THM 4T40-E

INDEX

AUTOMATIC TRANSMISSION SERVICE GROUP
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INTRODUCTION
THM 4T40-E

We wish to thank General Motors Corporation for the information and illustrations that have made this booklet possible. This booklet contains general description and the procedures necessary to repair, service, or overhaul the THM 4T40-E electronic overdrive automatic transaxle. This unit was first introduced in the 1995 Chevrolet Cavalier and Pontiac Sunfire vehicles, and will eventually replace the THM 125C (3T40).
The THM 4T40-E is a fully automatic front wheel drive transaxle. It provides park, reverse, neutral, and 4 forward speeds including overdrive. The shift pattern is controlled electronically with 2 shift solenoids that recieve a ground signal from the Powertrain Control Module (PCM). The PCM will vary shift points, as it is constantly interpreting numerous electronic signals from various operational sensore located on the vehicle. The PCM also controls apply and release of the Torque Converter Clutch. Line pressure and shift feel are also controlled electronically with a Pressure Control Solenoid (PCS) located on the valve body and is dependant on TPS and VSS signals.

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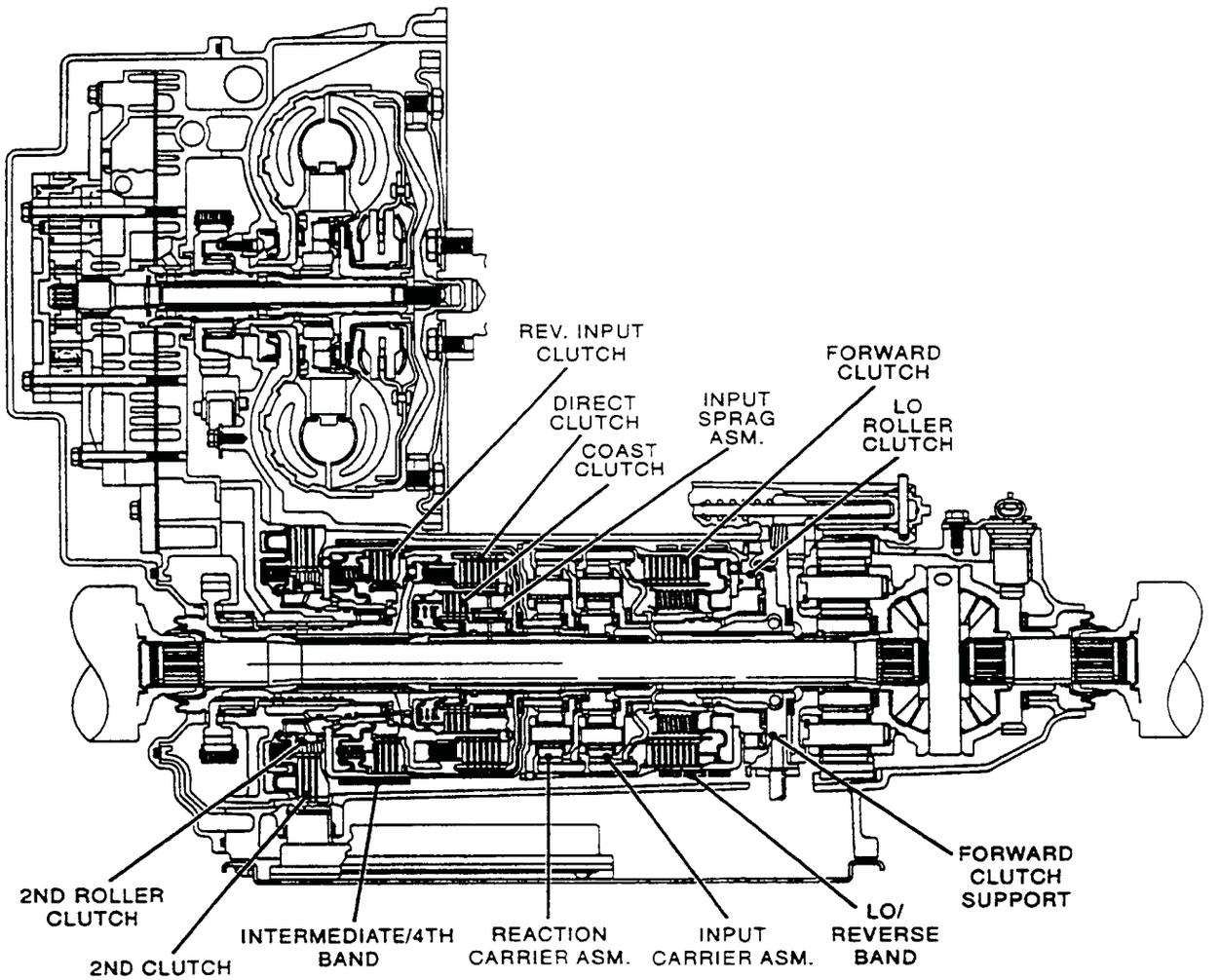
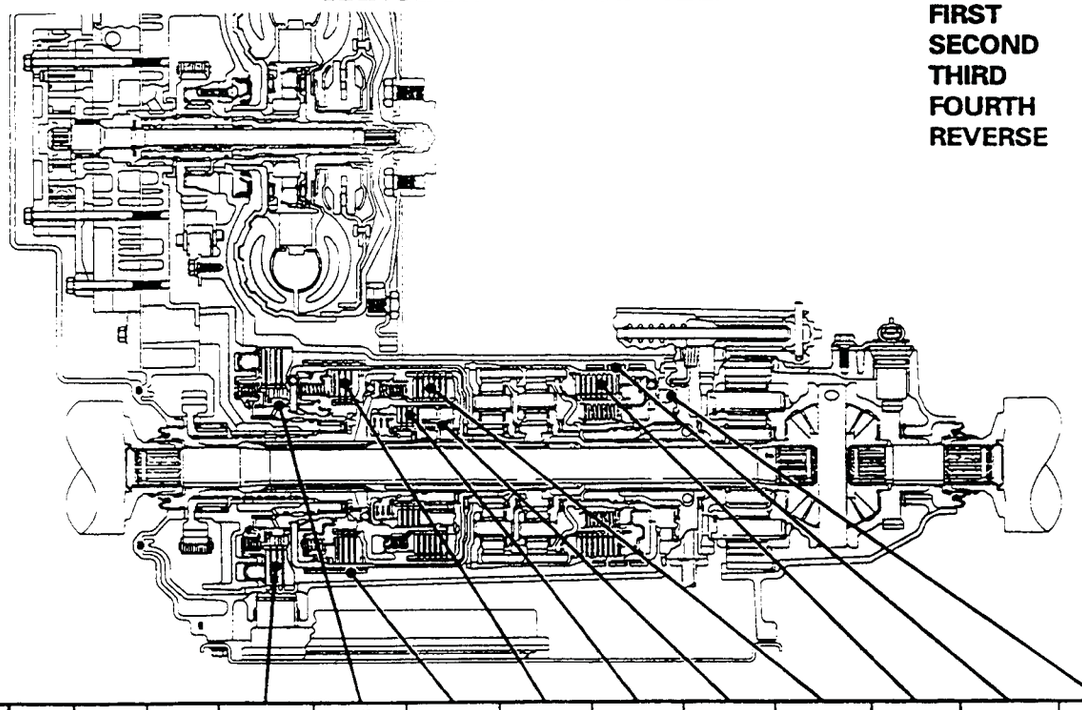
HYDRA-MATIC 4T40-E TRANSAXLE



RANGE REFERENCE CHART

4T40-E GEAR RATIOS

FIRST	2.96
SECOND	1.62
THIRD	1.00
FOURTH	0.68
REVERSE	2.14



RANGE	GEAR	1-2 SHIFT SOL	2-3 SHIFT SOL	2ND CLUTCH	2ND ROLLER CLUTCH	INT./4TH BAND	REVERSE CLUTCH	COAST CLUTCH	INPUT SPRAG	DIRECT CLUTCH	FORWARD CLUTCH	LO/REV. BAND	LO ROLLER CLUTCH
PARK	N	ON	OFF									APPLIED	
REV	R	ON	OFF				APPLIED					APPLIED	
NEU	N	ON	OFF									APPLIED	
D	1st	ON	OFF						HOLDING		APPLIED		HOLDING
	2nd	OFF	OFF	APPLIED	HOLDING				HOLDING		APPLIED		OVER-RUNNING
	3rd	OFF	ON	APPLIED*	OVER-RUNNING				HOLDING	APPLIED	APPLIED		OVER-RUNNING
	4th	ON	ON	APPLIED*		APPLIED			OVER-RUNNING	APPLIED	APPLIED*		OVER-RUNNING
3	1st	ON	OFF					APPLIED	HOLDING		APPLIED		HOLDING
	2nd	OFF	OFF	APPLIED	HOLDING			APPLIED	HOLDING		APPLIED		OVER-RUNNING
	3rd	OFF	ON	APPLIED*	OVER-RUNNING			APPLIED	HOLDING	APPLIED	APPLIED		OVER-RUNNING
2	1st	ON	OFF					APPLIED	HOLDING		APPLIED		HOLDING
	2nd	OFF	OFF	APPLIED	HOLDING	APPLIED		APPLIED	HOLDING		APPLIED		OVER-RUNNING
	3rd**	OFF	ON	APPLIED*	OVER-RUNNING			APPLIED	HOLDING	APPLIED	APPLIED		OVER-RUNNING
1	1st	ON	OFF					APPLIED	HOLDING		APPLIED	APPLIED	HOLDING
	2nd***	OFF	OFF	APPLIED	HOLDING	APPLIED		APPLIED	HOLDING		APPLIED		OVER-RUNNING

ON = SOLENOID ENERGIZED (CLOSED)
OFF = SOLENOID DE-ENERGIZED (OPEN)
* = APPLIED, BUT INEFFECTIVE
** = MANUAL SECOND - THIRD GEAR IS ONLY AVAILABLE ABOVE APPROXIMATELY 100 KM/H (62 MPH).
*** = MANUAL FIRST - SECOND GEAR IS ONLY AVAILABLE ABOVE APPROXIMATELY 60 KM/H (37 MPH).
NOTE: MANUAL FIRST - THIRD GEAR IS ALSO POSSIBLE AT HIGH VEHICLE SPEED AS A SAFETY FEATURE.

Figure 1

TRANSAXLE GENERAL DESCRIPTION

The 4T40-E is a fully automatic, electronically controlled, front wheel drive transaxle. It provides four forward gear ranges with 4th being overdrive, and one reverse gear range. Shift patterns are controlled by the PCM through two shift solenoids. Oil pressure is supplied by a vane type oil pump and is controlled electronically by the PCM through the pressure control solenoid (PCS) located on the valve body.

The transaxle can be operated in any one of the following seven gear selector positions.

P - Park position prevents the vehicle from rolling either forward or backward. ***For safety reasons the parking brake should be used in addition to the Park position.***

R - Reverse allows the vehicle to be operated in a rearward direction.

N - Neutral allows the engine to be started and to be operated while driving the vehicle. If necessary this position may be selected if the engine must be restarted while the vehicle is still moving.

D - Drive range position is used for all normal driving conditions. This range provides four gear ratios forward, plus converter clutch operation. Full and part throttle downshifts are available for safe passing by depressing the accelerator pedal.

3 - This drive range position is used for city traffic, hilly terrain and trailer towing. It provides three gear ratios forward and prevents the transaxle from shifting into 4th gear overdrive. Again, downshifts are available by depressing the accelerator pedal.

2 - Manual second range only provides two gear ratios forward, ***under most operating conditions.*** It is used to provide acceleration and engine braking. This range may be selected at any vehicle speed, but will not downshift to 2nd gear until vehicle speed drops below approximately 100 KMH (62MPH). However, the transaxle will upshift into 3rd gear with the selector in Manual 2nd, at high vehicle speeds, as a safety factor.

1 - Manual Lo Range is used to provide maximum engine braking. This range may also be selected at any vehicle speed, but the transaxle will not downshift into 1st gear until vehicle speed drops below approximately 60 KMH (37 MPH).
NOTE: Third gear is also possible while in Manual Lo Range, at high vehicle speeds as a safety factor.

TRANSAXLE COMPONENTS

Mechanical

- Five Multiple Disc Clutch Assemblies:
  (1) Second Clutch
  (2) Reverse Input Clutch
  (3) Direct Clutch
  (4) Coast Clutch
  (5) Forward Clutch
- Two Band Assemblies:
  (1) Intermediate/4th Band
  (2) Lo/Reverse Band
- Three One-Way Clutches:
  (1) Second Roller Clutch
  (2) Lo Roller Clutch
  (3) Input Sprag Clutch
- Two Compound Planetary Gear Sets.
- Final Drive and Differential Assembly.

Electronic

- Two Shift Solenoids:
  (1) Shift Solenoid "A"
  (2) Shift Solenoid "B"
- Pressure Control Solenoid (PCS).
- Pulse Width Modulated (PWM) TCC Solenoid.
- Two Speed Sensors:
  (1) Turbine Shaft Speed Sensor
  (2) Output Speed Sensor
- Transmission Fluid Temperature (TFT) Sensor
- Pressure Switch Assembly (PSA)

FLUID LEVEL CHECKING PROCEDURE

The fluid level should be checked before a road test is performed, and when the fluid temperature is above 40°C (104°F). This temperature can be reached by performing the following procedure.

1. Park the vehicle on a hoist, inspection pit or a similar raised level surface. ***The vehicle must be level to obtain correct fluid level reading.***
2. Place a fluid container below the fluid level plug which is an 1/8" pipe plug, located in the case near the final drive, as shown in Figure 2.
3. Start the engine and allow the engine to idle for approximately 5 minutes, or if possible drive the vehicle for a few miles to warm up the transaxle fluid.
4. With the brake pedal depressed, move the shift lever through the gear ranges, pausing a few seconds in each range, and then return the shift lever to the Park position.
5. Remove the fluid level plug (1/8" pipe plug), as shown in Figure 2. Because the transaxle works correctly over a range of fluid levels, fluid may or may not drain out of the plug hole in the case when the plug is removed.

CAUTION: Removal of the fluid level plug when the transaxle fluid is hot may cause injury if fluid drains from the plug hole.

6. If fluid does drain through the plug hole in case, the transaxle may have been overfilled. When the fluid stops draining, the fluid level is correct. Install the fluid level plug and torque to proper specification (12 N.m) or (10 ft.lb.)
7. If fluid does not drain through the plug hole in case, the transaxle fluid may be low. Add fluid through the fill cap located on top of the transaxle as shown in Figure 2. Add fluid in 1/2 Qt. increments, up to 1.5 quarts maximum, until the fluid drains through the plug hole. If the fluid drains through the plug hole the fluid level was in the correct operating range. Allow the fluid to finish draining through the plug hole and install the plug and torque to 12 N.m (10 ft.lb.).
   If fluid does not drain through the plug hole in case after adding a total of 1.5 quarts, then the transaxle was either underfilled or is leaking. The transaxle should be inspected for fluid leaks and any leaks should be corrected before setting the transaxle fluid level.
8. When the fluid level checking procedure is completed, wipe any access fluid from transaxle case with a rag or shop towel. Also check that the fluid fill cap/breather is properly installed.

SETTING FLUID LEVEL, AFTER SERVICE

1. Depending on the service performed, add the following amounts of fluid through the fill cap hole ***before*** adjusting fluid level:
   Bottom pan removal or filter change = 7 quarts.
   New torque converter only = 2.6 quarts.
   Complete overhaul or rebuild = 10.6 quarts.
2. Follow steps 1 through 4 of the Fluid Level Checking Procedure.
3. Add additional fluid through the fill cap in 1 pint increments until fluid comes out the plug hole in case by the final drive (See Figure 2).
4. Allow the fluid to finish draining out plug hole, install the fluid level plug and torque to 10 ft.lb.
5. When the fluid level setting procedure is done wipe any fluid from the transaxle with a rag or shop towel. Also check that the fluid fill cap and vent are properly installed.

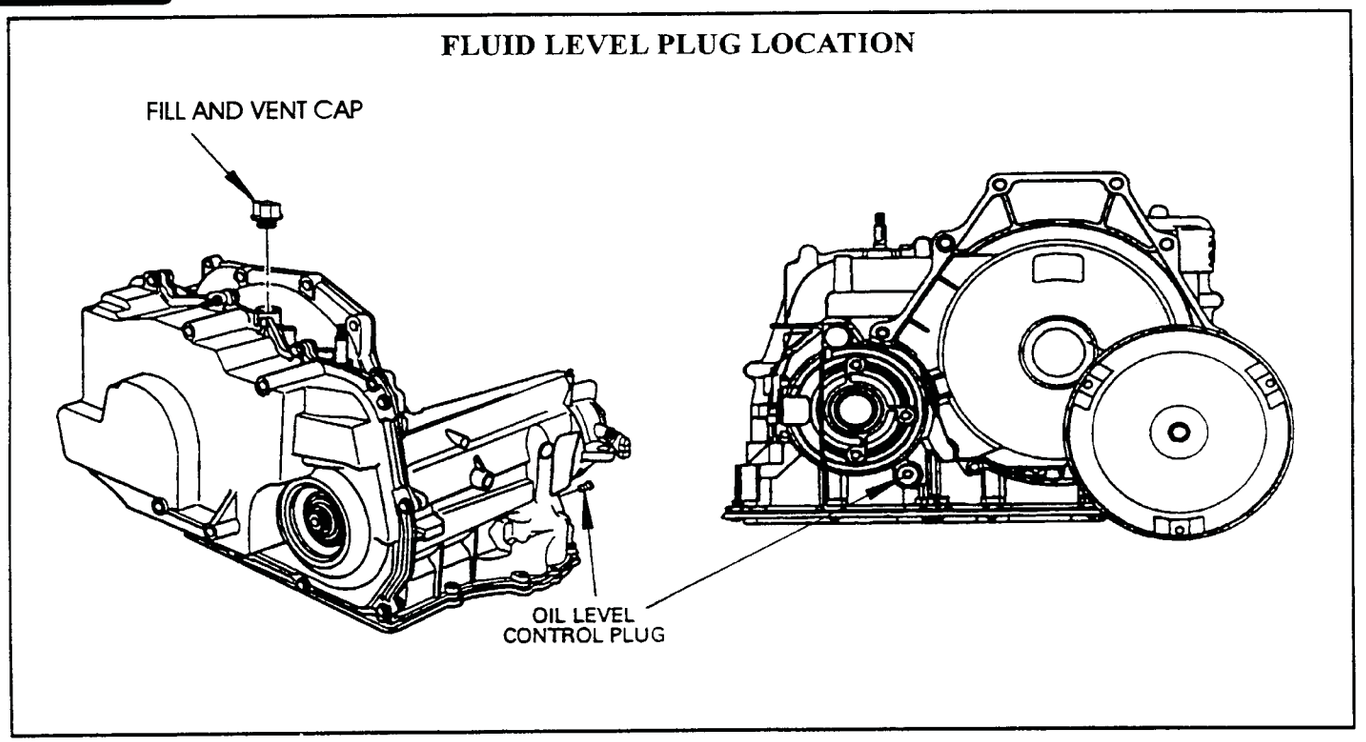

FLUID LEVEL PLUG LOCATION
FILL AND VENT CAP
OIL LEVEL
CONTROL PLUG

Figure 2

ABBREVIATIONS

AC Alternating Current
A/C Air Conditioning
CKT Circuit
DC Direct Current
DLC Diagnositc Link Connector
DTC Diagnostic Trouble Code
DVM Digital Volt Meter
ECT Engine Coolant Temperature Sensor
EGR Exhaust Gas Regulator
MAP Manifold Absolute Pressure
MIL Malfunction Indicator Light
NC Normally Closed
NO Normally Open
OBD On Board Diagnostics
OSS Output Speed Sensor
PM Permanent Magnent
PCM Powertrain Control Module
PCS Pressure Control Solenoid
PSA Pressure Switch Assembly
PWM Pulse Width Modulated
RPM Revolutions Per Minute
TCC Torque Converter Clutch
TCM Transmission Control Module
TFT Transmission Fluid Temperature
TIS Transaxle Input Speed Sensor
TPS Throttle Position Sensor
VSS Vehicle Speed Sensor
WOT Wide Open Throttle

ROAD TEST PROCEDURE

- Perform the road test using a scan tool.
- This test should be performed when traffic and road conditions permit.
- Observe all traffic regulations.

The PCM calculates upshift points based primarily on two inputs. They are ***throttle angle*** and ***vehicle speed***. When the PCM says a shift should occur, an electrical signal is sent to the shift solenoids which in turn moves the valves to perform the upshift. The shift speed charts in Figure 3 reference ***throttle angle*** instead of "Min Throttle" or "WOT" to make shift speed diagnosis more uniform and accurate. A scan tool should be used to moniter ***throttle angle***. Some scan tools have been programmed to record shift point information. Check the instruction manual on yours to see if this test is available.

GARAGE SHIFT CHECK

1. Start the engine.
2. Depress the service brake.
3. Move the gear selector lever to the Reverse (R) position, and then to the Neutral (N) position, and then to the Drive (D) position. Gear selections should be immediate, but should not be harsh.

UPSHIFTS AND TCC APPLY

1. Place the selector lever into the Overdrive (D) position.
2. Look at the shift speed chart in Figure 3, choose a percent throttle angle of 10% or 25%.
3. Set up the scan tool to moniter throttle angle and vehicle speed.
4. Accelerate to the chosen throttle angle and hold the throttle steady.
5. As the transaxle upshifts, note the shift speeds and commanded gear changes for second gear, third gear and fourth gear.
6. Shift speeds may vary due to slight hydraulic delays responding to electronic controls. Any change from the original equipment tire size also affects shift speeds.
7. Note when the TCC applies. This should occur in fourth gear, and is noticed by an RPM drop. The TCC should not apply unless the transaxle temperature has reached a Min. of 46°F ***AND*** engine coolant temperature of 122°F.

PART THROTTLE DOWNSHIFT

1. At vehicle speeds of 40-55 MPH (64-88 KPH) in 4th gear, quickly increase throttle angle to greater than 50%.
2. The converter clutch should release.
3. Transaxle should downshift to 3rd gear.
4. 1-2 shift solenoid should turn off, and the 2-3 shift solenoid should remain on.

FULL THROTTLE DOWNSHIFTS

1. At vehicle speeds of 40-55 MPH (64-88KPH) in 4th gear, quickly increase throttle angle to greater than 100%.
2. The converter clutch should release.
3. Transaxle should downshift into second gear immediately
4. Both shift solenoids should be off.

MANUAL DOWNSHIFTS

1. At vehicle speeds of 40-55 MPH (64-88 KPH) in 4th gear, release the accelerator pedal while moving the selector lever to Manual 3rd (3) position.
2. The converter clutch should release.
3. Transaxle should downshift to 3rd immediately, and the engine should slow the vehicle down.
4. Move the selector lever back to Overdrive (D) position and accelerate to 40-45 MPH. Release the accelerator pedal while moving the selector lever to the Manual Second (2) position.
5. The converter clutch should release.
6. Transaxle should downshift to 2nd immediately, and the engine should slow the vehicle down.
7. Move the selector lever back to Overdrive (D) position and accelerate to 40 MPH. Release the accelerator pedal while moving selector lever to the Manual 1st (1) position.
8. The converter clutch should release.
9. Transaxle should downshift to 2nd immediately, and the engine should slow the vehicle down.
10. Once the vehicle speed drops below 37 MPH, the transaxle should downshift to 1st gear, and the engine should continue to slow the vehicle.

NOTE: A shift into 3rd gear will occur at high vehicle speeds as a safety feature, while in the Manual 1st position. Do not attempt to perform this shift.

COASTING DOWNSHIFT

1. With the selector in the Overdrive (D) position, accelerate to 4th gear and TCC applied.
2. Release the accelerator pedal and lightly apply the brakes.
3. The converter clutch should release.
4. Downshifts should occur at the speeds shown in the shift speed chart in Figure 3.

REVERSE OPERATION

1. With vehicle stopped, move the selector lever to the Reverse (R) position, and slowly accelerate to observe reverse operation.
2. 1-2 shift solenoid should be ON, and the 2-3 shift solenoid should be OFF.

CONVERTER CLUTCH OPERATION

1. Install a tachometer or scan tool.
2. Operate the vehicle until proper operating temp has been reached. TCC operation requires that transaxle temperature has reached Min of 46°F, ***AND*** engine coolant temperature of 122°F.
3. At vehicle speeds of 50-55 MPH (80-88 KPH) and maintaining a light throttle, lightly touch the brake pedal and check for release of TCC and a slight increase in engine RPM.
4. Release the brake pedal, slowly accelerate, and check for a re-apply of the converter clutch and a slight decrease in engine RPM.

1995 HYDRA-MATIC 4T40-E SHIFT SPEED CHART

UPSHIFT SPEED INFORMATION

MODEL	1-2 SHIFT (+/- 3 MPH)				2-3 SHIFT (+/- 4 MPH)				3-4 SHIFT (+/- 5 MPH)		
	10% TPS	25% TPS	50% TPS	100% TPS	10% TPS	25% TPS	50% TPS	100% TPS	10% TPS	25% TPS	50% TPS
WAR	8.0	12.5	20.0	28.5	16.0	25.0	39.0	54.0	26.0	36.0	57.0
WLR	10.0	14.5	20.5	38.5	19.0	27.0	39.0	65.5	31.0	41.0	57.0

TRANSAXLE USAGE AND DOWNSHIFT SPEED INFORMATION

MODEL	SERIES	ENGINE		DOWNSHIFTS (+/- 4 MPH)			TCC APPLY 4TH GEAR		TCC RELEASE 4TH GEAR	
		DISP.	RPO	4-3 COAST	3-2 COAST	2-1 COAST	10% TPS	25% TPS	10% TPS	25% TPS
WLR	J	2.3	LD2	27	14.0	7	39	54	37	42

Figure 3

LINE PRESSURE CHECK

The THM 4T40-E uses a vane type oil pump to produce hydraulic pressure, and a pressure control solenoid to control that pressure at the pressure regulator valve after it leaves the pump.

The pressure control solenoid is controlled by an electrical signal from the PCM that ranges from 0 to 1.1 amps, with 1.1 amps corresponding to minimum line pressure (45-55 PSI), and 0 amps corresponds to maximum line pressure (140-180 PSI), when the selector lever is in Overdrive (D) position.

Refer to Figure 4 for the line pressure tap location and the procedure to perform line pressure test.

HYDRA-MATIC 4T40-E LINE PRESSURE CHECK PROCEDURE

Line pressures are calibrated for two sets of gear ranges – Drive-Park-Neutral and Reverse. This allows the transaxle line pressure to be appropriate for different pressure needs in different gear ranges:

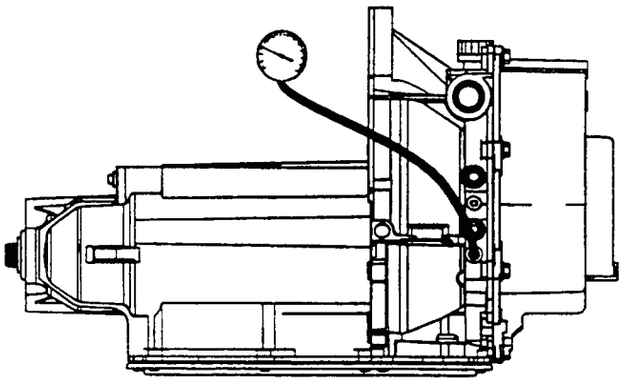
Gear Range	Nominal Line Pressure Range
Drive, Park or Neutral	50 - 160 PSI 345 – 1103 KPA
Reverse	58 - 186 PSI 400 – 1282 KPA

Before performing a line pressure check, verify that the pressure control solenoid is receiving the correct electrical signal from the PCM:

1. Install a scan tool.
2. Start the engine and set parking brake.
3. Check for a stored pressure control solenoid diagnostic trouble code, and other diagnostic trouble codes.
4. Repair vehicle if necessary.

Inspect
- Fluid level
- Manual linkage

Install or Connect
- TECH 1 Scan tool
- Oil pressure gage at line pressure tap



5. Put gear selector in Park and set the parking brake.
6. Start engine and allow it to warm up at idle.
7. Access the "PCS Control" test on the TECH 1 scan tool.
8. Increase DESIRED PCS in 0.1 Amp increments and read the corresponding line pressure on the pressure gage. (Allow pressure to stabilize for 5 seconds after each current change.)
9. Compare data to the Drive-Park-Neutral line pressure chart below.

***NOTICE** Total test running time should not exceed 2 minutes, or transaxle damage could occur.

CAUTION Brakes must be applied at all times to prevent unexpected vehicle motion.

If pressure readings differ greatly from the line pressure chart, refer to the Diagnosis Charts contained in this section.

The TECH 1 scan tool is only able to control the pressure control solenoid in Park and Neutral with the vehicle stopped. This protects the clutches from extremely high or low pressures in Drive or Reverse ranges.

Pressure Control Solenoid Current (Amp)	Approximate Line Pressure (PSI)
0.00	152 - 160
0.10	149 - 151
0.30	141 - 143
0.50	124 - 127
0.60	111 - 115
0.70	97 - 101
0.80	81 - 84
0.90	64 - 67
0.95	56 - 58
1.00	50 - 51
1.05	50
1.10	50

NOTE: Pressures are at 70°C and vary with temperature.
Pressure drops as temperature increases.

Figure 4

TROUBLE CODE RETRIEVAL

To read Diagnostic Trouble Codes (DTC), a scan tool MUST be used. Diagnostic Trouble Codes cannot be flashed by grounding the DLC.
To clear the Diagnostic Trouble Codes from the PCM memory, install a scan tool and select the clear DTC function.

DIAGNOSTIC CONNECTOR LOCATION

The Diagnostic Link Connector (DLC) is a multiple cavity connector. The DLC provides the means to access serial data from the PCM to aid in the Powertrain diagnosis. The DLC allows technicians to use a scan tool to moniter various systems and display Diagnostic Trouble Codes.
The Diagnostic Link Connector is located within the drivers compartment, directly below the steering column (See Figure 5).

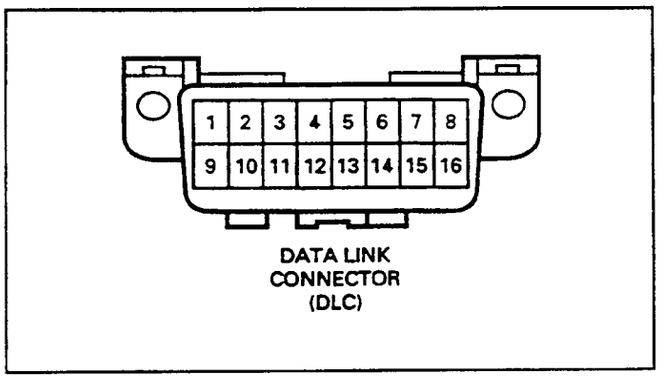


Figure 5

POWERTRAIN CONTROL MODULE

The Powertrain Control Module (PCM) is an electronic device which moniters inputs to control various transaxle functions including shift quality and transaxle diagnostics. The PCM recieves input information from sensors, switches, and various components to process for use within its control program. Based on this input information, the PCM controls various transaxle output functions and devices.

The PCM is mounted forward of the right front wheel housing, behind the front fascia cavity splash shield, as shown in Figure 6

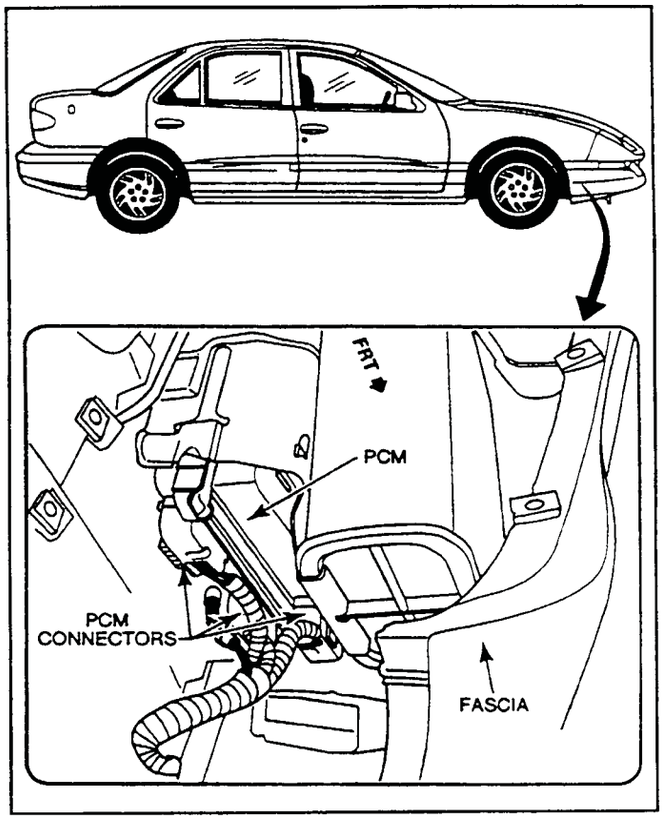


Figure 6

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION
DIAGNOSTIC TYPES

DTC	DESCRIPTION	DTC TYPE	DEFAULT ACTION
P0502	Vehicle Speed Sensor (VSS) Circuit Low Input	A	– DTC P0502 will be stored in PCM memory. – Freeze shift adapts. – Maximum line pressure. – Immediate landing to 2nd gear. – Inhibit TCC engagement.
P0503	Vehicle Speed Sensor (VSS) Circuit Intermittent/Erratic	A	– DTC P0503 will be stored in PCM memory. – Freeze shift adapts. – Commands maximum line pressure. – Commands soft landing to 2nd gear. – Inhibit TCC engagement.
P0703	Torque Converter/Brake Switch Circuit Malfunction	A	– DTC P0703 will be stored in PCM memory. – Inhibit TCC engagement.
P0712	Transmission Fluid Temperature Sensor Circuit Low Input	A	– DTC P0712 will be stored in PCM memory. – Freeze shift adapts. – Transaxle default temperature 0°C (32°F).
P0713	Transmission Fluid Temperature Sensor Circuit High Input	A	– DTC P0713 will be stored in PCM memory. – Freeze shift adapts. – Transaxle default temperature 0°C (32°F).
P0716	Input/Turbine Speed Sensor Circuit Range/Performance	A	– DTC P0716 will be stored in PCM memory. – Inhibit TCC engagement. – Freeze shift adapts. – Maximum line pressure.
P0717	Input/Turbine Speed Sensor Circuit No Signal	A	– DTC P0717 will be stored in PCM memory. – Shift adapts maintained at current levels. – Inhibit TCC engagement. – Freeze shift adapts. – Maximum line pressure.
P0741	Torque Converter Clutch Circuit Stuck Off	A	– DTC P0741 will be stored in PCM memory. – Inhibit TCC engagement.
P0742	Torque Converter Clutch Circuit Stuck On	A	– DTC P0742 will be stored in PCM memory – Freeze shift adapts. – TCC commanded for 1-2, 2-3 and 3-4 shifts.

DTC Type
A – Emission related, turn on MIL on 1st failure
B – Emission related, turn on MIL after 2 consecutive trips with failure
C – Non-emission related, turn on service lamp on 1st failure
D – Non-emission related, no lamps

Figure 7

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION
DIAGNOSTIC TYPES

DTC	DESCRIPTION	DTC TYPE	DEFAULT ACTION
P0748	Pressure Control Solenoid Electrical	D	– DTC P0748 will be stored in PCM memory. – Freeze shift adapts. – Maximum line pressure. – Will **NOT** illuminate the Malfunction – Indicator Lamp (MIL).
P0751	"A" (1-2) Shift Solenoid Performance	A	– DTC P0751 will be stored in PCM memory. – Freeze shift adapts. – Inhibit TCC engagement. – Maximum line pressure. – Commands soft landing to 2nd gear.
P0753	"A" (1-2) Shift Solenoid Electrical	A	– DTC P0753 will be stored in PCM memory. – Freeze shift adapts. – Maximum line pressure. – Inhibit TCC engagement. – Commands soft landing to 2nd gear.
P0756	"B" (2-3) Shift Solenoid Performance	A	– DTC P0756 will be stored in PCM memory. – Freeze shift adapts. – Inhibit TCC engagement. – Maximum line pressure. – Immediate landing to 2nd gear.
P0758	"B" (2-3) Shift Solenoid Electrical	A	– DTC P0758 will be stored in PCM memory. – Freeze shift adapts. – Maximum line pressure. – Inhibit TCC engagement. – Commands immediate landing to 2nd gear.
P1560	System Voltage Malfunction	B	– DTC P1560 will be stored in PCM memory. – Will **NOT** illuminate the Malfunction Indicator Lamp (MIL). – Inhibit TCC engagement. – Freeze shift adapts. – Maximum line pressure. – Condition 1, commands soft landing to 2nd gear. – Condition 2 and 3, commands immediate landing to 2nd gear.

DTC Type
A – Emission related, turn on MIL on 1st failure
B – Emission related, turn on MIL after 2 consecutive trips with failure
C – Non-emission related, turn on service lamp on 1st failure
D – Non-emission related, no lamps

Figure 8

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION
DIAGNOSTIC TYPES

DTC	DESCRIPTION	DTC TYPE	DEFAULT ACTION
P1810	Pressure Switch Assembly (PSA) Malfunction	A	– DTC P1810 will be stored in PCM memory. – Freeze shift adapts. – Assume D4 shift pattern. – Inhibit TCC engagement. – Elevate line pressure.
P1811	Maximum Adapt and Long Shift	D	– DTC P1811 will be stored in PCM memory. – Will **NOT** illuminate the Malfunction Indicator Lamp (MIL). – Maximum line pressure. – Freeze shift adapts.
P1812	Transmission Fluid Overtemperature	D	– DTC P1812 will be stored in PCM memory. – Will **NOT** illuminate the Malfunction Indicator Lamp (MIL). – Freeze shift adapts.
P1871	Undefined Gear Ratio	D	– DTC P1871 will be stored in PCM memory. – Maximum line pressure. – Freeze shift adapts. – Will **NOT** illuminate the Malfunction Indicator Lamp (MIL).
P1887	TCC Release Switch Circuit Malfunction	A	– DTC P1887 will be stored in PCM memory. – Maximum line pressure. – Freeze shift adapts. – Inhibits TCC operation.

DTC Type
A – Emission related, turn on MIL on 1st failure
B – Emission related, turn on MIL after 2 consecutive trips with failure
C – Non-emission related, turn on service lamp on 1st failure
D – Non-emission related, no lamps

Figure 9

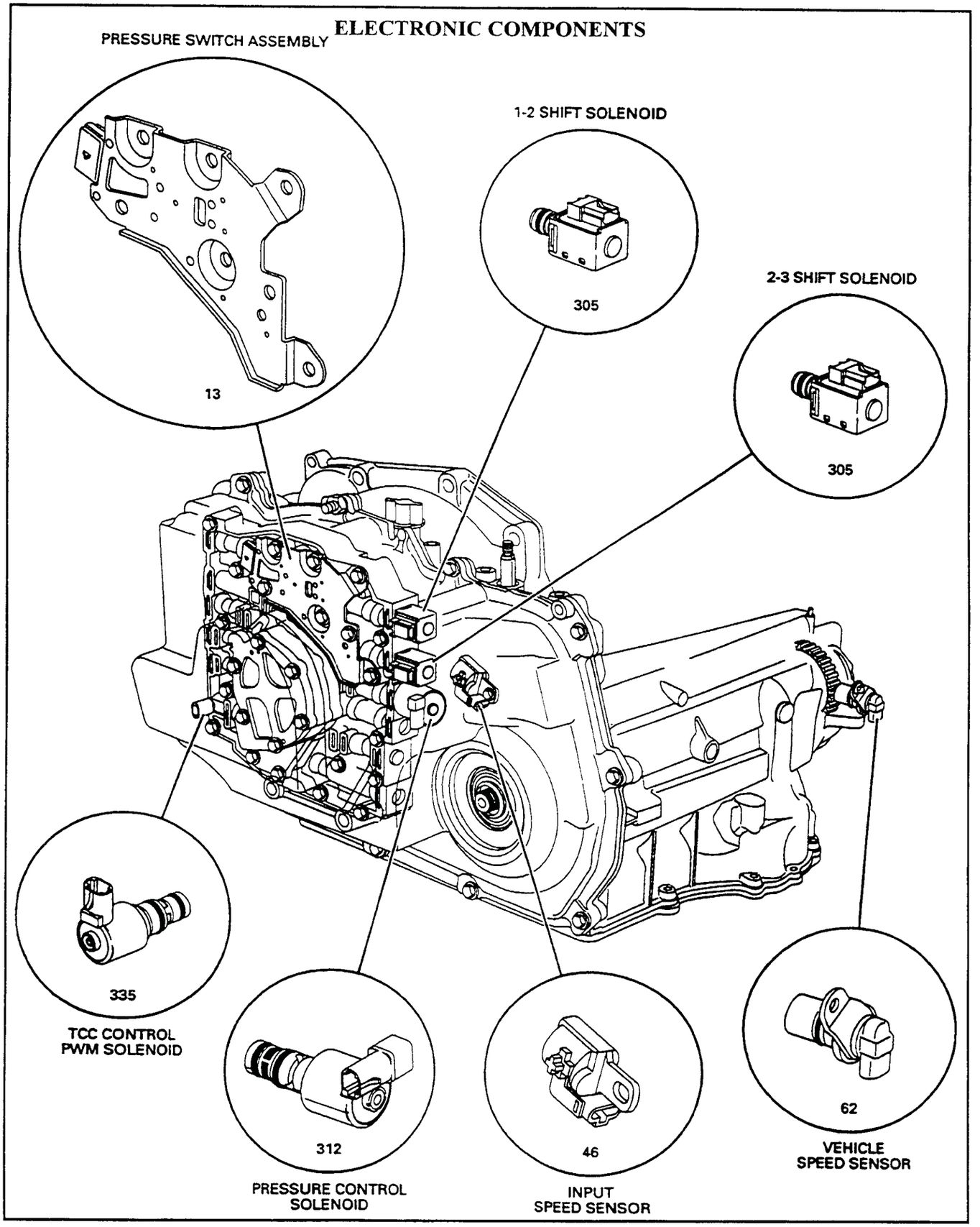
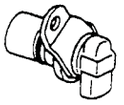

ELECTRONIC COMPONENTS
PRESSURE SWITCH ASSEMBLY
13
1-2 SHIFT SOLENOID
305
2-3 SHIFT SOLENOID
305
335
TCC CONTROL PWM SOLENOID
312
PRESSURE CONTROL SOLENOID
46
INPUT SPEED SENSOR
62
VEHICLE SPEED SENSOR

Figure 10

Vehicle Speed Sensor



The vehicle speed sensor is a magnetic inductive pickup that relays information relative to vehicle speed to the PCM. Vehicle speed information is used by the PCM to control shift timing, line pressure, and TCC apply and release.

The vehicle speed sensor mounts in the case at the speed sensor rotor which is pressed onto the differential. An air gap of 0.27 - 1.57 mm (0.011 - 0.062 inch) is maintained between the sensor and the teeth on the speed sensor rotor. The sensor consists of a permanent magnet surrounded by a coil of wire. As the differential rotates, an AC signal is induced in the vehicle speed sensor. Higher vehicle speeds induce a higher frequency and voltage measurement at the sensor.

Sensor resistance should measure between 1500 - 1750 ohms at 20°C (68°F). Output voltage will vary with vehicle speed from a minimum of 0.5 Volts AC at 25 RPM, to 200 Volts at 1728 RPM.

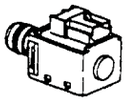
Transaxle Input Speed Sensor

The input speed sensor is a magnetic inductive pickup that relays information relative to transaxle input speed to the PCM. The PCM uses transaxle input speed information to control line pressure, TCC apply and release and transaxle shift patterns. This information is also used to calculate the appropriate operating gear ratios and TCC slippage.

The vehicle speed sensor mounts on the transaxle case under the channel plate and next to the drive sprocket. An air gap of 0.26 - 2.90 mm (0.010 - 0.114 inch) is maintained between the sensor and the teeth on the drive sprocket. The sensor consists of a permanent magnet surrounded by a coil of wire. As the drive sprocket is driven by the turbine shaft, an AC signal is induced in the input speed sensor. Higher vehicle speeds induce a higher frequency and voltage measurement at the sensor.

Sensor resistance should measure between 625 - 725 ohms at 20°C (68°F). Output voltage will vary with vehicle speed from a minimum of 0.5 Volts AC at 550 RPM, to 200 Volts at 7000 RPM.

Shift Solenoids: 1-2 and 2-3



The shift solenoids are two identical, normally open electronic exhaust valves that control upshifts and downshifts in all forward gear ranges. These shift solenoids work together in a combination of ON and OFF sequences to control the positions of the 1-2, 2-3 and 3-4 shift valve trains. The PCM monitors numerous inputs to determine the appropriate solenoid state combination and transmission gear for the vehicle operating conditions.

GEAR	SOLENOID 1-2	SOLENOID 2-3
Park, Reverse, Neutral*	ON	OFF
First	ON	OFF
Second	OFF	OFF
Third	OFF	ON
Fourth	ON	ON

The PCM energizes the shift solenoids by providing a ground to the solenoid's electrical circuit. This sends current through the coil winding of the solenoid, thereby creating a magnetic field. The magnetic field repels the plunger inside the solenoid which seats the solenoid metering ball against the fluid inlet port. This action prevents the exhaust of fluid through the solenoid and provides an increase in fluid pressure at the end of the shift valves. This fluid pressure initiates an upshift by moving the shift valves (refer to the oil flow diagrams for a complete description of the hydraulic control of the shift valves for each gear range).

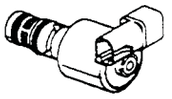
Shift solenoid resistance should measure between 19 - 24 ohms when measured at 20°C (68°F) and between 24 - 31 ohms when measured at 88°C (190°F).

The shift solenoids should energize when the voltage is greater than 7.5 volts. The shift solenoids should de-energize when the voltage is less than one volt.

* NOTE: THE SOLENOID STATES ARE NORMALLY ON (1-2) AND OFF (2-3) IN P, R, N. HOWEVER. THESE MAY CHANGE BASED ON VEHICLE SPEED AND THROTTLE POSITION.

Figure 11

Transaxle Pressure Control Solenoid



The pressure control solenoid (PCS) is a precision electronic pressure regulator that controls transaxle line pressure based on current flow through its coil windings. As current flow is increased the magnetic field produced by the coil moves the solenoid's plunger further away from the exhaust port. Opening the exhaust port decreases the output fluid pressure regulated by the PCS, which ultimately decreases line pressure. The PCM controls the PCS based on various inputs including throttle position, fluid temperature, MAP sensor and gear state.

The PCM controls the PCS on a positive duty cycle at a fixed frequency of 614 Hz (cycles per second). Duty cycle is defined as the percent of time current is flowing through the solenoid coil during each cycle. A higher duty cycle provides a greater current flow through the solenoid. The high (positive) side of the PCS electrical circuit at the PCM controls the PCS operation. The PCM provides a ground path for the circuit, monitors average current and continuously varies the PCS duty cycle to maintain the correct average current flowing through the PCS.

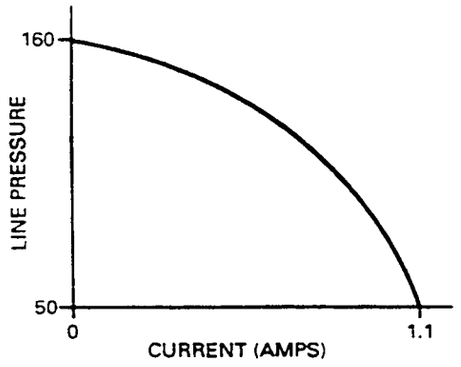
Duty Cycle	Current	Line Pressure
+ 5%	.02 Amps	Maximum
+40%	1.1 Amps	Minimum

Pressure control solenoid resistance should measure between 3.5 and 4.6 ohms when measured at 20°C (68°F).

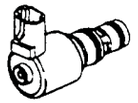
Transaxle Adapt Function

The 4T40-E uses a line pressure control system which has the ability to continuously adapt the system's line pressure (increase as needed) to compensate for normal wear of clutch fiber plates, seals, springs, etc. This "learning" feature is similar to what is used for fuel control (integrator/block learn) and throttle position (idle learn). The PCM maintains several adapt parameters for the transaxle:

- **Upshift Adapt** – The PCM monitors the TIS Sensor and VSS during commanded shifts to determine if a shift is occurring too fast (harsh) or too slow (soft) and adjusts the Transaxle Pressure Control Solenoid signal to maintain a set shift feel.



Torque Converter Clutch Solenoid



The TCC solenoid is a normally closed, pulse width modulated (PWM) solenoid used to control the apply and release of the converter clutch. The PCM operates the solenoid with a negative duty cycle at a fixed frequency of 42 Hz to control the rate of TCC apply/release. The solenoid's ability to "ramp" the TCC apply and release pressures results in a smoother TCC operation.

When vehicle operating conditions are appropriate to apply the TCC the PCM immediately increases the duty cycle to approximately 68% (see point a on graph). The PCM then ramps the duty cycle up to approximately 93% to achieve full TCC apply pressure. The rate at which the PCM increases the duty cycle controls the TCC apply. Similarly, the PCM also ramps down the TCC solenoid duty cycle to control TCC release.

There are some operating conditions that prevent or enable TCC apply under various conditions (refer to the temperature sensor description). Also, if the PCM receives a high voltage signal from the brake switch, signalling that the brake pedal is depressed, the PCM immediately releases the TCC.

Note: Duty cycles given are for example only. Actual duty cycles will vary depending on vehicle application and vehicle operating conditions.

TCC solenoid resistance should measure between 10.4 and 10.8 ohms when measured at 20°C (68°F). The resistance should measure approximately 16 ohms at 150°C (300°F).

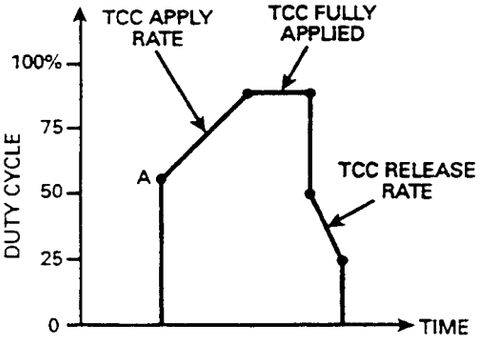


Figure 12

Transaxle Fluid Pressure Switch Assembly

The pressure switch assembly (PSA) is attached to the valve body and contains six fluid pressure switches and the transaxle temperature sensor (refer to the separate description of the temperature sensor). Five of the fluid pressure switches (PRND4, DRIVE, LO, D21, REV) are normally open and are used to indicate the position of the manual valve. The PCM uses this information to control line pressure, TCC apply and release and shift solenoid operation.

The RELEASE pressure switch is a normally closed pressure switch. 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.

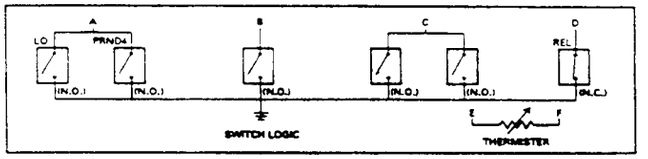
Each fluid pressure switch produces either an open or ground to the PCM depending on the presence of fluid pressure at the switches. The sequence of open and closed switches produces a combination of voltage readings that are monitored by the PCM (see chart and switch logic diagram). The PCM measures PSA signal voltage from each pin to ground and compares the voltage to a PSA combination chart stored in the PCM memory. If the PCM does not recognize the switch sequence a diagnostic code will be set as a result. A diagnostic code may also be set if the PSA switch sequence indicates a gear range selection that conflicts with other sensory inputs to the PCM.

RANGE INDICATOR	FLUID*					CIRCUIT+		
	REV	PRND4	DR	D21	LO	A	B	C
Park/Neutral	0		0	0	0	1	0	0
Reverse			0	0	0	1	0	1
Overdrive	0			0	0	1	1	0
Manual Third	0	0		0	0	0	1	0
Manual Second	0	0			0	0	1	1
Manual First	0	0				1	1	1

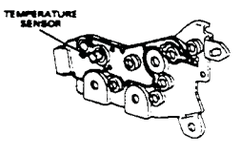
*: 1 = Pressurized
0 = Exhausted

+: 1 = Grounded (Resistance <50 ohms, 0 volts)
0 = Open (Resistance >50k ohms, 12 volts)

Note: Resistance should be measured with the engine running. When the transaxle pass thru connector is disconnected from the vehicle harness and the engine is running, multiple diagnostic codes will be set. Be sure to clear these codes when finished with this procedure.



Transaxle Temperature Sensor



The temperature sensor is a negative temperature coefficient thermistor (temperature sensitive resistor) that provides information to the PCM regarding transmission fluid temperature. The temperature sensor is integrated in the pressure switch assembly (PSA) which is bolted to the valve body. The sensor monitors pressurized main line pressure from the inside of the valve body to determine the operating temperature of the transaxle fluid. The sensor, similar to each of the PSA fluid pressure switches, uses an o-ring seal to maintian fluid pressure in the valve body.

The internal electrical resistance of the sensor varies in relation to the operating temperature of the transmission fluid (see chart). The PCM sends a 5 volt reference signal to the temperature sensor and measures the voltage drop in the electrical circuit. A lower fluid temperature creates a higher resistance in the temperature sensor, thereby measuring a higher voltage signal.

The PCM measures this voltage as another input to help control line pressure, shift schedules and TCC apply. When transaxle fluid temperature reaches 140°C (284°F) the PCM enters "hot mode". Above this temperature the PCM modifies transmission shift schedules and TCC apply in an attempt to reduce fluid temperature by reducing transmission heat generation. During hot mode the PCM applies the TCC at all times in Third and Fourth gears. Also, the PCM performs the 2-3 and 3-4 shifts earlier to help reduce fluid heat generation.

TRANSAXLE SENSOR – TEMPERATURE TO RESISTANCE TO VOLTAGE (approximate)

°C	R low (ohms)	R high (ohms)
0	7987	10859
10	4934	6407
20	3106	3923
30	1991	2483
40	1307	1611
50	878	1067
60	605	728
70	425	507
80	304	359
90	221	259
100	163	190

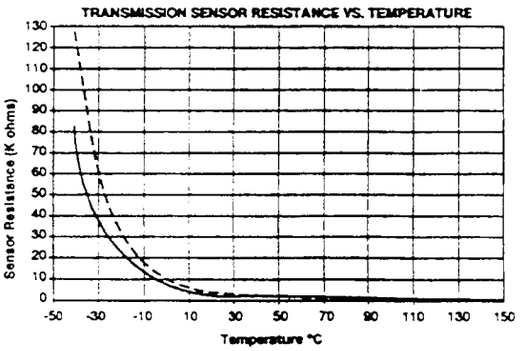
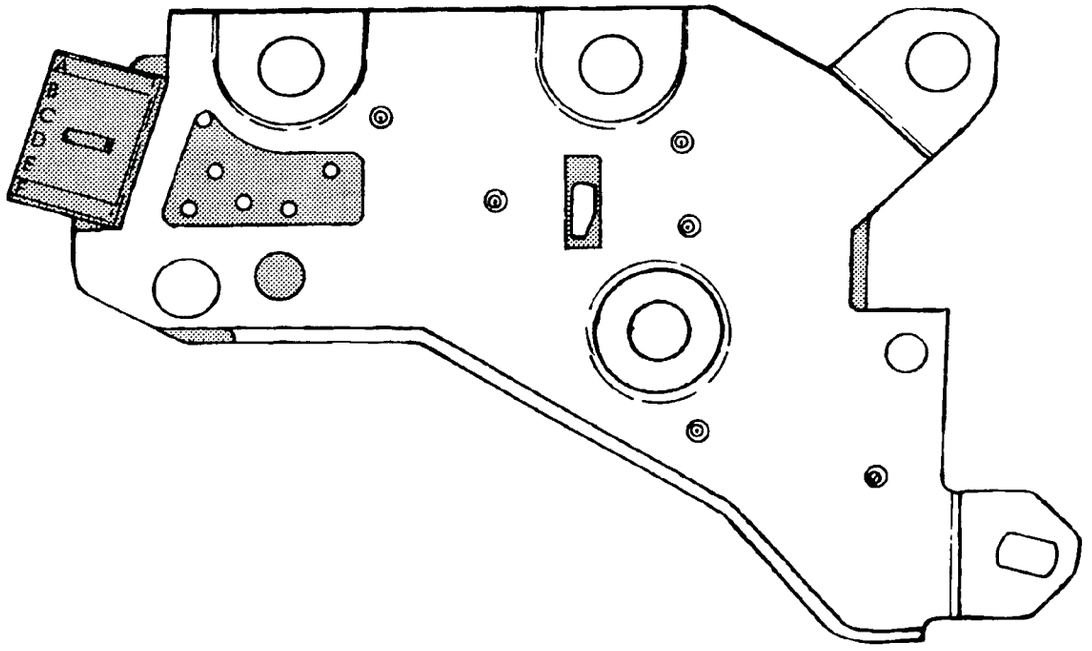


Figure 13

PRESSURE SWITCH ASSEMBLY



PRESSURE SWITCH ASSEMBLY (PSA) CONNECTOR

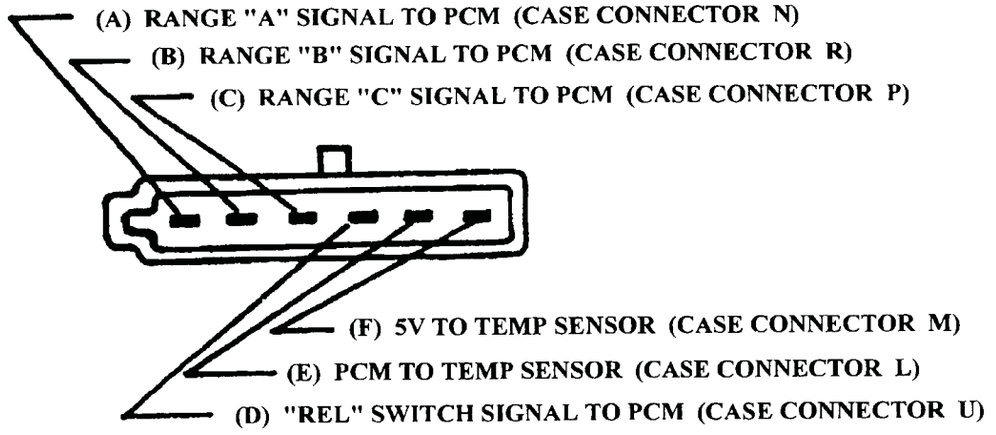
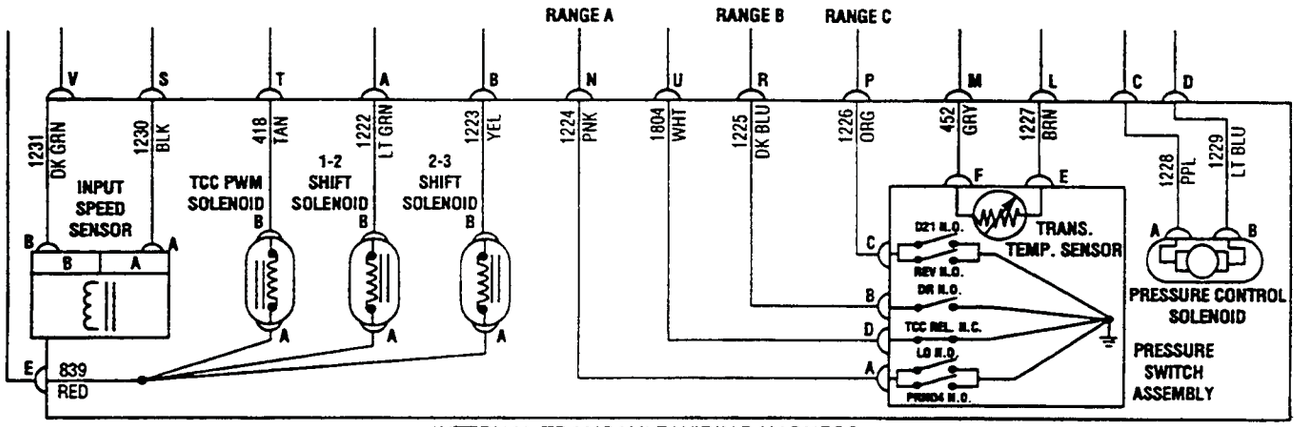


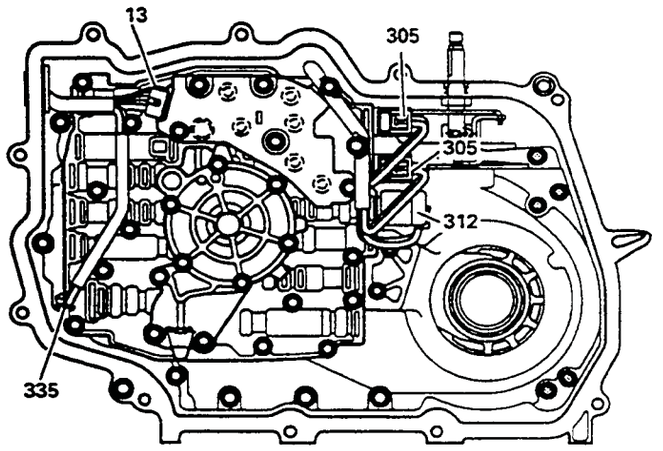
Figure 14

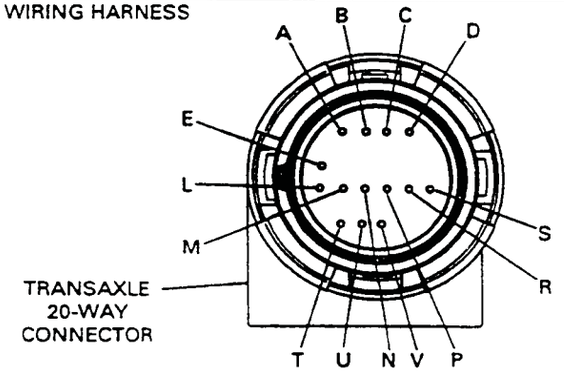
CASE CONNECTOR AND INTERNAL WIRING HARNESS



INTERNAL TRANSAXLE WIRING HARNESS

N.C. = NORMALLY CLOSED SWITCH
N.O. = NORMALLY OPEN SWITCH



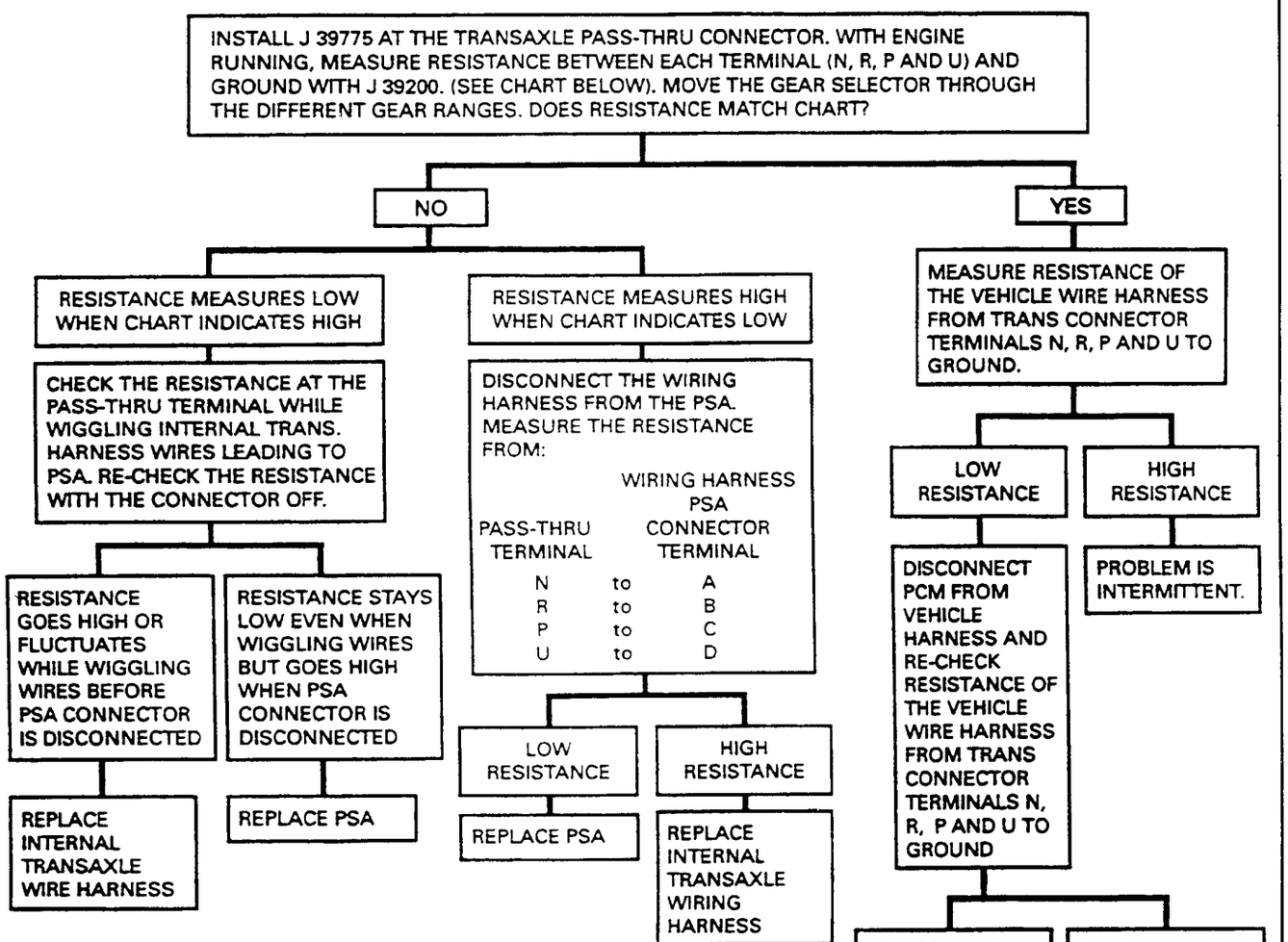


CAVITY	FUNCTION
A	1-2 SHIFT SOLENOID
B	2-3 SHIFT SOLENOID
C	PRESSURE CONTROL SOLENOID (HIGH)
D	PRESSURE CONTROL SOLENOID (LOW)
E	BOTH SHIFT SOLENOIDS AND TCC PWM SOLENOID
L	TRANSAXLE FLUID TEMPERATURE SENSOR (HIGH)
M	TRANSAXLE FLUID TEMPERATURE SENSOR (LOW)
N	RANGE SIGNAL "A"
P	RANGE SIGNAL "C"
R	RANGE SIGNAL "B"
S	INPUT SPEED SENSOR (HIGH)
T	TCC PWM SOLENOID
U	TCC RELEASE SWITCH
V	INPUT SPEED SENSOR (LOW)

13 PRESSURE SWITCH ASSEMBLY (PSA)
305 SOLENOID, SHIFT (1-2 & 2-3)
312 SOLENOID, PRESSURE CONTROL
335 SOLENOID, TCC PWM CONTROL

Figure 15

4T40-E TRANSAXLE
PRESSURE SWITCH ASSEMBLY (PSA) RESISTANCE CHECK



Pressure Switch Assembly Resistance Chart
NOTE: Engine must be running

Gear Selector	Range			TCC Rel
Position	A	B	C	D
PASS-THRU PIN	N	R	P	U
PARK	L	H	H	
REVERSE	L	H	L	
NEUTRAL	L	H	H	
D	L	L	H	
3	H	L	H	
2	H	L	L	
1	L	L	L	
TCC APPLIED				L
TCC OFF				H
ENGINE OFF, ANY GEAR	H	H	H	L

When range "X" is measured for resistance to ground,
H = High resistance (greater than 50K Ohms) - open circuit
L = Low resistance (less than 200 Ohms) - grounded circuit

IMPORTANT:

Whenever the transaxle pass-thru connector is disconnected from the vehicle harness and the engine is running, multiple transaxle Diagnostic Trouble Codes will set. Be sure to clear these codes when finished with this procedure.

