# THM 4L80-E

# INDEX




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*Updated*
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# INTRODUCTION
# THM 4L80-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, overhaul, or service the THM 4L80-E electronic overdrive automatic transmission. The THM 4L80-E is a fully automatic rear wheel drive transmission. It provides Park, Reverse, Neutral, and four forward speeds with 4th gear being overdrive.

The shift pattern is controlled electronically with two solenoids that recieve a ground signal from the Powertrain Control Module (PCM). The PCM will vary shift points and shift feel, as it is constantly interpreting numerous electronic signals from various operational sensors located on the vehicle. The PCM also controls the Torque Converter Clutch (TCC) apply speed, apply feel, and the release electronically with a solenoid.

Line pressure and shift feel are also controlled electronically with a Pressure Control Solenoid (PCS) located on the valve body. This function is also controlled by the PCM and the numerous electronic signals from the sensors.



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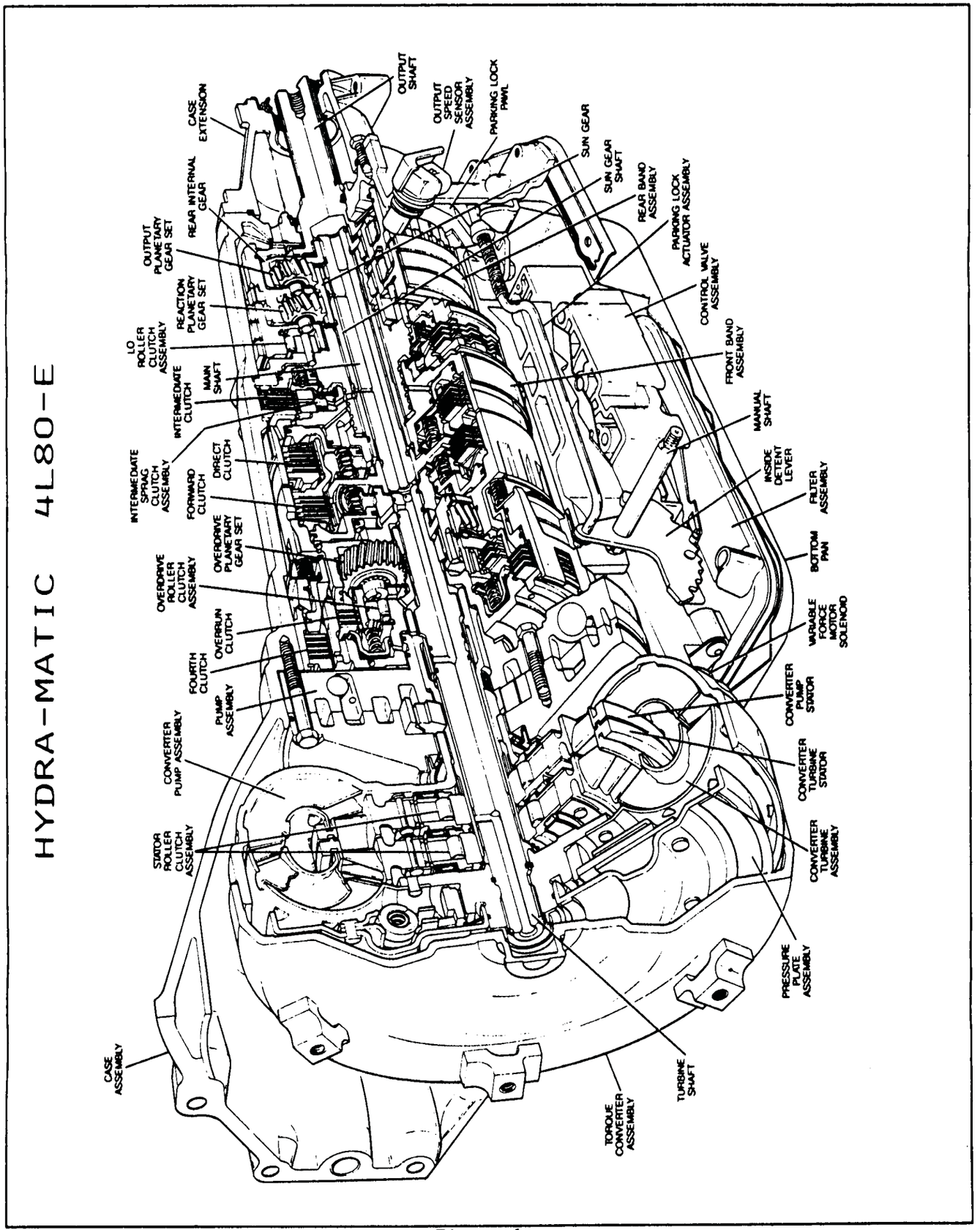
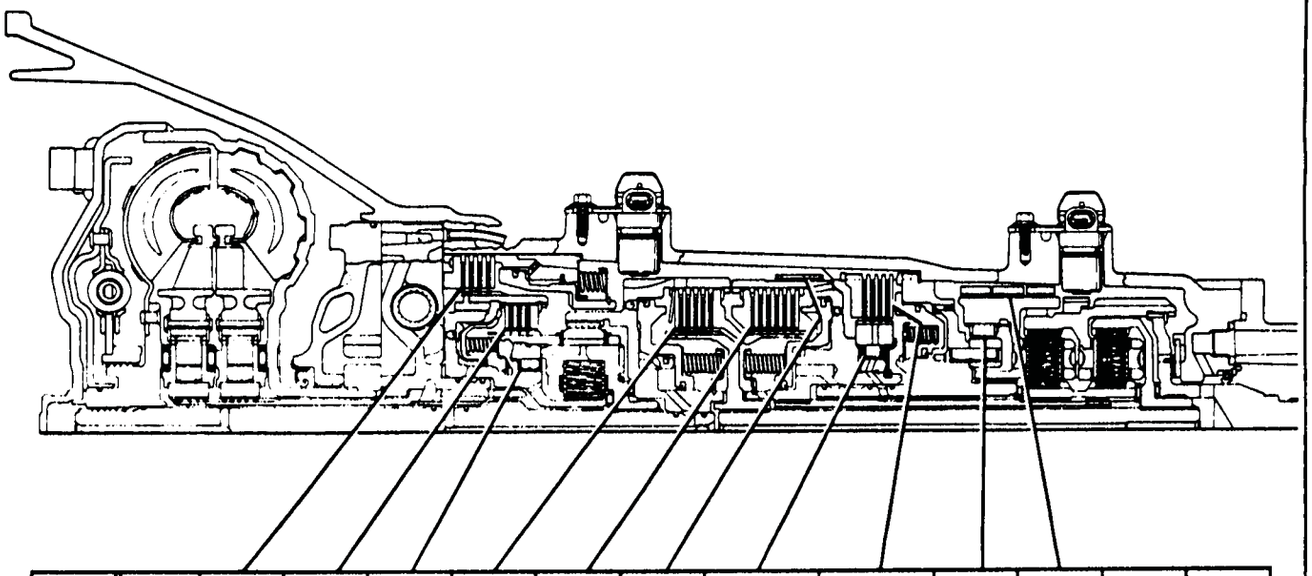



Figure 1

**HYDRA-MATIC 4L80-E GEAR RATIOS**

| | | | |
|---|---|---|---|
| FIRST | 2.48 | FOURTH | .75 |
| SECOND | 1.48 | REVERSE | 2.08 |
| THIRD | 1.00 | | |



| RANGE | GEAR | FOURTH CLUTCH | OVERRUN CLUTCH | OVERDRIVE ROLLER CLUTCH | FORWARD CLUTCH | DIRECT CLUTCH | FRONT BAND | INTERMEDIATE SPRAG CLUTCH | INTERMEDIATE CLUTCH | LO ROLLER CLUTCH | REAR BAND | SOLENOID A | SOLENOID B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-N | | | | | | | | | | | APPLIED | ON | OFF |
| D4 | 1st | | | HOLDING | APPLIED | | | * | | HOLDING | | ON | OFF |
| | 2nd | | | HOLDING | APPLIED | | | HOLDING | APPLIED | | | OFF | OFF |
| | 3rd | | | HOLDING | APPLIED | APPLIED | | | APPLIED | | | OFF | ON |
| | 4th | APPLIED | | | APPLIED | APPLIED | | | APPLIED | | | ON | ON |
| D3 | 1st | | APPLIED | HOLDING | APPLIED | | | * | | HOLDING | | @ ON | @OFF |
| | 2nd | | APPLIED | HOLDING | APPLIED | | | HOLDING | APPLIED | | | @OFF | @OFF |
| | 3rd | | APPLIED | HOLDING | APPLIED | APPLIED | | | APPLIED | | | @OFF | @ ON |
| D2 | 1st | | APPLIED | HOLDING | APPLIED | | | * | | HOLDING | | @ ON | @OFF |
| | 2nd | | APPLIED | HOLDING | APPLIED | | APPLIED | HOLDING | APPLIED | | | @OFF | @OFF |
| D1 | 1st | | APPLIED | HOLDING | APPLIED | | | * | | HOLDING | APPLIED | @ ON | @OFF |
| | 2nd | | APPLIED | HOLDING | APPLIED | | APPLIED | HOLDING | APPLIED | | | @OFF | @OFF |
| R | REVERSE | | | HOLDING | | APPLIED | | | | * | APPLIED | ON | OFF |

*HOLDING BUT NOT EFFECTIVE
ON = SOLENOID ENERGIZED
OFF = SOLENOID DE-ENERGIZED

@ THE SOLENOID'S STATE FOLLOWS A SHIFT PATTERN WHICH DEPENDS UPON VEHICLE SPEED AND THROTTLE POSITION. IT DOES NOT DEPEND UPON THE SELECTED GEAR.

Figure 2

## 1991 HYDRA-MATIC 4L80-E SHIFT SPEED CHART

| | | | 1-2 SHIFT +/- 150 RPM | | | | | 2-3 SHIFT +/- 200 RPM | | | | | 3-4 SHIFT +/- 250 RPM | | | | | 4-3 ±100 RPM | 3-2 ±100 RPM | 2-1 ±100 RPM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MODEL | BODY | TPS | 10 | 20 | 30 | 40 | 50 | 10 | 20 | 30 | 40 | 50 | 10 | 20 | 30 | 40 | 50 | 0 - 10 | 0 - 10 | 0 - 10 |
| | | | | | | | | | | | | | | | | | | | | |
| ABP | P | TRANS RPM | 536 | 682 | 779 | 974 | 1120 | 974 | 1218 | 1461 | 1705 | 1948 | 1705 | 1754 | 1948 | 2094 | 2289 | 1461 | 730 | 341 |
| ACP, ADP | C, K | TRANS RPM | 536 | 682 | 779 | 974 | 1120 | 974 | 1218 | 1364 | 1753 | 1948 | 1705 | 1754 | 1899 | 2240 | 2630 | 1461 | 730 | 341 |
| | | | | | | | | | | | | | | | | | | | | |
| BAP, BBP, BJP, BNP | C, K | TRANS RPM | 512 | 698 | 837 | 930 | 1023 | 930 | 1302 | 1535 | 1674 | 1814 | 1442 | 1721 | 1953 | 2139 | 2511 | 1302 | 744 | 350 |
| BAP, BBP, BJP | R, V, G, P | TRANS RPM | 465 | 558 | 651 | 791 | 884 | 884 | 1070 | 1302 | 1442 | 1628 | 1442 | 1674 | 1907 | 2139 | 2372 | 1302 | 744 | 419 |
| CAP, CBP, CKP | C, K, R, V, G, P | TRANS RPM | 438 | 438 | 536 | 682 | 828 | 828 | 828 | 974 | 1218 | 1510 | 1266 | 1266 | 1412 | 1802 | 2192 | 1120 | 755 | 341 |
| | | | | | | | | | | | | | | | | | | | | |
| DBP, DCP, DDP, DFP, DKP, DLP, DRP | C, K, R, V, G, P | TRANS RPM | 466 | 652 | 885 | 979 | 1072 | 979 | 1351 | 1584 | 1771 | 1957 | 1584 | 1911 | 2237 | 2470 | 2749 | 1305 | 652 | 419 |
| DNP, DPP | P | TRANS RPM | 559 | 699 | 885 | 979 | 1072 | 1025 | 1398 | 1584 | 1771 | 1911 | 1584 | 1957 | 2190 | 2470 | 2656 | 1305 | 652 | 419 |
| | | | | | | | | | | | | | | | | | | | | |

NOTES:

1. ALL SPEEDS GIVEN ARE IN TRANSMISSION OUTPUT SHAFT RPM.
2. SPEEDS ARE BASED ON PERCENT THROTTLE POSITION SENSOR (TPS) DATA.
3. USE A TECH 1™ OR OTHER SCAN TOOL TO MONITOR THIS DATA.

Figure 3

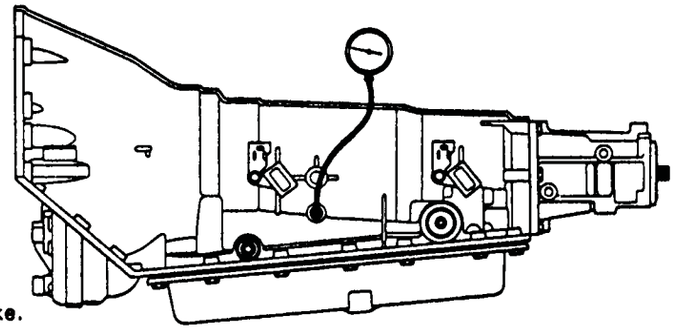
# 1991 HYDRA-MATIC 4L80-E LINE PRESSURE CHECK PROCEDURE

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

| Gear Range | Line Pressure Range |
|---|---|
| Drive, Park or Neutral | 35 - 171 PSI |
| Reverse | 67 - 324 PSI |

Before performing a line pressure check, verify that the force motor is receiving the correct electrical signal from the vehicle computer:

1. Install a scan tool.
2. Start the engine and set parking brake.
3. Check for a stored force motor malfunction code, and other malfunction codes.
4. Repair vehicle if necessary.



**Inspect**

- Fluid level (see Section 7A)
- 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 "override force motor" test on the TECH 1 scan tool.
8. Increase FORCE MOTOR CURRENT 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.

Line pressure will pulse either high or low every ten seconds to keep the force motor plunger free. This is normal and will not harm the transmission.

***NOTICE** Total test running time should not exceed 2 minutes, or transmission 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 force motor in Park and Neutral with the vehicle stopped at idle. This protects the clutches from extremely high or low pressures in Drive or Reverse ranges.

| Force Motor Current (Amp) | Line Pressure (PSI) |
|---|---|
| 0.02 | 157 - 177 |
| 0.10 | 151 - 176 |
| 0.20 | 140 - 172 |
| 0.30 | 137 - 162 |
| 0.40 | 121 - 147 |
| 0.50 | 102 - 131 |
| 0.60 | 88 - 113 |
| 0.70 | 63 - 93 |
| 0.80 | 43 - 73 |
| 0.90 | 37 - 61 |
| 0.98 | 35 - 55 |

Figure 4

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| HIGH LINE PRESSURE | • Pressure Regulator Valve (231) | — Stuck at high torque signal due to undersized bore or sediment. |
| | • Reverse Boost Valve (228) | — Stuck at high torque signal due to undersized bore or sediment. |
| | • Retainer Pin (211) | — Broken. |
| | • Orificed Plug (210) | — Blocked. |
| | • Force Motor (320) | — Failed "off".<br>— Loose connector. |
| | • PCM | — Loose connector. |
| | • Possible Codes<br>— 73 Force Motor Current | |
| FORWARD MOTION IN [N] | • Manual Valve (319) | — Mispositioned or stuck. |
| | • Forward Clutch Springs (607) | — Jammed. |
| | • Forward Clutch Piston (606) | — Jammed. |
| | • Forward Clutch Plates (610, 611) | — Seized or jammed. |
| | • Forward Clutch Housing (602) | — Hole plugged. |
| | • Hub (613) | — Holes plugged. |
| INADEQUATE LUBE AT LOW LINE OR HEAVY VEHICLE LOADS | • Converter Limit Valve (214) | — Stuck closed by sediment or valve bore collapse. |
| | • Retainer Pin (211) | — Broken. |
| INADEQUATE LUBE | • Pressure Regulator Valve (231) | — Stuck in high demand position. |
| | • Pump Body (206) | — Cross channel leakage. |
| | • Gasket (6) | — Damaged. |
| | • Oil Transfer Hole Cup Plug | — Leaking. |
| ENGINE STALL | • TCC System | — TCC stuck on or dragging. |
| LOSS OF POWER | • Transmission | — Low oil.<br>— Not starting in first gear. |
| | • TCC System | — TCC stuck on or dragging. |
| | • Torque Converter (1) | — Debris. |
| | • Stator Shaft (235) | — Broken. |
| | • Turbine Shaft (502) | — Bushing worn. |
| | • Main Shaft (662) | — Bushing worn. |
| | • Output Shaft (671) | — Bushing worn. |
| | • Bearing (668) | — Worn. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 5

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| NO TORQUE IN REVERSE AND THIRD | • Forward Clutch Hub (613) | — Broken. |
| | • Snap Ring (616a) | — Not seated. |
| | • Forward Clutch Housing (602) | — Broken. |
| TRANS OVERHEATS | • TCC Circuit | — Blockage in apply or release. |
| | • TCC Valve Spring (224) | — Broken. |
| | • Pump Cover (206) | — Cross channel leakage. |
| | • Pressure Regulator Valve (231) | — Stuck in high demand position. |
| | • Oil Cooler | — Blocked cooler or cooler lines. |
| | • Gasket (6) | — Damaged. |
| | • Retainer Pin (211) | — Broken. |
| | • Turbine Shaft O-ring (2) | — Damaged. |
| | • Turbine Shaft Seals (503) | — Damaged. |
| | • Stator Shaft Bushing (233) | — Worn or damaged. |
| | • Oil Transfer Hole Cup Plug | — Leaking. |
| | • Fluid | — Low fluid level. |
| | • Radiator | — Restricted air flow. |
| @ WOT | • Converter Limit Valve Bypass Orificed Cup Plug | — Blocked, therefore converter limit valve stuck closed. |
| LOW LINE PRESSURE | • Pump (203) | — Cross channel air leak at body to cover, or body to case gasket. |
| | • Pressure Regulator Valve (231) | — Stuck at low torque signal due to undersized bore or sediment. |
| | • Reverse Boost Valve (228) | — Stuck at low torque signal due to undersized bore or sediment. |
| | • Pump Valve Bores | — Excessive valve clearance due to wear. |
| | • Spring (230) | — Broken. |
| | • Retainer Pin (211) | — Broken. |
| | • Valve Body (301) | — Cross channel leaks.<br>— Cross valve land leaks. |
| | • Gaskets/Spacer Plate | — Damaged or missing. |
| | • Force Motor (320) | — Stuck "on".<br>— Broken clip causing leakage.<br>— Pinched wire to ground.<br>— Screen missing. |
| | • PCM | — Failed. |
| | • Possible Codes<br>— 73 Force Motor Current | |

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Figure 6

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| ENGINE STARTS IN GEAR | • Manual Valve (319) | – Not engaged to detent lever.<br>– Stuck in wrong position. |
| | • Neutral Safety Switch | – Not working. |
| SHIFT LEVER INDICATES WRONG GEAR | • Manual Valve (319) | – Not engaged to detent lever. |
| | • Detent Pin (711) | – Misaligned or broken. |
| | • Manual Shaft (708) | – Flats not parallel. |
| | • Indicator Linkage | – Misadjusted. |
| NO GEAR SELECTIONS | • Detent Lever (711) | – Nut loose or missing. |
| | • Manual Valve (319) | – Stuck. |
| | • Spacer Plate (46) | – Blocked holes. |
| | • Valve Body/Case (301, 7) | – Blocked channels. |
| LOSS OF DRIVE | • Torque Converter (1) | – Broken lug, failed lug welds.<br>– Sheared lug bolts.<br>– Worn turbine shaft splines.<br>– Low oil.<br>– Pump hub cracked, scored or broken.<br>– Internal failure.<br>– Closure weld failure.<br>– Cover cracked at lug weld. |
| | • Pump (203) | – Seized.<br>– Broken pump gears. |
| | • Case Extension Seal (20) | – Missing, damaged or displaced. |
| | • Orifice Plate | – Missing or leaking around edge. |
| | • Gasket (6) | – Damaged. |
| | • Oil Transfer Hole Cup Plug | – Leaking or missing. |
| | • Seals (503) | – Damaged or missing. |
| | • Housing (504) | – Broken. |
| | • Roller Clutch (512) | – Worn, broken or locked. |
| | • Carrier (514) | – Broken. |
| | • Pinions (518) | – Broken free from pilot.<br>– Spalled pins or pinions.<br>– Plugged pinion pin holes.<br>– Worn thrust washers.<br>– Lack of lube. |
| | • Bearing (513) | – Broken. |
| | • Roller Clutch (644) | – Worn, broken or locked.<br>– No lube. |
| | • Turbine Shaft (502) | – Shaft or splines broken. |

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Figure 7

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| LOSS OF DRIVE (Continued) | (Forward Clutch Components) | |
| | • Seals (603, 604, 605) | — Nicked or cut. |
| | • Checkball | — Leaking. |
| | • Piston (606) | — Cracked or jammed. |
| | • Housing (602) | — Cracked. |
| | • Friction Plates (611) | — Burned or splines worn. |
| | • Reaction Plates (610) | — Worn or splines worn. |
| | • Spring Assembly (607) | — Jammed. |
| | • Driving Hub (615) | — Broken. |
| | • Snap Ring (616) | — Not seated. |
| | • Driven Hub (613) | — Gear teeth worn. |
| | (Rear Gearset) | |
| | • Pinions (655) | — Broken or spalled. |
| | • Pinion Pins (656) | — Broken or spalled. |
| | • Needle Bearings (654) | — Broken or spalled. |
| | • Sun Gear (649) | — Broken or spalled. |
| | • Pinion Thrust Washers (652) | — Worn. |
| | • Rear Internal Gear (666) | — Broken or spalled. |
| | • Front Internal Gear (661) | — Broken or spalled. |
| | • Turbine Shaft Ball Seal | — Ineffective. |
| | • Main Shaft (662) | — Shaft or splines broken. |
| | • Fluid Pressure | — Too low. |
| [P] NO PARK | • Detent Lever (711) | — Incomplete travel.<br>— Misaligned. |
| | • Actuator Rod (710) | — Rabbit ears bent, disconnected or broken. |
| | • Detent Spring (41) | — Mispositioned. |
| | • Parking Pawl (703) | — Broken. |
| | • Pawl Shaft (702) | — Broken. |
| | • Park Bracket (713) | — Bent or broken. |
| | • Bolt (714) | — Loose or broken. |
| | • Front Internal Gear (661) | — Splines broken. |
| | • Manual Shaft (708) | — Flats not parallel. |
| REMAINS IN PARK | • Actuator Rod Assembly (710) | — Stretched. |
| DIFFICULT TO SHIFT OUT OF PARK | • Pawl Return Spring (705) | — Weak or broken. |
| | • Vehicle | — Parked on hill. |

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Figure 8

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| WILL NOT STAY IN PARK | • Detent Spring (41) | – Weak or broken. |
| [R] NO REVERSE | • Case (7) | – Rear band anchor pin broken or not positioned. |
| | • Center Support (640) | – Leaking at case or broken. |
| | • Center Support Seal (639) | – Leaking. |
| | • Center Support Bolt (25) | – Loose, broken or feed hole blocked. |
| | • Rear Band (657) | – Broken, worn or not anchored. |
| | • Rear Band Apply Pin (73) | – Too short or binding in case. |
| | • Piston (65) | – Binding in case. |
| | • Seal (66) | – Leaking, damaged or worn. |
| | • Gasket (63) | – Damaged or displaced. |
| | • Cover (62) | – Damaged. |
| | • Bolts (61) | – Broken, loose or missing. |
| | • Checkball | – Missing. |
| | • Fluid Pressure | – Too low. |
| | (Direct Clutch Components) | |
| | • Reaction Plates (618) | – Splines worn. |
| | • Friction Plates (611) | – Splines or friction worn. |
| | • Spring Assembly (607) | – Jammed. |
| | • Housing (623) | – Cracked. |
| | • Piston (619) | – Leaking. |
| | • Seal (620, 621, 622) | – Leaking. |
| | • Ball Check | – Leaking. |
| [D1] NO FIRST GEAR | * See [D4] – No First Gear | |
| | • Housing (504) | – Broken. |
| | • Case (7) | – Rear band anchor pin broken or not positioned. |
| | • Detent Lever (711) | – Misaligned. |
| NO SECOND GEAR | * See [D4] – No Second Gear | |
| NO OVERRUN BRAKING | * See [D3] – No Overrun Braking | |
| | • Possible Codes<br>– 28 PSM<br>– 68 Overdrive Ratio<br>– 85 Undefined Ratio | |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 9

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| NO OVERRUN BRAKING (Continued) | • Pressure Switch Manifold (40) | – Pinched wire.<br>– Loose connector.<br>– Loose bolt causing leakage.<br>– No signal to PCM. |
| NO ENGINE BRAKING | • Rear Band (657) | – Damaged, worn or not anchored. |
| | • Rear Band Apply Pin (73) | – Too short or binding in case. |
| | • Piston (65) | – Binding in case. |
| | • Seal (66) | – Worn or damaged. |
| | • Cover (62) | – Damaged. |
| | • Gasket (63) | – Damaged or missing. |
| | • Bolt (61) | – Loose, broken or missing. |
| | • Checkball | – Missing, damaged, not sealing or mis-sized. |
| | • Fluid Pressure | – Too low. |
| | • Output Shaft (671) | – Shaft or splines broken. |
| | • Main Shaft (662) | – Shaft or splines broken. |
| | • Thrust Washer (218) | – Worn or damaged. |
| | • Bushing (234) | – Worn or damaged. |
| D2<br>NO FIRST GEAR | * See D4 – No First Gear | |
| | • Front Band (628) | – Stuck on. |
| NO SECOND GEAR | * See D4 – No Second Gear | |
| | • Case (7) | – Front band anchor pin broken or not properly positioned.<br>– Intermediate clutch feed cup plug missing or not seated. |
| NO OVERRUN BRAKING | * See D3 – No Overrun Braking | |
| NO ENGINE BRAKING | • Bushing (234) | – Worn or damaged. |
| | • Thrust Washer (218) | – Worn or damaged. |
| | • Rear Gearset | – Spalled or broken. |
| | • Reaction Drum & Carrier (651) | – Broken. |
| | • Main Shaft (662) | – Shaft or splines broken. |
| | • Output Shaft (671) | – Shaft or splines broken. |
| | • Sun Gear Shaft (649) | – Shaft or splines broken. |
| NO SECOND GEAR ENGINE BRAKING | • Fluid Pressure | – Too low. |
| | • Direct Clutch Housing (623) | – Internal diameter splines worn.<br>– Outer band surface worn. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 10

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| NO SECOND GEAR ENGINE BRAKING (Continued) | • Front Band (628) | – Broken, worn or not anchored. |
| | • Apply Pin (55) | – Too short or binding in case. |
| | • Apply Clip (56) | – Broken or missing. |
| | • Piston (58) | – Cracked, broken or binding. |
| | • Seal (57) | – Damaged or worn. |
| | • Case (7) | – Cracked or damaged. |
| | • Spacer Plate (46) | – Damaged. |
| | • Gasket (48) | – Torn or pinched. |
| | • Valve Body Bolts (35) | – Loose, broken or missing. |
| D3 NO FIRST GEAR | * See D4 – No First Gear | |
| | • Front Band (628) | – Stuck on. |
| NO SECOND GEAR | * See D4 – No Second Gear | |
| NO THIRD GEAR | * See D4 – No Third Gear | |
| | • Front Band (628) | – Stuck on. |
| NO OVERRUN BRAKING | • Clutch Plates (508, 509) | – Splines or plate wear. |
| | • Thrust Washer (218) | – Damaged or worn. |
| | • Output Shaft (671) | – Shaft or splines broken. |
| | • Seals | – Cut or nicked. |
| | • Checkball | – Leaking. |
| | • Piston (505) | – Jammed, cracked or damaged. |
| | • Housing (504) | – Cracked or damaged. |
| | • Sun Gear (650) | – Worn. |
| | • Spring Assembly (506) | – Jammed. |
| | • Oil Feed | – Plugged. |
| NO ENGINE BRAKING | • Main Shaft (662) | – Shaft or splines broken. |
| | • Bushing (234) | – Damaged or worn. |
| D4 NO FIRST GEAR | • Low Roller Assembly (644) | – Not attached or race broken. |
| | • Center Support (640) | – Support or splines broken. |
| | • Case (7) | – Damage near center support. |
| | • Snap Rings (633, 643) | – Not seated. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 11

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| FIRST GEAR ONLY | • Sun Gear Shaft (649) | – Shaft or splines broken. |
| | • Output Speed Sensor (22) | – Reads zero. |
| | • Input Speed Sensor (22) | – Reads zero. |
| FIRST AND SECOND GEAR ONLY | • Solenoid B (311) | – Stuck "off".<br>– Loose connector.<br>– No voltage to solenoid.<br>– Solenoid o-ring failure.<br>– no PCM signal to solenoid. |
| | • 2-3 Shift Valve (312) | – Stuck |
| | • Quad Driver Module | – Failed. |
| | • Possible Codes<br>– 68 Overdrive Ratio<br>– 81 QDM & Solenoid B Fault<br>– 85 Undefined Ratio<br>– 87 Solenoid B Stuck Off | |
| SECOND GEAR ONLY | • Possible Codes<br>– 24 Output Speed<br>– 53 System Voltage High<br>– 75 System Voltage Low<br>– 81 QDM & Solenoid B | |
| SECOND AND THIRD GEAR ONLY | • Solenoid A (313) | – Stuck "off".<br>– No voltage to solenoid.<br>– Loose connector.<br>– Solenoid o-ring failed.<br>– No PCM signal to solenoid. |
| | • 1-2 Shift Valve (314) | – Stuck. |
| | • Quad Driver Module | – Failed. |
| | • Possible Codes<br>– 68 Overdrive Ratio<br>– 82 QDM & Solenoid A Fault<br>– 85 Undefined Ratio | |
| FIRST AND FOURTH GEAR ONLY (Second And Third Gear Available In D3 And D2) | • Solenoid A (313) | – Stuck "on".<br>– Pinched wire to ground. |
| | • 1-2 Shift Valve (314) | – Stuck. |
| | • Quad Driver Module | – Failed. |
| | • Possible Codes<br>– 68 Overdrive Ratio<br>– 82 QDM and Solenoid A Fault<br>– 85 Undefined Ratio | |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 12

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| THIRD AND FOURTH GEAR ONLY (Second Gear Available In D3 And D2) | • Solenoid B (311) | – Stuck "on".<br>– Pinched wire to ground. |
| | • 2-3 Shift Valve (312) | – Stuck. |
| | • Quad Driver Module | – Failed. |
| | • Possible Codes<br>– 81 QDM and Solenoid B Fault<br>– 85 Undefined Ratio<br>– 86 Solenoid B Stuck On | |
| NO SECOND GEAR | • Case (7) | – Intermediate clutch feed cup plug missing or not seated. |
| | (Intermediate Clutch Components) | |
| | • Backing Plate (630) | – Broken. |
| | • Snap Ring (633) | – Missing or not seated. |
| | • Friction Plates (631) | – Worn. |
| | • Outer Race (625) | – Splines worn. |
| | • Center Support (640) | – Cracked or oil feed hole blocked. |
| | • Center Support Bolt (25) | – Broken or loose.<br>– Oil hole blocked. |
| | • Seals (637, 638) | – Worn. |
| | • Piston (636) | – Cracked or jammed. |
| | • Springs (635) | – Jammed. |
| | • Transmission Fluid | – Improper fluid.<br>– Additive package. |
| | • Intermediate Sprag (624) | – Outer race splines worn.<br>– Outer race broken.<br>– Splines or inner race worn. |
| | • Direct Clutch Housing (623) | – Broken. |
| | • Snap Ring (627) | – Missing or not seated. |
| NO THIRD GEAR | (Direct Clutch Components) | |
| | • Seal (620, 621, 622) | – Leaking. |
| | • Ball Check | – Leaking. |
| | • Piston (619) | – Cracked or jammed. |
| | • Housing (623) | – Cracked. |
| | • Reaction Plates (618) | – Splines worn. |
| | • Friction Plates (611) | – Splines or friction worn. |
| | • Spring Assembly (607) | – Jammed. |
| | • Center Support Seal (639) | – Leaking at case. |
| | • Center Support (640) | – Broken or leaking at case. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 13

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| NO THIRD GEAR (Continued) | (Direct Clutch Components) | |
| | • Center Support Bolt (25) | – Loose or broken.<br>– Hole blocked. |
| | • Solenoid B (311) | – Stuck "off".<br>– Pinched wire.<br>– O-ring failure.<br>– No voltage to solenoid. |
| | • 2-3 Shift Valve (312) | – Stuck. |
| | • PCM | – No signal to solenoid. |
| | • Quad Driver Module | – Failed. |
| | • Possible Codes<br>– 81 QDM and Solenoid B Fault<br>– 85 Undefined Ratio<br>– 87 Solenoid B Stuck Off | |
| NO FOURTH GEAR | (Fourth Clutch Components) | |
| | • Seals (527, 531) | – Nicked or cut. |
| | • Cup Plug (530) | – Missing. |
| | • Bolt (26) | – Loose, broken or missing. |
| | • Piston (528) | – Jammed. |
| | • Spring Assembly (532) | – Jammed. |
| | • Snap Ring (523) | – Not seated. |
| | • Friction Plates (525) | – Worn or burned. |
| | • Reaction Plates (526) | – Splines worn. |
| | • Housing (529) | – Damaged or cracked. |
| | (Overrun Clutch Components) | |
| | • Housing (504) | – Broken. |
| | • Reaction Plates (508) | – Splines worn. |
| | • Sun Gear (650) | – Worn. |
| | • Solenoid B (311) | – Stuck "off".<br>– Pinched wire.<br>– O-ring failure.<br>– No voltage to solenoid. |
| | • 2-3 Shift Valve (312) | – Stuck. |
| | • PCM | – No signal to solenoid. |
| | • Quad Driver Module | – Failed. |
| | • Possible Codes<br>– 21 TPS High<br>– 22 TPS Low<br>– 28 Pressure Switch Manifold<br>– 68 Overdrive Ratio<br>– 75 System Voltage Low<br>– 81 QDM and Solenoid B | |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 14

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| NO TCC | • TCC Solenoid (323) | — Stuck off.<br>— O-ring failed.<br>— No voltage to solenoid.<br>— Poor connection. |
| | • Quad Driver Module | — Failed. |
| | • PCM | — No signal to solenoid. |
| | • Brake Switch | — Contact corroded.<br>— Poor connection.<br>— Pinched wire.<br>— Misadjusted.<br>— No supply voltage. |
| | • TCC Valve (223) | — Stuck off due to sediment or undersized bore. |
| | • Retainer Pin (211) | — Broken. |
| | • Torque Converter (1) | — Ballooning. |
| | • Turbine Shaft (502) | — Plugged oil holes. |
| | • Turbine Shaft Seals (501) | — Ineffective. |
| | • Pump Body Bushing (202) | — Worn. |
| | • O-ring (2) | — Heat set. |
| | • Oil Transfer Hole Cup Plug | — Leaking. |
| | • Regulated Apply Valve (324) | — Stuck. |
| | • TCC Valve Release Exhaust Orificed Cup Plug | — Blocked. |
| | • Possible Codes<br>— 21 TPS High<br>— 22 TPS Low<br>— 28 Pressure Switch Manifold<br>— 37 Brake Switch Stuck On<br>— 39 TCC Stuck Off<br>— 53 System Voltage High<br>— 68 Overdrive Ratio<br>— 75 System Voltage Low<br>— 81 QDM and Solenoid B<br>— 83 QDM and TCC Solenoid<br>* See Incorrect TCC Apply Or Release | |
| SOFT TCC APPLY | • Turbine Shaft Seals (501) | — Ineffective. |
| | • Pump Body Bushing (202) | — Worn. |
| | • O-ring (2) | — Heat set. |
| | • Oil Transfer Hole Cup Plug | — Leaking. |
| | • TCC Solenoid (323) | — Malfunction. |
| | • Fluid | — Low pressure. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 15

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| SLIPPING TCC | • TCC Valve Release Exhaust Orificed Cup Plug | – Blocked. |
| | • Turbine Shaft Seal | – Cut. |
| TCC STUCK ON | • Gasket (6) | – Damaged. |
| | • TCC Solenoid (323) | – Stuck on.<br>– Pinched wire to ground. |
| | • TCC Apply Valve (324) | – Stuck. |
| | • Quad Driver Module | – Failed. |
| | • Possible Codes<br>– 83 QDM And TCC Solenoid | |
| | * See Incorrect TCC Apply Or Release | |
| INCORRECT TCC APPLY OR RELEASE | • Output Speed Sensor (22) | – Poor connection.<br>– Pinched wire.<br>– Coil wire broken.<br>– Incorrect air gap.<br>– Inadequate signal. |
| | • Throttle Position Sensor | – Poor connection.<br>– Pinched wire.<br>– Incorrect resistance. |
| | • PCM | – Failed. |
| | • Pressure Switch Manifold (40) | – Poor connection.<br>– No signal to PCM.<br>– Pinched wire. |
| | • Transmission Temperature Sensor (332) | – Poor connection.<br>– No signal to PCM.<br>– Incorrect resistance.<br>– Pinched wire. |
| | • Engine Coolant Temperature Sensor | – Poor connection.<br>– No signal to PCM.<br>– Incorrect resistance.<br>– Pinched wire. |
| | • Brake Switch | – Poor connection.<br>– Pinched wire.<br>– No voltage supply.<br>– Misadjusted. |
| | • Possible Codes<br>– 14 Engine Temperature Sensor High<br>– 15 Engine Temperature Sensor Low<br>– 21 Throttle Position Sensor High | |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 16

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| INCORRECT TCC APPLY OR RELEASE (Continued) | • Possible Codes (Cont.)<br>– 22 Throttle Position Sensor Low<br>– 24 Output Speed Sensor<br>– 28 Pressure Switch Manifold<br>– 58 Transmission Temperature Sensor High<br>– 59 Transmission Temperature Sensor Low<br>– 68 Overdrive Ratio | |
| Only 2WD | • Digital Ratio Adapter (DRAC) | – Malfunction.<br>– Incorrect. |
| CONVERTER BALLOONING | • Converter Limit Valve (214) | – Stuck open due to sediment or undersized bore. |
| @ High Speeds | • Converter Limit Valve Feedback Orificed Cup Plug | – Blocked. |
| NO TORQUE MULTIPLICATION | • Stator Shaft (235) | – Broken or detached from pump cover. |
| FLUID FOAMING | • Fluid | – Contaminated (antifreeze).<br>– Transmission overfilled. |
| | • Engine | – Overheated. |
| | • Filter (31) | – Cracked or not seated. |
| | • Seal (32) | – Damaged or not seated. |
| | • Vehicle | – Overloaded. |
| NOISE | • Torque Converter (1) | – Loose lug bolts.<br>– Out of balance.<br>– Internal failure. |
| | • Transmission/Engine | – Misaligned. |
| | • Case Extension (19) | – Output shaft support bushing worn. |
| VIBRATION | • Torque Converter (1) | – Out of balance.<br>– Internal failure. |
| | • Transmission/Engine | – Misaligned. |
| | • Case Extension (19) | – Output shaft support bushing worn. |
| | • Turbine Shaft (502) | – Worn stator shaft bushing surface. |
| | • Main Shaft (662) | – Worn bushing. |
| | • Output Shaft (671) | – Worn bushing. |
| | • Bearing (668) | – Worn. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 17

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| ENGINE STALL | • Forward Clutch Housing (602) | — Seized bearing if holes plugged. |
| | (Fourth Clutch Components)<br>• Plates (525, 526) | — Seized or jammed. |
| | • Piston (528) | — Jammed. |
| | • Spring Assembly (532) | — Jammed. |
| | (Overrun Clutch Components)<br>• Plates (508, 509) | — Seized or jammed. |
| | • Piston (505) | — Jammed. |
| | • Spring Assembly (506) | — Jammed. |
| OIL OUT BREATHER TUBE | • Pump Cover (206) | — Cross channel leakage can pressurize vent area. |
| | • Fluid | — Foaming and filling pump vent ports.<br>— Transmission overfilled. |
| | • Transmission | — Overheated. |
| NO TORQUE IN SECOND GEAR | • Intermediate Sprag (624) | — Worn.<br>— Excessive eccentricity.<br>— Sprag rolled over or damaged. |
| SECOND GEAR STARTS | • Intermediate Clutch Plates (631, 632) | — Seized. |
| | • Direct Clutch Lube Feed | — Blocked. |
| | • Center Support Springs (635) | — Jammed. |
| | • Center Support Piston (636) | — Jammed. |
| | • Solenoid A (313) | — Stuck "off".<br>— O-ring failed.<br>— No voltage to solenoid.<br>— Poor connection. |
| | • PCM | — To PCM signal to solenoid. |
| | • Quad Driver Module | — Failed. |
| | • 1-2 Shift Valve (314) | — Stuck. |
| | • Possible Codes<br>— 82 QDM and Solenoid A | |
| THIRD GEAR STARTS | (Forward Clutch Components)<br>• Driving Hub (615) | — Holes plugged. |
| | • Plates (610, 611) | — Seized. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 18

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| THIRD GEAR STARTS (Continued) | (Direct Clutch Components) | |
| | • Plates (611, 618) | — Seized. |
| | • Piston (619) | — Jammed. |
| | • Spring Assembly (607) | — Jammed. |
| | • Lube Feed Hole | — Blocked. |
| FOURTH GEAR STARTS | • Solenoid B | — Stuck "on".<br>— Pinched wire to ground. |
| | • Possible Codes<br>— 86 Solenoid B Stuck On | |
| ERRATIC SHIFT QUALITY | • Gasket (6) | — Damaged. |
| | • Oil Transfer Hole Cup Plug | — Leaking. |
| | • Oil Seal Rings (219) | — Damaged. |
| TRANSMISSION SLIPS | • Fluid Level | — Too high or low. |
| TRANSMISSION SEIZED | (Rear Lube Components) | |
| | • Cooler Circuit | — Blocked or leaking. |
| | • Spacer Plate/Gasket | — Hole missing. |
| | • Lube Pipe (39) | — Poor seal.<br>— Damaged.<br>— Missing clips. |
| | • Valve Body (301) | — Loose, broken or missing bolts. |
| | • Filter (Inline) | — Blocked. |
| | • Output Shaft Seal (20) | — Missing or damaged.<br>— Lube holes missing or blocked. |
| | • Main Shaft (662) | — Lube holes missing or blocked. |
| | • Center Support (640) | — Lube hole missing or blocked. |
| | • Apply Pin (55) | — Too long.<br>— Binding in case. |
| | • Piston (58) | — Binding in case. |
| | • Center Support (640) | — Not held. |
| | • Snap Ring (643) | — Not seated. |
| | • Sun Gear Shaft (649) | — Bearing surface worn.<br>— Lube hole blocked. |
| | • Rear Gearset | — Bearing surface worn. |
| | • Main Shaft (662) | — Lube holes plugged. |
| In 2nd, 3rd And 4th | • Rear Band (657) | — Locked on. |
| | • Rear Servo Pin (73) | — Too long or binding in case. |
| | • Piston (65) | — Binding in case. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 19

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| CASE EXTENSION BEARING/SEAL FAILED | • Orifice Plate | – Missing or blocked hole. |
| | • Case Extension (19) | – Lube passages blocked or missing. |
| INACCURATE SHIFT POINTS | • Output Speed Sensor (22) | – Pinched or broken wire.<br>– Loose connector.<br>– Air gap incorrect.<br>– Inadequate signal.<br>– Coil damaged.<br>– Damaged rotor teeth.<br>– Loose connection. |
| | • Throttle Position Sensor | – Pinched or damaged wire.<br>– Incorrect resistance.<br>– Loose connector.<br>– PCM malfunction. |
| | • Pressure Switch Manifold | – Loose connector.<br>– Loose bolts causing leakage.<br>– Pinched wire.<br>– No signal to PCM. |
| | • Possible Codes<br>– 21 Throttle Position Sensor High<br>– 22 Throttle Position Sensor Low<br>– 24 Output Speed Sensor<br>– 28 Pressure Switch Manifold<br>– 85 Undefined Ratio | |
| | • Axle Ratio | – Incorrect or changed from original. |
| | • Tire Size | – Incorrect or changed from original. |
| Only 2WD | • Digital Ratio Adapter (DRAC) | – Incorrect.<br>– Malfunction. |
| HARSH SHIFT | • Line Pressure | – Too high.<br>– Too low. |
| | • Force Motor (320) | – Failed "off".<br>– Loose connector. |
| | • PCM | – Loose connector. |
| | • Accumulator Piston | – Leaking.<br>– Stuck. |
| | • Accumulator Spring | – Incorrect. |
| | • Checkballs | – Missing. |
| | • Calibration PROM | – Incorrect. |
| | • Possible Codes<br>– 21 TPS High<br>– 22 TPS Low<br>– 24 Output Speed | |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 20

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| HARSH SHIFT (Continued) | • Possible Codes (Cont.)<br>– 28 Pressure Switch Manifold<br>– 53 System Voltage High<br>– 68 Overdrive Ratio<br>– 73 Force Motor Current<br>– 75 System Voltage Low<br>– 81 QDM And Solenoid B<br>– 85 Undefined Ratio | |
| D To R | • Direct Lube Exhaust | – Blocked. |
| | • Forward Clutch Spring (607) | – Not acting. |
| | • Snap Ring (616) | – Not seated. |
| | • Checkball | – Plugged. |
| 3-4 | • Spring Assembly (532) | – Not compressing evenly. |
| | • Air Bleed | – Plugged. |
| | • Bolt (26) | – Oil feed hole plugged. |
| 4-3 | • Snap Ring (533) | – Not seated. |
| | • Spring Assembly (532) | – Not acting. |
| | • Bolt (26) | – Oil feed hole plugged. |
| | • Cup Plug (530) | – Plugged. |
| | • Direct Lube Exhaust | – Blocked. |
| D4 To D3, D2 Or D1 | • Spring Assembly (506) | – Not functioning. |
| | • Checkball | – Plugged. |
| | • Snap Ring (511) | – Not seated. |
| SOFT SHIFT | • Line Pressure | – Too low. |
| | • Force Motor (320) | – Stuck "on".<br>– Broken clip causing leakage.<br>– Pinched wire to ground. |
| | • PCM | – Failed. |
| | • Accumulator Piston | – Leaking.<br>– Stuck. |
| | • Accumulator Spring | – Incorrect. |
| | • Calibration PROM | – Incorrect. |
| | • Possible Codes<br>– 73 Force Motor Current | |
| Into R | • Direct Clutch Oil Feed | – Plugged. |
| | • Direct Lube Exhaust | – Blocked. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 21

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| SOFT SHIFT (Continued) | | |
| R To D | • Direct Clutch Spring (607) | – Not acting. |
| | • Snap Ring (616b) | – Not engaged or missing. |
| | • Ball Check | – Plugged. |
| 2-1 | • Center Support Springs (635) | – Not acting. |
| | • Snap Ring (634) | – Not seated. |
| | • Center Support (640) | – Air bleed blocked. |
| 2-3 | • Direct Clutch Oil Feed | – Plugged. |
| | • Direct Lube Exhaust | – Blocked. |
| 3-2 | • Direct Spring Assembly (607) | – Not acting. |
| | • Snap Ring (608) | – Not engaged or missing. |
| | • Ball Check | – Plugged. |
| D3 To D2 | • Ball Check | – Missing. |
| | • Orifices | – Incorrect Sizes. |
| DELAYED 1-2 SHIFT | • Output Speed Sensor (22) | – Pinched or broken wire.<br>– Loose connector.<br>– Air gap incorrect.<br>– Inadequate signal.<br>– Coil damage. |
| | • Input Speed Sensor (22) | – Pinched or damaged wire.<br>– Coil damage.<br>– Inadequate signal. |
| | • Pressure Switch Manifold (40) | – Loose connector.<br>– Pinched wire.<br>– No signal to PCM.<br>– Loose bolts causing leakage. |
| | • Calibration PROM | – Incorrect. |
| | • Possible Codes<br>– 24 Output Speed Sensor<br>– 28 Pressure Switch Manifold<br>– 85 Undefined Ratio | |
| Only 2WD | • Digital Ratio Adapter (DRAC) | – Malfunction.<br>– Loose connector. |
| NO D2 TO D1 | • Rear Band (657) | – Broken, worn or not anchored. |
| | • Detent Lever (711) | – Incomplete travel. |
| NO D3 TO D2 | • Front Band (628) | – Broken, worn or not anchored. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 22

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| LEAKS AT: OIL PAN | • Oil Pan (28) | – Damaged or not flat. |
| | • Gasket (29) | – Damaged. |
| | • Case (7) | – Porosity or cracked. |
| | • Bolt (27) | – Flange inside out.<br>– High or low torque. |
| FLUID FILL TUBE | • Seal | – Cut or nicked.<br>– Missing. |
| | • Case (7) | – Porosity. |
| | • Fill Tube | – Damaged at case end.<br>– Not seated in case. |
| | • Brackets | – Out of position causing tension on fill tube. |
| ELECTRICAL CONNECTOR | • Electrical Connector | – Damaged or not seated. |
| | • O-ring Seal | – Cut or nicked.<br>– Missing. |
| | • Case (7) | – Porosity or cracked. |
| COOLER CONNECTORS | • Cooler Connectors (8) | – Stripped threads.<br>– Damaged flare.<br>– High or low torque. |
| | • Case (7) | – Stripped threads.<br>– Porosity.<br>– Debris in threads. |
| CASE EXTENSION | • Case Extension (19) | – Porosity or cracked. |
| | • Case (7) | – Porosity or cracked. |
| | • Seal (15) | – Cut or nicked.<br>– Missing. |
| | • Bolt (21) | – Low torque.<br>– Missing. |
| MANUAL SHAFT | • Seal (707) | – Cut or nicked.<br>– Not seated. |
| | • Linkage | – Misadjusted. |
| PUMP BODY SEAL | • Seal (201) | – Cut, nicked or worn.<br>– Missing garter spring. |
| | • Torque Converter (1) | – Damaged hub. |
| | • Bolt | – Low torque. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

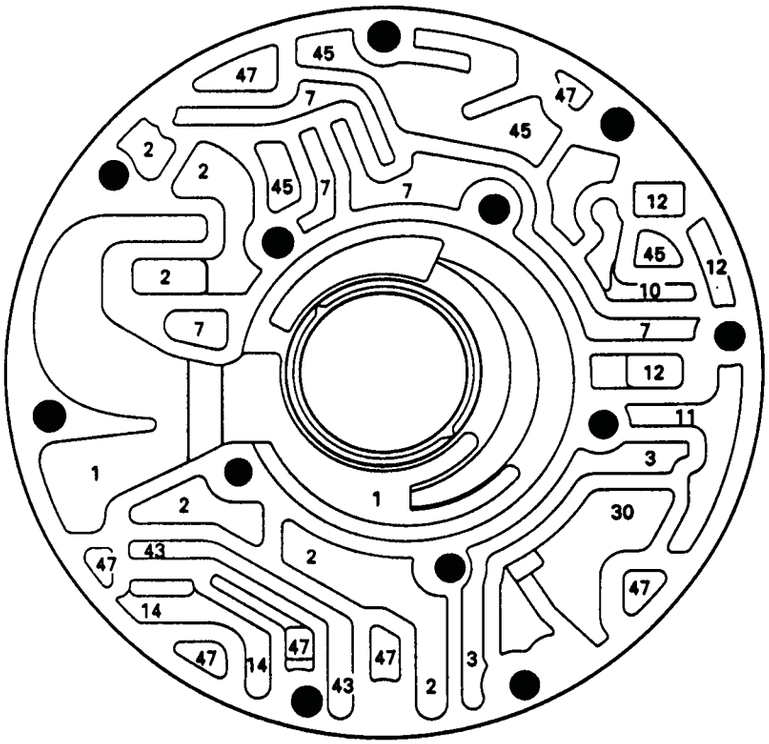
Figure 23

| CONDITION | INSPECT COMPONENT | FOR CAUSE |
|---|---|---|
| LEAKS AT: (Continued) SPEED SENSOR | • Seal | – Cut, missing, nicked. |
| | • Speed Sensor (22) | – Damaged.<br>– Not seated.<br>– Bracket damaged. |
| | • Bolt (23) | – Low torque.<br>– Missing.<br>– Damaged threads. |
| | • Case (7) | – Porosity or cracked. |
| OUTPUT SHAFT SEAL | • Seal (20) | – Cut or nicked. |
| | • Case (7) | – Porosity or cracked. |
| LINE PRESSURE PLUG | • Plug (24) | – Stripped threads.<br>– Low or high torque. |
| | • Case (7) | – Porosity or cracked.<br>– Damaged threads. |

ALL ILLUSTRATION NUMBERS REFERENCE HYDRA-MATIC 4L80-E UNIT REPAIR

Figure 24

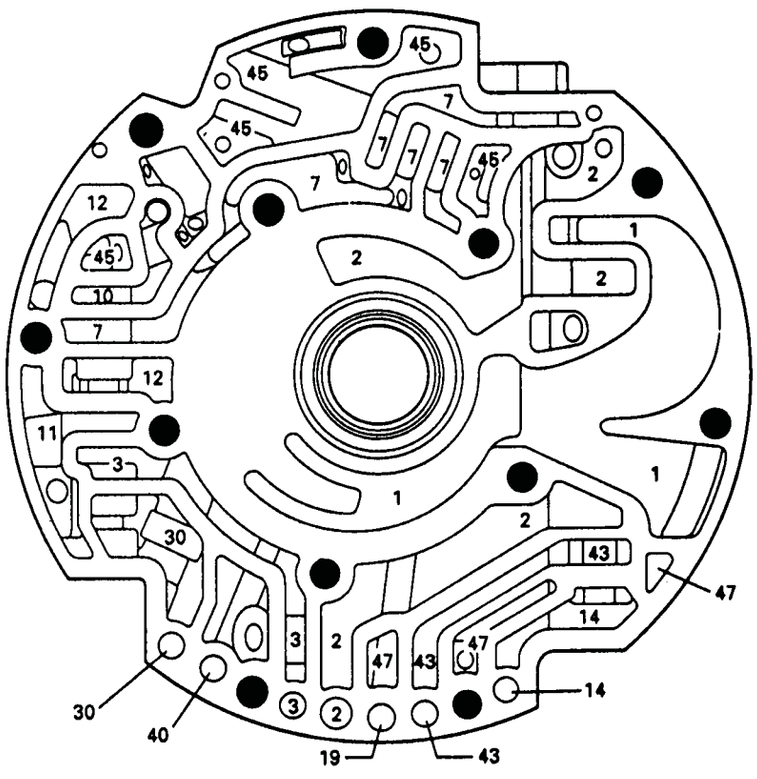
1 SUCTION
2 LINE
3 REGULATED APPLY
7 CONVERTER FEED
10 CONVERTER RELEASE
11 CONVERTER APPLY
12 COOLER
14 TORQUE SIGNAL
30 TCC SIGNAL
43 REVERSE
45 EXHAUST
47 VOID



PUMP BODY

Figure 25

1 SUCTION
2 LINE
3 REGULATED APPLY
7 CONVERTER FEED
10 CONVERTER RELEASE
11 CONVERTER APPLY
12 COOLER
14 TORQUE SIGNAL
19 DRIVE
30 TCC SIGNAL
40 OVERRUN CLUTCH
43 REVERSE
45 EXHAUST
47 VOID



