# INTRODUCTION
# HYDRA-MATIC 4/5L40-E

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Beginning at the start of production for some 1999 models, BMW has introduced a new 5 speed automatic transmission that is designed and manufactured by General Motors Powertrain division in Strasbourg, France and is illustrated in Figure 1. This new transmission is designated as follows:

**GM Designation - 5L40-E BMW Designation - A5S 360R**

**Model year 1999 applications are as follows:**

***3 Series BMW, with 2.5L Gasoline Engine, Used in USA and Japan.***
***3 Series BMW, with 2.8L Gasoline Engine, Used in USA and Japan.***
***5 Series BMW, with 3.0L Diesel Engine, Used Worldwide.***

**Model year 2003 applications are as follows:**

***Cadillac CTS model, Gasoline Engine, Used Worldwide***

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# HYDRA-MATIC 4L40-E/5L40-E

# INDEX


*5L40-E IDENTIFICATION TAG INFORMATION* ..... 3
*CUT-AWAY VIEW AND COOLER LINE IDENTIFICATION* ..... 4
*COMPONENT APPLICATION CHART* ..... 5
*SOLENOID APPLICATIONAND RESISTANCE CHARTS* ..... 6
*INTERNAL WIRE SCHEMATIC* ..... 7
*TCM LOCATION, CONNECTOR I.D. AND UNDERHOOD FUSE BLOCK I.D.* ..... 8
*ELECTRONIC COMPONENT LOCATER* ..... 10
*INTERNAL MODE SWITCH DESCRIPTION* ..... 11
*DIAGNOSTIC TROUBLE CODES AND DESCRIPTION* ..... 12
*GENERAL OPERATIONAND DESCRIPTION* ..... 14
*FLUID LEVEL CHECKING PROCEDURE* ..... 15
*LINE PRESSURE TESTS* ..... 16
*OIL PRESSURE PASSAGE IDENTIFICATIONS* ..... 17
*CHECK BALL DESCRIPTIONS* ..... 24
*TRANSMISSION DISASSEMBLY* ..... 27
*TRANSMISSION EXPLODED VIEW* ..... 30
*COMPONENT REBUILD SECTION*.....
- *CASE ASSEMBLY* ..... 41
- *OIL PUMP ASSEMBLY* ..... 45
- *DIRECT AND REVERSE CLUTCH HOUSING* ..... 51
- *FORWARDAND COAST CLUTCH HOUSING* ..... 59
- *FORWARD SPRAG ASSEMBLY* ..... 67
- *INTERMEDIATE SPRAG ASSEMBLY* ..... 69
- *INTERMEDIATE AND OVERDRIVE CLUTCH HOUSING* ..... 76
- *LOW SPRAG ASSEMBLY* ..... 81
- *CENTER SUPPORT ASSEMBLY* ..... 84
- *5L40-E PLANETARY CARRIER ASSEMBLY* ..... 96
- *4L40-E PLANETARY CARRIER ASSEMBLY* ..... 99
- *VALVE BODY ASSEMBLY* ..... 102
- *CHECKBALL LOCATIONS* ..... 105

*FINAL TRANSMISSION ASSEMBLY* ..... 108
*BOLT IDENTIFICATION CHART* ..... 126
*TORQUE SPECIFICATIONS* ..... 127

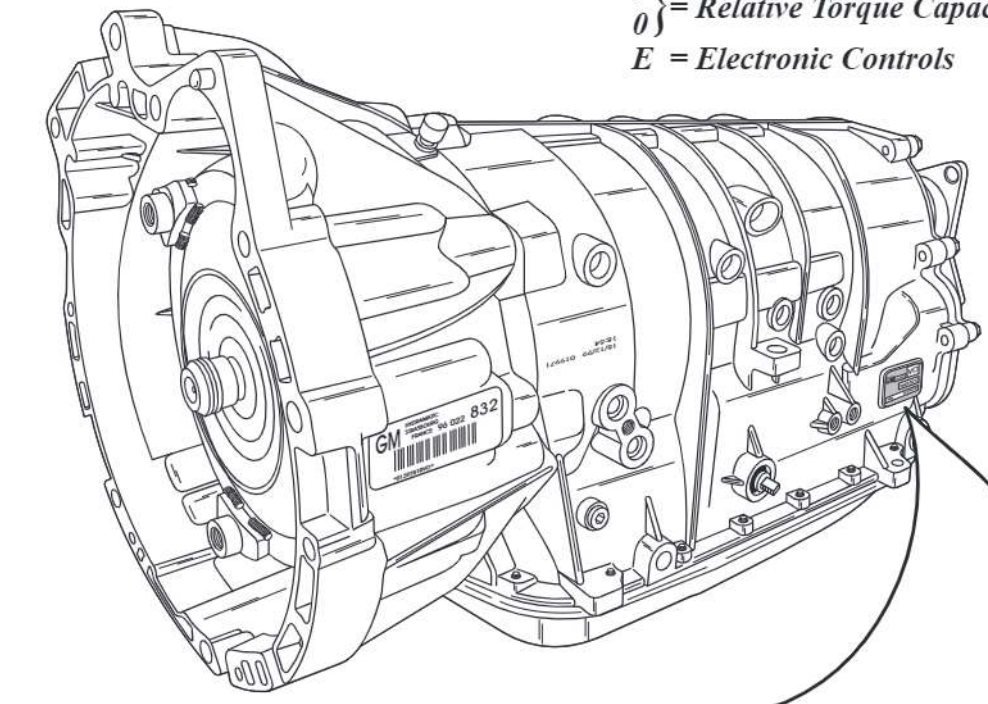

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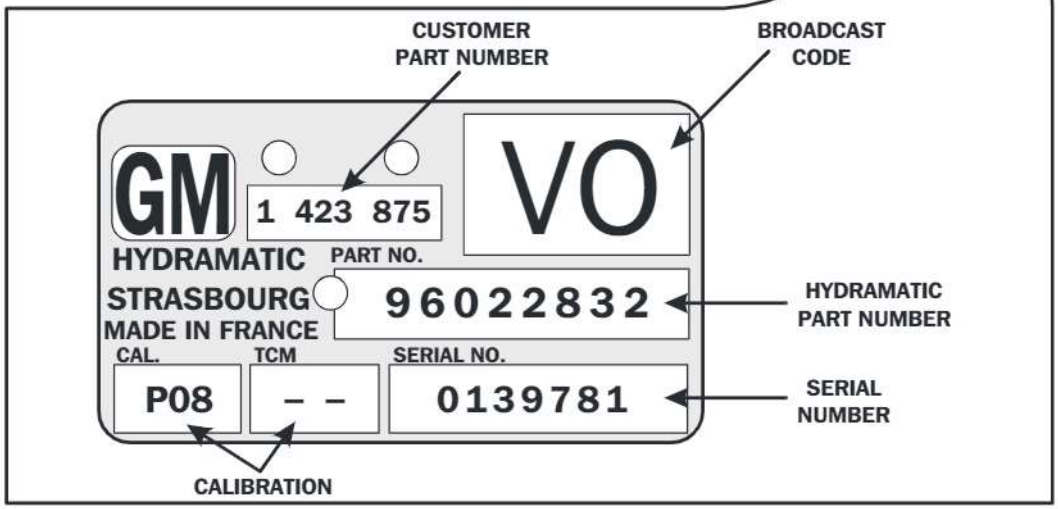

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*5 = 5 Forward Speeds*
*L = Longitudinal (Rear Drive)*
*4, 0 } = Relative Torque Capacity*
*E = Electronic Controls*






*Production Location = Strasbourg, France*
*Torque Converter Size = 245mm and 258mm (Model Sensitive)*
*Pressure Taps = Line Pressure Only*
*Transmission Fluid Type = Dexron III*
*Transmission Fluid Capacity (Approx.) = Complete Overhaul: Dry 8.5L (9.0 Qt)*

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Figure 1

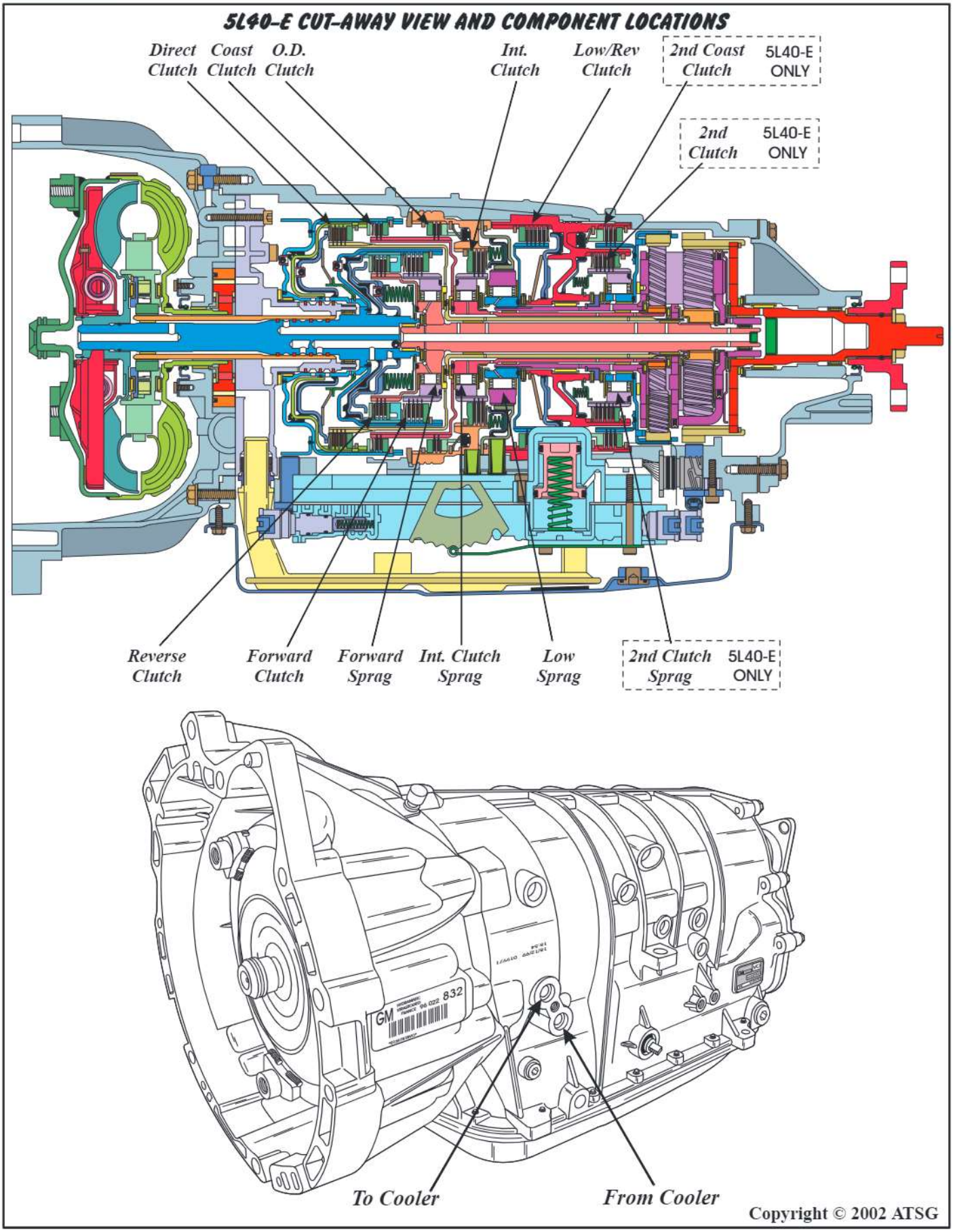

5L40-E CUT-AWAY VIEW AND COMPONENT LOCATIONS
Direct Clutch
Coast Clutch
O.D. Clutch
Int. Clutch
Low/Rev Clutch
2nd Coast Clutch
5L40-E ONLY
2nd Clutch
5L40-E ONLY
Reverse Clutch
Forward Clutch
Forward Sprag
Int. Clutch Sprag
Low Sprag
2nd Clutch Sprag
5L40-E ONLY
To Cooler
From Cooler
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Figure 2

## COMPONENT APPLICATION CHARTS

### 5L40-E COMPONENT APPLICATION CHART

| RANGE | GEAR | Engine Braking | Direct Clutch | Coast Clutch | Reverse Clutch | Fwd. Clutch | 2nd Clutch | Int. Clutch | O.D. Clutch | Low/ Reverse Clutch | 2nd Coast Clutch | Fwd. Clutch Sprag | Low Clutch Sprag | 2nd Clutch Sprag | Int. Clutch Sprag | Gear Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Park/Neutral | | | | | | | | | | | | | | | | |
| Reverse | R | Yes | | | On | | | | | On | | | | | | 3.03 |
| D, 4, 3, 2, | 1st | No* | | On | | On | | | | | | Hold | Hold | | | 3.42 |
| | 1st | Yes | | On | | On | | | | On | | Hold | Hold | | | 3.42 |
| | 2nd | No* | | On | | On | On | | | | | Hold | | Hold | | 2.21 |
| | 2nd | Yes | | On | | On | On | | | | On | Hold | | Hold | | 2.21 |
| | 3rd | No* | | On | | On | On | On | | | | Hold | | | Hold | 1.60 |
| | 3rd | Yes | | On | | On | On | On | On | | | Hold | | | Hold | 1.60 |
| | 4th | Yes | On | On | | On | On | On | | | | Hold | | | | 1.00 |
| | 5th | Yes | On | | | On | On | On | On | | | | | | | 0.75 |

** Engine braking is electronically controlled by the TCM, and is available as calibrated for each model and application.*
*On = Clutch Applied.*

### 4L40-E COMPONENT APPLICATION CHART

| RANGE | GEAR | Engine Braking | Direct Clutch | Coast Clutch | Reverse Clutch | Fwd. Clutch | | Int. Clutch | O.D. Clutch | Low/ Reverse Clutch | | Fwd. Clutch Sprag | Low Clutch Sprag | | Int. Clutch Sprag | Gear Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Park/Neutral | | | | | | | | | | | | | | | | |
| Reverse | R | Yes | | | On | | | | | On | | | | | | 3.03 |
| D, 4, 3, 2, | 1st | No* | | On | | On | | | | | | Hold | Hold | | | 2.82 |
| | 1st | Yes | | On | | On | | | | On | | Hold | Hold | | | 2.82 |
| | 2nd | No* | | On | | On | | | | | | Hold | | | | 1.54 |
| | 2nd | Yes | | On | | On | | | | | | Hold | | | | 1.54 |
| | 3rd | No* | | On | | On | | On | | | | Hold | | | Hold | 1.00 |
| | 3rd | Yes | | On | | On | | On | On | | | Hold | | | Hold | 1.00 |
| | 4th | Yes | On | On | | On | | On | | | | Hold | | | | 0.70 |
| | | | | | | | | | | | | | | | | |

** Engine braking is electronically controlled by the TCM, and is available as calibrated for each model and application.*
*On = Clutch Applied.*

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Figure 3

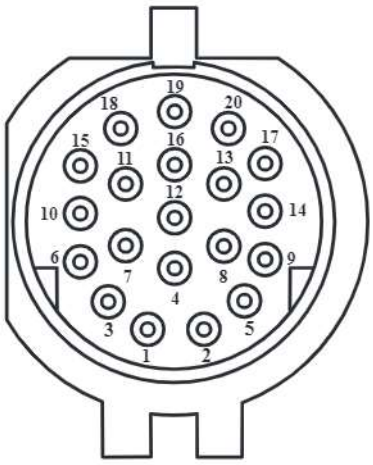
## 5L40-E SOLENOID APPLICATION CHART

| RANGE | GEAR | Engine Braking | Direct Clutch | Coast Clutch | Reverse Clutch | Fwd. Clutch | 2nd Clutch | Int. Clutch | O.D. Clutch | Low/ Reverse Clutch | 2nd Coast Clutch | 1-2 Shift Sol. | 2-3 Shift Sol. | 4-5 Shift Sol. | TCC Sol. | Gear Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Park/Neutral | | | | | | | | | | | | *** | *** | *** | Off | |
| Reverse | R | Yes | | | On | | | | | On | | On | | | Off | 3.03 |
| D, 4, 3, 2, | 1st | No* | | On | | On | | | | | | Off | On | Off | Off | 3.42 |
| | 1st | Yes | | On | | On | | | | On | | Off | On | On | Off | 3.42 |
| | 2nd | No* | | On | | On | On | | | | | On | On | Off | On** | 2.21 |
| | 2nd | Yes | | On | | On | On | | | | On | On | On | On | On** | 2.21 |
| | 3rd | No* | | On | | On | On | On | | | | On | Off | Off | On** | 1.60 |
| | 3rd | Yes | | On | | On | On | On | On | | | On | Off | On | On** | 1.60 |
| | 4th | Yes | On | On | | On | On | On | | | | Off | Off | On | On** | 1.00 |
| | 5th | Yes | On | | | On | On | On | On | | | Off | Off | Off | On** | 0.75 |

** Engine braking is electronically controlled by the TCM, and is available as calibrated for each model and application.*
*** Dependant upon various sensors including vehicle speed and throttle position.*
**** Calibrated for particular model and spplication.*
*On = Clutch Applied.*
*On = Solenoid Energized.*
*Off = Solenoid De-Energized.*

## 5L40-E COMPONENT RESISTANCE CHART

| COMPONENT | CASE CONN TERMINALS | RESISTANCE @ 20°C (68°F) |
|---|---|---|
| 1-2 Shift Solenoid "A" (On/Off - N/C) | 14 And 17 | 15-17 Ohms |
| 2-3 Shift Solenoid "B" (On/Off - N/C) | 9 And 17 | 15-17 Ohms |
| 4-5 Shift Solenoid "C" (On/Off - N/C) | 5 And 17 | 15-17 Ohms |
| TCC Solenoid (PWM - N/C) | 20 And 17 | 10.0-11.5 Ohms |
| Pressure Control Solenoid (PWM - N/C) | 8 And 13 | 3.5-4.6 Ohms |
| Input Speed Sensor | 18 And 15 | 325-485 Ohms |
| Output Speed Sensor | 1 And 3 | 325-485 Ohms |
| Transmission Fluid Temperature Sensor | 10 And 6 | See Chart Below |
| Internal Mode Switch | See Wire Schematic | See Chart |

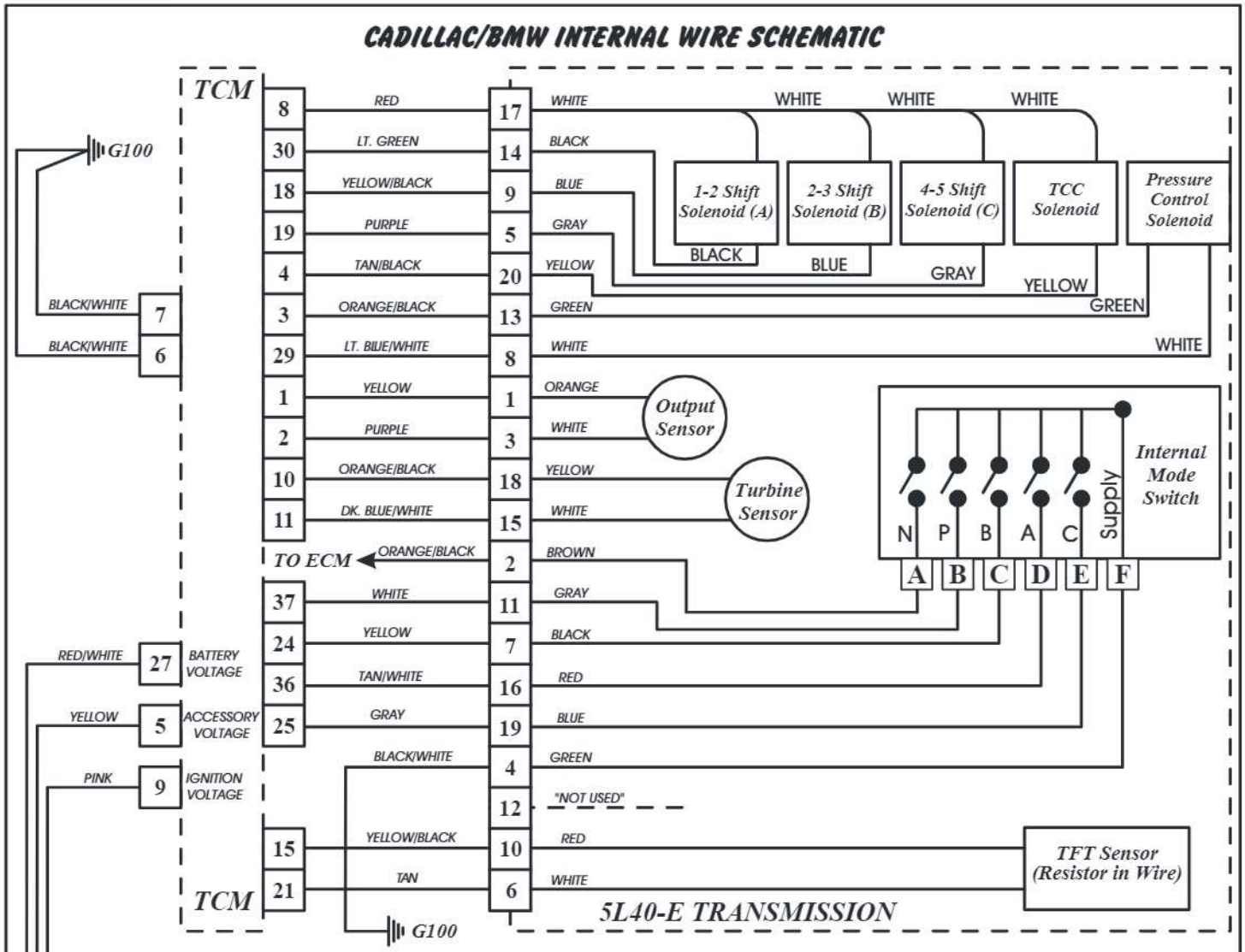


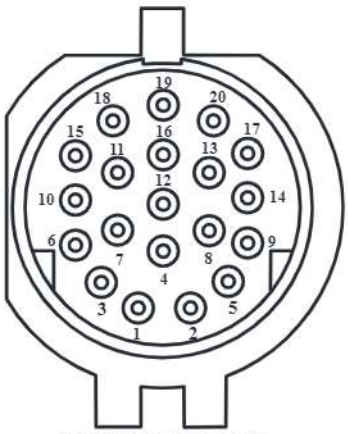

*View Looking Into Transmission Case Connector*

### TFT Sensor Resistance Chart

| Temperature C° (F°) | Resistance In Ohms | | |
|---|---|---|---|
| | Minimum | Nominal | Maximum |
| -30C (-22F) | 50264 | 52594 | 54924 |
| -20C (-8F) | 27439 | 28582 | 29725 |
| -10C (14F) | 15540 | 16120 | 16700 |
| 0C (32F) | 9097 | 9399 | 9701 |
| 10C (50F) | 5493 | 5658 | 5823 |
| 20C (68F) | 3418 | 3511 | 3604 |
| 30C (86F) | 2185 | 2240 | 2295 |
| 40C (104F) | 1430 | 1465 | 1500 |
| 50C (122F) | 958 | 980 | 1002 |
| 60C (140F) | 656 | 671 | 686 |
| 70C (158F) | 459 | 469 | 479 |
| 80C (176F) | 327 | 334 | 341 |
| 90C (194F) | 237 | 242 | 247 |
| 100C (212F) | 174 | 178 | 182 |
| 110C (230F) | 130 | 133 | 136 |
| 120C (248F) | 98 | 101 | 104 |
| 130C (266F) | 75 | 78 | 80 |

Figure 4



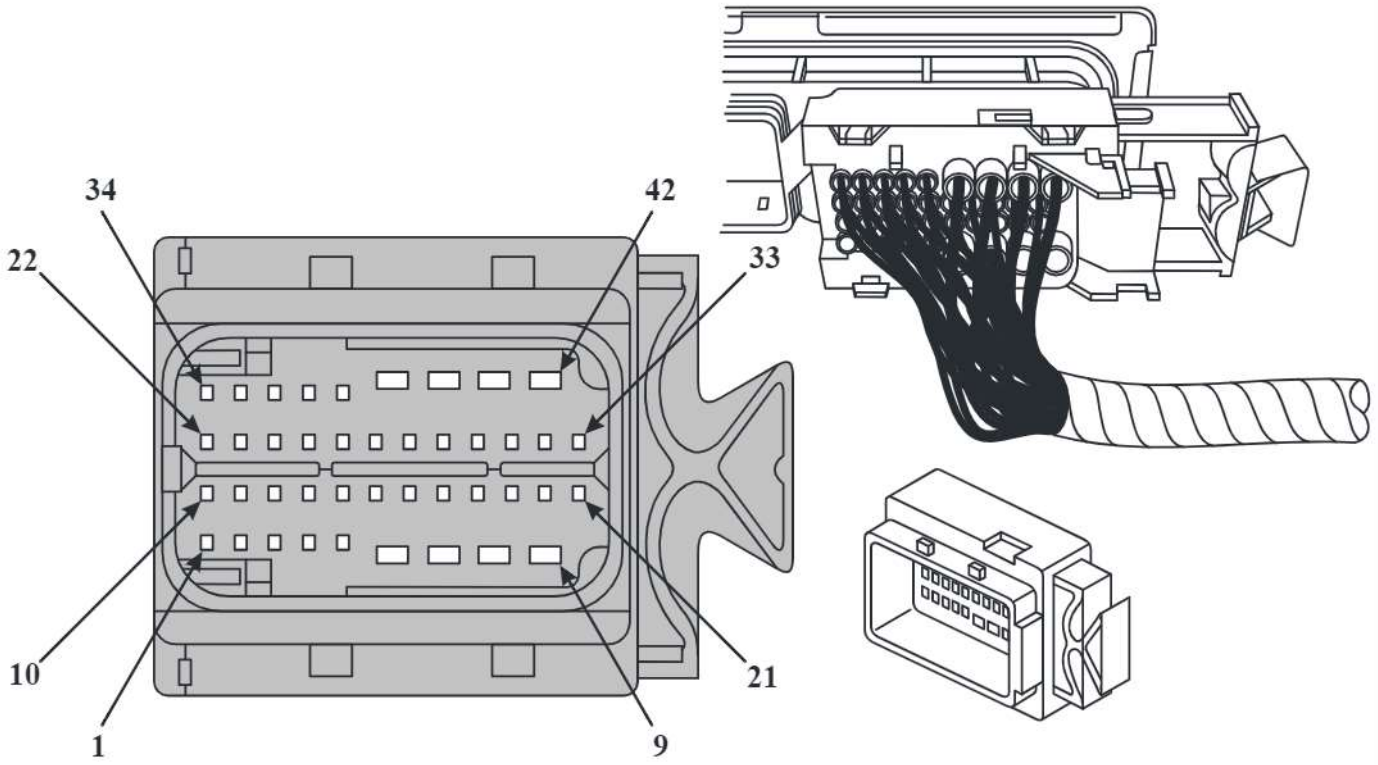
View Looking Into Trans Case Connector

| Case Connector Terminal Identification | | | |
|---|---|---|---|
| Pin No. | Description | Pin No. | Description |
| 1 | Output Speed Sensor (OSS) (+) | 11 | Internal Mode Switch Signal "P" |
| 2 | Internal Mode Switch Signal "N" | 12 | "Not Used" |
| 3 | Output Speed Sensor (OSS) (-) | 13 | Pressure Control Solenoid (+) |
| 4 | Internal Mode Switch Supply | 14 | 1-2 Shift Solenoid (A) Ground |
| 5 | 4-5 Shift Solenoid (C) Ground | 15 | Input Speed Sensor (ISS) (-) |
| 6 | Trans Fluid Temp (TFT) Sensor (-) | 16 | Internal Mode Switch Signal "A" |
| 7 | Internal Mode Switch Signal "B" | 17 | Solenoid Power In |
| 8 | Pressure Control Solenoid (-) | 18 | Input Speed Sensor (ISS) (+) |
| 9 | 2-3 Shift Solenoid (B) Ground | 19 | Internal Mode Switch Signal "C" |
| 10 | Trans Fluid Temp (TFT) Sensor (+) | 20 | TCC/PWM Solenoid Ground |

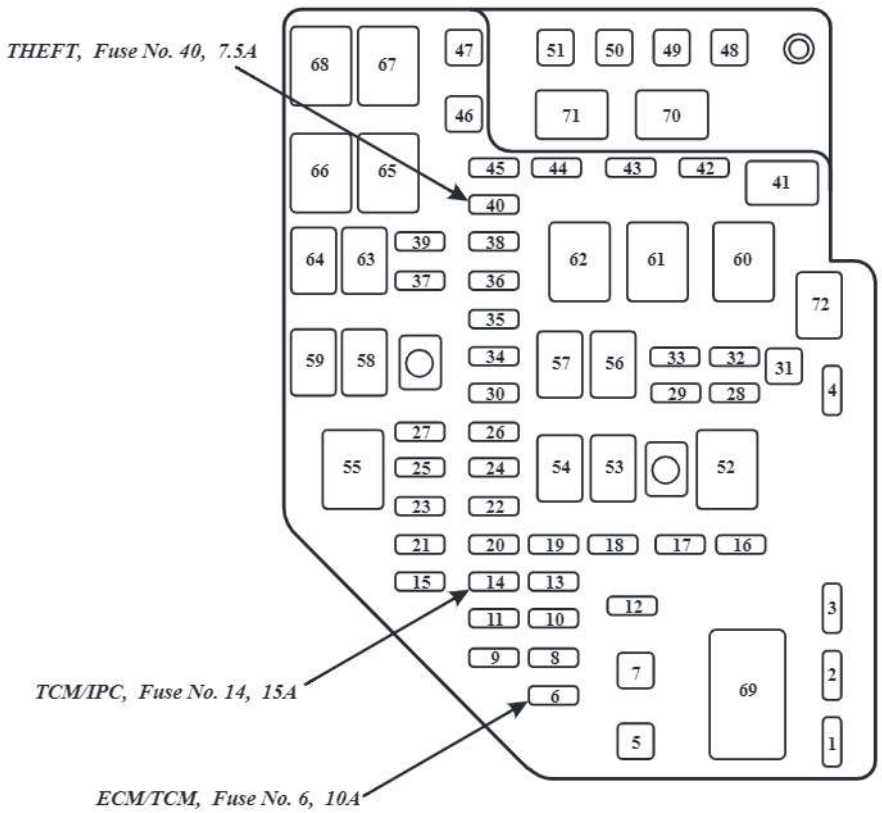
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Figure 5

## TRANSMISSION CONTROL MODULE (TCM) CONNECTOR IDENTIFICATION




## UNDERHOOD FUSE BLOCK LOCATIONS AND IDENTIFICATION




**PCM LOCATION**
**RIGHT FRONT ENGINE COMPARTMENT**

**TCM LOCATION**
**RIGHT FRONT ENGINE COMPARTMENT**

**UNDERHOOD FUSE BLOCK LOCATION**
**RIGHT FRONT ENGINE COMPARTMENT**

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Figure 6

| TRANSMISSION CONTROL MODULE (TCM) CONNECTOR IDENTIFICATION | | | |
|---|---|---|---|
| PIN NO. | WIRE COLOR | CIRCUIT NO. | FUNCTION |
| 1 | Yellow | 400 | Output Shaft Speed (OSS) Sensor High Signal |
| 2 | Purple | 401 | Output Shaft Speed (OSS) Sensor Low Signal |
| 3 | Orange/Black | 1228 | Pressure Control Solenoid High Control |
| 4 | Tan/Black | 422 | Torque Converter Clutch Solenoid Ground Control Signal |
| 5 | Yellow | 343A | Accessory Voltage |
| 6 | Black/White | 1551E | Ground |
| 7 | Black/White | 1551C | Ground |
| 8 | Orange | 1525 | Solenoid Power Feed |
| 9 | Pink | 239C | Ignition Switch Voltage |
| 10 | Orange/Black | 1230 | Transmission Input Shaft (ISS) High Signal |
| 11 | Dk. Blue/White | 1231 | Transmission Input Shaft (ISS) Low Signal |
| 13 | White/Black | 5043B | Serial Data |
| 15 | Yellow/Black | 1227 | Transmission Fluid Temperature (TFT) High Signal |
| 18 | Yellow/Black | 1223 | 2-3 Shift Solenoid "B" Ground Signal |
| 19 | Purple | 898 | 4-5 Shift Solenoid "C" Ground Signal |
| 21 | Tan | 2762 | Transmission Fluid Temperature (TFT) Low Signal |
| 24 | Yellow | 772 | Transmission Range Switch Signal "B" |
| 25 | Gray | 773 | Transmission Range Switch Signal "C" |
| 27 | Red/White | 1440D | Battery Positive Voltage |
| 29 | Lt. Blue/White | 1229 | Pressure Control Solenoid Low Control |
| 30 | Lt. Green | 1222 | 1-2 Shift Solenoid "A" Ground Signal |
| 32 | White | 2500 | High Speed GMLAN Serial Data Bus + (CAN) |
| 33 | Green | 2501 | High Speed GMLAN Serial Data Bus - (CAN) |
| 36 | Tan/White | 771 | Transmission Range Switch Signal "A" |
| 37 | White | 776 | Transmission Range Switch Signal "P" |
| 38 | Purple | 420E | TCC Brake Switch Signal |
| | | | |
| | | | |
| | | | |
| | | | |

*Special Note: Pins 12, 14, 16, 17, 20, 22, 23, 26, 28, 31, 34, 35, 39, 40, 41, 42 are "Not Used".*

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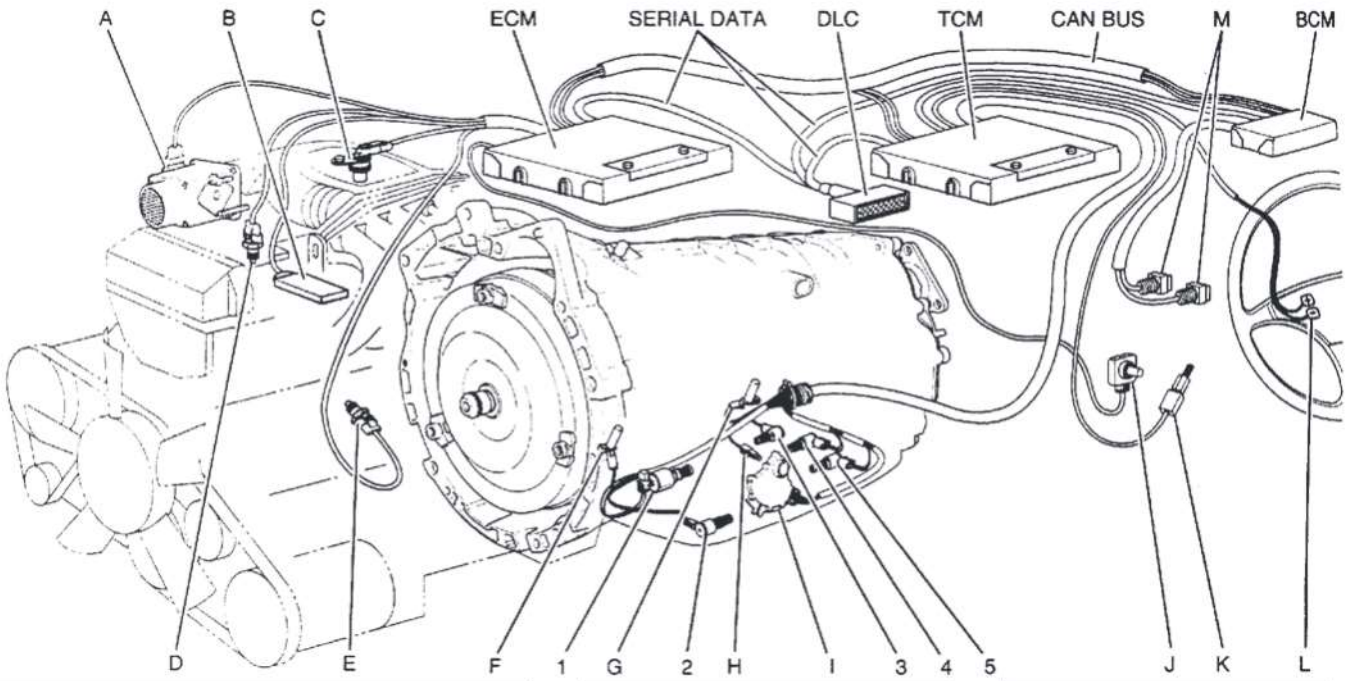
Figure 7

## ELECTRICAL COMPONENTS

Electrical signals from various sensors provide information to the TCM or PCM, about vehicle speed, throttle position, engine coolant temp, range selector position, engine speed and converter turbine speed. The TCM or PCM uses this information to determine upshift and downshift speeds, apply or release of the TCC and what fluid pressure is needed to apply the clutch packs. This type of control provides consistent shift points and shift quality based on the operating conditions of the vehicle.

If for any reason the entire electronic control system of the transmission becomes disabled, all three shift solenoids will be turned off. This "Safety Mode" operating state forces the transmission to operate in 5th gear when the range selector is in any forward range. Also, the pressure control solenoid is turned off which will increase line pressure to the maximum.

***Note: Some models use an Engine Control Module (ECM) and a Transmission Control Module (TCM) and some models use a Powertrain Control Module (PCM) for both engine and transmission management.***




**INFORMATION SENSORS**

- A. THROTTLE POSITION SENSOR (TPS)
- B. MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- C. ENGINE SPEED SENSOR
- D. MANIFOLD AIR TEMPERATURE (MAT) SENSOR
- E. ENGINE COOLANT TEMPERATURE (ECT) SENSOR
- F. INPUT SPEED SENSOR (ISS)
- G. OUTPUT SPEED SENSOR (OSS)
- H. TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR
- I. INTERNAL MODE SWITCH (IMS)
- J. ACCELERATOR PEDAL POSITION (APP) SENSOR
- K. TCC BRAKE SWITCH

**ELECTRONIC CONTROLLERS**

- * TRANSMISSION CONTROL MODULE (TCM) *SOME MODELS*
- * POWERTRAIN CONTROL MODULE (PCM)
- * ENGINE CONTROL MODULE (ECM) *SOME MODELS*
- * BODY CONTROL MODULE (BCM)
- * DIAGNOSTIC LINK CONNECTOR (DLC)

**TRANSMISSION COMPONENTS**

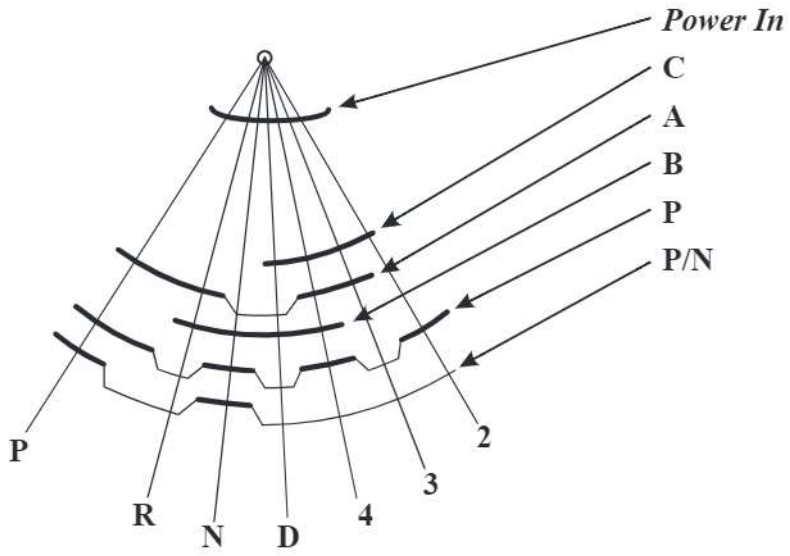
1. PRESSURE CONTROL SOLENOID
2. TCC/PWM SOLENOID
3. 1-2 SHIFT SOLENOID
4. 2-3 SHIFT SOLENOID
5. 4-5 SHIFT SOLENOID

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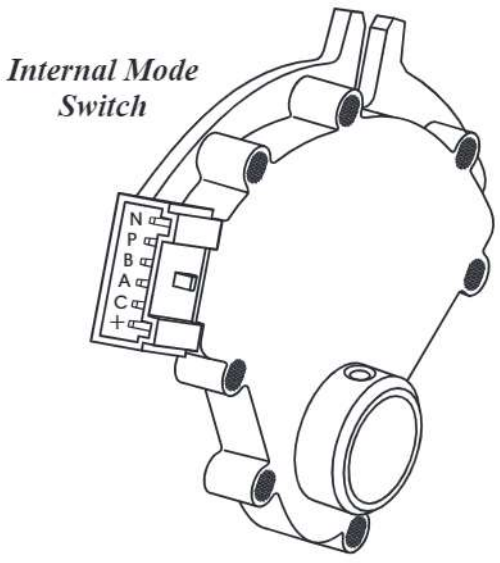
Figure 8

## INTERNAL MODE SWITCH

The Internal Mode Switch supplies the Transmission Control Module or Powertrain Control Module with input regarding the selector lever position (P, R, N, D, 4, 3, 2). The selector position is indicated by the state of five different On/Off switches, as shown below. The mode switch is located inside the transmission, on the manual shaft and is fixed in rotation to the main case by the dentent lever spring and no adjustment is ever necessary.




| RANGE SELECTED | CIRCUIT | | | | |
|---|---|---|---|---|---|
| | A | B | C | P | P/N |
| Park | 1 | 0 | 0 | 1 | 1 |
| Reverse | 1 | 1 | 0 | 0 | 0 |
| Neutral | 0 | 1 | 0 | 1 | 1 |
| Overdrive | 0 | 1 | 0 | 0 | 0 |
| Manual 4 | 1 | 1 | 1 | 1 | 0 |
| Manual 3 | 1 | 0 | 1 | 0 | 0 |
| Manual 2 | 0 | 0 | 1 | 1 | 0 |
| 1 = Switch Closed<br>0 = Switch Open | | | | | |




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Figure 9

| DIAGNOSTIC TROUBLE CODES (DTC) AND DESCRIPTION | | |
|---|---|---|
| DTC | DESCRIPTION | BMW CODE |
| P0218 | Transmission Fluid Temp is 132°C (270°F) or greater for 10 minutes | 61 |
| P0500 | Vehicle Speed is less than 5 km/h (3mph) for a total of 50 seconds | |
| P0562 | System Voltage is less than 11 Volts for 10 seconds | 96 |
| P0563 | System Voltage is greater than 18 Volts for 10 seconds | 96 |
| P0601 | TCM EEPROM checksums do not match | 80 |
| P0602 | TCM detects an unlocked calibration memory range | |
| P0603 | TCM NVRAM checksums do not match | 81 |
| P0604 | The data read from RAM does not match data written to RAM | |
| P0711 | Erratic Transmission Fluid Temperature (TFT) signal | 34 |
| P0712 | Transmission Fluid Temperature (TFT) shorted to ground, 315°F indicated | 34 |
| P0713 | Transmission Fluid Temperature (TFT) open circuit, -40°F indicated | 34 |
| P0716 | Input Shaft Speed (ISS) signal drops 1000 RPM or greater for 4 seconds | 33 |
| P0717 | No Input Shaft Speed (ISS) signal | 33 |
| P0719 | TCC Brake Switch stuck "ON" (Open) | 151 |
| P0722 | No Output Shaft Speed (OSS) signal | 32 |
| P0723 | Output Shaft Speed (OSS) signal drops 1300 RPM or greater for 3 seconds | 32 |
| P0724 | TCC Brake Switch stuck "OFF" (Closed) | 151 |
| P0727 | Invalid engine speed | 150 |
| P0731 | Gear Ratio Error, 1st Gear | 50 |
| P0732 | Gear Ratio Error, 2nd Gear | 52 |
| P0733 | Gear Ratio Error, 3rd Gear | 53 |
| P0734 | Gear Ratio Error, 4th Gear | 54 |
| P0735 | Gear Ratio Error, 5th Gear | 55 |
| P0741 | Torque Converter Clutch (TCC) slippage detected | 48 |
| P0742 | Torque Converter Clutch (TCC) stuck "ON" | |
| P0748 | Pressure Control Solenoid circuit, open or shorted to ground | 0 |
| P0751 | 1-2 Shift Solenoid "A" stuck "ON" | |
| P0752 | 1-2 Shift Solenoid "A" stuck "OFF" | |
| P0756 | 2-3 Shift Solenoid "B" stuck "OFF" | |
| P0757 | 2-3 Shift Solenoid "B" stuck "ON" | |
| P0761 | 4-5 Shift Solenoid "C" stuck "OFF" | |
| P0762 | 4-5 Shift Solenoid "C" stuck "ON" | |
| P0850 | Park/Neutral switch circuit low (0 Volts) or high (12 Volts) | 60 |
| P1621 | TCM detects checksum error between RAM and EEPROM test data | 80 |

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Figure 10

| DIAGNOSTIC TROUBLE CODES (DTC) AND DESCRIPTION | | |
|---|---|---|
| DTC | DESCRIPTION | BMW CODE |
| P1779 | Invalid Engine Torque Signal | 146 |
| P1780 | Engine Torque Reduction request has failed | 145 |
| P1791 | Invalid Accelerator Pedal Position (APP) sensor signal | 147 |
| P1792 | Engine Coolant Temperature (ECT) sensor circuit | 148 |
| P1793 | Invalid Wheel Speed data from the ECM | 149 |
| P1795 | Invalid Throttle Plate Position (TPP) sensor signal from the ECM | 147 |
| P1815 | Invalid Internal Mode Switch (IMS) state while engine is being started | 60 |
| P1818 | IMS signal indicates forward range, gear ratio indicates Reverse | 60 |
| P1820 | Internal Mode Switch (IMS) signal "A" shorted to ground | 60 |
| P1822 | Internal Mode Switch (IMS) D2 and D3 transitional error | 60 |
| P1823 | Internal Mode Switch (IMS) Neut and D5 transitional error | 60 |
| P1825 | Internal Mode Switch (IMS), combination of switch inputs invalid | 60 |
| P1826 | Internal Mode Switch (IMS) signal "C" is high while in a forward gear | 60 |
| P1831 | Pressure Control Solenoid circuit shorted to ground | 0 |
| P1832 | Pressure Control Solenoid circuit shorted to voltage | 0 |
| P1833 | Shift Solenoid power wire circuit shorted to ground | |
| P1834 | Shift Solenoid power wire circuit shorted to voltage | 84 |
| P1842 | 1-2 Shift Solenoid "A" circuit open or shorted to ground | 16 |
| P1843 | 1-2 Shift Solenoid "A" circuit shorted to voltage | |
| P1845 | 2-3 Shift Solenoid "B" circuit open or shorted to ground | 17 |
| P1847 | 2-3 Shift Solenoid "B" circuit shorted to voltage | |
| P1864 | 4-5 Shift Solenoid "C" circuit open or shorted to ground | 18 |
| P1865 | 4-5 Shift Solenoid "C" circuit shorted to voltage | |
| P1866 | TCC/PWM Solenoid circuit open or shorted to ground | 4 |
| P1867 | TCC/PWM Solenoid circuit shorted to voltage | |
| P1868 | Calculated transmission fluid life remaining is 10% or less | |
| U2105 | TCM has not recieved ECM data within the preset time parameters | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

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Figure 11

## GENERAL OPERATION AND DESCRIPTION

The 5L40-E transmission is a completely new design rear wheel drive unit and was designed to be a four or five speed transmission. The same case and components are used for both applications with the exclusion of the 2nd clutch, 2nd coast clutch and the 2nd sprag clutch, and the use of a smaller ravigneaux planetary carrier assembly in the 4 speed version.

The Hydra-matic 5L40-E is a fully automatic, five forward speed, rear wheel drive, fully electronic controlled transmission, with a maximum torque rating of 360 Nm. It consists primarily of a four element (Lock-Up) torque converter, one ravigneaux planetary gear set, nine multiple-disc friction clutch packs, four mechanical sprag clutches and a hydraulic pressurization and control system. We have provided you with an illustration to identify the location of the nine different clutch packs, the four mechanical sprag clutches and a component application chart in Figures 2 and 3.

The ravigneaux planetary gear set provides the five forward speeds and reverse. Changing gear ratios is fully automatic and is accomplished through the use of a Transmission Control Module (TCM). The TCM recieves and monitors various electronic sensor inputs and uses this information to shift the transmission at the optimum time, as illustrated in Figure 8.

The TCM commands three on/off Shift Solenoids to control shift timing. The TCM controls shift feel through the Pressure Control Solenoid. The TCM also controls the apply and release of the torque converter clutch through a TCC/PWM Solenoid. Refer to Figure 4 for the solenoid application chart for each gear, along with case connector pin identification and a resistance chart for the internal components. Refer to Figure 5 for the internal wiring schematic. Notice also in Figure 5 that this transmission uses an Internal Mode Switch (IMS). The IMS operation is illustrated and explained in Figure 9, and description of each gear range is explained in this section.

The hydraulic system primarily consists of a 13 vane pump, two control valve bodies, two channel plates, converter housing and transmission case. The pump maintains the working pressures needed to stroke the clutch pistons that apply or release the friction components.

## STANDARD SHIFT QUADRANT

With the "Standard" range indicator, as illustrated in Figure 12, the transmission may be operated in any one of the seven different positions shown on the shift quadrant as follows;

**P** - Park position enables the engine to be started while preventing the vehicle from rolling either forward or backward. Park position should not be selected until the vehicle has come to a complete stop. For safety reasons, the vehicles parking brake should always be used in addition to the "Park" position.

**R** - Reverse position enables the vehicle to be operated in a rearward direction.

**N** - Neutral position enables the engine to start and operate without driving the vehicle. If necessary, this position should be selected to restart the engine while the vehicle is moving.

**D** - Overdrive range should be used for all normal driving conditions for maximum efficiency and fuel economy. Overdrive range allows the transmission to upshift automatically into each of the 5 forward gear ratios. Downshifts to a lower gear are possible for safe passing by depressing the accelerator, or by manually selecting a lower gear with the shift selector.

**4** - Manual Fourth can be used for conditions where it may be desirable to use only 4 gear ratios, such as trailer towing or hilly terrain. This range is also helpful for engine braking when descending slight grades. Upshifts and downshifts all occur automatically, except 5th gear is prohibited. Manual Fourth can be selected at any vehicle speed but will downshift into 4th gear only if vehicle speed is low enough not to over-rev the engine. Manual downshifts are controlled by the TCM, not the manual valve location.

**3** - Manual Third can be used for conditions where it is desirable to use only 3 gear ratios, such as trailer towing or hilly terrain. This range also helps for engine braking when descending grades. Upshifts and downshifts all occur automatically, except 4th and 5th is prohibited. Manual 3rd can be selected at any vehicle speed but will downshift to 3rd only if vehicle speed is low enough not to over-rev the engine. Manual downshifts are controlled by the TCM, not the manual valve.

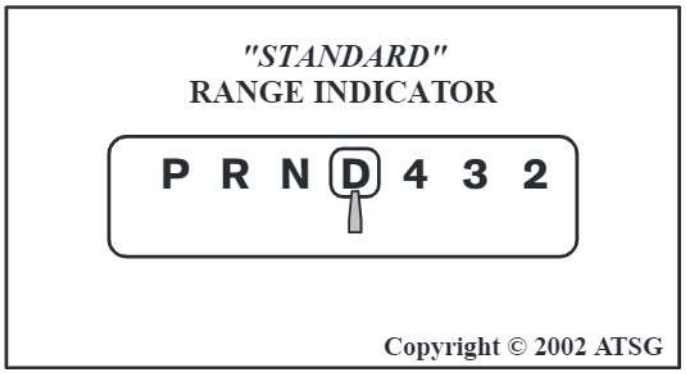



Figure 12

## FLUID LEVEL CHECKING PROCEDURE

Start the engine as it ***must*** be running to properly check the fluid level. Depress the brake pedal and move the shift lever through all of the gear ranges, pausing a few seconds in each range. Return the shift lever to the PARK range.

Raise the vehicle on a hoist. The vehicle ***must*** be level with the ***engine running*** and the shift lever in the PARK range.

***Caution:***

***The engine must be running when Check/Fill plug is removed, or excessive fluid loss will occur. Transmission fluid may be hot, and since the actual fluid level is unknown, stand clear and take precautions with protective clothing when removing the plug. Have a container ready to capture any lost fluid. Do not turn the engine off with the fill plug removed as you can be injured by hot transmission fluid being expelled from the Check/Fill plug opening.***

Let the transmission fluid temperature rise until it has reached a temperature of 90-125°F (30-50°C). Remove the transmission fill plug with care as described above. Use Figure 13 for the locations as they differ from gasoline models to diesel models. The fluid should trickle from the plugs opening.

Add Dexron® III automatic transmission fluid in increments of 0.5 L (0.5 quart) until the fluid drains from the threaded opening. Torque specification for the Check/Fill plug is 15 ft.lb.

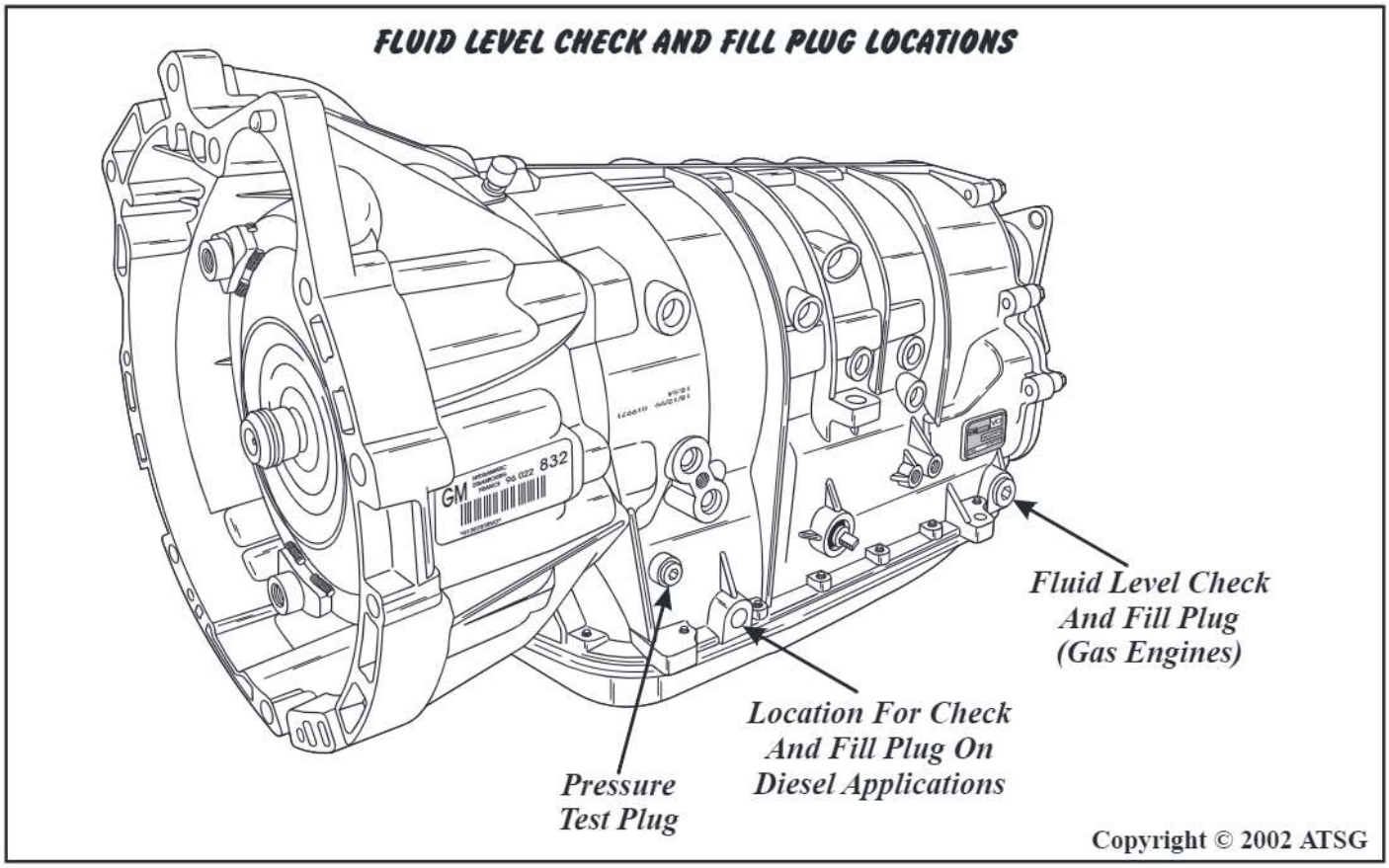
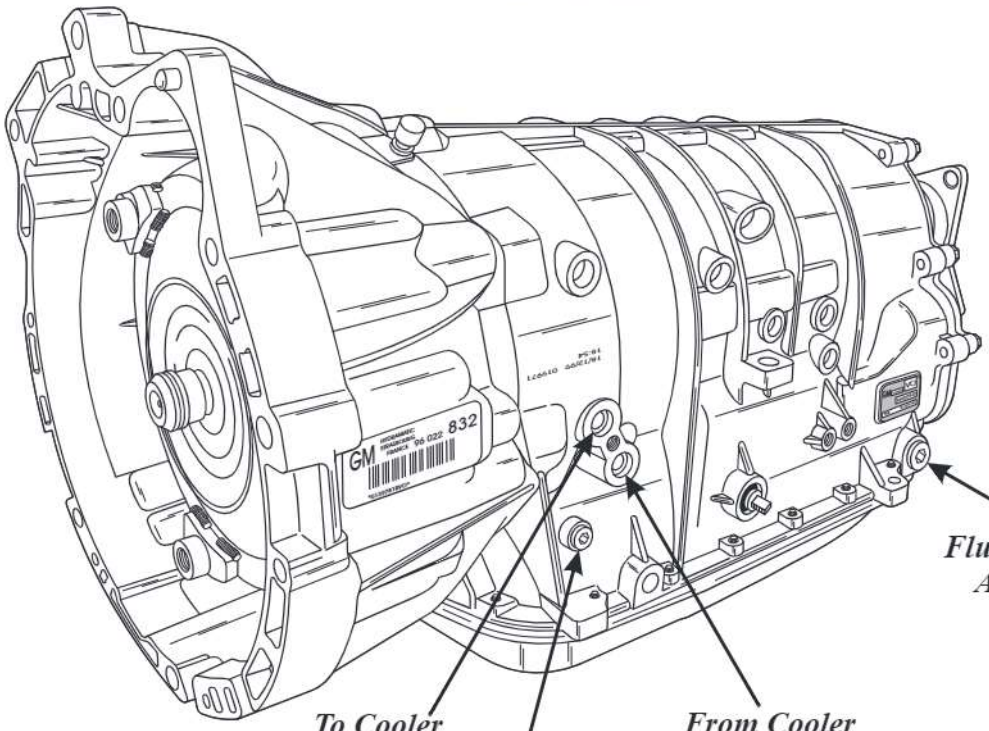
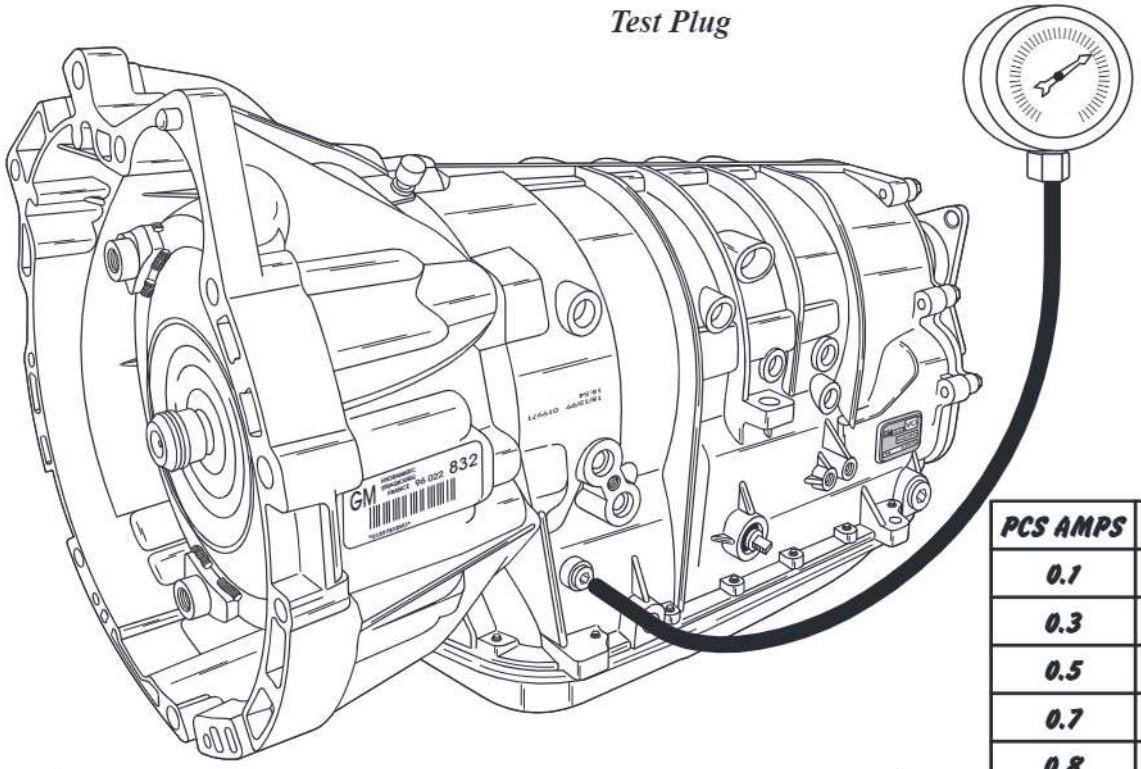



Figure 13

## LINE PRESSURE TEST



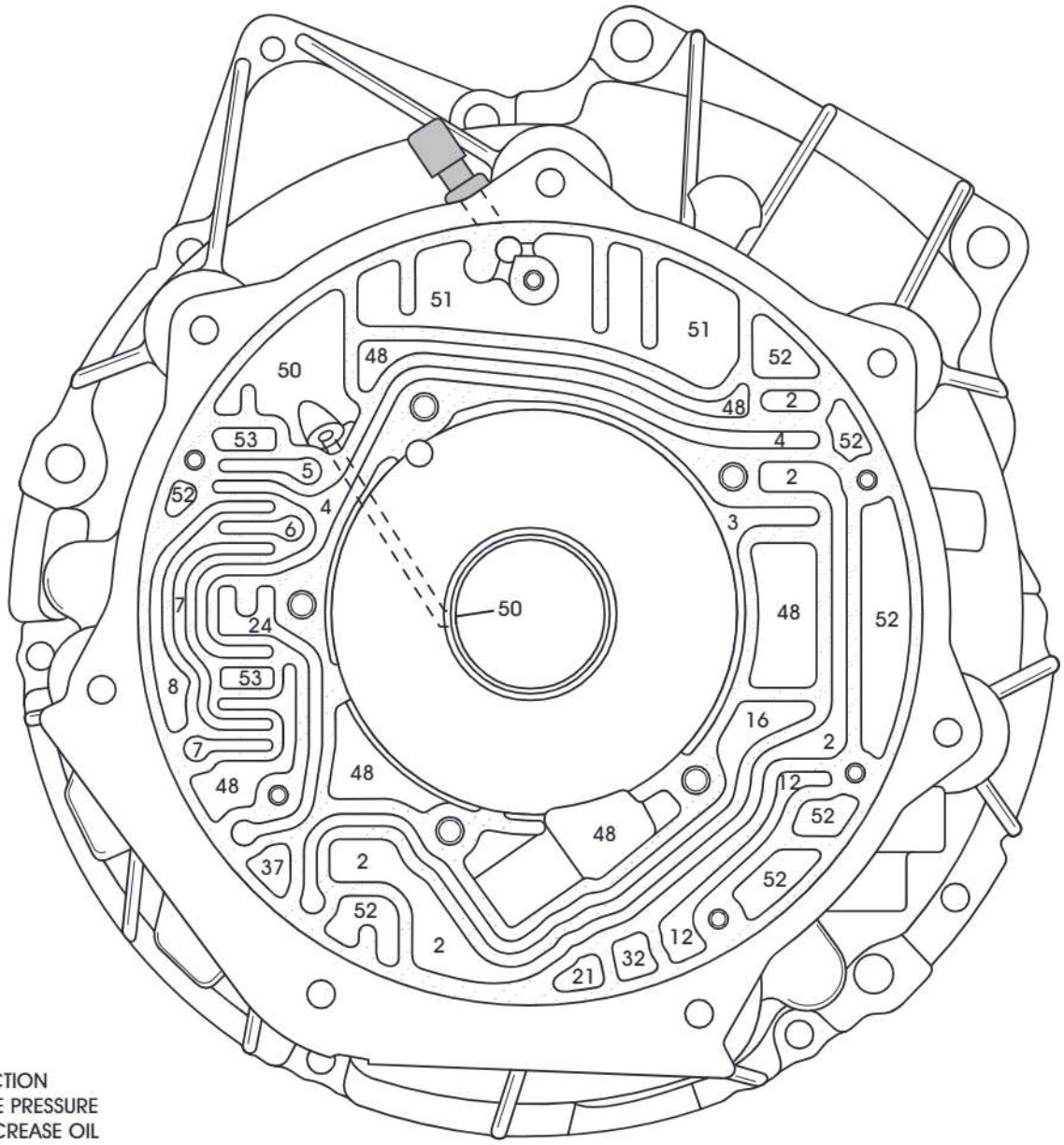
| RANGE | LINE PRESSURE | |
|---|---|---|
| | Minimum | Maximum |
| P, N, D, M4, M3, M2 | 48 psi | 180 psi |
| REVERSE | 60 psi | 232 psi |

| PCS AMPS | PRESSURE |
|---|---|
| 0.1 | 173-197 PSI |
| 0.3 | 162-188 PSI |
| 0.5 | 145-169 PSI |
| 0.7 | 117-140 PSI |
| 0.8 | 95-119 PSI |
| 0.9 | 63-89 PSI |
| 1.1 | 42-64 PSI |
| ENGINE AT 1300 RPM | |

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Figure 14

## BELL HOUSING OIL PASSAGES




1. SUCTION
2. LINE PRESSURE
3. DECREASE OIL
4. CONVERTER FEED
5. CONVERTER RELEASE
6. CONVERTER APPLY
7. REGULATED APPLY
8. TO COOLER
9. LUBE FROM COOLER
12. THROTTLE SIGNAL
16. REVERSE CLUTCH
21. FORWARD CLUTCH
24. TCC SIGNAL
32. COAST CLUTCH
37. DIRECT CLUTCH
48. EXHAUST
50. CONVERTER SEAL DRAIN
51. VENT
52. VOID
53. CONVERTER FEED LIMIT

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Figure 15

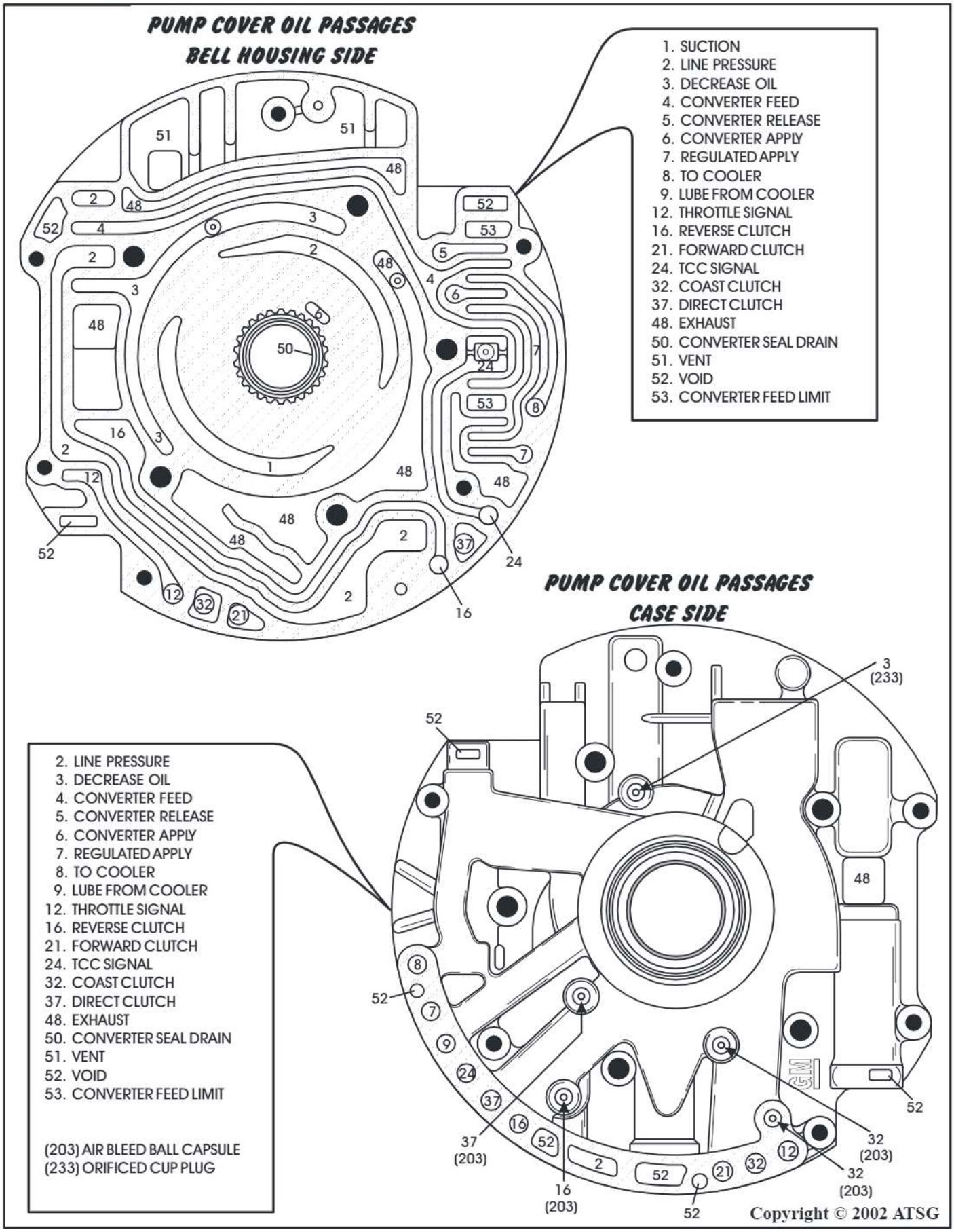
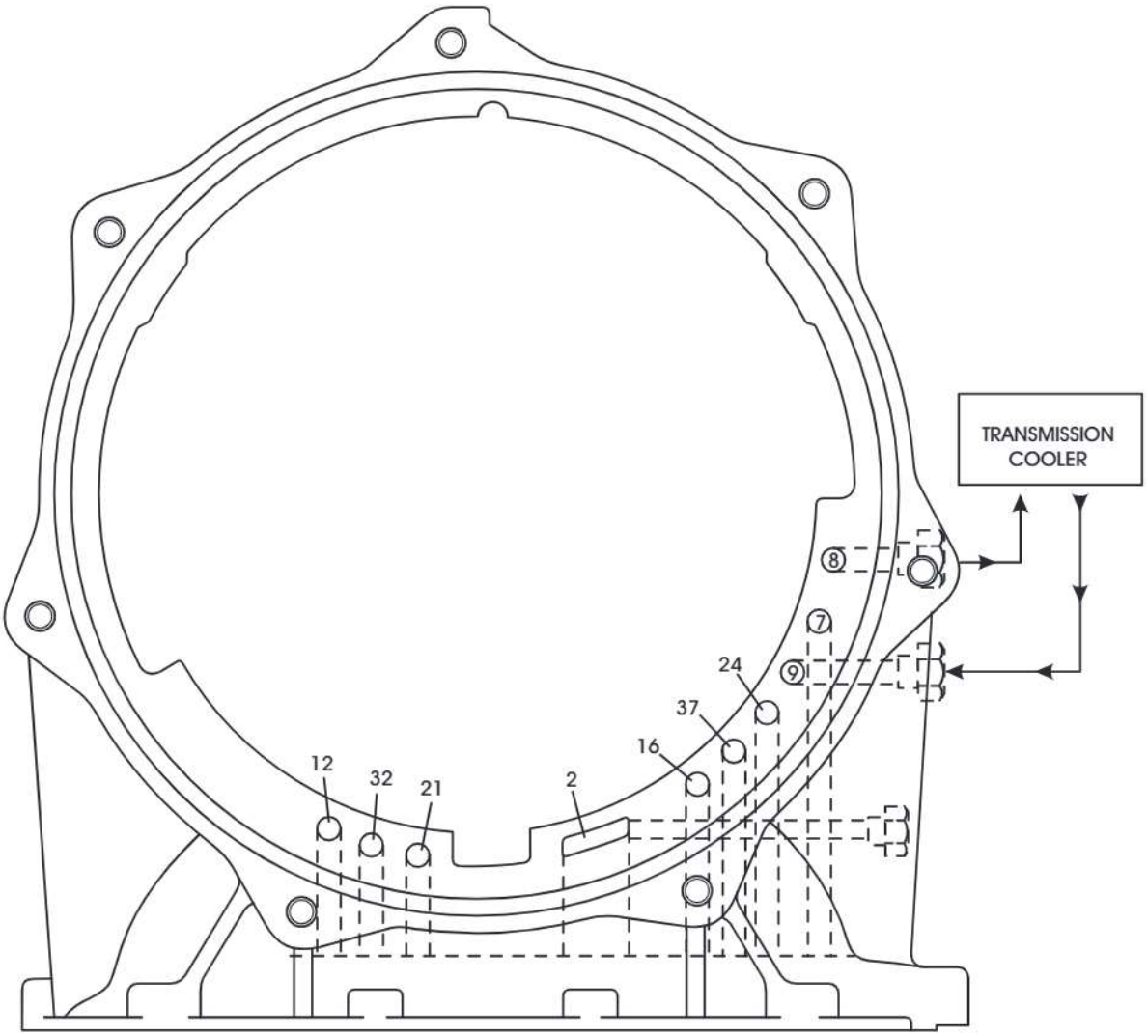

PUMP COVER OIL PASSAGES
BELL HOUSING SIDE
1. SUCTION
2. LINE PRESSURE
3. DECREASE OIL
4. CONVERTER FEED
5. CONVERTER RELEASE
6. CONVERTER APPLY
7. REGULATED APPLY
8. TO COOLER
9. LUBE FROM COOLER
12. THROTTLE SIGNAL
16. REVERSE CLUTCH
21. FORWARD CLUTCH
24. TCC SIGNAL
32. COAST CLUTCH
37. DIRECT CLUTCH
48. EXHAUST
50. CONVERTER SEAL DRAIN
51. VENT
52. VOID
53. CONVERTER FEED LIMIT
PUMP COVER OIL PASSAGES
CASE SIDE
2. LINE PRESSURE
3. DECREASE OIL
4. CONVERTER FEED
5. CONVERTER RELEASE
6. CONVERTER APPLY
7. REGULATED APPLY
8. TO COOLER
9. LUBE FROM COOLER
12. THROTTLE SIGNAL
16. REVERSE CLUTCH
21. FORWARD CLUTCH
24. TCC SIGNAL
32. COAST CLUTCH
37. DIRECT CLUTCH
48. EXHAUST
50. CONVERTER SEAL DRAIN
51. VENT
52. VOID
53. CONVERTER FEED LIMIT
(203) AIR BLEED BALL CAPSULE
(233) ORIFICED CUP PLUG
GM
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Figure 16

## MAIN CASE "FRONT" OIL PASSAGES

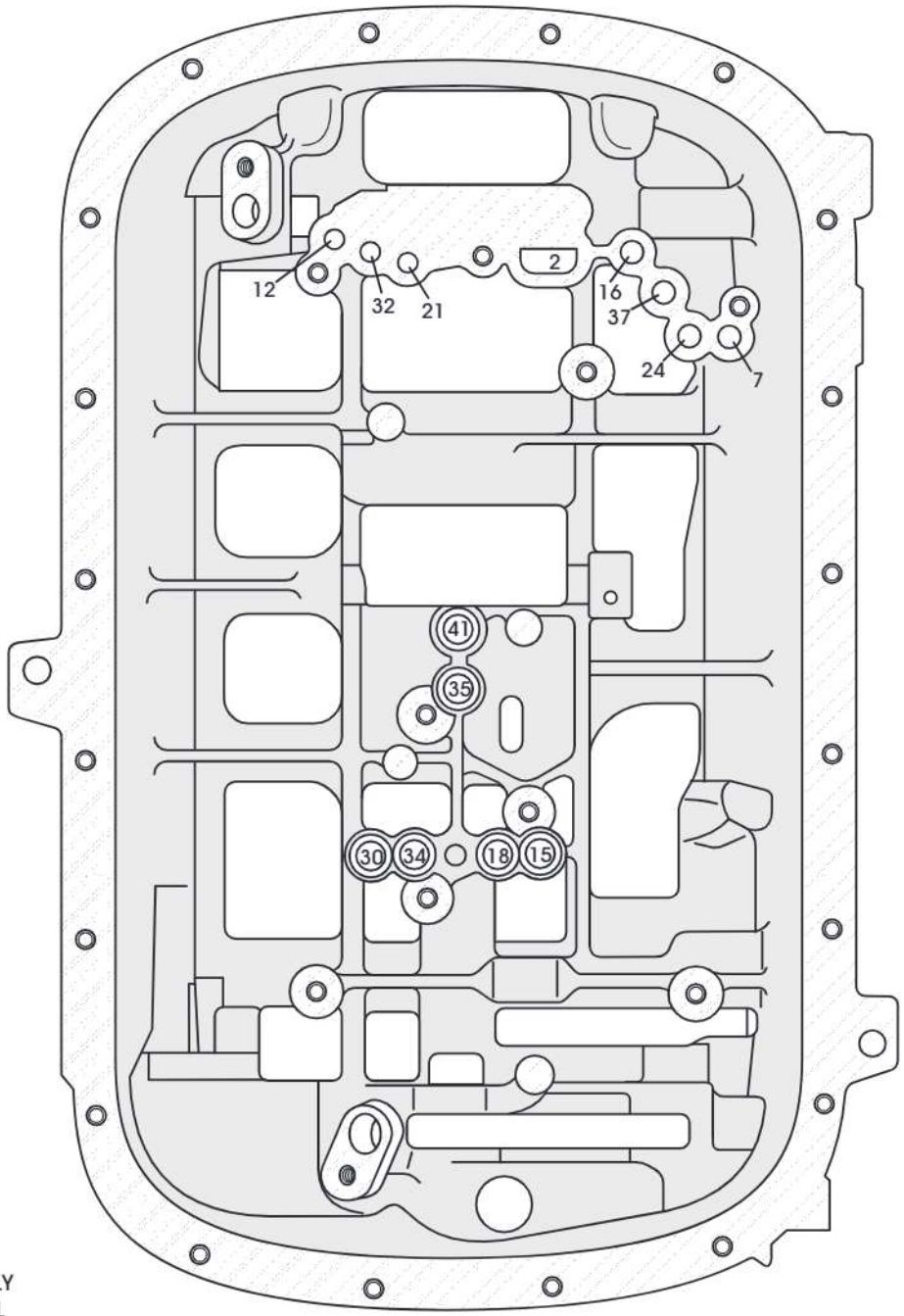



2. LINE PRESSURE
7. REGULATED APPLY
8. TO COOLER
9. LUBE FROM COOLER
12. THROTTLE SIGNAL
16. REVERSE CLUTCH
21. FORWARD CLUTCH
24. TCC SIGNAL
32. COAST CLUTCH
37. DIRECT CLUTCH

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Figure 17

## MAIN CASE "BOTTOM" OIL PASSAGES

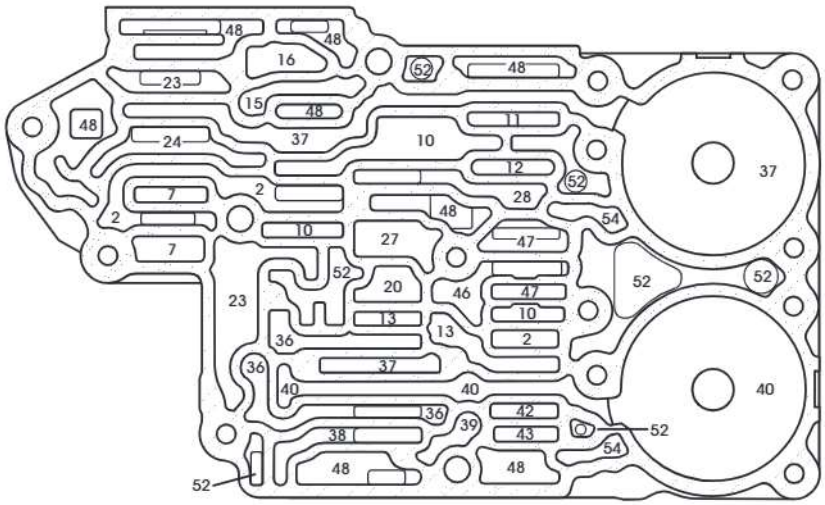



2. LINE PRESSURE
7. REGULATED APPLY
12. THROTTLE SIGNAL
15. REVERSE LOCK OUT
16. REVERSE CLUTCH
18. LOW/REV CLUTCH OR RLO
21. FORWARD CLUTCH
24. TCC SIGNAL
30. SECOND CLUTCH
32. COAST CLUTCH
34. 2ND COAST CLUTCH
35. INTERMEDIATE CLUTCH
37. DIRECT CLUTCH
41. OVERDRIVE CLUTCH

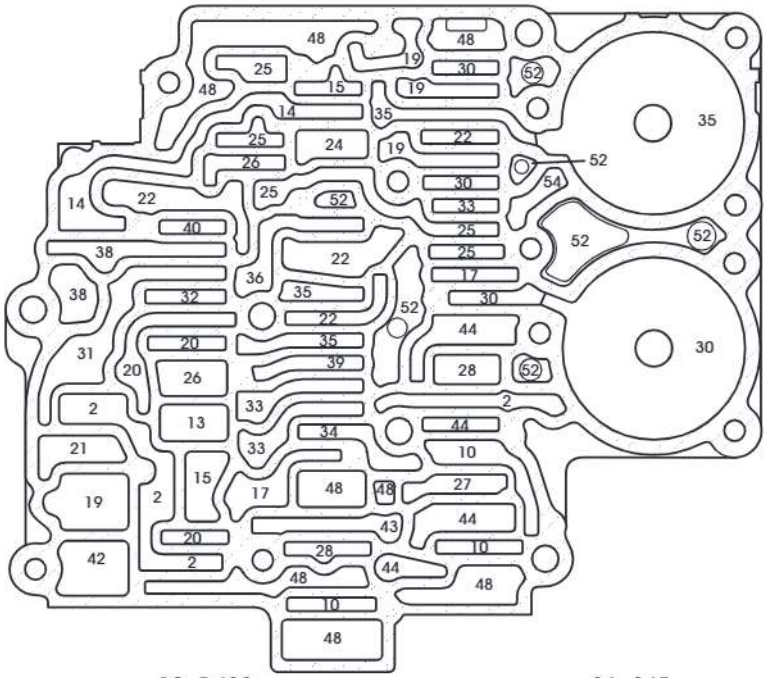
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Figure 18

## "FRONT" VALVE BODY OIL PASSAGES



## "REAR" VALVE BODY OIL PASSAGES

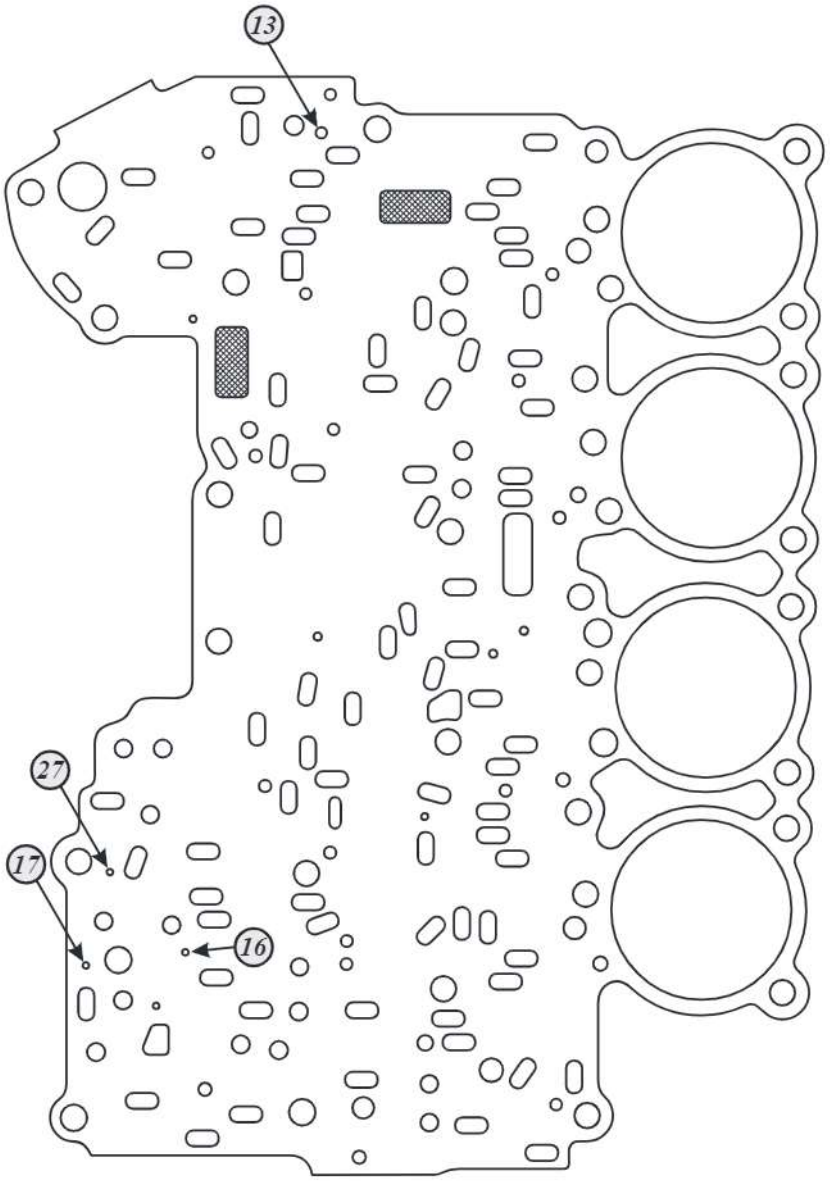


2. LINE PRESSURE
3. DECREASE OIL
4. CONVERTER FEED
5. CONVERTER RELEASE
6. CONVERTER APPLY
7. REGULATED APPLY
8. TO COOLER
9. LUBE FROM COOLER
10. FEED LIMIT
11. FILTERED FEED LIMIT
12. THROTTLE SIGNAL
13. LINE SAFETY MODE
14. REVERSE
15. REVERSE LOCK OUT (RLO)
16. REVERSE CLUTCH
17. LOW AND REVERSE CLUTCH
18. LOW/REV CLUTCH OR RLO
19. D432
20. 123
21. FORWARD CLUTCH
22. 2345
23. 2345 OR REVERSE
24. TCC SIGNAL
25. 123 REGULATED
26. 123 BRAKING
27. 1-2 SIGNAL
28. 2-3 SIGNAL
29. 4-5 SIGNAL
30. SECOND CLUTCH
31. COAST FEED CLUTCH
32. COAST CLUTCH
33. 23 REGULATED
34. SECOND COAST CLUTCH
35. INTERMEDIATE CLUTCH
36. 345
37. DIRECT CLUTCH
38. 45
39. OVERDRIVE CLUTCH FEED 1
40. OVERDRIVE CLUTCH FEED 2
41. OVERDRIVE CLUTCH
42. 32
43. 32 SAFETY MODE
44. FDL
45. 32 SAFETY MODE/FDL
46. MEMORY PILOT
47. MEMORY
48. EXHAUST
51. VENT
52. VOID
53. CONVERTER FDL
54. ACCUMULATOR

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Figure 19

"TYPICAL" SPACER PLATE

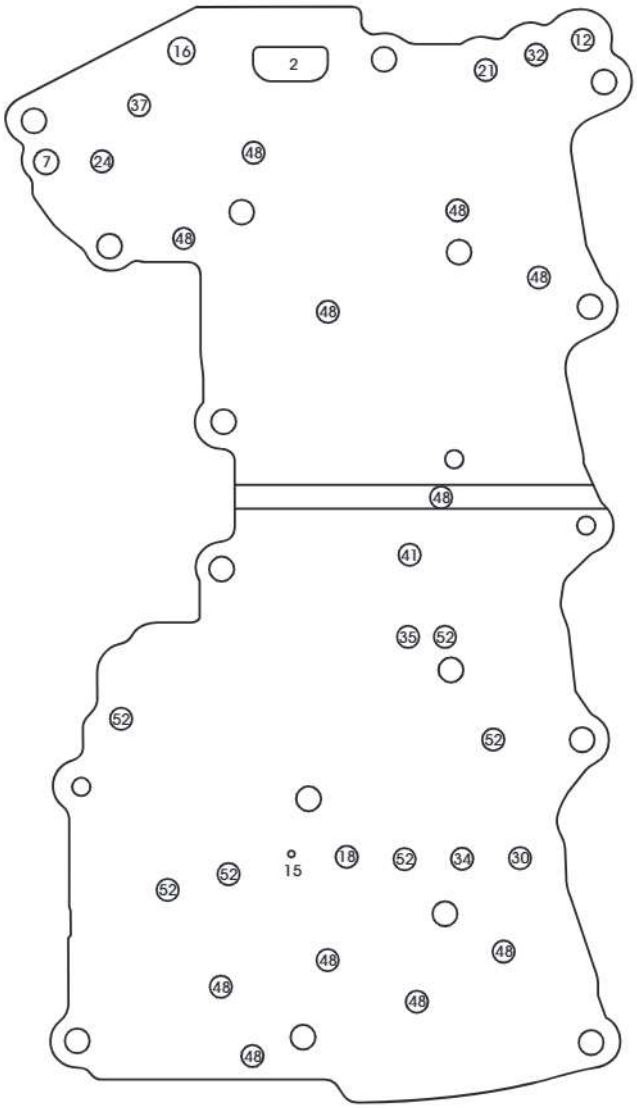



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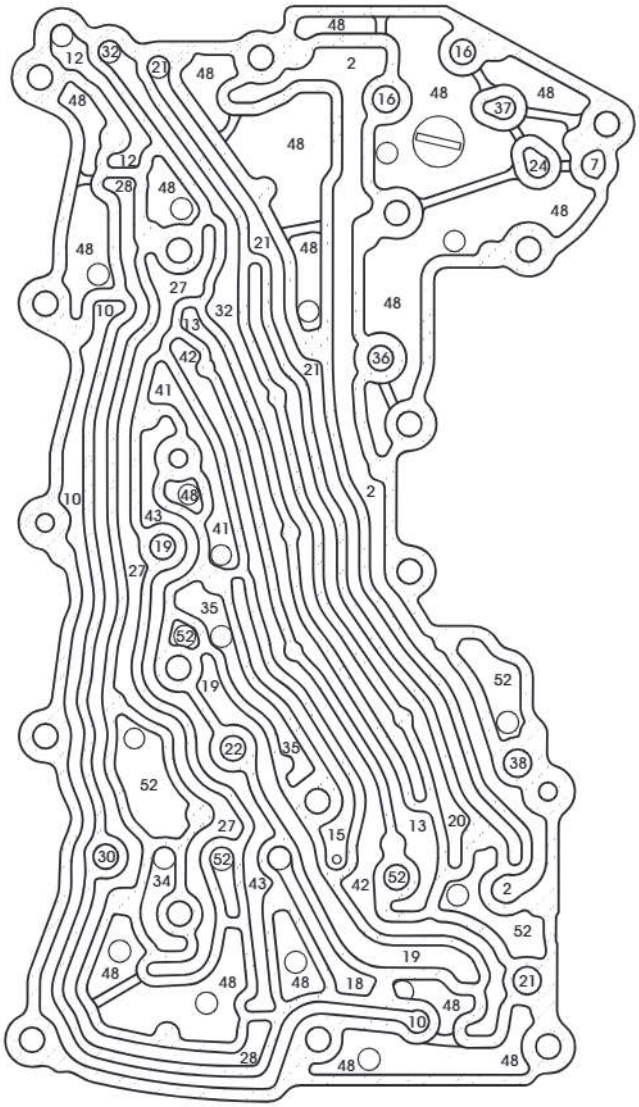
Figure 20

## "TOP" CHANNEL PLATE OIL PASSAGES

### "CASE" SIDE



### "BOTTOM" CHANNEL PLATE SIDE



2. LINE PRESSURE
3. DECREASE OIL
4. CONVERTER FEED
5. CONVERTER RELEASE
6. CONVERTER APPLY
7. REGULATED APPLY
8. TO COOLER
9. LUBE FROM COOLER
10. FEED LIMIT
11. FILTERED FEED LIMIT
12. THROTTLE SIGNAL
13. LINE SAFETY MODE
14. REVERSE
15. REVERSE LOCK OUT (RLO)
16. REVERSE CLUTCH
17. LOW AND REVERSE CLUTCH
18. LOW/REV CLUTCH OR RLO
19. D432
20. 123
21. FORWARD CLUTCH
22. 2345
23. 2345 OR REVERSE
24. TCC SIGNAL
25. 123 REGULATED
26. 123 BRAKING
27. 1-2 SIGNAL
28. 2-3 SIGNAL
29. 4-5 SIGNAL
30. SECOND CLUTCH
31. COAST FEED CLUTCH
32. COAST CLUTCH
33. 23 REGULATED
34. SECOND COAST CLUTCH
35. INTERMEDIATE CLUTCH
36. 345
37. DIRECT CLUTCH
38. 45
39. OVERDRIVE CLUTCH FEED 1
40. OVERDRIVE CLUTCH FEED 2
41. OVERDRIVE CLUTCH
42. 32
43. 32 SAFETY MODE
44. FDL
45. 32 SAFETY MODE/FDL
46. MEMORY PILOT
47. MEMORY
48. EXHAUST
51. VENT
52. VOID
53. CONVERTER FDL
54. ACCUMULATOR

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Figure 21

***Check Ball No. 1:*** Seats to force reverse lockout fluid through orifice 13 in the spacer plate, and into the reverse clutch circuit to help control the apply rate of the reverse clutch.