Figure 16

4T40-E COMPONENT RESISTANCE CHART

COMPONENT	PASS THRU PINS	RES 20° C OHMS	RES 100° C OHMS	RES TO GND (CASE) OHMS
1-2 SHIFT SOLENOID	A, E	19-24 Ω	24-31 Ω	Greater than 250 K Ω
2-3 SHIFT SOLENOID	B, E	19-24 Ω	24-31 Ω	Greater than 250 K Ω
TCC CONTROL PWM	T, E	10-11 Ω	13-15 Ω	Greater than 250 K Ω
PRESSURE CONTROL SOLENOID	C, D	3-5 Ω	4-7 Ω	Greater than 250 K Ω
PRESSURE SWITCH ASSEMBLY	SEE PSA RESISTANCE CHECK			
* TRANSAXLE FLUID TEMPERATURE SENSOR	M, L	3106-3923 Ω	164-190 Ω	Greater than 20 M Ω
INPUT SPEED SENSOR	S, V	615-700 Ω	750-835 Ω	Greater than 10 M Ω
VEHICLE SPEED SENSOR	A, B (OSS) CONN	1550-1650 Ω	1700-1870 Ω	Greater than 10 M Ω

* NOTE: The resistance of this device is necessarily temperature dependant and will therefore vary far more than any other device.

CENTIGRADE TO FARENHEIT CHART

°C	°F	°C	°F
0	32	91	194
7	40	103	213
19	68	115	239
31	86	127	260
43	110	139	284
55	131	151	302
67	145		
79	176		

Figure 17

CONDITION	INSPECT COMPONENT	FOR CAUSE
HIGH OR LOW LINE PRESSURE (Verify With Gage) (All Shifts Harsh or Soft)	• Oil Level	– High or Low: correct as required.
	• Pressure Regulator Valve (328), Springs (326, 327) and Boost Valve (325)	– Stuck.
Possible Codes: - 121 TP Sensor Circuit – Range/ Performance Problem	• Pressure Control Solenoid (312)	– Leak, o-rings damaged. – Loose connector, pins damaged. – Contaminated.
- 122 TP Sensor Circuit – Low Input	• Torque Signal Regulator Valve (309)	– Stuck.
- 123 TP Sensor Switch "A" Circuit – Intermittent		
- 502 VSS Circuit – Low Input	• Transmission Wiring Harness (11)	– Loose connector at vehicle harness, short.
- 503 VSS Circuit – Intermittent/Erratic	• Pressure Switch Assembly (13)	– Loose connector. – Damaged or missing o-ring.
- 712 Trans Fluid Temp Sensor Circuit – Low Input		
- 713 Trans Fluid Temp Sensor Circuit – High Input	• Throttle Position Sensor	– Damaged, sticking, disconnected. – Intermittent open or shorted circuit.
- 716 Input Speed Sensor Circuit – Range/Performance	• Oil Filter (85)	– Clogged, broken, loose.
- 717 Input Speed Sensor Circuit – No Signal	• Oil Filter Seal (84)	– Leaking.
- 742 TCC Stuck On		
- 748 PCS – Electrical	• Cooler Lines	– Clogged or restricted.
- 751 1-2 Shift Solenoid Performance	• Cooler Line Seals (49)	– Leaking.
- 753 1-2 Shift Solenoid Electrical	• Oil Pump (10)	– Damaged, sticking, porosity, leaking.
- 756 2-3 Shift Solenoid Performance	• Oil Pump Drive Shaft (19)	– Damaged.
- 758 2-3 Shift Solenoid Electrical	• Pressure Relief Valve (214)	– Damaged spring, ball missing.
- 1560 System Voltage Malfunction		
- 1810 PSA Malfunction	• Transaxle Case (1), Valve Body (18), Channel Plate (27)	– Porosity, leaking circuits. – Flatness of machined surfaces.
- 1811 Max Adapt/Longshift		
- 1871 Undefined Gear Ratio		
- 1887 TCC Release Switch Malfunction		
INACCURATE / INCONSISTENT SHIFT POINTS	• Shift Solenoids (305)	– Contamination. – Intermittent open or shorted circuit.
Possible Codes: - 121 TP Sensor Circuit – Range/Performance Problem	• Throttle Position Sensor	– Damaged, disconnect. – Intermittent open or shorted circuit.
- 122 TP Sensor Circuit – Low Input	• Vehicle (62) and Input Speed Sensors (46)	– Damaged, disconnected, loose. – Intermittent open or shorted circuit.
- 123 TP Sensor Switch "A" Circuit – Intermittent		
- 502 VSS Circuit – Low Input		
- 503 VSS Circuit – Intermittent/Erratic		

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4T40-E UNIT REPAIR SECTION

Figure 18

CONDITION	INSPECT COMPONENT	FOR CAUSE
INACCURATE / INCONSISTENT SHIFT POINTS (Continued) - 716 Input Speed Sensor Circuit – Range/Performance - 717 Input Speed Sensor Circuit – No Signal - 751 1-2 Shift Solenoid – Performance - 753 1-2 Shift Solenoid – Electrical - 756 2-3 Shift Solenoid – Performance - 758 2-3 Shift Solenoid – Electrical - 1560 System Voltage Malfunction		
HARSH SHIFTS (General)	• Line Pressure • Checkballs (26) • Accumulators • Clutch Housing Retainer and Ball Assemblies	– High (See High Line Pressure). – Missing; no orificed apply. – Springs or piston binding; no accumulation. – Accumulator valve stuck. – Plugged.
NO REVERSE, SLIPS IN REVERSE Possible Codes: - 1810 PSA Malfunction with Input Speed Sensor	• Reverse Clutch – Piston and Seal Assembly (457) – Inner Seal (456) – Clutch Plates (460 - 463) – Snap Ring (459, 464) – Housing (454) – Housing Retainer and Ball Assembly – Springs (458) • Reverse Clutch Fluid Routing – Driven Sprocket Support (95) – Channel Plate & Gasket, and Valve Body, Gaskets and Channel Plate • Lo & Reverse Band and Servo – Servo Piston (69) – Servo Piston Seals (71, 72) – Servo Pin (67) and Springs (66, 68) – Servo Cover (73)	– No apply / slipping. – Binding, cracked, leaking. – Orifice plugged. – Friction worn, splines broken. – Out of position. – Cracked, feed holes plugged, tangs broken. – Missing / out of position. – Binding. – Fluid leak / restriction. – Seal rings leaking. – Porosity, damaged, misaligned. – Porosity, fluid leak across channels, misaligned, damaged, fluid restriction. – No apply / slipping. – Broken, binding. – Leaking. – Binding. – Broken, loose, leaking.

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4T40-E UNIT REPAIR SECTION

Figure 19

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO REVERSE, SLIPS IN REVERSE (Continued)	– Lo & Reverse Band (111)	– Broken, worn, out of position.
	– Anchor Pin (64)	– Broken.
	– Fluid Feed Tubes (83)	– Broken, bent, plugged, seal rings missing / leaking.
	– Transaxle Case (1)	– Porosity, fluid leak or restriction.
	• Shift Linkage	– Disconnected, misaligned.
	• Manual Valve (800) and Link (802)	– Disconnected, misaligned.
	• #1 Checkball (LO/PRN)	– Missing (No Lo Band Fluid).
	• Fluid Level	– Low.
	• Fluid Pressure	– Low (See Low Fluid Pressure).
NO FIRST GEAR, SLIPS IN FIRST GEAR Possible Codes: - 502 VSS Circuit – Low Input - 503 VSS Circuit – Intermittent/Erratic - 716 Input Speed Sensor Circuit – Range/Performance - 717 Input Speed Sensor Circuit – No Signal - 751 1-2 Shift Solenoid Performance - 753 1-2 Shift Solenoid Electrical - 756 2-3 Shift Solenoid Performance - 758 2-3 Shift Solenoid Electrical - 1810 PSA Malfunction with Input Speed Sensor - 1871 Undefined Gear Ratio	• Forward Clutch	– No apply / slipping.
	– Piston and Seal Assembly (607)	– Binding, cracked, leaking.
	– Inner Seal (608)	– Orifice Plugged.
	– Clutch Plates (601 - 604)	– Splines broken, friction worn.
	– Snap Ring (600, 605)	– Out of position.
	– Housing (609)	– Cracked, feed holes plugged.
	– Housing Retainer and Ball Assembly	– Missing, out of position.
	– Springs (606)	– Binding.
	• Input Sprag (515)	– Damaged, not holding.
	• Lo Roller Clutch (652)	– Damaged, not holding.
	• Forward Clutch Fluid Routing	– Fluid leak or restriction.
	– Oil Feed Tubes (83)	– Bent, broken, seal rings leaking, plugged.
	– Forward Clutch Support (114)	– Porosity, seal rings leaking, damaged, feed holes plugged.
	– Channel Plate (27) and Gasket (28)	– Porosity, misaligned, fluid leak across channels or restriction.
	– PSA (13)	– Drive switch o-ring leaking.
	• 1-2 Shift Solenoid (305)	– Failed "OFF", leaking.
	• 1-2 Shift Valve (302)	– Stuck in upshifted position.
	• 2-3 Shift Solenoid (305)	– Failed "ON", exhaust plugged.
	• Manual Valve (800) / Shift Linkage	– Misaligned.
	• Torque Converter (55)	– Stator roller clutch not holding.
	• Line Pressure	– Low (See Low Line Pressure).

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4T40-E UNIT REPAIR SECTION

Figure 20

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO SECOND GEAR, SLIPS IN SECOND GEAR Possible Codes: - 751 1-2 Shift Solenoid Performance - 753 1-2 Shift Solenoid Electrical - 1871 Undefined Gear Ratio	• 2nd Clutch – Piston and Seal Assembly (404) – Clutch Plates (96 - 99) – Snap Ring (406) – Springs (405) – Driven Sprocket Support (95)	– No apply / slipping. – Binding, cracked, leaking. – Friction worn, splines broken. – Out of position. – Binding. – Damaged, leaking, porosity.
	• 2nd Clutch Fluid Routing – Valve Body, Gaskets & Spacer Plate; Channel Plate & Gasket; and Driven Sprocket Support	– Fluid leak or restriction. – Porosity, misaligned, loose, restriction, fluid leak across channels.
	• 2nd Roller Clutch (452)	– Damaged, not holding.
	• 1-2 Shift Solenoid (305)	– Stuck "ON", plugged.
	• Forward Clutch • Line Pressure	– Low Capacity shows up in Second Gear. – Low (See Low Line Pressure).
	• 1-2 Accumulator (29-31)	– Leak at piston seal. – Channel plate / case porosity.
	• 1-2 Accumulator Valve (323)	– Stuck.
	• 2-3 Shift Valve (306)	– Stuck in upshifted position.
	• PSA	– Malfunction (Electrical or Hydraulic)
NO THIRD GEAR, SLIPS IN THIRD GEAR Possible Codes: - 756 2-3 Shift Solenoid Performance - 758 2-3 Shift Solenoid Electrical - 1871 Undefined Gear Ratio	• Direct Clutch – Piston and Seal Assembly (518) – Clutch Plates (521 - 523) – Snap Ring (520) – Springs (519) – Direct & Coast Housing and Input Shaft (520) – Housing Retainer and Ball Assembly	– No apply / slipping. – Binding, cracked, leaking. – Friction worn, splines broken. – Out of position. – Binding. – Damaged, cracked, feed holes restricted. – Missing, loose.
	• Direct Clutch Fluid Routing – Valve Body, Gaskets & Spacer Plate; Channel Plate & Gasket; Driven Sprocket Support – Driven Sprocket Support Seals – Input Shaft	– Porosity, misaligned, loose, fluid restriction, fluid leak across channels. – Leaking. – Seals leaking. – Sleeve damaged; misaligned.
	• 2-3 Shift Solenoid (305)	– Stuck "OFF", leaking.
	• 2-3 Accumulator	– Leak at piston seal. – Channel plate / case porosity.

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4T40-E UNIT REPAIR SECTION

Figure 21

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO THIRD GEAR, SLIPS IN THIRD GEAR (Continued)	• 2-3 Accumulator Valve (330)	– Stuck.
	• Line Pressure	– Low (See Low Line Pressure).
	• 3-4 Shift Valve (319)	– Stuck in upshifted position.
	• PSA (13)	– Malfunction (Electrical or Hydraulic).
SECOND GEAR ONLY	• 1-2 Shift Valve (302)	– Stuck in down shifted position.
NO FOURTH GEAR, SLIPS IN FOURTH GEAR Possible Codes: - 751 1-2 Shift Solenoid Performance - 753 1-2 Shift Solenoid Electrical - 1871 Undefined Gear Ratio	• Intermediate / 4th Band & Servo – Servo Piston (77) – Servo Piston Seals (78, 79) – Servo Pin (76) and – Servo Cover (80) – Band (100) – Case (1)	– No apply / slipping. – Broken, binding. – Leaking. – Binding. Springs (75, 68) – Broken, loose, leaking. – Broken, worn, out of position. – Cracked at band seat.
	• Band Apply Fluid Routing – Valve Body, Gaskets & Spacer Plate; Channel Plate; Case	– Porosity, misaligned, loose, fluid restricting, fluid leak across channels.
	• 1-2 Shift Solenoid (305)	– Stuck "OFF", leaking.
	• 3-4 Shift Valve (319)	– Stuck in downshifted position.
	• Manual Valve (800)	– Misaligned (in Manual Third).
	• 3-4 Accumulator	– Leak at piston seal. – Channel plate / case porosity.
	• 3-4 Accumulator Valve (323)	– Stuck.
	• Line Pressure	– Low (See Low Line Pressure).
	• Direct Clutch	– Low capacity will cause failure in Fourth gear.
	• PSA	– Malfunction (Hydraulic or Electrical)
LOSS OF DRIVE	• Torque Converter (55)	– Broken lugs, failed lug weld. – Sheared lug bolts. – Worn turbine shaft splines. – Internal failure. – Cracked cover at weld.
	• Axles	– Damaged, splines worn, loose.
	• Turbine Shaft (39)	– Stripped splines.
	• Oil Pump (10)	– Seized, broken pump gears.
	• Oil Pump Shaft (19)	– Broken, stripped splines.

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4T40-E UNIT REPAIR SECTION

Figure 22

CONDITION	INSPECT COMPONENT	FOR CAUSE
LOSS OF DRIVE (Continued)	• Filter and Filter Seal (85, 84)	– Plugged, missing.
	• Fluid Level	– Low.
	• Shift Linkage	– Disconnected.
	• Drive / Driven Sprockets and Drive Chain (36, 37, 91)	– Broken.
	• Planetary Gears	– Failure, lack of lube.
	• Final Drive	– Gear failure, lack of lube.
	• Channel Plate and Gasket (28)	– Damaged, leaking, misaligned.
	• Valve Body, Gaskets and Spacer Plate	– Damaged, leaking, misaligned.
	• Forward Sprag Clutch; Forward Clutch; Lo Roller Clutch	– Damaged, not holding. (See No First Gear)
	• Hydraulic System	– Tie up, fluid circuit leaks
LOSS OF POWER Possible Codes: - 751 1-2 Shift Solenoid Performance - 753 1-2 Shift Solenoid Electrical - 756 2-3 Shift Solenoid Performance - 758 2-3 Shift Solenoid Electrical	• Fluid Level	– Low.
	• Shift Solenoids (305)	– Failed "OFF", 2nd gear start. – 2-3 Shift solenoid, failed "ON"
	• TCC System	– TCC stuck on or dragging.
	• Torque Converter (55)	– Contaminated, damaged.
ENGINE STALL Possible Codes: - 742 TCC Circuit stuck on	• TCC System – TCC Solenoid (335) – TCC Regulated Apply Valve (339)	– TCC stuck on or dragging. – Stuck "ON", solenoid exhaust plugged. – Stuck in apply position.
1ST AND 2ND GEARS ONLY Possible Codes: - 756 2-3 Shift Solenoid Performance - 758 2-3 Shift Solenoid Electrical	• 2-3 Shift Solenoid (305)	– Stuck "OFF"; solenoid leaking, electrical.
	• 2-3 Shift Valve (307)	– Stuck in downshifted position.
	• Direct Clutch	– Failed clutch (released)

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Figure 23

CONDITION	INSPECT COMPONENT	FOR CAUSE
3RD AND 4TH GEARS ONLY Possible Codes: - 756 2-3 Shift Solenoid Performance - 758 2-3 Shift Solenoid Electrical	• 2-3 Shift Solenoid (305) • 1-2 and 2-3 Shift Valves	– Stuck "ON"; solenoid plugged, electrical. – Both stuck in upshifted position.
1ST AND 4TH GEARS ONLY Possible Codes: - 751 1-2 Shift Solenoid Performance - 753 1-2 Shift Solenoid Electrical	• 1-2 Shift Solenoid (305)	– Stuck "ON", electrical, solenoid plugged.
2ND AND 3RD GEARS ONLY Possible Codes: - 751 1-2 Shift Solenoid Performance - 753 1-2 Shift Solenoid Electrical	• 1-2 Shift Solenoid (305)	– Stuck "OFF", electrical, solenoid leaking.
NO PARK	• Parking Lock Actuator Assembly (807) • Detent Roller and Spring (804) • Detent Lever (806) • Manual Valve (800) • Park Lock Gear (659) • Parking Lock Pawl (663) • Park Pawl Spring (662) • Shift Linkage	– Rod bent or damaged. – Spring binding or broken. – Rod not attached to detent lever. – Bolt not torqued, loose. – Bent, damaged. – Damaged, loose (manual shaft pin missing). – Misaligned, manual valve to detent lever link bent. – Damaged teeth, splines damaged. – Damaged, tooth broken. – Broken, missing. – Misadjusted.
RATCHETING NOISE	• Parking Pawl (663)	– Return spring damaged, weak or misassembled.

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4T40-E UNIT REPAIR SECTION

Figure 24

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO ENGINE COMPRESSION BRAKING: ALL MANUAL RANGES	• Coast Clutch – Piston and Seal Assembly (504) – Clutch Plates (508, 509) – Springs (505) – Direct & Coast Clutch Housing and Input Shaft (502) – Housing Retainer and Ball Assembly	– No apply/ slipping. – Binding, cracked, leaking. – Friction worn, splines broken. – Binding. – Damaged cracked, fluid feed holes restricted. – Missing, loose.
	• Coast Clutch Fluid Routing –Valve Body Gaskets and Spacer Plate; Channel Plate and Gasket; Driven Sprocket Support – Driven Sprocket Support Seals – Input Shaft (502)	– Porosity, misaligned, loose, fluid restriction, fluid leak across channels. – Leaking. – Seals leaking. – Sleeve damaged, misaligned.
	• Oil Level / Line Pressure	– Low (See Low Line Pressure).
	• 3-4 Shift Valve (319)	– Stuck in 4th gear position. (No coast clutch apply).
	• Manual Valve / Shift Linkage (800)	– Misaligned.
NO ENGINE COMPRESSION BRAKING: MANUAL SECOND – SECOND GEAR Possible Codes: - 1810 PSA Malfunction	• Coast Clutch	– No apply / slipping (See No Engine Compression Braking: All Ranges).
	• Intermediate / 4th Band (100)	– No apply / slipping (See No 4th Gear: Intermediate / 4th Band – No apply).
	• Pressure Switch Assembly (13)	– Leaking, inoperative.
	• Vehicle Speed Sensor (62)	– Reads 0 mph.
NO ENGINE COMPRESSION BRAKING: MANUAL FIRST – FIRST GEAR Possible Codes: - 1810 PSA Malfunction	• Coast Clutch	– No apply / slipping (See No Engine Compression Braking: All Ranges).
	• Lo & Reverse Servo	– No apply / slipping (See No Reverse: Lo & Reverse Band – No apply / slipping).
	• Pressure Switch Assembly (13)	– Leaking, inoperative.
	• #1 Checkball (LO/PRN)	– Missing.
DRIVES IN NEUTRAL	• Forward Clutch (Drives Forward)	– Not releasing.

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4T40-E UNIT REPAIR SECTION

Figure 25

CONDITION	INSPECT COMPONENT	FOR CAUSE
DRIVES IN NEUTRAL (Continued)	• Reverse Clutch and Lo & Reverse Servo (Drives in Reverse)	– Both not releasing.
	• Manual Valve and Linkage (800)	– Misaligned.
NO GEAR SELECTIONS	• Manual Valve to Detent Lever Link (802)	– Broken, missing. – Disconnected from manual valve.
	• Manual Valve to Link Clip (801)	– Disconnected.
	• Manual Valve (800)	– Stuck.
	• Shift Linkage	– Disconnected.
	• Valve Body, Channel Plate and Case	– Blocked fluid channels.
SHIFT INDICATOR INDICATES WRONG GEAR SELECTION	• Indicator Linkage	– Misadjusted.
	• Detent Spring and Roller Assembly (804)	– Broken, missing. – Bolt loose,
	• Manual Valve (800)	– Not connected to detent lever.
FLUID LEAKS	• Refer to Fluid Leak Diagnosis in this section.	
FLUID FOAMING	• Fluid	– Degraded fluid. – Contaminate (Antifreeze). – Transaxle overfilled.
	• Cooler Lines	– Plugged
	• Transaxle Oil Filter (85)	– Clogged. – Cracked.
	• Filter Seal (84)	– Leaking.
	• Side Cover Seal (6)	– Damaged.
	• Engine	– Overheated.
	• Vehicle	– Overloaded.
	• Oil Level Control Valve (86)	– Damaged, loose.

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Figure 26

CONDITION	INSPECT COMPONENT	FOR CAUSE
VIBRATION	• Torque Converter (55)	– Out of balance. – Internal failure.
	• Transaxle / Engine	– Misaligned.
	• Output (94) / Stub Shafts (58)	– Out of balance. – Bushings worn or damaged.
	• Turbine Shaft (39)	– Worn bushings. – Out of balance.
NOISE –		
IN ALL RANGES or (A whine which may RPM load sensitive or ceases when TCC engages.)	• Torque Converter (55)	– Verify noise internal to torque converter by placing left foot on brake with gear or selector in Drive and momentarily stall engine. Torque converter noise increases under load.
A High Pitch WHINE which will intensify with engine RPM or is Oil Pressure sensitive.	• Oil Pump System	– Verify noise internal to oil pump during preliminary oil pressure check. An increase in line pressure will vary an oil pump noise.
A Popping noise similar to Popcorn popping.		– Pump cavitation - indicated by bubbles in fluid. – Transaxle fluid filter for seam leak. – Transaxle fluid filter seal for proper positioning or cut seal.
A BUZZ or High Frequency Rattle sound.	• Trace cooler pipes and check for binding or contact at the Radiator other than the Cooler pipe connectors.	– Verify pressure buzz by watching for a needle vibration on the pressure gage. (Road test may be necessary.)
A WHINE or GROWL that increases and fades with Vehicle speed and is most Noticeable under Light Acceleration.	• Drive Link Assembly System • Verify noise from sprockets and/or drive link assembly (chain) by placing left foot on brake and moving gear selector from Park or Reverse. If noise stops check items below:	
	• Drive Chain (36)	– Stretched.
	• Drive Sprocket (37) and Driven Sprocket (91)	– Teeth broken or sheared. – Bearing surfaces nicked or scored. – Bearing race or roller bearing surfaces on gear Support Inner Bearing rough or pitted. – Bearing damaged.

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4T40-E UNIT REPAIR SECTION

Figure 27

CONDITION	INSPECT COMPONENT	FOR CAUSE
NOISE – (Continued)	• Drive Sprocket Support (43) and Driven Sprocket Support (95)	– Bearing outer race support rough or nicked.
A Final Drive Noise or Hum, is most noticeable under light throttle acceleration and/or turns.	• Final Drive Gear Set (116) Final Drive Internal Gear (118)	– Worn, planet pinions or washers. – Worn, tooth damage.
	• Differential Carrier (116) Differential Side Gears (709)	– Gears worn or pitted. – Thrust washer damage.
Noise in 1st, 2nd, 3rd or 4th.	• Final Drive Sun Gear (115) Final Drive Pinions (707)	– Gear worn or damage. – Gears worn or damaged.
Noise only in certain gear ranges.	• Check Range Reference Chart. Determine power flow and applicable components that may be causing noise.	
NO TCC / SLIPPING / SOFT APPLY	• TCC Solenoid (335)	– Stuck "OFF". – O-ring leaking. – No voltage to solenoid. – Poor electrical connection.
Possible Codes: - 502 VSS Circuit – Low Input - 503 VSS Circuit – Intermittent/Erratic - 703 Torque Converter/ Brake Switch Malfunction - 712 Trans Fluid Temp Sensor Circuit – Low Input - 713 Trans Fluid Temp Sensor Circuit – High Input - 716 Input Speed Sensor Circuit – Range/Performance - 717 Input Speed Sensor Circuit – No Signal - 741 TCC Circuit – Stuck "OFF" - 742 TCC Circuit – Stuck "ON" - 751 1-2 Shift Solenoid Performance - 753 1-2 Shift Solenoid Electrical - 756 2-3 Shift Solenoid Performance - 758 2-3 Shift Solenoid Electrical - 1560 System Voltage Malfunction - 1810 PSA Malfunction - 1812 Trans Fluid Overtemp - 1887 TCC Release Switch Malfunction	• Wiring Harness (11) • PCM • Brake Switch • Pressure Regulator Valve • Torque Converter (55) • TCC Fluid Circuits • TCC Regulated Apply Valve (339) and TCC Control Valve (334) • TCC Feed Limit Valve • Fluid Level or Pressure • Cooler Lines	– Pinched wire (electrical short). – Damaged electrical connector. – No signal to solenoid. – Not functioning (open). – Stuck. – Internal failure. – Leaks (Refer to Oil Flow Diagrams). – Plugged Release Exhaust Orifice. – Stuck in TCC release position. – Stuck. – Low. – Plugged.

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Figure 28

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO TCC RELEASE	• TCC Solenoid (335)	– Internal failure. – Fluid exhaust plugged. – External Ground.
	• Torque Converter (55)	– Internal Failure.
	• TCC Regulated Apply Valve (339) and TCC Control Valve (334)	– Stuck in TCC apply position.
TCC APPLY WITH COLD ENGINE	• Engine Coolant Temp Sensor	– Malfunction.
TCC SHUDDER	• Refer to TCC Shudder Diagnosis in this section. (SEE PAGE 36)	

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Figure 29

TCC SHUDDER DIAGNOSIS

The key to diagnosing Torque Converter Clutch (TCC) shudder is to note when it happens and under what conditions.
TCC shudder should occur only during the ***Apply*** and/or ***Release*** of the converter clutch, but ***Seldom*** after the TCC plate is fully applied.

While TCC is Applying Or Releasing:

If the shudder occurs while TCC is applying, the problem can be within the transaxle and/or torque converter. Something is not allowing the clutch to become fully engaged, not allowing the clutch to release, or is trying to release and apply the clutch at the same time. This could be caused by leaking turbine shaft seals, a restricted release orifice, a distorted clutch or housing surface due to converter bolts too long, or defective friction material on the TCC plate.

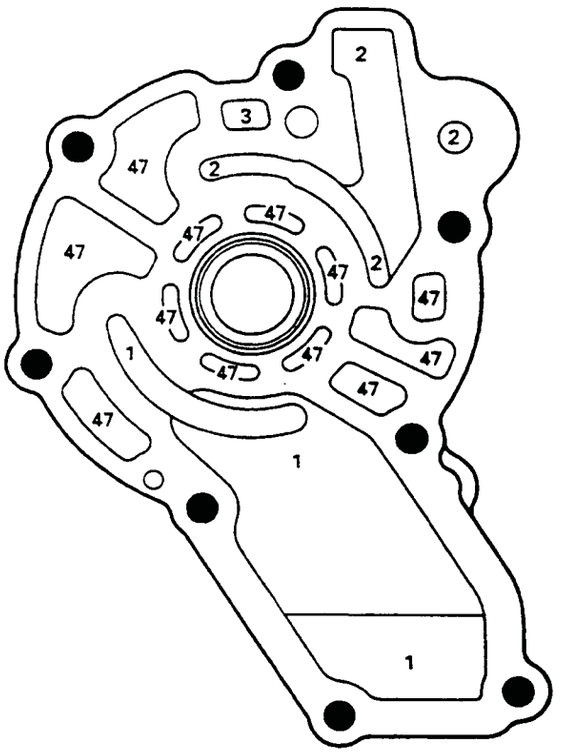
Shudder Occurs After TCC Has Applied:

In this case, most of the time there is nothing wrong with the transaxle! Once the TCC has been applied, it is very unlikely that it will slip.
Engine problems may go unnoticed under light throttle and load, but become very noticeable after TCC apply when going up a hill or accelerating, due to the mechanical coupling between the engine and transaxle.
Remember, once TCC is applied there is no torque converter (fluid coupling) assistance, and engine or driveline vibrations may not be detected before TCC engagement.

Inspect the following components to avoid possible misdiagnosis of TCC shudder and possible rebuild of the transaxle and/or replacing a torque converter unnecessarily.

1. ***Spark Plugs*** - Inspect for cracks, high resistance or broken insulators.
2. ***Plug Wires*** - Look into each end. If there is Red dust (ozone) or Black substance (carbon) present then the wires are bad. Also look for evidence of arcing during hard acceleration.
3. ***Distributor Cap and Rotor*** - Look for broken or uncrimped parts.
4. ***Ignition Coils*** - Look for idication of arcing while engine is under acceleration, and check each coil for proper ground.
5. ***Fuel Injector*** - Nozzles and/or filter plugged or partially restricted.
6. ***Vacuum Leaks*** - Engine will not get the correct amount of fuel. Engine may run rich or lean depending on where the leak is located.
7. ***EGR Valve*** - May let in too much unburnable exhaust gas and cause engine to run lean.
8. ***MAP/MAF Sensor*** - Like the vacuum leak, the engine will not recieve correct amount of fuel for proper engine operation.
9. ***Carbon on Intake Valves*** - Restricts the proper flow of air/fuel mixture into the cylinders.
10. ***Flat Camshaft*** - Valves don't open far enough to let proper fuel/air mixture into cylinders.
11. ***Oxygen Sensor*** - May command engine too rich or too lean for too long.
12. ***Fuel Pressure*** - May be too low.
13. ***Engine Mounts*** - Vibration of mounts can be multiplied by TCC engagement.
14. ***TPS*** - If TPS is out of specification, TCC may remain applied during initial engine crowd.
15. ***Cylinder Balance*** - Bad piston rings or poorly seating valves can cause low horsepower.
16. ***Fuel Contaminated*** - Engine performance can be severly impaired.

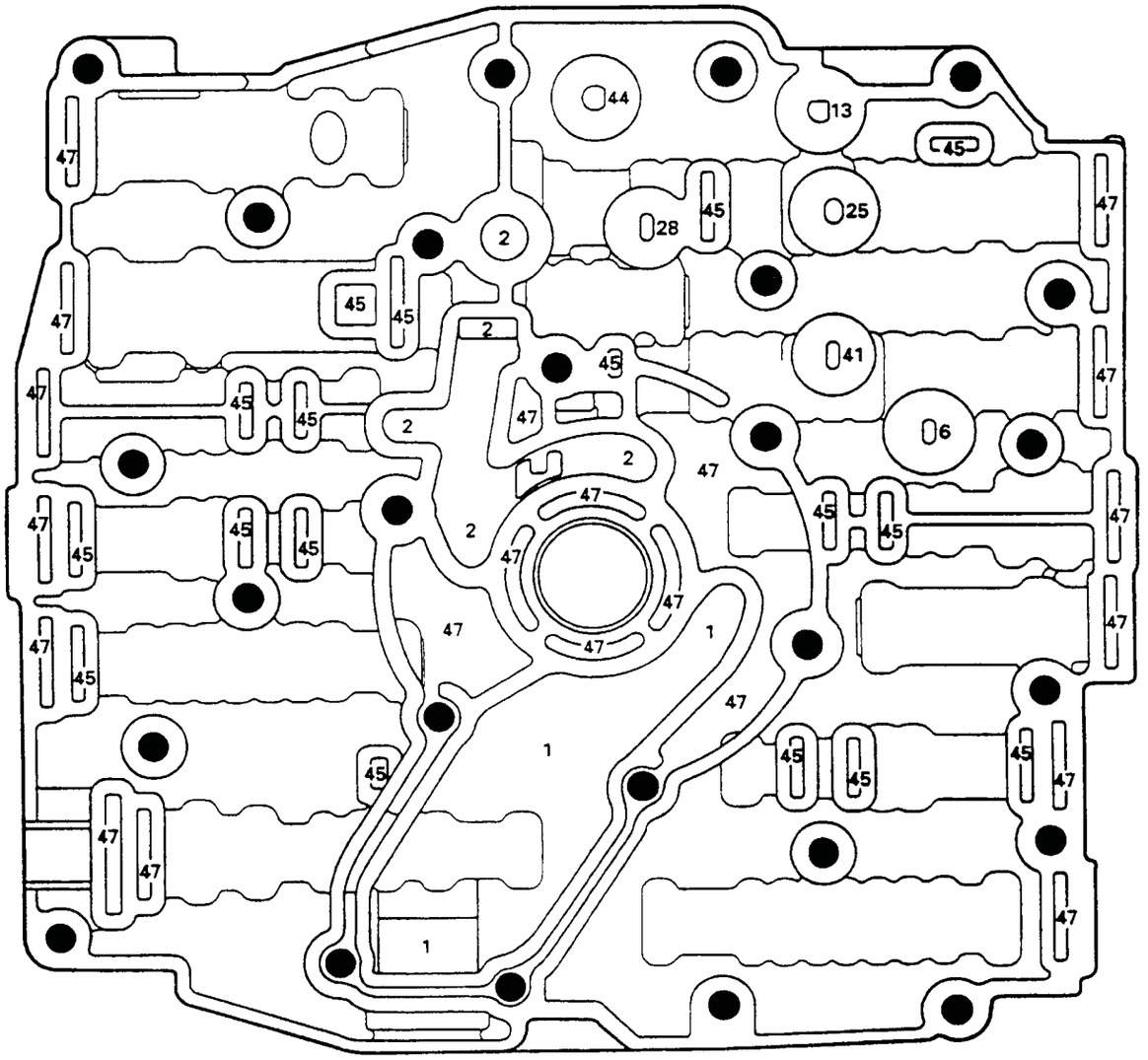
PUMP BODY OIL PASSAGES



1 SUCTION
2 LINE
3 DECREASE
47 VOID

Figure 30

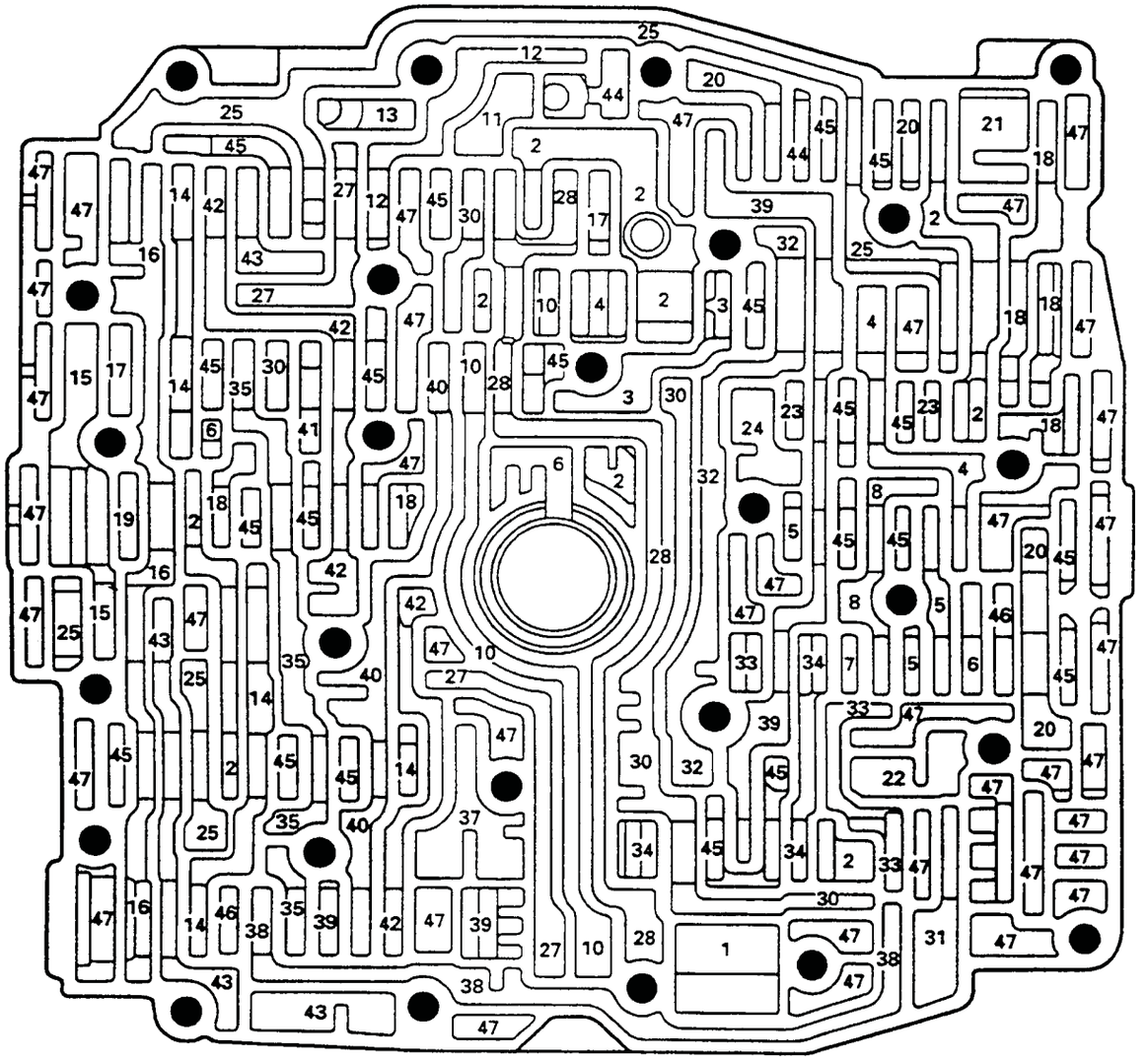
VALVE BODY PASSAGES - OIL PUMP SIDE



1	SUCTION	17	2-3 SIGNAL	33	TCC SIGNAL (PWM)
2	LINE	18	TORQUE SIGNAL	34	TCC REGULATED APPLY
3	DECREASE	19	PCS SIGNAL	35	3-4 DRIVE
4	CONVERTER FEED	20	1-2/3-4 ACCUMULATOR	36	DIRECT CLUTCH FEED
5	TCC FEED LIMIT	21	1-2 ACCUMULATOR FEED	37	DIRECT CLUTCH
6	RELEASE	22	3-4 ACCUMULATOR FEED	38	4TH BAND
7	APPLY	23	2-3 ACCUMULATOR	39	D321
8	COOLER	24	2-3 ACCUMULATOR FEED	40	COAST CLUTCH
9	LUBE 1	25	REVERSE	41	D21
10	LUBE 2	26	REVERSE CLUTCH	42	INTERMEDIATE BAND FEED
11	PRN	27	LO BAND	43	INTERMEDIATE BAND
12	LO/PRN	28	DRIVE	44	LO
13	PRND4	29	FORWARD CLUTCH	45	EXHAUST
14	ACTUATOR FEED	30	2-3 DRIVE	46	ORIFICED EXHAUST
15	FILTERED ACTUATOR FEED	31	FILTERED 2-3 DRIVE	47	VOID
16	1-2 SIGNAL	32	2ND CLUTCH		

Figure 31

VALVE BODY PASSAGES - CHANNEL PLATE SIDE



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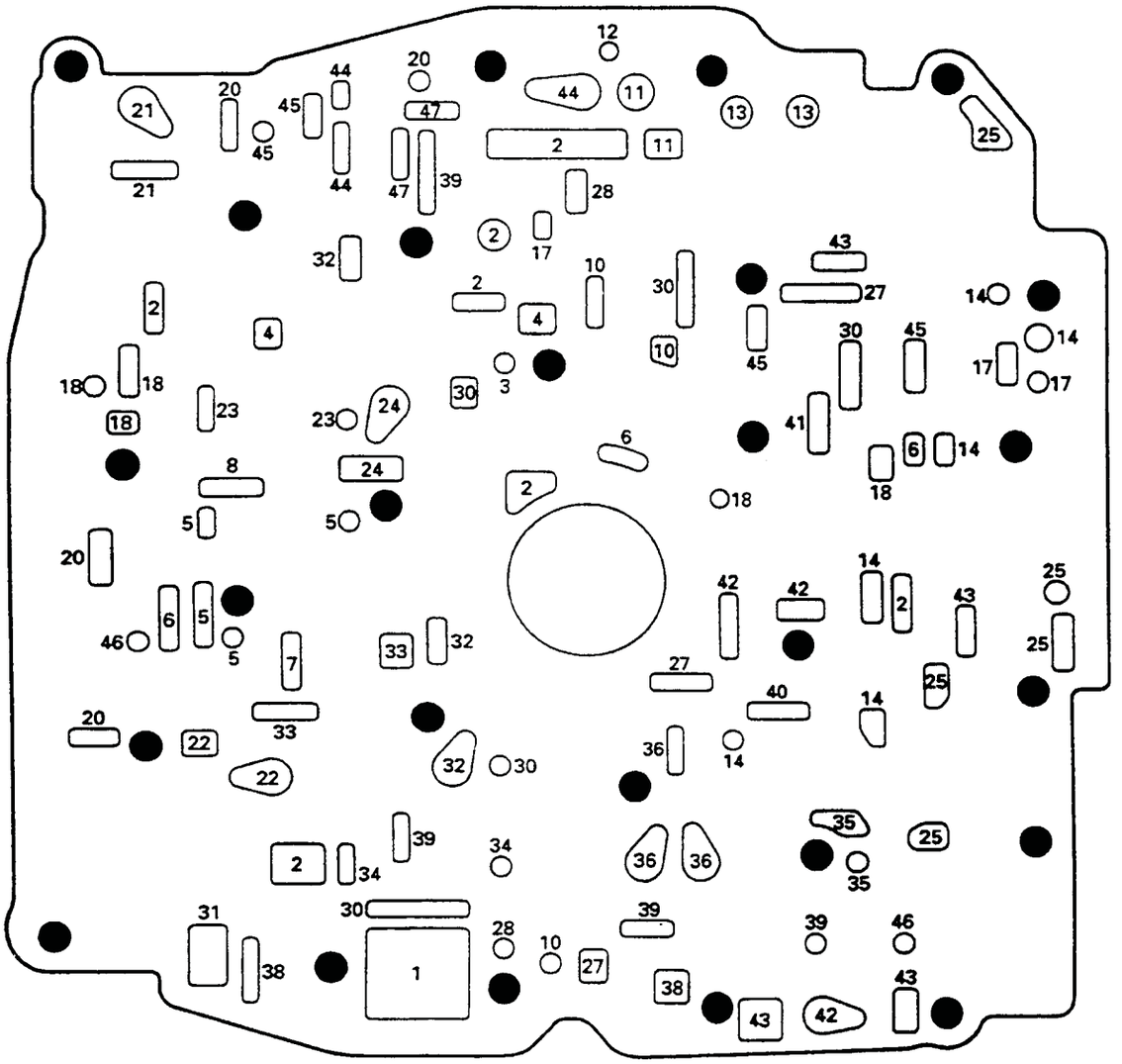
11	PRN	27	LO BAND	43	INTERMEDIATE BAND
12	LO/PRN	28	DRIVE	44	LO
13	PRND4	29	FORWARD CLUTCH	45	EXHAUST
14	ACTUATOR FEED	30	2-3 DRIVE	46	ORIFICED EXHAUST
15	FILTERED ACTUATOR FEED	31	FILTERED 2-3 DRIVE	47	VOID
16	1-2 SIGNAL	32	2ND CLUTCH		

Figure 32

VALVE BODY TO SPACER PLATE GASKET



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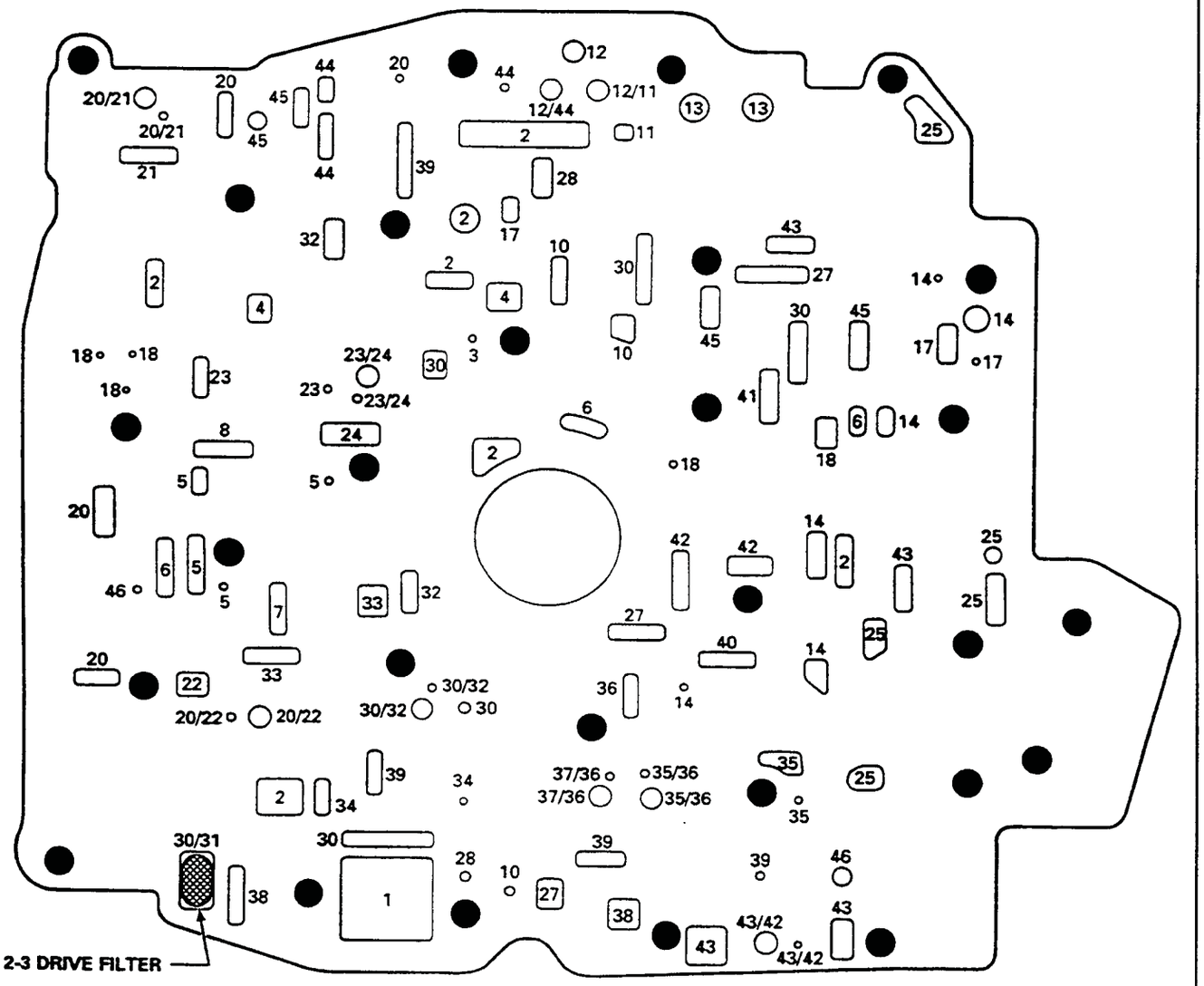
14	ACTUATOR FEED	30	2-3 DRIVE	46	ORIFICED EXHAUST
15	FILTERED ACTUATOR FEED	31	FILTERED 2-3 DRIVE	47	VOID
16	1-2 SIGNAL	32	2ND CLUTCH		

Figure 33

TYPICAL SPACER PLATE



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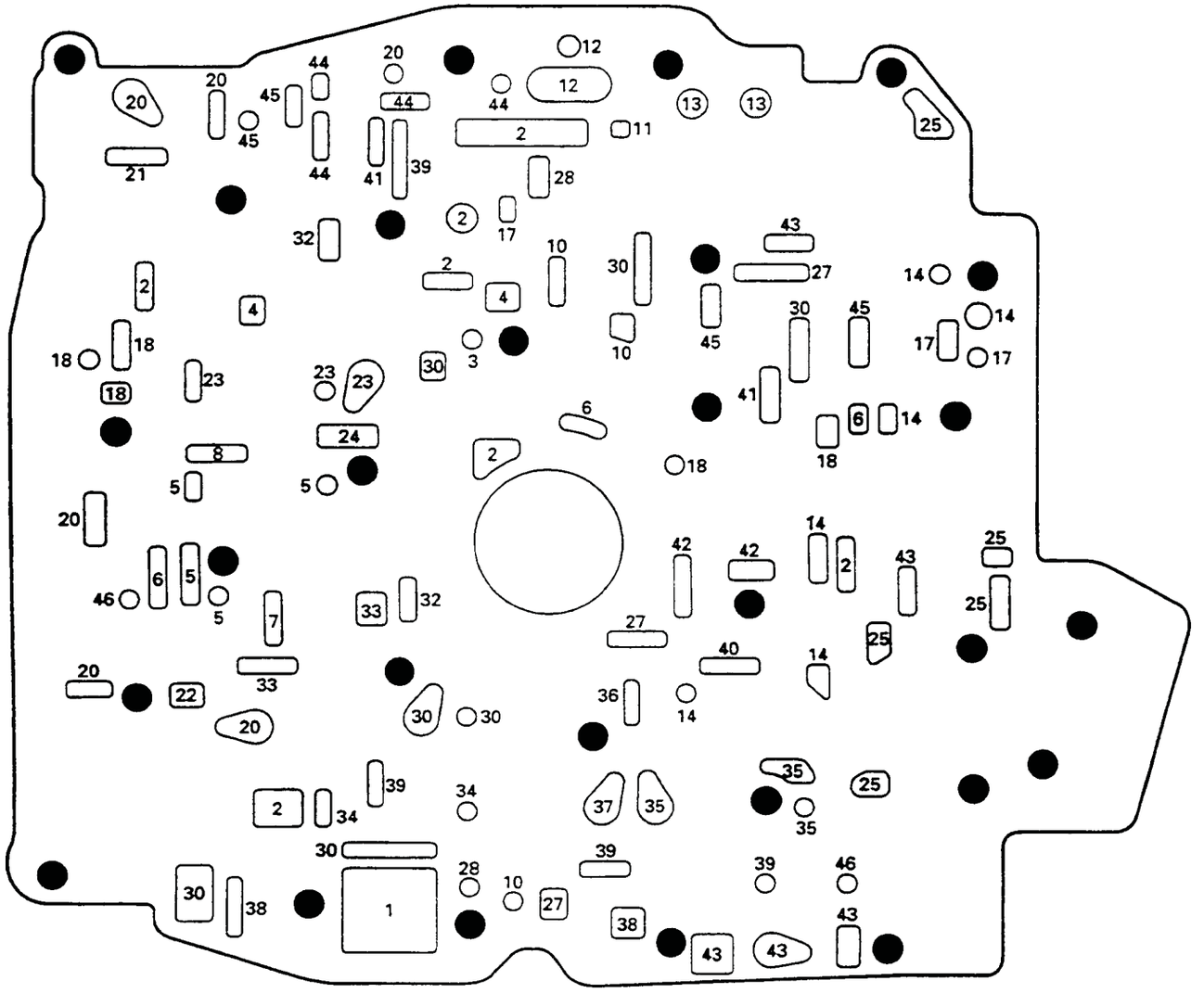
13	PRND4	29	FORWARD CLUTCH	45	EXHAUST
14	ACTUATOR FEED	30	2-3 DRIVE	46	ORIFICED EXHAUST
15	FILTERED ACTUATOR FEED	31	FILTERED 2-3 DRIVE	47	VOID
16	1-2 SIGNAL	32	2ND CLUTCH		

Figure 34

SPACER PLATE TO CHANNEL PLATE GASKET



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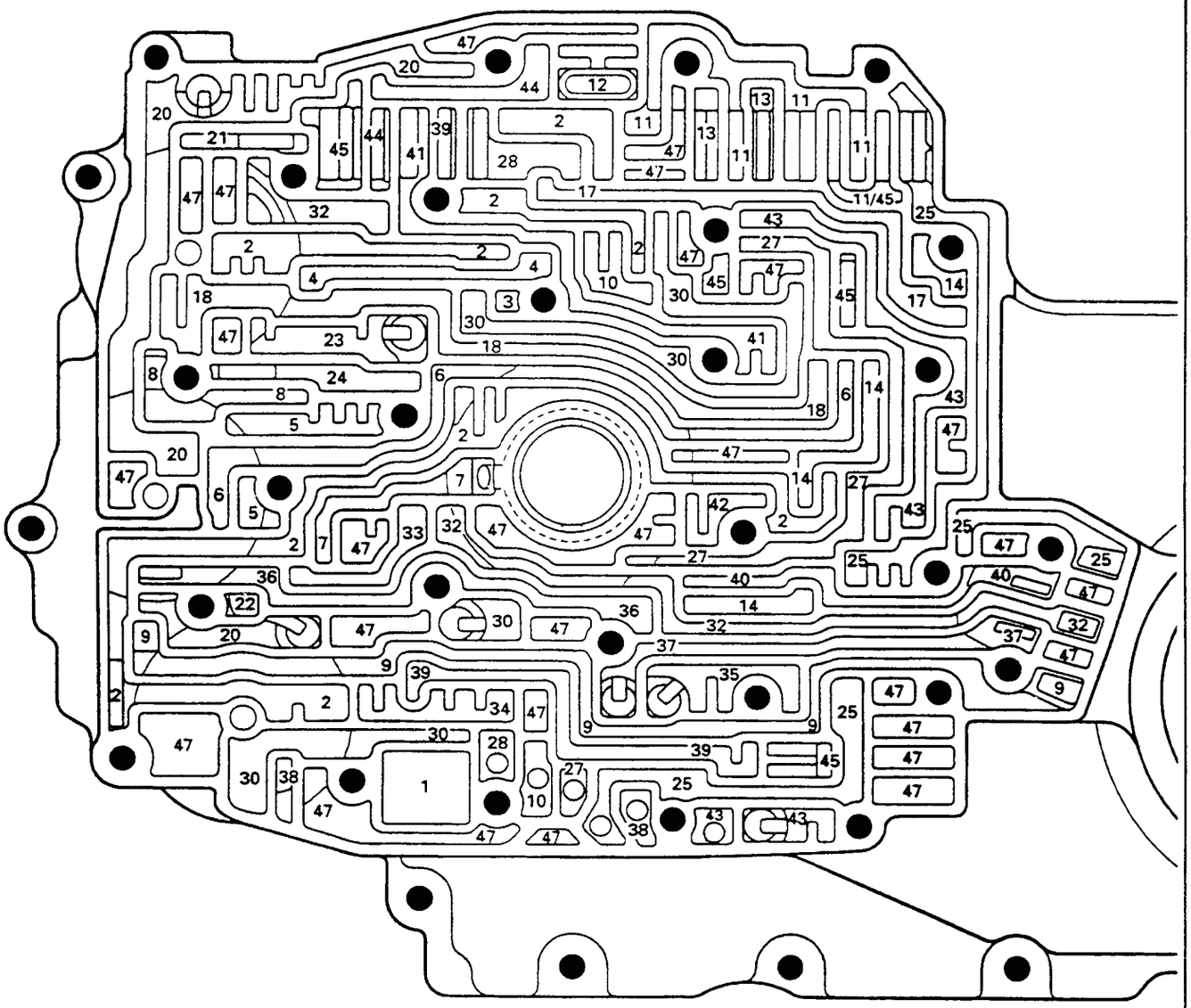
9	LUBE 1	25	REVERSE	41	D21
10	LUBE 2	26	REVERSE CLUTCH	42	INTERMEDIATE BAND FEED
11	PRN	27	LO BAND	43	INTERMEDIATE BAND
12	LO/PRN	28	DRIVE	44	LO
13	PRND4	29	FORWARD CLUTCH	45	EXHAUST
14	ACTUATOR FEED	30	2-3 DRIVE	46	ORIFICED EXHAUST
15	FILTERED ACTUATOR FEED	31	FILTERED 2-3 DRIVE	47	VOID
16	1-2 SIGNAL	32	2ND CLUTCH		

Figure 35

CHANNEL PLATE PASSAGES - VALVE BODY SIDE



1	SUCTION	17	2-3 SIGNAL	33	TCC SIGNAL (PWM)
2	LINE	18	TORQUE SIGNAL	34	TCC REGULATED APPLY
3	DECREASE	19	PCS SIGNAL	35	3-4 DRIVE
4	CONVERTER FEED	20	1-2/3-4 ACCUMULATOR	36	DIRECT CLUTCH FEED
5	TCC FEED LIMIT	21	1-2 ACCUMULATOR FEED	37	DIRECT CLUTCH
6	RELEASE	22	3-4 ACCUMULATOR FEED	38	4TH BAND
7	APPLY	23	2-3 ACCUMULATOR	39	D321
8	COOLER	24	2-3 ACCUMULATOR FEED	40	COAST CLUTCH
9	LUBE 1	25	REVERSE	41	D21
10	LUBE 2	26	REVERSE CLUTCH	42	INTERMEDIATE BAND FEED
11	PRN	27	LO BAND	43	INTERMEDIATE BAND
12	LO/PRN	28	DRIVE	44	LO
13	PRND4	29	FORWARD CLUTCH	45	EXHAUST
14	ACTUATOR FEED	30	2-3 DRIVE	46	ORIFICED EXHAUST
15	FILTERED ACTUATOR FEED	31	FILTERED 2-3 DRIVE	47	VOID
16	1-2 SIGNAL	32	2ND CLUTCH		

Figure 36

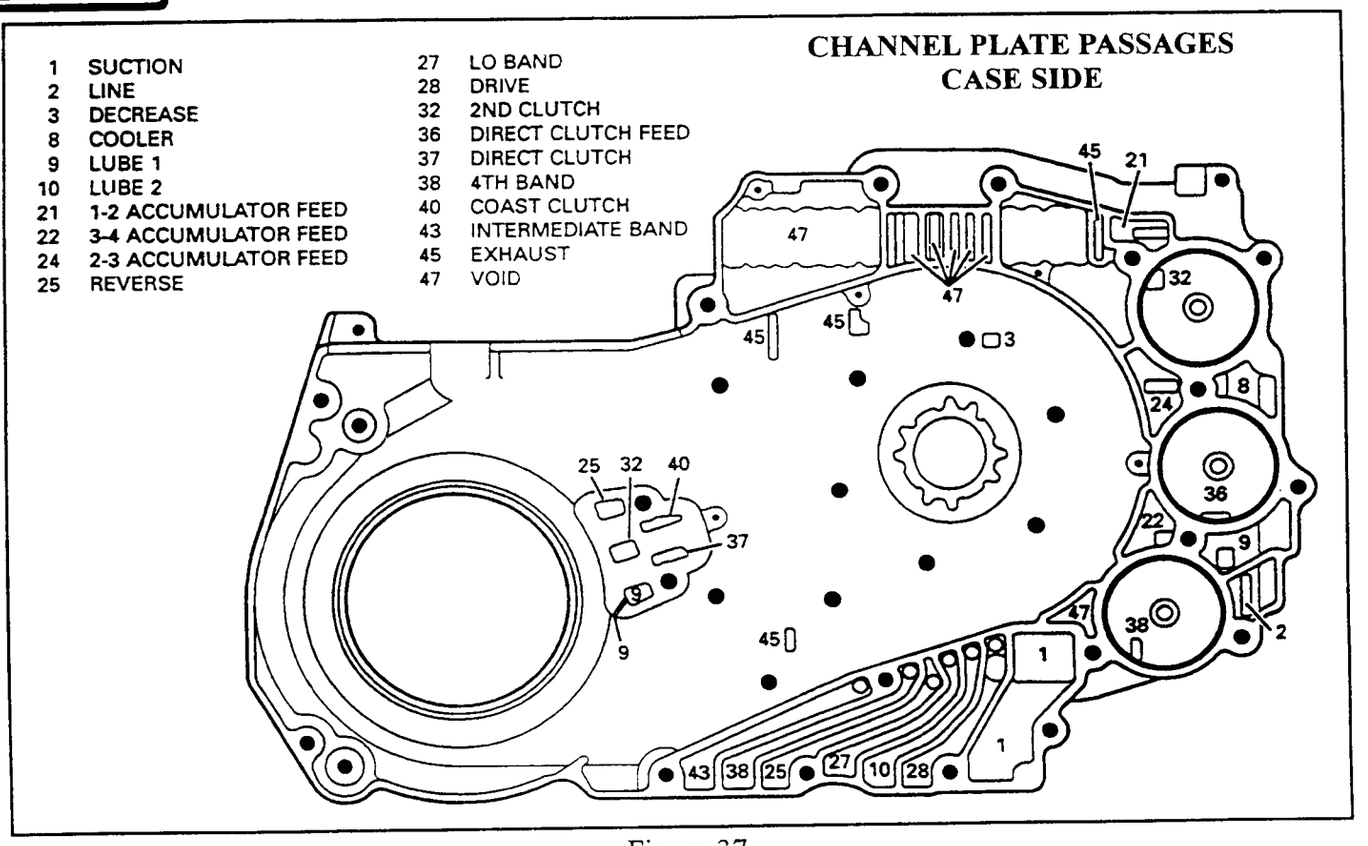


Figure 37

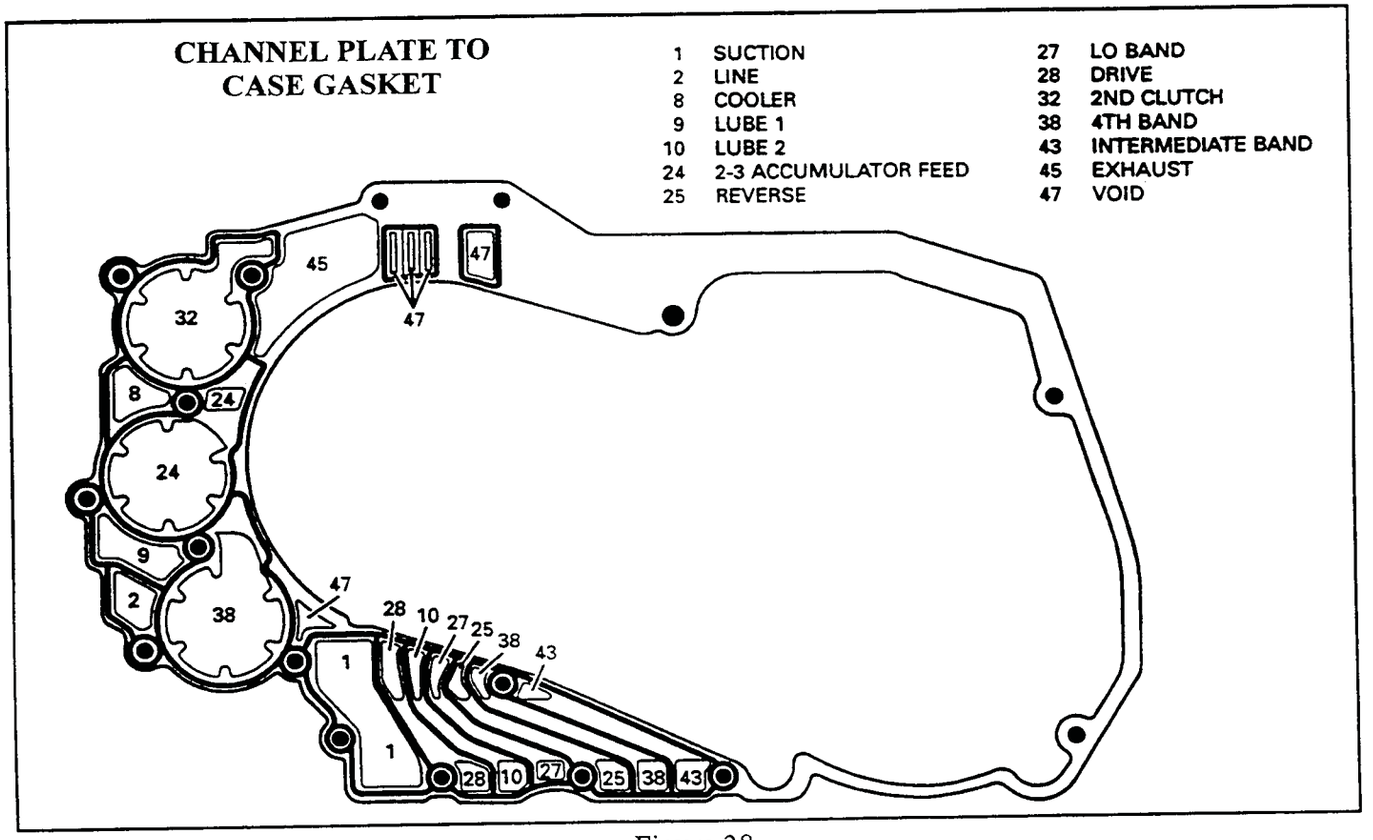


Figure 38

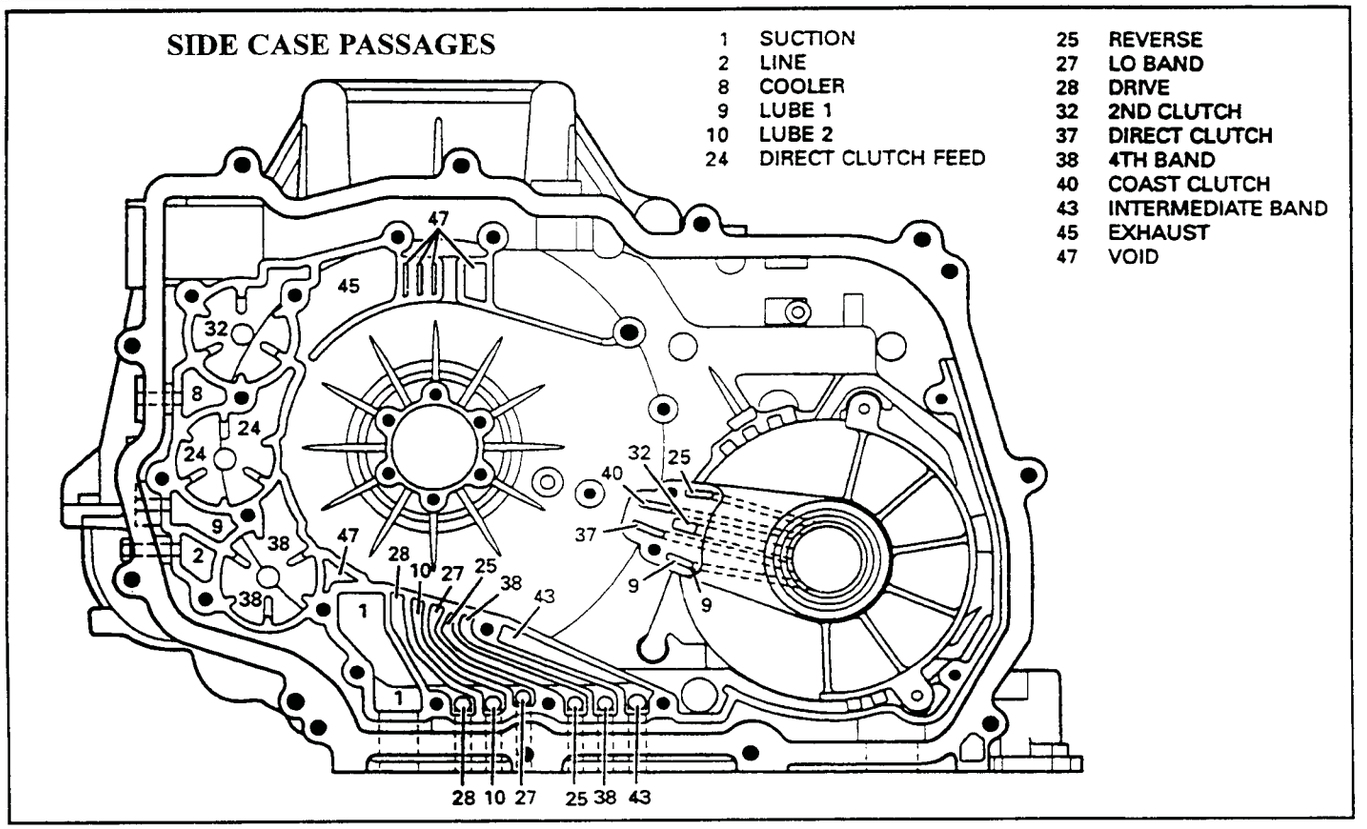


Figure 39

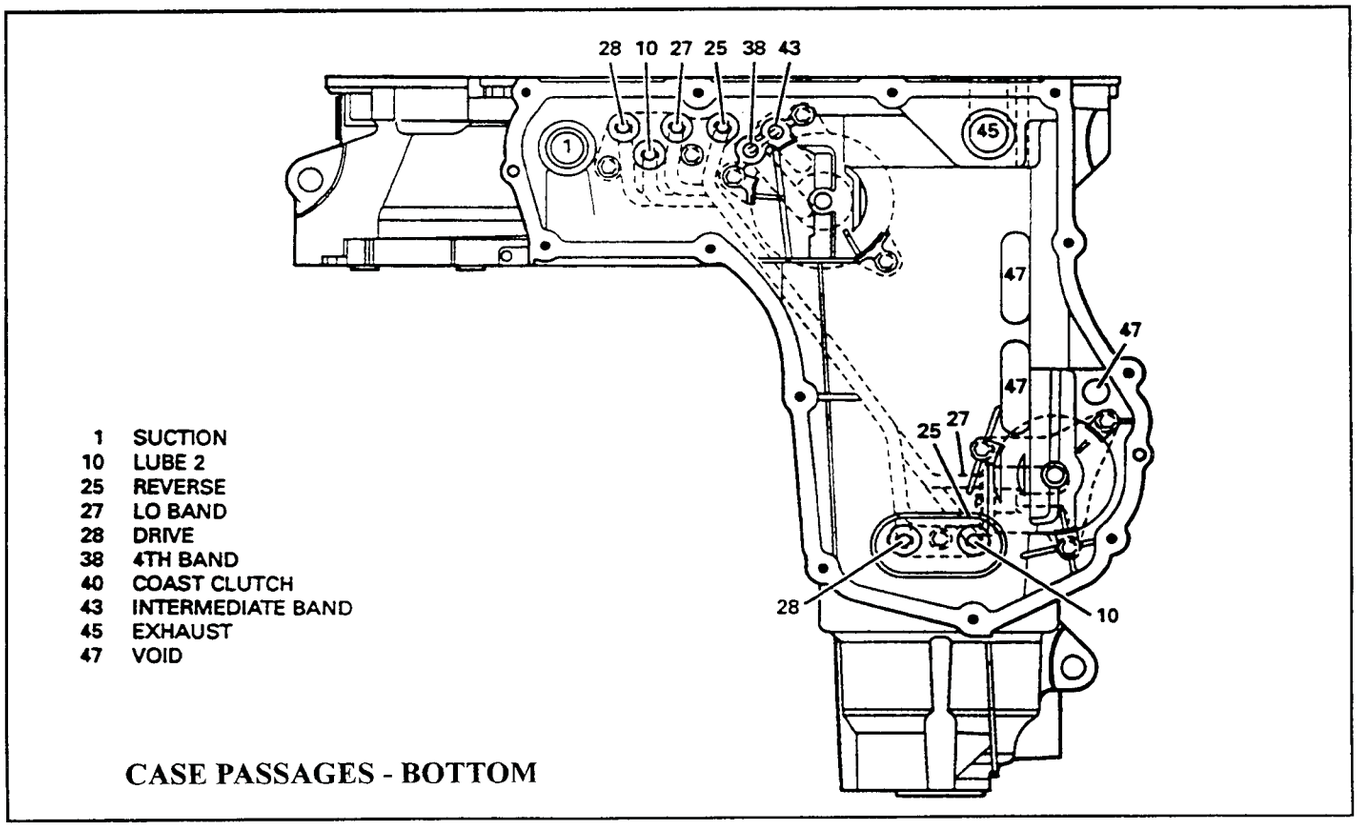
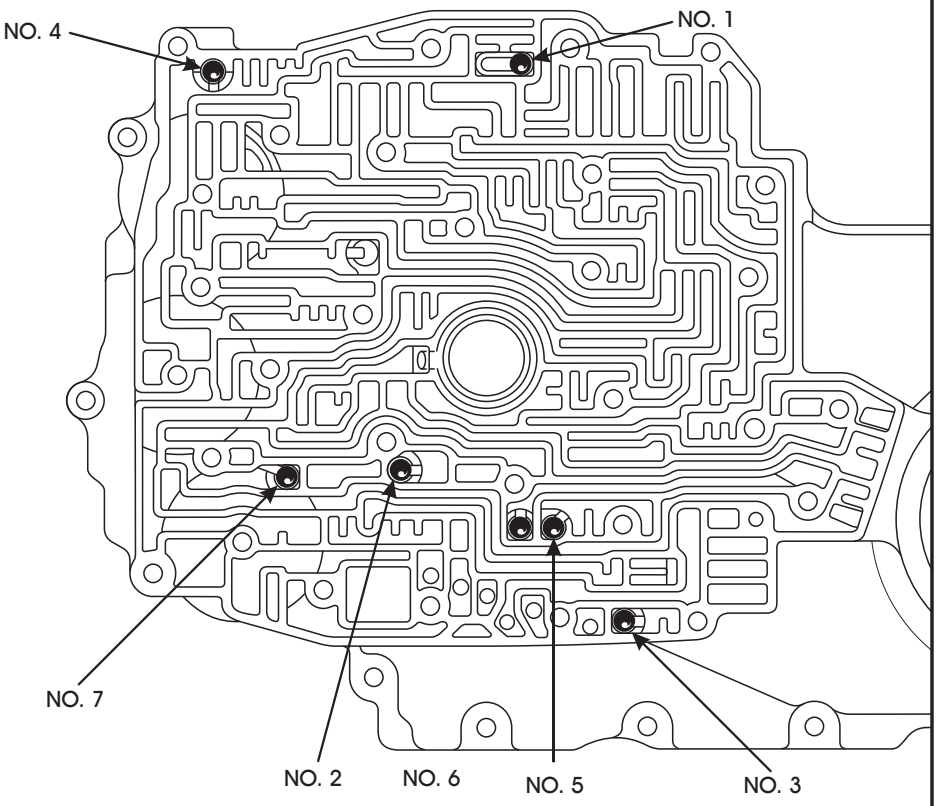


