

SECTION : 307-01C 5 Speed Automatic Transmission

VEHICLE APPLICATION : 2008.0 Falcon

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INSTALLATION

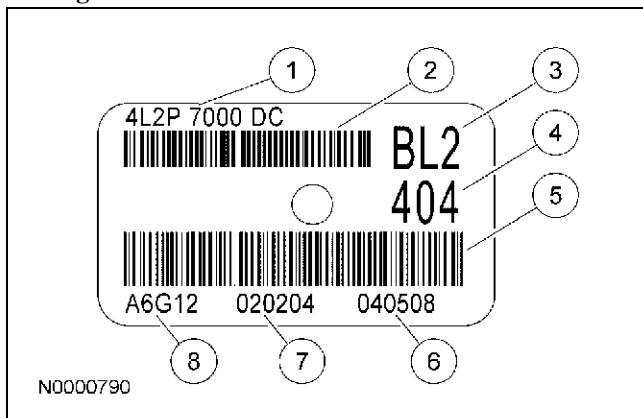
Transmission..... 307-01C-248



DESCRIPTION AND OPERATION

Identification Tags

ID Tag Located on Transmission Case



| Item | Description |
|------|--------------------------------------|
| 1 | Transmission part number |
| 2 | Bar code 1 |
| 3 | Transmission plant model code part 1 |
| 4 | Transmission plant model code part 2 |
| 5 | Bar code 2 |
| 6 | Transmission serial number |
| 7 | Transmission build date (DD MM YY) |
| 8 | Assembly plant line shift |

All vehicles are equipped with a vehicle certification label, located on the driver side door lock post. Refer to the code in the space marked TR. For model, service ID level or build date information, refer to the transmission service ID tag located on the transmission case.

DESCRIPTION AND OPERATION

Torque Converter

The torque converter transmits and multiplies torque. The torque converter is a 4-element device:

- Impeller assembly
- Turbine and damper assembly
- Reactor assembly
- Clutch

The standard torque converter components operate as follows:

- Rotation of the converter housing and impeller sets the fluid in motion.

- The turbine reacts to the fluid motion from the impeller, transferring rotation to the geartrain through the input shaft.
- The reactor redirects fluid going back into the impeller, allowing for torque multiplication.
- The clutch and damper assembly dampens powertrain torsional vibration and provides a direct mechanical connection for improved efficiency.
- Power is transmitted from the torque converter to the planetary gearsets and other components through the input shaft.

DESCRIPTION AND OPERATION

Geartrain

Power is transmitted from the torque converter to the planetary gearsets through the input shaft. Bands and clutches are used to hold and drive certain combinations of gearsets. This results in 5 forward ratios and 1 reverse ratio, which are transmitted to the output shaft and differential.

| Gear Ratio | |
|------------|-----------|
| 1st | 3.22 to 1 |
| 2nd | 2.29 to 1 |
| 3rd | 1.55 to 1 |
| 4th | 1.00 to 1 |
| 5th | 0.71 to 1 |
| Reverse | 3.07 to 1 |

Planetary Gearset — Overdrive

For component location, refer to Transmission in this section.

The planetary gear overdrive carrier is driven by the input shaft.

- The overdrive planetary gearset carrier drives the center shaft via the overdrive one-way clutch in 1st, 3rd, 4th and REVERSE gears.
- In 2nd and 5th gears, the overdrive sun gear is held causing the pinion gears to rotate around the overdrive sun gear.
- The pinion gears, in turn, drive the overdrive ring gear resulting in the 5th (overdrive) gear ratio.
- The overdrive planetary gearset is internally splined to the coast clutch for engine braking.

Planetary Gearset — Forward

For component location, refer to Transmission in this section.

The forward planetary gearset is splined to the output shaft.

- The forward planetary gearset is driven by the forward ring gear when the forward clutch is applied.

- The forward planetary gearset pinions drive the forward sun gear.
- The forward sun gear is splined to the input shell.
- The forward carrier is splined to the output shaft.

Planetary Gearset — Low/Reverse

For component location, refer to Transmission in this section.

The low/reverse planetary gearset is connected to the reverse brake drum by lugs from the low/reverse brake drum to the lugs of the low/reverse planetary gearset.

- The low/reverse planetary gearset is driven by the forward sun gear which is splined to the input shell.
- The forward sun gear drives the pinions in the low/reverse planetary gearset.
- The pinions of the low/reverse planetary gearset drive the output shaft ring gear and output shaft hub which is splined to the output shaft.
- The low/reverse planetary gearset can be held by the low one-way clutch in the low/reverse brake drum, or by the low/reverse band.

Input Shaft

For component location, refer to Transmission in this section.

- The radial positioning of the input shaft is controlled by 2 bushings in the stator support.
- Axial positioning of the input shaft is controlled by the splines in the converter turbine hub and the retaining ring in the overdrive planetary carrier.

Output Shaft

For component location, refer to Transmission in this section.

The output shaft is supported by a bearing in the case and by a bearing in the extension housing. End positioning is controlled by the parking gear and by the reverse ring gear hub and snap ring.

DESCRIPTION AND OPERATION

Apply Components

Band — Overdrive

For component location, refer to Transmission in this section.

During 2nd and 5th gear operation, hydraulic pressure is applied to the overdrive servo.

- This pressure causes the piston to move and apply force to the band.
- This action causes the overdrive band to hold the overdrive drum.
- This causes the overdrive sun gear to be held stationary through the adapter plate and the overdrive drum.

Band — Low/Reverse

For component location, refer to Transmission in this section.

During 2nd gear, 1st gear and REVERSE operation, hydraulic pressure is applied to the low/reverse servo.

- This pressure causes the servo to move and apply force to the low/reverse band.
- This action causes the low/reverse brake drum to be held.
- This action causes the low/reverse planetary assembly to be held stationary.

Band — Intermediate

For component location, refer to Transmission in this section.

During 3rd gear operation, hydraulic pressure is applied to the intermediate servo.

- This pressure causes the servo to move and apply force to the intermediate band.
- This action causes the direct clutch drum to be held.
- The intermediate band holds the intermediate brake and direct clutch drum to the case in 3rd gear.
- This causes the input shell and forward sun gear to be held stationary.

Clutches — Direct

For component location, refer to Transmission in this section.

The direct clutch is a multi-disc clutch made up of steel and friction plates.

- The direct clutch is applied with hydraulic pressure and disengaged by return springs and the exhaust of the hydraulic pressure.
- It is housed in the direct clutch drum.
- During 4th, 5th and REVERSE gear application, the direct clutch is applied transferring torque from the forward clutch cylinder to the direct clutch drum.
- This action causes the forward sun gear to drive the pinions of the low/reverse planetary carrier.

Clutches — Forward

For component location, refer to Transmission in this section.

The forward clutch is a multi-disc clutch made up of steel and friction plates.

- The forward clutch is applied with hydraulic pressure and disengaged by return springs and the exhaust of the hydraulic pressure.
- The forward clutch is applied in all forward gears.
- When applied, the forward clutch provides a direct mechanical coupling between the center shaft and the forward ring gear and hub.

Clutches — Coast

For component location, refer to Transmission in this section.

The coast clutch is a multi-disc clutch made up of steel and friction plates.

- The coast clutch is applied with hydraulic pressure and disengaged by return springs and the exhaust of the hydraulic pressure.
- The coast clutch is housed in the overdrive drum.
- The coast clutch is applied when in manual 1st and 3rd, 4th with OD cancelled, and REVERSE positions.
- When applied, the coast clutch locks the overdrive sun gear to the overdrive planetary carrier, thus preventing the one-way clutch from overrunning when the vehicle is coasting.
 - This allows the use of engine compression to help slow the vehicle and provide engine braking.

DESCRIPTION AND OPERATION (Continued)

One-Way Clutch — Direct

For component location, refer to Transmission in this section.

The direct one-way clutch is a sprag-type one-way clutch that is pressed into the center shaft.

- The direct one-way clutch is driven by the ring gear of the overdrive planetary carrier.
- The direct one-way clutch holds and drives the outer splines of the center shaft in 1st, 3rd, 4th and REVERSE gears.
- The direct one-way clutch overruns during all coast operations and at all times in 2nd and 5th gear.

One-Way Clutch — Low/Reverse

For component location, refer to Transmission in this section.

The low/reverse one-way clutch is a sprag-type one-way clutch.

- The low/reverse one-way clutch holds the low/reverse drum and low/reverse planetary assembly to the case in 1st and 2nd gear.
- In all other gears the low/reverse one-way clutch overruns.

One-Way Clutch — Overdrive

For component location, refer to Transmission in this section.

The overdrive one-way clutch is a sprag-type one-way clutch that connects the input shaft to the center shaft during drive operation.

The overdrive one-way clutch transmits torque in REVERSE, 1st, 3rd and 4th gears, as well as in manual 1st, manual 3rd and manual 4th gears.

- The input shaft connects through the overdrive planetary carrier to the inner race.
- The outer race is part of the center shaft.
- The inner race contacts the assembly of sprags, and wedges them between the inner and outer races.
- The wedging action causes the input shaft and center shaft to be connected.

DESCRIPTION AND OPERATION

Hydraulic System

Fluid Pump

For component location, refer to Transmission in this section.

- The fluid pump provides the fluid pressure necessary to charge the torque converter, main control assembly, transmission cooling system, lubrication system and apply devices.
- The fluid pump is a positive displacement, gear type pump.
 - The fluid pump is driven by the torque converter impeller hub.

Filter

For component location, refer to Transmission in this section.

- All fluid drawn from the transmission fluid pan by the fluid pump passes through the fluid filter.
- The transmission fluid filter and its accompanying seals are part of the fluid path from the sump (pan) to the fluid pump.
 - The transmission fluid filter has a bypass section which allows fluid vented at the main regulator valve to be recirculated to the fluid pump, without passing through the transmission fluid filter.

Main Control

For component location, refer to Transmission in this section.

- The main control assembly and related components are part of the pressure side of the hydraulic system.
- The main control assembly consists of the solenoids, the valve body assembly and the separator plate.
- These components combine to convert electrical signals into hydraulic actions.
 - All valves in the main control assembly are anodized aluminum and cannot be sanded, filed or dressed in any other way. If there is any damage to the valves that prevents or restricts their movement, install a new main control assembly.

DIAGNOSIS AND TESTING

Preliminary Inspection

The following items must be checked prior to beginning the diagnostic procedures:

Know and Understand the Concern

In order to correctly diagnose a concern, first understand the customer concern or condition. Customer contact may be necessary in order to begin to verify the concern. Understand the condition as to when the concern occurs, for example:

- hot or cold vehicle temperature.
- hot or cold ambient temperature.
- vehicle driving conditions.
- vehicle loaded/unloaded.

After understanding when and how the concern occurs, proceed to verify the concern.

Verification of Condition

This section provides information that must be used in both determining the actual cause of customer concerns and executing the appropriate procedures.

The following procedures must be used when verifying customer concerns for the engine.

Determine Customer Concern

NOTE: Some transmission conditions can cause engine concerns. An electronic pressure control short circuit can cause engine misfiring. The torque converter clutch not disengaging will stall the engine.

Determine customer concerns relative to vehicle use and dependent driving conditions, paying attention to the following items:

- Hot or cold vehicle operating temperature
- Hot or cold ambient temperatures
- Type of terrain
- Vehicle loaded/unloaded
- City/highway driving
- Upshift
- Downshift
- Coasting
- Engagement

- Noise/vibration — check for dependencies, either rpm dependent, vehicle speed dependent, shift dependent, gear dependent, range dependent or temperature dependent.

Check Fluid Level and Condition

Fluid Level Check

 **CAUTION:** The vehicle should not be driven if the fluid level is low or internal failure may result.

NOTE: If the vehicle has been operated for an extended period of time at highway speeds, in city traffic, in hot weather, or pulling a trailer, the fluid must cool down 30 minutes to obtain an accurate reading.

This vehicle is not equipped with a fluid level indicator. An incorrect level may affect the transmission operation and can result in transmission damage. To correctly check and add fluid to the transmission, refer to Transmission Fluid Level Check in this section.

High Fluid Level

A fluid level that is too high can cause the fluid to become aerated due to the churning action of the rotating internal parts. This will cause erratic control pressure, foaming, loss of fluid from the vent tube and possible transmission damage. If an overfill reading is indicated, refer to Transmission Fluid Level Check in this section.

Low Fluid Level

A low fluid level can result in poor transmission engagement, slipping or damage. It can also indicate a leak in one of the transmission seals or gaskets.

Adding Fluid

 **CAUTION:** The use of any type of transmission fluid other than specified may result in transmission damage.

If fluid must be added, add fluid in 0.25L (0.5 pt) increments through the fluid pan level check screw opening. Do not overfill the fluid, refer to Transmission Fluid Level Check in this section. For fluid type, refer to the General Specification chart in this section.



DIAGNOSIS AND TESTING (Continued)**Fluid Condition Check**

1. Observe the color and the odor of the fluid. Under normal circumstances, the color should be dark reddish, not brown or black.
2. Allow the fluid to drip onto a facial tissue and examine the stain.
3. If evidence of solid material is found, the transmission fluid pan should be removed for further inspection.

4. If fluid contamination or transmission failure is confirmed by the sediment in the bottom of the transmission fluid pan, the transmission must be disassembled and completely cleaned.
5. Carry out diagnostic checks and adjustments. Refer to Diagnosis By Symptom in this section.



DIAGNOSIS AND TESTING

Road Testing Vehicle

NOTE: Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

NOTE: When the battery has been disconnected or a new battery installed, certain transmission operating parameters may be lost. The PCM must relearn these parameters. During this learning process you may experience slightly firm shifts, delayed or early shifts. This operation is considered normal and will not affect the function of the transmission. Normal operation will return once these parameters are stored by the PCM.

The Shift Point Road Test and Torque Converter Operation Test provide diagnostic information on transmission shift controls and torque converter operation.



DIAGNOSIS AND TESTING

Torque Converter Diagnosis

Prior to installing a new torque converter, all diagnostic procedures must be followed. This is to prevent the unnecessary installation of good torque converters. Only after a complete diagnostic evaluation can the decision be made to install a new or remanufactured torque converter.

Begin with the normal diagnostic procedures as follows:

1. Preliminary Inspection.
2. Know and Understand the Customer Concern.
3. Verify the Concern — Carry out the Torque Converter Clutch Operation Test; refer to Torque Converter Operation Test in this section.
4. Carry out Diagnostic Procedures.
 - Run on-board diagnostics. See On-Board Diagnostics with scan tool. Refer to Diagnostics in this section.
 - Repair all non-transmission related DTCs first.
 - Repair all transmission DTCs.
 - Rerun on-board diagnostics to verify repair.
 - Carry out the Line Pressure Test. Refer to Special Testing Procedures in this section.
 - Carry out the Stall Speed Test. Refer to Special Testing Procedures in this section.
 - Carry out the Diagnosis by Symptom Index. Refer to Diagnosis By Symptom in this section.
 - Use the index to locate the appropriate routine that best describes the symptom(s). The routine will list all possible components that may cause or contribute to the symptom. Check each component listed, diagnose and service as necessary before servicing the torque converter.

Torque Converter Operation Test

This test verifies that the torque converter clutch control system and the torque converter are operating correctly.

1. Carry out the Quick Test. See On-Board Diagnostics with scan tool. Refer to Diagnostics in this section. Check for DTCs. Refer to the Diagnostic Trouble Code (DTC) Charts in this section.
2. Connect a tachometer to the engine.
3. Bring the engine to normal operating temperature by driving the vehicle at highway speeds for approximately 15 minutes in (D) position.
4. After normal operating temperature is reached, maintain a constant vehicle speed of about 80 km/h (50 mph) and tap the brake pedal with the left foot.
5. The engine rpm should increase when the brake pedal is tapped, and decrease about 5 seconds after the pedal is released. If this does not occur, refer to Torque Converter Operation Concerns in Diagnosis By Symptom.
6. If the vehicle stalls in (D) or manual 2 at idle with vehicle at a stop, move the transmission range selector lever to manual 1 position. If the vehicle stalls, refer to Diagnosis By Symptom, Torque Converter Operation Concerns in this section. Repair as necessary. If the vehicle does not stall in (D), refer to Diagnosis By Symptom in this section.



DIAGNOSIS AND TESTING

Visual Inspection

This inspection will identify modifications or additions to the vehicle operating system that may affect diagnosis. Inspect the vehicle for non-Ford factory add-on devices such as:

- Electronic add-on items:
 - air conditioning.
 - generator (alternator).
 - engine turbo.
 - cellular telephone.
 - cruise control.
 - CB radio.
 - linear booster.
 - backup alarm signal.
 - computer.
- Vehicle modification:

These items, if not installed correctly, will affect the powertrain control module (PCM) or transmission function. Pay particular attention to add-on wiring splices in the PCM harness or transmission wiring harness, abnormal tire size, or axle ratio changes.

 - Leaks; refer to Leakage Inspection in this section.
 - Correct linkage adjustments; refer to Section 307-05.

Shift Linkage Check

Check for a misadjustment in shift linkage by matching the detents in the transmission range selector lever with those in the transmission. If they match, the misadjustment is in the indicator. Do not adjust the shift linkage.

Hydraulic leakage at the manual control valve can cause delay in engagements and/or slipping while operating if the linkage is not correctly adjusted. Refer to Section 307-05.

Check TSBs and OASIS

Refer to all Technical Service Bulletins (TSBs) and OASIS messages which pertain to the transmission concern and follow the procedure as outlined.

Carry Out On-Board Diagnostics (KOEO, KOER)

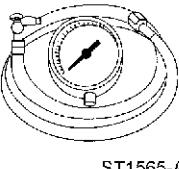
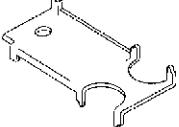
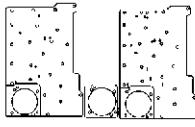
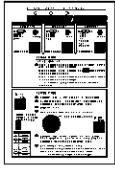
After a road test, with the vehicle warm and before disconnecting any connectors, carry out the Quick Test using a suitable diagnostic scan tool. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the powertrain control system.



DIAGNOSIS AND TESTING

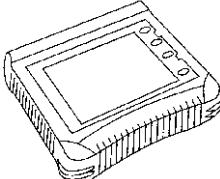
Diagnostics

Special Tool(s)

| | |
|--|---|
|  ST1300-A | UV Leak Detector 164-R0756 or equivalent |
|  ST1565-A | Pressure Gauge, Transmission Fluid 307-004 (T57L-77820-A) |
|  ST1633-A | Alignment Gauge, TR Sensor 307-351 (T97L-70010-A) |
|  ST2538-A | Transmission Test Plate and Gasket 307-433-01, 307-433-02, 307-433-03 |
|  ST1137-A | 73 III Automotive Meter 105-R0057 or equivalent |
|  ST1761-A | Trans Tester TR/MLP Overlay and Manual 007-00131 or equivalent |

(Continued)

Special Tool(s)

| | |
|---|--|
|  ST2332-A | Worldwide Diagnostic System (WDS) Vehicle Communication module (VCM) with appropriate adapters, or equivalent diagnostic tool |
|  ST1632-A | MLP-TR Cable 418-F107 (007-00111) or equivalent |
|  ST1389-A | Transmission Tester 307-F016 (007-00130) or equivalent |

Diagnosing electronically controlled automatic transmissions is simplified using the following procedures. It is important to remember that there is a definite procedure to follow. Do not take shortcuts or assume that critical checks or adjustments have already been made. Follow the procedures as written to avoid missing critical components or steps. By following the diagnostic sequence, the technician will be able to diagnose and repair the concern the first time.

On-Board Diagnostics with Diagnostic Tool

NOTE: For detailed instruction and other diagnostic methods using the diagnostic tool, refer to the diagnostic tool tester and the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

These quick tests should be used to diagnose the powertrain control module (PCM) and should be carried out in order.

- Quick Test 1.0 — Visual Inspection
- Quick Test 2.0 — Set Up
- Quick Test 3.0 — Key On, Engine Off
- Quick Test 4.0 — Continuous Memory
- Quick Test 5.0 — Key On, Engine Running



DIAGNOSIS AND TESTING (Continued)

- Special Test Mode
 - Wiggle Test Mode
 - Output Test Mode
- PCM Reset Mode
- Clearing DTCs
- OBD II Drive Cycle

For further information on other diagnostic testing features using the WDS or generic diagnostic tool, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.



DIAGNOSIS AND TESTING

Transmission Drive Cycle Test

NOTE: Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

NOTE: The Transmission Drive Cycle Test must be followed exactly. Transmission failure must occur four times consecutively for shift error DTC code to be set, and 5 times consecutively for continuous torque converter clutch code to set.

NOTE: When carrying out the Transmission Drive Cycle Test, use the Solenoid Operation Chart for proper solenoid operation. Refer to Pinpoint Tests — OSC Equipped Vehicle in this section.

After carrying out the Quick Test, use the Transmission Drive Cycle Test for checking continuous codes.

1. Record and then erase Quick Test codes.
2. Warm engine to normal operating temperature.
3. Make sure transmission fluid level is correct.
4. With transmission in (D) position, Moderately accelerate from stop to 80 km/h (50 mph). This allows the transmission to shift into 5th gear. Hold speed and throttle open steady for a minimum of 15 seconds.
5. With transmission in 5th gear and maintaining steady speed and throttle opening, lightly apply and release brake to operate stop lamps. Then hold speed and throttle steady for a minimum of 5 seconds.
6. Brake to a stop and remain stopped for a minimum of 20 seconds.
7. Repeat steps 4 through 6 at least 5 times.
8. Carry out the Quick Test and record continuous DTCs.

After On-Board Diagnostics

NOTE: The vehicle wiring harness, powertrain control module (PCM) and non-transmission sensors may affect transmission operations. Repair these concerns first.

After the on-board diagnostic procedures are completed, repair all DTCs.

Begin with non-transmission related DTCs, then repair any transmission related DTCs. Refer to the Diagnostic Trouble Code (DTC) Charts in this section for information on condition and symptoms. This chart will be helpful in referring to the correct manual(s) and aids in diagnosing internal transmission concerns and external non-transmission inputs. The pinpoint tests are used in diagnosing transmission electrical concerns. Make sure that the vehicle wiring harness and the PCM are diagnosed as well. The Powertrain Control/Emissions Diagnosis (PC/ED) manual will aid in diagnosing non-transmission electronic components.

Before Pinpoint Tests

NOTE: Prior to entering pinpoint tests, check the PCM wiring harness for correct connections, bent or broken pins, corrosion, loose wires, correct routing, correct seals and their condition. Check the PCM, sensors and actuators for damage. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

NOTE: If a concern still exists after electrical diagnosis, refer to Diagnosis By Symptom in this section.

If DTCs appear while carrying out the on-board diagnostics, refer to the Diagnostic Trouble Code (DTC) Charts in this section for the appropriate repair procedure. Prior to entering pinpoint tests, refer to any TSBs and OASIS messages for transmission concerns.



DIAGNOSIS AND TESTING

Output State Control (OSC) Mode

Output State Control (OSC) mode allows the technician to take control of certain parameters to function the transmission.

For example, OSC allows the technician to shift the transmission only when commanding a gear change. If the technician commands 1st gear in OSC, the transmission will remain in 1st gear until the technician commands the next gear.

Another example of the OSC feature is that a technician can command a shift solenoid to turn ON or OFF when carrying out an electrical circuit check. OSC has 2 modes of operation for transmission, the Bench Mode and the Drive Mode. Each mode/parameter has a unique set of vehicle operating requirements that the technician must meet before being allowed to operate the OSC.

NOTE: To operate the OSC, the digital transmission range (TR) sensor and the vehicle speed sensor (VSS) must be operational. No DTC's related to the digital TR sensor or the VSS can be present.

- The vehicle requirements MUST BE MET when SENDING the OSC value. Refer to vehicle requirements for each individual test.
- If the vehicle requirements are NOT MET when SENDING the OSC value, an ERROR MESSAGE will appear. When the ERROR MESSAGE is received, OSC is aborted and must be restarted.
- If after a sent value is substituted and the vehicle requirements are no longer met, the PCM will cancel the OSC value and resume normal operation. No error message will be sent.
- The OSC value XXX may be sent anytime to cancel OSC.

OSC Procedures

- Carry out visual inspection and vehicle preparation as necessary.
- Select "Vehicle and Engine Selection" menu.
- Select appropriate vehicle and engine.
- Select "Datalogger".
- Select "Powertrain Control Module (PCM)"
- Select "KOEO On-Demand Self Test and KOER On-Demand Self Tests".
- Carry out test and record DTCs.
- Repair all non- Transmission DTCs.
- Repair all VSS and digital TR sensor DTCs.
- Make sure that VSS and digital TR sensors are functional.
- Select "Appropriate PID's".
- Select "Output State Control of appropriate PID".
- Perform OSC function as required.

OSC - Transmission Bench Modes

The following transmission Bench Modes may be used as necessary during diagnostic.

SS1, SS2, SS3, SS4 and TCC Bench Mode

⚠ CAUTION: The parking brake must be set prior to carrying out this procedure.

The Bench Mode allows the technician to carry out electrical circuit checks on the following components:

- SS1 - Activates SS1 OFF or ON.
- SS2 - Activates SS2 OFF or ON.
- SS3 - Activates SS3 OFF or ON.
- SS4 - Activates SS4 OFF or ON.

OSC "SS1, SS2, SS3, SS4, TCC" Bench Mode operates ONLY when:

- VSS and digital TR sensor are operational.
- No VSS and digital TR sensor DTCs.
- Transmission range selector lever is in P or N.
- Key ON.
- Engine OFF.

OSC Command Values:

- OFF - Turns solenoid OFF.
- ON - Turns solenoid ON.
- XXX - Cancels OSC value sent.
- SEND - Sends the values to PCM.

Bench Mode Procedure for SS1, SS2, SS3, SS4 and TCC.

Follow operating instructions from the IDS tool menu screen:

- Select "PIPs" to be monitored.
- Monitor all selected PIPs during test.
- Select "Parameters - SS1, SS2, SS3, SS4 or TCC".
- Select "ON" to turn the solenoid ON.
- Press "SEND" to send the command ON.
- Select "OFF" to turn the solenoid OFF.
- Press "SEND" to send the command OFF.
- Select "XXX" to cancel at any time.
- Press "SEND".

PCA, PCB, PCC in Bench Mode

⚠ CAUTION: The parking brake must be set prior to carrying out this procedure.

The Bench Mode is also used to test the functionality of the transmission electronic pressure control. During Bench Mode, the PCx solenoids can be commanded in increments of 15 psi (103.4 KPa) from 0 to 90 psi (620.5 KPa) and 90 (620.5 KPa) to 0 psi.

The line pressure tap is used to verify output pressure from PCA or PCB by turning either one OFF while



DIAGNOSIS AND TESTING (Continued)

verifying the output from the other solenoid. The second pressure tap is used to verify the output from the PCC solenoid.

The OSC functions for the parameter PCx allows the technician to choose the following options:

- PCx - Activates PCx to selected values.
- 00 - Sets PCx pressure to 00 psi (0 KPa).
- 15 - Sets PCx pressure to 15 psi (103.4 KPa).
- 30 - Sets PCx pressure to 30 psi (206.8 KPa).
- 45 - Sets PCx pressure to 45 psi (310.3 KPa).
- 60 - Sets PCx pressure to 60 psi (413.7 KPa).
- 75 - Sets PCx pressure to 75 psi (517.0 KPa).
- 90 - Sets PCx pressure to 90 psi (620.5 KPa).

OSC "PCx" Bench Mode should ONLY be operated to check PRESSURE FUNCTIONALITY using and installed pressure gauge (300 psi) when:

- VSS and digital TR sensor are operational.
- No VSS and digital TR sensor DTCs.
- Transmission range selector lever is in P or N.
- Pressure gauge installed.
- Key ON.
- Engine ON.
- Engine rpm at least 1500.

OSC "PCx" Bench Mode should ONLY be operated to complete PCx SOLENOID CIRCUIT PINPOINT TESTS when:

- VSS and digital TR sensor are operational.
- No VSS and digital TR sensor DTCs are present.
- Transmission range selector lever is in P or N.
- Key ON.
- Engine OFF.

OSC Command Values:

- 00 - Sets PCx pressure to 00 psi (0 KPa).
- 15 - Sets PCx pressure to 15 psi (103.4 KPa).
- 30 - Sets PCx pressure to 30 psi (206.8 KPa).
- 45 - Sets PCx pressure to 45 psi (310.3 KPa).
- 60 - Sets PCx pressure to 60 psi (413.7 KPa).
- 75 - Sets PCx pressure to 75 psi (517.0 KPa).
- 90 - Sets PCx pressure to 90 psi (620.5 KPa).
- XXX - Cancels OSC value sent.
- SEND - Sends the value to PCM.

Bench Mode Procedure for PCx

Following operating instructions from the scan tool menu screen:

- Select "PIIDs" to be monitored.
- Monitor all selected PIIDs during test.
- Select "Parameters - PCx".
- Select value "0 - 90 psi".
- Press "SEND" to send command.
- Select "XXX" to cancel at any time.
- Press "SEND".

OSC - Transmission Drive Modes

The Drive Mode allows control of 3 transmission parameters. Each mode/parameter has a unique set of vehicle operating requirements that the technician must meet before being allowed to operate OSC. The recommended procedure, when using the Drive Mode, is to control one parameter at a time.

The Drive Mode allows the technician to carry out the following functions on the transmission:

- GEAR - Allows upshifts or downshifts.
- TCC - Engages or disengages the torque converter clutch.
- FIRM_SFT - Commands a higher control pressure during upshift.

The pressure control (PCx) solenoids for this transmission are not directly controlled during Drive Mode testing. Pressures may be raised during an upshift via the harsh shift control channel (FIRM_SFT).

GEAR in Drive Mode

This OSC function is used to test the transmission shift functions.

The OSC functions for the GEAR parameter allow the technician to choose the following options:

- 1 - PCM selects 1st gear.
- 2 - PCM selects 2nd gear.
- 3 - PCM selects 3rd gear.
- 4 - PCM selects 4th gear.
- 5 - PCM selects 5th gear.

OSC "GEAR" mode operates when:

- VSS and digital TR sensor are operational.
- No VSS and digital TR sensor DTCs.
- Engine ON.
- TCC OFF (TCC cannot be engaged).
- Transmission range selector lever in (D).
- Vehicle speed is greater than 3 km/h (2 mph).

OSC Command Values:

- 1 - PCM selects 1st gear.
- 2 - PCM selects 2nd gear.
- 3 - PCM selects 3rd gear.
- 4 - PCM selects 4th gear.
- 5 - PCM selects 5th gear.
- XXX - Cancels OSC value sent.
- SEND - Sends the values to the PCM.



DIAGNOSIS AND TESTING (Continued)

Drive Mode Procedure for GEAR

Follow operating instructions from the scan tool menu screen.

- Select “PID Gear #” to be monitored.
- Monitor all selected PIDs during test.
- Select value “1-5”.
- Press “SEND” to send command.
- Select “XXX” to cancel at any time.
- Press “SEND”.

TCC in Drive Mode

This OSC function is used to test whether the torque converter clutch (TCC) is engaging and disengaging correctly.

The OSC functions for the TCC parameter allows the technician to choose the following:

- TCC - Activates TCC OFF and ON.
- ON - Turns TCC solenoid ON.
- OFF - Turns TCC solenoid OFF.

OSC “TCC OFF” Drive Mode operates ONLY when:

- VSS and digital TR sensors are operational.
- No VSS and digital TR sensor DTCs present.
- Engine ON.
- Transmission range selector lever in (D).
- Vehicle speed is greater than 3km/h (2 mph).

OSC “TCC ON” Drive Mode operates ONLY when:

- VSS and digital TR sensors are operational.
- No VSS and digital TR sensor DTCs present.
- Engine ON.
- Transmission range selector lever in (D).
- Vehicle speed is greater than 3km/h (2 mph).
- Transmission in 2nd gear or higher.
- TFT is between 33-153°C (60-275°F)
- Brake not applied. “OFF” below 32km/h (20 mph).
- Maintain steady speed.

OSC Command Values:

- OFF - Turns TCC OFF.
- ON - Turns TCC ON.
- XXX - Cancels OSC value sent.
- SEND - Sends the values to PCM.

Drive Mode Procedures for TCC

Follow the operating instructions from the scan tool menu screen.

- Select “PIDs” to be monitored.
- Monitor all PIDs during test.
- Select “Parameters - TCC”.
- Select “ON” to turn solenoid ON.
- Press “SEND” to send command ON.
- Select “OFF” to turn solenoid OFF.

- Press “SEND” to send command OFF.
- Select “XXX” to cancel at any time.
- Press “SEND”.

FIRM_SFT in Drive Mode

This OSC function is used to raise pressure during an upshift to determine whether the pressure control system is functioning correctly. Harsher shifts indicate that the pressure controls system works at high pressure. The best test for isolating pressure control system problems is to carry out the PCA, PCB, PCC in Bench Mode using a hydraulic pressure gauge.

The OSC functions for the parameter FIRM_SFT allows the technician to choose the following options:

- FIRM_SFT - Activates the harsh shift channel.
- ON - Sets the control pressure higher for all upshifts (determined by the PCM).
- OFF - Sets the control pressure to normal for all upshifts (determined by the PCM).
- XXX - Cancels OSC for FIRM_SFT.

OSC “FIRM_SFT” Drive Mode operates ONLY when:

- VSS and digital TR sensor are operational.
- No VSS and digital TR sensor DTCs.
- Transmission range selector lever in O/D.
- Pressure gauge installed (optional).
- Key ON.
- Engine ON.
- Vehicle speed greater than 3 km/h (2 mph).
- TCC is OFF (TCC is not engaged).

OSC Command Values:

- ON - Sets the control pressure higher for all upshifts (determined by the PCM).
- OFF - Sets the control pressure to normal for all upshifts (determined by the PCM).
- XXX - Cancels OSC for FIRM_SFT.
- SEND - Sends the values to the PCM.

Drive Mode Procedure for FIRM_SFT

Follow operating instructions from the scan tool menu screen.

- Select “PID FIRM_SFT #” to be monitored
- Monitor selected PID during test.
- Press “SEND” to send command.
- Select “XXX” to cancel at any time.
- Press “SEND”.



DIAGNOSIS AND TESTING (Continued)

Using Output State Control (OSC) and Accessing PIDs

To confirm that the OSC value was sent by the scan tool and the PCM has accepted the OSC substitution, a corresponding PID for each OSC parameter must be monitored. Additional PIDs should be monitored to help the technician adequately diagnose the transmission.

The following is a list of OSC parameters and their corresponding PID:

| Corresponding PID | PID Description |
|-------------------|---|
| BPP | Brake Pedal Position Switch On/Off |
| PCA | Pressure Control Solenoid A - Commanded Pressure |
| PCB | Pressure Control Solenoid B - Commanded Pressure |
| PCC | Pressure Control Solenoid C - Commanded Pressure |
| FIRMST | Firm Shift Control (FMC) Status Requested by OSC; 0 = FSC not commanded by OSC, NGS PID Output = OFF; 1 = FSC Commanded by OSC, NGS PID Output = ON |
| GEAR | Commanded Transmission Gear (use in DRIVE only) |
| RPM | Engine Revolutions Per Minute |
| SS1 | Shift Solenoid 1 Commanded ON. |
| SS2 | Shift Solenoid 2 Commanded ON. |
| SS3 | Shift Solenoid 3 Commanded ON. |
| SS4 | Shift Solenoid 4 Commanded ON. |
| TCC | Torque Converter Commanded Duty Cycle (%) |
| TCCRAT | Torque Converter Speed Ratio (RPM and or TSS) |
| TFT | Transmission Fluid Temperature (degrees Fahrenheit) |
| VSS | Vehicle Speed (km/h) |

To confirm that the OSC substitution occurred, SEND the OSC value and monitor the corresponding PID value. If no ERROR MESSAGE was received and the value of the corresponding PID is the same as the value sent from OSC, then the OSC substitution was successful.



DIAGNOSIS AND TESTING (Continued)**Diagnostic Trouble Code (DTC) Chart**

| DTC Code | Component | Description | Condition | Symptom | Action |
|----------|-------------------|---|--|--|--|
| P0705 | Digital TR sensor | Digital TR circuit failure | Digital TR circuits, indicating an invalid pattern in TR D. Condition caused by a short to ground or an open in TR4, TR3A, TR2 and/or TR1 circuits. This DTC cannot be set by an incorrectly adjusted digital TR sensor. | Harsh engagements or wrong gear commanded. Defaults to (D) or invalid position. May turn MIL ON. | GO to Pinpoint Test C. |
| P0708 | Digital TR sensor | Digital TR sensor circuit TR3A open | Digital TR sensor circuit TR3A reading 2.6v - 5.0v (open circuit). This DTC cannot be set by an incorrectly adjusted digital TR sensor. | Harsh engagements or wrong gear commanded. Defaults to (D) or invalid position. May turn MIL ON. | GO to Pinpoint Test C. |
| P1702 | Digital TR sensor | Digital TR signal intermittent, code P0705, P0708 are set | See P0705, P0708 conditions. | See P0705, P0708 symptoms. May flash TCIL. | GO to Pinpoint Test C. |
| P1704 | Digital TR sensor | Digital TR not in P or N positions during KOEO/KOER | Digital TR sensor or shift cable incorrectly adjusted or digital TR circuit failure. | DTC is set. | GO to Pinpoint Test C. |
| P1705 | Digital TR sensor | Digital TR not in P or N position during KOEO/KOER | KOEO/KOER not run in park or neutral, or digital TR circuit failure. | DTC is set | RERUN KOEO/KOER in P or N or GO to Pinpoint Test C. |
| P0712 | TFT | 157°C (315°F) indicated TFT sensor grounded | Voltage drop across TFT sensor exceeds scale set for temperature of 157°C (315°F). | DTC set. May flash TCIL. | GO to Pinpoint Test B. |
| P0713 | TFT | -40°C (-40°F) indicated TFT sensor circuit open | Voltage drop across TFT sensor exceeds scale set for temperature -40°C (-40°F). | DTC set. May flash TCIL. | GO to Pinpoint Test B. |
| P1711 | TFT | TFT out of on-board diagnostic range | Transmission not at operating temperature during on-board diagnostic. | DTC set - vehicle cold or overheated. | Warm or cool vehicle to normal operating temperature. GO to Pinpoint Test B. |
| P0711 | TFT | No change in TFT | PCM has detected no TFT change during operation. | DTC is set. May flash TCIL | GO to Pinpoint Test B. |
| P1783 | TFT | Transmission overtemp condition indicated | Transmission fluid temperature exceeded 127°C (270°F). | Increase in control pressure. May flash TCIL. | GO to Pinpoint Test B. |



DIAGNOSIS AND TESTING (Continued)**Diagnostic Trouble Code (DTC) Chart**

| DTC Code | Component | Description | Condition | Symptom | Action |
|----------|----------------------------------|--|---|---|---|
| P0715 | TSS | Insufficient input from the turbine shaft speed sensor | PCM detected a loss of TSS signal during operation. | May turn on MIL | GO to Pinpoint Test E. |
| P0717 | TSS | Insufficient input from the turbine shaft speed sensor | PCM detected a loss of TSS signal during operation. | May flash TCIL | GO to Pinpoint Test E. |
| P0722 | OSS | Insufficient input from OSS sensor | PCM detected a loss of OSS signal during operation. | Abnormal shift schedule, harsh shifts. May flash TCIL. | GO to Pinpoint Test E. |
| P0731** | SS1, SS2, SS3 or internal parts | 1st gear ratio error. | No 1st gear. | Correct gear ratio not achieved for command gear. Shift errors may also be due to other transmission concerns (stuck valves, damaged friction material). Engine rpm could be higher or lower than expected. May flash TCIL. | On/Off Charts. Go to Pinpoint Test A. |
| P0732** | SS1, SS2, SS3 or internal parts. | 2nd gear ratio error. | No 2nd gear. | Correct gear ratio not achieved for command gear. Shift errors may also be due to other transmission concerns (stuck valves, damaged friction material). Engine rpm could be higher or lower than expected. May flash TCIL. | On/Off Charts. Go to Pinpoint Test A. |
| P0733** | SS1, SS2, SS3 or internal parts. | 3rd gear ratio error. | No 3rd gear. | Correct gear ratio not achieved for command gear. Shift errors may also be due to other transmission concerns (stuck valves, damaged friction material). Engine rpm could be higher or lower than expected. May flash TCIL. | REFER to the solenoid On/Off Charts. Go to Pinpoint Test A. |
| P0734** | SS1, SS2, SS3 or internal parts. | 4th gear ratio error. | No 4th gear. | Correct gear ratio not achieved for command gear. Shift errors may also be due to other transmission concerns (stuck valves, damaged friction material). Engine rpm could be higher or lower than expected. May flash TCIL. | REFER to the solenoid On/Off Charts. Go to Pinpoint Test A. |



DIAGNOSIS AND TESTING (Continued)**Diagnostic Trouble Code (DTC) Chart**

| DTC Code | Component | Description | Condition | Symptom | Action |
|----------|--------------------------------------|---|--|---|---------------------------------------|
| P0735 | SS1, SS2, SS3, SS4 or internal parts | 5th gear ratio error. | No 5th gear. | Correct gear ratio not achieved for command gear. Shift errors may also be due to other transmission concerns (stuck valves, damaged friction material). Engine rpm could be higher or lower than expected. May flash TCIL. | On/Off Charts. Go to Pinpoint Test A. |
| P0741** | TCC | TCC solenoid circuit error or stuck OFF | The PCM picked up an excessive amount of TCC slippage during normal vehicle operation. | Stuck OFF: harsh shifts or engagements. Engine RPM may be higher than expected. May flash TCIL. | Go to Pinpoint Test A. |
| P0743** | TCC | TCC solenoid circuit failure during on-board diagnostics | TCC solenoid circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostics. | Open or short to battery power: harsh shifts or engagements, engine rpm higher than expected. Short to ground: vehicle stalls when in drive gear at idle, harsh shifts or engagements or engine rpm lower than expected. May turn on MIL. | Go to Pinpoint Test A. |
| P1740** | TCC | TCC solenoid inoperative | TCC not commanded. Mechanical failure of the solenoid detected. | Stuck OFF: harsh shifts or engagements, engine rpm higher than expected. Stuck ON: vehicle stalls when in drive gear idle, harsh shifts or engagements or engine rpm lower than expected. May turn on MIL. | GO to Pinpoint Test F. |
| P0740** | TCC | TCC solenoid circuit failure during on-board diagnostics. | TCC solenoid circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostics. May flash TCIL. | Open or short to battery power: harsh shifts or engagements, engine rpm higher than expected. Short to ground: vehicle stalls when in drive gear at idle, harsh shifts or engagements or engine rpm lower than expected. May turn on MIL. | GO to Pinpoint Test A. |
| P0962** | PCA | PCA solenoid circuit failure, short to ground | Voltage through PCA solenoid is checked. An error will be noted if tolerance is exceeded. | Short circuit causes minimum PCA pressure (minimum capacity) and limits engine torque (alternate firm). Slips in gear and 3rd gear incorrect. May turn on MIL. | GO to Pinpoint Test D. |



DIAGNOSIS AND TESTING (Continued)**Diagnostic Trouble Code (DTC) Chart**

| DTC Code | Component | Description | Condition | Symptom | Action |
|----------|-----------|--|---|--|------------------------|
| P0745 | PCA | PCA solenoid or circuit fault | PCA functional fault low pressure | Incorrect shift pattern indicating mechanical or hydraulic failure of the transmission. May turn on MIL. | GO to Pinpoint Test D. |
| P0748 | PCA | PCA solenoid inoperative | Electrical failure of the solenoid detected. | Possible slip in gear and/or 3rd gear ratio. May turn on MIL. | GO to Pinpoint Test D. |
| P0960 | PCA | PCA solenoid circuit open | Voltage through PCA solenoid is checked. Error is noted if tolerance is exceeded. | Open circuit causes maximum PCA pressure, harsh engagements and shifts. May flash TCIL. | GO to Pinpoint Test D. |
| P0966 | PCB | PCB solenoid circuit failure, short to ground | Voltage through PCB solenoid is checked. An error will be noted if tolerance is exceeded. | Short to ground. No 2nd and 5th gear. May turn on MIL. | GO to Pinpoint Test D. |
| P0775 | PCB | PCB solenoid or circuit fault | PCB functional fault - low pressure. | Incorrect shift pattern indicating mechanical or hydraulic failure of the transmission. Will turn on MIL. | GO to Pinpoint Test D. |
| P0778 | PCB | PCB solenoid inoperative | Electrical failure of solenoid detected. | No 2nd or 5th gear. Will turn on TCIL. | GO to Pinpoint Test D. |
| P0967 | PCB | PCB solenoid short to battery voltage, short to ground | Voltage through PCB solenoid is checked. An error will be noted if tolerance is exceeded. | Short to battery power: harsh shift and engagements. Short to ground: No 2nd and 4th gear. May flash TCIL. | GO to Pinpoint Test D. |
| P0964 | PCB | PCB solenoid circuit open | Voltage through PCB solenoid is checked. Error is noted if tolerance is exceeded. | Open circuit causes maximum PCB pressure, harsh engagements and shifts. May flash TCIL. | GO to Pinpoint Test D. |
| P0795 | PCC | PCC solenoid or circuit fault. | PCC functional fault - low pressure. | Incorrect shift pattern indicating mechanical or hydraulic failure of transmission. Will turn on MIL. | GO to Pinpoint Test D. |
| P0798 | PCC | PCC solenoid inoperative | Electrical failure of the solenoid detected. | Incorrect gear ratio in 4th and 5th gear. Will turn on MIL. | GO to Pinpoint Test D. |
| P0968 | PCC | PCC solenoid circuit open. | Voltage through PCC solenoid is checked. Error is noted if tolerance is exceeded. | Open circuit causes maximum PCC pressure, harsh engagements and shifts. May flash TCIL. | GO to Pinpoint Test D. |
| P0970 | PCC | PCC solenoid circuit failure, short to ground. | Voltage through PCC solenoid is checked. An error will be noted if tolerance is exceeded. | No 4th and 5th gear. May turn on MIL. | GO to Pinpoint Test D. |



DIAGNOSIS AND TESTING (Continued)**Diagnostic Trouble Code (DTC) Chart**

| DTC Code | Component | Description | Condition | Symptom | Action |
|----------|-----------|--|---|---|------------------------|
| P0971 | PCC | PCC solenoid short to power, short to ground | Voltage through PCC solenoid is checked. An error will be noted if tolerance is exceeded. | Short to battery power: harsh shift and engagements. Short to ground: No 4th and 5th gear. May flash TCIL. | GO to Pinpoint Test D. |
| P0750* | SS1 | SS1 solenoid circuit failure | SS1 circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic. | Open or short to battery power: 1st gear ratio incorrect or no gear ratio errors, no first gear. Short to ground: no 4th or 5th gear. May turn on MIL. | GO to Pinpoint Test A. |
| P0753* | SS1 | SS1 solenoid circuit failure | SS1 circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic. | Open or short to battery power: 1st gear ratio incorrect or no gear ratio error. Short to ground: no 4th or 5th gear. May turn on TCIL. | GO to Pinpoint Test A. |
| P1714 | SS1 | SS1 inoperative | Mechanical failure of the solenoid detected. | Stuck OFF. Open or short to battery power: 1st gear ratio incorrect or no gear ratio error, no 1st gear. Short to ground: no 4th or 5th gear. May turn on TCIL. | GO to Pinpoint Test F. |
| P0755* | SS2 | SS2 solenoid circuit failure | SS2 circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic. | Open or short to battery power: no 3rd gear. Short to ground: no 1st gear. May turn on MIL. | GO to Pinpoint Test A. |
| P0758* | SS2 | SS2 solenoid circuit failure | SS2 circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic. | Open or short to battery power: no 3rd gear. Short to ground: no 1st gear. May turn on MIL. May flash TCIL. | GO to Pinpoint Test A. |
| P1715 | SS2 | SS2 inoperative | Mechanical failure of the solenoid detected. | Stuck OFF: 3rd gear ratio incorrect, no 3rd gear. Stuck ON: 1st gear ratio incorrect or no 1st gear. May turn on MIL. | GO to Pinpoint Test F. |
| P0760* | SS3 | SS3 solenoid circuit failure | SS3 circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic. | Open or short to battery power: 2nd and 5th gear ratio incorrect. Short to ground: 1st gear ratio incorrect or no gear ratio errors. May turn on MIL. | GO to Pinpoint Test A. |



DIAGNOSIS AND TESTING (Continued)**Diagnostic Trouble Code (DTC) Chart**

| DTC Code | Component | Description | Condition | Symptom | Action |
|----------|---------------------------------|--|---|---|------------------------|
| P0763* | SS3 | SS1 solenoid circuit failure | SS3 circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic. | Open or shorted to battery power: 2nd and 5th gear ratio incorrect. Short to ground: 1st gear incorrect or no gear ratio errors. May turn on MIL. | GO to Pinpoint Test A. |
| P1716 | SS3 | SS3 inoperative | Mechanical failure of the solenoid detected. | Stuck OFF: 2nd and 5th gear ratio incorrect. Stuck ON: 1st gear ratio incorrect or no gear ratio errors. May turn on MIL. | GO to Pinpoint Test F. |
| P0765 | SS4 | SS4 solenoid circuit failure | SS4 circuit failed to provide voltage drop across solenoid. Circuit shorted to ground. | Short to ground: no engine braking. May turn on MIL. | GO to Pinpoint Test A. |
| P0768 | SS4 | SS4 solenoid circuit failure | SS4 circuit failed to provide voltage drop across solenoid. Circuit shorted to ground. | Short to ground: no engine braking. May turn on MIL. | GO to Pinpoint Test A. |
| P1717 | SS4 | SS4 inoperative | Mechanical failure of the solenoid detected. | Stuck ON: no engine braking. May turn on MIL. | GO to Pinpoint Test F. |
| P0791 | Intermediate shaft speed sensor | Intermediate shaft speed sensor signal failure | PCM has detected a loss of the intermediate shaft speed sensor signal. | Harsh shifts. May flash TCIL. | GO to Pinpoint Test E. |
| P0794 | Intermediate shaft speed sensor | Intermediate shaft speed sensor signal intermittent. | PCM has detected an intermittent intermediate shaft speed sensor signal. | Harsh shifts. May flash TCIL. | GO to Pinpoint Test E. |



DIAGNOSIS AND TESTING (Continued)

Special Tool(s)

| | |
|---|--|
|  | Integrated Diagnostic System (IDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool. |
| NOT AVAILABLE AT TIME OF PRINT | Transmission Fluid Pressure Gauge 307-004 (T57L-77830A) |
| TBA | |

Shift Solenoid Pre-Diagnosis

Anytime an electrical connector or solenoid body is disconnected, inspect the connector terminal for condition, \corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install new as necessary.

Use the following shift solenoid operation information when carrying out Pinpoint Test A.

Solenoid Operation Chart

| Gearshift | PCM | 5R55 Solenoid States | | | | | | |
|-------------------|----------------|----------------------|-----|-----|-----|-----|-----|-----|
| Selector Position | Commanded Gear | SS1 | SS2 | SS3 | SS4 | PCA | PCB | PCC |
| P/N | P/N | ON | OFF | OFF | ON | L | H/L | L |
| R | R | ON | OFF | OFF | ON | L/H | L | H |
| D | 1 | ON | OFF | OFF | ON | H | H/L | L |
| | 2 | ON | OFF | ON | ON | L/H | H | L |
| | 3 | ON | ON | OFF | ON | H | L/H | L |
| | 4 | OFF | OFF | OFF | ON | H | H/L | H |
| | 5 | OFF | OFF | ON | ON | H | H | H |
| D (PERF) | 1 | ON | OFF | OFF | ON | H | H/L | L |
| | 2 | ON | OFF | ON | ON | L/H | H | L |
| | 3 | ON | ON | OFF | ON | H | L/H | L |
| | 4 | OFF | OFF | OFF | OFF | L/H | H | H |
| Manual 3 | 3 | ON | ON | OFF | OFF | H | L | H/L |
| Manual 2 | 2 | ON | OFF | ON | OFF | H | L | H/L |
| Manual 1 | 1 | ON | OFF | OFF | OFF | H | L | H/L |

H = High

L = Low

H/L = PCM controlled

Shift Solenoid Failure Mode Chart

Failed ON or OFF due to powertrain control module (PCM) and/.or vehicle wiring concerns, solenoid electrically, mechanically or hydraulically stuck ON or OFF.



DIAGNOSIS AND TESTING (Continued)

Solenoid Failure Mode Charts - 5R55S

| Gear | Actual Gear | | | | | | | |
|--------------------------|-------------|-----|-----|-----|-----|-----|-----|------|
| | SS1 | | SS2 | | SS3 | | SS4 | |
| | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| D Position | | | | | | | | |
| 1 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 1/M1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | M2 |
| 3 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3/M3 |
| 4 | 1 | 4 | 4 | 4 | 4/5 | 4 | 4 | 4/M4 |
| 5 | 2 | 5 | 5 | 5 | 5 | 4 | 5 | 5 |
| D Position (PERF) | | | | | | | | |
| 1M | M1 | M1 | M3 | M1 | M2 | M1 | 1 | M1 |
| 2M | M2 | M2 | 1.1 | M2 | M2 | M1 | 2 | M2 |
| 3M | M3 | M3 | M3 | M1 | 1.1 | M3 | 3 | M3 |
| 4M | M1 | M4 | M4 | M4 | 5 | M4 | 4 | M4 |
| R | R | R | N | R | R | R | R | R |

Slip = Slip due to low line pressure

1.1 = Actual ratio with Forward Clutch, Intermediate and Overdrive Band applied.

Solenoid Failure Mode Charts - 5R55S (Continued)

| Gear | Actual Gear | | | | | | | |
|--------------------------|-------------|----|-----|----|-----|----|---|---|
| | PCA | | PCB | | PCC | | | |
| | L | H | L | H | L | H | | |
| D Position | | | | | | | | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 |
| 3 | 1/S | 3 | 3 | 1 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 | 1 | 4 | 4 | 4 |
| 5 | 5 | 5 | 4 | 5 | 2 | 5 | 5 | 5 |
| D Position (PERF) | | | | | | | | |
| 1M | 1 | M1 | 1 | M1 | 1M | M1 | | |
| 2M | M2 | M2 | 1 | M2 | 2M | M2 | | |
| 3M | 1 | M3 | 3 | M1 | 3M | M3 | | |
| 4M | M4 | M4 | 4 | M4 | 1 | M4 | | |
| R | R/S | R | R/S | R | R | R | | |

H = High

L = Low

Slip = Slip due to low line pressure

1.1 = Actual ratio with Forward Clutch, Intermediate and Overdrive Band applied.

Pinpoint Tests

PINPOINT TEST A: SHIFT AND TORQUE CONVERTER CLUTCH SOLENOIDS

NOTE: Refer to the Transmission Vehicle Harness Connector illustration preceding these pinpoint tests.

NOTE: Read and record all DTCs. All digital TR sensor and VSS DTCs must be repaired before entering output state control (OSC).



DIAGNOSIS AND TESTING (Continued)

| Test Step | | Result / Action to Take |
|------------------|--|--------------------------------|
| A1 | Simulation Function Procedure | |
| | <p>1. Connect the IDS/PDS.</p> <p>2. After the vehicle is identified, select the following items from the initial screen of the IDS/PDS.</p> <ul style="list-style-type: none"> • When using IDS (laptop PC) <ol style="list-style-type: none"> 1. Select the “Toolbox” tab 2. Select the “DataLogger” 3. Select “Modules” 4. Select “PCM” • When using PDS (pocket PC) <ol style="list-style-type: none"> 1. Select “Module Tests” 2. Select “PCM” 3. Select “DataLogger” <p>3. Select the simulation items from the PID table.</p> <p>4. Perform the simulation function; inspect the operation for each part.</p> <ul style="list-style-type: none"> * If there is no operation sound from the solenoid after the simulation function inspection is performed, it is possible that there is an open or short circuit in the wiring harness, or solenoid, or sticking and operation malfunction. | |

SIMULATION ITEM Table

| Simulation Item | Applicable Component | Unit |
|------------------------|-----------------------------|-------------|
| PCA | Pressure control solenoid A | pis |
| PCB | Pressure control solenoid B | pis |
| PCC | Pressure control solenoid C | pis |
| SS1 | Shift solenoid 1 | ON/OFF |
| SS2 | Shift solenoid 2 | ON/OFF |
| SS3 | Shift solenoid 3 | ON/OFF |
| SS4 | Shift solenoid 4 | ON/OFF |
| TCC | TCC control solenoid | % |
| Gear | Gear selected | |
| Harsh Shift | Shift control | |

PID/DATA MONITOR AND RECORD function table

| Monitor Item | Definition | Unit/Condition | Condition/Specification |
|---------------------|---|-----------------------|---|
| BPP | Brake switch | ON/OFF | <ul style="list-style-type: none"> • Brake pedal depressed: ON • Other: OFF |
| FIRM_ST | Firm shaft control (FSC) status requested | 0/1 | <ul style="list-style-type: none"> • FSC not commanded by IDS/PDS PID output (OFF): 0 • FSC commanded by IDS/PDS output (ON): 1 |



DIAGNOSIS AND TESTING (Continued)

| Test Step | | | | Result / Action to Take |
|---|---|-----------------------|---|--------------------------------|
| PID/DATA MONITOR AND RECORD function table (Continued) | | | | |
| Monitor Item | Definition | Unit/Condition | Condition/Specification | |
| GEAR | Calculated gear range in PCM | 1/2/3/4/5 | <ul style="list-style-type: none"> • 1 GR: 1 • 2 GR: 2 • 3 GR: 3 • 4 GR: 4 • 5 GR: 5 | |
| GEAR_OSC | PID used to command gear range in Simulation Function | 1/2/3/4/5 | <ul style="list-style-type: none"> • 1 GR: 1 • 2 GR: 2 • 3 GR: 3 • 4 GR: 4 • 5 GR: 5 | |
| ISS | ISS Sensor | RPM | Indicates intermediate shaft speed | |
| OSS | OSS Sensor | RPM | Indicates output shaft speed | |
| PCA | Pressure control solenoid A | pis | Indicates pressure control solenoid A commanded pressure | |
| PCB | Pressure control solenoid B | pis | Indicates pressure control solenoid B commanded pressure | |
| PCC | Pressure control solenoid C | pis | Indicates pressure control solenoid C commanded pressure | |
| RPM | Engine speed | RPM | Indicates engine speed | |
| SS1 | Shift solenoid A | ON/OFF | <ul style="list-style-type: none"> • Shift solenoid A operation: ON • Shift solenoid A not operation: OFF | |
| SS2 | Shift solenoid B | ON/OFF | <ul style="list-style-type: none"> • Shift solenoid B operation: ON • Shift solenoid B not operation: OFF | |
| SS3 | Shift solenoid C | ON/OFF | <ul style="list-style-type: none"> • Shift solenoid C operation: ON • Shift solenoid C not operation: OFF | |
| SS4 | Shift solenoid D | ON/OFF | <ul style="list-style-type: none"> • Shift solenoid D operation: ON • Shift solenoid D not operation: OFF | |
| TCC | TCC control solenoid | % | Indicates TCC control solenoid operation | |

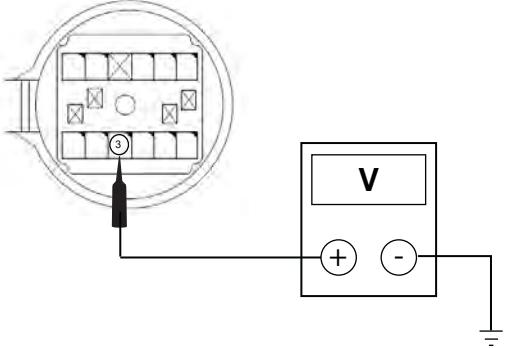
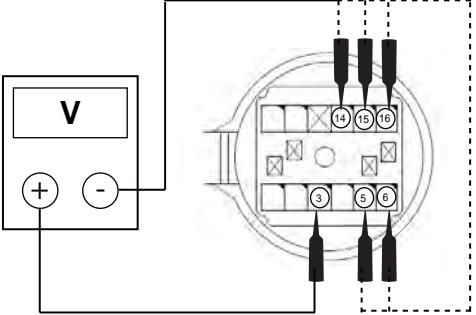


DIAGNOSIS AND TESTING (Continued)

| Test Step | | | | Result / Action to Take | | | | | | | | | | | | |
|--|------------------------------|----------------|---|---|------------|----------------|-------------------------|--------|------------------------------|-------|---|-----|-----|-----|-----|--|
| PID/DATA MONITOR AND RECORD function table (Continued) | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Monitor Item</th><th>Definition</th><th>Unit/Condition</th><th>Condition/Specification</th></tr> </thead> <tbody> <tr> <td>TCCRAT</td><td>Torque converter speed ratio</td><td>ratio</td><td>Indicates torque converter speed ratio (engine speed compared with turbine shaft speed)</td></tr> </tbody> </table> | | | | Monitor Item | Definition | Unit/Condition | Condition/Specification | TCCRAT | Torque converter speed ratio | ratio | Indicates torque converter speed ratio (engine speed compared with turbine shaft speed) | | | | | |
| Monitor Item | Definition | Unit/Condition | Condition/Specification | | | | | | | | | | | | | |
| TCCRAT | Torque converter speed ratio | ratio | Indicates torque converter speed ratio (engine speed compared with turbine shaft speed) | | | | | | | | | | | | | |
| A2 WIGGLE TEST | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none"> * Remain in Trans/Bench mode * Select PIDs to be monitored <table border="1"> <thead> <tr> <th>PID Command</th><th>PID Actual</th></tr> </thead> <tbody> <tr> <td>SS1</td><td>SS1</td></tr> <tr> <td>SS2</td><td>SS2</td></tr> <tr> <td>SS3</td><td>SS3</td></tr> <tr> <td>SS4</td><td>SS4</td></tr> <tr> <td>TCC</td><td>TCC</td></tr> </tbody> </table> <ul style="list-style-type: none"> • Select "ON" to turn suspect solenoid(s) ON. • Press "SEND." • Wiggle all wiring and connectors to the transmission. Monitor the solenoid state for changes * Select "OFF" to turn solenoid(s) OFF * Press "SEND." • Repeat steps for each solenoid. • Does the suspect solenoid(s) fault state change? | | | | PID Command | PID Actual | SS1 | SS1 | SS2 | SS2 | SS3 | SS3 | SS4 | SS4 | TCC | TCC | Yes Repair the circuit. TEST the system for normal operation. No Go to A3 |
| PID Command | PID Actual | | | | | | | | | | | | | | | |
| SS1 | SS1 | | | | | | | | | | | | | | | |
| SS2 | SS2 | | | | | | | | | | | | | | | |
| SS3 | SS3 | | | | | | | | | | | | | | | |
| SS4 | SS4 | | | | | | | | | | | | | | | |
| TCC | TCC | | | | | | | | | | | | | | | |
| A3 SOLENOID FUNCTIONAL CHECK | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Monitor each solenoid state. • Turn each solenoid ON and OFF. • Does the solenoid turn ON and OFF when commanded and can the solenoid activation be heard? | | | | Yes Go to A4. No Go to A5 | | | | | | | | | | | | |
| A4 OSC TRANS-DRIVE Mode (GEAR OR TCC) | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Carry out OSC Trans-Drive Mode. • Select GEAR for shift solenoids or follow procedures for GEAR as listed in this section. • Select TCC for torque converter clutch solenoid. Follow procedures of TCC in Drive Mode as listed in this section. • Does the transmission upshift and downshift or torque converter engage/disengage when commanded? | | | | Yes CLEAR all DTCs. ROAD TEST to verify if concern is still present. REFER to Diagnosis By Symptom to diagnose shift or torque converter concern. No Go to A5 | | | | | | | | | | | | |
| A5 CHECK FOR BATTERY VOLTAGE | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none"> • Disconnect transmission vehicle harness connector. • Visually inspect all wires and connectors for damage. • Key in the ON position. • Measure the voltage on pin 3 harness side and ground. | | | | Yes Go to A6 No REPAIR the circuit. TEST for normal operation. | | | | | | | | | | | | |

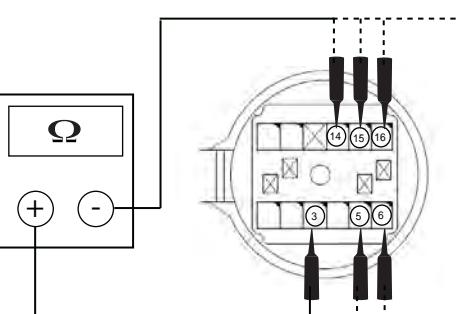
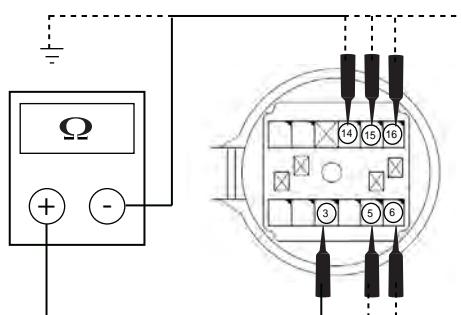


DIAGNOSIS AND TESTING (Continued)

| | Test Step | Result / Action to Take |
|----|---|-------------------------|
| |  <p>AUS06083</p> <ul style="list-style-type: none"> Is the voltage greater than 10 volts? | |
| A6 | ELECTRICAL SIGNAL CHECK <ul style="list-style-type: none"> Leave positive lead connected to pin 3 and connect negative lead to pin 5, 6, 14, 15 and 16.  <p>AUS06084</p> <ol style="list-style-type: none"> Connect the IDS/PDS After the vehicle is identified, select the following items from the initial screen of the IDS/PDS <ul style="list-style-type: none"> When using IDS (laptop PC) <ol style="list-style-type: none"> Select the "Toolbox" tab Select "DataLogger" Select "Modules" Select "PCM" When using PDS (pocket PC) <ol style="list-style-type: none"> Select "Module Tests" Select "PCM" Select "DataLogger" Select the simulation items from the PID table. Perform the simulation function; inspect the operation for each solenoid. <ul style="list-style-type: none"> If there is no operation sound from the solenoid after the simulation function inspection is performed, it is possible that there is an open or short circuit in the wiring harness, or solenoid, or sticking and operation malfunction. | |



DIAGNOSIS AND TESTING (Continued)

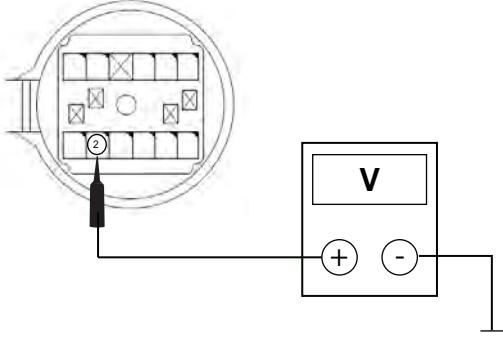
| Test Step | | Result / Action to Take | | | | | | | | | | | | |
|------------------|---|--|-------------------|-----|-------|-----|-------|-----|-------|-----|-------|-----|------|--|
| A7 | CHECK SOLENOID RESISTANCE AT SOLENOID | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> Measure the resistance between pin 3 and pin 5, 6, 14, 15 and 16 solenoid side. <table border="1"> <thead> <tr> <th>Solenoid</th><th>Resistance (ohms)</th></tr> </thead> <tbody> <tr> <td>SS1</td><td>16-45</td></tr> <tr> <td>SS2</td><td>16-45</td></tr> <tr> <td>SS3</td><td>16-45</td></tr> <tr> <td>SS4</td><td>16-45</td></tr> <tr> <td>TCC</td><td>9-16</td></tr> </tbody> </table>  <p>AUS06085</p> | Solenoid | Resistance (ohms) | SS1 | 16-45 | SS2 | 16-45 | SS3 | 16-45 | SS4 | 16-45 | TCC | 9-16 | Yes Go to A8. No INSTALL a new solenoid body assembly. TEST the system for normal operation. |
| Solenoid | Resistance (ohms) | | | | | | | | | | | | | |
| SS1 | 16-45 | | | | | | | | | | | | | |
| SS2 | 16-45 | | | | | | | | | | | | | |
| SS3 | 16-45 | | | | | | | | | | | | | |
| SS4 | 16-45 | | | | | | | | | | | | | |
| TCC | 9-16 | | | | | | | | | | | | | |
| A8 | CHECK SOLENOID FOR SHORT TO GROUND | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> Measure the resistance between pin 3 and pin 5, 6, 14, 15 and 16 solenoid side to ground.  <p>AUS06086</p> <ul style="list-style-type: none"> Is the resistance less than 5 ohms? | Yes INSTALL a new solenoid body assembly. No REFER to Diagnosis By Symptom in this section for diagnosis of shift or torque converter concerns. | | | | | | | | | | | | |

PINPOINT TEST B: TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR

NOTE: Refer to the Transmission Vehicle Harness Connector illustration preceding these pinpoint tests.

| Test Step | | Result / Action to Take |
|------------------|---|--------------------------------|
| B1 | PID/DATA MONITOR INSPECTION | |
| | 1. Connect the IDS/PDS. 2. After the vehicle is identified, select the following items from the initial screen of the IDS/PDS. | |

DIAGNOSIS AND TESTING (Continued)

| Test Step | | Result / Action to Take |
|-----------|--|---|
| | <ul style="list-style-type: none"> • When using IDS (laptop PC) <ol style="list-style-type: none"> 1. Select the "Toolbox" tab 2. Select "DataLogger" 3. Select "Modules" 4. Select "PCM" • When using PDS (pocket PC) <ol style="list-style-type: none"> 1. Select "Module Tests" 2. Select "PCM" 3. Select "DataLogger" 3. Select PID/DATA Monitor and Record. 4. Enter the following diagnostic mode on the scan tool: PIDs, TFT, TFTV. <p>• Does the vehicle enter PID/Data Monitor and Record?</p> | Yes RETAIN in PID/Data Control. Go to B2. No REPEAT procedure to enter PID. If vehicle did not enter PID, REFER to this chapter for diagnosis of PCM and VCM. |
| B2 | WARM-UP/COOL-DOWN CYCLE | |
| | <ul style="list-style-type: none"> • While monitoring the TFT PIDs, carry out the following test: If transmission is cold, run the transmission to warm it up. If transmission is warm, allow transmission to cool down. • Do the TFT PIDs increase as the transmission is warmed up or decrease as the transmission is cooled or does the TFT or TFTV drop in and out of range? | Yes If the TFT PIDs increase as the transmission is warmed or decrease as the transmission is cooled, CLEAR all DTCs. ROAD TEST to verify if concern is still present. If concern is still present, REFER to Diagnosis By Symptom in this section to diagnosis transmission overheating. If the TFT or TFTV drop in and out of range, INSPECT for intermittent concern in the internal/external harness, sensor or connector. No Go to B3. |
| B3 | ELECTRICAL SIGNAL CHECK | |
| | <ul style="list-style-type: none"> • Disconnect the transmission harness connector. • Visually inspect all wires and connectors for damage. • Measure the voltage between pin 2 harness side and ground.  <p>AUS06087</p> <ul style="list-style-type: none"> • Is the voltage between 4.5 and 5.0 volts | Yes Go to B4 No REPAIR the circuit. TEST the system for normal operation. |



DIAGNOSIS AND TESTING (Continued)

| Test Step | | Result / Action to Take | | | | | | | | | | | | | | | | | | | |
|--|-------------------|--------------------------------|------------|-------------|-----------|-------------|---------|------------|----------|-----------|----------|----------|----------|-----------|-----------|-------------|------------|-------------|------------|--------------|---|
| B4 CHECK RESISTANCE OF TFT SENSOR | | | | | | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none"> Measure the resistance between pin 2 and 12 at the solenoid body connector. Record the resistance. Resistance should be approximately in the following ranges: <p>Transmission Fluid Temperature</p> <table border="1"> <thead> <tr> <th>°C</th> <th>Resistance (Ohms)</th> </tr> </thead> <tbody> <tr><td>-40 to -20</td><td>967K - 284K</td></tr> <tr><td>-19 to -1</td><td>284K - 100K</td></tr> <tr><td>0 to 20</td><td>100K - 37K</td></tr> <tr><td>21 to 40</td><td>37K - 16K</td></tr> <tr><td>41 to 70</td><td>16K - 5K</td></tr> <tr><td>71 to 90</td><td>5K - 2.7K</td></tr> <tr><td>91 to 110</td><td>2.7K - 1.5K</td></tr> <tr><td>111 to 130</td><td>1.5K - 0.8K</td></tr> <tr><td>131 to 150</td><td>0.8K - 0.54K</td></tr> </tbody> </table> <ul style="list-style-type: none"> Is the resistance in the range? | °C | Resistance (Ohms) | -40 to -20 | 967K - 284K | -19 to -1 | 284K - 100K | 0 to 20 | 100K - 37K | 21 to 40 | 37K - 16K | 41 to 70 | 16K - 5K | 71 to 90 | 5K - 2.7K | 91 to 110 | 2.7K - 1.5K | 111 to 130 | 1.5K - 0.8K | 131 to 150 | 0.8K - 0.54K | Yes REFER to Diagnosis By Symptom in this section to diagnose an overheating concern. No INSTALL a new solenoid body assembly. |
| °C | Resistance (Ohms) | | | | | | | | | | | | | | | | | | | | |
| -40 to -20 | 967K - 284K | | | | | | | | | | | | | | | | | | | | |
| -19 to -1 | 284K - 100K | | | | | | | | | | | | | | | | | | | | |
| 0 to 20 | 100K - 37K | | | | | | | | | | | | | | | | | | | | |
| 21 to 40 | 37K - 16K | | | | | | | | | | | | | | | | | | | | |
| 41 to 70 | 16K - 5K | | | | | | | | | | | | | | | | | | | | |
| 71 to 90 | 5K - 2.7K | | | | | | | | | | | | | | | | | | | | |
| 91 to 110 | 2.7K - 1.5K | | | | | | | | | | | | | | | | | | | | |
| 111 to 130 | 1.5K - 0.8K | | | | | | | | | | | | | | | | | | | | |
| 131 to 150 | 0.8K - 0.54K | | | | | | | | | | | | | | | | | | | | |

PINPOINT TEST C: DIGITAL TRANSMISSION RANGE (TR) SENSOR

NOTE: Refer to the Digital Transmission Range (TR) Sensor Connector illustration and Digital Transmission (TR) Sensor Diagnosis Chart preceding these pinpoint tests.

| Test Step | | Result / Action to Take |
|--|---|--------------------------------|
| C1 VERIFY DIAGNOSTIC TROUBLE Codes | | |
| <ul style="list-style-type: none"> Key in ON position. Select PARK. Perform CMDTC check. Are only DTC codes P0705 and P0708 present? | Yes Go to C4. No Go to C2. | |
| C2 VERIFY DIGITAL TRANSMISSION RANGE SENSOR ALIGNMENT | | |
| <ul style="list-style-type: none"> Key in OFF position. Select PARK. Check to make sure the digital TR sensor harness connector is fully seated, terminals are fully engaged in connector and in good condition before proceeding. Apply the parking brake. Select NEUTRAL Disconnect the shift cable/linkage from the manual lever. Verify that the TR Sensor Alignment Gauge fits in the appropriate slots. Is the digital TR sensor correctly adjusted? | Yes Go to C3. No ADJUST the digital TR sensor; REFER to digital transmission range (TR) sensor in this section. PLACE transmission range selector lever into PARK and CLEAR DTCs. RETURN KOER Tests. Go to C3. | |



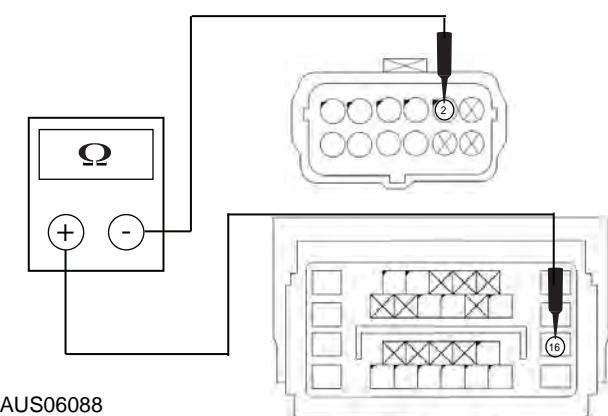
DIAGNOSIS AND TESTING (Continued)

| Test Step | | | | | | Result / Action to Take | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|---|-----------|------|-----|-----|--------------------------------|-------------------|------------|-----------|--|--|--|----------------------|-----|------|-----|-----|------|-----|---|---|---|---|------|------------|-----|---|---|---|---|------------|---------|-----|---|---|---|---|------------|------------|-----|---|---|---|---|------------|---------|------|---|---|---|---|------------|------------|-----|---|---|---|---|------------|-----------|-----|---|---|---|---|------------|------------|-------|---|---|---|---|------|----------|-------|---|---|---|---|------|------------|-------|---|---|---|---|------|
| C3 | VERIFY SHIFT CABLE/LINKAGE ADJUSTMENT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> Place the range selector in D. Connect the shift cable/linkage. Verify that the shift cable/linkage is correctly adjusted. REFER to Section 307-05. Is the shift cable/linkage correctly adjusted? | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C4 | CHECK ELECTRICAL SIGNAL OPERATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> Select PARK Disconnect the digital TR sensor. <p>CAUTION: Do not pry on connector. This will damage the connector and result in a transmission concern.</p> <ul style="list-style-type: none"> Inspect both ends of the connector for damage or pushed out pins, corrosion, loose wires and missing or damage seals. Is there damage to the connector, pins or harness? <table border="1"> <thead> <tr> <th rowspan="2">Selector Position</th> <th rowspan="2">PID: TR</th> <th colspan="4">PID: TD_D</th> <th rowspan="2">PID: TR_V (volts)</th> </tr> <tr> <th>TR4</th> <th>TR3A</th> <th>TR2</th> <th>TR1</th> </tr> </thead> <tbody> <tr> <td>PARK</td> <td>P/N</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0.0V</td> </tr> <tr> <td>In Between</td> <td>REV</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>1.3 - 1.8V</td> </tr> <tr> <td>REVERSE</td> <td>REV</td> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>1.3 - 1.8V</td> </tr> <tr> <td>In Between</td> <td>REV</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>1.3 - 1.8V</td> </tr> <tr> <td>NEUTRAL</td> <td>NTRL</td> <td>0</td> <td>1</td> <td>1</td> <td>0</td> <td>1.3 - 1.8V</td> </tr> <tr> <td>In Between</td> <td>O/D</td> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>1.3 - 1.8V</td> </tr> <tr> <td>OVERDRIVE</td> <td>O/D</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1.3 - 1.8V</td> </tr> <tr> <td>In Between</td> <td>Man 2</td> <td>1</td> <td>0</td> <td>1</td> <td>1</td> <td>0.0V</td> </tr> <tr> <td>Manual 2</td> <td>Man 2</td> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>0.0V</td> </tr> <tr> <td>In Between</td> <td>Man 2</td> <td>1</td> <td>0</td> <td>1</td> <td>1</td> <td>0.0V</td> </tr> </tbody> </table> | | | | | | Selector Position | PID: TR | PID: TD_D | | | | PID: TR_V (volts) | TR4 | TR3A | TR2 | TR1 | PARK | P/N | 0 | 0 | 0 | 0 | 0.0V | In Between | REV | 0 | 1 | 0 | 0 | 1.3 - 1.8V | REVERSE | REV | 1 | 1 | 0 | 0 | 1.3 - 1.8V | In Between | REV | 0 | 1 | 0 | 0 | 1.3 - 1.8V | NEUTRAL | NTRL | 0 | 1 | 1 | 0 | 1.3 - 1.8V | In Between | O/D | 1 | 1 | 1 | 0 | 1.3 - 1.8V | OVERDRIVE | O/D | 1 | 1 | 1 | 1 | 1.3 - 1.8V | In Between | Man 2 | 1 | 0 | 1 | 1 | 0.0V | Manual 2 | Man 2 | 1 | 0 | 0 | 1 | 0.0V | In Between | Man 2 | 1 | 0 | 1 | 1 | 0.0V |
| Selector Position | PID: TR | PID: TD_D | | | | PID: TR_V (volts) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | TR4 | TR3A | TR2 | TR1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PARK | P/N | 0 | 0 | 0 | 0 | 0.0V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| In Between | REV | 0 | 1 | 0 | 0 | 1.3 - 1.8V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| REVERSE | REV | 1 | 1 | 0 | 0 | 1.3 - 1.8V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| In Between | REV | 0 | 1 | 0 | 0 | 1.3 - 1.8V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NEUTRAL | NTRL | 0 | 1 | 1 | 0 | 1.3 - 1.8V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| In Between | O/D | 1 | 1 | 1 | 0 | 1.3 - 1.8V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OVERDRIVE | O/D | 1 | 1 | 1 | 1 | 1.3 - 1.8V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| In Between | Man 2 | 1 | 0 | 1 | 1 | 0.0V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Manual 2 | Man 2 | 1 | 0 | 0 | 1 | 0.0V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| In Between | Man 2 | 1 | 0 | 1 | 1 | 0.0V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C5 | CHECK ELECTRICAL SYSTEM OPERATION (DIGITAL TR AND PCM) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <ul style="list-style-type: none"> Key in OFF position. Connect the Digital TR Sensor. Key in ON position Connect the IDS/PDS After the vehicle is identified, select the following items from the initial screen of the IDS/PDS. <ul style="list-style-type: none"> When using IDS (laptop PC) <ol style="list-style-type: none"> Select the "Toolbox" tab Select "DataLogger" Select "Modules" Select "PCM" When using PDS (pocket PC) <ol style="list-style-type: none"> Select the "Module Tests" Select "PCM" Select "DataLogger" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>Yes The problem is not in the digital TR sensor system. REFER to Diagnosis By Symptom in this section for further diagnosis.</p> <p>No If TR_D changes when wiggling harness, tapping on the sensor or driving the vehicle, the problem may be intermittent. Go to C6.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

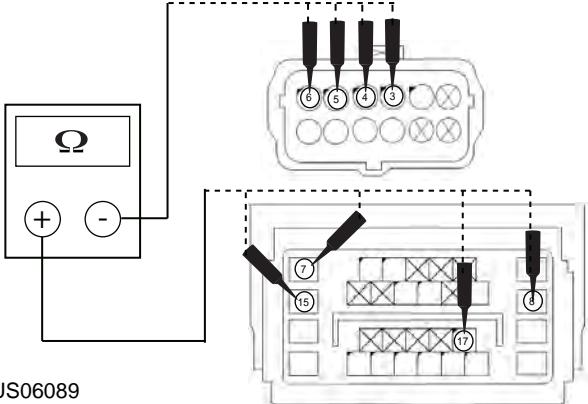
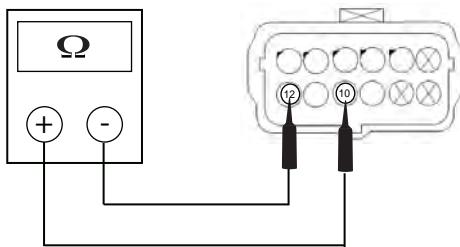
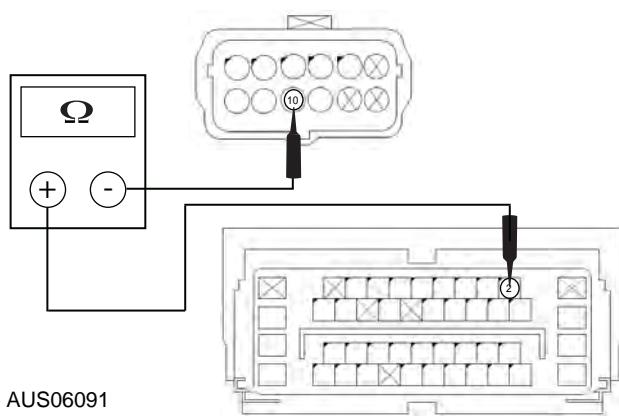


DIAGNOSIS AND TESTING (Continued)

| | Test Step | Result / Action to Take |
|-----------|---|--|
| | <ul style="list-style-type: none"> Select the PID(s) from the PID table. Move transmission range selector lever into each gear and stop. Observe the PID(s), TR_D and TR_V (vehicle dependent) while wiggling the harness, tapping on the sensor or driving the vehicle. Use PID(s), TR_D for DTCs P0705, P1704 and P1705. Use PID(s) TR_V for DTC P0708. Compare the PID(s) to the Digital Transmission Range (TR) Sensor diagnosis chart. Do the PID(s) TR_D and TR_V match the Digital Transmission Range (TR) Sensor Diagnosis Chart, and does the TR_D PID remain steady when the harness is wiggled, the sensor is tapped on or the vehicle driven? | |
| C6 | CHECK DIGITAL TRANSMISSION RANGE SENSOR OPERATION | |
| | <ul style="list-style-type: none"> Disconnect the Digital TR Sensor. Connect the TR-E Cable to Transmission Tester. Connect the TR-E Cable to Digital TR Sensor. Place the DIGITAL TR Overlay onto Transmission Tester. Carry out SENSOR Test as instructed on the Digital TR Overlay. Does the status lamp on the tester TRS-E cable match the selected gear position? | Yes Concern is not in the digital TR sensor. Go to C7 No INSTALL a new digital TR sensor and ADJUST. REFER to Digital Transmission Range (TR) Sensor in this section. CLEAR DTCs and RETURN OBD Tests. |
| C7 | CHECK PCM HARNESS CIRCUITS FOR OPEN CIRCUITS | |
| | <ul style="list-style-type: none"> Key in OFF position. Disconnect the PCM C-Connector. Inspect for damage or pushed out pins, corrosion or loose wires. Disconnect the Digital TR Sensor <p>CAUTION: Do not pry the connector. This will damage the connector and result in a transmission concern.</p> <ul style="list-style-type: none"> Measure the resistance between TR pin 2 harness side and signal return PCM pin C16 harness side. | Yes Go to C8 No REPAIR the circuits. TEST the system for normal operation. |

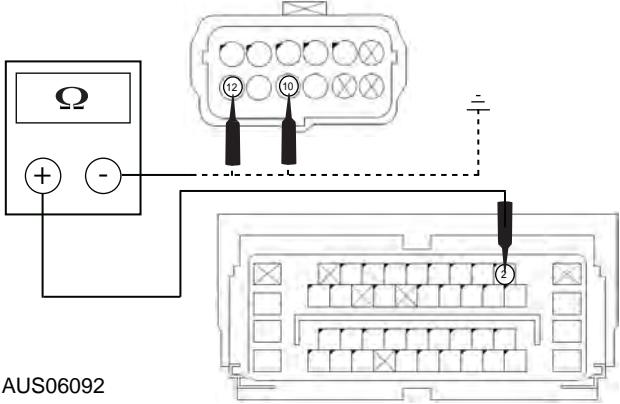
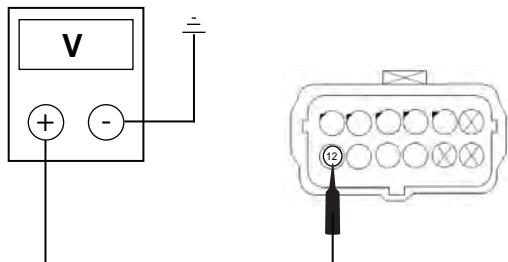
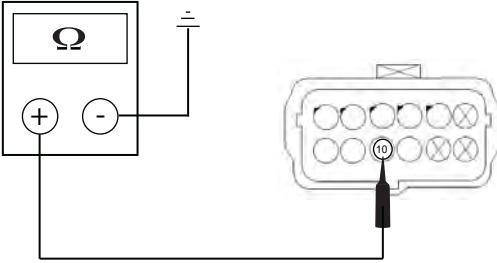


DIAGNOSIS AND TESTING (Continued)

| Test Step | Result / Action to Take |
|--|-------------------------|
| <ul style="list-style-type: none"> Measure the resistance between PCM pin C7 and TR pin 4 harness side. Measure the resistance between PCM pin C8 and TR pin 5 harness side. Measure the resistance between PCM pin C17 and TR pin 6 harness side. Measure the resistance between PCM pin C15 and TR pin 3 harness side. <p>AUS06089</p>  <ul style="list-style-type: none"> With the vehicle in P/N measure the resistance between TR pins 10 and 12 (< 5 Ohms) <p>AUS06090</p>  <ul style="list-style-type: none"> Measure the resistance from TR pin 10 to PCM pin A2. <p>AUS06091</p>  <ul style="list-style-type: none"> Are the resistances less than 5 ohms? | |

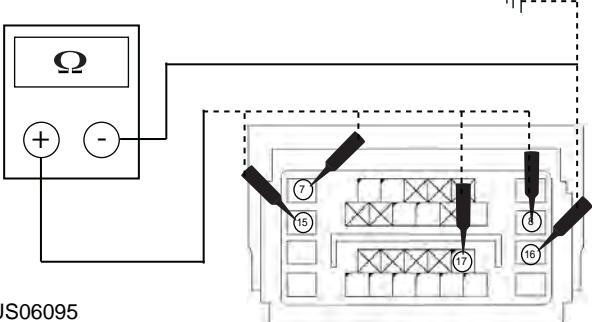
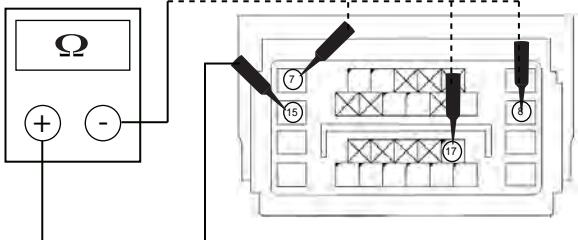
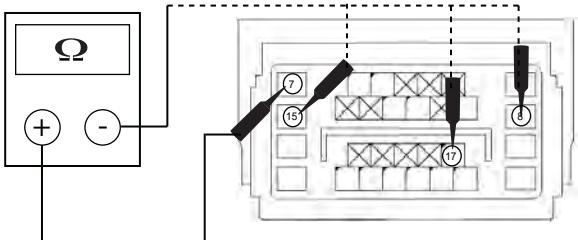


DIAGNOSIS AND TESTING (Continued)

| Test Step | | Result / Action to Take |
|------------------|--|--------------------------------|
| C8 | CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER | |
| | <ul style="list-style-type: none"> Measure the resistance between PCM pin A2 and TR pins 10 and 12 harness side and ground.  <p>AUS06092</p> <ul style="list-style-type: none"> With the ignition in the ON position, measure the voltage at TR pin 12 (>10V)  <p>AUS06093</p> <ul style="list-style-type: none"> Measure the resistance from TR pin 10 to ground (>10,000 ohms)  <p>AUS06094</p> <ul style="list-style-type: none"> Measure the resistance between pin C8 harness side and ground; and pin C16 harness side and ground. Measure the resistance between pin C17 harness side and ground; and pin C16 harness side and ground. Measure the resistance between pin C15 harness side and ground; and pin C16 harness side and ground. | |

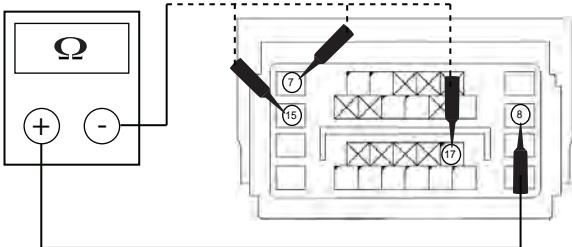
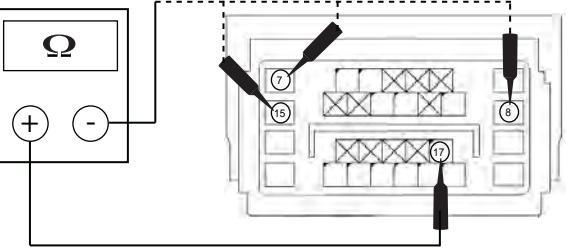


DIAGNOSIS AND TESTING (Continued)

| Test Step | | Result / Action to Take |
|------------------|---|---|
| |  <p>AUS06095</p> <ul style="list-style-type: none"> • Are the resistances greater than 10,000 ohms? | |
| C9 | CHECK FOR SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS | |
| | <ul style="list-style-type: none"> • Measure the resistance between pin C15 harness side; and between pin C7, pin C8 and pin C17 harness side.  <p>AUS06096</p> <ul style="list-style-type: none"> • Measure the resistance between pin C7 harness side; and between pin C15, pin C8 and pin C17 harness side.  <p>AUS06097</p> <ul style="list-style-type: none"> • Measure the resistance between pin C8 harness side; and between pin C7, pin C15, pin C17 harness side. | <p>Yes INSTALL a new PCM. TEST the system for normal operation.</p> <p>No REPAIR the circuit. TEST the system for normal operation.</p> |



DIAGNOSIS AND TESTING (Continued)

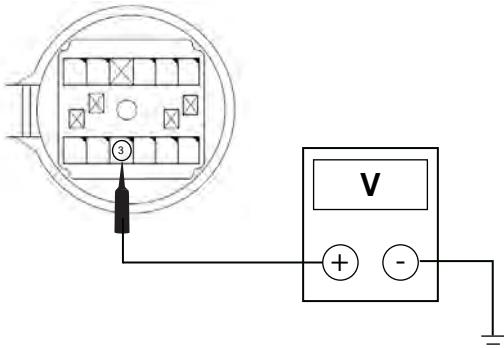
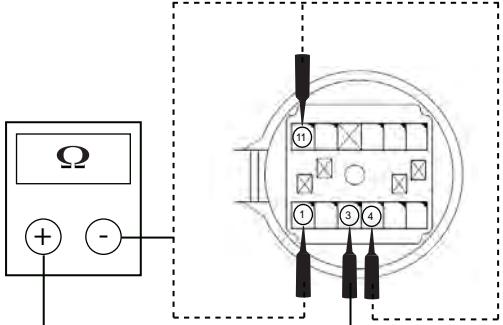
| | Test Step | Result / Action to Take |
|-----|--|--|
| |  <p>AUS06098</p> <ul style="list-style-type: none"> Measure the resistance between pin C17 harness side; and between pin C7, pin C8 and pin C15 harness side.  <p>AUS06099</p> <ul style="list-style-type: none"> Are the resistances greater than 10,000 ohms? | |
| C10 | CHECK THE NON-PCM INTERNAL CIRCUITS OR SENSOR | |
| | <ul style="list-style-type: none"> Connect the TRS-E Cable to Transmission Connect the TRS-E Cable to Digital TR Sensor Place the Digital TR Overlay onto Transmission Tester. Carry out Switch Test as instructed on the digital TR Overlay. Does the status lamp on the tester indicate RED for the correct gear position? | Yes Concern is not in the digital TR sensor. For backup lamp concerns, REFER to section 417-01. No INSTALL a new digital TTR sensor and ADJUST; REFER to Digital Transmission Range (TR) Sensor in this section. CLEAR DTCs and RERUN KOER Tests. |



DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST D: PRESSURE CONTROL (PC) SOLENOIDS (PCA, PCB, PCC)**

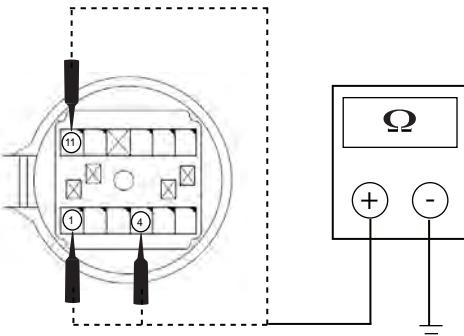
NOTE: Refer to the Transmission Vehicle Harness Connector illustration preceding these pinpoint tests.

