FORD MOTOR CO. 4F20E

INDEX

AUTOMATIC TRANSMISSION SERVICE GROUP
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INTRODUCTION
FORD 4F20E

The 4F20E electronically controlled automatic transaxle features a combination of electronic and mechanical systems to control forward gear shifting torque converter lock-up for quietness and economy and self diagnosis capability for simplifying trouble shooting procedures.

The electronic system controls the tranxaxle shifting in forward speeds and controls torque converter lock-up by means of solenoid actuated valves. These shift solenoid valves, when activated apply the friction elements (clutches and bands) to control shifting in the planetary gear. The shift timing and lock-up events are regulated by the TCM in programmed logic and in response to input sensors and switches to produce optimum performance.

We wish to thank Ford Motor Company for the information and illustrations that have made this booklet possible.

The information and part numbers contained in this booklet have been carefully compiled from industry sources known for their reliability, but ATSG does not guarantee its accuracy.

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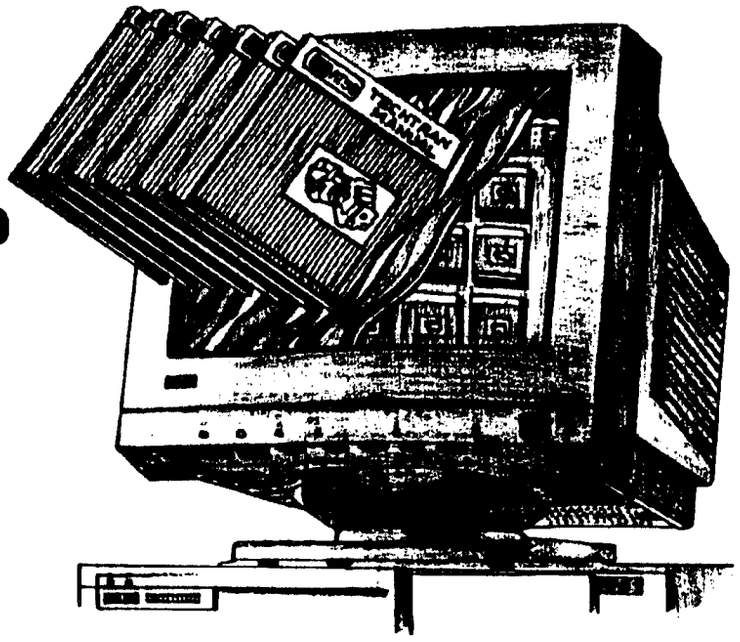
Another First ...



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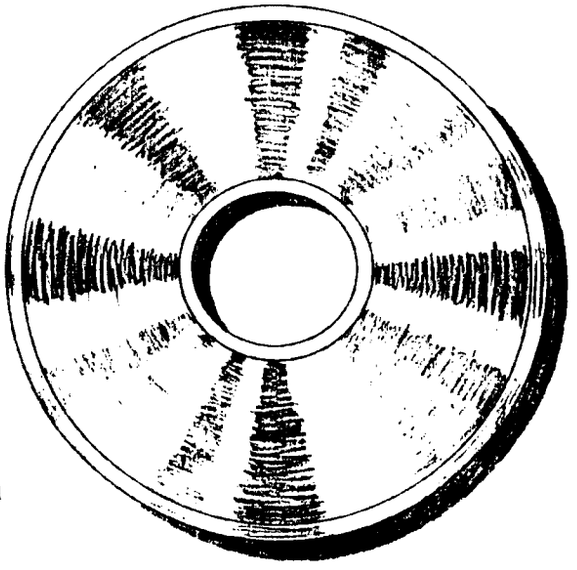

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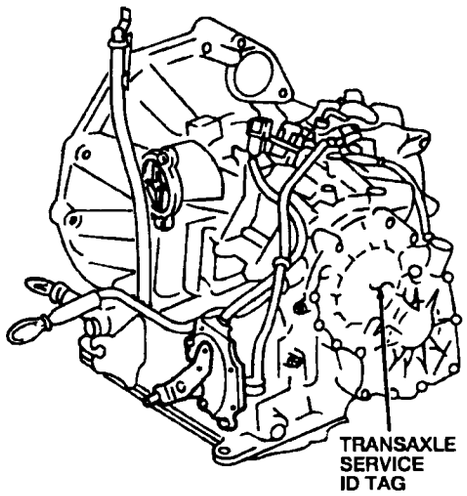
VEHICLE APPLICATION

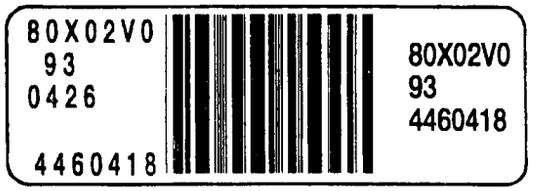
Villager

Transaxle Identification

For transaxle identification and serial number, refer to the transaxle service ID tag which is attached to the transaxle side cover.



Typical Transaxle Service ID Tag



Item	Part Number	Description
1	—	3-4 Clutch
2	—	Reverse Clutch
3	7D034	2-4 Band
4	7A103	Oil Pump Assembly
5	7005	Torque Converter Housing
6	7902	Torque Converter
7	—	Input Shaft (Part of 7F207)
8	4204	Differential Case
9	7F343	Final Drive Ring Gear
10	7F342	Reduction Gear
11	7A089	Forward One-Way Clutch (Sprag)
12	7F475	Idler Gear

Shift Control Selector Lever and Shift Patterns

The shift control selector lever has six positions, and appear as follows: P, R, N, D, 2, and 1.

These positions are:

- PARK
- REVERSE
- NEUTRAL
- DRIVE
- SECOND
- FIRST (Manual Low)

Additionally, an Overdrive control (O/D control) switch allows overdrive to be cancelled.

Park

There is no powerflow through the transaxle in PARK. The parking pawl (7A441) locks the output shaft (7060) to the transaxle case to prevent the vehicle from rolling. However, for safety reasons, the parking brake should also be used when the vehicle is parked and not in use. The engine (6007) can be started in the park range. In addition, PARK must be selected before the ignition key can be removed.

Reverse

The reverse gear enables the vehicle to be operated in a rearward direction, at a reduced ratio. There is engine braking in REVERSE.

