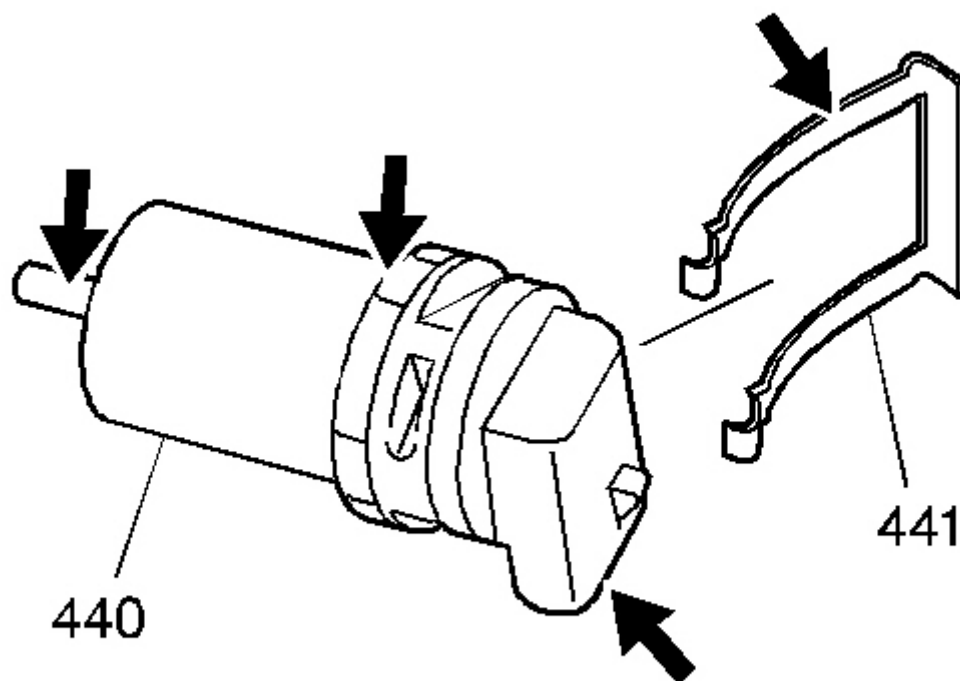


Fig. 267: Inspecting Input Speed Sensor
Courtesy of GENERAL MOTORS CORP.

13. Inspect the input speed sensor assembly (440) for the following conditions:
 - Damaged or missing magnet
 - Damaged housing
 - Bent or missing electrical terminals
 - Damaged input speed sensor clip (441)

CASE COVER COMPONENTS INSPECTION (WITH TOUCH ACTIVATED POWER)

Inspection Procedure

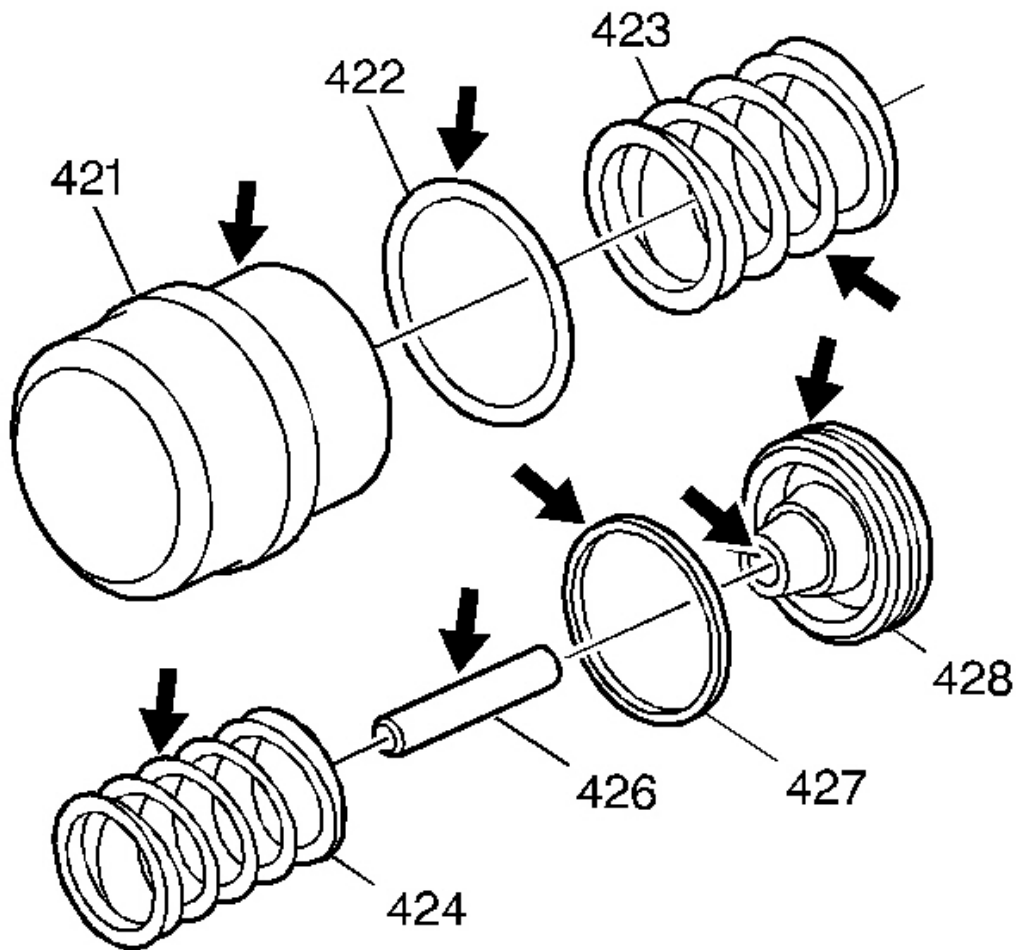


Fig. 268: Identifying 3-4 accumulator piston Inspection Areas
Courtesy of GENERAL MOTORS CORP.

1. Inspect the 3-4 accumulator piston (428) for the following conditions:
 - Porosity
 - A scored pin bore
 - A nicked piston seal groove
2. Inspect the 3-4 accumulator piston pin (426) for scoring and free movement in the 3-4 accumulator piston bore.
3. Inspect the 3-4 accumulator outer spring (423) and inner spring (424) for distorted or

broken coils.

4. Inspect the 3-4 accumulator piston cylinder (421) for the following conditions:
 - Porosity or cracks
 - A rough or scored seal surface
 - A cut seal (422)

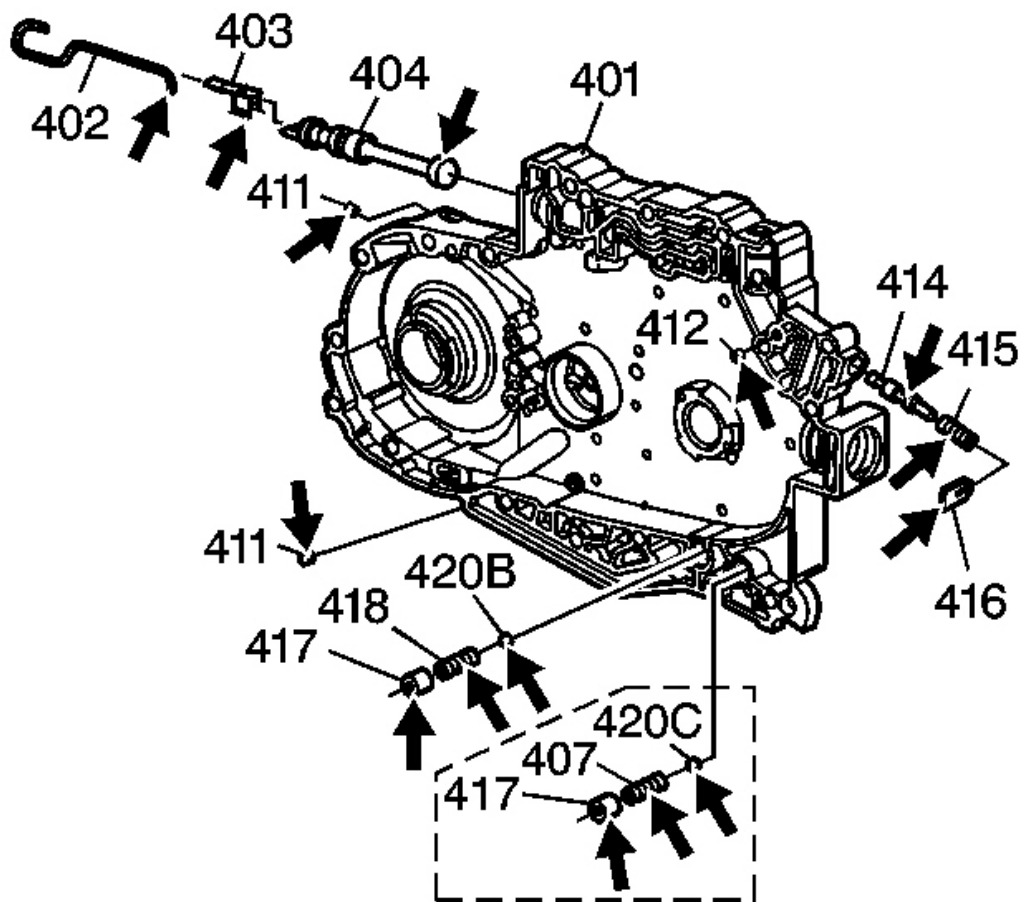


Fig. 269: View Of Case Cover Assembly Components
 Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not remove the blowoff valves unless the ball valves are damaged.

5. Inspect the low regulator valve spring (422), the low regulator valve (443) and the low regulator valve bore plug (444).
6. Inspect the TCC blow off ball valve (420B), the TCC blow off ball valve spring (418) and the TCC blow off ball valve bore plug (417).
7. Inspect the manual valve (404), the manual valve link (402) and the manual valve clip (403) for damage.
8. Inspect the manual valve (404) for binding or looseness in the case cover assembly (401).
9. Inspect the case cover bore plugs (411) and the orificed cup plug (412). Correct the following conditions:
 - Plug is loose
 - Plug is missing
 - Orifice is plugged

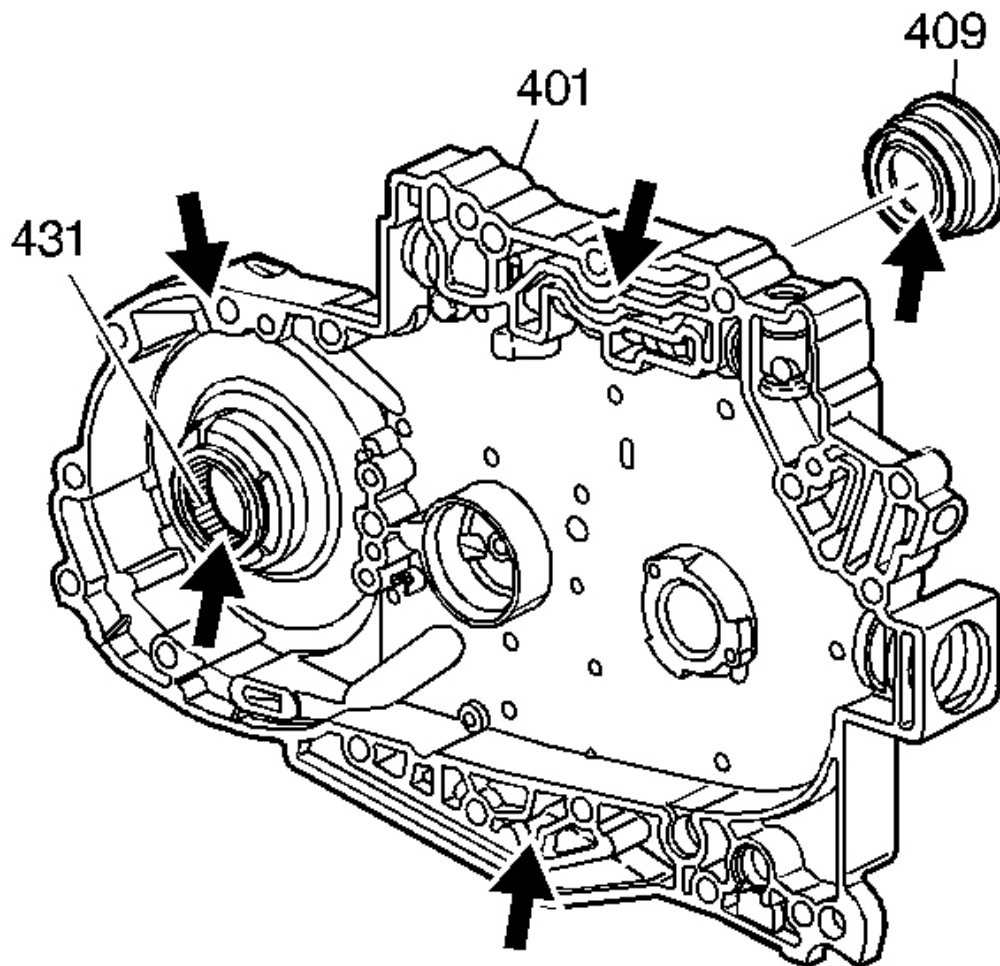


Fig. 270: Locating Inspection Areas On Drive Shaft Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not remove the drive shaft bearing (431) unless the bearing is damaged.

10. Inspect the drive shaft bearing assembly (431).
11. Inspect the axle oil seal assembly (409) for a missing garter spring or for a cut lip seal.
12. Inspect the case cover (401) for the following:
 - Porosity

- Interconnected fluid passages
- Cracks or rough machined surfaces

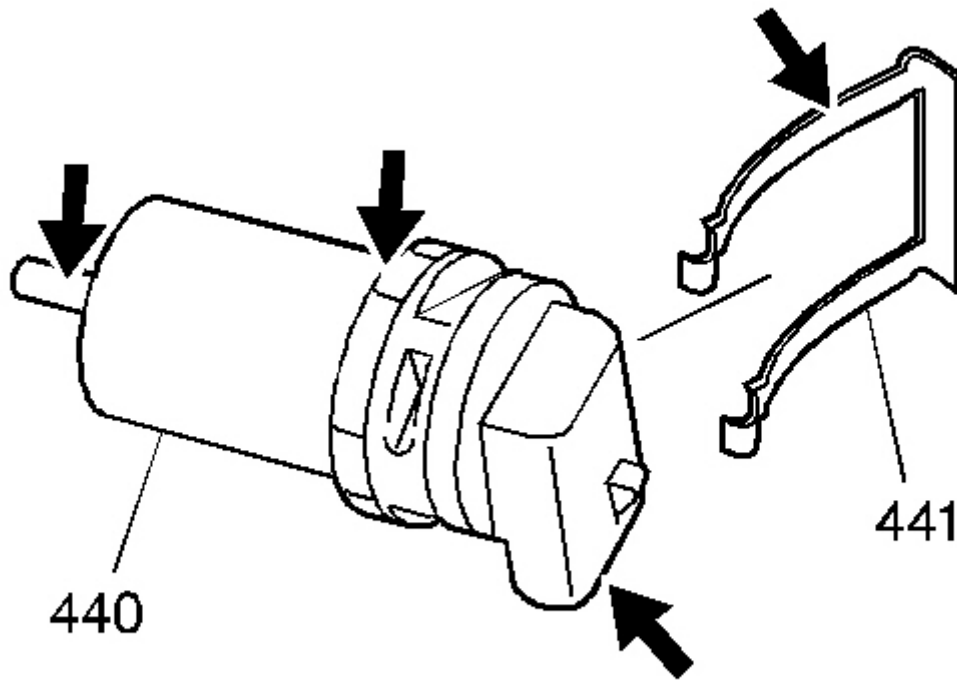


Fig. 271: Inspecting Input Speed Sensor
Courtesy of GENERAL MOTORS CORP.

13. Inspect the input speed sensor assembly (440) for the following conditions:
 - Damaged or missing magnet
 - Damaged housing
 - Bent or missing electrical terminals
 - Damaged input speed sensor clip (441)

CASE COVER BEARING DISASSEMBLE

Tools REquired

- **J 8092** Driver Handle
- **J 41991** Driveshaft Bearing Remover/Installer. See **Special Tools**.

Disassembly Procedure

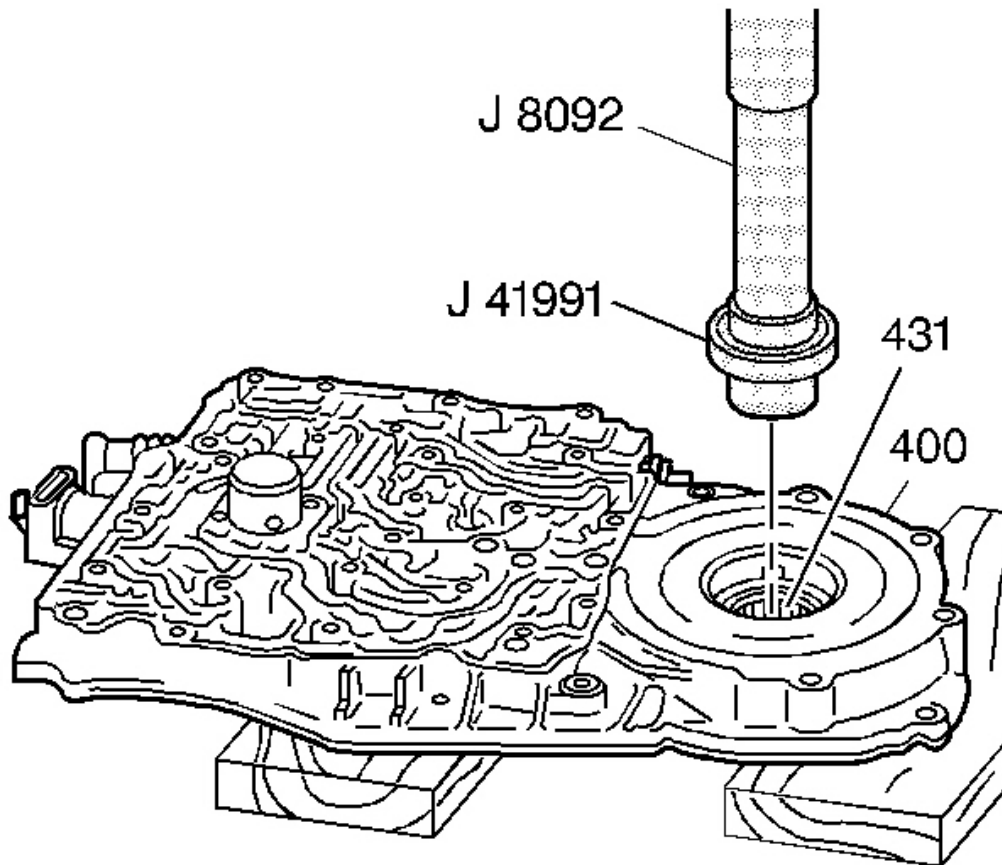


Fig. 272: Pressing Out Drive Shaft Bearing Assembly
Courtesy of GENERAL MOTORS CORP.

1. Assemble **J 8092** and **J 41991** for bearing removal. See **Special Tools**.
2. Place the case cover (400) on a clean, flat surface with the spacer plate mating surface up.
3. Using the assembled tool, press the drive shaft bearing assembly (431) from the case cover (400).

CASE COVER BEARING ASSEMBLE

Tools REquired

- **J 8092** Driver Handle
- **J 41991** Driveshaft Bearing Remover/Installer. See **Special Tools**.

Assembly Procedure

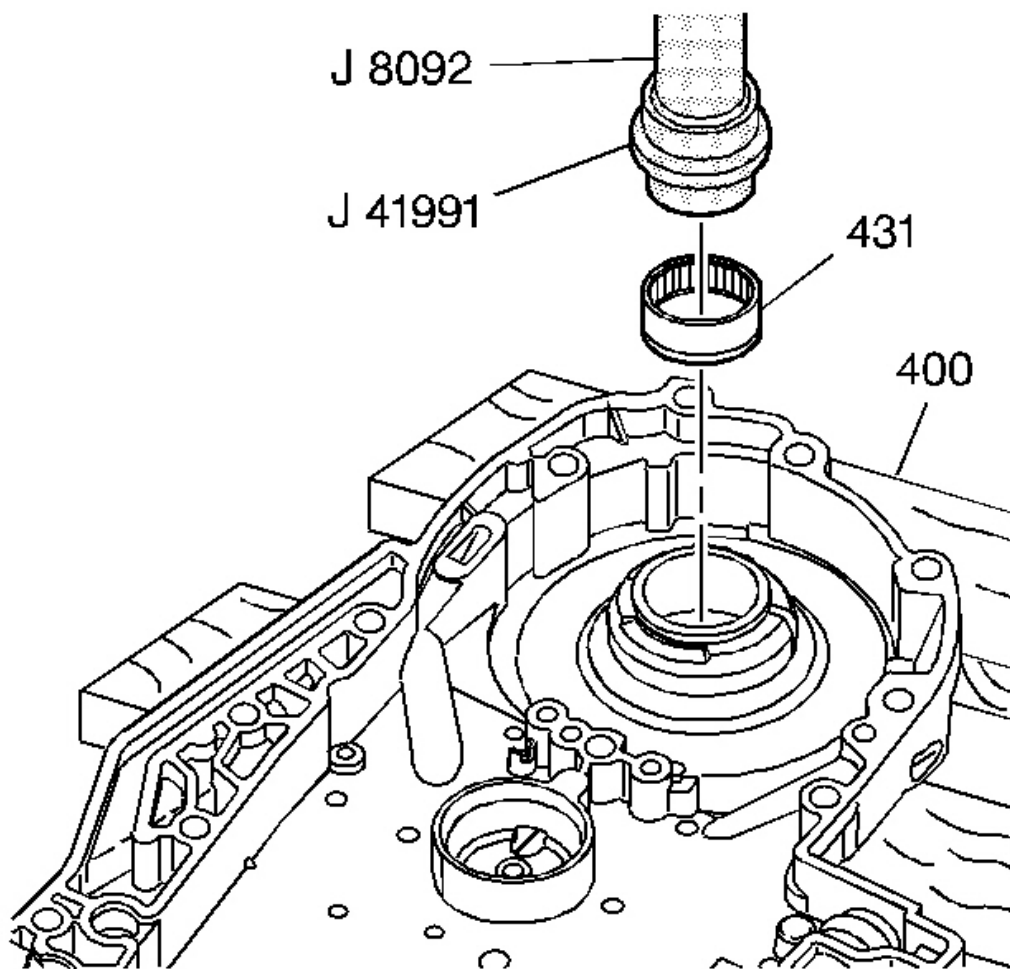


Fig. 273: Pressing Drive Shaft Bearing In With J 8092 & J 41991
Courtesy of GENERAL MOTORS CORP.

1. Assemble **J 8092** and **J 41991** for bearing installation. See **Special Tools**.
2. Place the case cover (400) on a clean, flat surface with the case mating surface up.

IMPORTANT: When installing the new bearing the part number should be visible (facing upward).

3. Using the assembled tool, press the drive shaft bearing (431) into the case cover (400).

DRIVE SHAFT OIL SEAL ASSEMBLE - LEFT SIDE

Tools Required

J 34115 Left Side Axle Seal Installer. See **Special Tools**.

Assembly Procedure

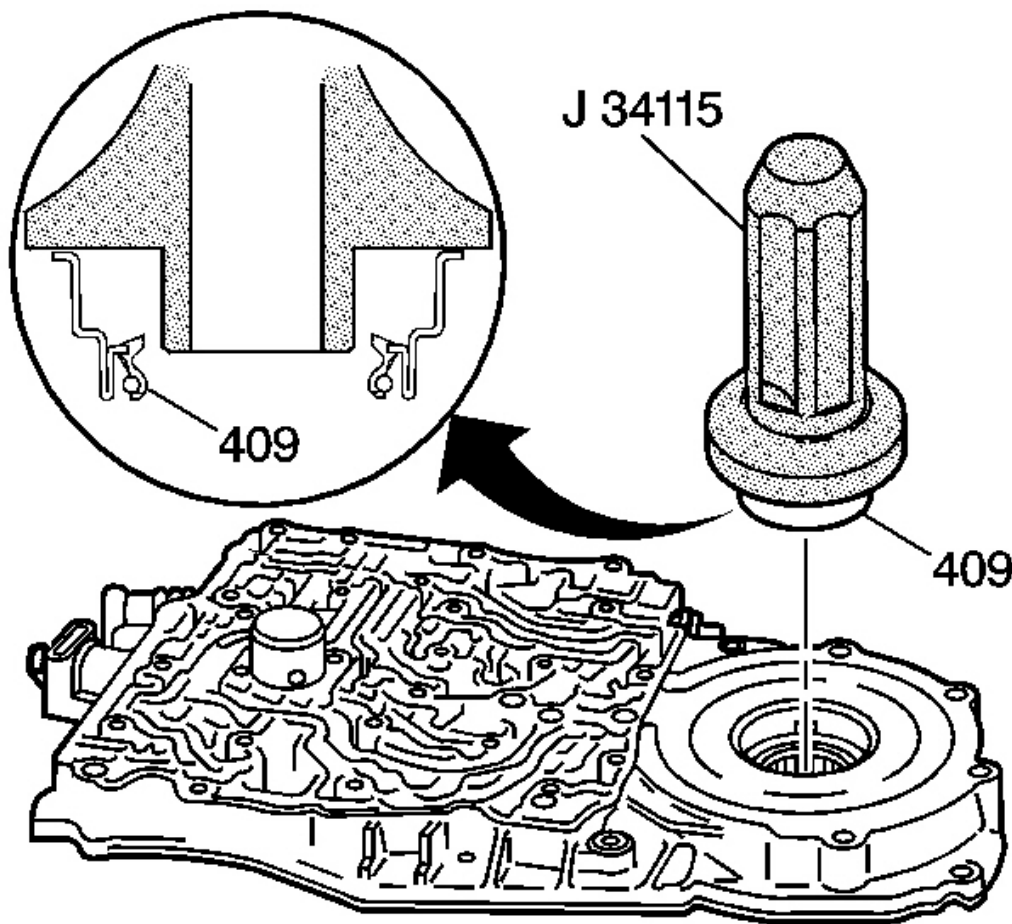


Fig. 274: Installing Left Side Axle Oil Seal Assembly
Courtesy of GENERAL MOTORS CORP.

NOTE: Install the seal onto the tool before installing into the case to prevent damage to the seal.

IMPORTANT: When you remove a drive axle from the transmission for any reason, inspect the axle sealing surface (tripot shank) for corrosion. If corrosion is evident, clean the surface with a 320 grit cloth or equivalent. Clean off any remaining debris with automatic transmission fluid. Wipe the surface dry and reinstall the drive axle free of any build up.

Use **J 34115** in order to install the left side axle oil seal assembly (409). See **Special Tools**.

CASE COVER COMPONENTS ASSEMBLE (WITHOUT TOUCH ACTIVATED POWER)

Assembly Procedure

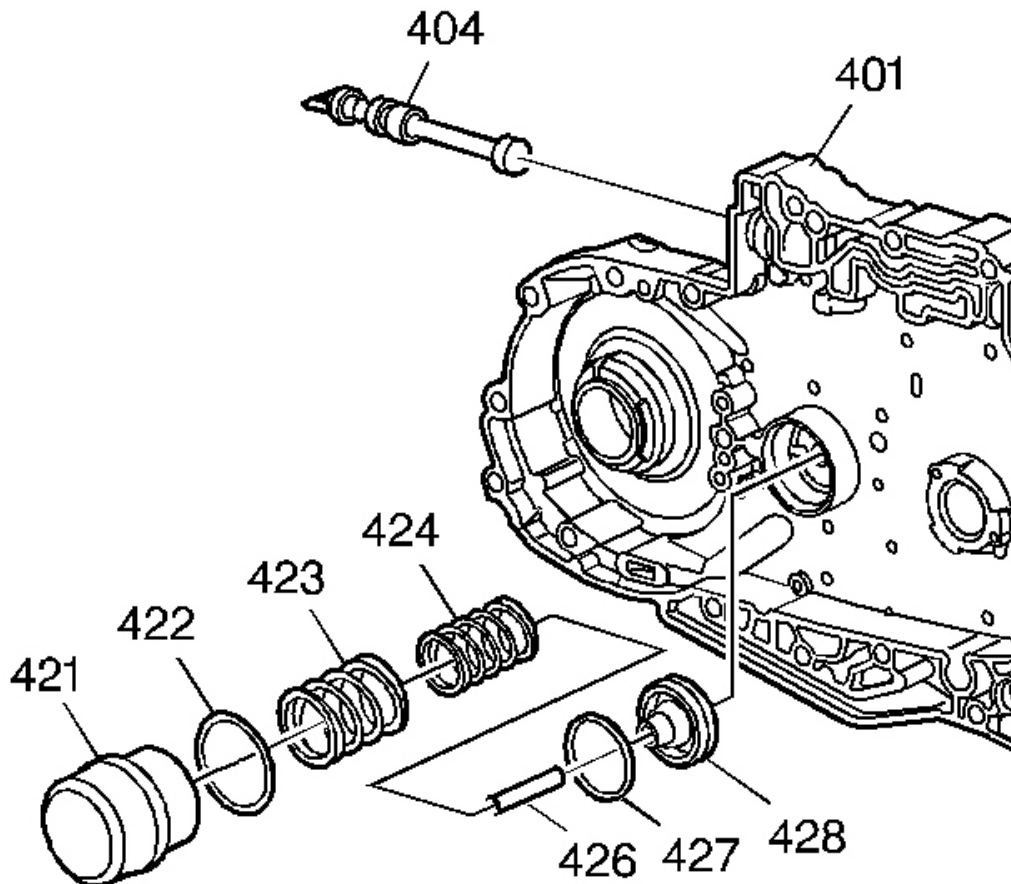


Fig. 275: Locating 3-4 Accumulator Piston Components
Courtesy of GENERAL MOTORS CORP.

1. Install a new 3-4 accumulator piston cylinder O-ring seal (422) onto the 3-4 accumulator piston cylinder (421).
2. Install the 3-4 accumulator piston outer spring (423) and inner spring (424) into the 3-4 accumulator piston cylinder (421).

3. Install a new 3-4 accumulator piston seal (427) onto the 3-4 accumulator piston (428).
4. Insert the 3-4 accumulator piston (428) into the 3-4 accumulator piston cylinder (421).
5. Using a slight twisting motion, insert the 3-4 accumulator piston cylinder (421) into the case cover (401).
6. Insert the 3-4 accumulator piston pin (426) through the front of the case cover (401) and into the 3-4 accumulator piston (428).
7. Install the manual valve (404) into the case cover (401).

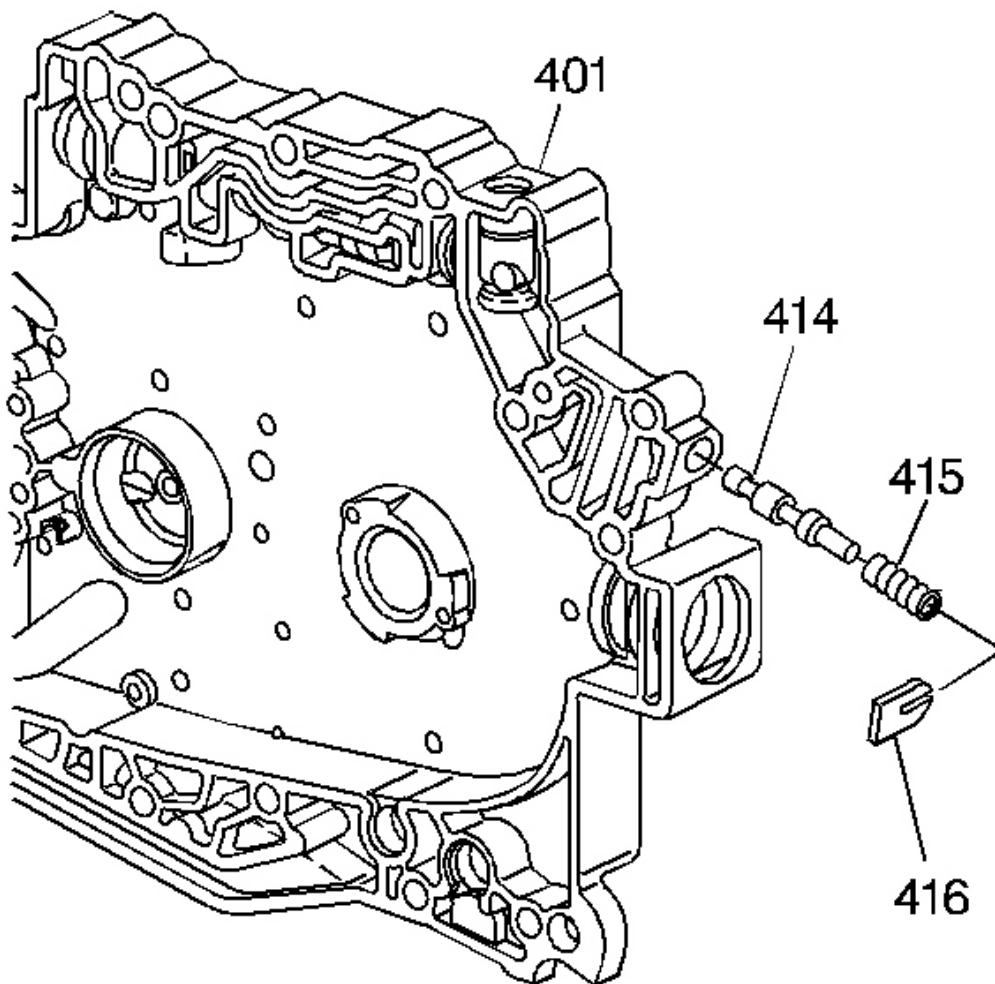


Fig. 276: Identifying Actuator Feed Limit Valve & Case Cover

Courtesy of GENERAL MOTORS CORP.

8. Install the actuator feed limit valve (414) into the case cover (401).
9. Install the actuator feed limit valve spring (415) into the case cover (401).
10. Install the actuator feed limit valve spring retainer (416) into the case cover (401).

CASE COVER COMPONENTS ASSEMBLE (WITH TOUCH ACTIVATED POWER)

Assembly Procedure

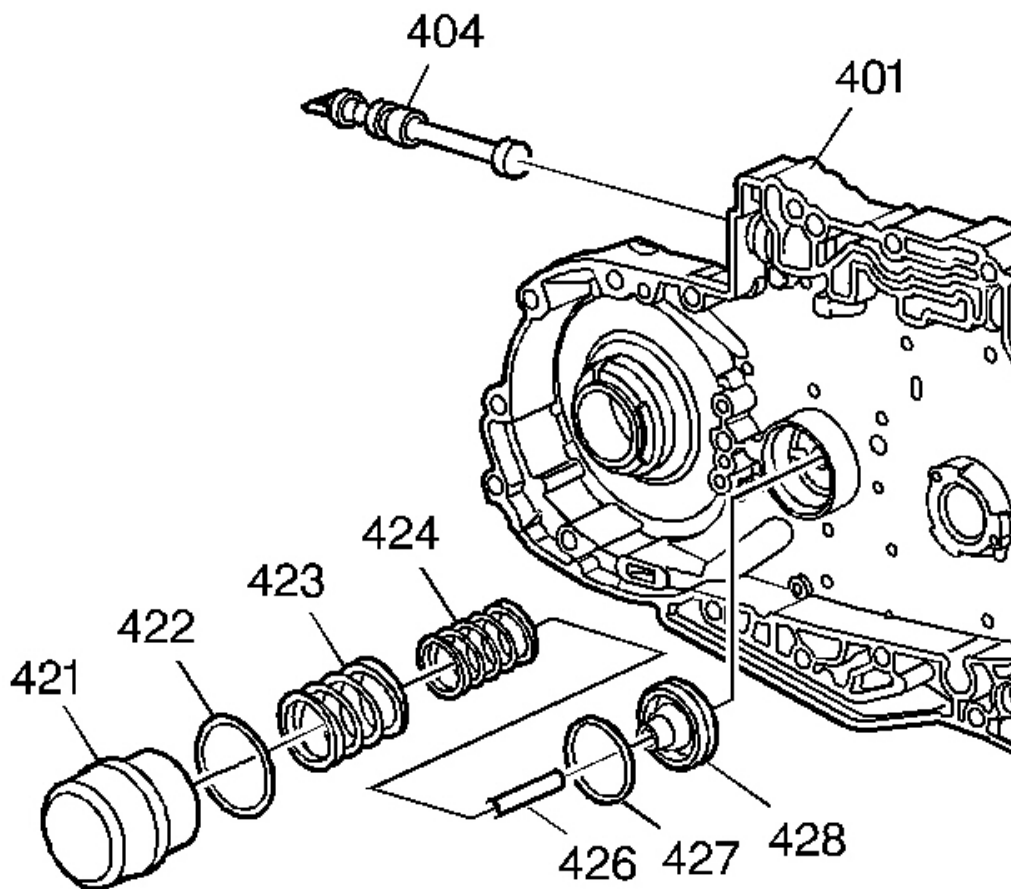


Fig. 277: Locating 3-4 Accumulator Piston Components
Courtesy of GENERAL MOTORS CORP.

1. Install a new 3-4 accumulator piston cylinder O-ring seal (422) onto the 3-4 accumulator

piston cylinder (421).

2. Install the 3-4 accumulator piston outer spring (423) and inner spring (424) into the 3-4 accumulator piston cylinder (421).
3. Install a new 3-4 accumulator piston seal (427) onto the 3-4 accumulator piston (428).
4. Insert the 3-4 accumulator piston (428) into the 3-4 accumulator piston cylinder (421).
5. Using a slight twisting motion, insert the 3-4 accumulator piston cylinder (421) into the case cover (401).
6. Insert the 3-4 accumulator piston pin (426) through the front of the case cover (401) and into the 3-4 accumulator piston (428).
7. Install the manual valve (404) into the case cover (401).

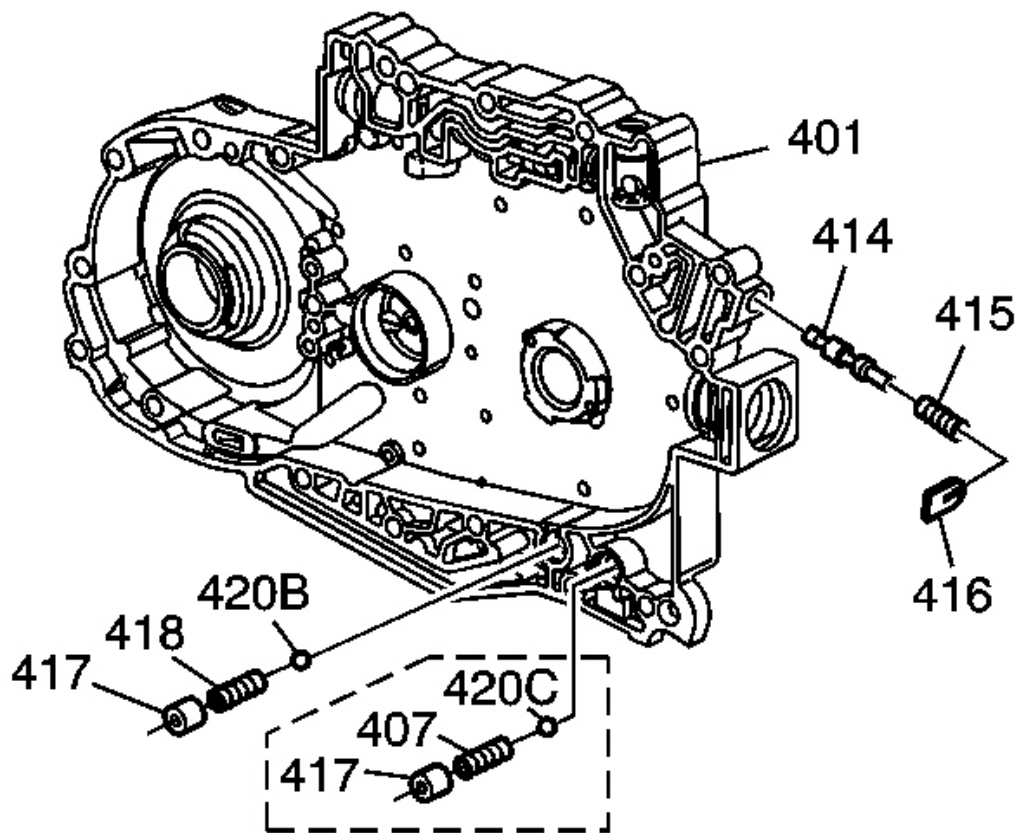


Fig. 278: Expanded View Of Case Cover Components
 Courtesy of GENERAL MOTORS CORP.

8. Install the actuator feed limit valve (414) into the case cover (401).
9. Install the actuator feed limit valve spring (415) into the case cover (401).
10. Install the actuator feed limit valve spring retainer (416) into the case cover (401).
11. Install the low regulator valve spring (442).
12. Install the low regulator valve (443).
13. Install the low regulator valve bore plug (444).

CASE COVER AND GASKETS ASSEMBLE

Tools Required

- **J 36850** Assembly Lubricant (or equivalent)
- **J44538** TORX® 30+. See **Special Tools**.

Assembly Procedure

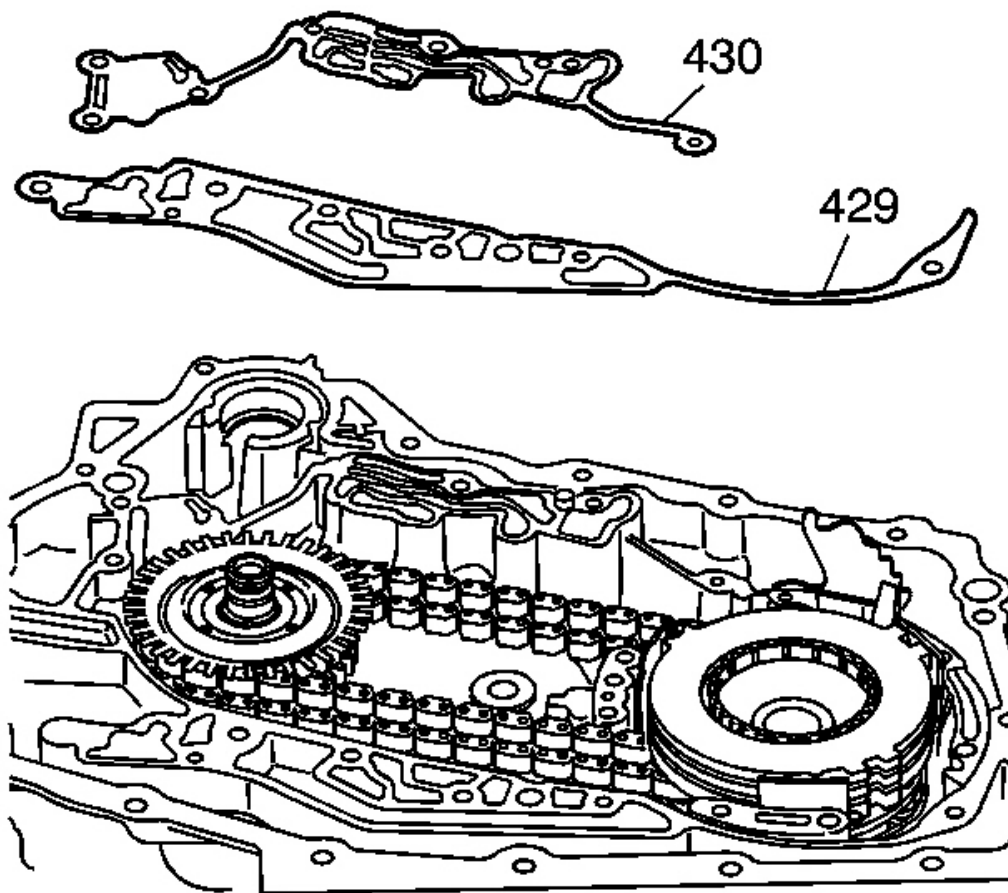


Fig. 279: View Of Case Cover Upper & Lower Gasket
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not use any type of adhesive or sealer when assembling the gaskets. You may use J 36850 or equivalent as an aid.

1. Install the case cover upper gasket (430) and the case cover lower gasket (429) on the case.

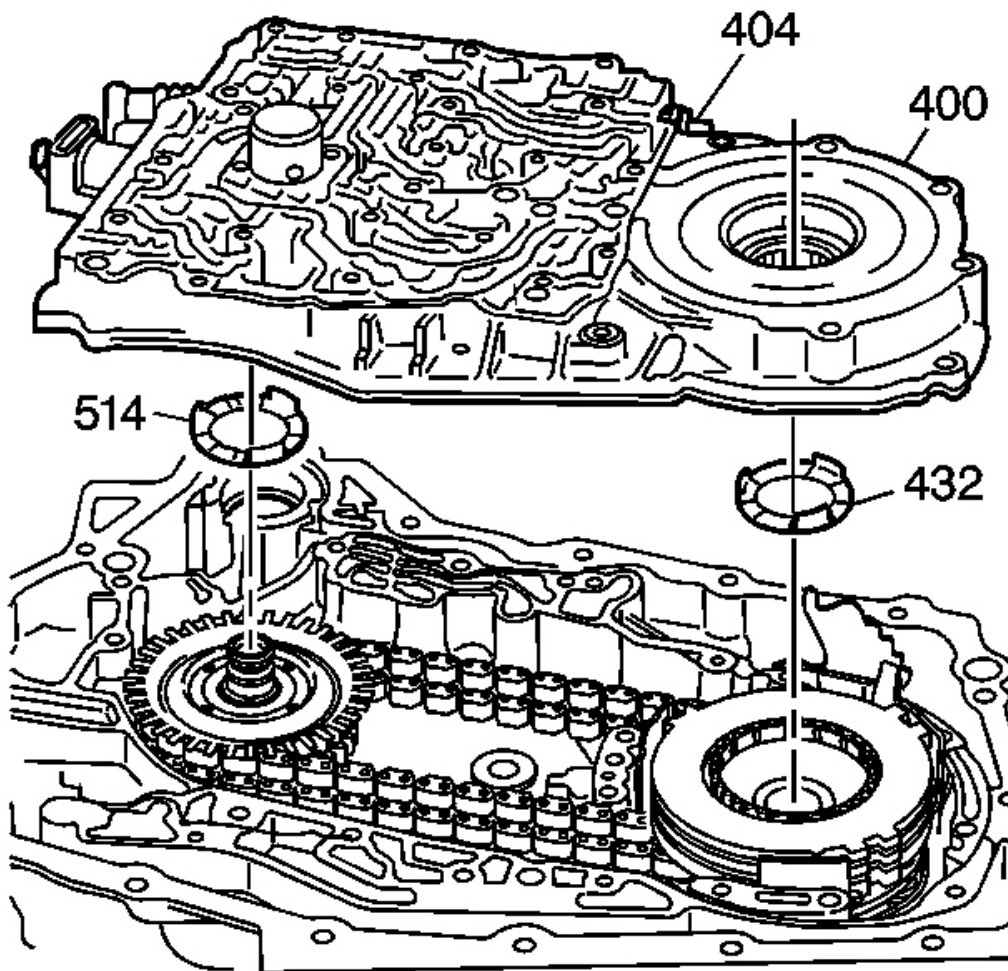


Fig. 280: Identifying Fourth Clutch Shaft Thrust Washer & Drive Sprocket/Case Cover Thrust Washer

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Be careful to not move the gaskets.

2. Use J 36850 or equivalent in order to retain the fourth clutch shaft thrust washer (432) and the drive sprocket/case cover thrust washer (514) to the case cover (400).

IMPORTANT: Do not install the case cover over the IMS. The IMS must move freely.

3. Make sure that the manual valve (404) is held in place and assemble the case cover (400) onto the pins in the case.

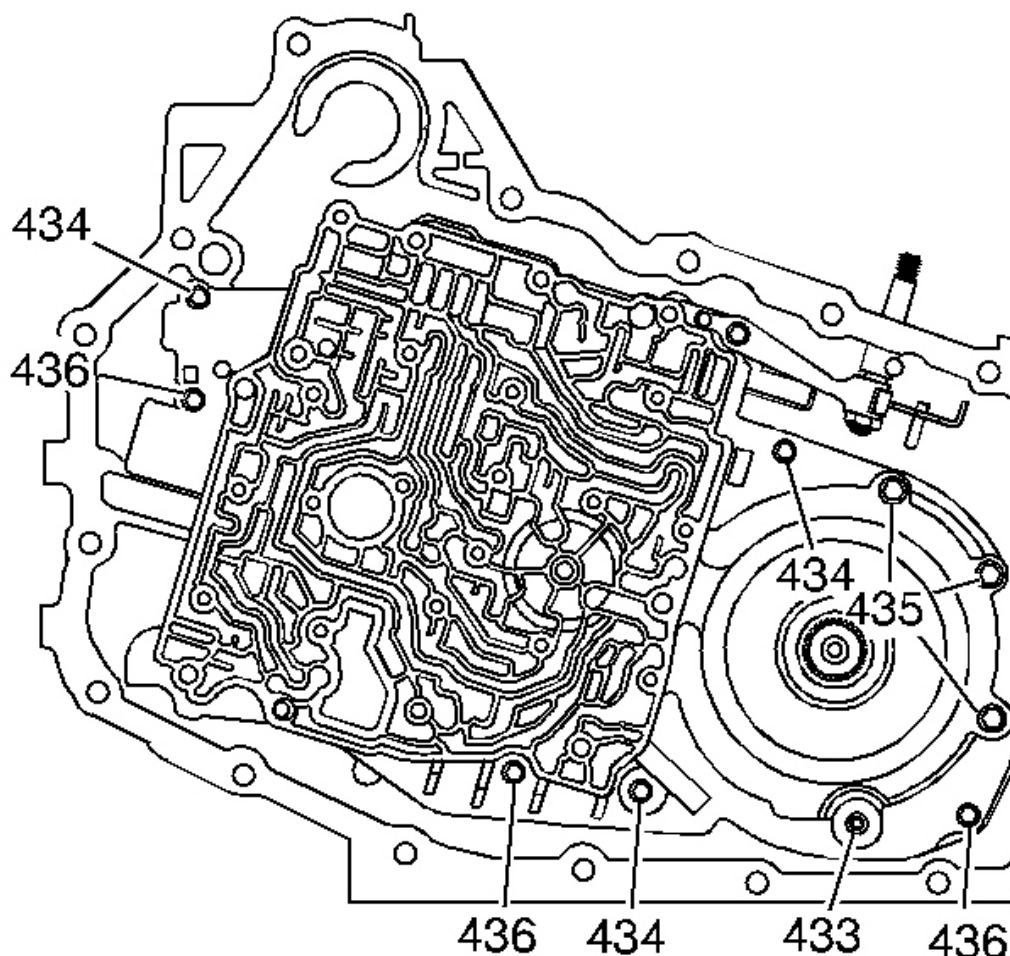


Fig. 281: Transaxle Case Cover Bolts Locations
Courtesy of GENERAL MOTORS CORP.

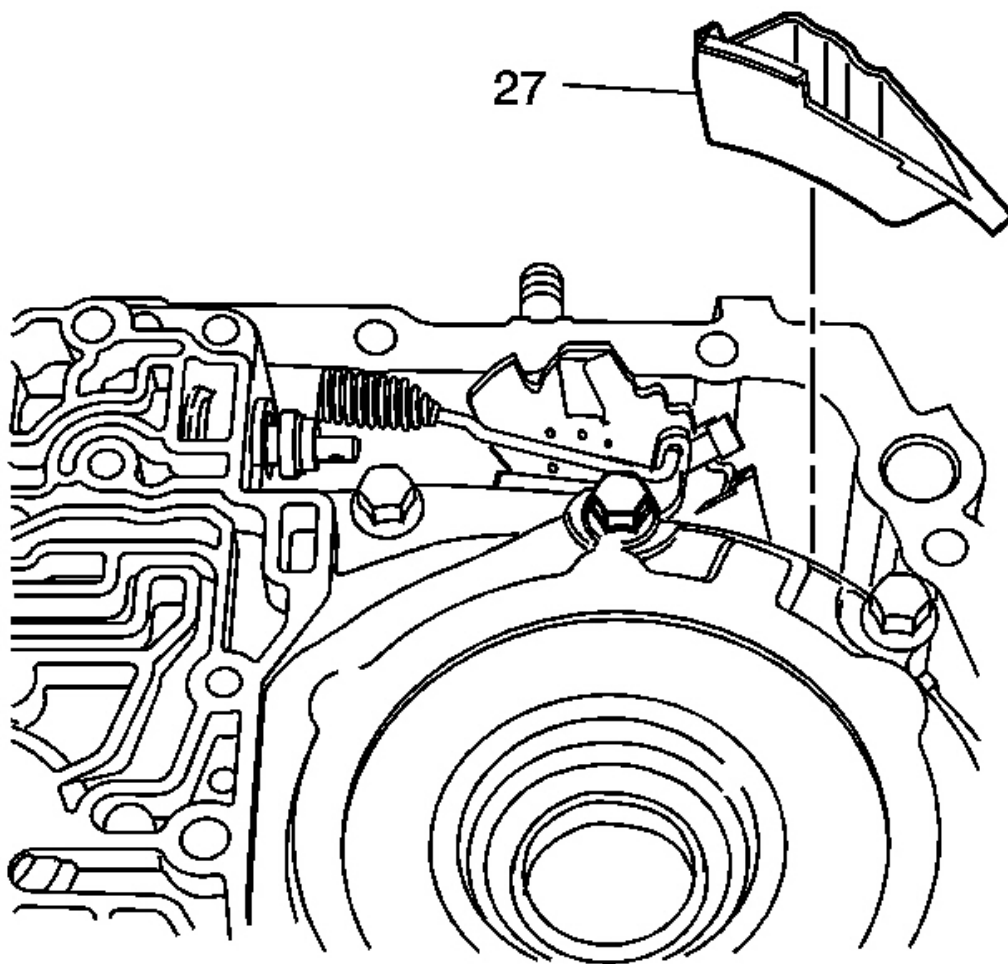
NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

IMPORTANT: Do not use an impact wrench.

4. Finger start all transaxle case cover bolts (433-436) into the locations noted.

Tighten:

- Tighten the M 6 size bolts (434, 436) to 12 N.m (106 lb in).
- Tighten the M 8 size bolts (435) to 25 N.m (18 lb ft).
- Tighten the M 6 size bolts (433) to 12 N.m (106 lb in) using **J44538** . See **Special Tools**.

MANUAL VALVE LINK AND OIL DAM ASSEMBLE**Assembly Procedure****Fig. 282: View Of Oil Dam**

Courtesy of GENERAL MOTORS CORP.

1. Install the oil dam (27) into the case.
2. Assemble the manual valve link onto the manual shift detent lever/IMS detent lever.

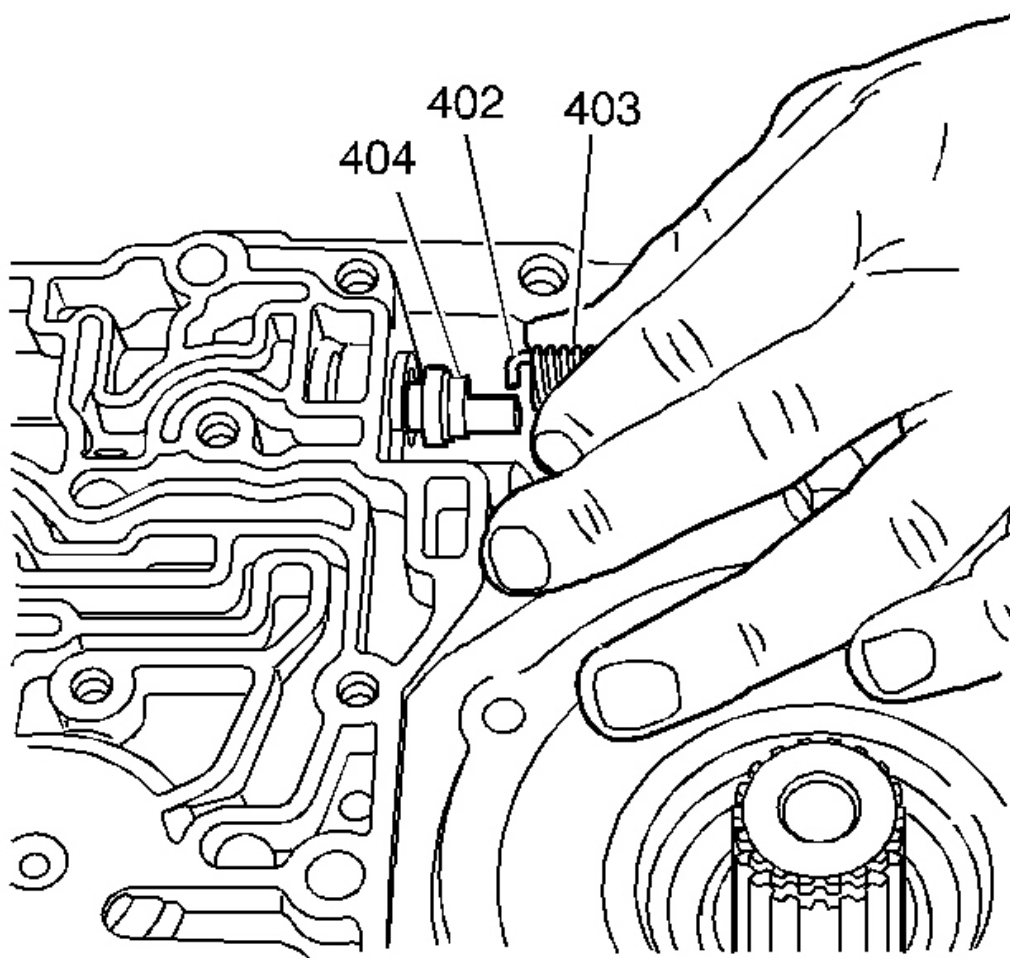


Fig. 283: Connecting Manual Valve Link To Manual Valve
Courtesy of GENERAL MOTORS CORP.

3. Connect the manual valve link (402) to the manual valve (404).
4. Install the manual valve link spring (403).

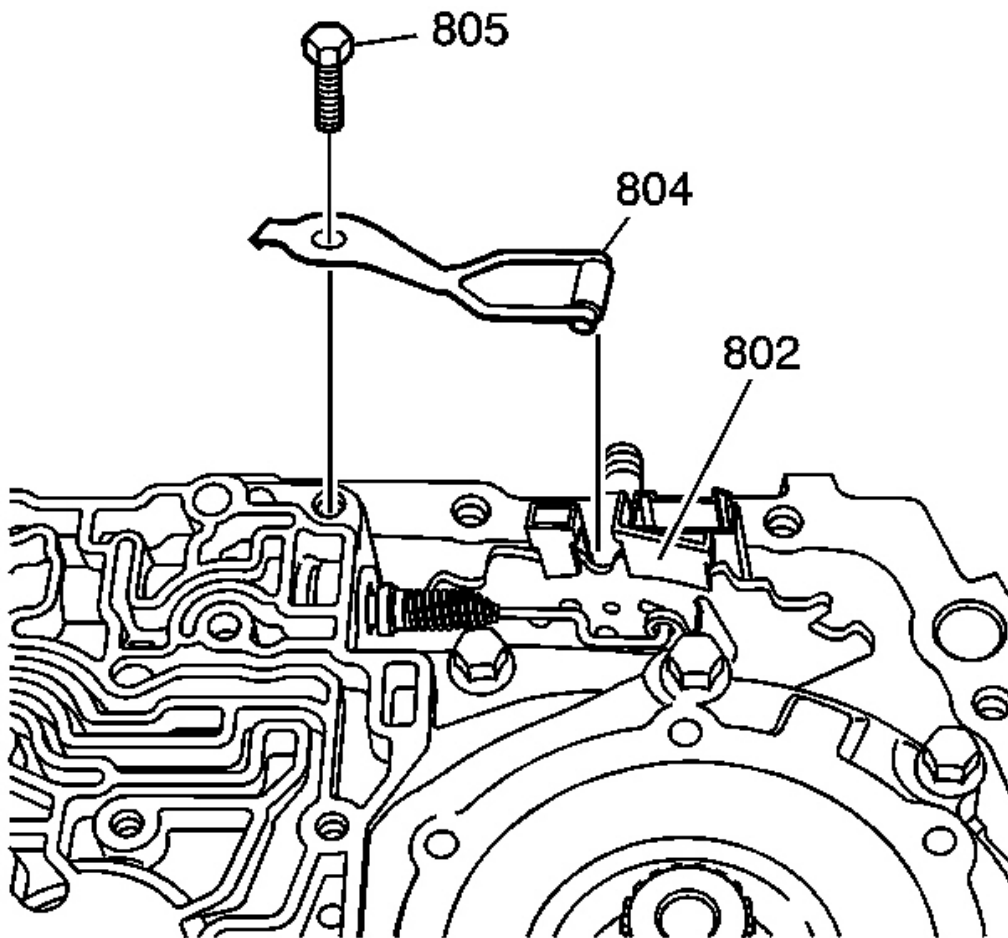


Fig. 284: Locating Manual Shift Detent Assembly
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

5. Install the manual shift detent assembly (804) and the manual shift detent bolt (805).

Tighten: Tighten the bolt to 12 N.m (106 lb in).

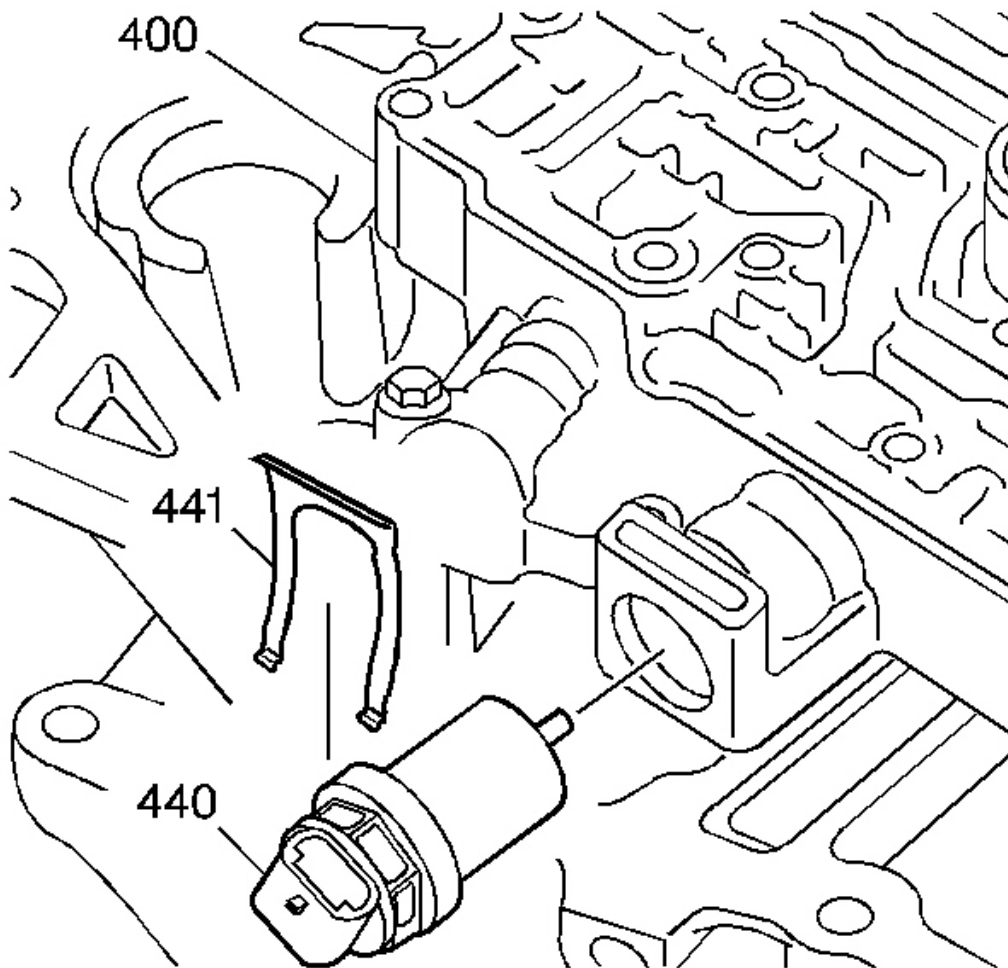


Fig. 285: View Of Input Speed Sensor
Courtesy of GENERAL MOTORS CORP.

6. Carefully install the input speed sensor (440) into the case cover (400).
7. Install the input speed sensor clip (441) into the case cover (400).

DIFFERENTIAL CARRIER END PLAY CHECK (FWD ONLY)

Tools Required

- **J 8001** Dial Indicator Set

- J 25025-8 Dial Indicator Mounting Post. See **Special Tools**.
- J 26958-10A Adapter Plug
- J 28585 Snap Ring Remover

Checking Procedure

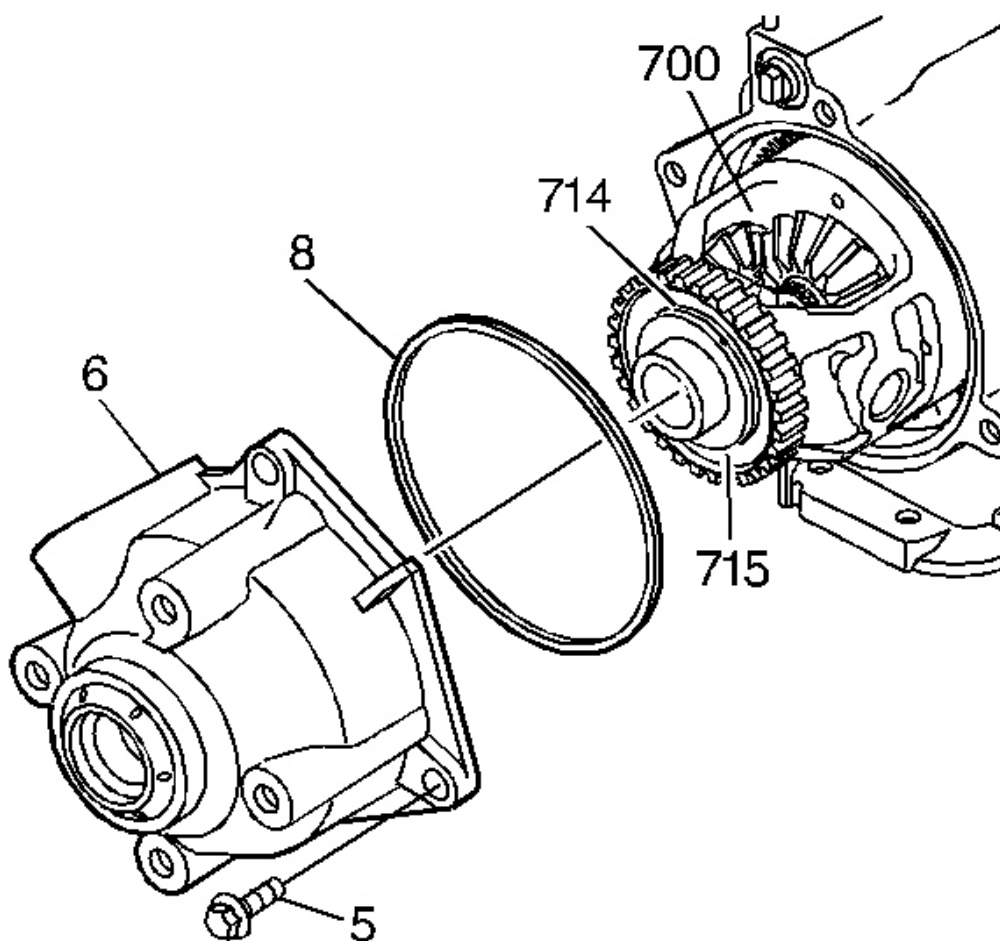


Fig. 286: View Of Case Extension Assembly & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Make sure that the differential carrier/case thrust washer (714) and the thrust bearing (715) are still on the differential/final drive carrier assembly (700).

2. Install the case extension seal (8) onto the case extension (6).
3. Install the case extension assembly (6) onto the transmission (3).

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

4. Install only two of the four case extension bolts (5).

Tighten: Do not torque the bolts. Tighten them only until the case extension is fully seated.

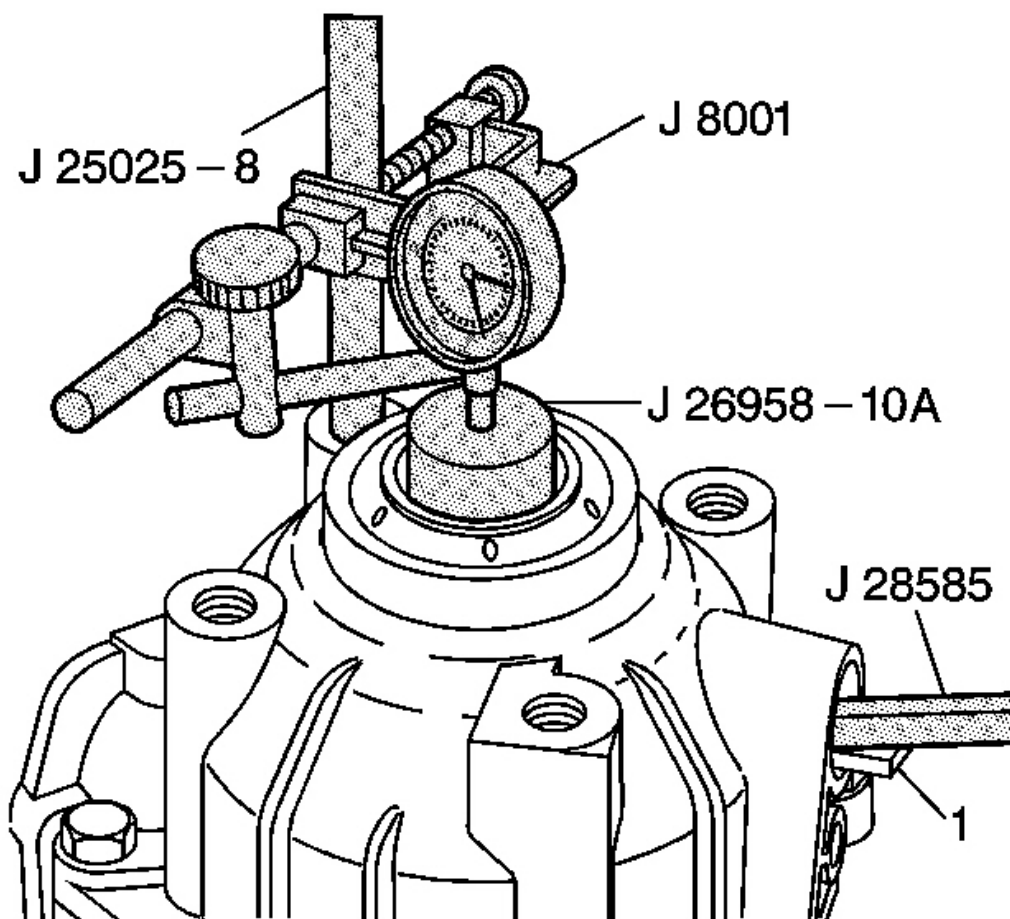


Fig. 287: Installing J 25025-8, J 26958-10A & J 8001 To Transmission Case
Courtesy of GENERAL MOTORS CORP.

5. Position the transmission so that the case extension is facing upward.
6. Install **J 25025-8** , **J 26958-10A** and **J 8001** . See **Special Tools**.
7. Set the dial indicator to zero.

NOTE: Use a piece of wood or rubber while prying with **J 28585** or a large screwdriver, to prevent damage to VSS bore.

8. Use **J 28585** or a large screwdriver in order to lift the differential/final drive carrier assembly. Pry up on the vehicle speed sensor reluctor wheel through the vehicle speed sensor hole in the case extension.

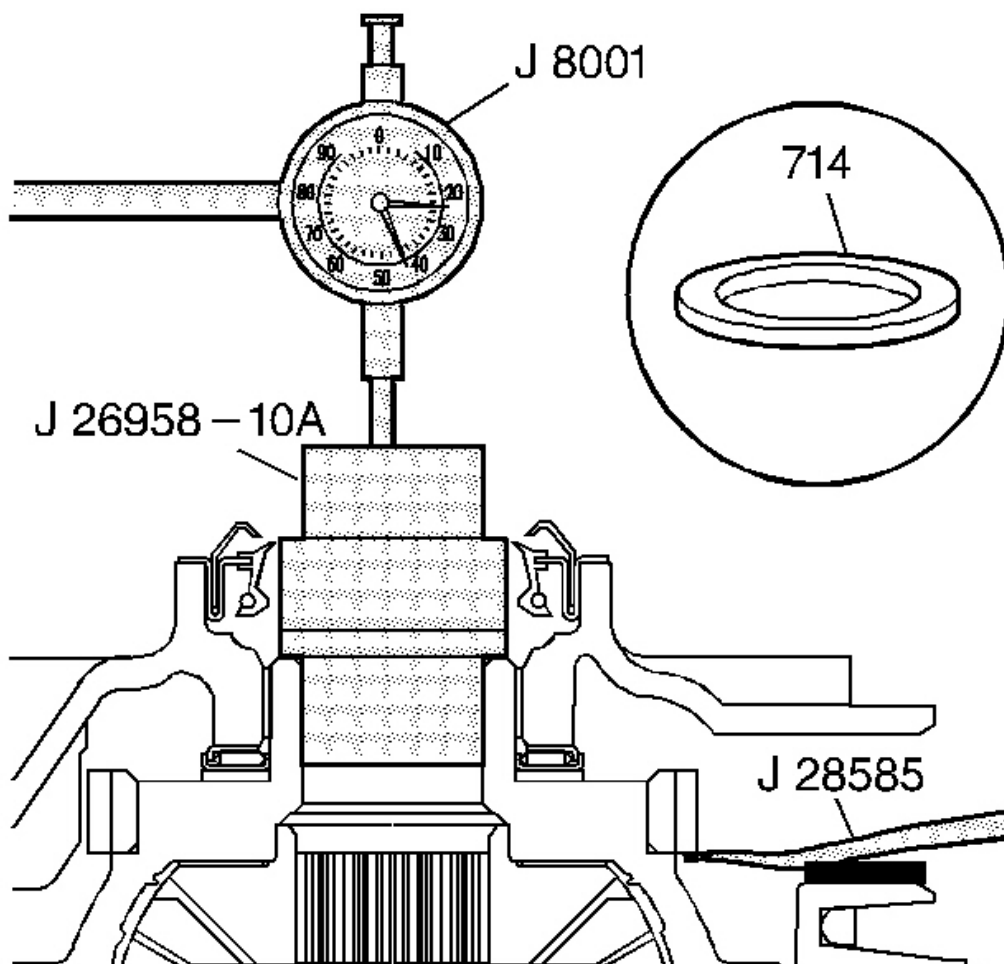


Fig. 288: Measuring Differential Carrier/Case Thrust Washer
Courtesy of GENERAL MOTORS CORP.

9. Note the dial indicator reading before changing the differential carrier/case thrust washer (714):
 - If the dial indicator reading is less than 0.12 mm (0.005 in), install the next smaller size thrust washer, then recheck.
 - If the dial indicator reading is greater than 0.62 mm (0.025 in), install the next larger size thrust washer, then recheck.
 - If the dial indicator reading is 0.12-0.62 mm (0.005-0.025 in), the thrust washer is correct.
10. Remove **J 8001** and **J 25025-8** . See **Special Tools**.
11. Install the case extension bolts (5).

Tighten: Tighten the case extension bolts to 36 N.m (26 lb ft).

DRIVE SHAFT OIL SEAL DISASSEMBLE - RIGHT SIDE (FWD ONLY)

Tools Required

- **J 23129** Seal Remover
- **J 6125-1B** Slide Hammer

Disassembly Procedure

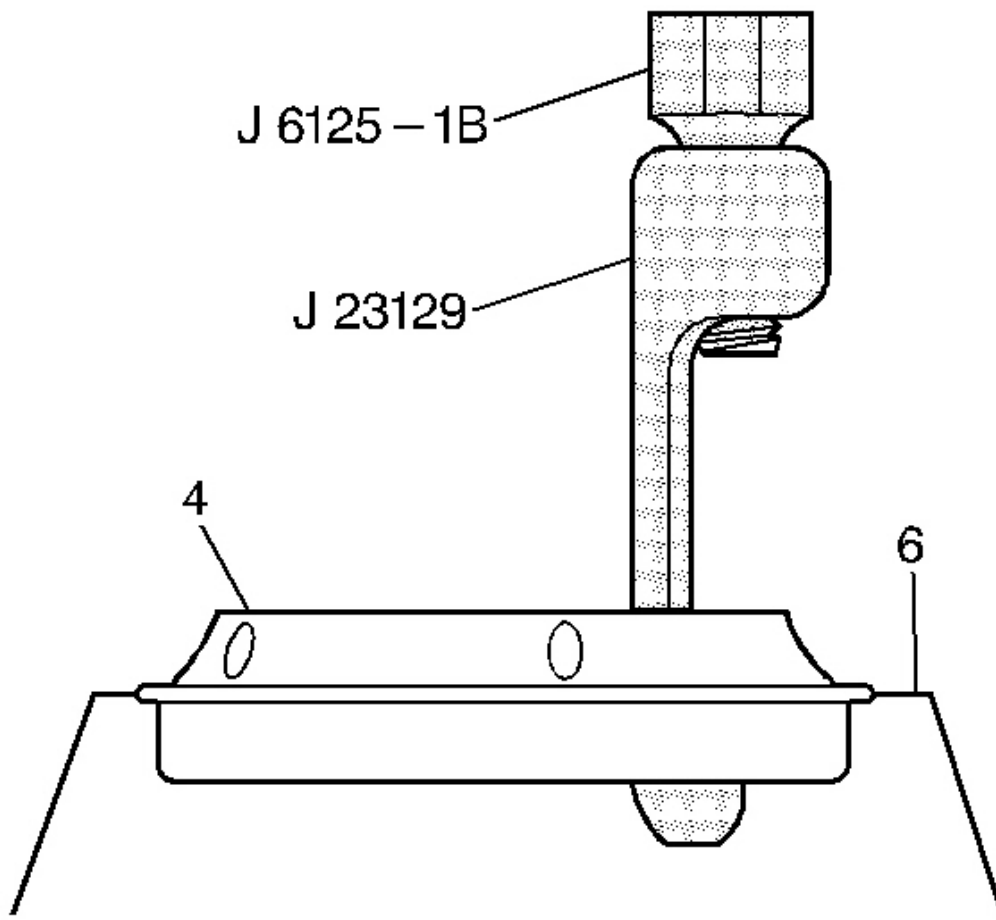


Fig. 289: Removing Right Front Wheel Drive Shaft Oil Seal
Courtesy of GENERAL MOTORS CORP.

Use **J 23129** and **J 6125-1B** in order to remove the axle oil seal assembly (4) from the case extension assembly (6).

DRIVE SHAFT OIL SEAL ASSEMBLE - RIGHT SIDE (FWD ONLY)

Tools Required

- **J 29130** Axle Seal Installer. See **Special Tools**.
- **J 8092** Driver Handle

Assembly Procedure

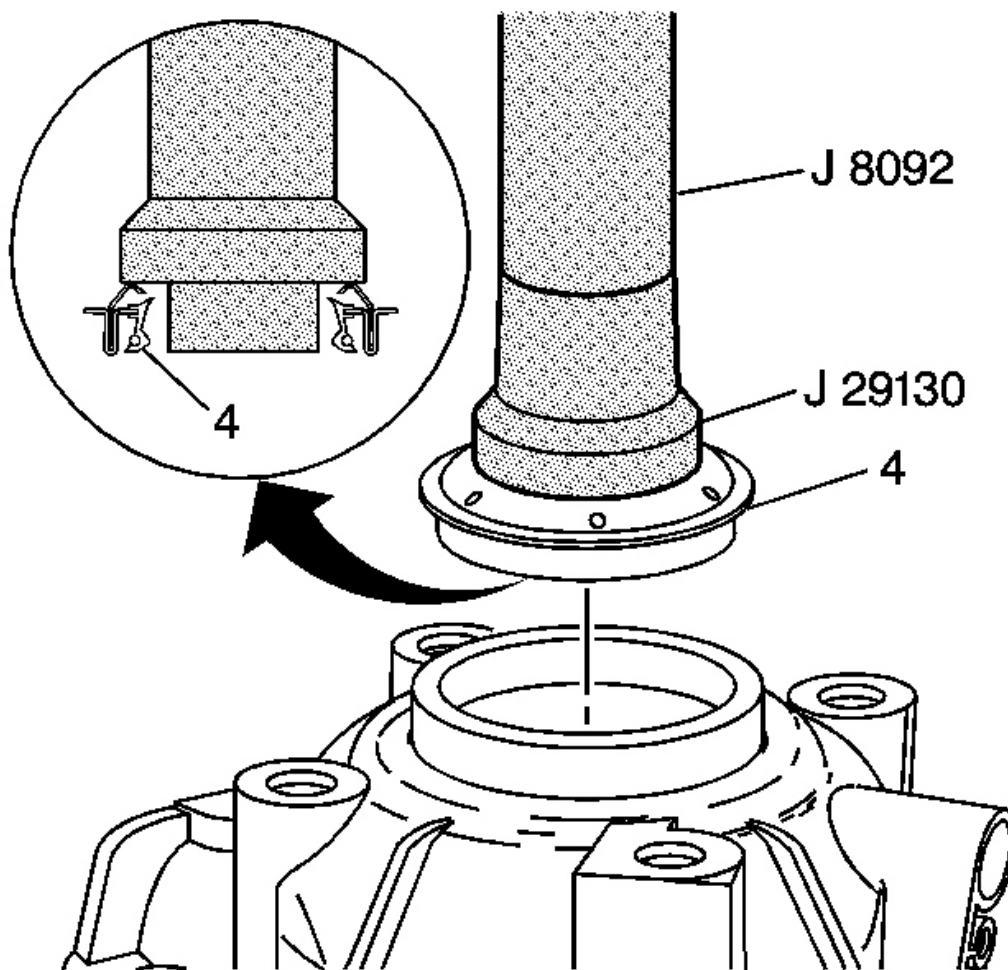


Fig. 290: Installing Axle Oil Seal With J 29130 & J 8092
Courtesy of GENERAL MOTORS CORP.

NOTE: Install the seal onto the tool before installing into the case to prevent damage to the seal.

IMPORTANT: Inspect the axle oil seal assembly (4). Be sure that the seal was not damaged during assembly. Check that the garter spring was not dislodged.

Use **J 29130** and **J 8092** in order to install the axle oil seal assembly (4) on the case extension assembly.

VEHICLE SPEED SENSOR ASSEMBLY (FWD ONLY)

Assembly Procedure

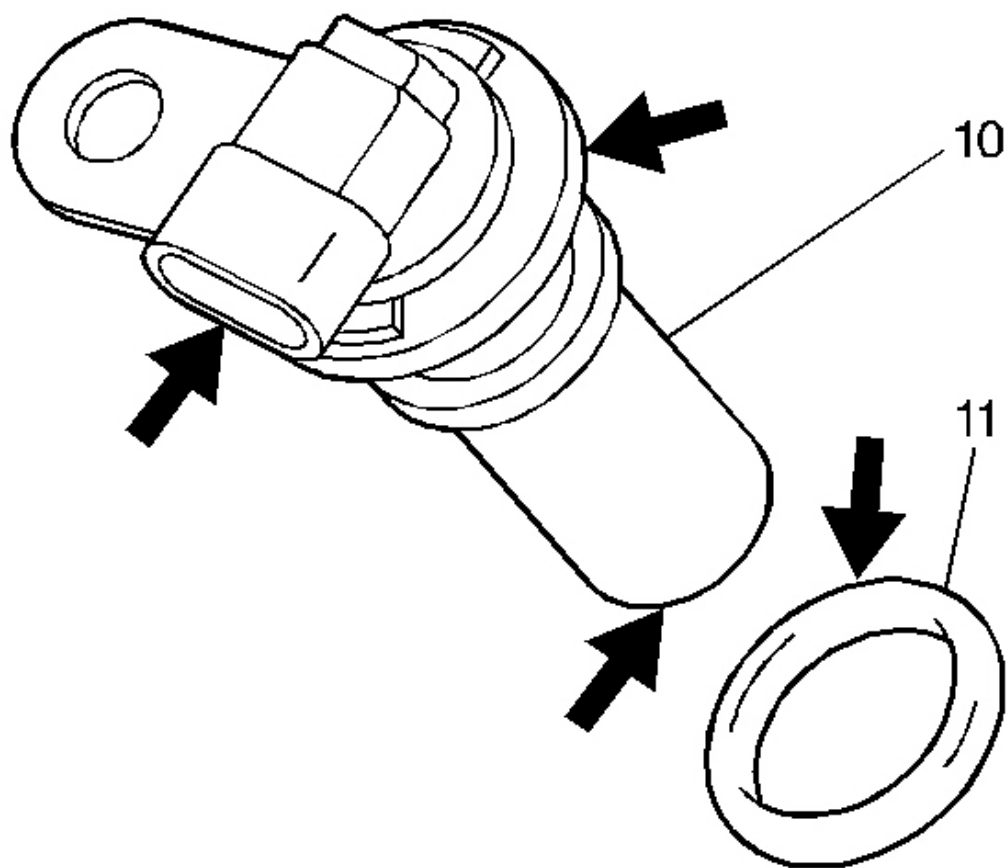


Fig. 291: View Of VSS & O-Ring
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Handle the vehicle speed sensor assembly carefully.

1. Inspect the vehicle speed sensor assembly (10) and the vehicle speed sensor O-ring seal (11) for the following conditions:

- Damaged connector
- Cracked housing
- Signs of rotor damage
- Cuts or nicks on the O-ring seal

2. Install a new O-ring seal (11) on the vehicle speed sensor assembly (10).

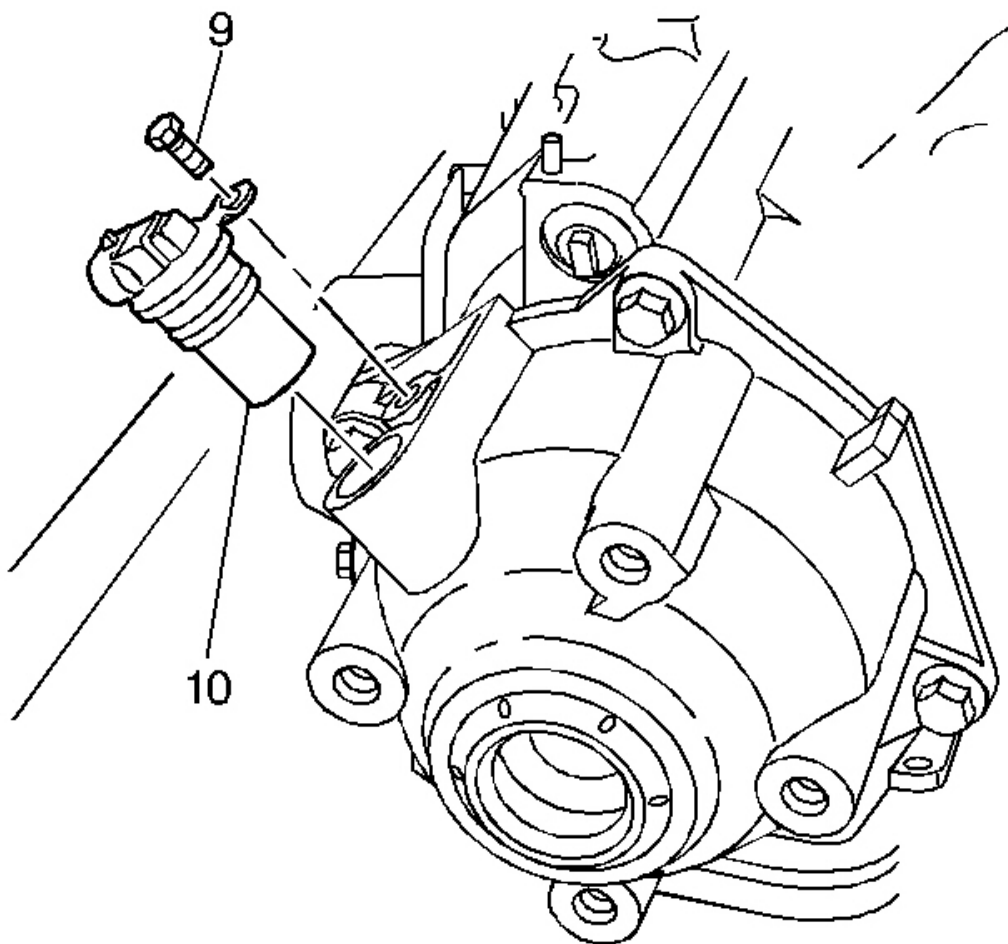


Fig. 292: Identifying Vehicle Speed Sensor (VSS)
Courtesy of GENERAL MOTORS CORP.

3. Install the vehicle speed sensor assembly (10) into the case extension.

NOTE: Refer to **FASTENER NOTICE** in Cautions and Notices.

4. Install the vehicle speed sensor bolt (9).

Tighten: Tighten the bolt to 12 N.m (106 lb in).

CONTROL VALVE BODY CLEAN

Cleaning Procedure

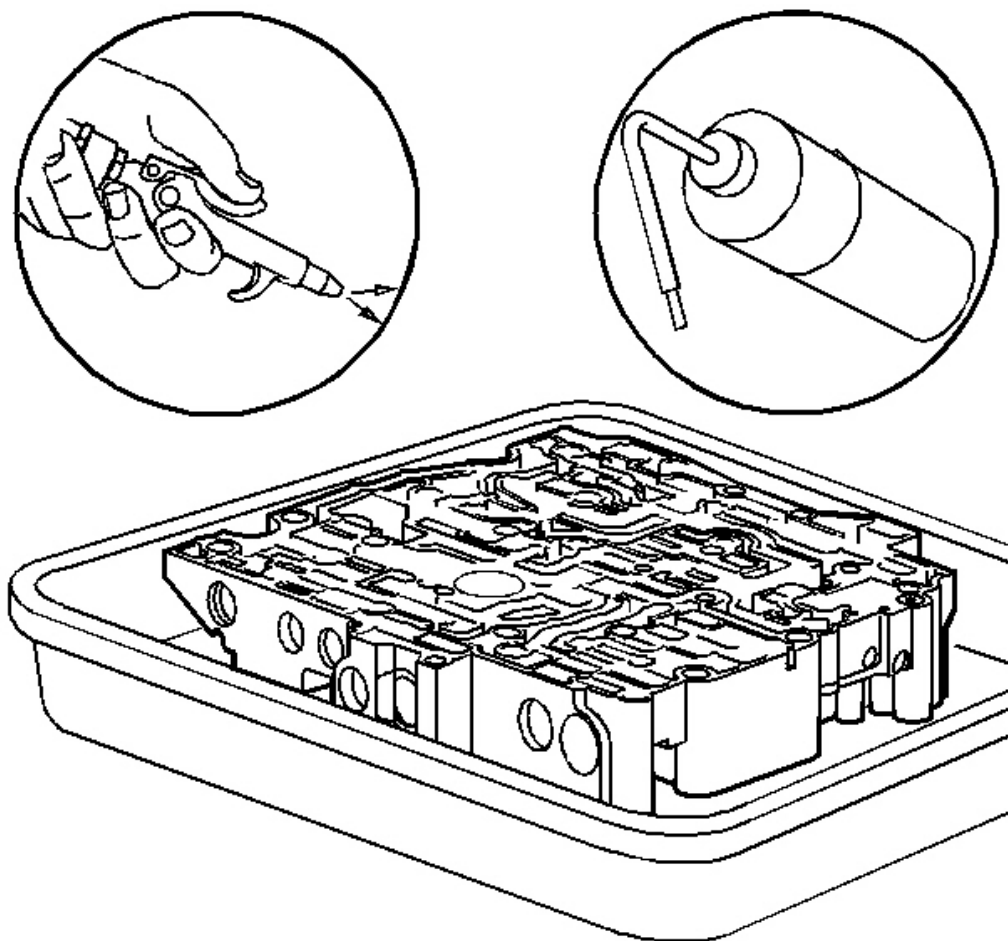


Fig. 293: Blowing Air In Control Valve Body
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not use solvent in order to clean the solenoid valves or the neoprene seals.

1. Clean the control valve body thoroughly in clean solvent.

IMPORTANT: In the following steps, handle the parts carefully in order to avoid nicks and scratches.

2. Move the valves with a pick or a small screwdriver in order to dislodge any dirt or debris.
3. Use an air nozzle in order to dry the control valve body and to blow out all of the passages.
4. Gently probe the small passages with a piece of identification tag wire or the equivalent.

CONTROL VALVE BODY INSPECTION

Inspection Procedure

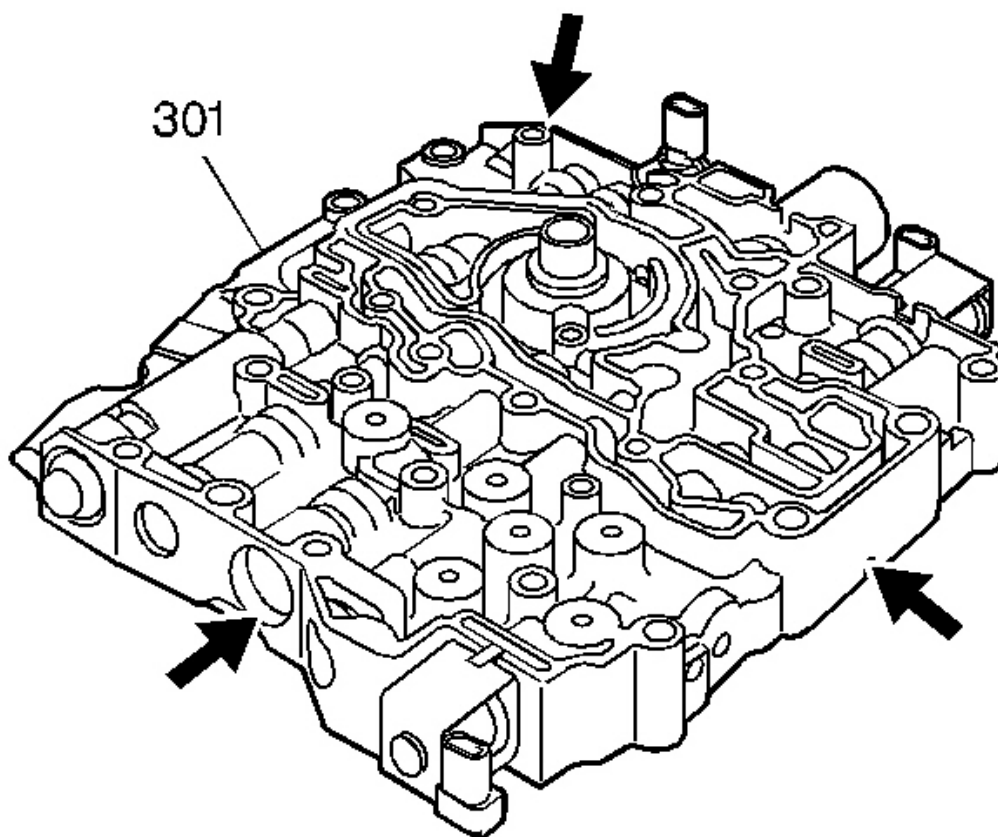


Fig. 294: Identifying Control Valve Body Inspection Points
Courtesy of GENERAL MOTORS CORP.