NOTE: Read and record all DTCs. All digital TR sensor and VSS DTCs must be repaired before entering output state control (OSC).

| | Test Step | Result / Action to Take |
|-----------|---|--|
| D1 | CHECK FOR BATTERY VOLTAGE | |
| | <ul style="list-style-type: none"> Disconnect the Transmission Harness Connector. Visually inspect the wires and connectors for damage. Key in ON position. Measure the voltage between pin 3 harness side and ground.  <p>AUS06100</p> <ul style="list-style-type: none"> Is the voltage greater than 10 volts? | Yes Go to D2 No REPAIR the circuit. TEST the system for normal operation. |
| D2 | CHECK SOLENOID RESISTANCE AT SOLENOID | |
| | <ul style="list-style-type: none"> Measure and record the resistance between PC solenoid pin 3 and pins 1, 4 and 11. Resistance should be between 3.3 and 7.5 ohms.  <p>AUS06101</p> <ul style="list-style-type: none"> Is the resistance within specification? | Yes Go to D3 No INSTALL a new solenoid body assembly. |
| D3 | CHECK SOLENOID FOR SHORT TO GROUND | |
| | <ul style="list-style-type: none"> Measure and record the resistance between the PC solenoid pins 1, 4, 11 and ground solenoid side. | Yes INSTALL a new solenoid body assembly. TEST the system for normal operation. No REFER to Diagnosis By Symptom in this section for diagnosis of pressure concerns. TEST the system for normal operation. |



DIAGNOSIS AND TESTING (Continued)

| | Test Step | Result / Action to Take |
|--|--|--------------------------------|
| |  <p>AUS06102</p> <ul style="list-style-type: none"> • Is the resistance less than 10,000 ohms? | |

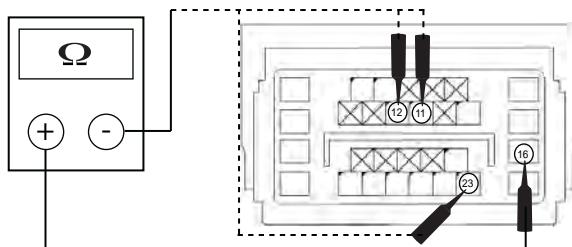
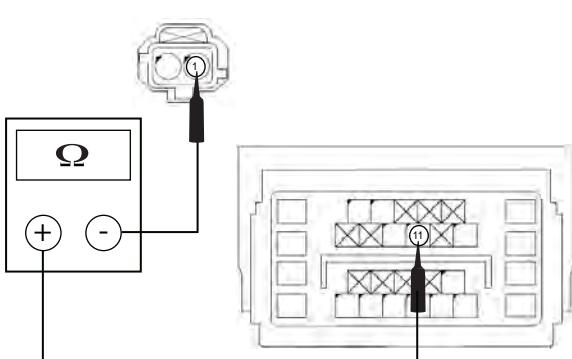
PINPOINT TEST E: TURBINE SHAFT SPEED (TSS), INTERMEDIATE SHAFT SPEED AND OUTPUT SHAFT SPEED (OSS) SENSORS

NOTE: Refer to the Turbine Shaft Speed (TSS), Intermediate Shaft Speed and Output Shaft Speed (OSS) Sensor Connector illustrations preceding these pinpoint tests.

| | Test Step | Result / Action to Take |
|-----------|--|--|
| E1 | ELECTRONIC DIAGNOSTICS | |
| | <ul style="list-style-type: none"> • Check to make sure the transmission harness connectors are fully seated, terminals are fully engaged in connector and in good condition before proceeding. • Connect the IDS tool. • Key in ON position. • Enter the following diagnostic mode on the scan tool: Diagnostic Data Link. DataLogger PCM. • Enter the following diagnostic mode on the scan tool: PCM. • Select PID/Data Monitor and Record. • Select the following PIDs: TSS, intermediate shaft speed or OSS. • Does the vehicle enter PID/Data Monitor and Record? | Yes REMAIN in PID/Data. Go to E2. No REPEAT procedure to ENTER PID. If vehicle did not enter PID, REFER to the PCM EOBD section of this chapter for diagnosis of PCM or VCM |
| E2 | DRIVE CYCLE TEST | |
| | <ul style="list-style-type: none"> • While monitoring the appropriate sensor PID, drive the vehicle so that the transmission upshifts and downshifts through all gears. • Does the TSS, intermediate shaft speed or OSS PID increase and decrease with engine speed and vehicle speed? | Yes Go to E3. No If the TSS, intermediate shaft speed or OSS PID does not increase or decrease with engine and vehicle speed, INSPECT for open or short in vehicle harness, sensor, a PCM concern or internal hardware concern. Go to E4. |

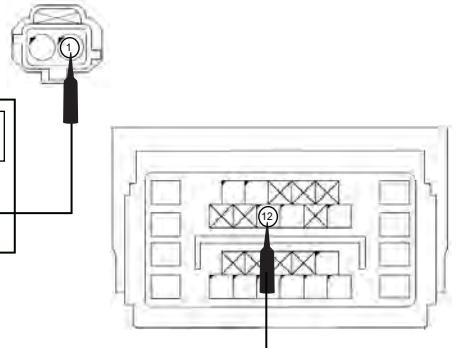
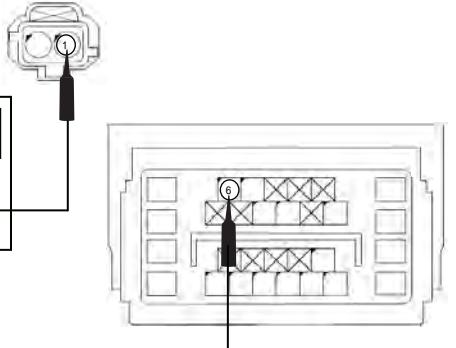
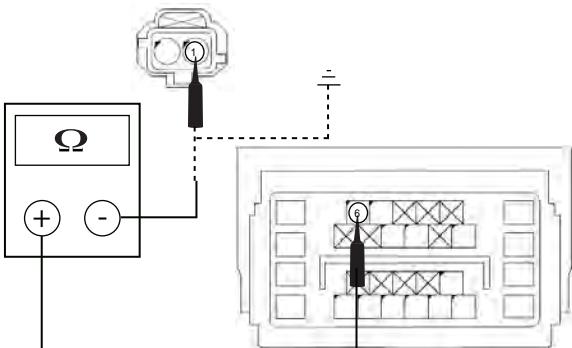


DIAGNOSIS AND TESTING (Continued)

| | Test Step | Result / Action to Take |
|----|--|--|
| E3 | DRIVE CYCLE TEST ERRATIC | <p>• While monitoring the appropriate sensor PID, drive the vehicle so that the transmission upshifts and downshifts through all gears.</p> <p>• Is the TSS, transmission shaft speed or OSS PID signal erratic (drop to zero or near zero and return to normal operation)?</p> |
| E4 | CHECK PCM HARNESS CIRCUITS FOR OPEN CIRCUITS | <p>• Key in OFF position.</p> <p>• Disconnect the PCM C Plug 122 Pin.</p> <p>• Inspect for damage or pushed out pins, corrosion or loose wires.</p> <p>• For OSS, measure the resistance between pin C23 and the appropriate sensor connector pin C16 harness side.</p> <p>• For intermediate shaft speed, measure the resistance between pin C11 and the appropriate sensor connector pin C16 harness side.</p> <p>• For TSS, measure the resistance between pin C12 and the appropriate sensor connector pin C16 harness side.</p> |
| |  <p>AUS06103</p> <ul style="list-style-type: none"> For intermediate shaft speed, measure the resistance between pin C11 and the appropriate sensor connector pin 1 harness side.  <p>AUS06104</p> <ul style="list-style-type: none"> For TSS, measure the resistance between pin C12 and the appropriate sensor connector pin 1 harness side. | <p>Yes If the sensor signal is erratic, INSPECT for intermittent concern in the harness, sensor or connector. Go to E4.</p> <p>No CLEAR all DTCs. RERUN KOER.</p> <p>Yes Go to E5.</p> <p>No REPAIR the circuit. TEST the system for normal operation.</p> |

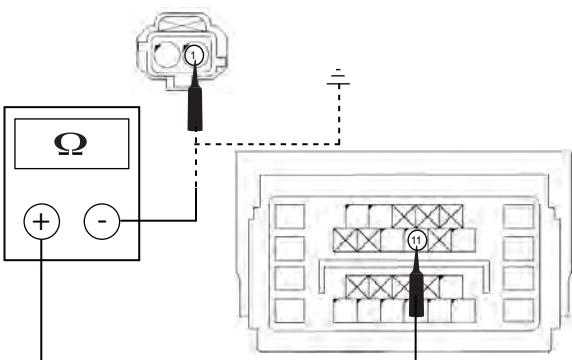
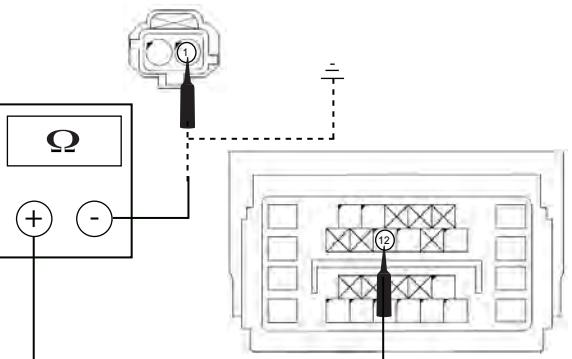
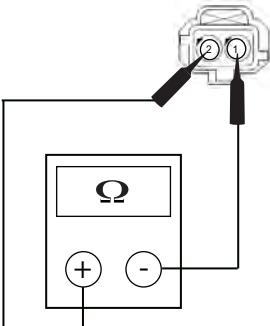


DIAGNOSIS AND TESTING (Continued)

| | Test Step | Result / Action to Take |
|-----------|---|--|
| |  <p>AUS06105</p> <ul style="list-style-type: none"> For OSS, measure the resistance between pin C6 and the appropriate sensor connector pin1 harness side.  <p>AUS06106</p> <ul style="list-style-type: none"> Are all resistances less than 5 ohms? | |
| E5 | CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND | |
| | <ul style="list-style-type: none"> For OSS, measure the resistance between pin C6 and sensor connector pin 1 harness side and ground.  <p>AUS06109</p> <ul style="list-style-type: none"> For intermediate shaft speed, measure the resistance between PCM pin C11 and sensor connector pin 1 harness side and ground. | <p>Yes Go to E6.</p> <p>No REPAIR the circuits. TEST the system for normal operation. CLEAR DTCs. RERUN OBD Tests.</p> |



DIAGNOSIS AND TESTING (Continued)

| | Test Step | Result / Action to Take |
|-----------|--|--|
| |  <p>AUS06110</p> <ul style="list-style-type: none"> For TSS, measure the resistance between PCM pin C12 and sensor connector pin 1 harness side and ground.  <p>AUS06111</p> <ul style="list-style-type: none"> Are the resistances greater than 10,000 ohms? | |
| E6 | CHECK RESISTANCE OF TSS, INTERMEDIATE SHAFT SPEED OR OSS SENSOR | |
| | <ul style="list-style-type: none"> Disconnect the appropriate vehicle harness connector from the TSS, intermediate shaft speed or OSS sensor. Connect the ohmmeter negative lead to one pin of the sensor and the positive lead to the other pin on the sensor.  <p>AUS06107</p> <ul style="list-style-type: none"> Record the resistance. Resistance should be as follows: | <p>Yes Go to E7.</p> <p>No INSTALL a new sensor.</p> |



DIAGNOSIS AND TESTING (Continued)

| | Test Step | Result / Action to Take | | | | | | | | |
|--------------------------|---|---|--------------------|-----------|-------------|-----------|-------------|-----------|---------------|--|
| | <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Resistance (ohms)</th> <th>Temperature</th> </tr> <tr> <td>266 - 390</td> <td>-20°C (4°F)</td> </tr> <tr> <td>325 - 485</td> <td>21°C (70°F)</td> </tr> <tr> <td>492 - 738</td> <td>150°C (302°F)</td> </tr> </table> <ul style="list-style-type: none"> • Is the resistance within specification for the appropriate sensor? | Resistance (ohms) | Temperature | 266 - 390 | -20°C (4°F) | 325 - 485 | 21°C (70°F) | 492 - 738 | 150°C (302°F) | |
| Resistance (ohms) | Temperature | | | | | | | | | |
| 266 - 390 | -20°C (4°F) | | | | | | | | | |
| 325 - 485 | 21°C (70°F) | | | | | | | | | |
| 492 - 738 | 150°C (302°F) | | | | | | | | | |
| E7 | CHECK SENSORS FOR SHORT TO GROUND | | | | | | | | | |
| | <ul style="list-style-type: none"> • Measure the resistance between pin 1 and 2 of each sensor and ground. <p>AUS06108</p> <ul style="list-style-type: none"> • Is the resistance less than 10,000 ohms? | <p>Yes INSTALL a new sensor.</p> <p>No REFER to Diagnosis By Symptom for diagnosis of shift or torque converter concerns in this section.</p> | | | | | | | | |

PINPOINT TEST F: SOLENOID MECHANICAL FAILURE

NOTE: Repair all other DTCs before repairing the following DTCs: P1714, P1715, P1716, P1717 and P1740.

| | Test Step | Result / Action to Take |
|-----------|--|--|
| F1 | ELECTRONIC DIAGNOSIS | |
| | <ul style="list-style-type: none"> • Connect the IDS tool. • Select PARK. • Key in ON position. • Carry out Key ON Engine OFF (KOEO) test until continuous DTCs have been displayed. • If any of the following DTCs are present, continue with this test: P1714, P1715, P1716, P1717 and P1740. • Are other DTCs present for TFT or shift solenoids? | <p>Yes REPAIR the DTCs for TFT or shift solenoids first. CLEAR DTCs and CARRY OUT Transmission Drive Cycle Test. RERUN Quick Test.</p> <p>No INSTALL a new solenoid and/or body. REFER to the Diagnostic Trouble Code (DTC) Charts for code description. Go to F2.</p> |
| F2 | TRANSMISSION DRIVE CYCLE TEST | |
| | <ul style="list-style-type: none"> • Carry out transmission drive cycle test. Refer to transmission drive cycle test in this section. • Does the vehicle upshift and downshift OK? | <p>Yes Go to F3.</p> <p>No REFER to Diagnosis By Symptom in this section to diagnose shift concerns.</p> |



DIAGNOSIS AND TESTING (Continued)

| | Test Step | Result / Action to Take |
|-----------|--|---|
| F3 | RETRIEVE DTCs | |
| | <ul style="list-style-type: none">• Connect the IDS tool.• Select PARK.• Key in ON position.• Carry out KOEO test until continuous DTCs have been displayed.• Are DTCs P1714, P1715, P1716, P1717 and P1740 still present? | <p>Yes INSTALL a new PCM. ROAD TEST and RERUN Quick Test.</p> <p>No Testing complete. If a concern still exists, REFER to Diagnosis By Symptom in this section for concern diagnosis.</p> |



DIAGNOSIS AND TESTING

Transmission Fluid Cooler

Special Tool(s)

| | |
|---|---|
|  | Transmission Fluid Fill Tool 307-437 |
| ST2581-A | |

Material

| Item | Specification |
|--|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada) | MERCON® V |

Transmission Fluid Cooler Flow Test

⚠ CAUTION: Whenever a transmission has been disassembled to install new parts or a new or remanufactured transmission has been installed, a new transmission fluid cooler (either in-tank, auxiliary or oil-to-air [OTA]) if equipped, will need to be installed. Using a suitable torque converter/fluid cooler cleaner, clean and backflush the transmission fluid cooler tubes.

⚠ CAUTION: Use only clean automatic transmission fluid specified for this transmission. Do not use supplemental fluid additives, treatments or cleaning agents. The use of these materials may affect transmission operation and result in internal damage to the transmission.

⚠ CAUTION: When internal wear or damage has occurred in the transmission, metal particles, clutch plate material or band material may have been carried into the transmission fluid cooler. These contaminants are a major cause of recurring transmission concerns and must be removed from the system before the transmission is put back into use.

When evidence of transmission fluid contamination (such as metal particles, clutch plate material or band material) is found in the cooling system, the transmission fluid cooler flow test should be carried out.

If the transmission cooling system fails the transmission fluid cooler flow test, install a new transmission fluid cooler and flush out the fluid cooler lines. If installing a new transmission fluid cooler, use only factory approved components.

⚠ CAUTION: The transmission fluid must be at normal operating temperature 85°C - 93°C (185°F - 200°F) to make sure that the cooler bypass is open. The cooler bypass is located in the main control valve body. The transmission fluid at normal operating temperature will be hot.

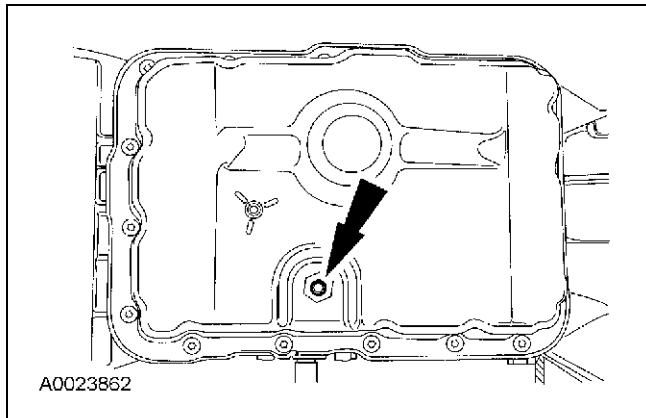
NOTE: The engine idle, transmission linkage/cable adjustment, fluid level and line pressure must be within specification before carrying out this test. Refer to Section 307-05 for adjustments. For information on engine idle diagnosis, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. For information on fluid level check, refer to Transmission Fluid Level Check in this section. For information on line pressure, refer to Special Testing Procedures in this section.

1. Place the transmission range selector lever into PARK.
2. Raise the vehicle on a hoist and place suitable safety stands under the vehicle. Refer to Section 100-02.

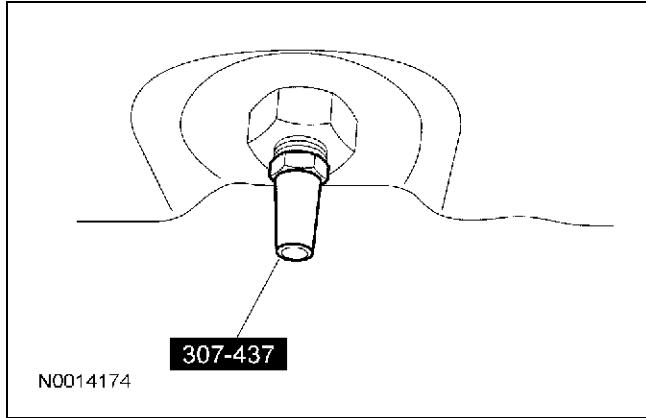


DIAGNOSIS AND TESTING (Continued)

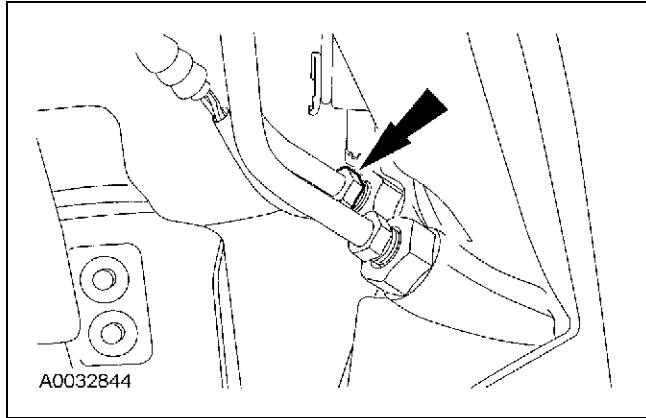
3. Hold the large drain plug with a wrench, and remove the small (center) fluid level indicating plug using a 3/16-inch Allen key.



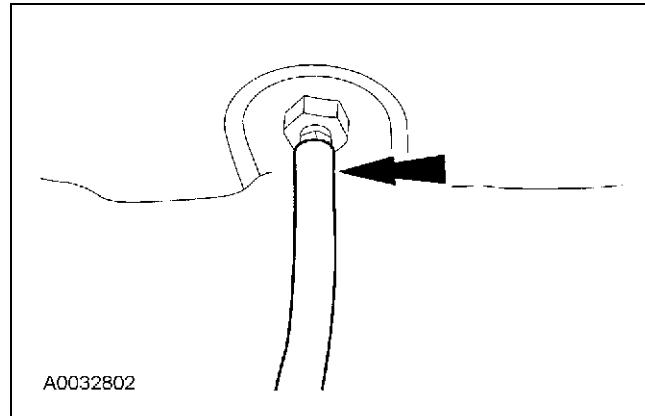
4. Install the special tool into the pan.



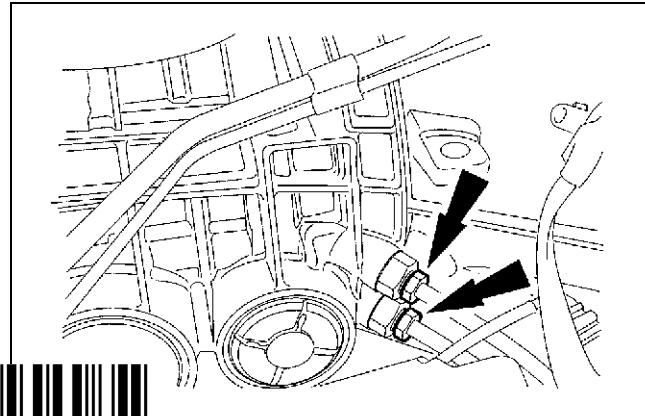
5. Remove the cooler return line (upper line) from the fitting on the transmission case.



6. Connect one end of a clear hose to the cooler return line and route the other end of the hose to the special tool in the pan.



7. Remove the safety stands and lower the vehicle.
8. Start the engine and run at idle.
9. With the engine running, raise the vehicle on a hoist and place suitable safety stands under the vehicle. Refer to Section 100-02.
10. Monitor the transmission fluid temperature to make sure that the transmission fluid is at normal operating temperature 85°C - 93°C (185°F - 200°F).
11. Once a steady flow of fluid (without air bubbles) is observed, remove the hose from the special tool and place the hose in a measuring container for 15 seconds. After 15 seconds, place the hose back onto the special tool. Lower the vehicle and turn the engine OFF. Measure the amount of fluid in the container. If adequate flow was observed, approximately 208 ml (7 oz) will be in the measuring container. The test is complete. Reconnect the cooler line and install the fluid fill plug.
12. If the flow is not liberal, disconnect the hose from the cooler return line and connect the hose to the cooler inlet (lower fitting) on the transmission case. Reconnect the cooler return line to the case (upper fitting).
 - Tighten to 40 Nm (30 lb-ft).



DIAGNOSIS AND TESTING (Continued)

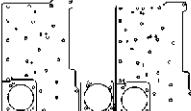
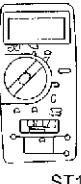
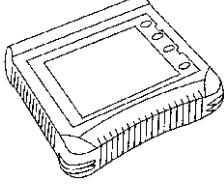
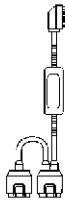
13. Repeat Steps 8 through 11. If flow is now approximately 208 ml (7 oz) in 15 seconds, the cooler lines and auxiliary cooler must be cleaned. Refer to Transmission Fluid Cooler Backflushing and Cleaning in this section. Carry out this entire test after the backflushing and cleaning procedure. If, after carrying out the backflushing and cleaning procedure, the flow is still not adequate, new cooler lines and/or an auxiliary cooler must be installed. If the flow from the case is still not adequate after the installation of new cooler lines and/or an auxiliary cooler (208 ml [7 oz] in 15 seconds), the pump and/or torque converter may be at fault. Carry out the appropriate procedures for diagnosis and repair in this section.



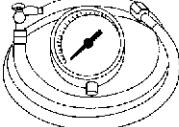
DIAGNOSIS AND TESTING

Diagnosis By Symptom

Special Tool(s)

| | |
|---|--|
|  | Air Test Plate, Transmission 307-433-01, 307-433-02, 307-433-03 |
|  | 73 III Automotive Meter 105-R0057 or equivalent |
|  | Trans Tester TR/MLP Overlay and Manual 007-00131 or equivalent |
|  | Worldwide Diagnostic System (WDS) Vehicle Communication module (VCM) with appropriate adapters, or equivalent diagnostic tool |
|  | MLP-TR Cable 418-F107 (007-00111) or equivalent |

Special Tool(s)

| | |
|--|---|
|  | Transmission Tester 307-F016 (007-00130) or equivalent |
|  | Pressure Gauge, Transmission Fluid 307-004 (T57L-77820-A) |

The Diagnosis by Symptom Index gives the technician diagnostic information and direction, and suggests possible components, using a symptom as a starting point.

Diagnosis by Symptom Index — Directions

1. Using the Symptom Index, select the Concern/Symptom that best describes the condition.
2. Refer to the routine indicated in the Diagnosis by Symptom Index.
3. Always begin diagnosis of a symptom with:
 - 1 Preliminary inspections.
 - 2 Verifications of condition.
 - 3 Checking the fluid levels.
 - 4 Carrying out other test procedures as directed.

(Continued)



DIAGNOSIS AND TESTING (Continued)

4. **NOTE:** Not all concerns and conditions with electrical components will set a diagnostic trouble code (DTC). Be aware that the components listed may still be the cause.

NOTE: When the battery is disconnected or a new battery is installed, certain transmission operating parameters can be lost. The powertrain control module (PCM) must relearn these parameters. During this learning process, you may experience slightly firm shifts, delayed or early shifts. This operation is considered normal and will not affect the function of the transmission. Normal operation will return once these parameters are stored by the PCM.

Begin with the ROUTINE, if indicated. Follow the reference or action statements. Always carry out the on-board diagnostic tests as necessary. Never skip steps. Repair as necessary.

Diagnosis by Symptom Index

Diagnosis by Symptom Index

| 5R55S | Routines |
|--|----------|
| Engagement Concerns: | |
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| • No Forward Only (All Positions) | 201B |
| • No Reverse Only | 202 |
| • Harsh Reverse Only | 203 |
| • Harsh Forward Only | 204A |
| • Harsh Manual 1st Gear Only | 204B |
| • Delayed/Soft Reverse Only | 205 |
| • Delayed/Soft Forward Only | 206 |
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| • Harsh Forward and Harsh Reverse | 208 |
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| Shift Concerns: | |
| • Some/All Shifts Missing (Automatic Mode Only) | 210 |
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DIAGNOSIS AND TESTING (Continued)**Diagnosis by Symptom Index (Continued)**

| 5R55S | Routines |
|--|-----------------|
| • No First Gear in Manual 1st | 216 |
| • No Manual 2nd Gear | 217 |
| Torque Converter Clutch Operation Concerns: | |
| • Does Not Apply | 240 |
| • Always Applied/Stalls Vehicle | 241 |
| • Cycling/Shudder/Chatter | 242 |
| Other Concerns: | |
| • Shift Lever Efforts High | 251 |
| • External Leaks | 252 |
| • Noise/Vibration — Forward or Reverse | 254 |
| • Engine Will Not Crank | 255 |
| • No Park Range | 256 |
| • Transmission Overheating | 257 |
| • No Engine Braking in Manual 2nd Position | 258 |
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| • Fluid Venting or Foaming | 261 |
| • Vehicle Movement with Gear Selector in "N" | 262 |
| • Slips/Chatters in Manual 1st Gear | 263 |
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| • No Engine Braking in Manual 3rd Position | 280 |
| • No Engine Braking in Manual 4th (D Performance) Position | 281 |
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| • Engine Braking in ALL Gears | 283 |
| • No 2nd and 5th Gears (Manual 2nd is OK) | 284 |
| • No 3rd, 4th and 5th gears | 285 |

Diagnostic Routines**Engagement Concern: No Forward in D or D (Performance) Only**

| Possible Component | Reference/Action |
|---|--|
| 201A — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, pressure control solenoid B | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test D. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Main Control <ul style="list-style-type: none"> • Screw not tightened to specification | <ul style="list-style-type: none"> • Tighten to specification. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: No Forward in D or D (Performance) Only (Continued)**

| Possible Component | Reference/Action |
|--|---|
| <ul style="list-style-type: none"> • Separator plate damaged • Contamination • Valves, springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Center Support | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Forward Planetary Assembly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |
| Low One-Way Clutch | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |

Engagement Concern: No Forward

| Possible Component | Reference/Action |
|----------------------------------|--|
| 201B — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, pressure control solenoid B |
| | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test D. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid | <ul style="list-style-type: none"> • Incorrect level • Condition |
| | <ul style="list-style-type: none"> • Adjust fluid to the correct level. Refer to Transmission Fluid Level Check in this section. • Carry out the fluid condition check. Refer to Preliminary Inspection in this section. |
| Main Control | <ul style="list-style-type: none"> • Screw not tightened to specification |
| | <ul style="list-style-type: none"> • Tighten to specification. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: No Forward (Continued)**

| Possible Component | Reference/Action |
|---|---|
| <ul style="list-style-type: none"> • Separator plate damaged • Contamination • Valves, springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Forward Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Case | |
| <ul style="list-style-type: none"> • Damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |

Engagement Concern: No Reverse

| Possible Component | Reference/Action |
|----------------------------------|---|
| 202 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, Pressure Control Solenoid C (PC C), Shift Solenoid B (SSB) |
| Main Control | <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: No Reverse (Continued)**

| Possible Component | Reference/Action |
|--|---|
| <ul style="list-style-type: none"> Valves, springs damaged, misassembled, missing, stuck or bore damage Filter damaged, missing | <ul style="list-style-type: none"> If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Direct Clutch Assembly | |
| <ul style="list-style-type: none"> Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged | <ul style="list-style-type: none"> Inspect or damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Reverse Servo | |
| <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Reverse Band | |
| <ul style="list-style-type: none"> Band damaged Servo worn or damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Reverse Drum Assembly | |
| <ul style="list-style-type: none"> One-way clutch damaged Bearing damaged | <ul style="list-style-type: none"> Inspect for damage. Install a new drum assembly. Inspect for damage. Install a new drum assembly. |
| Torque Converter Assembly | |
| <ul style="list-style-type: none"> Torque converter internal failure preventing engagement, piston release | <ul style="list-style-type: none"> Remove the transmission. Inspect for damage. Refer to Torque Converter in this section. If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter. |

Engagement Concern: Harsh Reverse ONLY

| Possible Component | Reference/Action |
|---|--|
| 203 — ROUTINE | |
| Powertrain Control System | |
| <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, pressure control solenoid C (PC C) | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | |
| <ul style="list-style-type: none"> High pressures | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | |
| <ul style="list-style-type: none"> Screws not tightened to specification | <ul style="list-style-type: none"> Tighten to specification. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: Harsh Reverse ONLY (Continued)**

| Possible Component | Reference/Action |
|---|---|
| <ul style="list-style-type: none"> • Separator plate damaged • Contamination • Valves, spring damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Direct Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing not seating, off location • Friction elements damaged or worn • Return springs damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Reverse Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Reverse Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Reverse Drum Assembly | |
| <ul style="list-style-type: none"> • One-way clutch damaged • Bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Install a new drum assembly. • Inspect for damage. Install a new drum assembly. |

Engagement Concern: Harsh Forward ONLY

| Possible Component | Reference/Action |
|----------------------------------|---|
| 204A — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, pressure control solenoid A (PC A), pressure control solenoid C (PC C) • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test D. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: Harsh Forward ONLY (Continued)**

| Possible Component | Reference/Action |
|--|--|
| Incorrect Pressures <ul style="list-style-type: none"> • High pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valves, springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Center Support <ul style="list-style-type: none"> • Screw not tightened to specification • Seal rings or bearing damage • Outside diameter of case bore damage • Support damaged or leaking | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Engagement Concern: Harsh Manual 1st Gear ONLY

| Possible Component | Reference/Action |
|--|---|
| 204B — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, pressure control solenoid B (PC B), Turbine Shaft Speed (TSS) sensor | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. For additional information, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test D and GO to Pinpoint Test E. • Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: Delayed or Soft Reverse ONLY**

| Possible Component | Reference/Action |
|----------------------------------|--|
| 205 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, pressure control solenoid C (PC C) |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. For additional information, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect pressures | <ul style="list-style-type: none"> Low pressure |
| | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valves, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing |
| | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Direct Clutch Assembly | <ul style="list-style-type: none"> Seals, piston damaged Check ball damaged, missing not seating, off location Friction elements damaged or worn Return springs damaged |
| | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Reverse Servo | <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged |
| | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Reverse Band | <ul style="list-style-type: none"> Band damaged Servo worn or damaged |
| | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |

Engagement Concern: Delayed/Soft Forward ONLY

| Possible Component | Reference/Action |
|----------------------------------|---|
| 206 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, pressure control solenoid B (PC B) |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: Delayed/Soft Forward ONLY (Continued)**

| Possible Component | Reference/Action |
|---|--|
| | <ul style="list-style-type: none"> • GO to Pinpoint Test D. • Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures <ul style="list-style-type: none"> • Low pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valves, spring damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Overdrive Servo <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Band <ul style="list-style-type: none"> • Band damaged. • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Center Support <ul style="list-style-type: none"> • Screw not tightened to specification • Seal rings or bearing damaged • Outside diameter of case bore damaged • Support damaged or leaking | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction element damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Engagement Concern: No Forward and No Reverse

| Possible Component | Reference/Action |
|----------------------------------|------------------|
| 207 — ROUTINE | |
| Powertrain Control System | |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: No Forward and No Reverse (Continued)**

| Possible Component | Reference/Action |
|---|---|
| <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, pressure control solenoid B (PC B) | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid <ul style="list-style-type: none"> Incorrect level Condition | <ul style="list-style-type: none"> Adjust to the correct level. Refer to Transmission Fluid Level Check in this section. Carry out Fluid Condition Check. Refer to Preliminary Inspection in this section. |
| Shift Cable/Digital TR Sensor <ul style="list-style-type: none"> Cable system or digital transmission range (TR) sensor damaged, misaligned | <ul style="list-style-type: none"> Inspect and repair as necessary. Refer to Transmission Range (TR) Sensor Adjustment in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten screws to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Input Shaft <ul style="list-style-type: none"> Damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |
| Fluid Pump Assembly <ul style="list-style-type: none"> Screws not tightened to specification Gasket damaged Porosity, cross leaks, ball missing, plugged hole Pump gears cracked and/or seized Flow control valves, springs, or seals damaged, stuck or not assembled correctly | <ul style="list-style-type: none"> Tighten screws to specification. Inspect for damage. If damaged, install a new gasket. Inspect for damage. If damaged, repair as necessary. Inspect for damage. Install a new pump. Inspect for damage. Install a new seal or flow control valve. |
| Overdrive Planetary Assembly <ul style="list-style-type: none"> Planetary damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |
| Center Shaft Assembly <ul style="list-style-type: none"> Damaged. One-way clutch damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly <ul style="list-style-type: none"> Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: No Forward and No Reverse (Continued)**

| Possible Component | Reference/Action |
|--|---|
| • Bronze seal ring or bearing damaged | • Inspect for damage. Repair as necessary. |
| Forward Planetary Assembly | |
| • Planetary damaged | • Inspect for damage. Repair as necessary. |
| Reverse Planetary Assembly | |
| • Planetary damaged | • Inspect for damage. Repair as necessary. |
| Output Shaft | |
| • Damage | • Inspect for damage. Repair as necessary. |
| Torque Converter | |
| • Damaged flexplate or adapter plate | • Remove the transmission. Inspect for damage. Refer to Torque Converter in this section. If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter. |
| • Damaged impeller hub | |
| • Damaged turbine hub | |
| Direct One-Way Clutch | |
| • Worn, damaged or assembled incorrectly | • Inspect for damage. Repair as necessary. |

Engagement Concern: Harsh Forward and Harsh Reverse

| Possible Component | Reference/Action |
|----------------------------------|---|
| 208 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, digital TR sensor, transmission fluid temperature (TFT) sensor <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test B and GO to Pinpoint Test C. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid | <ul style="list-style-type: none"> Incorrect level Condition <ul style="list-style-type: none"> Adjust to the correct level. For additional information, refer to Transmission Fluid Level Check in this section. Carry out Fluid Condition Check. For additional information, refer to Preliminary Inspection. |
| Incorrect Pressures | <ul style="list-style-type: none"> High pressures <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test, refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: Harsh Forward and Harsh Reverse (Continued)**

| Possible Component | Reference/Action |
|--|---|
| <ul style="list-style-type: none"> Valves, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Forward Clutch Assembly <ul style="list-style-type: none"> Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |

Engagement Concern: Delayed Forward and Delayed Reverse

| Possible Component | Reference/Action |
|----------------------------------|--|
| 209 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, TFT sensor |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test B. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid | <ul style="list-style-type: none"> Incorrect level Condition |
| | <ul style="list-style-type: none"> Adjust to the correct level. For additional information, refer to Transmission Fluid Level Check in this section. Carry out Fluid Condition Check. For additional information, refer to Preliminary Inspection. |
| Incorrect Pressures | <ul style="list-style-type: none"> High pressures |
| | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test, refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valves and springs damaged, misassembled, missing, stuck or bore damaged |
| | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: Delayed Forward and Delayed Reverse (Continued)**

| Possible Component | Reference/Action |
|---|---|
| <ul style="list-style-type: none"> • Filter damaged, missing | <ul style="list-style-type: none"> • Inspect for damage, repair as necessary. |
| Fluid Pump Assembly <ul style="list-style-type: none"> • Screws not tightened to specification • Gasket damaged • Porosity, cross leaks, ball missing, plugged hole • Pump gears cracked and/or seized • Flow control valves, springs, or seals damaged, stuck or not assembled correctly | <ul style="list-style-type: none"> • Tighten screws to specification. • Inspect for damage. If damaged, install a new gasket. • Inspect for damage. If damaged, repair as necessary. • Inspect for damage. Install a new pump. • Inspect for damage. Install a new seal or flow control valve. |

Shift Concern: Some/All Shifts Missing (Automatic Mode Only)

| Possible Component | Reference/Action |
|--------------------------------------|---|
| 210 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoids A, B, C, torque converter clutch (TCC) solenoid, pressure control solenoids A, B, C, output shaft speed (OSS) sensor, digital TR sensor, intake air temperature (IAT) sensor, vehicle speed sensor (VSS) input |
| Some Shifts Missing ONLY | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM, IAT and VSS. • GO to Pinpoint Test A, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. • Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid | <ul style="list-style-type: none"> • If only some shifts are missing, determine which shift(s) is missing. • Refer to the following routine(s) for further No Shift concerns: <ul style="list-style-type: none"> — No 1-2 Shift, Routine 220 — No 2-3 Shift, Routine 221 — No 3-4 Shift, Routine 222 — No 4-5 Shift, Routine 270 — No 5-4 Shift, Routine 271 — No 4-3 Shift, Routine 223 — No 3-2 Shift, Routine 224 — No 2-1 Shift, Routine 225 |
| Shift Cable/Digital TR Sensor | <ul style="list-style-type: none"> • Adjust fluid to correct level, refer to Transmission Fluid Level Check in this section. • Carry out Fluid Condition Check. For additional information, refer to Preliminary Inspection in this section. |
| Incorrect Pressures | <ul style="list-style-type: none"> • Inspect and repair as necessary. For additional information, refer to Transmission Range (TR) Sensor Adjustment in this section. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Some/All Shifts Missing (Automatic Mode Only) (Continued)**

| Possible Component | Reference/Action |
|--|--|
| <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | |
| <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valve, springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Fluid Pump Assembly | |
| <ul style="list-style-type: none"> • Screws not tightened to specification • Gasket damaged • Porosity, cross leaks, ball missing, plugged hole • Pump gears cracked and/or seized • Flow control valves, springs, or seals damaged, stuck or not assembled correctly | <ul style="list-style-type: none"> • Tighten screws to specification. • Inspect for damage. If damaged, install a new gasket. • Inspect for damage. If damaged, repair as necessary. • Inspect for damage. Install a new pump. • Inspect for damage. Install a new seal or flow control valve. |
| Overdrive Planetary Assembly | |
| <ul style="list-style-type: none"> • Planetary damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |
| Center Support | |
| <ul style="list-style-type: none"> • Screw not tightened to specification • Seal rings or bearing damaged • Outside diameter of case bore damaged • Support damaged or leaking | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Direct Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Shift Concern: Timing Concerns—Early/Late

| Possible Component | Reference/Action |
|----------------------------------|------------------|
| 211—ROUTINE | |
| Powertrain Control System | |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Timing Concerns—Early/Late (Continued)**

| Possible Component | Reference/Action |
|--|--|
| <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, OSS sensor, IAT sensor | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM and IAT. GO to Pinpoint Test E. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Some Shifts Early/Late ONLY | <ul style="list-style-type: none"> If only some shifts are early/late, determine which shift(s) is missing. Refer to the following routine(s) for further No Shift concerns: <ul style="list-style-type: none"> Soft/Slipping 1-2 Shift, Routine 226 Soft/Slipping 2-3 Shift, Routine 227 Soft/Slipping 3-4 Shift, Routine 228 Soft/Slipping 4-5 Shift, Routine 272 Soft/Slipping 5-6 Shift, Routine 273 Soft/Slipping 4-3 Shift, Routine 229 Soft/Slipping 3-2 Shift, Routine 230 Soft/Slipping 2-1 Shift, Routine 221 |
| Fluid <ul style="list-style-type: none"> Incorrect level Condition | <ul style="list-style-type: none"> Adjust to the correct level. Refer to Transmission Fluid Level Check in this section. Carry out Fluid Condition Check. Refer to Preliminary Inspection in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Overdrive Servo <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Overdrive Band <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Timing Concerns—Erratic/Hunting (Some/All)**

| Possible Component | Reference/Action |
|--|--|
| 212 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, OSS sensor, IAT sensor | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. For additional information, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM and IAT. GO to Pinpoint Test E. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid <ul style="list-style-type: none"> Incorrect level Condition | <ul style="list-style-type: none"> Adjust to the correct level. Refer to Transmission Fluid Level Check in this section. Carry out Fluid Condition Check. Refer to Preliminary Inspection in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Overdrive Servo <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Timing Concerns—Erratic/Hunting (Some/All) (Continued)**

| Possible Component | Reference/Action |
|---|---|
| Further Diagnosis <ul style="list-style-type: none"> For further diagnosis for timing issues, refer to Reference/Action | <ul style="list-style-type: none"> Refer to the following routine(s) for specific diagnosis: No 1-2 Shift, Routine 220 No 2-3 Shift, Routine 221 No 3-4 Shift, Routine 222 No 4-5 Shift, Routine 270 No 5-4 Shift, Routine 271 No 4-3 Shift, Routine 223 No 3-2 Shift, Routine 224 No 2-1 Shift, Routine 225 Soft/Slip 1-2 Shift, Routine 226 Soft/Slip 2-3 Shift, Routine 227 Soft/Slip 3-4 Shift, Routine 228 Soft/Slip 4-5 Shift, Routine 272 Soft/Slip 5-4 Shift, Routine 273 Soft/Slip 4-3 Shift, Routine 229 Soft/Slip 3-2 Shift, Routine 230 Soft/Slip 2-1 Shift, Routine 231 Harsh 1-2 Shift, Routine 232 Harsh 2-3 Shift, Routine 233 Harsh 3-4 Shift, Routine 234 Harsh 4-5 Shift, Routine 274 Harsh 5-4 Shift, Routine 275 Harsh 4-3 Shift, Routine 235 Harsh 3-2 Shift, Routine 236 Harsh 2-1 Shift, Routine 237 |

Engagement Concern: Feel—Soft/Slipping (Some/All)

| Possible Component | Reference/Action |
|---------------------------------------|---|
| 213 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoids A, B, C, pressure control solenoids A, B, C, D, intermediate shaft speed sensor, TFT sensor, IAT sensor, VSS input Carry out on-board diagnostic tests. For additional information, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM, IAT and VSS. GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test D and GO to Pinpoint Test E. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Some Shifts Soft/Slipping ONLY | <ul style="list-style-type: none"> If only some of the shifts are soft/slipping, determine which shift(s) is missing. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: Feel—Soft/Slipping (Some/All) (Continued)**

| Possible Component | Reference/Action |
|---|---|
| | <ul style="list-style-type: none"> Refer to the following routine(s) for further Soft/Slipping concerns: <ul style="list-style-type: none"> — Soft/Slipping 1-2 Shift, Routine 226 — Soft/Slipping 2-3 Shift, Routine 227 — Soft/Slipping 3-4 Shift, Routine 228 — Soft/Slipping 4-5 Shift, Routine 272 — Soft/Slipping 5-4 Shift, Routine 273 — Soft/Slipping 4-3 Shift, Routine 229 — Soft/Slipping 3-2 Shift, Routine 230 — Soft/Slipping 2-1 Shift, Routine 231 |
| Fluid <ul style="list-style-type: none"> • Incorrect level • Condition | <ul style="list-style-type: none"> • Adjust to the correct level. Refer to Transmission Fluid Level Check in this section. • Carry out Fluid Condition Check. Refer to Preliminary Inspection in this section. |
| Incorrect Pressures <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. • Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valves, springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Fluid Pump Assembly <ul style="list-style-type: none"> • Screws not tightened to specification • Gasket damaged • Porosity, cross leaks, ball missing, plugged hole • Pump gears cracked and/or seized • Flow control valves, springs, or seals damaged, stuck or not assembled correctly | <ul style="list-style-type: none"> • Tighten screws to specification. • Inspect for damage. If damaged, install a new gasket. • Inspect for damage. If damaged, repair as necessary. • Inspect for damage. Install a new pump. • Inspect for damage. Install a new seal or flow control valve. |
| Coast Clutch Assembly <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Center Support <ul style="list-style-type: none"> • Screw not tightened to specification | <ul style="list-style-type: none"> • Tighten to specification. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: Feel—Soft/Slipping (Some/All) (Continued)**

| Possible Component | Reference/Action |
|---|--|
| <ul style="list-style-type: none"> • Seal rings or bearings damaged • Outside diameter of case bore damage • Support damaged or leaking | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Direct Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Reverse Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Reverse Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Case | |
| <ul style="list-style-type: none"> • Damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |
| Torque Converter Assembly | |
| <ul style="list-style-type: none"> • Torque converter internal failure preventing engagement, piston release | <ul style="list-style-type: none"> • Remove the transmission. Inspect for damage. Refer to Torque Converter in this section. If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Feel—Harsh (Some/All)**

| Possible Component | Reference/Action |
|--|--|
| 214—ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoids A, B, C, pressure control solenoids A, B, C, D, intermediate shaft speed sensor, digital TR sensor, TFT sensor, IAT sensor, VSS input | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. For additional information, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM, IAT and VSS. GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test D and GO to Pinpoint Test E. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Some Shifts Harsh ONLY | <ul style="list-style-type: none"> If only some of the shifts are harsh, determine which shift(s) is missing. Refer to the following routine(s) for further No Shift concerns: <ul style="list-style-type: none"> — Harsh 1-2 Shift, Routine 232 — Harsh 2-3 Shift, Routine 233 — Harsh 3-4 Shift, Routine 234 — Harsh 4-5 Shift, Routine 274 — Harsh 5-4 Shift, Routine 275 — Harsh 4-3 Shift, Routine 235 — Harsh 3-2 Shift, Routine 236 — Harsh 2-1 Shift, Routine 237 |
| Fluid <ul style="list-style-type: none"> Incorrect level | <ul style="list-style-type: none"> Adjust to the correct level. Refer to Transmission Fluid Level Check in this section. |
| Incorrect Pressures <ul style="list-style-type: none"> High/low pressures | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test, refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valves, springs damaged, misassembled, missing, stuck, or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Input Shaft <ul style="list-style-type: none"> Damaged | <ul style="list-style-type: none"> Inspect for damage. Install new as necessary. |
| Overdrive Servo <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Feel—Harsh (Some/All) (Continued)**

| Possible Component | Reference/Action |
|--|--|
| Overdrive Band <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Center Shaft Assembly <ul style="list-style-type: none"> • Center shaft assembly damaged • One-way clutch damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Center Support <ul style="list-style-type: none"> • Screw not tightened to specification | <ul style="list-style-type: none"> • Tighten to specification. |
| Intermediate Servo <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Band <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Reverse Servo <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Reverse Band <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Output Shaft <ul style="list-style-type: none"> • Damaged | <ul style="list-style-type: none"> • Inspect for damage. Install new as necessary. |
| Case <ul style="list-style-type: none"> • Damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |

Shift Concern: No 1st and 2nd Gear in Drive, Engages in a Higher Gear

| Possible Component | Reference/Action |
|----------------------------------|------------------|
| 215 — ROUTINE | |
| Powertrain Control System | |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: No 1st and 2nd Gear in Drive, Engages in a Higher Gear (Continued)**

| Possible Component | Reference/Action |
|--|--|
| <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, Shift Solenoids A, B, C, digital TR sensor | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A and GO to Pinpoint Test C. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures <ul style="list-style-type: none"> High/low pressures | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Overdrive Servo <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Direct One-Way Clutch <ul style="list-style-type: none"> Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |
| Low One-Way Clutch <ul style="list-style-type: none"> Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |

Engagement Concern: No 1st Gear in Manual 1 When Selected

| Possible Component | Reference/Action |
|---|---|
| 216 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, Shift Solenoids A, B, Pressure Control Solenoids B, C | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A and GO to Pinpoint Test D. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures <ul style="list-style-type: none"> High/low pressures | <ul style="list-style-type: none"> Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification | <ul style="list-style-type: none"> Tighten to specification. |



DIAGNOSIS AND TESTING (Continued)**Engagement Concern: No 1st Gear in Manual 1 When Selected (Continued)**

| Possible Component | Reference/Action |
|--|---|
| <ul style="list-style-type: none"> • Separator plate damaged • Contamination • Valves, springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Overdrive Planetary Assembly | |
| <ul style="list-style-type: none"> • Planetary damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |
| Direct One-Way Clutch | |
| <ul style="list-style-type: none"> • Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |
| Low One-Way Clutch | |
| <ul style="list-style-type: none"> • Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |

Shift Concern: No 2nd Gear in Manual 2 When Selected

| Possible Component | Reference/Action |
|--|--|
| 217 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoids A, B, C, pressure control solenoid B |
| | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. For additional information, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A and GO to Pinpoint Test D. • Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> • High/low pressures |
| | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. • Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> • Screws not tightened to specification. • Separator plate damaged • Contamination • Valves, springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing |
| | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Overdrive Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: No 2nd Gear in Manual 2 When Selected (Continued)**

| Possible Component | Reference/Action |
|---|--|
| <ul style="list-style-type: none"> Seals (piston and cover) damaged Not adjusted correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Overdrive Band | |
| <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Direct One-Way Clutch | |
| <ul style="list-style-type: none"> Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |
| Low One-Way Clutch | |
| <ul style="list-style-type: none"> Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |

Torque Converter Operation Concerns: Does Not Apply

| Possible Component | Reference/Action |
|----------------------------------|--|
| 240 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, TCC solenoid, TFT sensor and engine coolant temperature (ECT) sensor |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. For additional information, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A and GO to Pinpoint Test B. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> High/low pressures |
| | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing |
| | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Fluid Pump Assembly | <ul style="list-style-type: none"> Screws not tightened to specification Gasket damaged Porosity, cross leaks, ball missing, plugged hole Pump gears cracked and/or seized |
| | <ul style="list-style-type: none"> Tighten screws to specification. Inspect for damage. If damaged, install a new gasket. Inspect for damage. If damaged, repair as necessary. Inspect for damage. Install a new pump. |



DIAGNOSIS AND TESTING (Continued)**Torque Converter Operation Concerns: Does Not Apply (Continued)**

| Possible Component | Reference/Action |
|--|---|
| <ul style="list-style-type: none"> Flow control valves, springs or seals damaged, stuck or not assembled correctly | <ul style="list-style-type: none"> Inspect for damage. Install a new seal or flow control valve. |
| Torque Converter Assembly <ul style="list-style-type: none"> Torque converter internal failure preventing engagement, piston application | <ul style="list-style-type: none"> Remove the transmission. Inspect for damage. Refer to Torque Converter in this section. If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter. |

Torque Converter Operation Concern: Always Applied/Stalls Vehicle

| Possible Component | Reference/Action |
|--|--|
| 241 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, TCC solenoid | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. For additional information, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Low One-Way Clutch <ul style="list-style-type: none"> Worn, damaged or assembled incorrectly. | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |
| Torque Converter Assembly <ul style="list-style-type: none"> Torque converter internal failure preventing engagement, piston release | <ul style="list-style-type: none"> Remove the transmission. Inspect for damage. Refer to Torque Converter in this section. If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter. |

Torque Converter Operation Concern: Cycling/Shudder/Chatter

| Possible Component | Reference/Action |
|----------------------------------|------------------|
| 242 — ROUTINE | |
| Powertrain Control System | |



DIAGNOSIS AND TESTING (Continued)**Torque Converter Operation Concern: Cycling/Shudder/Chatter (Continued)**

| Possible Component | Reference/Action |
|--|---|
| <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, TCC solenoid | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. For additional information, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid | |
| <ul style="list-style-type: none"> Condition—contaminated, degraded | <ul style="list-style-type: none"> Carry out Fluid Condition Check. Refer to Preliminary Inspection in this section. If contaminated, locate source of contamination. If burnt, inspect mechanical bands, clutches. Repair as necessary. Change fluid. Carry out drain and refill procedure. Refer to Transmission Fluid Drain and Refill — Without Torque Converter Drain Plug in this section. Carry out fluid cooler and torque converter cleaning procedure. For additional information, refer to Transmission Fluid Cooler Backflushing and Cleaning in this section. |
| Main Control | |
| <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Torque Converter Assembly | |
| <ul style="list-style-type: none"> Torque converter internal leakage, clutch material damaged | <ul style="list-style-type: none"> Remove the transmission. Inspect for damage. Refer to Torque Converter in this section. If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter. |

Other Concerns: Shift Lever Efforts High

| Possible Component | Reference/Action |
|--|--|
| 251 — ROUTINE | |
| Powertrain Control System | |
| <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, digital TR sensor | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test C. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Shift Cable, Digital TR sensor | |



DIAGNOSIS AND TESTING (Continued)**Other Concerns: Shift Lever Efforts High (Continued)**

| Possible Component | Reference/Action |
|---|--|
| <ul style="list-style-type: none"> Cable system or digital TR sensor damaged, misaligned | <ul style="list-style-type: none"> Inspect and repair as necessary. For additional information, refer to Transmission Range (TR) Sensor Adjustment in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Case <ul style="list-style-type: none"> Manual control lever assembly damage, manual valve inner lever pin bent, manual valve inner lever damaged, spring rod damaged Manual valve lever shaft retaining pin damaged | <ul style="list-style-type: none"> Inspect for damage. If damaged, install a new part. Inspect for damage. If damaged, repair as necessary. |

Other Concerns: External Leaks

| Possible Component | Reference/Action |
|--|---|
| 252 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> OSS sensor, intermediate shaft speed, TSS sensor, digital TR sensor | <ul style="list-style-type: none"> Inspect for leakage. If areas around sensor show signs of leakage, install a new sensor O-ring seal. If area behind digital TR sensor shows signs of a leak, a new manual lever shaft seal may need to be installed. |
| Fluid <ul style="list-style-type: none"> Incorrect level | <ul style="list-style-type: none"> Adjust to correct level. Refer to Transmission Fluid Level Check in this section. |
| Case <ul style="list-style-type: none"> Case vent damaged Output shaft flange damage | <ul style="list-style-type: none"> Inspect for damage. If damaged, repair as necessary. Inspect for damage. If damaged, repair as necessary. |
| Seals/Gaskets <ul style="list-style-type: none"> Leakage at gaskets, seals, cooler lines, torque converter studs, etc. | <ul style="list-style-type: none"> Refer to Leakage Inspection in this section for potential leak locations. Remove all traces of lubricant on exposed surfaces of the transmission. Check vent for free breathing. Operate the vehicle at normal temperatures and carry out leak check test, refer to Leakage Inspection in this section. Repair as necessary. |
| Vents | |



DIAGNOSIS AND TESTING (Continued)**Other Concerns: External Leaks (Continued)**

| Possible Component | Reference/Action |
|--|--|
| <ul style="list-style-type: none"> Fluid leakage through the vent system into the bellhousing | <ul style="list-style-type: none"> Incorrect fluid level may cause the transmission fluid to vent. If not already carried out, verify and adjust the fluid to the correct level. Refer to Transmission Fluid Level Check in this section. Verify the transmission operating temperature by monitoring TFT while driving the vehicle for 32 km (20 miles) or 20 minutes. If the TFT exceeds 102°C (215°F) during the drive, refer to routine No. 257 Transmission Overheating, Main Control, Thermostatic by-pass valve. Remove all traces of fluid on exposed surfaces of the transmission. Check the vent for damage and obstructions. Verify that the vent is operating correctly by applying air through the vent tubes. If the vent is damaged or obstructed, repair as necessary. |

Other Concern: Noise/Vibration—Forward or Reverse

| Possible Component | Reference/Action |
|--------------------------------------|---|
| 254 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, TCC solenoid, pressure control solenoids A, B, C <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A and GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Shift Cable/Digital TR Sensor | <ul style="list-style-type: none"> Cable or digital TR sensor damaged, misaligned <ul style="list-style-type: none"> Inspect and repair as necessary. For additional information, refer to Transmission Range (TR) Sensor Adjustment in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck, or bore damaged, thermostatic bypass valve damaged Filter damaged, missing <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Fluid Pump Assembly | <ul style="list-style-type: none"> Screws not tightened to specification Gasket damaged Porosity, cross leaks, ball missing, plugged hole <ul style="list-style-type: none"> Tighten screws to specification. Inspect for damage. If damaged, install a new gasket. Inspect for damage. If damaged, repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Other Concern: Noise/Vibration—Forward or Reverse (Continued)**

| Possible Component | Reference/Action |
|---|---|
| <ul style="list-style-type: none"> Pump gears cracked and/or seized Flow control valves, springs or seals damaged, stuck or not assembled correctly | <ul style="list-style-type: none"> Inspect for damage. Install a new pump. Inspect for damage. Install a new seal or flow control valve. |
| Low One-Way Clutch | |
| <ul style="list-style-type: none"> Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |
| Flexplate or Adapter Plate | |
| <ul style="list-style-type: none"> Damaged Nuts not tightened to specification Adapter plate not aligned correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Tighten to specification. Remove transmission and using special service tool and procedure in this section, align adapter plate. |
| Clutch Assemblies | |
| <ul style="list-style-type: none"> Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn. Return springs damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage, mislocation, poor seating. Install a new cylinder as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Torque Converter Assembly | |
| <ul style="list-style-type: none"> Torque converter hub damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |

Other Concern: Engine Will Not Crank

| Possible Component | Reference/Action |
|--|--|
| 255 — ROUTINE | |
| Powertrain Control System | |
| <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, digital TR sensor | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test C. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Shift Cable/Digital TR Sensor | |
| <ul style="list-style-type: none"> Cable or digital TR sensor damaged, misaligned | <ul style="list-style-type: none"> Inspect and repair as necessary. For additional information, refer to Transmission Range (TR) Sensor Adjustment in this section. |
| Main Control/Park System/TR Sensor Alignment | |



DIAGNOSIS AND TESTING (Continued)**Other Concern: Engine Will Not Crank (Continued)**

| Possible Component | Reference/Action |
|---|---|
| <ul style="list-style-type: none"> Detent spring, rooster comb, manual lever and TR sensor are not correctly aligned together | <ul style="list-style-type: none"> Disconnect TR sensor electrical connector. Remove outer manual lever nut. Loosen TR sensor screws. Loosen detent spring screw. Move manual lever through all gear ranges. Place manual lever into the NEUTRAL position. Tighten the detent spring screw to correct specification. Install TR sensor alignment tool. Tighten the TR sensor screws alternating sequence until correct tightening specification is obtained. Remove tool. Install outer manual lever and nut. Tighten nut to correct specification. Install TR sensor connector. Verify that the vehicle will start in PARK and NEUTRAL. Verify that the reverse backup lamps illuminate in REVERSE. |
| Fluid Pump Assembly | |
| <ul style="list-style-type: none"> Screws not tightened to specification Gasket damaged Porosity, cross leaks, ball missing, plugged hole Pump gears cracked and/or seized Flow control valves, springs or seals damaged, stuck or not assembled correctly | <ul style="list-style-type: none"> Tighten screws to specification. Inspect for damage. If damaged, install a new gasket. Inspect for damage. If damaged, repair as necessary. Inspect for damage. Install a new pump. Inspect for damage. Install a new seal or flow control valve. |
| Flexplate or Adapter Plate | |
| <ul style="list-style-type: none"> Damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |

Other Concern: No Park Range

| Possible Component | Reference/Action |
|---|--|
| 256 — ROUTINE | |
| Shift Cable/Digital TR sensor | |
| <ul style="list-style-type: none"> Cable system or digital TR sensor damaged, misaligned | <ul style="list-style-type: none"> Inspect and repair as necessary. For additional information, refer to Transmission Range (TR) Sensor Adjustment in this section. |
| Case | |
| <ul style="list-style-type: none"> Manual control lever assembly damage, manual valve inner lever pin bent, manual valve inner lever damaged, spring rod damaged Manual valve lever shaft retaining pin damaged | <ul style="list-style-type: none"> Inspect for damage. If damaged, repair as necessary. Inspect for damage. If damaged, repair as necessary. |
| Park System | |
| <ul style="list-style-type: none"> Park gear, parking pawl, parking pawl return spring, park or guide plate, parking actuating rod, parking pawl shaft, manual lever, manual lever detent spring damaged or misassembled External linkages/brackets damaged | <ul style="list-style-type: none"> Inspect for damage. If damaged, repair as necessary. Inspect for damage. If damaged, repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Other Concern: Transmission Overheating**

| Possible Component | Reference/Action |
|---|--|
| 257 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, TCC solenoid, pressure control solenoids A, B, C, TFT sensor | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test B and GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid <ul style="list-style-type: none"> Incorrect level | <ul style="list-style-type: none"> Adjust to correct level. Refer to Transmission Fluid Level Check in this section. |
| Hydraulic/Mechanical <ul style="list-style-type: none"> Thermostatic by-pass valve in the main control valve body assembly | <ul style="list-style-type: none"> Verify correct thermal valve function while monitoring TFT. Drive the vehicle for about 32 km (20 miles) or 20 minutes. If the temperature exceeds 102° C (215° F) during the drive, then install a new main control valve body assembly. |
| Incorrect Pressures <ul style="list-style-type: none"> High/low pressures | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged, thermostatic bypass valve damaged Thermostatic by-pass valve damaged or malfunctioning Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. If the verification procedure confirms the malfunction, install a new main control valve body assembly. If not malfunctioning, inspect for damage. If damaged, install a new main control valve body assembly. Inspect for damage, repair as necessary. |
| Fluid Pump Assembly <ul style="list-style-type: none"> Screws not tightened to specification Gasket damaged Porosity, cross leaks, ball missing, plugged hole Pump gears cracked and/or seized Flow control valves, springs or seals damaged, stuck or not assembled correctly | <ul style="list-style-type: none"> Tighten screws to specification. Inspect for damage. If damaged, install a new gasket. Inspect for damage. If damaged, repair as necessary. Inspect for damage. Install a new pump. Inspect for damage. Install a new seal or flow control valve. |
| Case <ul style="list-style-type: none"> Case vent damaged | <ul style="list-style-type: none"> Inspect for damage. If damaged, repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Other Concern: Transmission Overheating (Continued)**

| Possible Component | Reference/Action |
|---|---|
| Torque Converter Assembly <ul style="list-style-type: none"> • Seized torque converter one-way clutch • Excessive slip detected | <ul style="list-style-type: none"> • Remove the transmission. Inspect for damage. Refer to Torque Converter in this section. If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter. |
| Other <ul style="list-style-type: none"> • Restriction in the transmission cooling system • Excessive trailer tow load • Engine driveability concerns | <ul style="list-style-type: none"> • Refer to Section 307-02 for information and diagnosis of cooling system. • Refer to the owner guide for specifications on trailer towing. • Check engine. Refer to Section 303-00. |

Other Concern: No Engine Braking in 3rd Gear Performance, Manual or Cruise

| Possible Component | Reference/Action |
|---|--|
| 280 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoids A, B, C, reverse pressure (RP) switch, pressure control solenoids A, B | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test D. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid <ul style="list-style-type: none"> • Incorrect level | <ul style="list-style-type: none"> • Adjust fluid to correct level. Refer to Transmission Fluid Level Check in this section. |
| Incorrect Pressures <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at Line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valve/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Coast Clutch Assembly <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. |



DIAGNOSIS AND TESTING (Continued)**Other Concern: No Engine Braking in 3rd Gear Performance, Manual or Cruise (Continued)**

| Possible Component | Reference/Action |
|---|---|
| <ul style="list-style-type: none"> Friction elements damaged or worn Return springs damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Center Support | |
| <ul style="list-style-type: none"> Screw not tightened to specification Seals rings or bearing damaged Outside diameter of case bore damaged Support damaged or leaking | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Intermediate Servo | |
| <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Intermediate Band | |
| <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |

Other Concern: No Engine Braking in 4th Gear Performance, Manual or Cruise

| Possible Component | Reference/Action |
|----------------------------------|--|
| 281 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid D, RP switch, pressure control solenoid B |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid | <ul style="list-style-type: none"> Incorrect level |
| | <ul style="list-style-type: none"> Adjust fluid to correct level. Refer to Transmission Fluid Level Check in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Filter damaged, missing Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged |
| | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage, repair as necessary. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. |
| Coast Clutch Assembly | <ul style="list-style-type: none"> Seals, piston damaged |
| | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Other Concern: No Engine Braking in 4th Gear Performance, Manual or Cruise (Continued)**

| Possible Component | Reference/Action |
|---|--|
| <ul style="list-style-type: none"> Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged | <ul style="list-style-type: none"> Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |

Other Concerns: No Engine Braking in 2nd Gear Performance or Manual

| Possible Component | Reference/Action |
|----------------------------------|--|
| 258 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoids A, C, D, pressure control solenoid A |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A and GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid | <ul style="list-style-type: none"> Incorrect level |
| | <ul style="list-style-type: none"> Adjust fluid to correct level. Refer to Transmission Fluid Level Check in this section. |
| Incorrect Pressures | <ul style="list-style-type: none"> High/low pressures |
| | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Overdrive Servo | <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged |
| | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Overdrive Band | <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly |
| | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |

Other Concern: No Engine Braking in 1st Gear Performance or Manual

| Possible Component | Reference/Action |
|----------------------------------|--|
| 259 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoids A, C, D, pressure control solenoids A, B |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A and GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid | |



DIAGNOSIS AND TESTING (Continued)**Other Concern: No Engine Braking in 1st Gear Performance or Manual (Continued)**

| Possible Component | Reference/Action |
|--|--|
| • Incorrect level | • Adjust fluid to the correct level, refer to Transmission Fluid Level Check in this section. |
| Incorrect pressures | |
| • High/low pressures | • Check pressure at Line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Reverse Servo | |
| • Servo retaining screws damaged • Seals (piston and cover) damaged | • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Reverse Band | |
| • Band damaged • Servo worn or damaged | • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Other Concerns: Fluid Venting/Foaming

| Possible Component | Reference/Action |
|--|--|
| 261 — ROUTINE | |
| Fluid | |
| • Incorrect level • Condition | • Adjust fluid to correct level. Refer to Transmission Fluid Level Check in this section. • Carry out Fluid Condition Check. Refer to Preliminary Inspection in this section. |
| Fluid Pump Assembly | |
| • Screws not tightened to specification • Gasket damaged • Porosity, cross leaks, ball missing, plugged hole | • Tighten screws to specification. • Inspect for damage. If damaged, install a new gasket. • Inspect for damage. If damaged, repair as necessary. |
| Case | |
| • Case vent damaged | • Inspect for damage. If damaged, repair as necessary. |
| Other | |
| • Transmission overheating | • Refer to 257 routine in this section. |

Other Concern: Vehicle Movement with Gear Selector in N Position

| Possible Component | Reference/Action |
|---|--|
| 262 — ROUTINE | |
| Fluid | |
| • Incorrect level | • Adjust fluid to correct level. Refer to Transmission Fluid Level Check in this section. |
| Shift Cable/Digital TR sensor | |
| • Cable system or digital TR sensor damaged, misaligned | • Inspect and repair as necessary. For additional information, refer to Transmission Range (TR) Sensor Adjustment in this section. |
| Incorrect pressures | |



DIAGNOSIS AND TESTING (Continued)**Other Concern: Vehicle Movement with Gear Selector in N Position (Continued)**

| Possible Component | Reference/Action |
|--|--|
| <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at Line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valve/springs damaged, misassembled, missing, stuck or bore damaged | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. |
| Clutch Assemblies <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn. • Return springs damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage, mislocation, poor seating. Install a new cylinder as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Case <ul style="list-style-type: none"> • Manual control lever assembly damage, manual valve inner lever pin bent, manual valve inner lever damaged, spring rod damaged • Manual valve lever shaft retaining pin damaged | <ul style="list-style-type: none"> • Inspect for damage. If damaged, repair as necessary. • Inspect for damage. If damaged, repair as necessary. |

Other Concern: Slips/Chatters in Manual 1st When Selected

| Possible Component | Reference/Action |
|---|--|
| 263 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, pressure control solenoids A, B | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test D. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid <ul style="list-style-type: none"> • Incorrect level • Condition | <ul style="list-style-type: none"> • Adjust fluid to the correct level. Refer to Transmission Fluid Level Check in this section. • Carry out Fluid Condition Check. Refer to Preliminary Inspection in this section. |
| Incorrect Pressures <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at Line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | |



DIAGNOSIS AND TESTING (Continued)**Other Concern: Slips/Chatters in Manual 1st When Selected (Continued)**

| Possible Component | Reference/Action |
|--|--|
| <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valve/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Fluid Pump Assembly | |
| <ul style="list-style-type: none"> • Screws not tightened to specification • Gasket damaged • Porosity, cross leaks, ball missing, plugged hole • Pump gears cracked and/or seized • Flow control valves, springs, or seals damaged, stuck or not assembled correctly | <ul style="list-style-type: none"> • Tighten screws to specification. • Inspect for damage. If damaged, install a new gasket. • Inspect for damage. If damaged, repair as necessary. • Inspect for damage. Install a new pump. • Inspect for damage. Install a new seal or flow control valve. |
| Forward Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Reverse Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Reverse Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Direct One-Way Clutch | |
| <ul style="list-style-type: none"> • Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |

Other Concern: Slips/Chatters in Manual 2nd When Selected

| Possible Component | Reference/Action |
|----------------------------------|--|
| 264 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, pressure control solenoids A, B |



DIAGNOSIS AND TESTING (Continued)**Other Concern: Slips/Chatters in Manual 2nd When Selected (Continued)**

| Possible Component | Reference/Action |
|--|--|
| | <ul style="list-style-type: none"> Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid <ul style="list-style-type: none"> Incorrect level Condition | <ul style="list-style-type: none"> Adjust fluid to the correct level. Refer to Transmission Fluid Level Check in this section. Carry out Fluid Condition Check. Refer to Preliminary Inspection in this section. |
| Incorrect Pressures <ul style="list-style-type: none"> High/low pressures | <ul style="list-style-type: none"> Check pressure at Line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Overdrive Servo <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Overdrive Band <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Overdrive Planetary Assembly <ul style="list-style-type: none"> Planetary damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly <ul style="list-style-type: none"> Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |

Other Concern: Slip/Chatters in Manual 3rd Position

| Possible Component | Reference/Action |
|---|--|
| 282 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, pressure control solenoids A, B | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid <ul style="list-style-type: none"> Incorrect level Condition | <ul style="list-style-type: none"> Adjust fluid to the correct level. Refer to Transmission Fluid Level Check in this section. Carry out Fluid Condition Check. Refer to Preliminary Inspection in this section. |



DIAGNOSIS AND TESTING (Continued)**Other Concern: Slip/Chatters in Manual 3rd Position (Continued)**

| Possible Component | Reference/Action |
|--|--|
| Incorrect Pressures <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at Line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Overdrive Servo <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Band <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Servo <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Band <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Direct One-way Clutch <ul style="list-style-type: none"> • Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |
| Low One-Way Clutch <ul style="list-style-type: none"> • Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |

Other Concern: Engine Braking in 4, 3, 2, 1 in D Mode

| Possible Component | Reference/Action |
|--|--|
| 283 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoid D | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |



DIAGNOSIS AND TESTING (Continued)**Other Concern: Engine Braking in 4, 3, 2, 1 in D Mode (Continued)**

| Possible Component | Reference/Action |
|--|---|
| Torque Converter Assembly <ul style="list-style-type: none"> Torque converter internal failure preventing engagement, piston release | <ul style="list-style-type: none"> Remove the transmission. Inspect for damage. Refer to Torque Converter in this section. If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter. |

Other Concern: No 2nd and 5th Gears (Manual 2nd is OK)

| Possible Component | Reference/Action |
|---|---|
| 284 — ROUTINE | |
| Hydraulic/Mechanical | <ul style="list-style-type: none"> Verify that Manual 2 is present and functions correctly. If Manual 2 is not operating correctly, go to Shift Concerns: Routine 210 — Some/All Shifts Missing (Automatic Mode) and continue diagnosis. If Manual 2 is operating correctly, continue with this routine. |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, pressure control solenoids B, C | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |

Other Concern: No 3rd, 4th and 5th Gears (5th Gear Not Available in Performance)

| Possible Component | Reference/Action |
|---|--|
| 285 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, pressure control solenoids A, B | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Overdrive Servo <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Overdrive Band <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Overdrive Planetary Assembly <ul style="list-style-type: none"> Planetary damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Other Concern: No 3rd, 4th and 5th Gears (5th Gear Not Available in Performance) (Continued)**

| Possible Component | Reference/Action |
|--|--|
| Intermediate Servo <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Band <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Shift Concern: Harsh 1-2 Shift

| Possible Component | Reference/Action |
|---|--|
| 232 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift control solenoid C, pressure control solenoids B, TSS sensor, digital TR sensor, TFT sensor | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at Line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valve/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Overdrive Servo <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Band <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Harsh 2-3 Shift**

| Possible Component | Reference/Action |
|---|--|
| 233 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift control solenoid B, pressure control solenoids A, TSS sensor, intermediate shaft speed sensor, digital TR sensor, TFT sensor | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures <ul style="list-style-type: none"> High/low pressures | <ul style="list-style-type: none"> Check pressure at Line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Overdrive Servo <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Overdrive Band <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Direct Clutch Assembly <ul style="list-style-type: none"> Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Intermediate Servo <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Intermediate Band <ul style="list-style-type: none"> Band damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Harsh 2-3 Shift (Continued)**

| Possible Component | Reference/Action |
|---|--|
| <ul style="list-style-type: none"> Servo worn or damaged Not adjusted correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Direct One-Way Clutch | |
| <ul style="list-style-type: none"> Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |

Shift Concern: Harsh 3-4 Shift

| Possible Component | Reference/Action |
|--|--|
| 234 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift control solenoid A, pressure control solenoids C, digital TR sensor, TFT sensor |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test C and GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> High/low pressures |
| | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing |
| | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Center Support | <ul style="list-style-type: none"> Screws not tightened to specification Seal rings or bearing damaged Outside diameter of case bore damaged Support damaged or leaking |
| | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Direct Clutch Assembly | <ul style="list-style-type: none"> Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged |
| | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Intermediate Servo | |
| <ul style="list-style-type: none"> Seals (piston and cover) damaged |  damage. Repair as necessary. |

DIAGNOSIS AND TESTING (Continued)**Shift Concerns: Harsh 4-5 Shift (Not Performance)**

| Possible Component | Reference/Action |
|----------------------------------|---|
| 274 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B, TSS sensor, digital TR sensor, TFT sensor Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> High/low pressures Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing Tighten to specification. Inspect for damage. If damaged, install a new separator. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Overdrive Servo | <ul style="list-style-type: none"> Servo retaining screws damaged Seal (piston and cover) damaged Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Overdrive Band | <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |

Shift Concern: Harsh 5-4 Shift (Not Performance)

| Possible Component | Reference/Action |
|----------------------------------|---|
| 275 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift control solenoid C, pressure control solenoid C, TSS sensor, digital TR sensor, TFT sensor Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Harsh 5-4 Shift (Not Performance) (Continued)**

| Possible Component | Reference/Action |
|---|--|
| | <ul style="list-style-type: none"> Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures <ul style="list-style-type: none"> High/low pressures | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Overdrive Servo <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Overdrive Band <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Direct One-Way Clutch <ul style="list-style-type: none"> Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |

Shift Concern: Harsh 4-3 Shift

| Possible Component | Reference/Action |
|--|--|
| 235 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid A, pressure control solenoid A, digital TR sensor, TFT sensor | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test C and GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures <ul style="list-style-type: none"> High/low pressures | <ul style="list-style-type: none"> Check pressure at Line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification | <ul style="list-style-type: none"> Tighten to specification. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Harsh 4-3 Shift (Continued)**

| Possible Component | Reference/Action |
|--|---|
| <ul style="list-style-type: none"> • Separator plate damaged • Contamination • Valves, springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Direct Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Shift Concern: Harsh 3-2 Shift

| Possible Component | Reference/Action |
|----------------------------------|---|
| 236 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift control solenoid C, pressure control solenoid B, TSS sensor, intermediate shaft speed sensor, digital TR sensor, TFT sensor • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> • High/low pressures • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Harsh 3-2 Shift (Continued)**

| Possible Component | Reference/Action |
|---|---|
| <ul style="list-style-type: none"> • Contamination • Valve/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Overdrive Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Shift Concern: Harsh 2-1 Shift

| Possible Component | Reference/Action |
|----------------------------------|---|
| 237 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift control solenoid C, pressure control solenoid B, TSS sensor, digital TR sensor, TFT sensor |
| | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> • High/low pressures |
| | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination |
| | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Harsh 2-1 Shift (Continued)**

| Possible Component | Reference/Action |
|--|---|
| <ul style="list-style-type: none"> Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Overdrive Servo | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Seals (piston and cover) damaged |
| Overdrive Band | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Servo worn or damaged Not adjusted correctly |
| Direct Clutch One-Way Clutch | <ul style="list-style-type: none"> Worn, damaged or assembled incorrectly |
| | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |

Shift Concern: No 1-2 Shift

| Possible Component | Reference/Action |
|----------------------------------|--|
| 220 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B, OSS sensor, digital TR sensor, VSS input |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM and VSS. GO to Pinpoint Test A, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid | <ul style="list-style-type: none"> Incorrect level |
| | <ul style="list-style-type: none"> Adjust to correct level. Refer to Transmission Fluid Level Check in this section. |
| Incorrect Pressures | <ul style="list-style-type: none"> High/low pressures |
| | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged |
| | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: No 1-2 Shift (Continued)**

| Possible Component | Reference/Action |
|-------------------------------------|--|
| • Filter damaged, missing | • Inspect for damage, repair as necessary. |
| Overdrive Servo | |
| • Servo retaining screws damaged | • Inspect for damage. Repair as necessary. |
| • Seals (piston and cover) damaged | • Inspect for damage. Repair as necessary. |
| Overdrive Band | |
| • Band damaged | • Inspect for damage. Repair as necessary. |
| • Servo worn or damaged | • Inspect for damage. Repair as necessary. |
| • Not adjusted correctly | • Inspect for damage. Repair as necessary. |
| Overdrive Planetary Assembly | |
| • Planetary damaged | • Inspect for damage. Repair as necessary. |

Shift Concern: No 2-3 Shift

| Possible Component | Reference/Action |
|----------------------------------|---|
| 221 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid B, TCC solenoid, pressure control solenoid A, OSS sensor, digital TR sensor Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> High/low pressures Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Forward Clutch Assembly | <ul style="list-style-type: none"> Seals, piston damaged Check ball, damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: No 2-3 Shift (Continued)**

| Possible Component | Reference/Action |
|--|--|
| <ul style="list-style-type: none"> Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |
| Intermediate Servo <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. |
| Intermediate Band <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |

Shift Concern: No 3-4 Shift

| Possible Component | Reference/Action |
|---|--|
| 222 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid A, pressure control solenoid C, OSS sensor, digital TR sensor | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures <ul style="list-style-type: none"> High/low pressures | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Center Support <ul style="list-style-type: none"> Screws not tightened to specification Seal rings or bearing damaged Outside diameter of case bore damaged Support damaged or leaking | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Direct Clutch Assembly <ul style="list-style-type: none"> Seals, piston damaged | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: No 3-4 Shift (Continued)**

| Possible Component | Reference/Action |
|---|--|
| <ul style="list-style-type: none"> • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged | <ul style="list-style-type: none"> • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. |

Shift Concern: No 4-5 Shift (D Mode Only)

| Possible Component | Reference/Action |
|--|--|
| 270 — ROUTINE | |
| Powertrain Control System | |
| <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B, OSS sensor, digital TR sensor • Transmission control (TC) switch • TC switch | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. • For TC switch diagnosis, refer to Section 307-05. |
| Incorrect Pressures | <ul style="list-style-type: none"> • High/low pressures |
| | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valve/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing |
| | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Overdrive Servo | |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: No 4-5 Shift (D Mode Only) (Continued)**

| Possible Component | Reference/Action |
|---|--|
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Band <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Shift Concern: No 5-4 Shift (D Mode Only)

| Possible Component | Reference/Action |
|----------------------------------|--|
| 271 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid C, OSS sensor, digital TR sensor • TC switch |
| Incorrect Pressures | <ul style="list-style-type: none"> • High/low pressures |
| Main Control | <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valves/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing |
| Overdrive Servo | <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged |
| Overdrive Band | <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: No 4-3 Shift**

| Possible Component | Reference/Action |
|----------------------------------|--|
| 223 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid A, B, pressure control solenoid A, OSS sensor, digital TR sensor Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> High/low pressures Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Intermediate Servo | <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Intermediate Band | <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |

Shift Concern: No 3-2 Shift

| Possible Component | Reference/Action |
|----------------------------------|---|
| 224 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B, OSS sensor, digital TR sensor Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: No 3-2 Shift (Continued)**

| Possible Component | Reference/Action |
|---|--|
| <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | |
| <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valves/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Overdrive Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Forward Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Shift Concern: No 2-1 Shift

| Possible Component | Reference/Action |
|---|--|
| 225 — ROUTINE | |
| Powertrain Control System | |
| <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B, OSS sensor, digital TR sensor | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test C, GO to Pinpoint Test D and GO to Pinpoint Test E. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | |
| <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: No 2-1 Shift (Continued)**

| Possible Component | Reference/Action |
|--|--|
| Main Control <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valves/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Forward Clutch Assembly <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged • Bronze seal ring or bearing damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Servo <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Band <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Shift Concern: Soft/Slipping 1-2 Shift

| Possible Component | Reference/Action |
|--|---|
| 226 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B, TFT sensor, VSS input | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test B and GO to Pinpoint Test D. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Fluid <ul style="list-style-type: none"> • Incorrect level • Condition | <ul style="list-style-type: none"> • Adjust fluid to correct level. Refer to Transmission Fluid Level Check in this section. • Carry out Fluid Condition Check. Refer to Preliminary Inspection in this section. |
| Incorrect Pressures | |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Soft/Slipping 1-2 Shift (Continued)**

| Possible Component | Reference/Action |
|---|--|
| <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | |
| <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valve/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Overdrive Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Shift Concern: Soft/Slipping 2-3 Shift

| Possible Component | Reference/Action |
|---|--|
| 227 — ROUTINE | |
| Powertrain Control System | |
| <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoid A, pressure control solenoid A, intermediate shaft speed sensor, TFT sensor | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test D and GO to Pinpoint Test E. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | |
| <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | |
| <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Soft/Slipping 2-3 Shift (Continued)**

| Possible Component | Reference/Action |
|--|---|
| <ul style="list-style-type: none"> Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing | <ul style="list-style-type: none"> If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Intermediate Servo | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. |
| Intermediate Band | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Direct One-Way Clutch | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. |

Shift Concern: Soft/Slipping 3-4 Shift

| Possible Component | Reference/Action |
|----------------------------------|--|
| 228 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid A, pressure control solenoid C, TFT sensor |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test B and GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> High/low pressures |
| | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged |
| | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. |
| Center Support | <ul style="list-style-type: none"> Screw not tightened to specification |
| | <ul style="list-style-type: none"> Tighten to specification. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Soft/Slipping 3-4 Shift (Continued)**

| Possible Component | Reference/Action |
|--|--|
| <ul style="list-style-type: none"> • Seal rings or bearing damaged • Outside diameter of case bore damaged • Support damaged or leaking | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Direct Clutch Assembly | |
| <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Intermediate Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Shift Concern: Soft/Slipping 4-5 Shift (D Mode Only)

| Possible Component | Reference/Action |
|----------------------------------|--|
| 272 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B, TFT sensor |
| | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test B and GO to Pinpoint Test D. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> • High/low pressures |
| | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valves/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing |
| | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Overdrive Servo | <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged |
| | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Soft/Slipping 4-5 Shift (D Mode Only) (Continued)**

| Possible Component | Reference/Action |
|---|--|
| Overdrive Band <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |

Shift Concern: Feel — Soft/Slipping 5-4 Shift

| Possible Component | Reference/Action |
|--|--|
| 273 — ROUTINE | |
| Powertrain Control System <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid C, TFT sensor | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test B and GO to Pinpoint Test D. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valves/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Direct Clutch Assembly <ul style="list-style-type: none"> • Seals, piston damaged • Check ball damaged, missing, not seating, off location • Friction elements damaged or worn • Return springs damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for mislocation, poor seating, damage. Install a new cylinder. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Direct One-Way Clutch <ul style="list-style-type: none"> • Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Feel — Soft/Slipping 4-3 Shift**

| Possible Component | Reference/Action |
|----------------------------------|--|
| 229 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid A, pressure control solenoid A, TFT sensor |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test B and GO to Pinpoint Test D. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | <ul style="list-style-type: none"> High/low pressures |
| | <ul style="list-style-type: none"> Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | <ul style="list-style-type: none"> Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing |
| | <ul style="list-style-type: none"> Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. |
| Intermediate Servo | <ul style="list-style-type: none"> Servo retaining screws damaged Seals (piston and cover) damaged |
| | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |
| Intermediate Band | <ul style="list-style-type: none"> Band damaged Servo worn or damaged Not adjusted correctly |
| | <ul style="list-style-type: none"> Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. |

Shift Concern: Soft/Slipping 3-2 Shift

| Possible Component | Reference/Action |
|----------------------------------|--|
| 230 — ROUTINE | |
| Powertrain Control System | <ul style="list-style-type: none"> PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B, intermediate shaft speed sensor, TFT sensor |
| | <ul style="list-style-type: none"> Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. GO to Pinpoint Test A, GO to Pinpoint Test B, GO to Pinpoint Test D and GO to Pinpoint Test E. Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Soft/Slipping 3-2 Shift (Continued)**

| Possible Component | Reference/Action |
|--|--|
| <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | |
| <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination • Valves/springs damaged, misassembled, missing, stuck or bore damaged • Filter damaged, missing | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. • If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. • Inspect for damage, repair as necessary. |
| Overdrive Servo | |
| <ul style="list-style-type: none"> • Servo retaining screws damaged • Seals (piston and cover) damaged | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Overdrive Band | |
| <ul style="list-style-type: none"> • Band damaged • Servo worn or damaged • Not adjusted correctly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. • Inspect for damage. Repair as necessary. |
| Direct One-Way Clutch | |
| <ul style="list-style-type: none"> • Worn, damaged or assembled incorrectly | <ul style="list-style-type: none"> • Inspect for damage. Repair as necessary. |

Shift Concern: Feel — Soft/Slipping 2-1 Shift

| Possible Component | Reference/Action |
|---|---|
| 231 — ROUTINE | |
| Powertrain Control System | |
| <ul style="list-style-type: none"> • PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B, TFT sensor | <ul style="list-style-type: none"> • Carry out on-board diagnostic tests. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis and testing of the PCM. • GO to Pinpoint Test A, GO to Pinpoint Test B and GO to Pinpoint Test D. • Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. |
| Incorrect Pressures | |
| <ul style="list-style-type: none"> • High/low pressures | <ul style="list-style-type: none"> • Check pressure at line and PC C taps. Carry out Line Pressure Test. Refer to Special Testing Procedures in this section. |
| Main Control | |
| <ul style="list-style-type: none"> • Screws not tightened to specification • Separator plate damaged • Contamination | <ul style="list-style-type: none"> • Tighten to specification. • Inspect for damage. If damaged, install a new separator plate. • Disassemble and clean. |



DIAGNOSIS AND TESTING (Continued)**Shift Concern: Feel — Soft/Slipping 2-1 Shift (Continued)**

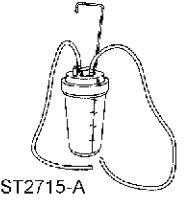
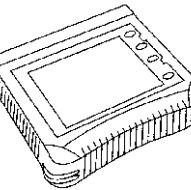
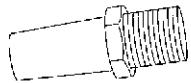
| Possible Component | Reference/Action |
|--|--|
| <ul style="list-style-type: none">• Valves/springs damaged, misassembled, missing, stuck or bore damaged• Filter damaged, missing | <ul style="list-style-type: none">• If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.• Inspect for damage, repair as necessary. |



GENERAL PROCEDURES

Transmission Fluid Level Check

Special Tool(s)

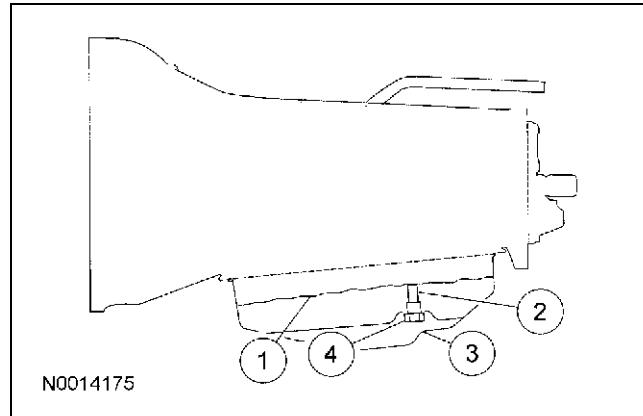
| | |
|---|--|
|  | Rubber Tip Air Nozzle 100-D009 (D93L-7000-A) ST2467-A |
|  | Vacuum Pump Kit 416-D002 (D95L-7559-A) ST1269-A |
|  | Fluid Transporter/Evacuator/Injector 307-D465 ST2715-A |
|  | Worldwide Diagnostic System (WDS) Vehicle Communication module (VCM) with appropriate adapters, or equivalent diagnostic tool ST2332-A |
|  | Adapter, Fluid Level and Fill Plug 307-437 ST2581-A |

Material

| Item | Specification |
|---|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM | MERCON® V |

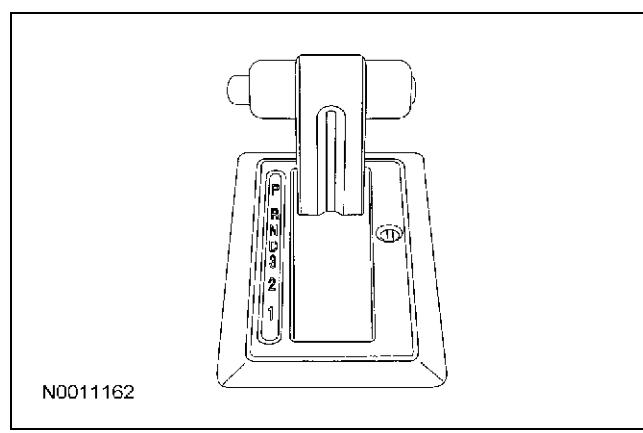
Fluid Fill Reference

NOTE: Left side of case shown.