***Check Ball No. 2:*** Seats to allow either reverse fluid (In Reverse) or 2345 fluid (In 2nd, 3rd, 4th, and 5th) to enter the reverse or 2345 circuit, while blocking the other fluid circuit.

***Check Ball No. 3:*** Seats to force four five fluid through orifice 27 in the spacer plate and into the overdrive clutch feed circuit to help control the apply rate of the overdrive clutch.

***Check Ball No. 4:*** Seats to force 123 fluid through orifice 16 in the spacer plate and into the coast clutch feed circuit to help control the apply rate of the coast clutch.

***Check Ball No. 5:*** Seats to force forward clutch fluid through orifice 17 in the spacer plate to help control the apply rate of the coast clutch.

***Check Ball No. 6:*** Seats to force forward clutch fluid through orifice 15 in the spacer plate and into the forward clutch circuit to help control the apply rate of the forward clutch.

***Check Ball No. 7:*** Seated by a calibrated spring that goes in channel plate before the check ball and provides extra D432 fluid in the forward and coast clutch circuits to reduce garage shift response time.

***Check Ball No. 8:*** Seats to allow either low/reverse clutch fluid (In 1st gear coast condition) or reverse lockout (RLO) fluid (In Reverse) to enter the low/reverse clutch or reverse lockout circuit, while blocking the other fluid circuit.

***Check Ball No. 9:*** Seats to force two-three regulated fluid through orifice 22 in the spacer plate and into the overdrive clutch feed 1 circuit to help control the apply rate of the overdrive clutch when in a 3rd gear coast condition.

***Check Ball No. 10:*** Seats to allow either three-two safety mode fluid (Safety Mode Operation Only) or FDL fluid (In 1st Gear) to enter the 3-2 safety mode or FDL fluid circuit while blocking the other.

***Check Ball No. 11:*** Seats to force two-three regulated fluid through orifice 23 in the spacer plate and into the second coast clutch circuit to help control the apply rate of the 2nd coast clutch when in a 2nd gear coast condition. ***Note: This Check Ball not used in 4L40-E models.***

***Check Ball No. 12:*** Seats to allow either overdrive clutch feed 1 fluid (In a 3rd Gear Coast condition) or overdrive clutch feed 2 fluid (In 5th Gear) to enter the overdrive clutch circuit while blocking the other fluid circuit.

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Figure 22

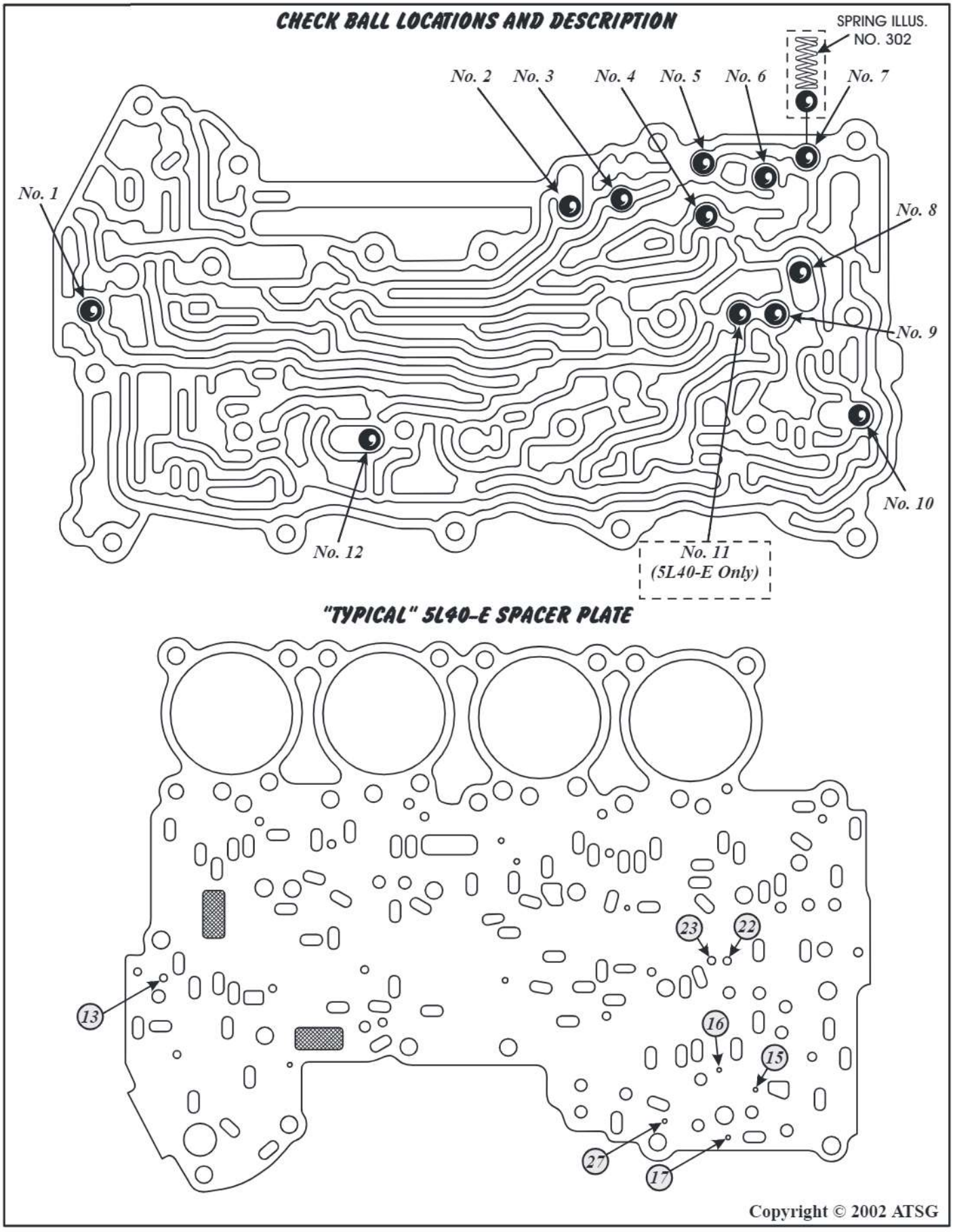
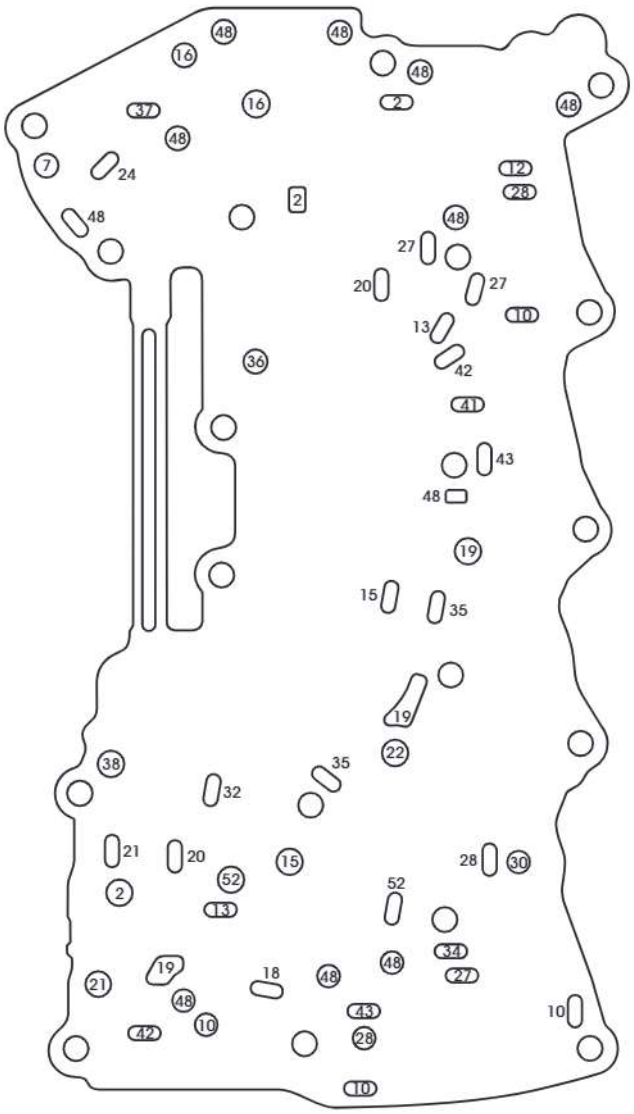

CHECK BALL LOCATIONS AND DESCRIPTION
SPRING ILLUS. NO. 302
No. 1
No. 2
No. 3
No. 4
No. 5
No. 6
No. 7
No. 8
No. 9
No. 10
No. 11 (5L40-E Only)
No. 12
"TYPICAL" 5L40-E SPACER PLATE
13
15
16
17
22
23
27
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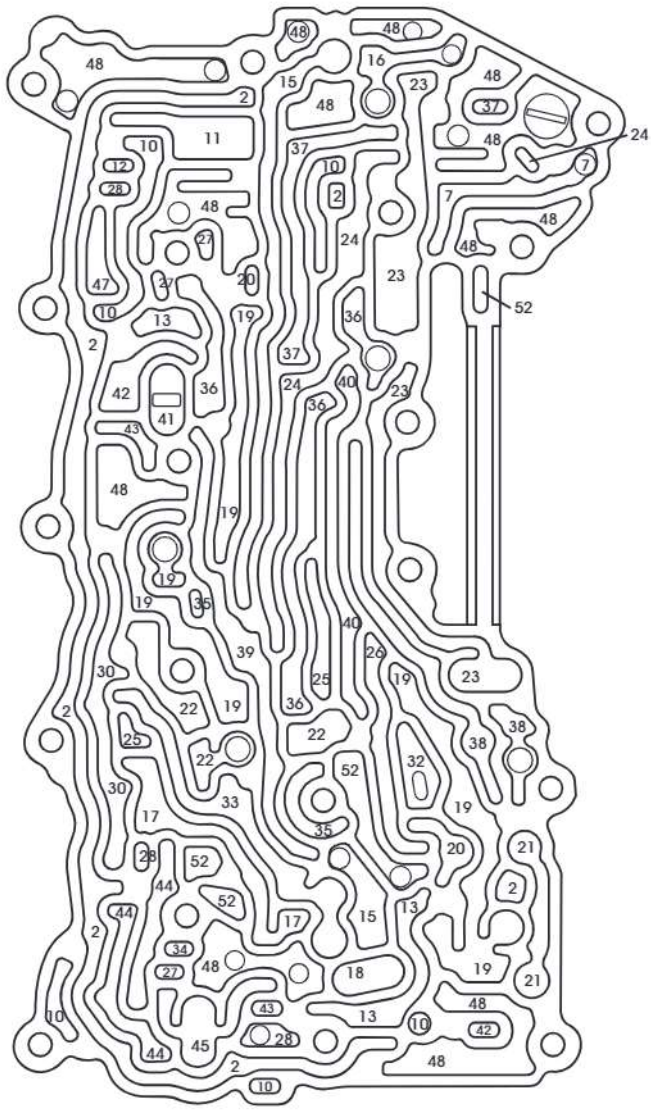
Figure 23

## "BOTTOM" CHANNEL PLATE OIL PASSAGES

### "TOP" CHANNEL PLATE SIDE



### "VALVE BODY" SIDE



2. LINE PRESSURE
3. DECREASE OIL
4. CONVERTER FEED
5. CONVERTER RELEASE
6. CONVERTER APPLY
7. REGULATED APPLY
8. TO COOLER
9. LUBE FROM COOLER
10. FEED LIMIT
11. FILTERED FEED LIMIT
12. THROTTLE SIGNAL
13. LINE SAFETY MODE
14. REVERSE
15. REVERSE LOCK OUT (RLO)
16. REVERSE CLUTCH
17. LOW AND REVERSE CLUTCH
18. LOW/REV CLUTCH OR RLO
19. D432
20. 123
21. FORWARD CLUTCH
22. 2345
23. 2345 OR REVERSE
24. TCC SIGNAL
25. 123 REGULATED
26. 123 BRAKING
27. 1-2 SIGNAL
28. 2-3 SIGNAL
29. 4-5 SIGNAL
30. SECOND CLUTCH
31. COAST FEED CLUTCH
32. COAST CLUTCH
33. 23 REGULATED
34. SECOND COAST CLUTCH
35. INTERMEDIATE CLUTCH
36. 345
37. DIRECT CLUTCH
38. 45
39. OVERDRIVE CLUTCH FEED 1
40. OVERDRIVE CLUTCH FEED 2
41. OVERDRIVE CLUTCH
42. 32
43. 32 SAFETY MODE
44. FDL
45. 32 SAFETY MODE/FDL
46. MEMORY PILOT
47. MEMORY
48. EXHAUST
51. VENT
52. VOID
53. CONVERTER FDL
54. ACCUMULATOR

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Figure 24

## TRANSMISSION DISASSEMBLY

### EXTERNAL COMPONENTS

1. Install transmission Holding Fixture J-8763-02 or equivalent that will allow you to mount the transmission in a bench fixture and rotate it to a desired position for disassembly, as shown in Figure 25.
2. Remove the torque converter assembly from transmission as shown in Figure 26, by pulling straight out and rotating until dis-engaged from the transmission.
   ***Caution: The Torque Converter weighs approximately 26 pounds.***
3. Remove and discard the "O" ring from turbine shaft, as shown in Figure 27, using a small screwdriver.

**Continued on Page 28**

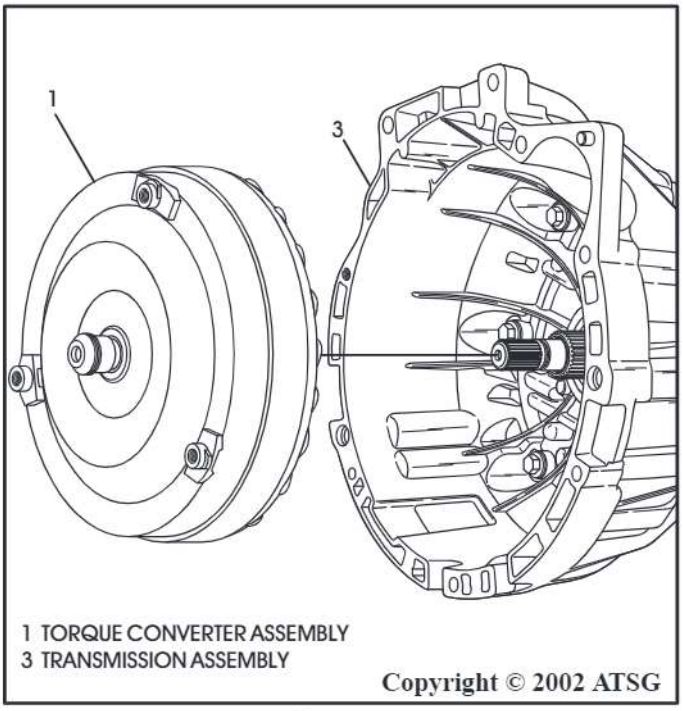



Figure 26

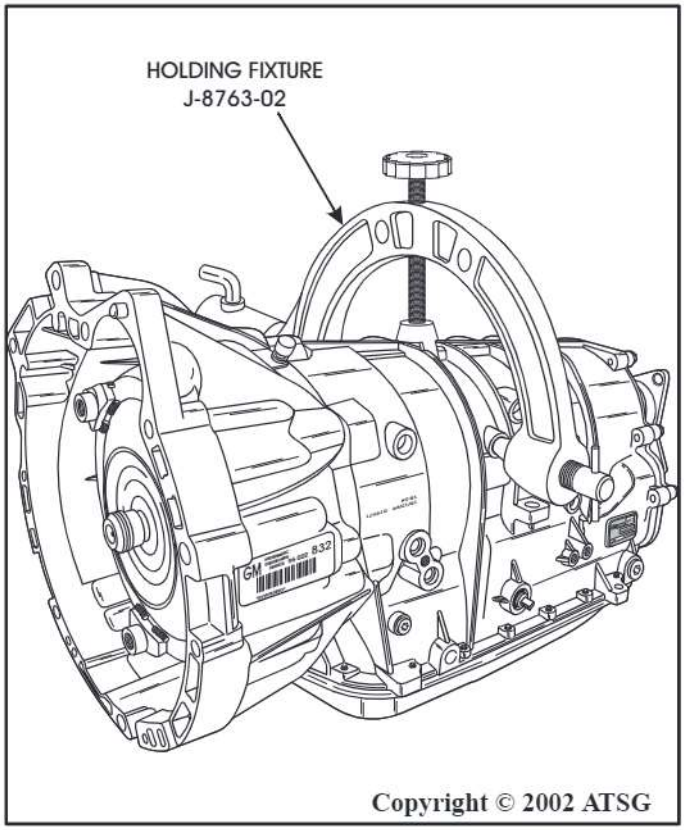



Figure 25

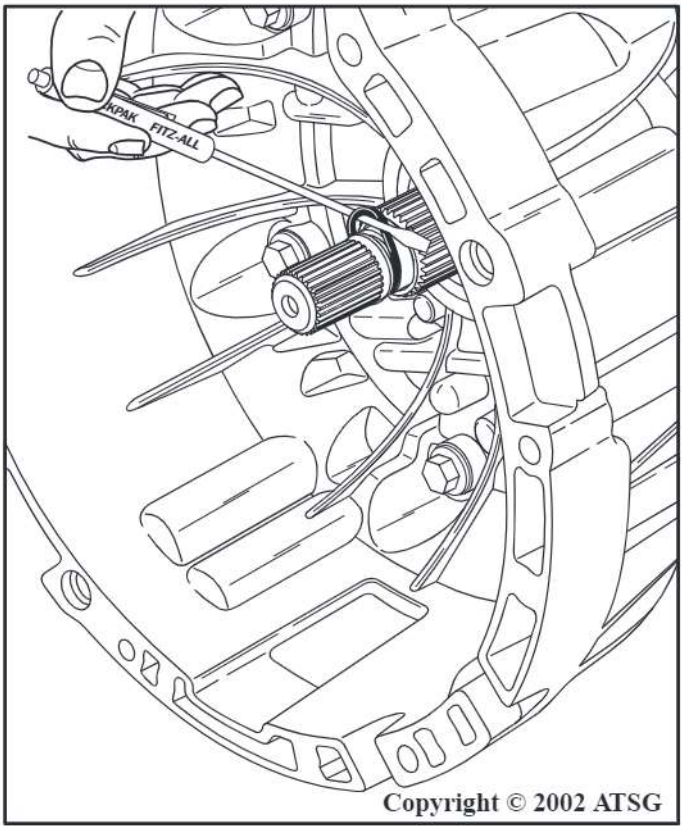
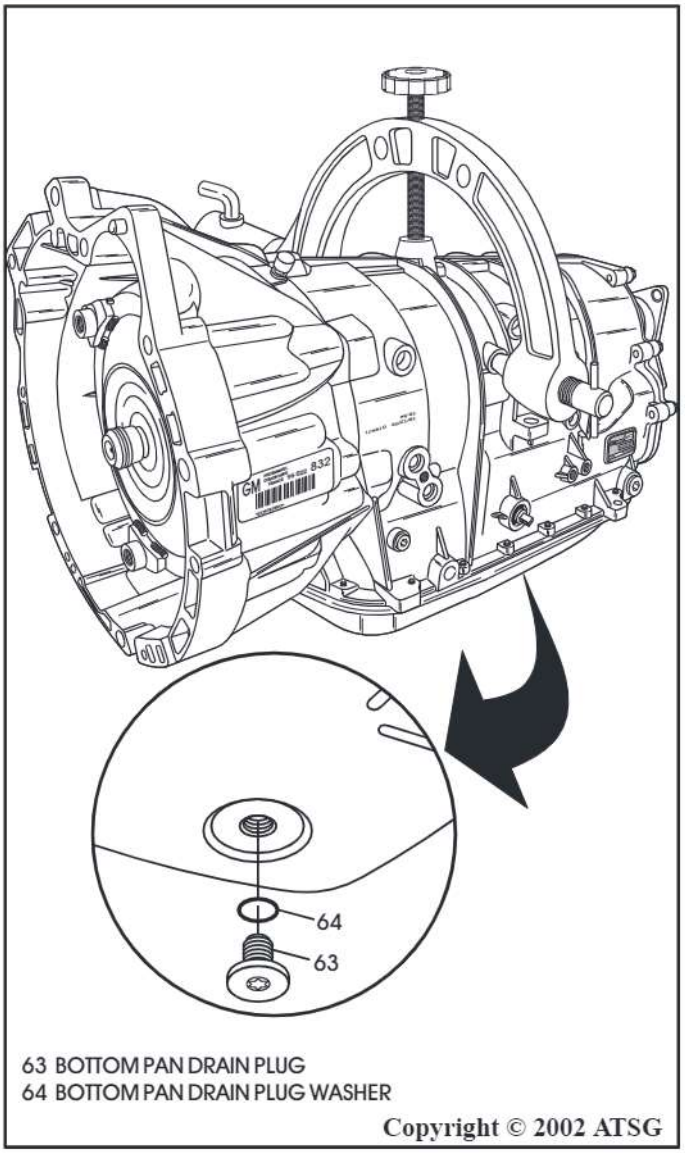



Figure 27

**Continued From Page 27**

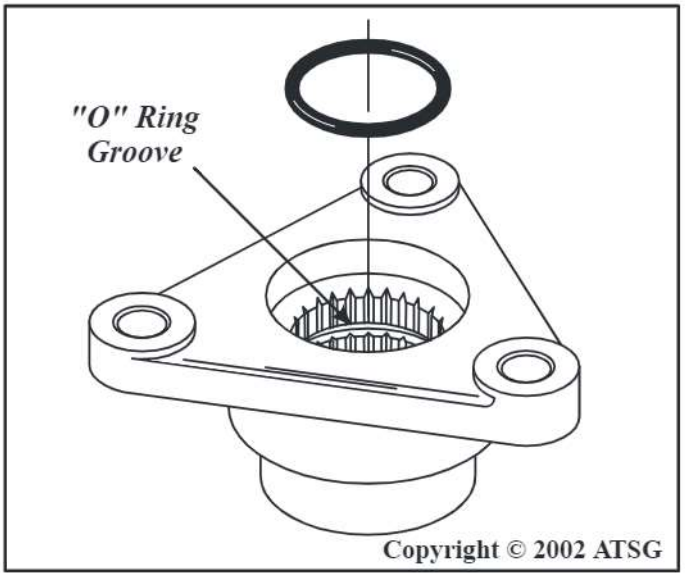
4. Remove the drain plug from the bottom pan, as shown in Figure 28, and allow fluid to drain.
5. Rotate the transmission in fixture so extension housing is facing up, as shown in Figure 30.
6. Put transmission into Park and remove the prop shaft flange nut and washer (See Figure 30)
7. Remove the driveshaft yoke from transmission output shaft, as shown in Figure 30.
8. Remove and discard the "O" ring seal from the inside groove of the driveshaft yoke, as shown in Figure 29.




63 BOTTOM PAN DRAIN PLUG
64 BOTTOM PAN DRAIN PLUG WASHER

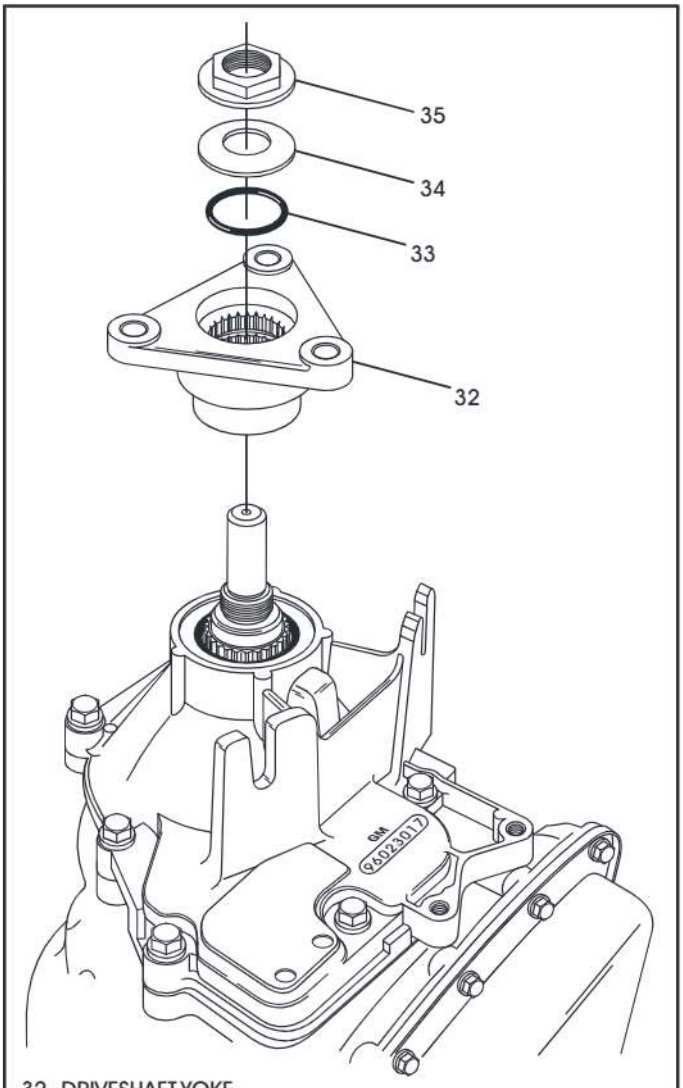
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Figure 28




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Figure 29



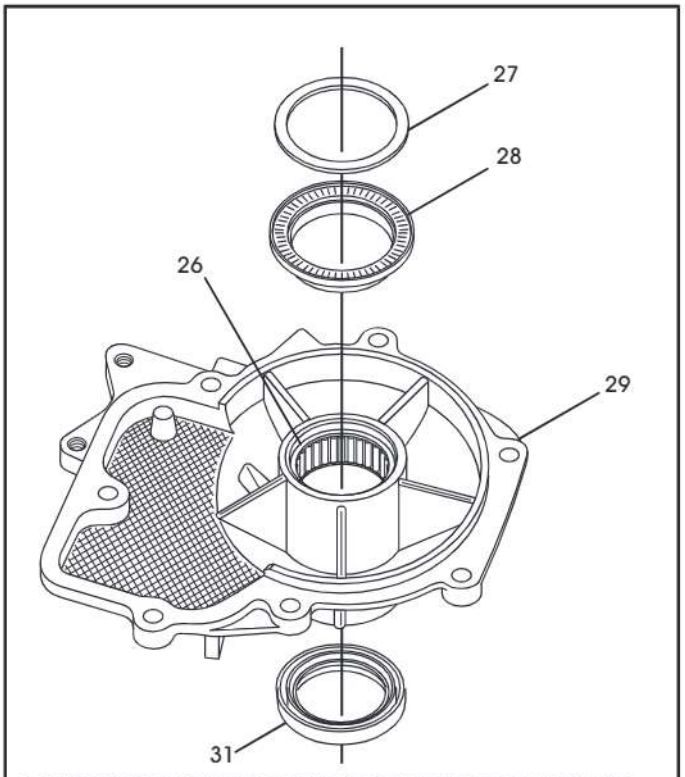

32. DRIVESHAFT YOKE
33. DRIVESHAFT YOKE "O" RING SEAL
34. DRIVESHAFT YOKE WASHER
35. DRIVESHAFT YOKE RETAINING NUT M22 X 1.5 X 10

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Figure 30

9. Remove the seven extension housing to case retaining bolts, as shown in Figure 32.
10. Remove the extension housing assembly, as shown in Figure 32.
11. Remove and discard the extension housing gasket, as shown in Figure 32.
12. Remove the output shaft to extension housing thrust washer (27) that may be on the output shaft, or stuck to the extension housing thrust bearing. Refer to Figures 31 and 32.
    ***Note: This thrust washer is selective.***
13. Remove the thrust bearing which is hand pressed into the extension housing, as shown in Figure 31.
14. Remove and discard the extension housing driveshaft yoke seal, as shown in Figure 31
15. Set extension housing aside for sub-assembly and rotate transmission slowly so that output shaft is facing down, to drain any access fluid.

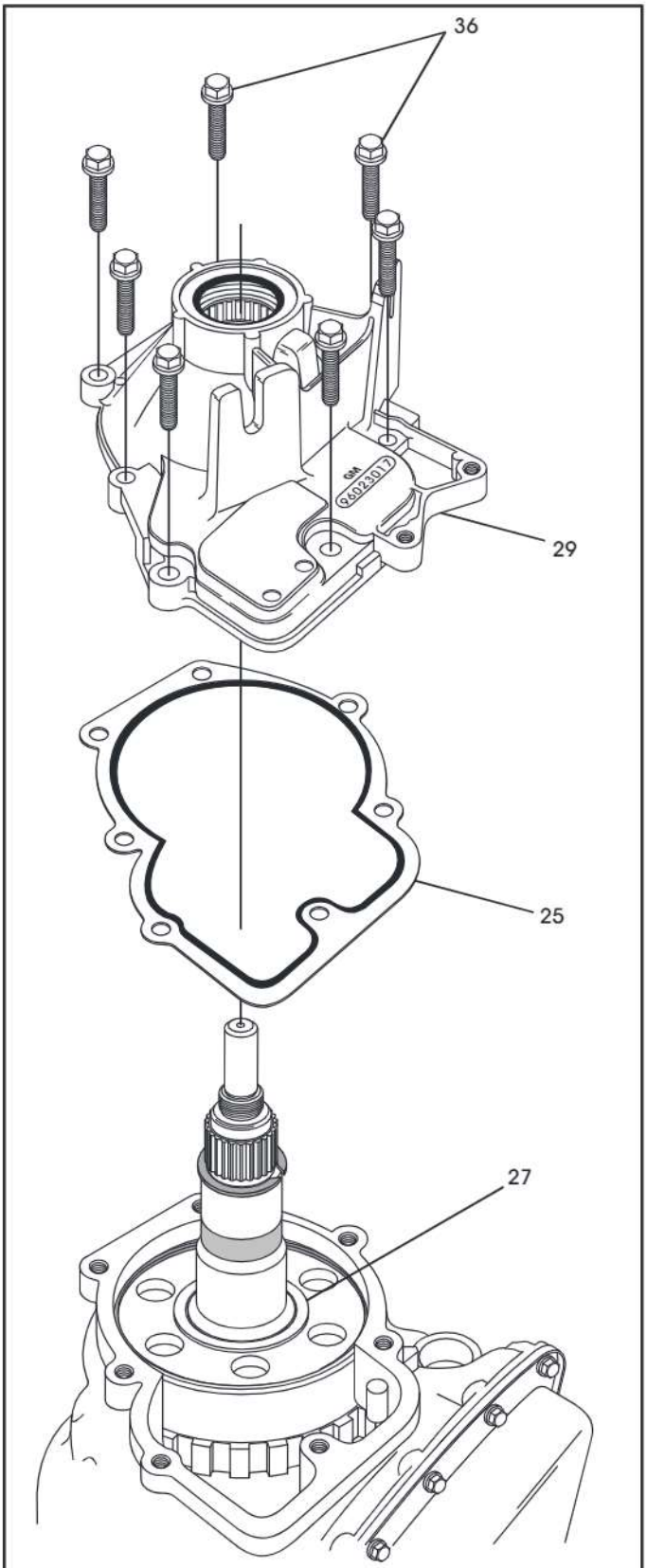
**Continued on Page 32**




26 EXTENSION HOUSING FRONT CAGED NEEDLE BEARING ASM.
27 OUTPUT SHAFT BEARING THRUST WASHER (SELECTIVE)
28 OUTPUT SHAFT TO EXTENSION HOUSING THRUST BEARING
29 EXTENSION HOUSING ASSEMBLY
31 EXTENSION HOUSING YOKE METAL CLAD SEAL ASSEMBLY

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Figure 31




25 EXTENSION HOUSING TO MAIN CASE GASKET
27 OUTPUT SHAFT BEARING THRUST WASHER (SELECTIVE)
29 EXTENSION HOUSING ASSEMBLY

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Figure 32

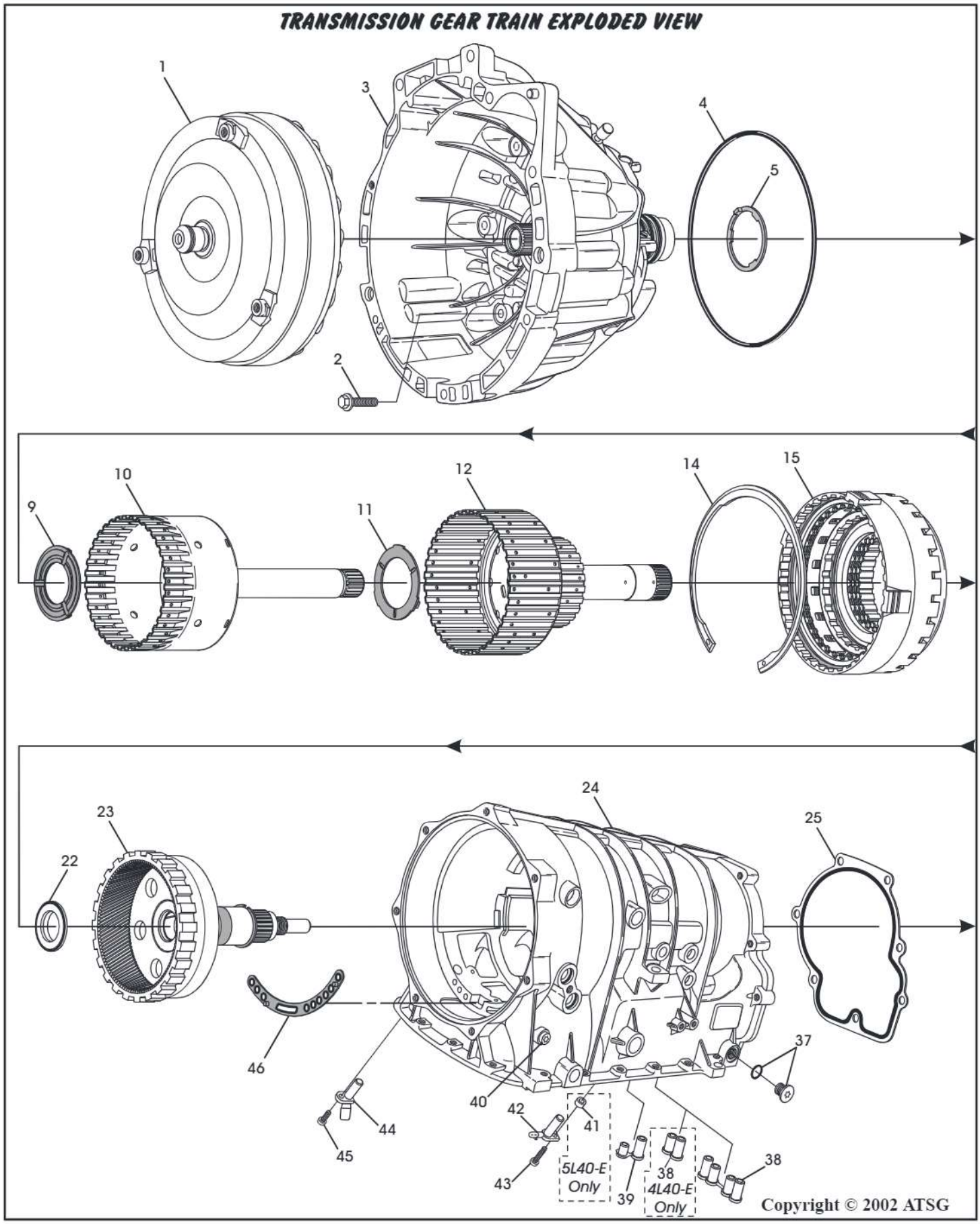

TRANSMISSION GEAR TRAIN EXPLODED VIEW
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5L40-E Only
4L40-E Only
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Figure 33

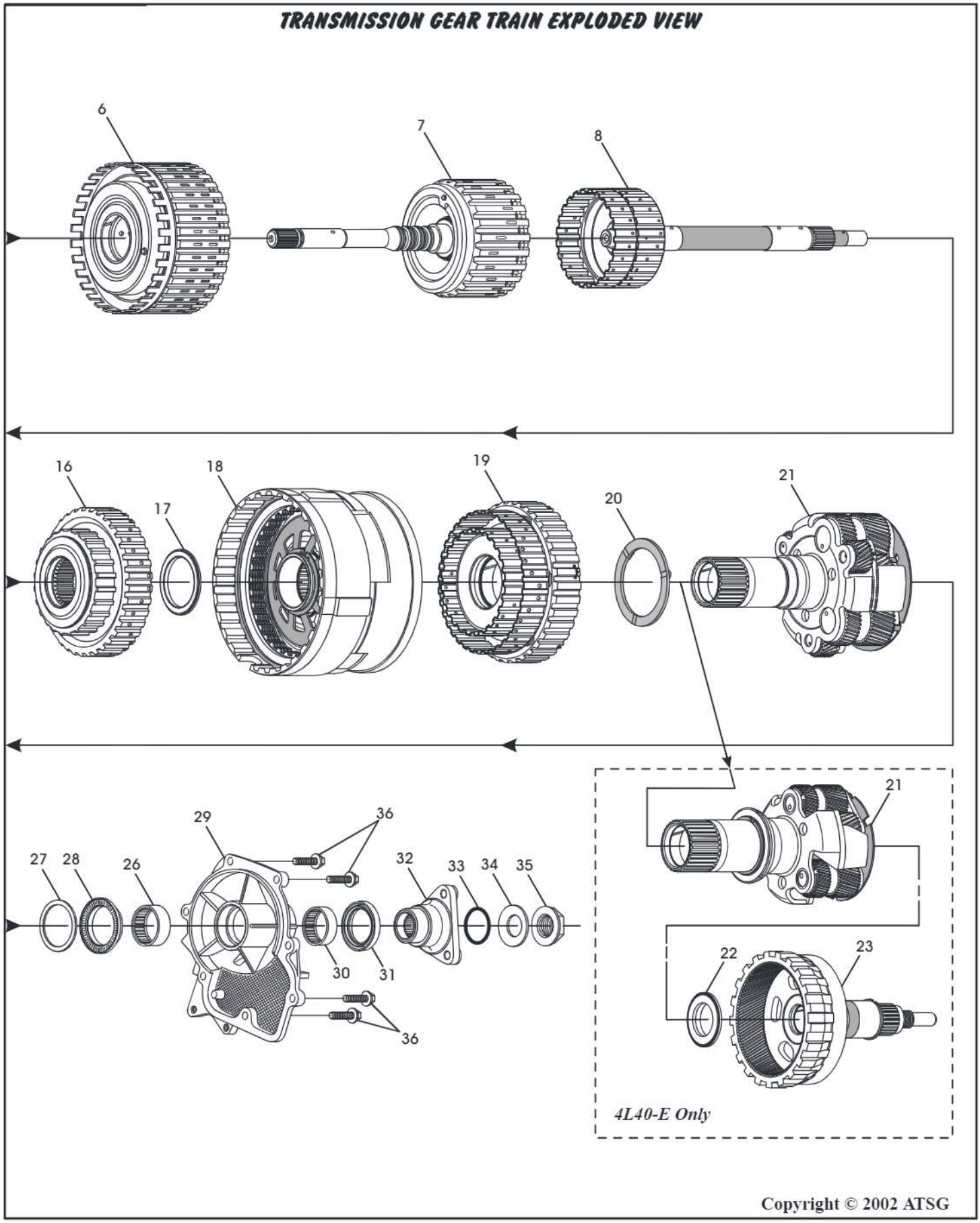

TRANSMISSION GEAR TRAIN EXPLODED VIEW
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4L40-E Only
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Figure 34

**Legend For Figures 33 and 34**

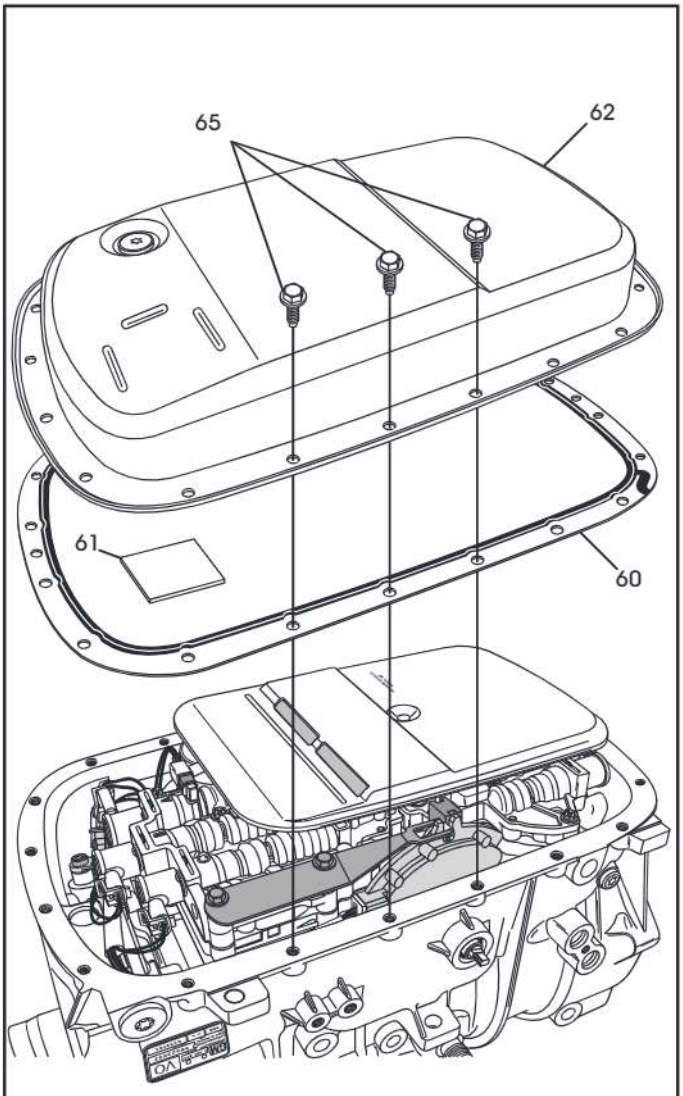
1 TORQUE CONVERTER ASSEMBLY (MODEL SENSITIVE)
2 TORQUE CONVERTER HOUSING TO MAIN CASE BOLTS (7)
3 CONVERTER HOUSING AND OIL PUMP ASSEMBLY
4 CONVERTER HOUSING TO MAIN CASE "D" RING SEAL
5 REVERSE CLUTCH HOUSING THRUST WASHER (SELECTIVE)
6 DIRECT AND REVERSE CLUTCH HOUSING ASSEMBLY
7 FORWARD AND COAST CLUTCH HOUSING ASSEMBLY
8 FORWARD SPRAG ASSEMBLY AND INPUT SUN GEAR SHAFT
9 DIRECT CLUTCH HUB THRUST WASHER
10 DIRECT CLUTCH HUB AND SHAFT ASSEMBLY
11 DIRECT CLUTCH HUB TO O.D. CLUTCH HUB THRUST WASHER
12 O.D. CLUTCH HUB AND INTERMEDIATE SPRAG ASSEMBLY
14 INTERM. AND O.D. CLUTCH HOUSING SNAP RING (SELECTIVE)
15 INTERMEDIATE AND OVERDRIVE CLUTCH HOUSING ASSEMBLY
16 LOW SPRAG ASSEMBLY
17 LOW SPRAG TO CENTER SUPPORT THRUST BEARING
18 CENTER SUPPORT ASSEMBLY
19 2ND CLUTCH SPRAG AND HUB ASSEMBLY (5L40-E ONLY)
20 2ND CLUTCH SPRAG THRUST WASHER (5L40-E ONLY)
21 PLANETARY CARRIER ASSEMBLY
22 PLANETARY CARRIER TO OUTPUT SHAFT THRUST BEARING
23 OUTPUT SHAFT AND INTERNAL RING GEAR ASSEMBLY
24 TRANSMISSION MAIN CASE ASSEMBLY
25 EXTENSION HOUSING TO MAIN CASE GASKET
26 FRONT CAGED NEEDLE BEARING IN EXTENSION HOUSING
27 OUTPUT SHAFT TO EXT. HSG. BEARING WASHER (SELECTIVE)
28 OUTPUT SHAFT TO EXTENSION HOUSING THRUST BEARING
29 EXTENSION HOUSING ASSEMBLY
30 REAR CAGED NEEDLE BEARING IN EXTENSION HOUSING
31 EXTENSION HOUSING YOKE SEAL ASSEMBLY
32 DRIVESHAFT YOKE ASSEMBLY
33 OUTPUT SHAFT TO YOKE "O" RING SEAL
34 DRIVESHAFT YOKE RETAINING WASHER
35 DRIVESHAFT YOKE RETAINING NUT
36 EXTENSION HOUSING RETAINING BOLTS (7)
37 TRANSMISSION FILL PLUG AND "O" RING
38 CENTER SUPPORT OIL PASSAGE SLEEVE AND SEAL ASSEMBLY
39 O.D./INTERMEDIATE OIL PASSAGE SLEEVE AND SEAL ASSEMBLY
40 TRANSMISSION PRESSURE TEST PLUG
41 OUTPUT SPEED SENSOR SPACER
42 OUTPUT SPEED SENSOR
43 OUTPUT SPEED SENSOR RETAINING BOLT
44 INPUT SPEED SENSOR
45 INPUT SPEED SENSOR RETAINING BOLT
46 PUMP COVER TO MAIN CASE MOLDED GASKET

Figures 33 and 34 Legend

## TRANSMISSION DISASSEMBLY (CONT'D)

### BOTTOM PAN COMPONENTS

16. Rotate transmission in fixture so that bottom pan is facing up, as shown in Figure 35.
17. Remove the 20 bottom pan retaining bolts, as shown in Figure 35, and remove oil pan.
18. Ensure that bottom pan magnet is stuck in position in bottom pan (See Figure 35).
19. Remove and discard bottom oil pan gasket, as shown in Figure 35.



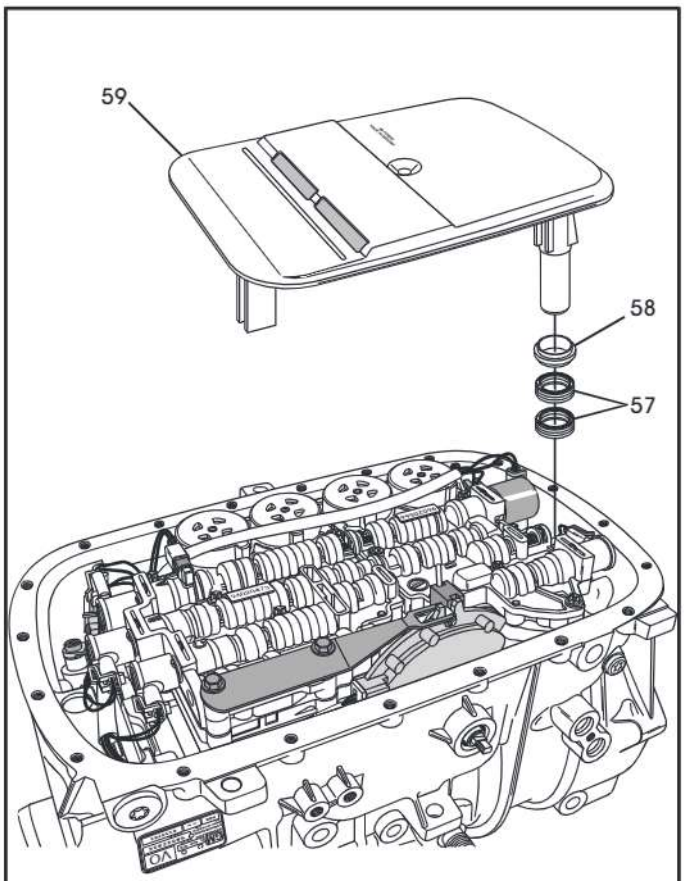

60 BOTTOM OIL PAN GASKET
61 BOTTOM OIL PAN MAGNET
62 BOTTOM OIL PAN
65 BOTTOM OIL PAN BOLTS (20 REQUIRED)

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Figure 35

20. Remove and discard the bottom pan oil filter, as shown in Figure 36.
21. Remove the oil filter spacer, if used, and store in a safe place for transmission re-assembly (See Figure 36).
22. The oil filter seals, will remain in the oil pump cover and will probably have to be removed with a slide hammer and attachment.
23. Notice that there are two filter seals used with this unit, as shown in Figure 36.
24. Remove and discard the two oil filter seals at this time, using the proper tools.
25. Remove transmission case connector retainer with a screwdriver and push case connector back into the transmission case to make ready for wiring harness removal (See Figure 37).

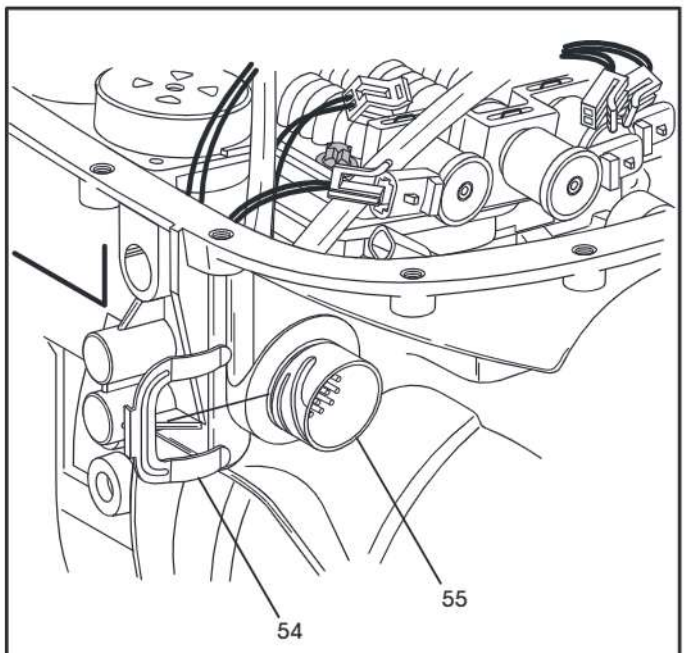
**Continued on Page 34**




57 BOTTOM PAN OIL FILTER SEALS
58 BOTTOM PAN OIL FILTER SPACER (SOME MODELS)
59 BOTTOM PAN OIL FILTER ASSEMBLY

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Figure 36




54 TRANSMISSION CASE CONNECTOR RETAINER
55 TRANSMISSION CASE CONNECTOR

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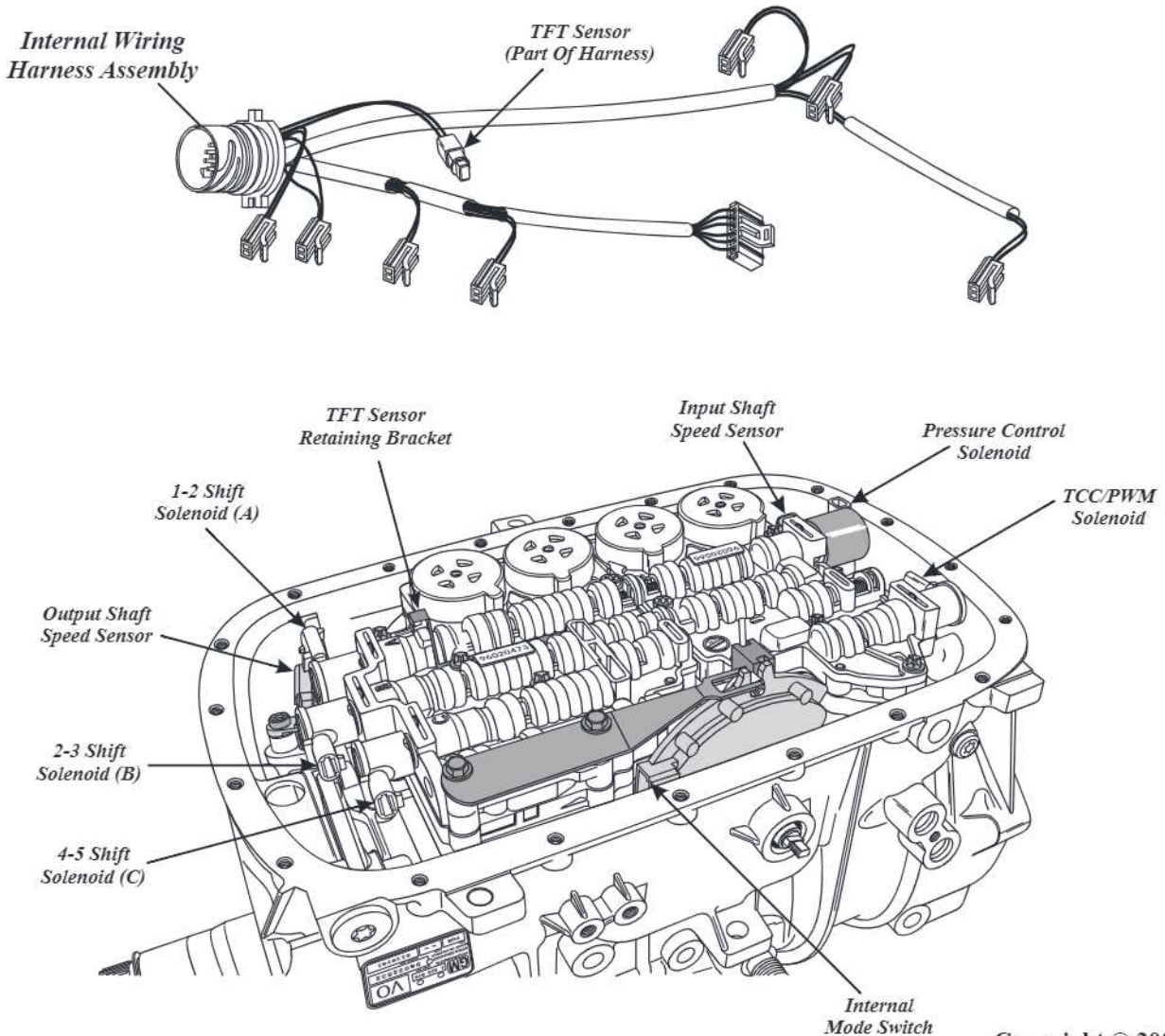
Figure 37

## TRANSMISSION DISASSEMBLY (CONT'D)

### BOTTOM PAN COMPONENTS

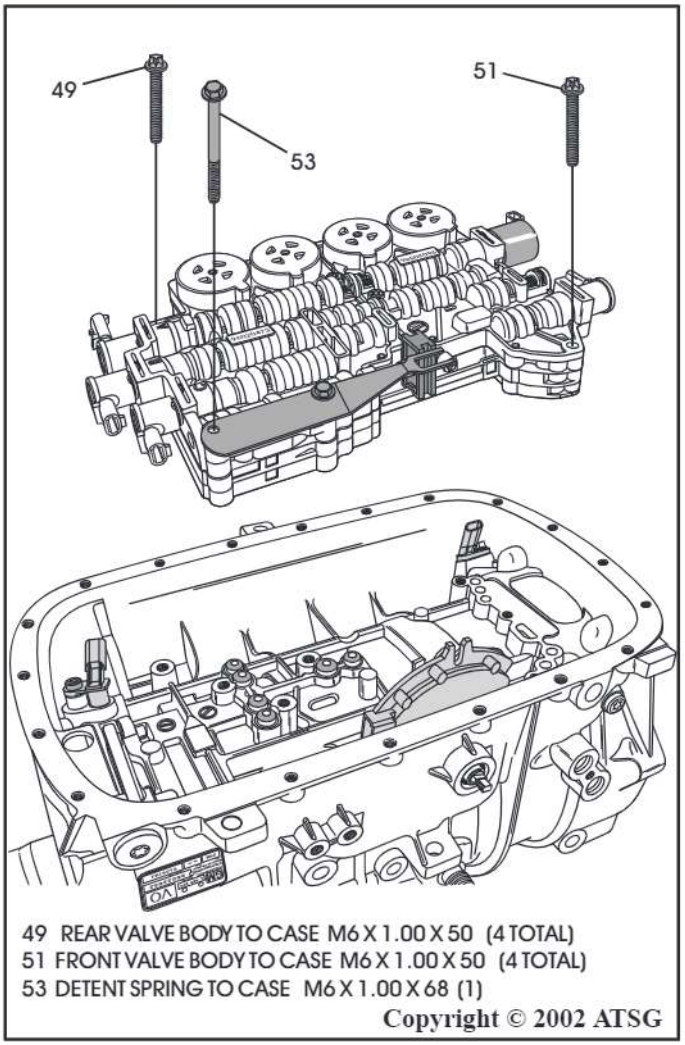
26. Using a small screwdriver, carefully remove the wire harness connectors from all of the following components: (See Figure 38)
    - o Pressure Control Solenoid
    - o TCC/PWM Solenoid
    - o Input Shaft Speed Sensor
    - o 1-2 Shift Solenoid
    - o 2-3 Shift Solenoid
    - o 4-5 Shift Solenoid
    - o Output Shaft Speed Sensor
    - o Internal Mode Switch
    - o TFT Sensor from Bracket
27. Remove the Internal Wiring Harness assembly from the transmission, as shown in Figure 38, and set aside for component rebuild.
28. Remove only the nine valve body bolts that are called out in Figure 41.
29. Remove the valve body assembly from the case as shown in Figure 39, and set aside for the component rebuild section.
30. Remove and discard the valve body seals from the case, as shown in Figure 40.

**Continued on Page 36**




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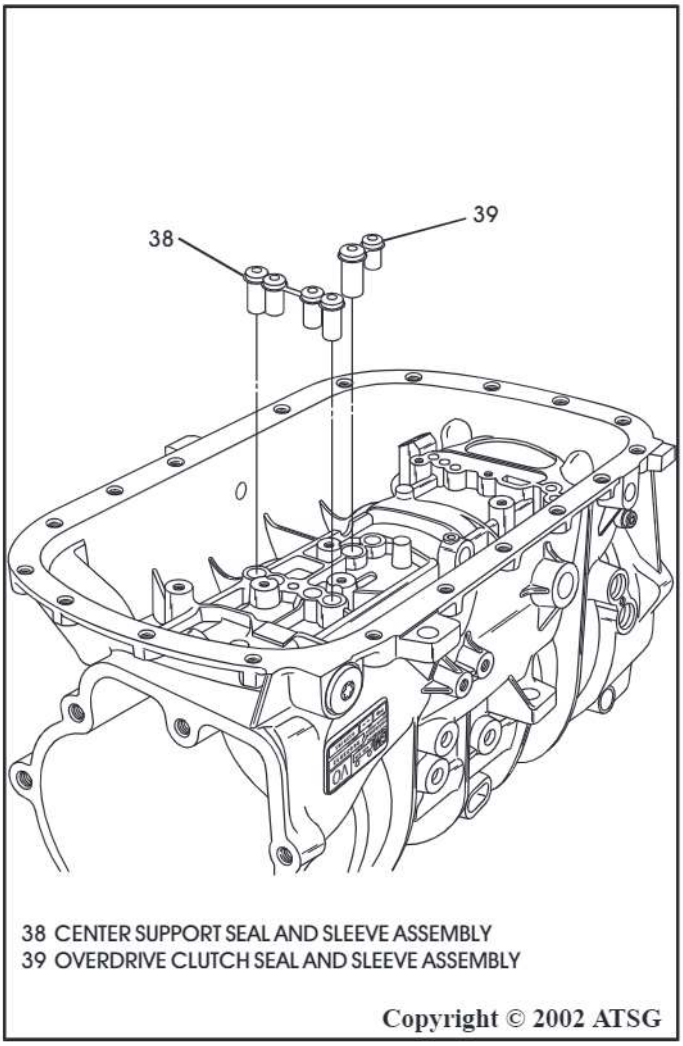
Figure 38




49 REAR VALVE BODY TO CASE M6 X 1.00 X 50 (4 TOTAL)
51 FRONT VALVE BODY TO CASE M6 X 1.00 X 50 (4 TOTAL)
53 DETENT SPRING TO CASE M6 X 1.00 X 68 (1)

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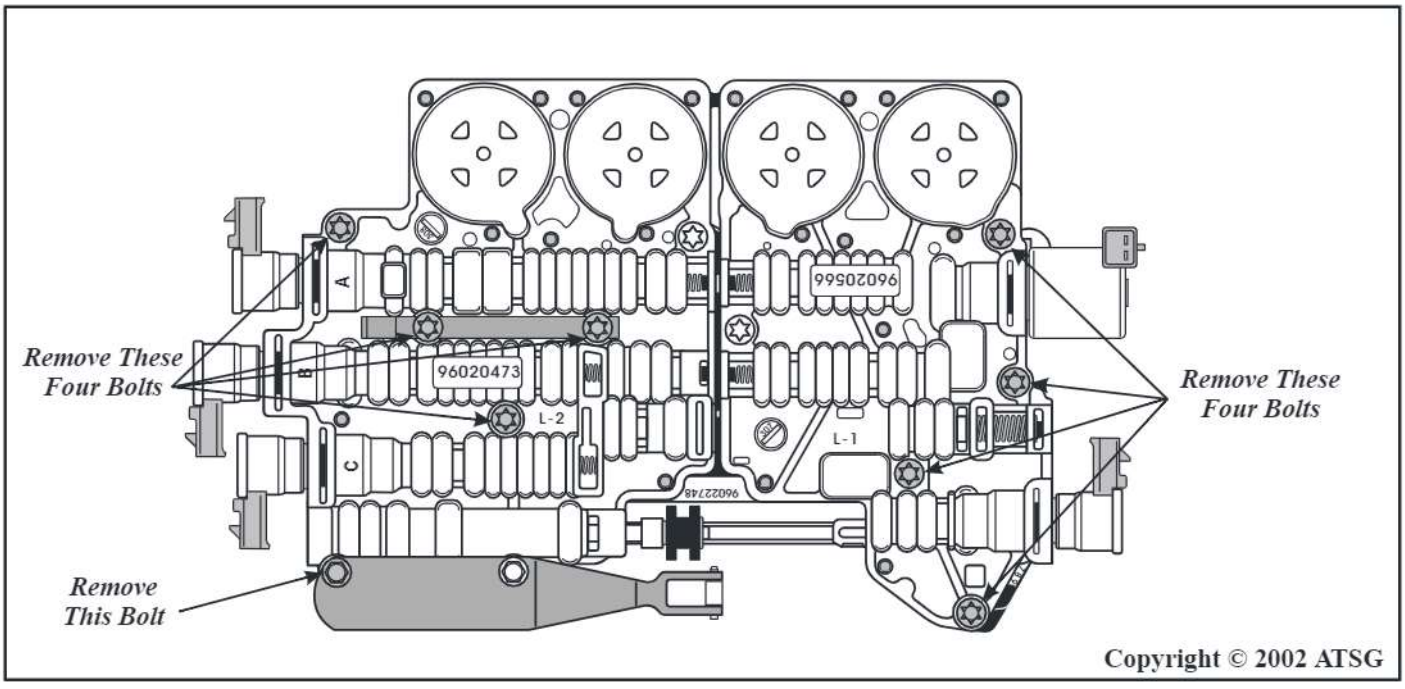
Figure 39




38 CENTER SUPPORT SEAL AND SLEEVE ASSEMBLY
39 OVERDRIVE CLUTCH SEAL AND SLEEVE ASSEMBLY

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Figure 40




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Figure 41

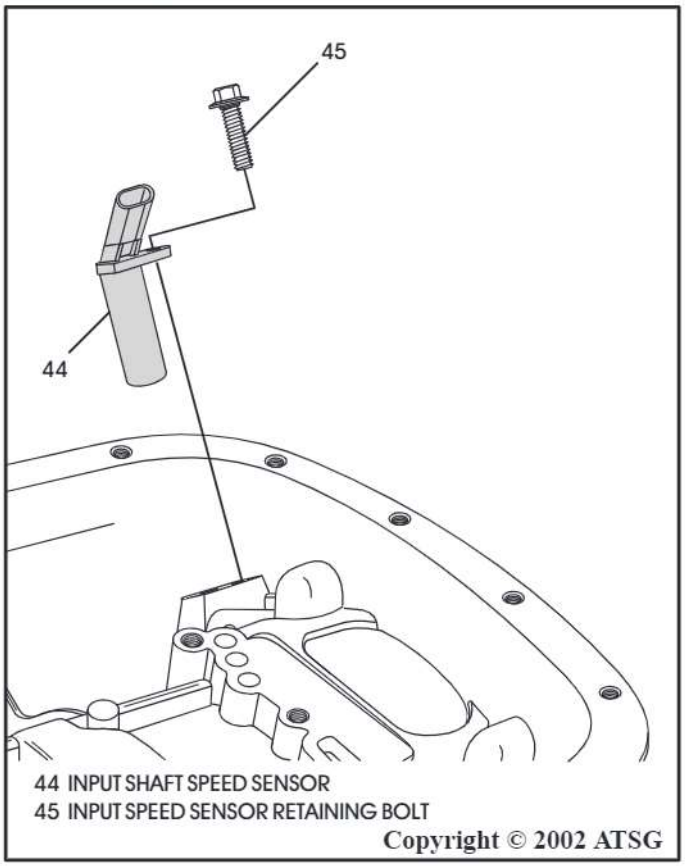



Figure 42

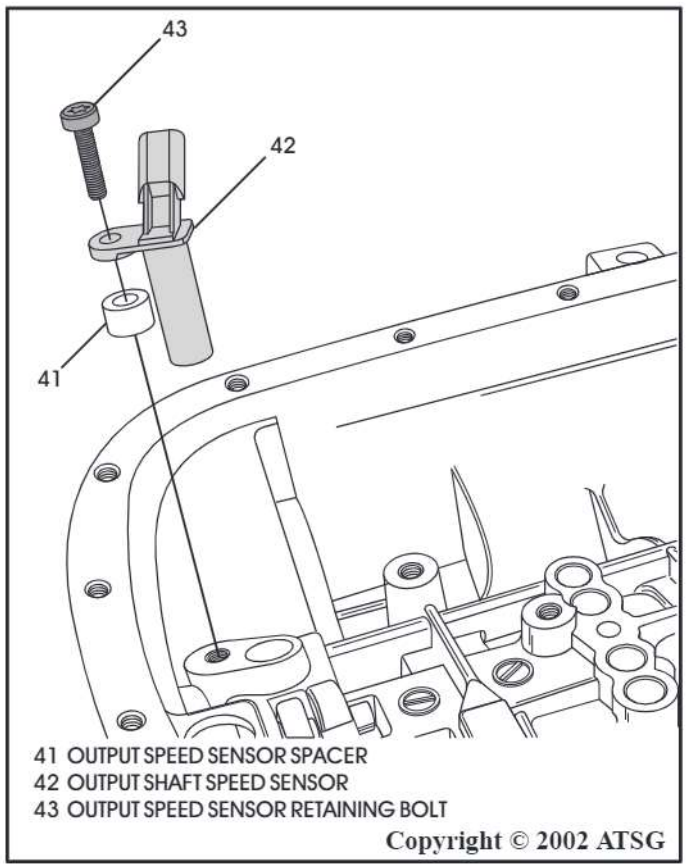



Figure 43

## TRANSMISSION DISASSEMBLY (CONT'D)

### BOTTOM PAN COMPONENTS

31. Remove input speed sensor retaining bolt and input speed sensor, as shown in Figure 42.
32. Remove output speed sensor retaining bolt, output speed sensor spacer and output speed sensor, as shown in Figure 43.

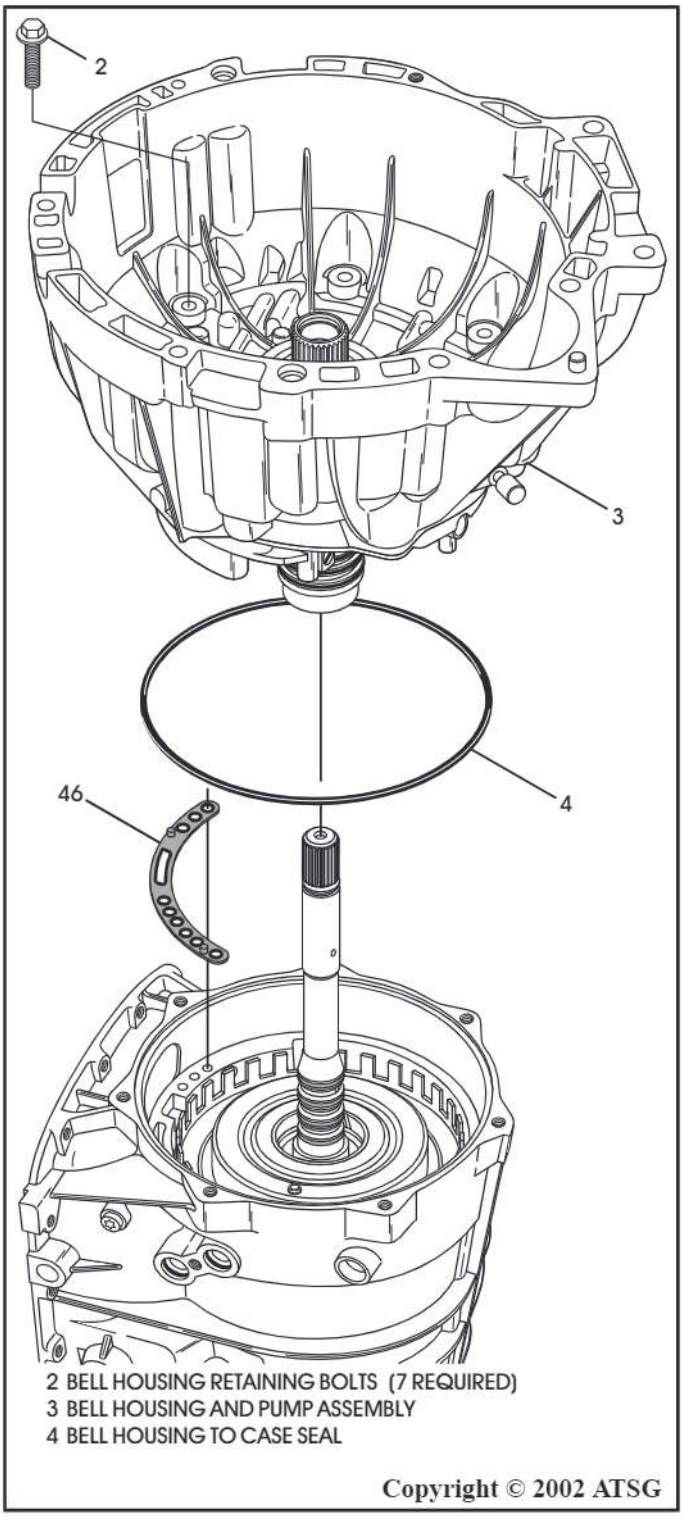



Figure 44

## TRANSMISSION DISASSEMBLY (CONT'D)

### INTERNAL COMPONENTS

33. Remove the 7 bell housing to case retaining bolts, as shown in Figure 44.
34. Remove bell housing and oil pump assembly, as shown in Figure 44 and set aside for the component rebuild process.
35. Remove and discard the bell housing to case seal and the pump cover to case gasket, as shown in Figure 44.
36. Remove the forward clutch housing and reverse clutch housing as an assembly by grasping the turbine shaft and lifting straight up, as shown in Figure 45.
37. Seperate the reverse clutch housing from the forward clutch housing, as shown in Figure 46, and set aside for component rebuild process.