1. Inspect the control valve body (301) for the following conditions:
 - Worn or damaged oil pump drive shaft bearing journal (not serviceable separately from the control valve body)
 - Damaged or porous casting
 - Damaged sealing surfaces
 - Debris in fluid passages

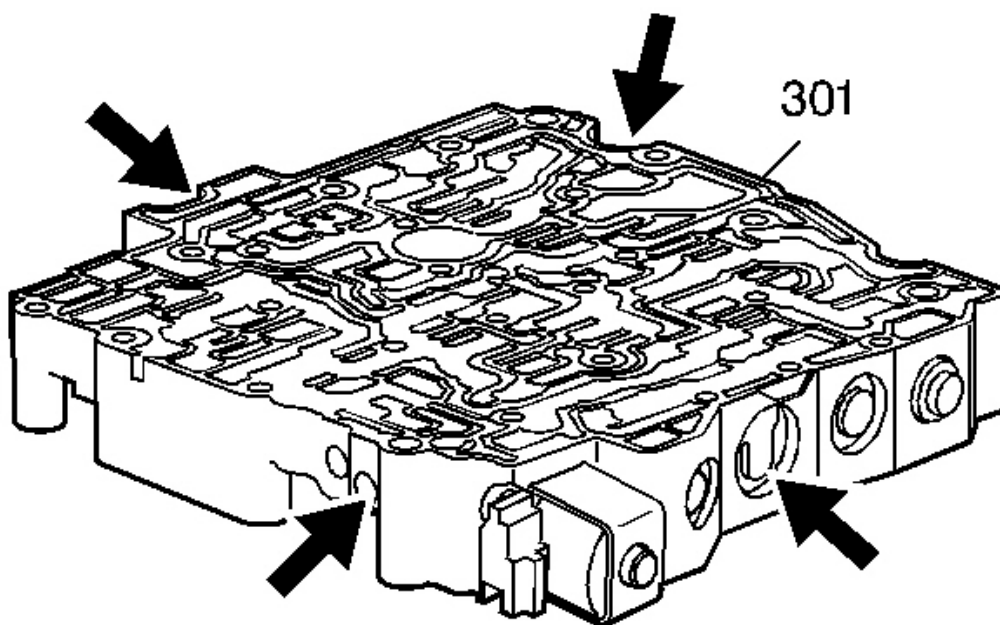


Fig. 295: Inspection Areas Of Control Valve Body
Courtesy of GENERAL MOTORS CORP.

2. Use a small pick or screwdriver. Before disassembly, inspect the control valve body (301) components for the following conditions:
 - Valves binding or sticking in their bores or bushings
 - Broken, missing or damaged springs
 - Missing or damaged retainers
 - Damaged solenoid valves
 - Debris in valve line-ups or solenoid valves

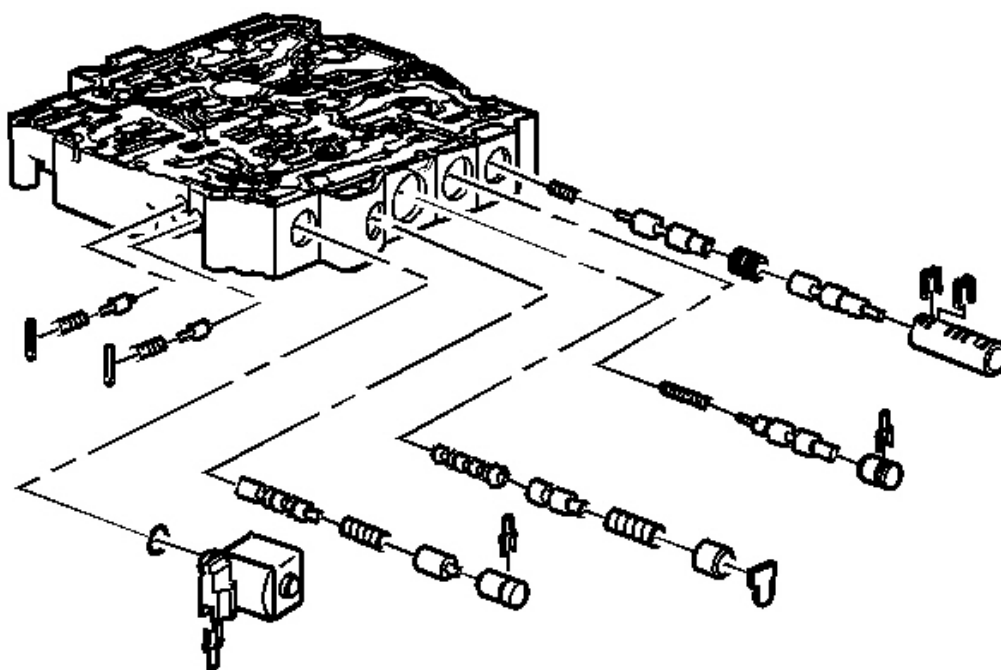


Fig. 296: Expanded View Of Control Valve Body
Courtesy of GENERAL MOTORS CORP.

3. During disassembly, inspect the control valve body for the following conditions:
 - Worn or damaged valves, valve bores or bushings
 - Broken, missing or damaged springs
 - Missing or damaged retainers
 - Damaged solenoid valves
 - Debris in valve line-ups or solenoid valves

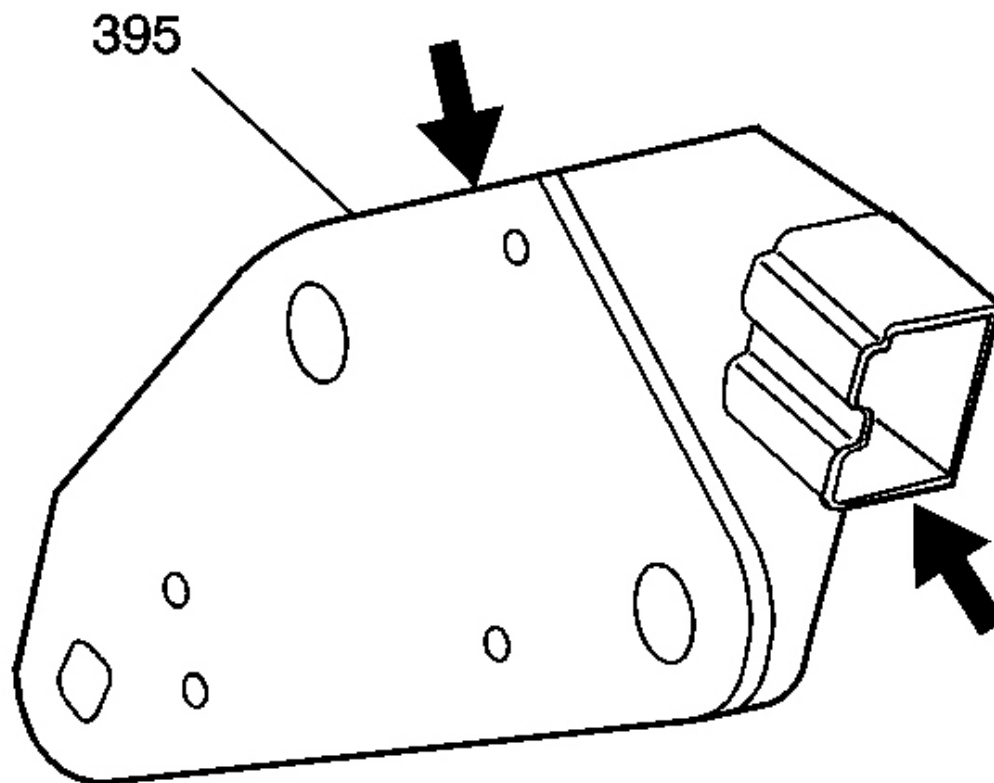


Fig. 297: View Of Transmission Fluid Pressure (TFP) Manual Valve Position Switch Assembly

Courtesy of GENERAL MOTORS CORP.

4. Inspect the transmission fluid pressure (TFP) manual valve position switch assembly (395) for the following conditions:
 - Damaged electrical connector terminals
 - Damaged seals
 - Damaged switch membranes
 - Debris on the switch membranes

CONTROL VALVE BODY DISASSEMBLE (WITHOUT TOUCH ACTIVATED POWER)

Disassembly Procedure

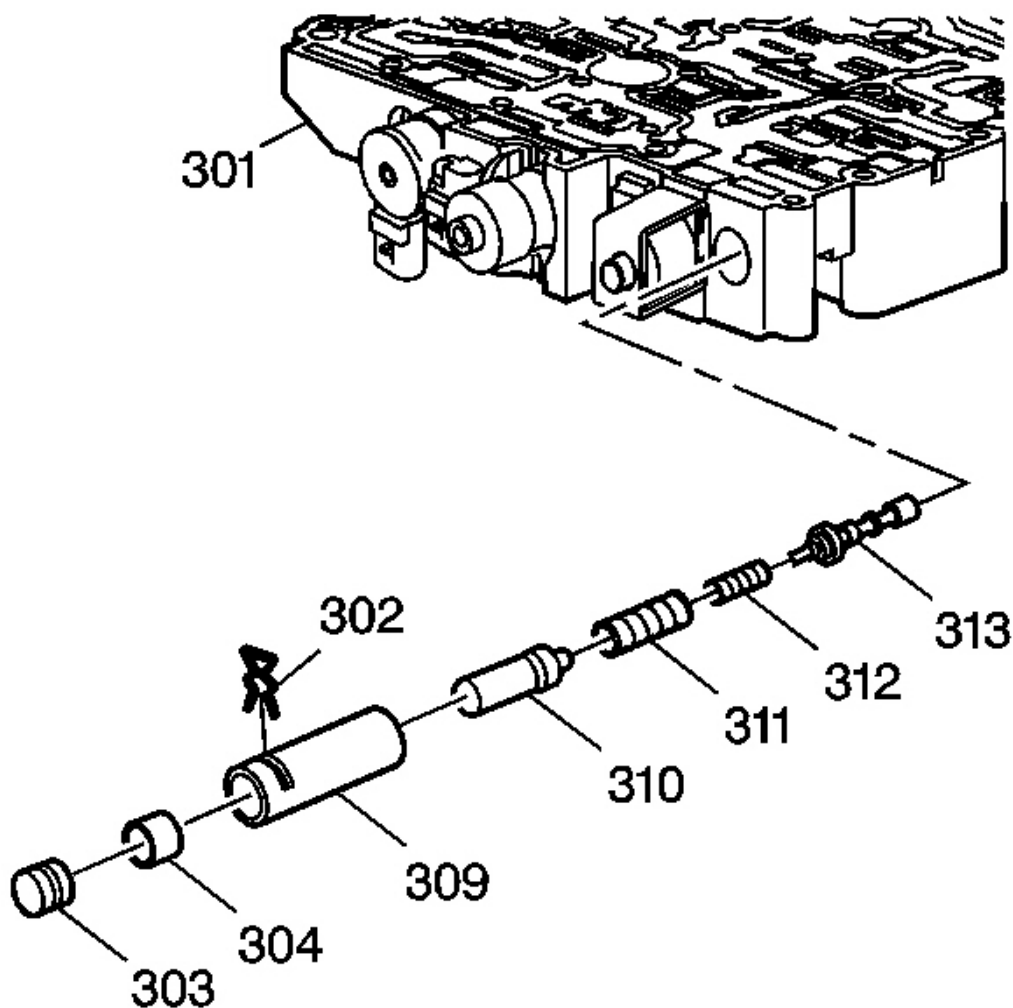


Fig. 298: View Of Reverse Boost Valve Bushing Assembly Components
Courtesy of GENERAL MOTORS CORP.

CAUTION: Valve Springs can be tightly compressed. Use care when removing retainers and plugs. Personal injury could result.

IMPORTANT: Position the control valve body assembly on a clean surface during disassembly.

IMPORTANT: All valves, springs and bushings must be laid out on a clean surface. Lay them exactly the way they are removed to aid reassembly.

1. Using a small screwdriver or pick, remove the line boost valve and bushing retainer (302) from the control valve body (301).
2. Remove the line boost valve bore plug (303), line boost valve (304), reverse boost valve bushing (309), reverse boost valve (310), pressure regulator valve outer and inner springs (311, 312) and pressure regulator valve (313) from the control valve body (301).

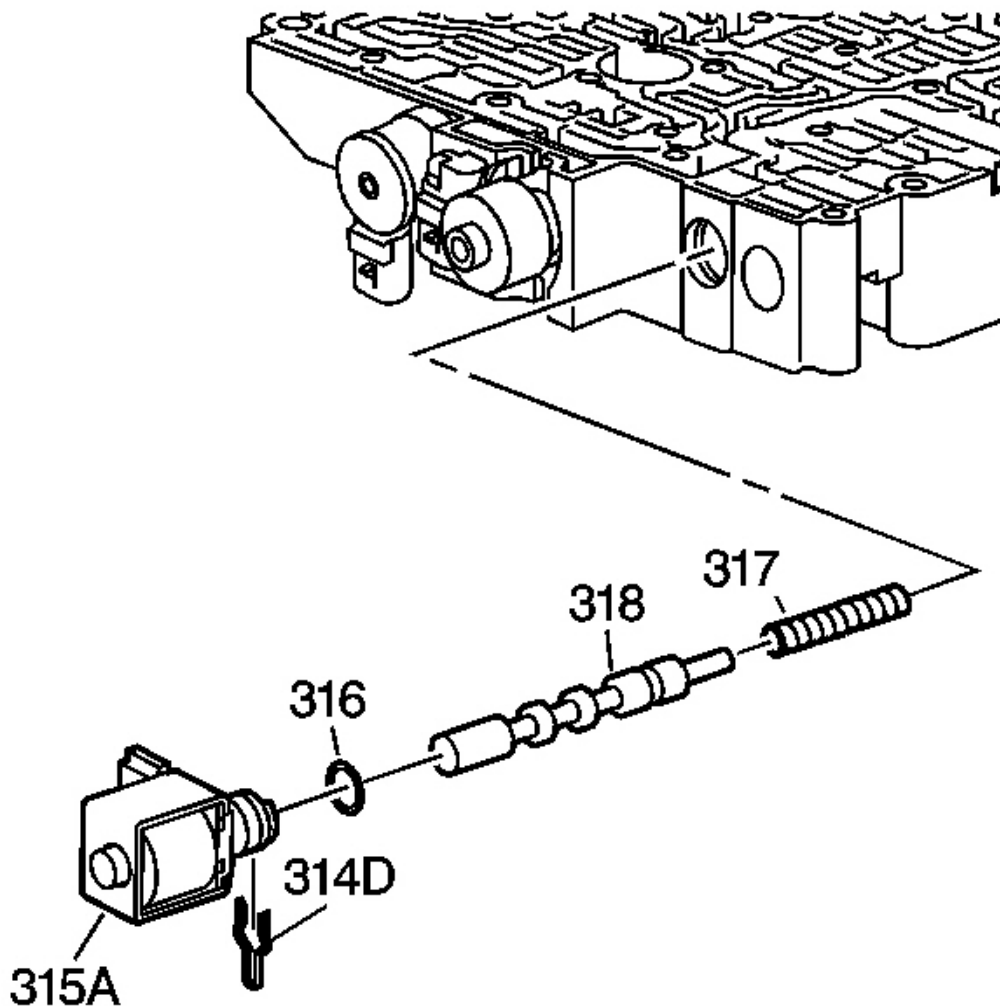


Fig. 299: Identifying 1-2, 3-4 Shift Solenoid (SS) Valve Components
Courtesy of GENERAL MOTORS CORP.

3. Using a small screwdriver or pick, remove the 1-2, 3-4 shift solenoid valve retainer (314D) from the control valve body (301).
4. Remove the 1-2, 3-4 shift solenoid (SS) valve (315A), 1-2 shift valve (318) and 1-2 shift valve spring (317) from the control valve body (301).
5. Remove the O-ring seal (316) from the 1-2, 3-4 SS valve (315A) ONLY if it is damaged.

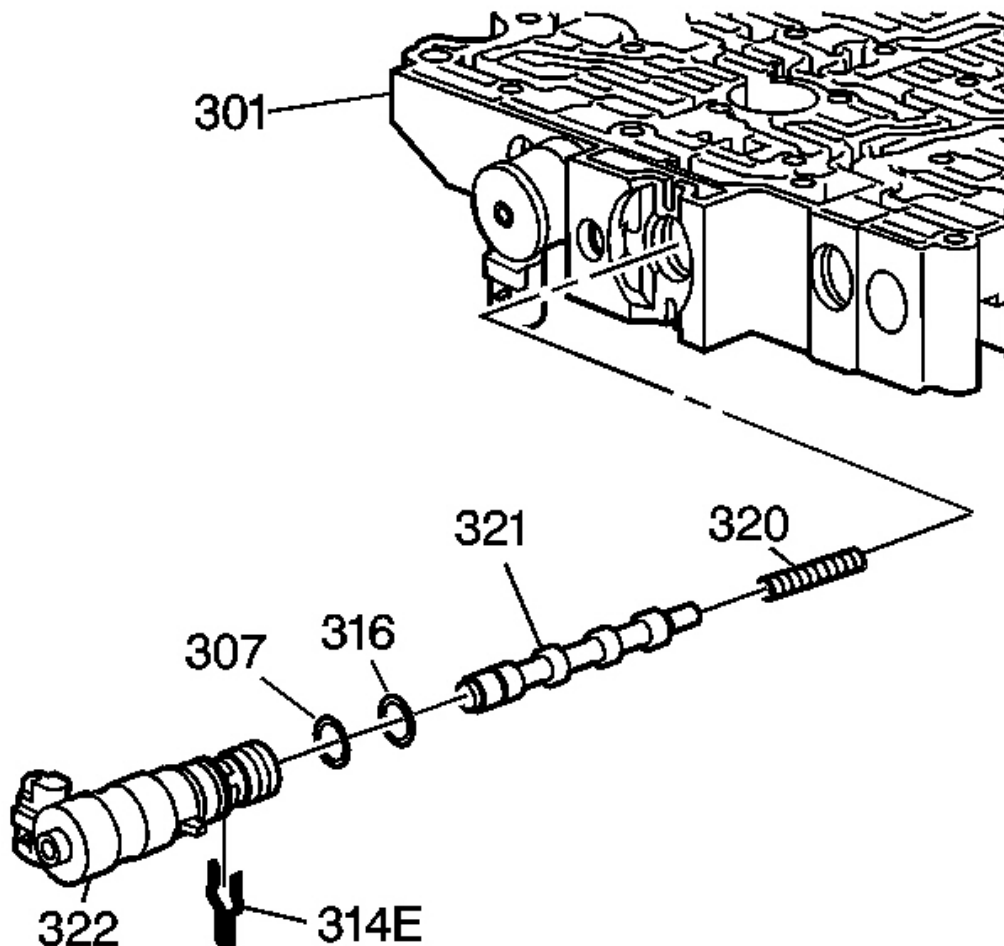


Fig. 300: View Of PC Solenoid Valve & Torque Signal Regulator Valve
Courtesy of GENERAL MOTORS CORP.

6. Using a small screwdriver or pick, remove the pressure control solenoid valve retainer (314E) from the control valve body (301).
7. Remove the pressure control (PC) solenoid valve (322), torque signal regulator valve (321) and torque signal regulator valve spring (320) from the control valve body (301).
8. Remove the O-ring seals (307, 316) from the PC solenoid valve (322) ONLY if they are damaged.

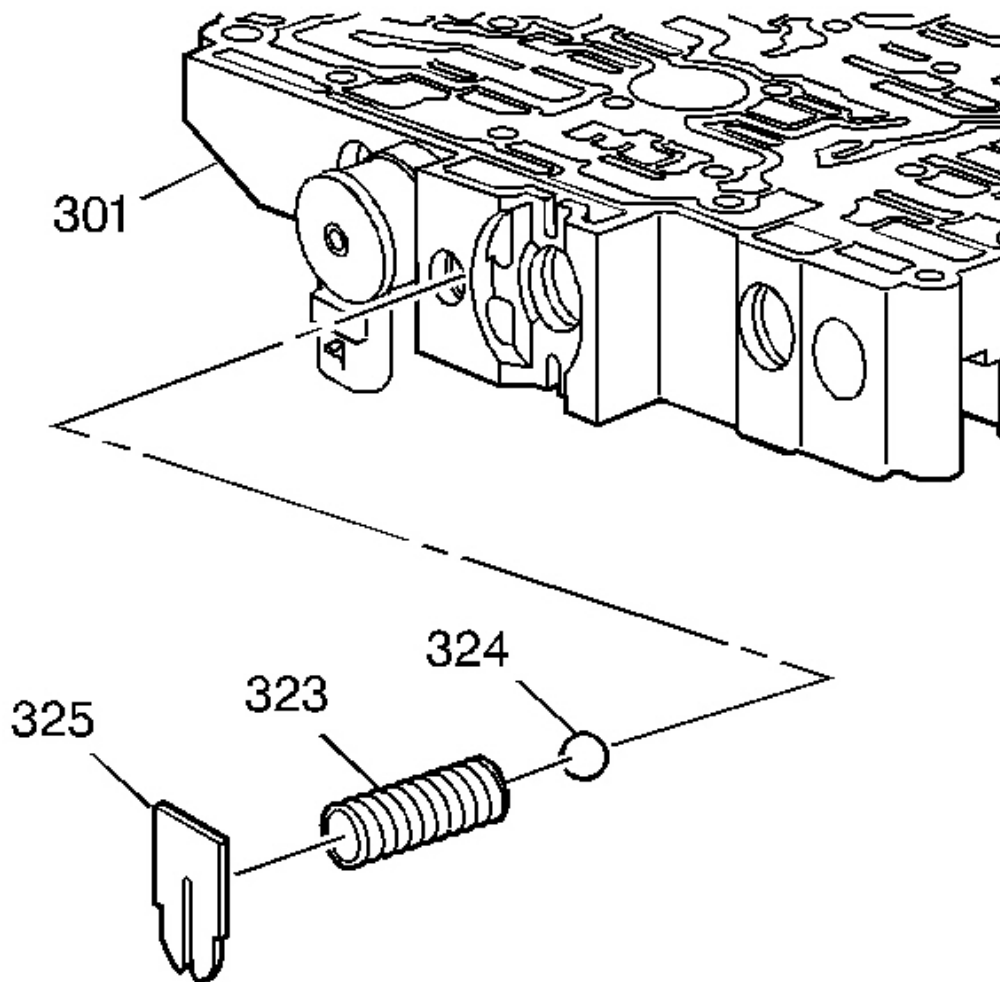


Fig. 301: Locating Line Pressure Relief Valve Assembly
Courtesy of GENERAL MOTORS CORP.

9. Using a small screwdriver or pick, remove the line pressure relief valve spring retainer (325) from the control valve body (301).
10. Remove the line pressure relief valve spring (323) and the line pressure relief valve (324) from the control valve body (301).

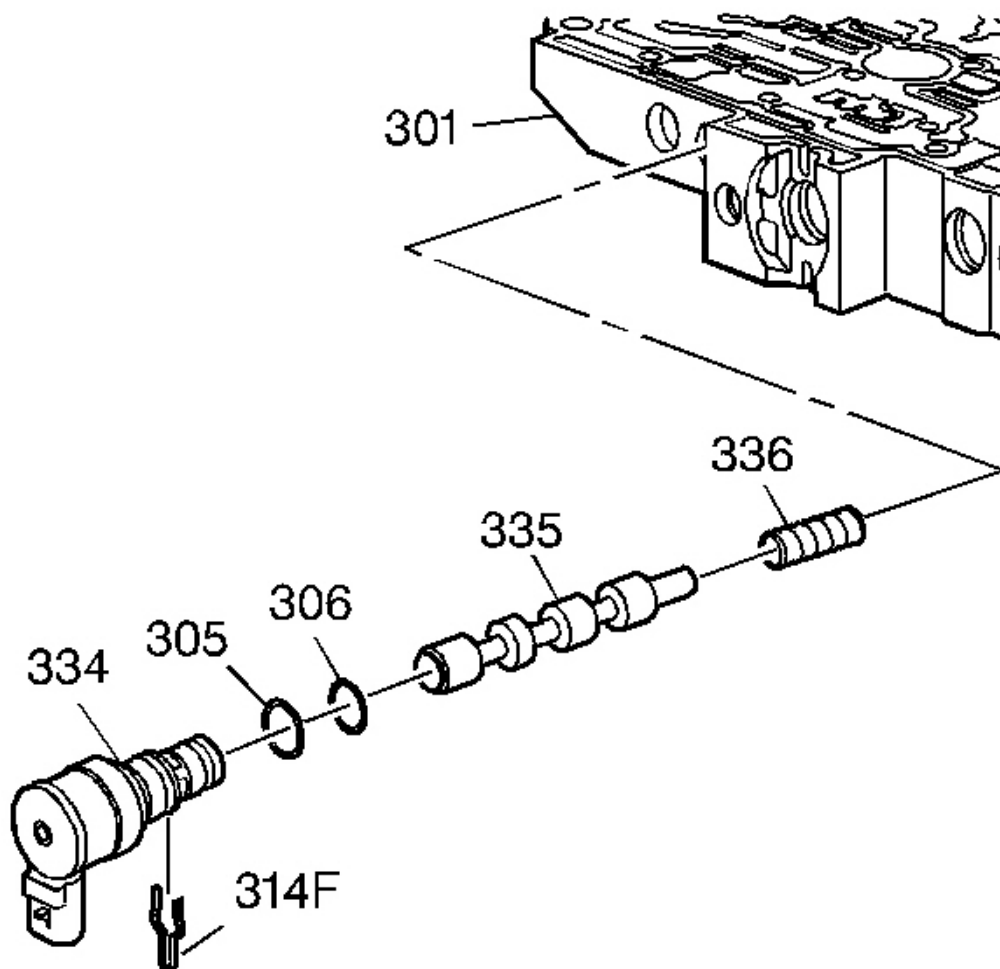


Fig. 302: View Of TCC PWM Solenoid
Courtesy of GENERAL MOTORS CORP.

11. Using a small screwdriver or pick, remove the TCC PWM solenoid valve retainer (314F) from the control valve body (301).

12. Remove the TCC PWM solenoid valve (334), TCC control valve (335) and TCC control valve spring (336) from the control valve body (301).
13. Remove the O-ring seals (305, 306) from the TCC PWM solenoid valve (334) ONLY if they are damaged.

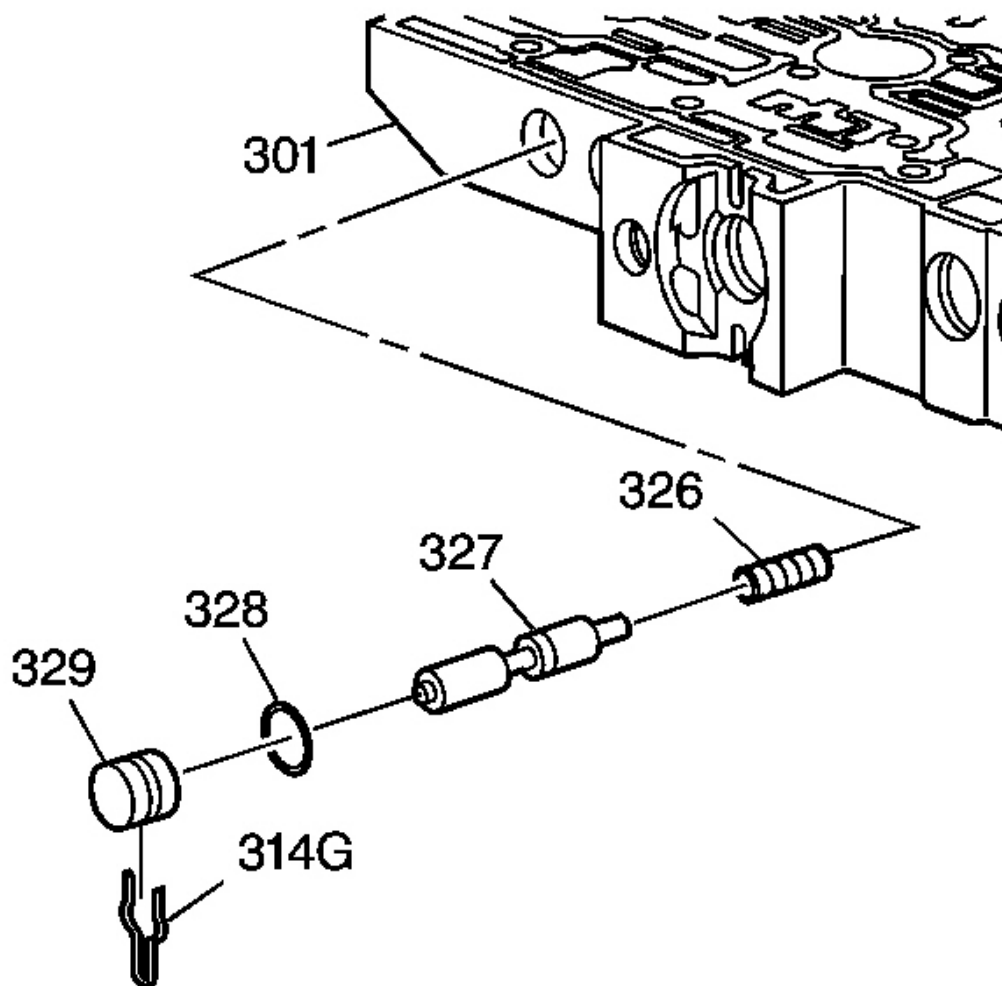


Fig. 303: Identifying TCC Regulator Apply Valve
Courtesy of GENERAL MOTORS CORP.

14. Using a small screwdriver or pick, remove the TCC regulator apply valve bore plug retainer (314G) from the control valve body (301).

15. Remove the TCC regulator apply valve bore plug (329), O-ring seal (328), TCC regulator apply valve (327) and TCC regulator apply valve spring (326) from the control valve body (301).

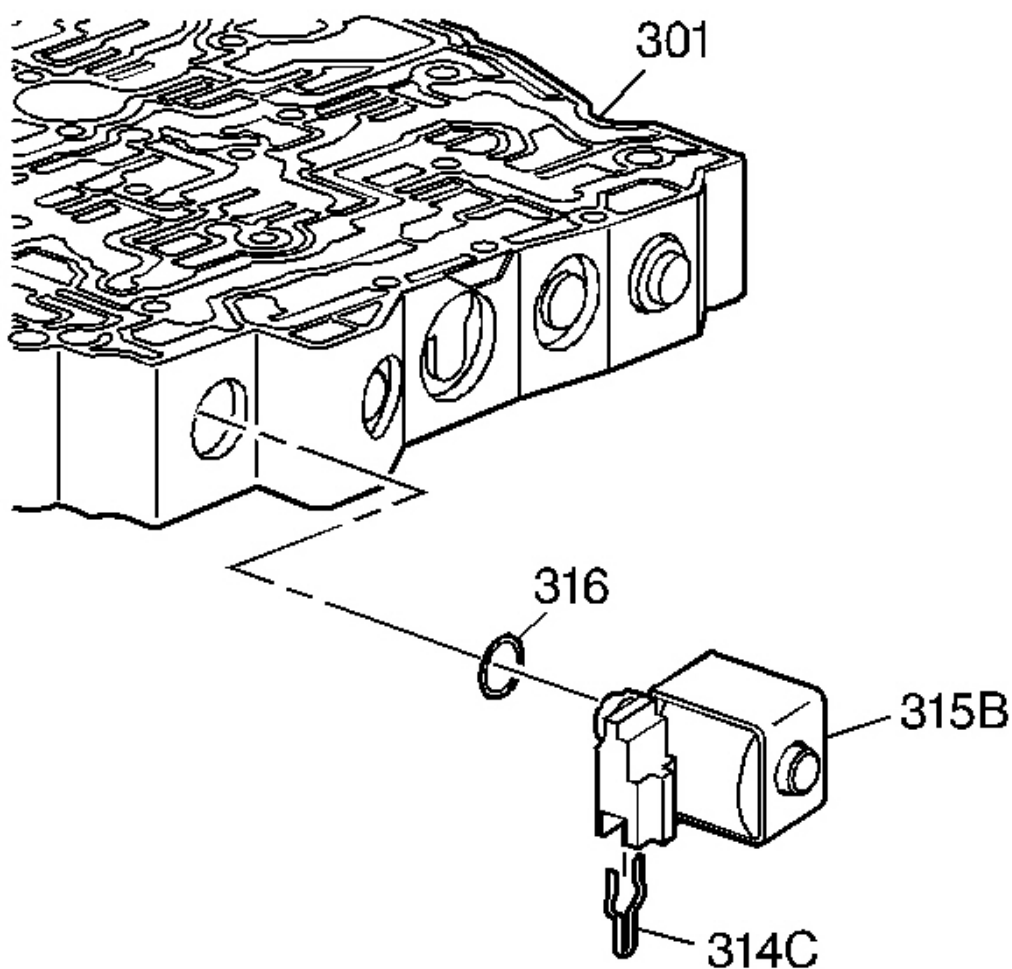


Fig. 304: View Of 2-3 Shift Solenoid & O-Ring
Courtesy of GENERAL MOTORS CORP.

16. Using a small screwdriver or pick, remove the 2-3 shift solenoid valve retainer (314C) from the control valve body (301).
17. Remove the 2-3 shift solenoid (SS) valve (315B) from the control valve body (301).
18. Remove the O-ring seal (316) from the 2-3 SS valve (315B) ONLY if it is damaged.

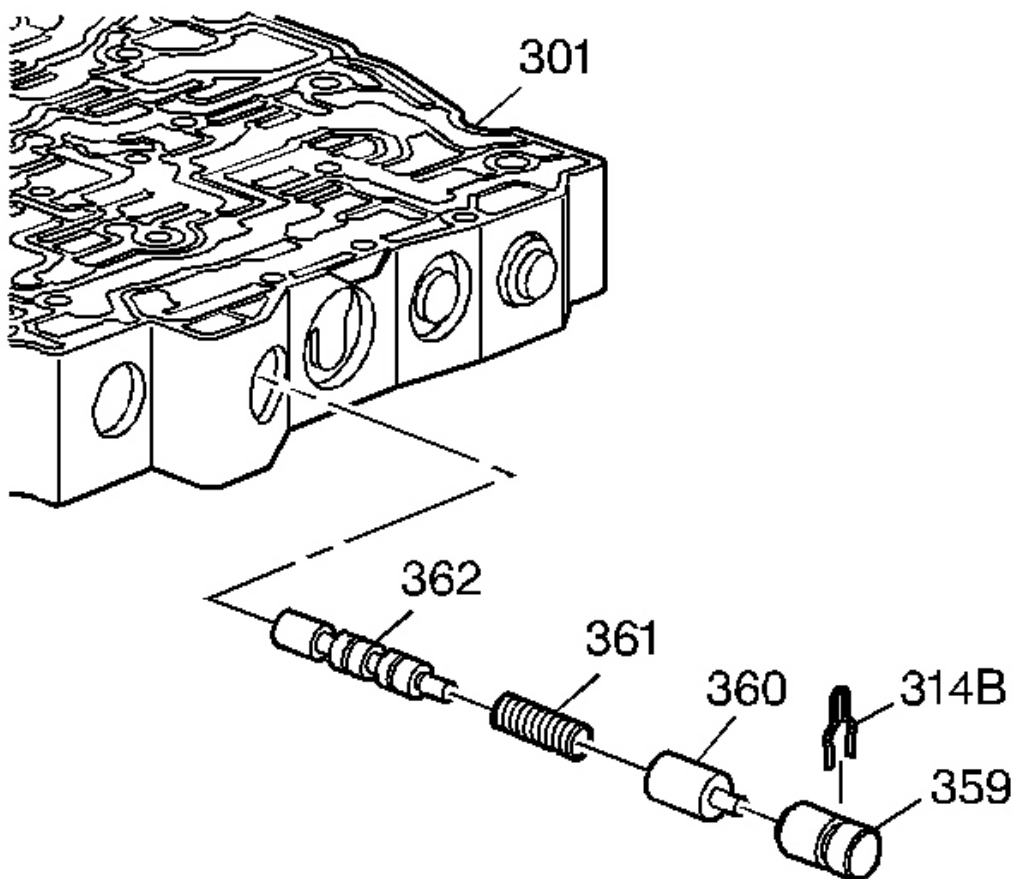


Fig. 305: View Of 3-4 Shift Valve & 4-3 Manual Downshift Valve Components
Courtesy of GENERAL MOTORS CORP.

19. Using a small screwdriver or pick, remove the 4-3 manual downshift valve retainer (314B) from the control valve body (301).
20. Remove the 4-3 manual downshift valve bore plug (359), 4-3 manual downshift valve (360), 4-3 manual downshift valve spring (361) and 3-4 shift valve (362) from the control valve body (301).

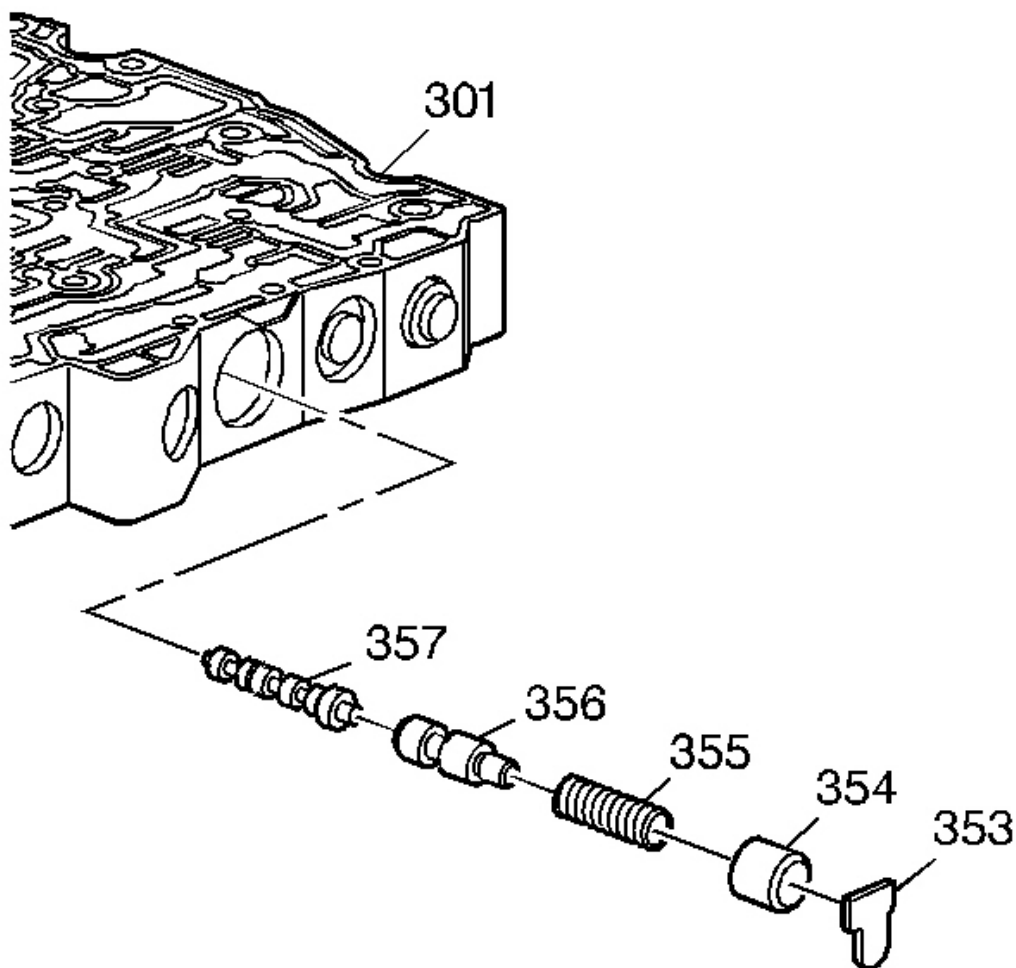


Fig. 306: Identifying 3-2 Manual Downshift Valve & 2-3 Shift Valve
Courtesy of GENERAL MOTORS CORP.

21. Using a small screwdriver or pick, remove the 3-2 manual downshift valve retainer (353) from the control valve body (301).
22. Remove the 3-2 manual downshift valve bore plug (354), 3-2 manual downshift valve spring (355), 3-2 manual downshift valve (356) and 2-3 shift valve (357) from the control valve body (301).

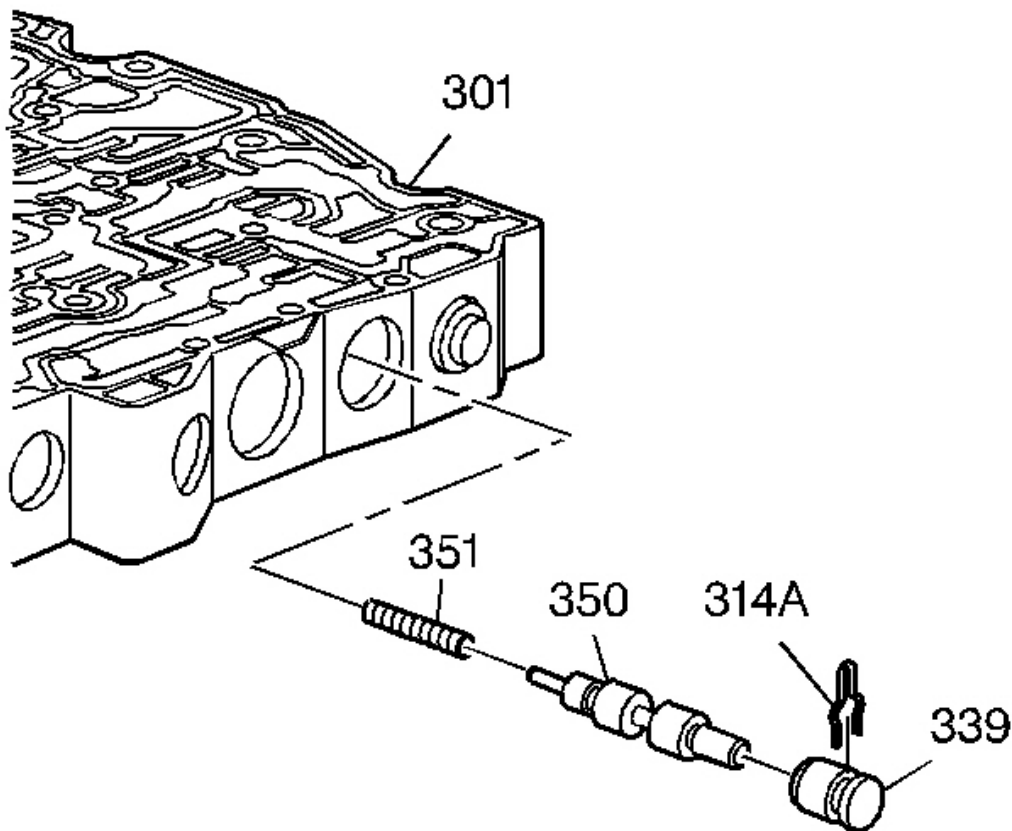


Fig. 307: Locating 1-2 Accumulator Valve & 1-2 Accumulator Valve Spring
Courtesy of GENERAL MOTORS CORP.

23. Using a small screwdriver or pick, remove the 1-2 accumulator valve retainer (314A) from the control valve body (301).
24. Remove the 1-2 accumulator valve bore plug (339), 1-2 accumulator valve (350) and 1-2 accumulator valve spring (351) from the control valve body (301).

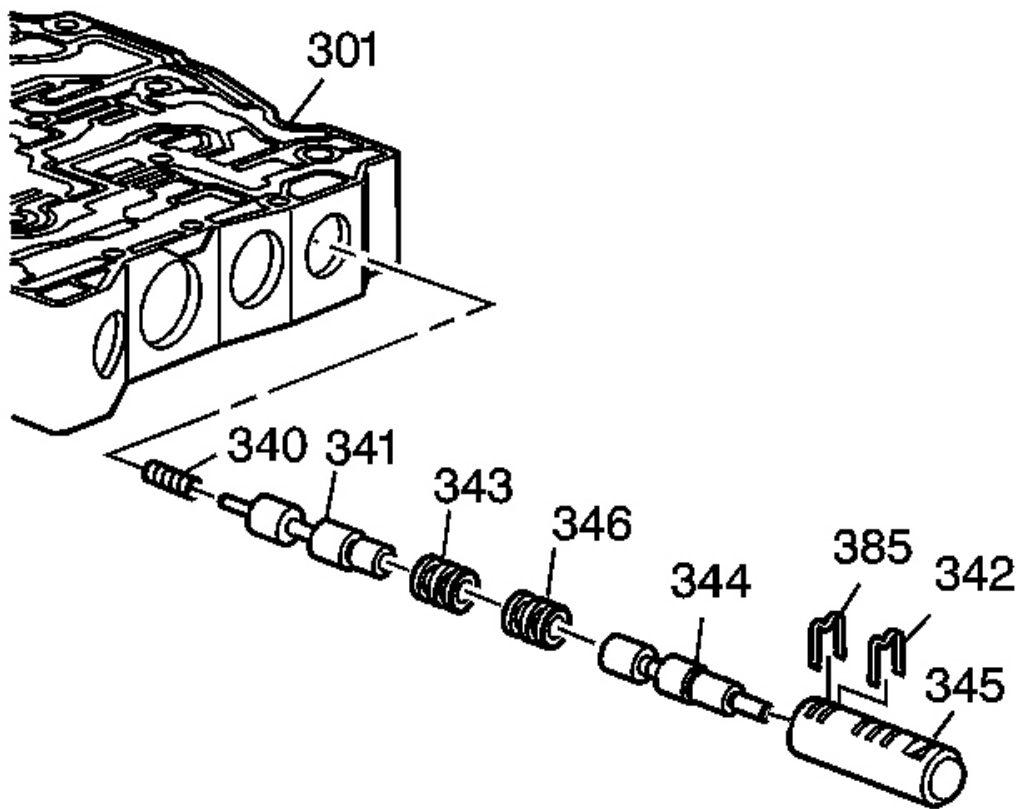


Fig. 308: View Of 2-3 Accumulator Valve & 3-4 Accumulator Valve Components
Courtesy of GENERAL MOTORS CORP.

25. Using a small screwdriver or pick, remove the 2-3 accumulator valve bushing assembly retainer (385) from the control valve body (301).
26. Remove the 2-3 accumulator valve bushing assembly (345), 3-4 accumulator valve (341) and 3-4 accumulator valve spring (340) from the control valve body (301).
27. Using a small screwdriver or pick, remove the 2-3 accumulator valve bore plug retainer (342) from the 2-3 accumulator valve bushing (345).
28. Remove the 2-3 accumulator valve bore plug (343), the 2-3 accumulator valve spring (346) and the 2-3 accumulator valve (344) from the 2-3 accumulator valve bushing (345).

CONTROL VALVE BODY DISASSEMBLE (WITH TOUCH ACTIVATED POWER)

Disassembly Procedure

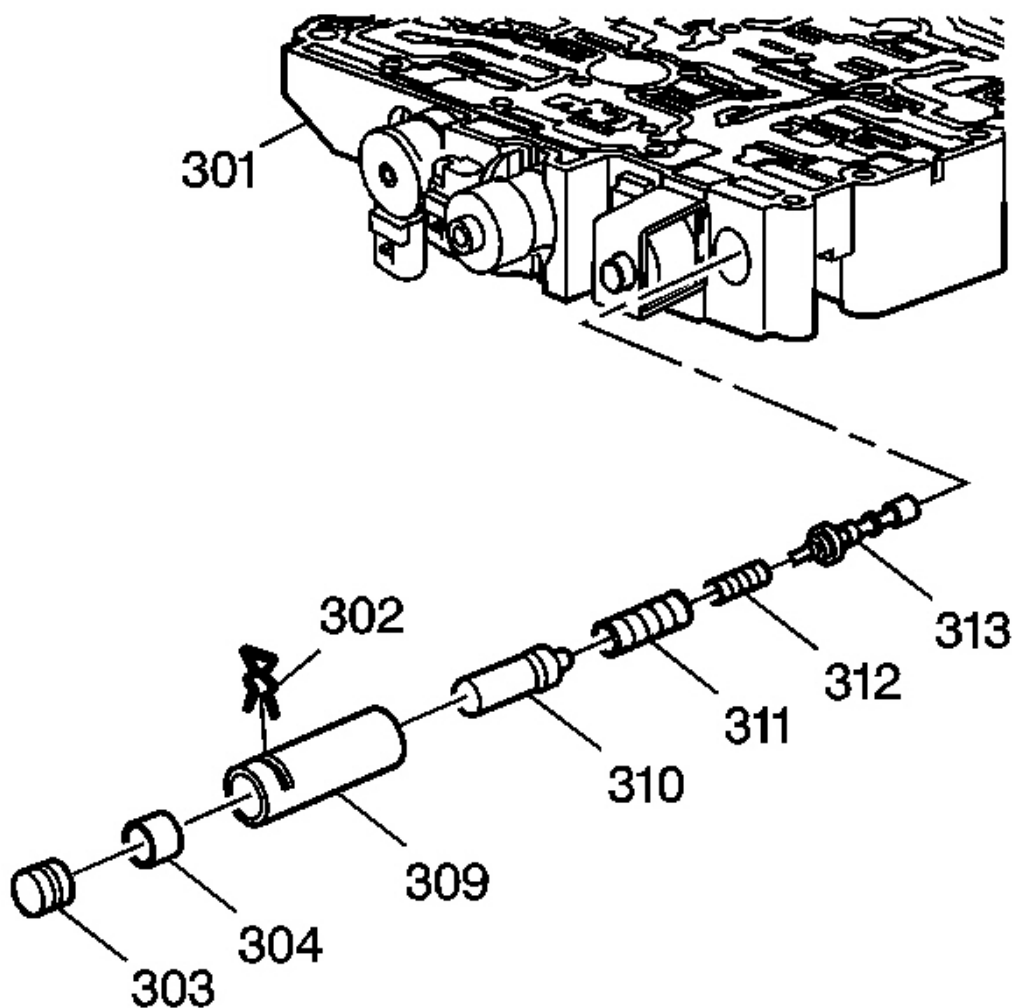


Fig. 309: View Of Reverse Boost Valve Bushing Assembly Components
Courtesy of GENERAL MOTORS CORP.

CAUTION: Valve Springs can be tightly compressed. Use care when removing retainers and plugs. Personal injury could result.

IMPORTANT: Position the control valve body assembly on a clean surface during disassembly.

IMPORTANT: All valves, springs and bushings must be laid out on a clean surface. Lay them exactly the way they are removed to aid reassembly.

1. Using a small screwdriver or pick, remove the line boost valve and bushing retainer (302) from the control valve body (301).
2. Remove the line boost valve bore plug (303), line boost valve (304), reverse boost valve bushing (309), reverse boost valve (310), pressure regulator valve outer and inner springs (311, 312) and pressure regulator valve (313) from the control valve body (301).

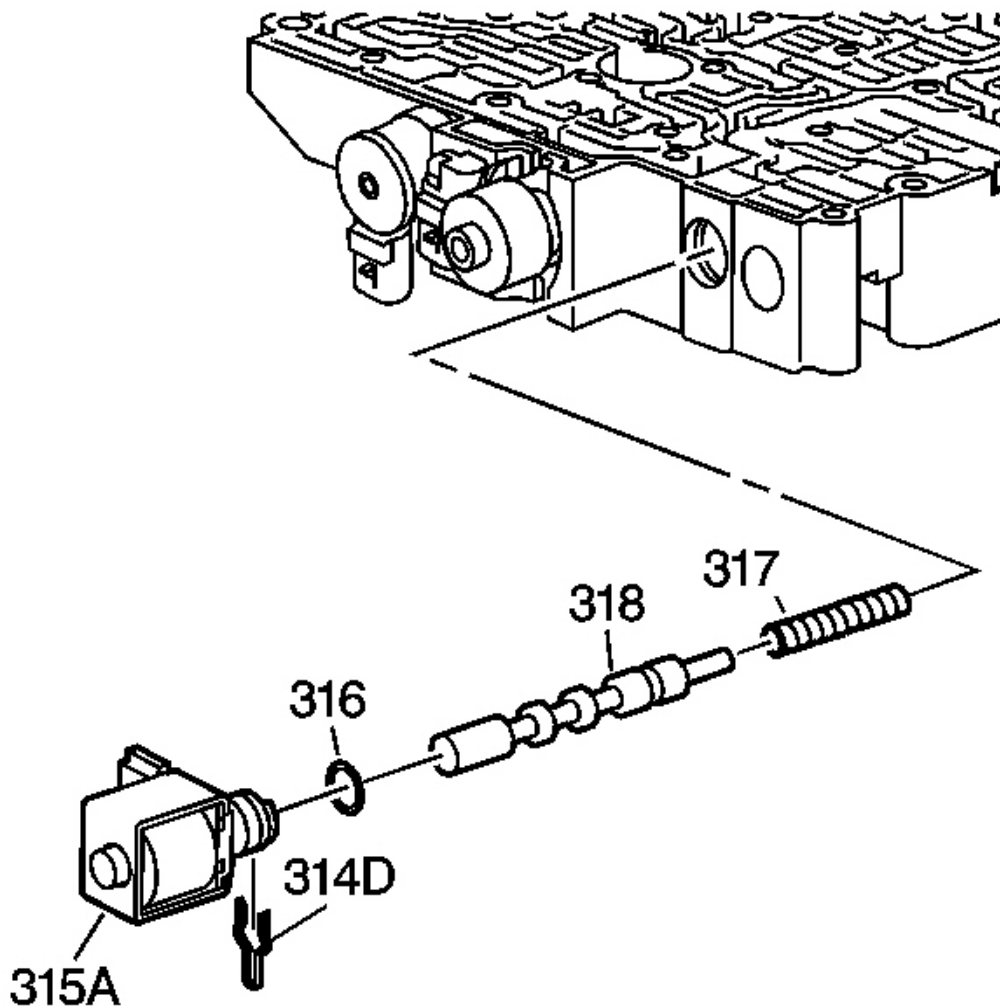


Fig. 310: Identifying 1-2, 3-4 Shift Solenoid (SS) Valve Components
Courtesy of GENERAL MOTORS CORP.

3. Using a small screwdriver or pick, remove the 1-2, 3-4 shift solenoid valve retainer (314D) from the control valve body (301).
4. Remove the 1-2, 3-4 shift solenoid (SS) valve (315A), 1-2 shift valve (318) and 1-2 shift valve spring (317) from the control valve body (301).
5. Remove the O-ring seal (316) from the 1-2, 3-4 SS valve (315A) ONLY if it is damaged.

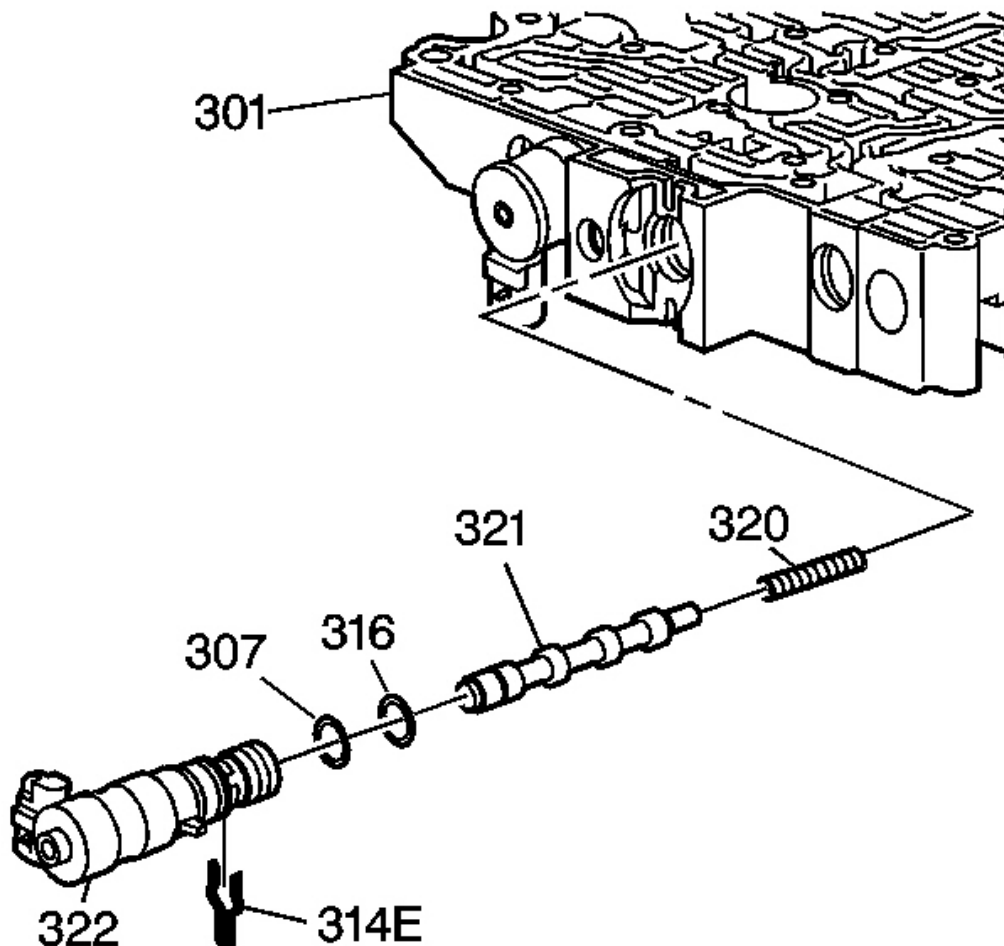


Fig. 311: View Of PC Solenoid Valve & Torque Signal Regulator Valve
Courtesy of GENERAL MOTORS CORP.

6. Using a small screwdriver or pick, remove the pressure control solenoid valve retainer (314E) from the control valve body (301).
7. Remove the pressure control (PC) solenoid valve (322), torque signal regulator valve (321) and torque signal regulator valve spring (320) from the control valve body (301).
8. Remove the O-ring seals (307, 316) from the PC solenoid valve (322) ONLY if they are damaged.

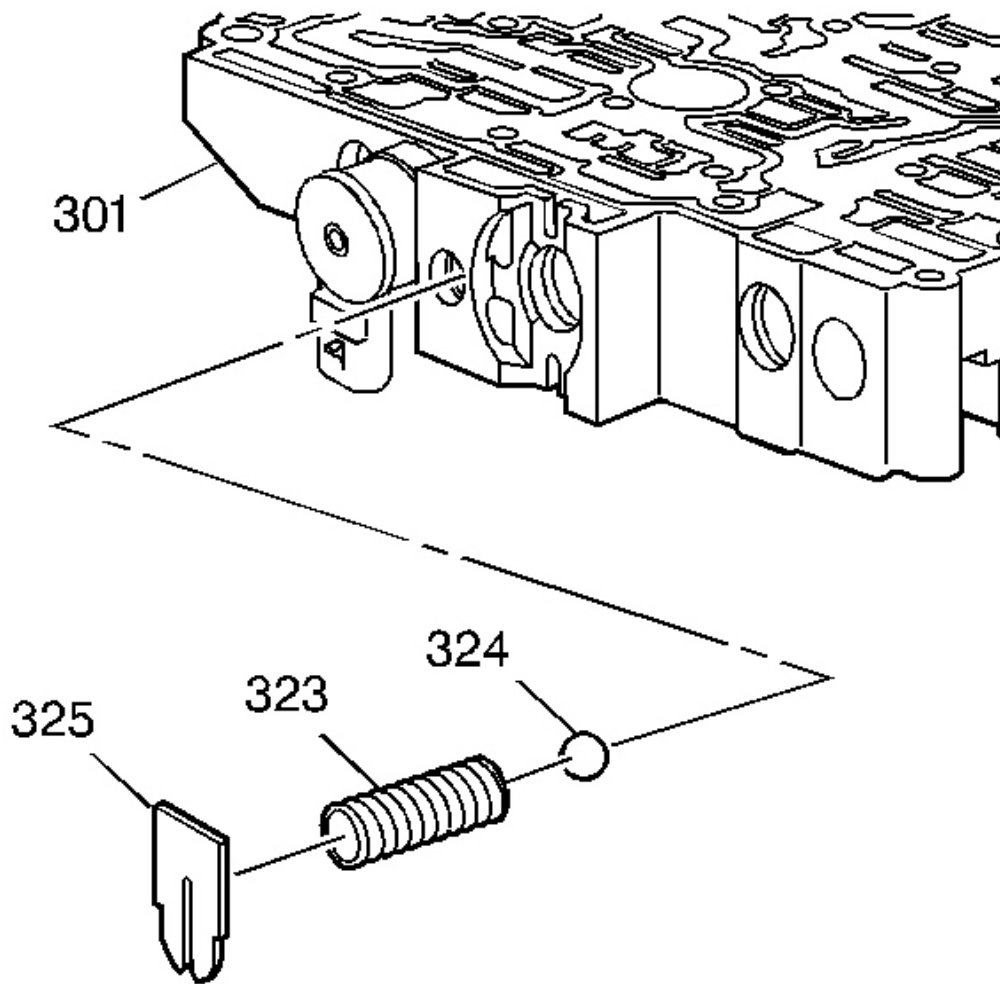


Fig. 312: Locating Line Pressure Relief Valve Assembly
Courtesy of GENERAL MOTORS CORP.

9. Using a small screwdriver or pick, remove the line pressure relief valve spring retainer (325) from the control valve body (301).
10. Remove the line pressure relief valve spring (323) and the line pressure relief valve (324) from the control valve body (301).

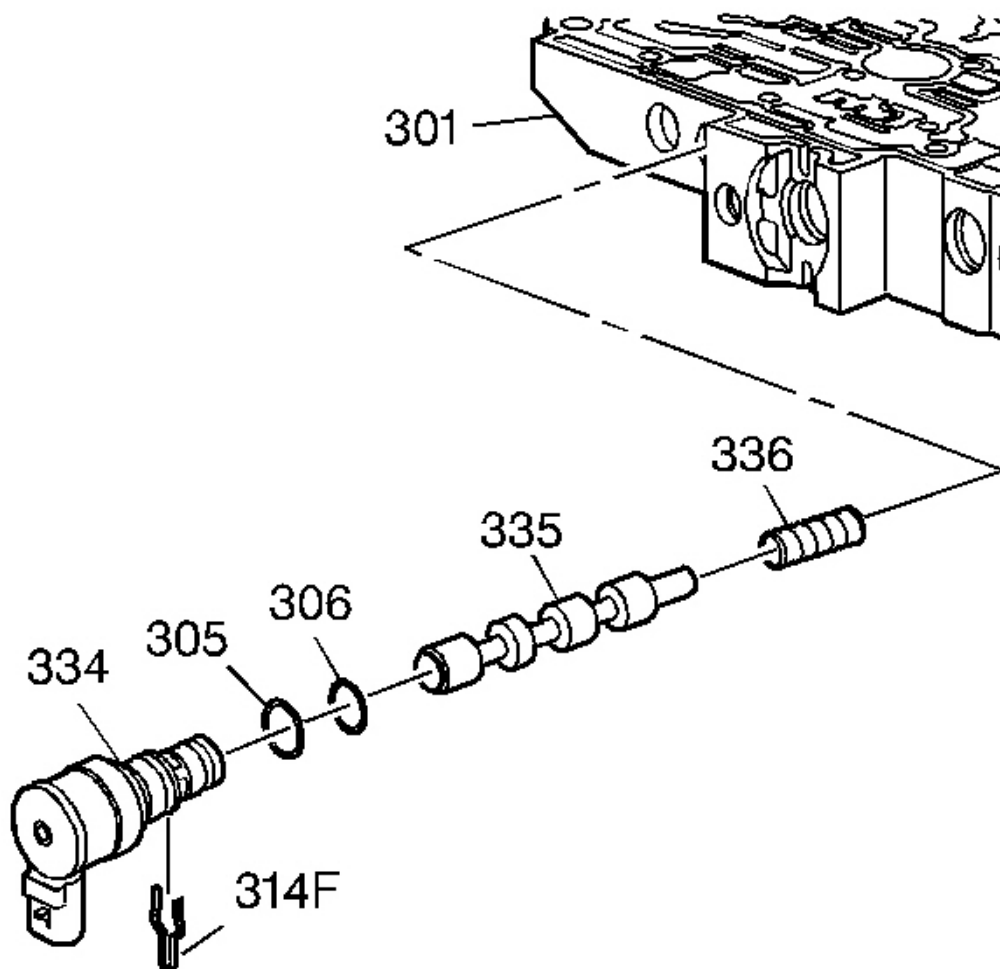


Fig. 313: View Of TCC PWM Solenoid
Courtesy of GENERAL MOTORS CORP.

11. Using a small screwdriver or pick, remove the TCC PWM solenoid valve retainer (314F) from the control valve body (301).

12. Remove the TCC PWM solenoid valve (334), TCC control valve (335) and TCC control valve spring (336) from the control valve body (301).
13. Remove the O-ring seals (305, 306) from the TCC PWM solenoid valve (334) ONLY if they are damaged.

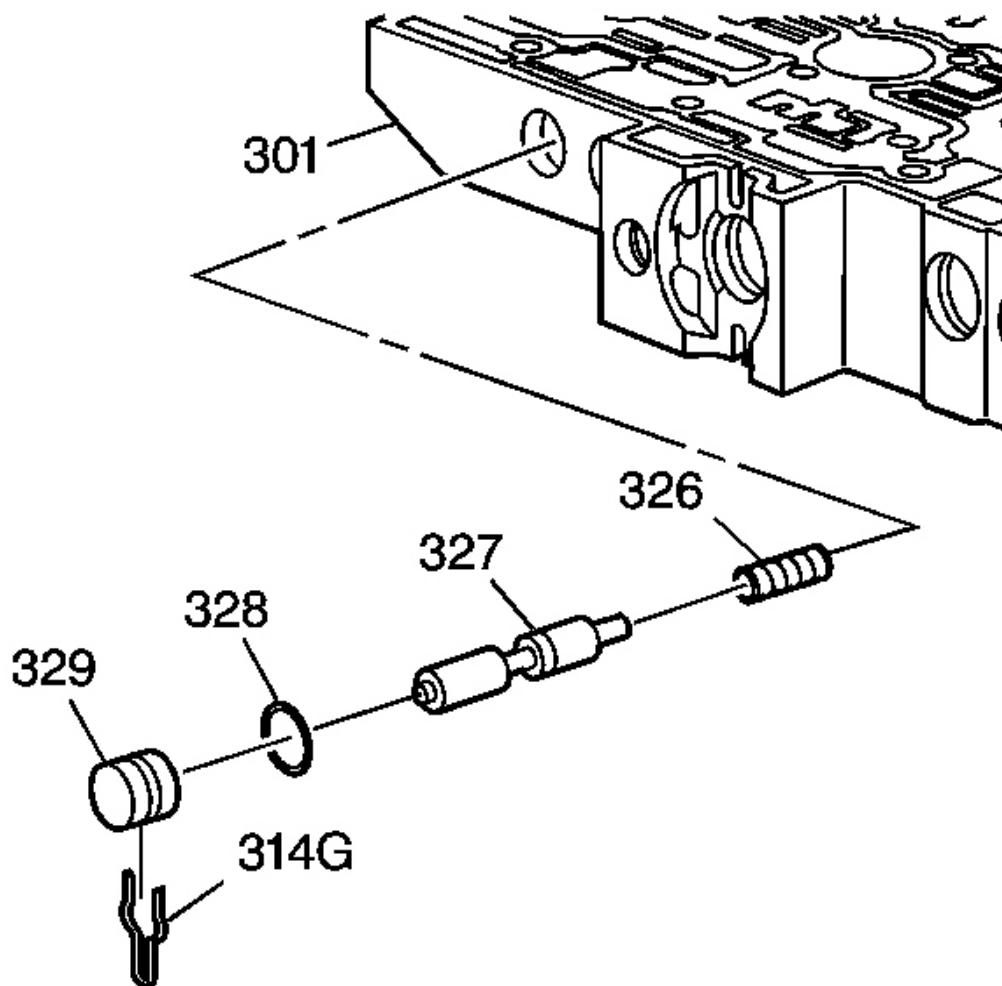


Fig. 314: Identifying TCC Regulator Apply Valve
Courtesy of GENERAL MOTORS CORP.

14. Using a small screwdriver or pick, remove the TCC regulator apply valve bore plug retainer (314G) from the control valve body (301).

15. Remove the TCC regulator apply valve bore plug (329), O-ring seal (328), TCC regulator apply valve (327) and TCC regulator apply valve spring (326) from the control valve body (301).

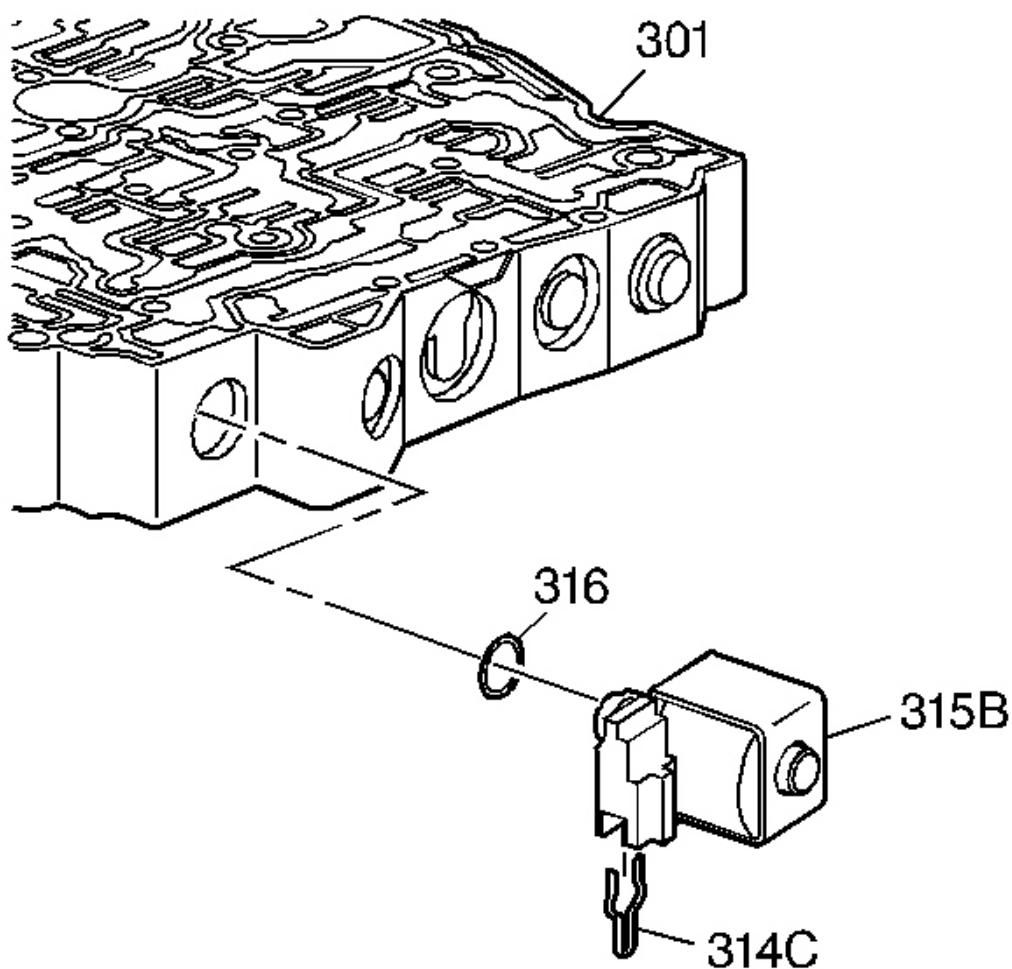


Fig. 315: View Of 2-3 Shift Solenoid & O-Ring
Courtesy of GENERAL MOTORS CORP.

16. Using a small screwdriver or pick, remove the 2-3 shift solenoid valve retainer (314C) from the control valve body (301).
17. Remove the 2-3 shift solenoid (SS) valve (315B) from the control valve body (301).
18. Remove the O-ring seal (316) from the 2-3 SS valve (315B) ONLY if it is damaged.

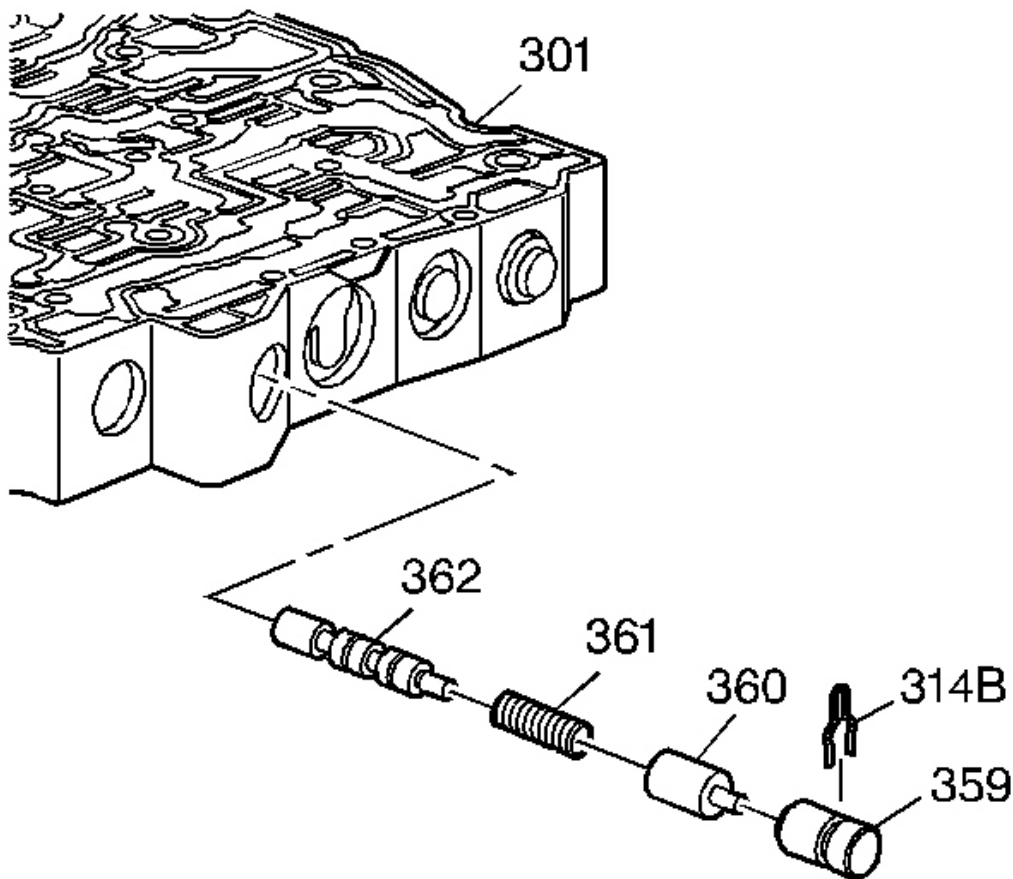


Fig. 316: View Of 3-4 Shift Valve & 4-3 Manual Downshift Valve Components
Courtesy of GENERAL MOTORS CORP.

19. Using a small screwdriver or pick, remove the 4-3 manual downshift valve retainer (314B) from the control valve body (301).
20. Remove the 4-3 manual downshift valve bore plug (359), 4-3 manual downshift valve (360), 4-3 manual downshift valve spring (361) and 3-4 shift valve (362) from the control valve body (301).

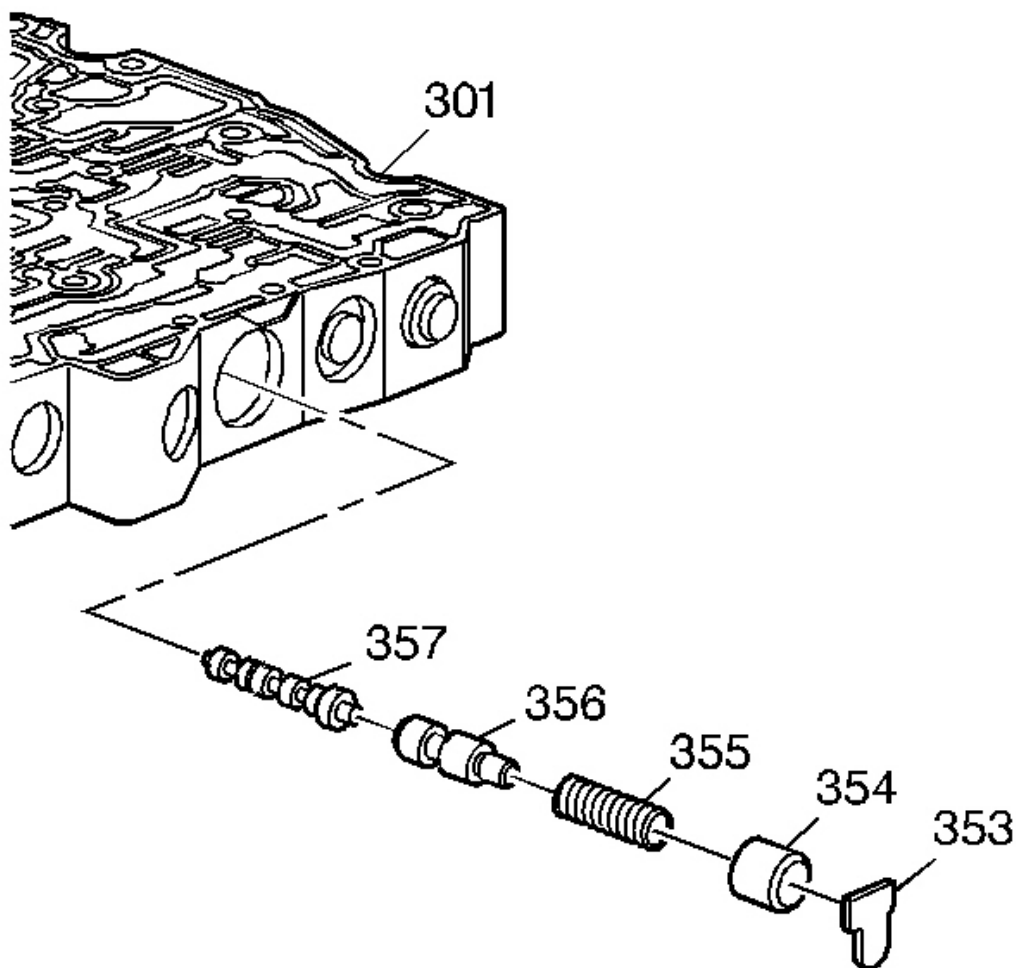


Fig. 317: Identifying 3-2 Manual Downshift Valve & 2-3 Shift Valve
Courtesy of GENERAL MOTORS CORP.

21. Using a small screwdriver or pick, remove the 3-2 manual downshift valve retainer (353) from the control valve body (301).
22. Remove the 3-2 manual downshift valve bore plug (354), 3-2 manual downshift valve spring (355), 3-2 manual downshift valve (356) and 2-3 shift valve (357) from the control valve body (301).

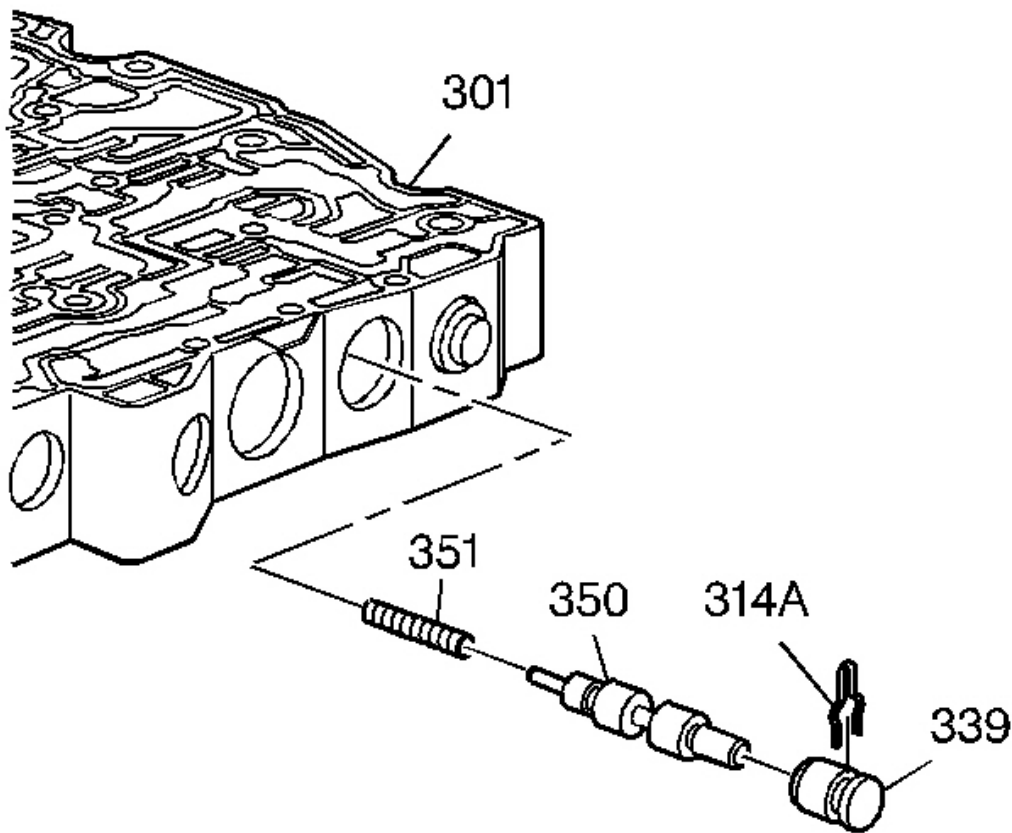


Fig. 318: Locating 1-2 Accumulator Valve & 1-2 Accumulator Valve Spring
Courtesy of GENERAL MOTORS CORP.

23. Using a small screwdriver or pick, remove the 1-2 accumulator valve retainer (314A) from the control valve body (301).
24. Remove the 1-2 accumulator valve bore plug (339), 1-2 accumulator valve (350) and 1-2 accumulator valve spring (351) from the control valve body (301).

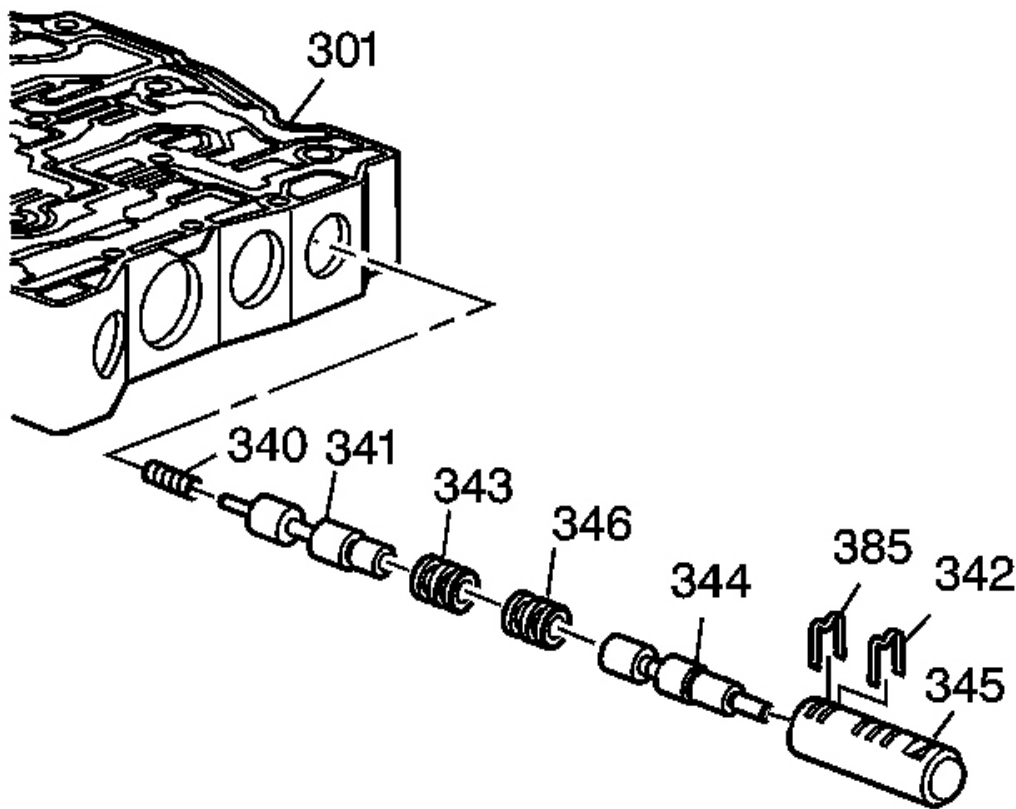


Fig. 319: View Of 2-3 Accumulator Valve & 3-4 Accumulator Valve Components
Courtesy of GENERAL MOTORS CORP.

25. Using a small screwdriver or pick, remove the 2-3 accumulator valve bushing assembly retainer (385) from the control valve body (301).
26. Remove the 2-3 accumulator valve bushing assembly (345), 3-4 accumulator valve (341) and 3-4 accumulator valve spring (340) from the control valve body (301).
27. Using a small screwdriver or pick, remove the 2-3 accumulator valve bore plug retainer (342) from the 2-3 accumulator valve bushing (345).
28. Remove the 2-3 accumulator valve bore plug (343), the 2-3 accumulator valve spring (346) and the 2-3 accumulator valve (344) from the 2-3 accumulator valve bushing (345).

CONTROL VALVE BODY ASSEMBLE (WITHOUT TOUCH ACTIVATED POWER)

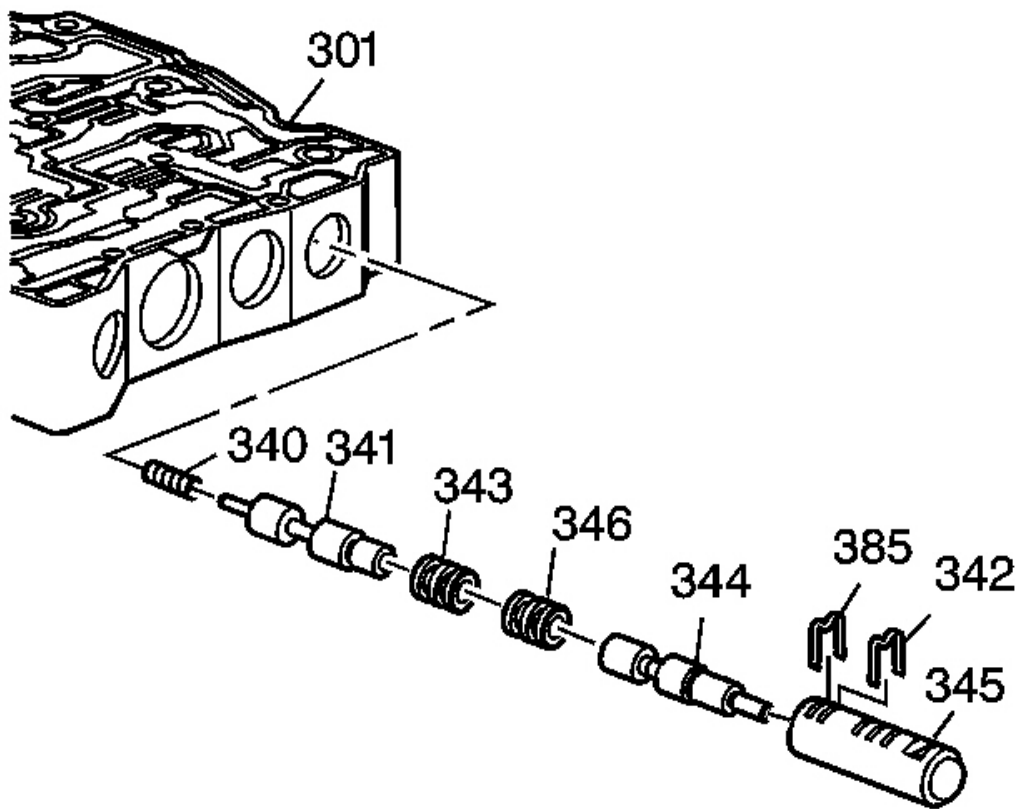


Fig. 320: View Of 2-3 Accumulator Valve & 3-4 Accumulator Valve Components
Courtesy of GENERAL MOTORS CORP.

1. Install the 2-3 accumulator valve (344), the 2-3 accumulator valve spring (346) and the 2-3 accumulator valve bore plug (343) into the 2-3 accumulator valve bushing (345).
2. Install the 2-3 accumulator valve bore plug retainer (342) in the 2-3 accumulator valve bushing (345), into the slot indicated.
3. Install the 3-4 accumulator valve spring (340), the 3-4 accumulator valve (341) and the 2-3 accumulator valve bushing (345) into the control valve body (301).
4. Hold the 2-3 accumulator valve bushing assembly (345) in the control valve body (301). Install the 2-3 accumulator valve bushing assembly retainer (385) into the slot indicated.

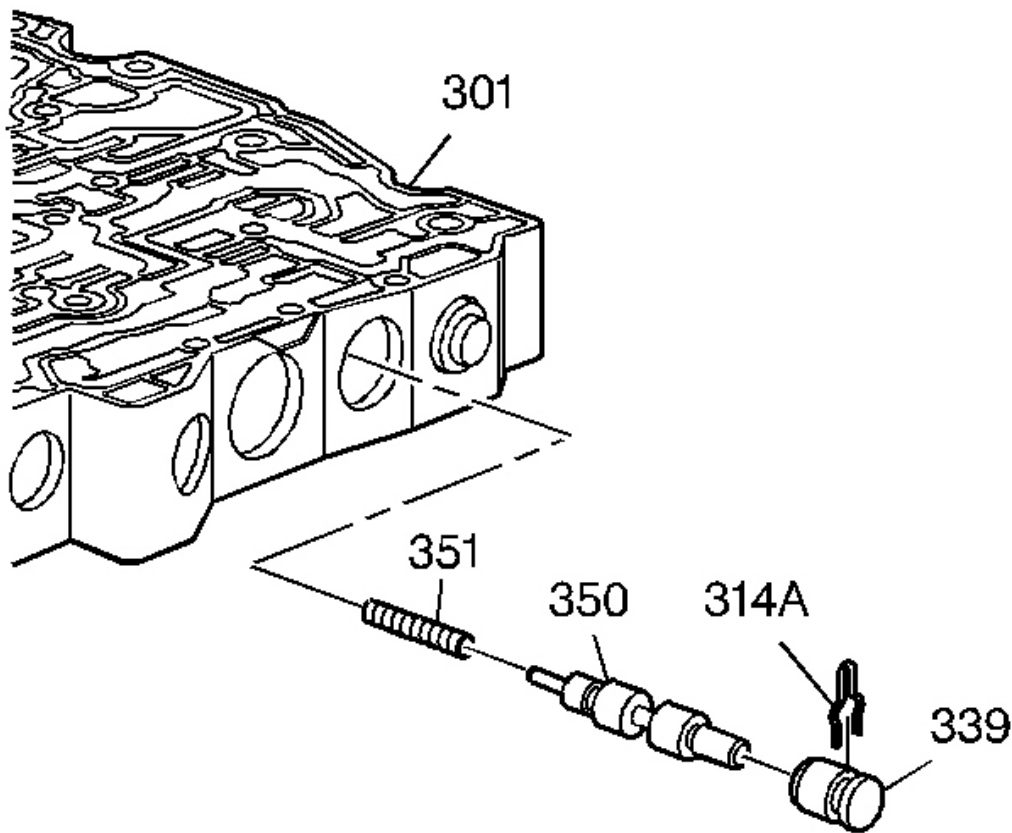


Fig. 321: Locating 1-2 Accumulator Valve & 1-2 Accumulator Valve Spring
Courtesy of GENERAL MOTORS CORP.

5. Install the 1-2 accumulator valve spring (351), the 1-2 accumulator valve (350) and the 1-2 accumulator valve bore plug (339) into the control valve body (301).
6. Hold the 1-2 accumulator valve bore plug (339) in the control valve body (301). Install the 1-2 accumulator valve retainer (314A) into the control valve body (301).

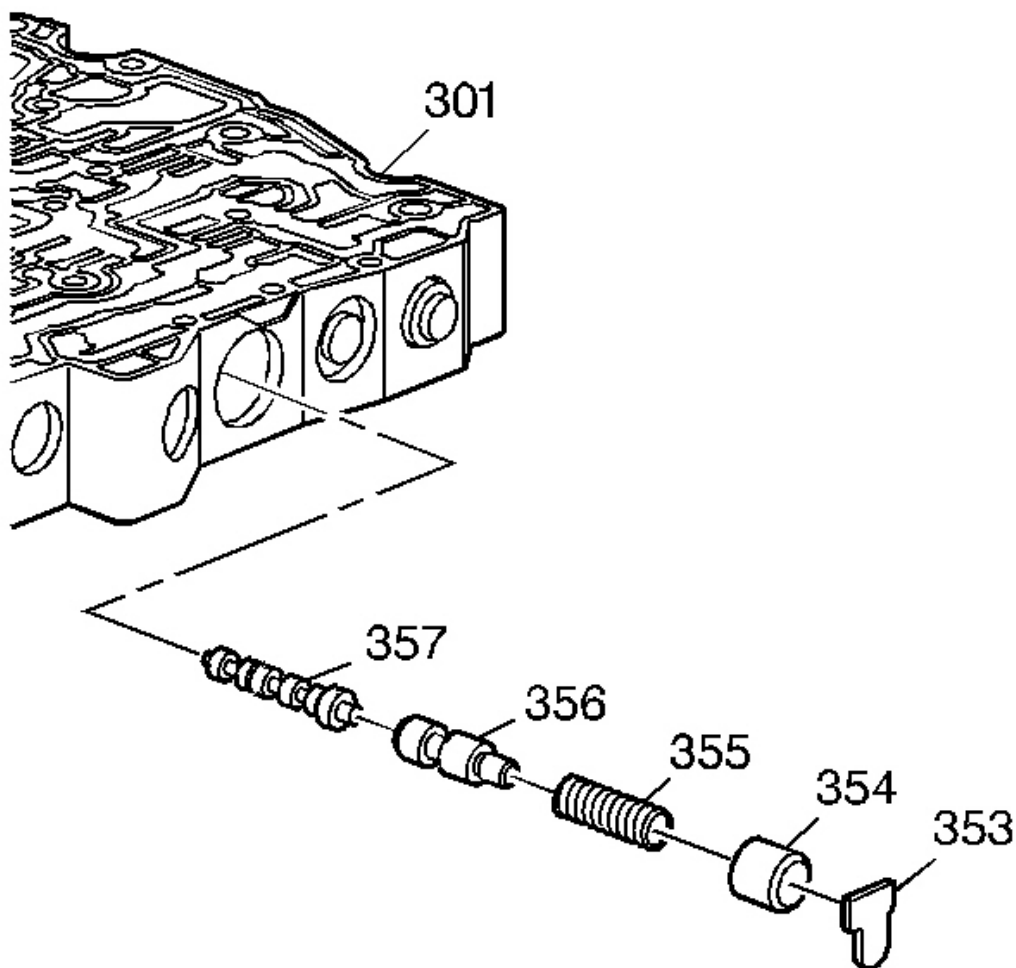


Fig. 322: Identifying 3-2 Manual Downshift Valve & 2-3 Shift Valve
Courtesy of GENERAL MOTORS CORP.