Neutral

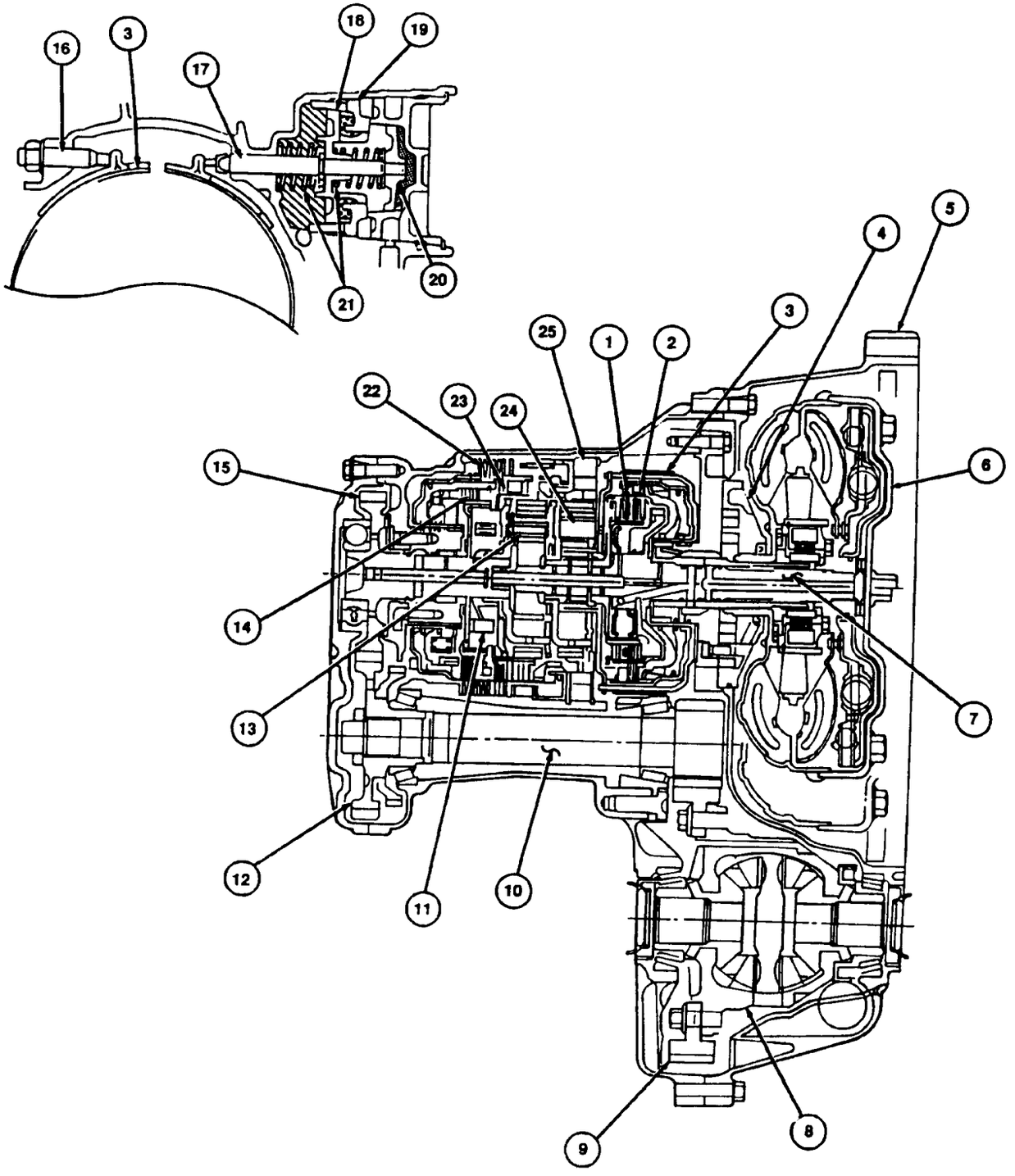
There is no powerflow through the transaxle in NEUTRAL. However, the vehicle's wheels are free to move because the output shaft is not held by the parking pawl. The engine may be started in NEUTRAL, but the ignition key cannot be removed while the vehicle is in this range.

Overdrive

Refer to Drive for overdrive information.

Item	Part Number	Description
13	7D006	Rear Planet
14	—	Coasting Clutch
15	—	Output Gear
16	7C492	2-4 Band Adjusting Stop
17	7D190	2-4 Servo Piston Stem
18	7D022	2-4 Servo Band Piston
19	7G278	2-4 Servo Piston Retainer
20	7F200	2-4 Servo Piston
21	7F201	2-4 Servo Piston Return Spring
22	—	Low/Reverse Clutch
23	—	Forward Clutch
24	7A398	Front Planet
25	7A089	Low One-Way Clutch (Roller)

4F20E - Cutaway



DESCRIPTION AND OPERATION

Forward Clutch

The forward clutch is applied in all forward gears. The forward clutch connects the front planet (7A398) to the ring gear through the forward one-way clutch (sprag).

Coasting Clutch

The coasting clutch is applied in all forward gears only when the Overdrive control (O/D control) switch is OFF. The coasting clutch connects the front planet to the ring gear bypassing the forward one-way clutch (sprag). The coasting clutch allows for engine braking upon deceleration.

Forward One-Way Clutch (Sprag)

The forward one-way clutch (sprag) is engaged in all forward gears during acceleration. The forward one-way (sprag) overruns during deceleration. The forward one-way clutch (sprag) connects the forward clutch to the front planet during acceleration.

2-4 Band

The 2-4 band is applied by the 2-4 servo in second and fourth gears. In third gear, the second gear apply pressure is overcome by the third gear release pressure in the 2-4 servo. The 2-4 band holds the primary sun gear (7A399) stationary by locking it to the transaxle case.

Low One-Way Clutch (Roller)

The low one-way clutch (roller) is engaged in first gear, with the exception of manual low. In manual low, the low one-way clutch (roller) is locked out by the application of the low/reverse clutch. The low one-way clutch (roller) prevents the front planet from rotating counterclockwise. The low one-way clutch (roller) overruns during deceleration in first gear, with the exception of manual low.

Low/Reverse Clutch

The low/reverse clutch is applied in manual low and reverse gears only. The low/reverse clutch holds the front planet stationary by locking it to the transaxle case.

3-4 Clutch

The 3-4 clutch is applied in third and fourth (overdrive) gears only. The 3-4 clutch drives the front planet directly from the input shaft.

Reverse Clutch

The reverse clutch is applied in REVERSE only. The reverse clutch drives the primary sun gear directly from the input shaft.

Parking Pawl

The parking pawl locks the idler gear to the transaxle case.

Idler Gear

The idler gear is driven by the output shaft (7060) and attached to the reduction gear. The reduction gear drives the final drive ring gear (7F343), part of the differential. The idler gear also provides a gear for the parking pawl to lock the final drive from rotating.

Reduction Gear

The reduction gear connects the output shaft to the final drive ring gear and provides gear reduction.

Differential Assembly

The differential assembly drives the front wheel driveshaft and joints (3B436) and allows the front wheel driveshaft and joints to turn at different speeds.

Torque Converter

The torque converter (7902) couples the engine (6007) to the turbine shaft (7F351). It also provides torque multiplication and absorbs engine shock of gear shifting. The torque converter main components are as follows:

Piston Plate Clutch and Damper Assembly

The piston plate clutch and damper assembly transmits engine power to the turbine from the torque converter cover during lockup.

Converter Cover

The converter cover transmits power from the engine into the torque converter. The oil pump driveshaft is splined to the converter cover.

Turbine

The turbine is splined to the drive sprocket turbine shaft and driven by fluid from the impeller.

Impeller

The impeller supplies torque manipulation together with the reactor and is driven by the torque converter cover.

Reactor

The reactor (also called the stator) contains a one-way clutch to hold it stationary only when reaction is required. The reactor causes hydraulic reaction during torque multiplication.

- **Torque Demand:** The torque demand downshift automatically occurs during part throttle acceleration when the demand for torque is greater than the engine can provide at that gear ratio. The transaxle will disengage the torque converter clutch (if applied) to provide added acceleration.
- **Kickdown:** For maximum acceleration, the driver can force an automatic downshift by pressing the accelerator pedal to the floor. A forced downshift into second gear is possible below 88 km/h (55 mph). Below approximately 40 km/h (25 mph) a forced kickdown to first gear will occur. For all shift speeds, specifications are subject to variation due to tire size and engine calibration requirements.

Drive

Drive is the normal selector position for most forward driving conditions. This position provides all automatic shifts (first through fourth), application and release of the torque converter clutch, and maximum fuel economy during normal operation. Overdrive may be cancelled by depressing the Overdrive control (O/D control) switch located on the end of the shift control selector lever. With overdrive cancelled, the transaxle will allow automatic shifts from first through third gears only. Overdrive shifting through all four gears may be activated again by depressing the O/D control switch. This should be done at closed throttle for best shift response.

Second (2)

The second (2) gear position allows the transaxle to shift up to second gear only. Engine braking occurs in second gear, making this position useful on steep grades.

Manual Low (1)

Selection of second or manual low position at idle will allow first gear operation only (no upshifts). If this position is selected at normal road speeds, the transaxle will initially downshift into second gear, then downshift into first gear when vehicle speed falls below approximately 45 km/h (28 mph).

The manual low position will provide engine braking, making it especially useful for descending steep grades.

Overdrive Control (O/D Control) Switch

The transaxle control system is equipped with an Overdrive control (O/D control) switch used to inhibit fourth gear operation. The O/D off lamp on the instrument panel will illuminate when fourth gear has been "locked out." If the O/D control switch is depressed during fourth gear operation, a 4-3 downshift will occur. The O/D control switch should be used when descending hills or during city driving to provide engine braking. The O/D control switch is located on the end of the shift control selector lever.