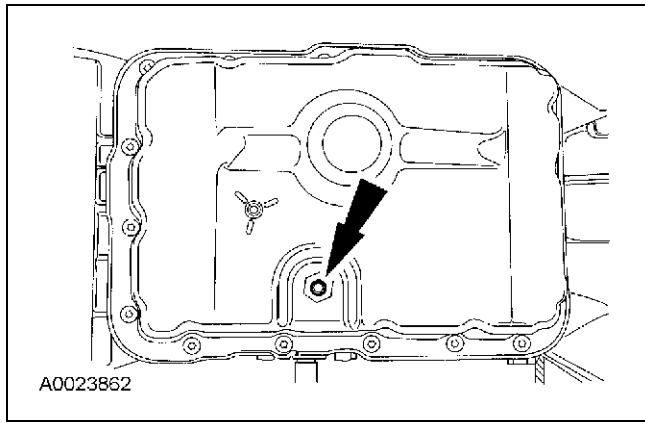
| Item | Part Number | Description |
|------|--------------|--|
| 1 | — | Fluid level |
| 2 | 7A010 | Fluid level tube |
| 3 | W704999-S309 | Fluid level and fill plug (small) (in-vehicle) |
| 4 | 7A010 | Fluid drain plug (large) |

1. Using the diagnostic tool, monitor the transmission fluid temperature (TFT) using PID: TFT.
2. Start the vehicle.
3. **NOTE:** Engine idle speed is approximately 650 rpm.
While proceeding with this procedure, run the engine until the transmission fluid temperature is between 27°-49°C (80°-120°F).
4. Move the range selector lever slowly through each gear, stopping in each position and allowing the transmission to engage.

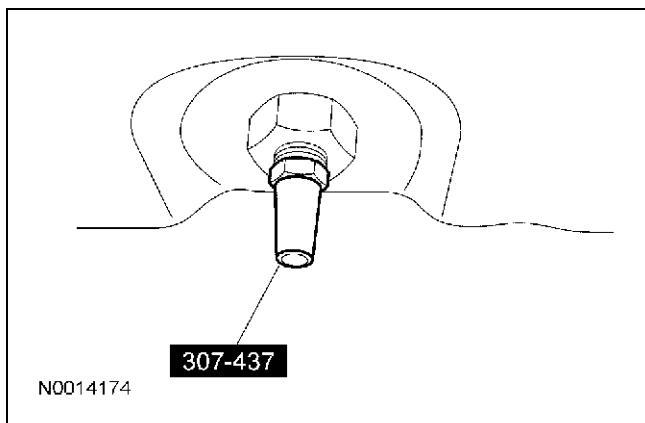


GENERAL PROCEDURES (Continued)

5. Place the range selector lever in the PARK position.
6. With the engine running, position the vehicle on a hoist and set it as close to level as possible. For additional information, refer to Section 100-02.
7. Hold the larger drain plug with a wrench and remove the small (center) fluid level indicating plug.

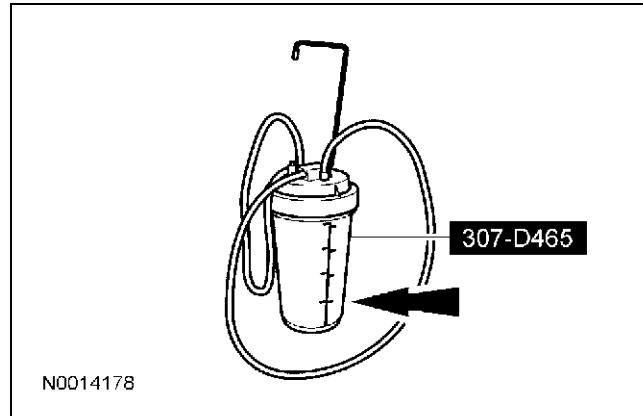


8. Install the special tool into the pan.

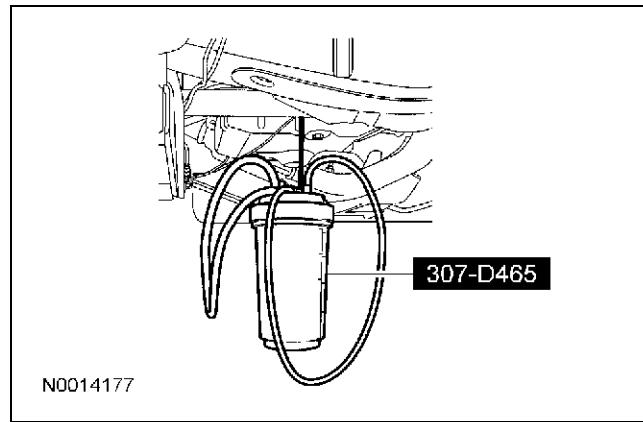


9. **NOTE:** Prior to filling the special tool with clean transmission fluid, make sure that the canister is clean.

Fill the special tool with clean automatic transmission fluid.

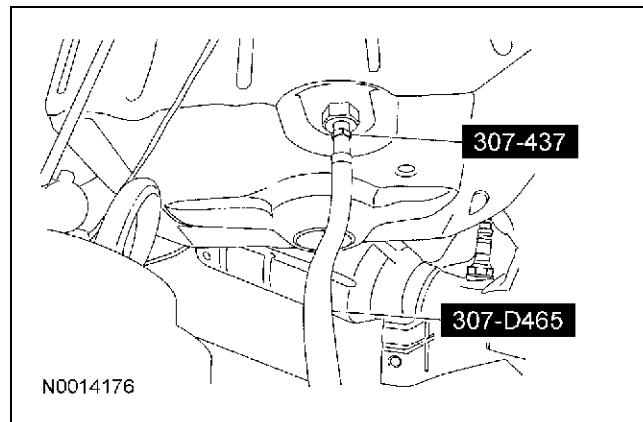


10. Hang the special tool under the vehicle. Position it upright and close to the transmission.



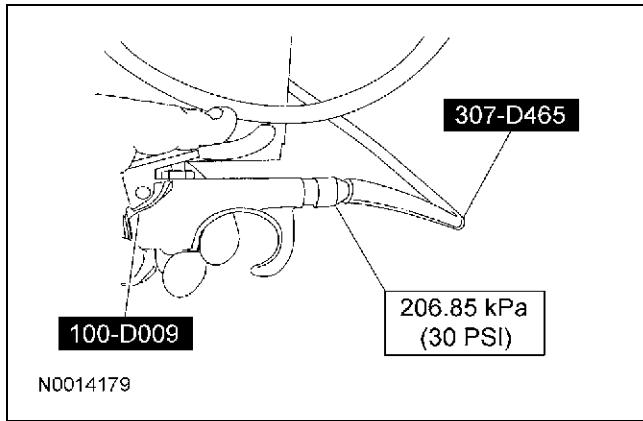
11. Connect the special tools.

- Connect the open end of the fluid hose from the Fluid Transporter/Evacuator/Injector to the Fluid Level and Fill Plug Adapter at the bottom of the transmission fluid pan.

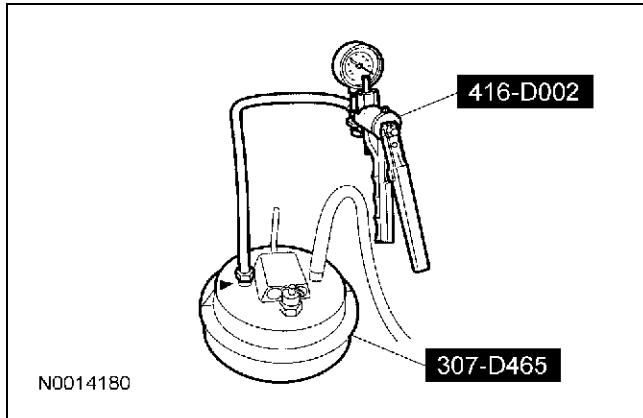


GENERAL PROCEDURES (Continued)

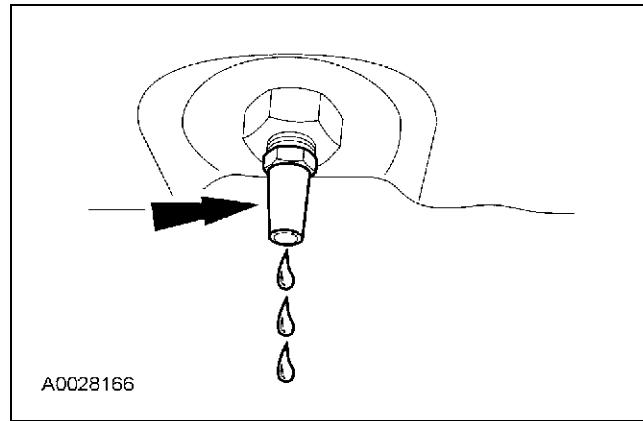
12. Apply a maximum of 206.85 kPa (30 psi) to the open end of the vacuum/pressure hose from the special tool. Fluid will immediately start flowing out of the special tool into the transmission fluid pan.



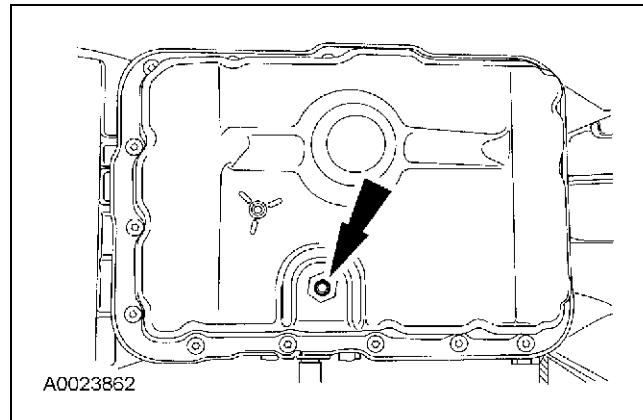
13. Add one pint of transmission fluid into the fluid pan. Stop the process by releasing the air pressure and removing the air nozzle from the end of the hose.
14. Inspect the fluid level in the special tool. If the fluid drains back into the canister, the transmission is full. If no fluid drains back, more fluid will need to be added. Repeat Steps 12 and 13.
15. Once the transmission is full, place a hand vacuum pump on the open end of the vacuum/pressure hose of the special tool and apply vacuum to the system. This will pull out any extra fluid trapped in the system and direct it into the container.



16. Allow the fluid to drain. Make sure that the fluid temperature is between 27°-49°C (80°-120°F). When the fluid comes out as a thin stream or drip, the fluid is at the correct level.



17. Reinstall the small (center) fluid level indicating plug and tighten to 10 Nm (89 lb-in).

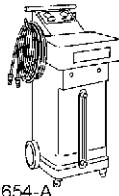


18. Check the operation of the transmission by moving the range selector lever slowly through each gear, stopping in each position and allowing the transmission to engage.

GENERAL PROCEDURES

Transmission Fluid Drain and Refill — Automated Equipment

Special Tool(s)

| | |
|---|--|
|  ST2654-A | Automatic Transmission Flush and Fill Machine 211-00018 Automatic Transmission Flush and Fill Machine 199-00010 or equivalent |
|---|--|

Material

| Item | Specification |
|---|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM | MERCON® V |

Draining

⚠ CAUTION: Use only clean automatic transmission fluid specified for this transmission. Do not use supplemental transmission fluid additives, treatments or clean agents. The use of these materials can affect transmission operation and result in damage to internal transmission components.

⚠ CAUTION: Always refer to the instructions supplied with the flush and fill machine.

- With the vehicle in PARK, position it on a hoist. For additional information, refer to Section 100-02.

- Use a suitable flush and fill machine to change the fluid.
- When connecting the flush and fill machine, connect the machine to the fluid cooler tube after the fluid cooler on the cooler return line. This will help remove any foreign material trapped in the fluid coolers.

Refill

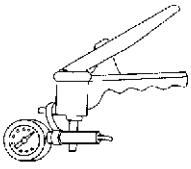
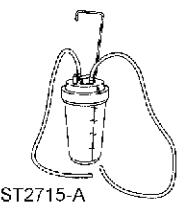
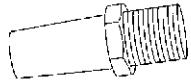
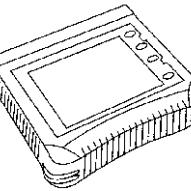
- Use only clean automatic transmission fluid.
- Once the fluid exchange has been completed, disconnect the flush and fill machine. Reconnect any disconnected fluid cooler tubes.
- With the engine running, check and adjust the transmission fluid level, and check for any leaks. If fluid is needed, add fluid in increments of 0.24 liter (0.5 pint) until the correct level is achieved. For additional information, refer to Transmission Fluid Level Check in this section.



GENERAL PROCEDURES

Transmission Fluid Drain and Refill — Without Torque Converter Drain Plug

Special Tool(s)

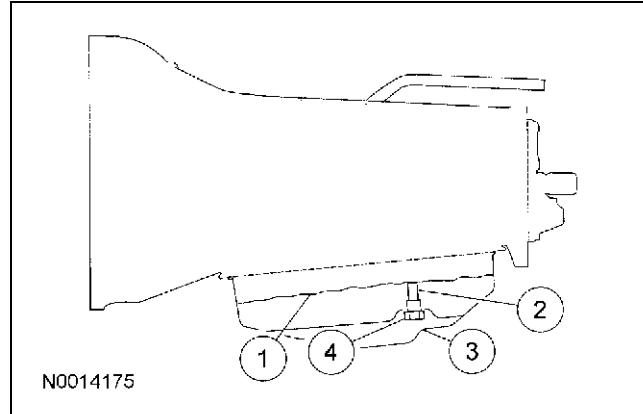
| | |
|---|--|
|  | Rubber Tip Air Nozzle 100-D009 (D93L-7000-A) ST2467-A |
|  | Vacuum Pump Kit 416-D002 (D95L-7559-A) ST1269-A |
|  | Fluid Transporter/Evacuator/ Injector 307-D465 ST2715-A |
|  | Adapter, Fluid Level and Fill Plug 307-437 ST2581-A |
|  | Worldwide Diagnostic System (WDS) Vehicle Communication module (VCM) with appropriate adapters, or equivalent diagnostic tool ST2332-A |

Material

| Item | Specification |
|--|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM | MERCON® V |

Fluid Fill Reference

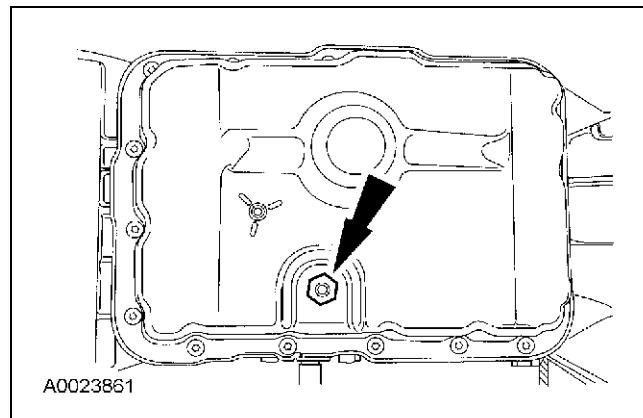
NOTE: Left side of case is shown.



| Item | Part Number | Description |
|------|--------------|---|
| 1 | — | Fluid level |
| 2 | 7A010 | Fluid level tube |
| 3 | W704999-S309 | Fluid level and fill plug (small) (in-vehicle) |
| 4 | 7A010 | Fluid drain plug (large) |

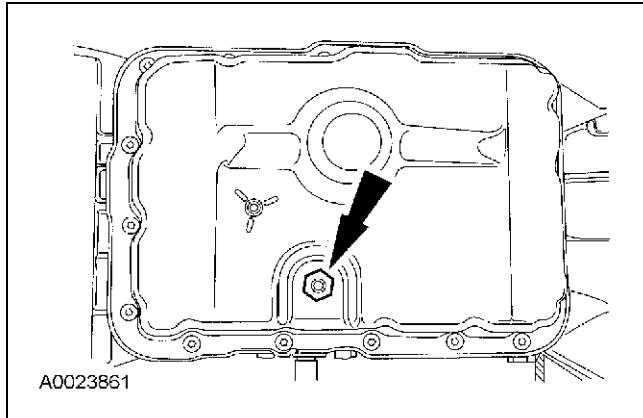
Draining

- With the vehicle in NEUTRAL, position it on a hoist. Set the vehicle as close to level as possible. For additional information, refer to Section 100-02.
- Remove the drain plug (large plug) and allow the fluid to drain.

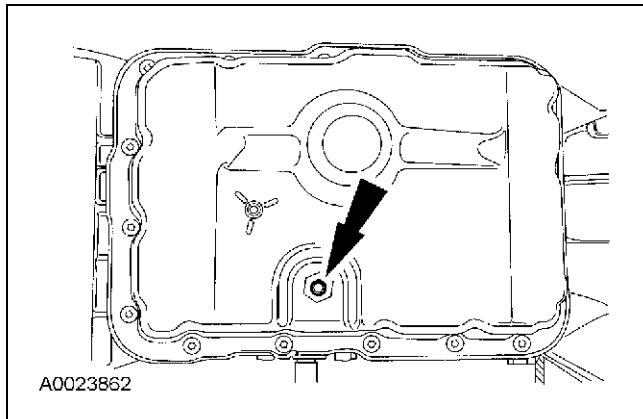


GENERAL PROCEDURES (Continued)**Filling**

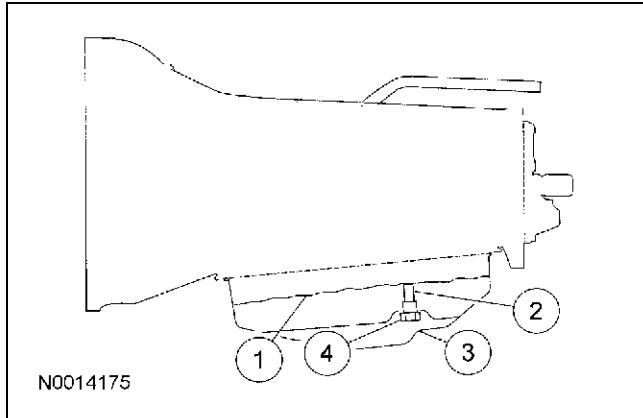
1. Install the fluid drain plug.
 - Tighten to 26 Nm (19 lb-ft).



2. Hold the larger drain plug with a wrench and remove the small (center) fluid level indicating plug.

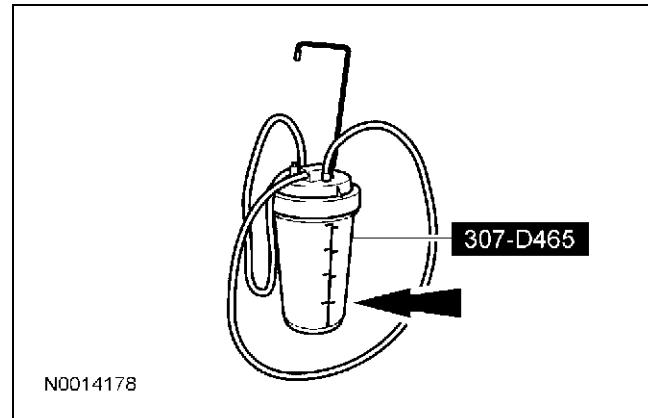


3. Install the special tool into the pan.

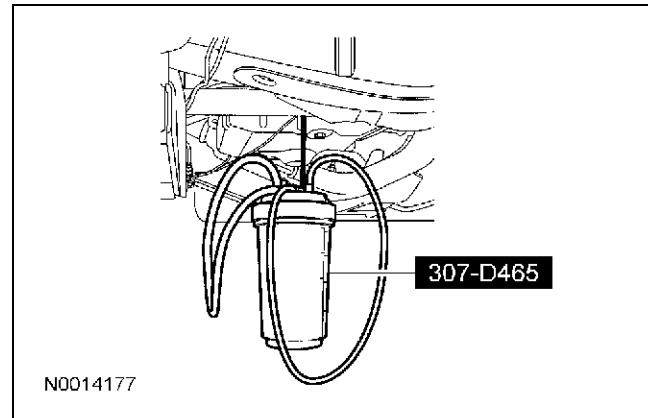


4. **NOTE:** Prior to filling the special tool with clean transmission fluid, make sure that the canister is clean.

Fill the special tool with clean automatic transmission fluid.



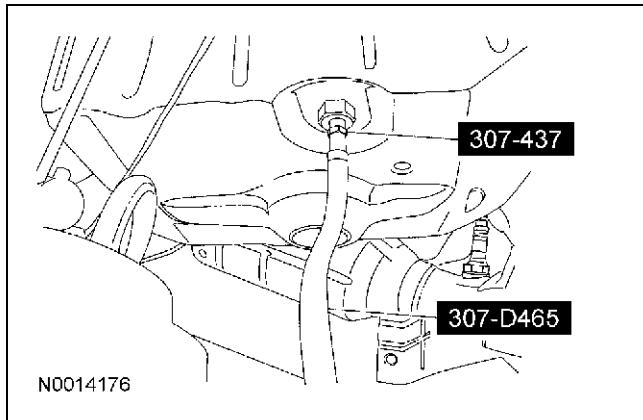
5. Hang the special tool under the vehicle, upright and close to the transmission.



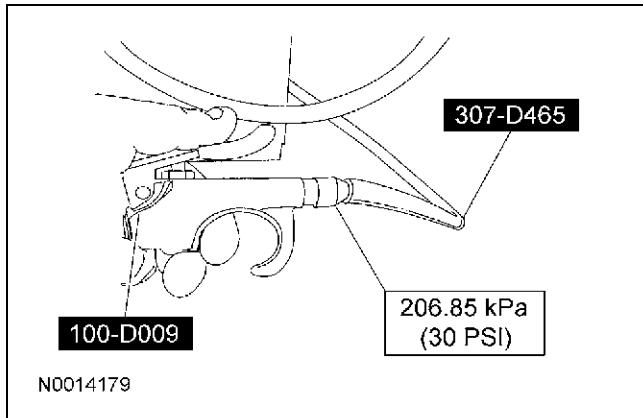
GENERAL PROCEDURES (Continued)

6. Connect the special tools.

- Connect the open end of the fluid hose from the Fluid Transporter/Evacuator/Injector to the Adapter, Fluid Level and Fill Plug at the bottom of the transmission fluid pan.



7. Apply a maximum of 206.85 kPa (30 psi) to the open end of the vacuum/pressure hose from the special tool. Fluid will immediately start flowing out of the special tool into the transmission fluid pan.



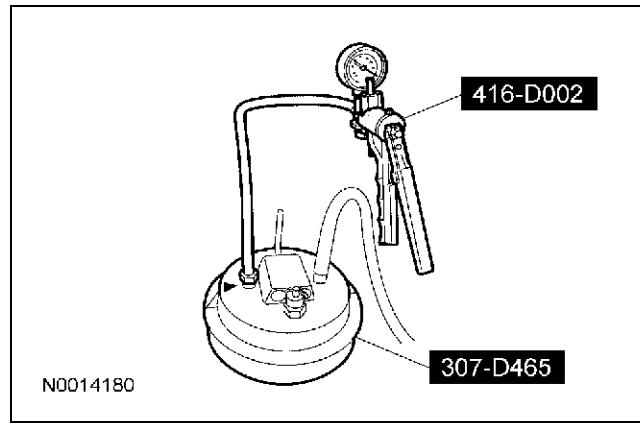
8. Add 2 or 3 quarts of transmission fluid into the fluid pan. Stop the process by releasing the air pressure and removing the air nozzle from the end of the hose.

9. **NOTE:** Engine idle speed is approximately 650 rpm.

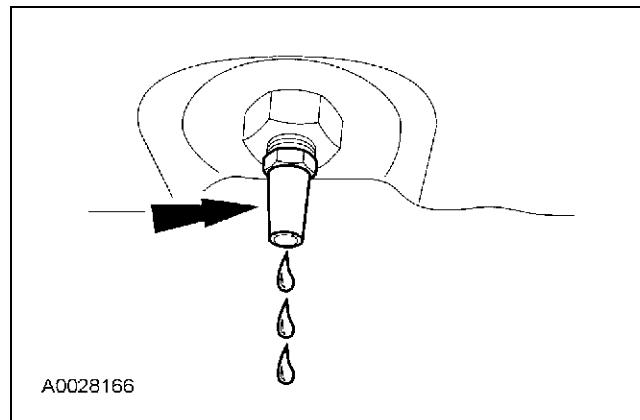
Start and run the engine until the transmission fluid temperature is between 27°-49°C (80°-120°F).

10. Inspect the fluid level in the special tool. If the fluid drains back into the canister, the transmission is full. If no fluid drains back, more fluid will need to be added. Repeat Steps 8 and 9.

11. Once the transmission is full, place a hand vacuum pump on the open end of the vacuum/pressure hose of the special tool and apply vacuum to the system. This will pull out any extra fluid trapped in the system and direct it into the container.

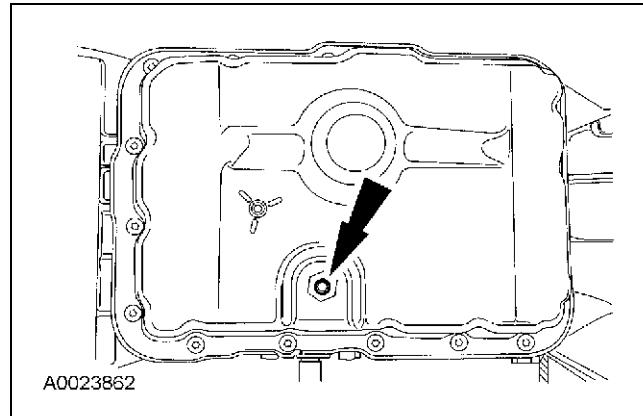


12. Allow the fluid to drain. When the fluid comes out as a thin stream or drip, the fluid is at the correct level.



GENERAL PROCEDURES (Continued)

13. Reinstall the small (center) fluid level indicating plug using a 3/16-inch Allen key.
- Tighten to 10 Nm (89 lb-in).



GENERAL PROCEDURES

Transmission Fluid Cooler Backflushing and Cleaning

Material

| Item | Specification |
|---|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada) | MERCON® V |

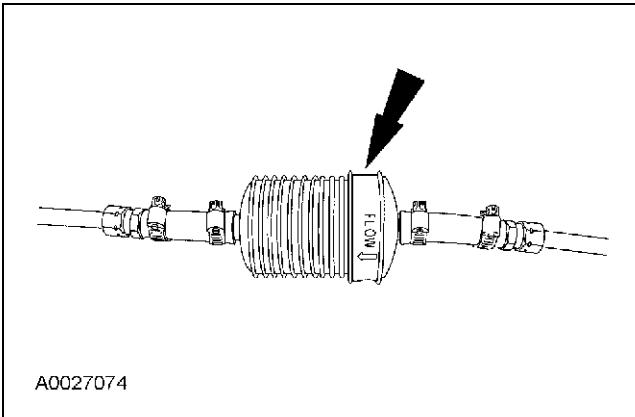
⚠ CAUTION: Whenever a transmission has been disassembled to install new parts or a new or remanufactured transmission has been installed, a new transmission fluid cooler, either in-tank, auxiliary or oil-to-air (OTA), if equipped will need to be installed. Using a suitable torque converter/fluid cooler cleaner, clean and backflush the transmission fluid cooler tubes.

⚠ CAUTION: Use only clean automatic transmission fluid specified for this transmission. Do not use supplemental fluid additives, treatments or cleaning agent. The use of these materials may affect transmission operation and result in internal damage to the transmission.

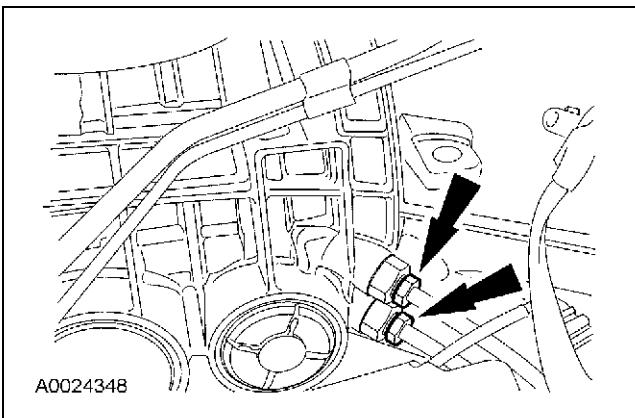
When internal wear or damage has occurred in the transmission, metal particles, clutch plate material or band material may have been carried into the transmission fluid cooler. These contaminants are a major cause of recurring transmission concerns and must be removed from the system before the transmission is put back in use.

NOTE: Do not use any solvents while carrying out this procedure. Only use clean automatic transmission fluid.

1. Conduct backflushing with a suitable torque converter/transmission fluid cooler cleaner. Test the equipment to make sure that a vigorous fluid flow is present before proceeding. Install a new system filter if flow is weak or contaminated.
2. Remove and discard the in-line transmission fluid filter, if equipped.



3. To aid in attaching the cleaner to the transmission steel cooler lines, connect 2 additional rubber hoses to the transmission end of the steel transmission cooler lines as described.
 - Connect the cleaner tank pressure line to the steel transmission cooler return line (transmission case upper fitting).
 - Connect a tank return hose to the steel transmission cooler pressure line (transmission case lower fitting). Place the outlet end of this hose in the solvent tank reservoir.



4. Turn on the pump and allow the transmission fluid to circulate a minimum of 5 minutes (cycling switch on and off will help dislodge contaminants in the cooler system).
5. Switch off the pump and disconnect the pressure hose from the transmission cooler return line.

GENERAL PROCEDURES (Continued)

6. Use compressed air to blow out the cooler(s) and lines (blow air into the transmission cooler return line) until all the fluid is removed.
7. Remove the rubber return hose from the remaining steel cooler line.



GENERAL PROCEDURES

Torque Converter

1. A new or remanufactured torque converter must be installed if one or more of the following statements is true:
 - A torque converter malfunction has been determined based on complete diagnostic procedures.
 - Converter stud or studs, impeller hub or bushing are damaged.
 - Discoloration (due to overheating).
 - Evidence of transmission assembly or fluid contamination due to the following transmission or converter failure modes:
 - Major metallic failure.
 - Multiple clutches or clutch plate failures.
 - Sufficient component wear which results in metallic contamination.
 - Internal torque converter contamination present. For additional information, refer to Torque Converter Contamination Inspection in this section.



GENERAL PROCEDURES

Torque Converter Contamination Inspection

⚠ CAUTION: Do not use water-based cleaners or mineral spirits to clean or flush the torque converter or transmission damage will occur. Use only clean automatic transmission fluid designated for the transmission and converter being serviced.

⚠ CAUTION: The torque converter drain plug and seal are not reusable. If equipped, discard the drain plug and seal, then install a new drain plug assembly.

1. If a new or remanufactured torque converter is not being installed, the following steps must be completed.
2. With the torque converter on a bench, pour a small amount of transmission fluid from the torque converter onto an absorbent white tissue or through a paper filter and examine the fluid.

3. Observe the color and odor of the fluid. The fluid should be red, not brown or black. Odor may indicate an overheating condition such as clutch disc or band failure.
4. Examine the stain on the tissue for evidence of particles (spec of any kind). Examine the fluid level indicator for signs of antifreeze (gum or varnish). If particles are present in the fluid or there is evidence of engine coolant or water, a new torque converter must be installed.
5. If there are no particles or contamination present, drain the remainder of the transmission fluid from the torque converter.
6. Add 1.9L (2 qt) of clean automatic transmission fluid into the converter and agitate by hand.
7. Thoroughly drain the fluid.

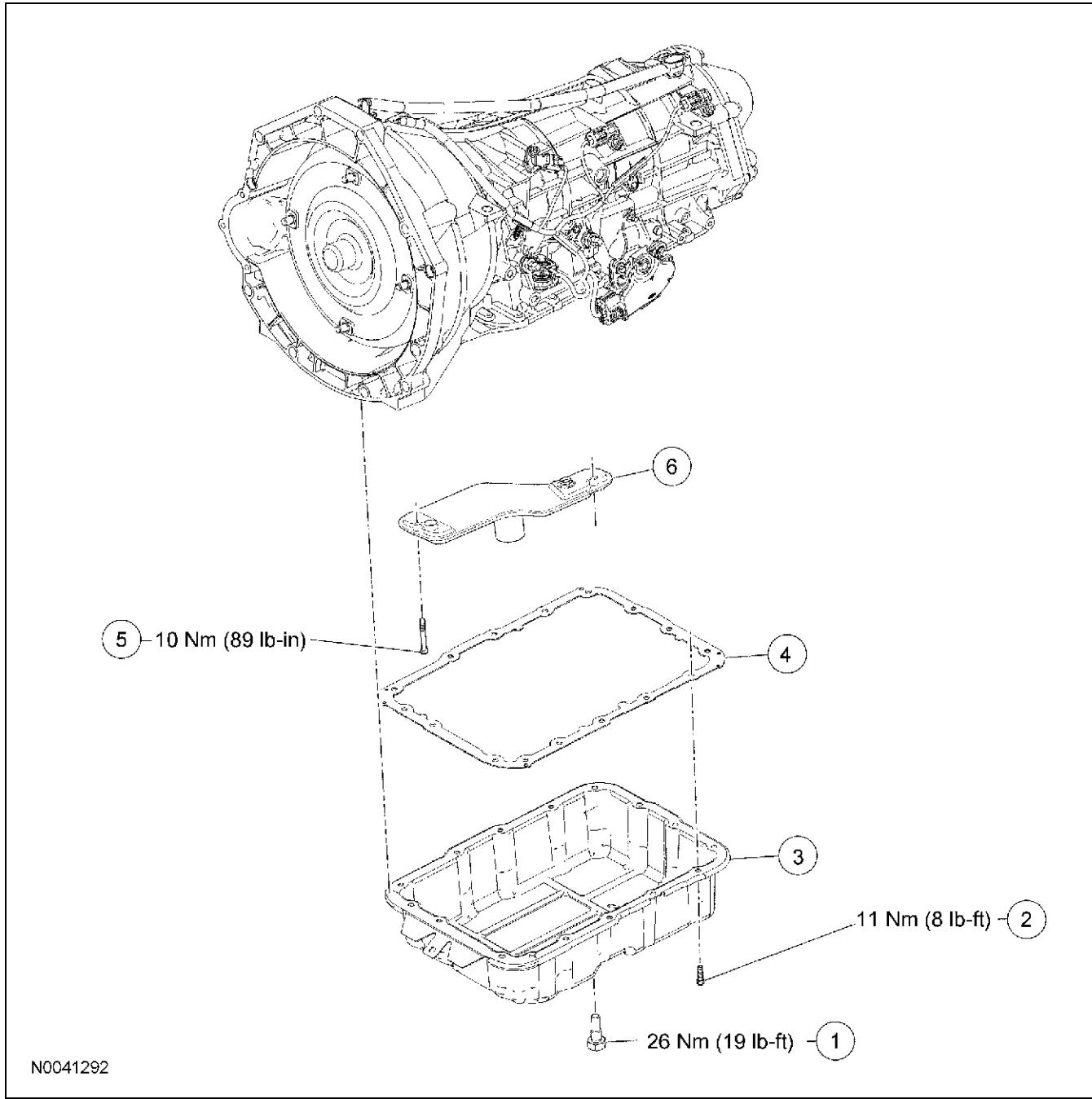


IN-VEHICLE REPAIR

Fluid Pan, Gasket and Filter

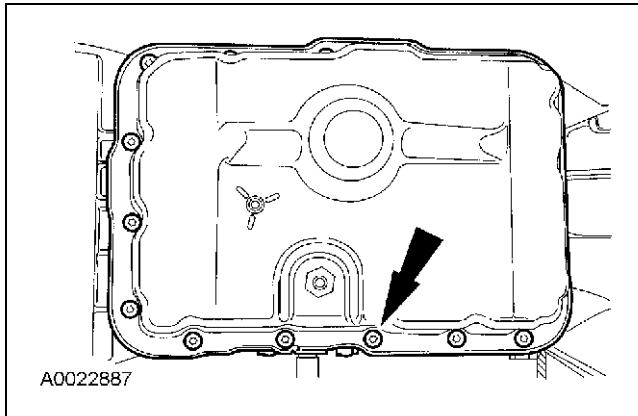
Material

| Item | Specification |
|---|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM | MERCON® V |



IN-VEHICLE REPAIR (Continued)

| Item | Part Number | Description |
|------|-------------|--|
| 1 | 7A010 | Transmission fluid pan drain plug |
| 2 | W500213 | Transmission fluid pan-to-case screw (16 required) |
| 3 | 7A194 | Transmission fluid pan |
| 4 | 7A191 | Transmission fluid pan gasket |
| 5 | W705559 | Transmission fluid filter screw (2 required) |
| 6 | 7A098 | Transmission fluid filter |

**Removal**

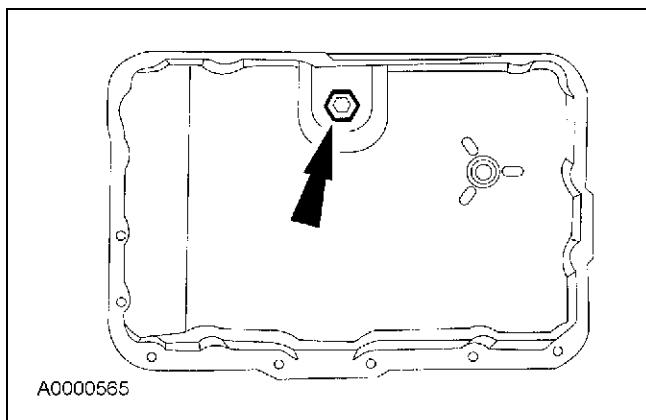
⚠ CAUTION: Lubricate the fluid filter seals with clean automatic transmission fluid or they may be damaged.

NOTE: Make sure that the fluid filter seals are correctly seated on the filter.

NOTE: The transmission fluid pan gasket is reusable. Clean and inspect for damage. If not damaged, the gasket should be reused.

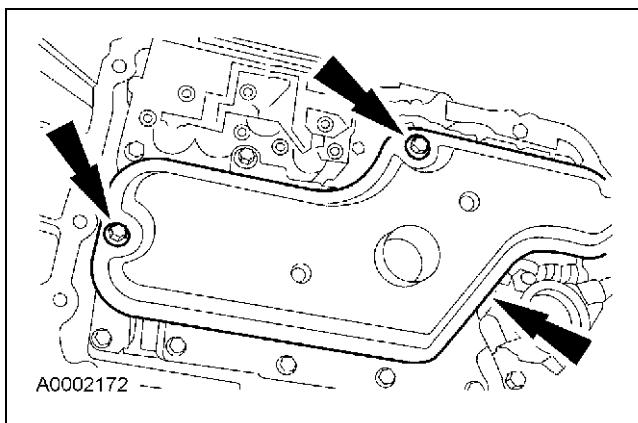
NOTE: Install a new transmission fluid filter.

- With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.
- Remove the drain plug and drain the fluid.

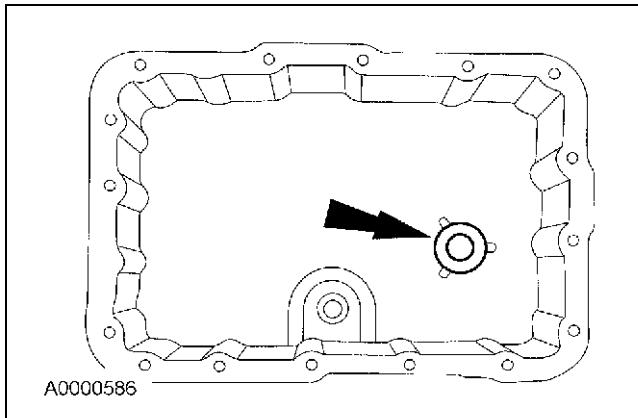


- NOTE:** The transmission fluid pan gasket is reusable, clean and inspect for damage. If not damaged, the gasket should be reused.
Remove the transmission fluid pan and gasket.

- Remove and discard the transmission fluid filter.

**Installation**

- Clean and inspect the transmission fluid pan and magnet.



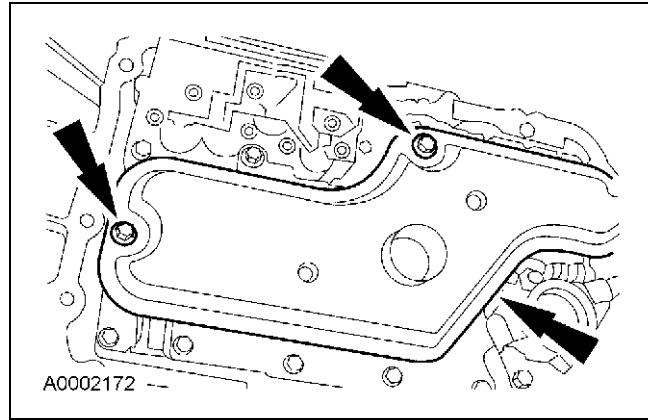
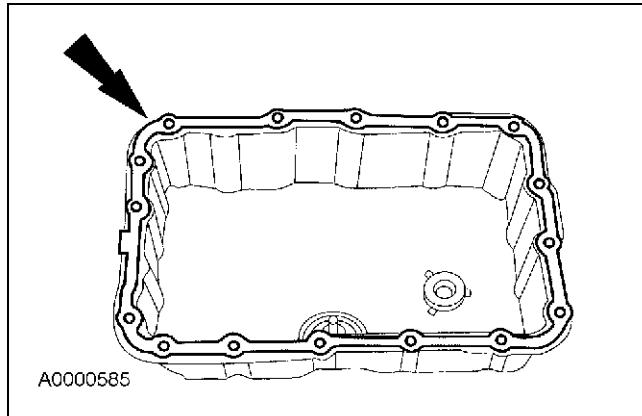
IN-VEHICLE REPAIR (Continued)

2. **⚠ CAUTION:** Lubricate the transmission fluid filter O-ring seals with clean automatic transmission fluid or the seals may be damaged.

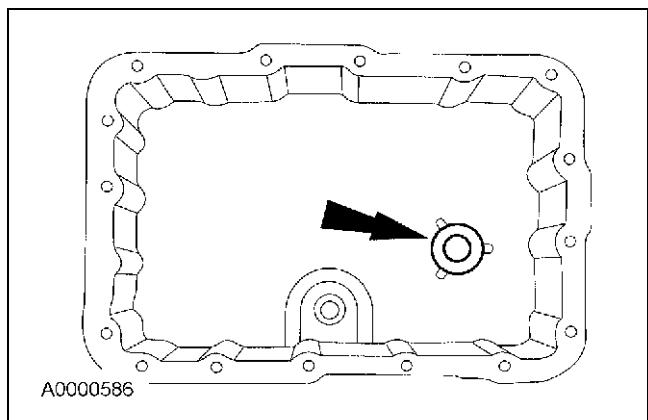
NOTE: Make sure the transmission fluid filter seals are correctly seated on the filter.

Lubricate the seals and install the transmission fluid filter and screws.

- Tighten to 10 Nm (89 lb-in).



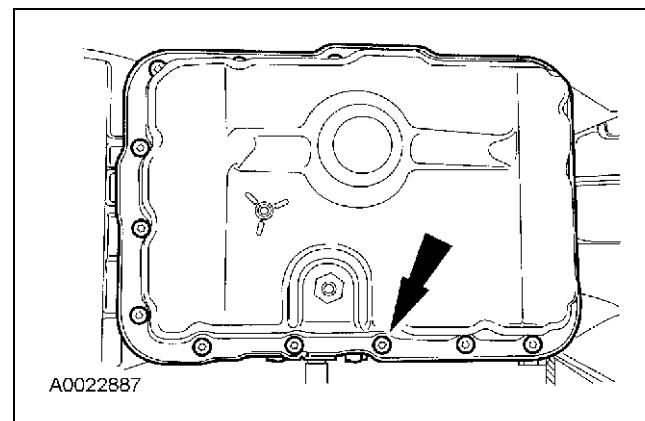
3. Install the fluid pan magnet in the transmission



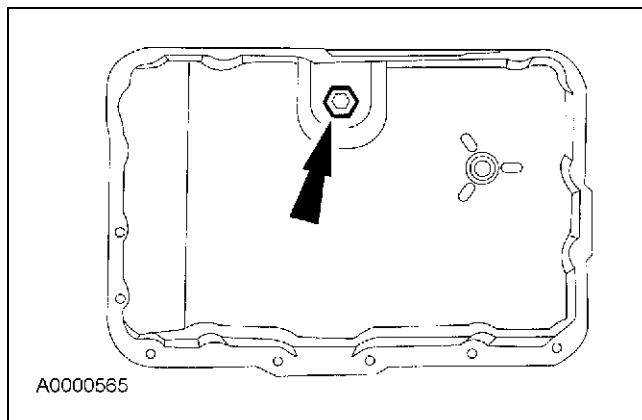
4. **NOTE:** The transmission fluid pan gasket is reusable, clean and inspect for damage. If not damaged, the gasket should be reused.

Install the transmission fluid pan and gasket and loosely install the screws.

5. Install the screws in a crisscross sequence.
- Tighten to 11 Nm (8 lb-ft).



6. Install the drain plug.
- Tighten to 26 Nm (19 lb-ft).

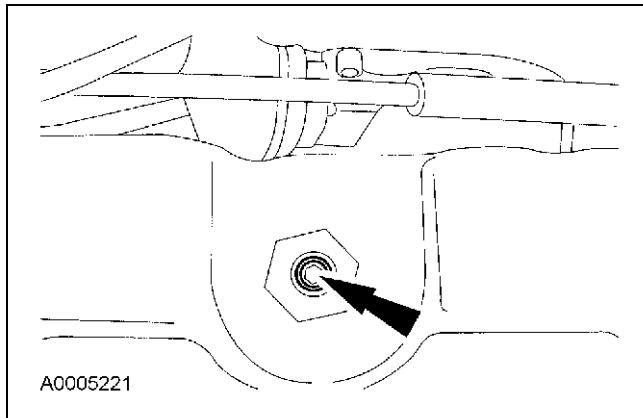


IN-VEHICLE REPAIR (Continued)

7. NOTE: It will be necessary to hold the drain plug with a wrench when removing the fluid level indicator plug.

NOTE: Use a 3/16 inch Allen key to remove the fluid level indicator plug.

Remove the fluid level indicator plug.



8. Carry out the fluid level check. Refer to Transmission Fluid Level Check in this section.



IN-VEHICLE REPAIR**Main Control Valve Body****Special Tool(s)**

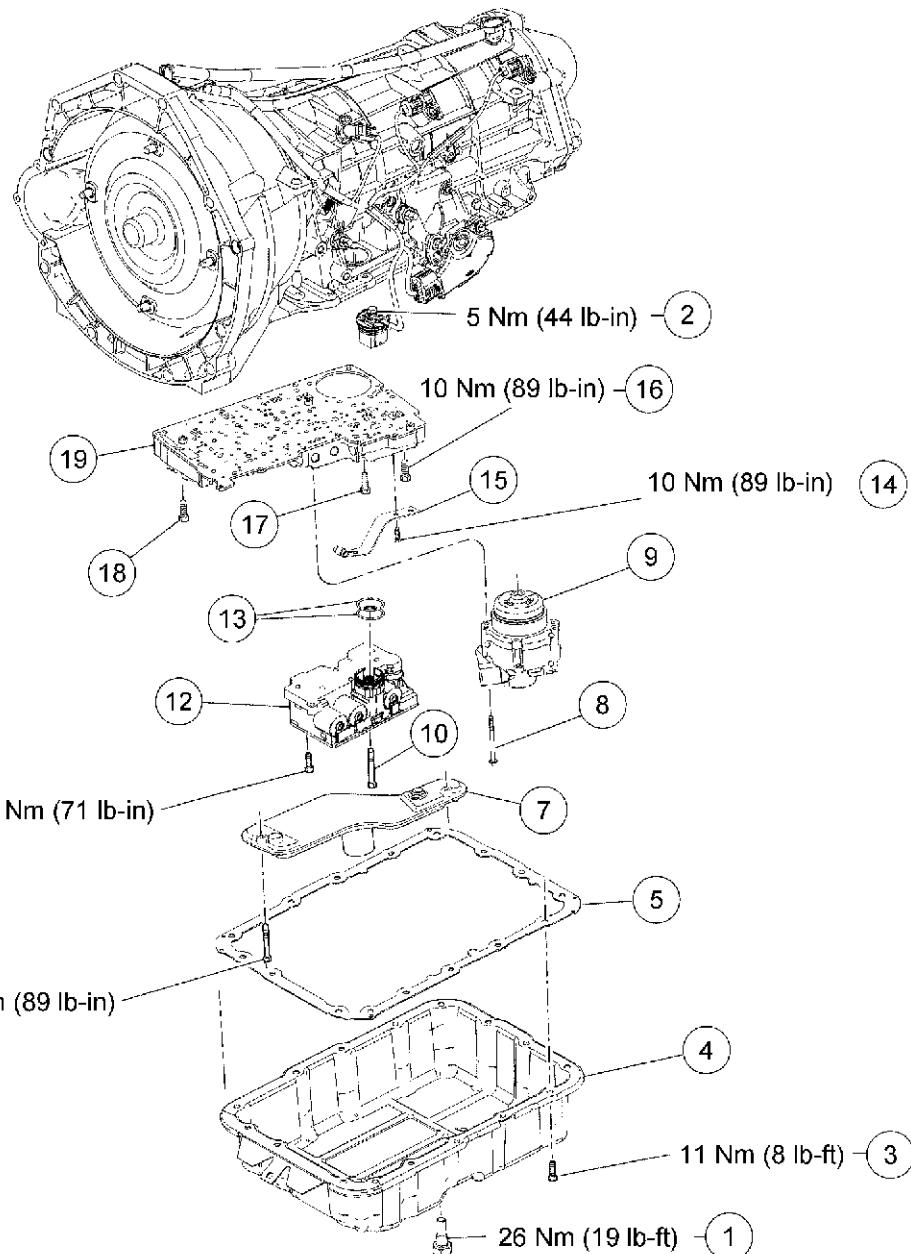
| | |
|---|--|
|  ST1639-A | Aligner, Valve Body (2 required) 307-334 (T95L-70010-C) |
|---|--|

Material

| Item | Specification |
|---|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM | MERCON® V |



IN-VEHICLE REPAIR (Continued)



N0044040

| Item | Part Number | Description |
|------|-------------|--|
| 1 | 7A010 | Transmission fluid pan drain plug |
| 2 | — | Solenoid body electrical connector screw |
| 3 | W500213 | Transmission fluid pan-to-case screw (16 required) |
| 4 | 7A194 | Transmission fluid pan |
| 5 | 7A191 | Transmission fluid pan gasket |
| 6 | W705559 | Transmission fluid filter screw (2 required) |

(Continued)

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| Item | Part Number | Description |
|------|-------------|----------------------------------|
| 7 | 7A098 | Transmission fluid filter |
| 8 | W702359 | Reverse servo screw (4 required) |
| 9 | 7B193 | Reverse servo assembly |
| 10 | W703189 | Solenoid body screw (7 required) |
| 11 | W702921 | Solenoid body screw |
| 12 | 7G391 | Solenoid body |
| 13 | W705928 | Solenoid body O-rings |

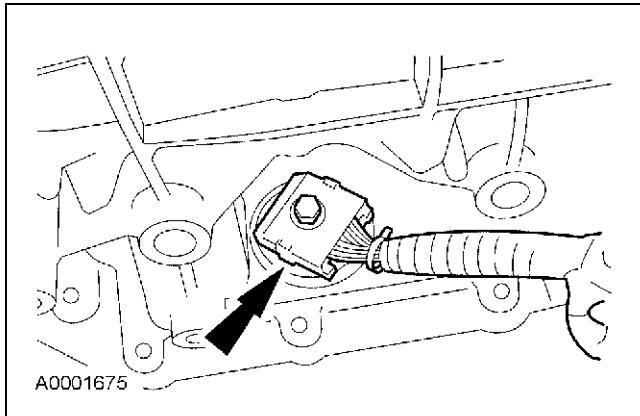
(Continued)



Login Tracking Code

IN-VEHICLE REPAIR (Continued)

| Item | Part Number | Description |
|------|-------------|---|
| 14 | W500100 | Manual valve detent spring screw |
| 15 | 7E332 | Manual valve detent spring |
| 16 | W500102 | Main control valve body screw (18 required) |
| 17 | W702791 | Main control valve body screw |
| 18 | W706672 | Main control valve body screw |
| 19 | 7A100 | Main control valve body assembly |

**Removal**

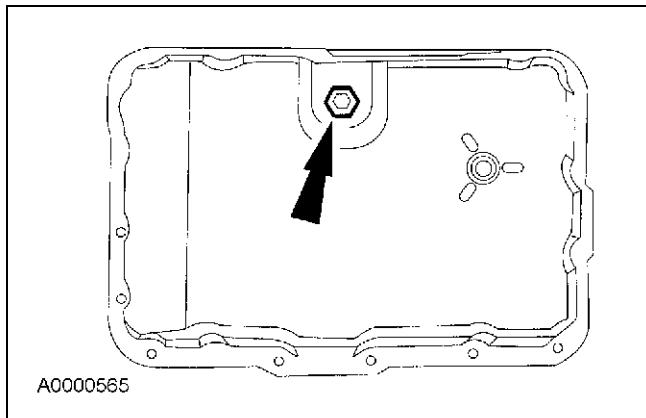
CAUTION: Lubricate the fluid filter seals with clean automatic transmission fluid or they may be damaged.

NOTE: Make sure that the fluid filter seals are correctly seated on the filter.

NOTE: Clean the area around the solenoid body connector to prevent contamination.

NOTE: The transmission fluid pan gasket is reusable. Clean and inspect for damage. If not damaged, the gasket should be reused.

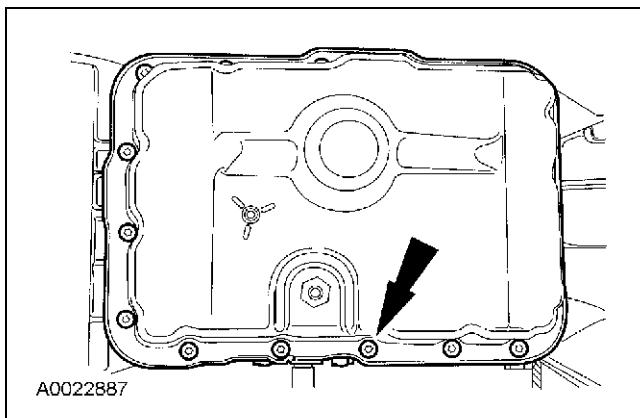
- With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.
- Drain the transmission fluid.



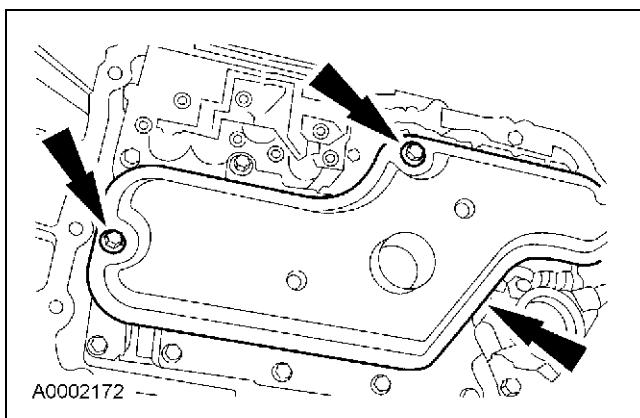
- NOTE:** Clean the area around the solenoid body connector to prevent contamination. Disconnect the solenoid body harness electrical connector.

4. **NOTE:** The transmission fluid pan gasket is reusable. Clean and inspect the gasket for damage. If not damaged, the gasket should be reused.

Remove the transmission fluid pan and gasket.



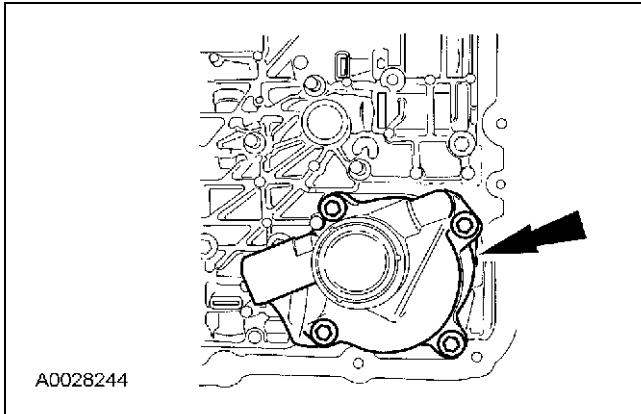
- Remove the transmission fluid filter.



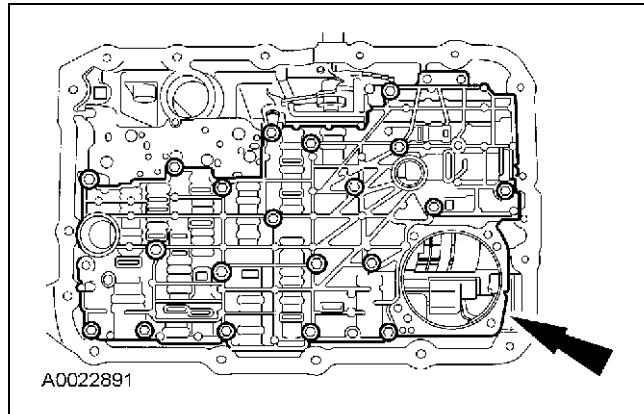
Login Tracking Code

IN-VEHICLE REPAIR (Continued)

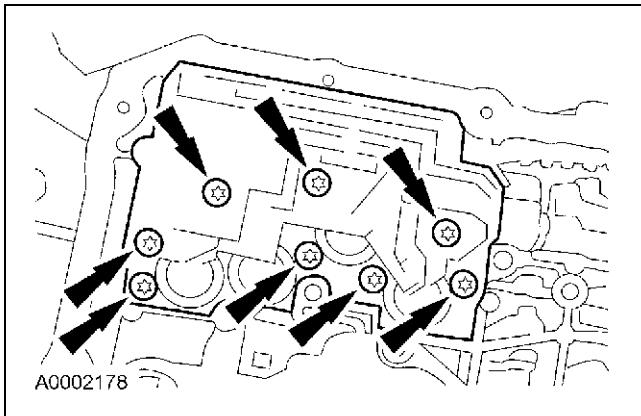
6. Remove the 4 screws attaching the reverse servo to the transmission case and remove the servo.



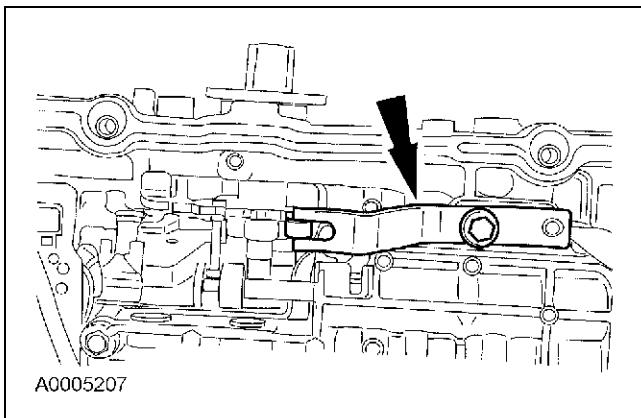
9. Remove the main control valve body bolts and the main control valve body assembly.



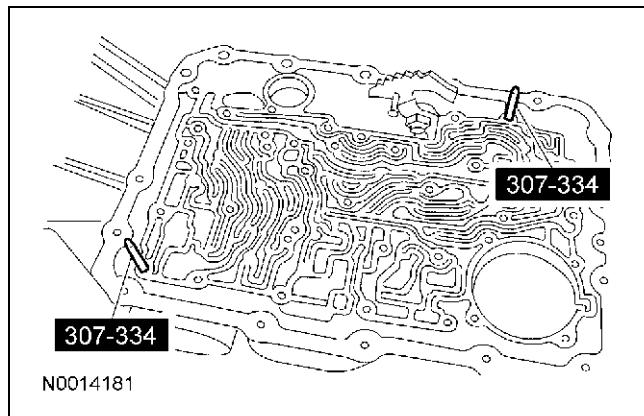
7. Remove the screws and the solenoid body



8. Remove the manual control valve detent spring.

**Installation**

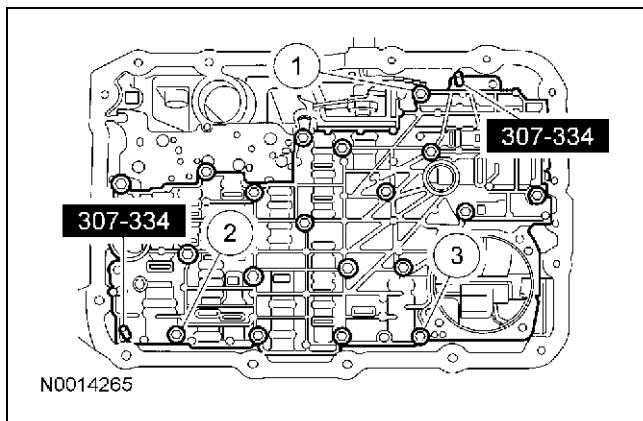
1. Install the special tools into the transmission case.



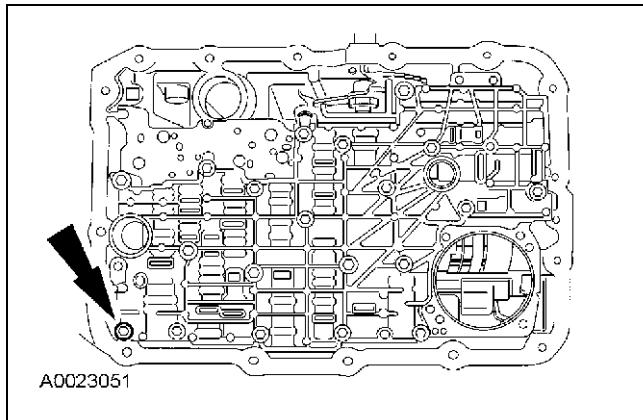
2. Using the special tools, install the main control valve body and loosely install the screws.
- 1 Install the short screw.
 - 2 Install the screw with the larger head.
 - 3 Install the remaining screws.



Login Tracking Code

IN-VEHICLE REPAIR (Continued)

3. Remove the special tool and loosely install the screw.

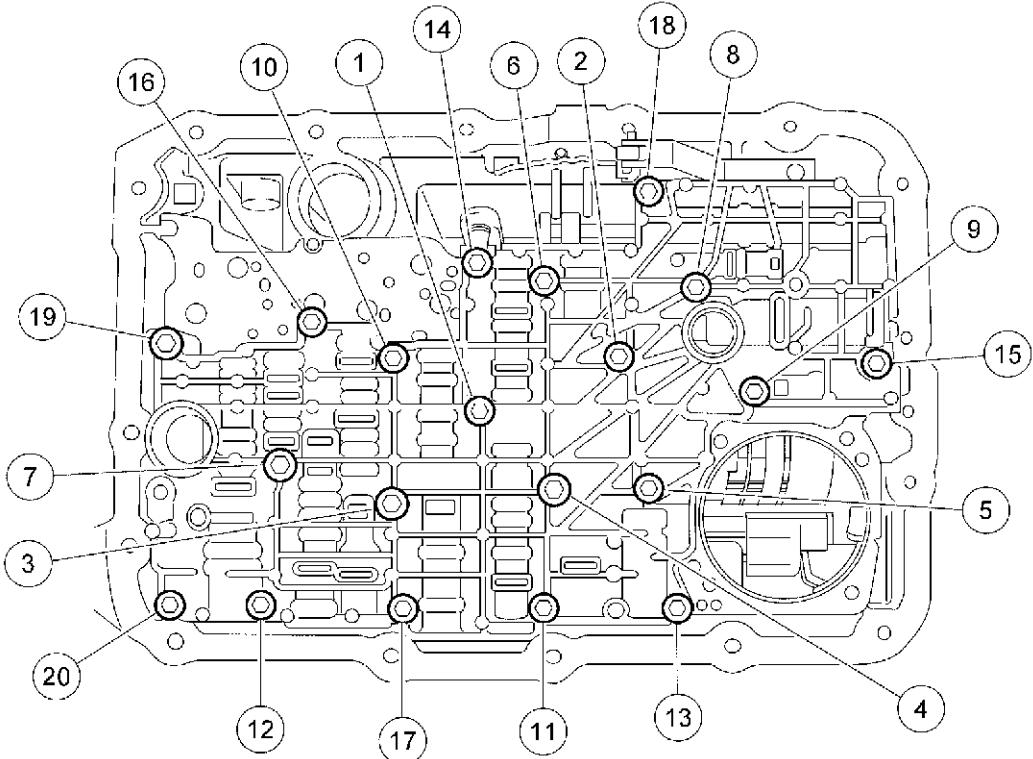


Login Tracking Code

IN-VEHICLE REPAIR (Continued)

4. Tighten the screws in the sequence shown.

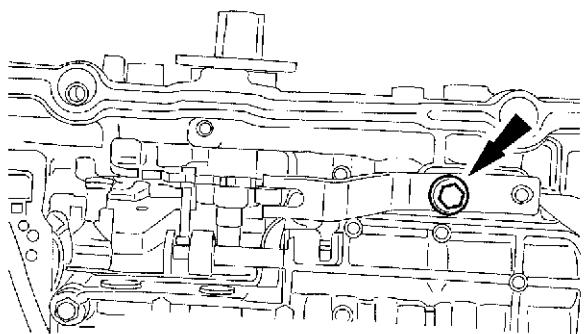
- Tighten to 10 Nm (89 lb-in).



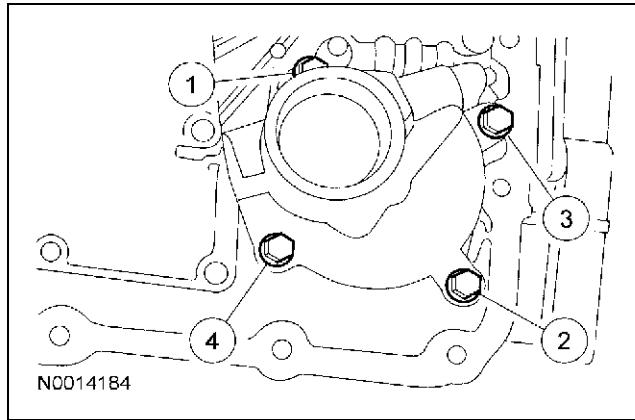
N0014183

5. Install the manual control valve detent spring.

- Tighten to 10 Nm (89 lb-in).



N0001496



N0014184

6. Install the reverse servo and the 4 screws.

Tighten the screws in sequence in 2 stages.

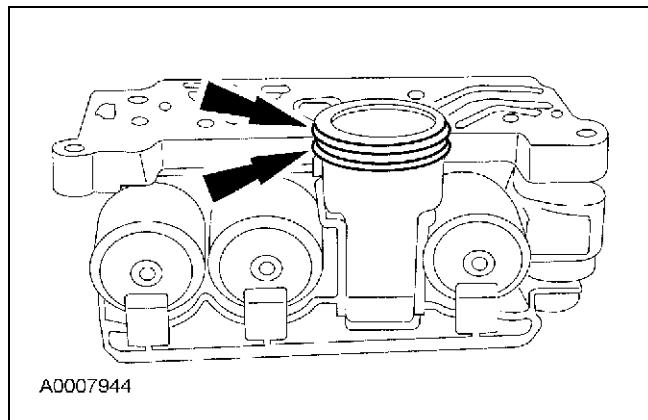
- Stage 1: Tighten to 5 Nm (44 lb-in).
- Stage 2: Tighten to 11 Nm (8 lb-ft).



Login Tracking Code

IN-VEHICLE REPAIR (Continued)

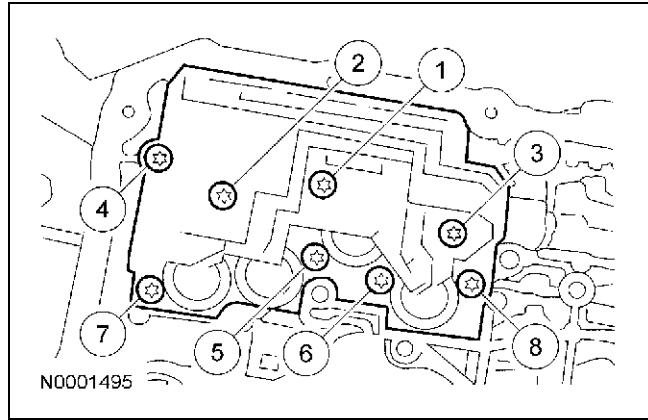
7. Install new O-ring seals on the solenoid body connector. Lubricate the O-ring seals with clean automatic transmission fluid.



8. **⚠ CAUTION: Inspect the transmission case bore to make sure it is free of foreign material and not damaged. If it is damaged, transmission leak may occur.**

Install the solenoid body. Tighten the screws in sequence shown.

- Tighten to 8 Nm (71 lb-in).

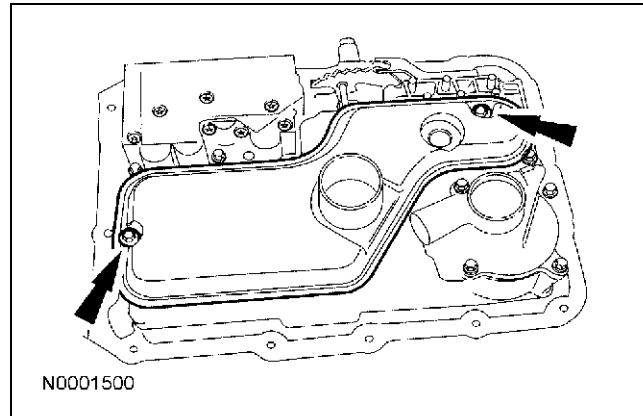


9. **⚠ CAUTION: Lubricate the fluid filter seals with clean automatic transmission fluid or they may be damaged.**

NOTE: Make sure that the fluid filter seals are correctly seated on the filter.

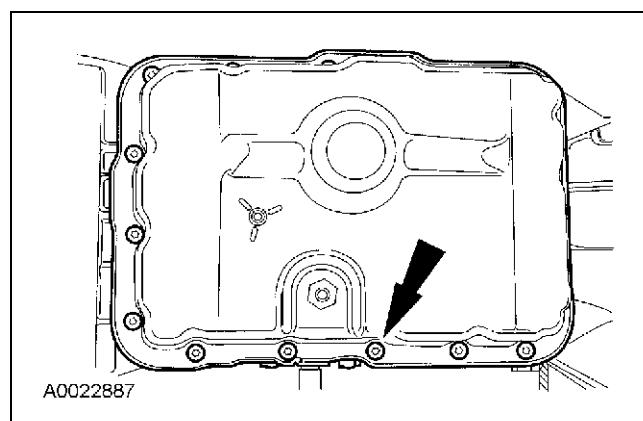
Lubricate the seals and install the transmission fluid filter.

- Tighten to 10 Nm (89 lb-in).



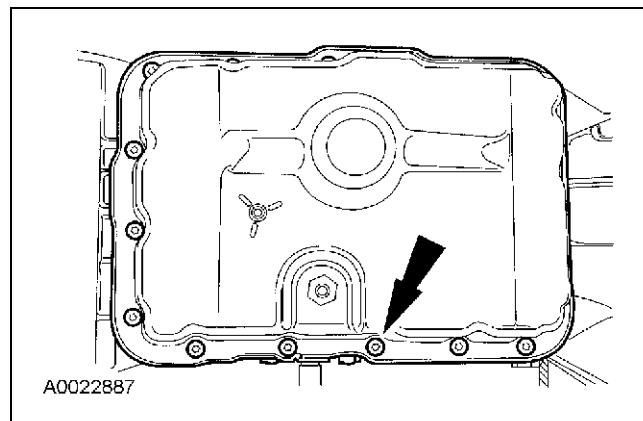
10. **NOTE:** The transmission fluid pan gasket is reusable, clean and inspect for damage. If not damaged, the gasket should be reused.

Install the transmission fluid pan and gasket and loosely install the screws.



11. Tighten the screws in a crisscross sequence.

- Tighten to 11 Nm (8 lb-ft).



IN-VEHICLE REPAIR (Continued)

14.  **CAUTION:** Damage will occur to the solenoid body assembly if the screw is tightened above specification.

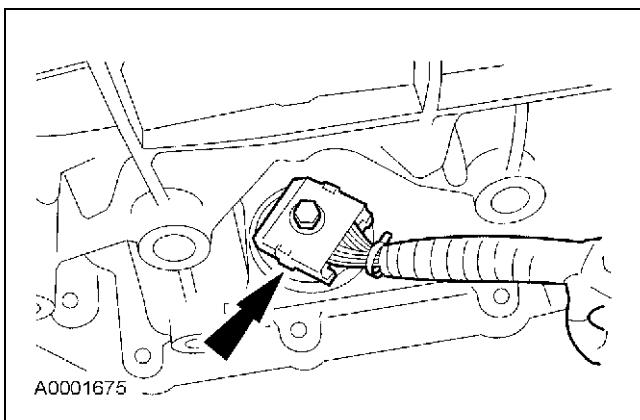
NOTE: Always install new O-ring seals on the vehicle harness connector.

NOTE: Clean the area around the connector to prevent contamination of the solenoid body connector.

NOTE: Use petroleum jelly to lubricate the O-ring seals to aid in the installation process.

Install and lubricate new O-ring seals on the transmission connector and connect the connector.

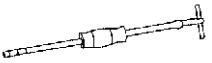
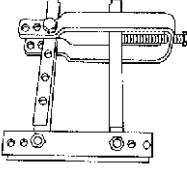
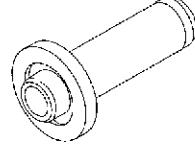
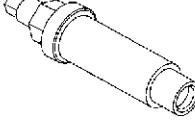
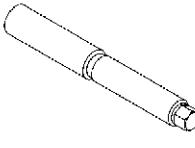
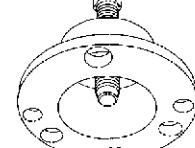
- Tighten to 5 Nm (44 lb-in).



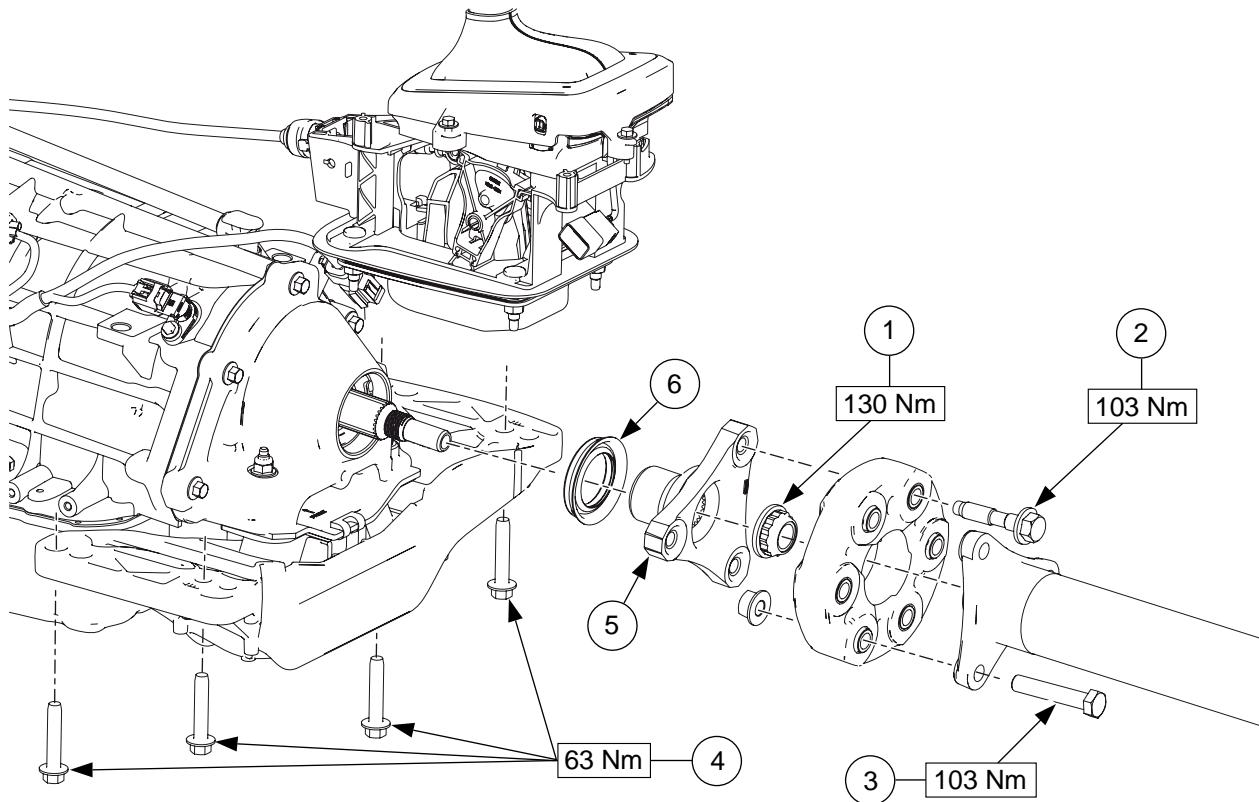
15. Fill the transmission to the correct level. For additional information, refer to Transmission Fluid Drain and Refill — Without Torque Converter Drain Plug in this section.



IN-VEHICLE REPAIR**Extension Housing Seal****Special Tool(s)**

| | |
|---|--|
|  ST1185-A | Slide Hammer 100-001 (T50T-100-A) |
|  ST1758-A | Remover, Torque Converter Fluid Seal 307-309 (T94P-77001-BH) |
|  ST2498-A | Installer, Drive Pinion Oil Seal 205-115 |
|  ST2440-A | Installer, Drive Pinion Flange 205-479 |
|  ST2416-A | Installer, Output Shaft Flange 307-404 |
|  ST2937A | Remover, Output Shaft Flange 307-523 |



IN-VEHICLE REPAIR (Continued)

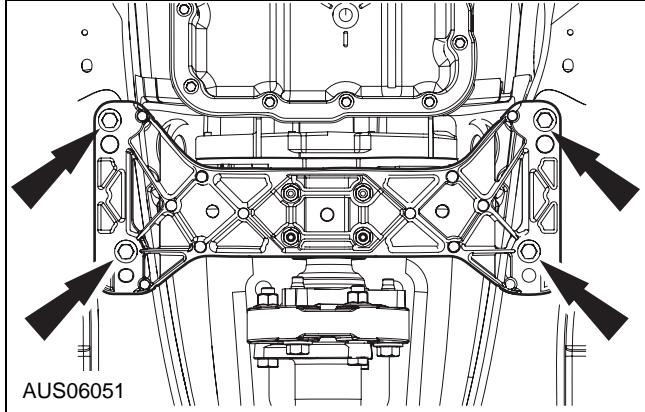
AUS06062

| Item | Part Number | Description |
|------|-------------|---|
| 1 | W701357 | Transmission output shaft flange coupler bolts (4 required) |
| 2 | W704971 | Transmission crossmember-to-floor pan screws |
| 3 | W701357 | Transmission output shaft flange nut |
| 4 | 7089 | Transmission output shaft flange |
| 5 | 7052 | Extension housing seal |

Removal

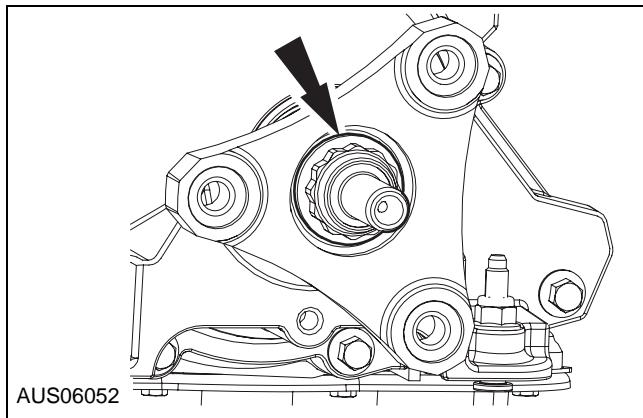
- With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.
- Remove the driveshaft. For additional information, refer to Section 205-01.

- Using a suitable transmission jack, support the transmission.
- Remove the 4 transmission crossmember-to-floor pan screws only and lower the transmission enough to gain access to the extension housing seal.

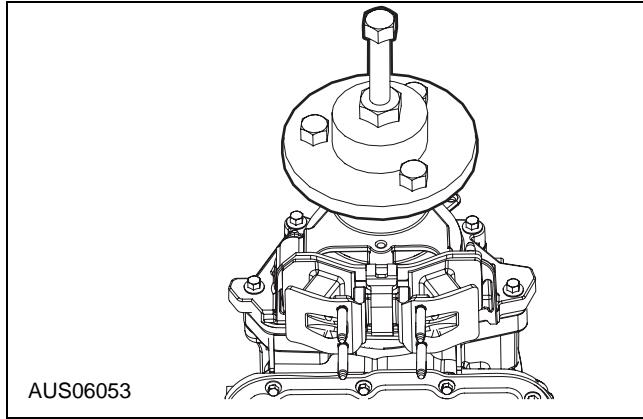


IN-VEHICLE REPAIR (Continued)

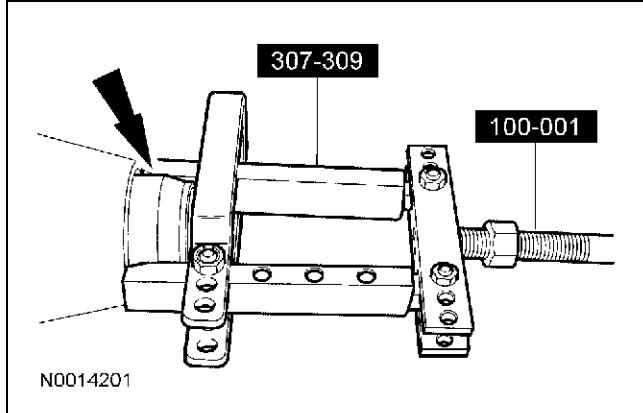
5. Remove and discard the nut.



6. Using the special tool, remove the output shaft flange.

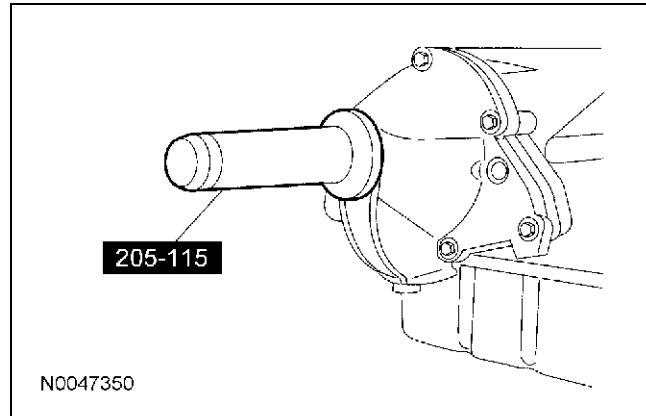


7. Using the special tools, remove and discard the extension housing seal.

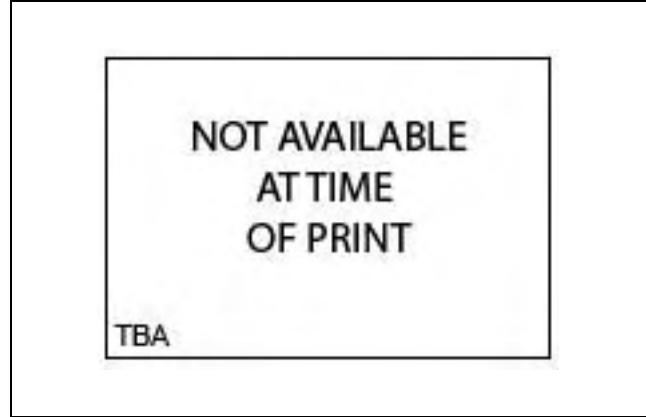
**Installation**

- NOTE:** Make sure the extension housing seal is correctly installed onto the special tool and the garter spring is in the correct position.

Using the special tool, install the new extension housing seal.

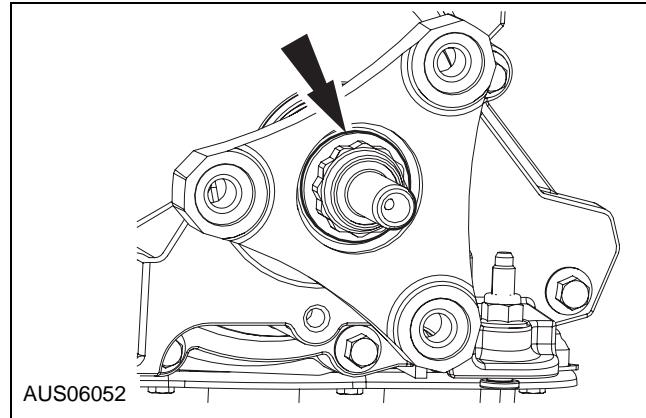


- Using the special tools, install the output flange.



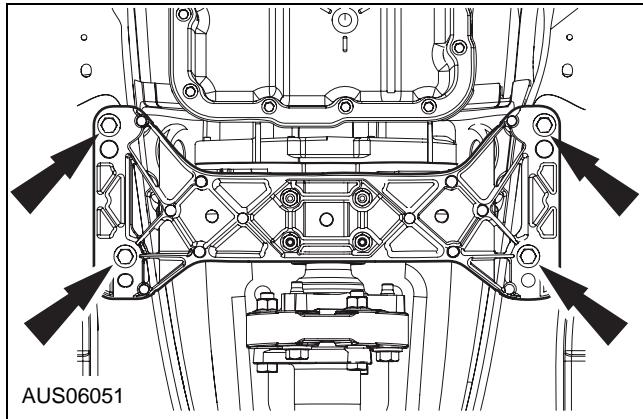
- Install a new nut.

- Tighten to 130 Nm (96 lb-ft).



IN-VEHICLE REPAIR (Continued)

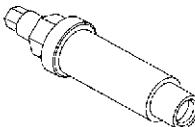
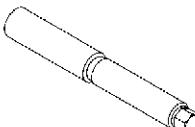
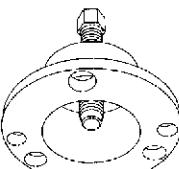
4. Install the 4 transmission crossmember-to-floor pan screws only.
- Tighten to 63 Nm (46 lb-ft).



5. Install the driveshaft. For additional information, refer to Section 205-01.
6. Check the transmission fluid level. For additional information, refer to Transmission Fluid Level Check in this section.