7. Install the 2-3 shift valve (357), the 3-2 manual downshift valve (356), the 3-2 manual downshift valve spring (355) and the 3-2 manual downshift valve bore plug (354) into the control valve body (301).
8. Hold the 3-2 manual downshift valve bore plug (354) in the control valve body (301). Install the 3-2 manual downshift valve retainer (353) into the control valve body (301).

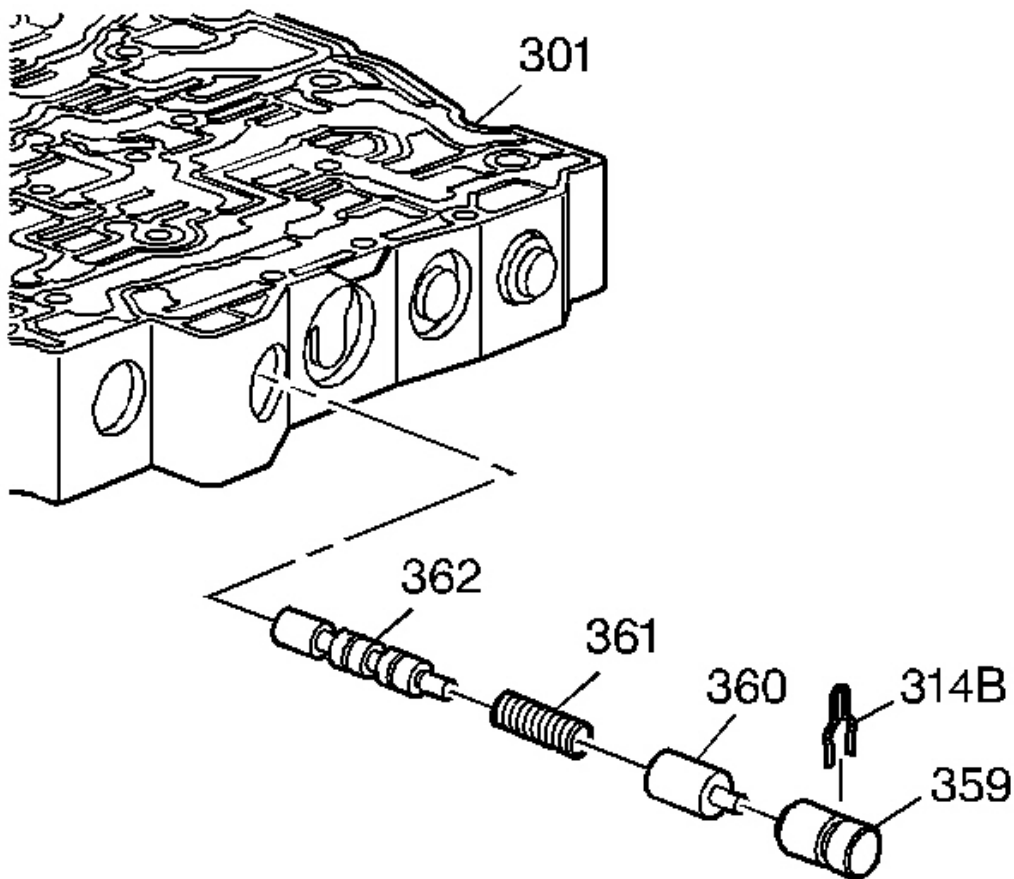


Fig. 323: View Of 3-4 Shift Valve & 4-3 Manual Downshift Valve Components
Courtesy of GENERAL MOTORS CORP.

9. Install the 3-4 shift valve (362), the 4-3 manual downshift valve spring (361), the 4-3 manual downshift valve (360) and the 4-3 manual downshift valve bore plug (359) into the control valve body (301).
10. Hold the 4-3 manual downshift valve bore plug (359) in the control valve body (301). Install the 4-3 manual downshift valve retainer (314B) into the control valve body (301).

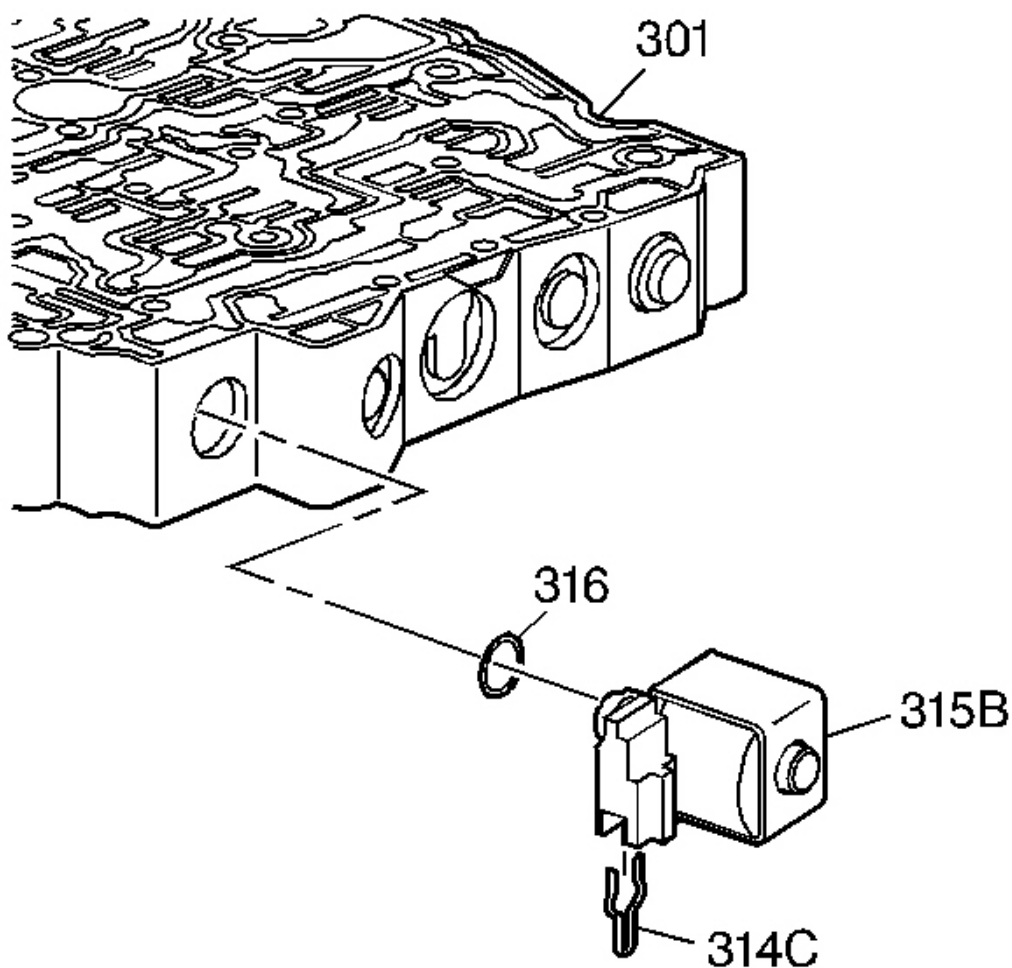


Fig. 324: View Of 2-3 Shift Solenoid & O-Ring
Courtesy of GENERAL MOTORS CORP.

11. Install a new O-ring seal (316) onto the 2-3 shift solenoid (SS) valve (315B), if it was removed.
12. Install the 2-3 SS valve (315B) into the control valve body (301).
13. Install the 2-3 shift solenoid valve retainer (314C) into the control valve body (301).

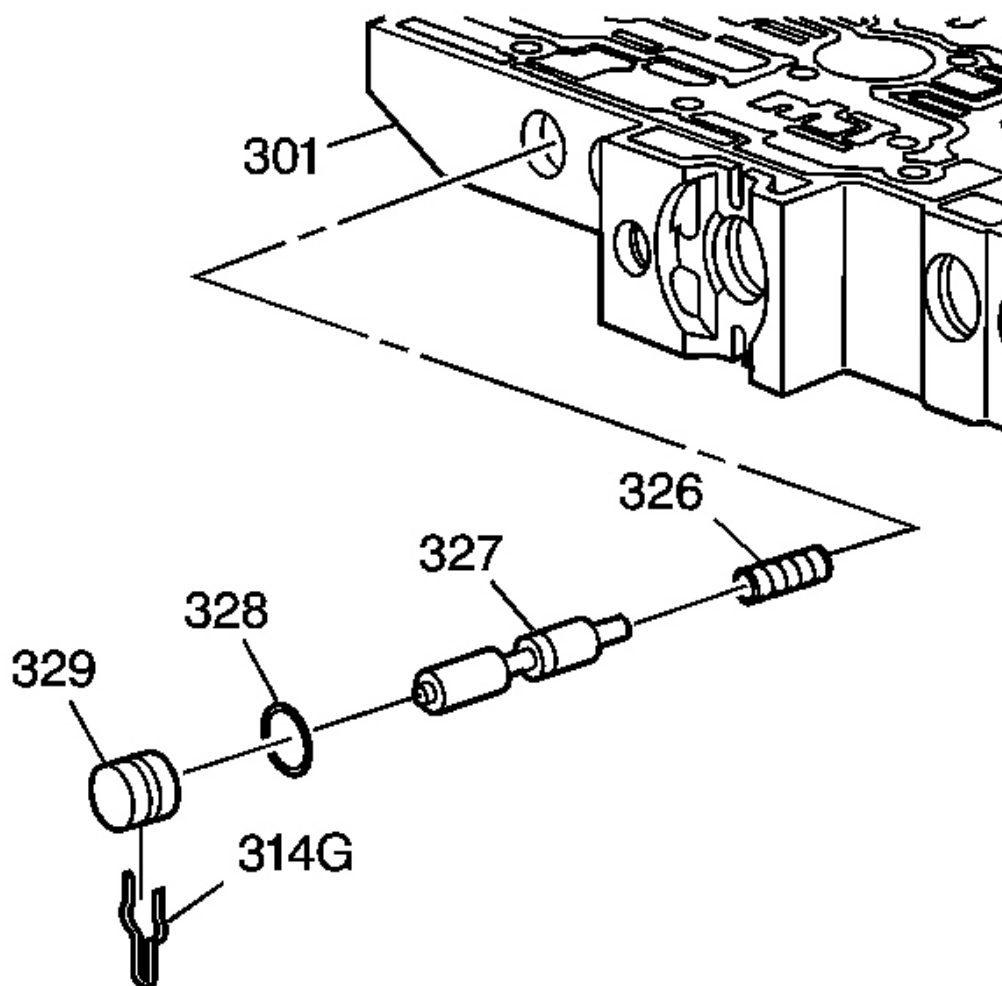


Fig. 325: Identifying TCC Regulator Apply Valve
Courtesy of GENERAL MOTORS CORP.

14. Install the TCC regulator apply valve bore plug O-ring seal (328) onto the TCC regulator apply valve bore plug (329).
15. Install the TCC regulator apply valve spring (326), the TCC regulator apply valve (327) and the TCC regulator apply valve bore plug (329) into the control valve body (301).
16. Hold the TCC regulator apply valve bore plug (329) in the control valve body (301). Install the TCC regulator apply valve bore plug retainer (314G) into the control valve body (301).

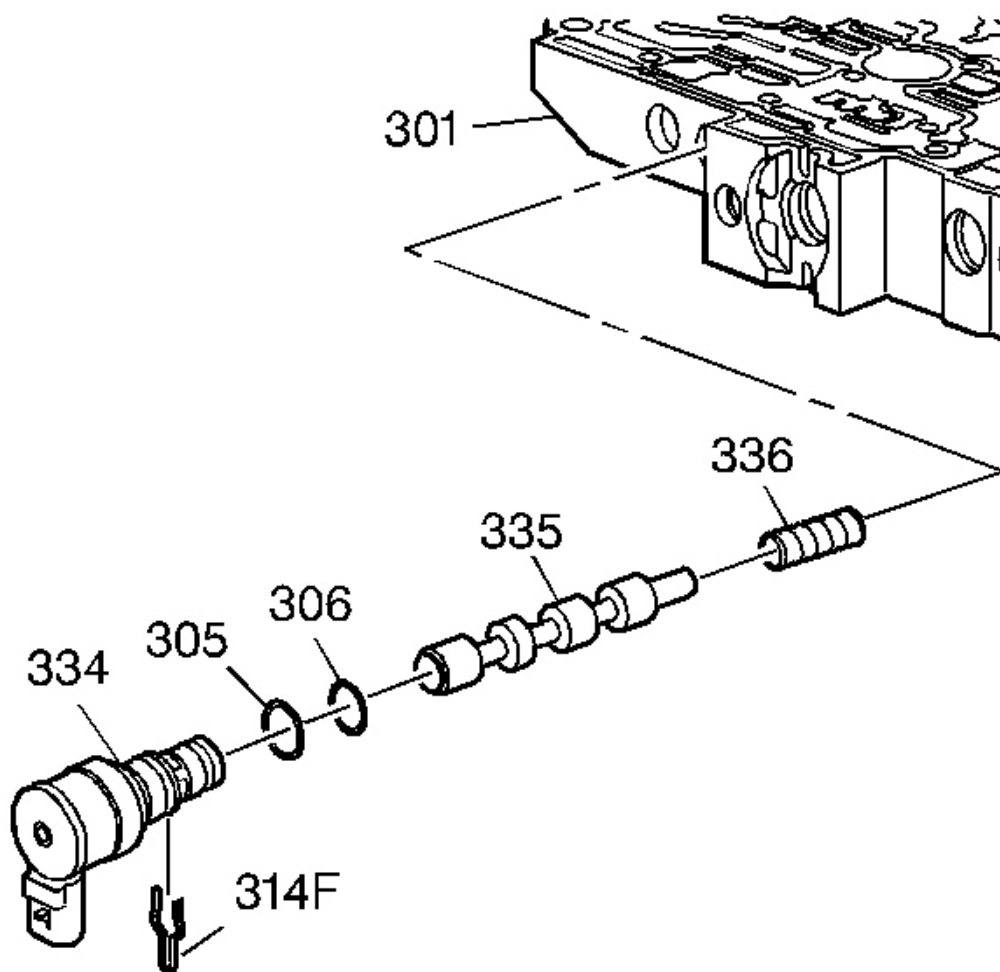


Fig. 326: View Of TCC PWM Solenoid
Courtesy of GENERAL MOTORS CORP.

17. Install new O-ring seals (305, 306) onto the TCC PWM solenoid valve (334) if they had been removed.
18. Install the TCC control valve spring (336), the TCC control valve (335) and the TCC PWM solenoid valve (334) into the control valve body (301).
19. Hold the TCC PWM solenoid valve (334) in the control valve body (301). Install the TCC PWM solenoid valve retainer (314F) into the control valve body (301).

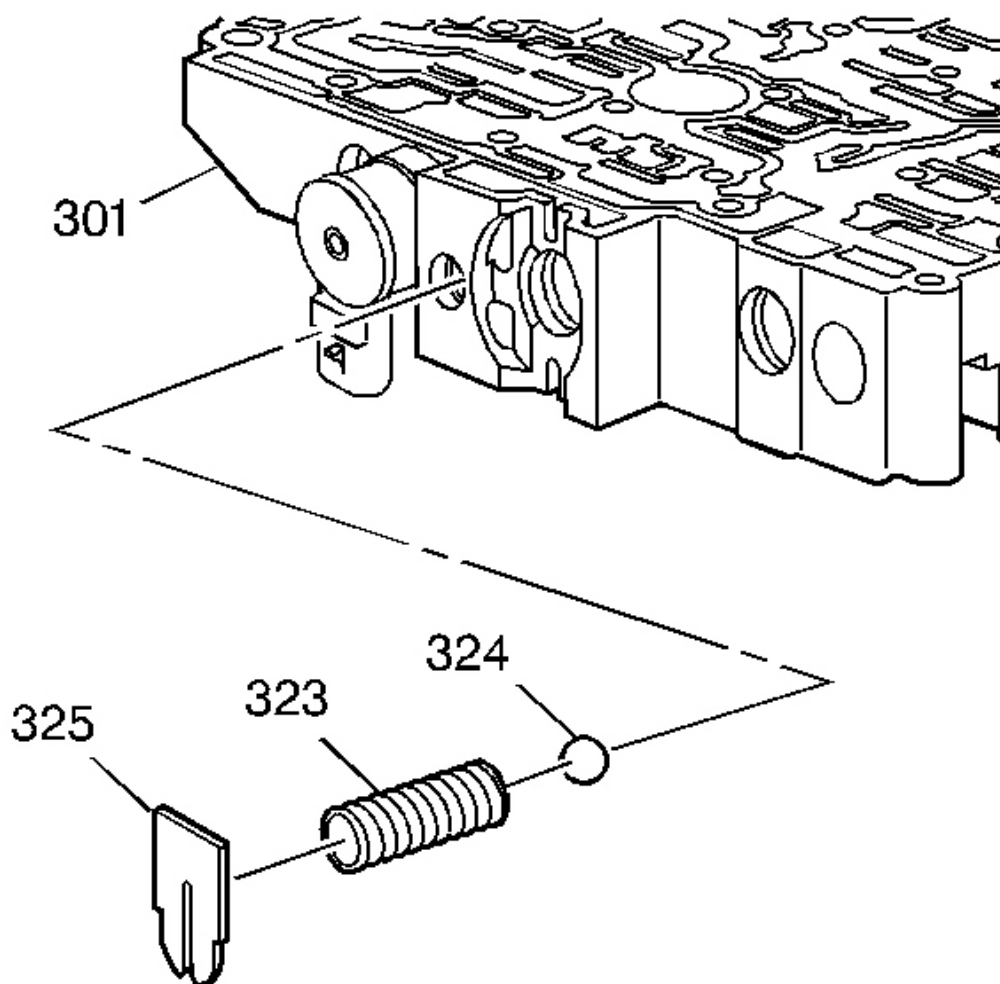


Fig. 327: Locating Line Pressure Relief Valve Assembly
Courtesy of GENERAL MOTORS CORP.

20. Install the line pressure relief valve (324) and the line pressure relief valve spring (323) into the control valve body (301).
21. Compress the line pressure relief valve spring (323) into the control valve body (301). Install the line pressure relief valve spring retainer (325) into the control valve body (301).

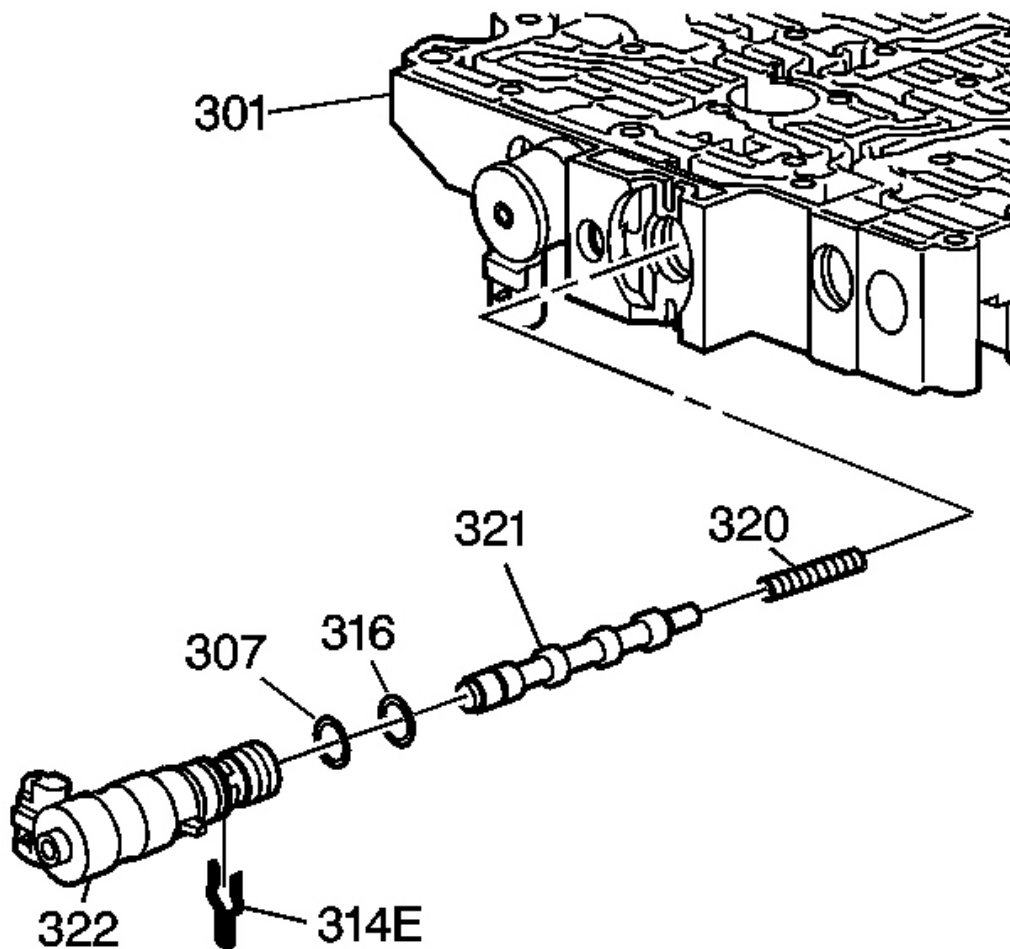


Fig. 328: View Of PC Solenoid Valve & Torque Signal Regulator Valve
Courtesy of GENERAL MOTORS CORP.

22. Install new O-ring seals (307, 316) onto the pressure control (PC) solenoid valve (322), if they had been removed.
23. Install the torque signal regulator valve spring (320), the torque signal regulator valve (321) and the PC solenoid valve (322) into the control valve body (301).
24. Hold the PC solenoid valve (322) in the control valve body (301). Install the pressure control solenoid valve retainer (314E) into the control valve body (301).

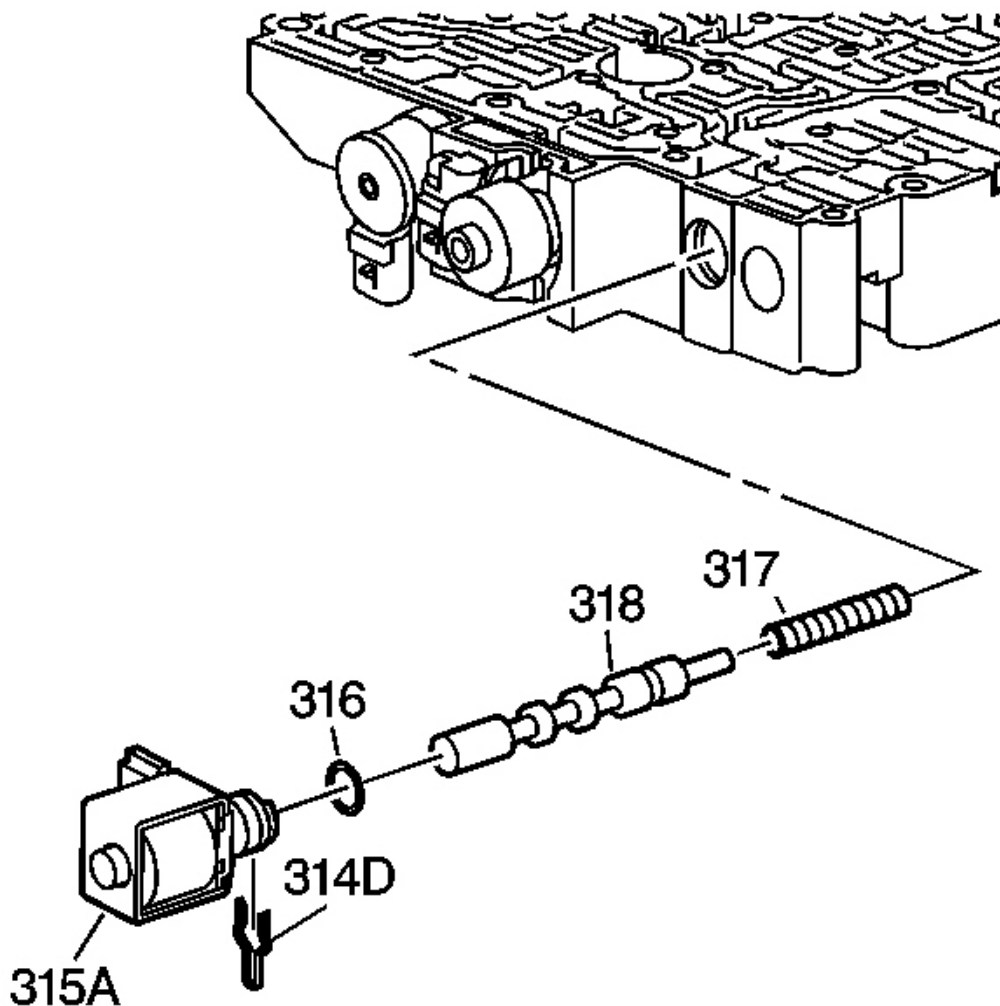


Fig. 329: Identifying 1-2, 3-4 Shift Solenoid (SS) Valve Components
Courtesy of GENERAL MOTORS CORP.

25. Install a new O-ring seal (316) onto the 1-2, 3-4 shift solenoid (SS) valve (315A), if it was removed.
26. Install the 1-2 shift valve spring (317), the 1-2 shift valve (318) and the 1-2, 3-4 SS valve (315A) into the control valve body (301).
27. Hold the 1-2, 3-4 SS valve (315A) in the control valve body (301). Install the 1-2, 3-4 shift solenoid valve retainer (314D) into the control valve body (301).

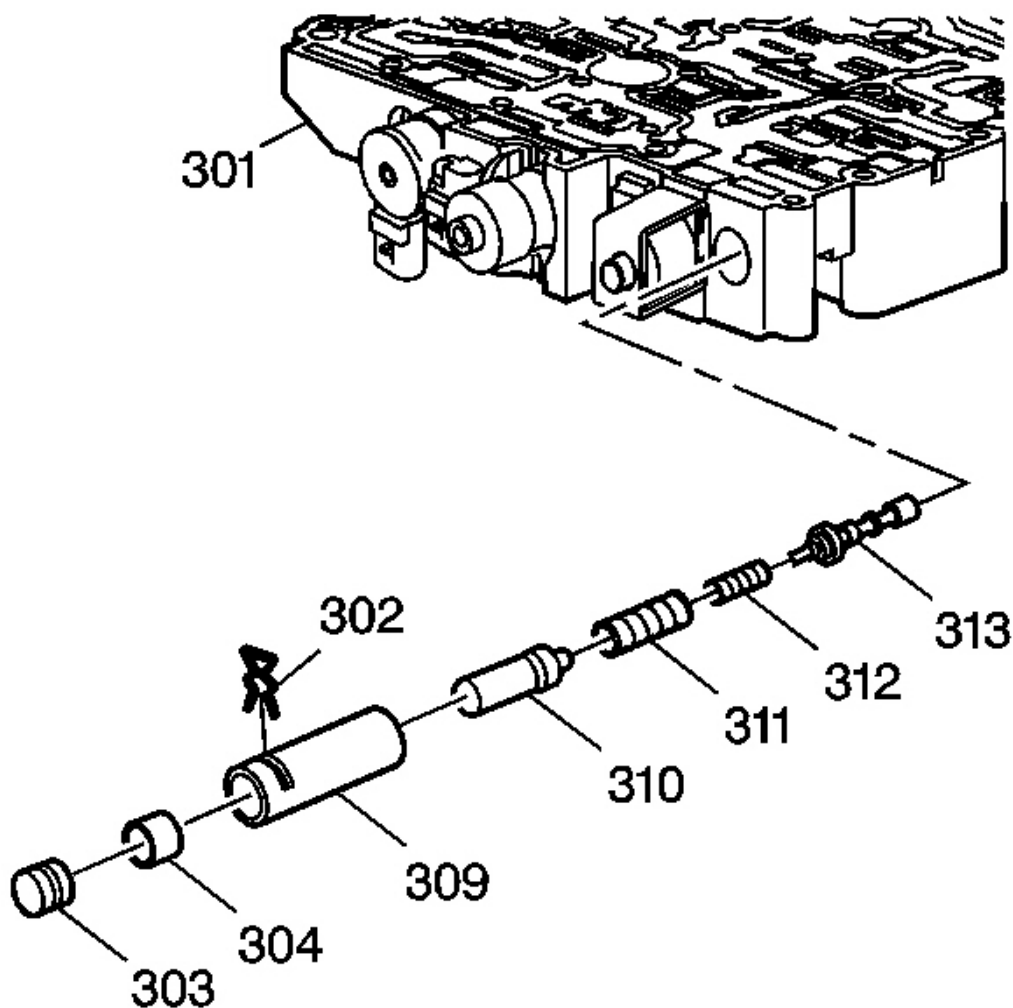


Fig. 330: View Of Reverse Boost Valve Bushing Assembly Components
Courtesy of GENERAL MOTORS CORP.

28. Install the reverse boost valve (310), the line boost valve (304) and the line boost valve bore plug (303) into the reverse boost valve bushing (309).
29. Install the pressure regulator valve (313), the pressure regulator valve outer and inner springs (311, 312) and the reverse boost valve bushing assembly (309) into the control valve body (301).
30. Hold the reverse boost valve bushing assembly (309) in the control valve body (301). Install the line boost valve and bushing retainer (302) into the control valve body (301).

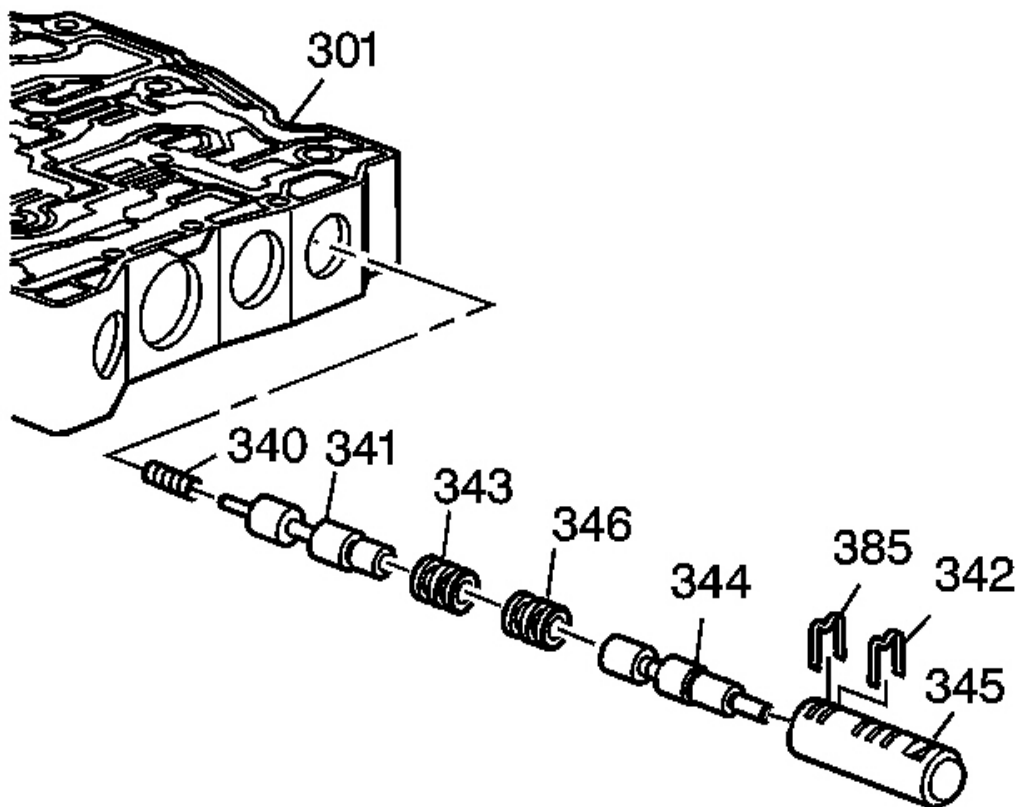
CONTROL VALVE BODY ASSEMBLE (WITH TOUCH ACTIVATED POWER)**Assembly Procedure**

Fig. 331: View Of 2-3 Accumulator Valve & 3-4 Accumulator Valve Components
Courtesy of GENERAL MOTORS CORP.

1. Install the 2-3 accumulator valve (344), the 2-3 accumulator valve spring (346) and the 2-3 accumulator valve bore plug (343) into the 2-3 accumulator valve bushing (345).
2. Install the 2-3 accumulator valve bore plug retainer (342) in the 2-3 accumulator valve bushing (345), into the slot indicated.
3. Install the 3-4 accumulator valve spring (340), the 3-4 accumulator valve (341) and the 2-3 accumulator valve bushing (345) into the control valve body (301).
4. Hold the 2-3 accumulator valve bushing assembly (345) in the control valve body (301). Install the 2-3 accumulator valve bushing assembly retainer (385) into the slot indicated.

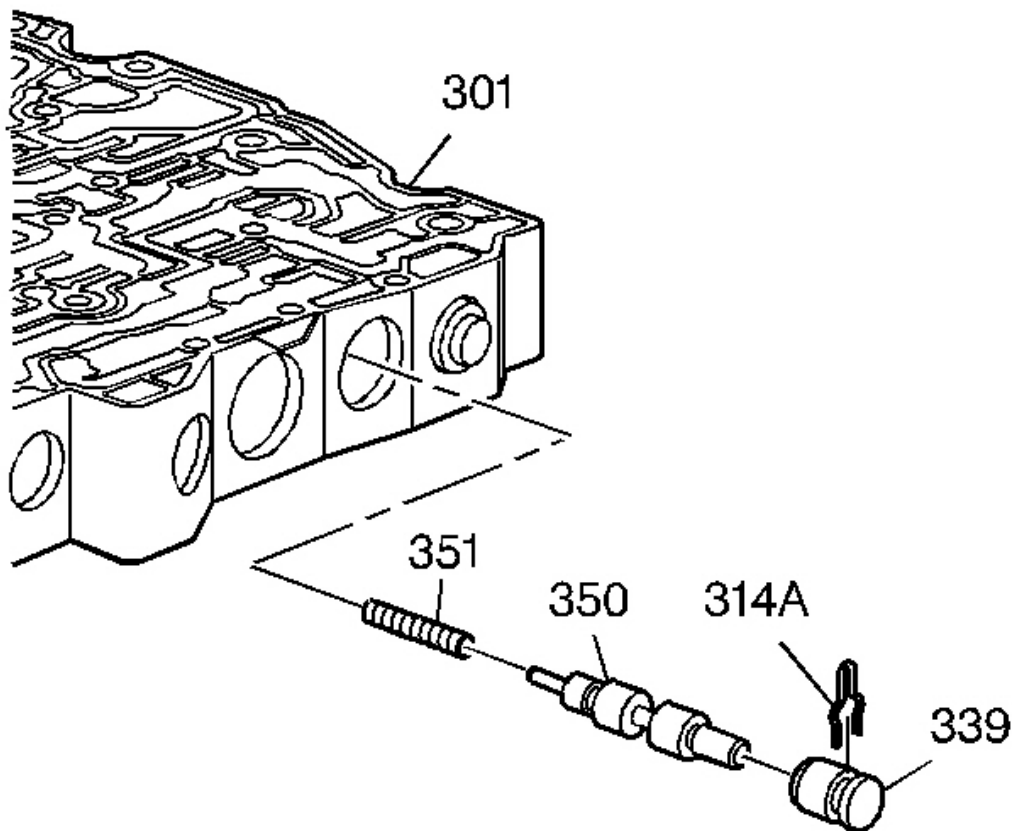


Fig. 332: Locating 1-2 Accumulator Valve & 1-2 Accumulator Valve Spring
Courtesy of GENERAL MOTORS CORP.

5. Install the 1-2 accumulator valve spring (351), the 1-2 accumulator valve (350) and the 1-2 accumulator valve bore plug (339) into the control valve body (301).
6. Hold the 1-2 accumulator valve bore plug (339) in the control valve body (301). Install the 1-2 accumulator valve retainer (314A) into the control valve body (301).

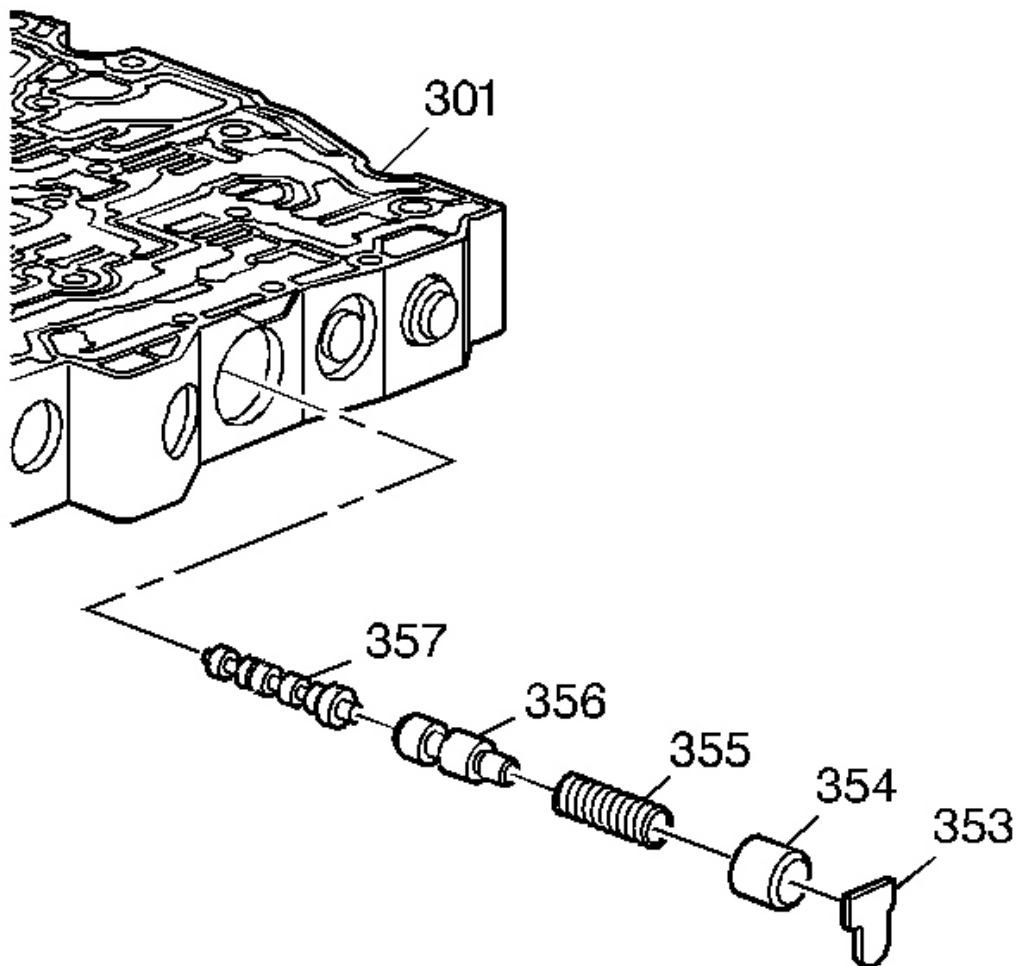


Fig. 333: Identifying 3-2 Manual Downshift Valve & 2-3 Shift Valve
Courtesy of GENERAL MOTORS CORP.

7. Install the 2-3 shift valve (357), the 3-2 manual downshift valve (356), the 3-2 manual downshift valve spring (355) and the 3-2 manual downshift valve bore plug (354) into the control valve body (301).
8. Hold the 3-2 manual downshift valve bore plug (354) in the control valve body (301). Install the 3-2 manual downshift valve retainer (353) into the control valve body (301).

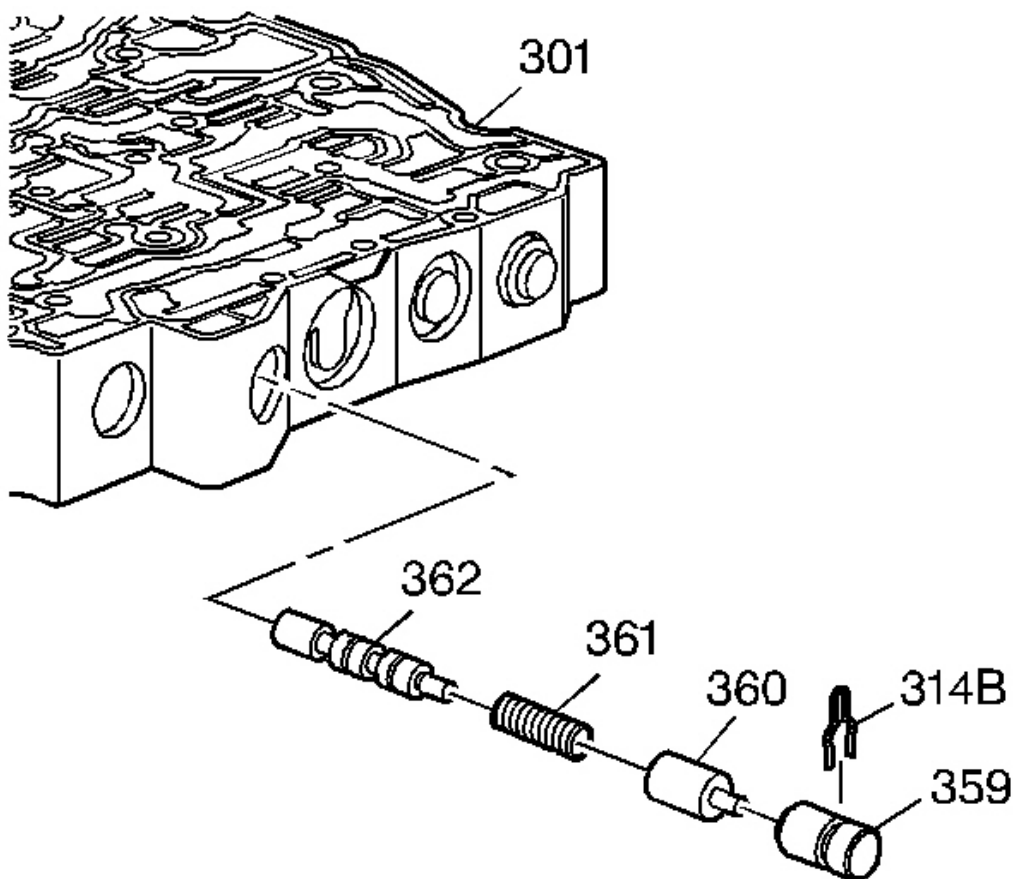


Fig. 334: View Of 3-4 Shift Valve & 4-3 Manual Downshift Valve Components
Courtesy of GENERAL MOTORS CORP.

9. Install the 3-4 shift valve (362), the 4-3 manual downshift valve spring (361), the 4-3 manual downshift valve (360) and the 4-3 manual downshift valve bore plug (359) into the control valve body (301).
10. Hold the 4-3 manual downshift valve bore plug (359) in the control valve body (301). Install the 4-3 manual downshift valve retainer (314B) into the control valve body (301).

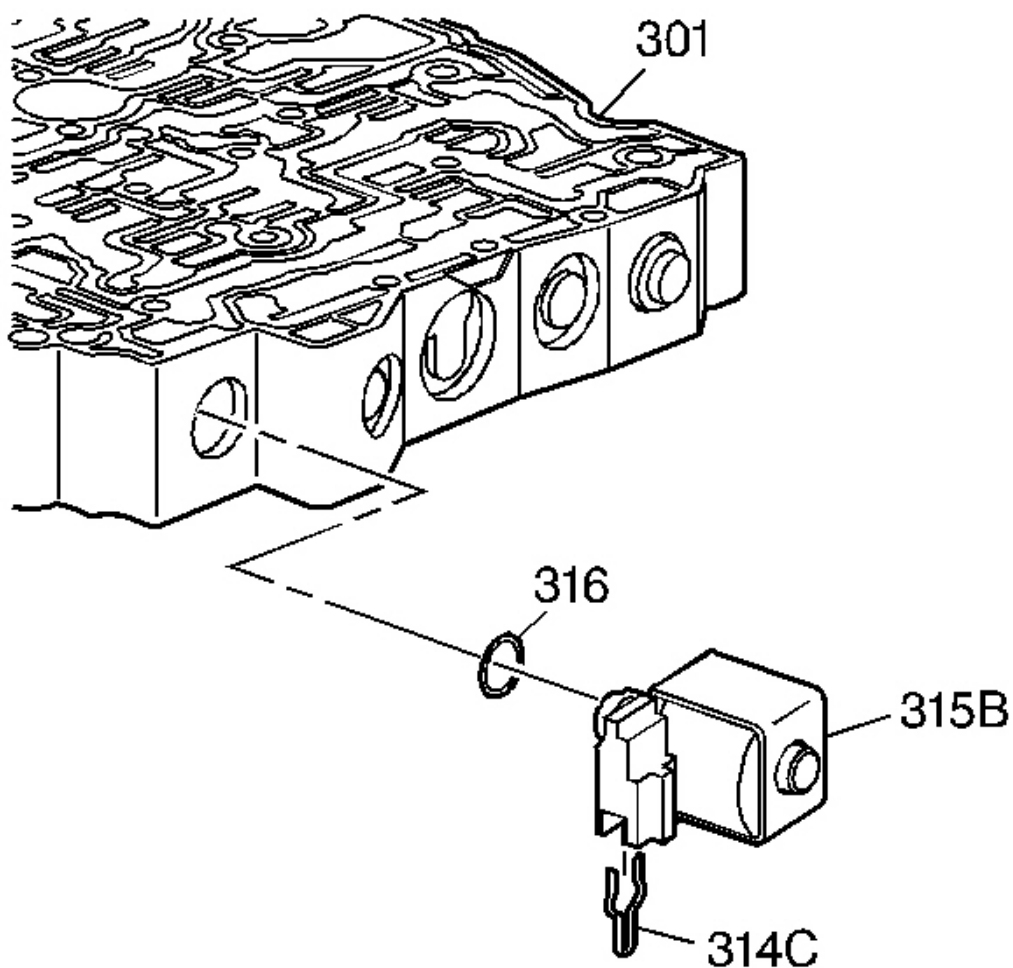


Fig. 335: View Of 2-3 Shift Solenoid & O-Ring
Courtesy of GENERAL MOTORS CORP.

11. Install a new O-ring seal (316) onto the 2-3 shift solenoid (SS) valve (315B), if it was removed.
12. Install the 2-3 SS valve (315B) into the control valve body (301).
13. Install the 2-3 shift solenoid valve retainer (314C) into the control valve body (301).

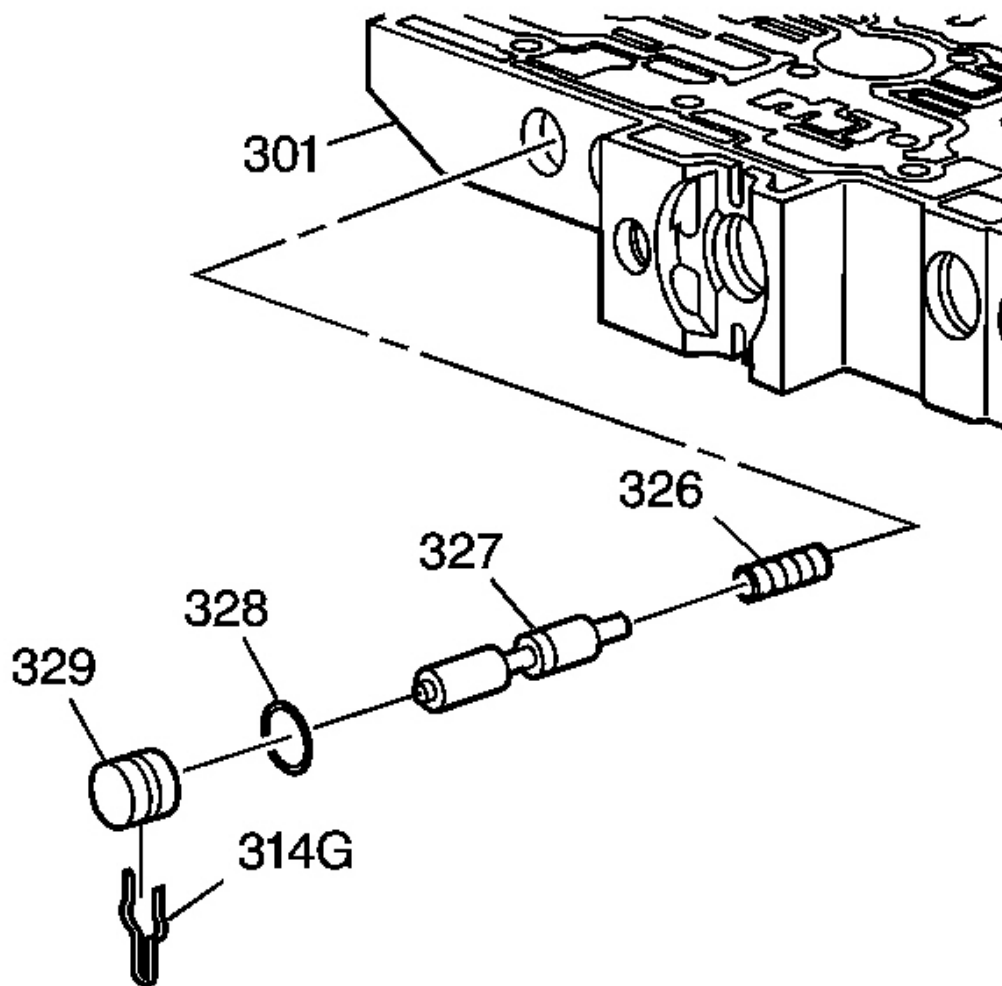


Fig. 336: Identifying TCC Regulator Apply Valve
Courtesy of GENERAL MOTORS CORP.

14. Install the TCC regulator apply valve bore plug O-ring seal (328) onto the TCC regulator apply valve bore plug (329).
15. Install the TCC regulator apply valve spring (326), the TCC regulator apply valve (327) and the TCC regulator apply valve bore plug (329) into the control valve body (301).
16. Hold the TCC regulator apply valve bore plug (329) in the control valve body (301). Install the TCC regulator apply valve bore plug retainer (314G) into the control valve body (301).

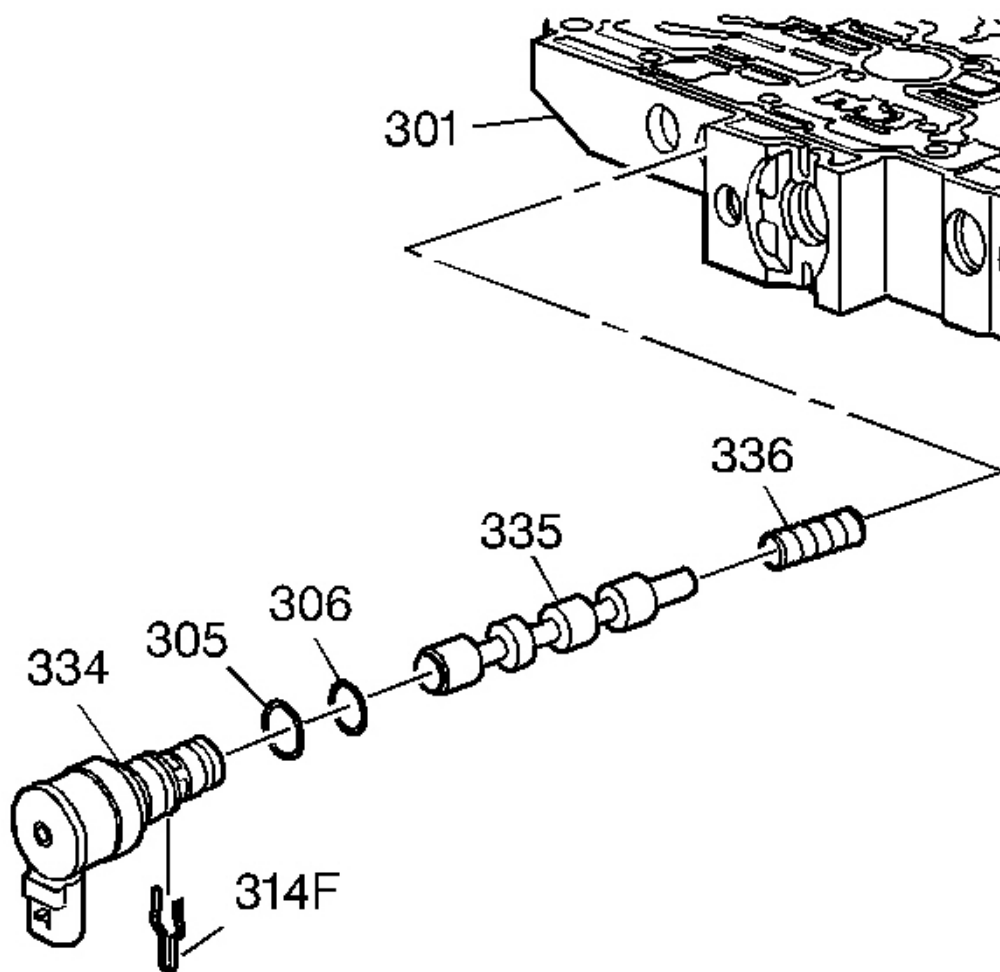


Fig. 337: View Of TCC PWM Solenoid
Courtesy of GENERAL MOTORS CORP.

17. Install new O-ring seals (305, 306) onto the TCC PWM solenoid valve (334) if they had been removed.
18. Install the TCC control valve spring (336), the TCC control valve (335) and the TCC PWM solenoid valve (334) into the control valve body (301).
19. Hold the TCC PWM solenoid valve (334) in the control valve body (301). Install the TCC PWM solenoid valve retainer (314F) into the control valve body (301).

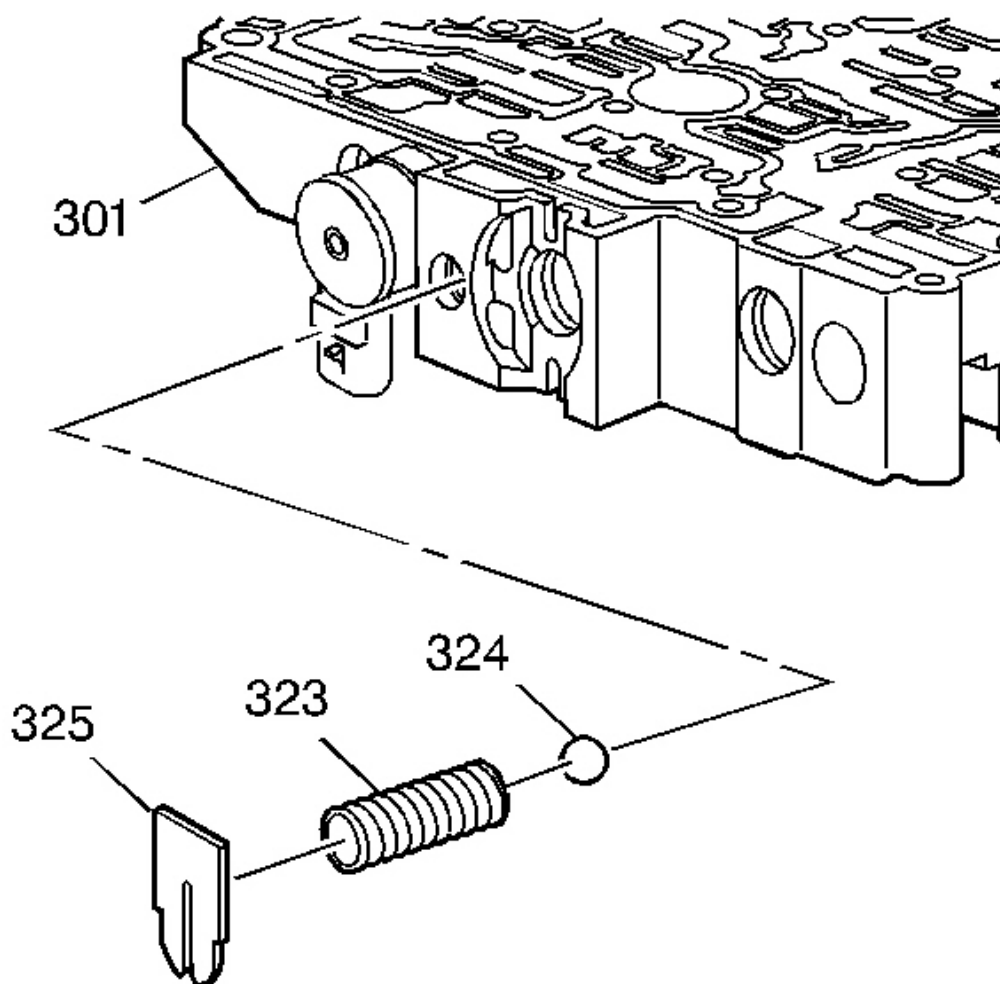


Fig. 338: Locating Line Pressure Relief Valve Assembly
Courtesy of GENERAL MOTORS CORP.

20. Install the line pressure relief valve (324) and the line pressure relief valve spring (323) into the control valve body (301).
21. Compress the line pressure relief valve spring (323) into the control valve body (301). Install the line pressure relief valve spring retainer (325) into the control valve body (301).

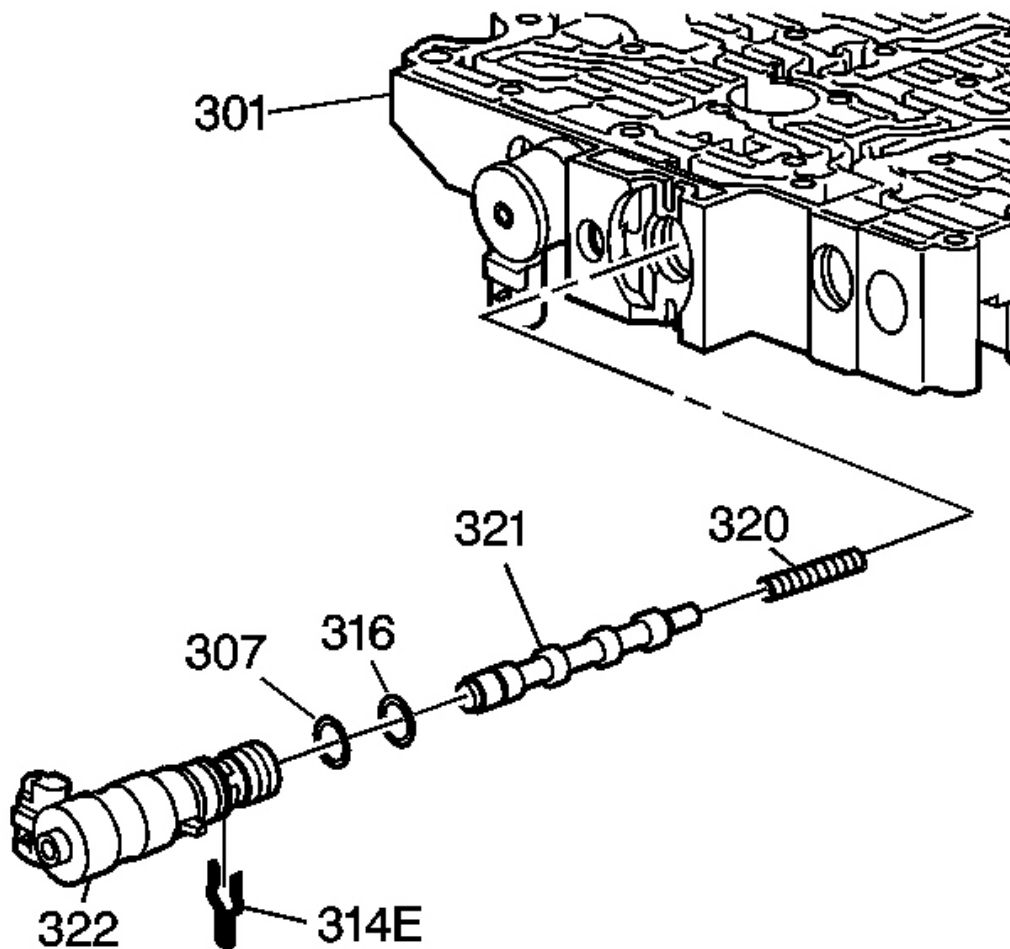


Fig. 339: View Of PC Solenoid Valve & Torque Signal Regulator Valve
Courtesy of GENERAL MOTORS CORP.

22. Install new O-ring seals (307, 316) onto the pressure control (PC) solenoid valve (322), if they had been removed.
23. Install the torque signal regulator valve spring (320), the torque signal regulator valve (321) and the PC solenoid valve (322) into the control valve body (301).
24. Hold the PC solenoid valve (322) in the control valve body (301). Install the pressure control solenoid valve retainer (314E) into the control valve body (301).

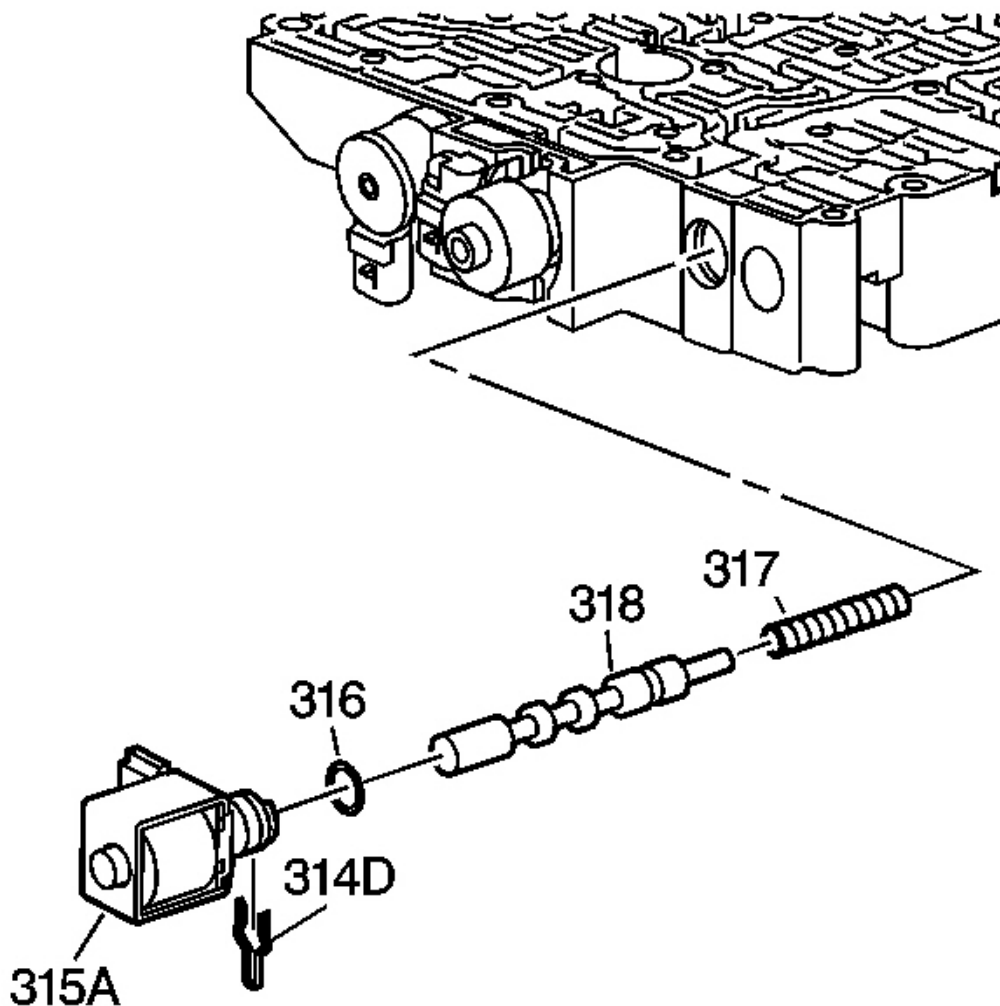


Fig. 340: Identifying 1-2, 3-4 Shift Solenoid (SS) Valve Components
Courtesy of GENERAL MOTORS CORP.

25. Install a new O-ring seal (316) onto the 1-2, 3-4 shift solenoid (SS) valve (315A), if it was removed.
26. Install the 1-2 shift valve spring (317), the 1-2 shift valve (318) and the 1-2, 3-4 SS valve (315A) into the control valve body (301).
27. Hold the 1-2, 3-4 SS valve (315A) in the control valve body (301). Install the 1-2, 3-4 shift solenoid valve retainer (314D) into the control valve body (301).

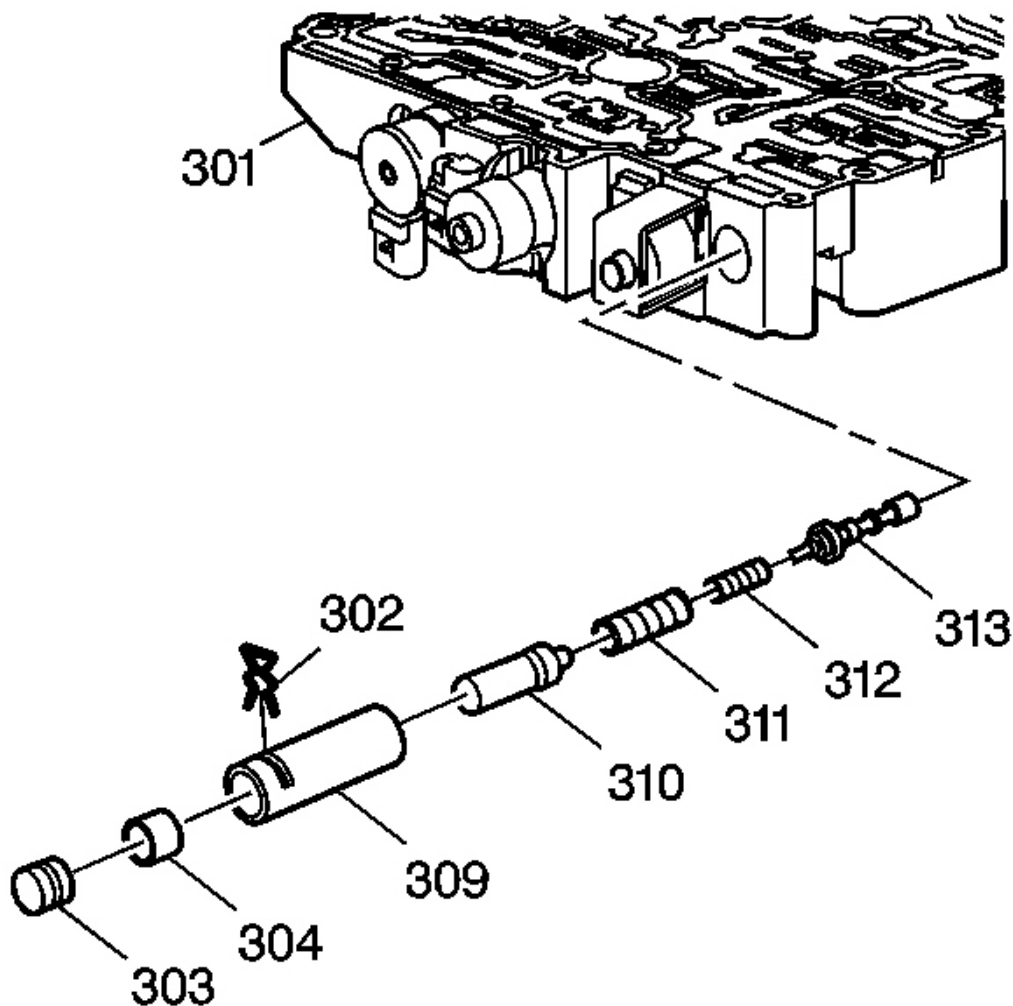


Fig. 341: View Of Reverse Boost Valve Bushing Assembly Components
Courtesy of GENERAL MOTORS CORP.

28. Install the reverse boost valve (310), the line boost valve (304) and the line boost valve bore plug (303) into the reverse boost valve bushing (309).
29. Install the pressure regulator valve (313), the pressure regulator valve outer and inner springs (311, 312) and the reverse boost valve bushing assembly (309) into the control valve body (301).
30. Hold the reverse boost valve bushing assembly (309) in the control valve body (301). Install the line boost valve and bushing retainer (302) into the control valve body (301).

OIL PUMP DRIVE SHAFT ASSEMBLY

Assembly Procedure

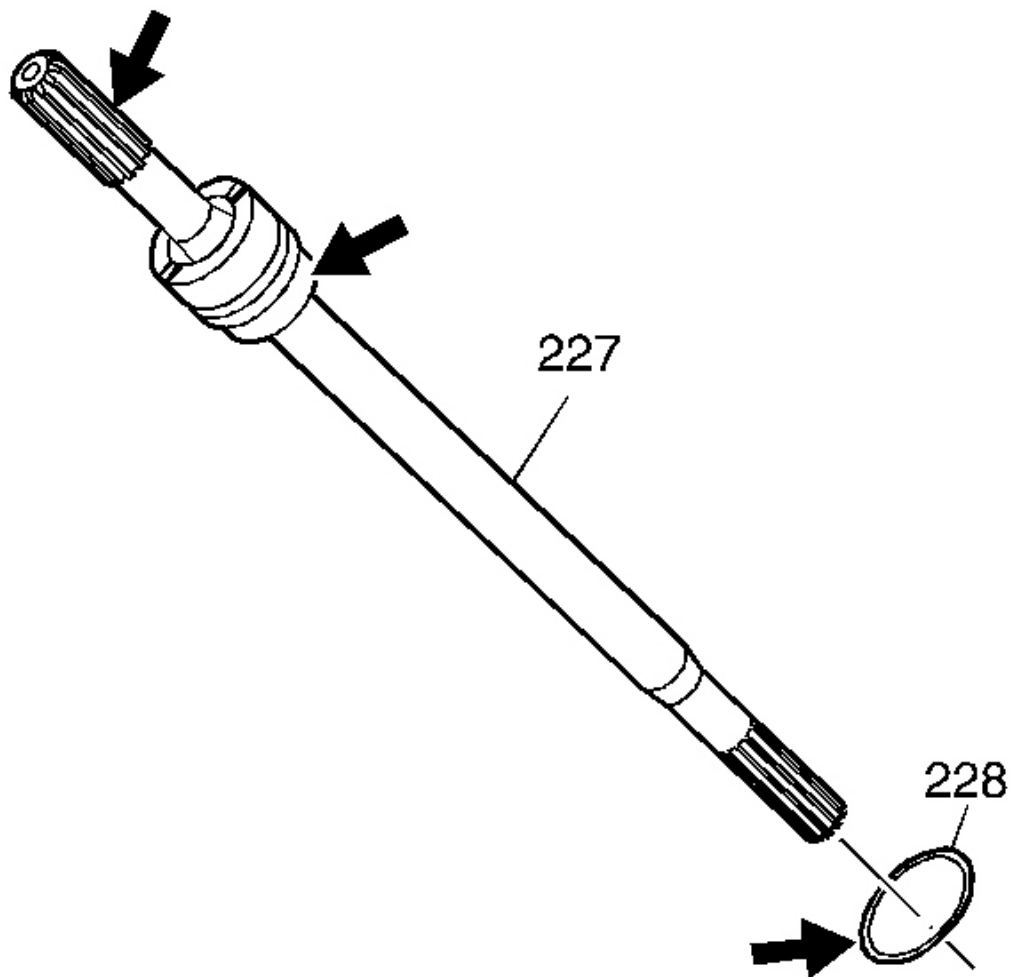


Fig. 342: Inspection Areas On Oil Pump Drive Shaft
Courtesy of GENERAL MOTORS CORP.

1. Inspect the oil pump drive shaft (227) for the following:
 - A scored or rough journal surface
 - Stripped or burred splines
 - A cut or damaged seal

2. Install a new oil pump drive shaft seal (228) onto the oil pump drive shaft (227).

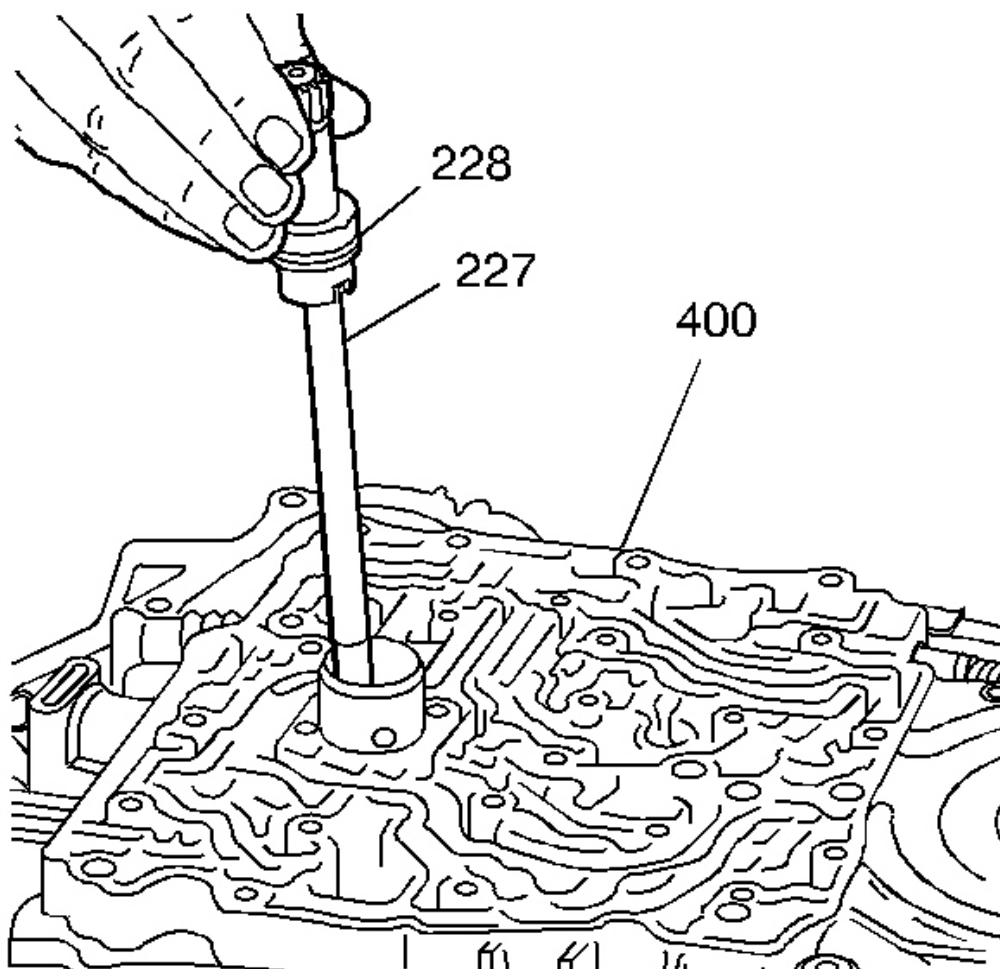


Fig. 343: Installing Oil Pump Drive Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

3. Install the oil pump drive shaft assembly (227) into the case cover (400).

CONTROL VALVE BODY AND SPACER PLATE ASSEMBLY

Tools Required

J 36850 Assembly Lubricant (or equivalent)

Assembly Procedure

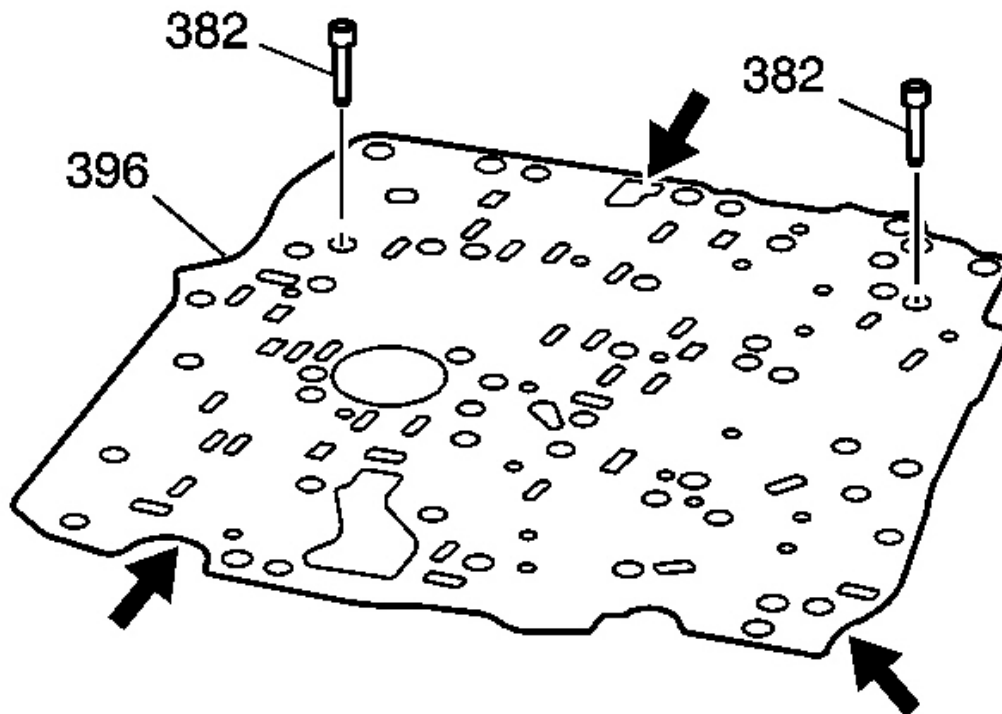


Fig. 344: View Of Control Valve Body Spacer Plate And Gasket Assembly
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The bonded spacer plate gasket assembly is not re-useable and should be replaced any time it is removed from the transmission.

1. Inspect the control valve body spacer plate and gasket assembly (396) for the following root cause:
 - Plugged holes
 - Damaged gasket sealing surfaces
 - Plugged or damaged screen/seal assemblies (382)

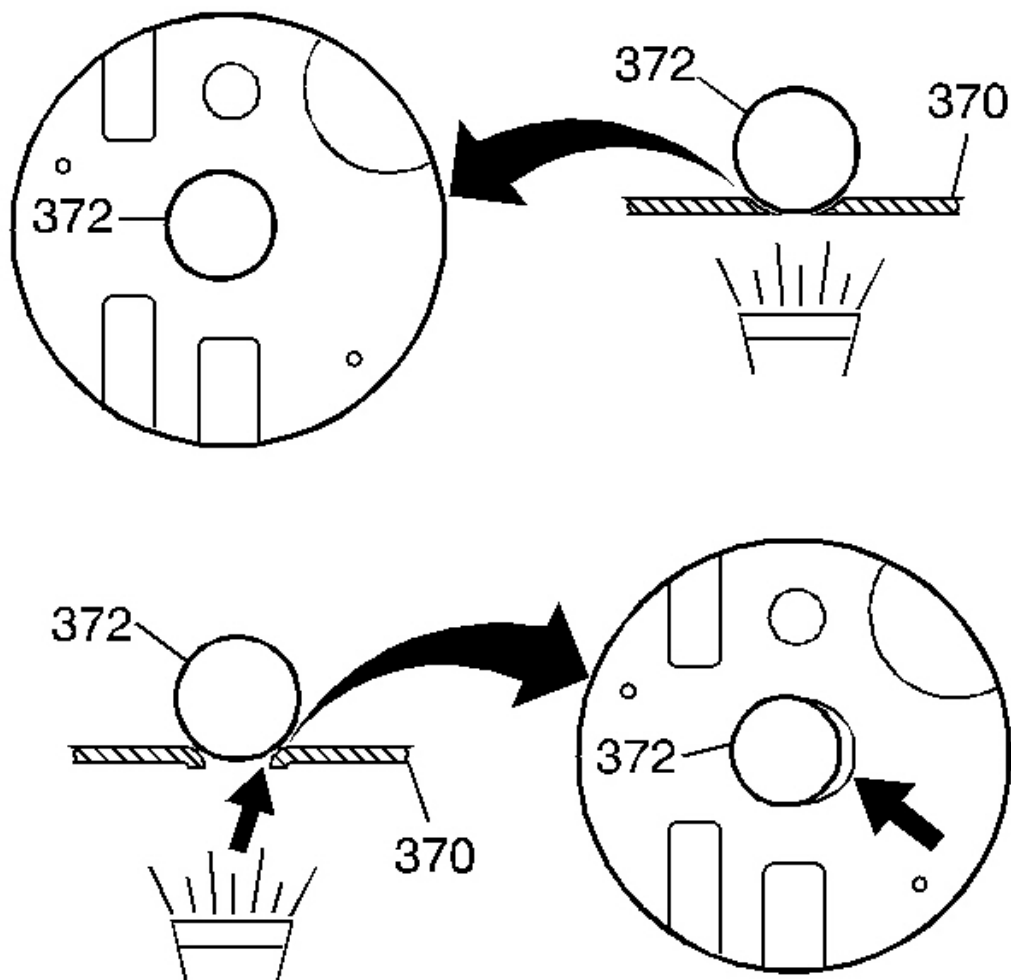


Fig. 345: Inspecting Valves For Excessive Peening
Courtesy of GENERAL MOTORS CORP.

2. Inspect each ball check valve seat (one at a time) on the spacer plate (370) for excessive peening.
 - Place a ball check valve (372) on each seat
 - Use a flashlight to look for visible light between the ball check valve and the seat.

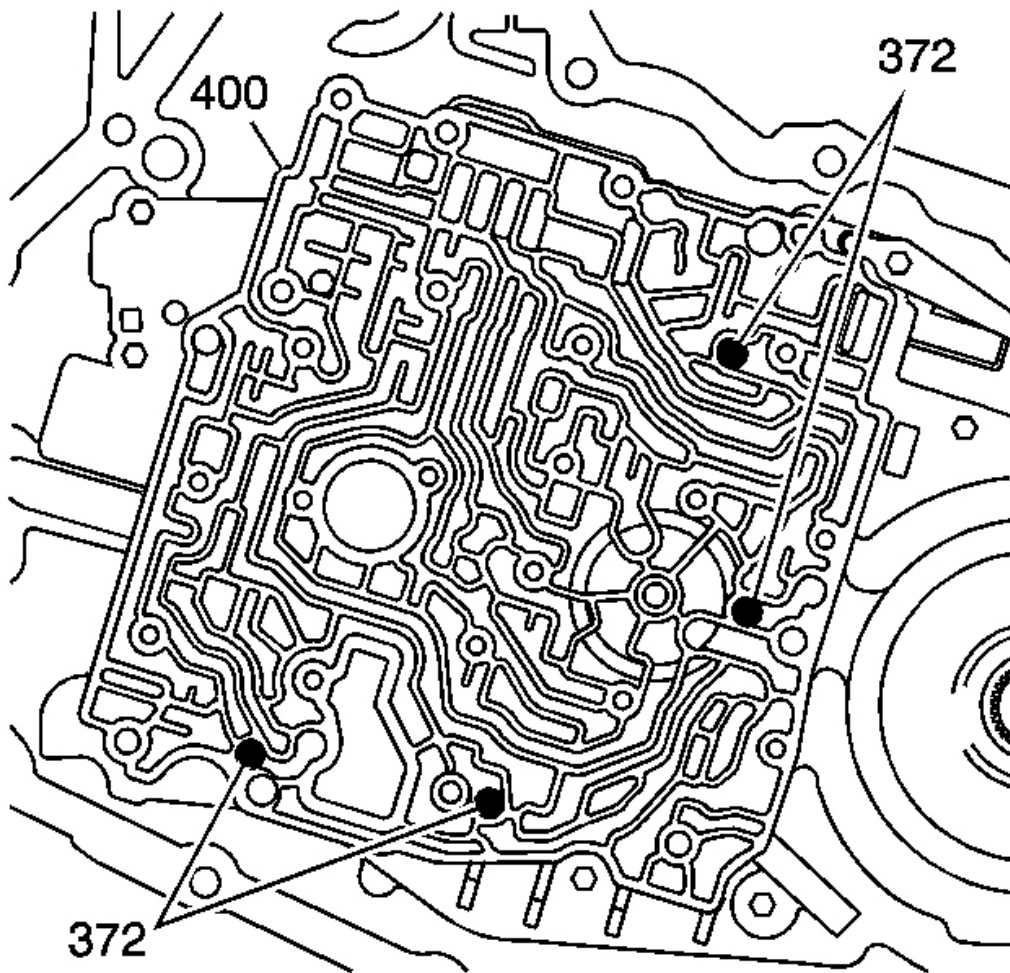


Fig. 346: Locating Ball Check Valves In Case Cover
Courtesy of GENERAL MOTORS CORP.

3. Install 4 ball check valves (372) into the case cover (400), in the positions shown. Use **J 36850** or equivalent in order to hold the ball check valves in the case cover (400).

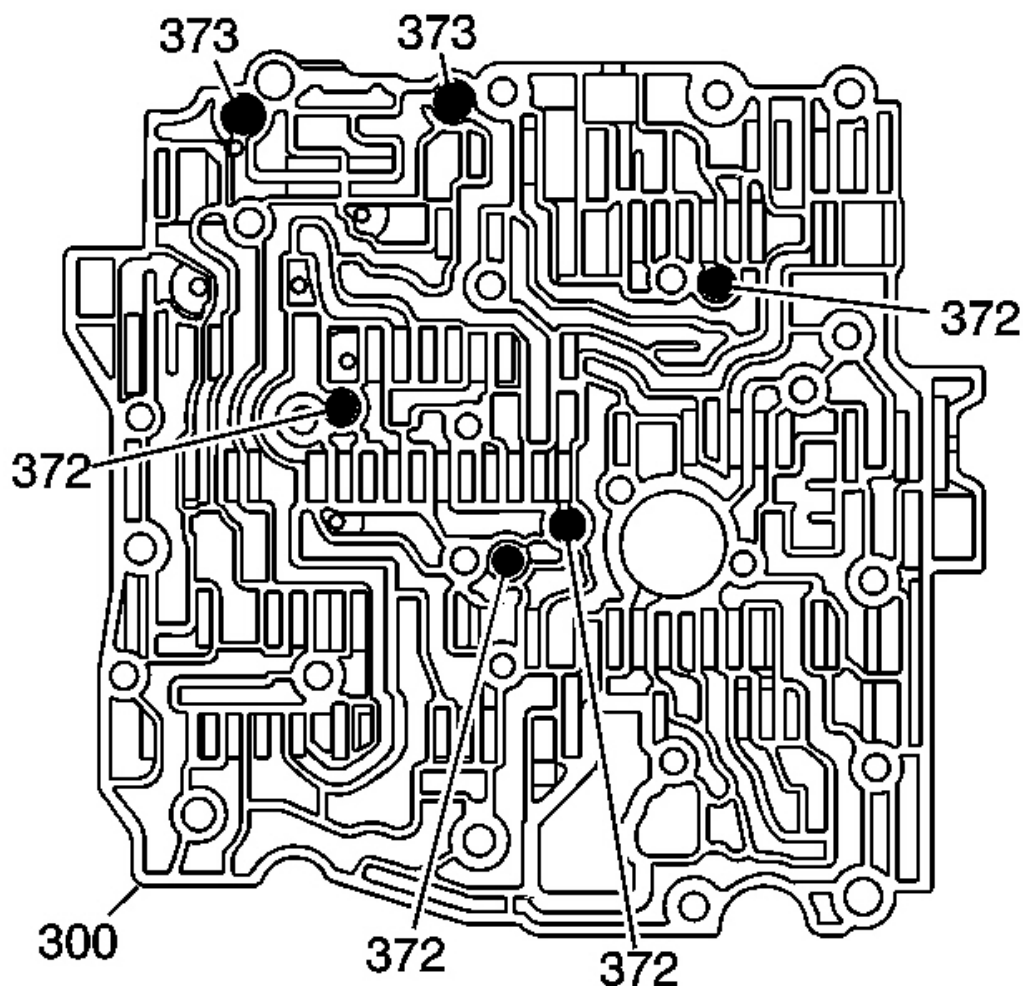


Fig. 347: Locating Ball Check Valves In Valve Body
Courtesy of GENERAL MOTORS CORP.

4. Install the 2 larger ball check valves (373) and the 4 smaller ball check valves (372) into the control valve body (300). Use **J 36850** or equivalent in order to retain the ball check valves in the control valve body (300).

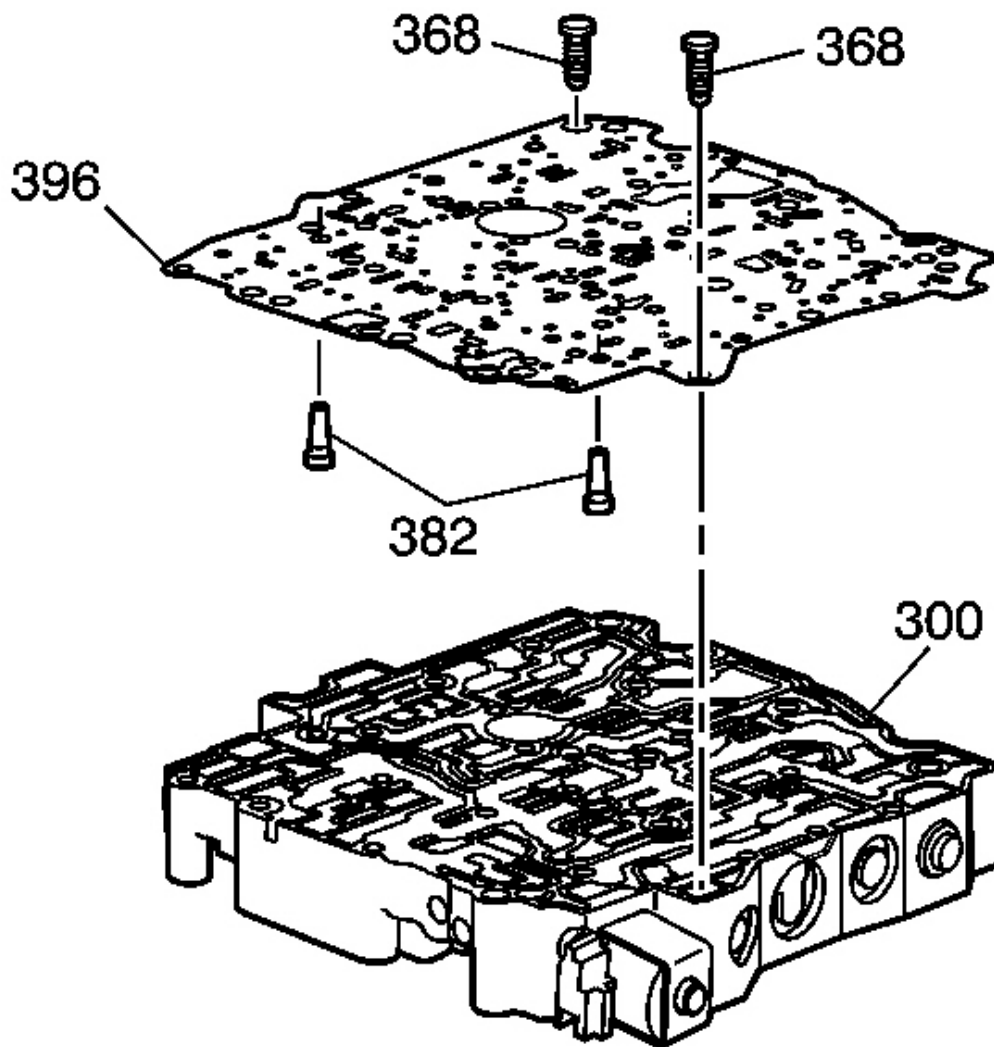


Fig. 348: Locating Screen/Seal Assemblies And Spacer Plate
Courtesy of GENERAL MOTORS CORP.

5. Install the screen/seal assemblies (382) into the spacer plate and gasket assembly (396).

IMPORTANT: The bonded spacer plate gasket assembly is not re-useable and should be replaced any time it is removed from the transmission.

6. Install the NEW spacer plate and gasket assembly (396) onto the control valve body (300).
7. Install the bolts (368) to hold the spacer plate and gaskets onto the control valve body (300).

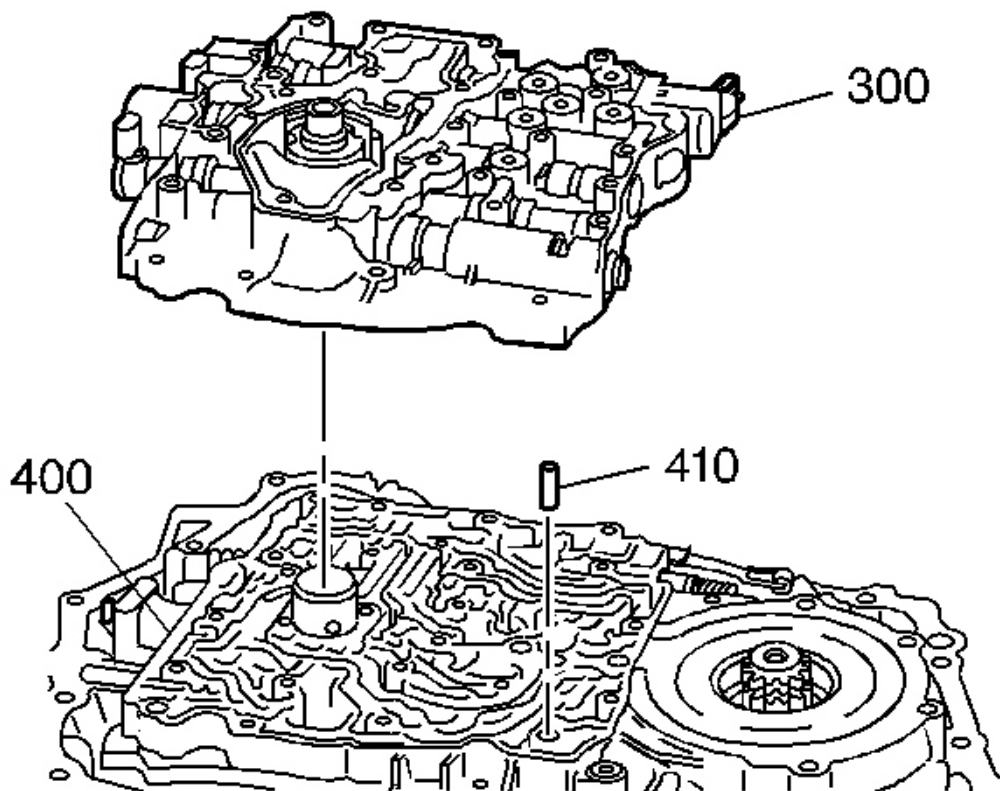


Fig. 349: Installing Control Valve Body Alignment Sleeve Into Case Cover
Courtesy of GENERAL MOTORS CORP.

8. Install the control valve body alignment sleeve (410) into the case cover (400).

IMPORTANT:

- Use the control valve body alignment sleeve (410) and turbine shaft sleeve in the case cover (400) as guides.
- Be sure that the ball check valves do not drop out of the control valve body (300) during assembly.