Downshifts

Under certain conditions the transaxle will downshift automatically to a lower gear range (without moving the shift control selector lever). There are three categories of automatic downshifts: coastdown, torque demand, and forced or kickdown shifts.

- **Coastdown:** The coastdown downshift automatically occurs as the name indicates, when the vehicle is coasting down to a stop.

Range	Gear	Operating Elements										
									2–4 Band 7D034			
		Reverse Clutch	Low and Reverse Clutch	Forward Clutch	Coasting Clutch	3–4 Clutch	Forward One-Way Clutch (Sprag) 7A089	Low One-Way Clutch (Roller) 7A089	2nd Apply	3rd Release	4th Apply	Torque Converter Clutch (Part of 7902)
P	—											
R	—	•	•									
N	—											
D[1]	1st			•	•[2]		•	•				
	2nd			•	•[2]		•		•			
	3rd			•	•[2]	•	•		•[3]	•[3]		•
	O/D			•[3]		•			•[3]	•[3]	•[4]	•
2	1st			•	•		•	•				
	2nd			•	•		•		•			
1	1st		•	•	•		•					
	2nd			•	•		•		•			

•: Operates

1: Automatic Transaxle will not shift to O/D when the O/D control switch is in the OFF position.

2: Operates when O/D switch is in the OFF position and the throttle opening is less than 1/4.

3: Operates, but does not affect power of transaxle.

4: 2–4 band applies when oil pressure is applied to 2nd and 4th, and released on 3rd.

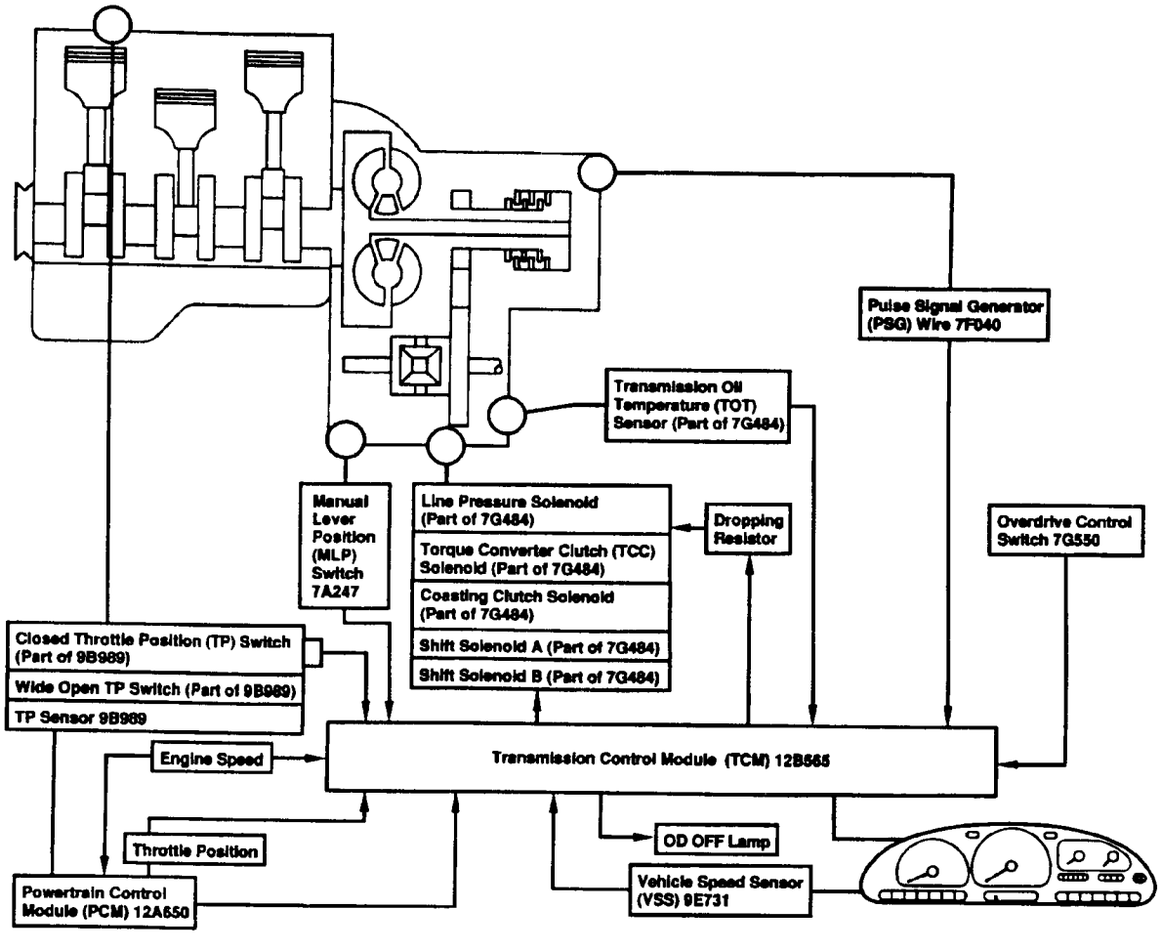
The 4F20E electronically-controlled automatic transaxle features a combination of electronic and mechanical systems to control forward gear shifting, torque converter lockup for quietness and economy, and a self-diagnosis capability for simplifying troubleshooting procedures.

A Power E-AT switch allows for a selection of two shift schedules to tailor transaxle operation to specific driving conditions. The normal schedule (Power E-AT switch released) provides increased fuel economy by providing earlier partial throttle upshifts. The power schedule (Power E-AT switch depressed) provides delayed upshifts at part throttle, utilizing more engine power. The Transmission Control Module (TCM)(12B565) has the capability to override the power schedule depending on driving conditions.

The electronic system controls the transaxle shifting in forward speeds and controls torque converter lockup by means of solenoid actuated valves. These shift solenoid valves, when energized, actuate friction elements (clutches and band) to control shifting in the planetary gear. The shift timing and lockup events are regulated by the TCM in programmed logic and in response to input sensors and switches to produce optimum driveability.

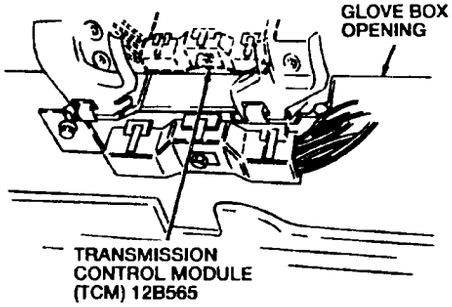
The Overdrive control (O/D control) switch is used to inhibit fourth gear operation. The O/D OFF lamp on the instrument panel will illuminate when fourth gear has been "locked out." If the O/D control switch is depressed during fourth gear operation, a 4-3 downshift will occur. The O/D control switch should be used when descending hills or during city driving to increase engine braking. The O/D control switch is located on the end of the shift control selector lever.

Electrical Control Chart



Transmission Control Module (TCM)

The Transmission Control Module (TCM)(12B565) is separate from the Powertrain Control Module (PCM)(12A650). Both control modules are used to determine the operational characteristics of the transaxle, such as shift timing or lockup. These characteristics are calculated by a series of switch and sensor inputs to produce optimum driveability.



Fail Safe

The 4F20E automatic transaxle is equipped with a fail safe control system. If the vehicle sustains damage to one of the components listed below, fail safe is activated. The fail safe action is controlled by the Transmission Control Module.(TCM). Fail safe operation can be detected by observing the O/D OFF lamp. The O/D OFF lamp will blink for approximately 8 seconds when the ignition switch (11572) is turned ON.

NOTE: Fail safe may be activated even if all electrical circuits are damaged. An example of this condition is excessive wheel spin. If this occurs the vehicle will be placed in 3rd gear and remain in 3rd until the ignition switch is cycled. Once the ignition switch is cycled, the fail safe action will be deactivated and the vehicle will return to its normal shift pattern.