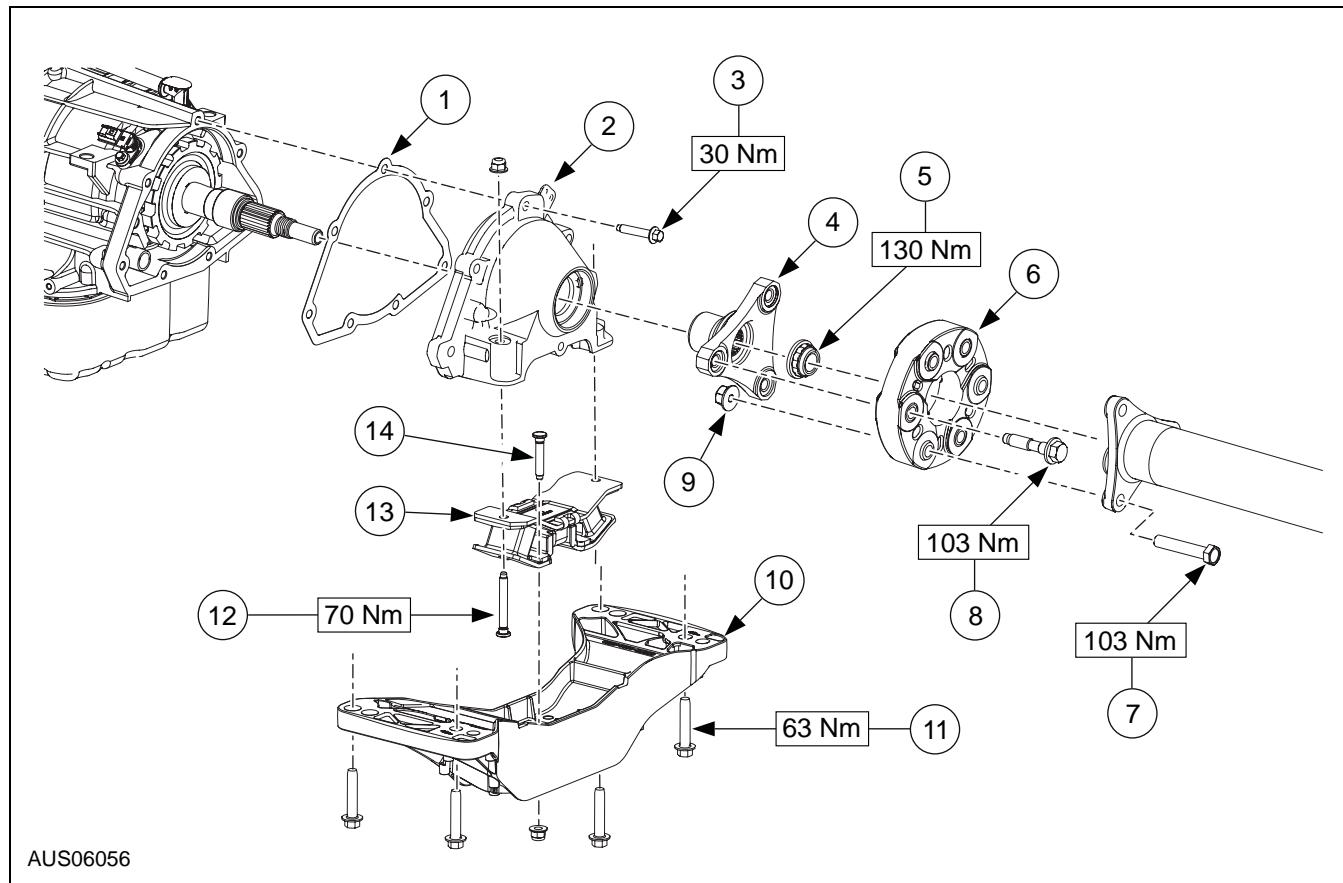
IN-VEHICLE REPAIR**Extension Housing Gasket****Special Tool(s)**

| | |
|---|---|
|  ST2440-A | Installer, Drive Pinion Flange 205-479 |
|  ST2416-A | Installer, Output Shaft Flange 307-404 |
|  ST2937A | Remover, Output Shaft Flange 307-523 |



Login Tracking Code

IN-VEHICLE REPAIR (Continued)

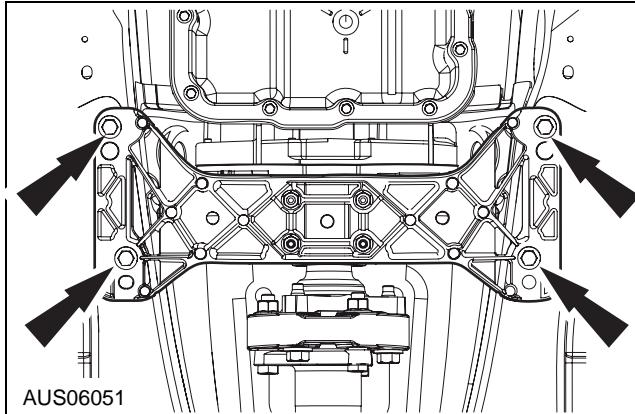


| Item | Part Number | Description |
|------|-------------|--|
| 1 | W701357 | Transmission output shaft flange coupler bolt (4 required) |
| 2 | W705966 | Transmission insulator-to-extension housing center screw |
| 3 | W704971 | Transmission crossmember-to-floor pan screws |
| 4 | W701357 | Transmission output shaft flange nut |
| 5 | 7089 | Transmission output shaft flange |
| 6 | W500311 | Extension housing-to-case screw |
| 7 | 7A039 | Extension housing |
| 8 | 7086 | Extension housing gasket |

Removal

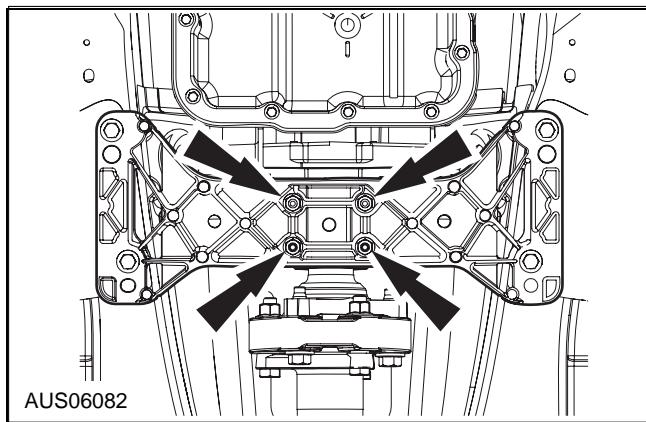
- With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.

- Remove the driveshaft. For additional information, refer to Section 205-01.
- Remove the catalytic converter assembly. For additional information, refer to Section 309-00.
- NOTE:** Use a suitable transmission jack to support the transmission.
Remove the 4 transmission crossmember-to-floor pan bolts.

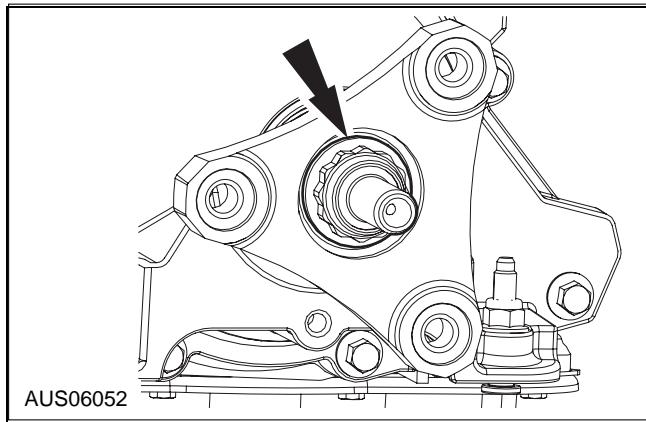


IN-VEHICLE REPAIR (Continued)

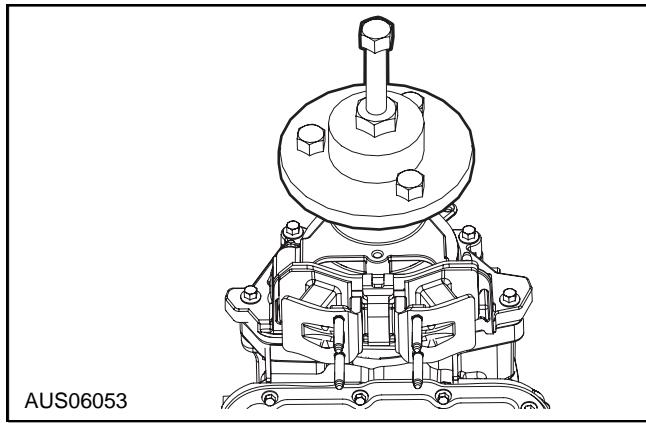
5. Remove the transmission insulator-to-extension housing center screw and remove the transmission crossmember.



6. Remove and discard the nut.

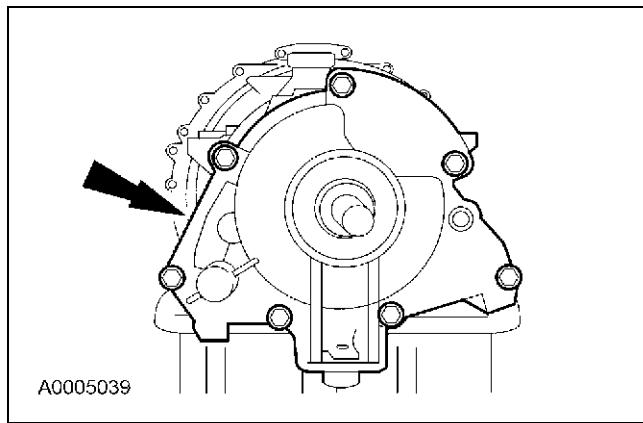


7. Using the special tool, remove the output shaft flange.

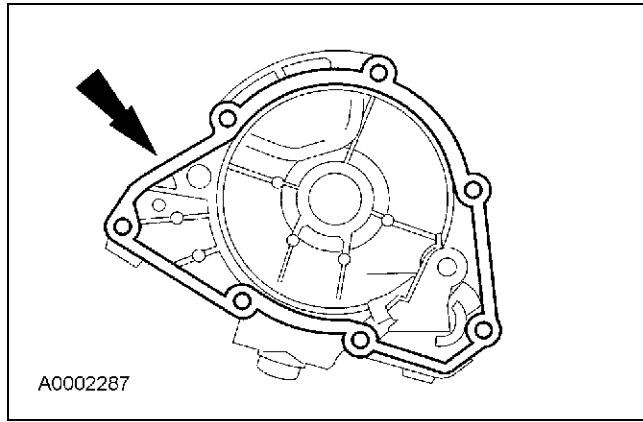


8. **⚠ CAUTION:** The parking pawl, parking pawl return and parking pawl shaft may fall out during removal of the extension housing.

Remove the 7 extension housing screws and the extension housing.

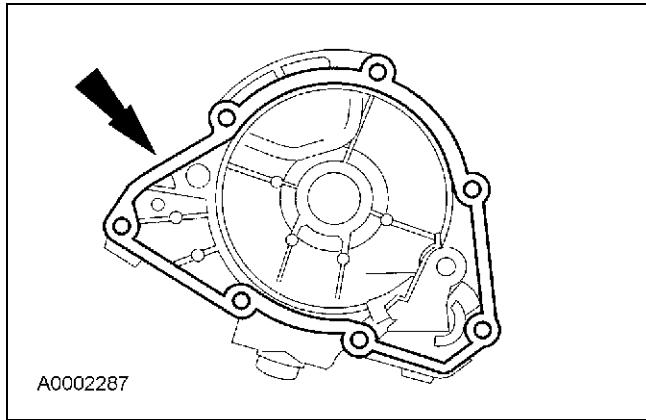


9. Remove and discard the extension housing gasket.



IN-VEHICLE REPAIR (Continued)**Installation**

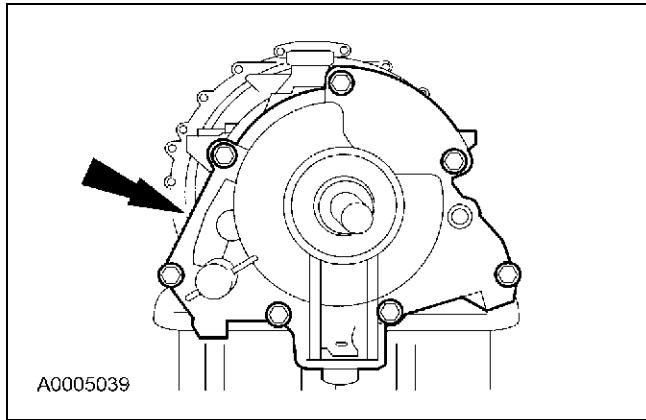
- Clean the extension housing and install a new extension housing gasket. Make sure the park pawl is installed correctly.



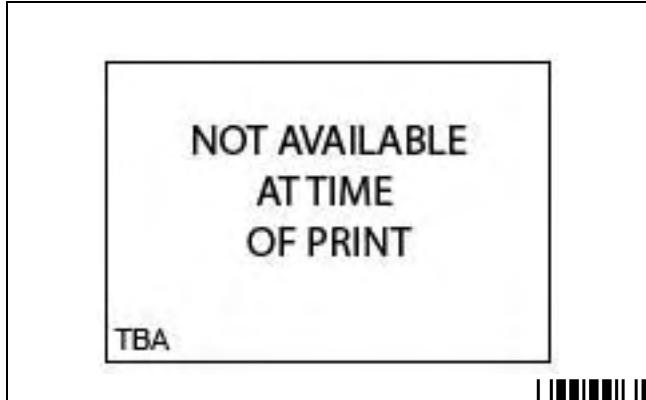
- ⚠ CAUTION:** Make sure the parking lever actuating rod is correctly seated into the case parking rod guide cup.

Install the extension housing and screws.

- Tighten to 30 Nm (22 lb-ft).

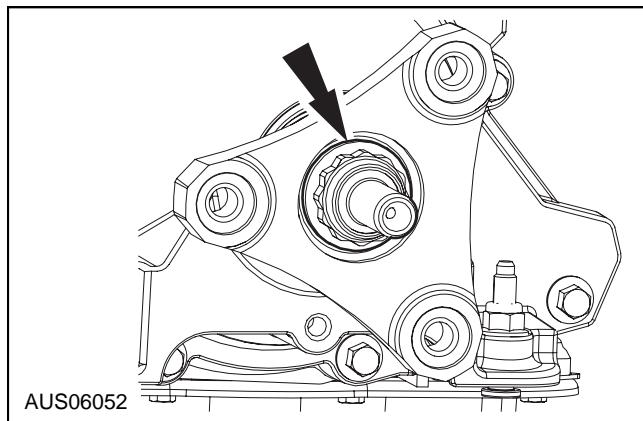


- Using the special tools, install the output flange.

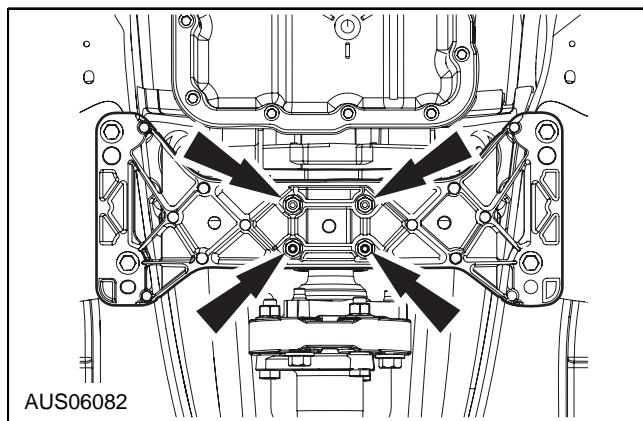


- Install a new nut.

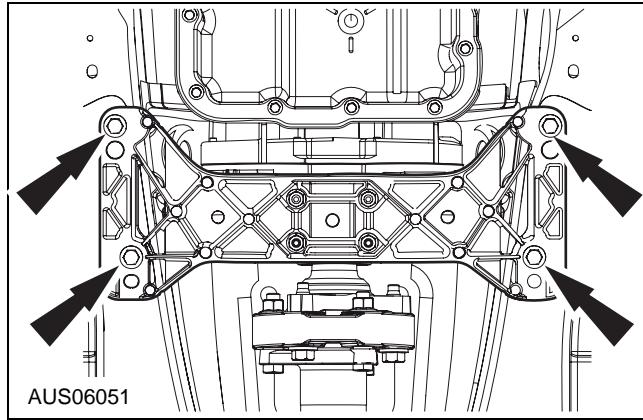
- Tighten to 130 Nm (96 lb-ft).



- Loosely install the transmission insulator-to-extension housing center screw.

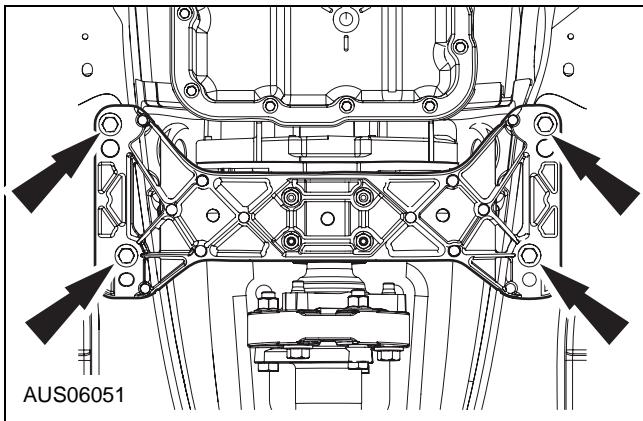


- Position the transmission crossmember in the vehicle and loosely install the transmission crossmember-to-floor pan screws.

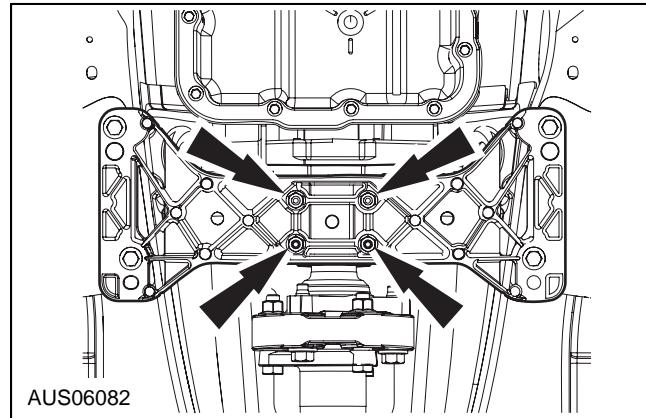


IN-VEHICLE REPAIR (Continued)

7. **NOTE:** The transmission support insulator must be neutralized.
- Slide the transmission support insulator forward, rearward and side-to-side until the gaps between the transmission support insulator snubber and crossmember are equal.
8. With the transmission support insulator neutralized, tighten the transmission crossmember-to-floor pan screws.
 - Tighten to 63 Nm (46 lb-ft).



9. With the transmission support insulator neutralized, tighten the transmission insulator-to-extension housing center screw.
 - Tighten to 70 Nm (52 lb-ft).

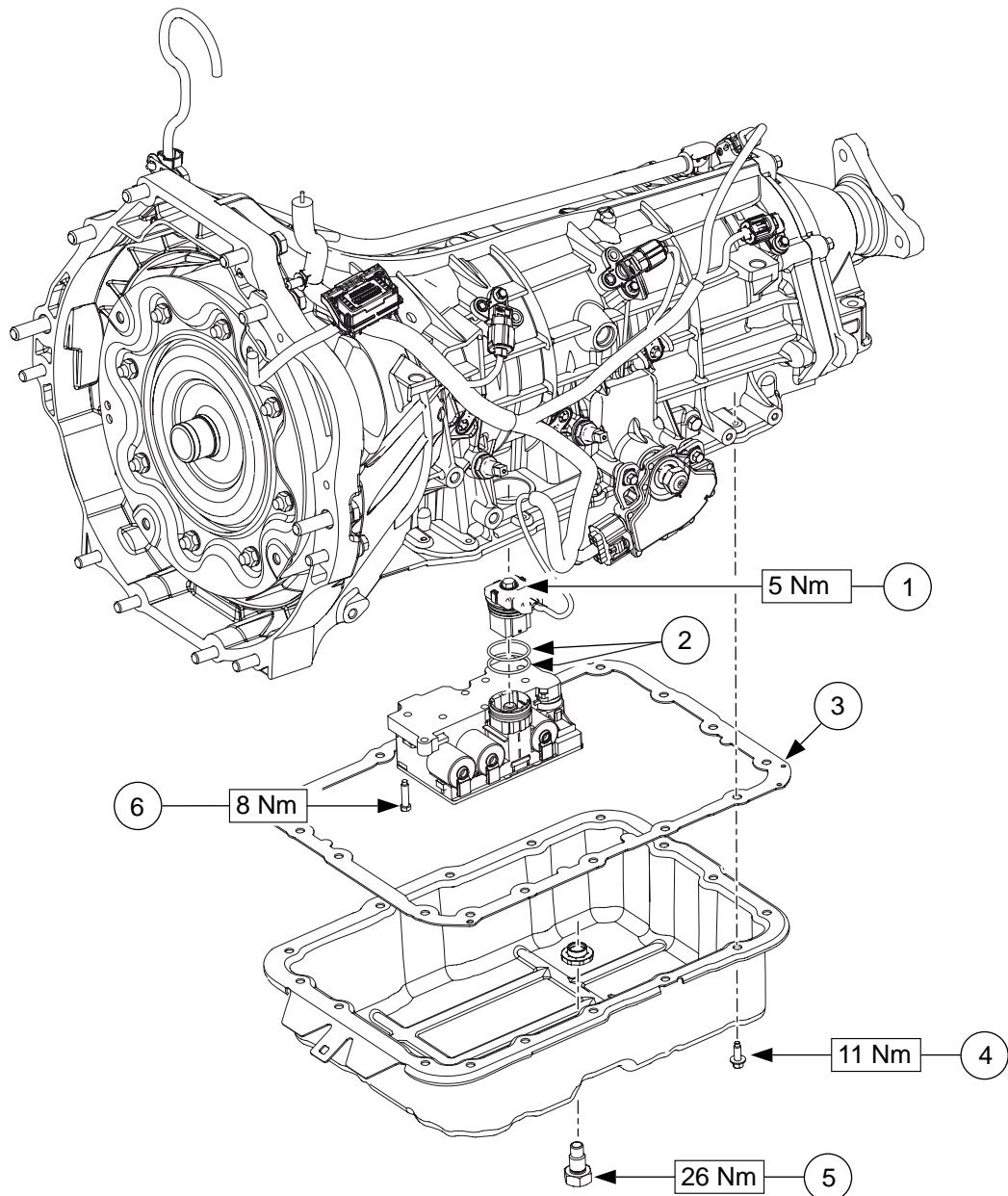


10. Install the catalytic converter assembly. For additional information, refer to Section 309-00.
11. Install the driveshaft. For additional information, refer to Section 205-01.
12. Check the transmission fluid level. For additional information, refer to Transmission Fluid Level Check in this section.



IN-VEHICLE REPAIR**Solenoid Body Assembly****Material**

| Item | Specification |
|---|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM | MERCON® V |

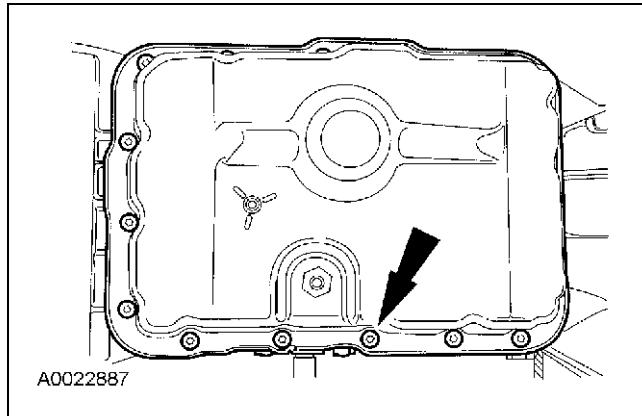


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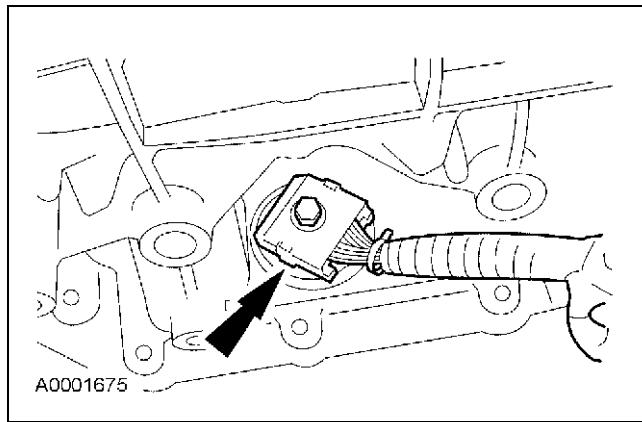
IN-VEHICLE REPAIR (Continued)

| Item | Part Number | Description |
|------|--------------|--|
| 1 | 7A010 | Transmission fluid pan drain plug |
| 2 | — | Heated oxygen sensor (HO2S) electrical connector (part of 9F472) |
| 3 | — | HO2S electrical connector retainer |
| 4 | 7E395 | Solenoid body harness electrical connector |
| 5 | W500213-S437 | Transmission fluid pan screws |
| 6 | 7A194 | Transmission fluid pan |
| 7 | 7A191 | Transmission fluid pan gasket |
| 8 | W70559-S300 | Transmission fluid pan filter screws |
| 9 | 7A098 | Transmission fluid pan filter |
| 10 | W703189 | Solenoid body screws |
| 11 | W702921 | Solenoid body screw |
| 12 | 7G391 | Solenoid body |
| 13 | W705928-S300 | Solenoid body O-ring seals |

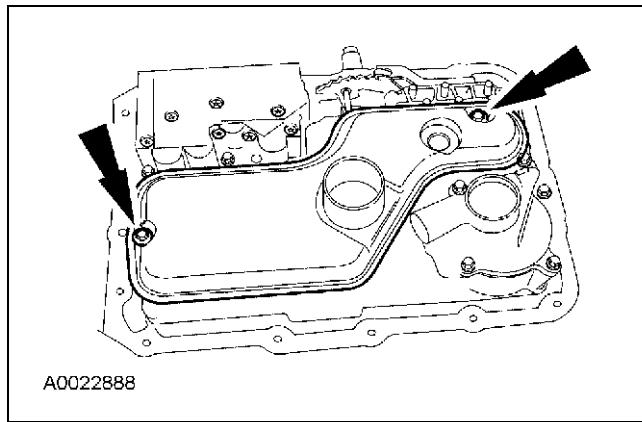
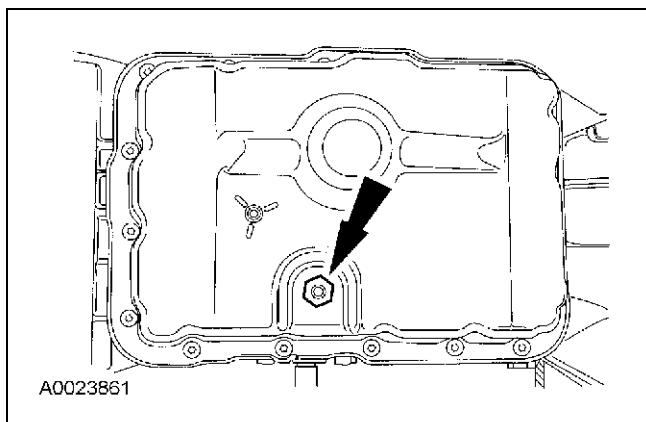


NOTE: Clean the area around the solenoid body connector to prevent contamination.

4. Disconnect the solenoid body harness electrical connector



5. Remove the screws and the transmission fluid filter.



NOTE: The transmission fluid pan gasket is reusable, clean and inspect for damage. If not damaged, the gasket should be reused.

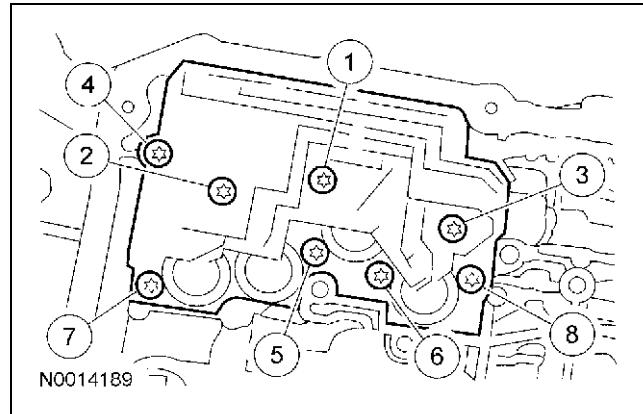
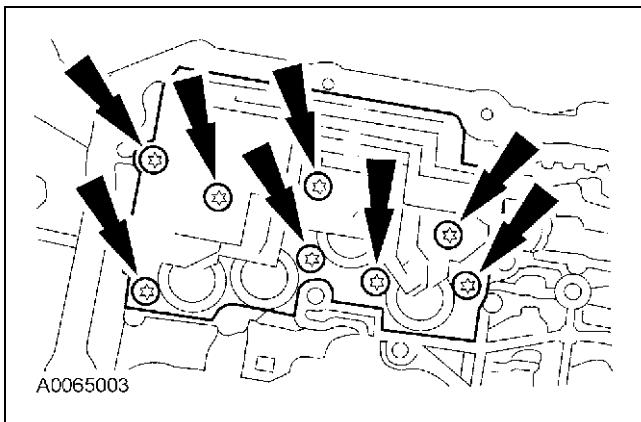
3. Remove the transmission fluid pan screws, gasket and fluid pan.



IN-VEHICLE REPAIR (Continued)

⚠ CAUTION: Do not damage the solenoid body connector pins.

8. Remove the solenoid body screws and remove the solenoid body by lifting on the body and pushing the connector from the other side of the case.



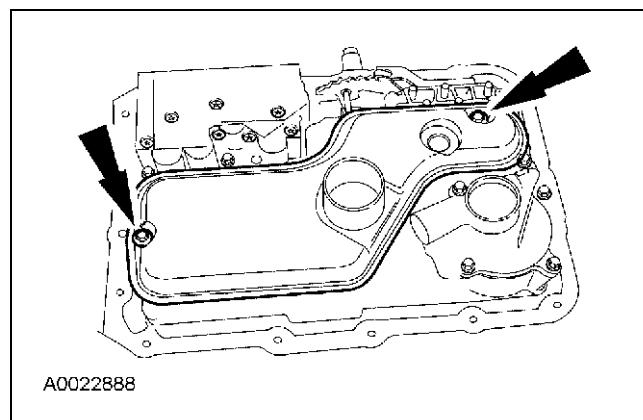
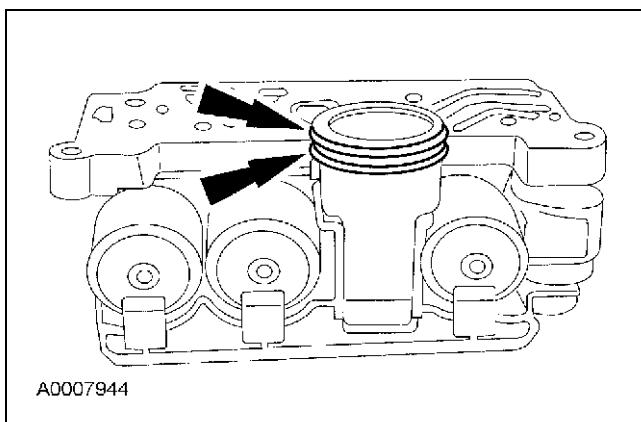
⚠ CAUTION: Lubricate the fluid filter seals with clean automatic transmission fluid or they may be damaged.

NOTE: Make sure the fluid filter seals are correctly seated on the filter.

3. Lubricate the seals and install the transmission fluid filter.
 - Tighten to 10 Nm (89 lb-in)

Installation

1. Install a new O-ring seals on the solenoid body connector. Lubricate the O-ring seals with clean automatic transmission fluid.



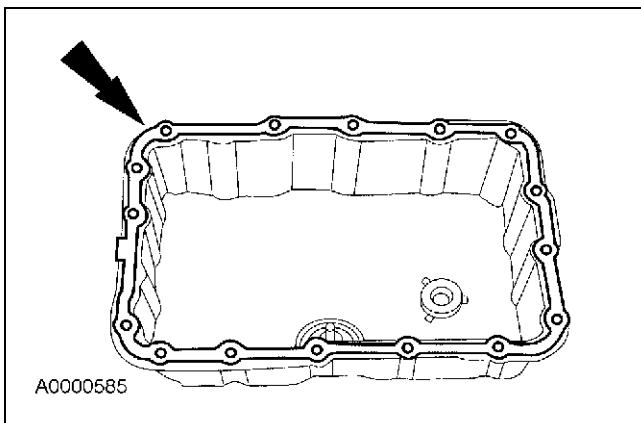
NOTE: The transmission fluid pan gasket is reusable, clean and inspect for damage. If not damaged, the gasket should be reused.

4. Install the transmission fluid pan and gasket and loosely install the screws.

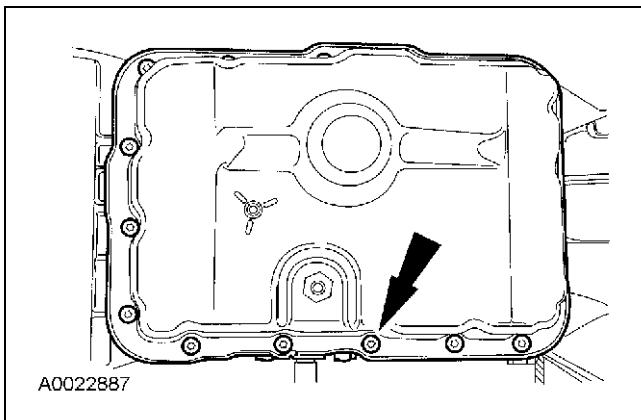
⚠ CAUTION: Inspect the transmission case bore to make sure it is free of foreign material and not damaged. If it is damaged, transmission leaks may occur.

2. Install the solenoid. Tighten the screws in the sequence shown.
 - Tighten to 8 Nm (71 lb-in)



IN-VEHICLE REPAIR (Continued)

5. Tighten the screws in a crisscross sequence.
 - Tighten to 11 Nm (8 lb-ft).



6. **⚠ CAUTION:** Damage will occur to the solenoid body assembly if the screw is tightened above specification.

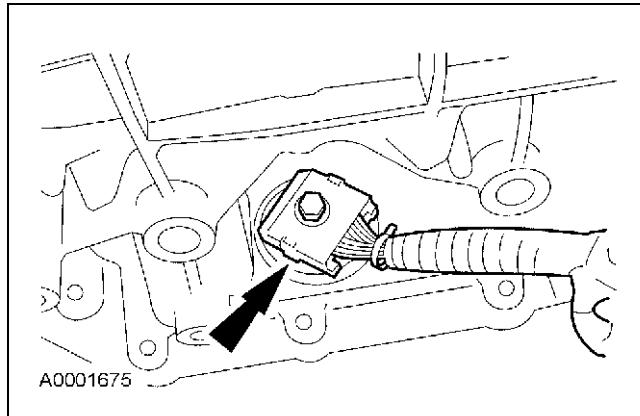
NOTE: Always install new O-ring seals on the vehicle harness connector.

NOTE: Clean the area around the connector to prevent contamination of the solenoid body connector.

NOTE: Use petroleum jelly to lubricate the O-ring seals to aid in the installation process.

Install and lubricate new O-ring seals on the transmission connector and connect the connector.

- Tighten to 5 Nm (44 lb-in).



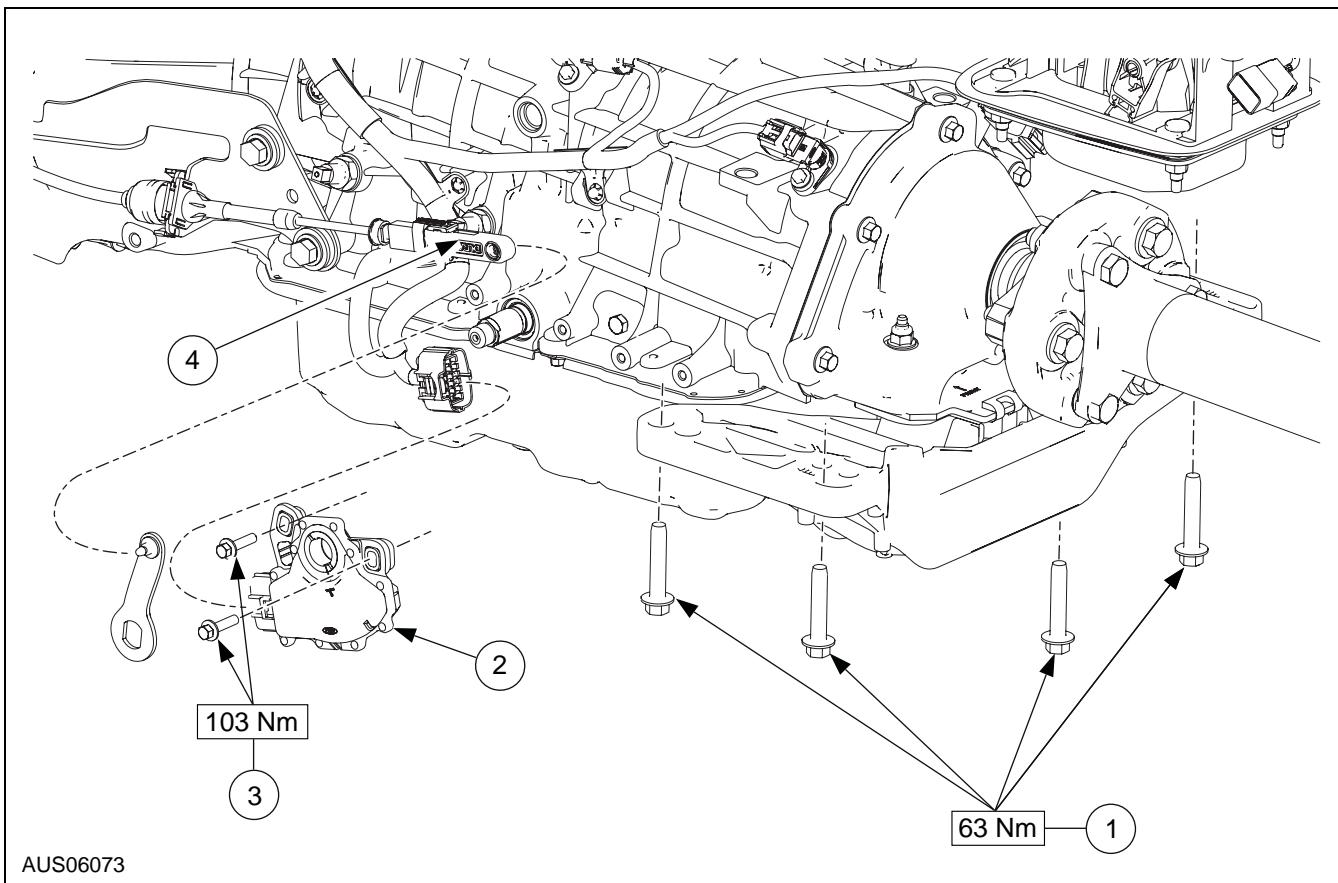
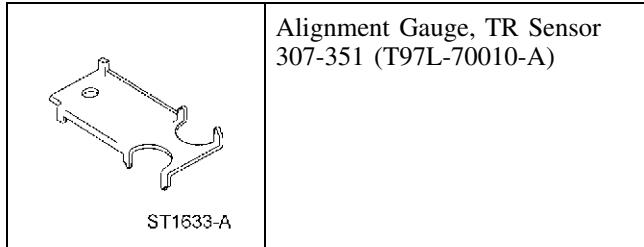
7. Fill the transmission. For additional information, refer to Transmission Fluid Drain and Refill - Automated Equipment or Transmission Fluid Level Check in this section.



IN-VEHICLE REPAIR

Digital Transmission Range (TR) Sensor

Special Tool(s)



| Item | Part Number | Description |
|------|--------------|---|
| 1 | W704971-S426 | Transmission crossmember-to-floor pan screws |
| 2 | 7E395 | Transmission selector lever cable |
| 3 | W500015 | Digital transmission range (TR) sensor screws |
| 4 | 7F293 | Digital TR sensor |

Removal

- With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.

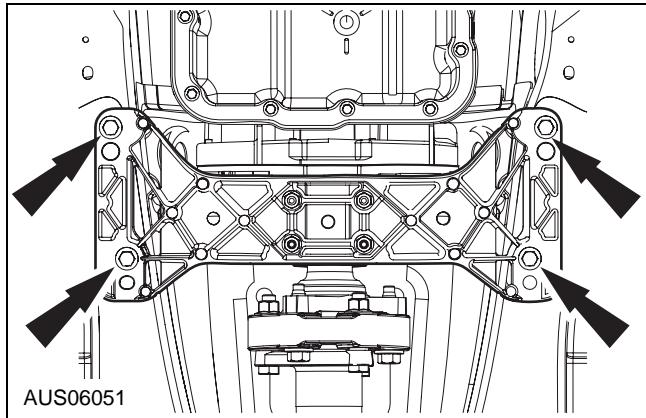


IN-VEHICLE REPAIR (Continued)

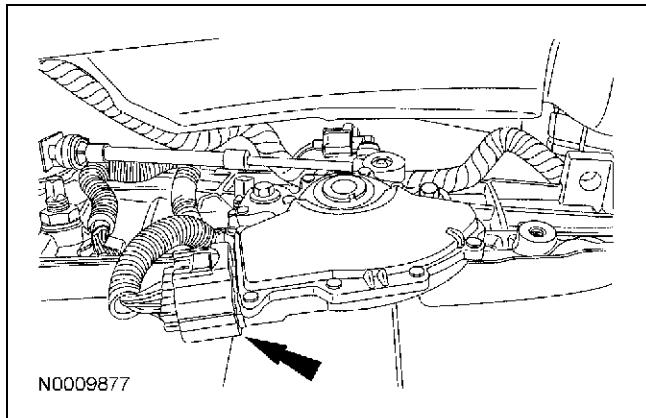
- 2.  WARNING:** Secure the transmission to the transmission jack with a safety chain. Failure to follow these instructions may result in personal injury.

Using a suitable transmission jack, support the transmission.

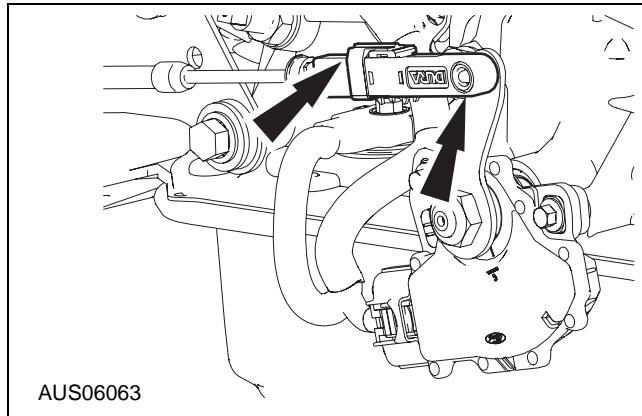
- 3. Remove the transmission crossmember-to-floor pan screws and lower the transmission enough to gain access to the TR sensor.**



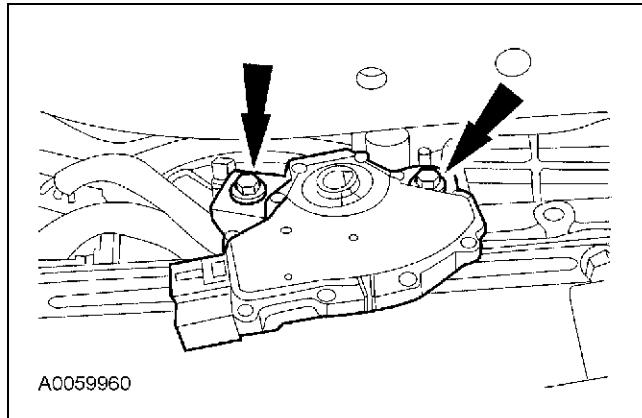
- 4. Disconnect the digital TR sensor connector.**



- 5. Disconnect the transmission shift cable from the manual control lever.**

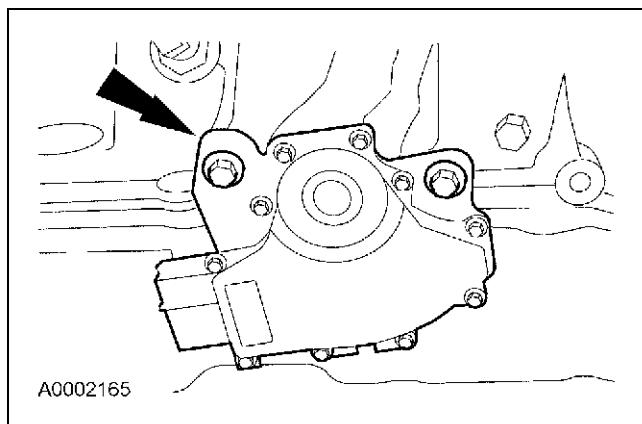


- 6. Remove the digital TR sensor screws and remove the digital TR sensor.**

**Installation**

- 1.  CAUTION:** The digital TR sensor must fit flush against the boss on the case to prevent damage to the sensor.

Install the digital TR sensor and loosely install the screws.



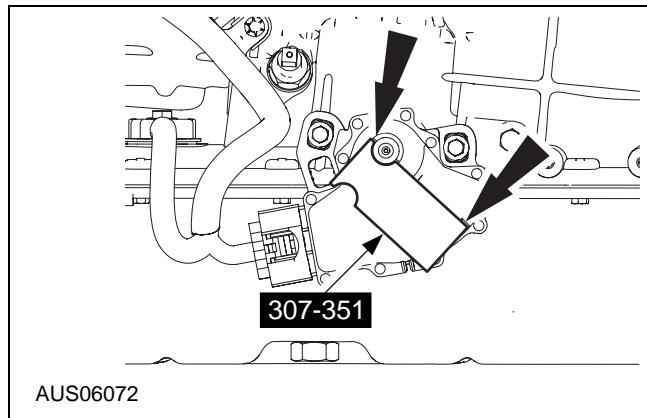
IN-VEHICLE REPAIR (Continued)

2. **CAUTION:** Tightening one screw before tightening the other may cause the sensor to bind or become damaged.

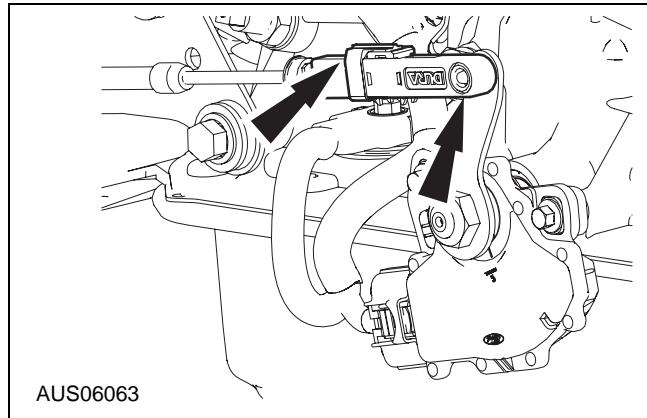
NOTE: The manual lever must be in the NEUTRAL position.

Using the special tool, align the digital TR sensor and tighten the screws in an alternating sequence.

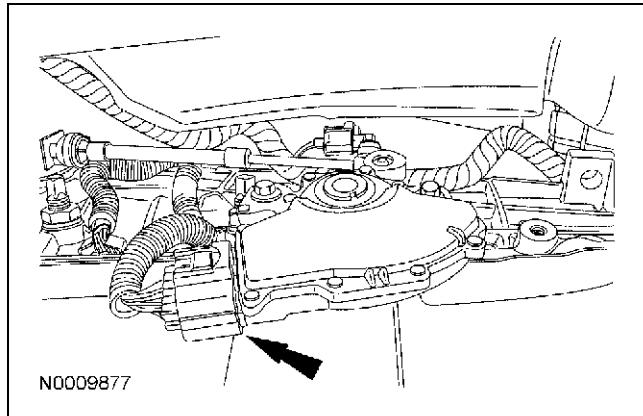
- Tighten 8 Nm (71 lb-in).



3. Connect the transmission shift cable to the manual control lever.

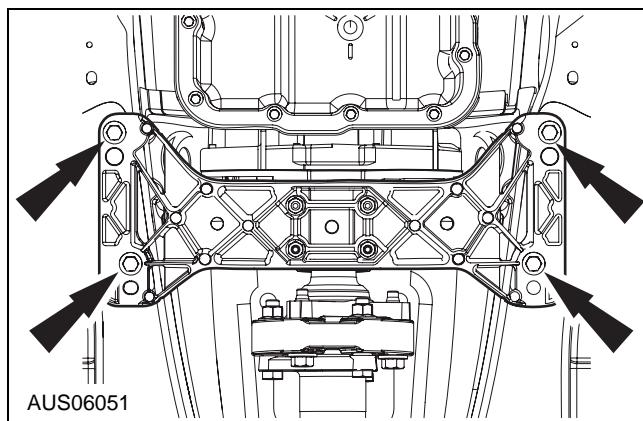


4. Connect the digital TR sensor connector.



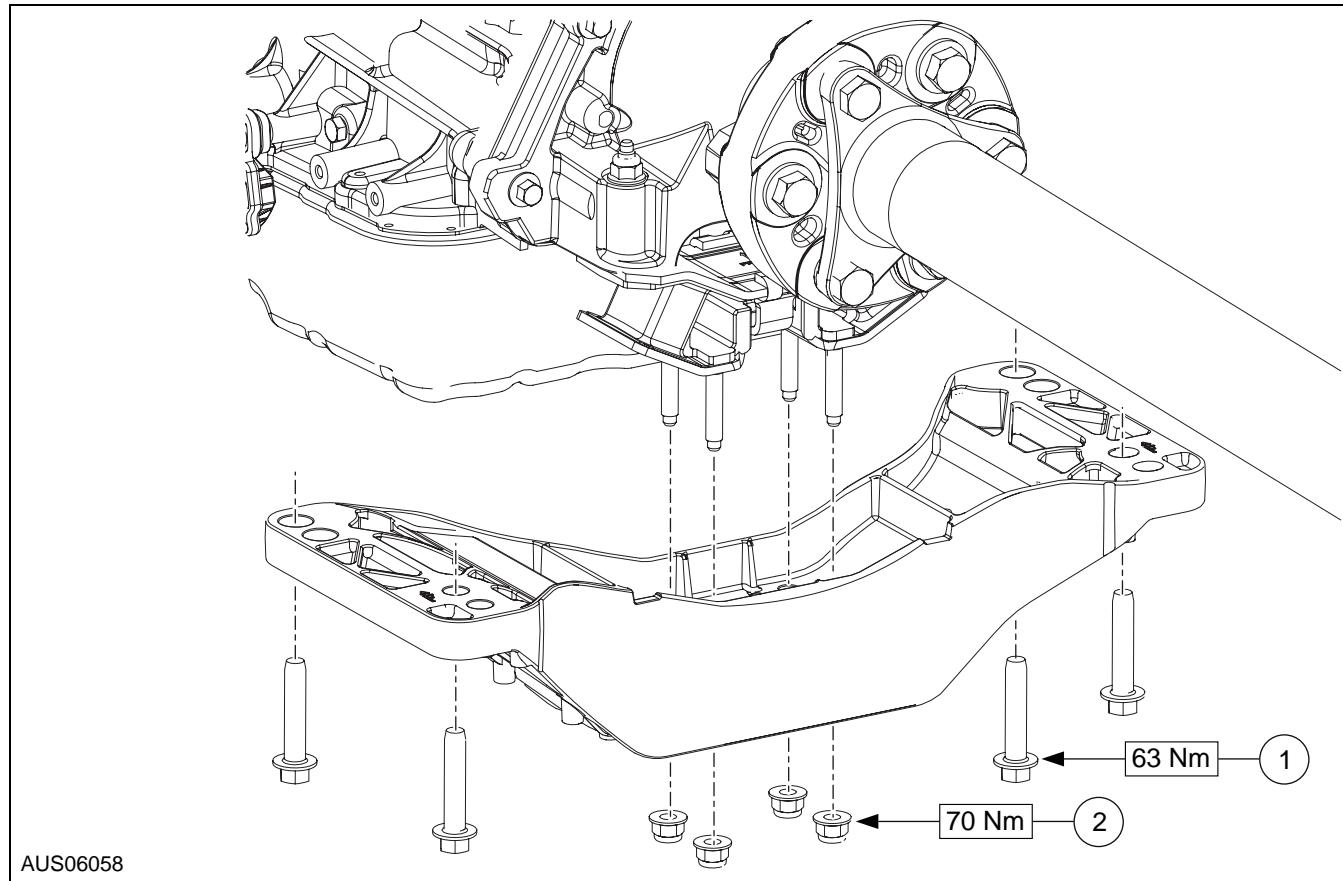
5. Install the transmission crossmember-to-floor pan screws.

- Tighten to 63 Nm (46 lb-ft).



6. Verify that the shift cable is adjusted correctly. For additional information, refer to Section 307-05.



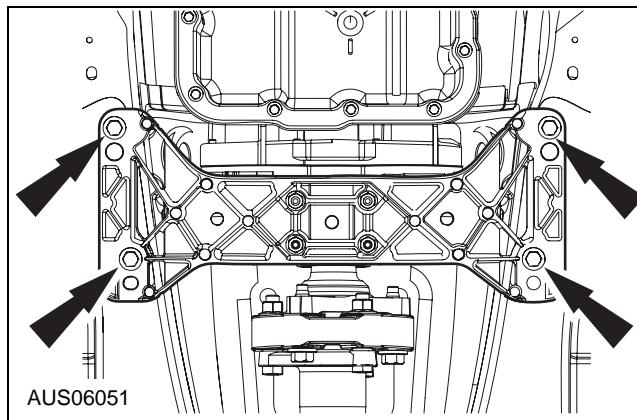
IN-VEHICLE REPAIR**Transmission Support Crossmember**

| Item | Part Number | Description |
|------|-------------|--|
| 1 | — | Transmission crossmember-to-floor pan screws |
| 2 | — | Transmission insulator-to-extension housing center screw |

Removal

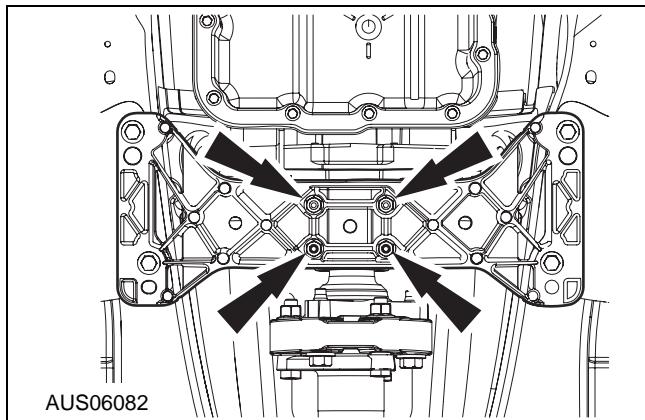
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.
2. Remove the catalytic converter. For additional information, refer to Section 309-00.
3. Support the transmission with a transmission jack.

4. Remove the transmission crossmember-to-floor pan bolts.



IN-VEHICLE REPAIR (Continued)

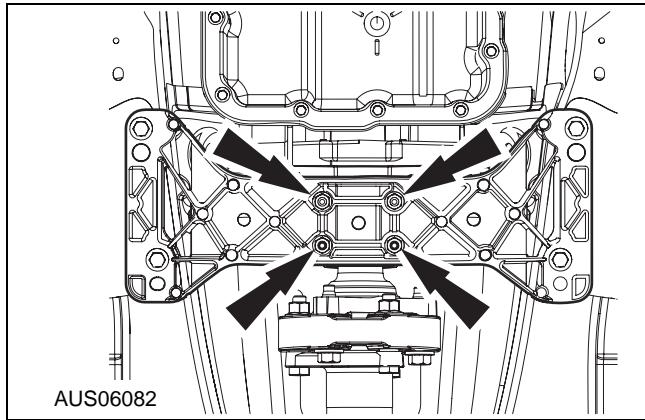
5. Remove the transmission insulator-to-extension housing center bolts.



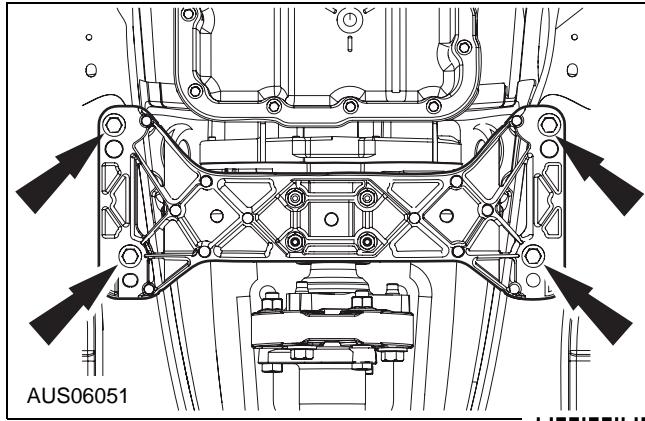
6. Remove the transmission crossmember.

Installation

1. Position the transmission crossmember in the vehicle and loosely install the transmission insulator-to-extension housing center bolts.



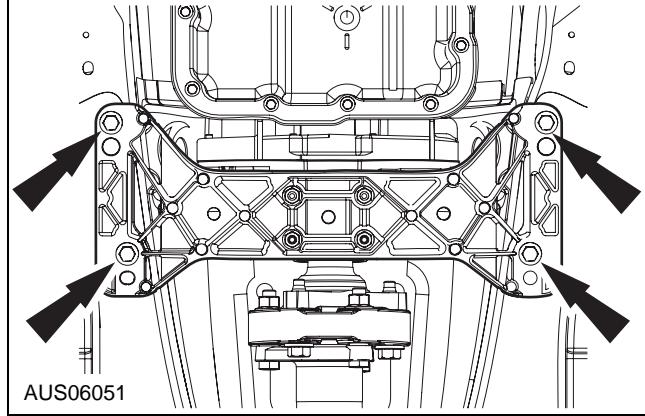
2. Loosely install the transmission crossmember-to-floor pan bolts.



3. **NOTE:** The transmission support insulator must be neutralized.

Slide the transmission support insulator forward, rearward and side-to-side until the gaps between the transmission support insulator snubber and crossmember are equal.

4. With the transmission support insulator neutralized, tighten the transmission crossmember-to-floor pan bolts.
- Tighten to 63 Nm (46 lb-ft).

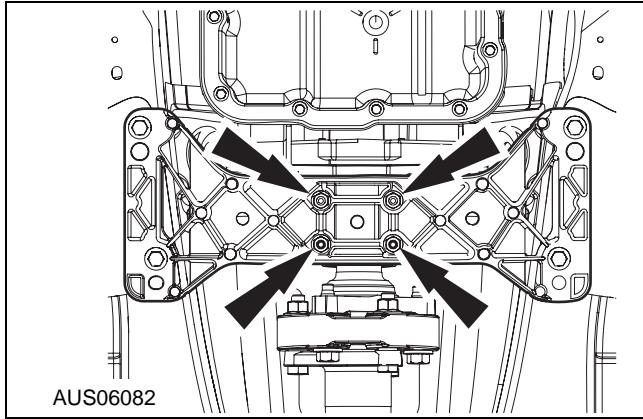


5. Install the catalytic converter. For additional information, refer to Section 309-00.



IN-VEHICLE REPAIR (Continued)

6. With the transmission support insulator neutralized, tighten the transmission insulator-to-extension housing center screw.
- Tighten to 70 Nm (52 lb-ft).



REMOVAL

Transmission

Special Tool(s)

| | |
|---|---|
|  | Retainer, Torque Converter 307-346 (T97T-7902-A) ST1636-A |
|---|---|

⚠️ WARNING: Secure the assembly to the jack. Avoid any obstructions while lowering and raising the jack. Contact with obstructions may cause the assembly to fall off the jack, which may result in serious personal injury.

NOTE: When the battery has been disconnected and reconnected, some abnormal drive symptoms can occur while the vehicle relearns its adaptive strategy. The customer needs to be notified that they can experience slightly different upshifts (either soft or firm) and that this is a temporary condition and will eventually return to normal operating condition.

NOTE: If transmission disassembly or installation of a new transmission is necessary, drain the transmission fluid. Install the drain plug when finished.

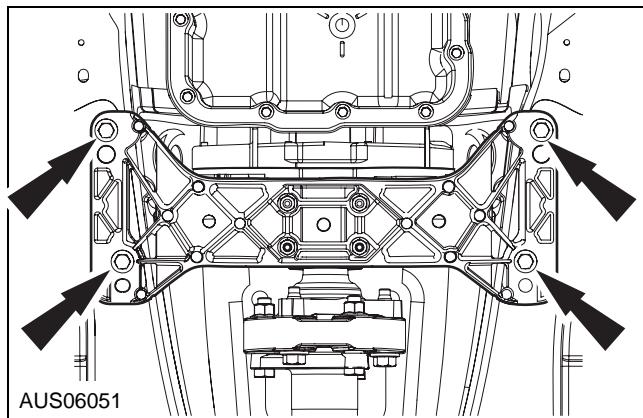
NOTE: If the transmission is to be removed for an extended period of time, support the engine with a safety stand and a word block.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.
2. Disconnect the battery ground cable. For additional information, refer to Section 414-01.
3. Remove the catalytic converter. For additional information, refer to Section 309-00.
4. Remove the driveshaft. For additional information, refer to Section 205-01.

5. **⚠️ WARNING:** Secure the assembly to the jack. Avoid any obstructions while lowering and raising the jack. Contact with obstructions may cause the assembly to fall off the jack, which may result in serious personal injury.

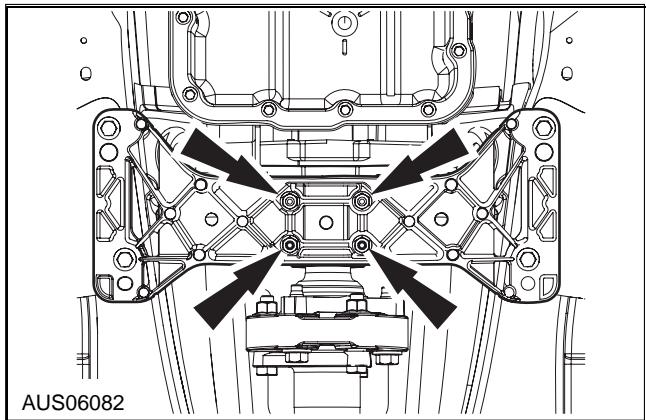
Using a suitable transmission jack, support the transmission.

7. Remove the rear transmission crossmember-to-floor pan screws.

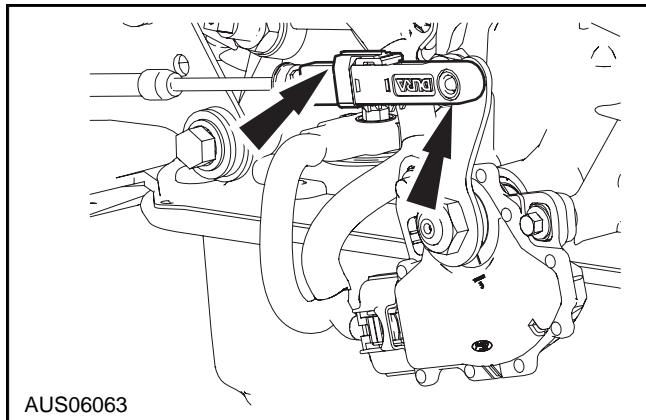


REMOVAL (Continued)

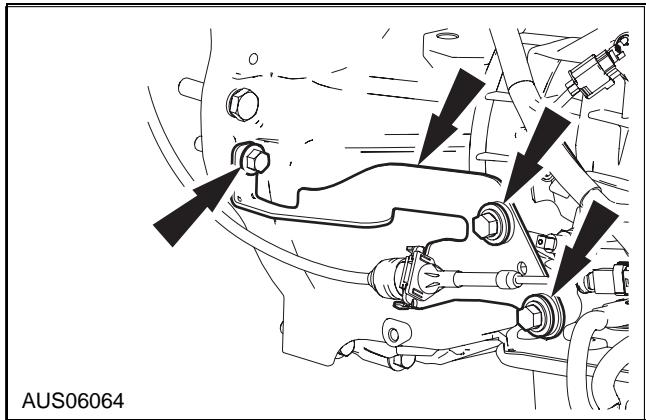
8. Remove the rear transmission insulator-to-extension housing center screw and remove the transmission crossmember.



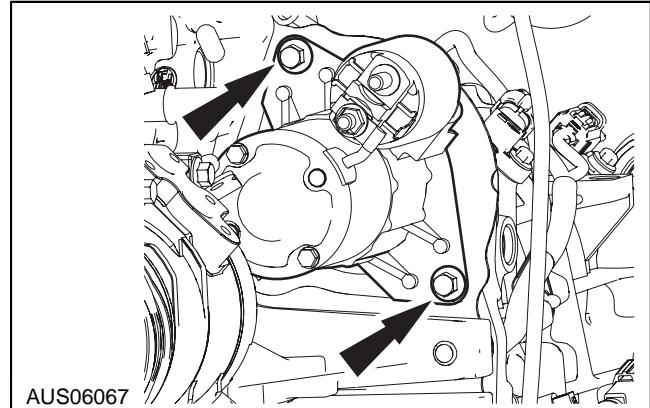
9. Remove the selector lever cable from the transmission manual lever.



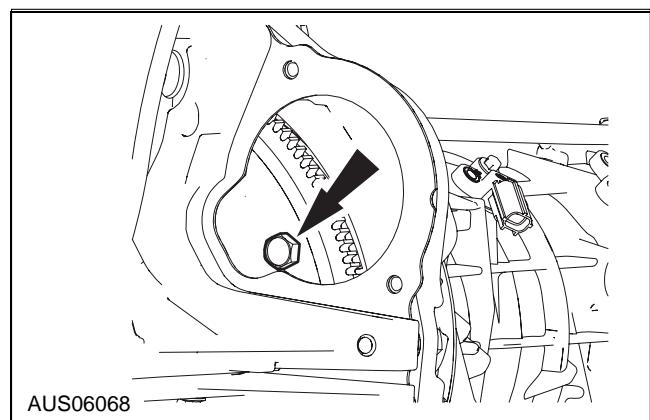
10. Remove the 2 transmission selector lever cable bracket bolts from the transmission and remove the bracket.

**4.0L engine**

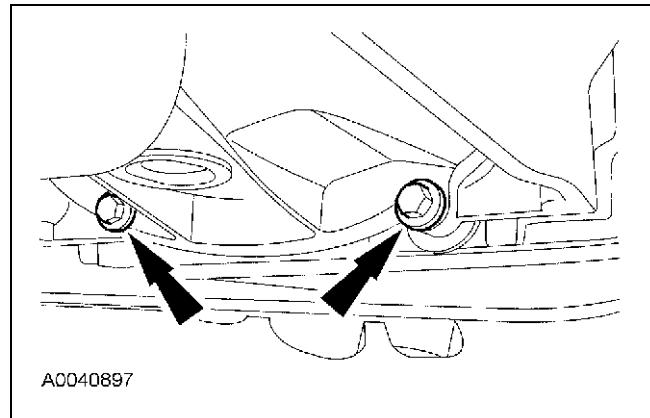
11. Remove the starter and position aside.



12. Remove and discard the 4 torque converter nuts.



13. Remove the lower transmission retaining bolts.

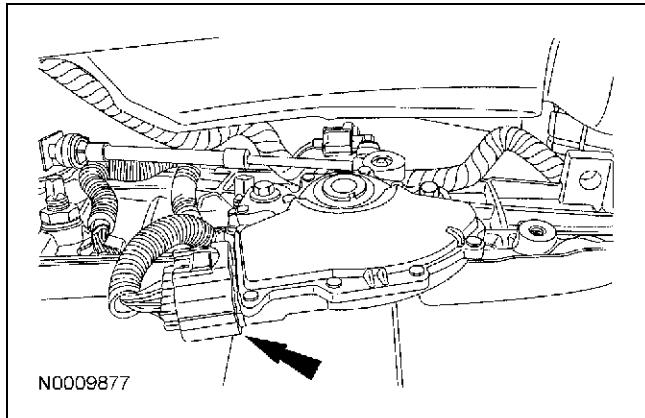


14. Lower the transmission to gain access to the sensor connectors and the transmission bolts.

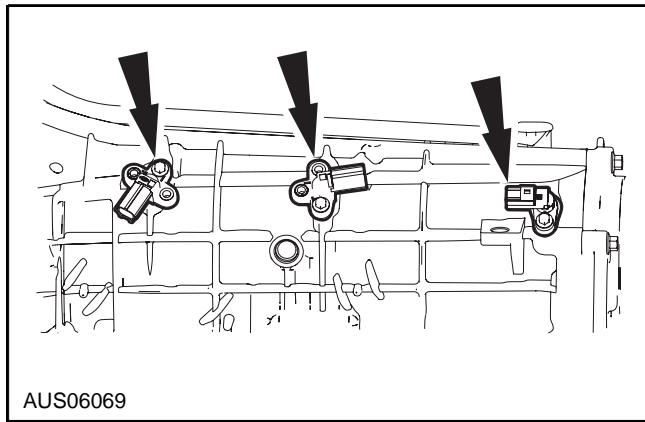


REMOVAL (Continued)

15. Disconnect the digital transmission range (TR) sensor connector.

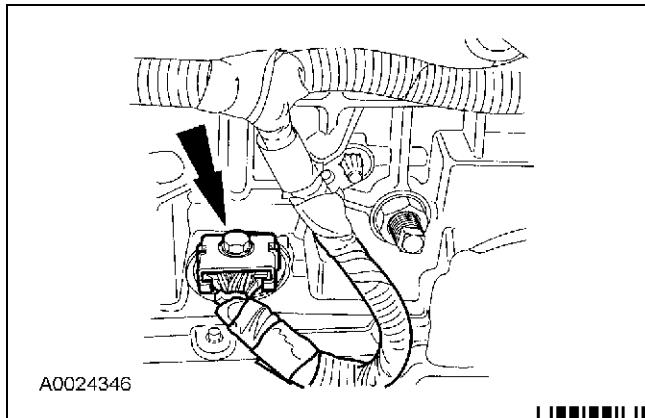


16. Disconnect the turbine shaft speed (TSS) sensor, output shaft speed (OSS) sensor and intermediate shaft speed sensor electrical connectors.

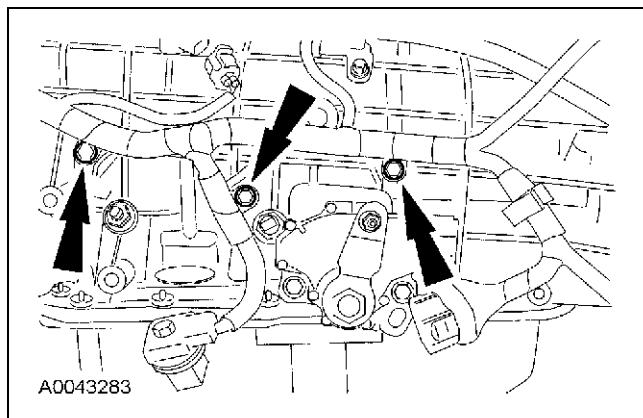


17. **NOTE:** Clean the area around the connector to prevent contamination of the solenoid body connector.

Remove the screw from the solenoid body connector and disconnect the connector.

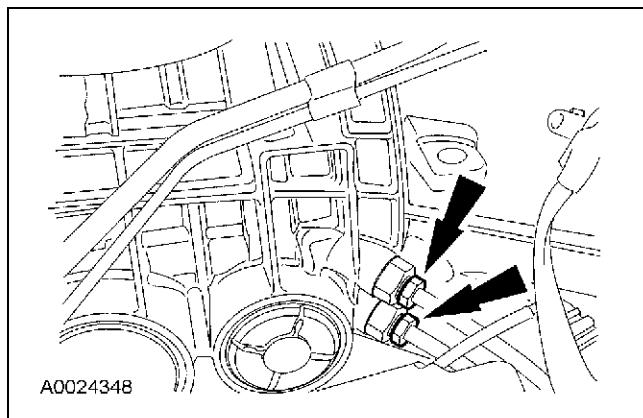


18. Disconnect the harness retainers.

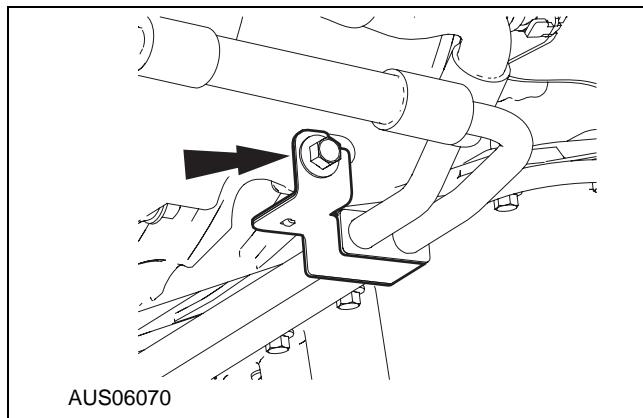


19. **CAUTION: Do not damage the cooler tubes.**

Disconnect the transmission cooler tubes.

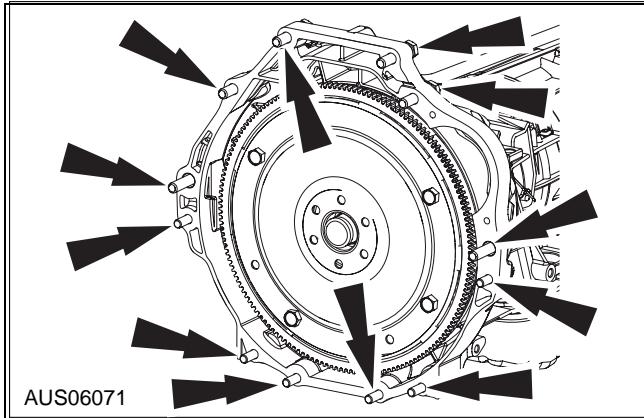


20. Remove the nut and position aside the transmission cooler tube bracket.

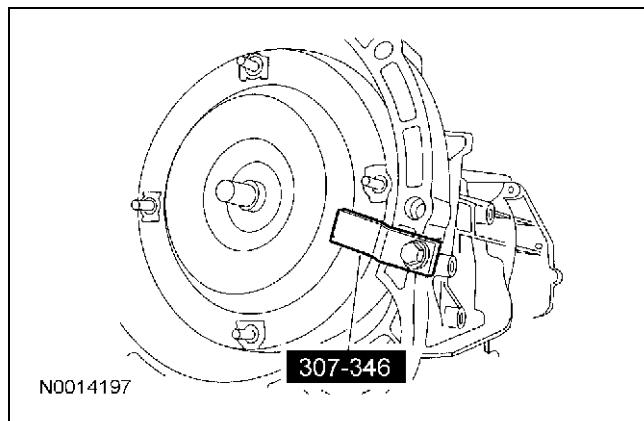


REMOVAL (Continued)**4.0L engine**

21. Remove the 13 engine-to-transmission retaining bolts.



22. Lower the transmission assembly from the vehicle.
23. Install the special tool.

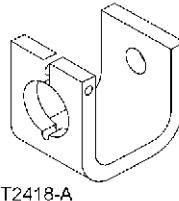
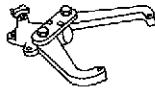
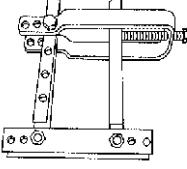
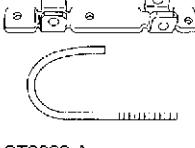


24. Carry out the transmission fluid cooler backflushing and cleaning if the transmission is being overhauled or installing a new or remanufactured transmission. For additional information, refer to Transmission Fluid Cooler Backflushing and Cleaning in this section.

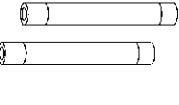
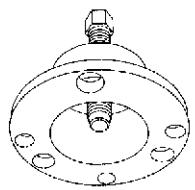
DISASSEMBLY

Transmission

Special Tool(s)

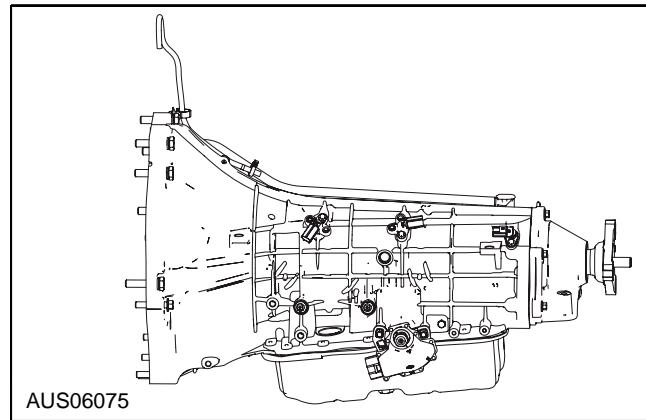
| | |
|---|---|
|  | Remover, Input Shaft Oil Seal 308-375 |
|  | Remover, Transmission Fluid Pump 307-397 |
|  | Holding Fixture, Transmission 307-003 (T57L-500-B) |
|  | Slide Hammer 100-001 (T50T-100-A) |
|  | Remover, Torque Converter Fluid Seal 307-309 (T94P-77001-BH) |
|  | Compressor, Servo Cover 307-402 |

Special Tool(s)

| | |
|--|---|
|  | Handle, Torque Converter 307-091 (T81P-7902-C) |
|  | Remover, Output Shaft Flange 307-523 |

1. **NOTE:** Tag and identify all parts for reassembly.

Place the transmission on a bench.



(Continued)

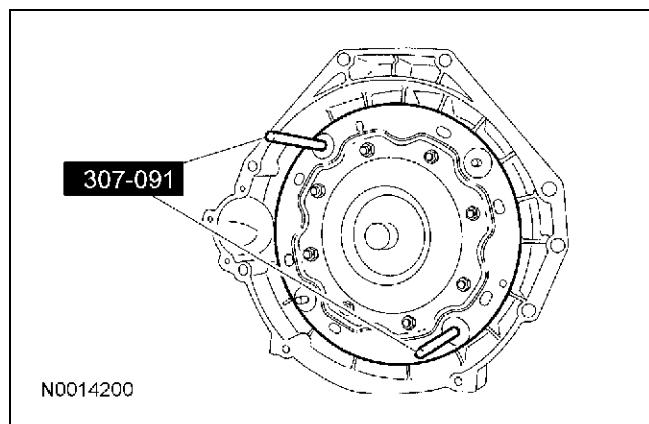
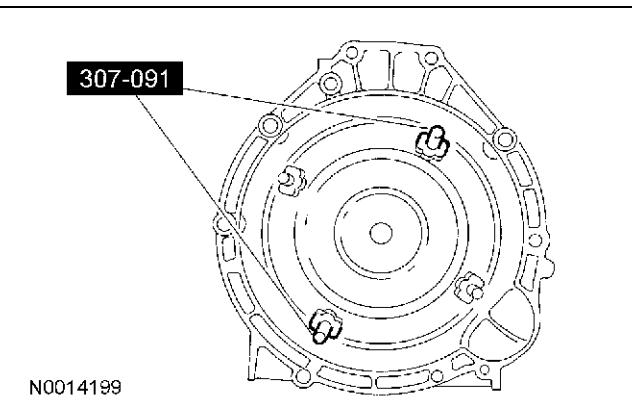


DISASSEMBLY (Continued)

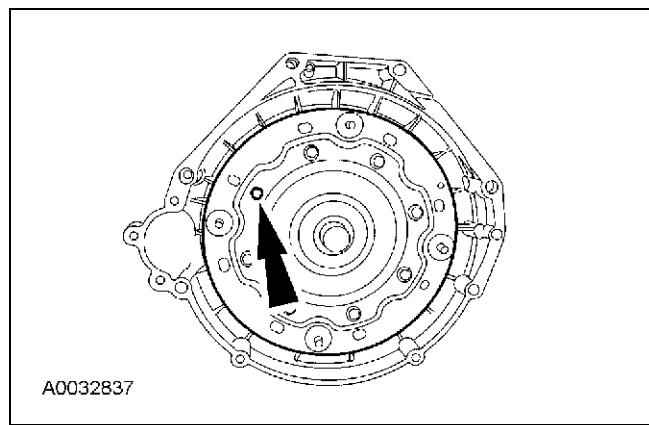
2. **⚠ WARNING:** Secure the torque converter in the transmission during removal or installation. The torque converter is heavy and may result in injury if it falls out of the transmission. Failure to follow this instruction may result in serious personal injury.

NOTE: If not installing a new torque converter, leave the adapter plate screwed to the torque converter.

Using the special tools, remove the torque converter and adapter plate as an assembly.

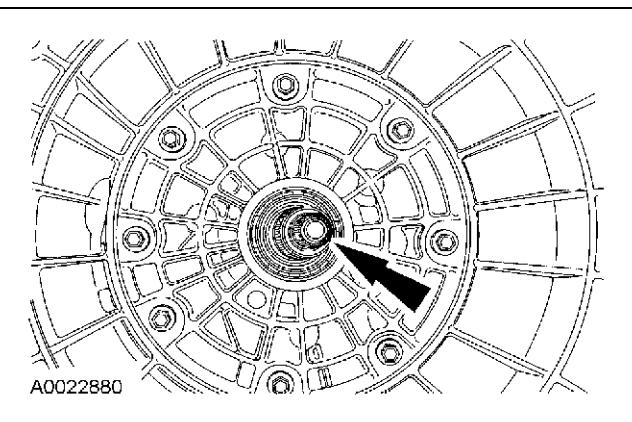


3. If the vehicle is equipped, and installation of a new or remanufactured torque converter is necessary, remove the torque converter adapter plate.

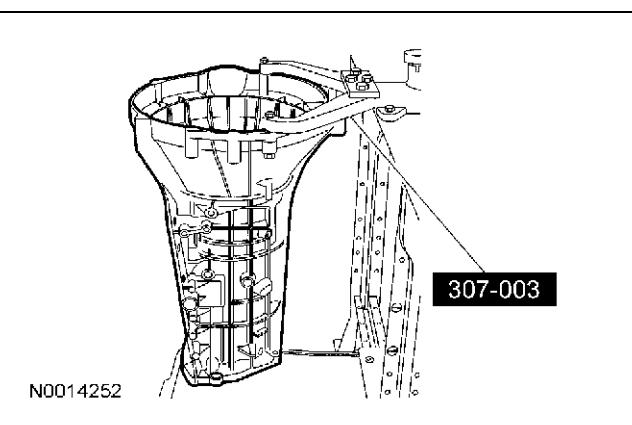


4. If the adapter plate has been removed, use the special tools to remove the torque converter.

5. Remove the input shaft.

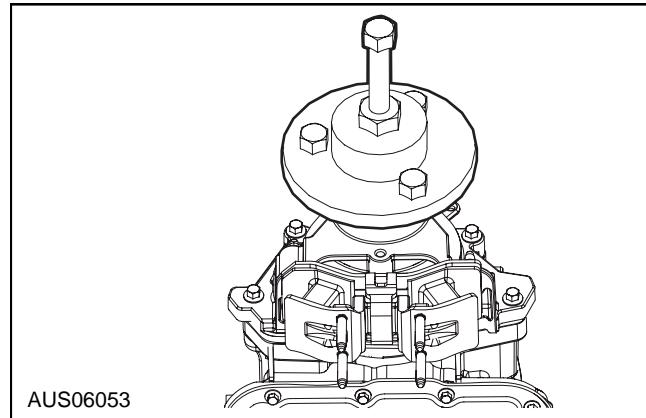
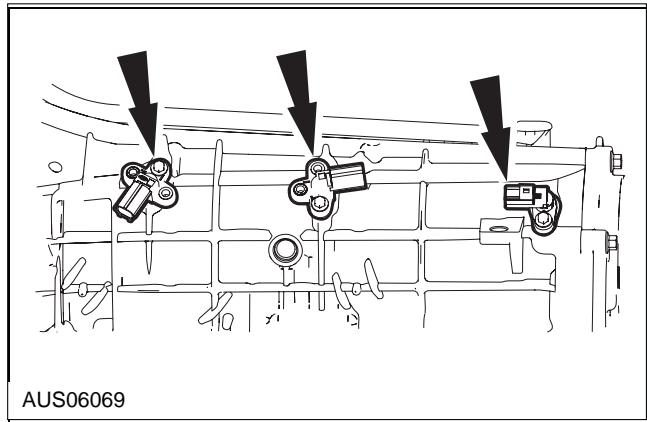


6. Using the special tool, install the transmission into the bench with the torque converter housing facing up.

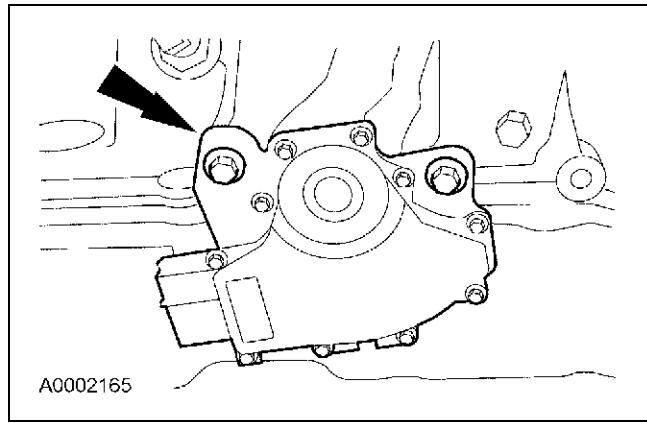


DISASSEMBLY (Continued)

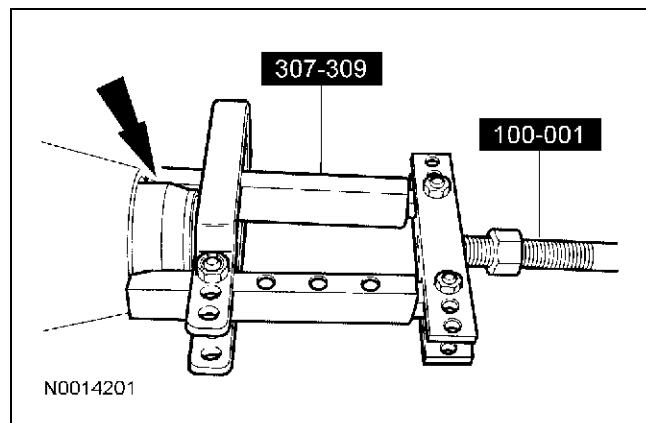
7. Remove the transmission sensors.



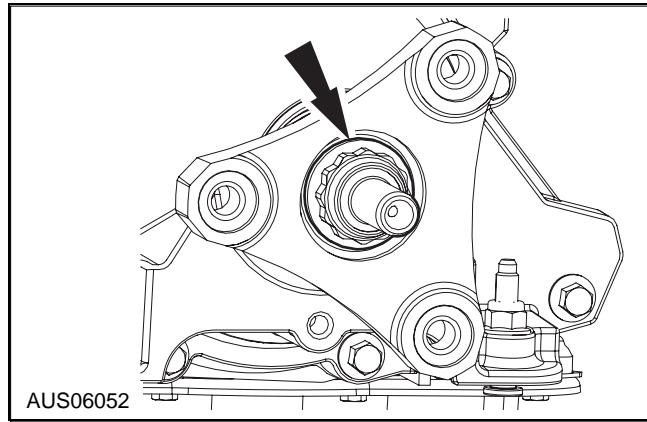
8. Remove the transmission range (TR) sensor.



11. Using the special tools, remove the extension housing seal.

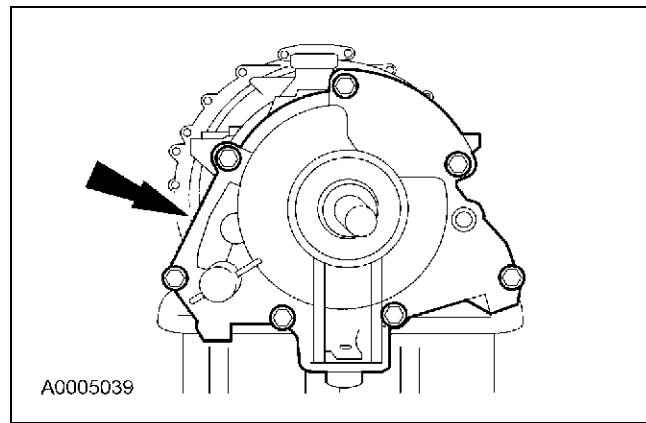


9. Remove and discard the nut.



12. **CAUTION:** The parking pawl, parking pawl return spring and parking pawl shaft may fall out during removal of the extension housing.

Remove the extension housing.



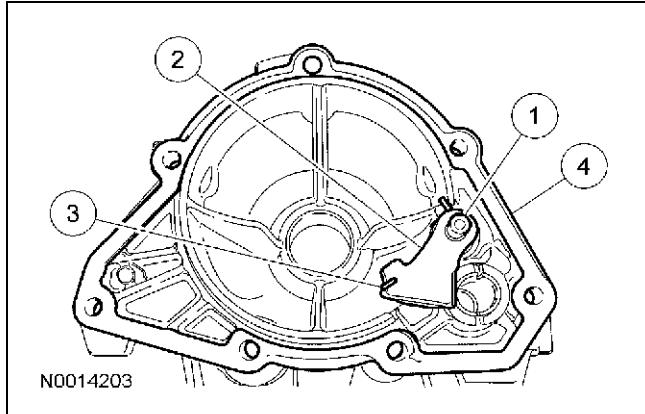
10. Using the special tool, remove the output shaft flange.



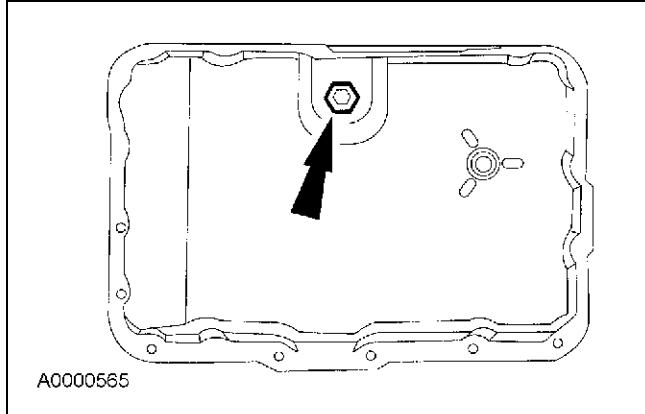
DISASSEMBLY (Continued)

13. Remove the parking pawl assembly and discard the gasket.

- 1 Remove the parking pawl shaft.
- 2 Remove the parking pawl.
- 3 Remove the parking pawl return spring.
- 4 Remove and discard the gasket.

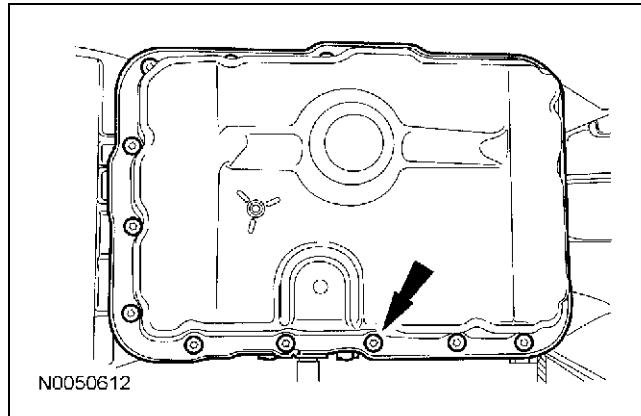


14. Remove the drain plug and discard the gasket.

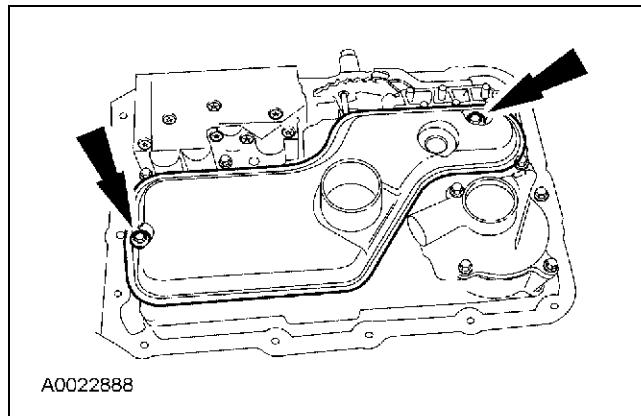


15. **NOTE:** The transmission fluid pan gasket is reusable. Clean and inspect the gasket for damage. If the gasket is not damaged, the gasket should be reused.

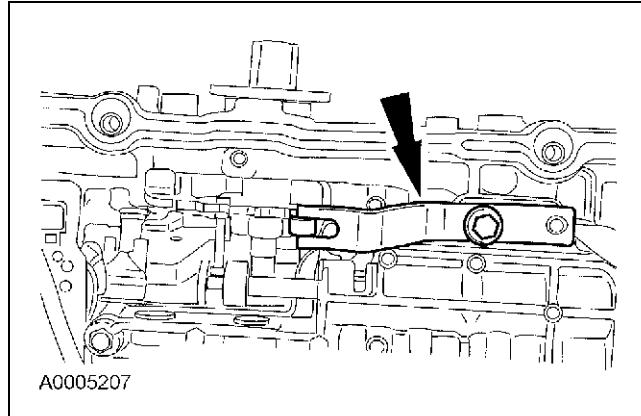
Remove the 16 transmission fluid pan screws, transmission fluid pan and gasket.