PUMP COVER

Figure 26

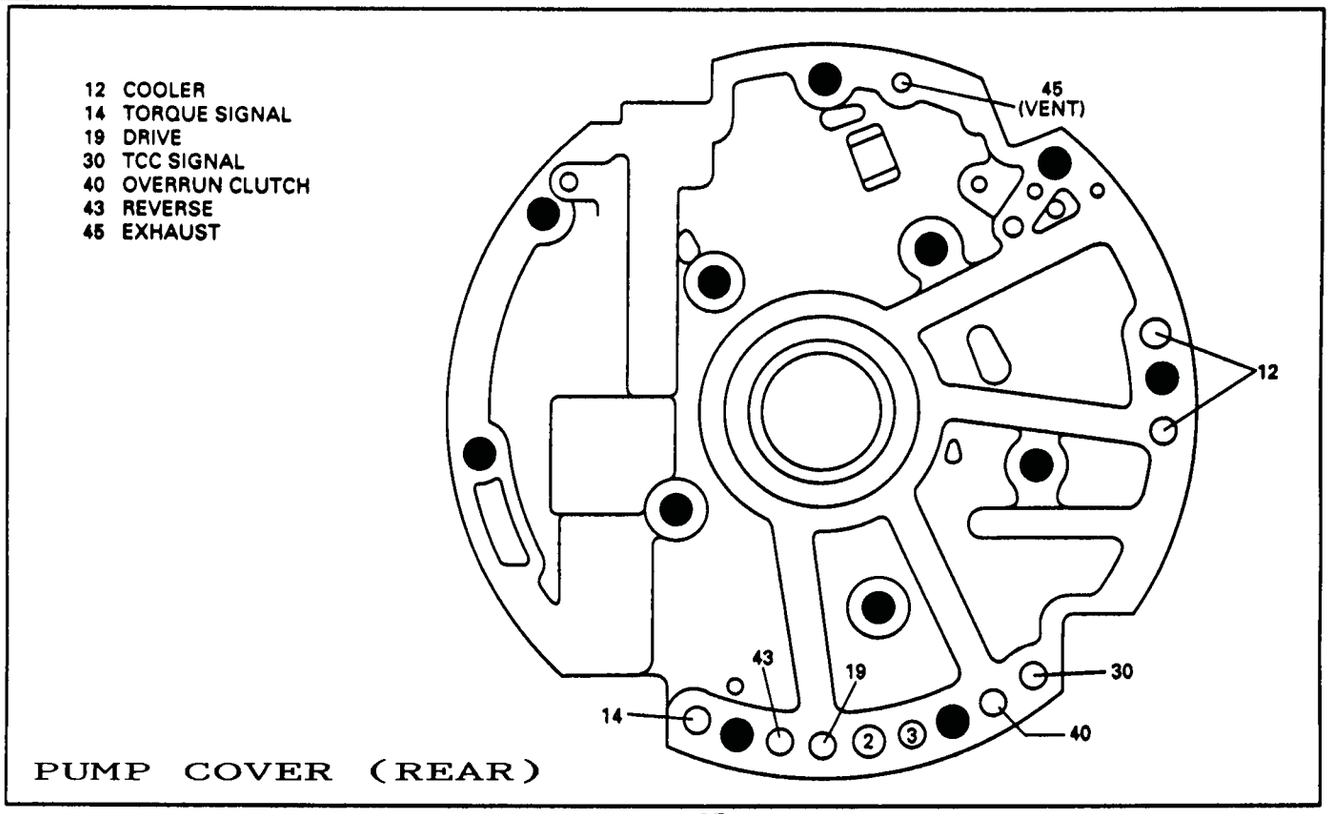



Figure 27

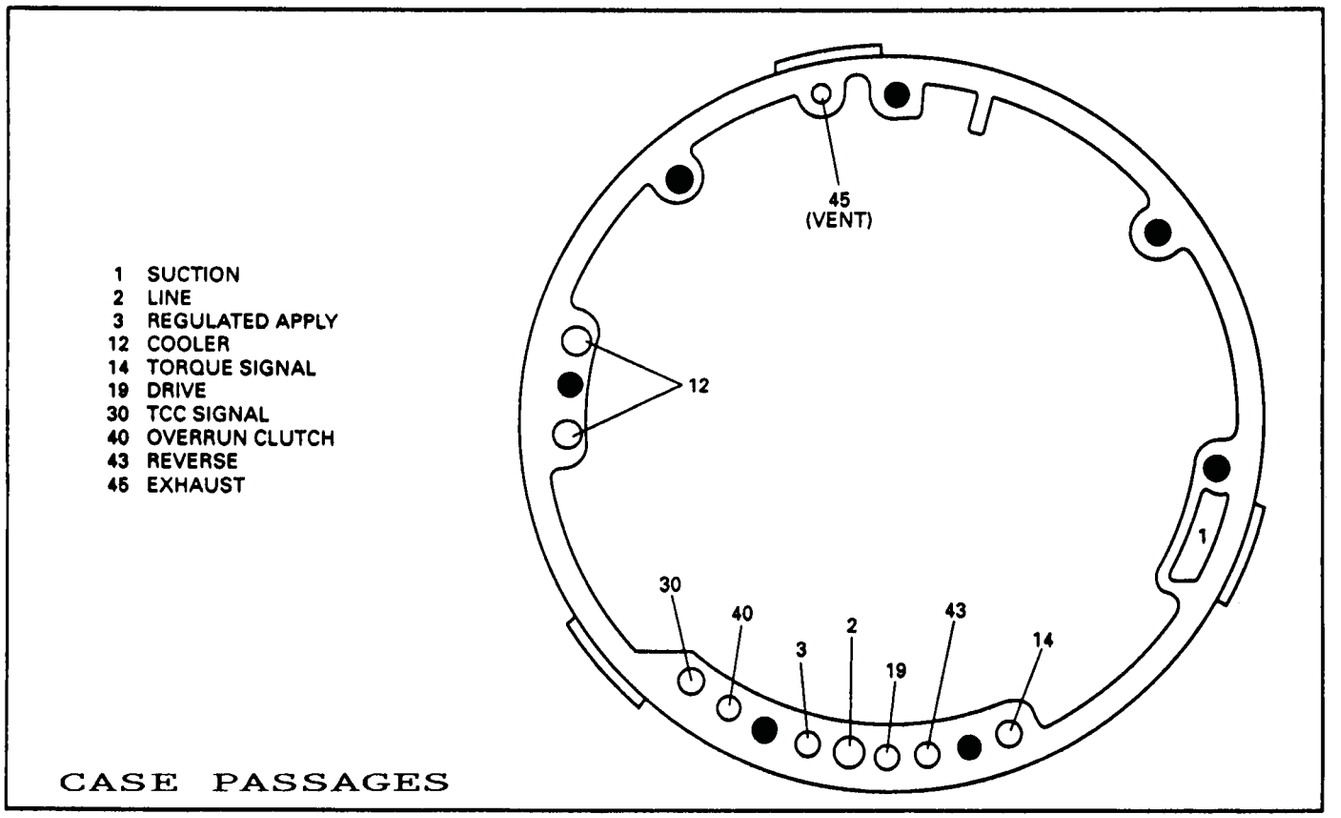
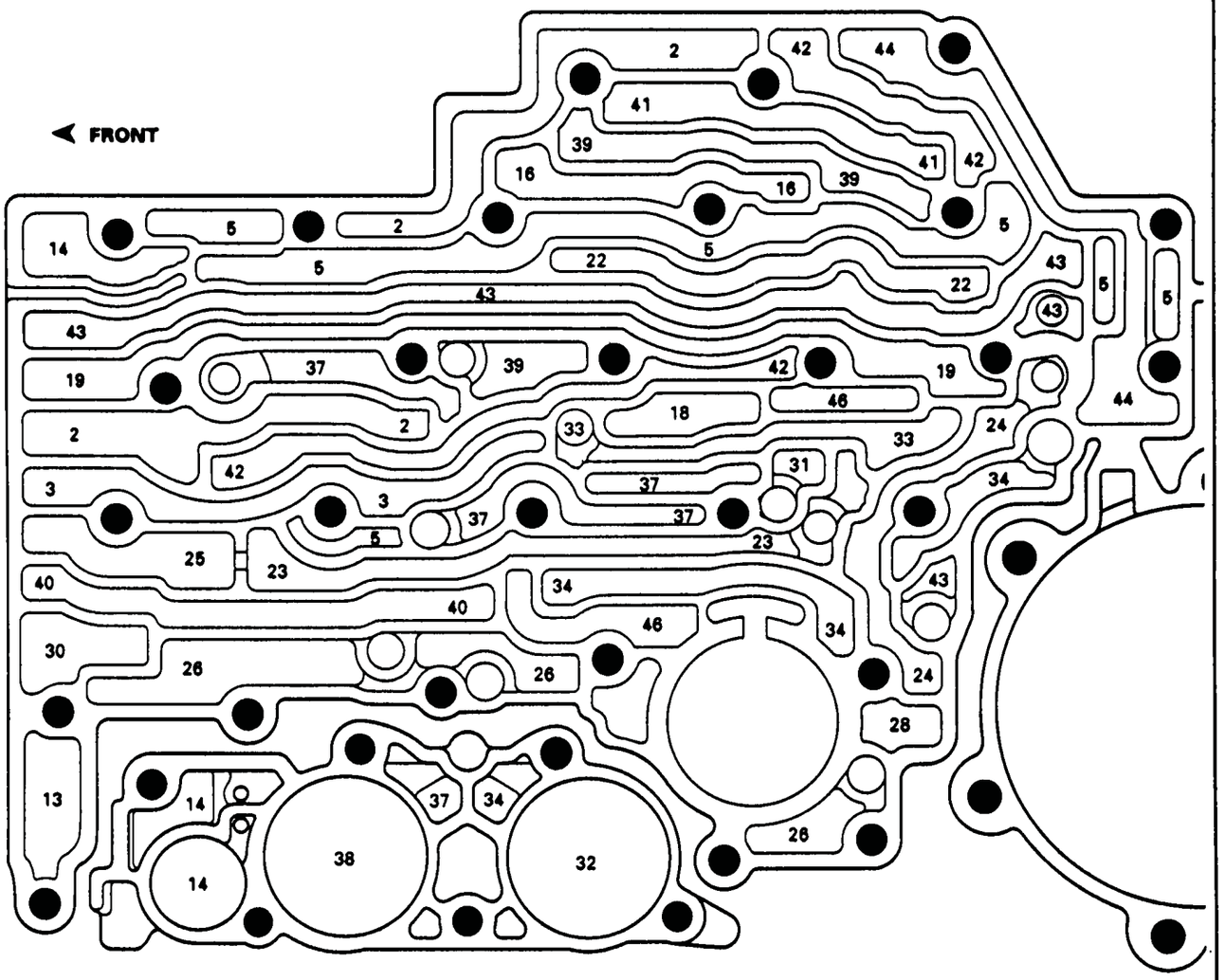


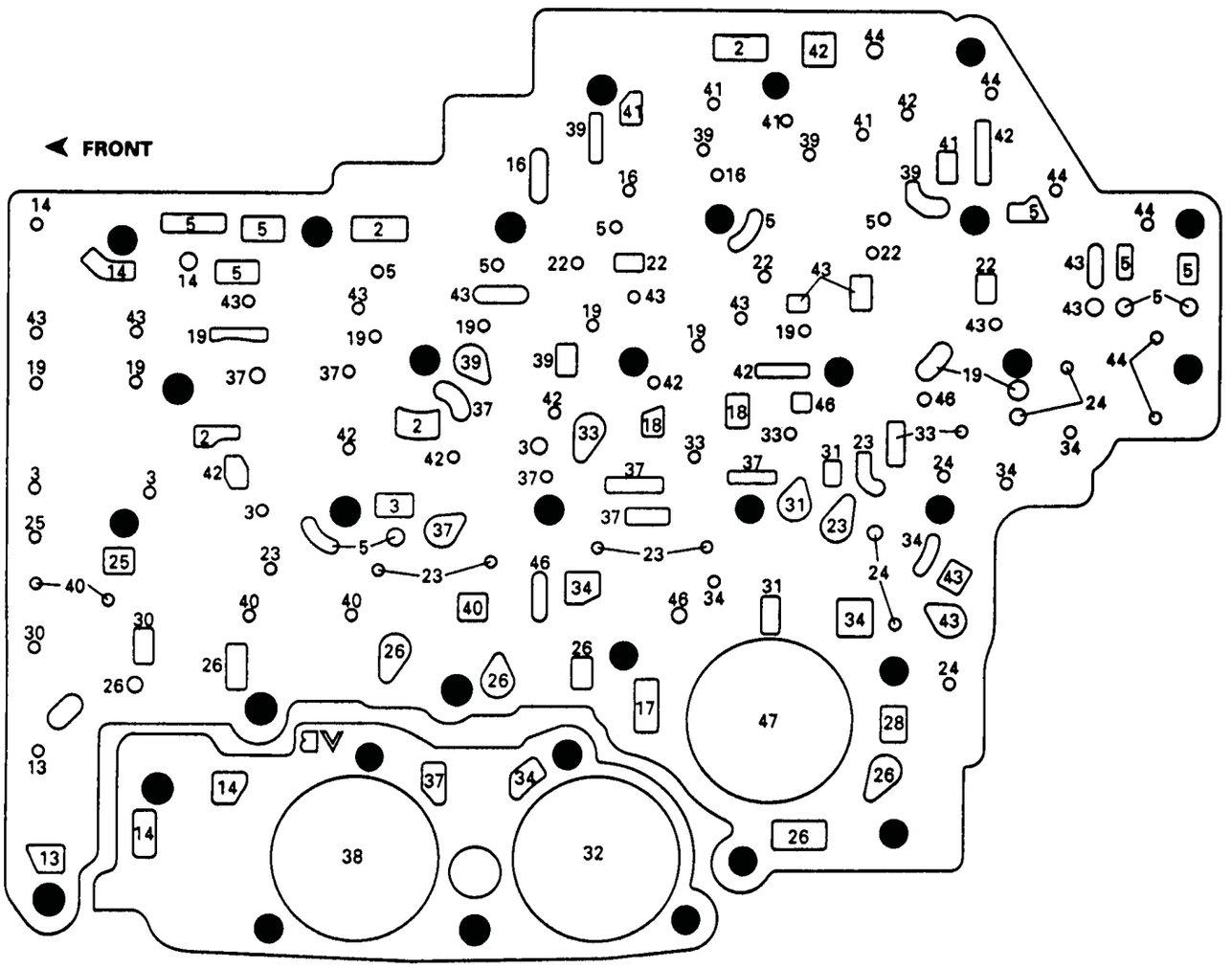

Figure 28




1 SUCTION
2 LINE
3 REGULATED APPLY
4 ORIFICED REGULATOR APPLY
5 ACTUATOR FEED
6 ORIFICED ACTUATOR FEED
7 CONVERTER FEED
8 REGULATED CONVERTER FEED
9 TCC TOGGLE
10 CONVERTER RELEASE
11 CONVERTER APPLY
12 COOLER
13 LUBE
14 TORQUE SIGNAL
15 ORIFICED TORQUE SIGNAL
16 PRN (PARK REVERSE NEUTRAL)
17 PRND 4-3
18 PRND 4
19 DRIVE
20 FILTERED ACTUATOR FEED
21 SIGNAL "A"
22 SIGNAL "B"
23 2-2 DRIVE
24 2ND CLUTCH
25 FILTERED 2-3 DRIVE
26 ACCUMULATOR
27 ORIFICED ACCUMULATOR
28 SECOND ACCUMULATOR
29 THIRD CLUTCH ACCUMULATOR
30 TCC SIGNAL
31 FRONT BAND APPLY
32 THIRD ACCUMULATOR
33 THIRD CLUTCH FEED
34 THIRD CLUTCH
35 THIRD / REVERSE
36 FOURTH CLUTCH FEED
37 FOURTH CLUTCH
38 FOURTH ACCUMULATOR
39 D 3-2-1
40 OVERRUN CLUTCH
41 D 2-1
42 LO
43 REVERSE
44 REAR BAND APPLY
45 EXHAUST
46 ORIFICED EXHAUST
47 VOID

CASE OIL PASSAGES

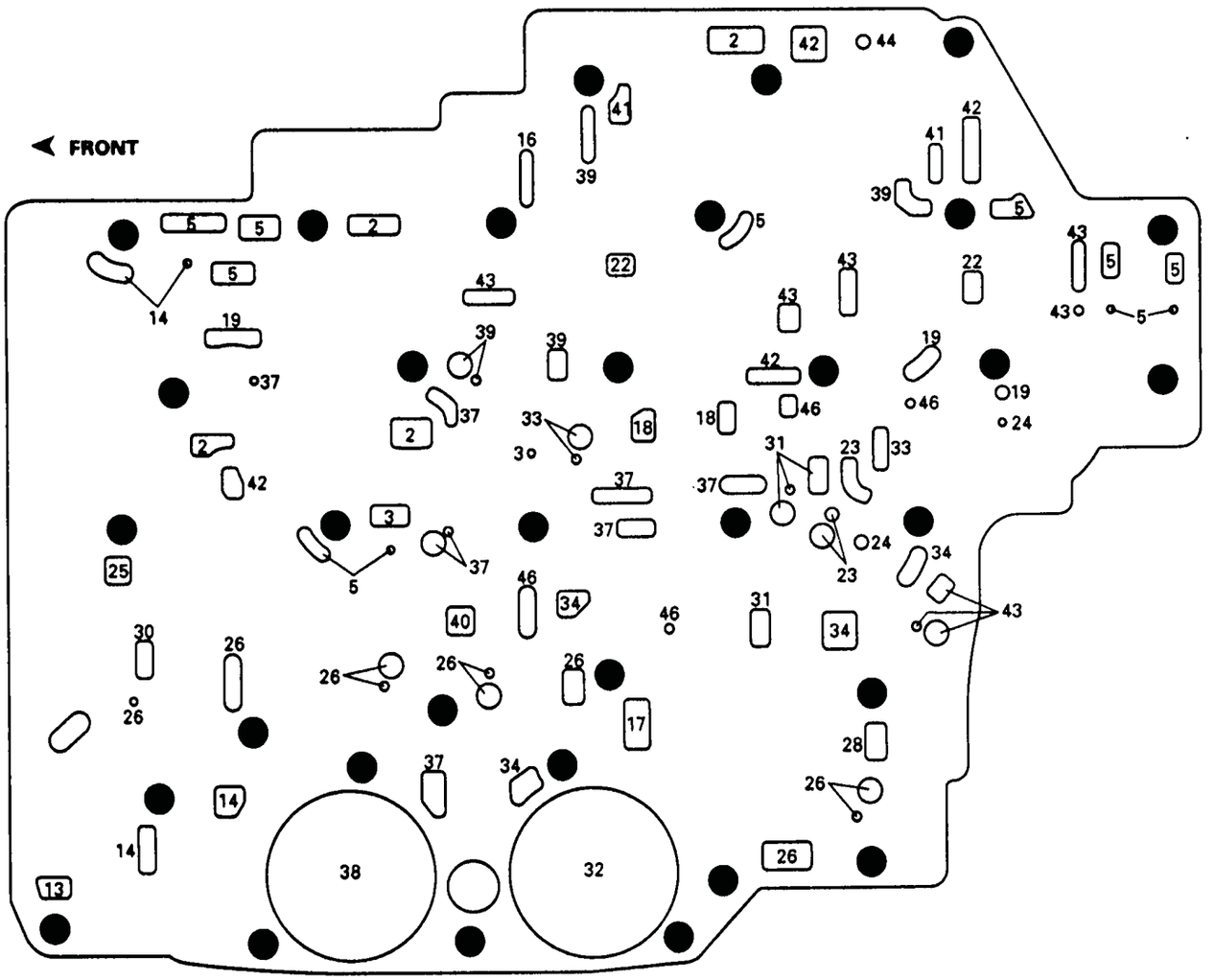
Figure 29




| | | | | | |
|---|---|---|---|---|---|
| 1 | SUCTION | 17 | PRND 4-3 | 33 | THIRD CLUTCH FEED |
| 2 | LINE | 18 | PRND 4 | 34 | THIRD CLUTCH |
| 3 | REGULATED APPLY | 19 | DRIVE | 35 | THIRD / REVERSE |
| 4 | ORIFICED REGULATOR APPLY | 20 | FILTERED ACTUATOR FEED | 36 | FOURTH CLUTCH FEED |
| 5 | ACTUATOR FEED | 21 | SIGNAL "A" | 37 | FOURTH CLUTCH |
| 6 | ORIFICED ACTUATOR FEED | 22 | SIGNAL "B" | 38 | FOURTH ACCUMULATOR |
| 7 | CONVERTER FEED | 23 | 2-2 DRIVE | 39 | D 3-2-1 |
| 8 | REGULATED CONVERTER FEED | 24 | 2ND CLUTCH | 40 | OVERRUN CLUTCH |
| 9 | TCC TOGGLE | 25 | FILTERED 2-3 DRIVE | 41 | D 2-1 |
| 10 | CONVERTER RELEASE | 26 | ACCUMULATOR | 42 | LO |
| 11 | CONVERTER APPLY | 27 | ORIFICED ACCUMULATOR | 43 | REVERSE |
| 12 | COOLER | 28 | SECOND ACCUMULATOR | 44 | REAR BAND APPLY |
| 13 | LUBE | 29 | THIRD CLUTCH ACCUMULATOR | 45 | EXHAUST |
| 14 | TORQUE SIGNAL | 30 | TCC SIGNAL | 46 | ORIFICED EXHAUST |
| 15 | ORIFICED TORQUE SIGNAL | 31 | FRONT BAND APPLY | 47 | VOID |
| 16 | PRN (PARK REVERSE NEUTRAL) | 32 | THIRD ACCUMULATOR | | |

SPACER PLATE TO CASE GASKET
AND ACCUMULATOR GASKET

Figure 30

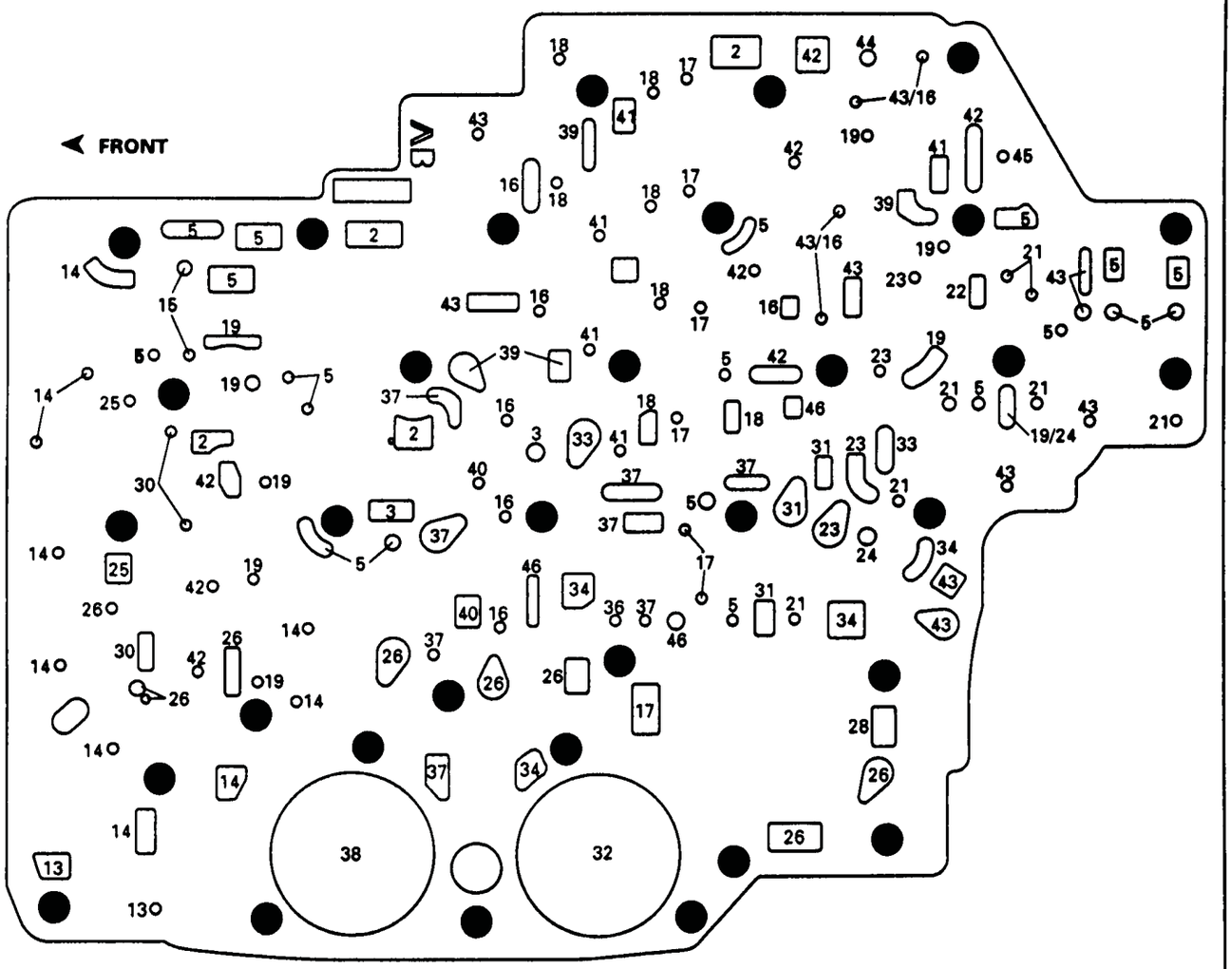



1 SUCTION
2 LINE
3 REGULATED APPLY
4 ORIFICED REGULATOR APPLY
5 ACTUATOR FEED
6 ORIFICED ACTUATOR FEED
7 CONVERTER FEED
8 REGULATED CONVERTER FEED
9 TCC TOGGLE
10 CONVERTER RELEASE
11 CONVERTER APPLY
12 COOLER
13 LUBE
14 TORQUE SIGNAL
15 ORIFICED TORQUE SIGNAL
16 PRN (PARK REVERSE NEUTRAL)
17 PRND 4-3
18 PRND 4
19 DRIVE
20 FILTERED ACTUATOR FEED
21 SIGNAL "A"
22 SIGNAL "B"
23 2-2 DRIVE
24 2ND CLUTCH
25 FILTERED 2-3 DRIVE
26 ACCUMULATOR
27 ORIFICED ACCUMULATOR
28 SECOND ACCUMULATOR
29 THIRD CLUTCH ACCUMULATOR
30 TCC SIGNAL
31 FRONT BAND APPLY
32 THIRD ACCUMULATOR
33 THIRD CLUTCH FEED
34 THIRD CLUTCH
35 THIRD / REVERSE
36 FOURTH CLUTCH FEED
37 FOURTH CLUTCH
38 FOURTH ACCUMULATOR
39 D 3-2-1
40 OVERRUN CLUTCH
41 D 2-1
42 LO
43 REVERSE
44 REAR BAND APPLY
45 EXHAUST
46 ORIFICED EXHAUST
47 VOID

SPACER PLATE

Figure 31

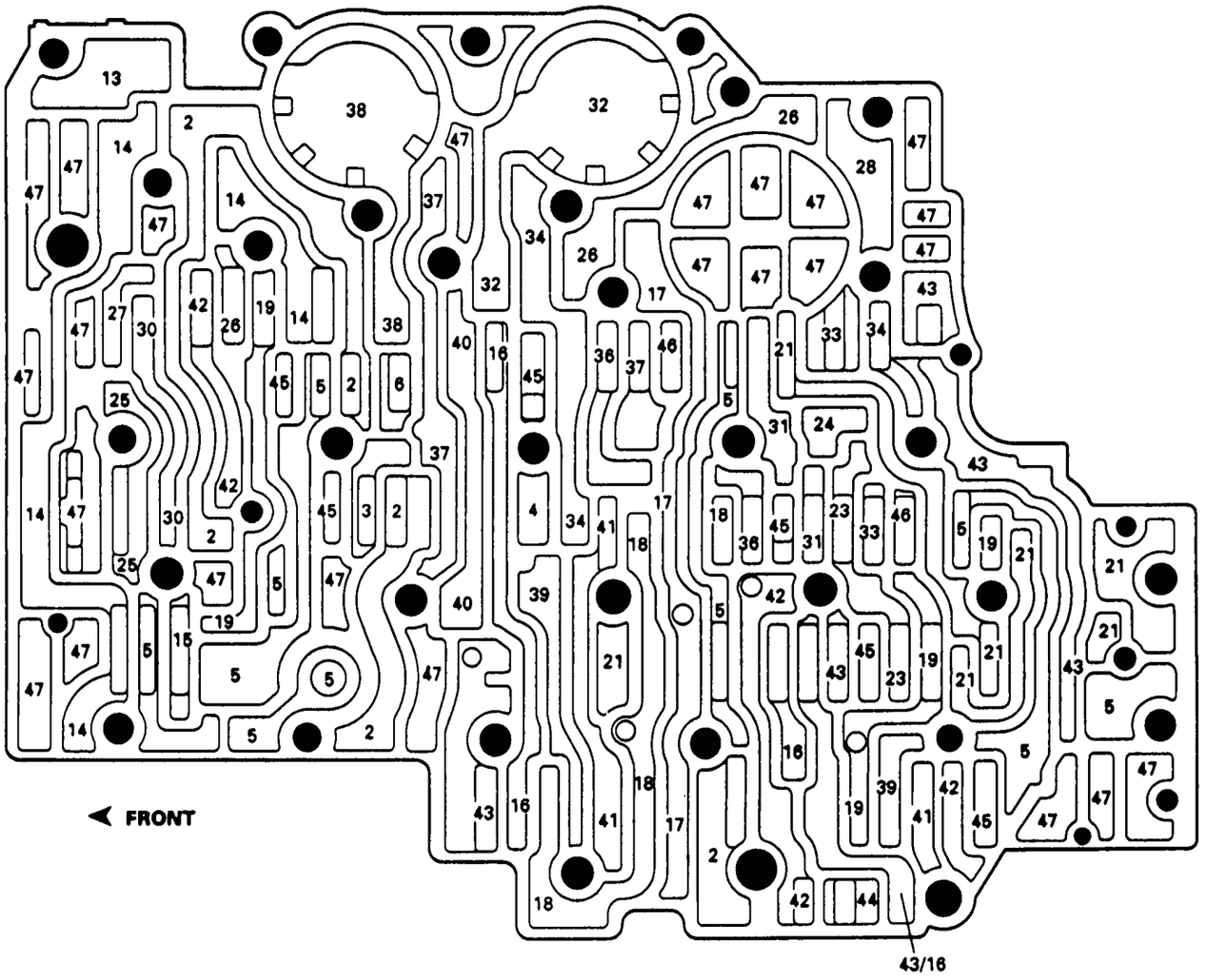
AUTOMATIC TRANSMISSION SERVICE GROUP




| | | | | | |
|---|---|---|---|---|---|
| 1 | SUCTION | 17 | PRND 4-3 | 33 | THIRD CLUTCH FEED |
| 2 | LINE | 18 | PRND 4 | 34 | THIRD CLUTCH |
| 3 | REGULATED APPLY | 19 | DRIVE | 35 | THIRD / REVERSE |
| 4 | ORIFICED REGULATOR APPLY | 20 | FILTERED ACTUATOR FEED | 36 | FOURTH CLUTCH FEED |
| 5 | ACTUATOR FEED | 21 | SIGNAL "A" | 37 | FOURTH CLUTCH |
| 6 | ORIFICED ACTUATOR FEED | 22 | SIGNAL "B" | 38 | FOURTH ACCUMULATOR |
| 7 | CONVERTER FEED | 23 | 2-2 DRIVE | 39 | D 3-2-1 |
| 8 | REGULATED CONVERTER FEED | 24 | 2ND CLUTCH | 40 | OVERRUN CLUTCH |
| 9 | TCC TOGGLE | 25 | FILTERED 2-3 DRIVE | 41 | D 2-1 |
| 10 | CONVERTER RELEASE | 26 | ACCUMULATOR | 42 | LO |
| 11 | CONVERTER APPLY | 27 | ORIFICED ACCUMULATOR | 43 | REVERSE |
| 12 | COOLER | 28 | SECOND ACCUMULATOR | 44 | REAR BAND APPLY |
| 13 | LUBE | 29 | THIRD CLUTCH ACCUMULATOR | 45 | EXHAUST |
| 14 | TORQUE SIGNAL | 30 | TCC SIGNAL | 46 | ORIFICED EXHAUST |
| 15 | ORIFICED TORQUE SIGNAL | 31 | FRONT BAND APPLY | 47 | VOID |
| 16 | PRN (PARK REVERSE NEUTRAL) | 32 | THIRD ACCUMULATOR | | |

VALVE BODY TO SPACER PLATE GASKET

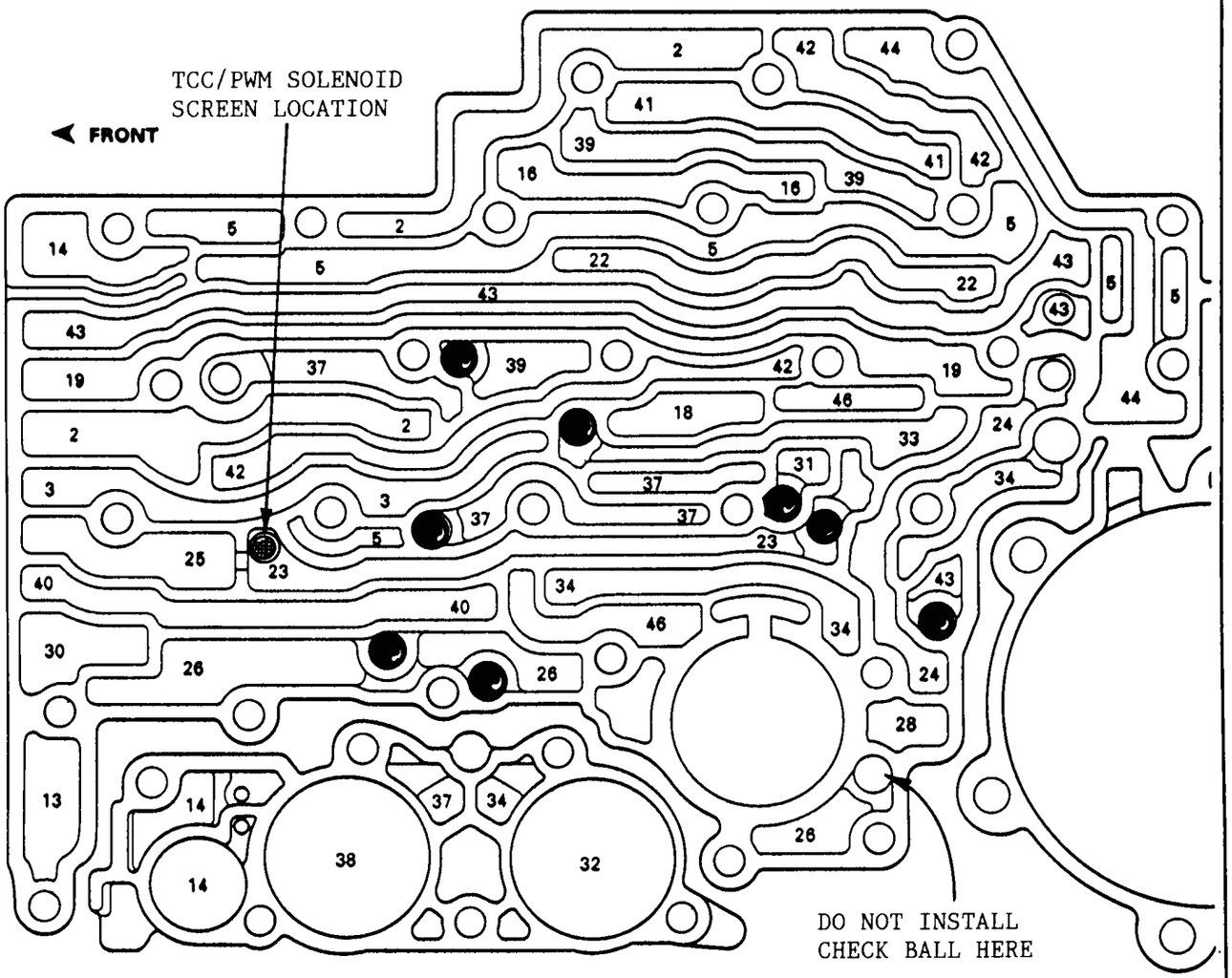
Figure 32




1 SUCTION
2 LINE
3 REGULATED APPLY
4 ORIFICED REGULATOR APPLY
5 ACTUATOR FEED
6 ORIFICED ACTUATOR FEED
7 CONVERTER FEED
8 REGULATED CONVERTER FEED
9 TCC TOGGLE
10 CONVERTER RELEASE
11 CONVERTER APPLY
12 COOLER
13 LUBE
14 TORQUE SIGNAL
15 ORIFICED TORQUE SIGNAL
16 PRN (PARK REVERSE NEUTRAL)
17 PRND 4-3
18 PRND 4
19 DRIVE
20 FILTERED ACTUATOR FEED
21 SIGNAL "A"
22 SIGNAL "B"
23 2-2 DRIVE
24 2ND CLUTCH
25 FILTERED 2-3 DRIVE
26 ACCUMULATOR
27 ORIFICED ACCUMULATOR
28 SECOND ACCUMULATOR
29 THIRD CLUTCH ACCUMULATOR
30 TCC SIGNAL
31 FRONT BAND APPLY
32 THIRD ACCUMULATOR
33 THIRD CLUTCH FEED
34 THIRD CLUTCH
35 THIRD / REVERSE
36 FOURTH CLUTCH FEED
37 FOURTH CLUTCH
38 FOURTH ACCUMULATOR
39 D 3-2-1
40 OVERRUN CLUTCH
41 D 2-1
42 LO
43 REVERSE
44 REAR BAND APPLY
45 EXHAUST
46 ORIFICED EXHAUST
47 VOID

VALVE BODY OIL PASSAGES

Figure 33



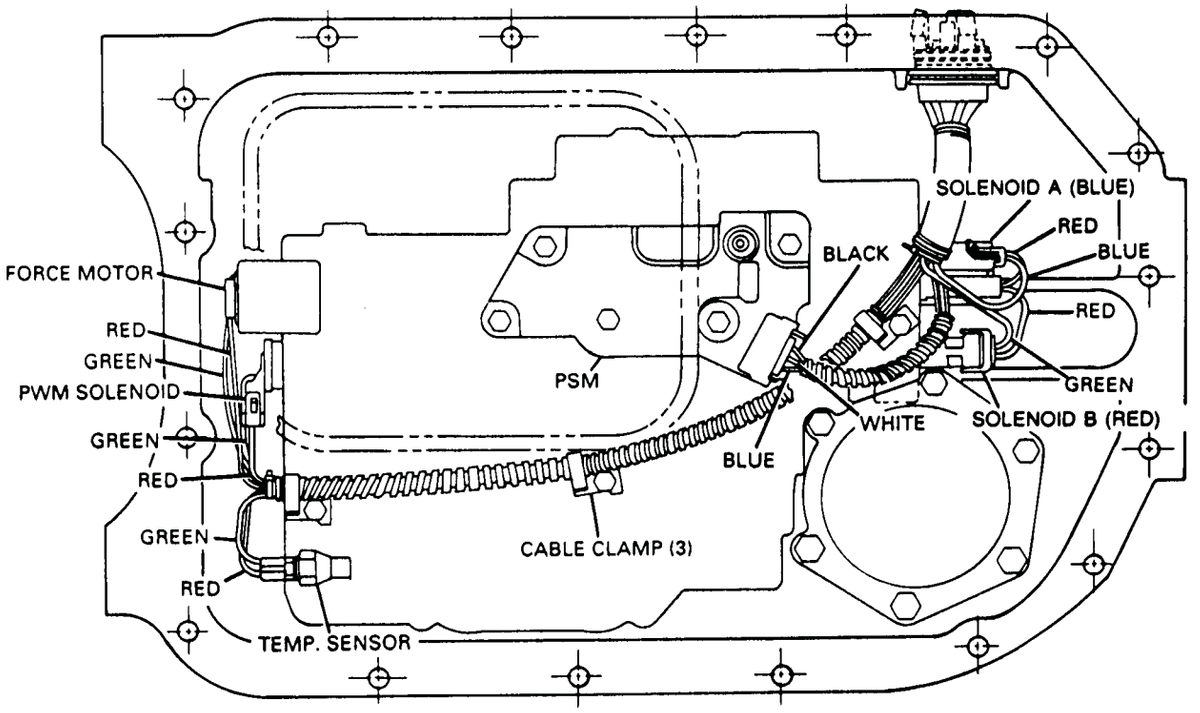

ALL CHECK BALLS .250" DIAMETER (8 TOTAL)

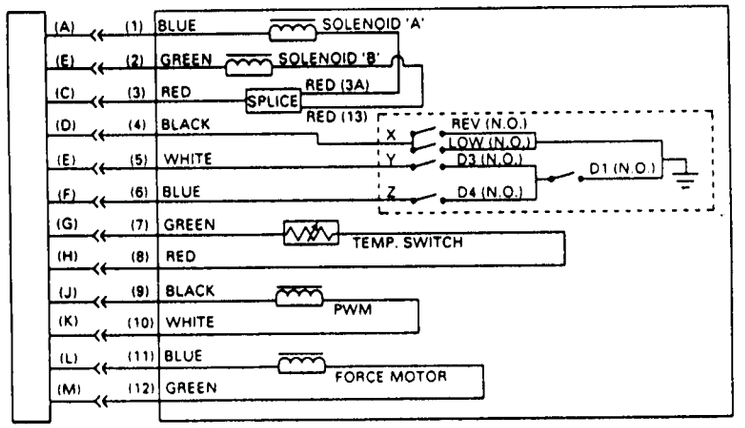
1 SUCTION
2 LINE
3 REGULATED APPLY
4 ORIFICED REGULATOR APPLY
5 ACTUATOR FEED
6 ORIFICED ACTUATOR FEED
7 CONVERTER FEED
8 REGULATED CONVERTER FEED
9 TCC TOGGLE
10 CONVERTER RELEASE
11 CONVERTER APPLY
12 COOLER
13 LUBE
14 TORQUE SIGNAL
15 ORIFICED TORQUE SIGNAL
16 PRN (PARK REVERSE NEUTRAL)
17 PRND 4-3
18 PRND 4
19 DRIVE
20 FILTERED ACTUATOR FEED
21 SIGNAL "A"
22 SIGNAL "B"
23 2-2 DRIVE
24 2ND CLUTCH
25 FILTERED 2-3 DRIVE
26 ACCUMULATOR
27 ORIFICED ACCUMULATOR
28 SECOND ACCUMULATOR
29 THIRD CLUTCH ACCUMULATOR
30 TCC SIGNAL
31 FRONT BAND APPLY
32 THIRD ACCUMULATOR
33 THIRD CLUTCH FEED
34 THIRD CLUTCH
35 THIRD / REVERSE
36 FOURTH CLUTCH FEED
37 FOURTH CLUTCH
38 FOURTH ACCUMULATOR
39 D 3-2-1
40 OVERRUN CLUTCH
41 D 2-1
42 LO
43 REVERSE
44 REAR BAND APPLY
45 EXHAUST
46 ORIFICED EXHAUST
47 VOID

CHECKBALL LOCATIONS IN CASE

Figure 34

## WIRING SCHEMATIC



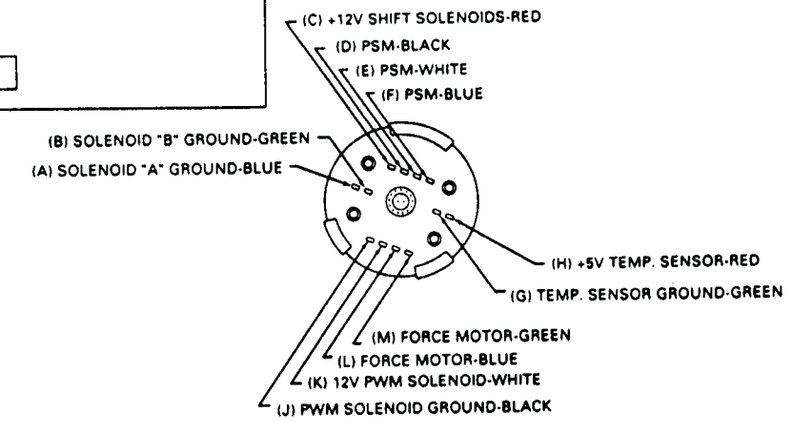




Figure 35

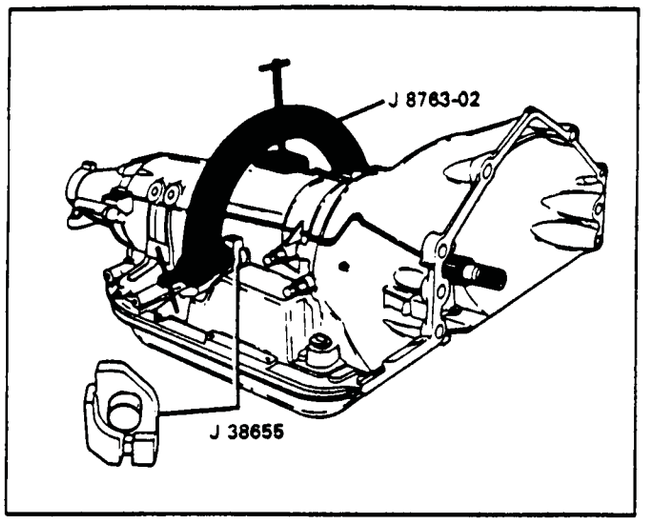



Figure 36

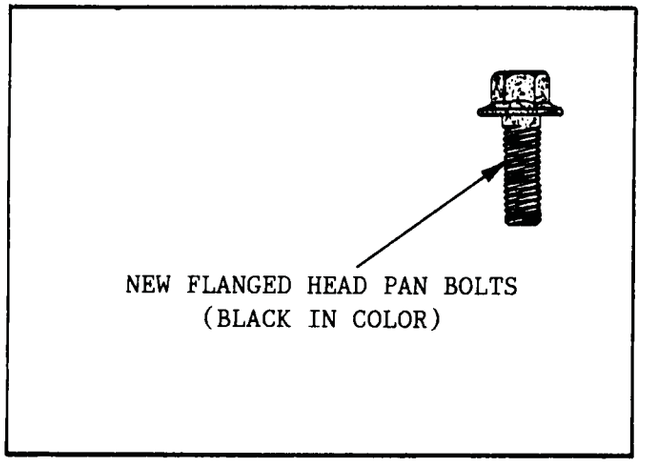



Figure 37

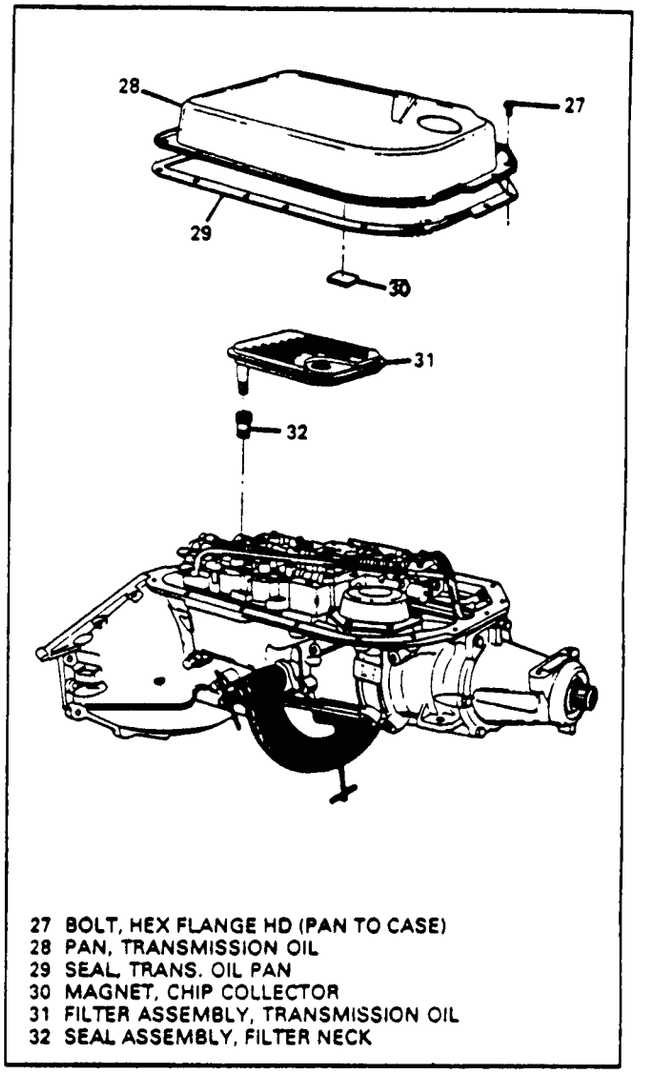
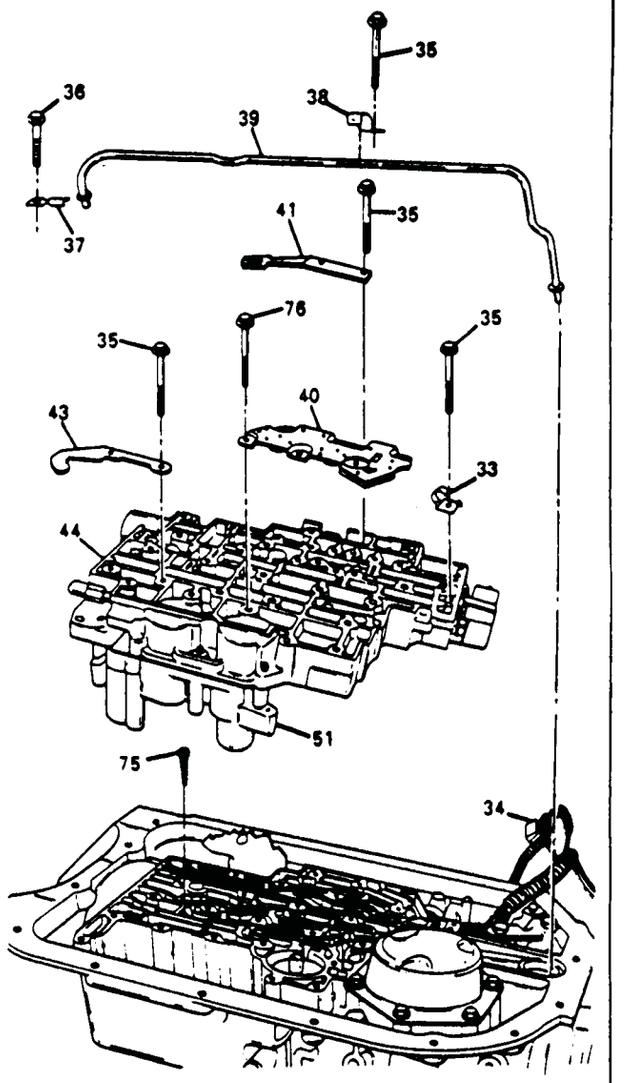



Figure 38

## TRANSMISSION DISASSEMBLY

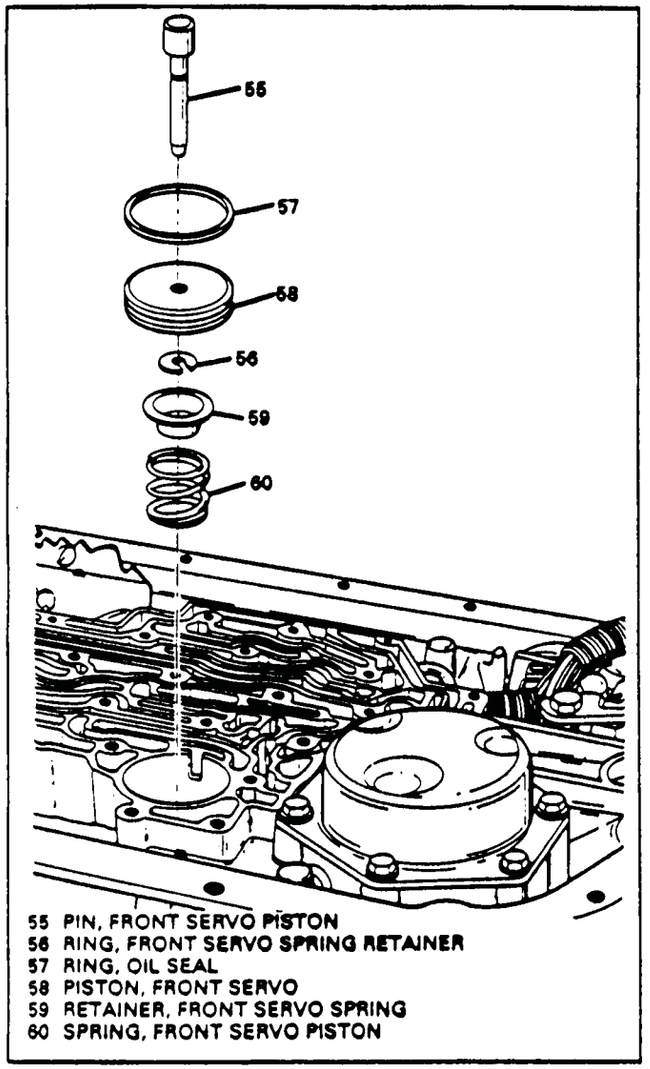
1. Remove the torque converter and drain transmission fluid.
2. Remove the two speed sensor assemblies and retaining bolts (See Figure 42).
3. Install holding fixture and J-38655 adapter onto the transmission, as shown in Figure 36.
4. DO NOT OVER TIGHTEN. Overtightening of fixture could cause case damage and inhibit disassembly.
5. Install transmission into J-3289-20 bench fixture, and lock in place with fixture pin.
6. Drain transmission fluid.
7. Rotate transmission so that bottom pan is up, and lock in place with base pin.
8. Remove 17 pan bolts using 10mm socket and speed handle.
9. Notice that the pan bolts are flange head bolts and black in color (See Figure 37).
10. Remove the bottom pan and the pan gasket. Notice that the pan gasket is the new "Controlled Compression" type and is reusable. Do not discard unless it is damaged or torn ribs.
11. Remove and discard the oil filter and multilip seal in case (See Figure 38).
12. Remove the wiring harness assembly from the case and six connectors.
13. Remove the six 8mm retaining bolts for the pressure switch manifold assembly, and remove the switch assembly (See Figure 39).

14. NOTE: Be sure 5 "O" rings are attached to pressure switch assembly, as they are not serviced.
15. Remove twenty one 10mm bolts from the valve body assembly.
16. Remove manual lever detent spring and roller assembly (See Figure 39).
17. Remove three wiring harness clips, and the fluid level indicator stop (43). (See Figure 39).
18. Remove lube pipe retainer, lube pipe, and lube pipe clamp (See Figure 39).
19. Remove the complete valve body assembly including the accumulator housing assembly (See Figure 39).
20. Remove the valve body gaskets and the spacer plate.
21. Remove 8 checkballs from case passages.
22. Remove the TCC/PWM solenoid screen from the case passage (See Figure 34).
23. Remove the intermediate (D2) servo assembly from the case bore (Figure 40).
24. Remove six retaining bolts for the reverse servo cover, and remove reverse servo cover (See Figure 41).
25. Remove the reverse servo assembly and the 1-2 accumulator assembly as shown in Figure 41.
26. Remove two retaining bolts for parking pawl bracket (713), and remove parking pawl bracket (See Figure 42).
27. Do not remove parking linkage from the case unless damaged.
28. If removal is necessary, use Figure 43 for procedure.