Figure 40

THM 4T40-E
1995-1996 MODELS ONLY
CHECKBALL LOCATIONS



THM 4T40-E
1997-UP MODELS ONLY
CHECKBALL LOCATIONS

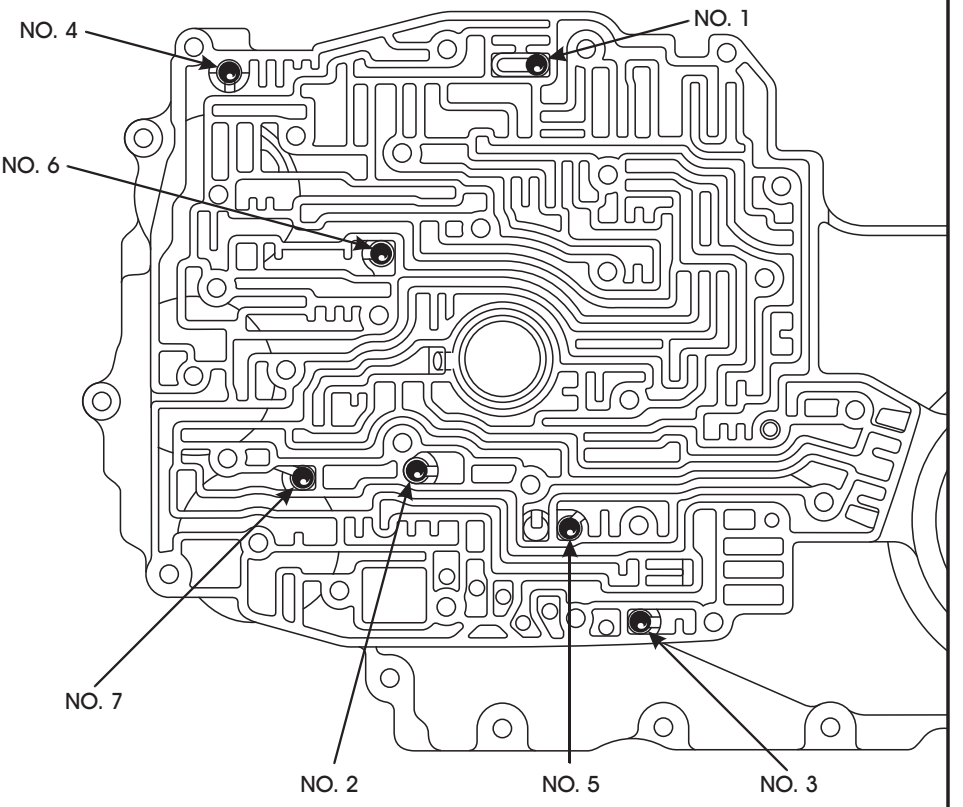
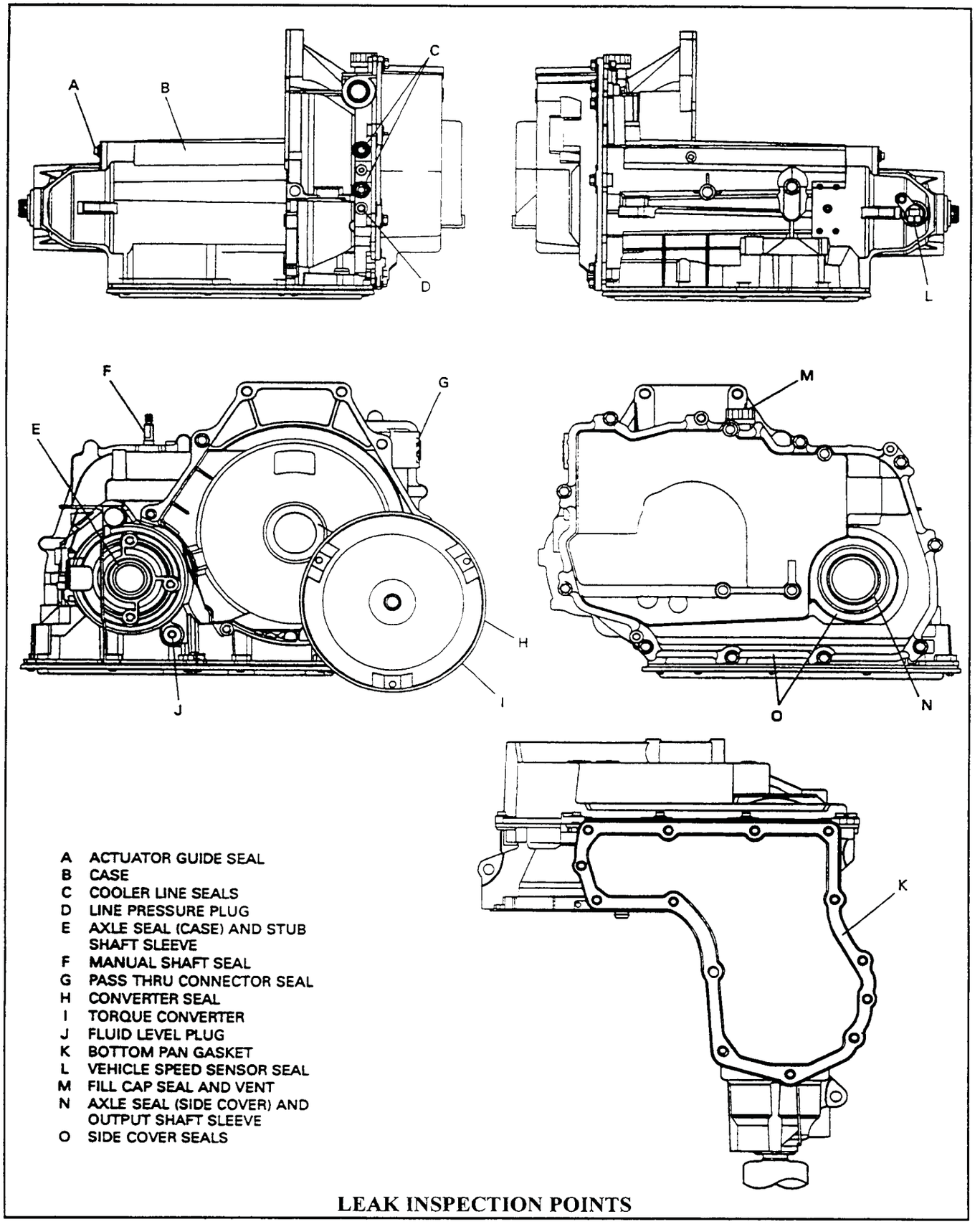


Figure 41



A ACTUATOR GUIDE SEAL
B CASE
C COOLER LINE SEALS
D LINE PRESSURE PLUG
E AXLE SEAL (CASE) AND STUB SHAFT SLEEVE
F MANUAL SHAFT SEAL
G PASS THRU CONNECTOR SEAL
H CONVERTER SEAL
I TORQUE CONVERTER
J FLUID LEVEL PLUG
K BOTTOM PAN GASKET
L VEHICLE SPEED SENSOR SEAL
M FILL CAP SEAL AND VENT
N AXLE SEAL (SIDE COVER) AND OUTPUT SHAFT SLEEVE
O SIDE COVER SEALS

LEAK INSPECTION POINTS

Figure 42

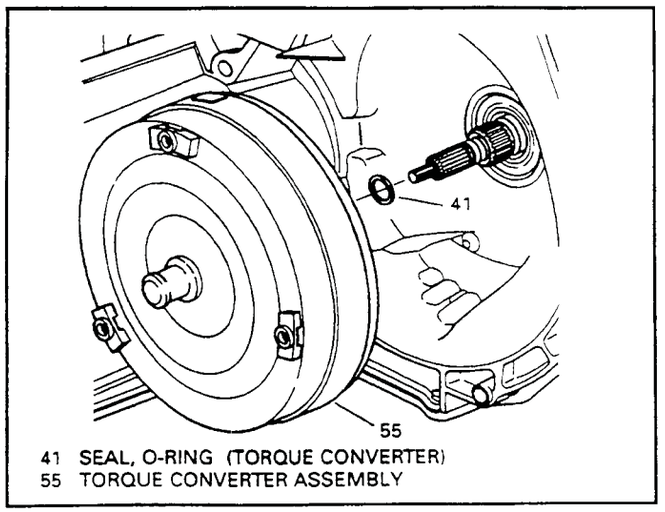


Figure 43

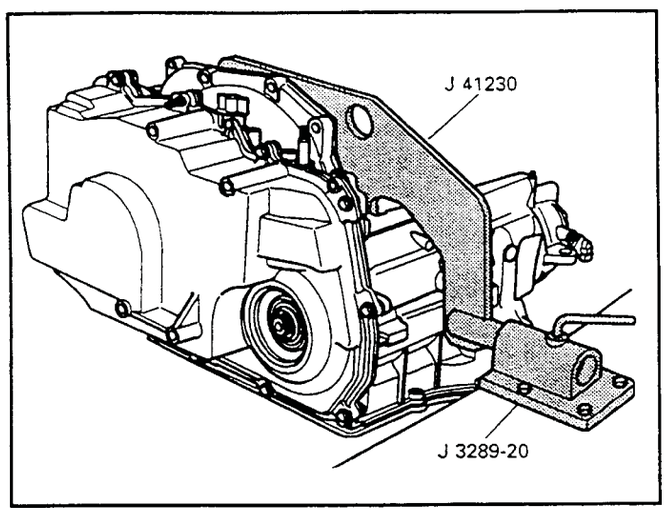


Figure 44

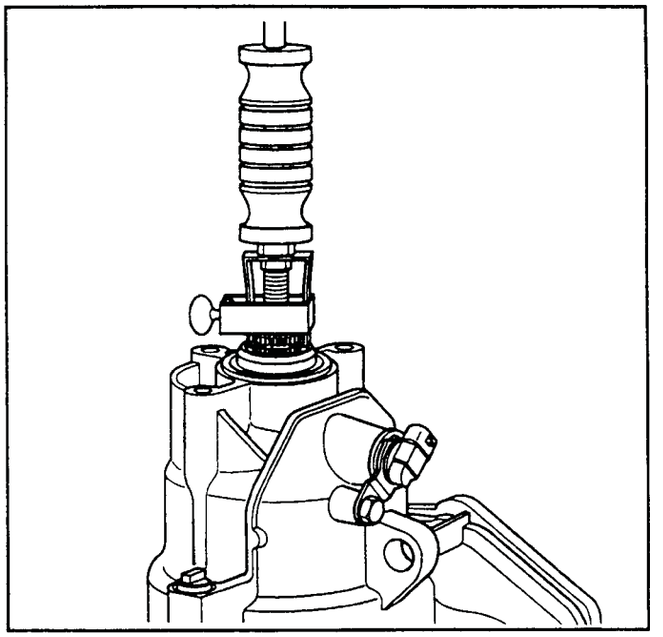
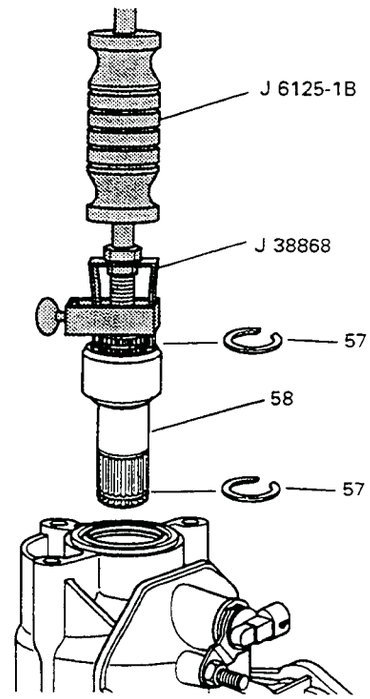


Figure 45

TRANSAXLE DISASSEMBLY

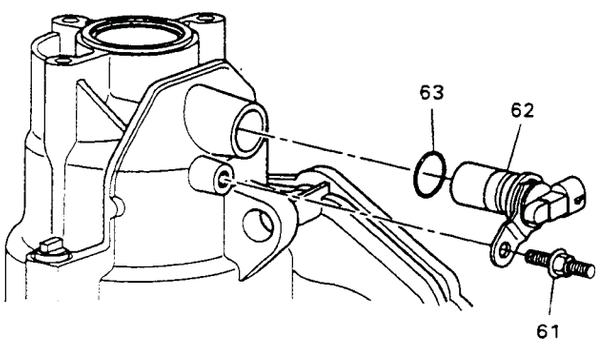
1. Thoroughly clean the exterior of the transaxle prior to disassembly.
2. Remove the torque converter assembly from the transaxle as shown in Figure 43.
3. Remove the turbine shaft "O" ring (41) from the end of the turbine shaft (See Figure 43).
4. Install transaxle support fixture J-41230 onto the transaxle as shown in Figure 44, and torque the bolts to 10 ft.lb.
5. Install the transaxle and support fixture into the fixture base J-3289-20 that is bolted to bench, as shown in Figure 44.
6. Rotate transaxle and position transaxle with the side cover facing down.
7. Insert the locking pin in the fixture base to lock the unit in place.
8. Remove and discard the snap ring (57) from the end of the stub shaft (See Figure 46). Snap ring ***is not*** reusable.
9. Attach slide hammer to the shaft removal tool J-38868 (See Figure 45).
10. Install the stub shaft removal tool into the snap ring groove on stub shaft, and tighten the shaft removal tool securely to the stub shaft, shown in Figure 45.



57 RING, OUTPUT/STUB SHAFT SNAP
58 SHAFT, OUTPUT STUB

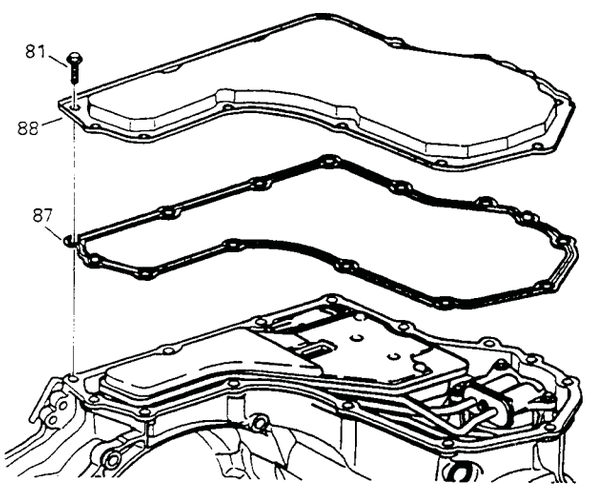
Figure 46

11. Pull lightly on the stub shaft and rotate it until the stub shaft snap ring inside at the differential seats into the taper on differential side gear.
12. Damage may occur when attempting to remove the stub shaft if the stub shaft snap ring at the differential is not properly seated.
13. Pull the stub shaft out using the slide hammer impact as shown in Figure 46.
14. With the stub axle removed you can now drain most of the fluid by rotating the transaxle with the side cover facing up.
15. After the fluid has drained, rotate the transaxle with the bottom oil pan facing up.
16. Remove the speed sensor stud (61), the speed sensor assembly (62) and "O" ring, as shown in Figure 47.
17. Pull the speed sensor assembly straight out of the transaxle case to prevent damage to the case bore (See Figure 47).
18. Remove the twelve bottom oil pan bolts, the oil pan, and oil pan gasket as shown in Figure 48.



61 STUD, VEHICLE SPEED SENSOR
62 SENSOR, VEHICLE SPEED
63 SEAL, O-RING (VEHICLE SPEED SENSOR)

Figure 47

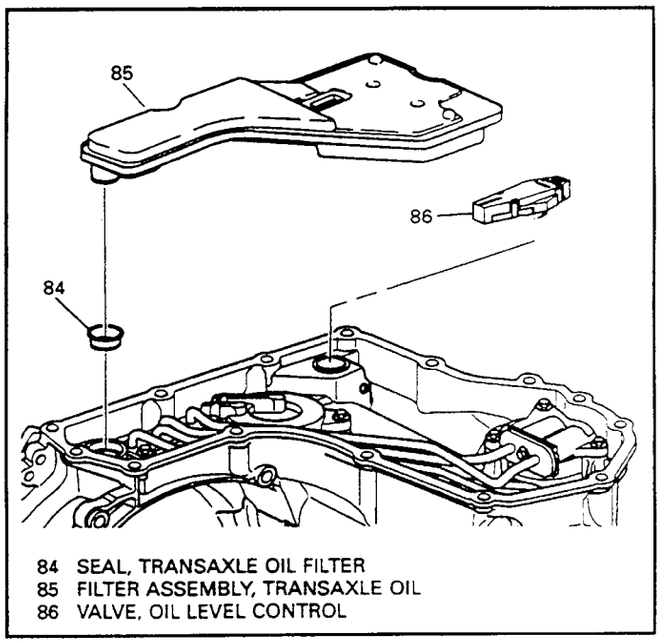


81 BOLT, OIL PAN
87 GASKET, TRANSAXLE OIL PAN
88 PAN, TRANSAXLE OIL

Figure 48

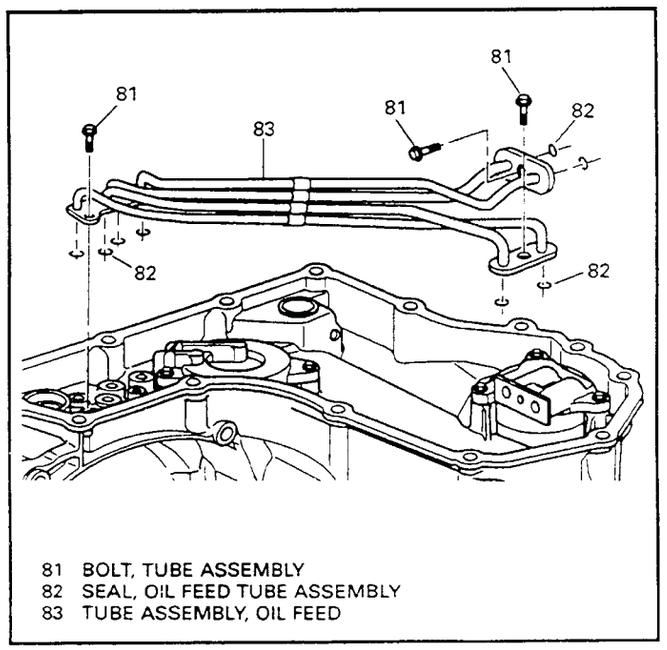
19. ***The bottom oil pan gasket is reusable as long as the beads are not broken. Do not discard.***

Continued on next Page



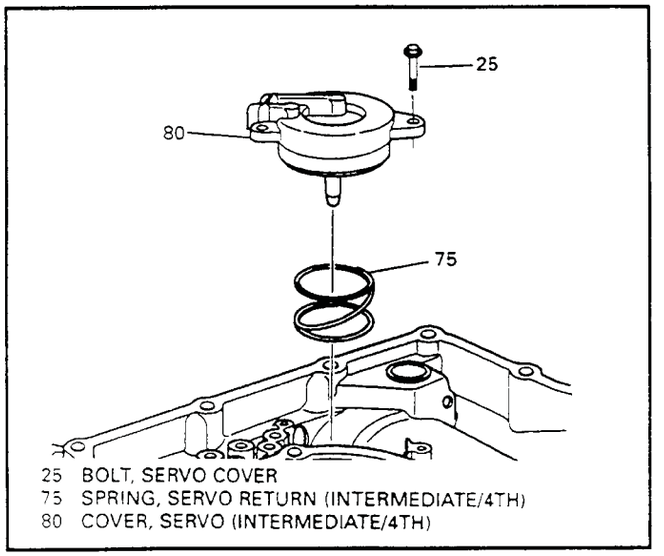
84 SEAL, TRANSAXLE OIL FILTER
85 FILTER ASSEMBLY, TRANSAXLE OIL
86 VALVE, OIL LEVEL CONTROL

Figure 49



81 BOLT, TUBE ASSEMBLY
82 SEAL, OIL FEED TUBE ASSEMBLY
83 TUBE ASSEMBLY, OIL FEED

Figure 50



25 BOLT, SERVO COVER
75 SPRING, SERVO RETURN (INTERMEDIATE/4TH)
80 COVER, SERVO (INTERMEDIATE/4TH)

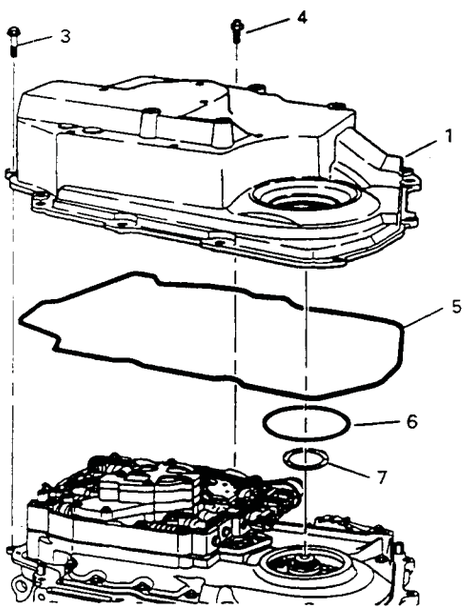
Figure 51

Continued from Page 49

20. Remove the transaxle filter assembly as shown in Figure 49.
21. Remove and discard the filter neck seal from the transaxle case as shown in Figure 49.
22. This seal is tough to remove without damaging the case bore and will require special tooling, like the proper size tap with a slide hammer.
23. Remove the oil level control valve (86) from the case as shown in Figure 49.
    NOTE: G.M. recommends replacing the oil level control valve (86) if it is removed.
24. Remove the four oil feed pipe bolts (81), and remove the oil feed pipe assembly as shown in Figure 50.
    NOTE: The feed pipe assembly "O" rings are glued into place and should remain with the feed pipe as they are reusable unless damaged. If new "O" rings are required they must also be glued back in place.
25. Remove three Int/4th servo cover retaining bolt as shown in Figure 51.
26. Remove the Int/4th servo cover (80), the servo piston and servo return spring (See Figure 51).
27. Remove three Lo/Rev servo cover bolts shown in Figure 52.
28. Remove the Lo/Rev servo cover (73), the servo piston and servo return spring (See Figure 52).

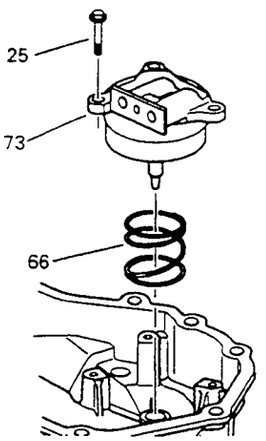
29. Rotate the transaxle so that the side cover (1) is facing upward as shown in Figure 53.
30. Remove the ten side cover bolts and one stud, as shown in Figure 53.
31. Remove the transaxle side cover.
32. Remove and discard the two side cover gaskets (5 and 6) as shown in Figure 53.
33. Remove the side cover to driven sprkt support thrust washer (See Figure 53).
34. Side cover gaskets and thrust washer might stay on side cover as it was removed.
35. Remove the eight retaining bolts from the oil pump as shown in Figure 54.
36. Remove the oil pump assembly (10) as shown in Figure 54.
37. Remove the oil pump drive shaft (19) as shown in Figure 54.

Continued on next Page



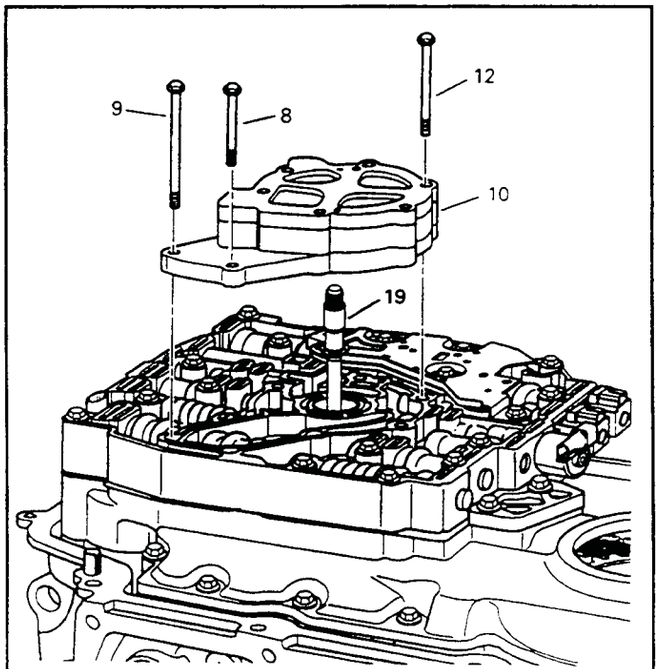
1 COVER, SIDE (STRUCTURAL)
3 BOLT, SIDE COVER
4 STUD, SIDE COVER
5 GASKET, SIDE COVER
6 GASKET, SIDE COVER OIL LEVEL CONTROL
7 WASHER, THRUST (SIDE COVER TO DRIVEN SPROCKET)

Figure 53



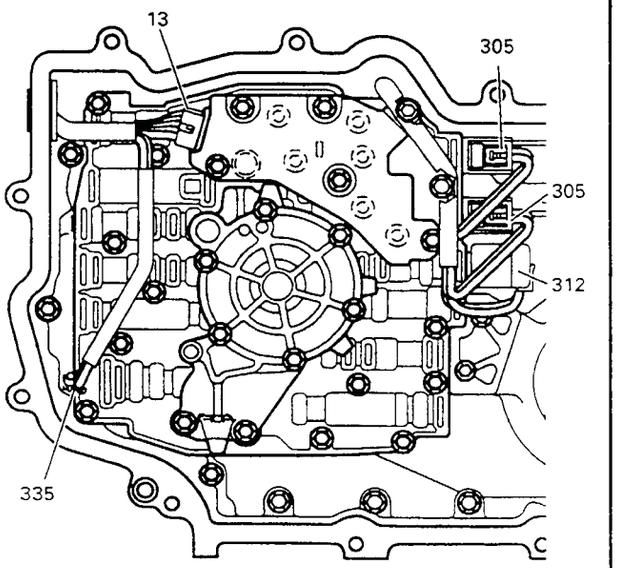
25 BOLT, SERVO COVER
66 SPRING, SERVO RETURN (LO/REVERSE)
73 COVER, SERVO (LO/REVERSE)

Figure 52



8 BOLT, OIL PUMP
9 BOLT, OIL PUMP
10 PUMP ASSEMBLY, TRANSAXLE OIL
12 BOLT, OIL PUMP
19 SHAFT, OIL PUMP DRIVE

Figure 54



13 PRESSURE SWITCH ASSEMBLY (PSA)
305 SOLENOID, SHIFT (A AND B)
312 SOLENOID, PRESSURE CONTROL
335 SOLENOID, TCC CONTROL

Figure 55

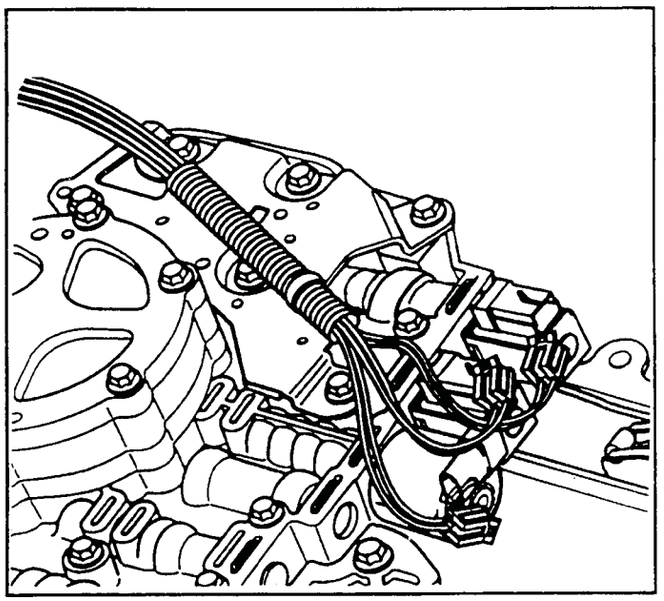
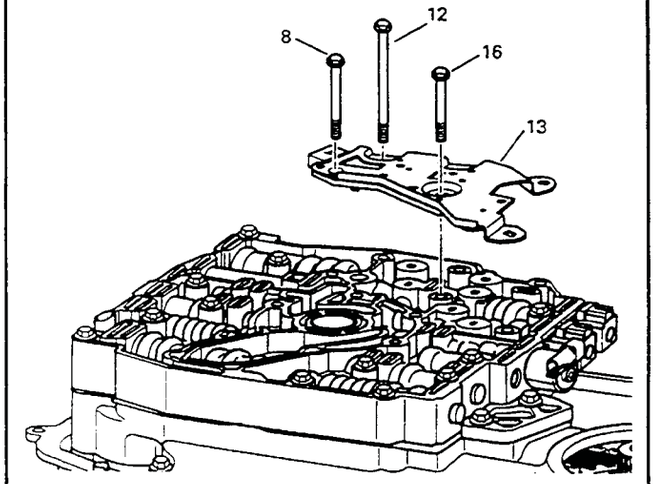


Figure 56



8 BOLT, (TR) PRESSURE SWITCH ASSEMBLY/VALVE BODY
12 BOLT, (TR) PRESSURE SWITCH ASSEMBLY/VALVE BODY
13 (TR) PRESSURE SWITCH ASSEMBLY
16 BOLT, (TR) PRESSURE SWITCH ASSEMBLY/VALVE BODY

Figure 57

Continued from Page 51

38. Disconnect the wiring harness connectors from the pressure control solenoid, 1-2 and 2-3 shift solenoids, pressure switch assembly, and TCC solenoid as shown in Figures 55 and 56.
39. Remove the six bolts from the pressure switch assembly as shown in Figure 57.
40. Remove the pressure switch assembly from the valve body assembly (See Figure 57).
41. The 7 pressure switch "O" rings are reusable, and should remain with the pressure switch.
42. Remove the remaining 12 bolts and remove the valve body assembly as shown in Figure 58.
43. ***There are not any checkballs in valve body.***
44. Remove and discard the valve body to spacer plate gasket (See Figure 58).
45. Remove the two spacer plate support bolts, as shown in Figure 59.
46. Remove the spacer plate with the spacer plate filter attached as shown in Figure 59.
47. Remove and discard the spacer plate to channel plate gasket (See Figure 59).
48. Remove the seven checkballs from the pockets in the channel plate as shown in Figure 60.
49. Notice that one of the pockets does not contain a checkball (See Figure 60).
50. Disconnect the manual valve clip and manual valve link from manual valve (See Figure 61).

Continued on Page 54

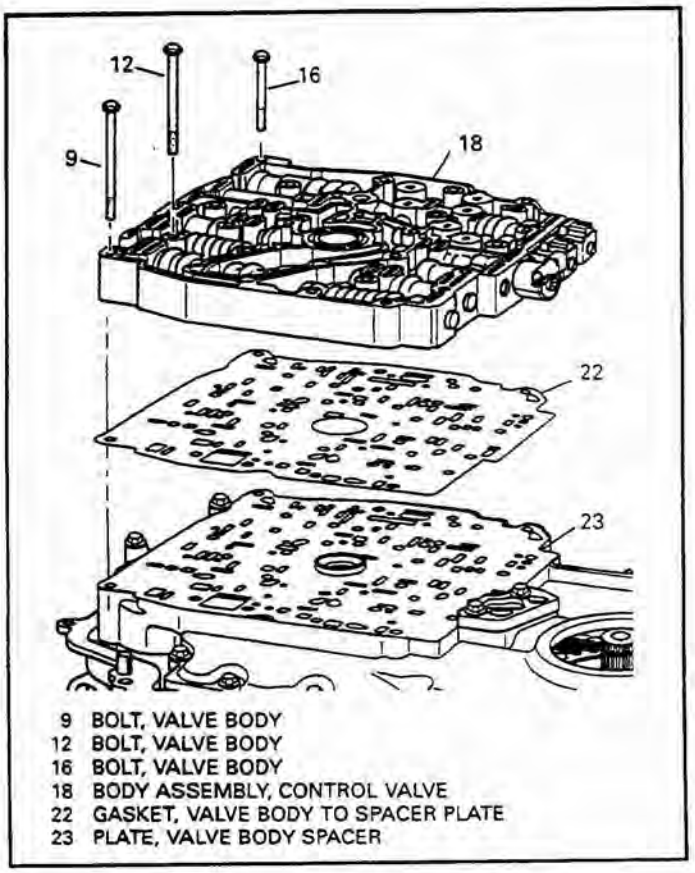


Figure 58

See Page 46 In This Manual For "Updated" Checkball Locations.

Figure 60

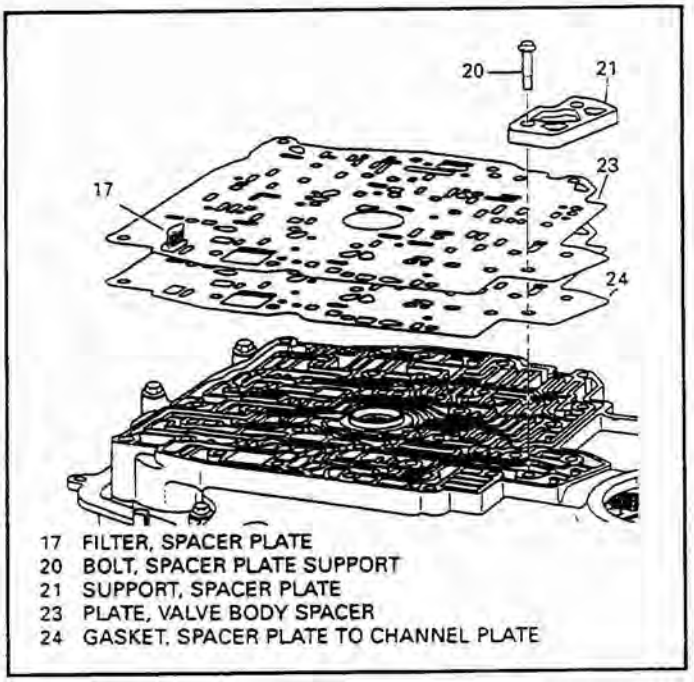


Figure 59

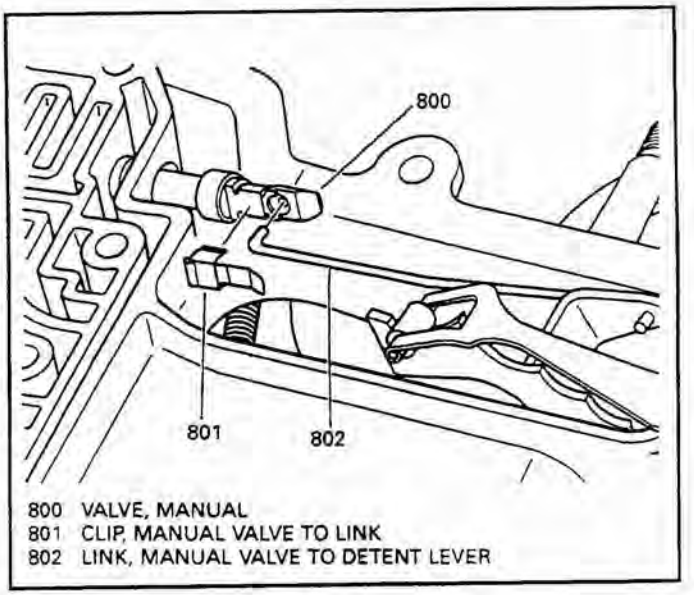
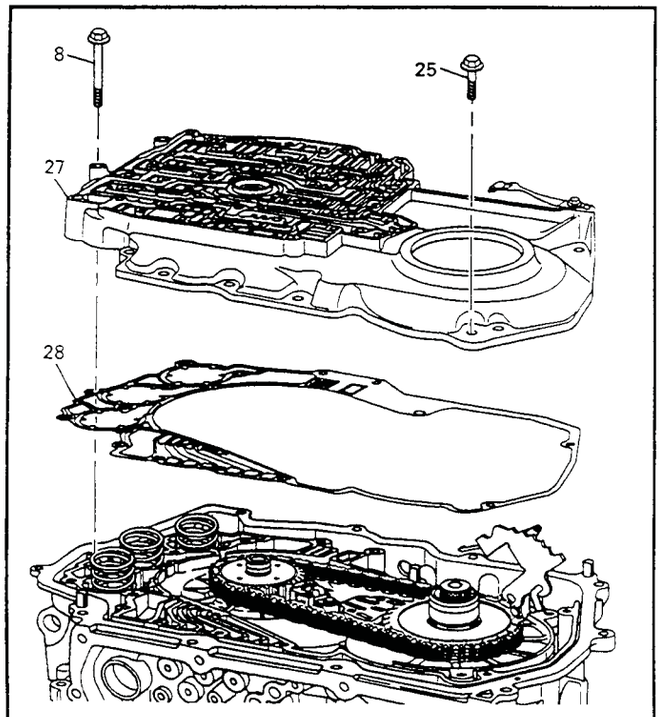
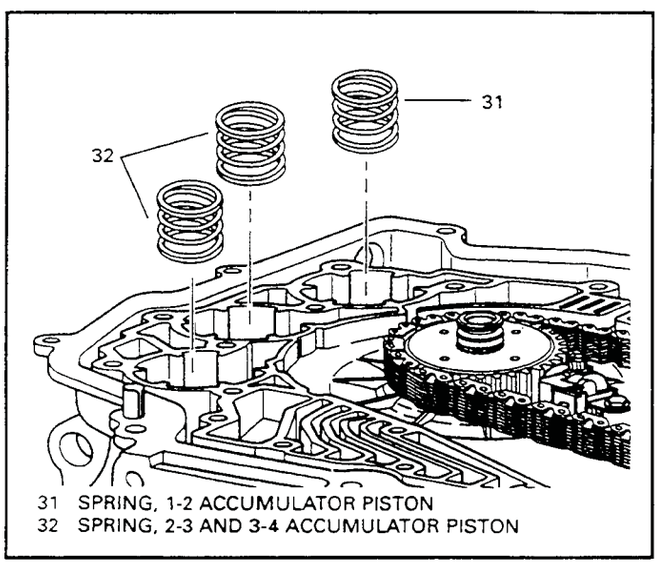


Figure 61



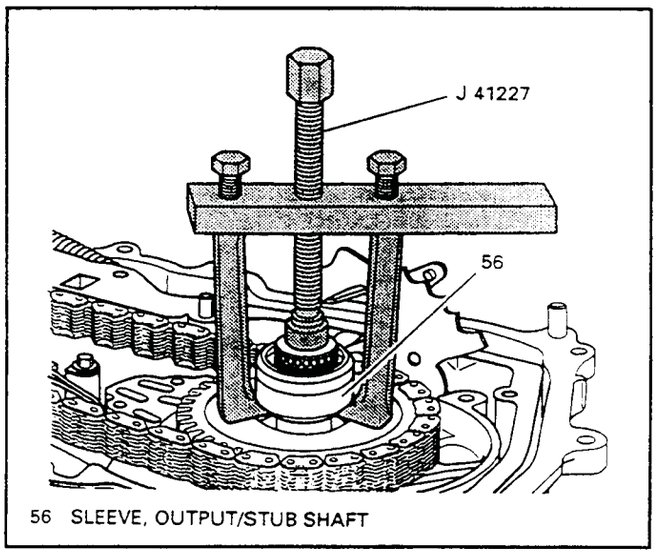
8 BOLT, CHANNEL PLATE
25 BOLT, CHANNEL PLATE
27 PLATE, CHANNEL
28 GASKET, CASE TO CHANNEL PLATE

Figure 62



31 SPRING, 1-2 ACCUMULATOR PISTON
32 SPRING, 2-3 AND 3-4 ACCUMULATOR PISTON

Figure 63

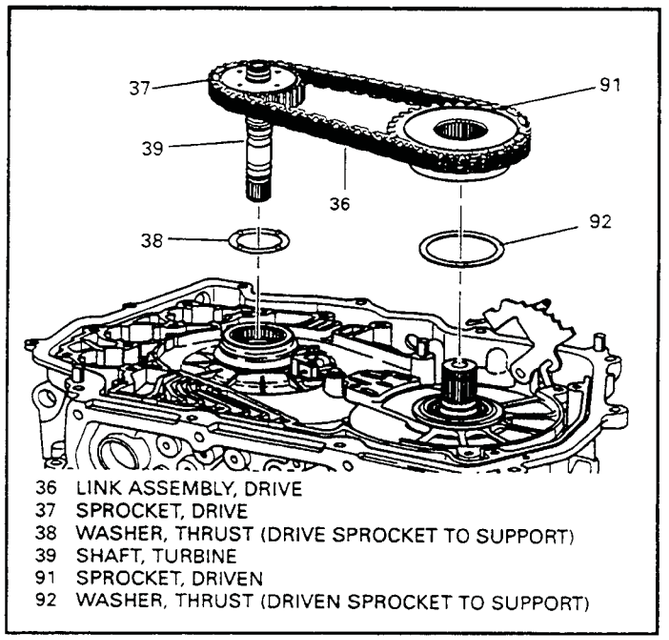


56 SLEEVE, OUTPUT/STUB SHAFT

Figure 64

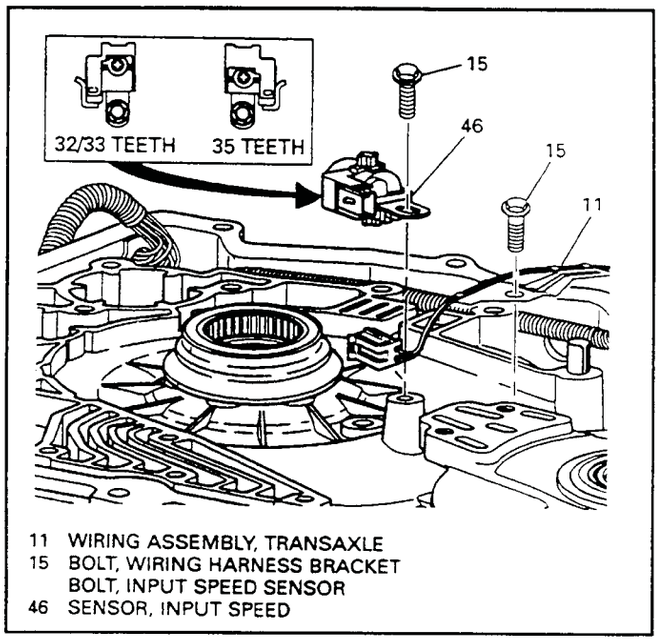
Continued from Page 52

51. Remove the ten channel plate bolts, as shown in Figure 62.
52. Remove the channel plate assembly (27) from transaxle, as shown in Figure 62.
    Note: The accumulator pistons and pins, the manual valve, the detent lever spring and bolt, and drive sprocket/channel plate thrust washer, should remain with the channel plate.
53. Remove and discard the channel plate to case gasket, as shown in Figure 62.
54. Remove the three accumulator springs from the case, as shown in Figure 63.
    Note: The 1-2 accumulator spring is different than the 2-3 and 3-4 accumulator springs, and is shown in Figure 63.
55. ***NOTICE: The transaxle output shaft cannot be removed without complete disassembly of transaxle. Attempting to remove output shaft at this time, in the same manner as stub shaft, will result in damage to other transaxle parts.***
56. Remove and discard the output shaft sleeve as shown in Figure 64, using the sleeve puller tool J-41227.
    NOTICE: The output shaft sleeve cannot be reused after being removed from the shaft.
57. Locate the pullers legs under the sleeve as it is shown in Figure 64, and tighten the pullers center bolt, to pull the sleeve off the shaft.



36 LINK ASSEMBLY, DRIVE
37 SPROCKET, DRIVE
38 WASHER, THRUST (DRIVE SPROCKET TO SUPPORT)
39 SHAFT, TURBINE
91 SPROCKET, DRIVEN
92 WASHER, THRUST (DRIVEN SPROCKET TO SUPPORT)

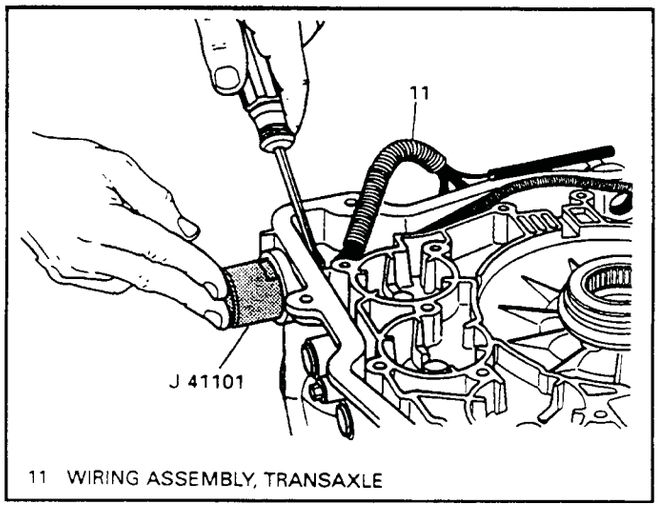
Figure 65



11 WIRING ASSEMBLY, TRANSAXLE
15 BOLT, WIRING HARNESS BRACKET
BOLT, INPUT SPEED SENSOR
46 SENSOR, INPUT SPEED

Figure 66

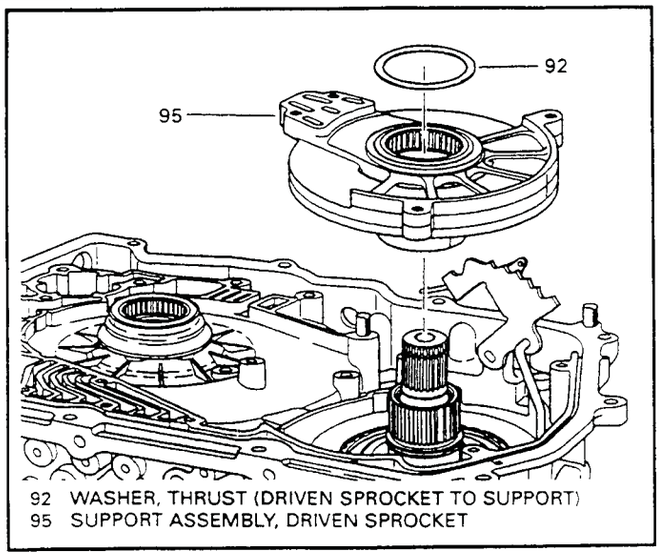
58. Remove the drive sprocket, driven sprocket and drive chain assembly, as an entire unit as shown in Figure 65.
Note which direction the chain is facing when removed. The chain should be installed in the same direction during assembly to help prevent excessive noise.
59. Remove the drive sprocket to support thrust washer (38) if it did not remain with the drive sprocket assembly (See Figure 65).
60. Remove the driven sprocket to driven sprocket support thrust washer (92) shown in Figure 65.
61. Disconnect the wire harness connector from the input speed sensor (See Figure 66).
62. Remove the input speed sensor retaining bolt, and the input speed sensor (See Figure 66).
63. Remove the harness retainer clip bolt and the retainer clip (See Figure 66).
64. Remove the pass thru case connector using the tool J-41101 as shown in Figure 67. Push the removal tool onto the case connector from the outside of the transaxle case to compress case connectors retaining tabs. With the retaining tabs compressed, use a screwdriver to remove the case connector through the inside of the transaxle case.



11 WIRING ASSEMBLY, TRANSAXLE

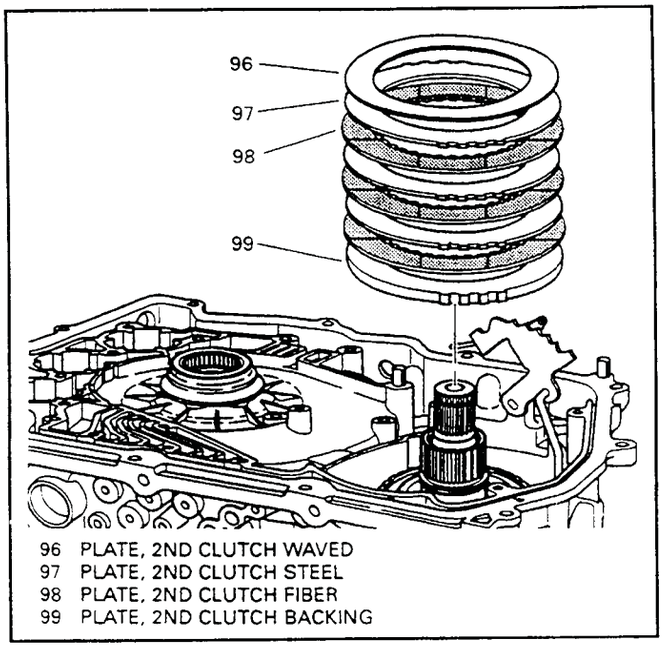
Figure 67

Continued on next Page



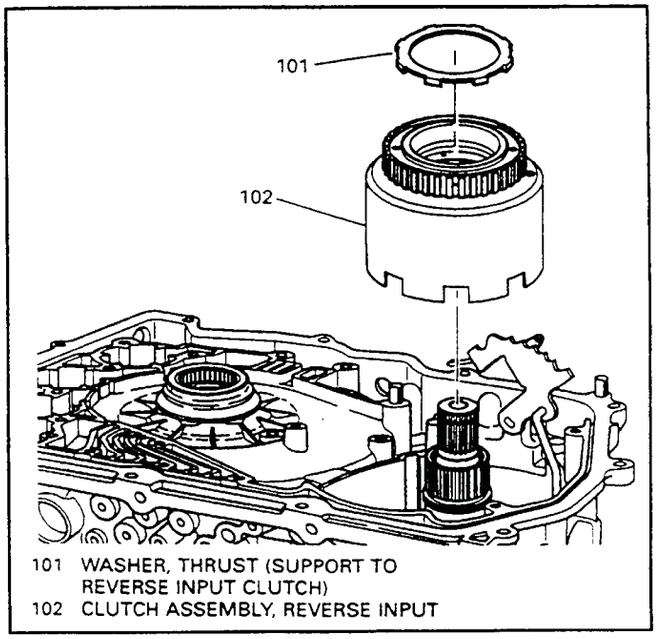
92 WASHER, THRUST (DRIVEN SPROCKET TO SUPPORT)
95 SUPPORT ASSEMBLY, DRIVEN SPROCKET

Figure 68



96 PLATE, 2ND CLUTCH WAVED
97 PLATE, 2ND CLUTCH STEEL
98 PLATE, 2ND CLUTCH FIBER
99 PLATE, 2ND CLUTCH BACKING

Figure 69



101 WASHER, THRUST (SUPPORT TO REVERSE INPUT CLUTCH)
102 CLUTCH ASSEMBLY, REVERSE INPUT

Figure 70

Continued from Page 55

65. Remove the driven sprocket support assembly, as shown in Figure 68.
66. Remove the 2nd clutch plates, one wave plate, three steel plates, three lined plates, and one backing plate, as shown in Figure 69.
67. Remove the driven sprocket support to reverse input clutch housing thrust washer (101), as shown in Figure 70.
68. Remove the reverse input clutch housing and 2nd roller clutch assembly (See Figure 70).
69. Remove the intermediate/4th band assembly as shown in Figure 71.
70. Remove the direct/coast clutch and the reaction carrier assembly by lifting straight up as shown in Figure 72. Keep the bearing assembly (103) and the selective thrust washer (104), located on top, with the assembly for now.
71. Remove the input carrier and reaction ring gear assembly, as shown in Figure 73.
72. Remove the input carrier to forward clutch hub thrust bearing (107) as shown in Figure 73.
73. Remove the ring gear and forward clutch hub assembly, as shown in Figure 74.
74. Remove the forward clutch hub to race thrust washer (109) if it did not remain with forward clutch hub (See Figure 74).

Continued on Page 58

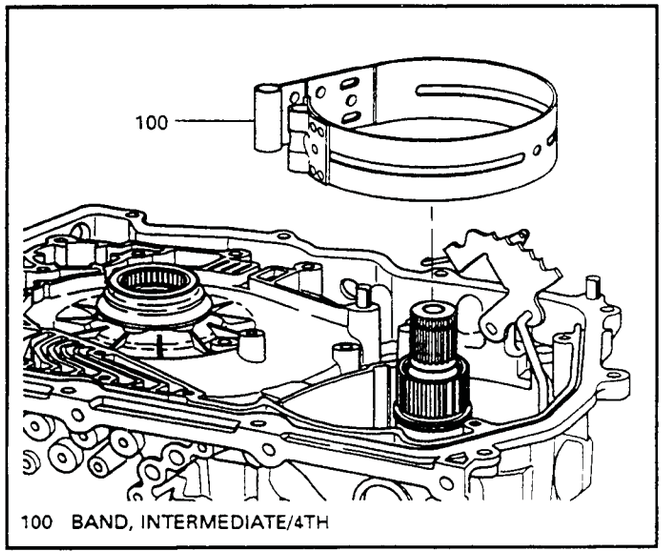


Figure 71

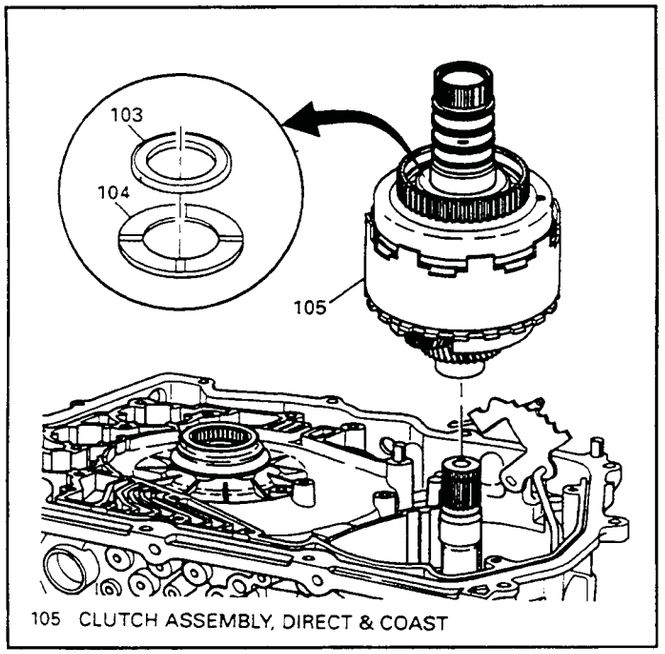


Figure 72

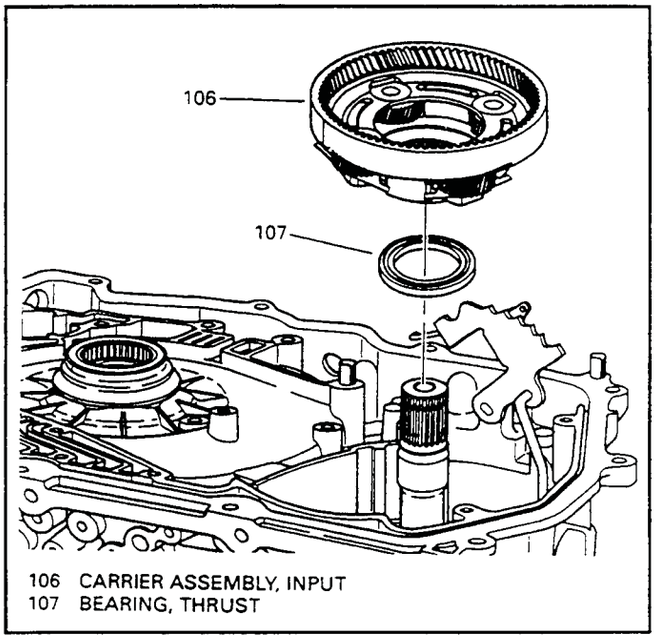


Figure 73

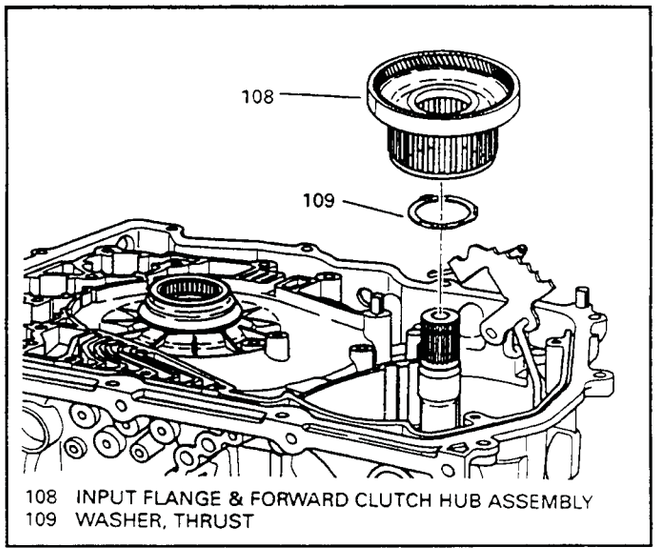
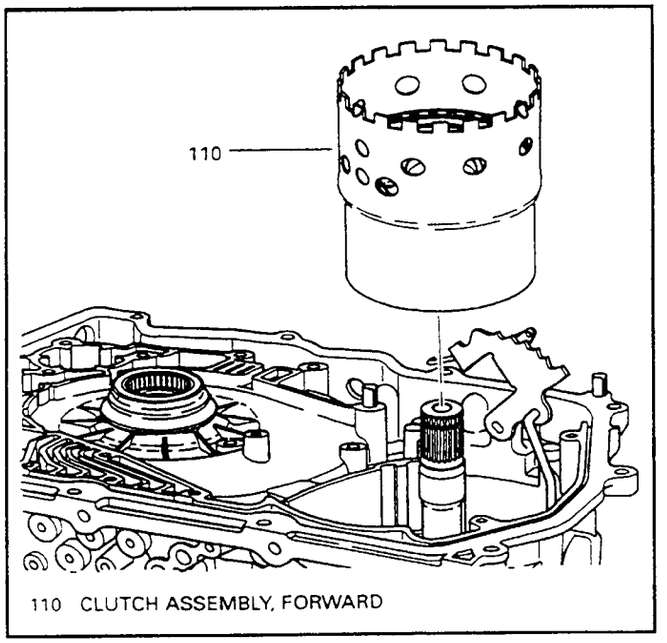
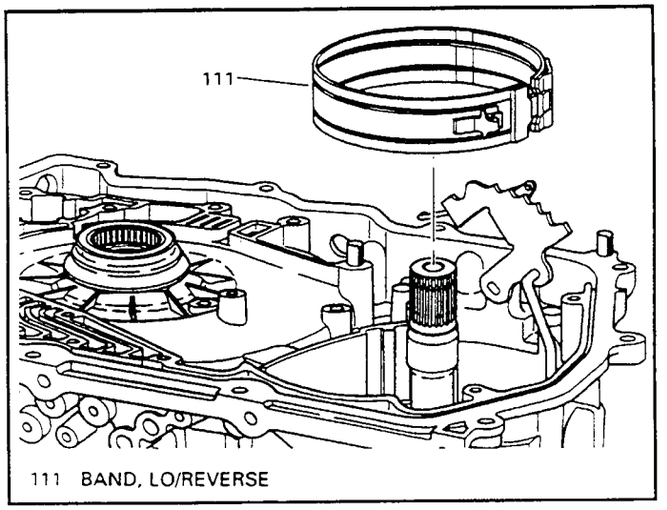


Figure 74



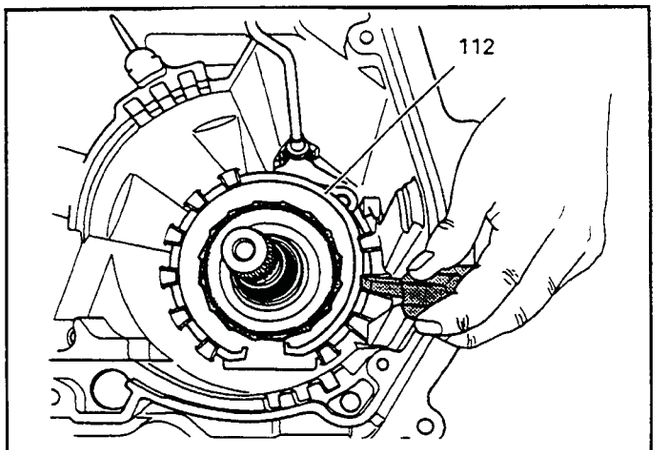
110 CLUTCH ASSEMBLY, FORWARD

Figure 75



111 BAND, LO/REVERSE

Figure 76

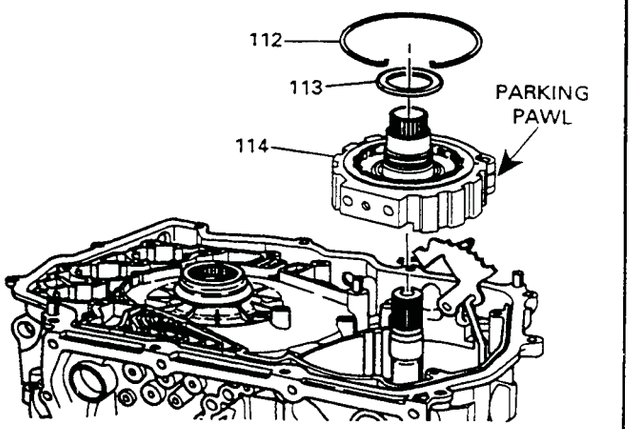


112 RING, SNAP (FORWARD CLUTCH SUPPORT TO CASE)

Figure 77

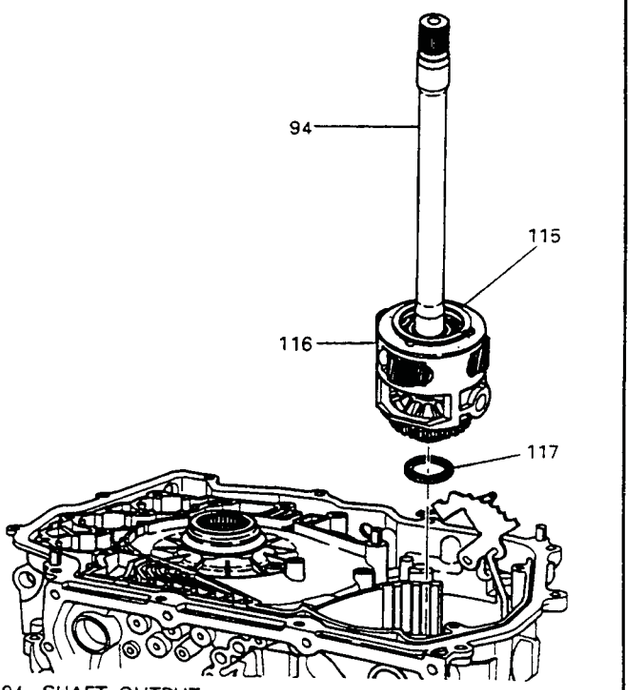
Continued from Page 56

75. Remove the complete forward clutch housing, as shown in Figure 75.
76. Remove the Lo/Reverse band assembly from the case, as shown in Figure 76.
77. Remove the forward clutch support snap ring using a modified screwdriver (See Figure 77). This is a very strong snap ring.
    NOTICE: The snap ring opening should at the bottom pan side of the case. If the snap ring opening is out of position, inspect the case for damage.
78. Remove the forward clutch support and the Lo roller clutch assembly as shown in Figure 78. Keep the thrust bearing (113) with support. The parking pawl may need to be depressed to allow forward clutch support to be removed. (See Figure 78).
79. Lift straight up on the output shaft and remove final drive assembly and final drive sun gear as one assembly (See Figure 79).
80. Remove the final drive internal ring gear, by lifting straight up with equal force on both side of the ring gear (See Figure 80).
    NOTE: The fretting ring (119) is located in the case groove. The fretting ring does not need to be removed unless it appears to be damaged. (See Figure 80).
81. Remove the manual shaft to transaxle case retaining pin (Nail), as shown in Figure 81.
82. Remove manual shaft/detent lever assembly (806), by pushing the manual shaft into case, as shown in Figure 81.