9. Install the control valve body (300) onto the case cover (400).

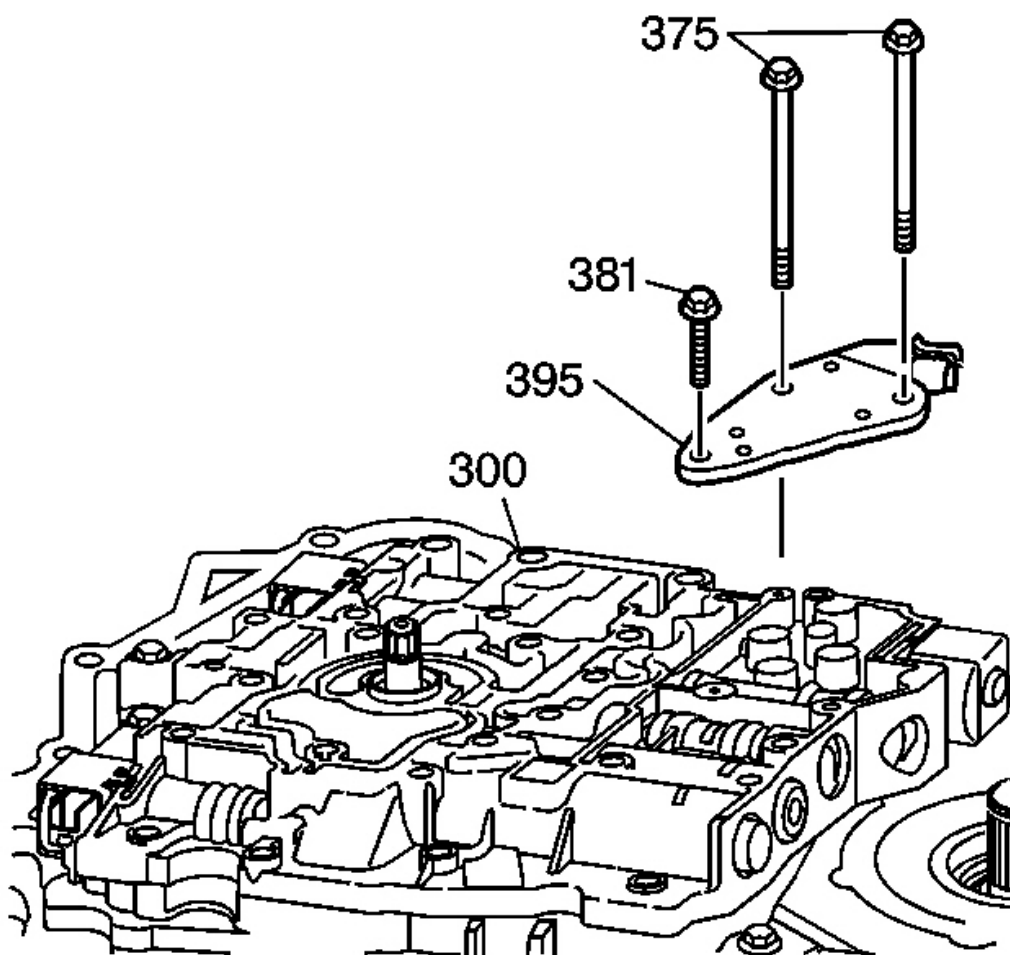


Fig. 350: Removing/Installing Transmission Fluid Pressure (TFP) Manual Valve
Courtesy of GENERAL MOTORS CORP.

10. Install the transmission fluid pressure (TFP) manual valve position switch assembly (395) onto the control valve body (300).

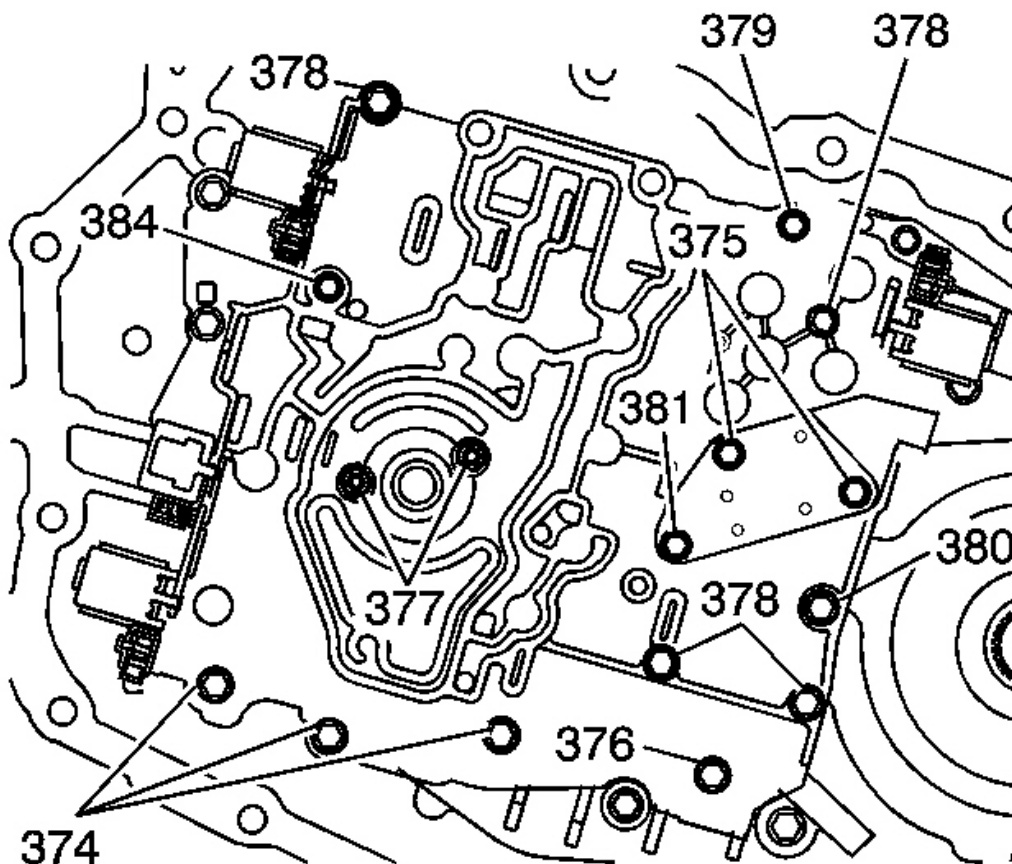


Fig. 351: Installing Valve Body Bolts
 Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Finger start the bolts to prevent cross-threading.

11. Install the control valve body bolts (374-381, 384) as indicated.

IMPORTANT:

- Tighten the bolts in a spiral pattern starting with the bolts at the center of the control valve body.
- If the bolts are tightened at random, valve bores may become distorted and inhibit proper valve operation.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

12. Tighten the control valve body bolts (374-381, 384).

Tighten:

- 374 - 12 N.m (106 lb in)
- 375 - 12 N.m (106 lb in)
- 376 - 12 N.m (106 lb in)
- 377 - 12 N.m (106 lb in)
- 378 - 12 N.m (106 lb in)
- 379 - 16 N.m (11 lb ft)
- 380 - 25 N.m (18 lb ft)
- 381 - 8 N.m (70 lb in)
- 384 - 12 N.m (106 lb in)

OIL PUMP COMPONENTS DISASSEMBLE

Disassembly Procedure

result.

4. Remove the outer and the inner oil pump prime springs (222, 223).
5. Remove the pump slide seal (220) and the slide seal support (221).
6. Remove the pump slide pivot pin (215).
7. Remove the pump body (227) from the pump base (229).
8. Remove the pump pivot pin (228).

OIL PUMP COMPONENTS ASSEMBLE**Assembly Procedure**

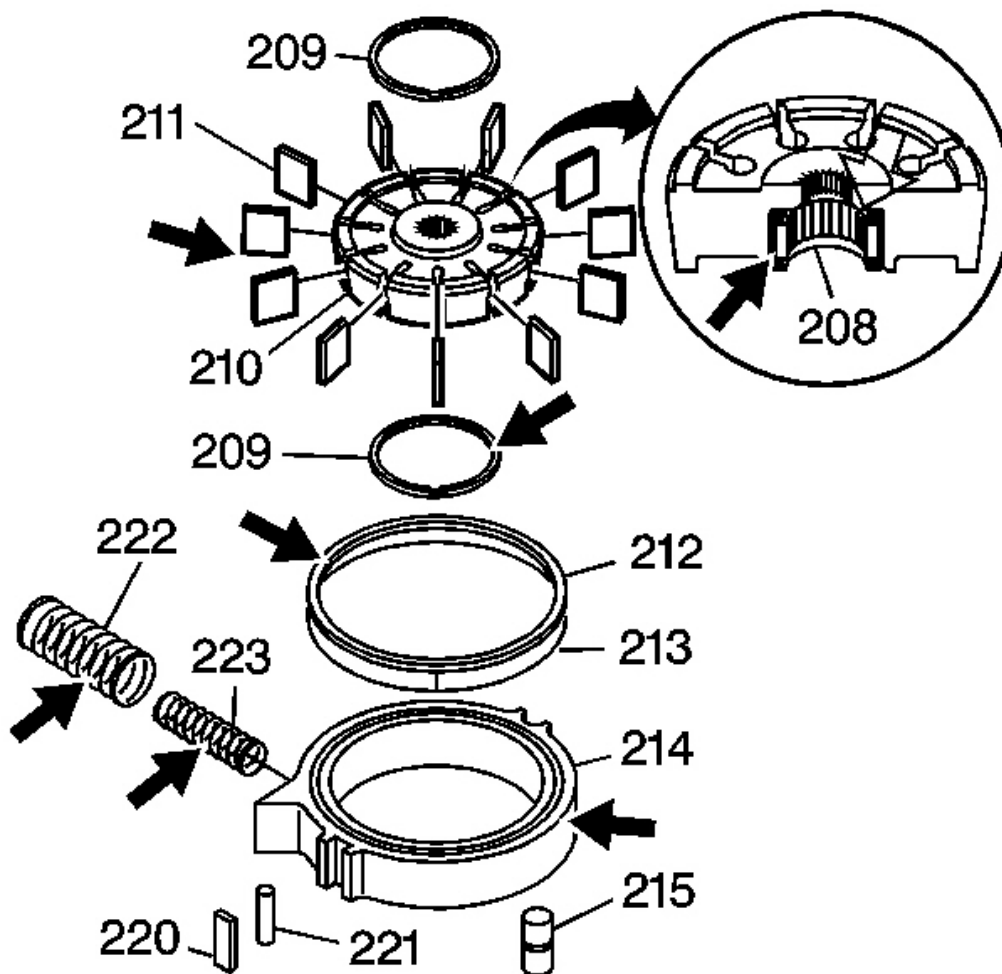


Fig. 353: Oil Pump Components Inspection
 Courtesy of GENERAL MOTORS CORP.

1. Inspect the oil pump for:
 - Worn, scored or gouged pump slide (214)
 - Cracks, wear or damage to the rotor (210) or the vanes (211)
 - Cuts or damage to the seals (212, 213, 220, 221)
 - Broken priming springs (222, 223)
 - Damaged oil pump drive shaft bearing (208) - the bearing is not serviced separately from the rotor.

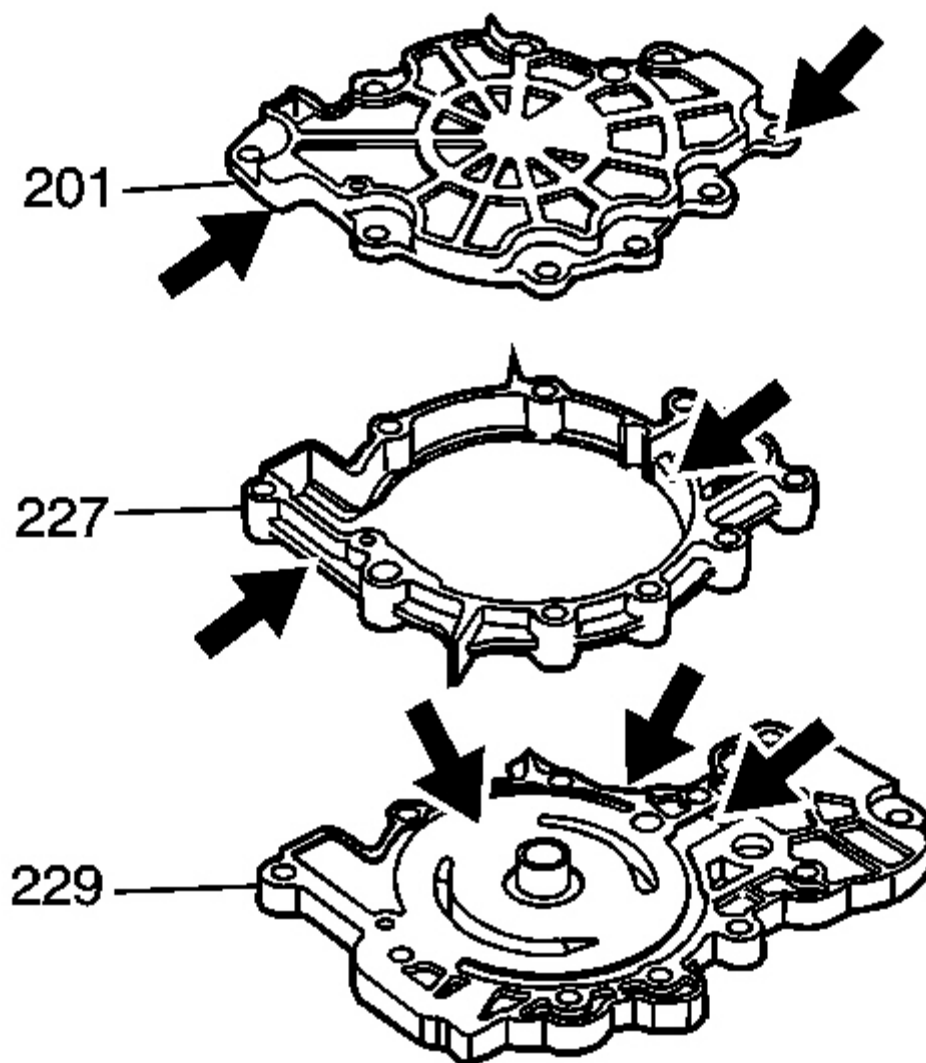


Fig. 354: Inspecting Areas On Oil Pump Body
Courtesy of GENERAL MOTORS CORP.

2. Inspect the oil pump body (228) and the base (229) for:
 - Porosity
 - A worn, scored or damaged pump pocket
 - Interconnected oil passages

- Damaged machined surfaces
3. Inspect the oil pump cover (201) for cracks, wear or gouges from the pump vanes.

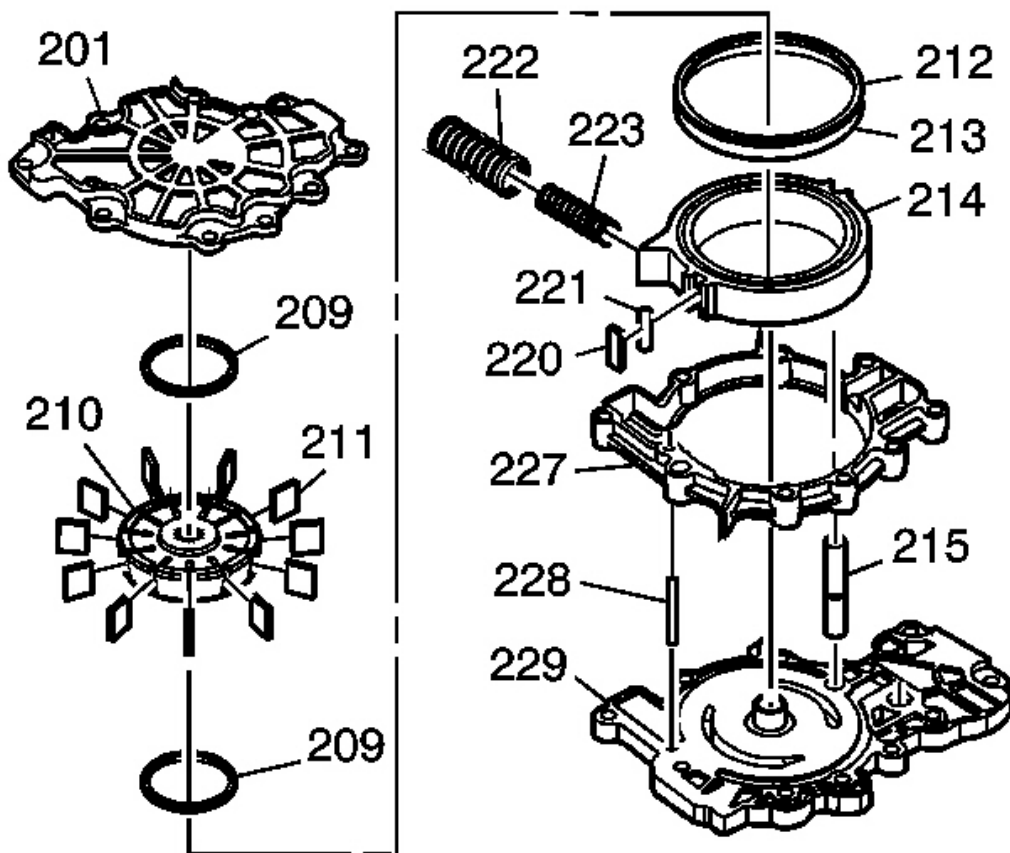


Fig. 355: Identifying Oil Pump Components
Courtesy of GENERAL MOTORS CORP.

4. Install the pump pivot pin (228).
5. Install the pump body (227) onto the pump base (229).
6. Install the pivot slide pin (215).
7. Insert the pump slide seal (221) and the pump slide seal (220) into the pump slide (214).
8. Insert the pump slide (214) and the slide pivot pin (215) into the pump body (227).
9. Install the outer and inner priming springs (222, 223) as an assembly into the pump body

- (227).
10. Install the first vane ring into the pump body (227).
 11. Insert the pump slide O-ring seal (213) and pump slide seal ring (212) into the pump slide (214).
 12. Insert the rotor (210) into the pump body (227).
 13. Install the pump vanes (211) into the rotor (210). The pump vane must be flush with the top of the rotor.
 14. Install the second vane ring (209) onto the top of the rotor (210).

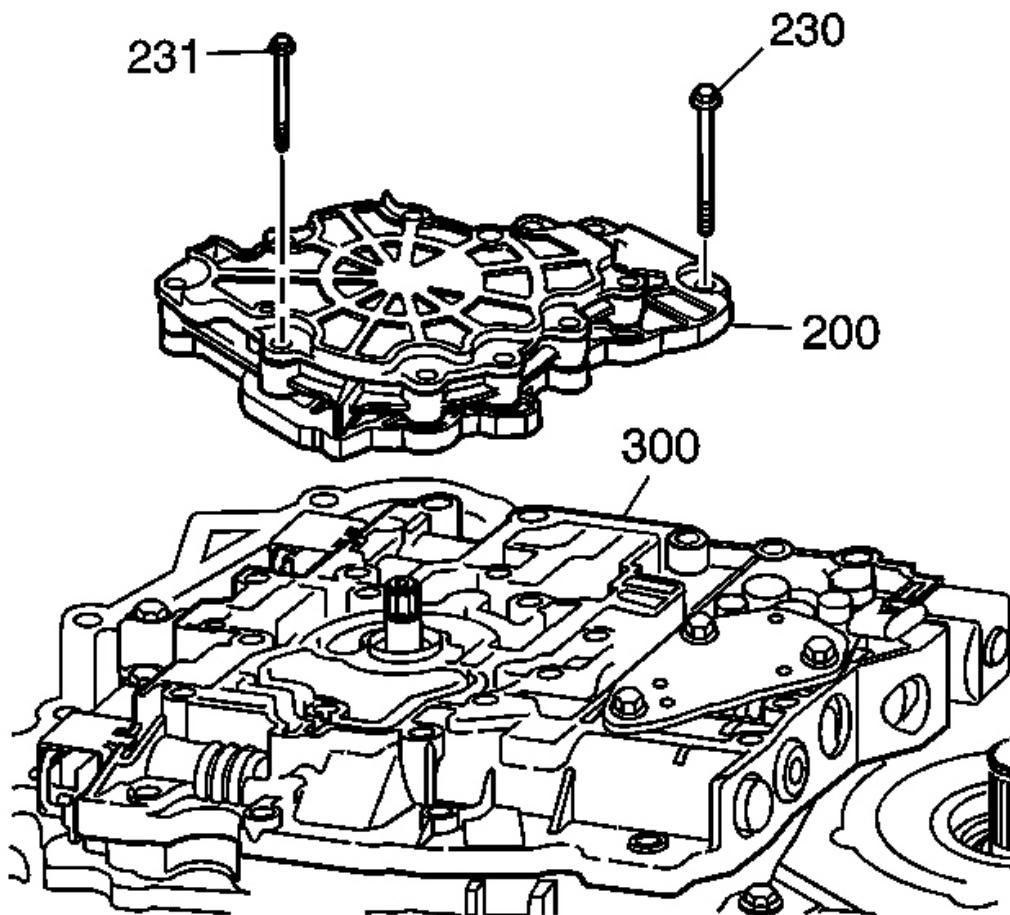


Fig. 356: Locating Oil Pump Assembly
Courtesy of GENERAL MOTORS CORP.

15. Install the oil pump assembly (200) onto the control valve assembly (300).

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

16. Install the two pump body to case bolts (230) and the nine pump cover to case cover bolts (231).

Tighten: Tighten the bolts to 12 N.m (106 lb in).

WIRING HARNESS ASSEMBLE

Assembly Procedure

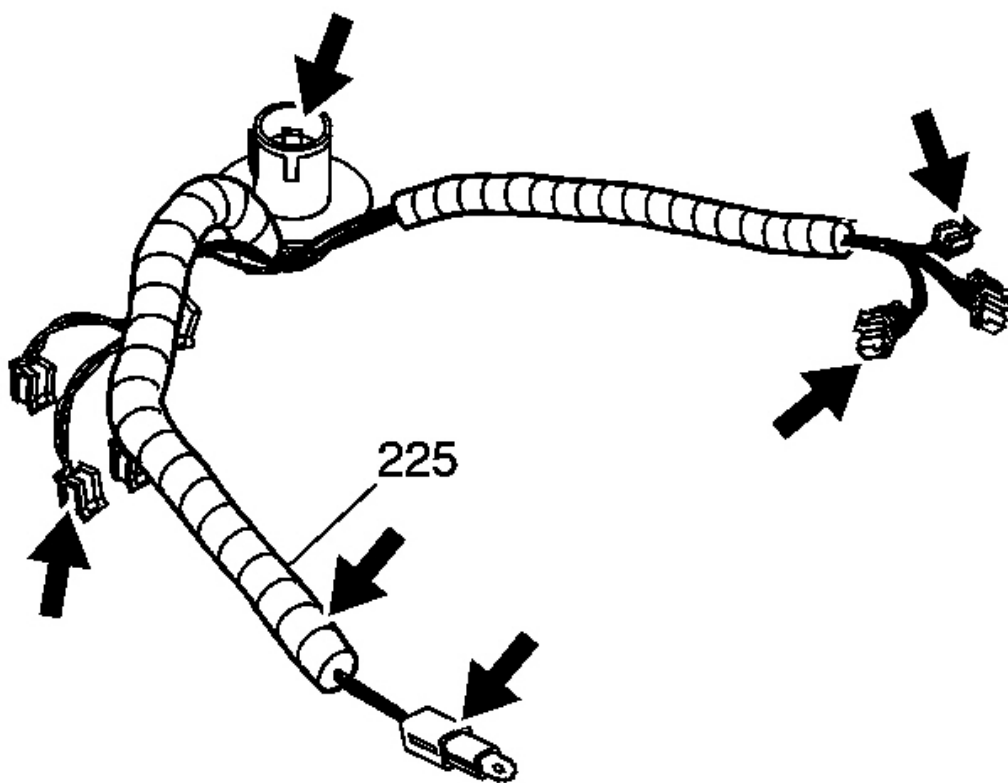


Fig. 357: View Of Wiring Harness Assembly
Courtesy of GENERAL MOTORS CORP.

1. Inspect the wiring harness assembly (225) for:

- Cut or pinched wires
- Cut wire insulation
- Bent or broken electrical connectors
- Damaged terminal pins

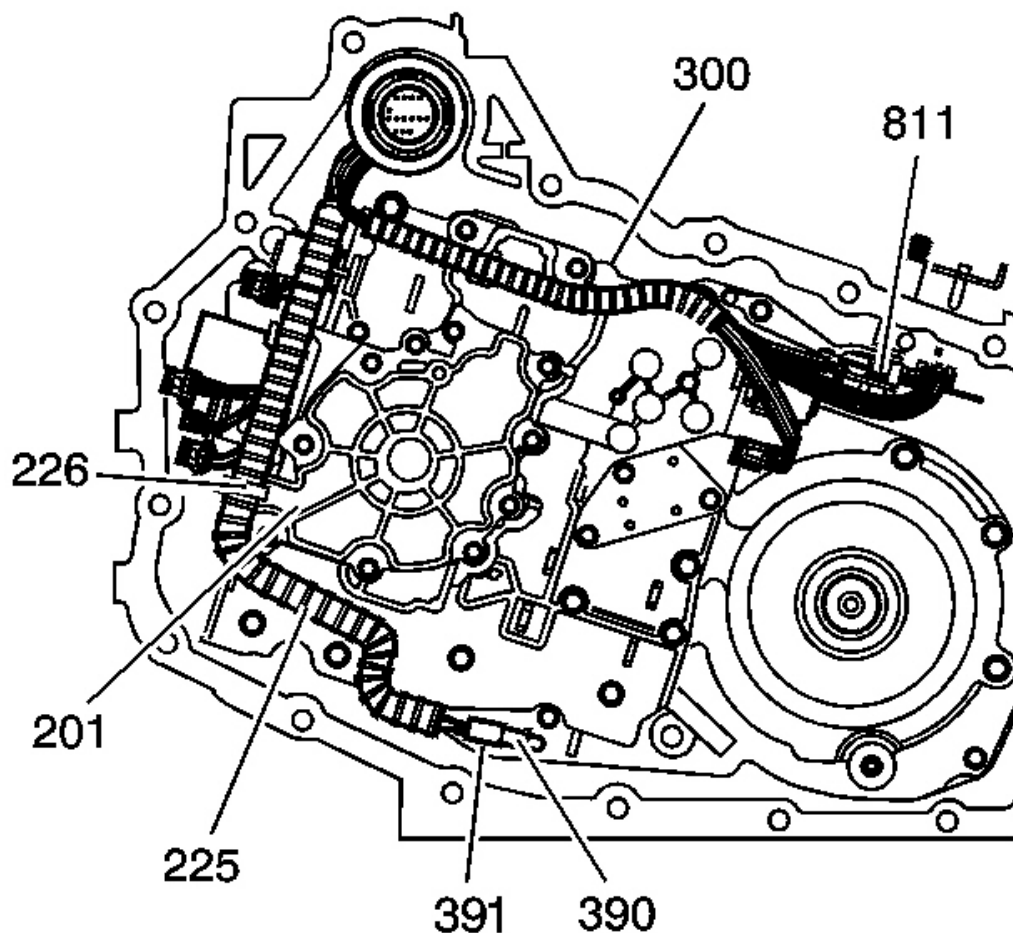


Fig. 358: Aligning Wire Harness Onto Control Valve Body
Courtesy of GENERAL MOTORS CORP.

2. Position the wire harness assembly (225) onto the control valve body (300) and the pump cover (201).

3. Mate each connector into its respective electrical component and engage the locking tabs.
4. Secure the wiring harness conduit into the retaining clip (226) on the pump cover (201).
5. Assemble the fluid temperature sensor (391) into the temperature sensor clip (390).

CONTROL VALVE BODY COVER AND GASKET ASSEMBLE

Tools Required

J 36850 Assembly Lubricant (or equivalent)

Assembly Procedure

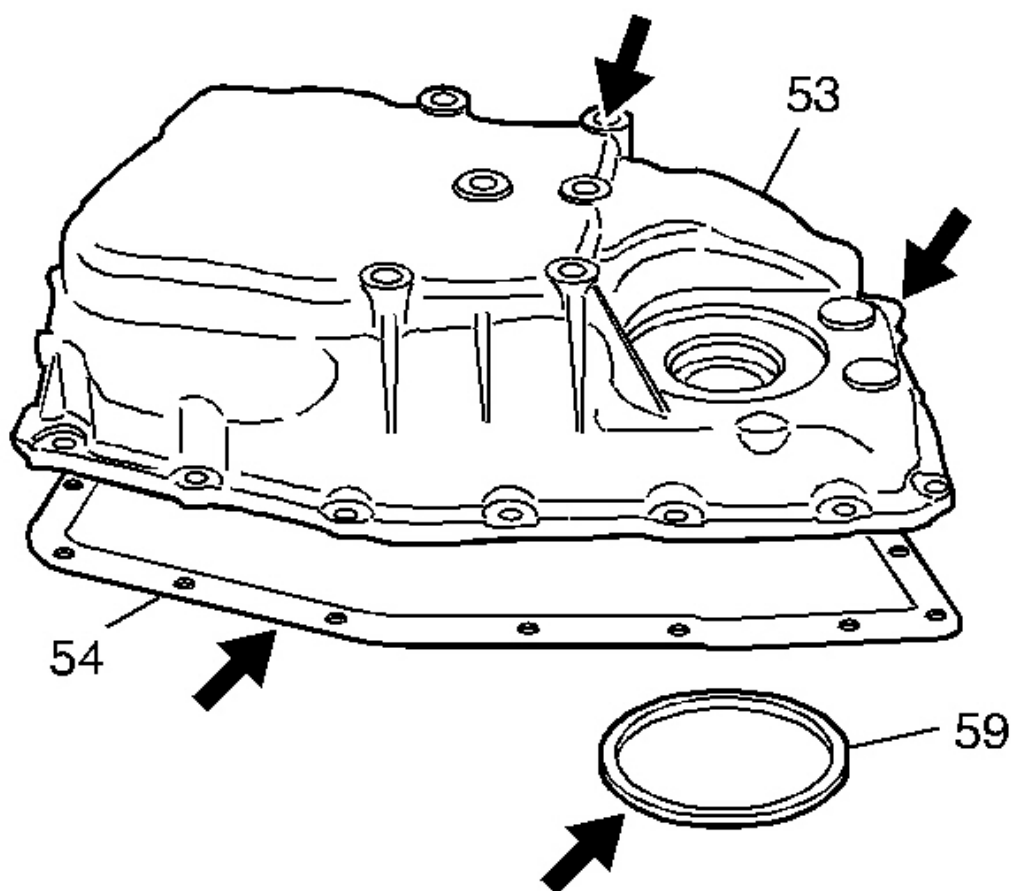


Fig. 359: Inspecting Case Side Cover

Courtesy of GENERAL MOTORS CORP.

1. Inspect the control valve body cover (53) for the following conditions:
 - Damaged or porous gasket sealing surfaces
 - Damaged or porous casting surfaces
 - Damaged or stripped bolt holes
2. Inspect the control valve body cover gaskets (54, 59) for damage. The gaskets are reusable if they are NOT damaged.

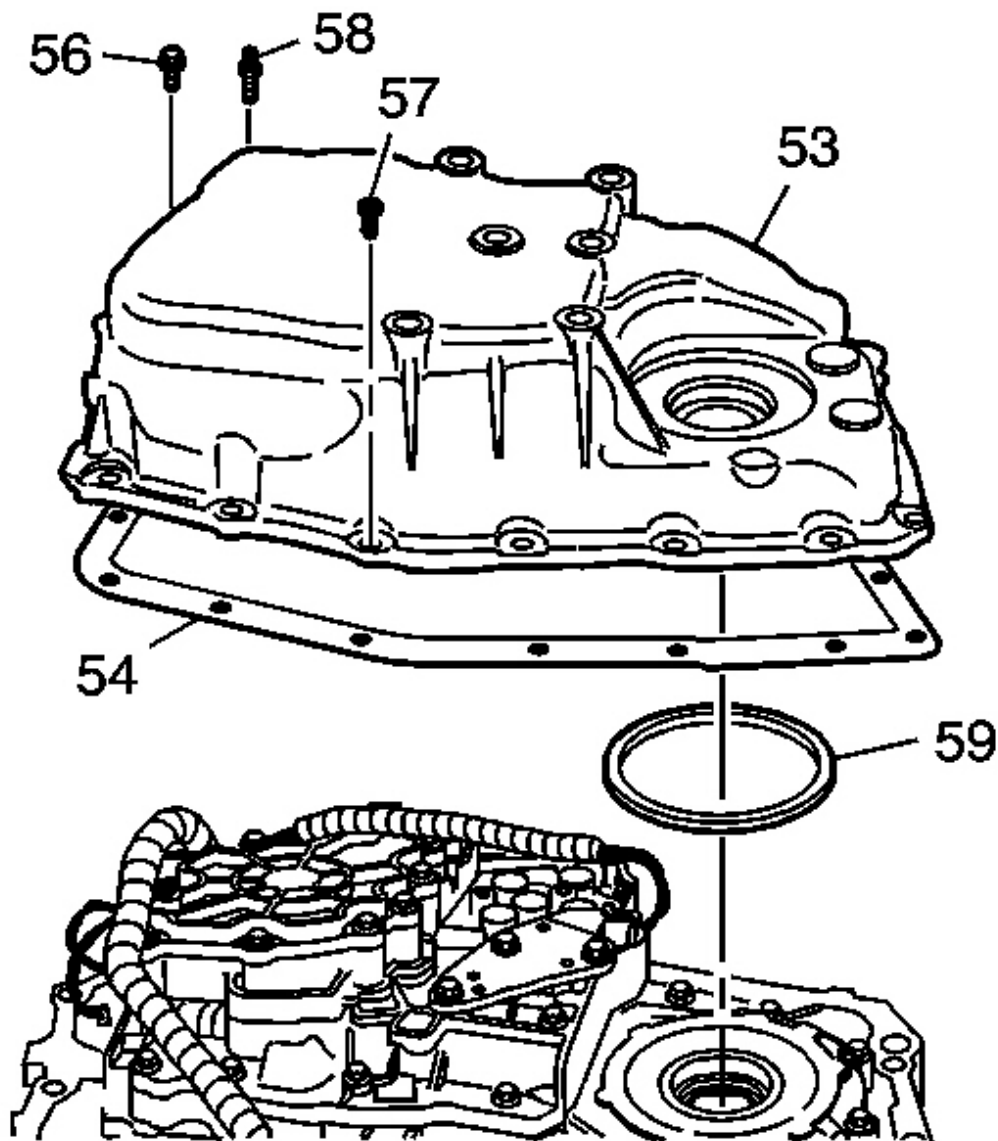


Fig. 360: Locating Control Valve Body Cover Gasket
Courtesy of GENERAL MOTORS CORP.

3. Assemble the control valve body cover inner gasket (59) to the control valve body cover (53). Use **J 36850** or equivalent to retain the gasket in position.
4. Install the control valve body cover gasket (54) and control valve body cover (53) onto the

case. Make sure the gaskets and electrical connector are positioned correctly.

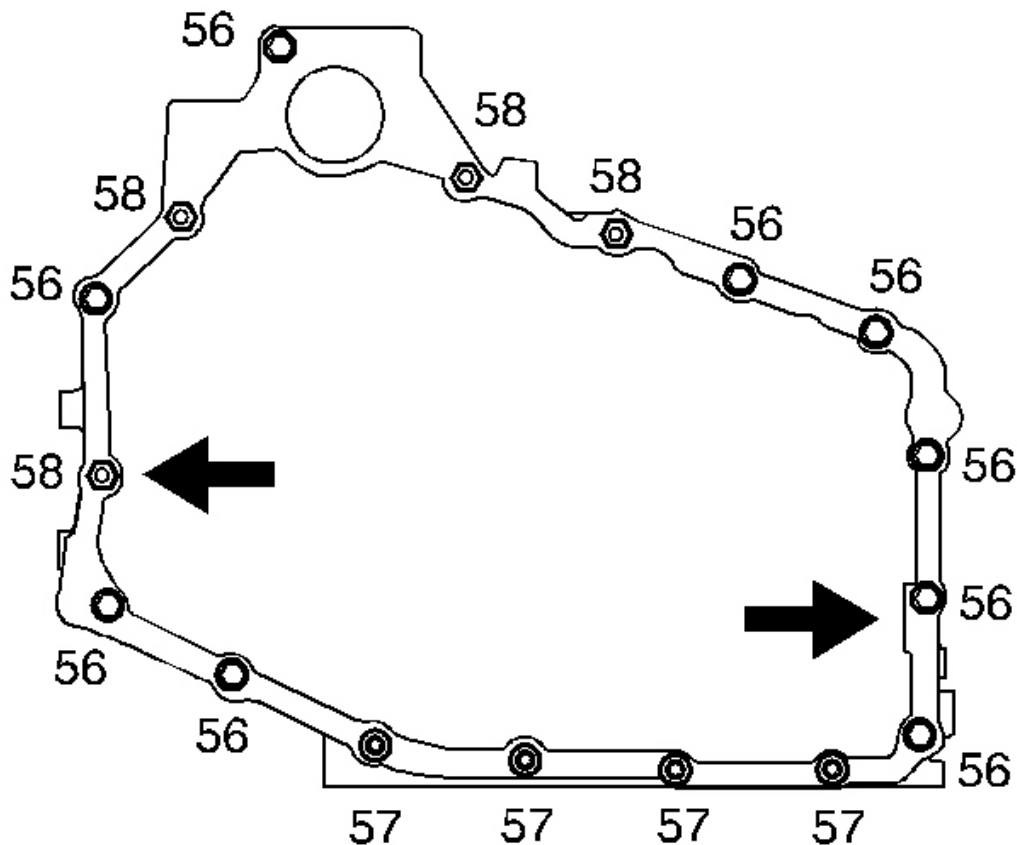


Fig. 361: Identifying Control Valve Body Cover Bolt & Control Valve Body Cover To Case Stud Bolt

Courtesy of GENERAL MOTORS CORP.

5. Install control valve body cover bolt (56) and one control valve body cover to case stud bolt (58) in the locations shown. These bolts will properly locate the control valve body cover and gasket to the case.

NOTE: Refer to **FASTENER NOTICE** in Cautions and Notices.

6. Install the remaining bolts as indicated:
 - Nine control valve body cover bolts (56)

- Four control valve body cover TORX® head bolts (57)
- Four control valve body cover to case stud bolts (58)

Tighten: Tighten all bolts to 25 N.m (18 lb ft).

THERMO ELEMENT ADJUSTMENT

Tools Required

J 34094-A Thermal Element Height Gauge. See **Special Tools**.

Adjustment Procedure

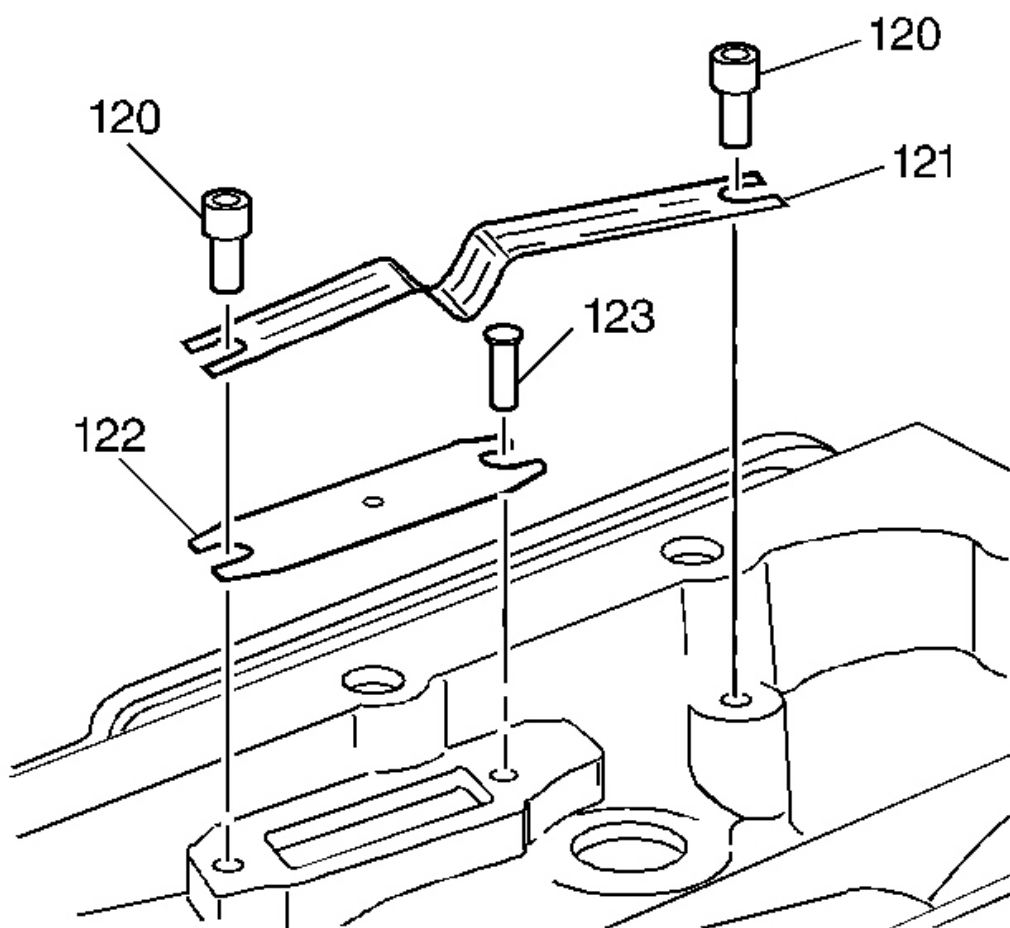


Fig. 362: Removing Thermo Element
Courtesy of GENERAL MOTORS CORP.

1. Remove the thermo element plate pins (120).
2. Remove the thermo element (121) and the thermo element plate (122).

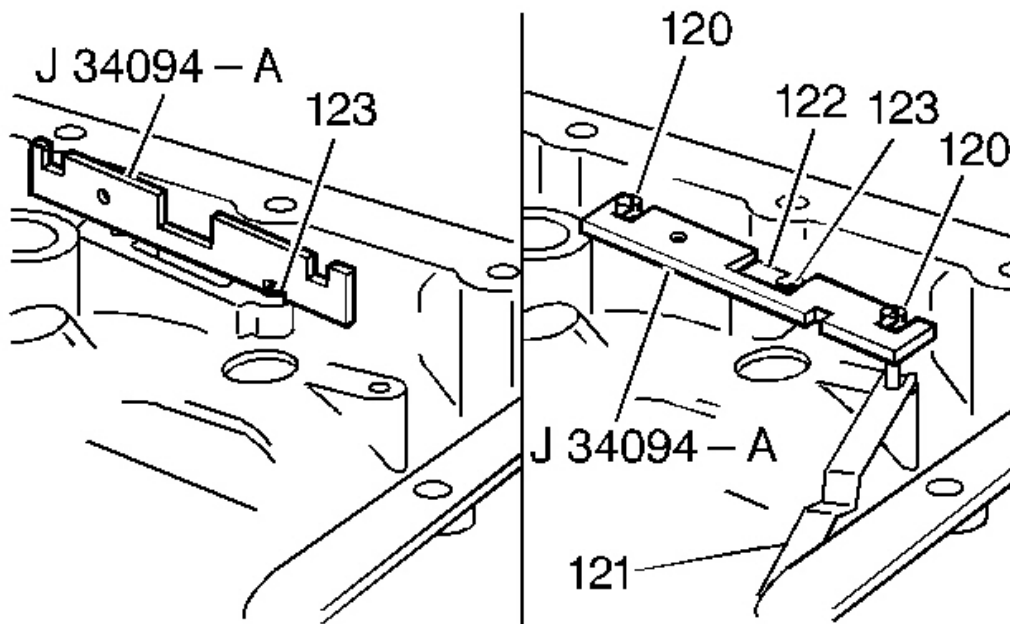


Fig. 363: Using J 34094-A To Set The Height Of The Thermo Element Plate Center Pin
Courtesy of GENERAL MOTORS CORP.

3. Use **J 34094-A** in order to set the height of the thermo element plate center pin (123). See **Special Tools**.
4. Install the thermo element plate (122).
5. Use **J 34094-A** in order to set the height of the thermo element plate pin (120) that is farthest from the accumulators. See **Special Tools**.
6. Use **J 34094-A** in order to set the height of the second thermo element plate pin (120). See **Special Tools**.

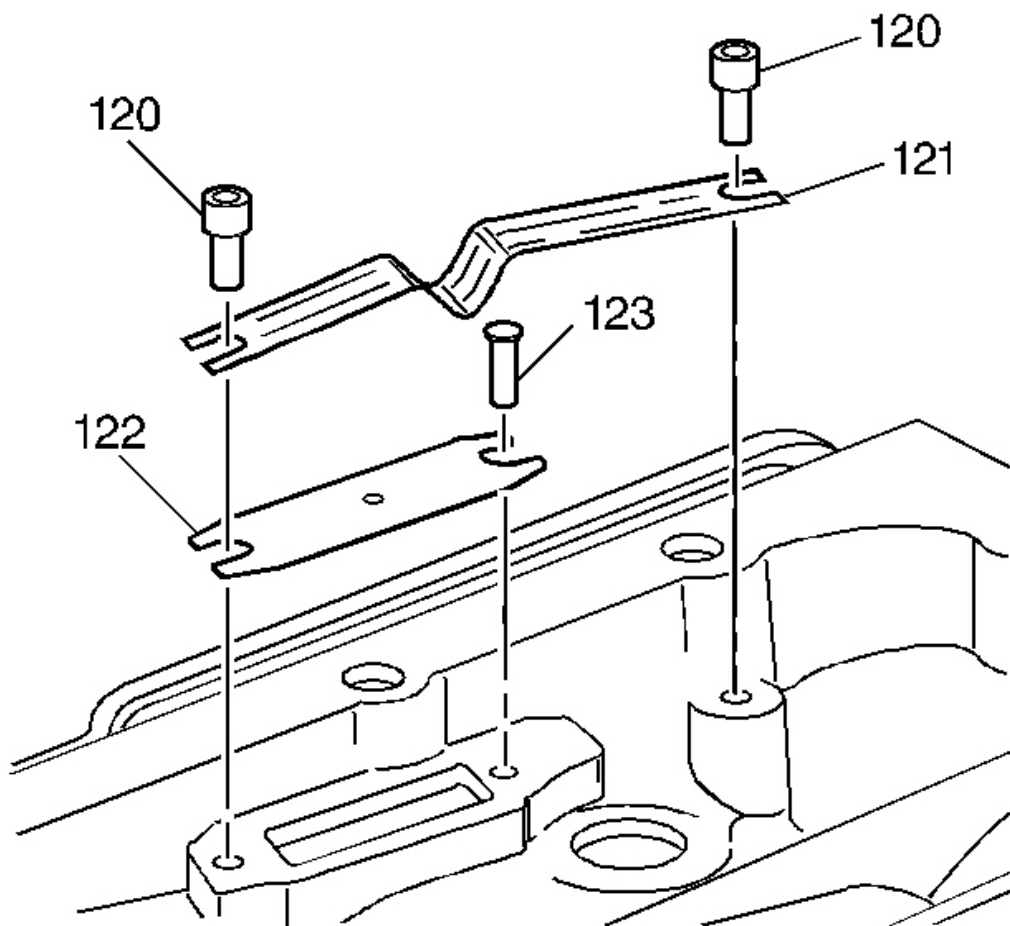


Fig. 364: Removing Thermo Element
Courtesy of GENERAL MOTORS CORP.

7. Carefully install the thermo element (121) between the two thermo element plate pins (120).
8. The V in the thermo element (121) must contact the thermo element plate (123).

2-1 MANUAL BAND SERVO DISASSEMBLE

Disassembly Procedure

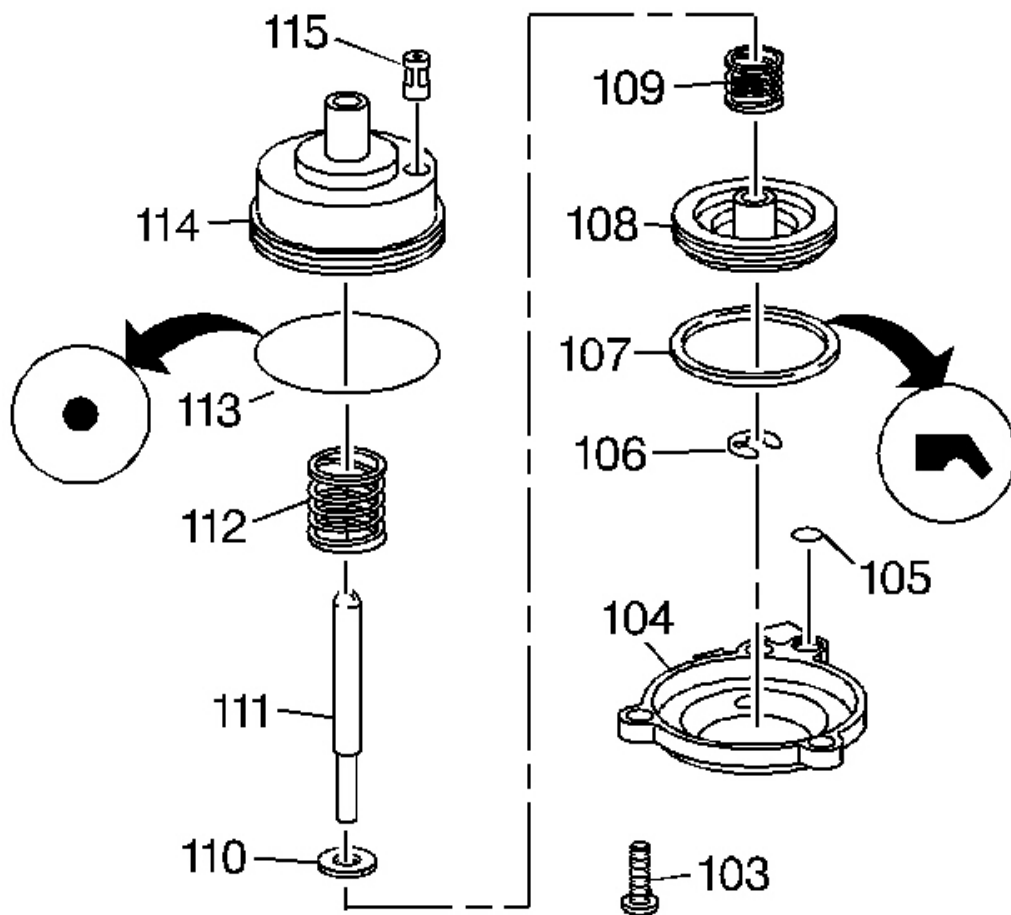


Fig. 365: Locating 2-1 Manual Band Servo Assembly
Courtesy of GENERAL MOTORS CORP.

1. Remove the servo piston cylinder (114) from the servo cover (104).
2. Remove the O-ring seal (113) from the servo piston cylinder (114).
3. Remove the servo piston assembly (106-111), the servo piston spring (112) and the servo exhaust screen (115) from the servo piston cylinder (114).
4. Remove the servo piston seal (107) from the servo piston (108).
5. Use a small screwdriver in order to remove the servo piston pin retaining ring (106) from the servo piston pin (111).
6. Remove the servo piston (108), the servo piston cushion spring (109) and the servo piston

spring retainer (110) from the servo piston pin (111).

2-1 MANUAL BAND SERVO ASSEMBLY

Assembly Procedure

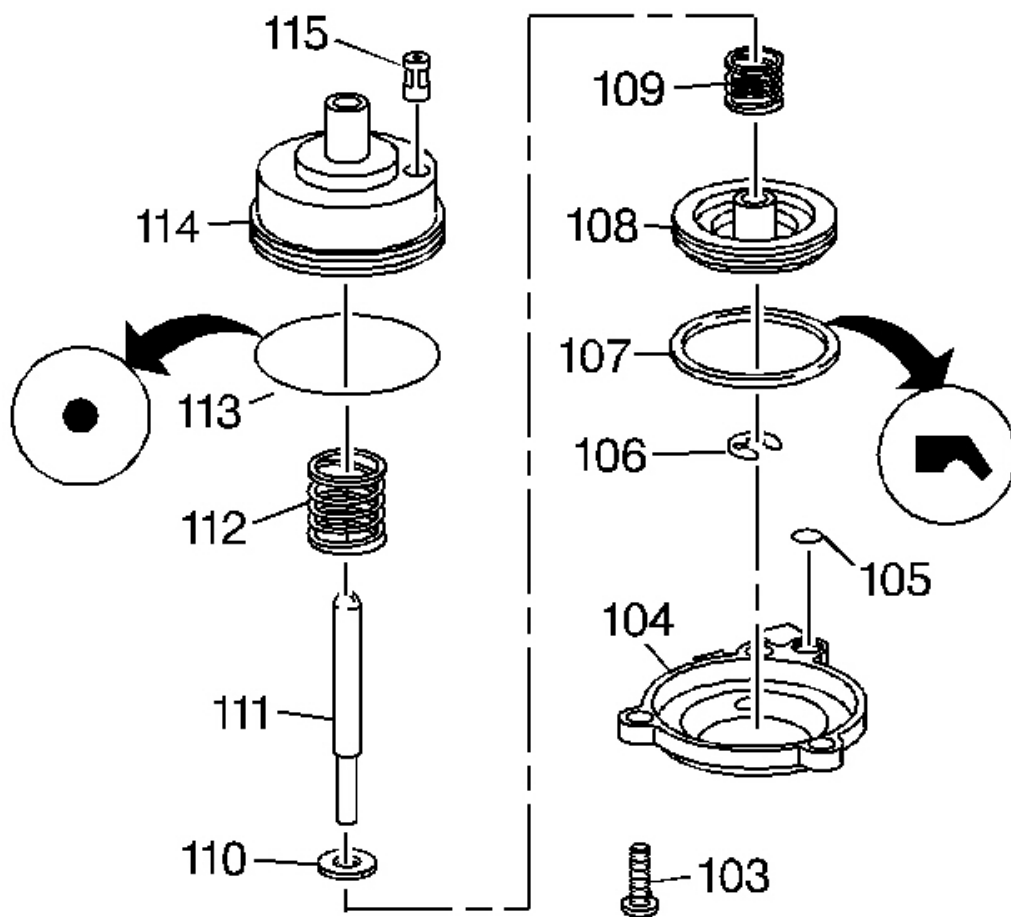


Fig. 366: Locating 2-1 Manual Band Servo Assembly
Courtesy of GENERAL MOTORS CORP.

1. Inspect the components of the 2-1 manual band servo for the following conditions:
 - A damaged, worn or porous servo piston cylinder (114)
 - A damaged, worn or porous servo piston (108)
 - A damaged or worn servo piston pin (111)

- A broken or damaged servo piston spring (112)
- A broken or damaged servo piston cushion spring (109)
- A damaged or plugged servo exhaust screen (115)
- A damaged servo cover seal (105)
- A damaged servo piston seal (107)
- A damaged servo piston cylinder O-ring seal (113)

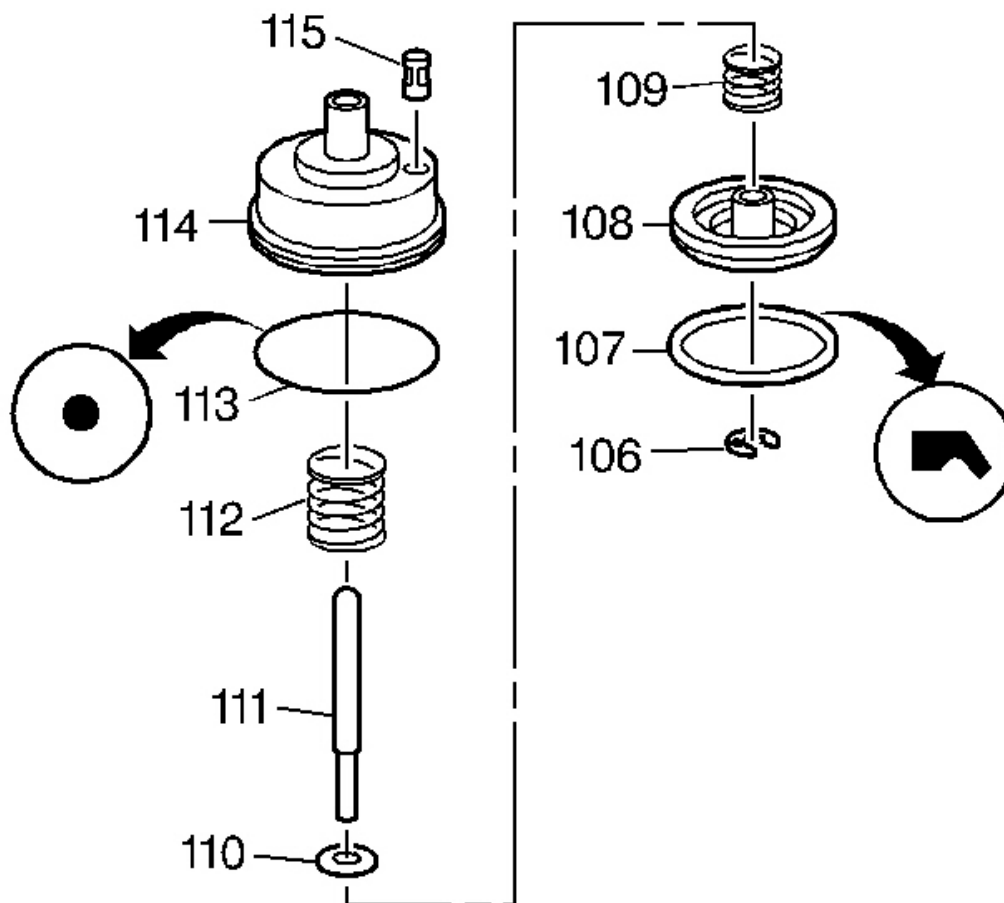


Fig. 367: Assembling Components Of 2-1 Manual Band Servo
Courtesy of GENERAL MOTORS CORP.

2. Assemble the servo piston spring retainer (110), the servo piston cushion spring (109) and the servo piston (108) onto the servo piston pin (111).

3. Use a small screwdriver in order to install the servo piston pin retaining ring (106).
4. Install the servo piston seal (107) onto the servo piston (108). Lubricate the servo piston seal (107) with automatic transmission fluid.
5. Assemble the servo exhaust screen (115) and the servo piston cylinder O-ring seal (113) onto the servo piston cylinder (114). Lubricate the servo piston cylinder O-ring seal (113) with automatic transmission fluid.
6. Attach the servo piston spring (112) to the servo piston assembly (106-111).
7. Install the servo piston and spring assembly (106-112) into the servo piston cylinder assembly (113-115) and set the assemblies aside.

ACCUMULATOR COMPONENTS DISASSEMBLE

Disassembly Procedure

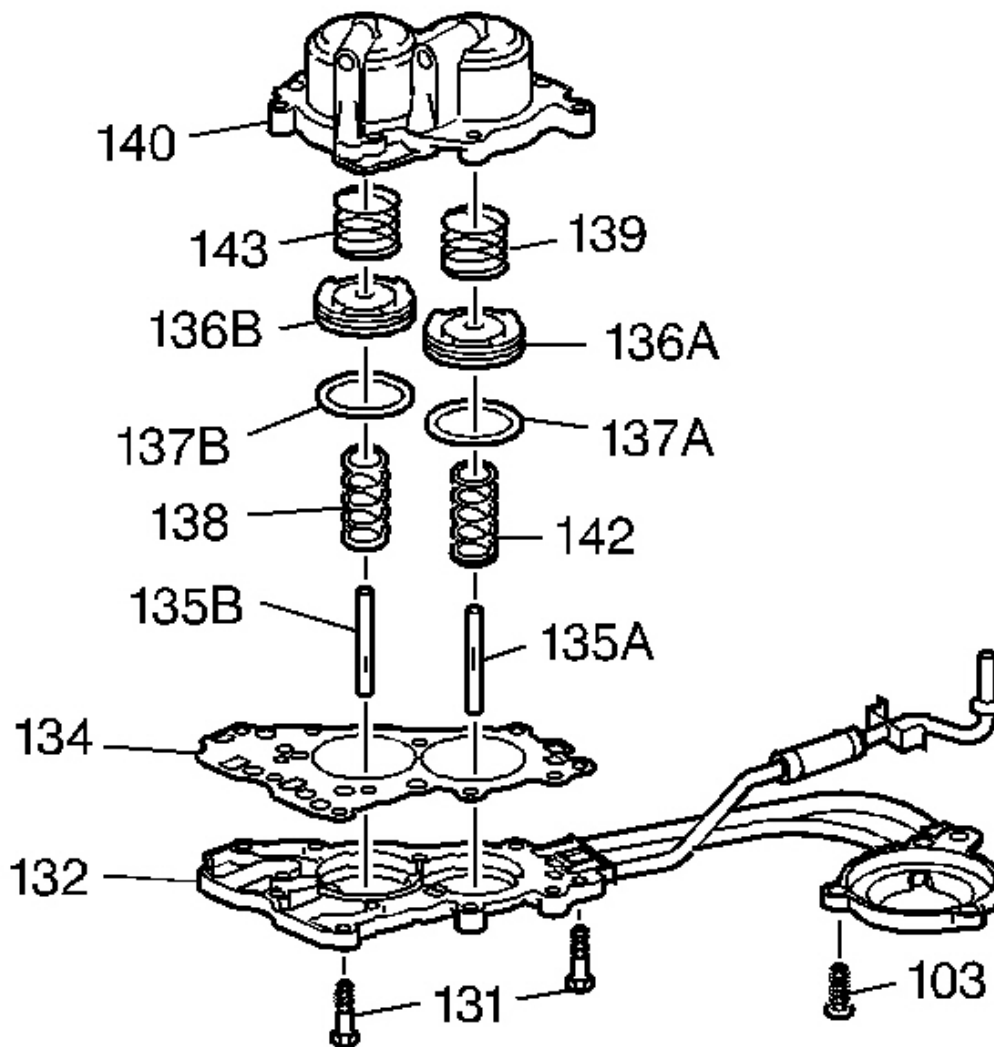


Fig. 368: Expanded View Of Accumulator Components
Courtesy of GENERAL MOTORS CORP.

1. Remove the seven remaining accumulator cover bolts (131) from the accumulator assembly.
2. Remove the accumulator cover (132) and the spacer plate assembly (134) from the accumulator housing assembly (140).
3. Remove the 1-2 and 2-3 accumulator pistons (136A/B), piston pins (135A/B), outer springs (138, 142 - springs are model dependent) and cushion springs (139, 143 - springs are model

dependent) from the accumulator housing (140).

4. Remove the piston oil seal rings (137A/B) from the 1-2 and 2-3 accumulator pistons (136A/B).

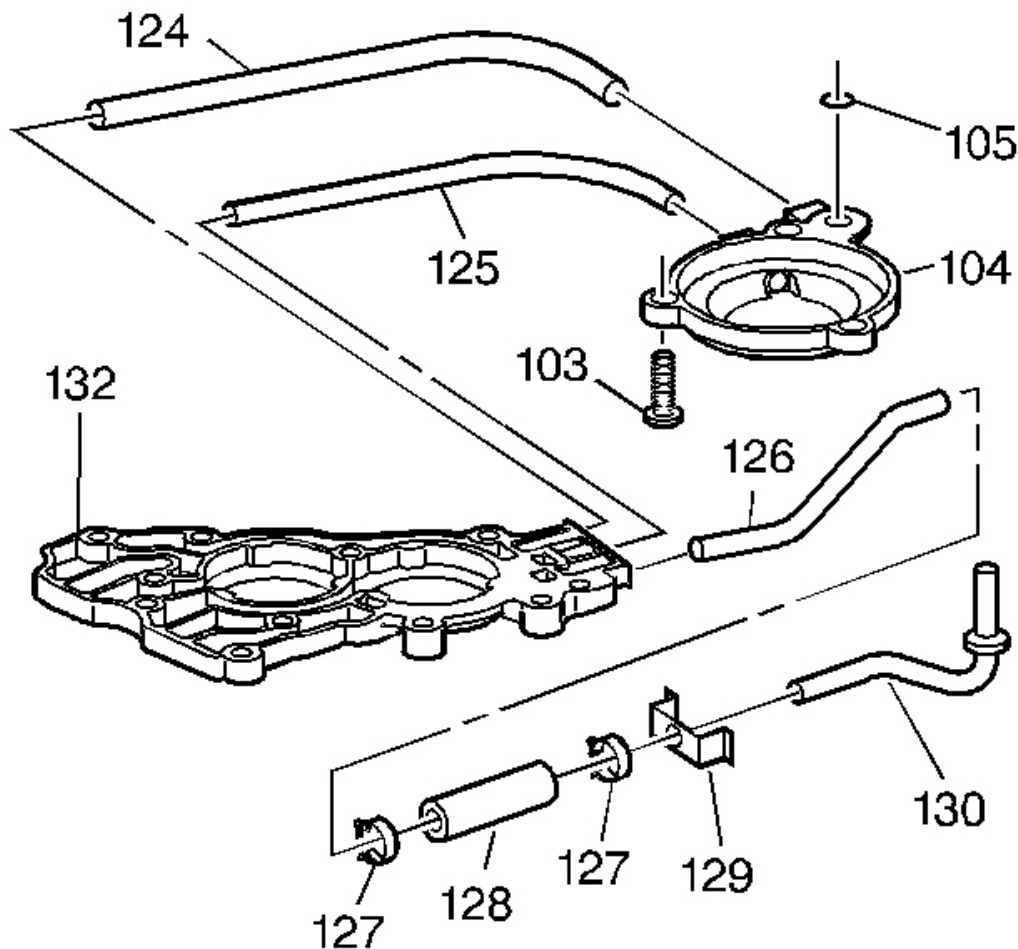


Fig. 369: Disconnecting Accumulator Cover From 2-1 Manual Band Servo Cover
Courtesy of GENERAL MOTORS CORP.

5. Disassemble the forward band servo and 2-1 manual band servo oil pipes (124, 125) and the lube oil pipe assembly (126-130) from the accumulator cover (132) and the 2-1 manual band servo cover (104).
6. Disassemble the lube oil pipe (126), the hose clamps (127), the hose (128), the lube oil pipe

retainer (129) and the lube oil pipe and washer assembly (130).

ACCUMULATOR COMPONENTS ASSEMBLE

Assembly Procedure

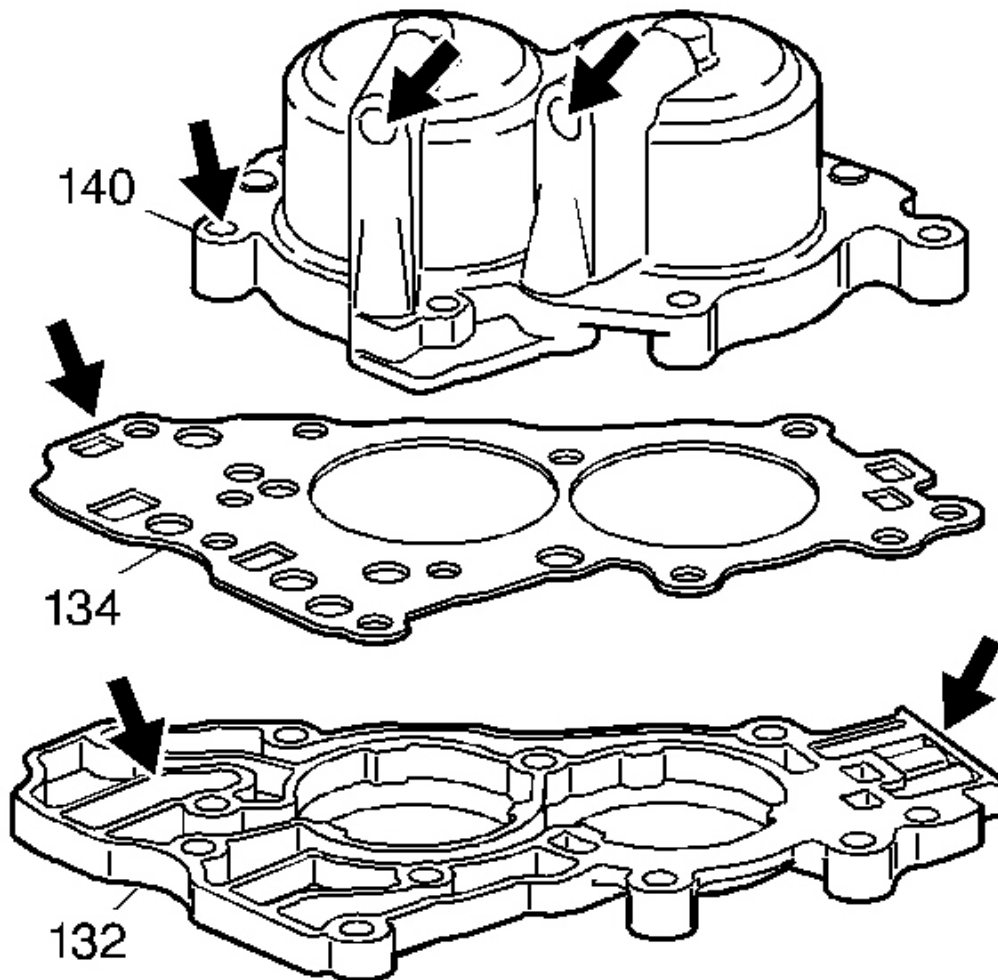


Fig. 370: View Of Accumulator Housing, Cover Spacer Plate Assembly & Cover
Courtesy of GENERAL MOTORS CORP.

1. Inspect the accumulator housing (140), the accumulator cover spacer plate assembly (134) and the accumulator cover (132) for the following conditions:

- Damaged lube and servo oil pipe holes in the accumulator cover (132)
- Damaged, improperly machined or porous accumulator cover (132)
- Bent or damaged accumulator cover spacer plate assembly (134)
- Stripped or damaged bolt holes in the accumulator housing (140)
- Damaged, worn, improperly machined or porous accumulator housing (140)
- Leaking, loose or missing cup plugs in the accumulator housing (140)

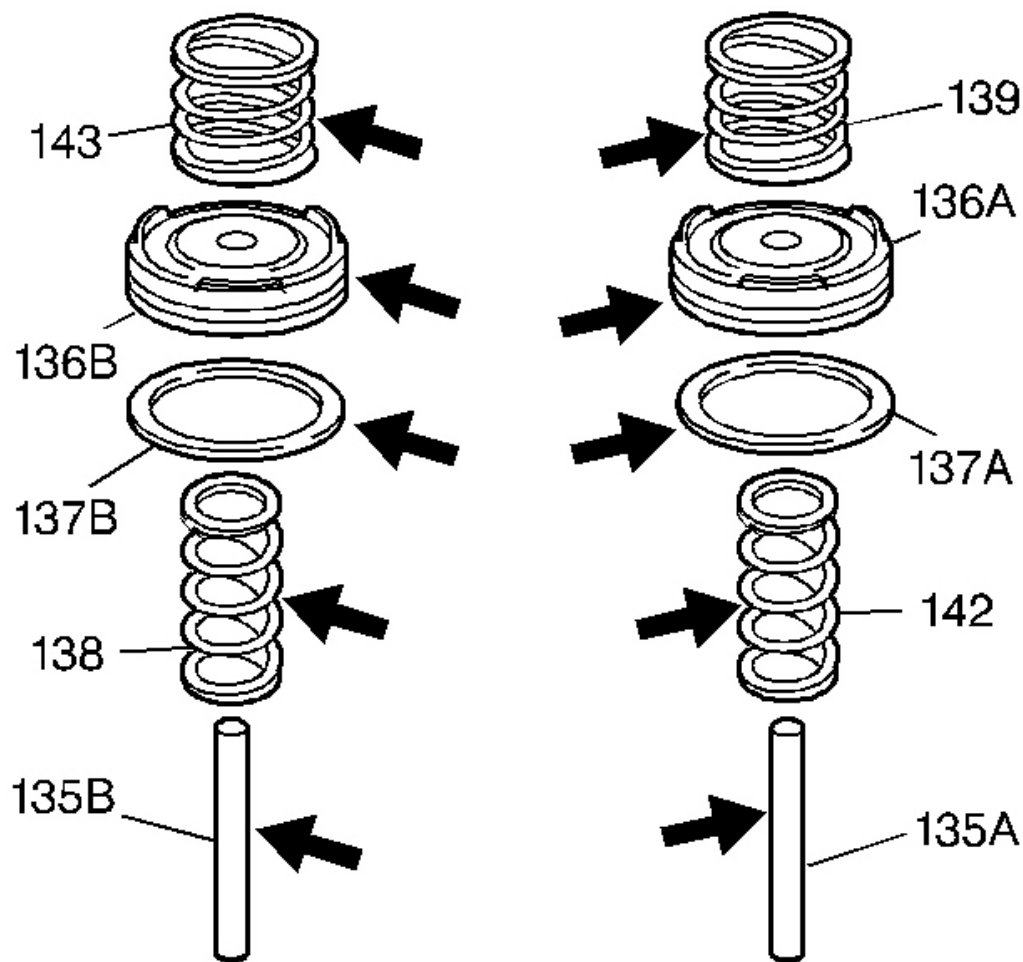


Fig. 371: Accumulator Pistons, Springs, Seals And Pins Inspection Areas
 Courtesy of GENERAL MOTORS CORP.

2. Inspect the accumulator pistons, springs, seals and pins for the following conditions:

- Broken or collapsed piston outer springs (138, 142)
- Broken or collapsed piston cushion springs (139, 143)
- Bent or worn accumulator piston pins (135A/B)
- Damaged, worn or porous accumulator pistons (136A/B)
- Damaged accumulator piston seals (137A/B)

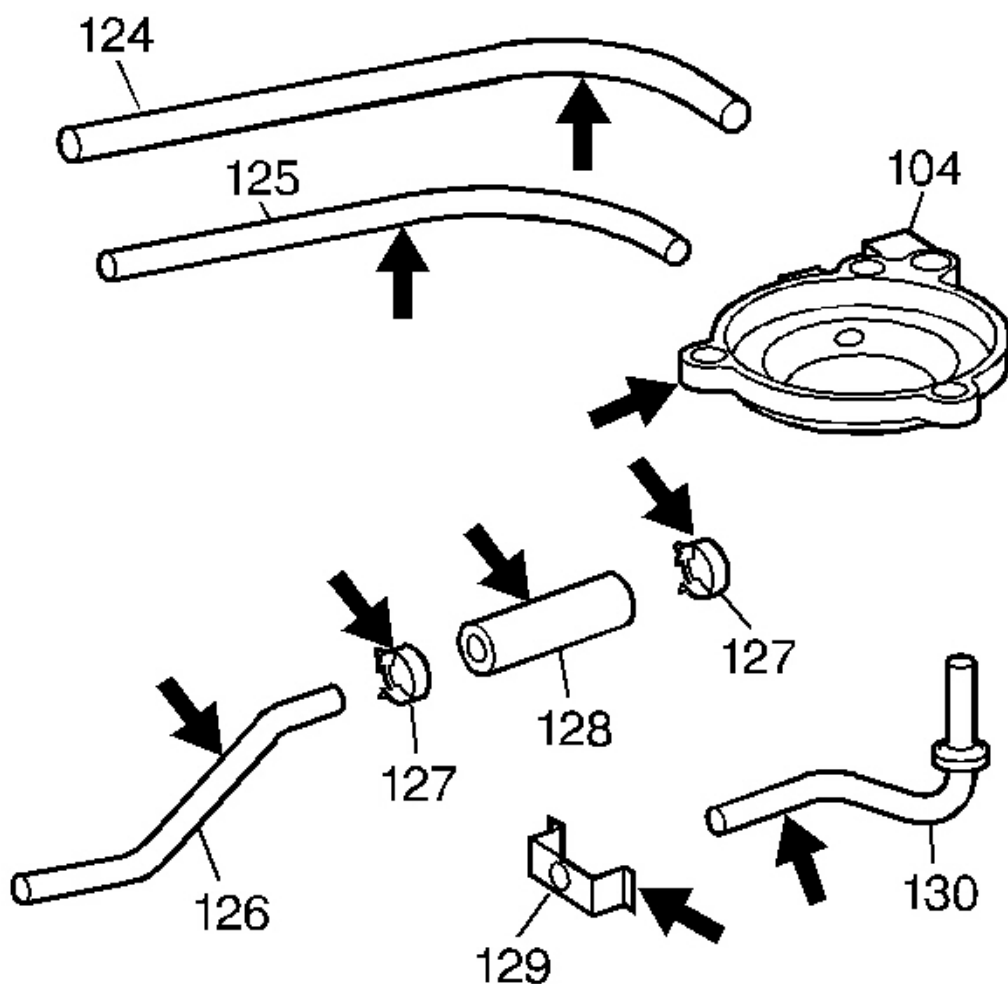


Fig. 372: Identifying Servo And Lube Oil Pipe Components
 Courtesy of GENERAL MOTORS CORP.

3. Inspect the servo and lube oil pipe components (124-130) and the 2-1 manual band servo cover (104) for the following conditions:
- Damaged lube and servo oil pipe holes in the servo cover (104)
 - Damaged, improperly machined or porous servo cover (104)
 - Bent, plugged or damaged lube and servo oil pipes (124, 125, 126, 130)
 - Plugged or damaged lube oil hose (128)
 - Damaged hose clamps (127)
 - Damaged lube oil pipe retainer (129)
 - Missing lube oil pipe washer (130)

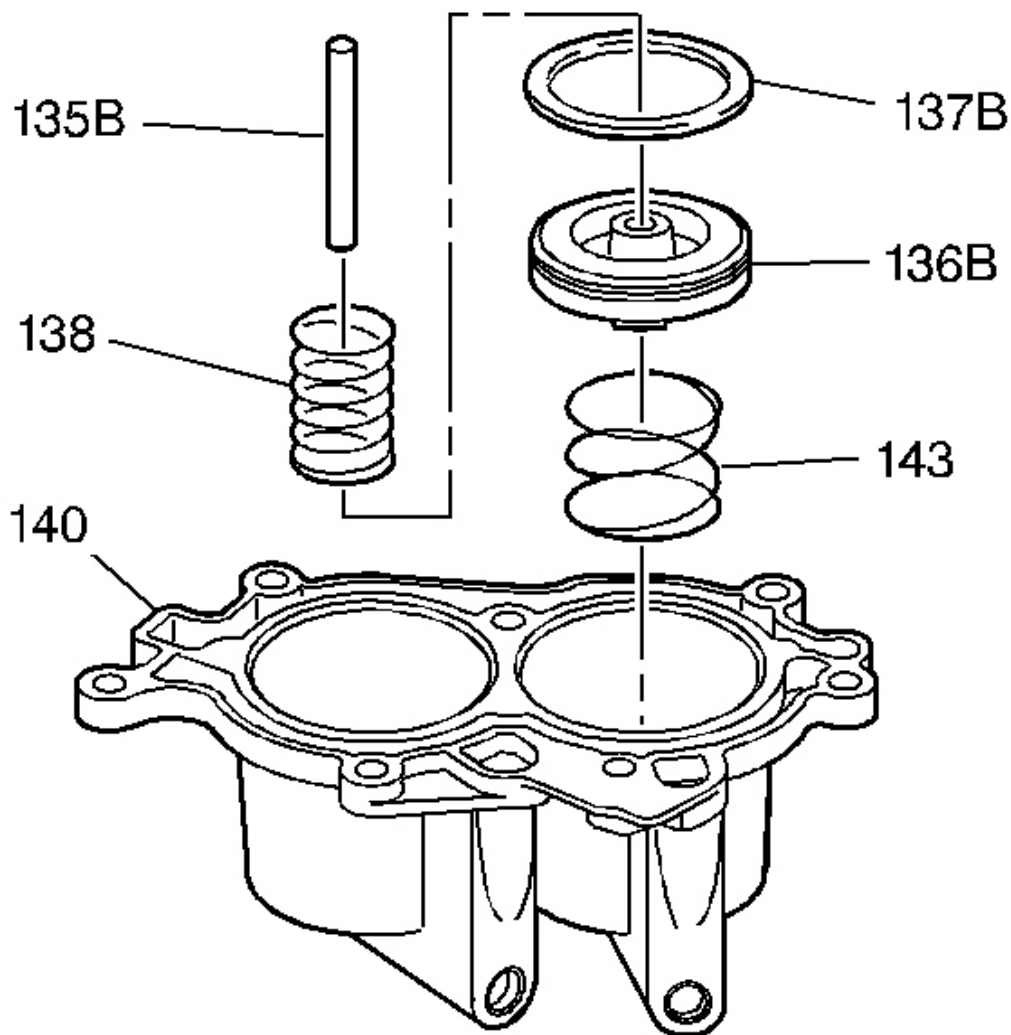


Fig. 373: Locating 2-3 Accumulator Piston Components
Courtesy of GENERAL MOTORS CORP.

4. Install the 2-3 accumulator piston oil seal ring (137B) onto the 2-3 accumulator piston (136B). Lubricate the oil seal ring with automatic transmission fluid.
5. Assemble the 2-3 accumulator piston pin (135B) and piston (136B).

IMPORTANT: Do not mix up spring or pistons/springs. Be sure to install the correct springs in the correct bore.

6. Install the 2-3 accumulator piston springs (138, 143) and piston assembly (136B) into the accumulator housing (140).

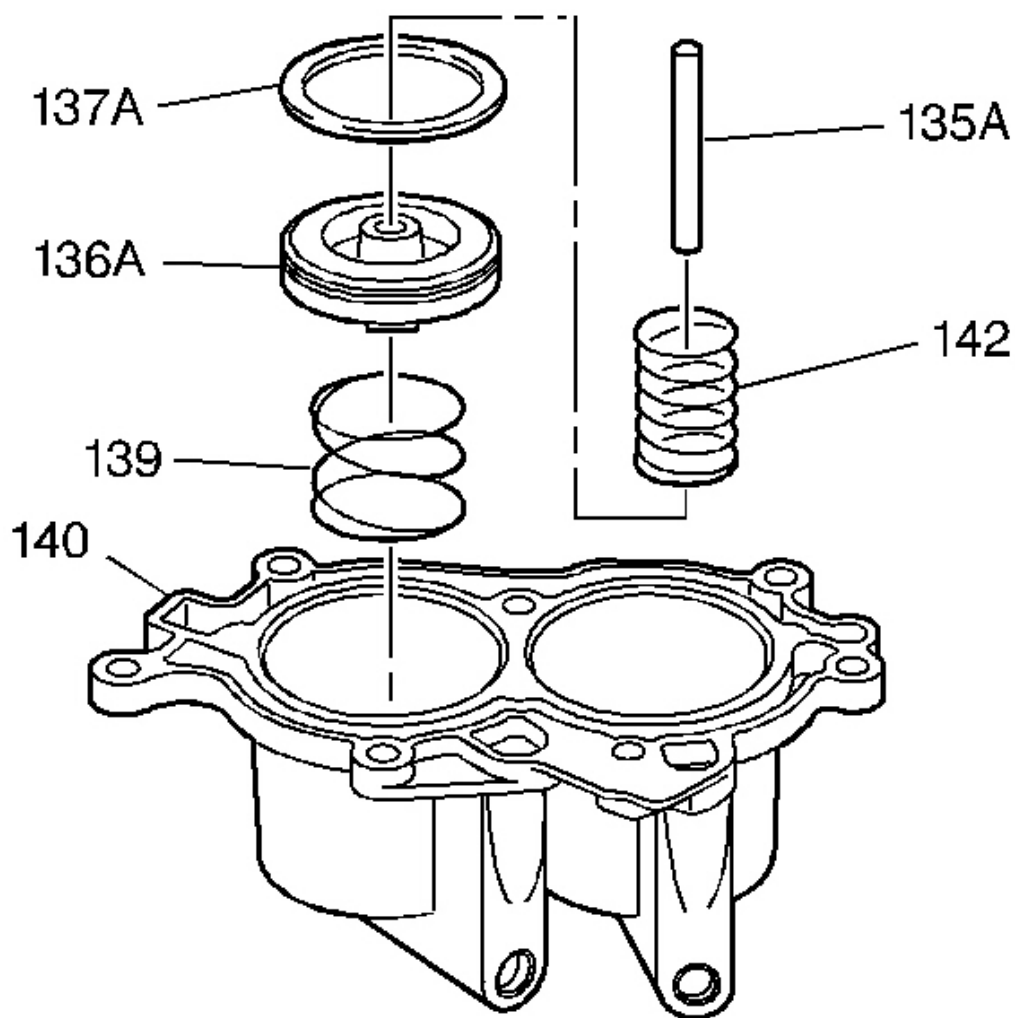


Fig. 374: View Of 1-2 Accumulator Piston Components
Courtesy of GENERAL MOTORS CORP.

7. Install the 1-2 accumulator piston oil seal ring (137A) onto the 1-2 accumulator piston (136A). Lubricate the oil seal ring with automatic transmission fluid.
8. Assemble the 1-2 accumulator piston pin (135A) and piston (136A).

IMPORTANT: Do not mix up spring or pistons/springs. Be sure to install the correct springs in the correct bore.

9. Install the 1-2 accumulator piston springs (139, 142) and the piston assembly (136A) into the accumulator housing (140).

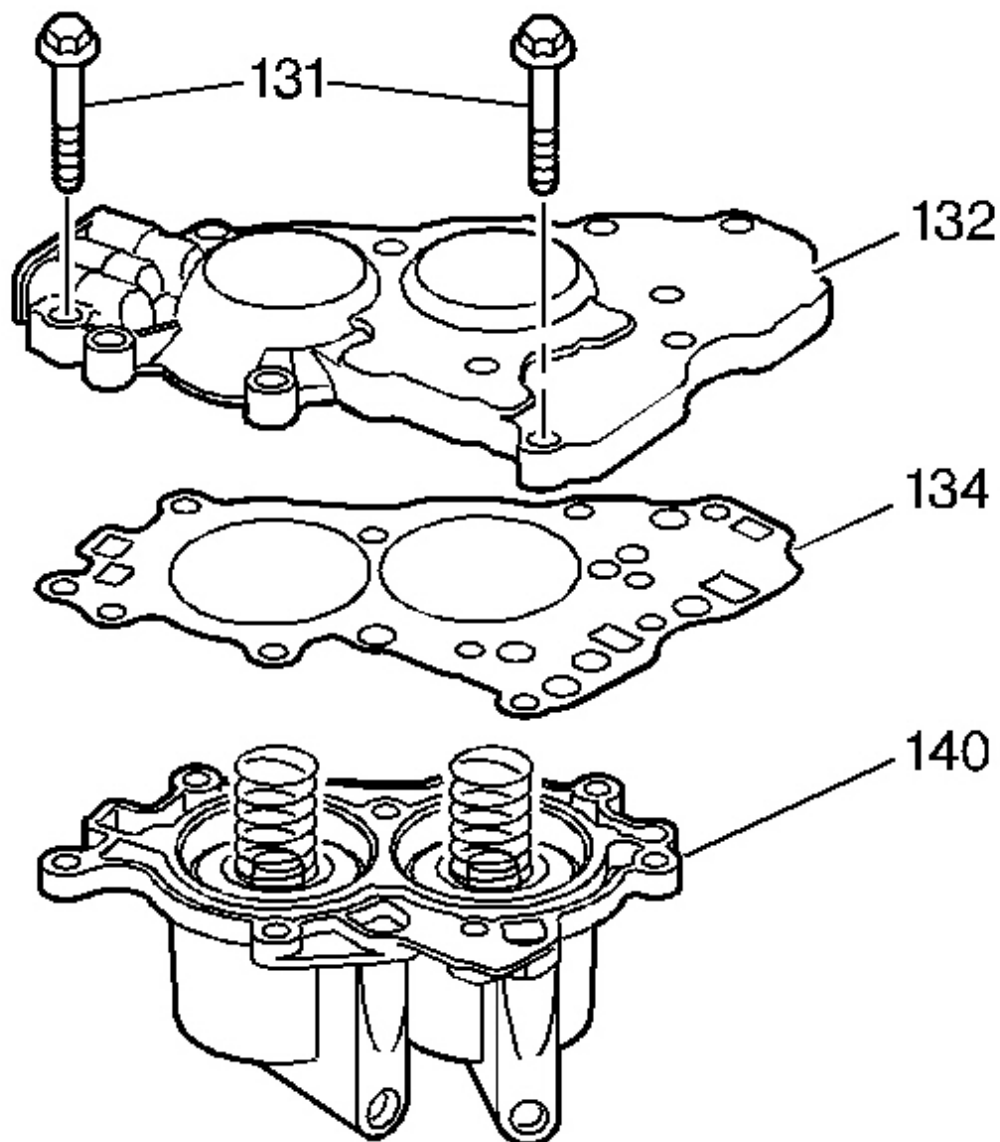


Fig. 375: Installing Accumulator Cover Bolts
Courtesy of GENERAL MOTORS CORP.

10. Assemble the accumulator cover spacer plate assembly (134) and the accumulator cover (132) onto the accumulator housing (140).

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

11. Install seven accumulator cover bolts (131).

Tighten: Tighten the accumulator cover bolts to 12 N.m (106 lb in).

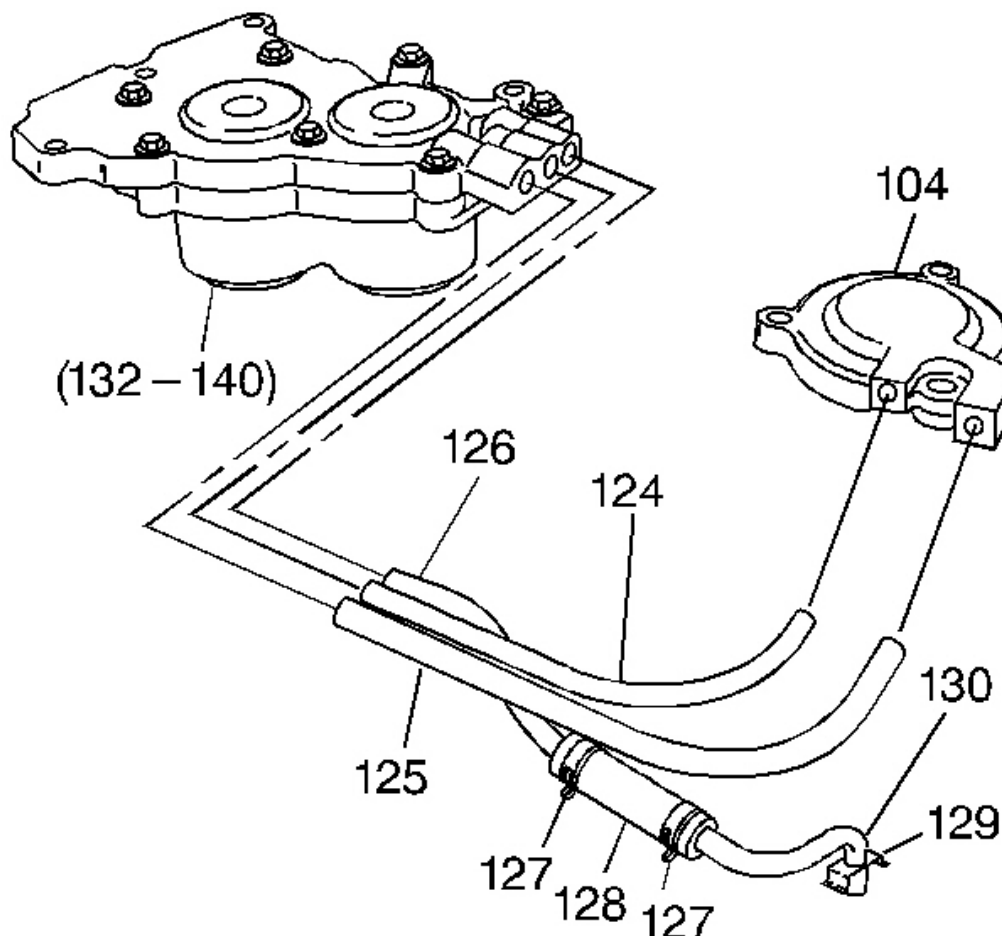


Fig. 376: Connecting 2-1 Manual Band Servo Cover To Accumulator Assembly
Courtesy of GENERAL MOTORS CORP.

12. Assemble the lube oil pipe (126), hose (128), hose clamps (127), pipe retainer (129) and pipe with washer (130).
13. Assemble the 2-1 manual band servo and forward band servo oil pipes (124, 125) into the accumulator assembly (132-140).
14. Assemble the 2-1 manual band servo and forward band servo oil pipes (124, 125) into the 2-1 manual band servo cover (104).
15. Install the lube oil pipe assembly (126-130) into the accumulator assembly (132-140).

ACCUMULATOR ASSEMBLY, 2-1 BAND SERVO ASSEMBLE

Assembly Procedure

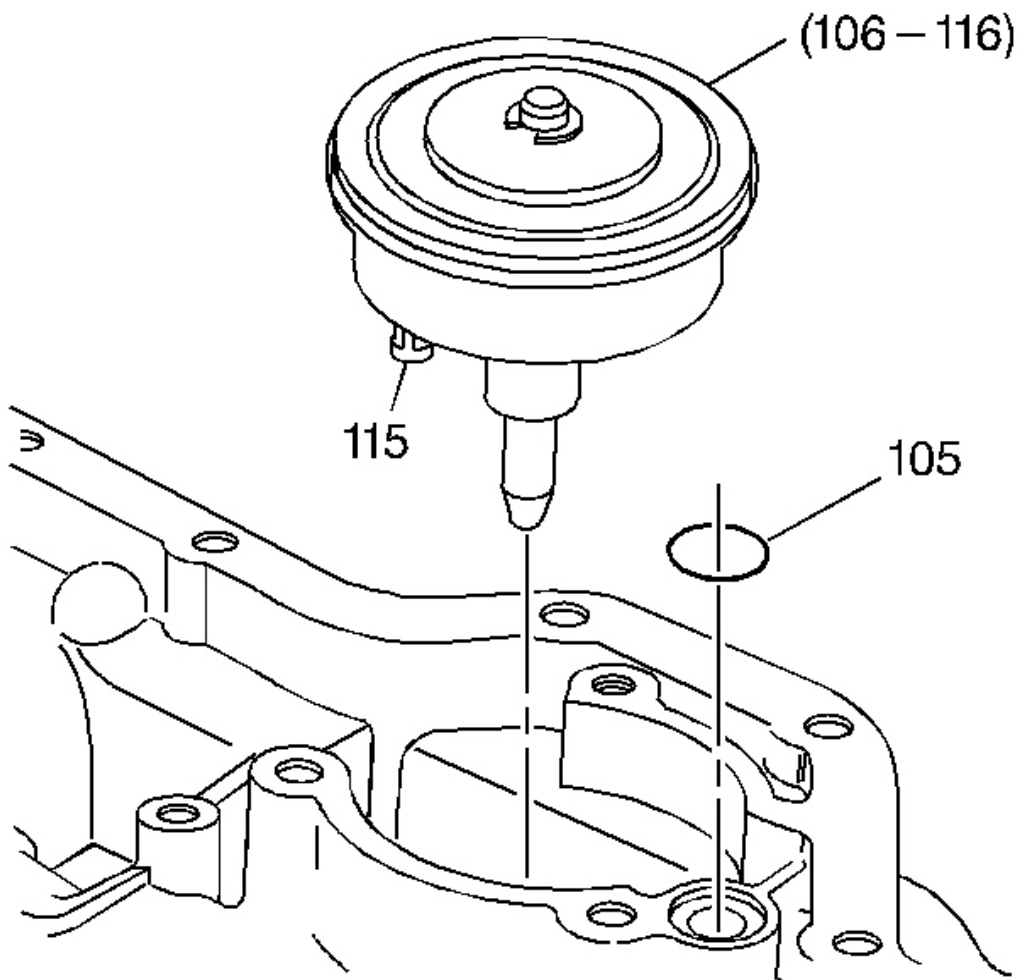


Fig. 377: Identifying 2-1 Manual Band Servo Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the 2-1 manual band servo cover seal (105) into the case. Lubricate the 2-1 manual band servo cover seal (105) with automatic transmission fluid.