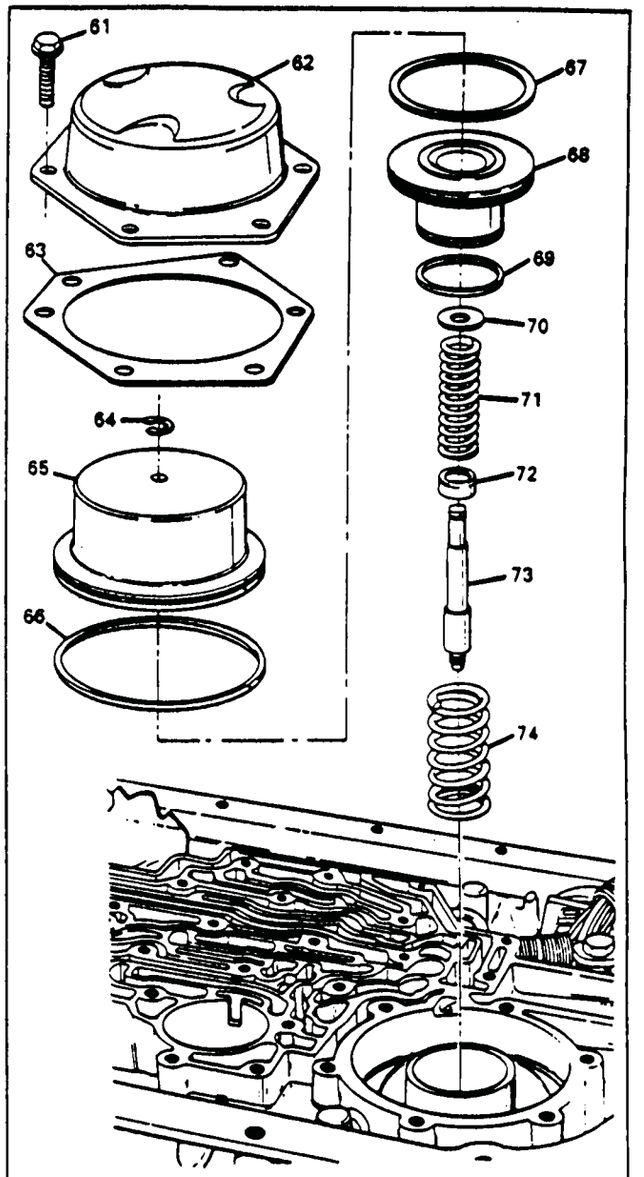

33 CLAMP, ELECTRICAL CABLE
34 HARNESS ASSEMBLY, ELECTRICAL WIRING
35 BOLT, HEX HD. (M6 X 1.0 X 55.0)
36 BOLT, HEX HD (M6 X 1.0 X 35.0)
37 RETAINER, LUBE PIPE
38 CLAMP, LUBE PIPE
39 PIPE, LUBE
40 MANIFOLD, PRESSURE SWITCH
41 SPRING ASSEMBLY, MANUAL DETENT
43 STOP, OIL (DIPSTICK)
44 BODY ASSEMBLY, CONTROL VALVE
51 HOUSING, ACCUMULATOR
75 SCREEN, PWM SOLENOID
76 BOLT, SPECIAL M6 X 1.0

Figure 39



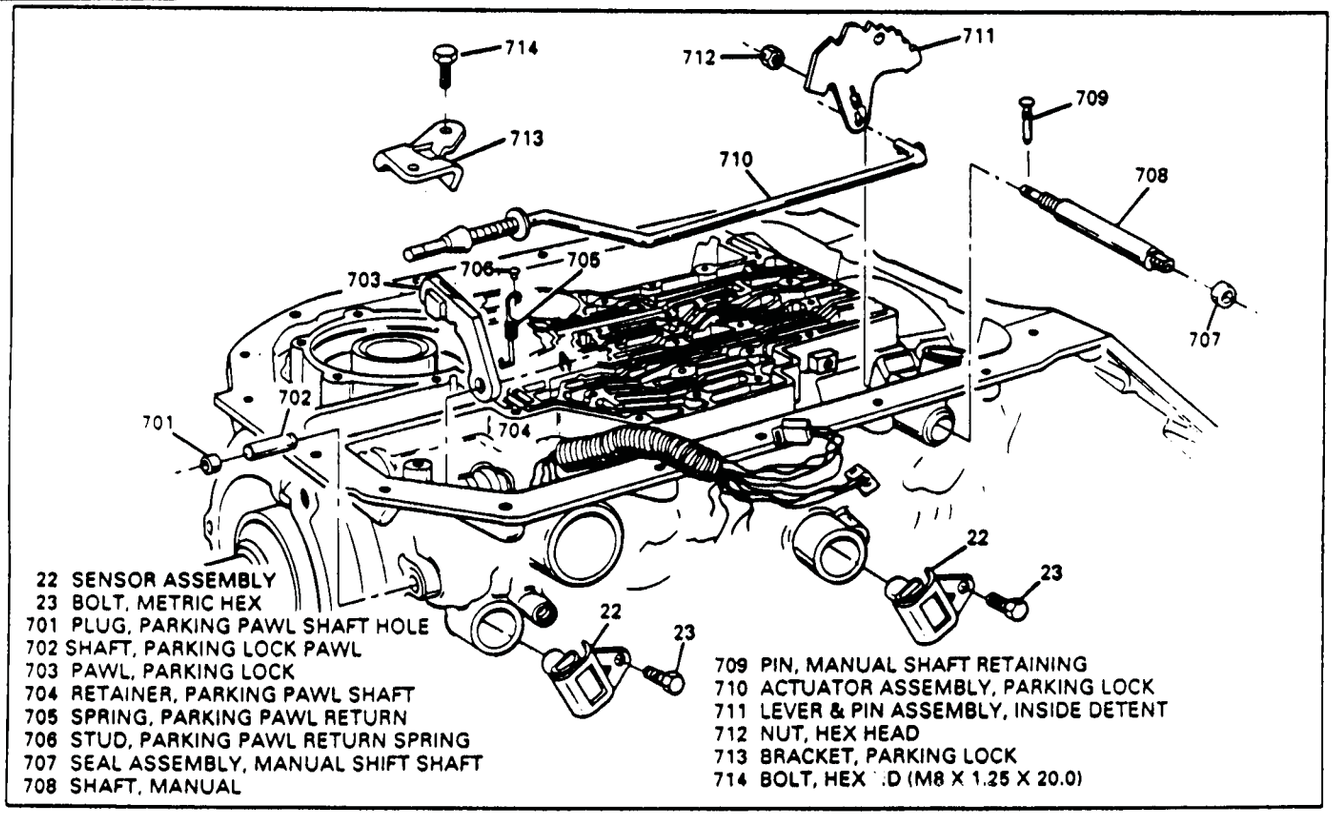

55 PIN, FRONT SERVO PISTON
56 RING, FRONT SERVO SPRING RETAINER
57 RING, OIL SEAL
58 PISTON, FRONT SERVO
59 RETAINER, FRONT SERVO SPRING
60 SPRING, FRONT SERVO PISTON

Figure 40



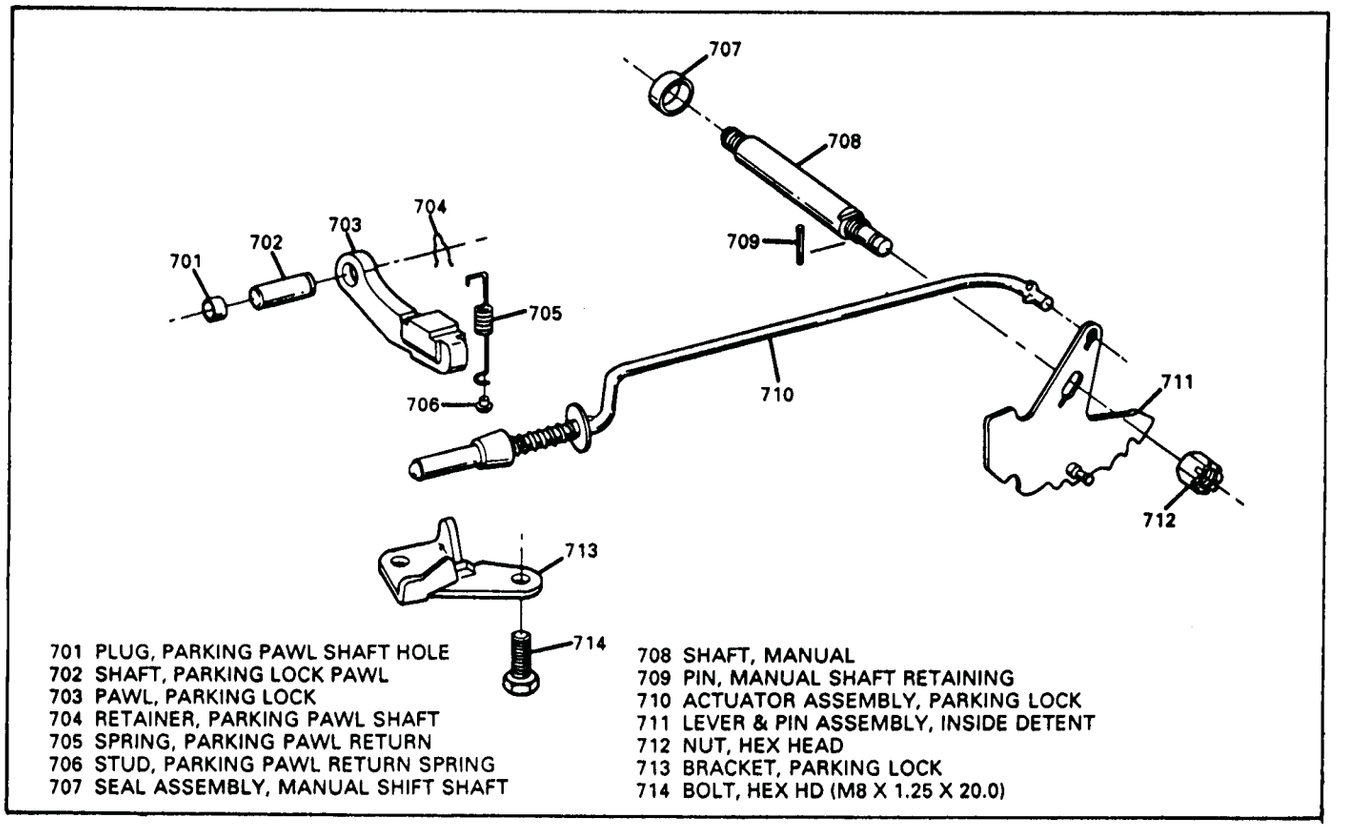

61 BOLT, REAR SERVO COVER
62 COVER, REAR SERVO
63 GASKET, REAR SERVO COVER
64 CLIP, RETAINING
65 PISTON, REAR SERVO
66 RING, OIL SEAL ACCUM. PISTON (OUTER)
67 RING, OIL SEAL ACCUM. PISTON (INNER)
68 PISTON, REAR ACCUMULATOR
69 SEAL, REVERSE SERVO PISTON
70 WASHER, SERVO PISTON
71 SPRING, REAR SERVO
72 RETAINER, REAR PISTON SPRING
73 PIN, REAR BAND APPLY (SELECTIVE)
74 SPRING, REAR ACCUMULATOR

Figure 41




22 SENSOR ASSEMBLY
23 BOLT, METRIC HEX
701 PLUG, PARKING PAWL SHAFT HOLE
702 SHAFT, PARKING LOCK PAWL
703 PAWL, PARKING LOCK
704 RETAINER, PARKING PAWL SHAFT
705 SPRING, PARKING PAWL RETURN
706 STUD, PARKING PAWL RETURN SPRING
707 SEAL ASSEMBLY, MANUAL SHIFT SHAFT
708 SHAFT, MANUAL
709 PIN, MANUAL SHAFT RETAINING
710 ACTUATOR ASSEMBLY, PARKING LOCK
711 LEVER & PIN ASSEMBLY, INSIDE DETENT
712 NUT, HEX HEAD
713 BRACKET, PARKING LOCK
714 BOLT, HEX HD (M8 X 1.25 X 20.0)

Figure 42




701 PLUG, PARKING PAWL SHAFT HOLE
702 SHAFT, PARKING LOCK PAWL
703 PAWL, PARKING LOCK
704 RETAINER, PARKING PAWL SHAFT
705 SPRING, PARKING PAWL RETURN
706 STUD, PARKING PAWL RETURN SPRING
707 SEAL ASSEMBLY, MANUAL SHIFT SHAFT
708 SHAFT, MANUAL
709 PIN, MANUAL SHAFT RETAINING
710 ACTUATOR ASSEMBLY, PARKING LOCK
711 LEVER & PIN ASSEMBLY, INSIDE DETENT
712 NUT, HEX HEAD
713 BRACKET, PARKING LOCK
714 BOLT, HEX HD (M8 X 1.25 X 20.0)

Figure 43

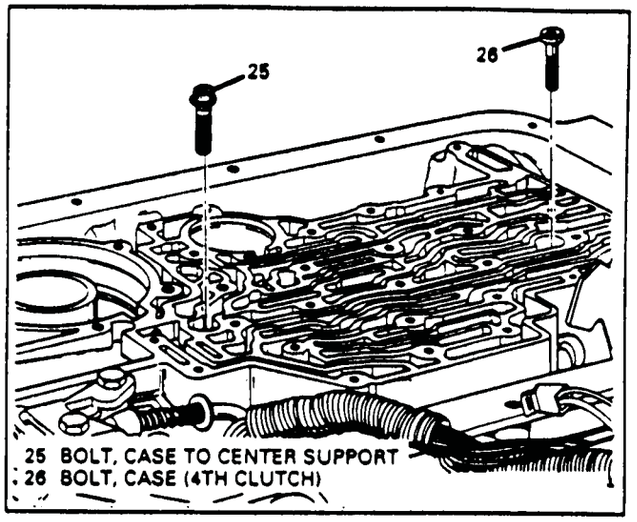



Figure 44

4TH CLUTCH BOLT AND CENTER SUPPORT BOLT

1. Remove the 4th clutch housing retaining bolt, using a 40 torx socket, as shown in Figure 44.
2. GM recommends replacing this bolt, and not reusing it.
3. Remove the center support bolt, using a 3/8" 12 point socket, from location shown in Figure 44.
4. GM recommends replacing this bolt, and not reusing it.

EXTENSION HOUSING REMOVAL

1. Remove the six extension housing bolts and remove extension housing. (See Figure 45).
2. Remove and discard the extension housing "O" ring seal (See Figure 45).
3. Remove the output shaft "O" ring seal shown in Figure 45. (Only Some Models).
4. Notice that there are two different type extension housing seals (20). (See Figure 45).

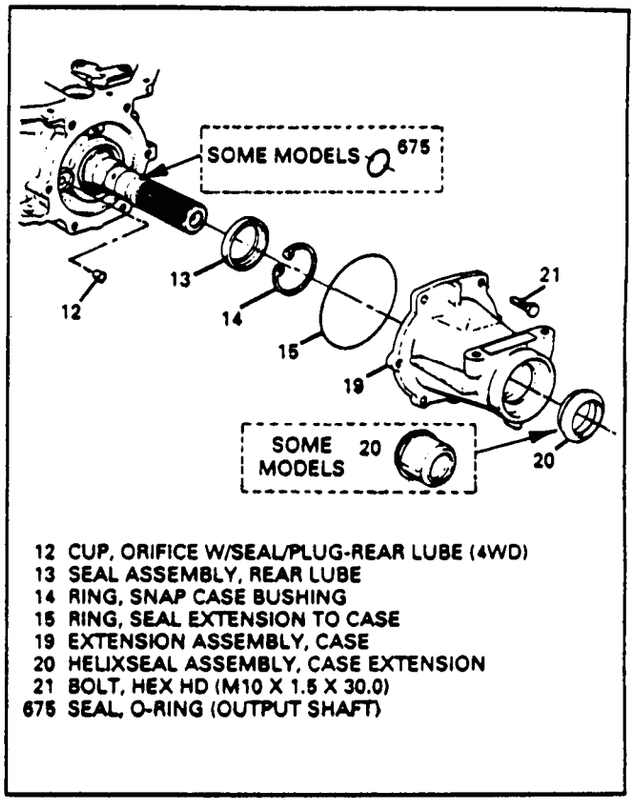



Figure 45

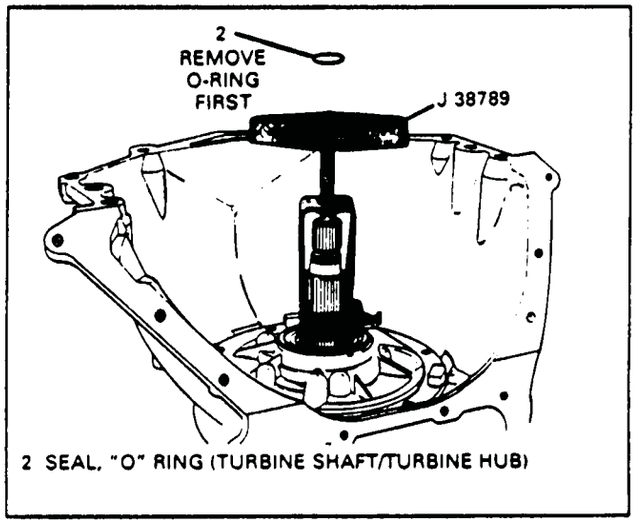



Figure 46

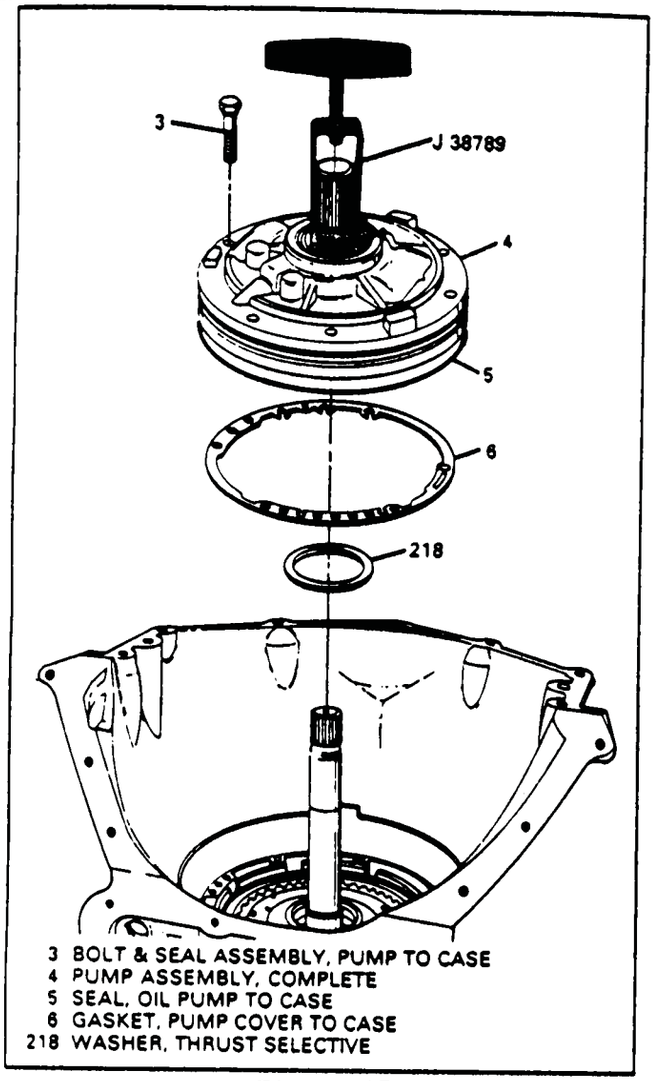



Figure 47

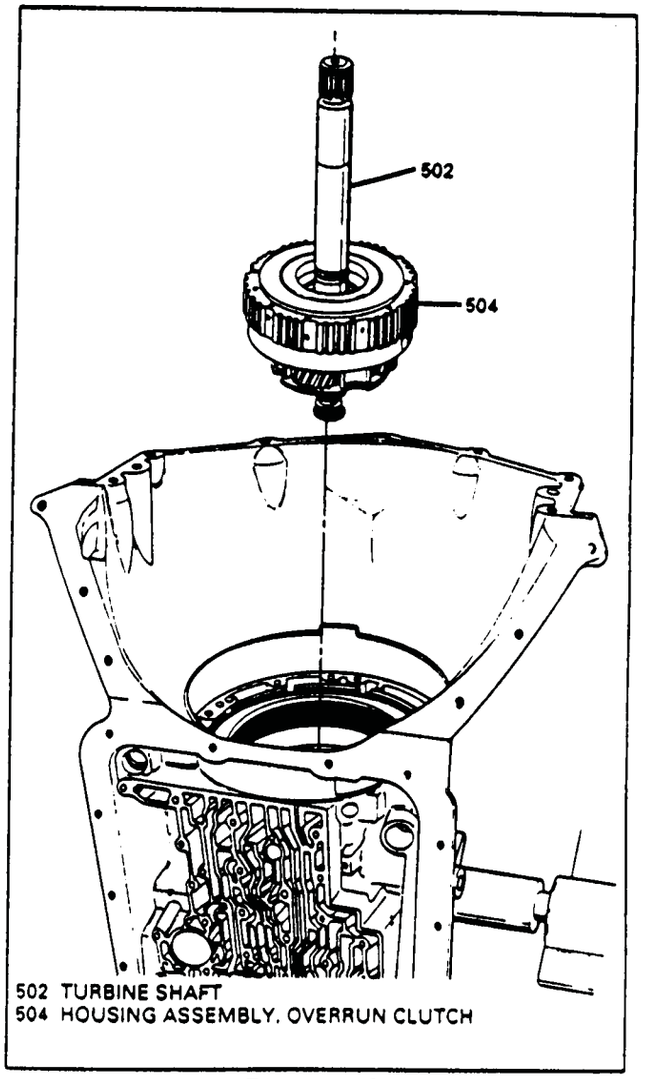



Figure 48

OIL PUMP ASSEMBLY REMOVAL

1. Remove the "O" ring seal from turbine shaft, as shown in Figure 46.
2. Remove seven 13mm pump retaining bolts and "O" rings (See Figure 47).
3. Install J-38789 pump removal tool as shown in Figure 46.
4. Tighten clamp onto stator shaft.
5. Turn the knob on top of the tool as much as necessary to break the pump assembly loose from the case.
6. Remove the oil pump assembly from the transmission (See Figure 47).
7. Remove and discard the oil pump gasket.
8. Remove the selective thrust washer (218), as shown in Figure 47.
9. The washer may be stuck to the back of the oil pump cover.

GEAR TRAIN REMOVAL

1. Remove the overdrive carrier and turbine shaft assembly, along with the overrun clutch housing assembly, by grasping the turbine shaft and lifting straight up (See Figure 48).
2. Insure that the 4th clutch retaining bolt has been removed (Figure 49).
3. Remove the complete 4th clutch assembly as shown in Figure 49.

Continued on next page.

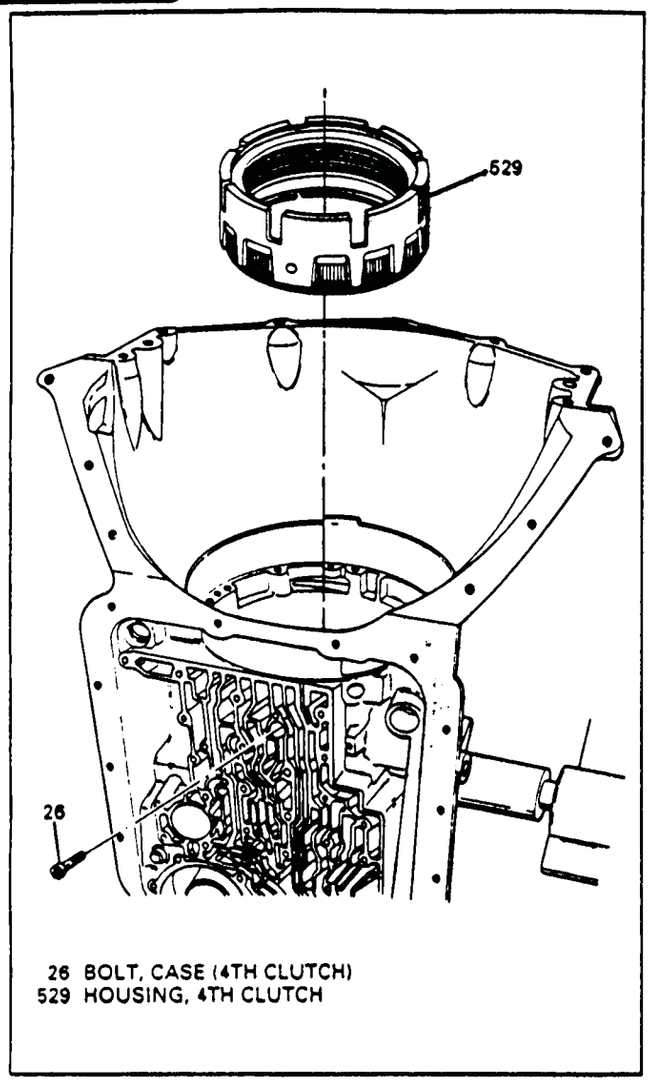



Figure 49

GEAR TRAIN REMOVAL (Continued)

4. Remove the forward clutch housing assembly, using J-38358-A, as shown in Figure 50.
5. Remove the thrust bearing from the top of the forward clutch housing. (See Figure 50).
6. Remove the thrust washer. This washer may be stuck to the bottom of forward clutch housing, or on top of direct clutch housing.
7. Remove the direct clutch housing, as shown in Figure 51, using J-38733.
8. Remove the intermediate (D2) band, as shown in Figure 51.
9. Remove the intermediate clutch snap ring with a large screwdriver.

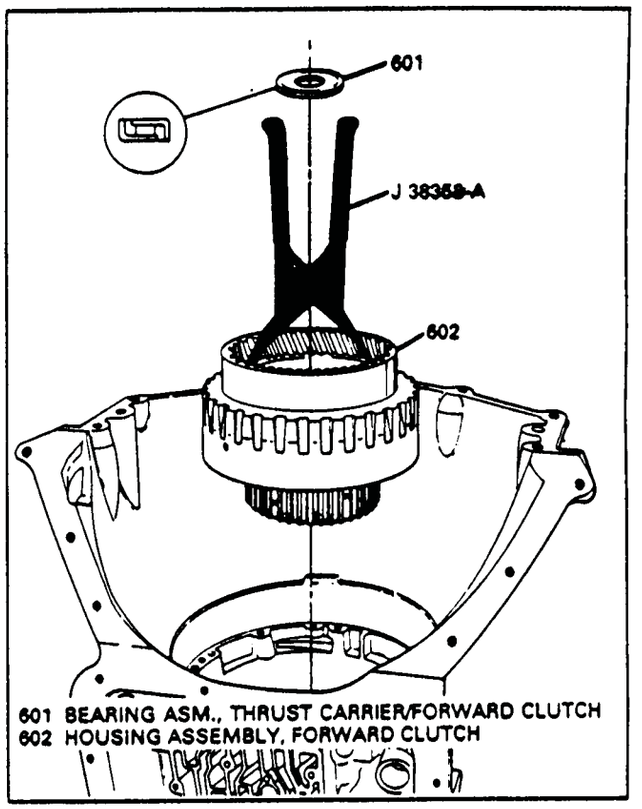



Figure 50

10. Remove the intermediate clutch backing plate (See Figure 52).
11. Remove the intermediate clutch plates both lined and steel, 4 of each, as shown in Figure 52.
12. Remove the center support bolt (25) from the location shown in Figure 54.
13. Remove the center support snap ring with a large screwdriver (Figure 53).
14. Attach tool J-38868 to the main shaft, as shown in Figure 53.
15. Remove the center support assembly and gear train unit (See Figure 53).
16. Place the center support assembly and gear train unit on work bench, remove the J-38868 tool.
17. Note the location, and remove the thin spacer (643) from case (Figure 53).
18. Remove the thrust washer, it may be stuck to gear train unit (Figure 53).
19. Remove the reverse band assembly, and the selective spacer from the case. (See Figure 55).

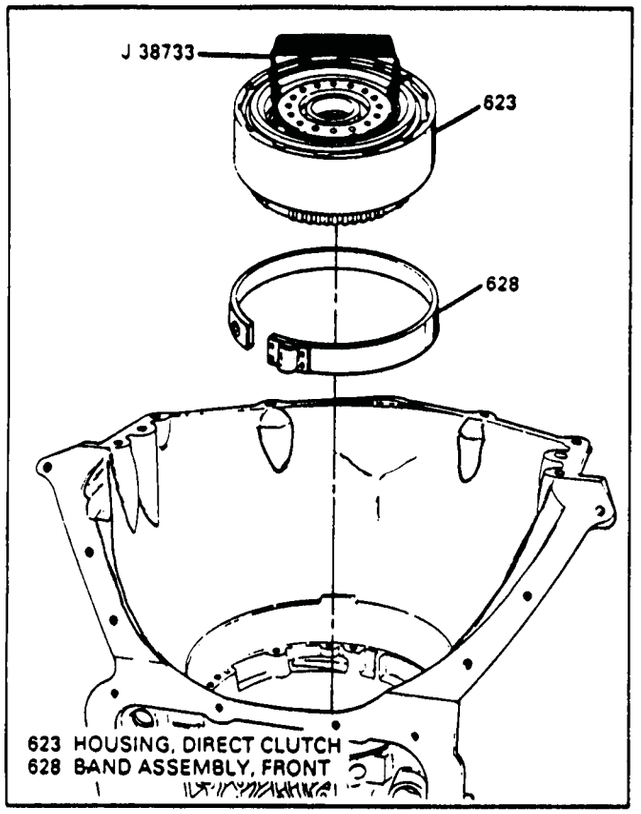



Figure 51

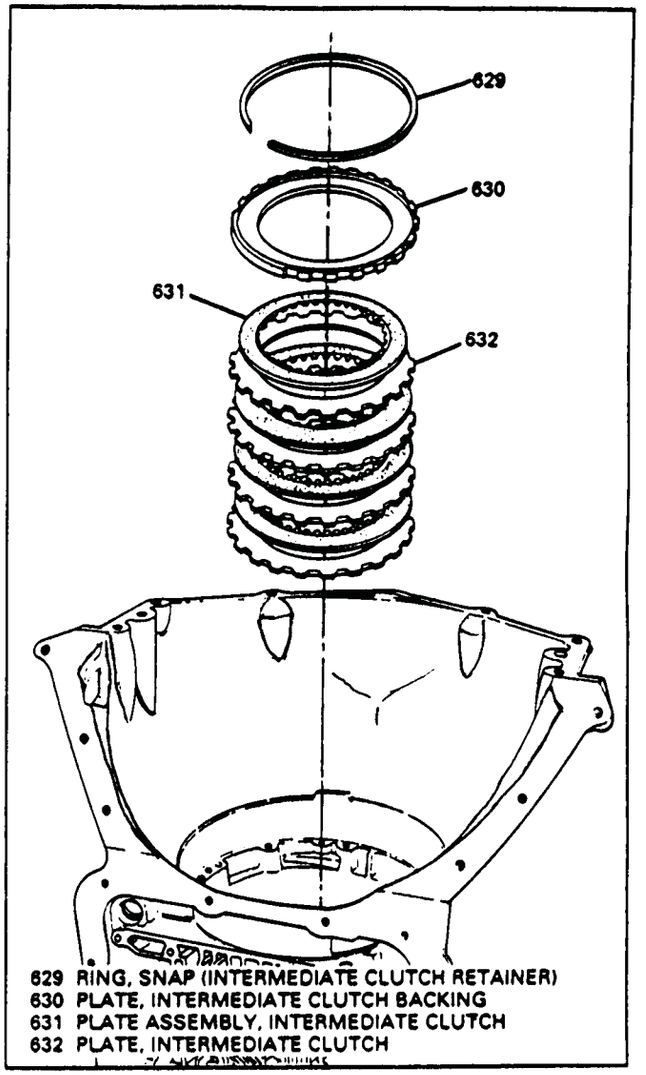



Figure 52

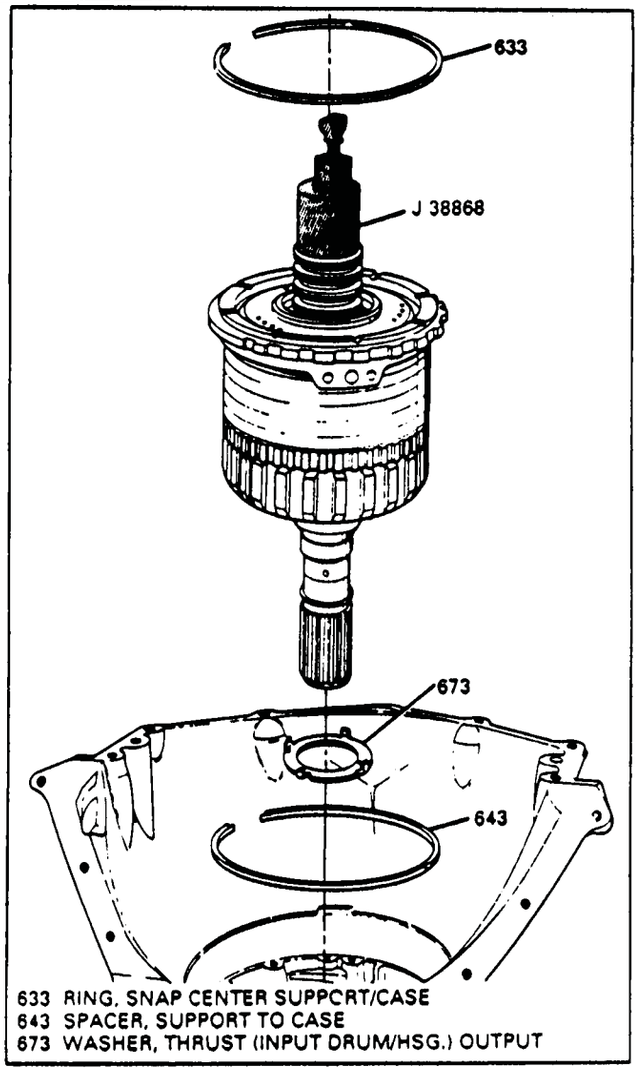



Figure 53

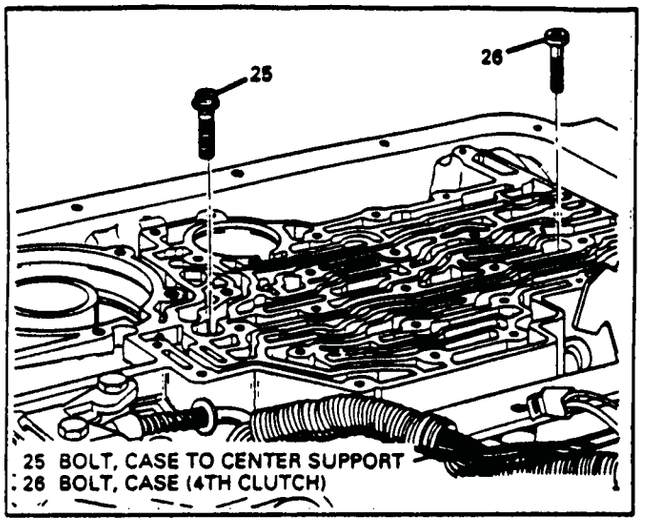



Figure 54

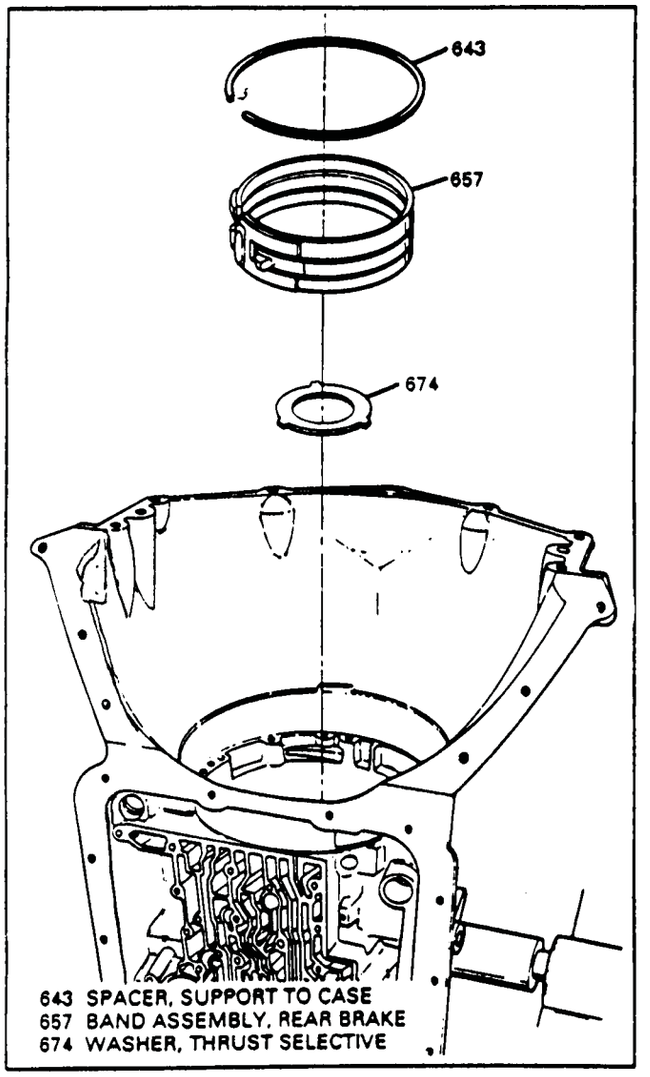
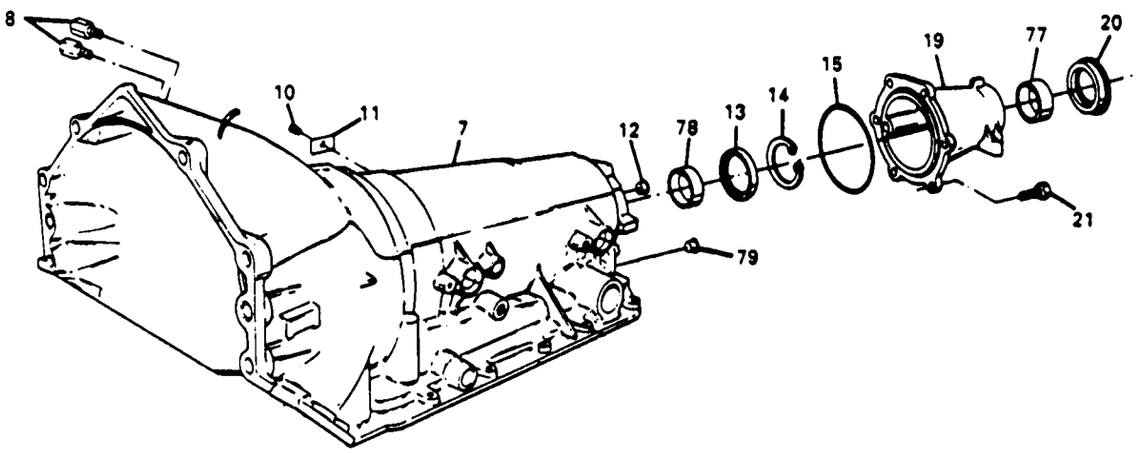



Figure 55



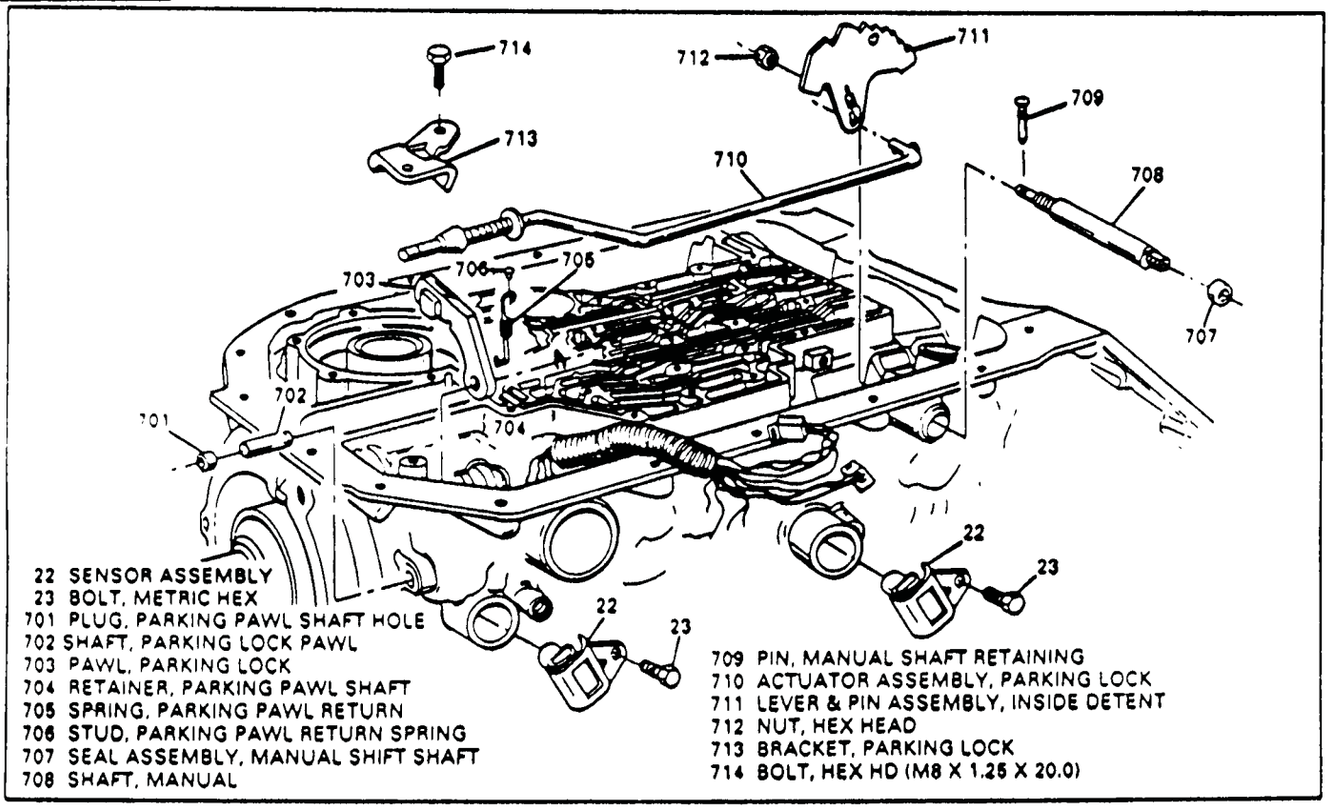

7 CASE ASSEMBLY, COMPLETE
8 FITTING, COOLER PIPE
10 SCREW, NAMEPLATE
11 NAMEPLATE
12 CUP, ORIFICE W/SEAL
13 SEAL ASSEMBLY, REAR LUBE
14 RING, SNAP CASE BUSHING
15 RING, SEAL EXTENSION TO CASE
19 EXTENSION ASSEMBLY, CASE
20 HELIXSEAL ASSEMBLY, CASE EXTENSION
21 BOLT, HEX HD (M10 X 1.5 X 30.0)
77 BUSHING, CASE EXTENSION
78 BUSHING, CASE TRANS.
79 PLUG, DIRECT OIL

Figure 56

## TRANSMISSION ASSEMBLY

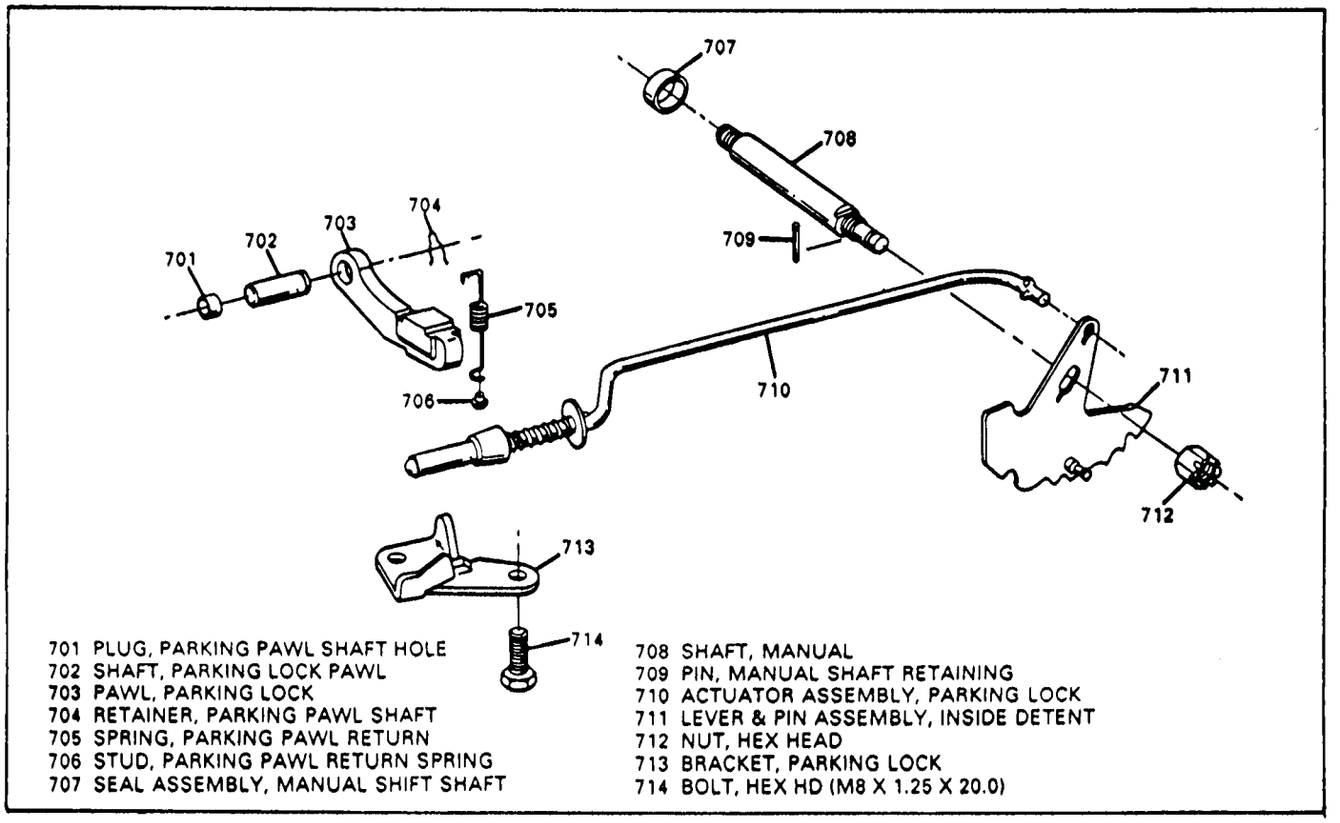
TRANSMISSION CASE ASSEMBLY

1. Inspect the case for following:
   * Cracks, Porosity, Bushing for wear and/or damage.
   * All threaded holes for damage. (Heli-coil to repair damage).
   * Front and rear servo bores for wear and/or damage.
   * Case center lugs for damage.
2. Remove snap ring and replace rear lube lube seal with seal driver.
3. Install the snap ring (14) as shown in Figure 56.
4. Install the TCC/PWM solenoid screen in case passage shown in Figure 34.
5. Lubricate new manual shaft seal with petrolatum, and install manual shaft seal into case bore.
6. Make sure it is fully seated with a 14mm deep socket.
7. If parking linkage and manual shaft were removed, install linkage at this time using Figure 57 and 58 as guide.
8. DO NOT install parking bracket (713) or the speed sensors (22) at this time to prevent damage during gear train installation (See Figure 57).
9. Install selective thrust plate (674) into transmission case, and retain with petrolatum (See Figure 59).
10. Install the reverse band into case, and insure that band apply tab lines up with rear servo pin bore.



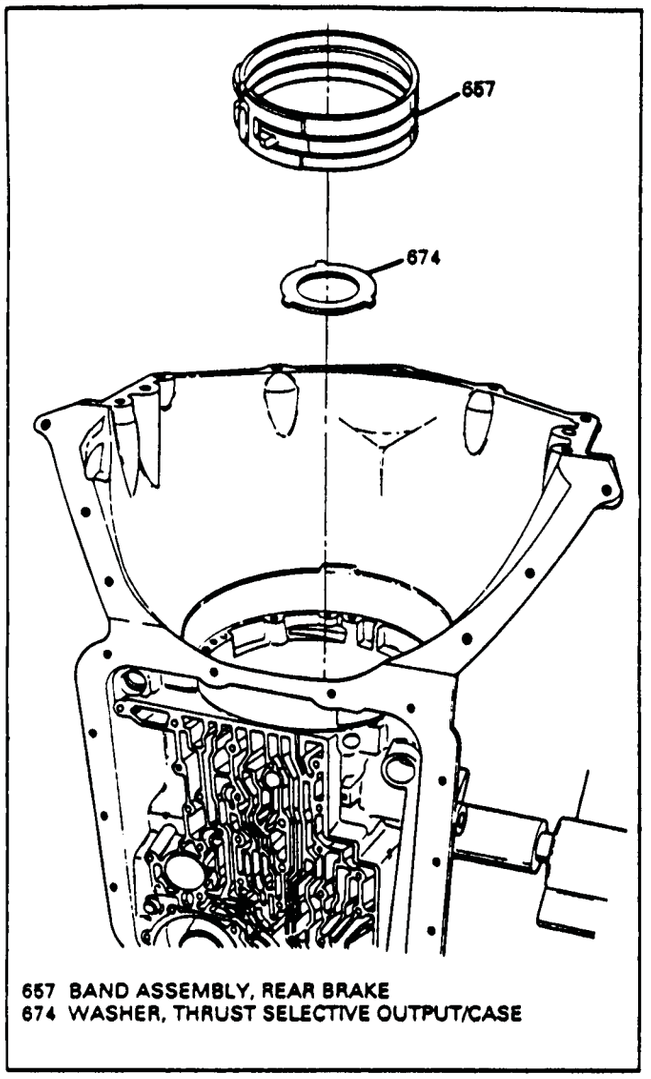

22 SENSOR ASSEMBLY
23 BOLT, METRIC HEX
701 PLUG, PARKING PAWL SHAFT HOLE
702 SHAFT, PARKING LOCK PAWL
703 PAWL, PARKING LOCK
704 RETAINER, PARKING PAWL SHAFT
705 SPRING, PARKING PAWL RETURN
706 STUD, PARKING PAWL RETURN SPRING
707 SEAL ASSEMBLY, MANUAL SHIFT SHAFT
708 SHAFT, MANUAL
709 PIN, MANUAL SHAFT RETAINING
710 ACTUATOR ASSEMBLY, PARKING LOCK
711 LEVER & PIN ASSEMBLY, INSIDE DETENT
712 NUT, HEX HEAD
713 BRACKET, PARKING LOCK
714 BOLT, HEX HD (M8 X 1.25 X 20.0)

Figure 57




701 PLUG, PARKING PAWL SHAFT HOLE
702 SHAFT, PARKING LOCK PAWL
703 PAWL, PARKING LOCK
704 RETAINER, PARKING PAWL SHAFT
705 SPRING, PARKING PAWL RETURN
706 STUD, PARKING PAWL RETURN SPRING
707 SEAL ASSEMBLY, MANUAL SHIFT SHAFT
708 SHAFT, MANUAL
709 PIN, MANUAL SHAFT RETAINING
710 ACTUATOR ASSEMBLY, PARKING LOCK
711 LEVER & PIN ASSEMBLY, INSIDE DETENT
712 NUT, HEX HEAD
713 BRACKET, PARKING LOCK
714 BOLT, HEX HD (M8 X 1.25 X 20.0)

Figure 58



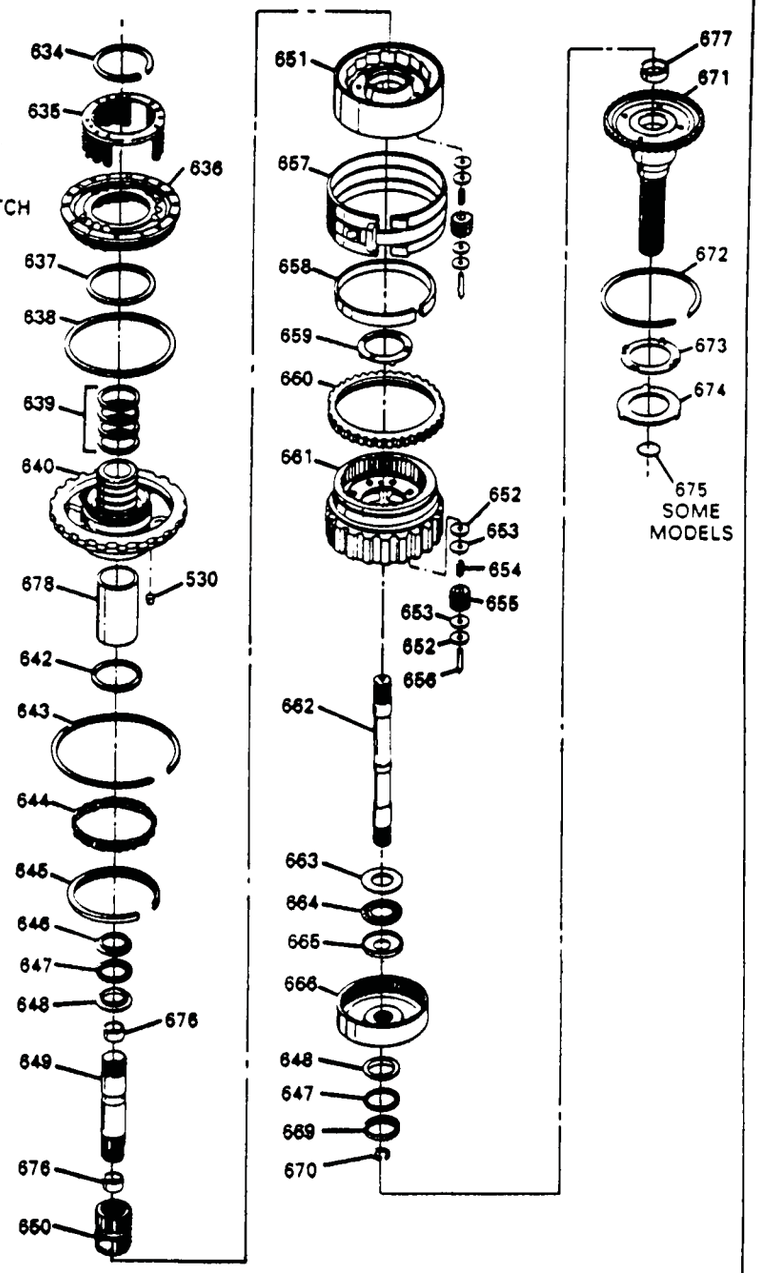

657 BAND ASSEMBLY, REAR BRAKE
674 WASHER, THRUST SELECTIVE OUTPUT/CASE

Figure 59

DISASSEMBLE GEAR TRAIN PARTS

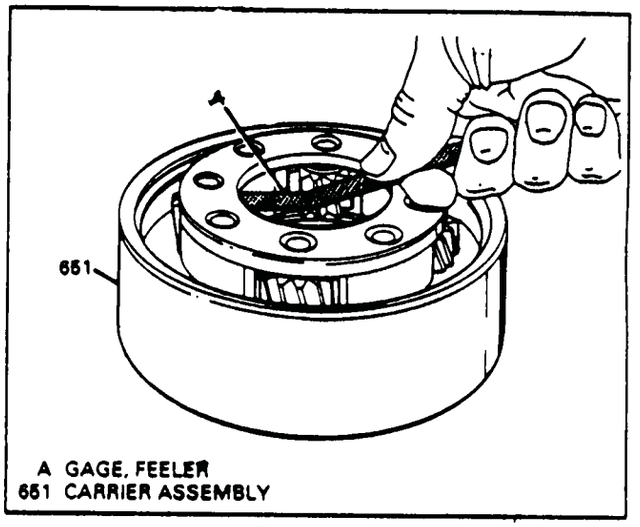
1. Disassemble all gear train parts using Figure 60 as a guide.
2. Inspect all parts for wear or damage that are shown in Figure 60.
3. Check both planetary carriers for excessive pinion end play, using feeler gage, as shown in Figures 61 and 63.
4. Normal end play is .009" to .024".
5. Clean all parts thoroughly.