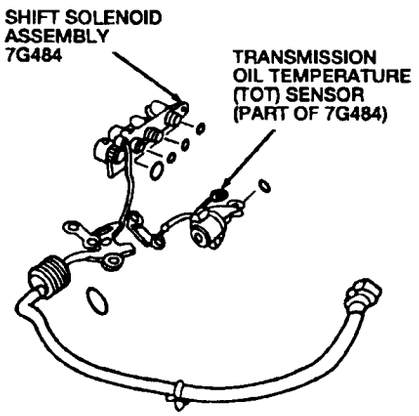
FAIL SAFE CONTROL

Component Malfunction	Fail Safe Action
Coasting clutch solenoid	Stops the coasting clutch control. During deceleration there will always be engine braking.
Line pressure solenoid	Line pressure is increased to maximum pressure.
Manual Lever Position (MLP) switch	Selector lever moves the manual valve and gear positions are selected manually.
Shift solenoids A and/or B	When the D range or 2 range is selected, the vehicle will be in 3rd gear. If the 1 range is selected, the vehicle will be in 2nd gear. There are no upshifts or downshifts.
Throttle Position (TP) sensor	Transmission Control Module (TCM) uses idle switch and Wide Open Throttle (WOT) switch. When idle switch is closed, line pressure is reduced to minimum pressure. When the idle switch is open, line pressure is increased to a maximum. The WOT switch is used to detect a 8/8 throttle opening.
Torque Converter Clutch (TCC) solenoid	The transaxle will not enter lock up.
Vehicle Speed Sensor (VSS) or Pulse Signal Generator (PSG)	If either of the sensors fail, the other sensor is used as the main signal. This does not affect driveability.

Transmission Oil Temperature (TOT) Sensor

The Transmission Oil Temperature (TOT) sensor is hard-wired to the valve body wiring harness along with the shift solenoids. All of the shift solenoids, the valve body wiring harness, and the TOT sensor are replaced as an assembly.

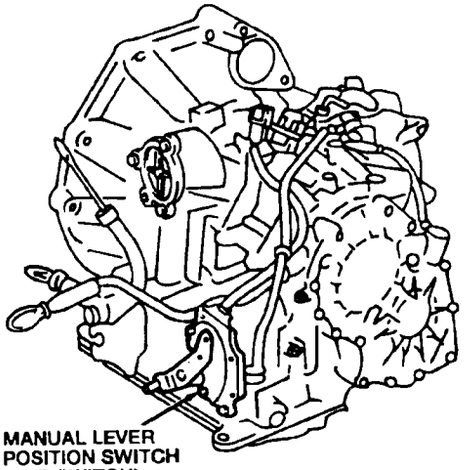
TOT Sensor and Shift Solenoids



The TOT sensor receives a voltage signal which is reduced by the resistance of the sensor in accordance with temperature. The Transmission Control Module (TCM) receives and interprets the voltage signals to determine the transmission oil temperature.

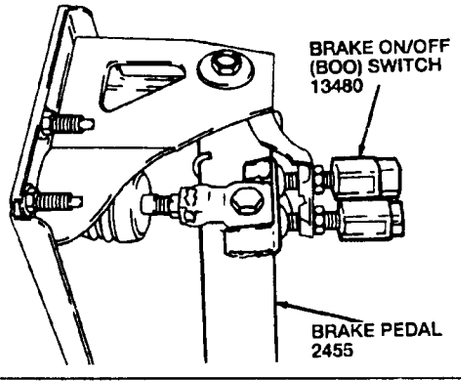
Manual Lever Position (MLP) Switch

The Manual Lever Position (MLP) switch is located on the transaxle case. It connects to the downshift detent lever (7D261) and detects the gear position (P, R, N, D, 2, 1). The MLP switch integrates the Park/Neutral Position (PNP) switch. The PNP switch is utilized in the starter circuit to detect PARK (P) and NEUTRAL (N) ranges.



Brake On/Off (BOO) Switch

The Brake On/Off (BOO) switch is located on the brake pedal (2455). Power is supplied to the BOO switch with the ignition switch in the ON or START position. When the brake pedal is depressed, the BOO switch de-energizes the shift lock actuator (3Z719), allowing the shift control selector lever and the Manual Lever Position (MLP) switch to be moved out of the PARK (P) range.



Shift Solenoid Assembly

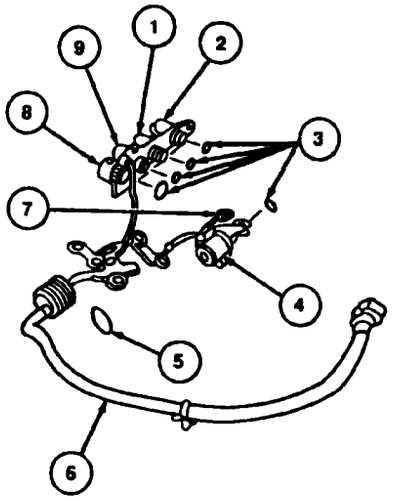
The shift solenoid assembly is located on the main control valve body (7A100).

The SS assembly includes the following:

- Shift solenoid A
- Shift solenoid B
- Coasting clutch solenoid
- Torque Converter Clutch (TCC) solenoid

The shift solenoid assembly is hard-wired into the main control valve body wiring along with the line pressure solenoid and the Transaxle Oil Temperature (TOT) sensor. All these parts must be replaced as an assembly.

Shift Solenoid Assembly

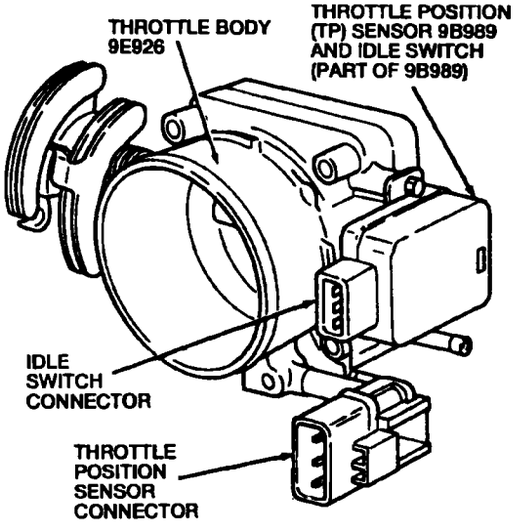


Item	Part Number	Description
1	—	Shift Solenoid B (Part of 7G484)
2	—	Shift Solenoid A (Part of 7G484)
3	—	O-Rings (5)
4	—	Line Pressure Solenoid (Part of 7G484)
5	—	O-Ring
6	—	Valve Body Wiring Harness (Part of 7G484)
7	—	Transmission Oil Temperature (TOT) Sensor (Part of 7G484)
8	—	Torque Converter Clutch (TCC) Solenoid (Part of 7G484)

(Continued)

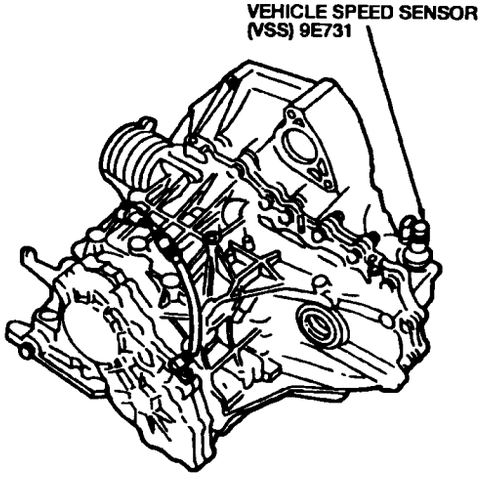
Throttle Position (TP) Sensor

The Throttle Position Sensor (TP sensor)(9B989) is a variable resistor located on the throttle body (9E926). The TP sensor detects the opening of the throttle and sends this information to the Transmission Control Module (TCM). The TCM uses this information to control transaxle shifting, lockup, and line pressure.



Vehicle Speed Sensor (VSS)

The Vehicle Speed Sensor (VSS)(9E731) is located above the transaxle differential. The VSS generates an AC signal which is sent to the instrument cluster (10849). The signal is converted to a DC signal and used as input to the Powertrain Control Module (PCM) and the Transmission Control Module (TCM).