NOTE: Do not damage the 2-1 manual band servo exhaust screen on installation.

2. Install the 2-1 manual band servo assembly (106-116) into the case. Make sure that the 2-1 manual band servo pin engages the 2-1 manual band assembly.

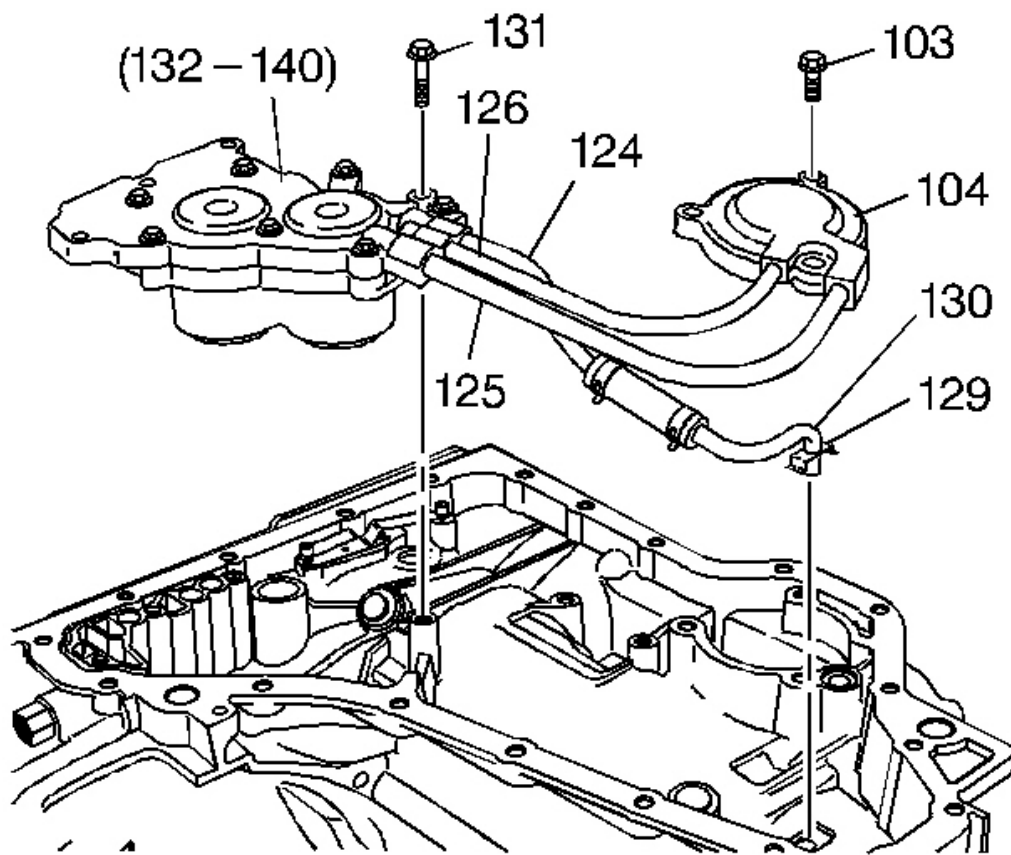


Fig. 378: Installing Accumulator And 2-1 Manual Band Servo Cover Assembly
Courtesy of GENERAL MOTORS CORP.

3. Install the accumulator (132-140) and 2-1 manual band servo cover assembly (104) into the case.
4. Install the lube oil pipe and washer assembly (130) through the case and into the lube hole in the differential carrier internal gear.
5. Use a screwdriver in order to lock the lube oil pipe retainer (129) into the case.

NOTE: Refer to **FASTENER NOTICE** in Cautions and Notices.

6. Install the three 2-1 manual band servo cover bolts (103).

Tighten: Tighten the bolts to 25 N.m (18 lb ft).

7. Install the four accumulator cover bolts (131).

Tighten: Tighten the bolts to 12 N.m (106 lb in).

OIL PAN AND FILTER ASSEMBLY

Assembly Procedure

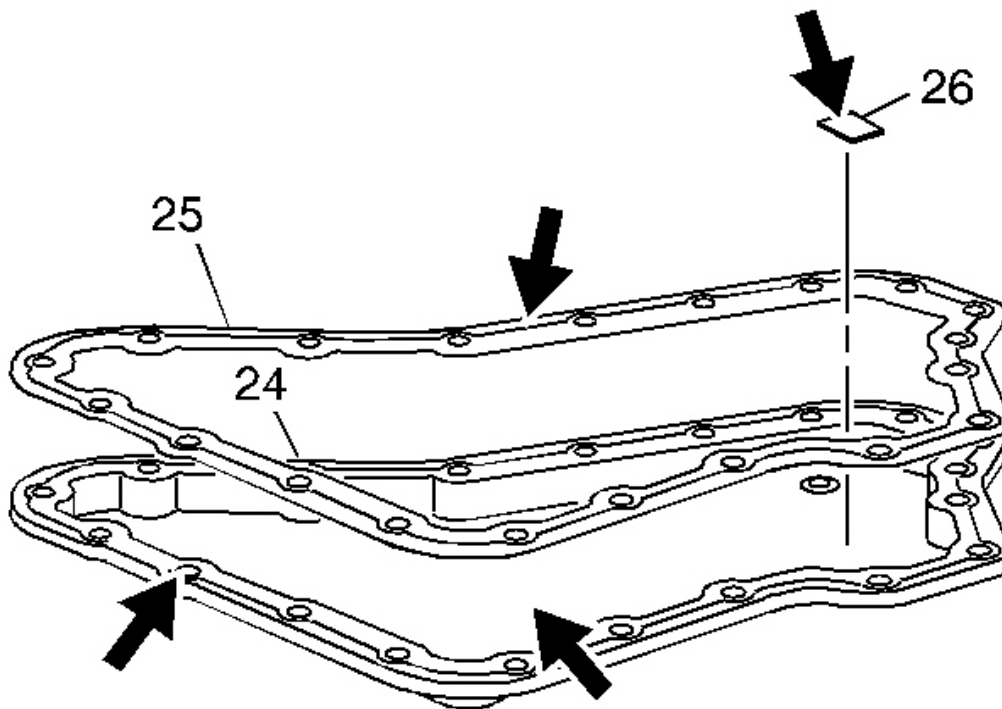


Fig. 379: Oil Pan Gasket
Courtesy of GENERAL MOTORS CORP.

1. Inspect the oil pan (24) for the following conditions:
 - A damaged sealing surface
 - A dented or cracked bottom surface
2. Inspect the oil pan gasket (25) for the following conditions:
 - A bent or damaged seal core
 - A damaged rubber seal surface

- A damaged gasket
3. Inspect the oil pan magnet (26) for damage or misalignment
 4. Clean the oil pan (24), the oil pan gasket (25) and the oil pan magnet (26) in order to remove any sediment.

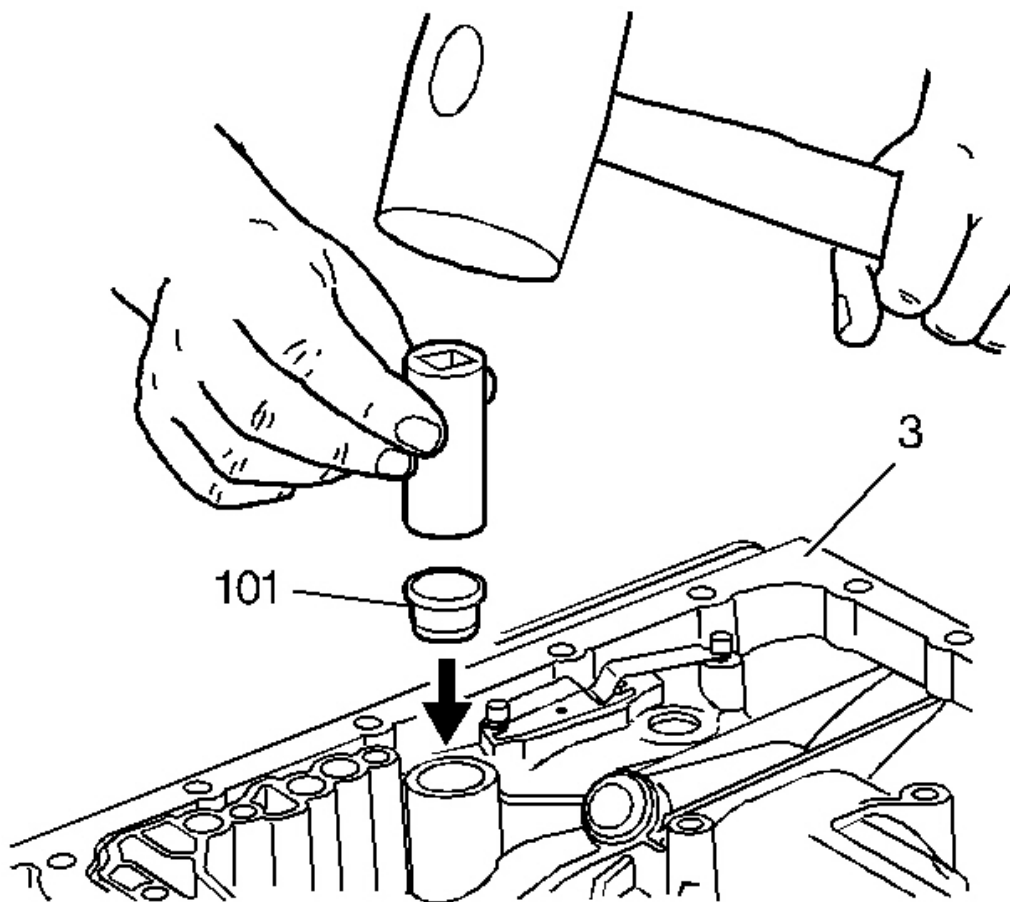


Fig. 380: Installing Oil Filter Seal Assembly
Courtesy of GENERAL MOTORS CORP.

5. Position the transmission so that the oil pan sealing surface is facing upward.
6. Lubricate the oil filter seal assembly (101) with transmission fluid.
7. Using a socket and a plastic mallet, gently tap the oil filter seal assembly (101) into the case (3).

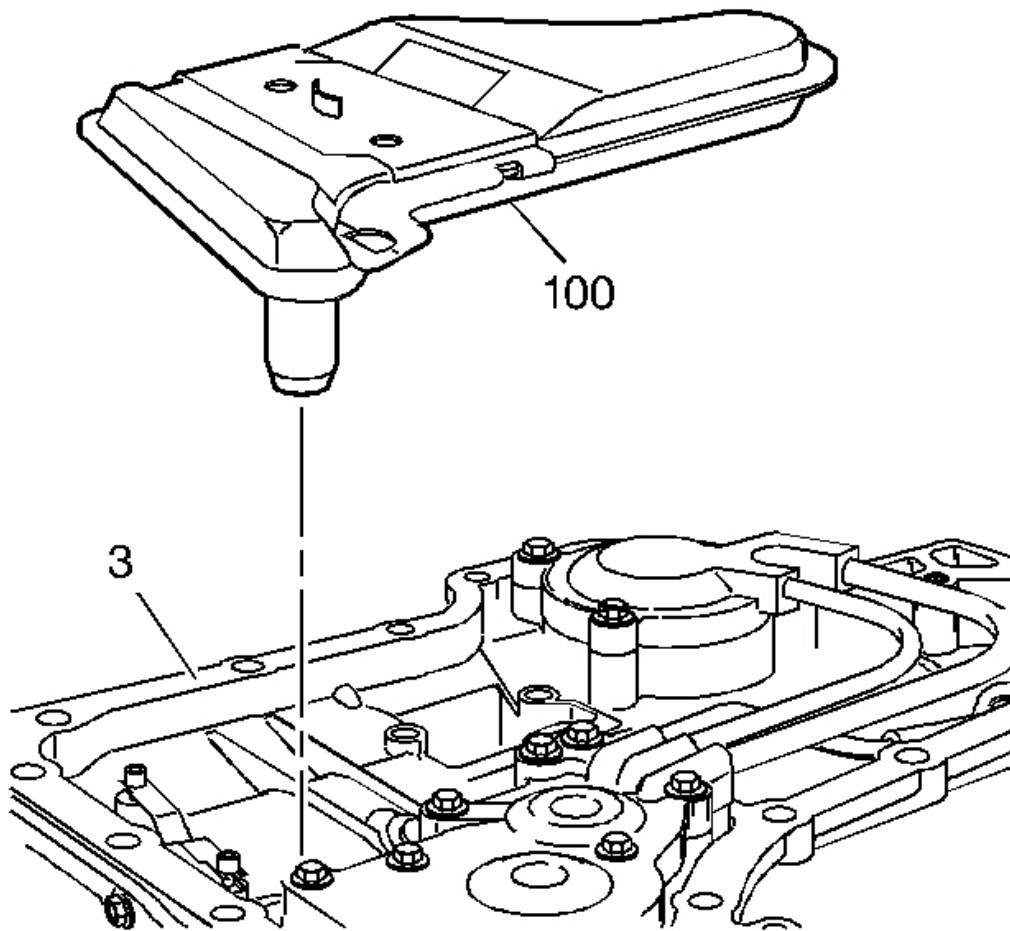


Fig. 381: Identifying Oil Filter Assembly
Courtesy of GENERAL MOTORS CORP.

8. Install the oil filter assembly (100) into the case (3).

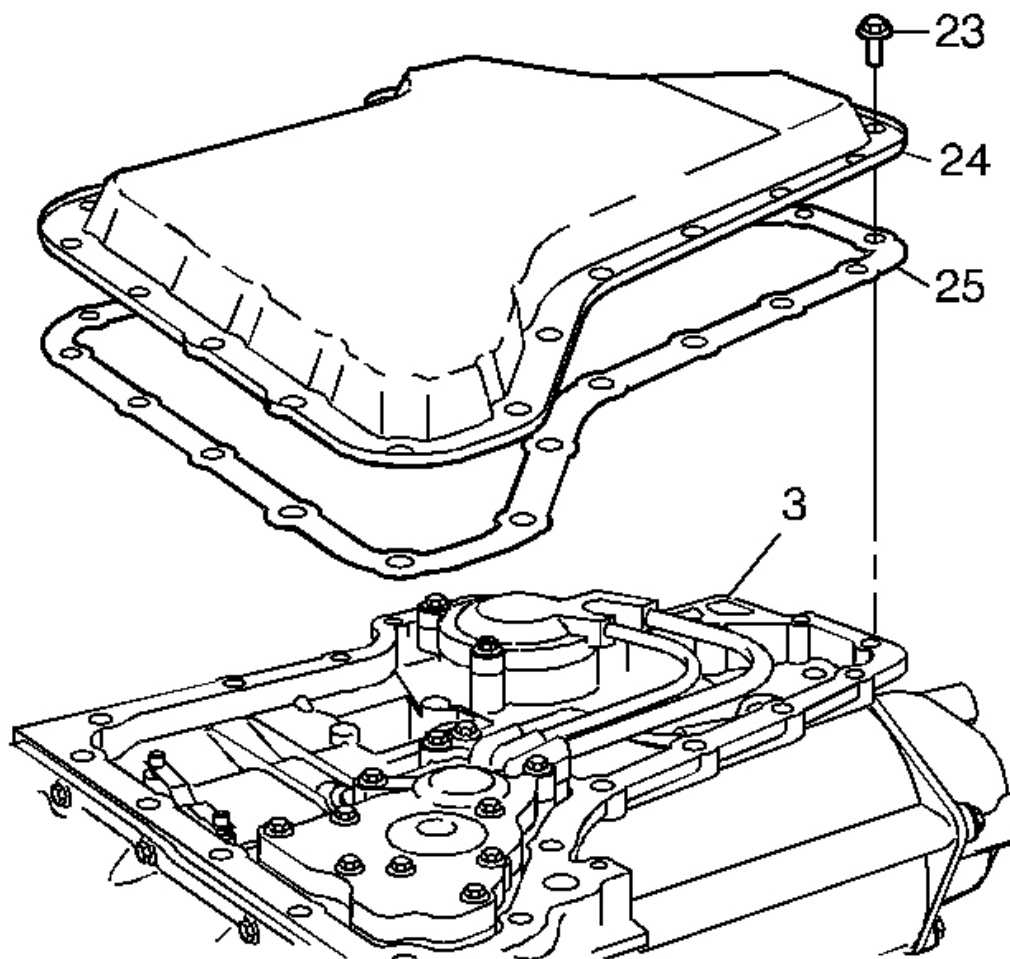


Fig. 382: Locating Oil Pan & Gasket
Courtesy of GENERAL MOTORS CORP.

9. Install the oil pan gasket (25) onto the case (3). The old gasket is reusable if the gasket is not damaged.
10. Install the oil pan (24) onto the case (3).

NOTE: Refer to **FASTENER NOTICE** in Cautions and Notices.

11. Install the 20 oil pan bolts (23).

Tighten: Tighten the bolts to 14 N.m (10 lb ft).

FORWARD BAND SERVO COMPONENTS DISASSEMBLE

Disassembly Procedure

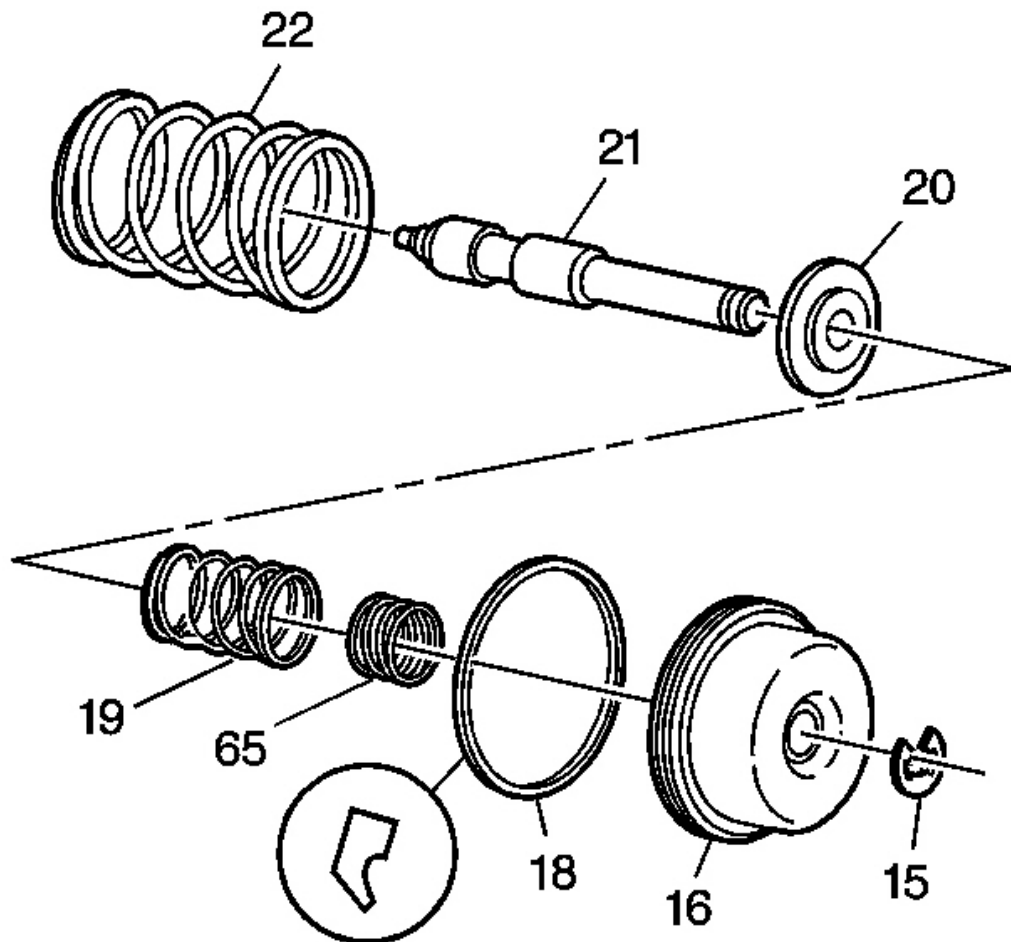


Fig. 383: Identifying Servo Piston & Components
Courtesy of GENERAL MOTORS CORP.

1. Disassemble the servo piston return spring (22) from the forward band servo assembly.
2. Remove the servo piston oil seal ring (18) from the servo piston (16).
3. Using a small screwdriver, remove the servo pin retaining ring (15) from the servo piston

apply pin (21).

4. Disassemble the servo piston (16), the servo piston cushion inner spring (65), the servo piston cushion outer spring (19), the servo cushion spring retainer (20) and the servo piston apply pin (21).

FORWARD BAND SERVO ASSEMBLY

Assembly Procedure

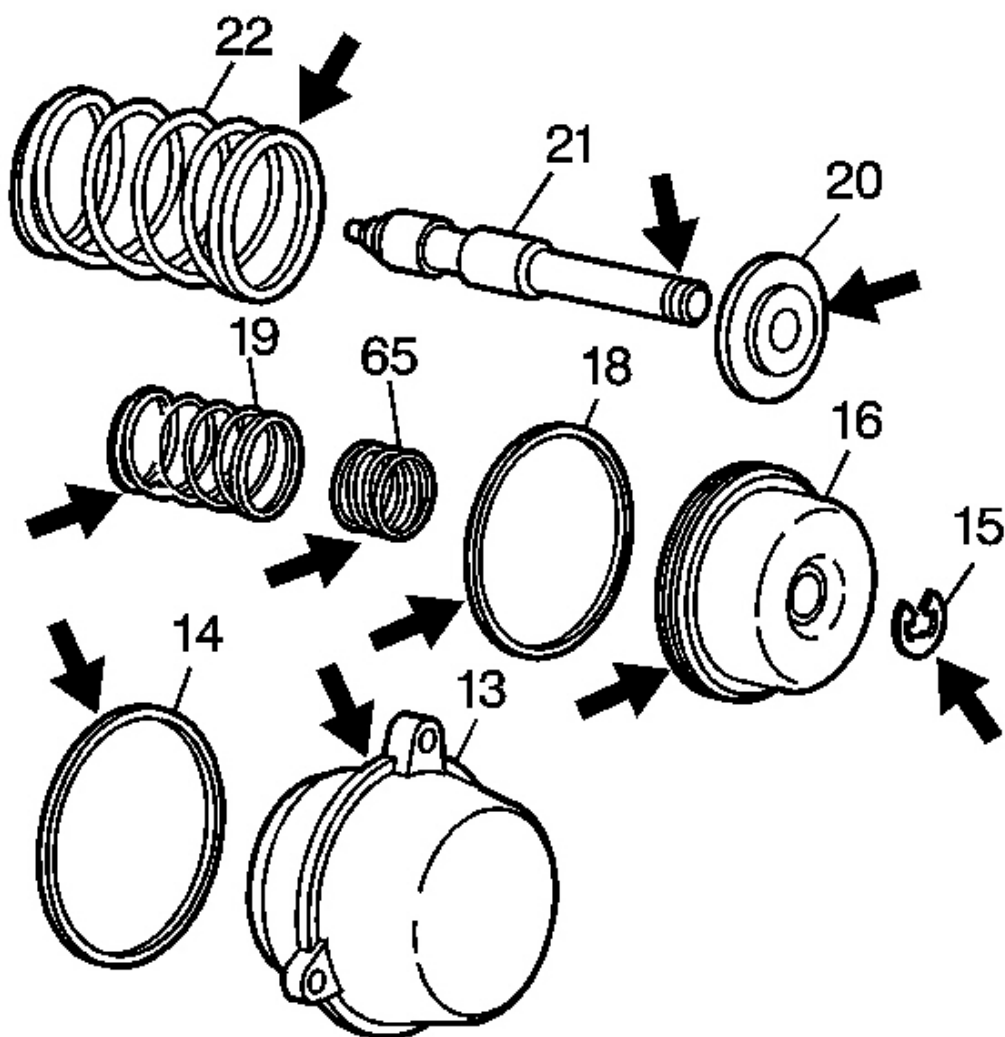


Fig. 384: Inspection Areas On Forward Band Servo
Courtesy of GENERAL MOTORS CORP.

1. Inspect the forward band servo components for the following conditions:
 - Damaged, worn or porous servo piston (16)
 - Damaged servo piston oil seal ring (18)
 - Damaged, worn or porous servo cover (13)
 - Damaged servo cover seal (14)
 - Broken or collapsed servo piston return spring (22)
 - Broken or collapsed servo piston cushion inner spring (65)
 - Broken or collapsed servo piston cushion outer spring (19)
 - Damaged or worn servo piston apply pin (21)

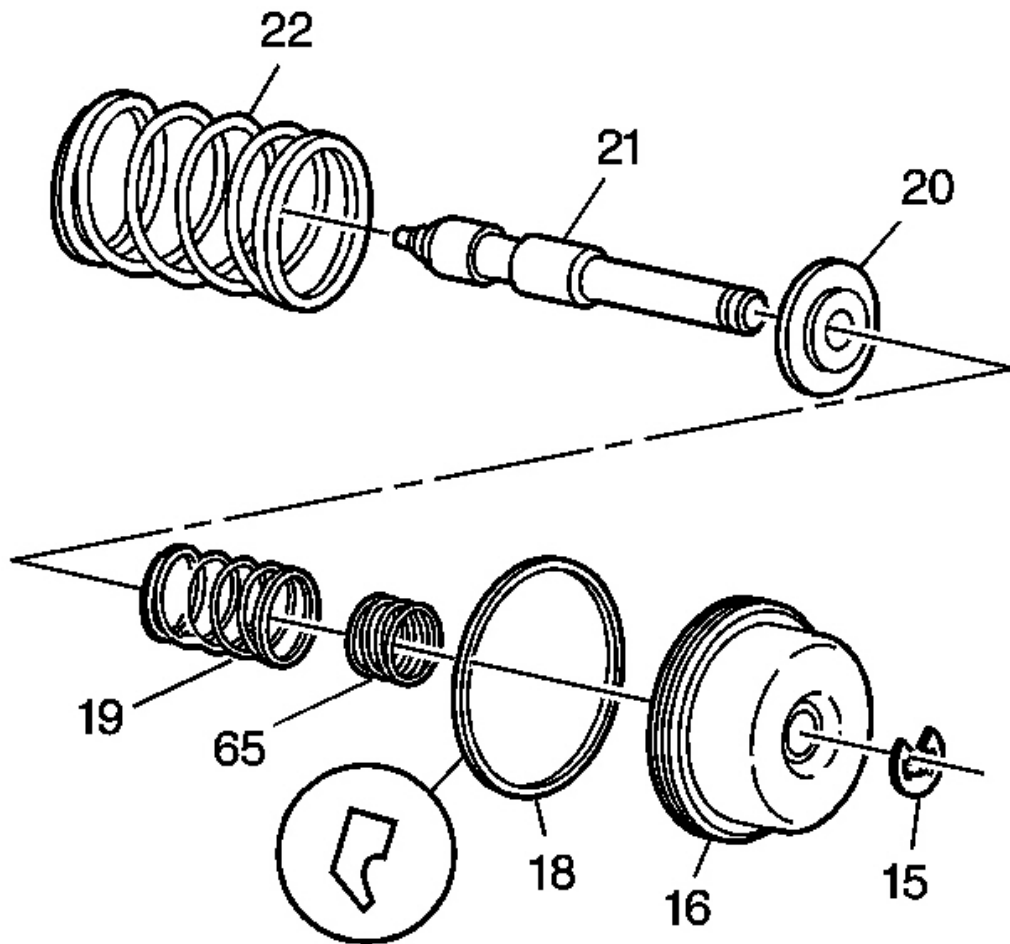


Fig. 385: Identifying Servo Piston & Components
Courtesy of GENERAL MOTORS CORP.

2. Assemble the servo piston (16), the servo piston cushion outer spring (19), the servo piston cushion inner spring (65), the servo cushion spring retainer (20) and the servo piston apply pin (21).
3. Install the servo pin retaining ring (15) onto the servo piston apply pin (21).
4. Install the servo piston oil seal ring (18) onto the servo piston (16).
5. Assemble the servo piston return spring (22) onto the servo assembly.

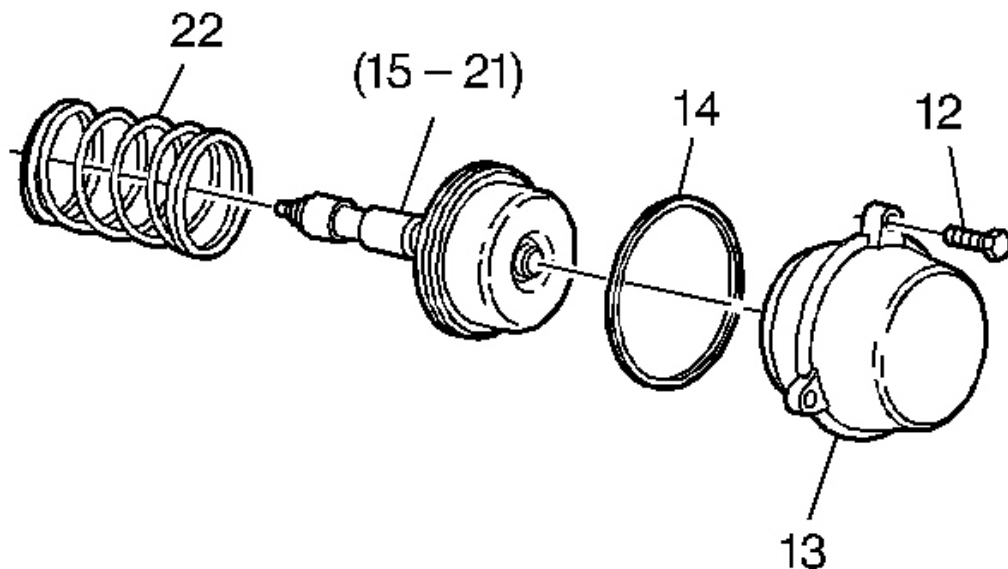


Fig. 386: View Of Servo Assembly
Courtesy of GENERAL MOTORS CORP.

6. Position the transmission so that the oil pan is facing up.
7. Install the servo cover seal (14) onto the servo cover (13).
8. Assemble the servo assembly (15-22) into the servo cover (13). Pivot the servo assembly (15-22) into the servo cover (13) in order to prevent the piston oil seal ring from being damaged.
9. Install the servo and cover assembly (13-22) into the case.

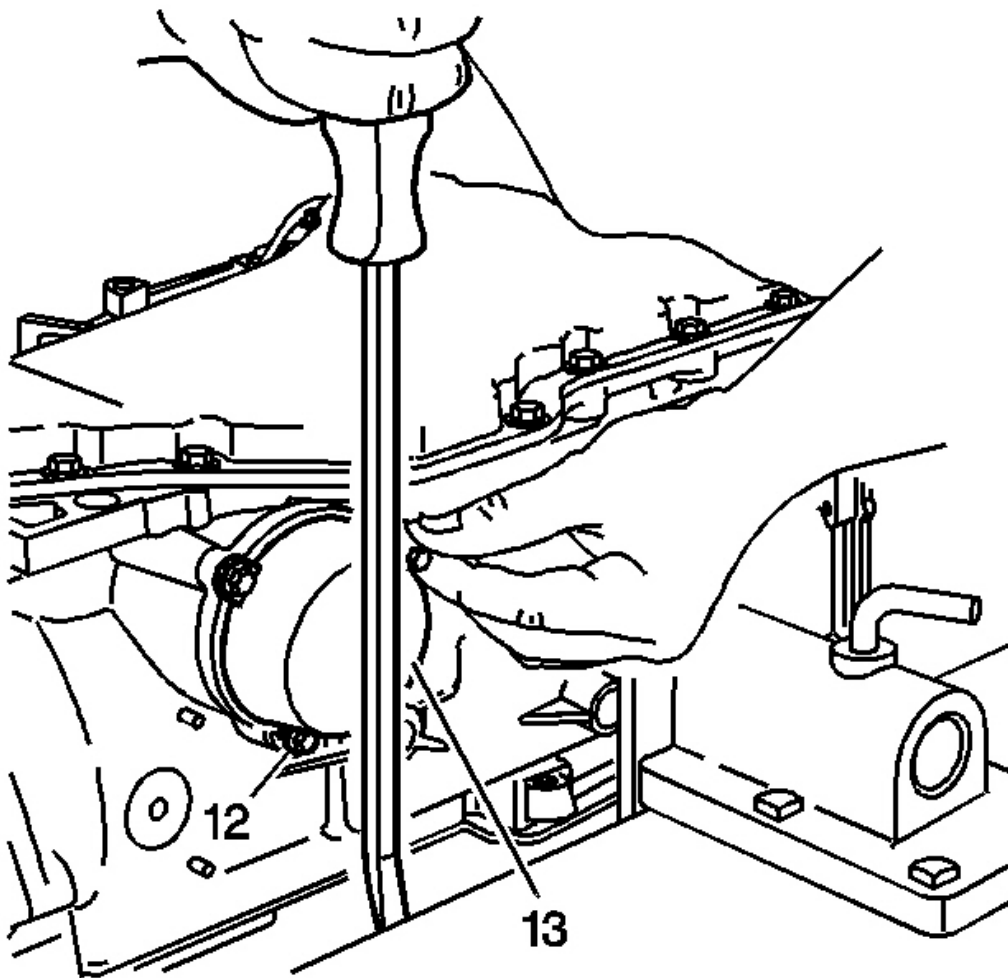


Fig. 387: Compressing Forward Band Servo Assembly
Courtesy of GENERAL MOTORS CORP.

10. Using a long screwdriver, pry against the work bench in order to compress the forward band servo assembly (13).
11. Hold the servo assembly compressed.

NOTE: Refer to **FASTENER NOTICE** in Cautions and Notices.

12. Install the 3 forward band servo cover bolts (12).

Tighten: Tighten the bolts to 12 N.m (106 lb in).

13. Remove the long screwdriver.

REVERSE BAND SERVO COMPONENTS DISASSEMBLE

Disassembly Procedure

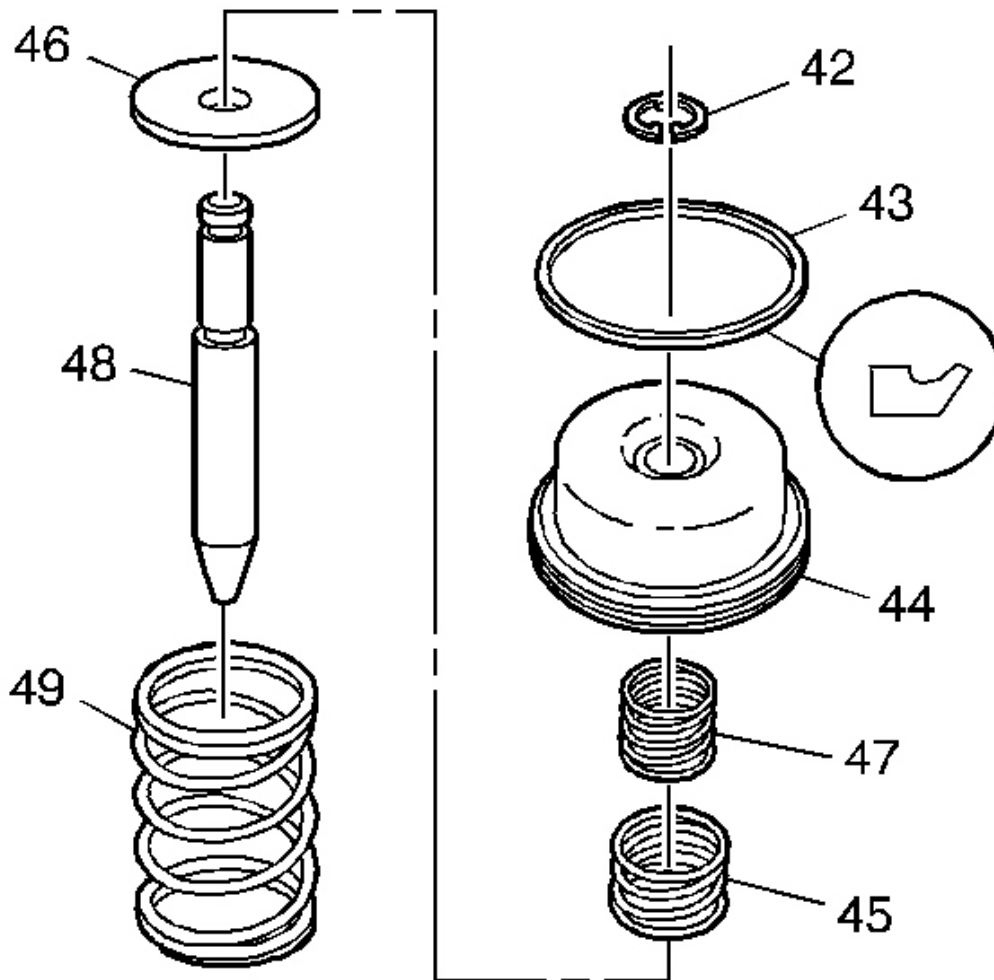


Fig. 388: View Of Reverse Band Servo Assembly Components
Courtesy of GENERAL MOTORS CORP.

1. Disassemble the reverse band servo piston return spring (49) from the reverse band servo assembly.
2. Remove the servo piston oil seal ring (43) from the servo piston (44).
3. Using a small screwdriver, remove the servo pin retaining ring (42) from the servo piston apply pin (48).
4. Disassemble the servo piston (44), the servo piston cushion springs (45, 47), the servo piston cushion spring retainer (46) and servo piston apply pin (48).

REVERSE BAND SERVO ASSEMBLE

Assembly Procedure

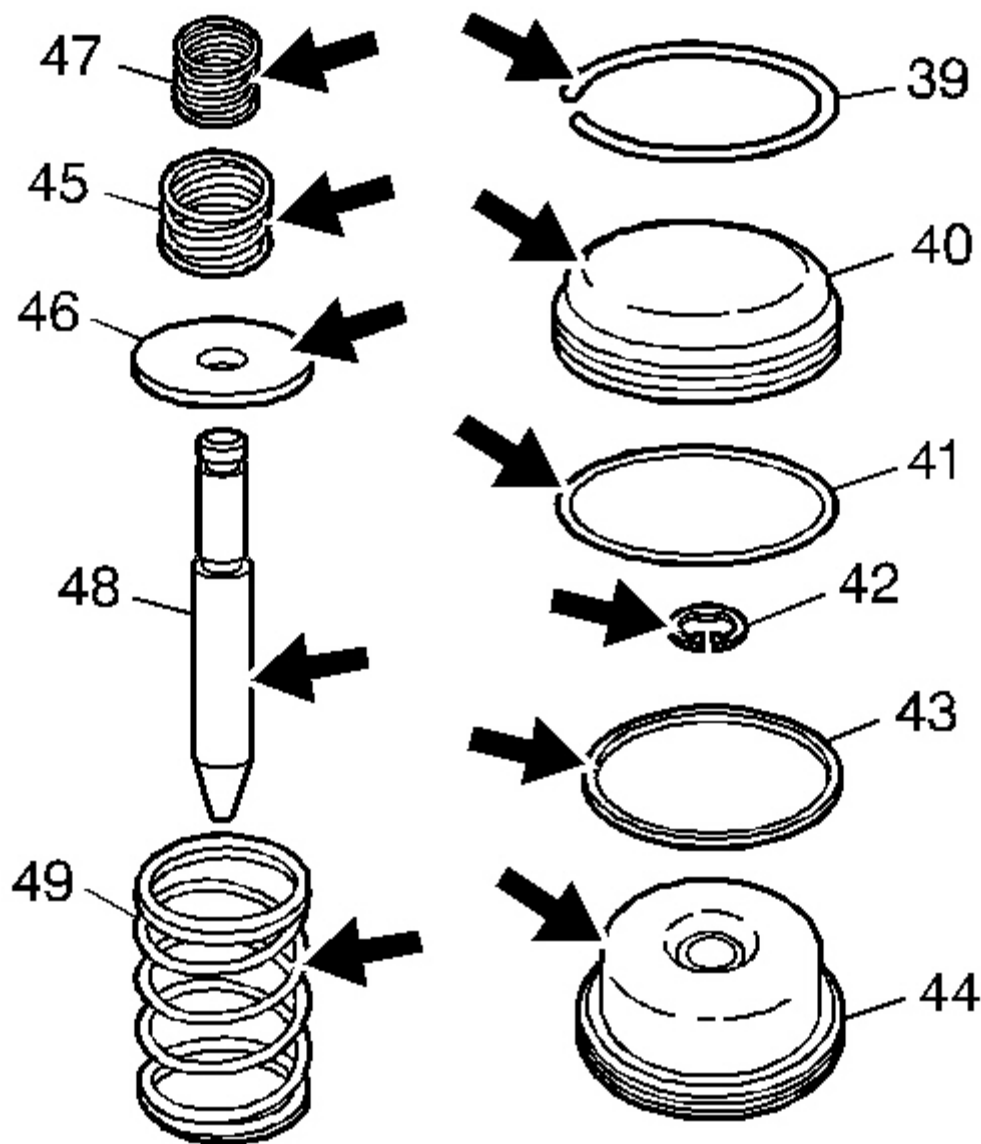


Fig. 389: Inspection Areas On Reverse Band Servo
Courtesy of GENERAL MOTORS CORP.

1. Inspect the reverse band servo components for the following conditions:
 - Damaged, worn or porous servo piston (44)
 - Damaged servo piston oil seal ring (43)

- Damaged, worn or porous servo cover (40)
- Damaged servo cover O-ring seal (41)
- Damaged servo cover retaining ring (39)
- Broken or collapsed servo piston return spring (49)
- Broken or collapsed servo piston cushion springs (45, 47)
- Damaged or worn servo piston apply pin (48)

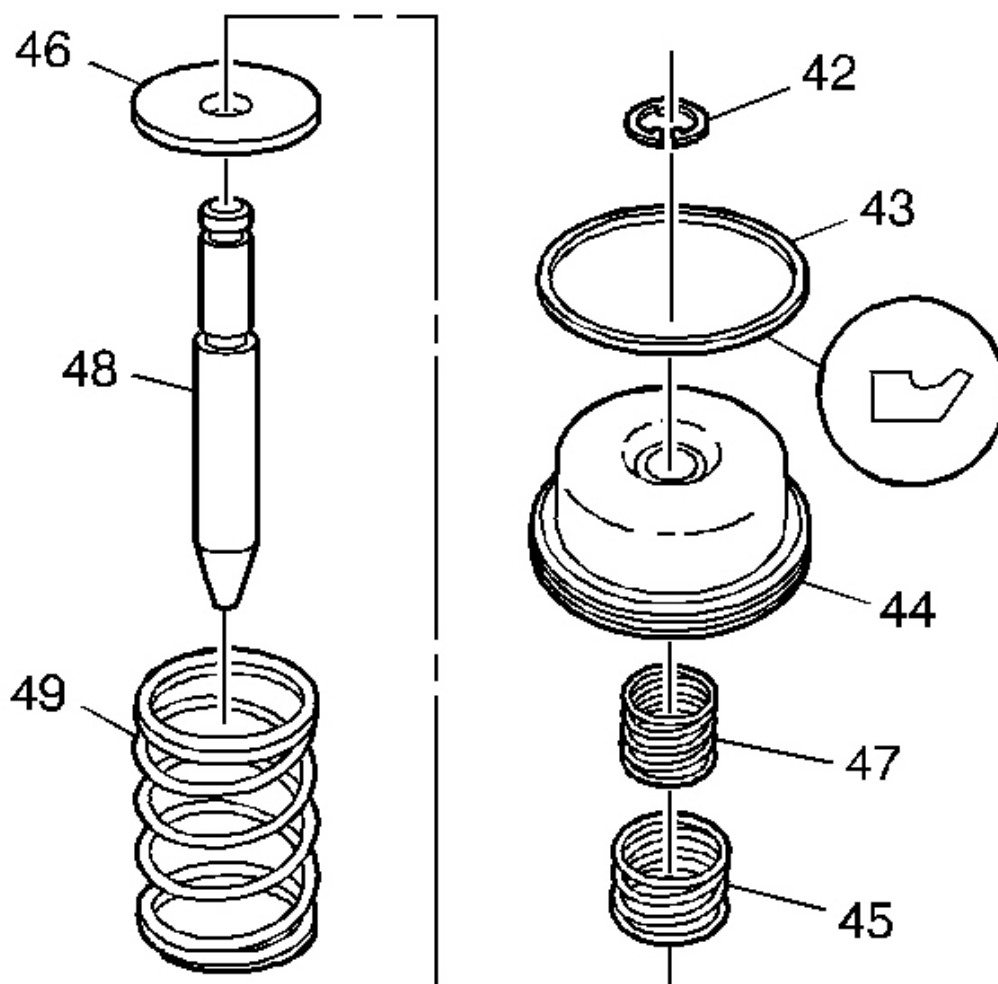


Fig. 390: View Of Reverse Band Servo Assembly Components
Courtesy of GENERAL MOTORS CORP.

2. Assemble the servo piston (44), the servo piston cushion springs (45, 47), the servo piston cushion spring retainer (46) and the servo piston apply pin (48).
3. Install the servo pin retaining ring (42) onto the servo piston apply pin (48).
4. Install the servo piston oil seal ring (43) onto the servo piston (44).
5. Assemble the servo piston return spring (49) onto the servo assembly.

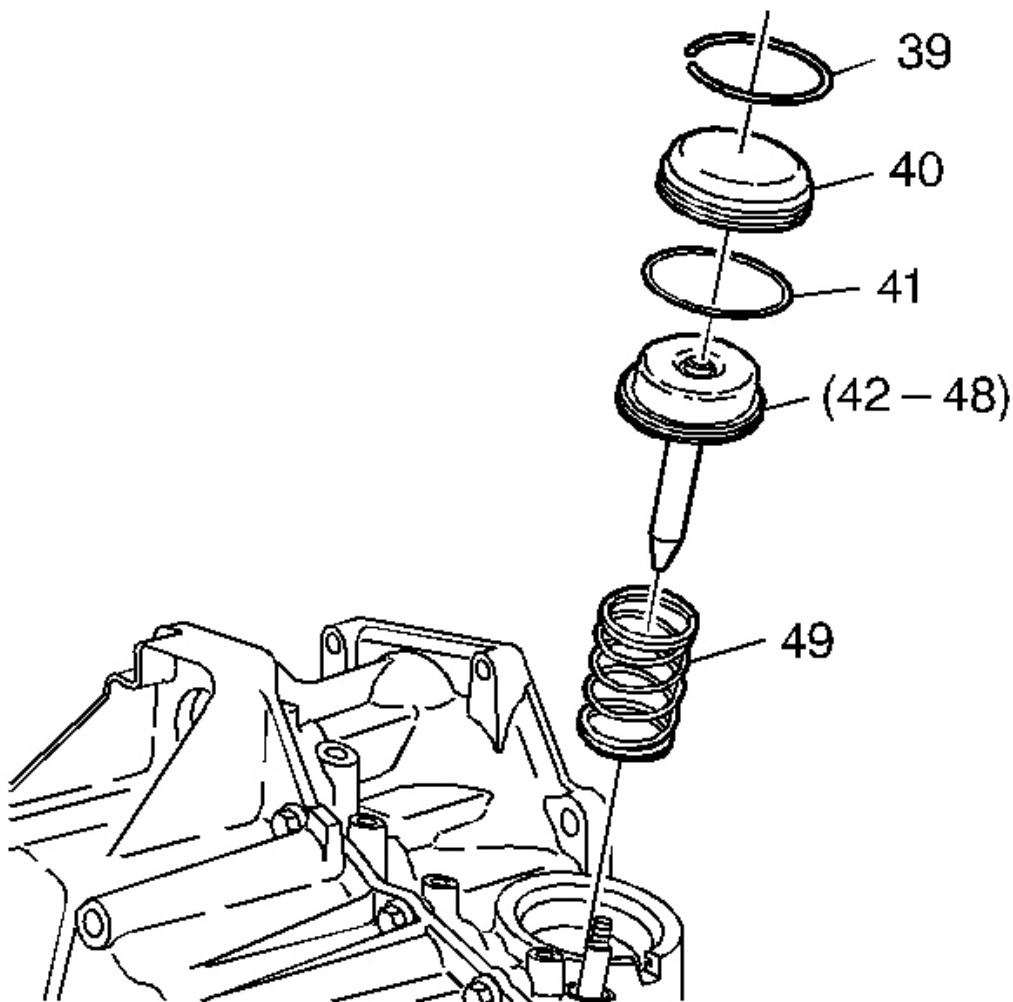


Fig. 391: Identifying Reverse Servo Assembly Components
Courtesy of GENERAL MOTORS CORP.

6. Position the transmission so that the oil pan is facing down.
7. Install the servo cover O-ring seal (41) onto the servo cover (40).
8. Install the servo and cover assembly (40-49) into the case.

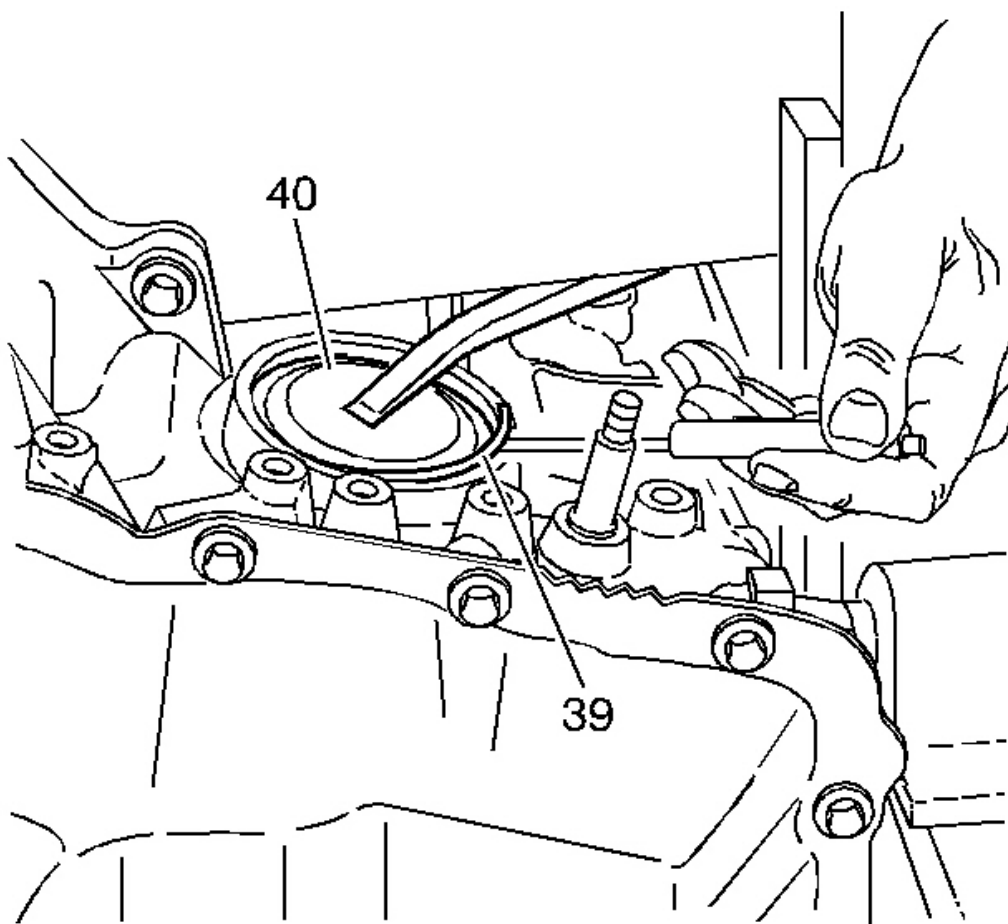


Fig. 392: Removing/Installing Reverse Servo Cover Snap Ring
Courtesy of GENERAL MOTORS CORP.

9. Use a long screwdriver in order to depress the reverse band servo cover (40) by prying against the transmission holding fixture.
10. Hold the reverse band servo assembly compressed.
11. Use a small screwdriver in order to install the reverse band servo cover retaining ring (39).

12. Remove the long screwdriver.

TRANSMISSION TO TRANSFER CASE END PLAY CHECK (F4WD ONLY)

Tools Required

- **J 36850** Assembly Lubricant (or equivalent)
- **J 44472** End Play Checking Tool. See **Special Tools**.

Checking Procedure

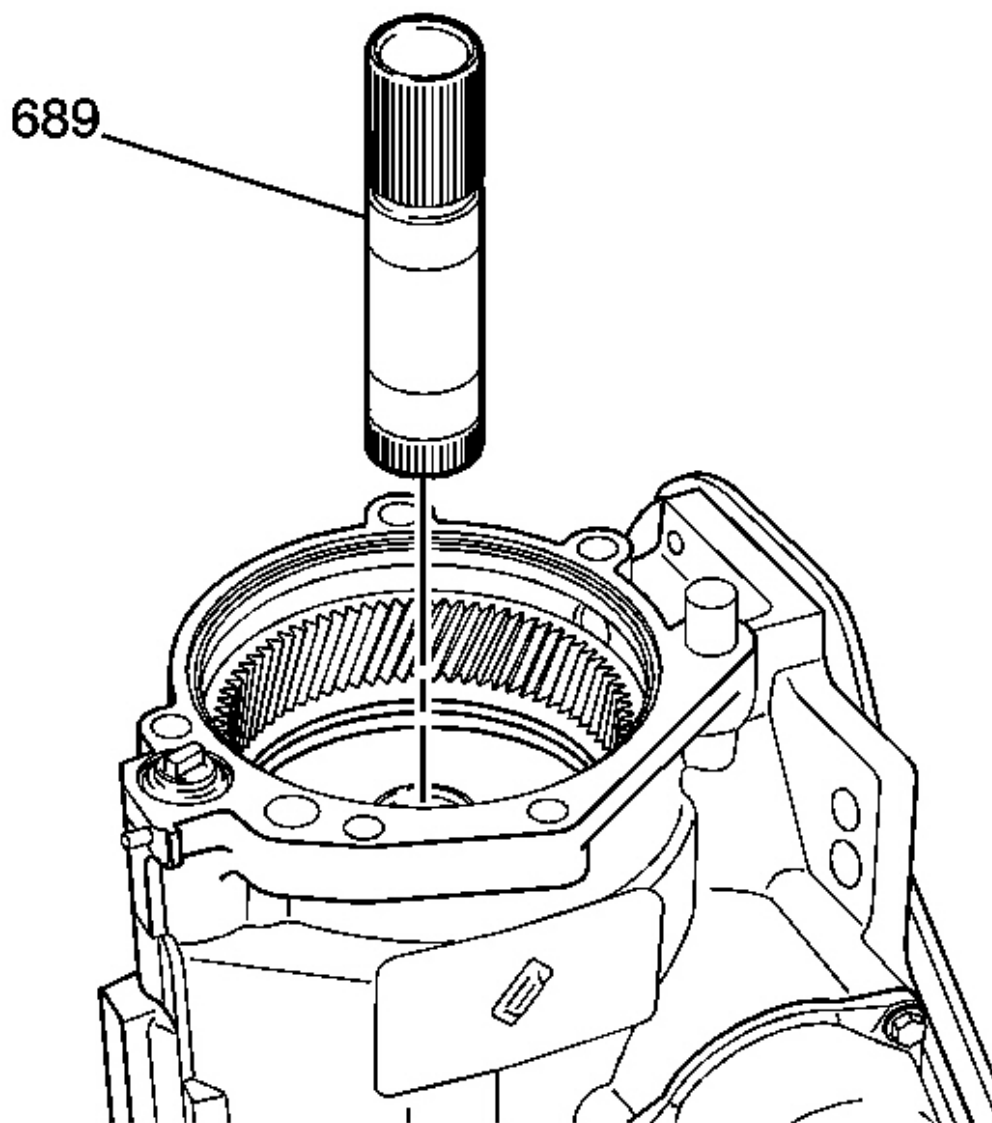


Fig. 393: Identifying Final Drive Sun Gear Shaft
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Transmission oil circulates between the transmission assembly and the transfer case. In situations where transmission related failures circulate debris into the

transfer case, the transfer case must be disassembled, cleaned and inspected for damage. Refer to Internal Components Cleaning and Inspection .

1. Position the transaxle so that the case side cover is facing down.
2. Install the final drive sun gear shaft (689).

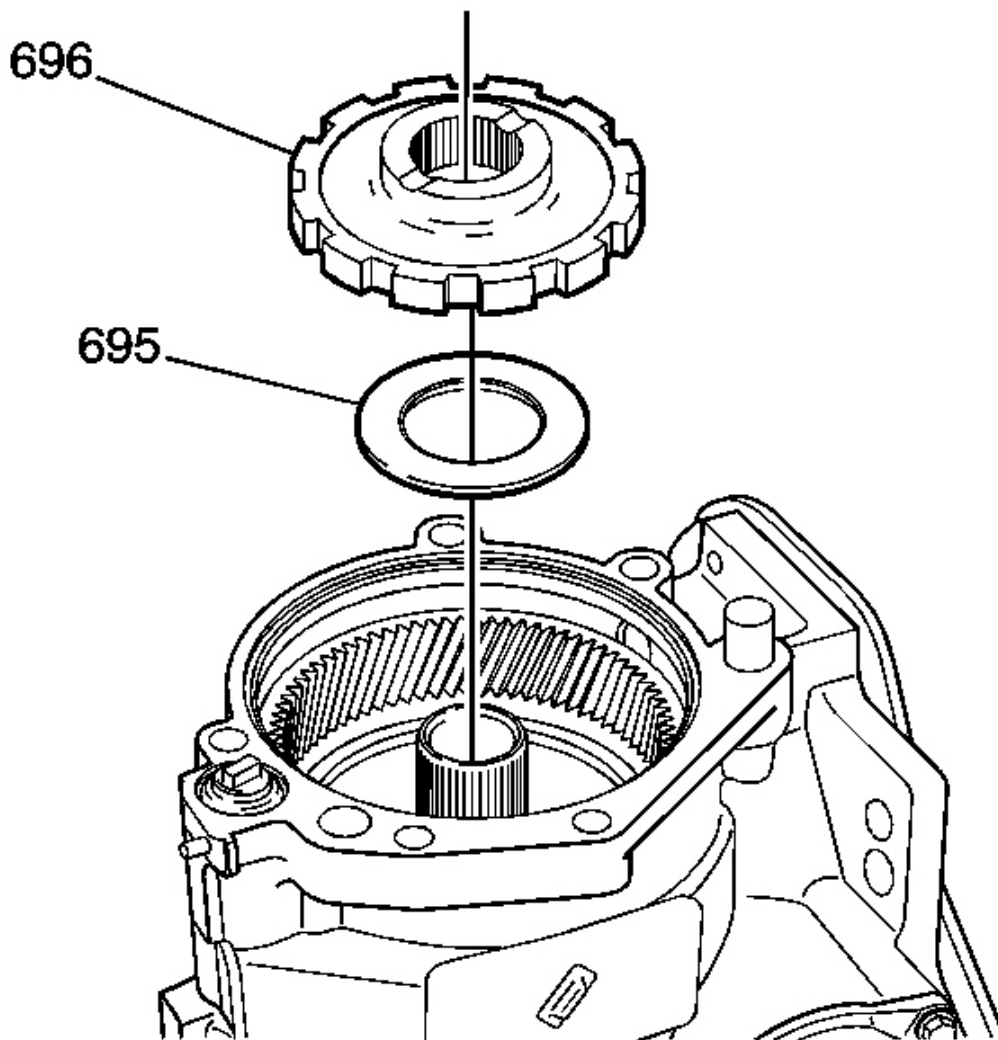


Fig. 394: View Of Park Gear Thrust Bearing & Park Gear
Courtesy of GENERAL MOTORS CORP.

NOTE: **The park gear thrust bearing (695) must be retained in the park gear (696) when installing the transfer case to the transmission or damage may occur.**

3. Use **J 36850** or equivalent in order to retain the parking gear thrust bearing (695) to the parking gear (696).

Install the parking gear thrust bearing (695) and the parking gear (696).

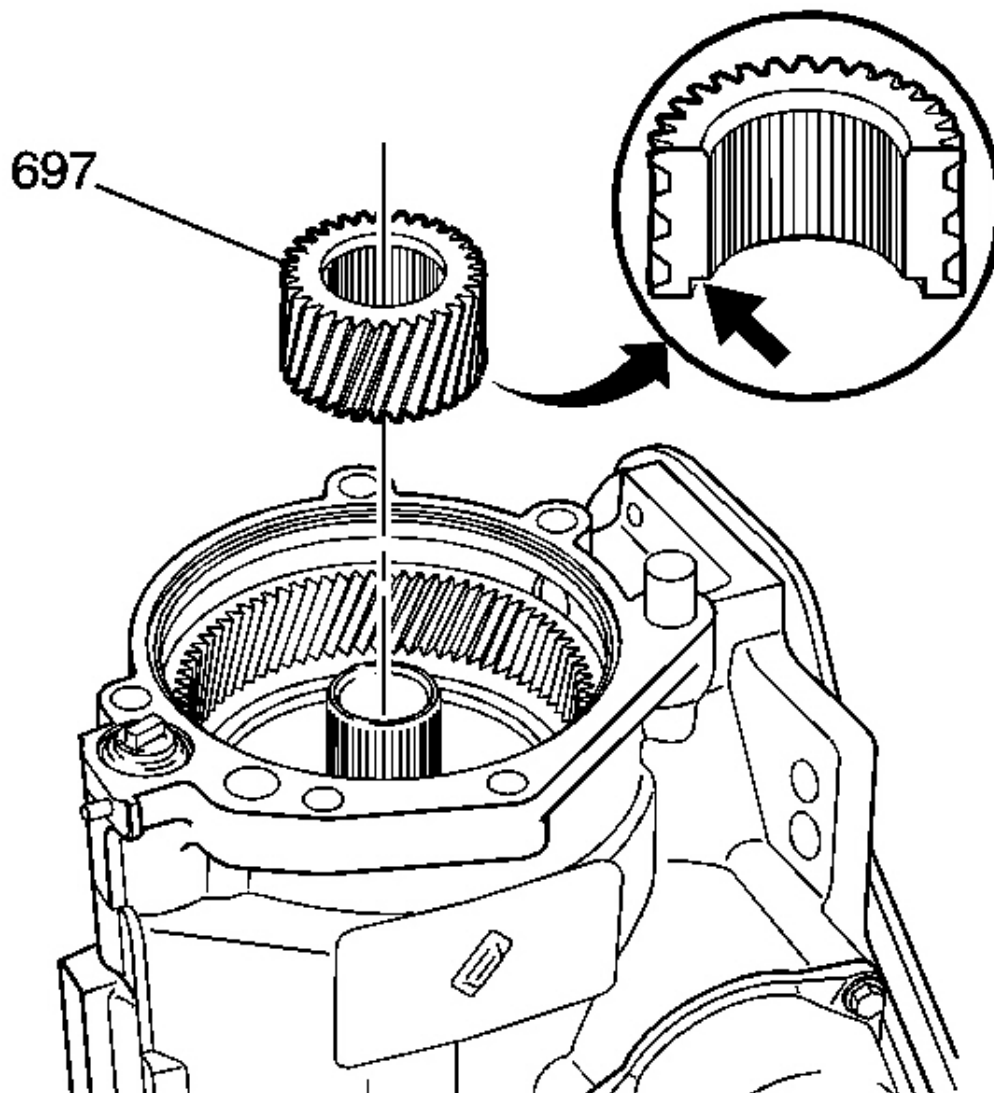


Fig. 395: Identifying Final Drive Sun Gear
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The counterbore on the final drive sun gear installs towards the parking gear.

4. Install the final drive sun gear (697).

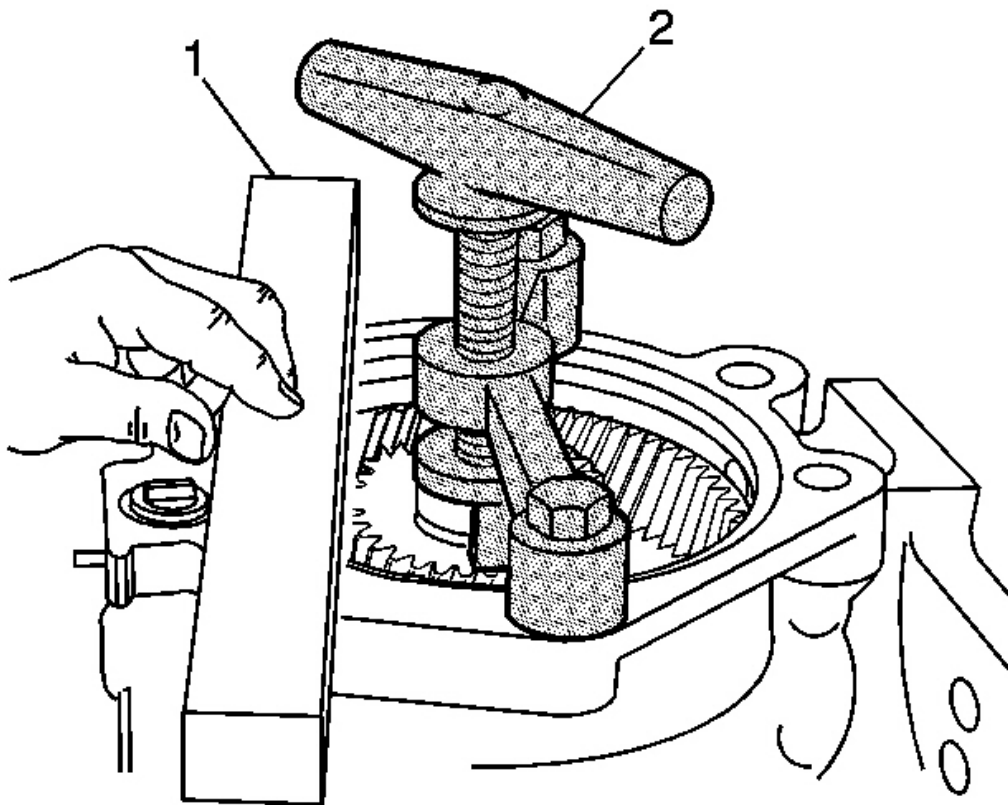


Fig. 396: Installing J 44472 Onto Transmission Case
Courtesy of GENERAL MOTORS CORP.

5. Install the gauge bar (1) onto the case mounting surface.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

IMPORTANT: Install bolts to J 44472 and tighten securely to prevent tool deflection during end play measurement. See Special Tools.

6. Install J 44472 (2) onto the transmission. See Special Tools.

Tighten: Tighten J 44472 to remove end play. See Special Tools. Hand tighten only.

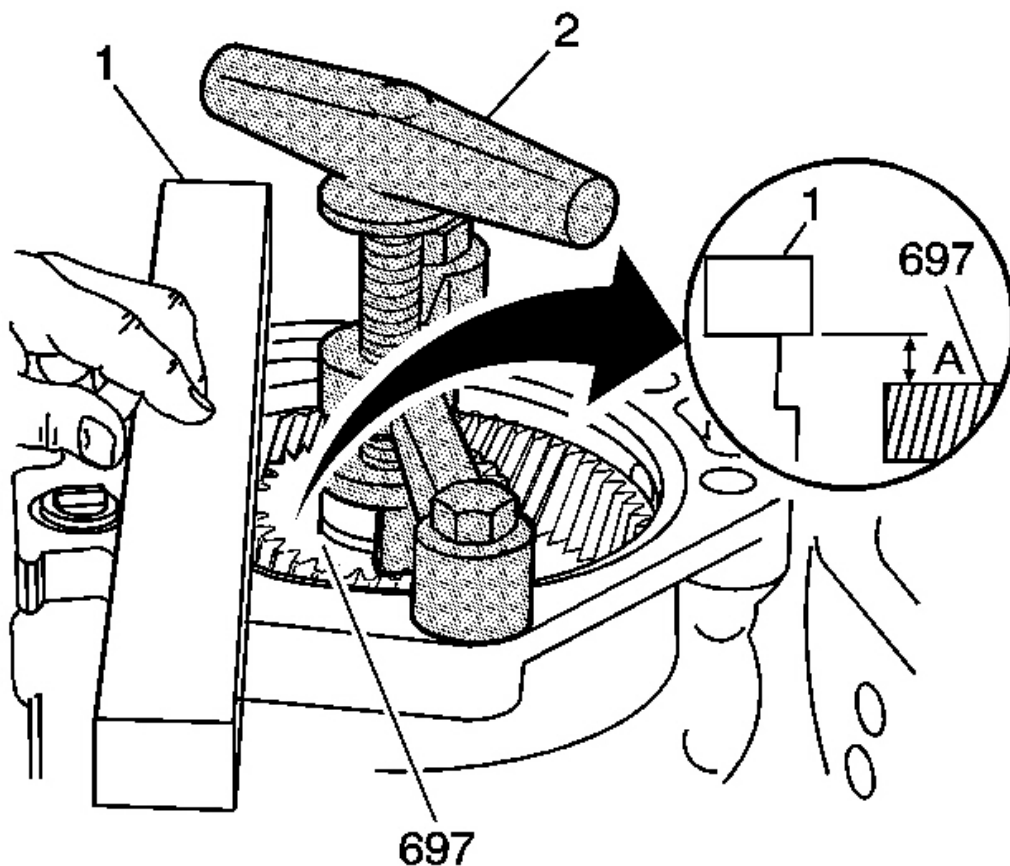


Fig. 397: Measuring Dimension A
 Courtesy of GENERAL MOTORS CORP.

7. Measure the distance from the case mounting surface, bottom of the gauge bar (1) to the top of the final drive sun gear (697). This measurement is dimension A, refer to **Transfer Case Selective Washer Specifications**.
8. Remove the gauge bar (1) and J 44472 (2). See **Special Tools**.

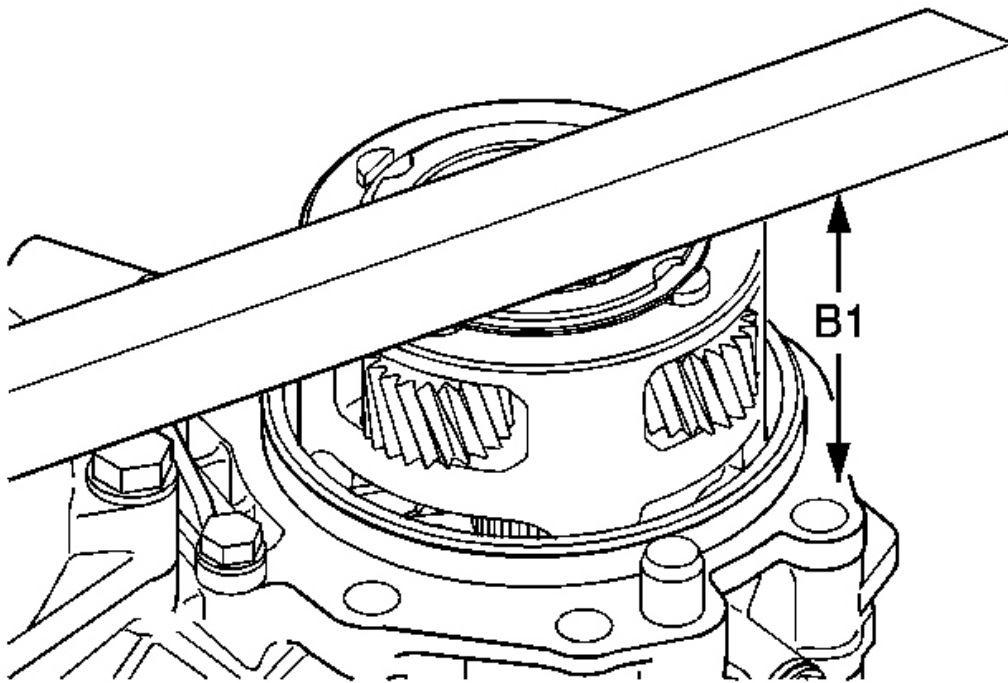


Fig. 398: Identifying Dimension B1
Courtesy of GENERAL MOTORS CORP.

9. Install the gauge bar onto the carrier.
10. Measure the distance from the bottom of the gauge bar to the transfer case. This measurement is Dimension B1.

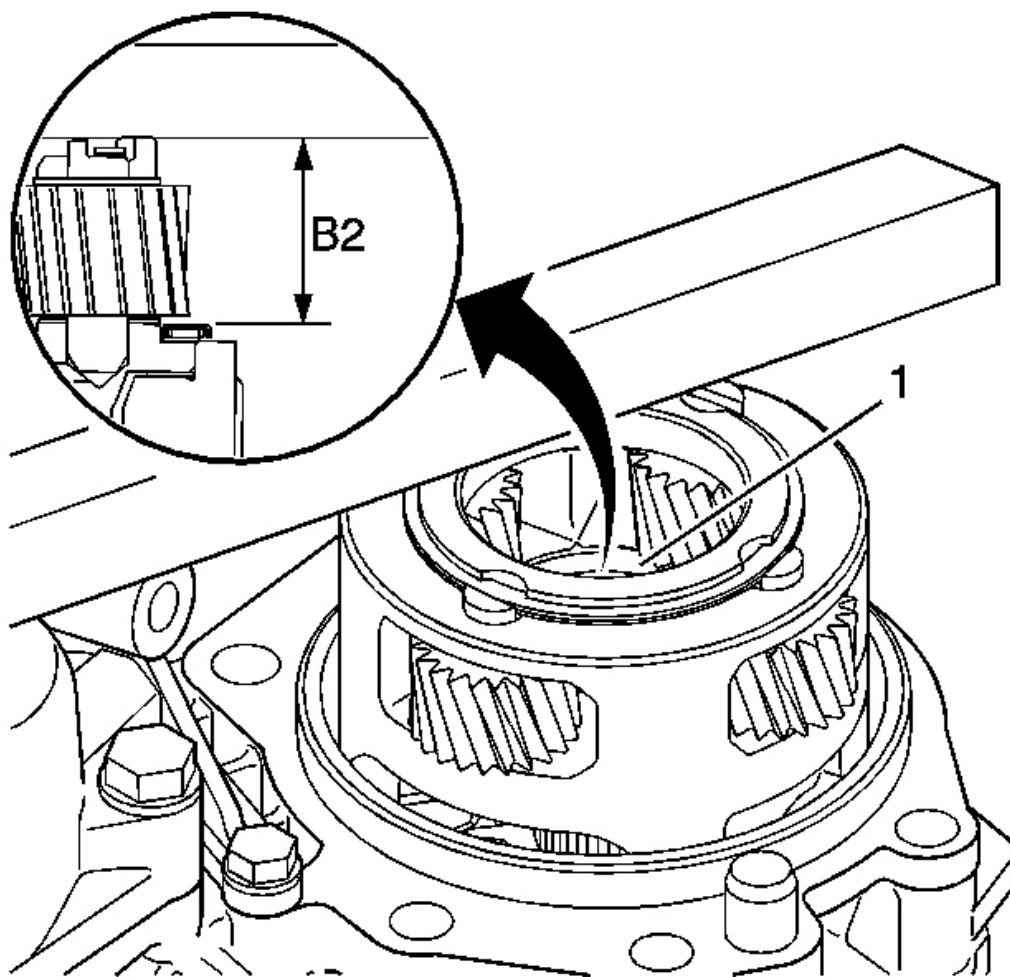


Fig. 399: Measuring Dimension B2
Courtesy of GENERAL MOTORS CORP.

11. Measure the distance from the bottom of the gauge bar to the thrust bearing (1). This measurement is Dimension B2.
12. Subtract Dimension B2 from Dimension B1. This Dimension is B. Refer to **Transfer Case Selective Washer Specifications**.
13. Remove the gauge bar from the transfer case.

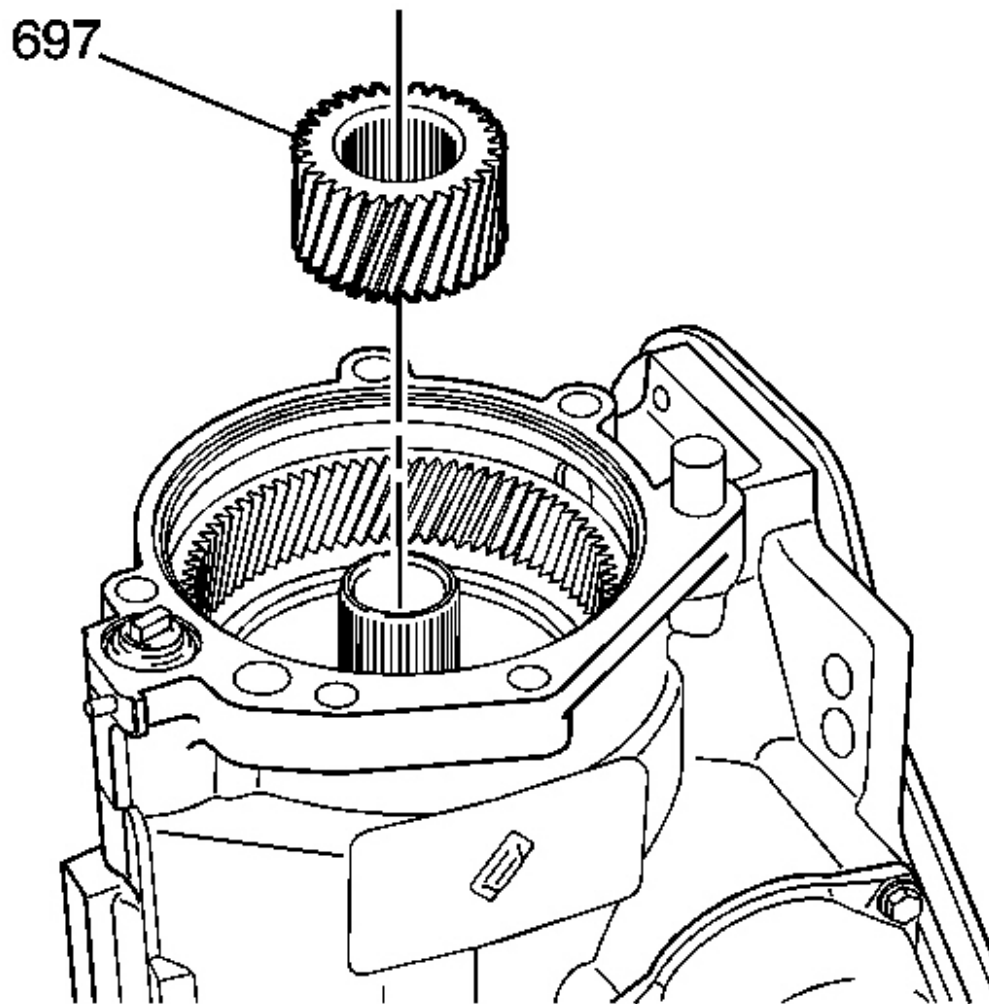


Fig. 400: Locating Final Drive Sun Gear
Courtesy of GENERAL MOTORS CORP.

14. Remove the final drive sun gear (697).

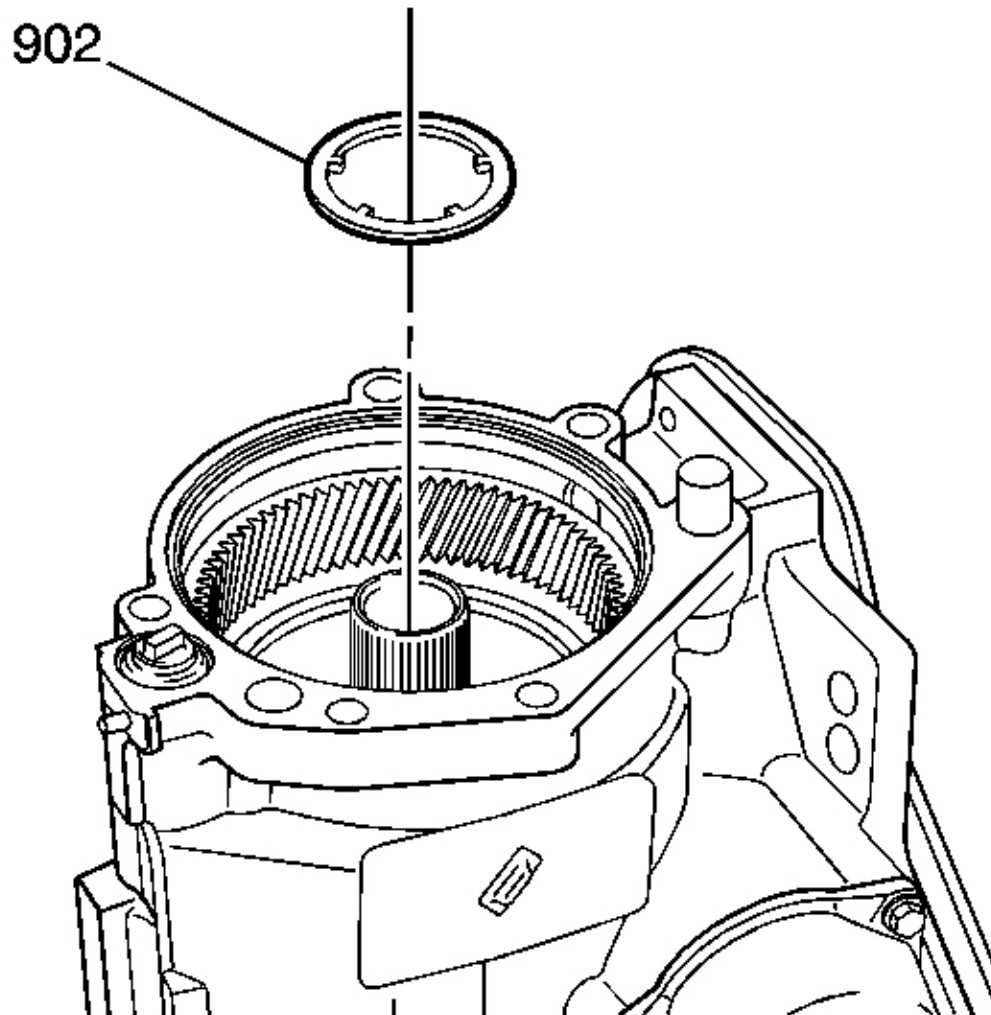


Fig. 401: View Of Selective Washer
Courtesy of GENERAL MOTORS CORP.

15. Refer to **Transfer Case Selective Washer Specifications**.

Install the selective washer (902).

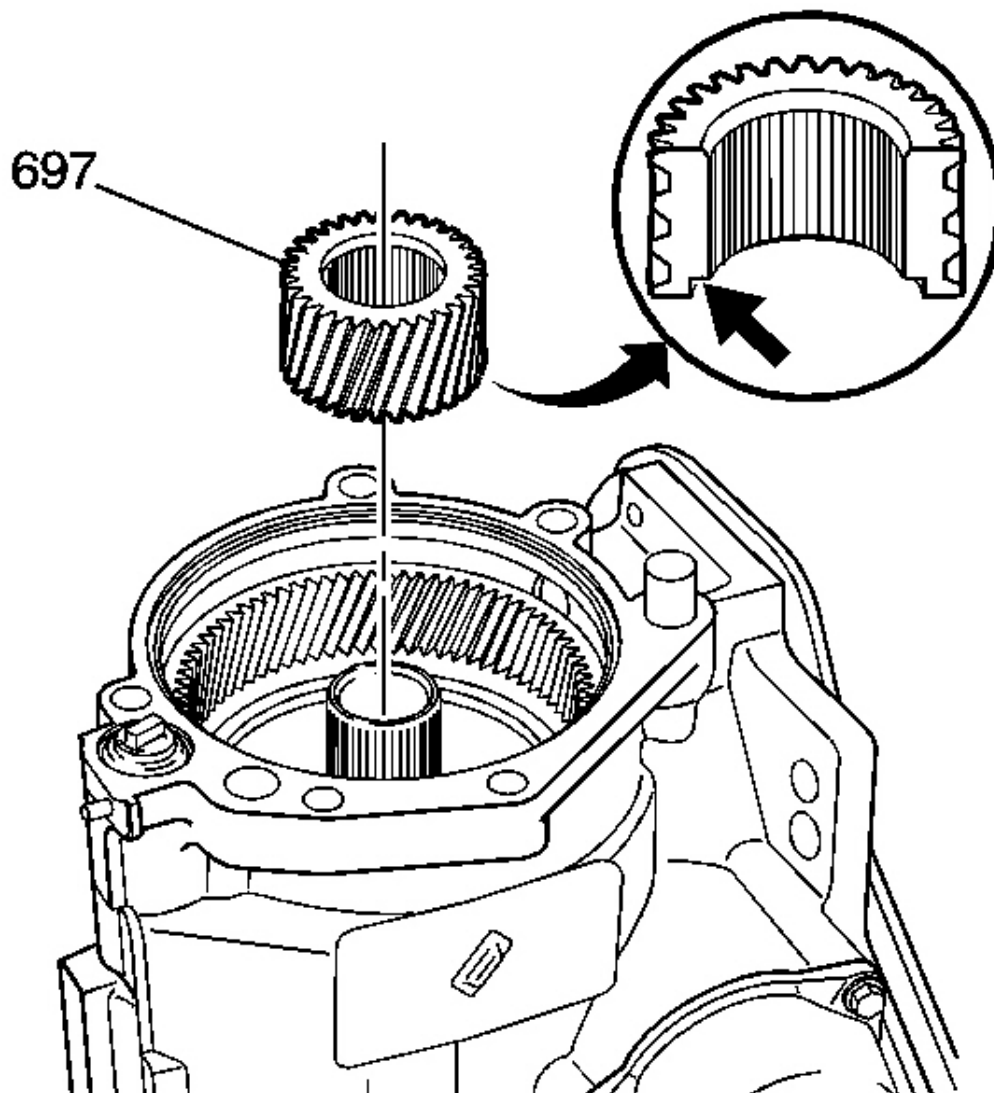


Fig. 402: Identifying Final Drive Sun Gear
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The counterbore on the final drive sun gear installs towards the parking gear.

16. Install the final drive sun gear (697).

TRANSFER CASE INSTALLATION

Tools Required

J 36850 Assembly Lubricant (or equivalent)

Installation Procedure

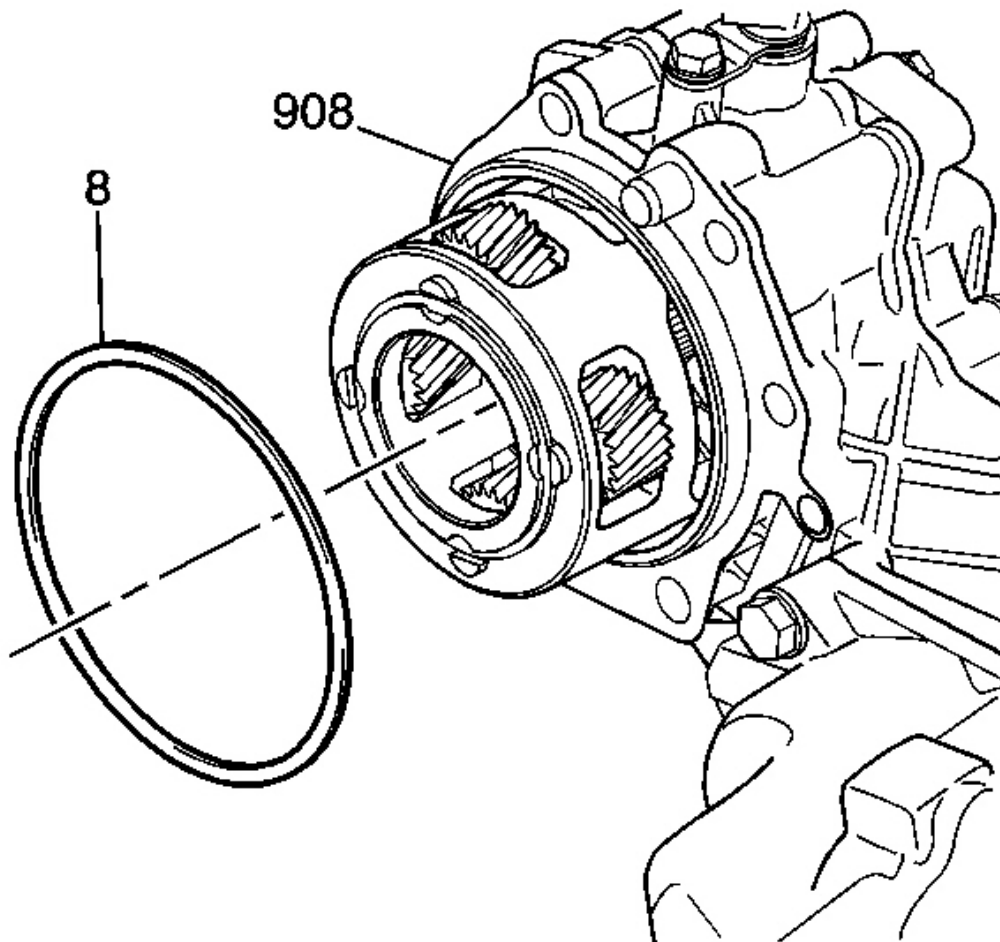


Fig. 403: View Of Case Extension Seal
Courtesy of GENERAL MOTORS CORP.

1. Install the case extension seal (8) using **J 36850** in order to retain.

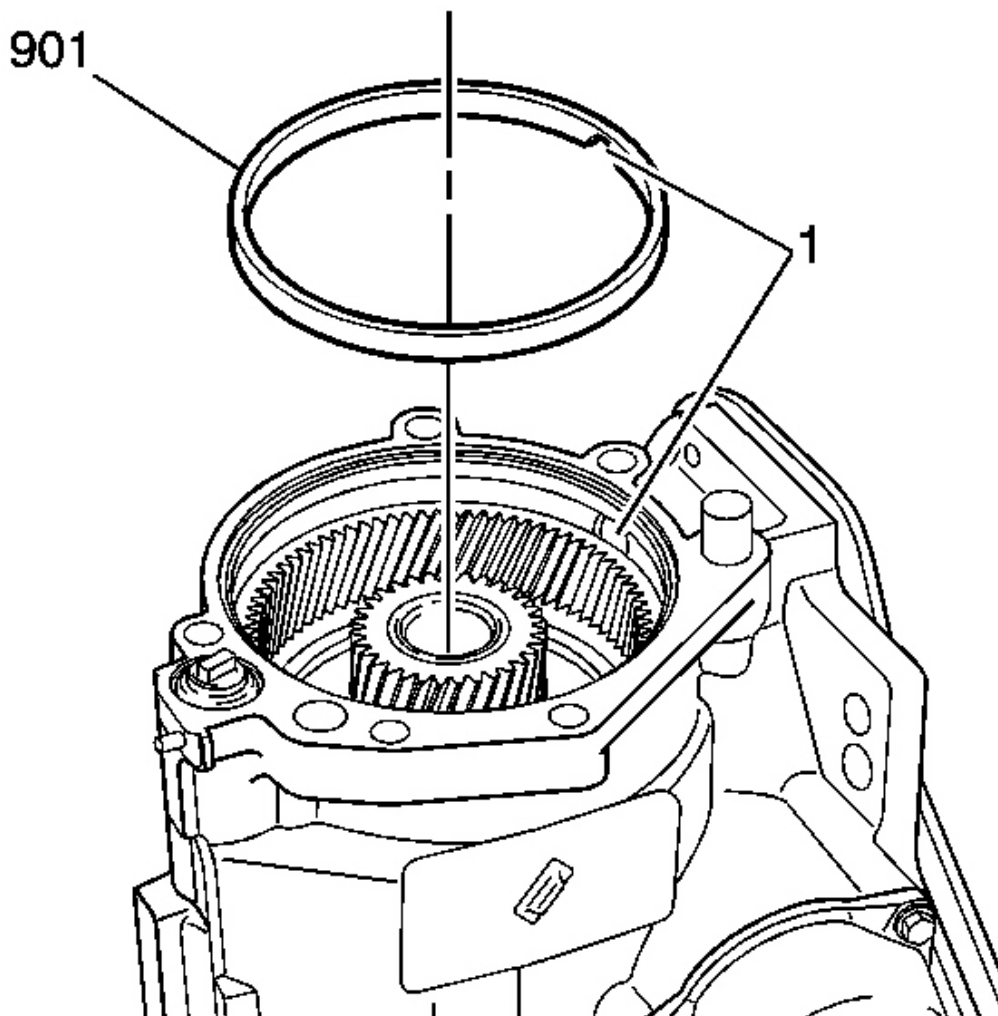


Fig. 404: Identifying Oil Dam
Courtesy of GENERAL MOTORS CORP.

NOTE: The oil dam must be installed with the oil passage notch aligned to the passage in the case. Incorrect alignment will cause oil flow stoppage and damage to the transmission.