530 PLUG, ORIFICE CENTER SUPPORT
634 RING, SNAP INTERMEDIATE CLUTCH
635 SPRING & RETAINER ASM., INTERMEDIATE CLUTCH
636 PISTON, INTERMEDIATE CLUTCH
637 SEAL, INTERMEDIATE CLUTCH (INNER)
638 SEAL, INTERMEDIATE CLUTCH (OUTER)
639 RING, OIL SEAL
640 SUPPORT & RACE ASSEMBLY, CENTER
641 PLUG, ORIFICE CENTER SUPPORT
642 WASHER, THRUST SUPPORT/REACTION DRUM
643 SPACER, SUPPORT TO CASE
644 ROLLER CLUTCH ASSEMBLY
645 RING, REACTION DRUM SPACER
646 RACE, THRUST BEARING TO CENTER SUPPORT
647 BEARING, NEEDLE THRUST
648 RACE, THRUST BEARING
649 SHAFT ASSEMBLY, SUN GEAR
650 GEAR, SUN
651 DRUM & CARRIER ASSEMBLY, REACTION
652 WASHER, PINION THRUST
653 WASHER, PINION THRUST
654 ROLLER, NEEDLE BEARING
655 PINION, PLANET
656 PIN, PLANET PINION
657 BAND ASSEMBLY, REAR BRAKE
658 RING, FRONT INTERNAL GEAR
659 WASHER, FRONT INTERNAL/REACTION CARRIER
660 RING, OUTPUT SPEED SENSOR
661 CARRIER ASSEMBLY, OUTPUT
662 SHAFT, TRANSMISSION MAIN
663 RACE, THRUST BEARING TO SUN GEAR
664 BEARING, NEEDLE THRUST RR INTERNAL GEAR
665 RACE, THRUST BEARING TO RR INTERNAL GEAR
666 GEAR, REAR INTERNAL
669 RACE, THRUST BEARING TO OUTPUT SHAFT
670 RING, SNAP MAINSHAFT INTERNAL GEAR
671 SHAFT & BUSHING ASSEMBLY, OUTPUT
672 RING, SNAP (OUTPUT SHAFT/ FRONT INTERNAL GEAR)
673 WASHER, THRUST (INPUT DRUM/HSG.) OUTPUT
674 WASHER, THRUST SELECTIVE OUTPUT/CASE
675 SEAL, O-RING OUTPUT SHAFT
676 BUSHING, SUN GEAR SHAFT
677 BUSHING, OUTPUT SHAFT
678 BUSHING, CENTER SUPPORT



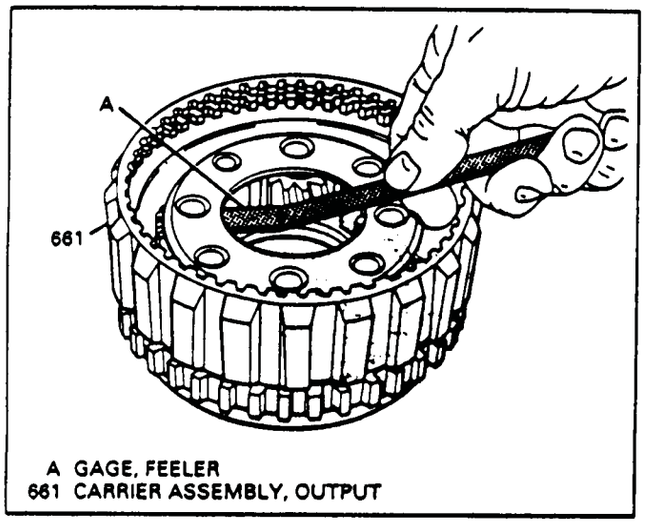

GEAR TRAIN PARTS

Figure 60



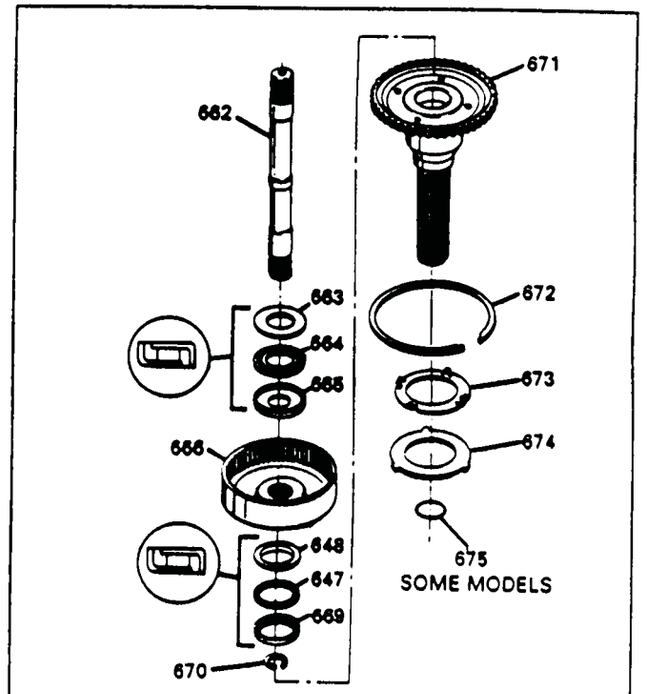

A GAGE, FEELER
651 CARRIER ASSEMBLY

Figure 61




A GAGE, FEELER
661 CARRIER ASSEMBLY, OUTPUT

Figure 63




647 BEARING, NEEDLE THRUST
648 RACE, THRUST BEARING
662 SHAFT, TRANSMISSION MAIN
663 RACE, THRUST BEARING TO SUN GEAR
664 BEARING, NEEDLE THRUST RR INTERNAL GEAR
665 RACE, THRUST BEARING TO RR INTERNAL GEAR
666 GEAR, REAR INTERNAL
669 RACE, THRUST BEARING TO OUTPUT SHAFT
670 RING, SNAP MAINSHAFT INTERNAL GEAR
671 SHAFT & BUSHING ASSEMBLY, OUTPUT
672 RING, SNAP (OUTPUT SHAFT/ FRONT INTERNAL GEAR)
673 WASHER, THRUST (INPUT DRUM/HSG.) OUTPUT
674 WASHER, THRUST SELECTIVE OUTPUT/CASE
675 SEAL, O-RING OUTPUT SHAFT

Figure 62

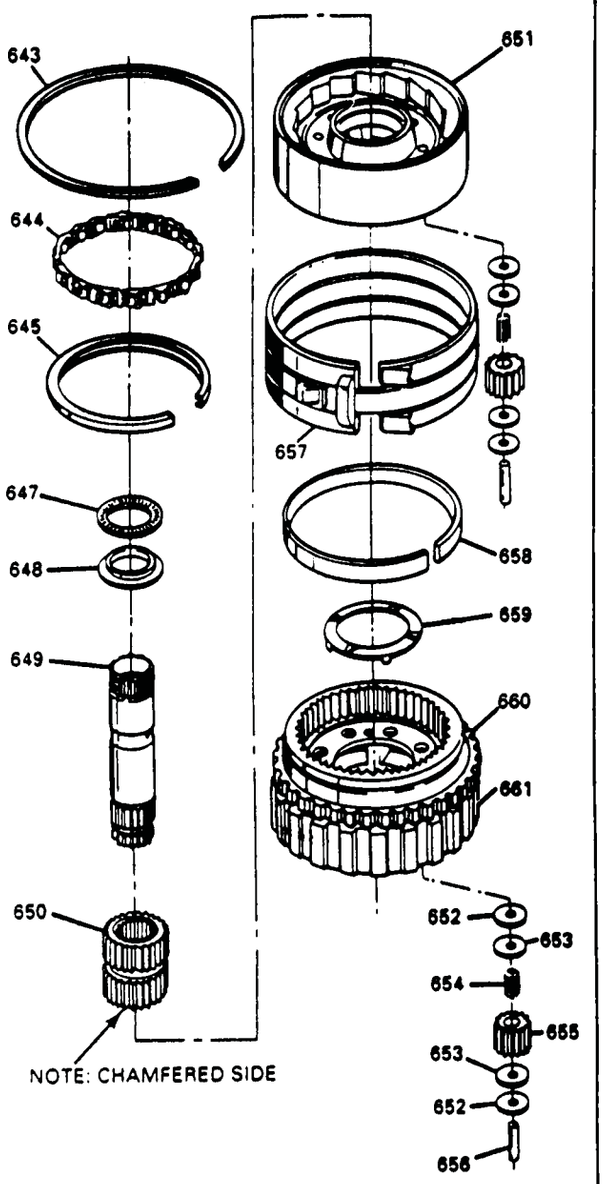
ASSEMBLE GEAR TRAIN PARTS

1. Install main shaft into rear ring gear (If Removed), and install snap ring on main shaft (See Figure 62).
2. Install inner race (648) with lip up, thrust bearing (647) and outer race with lip down, onto rear ring gear hub and retain with petrolatum (Figure 62).
3. Install outer race (665) with lip up, thrust bearing (664) and inner race (663), with lip down onto main shaft. (See Figure 62).
4. Install main shaft and rear ring gear assembly into output carrier assembly.
5. Install output shaft into output carrier assembly, and install snap ring. (See Figures 62 and 64).
6. Install thrust washer on back of output shaft, and retain with petrolatum. (See Figure 62).
7. Install thrust washer (659) onto output carrier with the tabs in pockets, and retain with petrolatum . (See Figure 64).
8. Install black spacer ring onto output carrier.
9. Install reaction carrier assembly onto output carrier by rotating into place. (See Figure 64).
10. Install sun gear into reaction carrier with the chamfered inner diameter facing down (See Figure 64).
11. Install sun gear shaft with the long splined end first and engage in the sun gear (See Figure 64).

Continued next page.

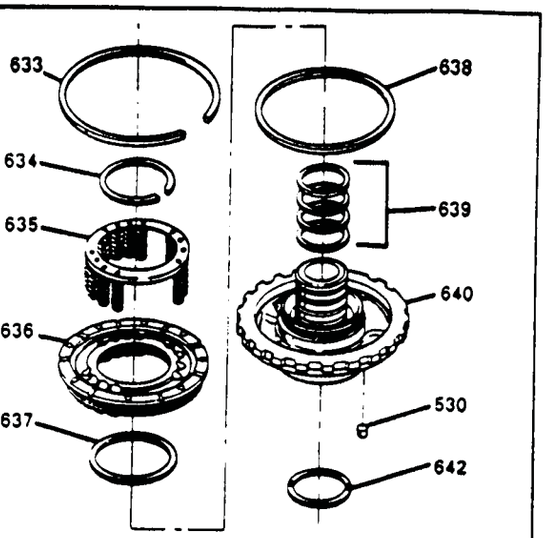
ASSEMBLE GEAR TRAIN PARTS (Continued)

12. Install longer lipped race (648) onto sun gear shaft with the lip facing up. (See Figure 64).
13. Install needle thrust bearing (647) on longer lipped race (See Figure 64).
14. With the center support on work bench install race (646) on center support and retain with petrolatum.
15. Install spacer ring (645) into reaction carrier assembly, if removed. (See Figure 64).
16. Install the intermediate roller clutch assembly into reaction carrier.
17. Inspect the center support assembly for any damage, and for presence of the orifice cup plug (See Figure 67).
18. Install the inner and outer lip seals onto intermediate piston, with the lip facing away from spring pockets. (See Figure 65).
19. Install tool J-21363 lip seal protector onto center support (See Figure 66).
20. Lubricate lip seals on piston with petrolatum, and install intermediate piston into center support by rotating into position.
21. Make sure that it is fully seated.
22. Install return spring and retainer assembly into the pockets in intermediate piston (See Figure 65).
23. Compress the spring assembly, install the snap ring, and insure fully seated.
24. Install new solid seal rings (639) on center support, using installer and resizing tool J-38735. See special tool section in rear of this booklet.
25. This tool is set up much like the 440 solid seal installer.
26. Be sure to use small chamfered end of resizer J-38735-2 to do the lower ring and the larger chamfered end to size all other seals. Start with the lower ring and work towards the top. (See Figure 68).
27. Lubricate the resized solid seals with petrolatum, for installation.
28. Install center support assembly into the intermediate roller clutch by rotating into position.



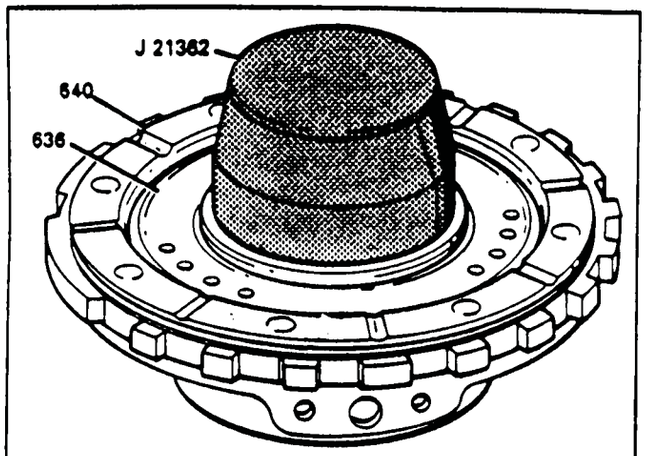

643 SPACER, SUPPORT TO CASE
644 ROLLER CLUTCH ASSEMBLY
645 RING, REACTION DRUM SPACER
647 BEARING, NEEDLE THRUST SUPPORT/SUN GEAR
648 RACE, THRUST BEARING TO SUN GEAR
649 SHAFT ASSEMBLY, SUN GEAR
650 GEAR, SUN
651 DRUM & CARRIER ASSEMBLY, REACTION
652 WASHER, PINION THRUST
653 WASHER, PINION THRUST
654 ROLLER, NEEDLE BEARING
655 PINION, PLANET
656 PIN, PLANET PINION
657 BAND ASSEMBLY, REAR BRAKE
658 RING, FRONT INTERNAL GEAR
659 WASHER, FRONT INTERNAL/REACTION CARRIER
660 RING, OUTPUT SPEED SENSOR
661 CARRIER ASSEMBLY, OUTPUT

Figure 64



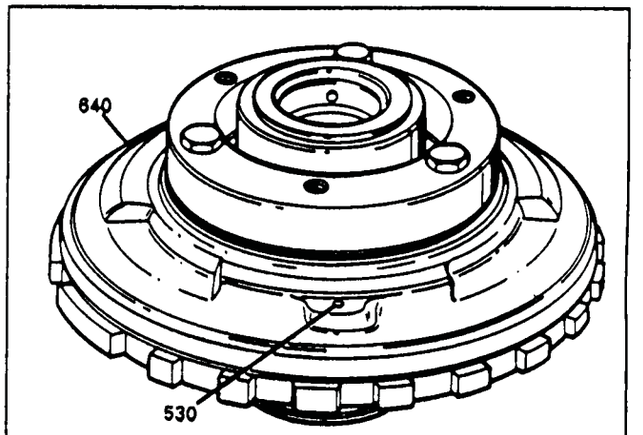

530 PLUG, ORIFICE CENTER SUPPORT
633 RING, SNAP CENTER SUPPORT/CASE
634 RING, SNAP INTERMEDIATE CLUTCH
635 SPRING & RETAINER ASM., INTERMEDIATE CLUTCH
636 PISTON, INTERMEDIATE CLUTCH
637 SEAL, INTERMEDIATE CLUTCH (INNER)
638 SEAL, INTERMEDIATE CLUTCH (OUTER)
639 RING, OIL SEAL
640 SUPPORT & RACE ASSEMBLY, CENTER
642 WASHER, THRUST SUPPORT/REACTION DRUM

Figure 65



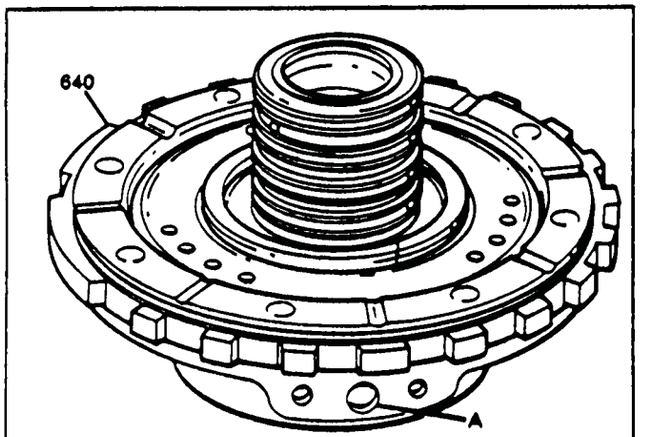

636 PISTON, INTERMEDIATE CLUTCH
640 SUPPORT & RACE ASSEMBLY, CENTER

Figure 66



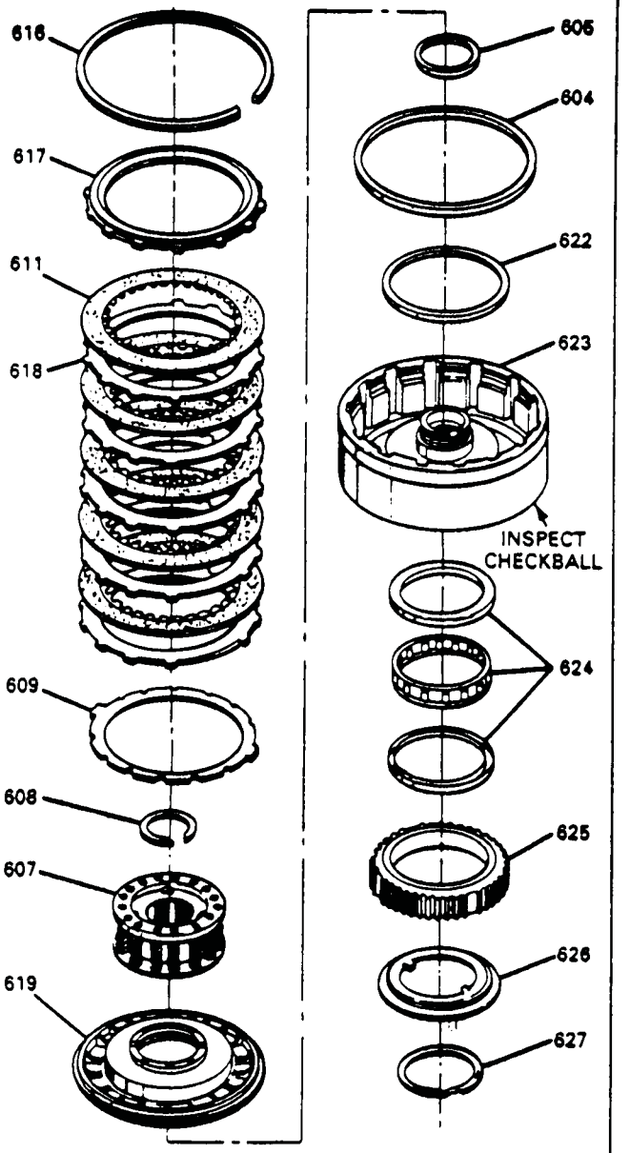

530 PLUG, ORIFICE CENTER SUPPORT
640 SUPPORT & RACE ASSEMBLY, CENTER

Figure 67



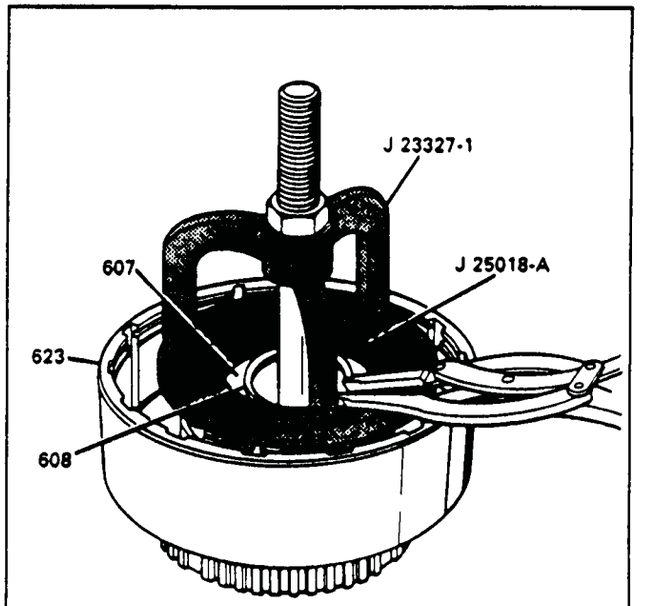

A PISTON APPLY
640 SUPPORT & RACE ASSEMBLY, CENTER

Figure 68




604 SEAL, CLUTCH (OUTER)
605 SEAL, CLUTCH (INNER)
607 SPRING & RETAINER ASM., FORWARD CLUTCH
608 RING, SNAP
609 PLATE, CLUTCH (.054 DISHED)
611 PLATE ASSEMBLY, CLUTCH
616 RING, SNAP (6.24 O.D. X .062)
617 PLATE, DIRECT CLUTCH BACKING
618 PLATE, CLUTCH (.0915 FLAT)
619 PISTON, DIRECT CLUTCH
622 SEAL, CLUTCH (CENTER)
623 HOUSING, DIRECT CLUTCH
624 SPRAG ASSEMBLY, INTERMEDIATE CLUTCH
625 RACE, INTERMEDIATE CLUTCH (OUTER)
626 RETAINER, INTERMEDIATE CLUTCH
627 RING, EXTERNAL LOCKING

Figure 69

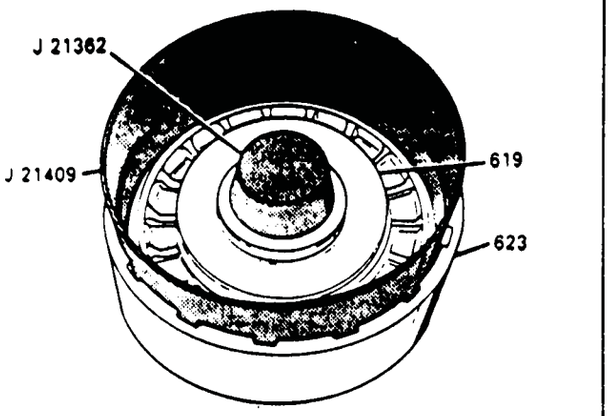



607 SPRING & RETAINER ASM.
608 RING, SNAP
623 HOUSING, DIRECT CLUTCH

Figure 70

DIRECT CLUTCH ASSEMBLY

1. Remove the backing plate snap ring and the backing plate (See Figure 69).
2. Remove the direct clutch pack, 5 lined plates, 5 steel plates, and 1 dished plate (See Figure 73).
3. Note the direction of the dished plate.
4. Compress the return spring assembly as shown in Figure 70, and remove the snap ring.
5. Remove the spring compressor and remove the return spring assembly (Figure 69).
6. Remove the direct clutch piston, remove and discard the lip seals from piston.
7. Remove and discard the lip seal from the center of direct clutch housing.
8. Remove the intermediate sprag parts for inspection if necessary (See Figure 69).
9. Clean all parts thoroughly in solvent.
10. Install intermediate sprag assembly on direct clutch housing (See Figure 72).
11. Install the outer race, grooves up, by rotating with a clockwise motion.
12. Sprag race should freewheel clockwise and lock counterclockwise, if installed properly (See Figure 72).
13. Install sprag retainer and spiral snap ring (See Figure 72).




619 PISTON, DIRECT CLUTCH
623 HOUSING, DIRECT CLUTCH

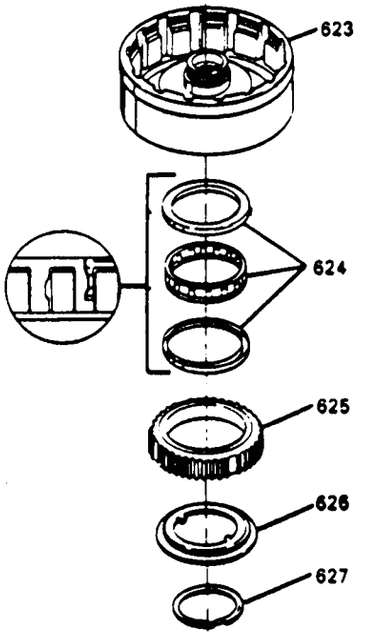
Figure 71

DIRECT CLUTCH ASSEMBLY (Continued)

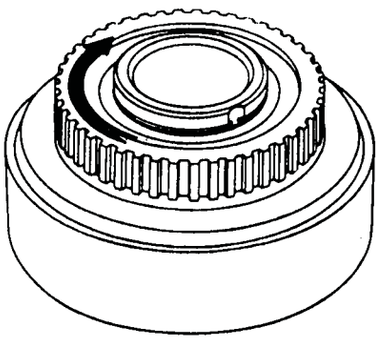
14. Install the inner lip seal and outer lip seal on direct clutch piston, with the lips facing the housing.
15. Lubricate lip seals with petrolatum.
16. Install lip seal onto center of direct clutch housing, with lip facing up, and lubricate with petrolatum.
17. Install lip seal protectors J-21362 and J-21409 on housing as shown in Figure 71.
18. Install the direct clutch piston into housing with rotating movement until it is fully seated in housing.
19. Install spring retainer, compress spring retainer, and install snap ring as shown in Figure 70.
20. Install dished plate into direct clutch housing with the inner diameter facing down (See Figure 73).
21. Install 5 lined plates and 5 steel plate starting with a steel plate on top of the dished plate, and alternating. (See Figure 73).
22. Install the direct clutch backing plate and backing plate snap ring.
23. Install the assembly onto center support and air check for proper operation, as shown in Figure 74.
24. Remove direct clutch from center support and set aside.

**1991 HYDRA-MATIC 4L80-E**
**CLUTCH PLATE APPLICATION CHART**
**DIRECT CLUTCH**

| MODELS | | NO. OF FLAT STEEL PLATES | NO. OF DISHED PLATES | NO. OF COMPOSITION PLATES | PISTON TRAVEL CHECK |
|---|---|---|---|---|---|
| | THICKNESS | 2.32MM (.0915") | | 2.03MM (.080") | 3.07-6.00MM (0.121"-0.236") |
| ALL MODELS | | 5 | 1 | 5 | |

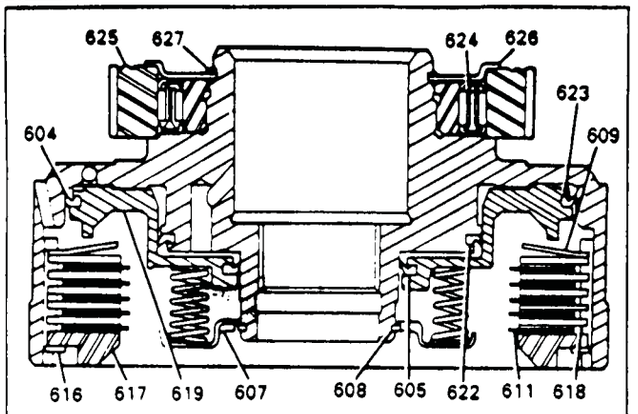



623 HOUSING, DIRECT CLUTCH
624 SPRAG ASSEMBLY, INTERMEDIATE CLUTCH
625 RACE, INTERMEDIATE CLUTCH (OUTER)
626 RETAINER, INTERMEDIATE CLUTCH
627 RING, EXTERNAL LOCKING



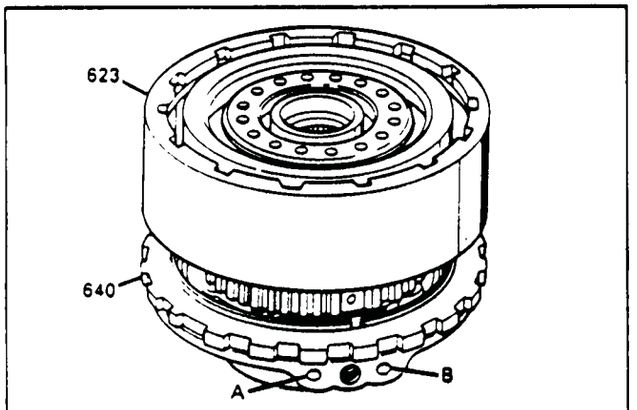
SHOULD FREEWHEEL IN DIRECTION OF ARROW AND LOCK OPPOSITE DIRECTION

Figure 72



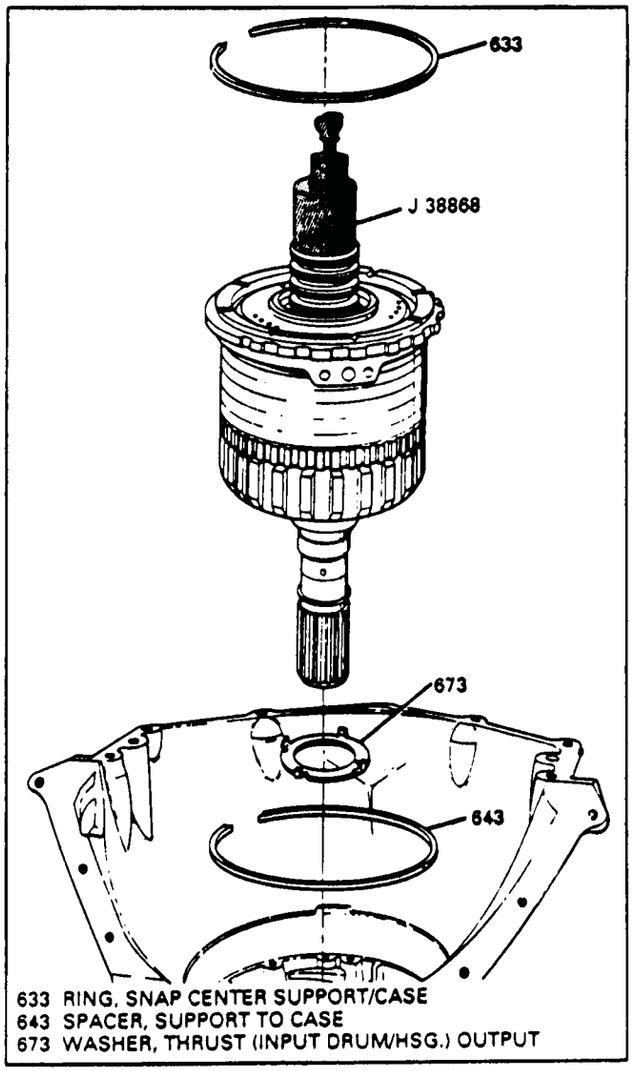

604 SEAL, CLUTCH (OUTER)
605 SEAL, CLUTCH (INNER)
607 SPRING & RETAINER ASM.
608 RING, SNAP
609 PLATE, CLUTCH (.054 DISHED)
611 PLATE ASSEMBLY, CLUTCH
616 RING, SNAP (6.24 O.D. X .062)
617 PLATE, DIRECT CLUTCH BACKING
618 PLATE, CLUTCH (.0915 FLAT)
619 PISTON, DIRECT CLUTCH
622 SEAL, CLUTCH (CENTER)
623 HOUSING, DIRECT CLUTCH
624 SPRAG ASSEMBLY, INTERMEDIATE CLUTCH
625 RACE, INTERMEDIATE CLUTCH (OUTER)
626 RETAINER, INTERMEDIATE CLUTCH
627 RING, EXTERNAL LOCKING

Figure 73




A DIRECT CLUTCH FLUID PASSAGE
B REVERSE CLUTCH FLUID PASSAGE
623 HOUSING, DIRECT CLUTCH
640 SUPPORT & RACE ASSEMBLY, CENTER

Figure 74




633 RING, SNAP CENTER SUPPORT/CASE
643 SPACER, SUPPORT TO CASE
673 WASHER, THRUST (INPUT DRUM/HSG.) OUTPUT

Figure 75

INSTALL CENTER SUPPORT AND GEAR TRAIN

1. Install thin spacer ring into the groove in case, that is shown in Figure 76. (Third snap ring groove down). Install so the snap ring opening is at the nine o'clock position.
2. Install J-38868 tool onto gear train assembly, as shown in Figure 75.
3. With transmission in a vertical position align bolt hole in center support with hole in case, and carefully lower gear unit and center support assembly into the case using J-38868 tool until fully seated (See Figure 75).
4. Install the "Beveled" snap ring into the case groove, with flat side down, and snap ring opening at the 9 o'clock position.

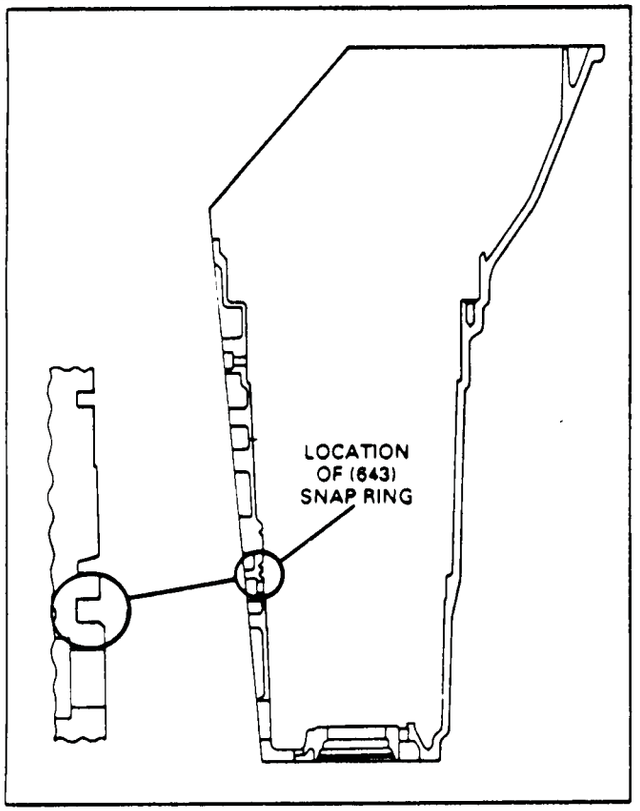



Figure 76

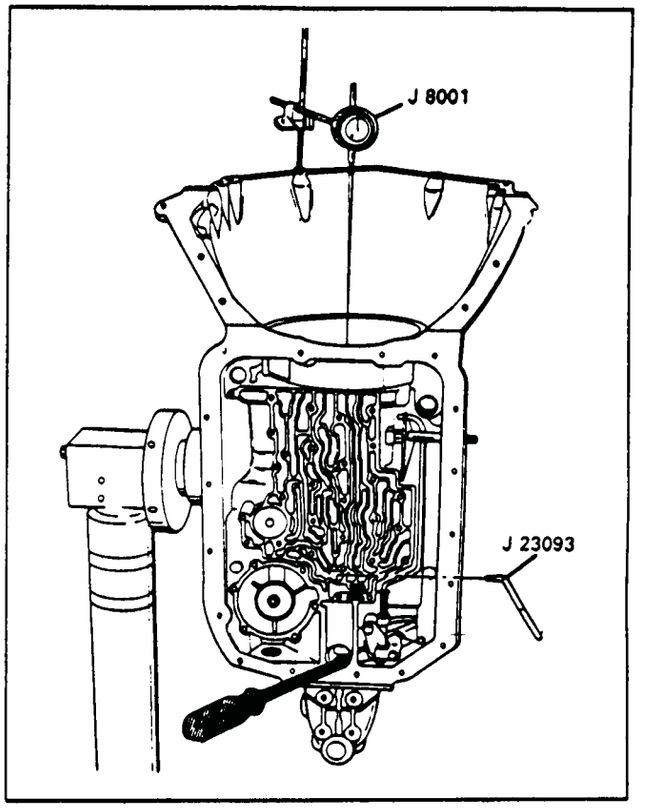



Figure 77

5. Check rear end play before installing the center support bolt.
6. Install dial indicator and locate on the main shaft, as shown in Figure 77.
7. While prying up on the output carrier with a large screwdriver, as shown in Figure 77, end play reading should be .005" to .025".
8. Change the selective spacer in rear of case to obtain this dimension.
9. Locate tool J-23093 into the direct clutch passage through the case. Apply pressure on J-23093 seating the center support splines counterclockwise against the case splines (See Figure 77).
10. Install the center support bolt into center support, using a 3/8" 12 point socket, and torque to 32 ft.lbs.
11. DO NOT OVER TORQUE, as this bolt is hollow to allow oil pressure to apply the intermediate clutch pack.

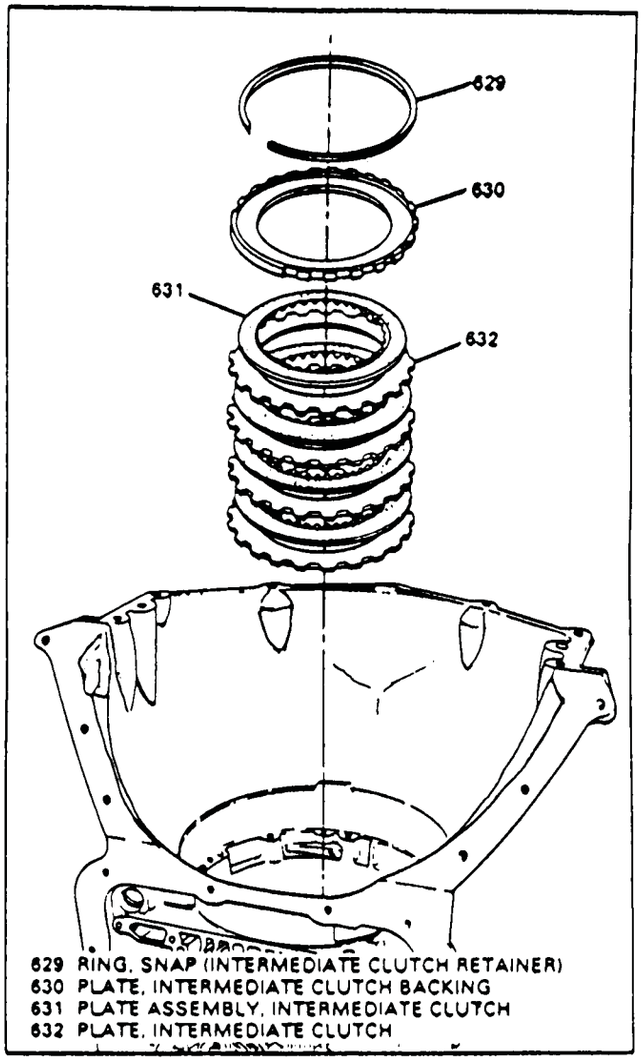



Figure 78

INSTALL INTERMEDIATE CLUTCH PLATES

1. Install the intermediate clutch plates both steel and lined, starting with a steel plate, and alternating with a lined plate (See Figure 78).
2. Install the intermediate backing plate as shown in Figure 78.
3. Install the backing plate snap ring, leaving the snap ring opening at the 9 o'clock position.
4. Check clutch pack end play, using a feeler gage between backing plate and snap ring.
5. End play should be .040" to .107".
6. Install the intermediate band assembly ensuring that it is engaged on band anchor in case.

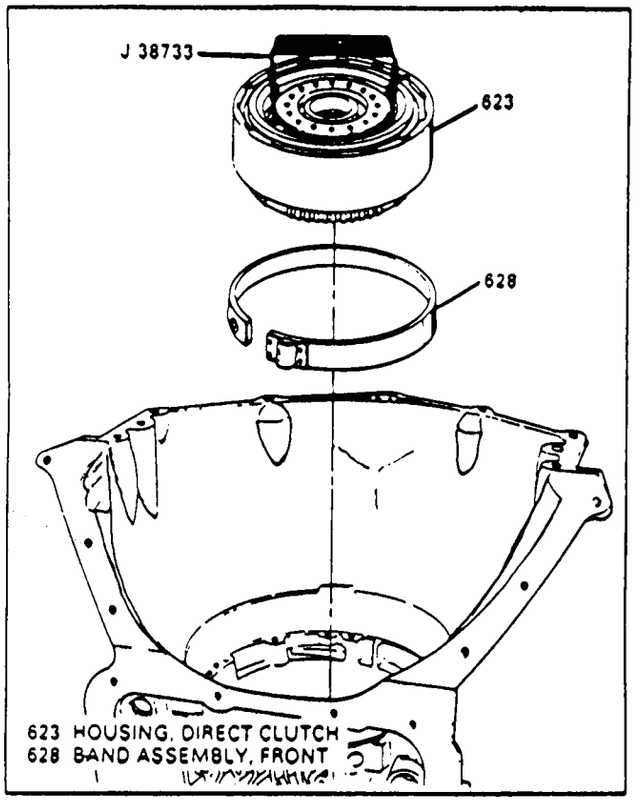
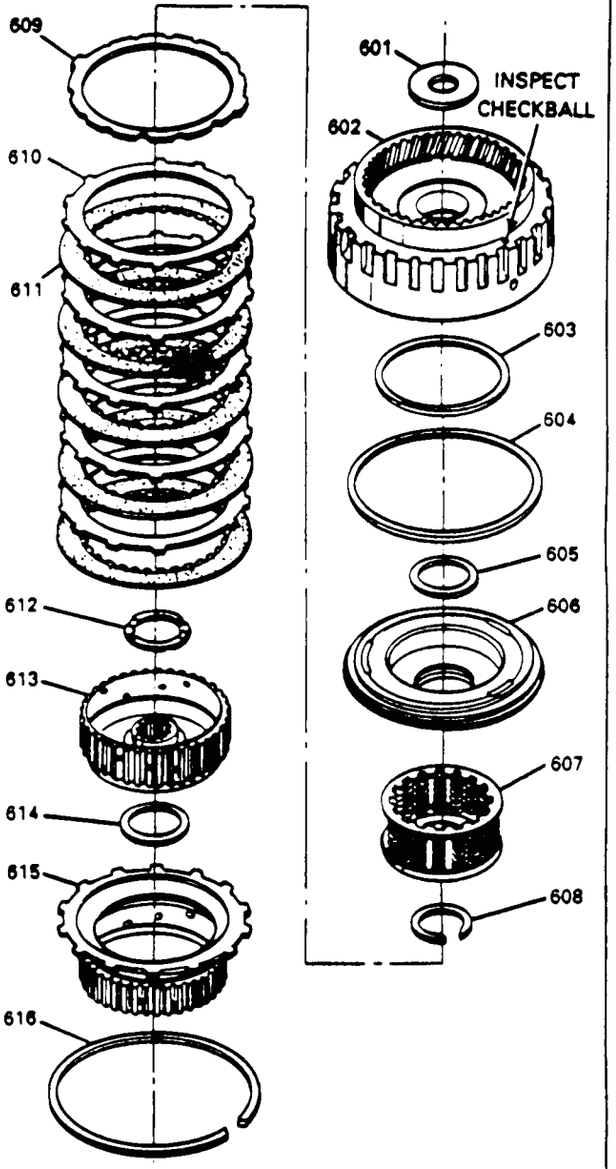


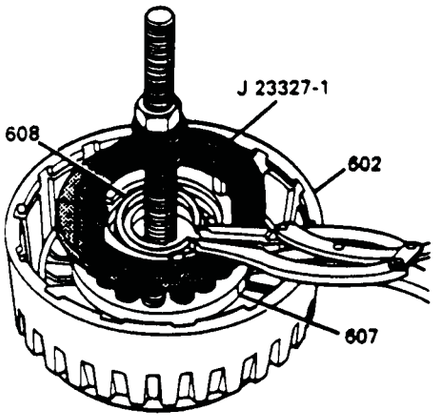

Figure 79

7. Install the direct clutch housing into transmission, and engage intermediate clutch plates, by rotating into position.
8. Make sure that it is fully seated into position.
9. Use tool J-38733, as shown in Figure 79 for installation.
10. Check for freedom of movement.




601 BEARING ASM., THRUST CARRIER/FORWARD CLUTCH
602 HOUSING ASSEMBLY, FORWARD CLUTCH
603 SEAL, CLUTCH (CENTER)
604 SEAL, CLUTCH (OUTER)
605 SEAL, CLUTCH (INNER)
606 PISTON, FORWARD CLUTCH
607 SPRING & RETAINER ASM.
608 RING, SNAP
609 PLATE, CLUTCH (.054 DISHED)
610 PLATE, CLUTCH (.0775 FLAT)
611 PLATE ASSEMBLY, CLUTCH
612 WASHER, THRUST CLUTCH HUB HOUSING
613 HUB, FORWARD CLUTCH DRIVEN
614 WASHER, THRUST FORWARD CLUTCH
615 HUB, DIRECT CLUTCH DRIVING
616 RING, SNAP (6.24 O.D. X .062)

Figure 80



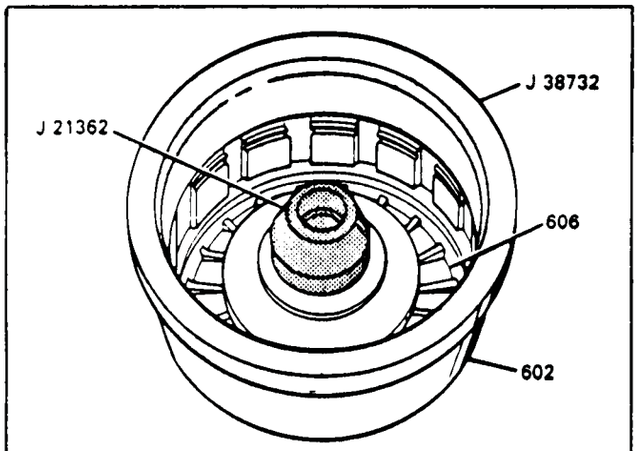

602 HOUSING ASSEMBLY, FORWARD CLUTCH
607 SPRING & RETAINER ASM.
608 RING, SNAP

Figure 81

FORWARD CLUTCH HOUSING OVERHAUL

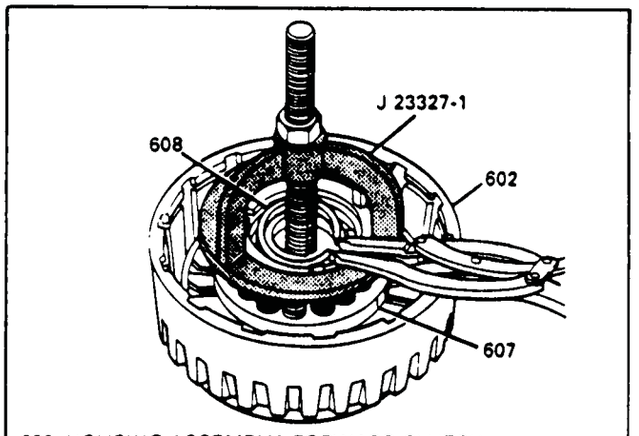
1. Remove the snap ring from top of the backing plate/direct clutch hub (See Figure 80).
2. Remove the direct clutch hub (615) as shown in Figure 80.
3. Remove the forward clutch hub (613) as shown in Figure 80, and both of the thrust washers.
4. Remove the forward clutch plates from forward housing, 5 lined plates, 5 steel plates, and 1 dished cushion plate, as shown in Figure 80.
5. Compress the return spring assembly as shown in Figure 81, and remove the snap ring with snap ring pliers.
6. Remove the spring compressor, and remove the return spring assembly.
7. Remove the forward clutch piston from the housing (See Figure 80).
8. Remove and discard the lip seals from the forward clutch piston.
9. Remove the lip seal from the center of forward clutch housing and discard.
10. Inspect all parts thoroughly for damage.
11. Clean all parts thoroughly in clean solvent, and air dry.

Continued on page 59.




602 HOUSING ASSEMBLY, FORWARD CLUTCH
606 PISTON, FORWARD CLUTCH

Figure 82



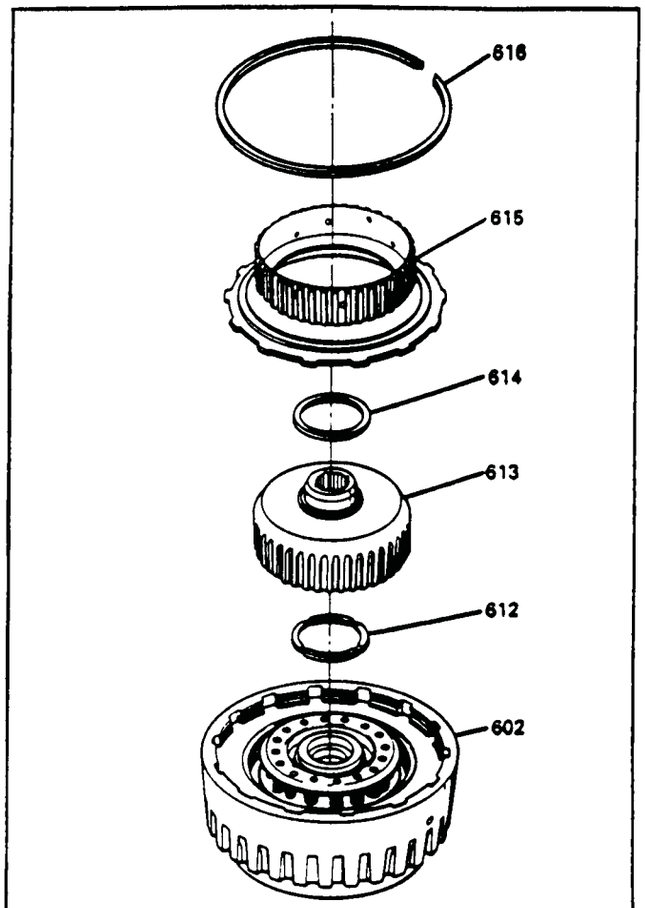

602 HOUSING ASSEMBLY, FORWARD CLUTCH
607 SPRING & RETAINER ASM.
608 RING, SNAP

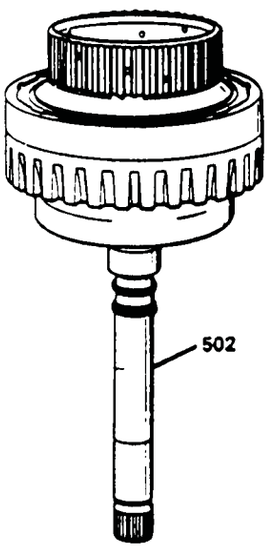
Figure 83

**1991 HYDRA-MATIC 4L80-E**
**CLUTCH PLATE APPLICATION CHART**
**FORWARD CLUTCH**

| MODELS | | NO. OF FLAT STEEL PLATES | NO. OF DISHED PLATES | NO. OF COMPOSITION PLATES | PISTON TRAVEL CHECK |
|---|---|---|---|---|---|
| | THICKNESS | 1.97MM (.0775") | 1.37MM (.054") | 2.03MM (.080") | 3.07-6.00MM (0.121"-0.236") |
| ALL MODELS | | 5 | 1 | 5 | |

Figure 84




502 SHAFT, TURBINE
602 HOUSING ASSEMBLY, FORWARD CLUTCH
612 WASHER, THRUST CLUTCH HUB HOUSING
613 HUB, FORWARD CLUTCH DRIVEN
614 WASHER, THRUST FORWARD CLUTCH
615 HUB, DIRECT CLUTCH DRIVING
616 RING, SNAP (6.24 O.D. X .062)

Figure 85

FORWARD CLUTCH HOUSING (Continued)

12. Install new lip seals onto the forward clutch piston, with the lips facing the housing, and lubricate with petrolatum.
13. Install new lip seal into the center of forward clutch housing, with the lip facing up, and lube with petrolatum.
14. Install lip seal protectors on housing as shown in Figure 82, and install the forward clutch piston into the housing by rotating into position.
15. Install the return spring assembly (607) as shown in Figure 80.
16. Compress the return spring assembly and install the snap ring as shown in Figure 83.
17. Remove the spring compressor slowly.
18. Install the bronze thrust washer (612) on the inside of forward clutch hub and retain with petrolatum (See Figure 85).
19. Install thrust washer (614) on outside of forward hub and retain with petrolatum (See Figure 85).
20. Install forward clutch hub into forward clutch housing (See Figure 85).
21. Install the dished cushion plate with the inside diameter facing down, same as the direct clutch.
22. Install forward clutch plates alternatly starting with a steel plate on top of the dished plate (See Figure 80).
23. Install the Backing Plate/Direct Clutch Hub (615) as shown in Figure 85.
24. Install the forward clutch housing snap ring (See Figure 85).
25. Forward clutch can be air checked for proper operation, by installing on a reconditioned turbine shaft, and apply air between the 2 sealing rings. (See Figure 85).
26. Install the thrust bearing (601) shown in Figure 86, and retain with petrolatum.
27. Install the forward clutch housing, as shown in Figure 86, using tool J-38358-A into transmission by rotating back and forth until fully seated into place.

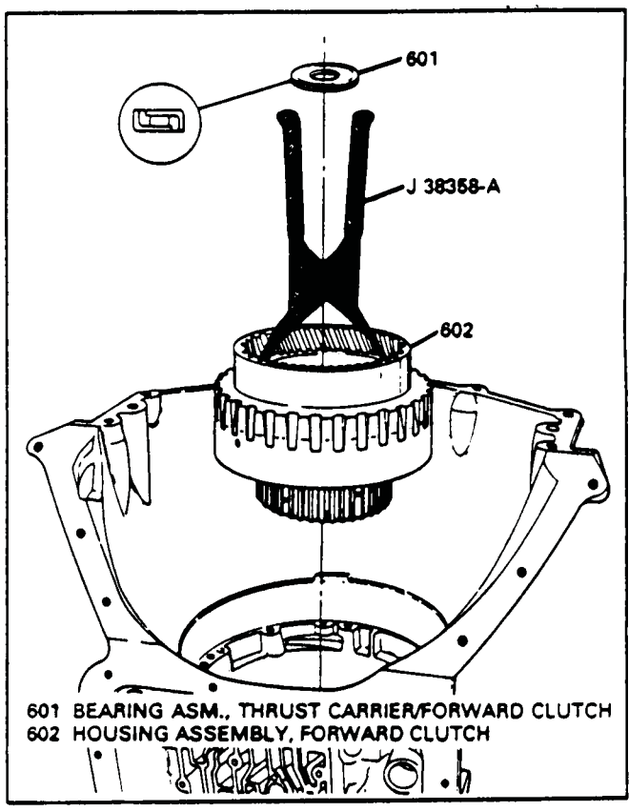
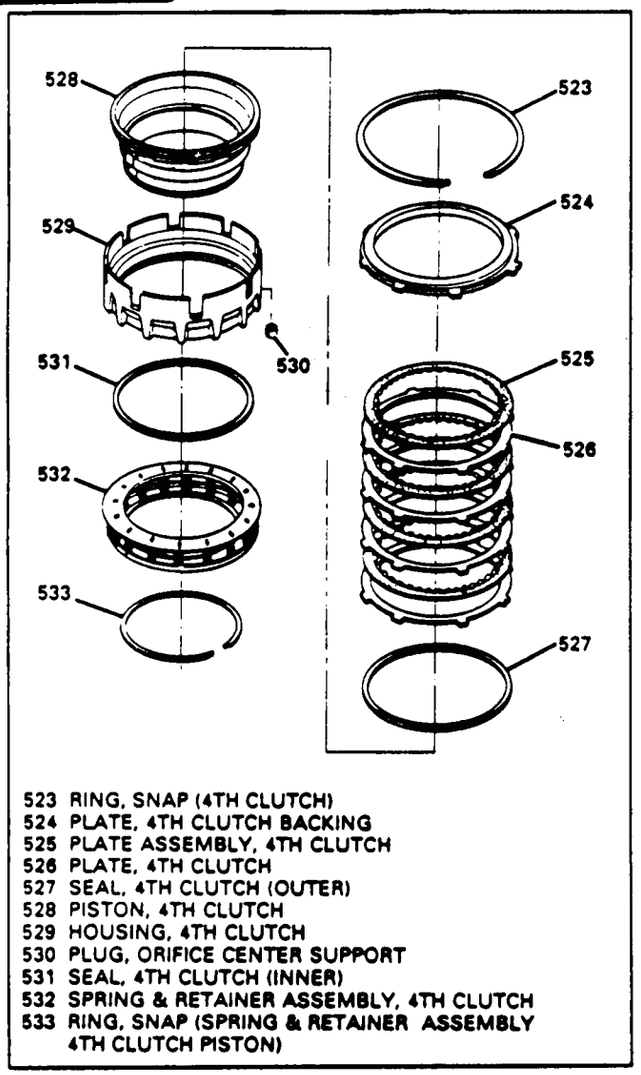



Figure 86




523 RING, SNAP (4TH CLUTCH)
524 PLATE, 4TH CLUTCH BACKING
525 PLATE ASSEMBLY, 4TH CLUTCH
526 PLATE, 4TH CLUTCH
527 SEAL, 4TH CLUTCH (OUTER)
528 PISTON, 4TH CLUTCH
529 HOUSING, 4TH CLUTCH
530 PLUG, ORIFICE CENTER SUPPORT
531 SEAL, 4TH CLUTCH (INNER)
532 SPRING & RETAINER ASSEMBLY, 4TH CLUTCH
533 RING, SNAP (SPRING & RETAINER ASSEMBLY 4TH CLUTCH PISTON)

Figure 87

FOURTH CLUTCH ASSEMBLY OVERHAUL

1. Remove snap ring from the top of fourth clutch backing plate (See Figure 87).
2. Remove fourth clutch backing plate.
3. Remove fourth clutch plates, 4 steel plates, and 4 lined plates.
4. Compress the return spring assembly and remove the snap ring (533) as shown in Figure 87.
5. Remove the compressor and the return spring assembly.
6. Remove the 4th clutch piston with the outer seal, and 4th clutch housing with the inner seal.
7. Inspect all components thoroughly and clean all parts in clean solvent.
8. Dry all parts with compressed air.
9. Install new seal on 4th clutch piston and lubricate with petrolatum.
10. Install new seal into 4th clutch housing and lubricate with petrolatum.
11. Insure the presence of the orifice cup plug in the 4th clutch housing (See Figure 87).
12. Place seal protector J-38731-1 into the small end of 4th clutch housing. (See Figure 88).
13. Place seal protector J-38731-2 onto the large end of the 4th clutch piston. (See Figure 88).
14. Place spacer J-38731-3 inside of piston.
15. Place 4th clutch housing on bench resting on piston and piston spacer.
16. Push down on 4th clutch housing until piston is through housing, exposing the snap ring groove.
17. Remove seal protector J-38731-1.
18. Place return spring assembly onto the piston and compress.
19. Install the snap ring, and remove the spring compressor.
20. Turn the 4th housing assembly over and install 4steel plates, and 4 lined plates, starting with a steel plate and alternating. (See Figure 89).
21. Locate the steel plate index notch as shown in Figure 90.
22. Install the 4th clutch backing plate, with the flat side down, and index notch in same location as steels. (See Figure 90).
23. Install the snap ring, and make sure it is FULLY seated in the groove.
24. Measure 4th clutch clearance with feeler gage between backing plate and the snap ring. Clearance should be .040" - .100".
25. Install the 4th clutch housing assembly into the case.
    NOTE: Backing plate tang extending out of 4th clutch housing, must assemble into slot space in case and housing, with transmission in vertical position.
26. Install the 4th clutch bolt through case fluid passage into the 4th clutch housing (See Figure 54).
27. Torque 4th clutch bolt to 12 ft.lbs. DO NOT OVER TORQUE.