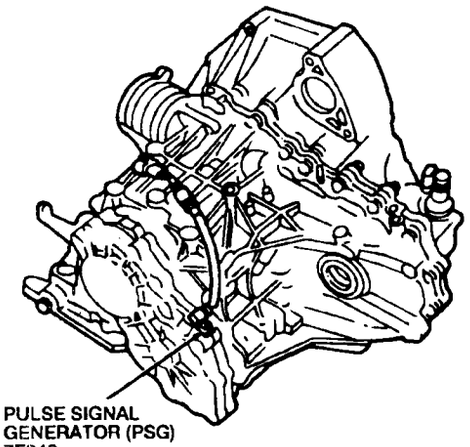
Item	Part Number	Description
9	—	Coasting Clutch Solenoid (Part of 7G484)

Torque Converter Clutch (TCC) Solenoid

The Torque Converter Clutch (TCC) solenoid is part of the shift solenoid assembly. The TCC solenoid is located on the main control valve body. The TCC solenoid is switched on and off by electrical signals from the Transmission Control Module (TCM). The TCC solenoid activates the TCC valve which controls lockup . When the TCC solenoid is off, lockup is prevented. Lockup is actuated when the TCC solenoid is on.

Pulse Signal Generator (PSG)

The Pulse Signal Generator (PSG) is a magnetic-pickup and located on the transaxle case. It detects the reverse clutch drum speed. There are 32 projections on the reverse clutch drum (7D044). As the reverse clutch drum rotates, the PSG produces an AC wave and sends it to the Transmission Control Module (TCM) or the Powertrain Control Module (PCM).

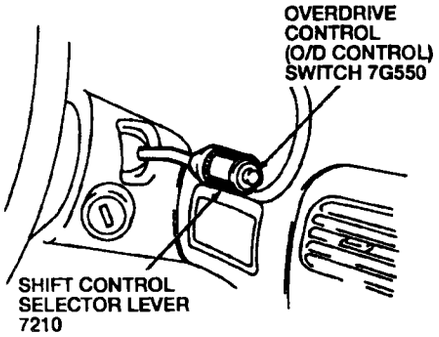


Idle Switch

The idle switch is integrated with the Throttle Position Sensor (TP sensor). The idle control switch sends a signal to the Powertrain Control Module (PCM) when the throttle valve is fully closed.

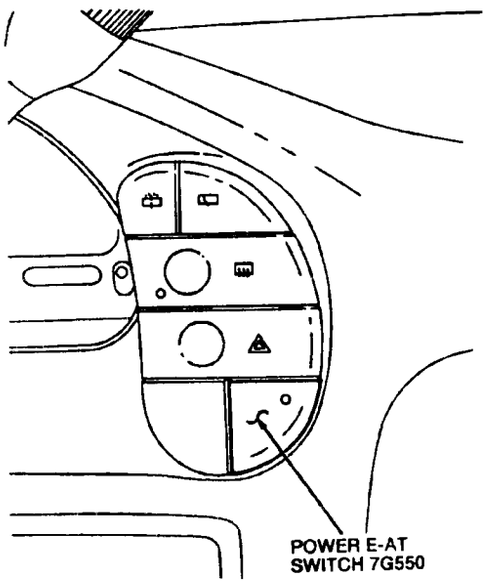
Overdrive Control (O/D Control) Switch

The Overdrive Control (O/D control) switch can be used to inhibit fourth gear operation. The OD/OFF lamp on the instrument panel will illuminate when fourth gear has been "locked out." If the O/D control switch is depressed during fourth gear operation, a 4-3 downshift will occur. The O/D control switch should be used when descending hills or during city driving to increase engine braking. The O/D control switch is located on the end of the shift control selector lever.



Power E-AT Switch

The power E-AT switch allows for a selection of two shift schedules to tailor transaxle operation to specific driving conditions. The normal schedule (Power E-AT switch released) provides increased fuel economy by providing earlier part throttle upshifts. The power schedule (Power E-AT switch depressed) provides delayed upshifts at part throttle, utilizing more engine power. The Transmission Control Module (TCM) has the capability to override the power schedule depending on driving conditions.



Symptom Chart — Automatic Transaxle

AUTOMATIC TRANSAXLE

CONDITION	POSSIBLE SOURCE	ACTION
• Engine Will Not Crank in Any Shift Control Selector Lever Position	• Manual lever position switch stuck, inoperative, damaged, or disconnected.	• INSPECT/SERVICE the manual lever position switch.
• Engine Does Not Crank in P and/or N	• Shift control selector lever and transmission shift cable out of adjustment. • Manual lever position switch not correctly aligned to automatic transaxle. • Battery. • Ignition system damaged.	• CONFIRM shift control selector lever or transmission shift cable adjustment and operation. • ADJUST manual lever position switch. • CHECK battery. • CHECK ignition system.
• Engine Starts in Shift Control Selector Lever Positions Other Than P or N	• Transmission shift cable or shift control selector lever damaged or out of adjustment. • Manual lever position switch.	• CONFIRM transmission shift cable or shift control selector lever adjustment and operation. • CONFIRM manual lever position switch adjustment.
• Vehicle Moves in P Range, or Transaxle Stays In PARK When Not In P Range	• Shift control selector lever and transmission shift cable out of adjustment. • Parking pawl. • Idler gear.	• CONFIRM shift control selector lever or transmission shift cable adjustment and operation. • INSPECT parking pawl. • INSPECT idler gear.
• Vehicle Moves in N	• Shift control selector lever and transmission shift cable out of adjustment. • Control valve damaged. • ATF level. • Torque converter damaged. • Forward clutch damaged. • Manual lever position switch out of adjustment. • Reverse clutch damaged. • Coasting clutch damaged.	• CONFIRM shift control selector lever or transmission shift cable adjustment and operation. • INSPECT control valve, SERVICE or REPLACE as required. • CHECK ATF level. • INSPECT, SERVICE, or REPLACE torque converter. • INSPECT, SERVICE, or REPLACE forward clutch. • INSPECT/ADJUST the manual lever position switch. • INSPECT/SERVICE or REPLACE reverse clutch. • INSPECT/SERVICE or REPLACE coasting clutch.
• Vehicle Does Not Move in D, 2, 1, or R	• Control valves. • Transmission shift cable damaged. • Improper fluid level. • Oil pump assembly dirty, broken, or bad seals. • Torque converter damaged. • Sclenoid valves. • Clutches. • Parking mechanism.	• INSPECT control valves. • INSPECT transmission shift cable. • CHECK and FILL ATF. • INSPECT oil pump assembly. • INSPECT torque converter. • INSPECT/REPLACE solenoid valves. • INSPECT clutches. • INSPECT/REPAIR or REPLACE parking mechanism.
• Vehicle Does Not Move in Any Forward Shift Position. REVERSE OK	• Control valves. • Forward clutch worn or damaged. • One-way clutch worn or damaged. • Oil flow to forward clutch blocked.	• INSPECT control valves. • INSPECT forward clutch. • INSPECT one-way clutch.
• Vehicle Does Not Move in REVERSE, Forward OK	• Reverse clutch worn or damaged. • Low/reverse clutch slipping.	• INSPECT reverse clutch. • INSPECT low/reverse clutch.