2. Line up the notch (1) to the hole in the case and install the oil dam (901).

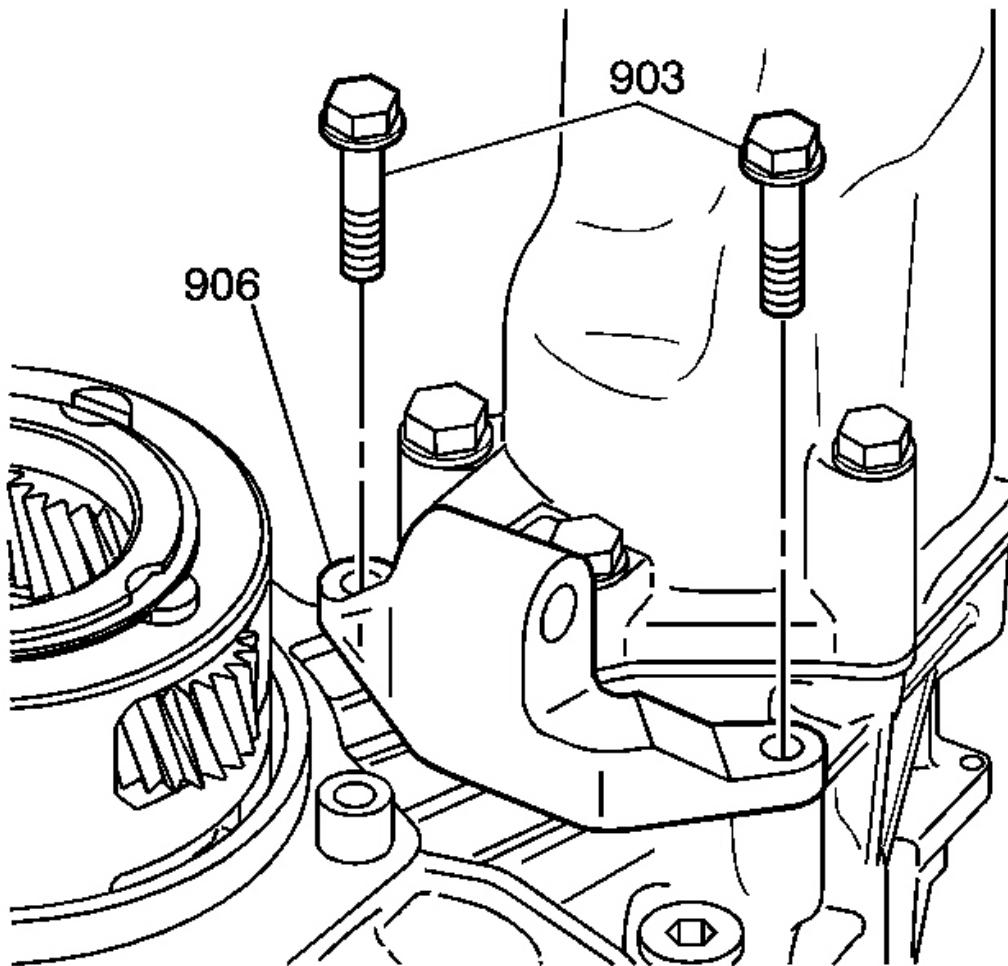


Fig. 405: View Of Transfer Case Lower Brace Bolts & Brace
Courtesy of GENERAL MOTORS CORP.

3. Install the transfer case lower brace (906).
4. Install the transfer case lower brace bolts (903). Hand tighten.

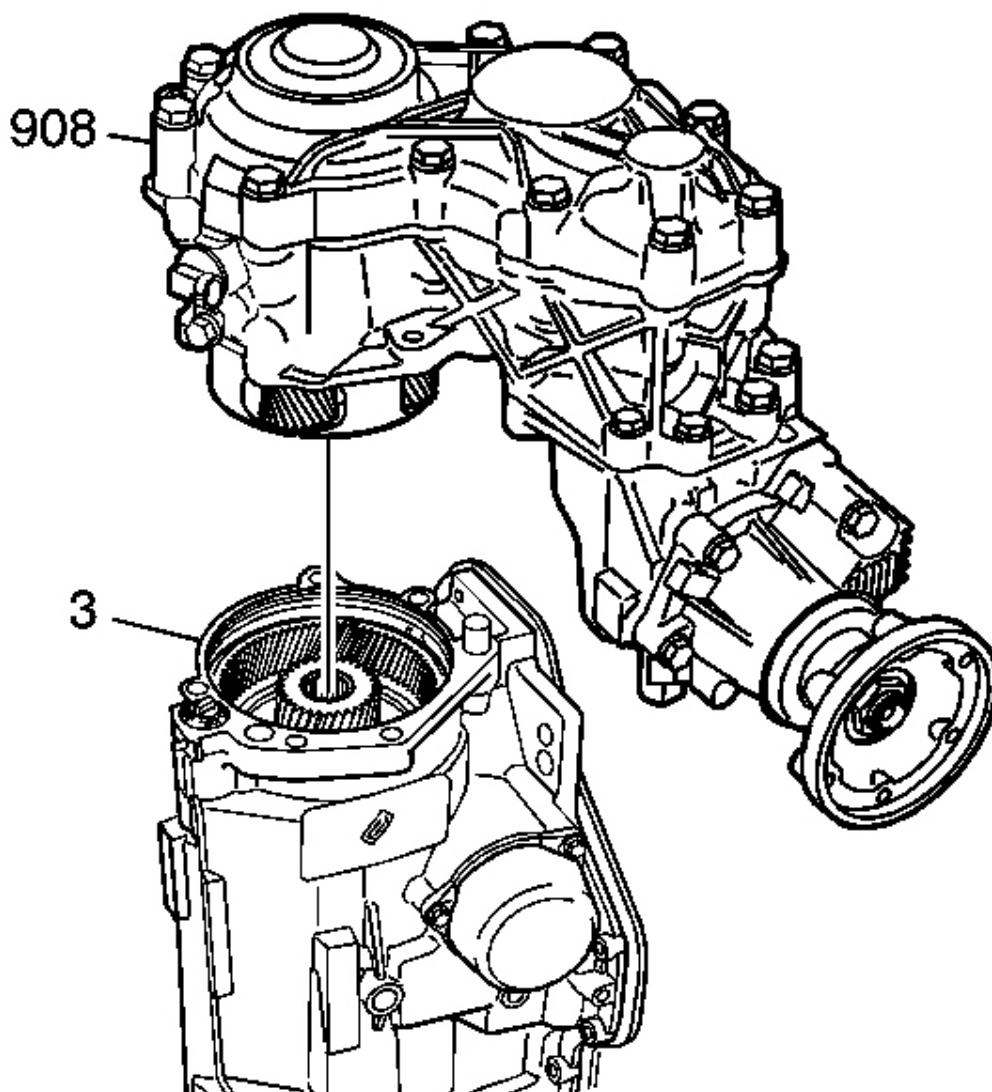


Fig. 406: View Of Transfer Case Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: This component weighs approximately 60 lbs. Personal injury may result if you lift the component improperly.

NOTE: The park gear thrust bearing (695) must be retained in the park

gear (696) when installing the transfer case to the transmission or damage may occur.

IMPORTANT: When the transfer case is installed onto the transmission, there should be no gap between these parts. If a gap exists, check the park gear thrust bearing for proper retention to the park gear.

5. Install the transfer case assembly (908) onto the transmission case (3).

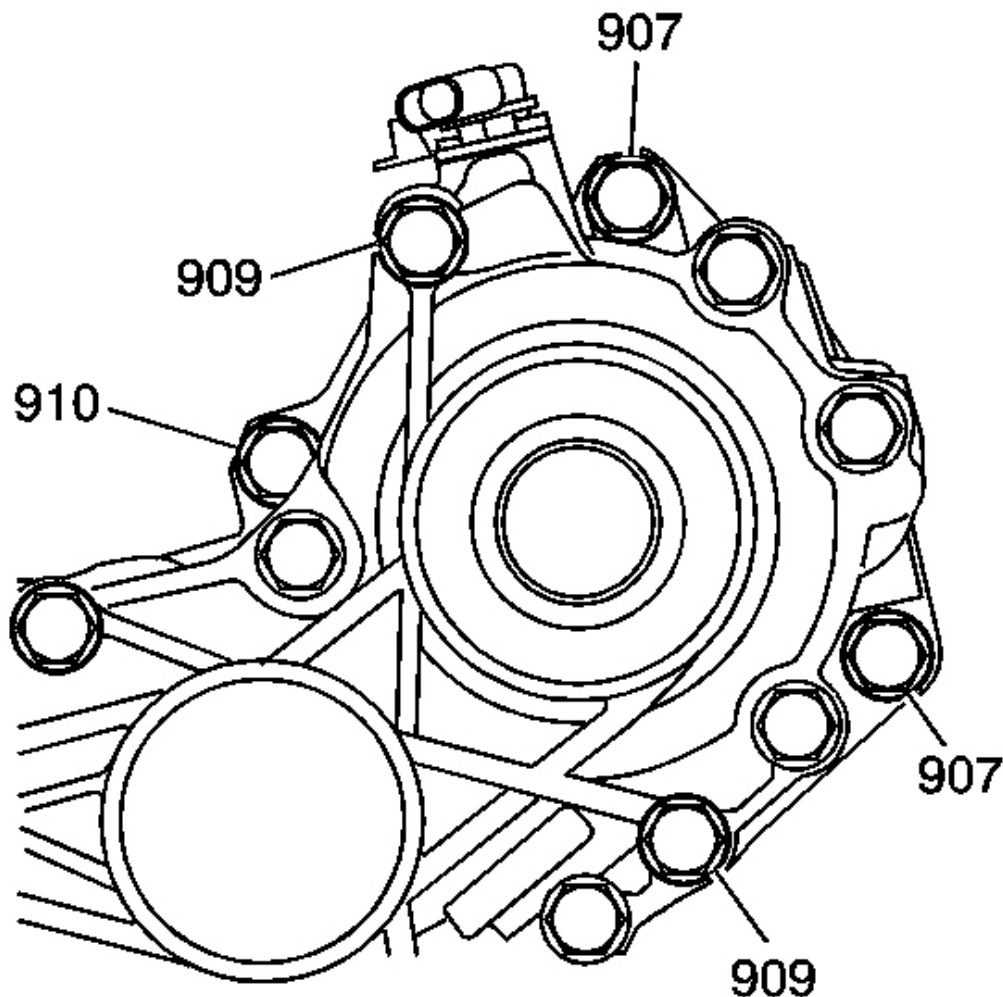


Fig. 407: View Of Transfer Case To Case Bolts
Courtesy of GENERAL MOTORS CORP.

6. Install the 5 transfer case to case bolts (907, 909, 910).

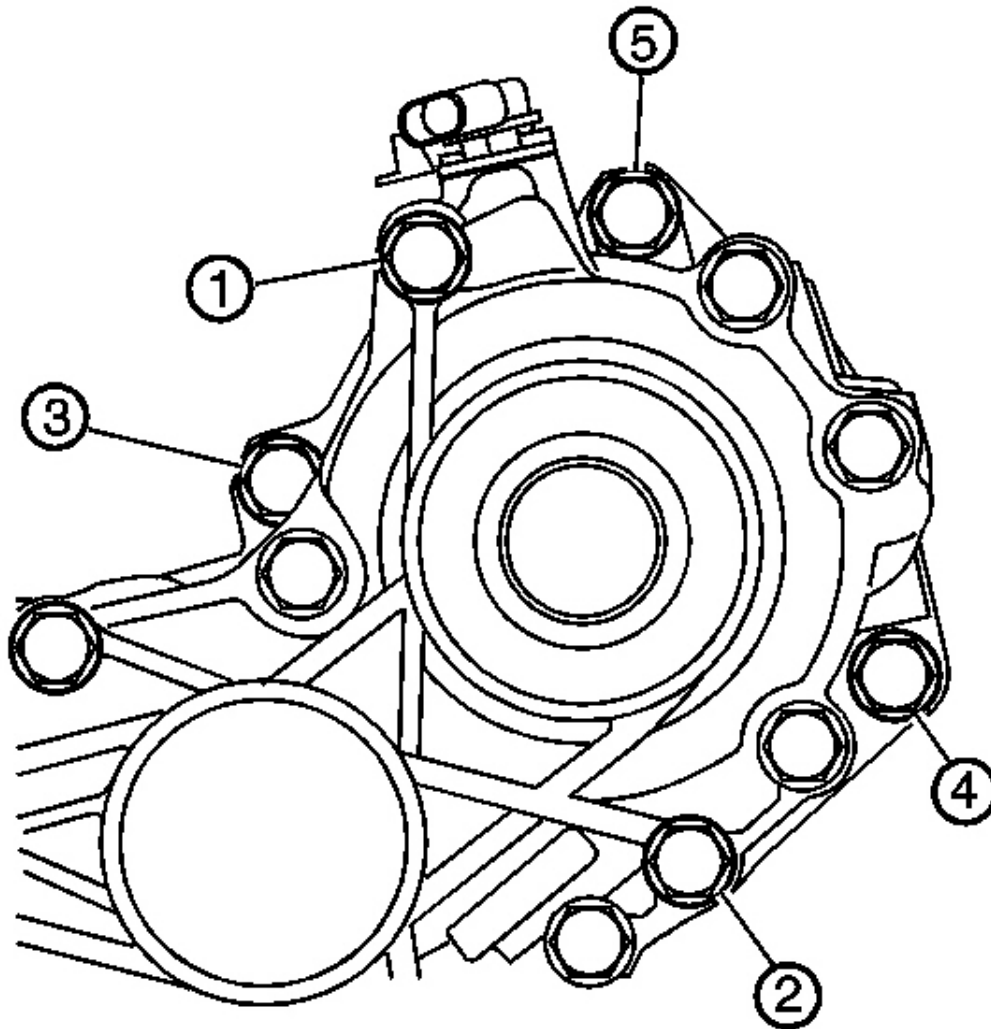


Fig. 408: Identifying Case Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: 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.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

7. Torque the bolts in the following sequence:

Tighten 2 transfer case bolts (1, 2):

Tighten:

1. First pass 35 N.m (26 lb ft)
2. Final Pass an additional 160 degrees

8. Tighten 1 transfer case bolt (3):

Tighten:

1. First pass 35 N.m (26 lb ft)
2. Final Pass an additional 70 degrees

9. Tighten 2 transfer case bolts (4, 5):

Tighten: Tighten transfer case bolts (4, 5) to 40 N.m (30 lb ft).

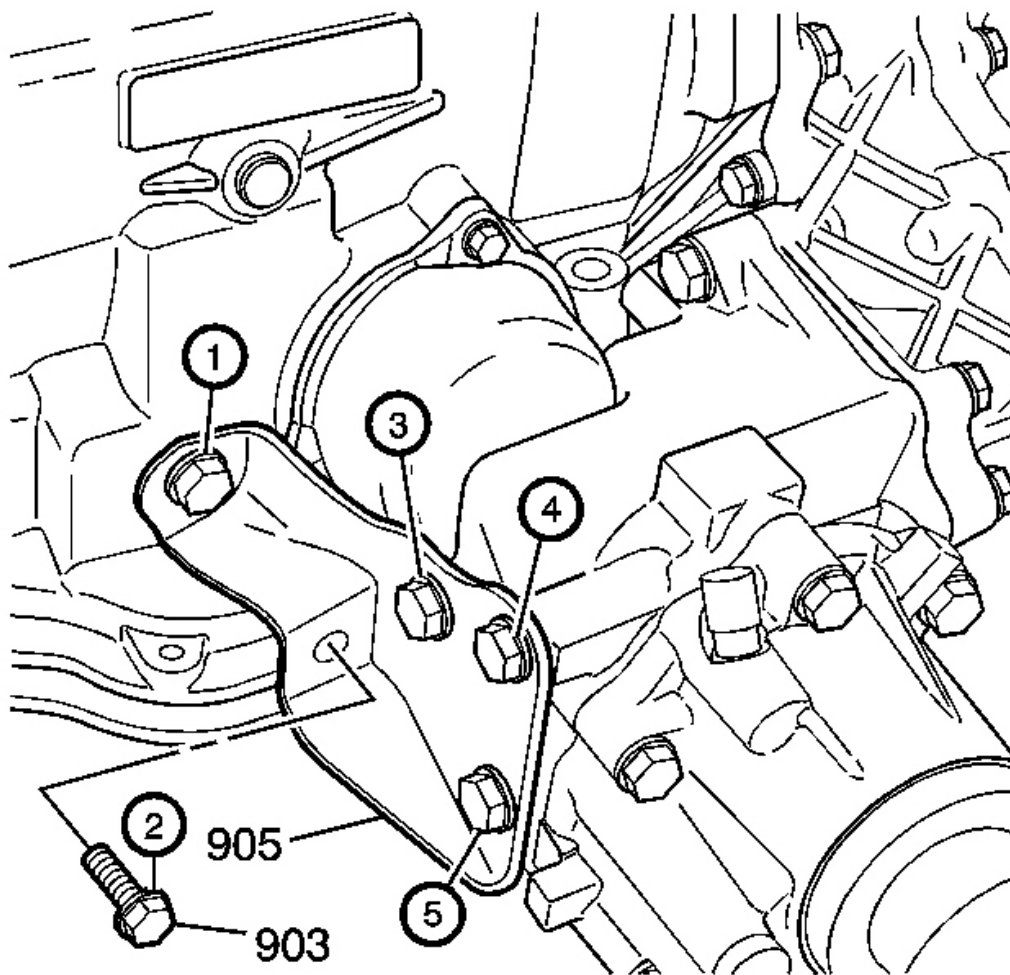


Fig. 409: View Of Transfer Case Side Brace
Courtesy of GENERAL MOTORS CORP.

10. Install the transfer case side brace (905) to case.
11. Install the transfer case side brace to case bolts (903). Hand tighten the bolts.
12. Torque the bolts in the following sequence (1, 2, 3, 4, 5).

Tighten: Tighten the transfer case side brace bolts to 31 N.m (23 lb ft).

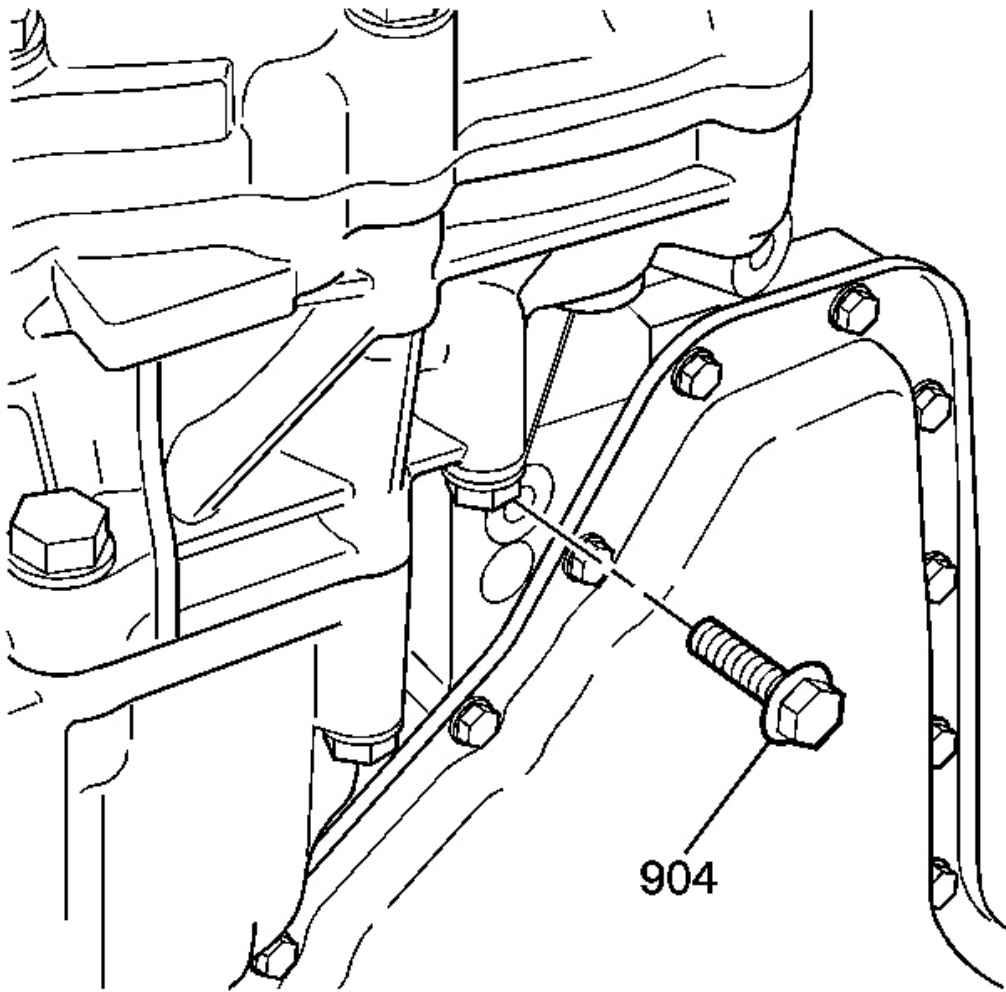


Fig. 410: Identifying Transfer Case Lower Brace To Case Bolt
Courtesy of GENERAL MOTORS CORP.

13. Install the transfer case lower brace to case bolt (904).

Tighten: Tighten the transfer case lower brace bolt to 56 N.m (42 lb ft).

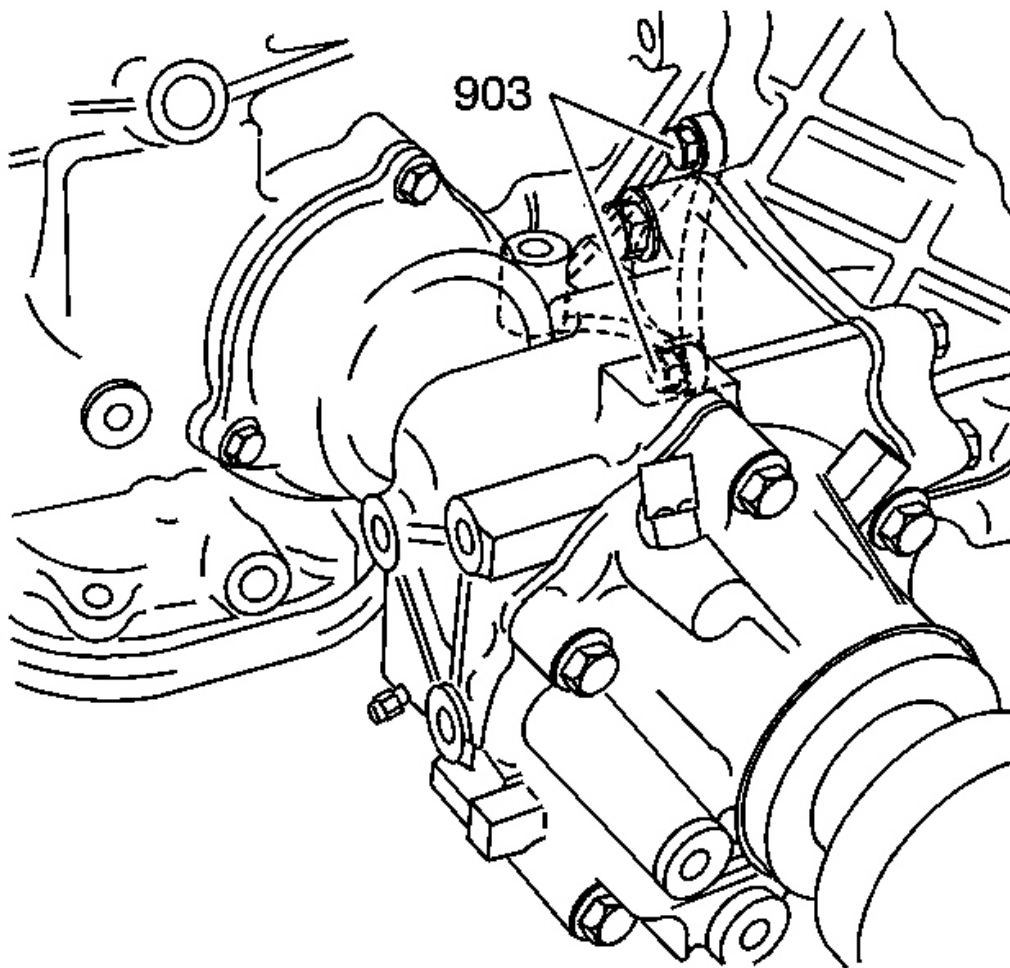


Fig. 411: Locating Transfer Case Lower Brace To Transfer Case Bolts
Courtesy of GENERAL MOTORS CORP.

14. Tighten the transfer case lower brace to case bolts (903).

Tighten: Tighten the transfer case lower brace bolts to 31 N.m (23 lb ft).

OUTPUT SHAFT ASSEMBLY

Assembly Procedure

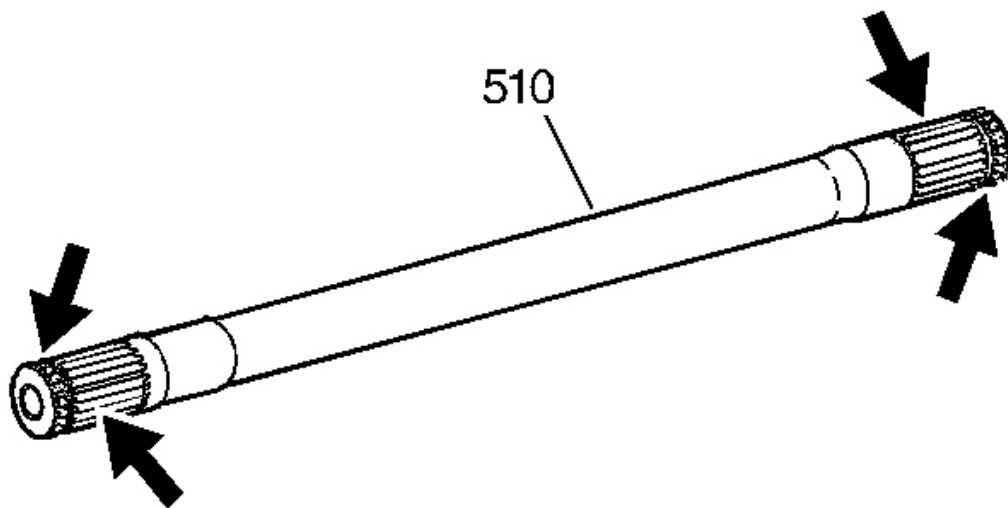


Fig. 412: Output Shaft Inspection Areas
Courtesy of GENERAL MOTORS CORP.

1. Inspect the output shaft (510) for:
 - Damaged bushing journals
 - Stripped splines
 - Snap ring groove damage

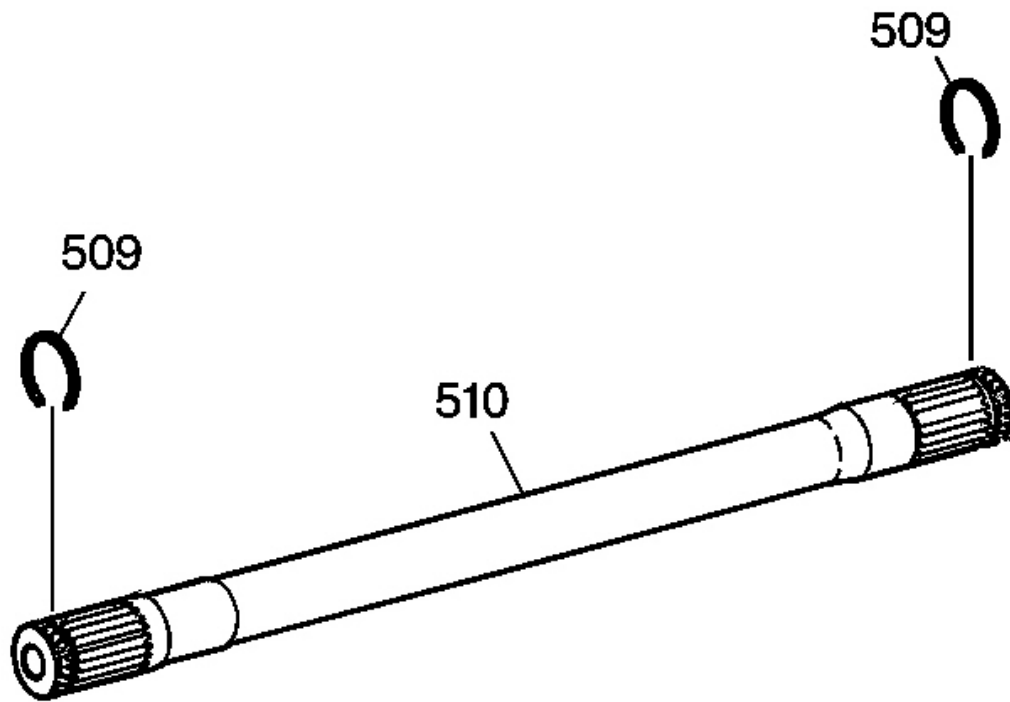


Fig. 413: Drive Axle Retainer Rings & Output Shaft
Courtesy of GENERAL MOTORS CORP.

2. Affix the outboard drive shaft retaining ring (509) and the inboard drive shaft retaining ring (509) onto the output shaft (510).

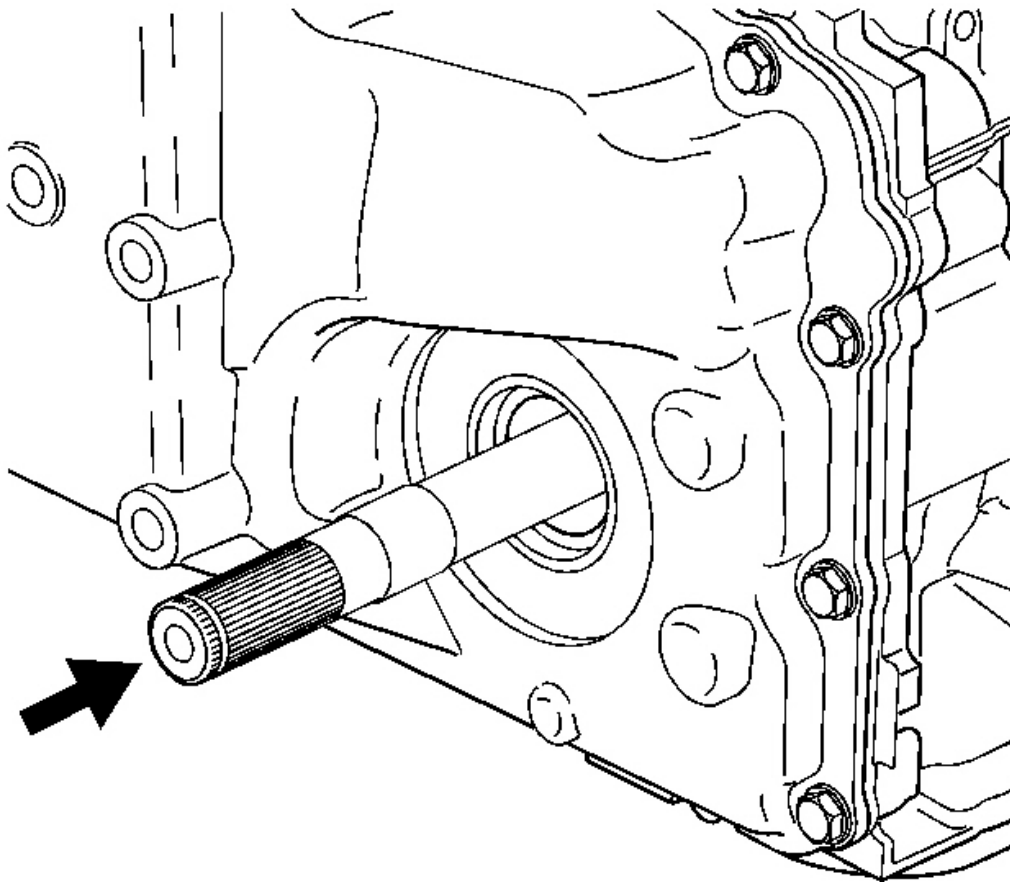


Fig. 414: View Of Output Shaft
Courtesy of GENERAL MOTORS CORP.

3. Rotate the transmission so that the oil pan flange faces downward.

NOTE: Do not push to hard during installation of the output shaft (510) or damage to the bushings or bearings may occur.

IMPORTANT: The output shaft (510) must be installed with the short splines toward the final drive assembly.

4. Carefully install the output shaft (510) into the transmission. Extend the shaft through the differential side gear.

TRANSMISSION HOLDING FIXTURE DISASSEMBLE**Tools Required**

- **J 28664-B** Transmission Holding Fixture. See **Special Tools**.
- **J 3289-20** Holding Fixture Base
- **J44465** Holding Fixture Adapter. See **Special Tools**.

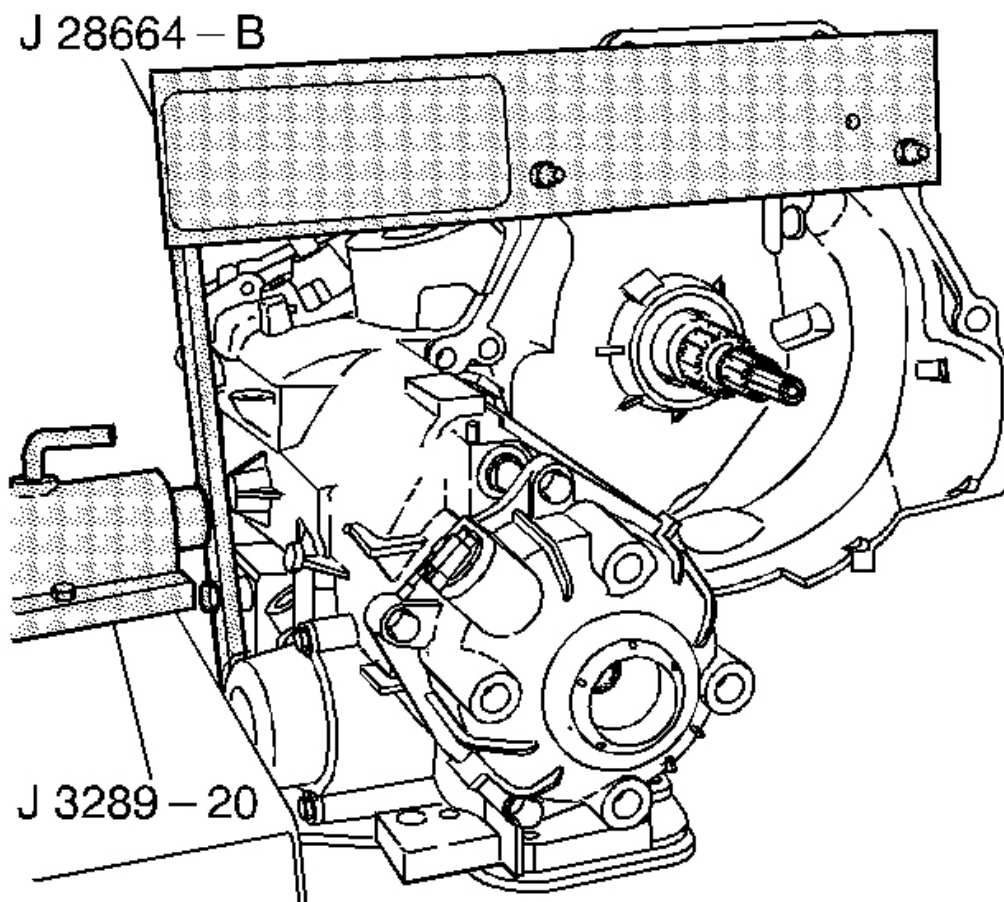
Assembly Procedure

Fig. 415: View Of J 28664-B & J 3289-20 Installed Onto Transmission
Courtesy of GENERAL MOTORS CORP.

1. Remove the pin from **J 3289-20** .
2. Remove the transmission and **J 28664-B** from **J 3289-20** . See **Special Tools**.
3. Remove **J 28664-B** from the transmission. See **Special Tools**.
4. Remove **J44465** from **J 28664-B** . See **Special Tools**.

TORQUE CONVERTER INSPECTION

Tools Required

- **J 8001** Dial Indicator Set
- **J 26900-13** Magnetic Indicator Base
- **J 35138** Torque Converter End Play Checking Tool

Inspection Procedure

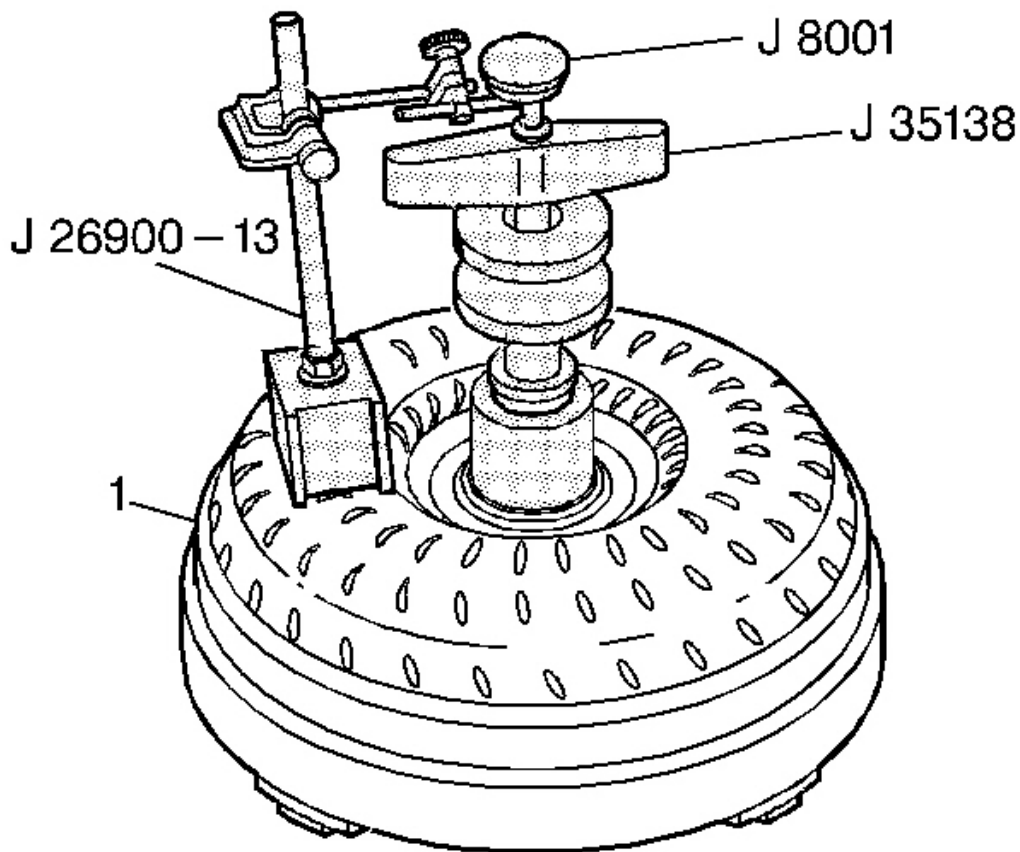


Fig. 416: View Of J 26900-13, J 8001 & J 35138 Installed On Torque Converter
Courtesy of GENERAL MOTORS CORP.

1. Position the torque converter (1) on the bench with the flywheel lugs facing down.
2. Install **J 26900-13** , **J 35138** and **J 8001** onto the torque converter (1).
3. Set the dial indicator to 0.
4. Lift **J 35138** and note the dial indicator reading:
 - The torque converter end play should be 0.5 mm (0.020 in) or less
 - If the end play is too high, replace the torque converter (1)

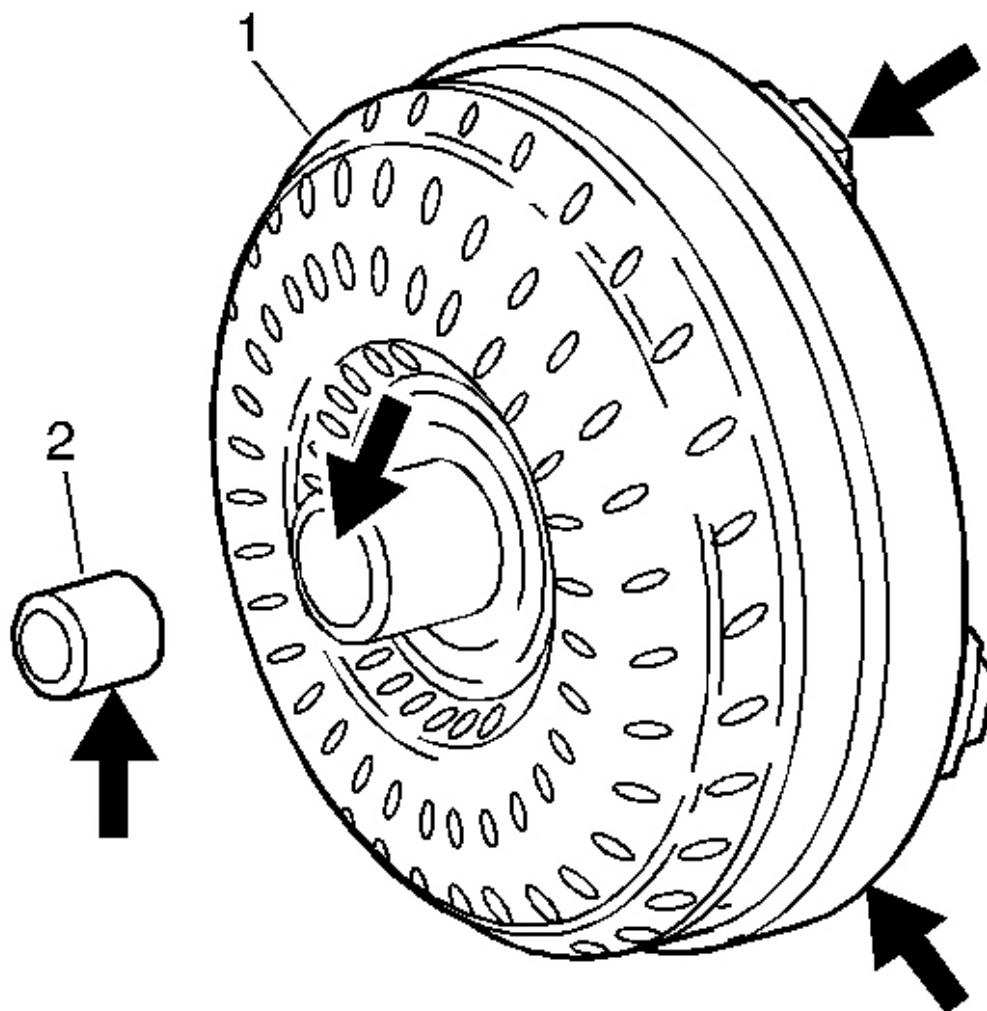


Fig. 417: Inspection Areas On Torque Converter
Courtesy of GENERAL MOTORS CORP.

5. Inspect and replace the torque converter (1) for the following conditions:
- Overheated (torque converter will be blue in color)
 - Leaking at the weld areas
 - A damaged torque converter pilot
 - Evidence of metal particles in the converter, the oil cooler or the cooler pipes

- A damaged torque converter stator, a damaged pump or a damaged turbine
 - A damaged or worn torque converter bushing (2)
 - Contaminated automatic transmission fluid due to engine coolant
6. Inspect the torque converter for stripped bolt hole threads. If found, repair the torque converter.

TORQUE CONVERTER ASSEMBLE

Tool Required

J 36850 Assembly Lubricant (or equivalent)

Assembly Procedure

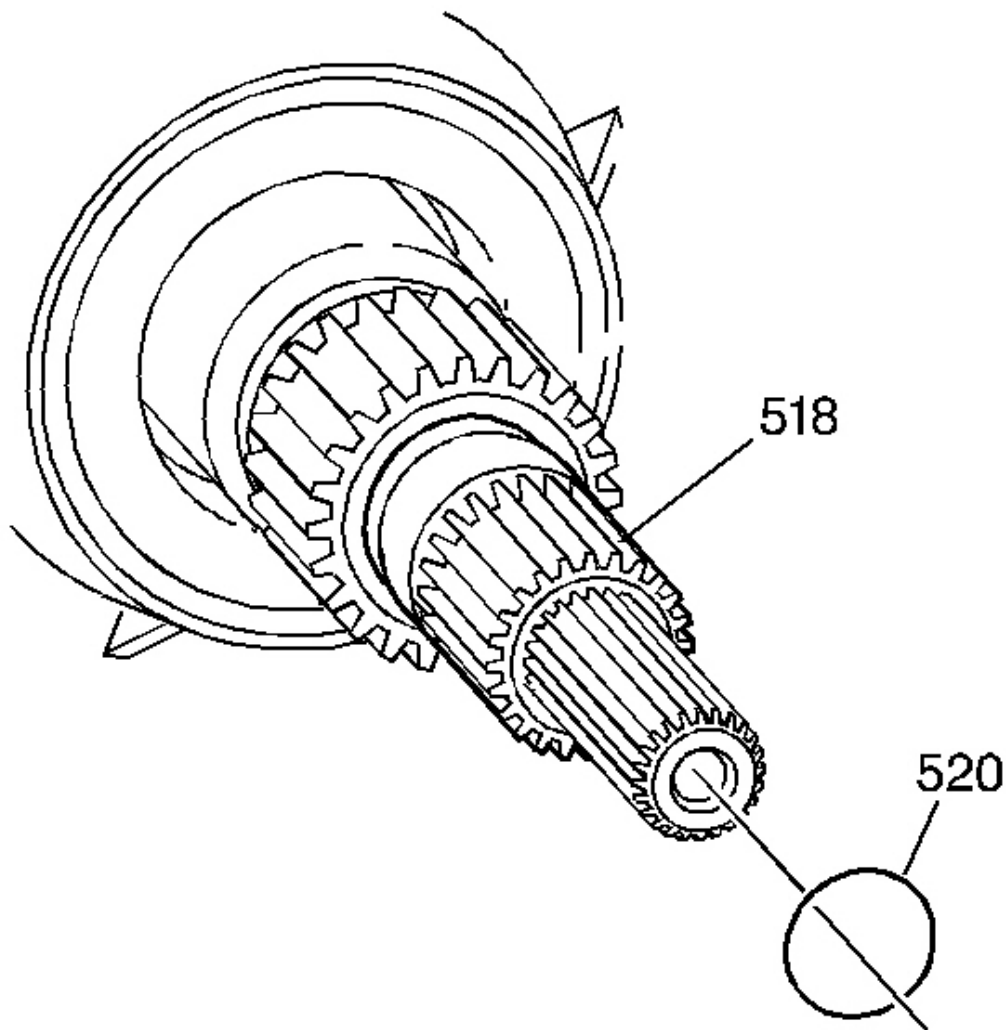


Fig. 418: Installing Turbine Shaft O-Ring Seal On Turbine Shaft
Courtesy of GENERAL MOTORS CORP.

1. Apply **J 36850** or equivalent to a new turbine shaft O-ring seal (520).
2. Apply **J 36850** or equivalent to the turbine shaft (518) splines.
3. Install the turbine shaft O-ring seal (520) onto the turbine shaft (518).

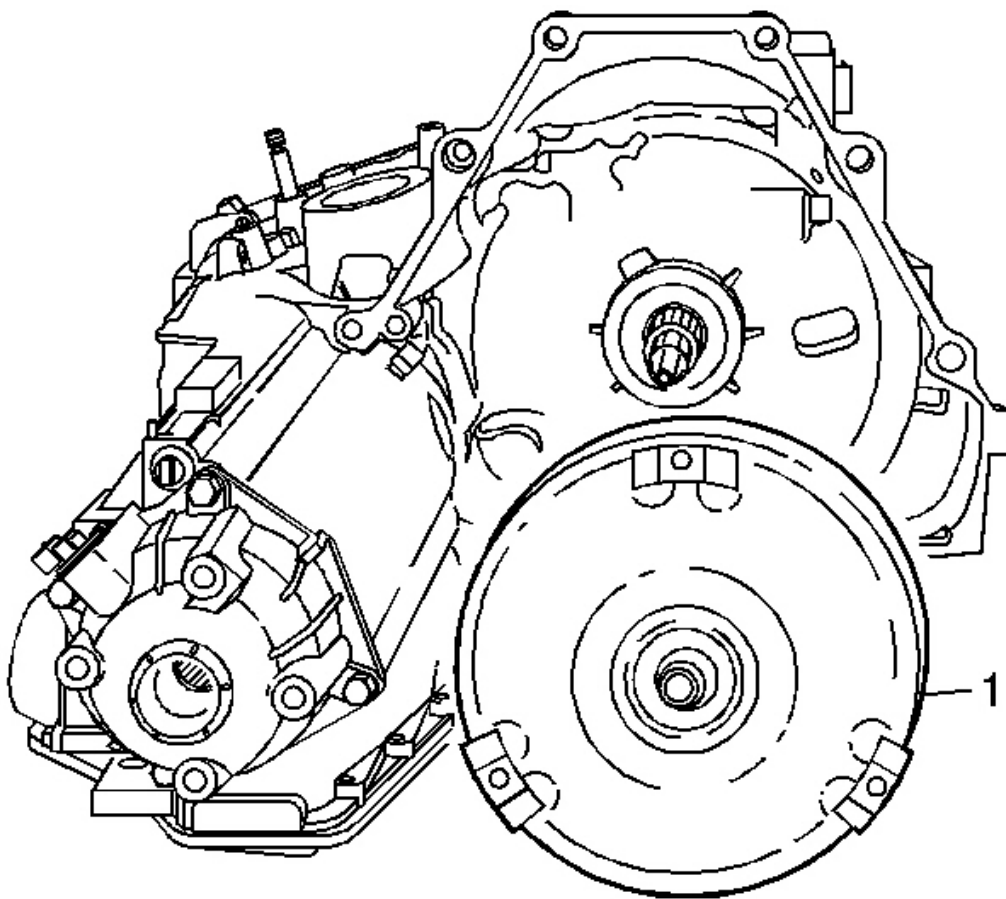


Fig. 419: View Of Torque Converter Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: The torque converter weighs approximately 65 lbs.
Personal injury may result if you lift the torque converter
improperly.

4. Install the torque converter assembly (1).

DESCRIPTION AND OPERATION

PARK OR NEUTRAL - ENGINE RUNNING (PARK - WITHOUT TOUCH ACTIVATED POWER)

When the gear selector lever is in the PARK (P) position and the engine is running, fluid is drawn into the oil pump and line pressure is then directed to the following control devices:

Pressure Regulator Valve (313)

Regulates pump output (line pressure) in response to torque signal fluid pressure acting on the boost valve, spring force and line pressure acting on the end of the valve. Line pressure is directed to the manual valve, 3 accumulator valves, torque signal regulator valve, pressure relief valve, TCC regulator valve, #10 ball check valve and 2-3 shift valve, 3-2 manual downshift valve, 3-4 shift valve, 2-3 shift solenoid valve, #3 ball check valve and input clutch and actuator feed limit valve.

Actuator Feed Limit Valve (414)

Line pressure is routed to the valve and limited to a maximum pressure as it passes through the valve and enters the actuator feed circuit. Actuator feed is then routed to the pressure control solenoid valve and into the 1-2, 3-4 shift solenoid valve.

Pressure Control (PC) Solenoid Valve (322)

Controlled by the PCM, the PC solenoid valve regulates filtered actuator feed pressure entering the torque signal circuit. Torque signal fluid is then routed to the pressure regulator valve, the 1-2, 2-3 and 3-4 accumulator valves.

Torque Signal Regulator Valve (321)

Regulates line pressure into the torque signal fluid circuit. This regulation is controlled by filtered actuator feed fluid pressure from the PC solenoid valve.

Line Pressure Relief Valve (324)

Exhausts line pressure above 1,690-2,480 kPa (450-360 psi).

Manual Valve (404)

The manual valve is moved to the NEUTRAL position and blocks line pressure from entering the Reverse fluid circuit. The reverse fluid circuit is opened to an exhaust at the manual valve.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch Assembly (34)

The automatic transmission fluid pressure (TFP) switch is attached to the valve body and consists of one fluid pressure switch that monitors TCC release pressure. This switch is used as a diagnostic tool to confirm that the TCC is actually off when it has been commanded off by the

PCM.

The TCC release switch is a normally closed pressure switch. A normally closed switch allows current to flow from the positive contact through the switch to ground when no fluid is present. Fluid pressure moves the diaphragm to disconnect the positive and ground contacts, opening the switch and stopping current flow. This change in switch state electronically signals the PCM that the TCC is released.

1-2, 3-4 Shift Solenoid Valve (315A)

Controlled by the powertrain control module (PCM), the 1-2, 3-4 shift solenoid (SS) valve is energized (On) in PARK range. Actuator feed pressure moves the 1-2 shift valve (318) against spring pressure and directs line fluid into the 1-2, 3-4 signal passage. 1-2, 3-4 signal fluid is then directed to the 3-4 shift valve (362).

2-3 Shift Solenoid Valve (315B)

Controlled by the powertrain control module (PCM), the 2-3 shift solenoid (SS) valve is energized (On) in PARK range and directs line pressure into the 2-3 signal passage. 2-3 signal fluid directed to the 4-3 manual downshift valve (360) and moves the valve against spring pressure and also the 3-2 manual downshift valve (356).

1-2 Shift Valve (318)

1-2 signal fluid pressure holds the valve in the downshift position against spring force.

2-3 Shift Valve (357)

In PARK range, line pressure passes through the 2-3 shift valve (357) and line pressure feeds the input clutch feed passage. Line pressure then passes through the 3-4 shift valve (362) and around the #3 ball check valve (372), located in the case cover) in order to apply the input clutch. Although the input clutch is applied and the input sprag is holding, these conditions are not effective because neither the forward band assembly (688) nor the reverse band assembly (615) is applied.

1-2, 2-3 and 3-4 Accumulator Valves (350, 344, 341)

Line pressure is regulated into accumulator fluid pressure. This regulation is basically controlled by torque signal fluid pressure acting on the end of the valve.

1-2, 2-3 and 3-4 Accumulator Assemblies

Accumulator fluid is routed to each of the accumulator assemblies in preparation for upshifts. The

fluid routed to the 1-2, 2-3 and 3-4 accumulators is orificed.

Pressure Regulator Valve (313) (Torque Converter/Cooler and Lube Circuits)

Line pressure at the valve enters the converter feed circuit which is then routed to the TCC control valve.

TCC Control Valve (335)

Spring pressure holds the valve in the released position. Converter feed fluid is directed to the release circuit. Release fluid seats #1 ball check valve and feeds the TCC blow-off. Release fluid feeds the TCC on the cover side of the pressure plate, exits the TCC through the apply circuit, then feeds the cooler circuit at the TCC control valve. Cooler fluid passes through the ball check valve, through the cooler, then returns to the transmission and feeds the rear lube circuit. A front lube circuit is fed from orificed line pressure.

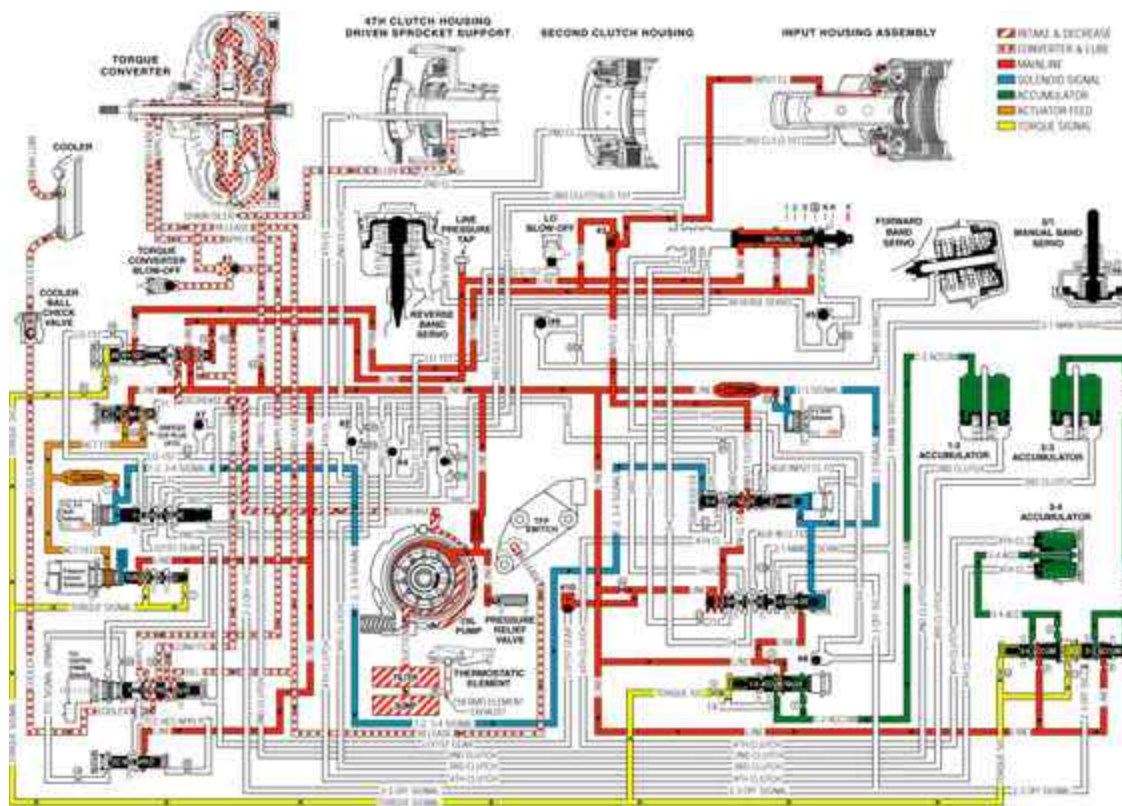


Fig. 420: Park - Engine Running - Without Touch Activated Power Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

PARK OR NEUTRAL - ENGINE RUNNING (PARK - WITH TOUCH ACTIVATED POWER)

When the gear selector lever is in the PARK (P) position and the engine is running, fluid is drawn

into the oil pump and line pressure is then directed to the following control devices:

Pressure Regulator Valve (313)

Regulates pump output (line pressure) in response to torque signal fluid pressure acting on the boost valve, spring force and line pressure acting on the end of the valve. Line pressure is directed to the manual valve, 3 accumulator valves, torque signal regulator valve, pressure relief valve, TCC regulator valve, #10 ball check valve and 2-3 shift valve, 3-2 manual downshift valve, 3-4 shift valve, 2-3 shift solenoid valve, #3 ball check valve and input clutch and actuator feed limit valve.

Actuator Feed Limit Valve (414)

Line pressure is routed to the valve and limited to a maximum pressure as it passes through the valve and enters the actuator feed circuit. Actuator feed is then routed to the pressure control solenoid valve and into the 1-2, 3-4 shift solenoid valve.

Pressure Control (PC) Solenoid Valve (322)

Controlled by the PCM, the PC solenoid valve regulates filtered actuator feed pressure entering the torque signal circuit. Torque signal fluid is then routed to the pressure regulator valve, the 1-2, 2-3 and 3-4 accumulator valves.

Torque Signal Regulator Valve (321)

Regulates line pressure into the torque signal fluid circuit. This regulation is controlled by filtered actuator feed fluid pressure from the PC solenoid valve.

Line Pressure Relief Valve (324)

Exhausts line pressure above 1,690-2,480 kPa (450-360 psi).

Manual Valve (404)

The manual valve is moved to the NEUTRAL position and blocks line pressure from entering the Reverse fluid circuit. The reverse fluid circuit is opened to an exhaust at the manual valve.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch Assembly (34)

The automatic transmission fluid pressure (TFP) switch is attached to the valve body and consists of one fluid pressure switch that monitors TCC release pressure. This switch is used as a diagnostic tool to confirm that the TCC is actually off when it has been commanded off by the PCM.

The TCC release switch is a normally closed pressure switch. A normally closed switch allows current to flow from the positive contact through the switch to ground when no fluid is present. Fluid pressure moves the diaphragm to disconnect the positive and ground contacts, opening the switch and stopping current flow. This change in switch state electronically signals the PCM that the TCC is released.

1-2, 3-4 Shift Solenoid Valve (315A)

Controlled by the powertrain control module (PCM), the 1-2, 3-4 shift solenoid (SS) valve is energized (On) in PARK range. Actuator feed pressure moves the 1-2 shift valve (318) against spring pressure and directs line fluid into the 1-2, 3-4 signal passage. 1-2, 3-4 signal fluid is then directed to the 3-4 shift valve (362).

2-3 Shift Solenoid Valve (315B)

Controlled by the powertrain control module (PCM), the 2-3 shift solenoid (SS) valve is energized (On) in PARK range and directs line pressure into the 2-3 signal passage. 2-3 signal fluid directed to the 4-3 manual downshift valve (360) and moves the valve against spring pressure and also the 3-2 manual downshift valve (356).

1-2 Shift Valve (318)

1-2 signal fluid pressure holds the valve in the downshift position against spring force.

2-3 Shift Valve (357)

In PARK range, line pressure passes through the 2-3 shift valve (357) and line pressure feeds the input clutch feed passage. Line pressure then passes through the 3-4 shift valve (362) and around the #3 ball check valve (372), located in the case cover) in order to apply the input clutch. Although the input clutch is applied and the input sprag is holding, these conditions are not effective because neither the forward band assembly (688) nor the reverse band assembly (615) is applied.

1-2, 2-3 and 3-4 Accumulator Valves (350, 344, 341)

Line pressure is regulated into accumulator fluid pressure. This regulation is basically controlled by torque signal fluid pressure acting on the end of the valve.

1-2, 2-3 and 3-4 Accumulator Assemblies

Accumulator fluid is routed to each of the accumulator assemblies in preparation for upshifts. The fluid routed to the 1-2, 2-3 and 3-4 accumulators is orificed.

Pressure Regulator Valve (313) (Torque Converter/Cooler and Lube Circuits)

Line pressure at the valve enters the converter feed circuit which is then routed to the TCC control valve.

TCC Control Valve (335)

Spring pressure holds the valve in the released position. Converter feed fluid is directed to the release circuit. Release fluid seats #1 ball check valve and feeds the TCC blow-off. Release fluid feeds the TCC on the cover side of the pressure plate, exits the TCC through the apply circuit, then feeds the cooler circuit at the TCC control valve. Cooler fluid passes through the ball check valve, through the cooler, then returns to the transmission and feeds the rear lube circuit. A front lube circuit is fed from orificed line pressure.

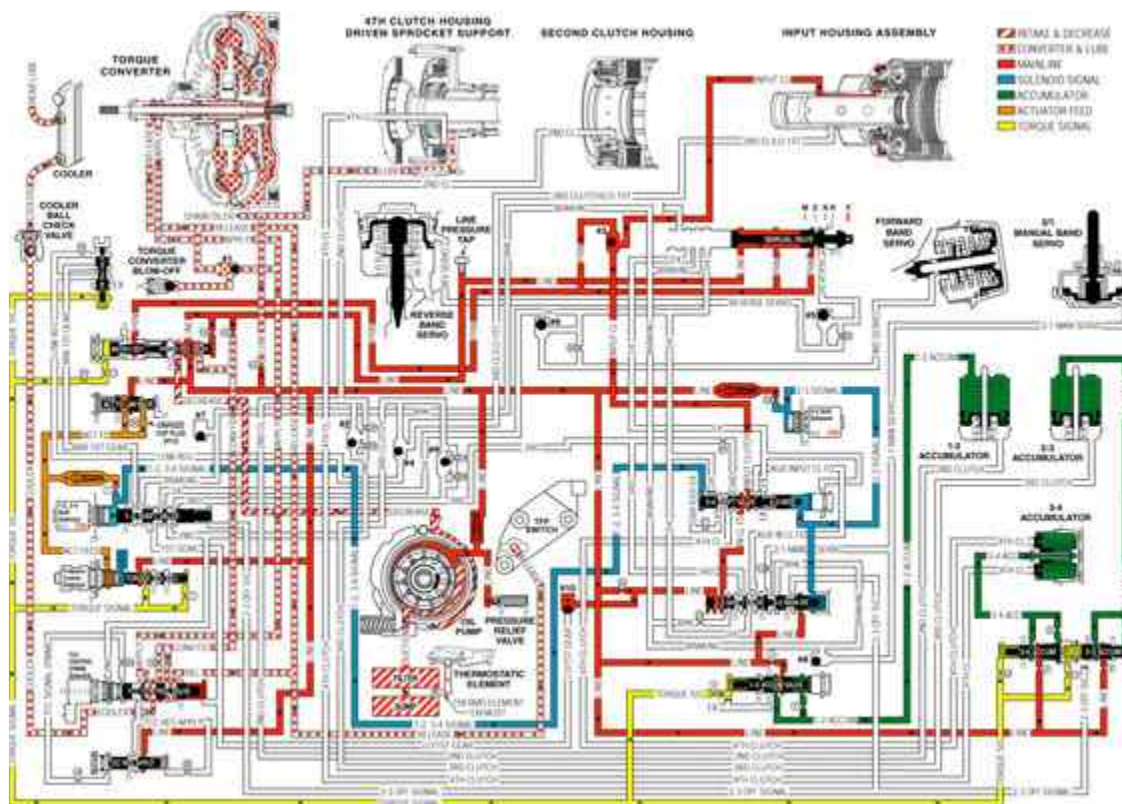


Fig. 421: Park - Engine Running - With Touch Activated Power Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

PARK OR NEUTRAL - ENGINE RUNNING (NEUTRAL-WITHOUT TOUCH ACTIVATED POWER POWER)

When the gear selector lever is moved from the REVERSE position to the NEUTRAL position the following changes occur to the hydraulic and electrical systems.

Manual Valve (404)

The manual valve is moved to the NEUTRAL position and blocks line pressure from entering the Reverse fluid circuit. The reverse fluid circuit is opened to an exhaust at the manual valve.

Reverse Band Assembly (615)

Reverse fluid exhausts from the reverse servo, the #5 ball check valve unseats, allowing reverse servo fluid to quickly exhaust at the manual valve and the reverse band releases, shifting the transmission into NEUTRAL.

Pressure Regulator Valve (313) (Torque Converter/Cooler and Lube Circuits)

Line pressure at the valve enters the converter feed circuit which is then routed to the TCC control valve.

TCC Control Valve (335)

Spring pressure holds the valve in the released position. Converter feed fluid is directed to the release circuit. Release fluid seats #1 ball check valve and feeds the TCC blow-off. Release fluid feeds the TCC on the cover side of the pressure plate, exits the TCC through the apply circuit, then feeds the cooler circuit at the TCC control valve. Cooler fluid passes through the ball check valve, through the cooler, then returns to the transmission and feeds the rear lube circuit. A front lube circuit is fed from orificed line pressure.

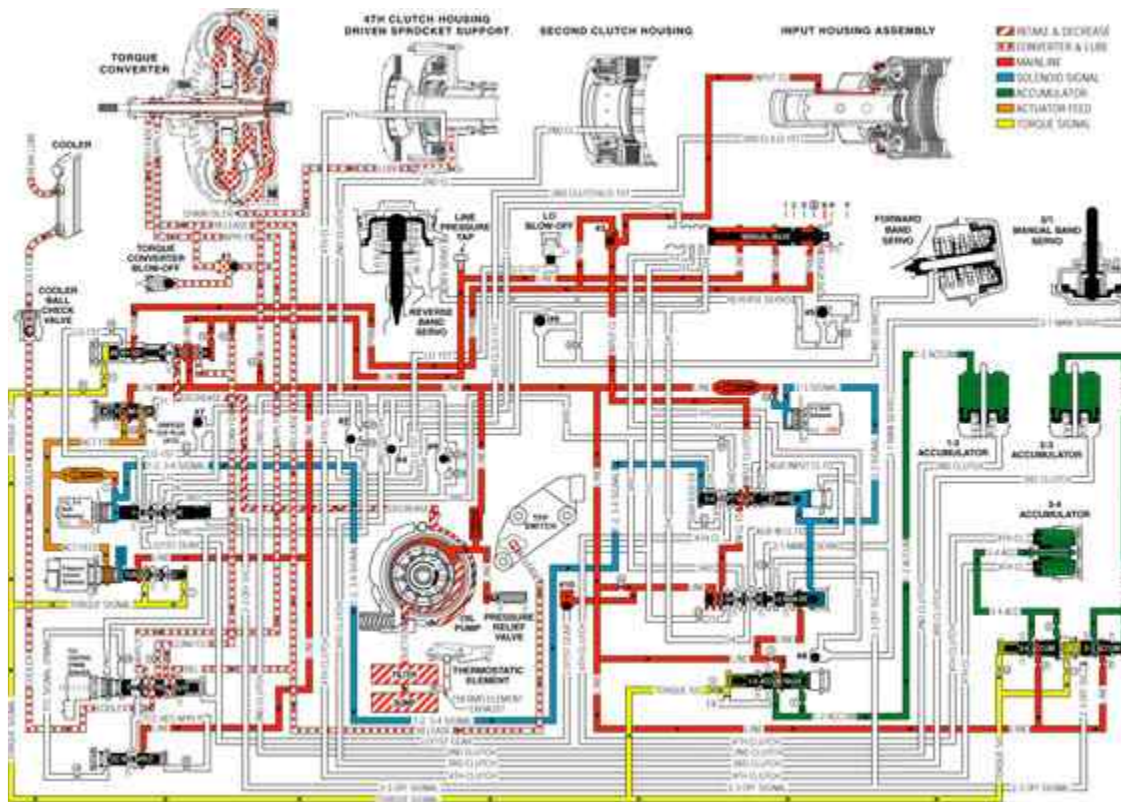


Fig. 422: Neutral - Engine Running - Without Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

PARK OR NEUTRAL - ENGINE RUNNING (NEUTRAL - WITH TOUCH ACTIVATED POWER)

When the gear selector lever is moved from the REVERSE position to the NEUTRAL position the following changes occur to the hydraulic and electrical systems.

Manual Valve (404)

The manual valve is moved to the NEUTRAL position and blocks line pressure from entering the Reverse fluid circuit. The reverse fluid circuit is opened to an exhaust at the manual valve.

Reverse Band Assembly (615)

Reverse fluid exhausts from the reverse servo, the #5 ball check valve unseats, allowing reverse servo fluid to quickly exhaust at the manual valve and the reverse band releases, shifting the transmission into NEUTRAL.

Pressure Regulator Valve (313) (Torque Converter/Cooler and Lube Circuits)

Line pressure at the valve enters the converter feed circuit which is then routed to the TCC

control valve.

TCC Control Valve (335)

Spring pressure holds the valve in the released position. Converter feed fluid is directed to the release circuit. Release fluid seats #1 ball check valve and feeds the TCC blow-off. Release fluid feeds the TCC on the cover side of the pressure plate, exits the TCC through the apply circuit, then feeds the cooler circuit at the TCC control valve. Cooler fluid passes through the ball check valve, through the cooler, then returns to the transmission and feeds the rear lube circuit. A front lube circuit is fed from orificed line pressure.

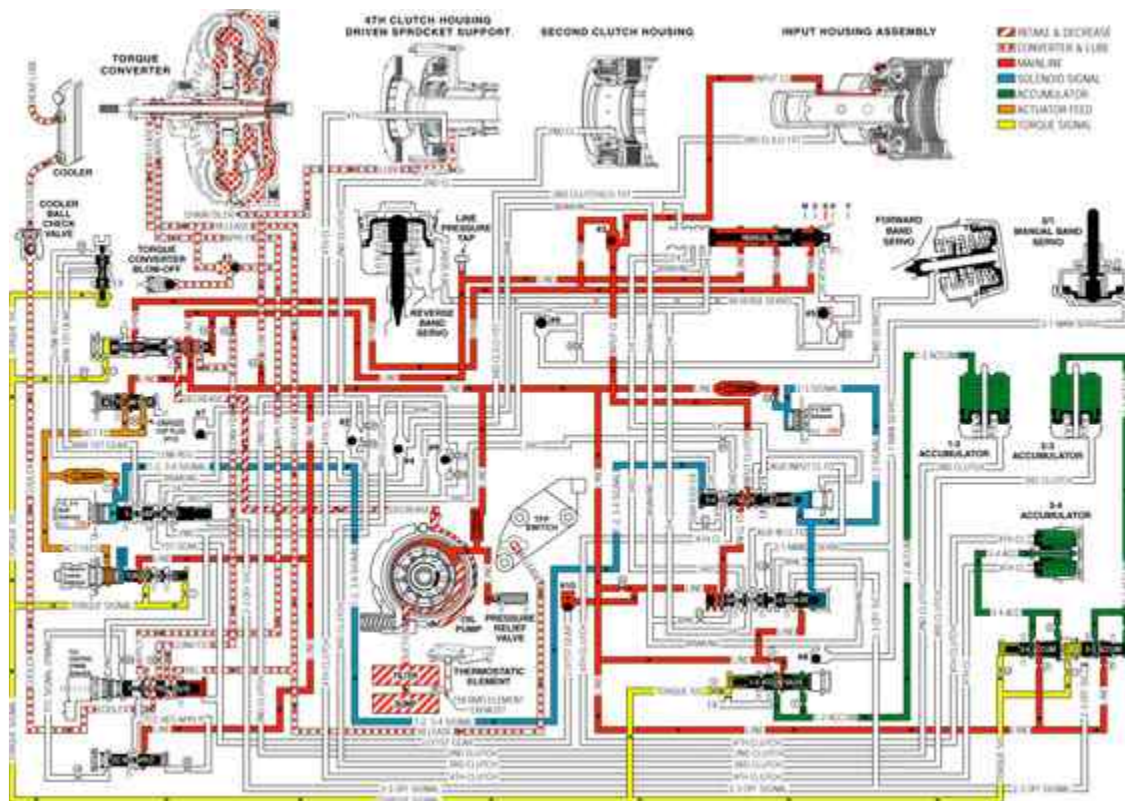


Fig. 423: Neutral - Engine Running - With Touch Activated Power Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

REVERSE (WITHOUT TOUCH ACTIVATED POWER)

When the gear selector lever is moved to the REVERSE (R) position (from the PARK position) the following changes occur in the transmission's hydraulic and electrical systems.

Pressure Regulator Valve (313)

Increases (or decreases) in line pressure is primarily influenced by changes in the throttle position

as a result of the changing operating conditions of the vehicle.

Manual Valve (404)

Is moved manually to the right through the gear selector lever and allows line pressure to enter the reverse fluid passage through the PRN fluid passage.

Number 5 Ball Check Valve (373)

Located in the control valve body, (300), it blocks the reverse servo feed passage forcing reverse fluid through an orifice in the spacer plate (370) into the reverse servo passage. When the manual valve (404) is moved out of reverse, the ball check valve unseats allowing reverse servo fluid to exhaust through the ball seat instead of through the orifice.

Reverse Servo Assembly (39-40)

Applies the reverse band (615) in response to reverse servo fluid pressure feeding into the servo cover (40) side of the reverse servo piston (44).

Reverse Band Assembly (615)

Wraps around the second clutch housing (617) and holds the input carrier (672), through the reverse reaction drum (669), allowing the vehicle to move in reverse.

Input Clutch

Remains applied from PARK to REVERSE and becomes effective as the reverse band applies. The input sprag holds at this time.

Pressure Regulator Valve (313) (Torque Converter/Cooler and Lube Circuits)

Line pressure at the valve enters the converter feed circuit which is then routed to the TCC control valve.

TCC Control Valve (335)

Spring pressure holds the valve in the released position. Converter feed fluid is directed to the release circuit. Release fluid seats #1 ball check valve and feeds the TCC blow-off. Release fluid feeds the TCC on the cover side of the pressure plate, exits the TCC through the apply circuit, then feeds the cooler circuit at the TCC control valve. Cooler fluid passes through the ball check valve, through the cooler, then returns to the transmission and feeds the rear lube circuit. A front lube circuit is fed from orificed line pressure.

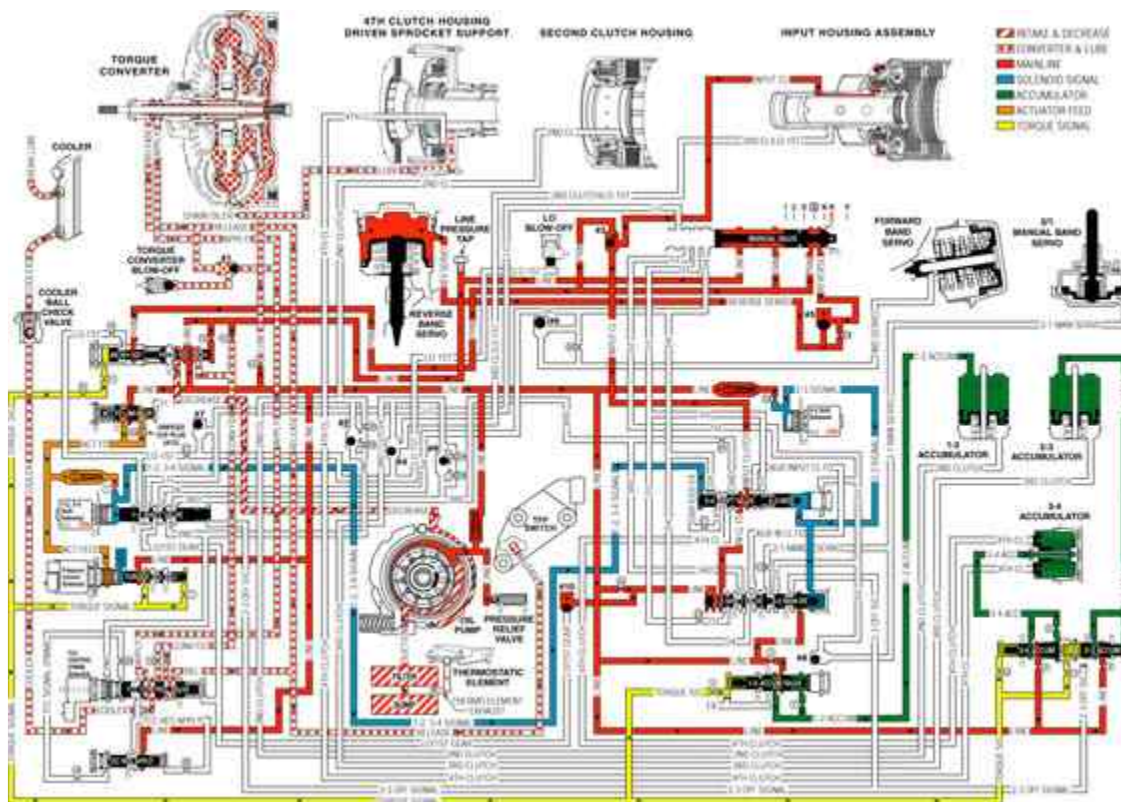


Fig. 424: Reverse - Without Touch Activated Power Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

REVERSE (WITH TOUCH ACTIVATED POWER)

When the gear selector lever is moved to the REVERSE (R) position (from the PARK position) the following changes occur in the transmission's hydraulic and electrical systems.

Pressure Regulator Valve (313)

Increases (or decreases) in line pressure is primarily influenced by changes in the throttle position as a result of the changing operating conditions of the vehicle.

Manual Valve (404)

Is moved manually to the right through the gear selector lever and allows line pressure to enter the reverse fluid passage through the PRN fluid passage.

Number 5 Ball Check Valve (373)

Located in the control valve body, (300), it blocks the reverse servo feed passage forcing reverse fluid through an orifice in the spacer plate (370) into the reverse servo passage. When the manual valve (404) is moved out of reverse, the ball check valve unseats allowing reverse servo fluid to

exhaust through the ball seat instead of through the orifice.

Reverse Servo Assembly (39-40)

Applies the reverse band (615) in response to reverse servo fluid pressure feeding into the servo cover (40) side of the reverse servo piston (44).

Reverse Band Assembly (615)

Wraps around the second clutch housing (617) and holds the input carrier (672), through the reverse reaction drum (669), allowing the vehicle to move in reverse.

Input Clutch

Remains applied from PARK to REVERSE and becomes effective as the reverse band applies. The input sprag holds at this time.

Pressure Regulator Valve (313) (Torque Converter/Cooler and Lube Circuits)

Line pressure at the valve enters the converter feed circuit which is then routed to the TCC control valve.

TCC Control Valve (335)

Spring pressure holds the valve in the released position. Converter feed fluid is directed to the release circuit. Release fluid seats #1 ball check valve and feeds the TCC blow-off. Release fluid feeds the TCC on the cover side of the pressure plate, exits the TCC through the apply circuit, then feeds the cooler circuit at the TCC control valve. Cooler fluid passes through the ball check valve, through the cooler, then returns to the transmission and feeds the rear lube circuit. A front lube circuit is fed from orificed line pressure.

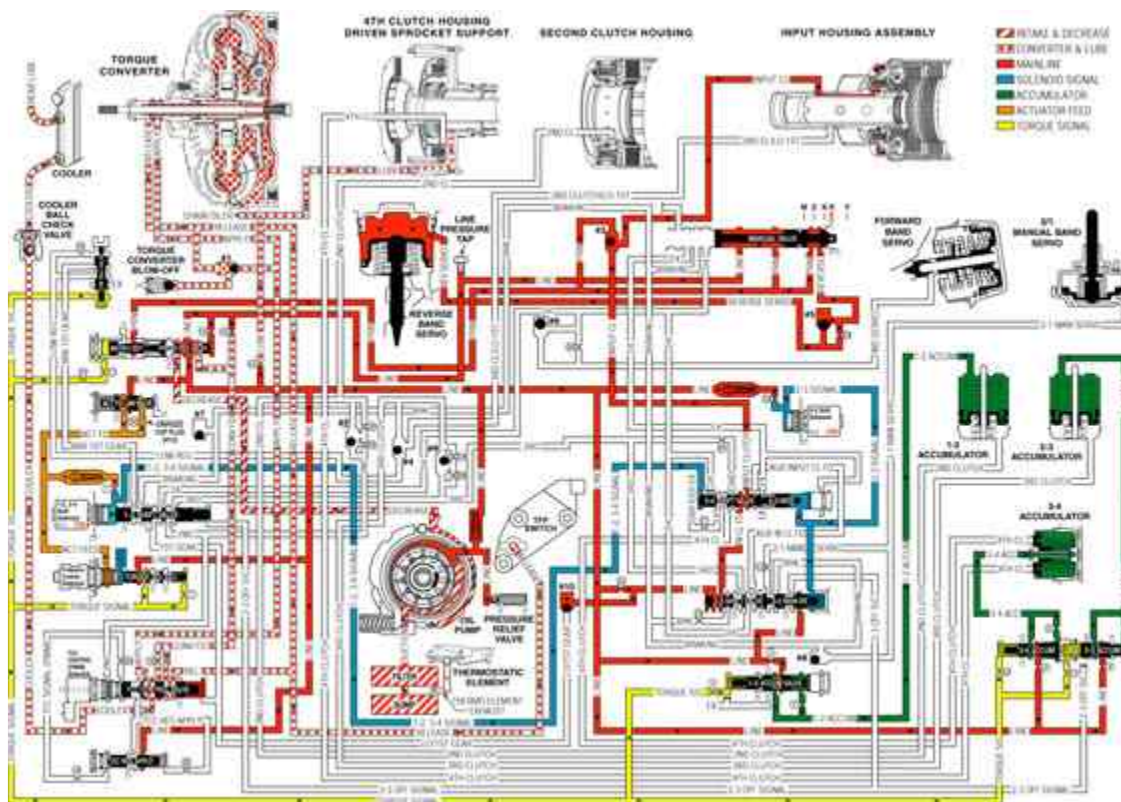


Fig. 425: Reverse - With Touch Activated Power Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, FIRST GEAR (WITHOUT TOUCH ACTIVATED POWER)

When the gear selector lever is moved to the Overdrive (D) position from the NEUTRAL (N) position the following changes occur to shift the transmission into Overdrive Range - First Gear.

Manual Valve (404)

Is moved by the gear selector lever and allows line pressure to enter the D4 passage.

Number 6 Ball Check Valve (372)

Located in the control valve body (300), blocks forward servo apply passage forcing D4 pressure to the forward servo boost valve (367), the forward servo feed orifice on the spacer plate (370). When the manual valve (404) is moved from DRIVE to PARK or NEUTRAL, the ball check valve unseats to allow for a quick exhaust of servo apply fluid and release of the forward band assembly (688).

Forward Servo Assembly (15-22)

Applies and holds the forward band (688) during all forward gear drive ranges.

Forward Band Assembly (688)

Wraps around and holds the 1-2 support outer race (687) during all forward gear drive ranges.

1-2 Shift Solenoid (SS) Valve (315A)

Energized (ON) by the PCM, high pressure in the 1-2, 3-4 signal fluid circuit holds the 12 shift valve in the downshift position. 1-2, 3-4 signal fluid also is routed to the 3-4 shift valve, but is not effective.

2-3 Shift Solenoid (SS) Valve (315B)

Energized (ON) by the PCM, high pressure in the 2-3 signal fluid circuit holds the 2-3 and 3-4 shift valves in the downshift position.

Input Clutch

Remains applied from NEUTRAL to DRIVE and becomes effective as the forward band applies. The input sprag holds at this time.

1-2 Support Roller Clutch

The 1-2 support roller clutch holds when the forward band is applied.

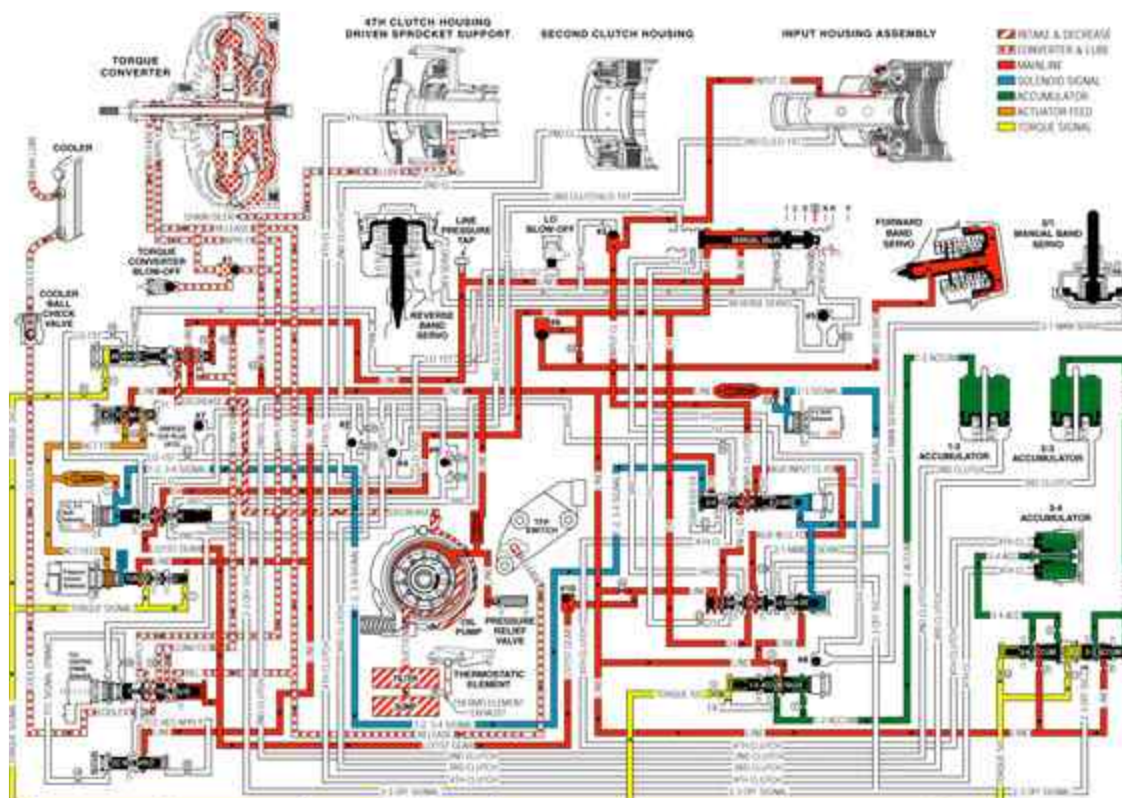


Fig. 426: Overdrive Range, First Gear - Without Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, FIRST GEAR (WITH TOUCH ACTIVATED POWER)

When the gear selector lever is moved to the Overdrive (D) position from the NEUTRAL (N) position the following changes occur to shift the transmission into Overdrive Range - First Gear.

Manual Valve (404)

Is moved by the gear selector lever and allows line pressure to enter the D4 passage.

Number 6 Ball Check Valve (372)

Located in the control valve body (300), blocks forward servo apply passage forcing D4 pressure to the forward servo boost valve (367), the forward servo feed orifice on the spacer plate (370). When the manual valve (404) is moved from DRIVE to PARK or NEUTRAL, the ball check valve unseats to allow for a quick exhaust of servo apply fluid and release of the forward band assembly (688).

Forward Servo Assembly (15-22)

Applies and holds the forward band (688) during all forward gear drive ranges.

Forward Band Assembly (688)

Wraps around and holds the 1-2 support outer race (687) during all forward gear drive ranges.

1-2 Shift Solenoid (SS) Valve (315A)

Energized (ON) by the PCM, high pressure in the 1-2, 3-4 signal fluid circuit holds the 1-2 shift valve in the downshift position. 1-2, 3-4 signal fluid also is routed to the 3-4 shift valve, but is not effective.

2-3 Shift Solenoid (SS) Valve (315B)

Energized (ON) by the PCM, high pressure in the 2-3 signal fluid circuit holds the 2-3 and 3-4 shift valves in the downshift position.

Input Clutch

Remains applied from NEUTRAL to DRIVE and becomes effective as the forward band applies. The input sprag holds at this time.

1-2 Support Roller Clutch

The 1-2 support roller clutch holds when the forward band is applied.

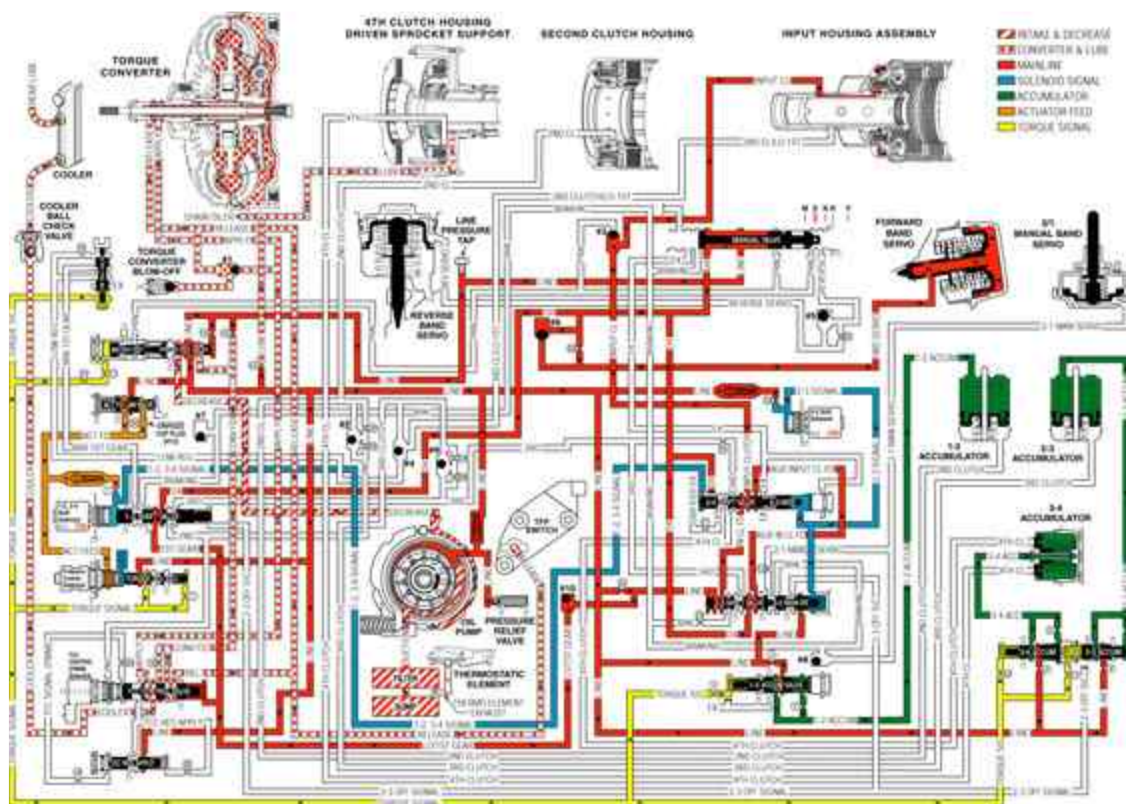


Fig. 427: Overdrive Range, First Gear - With Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, SECOND GEAR (WITHOUT TOUCH ACTIVATED POWER)

As the speed of the vehicle increases, the powertrain control module (PCM) receives input signals from various engine and transmission sensors. The PCM uses this data to de-energize 1-2, 3-4 shift solenoid valve in order to shift the transmission into second gear at the appropriate time.

1-2, 3-4 Shift Solenoid (SS) Valve (315A)

De-energized (OFF) by the PCM, it exhausts 1-2, 3-4 signal fluid through the solenoid thereby creating a low 1-2, 3-4 signal fluid pressure in the circuit. Low 1-2, 3-4 signal fluid pressure allows the 1-2 shift valve to move to the upshift position.

1-2 Shift Valve (318)

With the 1-2, 3-4 SS valve OFF, spring pressure moves the valve allowing D4 pressure to enter

the 2nd fluid passage directing 2nd fluid to the Number 2 ball check valve.

Number 2 Ball Check Valve (372)

Located in the case cover (400), 2nd fluid seats the ball check valve and is forced through an orifice into the 2nd clutch passage to apply the 2nd clutch.

Second Clutch

2nd clutch fluid pressure applies the Second clutch to shift the transmission into Overdrive Range - Second gear.

Input Clutch

Remains applied, but is now ineffective.

Input Sprag Clutch

Overruns as the second clutch applies.

Forward Band

Remains applied.

1-2 Support Roller Clutch

Continues to hold while the forward band is applied.

1-2 Accumulator

2nd clutch fluid is also routed to the 1-2 accumulator piston. 2nd Clutch fluid pressure, in addition to 1-2 assist spring force, moves the piston against spring force and 1-2 accumulator feed fluid pressure. This action absorbs initial 2nd clutch fluid pressure to cushion the second clutch apply. The movement of the 1-2 accumulator piston forces some accumulator fluid out of the accumulator.

1-2 Accumulator Valve

1-2 accumulator feed fluid forced from the 1-2 accumulator is routed back to the 1-2 accumulator valve. This pressure forces the 1-2 accumulator valve against spring force and the torque signal fluid pressure to regulate the exhaust of excess accumulator fluid. This regulation provides additional control for the second clutch apply.

TCC Control Pulse Width Modulated (PWM) Solenoid Valve

2nd fluid is routed to the TCC control PWM solenoid. Under normal operating conditions the TCC control PWM solenoid is OFF in Second gear and blocks 2nd fluid from entering the TCC signal fluid circuit.

Torque Converter Clutch

With the TCC control PWM solenoid OFF the converter clutch is released in Second gear. Under normal operating conditions the TCC is released in Second gear. However, TCC apply could vary depending on vehicle application and may be calibrated to apply in Overdrive Range - Second Gear.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch

Release fluid pressure routed to the TFP manual valve position switch signals the PCM that the TCC is released.