112 RING, SNAP (FORWARD CLUTCH SUPPORT TO CASE)
113 BEARING, THRUST
114 SUPPORT ASSEMBLY, FORWARD CLUTCH

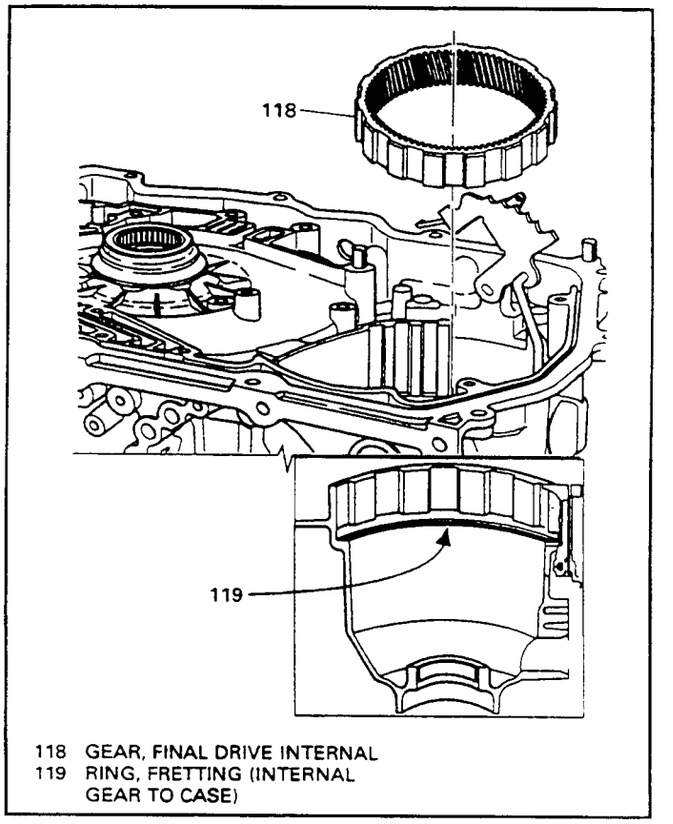
Figure 78



94 SHAFT, OUTPUT
115 GEAR, SUN (FINAL DRIVE)
116 DIFFERENTIAL AND FINAL DRIVE ASSEMBLY
117 BEARING, THRUST

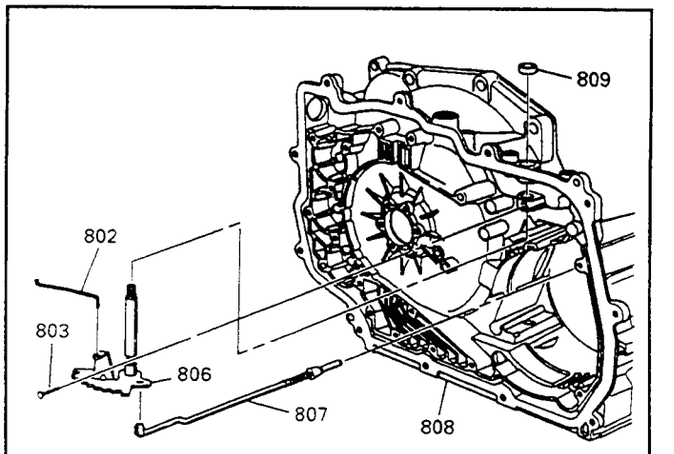
Figure 79

83. The parking rod will remain attached to the detent lever until the assembly is removed.
84. Remove the manual shaft seal (809) from the case using a small screwdriver. Be careful not to damage the case bore during removal.



118 GEAR, FINAL DRIVE INTERNAL
119 RING, FRETTING (INTERNAL GEAR TO CASE)

Figure 80



802 LINK, MANUAL VALVE TO DETENT LEVER
803 PIN, MANUAL SHAFT TO CASE
806 MANUAL SHAFT AND DETENT LEVER ASSEMBLY
807 PARKING LOCK ACTUATOR ASSEMBLY
808 CASE, TRANSAXLE
809 SEAL, MANUAL SHAFT TO CASE

Figure 81

Continued on next Page

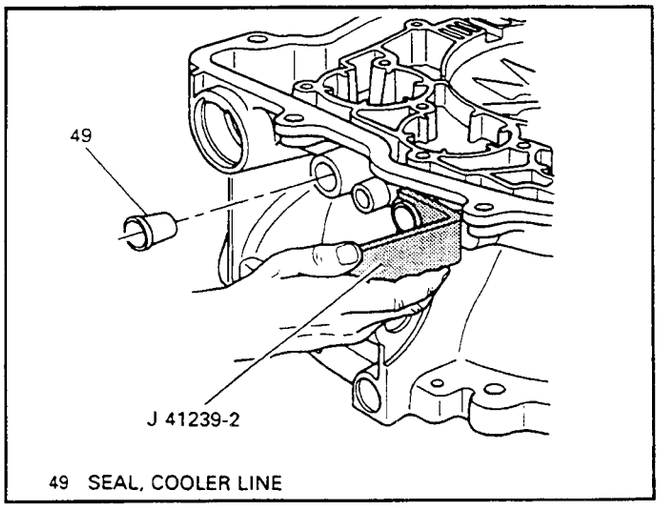


Figure 82

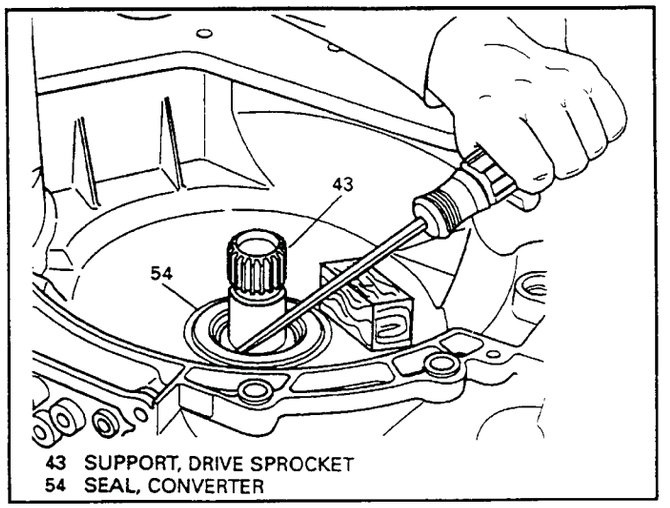


Figure 83

85. Remove the cooler line seals (49) using cooler line seal removal tool J-41239-2, as shown in Figure 82.
86. Wedge the tool into the seal on the outside of the case bore using a hammer (See Figure 82).
87. Pry the seal out of the case, strike the tool with a hammer if necessary (See Figure 82).
88. Remove the converter seal using a screwdriver or appropriate seal removal tool (Figure 83).
89. Remove the bolts from the drive sprocket support and remove drive sprocket support from the case (See Figure 84).
90. Remove the right hand axle seal from the case using a screwdriver or appropriate seal removal tool (See Figure 85).

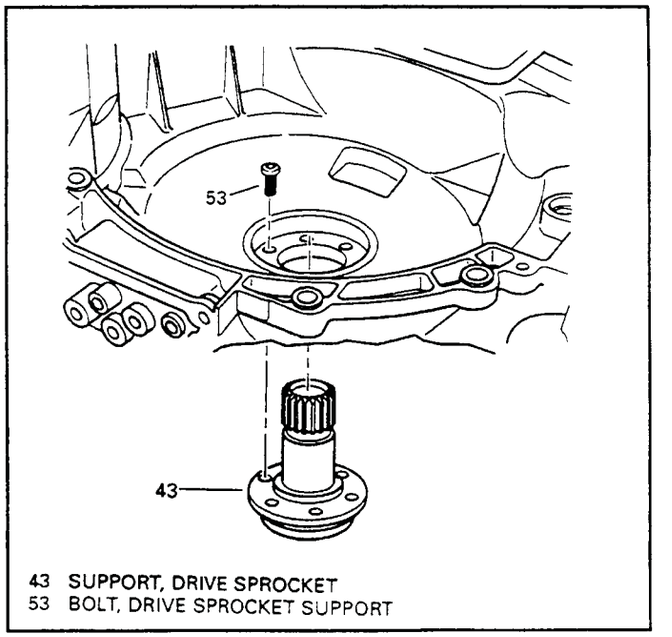


Figure 84

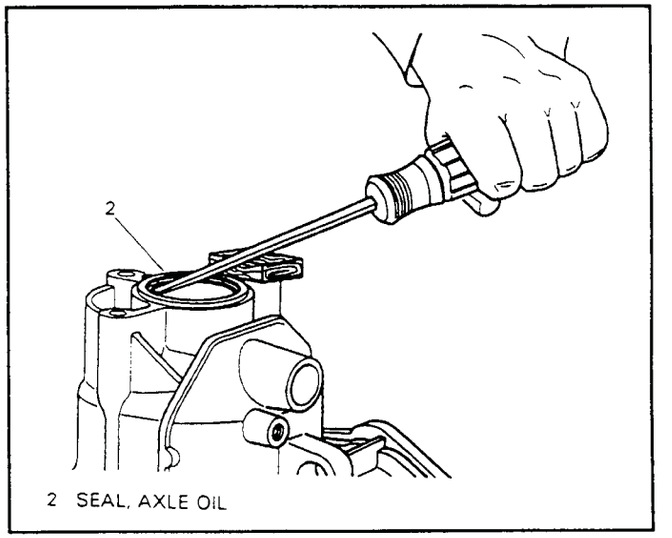
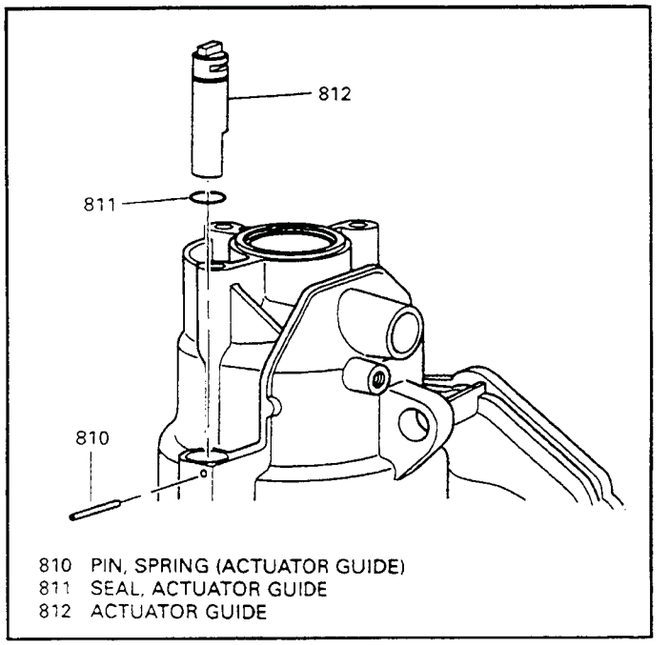


Figure 85

COMPONENT REPAIR AND TRANSAXLE ASSEMBLY

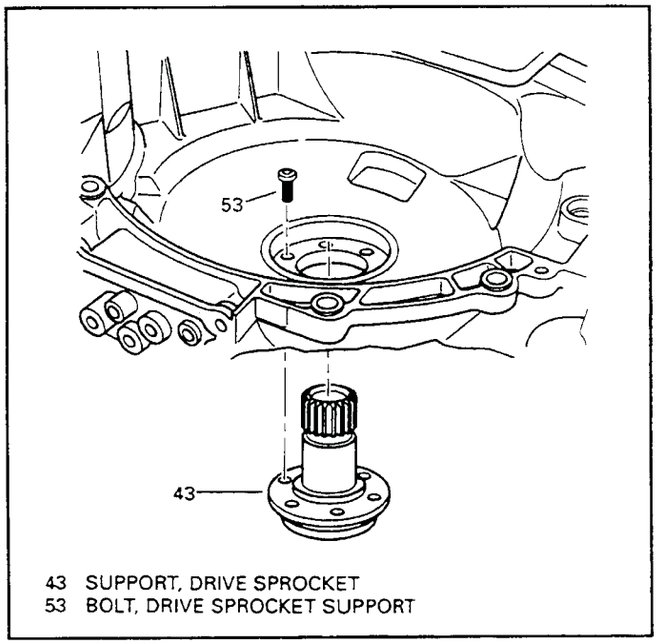
TRANSAXLE CASE ASSEMBLY

1. Thoroughly clean the transaxle case and all of the case threads with clean solvent, and blow dry with compressed air.
2. Inspect the transaxle case for the following:
   - 0 Case exterior for cracks or porosity.
   - 0 Channel plate to valve body surface and the case to channel plate surface for flatness.
   - 0 Bottom pan, side cover and channel plate gasket surfaces for damage.
   - 0 External bores for damage, sharp edges, and any porosity. Output speed sensor, the case connector bore, cooler line bores, axle seal bore, fill cap and manual shaft bores.
   - 0 Bolt holes for thread damage, repair with a Heli-Coil as necessary.
   - 0 Case interior for damaged snap ring groove, and/or damaged case lugs.
   - 0 Case bushing for excessive wear or damage.
3. Remove the actuator guide roll pin (810) from the case (See Figure 86).
4. Remove the actuator guide (812) and "O" ring seal assembly from the case (See Figure 86). ***NOTE: The acutator guide should not be removed unless it appears damaged.***
5. Install a new "O" ring on the actuator guide as shown in Figure 86.
6. Lubricate the actuator guide case bore with a small amount of "Trans-Jel".
7. Install the actuator guide and "O" ring seal into the transaxle case (See Figure 86).
8. Install the actuator guide roll pin into the case to secure the actuator guide, making certain the roll pin enters the slot in the actuator guide as shown in Figure 86.
9. Install the drive sprocket support into the bell housing in the case (See Figure 87).
10. Install the six drive sprocket support retaining bolts (53) into the drive sprocket support as shown in Figure 87.
11. Hand start all of the bolts, and then torque to 9 ft.lb. (See Figure 87).



810 PIN, SPRING (ACTUATOR GUIDE)
811 SEAL, ACTUATOR GUIDE
812 ACTUATOR GUIDE

Figure 86



43 SUPPORT, DRIVE SPROCKET
53 BOLT, DRIVE SPROCKET SUPPORT

Figure 87

Continued on next Page

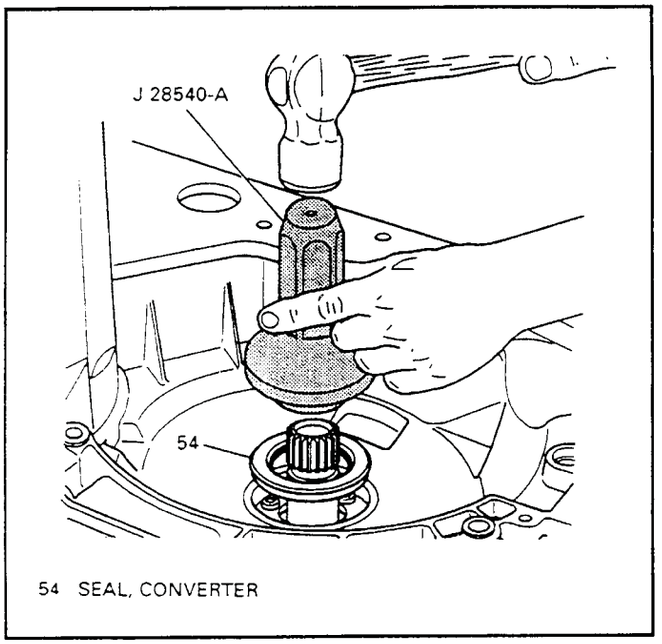


Figure 88

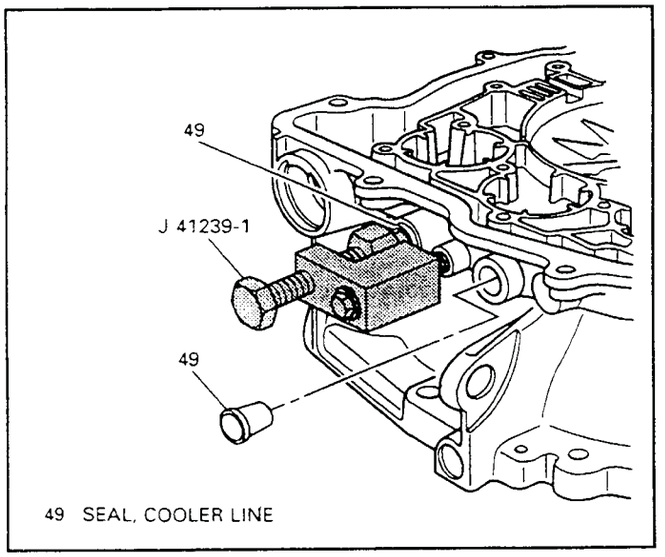
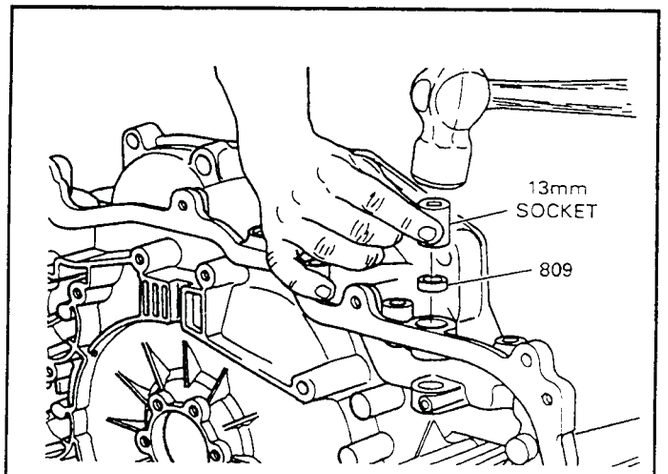


Figure 89

Continued from Page 61

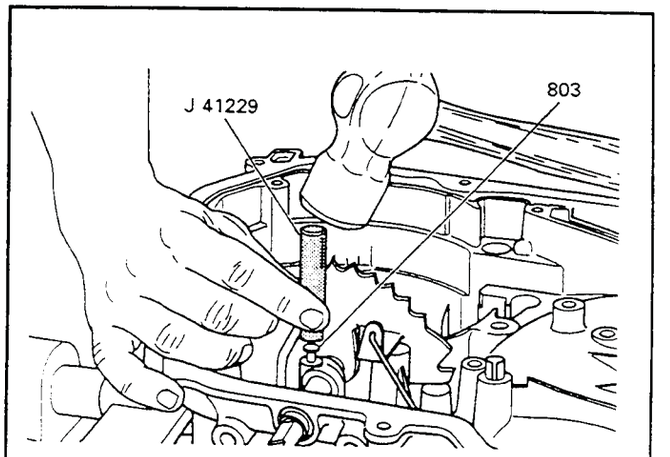
12. Install a new torque converter seal (54) using the installation tool J-28540-A, as shown in Figure 88.
13. After installation, insure that the garter spring is still in the correct position on the seal and lubricate seal with small amount of "Trans-Jel"
14. Place a new cooler line seal (49) into the case bore as shown in Figure 89.
15. Install tool J-41239-1 on the transaxle case at the cooler line bracket bolt hole, as shown in Figure 89.
16. Press the new cooler line seal in by tightening the seal pressing bolt on the tool until the seal bottoms out in the case bore (See Figure 89).
17. Repeat steps 14 thru 16 for the second cooler line seal.
18. Install a new manual shaft seal into the case bore using a 13mm deep socket, as shown in Figure 90.
19. Ensure that the manual shaft seal is fully seated into the case bore.
20. Install the manual shaft and detent lever Asm. (806) into the case with the parking actuator rod, and the manual valve link, attached to the detent lever (See Figure 91).
21. Verify that the parking actuator rod is in proper position in the actuator guide in the bottom of case.
22. Install the manual shaft to case retaining pin (803) using installation tool J-41229 as shown in Figure 92.
    NOTE: The manual shaft pin (Nail) must be installed to the correct height to properly lock the manual shaft, and tool J-41229 provides this correct installation. If the pin is installed too deep, it will crack the case boss.

Continued on Page 64



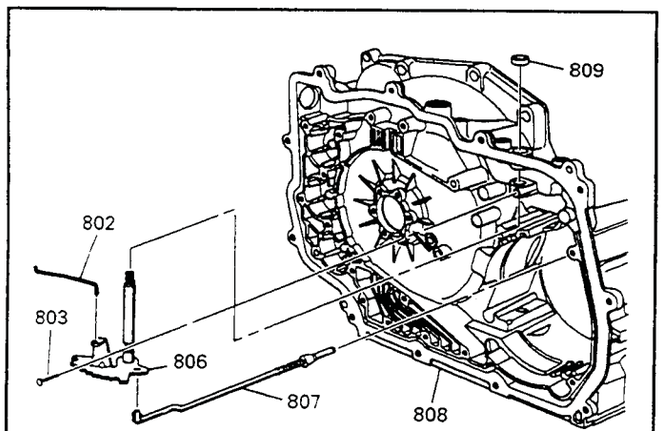
809 SEAL, MANUAL SHAFT TO CASE

Figure 90



803 PIN, MANUAL SHAFT TO CASE

Figure 92

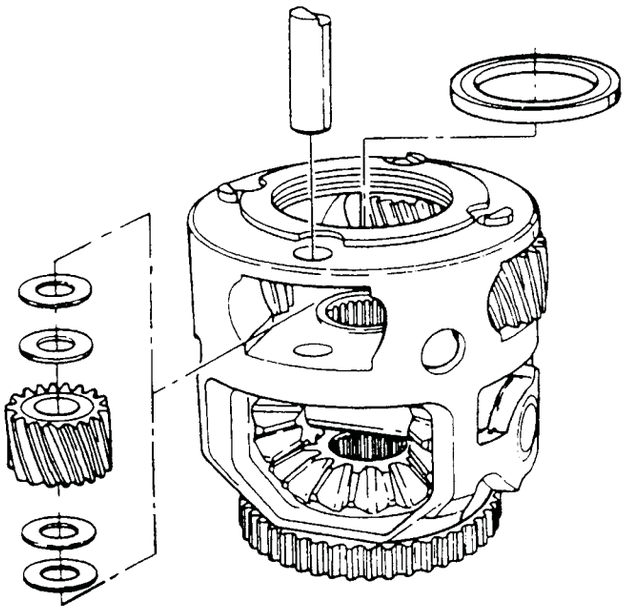


802 LINK, MANUAL VALVE TO DETENT LEVER
803 PIN, MANUAL SHAFT TO CASE
806 MANUAL SHAFT AND DETENT LEVER ASSEMBLY
807 PARKING LOCK ACTUATOR ASSEMBLY
808 CASE, TRANSAXLE
809 SEAL, MANUAL SHAFT TO CASE

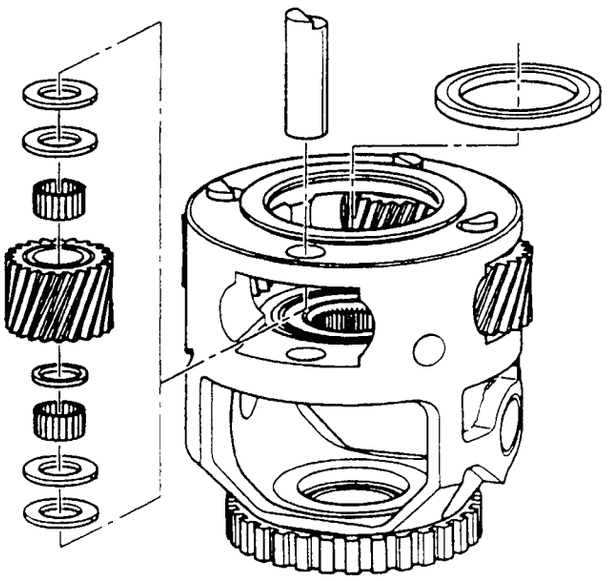
Figure 91

INFORMATION FOR FINAL DRIVE IDENTIFICATION

THM 4T60-E

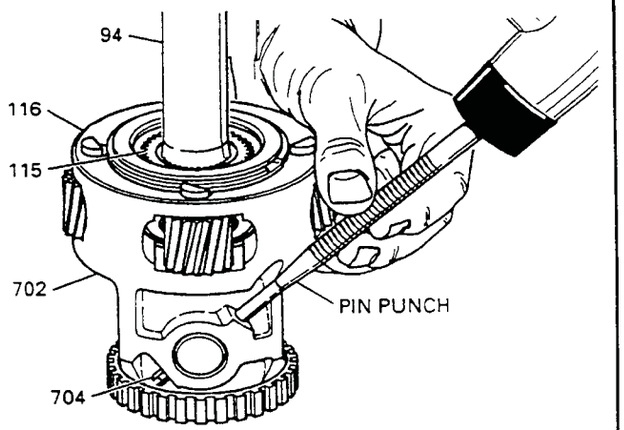


THM 4T40-E



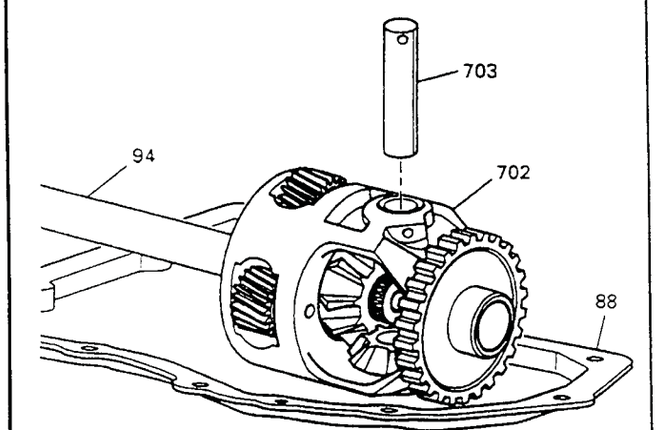
NOTICE THAT THE PINION GEAR TEETH ARE CUT IN THE OPPOSITE DIRECTION ON THESE TWO UNITS EVEN THOUGH THE FINAL DRIVES ARE VERY SIMILAR

Figure 93



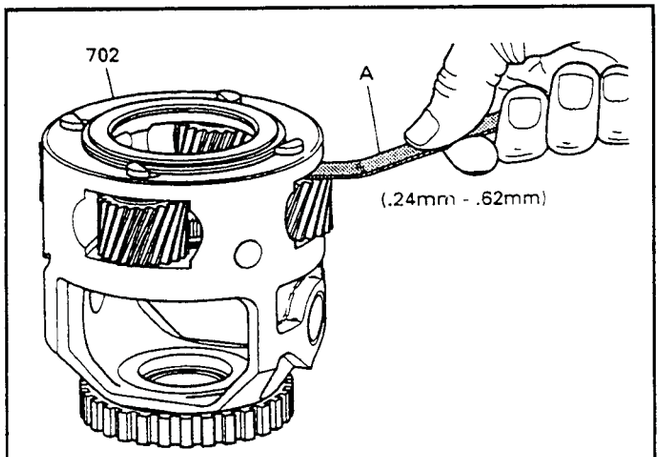
94 SHAFT, OUTPUT
115 GEAR, SUN (FINAL DRIVE)
116 DIFFERENTIAL AND FINAL DRIVE ASSEMBLY
702 CARRIER, DIFFERENTIAL & FINAL DRIVE
704 PIN, DIFFERENTIAL PINION SHAFT RETAINING

Figure 94



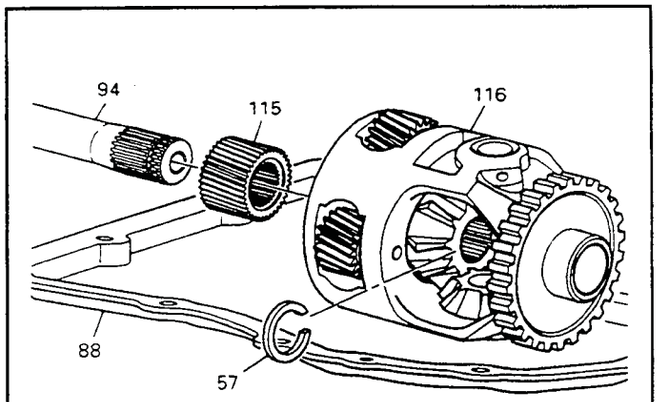
88 PAN, TRANSAXLE OIL
94 SHAFT, OUTPUT
702 CARRIER, DIFFERENTIAL & FINAL DRIVE
703 SHAFT, DIFFERENTIAL PINION

Figure 95



A FEELER GAGE
702 CARRIER, DIFFERENTIAL & FINAL DRIVE

Figure 96



57 RING, OUTPUT/STUB SHAFT SNAP
94 SHAFT, OUTPUT
115 GEAR, SUN (FINAL DRIVE)
116 DIFFERENTIAL AND FINAL DRIVE ASSEMBLY

Figure 97

FINAL DRIVE ASSEMBLY

1. Inspect the complete final drive assembly for any wear and/or damage.
2. Check for proper pinion end play, with a feeler gage, as shown in Figure 96. Proper end play should be .009"-.025" (.24mm-.62mm).
3. ***NOTE: Do not disassemble the final drive assembly unless necessary for damaged parts.***
4. Remove the differential pinion shaft retaining pin (704) using a drift punch (See Figure 94).
5. Remove the differential pinion cross shaft from final drive housing as shown in Figure 95.
6. Remove and discard the snap ring (57) from the end of the output shaft (See Figure 97). ***Snap ring is not reusable.***
7. Remove the output shaft and final drive sun gear, as shown in Figure 97.
8. Rotate and remove the differential pinion gears (707) and thrust washers (706) using Figure 98 as a guide.
9. Remove the differential side gears (709) and thrust washers (708) as shown in Figure 98.
10. Inspect the gears for wear and/or damage.

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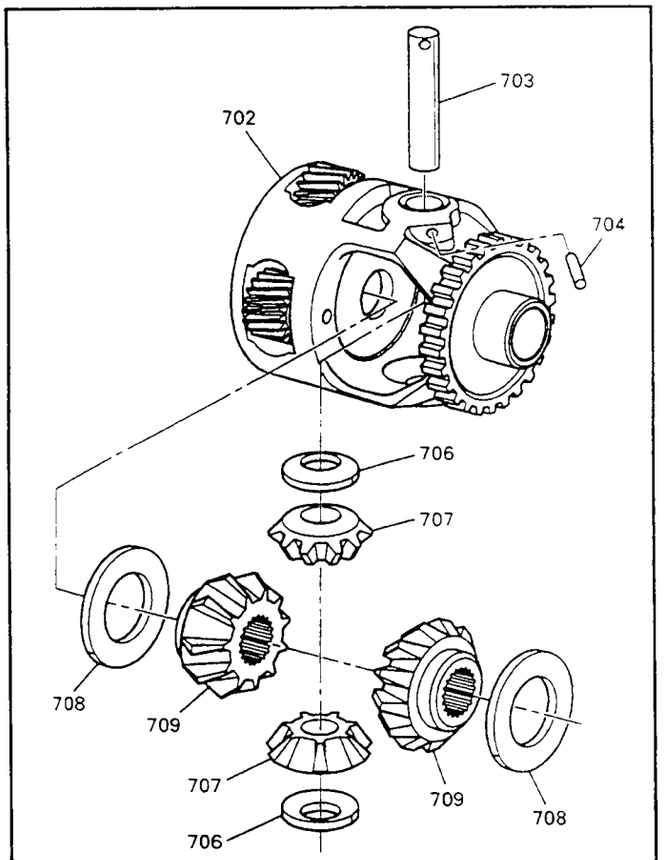
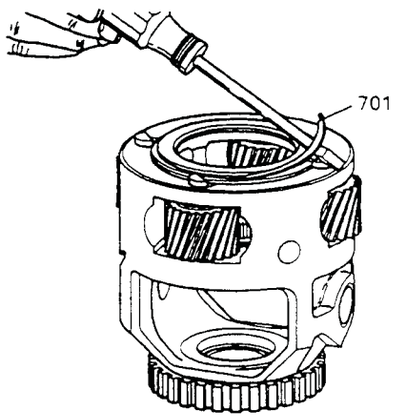


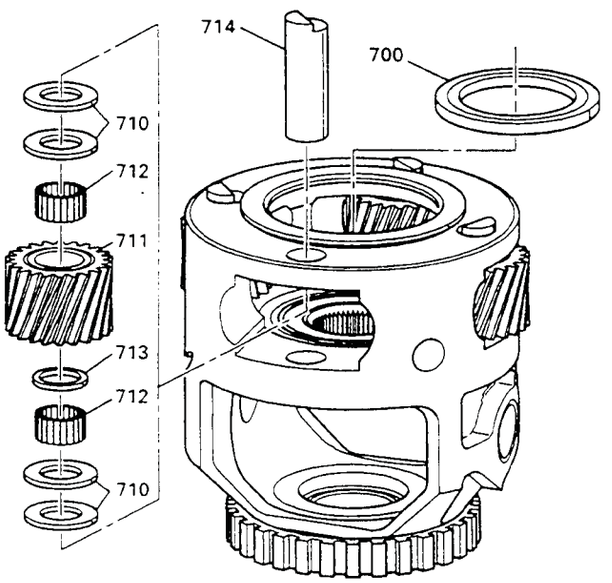
702 CARRIER, DIFFERENTIAL & FINAL DRIVE
703 SHAFT, DIFFERENTIAL PINION
704 PIN, DIFFERENTIAL PINION SHAFT RETAINING
706 WASHER, THRUST (DIFFERENTIAL PINION)
707 GEAR, DIFFERENTIAL PINION
708 WASHER, THRUST (DIFFERENTIAL SIDE GEAR)
709 GEAR, DIFFERENTIAL SIDE

Figure 98



701 RING, SPIRAL PIN RETAINING

Figure 99

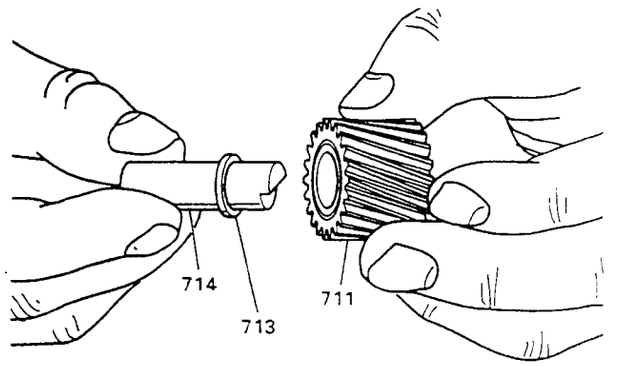


700 BEARING, THRUST
710 WASHER, PINION THRUST
711 GEAR, PINION (FINAL DRIVE PLANET)
712 ROLLER NEEDLE BEARING
713 SPACER, PINION NEEDLE BEARING
714 PIN, PLANET PINION

Figure 100

Continued from Page 65

11. Remove the spiral snap ring that retains the planetary pinion pins as shown in Figure 99. ***NOTE: Note the orientation of the planetary pinion gears before removal. The pinion gear should be re-installed in the same direction as removed, to prevent any noise because of the change in set wear patterns.***
12. Place the final drive carrier into a transaxle pan to prevent the needle bearings from being lost as the planet pinions are removed.
13. Remove the four planet pinion pins (714), four planet pinion gears (711), pinion thrust washers (710), needle roller bearings (712) and needle bearing spacers (See Figure 100).
14. Remove the final drive sun gear thrust bearing (700) as shown in Figure 100.
15. Inspect all parts removed for any wear and/or damage. Polishing is a normal condition for the pinion pins and needle bearings.
16. Install the pinion gear needle spacer (713) onto pinion pin and install inside of the planetary pinion gear as shown in Figure 101. The spacer must be assembled between the two rows of needle bearings.
17. Install the needle roller bearings (712) one at a time into the planet pinion. Place thrust washer (710) on the bottom of pinion to retain bottom row of needle bearings. Use "Trans-Jel" to aid in the assembly and keep the needle bearings in place (See Figure 102).
18. Install the sun gear to final drive carrier thrust bearing (700) into final drive carrier, as shown in Figure 100 and retain with "Trans-Jel".
19. Assemble the four planet pinion gears and the thrust washers into the final drive carrier, as shown in Figure 100.
20. Install the four planet pinion gear pins (714) in the final drive carrier to retain pinion gears as shown in Figure 100.
21. Install the final drive carrier spiral snap ring (701) into the groove to retain the planetary pinion gear pins, as shown in Figure 99.
22. Check planetary pinion end play with a feeler gage for proper end play as shown Figure 96. End play should be .009"-.025".



711 GEAR, PINION (FINAL DRIVE PLANET)
713 SPACER, PINION NEEDLE BEARING
714 PIN, PLANET PINION

Figure 101

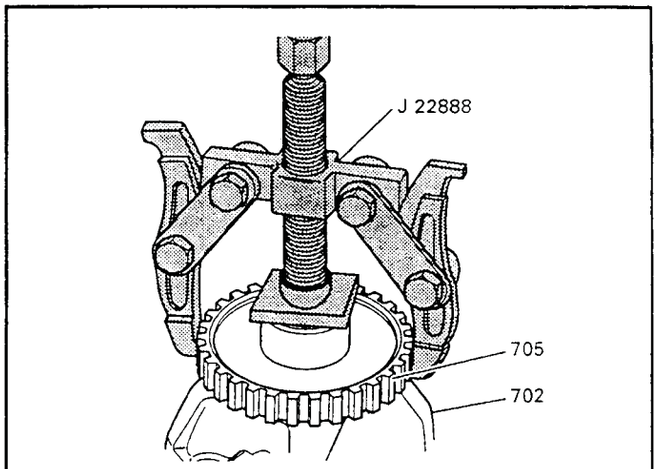
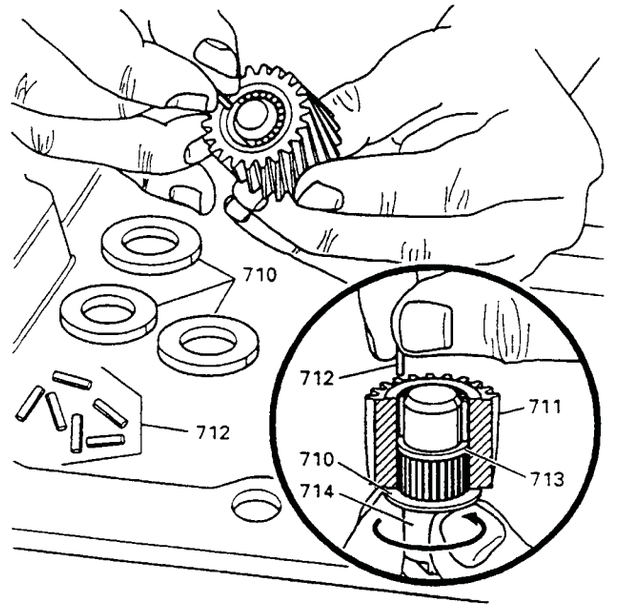


Figure 103



710 WASHER, PINION THRUST
711 GEAR, PINION (FINAL DRIVE PLANET)
712 ROLLER NEEDLE BEARING
713 SPACER, PINION NEEDLE BEARING
714 PIN, PLANET PINION

Figure 102

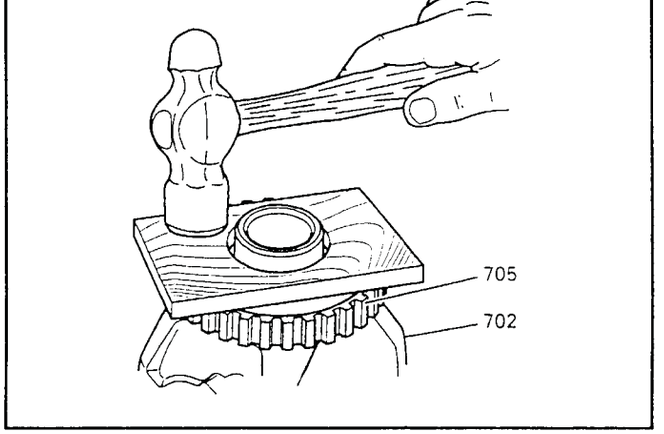
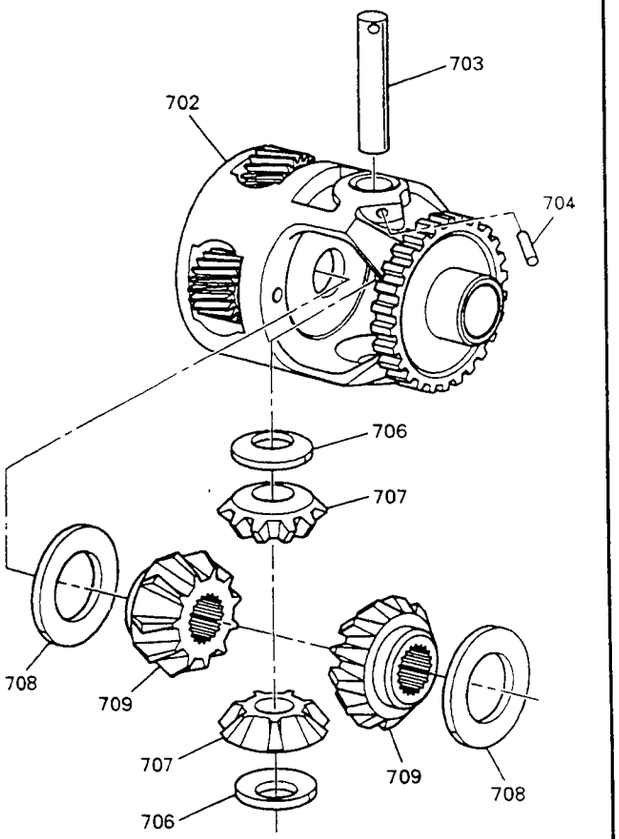


Figure 104

Continued from Page 66

23. NOTE: Do not remove the speed sensor rotor unless damage is apparent.
24. If necessary, use a universal puller and a thick flat washer to remove the speed sensor rotor as shown in Figure 103.
25. Install new speed sensor rotor using a modified wooden block and a plastic mallet, as shown in Figure 104.
26. Warming the new speed sensor rotor before installing will help the installation process.

Continued on next Page

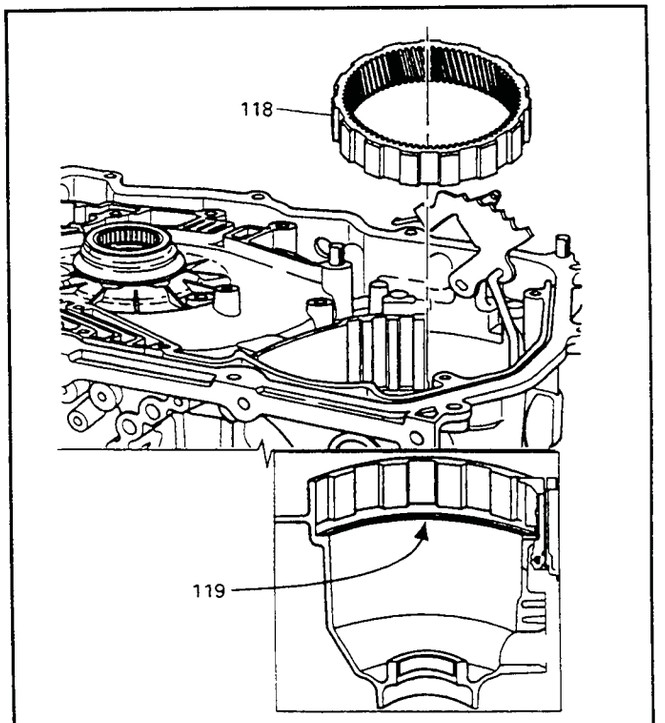


702 CARRIER, DIFFERENTIAL & FINAL DRIVE
703 SHAFT, DIFFERENTIAL PINION
704 PIN, DIFFERENTIAL PINION SHAFT RETAINING
706 WASHER, THRUST (DIFFERENTIAL PINION)
707 GEAR, DIFFERENTIAL PINION
708 WASHER, THRUST (DIFFERENTIAL SIDE GEAR)
709 GEAR, DIFFERENTIAL SIDE

Figure 105

Continued from Page 67

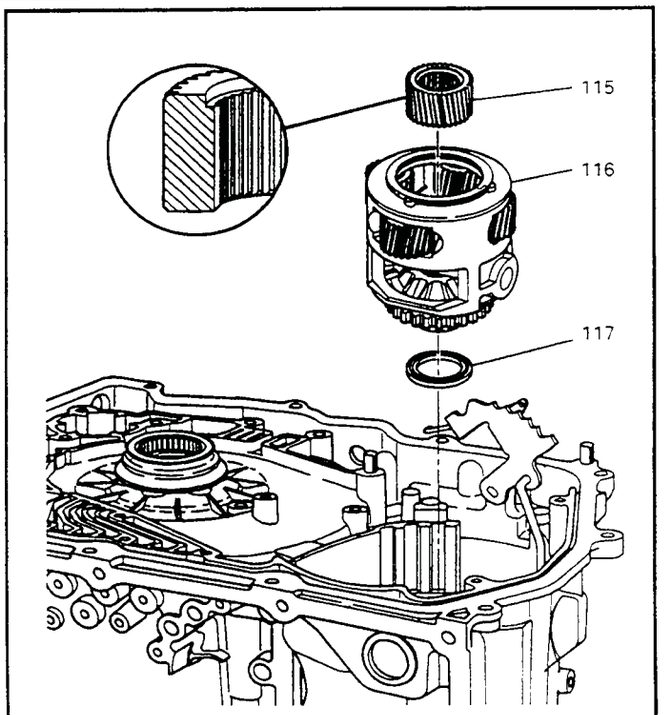
27. Assemble the side gear thrust washers (708) on the differential side gears (709) and install the differential side gears into the final drive carrier as shown in Figure 105.
28. Assemble the pinion gear thrust washers (706) onto the differential pinion gears (707), retain with "Trans-Jel", as shown in Figure 105.
29. Install the differential pinion gears with thrust washers attached into the final drive carrier, as shown in Figure 105.
30. Rotate the pinion gears into position and install the pinion shaft (703) through the final drive carrier and pinion gears (See Figure 105).
31. The position of the pinion shaft must allow the retaining pin to be installed.



118 GEAR, FINAL DRIVE INTERNAL
119 RING, FRETTING (INTERNAL GEAR TO CASE)

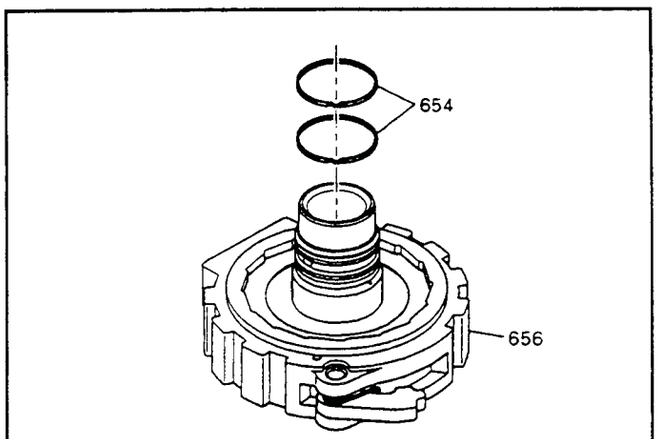
Figure 106

32. Install the pinion shaft retaining pin (704) thru the final drive carrier and pinion shaft to retain the pinion shaft, as shown in Figure 105.
33. Drive the pinion pin in with drift punch.
34. Install fretting ring (119) into the small groove in the transaxle case if it was removed, shown in Figure 106.
35. Install the final drive internal ring gear (118) into the transaxle case as shown in Figure 106.
36. Install the final drive carrier to case thrust bearing (117) onto the final drive and retain with "Trans-Jel" (See Figure 107).
37. Install the complete final drive carrier (116), into the transaxle by rotating into position in the ring gear (See Figure 107).
38. Install the final drive sun gear into the final drive carrier with the grooved side facing up, as shown in Figure 107.



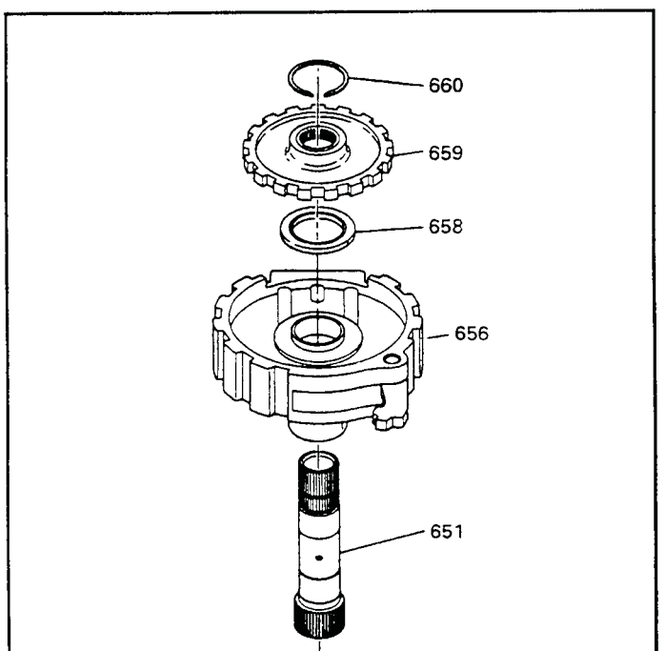
115 GEAR, SUN (FINAL DRIVE)
116 DIFFERENTIAL AND FINAL DRIVE ASSEMBLY
117 BEARING, THRUST

Figure 107



654 RING, OIL SEAL (FORWARD CLUTCH SUPPORT)
656 SUPPORT, FORWARD CLUTCH

Figure 109



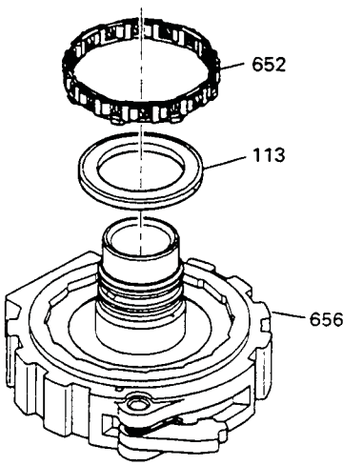
651 SHAFT, FINAL DRIVE SUN
656 SUPPORT, FORWARD CLUTCH
658 BEARING, THRUST (FORWARD SUPPORT TO PARK GEAR)
659 GEAR, PARK LOCK
660 RING, SNAP (FINAL DRIVE SUN SHAFT)

Figure 108

FORWARD CLUTCH SUPPORT AND LO ROLLER CLUTCH

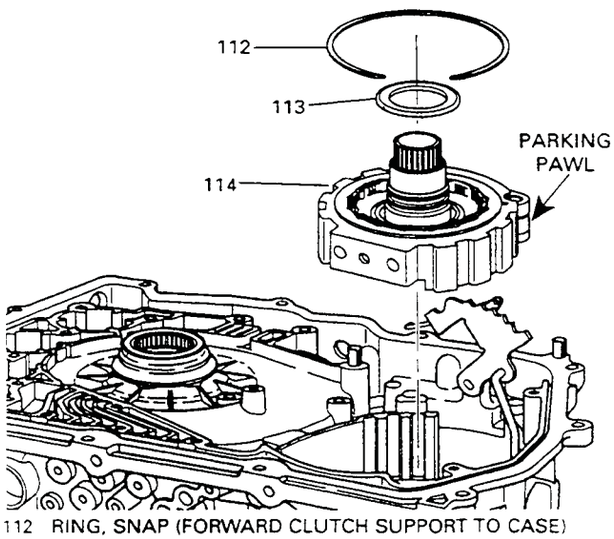
1. Install two new seals (654) onto the forward clutch support as shown in Figure 109.
2. Assemble the forward clutch support onto the final drive sun gear shaft (See Figure 108).
3. Install the thrust bearing (658) onto forward clutch support as shown in Figure 108.
4. Install the parking pawl gear (659) onto final drive sun gear shaft with the raised inner boss facing up, so that the parking pawl properly engages the teeth on gear (See Figure 108).
5. Install the snap ring onto final drive sun gear shaft to retain parking gear (See Figure 108). NOTE: There is approximately 1/8" space between the parking gear and snap ring. This space is normal.

Continued on next Page



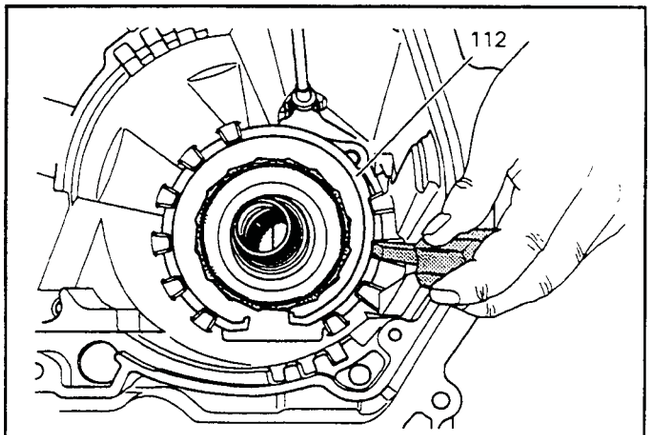
113 BEARING, THRUST
652 CLUTCH ASSEMBLY, LO ROLLER
656 SUPPORT, FORWARD CLUTCH

Figure 110



112 RING, SNAP (FORWARD CLUTCH SUPPORT TO CASE)
113 BEARING, THRUST
114 SUPPORT ASSEMBLY, FORWARD CLUTCH

Figure 111

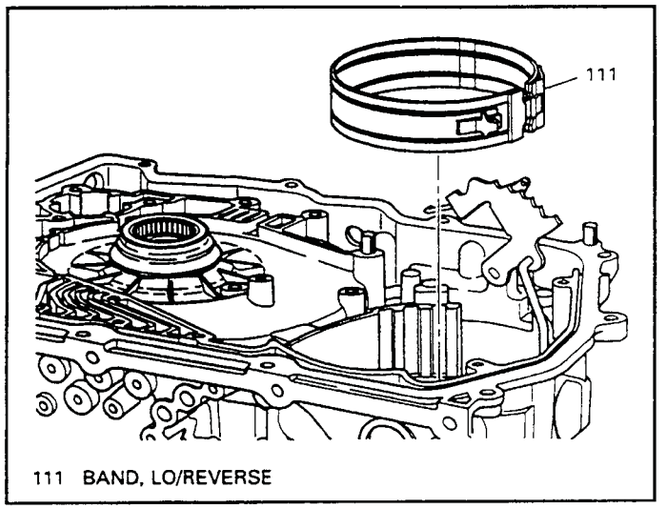


112 RING, SNAP (FORWARD CLUTCH SUPPORT TO CASE)

Figure 112

Continued from Page 69

6. Install the Lo roller clutch assembly (652) into the forward clutch support. The larger tabs on the plastic cage must face down into forward clutch support, rotate slightly counterclockwise to lock the tabs into the grooves in the forward clutch support (See Figure 110).
7. Install the thrust bearing (113) onto the forward clutch support as shown in Figure 110.
8. Compress the parking pawl spring and line up the parking pawl with the parking gear. While holding in this position, install the forward clutch support assembly into the transaxle case, as shown in Figure 111.
9. Install the forward clutch snap ring (112) into the transaxle case with the chamfer side facing up as shown in Figure 112.
10. The snap ring opening must be toward bottom of the case facing the bottom pan as shown in Figure 112.
11. Use a screwdriver to set the snap ring in place, as shown in Figure 112.
12. Install the Lo/Reverse band (111) into transaxle case as shown in Figure 113.
13. Align the band servo pin apply surface toward the bottom pan and hook the band onto band anchor pin in the transaxle case as shown in Figure 113

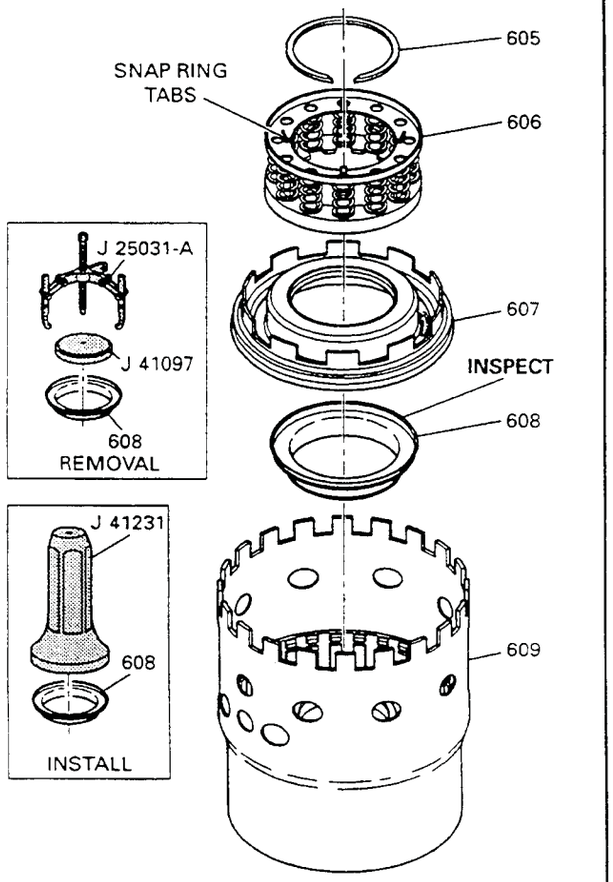


111 BAND, LO/REVERSE

Figure 113

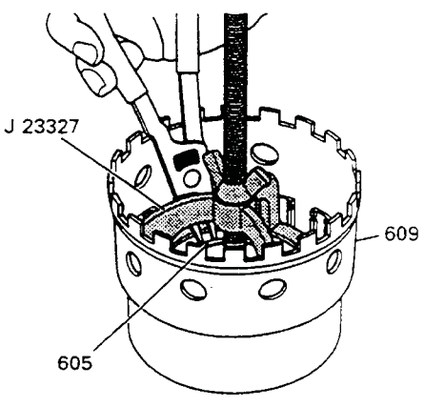
FORWARD CLUTCH HOUSING ASSEMBLY

1. ***NOTE: All pistons for the clutch packs in this transaxle are stamped steel with the rubber seals molded to the pistons, and reusable if they are not damaged.***
2. Inspect the forward clutch inner seal assembly (608) for any damage (See Figure 114).
3. If the seal is damaged, remove the seal using removal tools J-41907 and J-25031-A, shown in Figure 114.
4. Press a new inner seal assembly onto forward clutch housing inner hub using an arbor press and tool J-41231 (See Figure 114).
5. Lubricate the inner seal with "Trans-Jel".
6. Lubricate all seal surfaces with "Trans-Jel" and install the forward clutch piston (607) into the forward clutch housing with a twisting motion (See Figure 114).
7. Install the forward clutch return spring Asm. on top of the forward clutch piston with the snap ring tabs facing up as shown in Figure 114.
8. Lay the snap ring on top of the return spring assembly, install spring compressor as shown in Figure 115.
9. Compress the return spring assembly using care as it is compressed so as not to damage return spring cage as it goes by the snap ring groove.
10. Install the snap ring into the groove, to retain the return spring assembly (See Figure 115).
11. Remove the spring compressor after the snap ring is installed.



605 RING, SNAP (FORWARD CLUTCH SPRING ASSEMBLY)
606 SPRING ASSEMBLY, FORWARD CLUTCH RETURN
607 PISTON ASSEMBLY, FORWARD CLUTCH
608 SEAL AND SLEEVE ASSEMBLY, FORWARD CLUTCH INNER
609 HOUSING, FORWARD CLUTCH

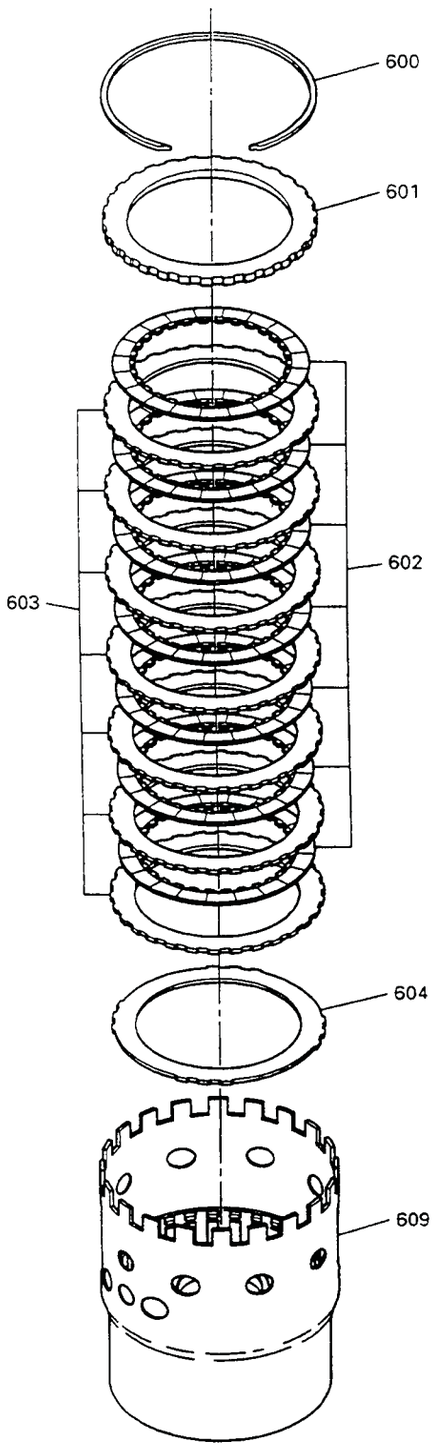
Figure 114



605 RING, SNAP (FORWARD CLUTCH SPRING ASSEMBLY)
609 HOUSING, FORWARD CLUTCH

Figure 115

Continued on next Page



600 RING, SNAP (FORWARD CLUTCH)
601 PLATE, FORWARD CLUTCH (BACKING)
602 PLATE, FORWARD CLUTCH (FIBER)
603 PLATE, FORWARD CLUTCH (STEEL)
604 PLATE, FORWARD CLUTCH (WAVED)
609 HOUSING, FORWARD CLUTCH

Figure 116

Continued from Page 71

12. Install the forward clutch wave plate (604) into the forward clutch housing (See Figure 116).
13. Install the forward clutch plates beginning with a steel plate on top of the wave plate and then alternating with lined plates, until you have installed seven steel plates and seven friction plates, as shown in Figure 116.
14. Install the forward clutch backing plate, with the flat side facing up as shown in Figure 116.
15. Install the forward clutch backing plate snap ring as shown in Figure 116.
16. Air check the forward clutch to verify proper operation of the seals and clutch pack as shown in Figure 117.
17. Install the forward clutch housing assembly in the transaxle case by rotating counterclockwise during assembly to seat the assembly into the lo roller clutch as shown in Figure 118.
18. When assembled properly the forward clutch housing will freewheel counterclockwise and lock in clockwise direction.
19. Verify the proper installation of the Lo/Reverse band by inserting a screwdriver through the reverse servo pin hole as shown in Figure 119.
20. The screwdriver should compress the band around the forward clutch housing and prevent it from turning in either direction.