16. Remove the transmission fluid filter and discard.



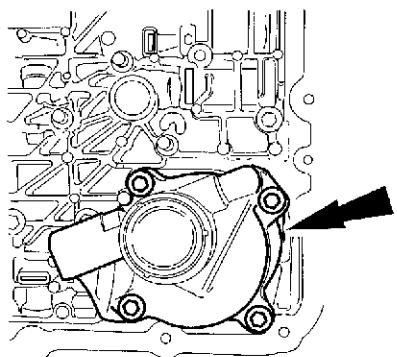
17. Remove the manual control valve detent spring.



DISASSEMBLY (Continued)

18. **⚠ WARNING:** Follow the specified procedure when using the tool to remove the servo cover. The servo and servo cover are under high spring force and can separate forcefully, which may result in serious personal injury.

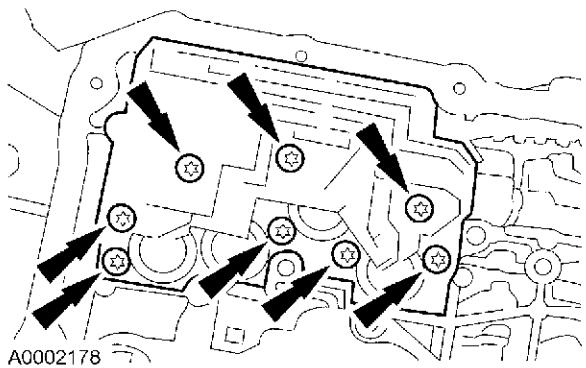
Remove the reverse servo assembly.



A0028244

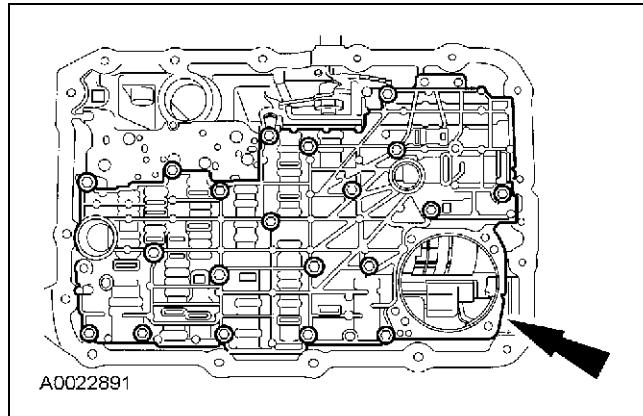
19. **⚠ CAUTION:** Do not damage solenoid body connector pins.

Remove the solenoid body assembly by lifting on the body and pushing the connector from the other side of the case.



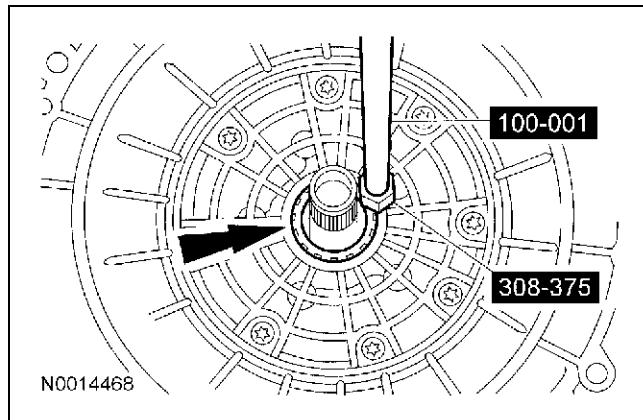
A0002178

20. Remove the main control valve body, separator plate and gasket.



A0022891

21. Using the special tools, remove the converter hub seal.



N0014468

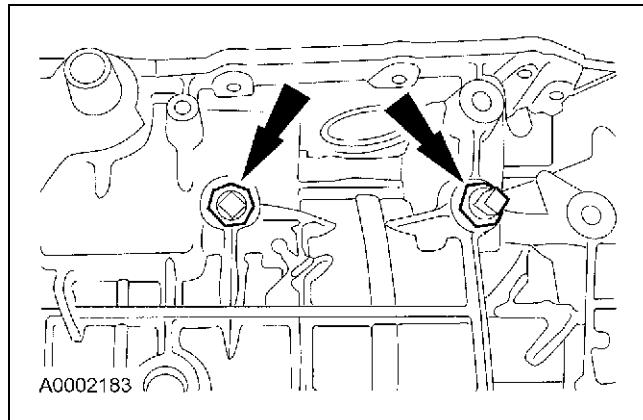
100-001

308-375

22. **⚠ CAUTION:** Failure to loosen the overdrive band adjusting screw prior to pump removal may cause damage to the pump and overdrive band.

⚠ CAUTION: Throw the locknuts away. The locknuts are not reusable for assembly.

Remove and discard the locknuts, and loosen the overdrive/intermediate band adjusting screw.

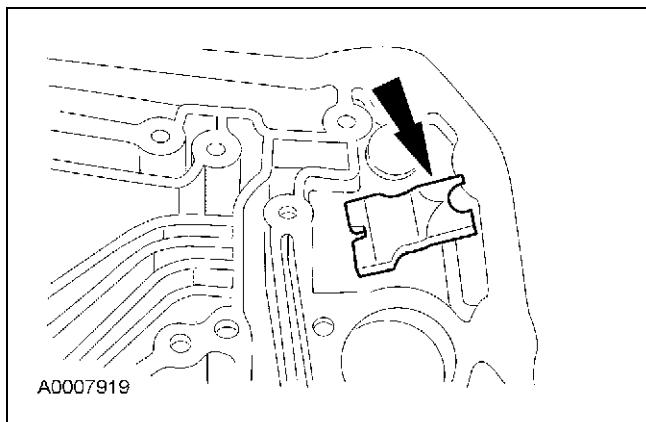


A0002183



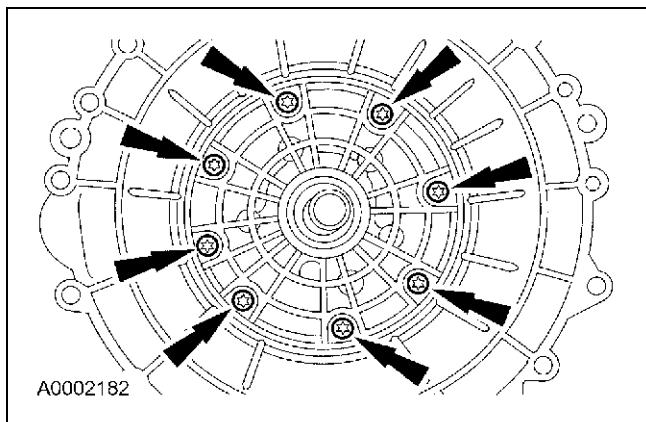
DISASSEMBLY (Continued)

23. Remove and tag part for assembly.

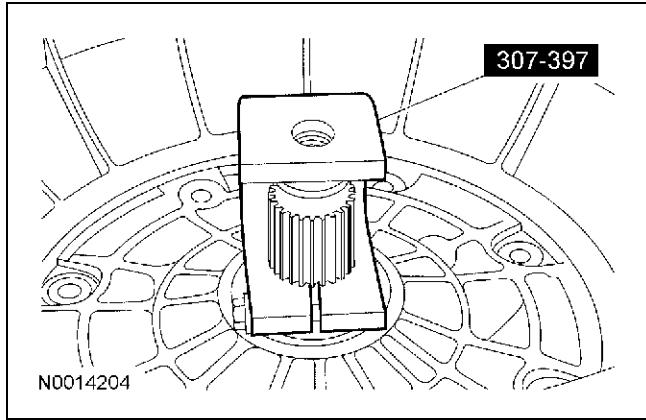


24. **⚠ CAUTION:** The screws are not reusable for assembly. Discard the screws. If the screws are reused, the housing may become separated from the transmission.

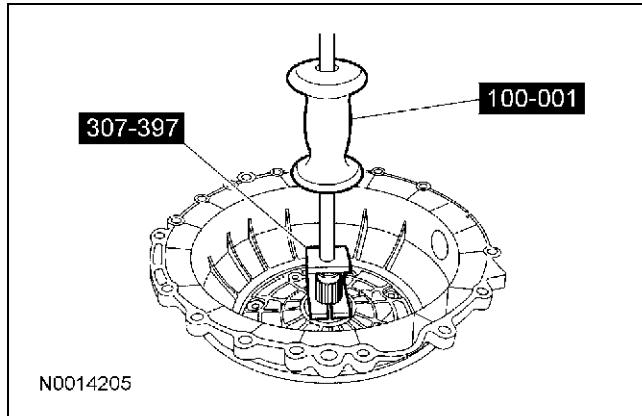
Remove and discard the screws.



25. Install the special tool.

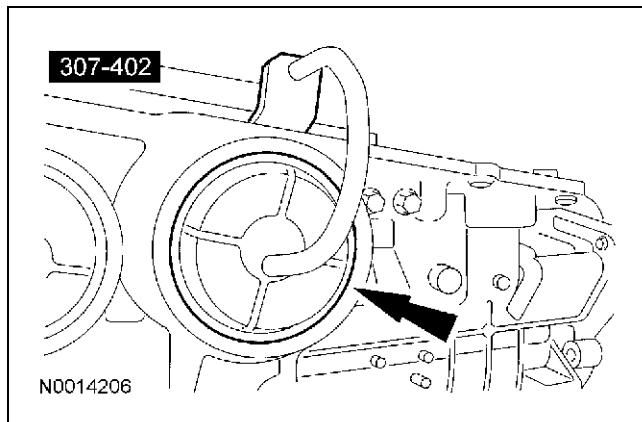


26. Using the special tools, remove the pump.

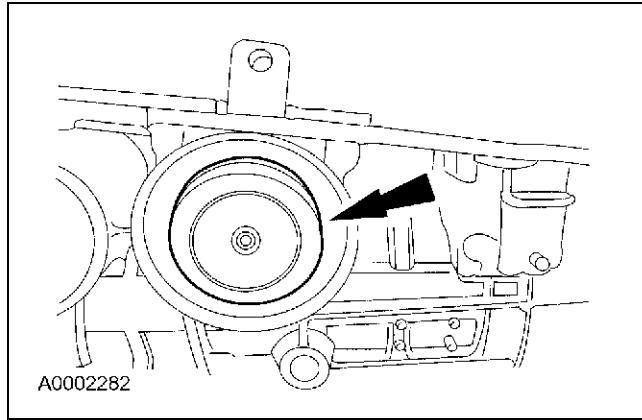


27. **⚠ WARNING:** Follow the specified procedure when using the tool to remove the servo cover. The servo and servo cover are under high spring force and can separate forcefully, which may result in serious personal injury.

Using the special tool, remove the intermediate servo cover retaining ring.



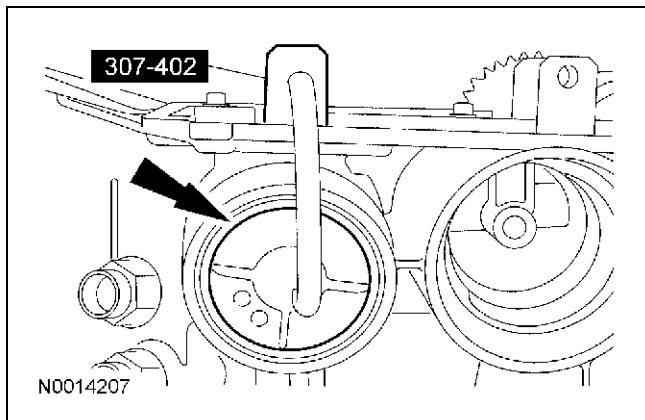
28. Remove the intermediate band servo piston and spring.



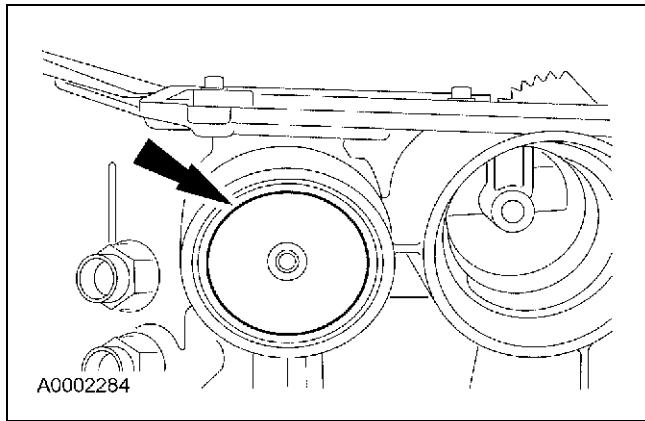
DISASSEMBLY (Continued)

- 29.**  **WARNING:** Follow the specified procedure when using the tool to remove the servo cover. The servo and servo cover are under high spring force and can separate forcefully, which may result in serious personal injury.

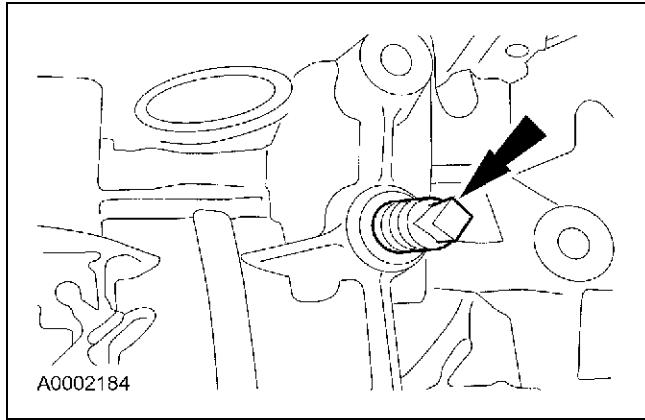
Using the special tool, remove the overdrive servo cover retaining ring and cover.



- 30.** Remove the front band servo piston and spring.

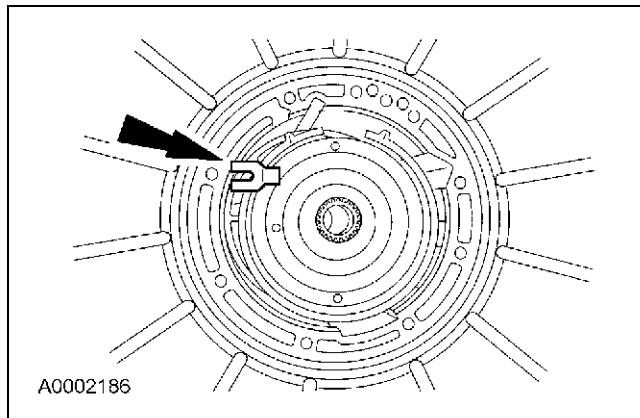


- 31.** Remove the screw.



- 32.** **NOTE:** Tag and identify parts for reassembly.

Compress the overdrive band and remove the apply strut.

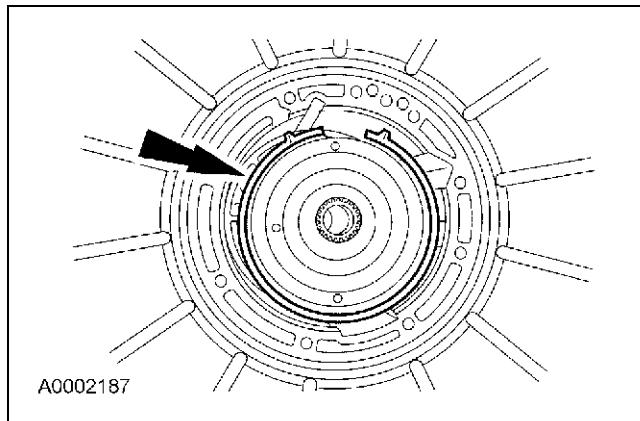


- 33.**  **CAUTION:** Identify the anchor and apply ends of the overdrive band.

NOTE: The new overdrive band is dark in color. This is a normal condition of the band. Hairline cracks in the band are also considered normal. Do not install a new band based solely on the color.

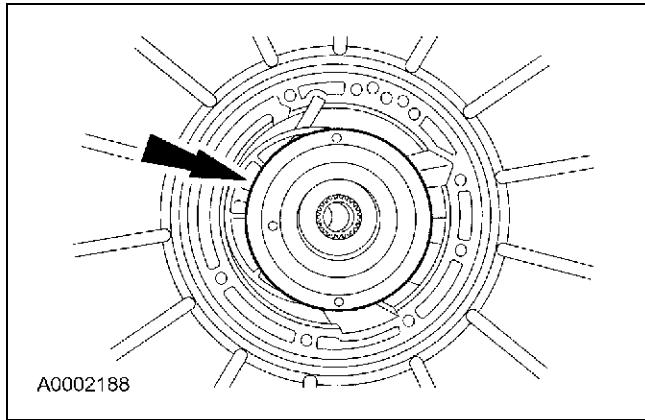
Remove and inspect the overdrive band. Check the following conditions for installing a new band:

- Inspect for glazing.
- Inspect for missing friction material.
- Inspect for material flaking.
- Inspect for damage to the anchor pins.



DISASSEMBLY (Continued)

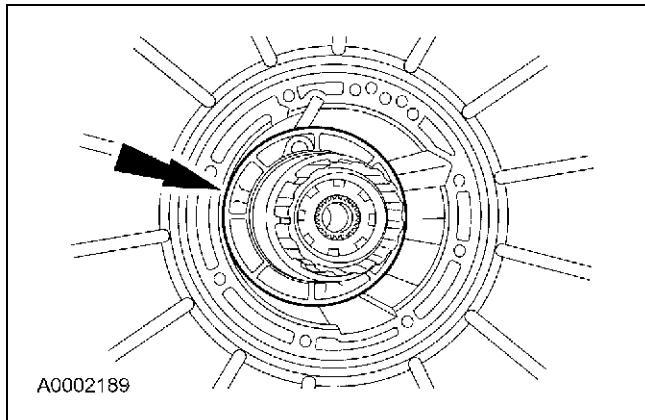
34. Remove the overdrive brake and coast clutch drum.



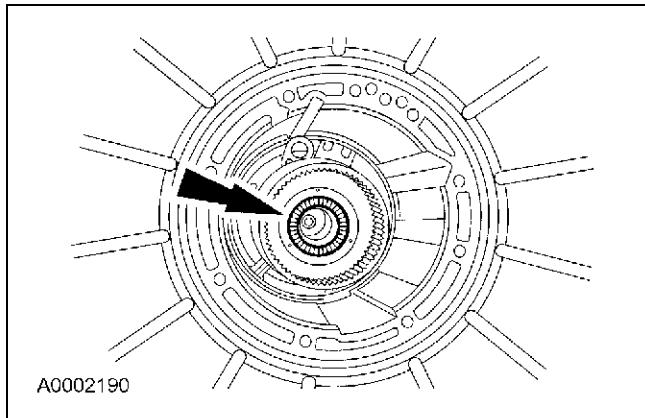
35. **⚠ CAUTION: Do not bend the trigger wheel.**

NOTE: The No. 12 thrust bearing is in this assembly.

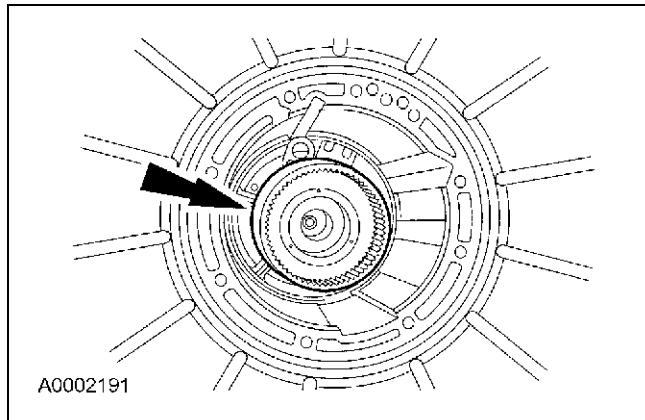
Remove the planetary gear overdrive carrier.



36. Remove the No. 2 overdrive planet thrust bearing.

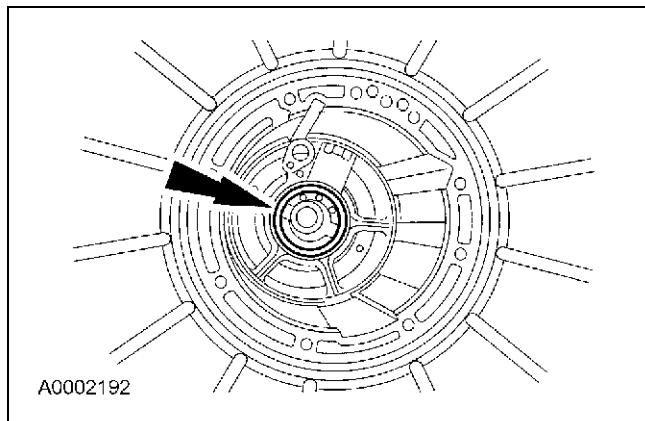


37. Remove the overdrive ring gear, overdrive one-way clutch assembly and center shaft as an assembly.



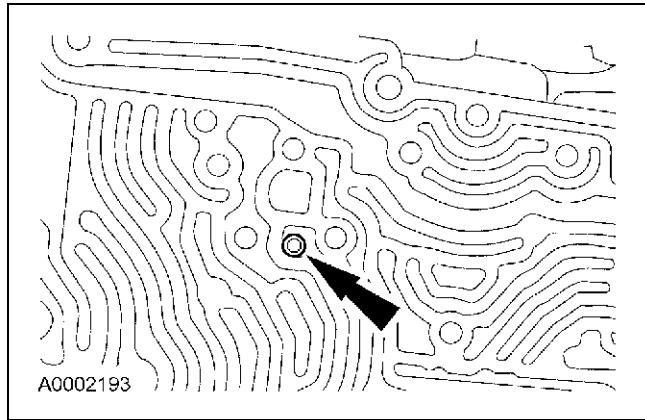
38. **NOTE:** Tag and identify the center shaft thrust bearing No. 3 for reassembly.

Remove the No. 3 center shaft thrust bearing.



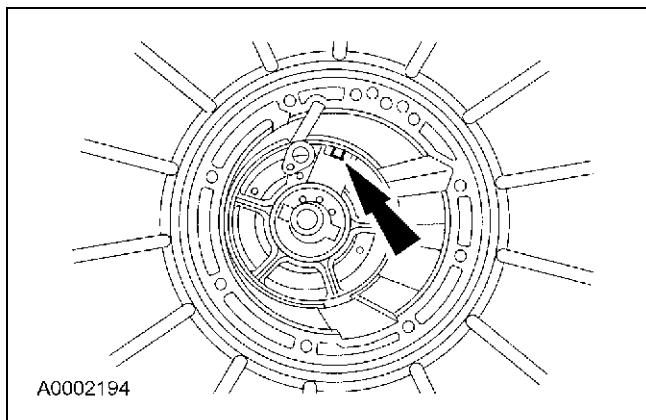
39. **⚠ CAUTION: The center support locknut could fall into the remaining assembly if not removed.**

Remove the bolt.

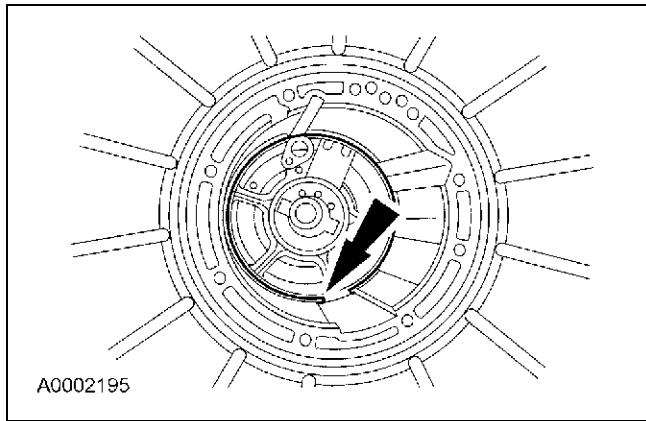


DISASSEMBLY (Continued)

40. Remove the locknut and cage.



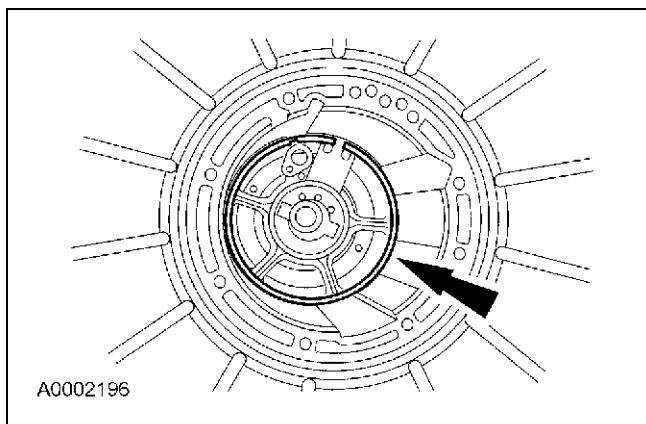
41. Remove the center support retaining ring.



42. **NOTE:** The center support is repaired as an assembly. Any damage requires installing a new component.

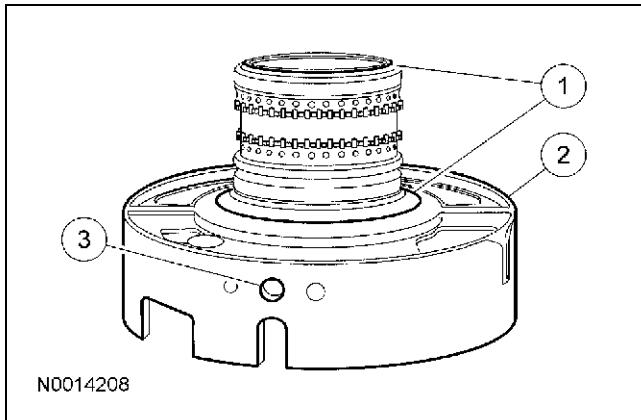
NOTE: When removing the center support, pull evenly around the center support web.

Remove the center support.

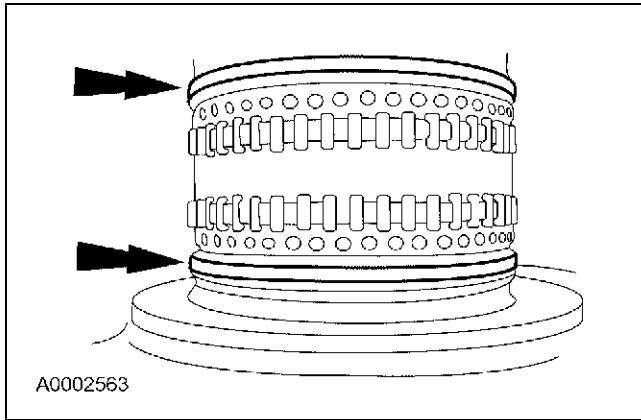


43. Inspect the center support assembly for wear or damage.

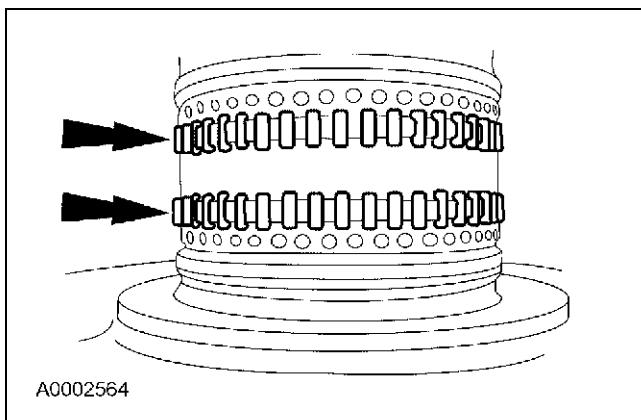
- 1 Inspect the thrust surfaces for wear or damage.
- 2 Inspect the center support sealing surface.
- 3 Inspect the fluid passage for blockage or damage.



44. Inspect the seal rings for damage.



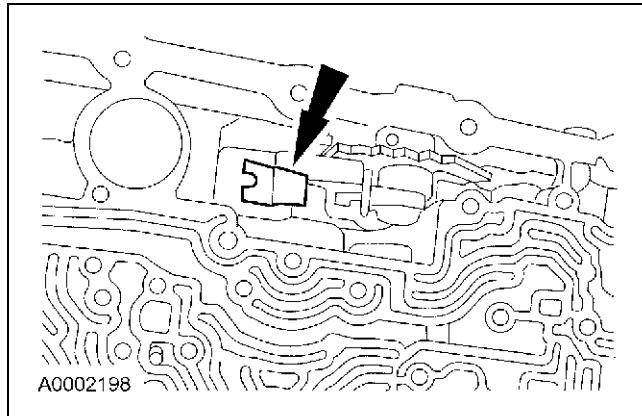
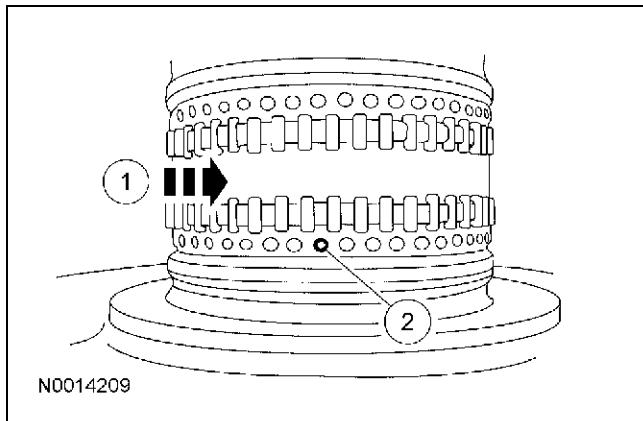
45. Inspect the bearing for missing rollers or damage.



DISASSEMBLY (Continued)

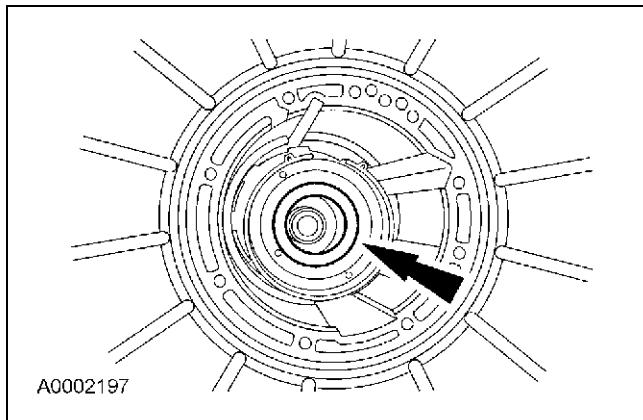
46. Inspect the direct clutch feed hole for blockage or damage.

- 1 Rotate the center support bearing to locate the direct clutch feed hole.
- 2 Inspect the direct clutch feed hole for blockage or damage.



47. **NOTE:** Tag and identify the No. 4 intermediate clutch drum thrust bearing.

Remove the intermediate brake drum thrust bearing (No. 4).



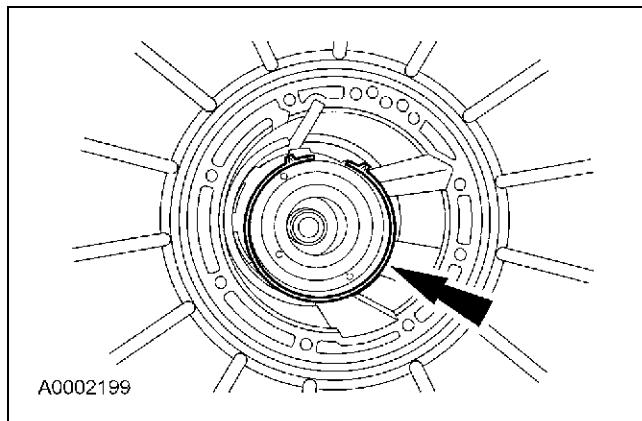
48. Remove, tag and identify the band anchor strut for assembly.

! CAUTION: Identify the anchor and apply ends of the intermediate band.

NOTE: The new intermediate band is dark in color. This is a normal condition of the band. Hairline cracks in the band are also considered normal. Do not install a new band based solely on the color.

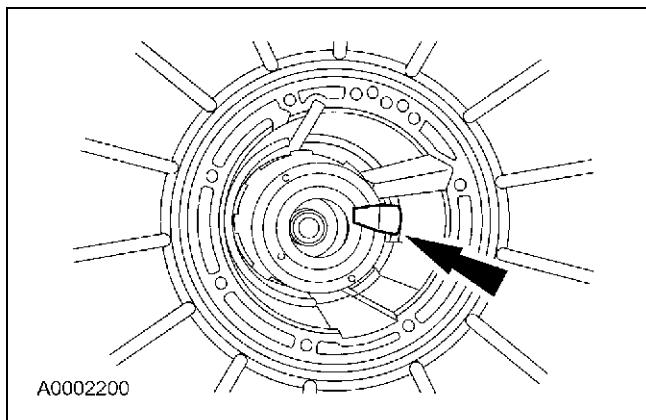
Remove and inspect the intermediate band. Check the following conditions when installing a new band:

- Inspect for glazing.
- Inspect for missing friction material.
- Inspect for material flaking.
- Inspect for damage to the anchor pins.

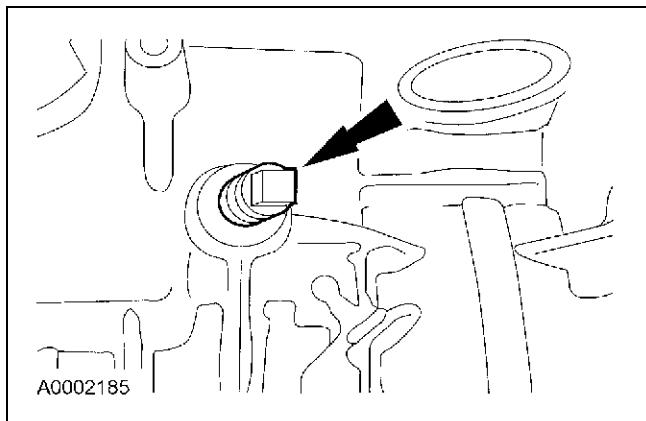


DISASSEMBLY (Continued)

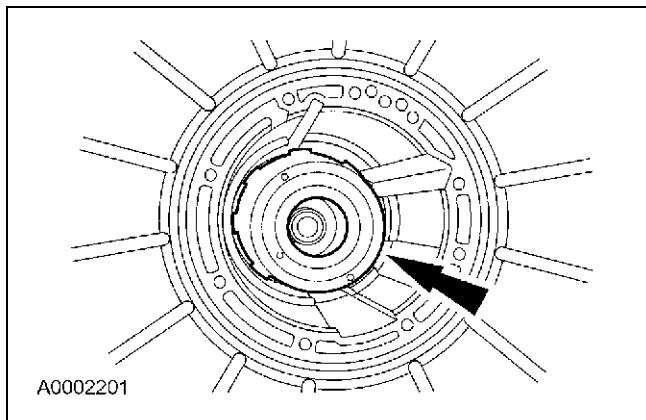
50. Remove, tag and identify the band apply strut.



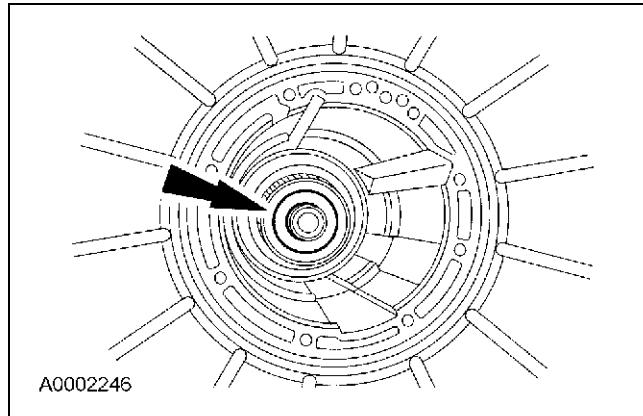
51. Remove the screw.



52. **NOTE:** The No. 5 forward clutch cylinder thrust bearing may come out with the intermediate brake and direct clutch drum.
Remove the direct clutch drum.

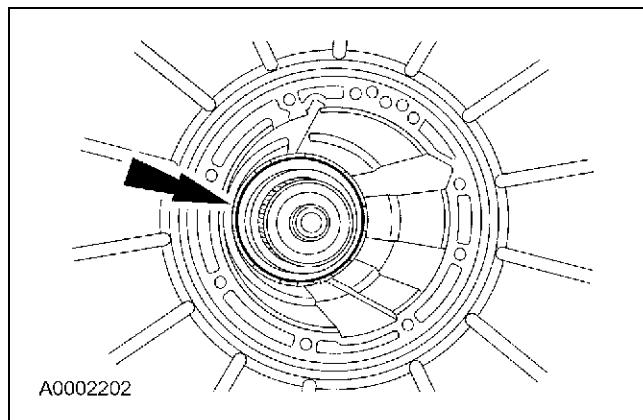


53. Remove the No. 5 forward clutch cylinder thrust bearing, tag and identify.



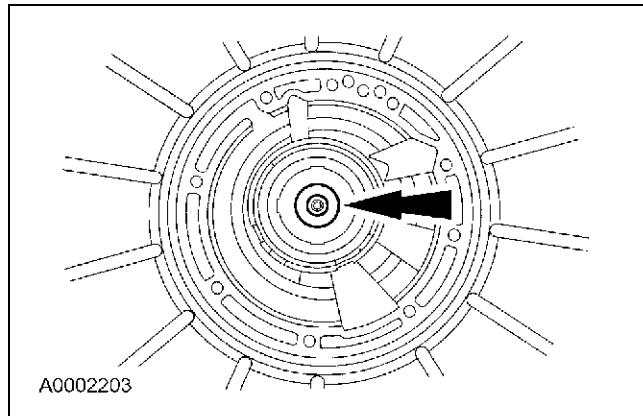
54. **NOTE:** The No. 6A thrust bearing may come out with the cylinder. Tag and identify for reassembly.

Remove the forward clutch cylinder.



55. **NOTE:** The No. 6A forward ring gear hub thrust bearing may have come out with the forward clutch cylinder.

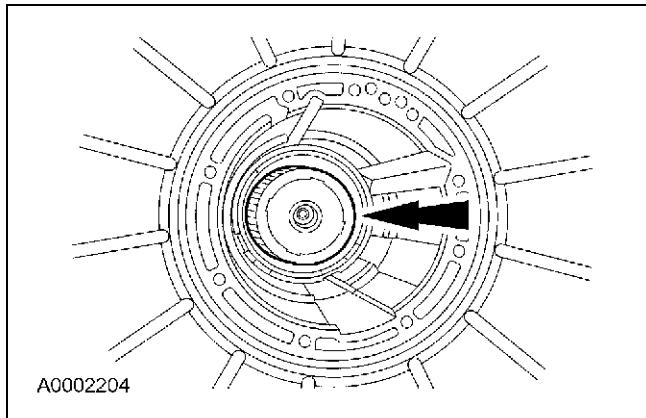
Remove the No. 6A forward ring gear hub thrust bearing.



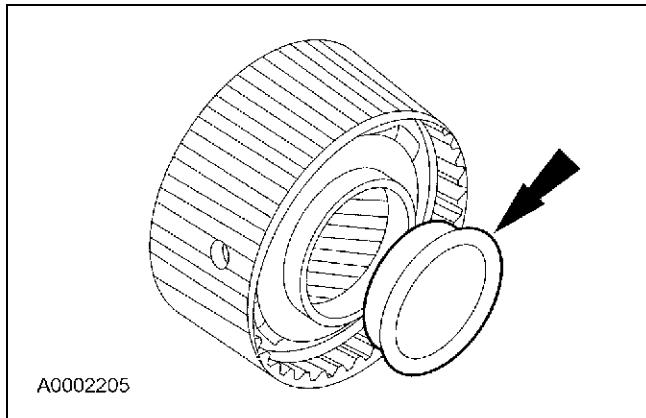
DISASSEMBLY (Continued)

56. **NOTE:** The No. 7 forward planet thrust bearing may come out with the forward ring gear and hub assembly.

Remove the forward ring gear and hub as an assembly.

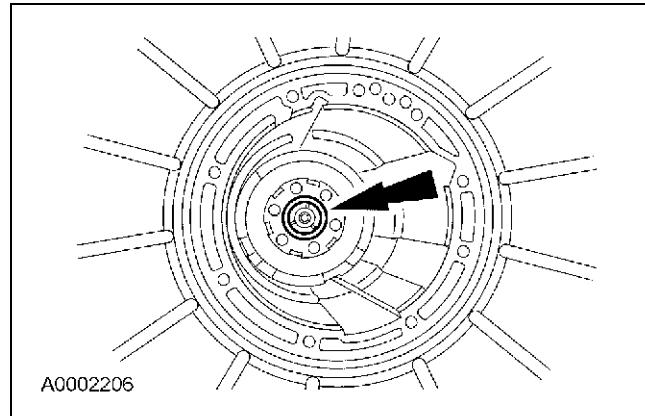


57. Remove the No. 6B forward clutch thrust washer from the forward ring gear hub.

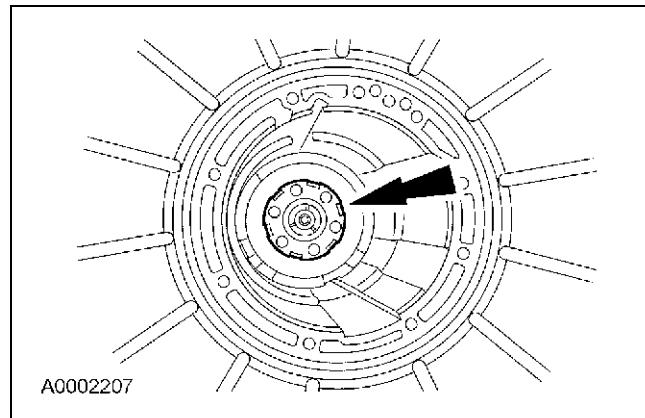


58. **NOTE:** The No. 7 forward planet thrust bearing may come out with the forward ring gear and hub assembly.

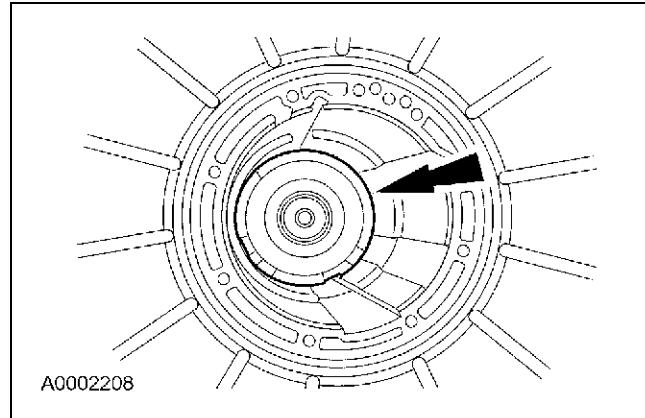
Remove the No. 7 forward planet thrust bearing.



59. Remove the forward planetary assembly.

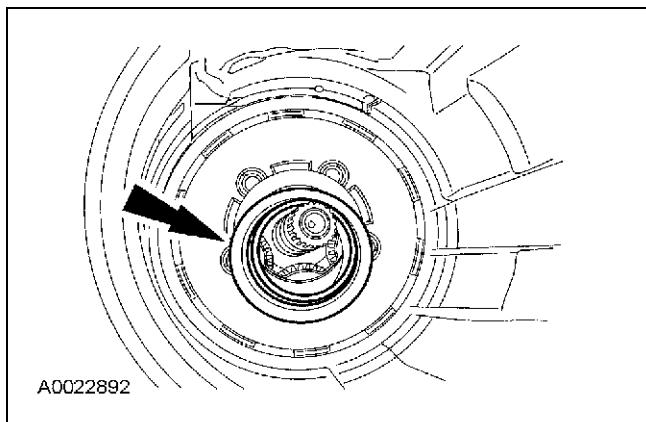


60. Remove the input shell and sun gear assembly.



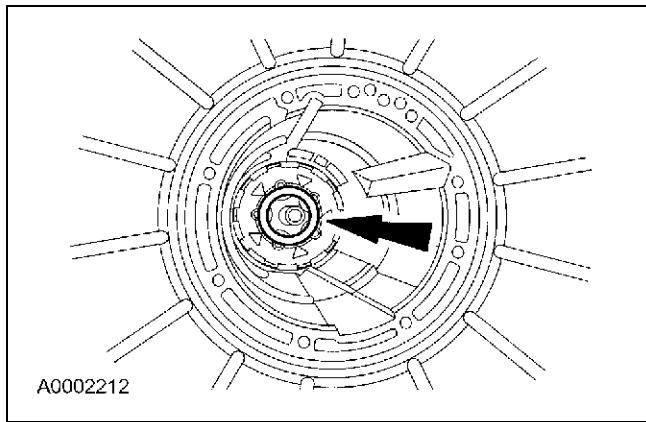
DISASSEMBLY (Continued)

61. Remove the spacer.

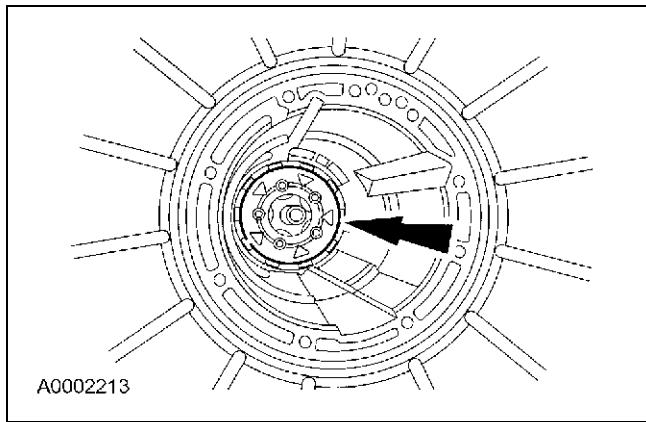


62. **NOTE:** Tag and identify the No. 8 low/reverse planetary carrier thrust bearing.

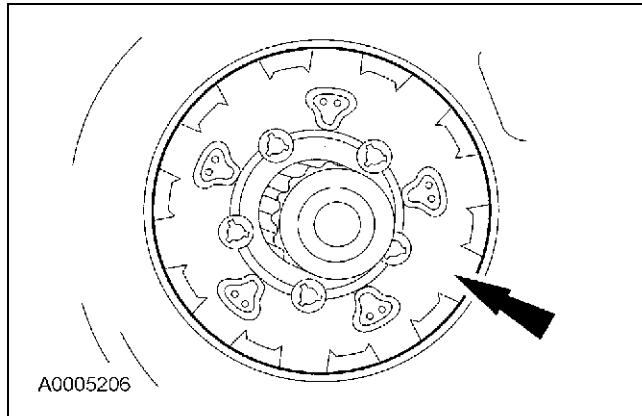
Remove the thrust bearing.



63. Remove the retaining ring.

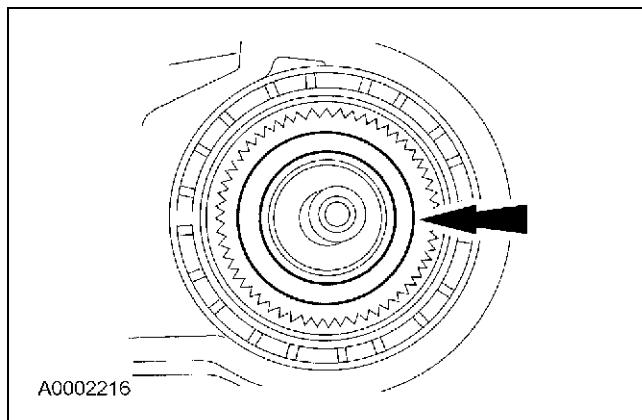


64. Remove the low/reverse planetary assembly.



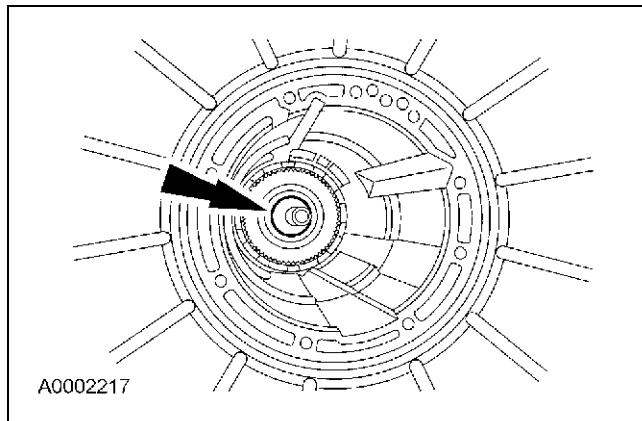
65. **NOTE:** Tag and identify the No. 9 low/reverse planetary carrier thrust bearing.

Remove the thrust bearing.



66. **NOTE:** Use slots located around the outside of the sleeve.

Using a small pick, remove the output shaft sleeve.

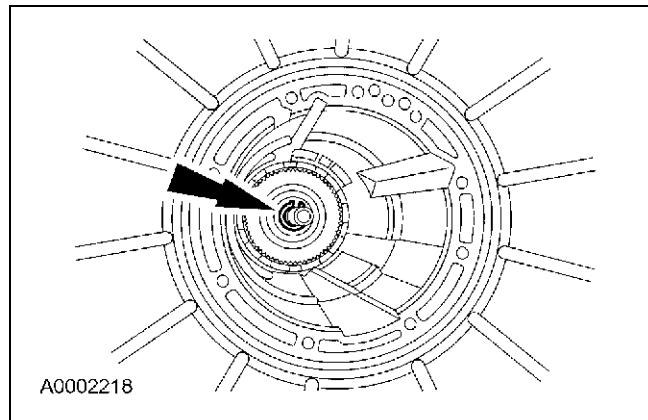
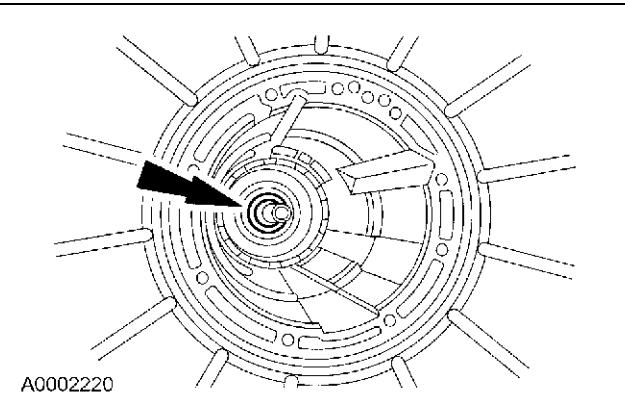


DISASSEMBLY (Continued)

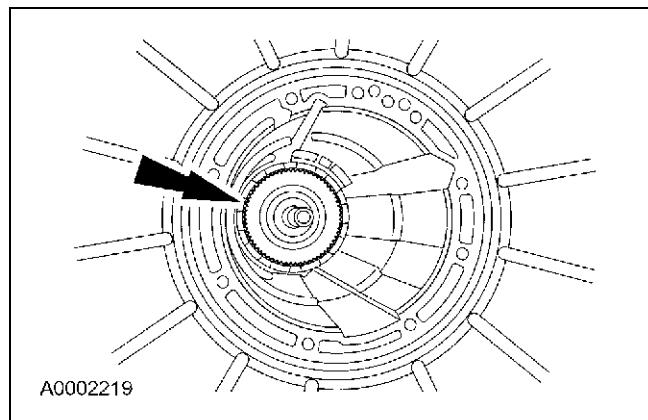
67. **⚠ WARNING:** Hold onto the output shaft so it does not fall out after removing the snap ring. Failure to follow this instruction may result in serious personal injury.

⚠ CAUTION: Discard the output shaft retaining ring. A new retaining ring must be used for assembly.

While holding the output shaft, remove and discard the output shaft retaining ring.



68. Remove the output shaft ring gear and hub.

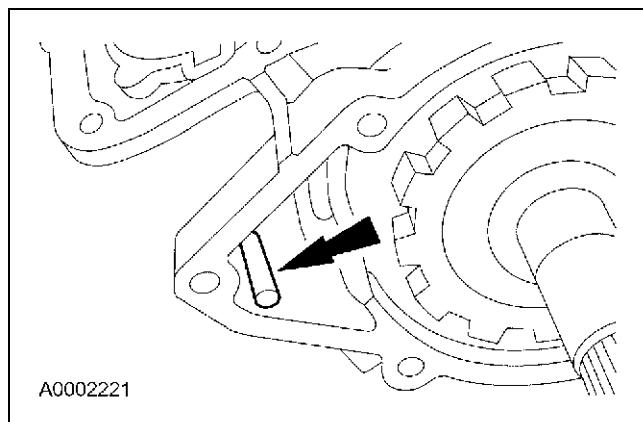


69. Remove the No. 10 low/intermediate sun gear bearing.

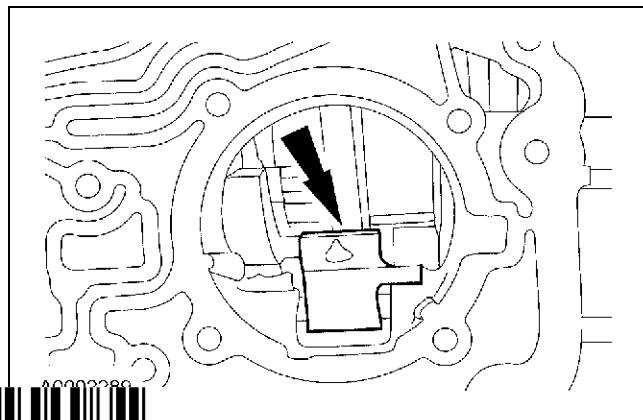
70. **⚠ CAUTION:** Do not pry on the outer edge of the case. Damage to the gasket sealing surface may occur.

NOTE: It may be necessary to grind flat spots on the edges of the reverse band actuating lever shaft in order to remove it.

Using a pair of vise grips, hold the flat spots on the reverse band actuating lever shaft, wiggle it back and forth and remove the reverse band actuating lever shaft.



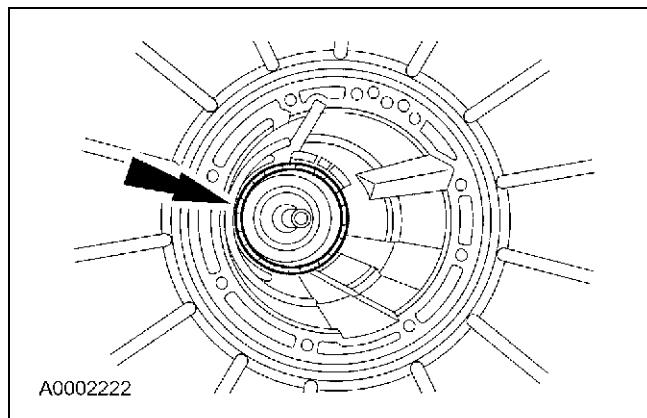
71. Remove the reverse band actuating lever assembly.



DISASSEMBLY (Continued)

72. **NOTE:** The inner race of the rear one-way clutch is not removable. It is repaired in the case.

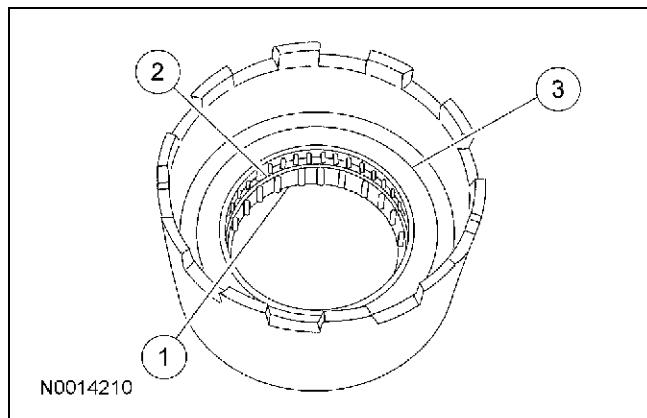
Remove the low/reverse brake drum and one-way clutch assembly by rotating it clockwise.



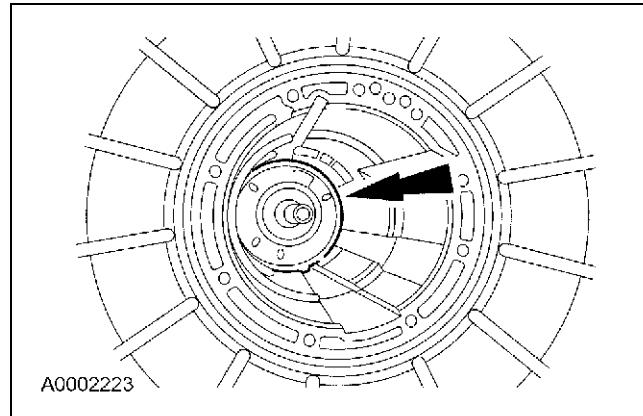
73. **NOTE:** The reverse one-way clutch is part of the reverse brake drum assembly. Install a new reverse brake drum as an assembly only.

Inspect the reverse brake drum assembly and install a new reverse brake drum assembly if damaged.

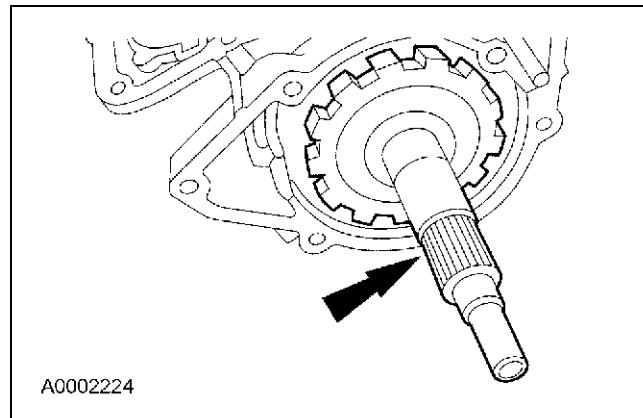
- 1 Inspect the reverse brake drum sprags.
- 2 Inspect the reverse brake drum rollers.
- 3 Inspect the reverse brake drum.



74. Remove the reverse band.

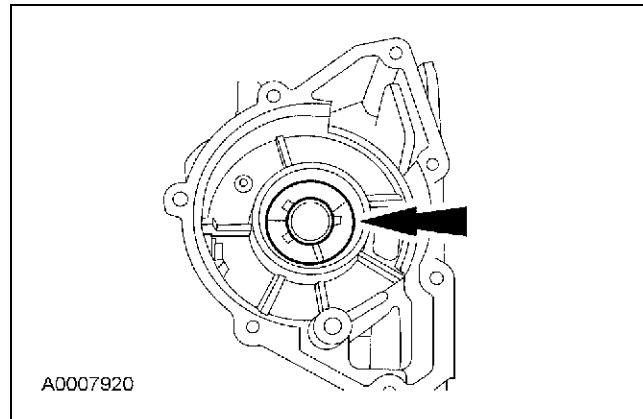


75. Remove the output shaft and park gear.



76. **NOTE:** Tag and identify the No. 11 output shaft thrust washer.

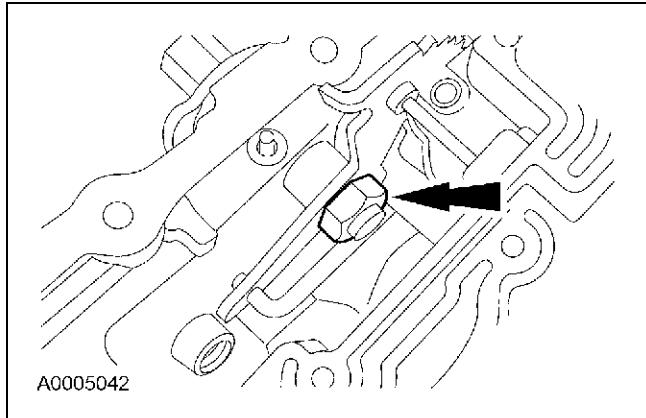
Remove the output shaft thrust washer.



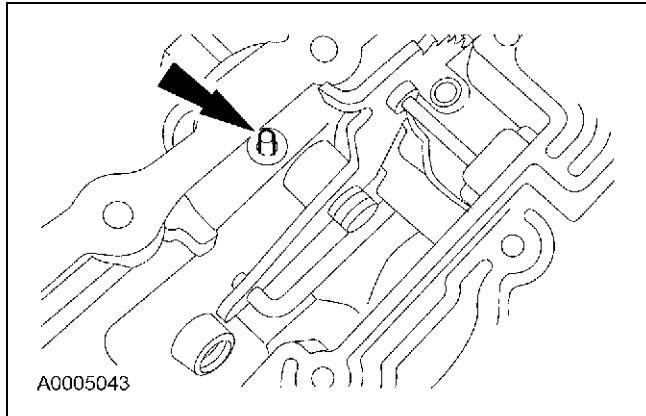
DISASSEMBLY (Continued)

77. **⚠ CAUTION:** To avoid damage, make sure the wrench does not strike the manual valve inner lever pin.

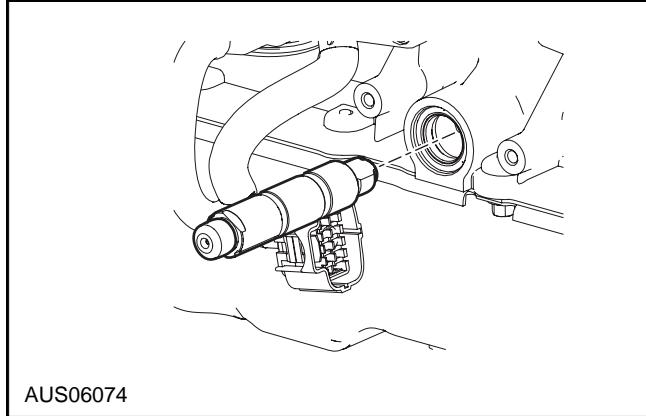
Remove the nut.



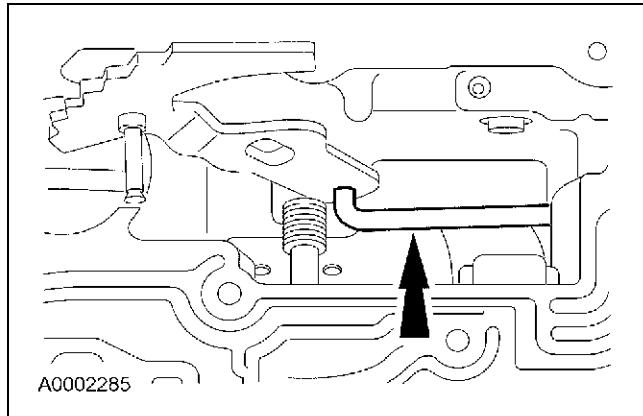
78. Remove the manual shaft retaining pin.



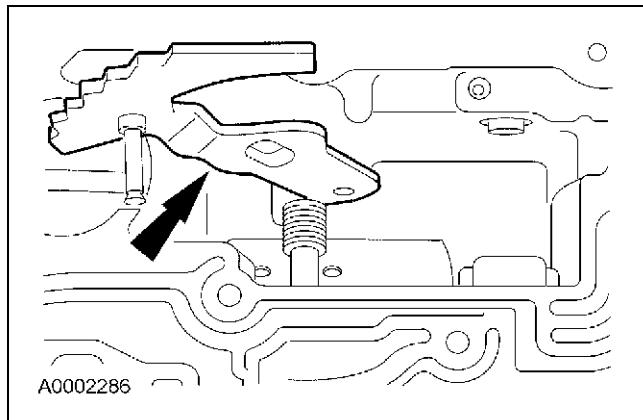
79. Remove the manual control lever shaft.



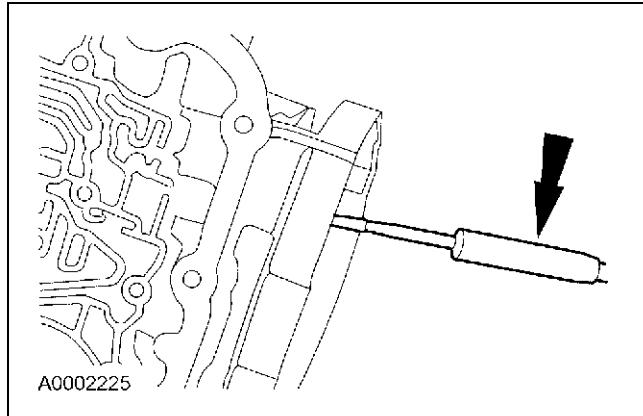
80. Disconnect the manual valve inner lever from the parking lever actuating rod.



81. Remove the manual valve inner lever.



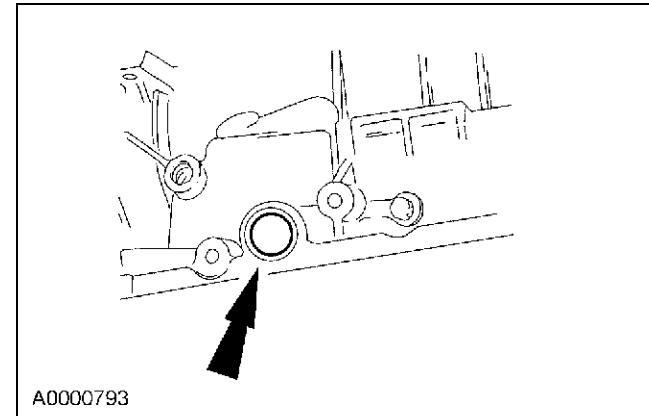
82. Remove the parking lever actuating rod.



DISASSEMBLY (Continued)

83.  **CAUTION:** Do not damage the bore.

Remove the manual control lever seal.

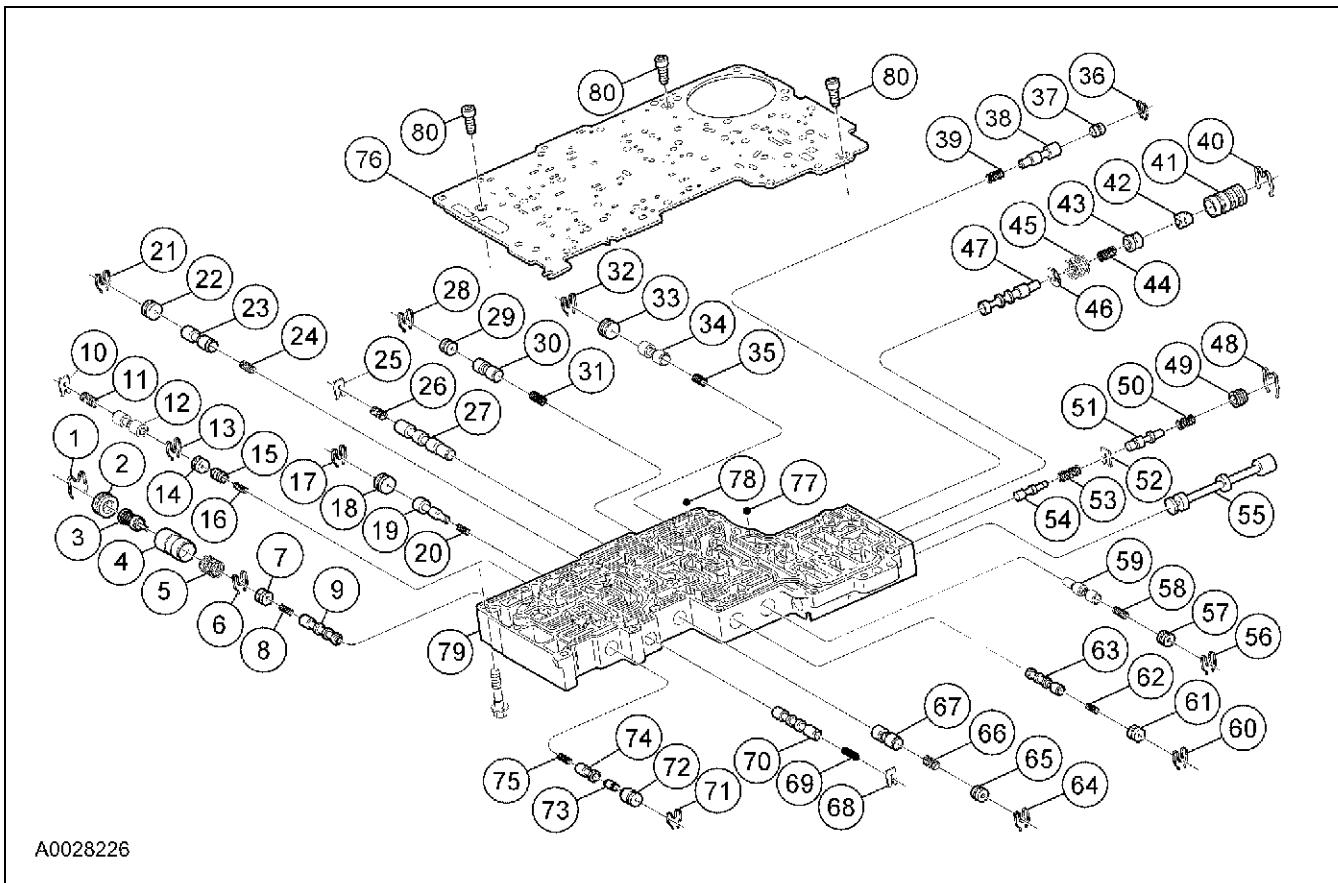


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

Main Control Valve Body

Special Tool(s)

| | |
|---|--|
|  | Aligner, Valve Body (2 required) 307-334 (T95L-70010-C) |
|---|--|



| Item | Part Number | Description |
|------|-------------|------------------------------|
| 1 | — | Clip — retainer |
| 2 | — | Plug — retainer |
| 3 | — | Valve assembly — thermo |
| 4 | — | Valve — fluid cooler bypass |
| 5 | — | Spring — fluid cooler bypass |
| 6 | — | Clip — retainer |
| 7 | — | Plug — retainer |

(Continued)

| Item | Part Number | Description |
|------|-------------|---|
| 8 | — | Spring — converter clutch control valve |
| 9 | — | Valve — converter clutch control |
| 10 | — | Plate |
| 11 | — | Spring — coast clutch control |
| 12 | — | Valve — coast clutch control |
| 13 | — | Clip — retainer |

(Continued)



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

| Item | Part Number | Description |
|-------------|--------------------|---|
| 14 | — | Plug — retainer |
| 15 | — | Valve — converter clutch back pressure |
| 16 | — | Spring — converter clutch back pressure |
| 17 | — | Clip — retainer |
| 18 | — | Plug — retainer |
| 19 | — | Valve — VFS2 modulator |
| 20 | — | Spring — VFS2 modulator valve |
| 21 | — | Clip — retainer |
| 22 | — | Plug — retainer |
| 23 | — | Valve — intermediate servo release |
| 24 | — | Spring — intermediate servo release valve |
| 25 | — | Plate |
| 26 | — | Spring — high clutch control |
| 27 | — | Valve — high clutch control |
| 28 | — | Plug — retainer |
| 29 | — | Clip — retainer |
| 30 | — | Valve — reverse modulator |
| 31 | — | Spring — reverse modulator valve |
| 32 | — | Clip — retainer |
| 33 | — | Plug — retainer |
| 34 | — | Valve — reverse engagement |
| 35 | — | Spring — reverse engagement valve |
| 36 | — | Clip — retainer |
| 37 | — | Plug — retainer |
| 38 | — | Valve — VFS1 modulator |
| 39 | — | Spring — VFS1 modulator valve |
| 40 | — | Clip — retainer |
| 41 | — | Sleeve |
| 42 | — | Valve — booster |
| 43 | — | Valve — booster |
| 44 | — | Spring — inner |
| 45 | — | Spring — outer |
| 46 | — | Spring — retainer |
| 47 | — | Valve — main regulator |
| 48 | — | Clip — retainer |

(Continued)

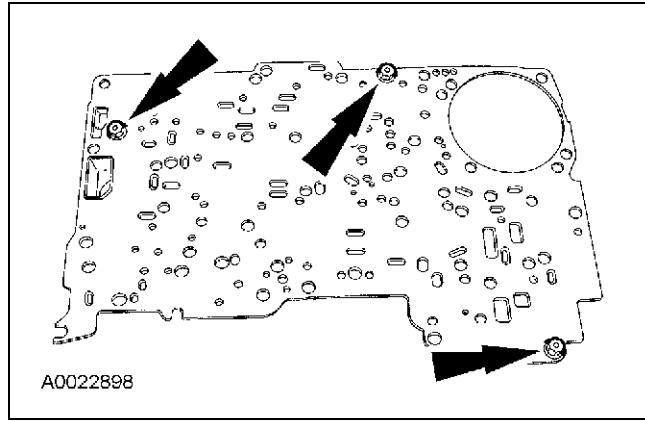
| Item | Part Number | Description |
|-------------|--------------------|--|
| 49 | — | Plug — retainer |
| 50 | — | Spring — converter limit |
| 51 | — | Valve — converter limit |
| 52 | — | Plate |
| 53 | — | Spring — solenoid regulator valve |
| 54 | — | Valve — solenoid regulator |
| 55 | — | Valve — manual |
| 56 | — | Clip — retainer |
| 57 | — | Plug — retainer |
| 58 | — | Spring — rear servo control valve |
| 59 | — | Valve — rear servo control |
| 60 | — | Clip — retainer |
| 61 | — | Plug — retainer |
| 62 | — | Spring — RS ISA select valve |
| 63 | — | Valve — RS ISA select |
| 64 | — | Clip — retainer |
| 65 | — | Plug — retainer |
| 66 | — | Spring — forward engagement control valve |
| 67 | — | Valve — forward engagement control |
| 68 | — | Plate |
| 69 | — | Spring — Overdrive servo control |
| 70 | — | Valve — Overdrive servo control |
| 71 | — | Retainer — clip |
| 72 | — | Sleeve — converter clutch modulator control |
| 73 | — | Valve — converter clutch modulator control |
| 74 | — | Valve — converter clutch modulator |
| 75 | — | Spring — converter clutch modulator control |
| 76 | 7Z490 | Plate assembly — main control valve body separator |
| 77 | 7E195 | Ball — lubrication check |
| 78 | 7E195 | Ball — shuttle valve |
| 79 | 7A101 | Body — control valve lower |
| 80 | W701099 | Screws — separator plate |



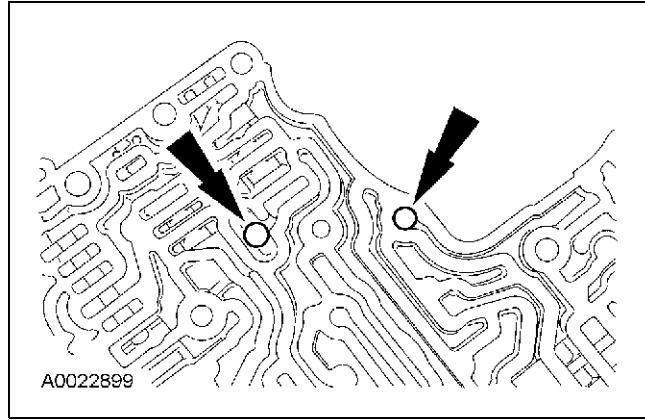
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

Disassembly

- NOTE:** The valve body separator plate has a bonded gasket. Do not reuse. Discard the plate. Remove and discard the valve body separator plate.



- Remove the check balls.



- NOTE:** Refer to the disassembled view. Disassemble the main control valve body only if cleaning is required.

Assembly

- CAUTION:** Do not lose parts when cleaning or repairing.

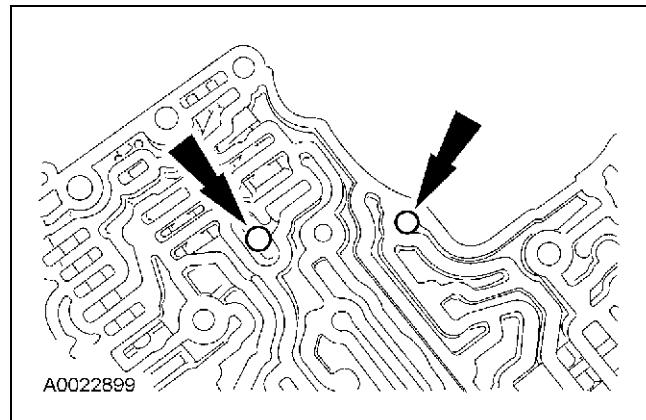
Thoroughly clean all parts in solvent and blow dry with moisture-free compressed air.

- CAUTION:** Do not stone, file or sand the valves. This will remove the anodized finish and may result in further main control or transmission damage.

After cleaning the main control valve body, carry out the following:

- Inspect all valve and plug bores for scoring or burrs
- Check all fluid passages for obstructions
- Inspect all valves and plugs for burrs
- Inspect all mating surfaces for burrs or distortion
- Inspect all springs for distortion
- Check all valves and plugs for free movement in their respective bores
 - Valves and plugs, when dry, must fall from their own weight into their respective bores
- Roll the manual valve on a flat surface to check for a bent condition

- Assemble the main control valve body.
- Install the main control valve body check balls.

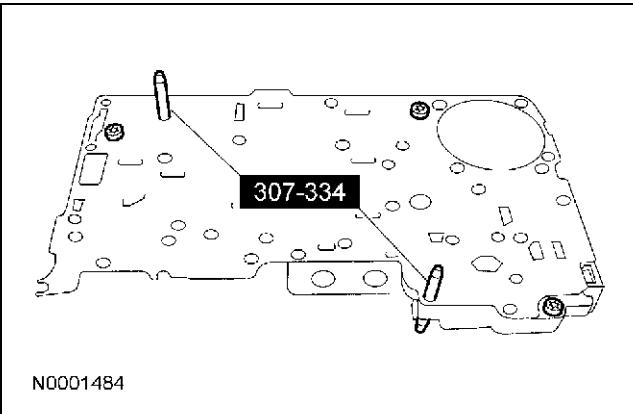


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

5. **NOTE:** Use a new valve body separator plate for main control valve body installation.

Using the special tools, install a new main control valve body separator plate.

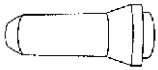
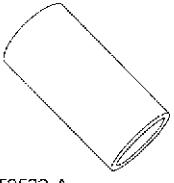
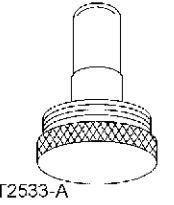
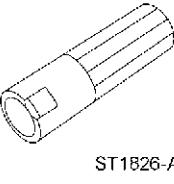
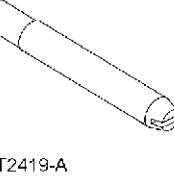
- Tighten to 7 Nm (62 lb-in).



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

Fluid Pump

Special Tool(s)

| | |
|---|--|
|  | Installer, Torque Converter Fluid Seal 307-349 (T97T-77000-A) |
|  | Alignment Set, Fluid Pump 307-S039 (T74P-77103-X) |
|  | Aligner, Fluid Pump Handle 307-431 |
|  | Aligner, Fluid Pump Pilot 307-432 |
|  | Sizer, Piston Seal 307-338 (T95L-70010-G) |
|  | Alignment Pins, Transmission Pump 307-398 |

(Continued)

Special Tool(s)

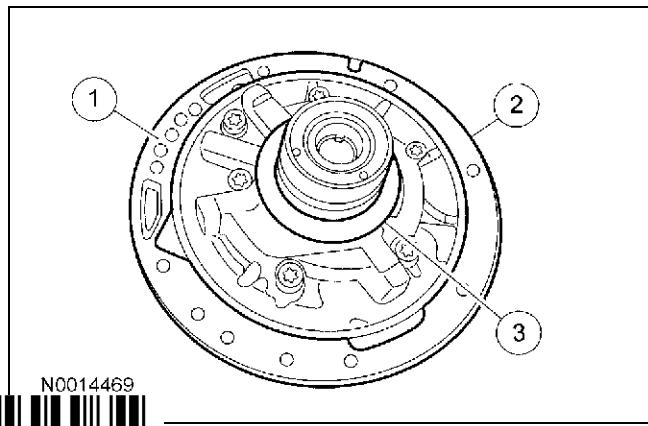
| | |
|--|---|
|  | Transmission Fluid Pump Seal Aligner 307-451/1 |
|  | Transmission Fluid Pump Seal Sizer 307-451/2 |
|  | Transmission Fluid Pump Seal Installer 307-451/3 |

Material

| Item | Specification |
|--|---------------|
| Multi-Purpose Grease XG-4 and/or XL-5 | ESB-M1C93-B |

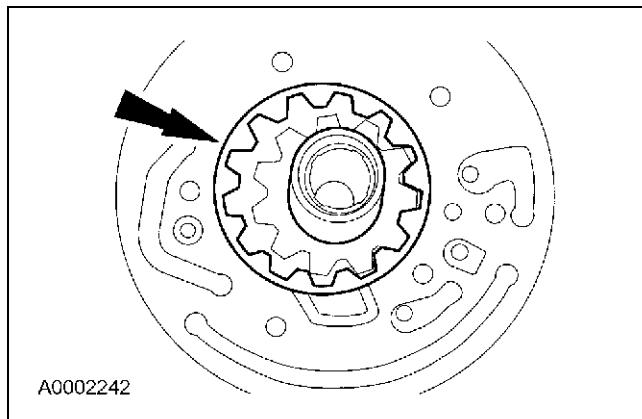
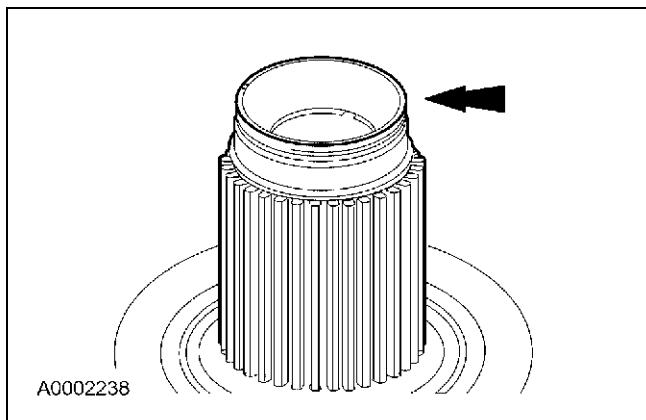
Disassembly

1. Remove the fluid pump gasket, fluid pump seal ring and the No. 1 thrust washer.
 - 1 Remove and discard the fluid pump gasket.
 - 2 Remove and discard the fluid pump seal ring (square cut).
 - 3 Remove and tag the No. 1 thrust washer.

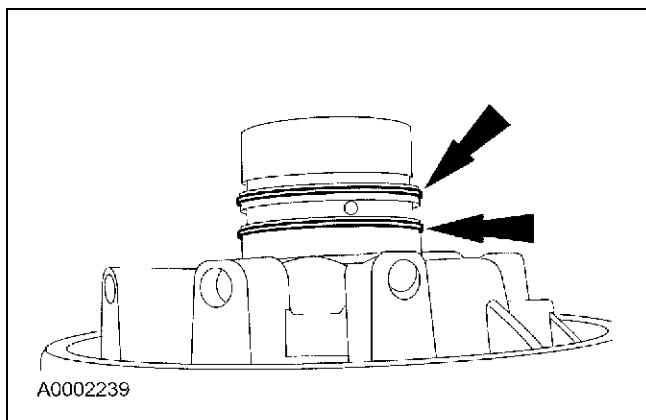


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

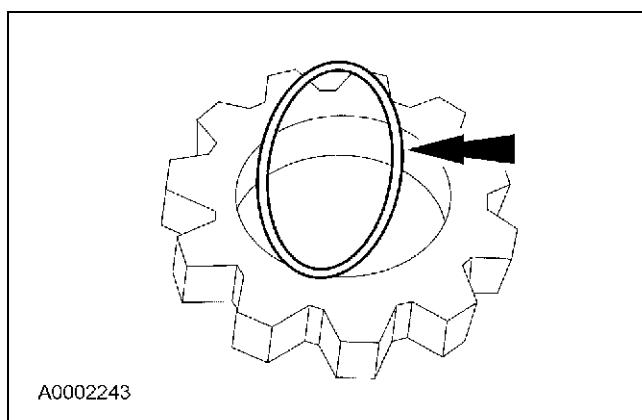
2. Remove the fluid pump support seal ring.



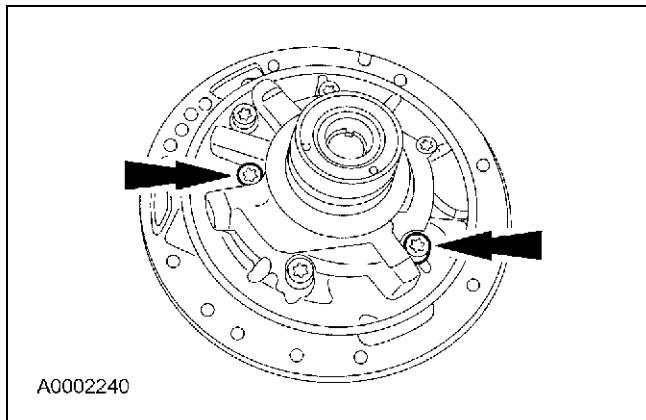
3. Remove the seal rings.



6. Remove the drive gear O-ring seal and discard. Inspect the fluid pump gears for cracks and scoring.

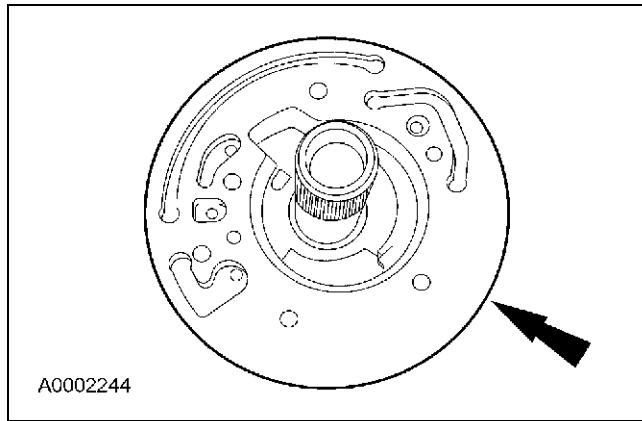


4. Remove the fluid pump housing.



7. Inspect the overdrive pump.

- Inspect the overdrive pump support gear pockets for scoring and wear.
- Clean and inspect the overdrive and rear input shaft bushings.



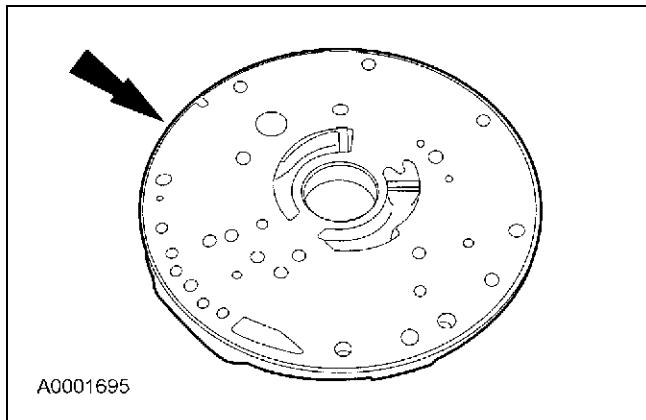
5. **NOTE:** A rough casting on the pump surface crescent is not a flaw.

NOTE: The fluid pump gears are part of the pump assembly and are not repaired separately.
Remove the fluid pump gears.

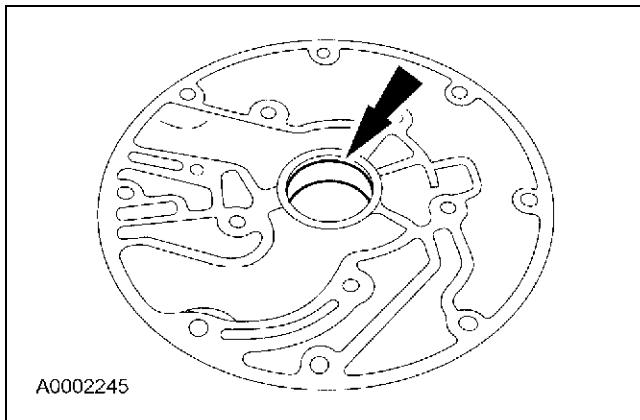


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

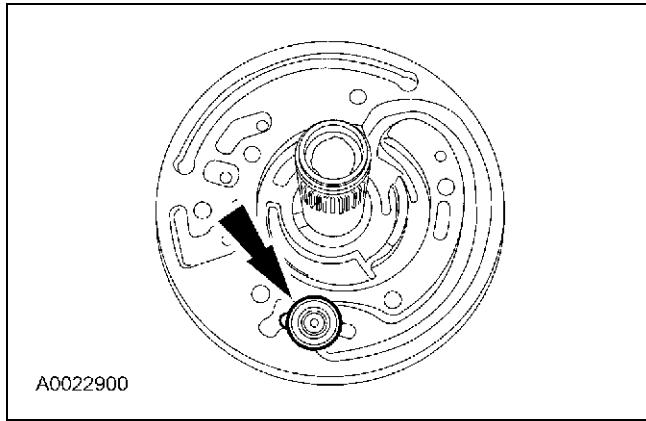
8. Inspect the fluid pump adapter plate for scoring and wear.



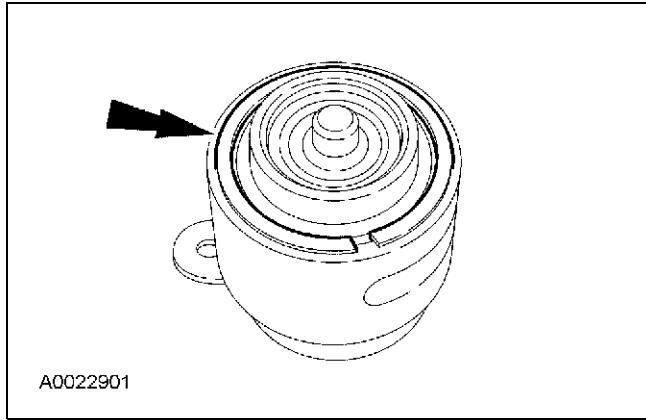
11. Inspect the fluid pump to converter housing bushing.



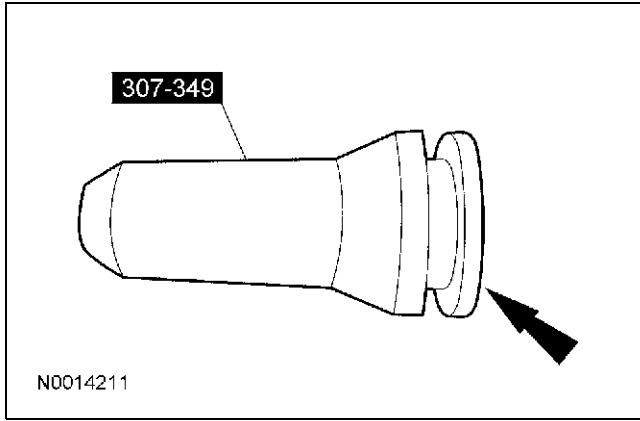
9. Remove the valve.



10. Remove and discard the seal.

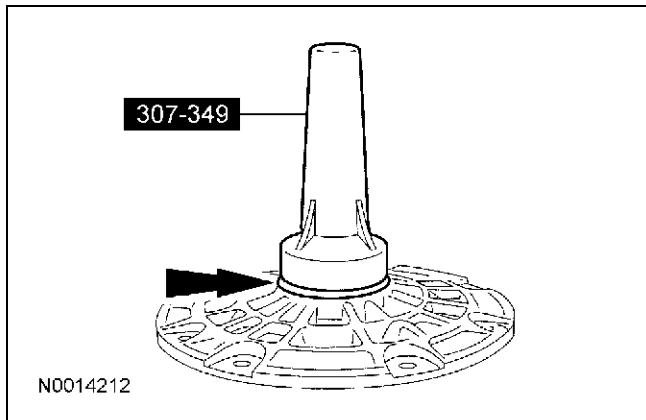
**Assembly**

- NOTE:** Minor burrs and scoring may be removed with crocus cloth. If damage is found, install a new assembly.
Inspect the fluid pump components for the following:
 - Pump body and case for burrs.
 - Fluid passages for obstructions.
- NOTE:** Check and make sure that the garter spring in the seal has not popped off of the converter hub seal.
Install a new seal onto the special tool.