AUTOMATIC TRANSAXLE (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
• Noise Severe Under Acceleration or Deceleration, OK in P, N or Steady Speed	• Torque converter failure. • Gear or clutch failure. • Transmission shift cable binding or casing is damaged. • Front engine support insulators grounding out.	• EXAMINE / SERVICE torque converter. • EXAMINE / SERVICE gear and clutch. • INSTALL and ROUTE transmission shift cable as specified. • REPAIR / REPLACE front engine support insulator
• Noise in P or N - Does Not Stop in DRIVE	• Loose flywheel-to-torque converter bolts. • Oil pump assembly worn. • Torque converter failure.	• TORQUE to specification. • EXAMINE / SERVICE oil pump assembly. • EXAMINE / SERVICE torque converter.
• Noise in all Gears - Changes Acceleration to Deceleration	• Differential worn. • ATF level. • Front wheel driveshaft joints. • Defective speedometer gear. • Bearings worn or damaged. • Planetary gearset noisy.	• EXAMINE / SERVICE differential. • CHECK ATF level. • SERVICE the front wheel driveshaft joints as required. • EXAMINE / REPLACE speedometer gear. • EXAMINE / REPLACE bearings. • INSPECT / SERVICE planetary gearset.
• Harsh Shifts (any gears)	• Line pressure incorrect. • Pressure reducing valve. • Main control valve body. • Sticking accumulators. • Front wheel driveshaft joints. • Front engine support insulators loose. • Pressure regulator valve sticking. • 2-4 band adjustment. • 2-4 band servo. • Pressure modulator valve sticking. • Throttle position sensor. • Manual lever position switch. • Transmission oil temperature sensor. • Oil pump assembly. • Clutches. • Torque converter. • Pulse signal generator.	• INSPECT / SERVICE pressure reducing valve. • INSPECT main control valve body. • INSPECT accumulators. • SERVICE front wheel driveshaft joints as required. • SERVICE front engine support insulators. • INSPECT pressure regulator valve. • CHECK 2-4 band adjustment. • INSPECT 2-4 band servo. • INSPECT pressure modulator valve. • INSPECT / SERVICE throttle position sensor. • INSPECT / ADJUST manual lever position switch. • CHECK transmission oil temperature sensor. • INSPECT oil pump assembly. • INSPECT clutches. • INSPECT torque converter. • INSPECT pulse signal generator.
• Soft Shifts (any gears)	• Line pressure incorrect. • Front pump support and gear worn. • Internal ATF leakage. • 2-4 band adjustment. • 2-4 band servo. • Pressure regulator damaged. • ATF level. • Main control valve body. • Sticking accumulators.	• INSPECT front pump support and gear. • INSPECT transaxle. • CHECK 2-4 band adjustment. • INSPECT 2-4 band servo. • INSPECT pressure regulator. • CHECK and FILL ATF. • INSPECT main control valve body. • INSPECT accumulators.

AUTOMATIC TRANSAXLE (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
• Erratic Shifting, Inconsistent Shift Points, Inconsistent Shift Sequence	• Line pressure solenoid sticking. • Control valves. • 2-4 band adjustment. • Clutches slipping. • ATF level and quality. • Pulse signal generator. • Oil pump assembly. • Clutches. • Transmission oil temperature sensor.	• GO to Pinpoint Test A1. • INSPECT control valves. • CHECK 2-4 band adjustment. • INSPECT clutches. • CHECK and FILL ATF. • INSPECT pulse signal generator. • EXAMINE / SERVICE oil pump assembly. • CHECK clutches. • INSPECT transmission oil temperature sensor.
• Improper Lockup (Customer Might Say Poor Fuel Economy)	• Control valves. • Torque converter.	• INSPECT control valves. • INSPECT torque converter.
• Skipping Gears (Shift 1st to 3rd, or 2nd to O/D, for Example)	• Control valves. • Transmission oil temperature sensor. • Main control valve body. • 2-4 band.	• INSPECT control valves. • INSPECT transmission oil temperature sensor. • INSPECT main control valve body. • CHECK 2-4 band adjustment.
• Transaxle Overheating NOTE: Excessive overheating may cause damage to internal components. Always retest automatic transaxle for other symptoms after overheating problem is resolved and burned fluid is replaced.	• Improper ATF level. • Poor engine performance. • Worn clutch, incorrect band application, or poor oil pressure control. • Restriction in oil cooler tube. • Transmission oil temperature sensor. • Clogged transmission oil cooler. • Main control valve body. • Solenoid valves.	• CHECK ATF level. • ADJUST according to specifications • CHECK oil cooler tube for kinks and damage. CLEAN, SERVICE or REPLACE oil cooler tube. • INSPECT transmission oil temperature sensor. • INSPECT transmission oil cooler for plugging. SERVICE as required. INSPECT and CLEAN the automatic transaxle internally. • INSPECT main control valve body. • INSPECT solenoid valves.
• Drags in R like Parking Brake is Applied	• 2-4 band. • Brakes.	• INSPECT 2-4 band adjustment.
• Drags in Forward Gears	• 2-4 band. • Brakes.	• INSPECT 2-4 band adjustment.
• Engine Runaway on Upshift or Accelerating	• ATF level low. • Main control valve body. • Transmission oil temperature sensor. • Oil pump assembly. • Clutches slipping.	• CHECK ATF level. • INSPECT main control valve body, solenoid valves. • INSPECT transmission oil temperature sensor. • INSPECT oil pump assembly. • INSPECT clutches.
• Engine Runaway on Downshift	• Clutches slipping. • ATF level. • Oil pump assembly.	• INSPECT clutches. • CHECK ATF level. • INSPECT oil pump assembly.
• Excessive Creep	• Torque converter. • Ignition timing and / or idle speed incorrect. • Line pressure solenoid. • Oil pump assembly.	• INSPECT torque converter. • CORRECT or ADJUST ignition timing and / or idle speed. • GO to Pinpoint Test A1. • INSPECT oil pump assembly.

AUTOMATIC TRANSAXLE (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
• No Creep	• ATF level and condition. • Shift control selector lever and transmission shift cable out of adjustment. • Main control valve body. • Control valves. • Forward clutch. • Reverse clutch. • Oil pump assembly. • Forward one-way clutch (sprag). • Low one-way clutch (roller). • Low/reverse clutch. • Torque converter. • 3-4 clutch. • Line pressure solenoid.	• CHECK ATF level and condition. • CONFIRM shift control selector lever or transmission shift cable adjustment and operation. • INSPECT main control valve body. • INSPECT control valves. • INSPECT forward clutch. • INSPECT reverse clutch. • INSPECT oil pump assembly. • INSPECT forward one-way clutch (sprag). • INSPECT low one-way clutch (roller). • INSPECT low/reverse clutch. • INSPECT/REPLACE torque converter. • INSPECT 3-4 clutch. •
• Engine Stalls When Put Into Gear	• Torque converter. • Main control valve body. • Control valves. • Oil pump assembly.	• INSPECT torque converter. • INSPECT main control valve body. • INSPECT control valves. • INSPECT oil pump assembly.
• No Kickdown	• Line pressure solenoid. • Main control valve body.	• INSPECT main control valve body.
• Poor Fuel Economy	• Torque converter clutch solenoid. • Torque converter clutch control solenoid. • Torque converter.	• INSPECT torque converter clutch solenoid. • INSPECT torque converter clutch control solenoid. • INSPECT torque converter.
• Lack of Power	• Torque converter. • Reverse clutch.	• INSPECT/REPLACE torque converter. • INSPECT reverse clutch.
• Surges While Cruising	• Main control valve body.	• INSPECT main control valve body.
• Poor Acceleration	• Torque converter clutch control solenoid. • Main control valve body.	• INSPECT torque converter clutch control solenoid. • INSPECT main control valve body.

Operational Tests

Operational Test procedures are provided to serve as Pre-Road Test checks. With the engine (6007) running in the service bay, the Operational Tests are conducted in minimal time and with less effort than the Road Tests require. They are used to determine the causes of (and provide the corrective actions for) automatic transaxle malfunctions most likely to occur. These include the torque converter (7902), the powertrain, the friction elements (clutches and bands), the hydraulic system, and the associated regulating valves and controls.