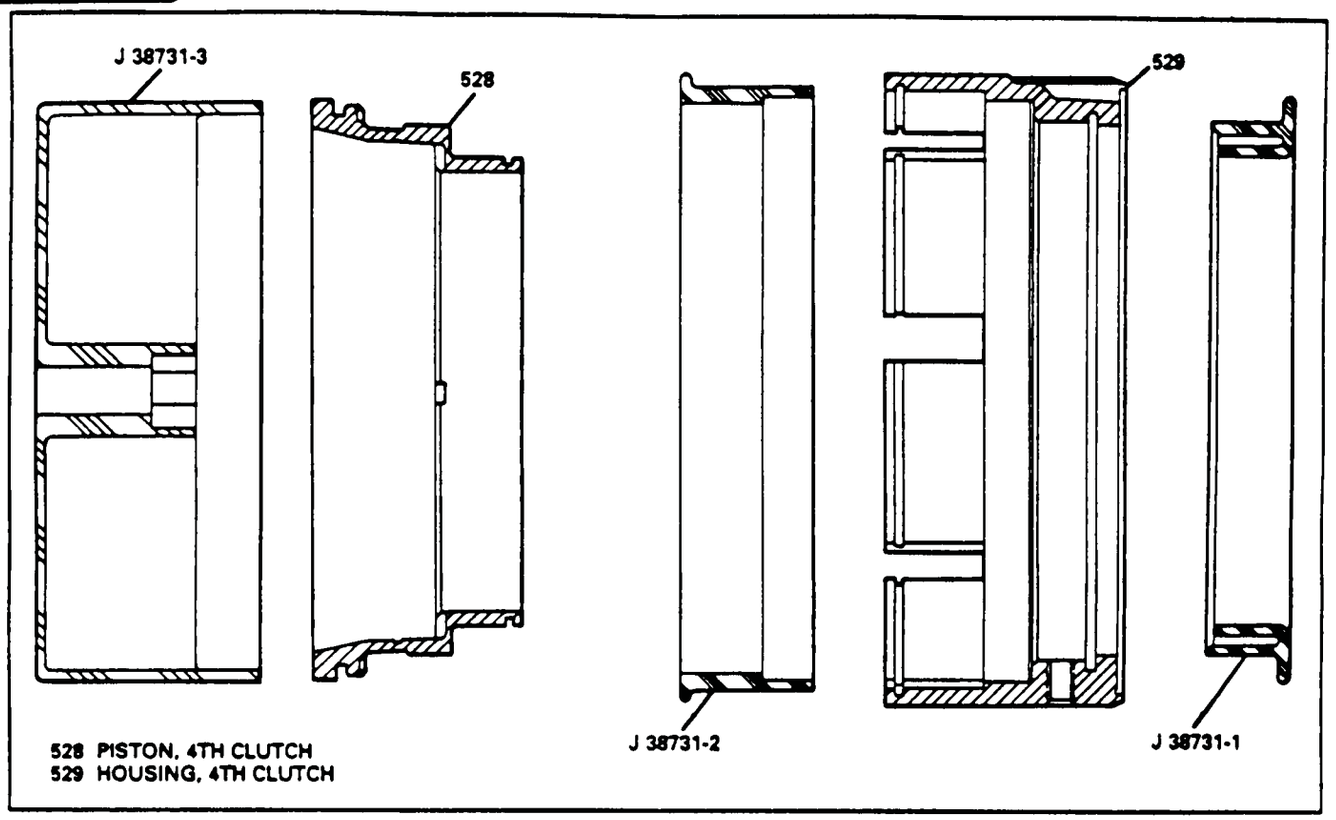
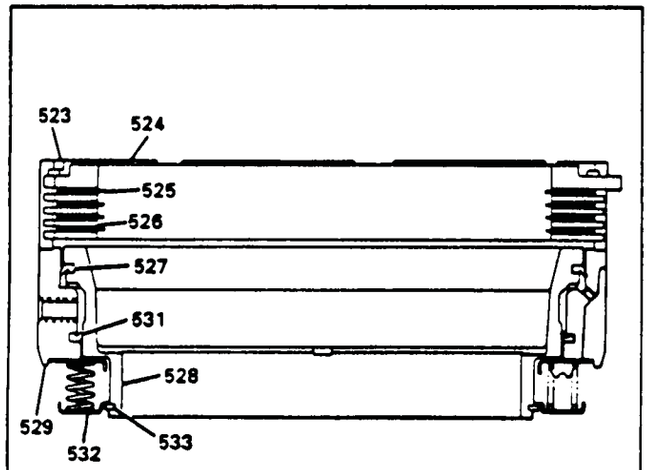



Figure 88




523 RING, SNAP (4TH CLUTCH)
524 PLATE, 4TH CLUTCH BACKING
525 PLATE ASSEMBLY, 4TH CLUTCH
526 PLATE, 4TH CLUTCH
527 SEAL, 4TH CLUTCH (OUTER)
528 PISTON, 4TH CLUTCH
529 HOUSING, 4TH CLUTCH
531 SEAL, 4TH CLUTCH (INNER)
532 SPRING & RETAINER ASSEMBLY, 4TH CLUTCH
533 RING, SNAP (SPRING & RETAINER ASSEMBLY 4TH CLUTCH PISTON)

Figure 89

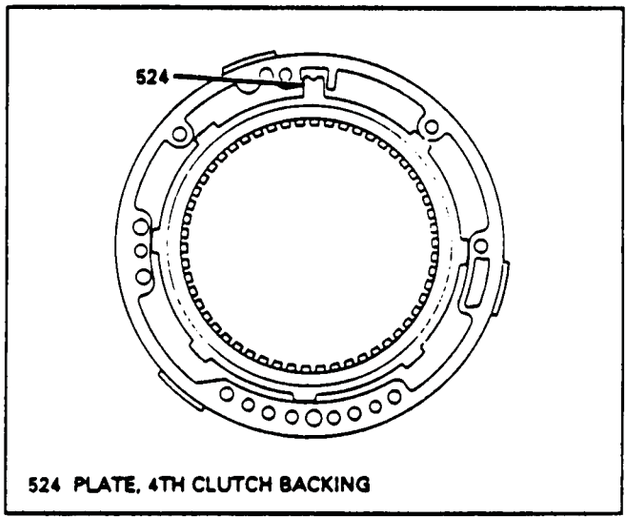
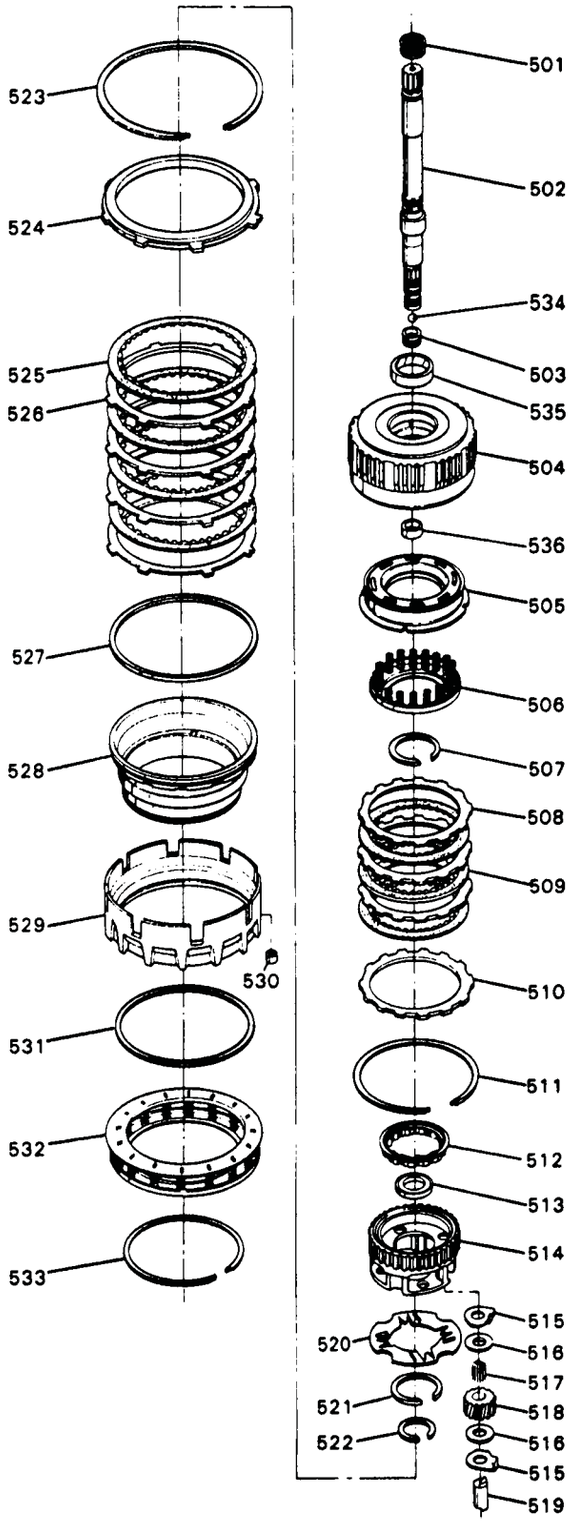


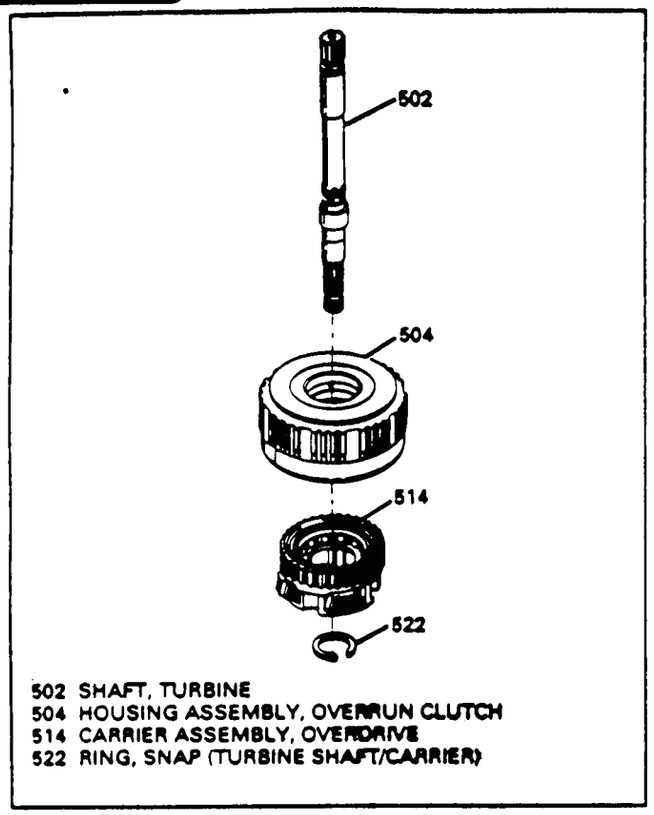

Figure 90

501 RING, OIL SEAL (TURBINE SHAFT/STATOR HSG.)
502 SHAFT, TURBINE
503 RING, OIL SEAL (TURBINE SHAFT/FORWARD HSG.)
504 HOUSING ASSEMBLY, OVERRUN CLUTCH
505 PISTON ASSEMBLY, OVERRUN CLUTCH
506 SPRING & RETAINER ASSEMBLY
507 RING, SNAP RETAINER
508 PLATE, OVERRUN CLUTCH
509 PLATE ASSEMBLY, OVERRUN CLUTCH
510 PLATE, OVERRUN CLUTCH BACKING
511 RING, SNAP
512 ROLLER CLUTCH ASSEMBLY, OVERDRIVE
513 BEARING ASSEMBLY, THRUST CARRIER/ OVERRUN CLUTCH
514 CARRIER ASSEMBLY, OVERDRIVE
515 WASHER, PINION THRUST
516 WASHER, PINION THRUST (STEEL)
517 ROLLER, NEEDLE BEARING
518 PINION, OVERDRIVE PLANET
519 PIN, OVERDRIVE PINION
520 RETAINER, PINION PIN
521 RING, SNAP
522 RING, SNAP (TURBINE SHAFT/CARRIER)
523 RING, SNAP (4TH CLUTCH)
524 PLATE, 4TH CLUTCH BACKING
525 PLATE ASSEMBLY, 4TH CLUTCH
526 PLATE, 4TH CLUTCH
527 SEAL, 4TH CLUTCH (INNER)
528 PISTON, 4TH CLUTCH
529 HOUSING, 4TH CLUTCH
530 PLUG, ORIFICE CENTER SUPPORT
531 SEAL, 4TH CLUTCH (OUTER)
532 SPRING GUIDE & RETAINER ASSEMBLY, 4TH CLUTCH
533 RING, SNAP (SPRING & RETAINER ASSEMBLY 4TH CLUTCH PISTON)
534 BALL, 0.28' DIA.
535 BUSHING, OVERRUN CLU. HSG.
536 BUSHING, 1.12' O.D. X 0.50'




4TH CLUTCH AND OVERDRIVE UNIT

Figure 91

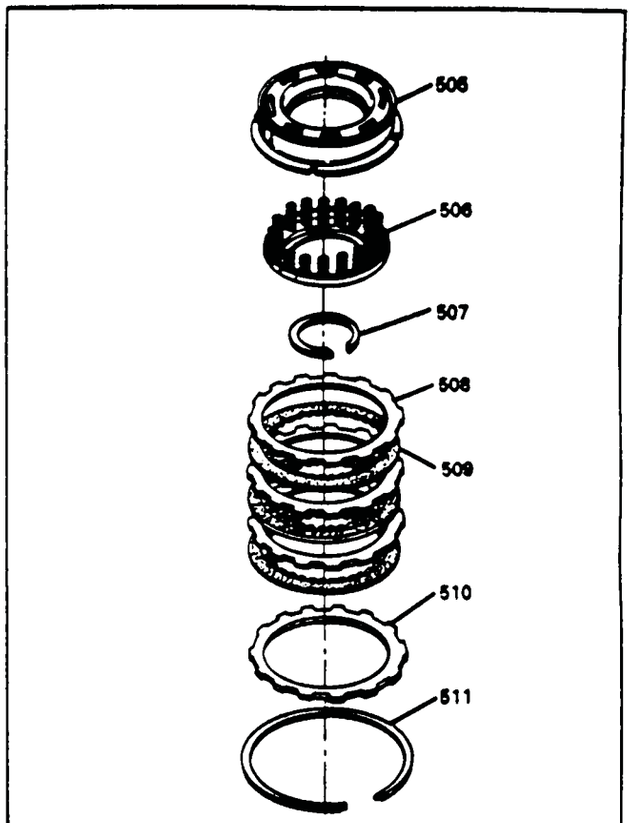



502 SHAFT, TURBINE
504 HOUSING ASSEMBLY, OVERRUN CLUTCH
514 CARRIER ASSEMBLY, OVERDRIVE
522 RING, SNAP (TURBINE SHAFT/CARRIER)

Figure 92

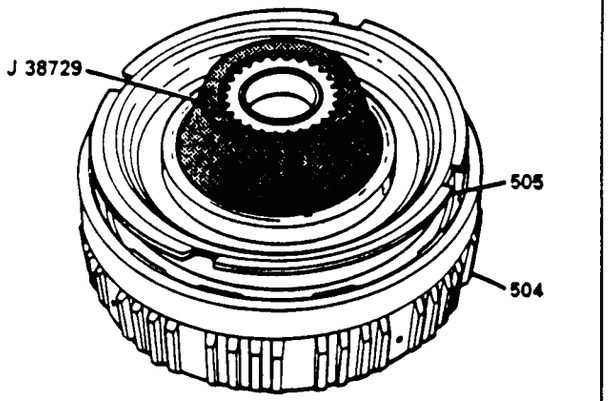
OVERHAUL OVERDRIVE UNIT ASSEMBLY

1. Remove snap ring (522) from the turbine shaft, as shown in Figure 92.
2. Remove the turbine shaft from the overdrive carrier (See Figure 92).
3. Remove the overrun clutch housing (504) from the overdrive carrier (Figure 92).
4. Remove the backing plate snap ring from the overrun clutch housing (Figure 93).
5. Remove the backing plate, and overrun clutches, 3 steel plates, and 3 lined plates, from the overrun clutch housing. (See Figure 93).
6. Compress the return spring assembly and remove snap ring (507), as shown in Figure 93.
7. Remove the spring compressor and remove the return spring assembly.
8. Remove the "Moulded" overrun clutch piston from the overrun clutch housing. (See Figure 93).
9. Inspect and clean all parts thoroughly.
10. DO NOT clean the "Moulded Seal" piston in any type of solvent.
11. Replace the piston as necessary.



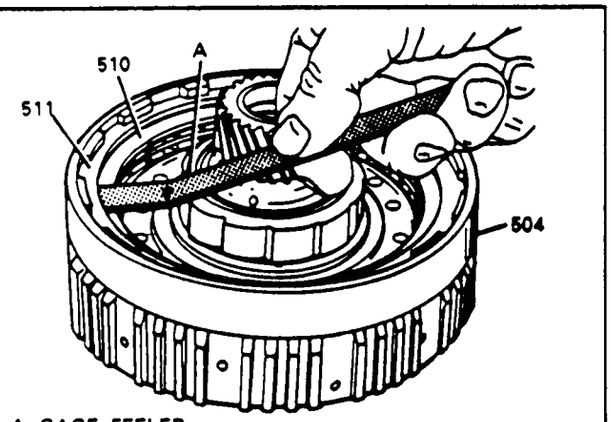

505 PISTON ASSEMBLY, OVERRUN CLUTCH
506 SPRING & RETAINER ASSEMBLY
507 RING, SNAP RETAINER
508 PLATE, OVERRUN CLUTCH
509 PLATE ASSEMBLY, OVERRUN CLUTCH
510 PLATE, OVERRUN CLUTCH BACKING
511 RING, SNAP

Figure 93




504 HOUSING ASSEMBLY, OVERRUN CLUTCH
505 PISTON ASSEMBLY, OVERRUN CLUTCH

Figure 94

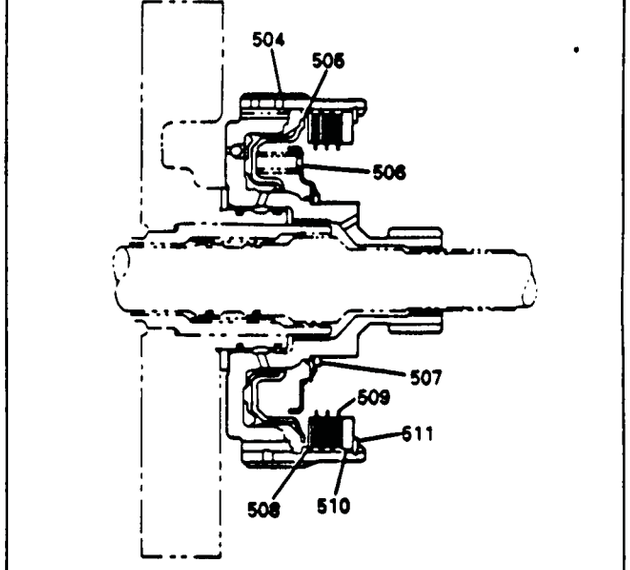



A GAGE, FEELER
504 HOUSING ASSEMBLY, OVERRUN CLUTCH
510 PLATE, OVERRUN CLUTCH BACKING
511 RING, SNAP

Figure 95

ASSEMBLE OVERRUN CLUTCH ASSEMBLY

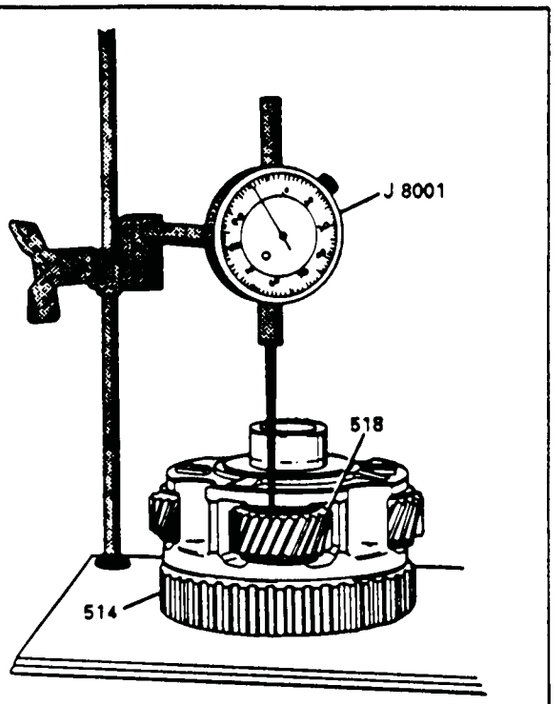
1. Install seal protector J-38729 onto the overrun clutch housing (See Figure 94).
2. Lubricate the moulded seal piston with petrolatum, and install piston into the housing while rotating.
3. NOTE: Piston must be kept level while rotating into position.
4. Install the return spring assembly into the housing.
5. Install spring compressor and install snap ring.
6. Remove the spring compressor.




504 HOUSING ASSEMBLY, OVERRUN CLUTCH
505 PISTON ASSEMBLY, OVERRUN CLUTCH
506 SPRING & RETAINER ASSEMBLY
507 RING, SNAP RETAINER
508 PLATE, OVERRUN CLUTCH
509 PLATE ASSEMBLY, OVERRUN CLUTCH
510 PLATE, OVERRUN CLUTCH BACKING
511 RING, SNAP

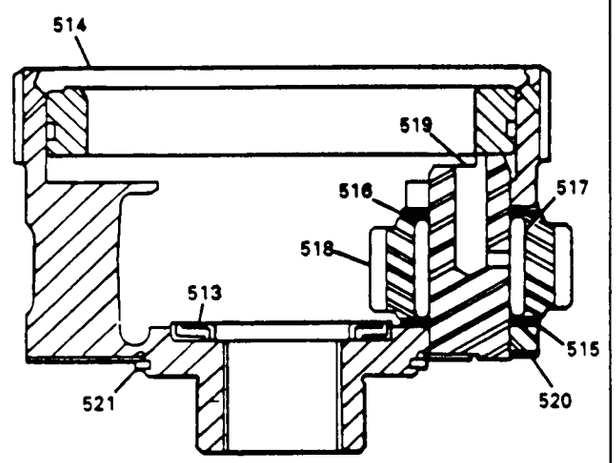
Figure 96

7. Install the overrun clutch plates alternatly, beginning with a steel plate. (See Figure 91).
8. This pack uses 3 lined plates and 3 steel plates. No cushion plate.
9. Install the overrun clutch backing plate into the housing.
10. Install the backing plate snap ring.
11. Measure overrun clutch clearance with a feeler gage, as shown in Figure 95.
12. Proper clutch clearance should be .033" to .094"



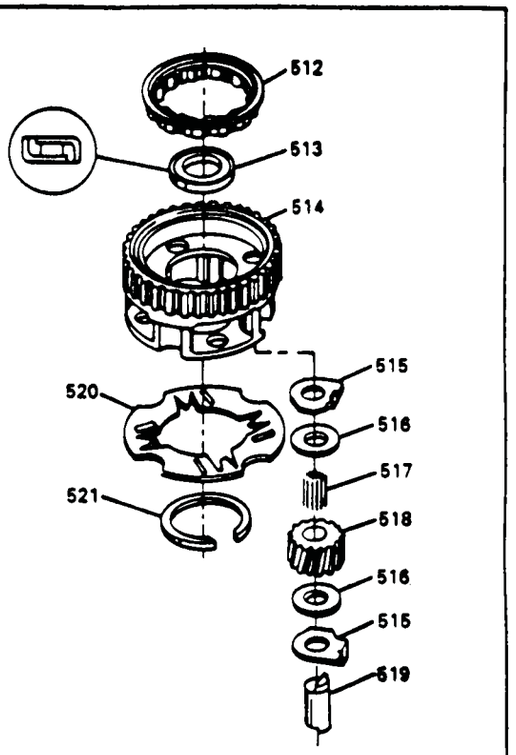

514 CARRIER ASSEMBLY, OVERDRIVE
518 PINION, OVERDRIVE PLANET

Figure 97




513 BEARING ASSEMBLY, (THRUST CARRIER/ OVERRUN CLUTCH)
514 CARRIER ASSEMBLY, OVERDRIVE
515 WASHER, PINION THRUST
516 WASHER, PINION THRUST (STEEL)
517 ROLLER, NEEDLE BEARING
518 PINION, OVERDRIVE PLANET
519 PIN, OVERDRIVE PINION
520 RETAINER, PINION PIN
521 RING, SNAP

Figure 98




512 ROLLER CLUTCH ASSEMBLY, OVERDRIVE
513 BEARING ASSEMBLY, (THRUST CARRIER/ OVERRUN CLUTCH)
514 CARRIER ASSEMBLY, OVERDRIVE
515 WASHER, PINION THRUST
516 WASHER, PINION THRUST (STEEL)
517 ROLLER, NEEDLE BEARING
518 PINION, OVERDRIVE PLANET
519 PIN, OVERDRIVE PINION
520 RETAINER, PINION PIN
521 RING, SNAP

Figure 99

OVERDRIVE CARRIER ASSEMBLY

1. Measure overdrive carrier pinion end play, with dial indicator, as shown in Figure 97.
2. Proper end play should be .009"-.024".
3. DO NOT DISASSEMBLE OVERDRIVE CARRIER PINIONS UNLESS NECESSARY.
4. If disassembly is necessary use Figure 99 as a guide for disassembly.
5. Remove snap ring (521) and pinion pin retainer (520) (See Figure 99).
6. NOTE: Mark the top of pinion gears and location on carrier of pins to be re-installed in original positions.
7. Remove 4 pinion pins from carrier, all pinions, thrust washers, and needle bearings (See Figure 99).
8. DO NOT DISASSEMBLE UNLESS NECESSARY.

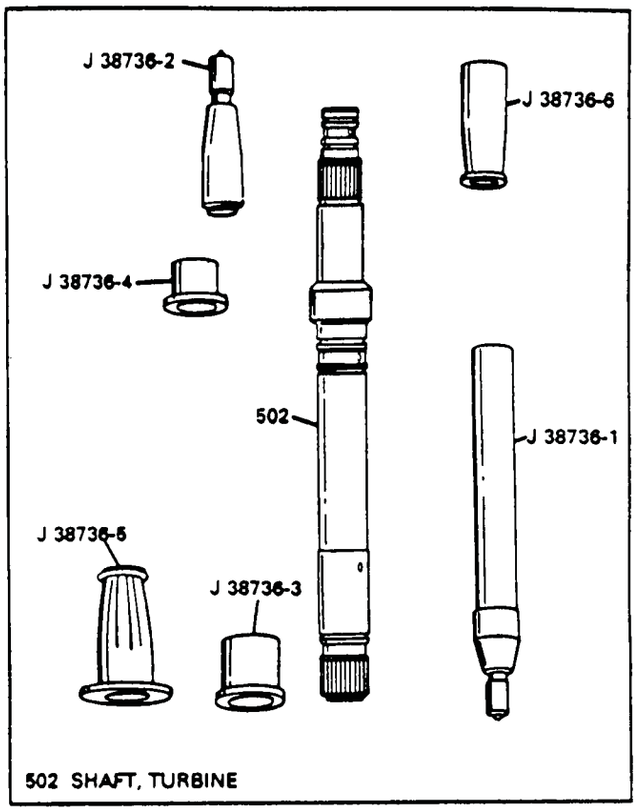



Figure 100

ASSEMBLE OVERDRIVE UNIT ASSEMBLY

1. Place solid seal installer J-38736-2 onto small end of turbine shaft, as shown in Figure 100.
2. Push the solid seals over and down the installer until they are in place using pusher tool J-38736-6 (See Figure 100).
3. Remove the installer tool.
4. Place the sizer J-38736-4 over turbine shaft to size the solid seals in place. (See Figure 100).
5. Always start with the lower seal first and work towards the top.
6. Repeat the above procedure with the different size set of tools that are shown in Figure 100, for the seals on the large end of the shaft.
7. Install the overdrive roller clutch (512) onto the inner cam in the overrun clutch housing.
8. Install the overdrive carrier into the overrun clutch housing, with a rotating motion, ensuring that all overrun clutches are engaged.

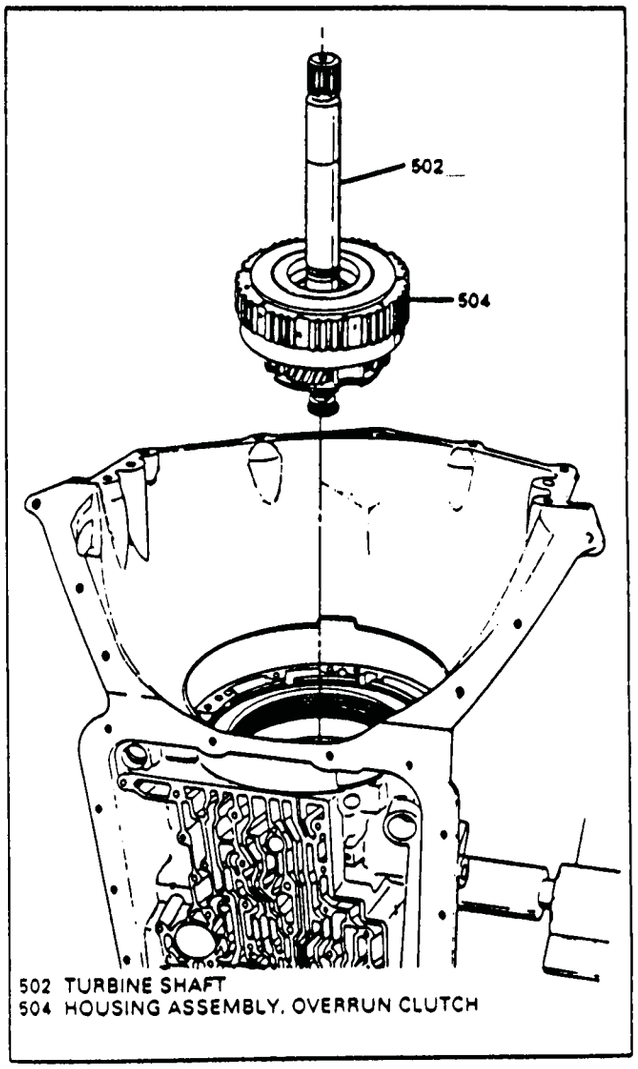
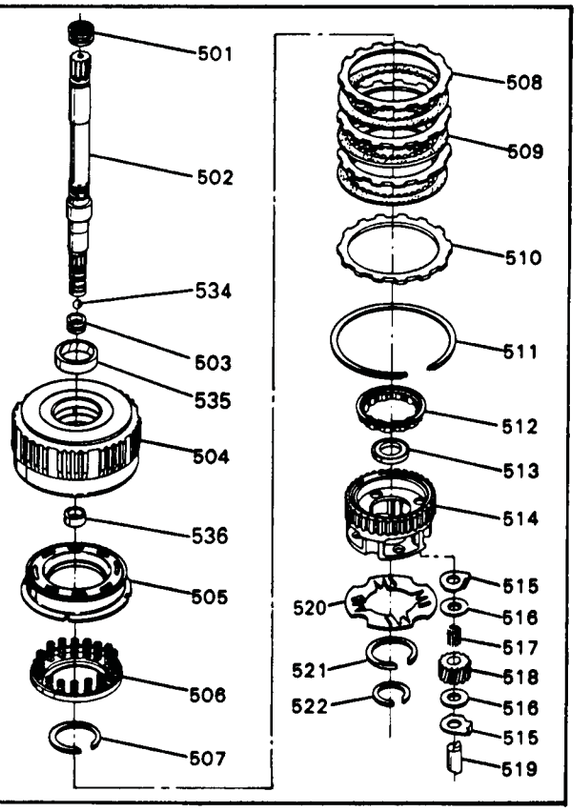



Figure 101

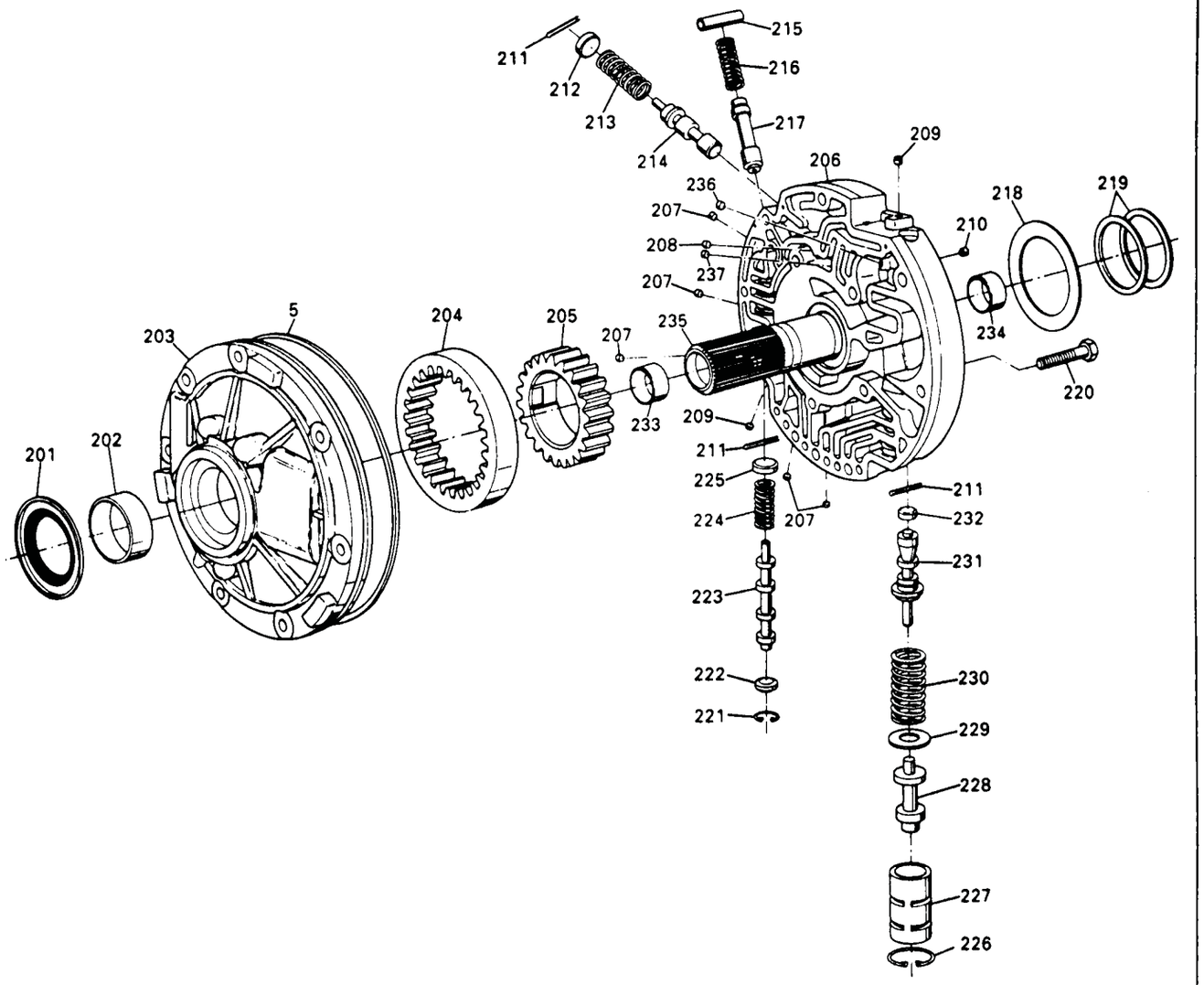
9. Install turbine shaft assembly through the overdrive carrier splines and use care not to damage seals.
10. Install snap ring (522) onto turbine shaft (See Figure 102).
11. Install thrust bearing assembly onto forward clutch housing, already in the transmission, and retain with petrolatum.
12. Make sure that silver side is up.
13. Install the complete overdrive unit into the transmission by rotating into position (See Figure 101).
14. Make sure that the overdrive unit is fully seated.

501 RING, OIL SEAL (TURBINE SHAFT/STATOR HSG.)
502 SHAFT, TURBINE
503 RING, OIL SEAL (TURBINE SHAFT/FORWARD HSG.)
504 HOUSING ASSEMBLY, OVERRUN CLUTCH
505 PISTON ASSEMBLY, OVERRUN CLUTCH
506 SPRING & RETAINER ASSEMBLY
507 RING, SNAP RETAINER
508 PLATE, OVERRUN CLUTCH
509 PLATE ASSEMBLY, OVERRUN CLUTCH
510 PLATE, OVERRUN CLUTCH BACKING
511 RING, SNAP
512 ROLLER CLUTCH ASSEMBLY, OVERDRIVE
513 BEARING ASSEMBLY, THRUST CARRIER/ OVERRUN CLUTCH
514 CARRIER ASSEMBLY, OVERDRIVE
515 WASHER, PINION THRUST
516 WASHER, PINION THRUST (STEEL)
517 ROLLER, NEEDLE BEARING
518 PINION, OVERDRIVE PLANET
519 PIN, OVERDRIVE PINION
520 RETAINER, PINION PIN
521 RING, SNAP
522 RING, SNAP (TURBINE SHAFT/CARRIER)




OVERDRIVE UNIT ASSEMBLY

Figure 102




5 SEAL, OIL PUMP TO CASE
201 HELIX SEAL ASSEMBLY, PUMP BODY
202 BUSHING, PUMP BODY
203 BODY, OIL PUMP
204 GEAR, PUMP DRIVEN
205 GEAR, PUMP DRIVE
206 COVER, PUMP
207 PLUG, CUP (5)
208 PLUG, CUP (1)
209 PLUG, CUP (2)
210 PLUG, ORIFICE CUP (1)
211 PIN, COILED SPRING (3)
212 PLUG, CONVERTER LIMIT VALVE BORE
213 SPRING, CONVERTER LIMIT VALVE
214 VALVE, CONVERTER LIMIT
215 SLEEVE, SPRING RETAINER
216 SPRING, TCC ENABLE VALVE
217 VALVE, TCC ENABLE
218 WASHER, THRUST SELECTIVE
219 RING, OIL SEAL (2)
220 BOLT, M8 X 1.25 X 40 (5)
221 RING, SNAP
222 PLUG, TCC VALVE BORE
223 VALVE, TCC
224 SPRING, TCC VALVE
225 PLUG, TCC VALVE BORE
226 RING, RETAINER (REV. BOOST VALVE BUSHING)
227 BUSHING, REVERSE BOOST VALVE
228 VALVE, REVERSE BOOST
229 RETAINER, PRESSURE REGULATOR SPRING
230 SPRING, PRESSURE REGULATOR
231 VALVE, PRESSURE REGULATOR
232 PLUG, PRESSURE REGULATOR
233 BUSHING, STATOR SHAFT (FRONT)
234 BUSHING, STATOR SHAFT (REAR)
235 SHAFT, STATOR
236 PLUG, CUP (1)
237 PLUG, CUP (1)

Figure 103

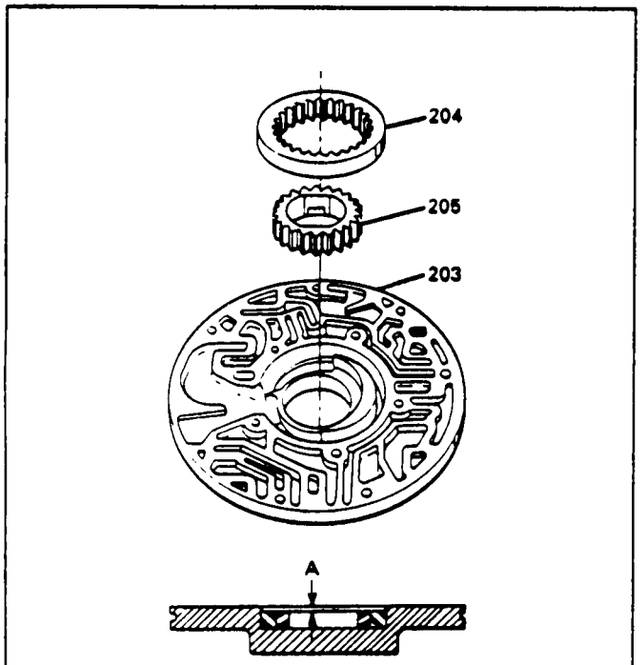



Figure 104

OIL PUMP ASSEMBLY

1. Install all valves, bushings, springs, and retainers as shown in Figure 103, into the pump cover assembly.
2. Inspect the oil pump cover to ensure that all cup plugs are in place. (See Figure 103).
3. Install the oil pump drive and driven gears into the pump body, with the identification marks facing up. (See Figure 104).
4. Place a straight edge across the pump body, and measure pump gear to face clearance, with a feeler gage (See Figure 104).
5. Proper gear to face clearance should be .0007" to .0028".
6. Remove both pump gears, lubricate with transmission fluid, and reinstall with identification marks facing up.
7. Install the oil pump cover onto the oil pump body, and install 5 oil pump cover retaining bolts.
8. DO NOT FULLY TIGHTEN BOLTS.

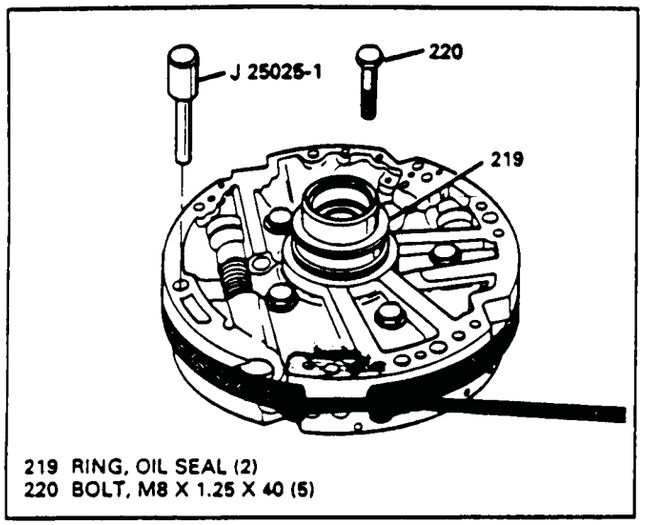



Figure 105

9. Insert oil pump alignment tool into the oil pump assembly, as shown in Figure 105.
10. Install the J-21368 alignment band as shown in Figure 105, and tighten the alignment band.
11. Torque the 5 oil pump cover bolts to 18 ft.lbs, using a crossing pattern.
12. Install front pump seal using a seal driver as shown in Figure 107.
13. Install selective thrust washer onto pump cover, and retain with petrolatum.
14. Install the 2 solid sealing rings on the oil pump cover, using J-38739 installer, pusher, and sizing tool.
15. Install new pump gasket into the case, and retain with petrolatum.
16. Install the oil pump assembly into the case, using J-38789, as shown in Figure 106.
17. Install the 6 oil pump to case bolts as shown in Figure 106.
18. NOTE: If turbine shaft cannot be rotated as pump assembly is being pulled into place, the overrun, 4th, forward and/or direct clutch housings have not been installed properly to index with all of the clutch plates. This must be corrected before pump assembly is fully installed.
19. Torque mounting bolts to 18 ft.lbs.

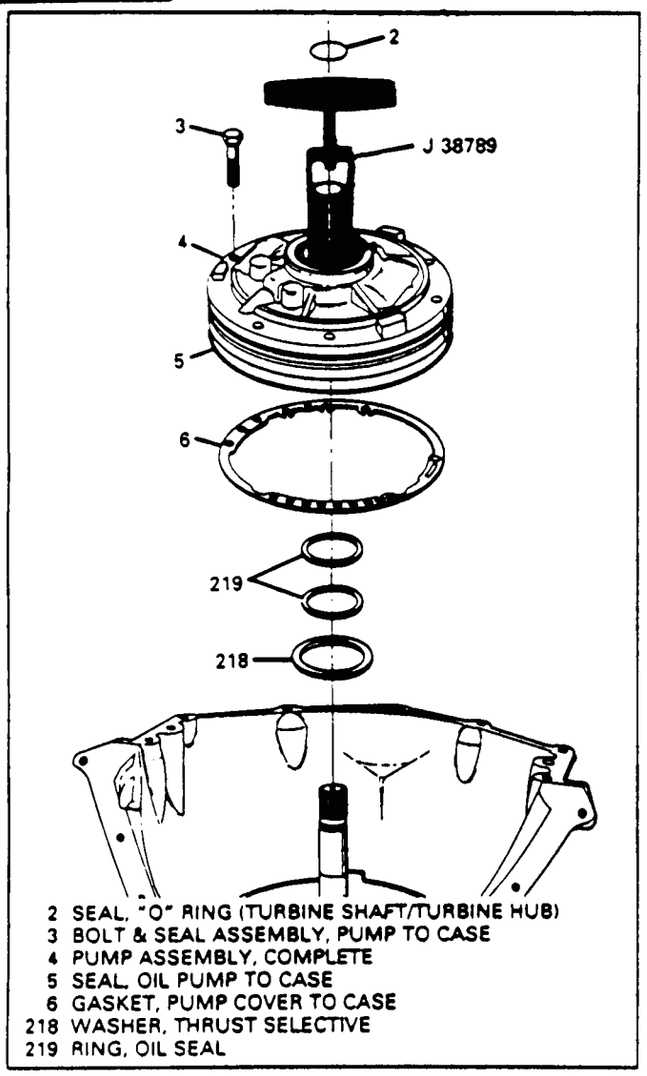



Figure 106

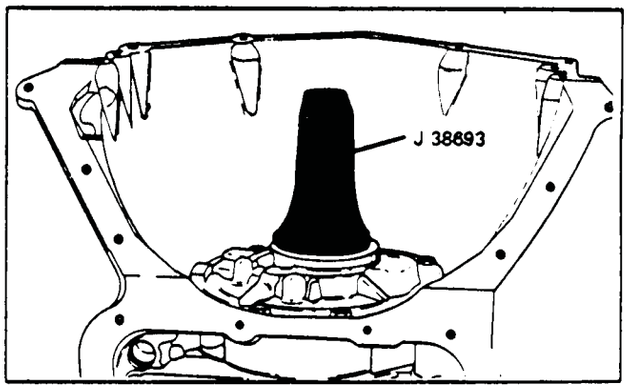



Figure 107

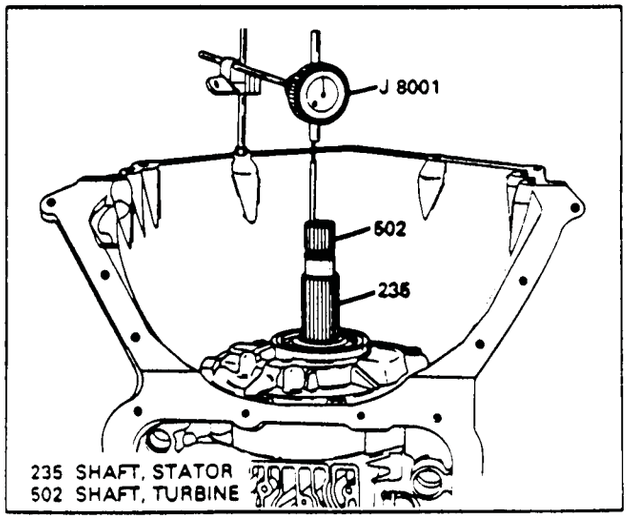



Figure 108

FRONT UNIT END PLAY CHECK

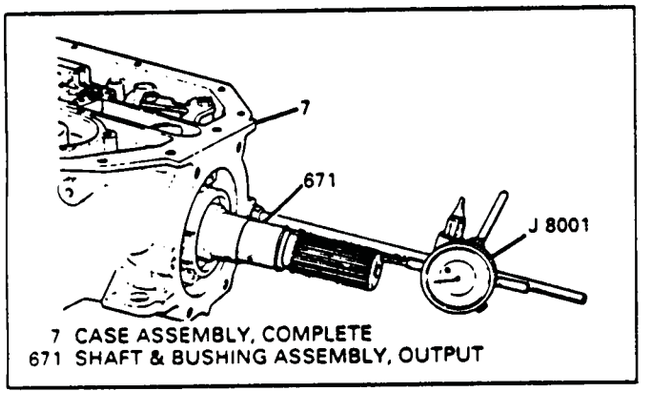
1. Install a dial indicator as shown in Figure 108, located on smooth section of turbine shaft.
2. Set dial indicator to zero.
3. Pull out on turbine shaft to read the transmission end play.
4. NOTE: There may be some play in the turbine shaft, between the snap ring and the overdrive carrier. This play MUST be subtracted from the end play reading obtained for proper transmission end play reading.
5. Proper transmission end play should be .004" to .022".
6. Change selective washer as necessary to obtain this dimension.
7. Use the chart in Figure 109 to select the proper selective washer.
8. Install new "O" ring onto the turbine shaft, as shown in Figure 106.
9. Lubricate "O" ring and front pump seal with petrolatum.

| THICKNESS (INCH) | STRIPE |
|---|---|
| .057 - .061 | BLUE |
| .073 - .077 | RED |
| .089 - .093 | BROWN |
| .105 - .109 | GREEN |
| .121 - .125 | PLAIN |

Figure 109

REAR UNIT END PLAY CHECK

1. Mount a dial indicator, locating on the output shaft, as shown in Figure 110.
2. Set dial indicator to zero.
3. Move the output shaft in and out noting the end play.
4. Correct end play should be .005"-.025".




7 CASE ASSEMBLY, COMPLETE
671 SHAFT & BUSHING ASSEMBLY, OUTPUT

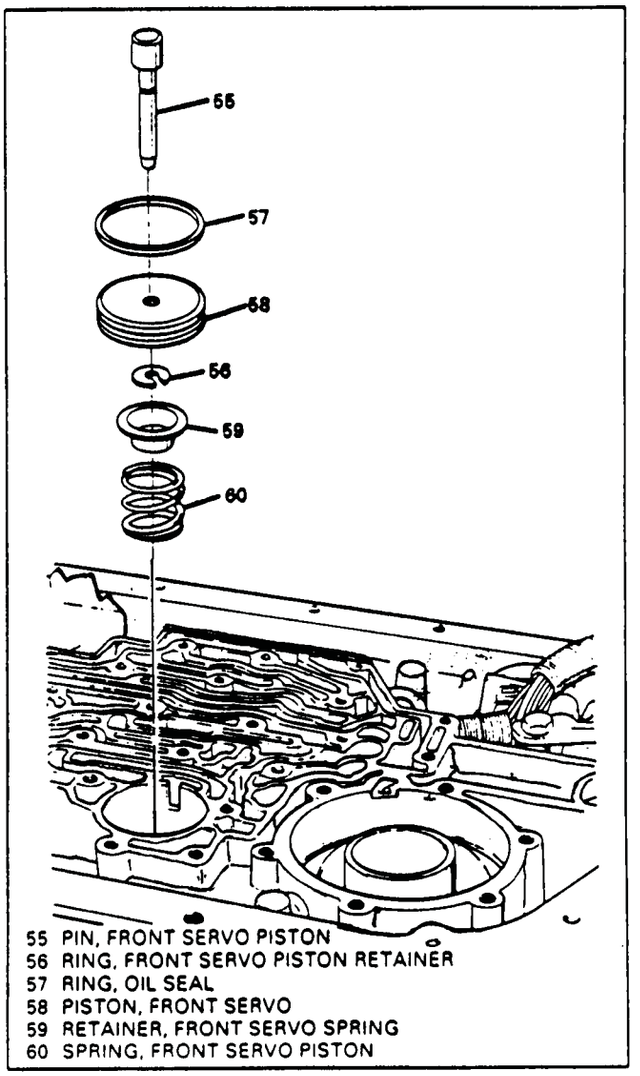
Figure 110

| THICKNESS (INCH) | IDENTIFICATION NOTCH AND/OR NUMERAL | |
|---|---|---|
| .074 - .078 | NONE | 1 |
| .082 - .086 | ON SIDE OF 1 TAB | 2 |
| .090 - .094 | ON SIDE OF 2 TABS | 3 |
| .098 - .102 | ON END OF 1 TAB | 4 |
| .106 - .110 | ON END OF 2 TABS | 5 |
| .114 - .118 | ON END OF 3 TABS | 6 |

Figure 111

INTERMEDIATE SERVO PISTON ASSEMBLY

1. Install new seal onto servo piston, and lubricate with petrolatum.
2. Install piston on the piston pin and install the "E" clip (See Figure 112).
3. Install the retainer onto the piston pin (See Figure 112).
4. Install the return spring into the transmission case bore.
5. Install the intermediate servo assembly into the case bore, and insure that the servo pin is engaged with the intermediate band (See Figure 112).




55 PIN, FRONT SERVO PISTON
56 RING, FRONT SERVO PISTON RETAINER
57 RING, OIL SEAL
58 PISTON, FRONT SERVO
59 RETAINER, FRONT SERVO SPRING
60 SPRING, FRONT SERVO PISTON

Figure 112

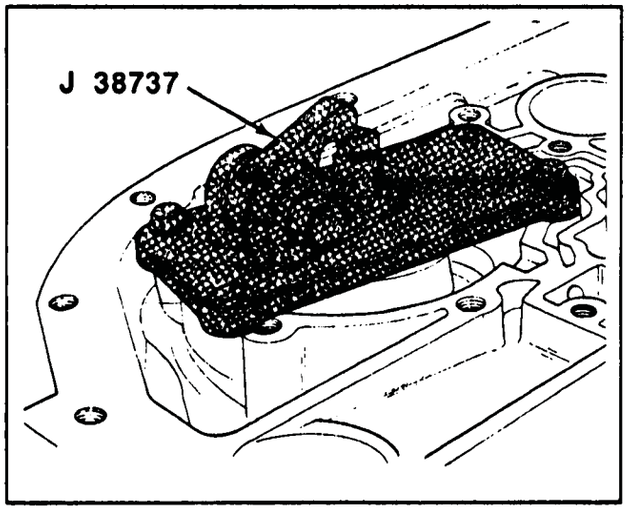



Figure 113

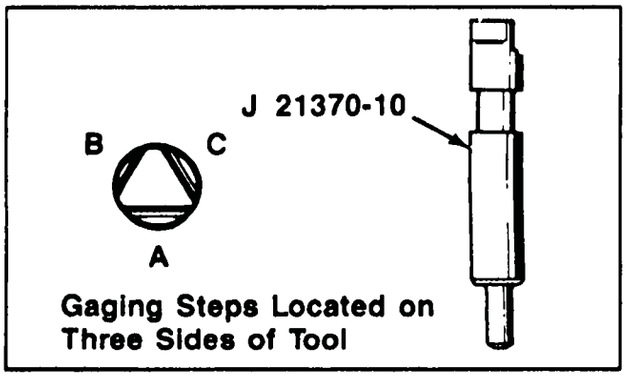



Figure 114

REVERSE BAND APPLY PIN CHECK

1. Place J-21370-10 gage pin into the reverse servo pin bore (Figure 114).
2. Position J-38737 tool over the gage pin and servo bore, with the hex nut facing the parking linkage, as shown in Figure 113.
3. Fasten the tool with two servo cover bolts, as shown in Figure 113.
4. Make sure that the gage pin moves free in the tool and case pin bore.
5. To determine the correct pin length, apply 25 ft.lbs. torque to the nut on the J-38737 gage tool.
6. There are gaging steps located on three sides of the gage pin (See Figure 114).
7. For proper pin selection and identification, see Figure 115.
8. Remove the gaging tool.