**Continued on Page 38**

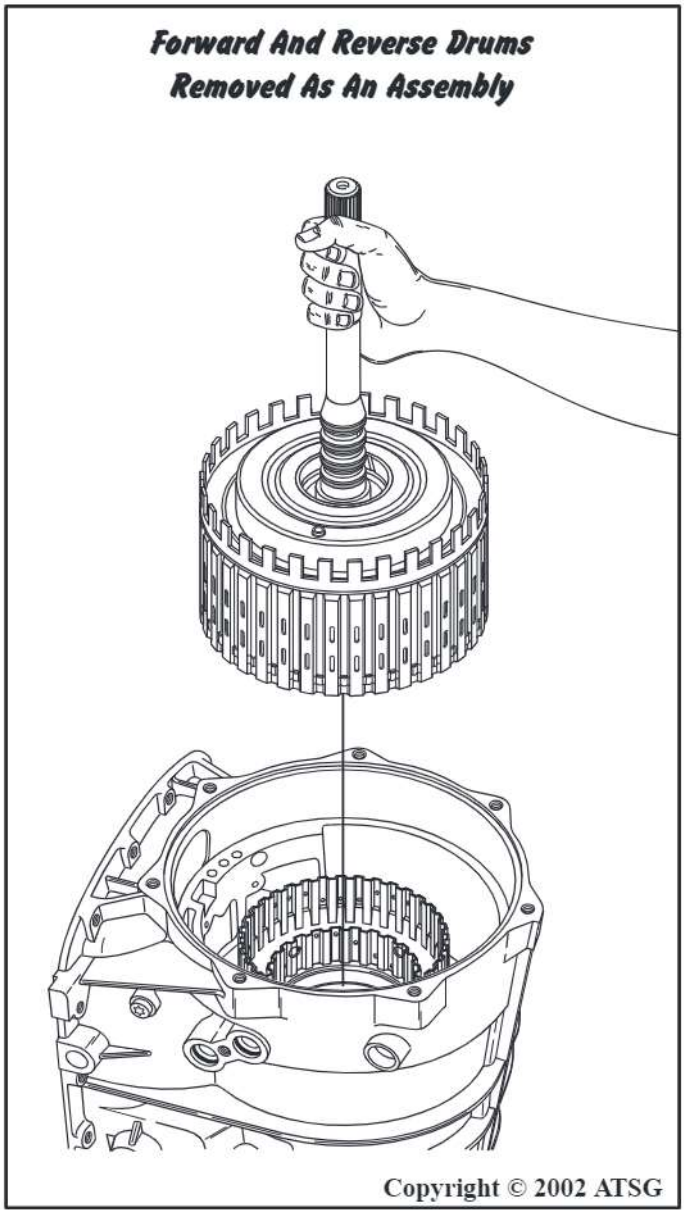



Figure 45

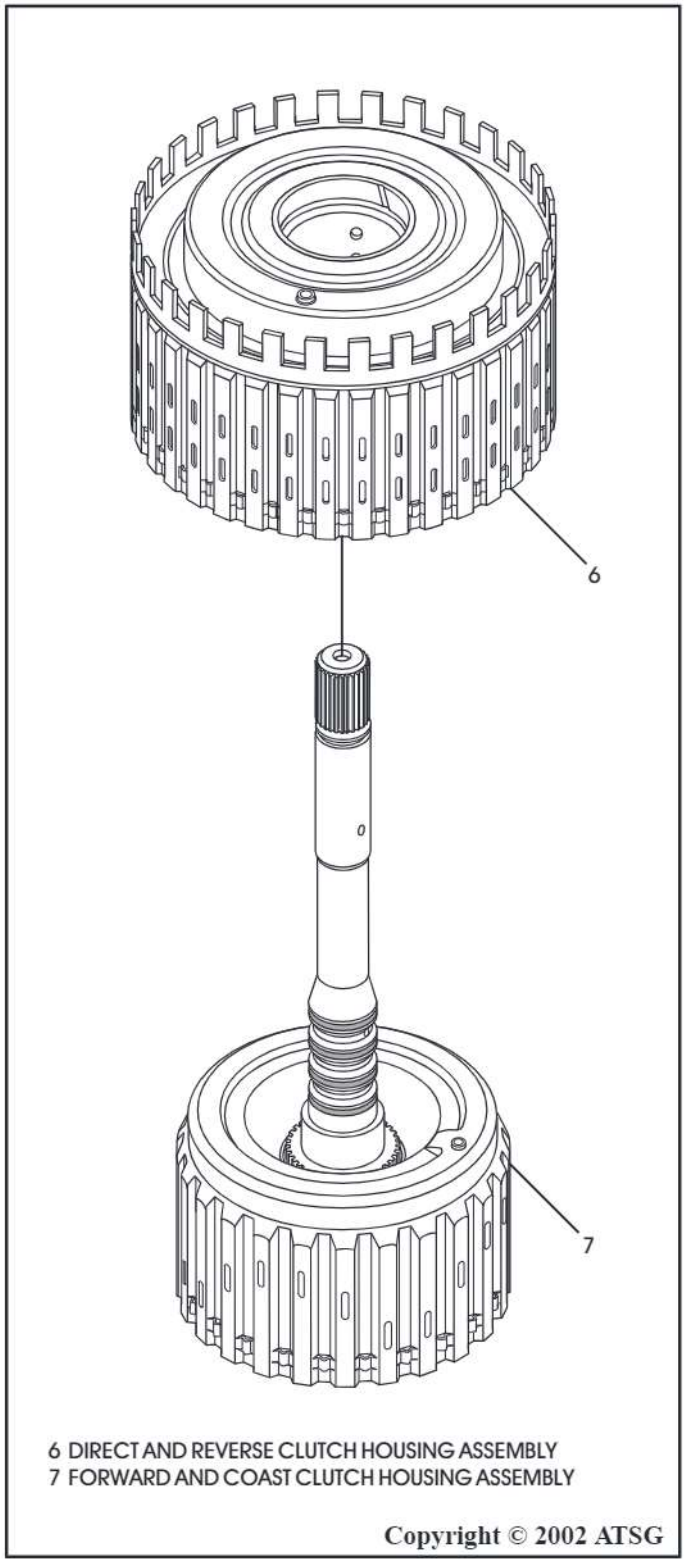


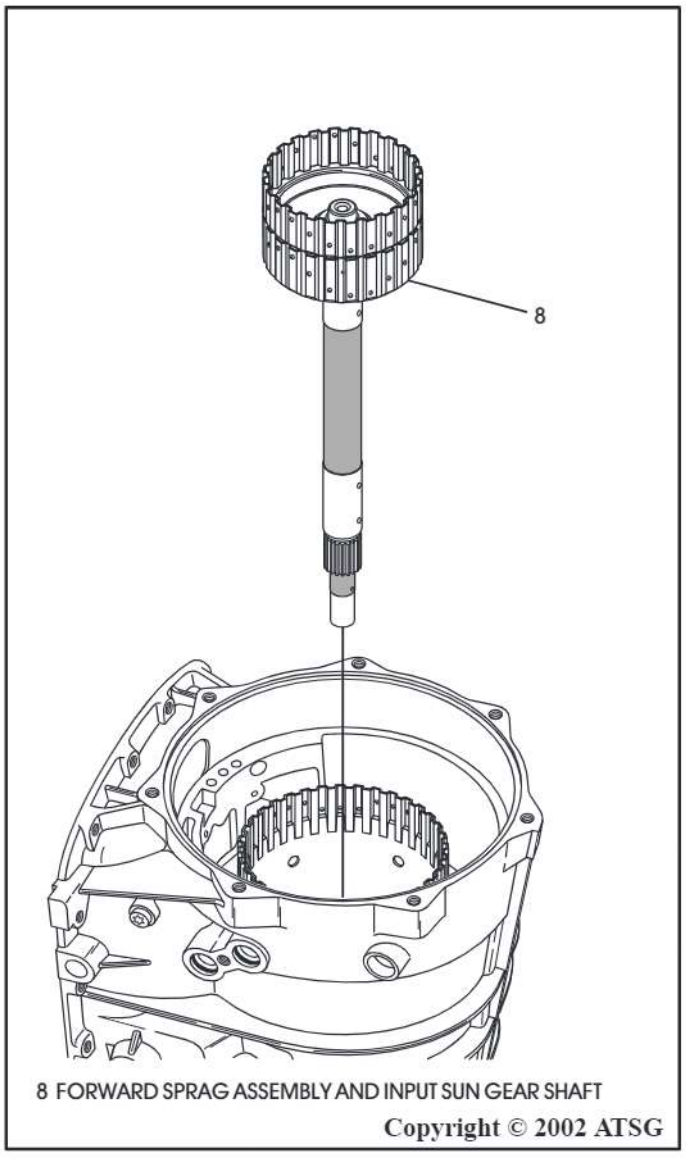

Figure 46

## TRANSMISSION DISASSEMBLY (CONT'D)

### INTERNAL COMPONENTS

38. Remove the input sun gear shaft and forward sprag assembly by lifting straight up, as shown in Figure 47, and set the assembly aside for the component rebuild section.
39. Remove the direct clutch hub and the thrust washer from the case, as shown in Figure 48.
40. Remove the overdrive clutch hub and thrust washer from the case, as shown in Figure 49.
41. Remove the ***"Selective"*** snap ring retaining the overdrive clutch housing in the case, using the Snap Ring Pliers J-45126 (See Figure 50).
    ***Note: These snap ring pliers are required to remove or install this snap ring as they have long handles and are locking.***
42. Use caution when removing or installing this snap ring, as the snap ring is very thick and very strong. Ensure that you have the J-45126 snap ring pliers engaged properly, as shown in Figure 50.
43. Remove the overdrive clutch housing from the case, as shown in Figure 50, and set aside for the component rebuild section.

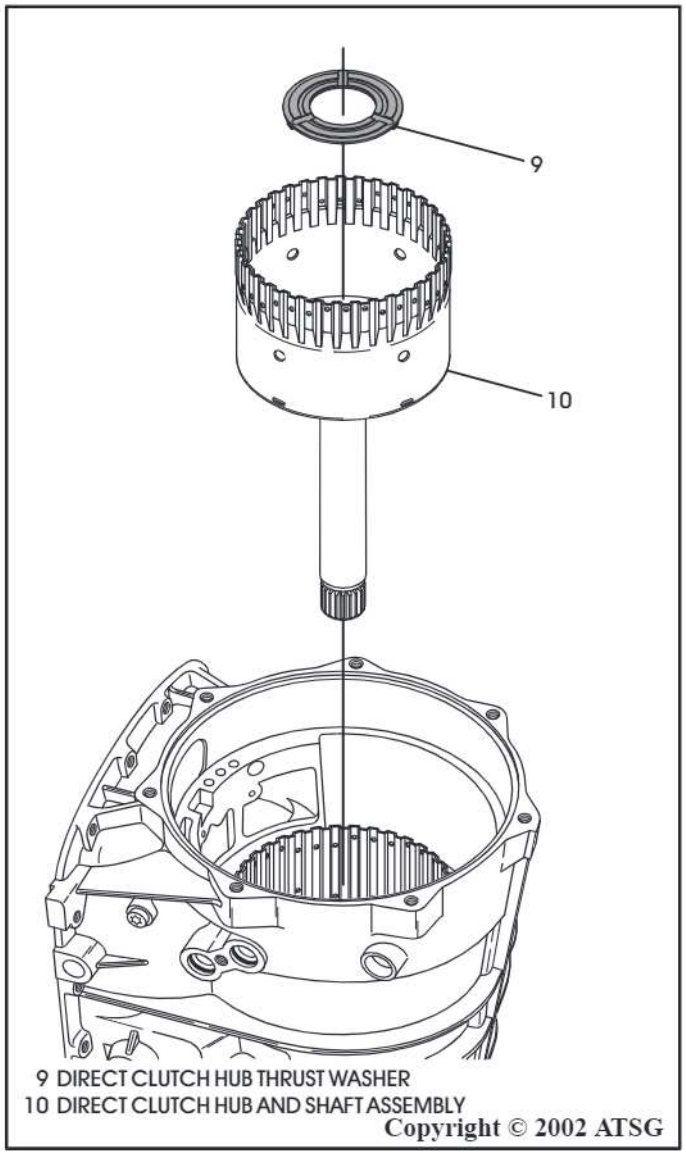
**Continued on Page 40**




8 FORWARD SPRAG ASSEMBLY AND INPUT SUN GEAR SHAFT

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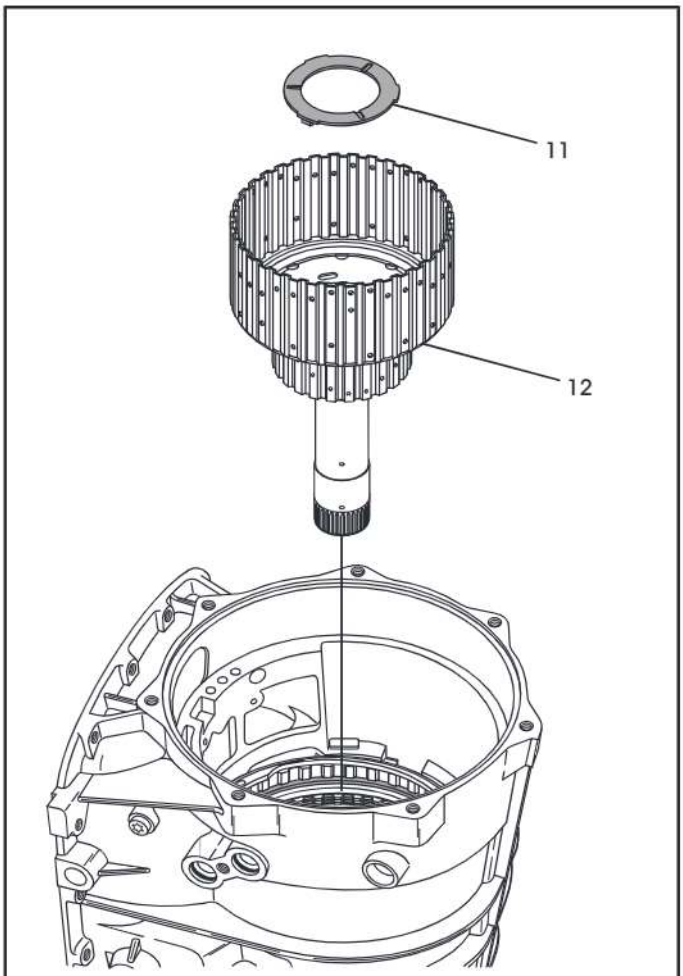
Figure 47




9 DIRECT CLUTCH HUB THRUST WASHER
10 DIRECT CLUTCH HUB AND SHAFT ASSEMBLY

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Figure 48



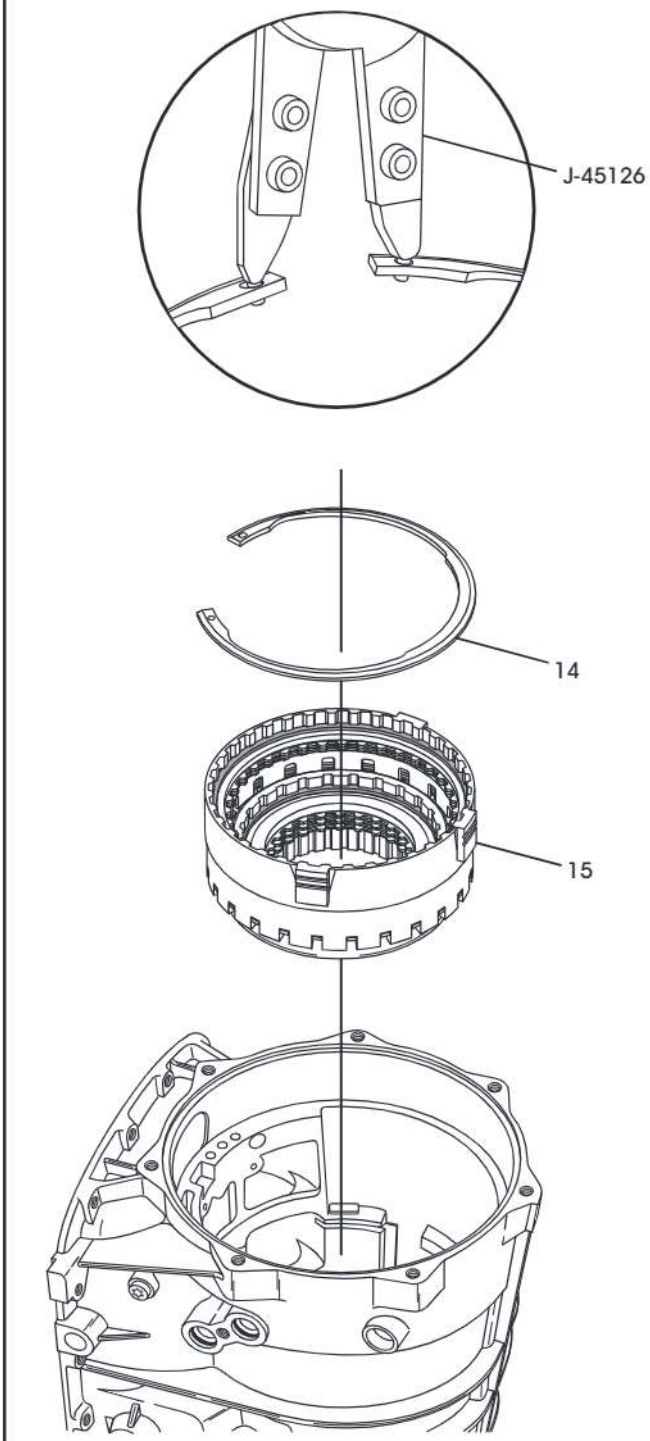

11 DIRECT CLUTCH HUB TO O.D. CLUTCH HUB THRUST WASHER
12 O.D. CLUTCH HUB AND INTERMEDIATE SPRAG ASSEMBLY

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Figure 49

***Snap Ring Pliers J-45126 Are "Required" To Remove Or Replace This Snap Ring***

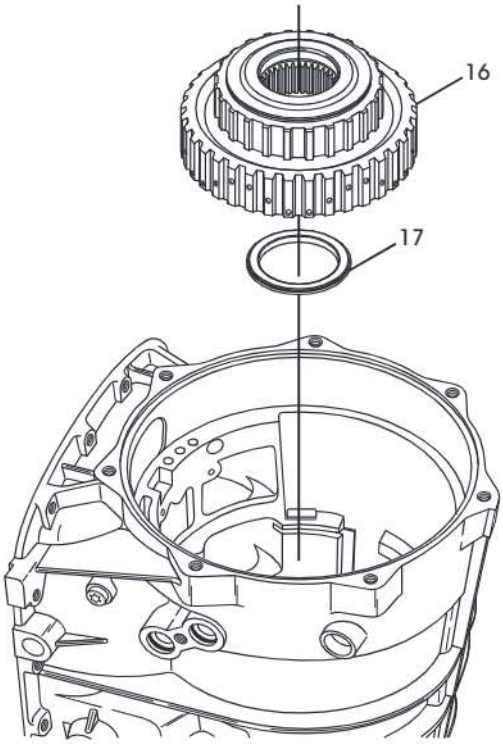
***Snap Ring Pliers J-45126 are long handled for leverage and locking***




14 INTERM/O.D. CLUTCH HOUSING SNAP RING (SELECTIVE)
15 INTERMEDIATE/OVERDRIVE CLUTCH HOUSING ASSEMBLY

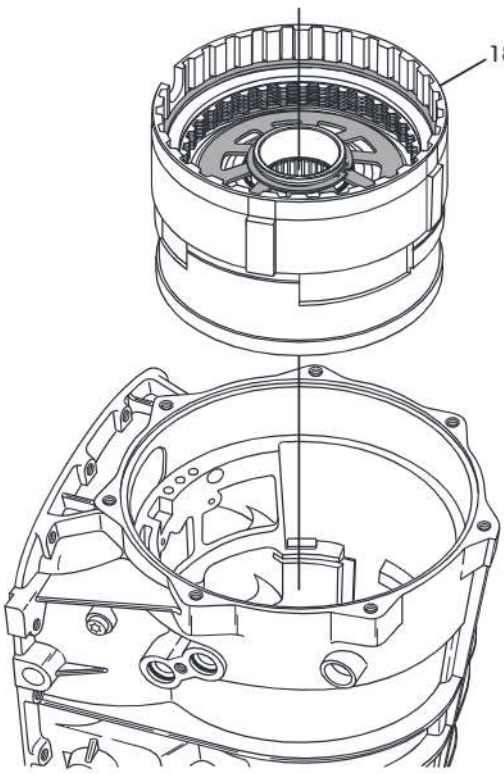
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Figure 50




16 LOW SPRAG ASSEMBLY
17 LOW SPRAG TO CENTER SUPPORT THRUST WASHER
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Figure 51



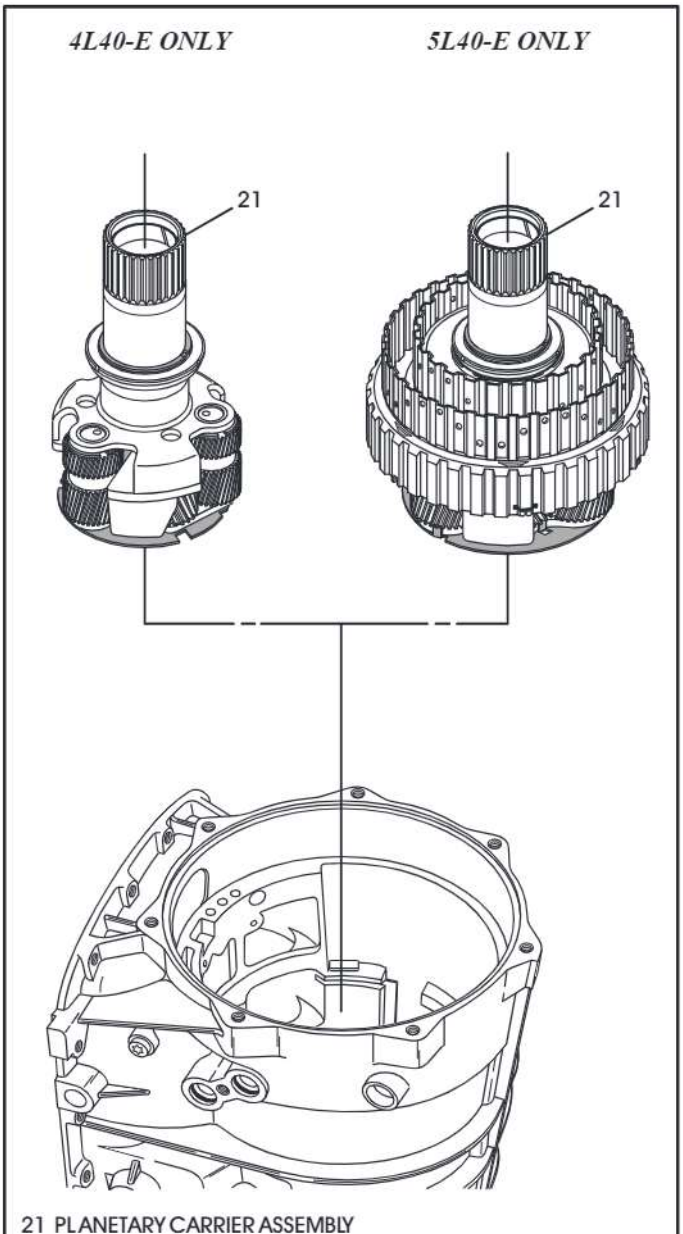

18 CENTER SUPPORT ASSEMBLY
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Figure 52

## TRANSMISSION DISASSEMBLY (CONT'D)

### INTERNAL COMPONENTS

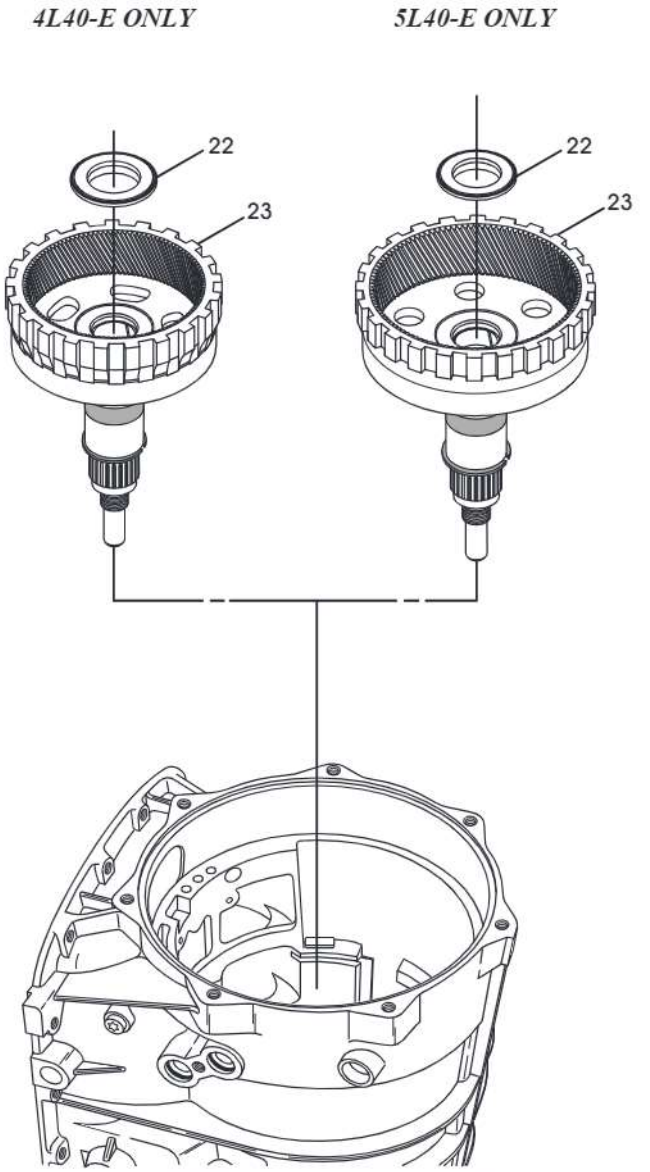
44. Remove the low sprag assembly and the thrust bearing, as shown in Figure 51, and set aside for component rebuild section.
45. Remove the center support assembly from the case, as shown in Figure 52, and set aside for the component rebuild section.
46. Remove the planetary gear set from the case, as shown in Figure 53, and set aside for the component rebuild section. We have illustrated both the 4L40-E and the 5L40-E in Figure 53.




21 PLANETARY CARRIER ASSEMBLY
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Figure 53

47. Remove the planetary internal ring gear and output shaft along with the thrust bearing, as shown in Figure 54. We have illustrated both the 4L40-E and the 5L40-E in Figure 54.
48. Rotate the transmission so that the pan surface is facing up to prepare for removing manual shaft and manual shaft seal.




22 PLANETARY CARRIER TO OUTPUT SHAFT THRUST BEARING
23 OUTPUT SHAFT AND INTERNAL RING GEAR ASSEMBLY

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Figure 54

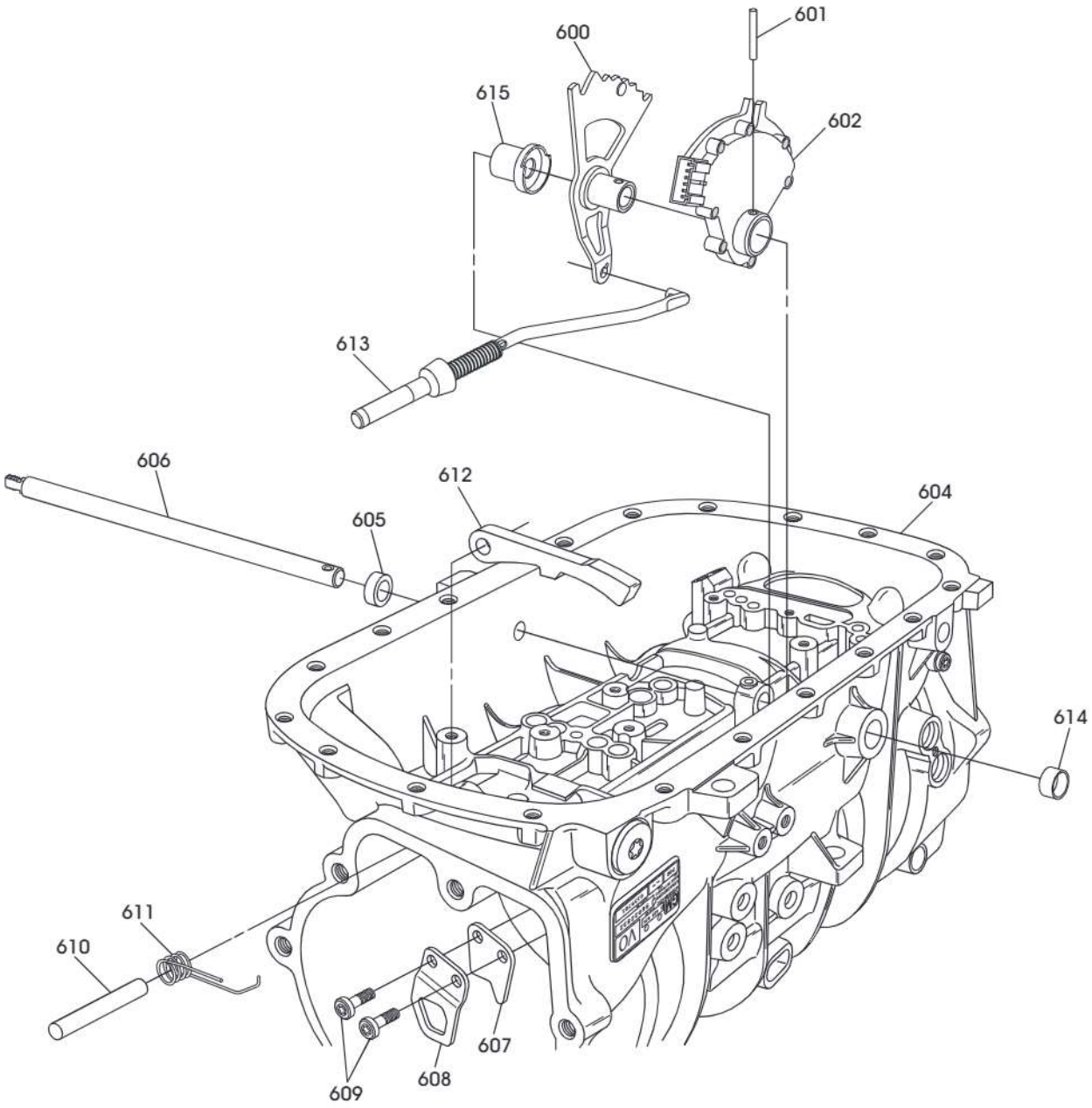
## COMPONENT REBUILD SECTION

### CASE ASSEMBLY

1. This transmission has 2 different manual shaft configurations, as shown in Figures 55 and 56. The models shown in Figure 55 is for right hand drive vehicles and the models shown in Figure 56 is for left hand drive vehicles.
2. Use Figure 55 or Figure 56, depending on the model you are working, as a guide to remove the manual shaft to replace the manual shaft seal.
3. Inspect the transmission case for the following:
   - o Damaged threads that may need Heli-Coil®.
   - o Gasket sealing surfaces for damage.
   - o Damaged or porous fluid passages.
   - o Snap ring grooves for damage.
   - o Pressure test plug threads for damage.
   - o Fluid level plug threads for damage.
4. Clean the transmission case thoroughly and dry with compressed air.
5. Install a new manual shaft seal using the proper seal driver and re-install the manual linkage using Figure 55 or Figure 56.
6. Re-install the transmission case into the fixture and rotate so that the case front is facing up.

**Component Rebuild**
**Continued on Page 45**

## MANUAL SHAFT ASSEMBLY "A"

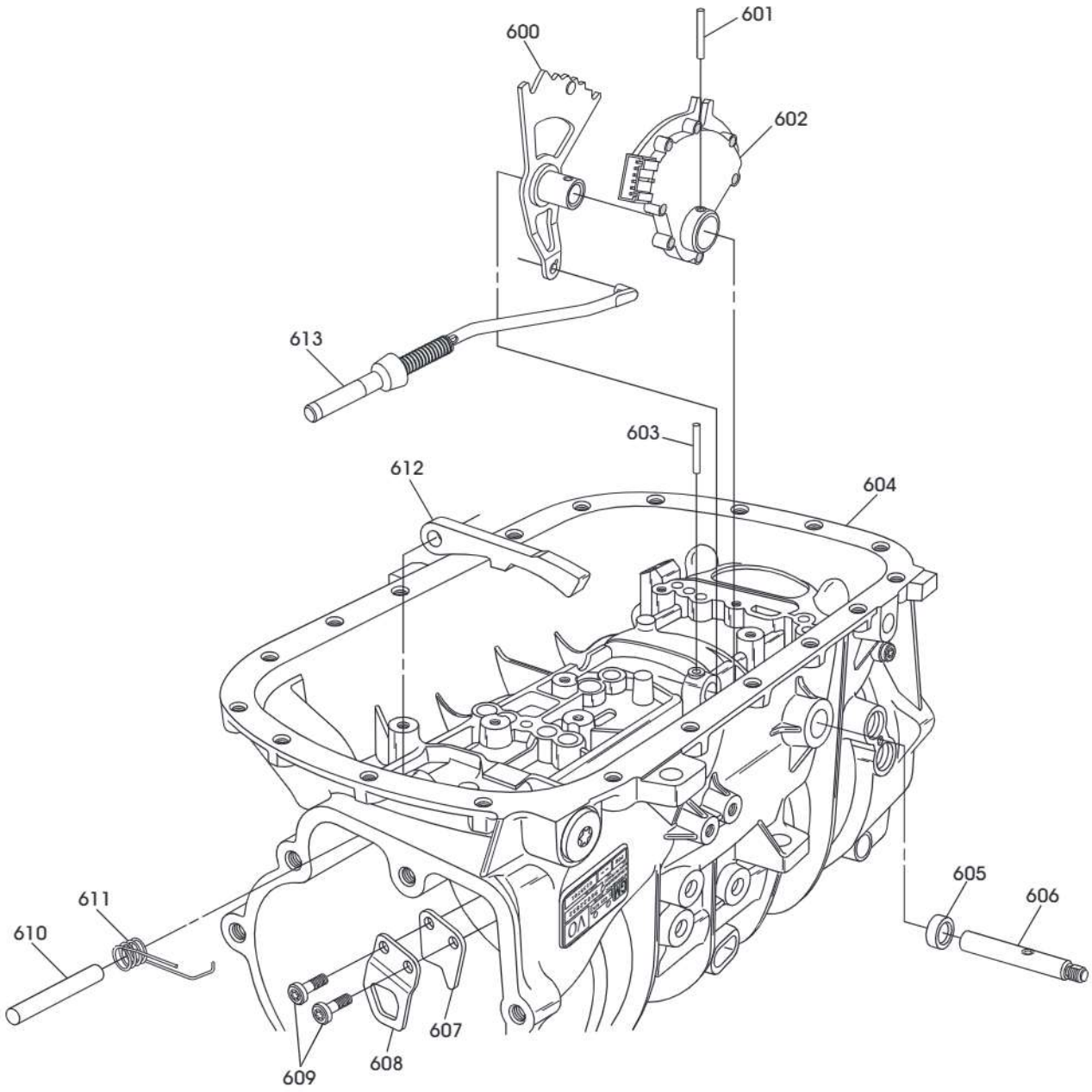



600 MANUAL SHAFT DETENT LEVER
601 MANUAL SHAFT DETENT LEVER RETAINING PIN
602 INTERNAL MODE SWITCH
604 TRANSMISSION MAIN CASE ASSEMBLY
605 MANUAL SHAFT SEAL ASSEMBLY
606 MANUAL SHIFT SHAFT
607 PARKING PAWL ACTUATOR BRACKET
608 PARKING PAWL ACTUATOR BRACKET
609 PARKING PAWL ACTUATOR BRACKET BOLTS (2)
610 PARKING PAWL PIVOT PIN
611 PARKING PAWL RETURN SPRING
612 PARKING PAWL
613 PARKING PAWL ACTUATOR ROD ASSEMBLY
614 CUP PLUG
615 MANUAL SHAFT SPACER ASSEMBLY

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Figure 55

## MANUAL SHAFT ASSEMBLY "B"

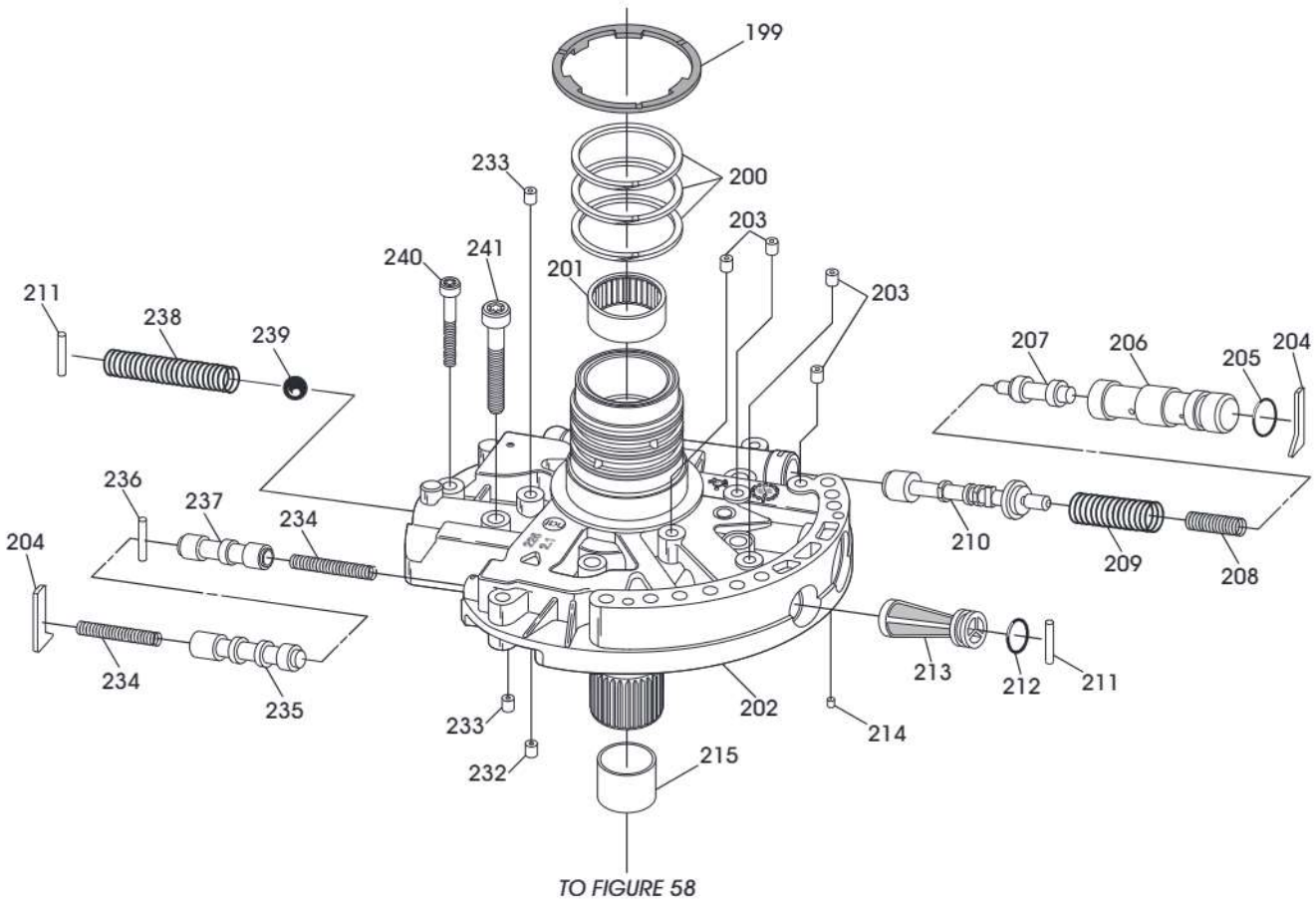



600 MANUAL SHAFT DETENT LEVER
601 MANUAL SHAFT DETENT LEVER RETAINING PIN
602 INTERNAL MODE SWITCH
603 MANUAL SHAFT DETENT LEVER RETAINING PIN
604 TRANSMISSION MAIN CASE ASSEMBLY
605 MANUAL SHAFT SEAL ASSEMBLY
606 MANUAL SHIFT SHAFT
607 PARKING PAWL ACTUATOR BRACKET
608 PARKING PAWL ACTUATOR BRACKET
609 PARKING PAWL ACTUATOR BRACKET BOLTS (2)
610 PARKING PAWL PIVOT PIN
611 PARKING PAWL RETURN SPRING
612 PARKING PAWL
613 PARKING PAWL ACTUATOR ROD ASSEMBLY

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Figure 56

## OIL PUMP COVER ASSEMBLY EXPLODED VIEW




*TO FIGURE 58*

199 PUMP COVER TO REVERSE DRUM THRUST WASHER (SELECTIVE)
200 REVERSE CLUTCH SCARF-CUT SEAL RINGS
201 CAGED NEEDLE BEARING (PUMP COVER TO INPUT SHAFT)
202 OIL PUMP COVER ASSEMBLY
203 BALL CAPSULE ASSE MBLY (4)
204 VALVE BUSHING RETAINER
205 LINE PRESSURE BOOST VALVE BUSHING "O" RING SEAL
206 LINE PRESSURE BOOST VALVE BUSHING
207 LINE PRESSURE BOO ST VALVE
208 LINE PRESSURE BOOST VALVE SPRING
209 PRESSURE REGUL ATOR VALVE SPRING
210 PRESSURE REGUL ATOR VALVE
211 OIL PUMP COVER RETAINING PIN
212 OIL PUMP COVER SCREEN ASSEMBLY "O" RING SEAL
213 OIL PUMP COVER SCREEN ASSEMBLY
214 BRASS ORIFICE CUP PLUG
215 STATOR SHAFT TO INPUT SHAFT BUSHING
216 OIL PUMP SLIDE (SELECTIVE)
217 OIL PUMP SLIDE SEAL SUPPORT
218 OIL PUMP SLIDE "TEFLON" SEAL
219 OIL PUMP SLIDE RETURN SPRING
220 OIL PUMP SLIDE "TEFLON" SEAL RING
221 OIL PUMP VANE RINGS (2)
222 OIL PUMP VANES (13)
223 OIL PUMP ROTOR (SELECTIVE)
224 OIL PUMP ROTOR GUIDE
226 TORQUE CONVERTER HUB BUSH ING
227 TORQUE CONVERTER HOUSING
228 TORQUE CONVERTER HUB METAL CLAD SEAL
229 TORQUE CONVERTER METAL CLAD SEAL RETAINING BOLTS (2)
230 TORQUE CONVERTER HOUSING TO MAIN CASE "O" RING SEAL
231 OIL PUMP SLIDE PIVOT PIN AND SPRING ASSEMBLY
232 ORIFICED SLEEVE ASSEMBLY
233 ORIFICED CUP PLUG (2)
234 TCC CONTROL/ENABLE VALVE SPRINGS (2 SAME)
235 TCC CONTROL VALVE
236 TCC ENABLE VALVE RETAINING PIN
237 TCC ENABLE VALVE
238 LINE PRESSURE RELIEF BA LL SPRING
239 LINE PRESSURE RELIEF BALL
240 OIL PUMP COVER RETAINING BOLT 6 X 1.25 X 40 (6)
241 OIL PUMP COVER RETAINING BOLT 8 X 1.25 X 40 (5)
242 OIL PUMP SLIDE SEAL BACK-UP "O" RING

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Figure 57

## OIL PUMP AND BELL HOUSING ASSEMBLY EXPLODED VIEW

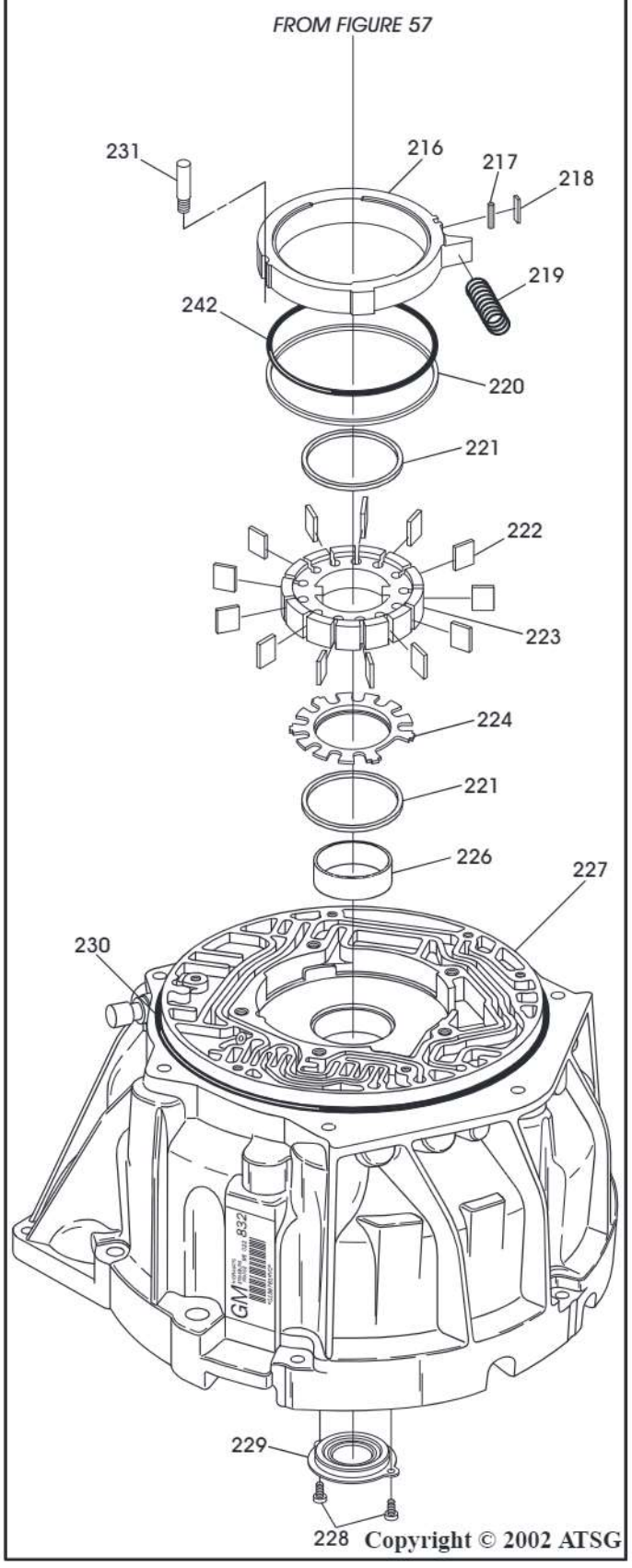



Figure 58

## COMPONENT REBUILD SECTION

### OIL PUMP ASSEMBLY

1. Use Figure 57 and 58 as a guide to disassemble the converter housing and oil pump assembly.
2. Clean all converter housing and oil pump parts thoroughly and dry with compressed air.
3. Inspect all converter housing and pump parts thoroughly and replace as necessary.
4. Lubricate all valves and sleeves with clean transmission fluid and install the valve line-ups exactly as shown in Figure 57.
5. Install a new pump screen and "O" ring seal in pump cover as shown in Figure 57.
6. Install the selective thrust washer on the pump cover and retain with Trans-Jel®.
7. Ensure that orifice cup plugs and ball capsules are in place and functional.
8. The caged needle bearing can be serviced as necessary with the proper puller and driver.
9. The bushing is not serviced and if necessary will require a complete pump cover.
10. Set the completed pump cover aside for final oil pump and converter housing assembly, as shown in Figure 59.

**Continued on Page 46**

## COMPLETED PUMP COVER ASSEMBLY

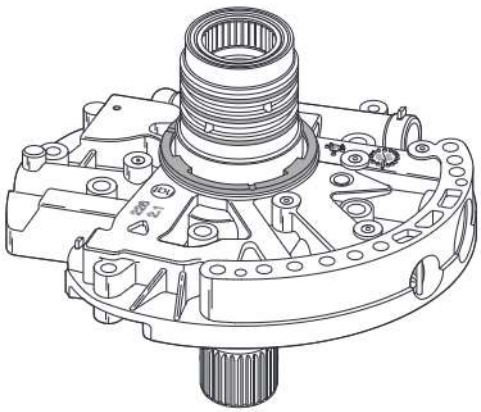



Figure 59

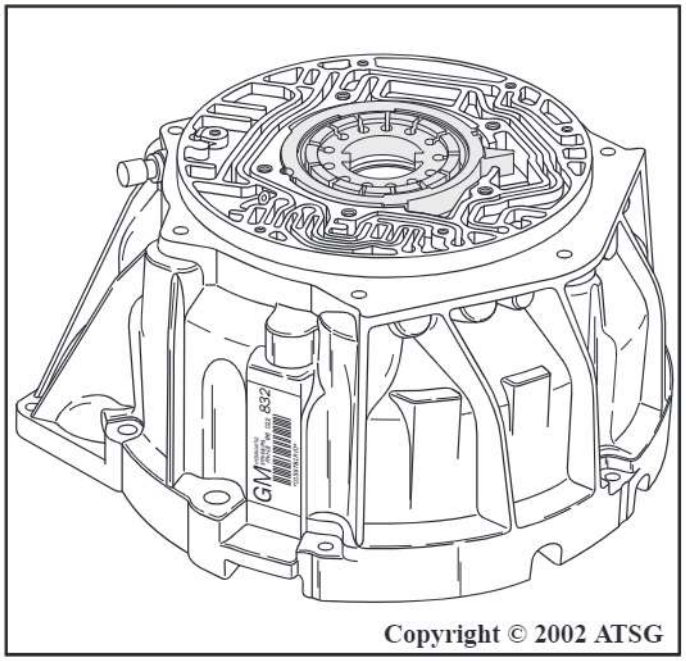



Figure 60

## COMPONENT REBUILD (CONT'D)

### OIL PUMP ASSEMBLY (CONT'D)

11. Place the converter housing on a flat surface with the worm track side facing up and install the current slide and rotor (See Figure 60).
12. Ensure that the slide seals are left out.
13. Lay a straight edge across the surface over the slide and rotor, as shown in Figure 61.
14. Measure the clearance between the slide and the straight edge, as shown in Figure 61. The clearance should be .002"-.0025" with no seals in the slide.
15. Measure the clearance between the rotor and the straight edge, as shown in Figure 61. The clearance should be .001"-.0015".
    ***Note: These measurements may also be done with a depth micrometer.***
16. If replacements are needed, use the chart in Figure 63 to make your selections based on the clearance recorded and the thickness of the current slide and rotor.
17. Install new bushing as necessary in converter housing, as shown in Figure 62, using proper size bushing driver.
18. Install the pump slide pivot pin and spring, as shown in Figure 64.

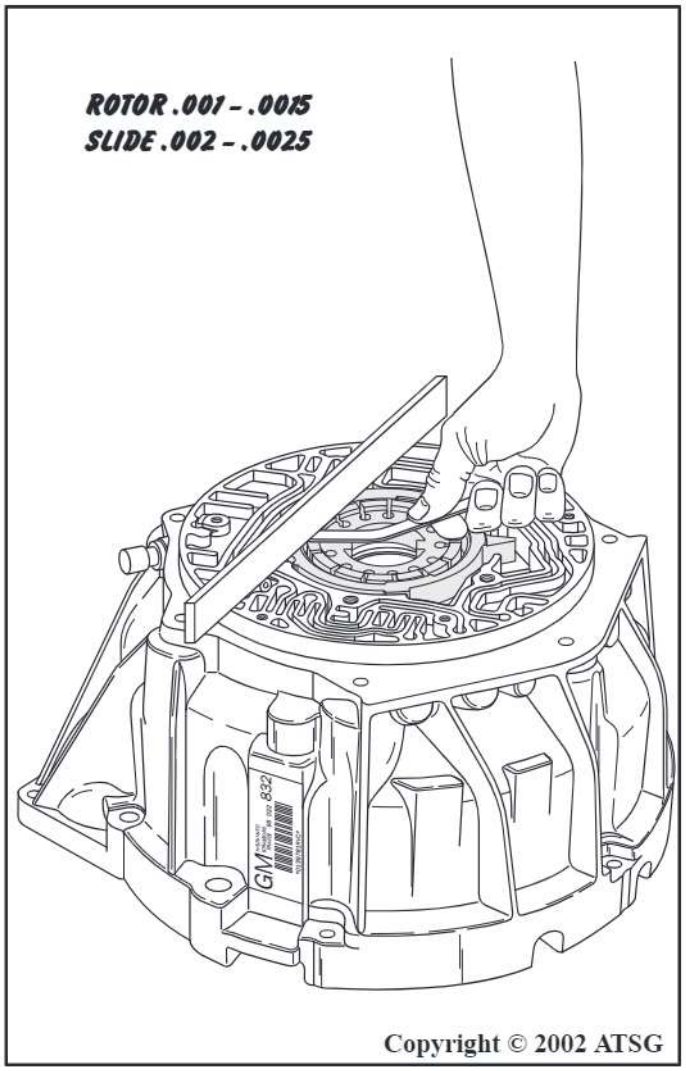



Figure 61

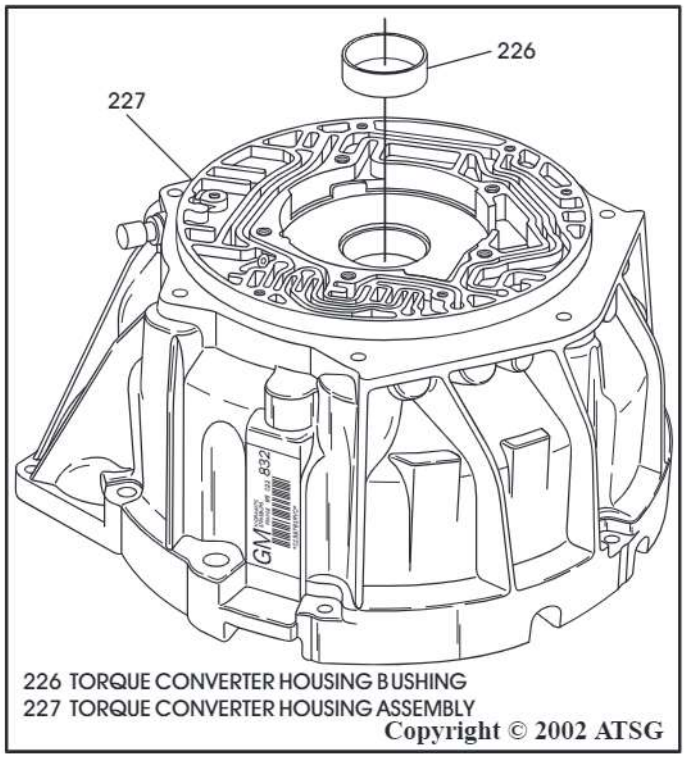


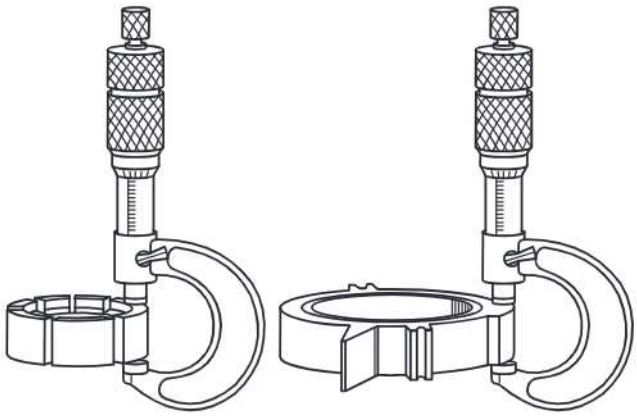

Figure 62

19. Install oil pump slide back-up "O" ring (242) and pump slide "Teflon" seal ring (220) into groove in slide, as shown in Figure 64.
20. Install oil pump slide seal support (217) into slide, as shown in Figure 64, and retain with a small amount of Trans-Jel®.
21. Install the oil pump slide into the pump pocket as shown in Figure 64, with the "Teflon" seal (220) facing down.
22. Install the oil pump slide "Teflon" seal (218) by pulling the slide towards the pump pivot pin and sliding the seal down between slide seal support (217) and converter housing, as shown in Figure 64.
23. Install the oil pump slide spring, as shown in Figure 64, using a screwdriver or installation tool.

**Continued on Page 48**

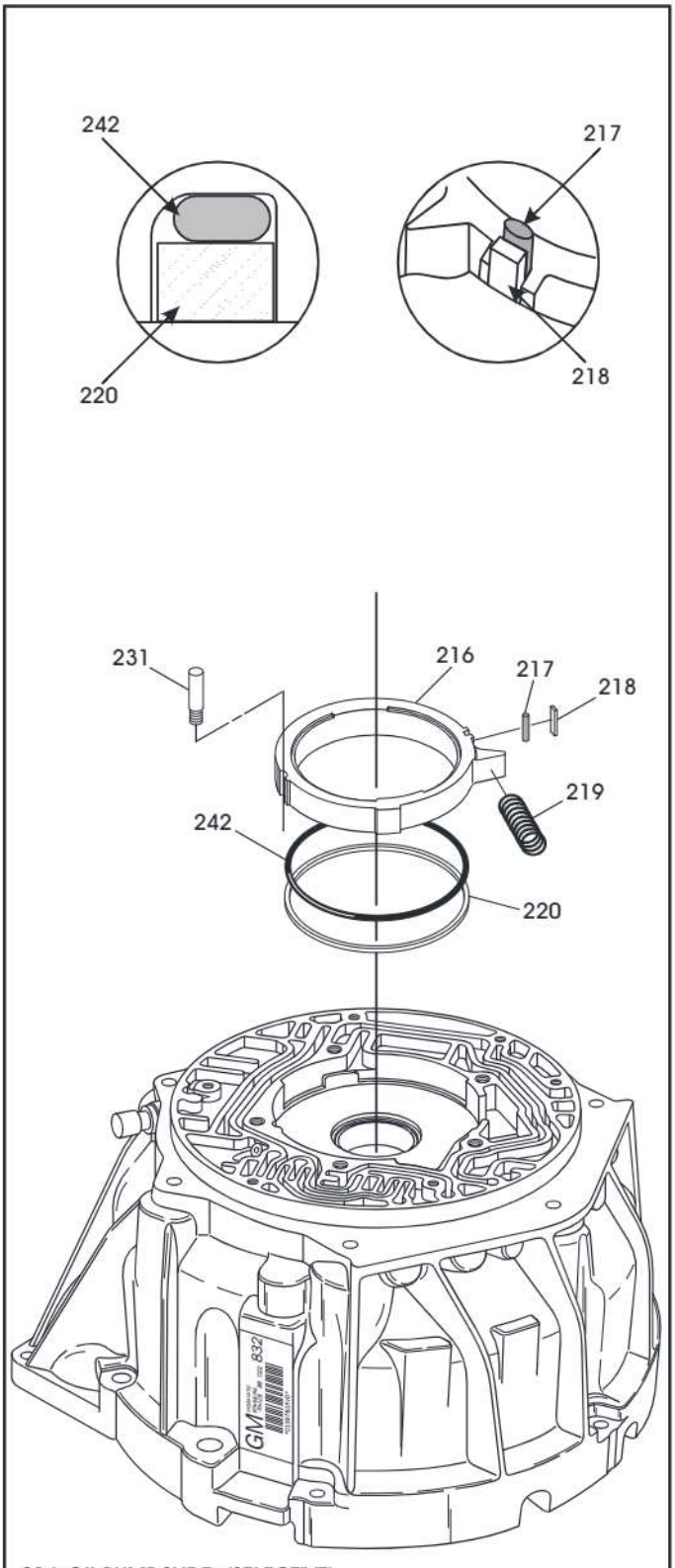
| OIL PUMP ROTOR SELECTION CHART | |
|---|---|
| THICKNESS (mm) | THICKNESS (In) |
| 17.948 - 17.961 | 0.7065 - 0.7071 |
| 17.962 - 17.974 | 0.7071 - 0.7076 |
| 17.975 - 17.987 | 0.7076 - 0.7081 |
| 17.988 - 18.000 | 0.7081 - 0.7086 |
| 18.001 - 18.013 | 0.7086 - 0.7091 |

| OIL PUMP SLIDE SELECTION CHART | |
|---|---|
| THICKNESS (mm) | THICKNESS (In) |
| 17.948 - 17.961 | 0.7065 - 0.7071 |
| 17.962 - 17.974 | 0.7071 - 0.7076 |
| 17.975 - 17.987 | 0.7076 - 0.7081 |
| 17.988 - 18.000 | 0.7081 - 0.7086 |
| 18.001 - 18.013 | 0.7086 - 0.7091 |



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Figure 63




216 OIL PUMP SLIDE (SELECTIVE)
217 OIL PUMP SLIDE SEAL SUPPORT
218 OIL PUMP SLIDE "TEFLON" SEAL
219 OIL PUMP SLIDE RETURN SPRING
220 OIL PUMP SLIDE "TEFLON" SEAL RING
231 OIL PUMP SLIDE PIVOT PIN AND SPRING ASSEMBLY
242 OIL PUMP SLIDE BACK-UP "O" RING

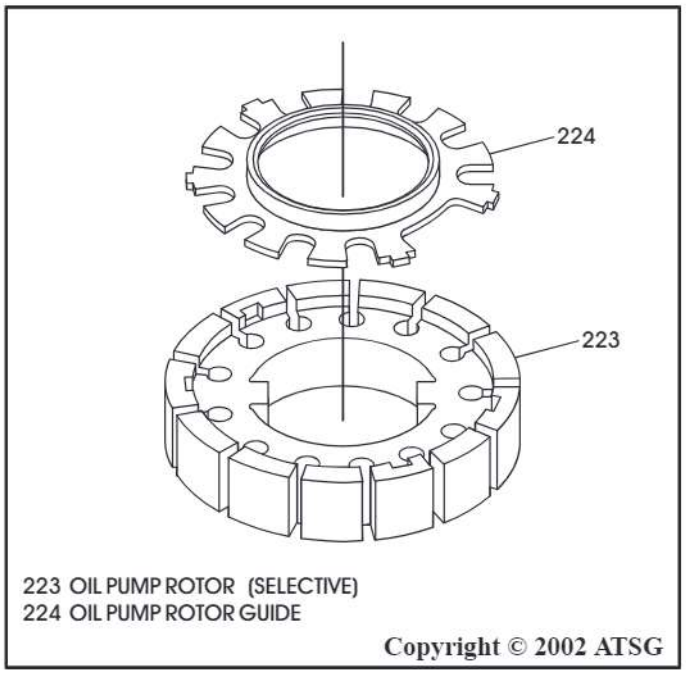
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Figure 64

## COMPONENT REBUILD (CONT'D)
## OIL PUMP ASSEMBLY (CONT'D)

24. Install the oil pump rotor guide into the rotor in the direction shown in Figure 65, and retain with a small amount of Trans-Jel®.
25. Install one of the oil pump vane rings into the pump pocket, as shown in Figure 66.
26. Install the previously assembled rotor guide and rotor assembly into the pump pocket and ensure that it is properly seated.
27. Install the 13 oil pump vanes into their slots in the rotor, as shown in Figure 66.
28. Install the other oil pump vane ring on top of the rotor and inside of the oil pump vanes. The finished assembly should look like illustration in Figure 66.
29. Install the pre-assembled oil pump cover onto the converter housing, as shown in Figure 67.
30. Install the proper pump cover to converter housing retaining bolts in their proper locations as shown in Figure 68, and hand tighten only.
31. Install the J-21368 pump alignment band and tighten, as shown in Figure 69.
32. Torque six pump cover retaining bolts (240) to 11 Nm (8 ft.lb.), as shown in Figure 69.
33. Torque five pump cover retaining bolts (241) to 22 Nm (16 ft.lb.), as shown in Figure 69.
34. Remove J-21368 pump alignment band.

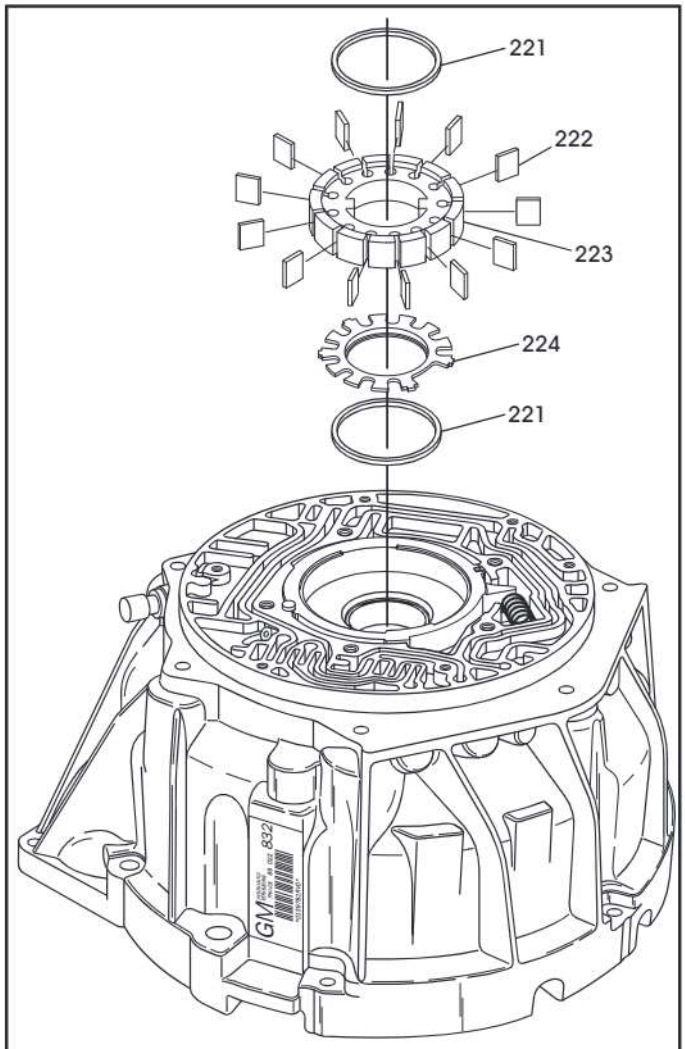
**Continued on Page 50**



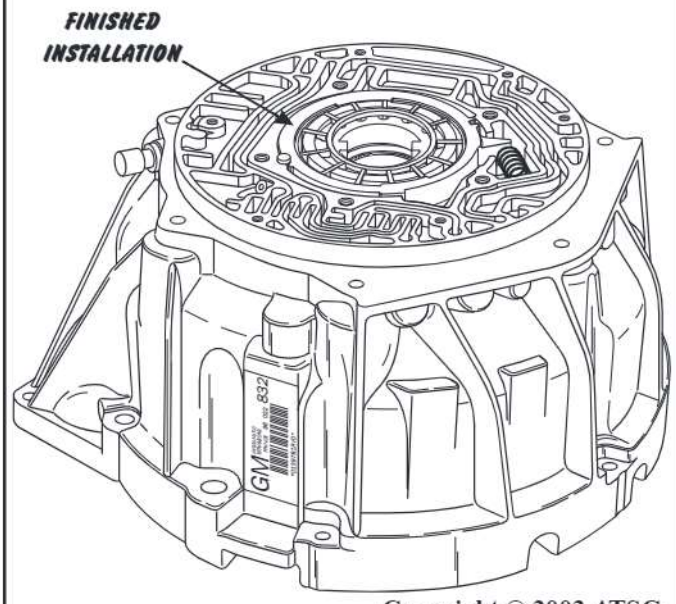

223 OIL PUMP ROTOR (SELECTIVE)
224 OIL PUMP ROTOR GUIDE

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Figure 65

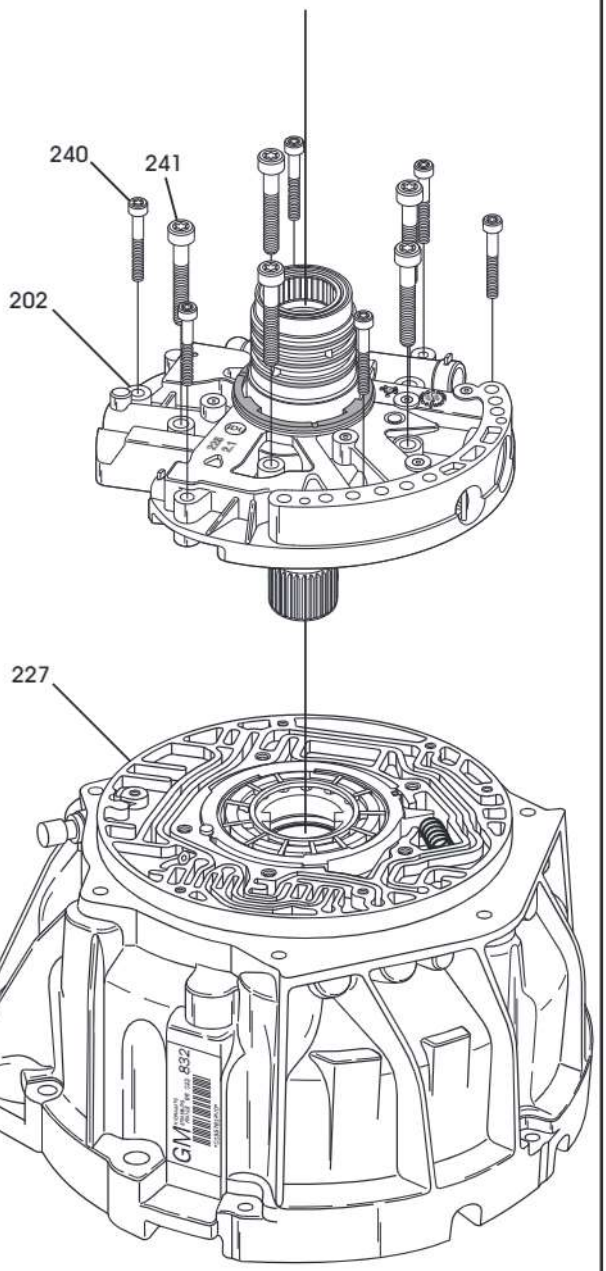



221 OIL PUMP VANE RINGS (2)
222 OIL PUMP VANES (13)
223 OIL PUMP ROTOR (SELECTIVE)
224 OIL PUMP ROTOR GUIDE




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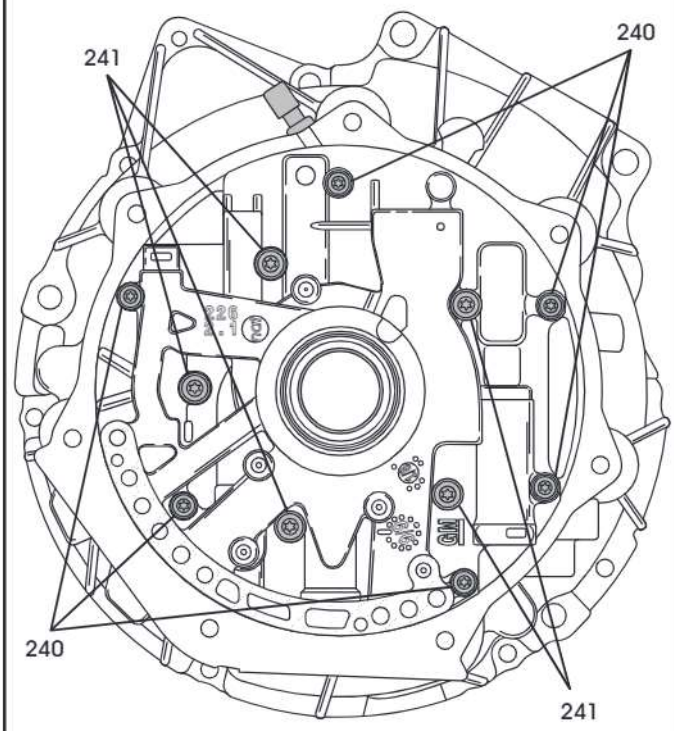
Figure 66




202 COMPLETED OIL PUMP COVER ASSEMBLY
227 COMPLETED CONVERTER HOUSING AND OIL PUMP ASM.
240 PUMP COVER RETAINING BOLT 6 X 1.25 X 40 (6 REQUIRED)
241 PUMP COVER RETAINING BOLT 8 X 1.25 X 40 (5 REQUIRED)

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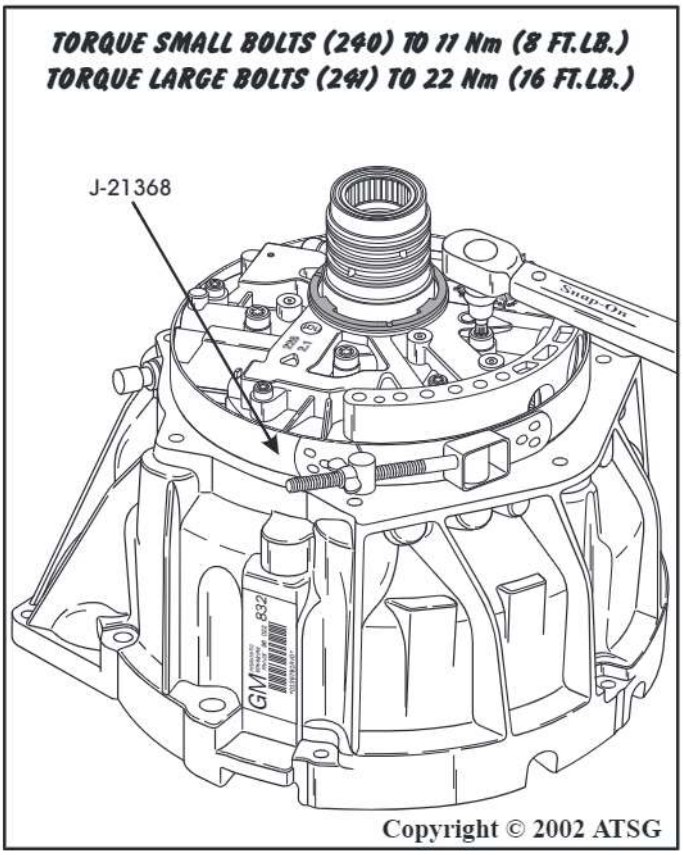
Figure 67




240 PUMP COVER RETAINING BOLT 6 X 1.25 X 40 (6 REQUIRED)
241 PUMP COVER RETAINING BOLT 8 X 1.25 X 40 (5 REQUIRED)

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Figure 68



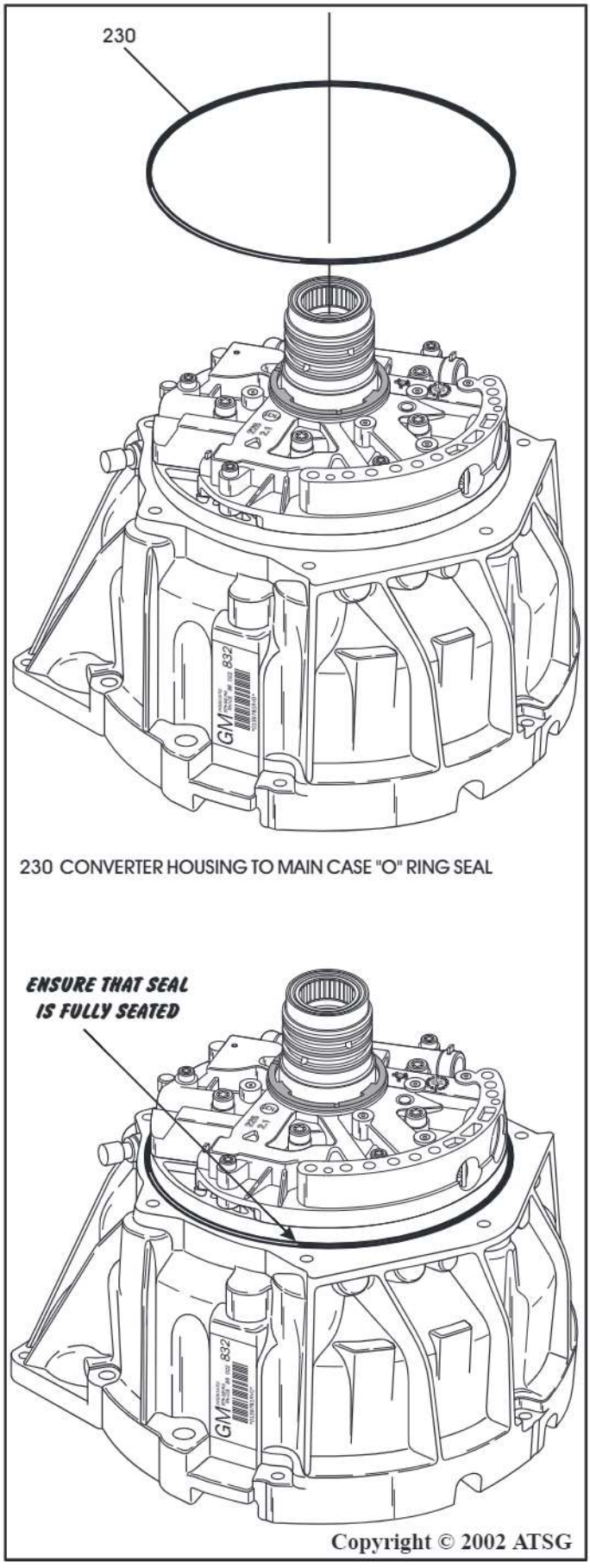

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Figure 69

## COMPONENT REBUILD (CONT'D)

### OIL PUMP ASSEMBLY (CONT'D)

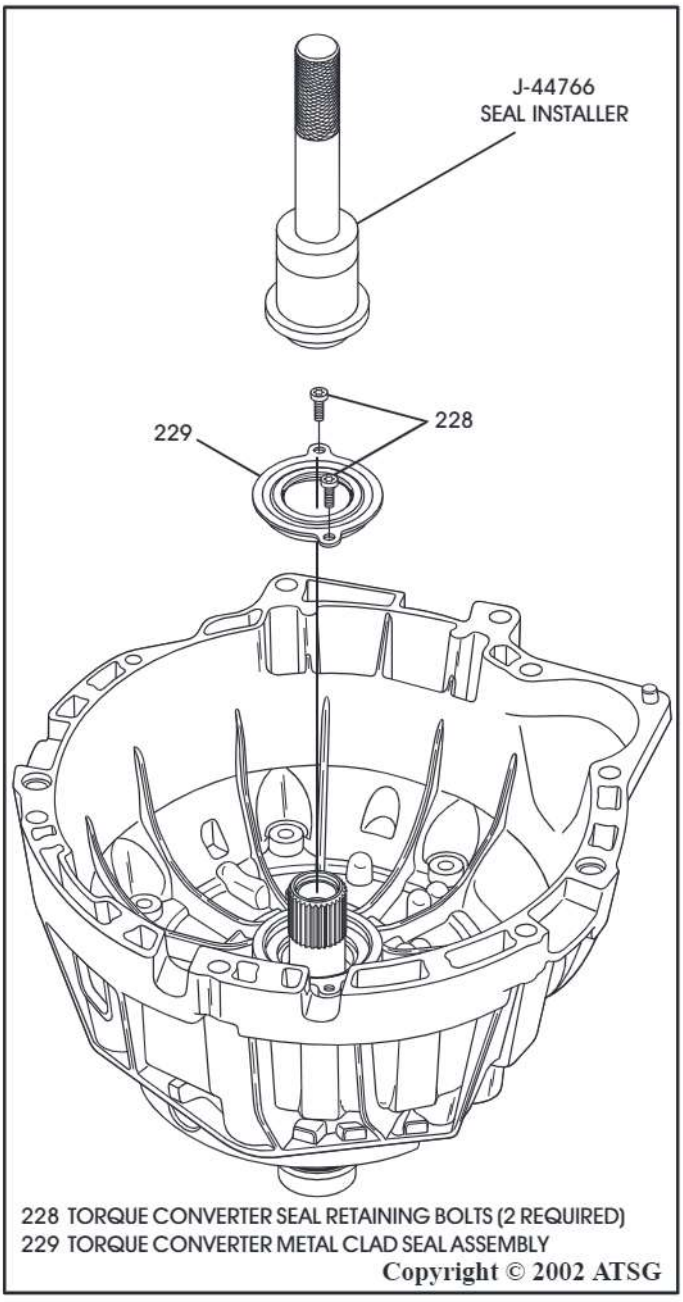
35. Install converter housing to case "O" ring seal, as shown in Figure 70, and ensure that it is fully seated.
36. Install new converter seal onto the installation tool J-44766, align the converter seal with the bolt holes, and then install the converter seal in the housing (See Figure 71).
37. Install the two seal retaining bolts and torque to 3.6 Nm (31 in.lb.), as shown in Figure 72.
38. Set the completed converter housing and pump assembly aside for the final assembly process.




230 CONVERTER HOUSING TO MAIN CASE "O" RING SEAL

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Figure 70




228 TORQUE CONVERTER SEAL RETAINING BOLTS (2 REQUIRED)
229 TORQUE CONVERTER METAL CLAD SEAL ASSEMBLY

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Figure 71

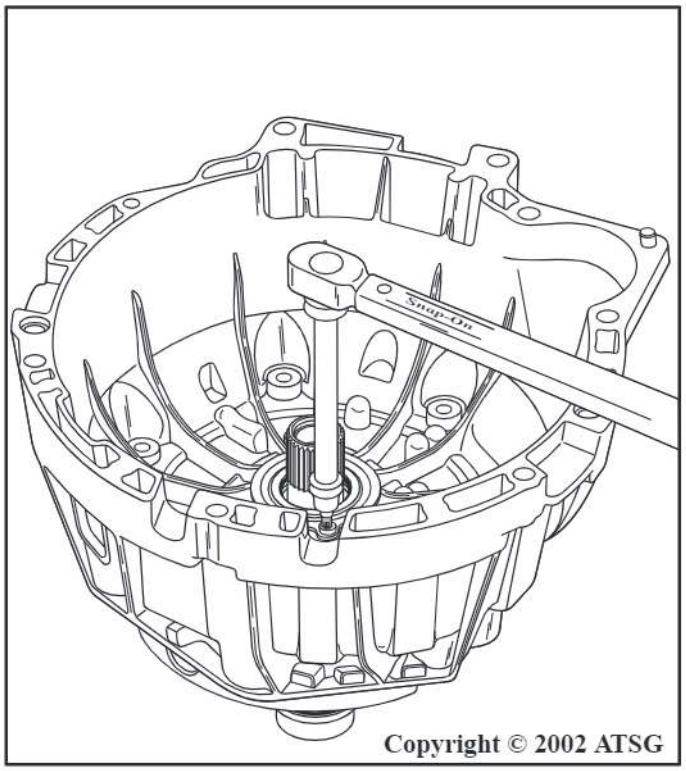



Figure 72

## COMPONENT REBUILD

### DIRECT AND REVERSE CLUTCH HOUSING

1. Using Figure 74 as a guide dis-assemble the direct and reverse clutch housing.
2. Clean thoroughly all direct and reverse clutch parts and dry with compressed air.
3. Inspect thoroughly all direct and reverse clutch parts for any wear and/or damage.
4. Inspect the direct clutch piston ball capsule for proper operation, as shown in Figure 73.
5. Inspect the reverse clutch housing ball capsule for proper operation, as shown in Figure 73.

**Continued on Page 53**

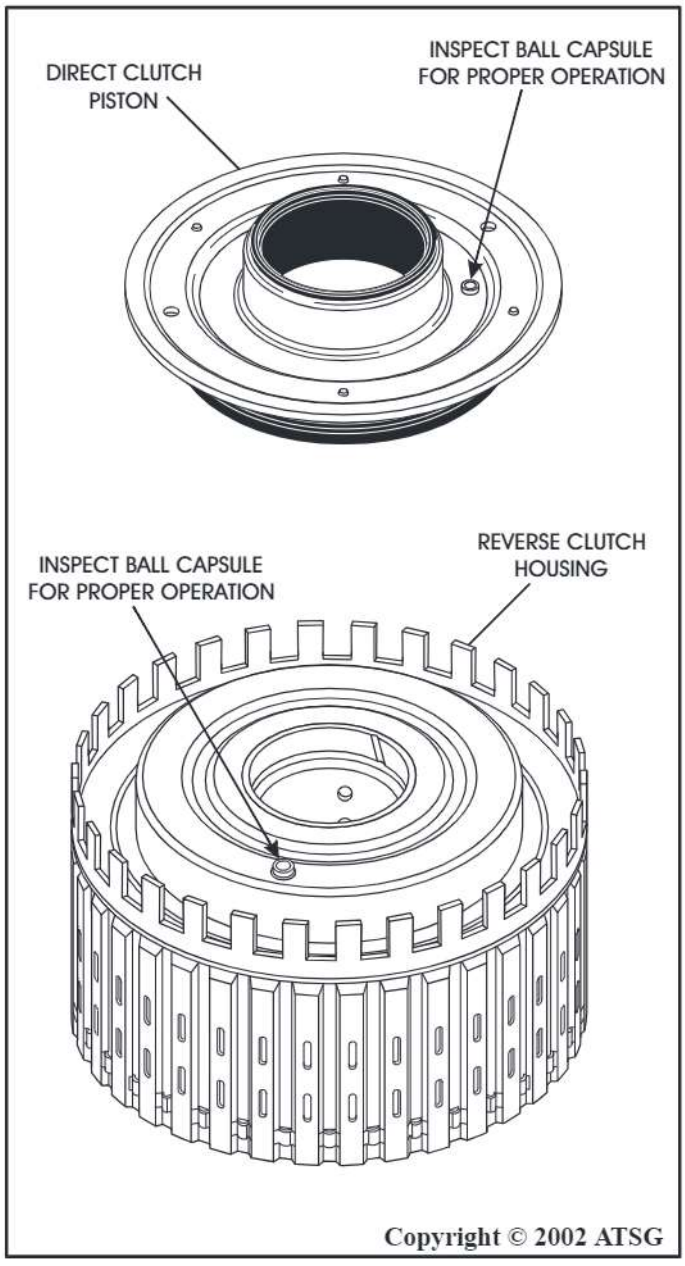
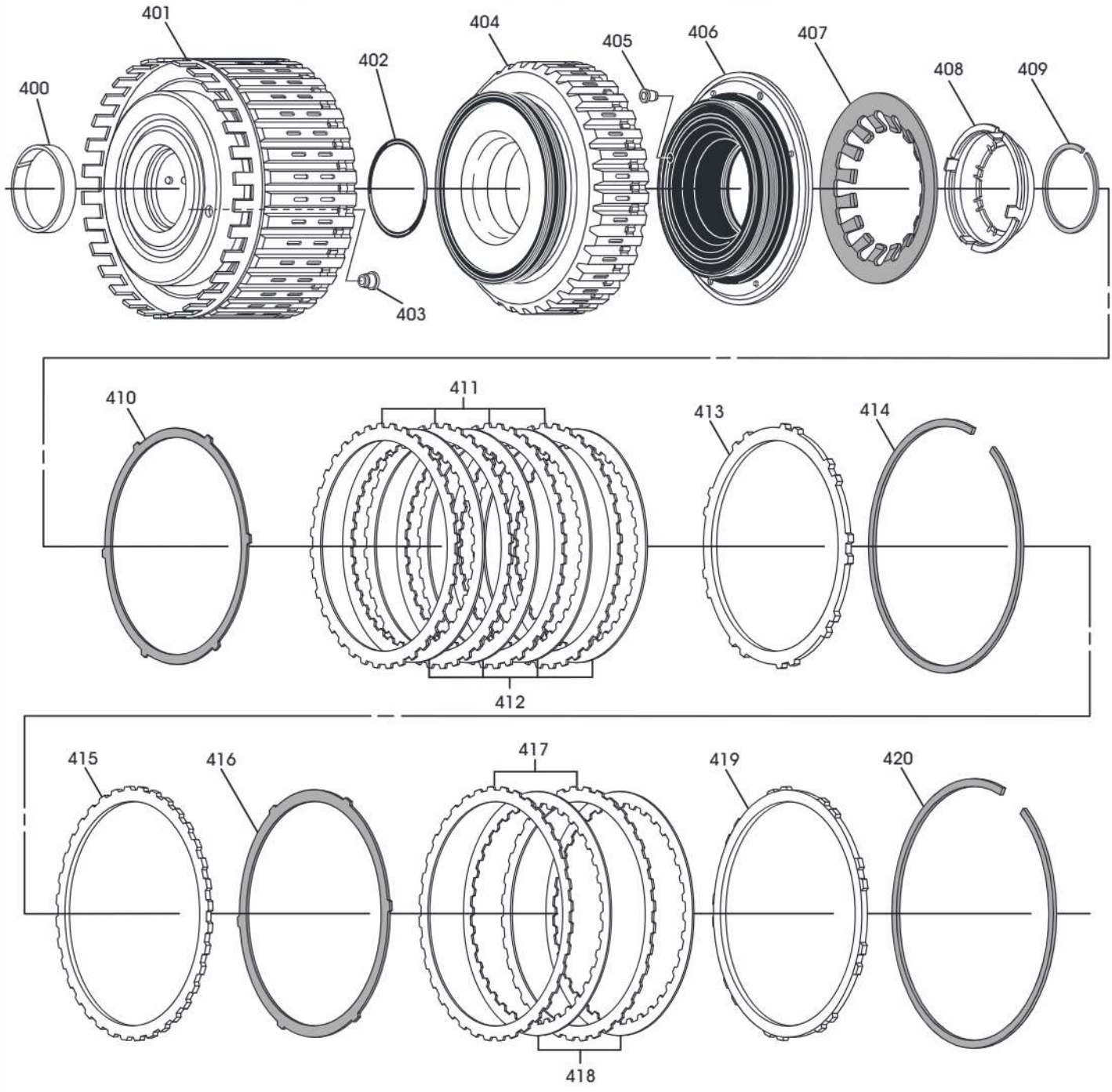



Figure 73

## REVERSE AND DIRECT CLUTCH HOUSING ASSEMBLY




400 REVERSE CLUTCH HOUSING BUSHING
401 REVERSE CLUTCH HOUSING ASSEMBLY
402 REVERSE CLUTCH HOUSING INNER "O" RING SEAL
403 REVERSE CLUTCH HOUSING BALL CAPSULE ASSEMBLY
404 REVERSE CLUTCH PISTON/DIRECT CLUTCH HOUSING
405 DIRECT CLUTCH PISTON BALL CAPSULE ASSEMBLY
406 DIRECT CLUTCH PISTON ASSEMBLY
407 DIRECT AND REVERSE CLUTCH BELLVILLE RETURN SPRING
408 DIRECT AND REVERSE CLUTCH RETURN SPRING RETAINER
409 RETURN SPRING RETAINER SNAP RING
410 DIRECT CLUTCH "WAVE" PLATE
411 DIRECT CLUTCH "OUTER SPLINE" SINGLE SIDED PLATES (4)
412 DIRECT CLUTCH "INNER SPLINE" SINGLE SIDED PLATES (4)
413 DIRECT CLUTCH BACKING PLATE
414 DIRECT CLUTCH BACKING PLATE SNAP RING (SELECTIVE)
415 REVERSE CLUTCH APPLY PLATE
416 REVERSE CLUTCH "WAVE" PLATE
417 REVERSE CLUTCH "OUTER SPLINE" SINGLE SIDED PLATES (2)
418 REVERSE CLUTCH "INNER SPLINE" SINGLE SIDED PLATES (2)
419 REVERSE CLUTCH BACKING PLATE
420 REVERSE CLUTCH BACKING PLATE SNAP RING (SELECTIVE)

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Figure 74

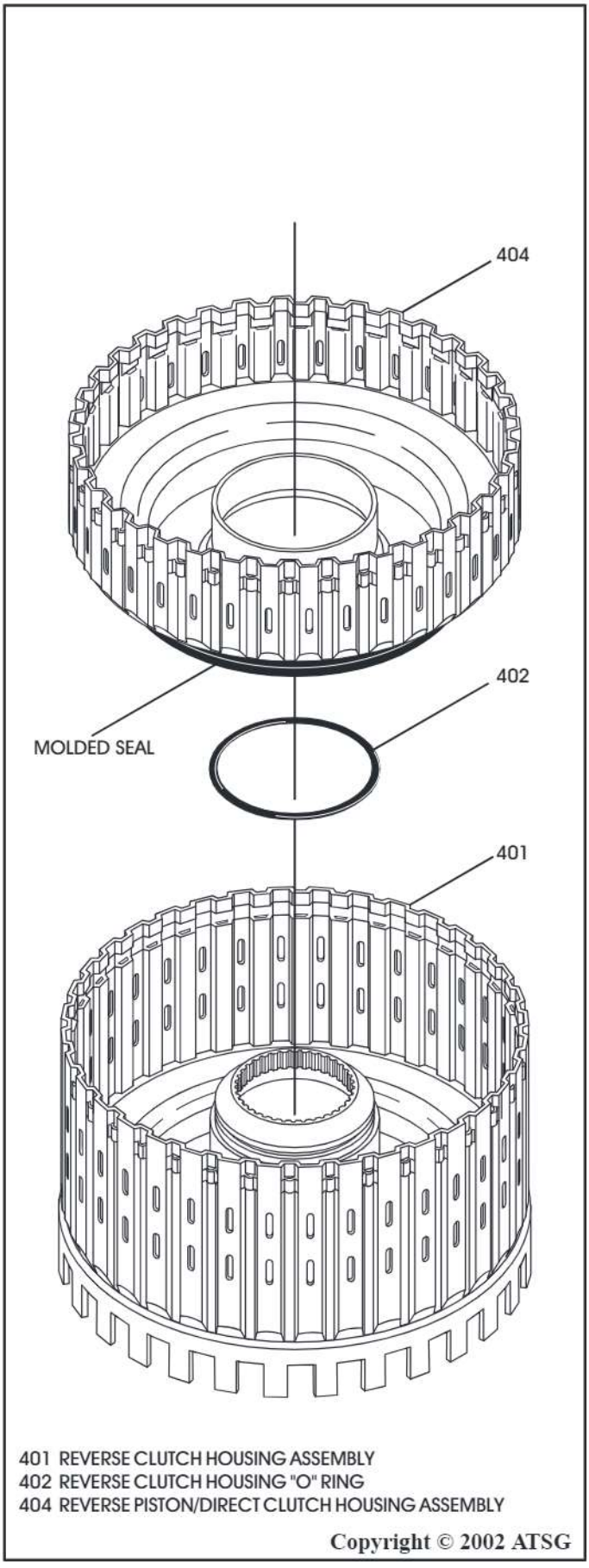



Figure 75

## COMPONENT REBUILD
### DIRECT AND REVERSE CLUTCH HOUSING

6. Install new "O" ring seal into groove in the reverse clutch housing and lubricate with a small amount of Trans-Jel® (See Figure 75).
7. Lubricate the inside diameter of the direct clutch housing and install the direct clutch housing into the reverse clutch housing, as shown in Figure 75, by rotating into position.
8. The direct clutch housing (404) also serves as the reverse clutch piston and has a molded seal as shown in Figure 75.
9. Install J-45133 seal protector onto the reverse housing, as shown in Figure 76.
10. Lubricate the molded seals with a small amount of Trans-Jel® and install direct clutch piston by rotating into position (See Figure 76).