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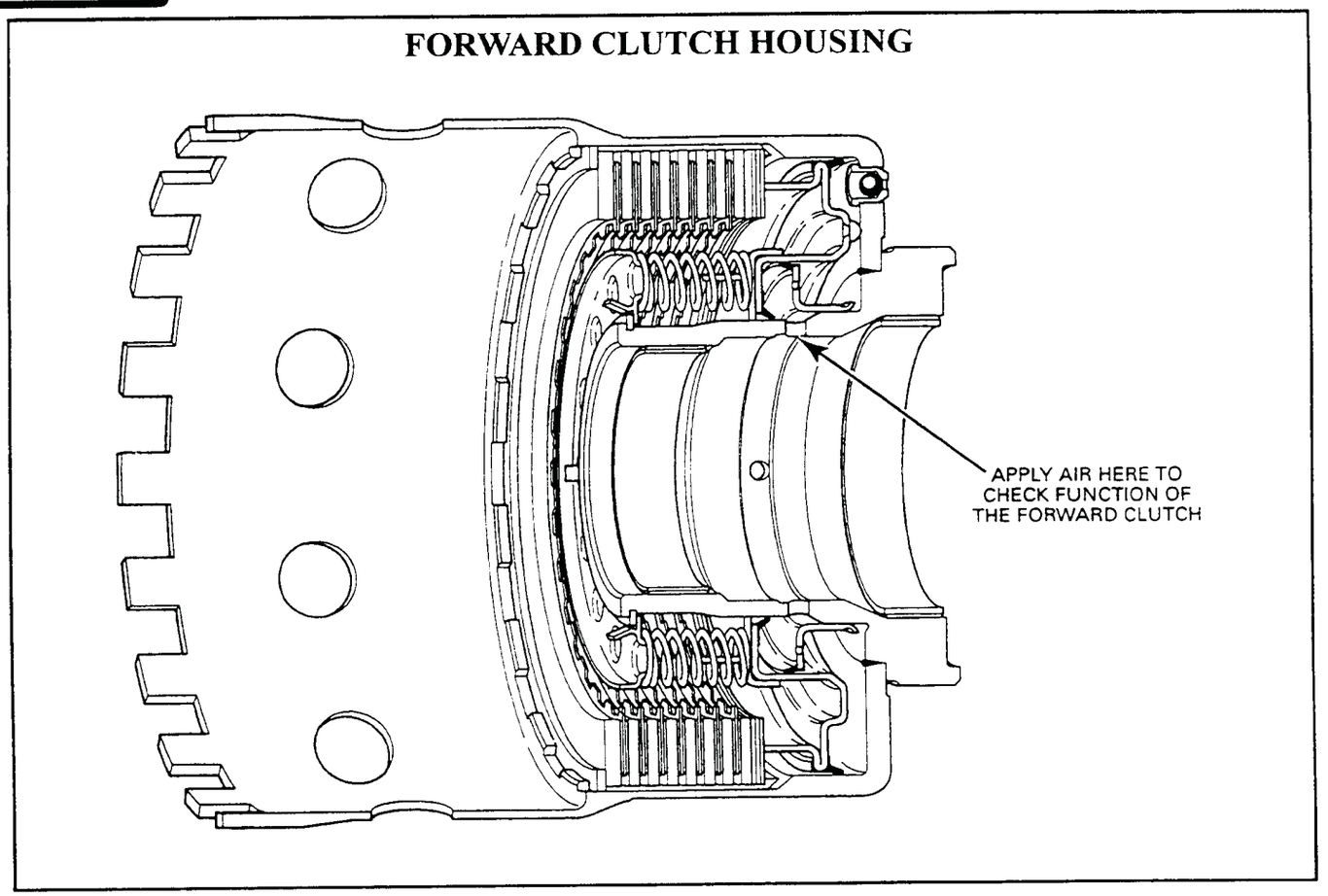


Figure 117

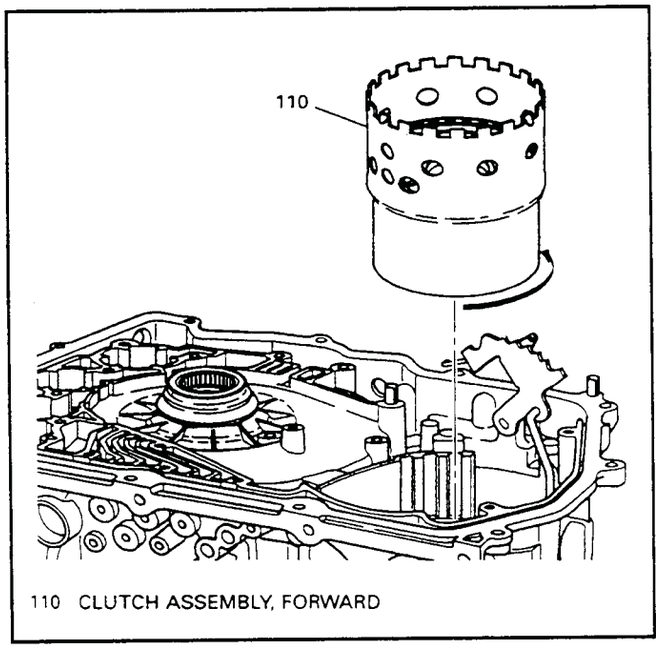


Figure 118

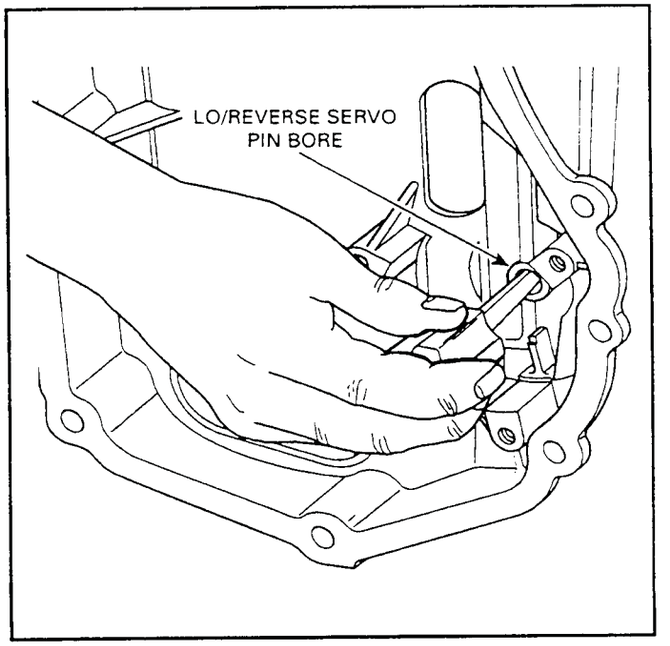
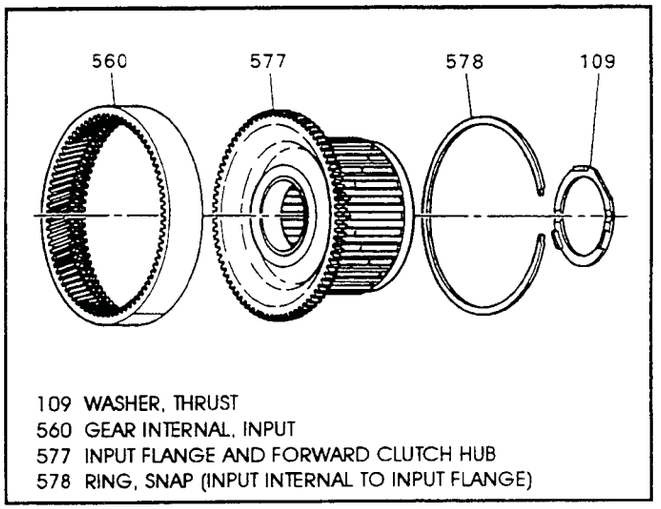
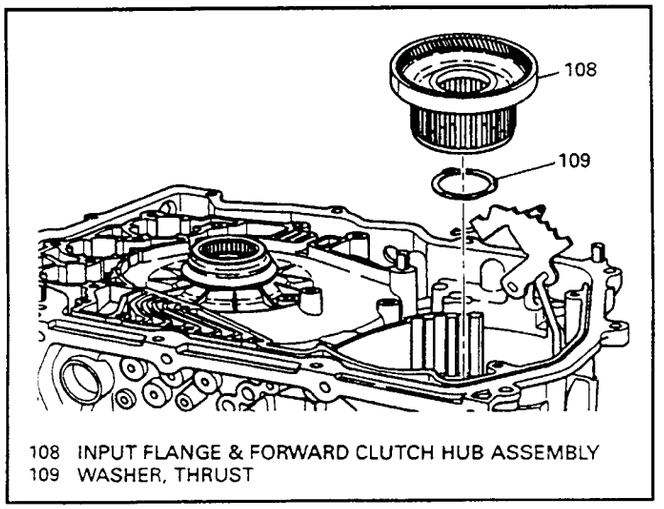


Figure 119



109 WASHER, THRUST
560 GEAR INTERNAL, INPUT
577 INPUT FLANGE AND FORWARD CLUTCH HUB
578 RING, SNAP (INPUT INTERNAL TO INPUT FLANGE)

Figure 120



108 INPUT FLANGE & FORWARD CLUTCH HUB ASSEMBLY
109 WASHER, THRUST

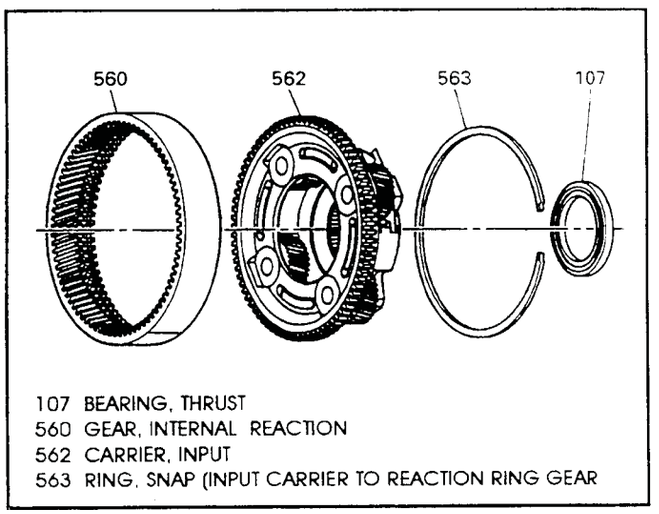
Figure 121

Continued from Page 72

21. Inspect the input internal ring gear and forward clutch hub splines, bushing and thrust washer for wear and/or damage (See Figure 120).
22. Assemble the input ring gear onto the forward clutch hub and install the snap ring as shown in Figure 120.
23. Install the thrust washer (109) onto the forward clutch hub and retain with a generous amount of "Trans-Jel" (See Figure 120).
24. Install the forward clutch hub and input ring gear assembly into the transaxle, by rotating back and forth to engage the hub splines into the forward clutch plates (See Figure 121).

REACTION INTERNAL RING GEAR AND INPUT CARRIER ASSEMBLY

1. Inspect the reaction internal ring gear and input carrier for wear or damage (See Figure 122).
2. Measure the pinion gear end play with a feeler gage for proper clearance (See Figure 123).
3. Should be .009"-.027" (.24mm-.69mm), as shown in Figure 123.
   NOTE: Replace the carrier if the pinion gear clearance is out of specification. The pinion gears are permanently assembled to carrier and are not serviced individually.
4. Assemble the reaction ring gear and the input carrier and install snap ring (See Figure 122).
5. Install thrust bearing (107) onto input carrier and retain with "Trans-Jel" (See Figure 122).
6. Install reaction ring gear and the input carrier assembly into the transaxle by rotating into the input internal ring gear (See Figure 124).



107 BEARING, THRUST
560 GEAR, INTERNAL REACTION
562 CARRIER, INPUT
563 RING, SNAP (INPUT CARRIER TO REACTION RING GEAR

Figure 122

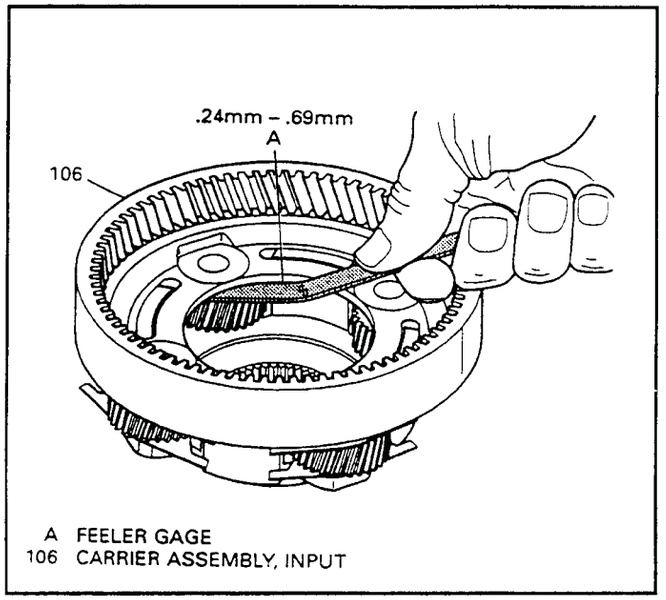


Figure 123

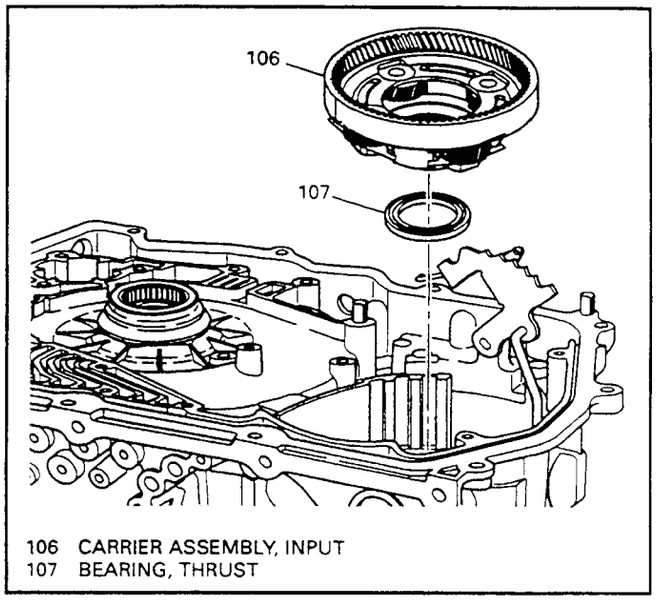


Figure 124

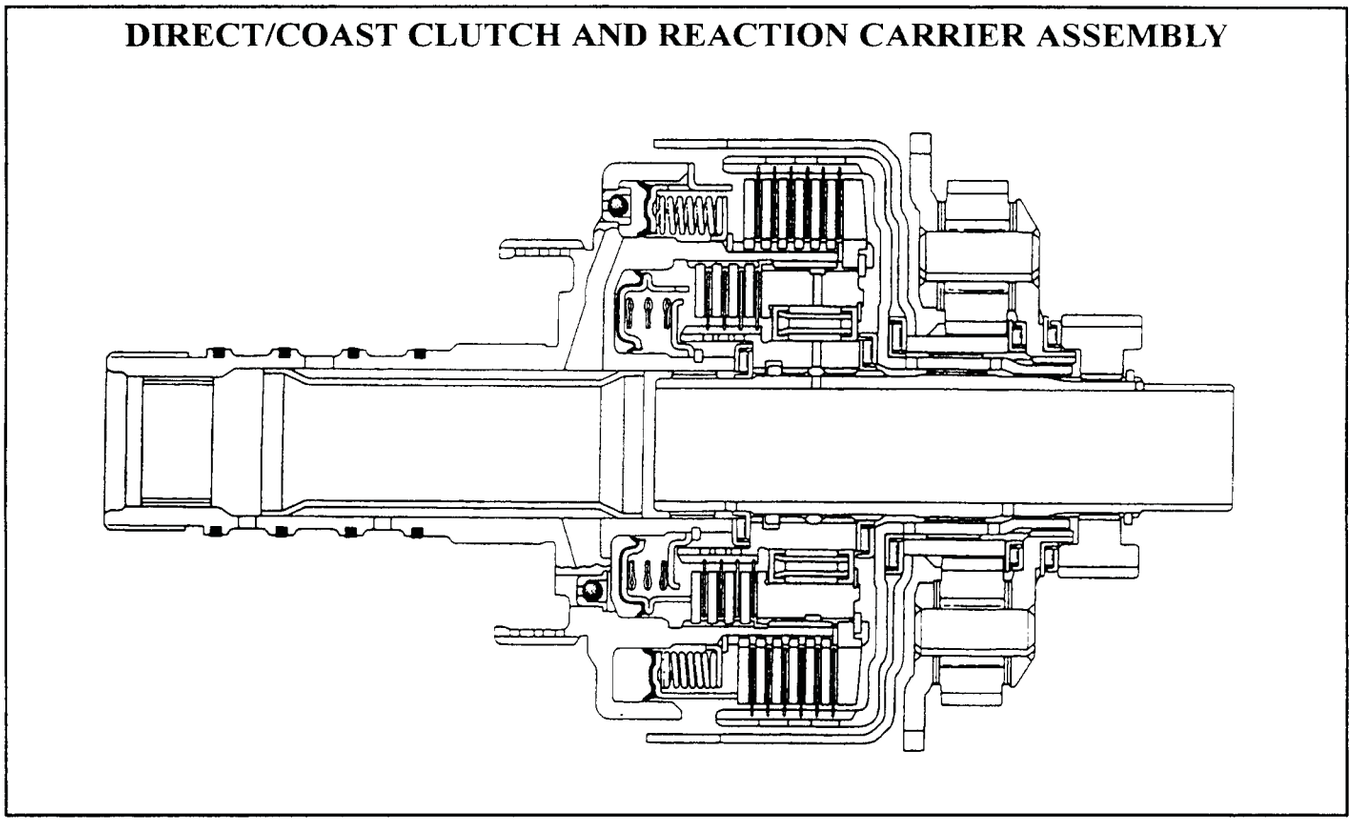
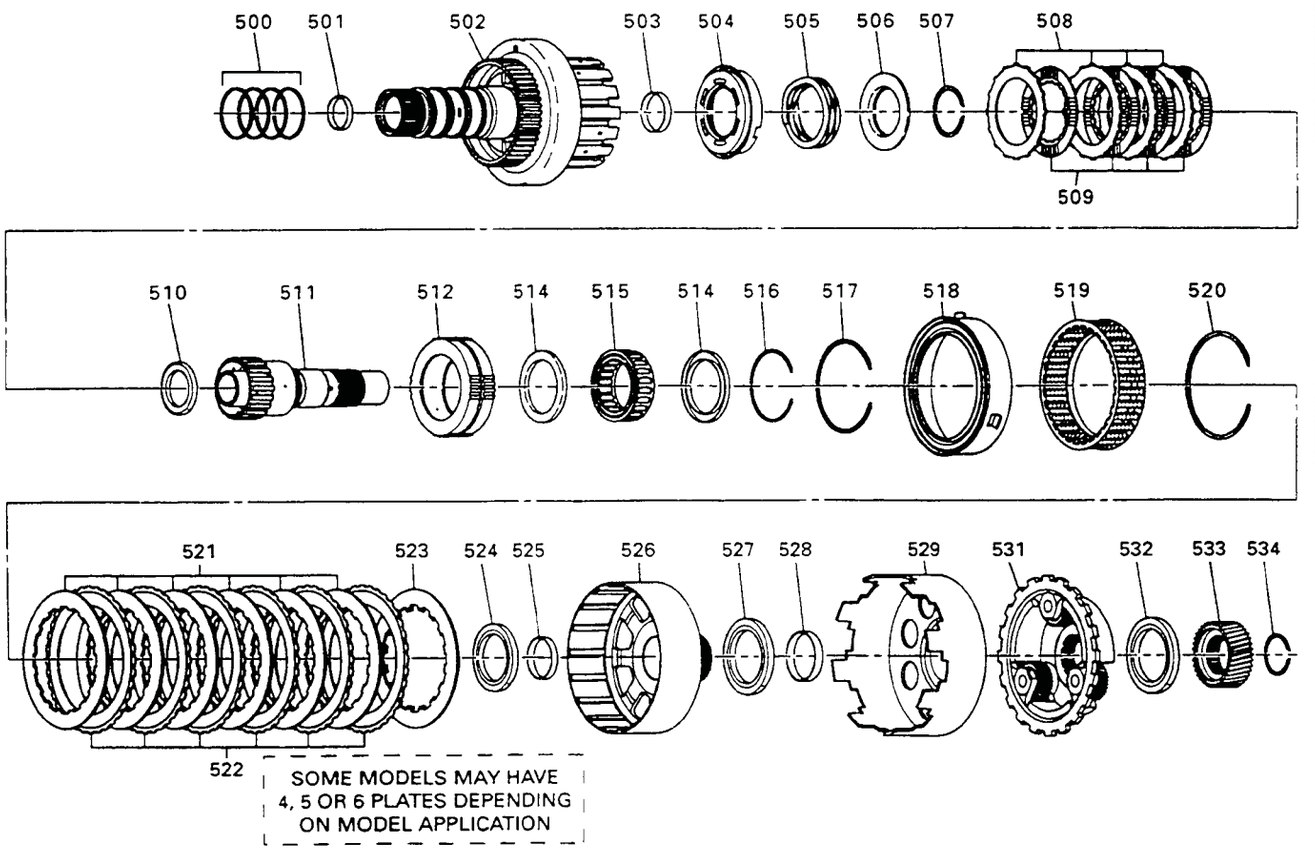


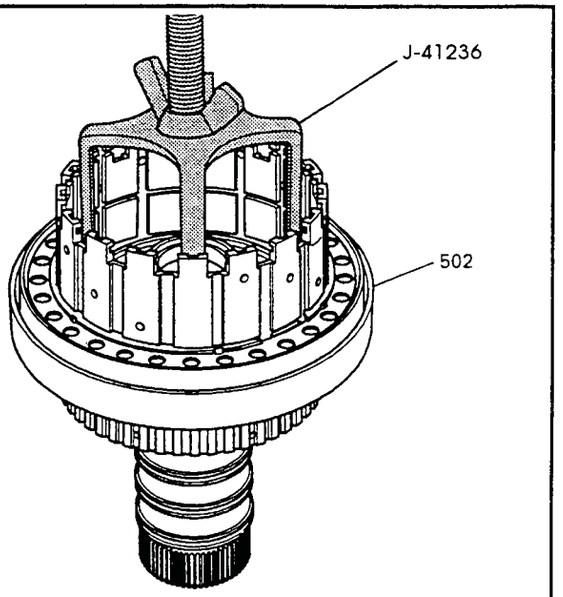
Figure 125

DIRECT/COAST CLUTCH AND REACTION CARRIER ASSEMBLY



500 RING, OIL SEAL - INPUT SHAFT
501 BUSHING, INPUT SHAFT
502 HOUSING, DIRECT & COAST CLUTCH AND INPUT SHAFT
503 BUSHING, DIRECT CLUTCH HOUSING TO OUTPUT SHAFT
504 PISTON ASSEMBLY, COAST CLUTCH
505 SPRING, COAST CLUTCH RELEASE
506 RETAINER, COAST CLUTCH SPRING
507 RING, SNAP (COAST CLUTCH SPRING RETAINER)
508 PLATE, COAST CLUTCH (STEEL)
509 PLATE, COAST CLUTCH (FIBER)
510 BEARING, THRUST
511 SHAFT AND INNER RACE ASSEMBLY, INPUT SUN GEAR
512 RACE, OUTER (INPUT SPRAG)
514 END BEARINGS, SPRAG CLUTCH (2)
515 SPRAG ASSEMBLY, INPUT
516 RING, SNAP (OUTER RACE TO SPRAG ASSEMBLY)
517 RING, SNAP (DIRECT/COAST CLUTCH RETAINING)
518 PISTON ASSEMBLY, DIRECT CLUTCH
519 SPRING AND RETAINER ASSEMBLY, DIRECT CLUTCH
520 RING, DIRECT CLUTCH SPRING RETAINER
521 PLATE, DIRECT CLUTCH (STEEL)
522 PLATE, DIRECT CLUTCH (FIBER)
523 PLATE, DIRECT CLUTCH (BACKING)
524 BEARING, THRUST
525 BUSHING, REACTION CARRIER SHAFT
526 SHELL, REACTION CARRIER SHAFT
527 BEARING, THRUST (CARRIER SHAFT TO SHELL)
528 BUSHING, REACTION SUN GEAR
529 SHELL, REACTION SUN
531 CARRIER ASSEMBLY, REACTION
532 BEARING, THRUST (REACTION CARRIER TO SUN GEAR)
533 GEAR, INPUT SUN
534 RING, SNAP

Figure 126

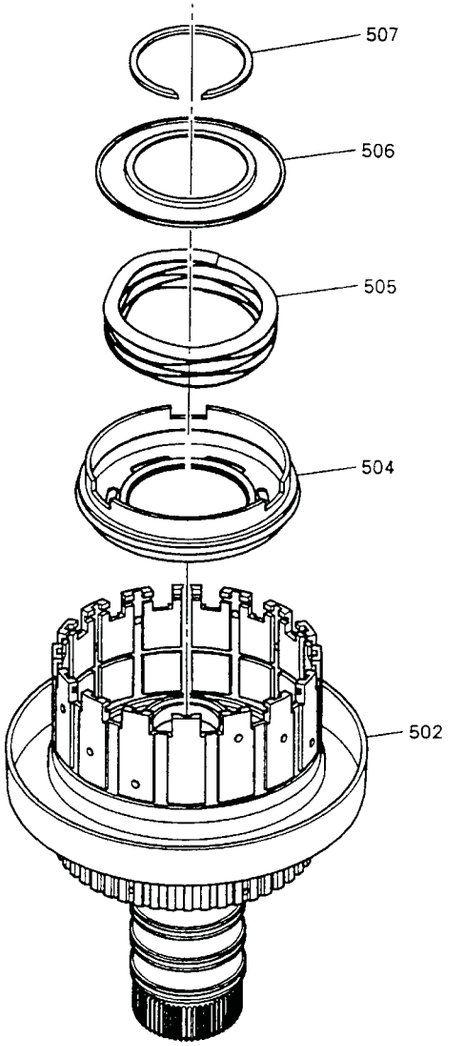


502 HOUSING, DIRECT & COAST CLUTCH AND INPUT SHAFT

Figure 127

DIRECT/COAST CLUTCH HOUSING AND REACTION CARRIER ASSEMBLY

1. Use Figure 126 as a guide to disassemble, and inspect all parts in this housing.
2. Lubricate the inner and outer molded seals on the coast clutch piston with "Trans-Jel".
3. Install the coast clutch piston and seal assembly into the input housing with a rotating motion, as shown in Figure 128.
4. Install the coast clutch return spring on top of the coast clutch piston (See Figure 128).
5. Install the coast clutch return spring retainer on top of the return spring with the inner lip facing up, as shown in Figure 128.
6. Lay the snap ring on top of the retainer, shown in Figure 128.
7. Install compressor tool J-41236, as shown in Figure 127, and compress coast clutch return spring.
8. Install the coast clutch spring retainer snap ring onto the input housing (See Figure 128).
9. Remove the compressor tool after installation of the snap ring.



502 HOUSING, DIRECT & COAST CLUTCH AND INPUT SHAFT
504 PISTON ASSEMBLY, COAST CLUTCH
505 SPRING, COAST CLUTCH RETURN
506 RETAINER, COAST CLUTCH RETURN SPRING
507 RING, SNAP (COAST CLUTCH SPRING RETAINER)

Figure 128

NOTE: All pistons for the clutch packs in this transaxle are stamped steel with the rubber seals molded to the pistons, and reusable if they are not damaged.

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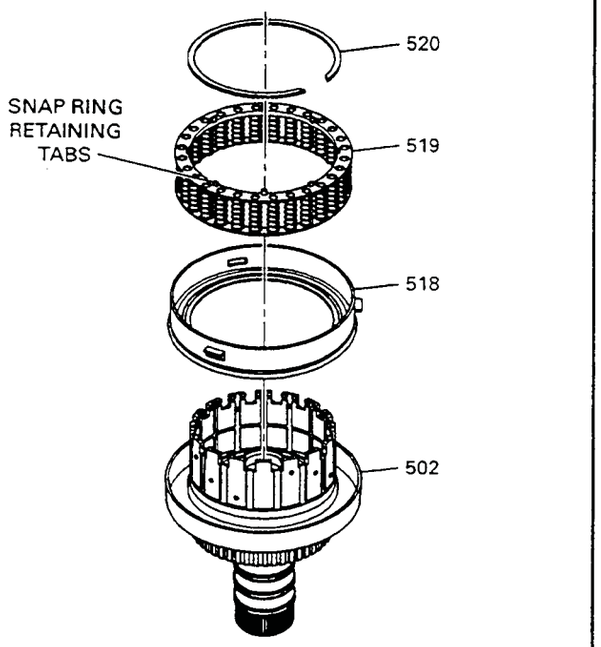
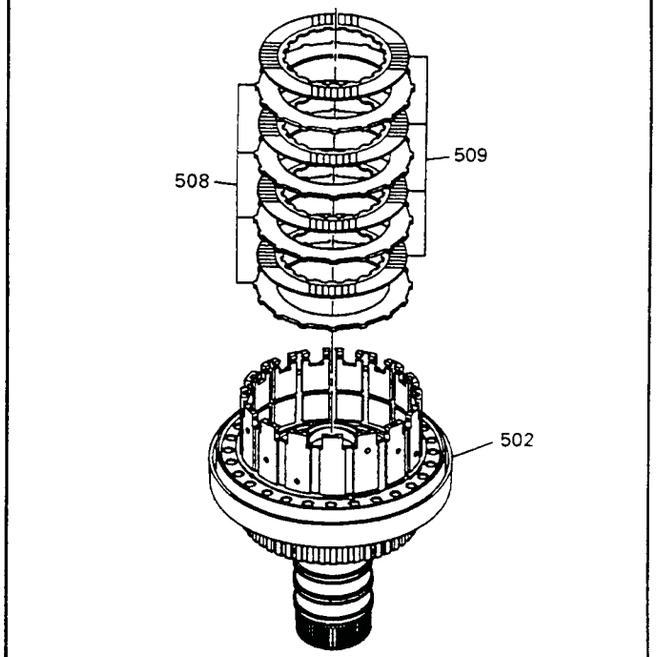


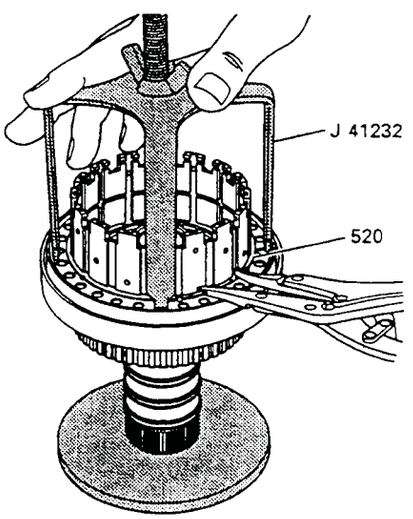
502 HOUSING, DIRECT & COAST CLUTCH AND INPUT SHAFT
518 PISTON ASSEMBLY, DIRECT CLUTCH
519 SPRING AND RETAINER ASSEMBLY, DIRECT CLUTCH
520 RING, DIRECT CLUTCH SPRING RETAINER

Figure 129



502 HOUSING, DIRECT & COAST CLUTCH AND INPUT SHAFT
508 PLATE, COAST CLUTCH (STEEL)
509 PLATE, COAST CLUTCH (FIBER)

Figure 131

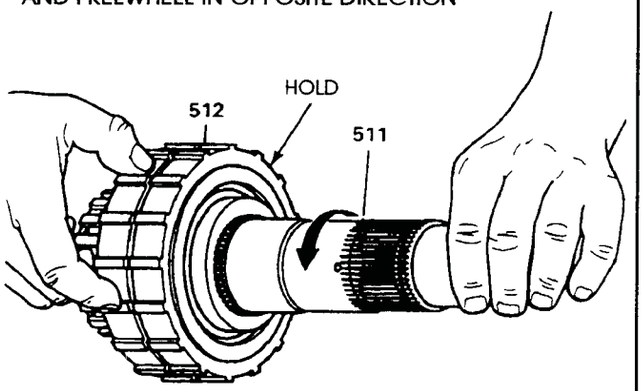


520 RING, DIRECT CLUTCH SPRING RETAINER

Figure 130

Continued from Page 77

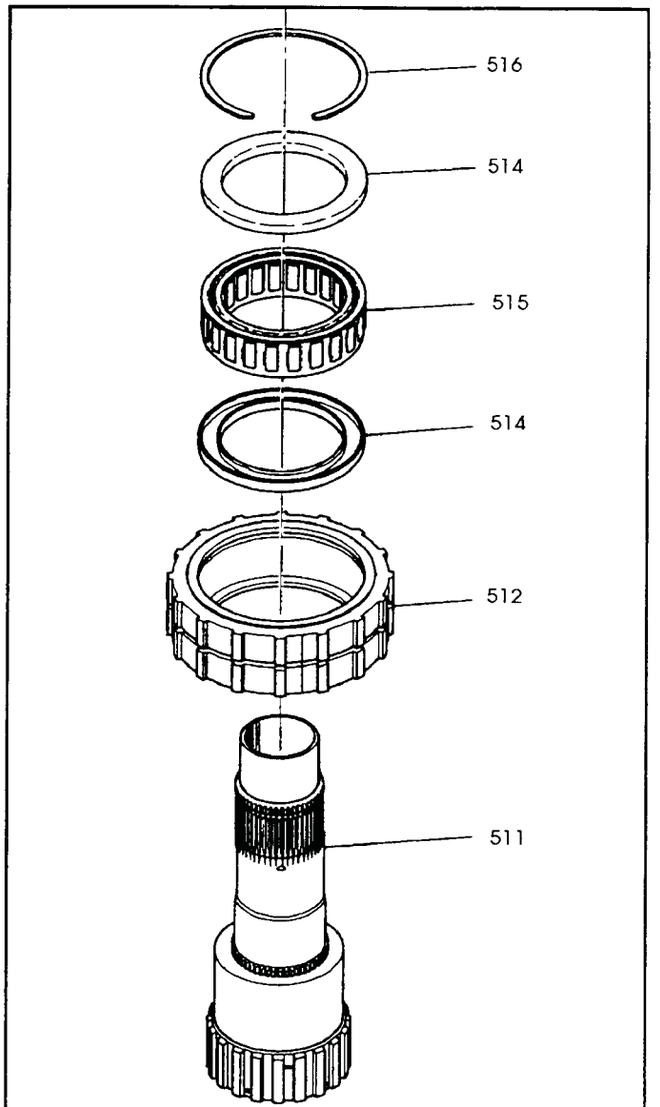
10. Lubricate the inner and outer molded seals on the direct clutch piston with "Trans-Jel".
11. Install direct clutch piston and seal assembly into the input housing in a rotating motion, as shown in Figure 129.
12. Install the direct clutch return spring assembly (519) into the input housing with the snap ring retaining tabs facing up as shown Figure 129.
13. Install spring compressor tool J-41232, shown in Figure 130, and compress the direct clutch return spring assembly.
14. Install the direct clutch snap ring (520), shown in Figure 130, and remove compressor tool.
15. Install the coast clutch plates into the input housing beginning with a steel plate and alternating with lined plates until you have installed four steel and four lined plates, as shown in Figure 131.
    NOTE: The steel plates must be assembled with the splines in the input housing grooves that are machined down to the piston.



511 SHAFT AND INNER RACE ASSEMBLY, INPUT SUN GEAR
512 RACE, OUTER (INPUT SPRAG)

Figure 132

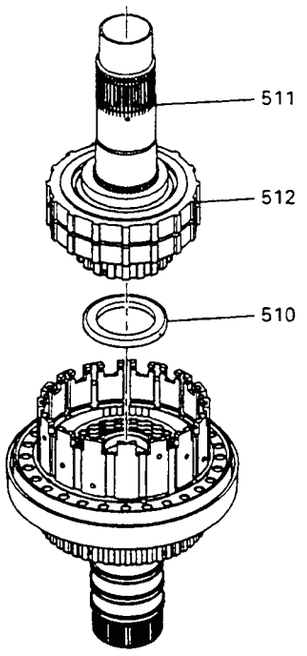
16. Place the input sprag outer race (512) on bench with the flat side down and the end with snap ring groove facing up (See Figure 133).
17. Place one end bearing (514) into the outer race as shown in Figure 133.
18. Install the input sprag assembly (515) into the sprag outer race with the grooved edge up and the flat side down, as shown in Figure 133.
19. Install the other end bearing (514) on top of the input sprag assembly as shown in Figure 133.
20. Install the snap ring (516) into the sprag outer race to retain the input sprag and end bearings as shown in Figure 133.
21. Install the input sprag and outer race assembly onto the input sun shaft (511), with the snap ring side of the assembly facing up, as shown in Figure 133.
22. Rotate the input sun shaft (511) clockwise during assembly to help the installation.
23. NOTE: The flat side of the sprag outer race also functions as the backing plate for the coast clutch.
24. Verify the correct operation of the input sprag by holding the sprag outer race and rotating the input sun shaft, as shown in Figure 132. ***The input sun shaft should rotate only in the clockwise direction (See Figure 132).***



511 SHAFT AND INNER RACE ASSEMBLY, INPUT SUN GEAR
512 RACE, OUTER (INPUT SPRAG)
514 END BEARINGS, INPUT SPRAG (2)
515 SPRAG ASSEMBLY, INPUT
516 RING, SNAP (OUTER RACE TO SPRAG ASSEMBLY)

Figure 133

Continued on next Page



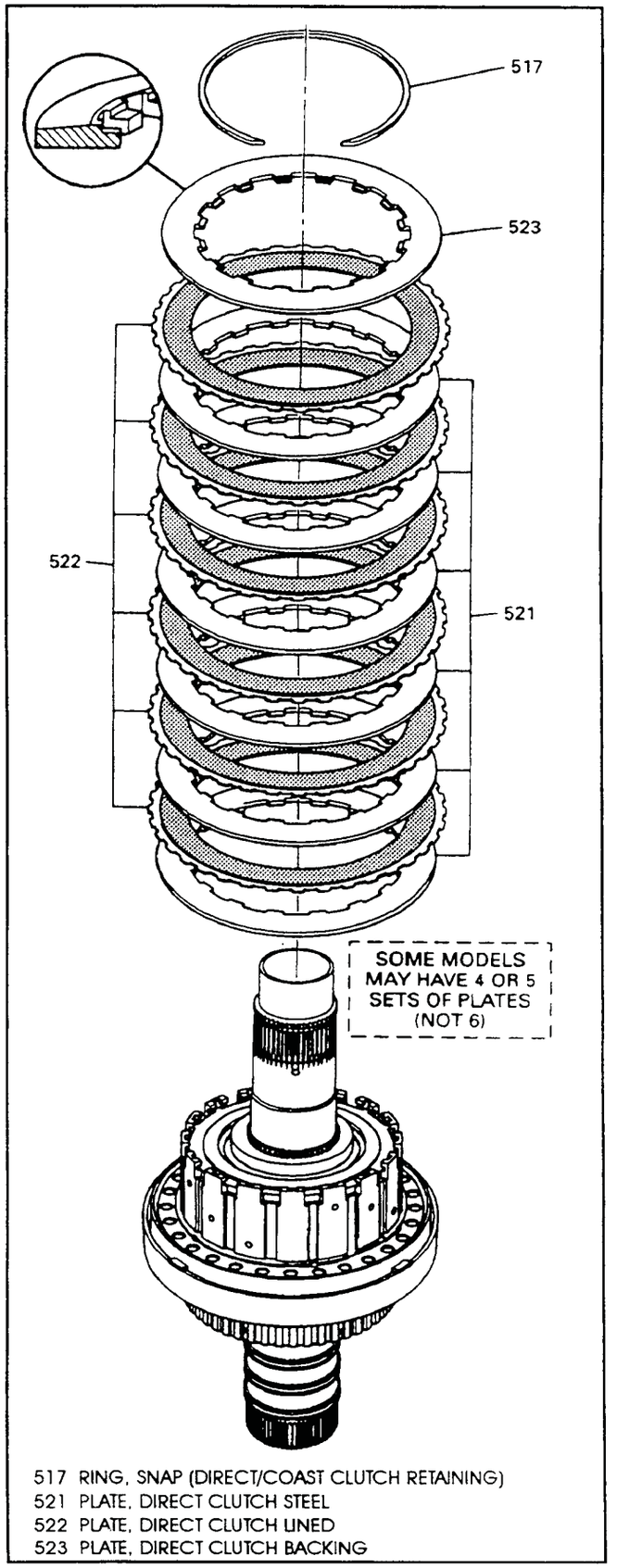
510 BEARING, THRUST
511 SHAFT AND INNER RACE ASSEMBLY, INPUT SUN GEAR
512 RACE, OUTER (INPUT SPRAG)

Figure 134

Continued from Page 79

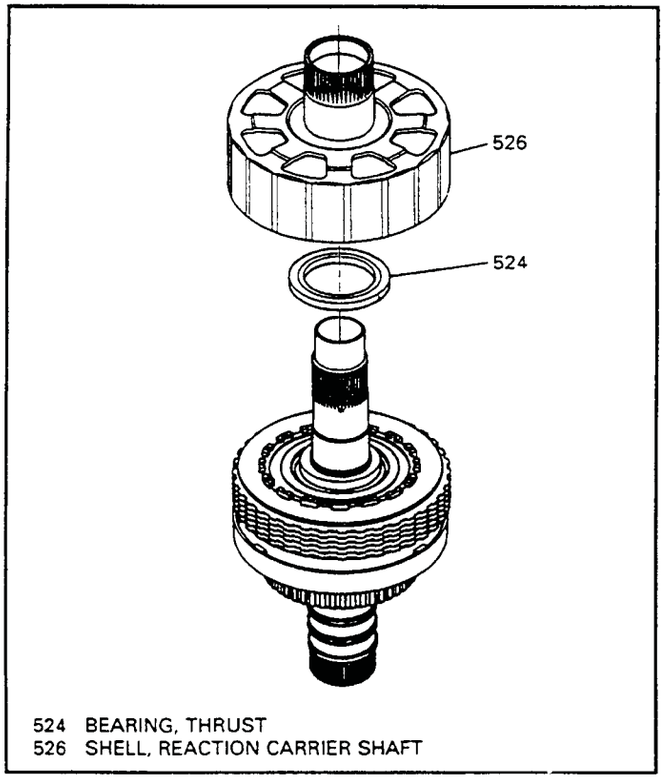
25. Install the thrust bearing (510) on the underside of the input shaft, as shown in Figure 134, and retain with generous amount "Trans-Jel".
26. Install the input shaft and input sprag assembly into the input as shown in Figure 134.
27. The splines on the input sun shaft must engage into the coast clutch lined plates, as shown in Figure 134.
28. Install the direct clutch plates beginning with a steel plate and alternating with lined plates, as shown in Figure 135.
    NOTE: Some models may have 4, 5 or 6 plates depending on model application.
29. Notice that the direct clutch lined plates have external splines, and the steel plates are internal splines (See Figure 135).
30. Install the direct clutch backing plate with the flat side facing down as shown in Figure 135.
31. Install the internal snap ring (517) to retain the input sprag and direct clutch plates as shown in Figure 135.

Continued on Page 81



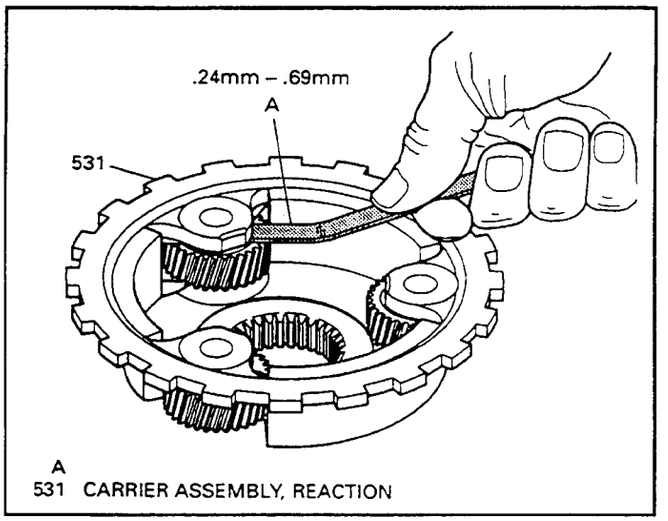
517 RING, SNAP (DIRECT/COAST CLUTCH RETAINING)
521 PLATE, DIRECT CLUTCH STEEL
522 PLATE, DIRECT CLUTCH LINED
523 PLATE, DIRECT CLUTCH BACKING

Figure 135



524 BEARING, THRUST
526 SHELL, REACTION CARRIER SHAFT

Figure 136

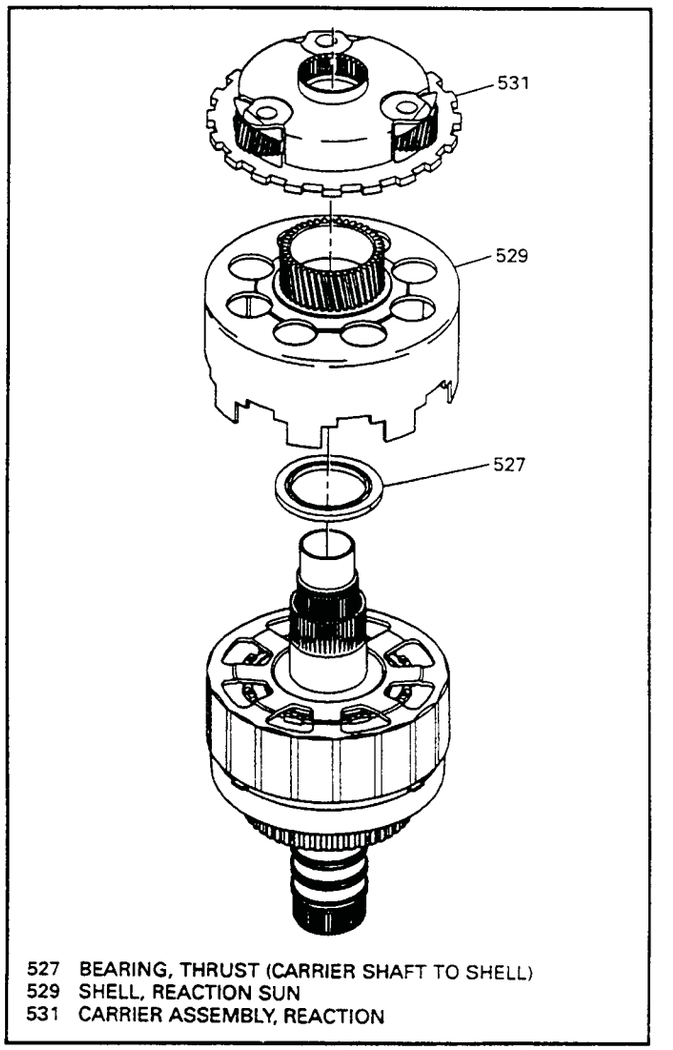


A
531 CARRIER ASSEMBLY, REACTION

Figure 137

Continued from Page 80

32. Install thrust bearing (524) on top of the sprag assembly and retain with "Trans-Jel" as shown in Figure 136.
33. Install the reaction sun shell (526) onto input housing. The splines on inside of the shell must engage on the direct clutch lined plates, shown in Figure 136.

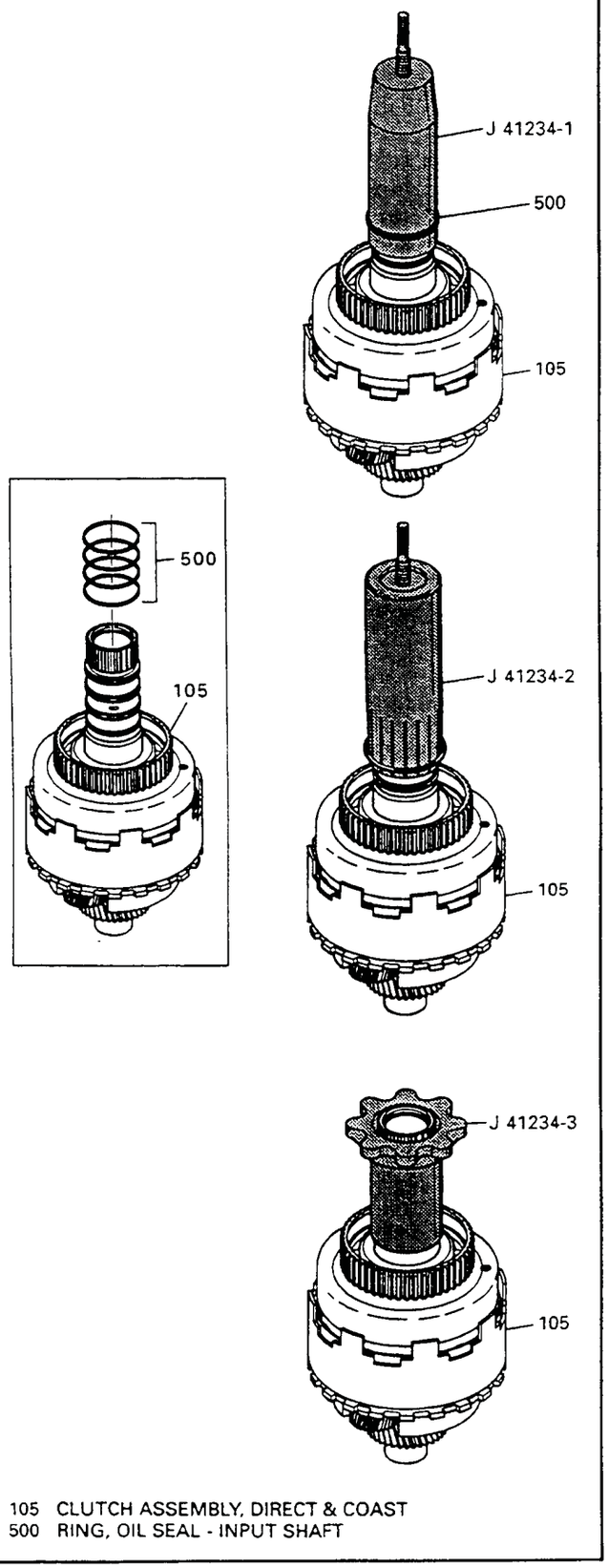


527 BEARING, THRUST (CARRIER SHAFT TO SHELL)
529 SHELL, REACTION SUN
531 CARRIER ASSEMBLY, REACTION

Figure 138

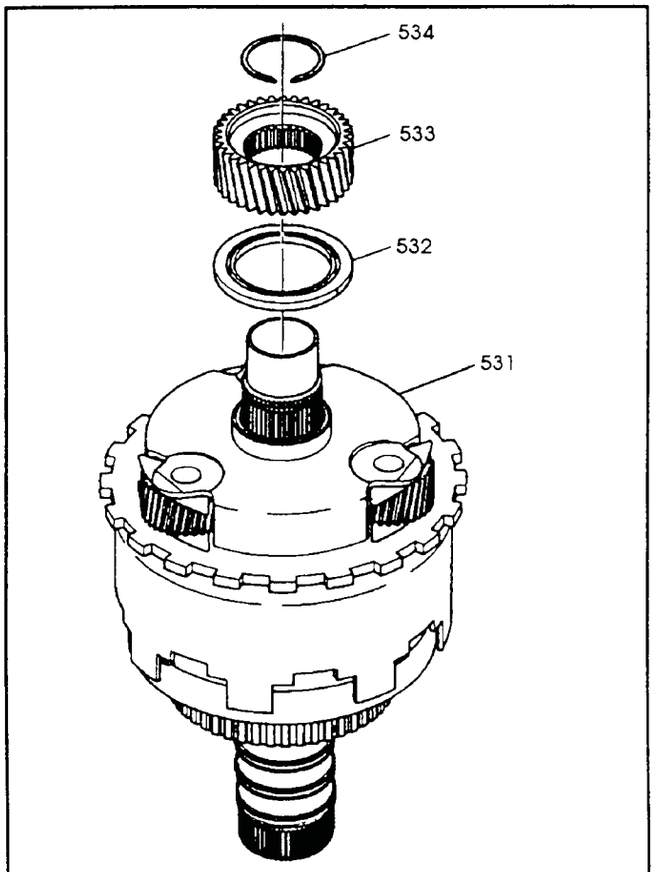
34. Install the thrust bearing (527) onto the top of of the reaction sun shell assembly as shown in Figure 138.
35. Install the reaction sun gear and shell assembly (529) onto the reaction shaft shell, as shown in Figure 138.
36. Measure the reaction carrier pinion gear end play with a feeler gage for proper specification, as shown in Figure 137.
37. End play should be .009"-.027" or .24mm to .69mm, as shown in Figure 137.
    NOTE: Replace the carrier assembly if pinion gear clearance is out of specification. Pinion gears are permanently assembled to the carrier and are not serviced individually.

Continued on next Page



105 CLUTCH ASSEMBLY, DIRECT & COAST
500 RING, OIL SEAL - INPUT SHAFT

Figure 139



531 CARRIER ASSEMBLY, REACTION
532 BEARING, THRUST (REACTION CARRIER TO SUN GEAR)
533 GEAR, INPUT SUN
534 RING, SNAP

Figure 140

Continued from Page 81

38. Install the reaction carrier (531) onto reaction sun gear by rotating the reaction carrier to mesh the sun gear teeth with the pinion gears, until fully seated as shown in Figure 140.
39. Install the reaction carrier to input sun gear bearing (532) on the reaction carrier assembly as shown in Figure 140.
40. Install the input sun gear (533) onto the input sun shaft, as shown in Figure 140.
41. Install the input sun gear snap ring (534) onto the input sun shaft as shown in Figure 140.
42. Install four new solid "Teflon" seals (500) onto the input shaft using tool J-41234, as shown in Figure 139. Begin with the seal closest to the input housing.

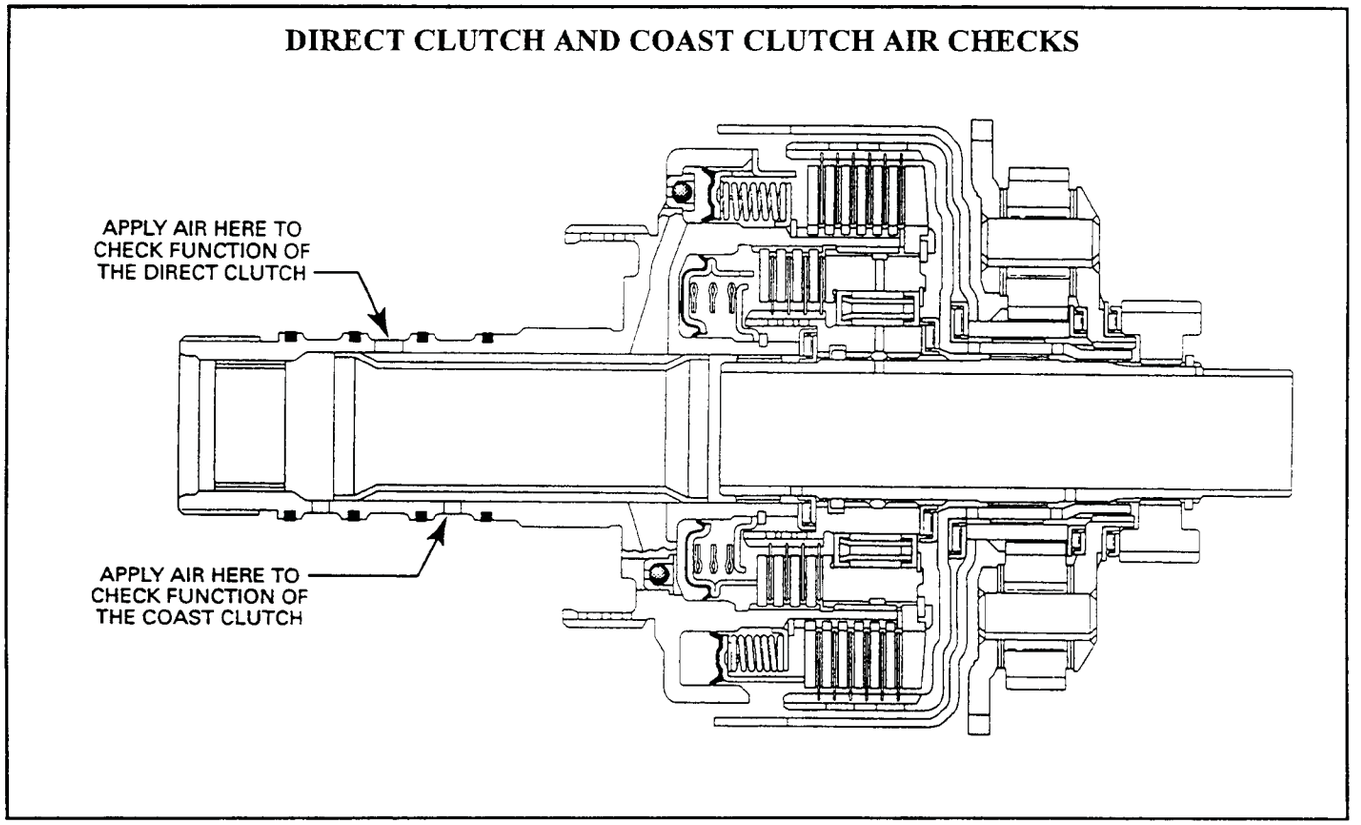


Figure 141

43. Slide tool J-41234-1 over the input shaft and position it at the seal groove closest to the input housing (See Figure 139). Lubricate the tool with small amount of transmission fluid.
44. Guide a new seal onto J-41234-1 and slide it down and into the seal groove with J-41234-2 (See Figure 139).
45. Repeat the procedure for each seal adjusting the J-41234- as necessary for each seal groove.
46. Use tool J-41234-3 to size the seals, as shown in Figure 139.
    Leave the sizer in place for at least 5 minutes before installing into the transaxle.
47. Air check the direct clutch and coast clutch to verify proper operation of the seals and clutch assemblies as shown in Figure 141.
48. Install the direct/coast clutch & reaction carrier assembly (105) into the transaxle, as shown in Figure 142, by rotating into position.

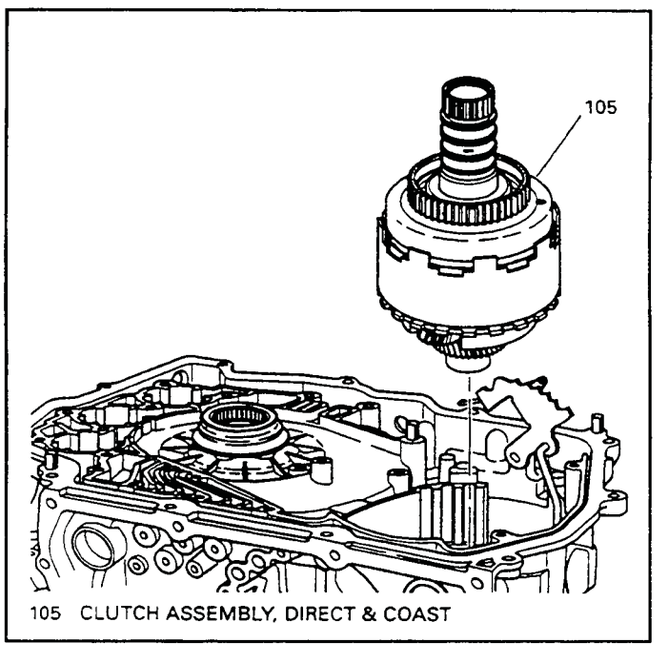
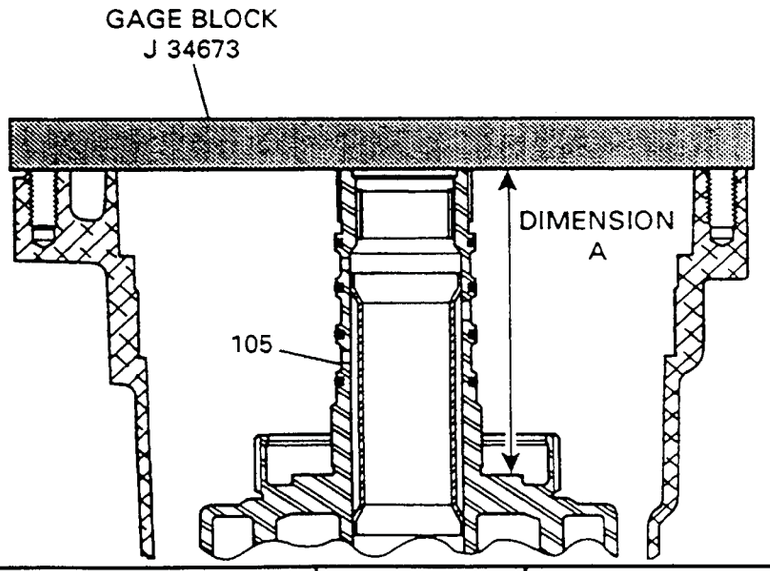


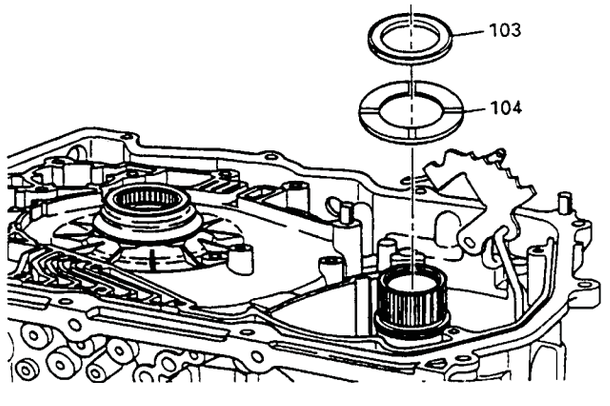
Figure 142

SELECTIVE WASHER MEASUREMENT AND CHART



DIMENSION "A"		WASHER COLOR I.D.	WASHER DIMENSION	
INCH	MILLIMETER		INCH	MILLIMETER
3.952" - 3.964"	100.40 - 100.70	BROWN	.059" - .062"	1.50 - 1.60
3.965" - 3.976"	100.70 - 100.99	GREY	.070" - .074"	1.80 - 1.90
3.977" - 3.987"	100.99 - 101.29	NATURAL	.082" - .086"	2.09 - 2.19
3.988" - 3.998"	101.29 - 101.59	BLACK	.094" - .098"	2.39 - 2.49
3.999" - 4.010"	101.59 - 101.88	ORANGE	.105" - .109"	2.68 - 2.78
4.011" - 4.021"	101.88 - 102.18	VIOLET	.117" - .121"	2.98 - 3.08
4.022" - 4.033"	102.18 - 102.48	YELLOW	.129" - .133"	3.28 - 3.38
4.034" - 4.045"	102.48 - 102.77	RED	.140" - .144"	3.57 - 3.67
4.046" - 4.057"	102.77 - 103.07	GREEN	.152" - .156"	3.87 - 3.97

Figure 143



103 BEARING, THRUST
104 WASHER, THRUST (SELECTIVE)

Figure 144

SELECTIVE WASHER MEASUREMENT

1. Place gage block J-34673 across the machined surface of the case as shown in Figure 143.
2. Measure the distance between the top of the direct/coast clutch housing and the machined surface of the case (Dimension "A").
   NOTE: If measured with a depth micrometer from the top of the gage block, the thickness of the gage block must be subtracted for the correct Dimension "A".
3. Note the measurement of Dimension "A" and choose the correct selective washer from the chart in Figure 143.
4. Install the correct selective washer (104) onto the top of the input housing with the tab on the thrust washer in recessed area of housing. (See Figure 144).

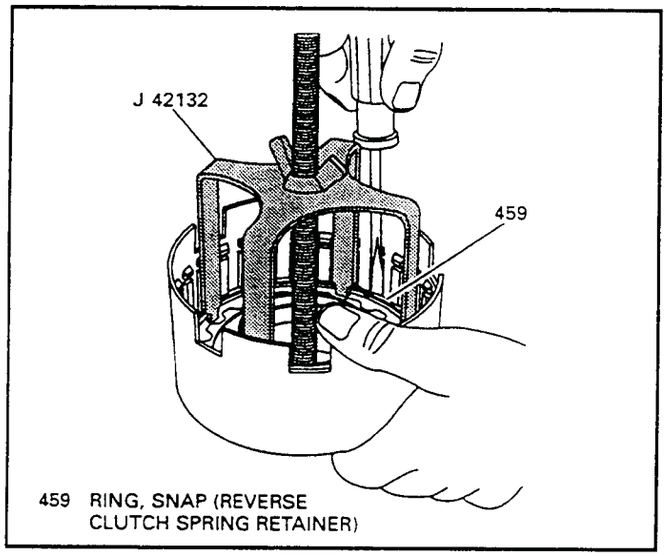


Figure 145

Continued from Page 84

5. Install the thrust bearing (103) over the input shaft and on top of the selective thrust washer as shown in Figure 144.

REVERSE INPUT CLUTCH AND 2ND ROLLER CLUTCH ASSEMBLY

1. ***NOTE: All pistons for the clutch packs in this transaxle are stamped steel with the rubber seals molded to the pistons, and reusable if they are not damaged.***
2. Inspect reverse input clutch inner seal assembly (456) for any damage (See Figure 146).
3. If the seal is damaged, remove the seal using removal tools J-25031-A and J-41907, shown in Figure 146.
4. Press a new inner seal assembly onto reverse input housing inner hub using an arbor press and tool J-41233 (See Figure 146).
5. Lubricate the new inner seal with "Trans-Jel".
6. Lubricate both seal surfaces with "Trans-Jel", and install the reverse input clutch piston into reverse input housing with a twisting motion (See Figure 146).
7. Install the reverse input clutch return spring assembly (458) on top of piston with smaller outside diameter down (See Figure 146).

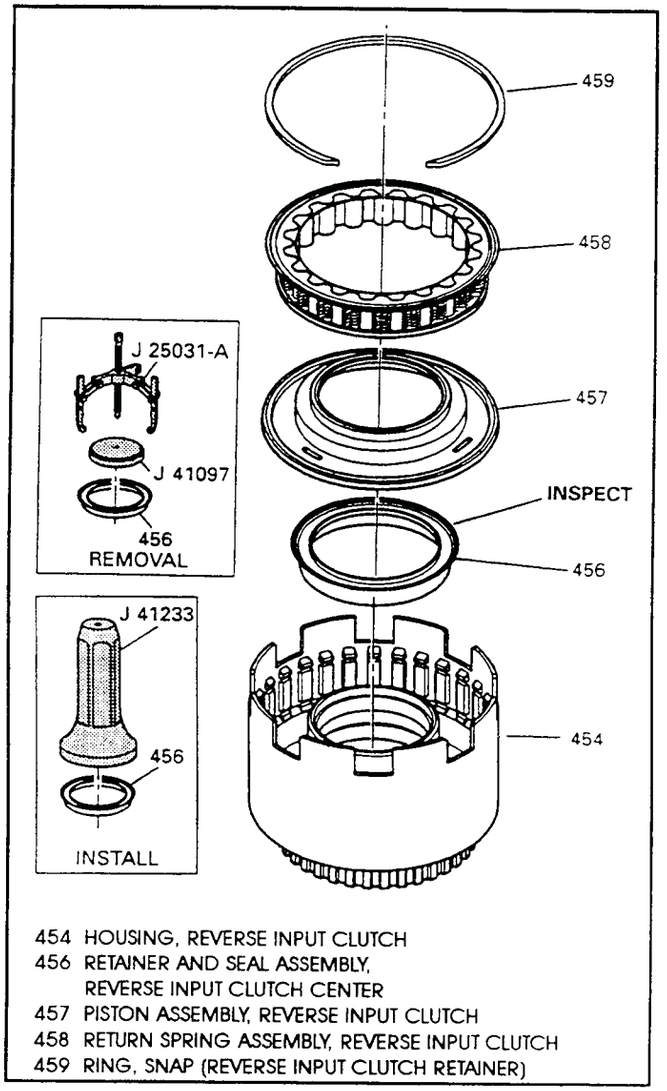


Figure 146

8. Install spring compressor tool and compress the return spring as shown in Figure 145.
9. Install the reverse input clutch return spring snap ring into groove using a screwdriver as shown in Figure 145.
10. Remove the spring compressor tool.