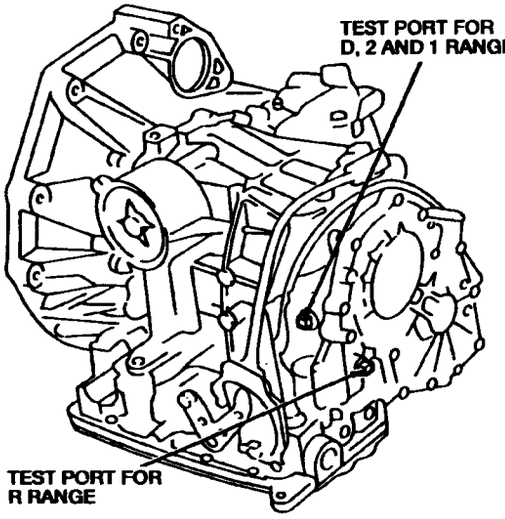
1. Check the following items:
   a. Coolant level and condition
   b. ATF level and condition
   c. Idle speed
2. Prepare the vehicle:
   a. Idle the vehicle.
   b. Depress the brake pedal (2455) and shift the shift control selector level through all of the ranges until the ATF reaches normal operating temperature 66°-77°C (151°-171°F).
   c. Place the shift control selector lever firmly in the P position.
   d. Block the wheels.
   e. Apply the parking brake.
3. Perform each Operational Test and use the following Evaluation Chart for direction.

ENGINE IDLE SPEED TEST

TEST STEP		RESULT ▶	ACTION TO TAKE
A1	CHECK IDLE SPEED		
	• Idle the vehicle. • Depress the brake pedal and shift the shift control selector lever through each range until the ATF reaches normal operating temperature 66°-77°C (151°-171°F). • Apply the parking brake. • Shift control selector lever in the N range. • Run the engine at idle. • Check the idle speed using the following procedures. • Connect Rotunda New Generation STAR (NGS) Tester 007-00500 and activate it using the following: — Select: VEHICLE & ENGINE SELECTION — Select: SELECT NEW VEHICLE YEAR & MODEL — Select: 1994 — VIN # 10:R — Select: 94 3.0L MFI VILLAGER — Select: DIAGNOSTIC DATA LINK — Select: TCM - TRANSMISSION CTRL MODULE — Select: PID / DATA MONITOR AND RECORD — Select: ENG RPM • Check the base idle speed. The idle speed should be 700 ± 50 rpm. • **Is the idle speed correct?**	Yes ▶ No ▶	GO to Stall Test. ADJUST the idle speed.

CONTROL PRESSURE TEST

TEST STEP		RESULT ▶	ACTION TO TAKE
B1	CHECK CONTROL PRESSURE		
• Connect Rotunda Automatic Transmission Tester 014-00737 or equivalent to the test port for each range as shown below.		Yes ▶	GO to Engine Idle Speed Test.
		No ▶	REFER to the Control Pressure Test Evaluation Chart in this section and REPAIR as necessary.



- Key ON, engine running.
- Operate the engine at base idle — 700 ± 50 rpm.
- Depress and hold the brake pedal.
- Shift the shift control selector lever to the D range.
- Read and record the control pressure at idle.

CAUTION: The following steps must be completed within 5 seconds, followed by cooling the ATF in the N range while idling for 1 minute.

- Steadily increase the accelerator pedal and shaft to its maximum.
- Read and record the control pressure when the engine speed is constant.
- Release the accelerator pedal and shaft.

NOTE: If the line pressure solenoid fails the automatic transaxle will operate at full line pressure.

- Repeat this test for the R, 2, and 1 ranges, making certain to cool the ATF in between tests.
- **Are the line pressures all OK?**

CONTROL PRESSURE EVALUATION CHART

	Control Pressure, kPa (psi)	Control Pressure, kPa (psi)
Range	D, 2, and 1	R
Idle	500 (73)*	776 (113)*
Stall	1226 (176)*	1961 (284)*

* Approximately

NOTE: Check for a plugged transaxle filter for all high and low pressure test results.

CONTROL PRESSURE TEST EVALUATION

Pressure Test Result	Range	Possible Source	Action to Take
Low at idle	All	Worn front pump support and gear. Pressure regulator valve damaged. Control valve damaged. ATF leakage.	DISASSEMBLE, INSPECT, and REPAIR or REPLACE components as required.
Low at idle	D,2	ATF leaking from hydraulic circuit of forward clutch.	DISASSEMBLE, INSPECT, and REPAIR or REPLACE components as required.
Low at idle	R,1	ATF leaking from hydraulic circuit of low/reverse clutch.	DISASSEMBLE, INSPECT, and REPAIR or REPLACE components as required.
Low at idle	R	ATF leaking from hydraulic circuit of reverse clutch.	DISASSEMBLE, INSPECT, and REPAIR or REPLACE components as required.
High at idle	All	Preesure regulator valve damaged. Pressure modulator valve damaged. Transaxle oil temperature sensor damaged. Line pressure solenoid damaged. Throttle position sensor out of adjustment.	DISASSEMBLE, INSPECT, and REPAIR or REPLACE components as required.
Low at Stall	All	Pressure reducing valve damaged. Line pressure solenoid damaged. Pressure modulator valve sticking. Pressure regulator valve sticking. Throttle position sensor out of adjustment.	DISASSEMBLE, INSPECT, and REPAIR or REPLACE components as required.
Within specification	All	—	GO to Engine Idle Speed Test.

STALL TEST

TEST STEP	RESULT ▶	ACTION TO TAKE
C1 CHECK POWERTRAIN FUNCTION WITH STALL TEST		
• Connect a Rotunda NGS Scan Tool 007-00500 to the vehicle. • Key ON, engine running. • Activate the Rotunda NGS Scan Tool 007-00500 using the following procedures. — Select: VEHICLE & ENGINE SELECTION — Select: SELECT NEW VEHICLE YEAR & MODEL — Select: 1994 — VIN # 10:R — Select: 94 3.0L MFI VILLAGER — Select: DIAGNOSTIC DATA LINK — Select: TCM — TRANSMISSION CTRL MODULE — Select: PID / DATA MONITOR AND RECORD — Select: ENG RPM • Operate and monitor the engine at base idle. • Depress and hold the brake pedal. • Shift the shift control selector lever to the R range. **CAUTION: The following steps must be completed within five seconds, followed by cooling the ATF in the N range while idling for 1 minute.** • Steadily increase the accelerator pedal to its maximum. • Read and record the engine rpm on the NGS Scan Tool. • Release the accelerator pedal. • Repeat this test for the D, 2, and 1 ranges, making certain to cool the ATF between tests. • **Is the stall speed within 1800-2100 rpm?**	Yes ▶ No ▶	PERFORM the Road Test. REFER to the Stall Test Evaluation Chart and REPAIR as necessary.

STALL TEST EVALUATION

Test Result In (rpm)	Range	Possible Source	Action to Take
Above specification[1]	Forward ranges	Forward clutch slipping.	DISASSEMBLE, INSPECT, and REPAIR or REPLACE as necessary.
		Forward one-way clutch (sprag) slipping.	
	D and/or 2 range	Low one-way clutch (roller) slipping.	DISASSEMBLE, INSPECT, and REPAIR or REPLACE as necessary.
	R range	Low/reverse clutch slipping.	Perform Road Test to determine clutch. a) Engine braking in 1 range: REPLACE/REPAIR the reverse clutch. b) Engine not braking in 1 range: REPLACE/REPAIR the low/reverse clutch.
		Reverse clutch slipping.	
Within specification[1]		All shift control elements within transaxle are functioning normally.	PERFORM the Road Test.
Below specification[1]		Engine out of tune.	Tune engine. REPEAT Stall Test.
		Forward one-way clutch (sprag) slipping.	REPLACE the torque converter.