**Continued on Page 54**

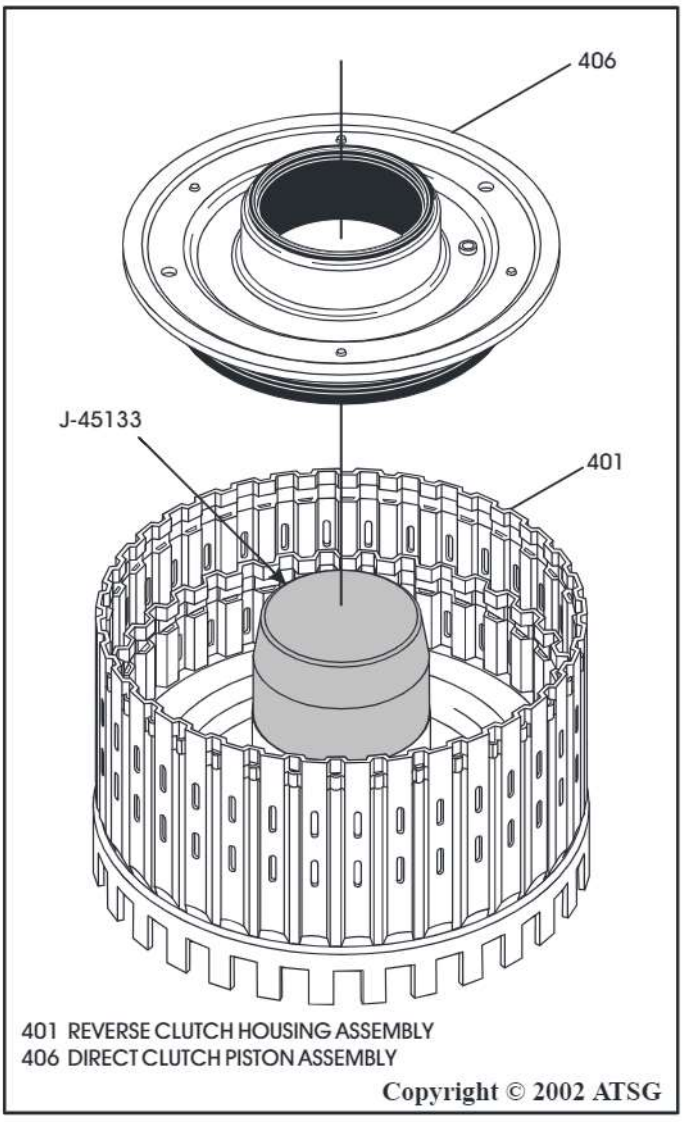
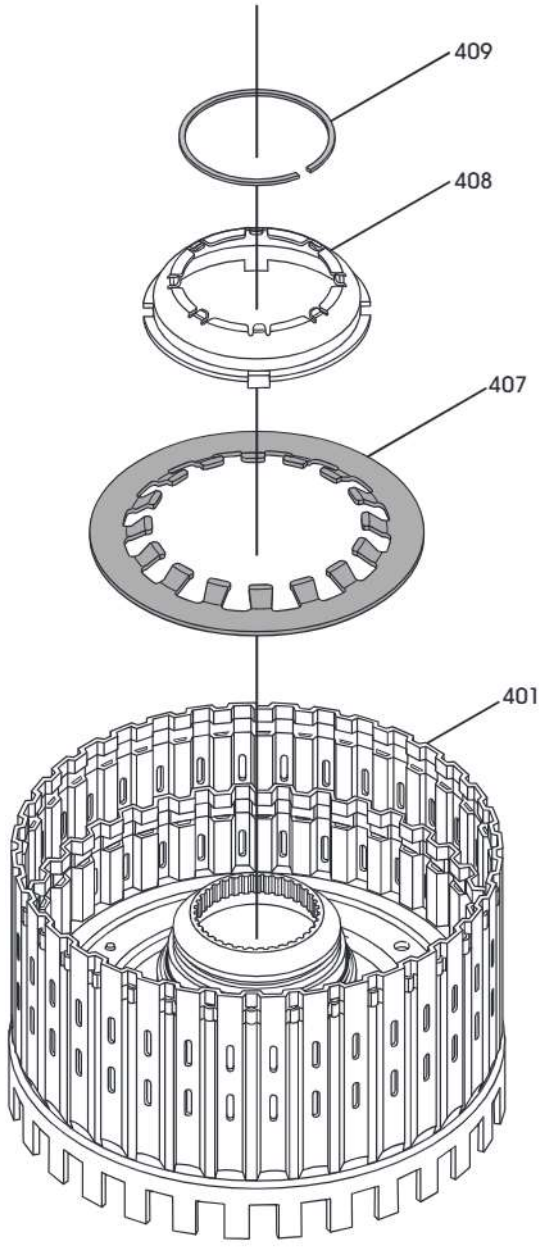



Figure 76

## COMPONENT REBUILD
### DIRECT AND REVERSE CLUTCH HOUSING (CONT'D)

11. Install the direct/reverse bellville return spring on top of the direct clutch piston, as shown in Figure 77.
12. Install the bellville return spring retainer, as shown in Figure 77.
13. Using a universal spring compressor or a foot press, compress the bellville spring and install the snap ring (See Figures 77 and 78).
    ***Note: GM recommends a "New" snap ring for this location.***
14. Install the direct clutch "Wave" plate, as shown in Figure 78.

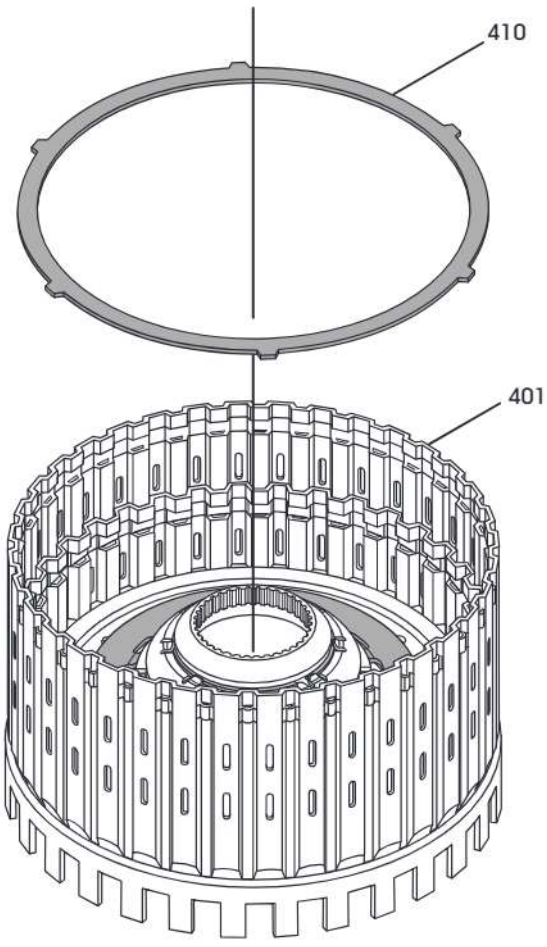
**Continued on Page 55**




401 REVERSE CLUTCH HOUSING ASSEMBLY
407 DIRECT/REVERSE BELLVILLE RETURN SPRING ASSEMBLY
408 DIRECT/REVERSE CLUTCH SPRING RETAINER
409 RETURN SPRING RETAINER SNAP RING

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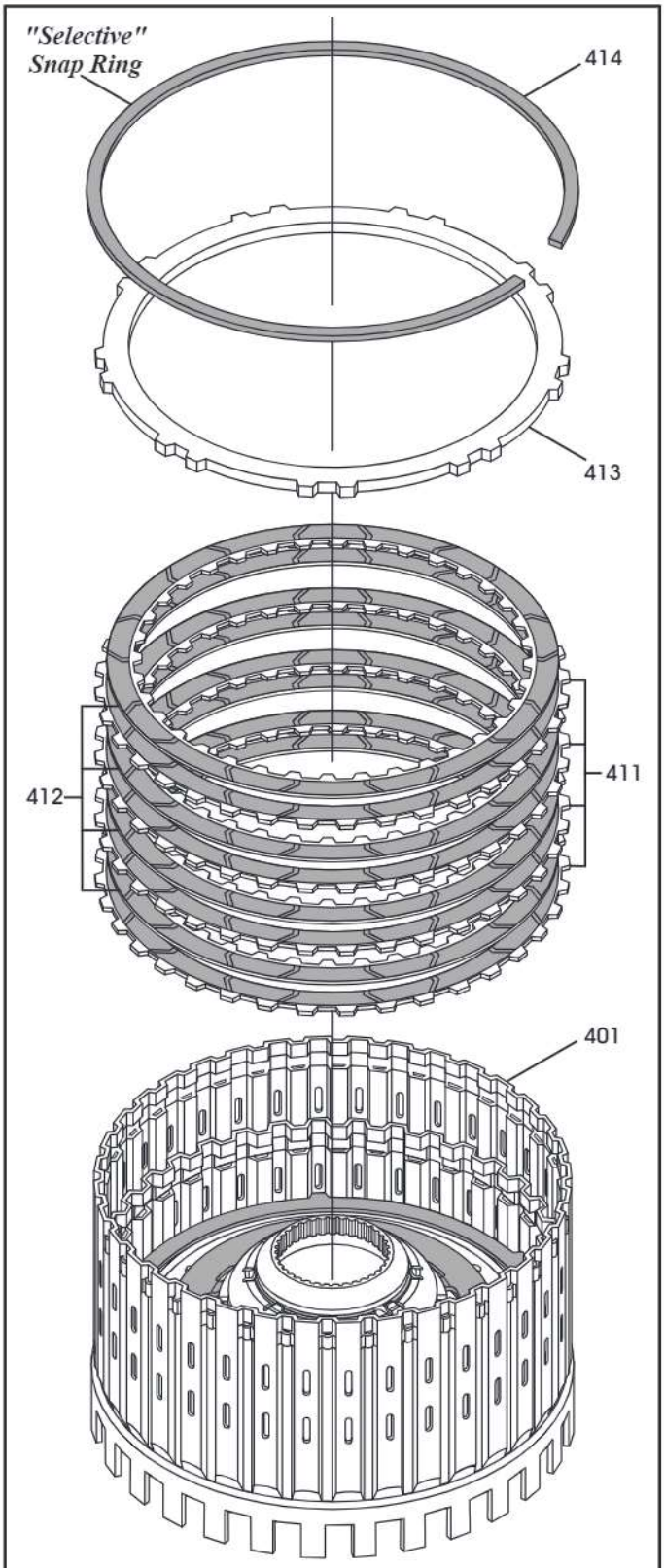
Figure 77




401 REVERSE CLUTCH HOUSING ASSEMBLY
410 DIRECT CLUTCH "WAVE" PLATE

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Figure 78



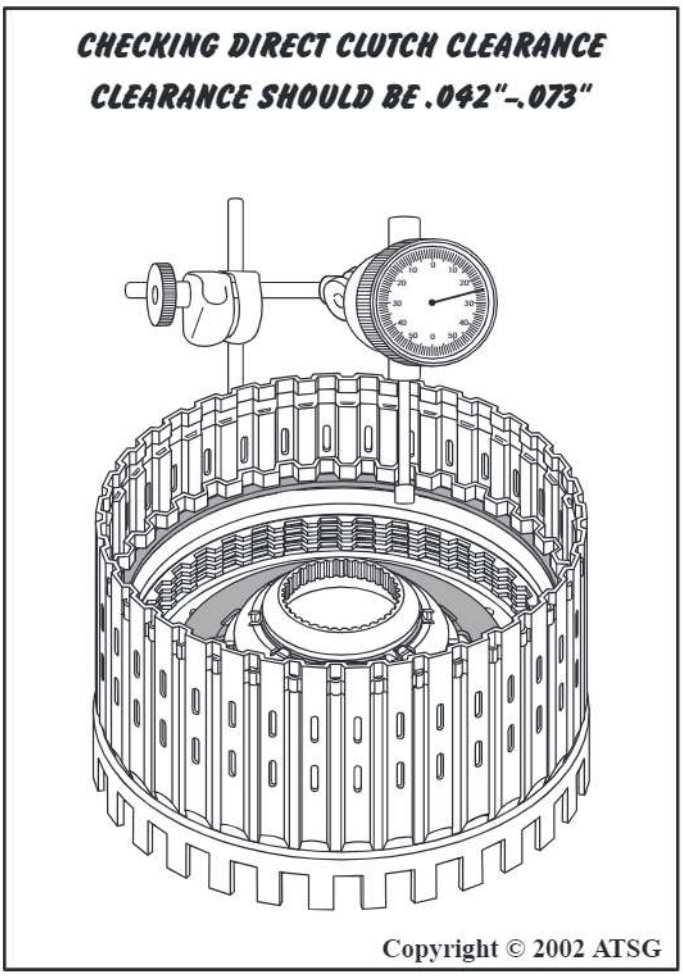

401 REVERSE/DIRECT CLUTCH HOUSING ASSEMBLY
411 DIRECT CLUTCH "OUTSIDE SPLINE" SINGLE SIDED PLATES (4)
412 DIRECT CLUTCH "INSIDE SPLINE" SINGLE SIDED PLATES (4)
413 DIRECT CLUTCH BACKING PLATE
414 DIRECT CLUTCH BACKING PLATE SNAP RING (SELECTIVE)

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Figure 79

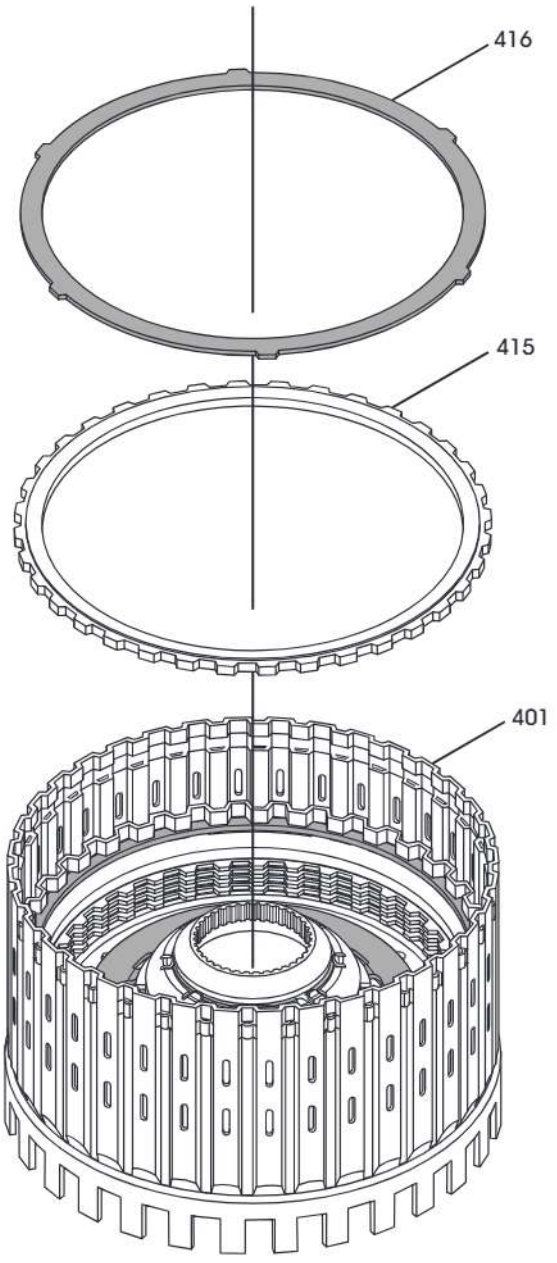
15. Install the direct clutch "single sided" plates beginning with an outside spline plate first and alternating with inside spline plates until you have installed 4 of each, as shown in Figure 79.
    ***Note: Lined side must be installed facing up as shown. Clutch plate amounts may vary by model.***
16. Install the direct clutch backing plate on top of the last inside spline plate (See Figure 79).
17. Install the "Selective" backing plate snap ring, as shown in Figure 79, and ensure that the snap ring is fully seated against the top of the snap ring groove in housing.
18. Install dial indicator on top of the direct clutch backing plate, as shown in Figure 80, and zero the dial indicator.
19. Direct clutch clearance should be: 1.06 mm (.042") to 1.86 mm (.073"). Change the "Selective" backing plate snap ring as necessary to achieve proper clutch clearance.

**Continued on Page 56**




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Figure 80




401 REVERSE/DIRECT CLUTCH HOUSING ASSEMBLY
415 REVERSE CLUTCH APPLY PLATE (LIP FACING UP)
416 REVERSE CLUTCH "WAVE" PLATE

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Figure 81

## COMPONENT REBUILD
## DIRECT AND REVERSE CLUTCH HOUSING (CONT'D)

20. Install the reverse clutch apply plate with the lip facing up, as shown in Figure 81.
21. Install the reverse clutch "Wave" plate on top of the apply plate, as shown in Figure 81.
22. Install the reverse clutch "single sided" plates beginning with an outside spline plate first and alternating with inside plates until you have installed 2 of each, as shown in Figure 82.
    ***Note: Lined side must be installed facing up as shown in Figure 82. Clutch plate amounts may vary by model.***
23. Install the reverse clutch backing plate on top of the last inside spline plate, as shown in Figure 82.
24. Install the "Selective" backing plate snap ring as shown in Figure 82, and ensure that the snap ring is fully seated against the top of the snap ring groove in reverse housing.
25. Install dial indicator on top of reverse clutch backing plate, as shown in Figure 83, and zero the dial indicator.
26. Reverse clutch clearance should be: 0.98 mm (.039") to 1.43 mm (.056"). Change the "Selective" backing plate snap ring as necessary to achieve proper clutch clearance.
27. Set the completed Direct/Reverse Clutch Housing aside for the final assembly process.

**Component Rebuild Section**
**Continued on Page 59**

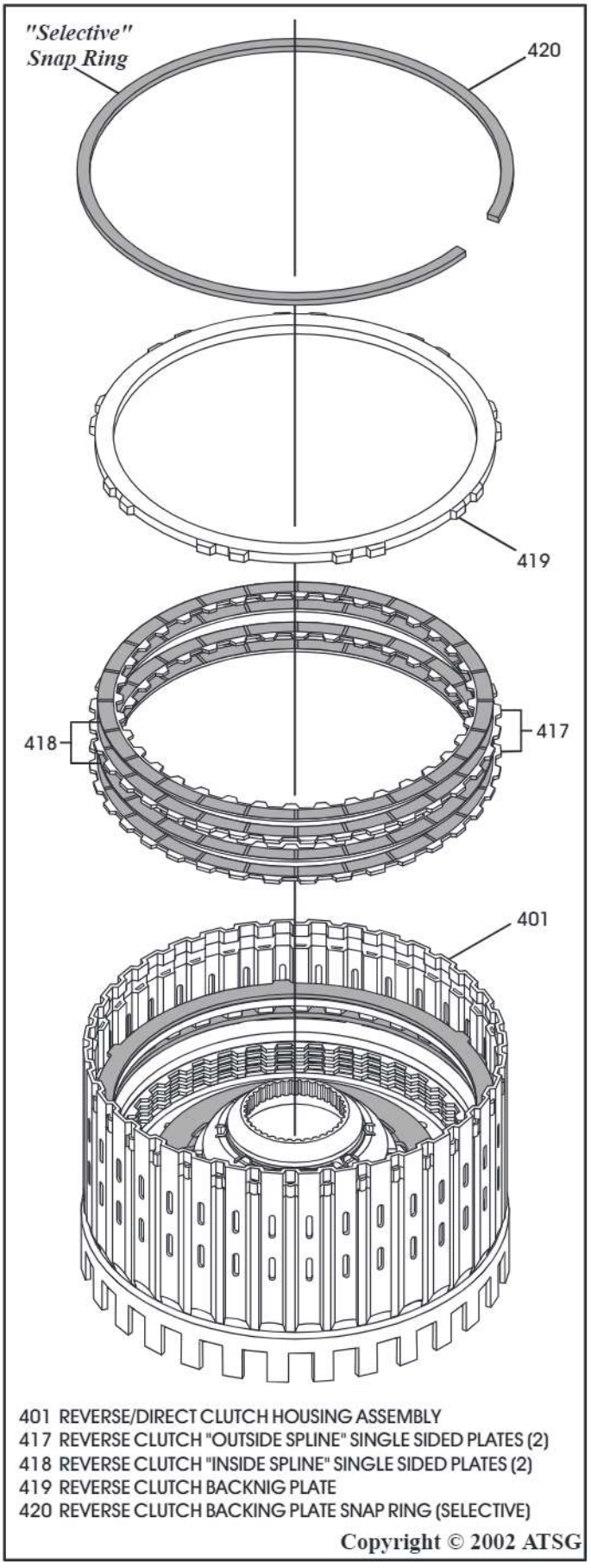



Figure 82

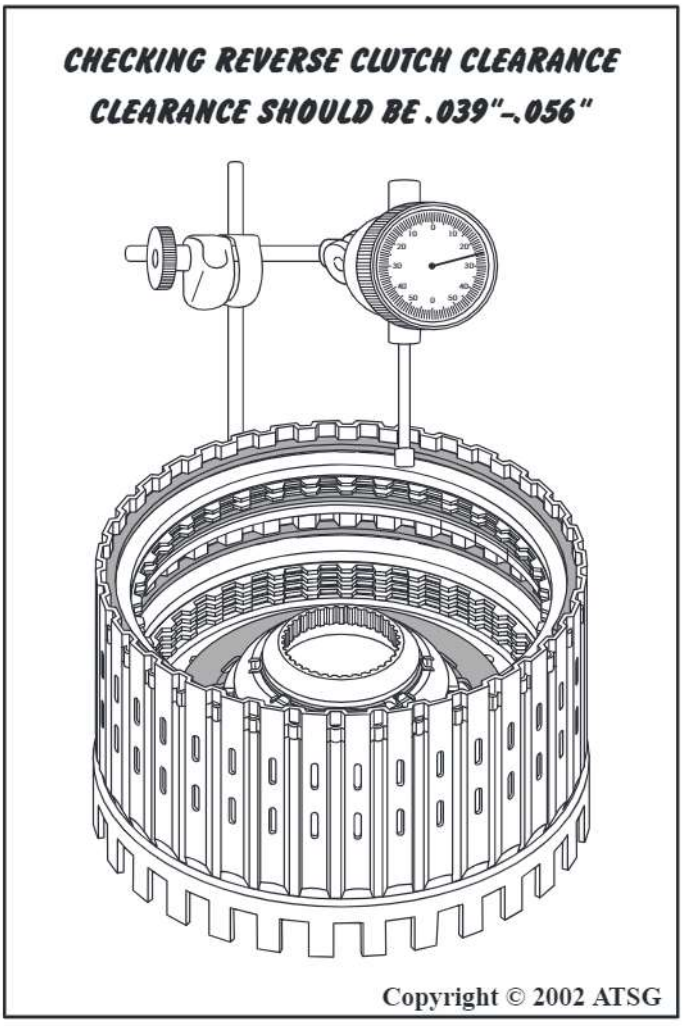
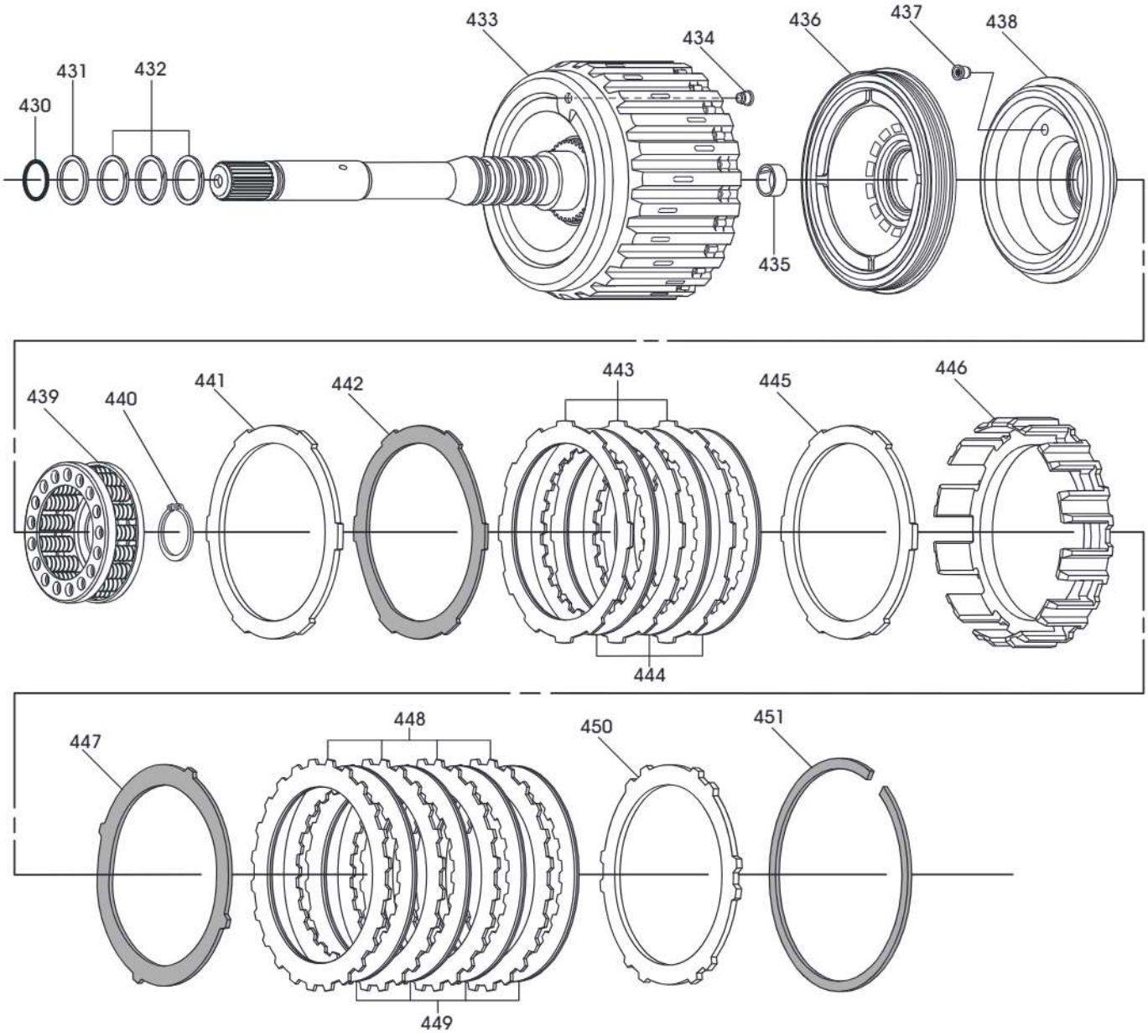



Figure 83

## FORWARD AND COAST CLUTCH HOUSING ASSEMBLY




430 INPUT SHAFT "O" RING SEAL
431 INPUT SHAFT "SOLID" TEFLON SEAL RING (1 REQUIRED)
432 INPUT SHAFT "SCARF-CUT" SEAL RING (3 REQUIRED)
433 INPUT HOUSING ASSEMBLY
434 FORWARD CLUTCH BALL CAPSULE ASSEMBLY
435 INPUT HOUSING BUSHING
436 FORWARD CLUTCH MOLDED PISTON ASSEMBLY
437 COAST CLUTCH BALL CAPSULE ASSEMBLY
438 COAST CLUTCH PISTON ASSEMBLY
439 FORWARD AND COAST CLUTCH RETURN SPRING ASM.
440 RETURN SPRING RETAINING SNAP RING
441 COAST CLUTCH APPLY PLATE, "SELECTIVE"
442 COAST CLUTCH "WAVE" PLATE
443 SINGLE SIDED "OUTSIDE S PLINE" COAST CLUTCH PLATE (3)
444 SINGLE SIDED "INSIDE SP LINE" COAST CLUTCH PLATE (3)
445 COAST CLUTCH BACKING PLATE
446 COAST CLUTCH HOUSING
447 FORWARD CLUTCH "WAVE" PLATE
448 SINGLE SIDED "OUTSIDE S PLINE" FORWARD CLUTCH PLATE (4)
449 SINGLE SIDED "INSIDE SP LINE" FORWARD CLUTCH PLATE (4)
450 FORWARD CLUTCH BACKING PLATE
451 FORWARD CLUTCH BACKING PLATE SNAP RING "SELECTIVE"

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Figure 84

## COMPONENT REBUILD
## FORWARD AND COAST CLUTCH HOUSING

1. Dis-assemble the forward/coast clutch housing using Figure 84 as a guide.
2. Thoroughly clean all forward and coast clutch parts and dry with compressed air.
3. Thoroughly inspect all forward and coast clutch parts for any wear and/or damage.
4. Inspect the coast clutch piston ball capsule for proper operation, as shown in Figure 85.
5. Inspect the forward/coast clutch housing ball capsule for proper operation (See Figure 85).
6. Place forward clutch housing on a foot press and install J-45134 seal ptotector on forward clutch housing, as shown in Figure 86.
7. Lubricate the molded seals of the new forward clutch piston with small amount of Trans-Jel®.
8. Install the forward clutch piston, as shown in Figure 86, by rotating into position.
9. Remove J-45134 seal protector.

**Continued on Page 60**

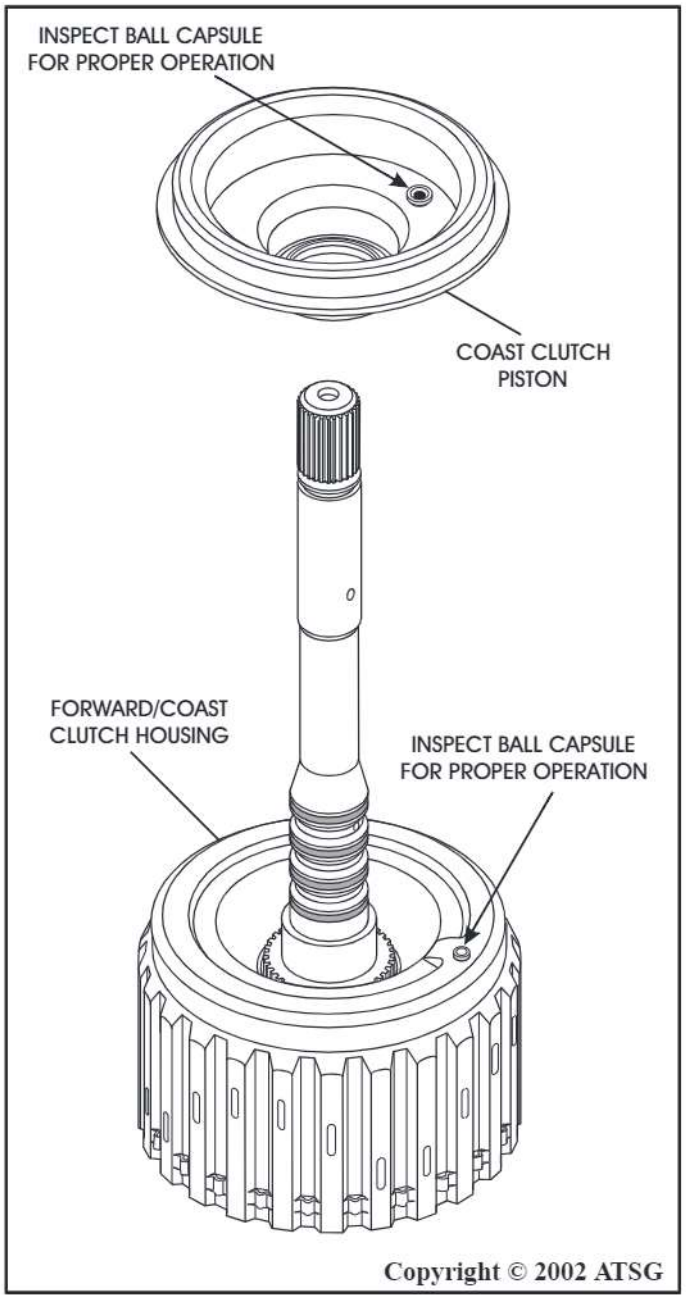



Figure 85

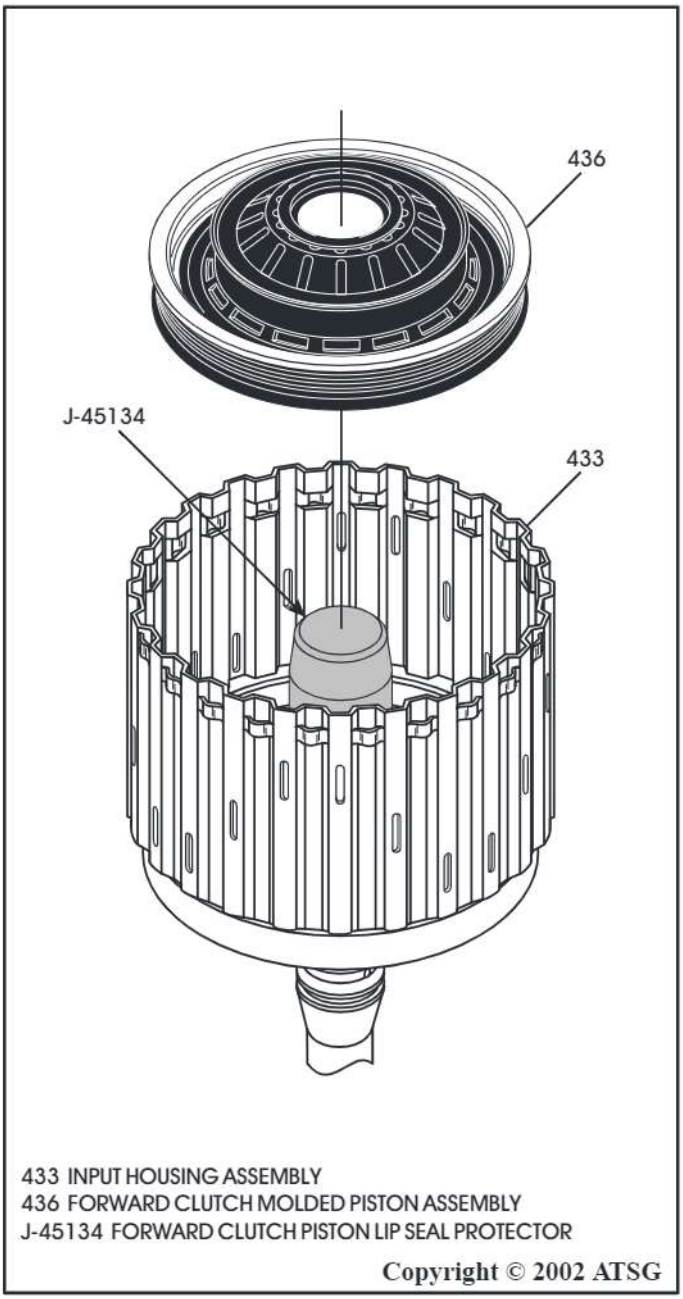
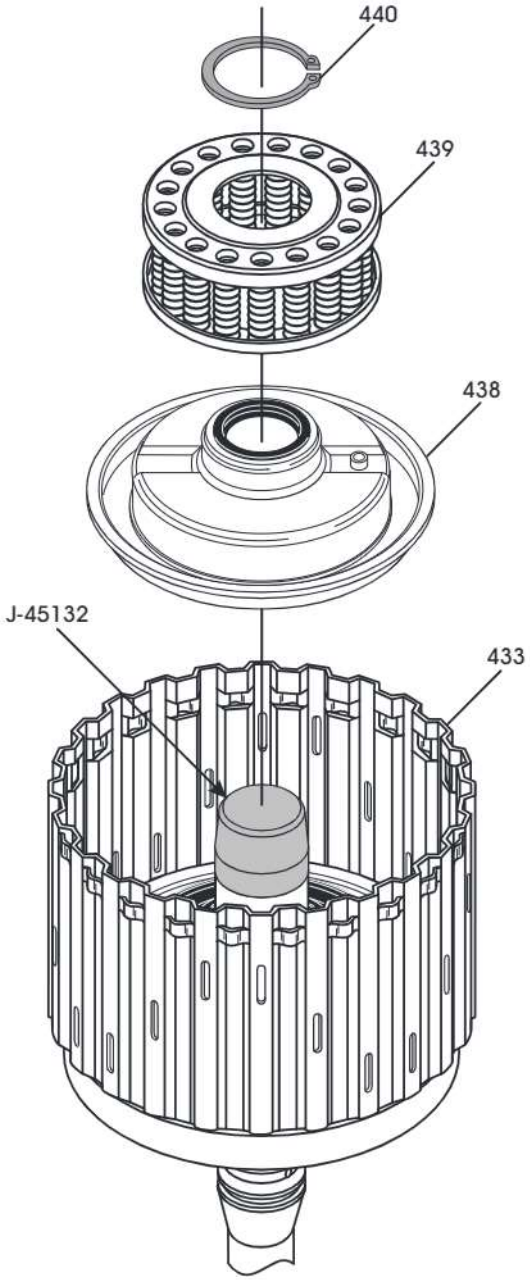



Figure 86



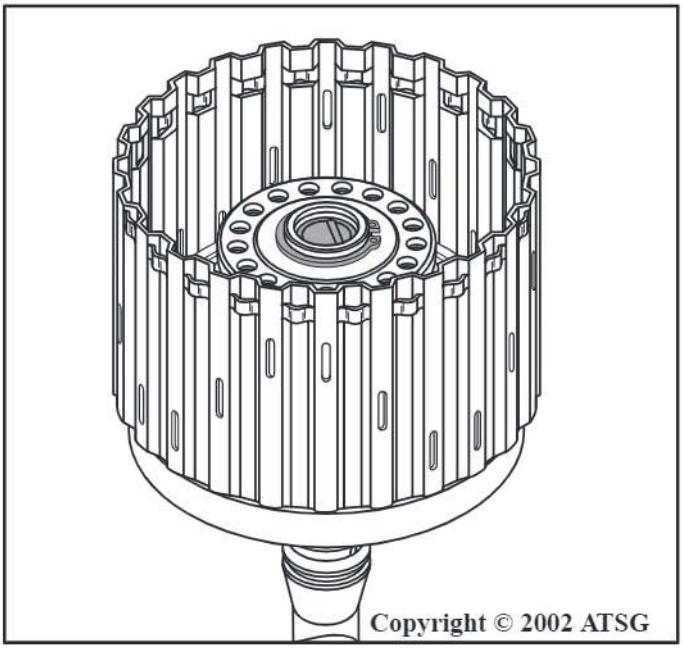

433 INPUT HOUSING ASSEMBLY
438 COAST CLUTCH PISTON ASSEMBLY
439 FORWARD AND COAST CLUTCH RETURN SPRING ASM.
440 RETURN SPRING RETAINING SNAP RING
J-45132 COAST CLUTCH PISTON LIP SEAL PROTECTOR

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Figure 87

## COMPONENT REBUILD
## FORWARD AND COAST CLUTCH HOUSING (CONT'D)

10. Install J-45132 seal protector on forward clutch housing, as shown in Figure 87.
11. Lubricate the molded inner seal and the inside diameter of the coast clutch piston with small amount of Trans-Jel®. (See Figure 87).
12. Install the coast clutch piston, as shown in Figure 87, by rotating and pushing down into position.
13. Remove J-45132 seal protector.
14. Install the forward/coast clutch return spring and retainer assembly, as shown in Figure 87.
15. Using the foot press, compress return spring and install the snap ring.
    ***Note: GM recommends a "New" snap ring in this location.***
16. Ensure that the snap ring is fully seated and release the foot press (See Figures 87 and 88).
17. Measure from the top of the forward clutch housing to the top of the coast clutch piston, as shown in Figure 89.
    ***Notice: Record this as dimension "C".***
18. Measure from the top of the forward clutch housing to the top of the forward clutch piston, as shown in Figure 89.
    ***Notice: Record this as dimension "B".***
19. Subtract dimension "C" from dimension "B". This answer is now dimension "A".
    ***Notice: Record dimension "A".***



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Figure 88

20. Lay the coast clutch housing on a flat surface in the direction shown in Figure 90.
21. Install the coast clutch backing plate into the coast clutch housing, as shown in Figure 90.
22. Install the coast clutch "single sided" plates beginning with an inside spline plate first and alternating with outside spline plates until you have installed 3 of each, as shown in Figure 90.
    ***Note: In this procedure, lined side must be installed facing down, as shown in Figure 90. Clutch plate amounts may vary by model.***
23. Install the coast clutch "Wave" plate on top of the last outside spline plate in the coast clutch housing, as shown in Figure 90.

**Continued on Page 62**

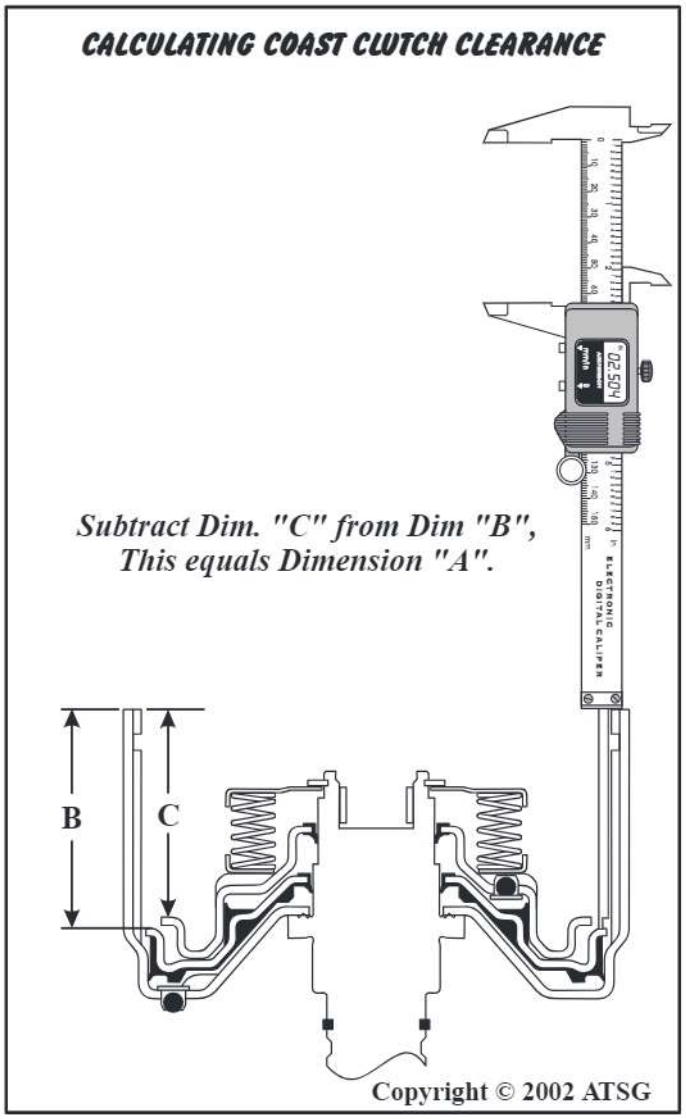



Figure 89

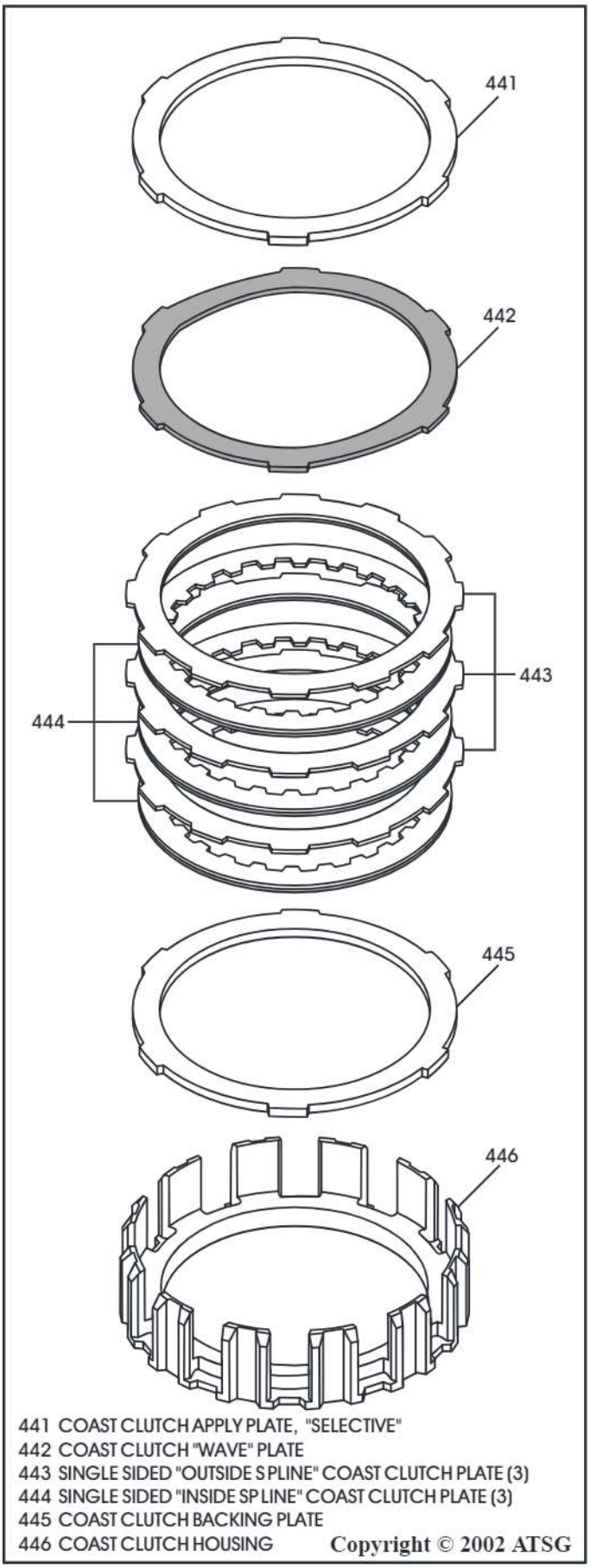



Figure 90

**COMPLETED COAST CLUTCH HOUSING**

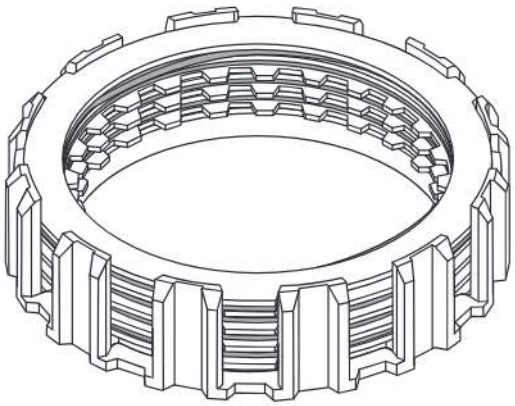


Figure 91

**CALCULATING COAST CLUTCH CLEARANCE**

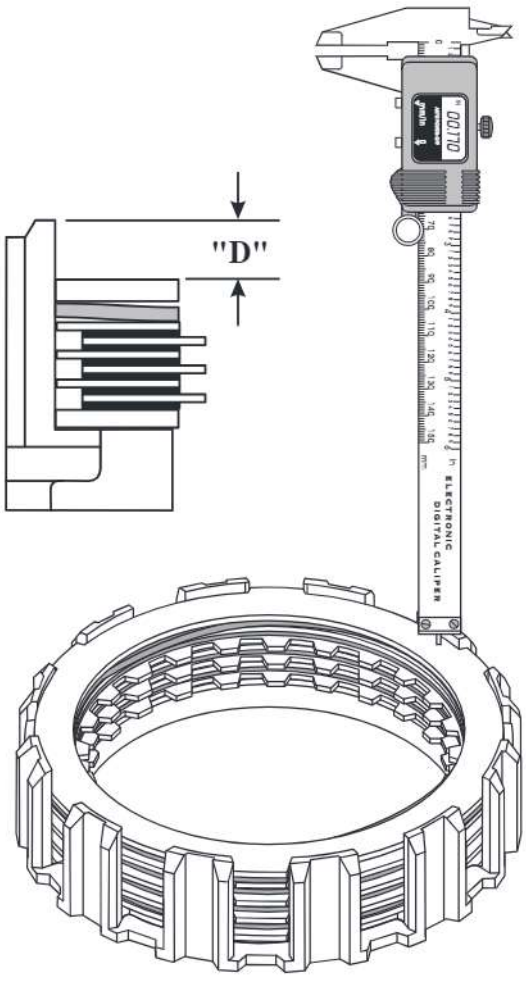



Figure 92

## COMPONENT REBUILD
## FORWARD AND COAST CLUTCH HOUSING (CONT'D)

24. Install the "Selective" apply plate on top of the wave plate, as shown in Figure 90.
    ***Note: The "Selective" apply plate usually has a number stamped on it for I.D.***
25. The coast clutch housing is now complete and should look like the illustration in Figure 91.
26. We are now ready to check for proper coast clutch clearance. This is where we will need the pre-recorded dimensions.
27. Measure the distance from the top of the coast clutch housing to the top of the coast clutch apply plate, as shown in Figure 92.
    ***Notice: Record this as dimension "D".***
28. ***Subtract pre-recorded dimension "A" from dimension "D". This is the coast clutch pack travel, and travel shoud be as follows: 0.77 mm (.030") to 1.67 mm (.060").***
    ***EXAMPLE:***
    ***Dimension "B" = 2.504"***
    ***Dimension "C" = 2.375"***
    ***Subtract dimension "C" from dimension "B" and this = dimension "A".***
    ***Dimension "A" = 0.129"***
    ***Dimension "D" = 0.170"***
    ***Subtract dimension "A" from dimension "D" and this = clutch pack travel.***
    ***Clutch travel in this example is 0.041".***
29. Change the "Selective" coast clutch apply plate as necessary to obtain proper clearance.
30. Holding the completed coast clutch housing in your left hand and grasping the turbine shaft with your right hand, as shown in Figure 93, index and install the coast clutch housing up into the forward clutch housing, all the way.
31. While holding it in position, turn the assembly over and place it back on the foot press as shown in Figure 94.
32. Install the forward clutch "Wave" plate on top of the coast clutch housing (See Figure 94).

**Continued on Page 64**

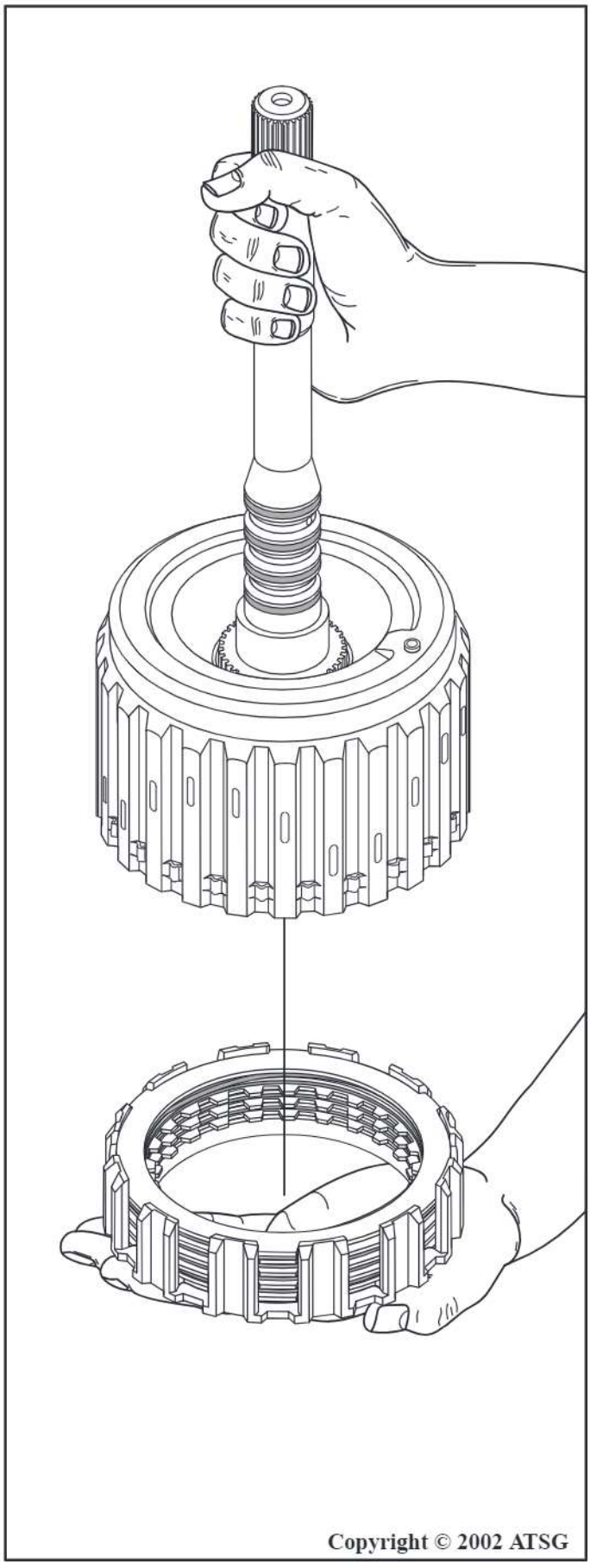
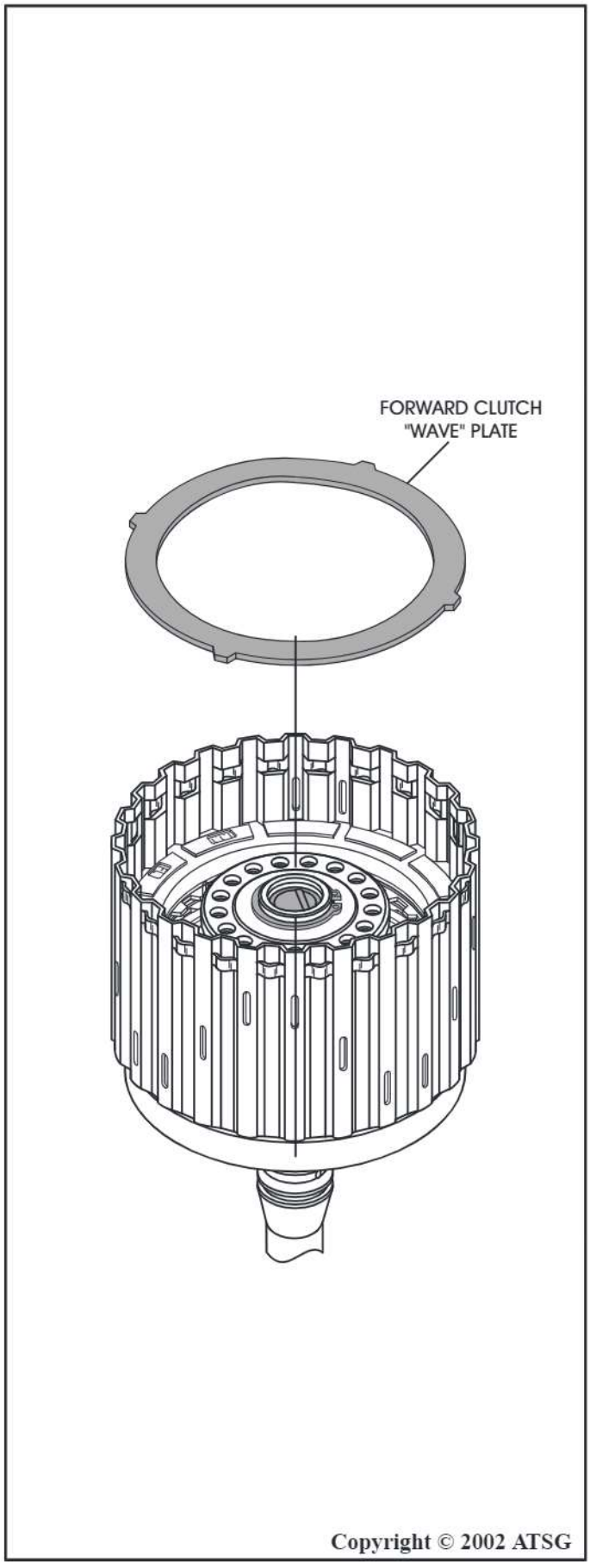
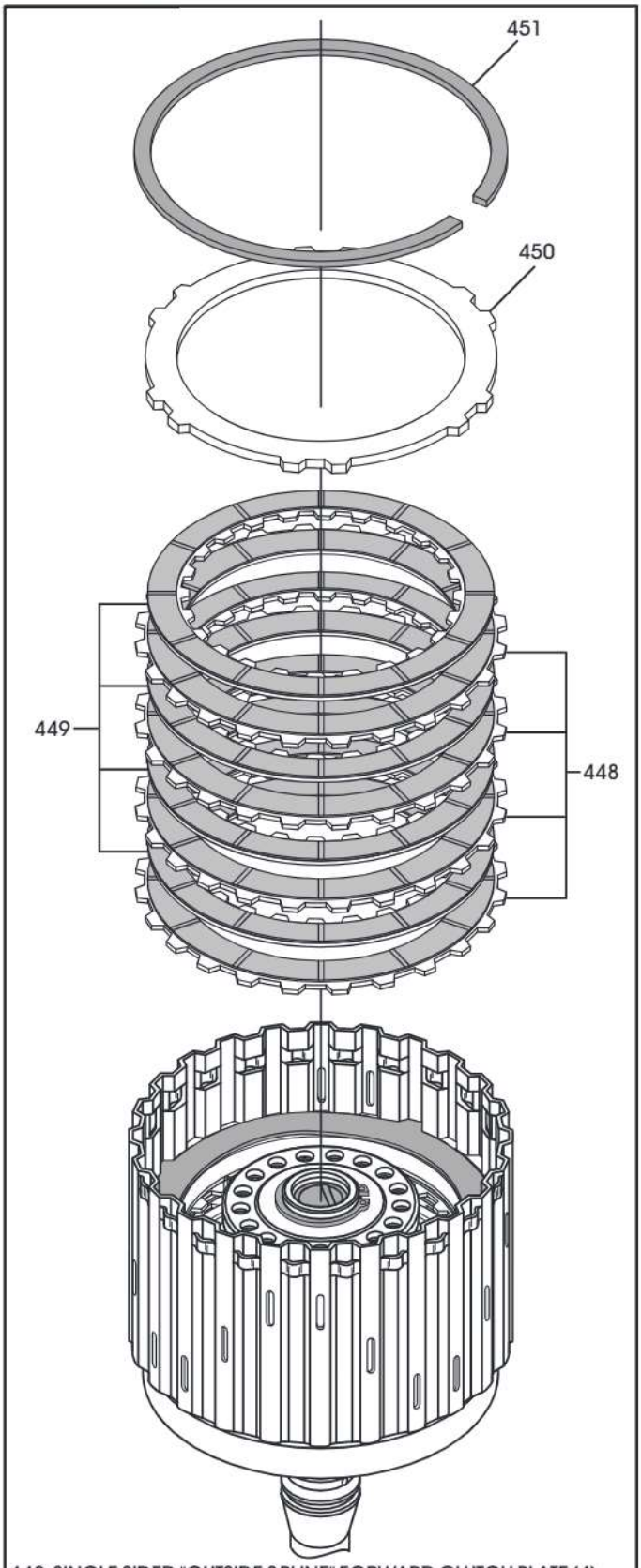

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Figure 93



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Figure 94




448 SINGLE SIDED "OUTSIDE SPLINE" FORWARD CLUTCH PLATE (4)
449 SINGLE SIDED "INSIDE SPLINE" FORWARD CLUTCH PLATE (4)
450 FORWARD CLUTCH BACKING PLATE
451 FORWARD CLUTCH BACKING PLATE SNAP RING "SELECTIVE"

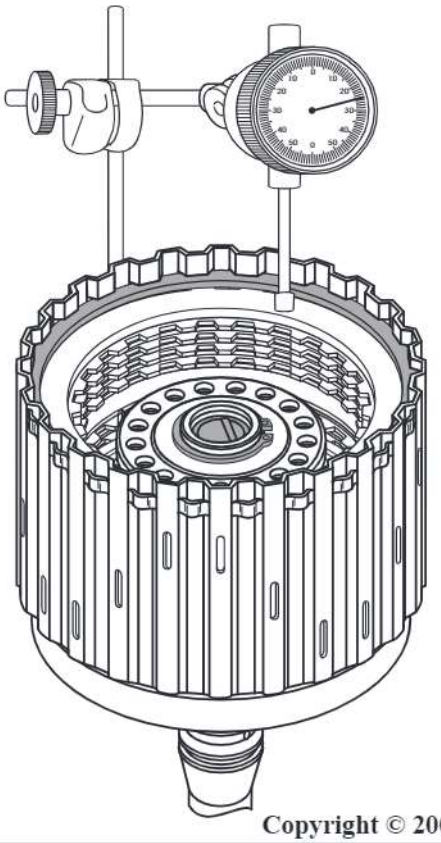
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Figure 95

## COMPONENT REBUILD
## FORWARD AND COAST CLUTCH HOUSING (CONT'D)

33. Install the forward clutch "single sided" plates beginning with an outside spline plate first and alternating with inside spline plates until you have installed 4 of each, as shown in Figure 95.
    ***Note: Lined side must be facing up, as shown in Figure 95. Clutch plate amounts may vary by model.***
34. Install forward clutch backing plate on top of the last inside spline plate (See Figure 95).
35. Install the "Selective" backing plate snap ring as shown in Figure 95, and ensure that the snap ring is fully seated against the top of the snap ring groove in forward clutch housing.
36. Install dial indicator on top of forward clutch backing plate, as shown in Figure 96, and zero the dial indicator.

### CHECKING FORWARD CLUTCH CLEARANCE
### CLEARANCE SHOULD BE .042" - .073"



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Figure 96

37. Forward clutch clearance should be: 1.06 mm (.042") to 1.86 mm (.073"). Change the "Selective" backing plate snap ring as necessary to achieve proper clutch clearance.
38. Install the one solid seal ring on the turbine shaft using J-45130 installation tool. Refer to Figure 98.
39. Install the three remaining scarf-cut seal rings as shown in Figure 98, ensuring that the scarfs are not overlapped.
40. Install the J-45130-3 re-sizing tool, as shown in Figure 97.
    ***Note: Leave the re-sizing tool in place until ready to install in transmission.***
41. Set completed forward/coast clutch housing aside for the final assembly process.

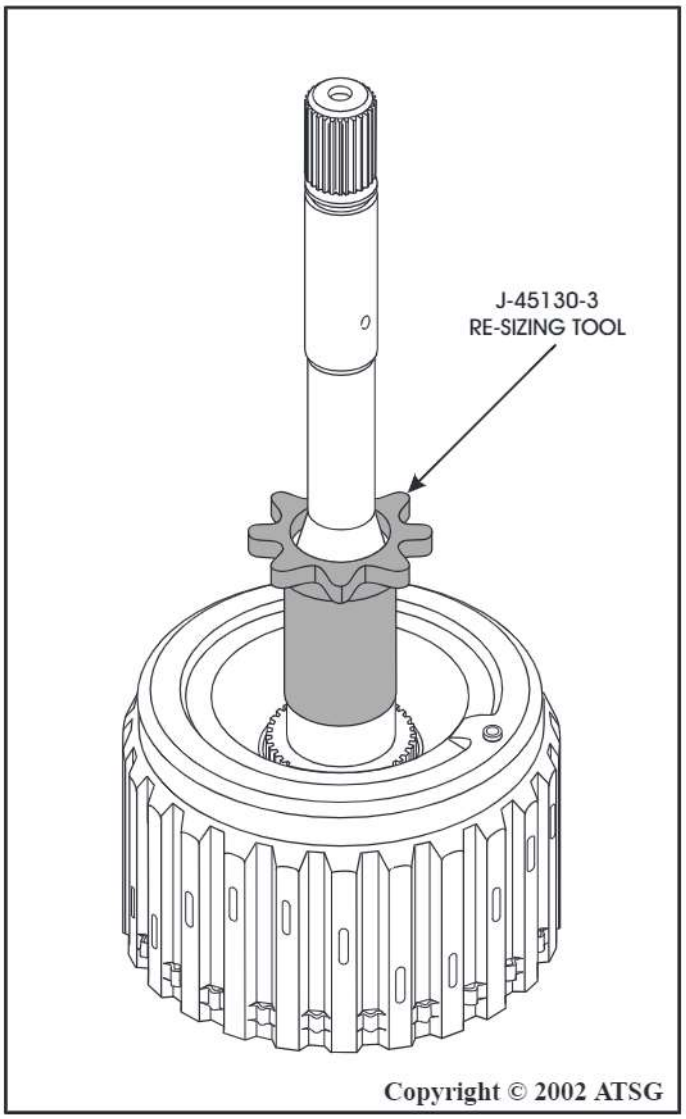



Figure 97

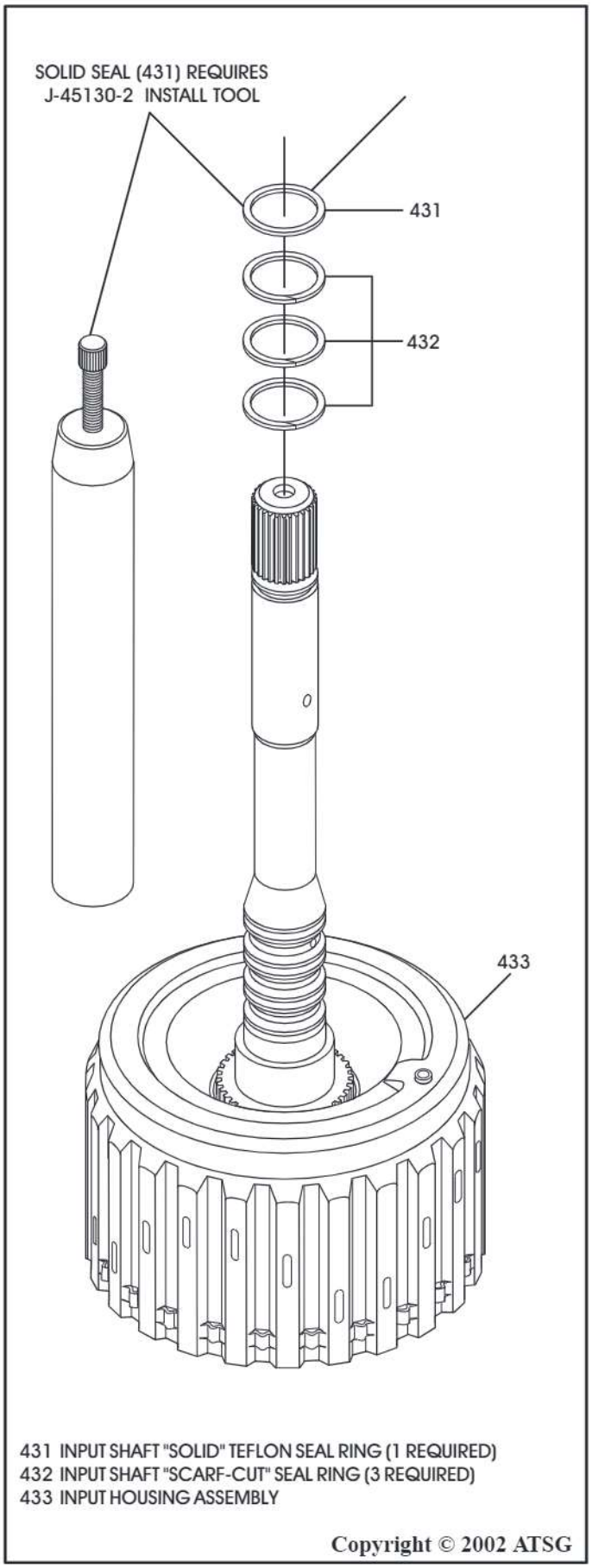
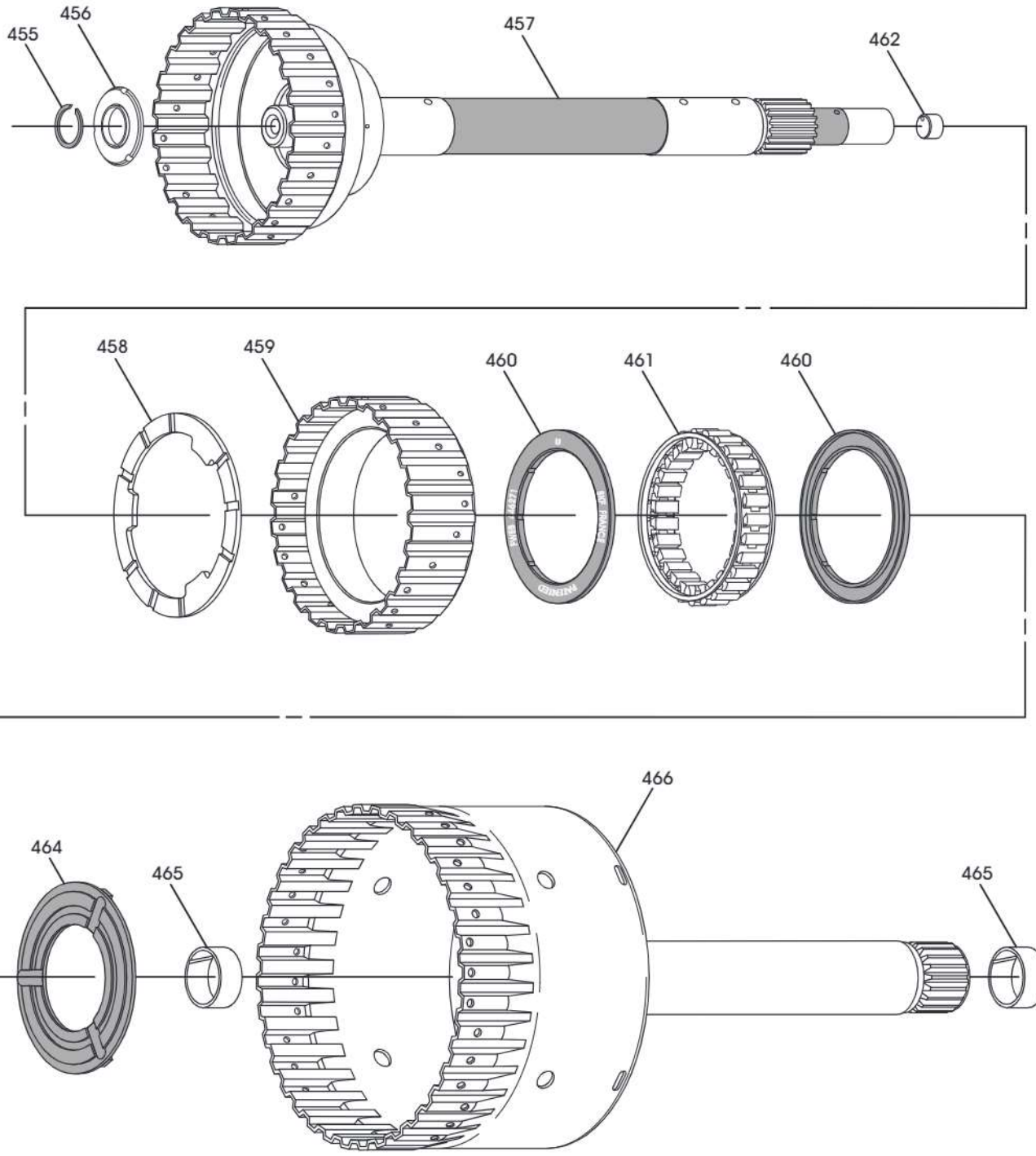



Figure 98

## FORWARD SPRAG AND DIRECT DRUM AND SHAFT ASSEMBLY




455 FORWARD SPRAG INNER RACE THRUST BEARING SNAP RING
456 FORWARD SPRAG INNER RACE THRUST BEARING
457 INPUT SUN GEAR SHAFT ASSEMBLY
458 FORWARD SPRAG OUTER RACE THRUST WASHER
459 FORWARD SPRAG OUTER RACE ASSEMBLY
460 FORWARD SPRAG END BEARINGS (2)
461 FORWARD SPRAG AND CAGE ASSEMBLY
462 ORIFICED CUP PLUG FOR LUBRICATION
464 OUTER RACE TO DIRECT DRUM THRUST WASHER
465 DIRECT DRUM AND SHAFT BUSHINGS (2)
466 DIRECT DRUM AND SHAFT ASSEMBLY

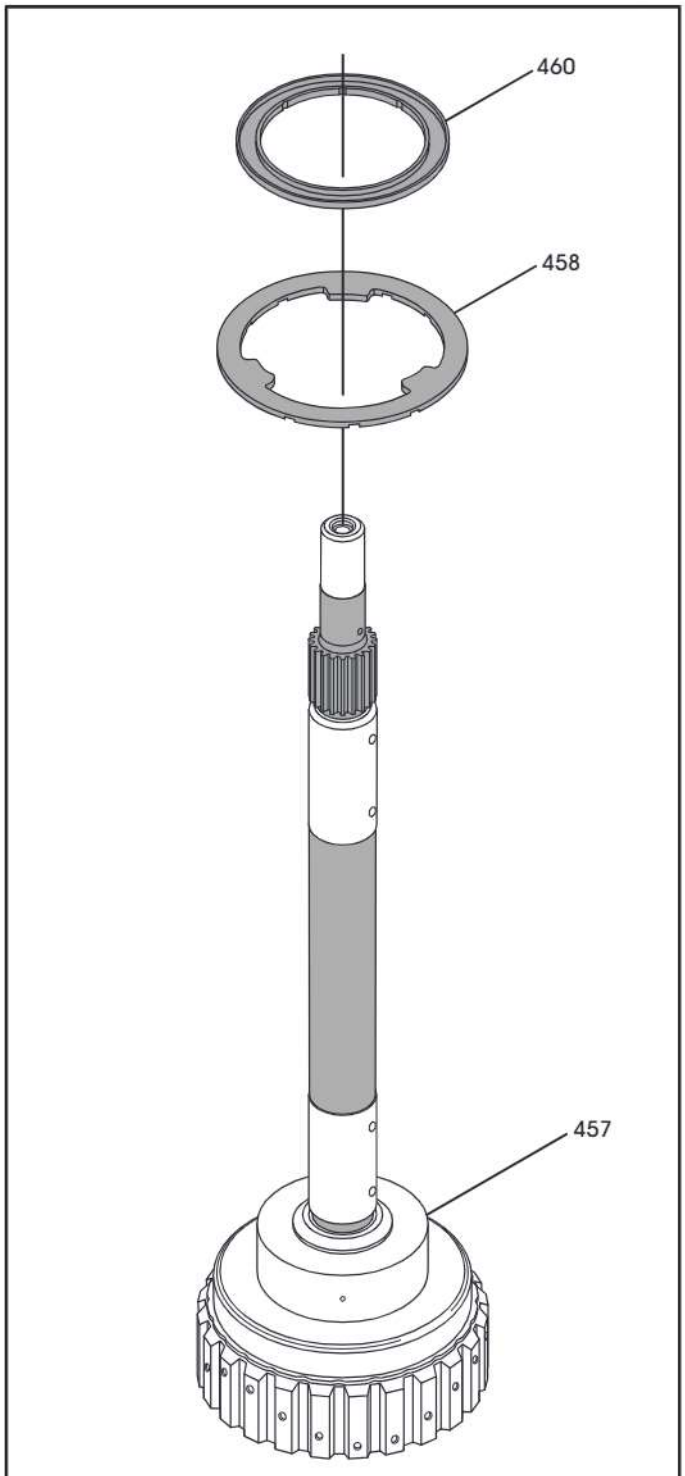
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Figure 99

## COMPONENT REBUILD

### FORWARD SPRAG ASSEMBLY

1. Dis-assemble the forward sprag assembly using Figure 99 as a guide.



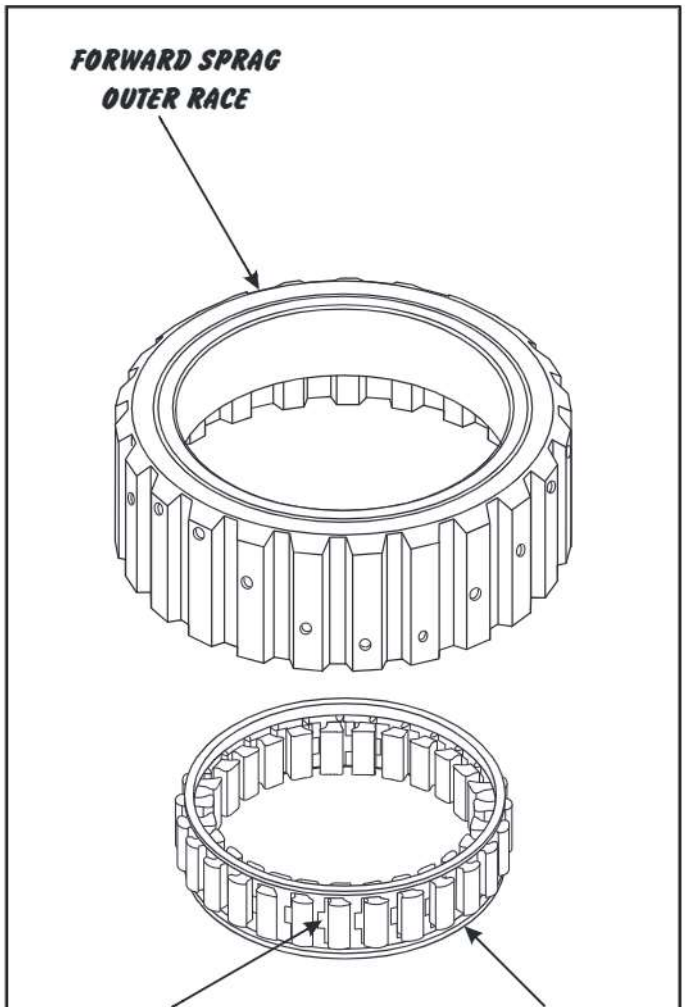

457 INPUT SUN GEAR SHAFT ASSEMBLY
458 FORWARD SPRAG OUTER RACE THRUST WASHER
460 FORWARD SPRAG END BEARING (2)

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Figure 100

2. Clean all forward sprag parts thoroughly and dry with compressed air.
3. Inspect all forward sprag parts thoroughly for any wear and/or damage. Replace as necessary.
4. Stand sun gear shaft up on the hub as shown in Figure 100, on a flat work surface.
5. Install thrust washer (458) on sun gear hub and shaft, as shown in Figure 100.
6. Install one forward sprag end bearing on sun gear hub and shaft, as shown in Figure 100.
7. Install the forward sprag cage assembly into the outer race ***exactly*** as shown in Figure 101, with the "windows" to the left, and ensure that the outer race is arranged as shown. Refer to Figure 101.

**Continued on Page 68**




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Figure 101

## COMPONENT REBUILD
## FORWARD SPRAG ASSEMBLY (CONT'D)

8. Install the pre-assembled forward sprag cage and outer race onto the inner race in direction shown in Figure 102, by rotating in a clockwise motion.
9. Install the other forward sprag end bearing in the direction shown in Figure 102, with the smooth side facing up.
10. Check the forward sprag for proper operation as shown in Figure 103.
    ***Note: Forward Sprag Outer Race should freewheel clockwise and lock counter-clockwise, as shown in Figure 103.***
11. Set the completed forward sprag and sun gear shaft assembly aside for final assembly.