Continued on next Page

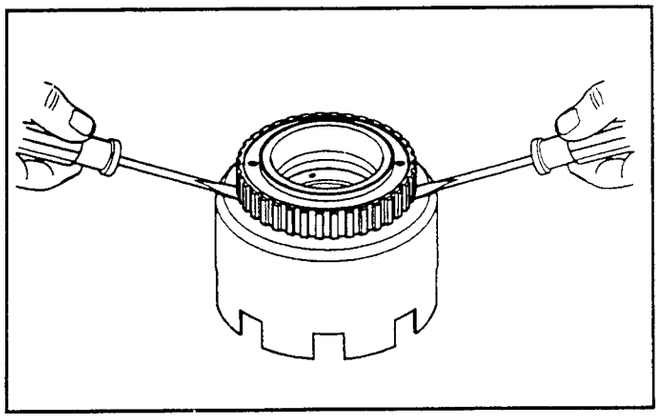


Figure 147

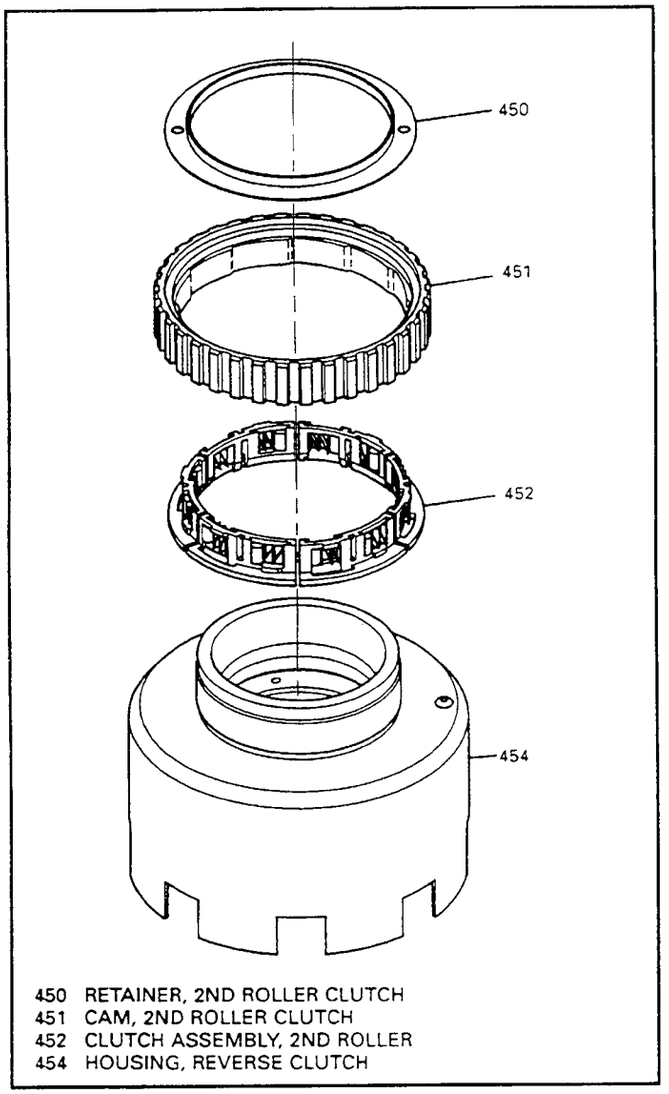


Figure 148

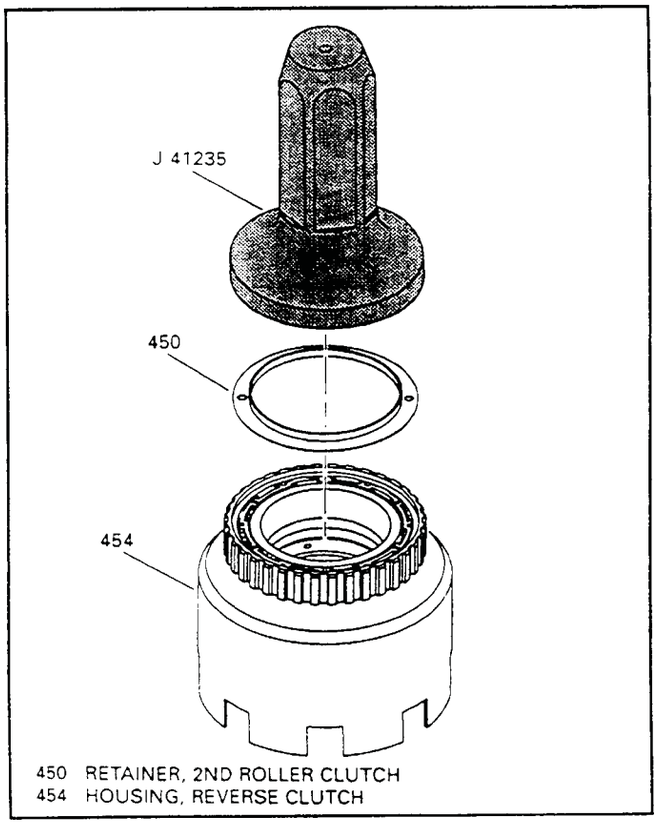


Figure 149

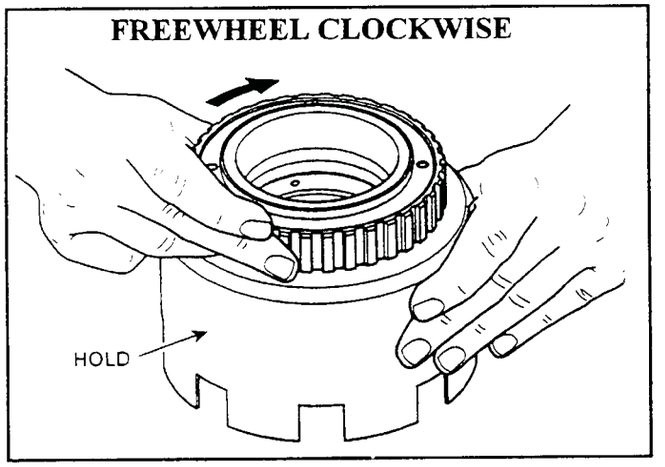
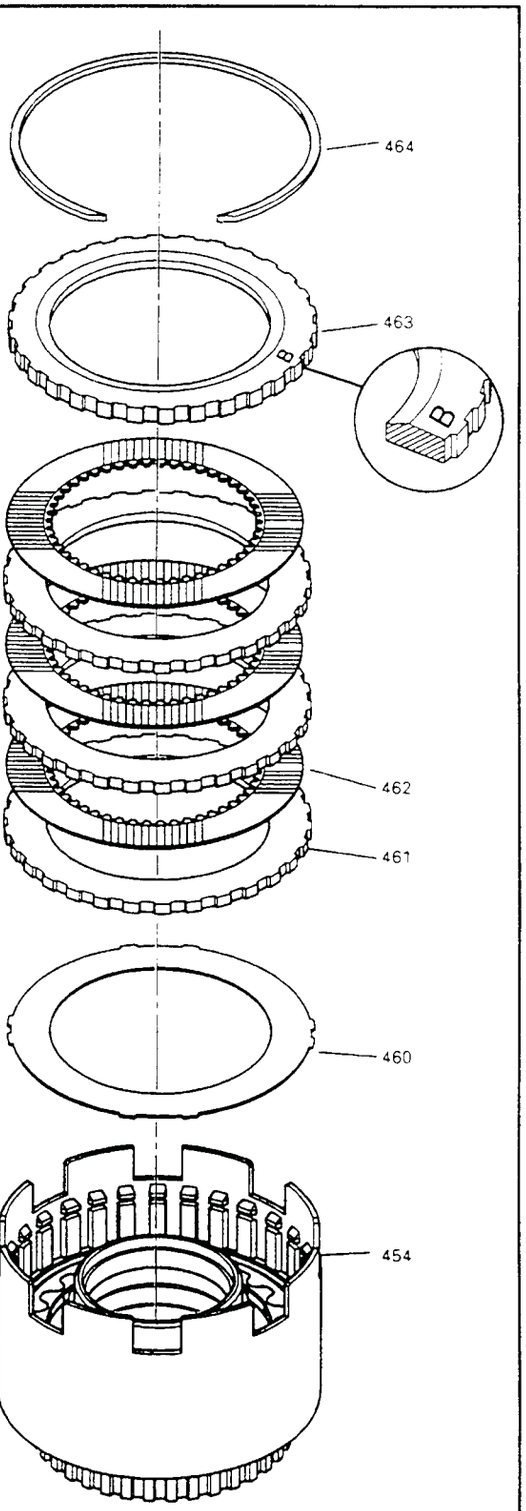


Figure 150

Continued from Page 85

11. Remove the 2nd roller clutch assembly retainer (450) by prying up on the roller clutch outer race with two large screwdrivers, as shown in Figure 147. The 2nd roller clutch retainer is pressed onto the reverse input clutch housing, ***and is not reusable after being removed.***

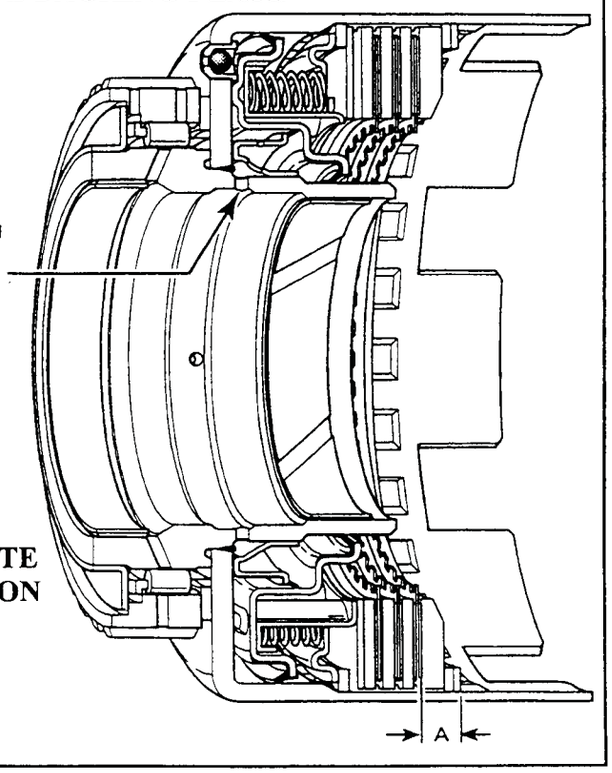
12. ***NOTE: Be careful when removing the second roller clutch, not to score roller clutch inner race with the screwdrivers.***
13. Inspect and replace parts as necessary as shown in Figure 148.
14. Install the 2nd roller clutch assembly (452) into the roller clutch cam (451) (See Figure 148).
15. Install the 2nd roller clutch assembly onto the reverse input housing with the flat side of the roller clutch cam facing down toward housing. Rotate the roller clutch clockwise to properly engage the rollers (See Figure 148).
16. Verify the proper operation of the roller clutch. While holding the reverse input housing, roller clutch cam should only freewheel clockwise, as shown in Figure 150.
17. Install a new 2nd roller clutch retainer (450) on the housing, using tool J-41235 to press the retainer into place.
    NOTE: Tool J-41235 is designed to press the roller clutch assembly to a specified depth. If the 2nd roller clutch is installed too far down onto the inner race, damage may occur.
18. Install the reverse input clutch wave plate into the housing as shown in Figure 151.
19. Install the reverse input clutch plates beginning with a steel plate on top of the wave plate, and alternating with lined plates, until you have installed 3 steel plates and 3 lined plates, as shown in Figure 151.
20. Measure the distance between the top of the snap ring groove and the top friction plate, as shown in Figure 152 (Dimension "A").
    Use Dimension "A" to select the appropriate backing plate from the chart in Figure 152.
21. The backing plate identification is stamped into the beveled side of the backing plate as shown in Figure 151.
22. Install the proper reverse input backing plate, with the beveled side facing up, as shown in Figure 151.
23. Install the snap ring (464) in the reverse input housing to retain the clutch plates as shown in Figure 151.
24. Air check the reverse input clutch housing, as shown in Figure 152, to verify proper operation of the seals and clutch assembly.



454 HOUSING, REVERSE CLUTCH
460 PLATE, REVERSE CLUTCH (WAVED)
461 PLATE, REVERSE CLUTCH (STEEL)
462 PLATE, REVERSE CLUTCH (FIBER)
463 PLATE, REVERSE CLUTCH (BACKING)
464 RING, SNAP (REVERSE CLUTCH)

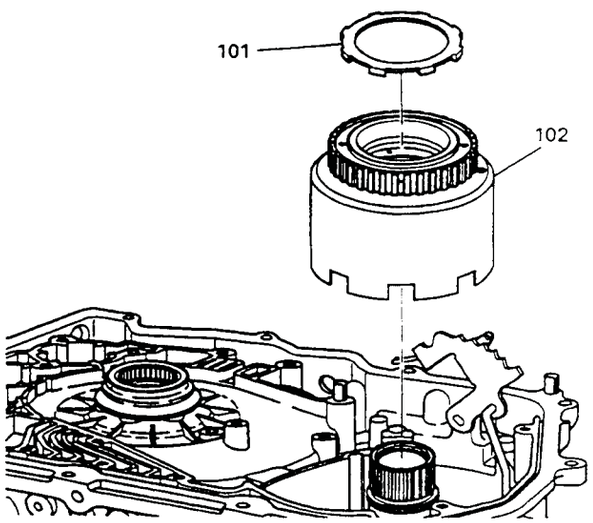
Figure 151

REVERSE INPUT SELECTIVE BACKING PLATE



DIMENSION "A"		BACKING PLATE IDENTIFICATION
INCH	MILLIMETER	
.353" - .371"	8.970 - 9.433	A
.372" - .393"	9.434 - 10.007	B
.394" - .412"	10.008 - 10.470	C

Figure 152



101 WASHER, THRUST (SUPPORT TO REVERSE INPUT CLUTCH)
102 CLUTCH ASSEMBLY, REVERSE INPUT

Figure 153

Continued from Page 87

25. Install the reverse input housing and 2nd roller clutch assembly (102) into the transaxle case as shown in Figure 153.
26. The tangs on the reverse input housing spline to the tangs on the reaction carrier sun gear and shell assembly. Rotate the reverse input clutch housing to align the clutch plates until it's fully seated.
27. Install the reverse input clutch thrust washer (101) onto the top of the 2nd roller clutch with the tabs facing down, as shown in Figure 153, and retain with "Trans-Jel".
28. Install a new intermediate/4th band (100) into the transaxle case as shown in Figure 154.
29. Verify the proper positioning of the band by inserting a screwdriver through the servo bore as shown in Figure 155.
30. The screwdriver should press on the servo pin target area and compress the band around the reverse input clutch housing (See Figure 155).

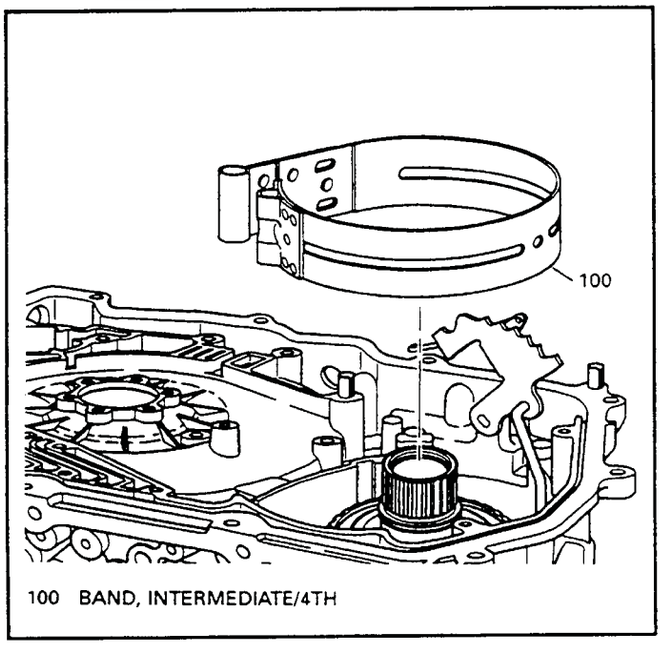


Figure 154

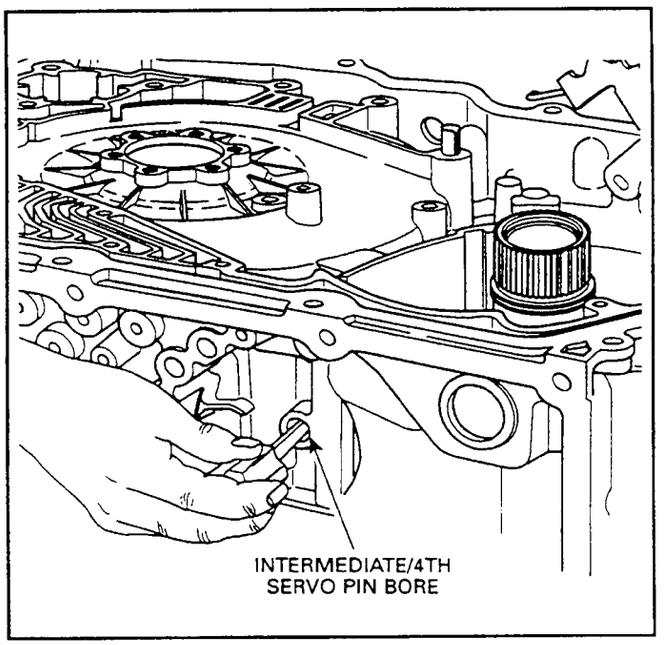


Figure 155

31. Install the 2nd clutch backing plate (99) into the transaxle case with the flat side facing up and the beveled side facing down as shown in Figure 156.
32. Install the three steel plates (97) and three new lined plates (98), beginning with a lined plate against the backing plate and alternating with steel plates, as shown in Figure 156.
33. Install the 2nd clutch wave plate (96) on top of the last steel plate as shown in Figure 156.

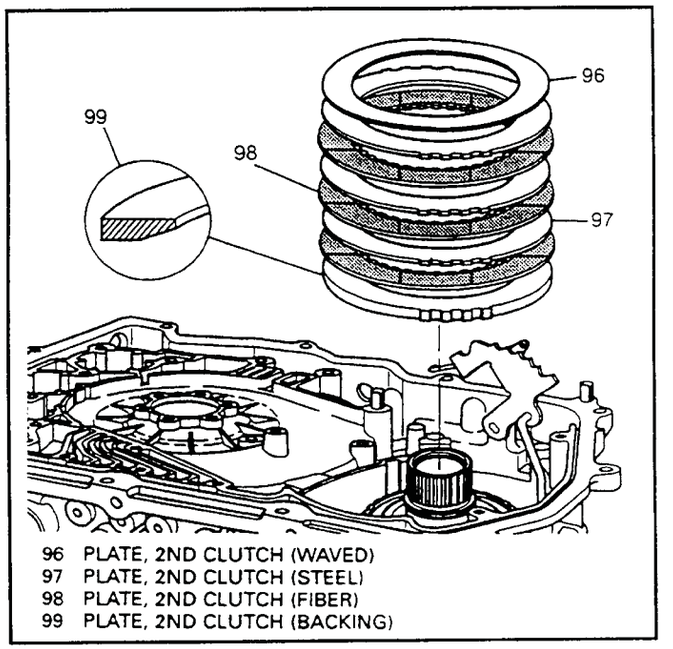
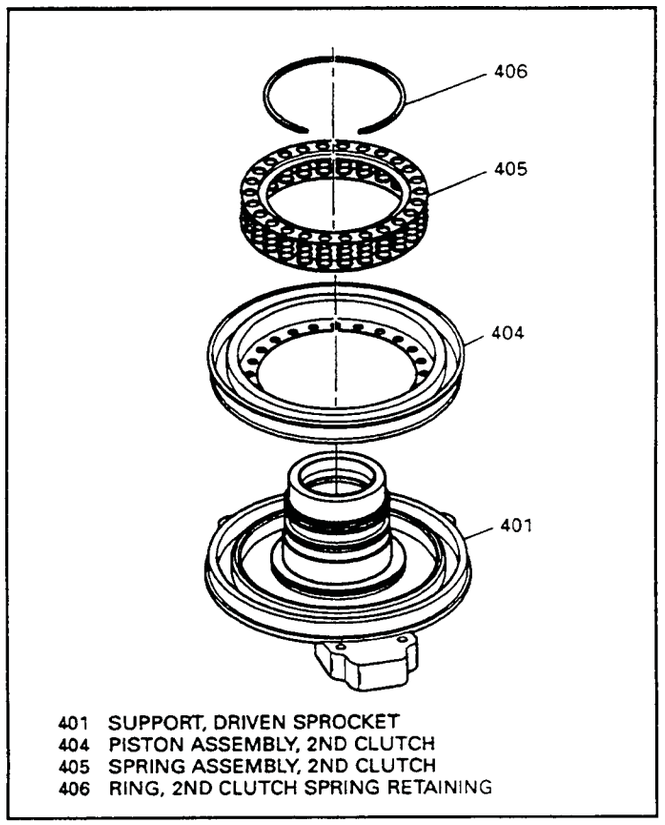
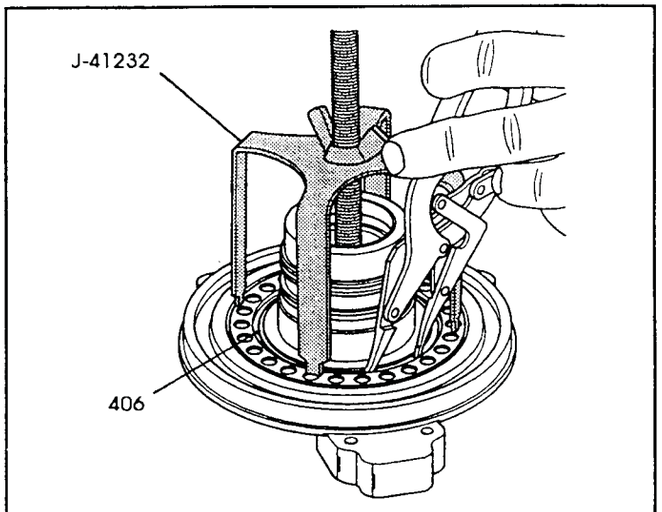


Figure 156



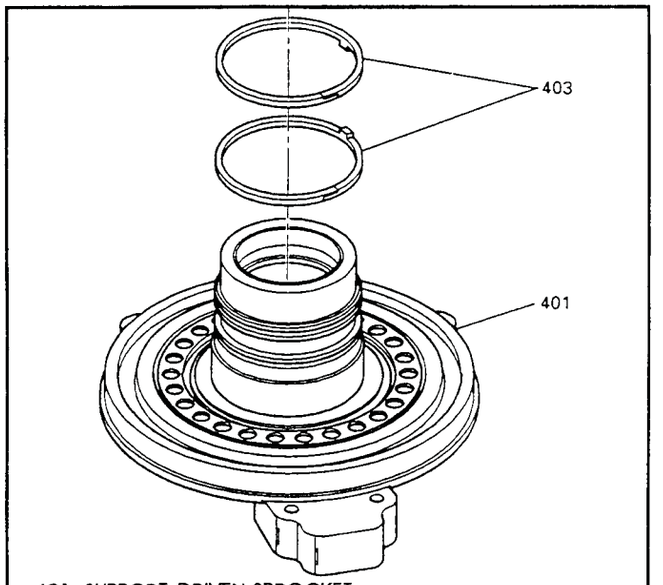
401 SUPPORT, DRIVEN SPROCKET
404 PISTON ASSEMBLY, 2ND CLUTCH
405 SPRING ASSEMBLY, 2ND CLUTCH
406 RING, 2ND CLUTCH SPRING RETAINING

Figure 157



406 RING, 2ND CLUTCH RETURN SPRING

Figure 158

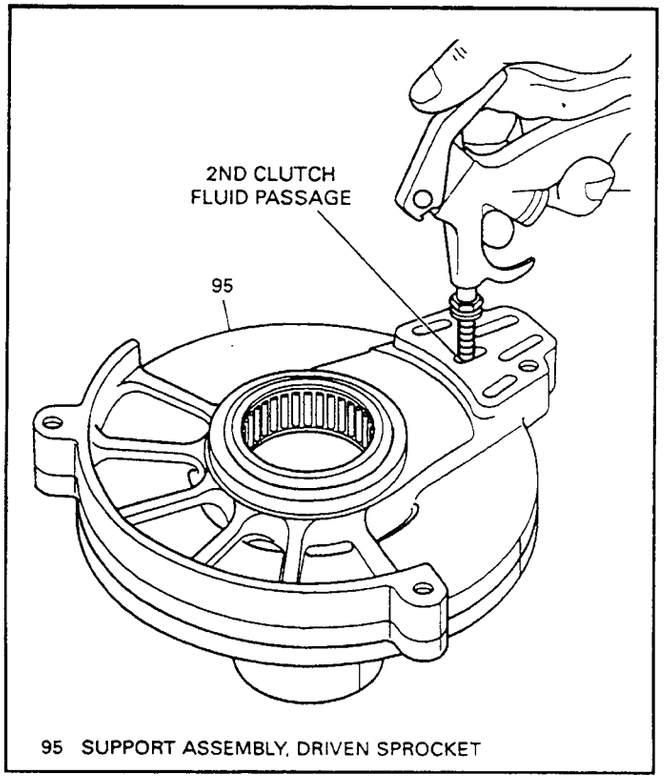


401 SUPPORT, DRIVEN SPROCKET
403 RING, OIL SEAL

Figure 159

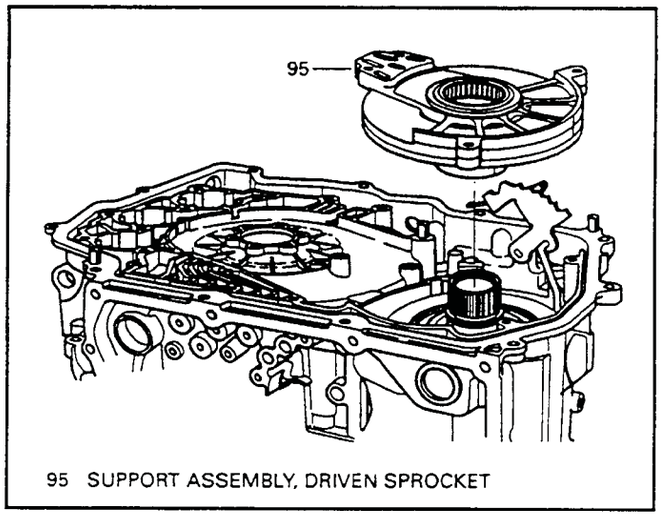
DRIVEN SPROCKET SUPPORT ASSEMBLY

1. ***NOTE: All pistons for the clutch packs in this transaxle are stamped steel with the rubber seals molded to the pistons, and reusable if they are not damaged.***
2. Inspect the 2nd clutch piston assembly for any damage and replace as necessary.
3. Lubricate the inner and outer molded seals on the 2nd clutch piston with "Trans-Jel".
4. Install the 2nd clutch piston (404) into driven sprocket support with a twisting motion, as shown in Figure 157.
5. Install the 2nd clutch return spring assembly (405) with inside step facing up, as shown in Figure 157.
6. Install compressor tool J-41232 on the driven sprocket support, as shown in Figure 158, and compress the return spring.
7. Install the 2nd clutch snap ring (406) as shown in Figure 158, and remove compressor tool after snap ring is installed.
8. Install two new sealing rings (403) onto driven sprocket support as shown in Figure 159.
9. Air check the 2nd clutch to verify proper operation of the seals, as shown in Figure 160. ***CAUTION: Use only about 30 PSI of air pressure to prevent damage and/or injury.***



95 SUPPORT ASSEMBLY, DRIVEN SPROCKET

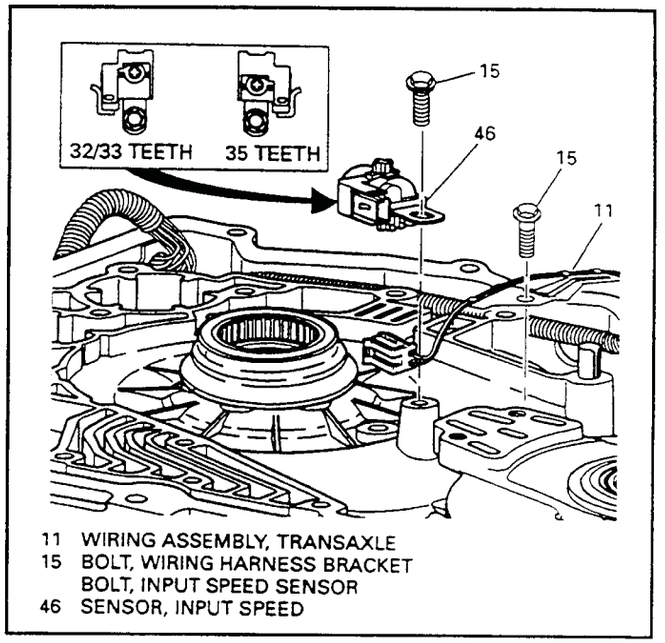
Figure 160



95 SUPPORT ASSEMBLY, DRIVEN SPROCKET

Figure 161

10. Install the completed driven sprocket support into the transaxle case as shown in Figure 161.
11. When installed properly and the right selective thrust washer has been chosen, the driven sprocket support will sit .006" - .012" below the machined surface of the transaxle case.



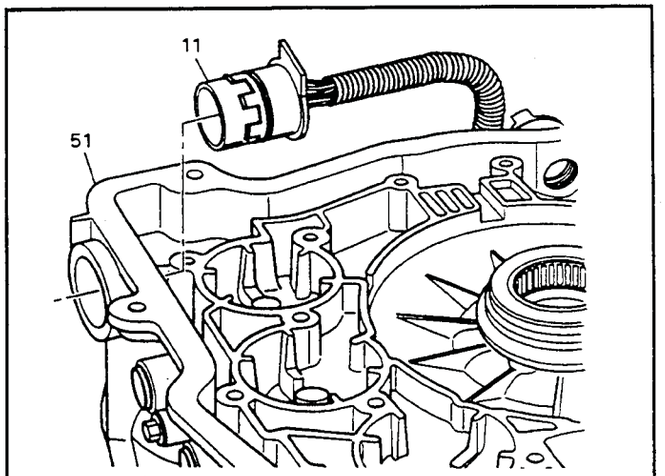
11 WIRING ASSEMBLY, TRANSAXLE
15 BOLT, WIRING HARNESS BRACKET
BOLT, INPUT SPEED SENSOR
46 SENSOR, INPUT SPEED

Figure 162

INPUT SPEED SENSOR AND WIRING HARNESS ASSEMBLY

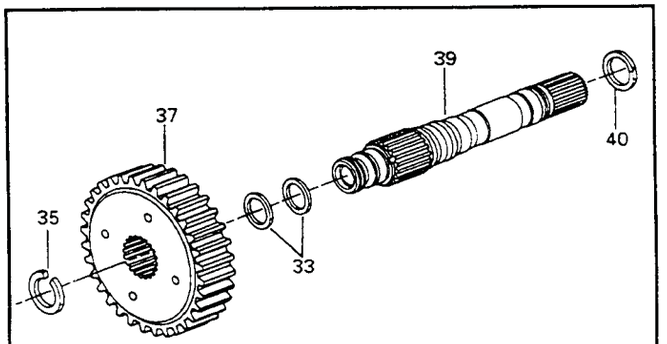
1. Install the input speed sensor (46) in transaxle case. The tab on the input speed sensor housing fits into the recess on the case boss, as shown in Figure 162.
   IMPORTANT: Orientation of the input speed sensor depends on the number of teeth on the drive sprocket, which varies depending on model application. Drive sprockets with 32 or 33 teeth have the speed sensor connector facing the bottom pan as shown in Figure 162. Drive sprockets with 35 teeth have the speed sensor connector facing the fluid fill cap.
2. Install the input speed sensor in the proper direction for your model, install the retaining bolt, and torque to 9 ft.lb (See Figure 162).
3. Inspect the wiring harness (11) for damage. Also inspect the case connector pins for any damage and/or bent pins.

Continued on next Page



11 WIRING ASSEMBLY, TRANSAXLE
51 CASE, TRANSAXLE

Figure 163

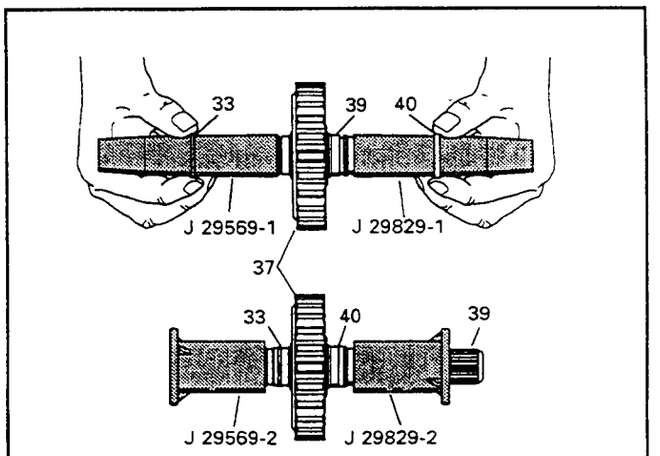


33 SEAL, (TURBINE SHAFT TO SPROCKET)
35 RING, SNAP (TURBINE SHAFT TO DRIVE SPROCKET)
37 SPROCKET, DRIVE
39 SHAFT, TURBINE
40 SEAL, (TURBINE SHAFT TO SUPPORT))

Figure 164

Continued from Page 91

4. Install a new "O" ring on the case connector and lube with small amount of "Trans-Jel".
5. Install the case connector and wiring harness assembly into the transaxle case bore from the inside of transaxle case (See Figure 163).
6. Route the input speed sensor wiring harness in the transaxle case channel.
7. Install the wire harness retainer to the case with wire harness retainer bolt, and torque to 9 ft.lb. (See Figure 162).
8. Connect the input speed sensor connector to the input speed sensor (See Figure 162).

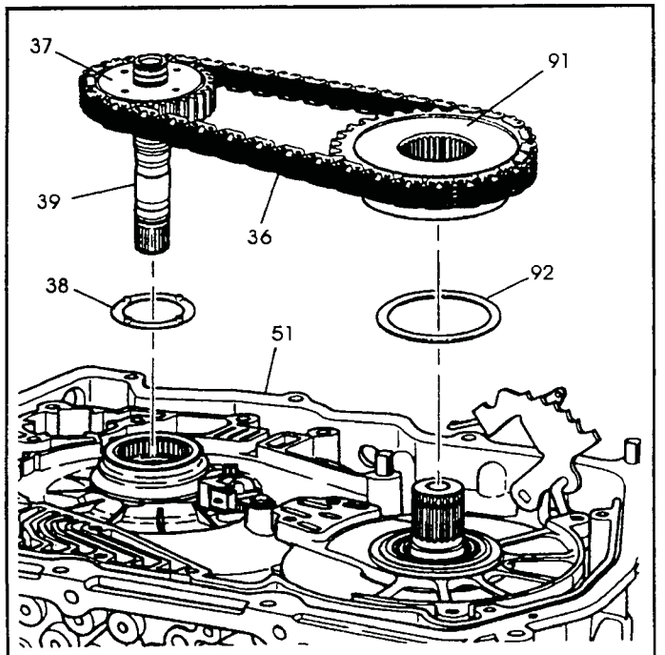


33 SEAL, O-RING (TURBINE SHAFT TO SPROCKET)
39 SHAFT, TURBINE
40 SEAL, O-RING (TURBINE SHAFT TO SUPPORT)

Figure 165

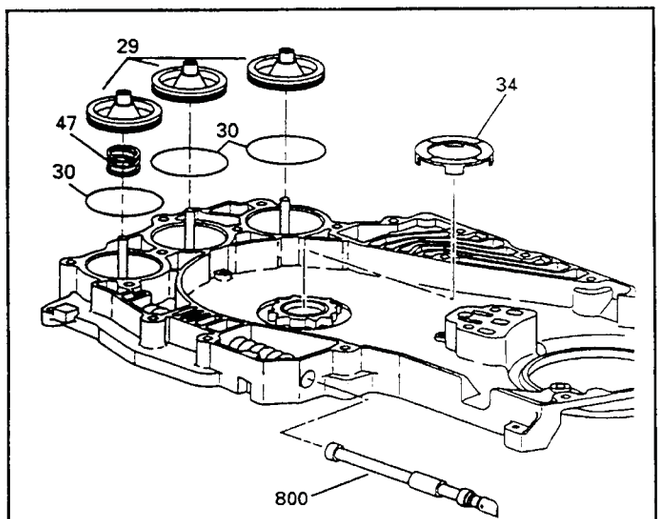
DRIVE AND DRIVEN SPROCKETS AND DRIVE CHAIN ASSEMBLY

1. Remove the drive sprocket from the turbine shaft and inspect the spline area on both, as shown in Figure 164.
2. Remove and discard the three solid sealing rings from the turbine shaft (See Figure 164).
3. Install three new sealing rings onto the turbine shaft using the installation and resizing tools shown in Figure 165.
4. Install the drive sprocket onto the turbine shaft and install the snap ring as shown Figure 164.
5. Install the drive sprocket to drive sprocket support thrust washer (38) into drive sprocket with the tabs on the thrust washer in the holes of the drive sprocket and retain with a small amount of "Trans-Jel" (See Figure 166).
6. Install the driven sprocket to driven sprocket support thrust washer (92) onto the driven sprocket support and retain with "Trans-Jel". (See Figure 166).
7. Assemble the drive chain assembly to the drive and driven sprockets with the chain oriented in the same direction it was removed.
8. Install the drive sprocket, driven sprocket and chain assembly into the transaxle as a complete assembly, as shown in Figure 166.



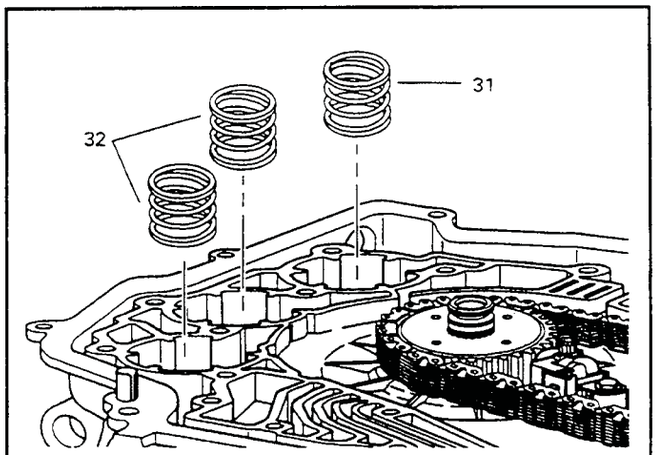
36 CHAIN ASSEMBLY, DRIVE
37 SPROCKET, DRIVE
38 WASHER, THRUST (DRIVE SPROCKET TO SUPPORT)
39 SHAFT, TURBINE
51 CASE, TRANSAXLE
91 SPROCKET, DRIVEN
92 WASHER, THRUST (DRIVEN SPROCKET TO SUPPORT)

Figure 166



29 PISTON, ACCUMULATOR (1-2, 2-3 AND 3-4)
30 SEAL, ACCUMULATOR PISTON (1-2, 2-3 AND 3-4)
34 WASHER, THRUST (CHANNEL PLATE TO DRIVE SPROCKET)
800 VALVE, MANUAL

Figure 167



31 SPRING, 1-2 ACCUMULATOR PISTON
32 SPRING, 2-3 AND 3-4 ACCUMULATOR PISTON

Figure 168

CHANNEL PLATE ASSEMBLY

1. Install new seals on the 3 plastic accumulator pistons as shown in Figure 167.
2. The accumulator pins are pressed into channel plate and should not be removed.
3. Install the 1-2 accumulator assist spring in the location shown in Figure 167.
4. Install the accumulator pistons into the channel plate over the accumulator pins, as shown in Figure 167.
   NOTE: The accumulator pistons are identical and can be installed in any one of the three accumulator bores.
5. Install the 1-2 accumulator spring (31) into the location shown in Figure 168.
6. Install the 2-3 & 3-4 accumulator springs (32) into the locations shown in Figure 168.
7. NOTE: The 1-2 accumulator spring is slightly taller than the other two springs and is installed in the bore closest to the case connector, shown in Figure 168.
8. Install the channel plate to drive sprocket thrust washer (34) onto the channel plate and retain with "Trans-Jel", as shown in Figure 167.

Continued on next Page

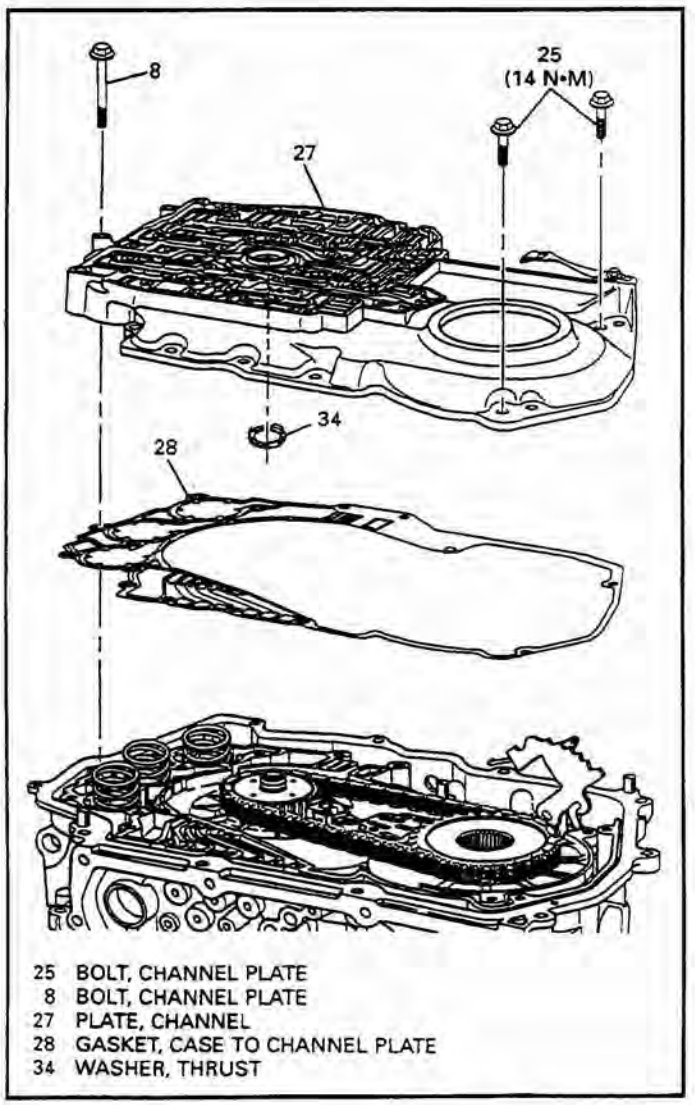


Figure 169

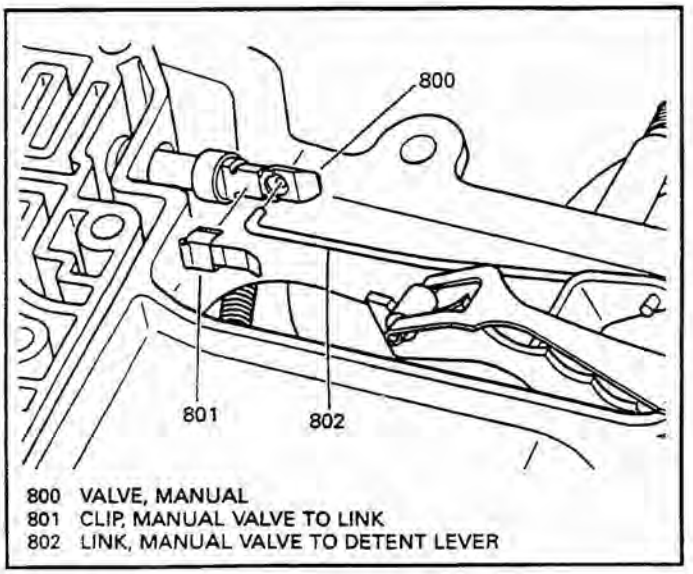


Figure 170

See Page 46 In This Manual
For "Updated" Checkball Locations.

See Page 121 In This Manual
For "Updated" Channel Plates.

Figure 171

Continued from Page 93

9. Install a new channel plate to case gasket (28) onto the transaxle case as shown in Figure 169.
10. Install the completed channel plate assembly onto the transaxle case as shown in Figure 169. The channel plate should fit tightly over the guide pins located on the transaxle case.
11. There are eight ***short*** channel plate bolts (25), and two ***long*** channel plate bolts (8), that are installed at this time, in the locations shown in Figure 172.
    SPECIAL NOTE: Tighten these ten bolts by hand only at this time. We will torque later.
12. Connect the manual valve link to the manual valve with the manual valve clip (801), shown in Figure 170.
13. Install the seven checkballs into channel plate in the proper locations as shown in Figure 171. Notice that there is one pocket that does not get a checkball.

Continued on Page 96

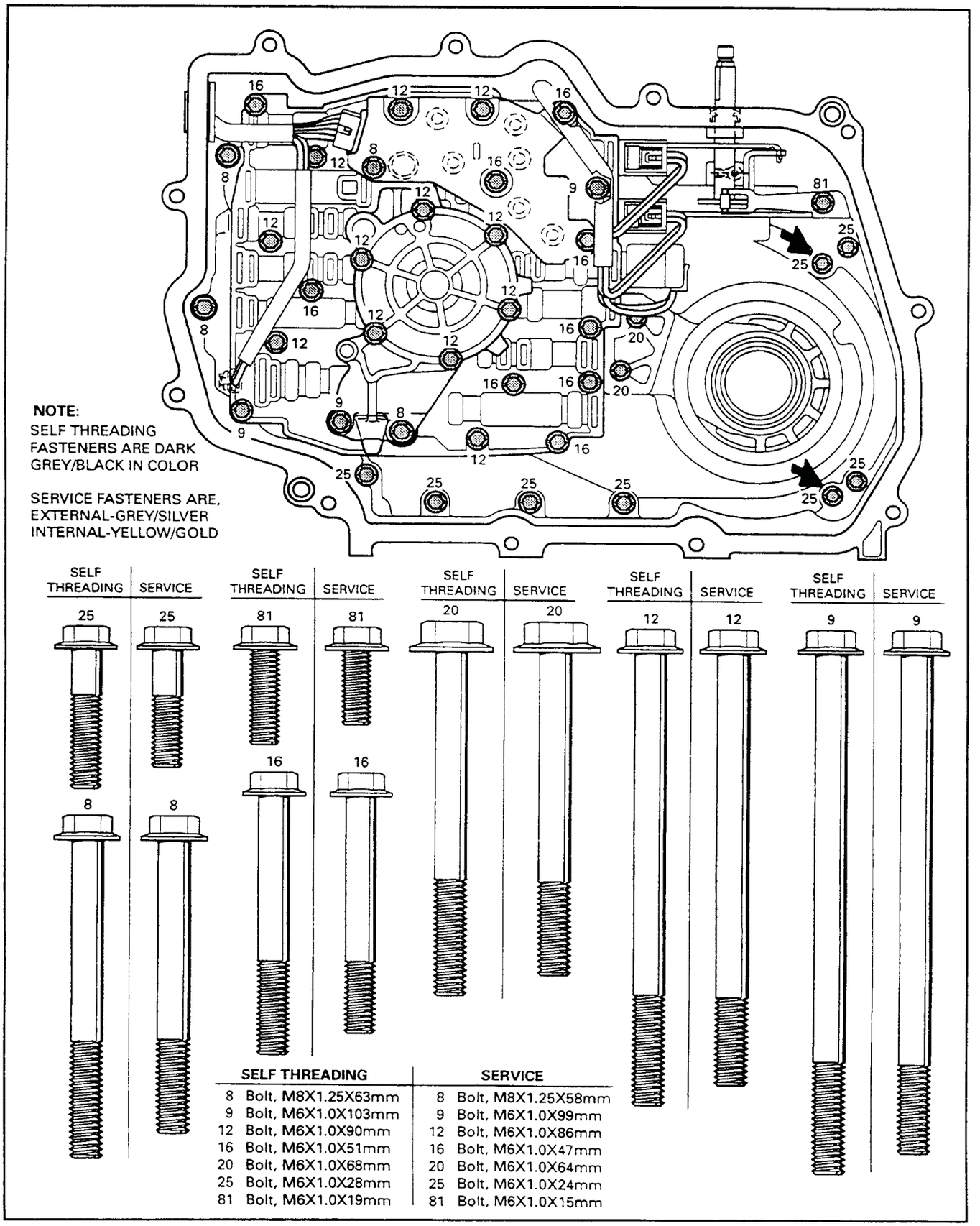
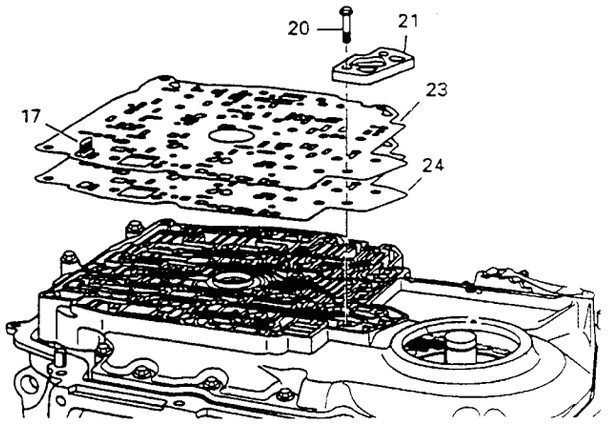


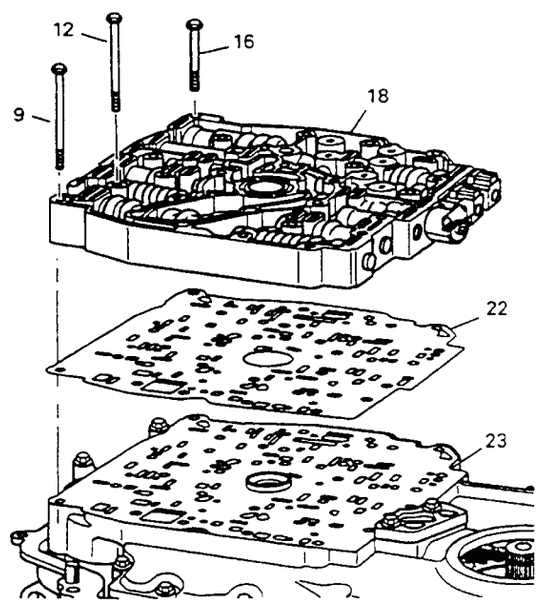
Figure 172

AUTOMATIC TRANSMISSION SERVICE GROUP



17 FILTER, SPACER PLATE
20 BOLT, SPACER PLATE SUPPORT
21 SUPPORT, SPACER PLATE
22 GASKET, VALVE BODY TO SPACER PLATE
23 PLATE, VALVE BODY SPACER
24 GASKET, SPACER PLATE TO CHANNEL PLATE

Figure 173



9 BOLT, VALVE BODY
12 BOLT, VALVE BODY
16 BOLT, VALVE BODY
18 BODY ASSEMBLY, CONTROL VALVE
22 GASKET, VALVE BODY TO SPACER PLATE
23 PLATE, VALVE BODY SPACER

Figure 174

Continued from Page 94

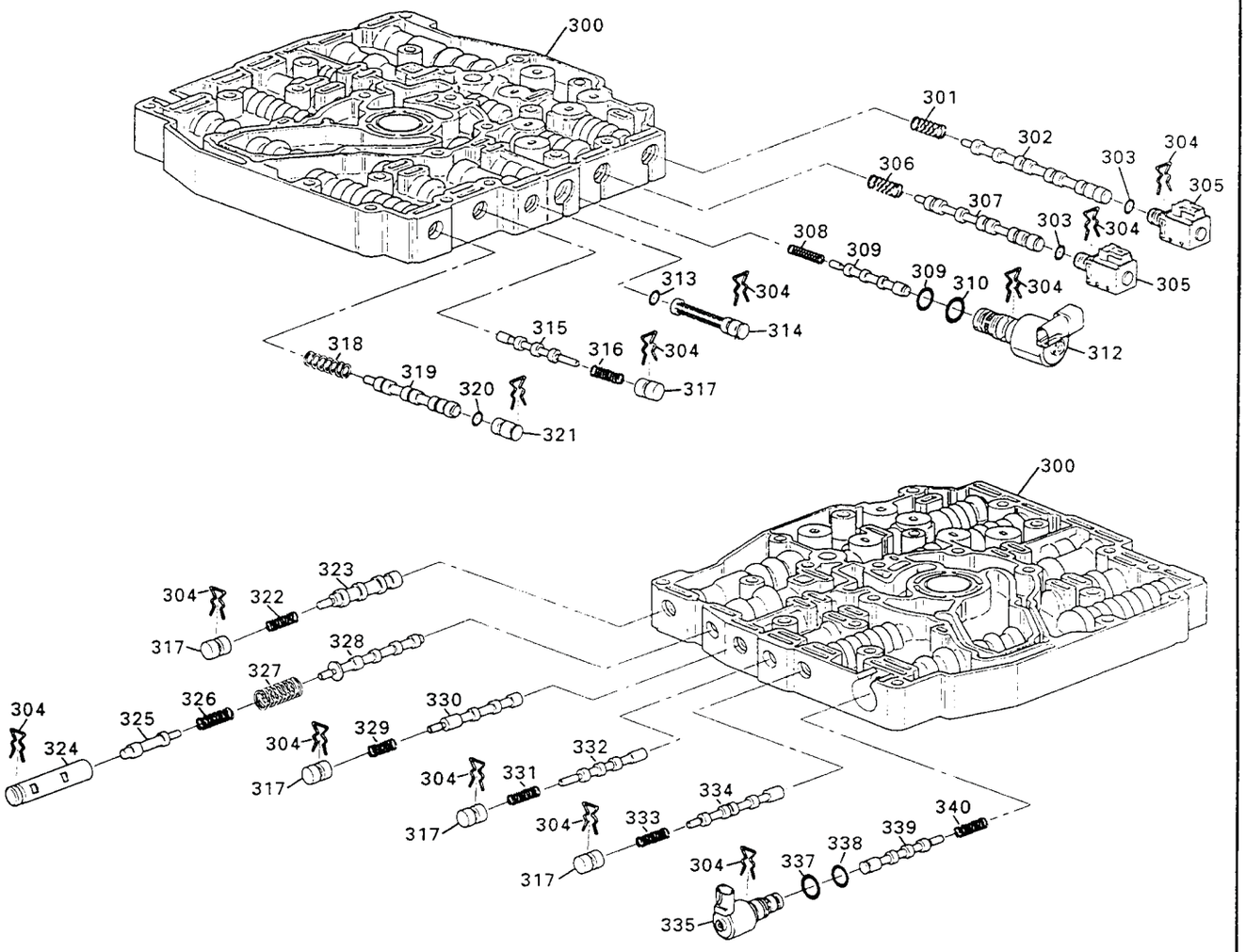
14. Install a new spacer plate to channel plate gasket (24) onto the channel plate as shown in Figure 173.
15. Install the spacer plate (23) on top of the gasket and ensure that the filter screen (17) is in place. (See Figure 173.
16. Install the spacer plate support (21) and the two bolts (20) onto the spacer plate. Hand start the bolts to finger tight.
    NOTE: Torque channel plate bolts in exactly the following sequence.
17. ***Torque the two spacer plate support bolts (20) that just went in to 11 ft.lb. These two bolts pull the driven sprocket support oil passages against the channel plate.***
18. ***Next, torque the remaining channel plate to case bolts to 9 ft.lb. Then torque the two bolts marked with the arrows in Figure 172, to 11 ft.lb.***

VALVE BODY ASSEMBLY

1. Clean the complete valve body assembly with clean solvent thoroughly.
2. Move valves with a pick or small screwdriver to ensure that any debris or dirt is dislodged.
3. Blow dry with compressed air.
4. Position the valve body on a clean and flat work surface for disassembly.
5. Each of the valve line-ups are held in by the retainer clips that can be removed using a small screwdriver. Be careful not to score the valve body when removing the clips and valves.
6. Remove valve trains one at a time beginning in one corner of the valve body.
7. Valves, springs and bushings should be laid out exactly the way they are removed.
8. Clean all valves, springs and bushings and then blow dry with compressed air.
9. Check all solenoids for proper resistance using the chart on Page 23 in this manual.
10. Use the illustrations in Figure 175 to assemble the valves, springs and bushings.
11. Install a new valve body to spacer plate gasket on top of the spacer plate (See Figure 174).
12. Install the valve body assembly and start the three bolts as shown in Figure 174.

Continued on Page 98

4T40-E VALVE BODY EXPLODED VIEW



300	BODY, CONTROL VALVE ASSEMBLY
301	SPRING, 1-2 SHIFT VALVE
302	VALVE, 1-2 SHIFT
303	O-RING, SHIFT SOLENOID A AND B
304	RETAINER CLIP
305	SOLENOID, SHIFT (A AND B)
306	SPRING, 2-3 SHIFT VALVE
307	VALVE, 2-3 SHIFT
308	SPRING, TORQUE SIGNAL REGULATOR VALVE
309	VALVE, TORQUE SIGNAL REGULATOR
310	O-RING, PRESSURE CONTROL SOLENOID
311	O-RING, PRESSURE CONTROL SOLENOID
312	SOLENOID, PRESSURE CONTROL
313	O-RING, ACTUATOR OIL FILTER
314	FILTER, ACTUATOR OIL
315	VALVE, ACTUATOR FEED LIMIT
316	SPRING, ACTUATOR FEED LIMIT VALVE
317	PLUG, BORE
318	SPRING, 3-4 SHIFT VALVE
319	VALVE, 3-4 SHIFT
320	O-RING, 3-4 SHIFT VALVE PLUG
321	PLUG, BORE
322	SPRING, 1-2/3-4 ACCUMULATOR VALVE
323	VALVE, 1-2/3-4 ACCUMULATOR
324	BUSHING, PRESSURE REGULATOR BOOST
325	VALVE, PRESSURE REGULATOR BOOST
326	SPRING, ISOLATOR
327	SPRING, PRESSURE REGULATOR VALVE
328	VALVE, PRESSURE REGULATOR
329	SPRING, 2-3 ACCUMULATOR VALVE
330	VALVE, 2-3 ACCUMULATOR
331	SPRING, TCC FEED LIMIT VALVE
332	VALVE, TCC FEED LIMIT
333	SPRING, TCC CONTROL VALVE
334	VALVE, TCC CONTROL
335	SOLENOID, TCC CONTROL
337	O-RING, TCC CONTROL SOLENOID
338	O-RING, TCC CONTROL SOLENOID
339	VALVE, TCC REGULATED APPLY
340	SPRING, TCC REGULATED APPLY VALVE

Figure 175

PRESSURE SWITCH ASSEMBLY

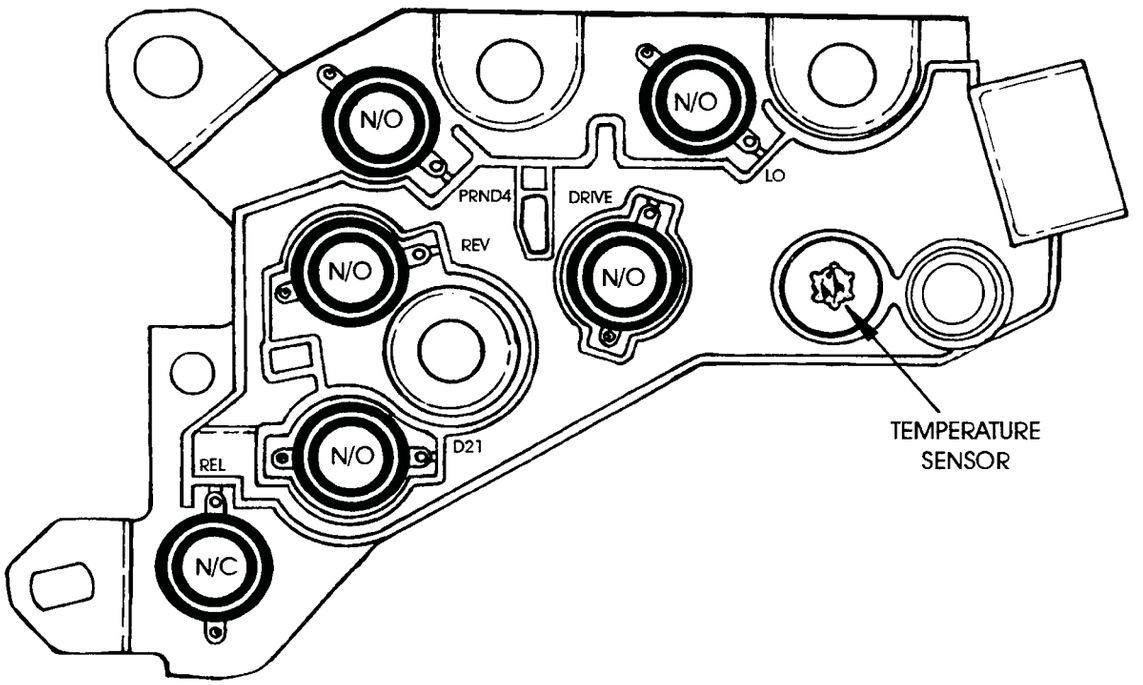
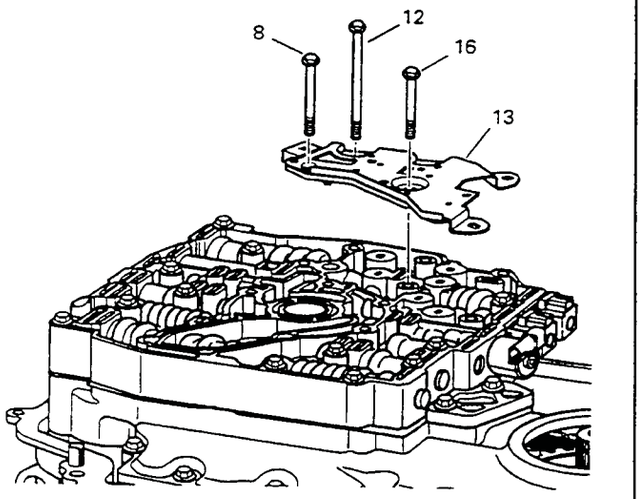


Figure 176

Continued from Page 96

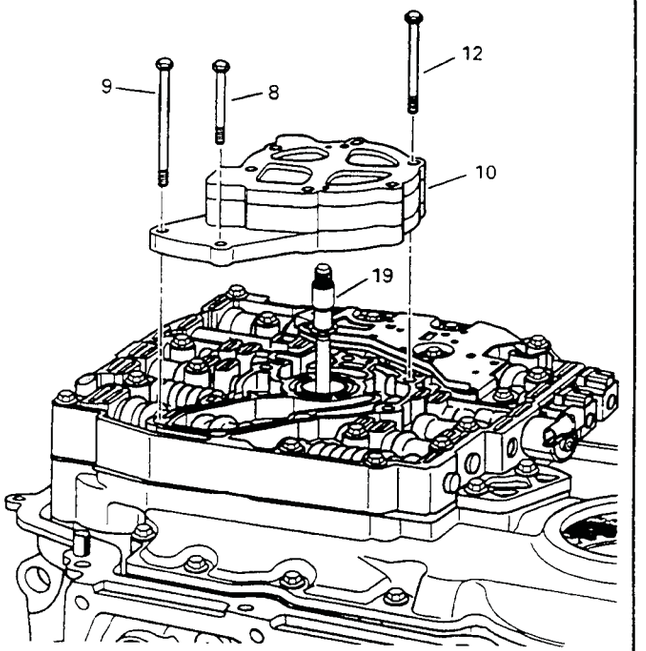
13. Inspect the pressure switch assembly to verify the condition and location of the "O" rings on the back side (See Figure 176).
14. One of the six switches in the pressure switch assembly is normally closed (N.C.), and the other five are normally open (N.O.), as shown in Figure 176.
15. Set your ohmmeter so that it emits a "Tone" when the leads are connected.
16. Place the ohmmeter leads on the pins on each side of the LO switch which is normally open. No tone should be heard.
17. With the leads still in place, using a small flat punch, close the switch by carefully pushing down in the center of switch. If the switch is good, a tone will now be heard from ohmmeter.
18. Check the DRIVE, PRND4, REV, and the D21 switches in the same manner (See Figure 176).
19. Place the ohmmeter leads on the pins on each side of the REL switch, which is normally closed (N.C.) as shown in Figure 176.
20. A tone should be heard from ohmmeter until you push down in the center of the switch with small flat punch, and the tone will then stop.
21. To check the resistance values for the transaxle temperature sensor, see Page 19 of this manual.
22. Install the pressure switch assembly (13) onto transaxle valve body as shown in Figure 177.
23. Install the valve body bolts using the chart in Figure 172 for length and location. Hand start the bolts and finger tighten only.
24. Thoroughly flush the oil pump assembly with clean transmission fluid through the oil pump inlet and outlet passages. While flushing, use the oil pump drive shaft to rotate pump rotor. This action will flush clean fluid through the oil pump assembly.
    NOTE: The oil pump is very difficult to get apart. Oil pump should not be disassembled unless damage is apparent. At time of this printing, it is serviced only as a complete assembly.
25. Install the oil pump drive shaft into transaxle as shown in Figure 178.



8 BOLT, VALVE BODY/(PSA) PRESSURE SW ASM
12 BOLT, VALVE BODY/(PSA) PRESSURE SW ASM
13 (PSA) PRESSURE SWITCH ASSEMBLY
16 BOLT, VALVE BODY/PRESS SW ASM

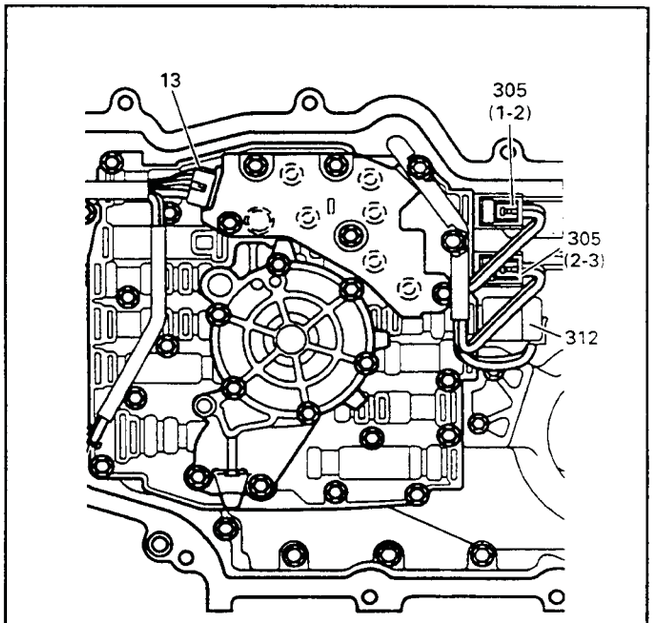
Figure 177

26. Install the oil pump assembly onto the transaxle as shown in Figure 178.
27. Install the oil pump bolts using Figure 172 for length and location.
28. Torque all oil pump and valve body bolts down to 9 ft.lb. Begin in the center and work outward in a circle (See Figure 179).
29. Connect the wiring harness assembly to each of the electrical components (See Figure 179).
    NOTE: The 1-2 shift solenoid wires are Red and Light Green.
    NOTE: The 2-3 shift solenoid wires are Red and Yellow.
    These wires can be connected improperly so be very careful.