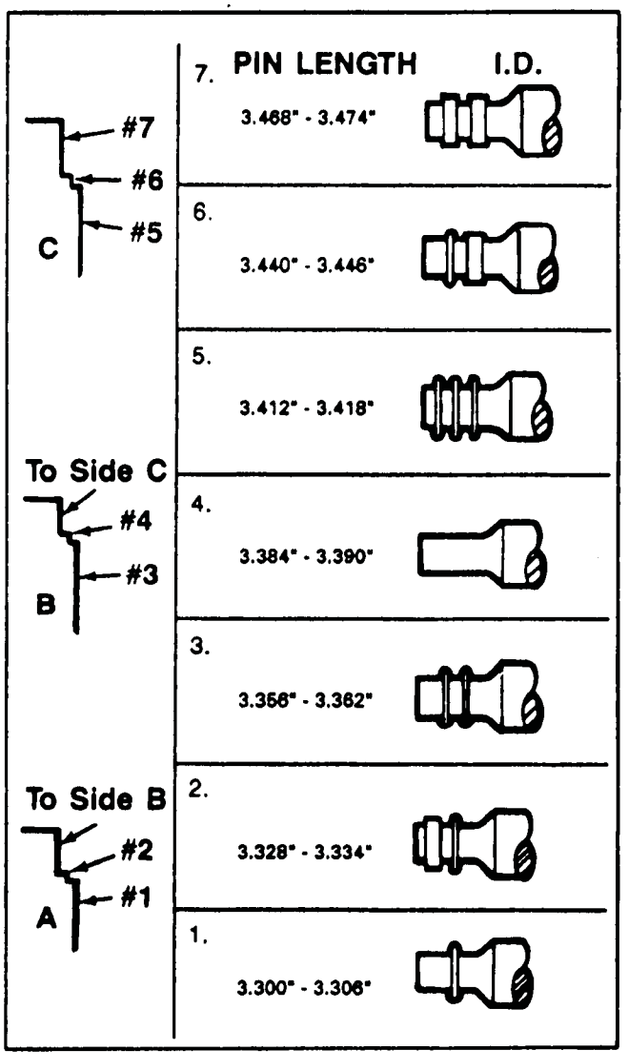
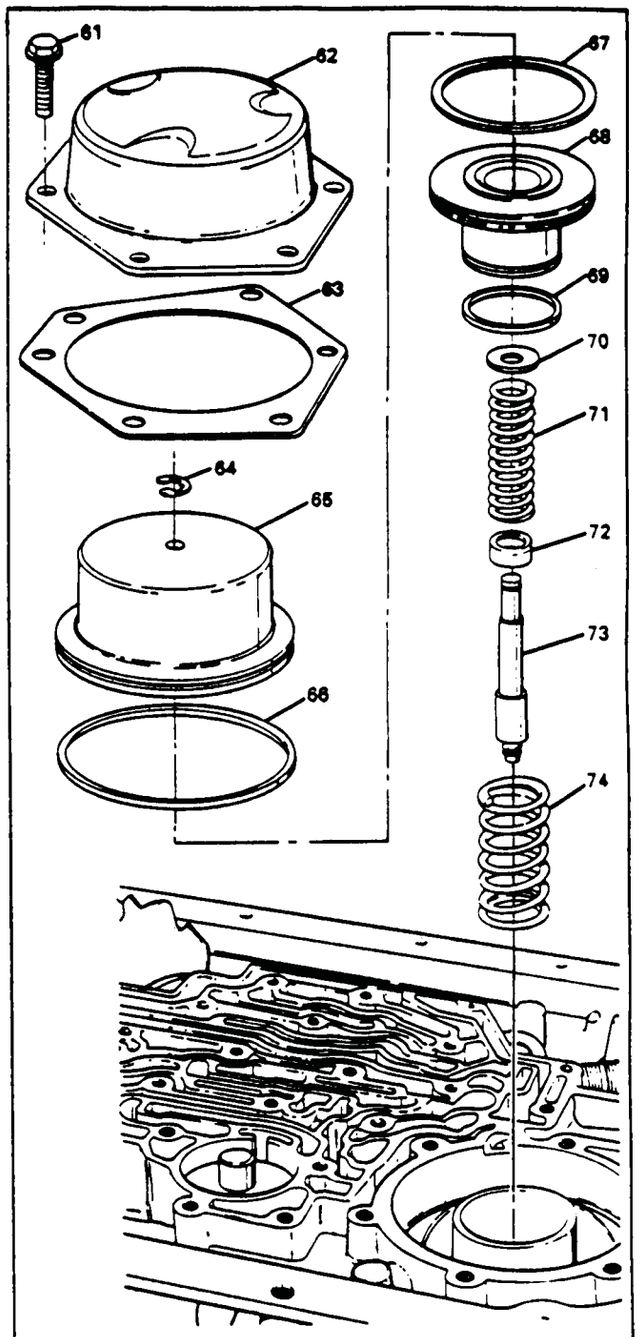



Figure 115

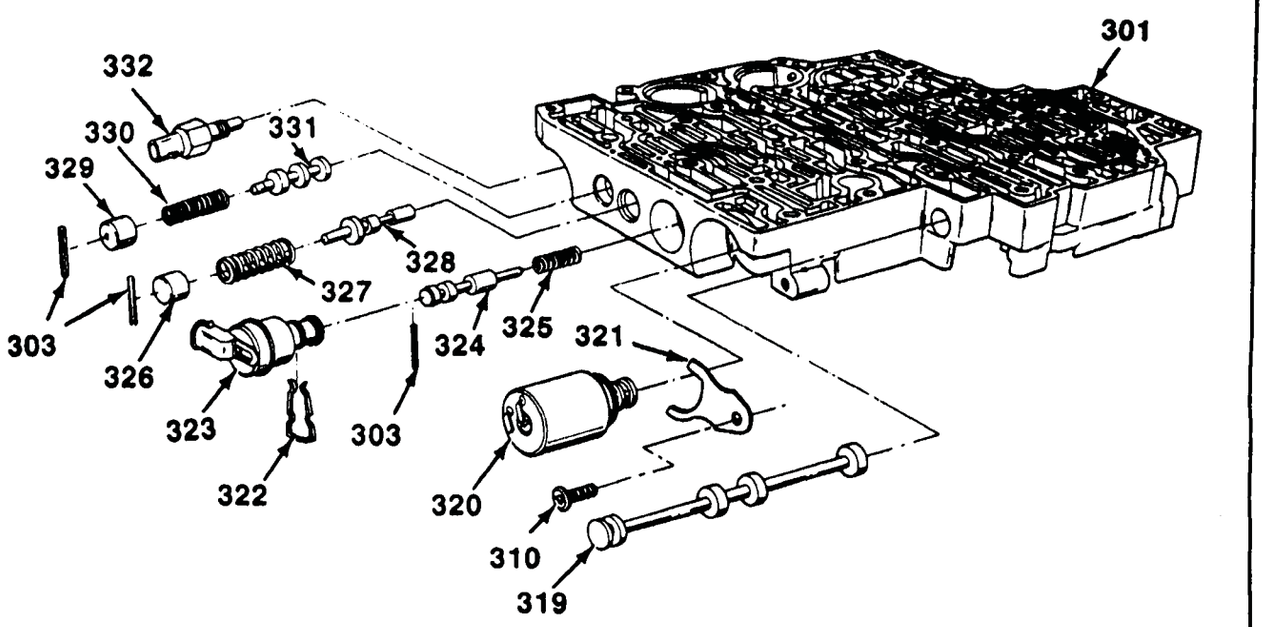
REVERSE SERVO AND 1-2 ACCUMULATOR ASSEMBLY

1. Install retainer (72) on reverse servo pin, spring (71) and washer (70) on servo pin (See Figure 116).
2. Install the servo pin assembly through the reverse servo piston, and install the "E" clip (See Figure 116).
3. Install a new seal onto the reverse servo piston, and lubricate with petrolatum (See Figure 116).
4. Install the 1-2 accumulator piston on the inside of the reverse servo piston. (See Figure 116).
5. Install the 1-2 accumulator spring (74) into the case bore (See Figure 116).
6. Install the reverse servo assembly into the case bore, using care so as not to cut the seal (See Figure 116).
7. Install new reverse servo cover gasket on case (See Figure 116).
8. Install the reverse servo cover, and 6 retaining bolts (See Figure 116).
9. Torque the reverse servo cover retaining bolts to 18 ft.lbs.




61 BOLT, REAR SERVO COVER
62 COVER, REAR SERVO
63 GASKET, REAR SERVO COVER
64 CLIP, RETAINING
65 PISTON, REAR SERVO
66 RING, OIL SEAL ACCUM. PISTON (OUTER)
67 RING, OIL SEAL ACCUM. PISTON (INNER)
68 PISTON, REAR ACCUMULATOR
69 SEAL, REVERSE SERVO PISTON
70 WASHER, SERVO PISTON
71 SPRING, REAR SERVO
72 RETAINER, REAR PISTON SPRING
73 PIN, REAR BAND APPLY (SELECTIVE)
74 SPRING, REAR ACCUMULATOR

Figure 116

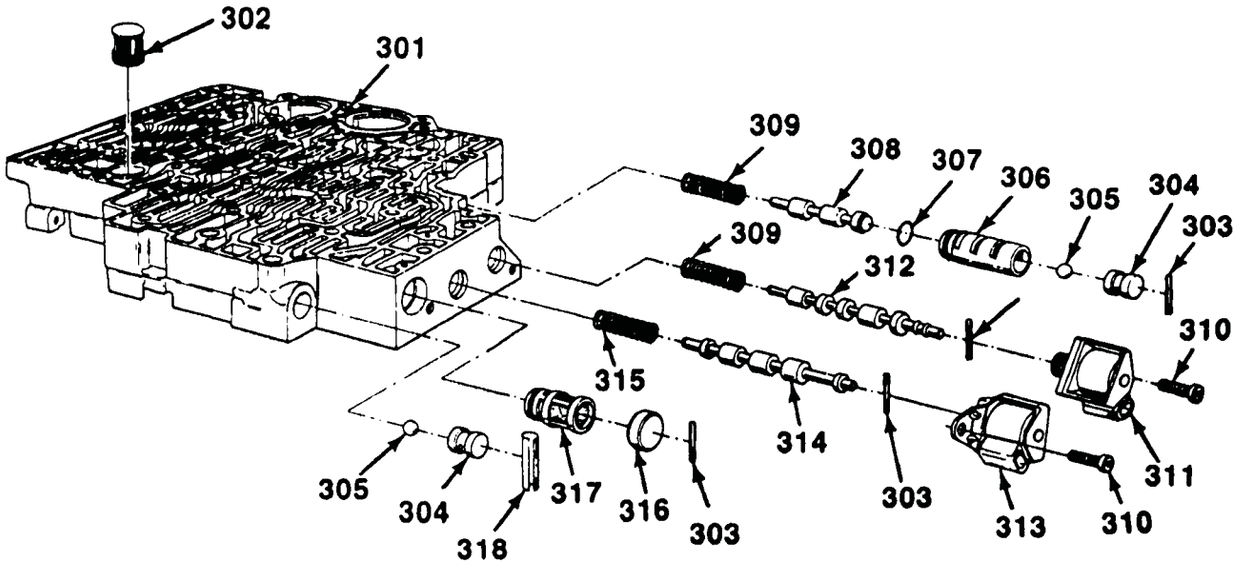



301. Control Valve Body
303. Coiled Spring Pin
310. Solenoid Bolt (1/2 and 2/3 Shift Force Motor)
319. Manual Valve
320. Variable Force Motor
321. Force Motor Retaining Clamp
322. PWM Solenoid Retaining Clip
323. Solenoid Assembly (PWM)
324. TCC Regulator Apply Valve
325. TCC Regulator Apply Valve Spring
326. Actuator Feed Valve Bore Plug
327. Actuator Feed Limit Valve Spring
328. Actuator Feed Limit Valve
329. Accumulator Valve Bore Plug
330. Accumulator Valve Spring
331. Accumulator Valve
332. Temperature Sensor

Figure 117

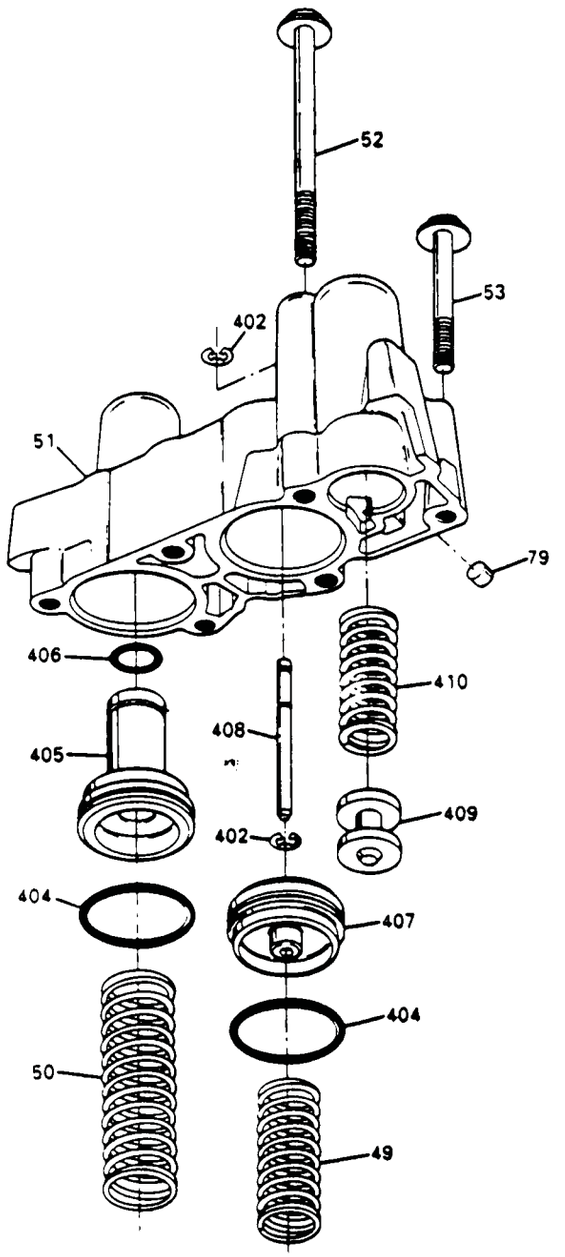
VALVE BODY ASSEMBLY

1. Clean the valve body assembly in clean solvent thoroughly.
2. Move the valves with a pick or small screwdriver to ensure that any debris or dirt is dislodged.
3. Dry with compressed air.
4. Position valve body on a clean and dry flat surface for disassembly.
5. Remove valve trains one at a time and begin in one corner of the valve body.
6. Some valves are under spring pressure so cover the end of the bore when removing roll pins and/or retainers.
7. Valves, springs, and bushings should be laid out on a clean dry surface EXACTLY the way they are removed.
8. Clean all valves, springs and bushings then dry using compressed air.
9. Inspect all valve body parts for wear and/or damage.
10. Use the illustrations in Figures 117 and 118, to reassemble the valves, springs, and bushings in their proper order.
11. Replace all "O" ring seals on solenoids before re-installing in valve body.
12. NOTE: Shift Solenoid "A" (313) is BLUE in color (See Figure 118).
    Shift Solenoid "B" (311) is RED in color (See Figure 118).
13. After assembling the valve body, lay it with the worm track side facing up for accumulator housing assembly.




301. Control Valve Body
302. Force Motor Feed Filter Screen
303. Coiled Spring Pin
304. Check Ball Plug
305. Ball (.375 Dia.)
306. 3rd Reverse Check Ball Bushing
307. O-Ring Seal
308. 3/4 Shift Valve
309. Shift Valve Return Spring (2/3 and 3/4)
310. Solenoid Bolt (1/2 and 2/3 Shift Force Motor)
311. 2/3 Shift Solenoid and O-Ring Assembly
312. 2/3 Shift Valve
313. 1/2 Shift Solenoid and O-Ring Assembly
314. 2/3 Shift Valve
315. 1/2 Shift Valve Return Spring
316. Shift Solenoid Feed Filter Plug
317. Shift Solenoid Feed Filter
318. Low/Reverse Check Ball Sleeve

Figure 118

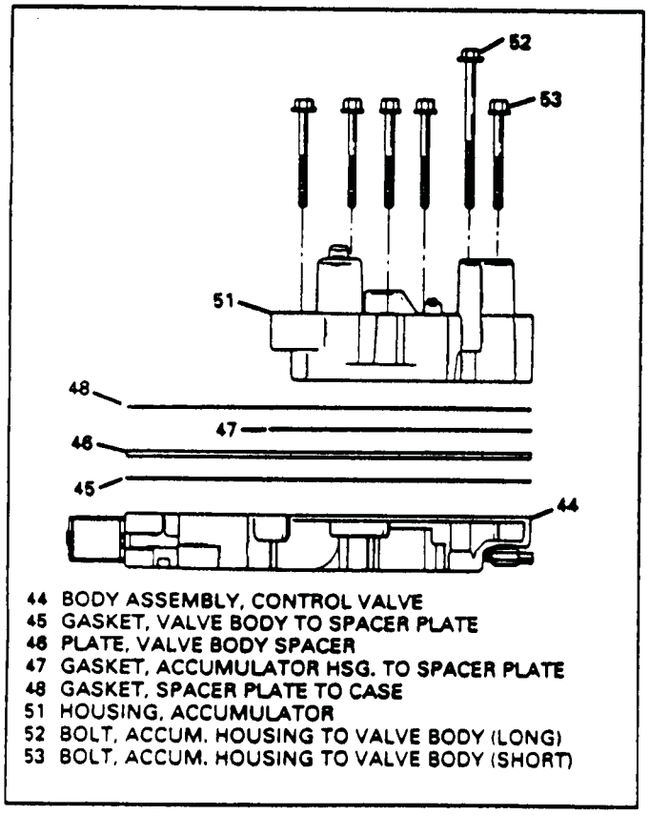



49 SPRING, 4TH CLUTCH ACCUM. PISTON
50 SPRING, 3RD CLUTCH ACCUM. PISTON
51 HOUSING, ACCUMULATOR
52 BOLT, ACCUM. HOUSING TO VALVE BODY (LONG)
53 BOLT, ACCUM. HOUSING TO VALVE BODY (SHORT)
79 PLUG, DIRECT OIL GAL (.25 DIA. CUP)
402 RING, SNAP
404 SEAL, (1.615) SQUARE CUT
405 PISTON, 3RD CLUTCH ACCUMULATOR
406 SEAL, (.859) SQUARE CUT
407 PISTON, 4TH CLUTCH ACCUMULATOR
408 PIN, 4TH CLUTCH ACCUMULATOR PISTON
409 VALVE, TORQUE SIGNAL COMPENSATOR
410 SPRING, T.S. COMPENSATOR

Figure 119

ACCUMULATOR HOUSING ASSEMBLY

1. Assemble the accumulator housing components exactly as shown in Figure 119.
2. Notice the positions of the springs, valve, and pistons (See Figure 119).
3. With the valve body on bench, wormtrack side facing up, install new valve body to spacer plate gasket.
4. Install the spacer plate.
5. Install new accumulator to spacer plate gasket (See Figure 121).
6. Install accumulator housing assembly on valve body, and tighten finger tight only.
7. Install alignment guide pin, in location shown in Figure 121.
8. Torque the accumulator housing to valve body bolts to 97 in.lbs., and use the tightening sequence shown in Figure 121.
9. Install eight check balls in locations shown in Figure 122.
10. Using guide pins in case, install a new spacer plate to case gasket onto case, and over the guide pins.
11. Install the complete valve body and accumulator assembly onto the case using guide pins.
12. Install the pressure switch manifold on valve body assembly (See Figure 124).
13. Install detent spring and roller into place, 3 wiring clips into place, and fluid indicator stop into place (See Figures 123 and 124).
14. Install all valve body bolts, 21 total.
15. Install six bolts into the pressure switch manifold (See Figure 124).
16. Install the lube pipe, with the long end into the case (See Figure 124).
17. Install lube pipe clip and bolt.
18. Tighten bolts to 116 in.lbs.
19. Install the wiring harness, and attach all connectors. (See Figures 123 and Figure 124).
20. Install large end into case first, then pressure switch hook up, shift solenoid "A" (Blue), shift solenoid "B" (Red), temperature sensor, PWM solenoid, and the force motor (See Figures 123 & 124).




44 BODY ASSEMBLY, CONTROL VALVE
45 GASKET, VALVE BODY TO SPACER PLATE
46 PLATE, VALVE BODY SPACER
47 GASKET, ACCUMULATOR HSG. TO SPACER PLATE
48 GASKET, SPACER PLATE TO CASE
51 HOUSING, ACCUMULATOR
52 BOLT, ACCUM. HOUSING TO VALVE BODY (LONG)
53 BOLT, ACCUM. HOUSING TO VALVE BODY (SHORT)

Figure 120

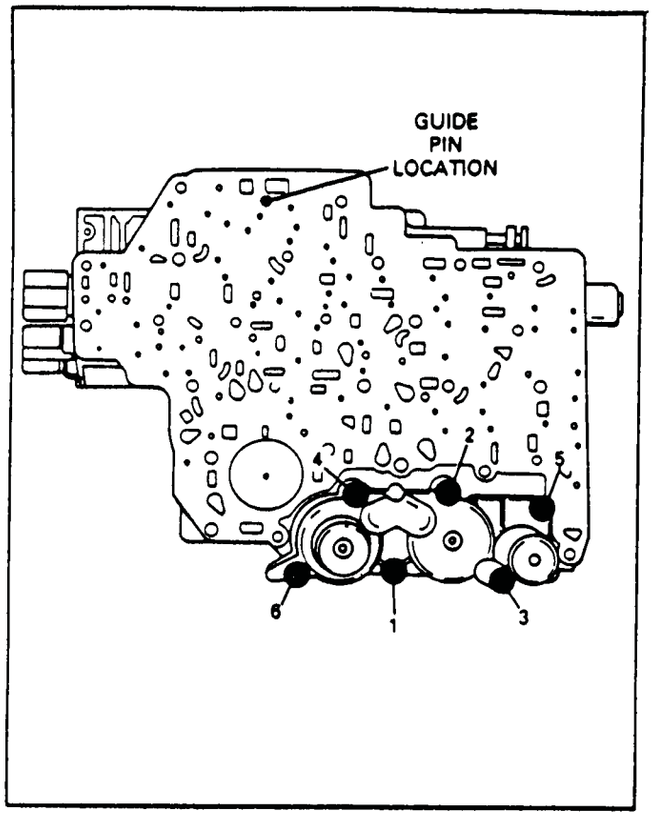
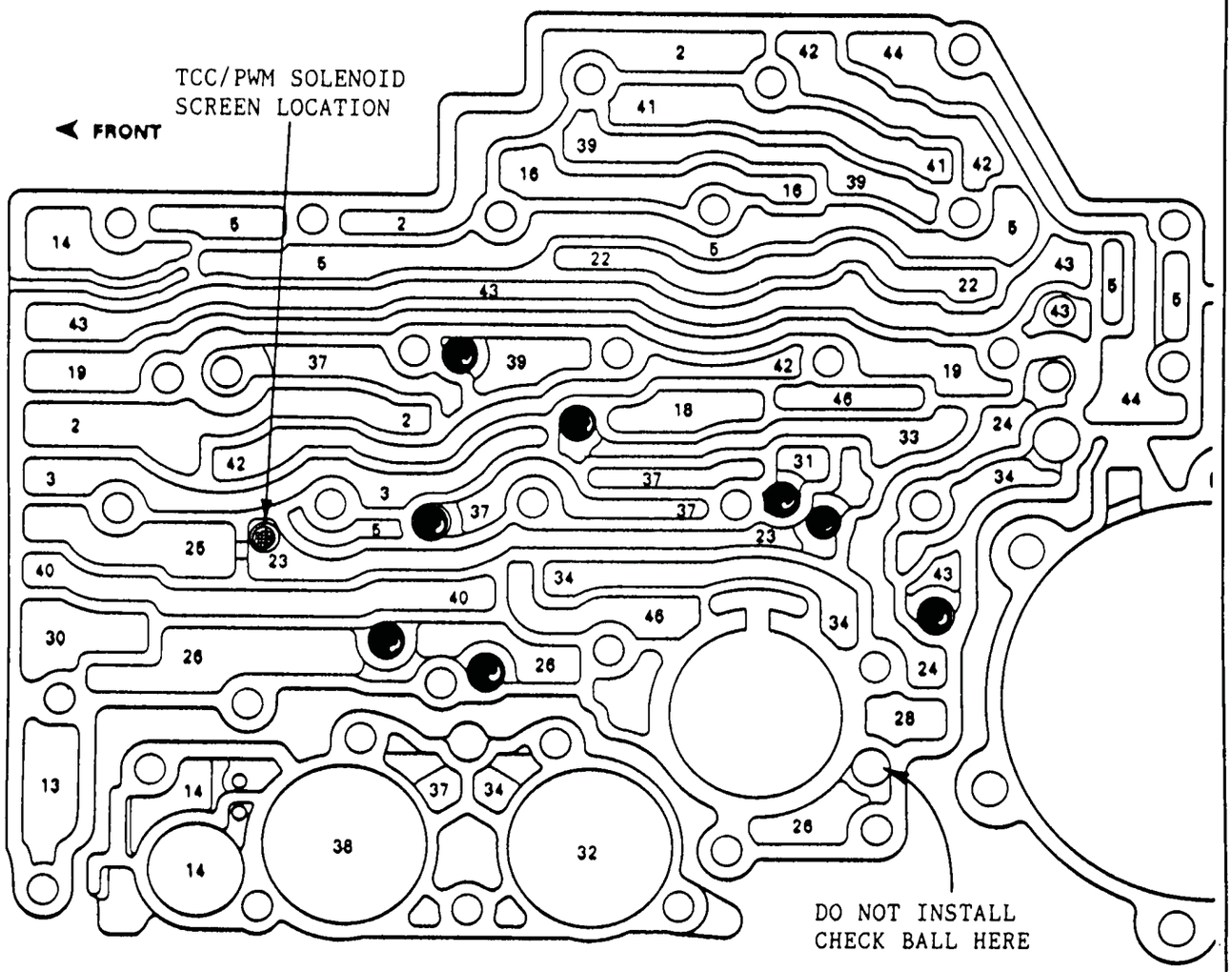



Figure 121




ALL CHECK BALLS .250" DIAMETER (8 TOTAL)

1 SUCTION
2 LINE
3 REGULATED APPLY
4 ORIFICED REGULATOR APPLY
5 ACTUATOR FEED
6 ORIFICED ACTUATOR FEED
7 CONVERTER FEED
8 REGULATED CONVERTER FEED
9 TCC TOGGLE
10 CONVERTER RELEASE
11 CONVERTER APPLY
12 COOLER
13 LUBE
14 TORQUE SIGNAL
15 ORIFICED TORQUE SIGNAL
16 PRN (PARK REVERSE NEUTRAL)
17 PRND 4-3
18 PRND 4
19 DRIVE
20 FILTERED ACTUATOR FEED
21 SIGNAL "A"
22 SIGNAL "B"
23 2-2 DRIVE
24 2ND CLUTCH
25 FILTERED 2-3 DRIVE
26 ACCUMULATOR
27 ORIFICED ACCUMULATOR
28 SECOND ACCUMULATOR
29 THIRD CLUTCH ACCUMULATOR
30 TCC SIGNAL
31 FRONT BAND APPLY
32 THIRD ACCUMULATOR
33 THIRD CLUTCH FEED
34 THIRD CLUTCH
35 THIRD / REVERSE
36 FOURTH CLUTCH FEED
37 FOURTH CLUTCH
38 FOURTH ACCUMULATOR
39 D 3-2-1
40 OVERRUN CLUTCH
41 D 2-1
42 LO
43 REVERSE
44 REAR BAND APPLY
45 EXHAUST
46 ORIFICED EXHAUST
47 VOID

CHECKBALL LOCATIONS IN CASE

Figure 122

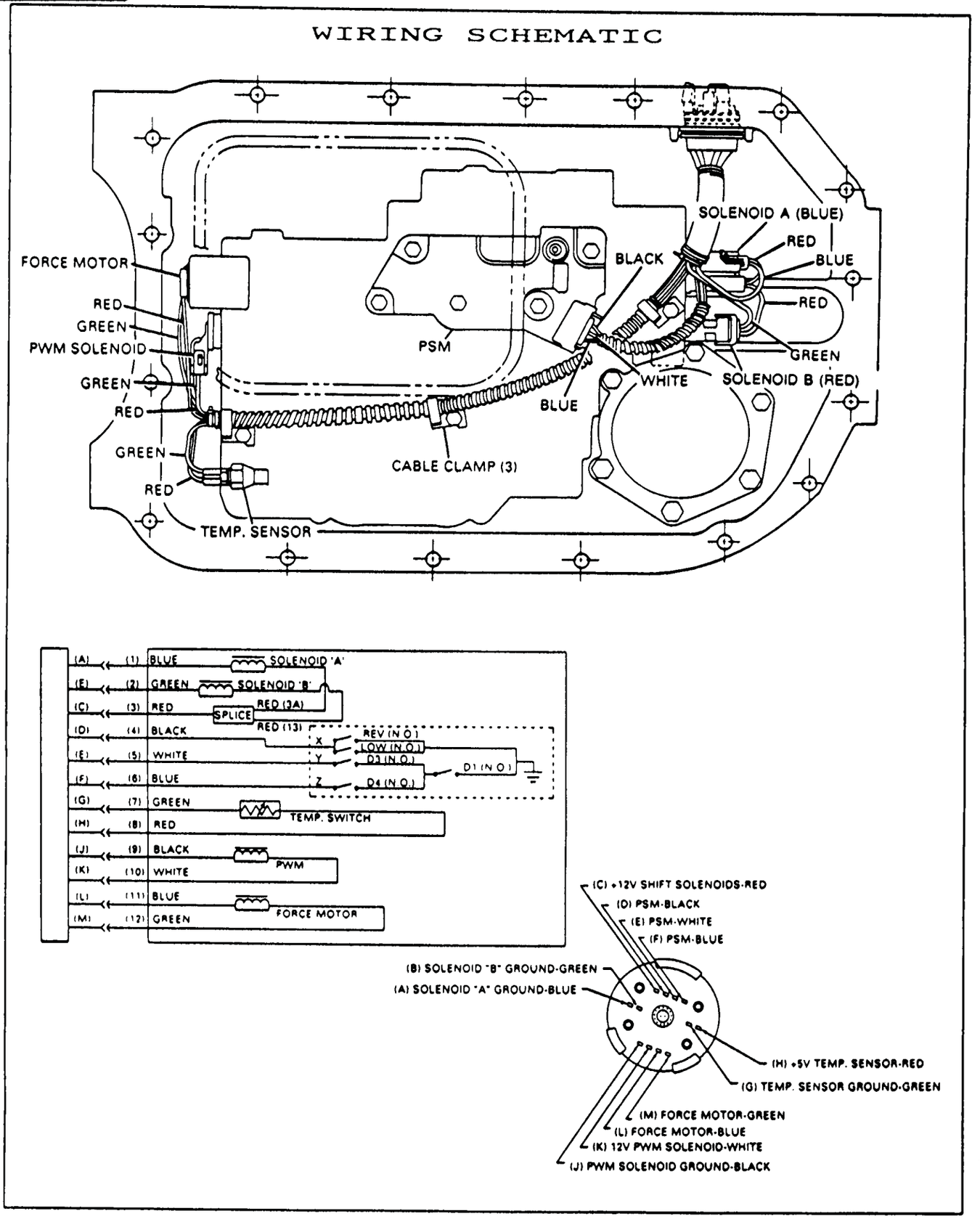
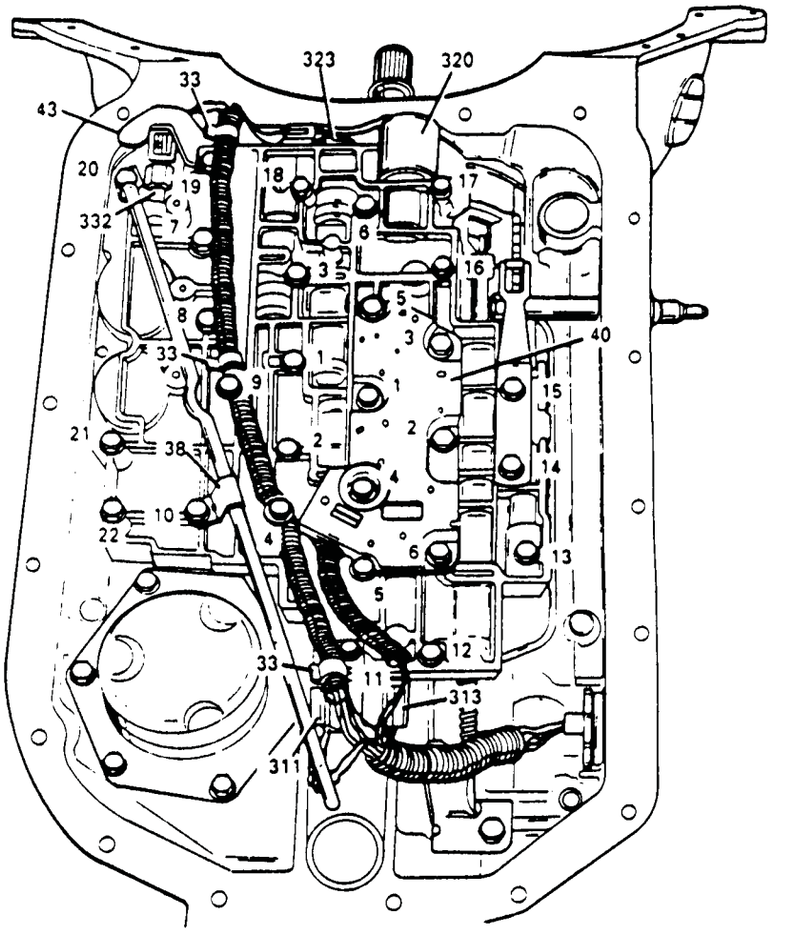



Figure 123

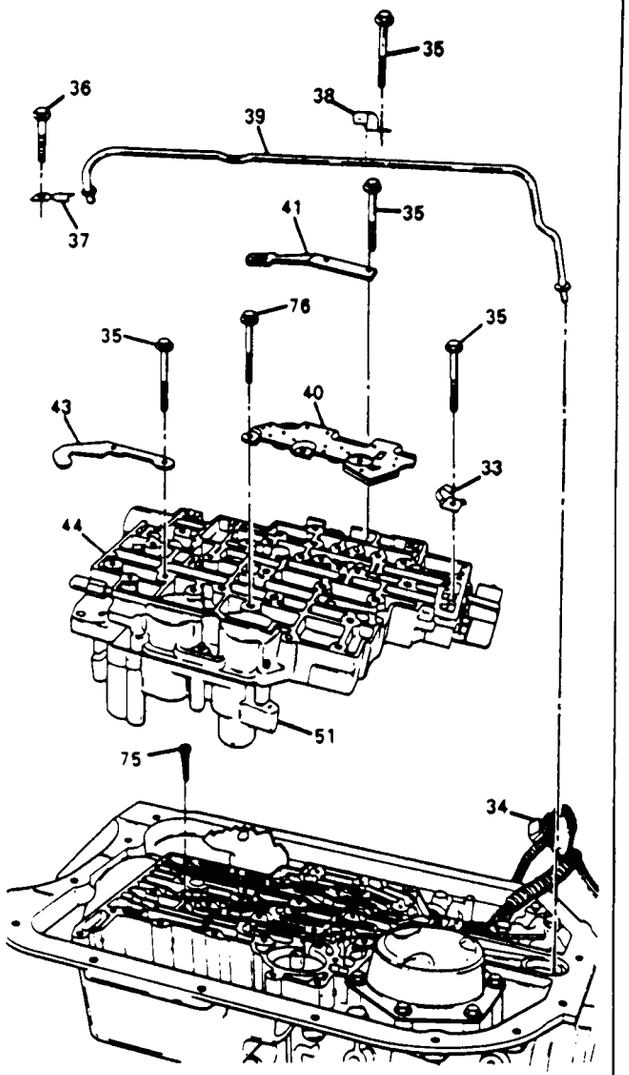



33 CLAMP, ELECTRICAL CABLE
38 CLAMP, LUBE PIPE
40 MAINFOLD, PRESSURE SWITCH
43 STOP, OIL (DIPSTICK)
311 SOLENOID & O-RING ASSEMBLY, B
313 SOLENOID & O-RING ASSEMBLY, A
320 VARIABLE FORCE MOTOR
323 SOLENOID ASSEMBLY, PWM
332 SENSOR, TEMPERATURE

Figure 124

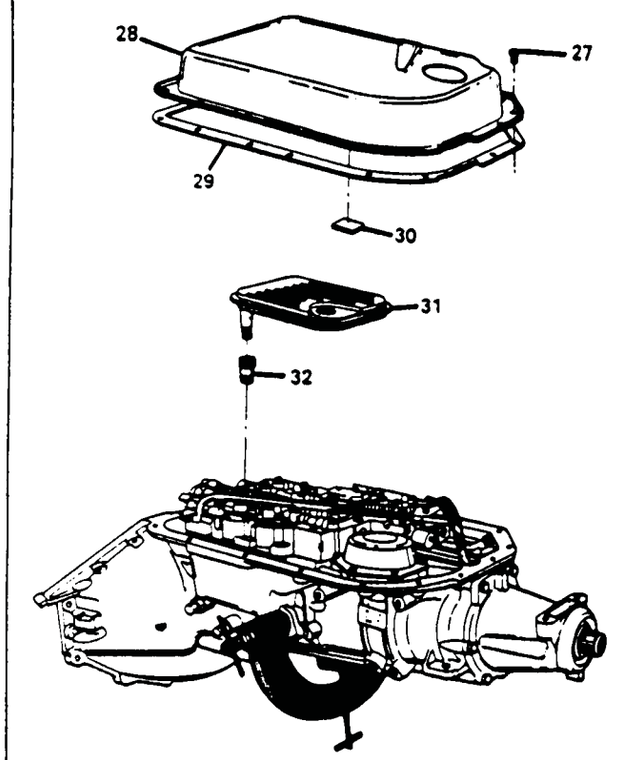
BOTTOM PAN AND FILTER ASSEMBLY

1. Install new filter seal into the case bore (See Figure 126).
2. Install the filter assembly into the filter seal (See Figure 126).
3. Install the bottom pan gasket onto transmission case (See Figure 126).
4. NOTE: This pan gasket is a "Controlled Compression" type and can be re-used as long as there are no "Ribs" broken and/or cracked. Replace as necessary.
5. Install magnet into bottom pan.
6. Install the bottom pan onto case.
7. Install 17, 10mm pan bolts, and notice that they are flanged head and black in color (See Figure 127).
8. Torque all pan bolts to 18 ft.lbs.




33 CLAMP, ELECTRICAL CABLE
34 HARNESS ASSEMBLY, ELECTRICAL WIRING
35 BOLT, HEX HD. (M6 X 1.0 X 55.0)
36 BOLT, HEX HD (M6 X 1.0 X 35.0)
37 RETAINER, LUBE PIPE
38 CLAMP, LUBE PIPE
39 PIPE, LUBE
40 MANIFOLD, PRESSURE SWITCH
41 SPRING ASSEMBLY, MANUAL DETENT
43 STOP, OIL (DIPSTICK)
44 BODY ASSEMBLY, CONTROL VALVE
51 HOUSING, ACCUMULATOR
75 SCREEN, PWM SOLENOID
76 BOLT, SPECIAL M6 X 1.0

Figure 125

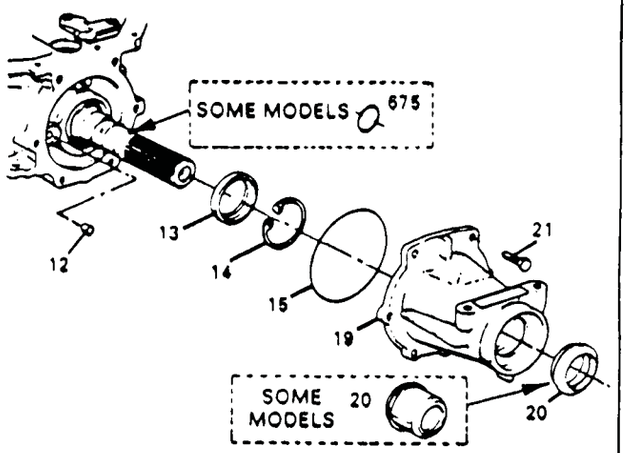



27 BOLT, HEX FLANGE HD (PAN TO CASE)
28 PAN, TRANSMISSION OIL
29 SEAL, TRANS. OIL PAN
30 MAGNET, CHIP COLLECTOR
31 FILTER ASSEMBLY, TRANSMISSION OIL
32 SEAL ASSEMBLY, FILTER NECK

Figure 126

NEW FLANGED HEAD PAN BOLTS
(BLACK IN COLOR)

Figure 127




12 CUP, ORIFICE W/SEAL/PLUG-REAR LUBE (4WD)
13 SEAL ASSEMBLY, REAR LUBE
14 RING, SNAP CASE BUSHING
15 RING, SEAL EXTENSION TO CASE
19 EXTENSION ASSEMBLY, CASE
20 HELIXSEAL ASSEMBLY, CASE EXTENSION
21 BOLT, HEX HD (M10 X 1.5 X 30.0)
675 SEAL, O-RING (OUTPUT SHAFT)

Figure 128

EXTENSION HOUSING ASSEMBLY

1. Inspect for presence of orificed cup plug (12) (See Figure 128).
2. Make sure that rear lube seal (13) and snap ring (14) are in place. (See Figure 128).
3. Install a new extension housing seal using the proper seal driver (See Figure 128).
4. Install new "O" ring seal onto the extension housing (See Figure 128).
5. Install the extension housing and 6 mounting bolts.
6. Torque the 6 bolts to 25 ft.lbs.
7. Lubricate the rear seal assembly with petrolatum.
8. Install the fixed yoke, if so equipped.

SPEED SENSOR ASSEMBLIES

1. Inspect speed sensor assemblies for evidence of any damage.
2. Install both speed sensor assemblies into case bores, and install the two retaining bolts (See Figure 129 & 130).
3. Torque the speed sensor retaining bolts to 97 in.lbs.

TORQUE CONVERTER ASSEMBLY

1. Install measuring device, as shown in Figure 131, and check for converter end play.
2. Proper end play should be .005"-.024"
3. Replace converter as necessary.
4. Install torque converter into the transmission.

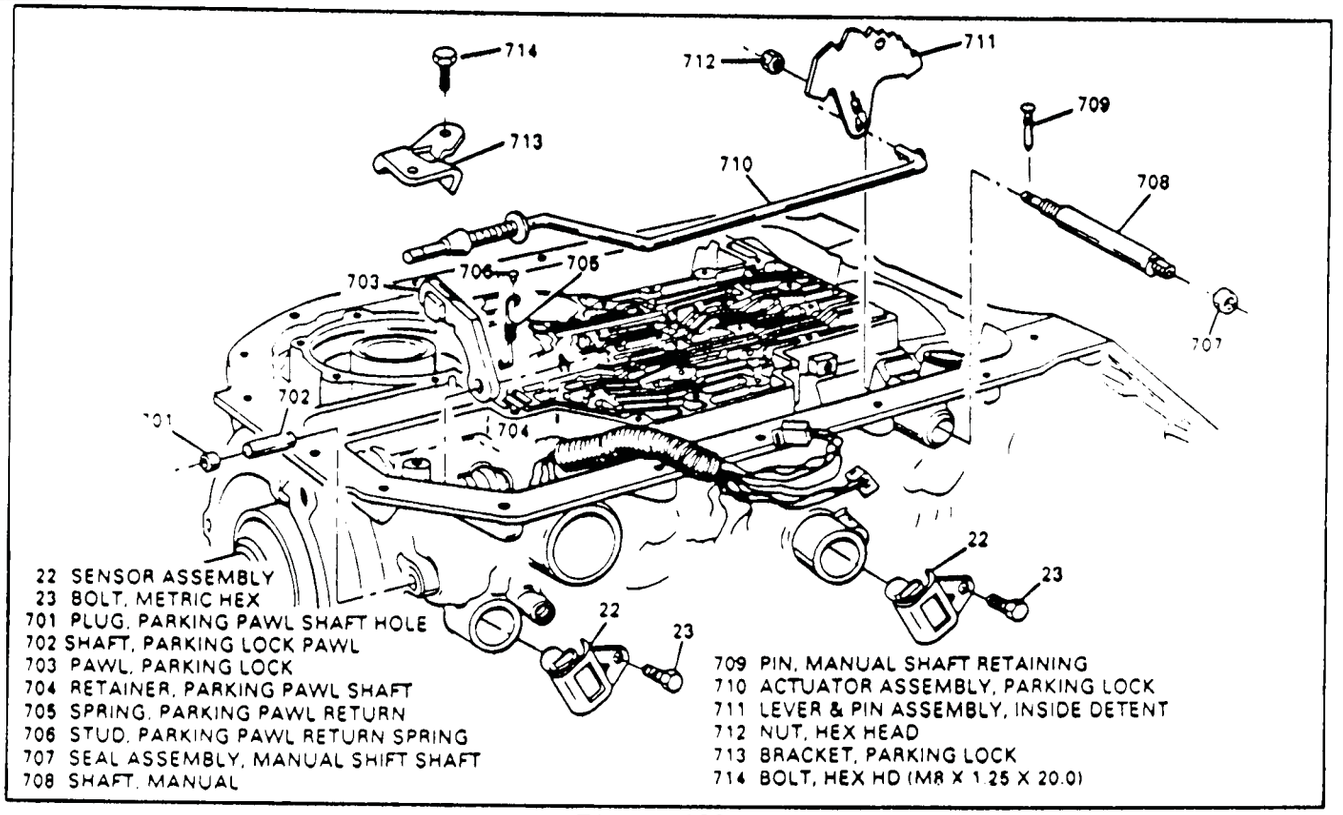



Figure 129

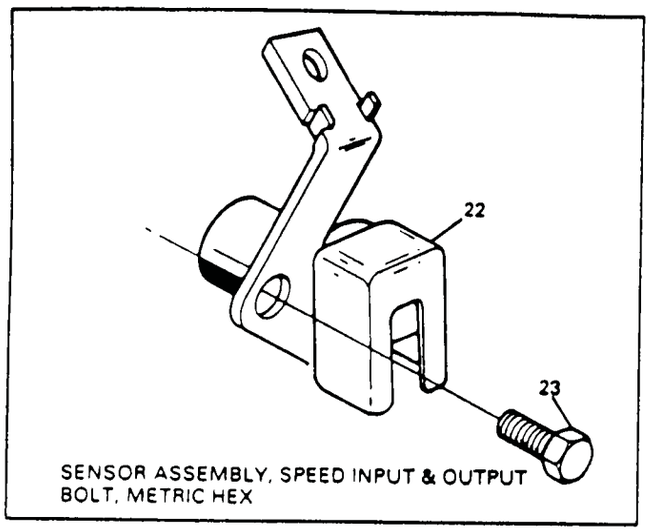



Figure 130

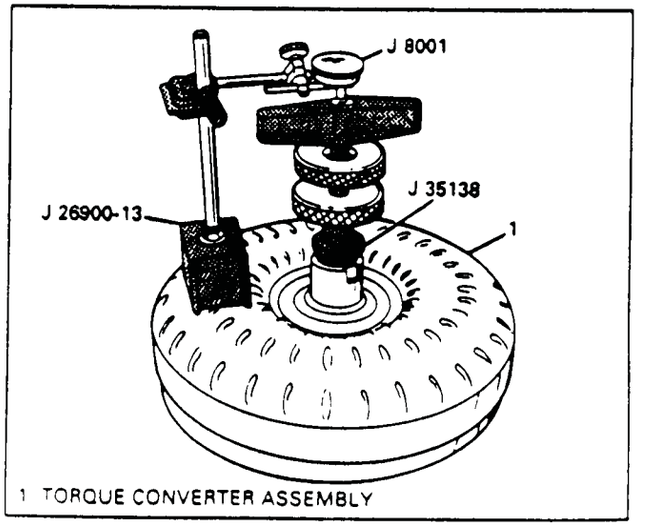



Figure 131

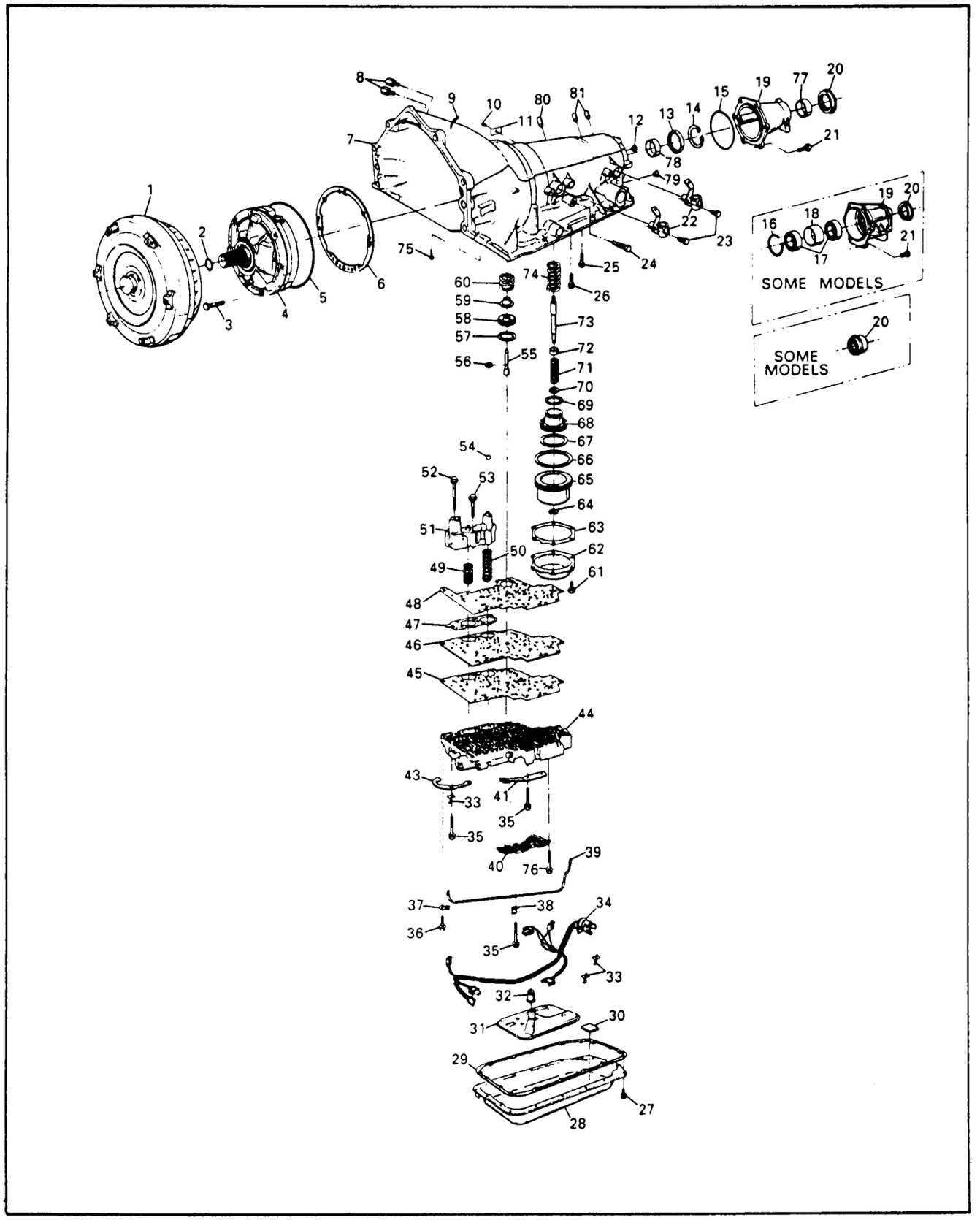



Figure 132

AUTOMATIC TRANSMISSION SERVICE GROUP

1 TORQUE CONVERTER ASSEMBLY
2 SEAL, O-RING (TURBINE SHAFT/TURBINE HUB)
3 BOLT & SEAL ASSEMBLY, PUMP TO CASE
4 PUMP ASSEMBLY, COMPLETE
5 SEAL, OIL PUMP TO CASE
6 GASKET, PUMP COVER TO CASE
7 CASE ASSEMBLY, COMPLETE
8 CONNECTOR, INVERTED FLARED TUBE
9 PIPE, VENT
10 SCREW, NAMEPLATE
11 NAMEPLATE
12 CUP, ORIFICE W/SEAL/PLUG-REAR LUBE (4WD)
13 SEAL ASSEMBLY, REAR LUBE
14 RING, SNAP SEAL RETAINER
15 RING, SEAL EXTENSION TO CASE
16 RING, SNAP INTERNAL
17 BEARING ASSEMBLY, BALL
18 SPACER, BEARING
19 EXTENSION ASSEMBLY, CASE
20 HELIXSEAL ASSEMBLY, CASE EXTENSION
21 BOLT, HEX HD (M10 X 1.5 X 30.0)
22 SENSOR ASSEMBLY, SPEED INPUT & OUTPUT
23 BOLT, METRIC HEX
24 PLUG, OIL TEST HOLE (HEX HD 1/8 PIPE)
25 BOLT, CASE TO CENTER SUPPORT
26 BOLT, CASE (4TH CLUTCH)
27 BOLT, HEX FLANGE HD (PAN TO CASE)
28 PAN, TRANSMISSION OIL
29 SEAL, TRANS. OIL PAN
30 MAGNET, CHIP COLLECTOR
31 FILTER ASSEMBLY, TRANSMISSION OIL
32 SEAL ASSEMBLY, FILTER NECK
33 CLAMP, ELECTRICAL CABLE
34 HARNESS ASSEMBLY, ELECTRICAL WIRING
35 BOLT, HEX HD. (M6 X 1.0 X 55.0)
36 BOLT, M6 X 1.0 X 35.0 LG V/B TO C/P
37 RETAINER, LUBE PIPE
38 CLAMP, LUBE PIPE
39 PIPE, LUBE
40 MANIFOLD, PRESSURE SWITCH
41 SPRING ASSEMBLY, MANUAL DETENT
43 STOP, DIPSTICK (FLUID LEVEL INDICATOR)
44 BODY ASSEMBLY, CONTROL VALVE
45 GASKET, VALVE BODY TO SPACER PLATE
46 PLATE, VALVE BODY SPACER
47 GASKET, ACCUMULATOR HSG. TO SPACER PLATE
48 GASKET, SPACER PLATE TO CASE
49 SPRING, 4TH CLUTCH ACCUM. PISTON
50 SPRING, 3RD CLUTCH ACCUM. PISTON
51 HOUSING, ACCUMULATOR
52 BOLT, ACCUM. HOUSING TO VALVE BODY (LONG)
53 BOLT, ACCUM. HOUSING TO VALVE BODY (SHORT)
54 BALL, .25 DIAMETER
55 PIN, FRONT SERVO PISTON
56 RING, FRONT SERVO SPRING RETAINER
57 RING, OIL SEAL
58 PISTON, FRONT SERVO
59 RETAINER, FRONT SERVO SPRING
60 SPRING, FRONT SERVO PISTON
61 BOLT, REAR SERVO COVER
62 COVER, REAR SERVO
63 GASKET, REAR SERVO COVER
64 CLIP, RETAINING (BOTTOM)
65 PISTON, REAR SERVO
66 RING, OIL SEAL ACCUM. PISTON (OUTER)
67 RING, OIL SEAL ACCUM. PISTON (INNER)
68 PISTON, REAR ACCUMULATOR
69 SEAL, REVERSE SERVO PISTON
70 WASHER, SERVO PISTON
71 SPRING, REAR SERVO
72 RETAINER, REAR PISTON SPRING
73 PIN, REAR BAND APPLY (SELECTIVE)
74 SPRING, REAR ACCUMULATOR
75 SCREEN, PWM SOLENOID
76 BOLT, SPECIAL
77 BUSHING, CASE EXTENSION
78 BUSHING, TRANSMISSION CASE
79 PLUG, DIRECT OIL GAL (.25 DIA. CUP)
80 PIN, ANCHOR FRONT BAND
81 PIN, ANCHOR REAR BAND