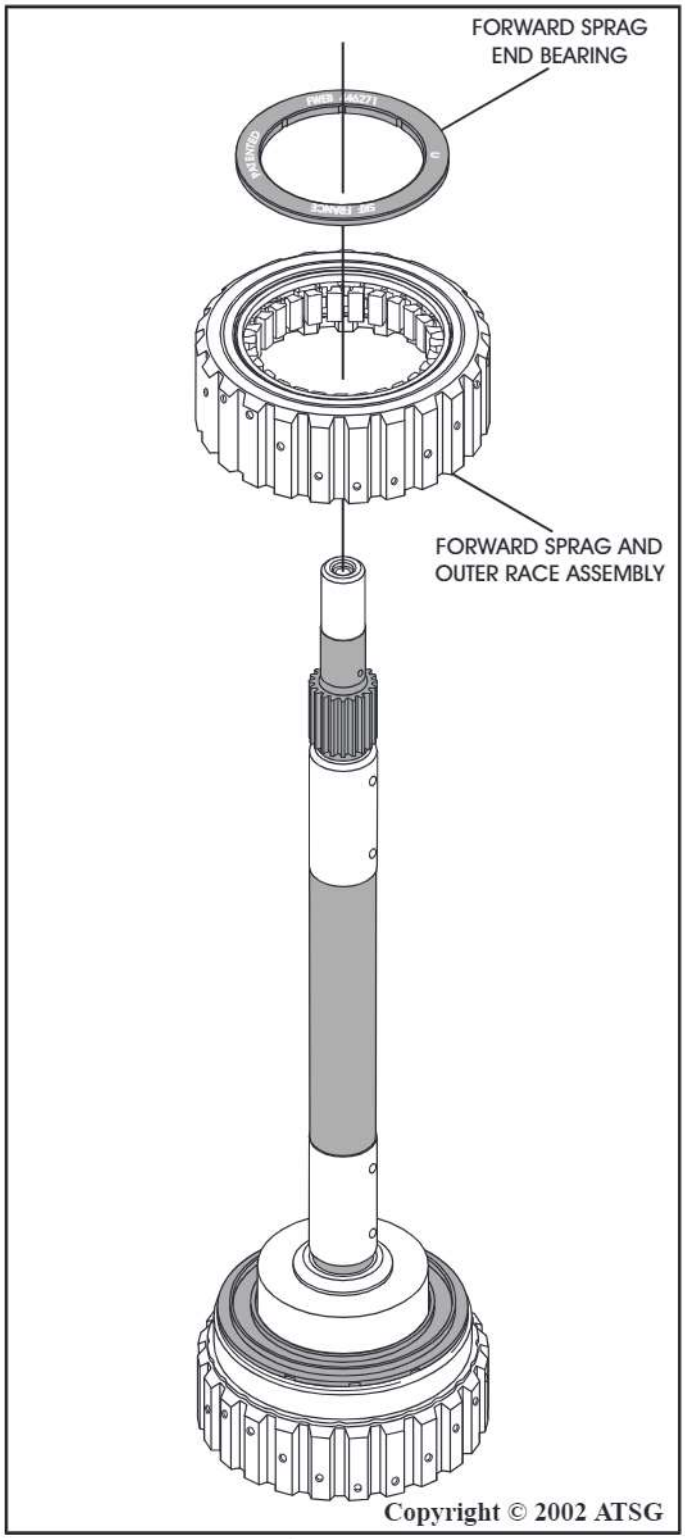



Figure 102

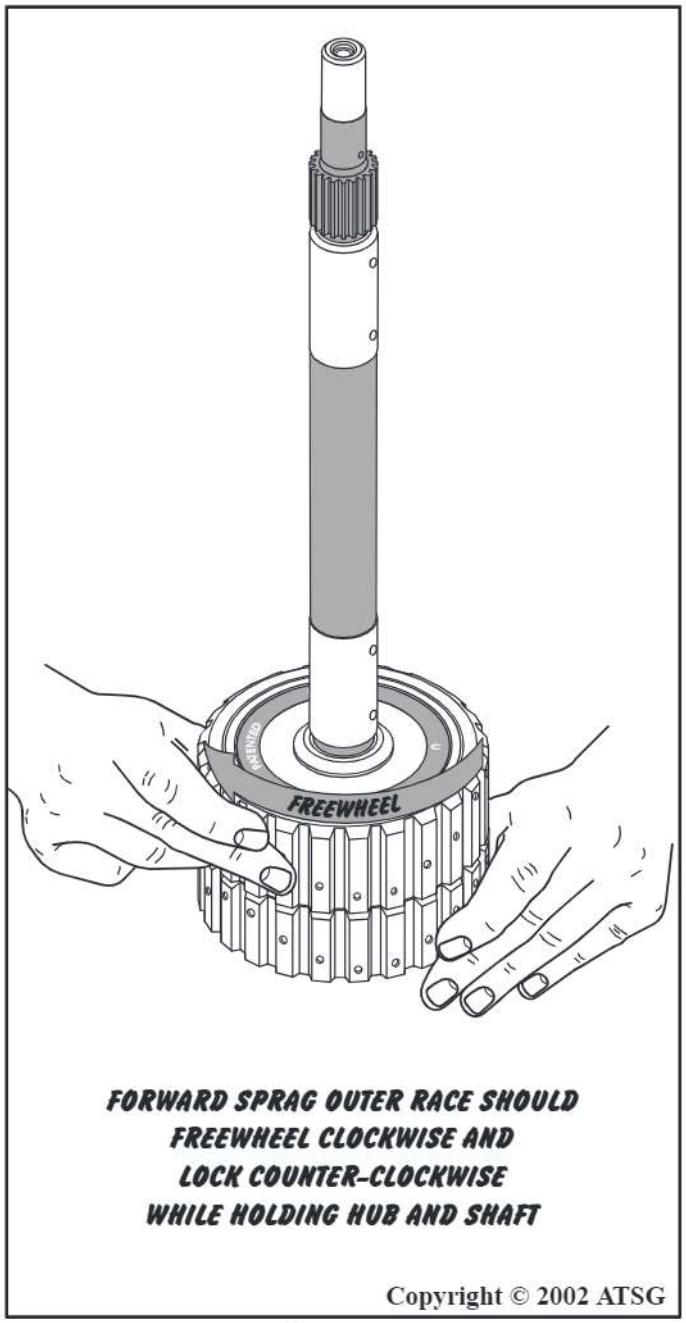
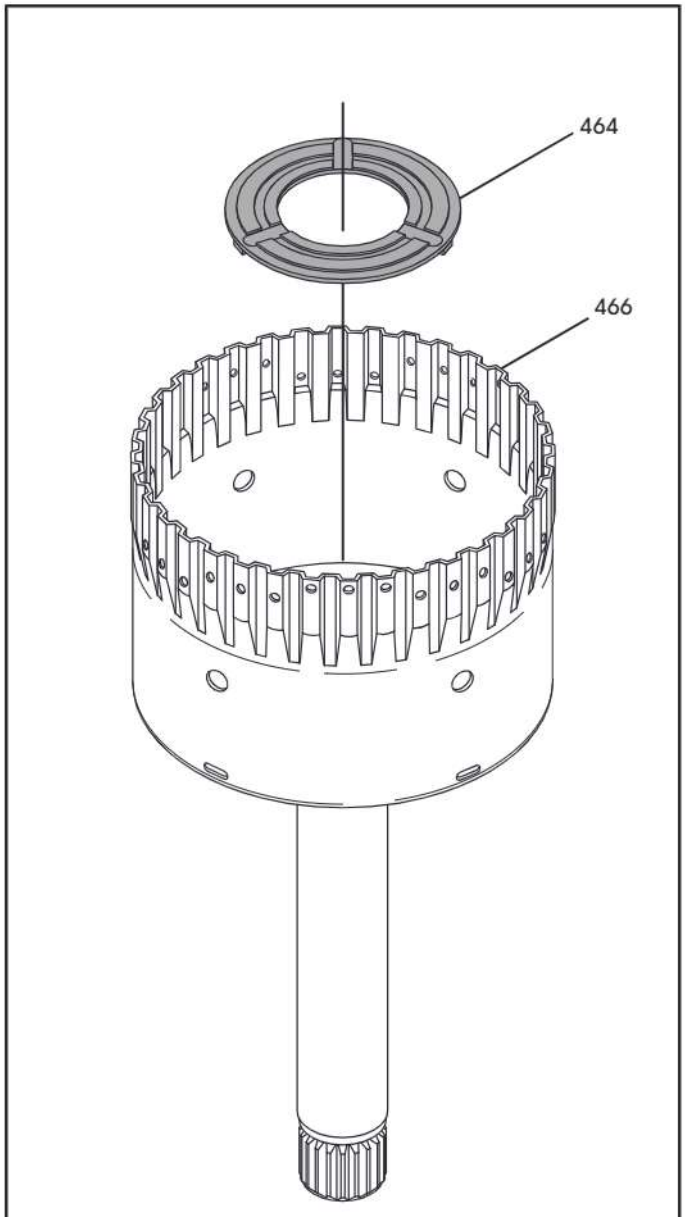



Figure 103

## COMPONENT REBUILD
### DIRECT CLUTCH HUB AND WASHER

1. Install the direct clutch hub to forward sprag outer race thrust washer into the direct clutch hub and shaft assembly in the direction shown in Figure 104, and retain with a small amount of Trans-Jel®.
2. Set the completed assembly aside for the final transmission assembly process.




464 OUTER RACE TO DIRECT DRUM THRUST WASHER
466 DIRECT CLUTCH HUB AND SHAFT ASSEMBLY

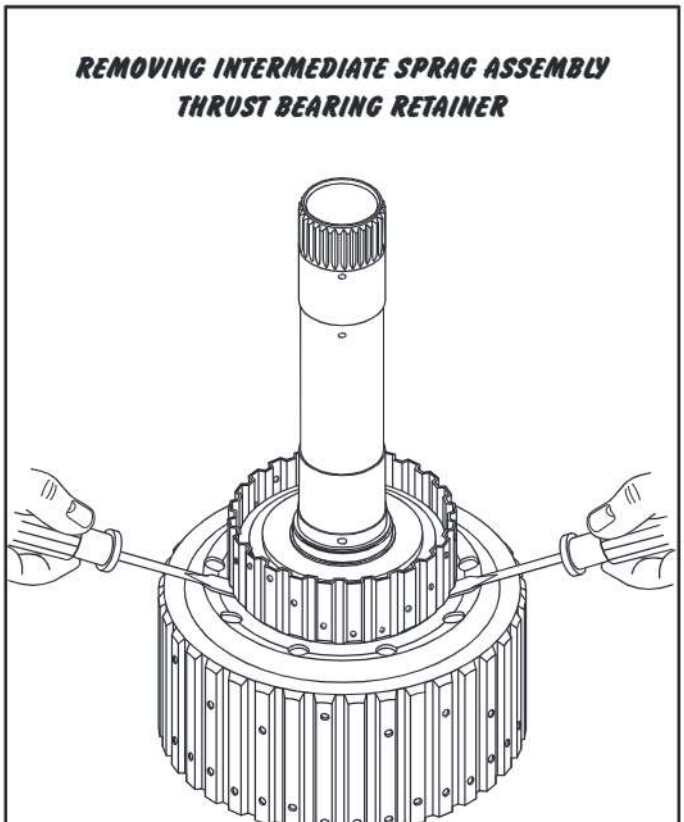
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Figure 104

## COMPONENT REBUILD
### O.D. CLUTCH HUB/INTERMEDIATE SPRAG

1. Place the overdrive clutch hub and intermediate sprag assembly on flat work surface, as shown in Figure 105.
2. The intermediate sprag outer race is held on with a pressed on metal retainer, as shown in Figure 105, and can be removed easily with 2 screwdrivers as shown in Figure 105.
3. After removing the metal retainer dis-assemble the remainder of the intermediate sprag using Figure 106 as a guide.
4. Clean all intermediate sprag parts thoroughly and dry with compressed air.
5. Inspect all intermediate sprag parts thoroughly for any wear and/or damage.

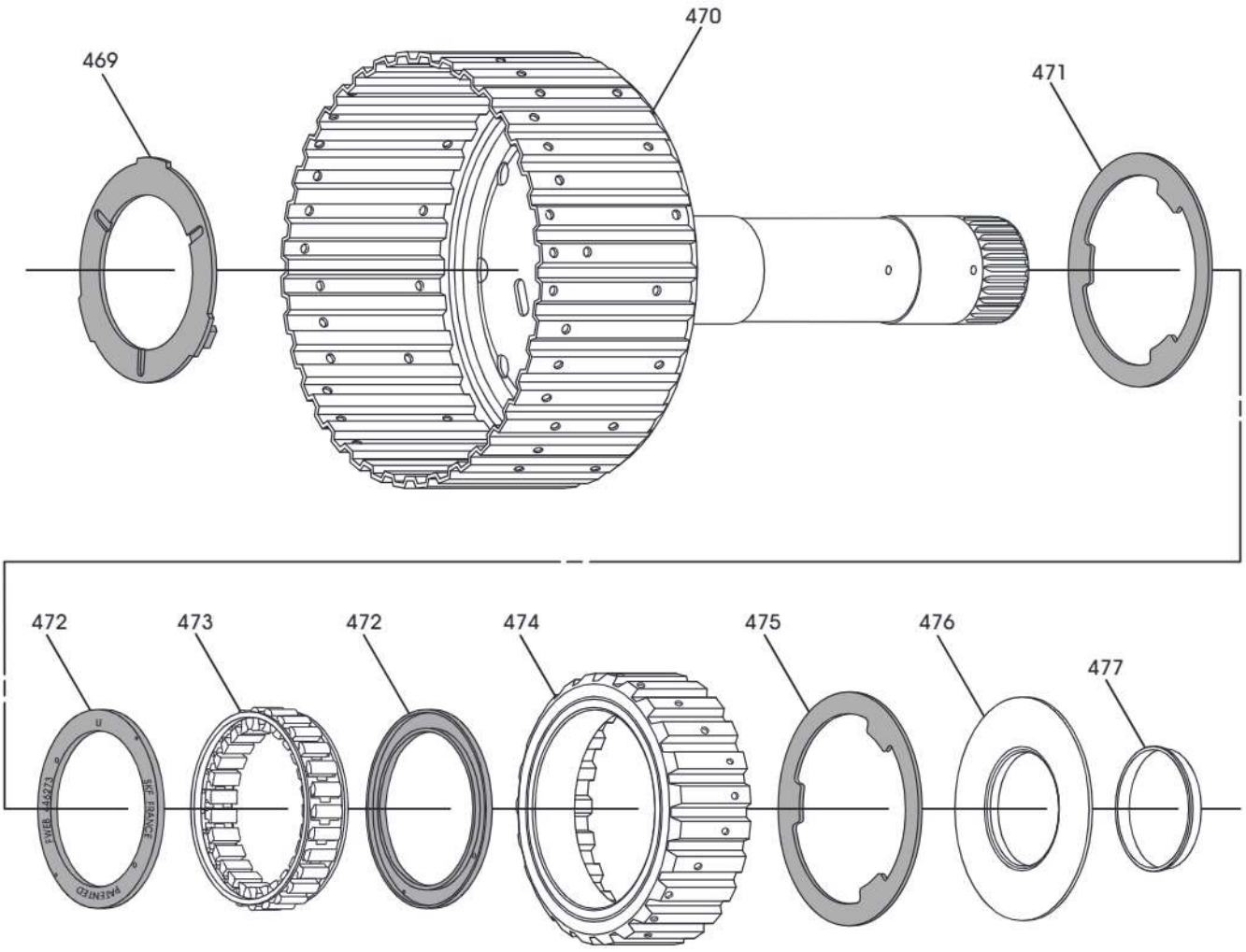
**Continued on Page 70**




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Figure 105

## INTERMEDIATE SPRAG ASSEMBLY




469 DIRECT CLUTCH HUB TO OVERDRIVE/REVERSE CLUTCH HUB THRUST WASHER
470 OVERDRIVE AND REVERSE CLUTCH HUB ASSEMBLY
471 INTERMEDIATE SPRAG FRONT THRUST WASHER
472 INTERMEDIATE SPRAG END BEARINGS
473 INTERMEDIATE SPRAG AND CAGE ASSEMBLY
474 INTERMEDIATE SPRAG OUTER RACE ASSEMBLY
475 INTERMEDIATE SPRAG REAR THRUST WASHER
476 INTERMEDIATE SPRAG THRUST BEARING ASSEMBLY
477 INTERMEDIATE SPRAG THRUST BEARING RETAINER

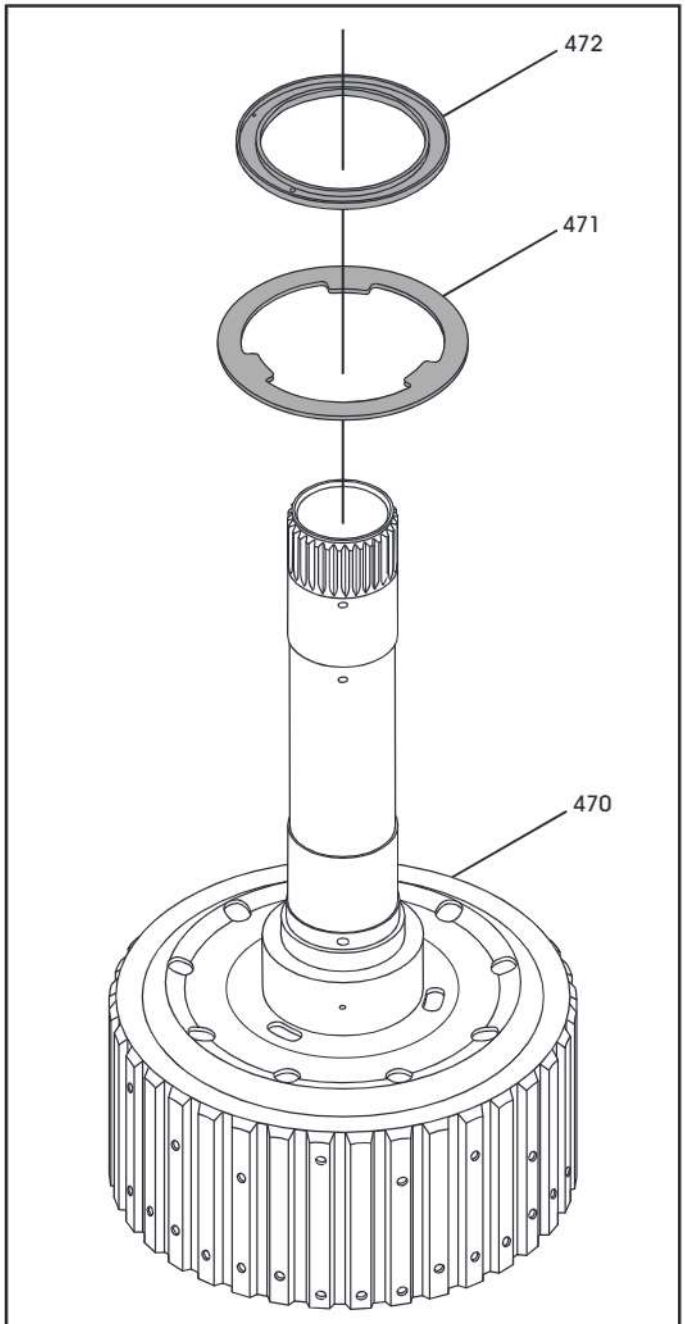
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Figure 106

## O.D. CLUTCH HUB/INTERMEDIATE SPRAG (CONT'D)

6. Place the overdrive clutch hub on a flat surface with shaft facing up, as shown in Figure 107.
7. Install intermediate sprag outer race thrust washer, as shown in Figure 107.
8. Install one intermediate sprag end bearing on top of the thrust washer in the direction shown in Figure 107.
9. Install the intermediate sprag cage assembly in the outer sprag race ***exactly*** as shown in Figure 108, with the "windows" to the left, and ensure that the outer race is arranged as shown. Refer to Figure 108.

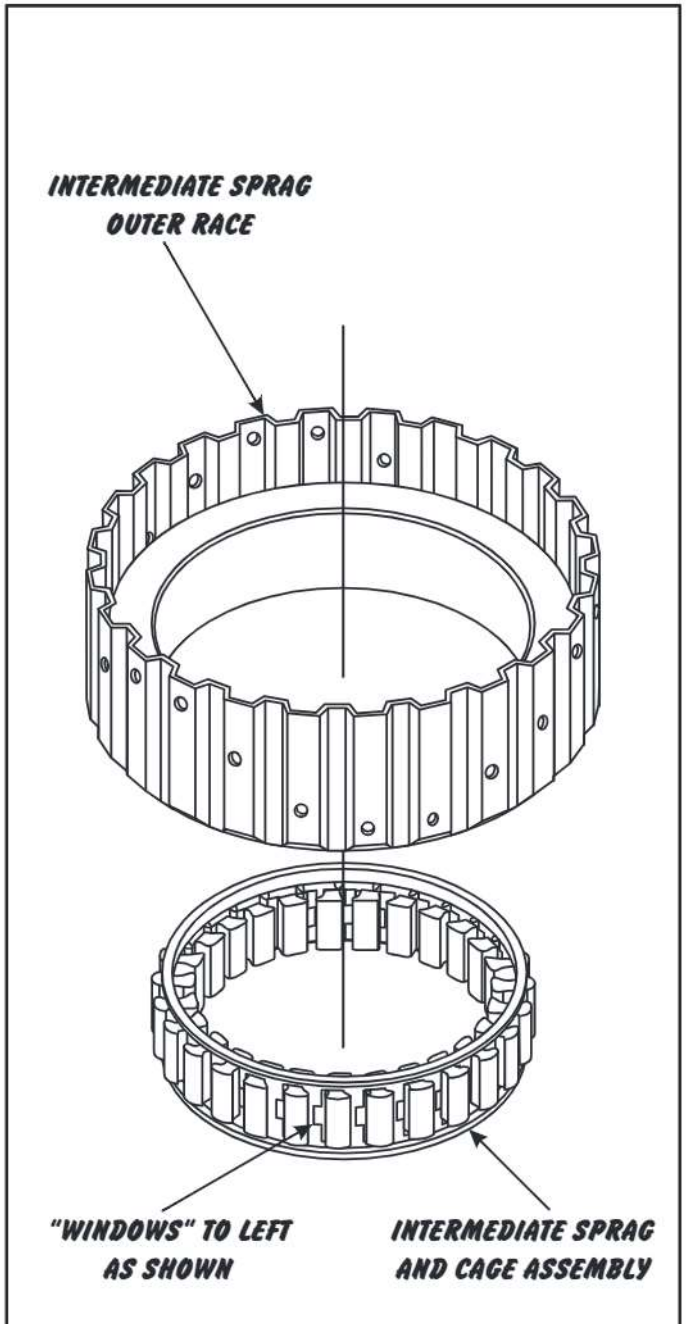
**Continued on Page 72**




470 OVERDRIVE CLUTCH HUB ASSEMBLY
471 INTERMEDIATE SPRAG FRONT THRUST WASHER
472 INTERMEDIATE SPRAG END BEARINGS (2 REQUIRED)

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Figure 107




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Figure 108

## O.D. CLUTCH HUB/INTERMEDIATE SPRAG (CONT'D)

10. Install the pre-assembled intermediate sprag cage and outer race assembly onto the inner race, in the direction shown in Figure 109, by rotating with a clockwise motion.

11. Ensure now that the outer race freewheels in a clockwise direction and holds in the counter clockwise direction, as shown in Figure 110.

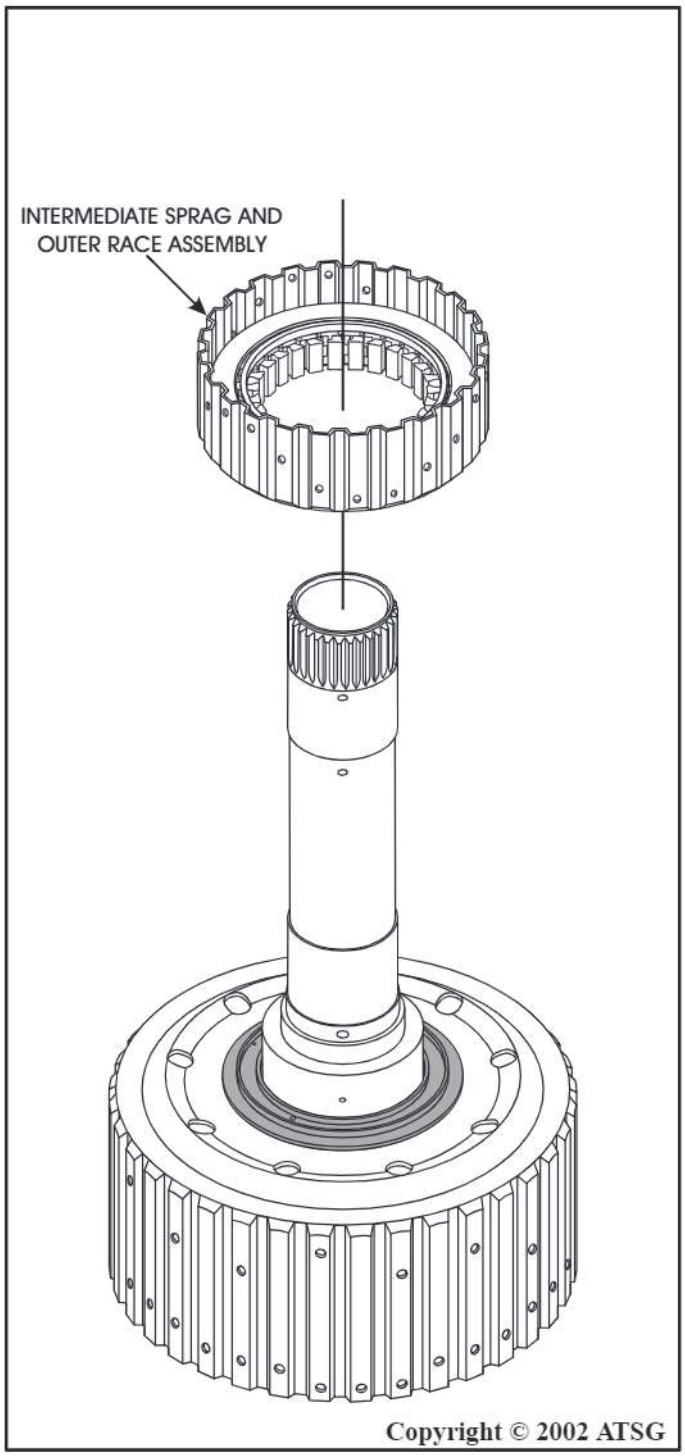



Figure 109

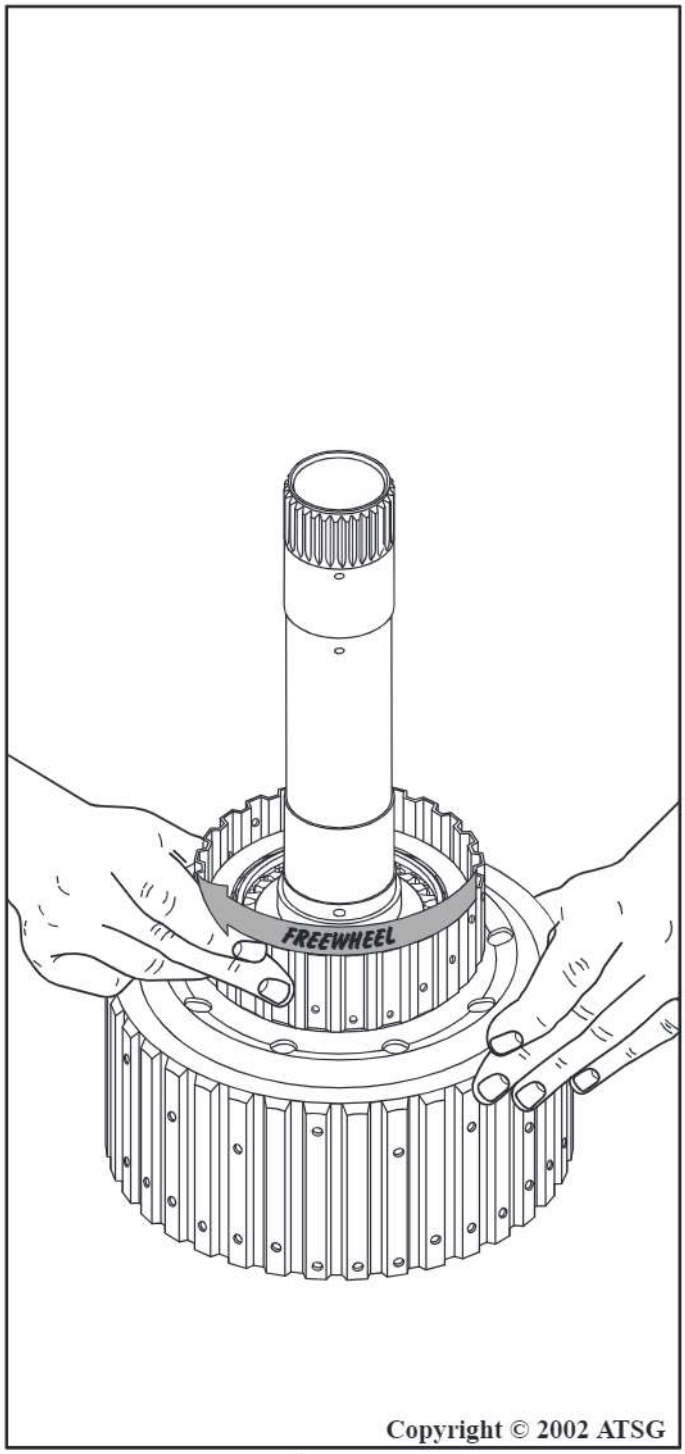
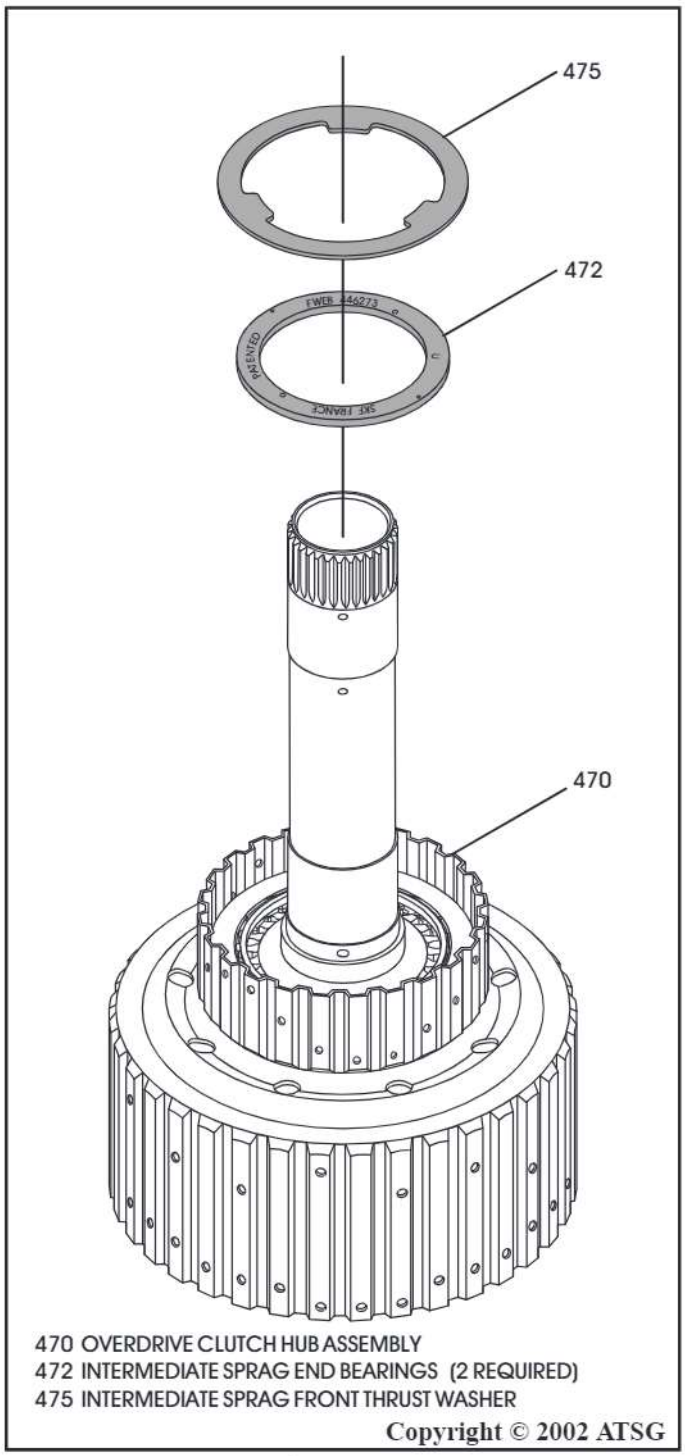



Figure 110

12. Install the other intermediate sprag end bearing in the direction shown in Figure 111, with the smooth side facing up.
13. Install another intermediate sprag thrust washer on top of the end bearing (See Figure 111).
14. Install the intermediate sprag thrust bearing, as shown in Figure 112 with the lip facing up, on top of the thrust washer.
15. Install a "New" retainer (477) on top of thrust bearing, as shown in Figure 112.

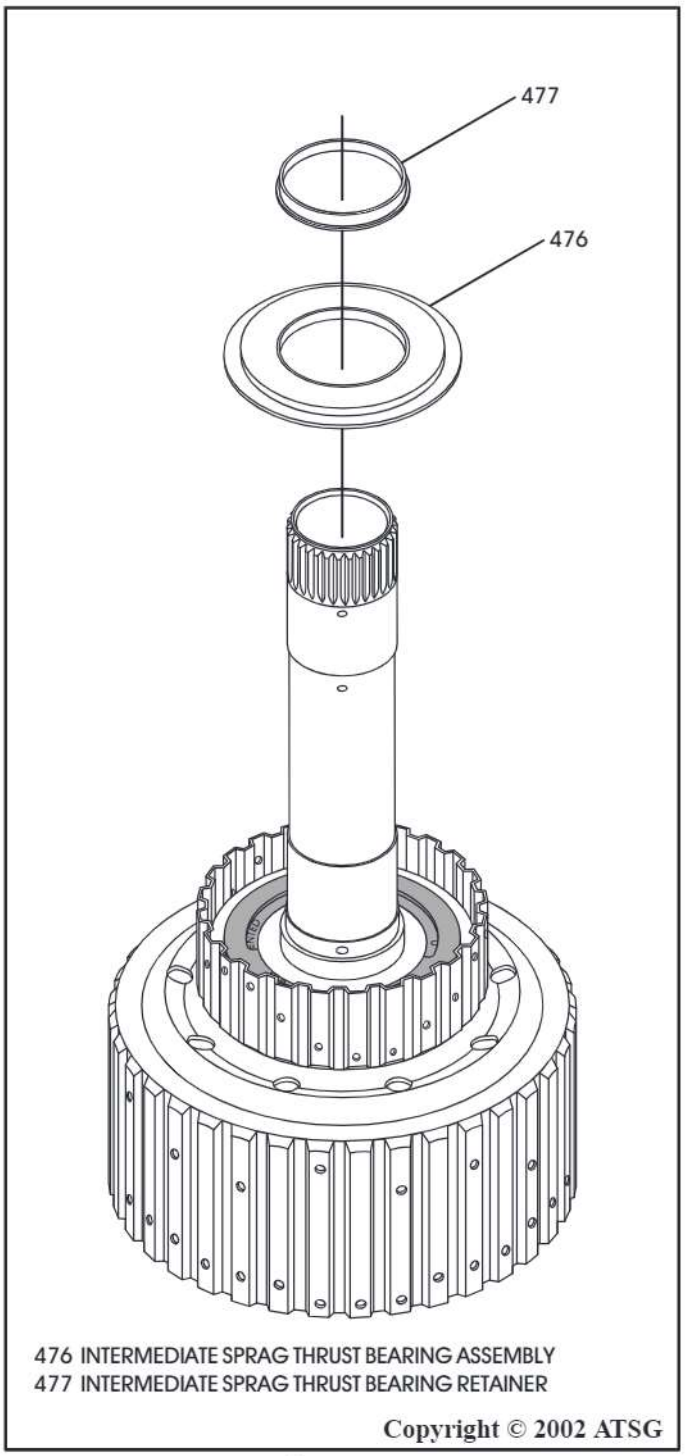
**Continued on Page 74**




470 OVERDRIVE CLUTCH HUB ASSEMBLY
472 INTERMEDIATE SPRAG END BEARINGS (2 REQUIRED)
475 INTERMEDIATE SPRAG FRONT THRUST WASHER

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Figure 111




476 INTERMEDIATE SPRAG THRUST BEARING ASSEMBLY
477 INTERMEDIATE SPRAG THRUST BEARING RETAINER

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Figure 112

### O.D. CLUTCH HUB/INTERMEDIATE SPRAG (CONT'D)

16. Ensure that the "New" retainer is fully seated, shown in Figure 113.
17. Check for proper sprag freewheel one more time referring to Figure 110.
18. Turn the assembly over and install the thrust washer, as shown in Figure 114, Retain the thrust washer with small amount of Trans-Jel®.
19. Set the completed overdrive clutch hub and intermediate sprag assembly aside for the final transmission assembly process.

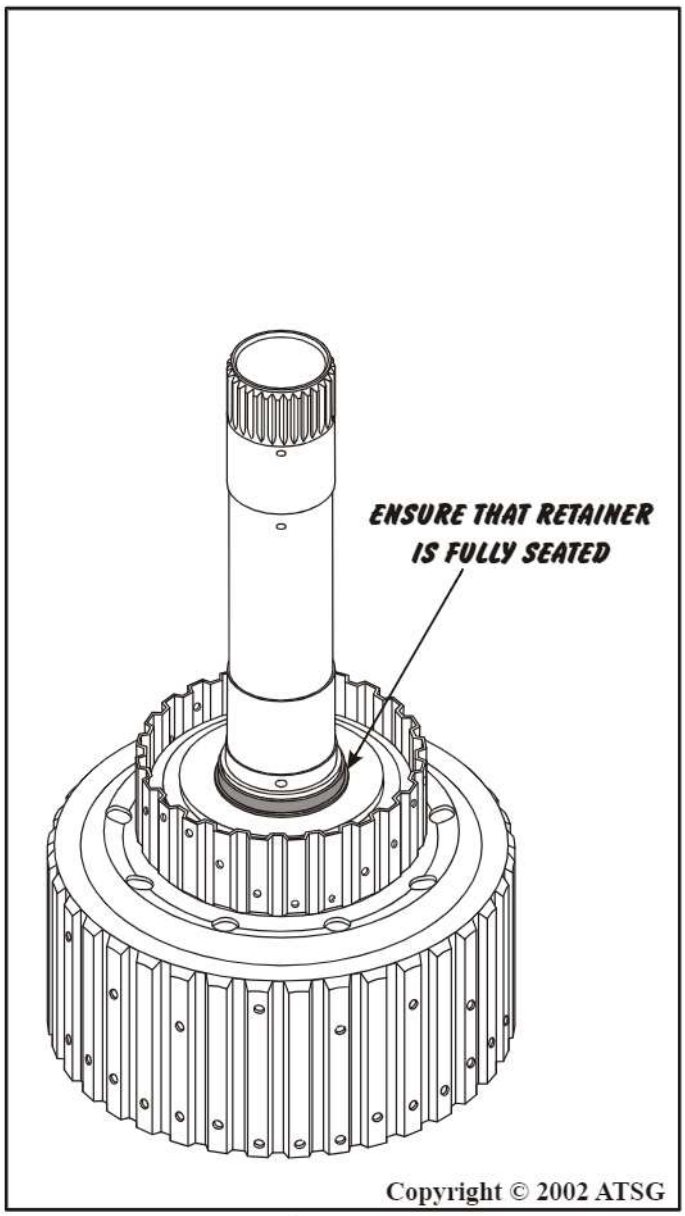



Figure 113

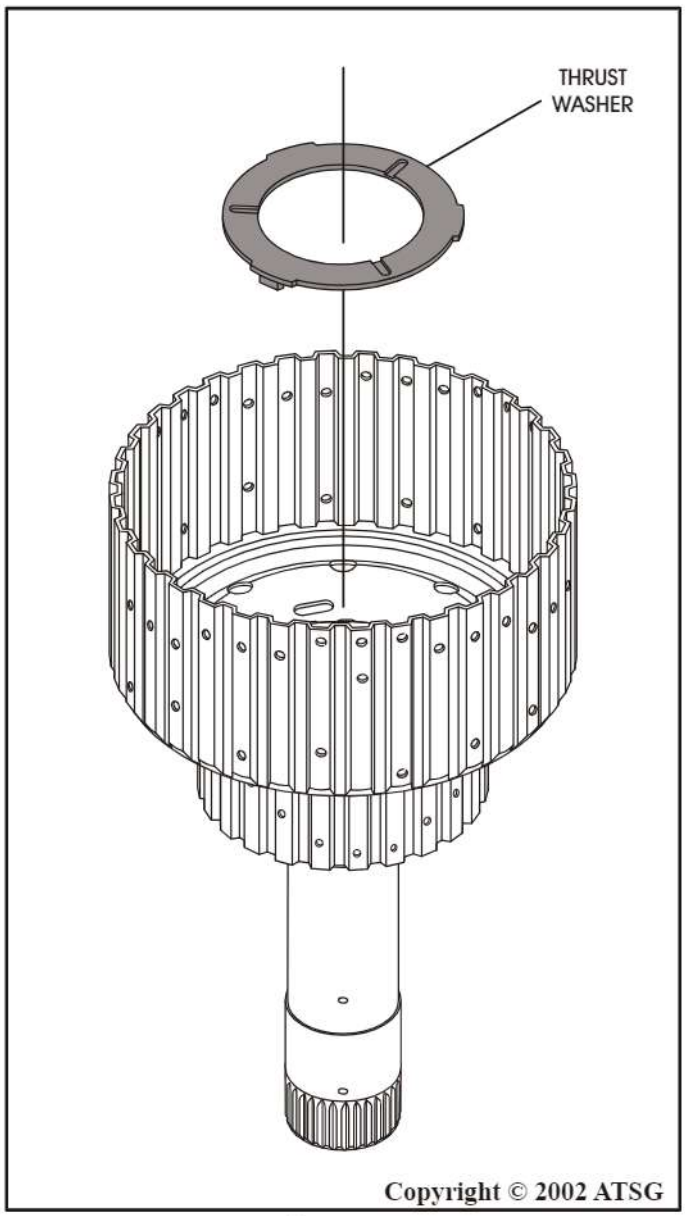
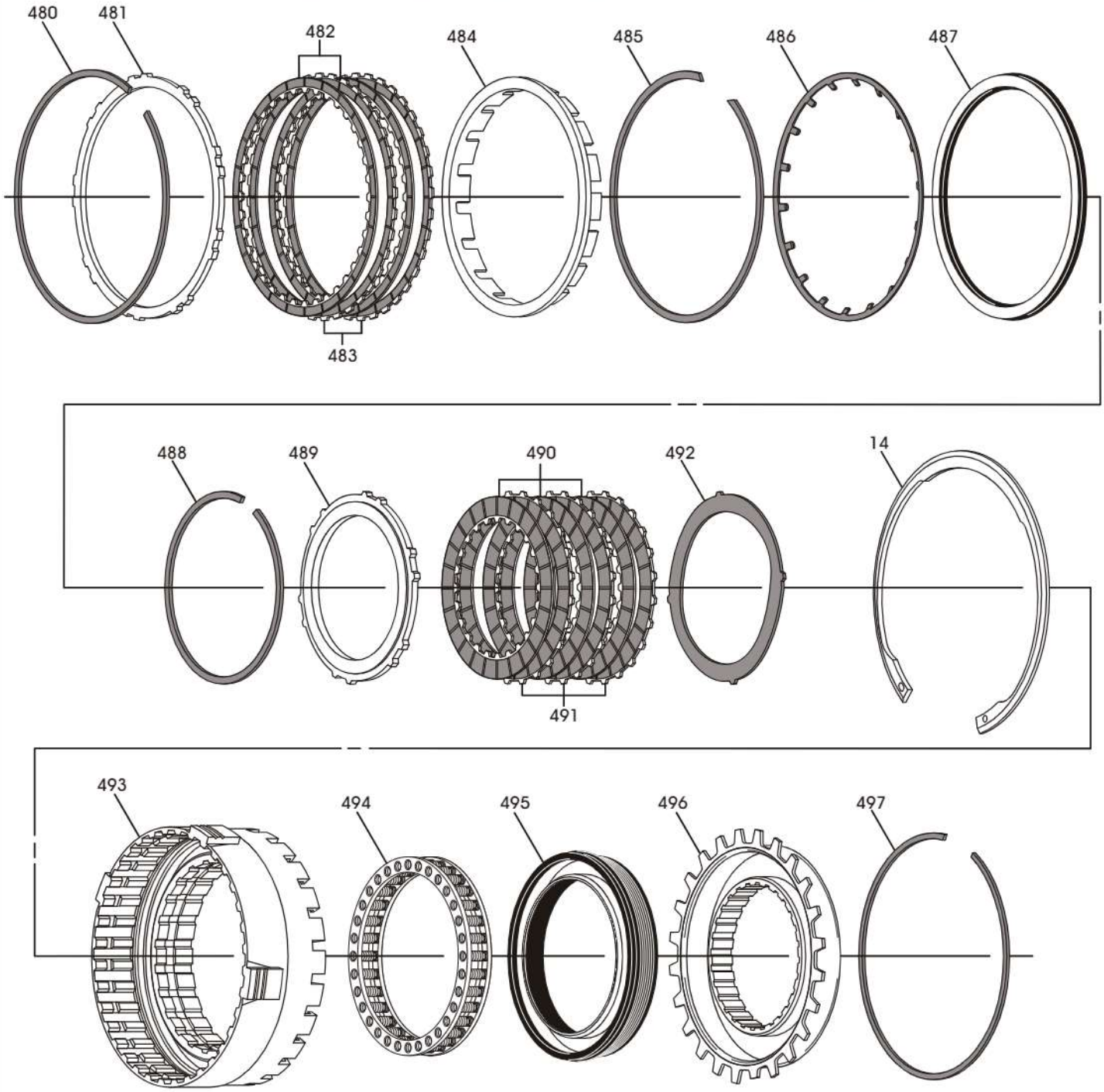



Figure 114

## INTERMEDIATE AND OVERDRIVE CLUTCH HOUSING ASSEMBLY



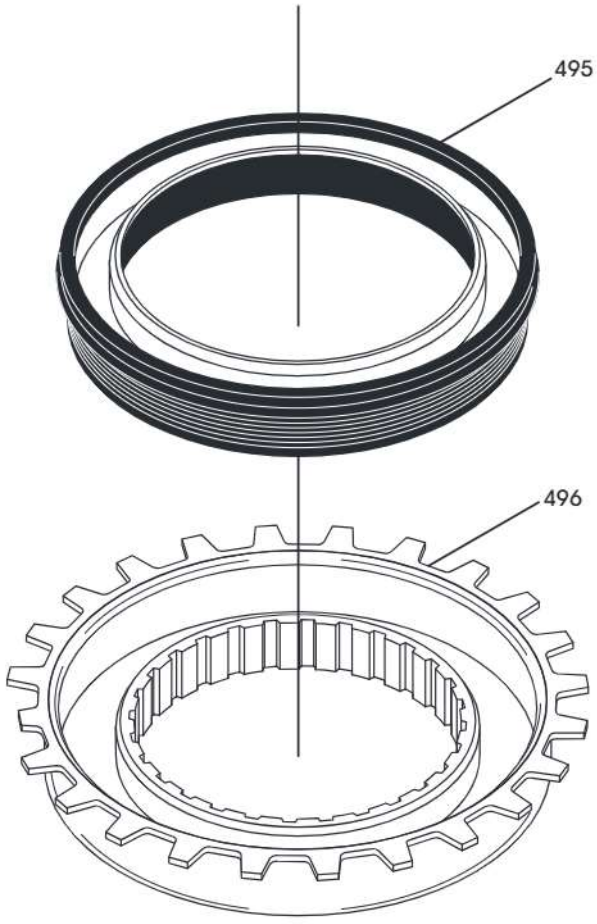

14 INT./O.D. HOUSING TO MAIN CASE SNAP RING (SELECTIVE)
480 OVERDRIVE CLUTCH BACKING PLATE SNAP RING (SELECTIVE)
481 OVERDRIVE CLUTCH BACKING PLATE
482 OVERDRIVE CLUTCH "INSIDE SPLINE" SINGLE SIDED PLATES (2)
483 OVERDRIVE CLUTCH "OUTSIDE SPLINE" SINGLE SIDED PLATES (2)
484 OVERDRIVE CLUTCH APPLY RING SPACER
485 OVERDRIVE CLUTCH BELLVILLE RETURN SPRING SNAP RING
486 OVERDRIVE CLUTCH BELLVILLE RETURN SPRING
487 OVERDRIVE CLUTCH PISTON ASSEMBLY
488 INTERMEDIATE CLUTCH BACKING PLATE SNAP RING (SELECTIVE)
489 INTERMEDIATE CLUTCH BACKING PLATE
490 INTERMEDIATE CLUTCH "INSIDE SPLINE" SINGLE SIDED PLATES (3)
491 INTERMEDIATE CLUTCH "OUTSIDE SPLINE" SINGLE SIDED PLATES (3)
492 INTERMEDIATE CLUTCH "WAVE" PLATE
493 INTERMEDIATE/OVERDRIVE CLUTCH HOUSING
494 INTERMEDIATE CLUTCH RETURN SPRING ASSEMBLY
495 INTERMEDIATE CLUTCH PISTON ASSEMBLY
496 INTERMEDIATE CLUTCH PISTON HOUSING
497 INTERMEDIATE CLUTCH PISTON HOUSING RETAINING RING

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Figure 115

## COMPONENT REBUILD
## O.D. AND INTERMEDIATE CLUTCH HOUSING

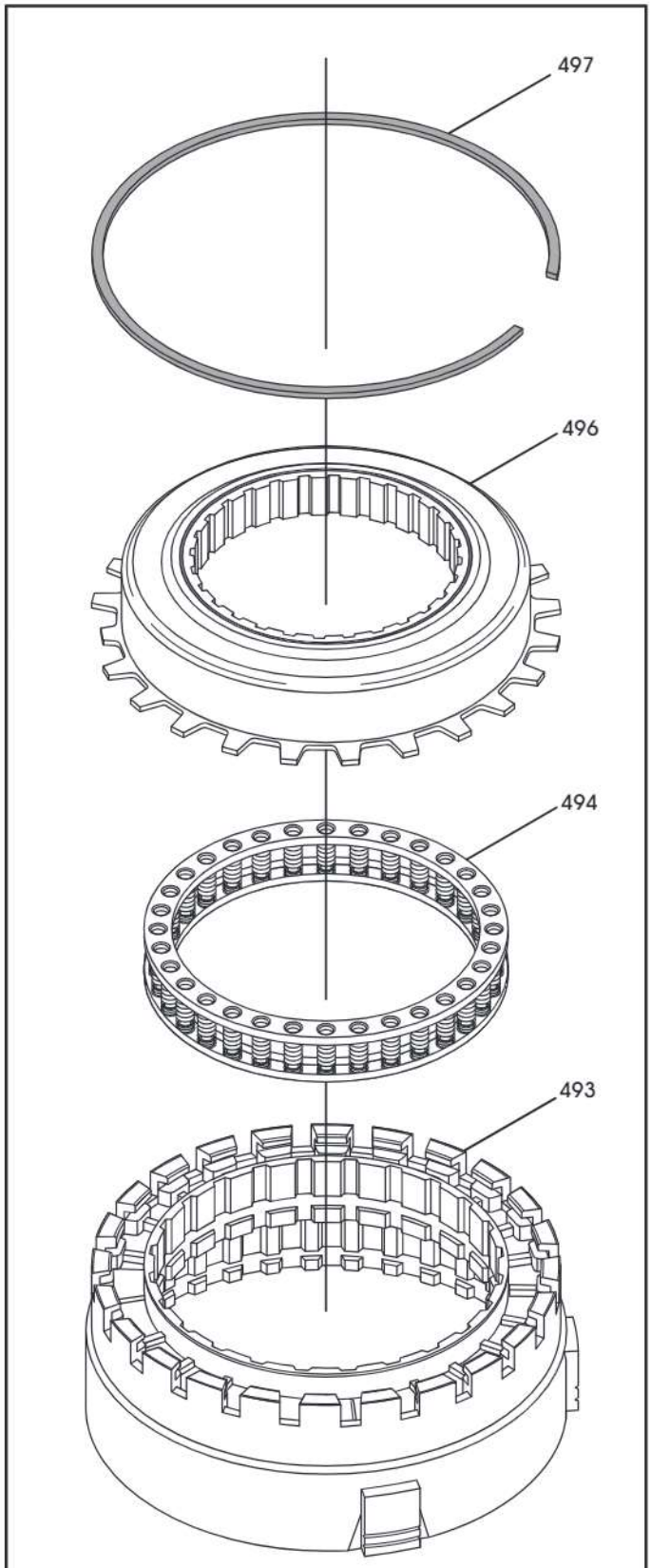
1. Dis-assemble the overdrive and intermediate clutch housing assembly, using Figure 115 as a guide.
2. Clean all overdrive and intermediate clutch parts thoroughly and dry with compressed air.
3. Inspect all overdrive and intermediate clutch parts thoroughly for the following:
   - o Plugged feed passages
   - o Worn or damaged splines
   - o Damaged or worn springs
   - o Damaged or worn pistons
   - o Damaged or worn clutch plates
4. Lubricate molded intermediate clutch piston with small amount of Trans-Jel® and install it into intermediate clutch housing with rotating motion, as shown in Figure 116.




495 INTERMEDIATE CLUTCH MOLDED PISTON ASSEMBLY
496 INTERMEDIATE CLUTCH PISTON HOUSING

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Figure 116



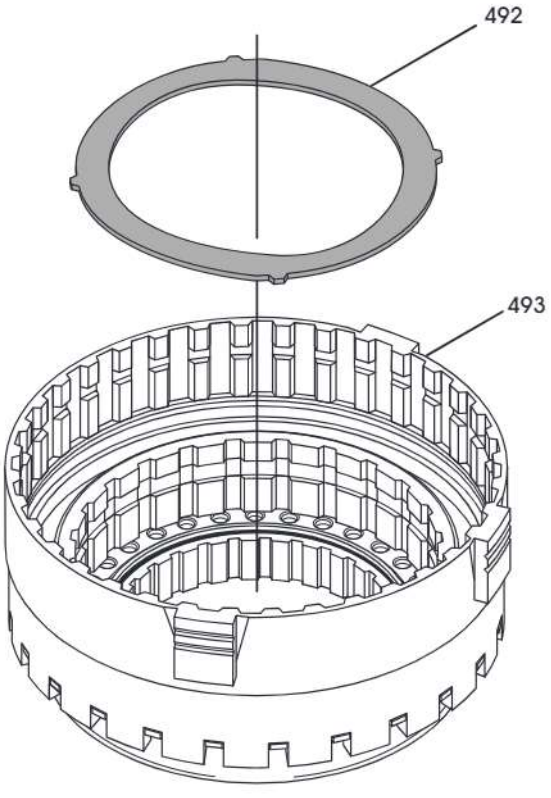

493 INTERMEDIATE/OVERDRIVE CLUTCH HOUSING
494 INTERMEDIATE CLUTCH RETURN SPRING ASSEMBLY
496 PRE-ASSEMBLED INTERMEDIATE CLUTCH PISTON HOUSING
497 INTERMEDIATE CLUTCH PISTON HOUSING RETAINING RING

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Figure 117

5. Install the intermediate clutch return spring assembly into housing, as shown in Figure 117.
6. Install pre-assembled intermediate clutch piston and housing assembly on top of return spring in direction shown in Figure 117.
7. Compress intermediate housing and the return spring using a foot press, and install snap ring, as shown in Figure 117.
8. Turn overdrive housing over and install "Wave" plate, as shown in Figure 118.
9. Install the intermediate clutch "single sided" plates beginning with an outside spline plate first and alternating with inside spline plates until you have installed 3 of each, as shown in Figure 119.
   ***Note: Lined side must be installed facing up as shown in Figure 119. Clutch plate amounts may vary by model.***
10. Install the intermediate clutch backing plate, as shown in Figure 119.

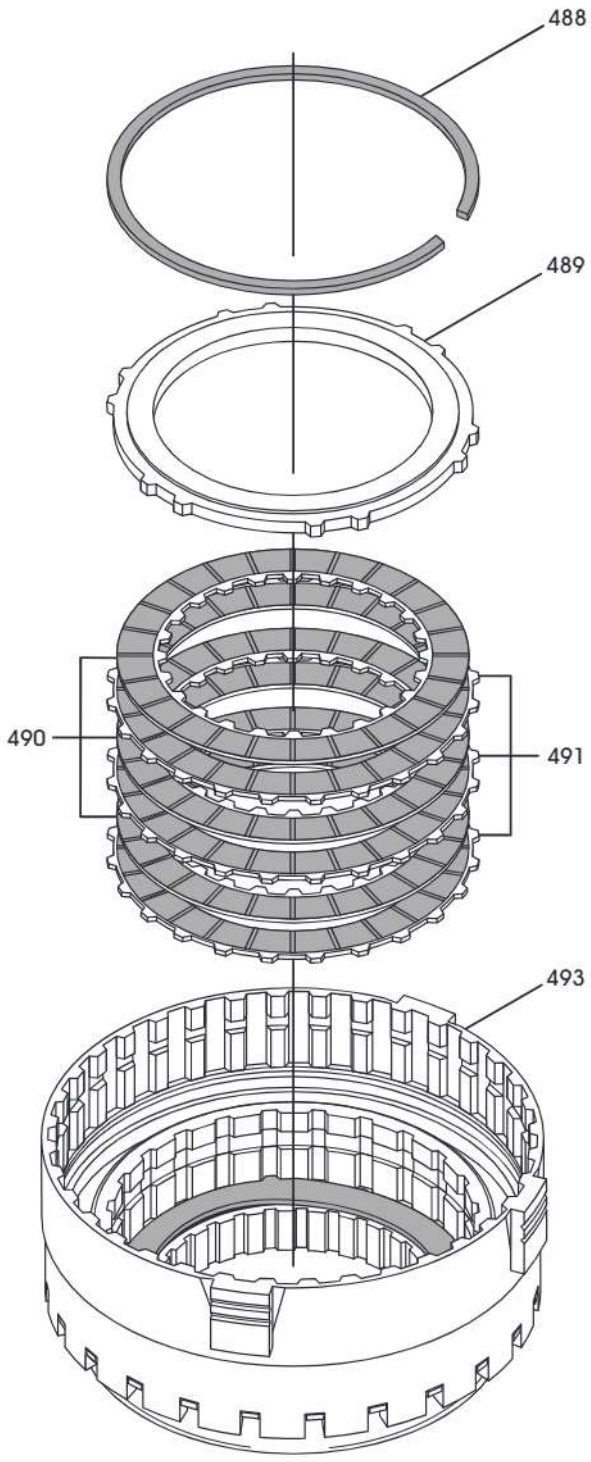
**Continued on Page 78**




492 INTERMEDIATE CLUTCH "WAVE" PLATE
493 INTERMEDIATE/OVERDRIVE CLUTCH HOUSING

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Figure 118




488 INTERMED. CLUTCH BACKING PLATE SNAP RING (SELECTIVE)
489 INTERMEDIATE CLUTCH BACKING PLATE
490 INTERMED. CLUTCH "INSIDE SPLINE" S.S. PLATES (3)
491 INTERMED. CLUTCH "OUTSIDE SPLINE" S.S. PLATES (3)
493 INTERMEDIATE/OVERDRIVE CLUTCH HOUSING

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Figure 119

## COMPONENT REBUILD
## O.D. AND INTERMEDIATE CLUTCH HOUSING CONT'D)

11. Install the "Selective" backing plate snap ring as shown in Figure 119, and ensure that snap ring is fully seated against the top of snap ring groove in the housing.
12. Install dial indicator on top of the intermediate clutch backing plate, as shown in Figure 120, and zero the dial indicator.
13. Intermediate clutch clearance should be: 0.78 mm (.031") to 1.58 mm (.062"). Change the "Selective" backing plate snap ring as necessary to achieve proper clutch clearance.
14. Install J-45135 lip seal protector, as shown in Figure 121 to install overdrive clutch piston.
    ***Note: This tool is mandatory to prevent damage to the O.D. piston seals.***
15. Lubricate molded overdrive clutch piston seals with small amount of Trans-Jel® and install the overdrive clutch piston into the housing, as shown in Figure 122.
16. Remove the J-45135 lip seal protector.

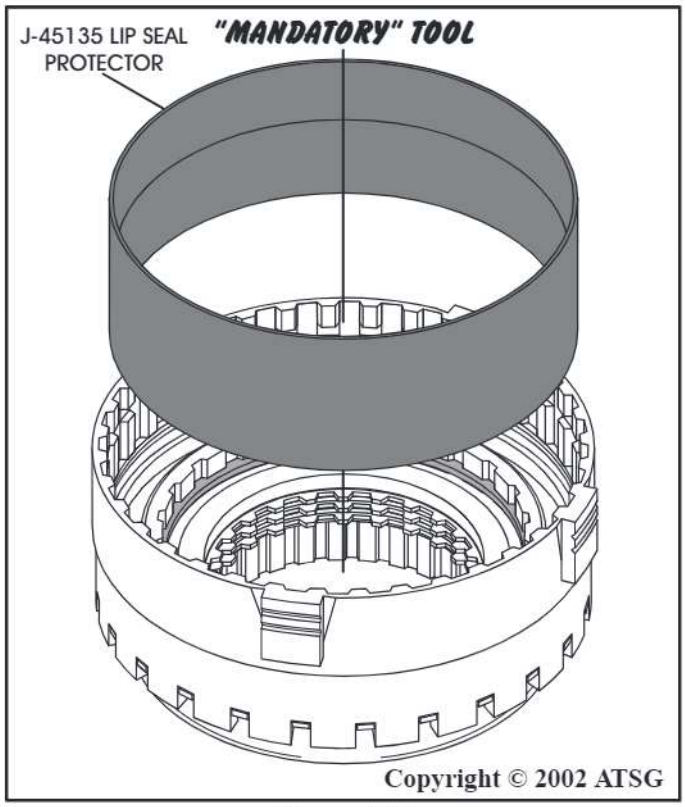



Figure 121

**Continued on Page 79**

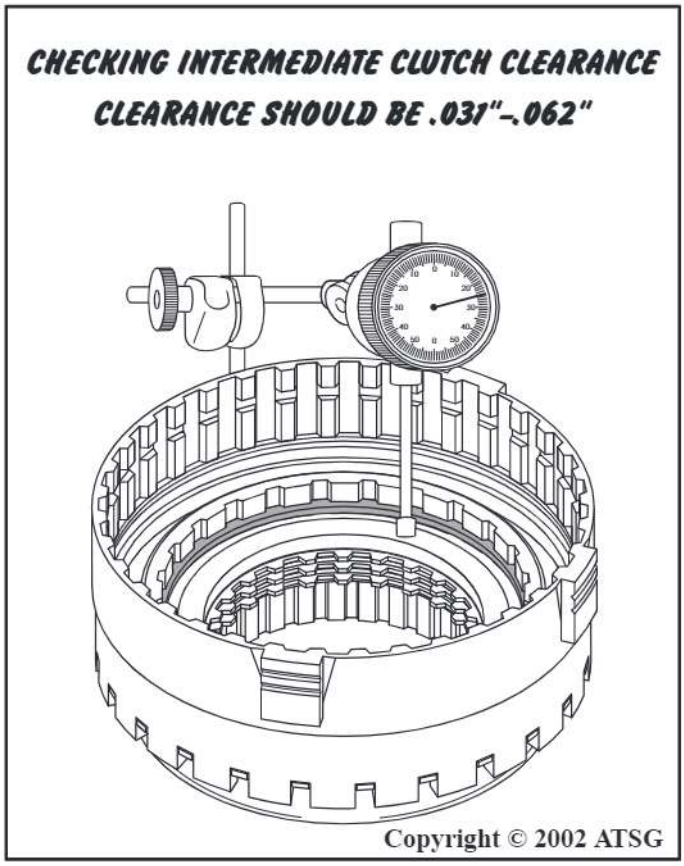



Figure 120

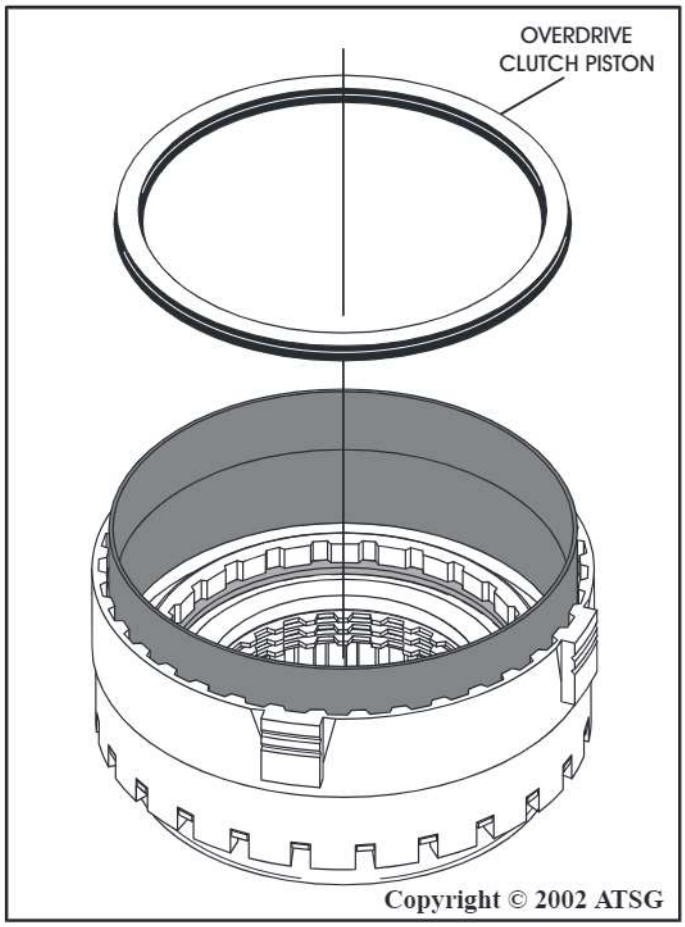
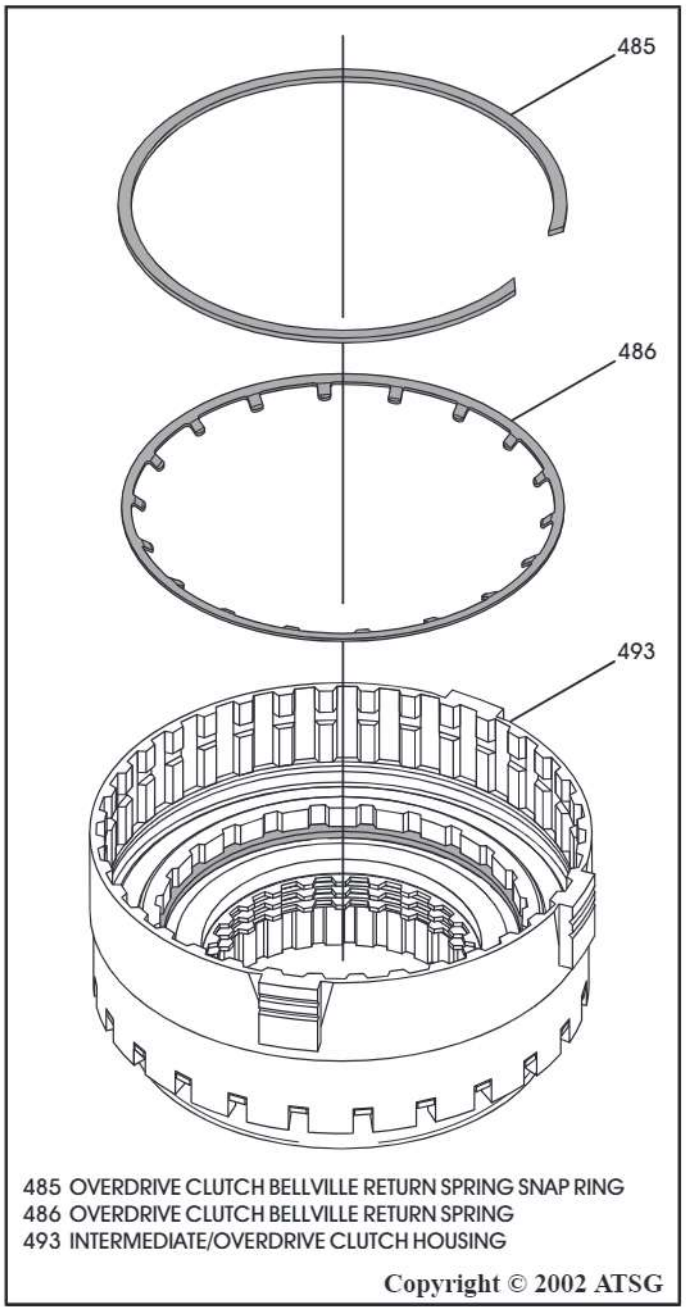



Figure 122

### O.D. AND INTERMEDIATE CLUTCH HOUSING (CONT'D)

17. Install the "Bellville" overdrive clutch piston return spring (486), as shown in Figure 123.
18. Using your foot press and J-44764 spring compressor adapter, as shown in Figure 124, compress the return spring and install the snap ring.
19. Install the overdrive clutch apply ring spacer, as shown in Figure 125.

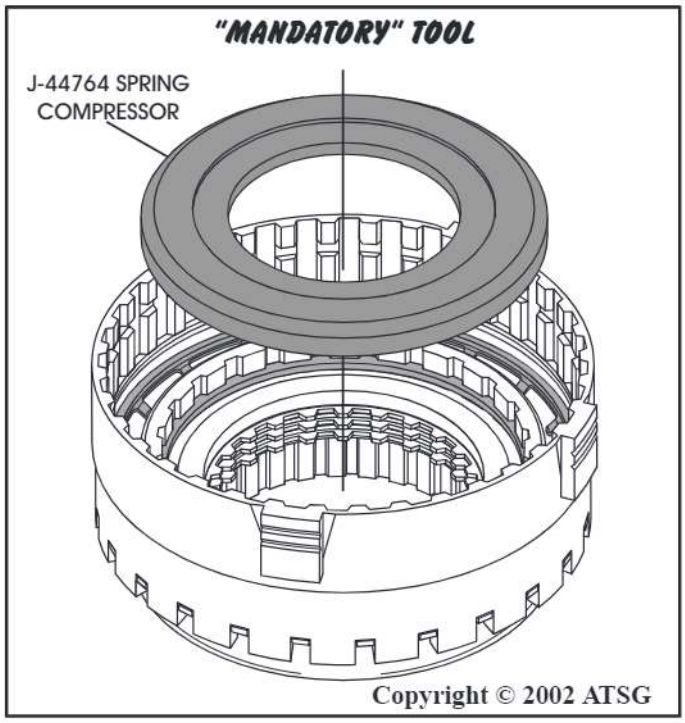
**Continued on Page 80**




485 OVERDRIVE CLUTCH BELLVILLE RETURN SPRING SNAP RING
486 OVERDRIVE CLUTCH BELLVILLE RETURN SPRING
493 INTERMEDIATE/OVERDRIVE CLUTCH HOUSING

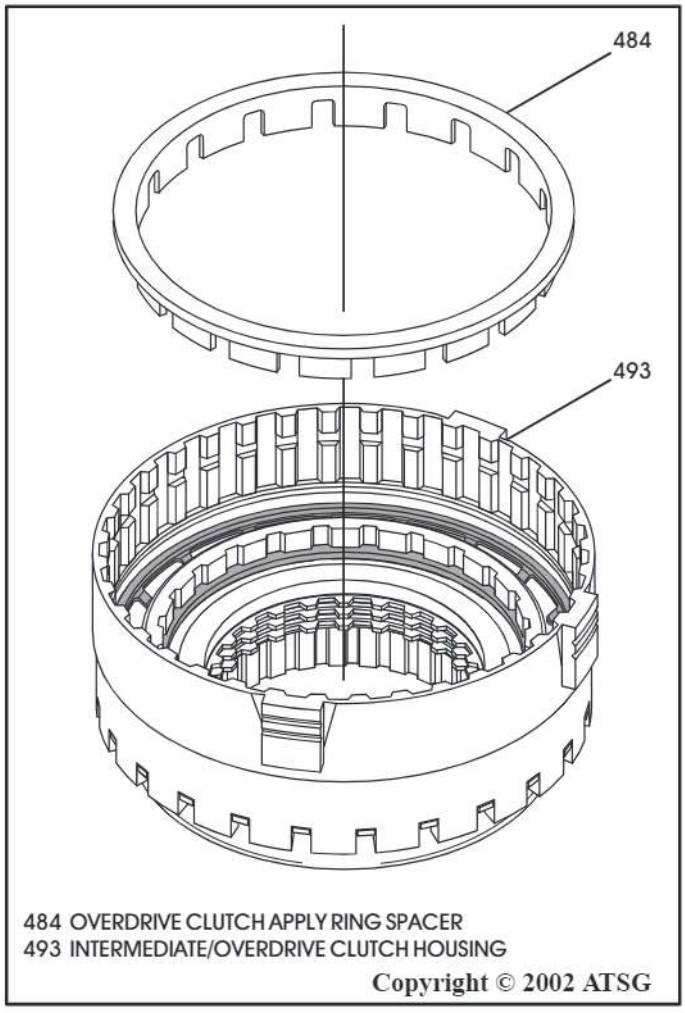
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Figure 123




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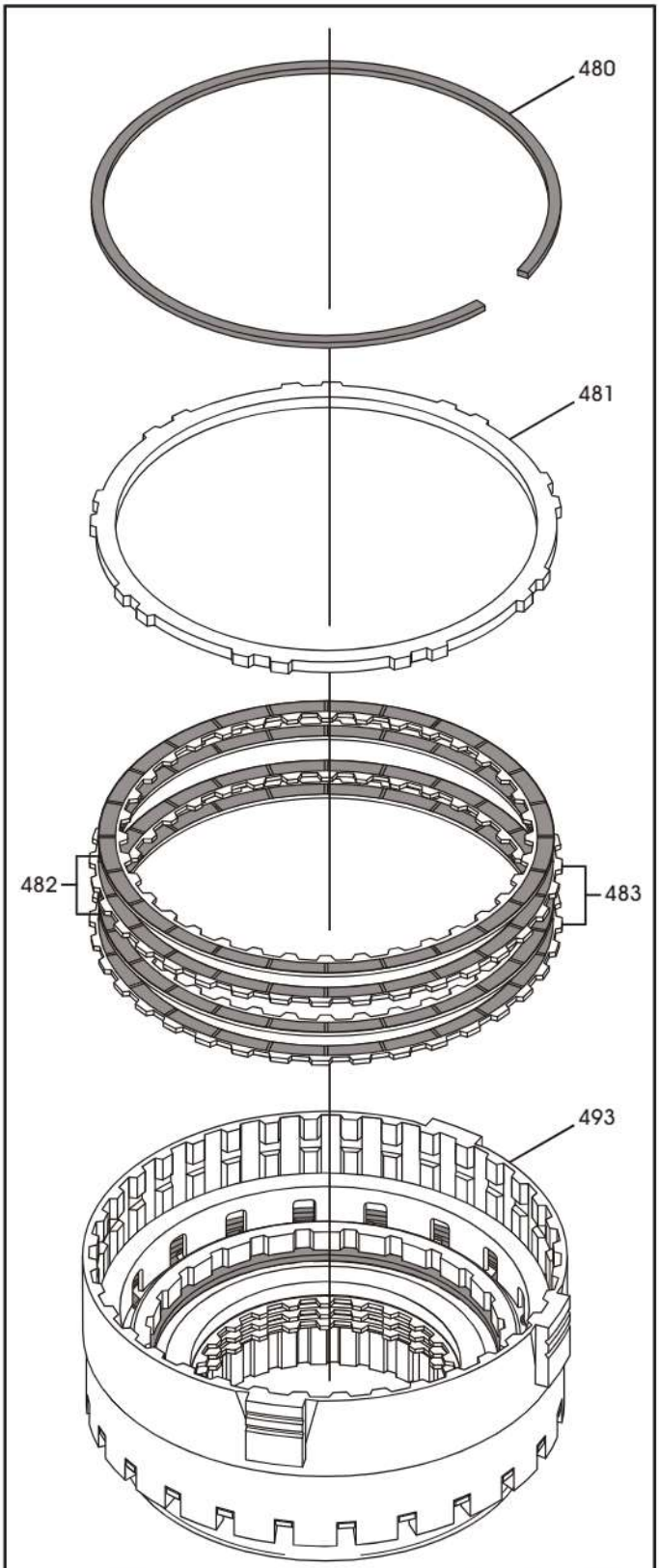
Figure 124




484 OVERDRIVE CLUTCH APPLY RING SPACER
493 INTERMEDIATE/OVERDRIVE CLUTCH HOUSING

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Figure 125




480 OVERDRIVE CLUTCH BACKING PLATE SNAP RING (SELECTIVE)
481 OVERDRIVE CLUTCH BACKING PLATE
482 OVERDRIVE CLUTCH "INSIDE SPLINE" S.S. PLATES (2)
483 OVERDRIVE CLUTCH "OUTSIDE SPLINE" S.S. PLATES (2)
493 INTERMEDIATE/OVERDRIVE CLUTCH HOUSING

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Figure 126

## O.D. AND INTERMEDIATE CLUTCH HOUSING (CONT'D)

20. Install the overdrive clutch "single sided" plates beginning with an outside spline plate first and alternating with inside spline plates until you have installed 2 of each (See Figure 126).
    ***Note: Lined side must be installed facing up as shown in Figure 126. Clutch plate amounts may vary by model.***
21. Install the overdrive clutch backing plate, as shown in Figure 126.
22. Install the "Selective" backing plate snap ring, as shown in Figure 126, and ensure that snap ring is fully seated against the top of snap ring groove in the housing.
23. Install dial indicator on top of the overdrive clutch backing plate, as shown in Figure 127, and zero the dial indicator.
24. Overdrive clutch clearance should be: 0.94 mm (.037") to 1.79 mm (.070"). Change the "Selective" backing plate snap ring as necessary to achieve proper clutch clearance.
25. Set the completed overdrive clutch housing aside for transmission final assembly process.

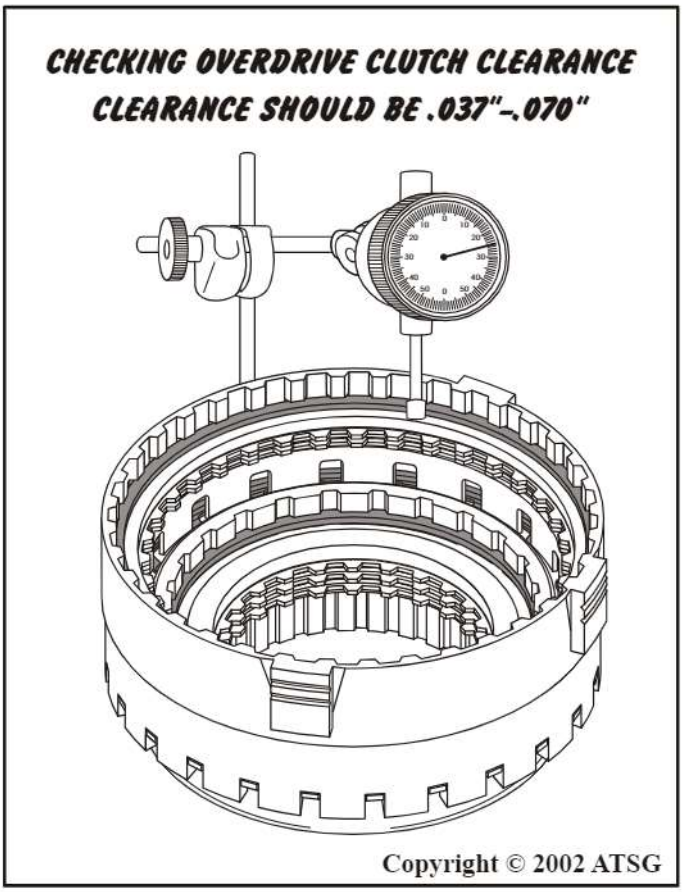



Figure 127

## COMPONENT REBUILD

### LOW SPRAG ASSEMBLY

1. Inspect the low sprag assembly for proper hold and freewheel operation (See Figure 128).
2. Inspect the low sprag assembly for any visable wear and/or damage, and then set aside for the transmission final assembly process.
3. If replacement is necessary, low sprag must be serviced as a complete assembly.