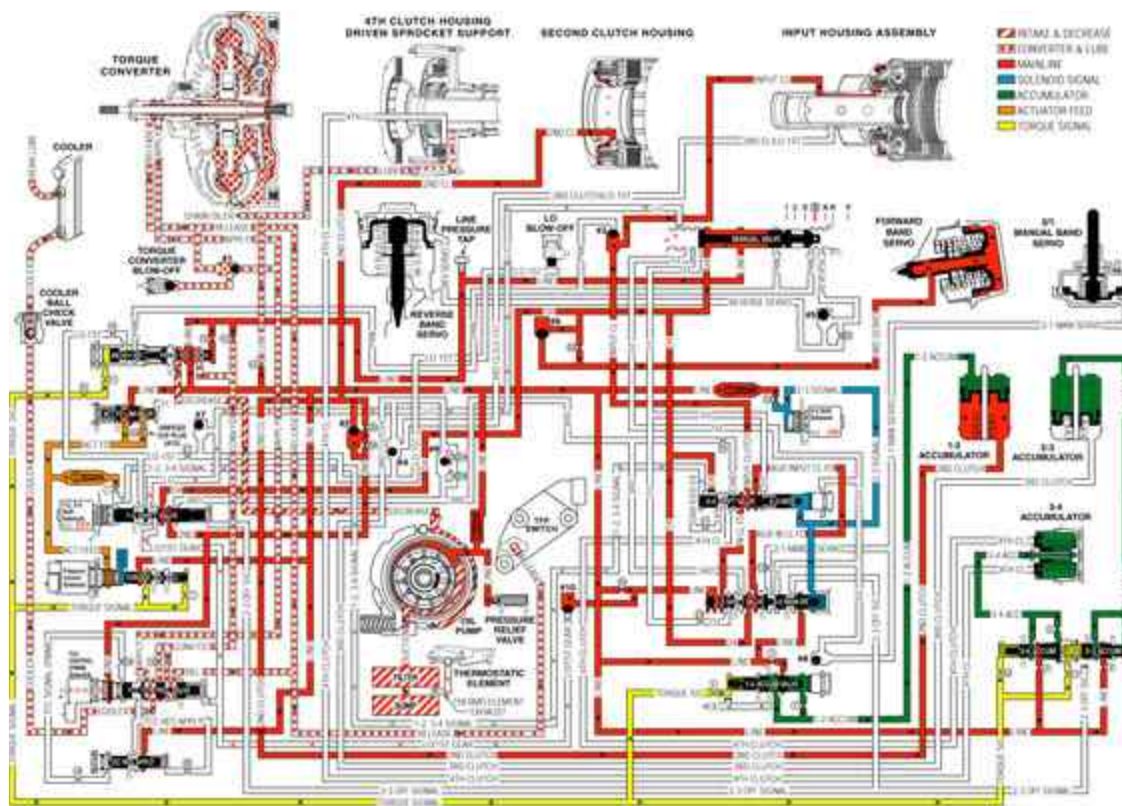


Fig. 428: Overdrive Range, Second Gear - Without Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, SECOND GEAR (WITH TOUCH ACTIVATED POWER)

As the speed of the vehicle increases, the powertrain control module (PCM) receives input signals from various engine and transmission sensors. The PCM uses this data to de-energize 1-2, 3-4 shift solenoid valve in order to shift the transmission into second gear at the appropriate time.

1-2, 3-4 Shift Solenoid (SS) Valve (315A)

De-energized (OFF) by the PCM, it exhausts 1-2, 3-4 signal fluid through the solenoid thereby creating a low 1-2, 3-4 signal fluid pressure in the circuit. Low 1-2, 3-4 signal fluid pressure allows the 1-2 shift valve to move to the upshift position.

1-2 Shift Valve (318)

With the 1-2, 3-4 SS valve OFF, spring pressure moves the valve allowing D4 pressure to enter the 2nd fluid passage directing 2nd fluid to the Number 2 ball check valve.

Number 2 Ball Check Valve (372)

Located in the case cover (400), 2nd fluid seats the ball check valve and is forced through an orifice into the 2nd clutch passage to apply the 2nd clutch.

Second Clutch

2nd clutch fluid pressure applies the Second clutch to shift the transmission into Overdrive Range - Second gear.

Input Clutch

Remains applied, but is now ineffective.

Input Sprag Clutch

Overruns as the second clutch applies.

Forward Band

Remains applied.

1-2 Support Roller Clutch

Continues to hold while the forward band is applied.

1-2 Accumulator

2nd clutch fluid is also routed to the 1-2 accumulator piston. 2nd Clutch fluid pressure, in

addition to 1-2 assist spring force, moves the piston against spring force and 1-2 accumulator feed fluid pressure. This action absorbs initial 2nd clutch fluid pressure to cushion the second clutch apply. The movement of the 1-2 accumulator piston forces some accumulator fluid out of the accumulator.

1-2 Accumulator Valve

1-2 accumulator feed fluid forced from the 1-2 accumulator is routed back to the 1-2 accumulator valve. This pressure forces the 1-2 accumulator valve against spring force and the torque signal fluid pressure to regulate the exhaust of excess accumulator fluid. This regulation provides additional control for the second clutch apply.

TCC Control Pulse Width Modulated (PWM) Solenoid Valve

2nd fluid is routed to the TCC control PWM solenoid. Under normal operating conditions the TCC control PWM solenoid is OFF in Second gear and blocks 2nd fluid from entering the TCC signal fluid circuit.

Torque Converter Clutch

With the TCC control PWM solenoid OFF the converter clutch is released in Second gear. Under normal operating conditions the TCC is released in Second gear. However, TCC apply could vary depending on vehicle application and may be calibrated to apply in Overdrive Range - Second Gear.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch

Release fluid pressure routed to the TFP manual valve position switch signals the PCM that the TCC is released.

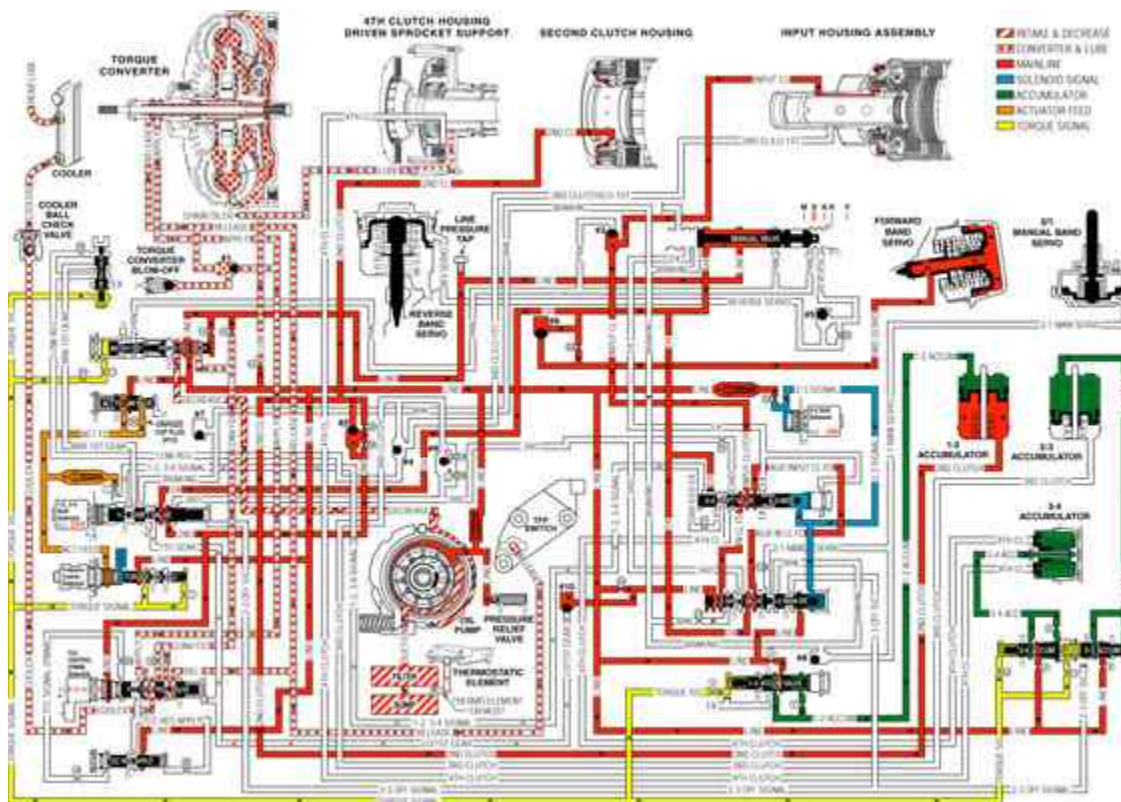


Fig. 429: Overdrive Range, Second Gear - With Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, THIRD GEAR - TORQUE CONVERTER CLUTCH NOT APPLIED (WITHOUT TOUCH ACTIVATED POWER)

As the speed of the vehicle increases, the powertrain control module (PCM) receives input signals from various engine and transmission sensors. The PCM uses this data to energize the 2-3 shift solenoid (SS) valve in order to shift the transmission into third gear at the appropriate time.

2-3 Shift Solenoid (SS) Valve (315)

De-energizes, allowing 2-3 signal fluid to exhaust through the solenoid. Spring pressure forces the 4-3 manual downshift valve (360) to move while line pressure moves the 2-3 shift valve (357) and 3-2 manual downshift valve (356).

Number 9 Ball Check Valve (372)

Located in the control valve body (300), forces 3rd fluid through a feed orifice and into the 3rd clutch passage.

Number 4 Ball Check Valve (372)

Located in the case cover (400), directs 3rd clutch fluid into the 3rd clutch/lo-1st passage to apply the 3rd clutch.

2-3 Shift Valve (357)

When shifted, allows D4 fluid to enter the 3rd passage to stroke the 2-3 accumulator piston (136) and apply the 3rd clutch. The 2-3 shift valve also allows input clutch apply fluid to exhaust into the D3 passage and out at the manual valve (404). And provides 2-3 off signal fluid to the 1-2 shift valve.

Third Clutch

3rd clutch/lo-1st fluid pressure applies the third clutch to shift the transmission into Third gear.

Third Roller Clutch

Holds as third clutch applies.

Input Clutch

In third gear, the input clutch is released allowing input clutch apply fluid to exhaust through the 3-4 shift valve (362) into the input clutch feed passage. At the 2-3 shift valve (357), exhausting input clutch apply fluid is directed into the D3 passage and out the manual valve (404).

Forward Band

Remains applied, but is ineffective.

1-2 Support Roller Clutch

Overruns as third clutch is applied.

2-3 Accumulator

Third clutch feed fluid is also routed to the 2-3 accumulator piston. This fluid pressure moves the piston against spring force and 2-3 accumulator feed fluid pressure. This action absorbs initial third clutch fluid pressure to cushion the third clutch apply. The movement of the 2-3 accumulator piston forces some accumulator fluid out of the accumulator.

2-3 Accumulator Valve

Excess 2-3 accumulator feed fluid is routed back to the 2-3 accumulator valve. This fluid pressure moves the accumulator valve against spring force and torque signal fluid pressure to regulate the exhaust of excess accumulator fluid. This regulation provides additional control for the third

clutch apply.

Torque Converter Clutch

TCC apply could vary depending on vehicle application and may be calibrated to apply in Overdrive Range - Third Gear.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch

Release fluid pressure routed to the TFP manual valve position switch signals the PCM that the TCC is released.

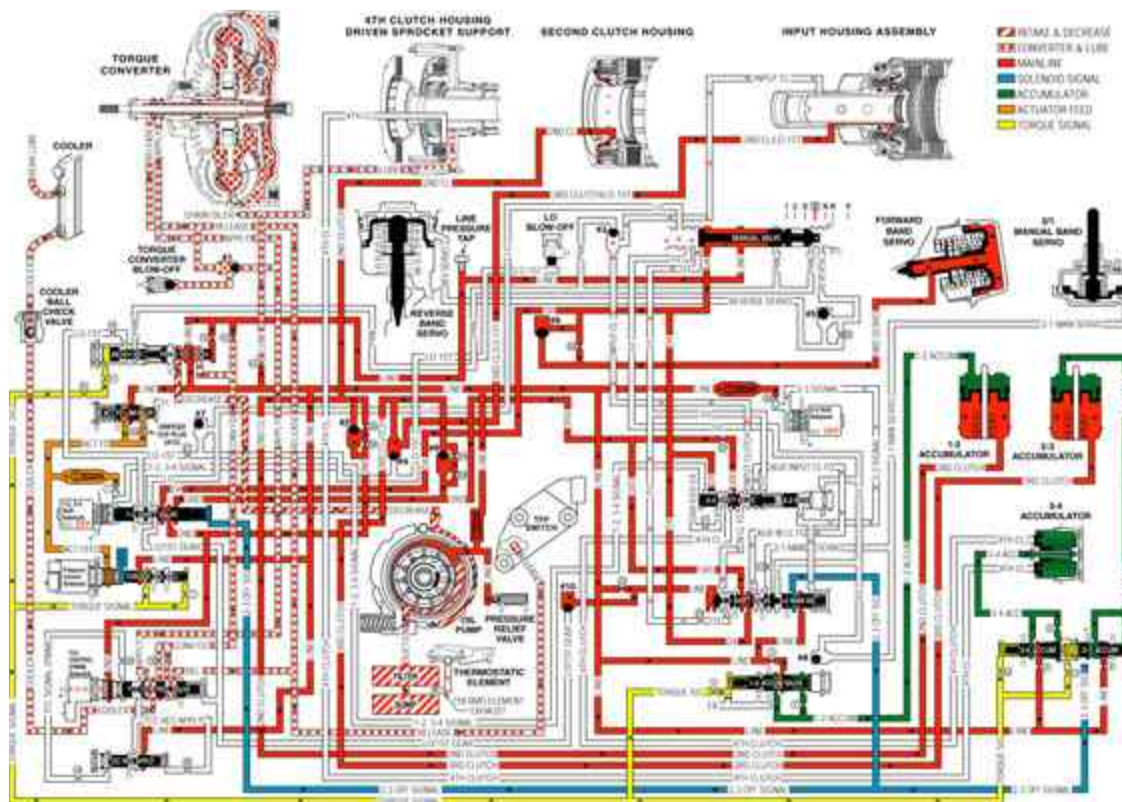


Fig. 430: Overdrive Range, Third Gear - Torque Converter Clutch (TCC) Not Applied - Without Touch Activated Power Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, THIRD GEAR - TORQUE CONVERTER CLUTCH NOT APPLIED (WITH TOUCH ACTIVATED POWER)

As the speed of the vehicle increases, the powertrain control module (PCM) receives input signals from various engine and transmission sensors. The PCM uses this data to energize the 2-3 shift solenoid (SS) valve in order to shift the transmission into third gear at the appropriate time.

2-3 Shift Solenoid (SS) Valve (315)

De-energizes, allowing 2-3 signal fluid to exhaust through the solenoid. Spring pressure forces the 4-3 manual downshift valve (360) to move while line pressure moves the 2-3 shift valve (357) and 3-2 manual downshift valve (356).

Number 9 Ball Check Valve (372)

Located in the control valve body (300), forces 3rd fluid through a feed orifice and into the 3rd clutch passage.

Number 4 Ball Check Valve (372)

Located in the case cover (400), directs 3rd clutch fluid into the 3rd clutch/lo-1st passage to apply the 3rd clutch.

2-3 Shift Valve (357)

When shifted, allows D4 fluid to enter the 3rd passage to stroke the 2-3 accumulator piston (136) and apply the 3rd clutch. The 2-3 shift valve also allows input clutch apply fluid to exhaust into the D3 passage and out at the manual valve (404). And provides 2-3 off signal fluid to the 1-2 shift valve.

Third Clutch

3rd clutch/lo-1st fluid pressure applies the third clutch to shift the transmission into Third gear.

Third Roller Clutch

Holds as third clutch applies.

Input Clutch

In third gear, the input clutch is released allowing input clutch apply fluid to exhaust through the 3-4 shift valve (362) into the input clutch feed passage. At the 2-3 shift valve (357), exhausting input clutch apply fluid is directed into the D3 passage and out the manual valve (404).

Forward Band

Remains applied, but is ineffective.

1-2 Support Roller Clutch

Overruns as third clutch is applied.

2-3 Accumulator

Third clutch feed fluid is also routed to the 2-3 accumulator piston. This fluid pressure moves the piston against spring force and 2-3 accumulator feed fluid pressure. This action absorbs initial third clutch fluid pressure to cushion the third clutch apply. The movement of the 2-3 accumulator piston forces some accumulator fluid out of the accumulator.

2-3 Accumulator Valve

Excess 2-3 accumulator feed fluid is routed back to the 2-3 accumulator valve. This fluid pressure moves the accumulator valve against spring force and torque signal fluid pressure to regulate the exhaust of excess accumulator fluid. This regulation provides additional control for the third clutch apply.

Torque Converter Clutch

TCC apply could vary depending on vehicle application and may be calibrated to apply in Overdrive Range - Third Gear.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch

Release fluid pressure routed to the TFP manual valve position switch signals the PCM that the TCC is released.

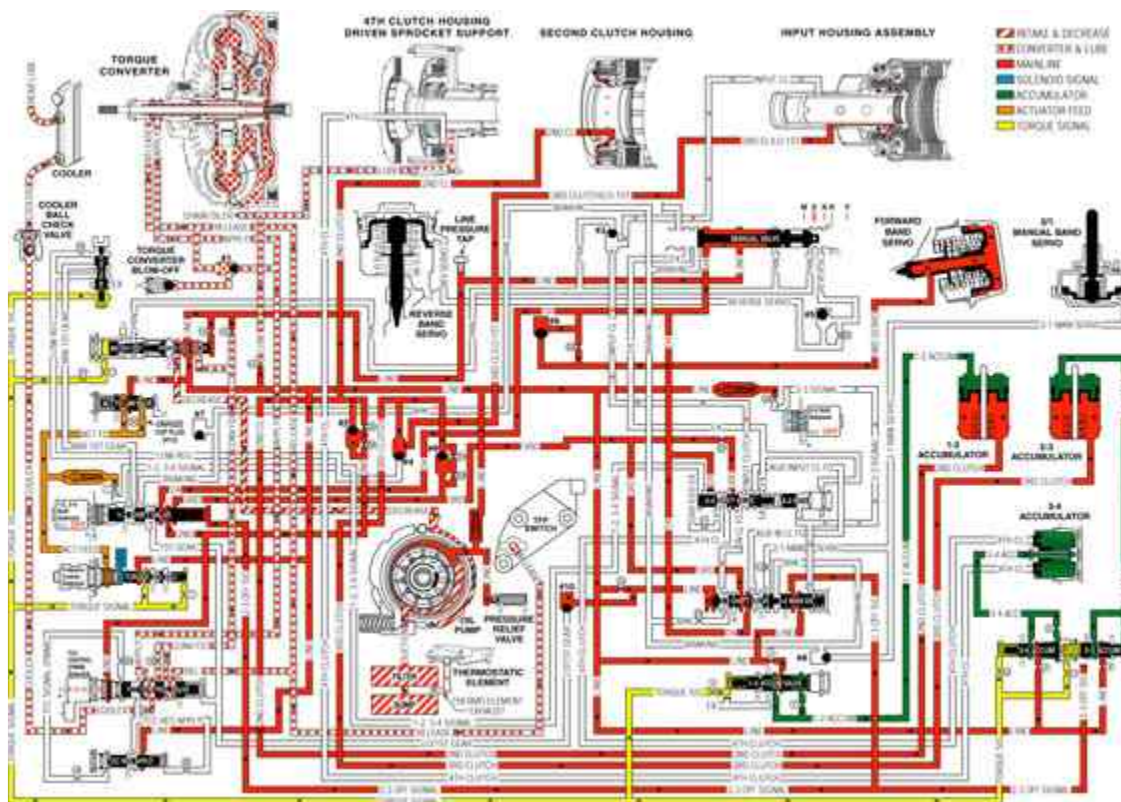


Fig. 431: Overdrive Range, Third Gear - Torque Converter Clutch (TCC) Not Applied - With Touch Activated Power Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, FOURTH GEAR - TORQUE CONVERTER CLUTCH NOT APPLIED (WITHOUT TOUCH ACTIVATED POWER)

As the speed of the vehicle continues to increase, the powertrain control module (PCM) monitors the input signals from various engine and transmission sensors. The PCM uses this data to energize the 1-2, 3-4 shift solenoid (SS) valve in order to shift the transmission into fourth gear at the appropriate time.

1-2, 3-4 Shift Solenoid (SS) Valve (315)

Energizes to prevent fluid from exhausting out of the line passage and the 1-2, 3-4 signal fluid passage.

1-2 Shift Valve (318)

Is held against 1-2, 3-4 signal fluid pressure by spring pressure and 2-3 off signal fluid pressure at the end of the valve.

3-4 Shift Valve (362)

When 1-2, 3-4 signal fluid shifts the 3-4 shift valve against spring force, it allows 3rd fluid to enter the 4th clutch fluid passage. 4th clutch fluid is forced through a feed orifice before stroking the 3-4 accumulator piston (428) and applying the fourth clutch.

Fourth Clutch

4th Clutch fluid pressure applies the fourth clutch to shift the transmission to fourth gear.

Third Clutch

Remains applied, but is ineffective.

Third Roller Clutch

Overruns as fourth clutch is applied. In third gear, the input clutch is released allowing input clutch apply fluid to exhaust through the 3-4 shift valve (362) into the input clutch feed passage. At the 2-3 shift valve (357), exhausting input clutch apply fluid is directed into the D3 passage and out the manual valve (404).

Second Clutch

Remains applied.

Forward Band

Remains applied, but is ineffective.

1-2 Support Roller Clutch

Continues to overrun.

3-4 Accumulator

4th clutch fluid is also routed to the 3-4 accumulator piston. 4th clutch fluid pressure moves the piston against spring force and 3-4 accumulator feed fluid pressure. This action absorbs initial 4th clutch fluid pressure to cushion the 4th clutch apply. The movement of the 3-4 accumulator piston forces some accumulator fluid out of the accumulator.

3-4 Accumulator Valve

Excess 3-4 accumulator feed fluid is routed back to the 3-4 accumulator valve. This fluid pressure moves the accumulator valve against spring force and torque signal fluid pressure to regulate the exhaust of excess accumulator fluid. This regulation provides additional control for the fourth clutch apply.

Torque Converter Clutch

TCC apply could vary depending on vehicle application and may be calibrated to apply in Overdrive Range - Fourth Gear.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch

Release fluid pressure routed to the TFP manual valve position switch signals the PCM that the TCC is released.

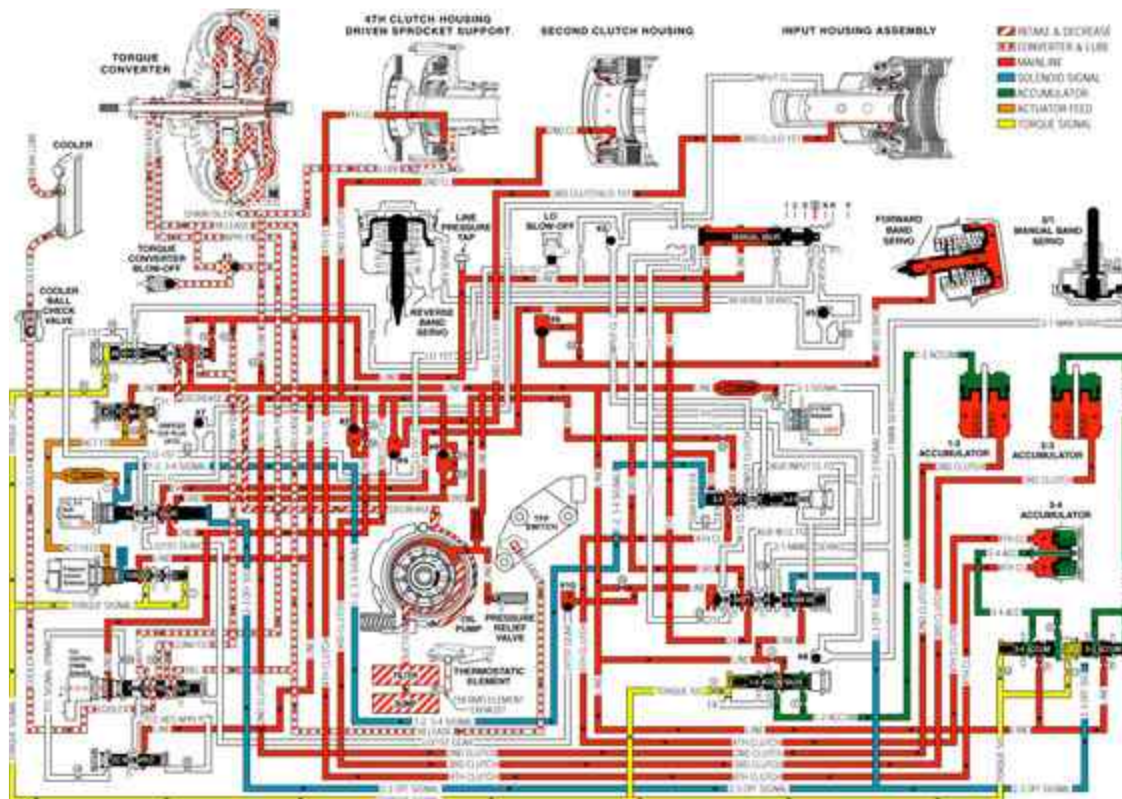


Fig. 432: Overdrive Range, Fourth Gear - TCC Not Applied - Without Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, FOURTH GEAR - TORQUE CONVERTER CLUTCH NOT APPLIED (WITH (WITH TOUCH ACTIVATED POWER)

As the speed of the vehicle continues to increase, the powertrain control module (PCM) monitors the input signals from various engine and transmission sensors. The PCM uses this data to energize the 1-2, 3-4 shift solenoid (SS) valve in order to shift the transmission into fourth gear at the appropriate time.

1-2, 3-4 Shift Solenoid (SS) Valve (315)

Energizes to prevent fluid from exhausting out of the line passage and the 1-2, 3-4 signal fluid passage.

1-2 Shift Valve (318)

Is held against 1-2, 3-4 signal fluid pressure by spring pressure and 2-3 off signal fluid pressure at the end of the valve.

3-4 Shift Valve (362)

When 1-2, 3-4 signal fluid shifts the 3-4 shift valve against spring force, it allows 3rd fluid to enter the 4th clutch fluid passage. 4th clutch fluid is forced through a feed orifice before stroking the 3-4 accumulator piston (428) and applying the fourth clutch.

Fourth Clutch

4th Clutch fluid pressure applies the fourth clutch to shift the transmission to fourth gear.

Third Clutch

Remains applied, but is ineffective.

Third Roller Clutch

Overruns as fourth clutch is applied. In third gear, the input clutch is released allowing input clutch apply fluid to exhaust through the 3-4 shift valve (362) into the input clutch feed passage. At the 2-3 shift valve (357), exhausting input clutch apply fluid is directed into the D3 passage and out the manual valve (404).

Second Clutch

Remains applied.

Forward Band

Remains applied, but is ineffective.

1-2 Support Roller Clutch

Continues to overrun.

3-4 Accumulator

4th clutch fluid is also routed to the 3-4 accumulator piston. 4th clutch fluid pressure moves the

piston against spring force and 3-4 accumulator feed fluid pressure. This action absorbs initial 4th clutch fluid pressure to cushion the 4th clutch apply. The movement of the 3-4 accumulator piston forces some accumulator fluid out of the accumulator.

3-4 Accumulator Valve

Excess 3-4 accumulator feed fluid is routed back to the 3-4 accumulator valve. This fluid pressure moves the accumulator valve against spring force and torque signal fluid pressure to regulate the exhaust of excess accumulator fluid. This regulation provides additional control for the fourth clutch apply.

Torque Converter Clutch

TCC apply could vary depending on vehicle application and may be calibrated to apply in Overdrive Range - Fourth Gear.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch

Release fluid pressure routed to the TFP manual valve position switch signals the PCM that the TCC is released.

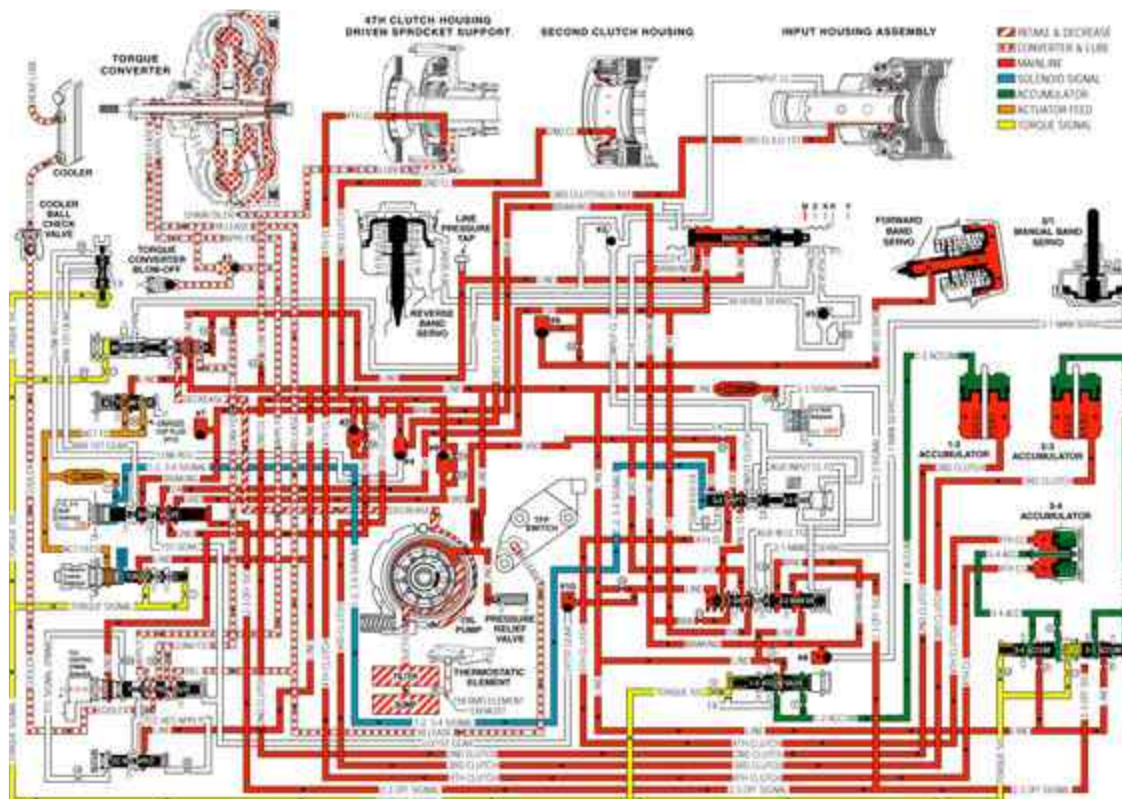


Fig. 433: Overdrive Range, Fourth Gear - TCC Not Applied - With Touch Activated

Power Fluid Flow Diagram**Courtesy of GENERAL MOTORS CORP.****OVERDRIVE RANGE, FOURTH GEAR - TORQUE CONVERTER CLUTCH APPLIED (WITH (WITHOUT TOUCH ACTIVATED POWER)**

The torque converter clutch applies during third or fourth gear operation after the powertrain control module (PCM) receives the appropriate input signals to energize the TCC control (PWM) solenoid. To apply the torque converter clutch, the following changes take place in the electrical and hydraulic systems:

TCC Control (PWM) Solenoid

When conditions are appropriate, the PCM energizes the TCC control (PWM) solenoid to initiate the TCC apply. The solenoid is pulse width modulated (PWM) to provide a smooth TCC apply (refer to the appropriate electrical controls information for a detailed description of the TCC control (PWM) solenoid operation). When energized, the TCC control (PWM) solenoid modulates 2nd fluid into the TCC signal (PWM) fluid circuit.

TCC Regulator Valve

TCC signal (PWM) fluid pressure modulates the valve against spring force and TCC regulated apply fluid pressure. This action directs line pressure into the TCC regulated apply fluid circuit in relation to vehicle operating conditions.

TCC Control Valve

Modulated TCC signal (PWM) fluid pressure moves the valve against spring force in relation to vehicle operating conditions. This action regulates TCC regulated apply fluid into the TCC apply fluid circuit. At the same time, the TCC release fluid circuit is opened to an orificed exhaust. In this position the valve directs converter feed fluid to feed the cooler fluid circuit.

Torque Converter Clutch

TCC apply fluid is routed to the torque converter clutch at the same time TCC release fluid exhausts from the torque converter clutch. TCC apply fluid pressure applies the TCC.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch

Release fluid also exhausts from the TFP manual valve position switch and the TFP manual valve position switch signals the PCM that the TCC is engaged.

Cooler Check Valve

Located in either the case cover or cooler line fitting depending on model. Allows cooler fluid to pass through the cooler and provide lubrication for the transmission. It also prevents converter drainback when the engine is off.

Number 1 Ball Check Valve (372)

Located in the case cover (400), blocks TCC release fluid while sending TCC apply fluid to the torque converter clutch blow-off valve (417-20).

Converter Clutch Blow-off Valve

Limits maximum TCC apply pressure to prevent torque converter damage.

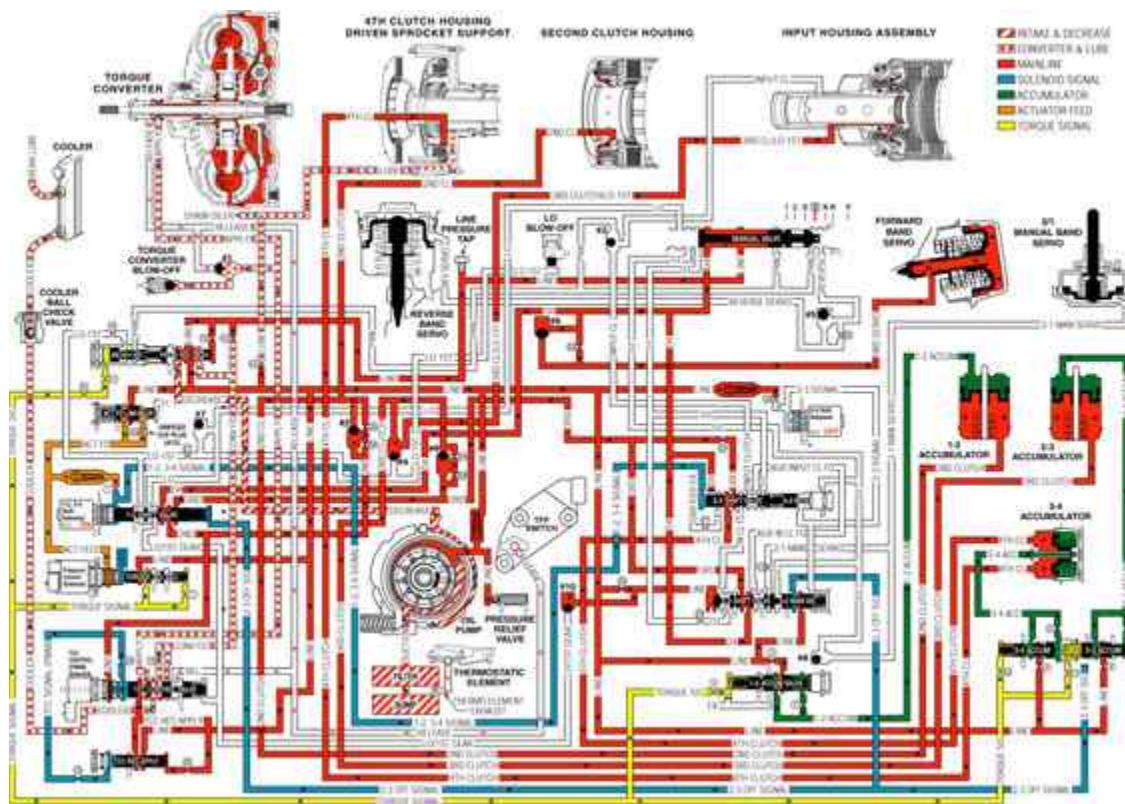


Fig. 434: Overdrive Range, Fourth Gear - TCC Applied - Without Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, FOURTH GEAR - TORQUE CONVERTER CLUTCH APPLIED (WITH TOUCH ACTIVATED POWER)

The torque converter clutch applies during third or fourth gear operation after the powertrain control module (PCM) receives the appropriate input signals to energize the TCC control (PWM)

solenoid. To apply the torque converter clutch, the following changes take place in the electrical and hydraulic systems:

TCC Control (PWM) Solenoid

When conditions are appropriate, the PCM energizes the TCC control (PWM) solenoid to initiate the TCC apply. The solenoid is pulse width modulated (PWM) to provide a smooth TCC apply (refer to the appropriate electrical controls information for a detailed description of the TCC control (PWM) solenoid operation). When energized, the TCC control (PWM) solenoid modulates 2nd fluid into the TCC signal (PWM) fluid circuit.

TCC Regulator Valve

TCC signal (PWM) fluid pressure modulates the valve against spring force and TCC regulated apply fluid pressure. This action directs line pressure into the TCC regulated apply fluid circuit in relation to vehicle operating conditions.

TCC Control Valve

Modulated TCC signal (PWM) fluid pressure moves the valve against spring force in relation to vehicle operating conditions. This action regulates TCC regulated apply fluid into the TCC apply fluid circuit. At the same time, the TCC release fluid circuit is opened to an orificed exhaust. In this position the valve directs converter feed fluid to feed the cooler fluid circuit.

Torque Converter Clutch

TCC apply fluid is routed to the torque converter clutch at the same time TCC release fluid exhausts from the torque converter clutch. TCC apply fluid pressure applies the TCC.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch

Release fluid also exhausts from the TFP manual valve position switch and the TFP manual valve position switch signals the PCM that the TCC is engaged.

Cooler Check Valve

Located in either the case cover or cooler line fitting depending on model. Allows cooler fluid to pass through the cooler and provide lubrication for the transmission. It also prevents converter drainback when the engine is off.

Number 1 Ball Check Valve (372)

Located in the case cover (400), blocks TCC release fluid while sending TCC apply fluid to the

torque converter clutch blow-off valve (417-20).

Converter Clutch Blow-off Valve

Limits maximum TCC apply pressure to prevent torque converter damage.

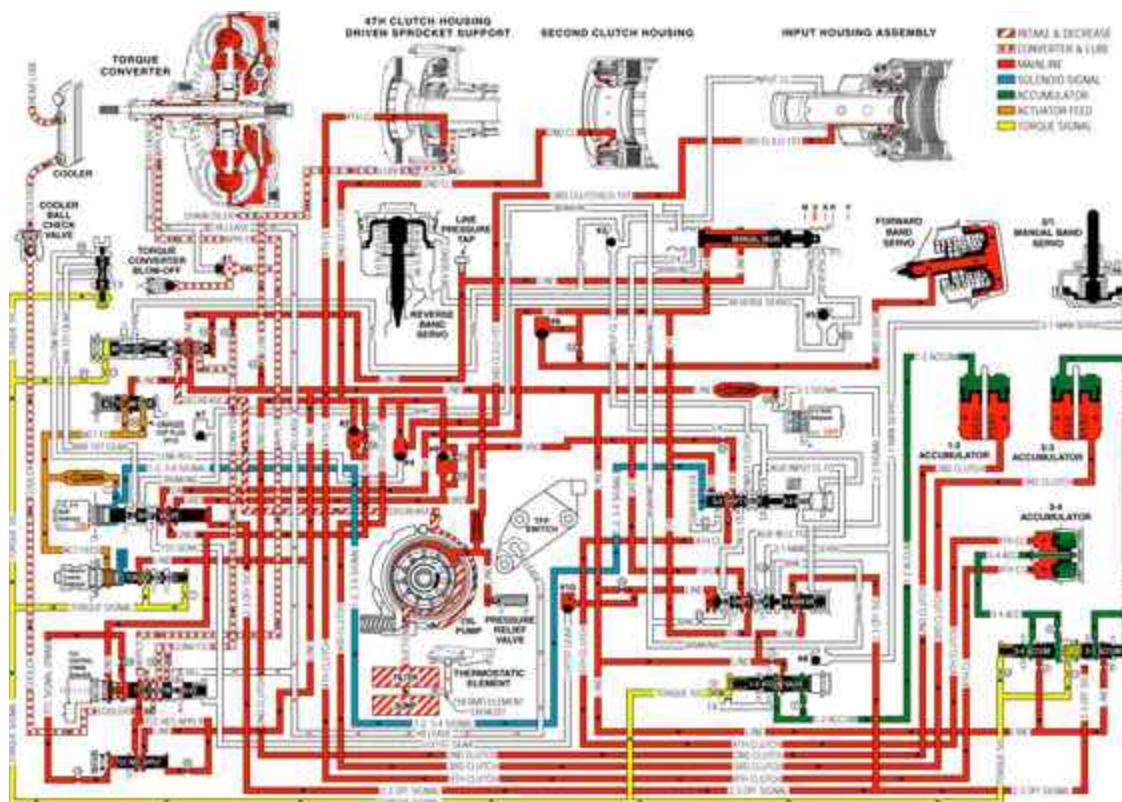


Fig. 435: Overdrive Range, Fourth Gear - TCC Applied - With Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, 4-3 DOWNSHIFT - TORQUE CONVERTER CLUTCH NOT APPLIED (WITHOUT TOUCH ACTIVATED POWER)

When the transmission is operating in Fourth gear, a 4-3 downshift will occur if there is a significant change (increase) in the throttle position or if the load on the engine is increased. When the 4-3 downshift occurs, the torque converter clutch will release prior to the shift occurring which results in the following changes in the hydraulic system:

Pressure Control (PC) Solenoid

During the downshift, except for a coastdown, the PCM senses the increase in throttle position or engine load and increases the PC solenoid duty cycle. The increase in duty cycle increases output

fluid pressure from the PC solenoid, thereby increasing torque signal fluid pressure at the torque signal regulator valve.

Pressure Regulator Valve

Increased torque signal fluid pressure acting on the line boost valve increases line pressure at the pressure regulator valve.

TCC Control (PWM) Solenoid Valve

As the throttle position changes, the throttle position sensor provides input to the PCM indicating throttle angle. The PCM then lowers the ON/OFF cycle time of the TCC control PWM solenoid valve, lowering TCC signal (PWM) fluid pressure.

TCC Control Valve

Lowered TCC signal (PWM) fluid pressure allows the valve to move with spring pressure, allowing converter feed fluid into the TCC release circuit. TCC release fluid is then routed to the torque converter pressure plate and disengages the torque converter clutch, TCC apply fluid from the torque converter clutch pressure plate is then routed back through its circuit to the converter clutch control valve. TCC apply fluid passes through the valve and enters the cooler circuit.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch

When the TCC is in the release position, TCC release fluid pressure is routed to the TFP manual valve position switch. This fluid pressure signals the PCM that the TCC is in the released position.

1-2, 3-4 Shift Solenoid (SS) Valve (315)

De-energizes, allowing 1-2, 3-4 signal fluid at the 3-4 shift valve (362) to exhaust through the solenoid.

3-4 Shift Valve (362)

When 1-2, 3-4 signal fluid exhausts, spring force moves the valve allowing 4th clutch fluid to exhaust through the valve.

Fourth Clutch

Fourth Clutch fluid is exhausted at the 3-4 shift valve and the driven support ball check valve. Fourth clutch return spring pressure moves the fourth clutch piston and releases the fourth clutch.

3-4 Accumulator

4th Clutch fluid exhausts from the accumulator. Spring force and 3-4 accumulator feed fluid pressure move the accumulator piston to the Third gear position.

3-4 Accumulator Valve

The accumulator valve regulates line pressure into the 3-4 accumulator fluid circuit to fill the 3-4 accumulator. This regulation is basically controlled by torque signal fluid pressure. Increased torque signal fluid pressure regulates accumulator fluid to a higher pressure. Note: The clutch and band application information is the same as Overdrive Range - Third Gear.

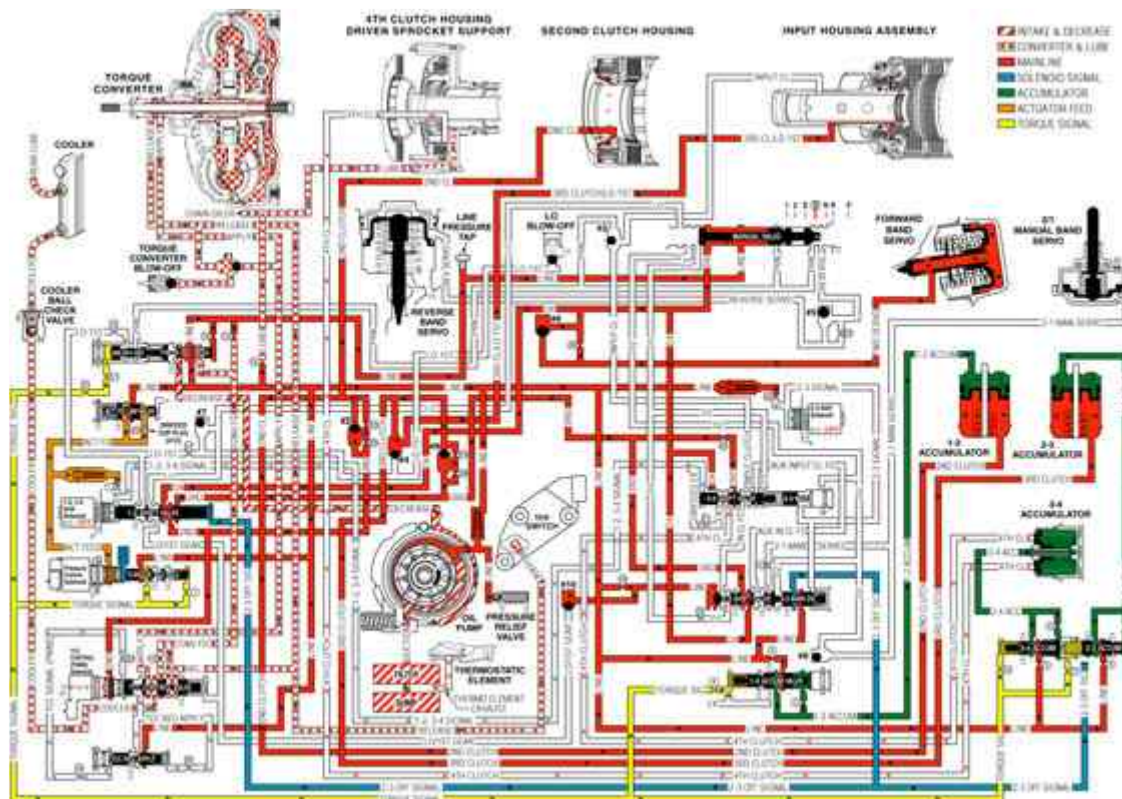


Fig. 436: Overdrive Range, 4-3 Downshift - TCC Not Applied - Without Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

OVERDRIVE RANGE, 4-3 DOWNSHIFT - TORQUE CONVERTER CLUTCH NOT APPLIED (WITH TOUCH ACTIVATED POWER)

When the transmission is operating in Fourth gear, a 4-3 downshift will occur if there is a significant change (increase) in the throttle position or if the load on the engine is increased. When the 4-3 downshift occurs, the torque converter clutch will release prior to the shift occurring which results in the following changes in the hydraulic system:

Pressure Control (PC) Solenoid

During the downshift, except for a coastdown, the PCM senses the increase in throttle position or engine load and increases the PC solenoid duty cycle. The increase in duty cycle increases output fluid pressure from the PC solenoid, thereby increasing torque signal fluid pressure at the torque signal regulator valve.

Pressure Regulator Valve

Increased torque signal fluid pressure acting on the line boost valve increases line pressure at the pressure regulator valve.

TCC Control (PWM) Solenoid Valve

As the throttle position changes, the throttle position sensor provides input to the PCM indicating throttle angle. The PCM then lowers the ON/OFF cycle time of the TCC control PWM solenoid valve, lowering TCC signal (PWM) fluid pressure.

TCC Control Valve

Lowered TCC signal (PWM) fluid pressure allows the valve to move with spring pressure, allowing converter feed fluid into the TCC release circuit. TCC release fluid is then routed to the torque converter pressure plate and disengages the torque converter clutch, TCC apply fluid from the torque converter clutch pressure plate is then routed back through its circuit to the converter clutch control valve. TCC apply fluid passes through the valve and enters the cooler circuit.

Transmission Fluid Pressure (TFP) Manual Valve Position Switch

When the TCC is in the release position, TCC release fluid pressure is routed to the TFP manual valve position switch. This fluid pressure signals the PCM that the TCC is in the released position.

1-2, 3-4 Shift Solenoid (SS) Valve (315)

De-energizes, allowing 1-2, 3-4 signal fluid at the 3-4 shift valve (362) to exhaust through the solenoid.

3-4 Shift Valve (362)

When 1-2, 3-4 signal fluid exhausts, spring force moves the valve allowing 4th clutch fluid to exhaust through the valve.

Fourth Clutch

Fourth Clutch fluid is exhausted at the 3-4 shift valve and the driven support ball check valve. Fourth clutch return spring pressure moves the fourth clutch piston and releases the fourth clutch.

3-4 Accumulator

4th Clutch fluid exhausts from the accumulator. Spring force and 3-4 accumulator feed fluid pressure move the accumulator piston to the Third gear position.

3-4 Accumulator Valve

The accumulator valve regulates line pressure into the 3-4 accumulator fluid circuit to fill the 3-4 accumulator. This regulation is basically controlled by torque signal fluid pressure. Increased torque signal fluid pressure regulates accumulator fluid to a higher pressure. Note: The clutch and band application information is the same as Overdrive Range - Third Gear.

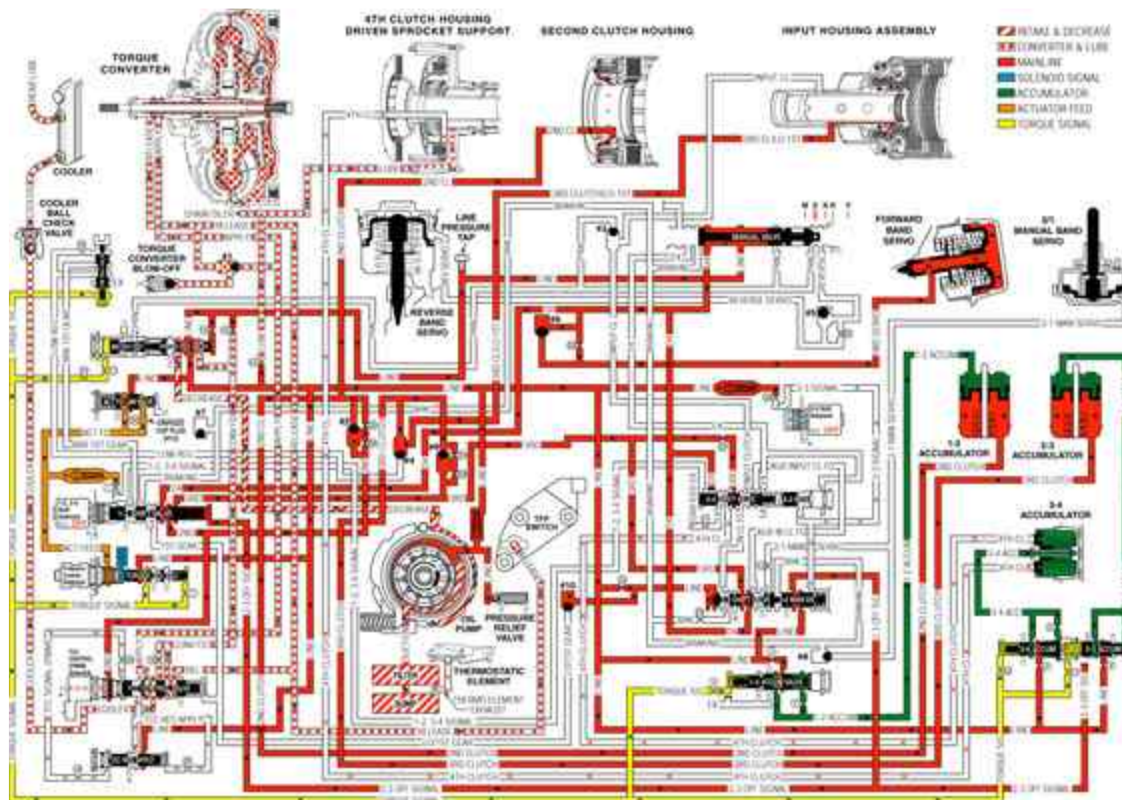


Fig. 437: Overdrive Range, 4-3 Downshift - TCC Not Applied - With Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

DRIVE RANGE, MANUAL THIRD (FROM OVERDRIVE RANGE) (WITHOUT TOUCH ACTIVATED POWER)

A manual 4-3 downshift is accomplished by moving the gear selector lever to the Manual Third (3) position. In Manual Third the transmission is hydraulically prevented from upshifting into Fourth gear under any conditions. Also, the input clutch is applied in Manual Third range to provide engine compression braking in 3rd gear. The following information explains the additional changes during a manual 4-3 downshift as compared to a forced 4-3 downshift. Refer to Overdrive Range: 4-3 Downshift for a complete description of a 4-3 downshift.

Manual Valve

The manual valve moves into the Manual Third (3) position and line pressure enters the D3 fluid circuit.

2-3 Shift Valve (357)

Allows D3 fluid to enter the input clutch feed passage and directs it to the 3-4 shift valve (362).

3-4 Shift Valve (362)

Is downshift when D3 fluid is fed to the valve. In this position input clutch feed fluid enters the input clutch passage. 4th clutch fluid is exhausted through an orifice.

Number 3 Ball Check Valve (372)

Located in the case cover (400), it is seated against the PRN passage allowing input clutch fluid to apply the input clutch.

1-2, 3-4 Shift Solenoid (SS) Valve (315)

When de-energized, it allows 1-2, 3-4 signal fluid from the 3-4 shift valve (362) to exhaust through the solenoid. However, this event does not have to occur in order to achieve a manual 4-3 downshift.

Manual Third-Second and First Gears

The transmission operates the same in Manual Third as in Overdrive range with the exception of Fourth gear being prevented. The transmission will upshift and downshift between First, Second and Third gears as in Overdrive range. However, engine compression braking is not available in Manual Third - First gear and the vehicle will coast when the throttle is released.

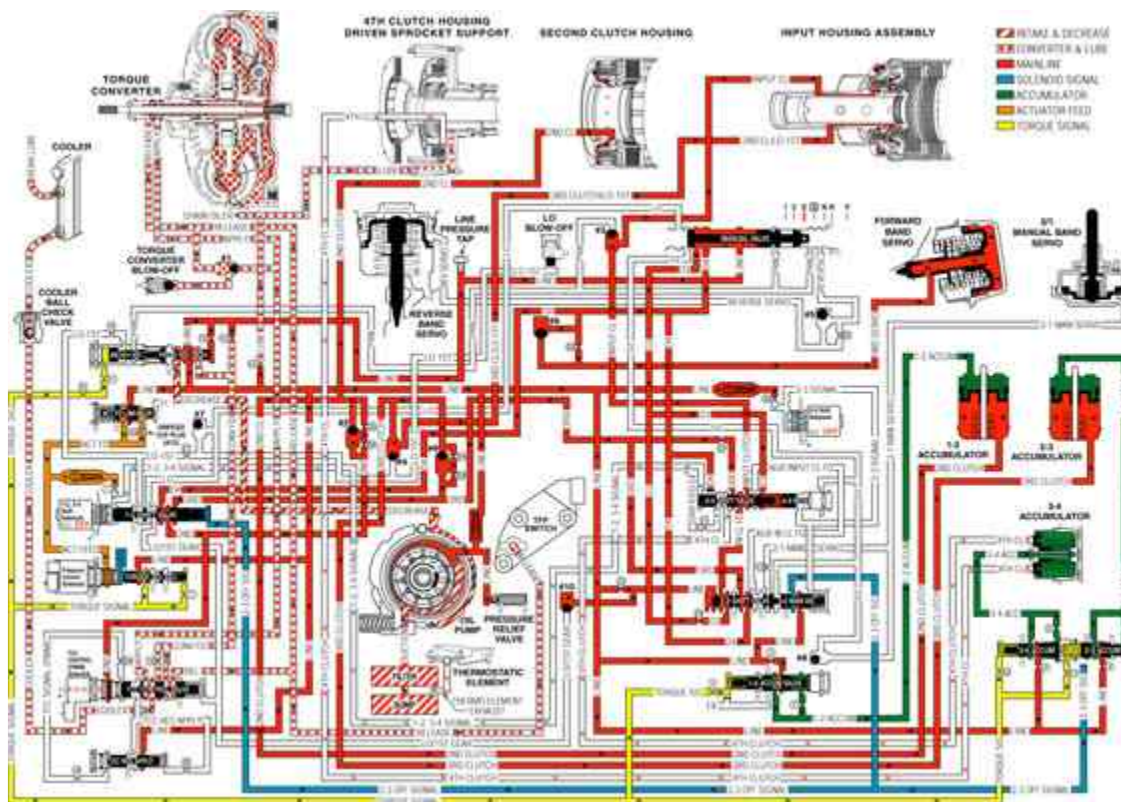


Fig. 438: Drive Range, Manual 3rd - from Overdrive Range - Without Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

MANUAL THIRD GEAR (WITH TOUCH ACTIVATED POWER)

A manual 4-3 downshift is accomplished by moving the gear selector lever to the Manual position. In Manual the transmission is hydraulically prevented from upshifting into Fourth gear under any conditions. Also, the input clutch is applied in Manual range to provide engine compression braking in 3rd gear. The following information explains the additional changes during a manual 4-3 downshift as compared to a forced 4-3 downshift. Refer to Overdrive Range: 4-3 Downshift for a complete description of a 4-3 downshift.

Manual Valve

The manual valve moves into the Manual position and line pressure enters the braking fluid circuit.

2-3 Shift Valve (357)

Allows braking fluid to enter the input clutch feed passage and directs it to the 3-4 shift valve (362).

3-4 Shift Valve (362)

Is downshift when D3 fluid is fed to the valve. In this position input clutch feed fluid enters the input clutch passage. 4th clutch fluid is exhausted through an orifice.

Number 3 Ball Check Valve (372)

Located in the case cover (400), it is seated against the PRN passage allowing input clutch fluid to apply the input clutch.

1-2, 3-4 Shift Solenoid (SS) Valve (315)

When de-energized, it allows 1-2, 3-4 signal fluid from the 3-4 shift valve (362) to exhaust through the solenoid. However, this event does not have to occur in order to achieve a manual 4-3 downshift.

Manual Third-Second and First Gears

The transmission operates the same in Manual Third as in Overdrive range with the exception of Fourth gear being prevented. The transmission will upshift and downshift between First, Second and Third gears as in Overdrive range. However, engine compression braking is not available in Manual Third - First gear and the vehicle will coast when the throttle is released.

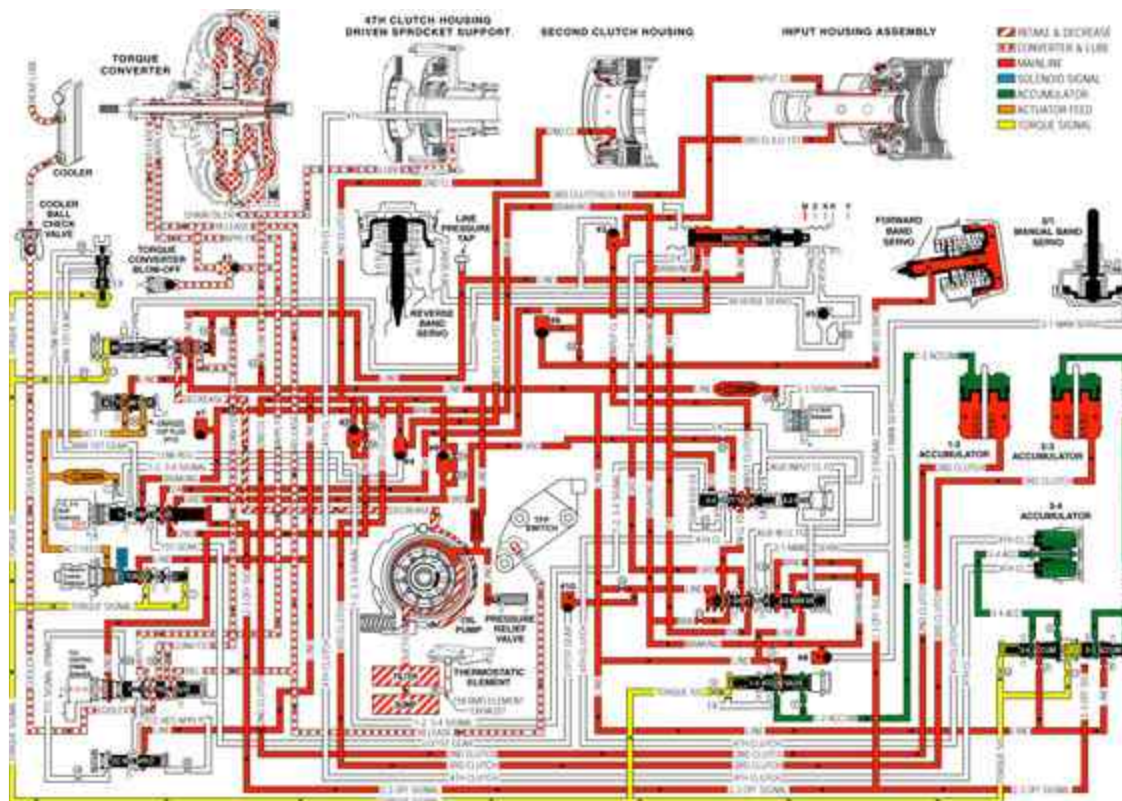


Fig. 439: Drive Range, Manual 3rd - from Overdrive Range - With Touch Activated Power Fluid Flow Diagram
Courtesy of GENERAL MOTORS CORP.

DRIVE RANGE, MANUAL SECOND (FROM DRIVE, MANUAL THIRD) (WITHOUT TOUCH ACTIVATED POWER)

When the gear selector lever is moved to the Manual Second (D2) gear range, the manual valve moves and allows line pressure to enter the D2 fluid passage. The transmission reacts by shifting immediately into second gear range and is prevented from upshifting into either Third or Fourth gear.

Manual Valve (404)

Is moved by the gear selector lever allowing line pressure to enter the D2 passage.

Number 8 Ball Check Valve (372)

Located in the control valve body (300), is fed D2 fluid from the manual valve (404) and directs it to the 2-3 shift valve (357).

2-3 Shift Valve (357)

When shifted by D2 fluid, it allows D2 to enter the manual 2-1 servo feed passage to stroke the manual 2-1 servo assembly (104-115) and allows 3rd fluid to exhaust.

Manual 2-1 Servo Assembly (104-115)

Applies the manual 2-1 band (680) during manual second and manual first gear ranges.

Number 4 Ball Check Valve (372)

Located in the case cover (400), it directs 3rd clutch/lo-1st exhaust fluid into the 3rd clutch passage, releasing the 3rd clutch.

2-3 Shift Solenoid (SS) Valve (315)

When energized, it allows line pressure to enter the 2-3 signal fluid passage and sends it to the 4-3 manual downshift valve (360) and 3-2 manual downshift valve (356). However, this event does not have to occur in order to achieve a manual 3-2 downshift.

3-2 Manual Downshift Valve (356)

Is shifted by 2-3 signal fluid and prevents the 2-3 shift valve (357) from upshifting.

Pressure Control (PC) Solenoid

The PCM increases the PC solenoid duty cycle to increase the operating range of torque signal fluid pressure in Manual Second. This provides increased line pressure for the additional torque requirements during engine compression braking and increased engine load in Manual Second.

Torque Converter Clutch

The PCM will release the TCC before downshifting into Manual Second. The TCC will not re-apply in Second gear under normal operating conditions.

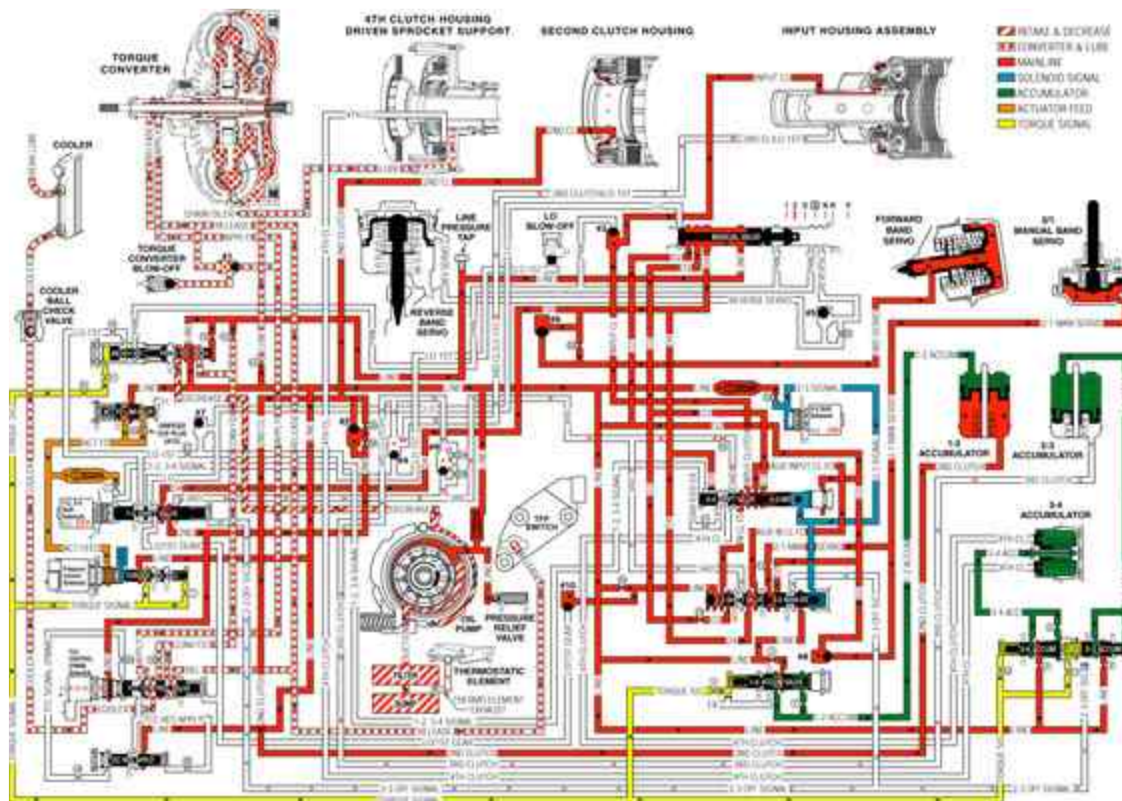


Fig. 440: Drive Range, Manual 2nd - from Drive, Manual 3rd - Without Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

MANUAL SECOND GEAR (WITH TOUCH ACTIVATED POWER)

When the gear selector lever is moved to the Manual gear range, the manual valve moves and allows line pressure to enter the Braking fluid passage. The transmission reacts by shifting immediately into second gear range and is prevented from upshifting into either Third or Fourth gear.

Manual Valve (404)

Is moved by the gear selector lever allowing line pressure to enter the braking passage.

Number 8 Ball Check Valve (372)

Located in the control valve body (300), is fed braking fluid from the manual valve (404) and directs it to the 2-3 shift valve (357).

2-3 Shift Valve (357)

When shifted by braking fluid, it allows 3rd fluid to exhaust.

3-2 Manual Downshift Valve (356)

Is shifted by 2-3 signal fluid and prevents the 2-3 shift valve (357) from upshifting. It also allows braking fluid to enter the manual 2-1 servo feed passage to stroke the manual 2-1 servo assembly (104-115).

Manual 2-1 Servo Assembly (104-115)

Applies the manual 2-1 band (680) during manual second and manual first gear ranges.

Number 4 Ball Check Valve (372)

Located in the case cover (400), it directs 3rd clutch/lo-reg exhaust fluid into the 3rd clutch passage, releasing the 3rd clutch.

2-3 Shift Solenoid (SS) Valve (315)

When energized, it allows line pressure to enter the 2-3 signal fluid passage and sends it to the 4-3 manual downshift valve (360) and 3-2 manual downshift valve (356).

Pressure Control (PC) Solenoid

The PCM increases the PC solenoid duty cycle to increase the operating range of torque signal fluid pressure in Manual Second. This provides increased line pressure for the additional torque requirements during engine compression braking and increased engine load in Manual Second.

Torque Converter Clutch

The PCM will release the TCC before downshifting into Manual Second. The TCC will not re-apply in Second gear under normal operating conditions.

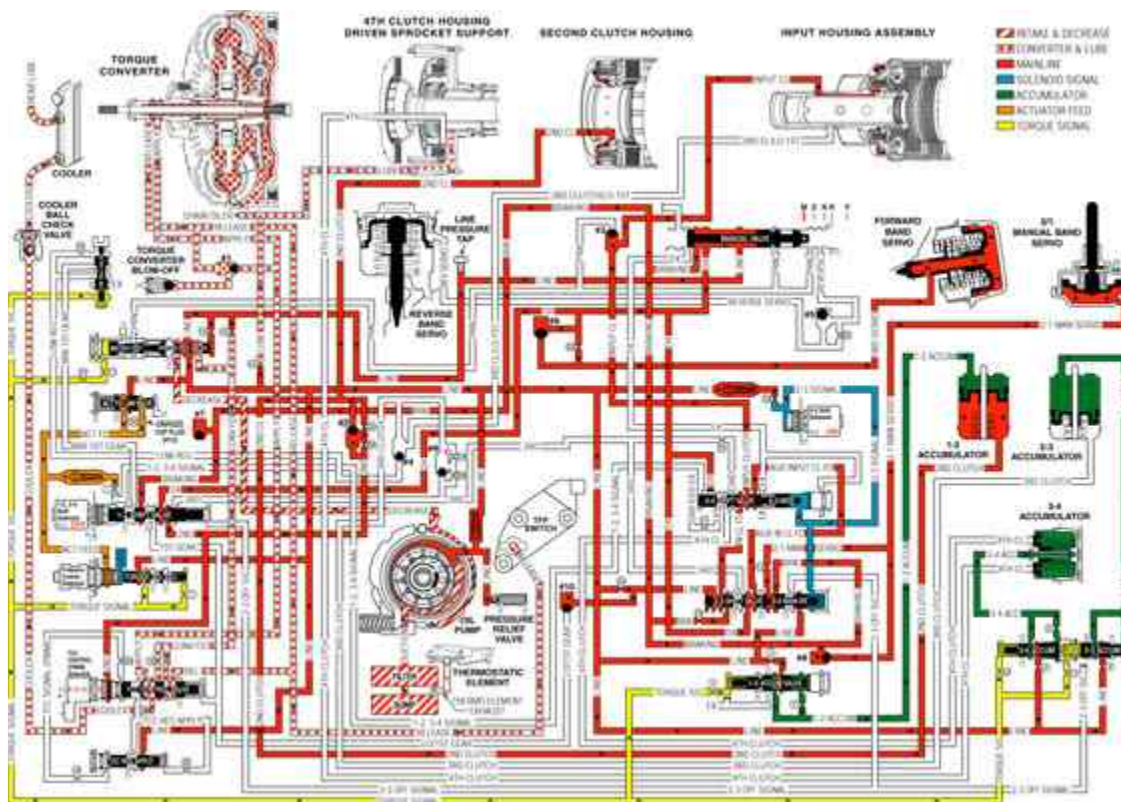


Fig. 441: Drive Range, Manual 2nd - from Drive, Manual 3rd - With Touch Activated Power

Courtesy of GENERAL MOTORS CORP.

DRIVE RANGE, MANUAL FIRST (FROM DRIVE, MANUAL SECOND) (WITHOUT TOUCH ACTIVATED POWER)

A manual 2-1 downshift is initiated by moving the gear selector lever to the Manual First (1) position. However, the transmission will not downshift into First gear until vehicle speed is below approximately 60 km/h (37 mph). At higher vehicle speeds the PCM will keep 1-2 shift solenoid (SS) valve de-energized (OFF) and the transmission will operate in Manual First - Second Gear. In Manual First the transmission is electronically prevented from upshifting into Third or Fourth gears under any conditions. Also, the third clutch is applied in Manual First - First Gear to provide engine compression braking.

Manual Valve (404)

Line pressure is routed into the Lo fluid circuit when the selector lever is moved into the Manual First (1) position. Line pressure continues to feed the D4, D3 and D2 fluid circuits as in Manual Second.

Number 7 Ball Check Valve (372)

Located in the control valve body (300), directs Lo fluid to the 1-2 shift valve (318).

1-2 Shift Valve (318)

When shifted against spring force, allows Lo fluid to enter the Lo-1st passage to the pressure regulator valve (313). During release of the 2nd clutch, exhausting 2nd fluid passes through the valve and enters the 3rd fluid passage.

Lo Blow Off Valve (407)

A relief valve that exhausts excess Lo fluid pressures above 448 kPa (65 psi) from the 3rd clutch apply circuit.

Number 4 Ball Check Valve (372)

Located in the case cover (400), it seats against 3rd clutch fluid allowing Lo-1st fluid to enter the 3rd clutch fluid passage and apply the 3rd clutch.

1-2, 3-4 Shift Solenoid (SS) Valve (315)

Energizes, allowing line pressure to feed into the 1-2, 3-4 signal fluid passage and to the 3-4 shift valve (362).

Number 2 Ball Check Valve (372)

Located in the case cover (400), forces exhausting 2nd clutch apply fluid through an orifice into the 2nd clutch passage and to the 1-2 shift valve (318).

Pressure Regulator Valve

Lo fluid is directed through the 1-2 shift valve (318) into the Lo-1st fluid passage. Lo-1st fluid is sent to the pressure regulator valve (313) to boost line pressure and at the same time to the Lo blow off valve (407). The addition of Lo-1st fluid pressure increases the operating range of line pressure in Manual First.

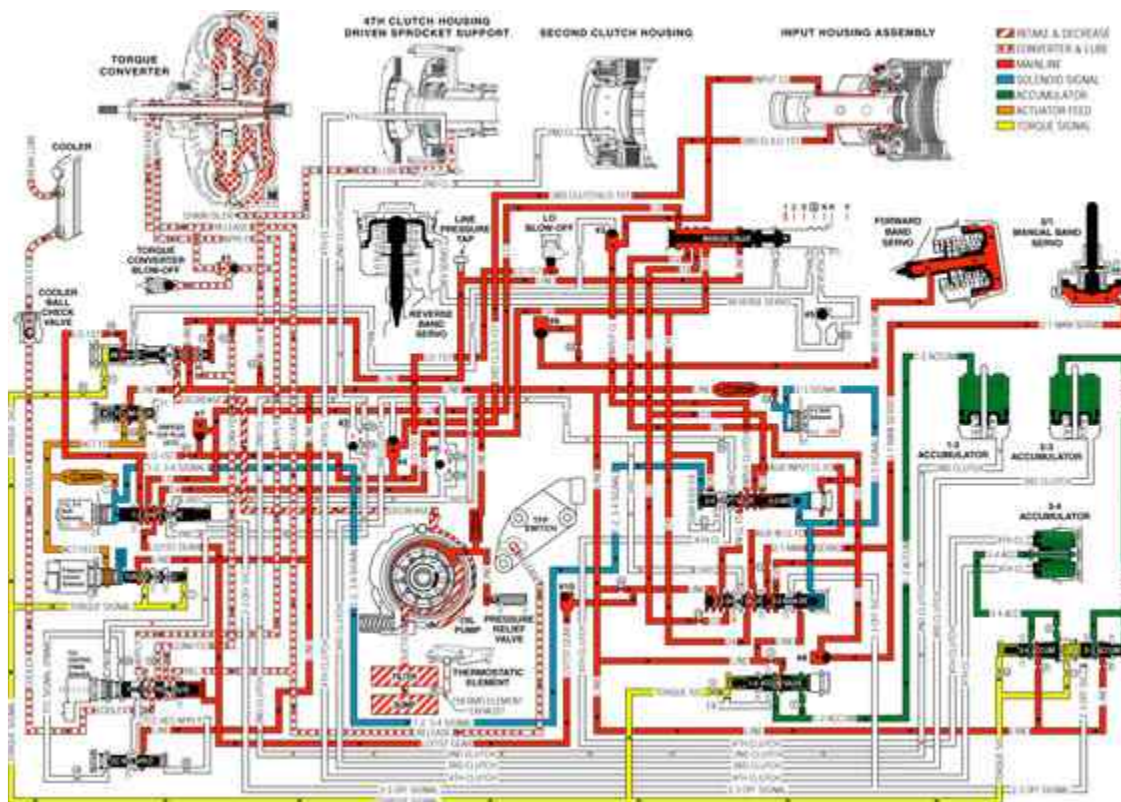


Fig. 442: Drive Range, Manual 1st - from Drive, Manual 2nd - Without Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

MANUAL FIRST GEAR (WITH TOUCH ACTIVATED POWER)

A manual 2-1 downshift is initiated by moving the gear selector lever to the Manual position. However, the transmission will not downshift into First gear until vehicle speed is below approximately 60 km/h (37 mph). At higher vehicle speeds the PCM will keep 1-2 shift solenoid (SS) valve de-energized (OFF) and the transmission will operate in Manual - Second Gear. Also, the third clutch is applied in Manual First - First Gear to provide engine compression braking.

Manual Valve (404)

Line pressure is routed into the braking circuit when the selector lever is moved into the Manual position. Line pressure continues to feed the D4 in Manual.

Number 7 Ball Check Valve (372)

Located in the control valve body (300), directs braking to the 1-2 shift valve (318).

1-2 Shift Valve (318)

When shifted against spring force, allows braking to enter the braking-1st gear passage to the low regulator valve (313). During release of the 2nd clutch, exhausting 2nd fluid passes through the valve and enters the 3rd fluid passage.

Lo Blow Valve (443)

When shifted against spring force, allows braking first gear fluid to be directed into low reg fluid passage.

Number 4 Ball Check Valve (372)

Located in the case cover (400), it seats against 3rd clutch fluid allowing low reg fluid to enter the 3rd clutch/lo-1st fluid passage and apply the 3rd clutch.

1-2, 3-4 Shift Solenoid (SS) Valve (315)

Energizes, allowing line pressure to feed into the 1-2, 3-4 signal fluid passage and to the 3-4 shift valve (362).

Number 2 Ball Check Valve (372)

Located in the case cover (400), forces exhausting 2nd clutch apply fluid through an orifice into the 2nd clutch passage and to the 1-2 shift valve (318).

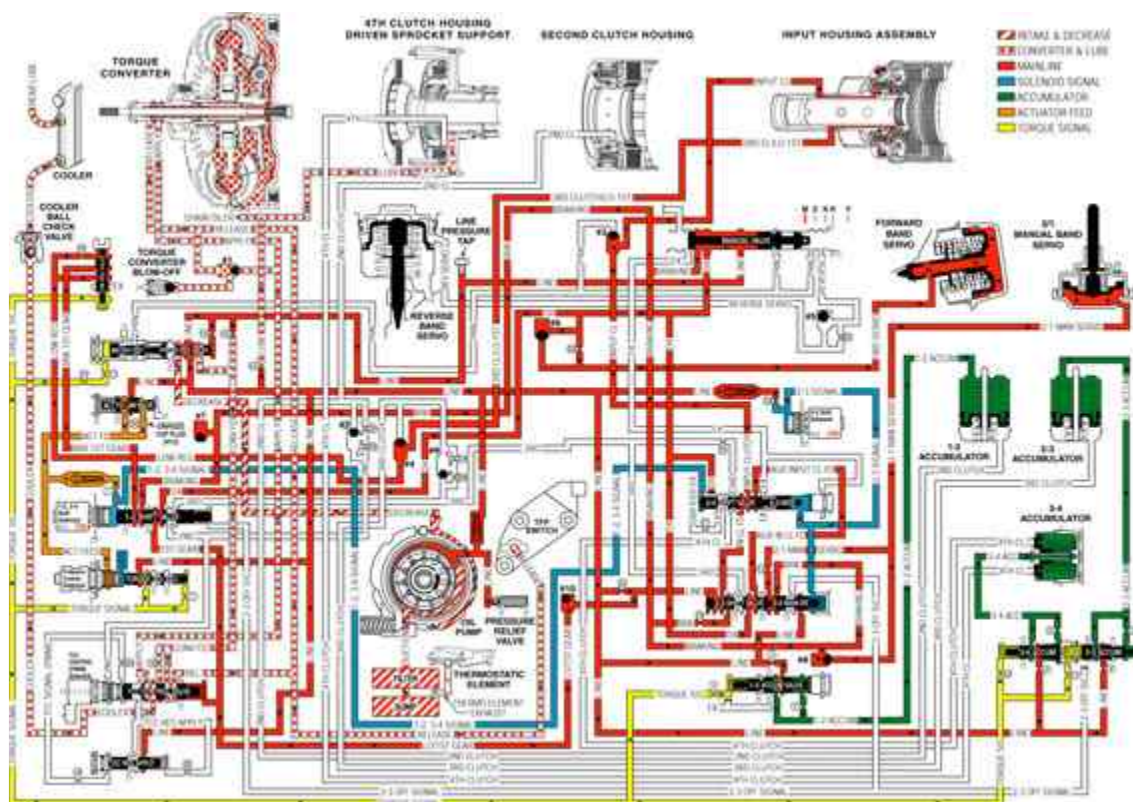


Fig. 443: Drive Range, Manual 1st - from Drive, Manual 2nd - With Touch Activated Power Fluid Flow Diagram

Courtesy of GENERAL MOTORS CORP.

FLUID PASSAGES

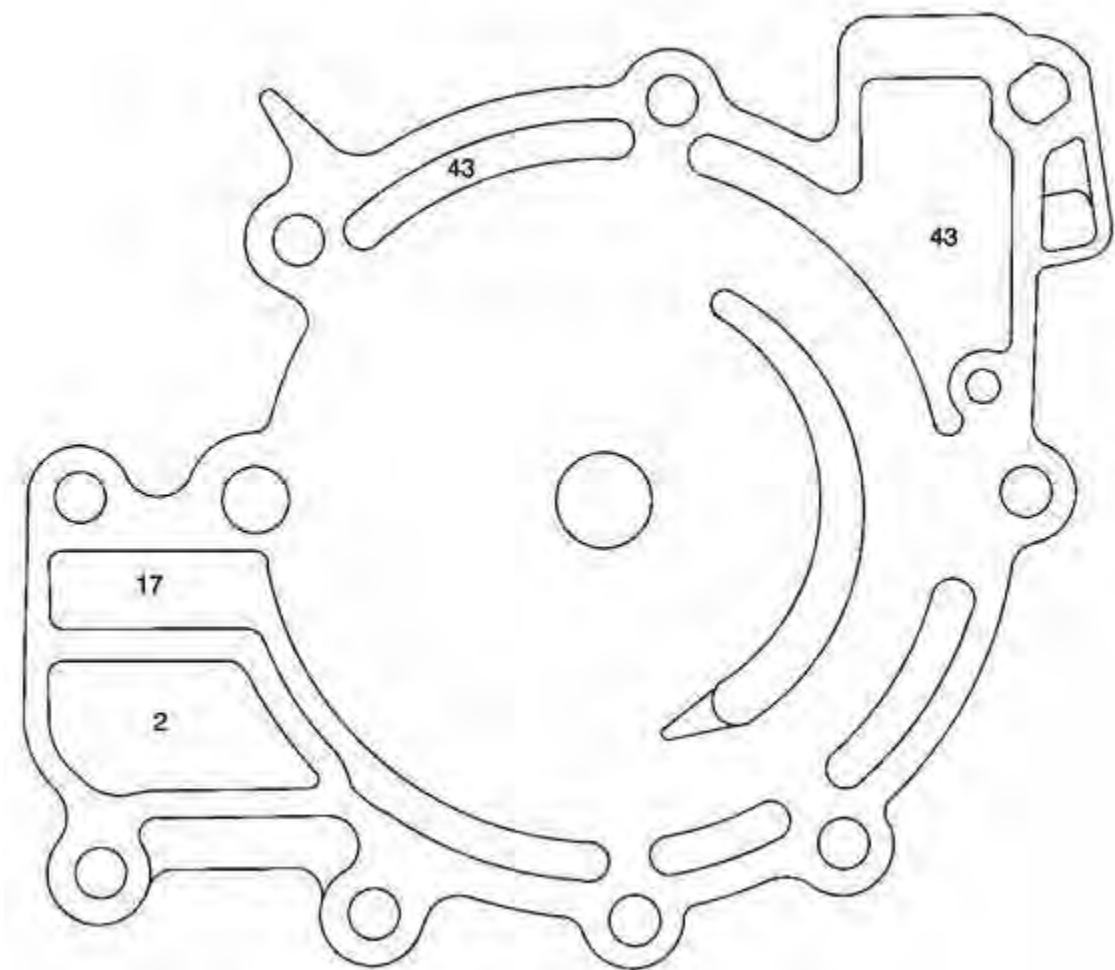


Fig. 444: Oil Pump Cover Fluid Passages - Oil Pump Body Side
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 444

Callout	Component Name
2	Line
17	Decrease
43	Casting Void
43	Casting Void

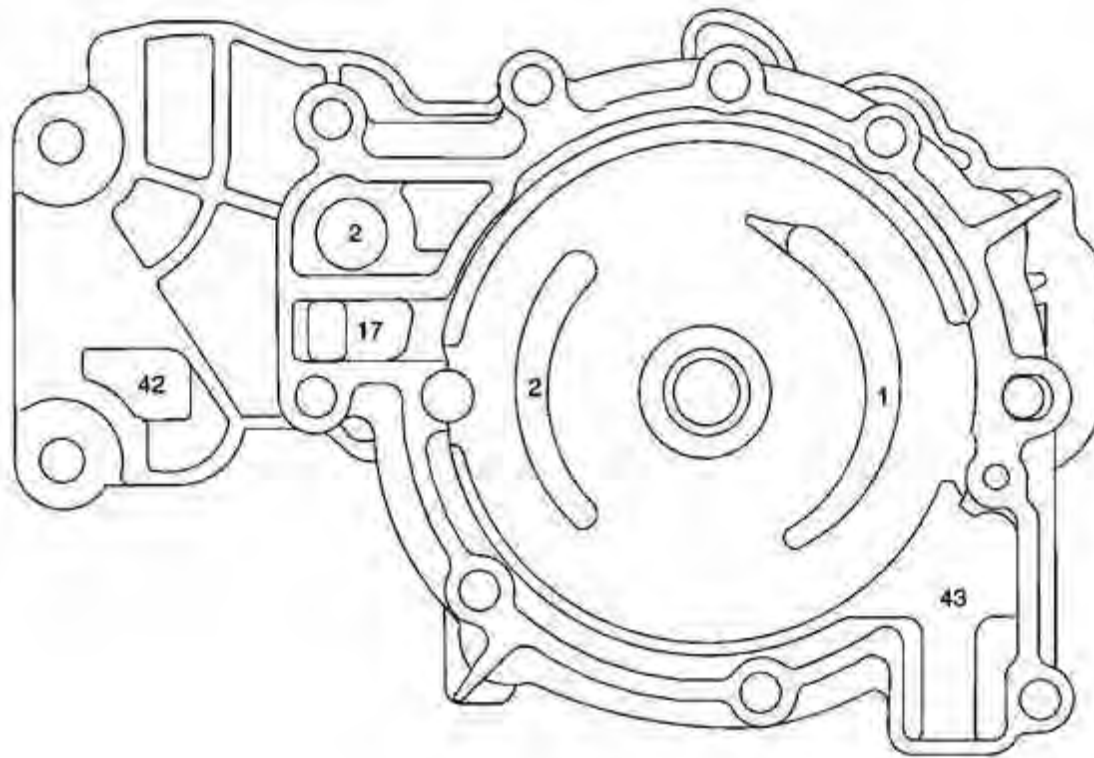


Fig. 445: Oil Pump Body Fluid Passages - Oil Pump Cover Side
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 445

Callout	Component Name
1	Suction
2	Line
2	Line
17	Decrease
42	Exhaust
43	Casting Void

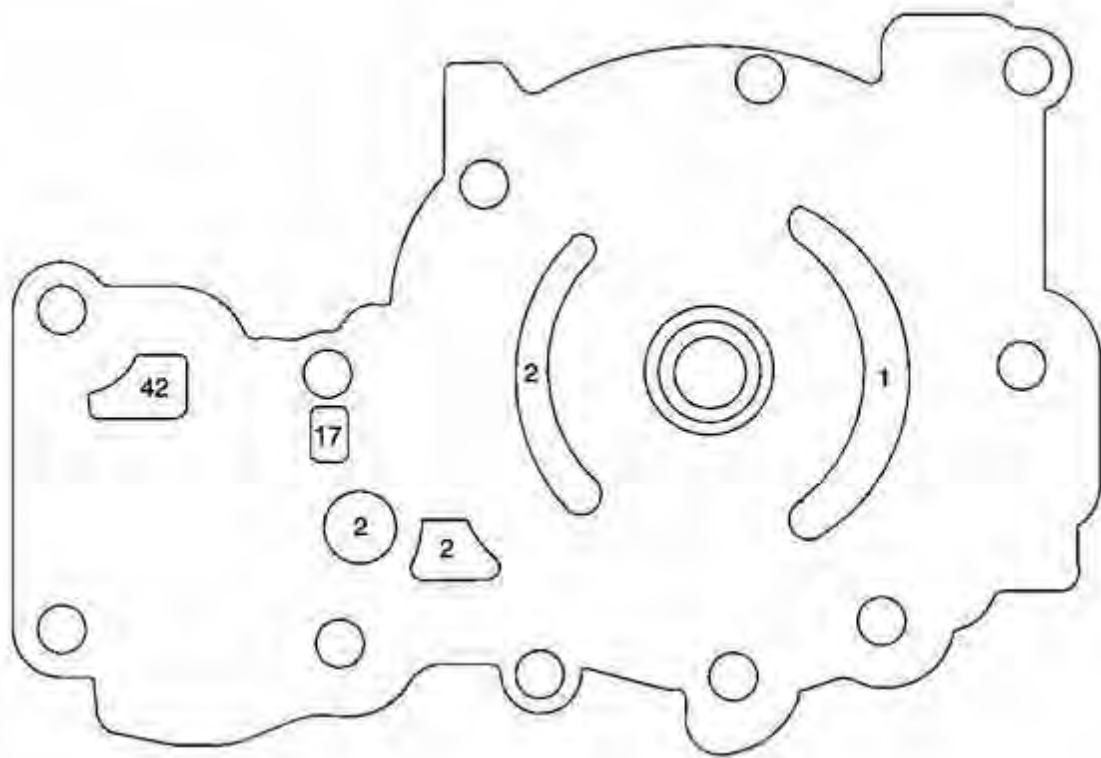


Fig. 446: Oil Pump Body Fluid Passages - Control Valve Body Side
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 446

Callout	Component Name
1	Suction
2	Line
2	Line
2	Line
17	Decrease
42	Exhaust

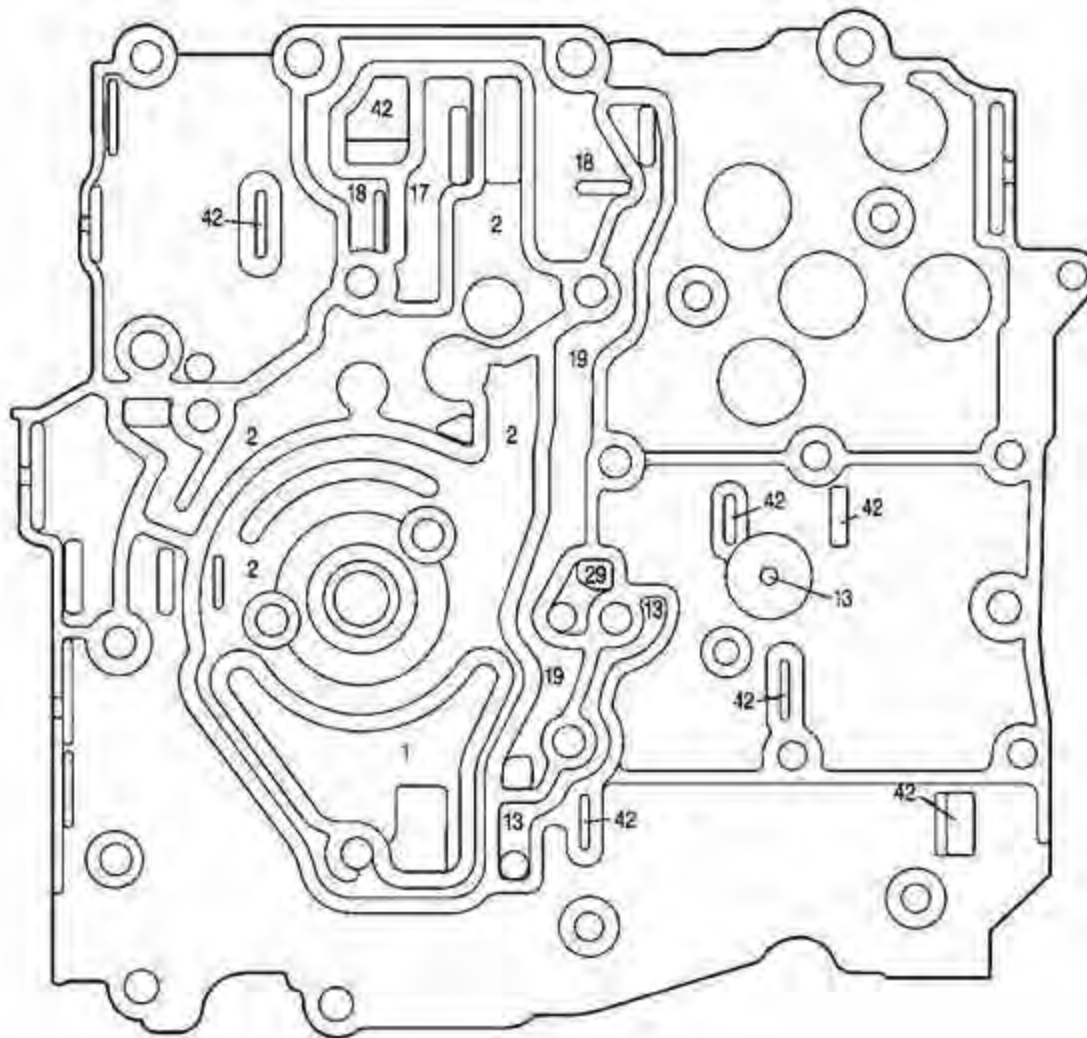


Fig. 447: Control Valve Body Fluid Passages - Oil Pump Body Side - Without Touch Activated Power

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 447

Callout	Component Name
1	Suction
2	Line
2	Line
2	Line
2	Line
13	TCC Release

13	TCC Release
13	TCC Release
17	Decrease
18	D4
18	D4
18	D4
19	Forward Servo
19	Forward Servo
29	3rd
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust