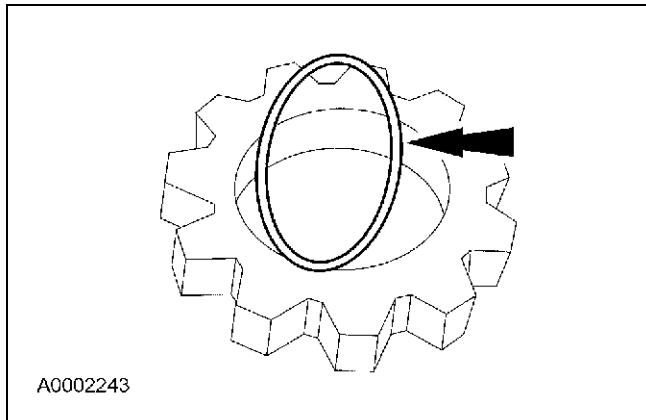


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

3. Using the special tool, install the converter hub seal.

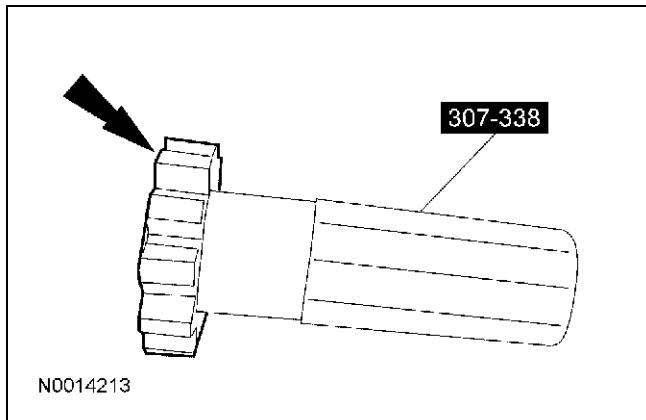


4. Install a new O-ring seal in the fluid pump drive gear.



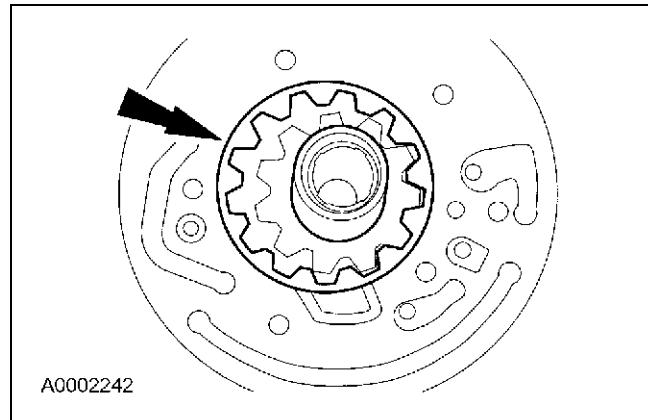
5. **⚠ CAUTION: Lubricate the special tool with multi-purpose grease.**

Using the special tool, seat the O-ring seal in the pump gear.

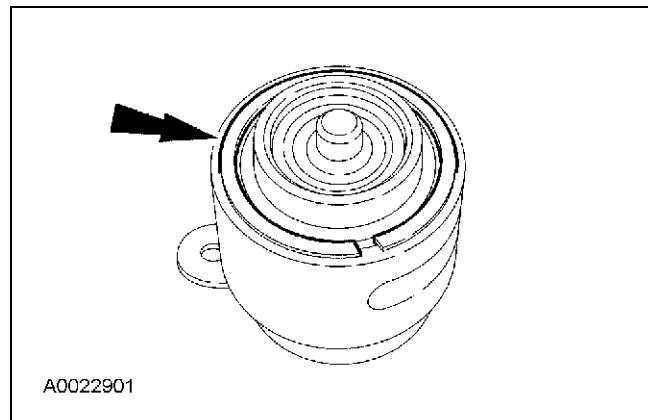


6. **⚠ CAUTION: The chamber on the inside edge of the small gear must be UP when in the pump housing gear pocket. The dimple on the larger gear must be DOWN when in the pump housing gear pocket.**

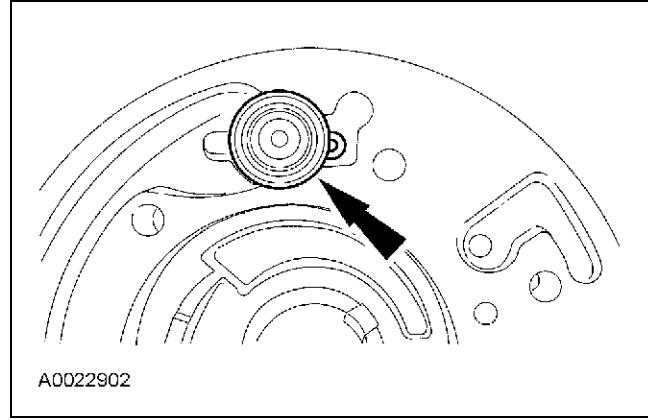
Install the pump gears into the fluid pump housing. Apply multi-purpose grease to the pump gear to prevent scoring at start up.



7. Install a new seal on the valve.

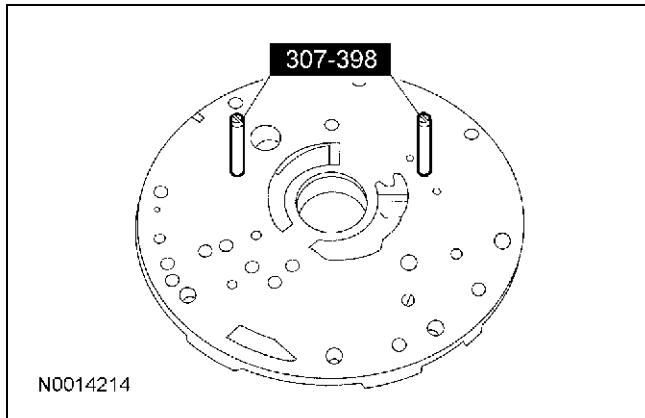


8. Install the valve with the tab facing down.



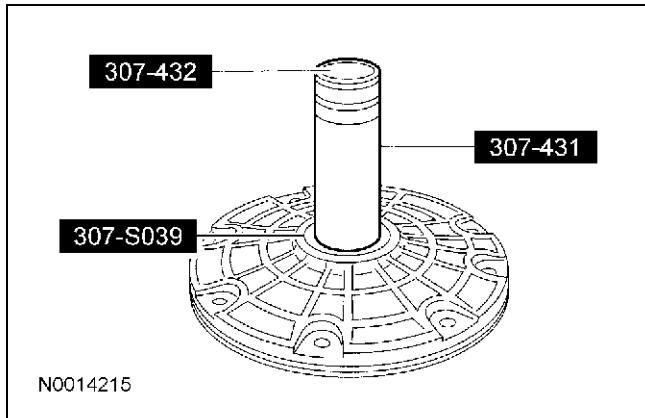
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

9. First, install the fluid pump adapter plate, then install the alignment pins in their correct location.

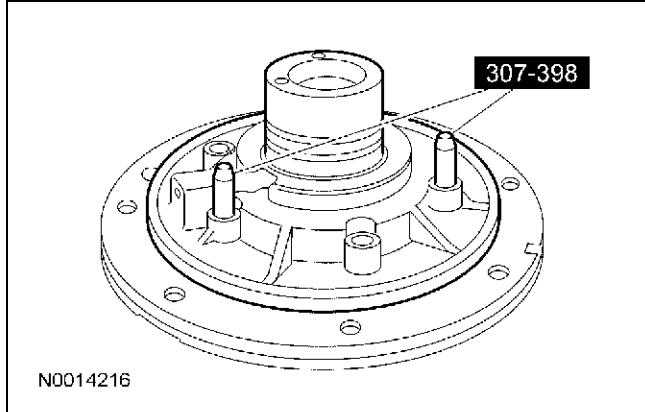


10. **⚠ CAUTION: The special tools must be used to correctly align the pump with the adapter plate to reduce gear noise, bushing failure and leakage.**

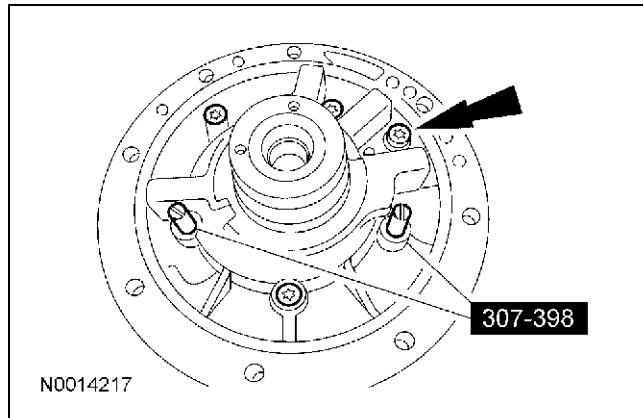
Using the special tool, align the fluid pump to the adapter plate.



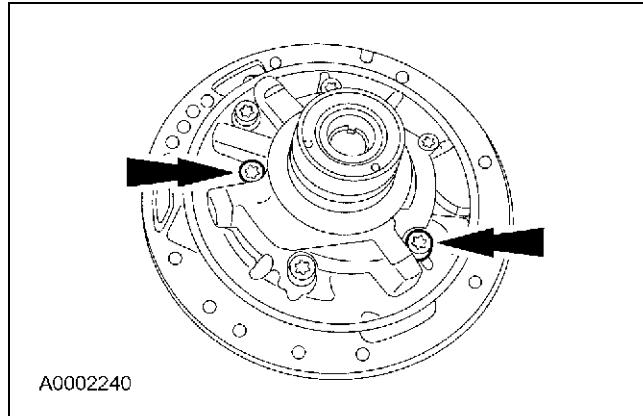
11. Using the special tools, assemble the pump.



12. Loosely install the fluid pump housing screws in their correct location and remove the special tools.

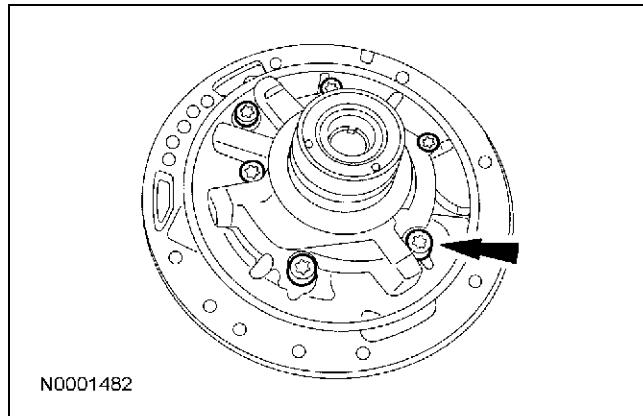


13. Install the 2 remaining screws.



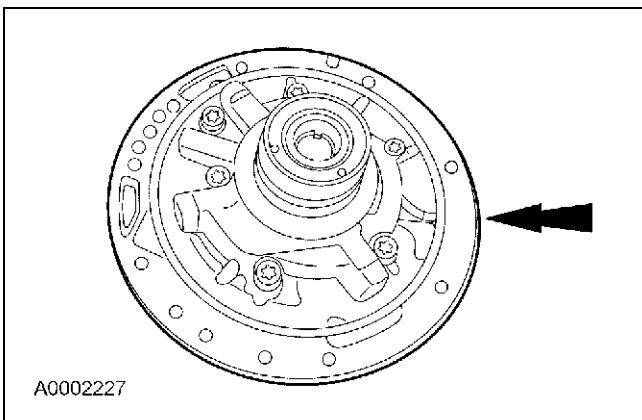
14. Tighten all of the fluid pump screws in a star pattern.

- Tighten to 22 Nm (16 lb-ft).

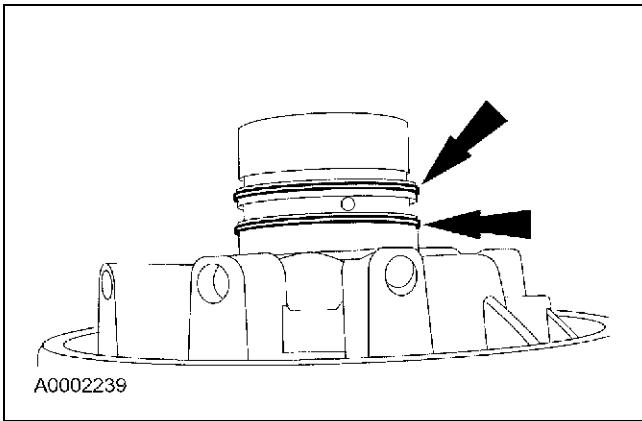


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

15. Install a new fluid pump seal ring.

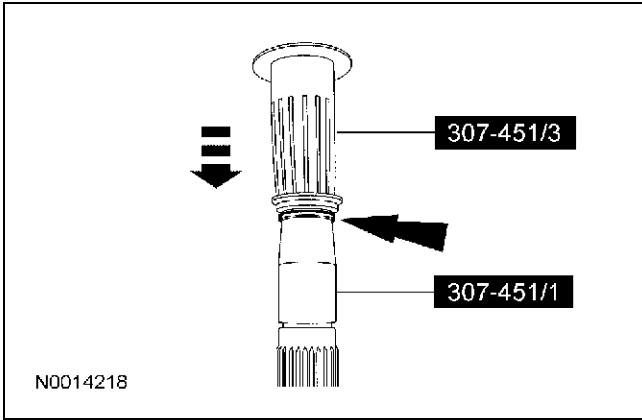


16. Install the 2 new seal rings.



17. **⚠ CAUTION:** Be careful not to overstretch the seal ring past the seal ring groove. Damage to the seal will occur.

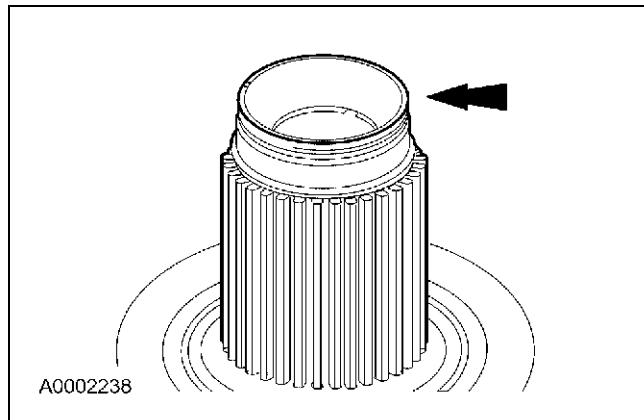
Using the special tools, install the fluid pump seal ring.



18. **⚠ CAUTION:** Verify correct seal installation. Make sure seal grooves are clean and free of burrs.

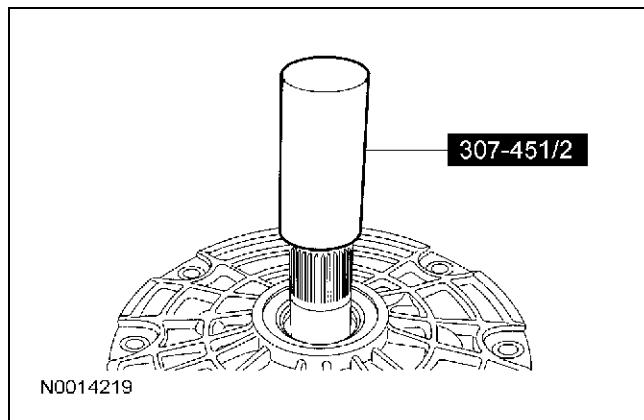
NOTE: Make sure seal grooves are clean and free of burrs. Make sure that the seal is seated into the groove.

Verify the seal is installed correctly.



19. **⚠ CAUTION:** Failure to correctly size the seal will cause damage to the seal when the torque converter is installed.

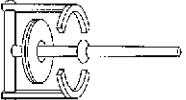
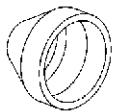
Using the special tool, size the seal to the correct size. Leave the special tool on the seal ring for 2 minutes to obtain the correct seal size.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

Overdrive Brake and Coast Clutch Drum Assembly

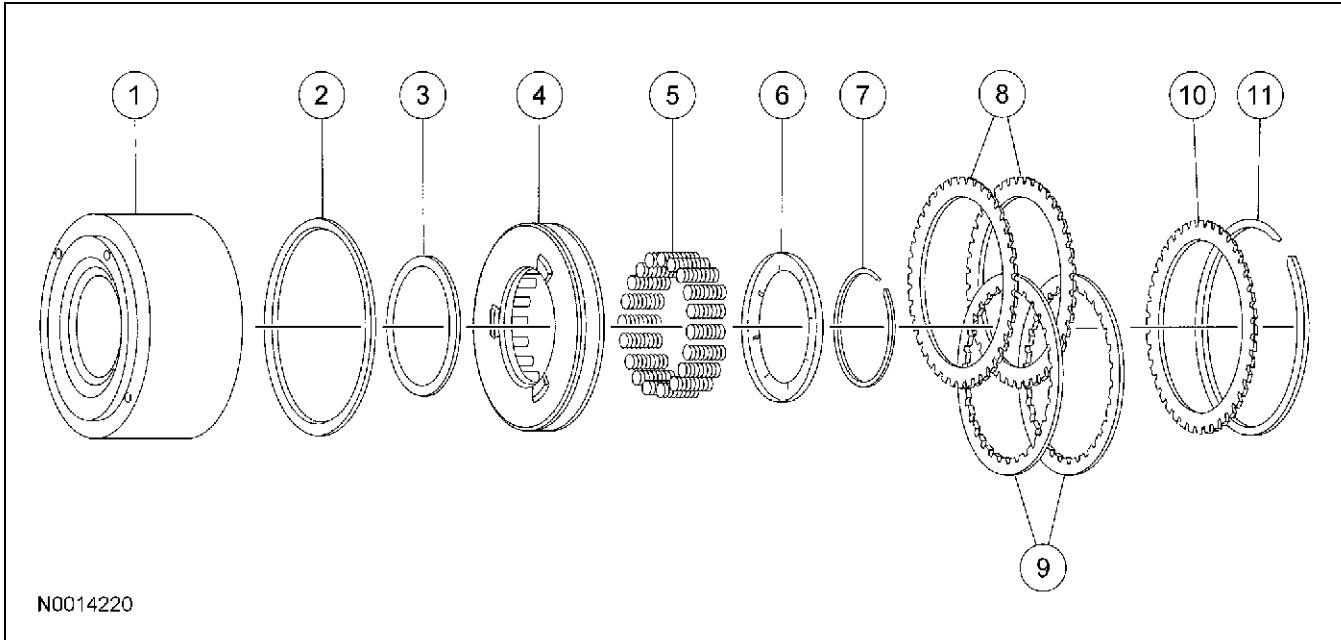
Special Tool(s)

| | |
|---|---|
|  | Compressor, Clutch Spring 307-015 (T65L-77515-A) ST1190-A |
|  | Protector, Piston Seal 307-049 (T74P-77404-A) ST2431-A |

Material

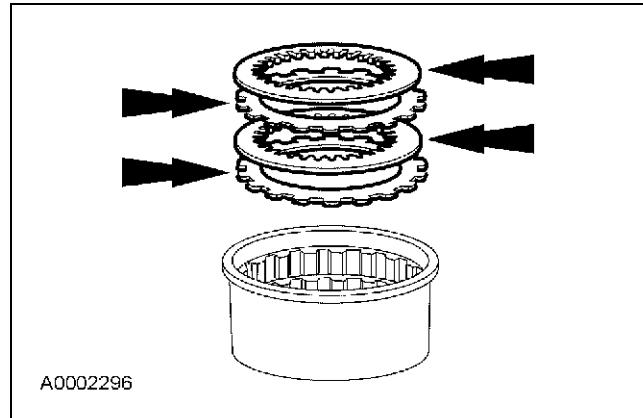
| Item | Specification |
|---|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM | MERCON® V |

Overdrive Brake and Coast Clutch Drum Assembly

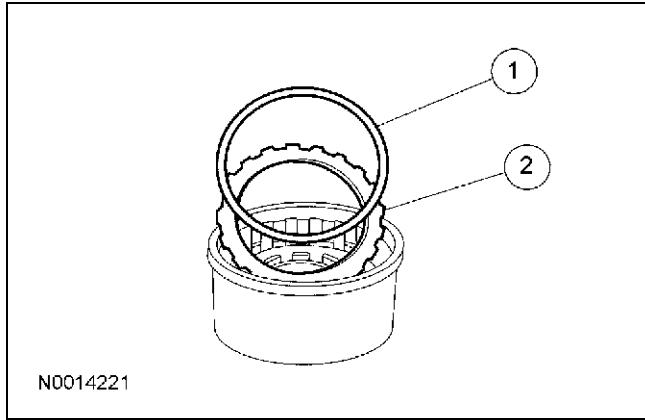


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

| Item | Part Number | Description |
|------|---------------|---|
| 1 | 7L669 | Coast clutch drum |
| 2 | 7A548 | Overdrive piston outer seal ring |
| 3 | 7D404 | Overdrive piston inner seal ring |
| 4 | 7A262 | Overdrive clutch piston |
| 5 | 7A480 | Overdrive piston spring (20 required) |
| 6 | 7A527 | Coast clutch piston spring retainer |
| 7 | E860125-S | Retaining ring |
| 8 | 7B442 | Coast clutch external plate — steel (2 required) |
| 9 | 7B164 | Coast clutch internal plate — friction (2 required) |
| 10 | 7B066 | Coast clutch pressure plate |
| 11 | E860126S/129S | Retaining ring (select fit) |

**Disassembly**

1. Remove the coast clutch pressure plate.
 - 1 Remove the coast clutch retaining ring.
 - 2 Remove the coast clutch pressure plate.

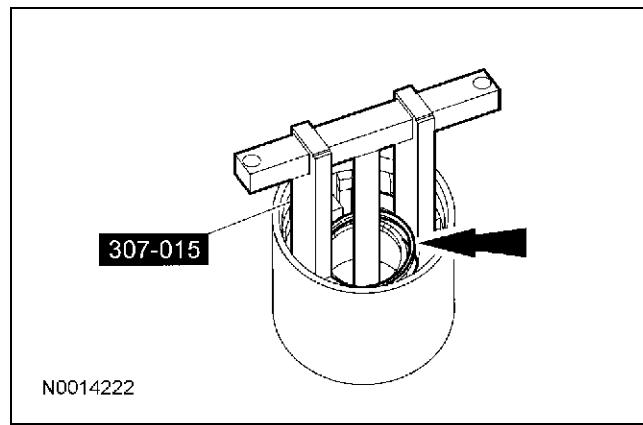


2. Remove the coast clutch disc pack.
 - Inspect for wear, install a new pack as necessary.

3. **⚠ WARNING:** Use caution when releasing tool pressure on the rear clutch piston spring. Failure to follow these instructions may result in personal injury.

⚠ CAUTION: Do not fully compress the special tool or damage to the spring retainer may occur.

Using the special tool, remove the coast clutch piston retaining ring.

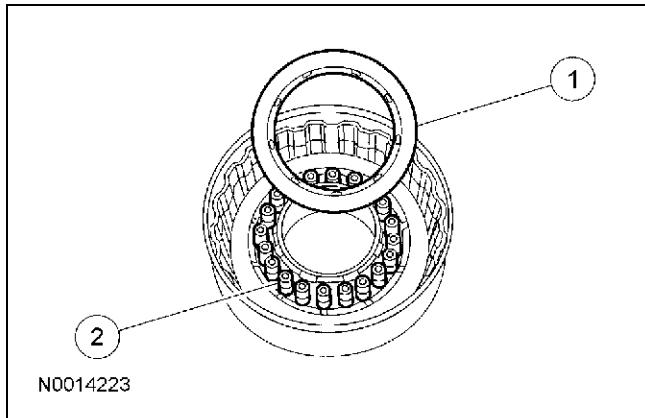


4. Relieve the coast clutch spring tension and remove the special tool.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

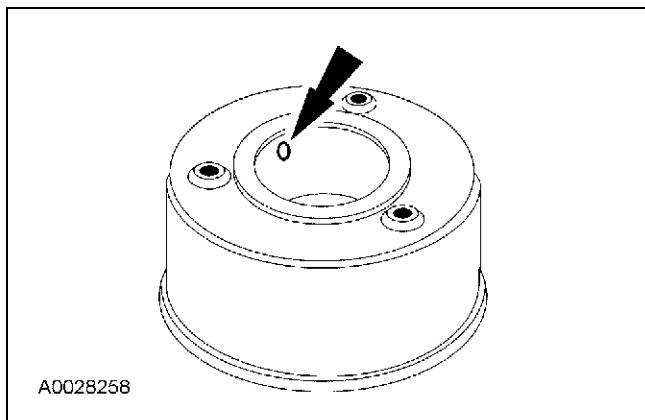
5. Remove the coast clutch piston springs.
- 1 Remove the coast clutch piston retainer.
 - 2 Remove the clutch piston springs.



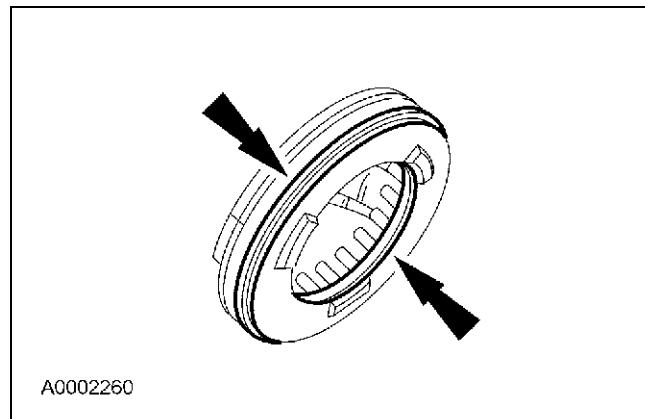
6. **⚠ WARNING:** Air pressure must not exceed 138 kPa (20 psi). Wear safety glasses when using compressed air, and make sure the drum is facing down as shown. Failure to follow these instructions may result in personal injury.

Remove the coast clutch piston.

- Apply air pressure to the hole in the drum to remove the coast clutch piston while blocking the other hole with a finger.

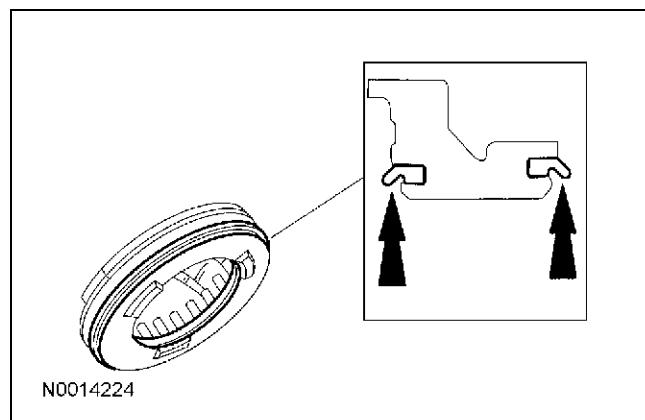


7. Remove and discard the coast clutch piston inner seal and the coast clutch piston outer seal.

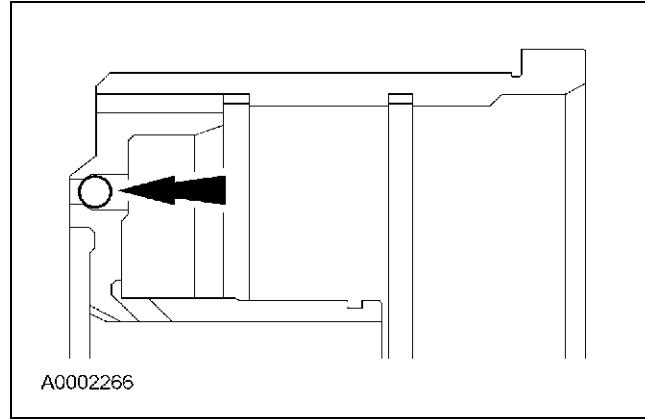
**Assembly**

1. **⚠ CAUTION:** The lip seals must be positioned as shown. Care must be taken to prevent rollover of the lip seal.

Install the new coast clutch piston inner and outer seal.



2. Verify the check ball is free to move.

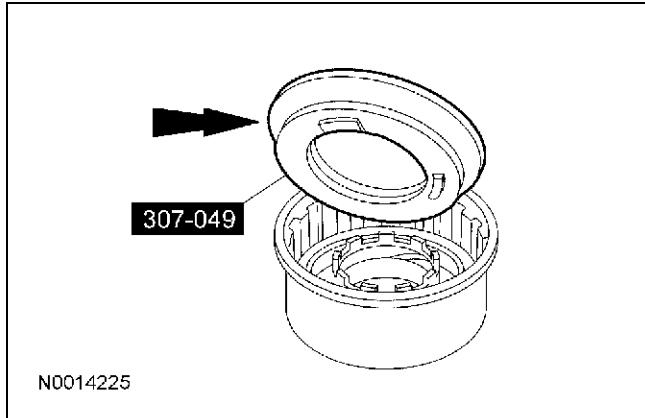


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

3. **⚠ CAUTION:** Care must be taken to prevent damage to the seals during installation.

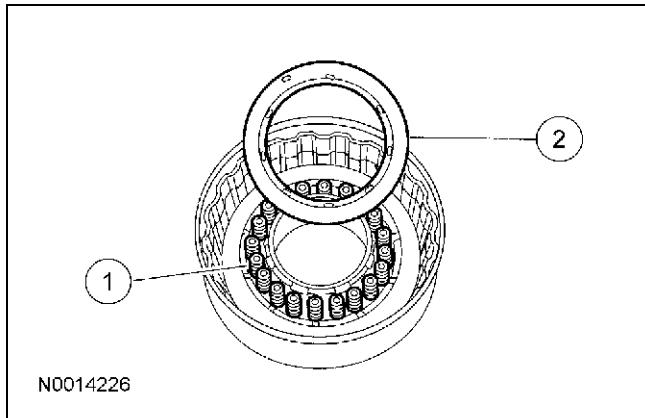
Using the special tool, install the coast clutch piston.

- Lubricate the seals with transmission fluid.



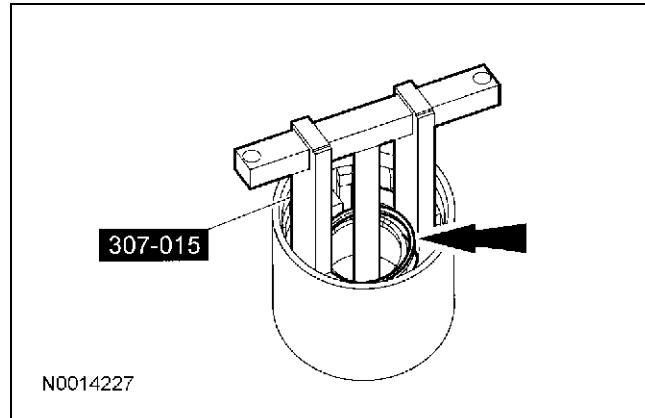
4. Install the coast clutch piston springs.

- Install the coast clutch piston springs.
- Install the coast clutch spring retainer.



5. **⚠ CAUTION:** Do not fully compress the special tool or damage to the coast clutch piston spring retainer may occur.

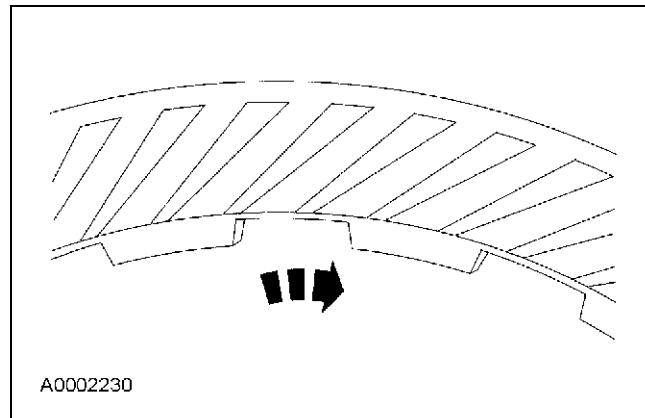
Using the special tool, install the coast clutch piston spring retainer ring.



6. **⚠ CAUTION:** Coast clutch friction plates are directional and must be installed with grooves clockwise (I.D. to O.D.). The word "TOP" should face up.

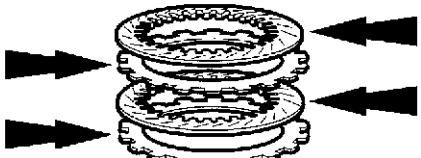
- ⚠ CAUTION:** If new clutch plates are being used, they should be soaked in clean automatic transmission fluid before assembly.

When installing friction plates, the word "TOP" should face up. If reusing plates, grooves must be installed clockwise. Install the coast clutch disc pack.

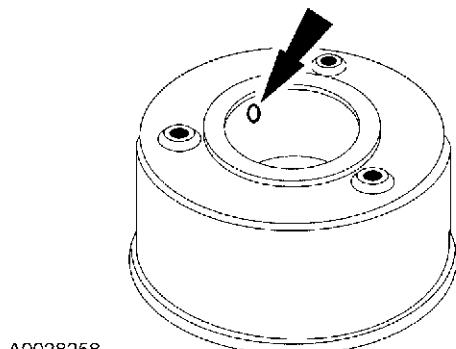


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

7. Install the 2 steel clutch plates and 2 friction clutch plates in alternating order starting with a steel clutch plate.



A0007925

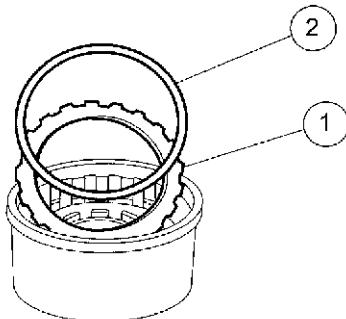


A0028258

8. **CAUTION:** The retaining ring is select fit.

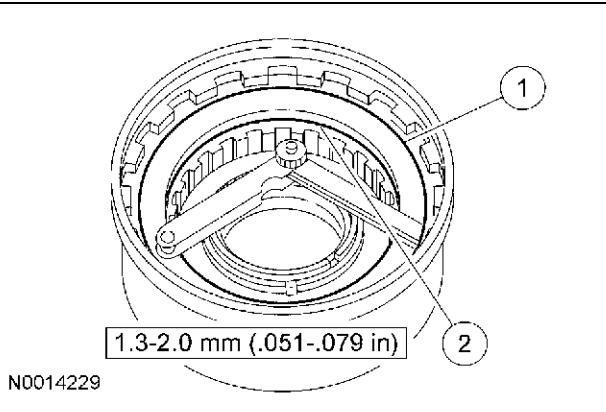
Install the coast clutch pressure plate.

- 1 Install the coast clutch pressure plate.
- 2 Install the original coast clutch retaining ring.



N0014228

| Part Number | Thickness | | Diameter | |
|-------------|-----------|--------|----------|-------|
| | mm | In | mm | In |
| E860126-S | 1.37 | 0.0539 | 130.1 | 5.122 |
| E860127-S | 1.73 | 0.0681 | 130.1 | 5.122 |
| E860128-S | 2.08 | 0.0819 | 130.1 | 5.122 |
| E860129-S | 2.44 | 0.0961 | 130.1 | 5.122 |



N0014229

9. **WARNING:** Air pressure must not exceed 138 kPa (20 psi). Wear safety glasses when using compressed air, and make sure drum is facing down as shown. Failure to follow these instructions may result in personal injury.

Air check the assembly.

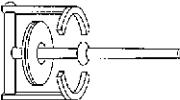
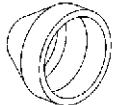
- Apply air pressure to the hole in the drum while blocking the other hole with a finger.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

Direct Clutch Drum Assembly

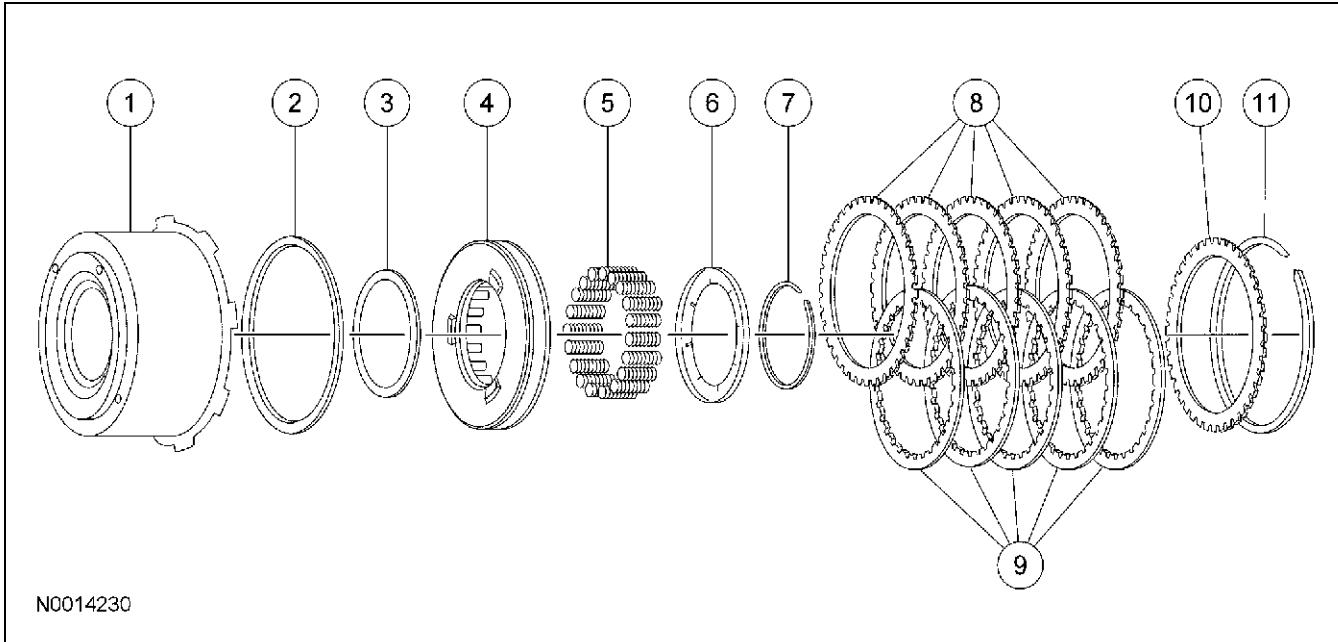
Special Tool(s)

| | |
|---|---|
|  | Compressor, Clutch Spring 307-015 (T65L-77515-A) ST1190-A |
|  | Protector, Piston Seal 307-049 (T74P-77404-A) ST2431-A |

Material

| Item | Specification |
|---|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM | MERCON® V |

Direct Clutch Drum Assembly

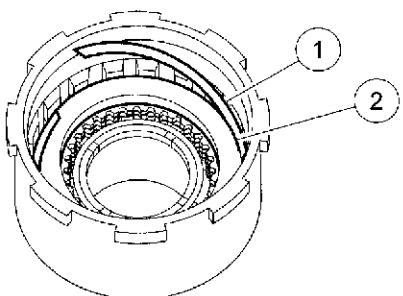


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

| Item | Part Number | Description |
|------|---------------|--------------------------------------|
| 1 | 7D044 | Intermediate brake drum assembly |
| 2 | 7A548 | Direct piston outer seal ring |
| 3 | 7D404 | Direct piston inner seal ring |
| 4 | 7A262 | Direct clutch piston |
| 5 | 7A480 | Direct piston spring (20 required) |
| 6 | 7A527 | Direct clutch piston spring retainer |
| 7 | E860125-S | Retaining ring |
| 8 | 7B442 | Direct clutch external spline plates |
| 9 | 7B164 | Direct clutch internal spline plates |
| 10 | 7B066 | Direct clutch pressure plate |
| 11 | E860126S/129S | Retaining ring (select fit) |

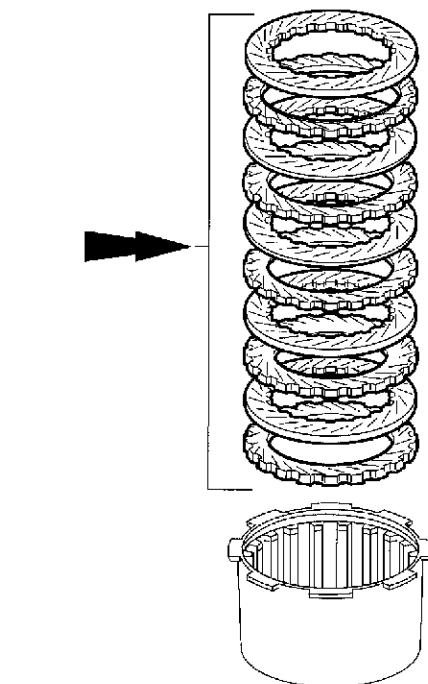
Disassembly

1. Remove the direct clutch retaining ring and the direct clutch pressure plate.
 - 1 Remove the direct clutch retaining ring.
 - 2 Remove the direct clutch pressure plate.



N0014231

2. Remove the direct clutch disc pack.
 - Inspect and install new friction plates if worn, damaged or overheated.

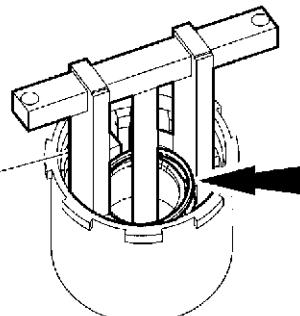


A0007927

3. **⚠ WARNING:** After removing the retaining ring, use care when releasing the pressure on the springs. Failure to follow these instructions may result in personal injury.

⚠ CAUTION: Do not fully compress the special tool or damage to the spring retainer may occur.

Using the special tool, remove the direct clutch piston retaining ring.

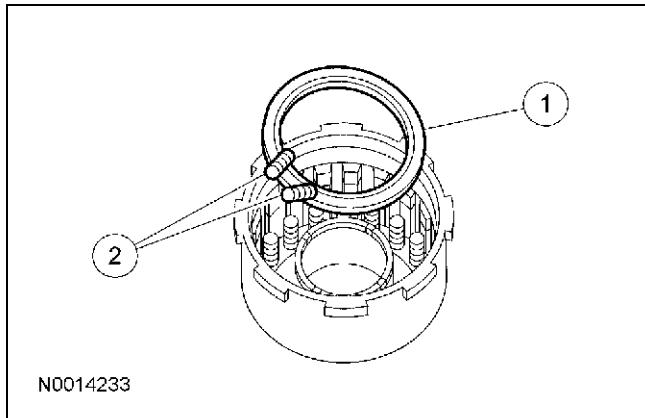


N0014232

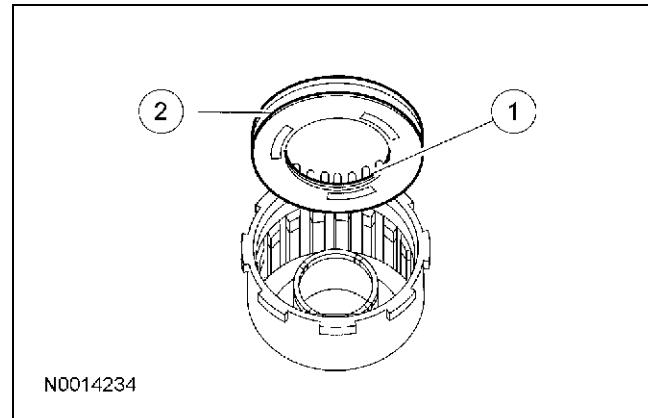


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

4. Relieve the direct clutch spring tension and remove the special tool.
5. Remove the direct clutch piston spring retainer and the direct clutch piston springs.
 - 1 Remove the direct clutch piston spring retainer.
 - 2 Remove the direct clutch piston springs.



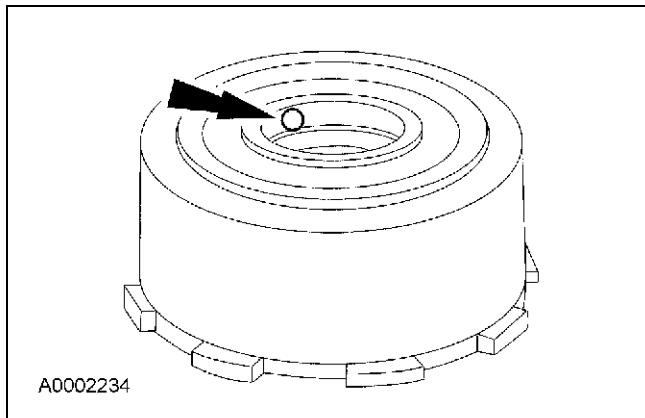
7. Remove and discard the direct clutch piston inner and outer seal.
 - 1 Remove and discard the direct clutch piston inner seal.
 - 2 Remove and discard the direct clutch piston outer seal.
 - Clean the components as necessary.



6. **⚠ WARNING:** Air pressure must not exceed 138 kPa (20 psi). Wear safety glasses when using compressed air, and make sure the drum is facing down as shown. Failure to follow these instructions may result in personal injury.

Using compressed air, remove the direct clutch piston from the direct clutch drum.

- Apply air pressure to the hole in the drum while blocking the other hole with a finger.



Assembly

1. Inspect the clutch components for damage or wear. Install new components as necessary.
 - Inspect the drum surface for damage.
 - Inspect the clutch piston bore, and piston.
 - Check the fluid passages for obstructions. All fluid passages must be clean and free of obstructions.
 - Inspect the clutch plates for damage.
 - Inspect the clutch springs.

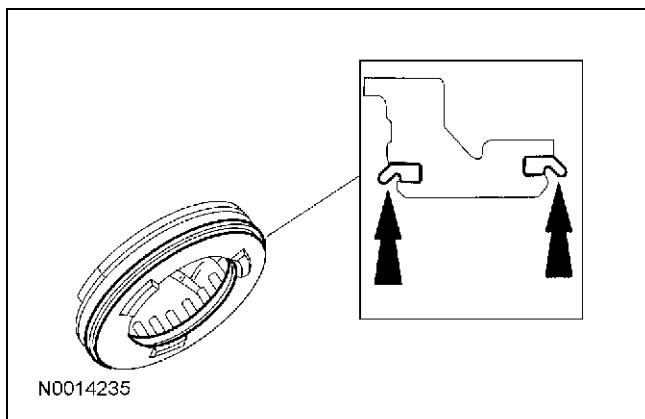


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

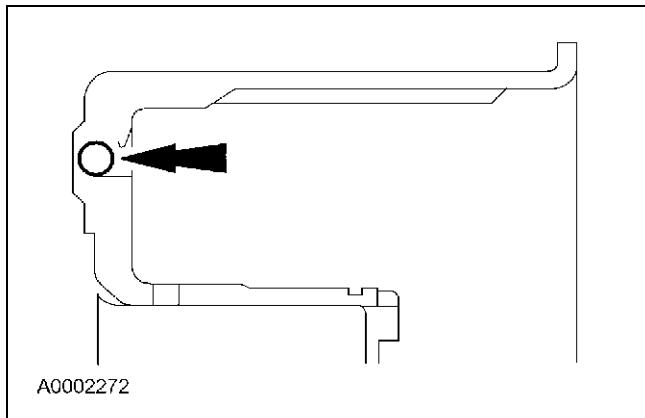
2. **⚠ CAUTION:** The lip seals must be positioned as shown. Care must be taken to prevent rollover of the lip seal.

NOTE: Use new seals to help prevent seal failures.

Install the new direct clutch piston inner seal and the direct clutch piston outer seal.



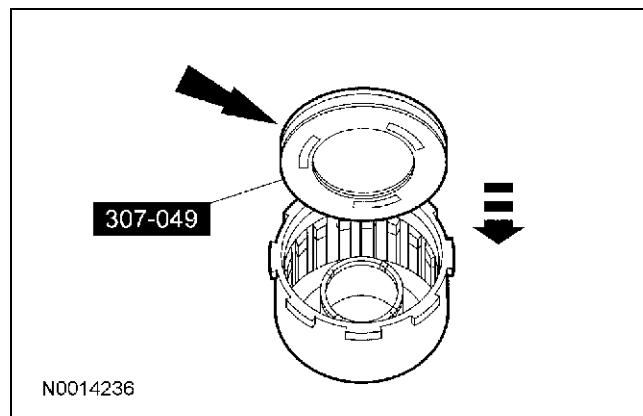
3. Verify the check ball is free to move.



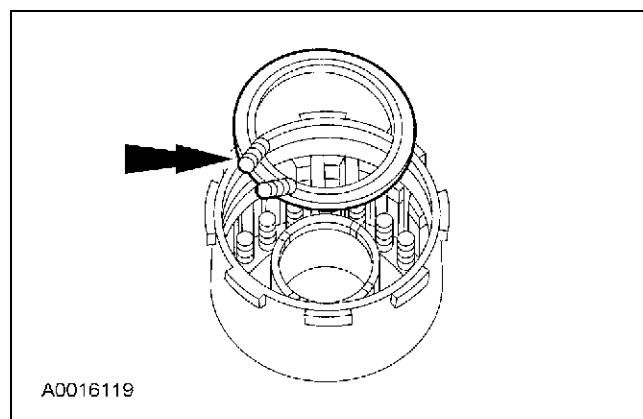
4. **⚠ CAUTION:** Care must be taken to prevent damage to the seals during installation.

Using the special tool, install the direct clutch piston.

- Lubricate the seals with transmission fluid before installing.



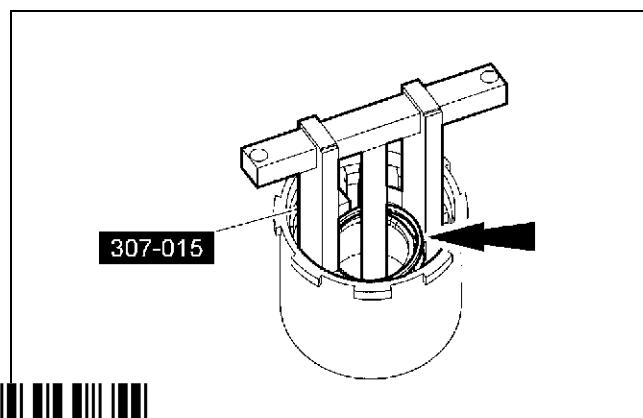
5. Install the direct clutch piston springs and the retainer.



6. **⚠ WARNING:** After removing the retaining ring, use care when releasing the pressure on the springs. Failure to follow these instructions may result in personal injury.

⚠ CAUTION: Do not fully compress the special tool or damage to the spring retainer may occur.

Using the special tool, install the direct clutch piston retaining ring.

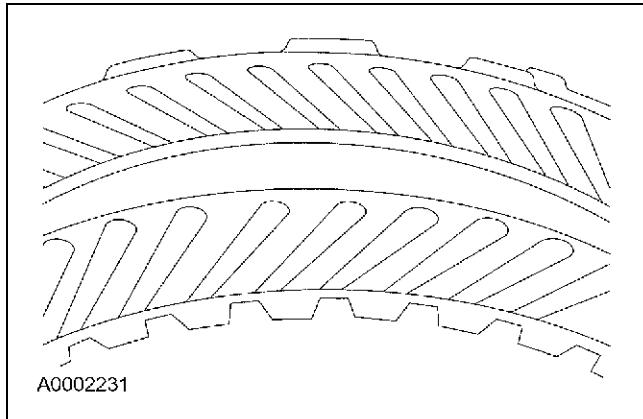


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

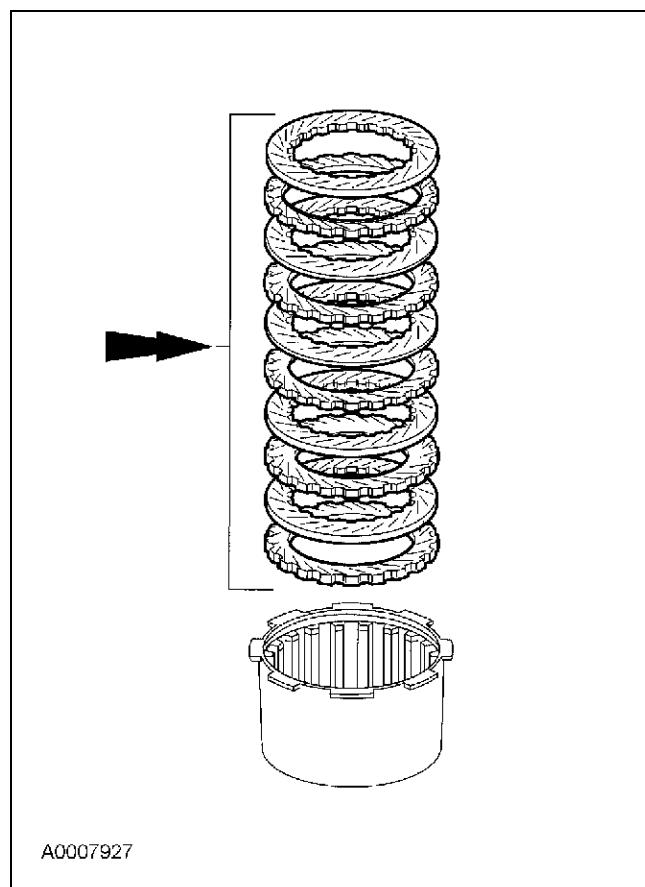
7. **⚠ CAUTION:** The direct clutch friction plates are directional and must be installed correctly. Alternate the internally splined (clockwise) and the externally splined (counterclockwise) clutch plates.

⚠ CAUTION: If new plates are used, they should be soaked in clean automatic transmission fluid before assembly.

When installing friction plates, alternate the internally splined (clockwise) and the externally splined (counterclockwise) clutch plates. Install the direct clutch disc pack.

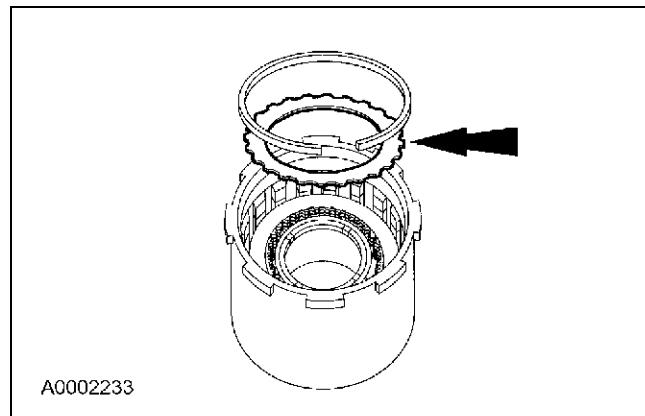


8. Install the friction plates alternating the internally splined (clockwise) and the externally splined (counterclockwise) clutch plates starting with an externally splined (counterclockwise) clutch plate.



9. **⚠ CAUTION:** The retaining ring is a select fit.

Install the direct clutch pressure plate using the original direct clutch retaining ring.

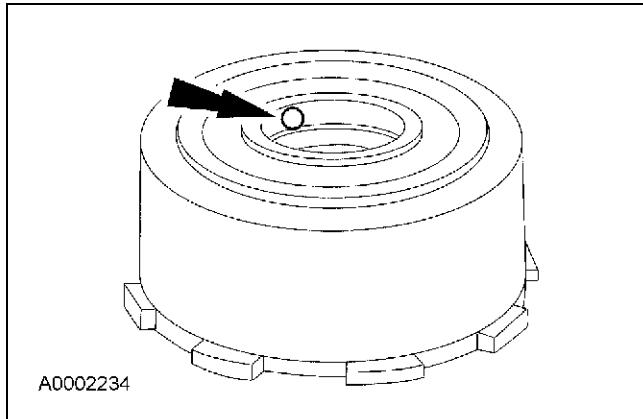


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

10. **⚠ WARNING:** Air pressure must not exceed 138 kPa (20 psi). Wear safety glasses when using compressed air, and make sure drum is facing down as shown. Failure to follow these instructions may result in personal injury.

Air check the assembly.

- Apply air pressure to the hole in the drum while blocking the other hole with a finger.

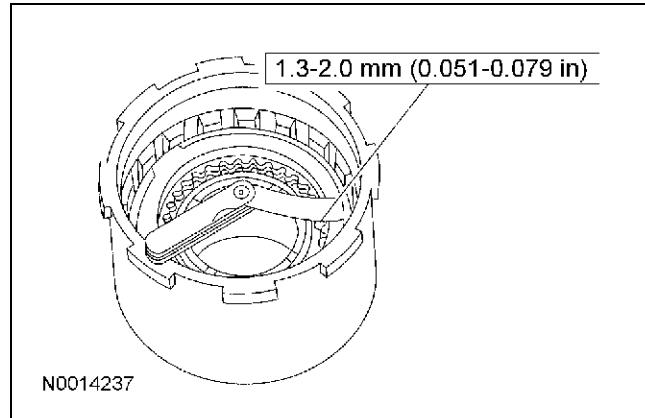


11. Push down on direct clutch disc pack and check gap between the direct clutch retaining ring and the direct clutch pressure plate with a feeler gauge.

- If specifications do not match, use a select fit direct clutch retaining ring to match specifications and verify with a feeler gauge.

Direct Clutch

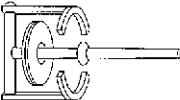
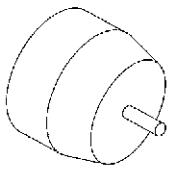
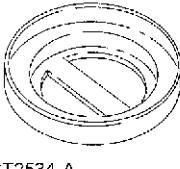
| Part Number | Thickness | | Diameter | |
|-------------|-----------|--------|----------|-------|
| | mm | In | mm | In |
| E860126-S | 1.37 | 0.0539 | 130.1 | 5.122 |
| E860127-S | 1.73 | 0.0681 | 130.1 | 5.122 |
| E860128-S | 2.08 | 0.0819 | 130.1 | 5.122 |
| E860129-S | 2.44 | 0.0961 | 130.1 | 5.122 |



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

Forward Clutch

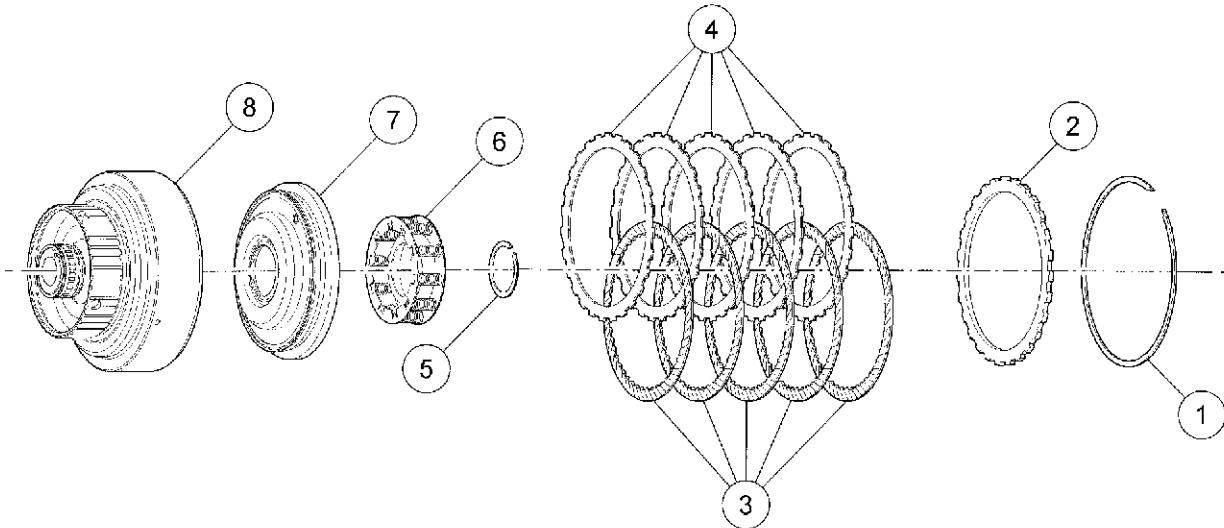
Special Tool(s)

| | |
|--|---|
|  | Compressor, Clutch Spring 307-015 (T65L-77515-A) ST1190-A |
|  | Protector, Piston Seal 307-051 (T74P-77548-A) ST1813-A |
|  | Bonded Piston Seal Sizer 307-434 ST2534-A |

Material

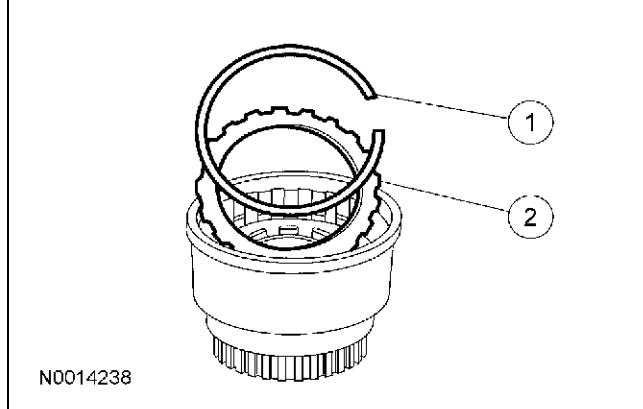
| Item | Specification |
|---|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada) | MERCON® V |



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)**Forward Clutch Assembly**

N0001485

| Item | Part Number | Description |
|------|-------------|---|
| 1 | 7D483 | Forward clutch retaining ring (select fit) |
| 2 | 7B066 | Forward clutch pressure plate |
| 3 | 7B164 | Forward clutch internal plates — friction (vehicle-dependent) |
| 4 | 7B442 | Forward clutch external plates — steel (vehicle-dependent) |
| 5 | E860109 | Forward clutch retaining ring |
| 6 | 7G229 | Forward clutch spring assembly |
| 7 | 7A262 | Forward clutch piston |
| 8 | 7A360 | Forward clutch cylinder assembly |



N0014238

Disassembly

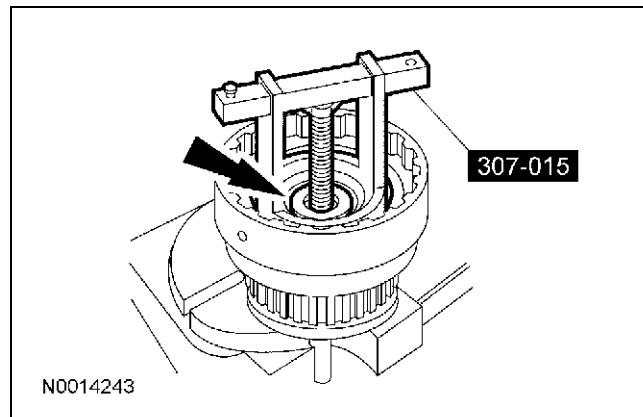
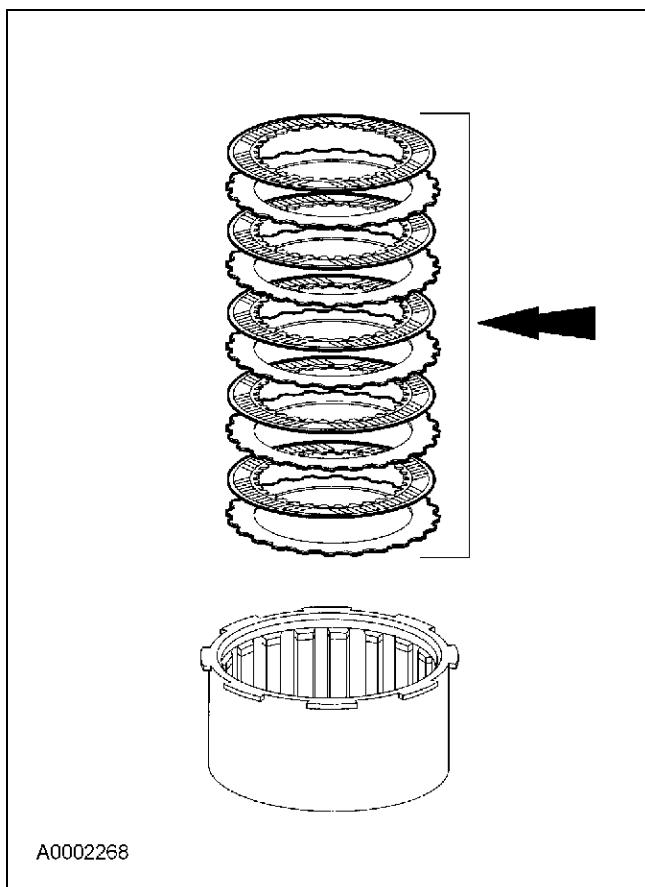
1. Remove the pressure plate.
 - 1 Remove the forward clutch retaining ring.
 - 2 Remove the pressure plate.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

2. Remove the forward clutch disc pack.

- Inspect the forward clutch plates for wear, damage or overheating.

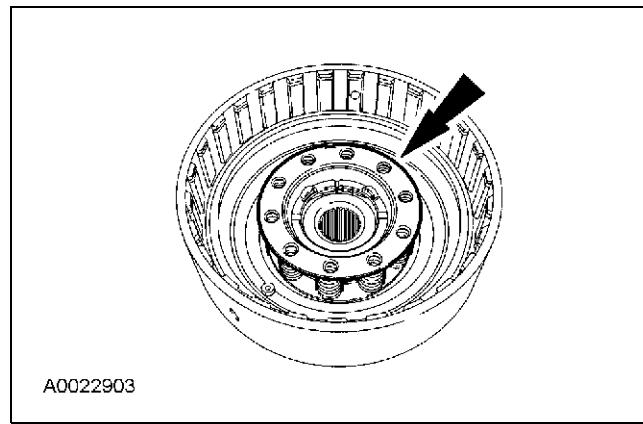


3. **⚠ WARNING:** While removing or installing the retaining ring, slowly release tool pressure on clutch piston springs. Failure to follow this instruction may cause the assembly to separate forcefully, resulting in serious personal injury.

⚠ CAUTION: Do not fully depress the special tool or damage to the spring retainer may occur.

Using the special tool, remove the forward clutch piston retaining ring.

4. Relieve the forward clutch spring tension and remove the tool.
5. Remove the forward clutch piston spring assembly.

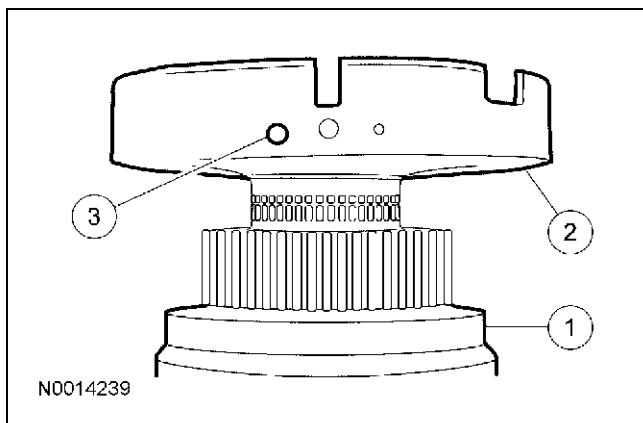


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

6. **⚠ WARNING:** When using compressed air, never let air pressure exceed 138 kPa (20 psi) and always wear safety glasses. Compressed air may cause foreign material or parts to become airborne. Failure to follow this instruction may result in serious personal injury.

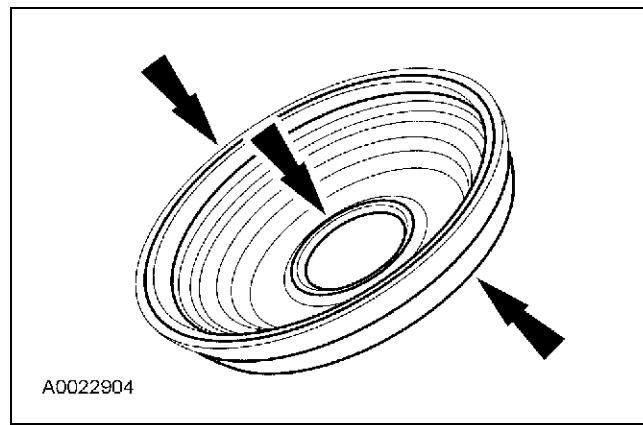
Remove the forward clutch piston.

- 1 Place the forward clutch cylinder with forward clutch piston facing down.
- 2 Install the center support on the forward clutch cylinder.
- 3 Apply air pressure to the left port of the center support.

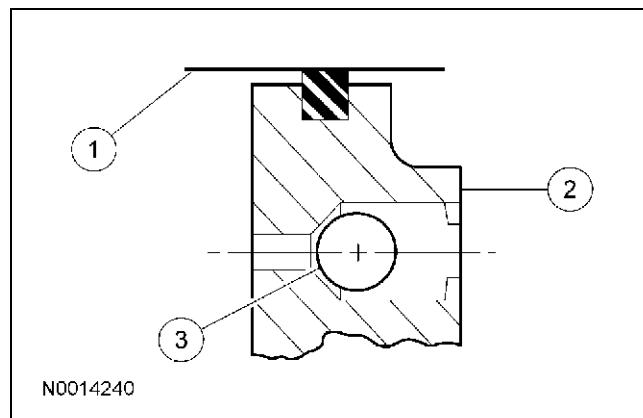
**Assembly**

1. Inspect the clutch components for damage or wear. Install new components as necessary.
 - Check the fluid passages for obstructions. All fluid passages must be clean and free of obstructions.
 - Inspect the clutch plates for damage.
 - Inspect the clutch springs.
 - Inspect the needle bearing and seal rings for damage.
 - Check clutch hub thrust surfaces for damage.
 - Check clutch plates for flatness and fit on the clutch hub serrations.

2. **NOTE:** If the seals on the forward clutch piston show any signs of damage, a new forward clutch piston will need to be installed. Inspect the forward clutch piston and seals.



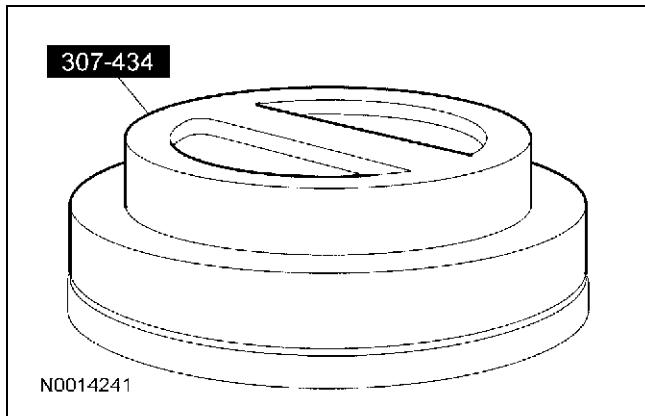
3. Inspect the forward clutch drum assembly.
 - 1 Inspect the forward clutch cylinder surfaces for scores or burrs.
 - 2 Inspect the forward clutch piston for scores or burrs.
 - 3 Verify the check ball is free to move in the piston.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

4. **NOTE:** The special tool must be installed on the forward clutch piston for a couple of minutes prior to installing it into the forward clutch cylinder.

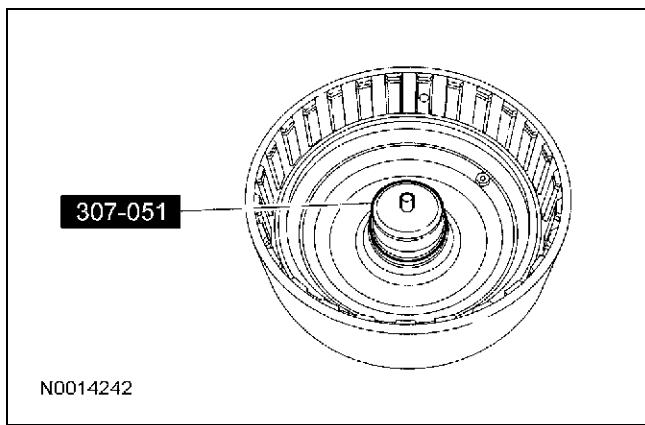
Install the special tool on the forward clutch piston.



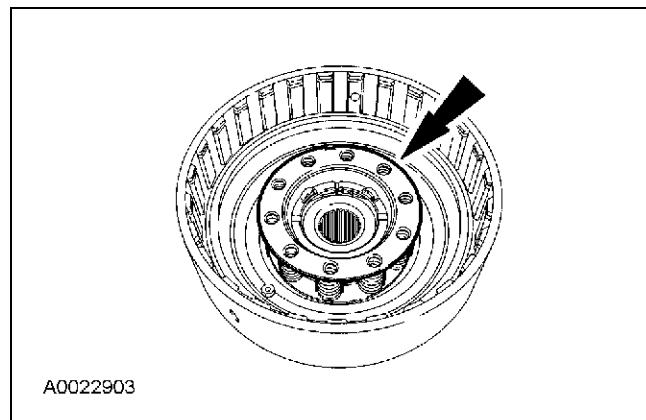
5. **⚠ CAUTION:** Care must be taken to prevent damage to the seals.

NOTE: Lubricate the forward clutch piston inner and outer seal with clean automatic transmission fluid.

Using the special tool, install the forward clutch piston assembly into the forward clutch cylinder.

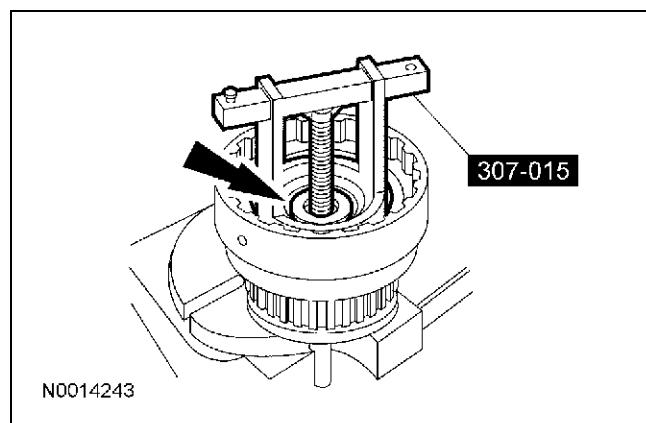


6. Install the forward clutch piston spring assembly.



7. **⚠ CAUTION:** Do not fully depress the clutch spring compressor or damage to the spring retainer may occur.

Using the special tool, install the forward clutch piston spring retaining ring.

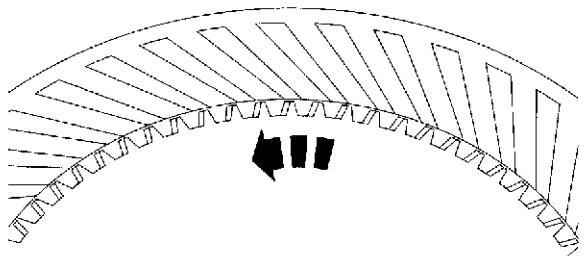


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

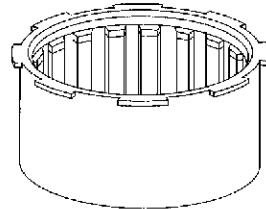
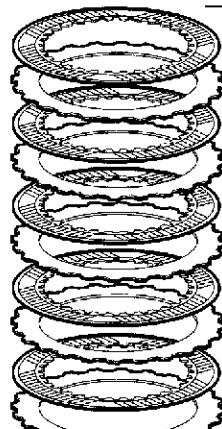
8. **⚠ CAUTION:** The forward clutch friction plates are directional and must be installed with grooves pointing counterclockwise.

⚠ CAUTION: If new plates are used, they should be soaked in clean automatic transmission fluid before assembly, or damage to the plates may occur.

If reusing plates, grooves must be installed counterclockwise. Install the direct clutch disc pack.



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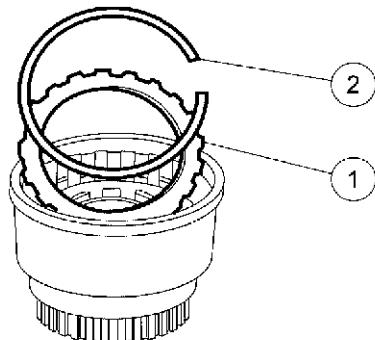
A0002268

9. Install the steel clutch plates and friction clutch plates in alternating order starting with a steel clutch plate.

10. **NOTE:** The retaining ring is a select fit.

Install the original selective retaining ring.

- 1 Install the forward clutch pressure plate.
- 2 Install the original selective retaining ring.



N0014244

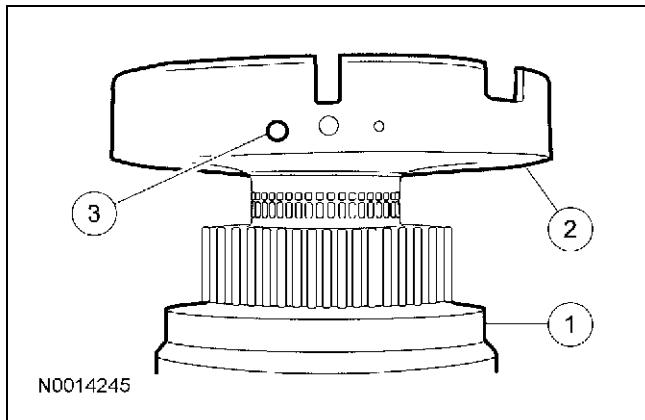


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

11. **⚠ WARNING:** When using compressed air, never let air pressure exceed 138 kPa (20 psi) and always wear safety glasses. Compressed air may cause foreign material or parts to become airborne. Failure to follow this instruction may result in serious personal injury.

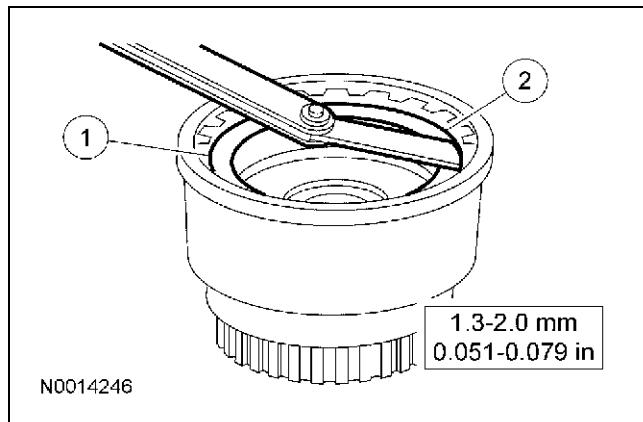
Air check the forward clutch piston.

- 1 Place the forward clutch cylinder with forward clutch piston facing down.
- 2 Install the transmission center support on the forward clutch cylinder.
- 3 Apply air pressure to the left port of the center support.



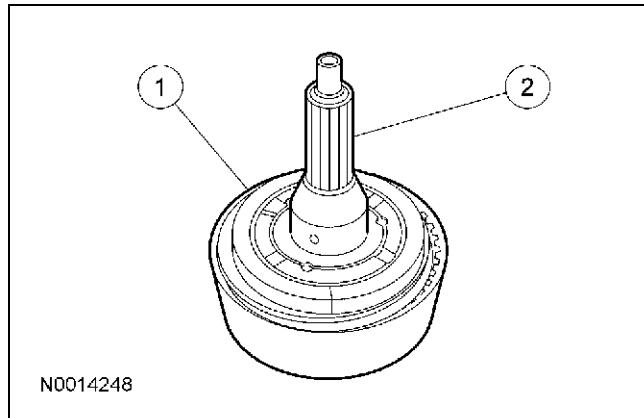
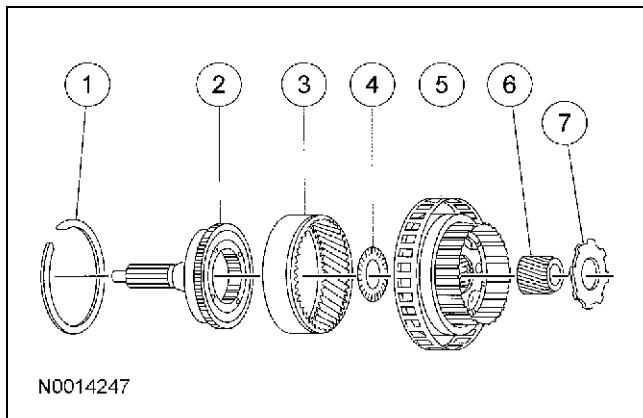
12. Check the forward clutch disc pack free play.
- 1 Press down on the forward clutch disc pack.
 - 2 Using a feeler gauge, check the gap between the forward clutch retaining ring and the forward clutch pressure plate.
 - If the clearance is not within specifications, install the correct size retaining ring.

| Part Number | Thickness | | Diameter | |
|---------------|-----------|--------|----------|------|
| | mm | Inch | mm | Inch |
| XW4Z-7D483-AB | 1.73 | 0.0681 | 141.45 | 5.65 |
| XW4Z-7D483-AC | 2.08 | 0.0819 | 141.45 | 5.65 |
| XW4Z-7D483-AD | 2.44 | 0.0961 | 141.45 | 5.65 |



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

Overdrive Planetary and One-Way Clutch Assembly



| Item | Part Number | Description |
|------|--------------|---|
| 1 | W702037-S300 | Retaining ring |
| 2 | 7A658 | Center shaft |
| 3 | 7653 | Overdrive ring gear |
| 4 | 7L495 | No. 2 overdrive planetary thrust bearing |
| 5 | 7B446 | Overdrive planetary gear carrier assembly |
| 6 | 7D063 | Overdrive sun gear |
| 7 | 7660 | Coast clutch adapter |

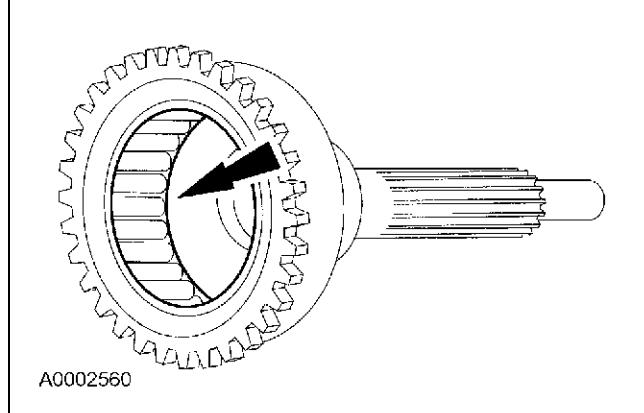
Disassembly

1. **NOTE:** The overdrive one-way clutch is serviced with the center shaft assembly.
Remove the center shaft from the overdrive ring gear.
 - 1 Remove the overdrive center shaft retaining ring.
 - 2 While rotating counterclockwise remove the center shaft from the ring gear.

2. **CAUTION: Do not remove the overdrive one-way clutch. Damage to the clutch may occur if it is removed.**

Clean and inspect the overdrive one-way clutch and center shaft.

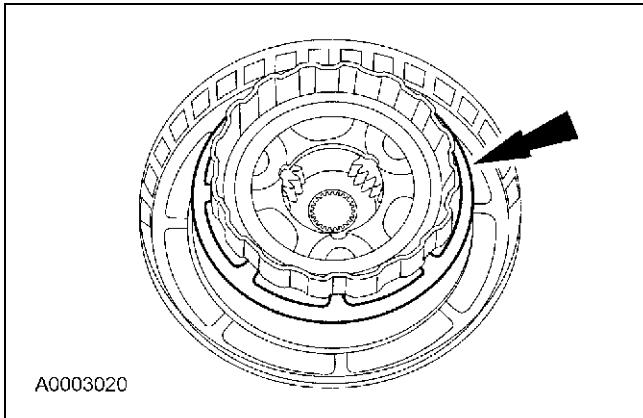
- Inspect for cracks in the roller cage and wear on the roller clutch, and the press fit of the one-way clutch to the center shaft.



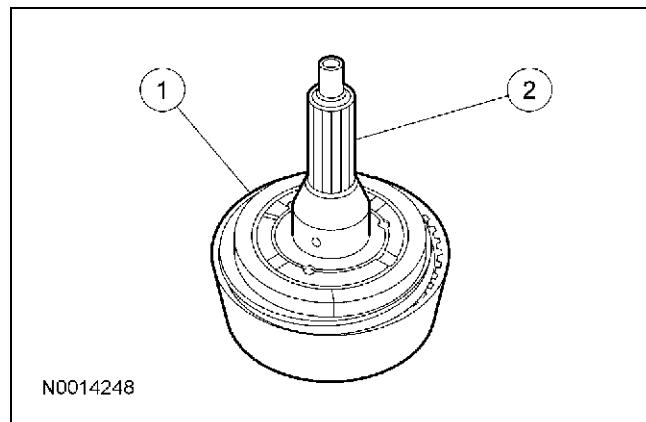
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

3. Inspect the one-way clutch.

- Temporarily insert the overdrive planetary gear carrier assembly into the one-way clutch rollers for verification of the one-way clutch.
- The planetary gear must rotate counterclockwise and hold when rotated clockwise.
- Remove the planetary gear carrier assembly.

**Assembly**

1. Install the center shaft and one-way clutch.
 - 1 Install the center shaft and one-way clutch.
 - 2 Install the center shaft retaining ring.



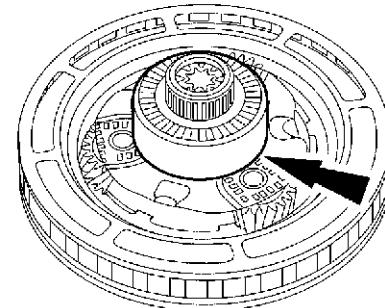
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

Overdrive Planetary Gears

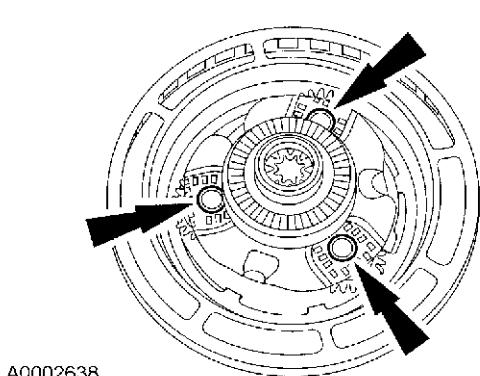
Disassembly

- NOTE:** Individual parts of the planetary carriers are not serviceable.

Before installing a planetary assembly, the shaft retaining pins should be checked for adequate staking. Check the pins and shafts in the planetary assemblies for loose fit and/or complete disengagement. Install a new planetary assembly if necessary.

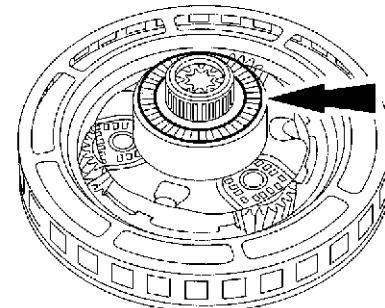


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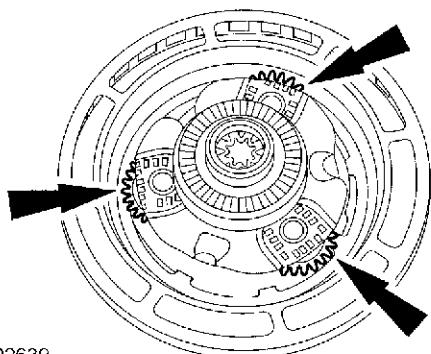
A0002638

- Inspect the pinion gears for damaged or excessively worn teeth and for free rotation.



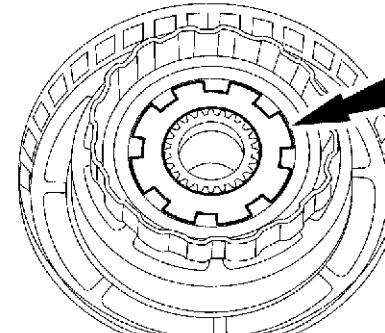
A0002641

- Remove and inspect the No. 2 overdrive planetary thrust bearing on the nose of the overdrive planetary gear carrier assembly.



A0002639

- Inspect the overdrive one-way clutch inner race and the inner and outer races for scored or damaged surface areas where the rollers contact the races.



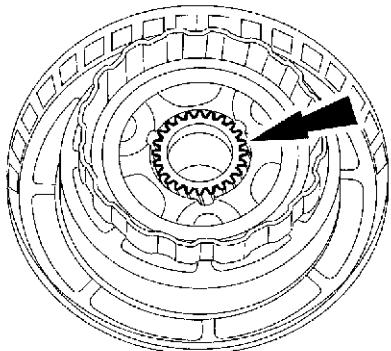
A0002642

- NOTE:** Inspect the sun gear for damaged or worn teeth.
Remove the coast clutch-to-overdrive carrier adapter.

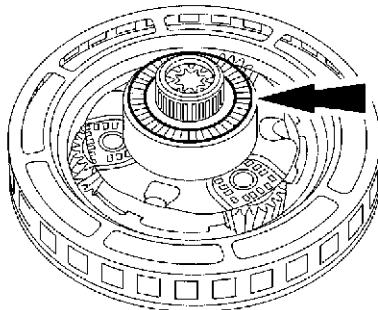


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

6. Remove and inspect the overdrive sun gear.



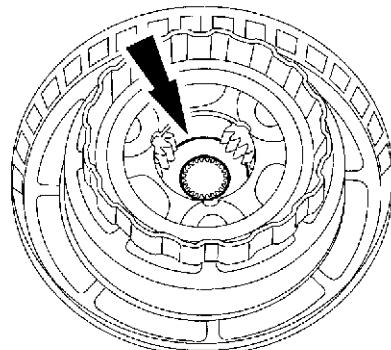
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A0002641

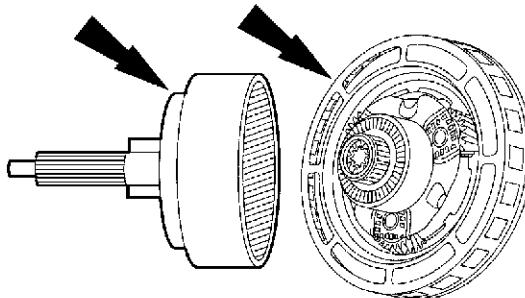
7. **⚠ CAUTION:** Do not attempt to remove the No. 12 bearing from behind the pinion gears.

Inspect the No. 12 bearing for damage.



A0002644

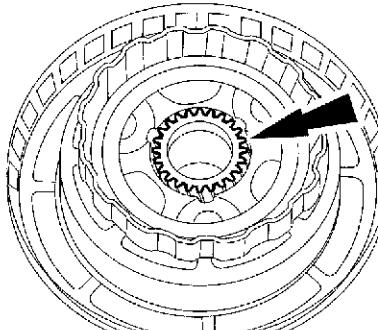
2. Install the overdrive planetary gear carrier into the center shaft and overdrive.



A0002645

3. **⚠ CAUTION:** Make sure that the No. 12 bearing is in place in the overdrive planetary prior to installing the overdrive sun gear.

Install the overdrive sun gear with the recessed gear teeth facing toward the adapter.



A0002643

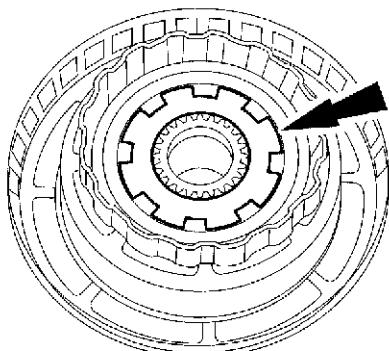


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

4. **⚠ CAUTION:** Adapter part number must not be visible after installation.

NOTE: Inspect the sun gear for damaged or worn teeth.

Install the coast clutch-to-overdrive carrier adapter.