**"SPECIAL NOTE"**
**LOW SPRAG CANNOT BE DIS-ASSEMBLED IF SERVICE IS NECESSARY, IT MUST BE REPLACED AS A SERVICE PACKAGE. EXPLODED VIEW IS FOR REFERENCE ONLY!**

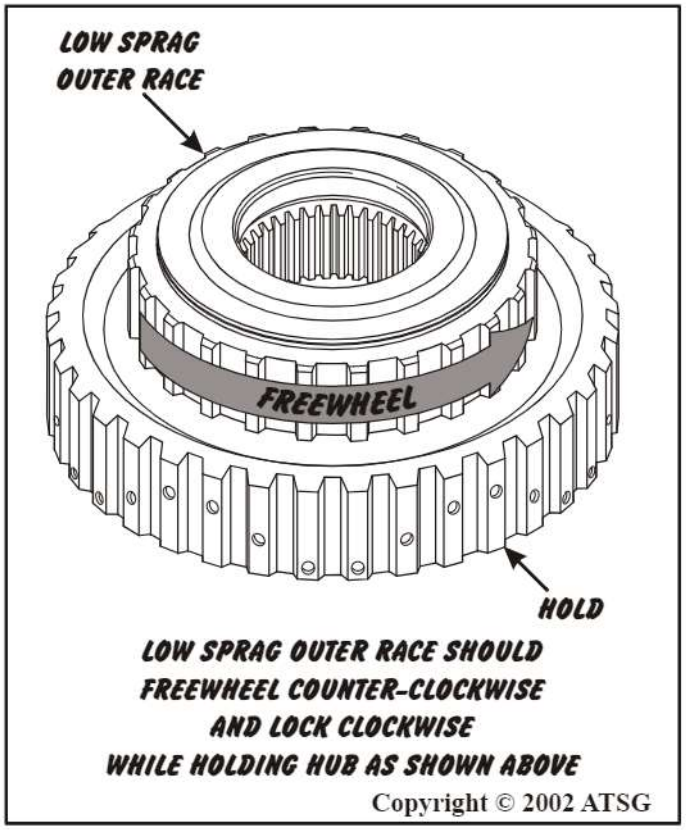



Figure 128

*Serviced As Complete Assembly*

500 LOW SPRAG ASSEMBLY RETAINER (CRIMPED IN PLACE)
501 LOW SPRAG THRUST WASHER (2)
502 LOW SPRAG END BEARINGS (2)
503 LOW SPRAG AND CAGE ASSEMBLY
504 LOW SPRAG OUTER RACE
505 LOW SPRAG INNER RACE

Figure 129 legend

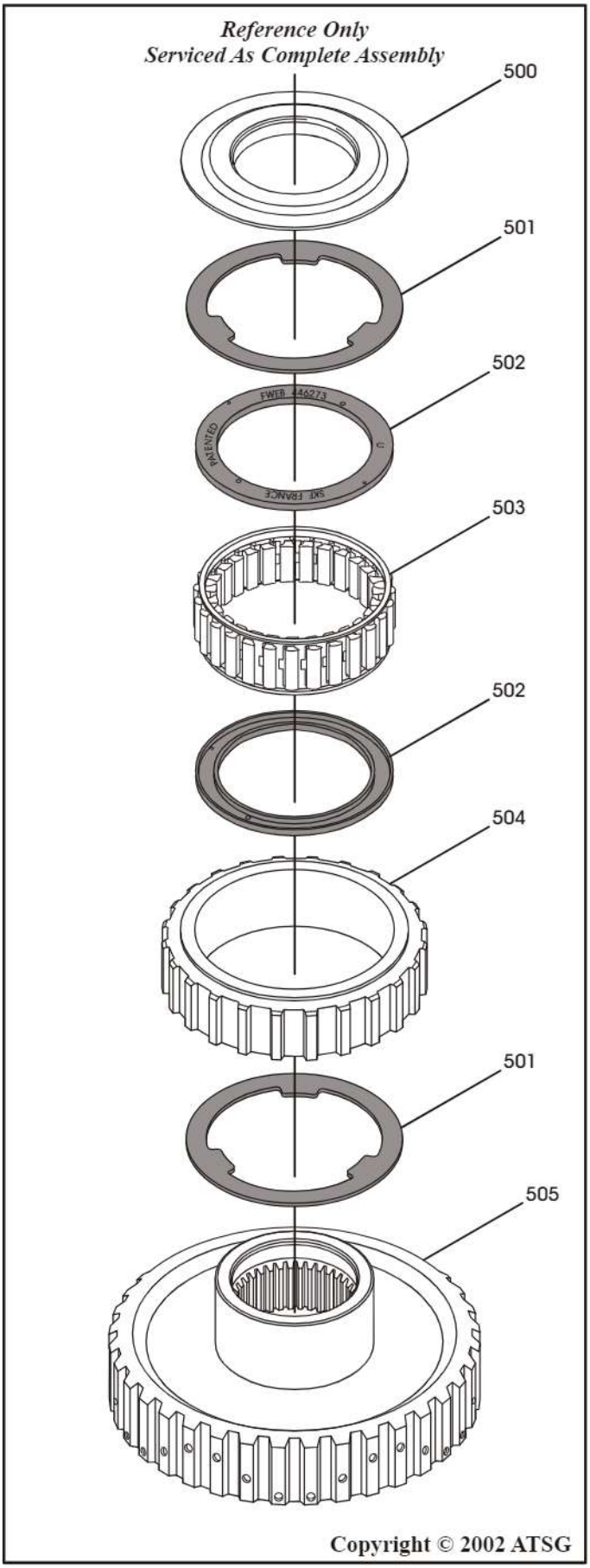
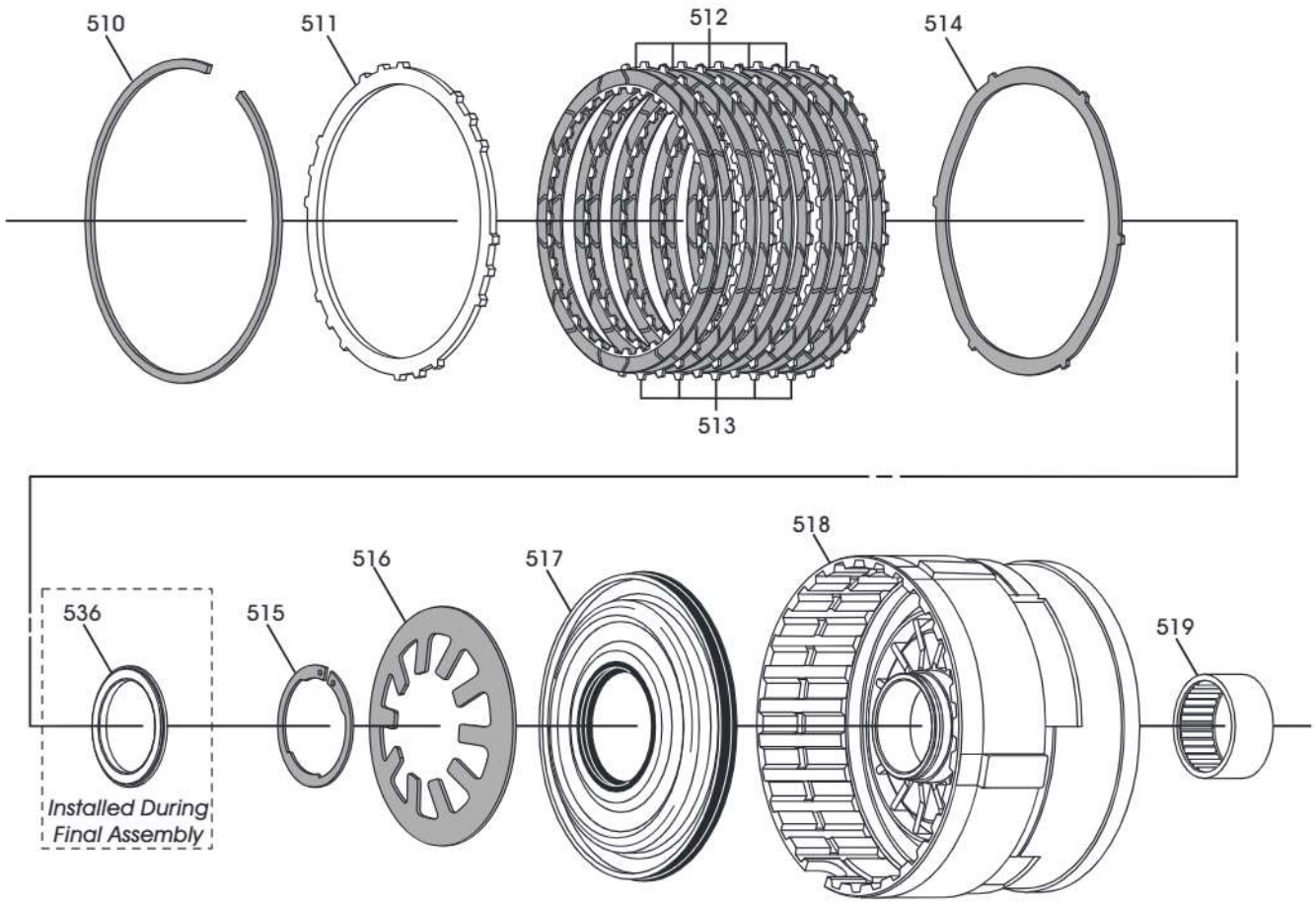



Figure 129

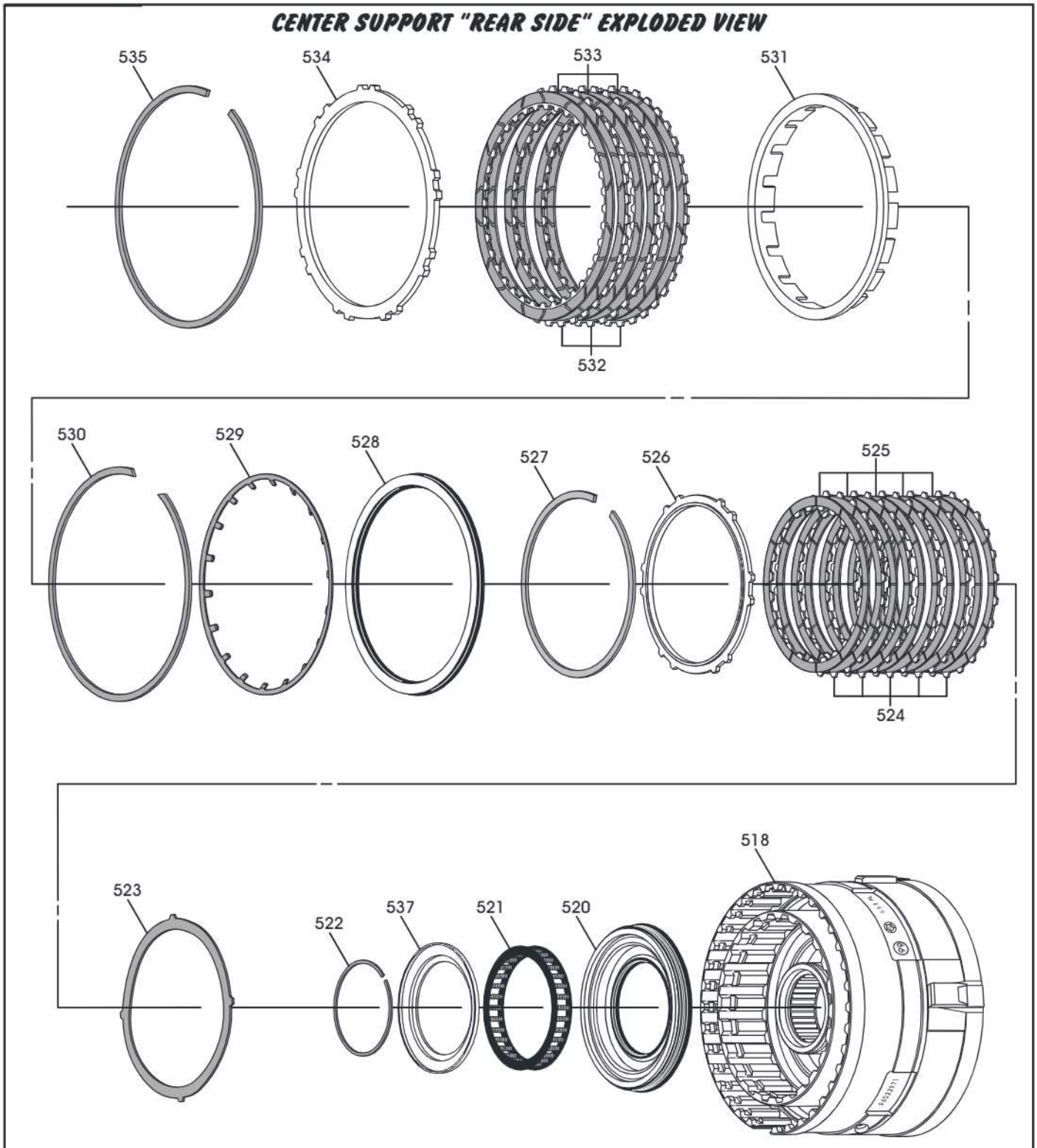
## CENTER SUPPORT "FRONT SIDE" EXPLODED VIEW




510 LOW/REVERSE CLUTCH BACKING PLATE SNAP RING (SELECTIVE)
511 LOW/REVERSE CLUTCH BACKING PLATE
512 LOW/REVERSE CLUTCH "INNER SPLINE" SINGLE SIDED PLATE (5)
513 LOW/REVERSE CLUTCH "OUTER SPLINE" SINGLE SIDED PLATE (5)
514 LOW/REVERSE CLUTCH "WAVE" PLATE
515 LOW/REVERSE CLUTCH BELLVILLE RETURN PLATE SNAP RING
516 LOW/REVERSE CLUTCH BELLVILLE RETURN SPRING
517 LOW/REVERSE CLUTCH PISTON ASSEMBLY
518 CENTER SUPPORT ASSEMBLY
519 CAGED NEEDLE BEARING ASSEMBLY
520 2ND CLUTCH PISTON ASSEMBLY
521 2ND CLUTCH PISTON RETURN SPRING ASSEMBLY
522 2ND CLUTCH RETURN SPRING RETAINER SNAP RING
523 2ND CLUTCH "WAVE" PLATE
524 2ND CLUTCH "OUTER SPLINE" SINGLE SIDED PLATE (5)
525 2ND CLUTCH "INNER SPLINE" SINGLE SIDED PLATE (5)
526 2ND CLUTCH BACKING PLATE
527 2ND CLUTCH BACKING PLATE SNAP RING (SELECTIVE)
528 2ND COAST CLUTCH PISTON ASSEMBLY
529 2ND COAST CLUTCH PISTON BELLVILLE RETURN SPRING
530 2ND COAST CLUTCH BELLVILLE RETURN SPRING SNAP RING
531 2ND COAST CLUTCH APPLY/SPACER RING
532 2ND COAST CLUTCH "OUTER SPLINE" SINGLE SIDED PLATE (3)
533 2ND COAST CLUTCH "INNER SPLINE" SINGLE SIDED PLATE (3)
534 2ND COAST CLUTCH BACKING PLATE
535 2ND COAST CLUTCH BACKING PLATE SNAP RING (SELECTIVE)
536 LOW SPRAG TO CENTER SUPPORT THRUST BEARING
537 2ND CLUTCH PISTON RETURN SPRING RETAINER

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Figure 130




*Legend For This Illustration Is Found In Figure 130*

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Figure 131

## COMPONENT REBUILD

### CENTER SUPPORT

1. Dis-assemble the center support using Figures 130 and 131 as a guide.
2. Clean all center support parts thoroughly and dry with compressed air.
3. Inspect all center support parts thoroughly for the following:
   - o Plugged feed passages
   - o Damaged or worn splines
   - o Damaged or worn springs
   - o Damaged or worn pistons
   - o Damaged or worn clutch plates
4. Replace the caged needle bearing as necessary, using the proper puller and proper diameter installer (See Figure 132).
5. Install J-45136 and J-45140 lip seal protectors, as shown in Figure 133, on low/reverse side.
   ***Note: These tools are mandatory to prevent damage to the L/R piston seals.***
6. Lubricate the low/reverse clutch piston seals with small amount of Trans-Jel® and install the low/reverse clutch piston in the center support, as shown in Figure 134.
7. Remove the lip seal protectors.
8. Install the low/reverse clutch "Bellville" return spring, as shown in Figure 134.

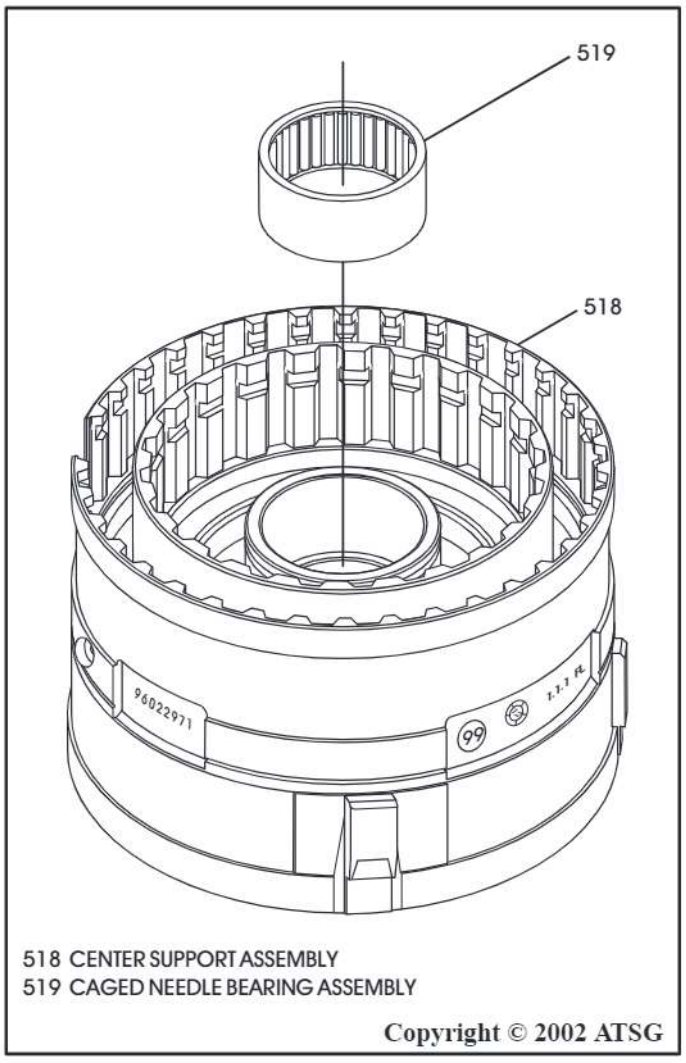



Figure 132

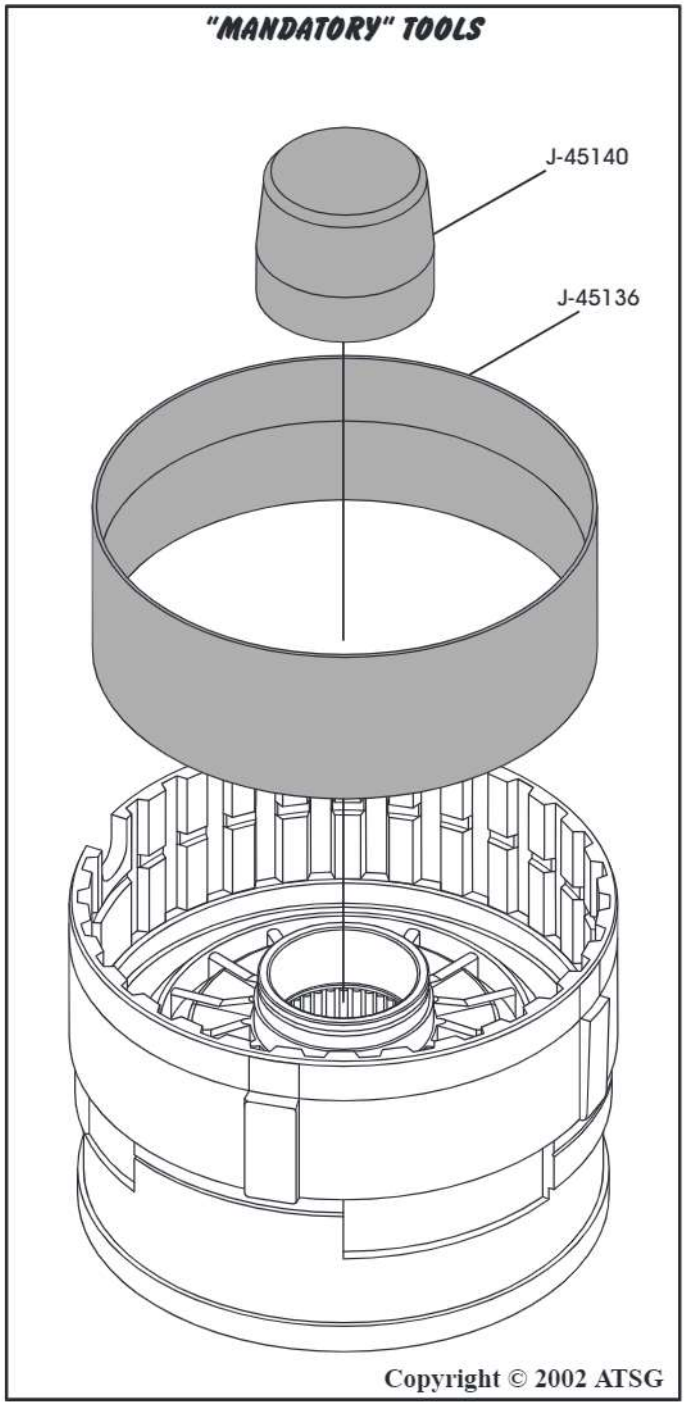
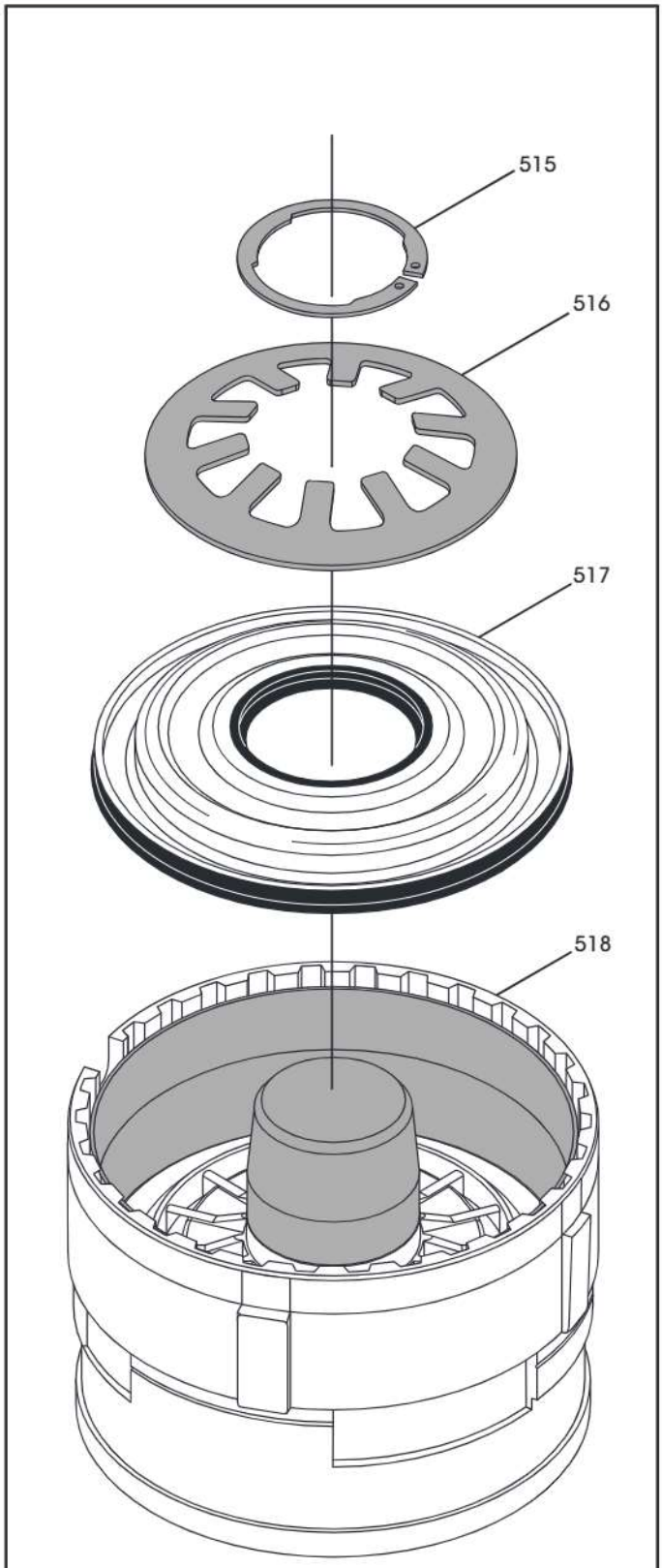



Figure 133



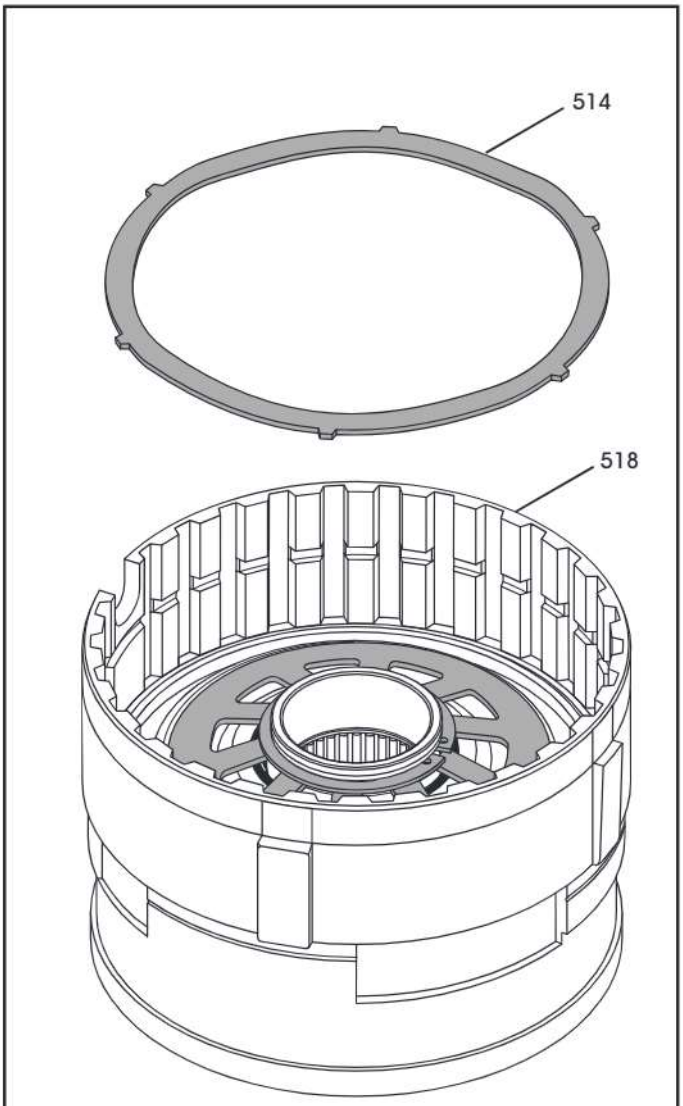

515 LOW/REVERSE BELLVILLE RETURN SPRING SNAP RING
516 LOW/REVERSE CLUTCH BELLVILLE RETURN SPRING
517 LOW/REVERSE CLUTCH PISTON ASSEMBLY
518 CENTER SUPPORT ASSEMBLY

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Figure 134

9. Place the assembly on foot press, compress the return spring and install the retaining snap ring (See Figure 134).
10. Install the low/reverse clutch "Wave" plate into center support, as shown in Figure 135.

**Continued on Page 86**



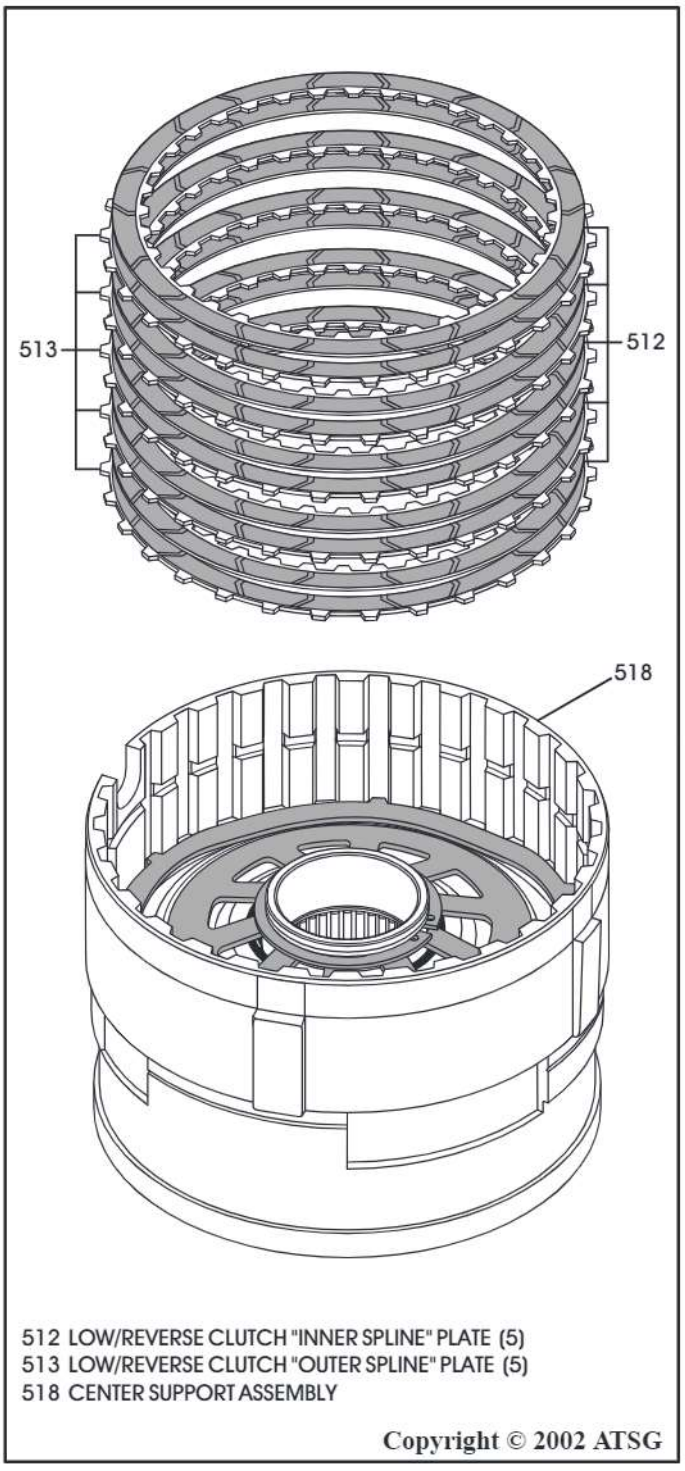

514 LOW/REVERSE "WAVE" PLATE
518 CENTER SUPPORT ASSEMBLY

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Figure 135

## CENTER SUPPORT (CONT'D)

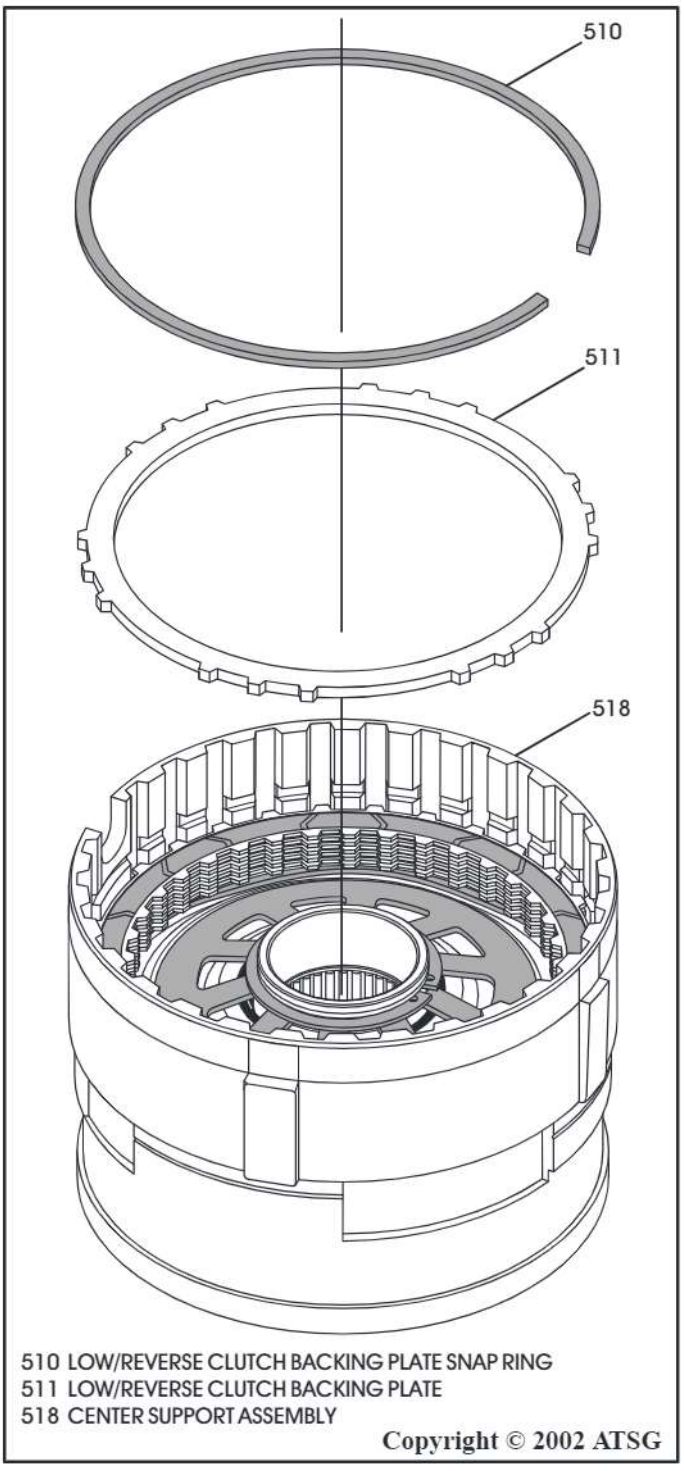
11. Install low/reverse clutch "single sided" plates beginning with an outside spline plate first and alternating with inside spline plates until you have installed 5 of each (See Figure 136).
    ***Note: Lined side must be installed facing up, as shown in Figure 136. Clutch plate amounts may vary by model.***
12. Install the low/reverse backing plate, as shown in Figure 137.
13. Install the "Selective" backing plate snap ring, as shown in Figure 137, and ensure that snap ring is fully seated against the top of snap ring groove in the center support.




512 LOW/REVERSE CLUTCH "INNER SPLINE" PLATE (5)
513 LOW/REVERSE CLUTCH "OUTER SPLINE" PLATE (5)
518 CENTER SUPPORT ASSEMBLY

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Figure 136




510 LOW/REVERSE CLUTCH BACKING PLATE SNAP RING
511 LOW/REVERSE CLUTCH BACKING PLATE
518 CENTER SUPPORT ASSEMBLY

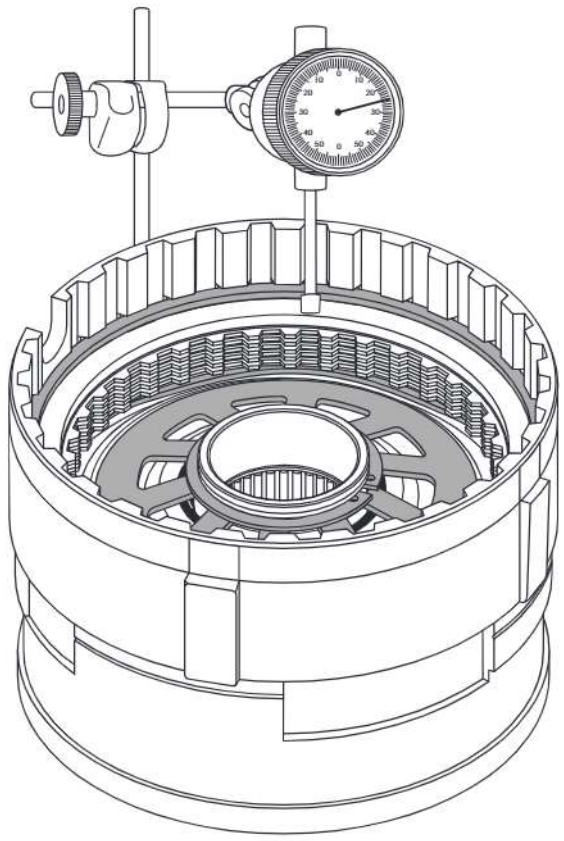
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Figure 137

14. Install dial indicator on top of the low/reverse clutch backing plate, as shown in Figure 138, and zero the dial indicator.
15. Low/Reverse clutch clearance shoud be: 1.32 mm (.052") to 2.17 mm (.085"). Change the "Selective" backing plate snap ring as necessary to achieve proper clutch clearance.
16. Turn the center support over, install J-45137 and J-45145 lip seal protectors, as shown in Figure 139.
    *Note: These tools are mandatory to prevent damage to the 2nd clutch piston seals.*

**Continued on Page 88**

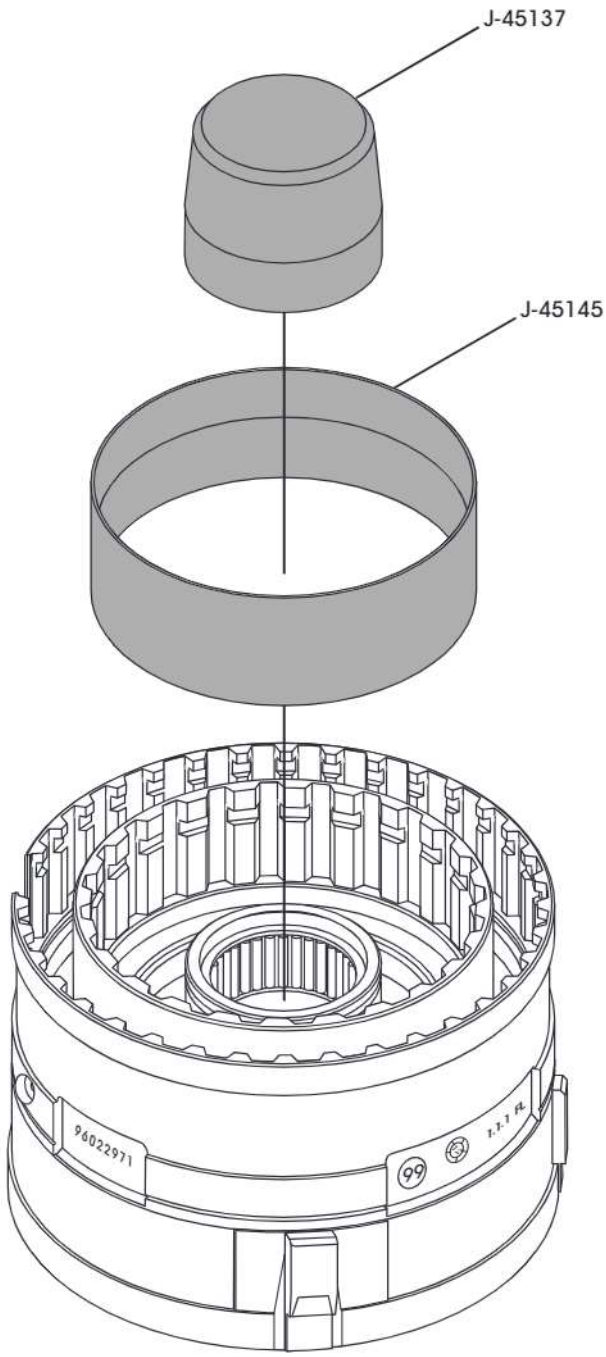
**CHECKING LOW/REVERSE CLUTCH CLEARANCE**
**CLEARANCE SHOULD BE .052"-.085"**



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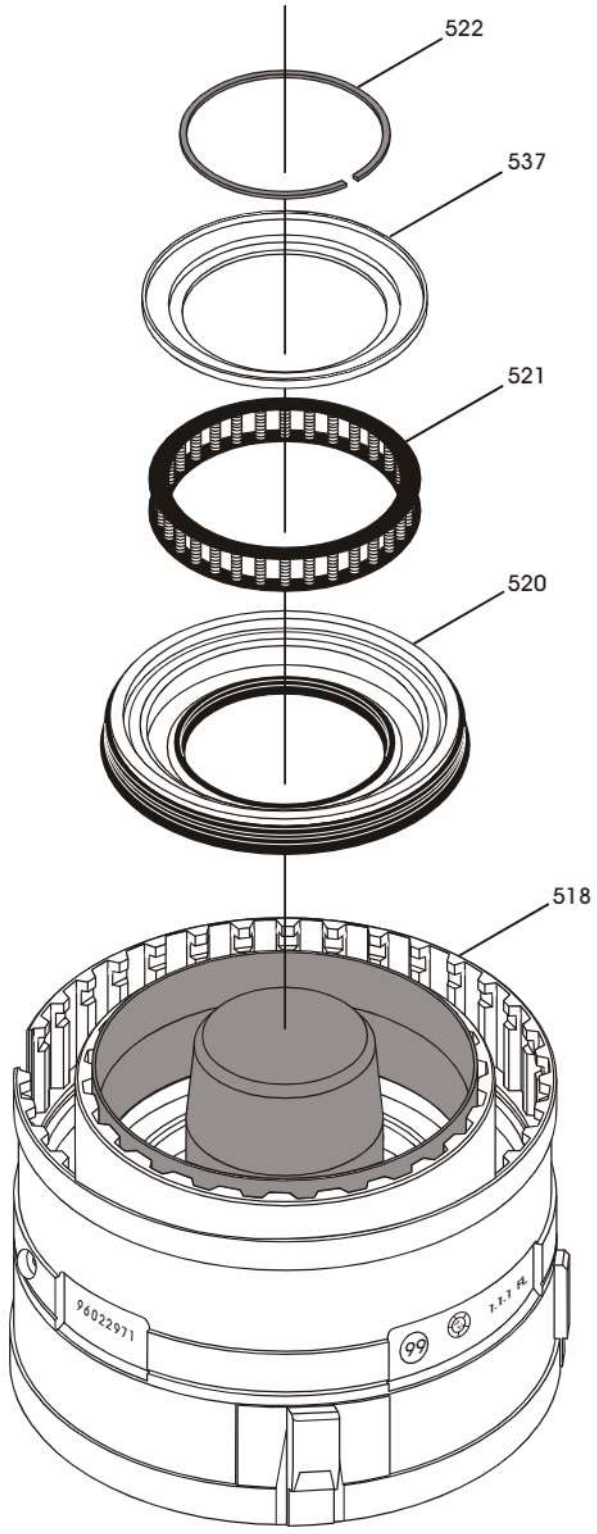
Figure 138

**"MANDATORY" TOOLS**
**FOR 2ND CLUTCH PISTON**




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Figure 139




518 CENTER SUPPORT ASSEMBLY
520 2ND CLUTCH PISTON ASSEMBLY
521 2ND CLUTCH PISTON RETURN SPRING ASSEMBLY
522 2ND CLUTCH RETURN SPRING RETAINER SNAP RING
537 2ND CLUTCH RETURN SPRING RETAINER

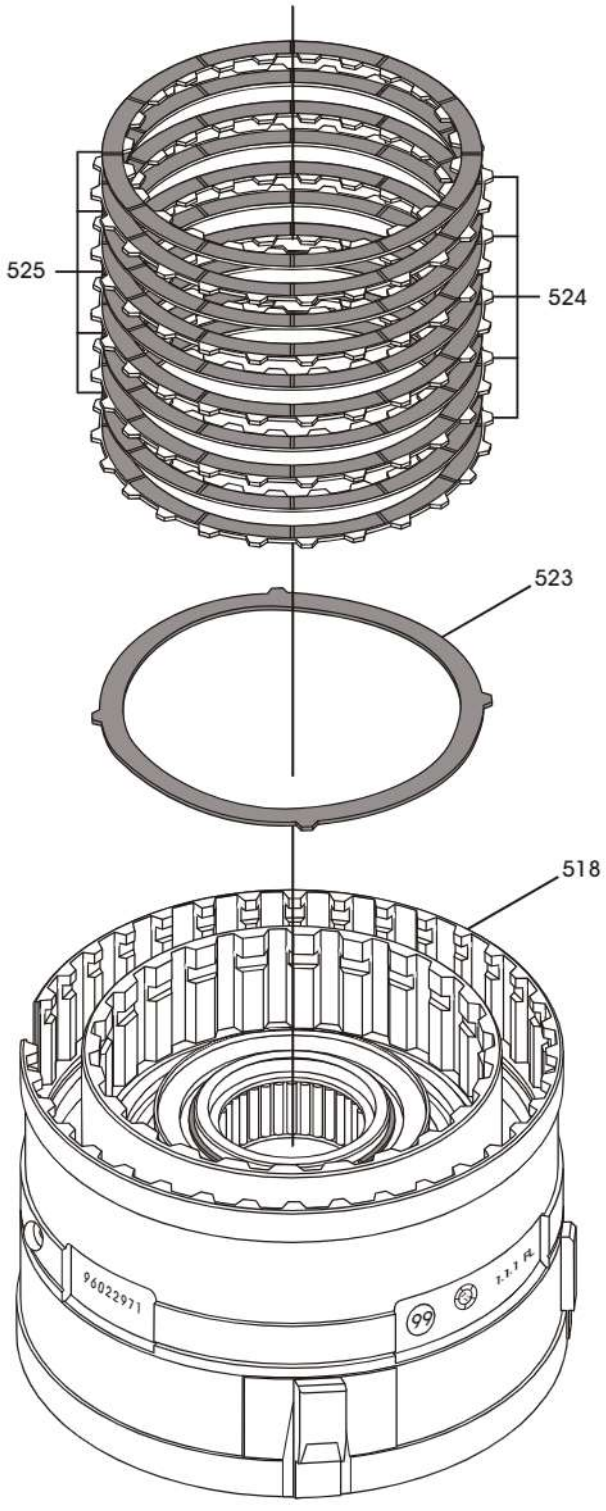
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Figure 140

### CENTER SUPPORT (CONT'D)

17. Lubricate the 2nd clutch piston seals with a small amount of Trans-Jel® and install the 2nd clutch piston into the center support, as shown in Figure 140.
18. Remove the lip seal protectors.
19. Install the 2nd clutch return spring assembly, as shown in Figure 140.
20. Install the return spring retainer and snap ring on top of the return spring (See Figure 140).
21. Place center support on foot press, compress return spring and retainer, and install the snap ring ensuring that it is fully seated.
22. Install the 2nd clutch "Wave" plate into center support, as shown in Figure 141.
23. Install the 2nd clutch "single sided" plates beginning with an outside spline plate first and alternating with inside spline plates until you have installed 5 of each (See Figure 141).
    ***Note: Lined side must be installed facing up, as shown in Figure 141. Clutch plate amounts may vary by model. This set of clutch plates are not used at all in the "4L40-E" models.***
24. Install the 2nd clutch backing plate, as shown in Figure 142.
25. Install the "Selective" backing plate snap ring, as shown in Figure 141, and ensure that snap ring is fully seated against the top of snap ring groove in the center support.

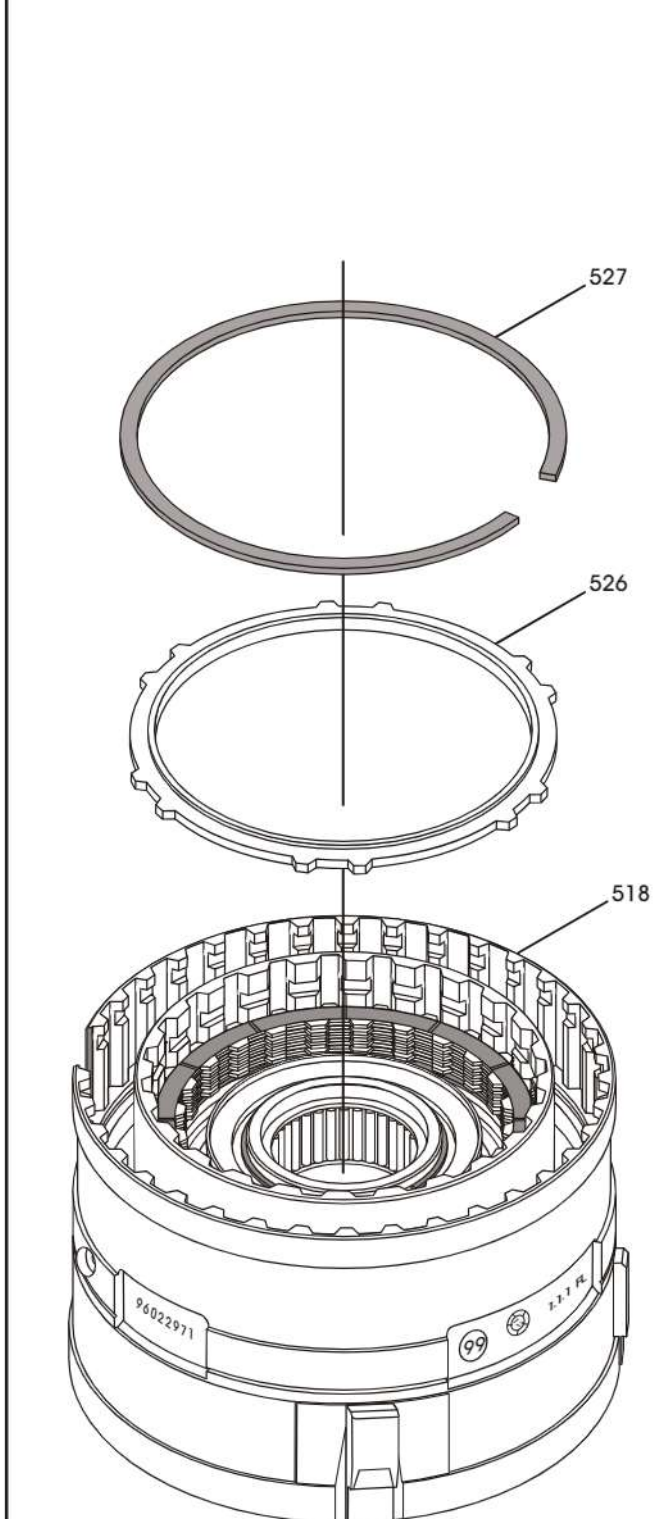
**Continued on Page 90**




518 CENTER SUPPORT ASSEMBLY
523 2ND CLUTCH "WAVE" PLATE
524 2ND CLUTCH "OUTER SPLINE" SINGLE SIDED PLATE (5)
525 2ND CLUTCH "INNER SPLINE" SINGLE SIDED PLATE (5)

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Figure 141




518 CENTER SUPPORT ASSEMBLY
526 2ND CLUTCH BACKING PLATE
527 2ND CLUTCH BACKING PLATE SNAP RING (SELECTIVE)

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Figure 142

## CENTER SUPPORT (CONT'D)

26. Install dial indicator on top of the 2nd clutch backing plate, as shown in Figure 143, and zero the dial indicator.
27. 2nd Clutch clearance should be: 1.32 mm (.052") to 1.92 mm (.076"). Change the "Selective" backing plate snap ring as necessary to achieve proper clutch clearance.
28. Install J-45136 lip seal protector, as shown in Figure 144.
    ***Note: This is a mandatory tool to prevent any damage to 2nd coast clutch piston seals.***
29. Lubricate the 2nd coast clutch piston seals with small amount of Trans-Jel® and install the 2nd coast clutch piston into the center support using the J-45145 installation tool (See Figure 145).
30. Remove the J-45136 lip seal protector.
31. Install the 2nd coast clutch "Bellville" return spring, as shown in Figure 146.
32. Compress return spring and install the return spring snap ring as shown in Figure 146.

**Continued on Page 93**

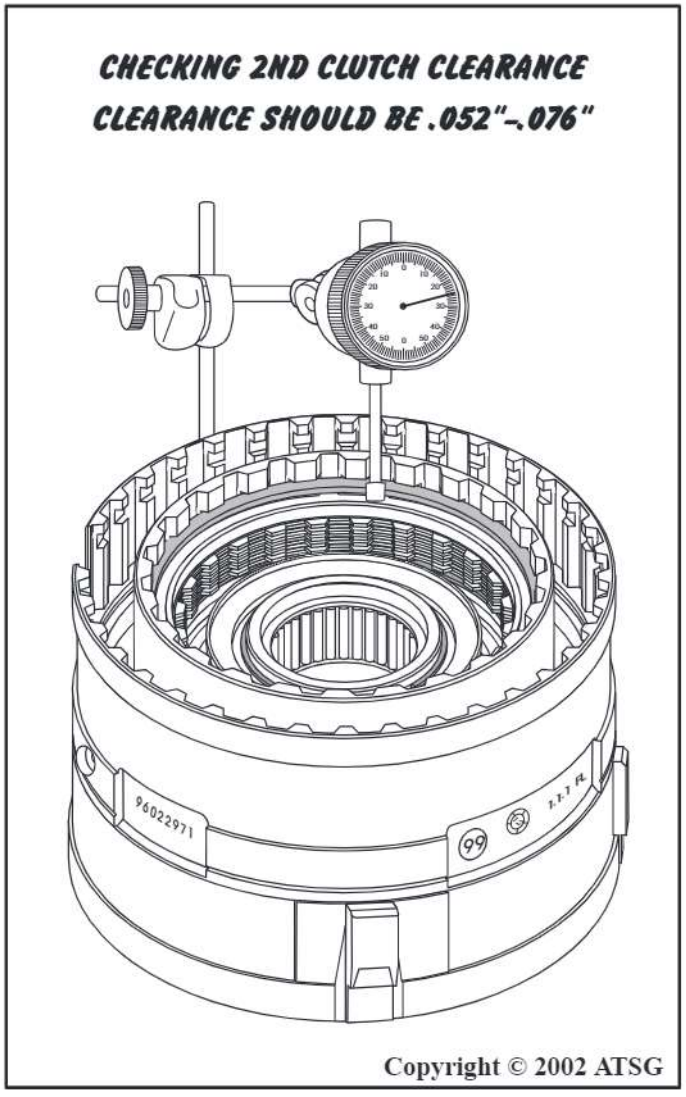



Figure 143

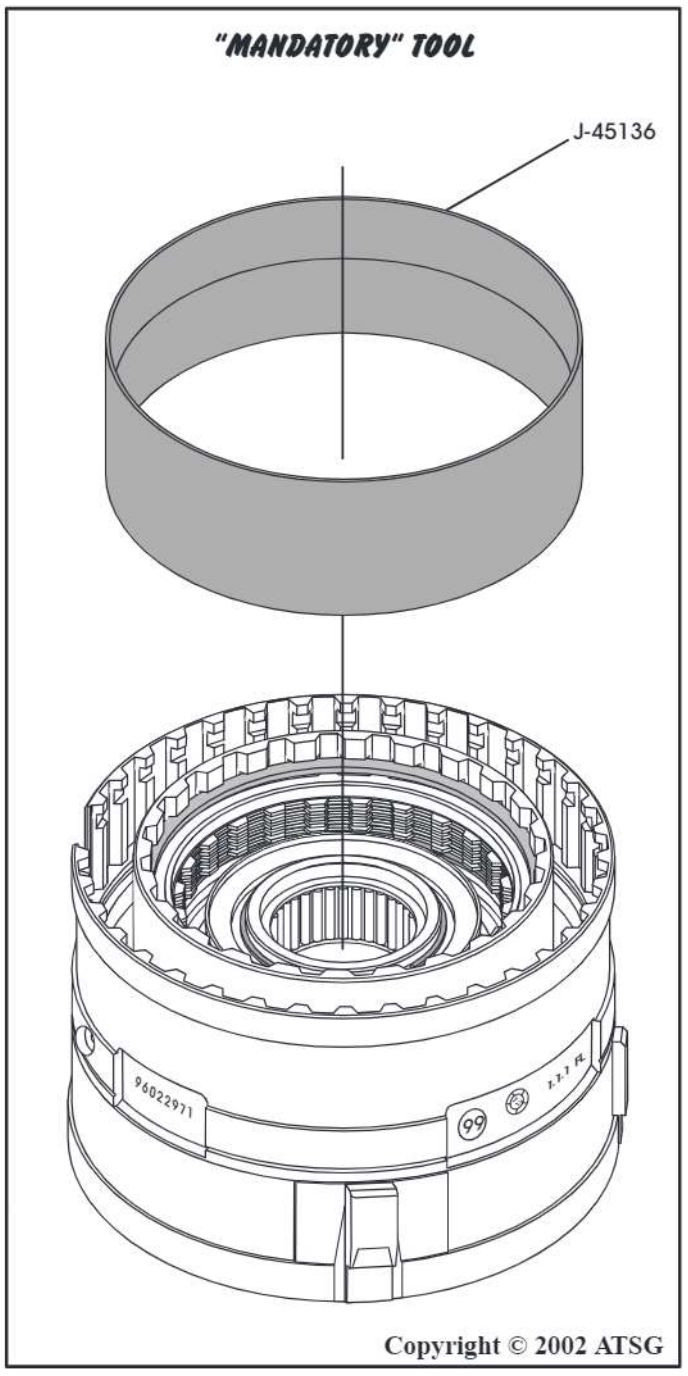
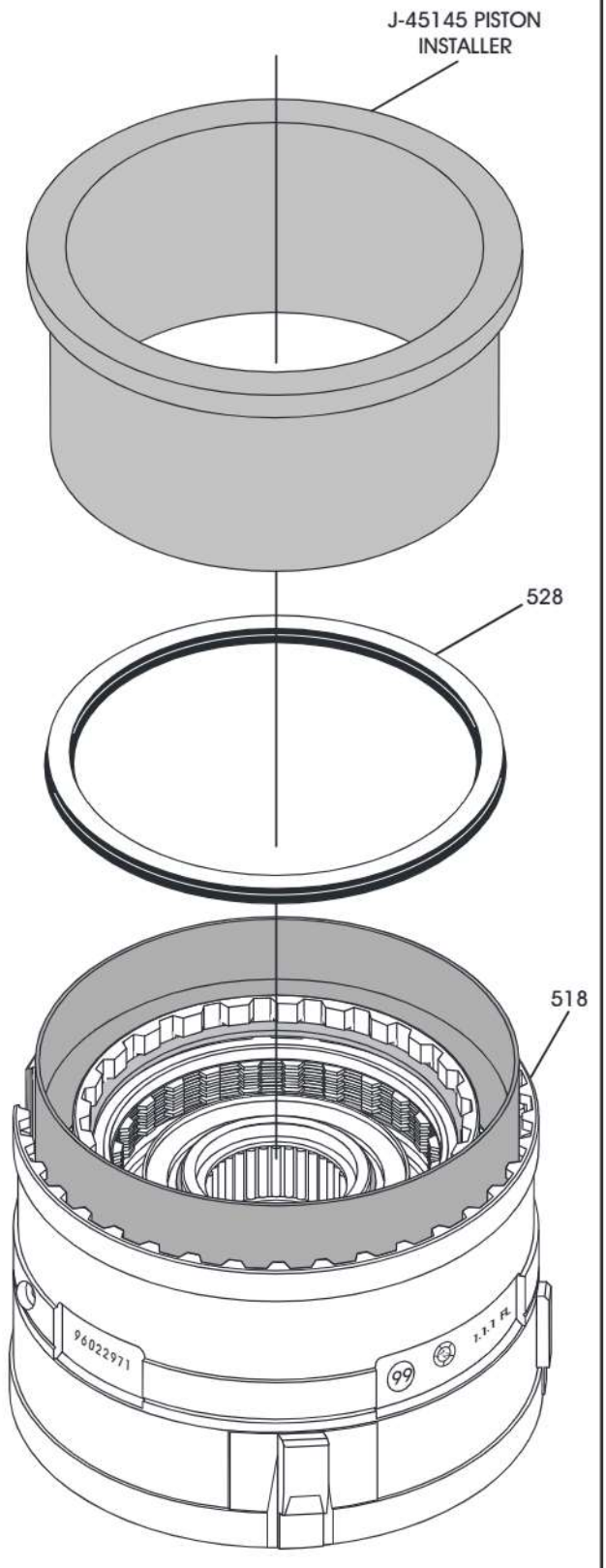


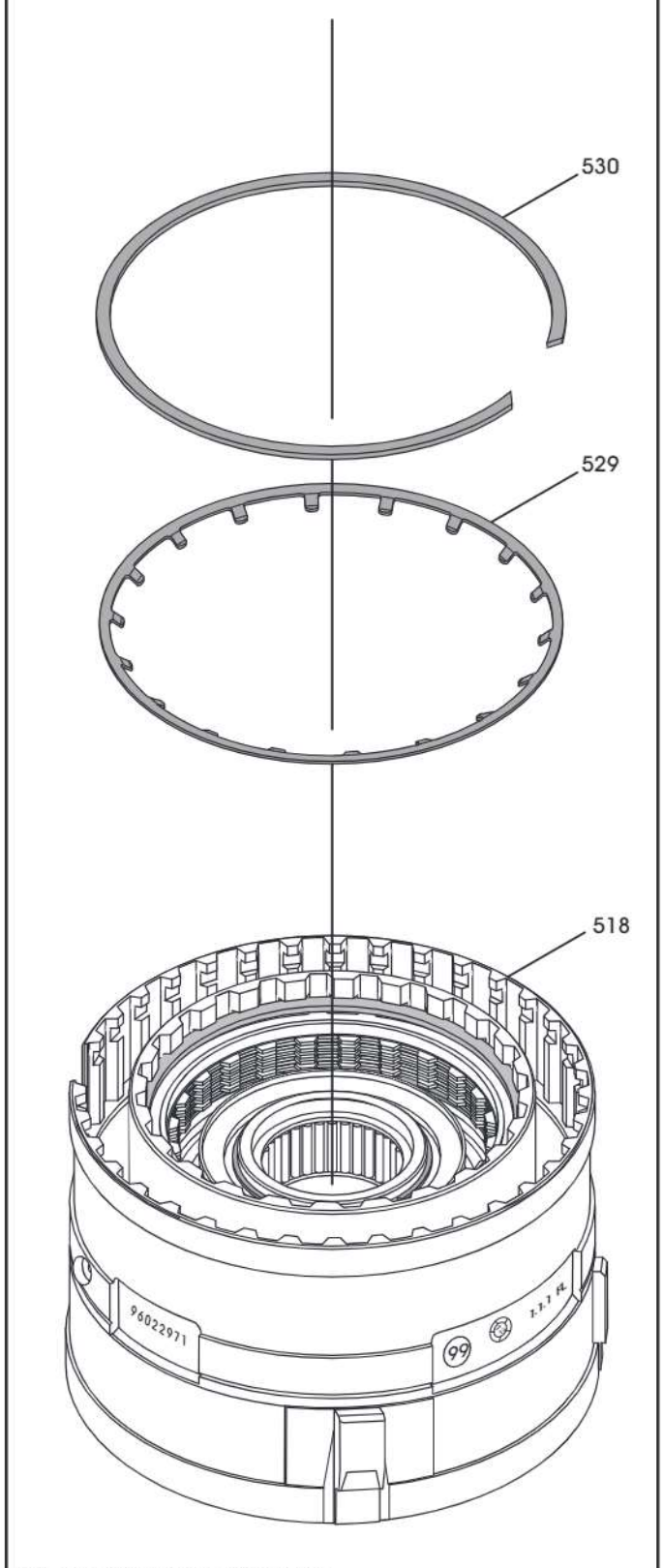

Figure 144




518 CENTER SUPPORT ASSEMBLY
528 2ND COAST CLUTCH PISTON ASSEMBLY

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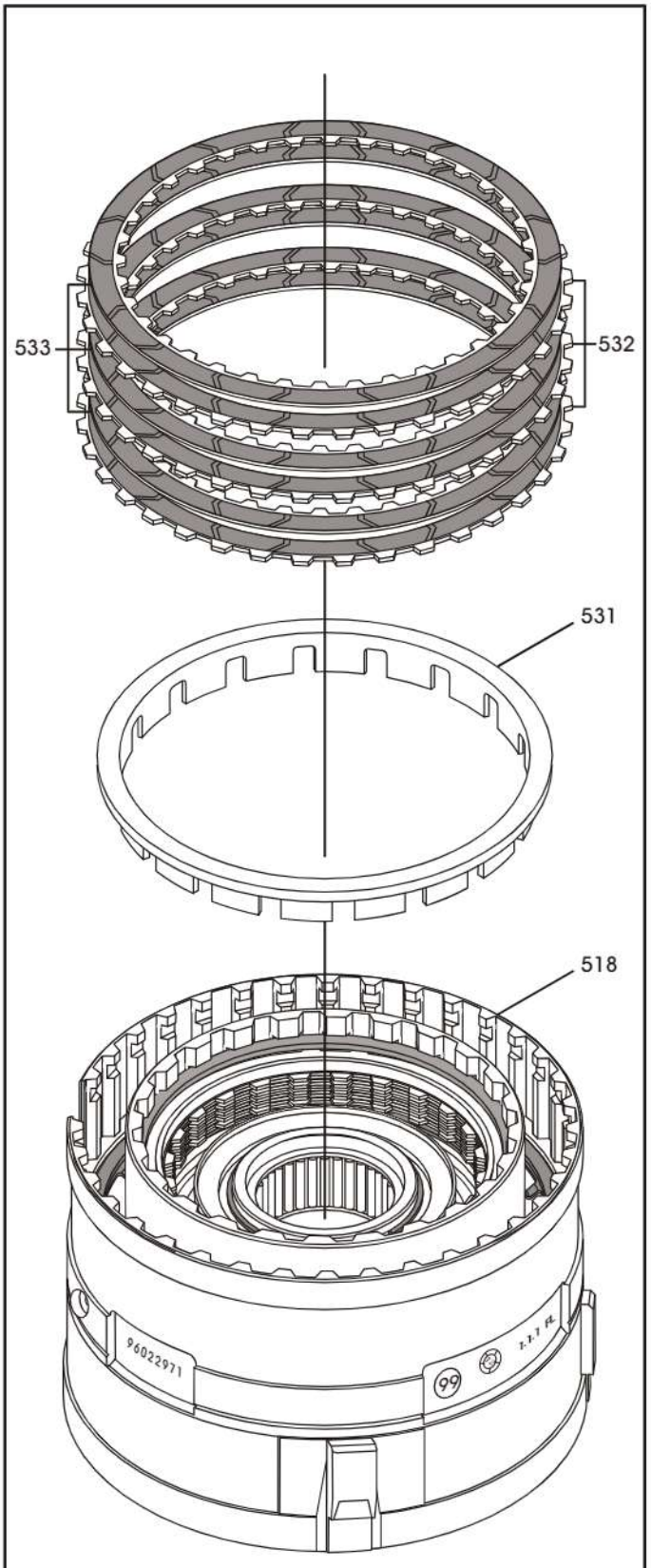
Figure 145




518 CENTER SUPPORT ASSEMBLY
529 2ND COAST CLUTCH PISTON RETURN SPRING
530 2ND COAST CLUTCH RETURN SPRING SNAP RING

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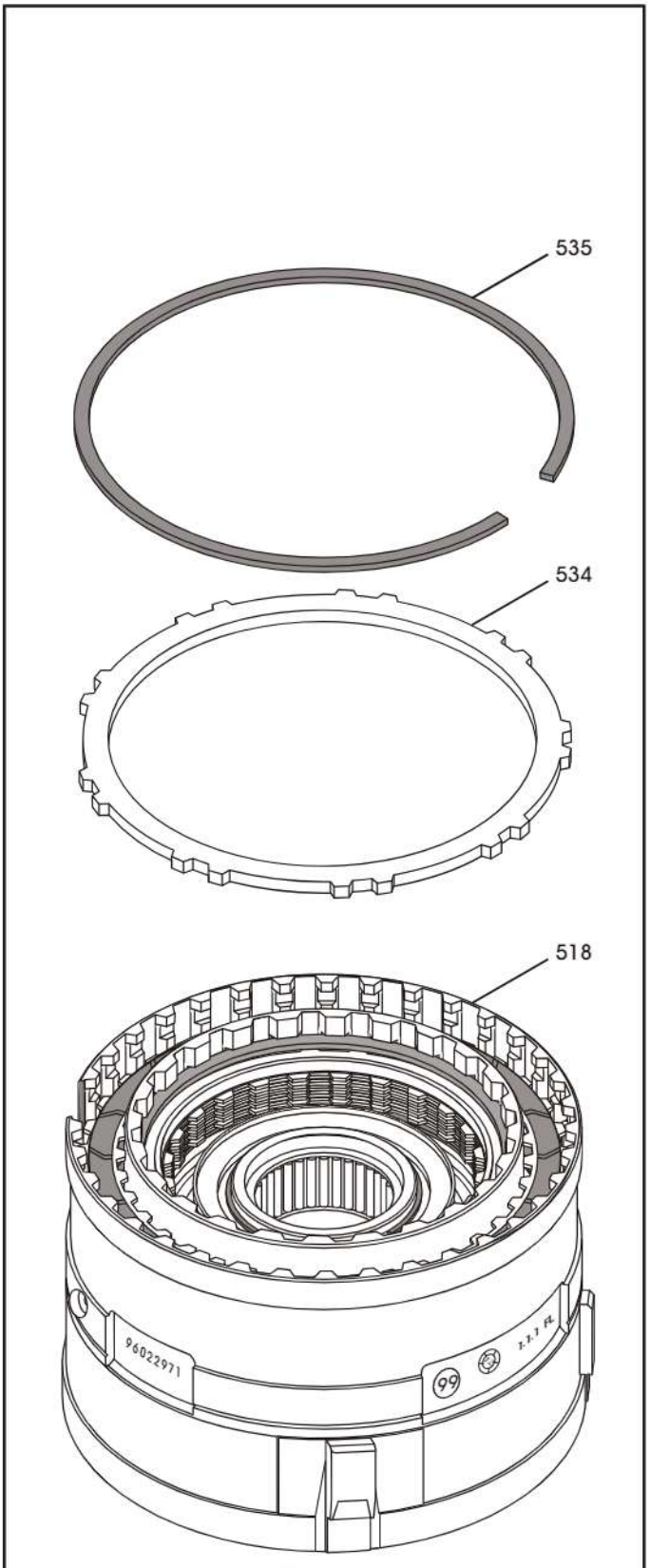
Figure 146




518 CENTER SUPPORT ASSEMBLY
531 2ND COAST CLUTCH APPLY RING SPACER
532 2ND COAST CLUTCH "OUTER SPLINE" S.S. PLATES (3)
533 2ND COAST CLUTCH "INNER SPLINE" S.S. PLATES (3)

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Figure 147




518 CENTER SUPPORT ASSEMBLY
534 2ND COAST CLUTCH BACKING PLATE
535 2ND COAST CLUTCH BACKING PLATE SNAP RING (SELECTIVE)

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Figure 148

### CENTER SUPPORT (CONT'D)

33. Install the 2nd coast clutch apply ring spacer, as shown in Figure 147, ensuring that slots are installed over return spring legs.
34. Install 2nd coast clutch "single sided" plates beginning with an outside spline plate first and alternating with inside spline plates until you have installed 3 of each (See Figure 147).
    ***Note: Lined side must be installed facing up, as shown in Figure 147. Clutch plate amounts may vary by model. This set of clutch plates are not used at all in the "4L40-E" models.***
35. Install the 2nd coast clutch backing plate, as shown in Figure 148.
36. Install the "Selective" backing plate snap ring, as shown in Figure 148, and ensure that snap ring is fully seated against the top of snap ring groove in the center support.
37. Install dial indicator on top of 2nd coast clutch backing plate, as shown in Figure 149, and zero the dial indicator.
38. 2nd Coast Clutch clearance should be: 0.80 mm (.031") to 1.6 mm (.063"). Change the "Selective" backing plate snap ring as necessary to achieve proper clutch clearance.
39. Set the completed Center Support Assembly aside for final transmission assembly.

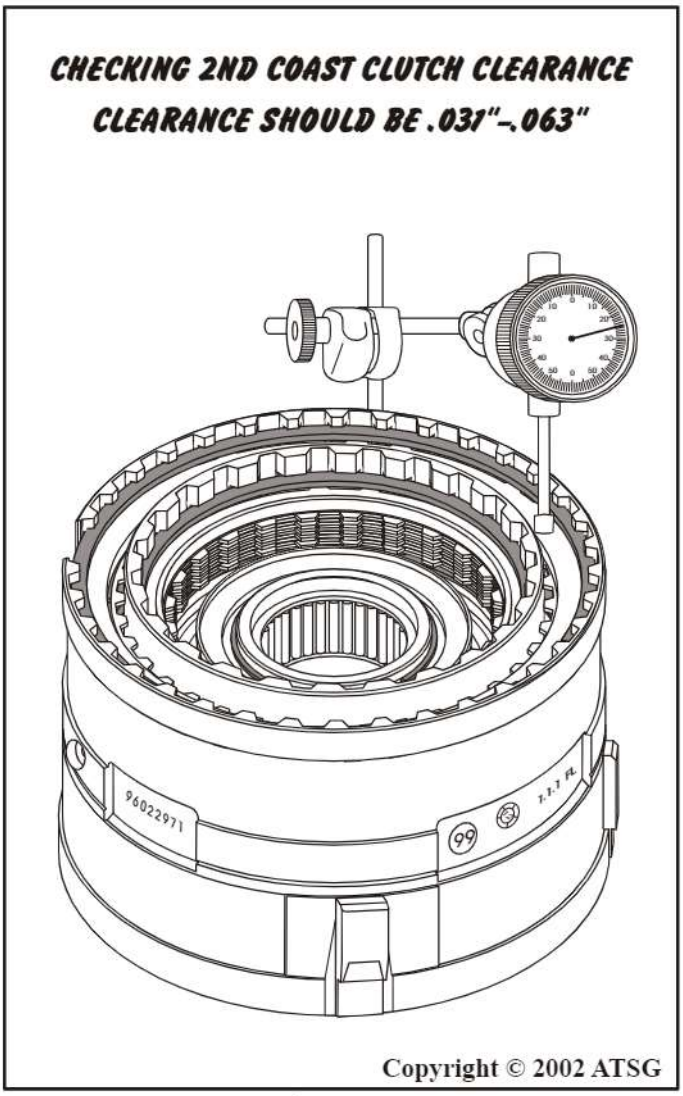
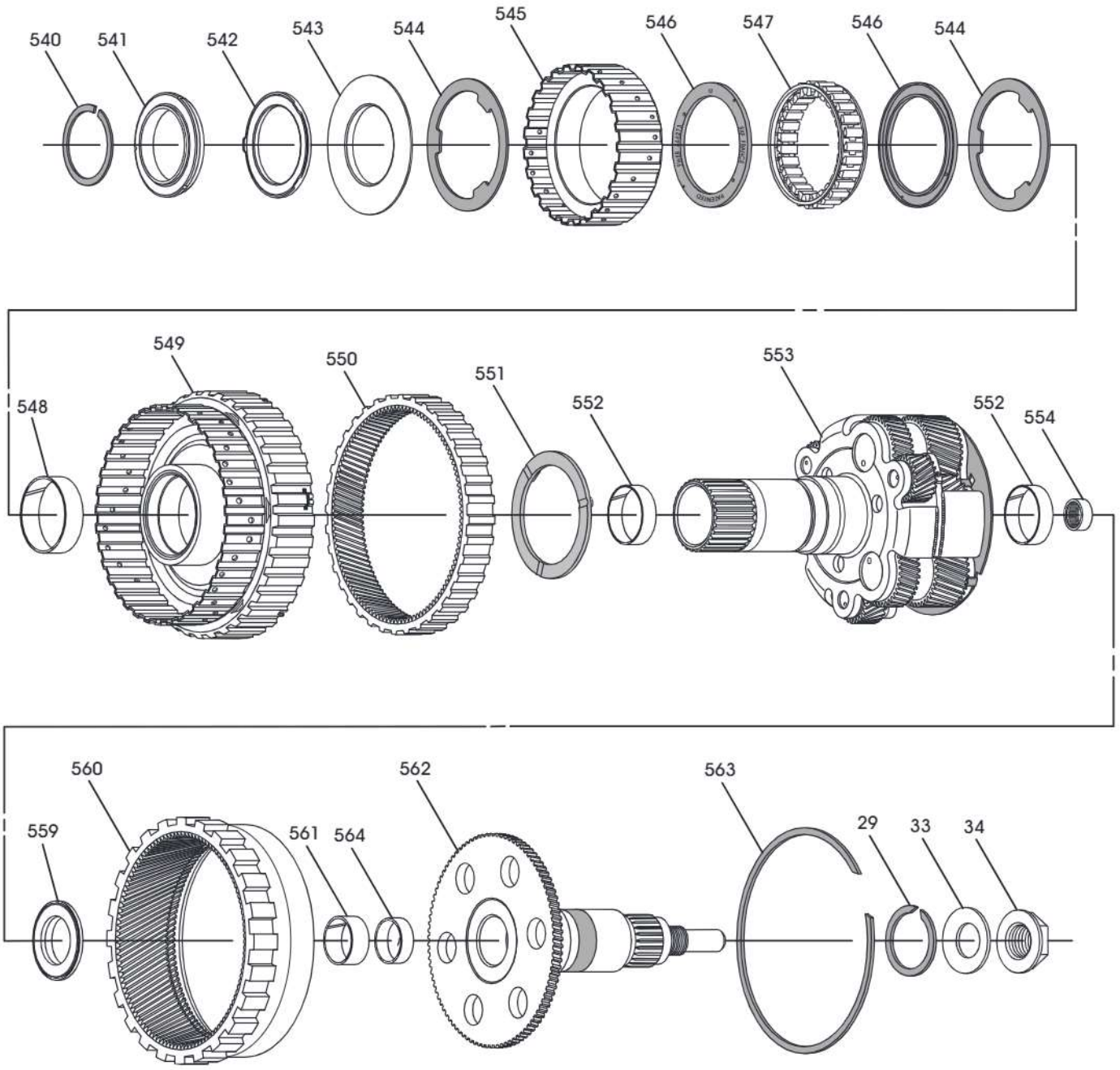



Figure 149

## 5L40-E "ONLY" 2ND SPRAG AND PLANETARY SYSTEM EXPLODED VIEW

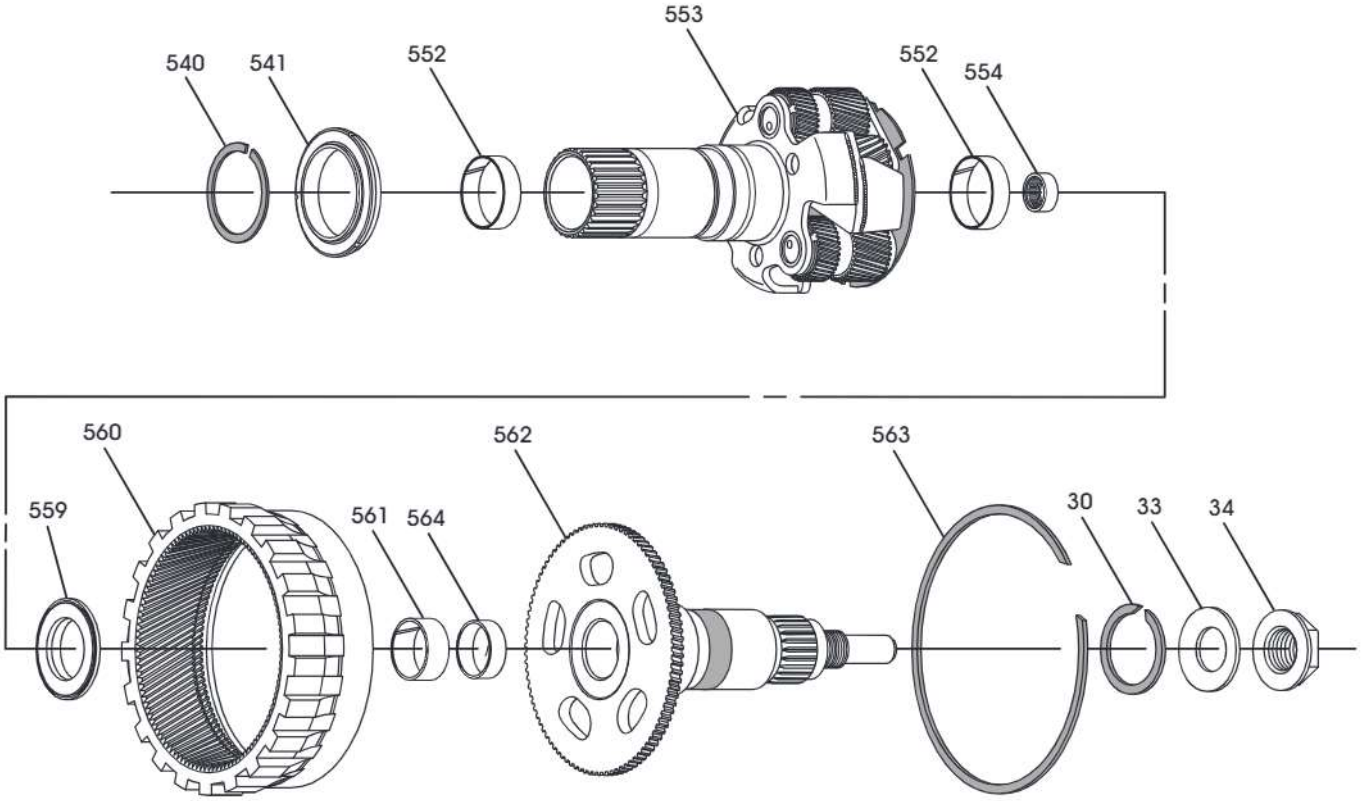



**"SPECIAL NOTE"**
**2ND SPRAG CANNOT BE DIS-ASSEMBLED.**
**IF SERVICE IS NECESSARY, IT MUST BE**
**REPLACED AS A SERVICE PACKAGE.**
**EXPLODED VIEW IS FOR REFERENCE ONLY!**

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Figure 150

## 4L40-E "ONLY" PLANETARY SYSTEM EXPLODED VIEW (2ND SPRAG NOT USED)




29 OUTPUT SHAFT TO DRIVESHAFT YOKE SPACER
33 DRIVESHAFT YOKE WASHER
34 DRIVESHAFT YOKE RETAINING NUT
540 THRUST BEARING RETAINING SNAP RING
541 PLANETARY CARRIER THRUST BEARING
542 2ND SPRAG ASSEMBLY THRUST BEARING
543 2ND CLUTCH SPRAG RETAINER (CRIMPED IN PLACE)
544 2ND CLUTCH SPRAG OUTER RACE THRUST WASHER (2)
545 2ND CLUTCH SPRAG OUTER RACE
546 2ND CLUTCH SPRAG END BEARING (2)
547 2ND CLUTCH SPRAG AND CAGE ASSEMBLY
548 2ND CLUTCH SPRAG INNER RACE AND HUB BUSHING
549 2ND CLUTCH SPRAG INNER RACE AND HUB ASSEMBLY
550 REACTION INTERNAL RING GEAR
551 PLANETARY TO 2ND SPRAG/HUB THRUST WASHER
552 PLANETARY CARRIER BUSHING (2)
553 PLANETARY CARRIER ASSEMBLY
554 PLANETARY CARRIER CAGED NEEDLE BEARING
559 OUTPUT SHAFT TO PLANETARY CARRIER THRUST BEARING
560 REAR INTERNAL RING GEAR
561 OUTPUT SHAFT BUSHING
562 OUTPUT SHAFT ASSEMBLY
563 OUTPUT SHAFT TO REAR RING GEAR RETAINING SNAP RING
564 OUTPUT SHAFT CUP PLUG

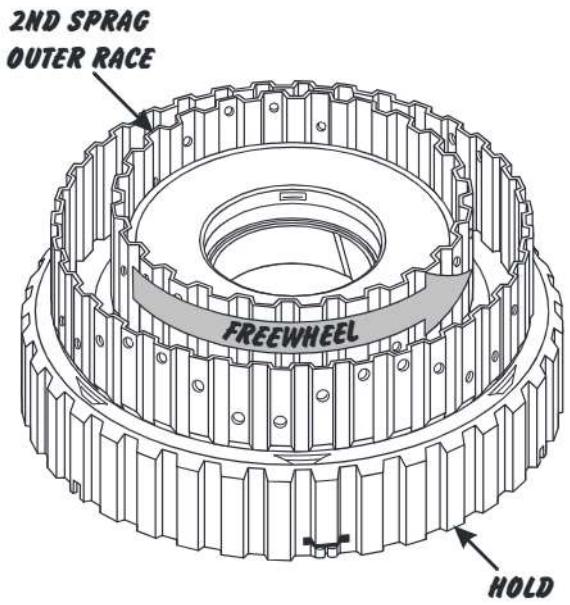
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Figure 151

## COMPONENT REBUILD
## "5L40-E" PLANETARY SYSTEM

1. Dis-assemble the planetary carrier system using Figures 150 and 151 as a guide.
2. Clean all planetary system parts thoroughly and dry with compressed air.
3. Inspect all planetary system parts thoroughly for any wear and/or damage.
   *Note: The 2nd Sprag Assembly cannot be dis-assembled. Exploded view is for reference only.*
4. Inspect the Sprag Assembly for proper hold and freewheel operation (See Figure 152).
5. If replacement is necessary, 2nd sprag must be serviced as a complete assembly.
6. Install thrust washer (551) on 5L40-E carrier as ahown in Figure 153.
7. Install 2nd sprag and hub assembly on 5L40-E carrier, as shown in Figure 153.
8. Install thrust bearing (542) on top of 2nd sprag assembly, as shown in Figure 156.
9. Install thrust bearing (541) on top of thrust bearing 542, as shown in Figure 156

**Continued on Page 97**



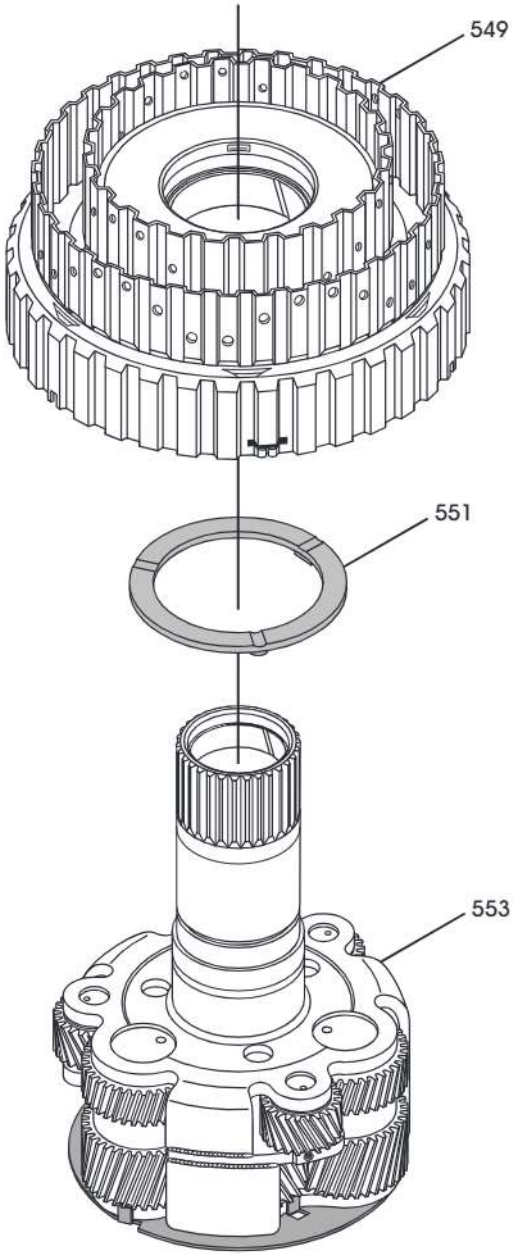

**2ND SPRAG OUTER RACE SHOULD FREEWHEEL COUNTER-CLOCKWISE AND LOCK CLOCKWISE WHILE HOLDING HUB AS SHOWN ABOVE**

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Figure 152

**5L40-E PLANETARY CARRIER**

**"SPECIAL NOTE"**
**2ND SPRAG CANNOT BE DIS-ASSEMBLED IF SERVICE IS NECESSARY, IT MUST BE REPLACED AS A SERVICE PACKAGE. EXPLODED VIEW IS FOR REFERENCE ONLY!**

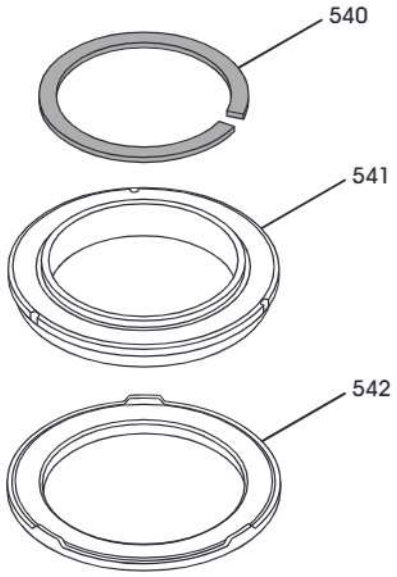



549 COMPLETE 2ND SPRAG AND HUB ASSEMBLY (5L40-E ONLY)
551 2ND SPRAG TO PLANETARY THRUST WASHER (5L40-E ONLY)
553 5L40-E PLANETARY CARRIER ASSEMBLY

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Figure 153

### PLANETARY THRUST BEARING IDENTIFICATION




540 PLANETARY THRUST BEARING RETAINING SNAP RING
541 PLANETARY CARRIER THRUST BEARING
542 2ND SPRAG ASSEMBLY THRUST BEARING (5L40-E ONLY)

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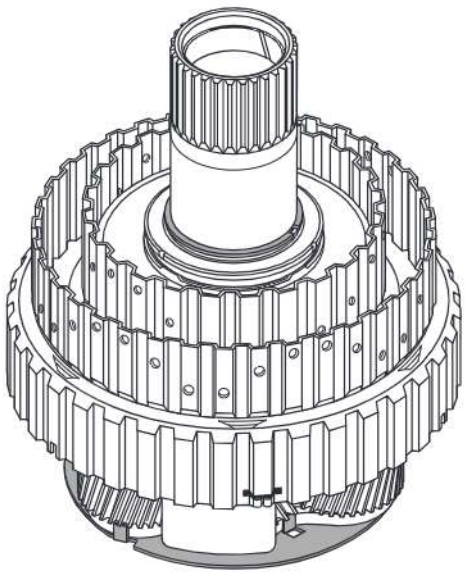
Figure 154

### "5L40-E" PLANETARY SYSTEM (CONT'D)

10. Thrust bearing identification for these two bearings is provided in Figure 154.
11. Install the retaining snap ring, as shown in Figure 156, and ensure that it is fully seated.
12. Set the completed 5L40-E planetary carrier assembly, as shown in Figure 155, aside for the final transmission assembly process.