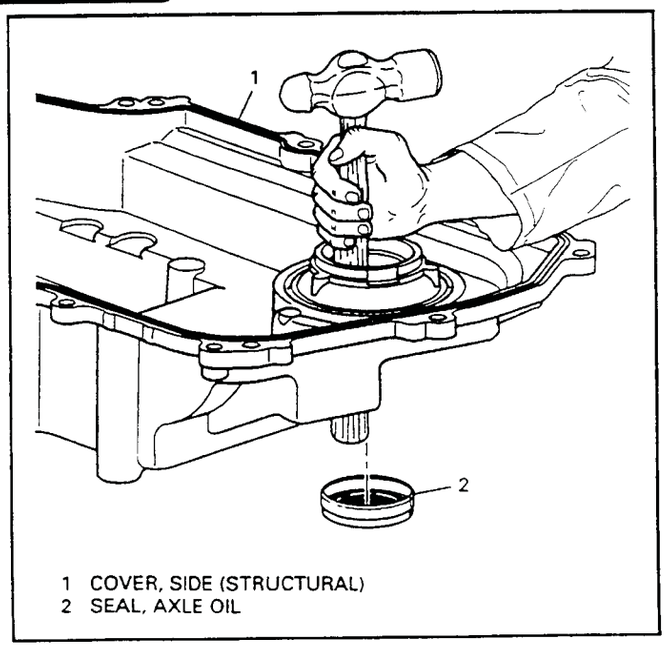
8 BOLT, OIL PUMP
9 BOLT, OIL PUMP
10 PUMP ASSEMBLY, TRANSAXLE OIL
12 BOLT, OIL PUMP
19 SHAFT, OIL PUMP DRIVE

Figure 178



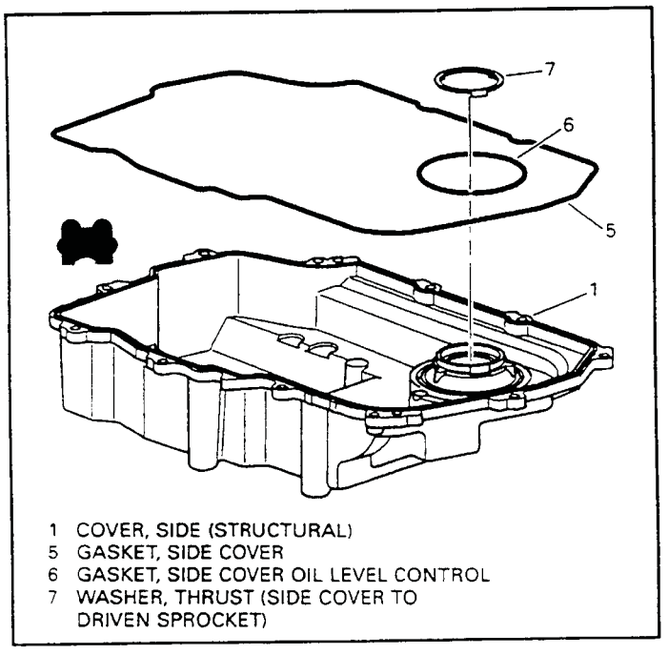
13 PRESSURE SWITCH ASSEMBLY (PSA)
305 SOLENOID, SHIFT (1-2 & 2-3)
312 SOLENOID, PRESSURE CONTROL
335 SOLENOID, TCC CONTROL

Figure 179



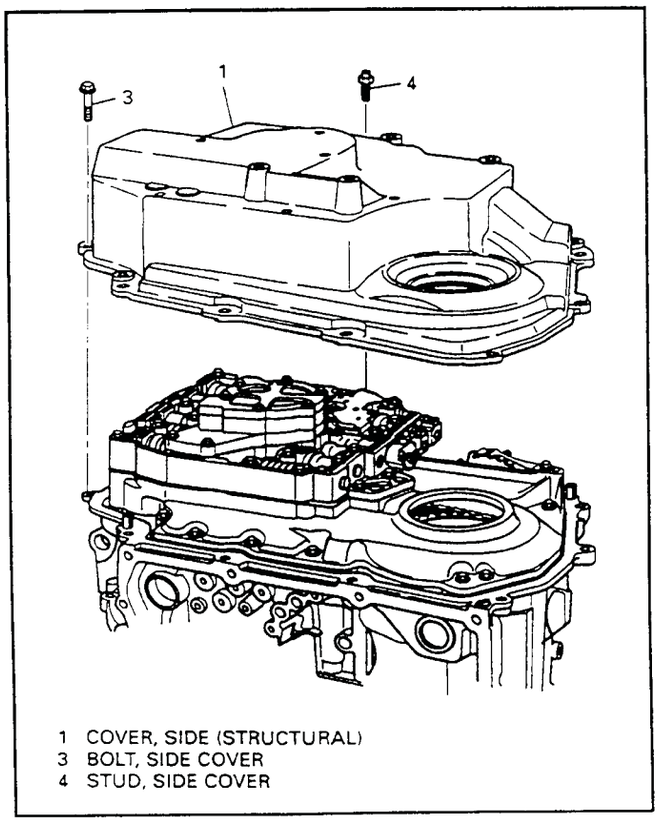
1 COVER, SIDE (STRUCTURAL)
2 SEAL, AXLE OIL

Figure 180



1 COVER, SIDE (STRUCTURAL)
5 GASKET, SIDE COVER
6 GASKET, SIDE COVER OIL LEVEL CONTROL
7 WASHER, THRUST (SIDE COVER TO DRIVEN SPROCKET)

Figure 181



1 COVER, SIDE (STRUCTURAL)
3 BOLT, SIDE COVER
4 STUD, SIDE COVER

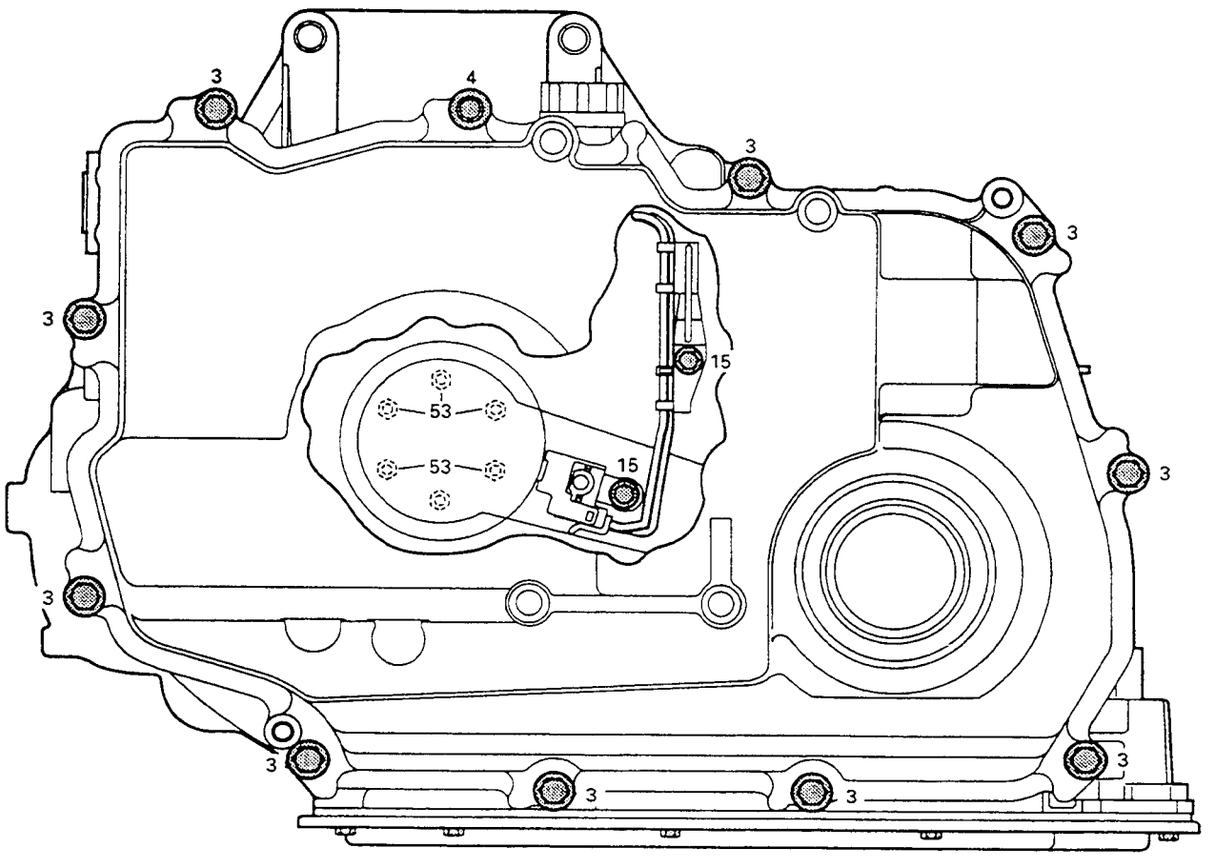
Figure 182

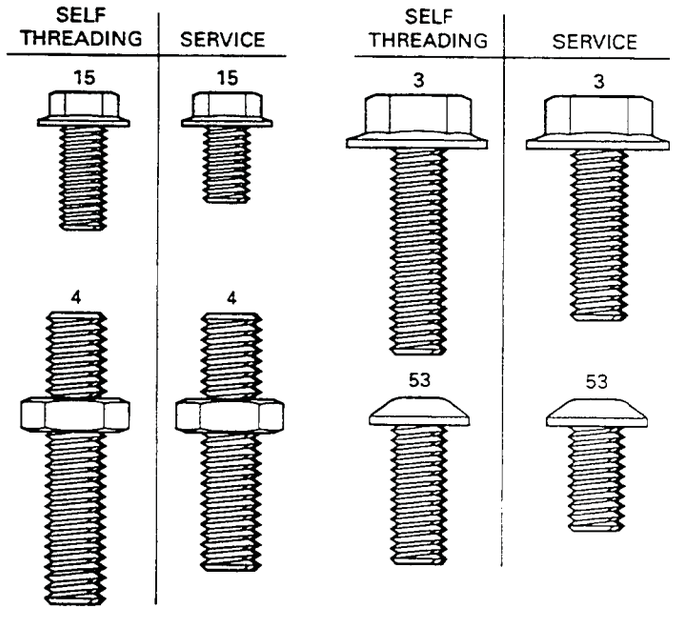
TRANSAXLE SIDE COVER AND AXLE SHAFTS, ASSEMBLY

1. Remove the side cover axle seal using a press or a hammer handle as shown in Figure 180. ***NOTE: Do not install a new axle seal into the side cover at this time.***
2. During initial assembly, the side cover seals are glued into place. Be sure to thoroughly clean the side cover grooves before assembly.
3. Install the side cover gaskets carefully into the grooves with the dual lips facing up as shown in Figure 181.
4. Retain the side cover seals in the groove with "Trans-Jel" or equivalent
5. Install the side cover to driven sprocket thrust washer (7) onto the side cover, as shown in Figure 181, and retain with "Trans-Jel".
6. Install the side cover assembly onto transaxle case as shown in Figure 182.
7. Install the nine side cover bolts and one stud using the chart in Figure 183 for the length and locations, and torque to 15 ft.lbs.

Continued on page 102

SIDE COVER BOLT LOCATIONS



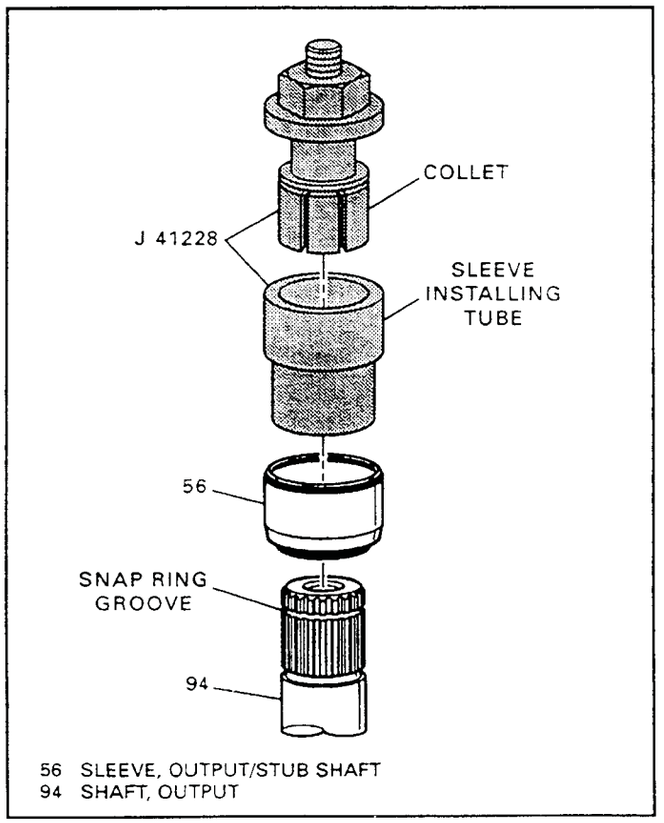


NOTE:
SELF THREADING FASTENERS ARE DARK GREY/BLACK IN COLOR

SERVICE FASTENERS ARE, EXTERNAL-GREY/SILVER INTERNAL-YELLOW/GOLD

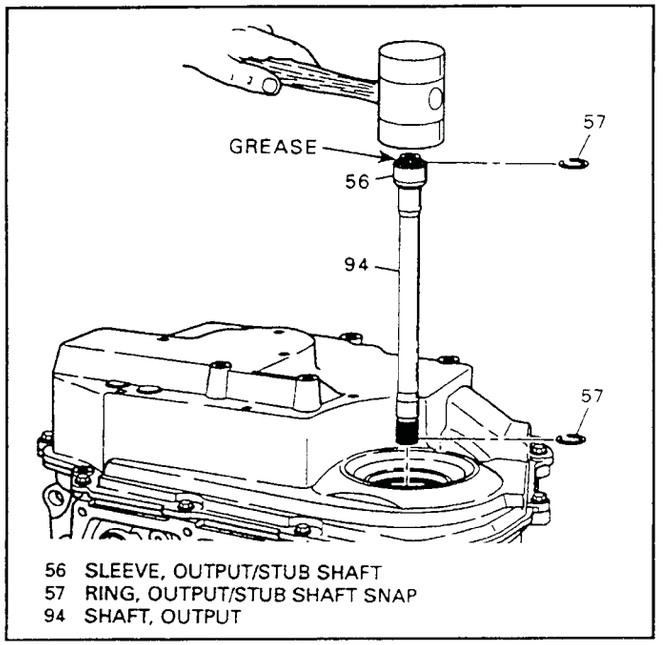
	SELF THREADING	SERVICE
3	Bolt, M8X1.25X28mm	Bolt, M8X1.25X23mm
4	Stud, M8X1.25X25mm	Stud, M8X1.25X20mm
15	Bolt, M6X1.0X15mm	Bolt, M6X1.0X11mm
53	Bolt, M8X1.25X20mm	Bolt, M8X1.25X16mm

Figure 183



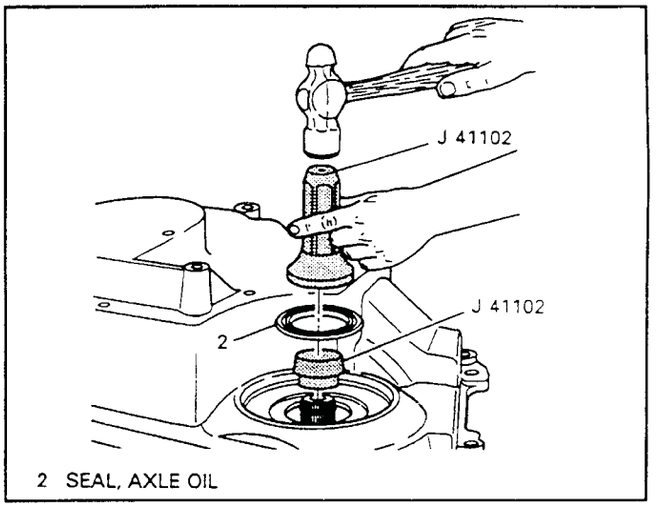
56 SLEEVE, OUTPUT/STUB SHAFT
94 SHAFT, OUTPUT

Figure 184



56 SLEEVE, OUTPUT/STUB SHAFT
57 RING, OUTPUT/STUB SHAFT SNAP
94 SHAFT, OUTPUT

Figure 185

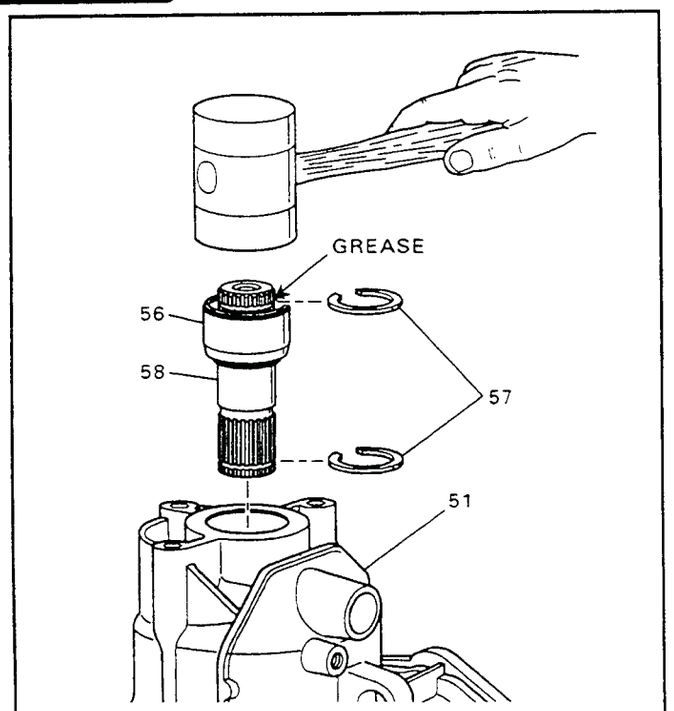


2 SEAL, AXLE OIL

Figure 186

Continued from Page 100

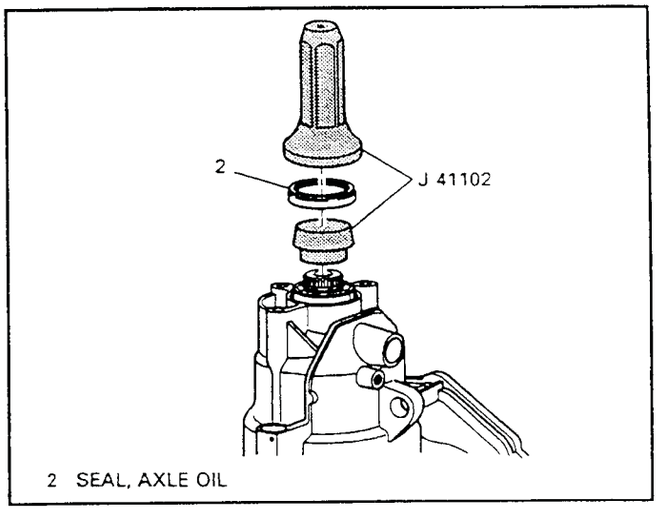
8. Install a ***new*** output shaft sleeve (56) onto the output shaft, using tool J-41228, as shown in Figure 184.
   NOTE: Installation not using tool J-41228 will result in a fluid leak.
9. Place a new sleeve over the end of the output shaft as shown in Figure 184.
10. Install the collet into the output shaft snap ring groove with the collet attached to the threaded collet shaft (See Figure 184).
11. Locate the sleeve installing tube over the collet with the small end of the tube fitting securely into the sleeve (See Figure 184).
12. Install the bearing and nut onto the threaded collet shaft (See Figure 184).
13. Hold the end of the threaded collet shaft while tightening the nut down. This will press the sleeve onto the output shaft.
14. Remove the installation tool.
15. Install two new snap rings (57) into the output shaft snap ring grooves (See Figure 185).
16. Install the output shaft and sleeve assembly into the transaxle using a mallet to install the shaft through the differential gear, as shown in Figure 185.
17. Install a new side cover axle seal into the side cover using tool J-41102 as shown Figure 186. Tool J-41102 installs the axle seal to a given depth and also spreads the seal to get it over the sleeve without damage.
18. Add Polyurea grease, part number 7843867 to the splines on the output shaft.



51 CASE, TRANSAXLE
56 SLEEVE, OUTPUT/STUB SHAFT
57 RING, OUTPUT/STUB SHAFT SNAP
58 SHAFT, OUTPUT STUB

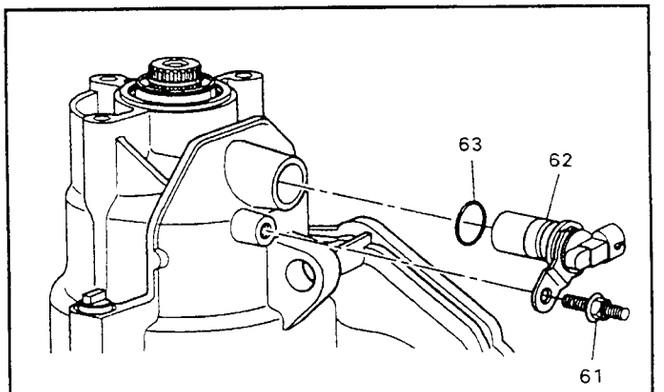
Figure 187

19. Inspect the stub shaft (58) for damage to the splines, snap ring grooves and journals.
20. Inspect the stub shaft sleeve (56) for scratches, nicks or damage that may cause a leak. If the sleeve appears damaged, it must be replaced using the same procedure for the removal and installation as with the output shaft.
21. Install two new snap rings (57) into the snap ring grooves on the stub shaft, as shown in Figure 187.
    These snap rings are not reusable once the stub shaft has been removed.
22. Install the stub shaft and sleeve assembly into the transaxle, using a mallet to install the shaft through the final drive differential gear, shown in Figure 187.
23. Install a new right hand axle seal into transaxle case using tool J-41102 (See Figure 188). Tool J-41102 installs the seal to a given depth and also spreads the seal to get it over the sleeve without any damage.
24. Add Polyurea grease, part number 7843867, to the splines on the stub shaft after the seal has been installed.



2 SEAL, AXLE OIL

Figure 188

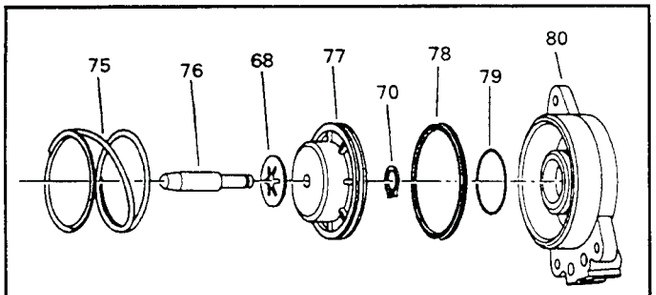


61 STUD, OUTPUT SPEED SENSOR
62 SENSOR, OUTPUT SPEED
63 SEAL, O-RING (OUTPUT SPEED SENSOR)

Figure 189

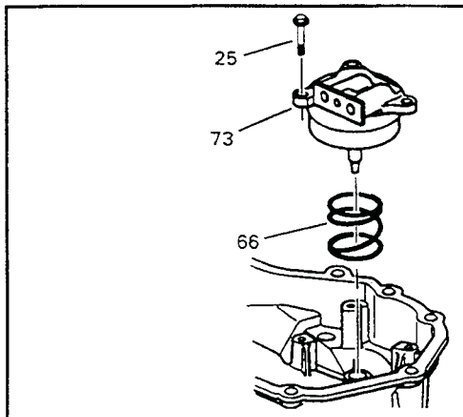
OUTPUT SPEED SENSOR

1. Inspect the output speed sensor for any damage to the sensor or the electrical connector.
2. Check the resistance across the two terminals in the speed sensor, using the chart on Page 23 for the proper specifications.
3. Install a new "O" ring seal on the output speed sensor as shown in Figure 189.
4. Install the speed sensor into the transaxle case using a small amount of "Trans-Jel" in the case bore (See Figure 189).
5. Install the speed sensor stud and torque stud to 9 ft.lb. (See Figure 189).



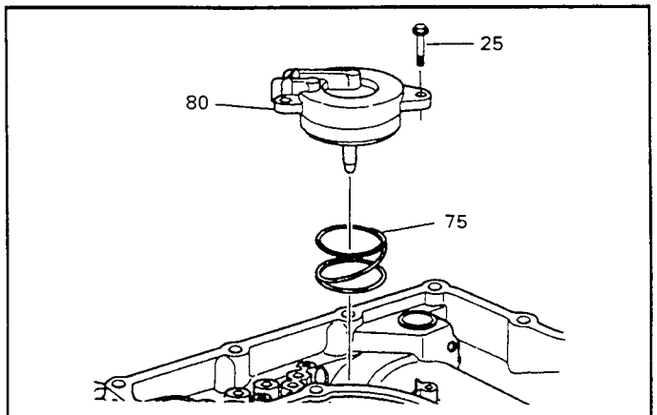
68 SPRING, SERVO CUSHION
70 RING, SERVO SNAP
75 SPRING, SERVO RETURN (INTERMEDIATE/4TH)
76 PIN, SERVO APPLY (INTERMEDIATE/4TH)
77 PISTON, SERVO (INTERMEDIATE/4TH)
78 SEAL, SERVO PISTON (INTERMEDIATE/4TH)
79 SEAL, SERVO COVER (INTERMEDIATE/4TH)
80 COVER, SERVO (INTERMEDIATE/4TH)

Figure 190



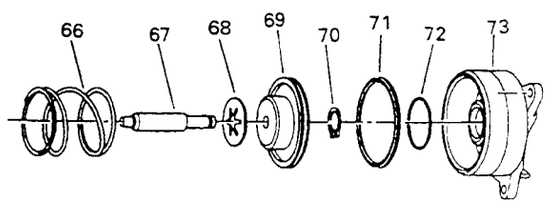
25 BOLT, SERVO COVER
66 SPRING, SERVO RETURN (LO/REVERSE)
73 COVER, SERVO (LO/REVERSE)

Figure 193



25 BOLT, SERVO COVER
75 SPRING, SERVO RETURN (INTERMEDIATE/4TH)
80 COVER, SERVO (INTERMEDIATE/4TH)

Figure 191

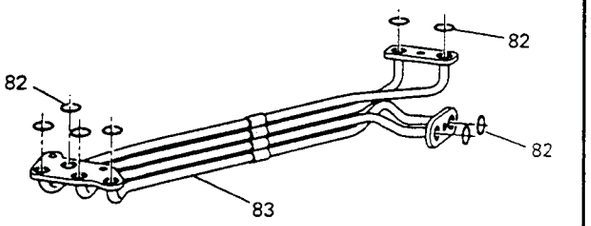


66 SPRING, SERVO RETURN (LO/REVERSE)
67 PIN, SERVO APPLY (LO/REVERSE)
68 SPRING, SERVO CUSHION
69 PISTON, SERVO (LO/REVERSE)
70 RING, SERVO SNAP
71 SEAL, SERVO PISTON (LO/REVERSE)
72 SEAL, SERVO COVER (LO/REVERSE)
73 COVER, SERVO (LO/REVERSE)

Figure 192

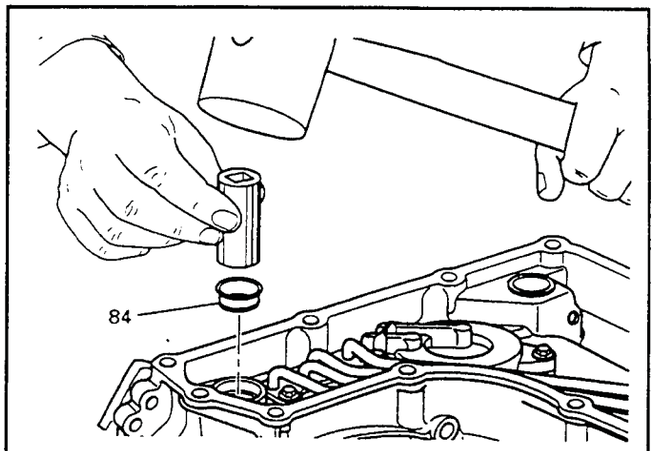
SERVO ASSEMBLIES AND SERVO FEED PIPES ASSEMBLE

1. Assemble the Intermediate/4th servo cushion springs (68) and servo piston onto the servo apply pin, as shown in Figure 190. Retain the spring and piston by installing the snap ring as shown in Figure 190.
2. Install new servo seals (78) and (79) onto the servo piston and servo cover and lubricate with "Trans-Jel", as shown in Figure 190.
3. Assemble the intermediate/4th servo piston in the servo cover, as shown in Figure 190.
4. Install the intermediate/4th servo return spring (75) into the transaxle case (See Figure 191).
5. Install the intermediate/4th servo cover and piston as an assembly over the return spring as shown in Figure 191.
6. Install the three servo cover retaining bolts and torque to 9 ft.lb. (See Figure 191).
7. Assemble the lo/reverse servo cushion spring (68) and servo piston onto the servo apply pin as shown in Figure 192.
8. Install new servo seals (71) and (72) onto the servo piston and servo cover and lubricate with "Trans-Jel", as shown in Figure 192.
9. Assemble the lo/reverse servo piston into the servo cover, as shown in Figure 192.
10. Install the lo/reverse servo return spring (66) into the transaxle case (See Figure 193).
11. Install the lo/reverse servo cover and piston as an assembly over the return spring, as shown in Figure 193.



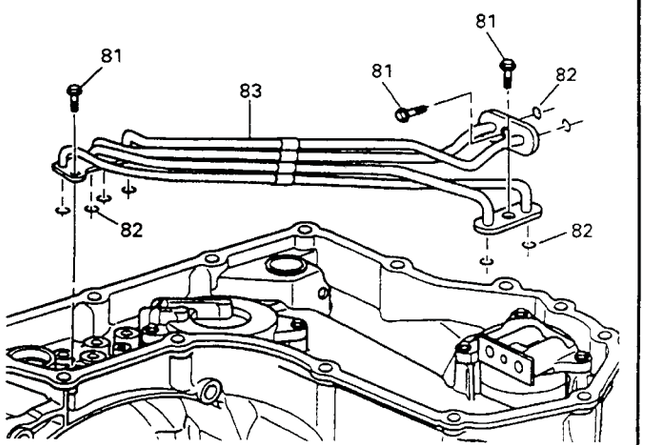
82 SEAL, OIL FEED TUBE ASSEMBLY
83 TUBE ASSEMBLY, OIL FEED

Figure 194



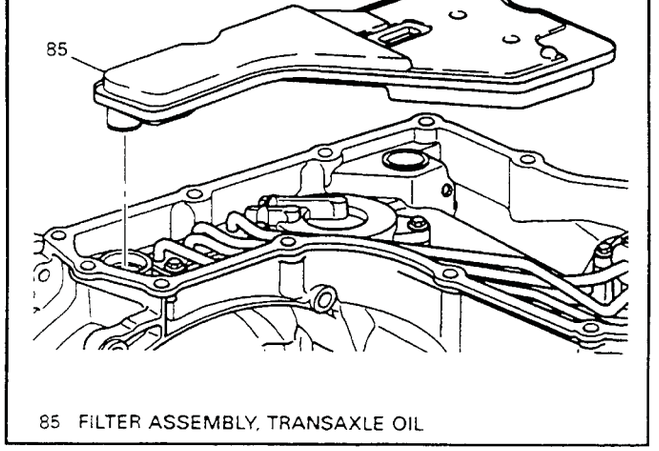
84 SEAL, TRANSAXLE OIL FILTER

Figure 196



81 BOLT, TUBE ASSEMBLY
82 SEAL, OIL FEED TUBE ASSEMBLY
83 TUBE ASSEMBLY, OIL FEED

Figure 195



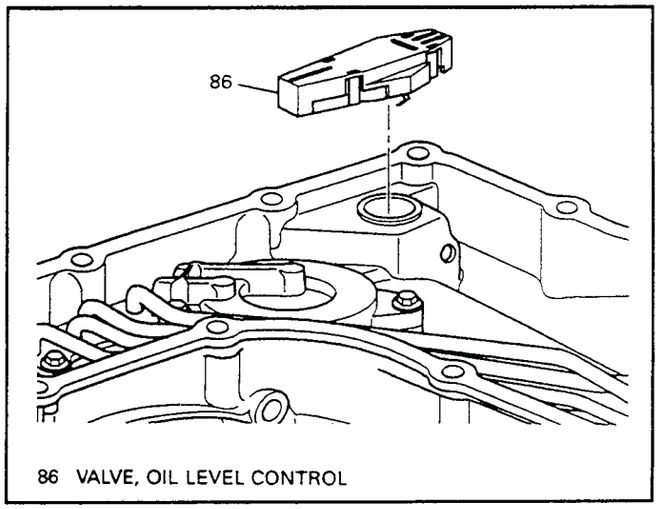
85 FILTER ASSEMBLY, TRANSAXLE OIL

Figure 197

12. Install the three lo/reverse servo cover bolts and torque to 9 ft.lb. as shown Figure 193.
13. The oil feed pipe "O" rings are glued into place during initial assembly. Be sure to thoroughly clean any residual glue from the oil feed pipe pockets (See Figure 194).
14. Install new feed pipe "O" rings into the feed pipe pockets and retain with "Trans-Jel", as shown in Figure 194.
15. Install the oil feed pipe assembly onto transaxle as shown Figure 195, hand start the four bolts, and torque bolts to 9 ft.lb.

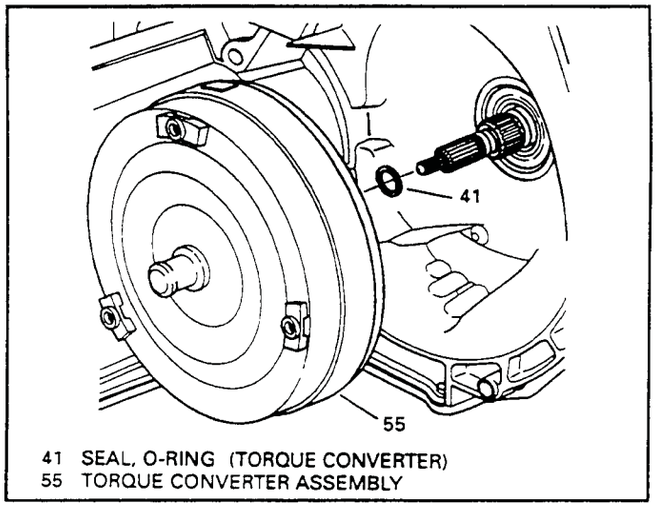
OIL FILTER SEAL AND OIL FILTER ASSEMBLY

1. Install a new oil filter seal (84) in the transaxle case, as shown in Figure 196. Tap gently and evenly on the seal to prevent damage to case bore and seal, using a large socket to tap seal into position (See Figure 196).
2. Install a new oil filter assembly into filter seal as shown in Figure 197, twisting the oil filter slightly during installation.



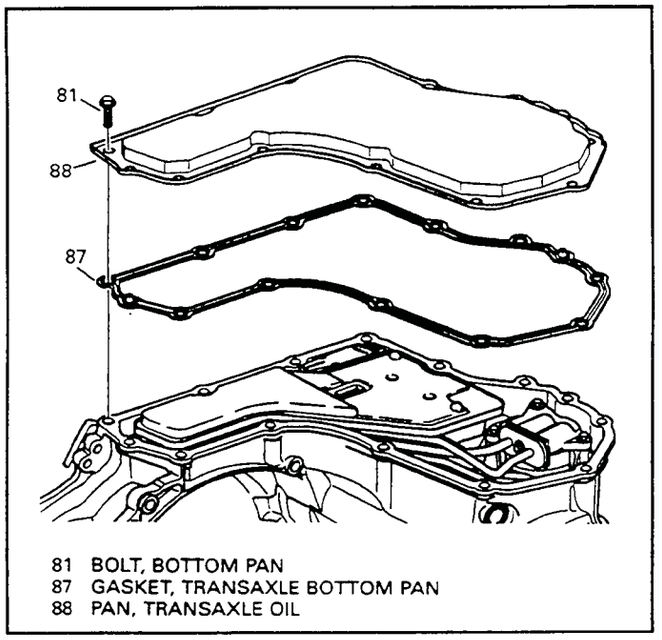
86 VALVE, OIL LEVEL CONTROL

Figure 198



41 SEAL, O-RING (TORQUE CONVERTER)
55 TORQUE CONVERTER ASSEMBLY

Figure 200



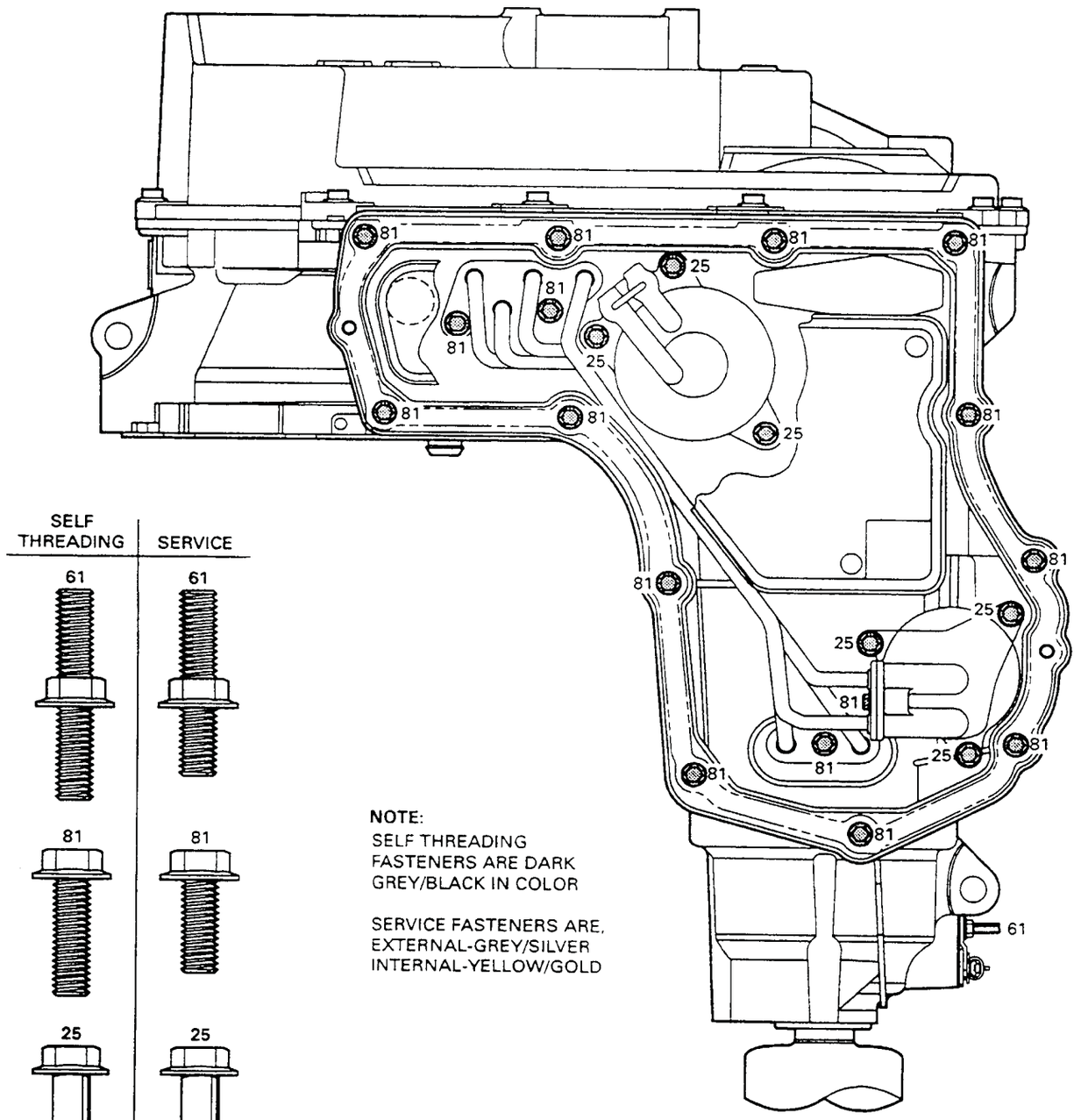
81 BOLT, BOTTOM PAN
87 GASKET, TRANSAXLE BOTTOM PAN
88 PAN, TRANSAXLE OIL

Figure 199

OIL LEVEL CONTROL VALVE BOTTOM PAN AND GASKET

1. General Motors recommends that the oil level control valve (86) be replaced if it is removed. The oil level control valve can be reused if the retaining tabs on the bottom are not bent and still have the ability to retain it in the case bore (See Figure 198).
2. Install the oil level control valve into transaxle case bore as shown in Figure 198, by pushing down on oil level control valve where it says ***"PRESS HERE"***.
3. Install the bottom pan gasket and the bottom pan onto the transaxle as shown in Figure 199.
4. Install the twelve bottom pan bolts, hand start and then torque to 8 ft.lb. (See Figure 199).
5. Install a new turbine shaft "O" ring into the turbine shaft "O" ring groove, as shown in Figure 200.
6. Remove the transaxle from the holding fixture and install the torque converter, as shown in Figure 200.

BOTTOM PAN AREA BOLT LENGTH AND LOCATIONS



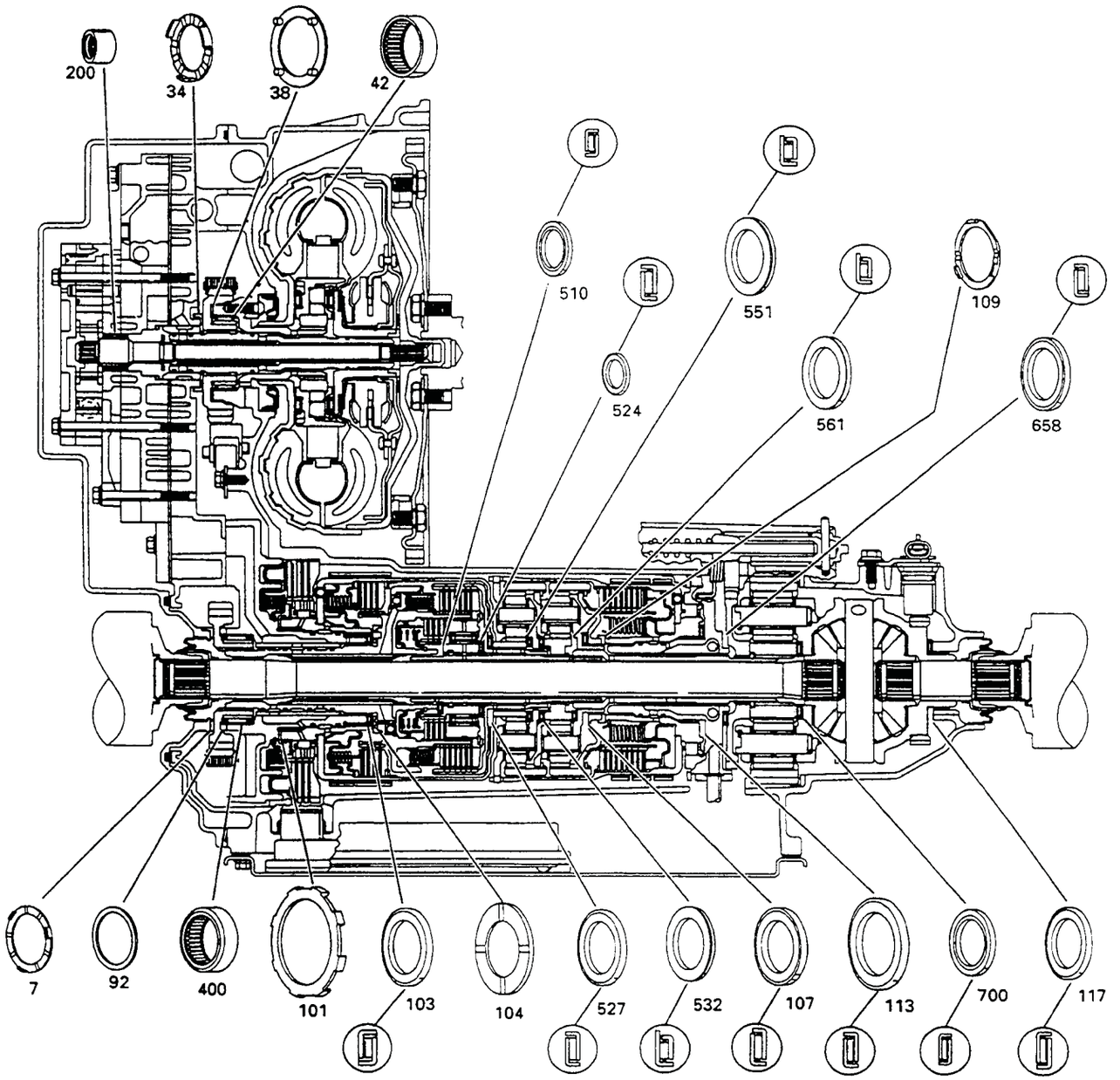
NOTE:
SELF THREADING FASTENERS ARE DARK GREY/BLACK IN COLOR

SERVICE FASTENERS ARE, EXTERNAL-GREY/SILVER INTERNAL-YELLOW/GOLD

SELF THREADING		SERVICE	
25	Bolt, M6X1.0X28mm	25	Bolt, M6X1.0X24mm
81	Bolt, M6X1.0X19mm	81	Bolt, M6X1.0X15mm
61	Bolt, M6X1.0X15mm	61	Bolt, M6X1.0X11mm

Figure 201

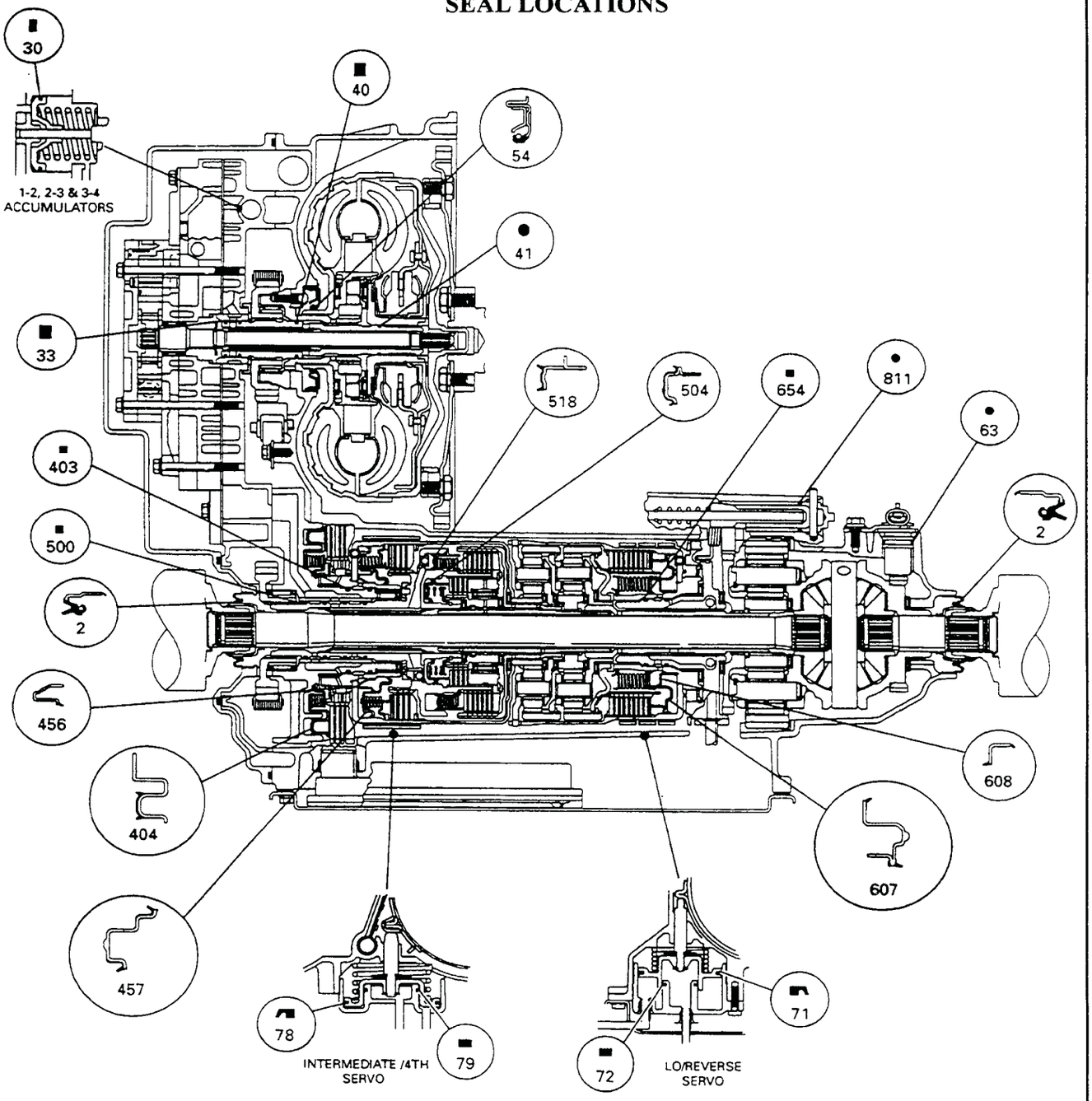
BEARING AND WASHER LOCATIONS



7	WASHER, THRUST (SIDE COVER TO DRIVEN SPROCKET)
34	WASHER, THRUST (CHANNEL PLATE TO DRIVE SPROCKET)
38	WASHER, THRUST (DRIVE SPROCKET TO SUPPORT)
42	BEARING, DRIVE SPROCKET SUPPORT
92	WASHER, THRUST (DRIVEN SPROCKET TO SUPPORT)
101	WASHER, THRUST (SUPPORT TO REVERSE INPUT CLUTCH)
103	BEARING, THRUST
104	WASHER, THRUST (SELECTIVE)
107	BEARING, THRUST
109	WASHER, THRUST
113	BEARING, THRUST
117	BEARING, THRUST
200	BEARING & SEAL ASSEMBLY, OIL PUMP
400	BEARING, DRIVEN SPROCKET SUPPORT
510	BEARING, THRUST
524	BEARING, THRUST
527	BEARING, THRUST (CARRIER SHAFT TO SHELL)
532	BEARING, THRUST (REACTION CARRIER TO SUN GEAR)
551	BEARING, THRUST
561	BEARING, THRUST
658	BEARING, THRUST (FORWARD SUPPORT TO PARK GEAR)
700	BEARING, THRUST

Figure 202

SEAL LOCATIONS



2	SEAL, AXLE OIL
30	SEAL, ACCUMULATOR PISTON (1-2, 2-3 AND 3-4)
33	SEAL, TURBINE SHAFT
40	SEAL, (TURBINE SHAFT TO SUPPORT)
41	SEAL, O-RING (TORQUE CONVERTER)
54	SEAL, CONVERTER
63	SEAL, O-RING (OUTPUT SPEED SENSOR)
71	SEAL, SERVO PISTON (LO/REVERSE)
72	SEAL, SERVO COVER (LO/REVERSE)
78	SEAL, SERVO PISTON (INTERMEDIATE/4TH)
79	SEAL, SERVO COVER (INTERMEDIATE/4TH)
403	RING, OIL SEAL
404	PISTON ASSEMBLY, 2ND CLUTCH
456	RETAINER & SEAL ASSEMBLY, REVERSE CLUTCH CENTER
457	PISTON ASSEMBLY, REVERSE CLUTCH
500	RING, OIL SEAL - INPUT SHAFT
504	PISTON ASSEMBLY, COAST CLUTCH
518	PISTON ASSEMBLY, DIRECT CLUTCH
607	PISTON ASSEMBLY, FORWARD CLUTCH
608	SEAL AND SLEEVE ASSEMBLY, FORWARD CLUTCH INNER
654	RING, OIL SEAL (FORWARD CLUTCH SUPPORT)
811	SEAL, ACTUATOR GUIDE

Figure 203

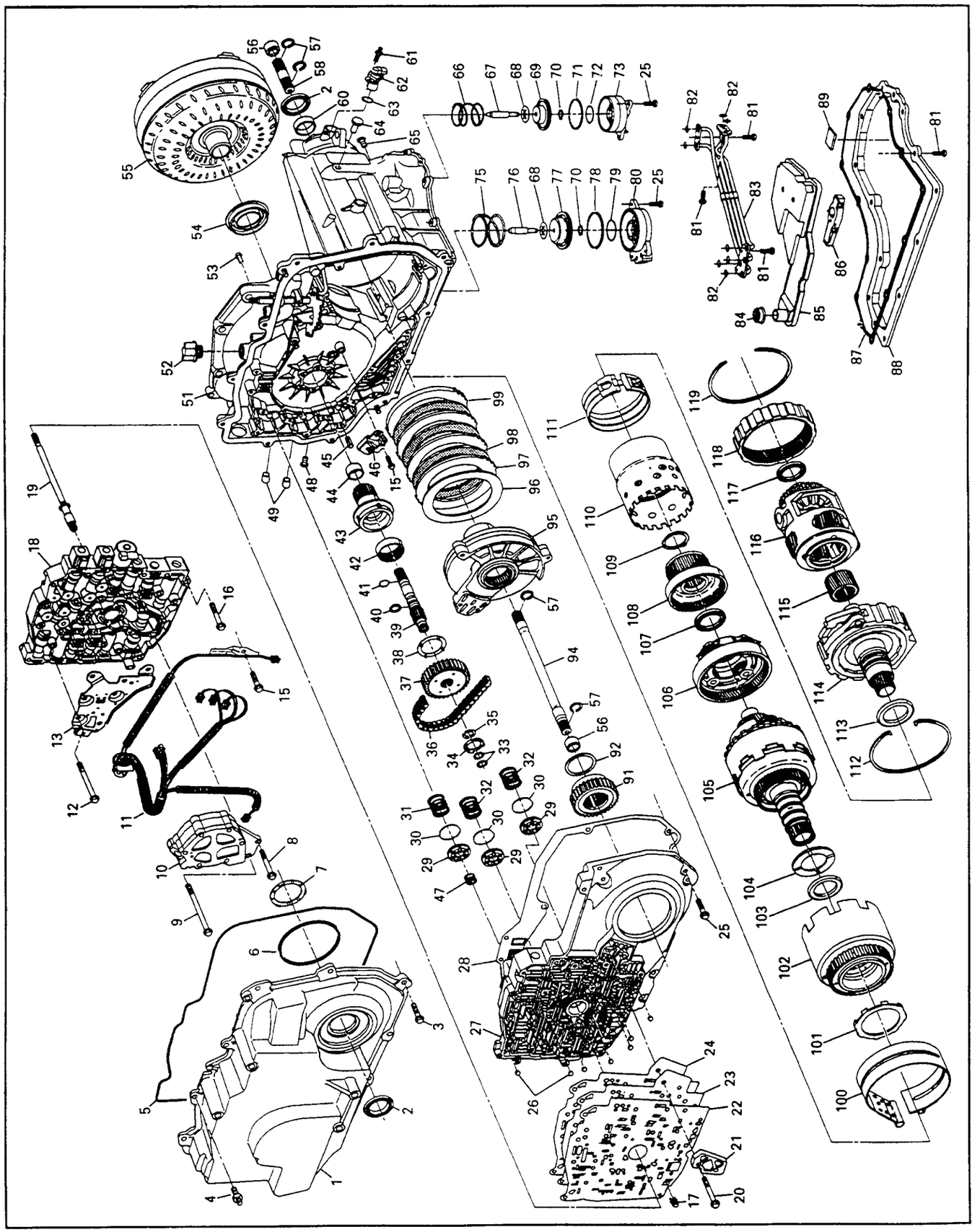
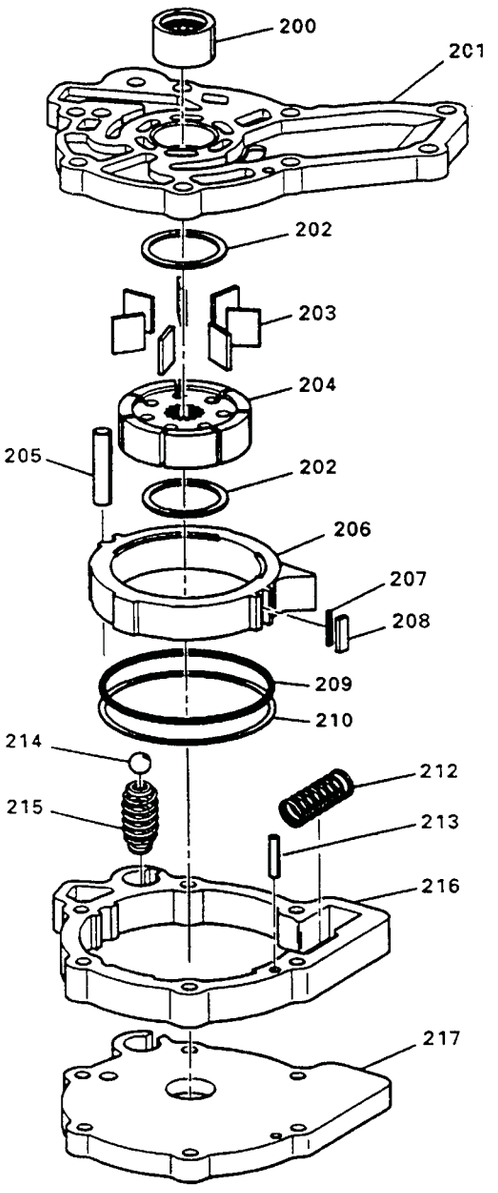


Figure 204

1 COVER, SIDE (STRUCTURAL)
2 SEAL, AXLE OIL
3 BOLT, SIDE COVER
4 STUD, SIDE COVER
5 GASKET, SIDE COVER
6 GASKET, SIDE COVER OIL LEVEL CONTROL
7 WASHER, THRUST (SIDE COVER TO DRIVEN SPROCKET)
8 BOLT, OIL PUMP
9 BOLT, OIL PUMP
10 PUMP ASSEMBLY, TRANSAXLE OIL
11 WIRING ASSEMBLY, TRANSAXLE
12 BOLT, PRESSURE SWITCH ASSEMBLY
13 PRESSURE SWITCH ASSEMBLY (PSA)
15 BOLT, WIRING HARNESS BRACKET
BOLT, INPUT SPEED SENSOR
16 BOLT, VALVE BODY
17 FILTER
18 BODY ASSEMBLY, CONTROL VALVE
19 SHAFT, OIL PUMP DRIVE
20 BOLT, SPACER PLATE SUPPORT
21 SUPPORT, SPACER PLATE
22 GASKET, VALVE BODY TO SPACER PLATE
23 PLATE, VALVE BODY SPACER
24 GASKET, SPACER PLATE TO CHANNEL PLATE
25 BOLT, CHANNEL PLATE
BOLT, SERVO COVER
26 CHECKBALLS (7)
27 PLATE, CHANNEL
28 GASKET, CASE TO CHANNEL PLATE
29 PISTON, ACCUMULATOR (1-2, 2-3 AND 3-4)
30 SEAL, ACCUMULATOR PISTON (1-2, 2-3 AND 3-4)
31 SPRING, 1-2 ACCUMULATOR PISTON
32 SPRING, 2-3 AND 3-4 ACCUMULATOR PISTON
33 SEAL, (TURBINE SHAFT TO SPROCKET)
34 WASHER, THRUST (CHANNEL PLATE TO DRIVE SPROCKET)
35 RING, SNAP (TURBINE SHAFT TO DRIVE SPROCKET)
36 LINK ASSEMBLY, DRIVE
37 SPROCKET, DRIVE
38 WASHER, THRUST (DRIVE SPROCKET TO SUPPORT)
39 SHAFT, TURBINE
40 SEAL, (TURBINE SHAFT TO SUPPORT)
41 SEAL, O-RING (TORQUE CONVERTER)
42 BEARING, DRIVE SPROCKET SUPPORT
43 SUPPORT, DRIVE SPROCKET
44 BUSHING, DRIVE SPROCKET SUPPORT
45 PIN, DOWEL (CHANNEL PLATE TO CASE)
46 SENSOR, INPUT SPEED
47 SPRING, 1-2 ACCUMULATOR PISTON CUSHION
48 PLUG, LINE PRESSURE TAP
49 SEAL, COOLER PIPE
51 CASE, TRANSAXLE
52 CAP, VENT
53 SCREW, DRIVE SPROCKET SUPPORT
54 SEAL, CONVERTER
55 TORQUE CONVERTER ASSEMBLY
56 SLEEVE, OUTPUT/STUB SHAFT
57 RING, OUTPUT/STUB SHAFT SNAP
58 SHAFT, OUTPUT STUB
60 BUSHING, CASE TO FINAL DRIVE
61 STUD, OUTPUT SPEED SENSOR
62 SENSOR, OUTPUT SPEED
63 SEAL, O-RING (OUTPUT SPEED SENSOR)
64 PIN, BAND ANCHOR - LO/REVERSE
65 PLUG, OIL LEVEL CONTROL
66 SPRING, SERVO RETURN (LO/REVERSE)
67 PIN, SERVO APPLY (LO/REVERSE)
68 SPRING, SERVO CUSHION
69 PISTON, SERVO (LO/REVERSE)
70 RING, SERVO SNAP
71 SEAL, SERVO PISTON (LO/REVERSE)
72 SEAL, SERVO COVER (LO/REVERSE)
73 COVER, SERVO (LO/REVERSE)
75 SPRING, SERVO RETURN (INTERMEDIATE/4TH)
76 PIN, SERVO APPLY (INTERMEDIATE/4TH)
77 PISTON, SERVO (INTERMEDIATE/4TH)
78 SEAL, SERVO PISTON (INTERMEDIATE/4TH)
79 SEAL, SERVO COVER (INTERMEDIATE/4TH)
80 COVER, SERVO (INTERMEDIATE/4TH)
81 BOLT, TUBE ASSEMBLY
BOLT, BOTTOM PAN
82 SEAL, OIL FEED TUBE ASSEMBLY
83 TUBE ASSEMBLY, OIL FEED
84 SEAL, TRANSAXLE OIL FILTER
85 FILTER ASSEMBLY, TRANSAXLE OIL
86 VALVE, OIL LEVEL CONTROL
87 GASKET, TRANSAXLE BOTTOM PAN
88 PAN, TRANSAXLE OIL
89 MAGNET, CHIP COLLECTOR
91 SPROCKET, DRIVEN
92 WASHER, THRUST (DRIVEN SPROCKET TO SUPPORT)
94 SHAFT, OUTPUT
95 SUPPORT ASSEMBLY, DRIVEN SPROCKET
96 PLATE, 2ND CLUTCH WAVED
97 PLATE, 2ND CLUTCH STEEL
98 PLATE, 2ND CLUTCH FIBER
99 PLATE, 2ND CLUTCH BACKING
100 BAND, INTERMEDIATE/4TH
101 WASHER, THRUST (SUPPORT TO REVERSE INPUT CLUTCH)
102 CLUTCH ASSEMBLY, REVERSE INPUT
103 BEARING, THRUST
104 WASHER, THRUST (SELECTIVE)
105 CLUTCH ASSEMBLY, DIRECT & COAST
106 CARRIER ASSEMBLY, INPUT
107 BEARING, THRUST
108 INPUT FLANGE & FORWARD CLUTCH HUB ASSEMBLY
109 WASHER, THRUST
110 CLUTCH ASSEMBLY, FORWARD
111 BAND, LO/REVERSE
112 RING, SNAP (FORWARD CLUTCH SUPPORT TO CASE)
113 BEARING, THRUST
114 SUPPORT ASSEMBLY, FORWARD CLUTCH
115 GEAR, SUN (FINAL DRIVE)
116 DIFFERENTIAL AND FINAL DRIVE ASSEMBLY
117 BEARING, THRUST
118 GEAR, FINAL DRIVE INTERNAL
119 RING, FRETTING (INTERNAL GEAR TO CASE)

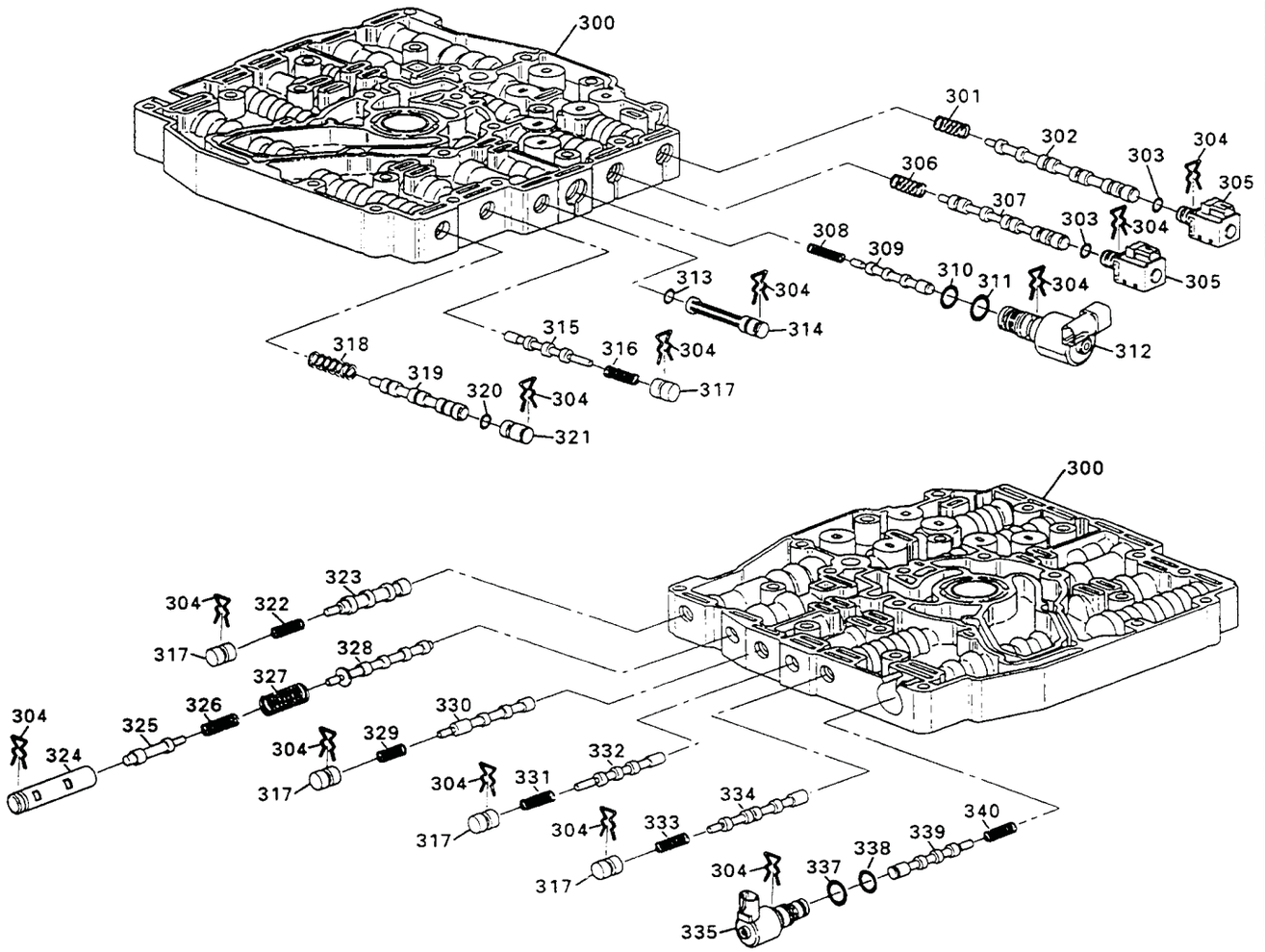
Figure 204 Legend

NOTE: At the time of this printing the oil pump assembly was serviced as a complete assembly. only. The oil pump should not be disassembled. Figure 205 is provided only for reference. This policy may change in the future.