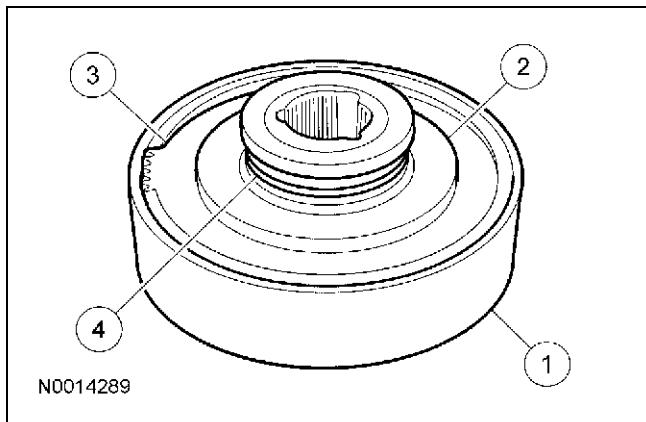
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DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

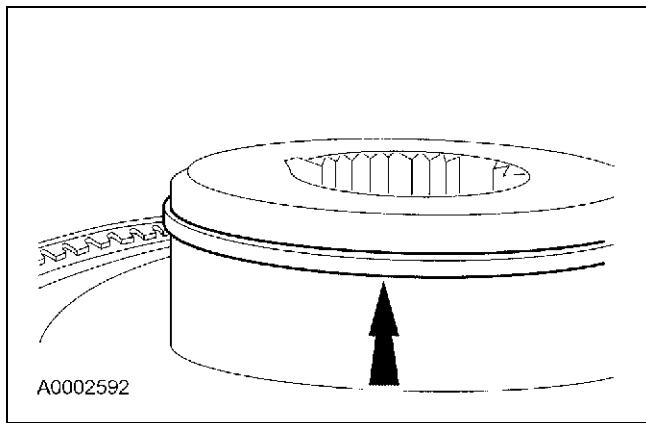
Output Shaft Ring Gear and Hub Shaft Assembly

Disassembly

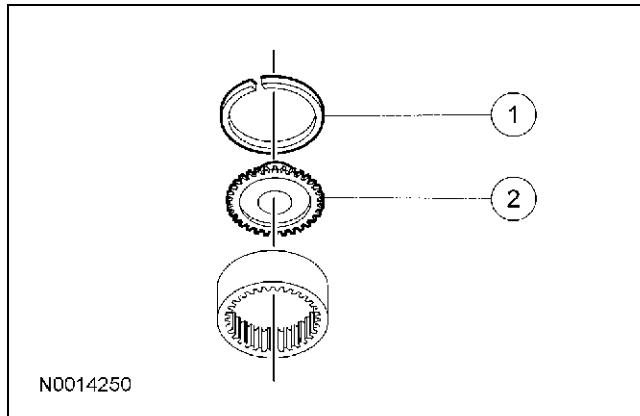


| Item | Part Number | Description |
|------|-------------|------------------------|
| 1 | 7A153 | Output shaft ring gear |
| 2 | 7D164 | Output shaft hub |
| 3 | 7C122 | Retaining ring |
| 4 | 7D019 | Output shaft hub seal |

1. Inspect the output shaft ring gear and hub shaft assembly for damage. If repair is necessary, use the following procedure.
2. Remove the seal.

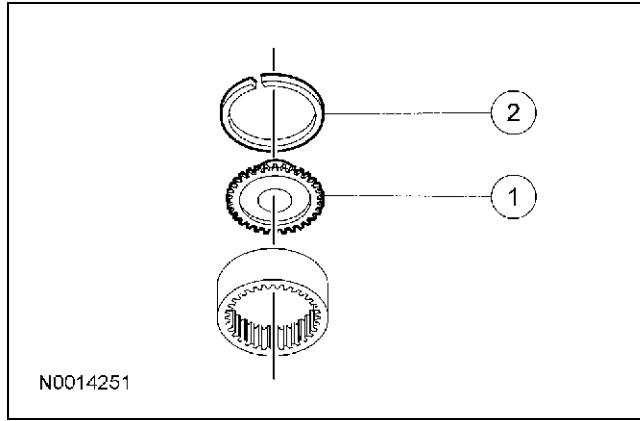


3. Remove the output shaft ring gear from the output shaft hub.
 - 1 Remove the retaining ring.
 - 2 Remove the output shaft ring gear.



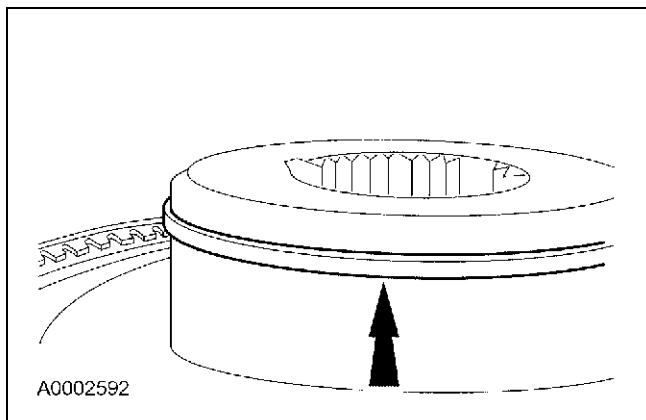
Assembly

1. Install the output shaft ring gear onto the output shaft hub.
 - 1 Install the output shaft ring gear.
 - 2 Install the retaining ring.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

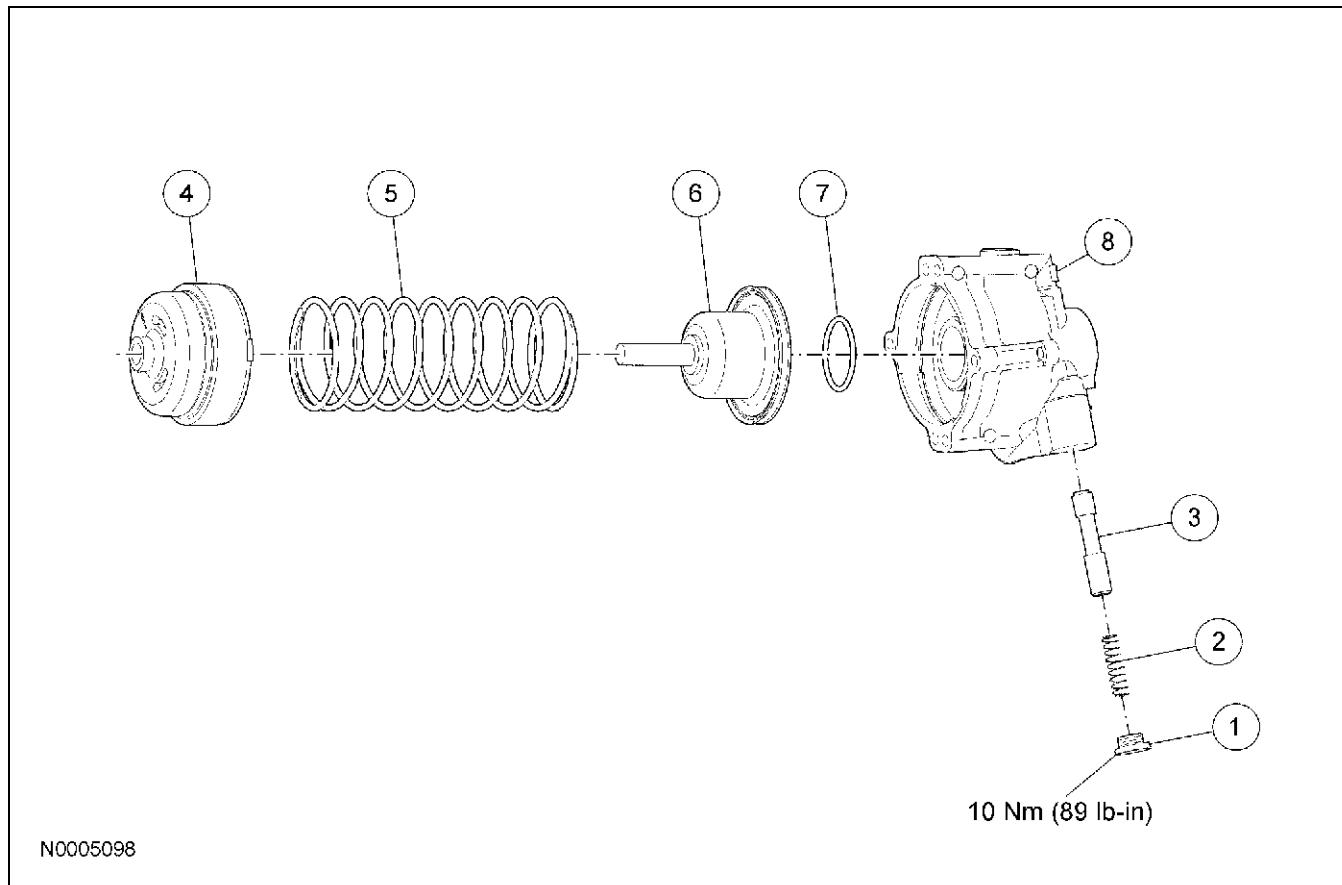
2. Install the seal.



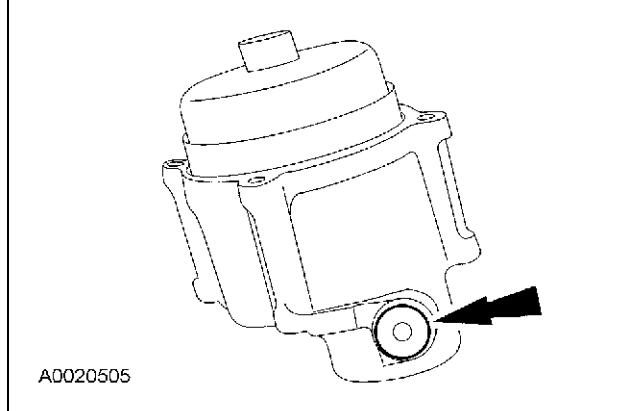
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

Reverse Servo Assembly

Disassembly



| Item | Part Number | Description |
|------|-------------|---------------------------------------|
| 1 | 7D321 | Control valve spring retainer |
| 2 | 7A270 | Fluid pressure regulator valve spring |
| 3 | 7D488 | Reverse servo check valve |
| 4 | 7D372 | Reverse servo plate |
| 5 | 7D466 | Reverse servo accumulator spring |
| 6 | 7D189 | Reverse servo piston and seal |
| 7 | 7423 | Reverse servo piston O-ring |
| 8 | 7D036 | Reverse servo cover |

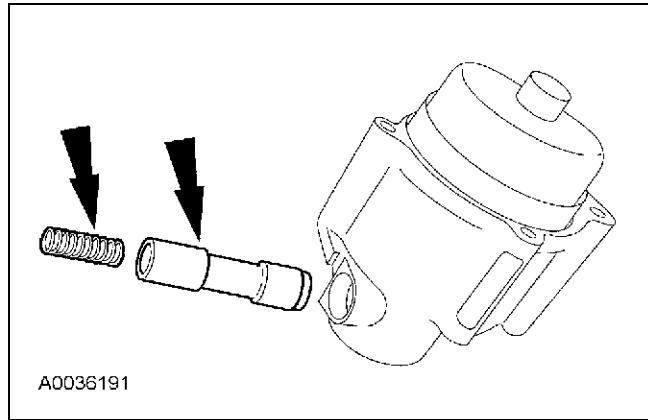


1. Remove the control valve spring retainer.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

2. Remove the reverse servo spring and check valve.

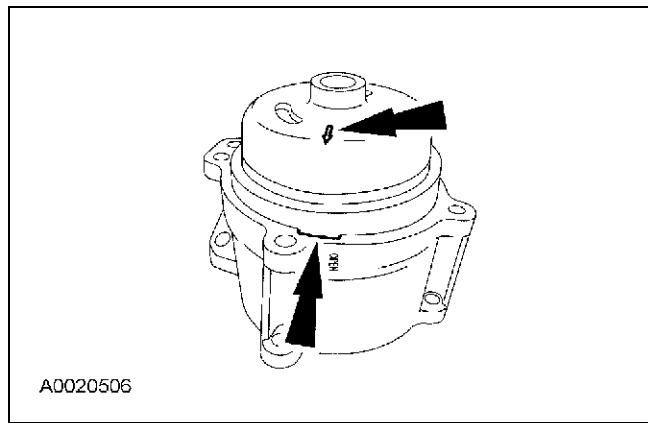


3. **⚠️ WARNING:** Follow the specified procedure when using the tool to remove the servo cover. The servo and servo cover are under high spring force and can separate forcefully, which may result in serious personal injury.

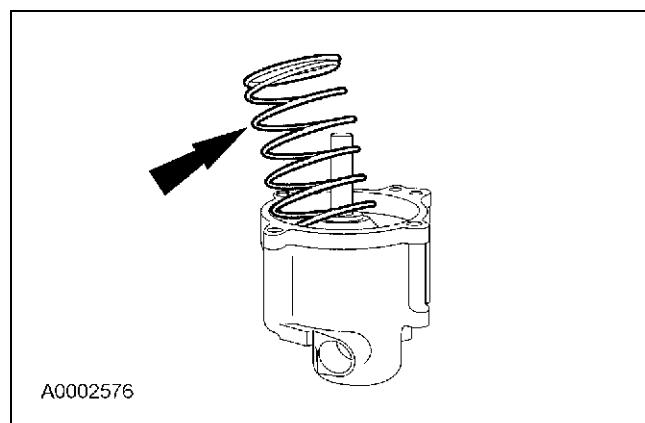
NOTE: Tabs on servo plate mate with slots on cover every 120 degrees.

Remove the reverse servo plate by turning in either direction to release.

- Align the arrow on the servo plate with any slot on the cover.

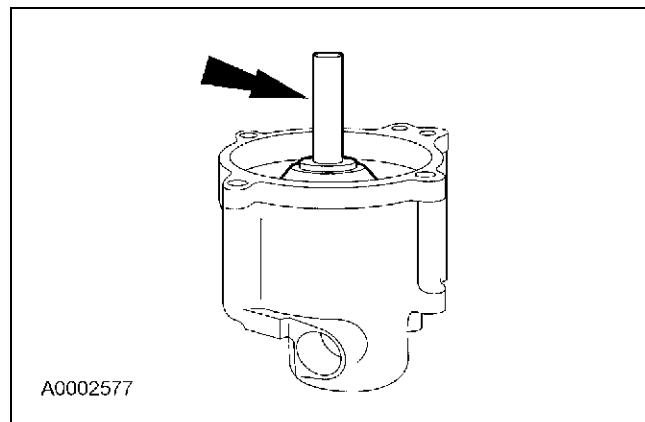


4. Remove the reverse servo spring.

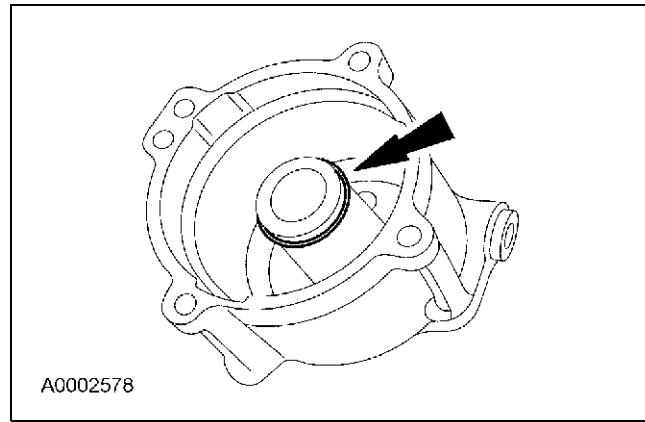


5. Remove the reverse servo piston and seal assembly.

- Inspect the seal for damage, install a new reverse servo piston if necessary.



6. Remove and discard the reverse servo piston seal.

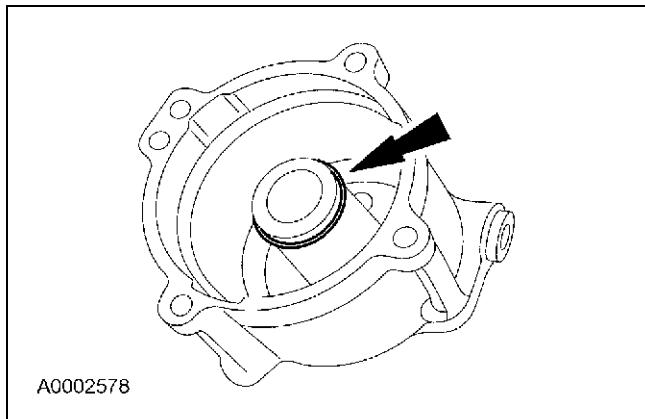


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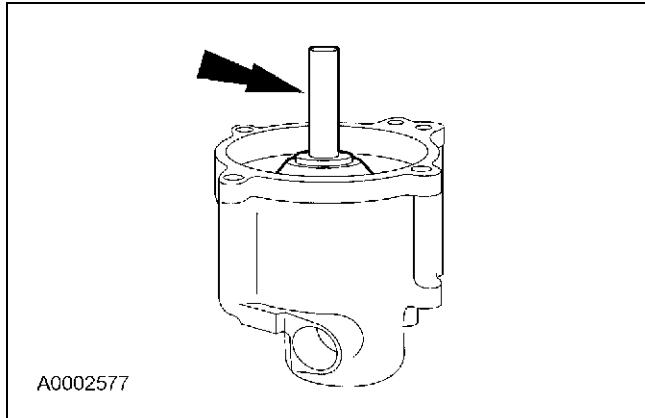
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)**Assembly**

1.  **CAUTION:** Try not to roll the seal onto the housing when installing the seal or damage to the seal may occur.

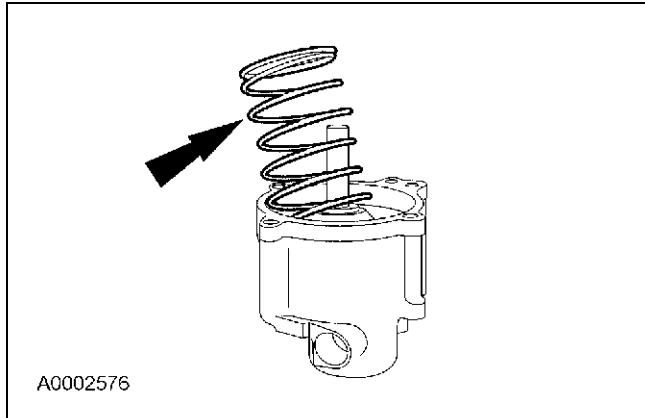
Lubricate and install a new reverse servo piston seal.



2. Lubricate and install the reverse servo piston and seal assembly.



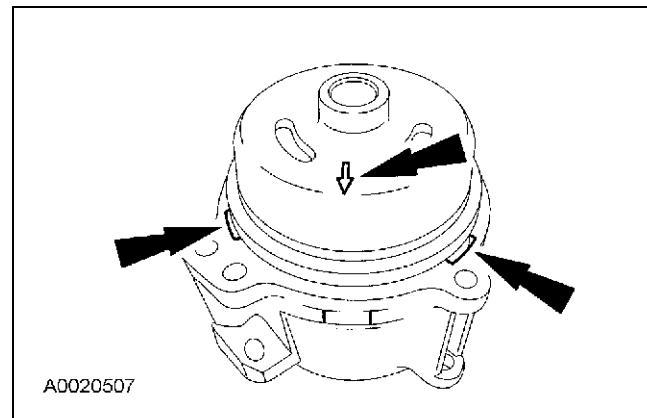
3. Install the reverse servo spring.



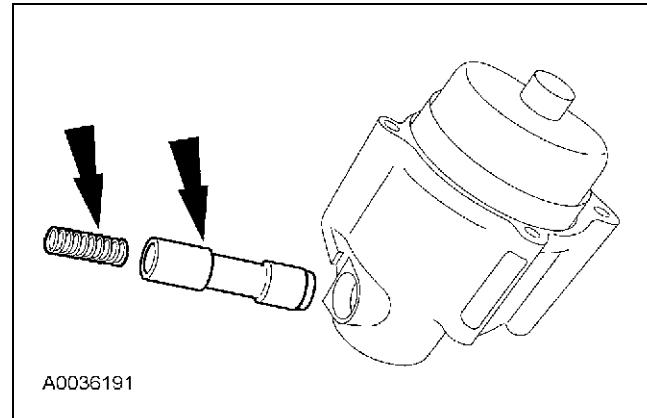
4.  **WARNING:** Follow the specified procedure when using the tool to remove the servo cover. The servo and servo cover are under high spring force and can separate forcefully, which may result in serious personal injury.

NOTE: The arrow on the servo plate must be aligned evenly between any 2 slots on the cover.

Install the reverse servo plate.



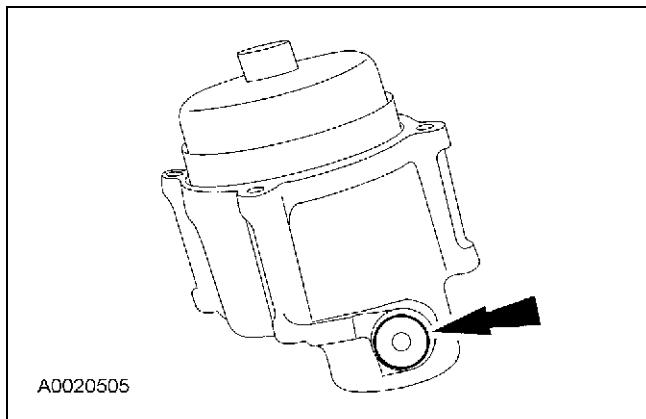
5. Install the reverse servo spring and check valve.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES (Continued)

6. Install the control valve spring retainer.

- Tighten to 10 Nm (89 lb-in).

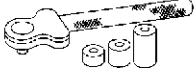
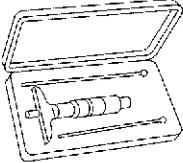
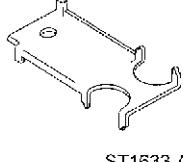
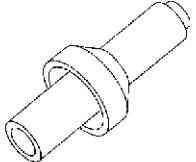
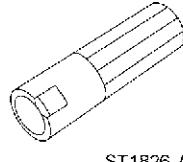


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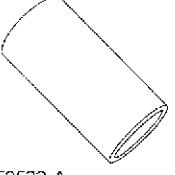
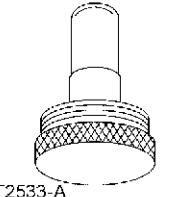
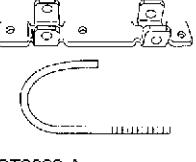
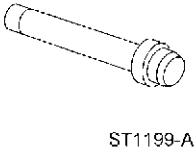
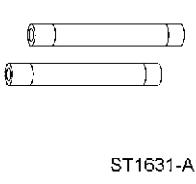
Transmission

Special Tool(s)

| | |
|---|--|
|  ST1792-A | Adjustment Set, Transmission Band 307-S022 (T71P-77370-A) |
|  ST1186-A | Holding Fixture, Transmission 307-003 (T57L-500-B) |
|  ST1274-A | Depth Micrometer 303-D026 (D80P-4201-A) or equivalent |
|  ST1633-A | Alignment Gauge, TR Sensor 307-351 (T97L-70010-A) |
|  ST1188-A | Installer, Transmission Extension Housing Oil Seal 307-038 (T74P-77052-A) |
|  ST1826-A | Sizer, Piston Seal 307-338 (T95L-70010-G) |

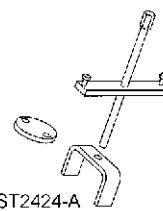
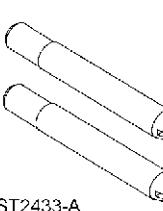
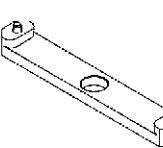
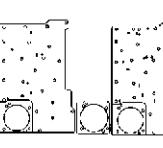
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Special Tool(s)

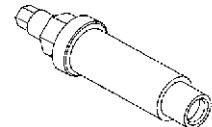
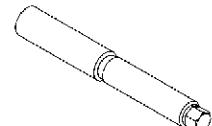
| | |
|--|---|
|  ST1817-A | Alignment Set, Fluid Pump 307-S039 (T74P-77103-X) |
|  ST2532-A | Aligner, Fluid Pump Handle 307-431 |
|  ST2533-A | Aligner, Fluid Pump Pilot 307-432 |
|  ST2432-A | Gauge Bar 307-400 |
|  ST2393-A | Compressor, Servo Cover 307-402 |
|  ST1199-A | Installer, Shift Shaft Fluid Seal 307-050 (T74P-77498-A) |
|  ST1631-A | Handle, Torque Converter 307-091 (T81P-7902-C) |



ASSEMBLY (Continued)**Special Tool(s)**

| | |
|---|---|
|  | Compressor, Cushion Spring 307-401 |
|  | Aligner, Valve Body 307-334 (T95L-70010-C) |
|  | Alignment Pins, Transmission Pump 307-399 |
|  | Aligner, Flex Plate 307-403 |
|  | Air Test Plate 307-433-01, 307-433-2, 307-433-3 |

Special Tool(s)

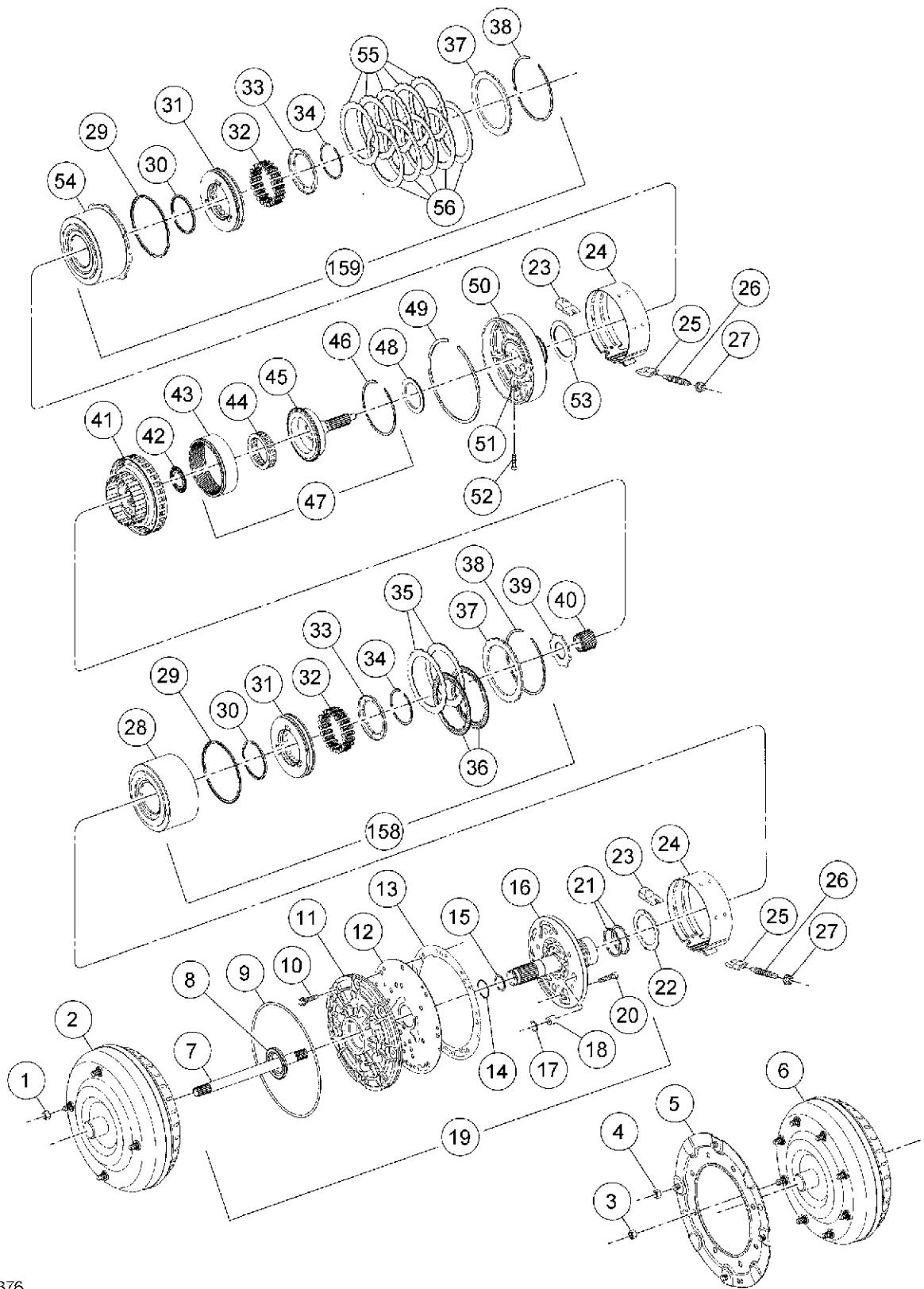
| | |
|--|---|
|  | Installer, Drive Pinion flange 205-479 |
|  | Installer, Output Shaft Flange 307-404 |

Material

| Item | Specification |
|---|---------------|
| MERCON® V Automatic Transmission Fluid XT-5-QM | MERCON® V |
| Multi-Purpose Grease XG-4 and/or XL-5 | ESB-M1C93-B |

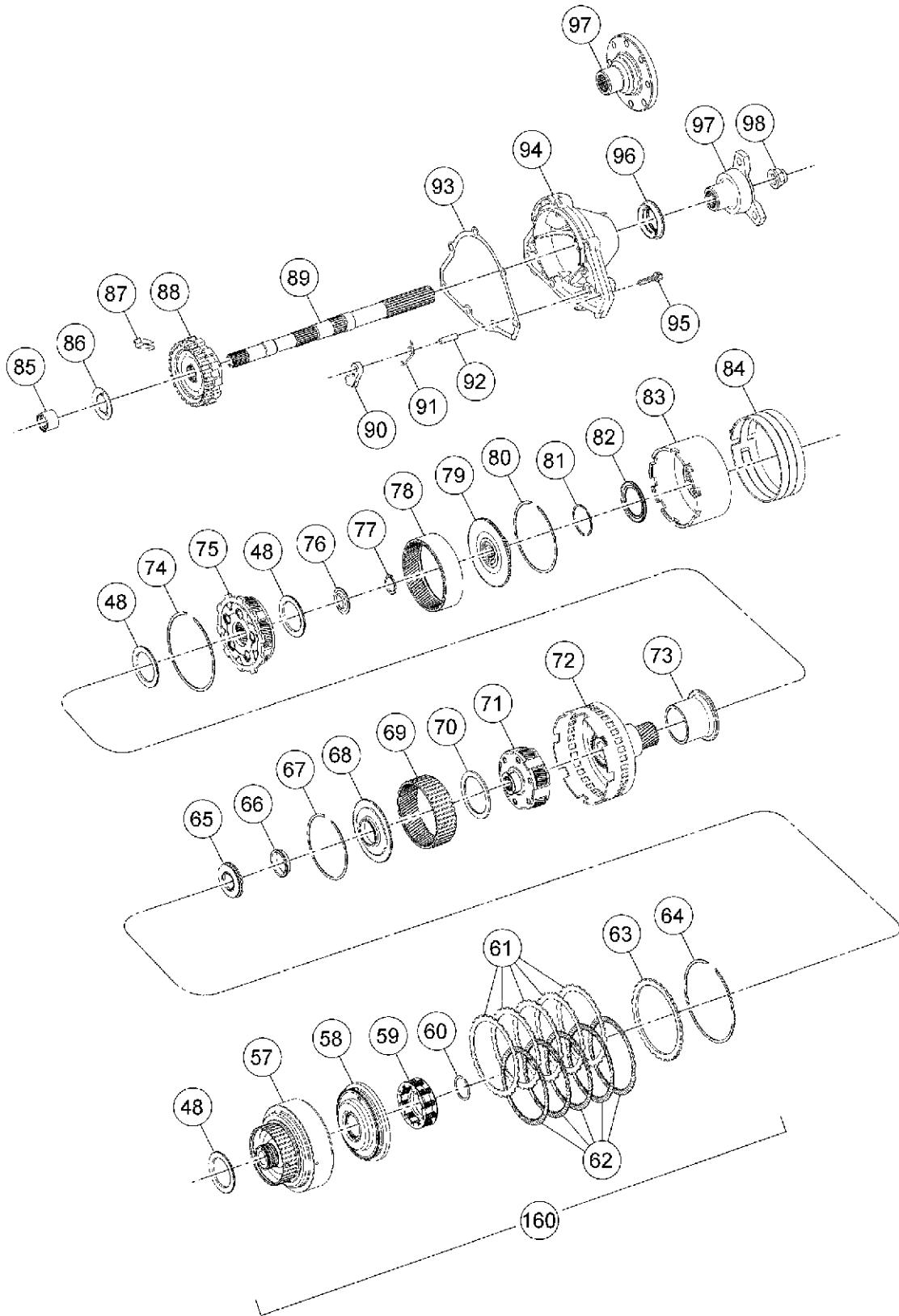
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ASSEMBLY (Continued)

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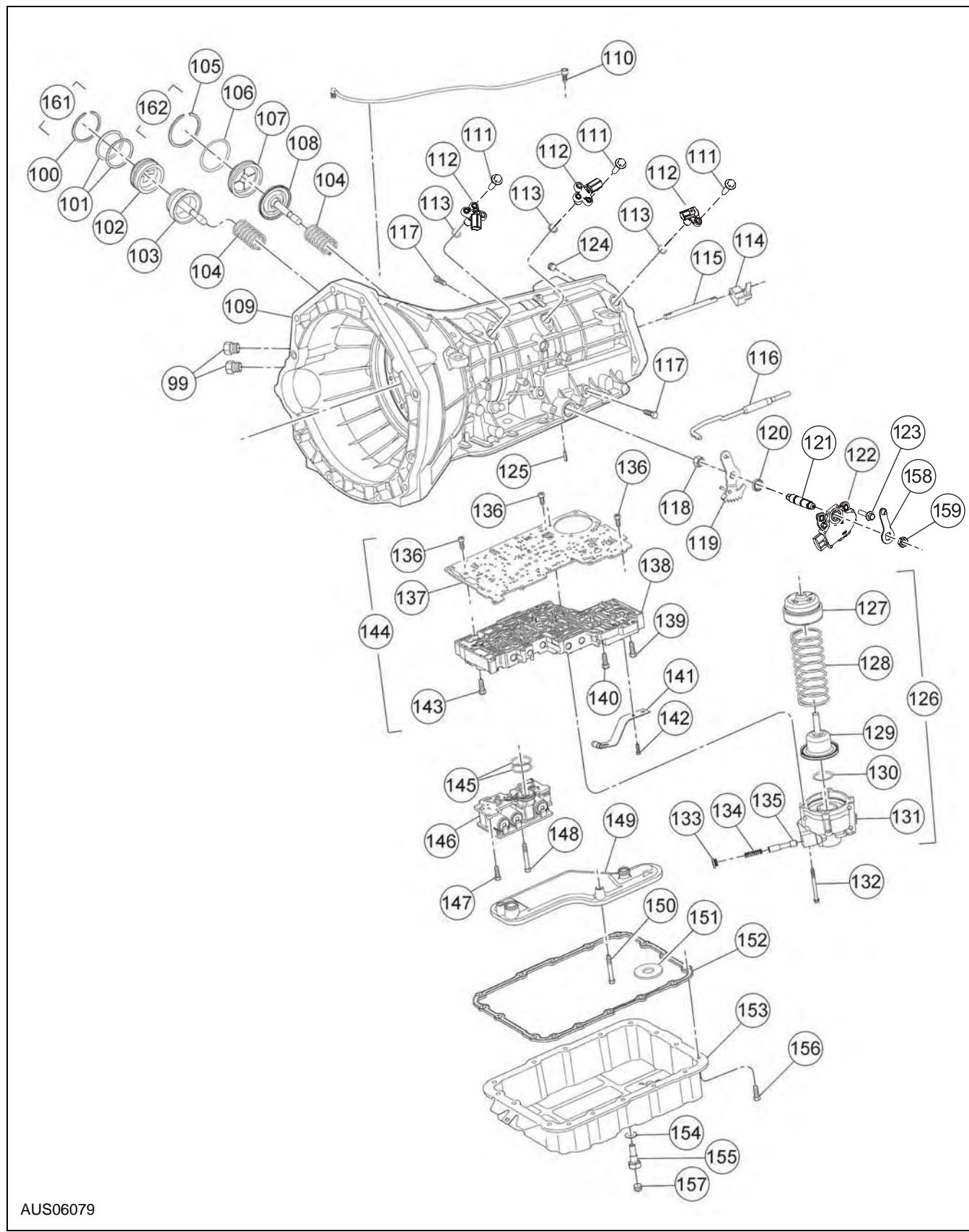


ASSEMBLY (Continued)

N0035877



ASSEMBLY (Continued)



AUS06079



ASSEMBLY (Continued)

| Item | Part Number | Description |
|-------------|--------------------|--|
| 1 | 379299-S2 | Converter-to-flexplate nut (attaches the converter assembly to the flexplate) |
| 2 | 7902 | Converter assembly |
| 3 | 379299-S2 | Converter-to-adapter plate nut (attaches the converter assembly to the adapter plate) (8 required) |
| 4 | 379299-S2 | Adapter plate-to-flexplate nut (attaches adapter plate to the flexplate) (4 required) |
| 5 | 6K374 | Adapter plate assembly |
| 6 | 7902 | Converter assembly |
| 7 | 7017 | Input shaft |
| 8 | 7A248 | Front fluid pump seal assembly |
| 9 | 7A248 | Front fluid pump seal |
| 10 | W704892-S1300 | Screw and washer assembly — M8 x 35 internal lobe (attaches pump to case) (8 required) |
| 11 | 7G178 | Fluid pump cover assembly |
| 12 | 7B472 | Fluid pump adapter plate |
| 13 | 7A136 | Front fluid pump gasket |
| 14 | W701431-S300 | Fluid pump shaft-to-inner gear O-ring seal (also in pump assembly) |
| 15 | 7L323 | Stator support seal |
| 16 | 7A108 | Front pump support assembly |
| 17 | 7H416 | O-ring |
| 18 | 7H411 | Fluid pump control valve |
| 19 | 7A103 | Fluid pump assembly |
| 20 | W701429-S300 | M8 x 1 x 35 internal lobe screw (attaches pump support to pump assembly) (6 required) |
| 21 | 7D025 | Overdrive brake drum seal |
| 22 | 7D014 | Fluid pump input thrust washer No. 1 |
| 23 | 7D029 | Intermediate and Overdrive brake band anchor strut (2 required) |
| 24 | 7D034 | Intermediate and Overdrive brake band (2 required) |
| 25 | 7D029 | Intermediate and Overdrive brake band apply strut (2 required) |
| 26 | 7C492 | Overdrive/intermediate band adjusting screw |

(Continued)

| Item | Part Number | Description |
|-------------|--------------------|--|
| 27 | 71000-S100 | Overdrive/intermediate locking nut |
| 28 | 7L669 | Overdrive brake band drum assembly |
| 29 | 7A548 | Direct and Overdrive piston outer seal |
| 30 | 7D404 | Direct and Overdrive piston inner seal |
| 31 | 7A262 | Direct and Overdrive clutch piston |
| 32 | 7A480 | Direct and Overdrive clutch piston spring |
| 33 | 7A527 | Clutch piston spring retainer (2 required) |
| 34 | E860125-S | Retaining ring (retains 7D041 to drum) (2 required) |
| 35 | 7B442 | Coast clutch external splined plate (steel) (2 required) |
| 36 | 7B164 | Coast clutch internal splined friction plate (2 required) |
| 37 | 7B066 | Coast and direct clutch pressure plate (2 required) |
| 38 | E860126-S | Coast and direct clutch plates retaining ring (select fit) (2 required) |
| 39 | 7660 | Coast clutch to Overdrive carrier adapter |
| 40 | 7D063 | Overdrive sun gear |
| 41 | 7B446 | Overdrive planetary gear carrier (with trigger wheel) |
| 42 | 7L495 | Overdrive planet thrust bearing No. 2 |
| 43 | 7A153 | Overdrive ring gear |
| 44 | 7A089 | Center shaft one-way clutch assembly |
| 45 | 7A658 | Overdrive center shaft |
| 46 | W702037-S300 | Retaining ring (retains 7686 to 7653) |
| 47 | 7L678 | Hub and ring gear assembly (includes 7C109, 7A153, 7A658, W702037-S300) |
| 48 | 7M153 | Center shaft and forward clutch cylinder bearing assembly No. 3, No. 5, No. 8 and No. 9 (4 required) |
| 49 | W702465-S300 | Retaining ring |
| 50 | 7A130 | Center support assembly |
| 51 | E826160-S76 | Nut and cage assembly (attaches center support to case) |



ASSEMBLY (Continued)

| Item | Part Number | Description |
|-------------|--------------------|--|
| 52 | W705407-S300 | Bolt |
| 53 | 7D014 | Intermediate clutch drum bearing No. 4 |
| 54 | 7D044 | Intermediate brake drum assembly |
| 55 | 7B442 | Direct clutch external splined steel plates (5 required) |
| 56 | 7B164 | Direct clutch internal splined friction plates (5 required) |
| 57 | 7A360 | Forward clutch cylinder |
| 58 | 7A262 | Forward clutch piston assembly |
| 59 | 7G299 | Forward clutch support and spring assembly |
| 60 | E860109-S | Forward clutch piston and spring retaining ring in forward clutch cylinder |
| 61 | 7B442 | Forward clutch external spline steel plate (5 required) |
| 62 | 7B164 | Forward clutch internally spline friction plate (5 required) |
| 63 | 7B066 | Forward clutch pressure plate |
| 64 | 7D483 | Retaining ring 141.45 x 1.37 internal (select fit) |
| 65 | 7D234 | Forward ring gear hub thrust bearing No. 6A |
| 66 | 7D090 | Forward clutch thrust washer No. 6B |
| 67 | 7G375 | Forward clutch hub retainer ring |
| 68 | 7B067 | Forward ring gear hub |
| 69 | 7D392 | Forward ring gear |
| 70 | 7F374 | Forward planet thrust bearing No. 7 |
| 71 | 7A398 | Forward planetary |
| 72 | 7A019 | Shell and sun gear assembly |
| 73 | 7C176 | Low and reverse spacer gear |
| 74 | W702775-S300 | Reverse carrier drum snap ring |
| 75 | 7D006 | Reverse planet assembly |
| 76 | 7B167 | Output shaft sleeve |
| 77 | E860527-S | External retainer ring |
| 78 | 7A153 | Output shaft ring gear |
| 79 | 7D164 | Output shaft hub |
| 80 | 7C122 | Output shaft ring gear retaining ring |
| 81 | 7D019 | Output shaft hub seal |

(Continued)

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| Item | Part Number | Description |
|-------------|--------------------|--|
| 82 | 7H027 | Low/intermediate sun gear bearing assembly |
| 83 | 7C498 | Reverse brake drum and clutch assembly (includes OWC) |
| 84 | 7D095 | Low/reverse band assembly |
| 85 | 7R205 | Output shaft bearing |
| 86 | 7B368 | Output shaft thrust washer No.11 |
| 87 | 7C058 | Deflector assembly |
| 88 | 7A233 | Transmission parking gear assembly |
| 89 | 7060 | Output shaft |
| 90 | 7A441 | Parking pawl |
| 91 | 7D070 | Parking pawl return spring |
| 92 | 7D071 | Parking pawl shaft |
| 93 | 7086 | Extension housing gasket |
| 94 | 7A039 | Extension housing |
| 95 | W500311-S437 | M8 x 1.25 extension housing-to-case screw (5 required) |
| 96 | 7052 | Extension housing seal |
| 97 | 7089 | Output shaft flange |
| 98 | W701357 | Output shaft flange nut |
| 99 | 7D273 | Fluid tube connector assembly (2 required) |
| 100 | 7H074 | Ring overdrive servo retainer |
| 101 | W703119-S300 | Overdrive servo cover seal (2 required) |
| 102 | 7D027 | Overdrive servo cover |
| 103 | 7D021 | Overdrive servo piston and rod |
| 104 | 7D028 | Intermediate/overdrive servo piston spring (2 required) |
| 105 | W702777-S300 | Ring intermediate servo retainer |
| 106 | W702969-S300 | Intermediate servo cover seal |
| 107 | 7D027 | Intermediate servo cover |
| 108 | 7D021 | Intermediate servo piston and rod |
| 109 | 7005 | Case assembly |
| 110 | 7034 | Case vent assembly |
| 111 | W708389-S437 | Speed sensor-to-case screw (M6 x 19) |
| 112 | 7H103 | Output shaft speed, turbine shaft speed and intermediate shaft speed sensors |

(Continued)



Login Tracking Code

ASSEMBLY (Continued)

| Item | Part Number | Description |
|-------------|--------------------|---|
| 113 | W702981-S300 | Speed sensor-to-case O-ring seal |
| 114 | 7A179 | Reverse brake drum lever |
| 115 | 7D433 | Reverse band actuating lever shaft |
| 116 | 7A232 | Parking pawl actuating rod |
| 117 | 390318-S2 | Pipe plug |
| 118 | W703001-S437 | Manual lever shaft outer and inner nut |
| 119 | 7A115 | Manual valve inner lever |
| 120 | 7B498 | Manual control lever seal |
| 121 | 7A256 | Manual control lever |
| 122 | 7F293 | Digital transmission range (TR) sensor |
| 123 | W500015-S437 | Digital TR sensor screw and washer (2 required) |
| 124 | 6026 | Fluid fill plug |
| 125 | 7B210 | Manual lever shaft pin retainer |
| 126 | 7B193 | Reverse servo assembly |
| 127 | 7D372 | Reverse servo plate |
| 128 | 7D466 | Reverse servo accumulator spring |
| 129 | 7D189 | Reverse servo piston and seal |
| 130 | 7423 | Reverse servo piston O-ring seal |
| 131 | 7D036 | Reverse servo cover |
| 132 | W709492-S300 | Reverse servo piston-to-case screw (4 required) |
| 133 | 7D321 | Control valve spring retainer |
| 134 | 7A270 | Main fluid pressure spring regulator valve |
| 135 | 7D488 | Reverse servo check valve |
| 136 | W701099-S1430 | Main control valve body separating plate screw |
| 137 | 7Z490 | Main control valve body separating plate (bonded) |
| 138 | 7A101 | Lower main control valve body |
| 139 | W500102-S300 | Main control valve body screws (18 required) |

(Continued)

| Item | Part Number | Description |
|-------------|--------------------|--|
| 140 | W702791-S300 | Main control valve body screw |
| 141 | 7E332 | Manual valve detent spring |
| 142 | W500100-S300 | Screw detent spring |
| 143 | W706672-S430 | Main control valve body screw |
| 144 | 7A100 | Main control valve body |
| 145 | W705928-S300 | Solenoid body connector O-ring seal |
| 146 | 7G391 | Transmission control solenoid body |
| 147 | W702921-S300 | Transmission control solenoid body screw |
| 148 | W703189-S300 | Transmission control solenoid body screws (7 required) |
| 149 | 7A098 | Transmission fluid pan filter |
| 150 | W705559-S300 | Transmission fluid pan filter screws |
| 151 | 7L027 | Transmission fluid pan magnet |
| 152 | 7A191 | Transmission fluid pan gasket |
| 153 | 7A194 | Transmission fluid pan |
| 154 | 6734 | Transmission fluid pan drain plug gasket |
| 155 | 7A010 | Transmission fluid pan drain plug |
| 156 | W500213-S437 | Transmission fluid pan screw |
| 157 | W704999-S309 | Transmission fluid pan drain tube plug (short hex) |
| 158 | — | Overdrive/coast clutch assembly |
| 159 | — | Direct clutch assembly |
| 160 | — | Forward clutch assembly |
| 161 | — | Overdrive servo |
| 162 | — | Intermediate servo |

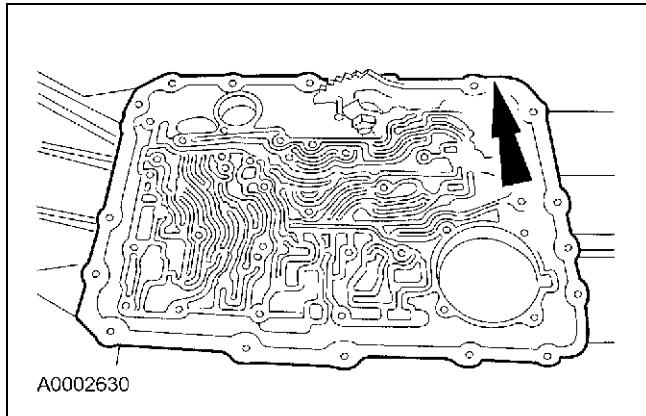
1. Thoroughly clean the transmission case and extension housing in solvent and blow dry with compressed air.



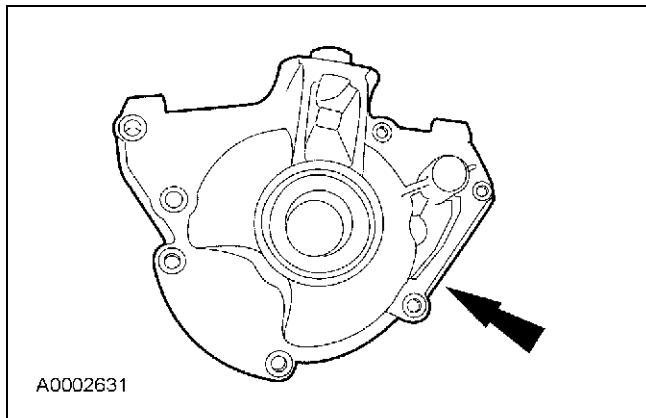
ASSEMBLY (Continued)

2. Inspect the transmission case for the following:

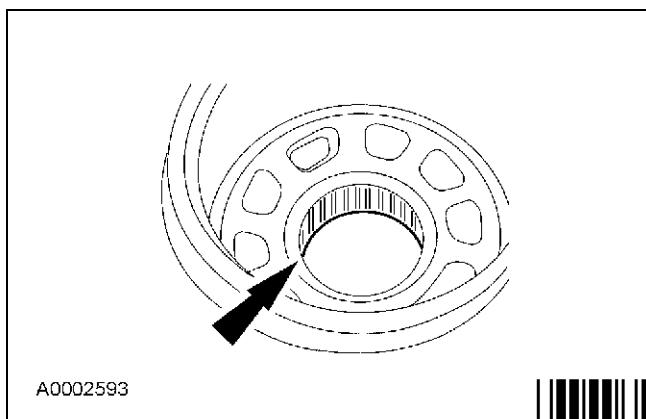
- Stripped bolt hole threads.
- Gasket and mating surfaces for burrs or nicks.
- Obstructions to vent and fluid passages.
- Cracks or warpage.



3. Inspect the extension housing for cracks, burrs or warpage.

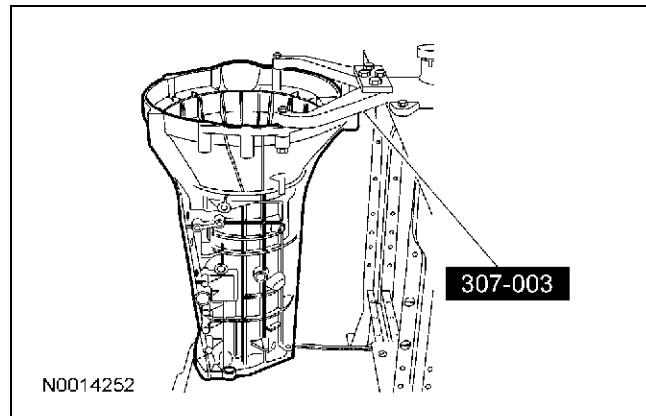


4. Inspect the case bearing for damage. If damage to the case bearing is indicated, install a new case.

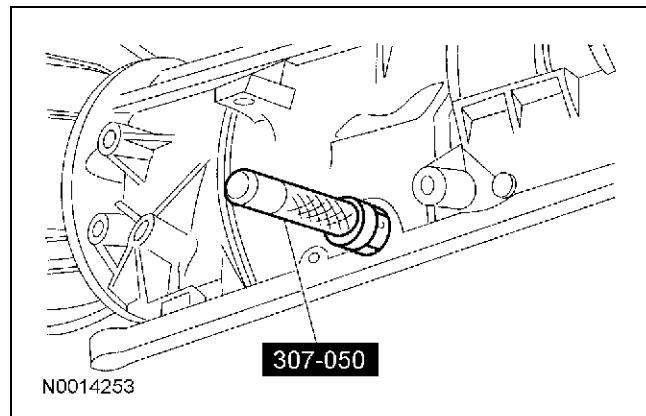


5. **⚠️ WARNING:** Make sure the lock pin on bench-mounted holding fixture is secure. Failure to follow these instructions may result in personal injury.

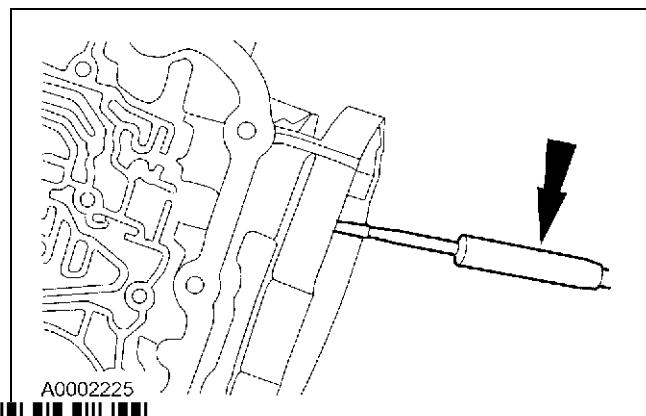
Using the special tool, install the transmission into the bench with the converter housing facing up.



6. Using the special tool, install the manual control lever shaft seal and lubricate it with petroleum jelly.

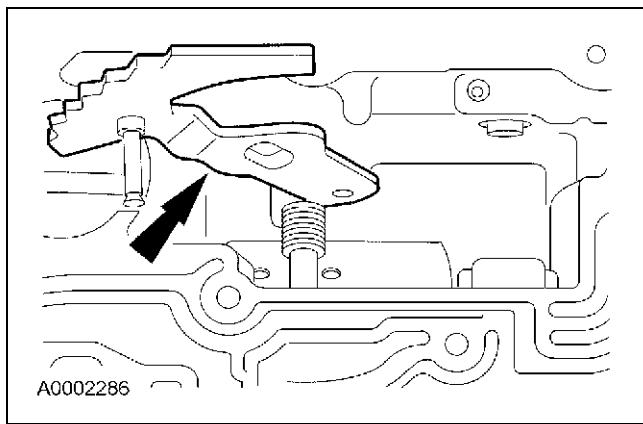


7. Install the parking lever rod.

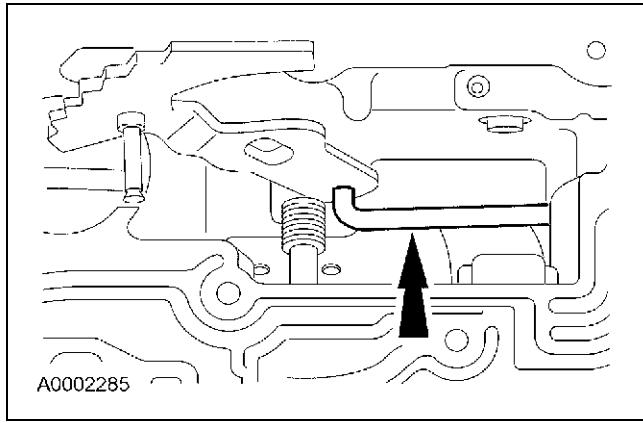


ASSEMBLY (Continued)

8. Install the manual control lever.

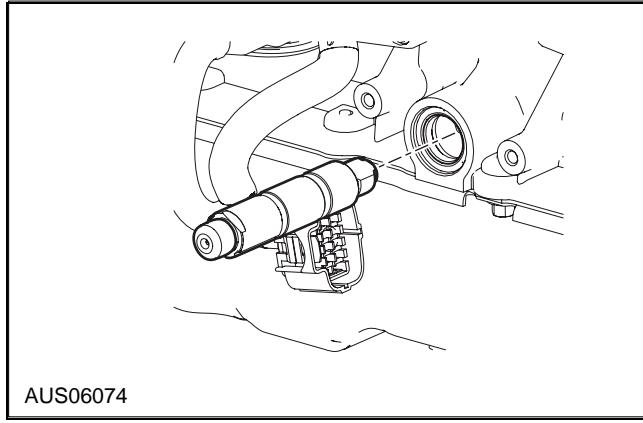


9. Assemble the manual valve inner lever and parking lever actuating rod as shown.

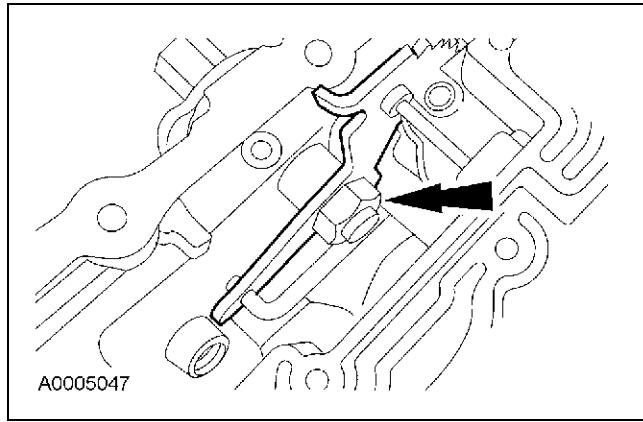


10. **⚠ CAUTION:** Align the flats on the manual valve inner lever with the flats on the manual control lever shaft.

Install the manual control lever shaft.



11. Install the manual valve inner lever onto the manual shaft and loosely install the nut.

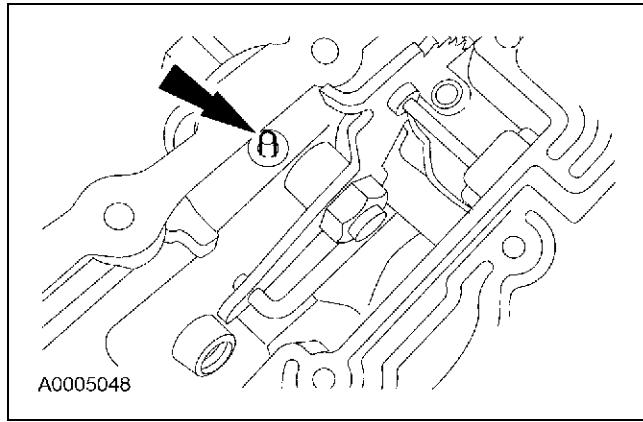


12. **⚠ CAUTION:** Use care not to damage the fluid pan rail surface when installing the retaining pin.

NOTE: Align the manual control lever shaft alignment groove with the manual control lever shaft spring pin bore in the transmission case.

Install the manual control lever shaft spring pin.

- Tap the manual control lever shaft spring pin into the transmission case.

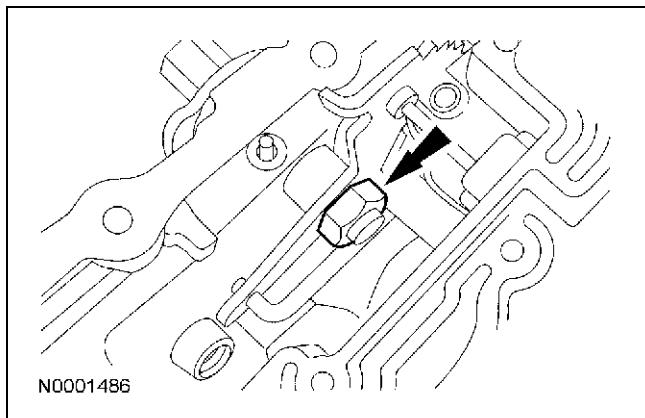


ASSEMBLY (Continued)

13. **⚠ CAUTION:** To avoid damage, do not allow the wrench to strike the manual valve inner lever pin.

Tighten the nut.

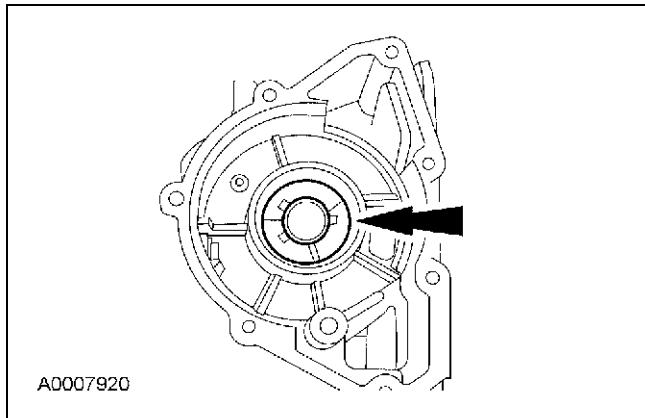
- Tighten to 48 Nm (35 lb-ft).



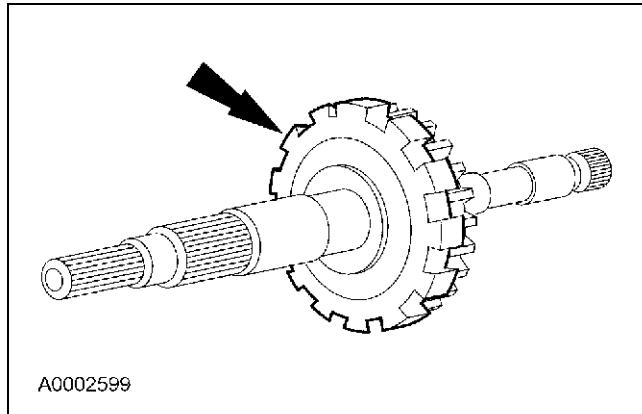
14. **⚠ CAUTION:** The tabs on the output shaft thrust washer (No. 11) point into the case. Make sure the thrust washer is correctly seated.

Install the output shaft thrust washer (No. 11).

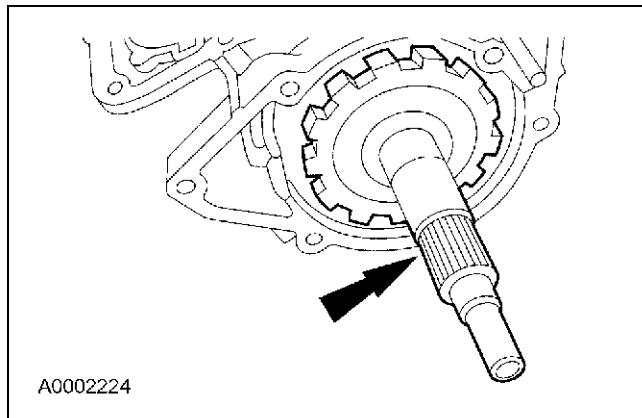
- Coat the output shaft thrust washer with petroleum jelly.



15. Install the park gear on the output shaft.

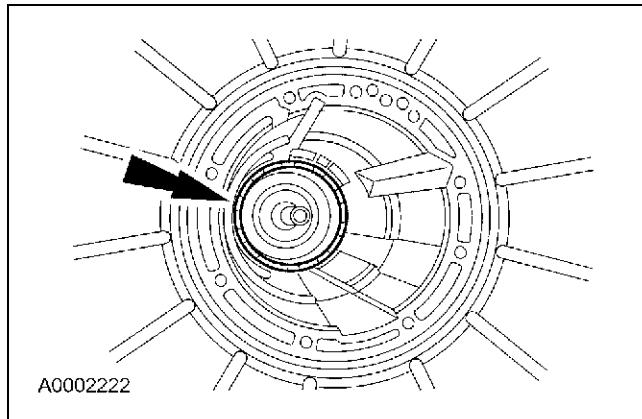


16. Install the output shaft and park gear.



17. Install the low/reverse brake drum.

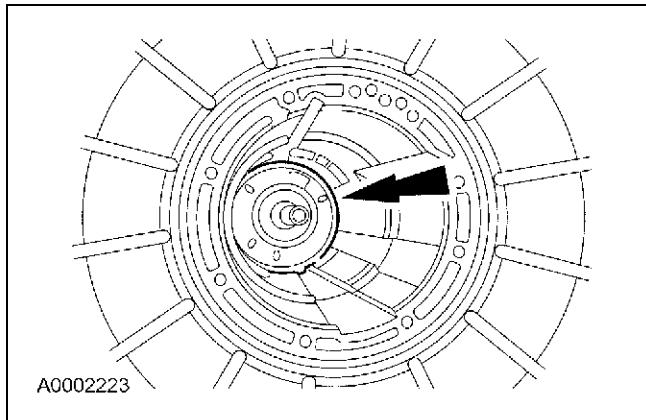
- Rotate the low/reverse brake drum clockwise to install.



ASSEMBLY (Continued)

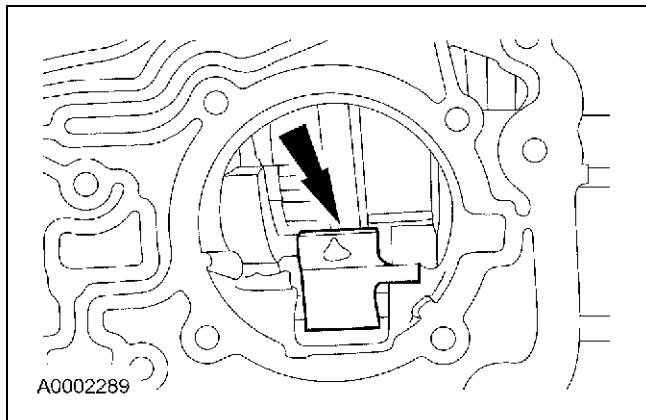
18. **⚠ CAUTION:** Make sure band is resting on the 2 anchor pins in the case.

Install the low/reverse band over the reverse drum.

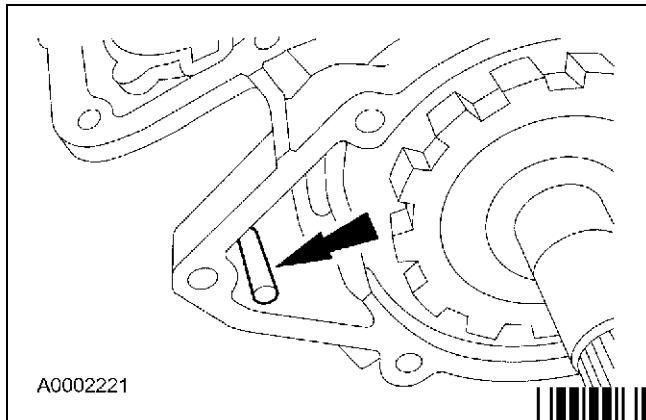


19. **NOTE:** The reverse band actuating lever must fit into the notches in the band.

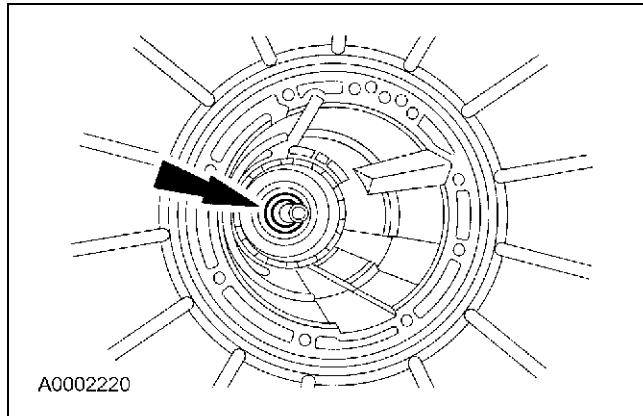
Install the reverse band actuating lever into the reverse band.



20. Install the reverse band actuating lever shaft into the case and into the reverse band actuating lever.

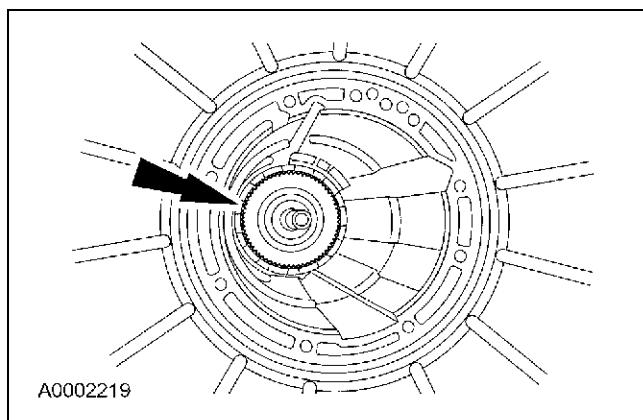


21. Install the No. 10 needle bearing into the case.



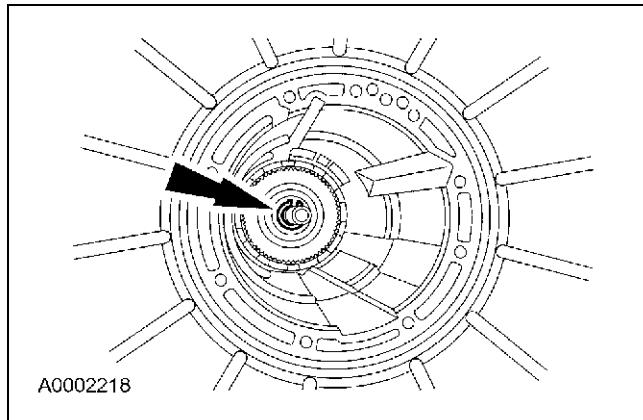
22. **⚠ CAUTION:** Do not damage the seal against the case during assembly.

Install the output shaft ring gear, hub and seal.



23. **⚠ CAUTION:** Always install a new output shaft retaining ring.

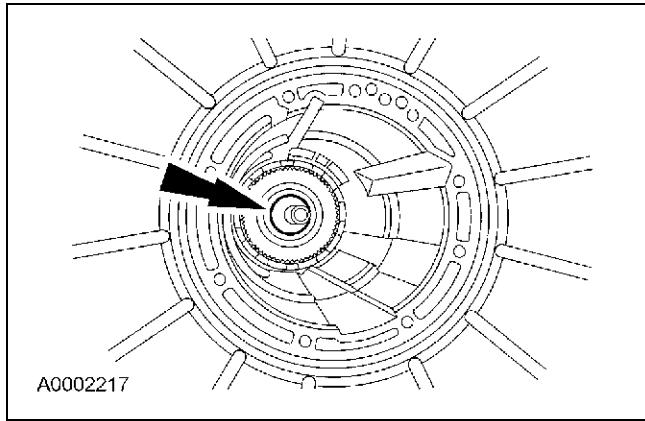
Install a new output shaft retaining ring.



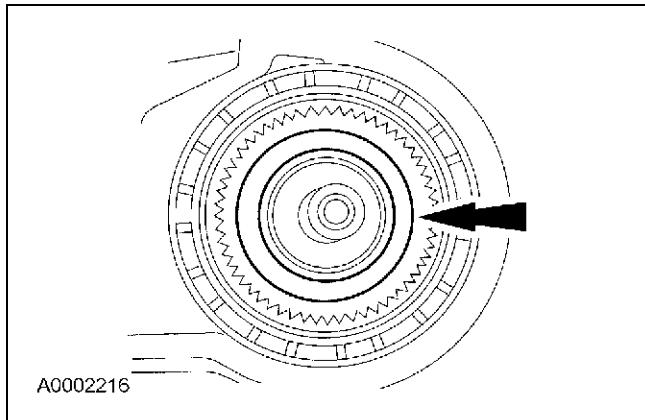
ASSEMBLY (Continued)

24. **NOTE:** Install the output shaft sleeve with the cone facing up. This sleeve will snap into place when correctly installed.

Install the output shaft sleeve.

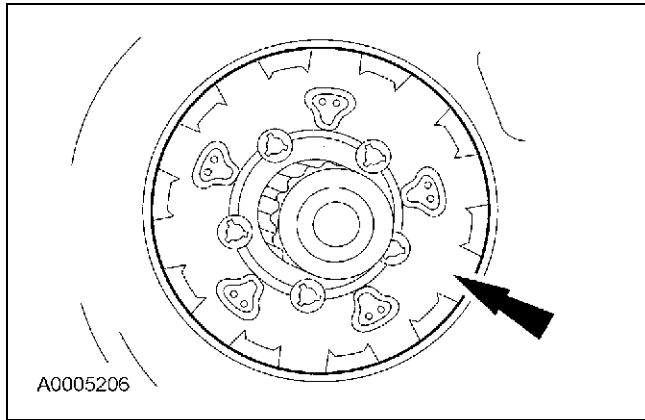


25. Install low/reverse planetary carrier needle bearing (No. 9) onto the output shaft ring gear and hub assembly.



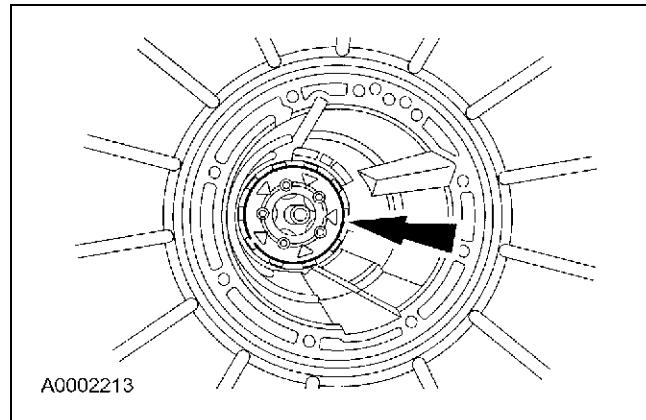
26. **⚠ CAUTION:** Make sure the needle bearings stay in place.

Install the low/reverse planetary assembly.

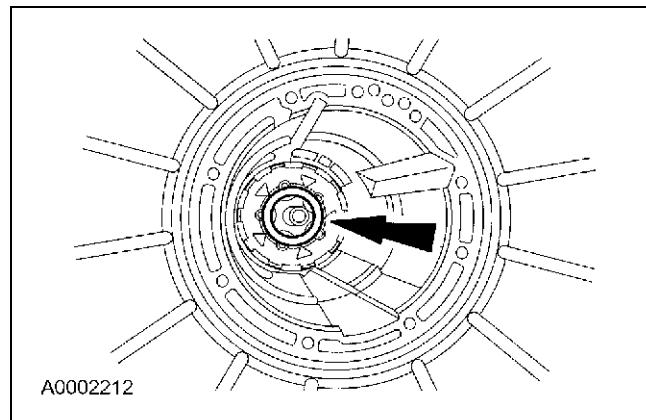


27. **⚠ CAUTION:** The low/reverse brake drum must be pulled forward to install the low/reverse planet retaining ring.

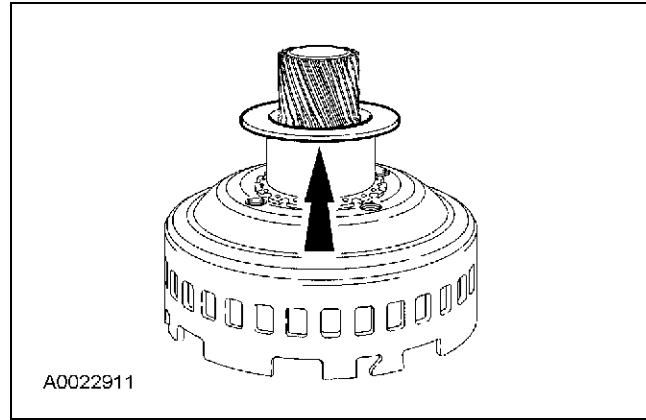
Install the retaining ring.



28. Install the No. 8 thrust bearing.

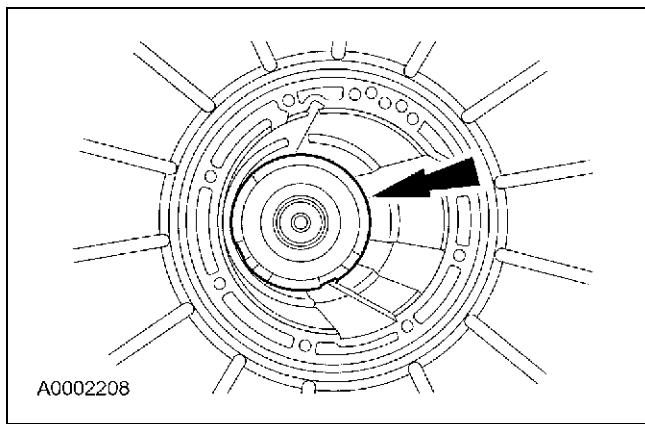


29. Install the spacer on the input shell, using petroleum jelly to hold it in place.



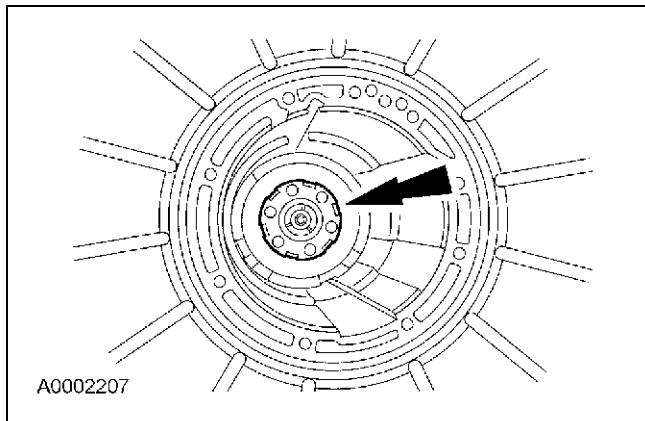
ASSEMBLY (Continued)

30. Install the input shell and sun gear assembly.

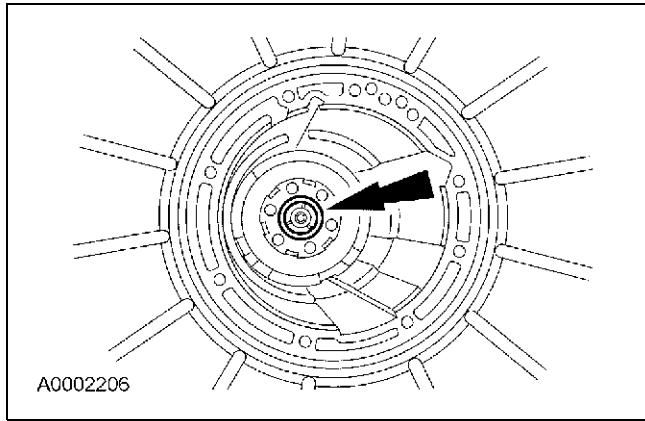


31. **NOTE:** The No. 13 bearing must be correctly seated in the forward planet assembly so the sun gear can be installed correctly.

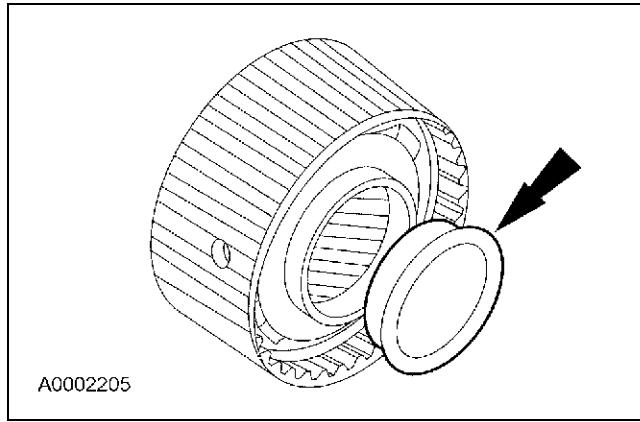
Install the forward planetary assembly.



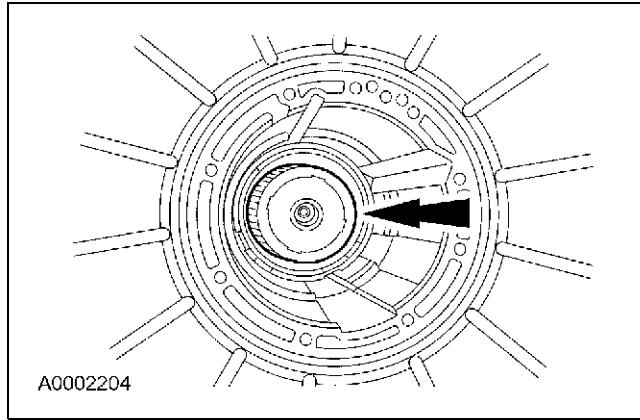
32. Install the No. 7 forward planet thrust bearing into the forward ring gear and hub assembly. Use petroleum jelly to hold the bearing in place.



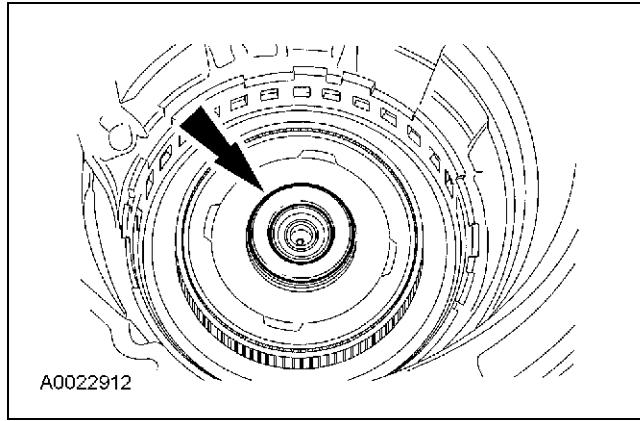
33. Install the No. 6B forward clutch thrust washer onto the forward ring gear hub.



34. Install the forward ring gear and hub as an assembly.

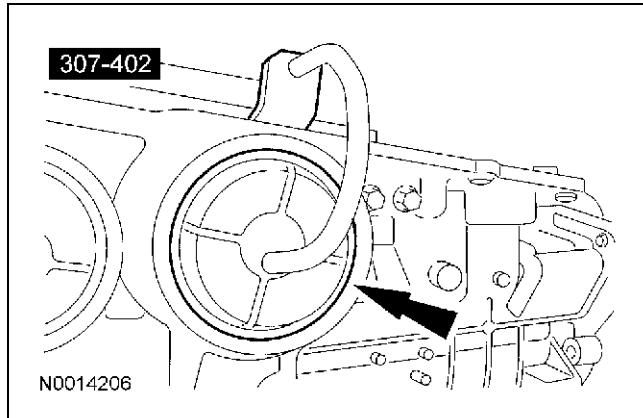
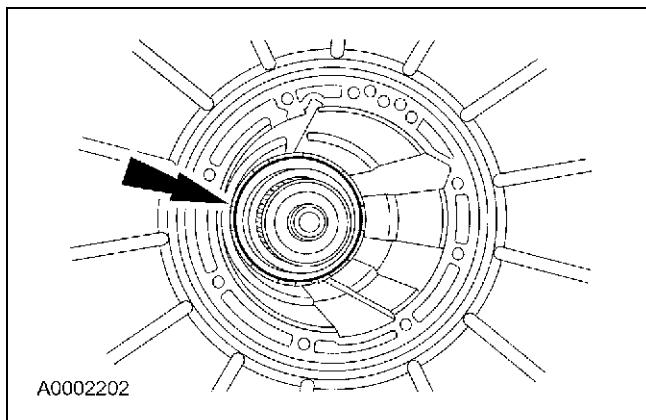


35. Install the No. 6A forward ring gear hub thrust bearing into the forward ring gear and hub.

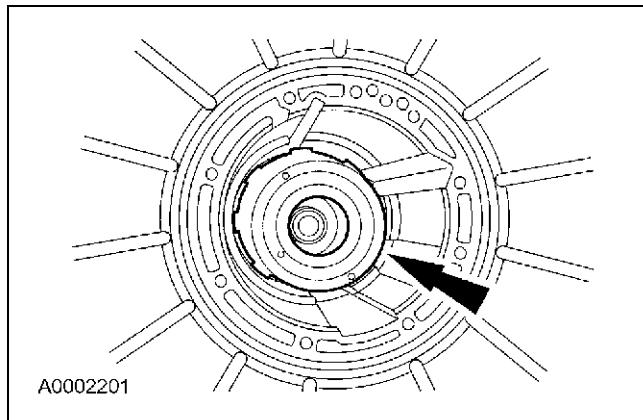
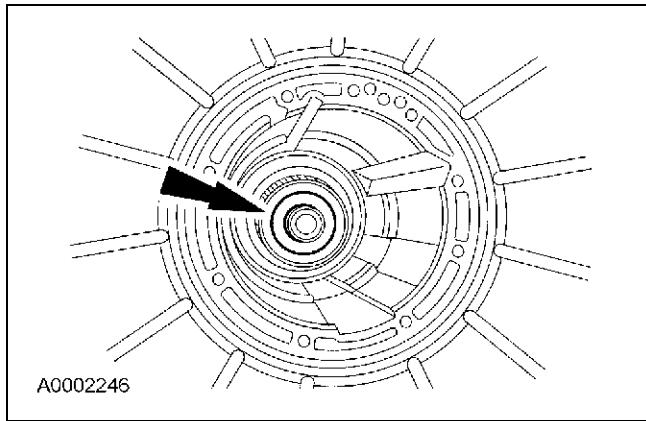


ASSEMBLY (Continued)

36. Install the forward clutch cylinder.

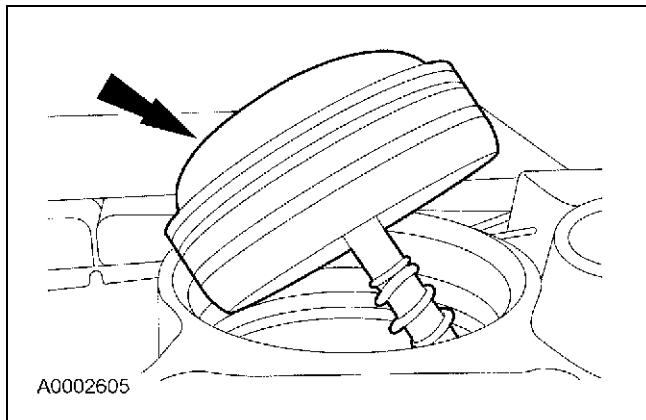


37. Install the No. 5 thrust bearing.



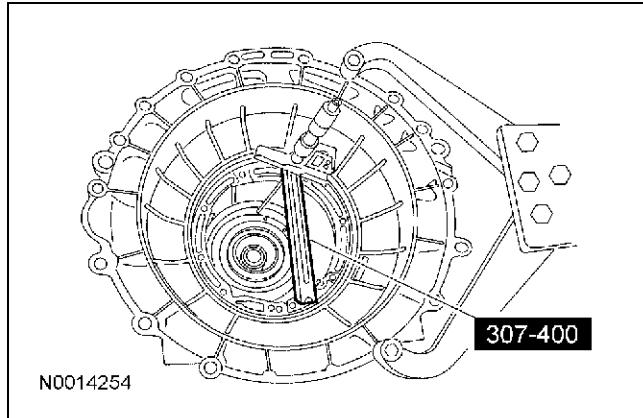
38. Install the intermediate servo piston and spring.

- Lubricate the servo bore with clean automatic transmission fluid.



41. Using a depth micrometer with an appropriate length extension, measure from the top of the gauge bar to center support ledge in case at 4 places 90 degrees apart.

- Add the 4 measurements, divide by 4, and record as dimension A.



39. Using the special tool, install the retaining ring.

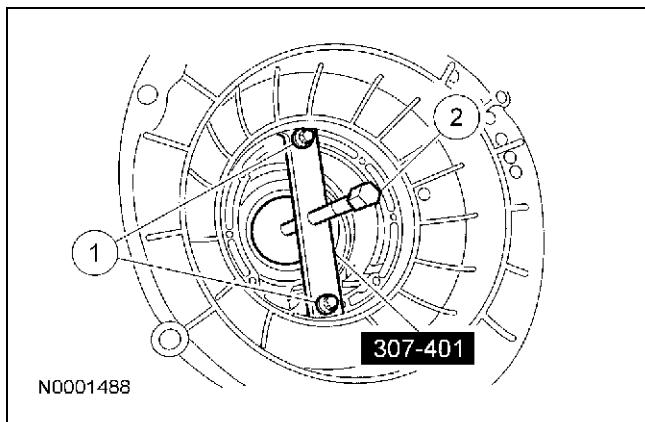


ASSEMBLY (Continued)

- 42.  CAUTION:** The torque specifications are critical for this procedure. Failure to use the correct torque specifications may cause transmission damage.

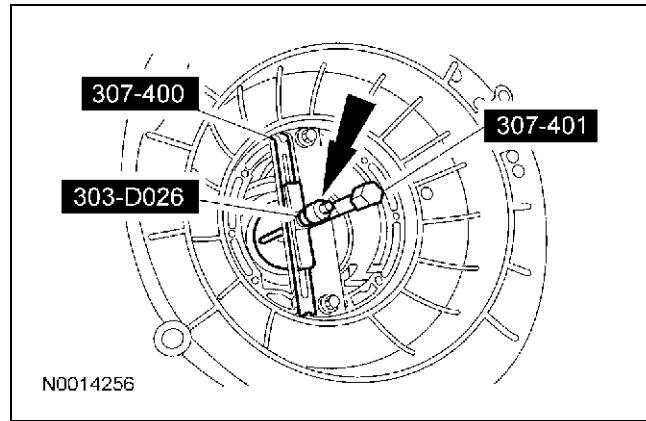
Install the special tool.

- 1 Install the special tool and the bolts using the 2 pump screw locations at approximately 6 and 12 o'clock positions.
- Tighten to 15 Nm (11 lb-ft).
- 2 Tighten the center screw.
- Tighten to 1.13 Nm (10 lb-in).



- 43. NOTE:** Align the disc holes on special tool with the slot in gauge bar for correct measurement.

Measure the distance from the top of the gauge bar to the drum bearing surface through the hole in the disc and record as dimension B. Repeat the measurement 180 degrees on the opposite side of the special tool and record as dimension C.



44. Add dimension B to C, divide by 2, and record as dimension D.
45. Subtract A from D and record as dimension E.
46. Select bearing from the following chart, using dimension E.

| Dimension E | Service Part Number (7D014) | Bearing Thickness | Identification (Notches) |
|----------------------------------|-----------------------------|----------------------------------|--------------------------|
| 1.69-1.87 mm (0.066-0.074 in) | XW4Z-CA | 2.65-2.80 mm (0.104-0.110 in) | None |
| 1.88-2.04 mm (0.073-0.080 in) | XW4X-DA | 2.83-2.98 mm (0.111-0.116 in) | One |
| 2.05-2.22 mm (0.081-0.088 in) | XW4Z-EA | 3.01-3.16 mm (0.118-0.124 in) | Two |
| 2.23-2.43 mm (0.088-0.096 in) | XW4Z-FA | 3.21-3.36 mm (0.126-0.132 in) | Three |



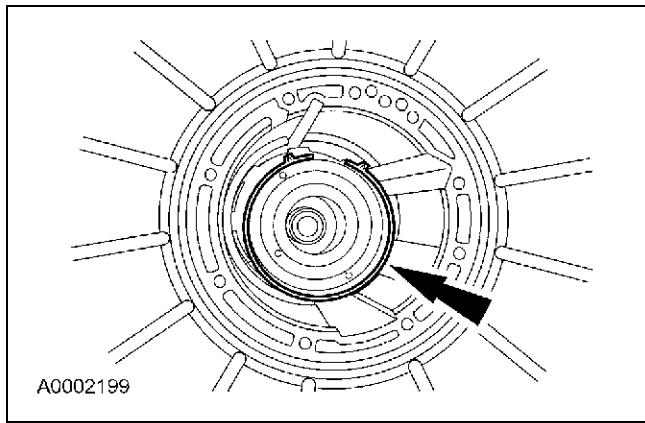
ASSEMBLY (Continued)

47. **NOTE:** Make sure that the intermediate band apply strut is aligned with the band notch.

NOTE: If the intermediate band is reused, it must be installed in the same position as when removed.

NOTE: The new intermediate band is dark in color. This is a normal condition of the band. Hairline cracks in the band are also considered normal. Do not install a new band based solely on the color.