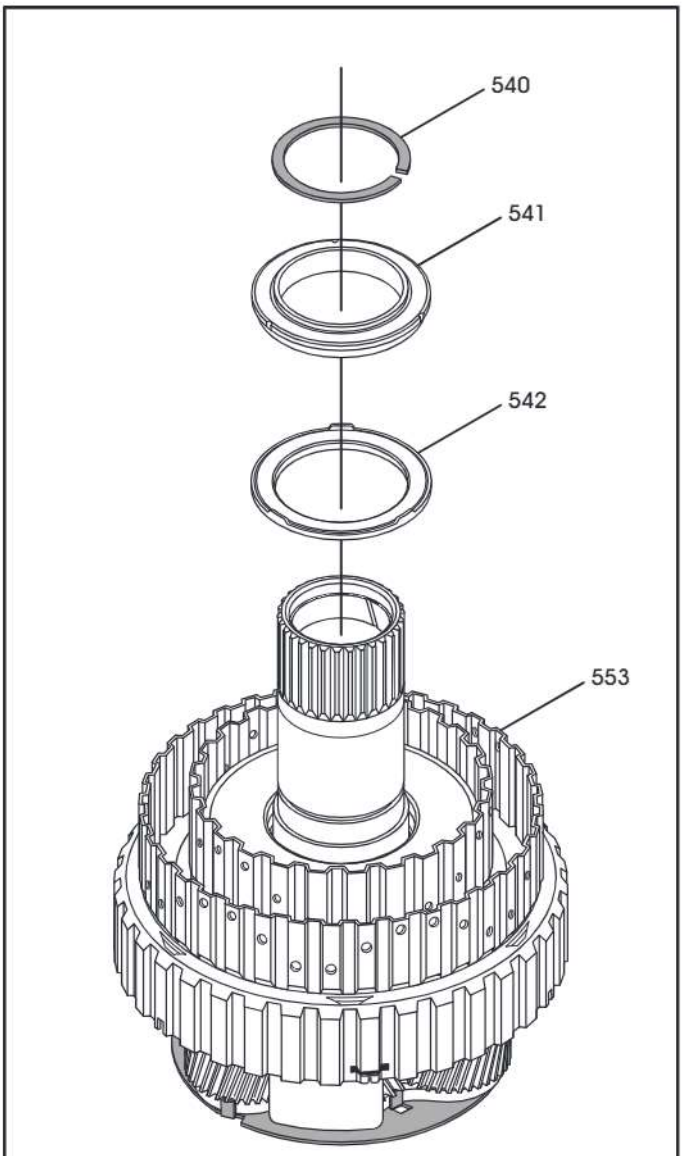
**Continued on Page 98**

### COMPLETED 5L40-E REAR PLANETARY



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Figure 155




540 PLANETARY THRUST BEARING RETAINING SNAP RING
541 PLANETARY CARRIER THRUST BEARING
542 2ND SPRAG ASSEMBLY THRUST BEARING (5L40-E ONLY)
553 5L40-E PLANETARY CARRIER/2ND SPRAG ASSEMBLY

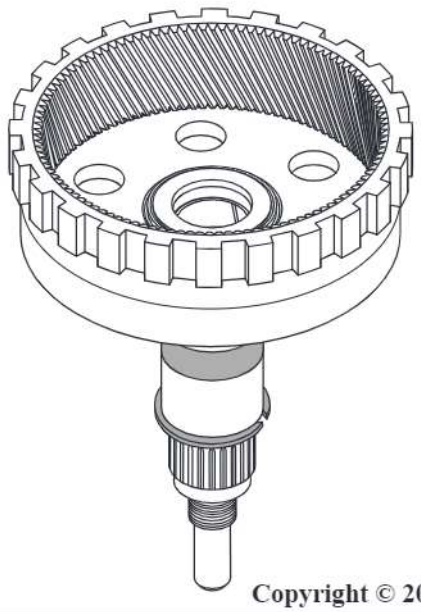
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Figure 156

## "5L40-E" PLANETARY SYSTEM (CONT'D)

13. Install output shaft into the output internal ring gear, as shown in Figure 158.
14. Install the internal ring gear snap ring into the groove in ring gear, as shown in Figure 158, and ensure that it is fully seated.
15. Install driveshaft yoke spacer onto output shaft against the flat surface (See Figure 158).
16. Install thrust bearing (559) onto output shaft, as shown in Figure 158, and retain with small amount of Trans-Jel®.
17. Set the completed 5L40-E output shaft, as shown in Figure 157, aside for the final transmission assembly process.

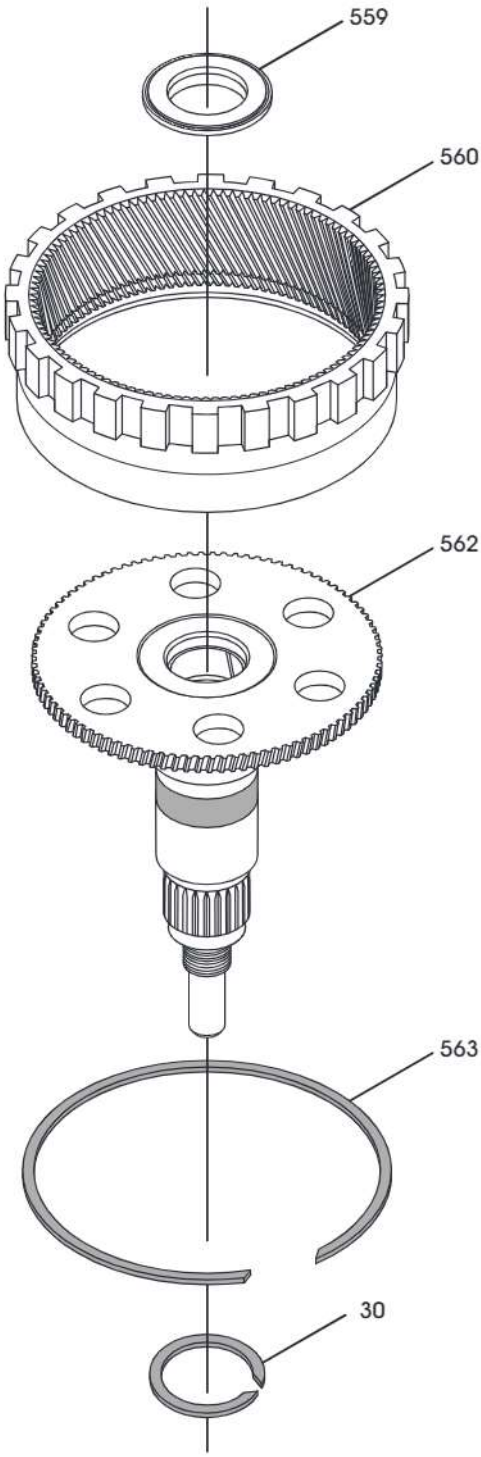
### COMPLETED 5L40-E OUTPUT SHAFT



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Figure 157

### 5L40-E OUTPUT SHAFT EXPLODED VIEW

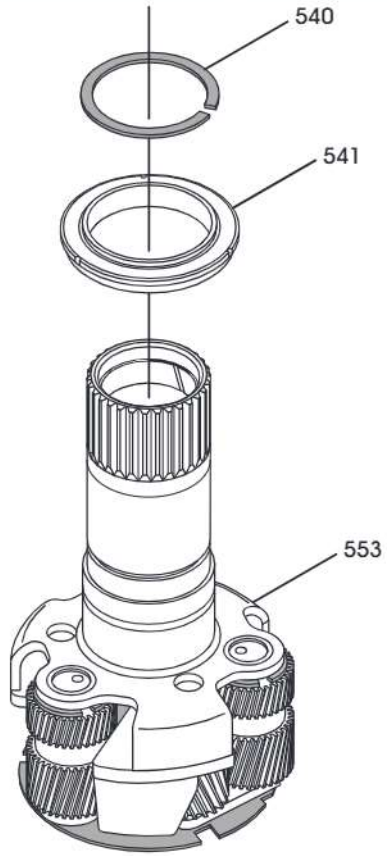



30 DRIVESHAFT YOKE TO OUTPUT SHAFT SPACER
559 OUTPUT SHAFT TO PLANETARY CARRIER THRUST BEARING
560 5L40-E REAR INTERNAL RING GEAR
562 5L40-E OUTPUT SHAFT ASSEMBLY
563 OUTPUT SHAFT TO RING GEAR RETAINING SNAP RING

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Figure 158

## 4L40-E PLANETARY CARRIER EXPLODED VIEW




540 PLANETARY THRUST BEARING RETAINING SNAP RING
541 PLANETARY CARRIER THRUST BEARING
553 4L40-E PLANETARY CARRIER ASSEMBLY

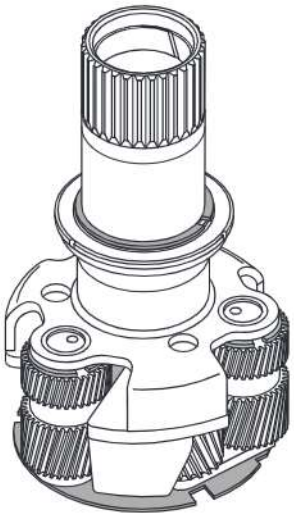
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Figure 159

## COMPONENT REBUILD
### "4L40-E" PLANETARY SYSTEM

1. Install thrust bearing (541) onto the 4L40-E planetary carrier, as shown in Figure 159, and down flush on step.
2. Install the retaining snap ring onto planetary carrier, as shown in Figure 159, and ensure that it is fully seated.
3. Set the completed 4L40-E planetary carrier, as shown in Figure 160, for final assembly.
4. Install output shaft into the output internal ring gear, as shown in Figure 162.
5. Install the internal ring gear snap ring into the groove in ring gear, as shown in Figure 162, and ensure that it is fully seated.
6. Install driveshaft yoke spacer onto output shaft against the flat surface (See Figure 162).
7. Install thrust bearing (559) onto output shaft, as shown in Figure 162, and retain with small amount of Trans-Jel®.
8. Set the completed 4L40-E output shaft, as shown in Figure 161, aside for the final transmission assembly process.

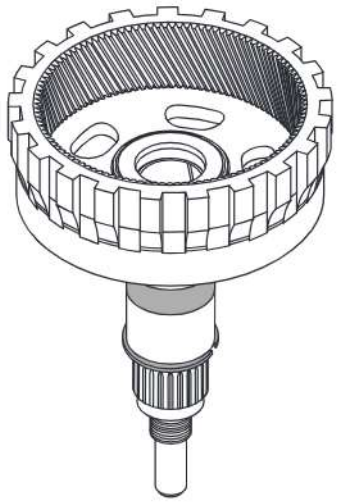
## COMPLETED 4L40-E PLANETARY CARRIER



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Figure 160

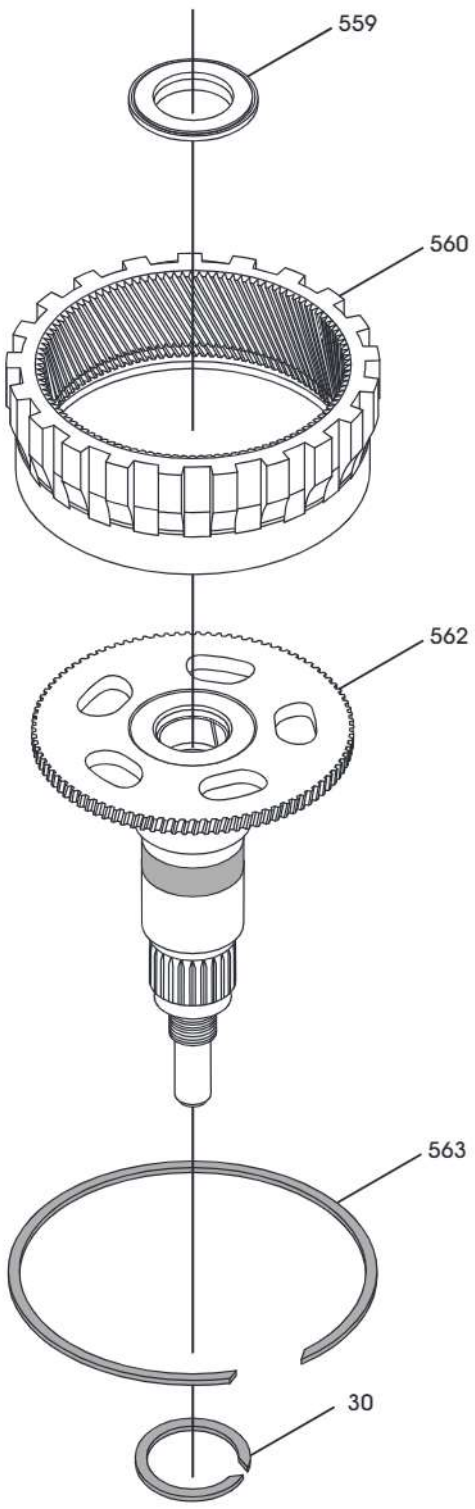
## COMPLETED 4L40-E OUTPUT SHAFT



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Figure 161

## 4L40-E OUTPUT SHAFT EXPLODED VIEW




30 DRIVESHAFT YOKE TO OUTPUT SHAFT SPACER
559 OUTPUT SHAFT TO PLANETARY CARRIER THRUST BEARING
560 4L40-E REAR INTERNAL RING GEAR
562 4L40-E OUTPUT SHAFT ASSEMBLY
563 OUTPUT SHAFT TO RING GEAR RETAINING SNAP RING

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Figure 162

300 TOP CHANNEL PLATE TO VALVE BODY BOLTS (7)
301 TOP CHANNEL PLATE ASSEMBLY
302 NUMBER 7 CHECKBALL SPRING
303 TOP CHANNEL PLATE TO BOTTOM CHANNEL PLATE GASKET
304 BOTTOM CHANNEL PLATE ASSEMBLY
305 UPPER SPACER PLATE GASKET
306 NUMBER 7 CHECKBALL
307 VALVE BODY SPACER PLATE
308 TCC/PWM SOLENOID SCREEN ASSEMBLY
309 LOWER SPACER PLATE GASKET
310 REAR VALVE BODY ASSEMBLY
311 FRONT VALVE BODY ASSEMBLY
312 PRESSURE CONTROL SOLENOID SCREEN ASSEMBLY
313 DIRECT CLUTCH ACCUMULATOR PISTON SPRING
314 DIRECT CLUTCH ACCUMULATOR PISTON LARGE SEAL RING
315 DIRECT CLUTCH ACCUMULATOR PISTON
316 DIRECT CLUTCH ACCUMULATOR PISTON SMALL SEAL RING
317 DIRECT CLUTCH ACCUMULATOR HOUSING
318 ACCUMULATOR HOUSING BOLTS (3 PER HOUSING)
319 OVERDRIVE CLUTCH ACCUMULATOR PISTON SPRING
320 O.D. CLUTCH ACCUMULATOR PISTON LARGE SEAL RING
321 OVERDRIVE CLUTCH ACCUMULATOR PISTON
322 O.D. CLUTCH ACCUMULATOR PISTON SMALL SEAL RING
323 OVERDRIVE CLUTCH ACCUMULATOR HOUSING
324 INTERMEDIATE CLUTCH ACCUMULATOR PISTON SPRING
325 INTERM. CLUTCH ACCUMULATOR PISTON LARGE SEAL RING
326 INTERMEDIATE CLUTCH ACCUMULATOR PISTON
327 INTERM. CLUTCH ACCUMULATOR PISTON SMALL SEAL RING
328 INTERMEDIATE CLUTCH ACCUMULATOR HOUSING
329 2ND CLUTCH ACCUMULATOR PISTON SPRING
330 2ND CLUTCH ACCUMULATOR PISTON LARGE SEAL RING
331 2ND CLUTCH ACCUMULATOR PISTON
332 2ND CLUTCH ACCUMULATOR PISTON SMALL SEAL RING
333 2ND CLUTCH ACCUMULATOR HOUSING

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Figure 163 Legend

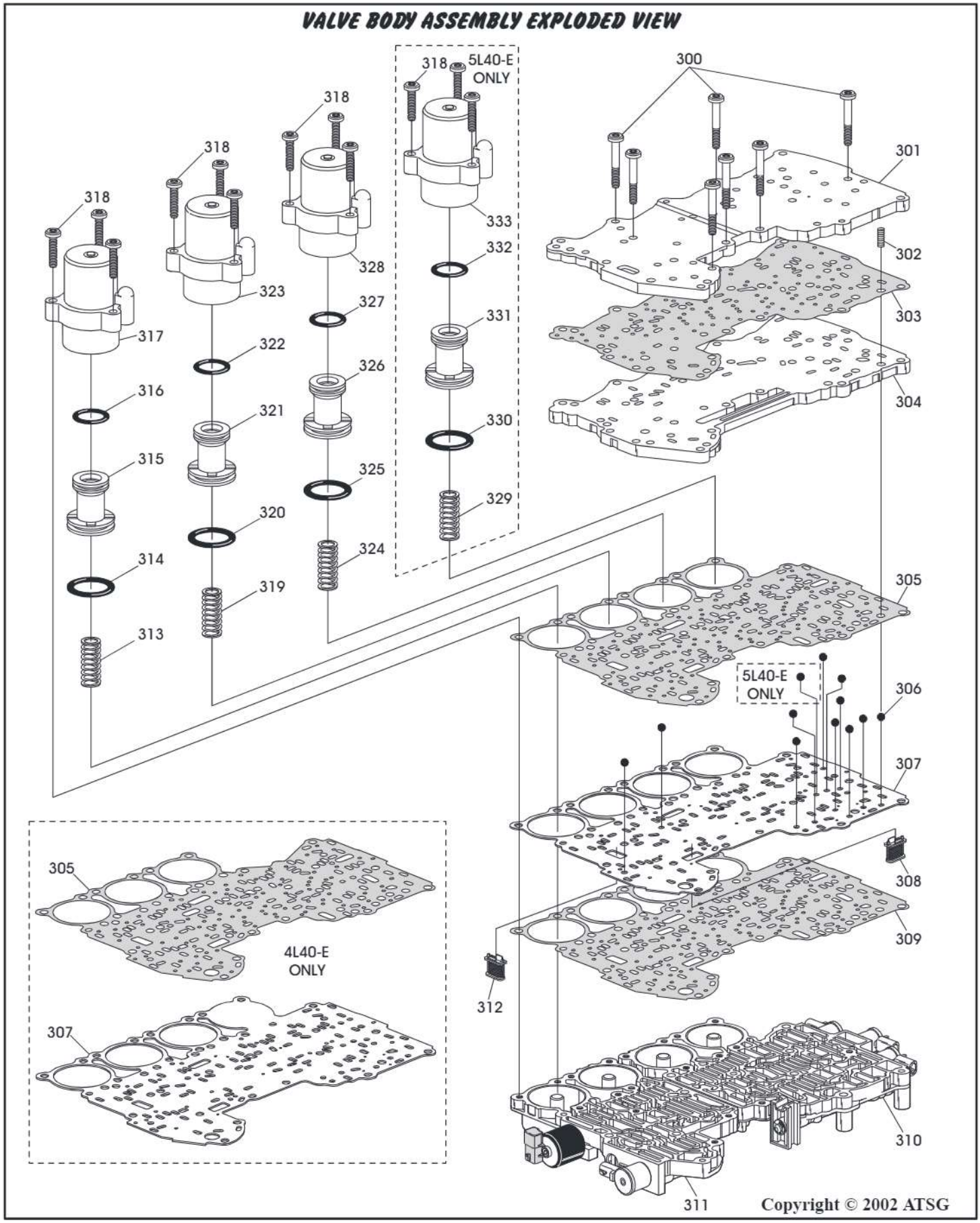

VALVE BODY ASSEMBLY EXPLODED VIEW
318
5L40-E ONLY
300
301
333
332
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317
322
326
304
316
321
330
315
325
329
320
324
314
319
305
313
5L40-E ONLY
306
307
308
305
4L40-E ONLY
309
312
307
310
311
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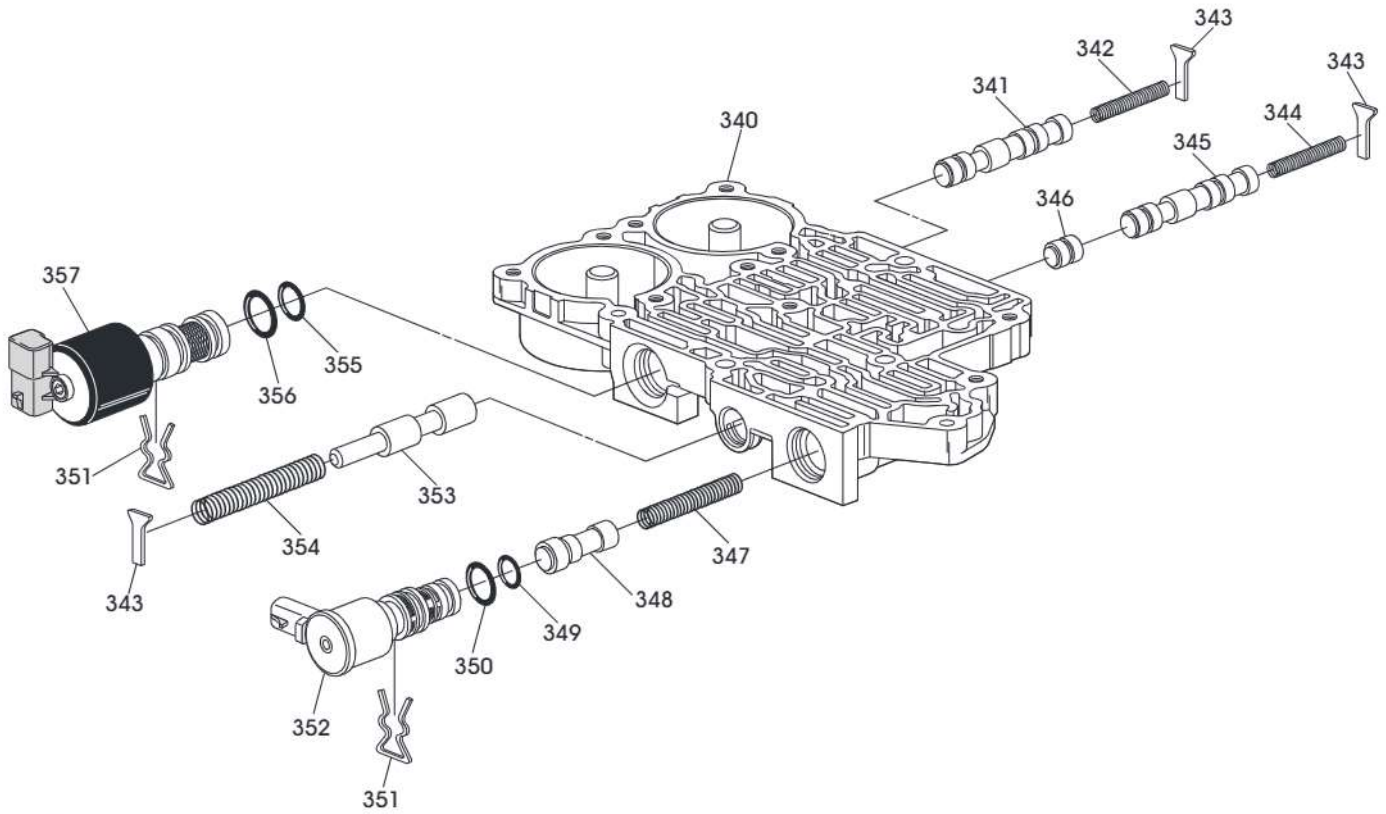
Figure 163

## COMPONENT REBUILD

### VALVE BODY ASSEMBLY

1. Dis-assemble complete valve body assembly using Figure 163 as a guide.
2. Remove and discard both valve body gaskets. Refer to Figure 163.
3. Clean all valve body parts thoroughly and dry with compressed air.
4. Inspect all valve body parts thoroughly for any wear and/or damage.
5. Dis-assemble the front valve body assembly using Figure 164 as a guide.
6. Lay each valve line-up out in order as you remove them from the valve body casting.
7. Inspect each valve, valve spring, bore plug and retainers for any wear and/or damage.
8. Clean all front valve body parts thoroughly and dry with compressed air.
9. Install each valve train back into their bores ***exactly*** as shown in Figure 164, lubricating them with Dexron III® as they are installed.
10. Install new "O" ring seals on the TCC/PWM Solenoid and the Pressure Control Solenoid as they are installed (See Figure 164).
11. Extra care here will eliminate some of the troublesome problems encountered later.
12. Dis-assemble the rear valve body assembly using Figure 165 as a guide.
13. Lay each valve line-up out in order as you remove them from the valve body casting.
14. Inspect each valve, valve spring, bore plug and retainers for any wear and/or damage.

**FRONT VALVE BODY ASSEMBLY EXPLODED VIEW**




340 FRONT VALVE BODY CASTING ASSEMBLY
341 SAFETY MODE VALVE
342 SAFETY MODE VALVE SPRING
343 VALVE SPRING RETAINER
344 3-4 SHIFT VALVE SPRING
345 3-4 SHIFT VALVE
346 3-4 SHIFT CONTROL VALVE
347 TCC REGULATOR APPLY VALVE SPRING
348 TCC REGULATOR APPLY VALVE
349 SOLENOID ASSEMBLY SMALL "O" RING SEAL
350 SOLENOID ASSEMBLY LARGE "O" RING SEAL
351 SOLENOID ASSEMBLY RETAINER
352 TCC/PWM SOLENOID ASSEMBLY
353 FEED LIMIT VALVE
354 FEED LIMIT VALVE SPRING
355 PRESSURE CONTROL SOLENOID SMALL "O" RING SEAL
356 PRESSURE CONTROL SOLENOID L ARGE "O" RING SEAL
357 PRESSURE CONTROL SOLENOID ASSEMBLY

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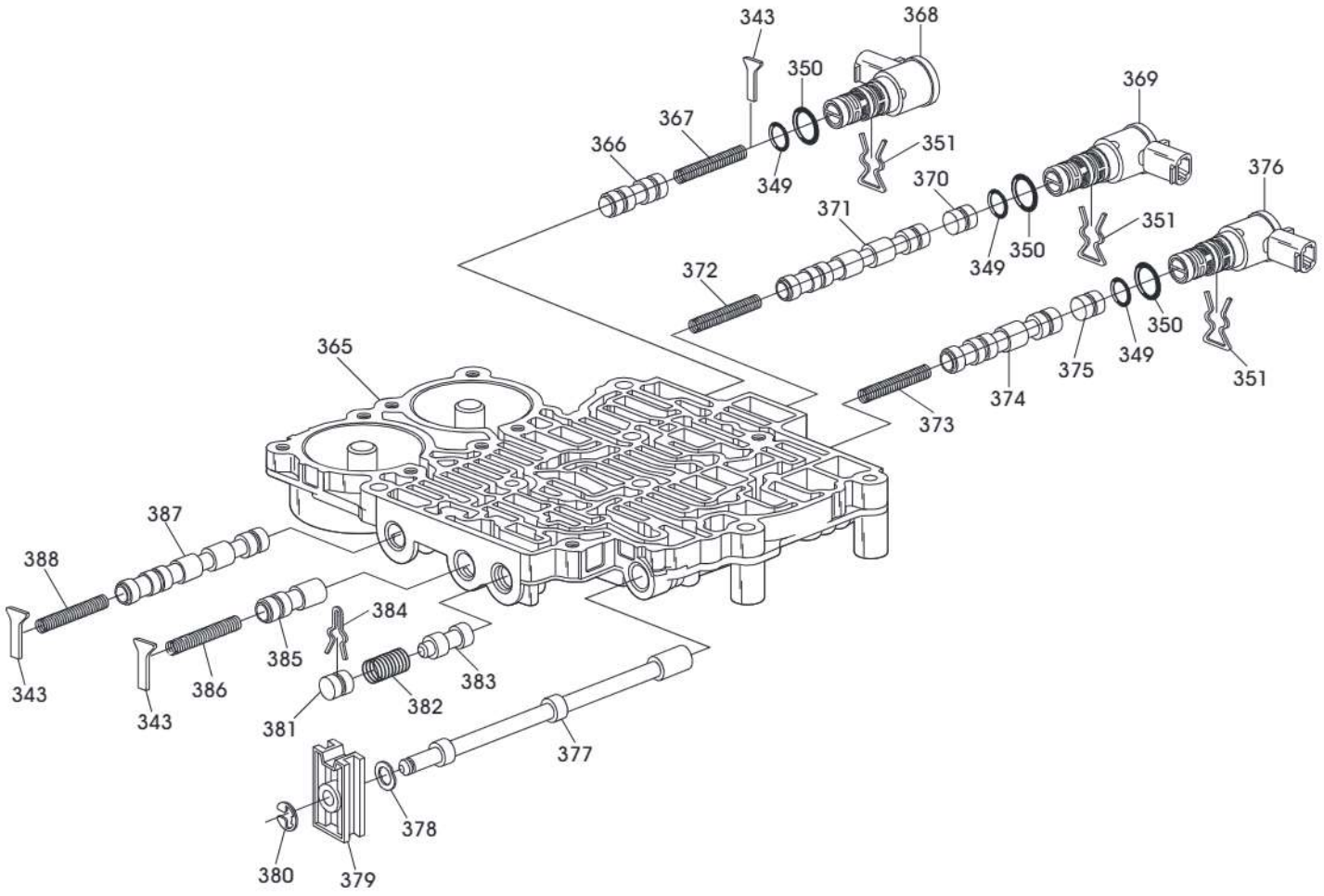
Figure 164

## VALVE BODY ASSEMBLY (CONT'D)

15. Clean all front valve body parts thoroughly and dry with compressed air.
16. Install each valve train back into their bores ***exactly*** as shown in Figure 165, lubricating them with Dexron III® as they are installed.
17. Install new "O" ring seals on all three of the Shift Solenoids as they are installed, as shown in Figure 165.
18. Extra care here will eliminate some of the troublesome problems encountered later.

**Continued on Page 104**

### REAR VALVE BODY ASSEMBLY EXPLODED VIEW




343 VALVE SPRING RETAINER
349 SOLENOID ASSEMBLY SMALL "O" RING SEAL
350 SOLENOID ASSEMBLY LARGE "O" RING SEAL
351 SOLENOID ASSEMBLY RETAINER
365 REAR VALVE BODY CASTING ASSEMBLY
366 1-2 SHIFT CONTROL VALVE
367 1-2 SHIFT CONTROL VALVE SPRING
368 1-2 SHIFT SOLENOID ASSEMBLY
369 2-3 SHIFT SOLENOID ASSEMBLY
370 2-3 SHIFT CONTROL VALVE
371 2-3 SHIFT VALVE
372 2-3 SHIFT VALVE SPRING
373 4-5 SHIFT VALVE SPRING
374 4-5 SHIFT VALVE
375 4-5 SHIFT CONTROL VALVE
376 4-5 SHIFT SOLENOID ASSEMBLY
377 MANUAL VALVE
378 MANUAL VALVE LINK "WAVED" WASHER
379 MANUAL VALVE LINK
380 MANUAL VALVE LINK "E" CLIP RETAINER
381 LOW PRESSURE CONTROL VALVE BORE PLUG
382 LOW PRESSURE CONTROL VALVE SPRING
383 LOW PRESSURE CONTROL VALVE
384 LOW PRESSURE CONTROL VALVE BORE PLUG RETAINER
385 REVERSE LOCKOUT VALVE
386 REVERSE LOCKOUT VALVE SPRING
387 1-2 SHIFT VALVE
388 1-2 SHIFT VALVE SPRING

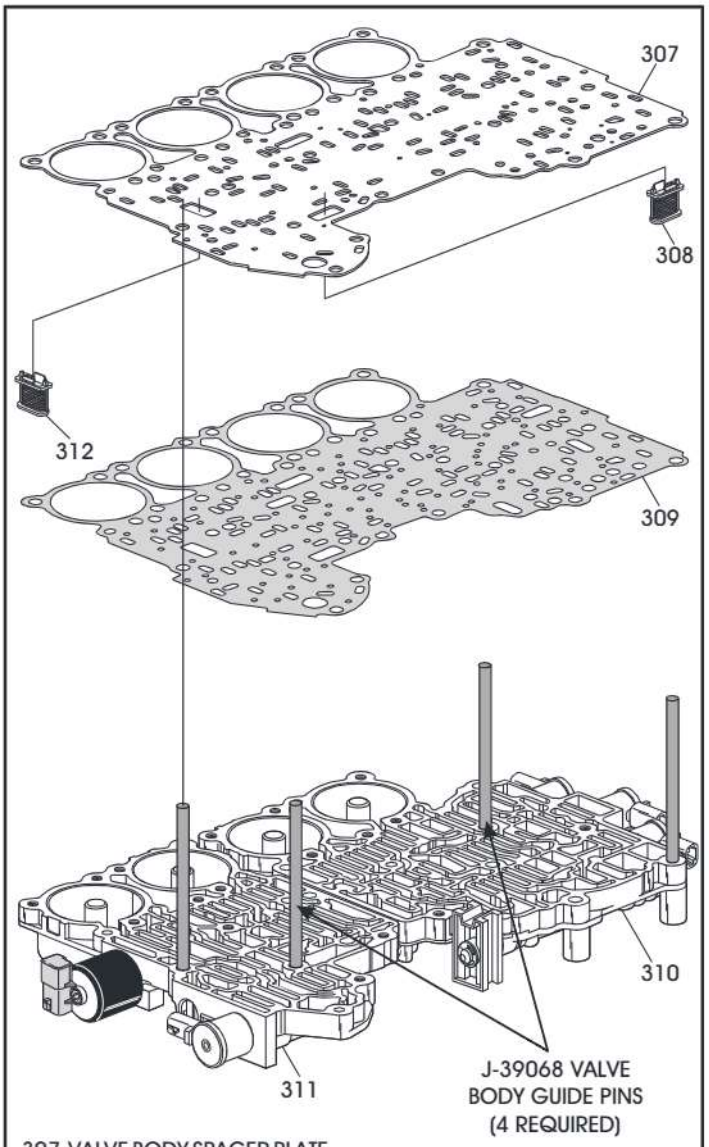
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Figure 165

## VALVE BODY ASSEMBLY (CONT'D)

19. Lay both front and rear valve body assemblies on a flat work surface ***exactly*** as they are layed out in Figure 166.
20. Install the four J-39068 guide pins in locations shown in Figure 166.
21. Install two new screens into the spacer plate in locations shown in Figure 166.
22. Install lower spacer plate gasket over the guide pins as shown in Figure 166.
23. Install spacer plate over guide pins, as shown in Figure 166.
24. Install upper spacer plate gasket over the guide pins, as shown in Figure 167.
25. Install valve body checkballs into their proper locations in the lower channel plate, as shown in Figure 168.
    ***Note: Retain the checkballs in channel plate with "Small" amount of Trans-Jel®.***
26. Install the lower channel plate with checkballs over the guide pins, as shown in Figure 167.

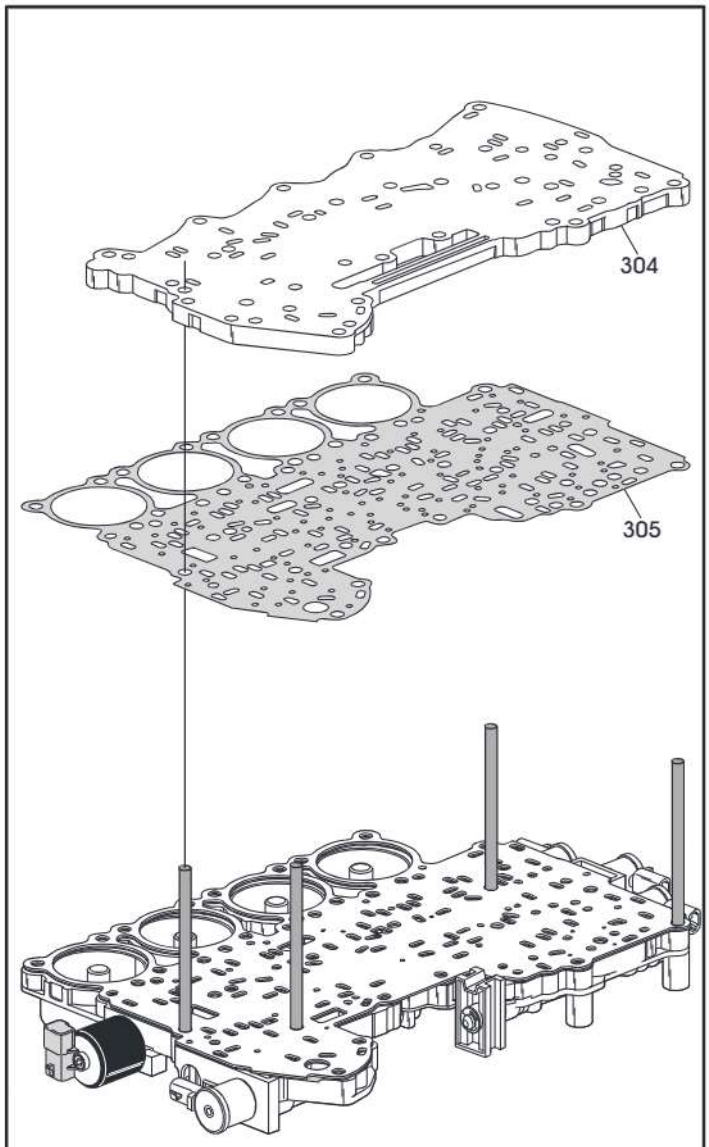
**Continued on Page 107**




307 VALVE BODY SPACER PLATE
308 TCC PWM SOLENOID SCREEN ASSEMBLY
309 LOWER SPACER PLATE GASKET
310 REAR VALVE BODY ASSEMBLY
311 FRONT VALVE BODY ASSEMBLY
312 PRESSURE CONTROL SOLENOID SCREEN ASSEMBLY

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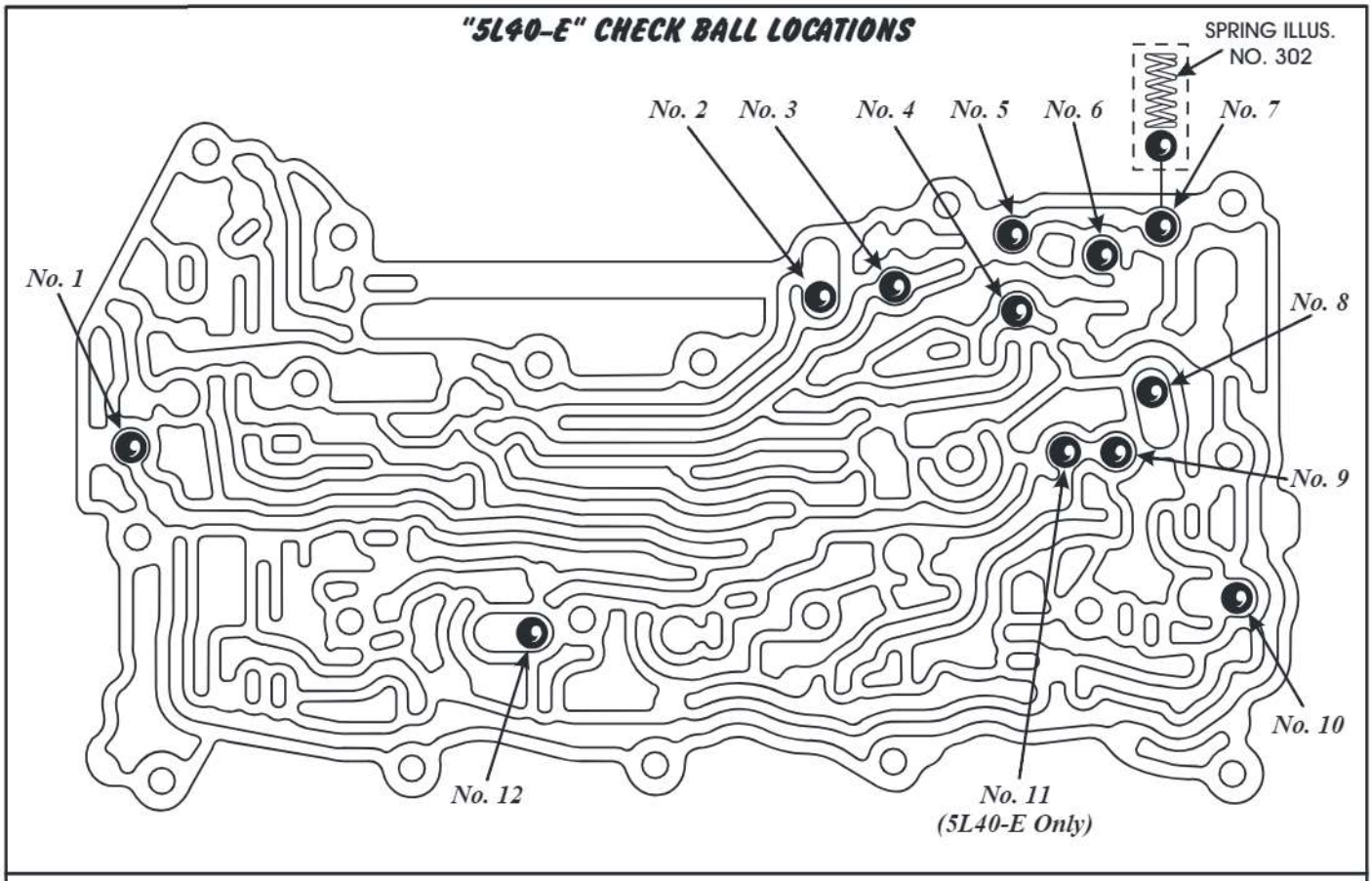
Figure 166




304 BOTTOM CHANNEL PLATE WITH CHECKBALLS INSTALLED
305 UPPER SPACER PLATE GASKET

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Figure 167


"5L40-E" CHECK BALL LOCATIONS
SPRING ILLUS. NO. 302
No. 1
No. 2
No. 3
No. 4
No. 5
No. 6
No. 7
No. 8
No. 9
No. 10
No. 11 (5L40-E Only)
No. 12

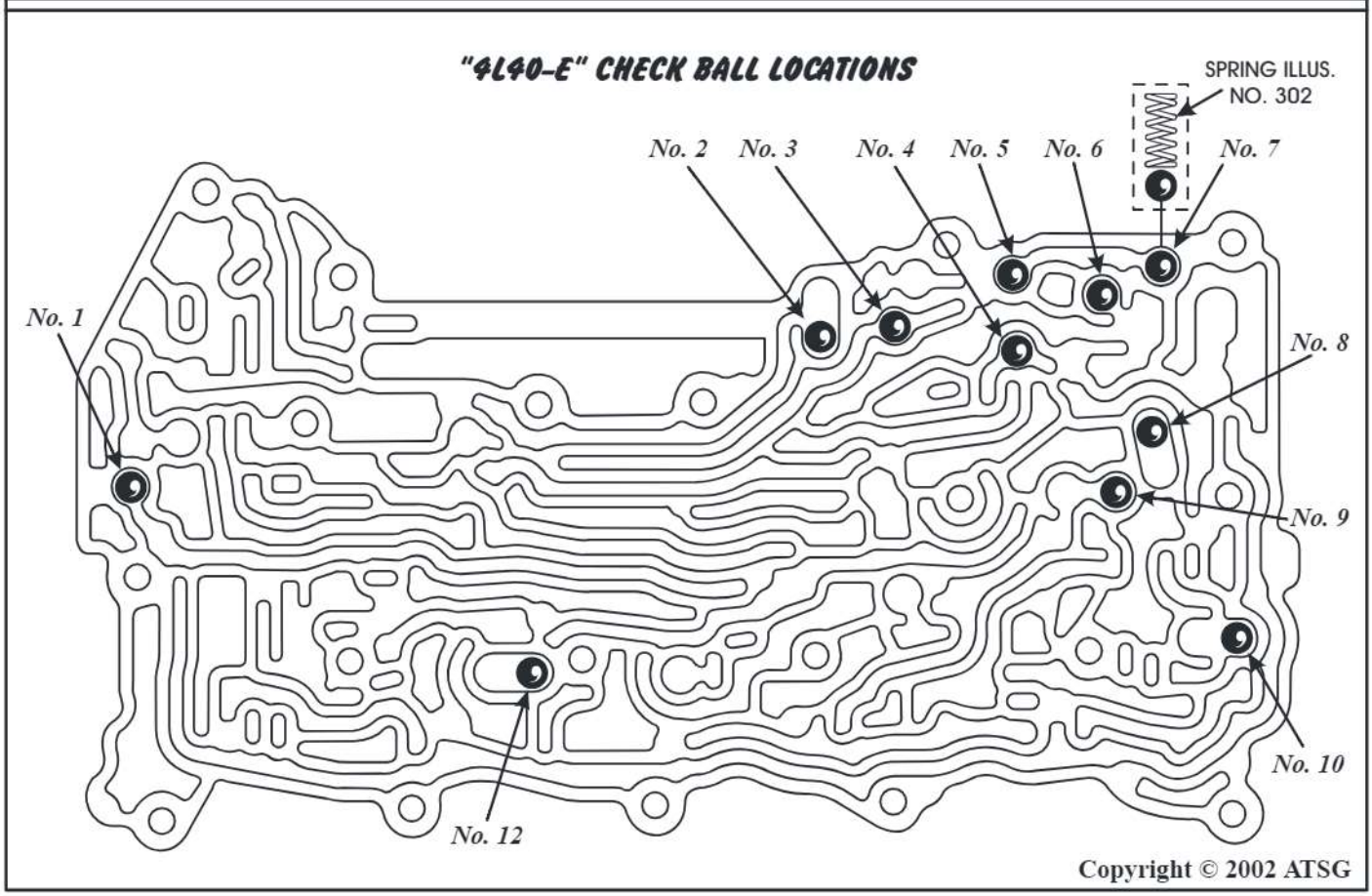
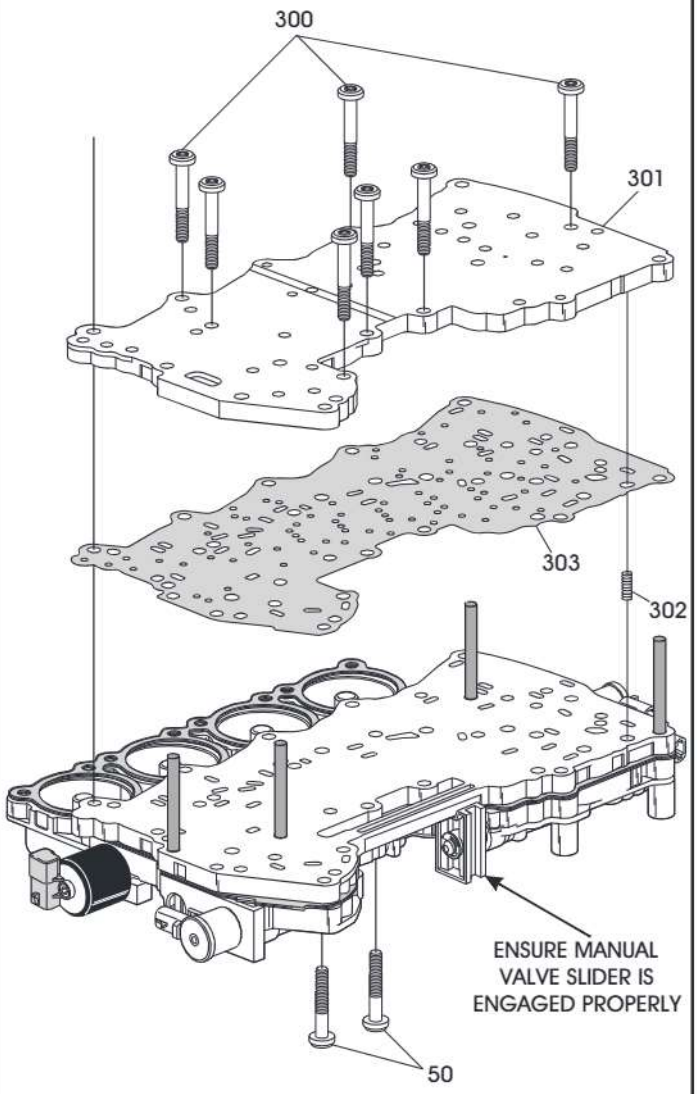

"4L40-E" CHECK BALL LOCATIONS
SPRING ILLUS. NO. 302
No. 1
No. 2
No. 3
No. 4
No. 5
No. 6
No. 7
No. 8
No. 9
No. 10
No. 12
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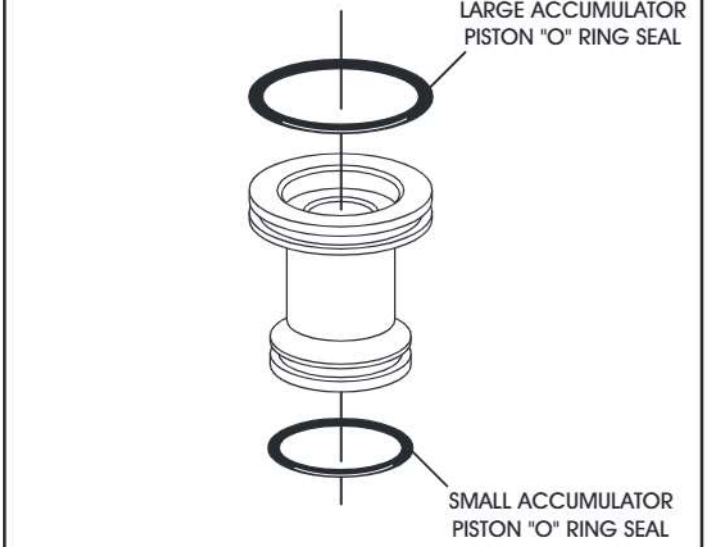
Figure 168




50 VALVE BODY TO TOP CHANNEL PLATE (SEE BOLT CHART)
300 TOP CHANNEL PLATE TO VALVE BODY (SEE BOLT CHART)
301 TOP CHANNEL PLATE ASSEMBLY
302 NUMBER 7 CHECKBALL SPRING
303 TOP CHANNEL PLATE TO BOTTOM CHANNEL PLATE GASKET

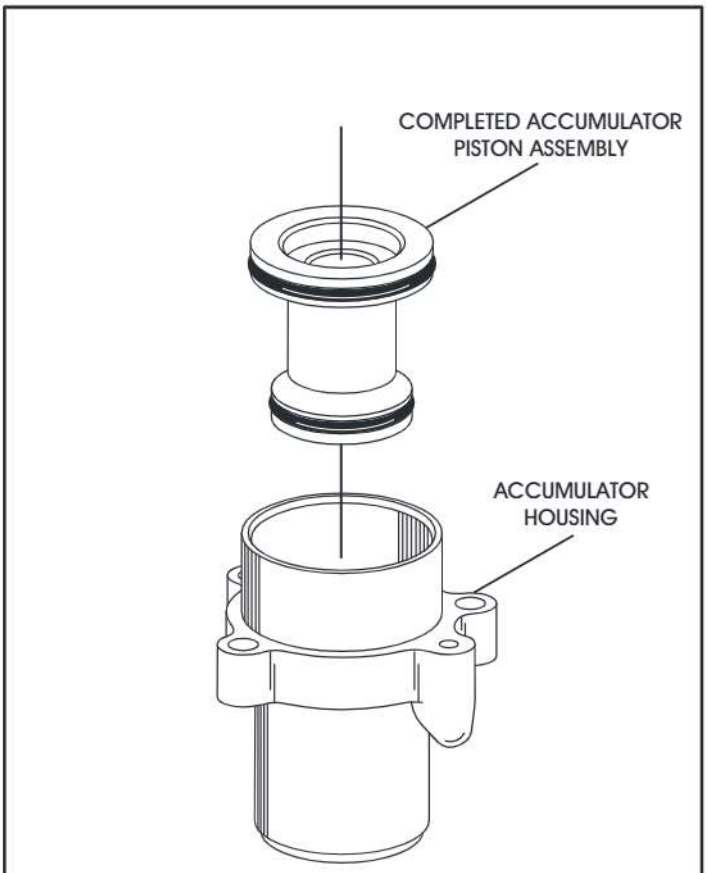
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Figure 169




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Figure 170

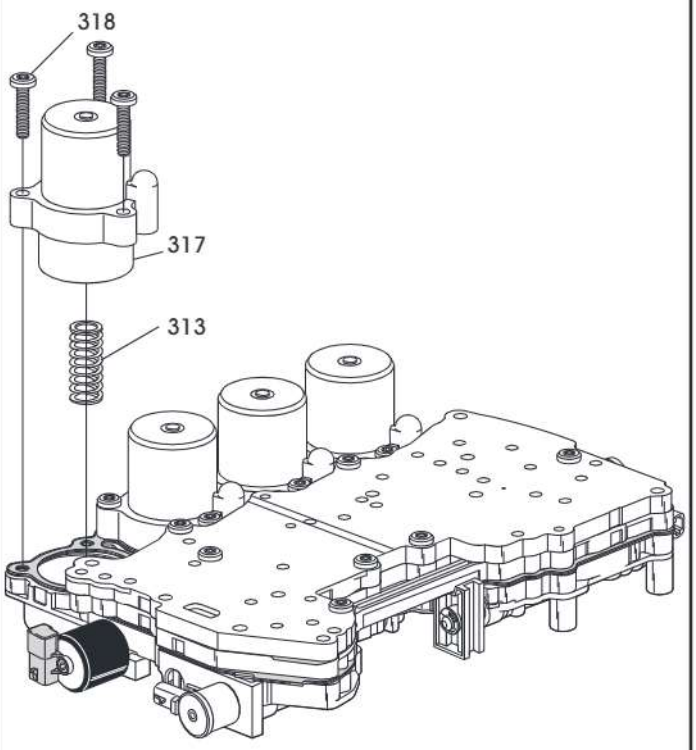



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Figure 171

## VALVE BODY ASSEMBLY (CONT'D)

24. Ensure that the manual valve slider is engaged properly with the lower channel plate casting, as shown in Figure 169.
    ***Note: Manual valve must slide freely.***
25. Install the top channel plate to bottom channel plate gasket over the guide pins, as shown in Figure 169.
26. Install the number 7 checkball spring (302) in the location shown in Figure 169.
27. Install the top channel plate casting over guide pins, as shown in Figure 169.
28. Install the 7 top channel plate to valve body bolts in the locations shown in Figure 169, and finger tighten only at this time.
    ***Note: Refer to bolt chart for identification of valve body bolts and their length.***
29. Install the 2 valve body to top channel plate bolts from the bottom, as shown in Figure 169, and finger tighten only at this time.
    ***Note: Refer to bolt chart for identification of valve body bolts and their length.***
30. Now you can torque the 9 valve body bolts you have just installed to 11 Nm (8 ft.lb.), and then remove the J-39068 guide pins.
    ***Note: Once again, ensure that manual valve moves freely.***
31. Install new "O" ring seals onto all four of the accumulator pistons, as shown in Figure 170.
    ***Note: All accumulator pistons are the same.***
    ***All large "O" ring seals are the same.***
    ***All small "O"ring seals are the same.***
    ***All accumulator housings are the same.***
    ***All accumulator springs are the same.***
32. Install the completed accumulator pistons into the accumulator housings (See Figure 171).
33. Install all completed accumulator assemblies onto the valve body assembly, using three bolts per accumulator, as shown in Figure 172.
34. Torque all four of the accumulator housings to 11 Nm (8 ft.lb.).
35. Set the completed valve body assembly, as shown in Figure 173, aside for final assembly.

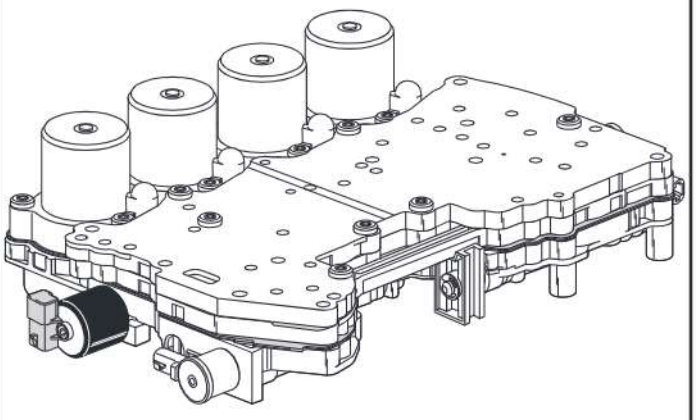



313 ACCUMULATOR SPRINGS (ALL THE SAME)
317 COMPLETED ACCUMULATOR HOUSING AND PISTON
318 ACCUMULATOR HOUSING RETAINING BOLTS (3 REQUIRED PER)

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Figure 172

### COMPLETED VALVE BODY ASSEMBLY



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Figure 173

## TRANSMISSION ASSEMBLY

### INTERNAL COMPONENTS

1. Install the pre-assembled planetary internal ring gear and output shaft, along with the thrust bearing, as shown in Figure 174.
   *Note: We have illustrated both the 4L40-E and the 5L40-E in Figure 174.*
2. Install pre-assembled planetary carrier system, as shown in Figure 175, by rotating down into position.
   *Note: We have illustrated both the 4L40-E and the 5L40-E in Figure 175.*
3. Install pre-assembled center support assembly as shown in Figure 176, and rotate the output shaft back and forth to engage the 2nd clutch plates and the 2nd coast clutch plates.
4. Install thrust bearing on the back side of the low sprag assembly and retain with a small amount of Trans-Jel® (See Figure 177).
5. Install the low sprag assembly until fully seated by rotating back and forth to engage the low/reverse clutch plates (See Figure 177).

**Continued on Page 109**

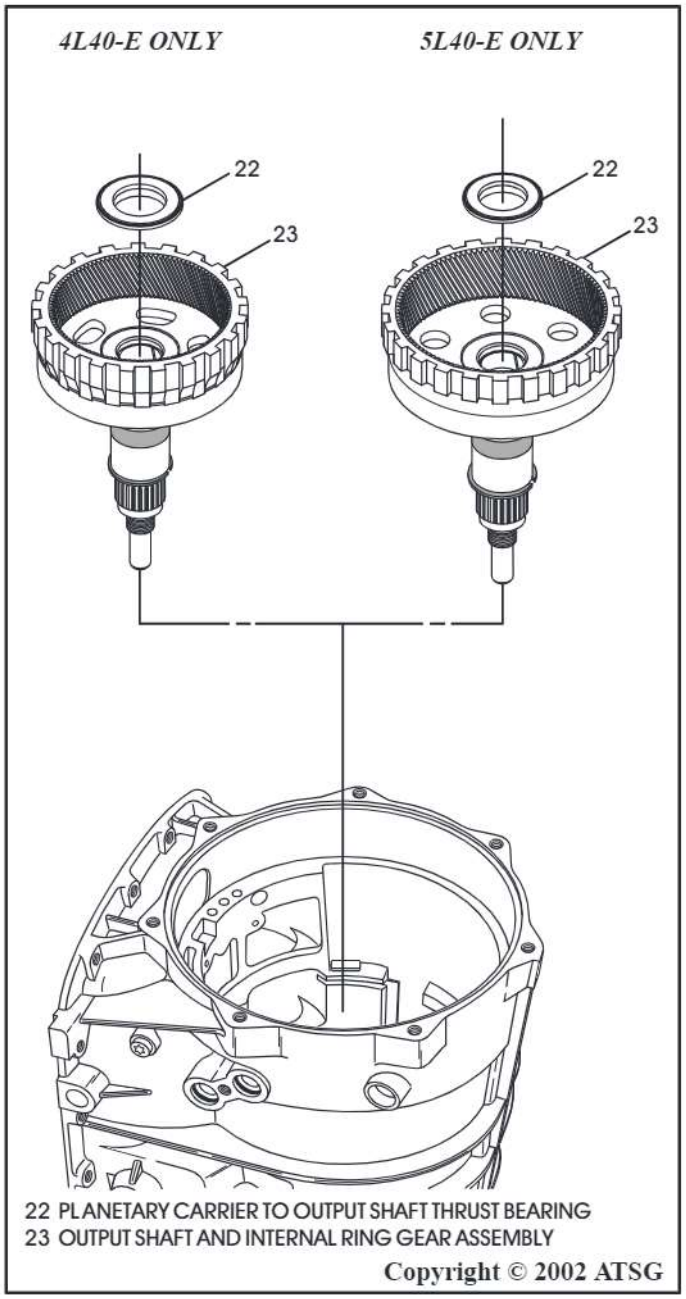



Figure 174

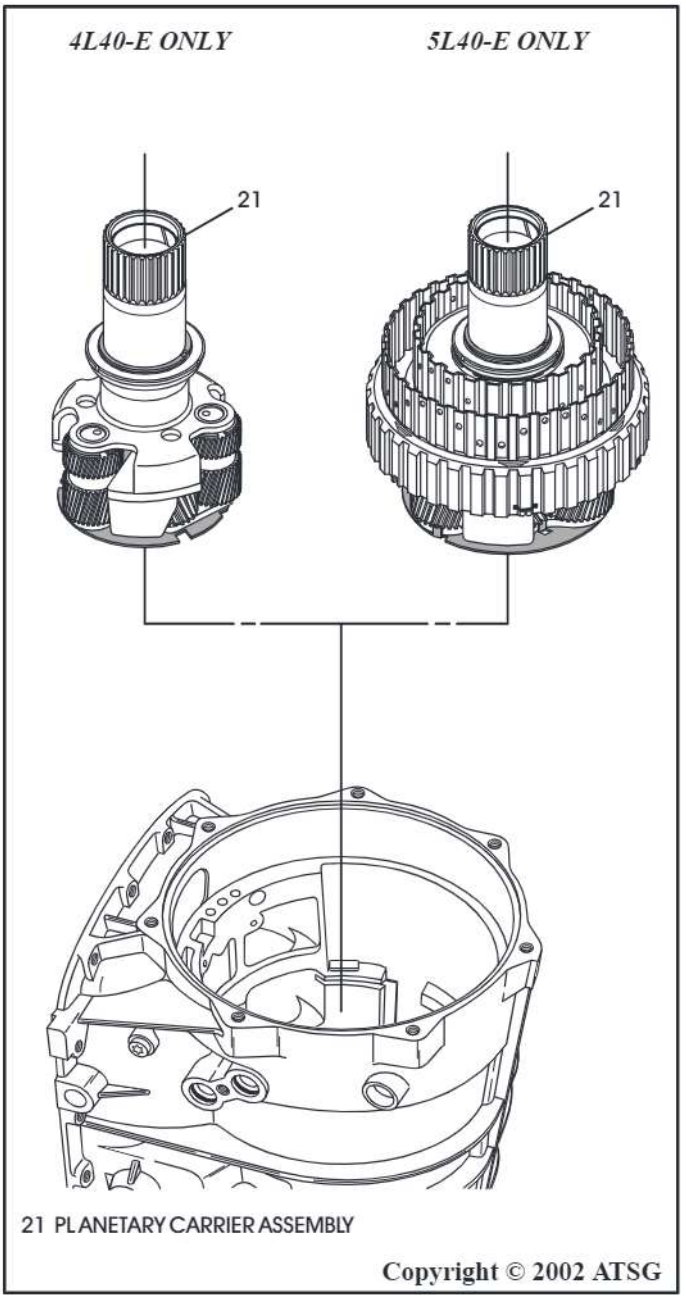
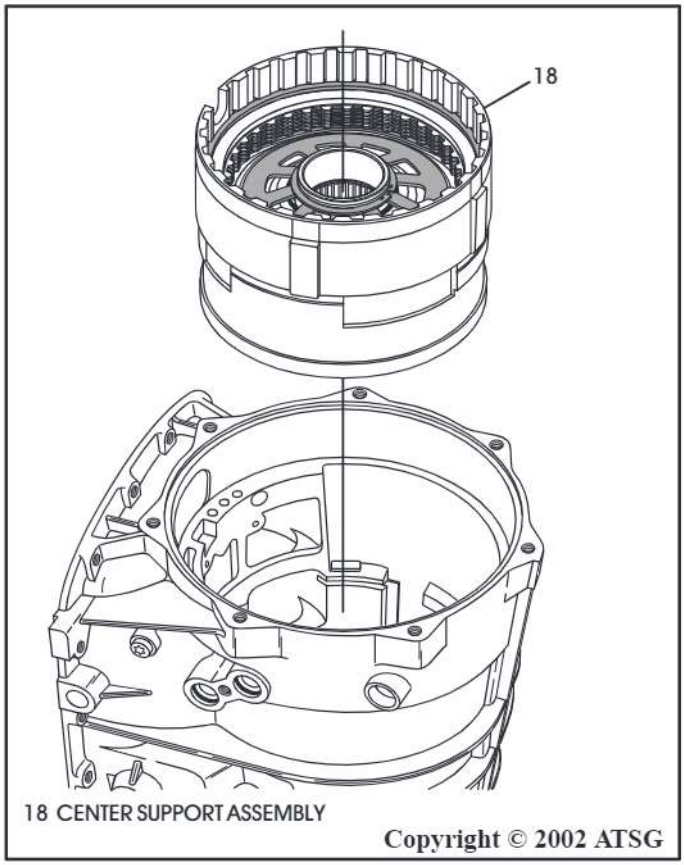


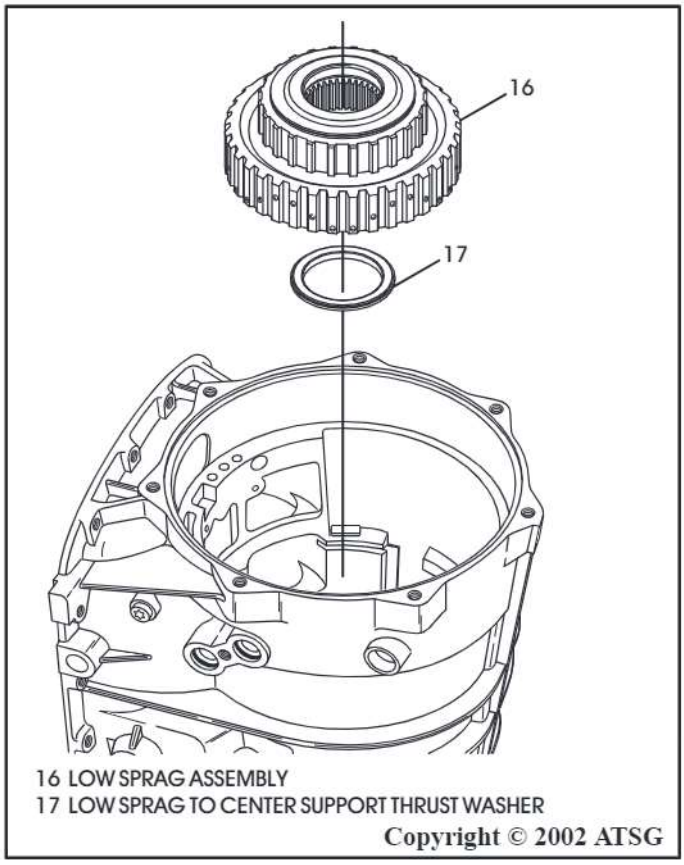

Figure 175




18 CENTER SUPPORT ASSEMBLY

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Figure 176




16 LOW SPRAG ASSEMBLY
17 LOW SPRAG TO CENTER SUPPORT THRUST WASHER

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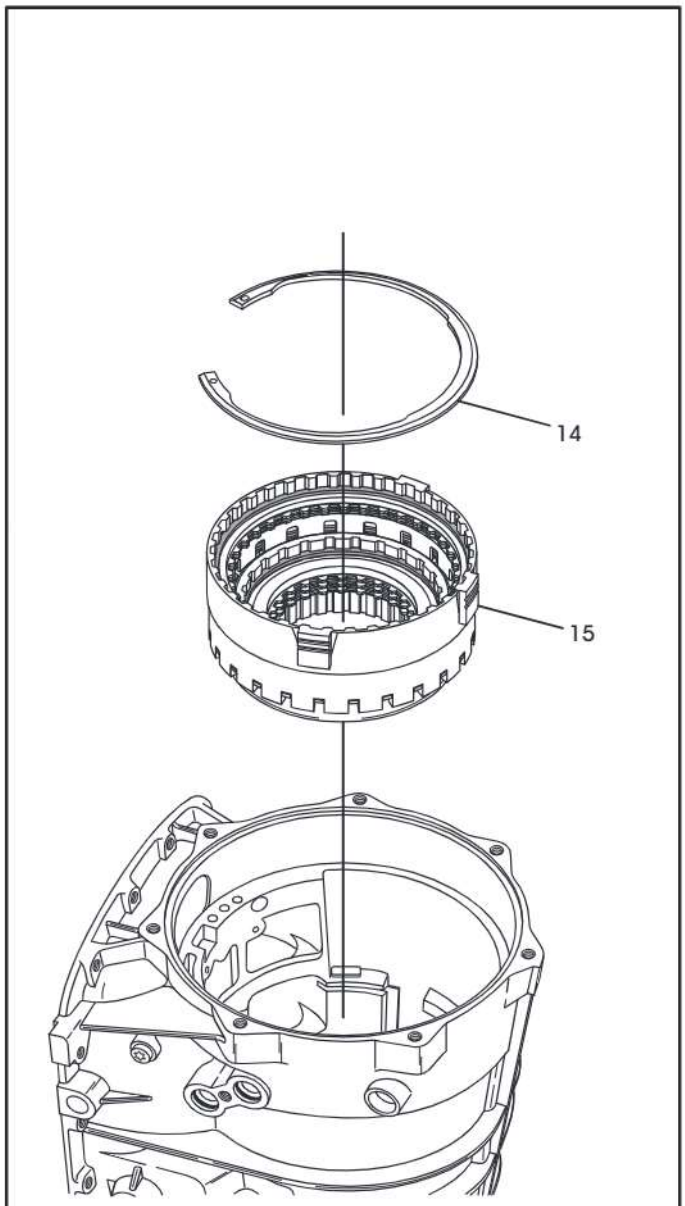
Figure 177

## TRANSMISSION ASSEMBLY (CONT'D)

### INTERNAL COMPONENTS

6. Install pre-assembled intermediate/overdrive clutch housing, as shown in Figure 178. Rotate the output shaft back and forth until it is fully seated and engaged on the low sprag race.
7. ***"Do Not" install the snap ring yet. This snap ring is "Selective" and we must measure to determine correct thickness.***

**Continued on Page 110**




14 INTERM/O.D. CLUTCH HOUSING SNAP RING (SELECTIVE)
15 INTERMEDIATE/OVERDRIVE CLUTCH HOUSING ASSEMBLY

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Figure 178

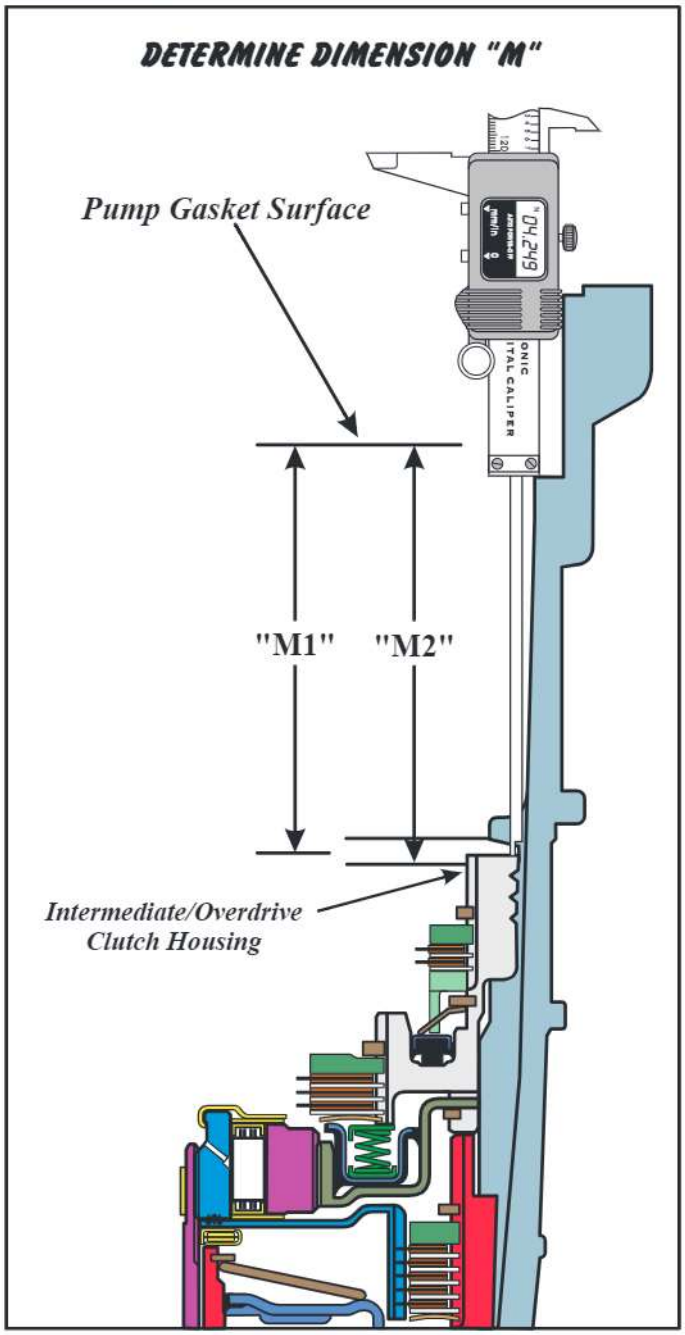



Figure 179

## TRANSMISSION ASSEMBLY (CONT'D)

### INTERNAL COMPONENTS (CONT'D)

8. Measure the distance from the pump gasket surface, to the top of the intermediate/overdrive housing, as shown in Figures 179 and 180. ***Note: Record this as Dimension "M1".***
9. Measure the distance from the pump gasket surface, to the bottom of the snap ring groove in the case, as shown in Figures 179 and 180. ***Note: Record this as Dimension "M2".***

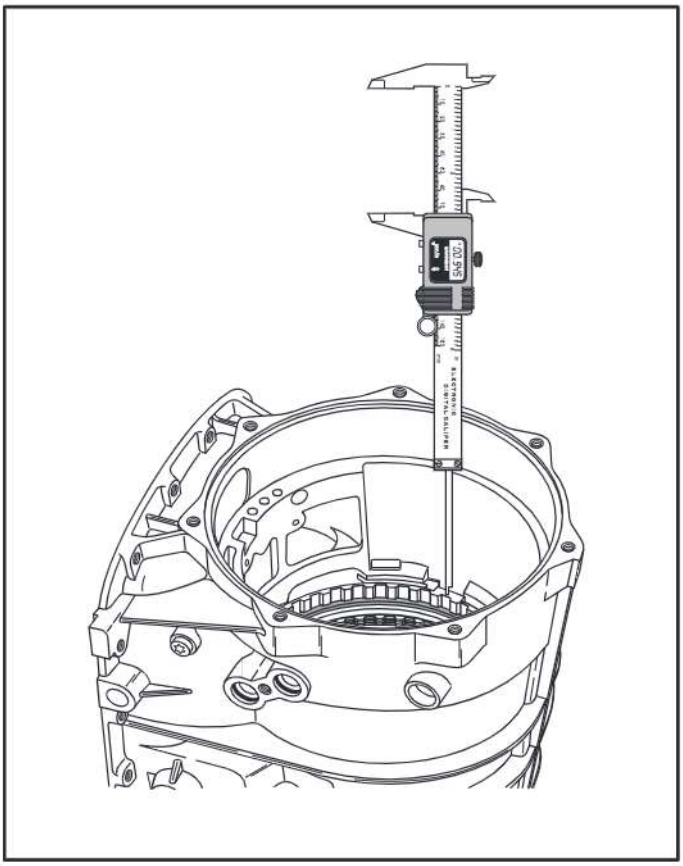


Figure 180

| INTERMEDIATE AND OVERDRIVE CLUTCH HOUSING SNAP RING CHART | |
|---|---|
| **DIMENSION "M"** | **SNAP RING THICKNESS SHOULD BE:** |
| *0.75 mm (.029") to .085 mm (.033")* | *3.90 to 4.00mm (.153" to .157")* |
| *0.85 mm (.033") to .095 mm (.037")* | *3.80 to 4.90mm (.149" to .153")* |
| *0.95 mm (.037") to 1.05 mm (.041")* | *3.70 to 3.80mm (.145" to .149")* |
| *1.05 mm (.041") to 1.15 mm (.045")* | *3.60 to 3.70mm (.141" to .145")* |
| *1.15 mm (.045") to 1.25 mm (.049")* | *3.50 to 3.60mm (.137" to .141")* |
| *1.25 mm (.049") to 1.35 mm (.054")* | *3.40 to 3.50mm (.133" to .137")* |

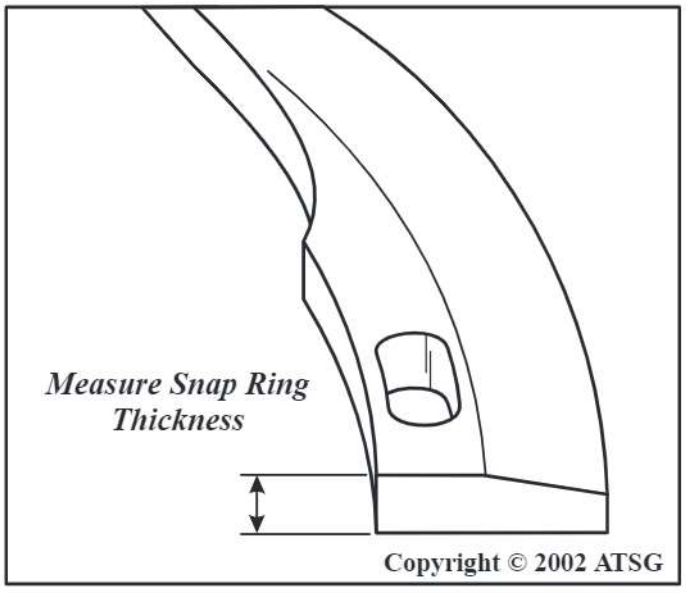
Figure 181

### INTERNAL COMPONENTS (CONT'D)

10. After you have both dimensions recorded, subtract "M1" from "M2".
    ***Note: This will be Dimension "M".***
11. Refer to the chart in Figure 181 to determine the thickness of the proper snap ring.
12. Measure thickness of your snap ring ***exactly*** as shown in Figure 182, to ensure that your snap ring is the proper thickness.

    ***EXAMPLE:***
    1. ***Dimension "M1" = 4.206".***
    2. ***Dimension "M2" = 4.249".***
    3. ***Subtract "M1" from "M2" = .043".***
    4. ***Dimension "M" = .043"***
    5. ***Dimension "M" from the chart in Figure 181 shows a .141"-.145" thickness snap ring required.***
13. Now you can install the proper size snap ring using the J-45126 snap ring pliers, as shown in Figure 183.
    ***Note: This snap ring is "Very" strong and requires J-45126 snap ring pliers to avoid any possible injury.***

**Continued on Page 112**

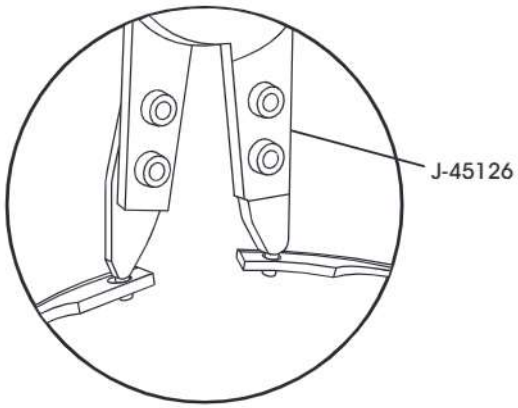


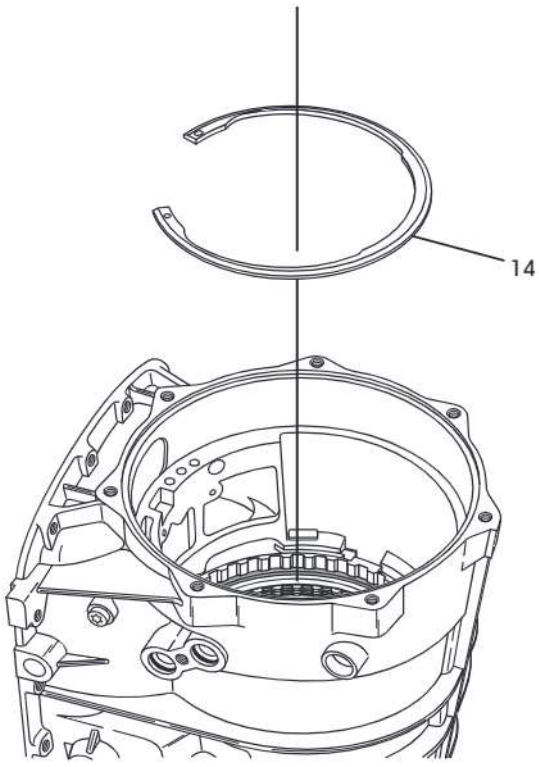

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Figure 182

***Snap Ring Pliers J-45126 Are "Required" To Remove Or Replace This Snap Ring***

***Snap Ring Pliers J-45126 are long handled for leverage and locking***




14 INTERM/O.D. CLUTCH HOUSING SNAP RING (SELECTIVE)

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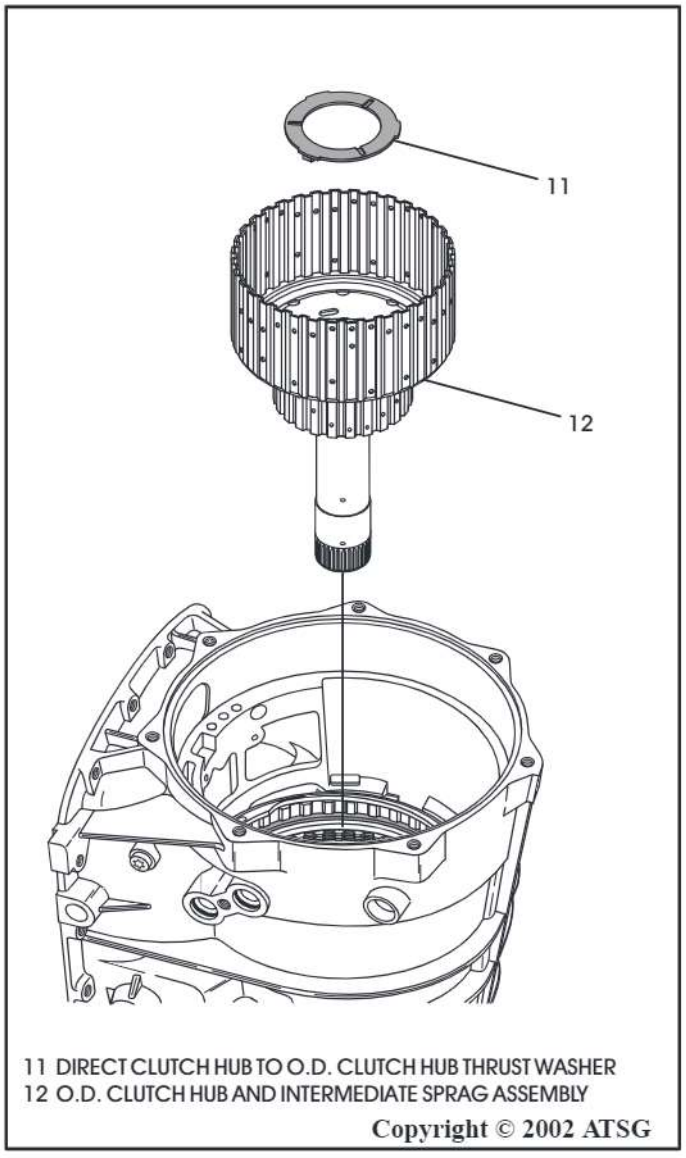
Figure 183

## TRANSMISSION ASSEMBLY (CONT'D)

### INTERNAL COMPONENTS (CONT'D)

14. Install thrust washer (11) onto the overdrive clutch hub and intermediate sprag assembly as shown in Figure 184, if not already done, and retain with small amount of Trans-Jel®.
15. Install overdrive clutch hub and intermediate sprag assembly, as shown in Figure 184, by rotating back and forth until fully seated and both overdrive and 2nd clutches are engaged.
16. Install direct clutch hub thrust washer (9) into direct clutch hub, as shown in Figure 185, if not already done, and retain with small amount of Trans-Jel®.
17. Install the direct clutch hub assembly into the transmission, as shown in Figure 185, by rotating back and forth until fully seated.
18. Install the pre-assembled forward sprag and sun gear shaft assembly into the transmission, as shown in Figure 186, by rotating back and forth until fully seated.