Figure 132 Legend

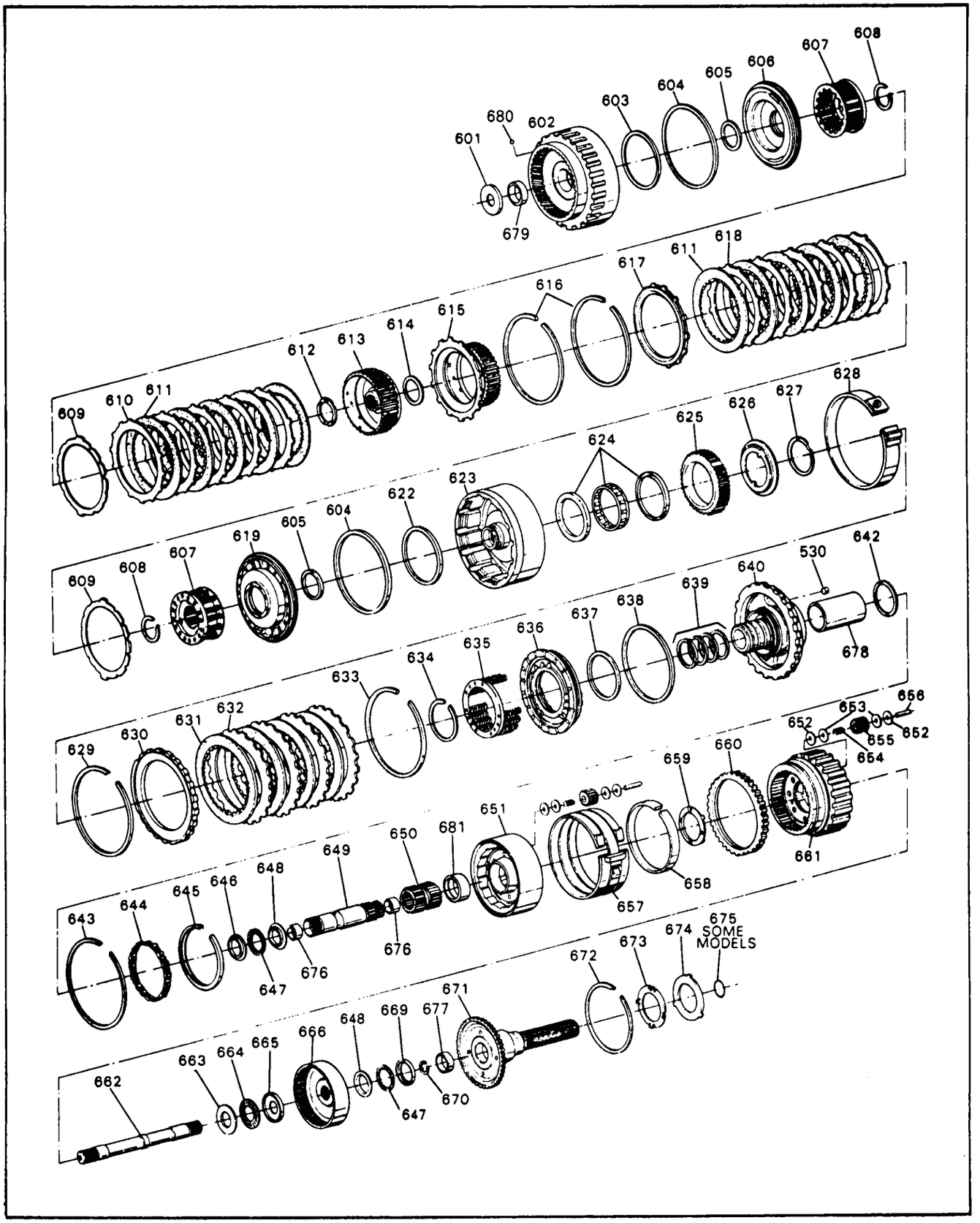
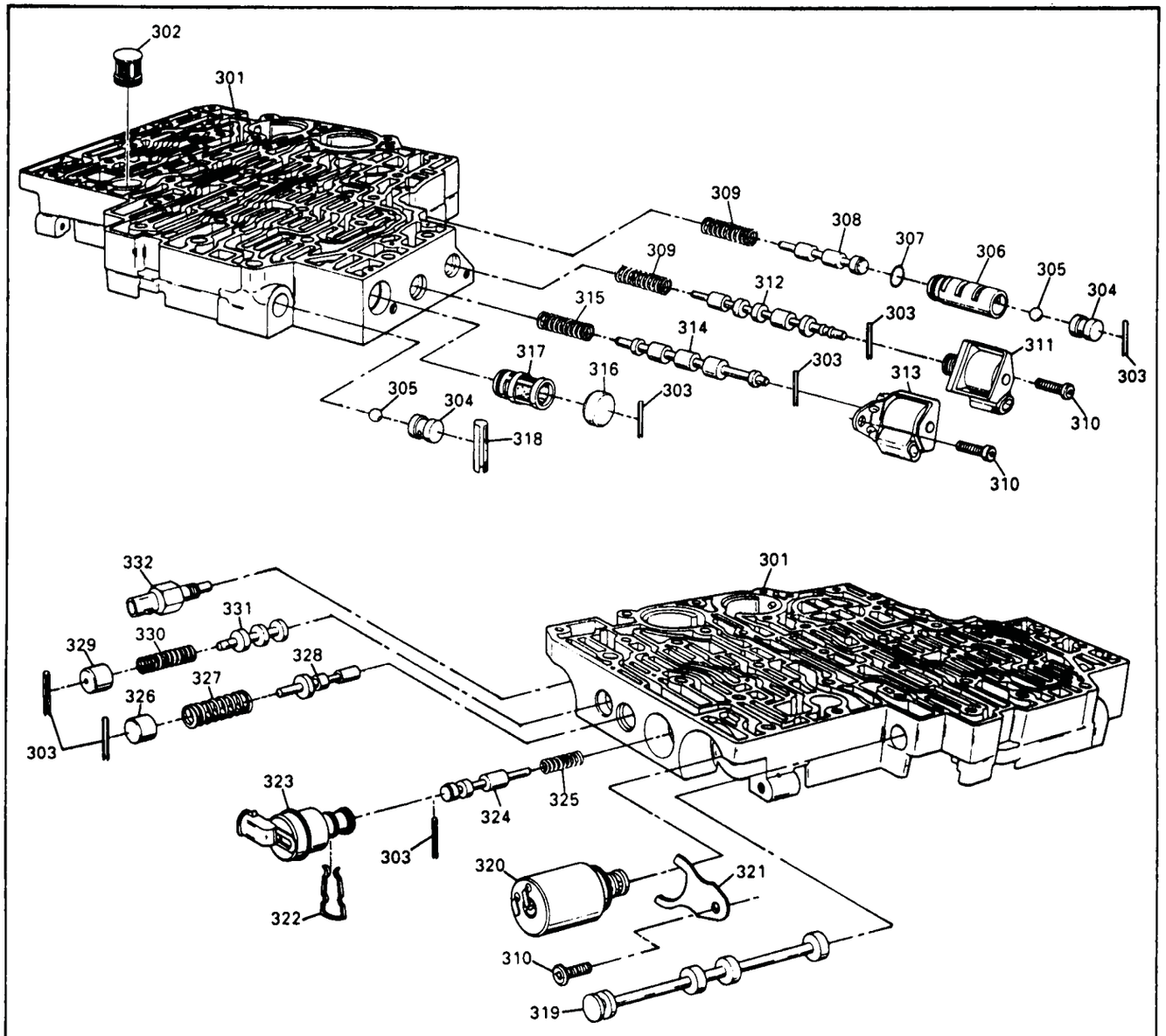



Figure 133

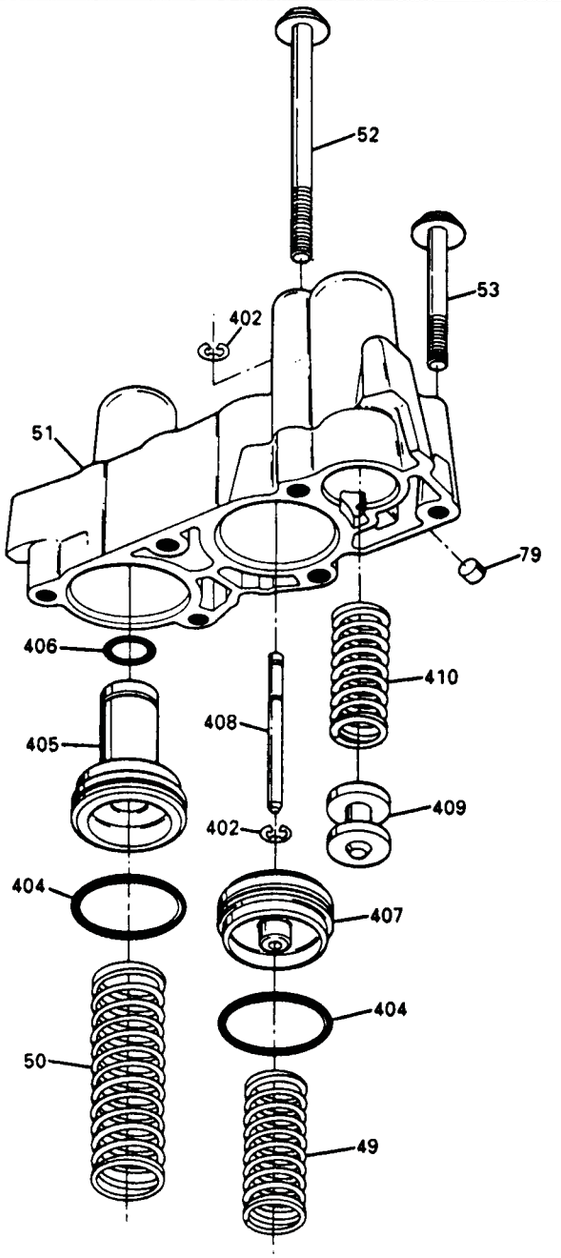
530 PLUG, ORIFICE CENTER SUPPORT
601 BEARING ASM., THRUST CARRIER/FORWARD CLUTCH
602 HOUSING ASSEMBLY, FORWARD CLUTCH
603 SEAL, CLUTCH (CENTER)
604 SEAL, CLUTCH (OUTER)
605 SEAL, CLUTCH (INNER)
606 PISTON, FORWARD CLUTCH
607 SPRING & RETAINER ASSEMBLY
608 RING, SNAP
609 PLATE, CLUTCH (.054 DISHED)
610 PLATE, CLUTCH (.0775 FLAT)
611 PLATE ASSEMBLY, CLUTCH
612 WASHER, THRUST CLUTCH HUB HOUSING
613 HUB, FORWARD CLUTCH DRIVEN
614 WASHER, THRUST FORWARD CLUTCH
615 HUB, DIRECT CLUTCH DRIVING
616 RING, SNAP (6.24 O.D. X .062)
617 PLATE, DIRECT CLUTCH BACKING
618 PLATE, CLUTCH (.0915 FLAT)
619 PISTON, DIRECT CLUTCH
622 SEAL, CLUTCH (CENTER)
623 HOUSING, DIRECT CLUTCH
624 SPRAG ASSEMBLY, INTERMEDIATE CLUTCH
625 RACE, INTERMEDIATE CLUTCH (OUTER)
626 RETAINER, INTERMEDIATE CLUTCH
627 RING, EXTERNAL LOCKING
628 BAND ASSEMBLY, FRONT
629 RING, SNAP (INTERMEDIATE CLUTCH RETAINER)
630 PLATE, INTERMEDIATE CLUTCH BACKING
631 PLATE ASSEMBLY, INTERMEDIATE CLUTCH
632 PLATE, INTERMEDIATE CLUTCH
633 RING, SNAP CENTER SUPPORT/CASE
634 RING, SNAP INTERMEDIATE CLUTCH
635 SPRING & RETAINER ASM., INTERMEDIATE CLUTCH
636 PISTON, INTERMEDIATE CLUTCH
637 SEAL, INTERMEDIATE CLUTCH (INNER)
638 SEAL, INTERMEDIATE CLUTCH (OUTER)
639 RING, OIL SEAL
640 SUPPORT & RACE ASSEMBLY, CENTER
641 PLUG, ORIFICE CENTER SUPPORT
642 WASHER, THRUST SUPPORT/REACTION DRUM
643 SPACER, SUPPORT TO CASE
644 ROLLER CLUTCH ASSEMBLY
645 RING, REACTION DRUM SPACER
646 RACE, THRUST BEARING TO CENTER SUPPORT
647 BEARING, NEEDLE THRUST
648 RACE, THRUST BEARING
649 SHAFT ASSEMBLY, SUN GEAR
650 GEAR, SUN
651 DRUM & CARRIER ASSEMBLY, REACTION
652 WASHER, PINION THRUST
653 WASHER, PINION THRUST
654 ROLLER, NEEDLE BEARING
655 PINION, PLANET
656 PIN, PLANET PINION
657 BAND ASSEMBLY, REAR BRAKE
658 RING, FRONT INTERNAL GEAR
659 WASHER, FRONT INTERNAL/REACTION CARRIER
660 RING, OUTPUT SPEED SENSOR
661 CARRIER ASSEMBLY, OUTPUT
662 SHAFT, TRANSMISSION MAIN
663 RACE, THRUST BEARING TO SUN GEAR
664 BEARING, NEEDLE THRUST RR INTERNAL GEAR
665 RACE, THRUST BEARING TO RR INTERNAL GEAR
666 GEAR, REAR INTERNAL
669 RACE, THRUST BEARING TO OUTPUT SHAFT
670 RING, SNAP MAINSHAFT INTERNAL GEAR
671 SHAFT & BUSHING ASSEMBLY, OUTPUT
672 RING, SNAP (OUTPUT SHAFT/ FRONT INTERNAL GEAR)
673 WASHER, THRUST
674 WASHER, THRUST SELECTIVE
675 SEAL, O-RING OUTPUT SHAFT
676 BUSHING, SUN GEAR SHAFT
677 BUSHING, OUTPUT SHAFT
678 BUSHING
679 BUSHING, 1.536" DIA. X 3.52"
680 BALL, CHECK
681 BUSHING, REACTION DRUM

Figure 133 Legend




301 BODY, CONTROL VALVE
302 SCREEN FILTER, FORCE MOTOR FEED
303 PIN, COILED SPRING
304 PLUG, CHECKBALL
305 BALL (.375 DIA.)
306 BUSHING, 3RD/REVERSE CHECKBALL
307 SEAL, OIL PUMP CVR SCREEN
308 VALVE, 3/4 SHIFT
309 SPRING, SHIFT VALVE RETURN (2/3 & 3/4)
310 BOLT, SOLENOID (1/2 & 2/3 SHIFT, FORCE MOTOR)
311 SOLENOID & O-RING ASSEMBLY, B
312 VALVE, 2/3 SHIFT
313 SOLENOID & O-RING ASSEMBLY, A
314 VALVE, 1/2 SHIFT
315 SPRING, 1/2 SHIFT VALVE RETURN
316 PLUG, SHIFT SOLENOID FEED FILTER
317 FILTER, SHIFT SOLENOID FEED
318 SLEEVE, LO/REVERSE CHECKBALL
319 VALVE, MANUAL
320 VARIABLE FORCE MOTOR
321 CLAMP, FORCE MOTOR RETAINING
322 CLIP, PWM SOLENOID RETAINING
323 SOLENOID ASSEMBLY, PWM
324 VALVE, TCC REGULATOR APPLY
325 SPRING, TCC REGULATOR APPLY VALVE
326 PLUG, VALVE BORE (ACTUATOR FEED)
327 SPRING, ACTUATOR FEED LIMIT VALVE
328 VALVE, ACTUATOR FEED LIMIT
329 PLUG, ACCUMULATOR VALVE BORE
330 SPRING, ACCUMULATOR VALVE
331 VALVE, ACCUMULATOR
332 SENSOR, TEMPERATURE

Figure 134




49 SPRING, 4TH CLUTCH ACCUM. PISTON
50 SPRING, 3RD CLUTCH ACCUM. PISTON
51 HOUSING, ACCUMULATOR
52 BOLT, ACCUM. HOUSING TO VALVE BODY (LONG)
53 BOLT, ACCUM. HOUSING TO VALVE BODY (SHORT)
79 PLUG, DIRECT OIL GAL (.25 DIA. CUP)
402 RING, SNAP
404 SEAL, (1.615) SQUARE CUT
405 PISTON, 3RD CLUTCH ACCUMULATOR
406 SEAL, (.859) SQUARE CUT
407 PISTON, 4TH CLUTCH ACCUMULATOR
408 PIN, 4TH CLUTCH ACCUMULATOR PISTON
409 VALVE, TORQUE SIGNAL COMPENSATOR
410 SPRING, T.S. COMPENSATOR

Figure 135

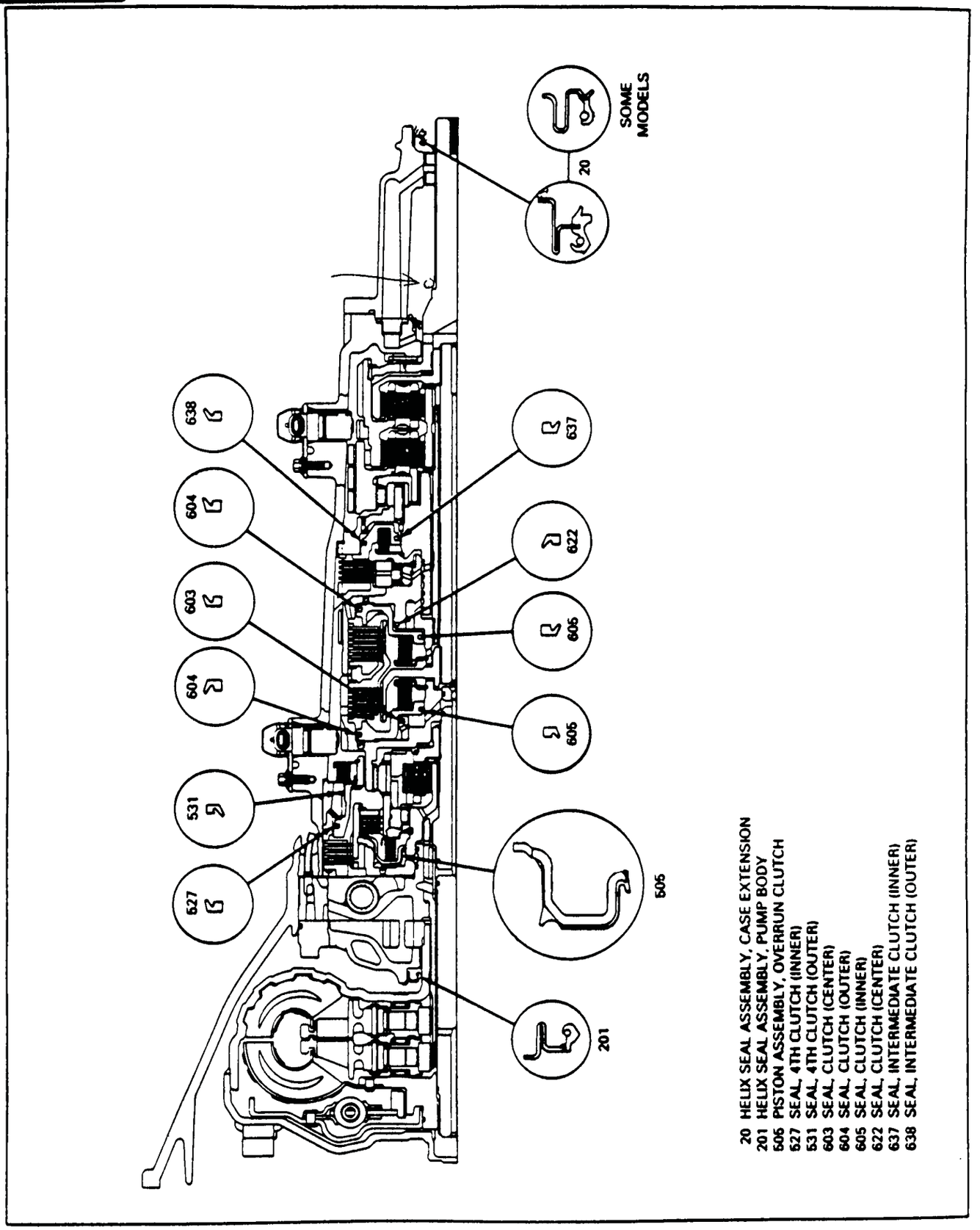
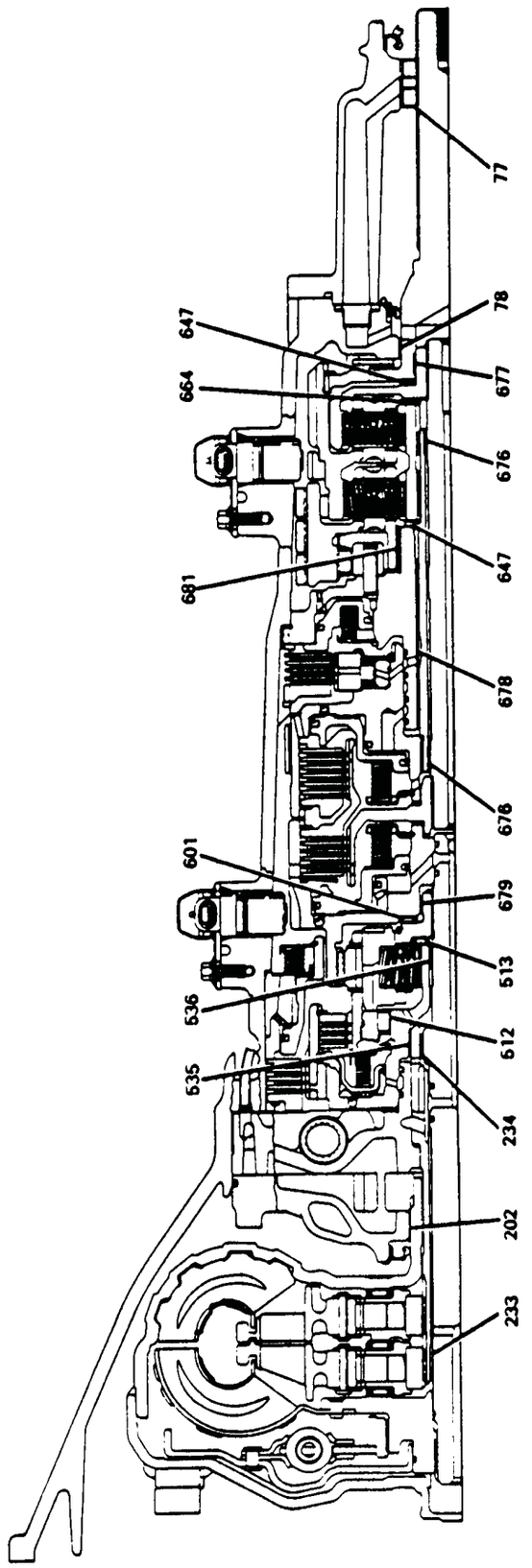



Figure 136




77 BUSHING, CASE EXTENSION
78 BUSHING, CASE TRANS
202 BUSHING, PUMP BODY
233 BUSHING, STATOR SHAFT (FRONT)
234 BUSHING, STATOR SHAFT (REAR)
512 ROLLER CLUTCH ASSEMBLY, OVERDRIVE
513 BEARING ASM., THRUST CARRIER/OVERRUN CLU.
535 BUSHING, OVERRUN CLU. HSG.
536 BUSHING, 1.12" O.D. X 0.50"

601 BEARING ASM., THRUST CARRIER/FORWARD CLU
647 BEARING, NEEDLE THRUST
664 BEARING, NEEDLE THRUST RR INTERNAL GEAR
676 BUSHING, SUN GEAR SHAFT
677 BUSHING, OUTPUT SHAFT
678 BUSHING
679 BUSHING, 1.536" DIA. X 3.62"
681 BUSHING, REACTION DRUM

Figure 137

## CODE IDENTIFICATION AND DEFAULT ACTION

| CODE AND CIRCUIT | PROBABLE CAUSE | DEFAULT ACTION |
|---|---|---|
| 14<br>Engine Temperature High | Signal voltage has been above 130°C (270°F) for 1 second. | • TCC apply cold.<br>• Loss of driveability. |
| 15<br>Engine Temperature Low | Signal voltage has been less than -33°C (-27°F) for 1 second. | • TCC apply cold.<br>• Loss of driveability. |
| 21<br>Throttle Position High | Code 21 will set if signal voltage has been above 4.9 volts for 1 second. | • Set line pressure to maximum.<br>• Fixed shift points.<br>• Inhibit 4th gear.<br>• Inhibit TCC operation. |
| 22<br>Throttle Position Low | Code 22 will set if TPS signal voltage is below .06 volt for more than 1 second. | • Set pressure to maximum.<br>• Fixed shift points.<br>• Inhibit 4th gear.<br>• Inhibit TCC operation. |
| 24<br>Output Speed Low | With input speed at least 3000 rpm, output speed must read less than 200 rpm. | • Set pressure to maximum.<br>• Allow 4–3, 3–2, and 1–2 shifts, then maintain 2nd gear.<br>• Calculate output speed from input speed. |
| 28<br>Pressure Switch Manifold | PCM/TCM must see one of two "illegal" combinations from the pressure switch manifold. | • Assume Ⓓ Drive 4 is selected.<br>• Inhibit 4th gear operation.<br>• Inhibit TCC operation. |
| 39<br>TCC Stuck "OFF" | Code 39 sets if the TCC slip is greater than 65 rpm for 2 seconds. | • Inhibit 4th gear.<br>• Inhibit TCC operation. |
| 53<br>System Voltage High | Code 53 will set if system voltage is above 19.5 volts for 2 seconds. | • Maximum line pressure.<br>• 2nd gear only.<br>• Inhibit TCC operation. |
| 58<br>Transmission Temperature High | Transmission temperature must be above 154°C (304°F) for 1 second. | • TCC in 2nd, 3rd, 4th gears.<br>• Maximum line pressure. |
| 59<br>Transmission Temperature Low | Transmission Temperature must be below -48°C (-54°F) for 1 second. | • TCC in 2nd, 3rd and 4th gears.<br>• Maximum line pressure. |

Figure 138

## CODE IDENTIFICATION AND DEFAULT ACTION

| CODE AND CIRCUIT | PROBABLE CAUSE | DEFAULT ACTION |
|---|---|---|
| 68<br>Over Drive Ratio | Code 68 will set if the engine speed is 200 rpm higher than input speed for 2 seconds must be in 4th gear TCC engaged. | • Set Pressure to maximum. |
| 73<br>Force Motor Current | Code 73 sets when actual force motor current is more than 1.6 amps lower than command current. | • Maximum line pressure. |
| 75<br>System Voltage Low | Code 75 will set when system voltage falls below 8.6 volts. | • Turn force motor "OFF."<br>• Allow 4-3, 3-2, and 1-2 shifts, then maintain 2nd gear.<br>• Inhibit TCC and 4th gear. |
| 81<br>Quad Driver and<br>Shift Solenoid "B" Fault | Code 81 will set if the PCM/TCM detects an inappropriate voltage on the shift solenoid "B" circuit. | • Shift to 2nd gear.<br>• Inhibit TCC operation. |
| 82<br>Quad Driver and<br>Shift Solenoid "A" Fault | Code 82 will set if the PCM/TCM detects an inappropriate voltage on the shift solenoid "A" circuit. | • 2nd and 3rd gears only or 1st and 4th gears only. |
| 83<br>Quad Driver and TCC Fault | Code 83 will set if an inappropriate voltage is detected on the TCC circuit. | • Inhibit 4th gear.<br>• Inhibit TCC operation. |
| 85<br>Undefined Ratio | Code 85 will set if the PCM/TCM's calculations indicate an unexpected gear ratio does not include over drive. | • Set pressure to maximum. |
| 86<br>Shift Solenoid "B" Stuck "ON" | Code 86 will set if the PCM/TCM has commanded 1st or 2nd gear but a ratio calculation indicates 3rd gear. | • Set pressure to maximum. |
| 87<br>Shift Solenoid "B" Stuck "OFF" | Code 87 will set if the PCM/TCM commands 3rd or 4th gear but a ratio calculation indicates 2nd gear. | • Set pressure to maximum. |

Figure 139

| FASTENER APPLICATION | ASSEMBLY TORQUE | | | RECHECK TORQUE | | |
|---|---|---|---|---|---|---|
| | N.M | LB.-FT. | LB.-IN. | N.M | LB.-FT | LB.-IN. |
| TEMPERATURE SENSOR TO VALVE BODY | 4 | — | 35 | 4 MIN. | — | 35 MIN. |
| SOLENOID TO VALVE BODY SCREW | 8 | — | 71 | 5 MIN. | — | 44 MIN. |
| CONTROL VALVE ASSEMBLY TO CASE SCREW | 11 | — | 97 | 8 MIN. | — | 71 MIN. |
| OIL TEST HOLE PLUG | 11 | — | 97 | 8 MIN. | — | 71 MIN. |
| FLYWHEEL HOUSING COVER TO TRANSMISSION SCREW | 7 | — | 62 | 7 MIN. | — | 62 MIN. |
| PUMP BODY TO COVER SCREW | 24 | 18 | — | 20 MIN. | 15 MIN. | — |
| PUMP ASSEMBLY TO CASE SCREW | 24 | 18 | — | 20 MIN. | 15 MIN. | — |
| REAR SERVO COVER TO CASE SCREW | 24 | 18 | — | 20 MIN. | 15 MIN. | — |
| FORCE MOTOR BRACKET TO VALVE BODY SCREW | 8 | — | 71 | 5 MIN. | — | 44 MIN. |
| PARKING PAWL BRACKET TO CASE SCREW | 24 | 18 | — | 20 MIN. | 15 MIN. | — |
| ACCUMULATOR HOUSING TO VALVE BODY SCREW | 11 | — | 97 | 8 MIN. | — | 71 MIN. |
| FOURTH CLUTCH SCREW | 16 | 12 | — | 15 MIN. | — | 133 MIN. |
| PAN TO CASE SCREW | 24 | 18 | — | 15 MIN. | — | 133 MIN. |
| EXTENSION HOUSING TO CASE SCREW | 34 | 25 | — | 27 MIN. | 20 MIN. | — |
| MANUAL SHAFT TO DETENT LEVER NUT | 24 | 18 | — | 20 MIN. | 15 MIN. | — |
| SPEED SENSOR TO CASE SCREW | 11 | — | 97 | 8 MIN. | — | 71 MIN. |
| CASE CENTER SUPPORT SCREW | 39 | 29 | — | 34 MIN. | 25 MIN. | — |
| FLYWHEEL TO CONVERTER SCREW | 44 | 32 | — | 44 MIN. | 32 MIN. | — |
| TRANSMISSION CASE TO ENGINE SCREW | 44 | 32 | — | 44 MIN. | 32 MIN. | — |
| COOLER PIPE CONNECTOR NUT AT CASE &RADIATOR | 38 | 28 | — | 35 MIN. | 26 MIN. | — |
| VALVE BODY TO CASE/LUBE PIPE | 11 | — | 97 | 8 MIN. | — | 71 MIN. |
| ENGINE REAR MOUNT TO TRANSMISSION BOLT | 44 | 32 | — | 44 MIN. | 32 MIN. | — |
| ENGINE REAR SUPPORT BRACKET TO FRAME NUT | 44 | 32 | — | 44 MIN. | 32 MIN. | — |
| VALVE BODY TO CASE/PSM | 11 | — | 97 | 8 MIN. | — | 71 MIN. |

Figure 140

# THM 4L80-E/4L80-EHD

## NEW DESIGN CASE CONNECTOR FOR 1993

CHANGE: Beginning on May 25, 1993 (Julian Date 145) a new case connector and wiring harness assembly went into production on all THM 4L80-E/4L80-EHD transmissions (See Figure 2).

REASON: Greatly decreased the possibility of bending the case connector terminals and ease of assembly.

PARTS AFFECTED:

(1) CASE CONNECTOR AND INTERNAL WIRING HARNESS - Now has a much more durable case connector and REVISED pin locations.
Refer to Figure 1 for previous transmission case connector.
Refer to Figure 2 for new transmission case connector.

(2) EXTERNAL VEHICLE HARNESS CONNECTOR - Changed to accomodate the new design transmission case connector and REVISED cavity locations.
Refer to Figure 3 for new design vehicle harness connector.

INTERCHANGEABILITY:

There is now available a new service package, OEM part number 24200161, that will update ANY previous model THM 4L80-E/4L80-EHD transmission to the new design case connector, and includes the following:

1. New design transmission case connector and internal wiring harness.
2. New design external vehicle harness connector that requires cutting and splicing the new connector to the existing vehicle harness. Use the chart provided in Figure 2 as a guide.

SERVICE INFORMATION:

UPDATE SERVICE PACKAGE (Includes the following) ..... 24200161

1. New Design Transmission Case Connector, and Internal Wiring Harness Assembly.
2. New Design External Vehicle Harness Connector.

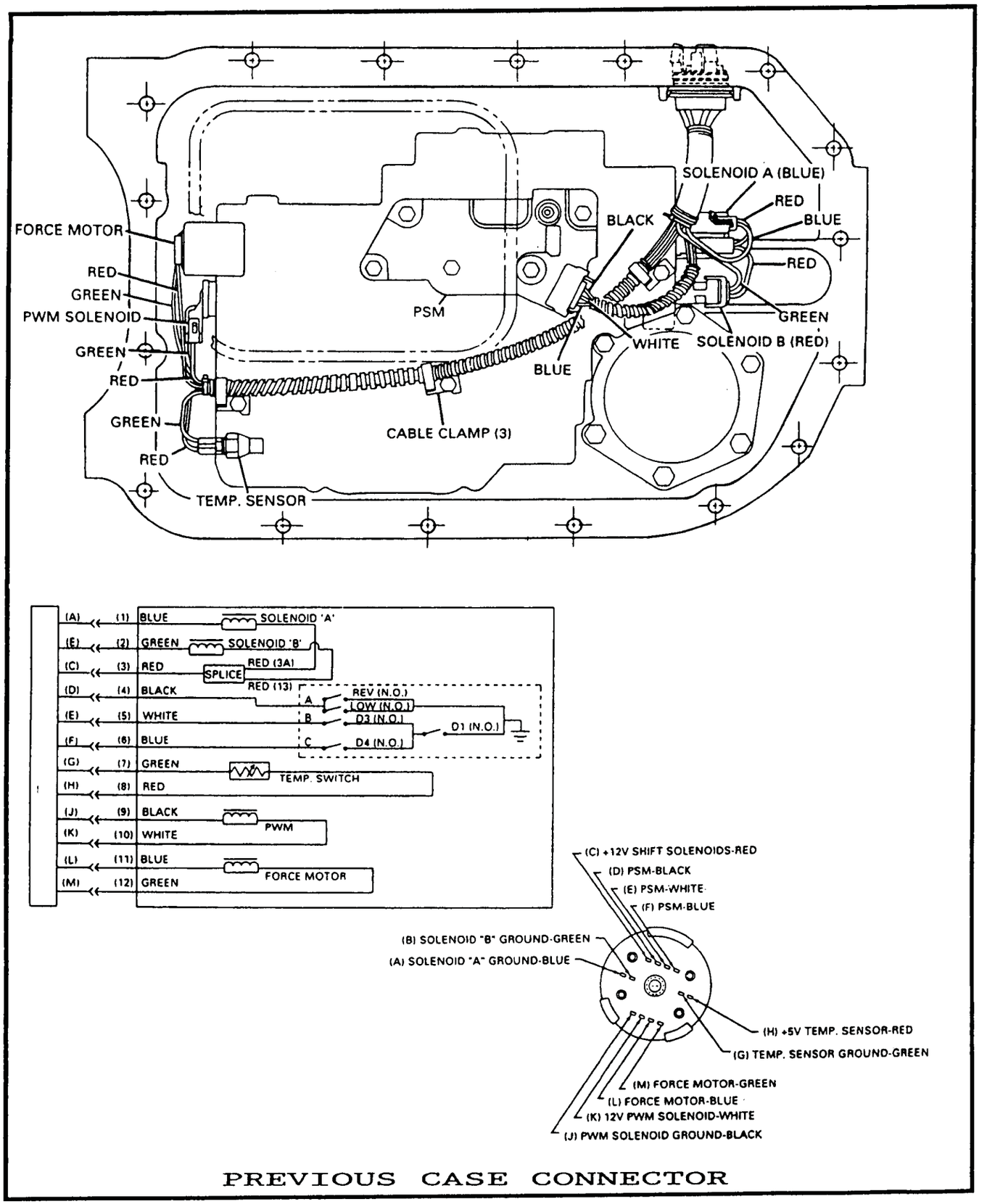
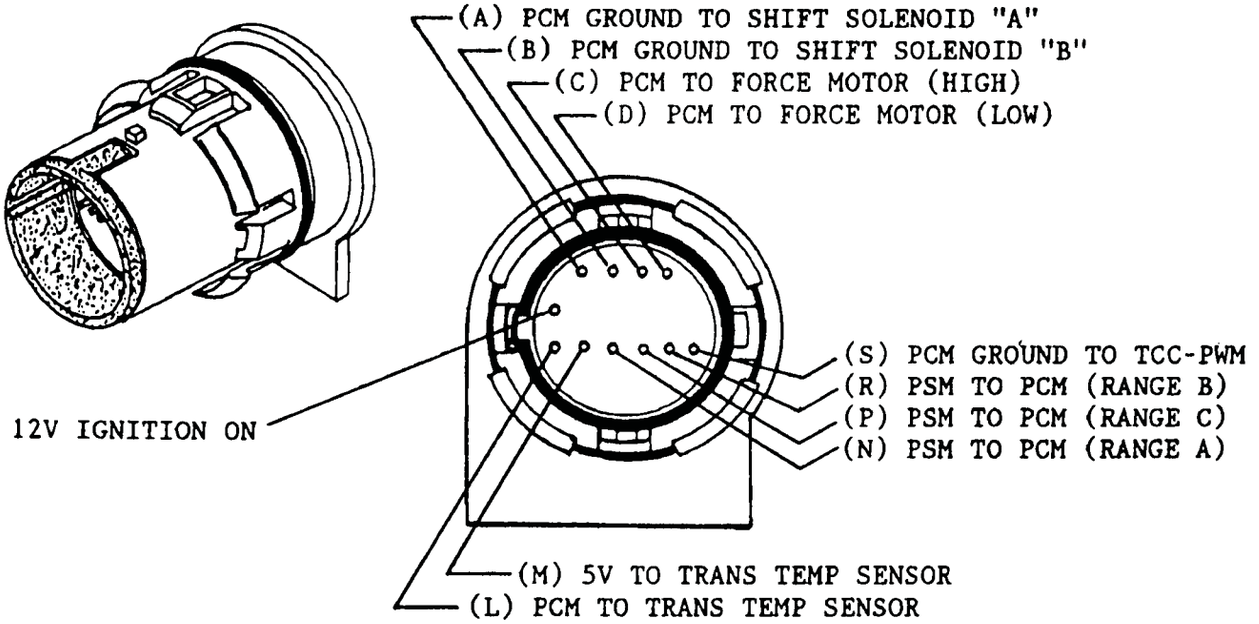



Figure 1

## NEW CASE CONNECTOR FOR 1993

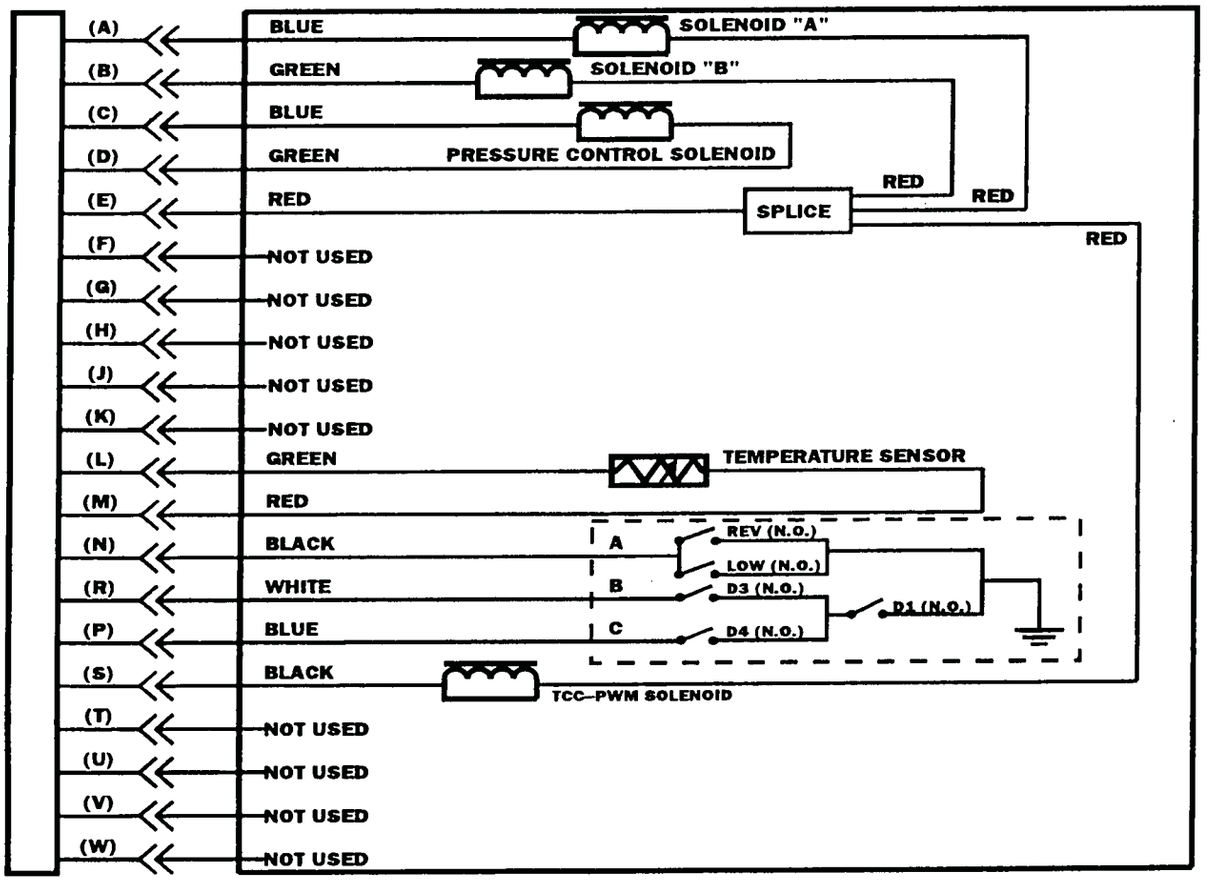


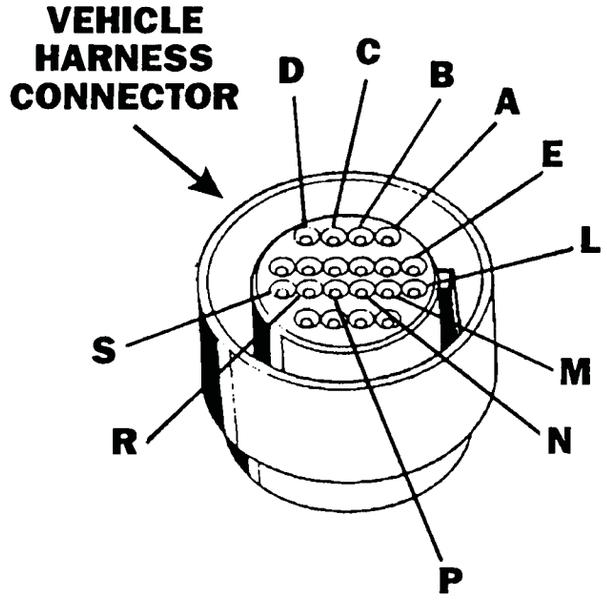

| OLD CAVITY | NEW CAVITY | FUNCTION |
|---|---|---|
| A | A | PCM GROUND TO SHIFT SOLENOID "A" |
| B | B | PCM GROUND TO SHIFT SOLENOID "B" |
| L | C | PCM TO FORCE MOTOR (HIGH) |
| M | D | PCM TO FORCE MOTOR (LOW) |
| C | E | 12V IGNITION ON, TO SOLENOIDS |
| G | L | PCM TO TRANS TEMP SENSOR |
| H | M | 5V TO TRANS TEMP SENSOR |
| D | N | PSM TO PCM (RANGE A) |
| F | P | PSM TO PCM (RANGE C) |
| E | R | PSM TO PCM (RANGE B) |
| J | S | PCM GROUND TO TCC-PWM SOLENOID |

NEW CASE CONNECTOR FOR 1993

Figure 2

## 1993 WIRING SCHEMATIC AND EXTERNAL HARNESS CONNECTOR




**A** PCM GROUND TO SHIFT SOLENOID "A"
**B** PCM GROUND TO SHIFT SOLENOID "B"
**C** PCM TO FORCE MOTOR (HIGH)
**D** PCM TO FORCE MOTOR (LOW)
**E** 12V IGNITION ON, TO SOLENOIDS
**L** PCM TO TRANS TEMP SENSOR
**M** 5V TO TRANS TEMP SENSOR
**N** PSM TO PCM (RANGE A)
**P** PSM TO PCM (RANGE C)
**R** PSM TO PCM (RANGE B)
**S** PCM GROUND TO TCC-PWM SOLENOID

Figure 3

# THM 4L80-E

## NEW FORCE MOTOR FOR 1994
## NEW ELECTRONICS FOR 1994

CHANGE: Beginning at the start of production 1994, ALL THM 4L80-E transmissions were built with a new Force Motor, new Spacer Plate, and elimination of the torque signal compensator valve in the accumulator housing. The new force motor operates at the 614 Hz (Cycles per Second) instead of the previous 292.5 Hz, which obviously requires a new PCM. With the new design force motor, the need for the cleaning cycle is eliminated, so the force motor is no longer pulsed every 10 seconds by the PCM/TCM.

REASON: Improved line pressure stability, and standardization, as the same part number will now fit 4L80-E, 4L60-E, and 4T80-E.

PARTS AFFECTED:

(1) FORCE MOTOR - New design that does not require torque signal oil be sent back to the end of the enclosed spool valve, so the feed passage and the screen in the end of it were eliminated, as shown in Figure 1. The armature housing is also smaller in diameter than the previous force motor, and is now Black in color (See Figure 1).

(2) SPACER PLATE - The orificed feed hole for torque signal oil in the spacer plate, marked "A" in Figure 2, has been eliminated to accomodate the new design force motor (See Figure 2).

(3) TORQUE SIGNAL COMPENSATOR VALVE - Eliminated because it is no longer needed to absorb torque signal pulses created by the previous model PCM. The torque signal feed passage is no longer drilled in the accumulator housing on 1994 models (See Figures 3 and 4)

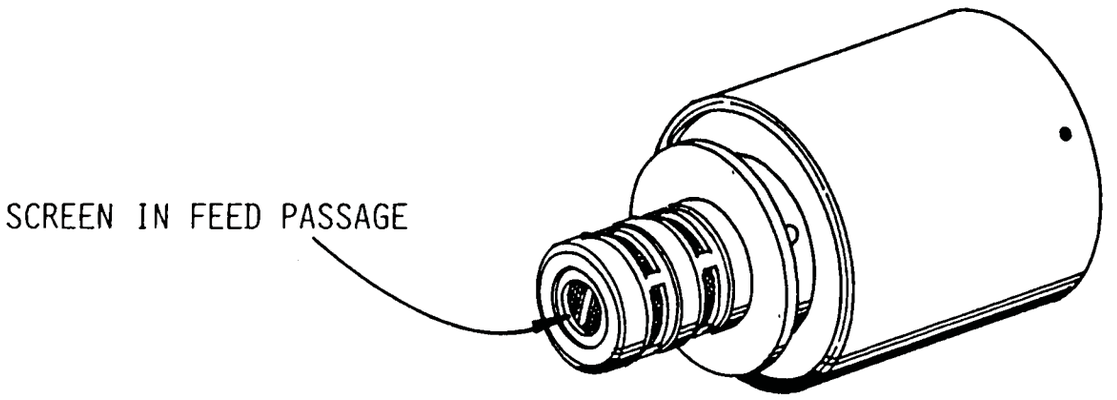
INTERCHANGEABILITY:

NONE OF THE PARTS LISTED ABOVE WILL INTERCHANGE WITH PREVIOUS MODELS.

SERVICE INFORMATION:

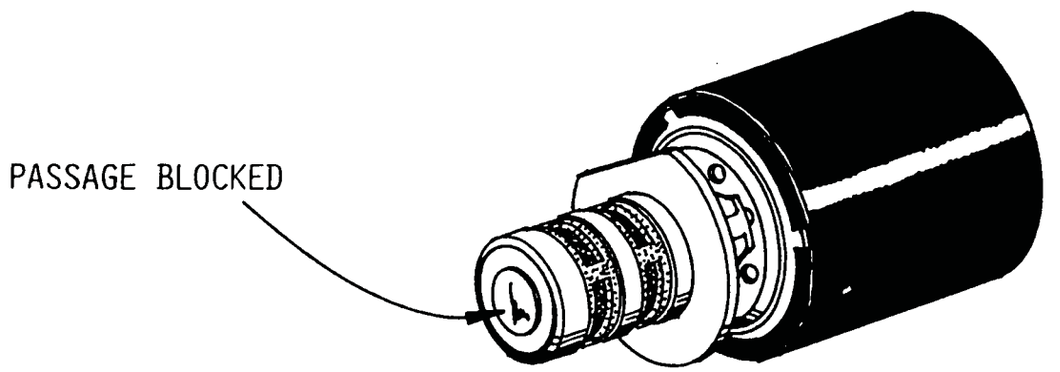
Force Motor, 91-93 Models ..... 8677314
Force Motor, 94-Up Models ..... 8684216

FORCE MOTOR (PRESSURE CONTROL SOLENOID)
1991-1993 MODELS ONLY!




OEM PART NUMBER 8677314
(OPERATES AT 292.5 Hz LEVEL)

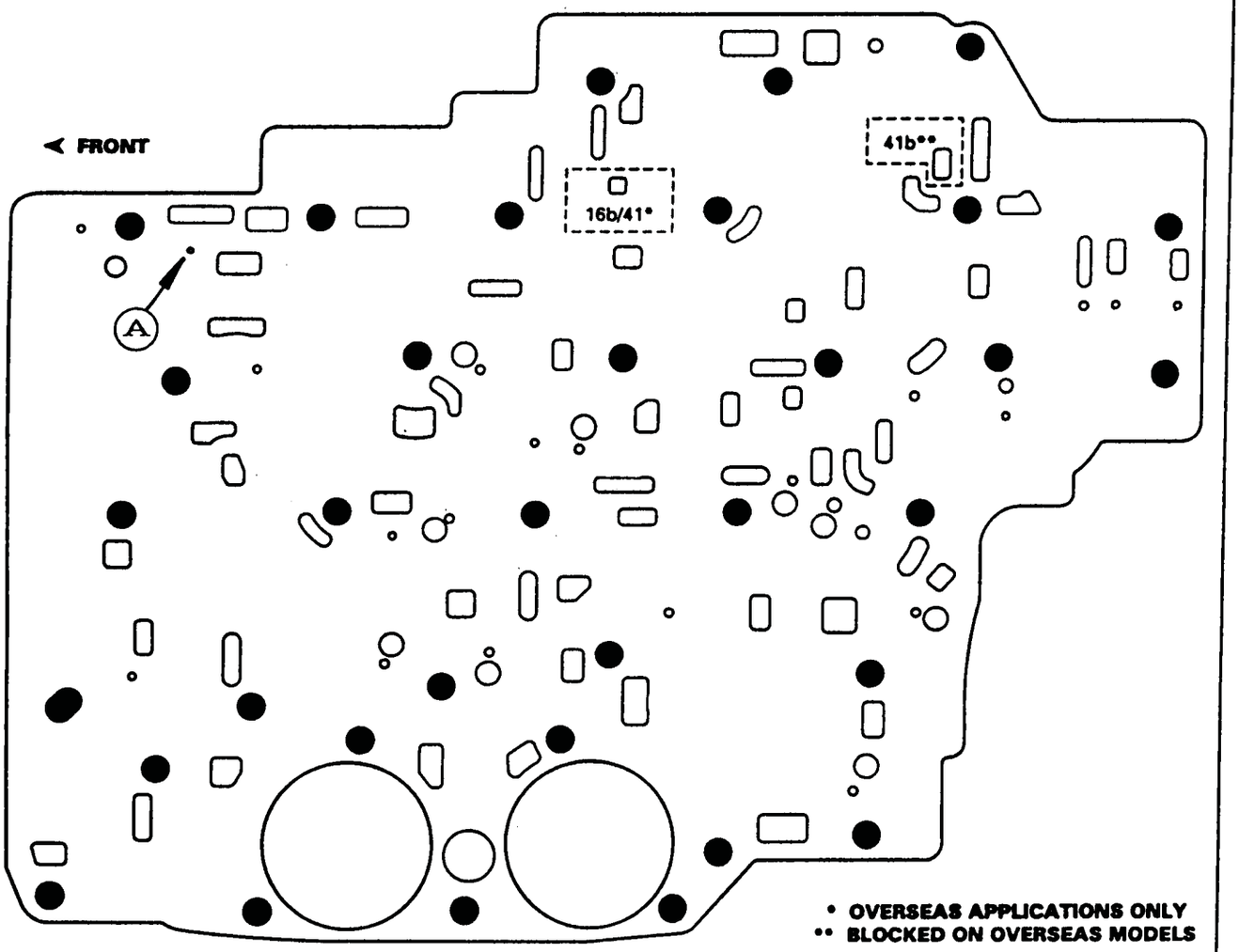
FORCE MOTOR (PRESSURE CONTROL SOLENOID)
1994-UP MODELS ONLY!




OEM PART NUMBER 8684216
(OPERATES AT 614 Hz LEVEL)

Figure 1

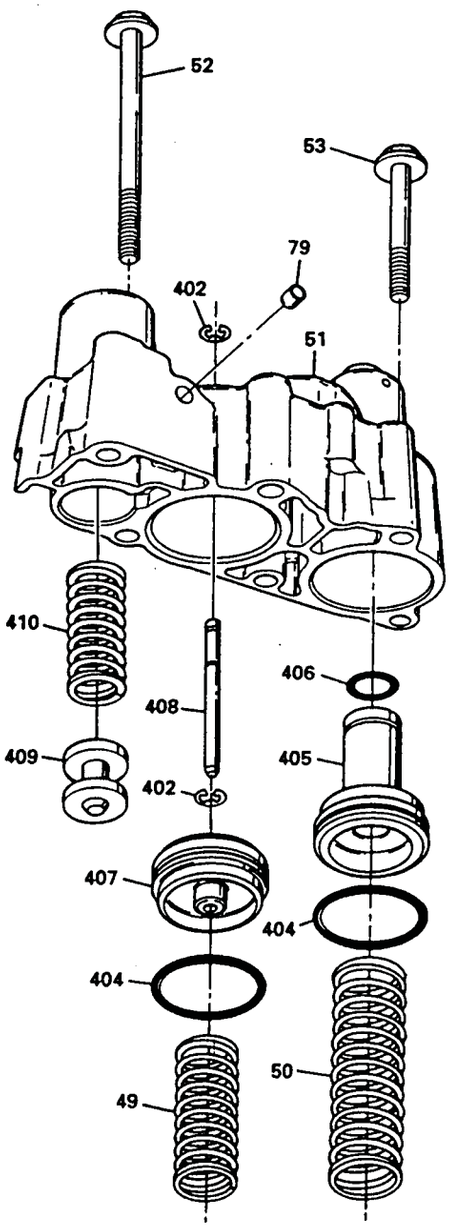
## THM 4L80-E SPACER PLATE




HOLE MARKED "A" ELIMINATED IN THE 1994 MODEL SPACER PLATE.

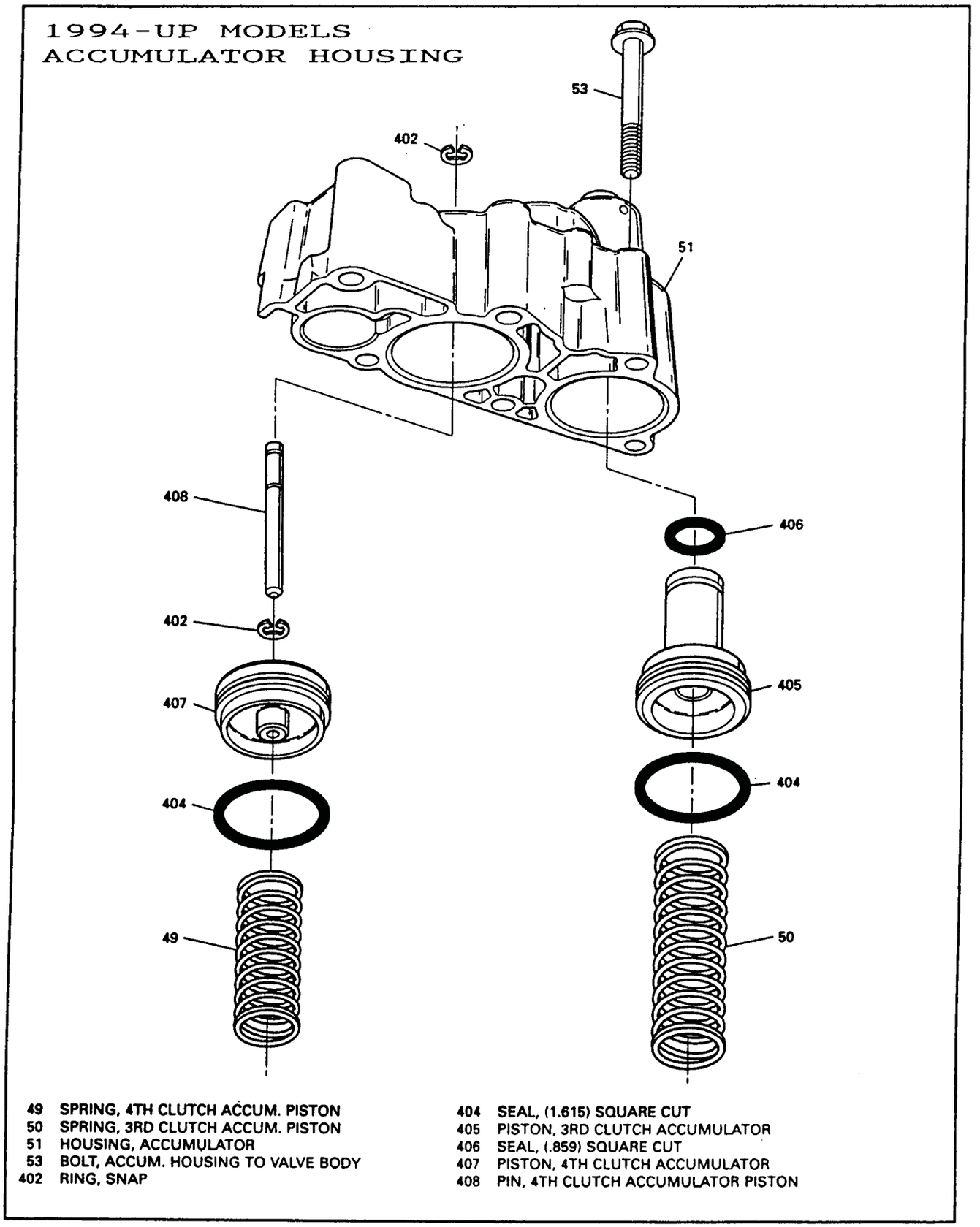
Figure 2

# 1991-1993 ACCUMULATOR HOUSING




49 SPRING, 4TH CLUTCH ACCUM. PISTON
50 SPRING, 3RD CLUTCH ACCUM. PISTON
51 HOUSING, ACCUMULATOR
52 BOLT, ACCUM. HOUSING TO VALVE BODY (LONG)
53 BOLT, ACCUM. HOUSING TO VALVE BODY (SHORT)
79 PLUG, DIRECT OIL GAL (.25 DIA. CUP)
402 RING, SNAP
404 SEAL, (1.615) SQUARE CUT
405 PISTON, 3RD CLUTCH ACCUMULATOR
406 SEAL, (.859) SQUARE CUT
407 PISTON, 4TH CLUTCH ACCUMULATOR
408 PIN, 4TH CLUTCH ACCUMULATOR PISTON
409 VALVE, TORQUE SIGNAL COMPENSATOR
410 SPRING, T.S. COMPENSATOR

Figure 3




| | |
|---|---|
| 49 | SPRING, 4TH CLUTCH ACCUM. PISTON |
| 50 | SPRING, 3RD CLUTCH ACCUM. PISTON |
| 51 | HOUSING, ACCUMULATOR |
| 53 | BOLT, ACCUM. HOUSING TO VALVE BODY |
| 402 | RING, SNAP |
| 404 | SEAL, (1.615) SQUARE CUT |
| 405 | PISTON, 3RD CLUTCH ACCUMULATOR |
| 406 | SEAL, (.859) SQUARE CUT |
| 407 | PISTON, 4TH CLUTCH ACCUMULATOR |
| 408 | PIN, 4TH CLUTCH ACCUMULATOR PISTON |

Figure 4

# THM 4L80-E

## CENTER GEAR BOX CHANGES FOR 1999 MODELS

**CHANGE:** Beginning at the start of production for all 1999 model THM 4L80E transmissions, the planetary pinions on both carriers were produced 10% thicker than the previous models, as shown in Figure 1. This engineering change required the addition of a .041" shim in the gear train to re-center the sun gear in the new planetary pinions and affected several internal parts, that may create some confusion, and thus some mis-assembly concerns.