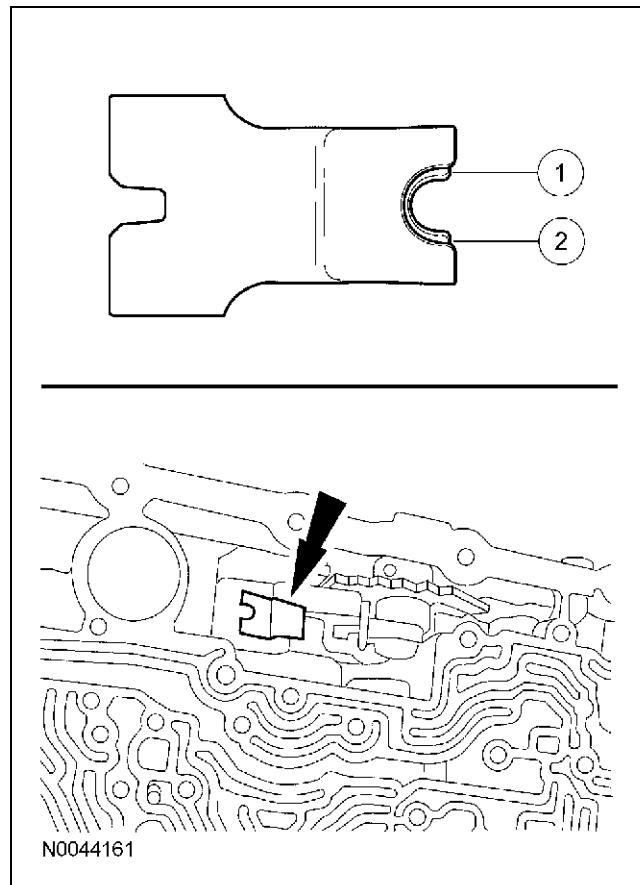
Install the intermediate band.



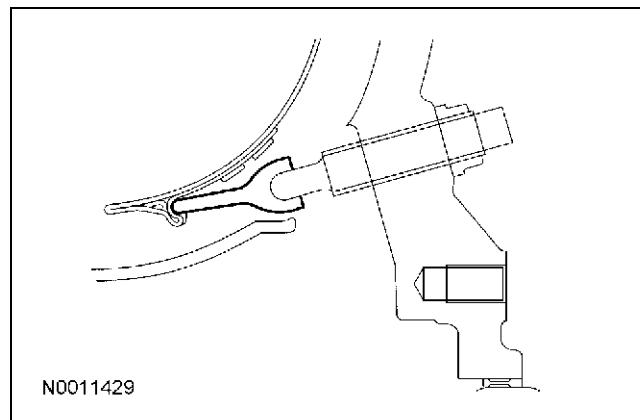
48. **⚠ CAUTION:** To avoid a “fall-out” condition of the strut from the screw during assembly and function, the small “U” shaped notch should be toward the band/case side and the large “U” shaped notch toward the main control side.

Install the intermediate band anchor strut.

- 1 Band/case side of the anchor (small U notch).
- 2 Main control side of the anchor (large U notch).

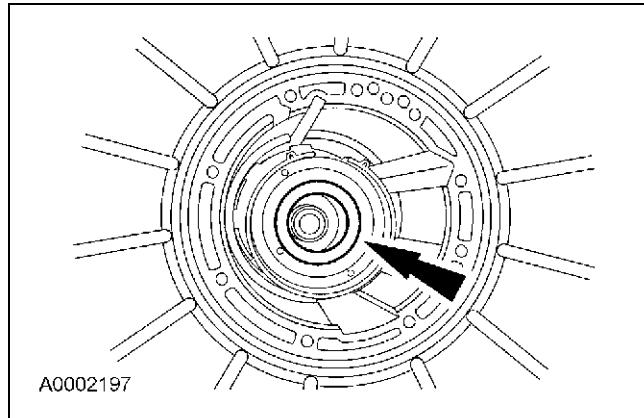
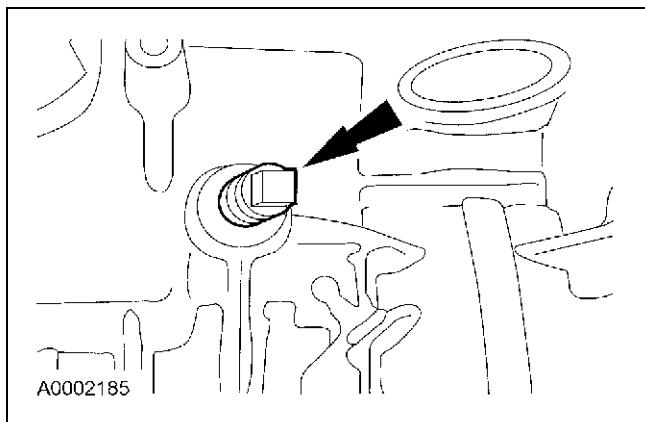


49. **⚠ CAUTION:** If the strut is installed incorrectly, transmission damage will occur. Check to make sure that the intermediate band anchor strut is installed in the correct orientation to the case and adjustment screw.

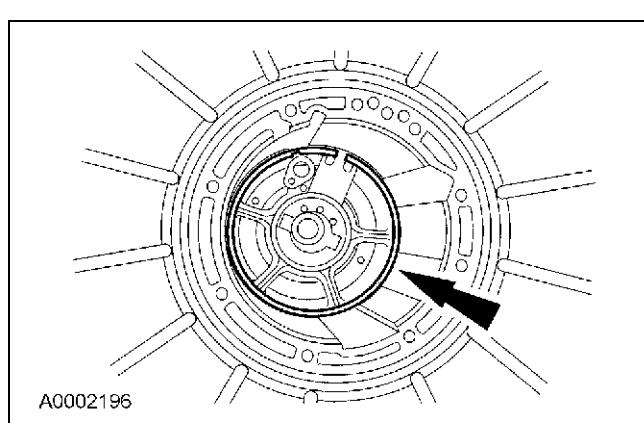
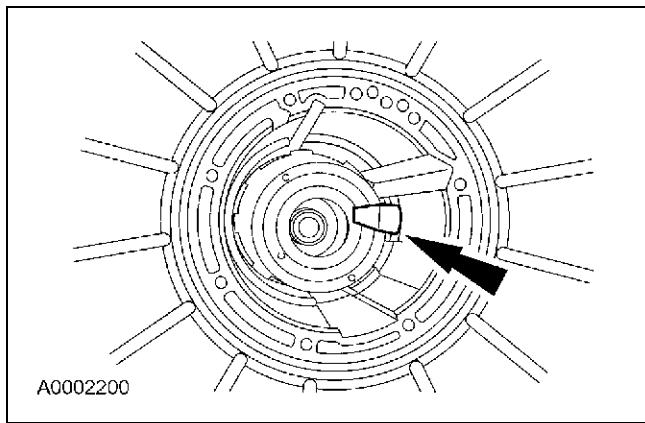


ASSEMBLY (Continued)

50. Loosely install the screw.

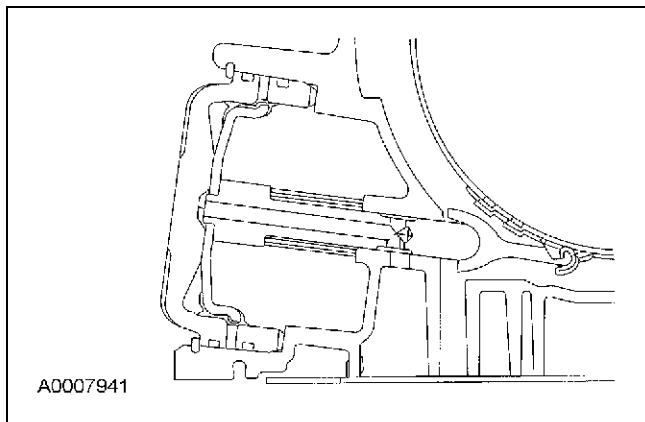


51. Install the intermediate band apply strut.

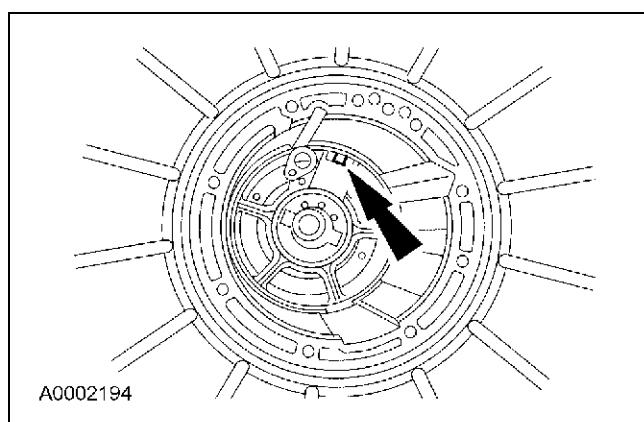


52. CAUTION: If the strut is installed incorrectly, transmission damage will occur.

Check to make sure that the intermediate band apply strut is installed in the correct orientation to the case and piston rod.



55. Install the center support locknut and cage.



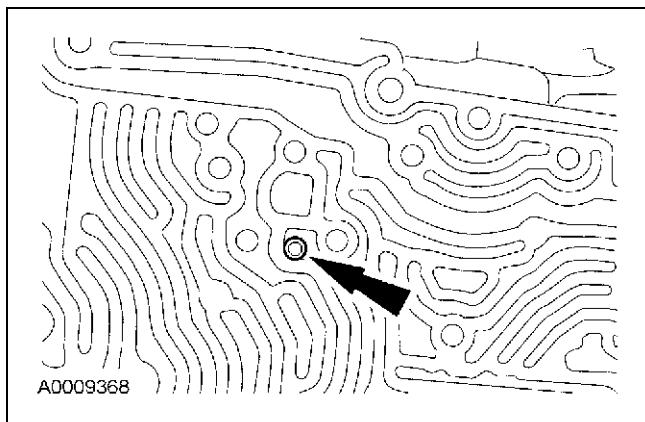
53. Install the selected No. 4 thrust washer on the direct clutch drum.

- Coat the thrust washer with petrol



ASSEMBLY (Continued)

56. Loosely install the screw.

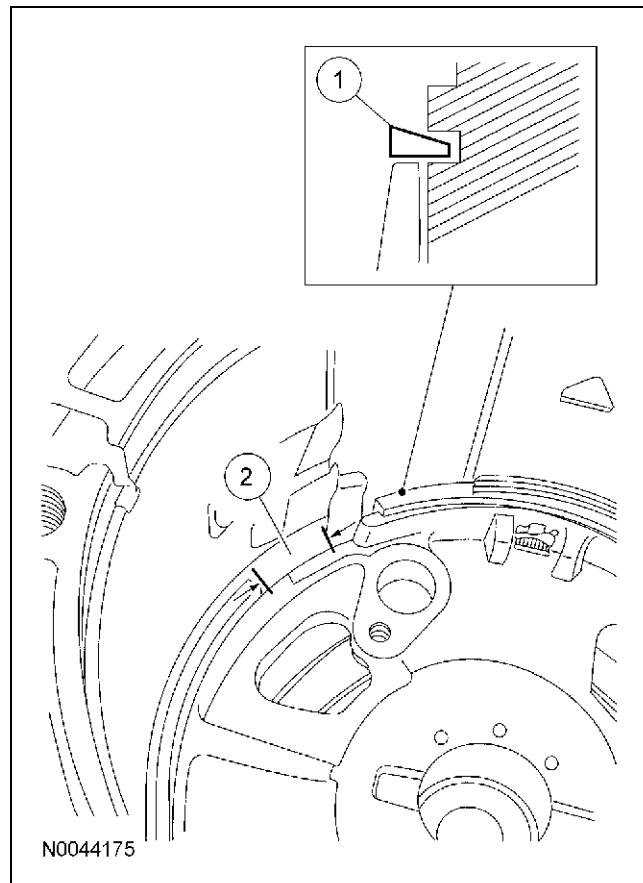


57. **⚠ CAUTION:** Install the center support retaining ring with the tapered side facing up.

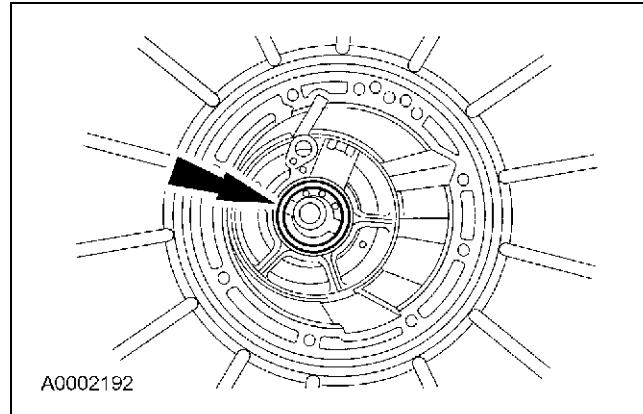
⚠ CAUTION: Make sure the notch opening is not obstructed by the center support retaining ring.

Install the center support retaining ring.

- 1 Make sure the center support retaining ring is installed with the tapered side facing up.
- 2 Make sure the opening of the center support retaining ring is positioned correctly.

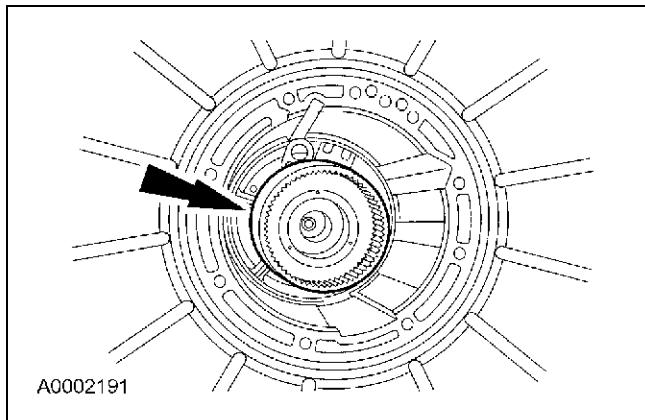


58. Install the center shaft thrust bearing (No. 3).



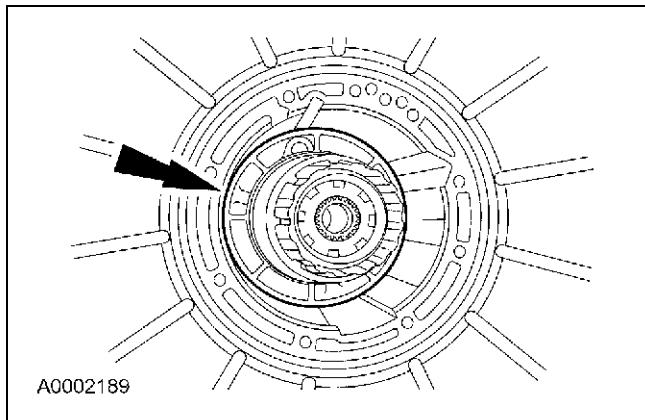
ASSEMBLY (Continued)

59. Install the Overdrive ring gear, Overdrive one-way clutch and center shaft assembly.

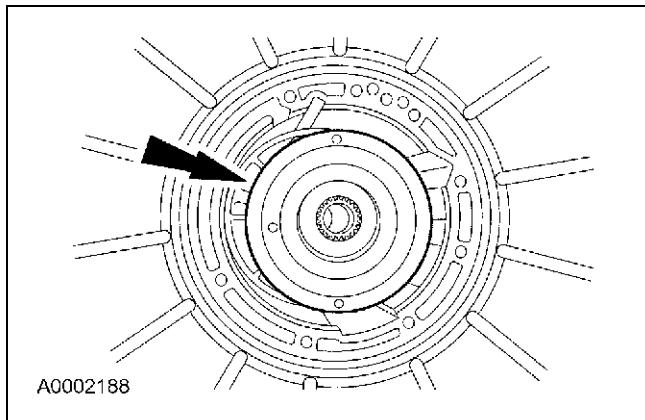


60. **⚠ CAUTION: Do not bend the trigger wheel. Make sure that the No. 2 thrust bearing is in this assembly.**

Install the planetary gear Overdrive carrier.

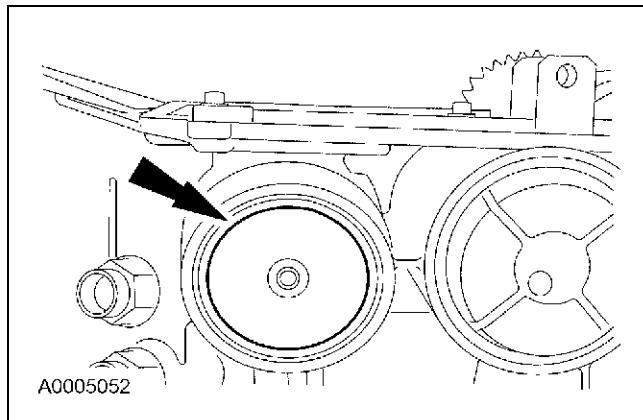


61. Install the Overdrive brake drum and coast clutch drum assembly.

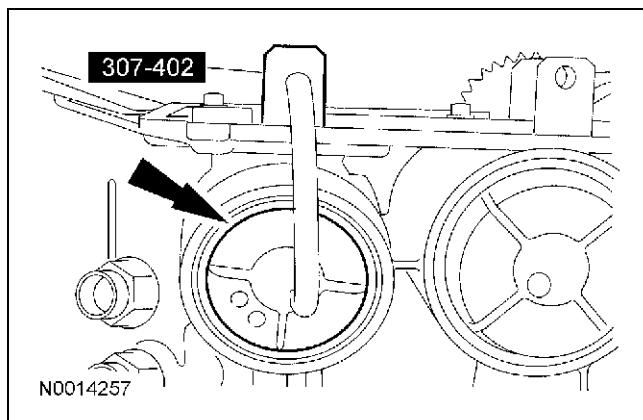


62. Install the Overdrive band servo piston and spring.

- Lubricate the servo bore with clean automatic transmission fluid.



63. Using the special tools, install the retaining ring.



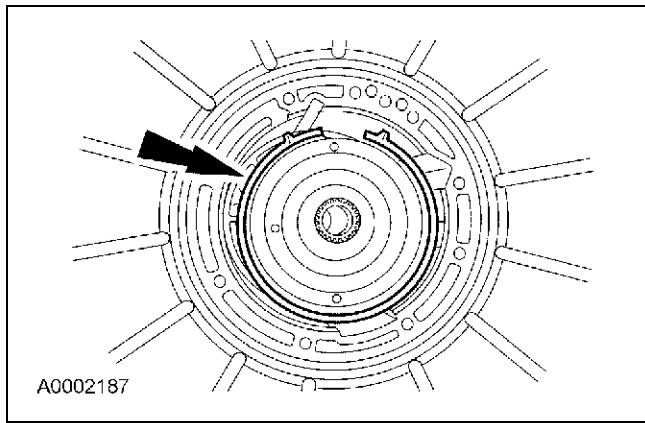
ASSEMBLY (Continued)

64. **NOTE:** If the Overdrive band is reused, it must be installed in the same position as when removed.

NOTE: Make sure that the Overdrive band apply strut is aligned with the band notch.

NOTE: The new Overdrive band is dark in color. This is a normal condition of the band. Hairline cracks in the band are also considered normal. Do not install a new band based solely on the color.

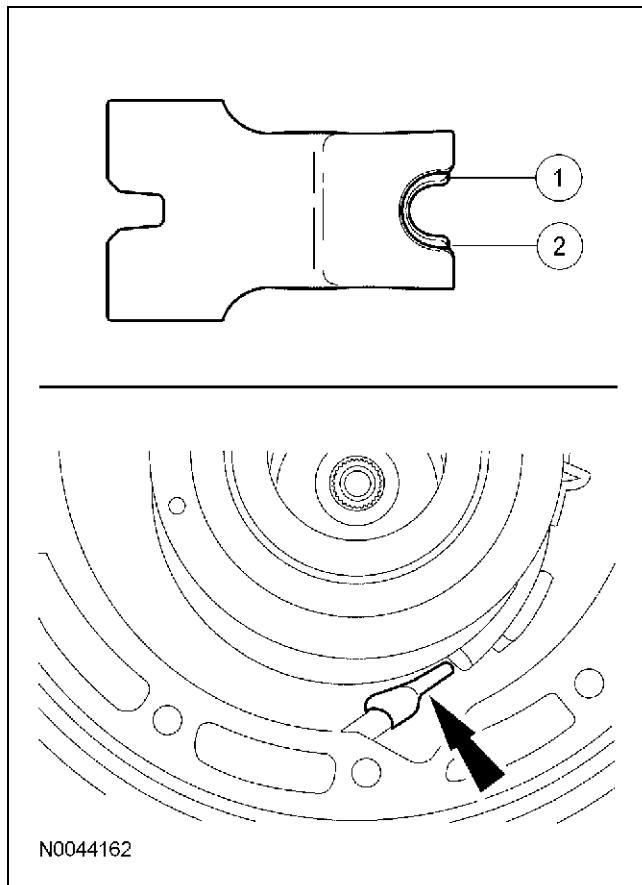
Install the Overdrive band.



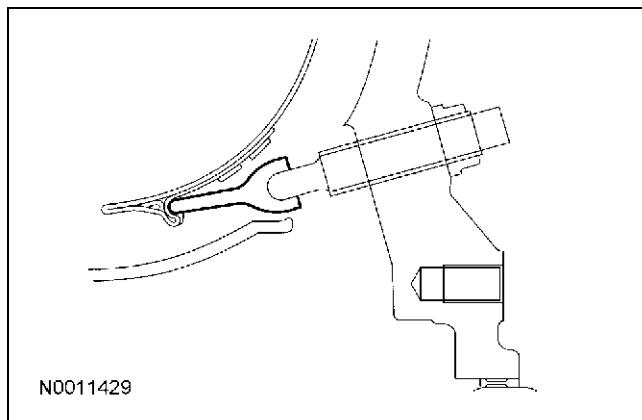
65. **⚠ CAUTION:** To avoid a “fall-out” condition of the strut from the screw during assembly and function, the small “U” shaped notch should be toward the band/case side and the large “U” shaped notch toward the main control side.

Install the Overdrive band anchor strut.

- 1 Band/case side of the anchor (small U notch).
- 2 Main control side of the anchor (large U notch).

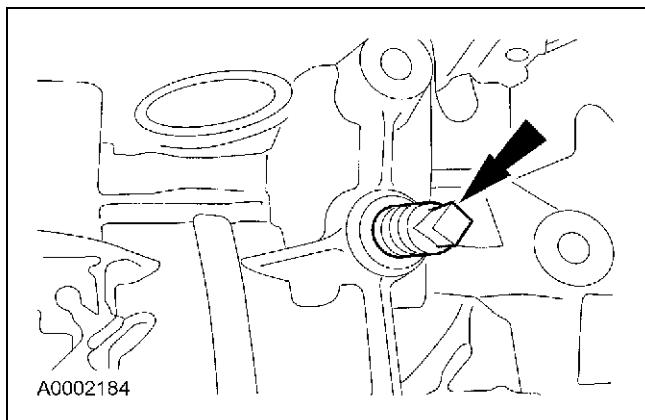


66. **⚠ CAUTION:** If the strut is installed incorrectly, transmission damage will occur. Check to make sure that the intermediate band anchor strut is installed in the correct orientation to the case and adjustment screw.

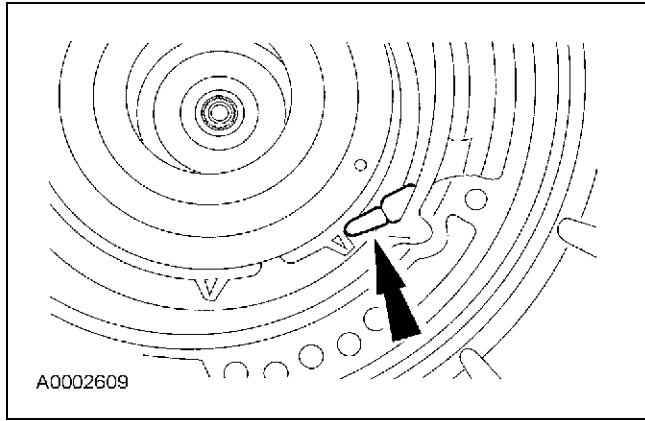


ASSEMBLY (Continued)

67. Loosely install the screw.

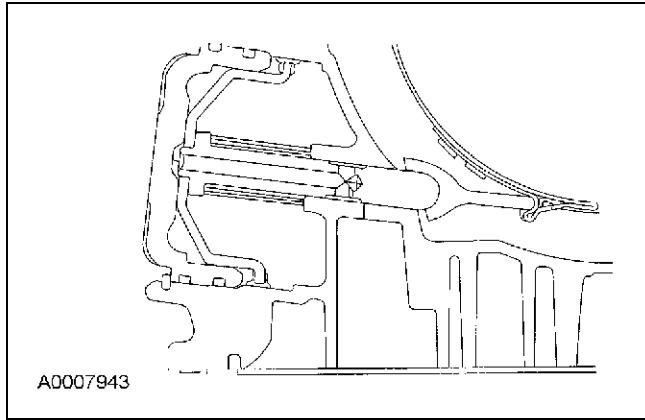


68. Install the Overdrive apply strut.



69. **⚠ CAUTION: If the strut is installed incorrectly, transmission damage will occur.**

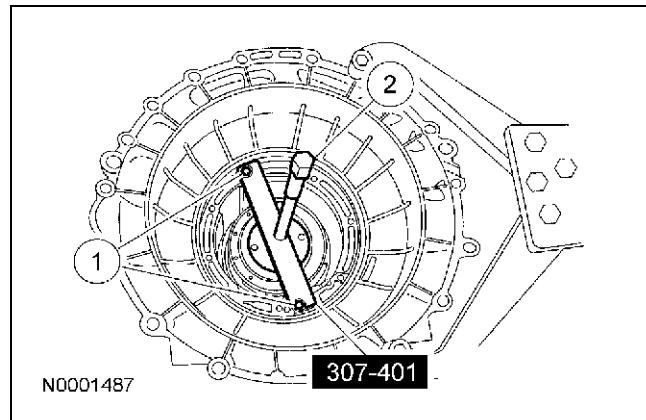
Check to make sure that the Overdrive band apply strut is installed in the correct orientation to the case and piston rod.



70. **⚠ CAUTION: The torque specifications are critical for this procedure. Failure to use the correct torque specifications may cause transmission damage.**

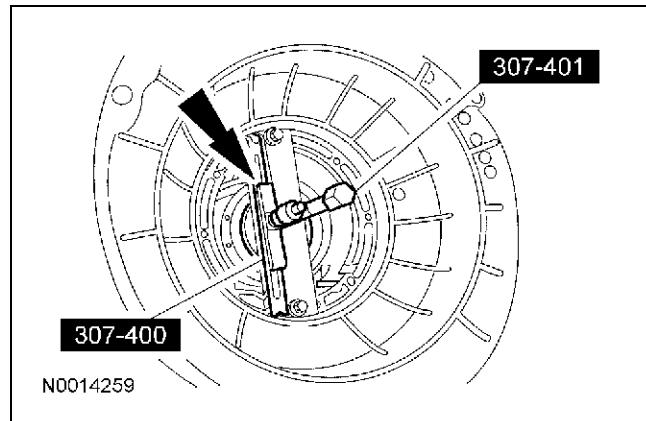
Install the special tool.

- 1 Install the special tool and the bolts using the 2 pump screw locations at approximately 6 and 12 o'clock positions.
 - Tighten to 15 Nm (11 lb-ft).
- 2 Tighten the center screw.
 - Tighten to 1 Nm (9 lb-in).



71. **NOTE: Align the disc holes on special tool with the slot in gauge bar for correct measurement.**

Measure the distance from the top of the gauge bar to the drum bearing surface through the hole in the disc and record as dimension A. Repeat the measurement 180 degrees on the opposite side of the special tool and record as dimension B.



72. Add dimension A to B, divide by 2, and record as dimension C.

ASSEMBLY (Continued)

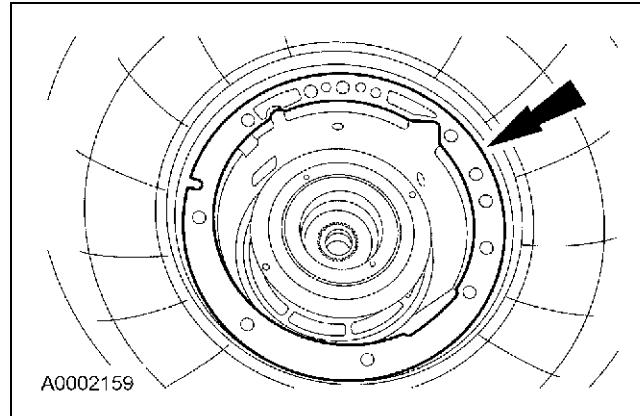
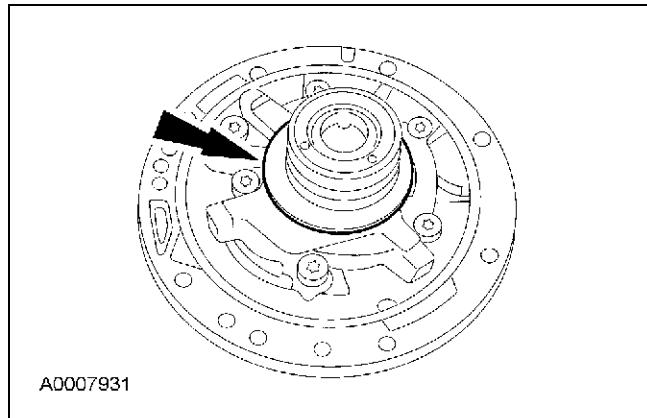
73. Subtract the thickness of the gauge bar 17.78 mm (0.70 in) from dimension C and record as dimension D.

74. Select the No. 1 thrust bearing from the following chart using dimension D.

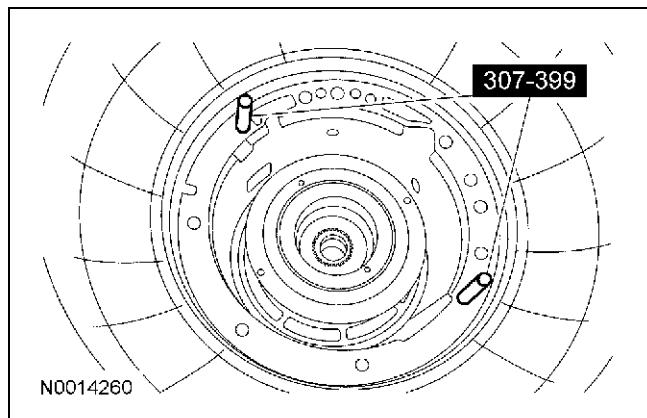
| Dimension D | Service Part Number (7D014) | Bearing Thickness | Identification (Color/ID) |
|---------------------------------|-----------------------------|-------------------------------|---------------------------|
| 38.05-38.13 mm (1.498-1.501 in) | F7TZ-TA | 1.55-1.60 mm (0.061-0.063 in) | White |
| 38.14-38.28 mm (1.50-1.51 in) | F7TZ-MA | 1.75-1.80 mm (0.069-0.071 in) | Green |
| 38.29-38.42 mm (1.507-1.513 in) | F7TZ-NA | 1.85-1.90 mm (0.073-0.075 in) | Red |
| 38.43-38.61 mm (1.51-1.52 in) | F7TZ-RA | 2.05-2.10 mm (0.081-0.083 in) | Black |
| 38.62-38.74 mm (1.52-1.53 in) | F7TZ-SA | 2.15-2.20 mm (0.095-0.097 in) | Yellow |

75. Install the selected No. 1 fluid pump input thrust washer.

- Coat the fluid pump input thrust washer with petroleum jelly.

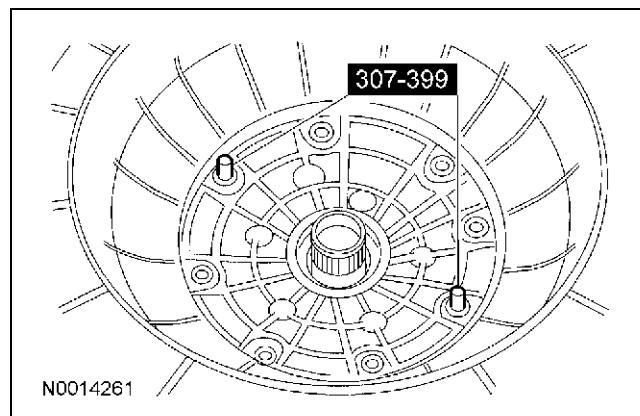


76. Install the special tools into the transmission case.



78. **CAUTION:** Make sure that the fluid pump inlet thrust washer (No. 1), selective thrust washer, fluid pump gasket and the fluid pump-to-case O-ring seal remain in the correct position throughout this step.

Install the fluid pump.

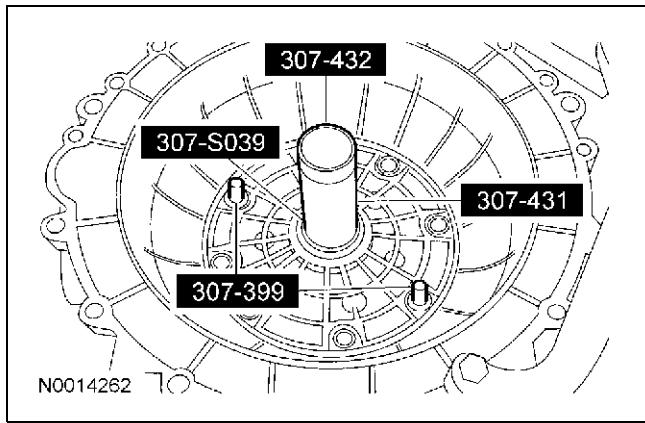


77. Install the pump gasket.

ASSEMBLY (Continued)

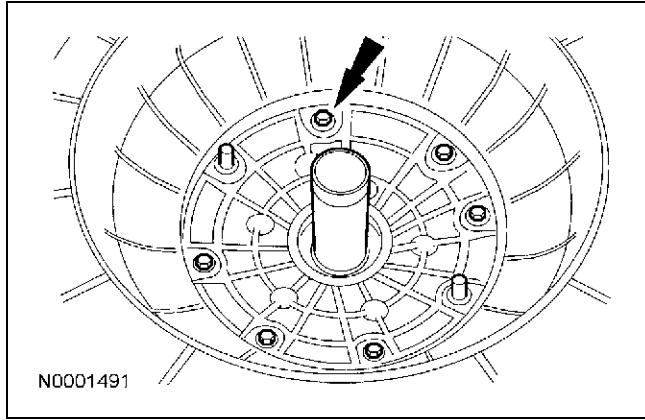
79. **⚠ CAUTION:** The special tools must be used to correctly align the pump with the adapter plate to reduce gear noise, bushing failure and leakage.

Using the special tool, align the fluid pump to the adapter plate.



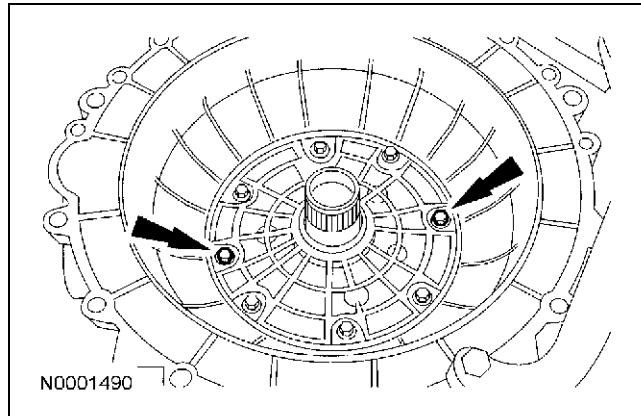
80. Install screws. Tighten the screws in a star pattern.

- Tighten to 25 Nm (18 lb-ft).



81. Remove the special tools and install the 2 remaining screws.

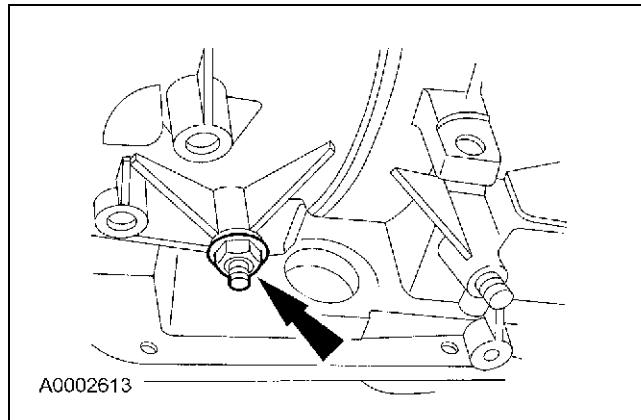
- Tighten to 25 Nm (18 lb-ft).



82. **⚠ CAUTION:** Do not allow Overdrive band adjustment screw to back out. Band strut could fall out of position.

⚠ CAUTION: Install, but do not tighten, a new locknut on the band adjustment screw. Apply petroleum jelly to the locknut seal.

Install a new locknut on the band adjustment screw.

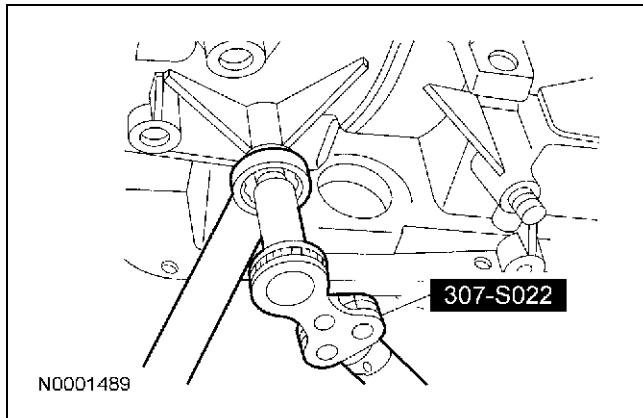


ASSEMBLY (Continued)

83. **⚠ CAUTION:** The Overdrive servo must be installed prior to band adjustment.

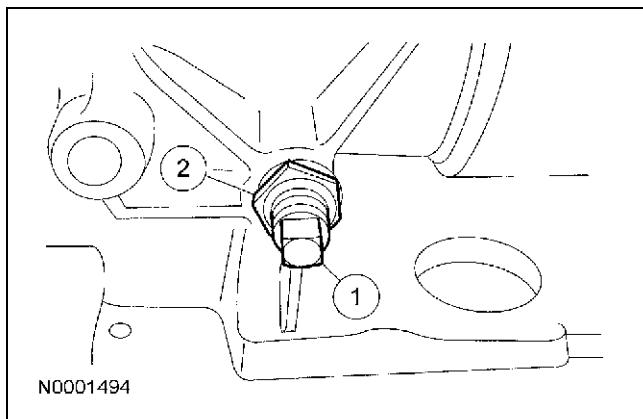
Using the special tool, tighten the Overdrive band adjustment screw.

- Tighten to 14 Nm (10 lb-ft).
- Then back off the screw exactly 1.5 turns and hold that position.



84. Tighten the Overdrive band locknut.

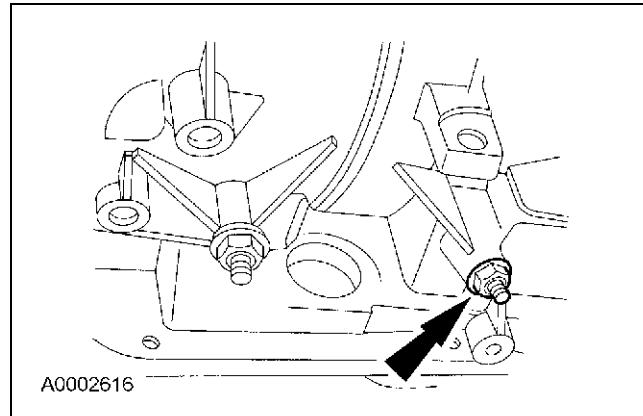
- 1 Hold the Overdrive band adjustment screw stationary.
 - 2 Tighten the Overdrive band locknut.
- Tighten to 54 Nm (40 lb-ft).



85. **⚠ CAUTION:** Do not allow the intermediate band adjusting screw to back out. Band strut could fall out of position.

⚠ CAUTION: Install, but do not tighten, a new locknut on the band adjustment screw. Apply petroleum jelly to the locknut seal.

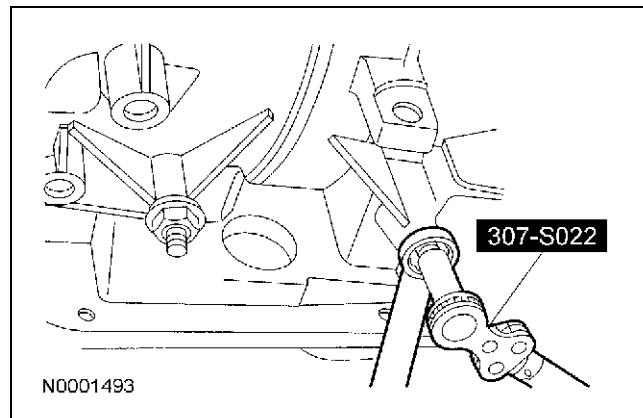
Install new nut on the band adjustment screw.



86. **⚠ CAUTION:** The intermediate servo must be installed prior to band adjustment.

Using the special tool, tighten the intermediate band adjustment screw.

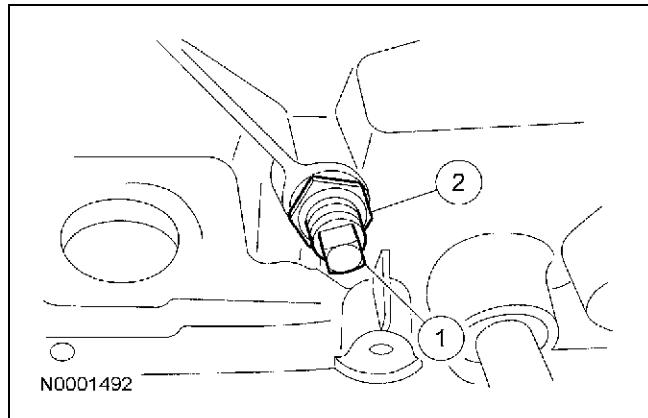
- Tighten to 14 Nm (10 lb-ft).
- Then back off the screw exactly 1.5 turns and hold that position.



ASSEMBLY (Continued)

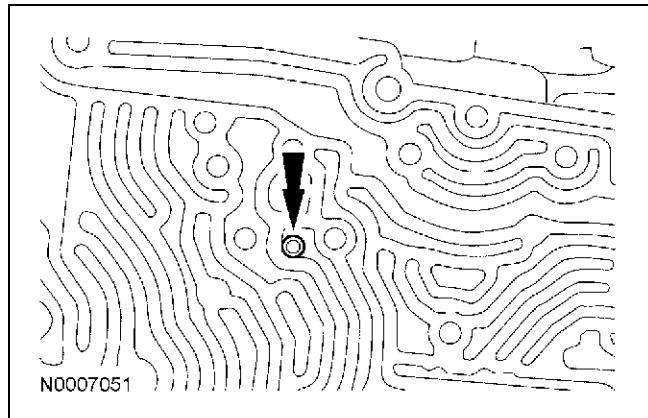
87. Tighten the intermediate band locknut.

- 1 Hold the intermediate band adjustment screw stationary.
- 2 Tighten the intermediate band locknut.
■ Tighten to 54 Nm (40 lb-ft).

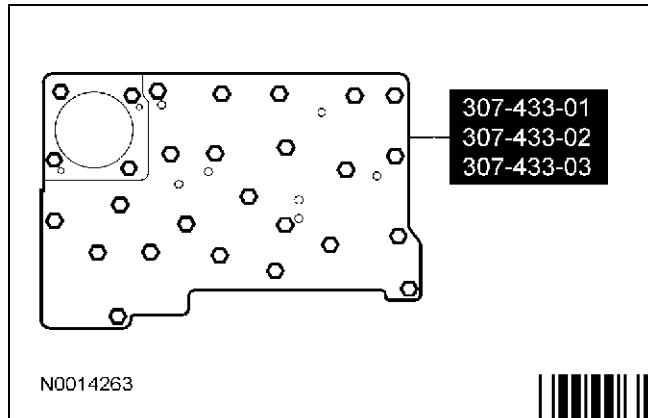


88. Tighten the center support screw.

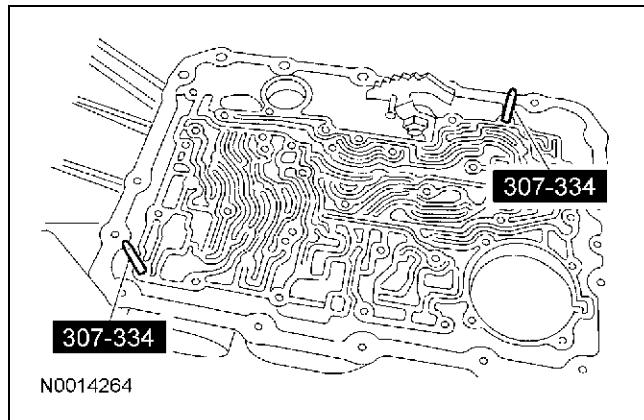
- Tighten to 11 Nm (8 lb-ft).



89. Using the special tools, carry out the air pressure test procedure. For additional information, refer to Special Testing Procedures in this section.

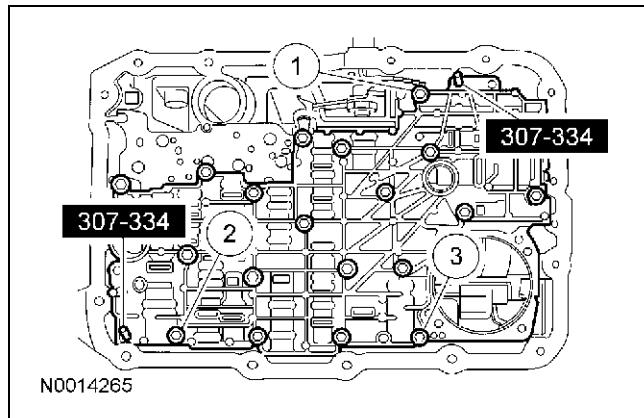


90. Install the special tools into the transmission case.

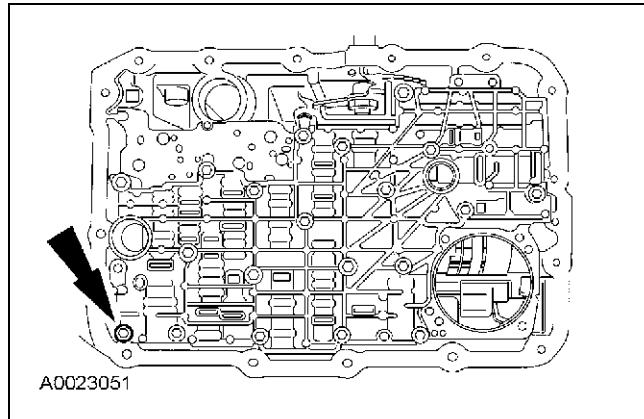


91. Using the special tools, install the main control valve body and loosely install the screws.

- 1 Install the short screw.
- 2 Install the screw with the larger head.
- 3 Install the remaining screws.



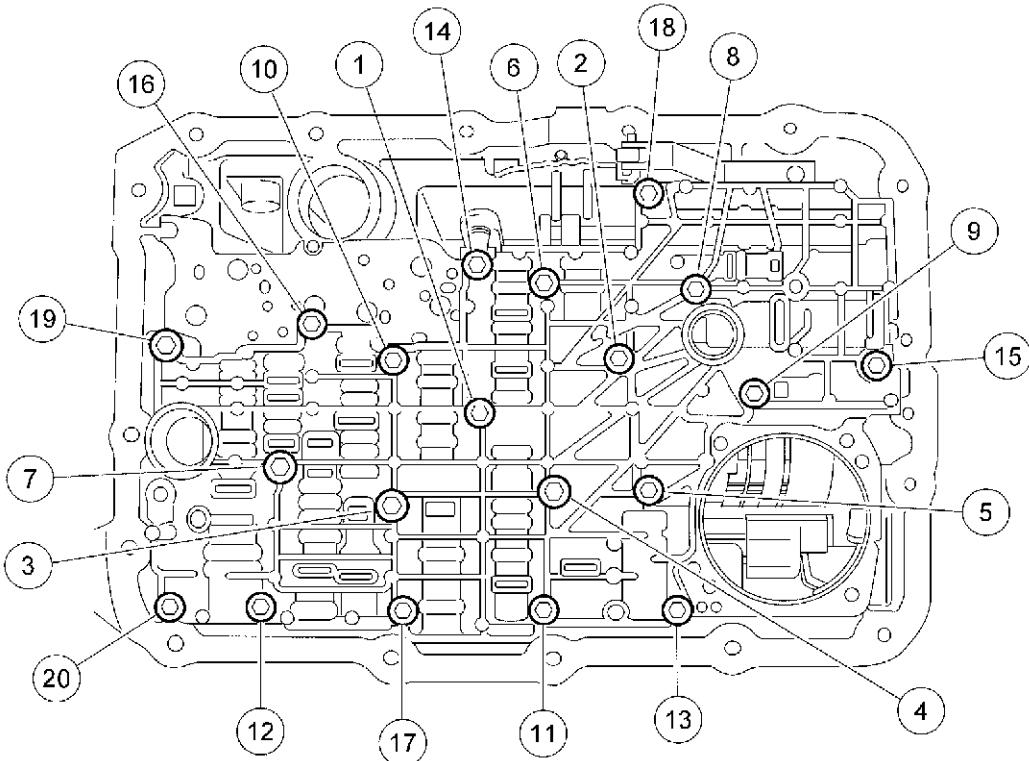
92. Remove the special tools, and loosely install the screw.



ASSEMBLY (Continued)

93. Tighten the screws in the sequence shown.

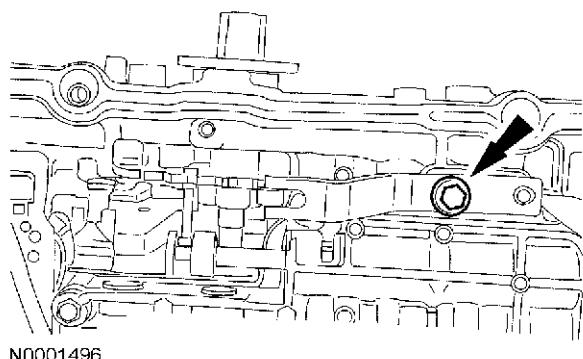
- Tighten to 10 Nm (89 lb-in).



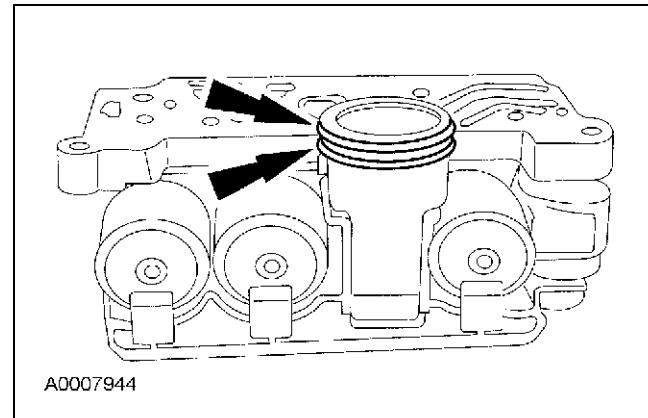
N0014183

94. With the manual lever in the NEUTRAL position, install the manual valve detent spring.
• Tighten to 10 Nm (89 lb-in).

95. Install new O-ring seals on the solenoid body connector. Lubricate the O-ring seals with clean automatic transmission fluid.



N0001496



A0007944

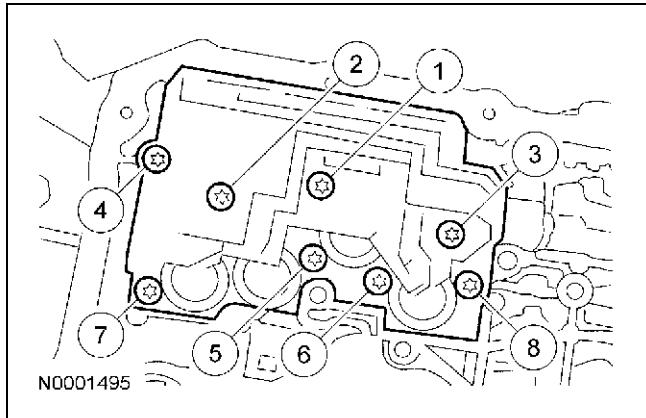


ASSEMBLY (Continued)

96. **⚠ CAUTION:** Inspect the transmission case bore to make sure it is free of foreign material and not damaged. If damaged, transmission leak may occur.

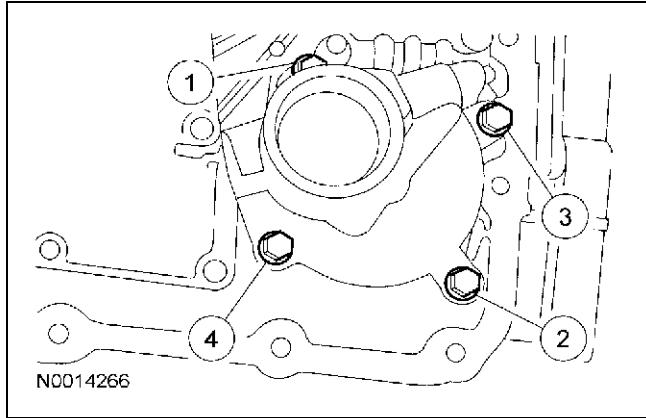
Install the solenoid body. Tighten the screws in sequence shown.

- Tighten to 8 Nm (71 lb-in).



97. Install the reverse servo. Tighten the bolts in the sequence shown in 2 stages.

- Stage 1: Tighten to 5 Nm (44 lb-in).
- Stage 2: Tighten to 11 Nm (8 lb-ft).

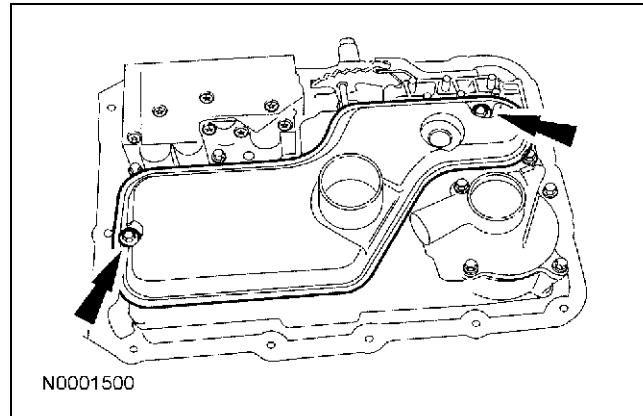


98. **⚠ CAUTION:** Lubricate the fluid filter seals with clean automatic transmission fluid or they may be damaged.

NOTE: Make sure that the fluid filter seals are correctly seated on the filter.

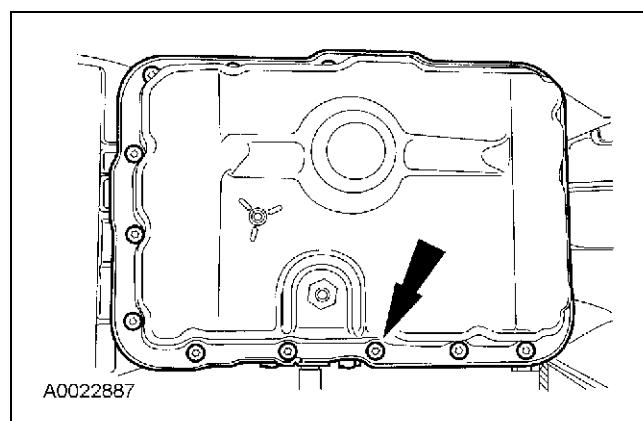
Lubricate the seals and install the transmission fluid filter.

- Tighten to 10 Nm (89 lb-in).



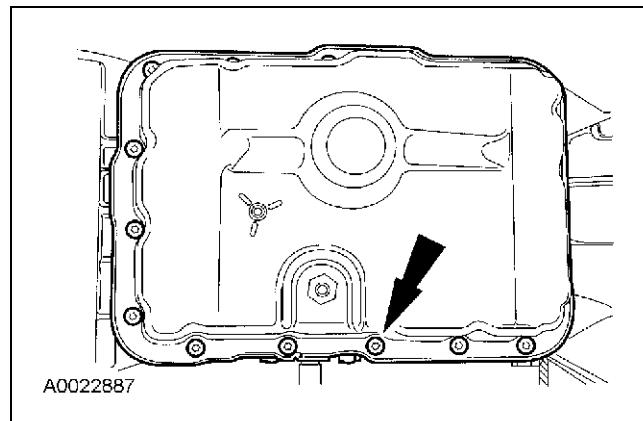
99. **NOTE:** The transmission fluid pan gasket is reusable. Clean and inspect for damage. If not damaged, the gasket should be reused.

Install the transmission fluid pan and gasket and loosely install the screws.



100. Tighten the 16 screws in a crisscross sequence.

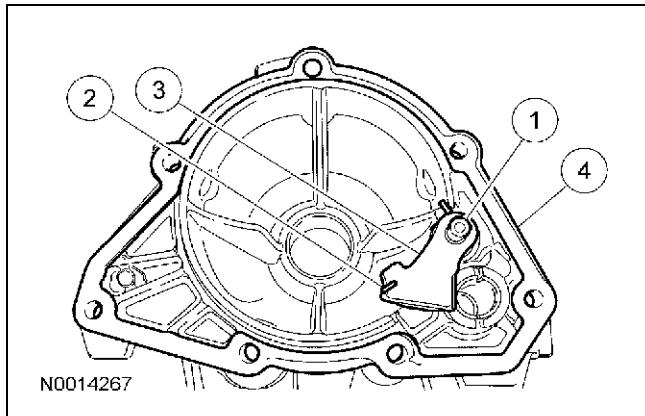
- Tighten to 11 Nm (8 lb-ft).



ASSEMBLY (Continued)

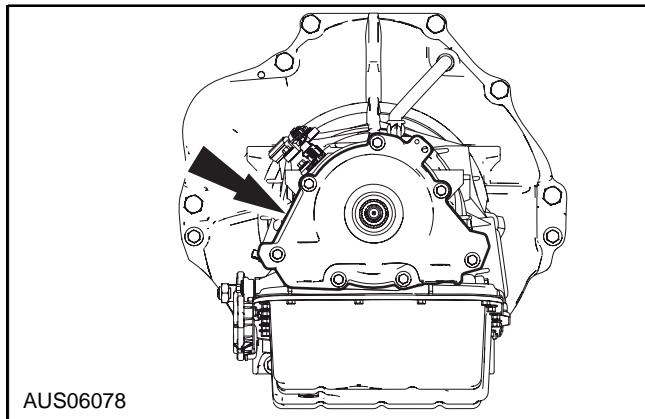
101. Install the parking pawl assembly and gasket.

- 1 Install the parking pawl shaft.
- 2 Install the parking pawl return spring.
- 3 Install the parking pawl.
- 4 Install a new gasket.

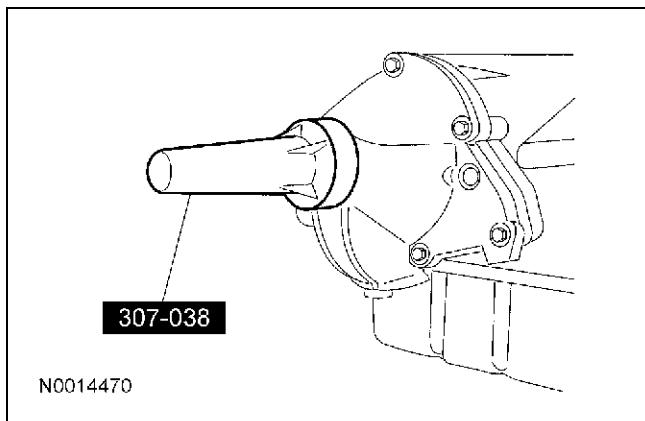


102. Install the extension housing.

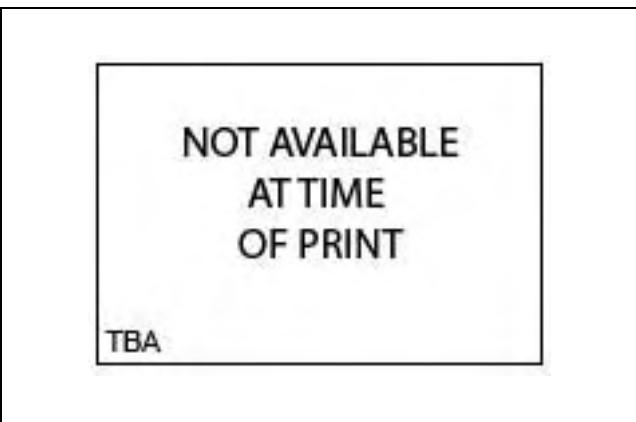
- Tighten to 30 Nm (22 lb-ft).



103. Using the special tool, install the extension housing seal.

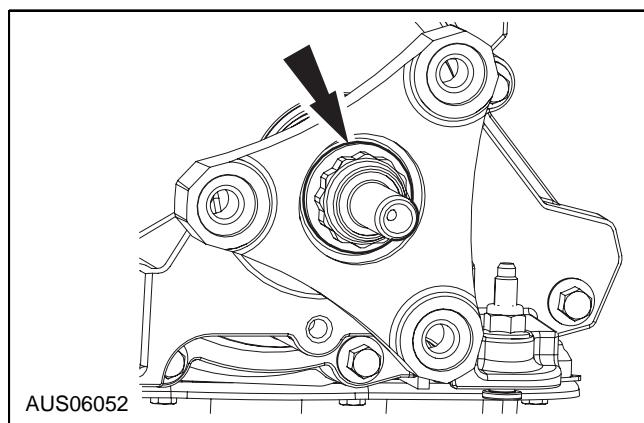


104. Using the special tools, install the output shaft flange.



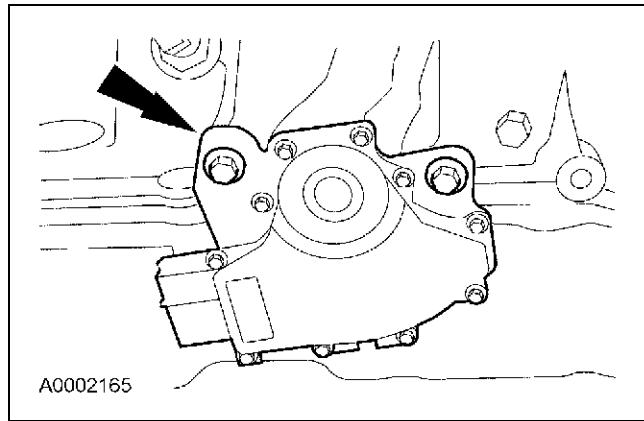
105. Install a new nut.

- Tighten to 131 Nm (97 lb-ft).



106. **CAUTION:** The digital TR sensor must fit flush against the boss on the case to prevent damage to the sensor.

Install the digital TR sensor and loosely install the screws.



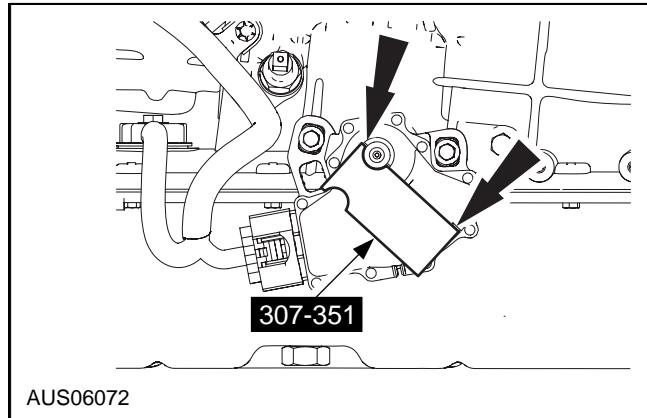
ASSEMBLY (Continued)

107. **⚠ CAUTION:** Tightening one screw before tightening the other may cause the sensor to bind or become damaged.

NOTE: The manual lever must be in the NEUTRAL position.

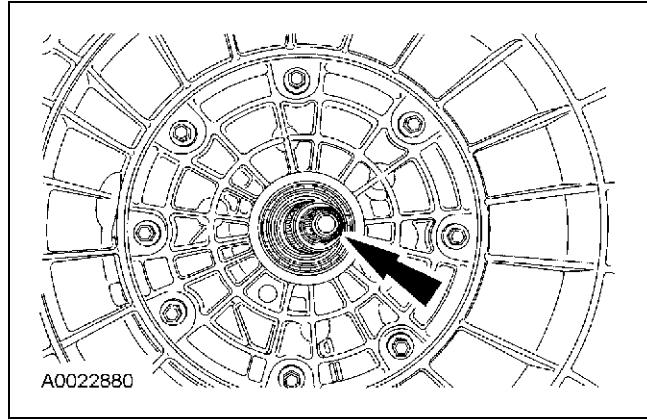
Using the special tool, align the digital TR sensor and tighten the screws in an alternating sequence.

- Tighten 8 Nm (71 lb-in).

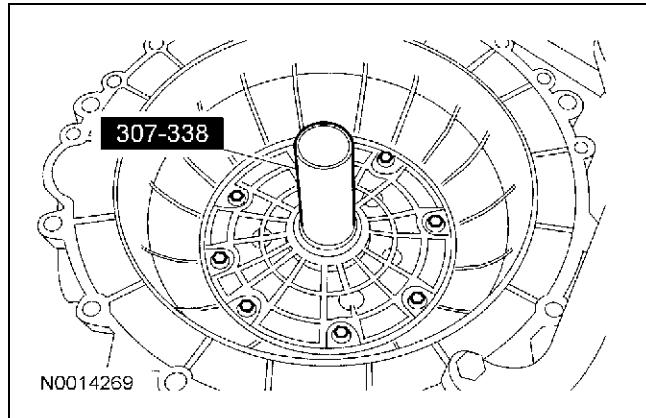


108. **⚠ CAUTION:** The splines of the input shaft are not the same length on both ends. The shaft end with the shorter splines goes into the fluid pump.

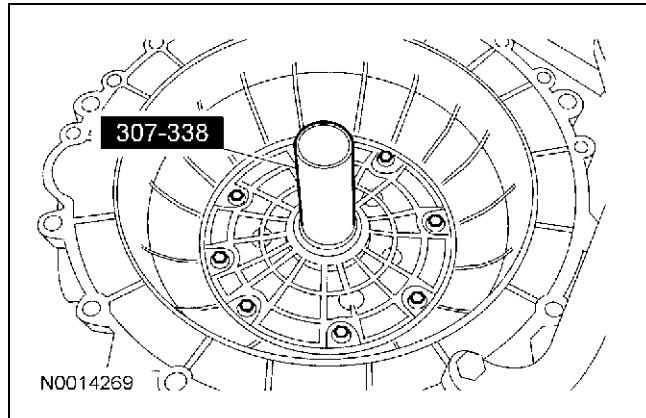
Install the input shaft.



109. Using the special tool, make sure that the fluid pump gear seal ring is fully seated.



110. Remove the special tool.



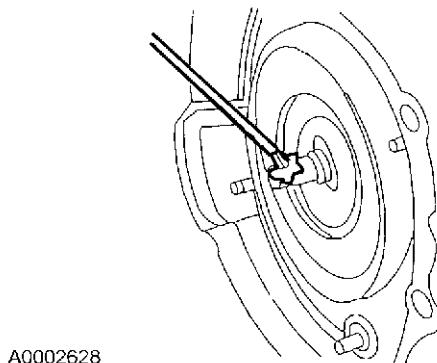
ASSEMBLY (Continued)

111.  **CAUTION:** Do not damage the fluid pump gear O-ring seal when installing torque converter.

 **CAUTION:** Make sure the converter hub is fully engaged in the pump support and gear and rotates freely. Do not damage the hub seal.

 **CAUTION:** If the torque converter slides out, the hub seal may be damaged.

Lubricate the converter hub with clean automatic transmission fluid.



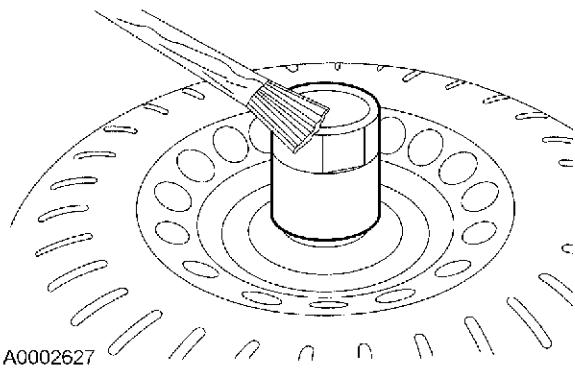
114.  **CAUTION:** The special tool must be used to correctly align the adapter plate to the converter or transmission damage could occur.

In order to correctly install the special service tool, it must be installed using 1 round and 1 oblong hole. Using 2 oblong holes will cause damage to the transmission.

NOTE: Position the adapter plate on the torque converter and identify the position of the orange or green paint daub on the converter face.

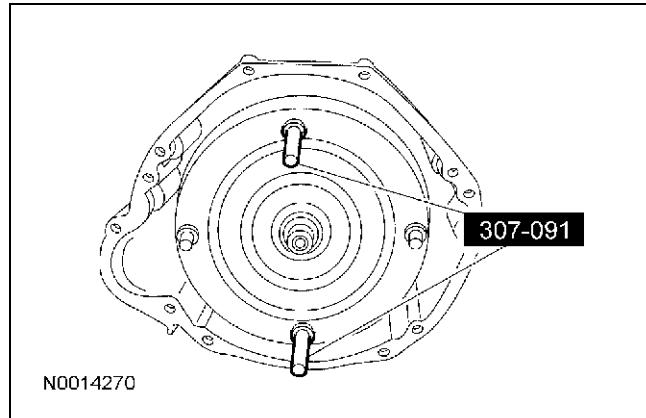
If the vehicle is equipped, use the special tool to install the torque converter flex plate adapter assembly and 8 nuts.

- Tighten to 40 Nm (30 lb-ft).

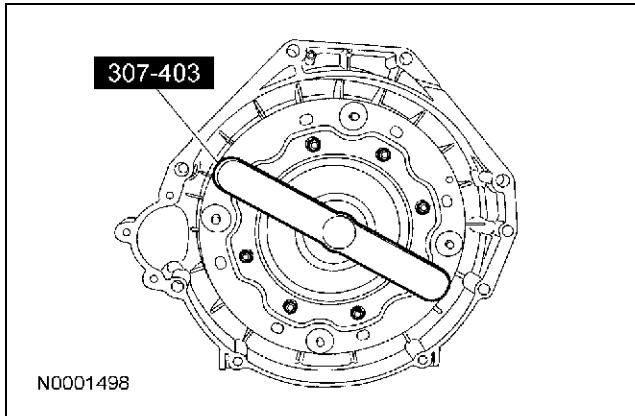


112.  **WARNING:** The torque converter can fall out if the transmission is tipped. Failure to follow these instructions may cause personal injury.

Using the special tools, install the torque converter by pushing and rotating.

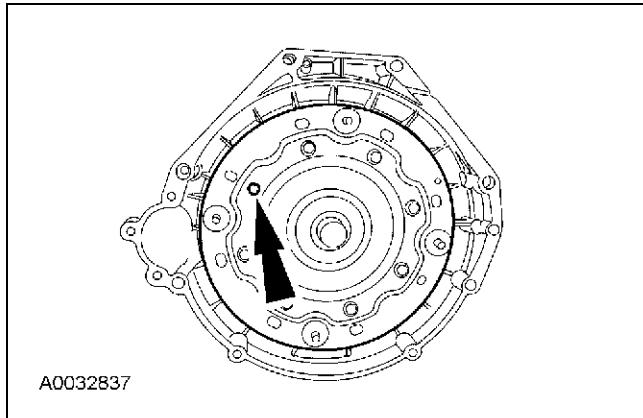


113. Lubricate the torque converter pilot hub with multi-purpose grease.

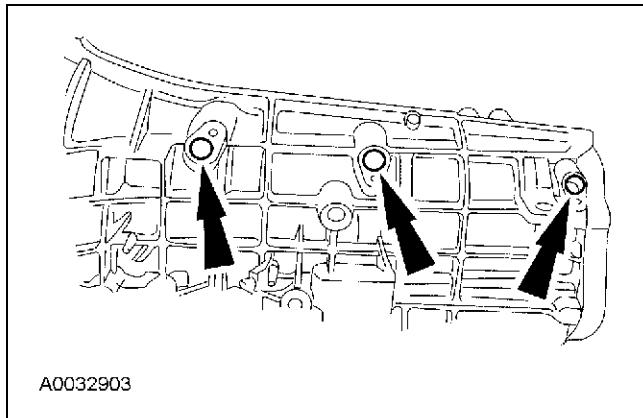


ASSEMBLY (Continued)

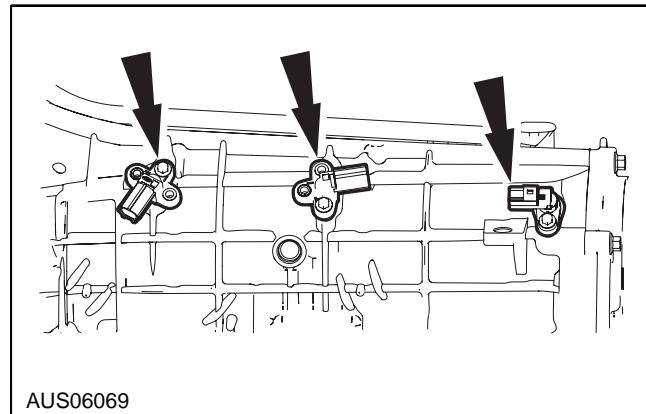
115. Remove the special tool and install the remaining torque converter flex plate adapter nuts.
- Tighten to 40 Nm (30 lb-ft).



116. Using one of the speed sensor holes, fill the transmission with 8.5L (9 qts) of automatic transmission fluid.



117. **NOTE:** Inspect O-ring seals for damage. Install new O-ring seals if damaged. Lubricate the O-ring seals with petroleum jelly to prevent damage to the O-ring seals.
- Install the sensors.
- Tighten to 14 Nm (10 lb-ft).



INSTALLATION

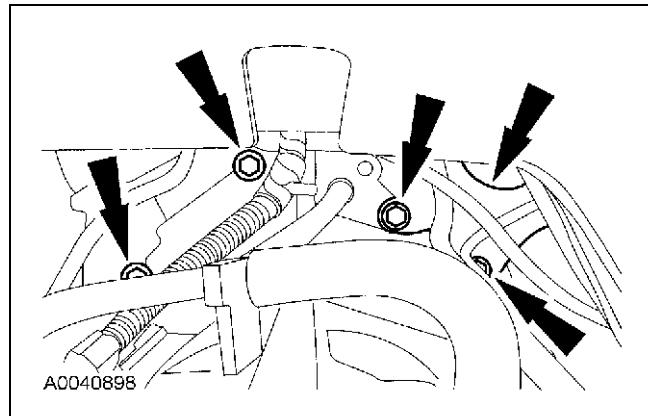
Transmission

All vehicles

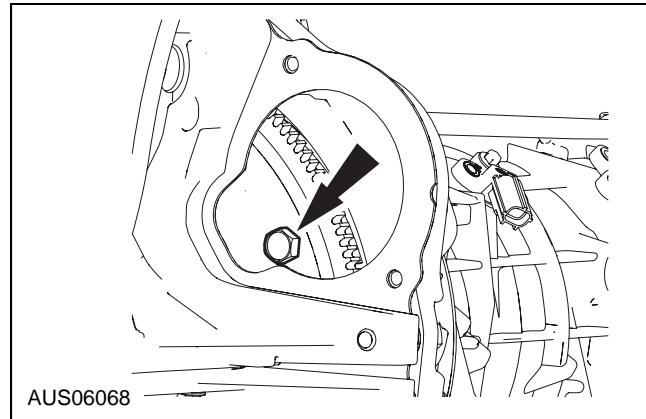
- ⚠️ WARNING:** Secure the assembly to the jack. Avoid any obstructions while lowering and raising the jack. Contact with obstructions may cause the assembly to fall off the jack, which may result in serious personal injury.

Secure the transmission to the transmission jack with a safety chain.

- Rotate the torque converter and adapter plate so the orange or green paint daub on the torque converter is in the 12 o'clock location.
- Raise and position the transmission to the back of the engine.
- Install the 13 engine-to-transmission retaining bolts.
 - Tighten to 48 Nm (35 lb-ft).

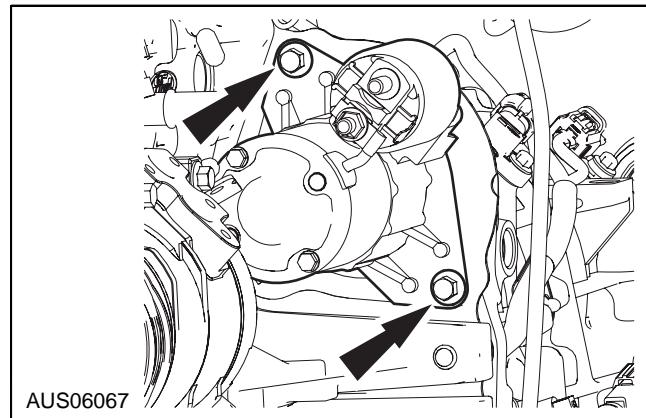


- Install the 4 new torque converter nuts.
 - Tighten to 44 Nm (32 lb-ft).

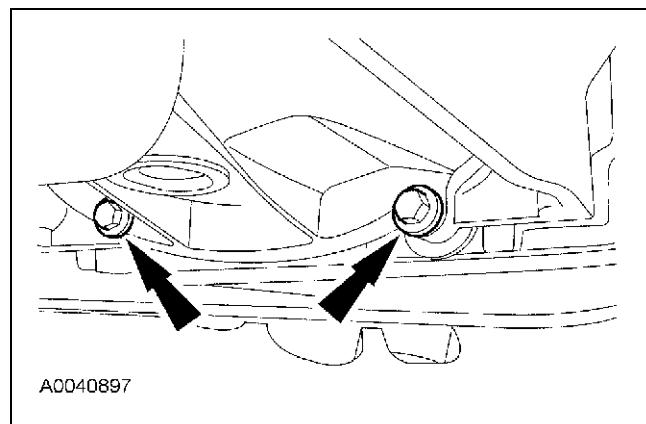


NOTE: Clean the starter motor mounting flange and mating surface of the starter motor to make sure there is a correct ground connection.

- Install the starter motor.
 - Tighten to 25 Nm (18 lb-ft).



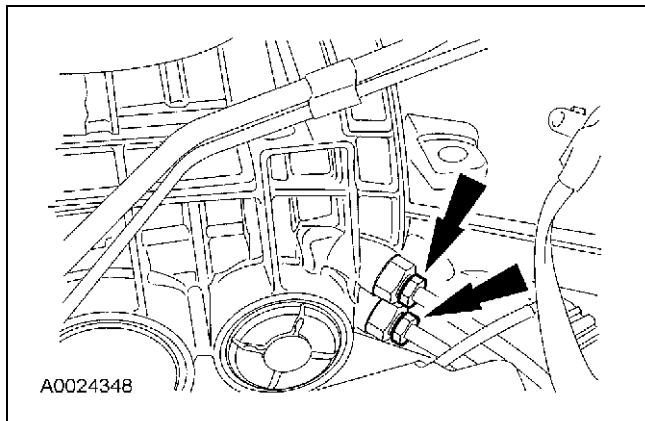
- Install the lower transmission retaining bolts.
 - Tighten to 48 Nm (35 lb-ft).



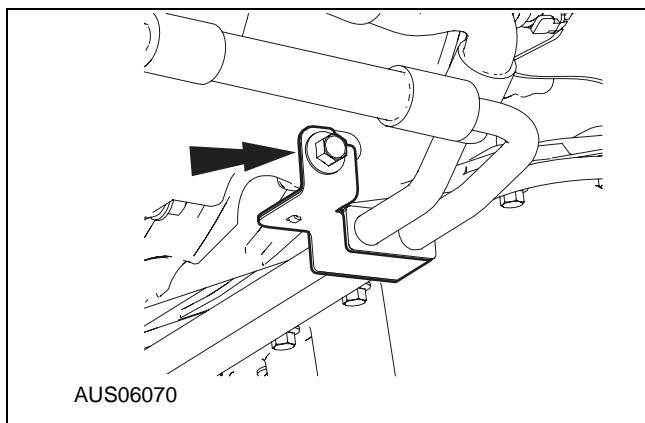
INSTALLATION (Continued)

⚠ CAUTION: Use care not to bend or force the cooler tubes, otherwise, damage to the cooler tubes and the transmission may result.

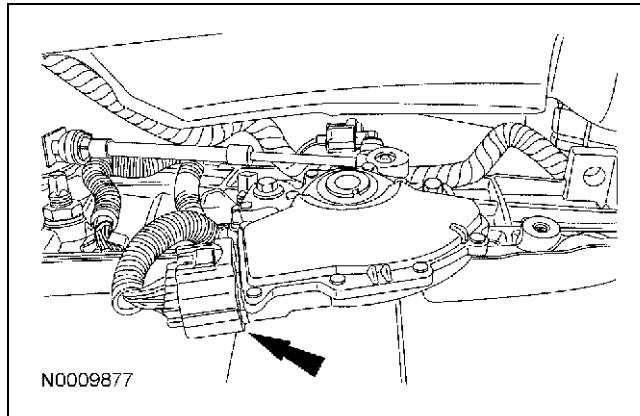
8. Install the transmission fluid cooler tubes.
 - Tighten to 40 Nm (30 lb-ft).



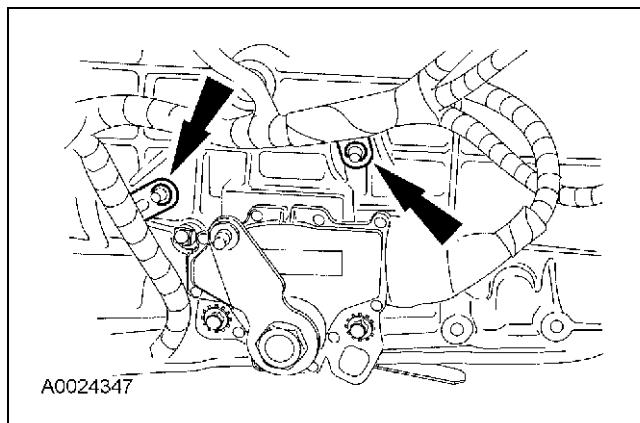
9. Install the transmission cooler tube bracket and nut.
 - Tighten to 25 Nm (18 lb-ft).



10. Connect the digital transmission range (TR) sensor connector.



11. Position the wire harness and install the retainers.



⚠ CAUTION: Damage will occur to the solenoid body assembly if the screw is tightened above the specification.

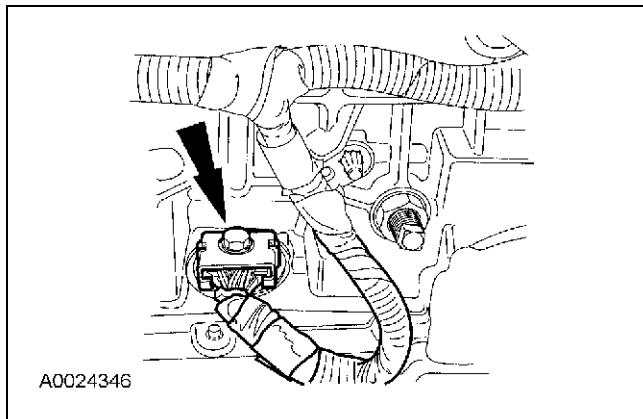
NOTE: Always install new O-ring seals on the vehicle harness connector.

NOTE: Clean the area around the connector to prevent contamination of the solenoid body connector.

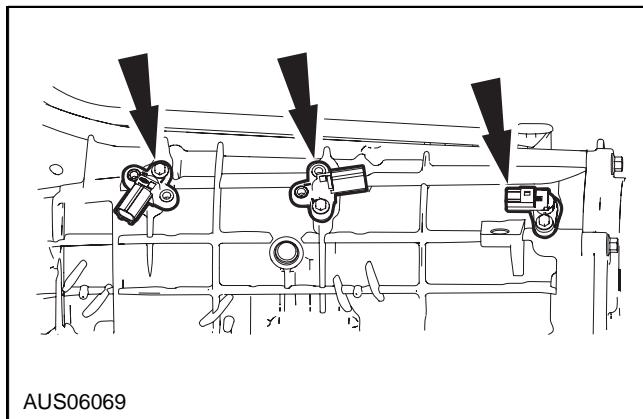
NOTE: Use petroleum jelly to lubricate the O-ring seals to aid in the installation process.

12. Install and lubricate new O-ring seals on the transmission connector and connect the connector.
 - Tighten to 5 Nm (44 lb-in).

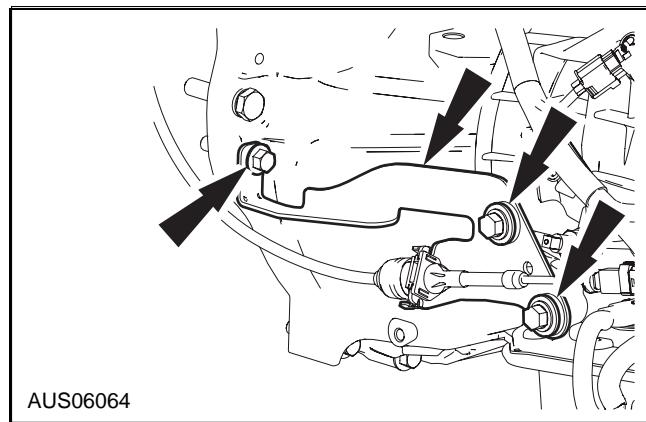


INSTALLATION (Continued)

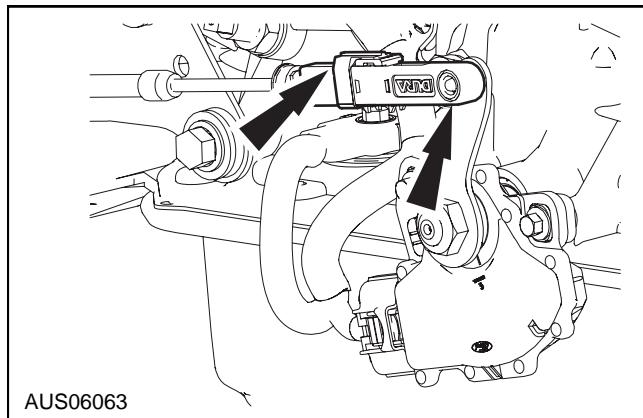
13. Connect the turbine shaft speed (TSS) sensor, output shaft speed (OSS) sensor and intermediate shaft speed sensor electrical connectors.



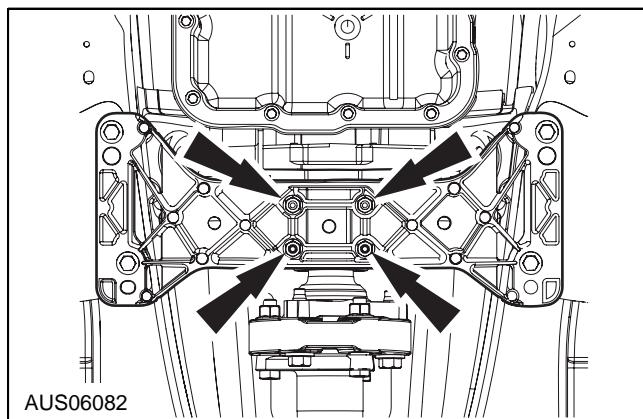
14. Install the selector lever cable bracket and install the 2 bolts.
• Tighten to 28 Nm (21 lb-ft).



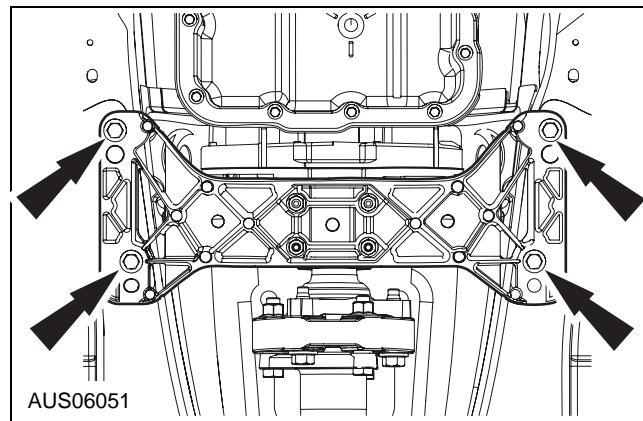
15. Install the selector lever cable eyelet onto the transmission manual lever.



16. Install the transmission insulator-to-extension housing bolts.



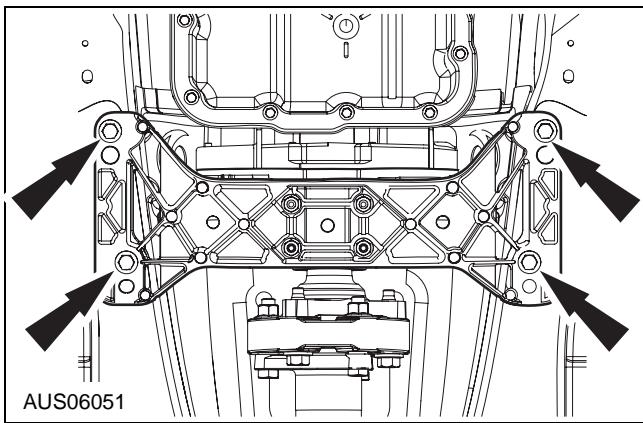
17. Position the transmission crossmember in the vehicle and loosely install the transmission crossmember-to-floor pan bolts.



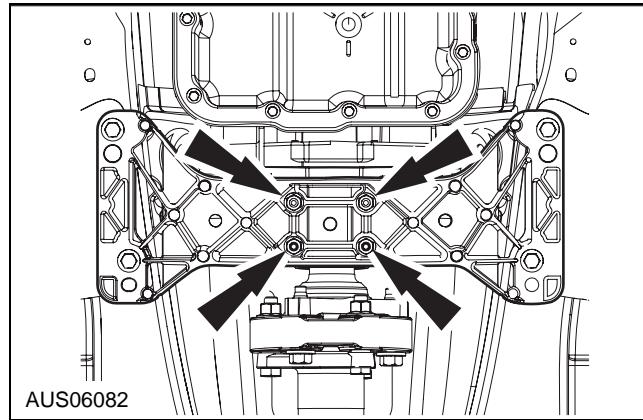
INSTALLATION (Continued)

NOTE: the transmission support insulator must be neutralized.

18. Slide the transmission support insulator forward, rearward and side-to-side until the gaps between the transmission support insulator rubber and crossmember are equal.
19. With the transmission support insulator neutralized, tighten the transmission crossmember-to-floor pan bolts.
 - Tighten to 63 Nm (46 lb-ft).



20. With the transmission support insulator neutralized, tighten the transmission insulator-to-extension housing bolts.
 - Tighten to 70 Nm (52 lb-ft).



21. Install the driveshaft. For additional information, refer to Section 205-01.
22. Install the catalytic converter. For additional information, refer to Section 309-00.

23. Use the following guidelines for installing the in-line transmission fluid filter:
 - If the transmission was overhauled and the vehicle was equipped with an in-line fluid filter, install a new in-line fluid filter.
 - If the transmission was overhauled and the vehicle was not equipped with an in-line fluid filter, install a new in-line fluid filter kit.
 - If the transmission is being installed for a non-internal repair, do not install an in-line filter or filter kit.
 - If installing a new or a Ford-authorised remanufactured transmission, install the in-line transmission fluid filter that is supplied.
 - Prior to lowering the vehicle, install a new in-line transmission filter or a filter kit. For additional information, refer to Transmission Filter - In-Line in this section.

NOTE: When the battery has been disconnected and reconnected, some abnormal drive symptoms can occur while the vehicle relearns its adaptive strategy. The customer needs to be notified that they can experience slightly different upshifts (either soft or firm) and that this is a temporary condition and will eventually return to normal operating conditions.

24. Connect the battery ground cable. For additional information, refer to Section 414-01.
25. Carry out the fluid level check. For additional information, refer to Transmission Fluid Level Check in this section.
26. Verify that the shift cable is correctly adjusted. For additional information, refer to Section 307-05.
27. Check the operation of the transmission and inspect for leaks.