200	BEARING & SEAL ASSEMBLY, OIL PUMP
201	BASE, OIL PUMP
202	RING, OIL PUMP VANE
203	VANE, OIL PUMP
204	ROTOR, OIL PUMP
205	PIN, PIVOT (OIL PUMP SLIDE)
206	SLIDE, OIL PUMP
207	SUPPORT, OIL PUMP SLIDE SEAL
208	SEAL, OIL PUMP SLIDE
209	SEAL, O-RING (OIL PUMP SLIDE)
210	RING, FLUID SEAL (SLIDE TO BODY)
212	SPRING, OIL PUMP PRIMING
213	PIN, LOCATING
214	BALL, PRESSURE RELIEF
215	SPRING, PRESSURE RELIEF
216	BODY, OIL PUMP
217	COVER, PUMP

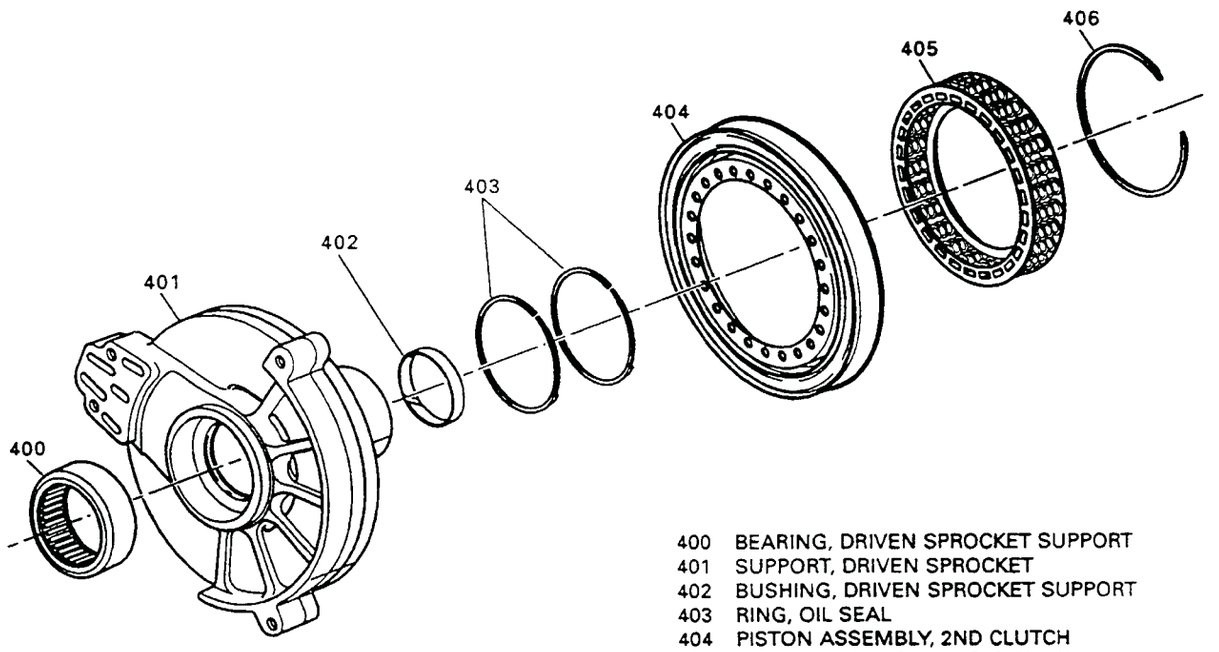
Figure 205



300	BODY, CONTROL VALVE ASSEMBLY
301	SPRING, 1-2 SHIFT VALVE
302	VALVE, 1-2 SHIFT
303	O-RING, SHIFT SOLENOID A AND B
304	RETAINER CLIP
305	SOLENOID, SHIFT (A AND B)
306	SPRING, 2-3 SHIFT VALVE
307	VALVE, 2-3 SHIFT
308	SPRING, TORQUE SIGNAL REGULATOR VALVE
309	VALVE, TORQUE SIGNAL REGULATOR
310	O-RING, PRESSURE CONTROL SOLENOID
311	O-RING, PRESSURE CONTROL SOLENOID
312	SOLENOID, PRESSURE CONTROL
313	O-RING, ACTUATOR OIL FILTER
314	FILTER, ACTUATOR OIL
315	VALVE, ACTUATOR FEED LIMIT
316	SPRING, ACTUATOR FEED LIMIT VALVE
317	PLUG, BORE
318	SPRING, 3-4 SHIFT VALVE
319	VALVE, 3-4 SHIFT
320	O-RING, 3-4 SHIFT VALVE PLUG
321	PLUG, BORE
322	SPRING, 1-2/3-4 ACCUMULATOR VALVE
323	VALVE, 1-2/3-4 ACCUMULATOR
324	BUSHING, PRESSURE REGULATOR BOOST
325	VALVE, PRESSURE REGULATOR BOOST
326	SPRING, ISOLATOR
327	SPRING, PRESSURE REGULATOR VALVE
328	VALVE, PRESSURE REGULATOR
329	SPRING, 2-3 ACCUMULATOR VALVE
330	VALVE, 2-3 ACCUMULATOR
331	SPRING, TCC FEED LIMIT VALVE
332	VALVE, TCC FEED LIMIT
333	SPRING, TCC CONTROL VALVE
334	VALVE, TCC CONTROL
335	SOLENOID, TCC CONTROL
337	O-RING, TCC CONTROL SOLENOID
338	O-RING, TCC CONTROL SOLENOID
339	VALVE, TCC REGULATED APPLY
340	SPRING, TCC REGULATED APPLY VALVE

Figure 206

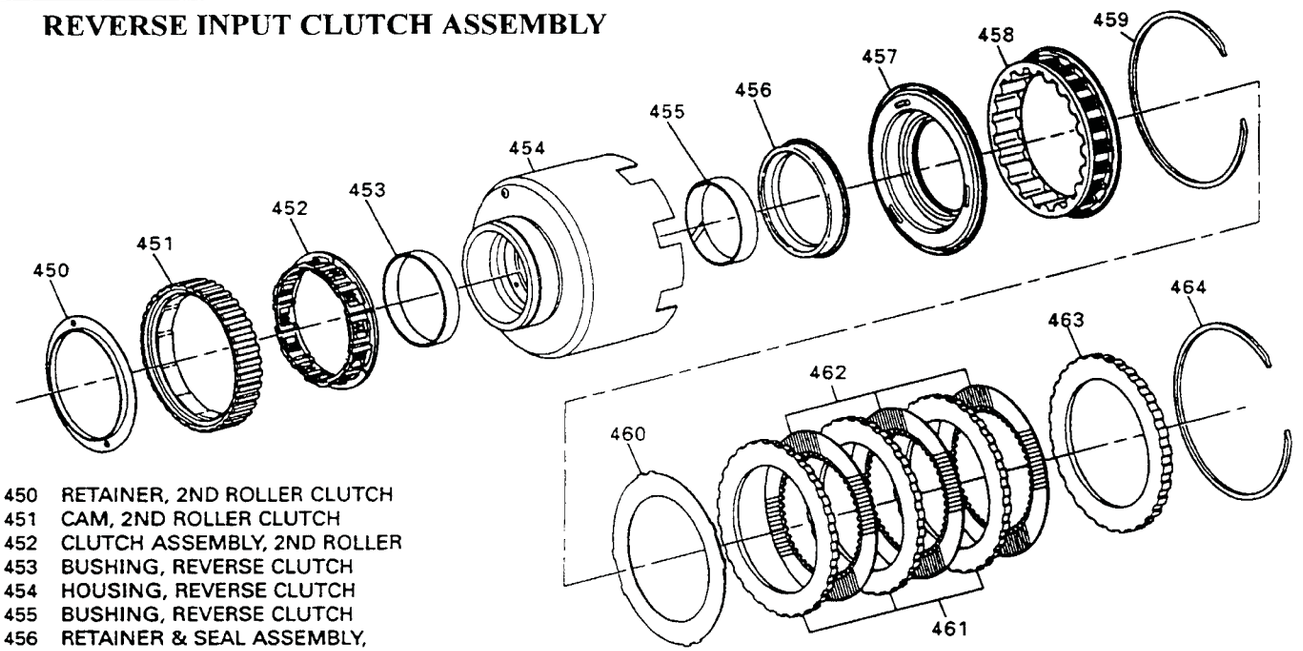
DRIVEN SPROCKET SUPPORT ASSEMBLY



400 BEARING, DRIVEN SPROCKET SUPPORT
401 SUPPORT, DRIVEN SPROCKET
402 BUSHING, DRIVEN SPROCKET SUPPORT
403 RING, OIL SEAL
404 PISTON ASSEMBLY, 2ND CLUTCH
405 SPRING ASSEMBLY, 2ND CLUTCH
406 RING, 2ND CLUTCH SPRING RETAINING

Figure 207

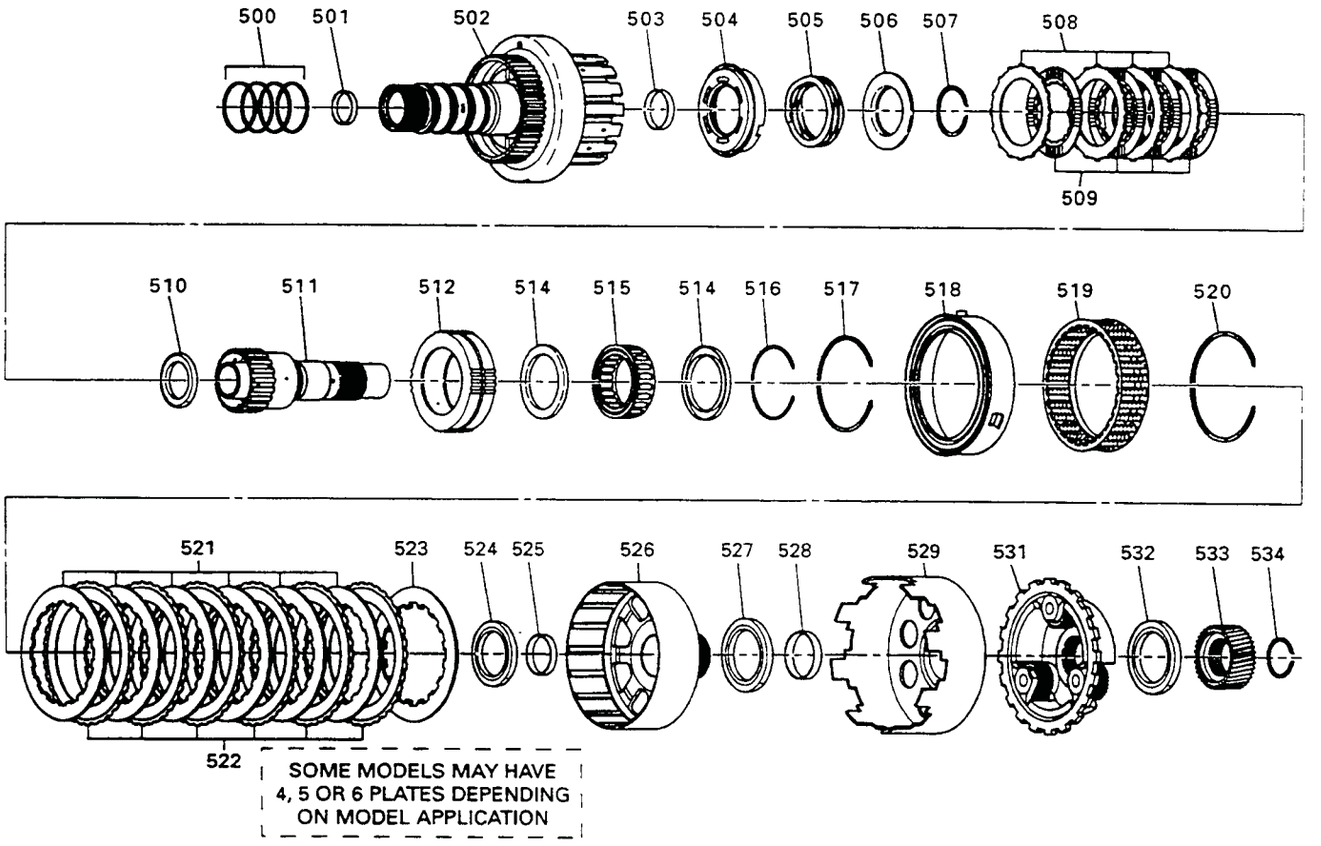
REVERSE INPUT CLUTCH ASSEMBLY



450 RETAINER, 2ND ROLLER CLUTCH
451 CAM, 2ND ROLLER CLUTCH
452 CLUTCH ASSEMBLY, 2ND ROLLER
453 BUSHING, REVERSE CLUTCH
454 HOUSING, REVERSE CLUTCH
455 BUSHING, REVERSE CLUTCH
456 RETAINER & SEAL ASSEMBLY, REVERSE CLUTCH CENTER
457 PISTON ASSEMBLY, REVERSE CLUTCH
458 SPRING & RETAINER ASSEMBLY, REVERSE CLUTCH
459 RING, SNAP (REVERSE CLUTCH SPRING RETAINER)
460 PLATE, REVERSE CLUTCH (WAVED)
461 PLATE, REVERSE CLUTCH (STEEL)
462 PLATE, REVERSE CLUTCH (FIBER)
463 PLATE, REVERSE CLUTCH (BACKING) SELECTIVE
464 RING, SNAP (REVERSE CLUTCH)

Figure 208

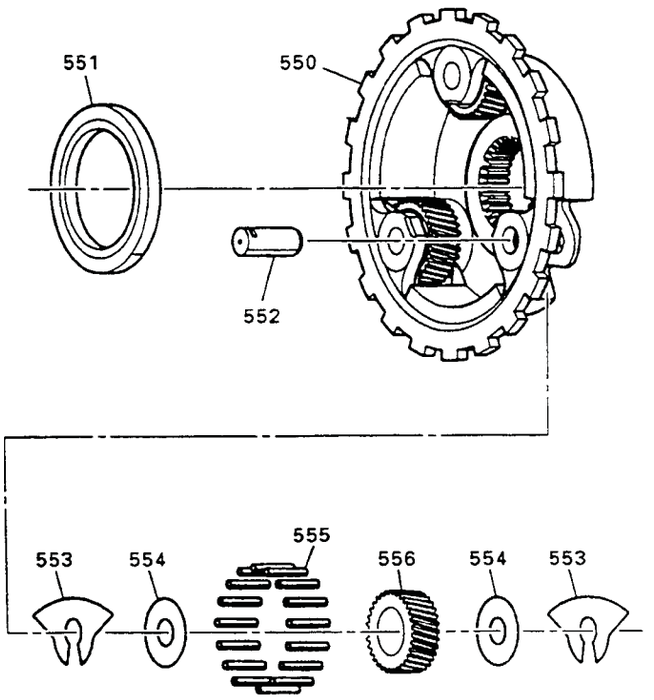
DIRECT AND COAST CLUTCH ASSEMBLIES



500 RING, OIL SEAL - INPUT SHAFT
501 BUSHING, INPUT SHAFT
502 HOUSING, DIRECT & COAST CLUTCH AND INPUT SHAFT
503 BUSHING, DIRECT CLUTCH HOUSING TO OUTPUT SHAFT
504 PISTON ASSEMBLY, COAST CLUTCH
505 SPRING, COAST CLUTCH RELEASE
506 RETAINER, COAST CLUTCH SPRING
507 RING, SNAP (COAST CLUTCH SPRING RETAINER)
508 PLATE, COAST CLUTCH (STEEL)
509 PLATE, COAST CLUTCH (FIBER)
510 BEARING, THRUST
511 SHAFT AND INNER RACE ASSEMBLY, INPUT SUN GEAR
512 RACE, OUTER (INPUT SPRAG)
514 END BEARINGS, SPRAG CLUTCH (2)
515 SPRAG ASSEMBLY, INPUT
516 RING, SNAP (OUTER RACE TO SPRAG ASSEMBLY)
517 RING, SNAP (DIRECT/COAST CLUTCH RETAINING)
518 PISTON ASSEMBLY, DIRECT CLUTCH
519 SPRING AND RETAINER ASSEMBLY, DIRECT CLUTCH
520 RING, DIRECT CLUTCH SPRING RETAINER
521 PLATE, DIRECT CLUTCH (STEEL)
522 PLATE, DIRECT CLUTCH (FIBER)
523 PLATE, DIRECT CLUTCH (BACKING)
524 BEARING, THRUST
525 BUSHING, REACTION CARRIER SHAFT
526 SHELL, REACTION CARRIER SHAFT
527 BEARING, THRUST (CARRIER SHAFT TO SHELL)
528 BUSHING, REACTION SUN GEAR
529 SHELL, REACTION SUN
531 CARRIER ASSEMBLY, REACTION
532 BEARING, THRUST (REACTION CARRIER TO SUN GEAR)
533 GEAR, INPUT SUN
534 RING, SNAP

Figure 209

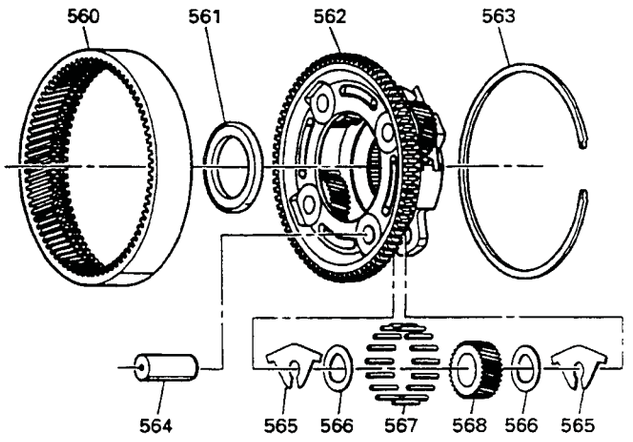
REACTION CARRIER ASSEMBLY



550 CARRIER, REACTION
551 BEARING, THRUST
552 PIN, PLANET PINION
553 WASHER, PINION THRUST REACTION
554 WASHER, PINION THRUST INNER
555 ROLLER NEEDLE BEARING
556 GEAR, REACTION PLANET PINION

Figure 210

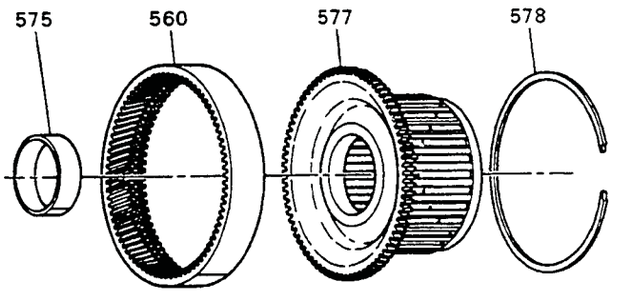
INPUT CARRIER ASSEMBLY



560 GEAR, INTERNAL (INPUT AND REACTION)
561 BEARING, THRUST
562 CARRIER, INPUT
563 RING, SNAP (INPUT CARRIER TO INTERNAL GEAR)
564 PIN, PLANET PINION
565 WASHER, PINION THRUST INPUT
566 WASHER, PINION THRUST INNER
567 ROLLER NEEDLE BEARING
568 GEAR, PINION

Figure 211

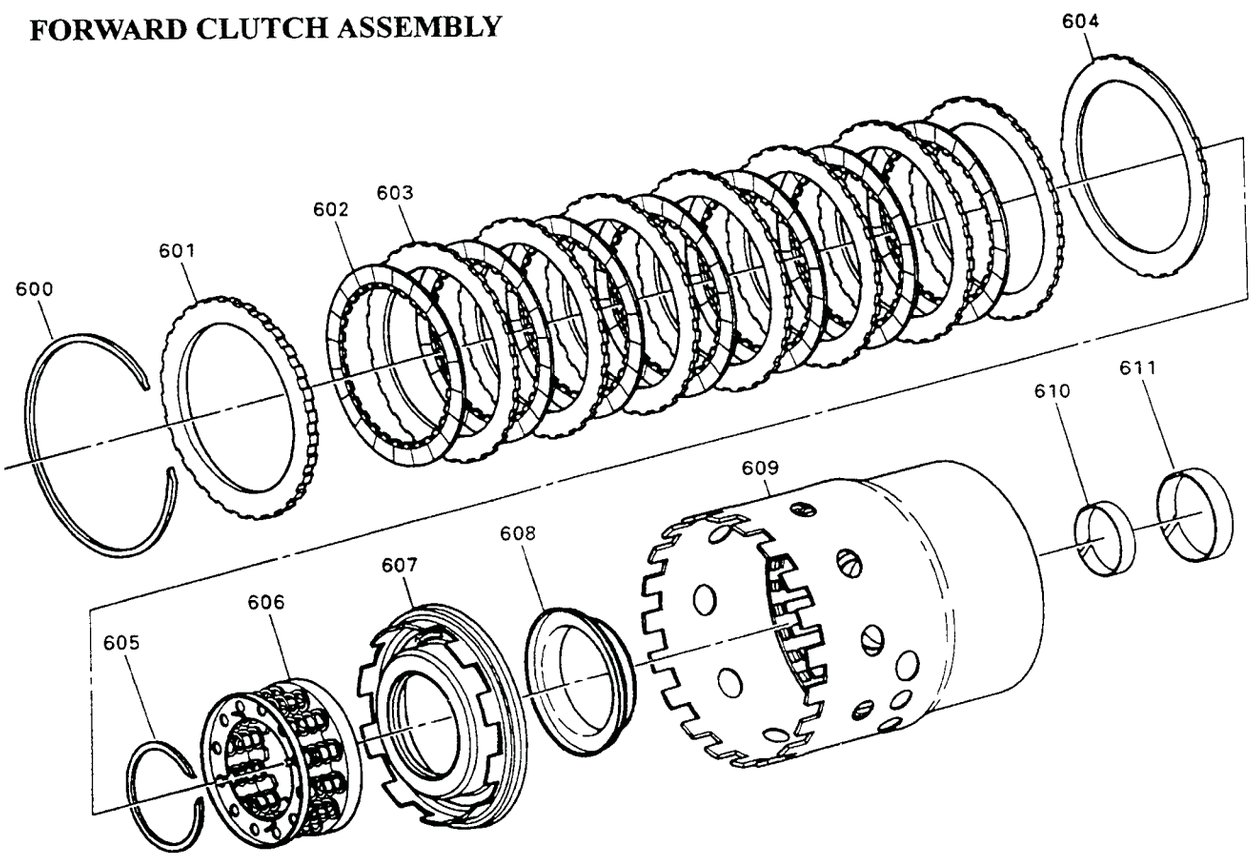
INPUT RING GEAR AND FORWARD CLUTCH HUB



560 GEAR, INTERNAL (INPUT AND REACTION)
575 BUSHING, INPUT FLANGE
577 INPUT FLANGE AND FORWARD CLUTCH HUB
578 RING, SNAP (INPUT INTERNAL GEAR TO INPUT FLANGE)

Figure 212

FORWARD CLUTCH ASSEMBLY



600 RING, SNAP (FORWARD CLUTCH)
601 PLATE, FORWARD CLUTCH (BACKING)
602 PLATE, FORWARD CLUTCH (FIBER)
603 PLATE, FORWARD CLUTCH (STEEL)
604 PLATE, FORWARD CLUTCH (WAVED)
605 RING, SNAP (FORWARD CLUTCH SPRING ASSEMBLY)
606 SPRING ASSEMBLY, FORWARD CLUTCH RETURN
607 PISTON ASSEMBLY, FORWARD CLUTCH
608 SEAL AND SLEEVE ASSEMBLY, FORWARD CLUTCH INNER
609 HOUSING, FORWARD CLUTCH
610 BUSHING, FORWARD CLUTCH SUPPORT
611 BUSHING, FORWARD CLUTCH SUPPORT

Figure 213

FORWARD CLUTCH SUPPORT ASSEMBLY

650 BUSHING, FINAL DRIVE SUN SHAFT
651 SHAFT, FINAL DRIVE SUN
652 CLUTCH ASSEMBLY, LO ROLLER
653 BEARING, THRUST
654 RING, OIL SEAL (FORWARD CLUTCH SUPPORT)
655 BUSHING, FORWARD CLUTCH SUPPORT
656 SUPPORT, FORWARD CLUTCH
657 BUSHING, FORWARD CLUTCH SUPPORT
658 BEARING, THRUST (FORWARD SUPPORT TO PARK GEAR)
659 GEAR, PARK LOCK
660 RING, SNAP (FINAL DRIVE SUN SHAFT)
661 SHAFT, PARKING LOCK PAWL
662 SPRING, PARKING LOCK PAWL RETURN
663 PAWL, PARKING LOCK

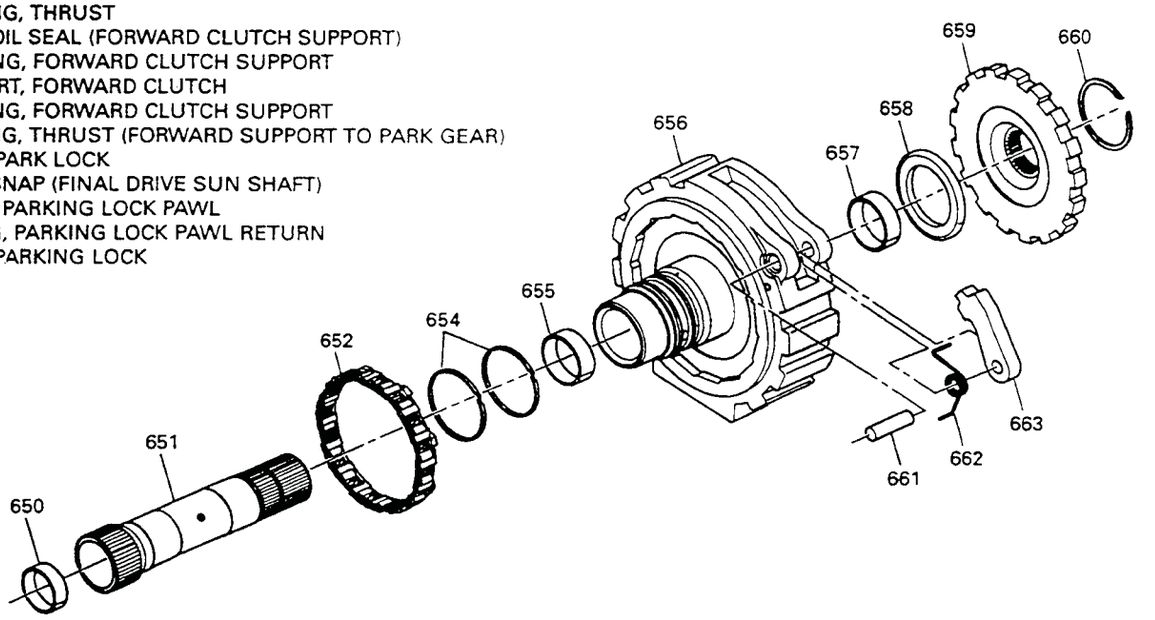


Figure 214

FINAL DRIVE ASSEMBLY

700 BEARING, THRUST
701 RING, SPIRAL PIN RETAINING
702 CARRIER, DIFFERENTIAL & FINAL DRIVE
703 SHAFT, DIFFERENTIAL PINION
704 PIN, DIFFERENTIAL PINION SHAFT RETAINING
705 ROTOR, SPEED SENSOR
706 WASHER, THRUST (DIFFERENTIAL PINION)
707 GEAR, DIFFERENTIAL PINION
708 WASHER, THRUST (DIFFERENTIAL SIDE GEAR)
709 GEAR, DIFFERENTIAL SIDE
710 WASHER, PINION THRUST
711 GEAR, PINION (FINAL DRIVE PLANET)
712 ROLLER NEEDLE BEARING
713 SPACER, PINION NEEDLE BEARING
714 PIN, PLANET PINION

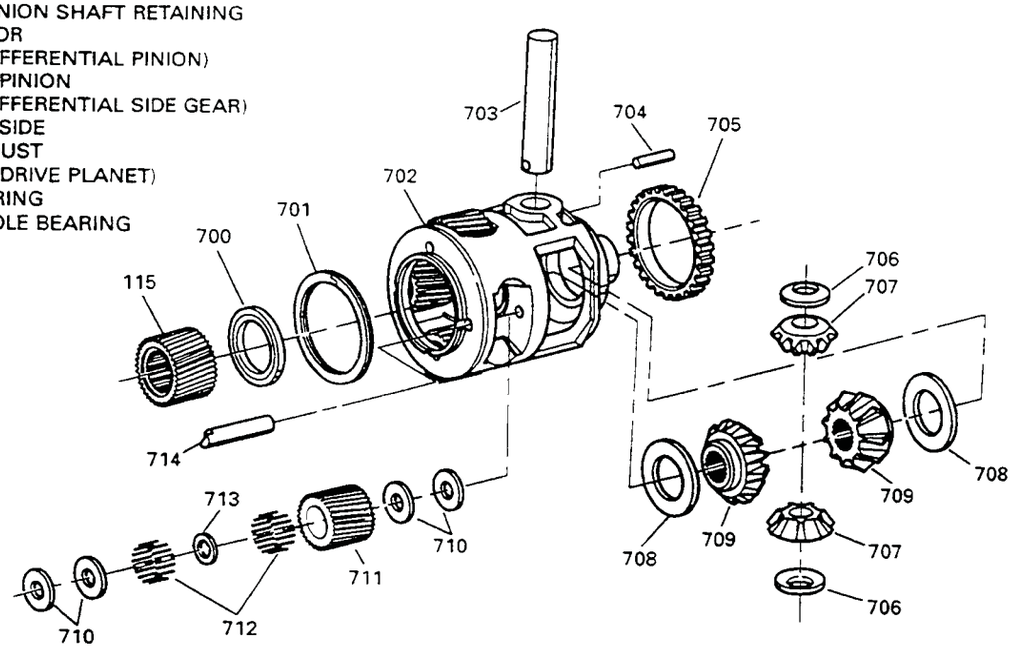
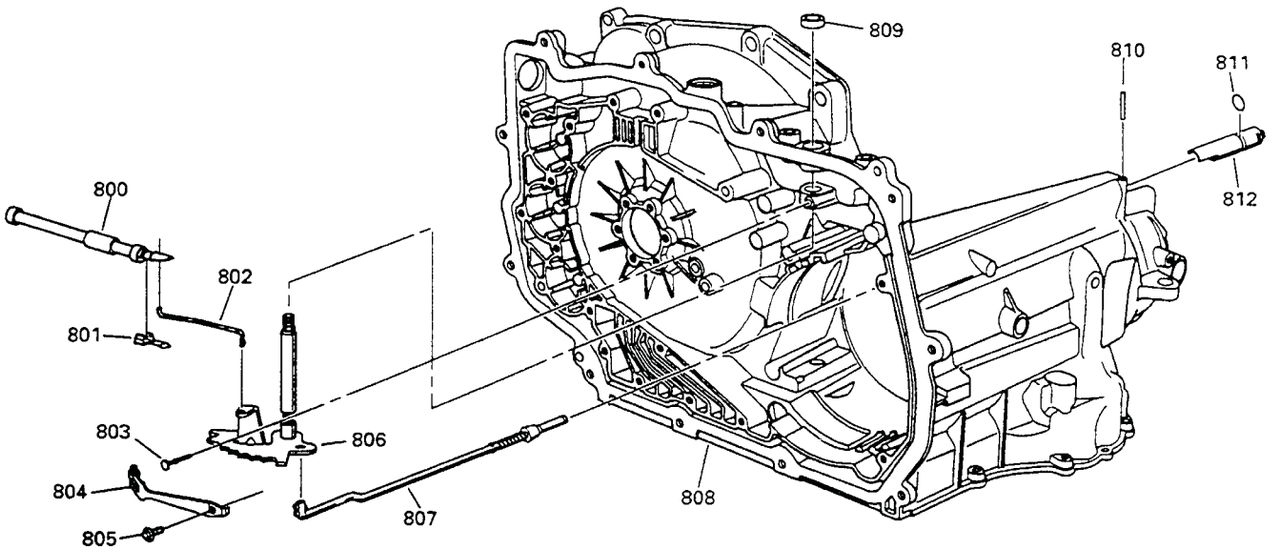


Figure 215



800	VALVE, MANUAL	806	MANUAL SHAFT AND DETENT LEVER ASSEMBLY
801	CLIP, MANUAL VALVE TO LINK	807	PARKING LOCK ACTUATOR ASSEMBLY
802	LINK, MANUAL VALVE TO DETENT LEVER	808	CASE, TRANSAXLE
803	PIN, MANUAL SHAFT TO CASE	809	SEAL, MANUAL SHAFT TO CASE
804	SPRING AND ROLLER ASSEMBLY, MANUAL DETENT	810	PIN, SPRING (ACTUATOR GUIDE)
805	BOLT, SPRING AND ROLLER ASSEMBLY TO CHANNEL PLATE	811	SEAL, ACTUATOR GUIDE
		812	ACTUATOR GUIDE

Figure 216

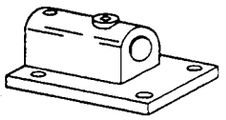
TORQUE SPECIFICATIONS

	FOOT POUNDS	NEWTON METERS
DRIVE SPROCKET SUPPORT TO CASE	9	12
TURBINE SPEED SENSOR TO CASE	9	12
WIRE HARNESS BRACKET TO CASE	9	12
CHANNEL PLATE TO CASE	9	12
CHANNEL PLATE TO DRIVEN SPROCKET SUPPORT	10.5	14
VALVE BODY TO CHANNEL PLATE	9	12
PRESSURE SWITCH ASSEMBLY TO VALVE BODY	9	12
OIL PUMP TO VALVE BODY	9	12
SIDE COVER TO CASE	15	20
OUTPUT SPEED SENSOR TO CASE	9	12
INTERMEDIATE/4TH SERVO TO CASE	9	12
LO/REVERSE SERVO TO CASE	9	12
OIL FEED PIPE ASSEMBLY	9	12
BOTTOM PAN BOLTS	8	10

Figure 217

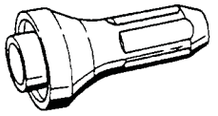
SPECIAL TOOLS

Transmission Support Fixture Base



J 3289-20

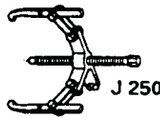
Torque Converter Seal Installer



J 28540-A

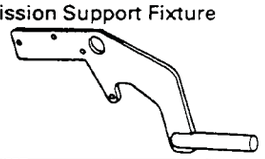
Forward and Reverse Clutch Inner Seal Assembly Remover

J 41097



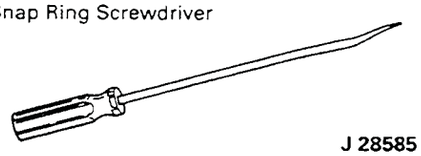
J 25031-A

Transmission Support Fixture



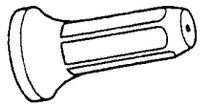
J 41230

Snap Ring Screwdriver



J 28585

Forward Clutch Inner Seal Assembly Installer

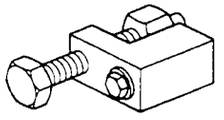


J 41231

Slide Hammer

J 6125-1B

Cooler Line Seal Installer

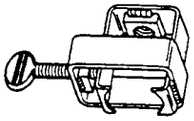


J 41239-1

Input Shaft Seal Installer Set

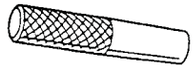
J 41234-1 J 41234-2 J 41234-3

Stub Shaft Sleeve Remover



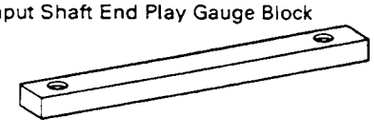
J 38868

Manual Shaft to Case Pin



J 41229

Input Shaft End Play Gauge Block

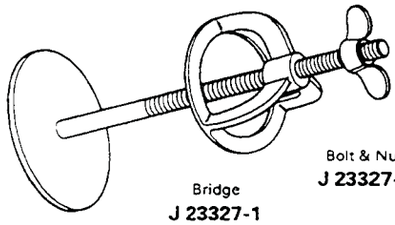


J 34673

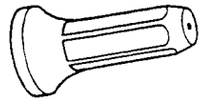
Output Shaft Sleeve Remover

J 41227

Clutch Spring Compressor

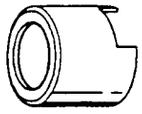


Reverse Clutch Inner Seal Installer



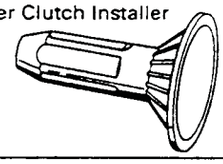
J 41233

Pass Through Connector Remover



J 41101

2nd Roller Clutch Installer

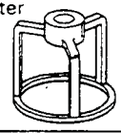


J 41235

Assembly Lubricant

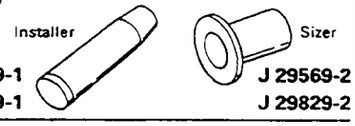
J 36850

Coast Clutch Return Spring Compressor Adapter



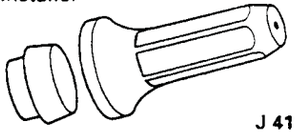
J 41236

Turbine Shaft Seal Installers and Sizers (1 Seal)



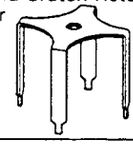
J 29569-1 J 29569-2
J 29829-1 J 29829-2

Axle Seal Installer



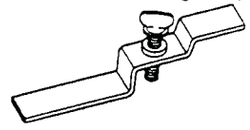
J 41102

Direct, Reverse, & 2nd Clutch Return Spring Compressor Adapter



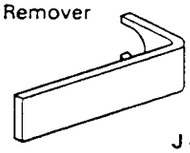
J 41232

Torque Converter Holding Strap



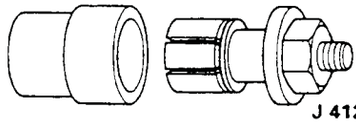
J 21366

Cooler Line Seal Remover



J 41239-2

Stub Shaft Sleeve Installer



J 41228

Figure 218

THM 4T40-E

TRANSAXLE CASE, CHANNEL PLATE AND CHECKBALL LOCATION CHANGES FOR 1997

CHANGE: Beginning in the middle of the 1997 model year, the transaxle case, channel plate and the checkball locations were changed on all THM 4T40-E transaxles, that may create some confusion for service.

REASON: Improved clutch durability, and improved 4-2 downshift.

PARTS AFFECTED:

(1) TRANSAXLE CASE - Added boss and the second threaded hole to the case in the area shown in Figure 2, to accommodate valve body bolt and channel plate changes for improved clamping. The previous design case, with the single boss and hole is shown in Figure 1.

(2) CHANNEL PLATE - New casting with an added boss, and one of the threaded holes in the channel plate changes to a non-threaded hole to accomodate the valve body bolt changes for improved clamping force. The previous design channel plate is shown in Figure 3, and the new design channel plate is shown in Figure 4.

(3) CHECKBALL LOCATIONS - The number 6 checkball moves from the direct clutch apply circuit, and into the 2-3 accumulator circuit. There were no changes in worm track configuration, however we also show the "Threaded" hole that changed to a "Non-Threaded" hole in the channel plate. Refer to Figure 5 for 1995-1996 checkball locations, and Figure 6 for the 1997-Up checkball locations.

(4) SPACER PLATE - The number 45 exhaust passage in the spacer plate has changed from a rectangular hole to a small oval hole, as shown in Figure 7.

(5) DRIVEN SPROCKET SUPPORT - Ball capsule added in the direct clutch circuit to act as an air bleed to improve direct clutch apply, as shown in Figure 8.

INTERCHANGEABILITY:

NONE of the parts listed above will interchange with previous design level transaxles. Any transaxle using the ball capsule in the direct clutch circuit must use the 1997 channel plate and all associated parts listed above.

1995-1996 TRANSAXLE CASE

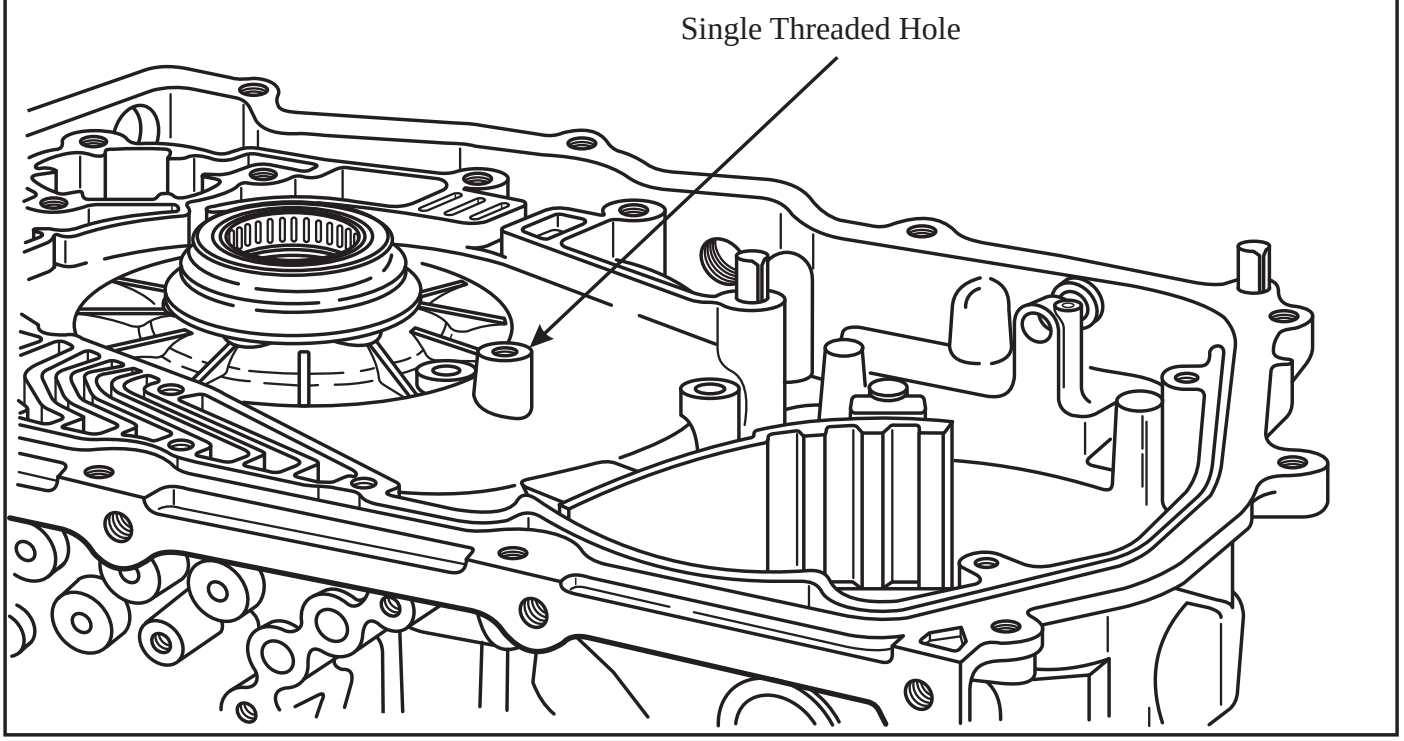


Figure 1

1997-UP TRANSAXLE CASE

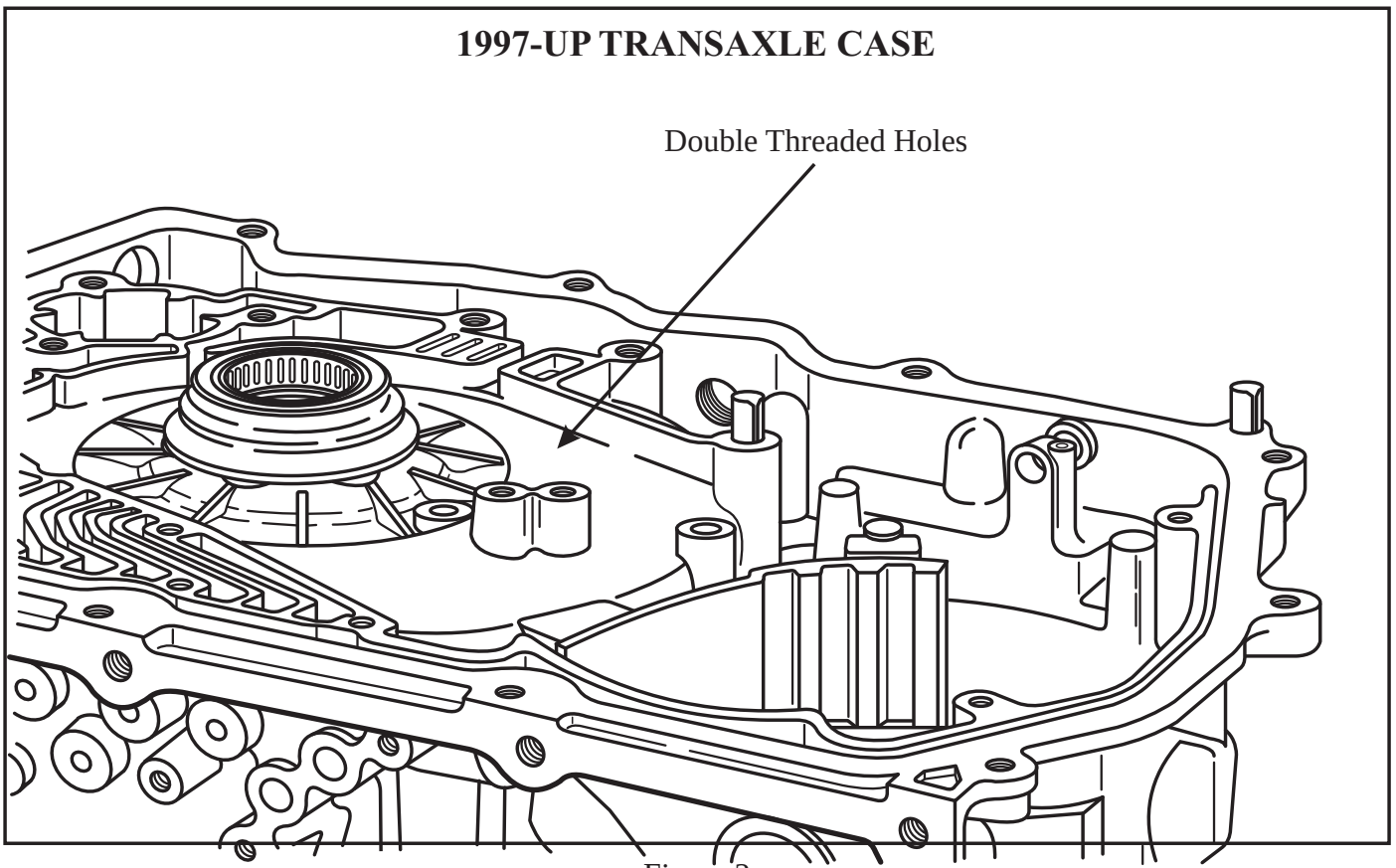


Figure 2

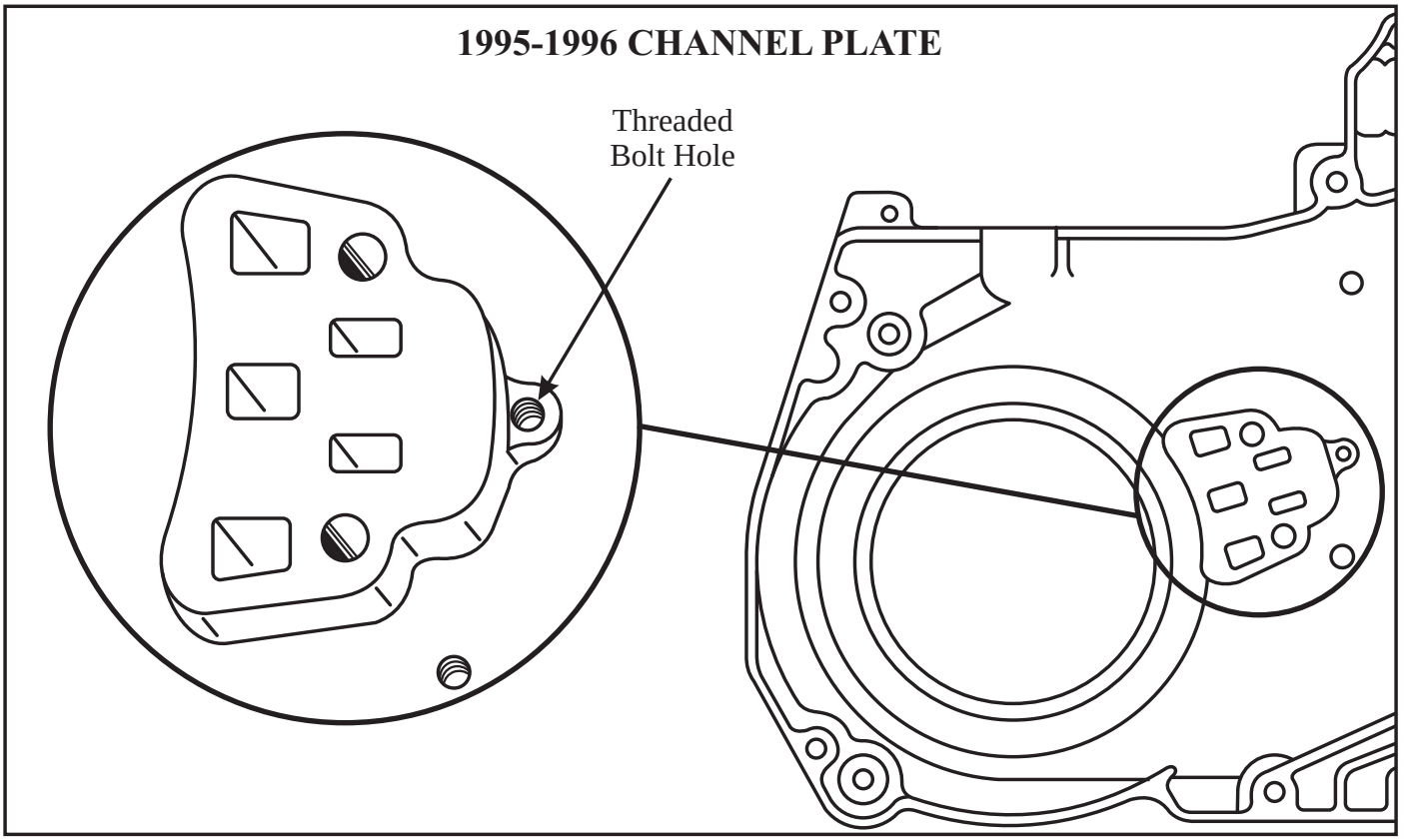


Figure 3

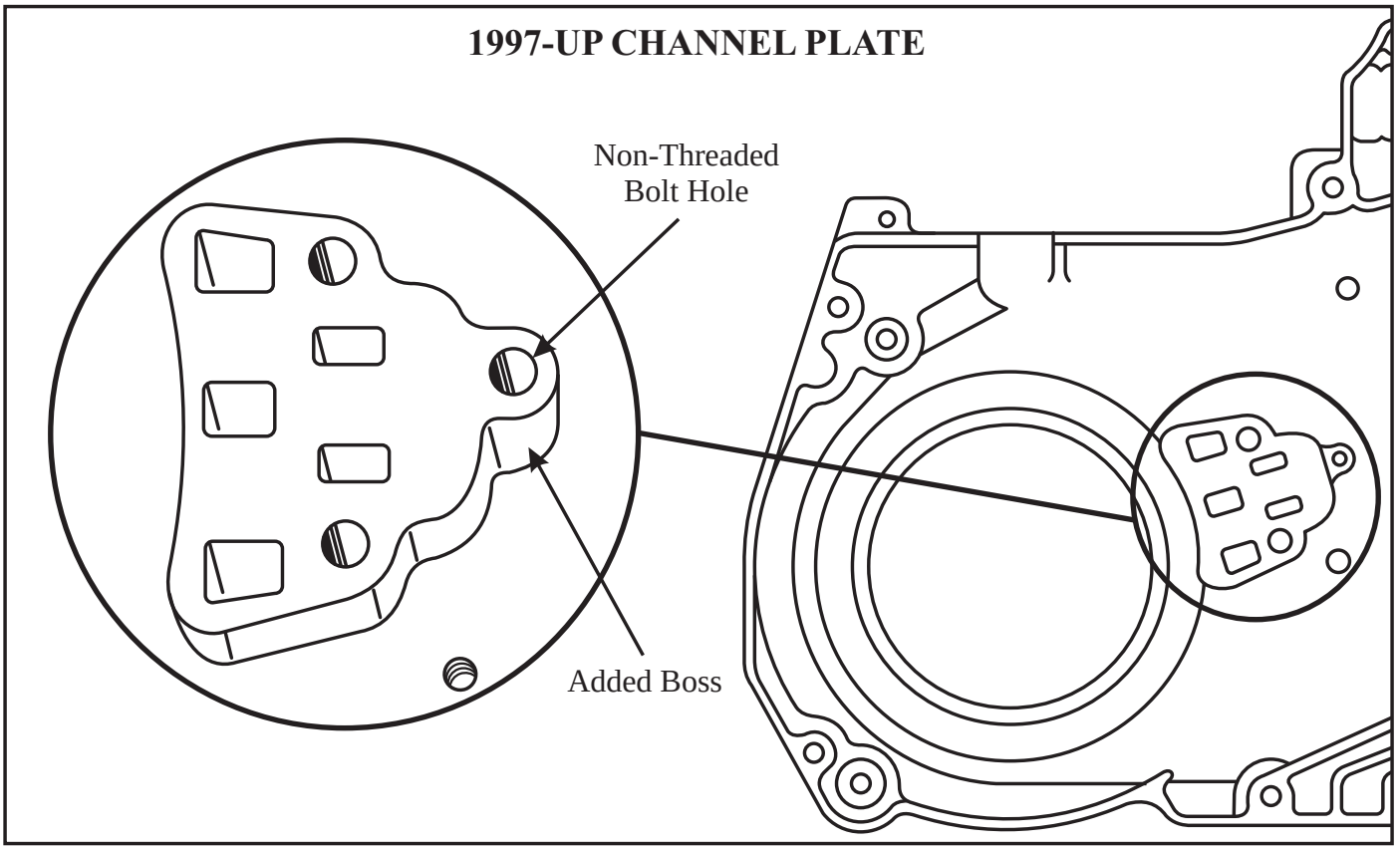
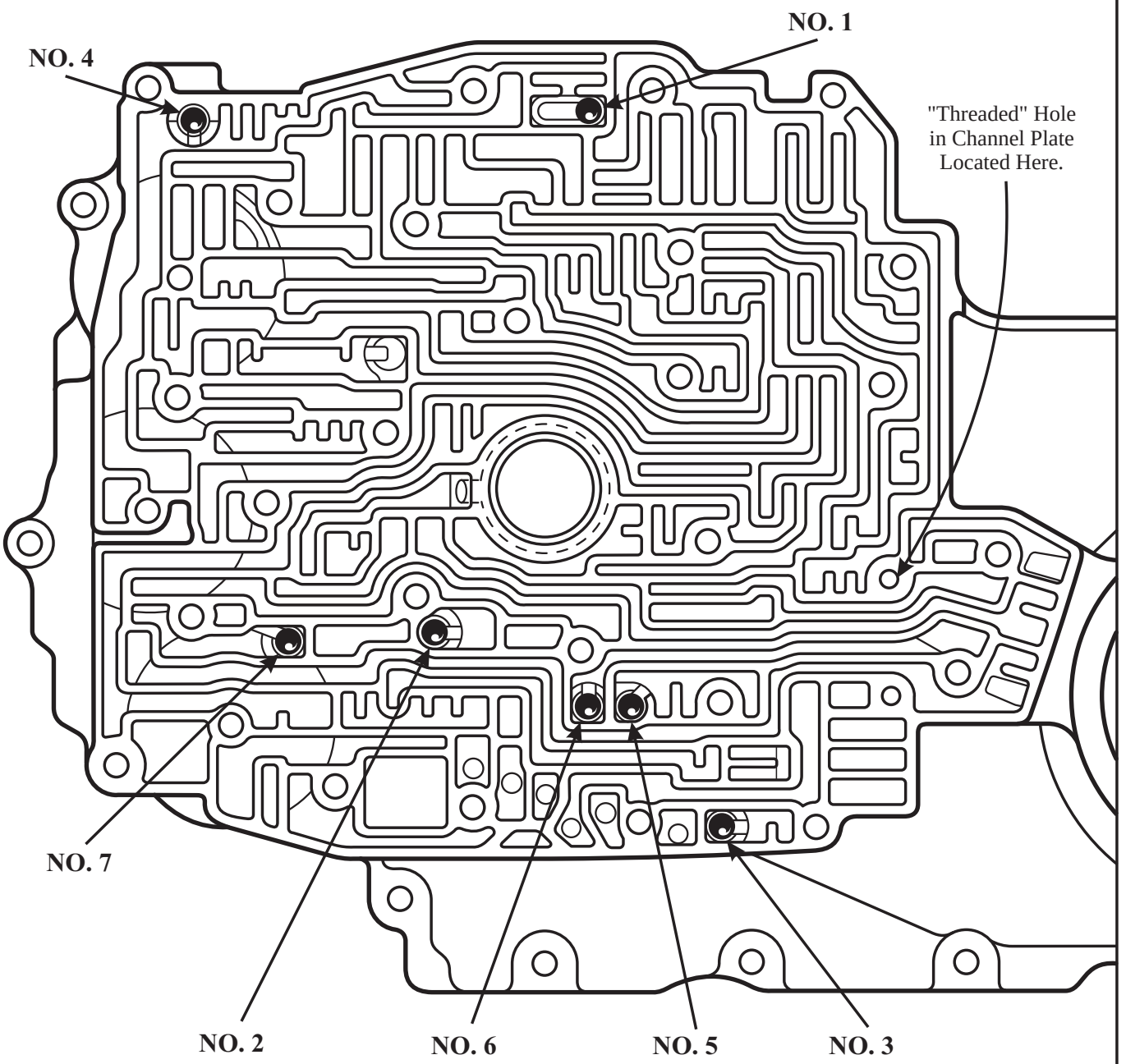


Figure 4

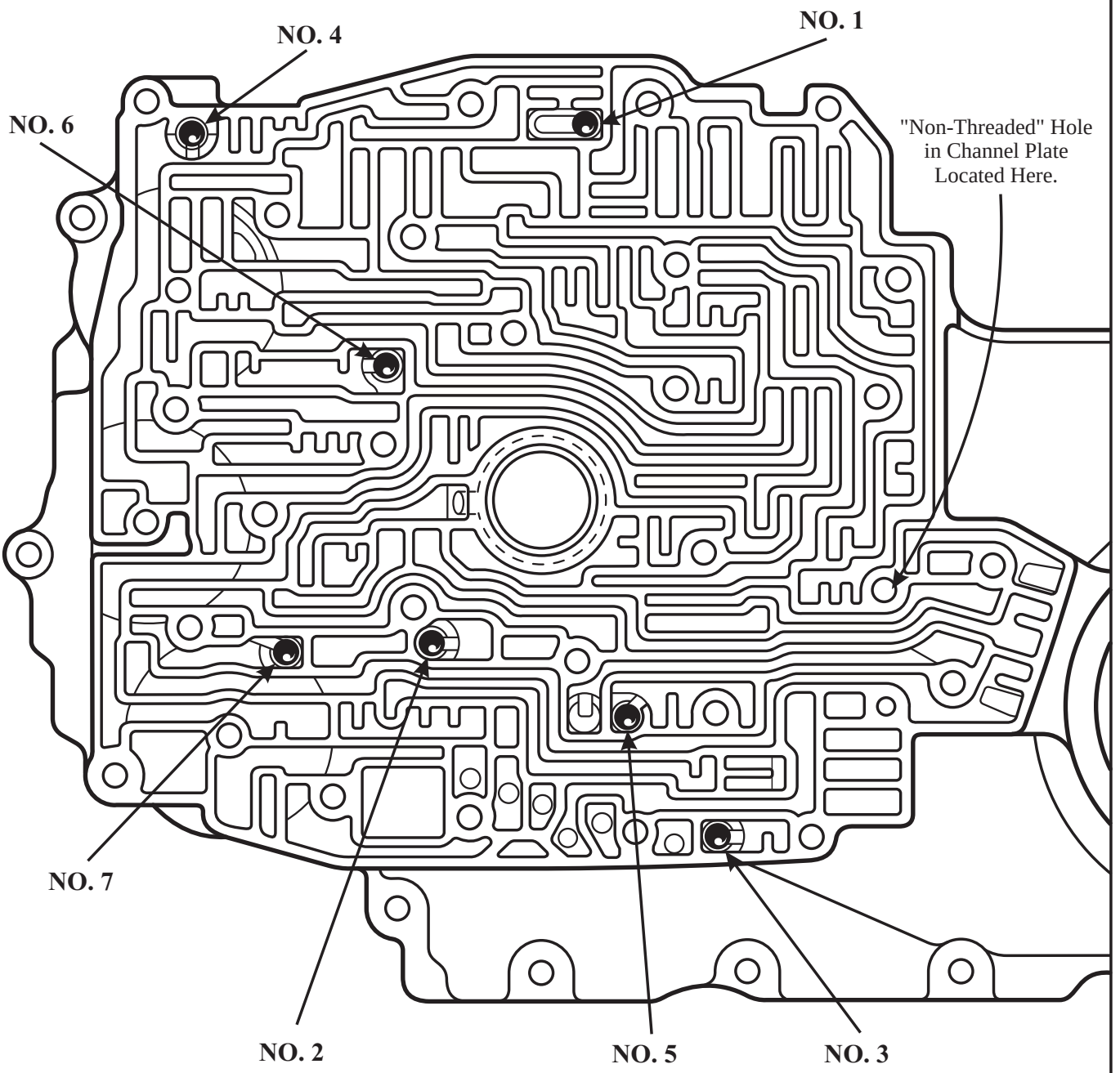
THM 4T40-E *1995-1996 MODELS ONLY*
CHECKBALL LOCATIONS



NO. 1 SEPERATES LO/PRN FLUID CIRCUITS.
NO. 2 FORCES 2-3 DRIVE FLUID THRU ORIFICE #3 TO CONTROL 1-2 SHIFT FEEL.
NO. 3 FORCES INTERMEDIATE BAND APPLY OIL THRU ORIFICE #8 FOR APPLY FEEL.
NO. 4 FORCES ACCUMULATOR OIL THRU ORIFICE #24 TO THE 1-2 ACCUMULATOR.
NO. 5 FORCES 3-4 DRIVE OIL THRU ORIFICE #26 TO CONTROL 2-3 SHIFT FEEL.
NO. 6 FORCES EXHAUSTING DIRECT CLUTCH OIL THRU ORIFICE #25 TO CONTROL RELEASE. OF DIRECT CLUTCH.
NO. 7 FORCES ACCUMULATOR OIL THRU ORIFICE #28 TO THE 3-4 ACCUMULATOR.

Figure 5

THM 4T40-E *1997-UP MODELS ONLY*
CHECKBALL LOCATIONS



NO. 1 SEPERATES LO/PRN FLUID CIRCUITS.
NO. 2 FORCES 2-3 DRIVE FLUID THRU ORIFICE #3 TO CONTROL 1-2 SHIFT FEEL.
NO. 3 FORCES INTERMEDIATE BAND APPLY OIL THRU ORIFICE #8 FOR APPLY FEEL.
NO. 4 FORCES ACCUMULATOR OIL THRU ORIFICE #24 TO THE 1-2 ACCUMULATOR.
NO. 5 FORCES 3-4 DRIVE OIL THRU ORIFICE #26 TO CONTROL 2-3 SHIFT FEEL.
NO. 6 FORCES ACCUMULATOR OIL THRU ORIFICE #27 TO THE 2-3 ACCUMULATOR.
NO. 7 FORCES ACCUMULATOR OIL THRU ORIFICE #28 TO THE 3-4 ACCUMULATOR.

Figure 6

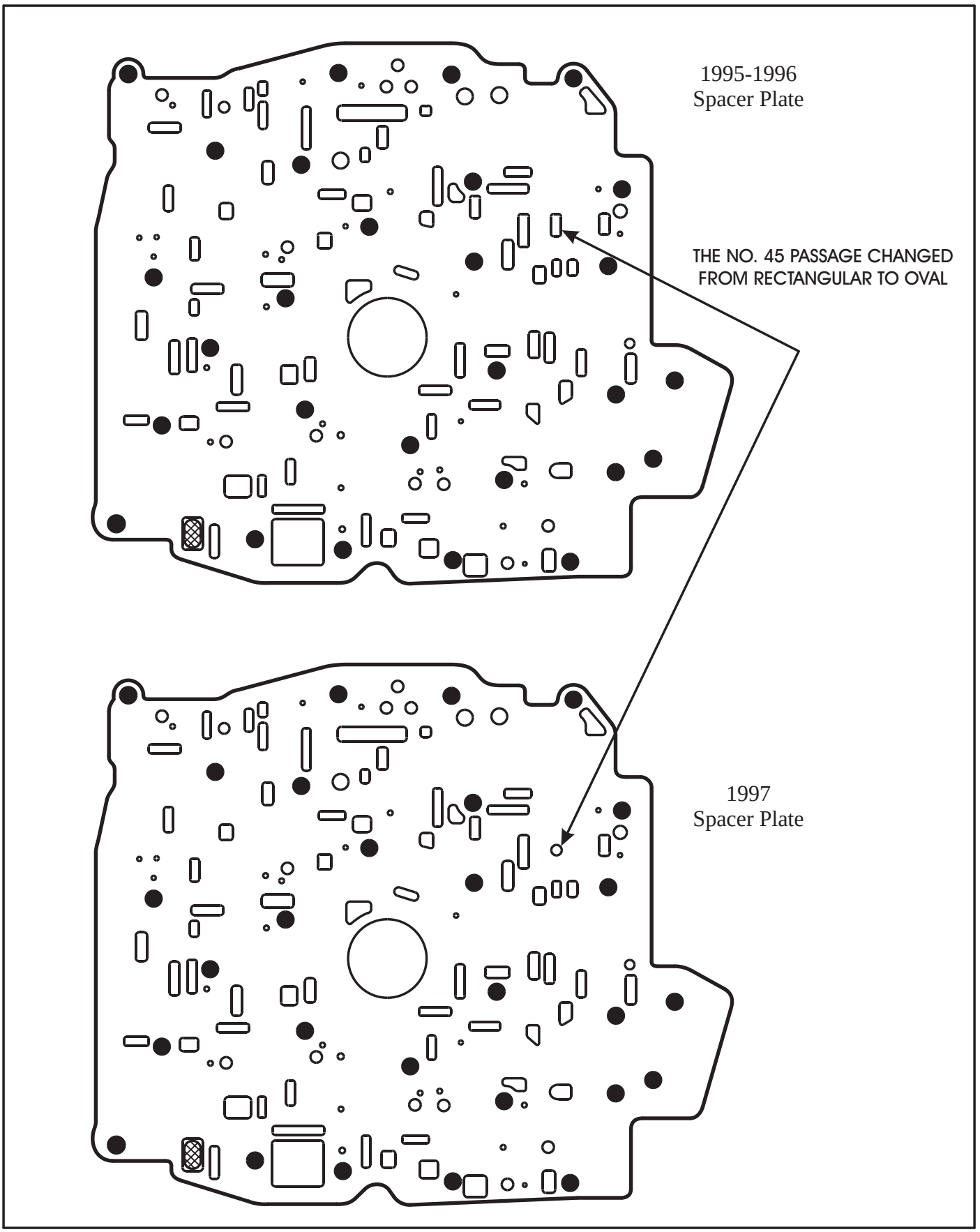

1995-1996
Spacer Plate
THE NO. 45 PASSAGE CHANGED
FROM RECTANGULAR TO OVAL
1997
Spacer Plate

Figure 7

THM 4T40-E *1997-UP MODELS ONLY*
DRIVEN SPROCKET SUPPORT

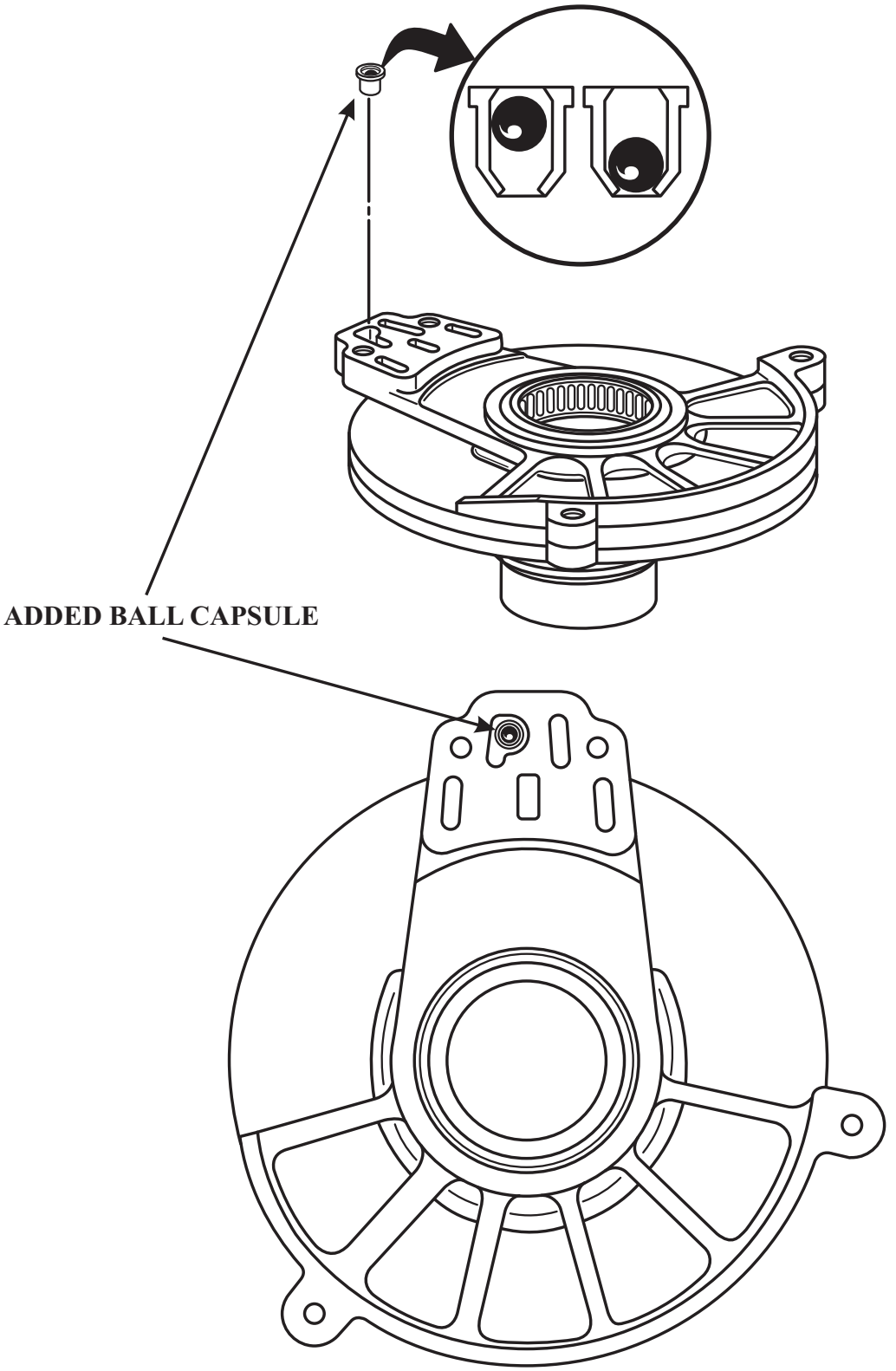


Figure 8

Notes