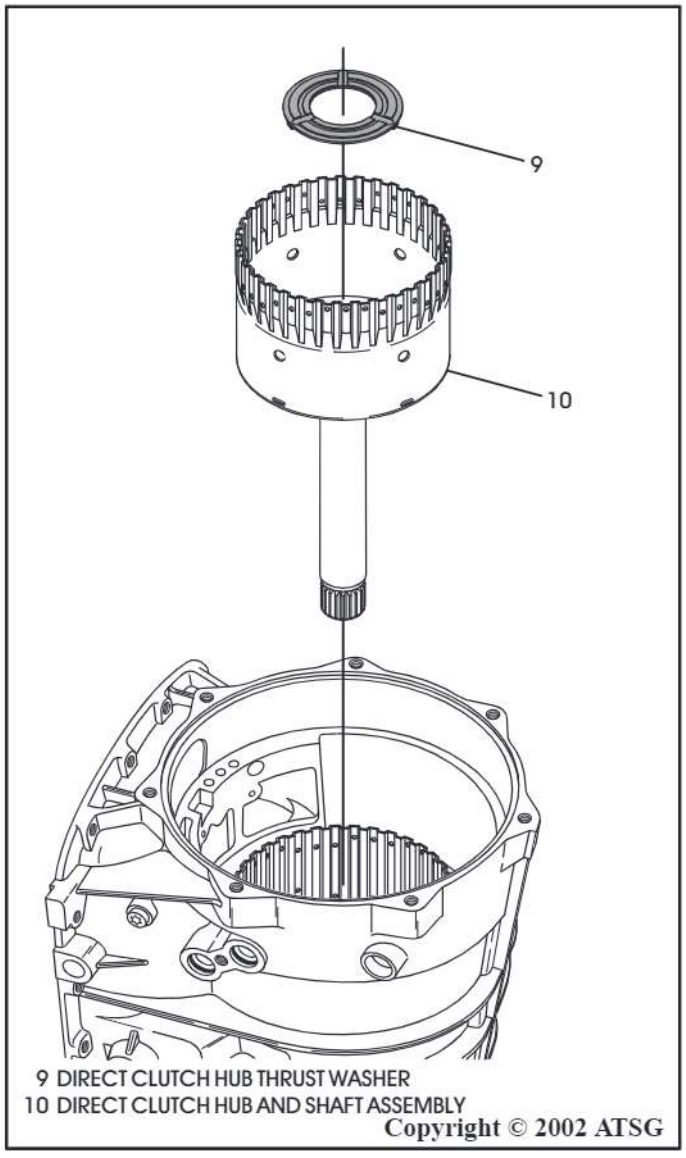
**Continued on Page 113**




11 DIRECT CLUTCH HUB TO O.D. CLUTCH HUB THRUST WASHER
12 O.D. CLUTCH HUB AND INTERMEDIATE SPRAG ASSEMBLY

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Figure 184




9 DIRECT CLUTCH HUB THRUST WASHER
10 DIRECT CLUTCH HUB AND SHAFT ASSEMBLY

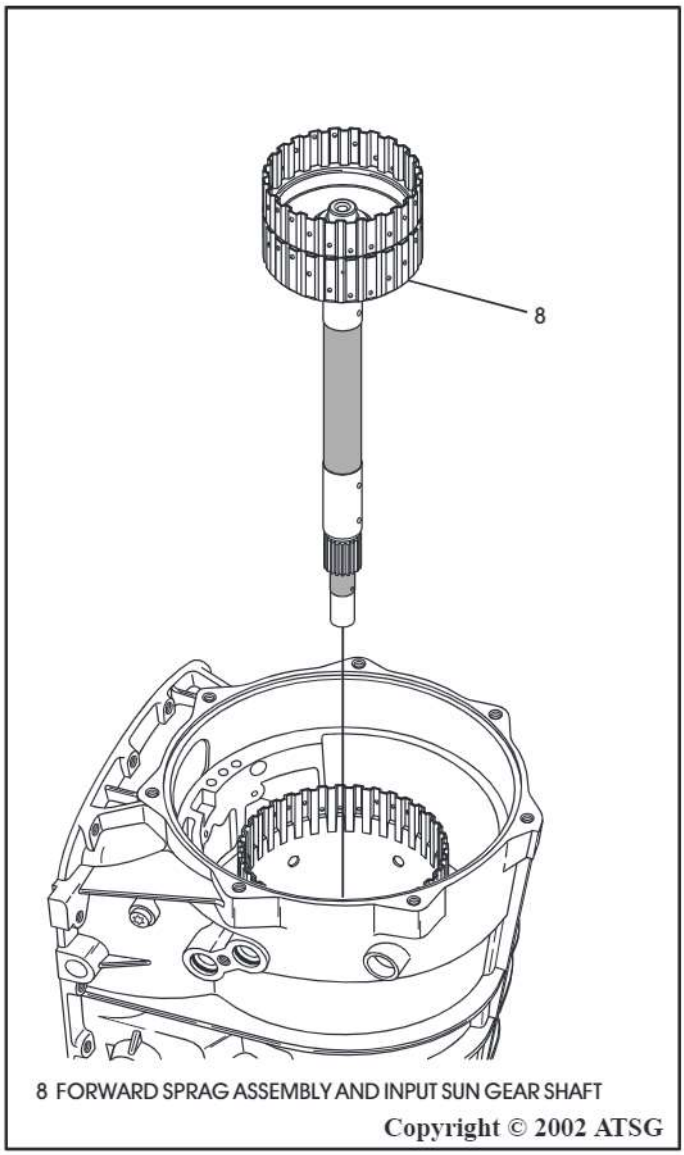
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Figure 185

### INTERNAL COMPONENTS (CONT'D)

19. Install the reverse clutch housing on forward and coast clutch housing by rotating back and forth to engage the reverse clutch plates, until fully seated and splines engaged on forward clutch housing (See Figure 187).

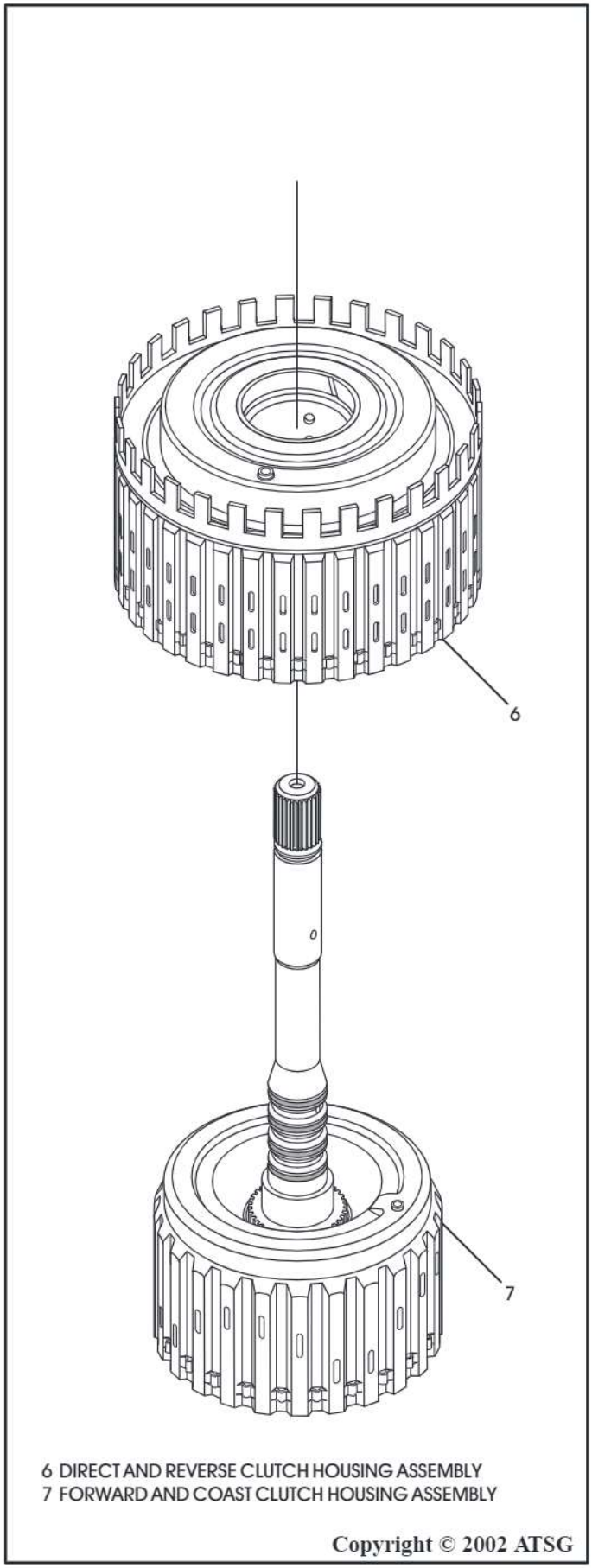
**Continued on Page 114**




8 FORWARD SPRAG ASSEMBLY AND INPUT SUN GEAR SHAFT

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Figure 186




6 DIRECT AND REVERSE CLUTCH HOUSING ASSEMBLY
7 FORWARD AND COAST CLUTCH HOUSING ASSEMBLY

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Figure 187

## TRANSMISSION ASSEMBLY (CONT'D)

### INTERNAL COMPONENTS (CONT'D)

20. Install the pre-assembled forward/coast clutch housing and reverse clutch housing as assembly as shown in Figure 188, by rotating back and forth to engage the three sets of clutches.
21. Install the "H" gage on top surface of the case, as shown in Figure 189, loosen adjusting knob and allow gage rod to rest on washer surface of reverse clutch housing (See Figure 189).
22. Remove "H" gage from case, turn it over and install on surface of converter housing as it is shown in Figure 190.
23. Measure with feeler gage between the gage rod and the current "Selective" thrust washer being used, as shown in Figure 190.
24. Front end clearance should be: 0.76 - 1.02 mm (.030" - .040"). Change the selective thrust washer as necessary to achieve the proper front end clearance.
25. Refer to chart in Figure 190 for the different thickness thrust washers that are available.

**Continued on Page 115**

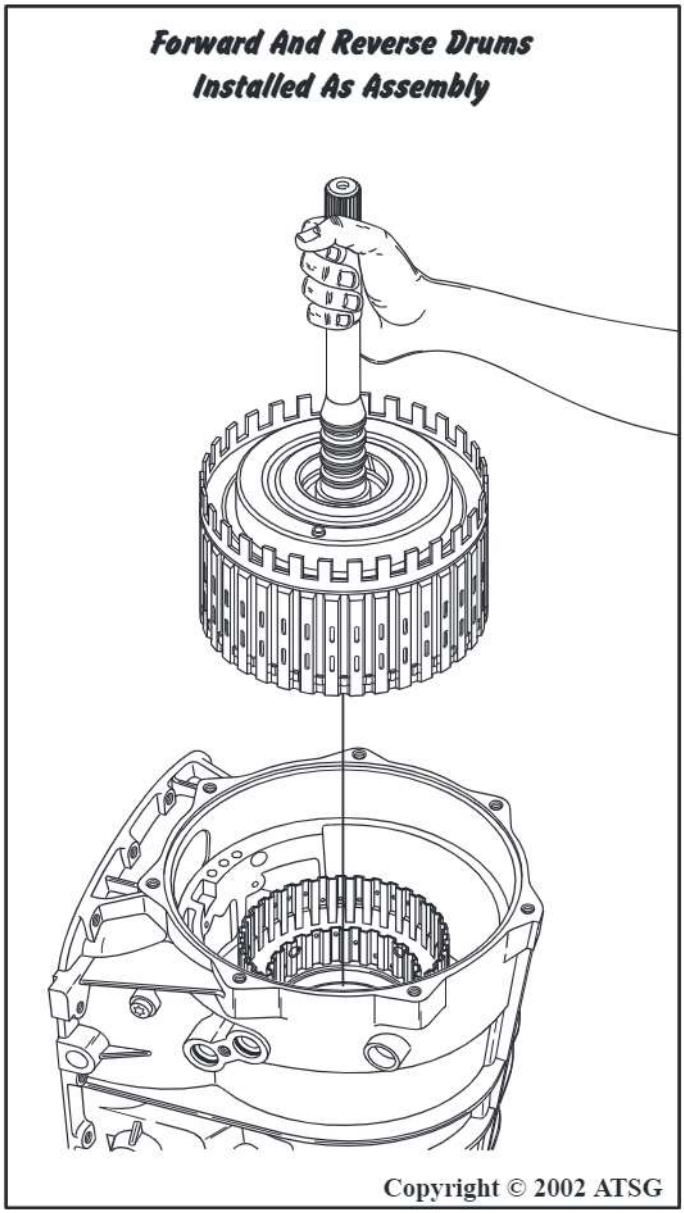



Figure 188

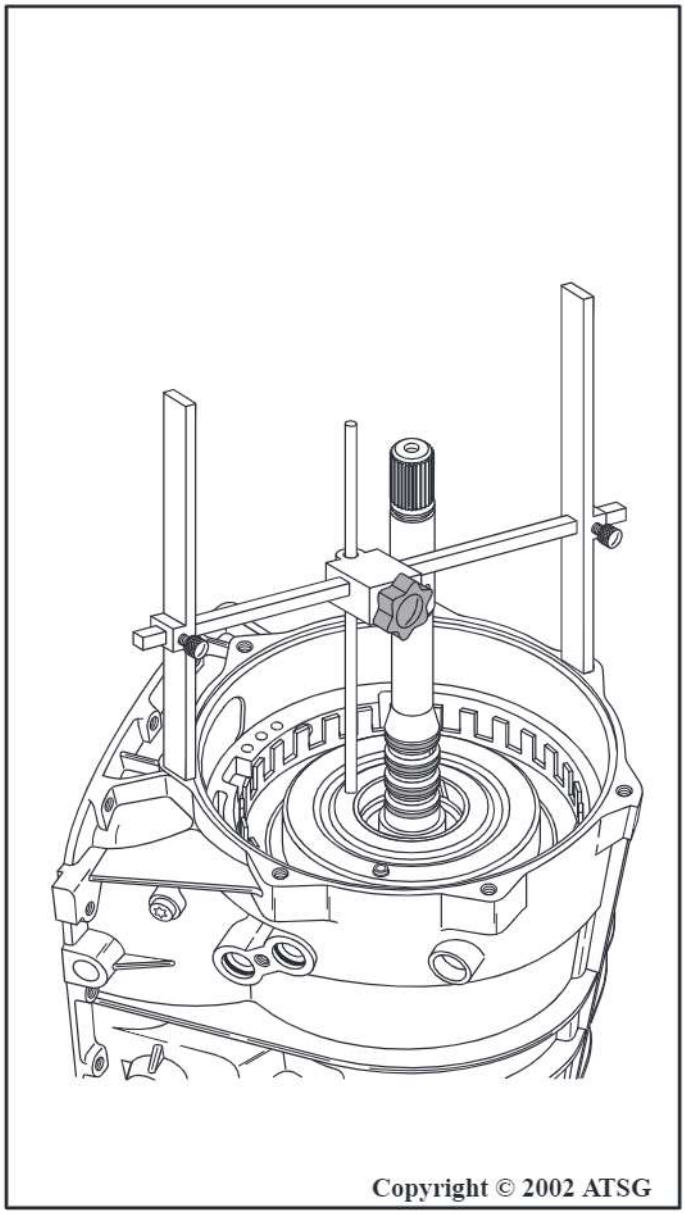
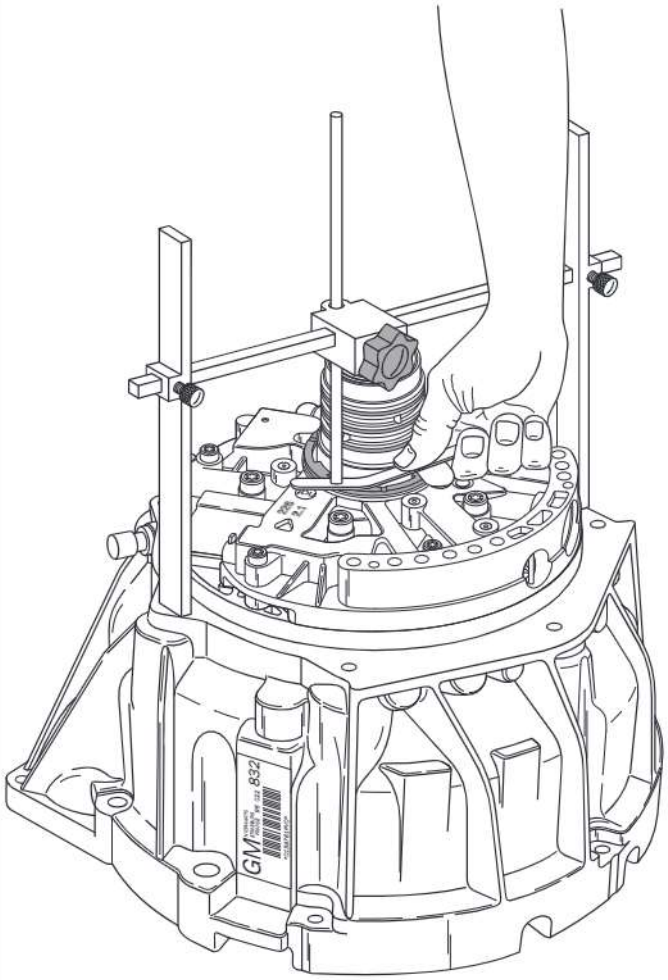



Figure 189

| THRUST WASHERS AVAILABLE |
|---|
| 2.53-2.68 mm (.099"-.105") |
| 2.71-2.86 mm (.106"-.112") |
| 2.89-3.04 mm (.113"-.119") |
| 3.05-3.20 mm (.120"-.125") |
| 3.25-3.40 mm (.127"-.133") |
| 3.43-3.58 mm (.135"-.140") |
| 3.61-3.76 mm (.142"-.148") |
| 3.79-3.94 mm (.149"-.155") |

### CHECKING FRONT END CLEARANCE CLEARANCE SHOULD BE .030" TO .040"



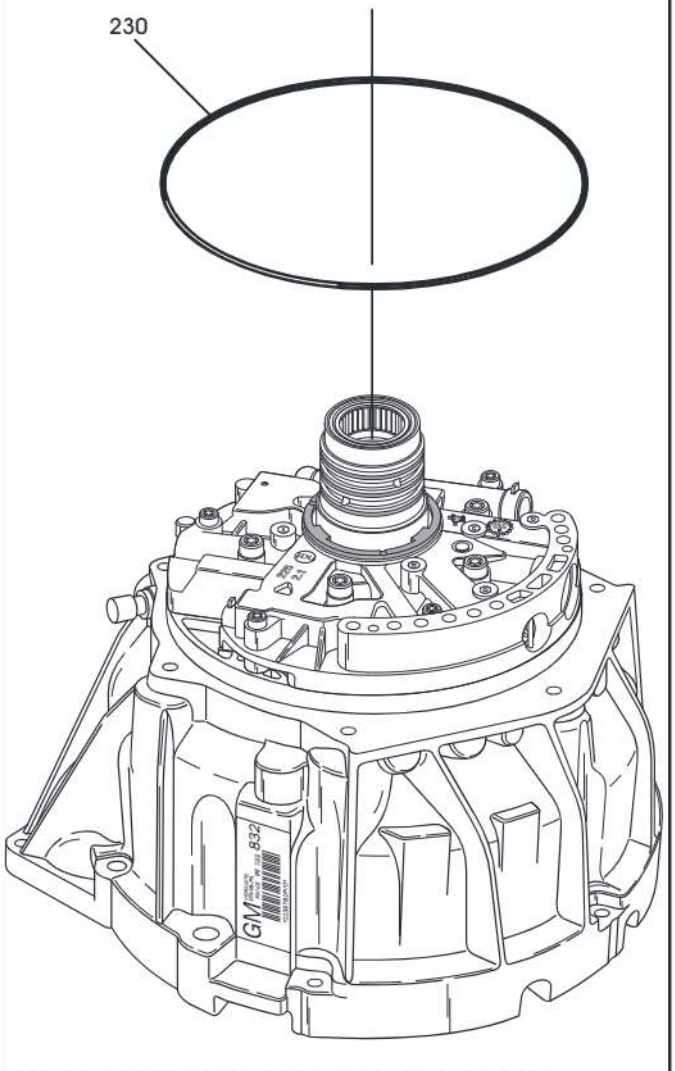
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Figure 190

### INTERNAL COMPONENTS (CONT'D)

26. Ensure that the converter housing to case "O" ring seal is in place on the converter housing. If not, install it now as shown in Figure 191 and retain with small amount of Trans-Jel®.

**Continued on Page 116**




230 CONVERTER HOUSING TO MAIN CASE "O" RING SEAL

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Figure 191

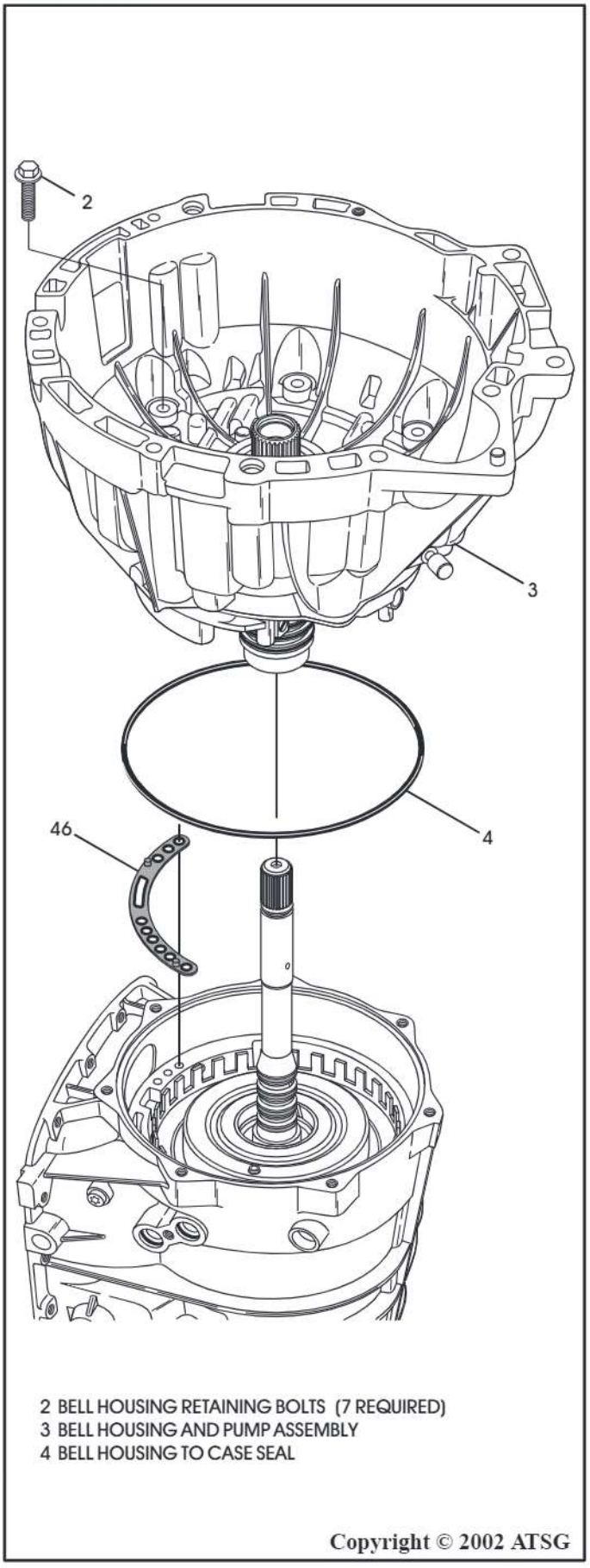



Figure 192

## TRANSMISSION ASSEMBLY (CONT'D)

### INTERNAL COMPONENTS (CONT'D)

27. Install the molded pump to case gasket (46) onto the back side of pump cover, as shown in Figure 192, using the molded guide pins.
28. Retain with a small amount of Trans-Jel®, if necessary.
29. Install complete converter housing assembly onto case, as shown in Figure 192.
30. Install the seven converter housing to case bolts, as shown in Figure 192. Refer to the bolt chart to identify proper bolts.
31. Torque the seven bolts to 22 Nm (16 ft,lb.), as shown in Figure 194.
32. Use the torque sequence in a cris-cross pattern, as shown in Figure 193.
33. Install the turbine shaft "O" ring seal using a small screwdriver, as shown in Figure 195, and lubricate with small amount of Trans-Jel®.

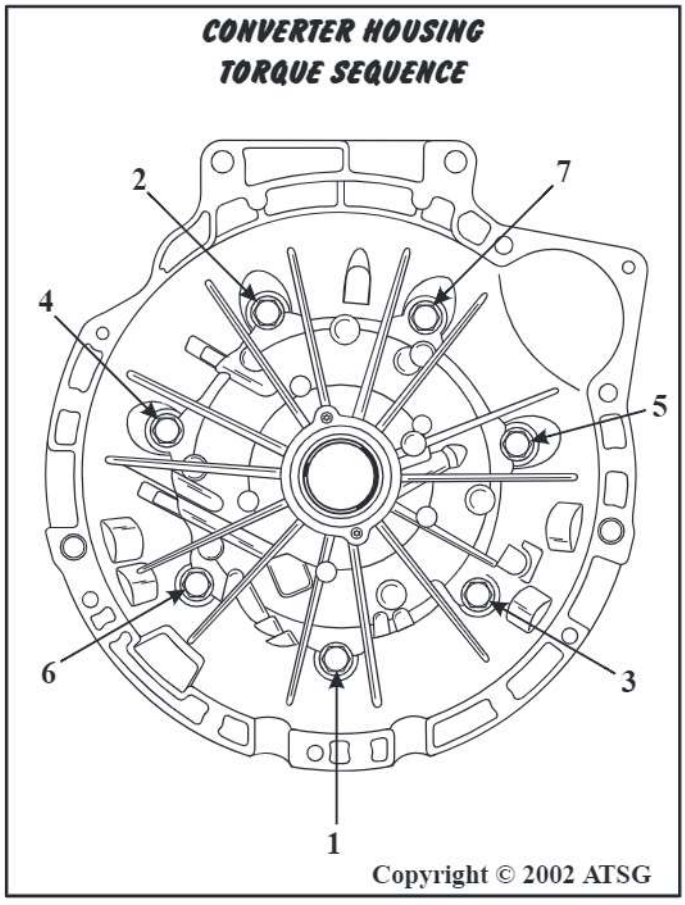
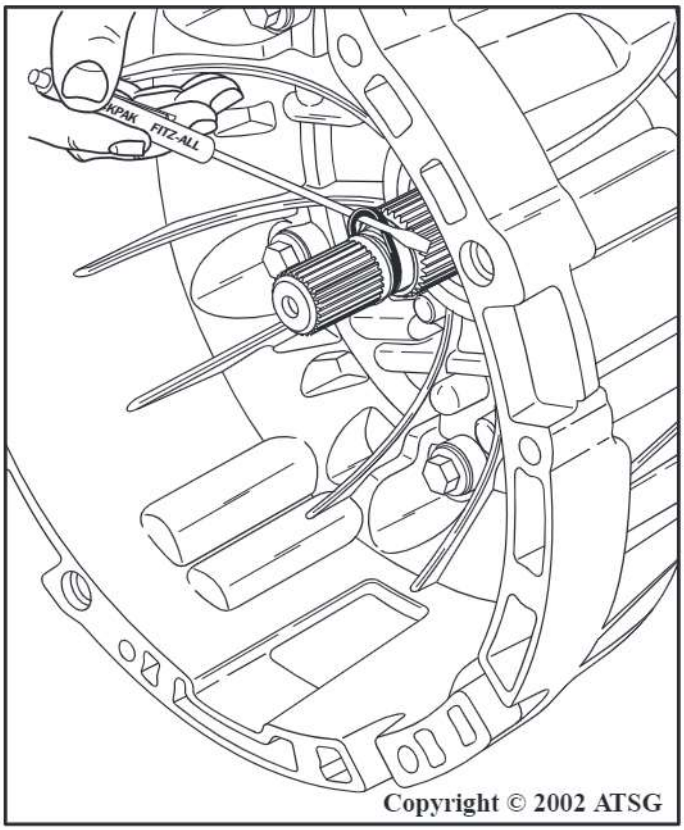



Figure 193

### INTERNAL COMPONENTS (CONT'D)

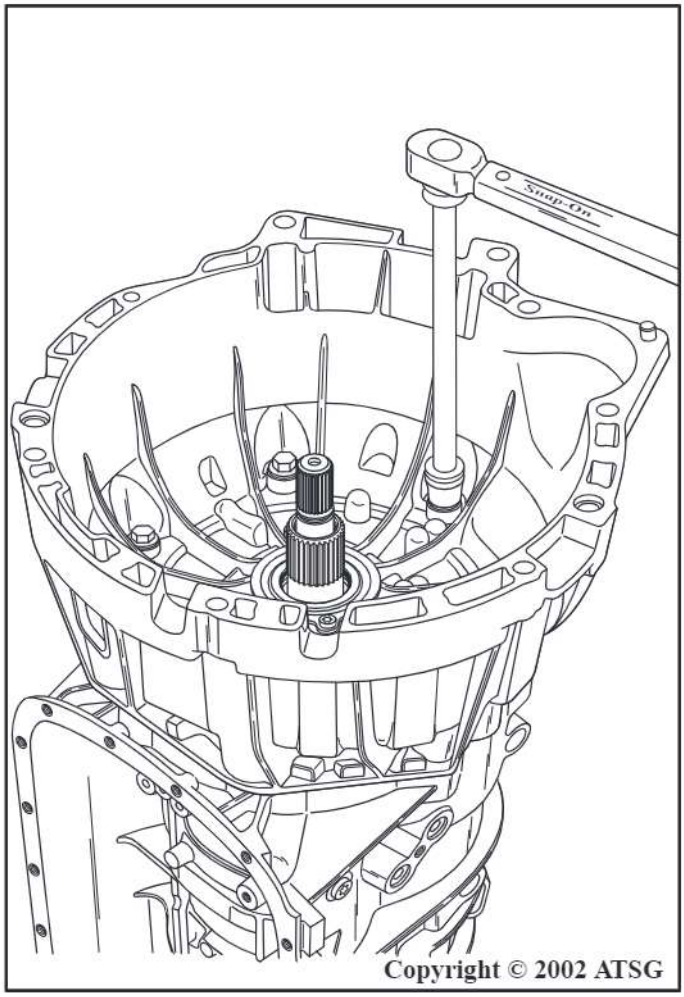
34. Rotate the transmission in fixture so that the bottom pan side is facing up, as shown in Figure 196.
35. Install the valve body to case seal assemblies, as shown in Figure 196.

**Continued on Page 118**



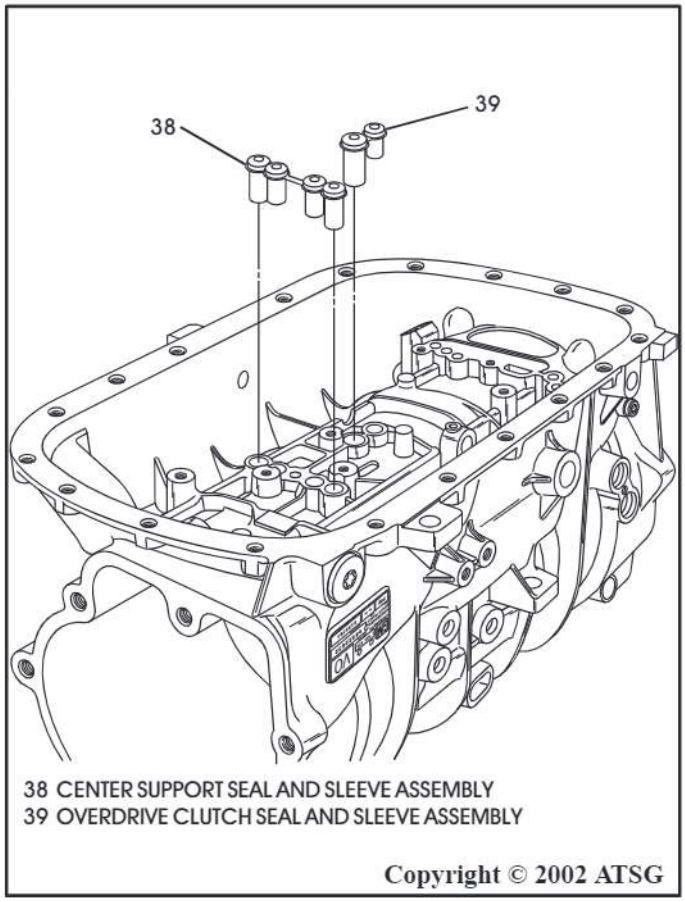

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Figure 195




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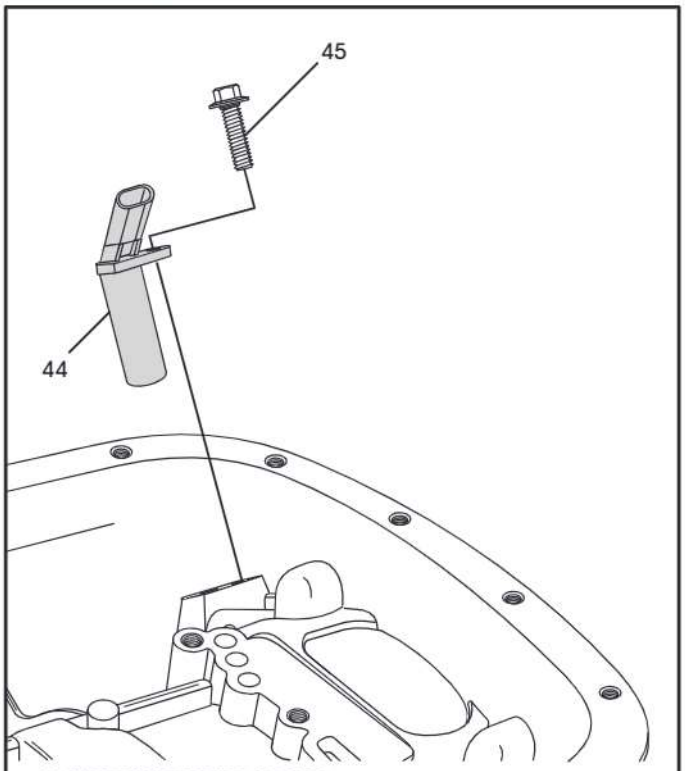
Figure 194




38 CENTER SUPPORT SEAL AND SLEEVE ASSEMBLY
39 OVERDRIVE CLUTCH SEAL AND SLEEVE ASSEMBLY

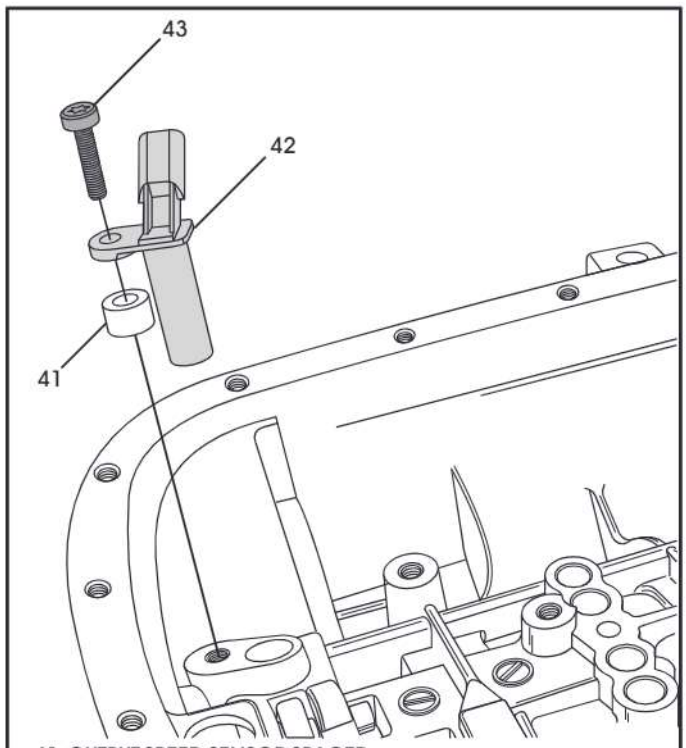
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Figure 196




44 INPUT SHAFT SPEED SENSOR
45 INPUT SPEED SENSOR RETAINING BOLT
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Figure 197




41 OUTPUT SPEED SENSOR SPACER
42 OUTPUT SHAFT SPEED SENSOR
43 OUTPUT SPEED SENSOR RETAINING BOLT
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Figure 198

## TRANSMISSION ASSEMBLY (CONT'D)

### BOTTOM PAN COMPONENTS

1. Install the input shaft speed sensor, as shown in Figure 197.
2. Torque the input shaft speed sensor bolt down to 11 Nm (8 ft.lb.).
   ***Note: Refer to the bolt chart to identify the proper bolt.***
3. Install the output shaft speed sensor, as shown in Figure 198.
4. Torque the output shaft speed sensor bolt down to 11 Nm (8ft.lb.).
   ***Note: Refer to the bolt chart to identify the proper bolt.***
5. Install the pre-assembled valve body assembly onto case, as shown in Figure 199.
6. Install the proper bolts installed in the locations shown in Figure 199 and 201, and hand tighten only at this time.
   ***Note: Refer to the bolt chart to identify the proper valve body bolts.***
7. Install a 0.8 mm spacer between inside detent lever and the detent spring, as shown in Figure 200.
8. Torque all ten valve body bolts, in the exact sequence shown in Figure 201, down to 11 Nm (8 ft.lb.).
9. Remove the 0.8 mm spacer.

**Continued on Page 120**

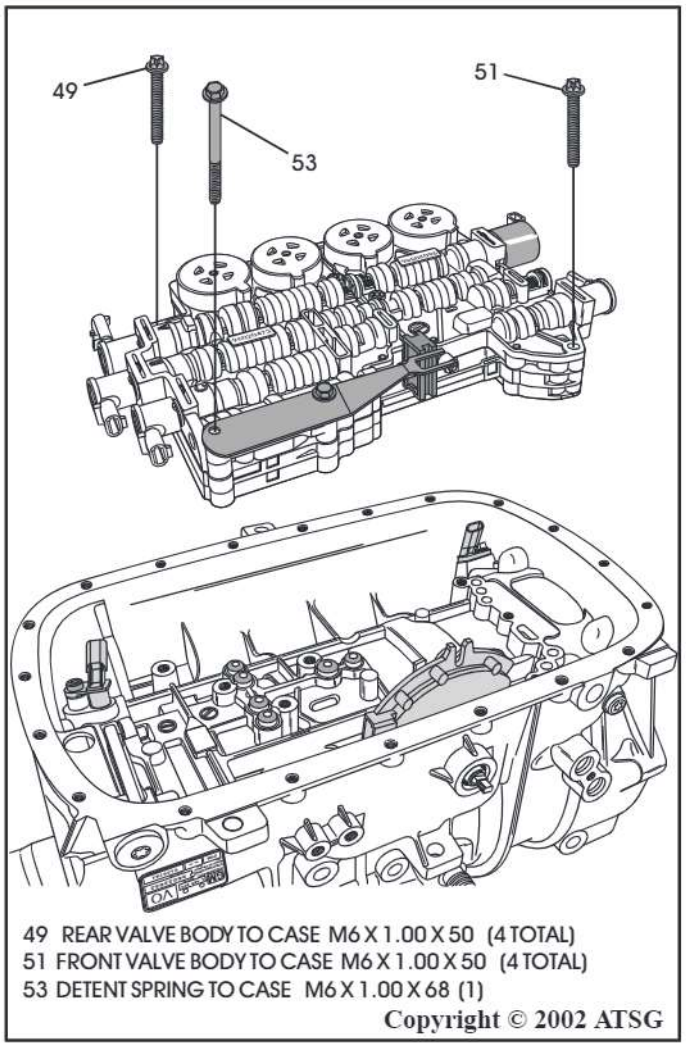



Figure 199

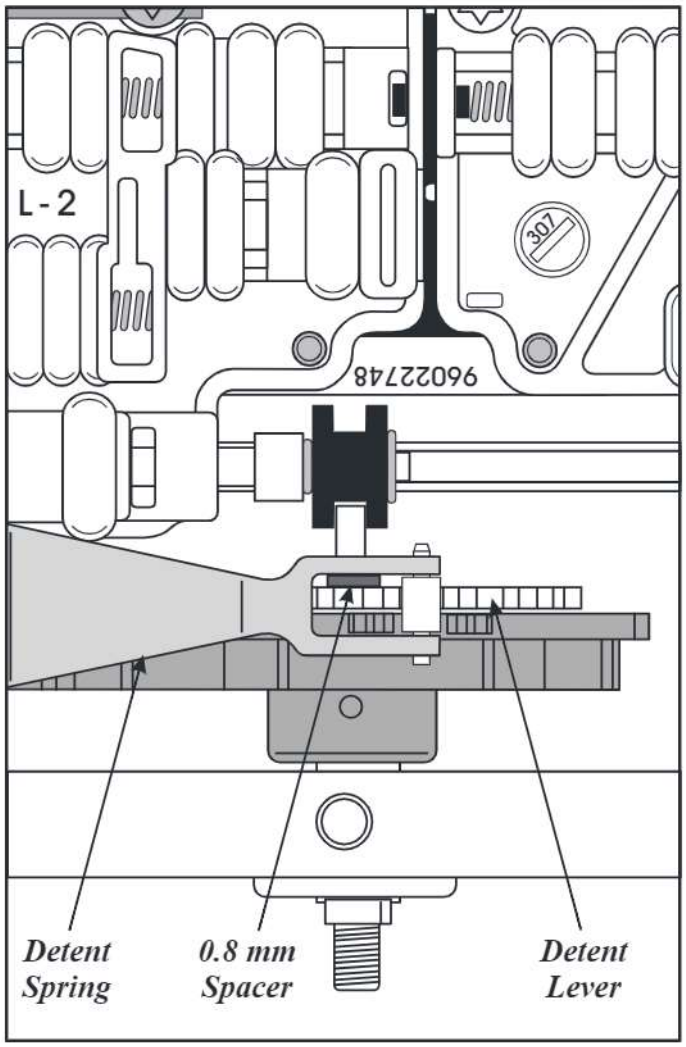



Figure 200

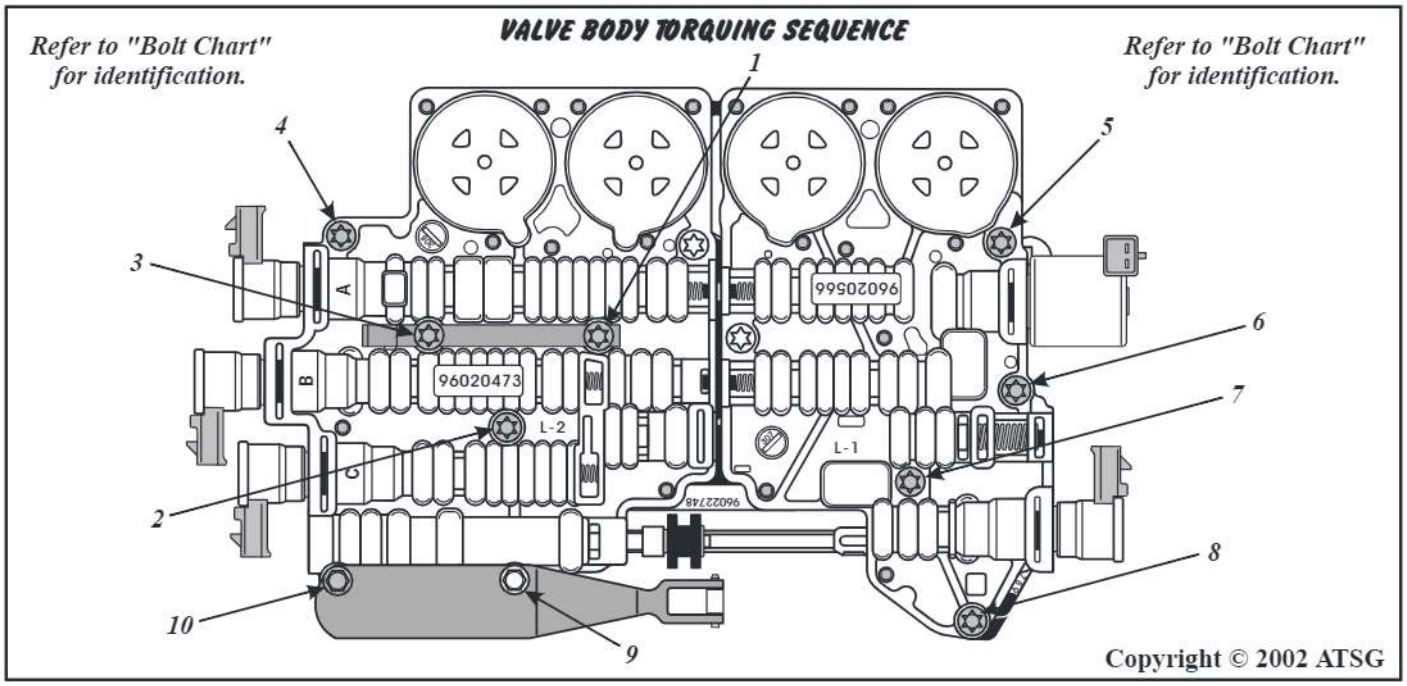



Figure 201

## TRANSMISSION ASSEMBLY (CONT'D)

### BOTTOM PAN COMPONENTS (CONT'D)

10. Install two new "O" ring seals onto the case connector, as shown in Figure 202, and lube with a small amount of Trans-Jel®.
11. Install the case connector through the case bore and while holding the connector, install the retaining clip, as shown in Figure 203.
12. Route the internal harness and connect all the components that are listed in Figure 202.
13. Install the TFT Sensor into the TFT Sensor bracket (See Figure 202).
14. Install the bottom pan filter, filter seals and the filter spacer, as shown in Figure 204.
    ***Note: Notice that spacer is used only on "Some" models.***
15. Install a new bottom pan gasket onto the transmission case, as shown in Figure 205.
16. Ensure that the bottom pan magnet is in proper position in the oil pan (See Figure 205).
17. Install the bottom transmission pan onto the transmission, as shown in Figure 205.
18. Ensure that internal wiring harness is not rubbing on any part of the oil pan, as you put it on the case.
19. Install the 20 bottom oil pan bolts, as shown in Figure 205, and torque to 11 Nm (8 ft.lb.).

**Continued on Page 122**

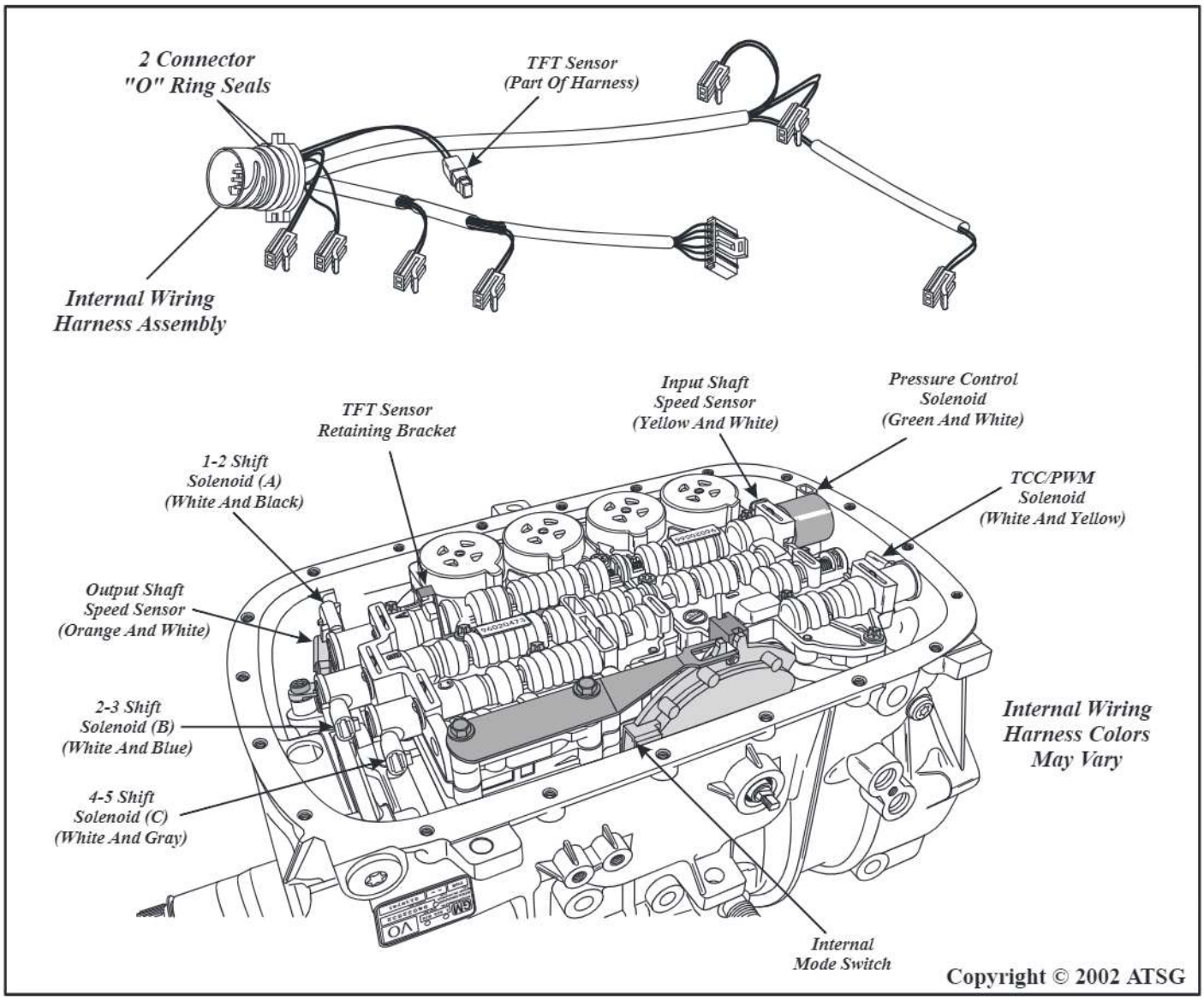
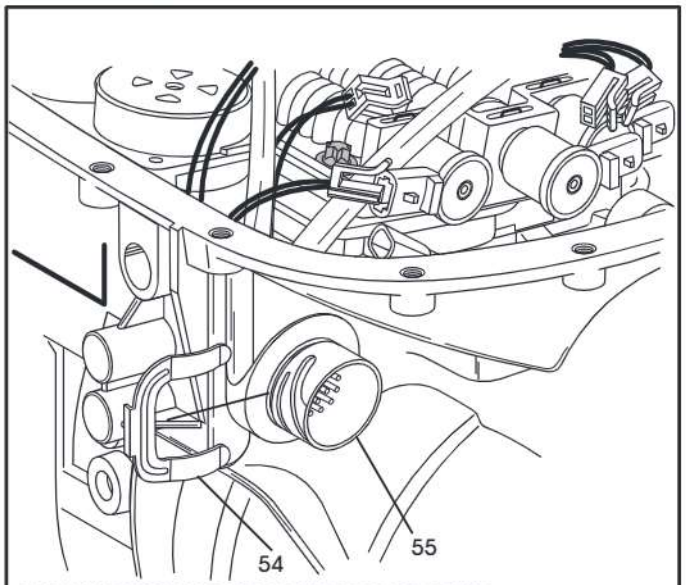


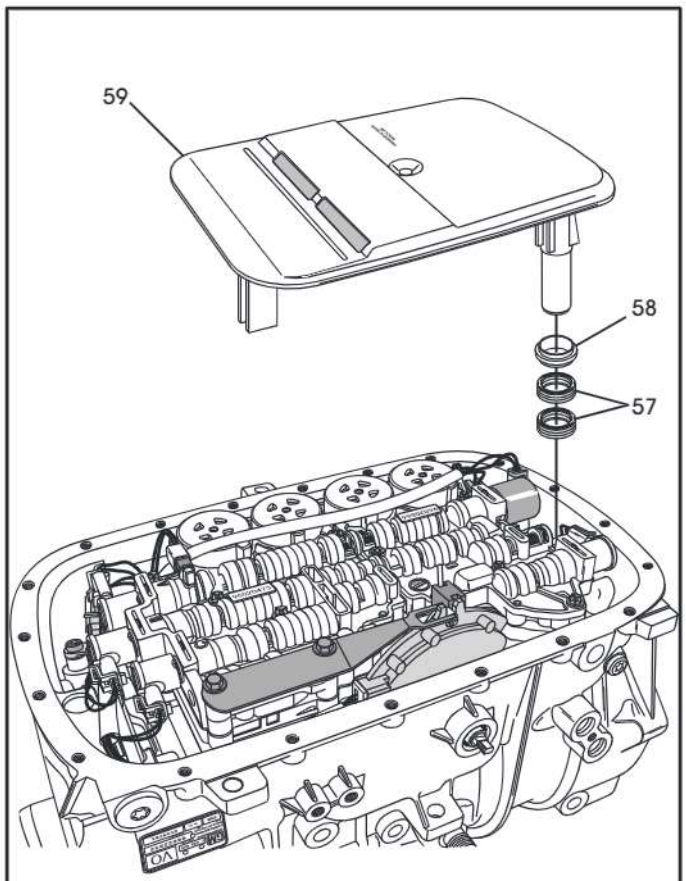

Figure 202




54 TRANSMISSION CASE CONNECTOR RETAINER
55 TRANSMISSION CASE CONNECTOR

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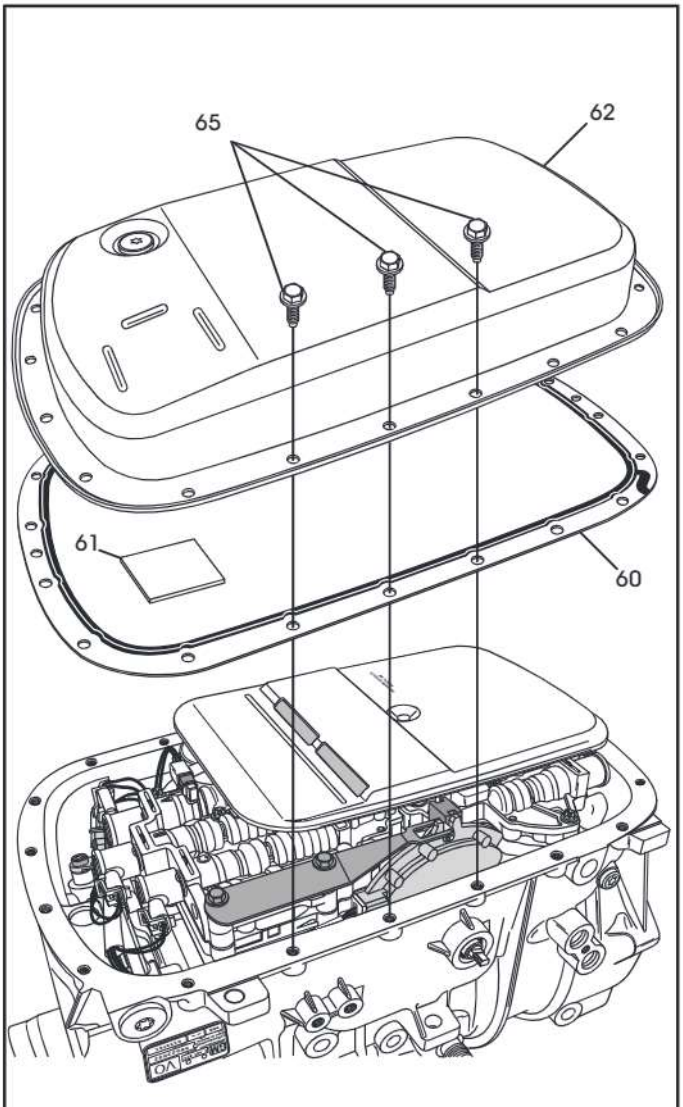
Figure 203




57 BOTTOM PAN OIL FILTER SEALS
58 BOTTOM PAN OIL FILTER SPACER (SOME MODELS)
59 BOTTOM PAN OIL FILTER ASSEMBLY

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Figure 204




60 BOTTOM OIL PAN GASKET
61 BOTTOM OIL PAN MAGNET
62 BOTTOM OIL PAN
65 BOTTOM OIL PAN BOLTS (20 REQUIRED)

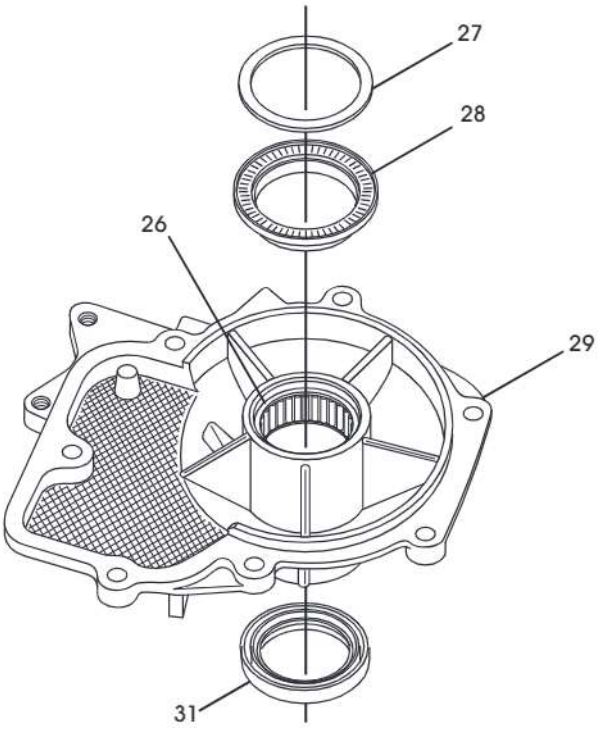
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Figure 205

## TRANSMISSION ASSEMBLY (CONT'D)

### EXTERNAL COMPONENTS

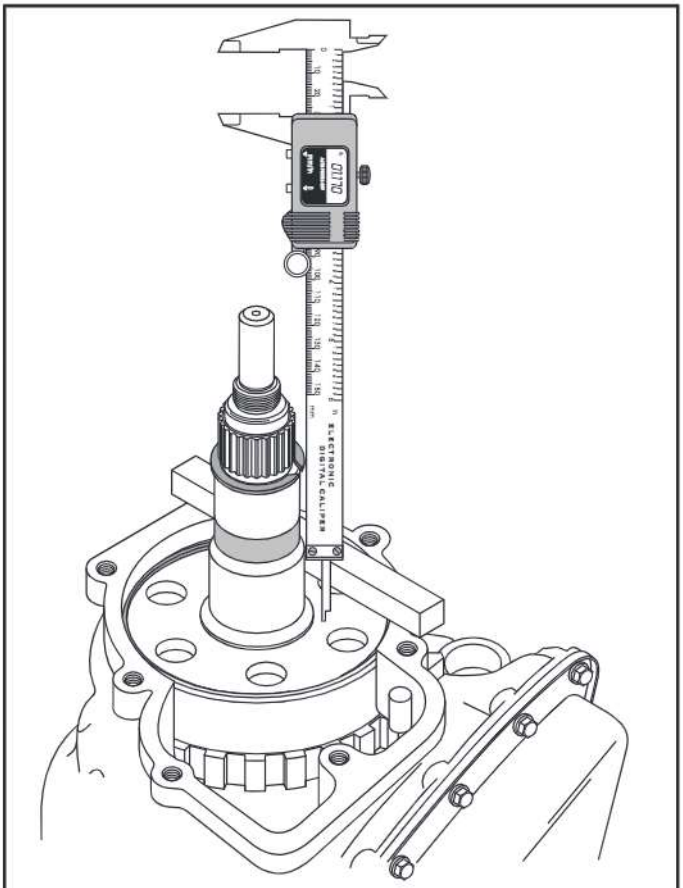
1. Rotate transmission in fixture so that output shaft is facing up, as shown in Figure 207.
2. Install extension housing yoke seal into the extension housing, as shown in Figure 206, using the proper seal driver.




26 EXTENSION HOUSING FRONT CAGED NEEDLE BEARING ASM.
27 OUTPUT SHAFT BEARING THRUST WASHER (SELECTIVE)
28 OUTPUT SHAFT TO EXTENSION HOUSING THRUST BEARING
29 EXTENSION HOUSING ASSEMBLY
31 EXTENSION HOUSING YOKE METAL CLAD SEAL ASSEMBLY

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Figure 206



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Figure 207

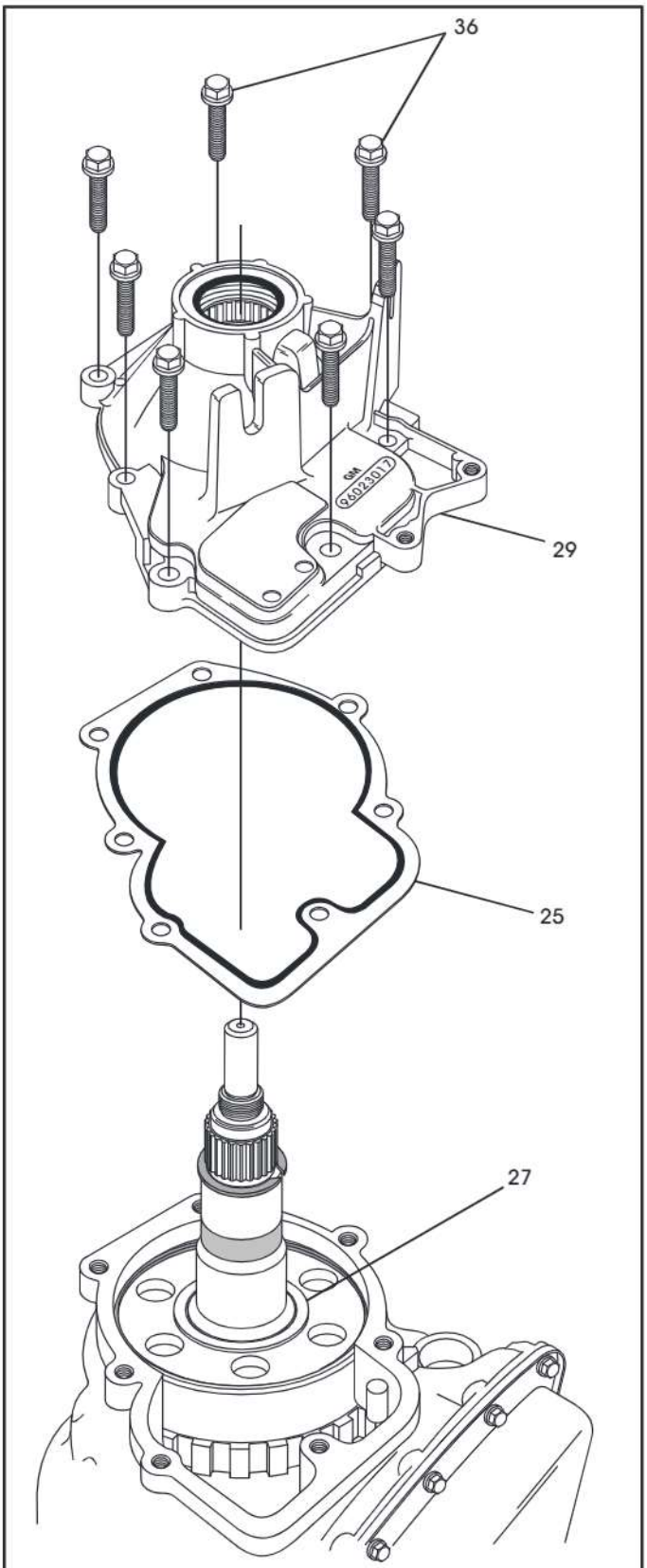
| OUTPUT SHAFT END PLAY CHART | |
|---|---|
| **IF DIMENSION "B" IS:** | **THRUST WASHER THICKNESS SHOULD BE:** |
| *15.99 to 16.27 mm (.629" to .640")* | *0.95 to 1.05 mm (.037" to .041")* |
| *16.27 to 16.47 mm (.640" to .648")* | *1.15 to 1.25 mm (.045" to .049")* |
| *16.47 to 16.67 mm (.648" to .656")* | *1.35 to 1.45 mm (.053" to .057")* |
| *16.67 to 16.87 mm (.656" to .664")* | *1.55 to 1.65 mm (.061" to .065")* |
| *16.87 to 17.07 mm (.664" to .672")* | *1.75 to 1.85 mm (.068" to .073")* |
| *17.07 to 17.27 mm (.672" to .680")* | *1.95 to 2.05 mm (.076" to .081")* |
| *17.27 to 17.47 mm (.680" to .688")* | *2.15 to 2.25 mm (.084" to .089")* |
| *17.47 to 17.67 mm (.688" to .696")* | *2.35 to 2.45 mm (.093" to .096")* |
| *17.67 to 17.87 mm (.696" to .704")* | *2.55 to 2.65 mm (.100" to .104")* |
| *17.87 to 18.07 mm (.703" to .711")* | *2.75 to 2.85 mm (.108" to .112")* |

Figure 208

## TRANSMISSION ASSEMBLY (CONT'D)
### EXTERNAL COMPONENTS

3. Replace the caged needle bearings in extension housing as necessary using the proper pullers and drivers.
4. Install the output shaft to extension housing thrust bearing (28), by hand pressing into the bore, as shown in Figure 206.
5. The output shaft bearing thrust washer (27) is "Selective" and measurements are required to determine proper thickness to set rear end-play.
6. Place gaging bar across case extension housing gasket surface, as shown in Figure 207.
7. Measure from the gaging bar to the face of the output shaft, as shown in Figure 207.
   ***Note: Record this as Dimension "B1".***
8. Measure the thickness of the gaging bar as they vary in thickness (See Figure 207).
   ***Note: Record this as Dimension "B2".***
9. Subtract Dimension "B2" from "B1".
   ***Note: Record this as Dimension "B".***
10. Refer to the output shaft end-play chart shown in Figure 208 to determine proper "Selective" output shaft bearing thrust washer.
11. Install output shaft bearing thrust washer onto the output shaft, as shown in Figure 209.
12. Install a new extension housing gasket on the case surface, as shown in Figure 209.
13. Install the pre-assembled extension housing onto the case, as shown in Figure 209.
14. Install the seven extension housing bolts, as shown in Figure 209.
    ***Note: Refer to bolt chart for identification of extension housing bolts.***
15. Torque the seven extension housing bolts down to 22 Nm (16 ft.lb.).

**Continued on Page 124**




25 EXTENSION HOUSING TO MAIN CASE GASKET
27 OUTPUT SHAFT BEARING THRUST WASHER (SELECTIVE)
29 EXTENSION HOUSING ASSEMBLY

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Figure 209

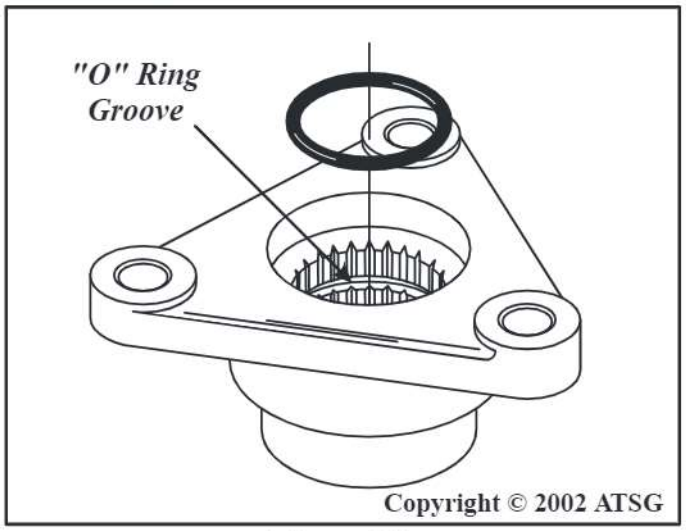
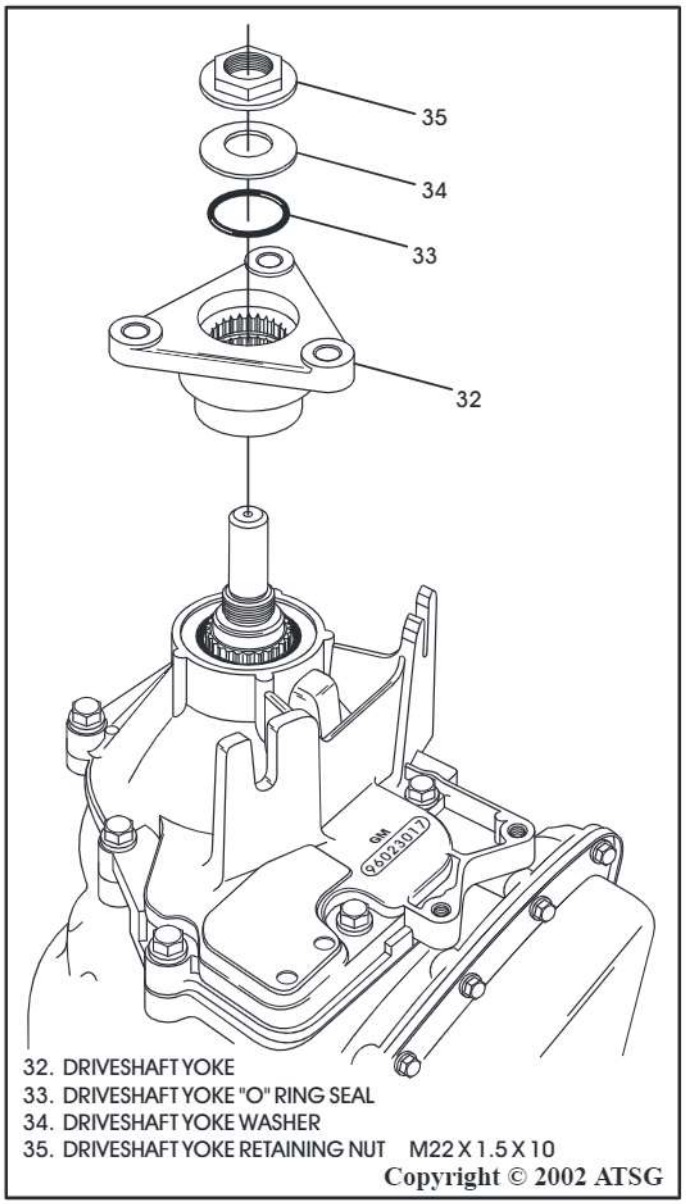



Figure 210




32. DRIVESHAFT YOKE
33. DRIVESHAFT YOKE "O" RING SEAL
34. DRIVESHAFT YOKE WASHER
35. DRIVESHAFT YOKE RETAINING NUT M22 X 1.5 X 10

Figure 211

## TRANSMISSION ASSEMBLY

### EXTERNAL COMPONENTS (CONT'D)

16. Install a new "O" ring into the inside groove of the transmission yoke assembly, as shown in Figure 210, and lubricate with a small amount of Trans-Jel®.
17. Install the transmission yoke onto the output shaft, as shown in Figure 211.
18. Install the yoke washer and screw the nut onto output shaft, as shown in Figure 211.
19. Place the transmission in the Park position to engage the parking pawl.
20. Torque the drive shaft yoke flange nut down to 57 Nm (42 ft.lb.) (See Figure 211).
21. Rotate the transmission in fixture so that the bottom pan is facing down (See Figure 212).
22. Install a new turbine shaft "O" ring, as shown in Figure 212, if you have not already done so.
23. Lubricate turbine shaft "O" ring with a small amount of Trans-Jel®.

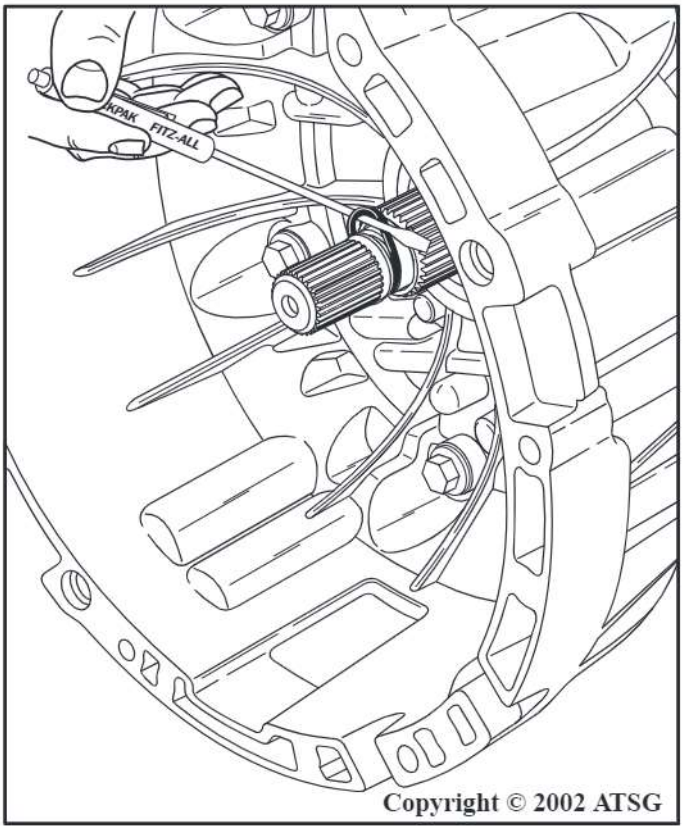



Figure 212

### EXTERNAL COMPONENTS (CONT'D)

24. Install the torque converter carefully into the transmission, as shown in Figure 213. Ensure that it is fully seated and engaged with the oil pump gear.
25. Remove the transmission assembly from the work bench with a lifting device.
26. Remove the fixture from transmission. Refer to Figure 214.

**CONGRATULATIONS, YOU ARE FINISHED!**

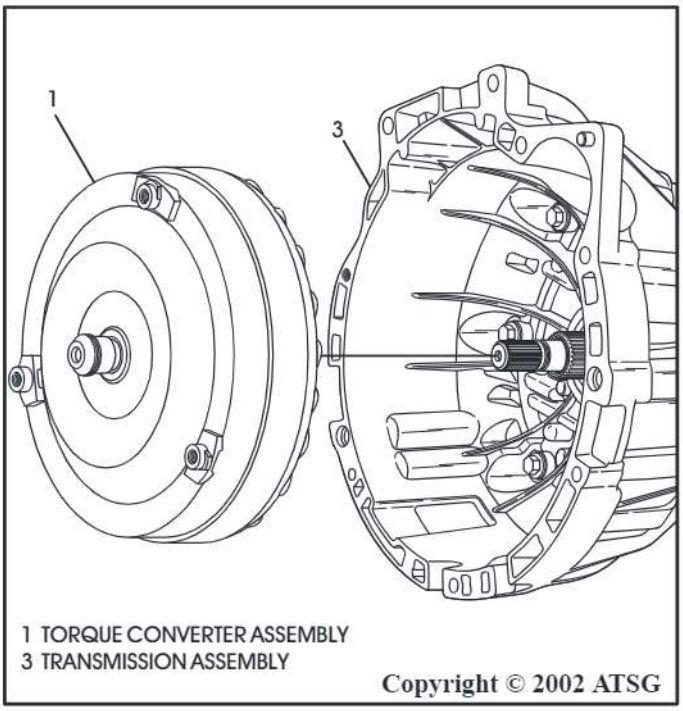



Figure 213

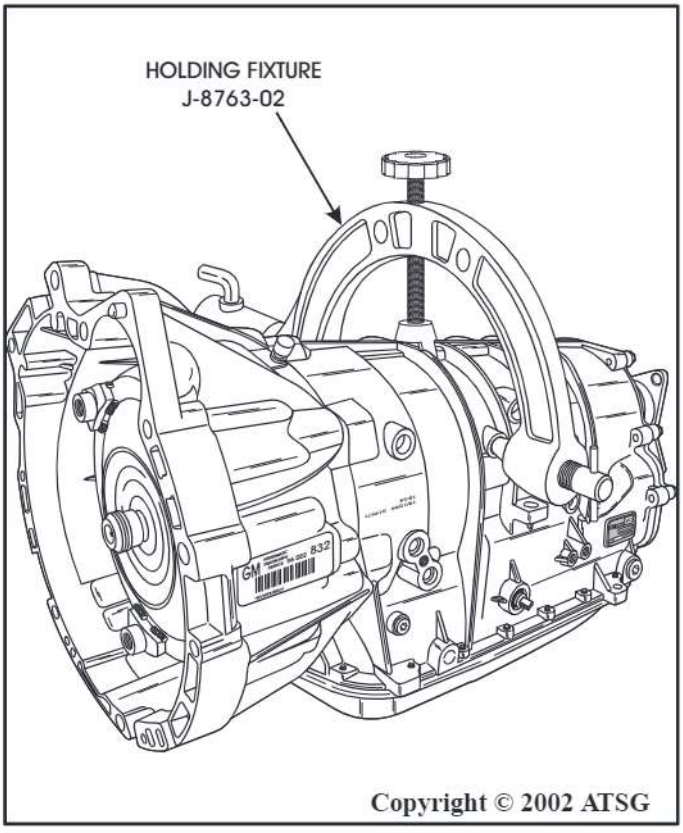
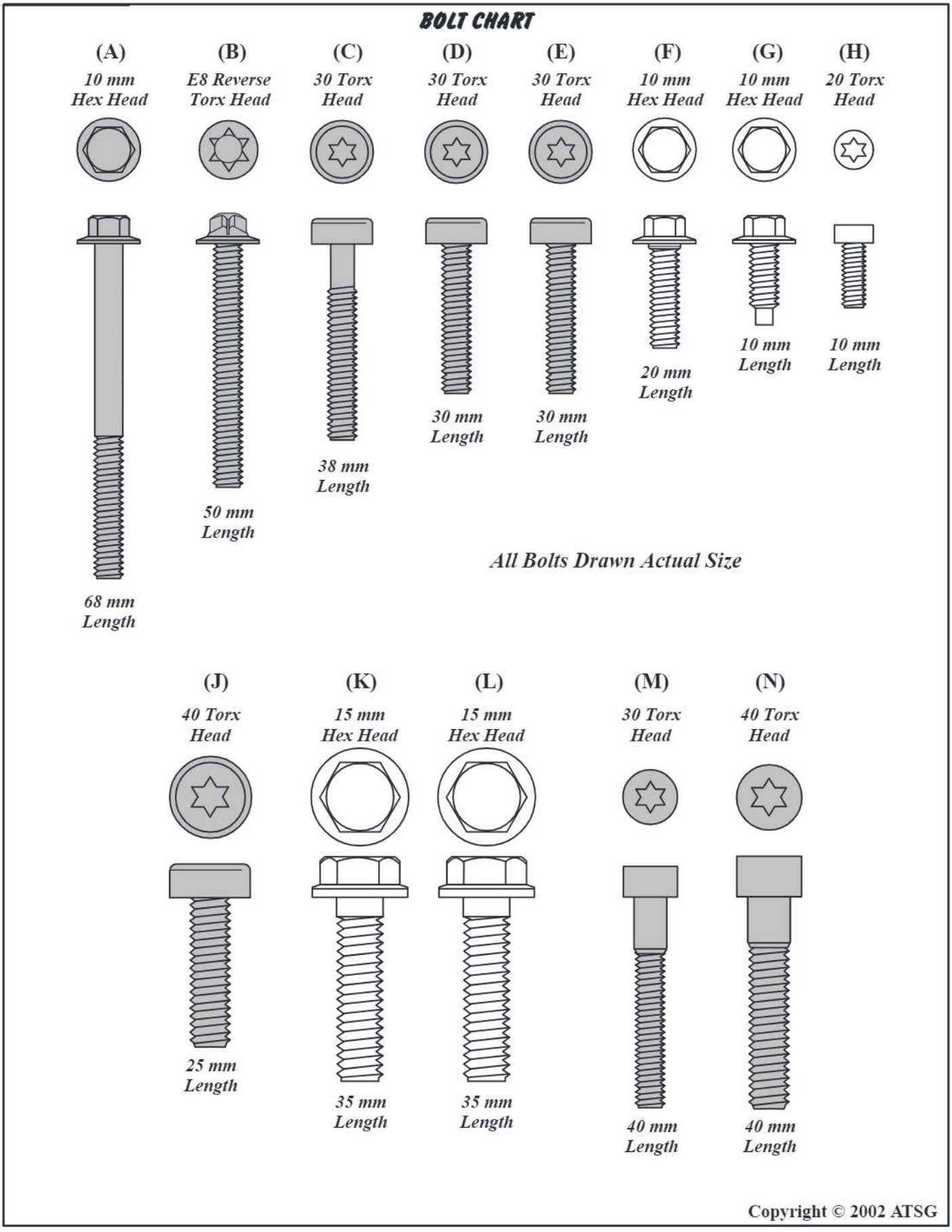



Figure 214




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Figure 215

| TORQUE SPECIFICATIONS | | | | | |
|---|---|---|---|---|---|
| DESCRIPTION | REF NO. | QTY | SIZE | METRIC | ENGLISH |
| (K) Converter Housing To Main Case | 2 | 7 | M8 X 1.25 X 35 | 22 N·m | 16 ft.lb. |
| (H) Converter Seal To Converter Housing | 228 | 2 | M4 X 0.7 X 10 | 3.6 N·m | 31 in.lb. |
| (M) Pump Cover To Converter Housing | 240 | 6 | M6 X 1.00 X 40 | 11 N·m | 8 ft.lb. |
| (N) Pump Cover To Converter Housing | 241 | 5 | M8 X 1.25 X 40 | 22 N·m | 16 ft.lb. |
| Drain Plug To Bottom Pan | 63 | 1 | M14 X 1.5 X 10 | 20 N·m | 15 ft.lb. |
| (G) Bottom Pan To Case | 65 | 20 | M6 X 1.00 X 16 | 11 N·m | 8 ft.lb. |
| (L) Extension Housing To Main Case | 35 | 7 | M8 X 1.25 X 35 | 22 N·m | 16 ft.lb. |
| (J) Parking Pawl Actuator Bracket | 609 | 2 | M8 X 1.25 X 25 | 22 N·m | 16 ft.lb. |
| Drive Shaft Yoke To Output Shaft Nut | 34 | 1 | M22 X 1.5 X 10 | 57 N·m | 42 ft.lb. |
| (F) Input Speed Sensor To Main Case | 45 | 1 | M6 X 1.00 X 20 | 11 N·m | 8 ft.lb. |
| (E) Output Speed Sensor To Main Case | 43 | 1 | M6 X 1.00 X 30 | 11 N·m | 8 ft.lb. |
| (D) Accumulator Housings To Valve Body | 318 | 12 | M6 X 1.00 X 30 | 11 N·m | 8 ft.lb. |
| (C) Channel Plate To Valve Body | 300 | 7 | M6 X 1.00 X 38 | 11 N·m | 8 ft.lb. |
| (C) Valve Body To Top Channel Plate | 50 | 2 | M6 X 1.00 X 38 | 11 N·m | 8 ft.lb. |
| (B) Rear Valve Body To Main Case | 49 | 4 | M6 X 1.00 X 50 | 11 N·m | 8 ft.lb. |
| (B) Front Valve Body To Main Case | 51 | 4 | M6 X 1.00 X 50 | 11 N·m | 8 ft.lb. |
| (A) Valve Body Detent Spring To Main Case | 53 | 1 | M6 X 1.00 X 68 | 11 N·m | 8 ft.lb. |
| (A) Valve Body Detent Spring To Channel Plate | 53 | 1 | M6 X 1.00 X 68 | 11 N·m | 8 ft.lb. |
| Line Pressure Test Plug To Case | 40 | 1 | M10 X 1.00 X 8 | 11 N·m | 8 ft.lb. |
| Fluid Level Fill/Check Plug To Case | 36 | 1 | M18 X 1.5 X 12 | 20 N·m | 15 ft.lb. |

*Reference Number refers to the callout number on the exploded views.*

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Figure 216

*We wish to thank the following for supplying the actual transmission that have made these illustrations possible.*

INDEPENDENT TRANSMISSION SERVICE
AND MARIO ARISTIDES
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