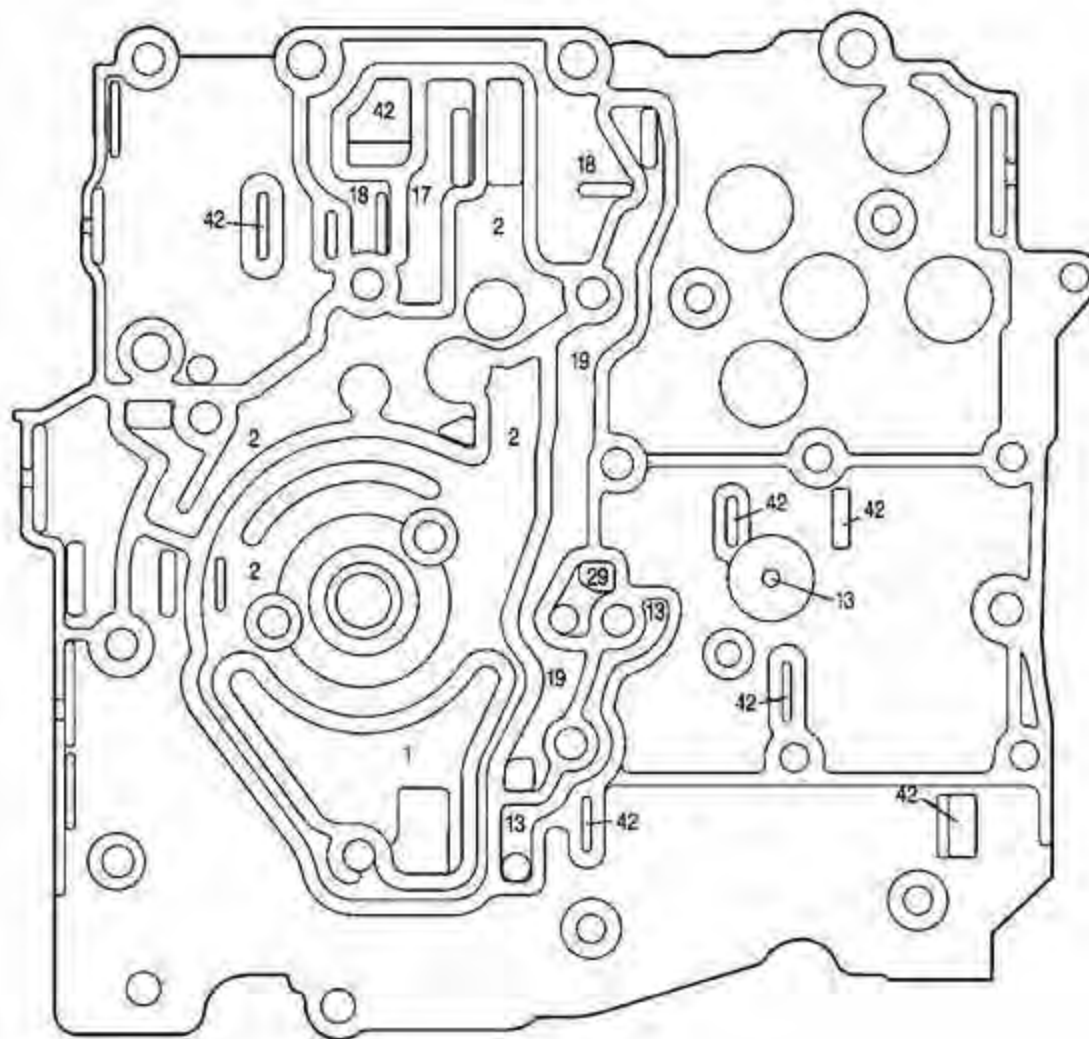


Fig. 448: Control Valve Body Fluid Passages - Oil Pump Body Side - With Touch Activated Power

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 448

Callout	Component Name
1	Suction
2	Line
2	Line
2	Line
2	Line
13	TCC Release

13	TCC Release
13	TCC Release
17	Decrease
18	D4
18	D4
18	D4
19	Forward Servo
19	Forward Servo
29	3rd
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust

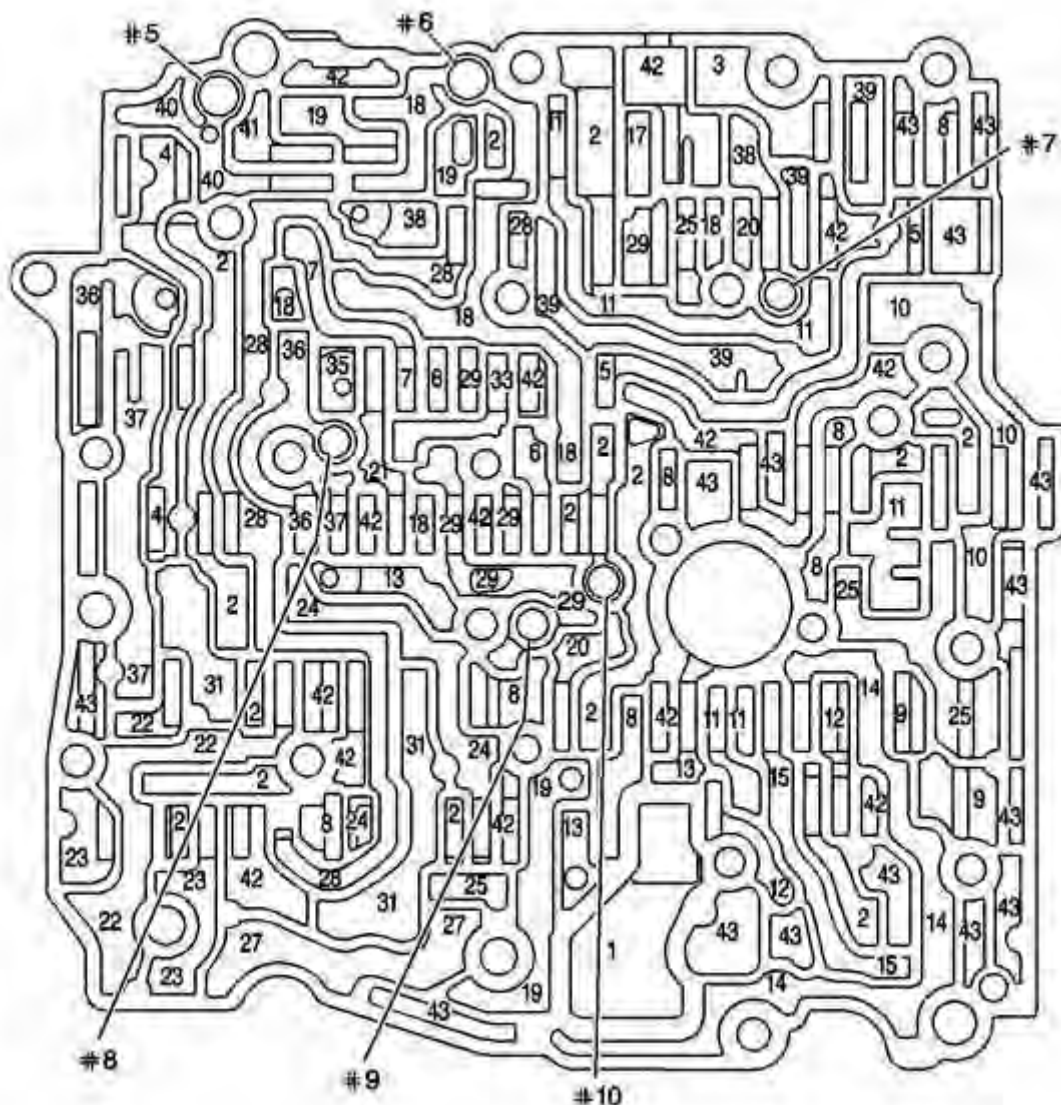


Fig. 449: Control Valve Body Fluid Passages - Case Cover Side - Without Touch Activated Power

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 449

Callout	Component Name
1	Suction
2	Line
2	Line
2	Line

2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
3	PRN
4	2-3 Signal
4	2-3 Signal
5	1-2, 3-4 Signal
5	1-2, 3-4 Signal
6	Input Clutch Feed
6	Input Clutch Feed
7	Input Clutch
7	Input Clutch
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
9	TCC Signal (PWM)
9	TCC Signal (PWM)
10	Actuator Feed
10	Actuator Feed
10	Actuator Feed
11	Converter Feed
11	Converter Feed

	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
12	TCC Regulated Apply
12	TCC Regulated Apply
13	TCC Release
13	TCC Release
13	TCC Release
14	TCC Apply
14	TCC Apply
14	TCC Apply
15	Cooler
15	Cooler
17	Decrease
18	D4
18	D4
18	D4
18	D4
18	D4
18	D4
19	Forward Servo
19	Forward Servo
19	Forward Servo
19	Forward Servo
20	Lo/1st Gear
20	Lo/1st Gear
21	Auxiliary Input Clutch Feed
22	1-2 Accumulator
22	1-2 Accumulator
22	1-2 Accumulator
23	2-3 Accumulator
23	2-3 Accumulator
23	2-3 Accumulator
24	3-4 Accumulator

	3-4 Accumulator
24	3-4 Accumulator
25	2nd
25	2nd
25	2nd
25	2nd
27	2nd Clutch
27	2nd Clutch
28	2-3 Off Signal
28	2-3 Off Signal
28	2-3 Off Signal
28	2-3 Off Signal
28	2-3 Off Signal
29	3rd
29	3rd
29	3rd
29	3rd
29	3rd
29	3rd
31	3rd Clutch
31	3rd Clutch
31	3rd Clutch
33	4th Clutch
35	D3
36	D2
36	D2
36	D2
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37	Manual 2-1 Servo
38	Lo
38	Lo
39	Lo-1st
39	Lo-1st
39	Lo-1st

	Ball Check Valve
#8	Ball Check Valve
#9	Ball Check Valve
#10	Ball Check Valve

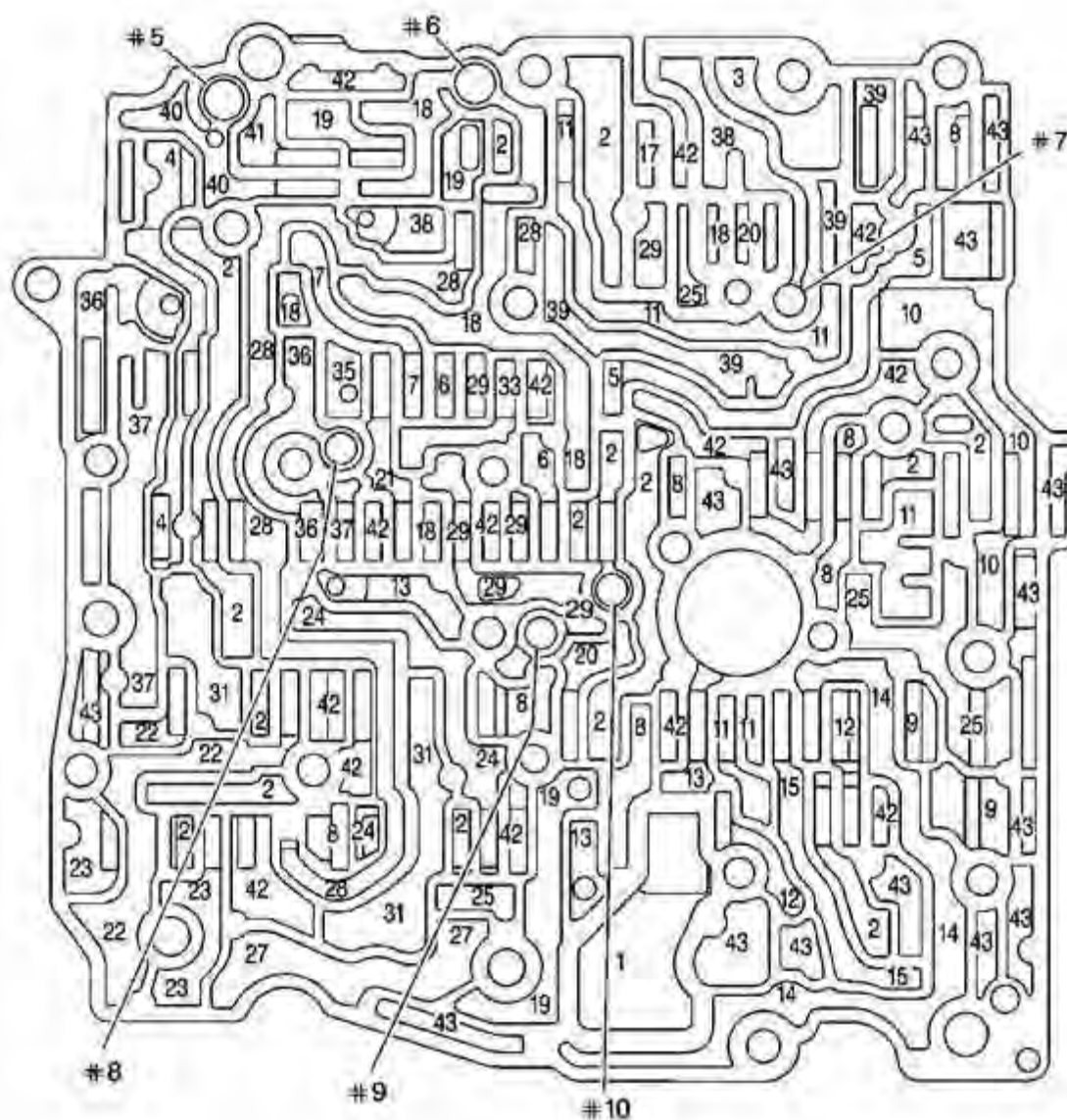


Fig. 450: Control Valve Body Fluid Passages - Case Cover Side - With Touch Activated Power

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 450

--	--

	Actuator Feed
10	Actuator Feed
10	Actuator Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
12	TCC Regulated Apply
12	TCC Regulated Apply
13	TCC Release
13	TCC Release
13	TCC Release
14	TCC Apply
14	TCC Apply
14	TCC Apply
15	Cooler
15	Cooler
17	Decrease
18	D4
18	D4
18	D4
18	D4
18	D4
18	D4
19	Forward Servo
19	Forward Servo
19	Forward Servo
19	Forward Servo
20	Lo/1st Gear
20	Lo/1st Gear
21	Auxiliary Input Clutch Feed
22	1-2 Accumulator
22	1-2 Accumulator

	1-2 Accumulator
23	2-3 Accumulator
23	2-3 Accumulator
23	2-3 Accumulator
24	3-4 Accumulator
24	3-4 Accumulator
24	3-4 Accumulator
25	2nd
25	2nd
25	2nd
25	2nd
27	2nd Clutch
27	2nd Clutch
28	2-3 Off Signal
28	2-3 Off Signal
28	2-3 Off Signal
28	2-3 Off Signal
28	2-3 Off Signal
29	3rd
29	3rd
29	3rd
29	3rd
29	3rd
29	3rd
31	3rd Clutch
31	3rd Clutch
31	3rd Clutch
33	4th Clutch
35	D3
36	D2
36	D2
36	D2
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37	Manual 2-1 Servo

	Casting Void
43	Casting Void
43	Casting Void
#5	Ball Check Valve
#6	Ball Check Valve
#7	Ball Check Valve
#8	Ball Check Valve
#9	Ball Check Valve
#10	Ball Check Valve

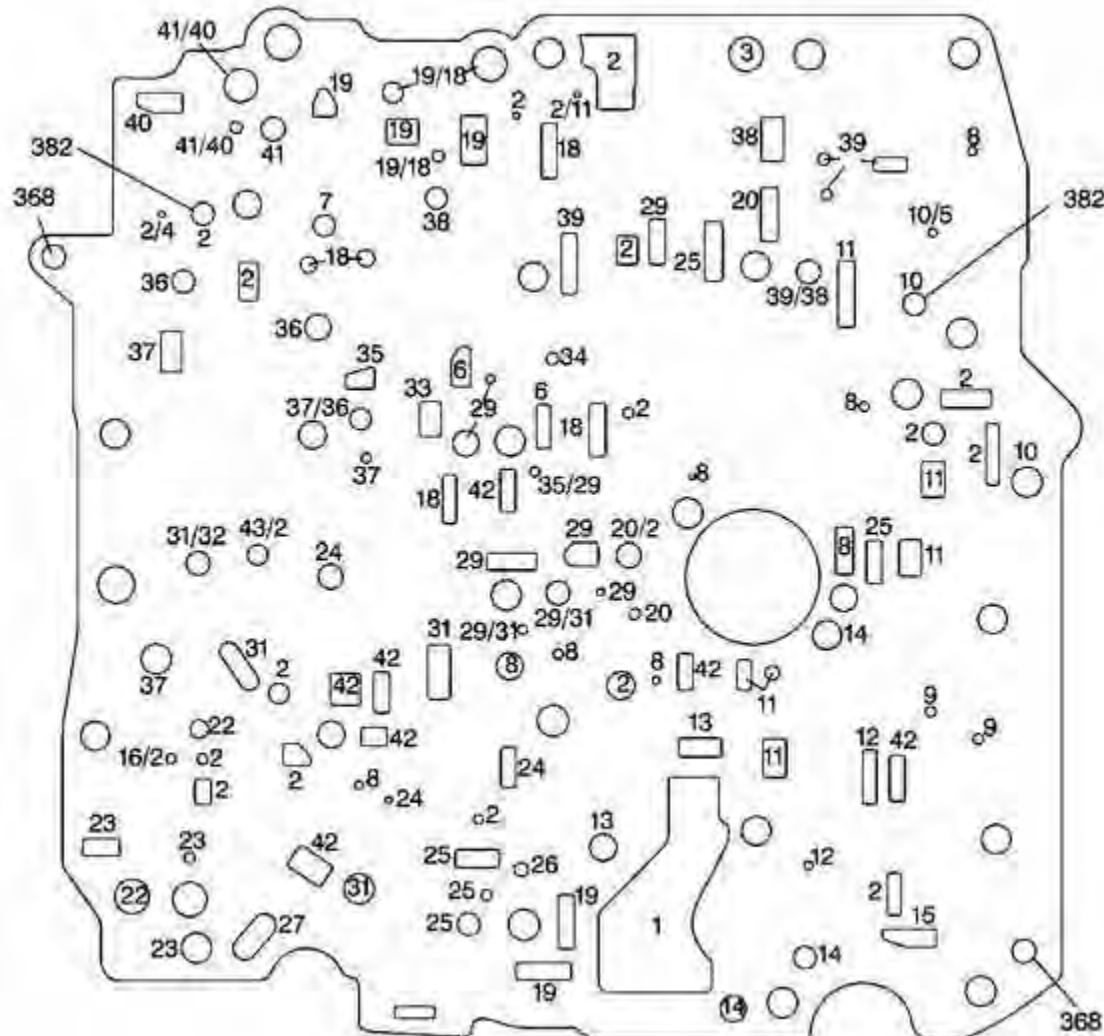


Fig. 451: Spacer Plate Fluid Passages - Without Touch Activated Power
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 451

Callout	Component Name
1	Suction
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2/4	Line/2-3 Signal
2/11	Line/Converter Feed
3	PRN
6	Input Clutch Feed
6	Input Clutch Feed
7	Input Clutch
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
9	TCC Signal (PWM)
9	TCC Signal (PWM)

10	Actuator Feed
10	Actuator Feed
10/5	Actuator Feed/1-2, 3-4 Signal
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
12	TCC Regulated Apply
12	TCC Regulated Apply
13	TCC Release
13	TCC Release
14	TCC Apply
14	TCC Apply
14	TCC Apply
15	Cooler
16/2	Lube/Line
18	D4
18	D4
18	D4
18	D4
19	Forward Servo
19	Forward Servo
19	Forward Servo
19	Forward Servo
19	Forward Servo
19/18	Forward Servo/D4
19/18	Forward Servo/D4
20	Lo/1st Gear
20	Lo/1st Gear
20/2	Lo/1st Gear/Line
22	1-2 Accumulator
22	1-2 Accumulator
23	2-3 Accumulator
23	2-3 Accumulator

	2-3 Accumulator
24	3-4 Accumulator
24	3-4 Accumulator
24	3-4 Accumulator
25	2nd
25	2nd
25	2nd
25	2nd
25	2nd
26	2nd Exhaust
27	2nd Clutch
29	3rd
29	3rd
29	3rd
29	3rd
29	3rd
29/31	3rd/3rd Clutch
29/31	3rd/3rd Clutch
31	3rd Clutch
31	3rd Clutch
31	3rd Clutch
31/32	3rd Clutch/3rd Clutch/Lo-1st
33	4th Clutch
34	4th Clutch Exhaust
35	D3
35/29	D3/3rd
36	D2
36	D2
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37/36	Manual 2-1 Servo/D2
38	Lo
38	Lo
39	Lo-1st

	Lo-1st
39/38	Lo-1st/Lo
40	Reverse
41	Reverse Servo
41/40	Reverse Servo/Reverse
41/40	Reverse Servo/Reverse
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
43/2	Casting Void/Line
368	Spacer Plate and Gaskets/Control Valve Body Bolt Hole
368	Spacer Plate and Gaskets/Control Valve Body Bolt Hole
382	TCC Solenoid Valve Screen/Seal Assembly
382	TCC Solenoid Valve Screen/Seal Assembly

[illegible]

2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2/4	Line/2-3 Signal
2/11	Line/Converter Feed
3	PRN
6	Input Clutch Feed
6	Input Clutch Feed
7	Input Clutch
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
9	TCC Signal (PWM)
9	TCC Signal (PWM)
10	Actuator Feed
10	Actuator Feed
10/5	Actuator Feed/1-2, 3-4 Signal
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
12	TCC Regulated Apply

	TCC Regulated Apply
13	TCC Release
13	TCC Release
14	TCC Apply
14	TCC Apply
14	TCC Apply
15	Cooler
16/2	Lube/Line
18	D4
18	D4
18	D4
18	D4
19	Forward Servo
19	Forward Servo
19	Forward Servo
19	Forward Servo
19	Forward Servo
19/18	Forward Servo/D4
19/18	Forward Servo/D4
20	Lo/1st Gear
20	Lo/1st Gear
20/2	Lo/1st Gear/Line
22	1-2 Accumulator
22	1-2 Accumulator
23	2-3 Accumulator
23	2-3 Accumulator
23	2-3 Accumulator
24	3-4 Accumulator
24	3-4 Accumulator
24	3-4 Accumulator
25	2nd
25	2nd
25	2nd
25	2nd
25	2nd

	2nd Exhaust
27	2nd Clutch
29	3rd
29	3rd
29	3rd
29	3rd
29	3rd
29/31	3rd/3rd Clutch
29/31	3rd/3rd Clutch
31	3rd Clutch
31	3rd Clutch
31	3rd Clutch
31/32	3rd Clutch/3rd Clutch/Lo-1st
33	4th Clutch
34	4th Clutch Exhaust
35	D3
35/29	D3/3rd
36	D2
36	D2
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37/36	Manual 2-1 Servo/D2
38	Lo
38	Lo
39	Lo-1st
39	Lo-1st
39/38	Lo-1st/Lo
40	Reverse
41	Reverse Servo
41/40	Reverse Servo/Reverse
41/40	Reverse Servo/Reverse
42	Exhaust
42	Exhaust
42	Exhaust

	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
43/2	Casting Void/Line
368	Spacer Plate and Gaskets/Control Valve Body Bolt Hole
368	Spacer Plate and Gaskets/Control Valve Body Bolt Hole
382	TCC Solenoid Valve Screen/Seal Assembly
382	TCC Solenoid Valve Screen/Seal Assembly

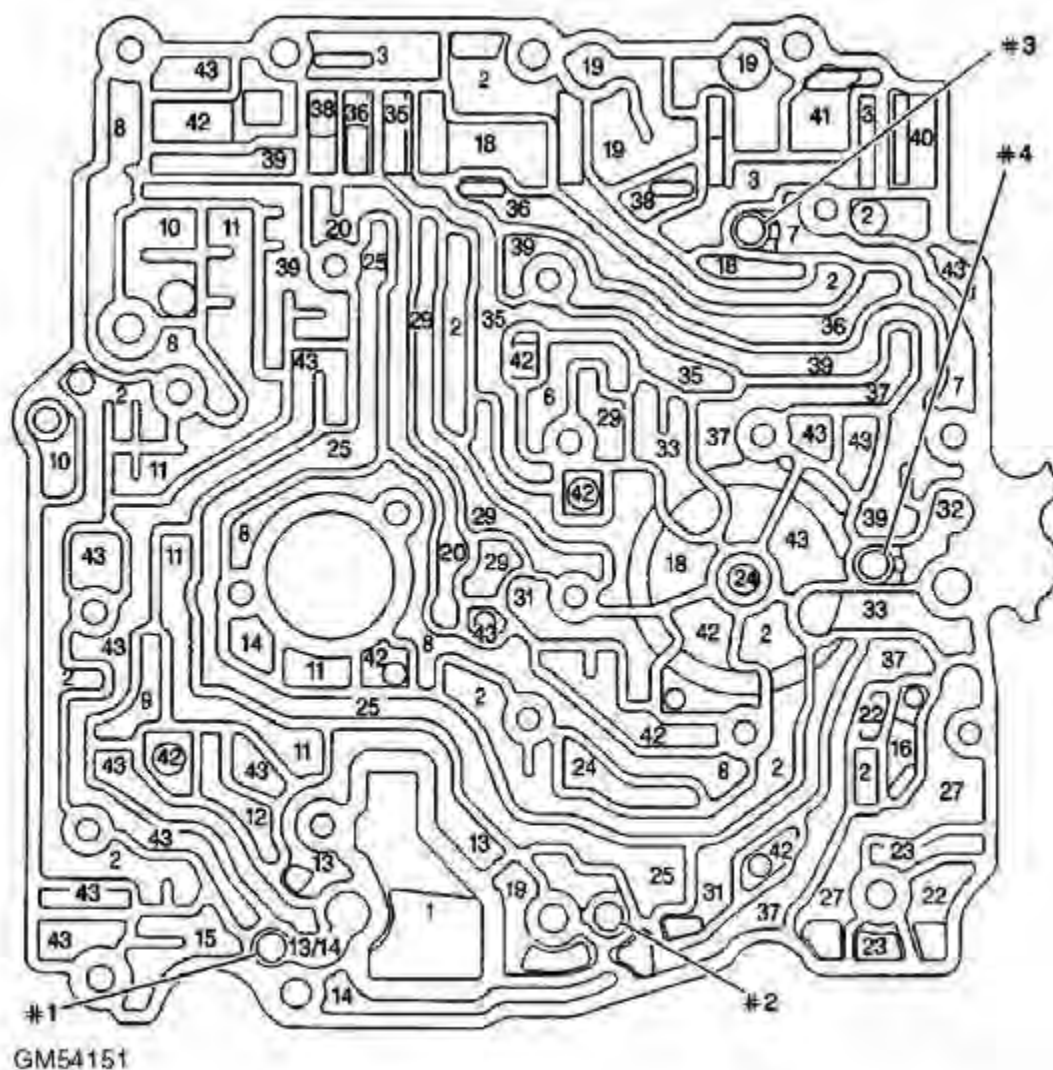


Fig. 453: Case Cover Fluid Passages - Control Valve Body Side - Without Touch Activated Power

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 453

Callout	Component Name
1	Suction
2	Line
2	Line

2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
3	PRN
3	PRN
3	PRN
6	Input Clutch Feed
7	Input Clutch
7	Input Clutch
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
9	TCC Signal (PWM)
10	Actuator Feed
10	Actuator Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
12	TCC Regulated Apply
13	TCC Release
13	TCC Release
13/14	TCC Release/TCC Apply
14	TCC Apply
14	TCC Apply
15	Cooler

	Lube
18	D4
18	D4
18	D4
19	Forward Servo
19	Forward Servo
19	Forward Servo
19	Forward Servo
20	Lo/1st Gear
20	Lo/1st Gear
22	1-2 Accumulator
22	1-2 Accumulator
23	2-3 Accumulator
23	2-3 Accumulator
24	3-4 Accumulator
24	3-4 Accumulator
25	2nd
25	2nd
25	2nd
25	2nd
27	2nd Clutch
27	2nd Clutch
29	3rd
29	3rd
29	3rd
29	3rd
31	3rd Clutch
31	3rd Clutch
32	3rd Clutch/Lo-1st
33	4th Clutch
33	4th Clutch
35	D3
35	D3
35	D3
36	D2

	D2
36	D2
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37	Manual 2-1 Servo
38	Lo
38	Lo
39	Lo-1st
39	Lo-1st
39	Lo-1st
39	Lo-1st
39	Lo-1st
40	Reverse
41	Reverse Servo
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void

	Casting Void
43	Casting Void
#1	Ball Check Valve
#2	Ball Check Valve
#3	Ball Check Valve
#4	Ball Check Valve

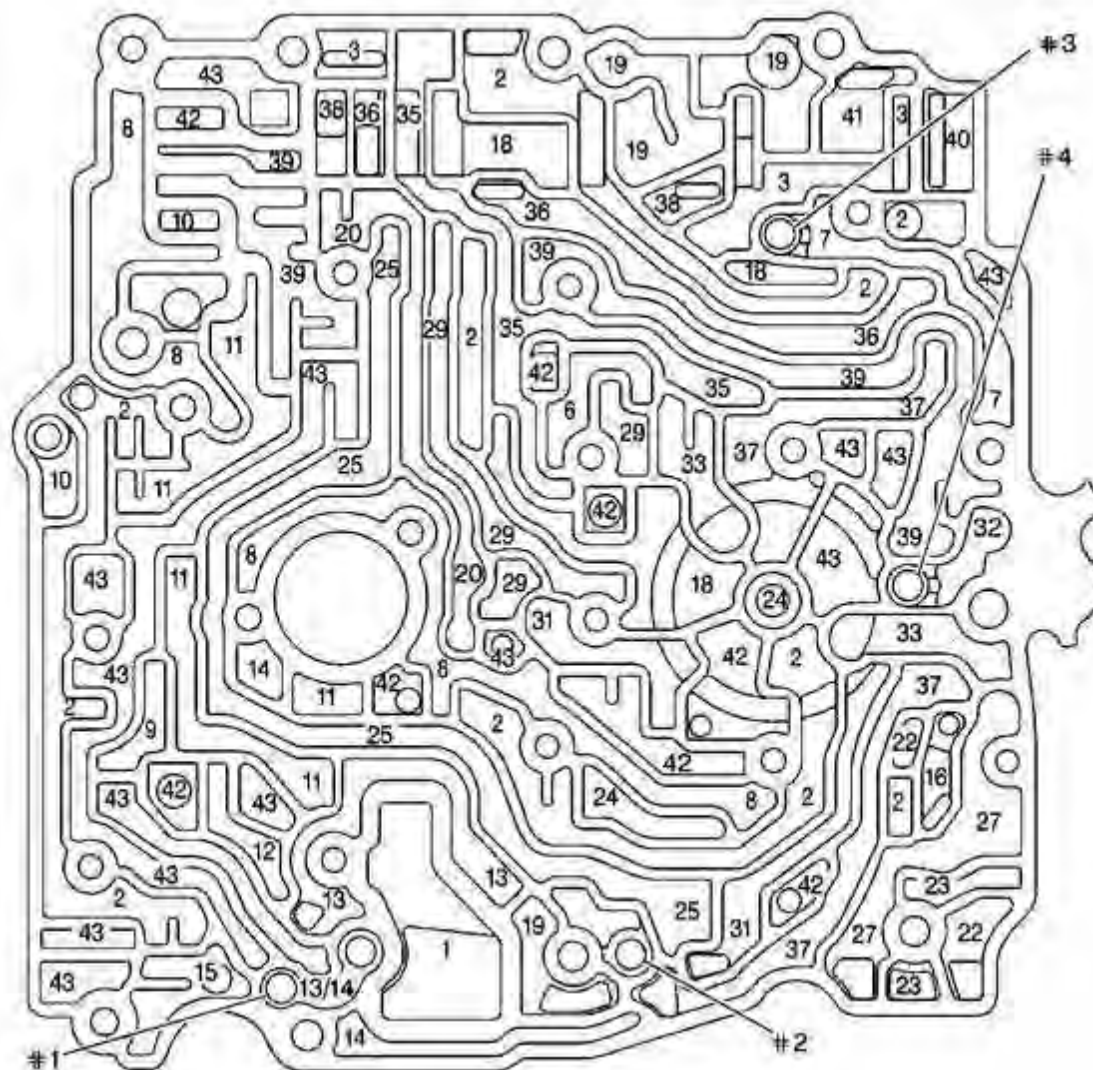


Fig. 454: Case Cover Fluid Passages - Control Valve Body Side - With Touch Activated Power

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 454

Callout	Component Name
1	Suction
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
2	Line
3	PRN
3	PRN
3	PRN
6	Input Clutch Feed
7	Input Clutch
7	Input Clutch
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
8	Torque Signal
9	TCC Signal (PWM)
10	Actuator Feed
10	Actuator Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
11	Converter Feed
12	TCC Regulated Apply
13	TCC Release
13	TCC Release

	TCC Release/TCC Apply
14	TCC Apply
14	TCC Apply
15	Cooler
16	Lube
18	D4
18	D4
18	D4
19	Forward Servo
19	Forward Servo
19	Forward Servo
19	Forward Servo
20	Lo/1st Gear
20	Lo/1st Gear
22	1-2 Accumulator
22	1-2 Accumulator
23	2-3 Accumulator
23	2-3 Accumulator
24	3-4 Accumulator
24	3-4 Accumulator
25	2nd
25	2nd
25	2nd
25	2nd
27	2nd Clutch
27	2nd Clutch
29	3rd
29	3rd
29	3rd
29	3rd
31	3rd Clutch
31	3rd Clutch
32	3rd Clutch/Lo-1st
33	4th Clutch
33	4th Clutch

	D3
35	D3
35	D3
36	D2
36	D2
36	D2
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37	Manual 2-1 Servo
38	Lo
38	Lo
39	Lo-1st
39	Lo-1st
39	Lo-1st
39	Lo-1st
39	Lo-1st
40	Reverse
41	Reverse Servo
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void

	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
43	Casting Void
#1	Ball Check Valve
#2	Ball Check Valve
#3	Ball Check Valve
#4	Ball Check Valve

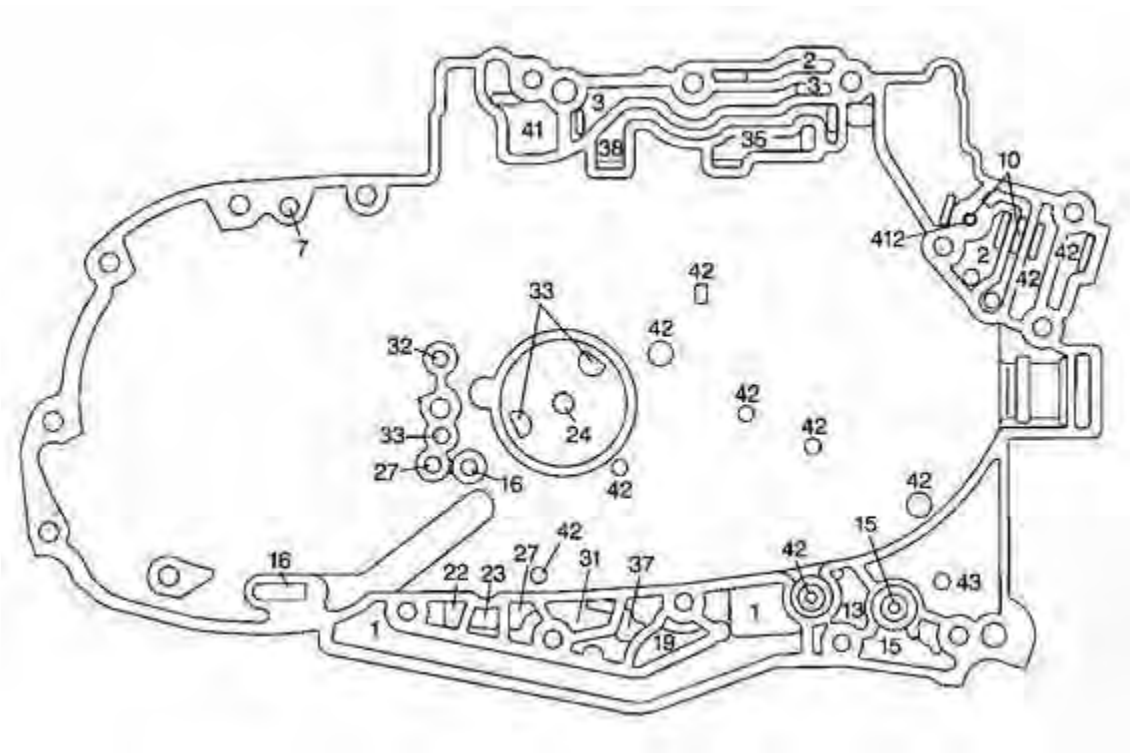


Fig. 455: Case Cover Fluid Passages - Case Side - Without Touch Activated Power
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 455

Callout	Component Name
1	Suction
1	Suction
2	Line
2	Line

3	PRN
3	PRN
7	Input Clutch
10	Actuator Feed
13	TCC Release
15	Cooler
15	Cooler
16	Lube
16	Lube
19	Forward Servo
22	1-2 Accumulator
23	2-3 Accumulator
24	3-4 Accumulator
27	2nd Clutch
27	2nd Clutch
31	3rd Clutch
32	3rd Clutch/Lo-1st
33	4th Clutch
33	4th Clutch
35	D3
37	Manual 2-1 Servo
38	Lo
41	Reverse Servo
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
43	Casting Void
412	Orificed Cup Plug

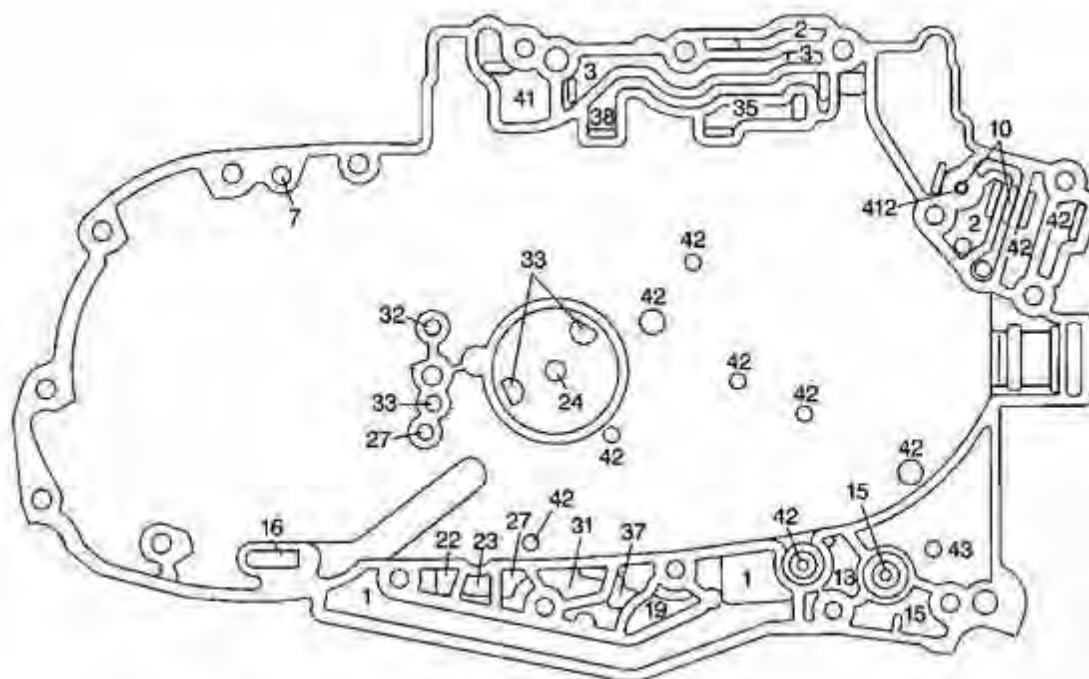


Fig. 456: Case Cover Fluid Passages - Case Side - With Touch Activated Power
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 456

Callout	Component Name
1	Suction
1	Suction
2	Line
2	Line
3	PRN
3	PRN
7	Input Clutch
10	Actuator Feed
13	TCC Release
15	Cooler
15	Cooler
16	Lube
16	Lube
19	Forward Servo
22	1-2 Accumulator

23	2-3 Accumulator
24	3-4 Accumulator
27	2nd Clutch
27	2nd Clutch
31	3rd Clutch
32	3rd Clutch/Lo-1st
33	4th Clutch
33	4th Clutch
35	D3
37	Manual 2-1 Servo
38	Lo
41	Reverse Servo
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
42	Exhaust
43	Casting Void
412	Orificed Cup Plug

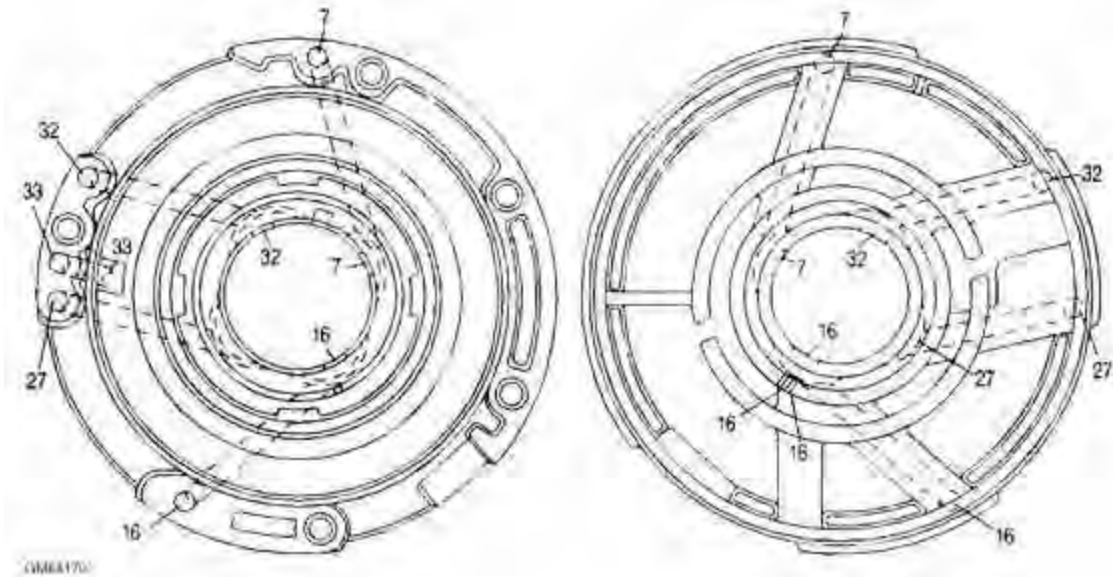


Fig. 457: Driven Sprocket Support Fluid Passages
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 457

Callout	Component Name
7	Input Clutch
7	Input Clutch
7	Input Clutch
7	Input Clutch
16	Lube
16	Lube
16	Lube
16	Lube
16	Lube
16	Lube
27	2nd Clutch
27	2nd Clutch
27	2nd Clutch
32	3rd Clutch/Lo-1st
32	3rd Clutch/Lo-1st
32	3rd Clutch/Lo-1st
32	3rd Clutch/Lo-1st

33	4th Clutch
33	4th Clutch

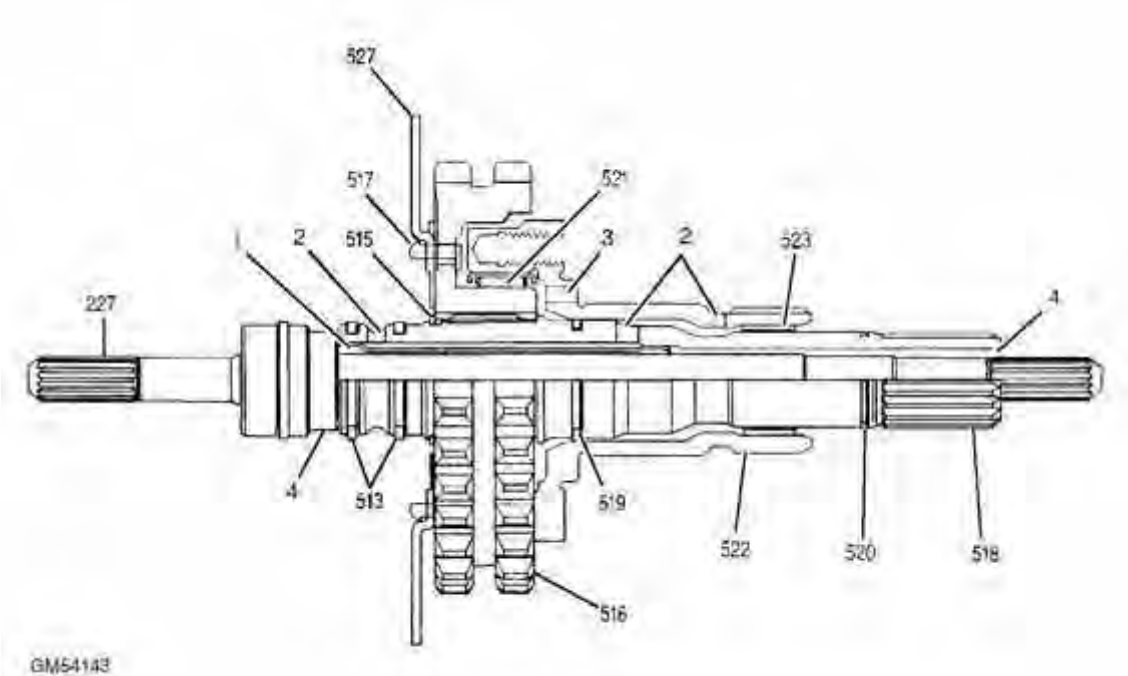


Fig. 458: Oil Pump Drive Shaft and Drive Sprocket Support Fluid Passages
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 458

Callout	Component Name
1	Steel Sleeve
2	TCC Apply Passage
2	TCC Apply Passage
3	Converter Seal Drainback Passage
4	TCC Release Passage
4	TCC Release Passage
227	Oil Pump Drive Shaft Assembly
513	Turbine Shaft Oil Seal Ring
515	Drive Sprocket Retaining Ring
516	Drive Sprocket
517	Drive Sprocket Thrust Washer
518	Turbine Shaft

519	Turbine Shaft Oil Seal Ring
520	Turbine Shaft O-Ring Seal
521	Drive Sprocket Bearing Assembly
522	Drive Sprocket Support
523	Drive Sprocket Support Bushing
527	Vehicle Speed Sensor Reluctor Wheel Assembly

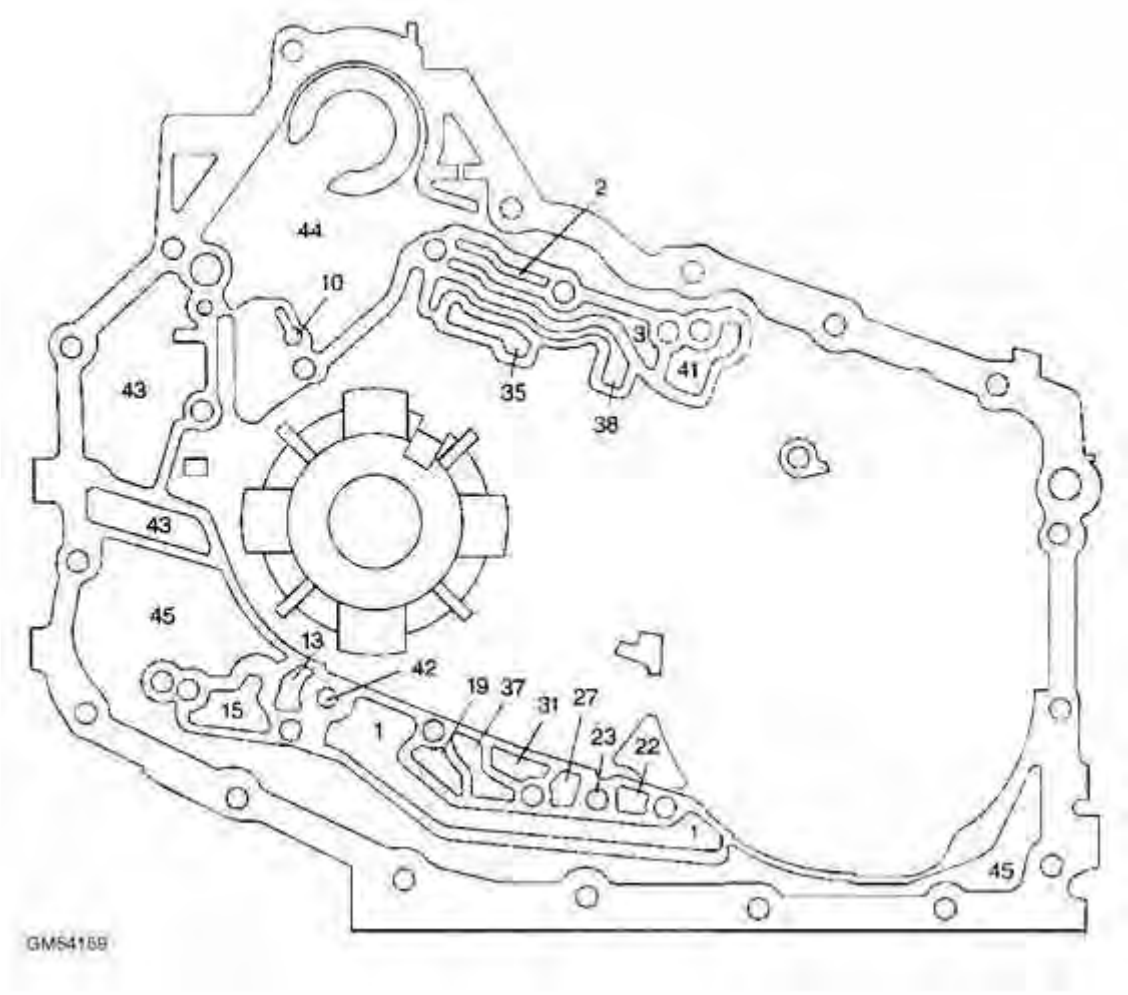


Fig. 459: Case Fluid Passages (Case Cover Side)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 459

Callout	Component Name
1	Suction
1	Suction

2	Line
3	PRN
10	Actuator Feed
13	TCC Release
15	Cooler
19	Forward Servo
22	1-2 Accumulator
23	2-3 Accumulator
27	2nd Clutch
31	3rd Clutch
35	D3
37	Manual 2-1 Servo
38	Lo
41	Reverse Servo
42	Exhaust
43	Casting Void
43	Casting Void
44	Vent
45	Thermo Element Exhaust
45	Thermo Element Exhaust

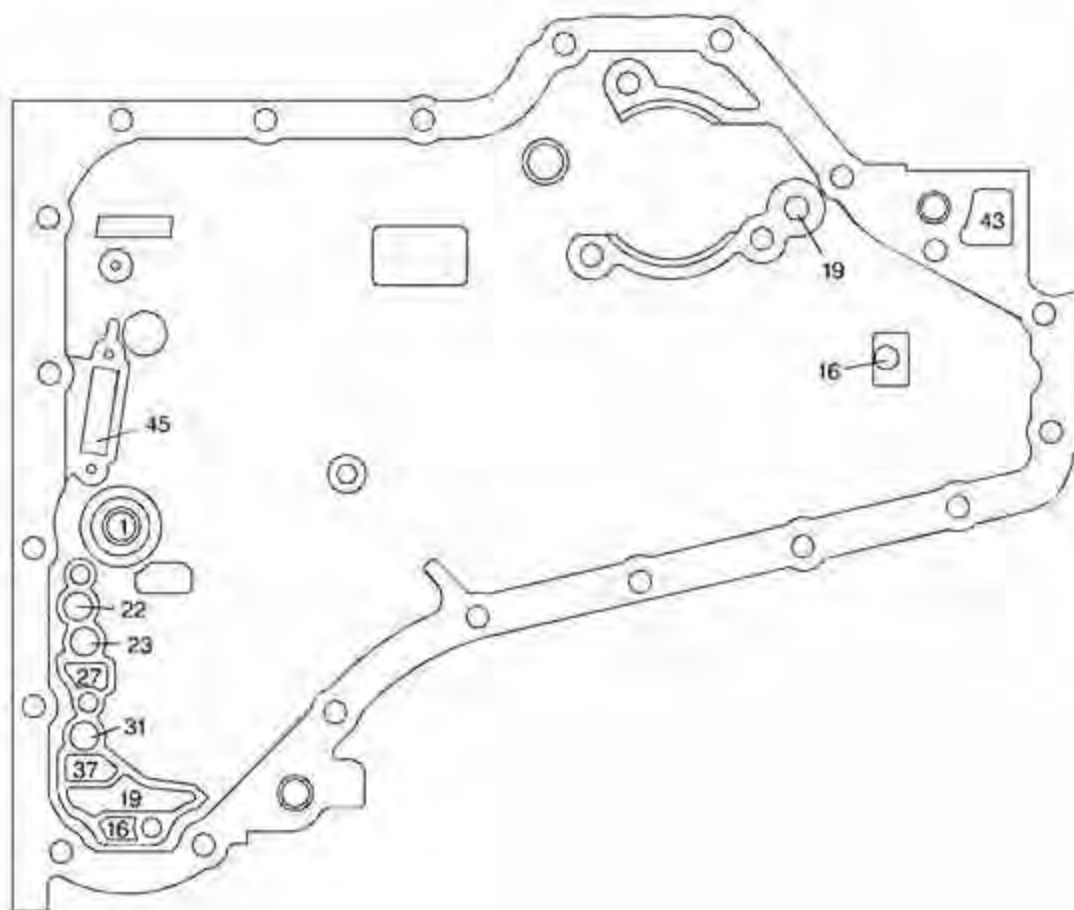


Fig. 460: Case Fluid Passages (Bottom)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 460

Callout	Component Name
1	Suction
16	Lube
16	Lube
19	Forward Servo
19	Forward Servo
22	1-2 Accumulator
23	2-3 Accumulator
27	2nd Clutch
31	3rd Clutch

37	Manual 2-1 Servo
43	Casting Void
45	Thermo Element Exhaust

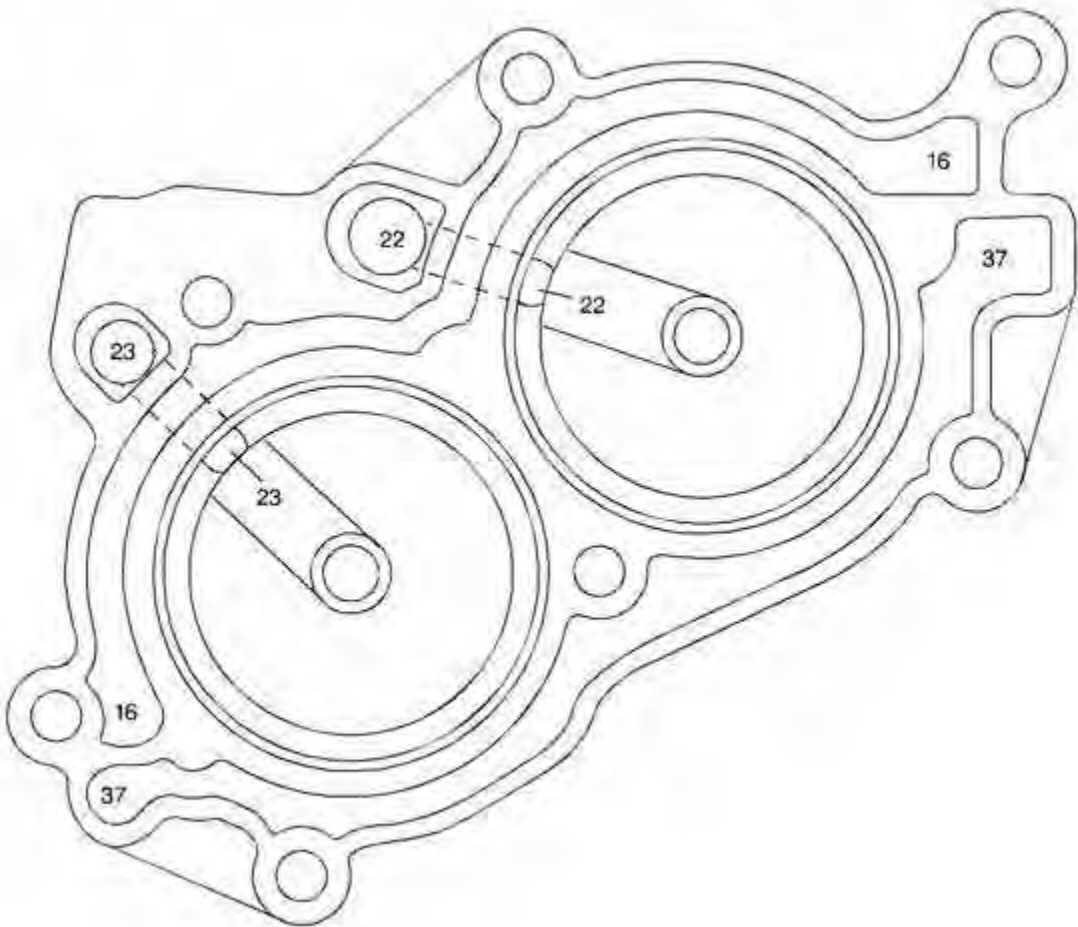


Fig. 461: 1-2 and 2-3 Accumulator Housing Fluid Passages
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 461

Callout	Component Name
16	Lube
16	Lube
22	1-2 Accumulator
22	1-2 Accumulator
23	2-3 Accumulator

23	2-3 Accumulator
37	Manual 2-1 Servo
37	Manual 2-1 Servo

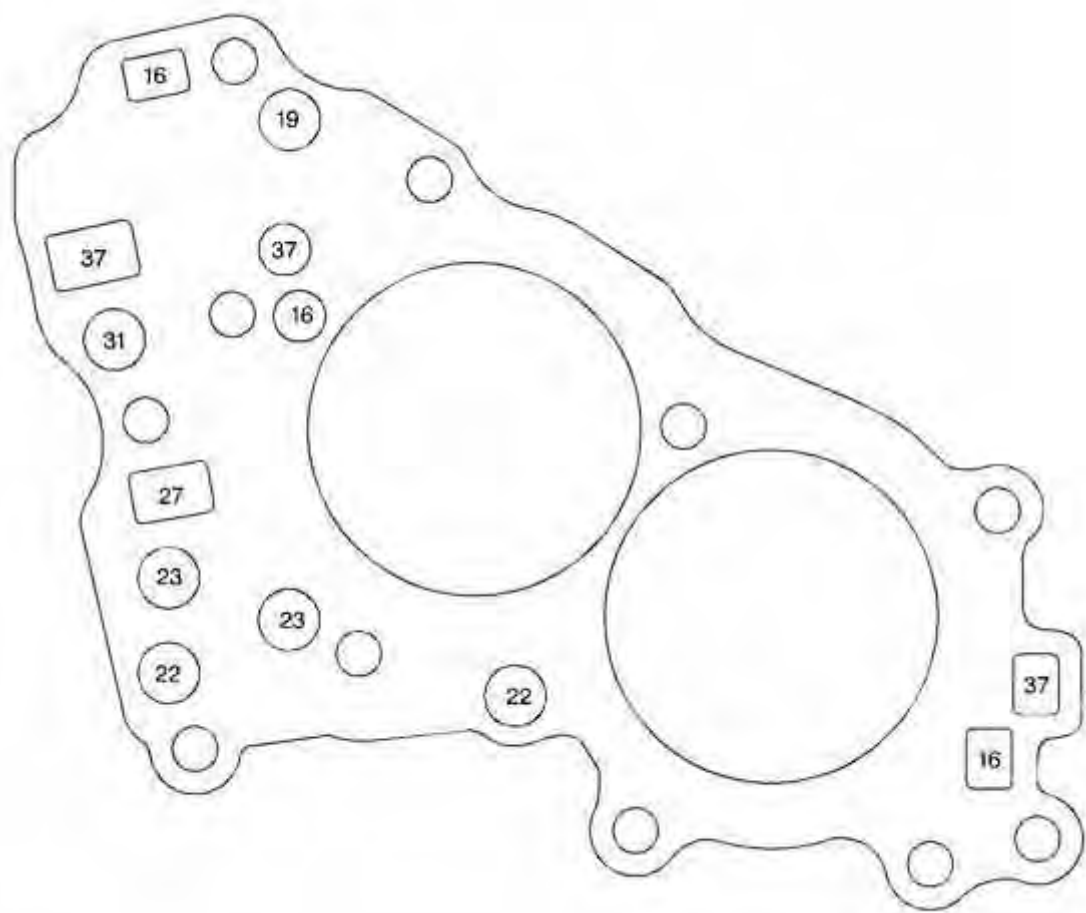


Fig. 462: Accumulator Cover Spacer Plate Fluid Passages
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 462

Callout	Component Name
16	Lube
16	Lube
16	Lube
19	Forward Servo
22	1-2 Accumulator

22	1-2 Accumulator
23	2-3 Accumulator
23	2-3 Accumulator
27	2nd Clutch
31	3rd Clutch
37	Manual 2-1 Servo
37	Manual 2-1 Servo
37	Manual 2-1 Servo

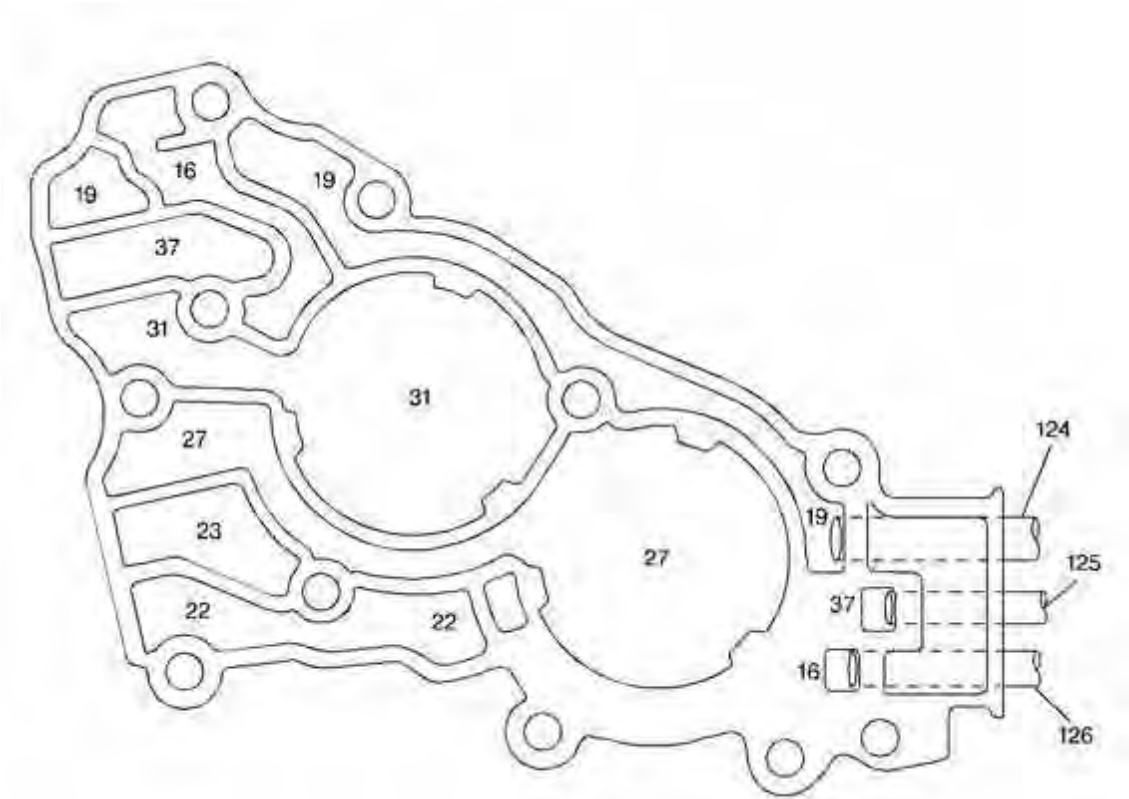


Fig. 463: Accumulator Cover Fluid Passages
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 463

Callout	Component Name
16	Lube
16	Lube
19	Forward Servo
19	Forward Servo

19	Forward Servo
22	1-2 Accumulator
22	1-2 Accumulator
23	2-3 Accumulator
27	2nd Clutch
27	2nd Clutch
31	3rd Clutch
31	3rd Clutch
37	Manual 2-1 Servo
37	Manual 2-1 Servo
124	Forward Band Servo Oil Pipe
125	Manual 2-1 Band Servo Oil Pipe
126	Lube Oil Pipe

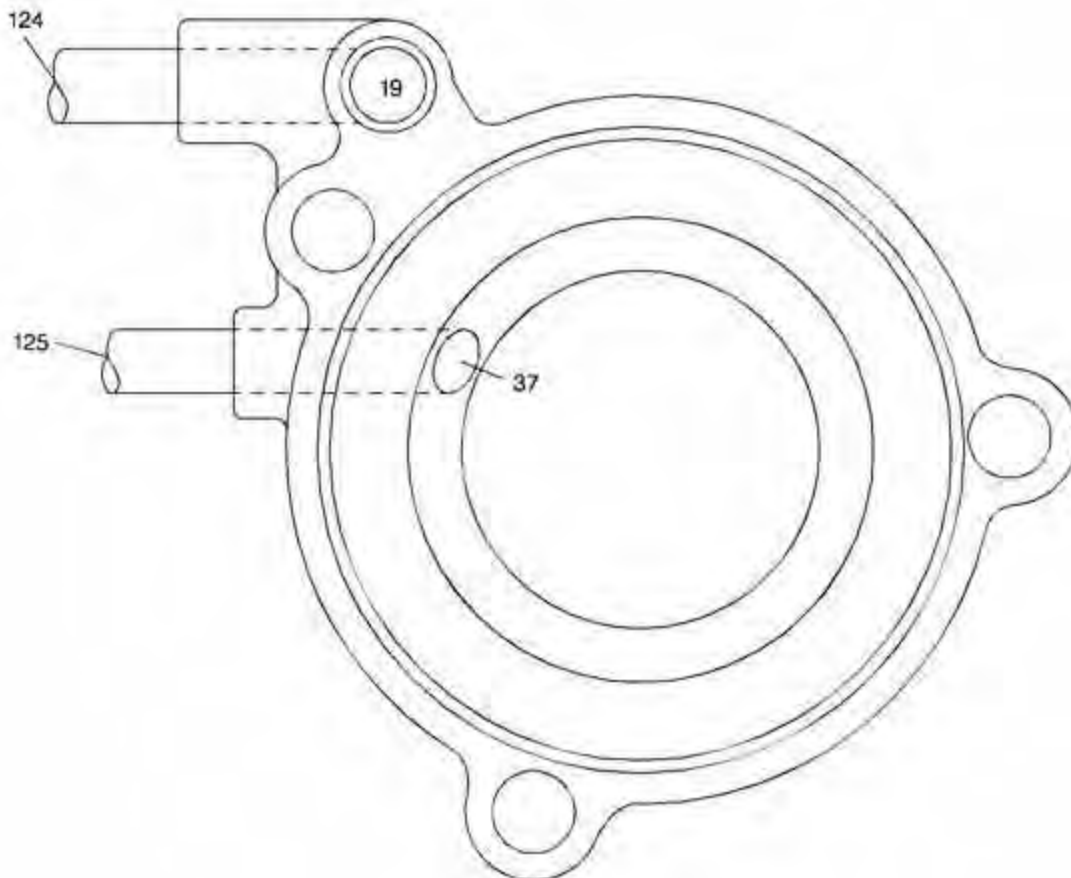


Fig. 464: Manual 2-1 Band Servo Cover Fluid Passages
Courtesy of GENERAL MOTORS CORP.

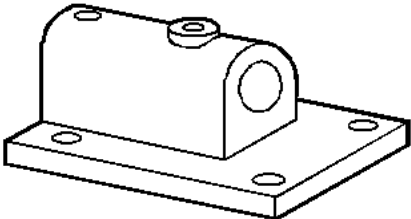
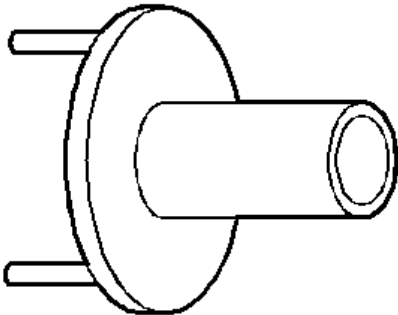
Callouts For Fig. 464

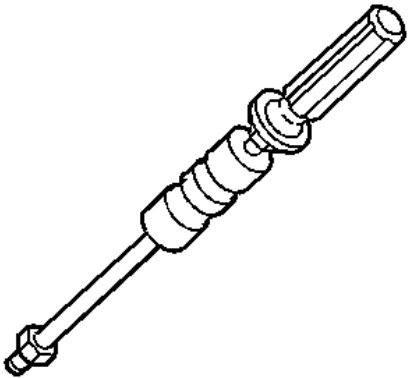
Callout	Component Name
19	Forward Servo
37	Manual 2-1 Servo
124	Forward Band Servo Oil Pipe
125	Manual 2-1 Band Servo Oil Pipe

SPECIAL TOOLS AND EQUIPMENT

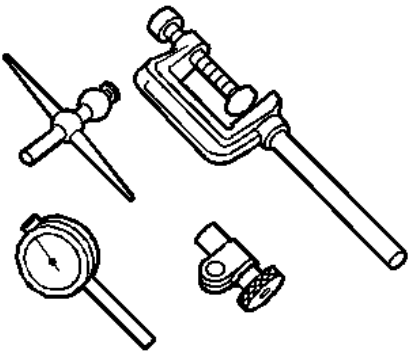
SPECIAL TOOLS

Special Tools

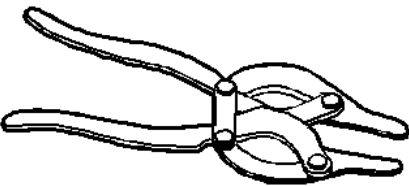
Illustration	Tool Number/Description
	J 3289-20 Holding Fixture Base Assembly
	J 4670-01 4th Clutch Spring Compressor



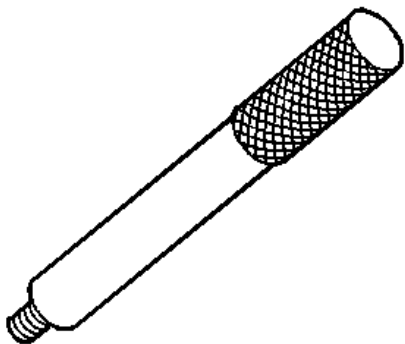
J 6125-1B
Slide Hammer



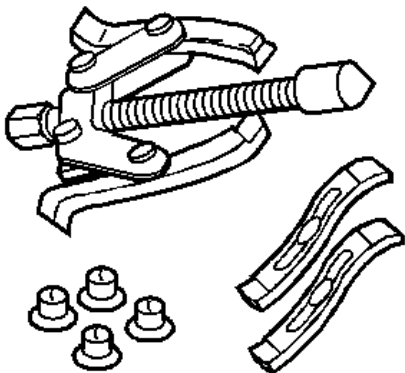
J 8001
Dial Indicator Set



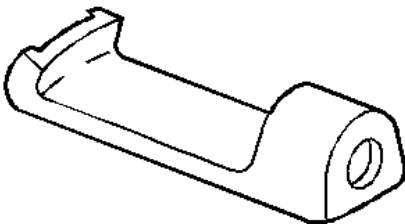
J 8059
Snap Ring Plier



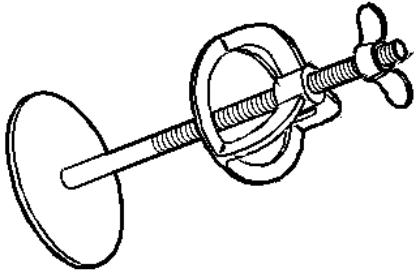
J 8092
Universal Driver Handle



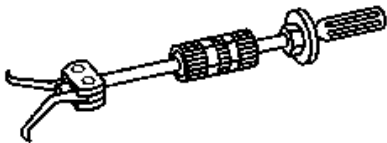
J 22888-D
Universal Bearing Puller



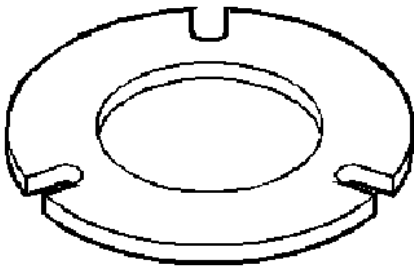
J 23129
Universal Seal Remover - use with J 6125-1B



J 23327
Clutch Spring Compressor

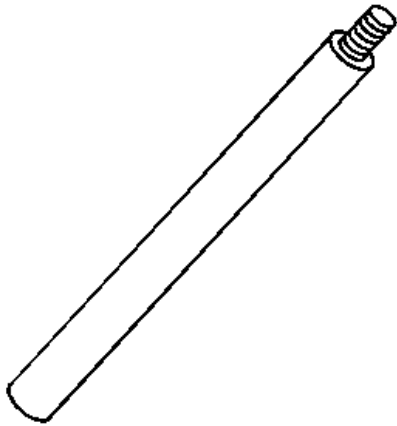


J 23907
Slide Hammer with Bearing Adapter



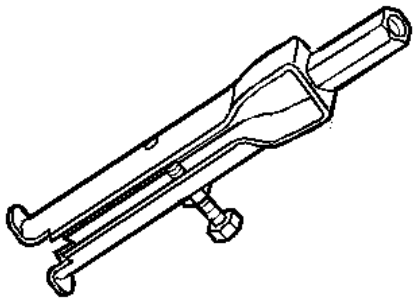
J 25018-A
Clutch Spring Compressor Adapter

J 25025-8
Dial Indicator Mounting Post

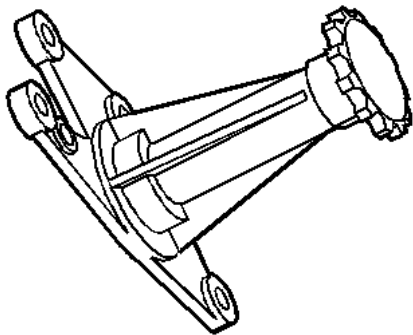


J 26900-13
Magnetic Indicator Base

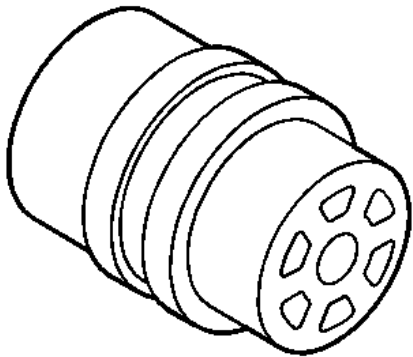




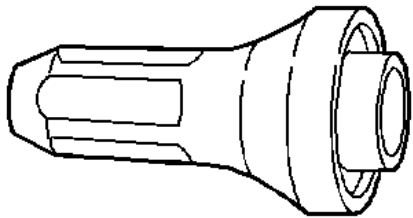
J 26941
Bushings/Bearing Remover



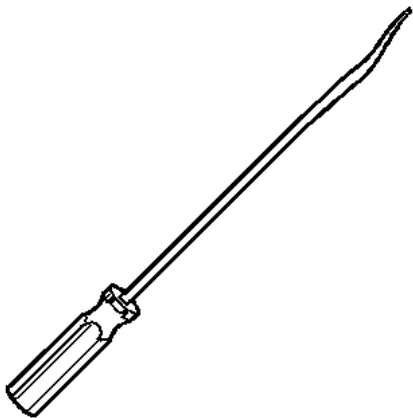
J 26958
Output Shaft Loading and Aligning Tool



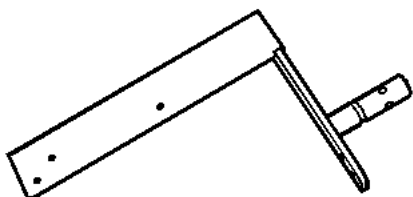
J 26958-10B
Adapter Plug



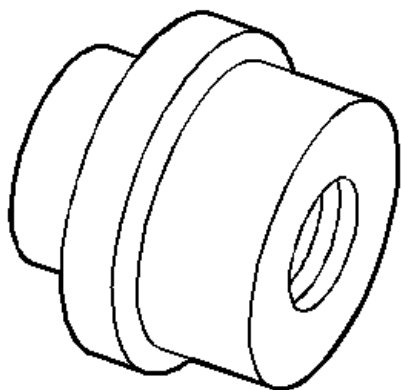
J 28540-A
Torque Converter Seal Installer



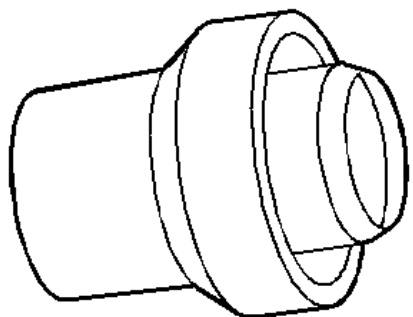
J 28585
Snap Ring Remover



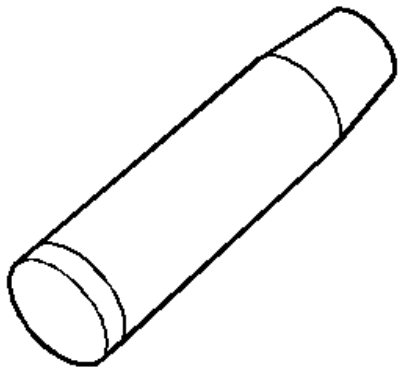
J 28664-B
Transmission Holding Fixture



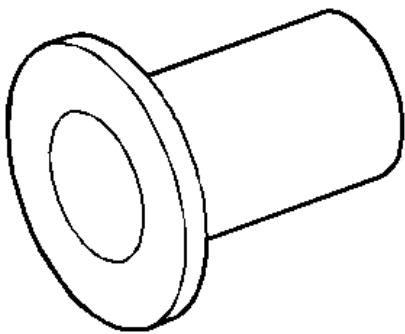
J 28677
Drive Sprocket Support Bearing Installer



J 29130
Axle Shaft Seal Installer

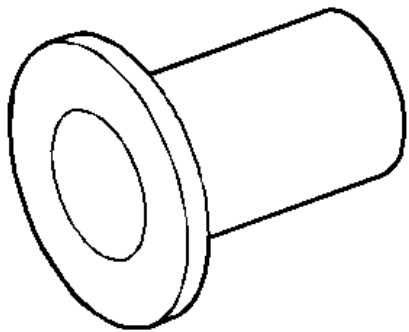
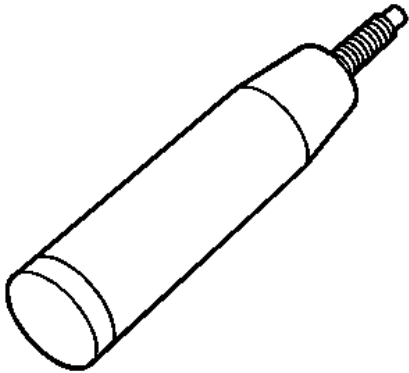


J 29569-1
Turbine Shaft Seal Installer - Expander

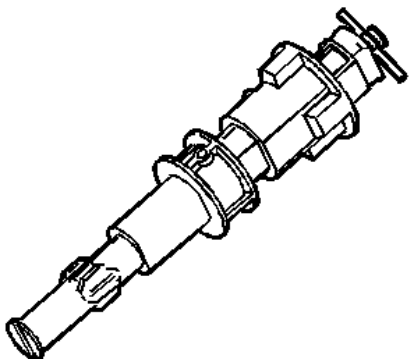


J 29569-2
Turbine Shaft Seal Installer - Compressor

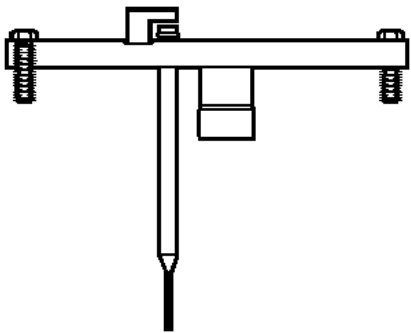
J 29829-1A
Turbine Shaft Seal Installer - Expander



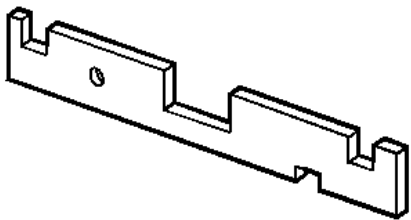
J 29829-2
Turbine Shaft Seal Installer - Compressor



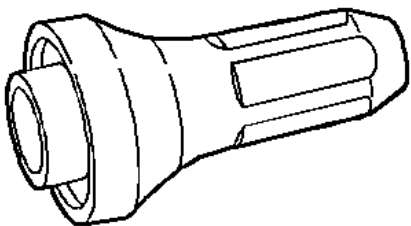
J 33381-A
Clutch Assembly Remover/Installer



J 33386-A
Input Shaft End Play Tool

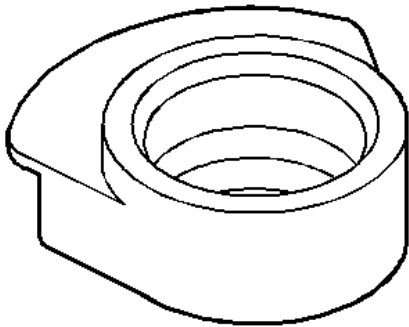
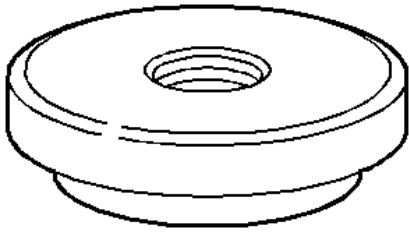


J 34094-A
Thermo Element Height Gauge

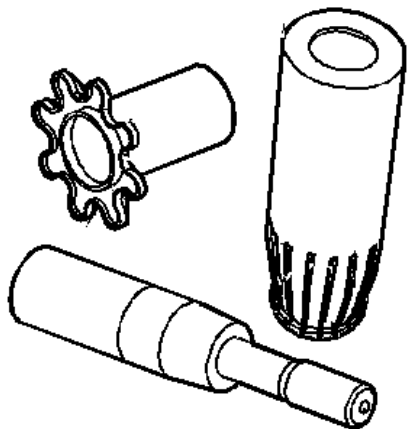


J 34115
Left Side Axle Seal Installer

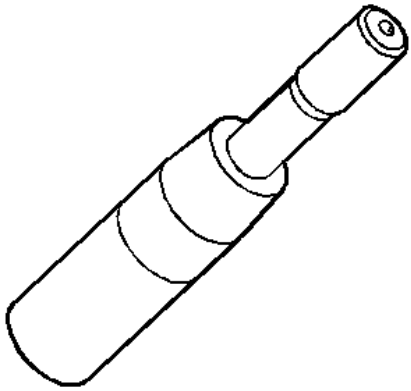
J 34126
Driven Sprocket Bearing Installer



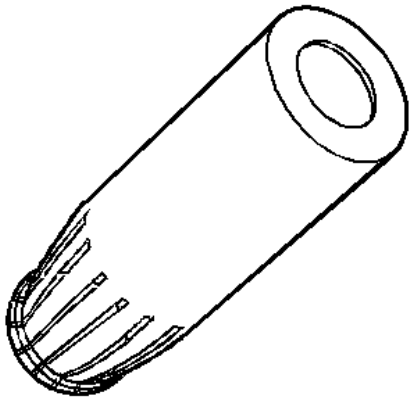
J 34129
Driven Sprocket Support Bearing Remover



J 34741-A
Input Shaft Seal Installer Set

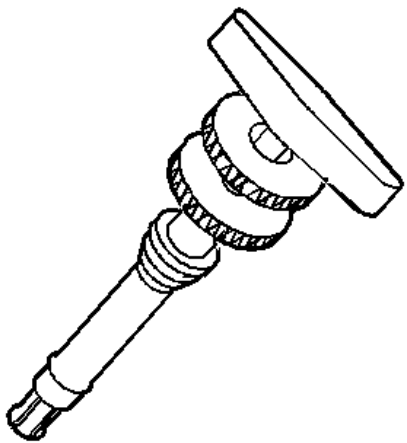
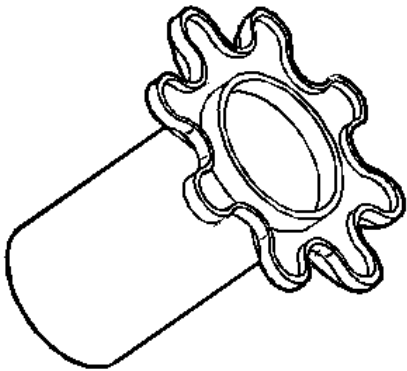


J 34741-1
Input Shaft Seal Installer



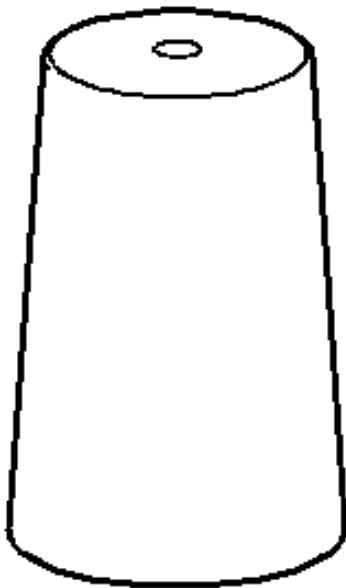
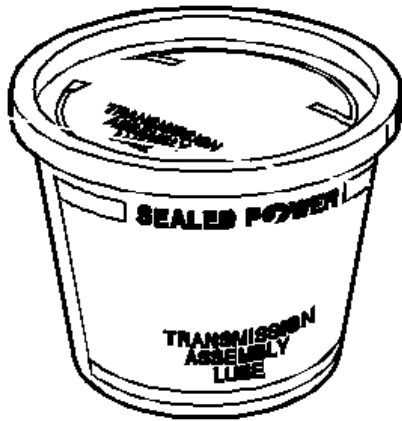
J 34741-2
Input Shaft Seal Pusher

J 34741-3
Input Shaft Seal Compressor

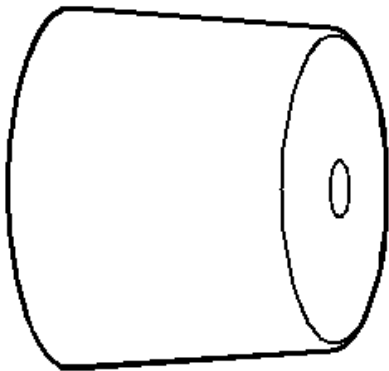


J 35138
Torque Converter End Play Fixture

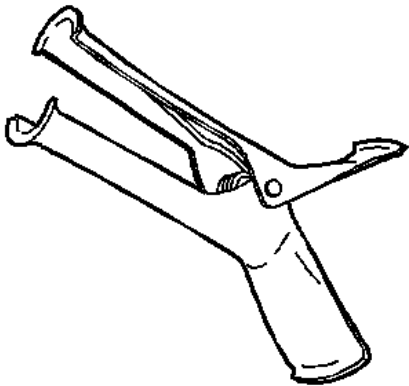
J 36850
Assembly Lubricant



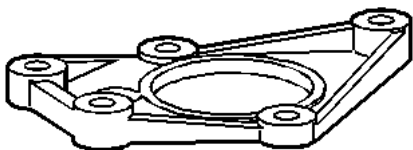
J 37361
Input Clutch Piston Seal Protector



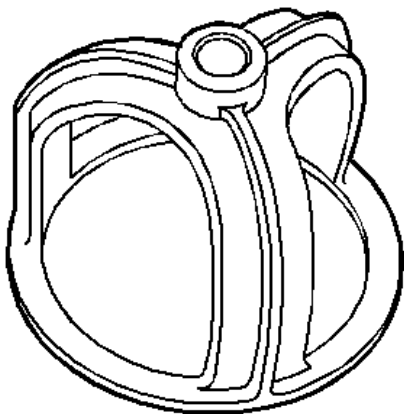
J 37362
Third Clutch Piston Seal Protector



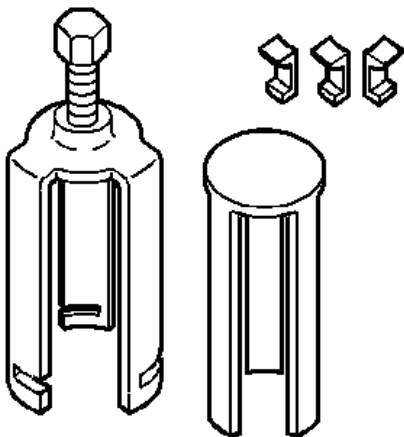
J 38358-A
1-2 Support Remover Installer



J 38385
Output Shaft Loading Tool Adapter

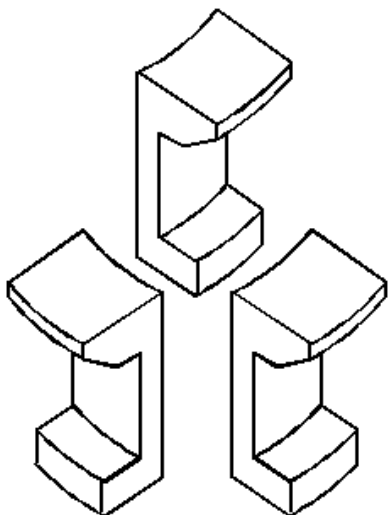


J 38734
Intermediate Spring Compressor Adapter

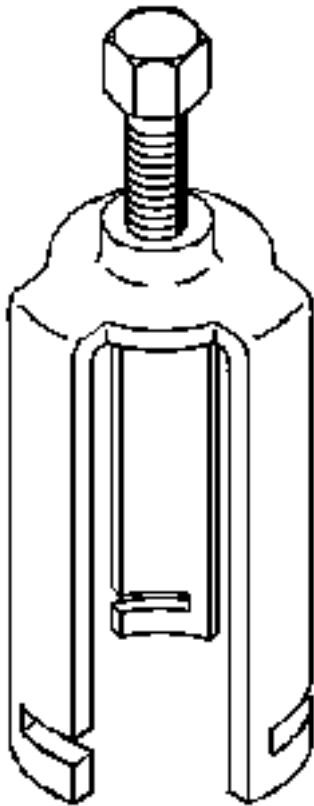


J 41103
Torque Converter Seal Remover Set

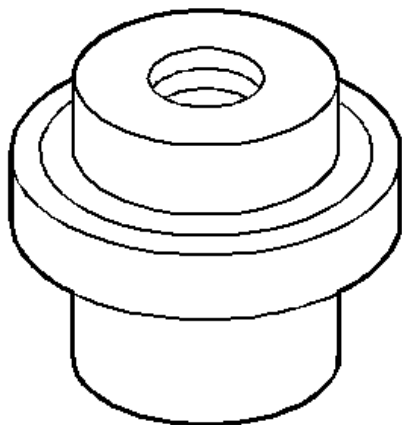
Torque Converter Seal Puller Legs



J 41103-2 Torque Converter Seal Puller Bridge

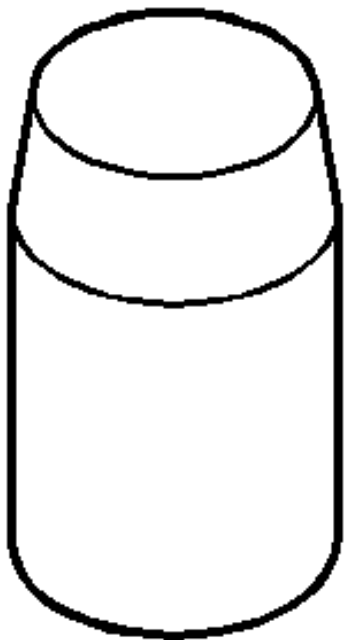
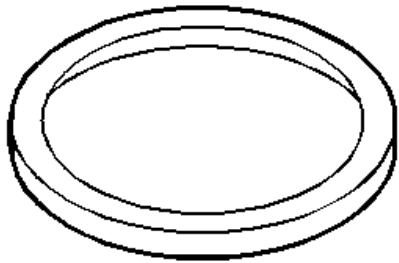


J 41103-3
Torque Converter Seal Support Body

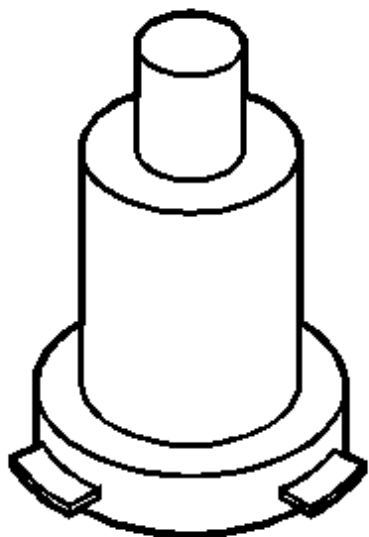


J 41991
Side Cover Bearing Remover/Installer

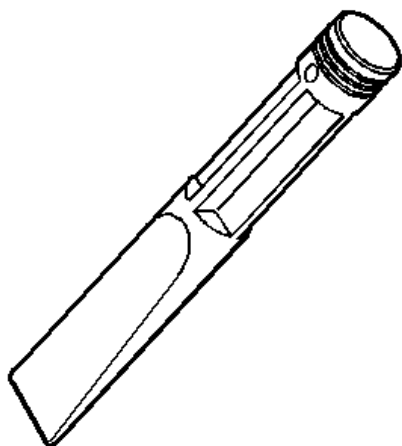
J 41992-1
2nd Clutch Piston Protector



J 41992-2
2nd Clutch Piston Adapter

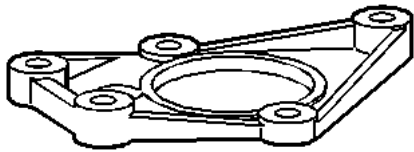


J 41992-3
2nd Clutch Piston Installer

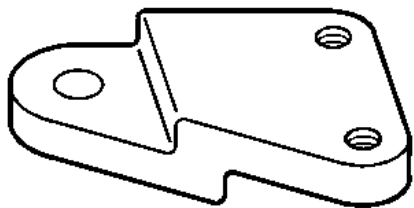
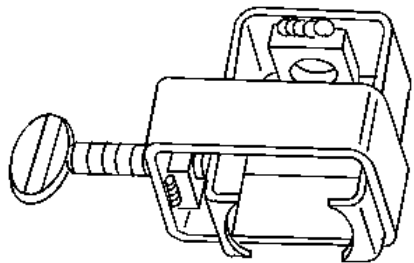


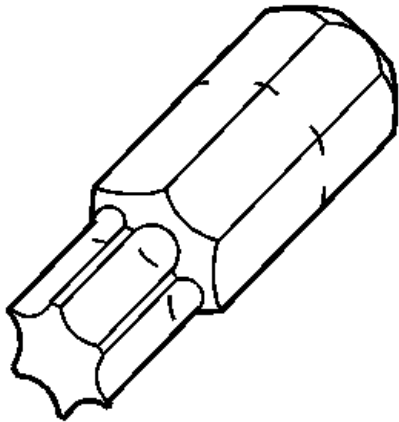
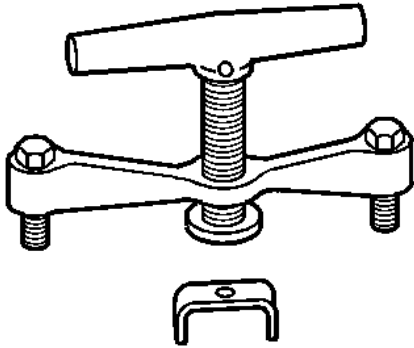
J 42562
Axle Removal Wedge

J 43425

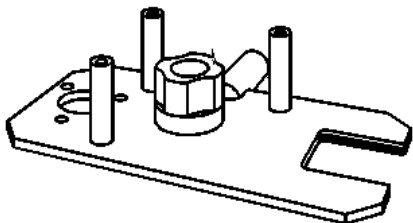


Output Shaft Loading Tool Adapter

J 44465
Holding Fixture AdapterJ 44467
Output Shaft Assembly Remover and
InstallerJ 44472
End Play Checking Tool



J 44538
TORX® 30+



J 44755
Holding Fixture