**REASON:** Increased durability and reliability.

**PARTS AFFECTED:**

**(1)** PLANETARY PINION GEARS - Were increased in length by approximately .075" in both front and rear carriers, as shown in Figure 1, for increased durability.

**(2)** ADDED .041" SHIM - There was a .041" shim added between the thrust bearing and the rear internal ring gear, to re-center the sun gear in the revised planetary pinion gears, as shown in Figure 2.

**(3)** CENTER SUPPORT - Required a .041" recess to be machined into the center support bearing surface, to accommodate the sun gear being re-centered in the revised planetary pinion gears, as shown in Figure 3.

**(4)** SUN GEAR SHAFT - Required that .041" be removed from the bottom of the rear bushing journal, to accommodate the re-centering of the sun gear in the revised planetary pinion gears, as shown in Figure 4. Notice that revised sun gear shaft can be identified with a groove cut into the shaft splines, as shown in Figure 4.



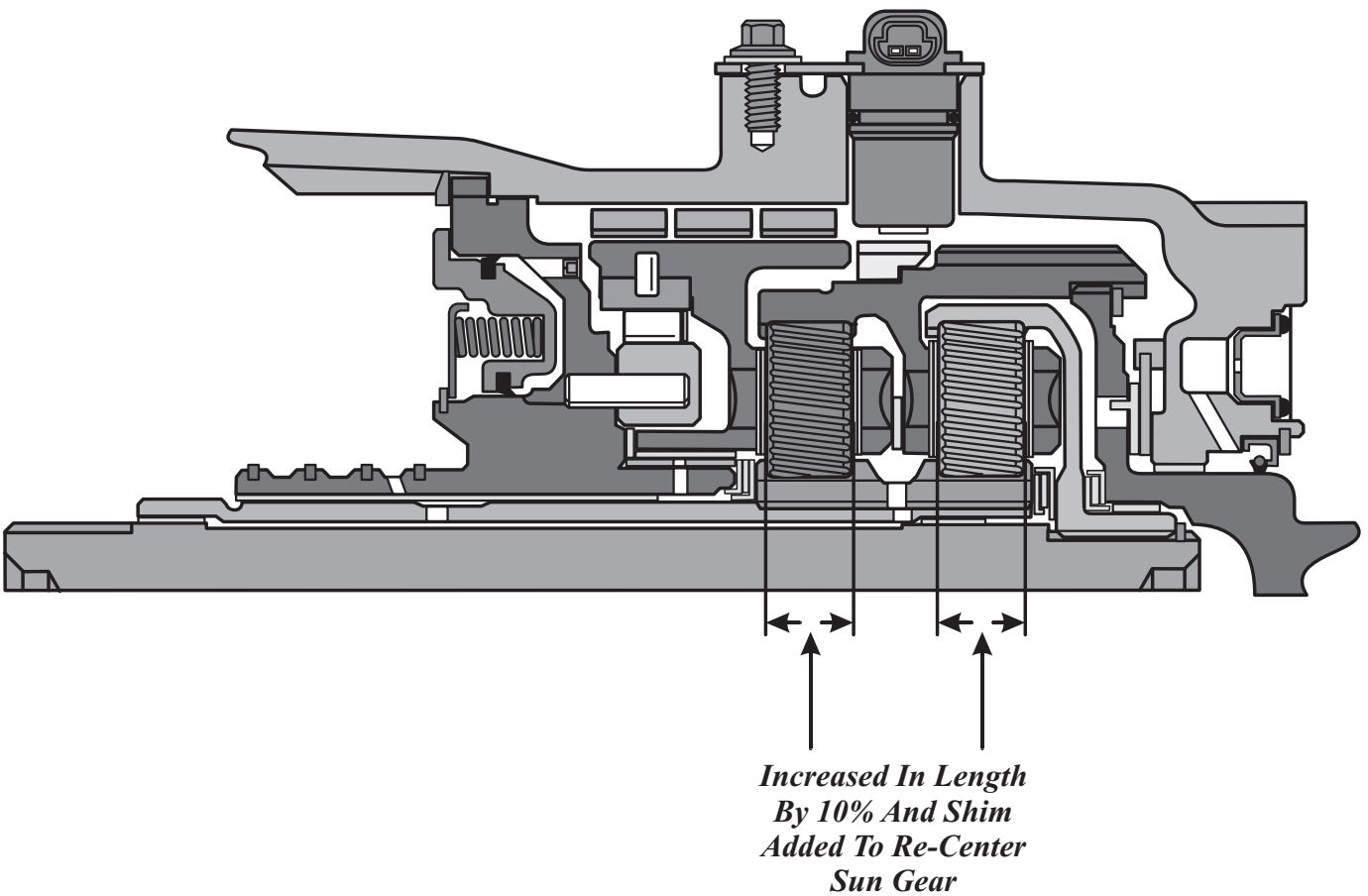
**INTERCHANGEABILITY:**

***None of the parts listed above will interchange with any of the previous design level parts, and none of the previous design level parts can be used in the 1999 and later units.***
***However, when all pieces listed above are used as a service package, they can be used to back service "Center Lube" model 4L80-E transmissions.***
***The Sun Gear, Main Shaft, Rear Internal Ring Gear and all Thrust Bearings remained the same, as shown in Figures 5, 6, and 7.***

***SPECIAL NOTE: Some mis-assembly examples are illustrated in Figure 8 with some dimensional checks to prevent this from happening to you.***

**SERVICE INFORMATION:**

Reaction (Front) Carrier Assembly (99 Design Level) ..... 24202051
Output (Rear) Carrier Assembly (99 Design Level) ..... 24202052
Washer, .041" (99 Design Level) ..... 24211821
Center Support Assembly (99 Design Level) ..... 24217454
Sun Gear Shaft Assembly (99 Design Level) ..... 24207264



*Increased In Length By 10% And Shim Added To Re-Center Sun Gear*



Figure 1

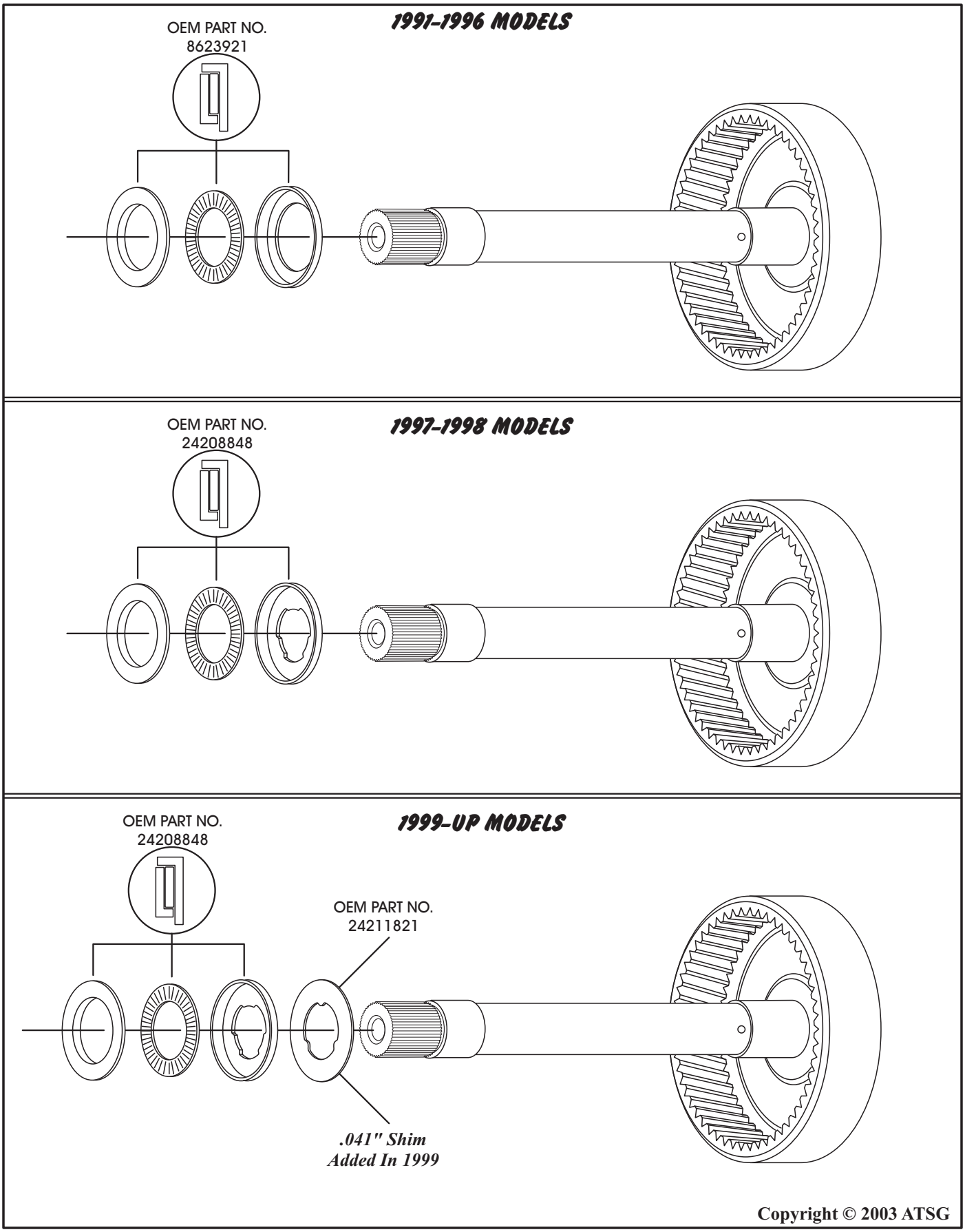



Figure 2

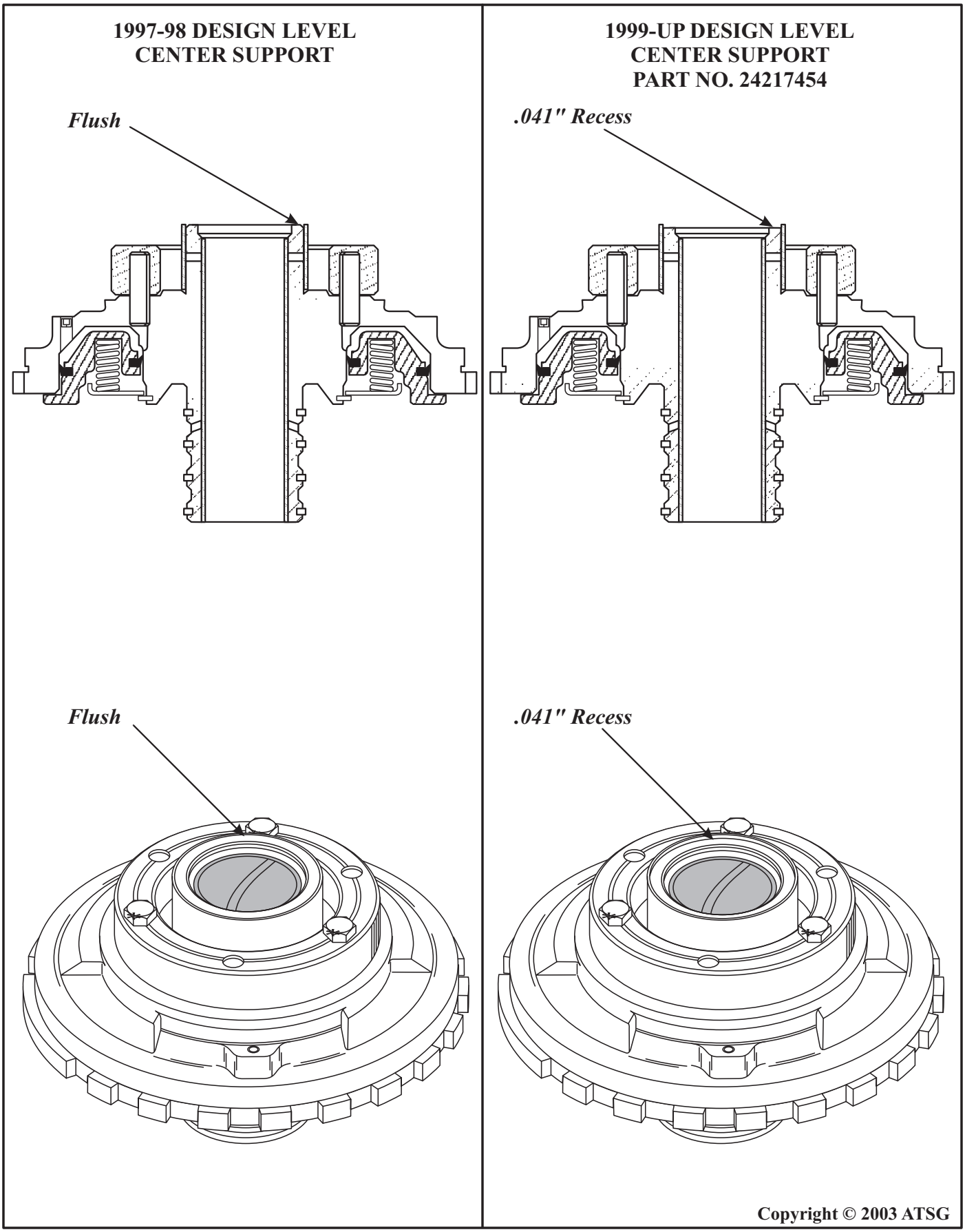



Figure 3

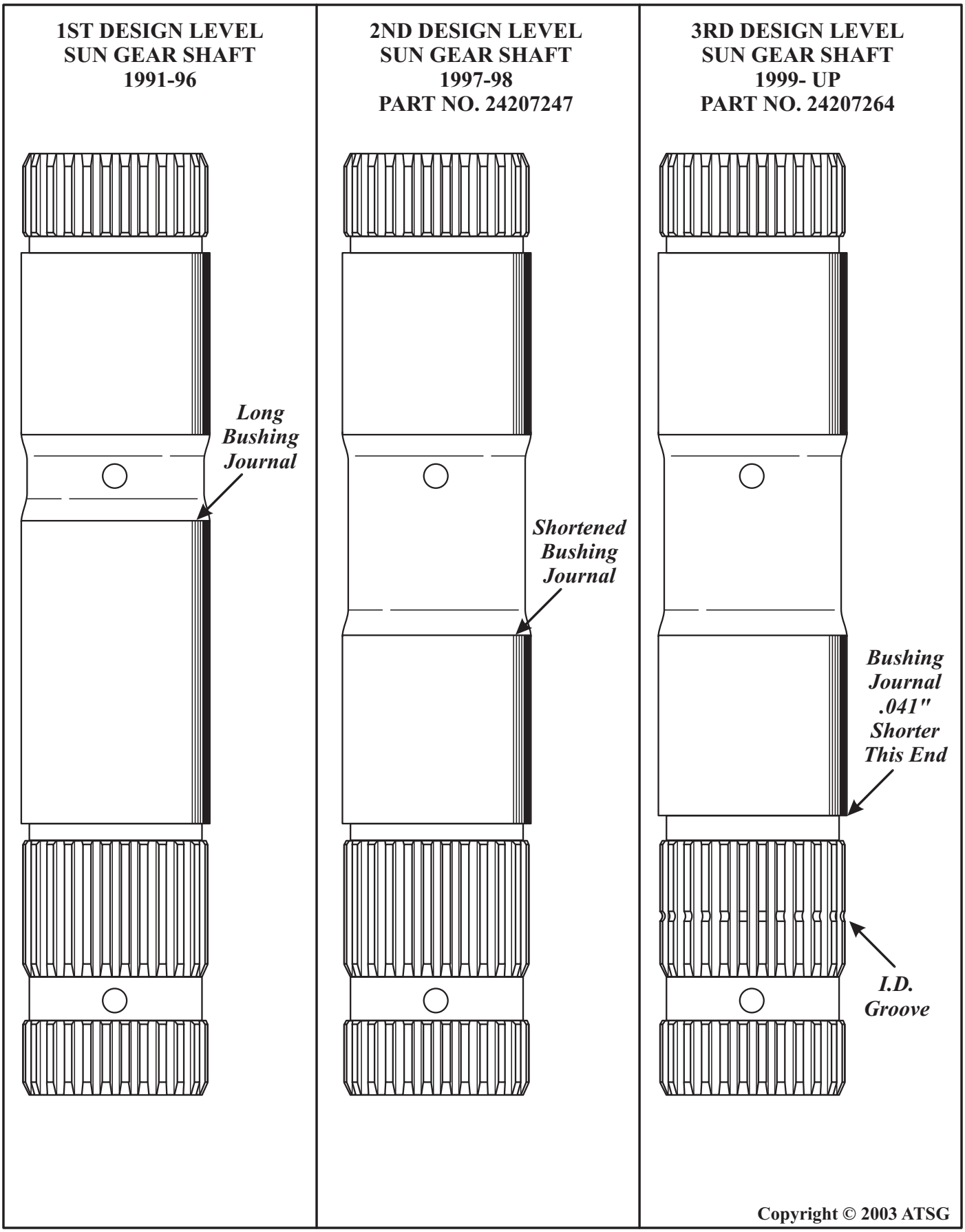



Figure 4

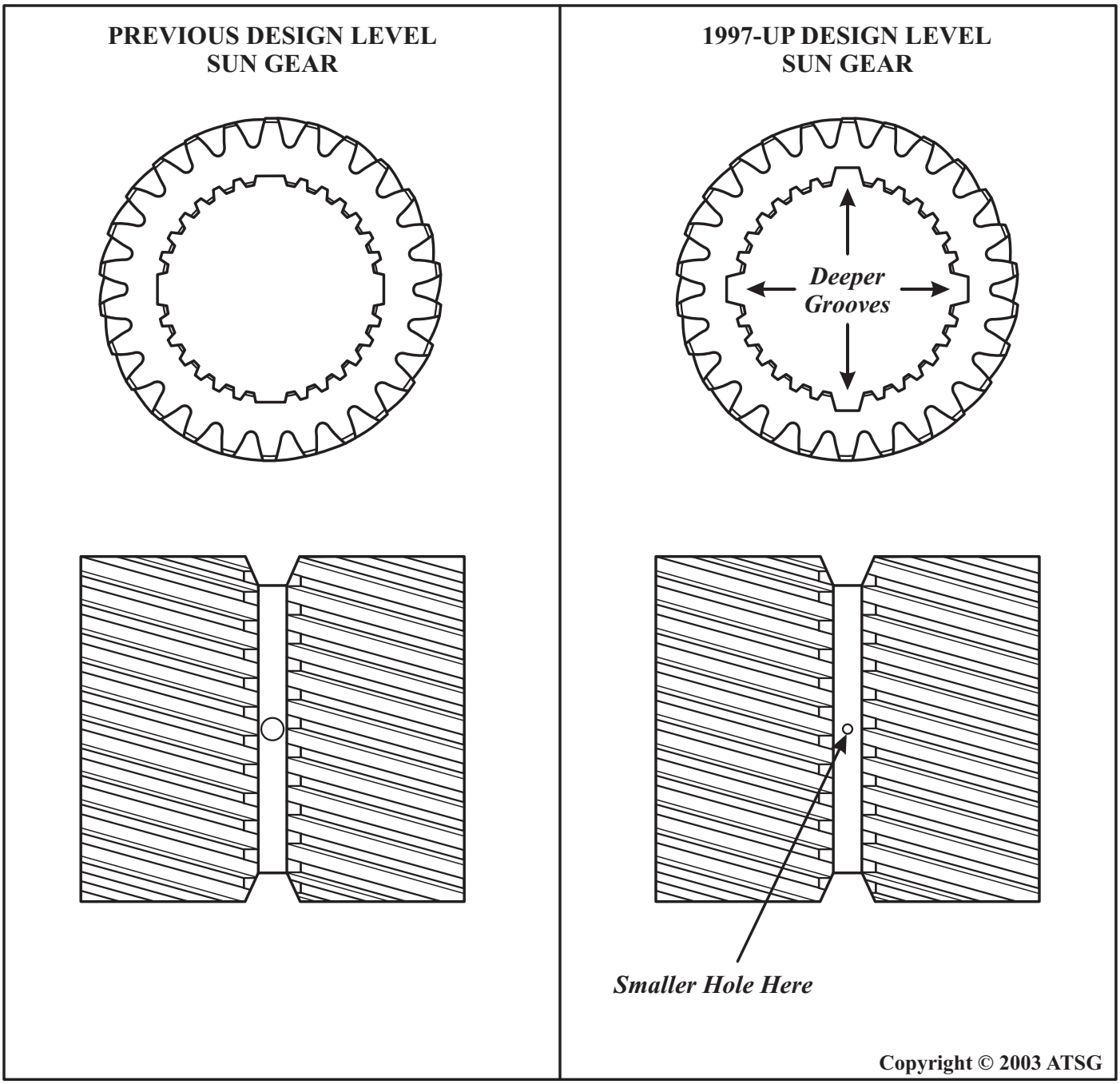



Figure 5

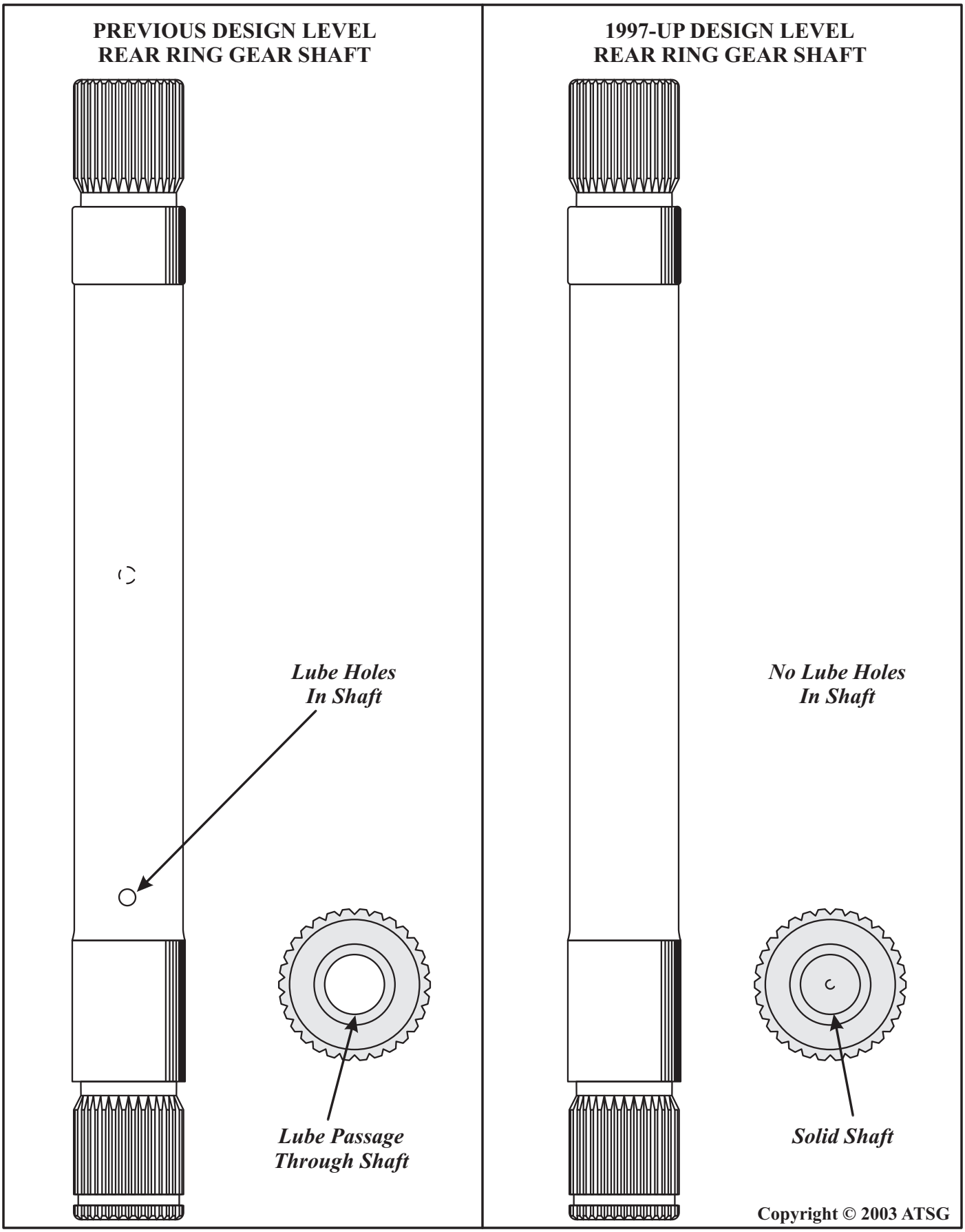



Figure 6

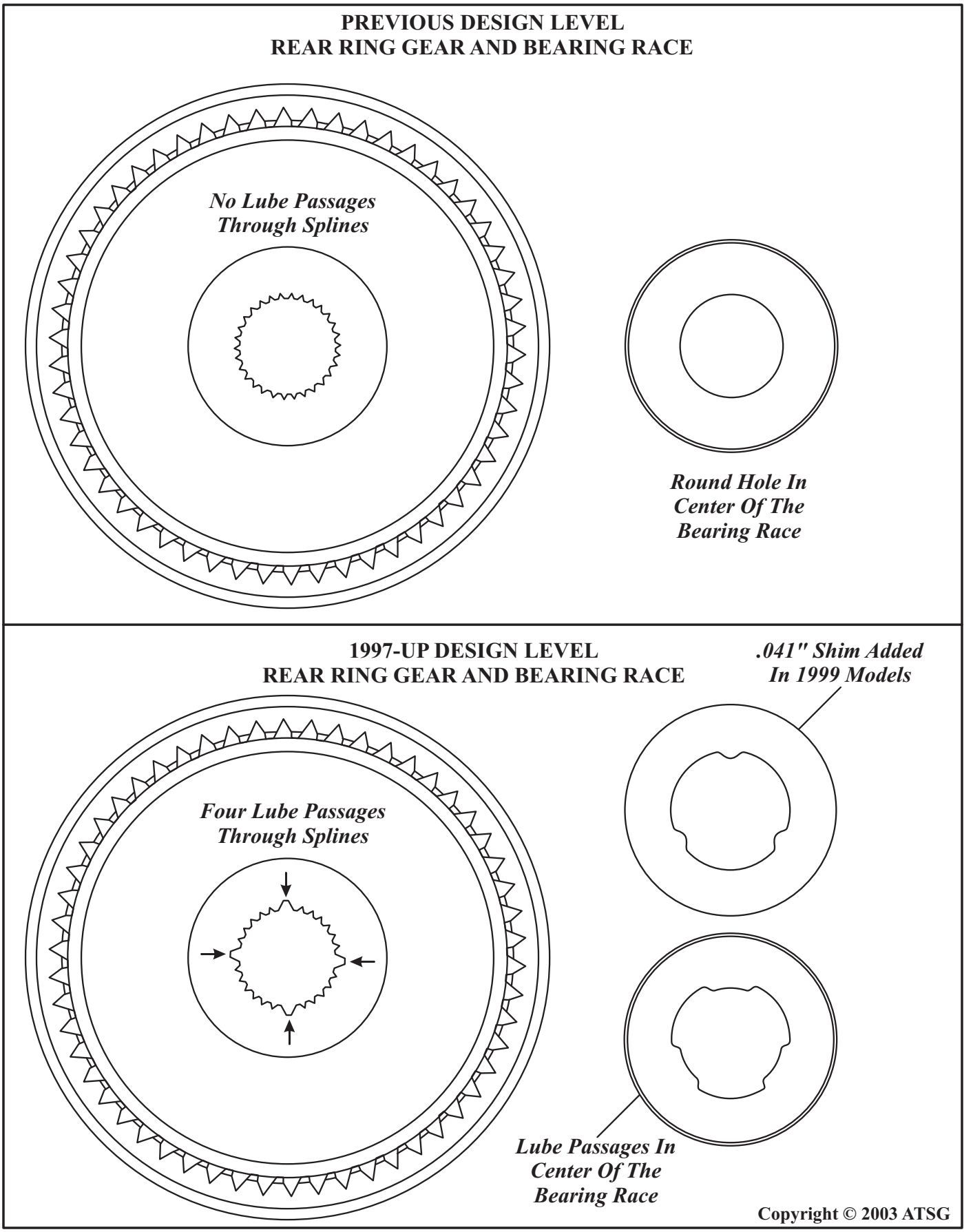



Figure 7

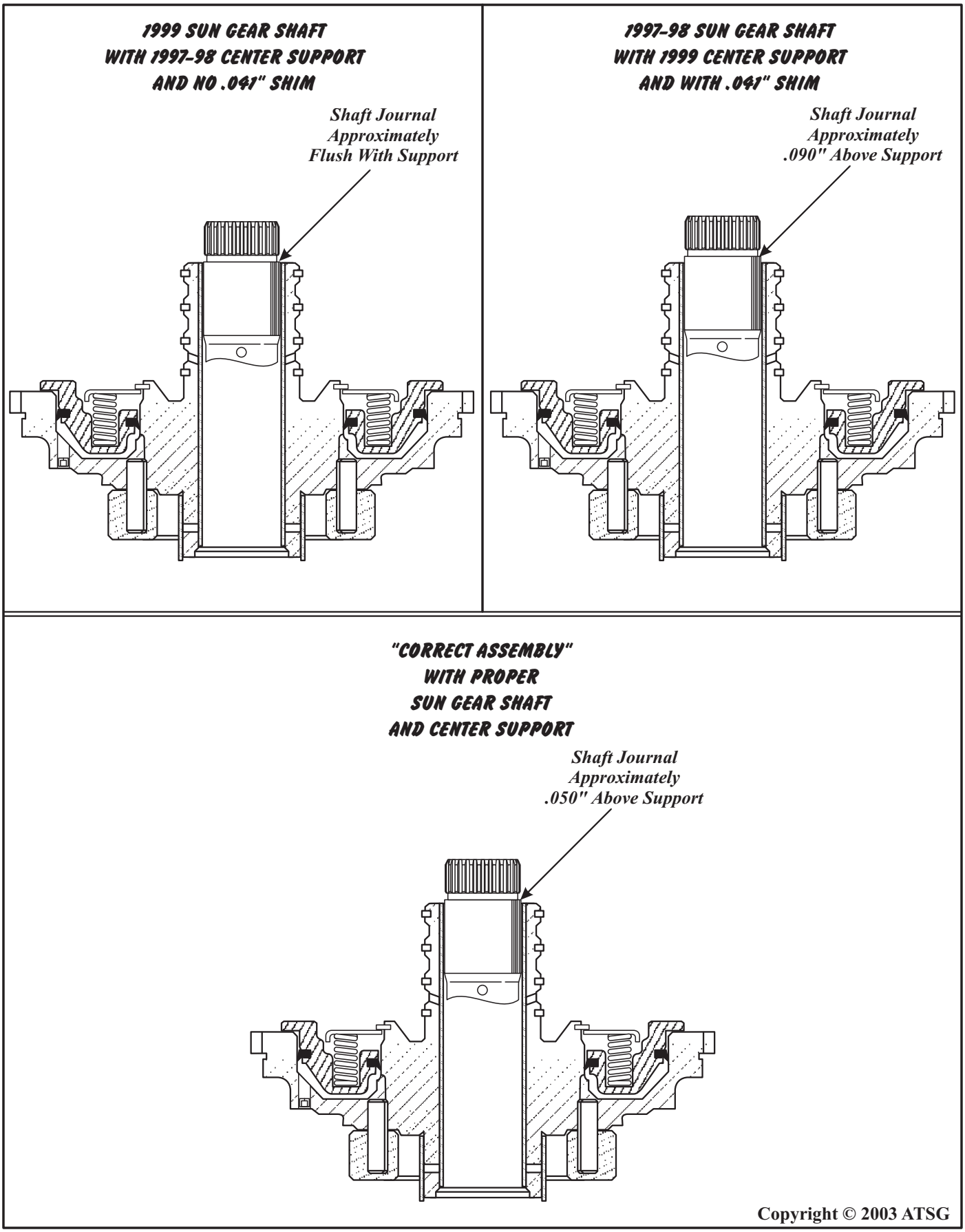



Figure 8

# THM 4L80-E

## NEW DESIGN MANUAL 2ND BAND

**CHANGE:** Beginning at the start of production for 1999 models, all THM 4L80-E transmissions were built with a revised manual 2nd band that is wider than the previous design (See Figure 1).

**REASON:** Improved durability and reliability.

**PARTS AFFECTED:**

**(1)** MANUAL 2ND BAND - Now 1-1/4 inches wide instead of the previous 1 inch wide, and manufactured with a revised band apply pin anchor, as illustrated in Figure 2.

**(2)** MANUAL 2ND BAND APPLY PIN - The band apply pin has a revised overall length, 2.730" instead of the previous 2.530", to accommodate the revised apply pin anchor, as illustrated in Figure 2.

**INTERCHANGEABILITY:**

The new design "Wide Band" will retro-fit back, but you must purchase the new design band apply pin that is .200" longer than the previous design. Currently, it is only available in a service package that includes the piston and the return spring, under part number 24223081, as shown in Figure 2.

**SERVICE INFORMATION:**

"Narrow" Manual 2nd Band ..... 24202631
"Wide" Manual 2nd Band ..... 24210080
Apply Pin Service Package (Narrow Band) ..... 24200418
Apply Pin Service Package (Wide Band) ..... 24223081

***Special Service Note:***

***If the "Wide Band" is used with the Narrow Band Apply Pin, the result will be No Engine Braking when selector lever is moved to the Manual 2nd position, because the apply pin is not long enough to apply the band.***
***If the "Narrow Band" is used with the Wide Band Apply Pin, the result will be 2nd Gear Starts and tie-up on the 2-3 shift and tie-up in reverse, because you have mechanically applied the band because of the length of the pin.***

**MANUAL 2ND BAND**



Figure 1

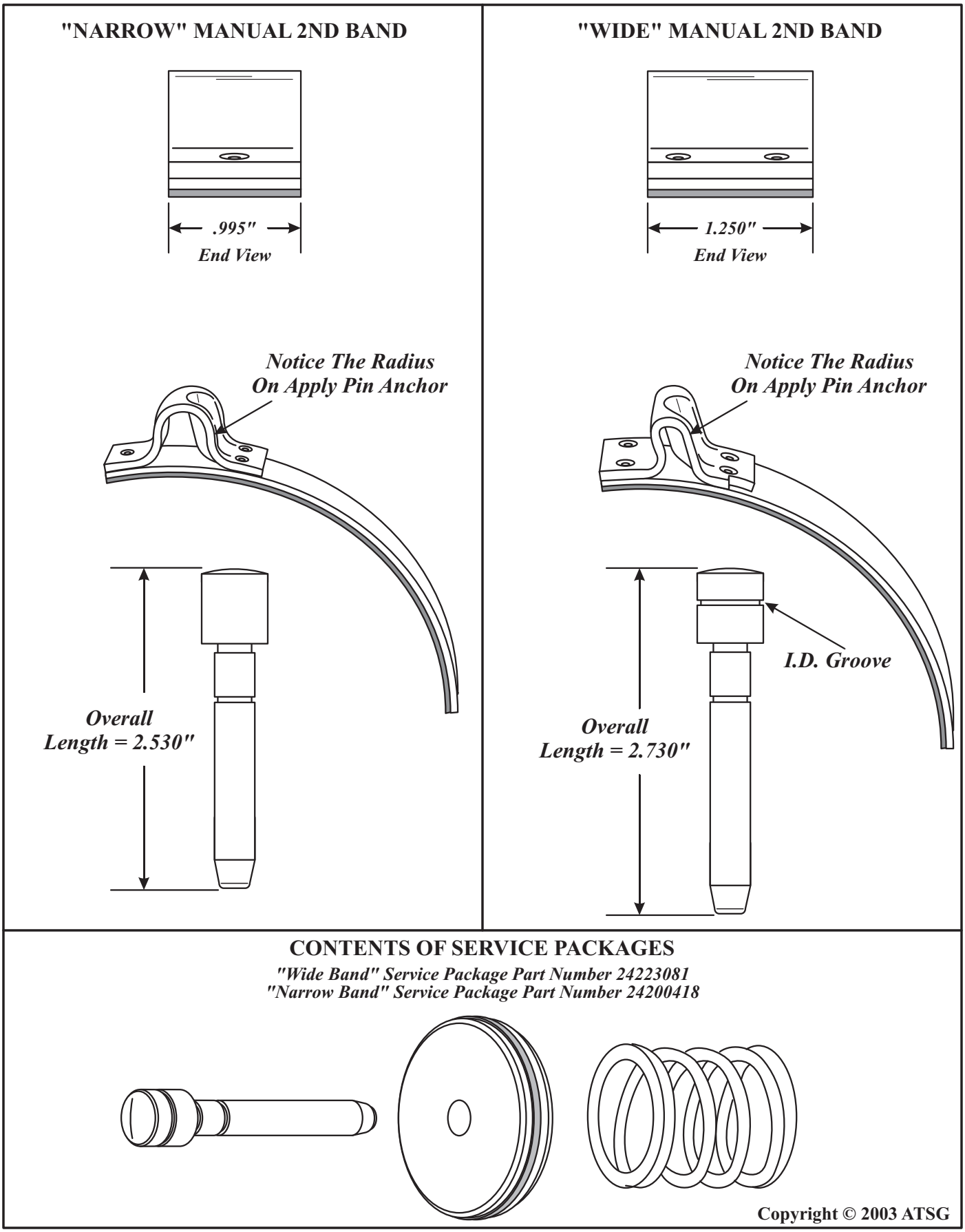



Figure 2

# THM 4L80E/4L80EHD

## NEW DESIGN OVERRUN ROLLER CLUTCH

**CHANGE:** Beginning in March 2001, a new design Overrun Roller Clutch was introduced into the THM 4L80E, as a running change. This engineering change affected many other related parts.

**REASON:** Increased durability and reliability with the new design roller clutch, by reducing the ability of the rollers to "skew".

**PARTS AFFECTED:**

**(1)** OVERRUN ROLLER CLUTCH - Entirely new design with smaller diameter rollers and the rollers are now trapped inside of a "Shoe" to help prevent skewing, and the springs put pressure on the "Shoe", as shown in Figure 1.

**(2)** OVERRUN CLUTCH HOUSING - Requires a different ramp angle on the inner cam, to accommodate the new design roller clutch, as shown in Figure 1. The snap ring was also moved away from the back of the roller clutch which required a new snap ring groove that is lower in the housing, as shown in Figure 2.

**(3)** OVERRUN ROLLER CLUTCH RETURN SPRING - Now requires a recess in the return spring retainer to accomodate the relocated snap ring groove, as shown in Figure 2.

**(4)** RETAINER SNAP RING - New design has revised dimensions, as shown in Figure 2. The new design snap ring is thinner and narrower.

**(5)** OVERDRIVE PLANETARY CARRIER - The new design has a smaller diameter roller clutch outer race incorporated in the overdrive carrier, as shown in Figure 3.

**INTERCHANGEABILITY:**

None of the current design parts listed above will interchange with the previous design level parts. They will however retro-fit back on all models, when used as a service package.

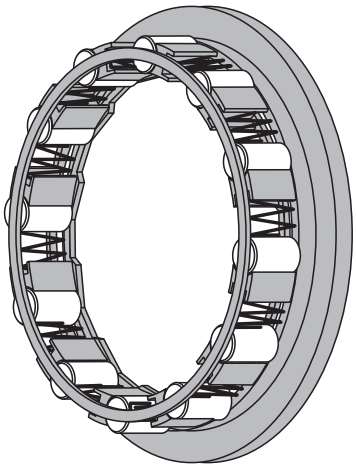
**SERVICE INFORMATION:**

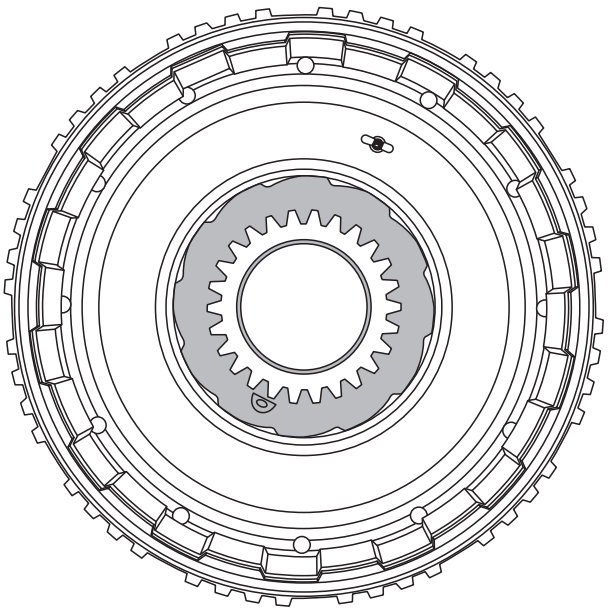
Overrun Roller Clutch Service Package (New Design) ..... 24222160
Turbine Shaft Assembly (2nd Design) ..... 24200128

***SPECIAL NOTE:***

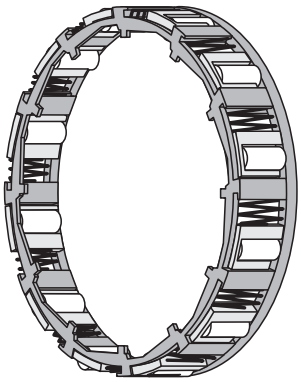
***If installing this service package into an early model, with the 1st design turbine shaft, you must also purchase the 2nd design turbine shaft, as shown in Figure 4. The changes included shot peening the area around the forward clutch feed hole, the feed hole diameter reduced and drilled through the turbine shaft (See Figure 4).***

**PREVIOUS DESIGN**
**OVERRUN ROLLER CLUTCH**





**CURRENT DESIGN**
**OVERRUN ROLLER CLUTCH**



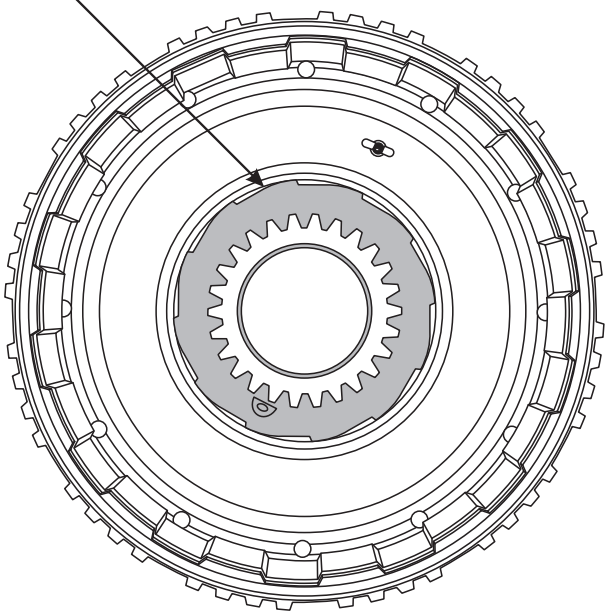





Figure 1

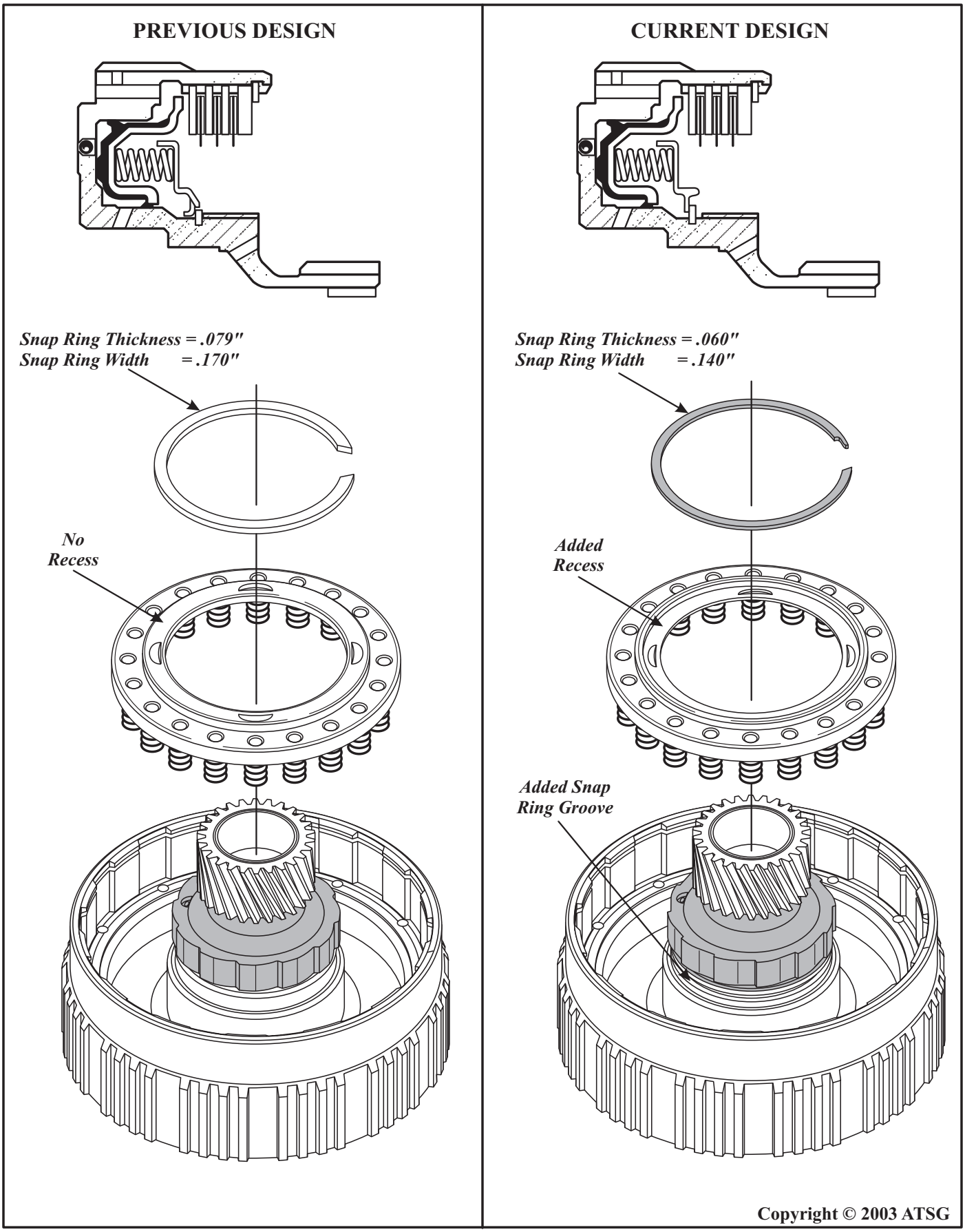



Figure 2

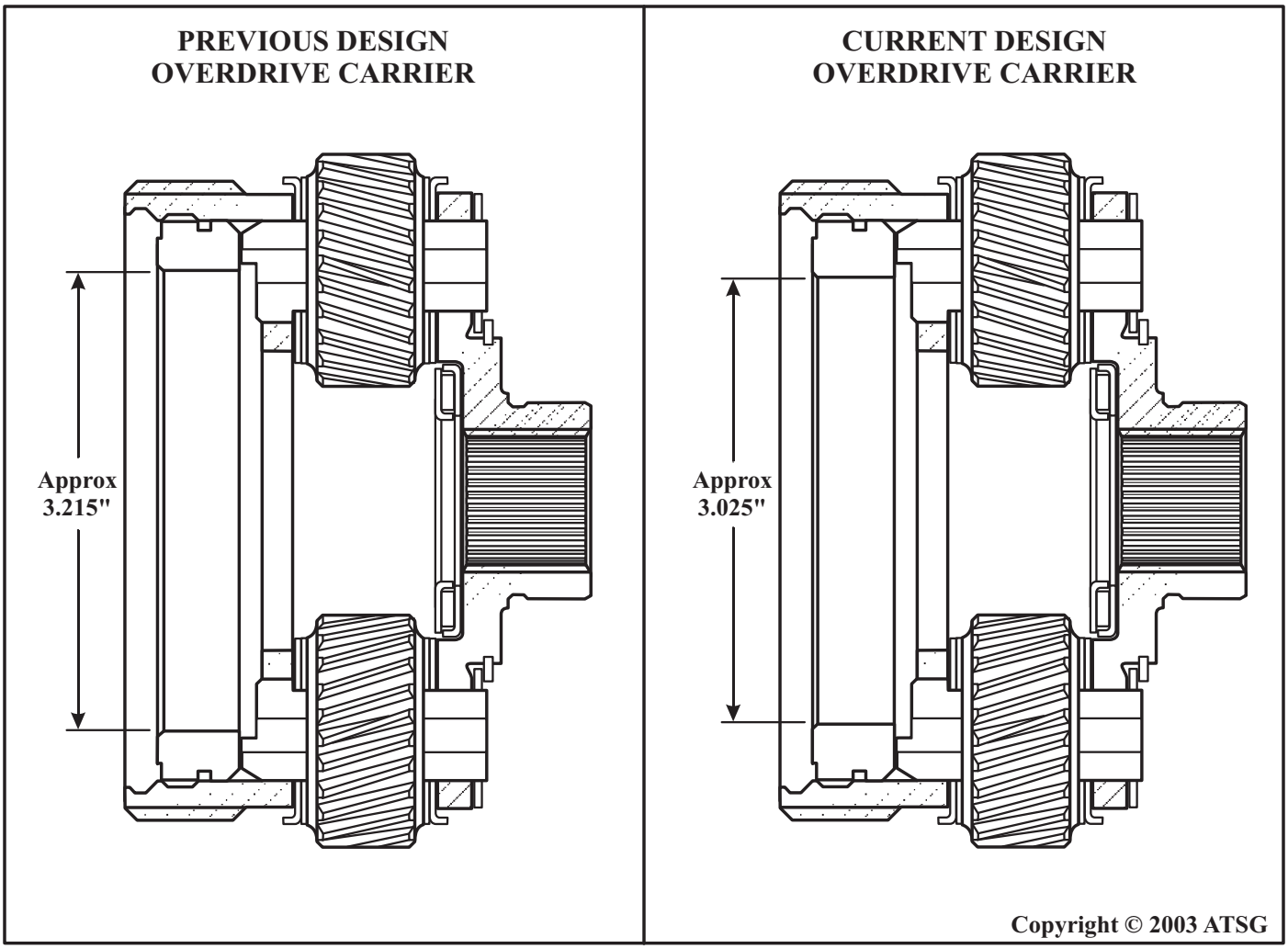
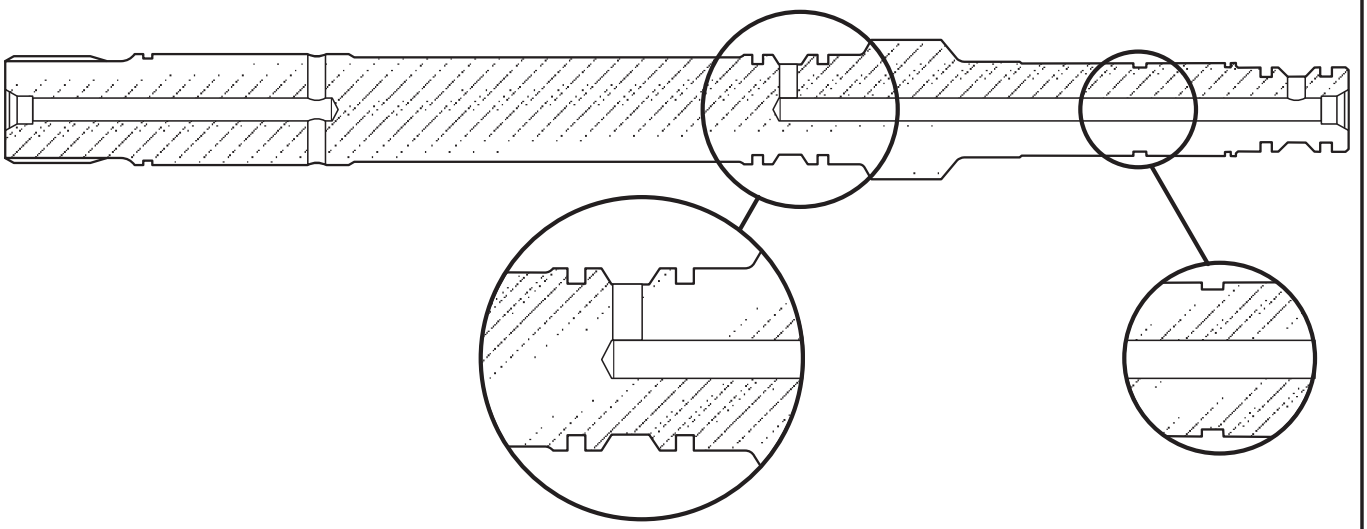
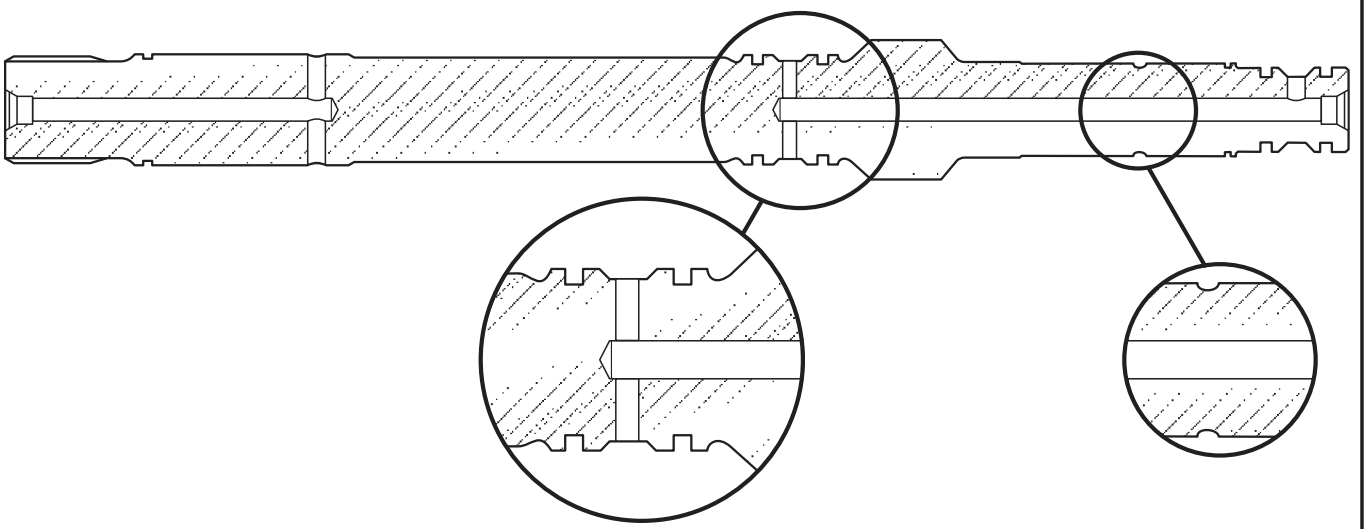



Figure 3

***"1ST" DESIGN TURBINE SHAFT***



***"2ND" DESIGN TURBINE SHAFT***



***Forward Clutch Feed Hole Drilled Through***



Figure 4