[1] Specification – Stall Speed: 1800–2100 rpm

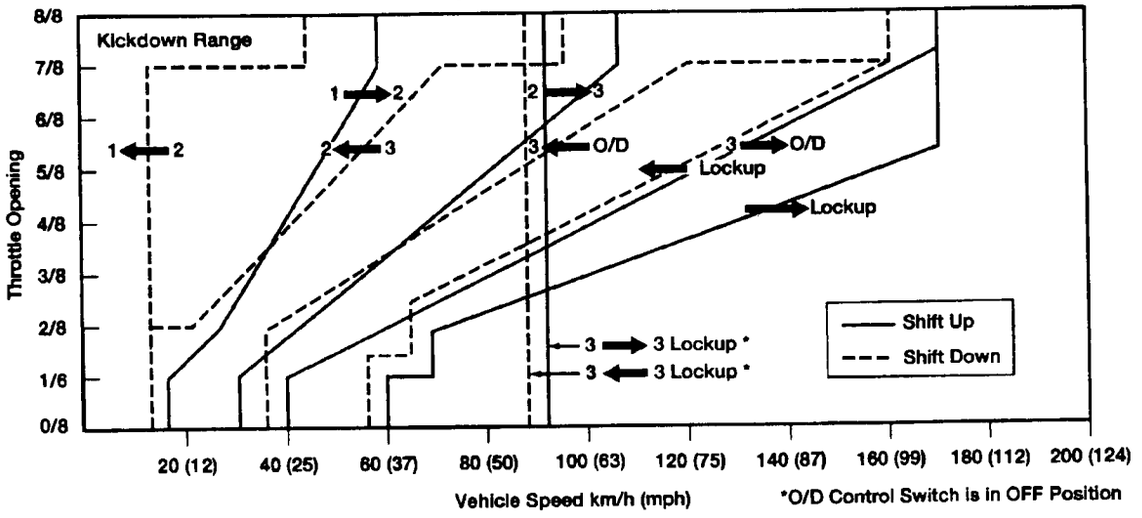
D RANGE SHIFT POINT CHART

Range	Gear	Throttle Condition (Throttle Position Sensor Voltage)	Shifting Gears	Vehicle Speed km/h (mph)
D	Normal	Fully open (3.0–4.4 volts)	1 → 2	56–64 (35–40)
			2 → 3	100–108 (62–67)
			3 → O/D	164–174 (102–108)
			O/D → 3	166–158 (103–98)
			3 → 2	98–90 (61–56)
			2 → 1	50–42 (31–26)
		Half throttle (1.6–2.7 volts)	1 → 2	36–44 (22–27)
			2 → 3	63–71 (39–44)
			3 → O/D	101–104 (63–68)
			O/D → 3	73–65 (45–40)
			3 → 2	44–36 (27–22)
			2 → 1	16–8 (10–5)
	Power	Fully open (3.0–4.4 volts)	1 → 2	56–64 (35–40)
			2 → 3	100–108 (62–67)
			3 → O/D	166–174 (103–108)
			O/D → 3	166–158 (103–98)
			3 → 2	98–90 (61–56)
			2 → 1	50–42 (31–26)
		Half throttle (1.6–2.7 volts)	1 → 2	37–45 (23–28)
			2 → 3	72–80 (45–50)
			3 → O/D	117–125 (73–78)
			O/D → 3	87–79 (54–42)
			3 → 2	49–41 (30–26)
			2 → 1	16–8 (10–5)

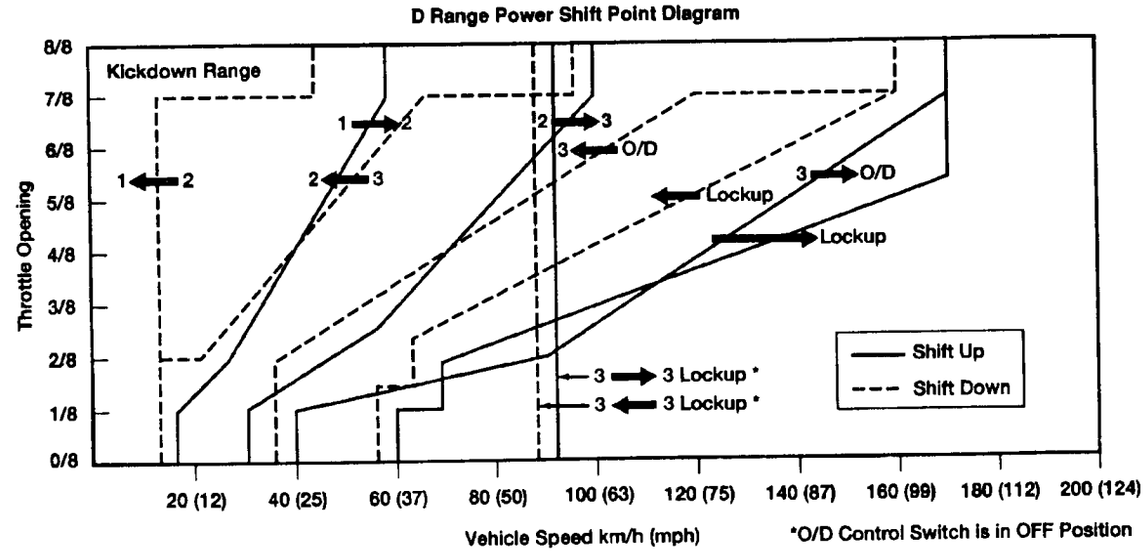
LOCKUP CHART FOR D RANGE

Throttle Opening	Gear	Mode	Vehicle speed km/h (mph)	
			Lockup ON	Lockup OFF
1/4	O/D	Normal	66–74 (41–46)	71–63 (44–39)
		Power	66–74 (41–46)	71–63 (44–39)
	O/D OFF	Normal	86–94 (53–58)	83–91 (52–57)
		Power	86–94 (53–58)	83–91 (52–57)

D Range Normal Shift Point Diagram



D Range Power Shift Point Diagram



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Symptom Chart — Shift Feel Concerns

SHIFT FEEL CONCERNS

CONDITION	POSSIBLE SOURCE	ACTION
• Shift Shock in All Ranges	• Line pressure solenoid. • Pressure modulator valve sticking or damaged. • Control valves blocked. • Coasting clutch. • Low/reverse clutch. • Front pump support and gear. • Main control valve body. • Accumulators. • 3-4 clutch. • Front wheel driveshaft joints or front engine support insulators. • 2-4 band and servo. • Pressure regulator valve sticking or damaged.	• CLEAN, SERVICE, or REPLACE line pressure solenoid. • CLEAN, SERVICE, or REPLACE pressure modulator valve. • CHECK for blockage, SERVICE as required. • CHECK for wear, SERVICE or REPLACE coasting clutch. • CHECK for adjustment, wear and damage, SERVICE low/reverse clutch. • INSPECT front pump support and gear. • INSPECT main control valve body. • CLEAN, SERVICE, or REPLACE accumulators. • INSPECT, SERVICE, or REPLACE 3-4 clutch. • SERVICE or REPLACE front wheel driveshaft joints or front engine support insulators. • CHECK 2-4 band and servo adjustment. • CLEAN, SERVICE, or REPLACE pressure regulator valve.
• Harsh 1-2 Shift	• Line pressure solenoid.	• CLEAN, SERVICE, or REPLACE line pressure solenoid.
• N-R (NEUTRAL-REVERSE) Shift Shock	• N-R accumulator sticking or damaged. • Main control valve body. • Line pressure solenoid.	• INSPECT and SERVICE or REPLACE N-R accumulator. • INSPECT/SERVICE main control valve body. • INSPECT/REPLACE line pressure solenoid.
• 2-3 Shift Shock	• 2-3 accumulator sticking or damaged. • 1-2 accumulator sticking or damaged.	• INSPECT and SERVICE or REPLACE 2-3 accumulator. • INSPECT and SERVICE or REPLACE 1-2 accumulator.
• 1-2 Soft Shift	• Main control valve body. • 2-4 band is too loose.	• INSPECT main control valve body, solenoid valves. • INSPECT 2-4 band adjustment.
• 2-3 Soft Shift	• 2-3 accumulator sticking or damaged. • Main control valve body.	• CLEAN, SERVICE, or REPLACE 2-3 accumulator. • INSPECT main control valve body, solenoid valves.
• N-R Soft Shift	• N-R accumulator sticking or damaged.	• CLEAN, SERVICE, or REPLACE N-R accumulator.
• Slow to Engage in REVERSE	• Reverse clutch.	• INSPECT for damage or wear; SERVICE or REPLACE reverse clutch.

Symptom Chart — Downshift Concerns

DOWNSHIFT CONCERNS

CONDITION	POSSIBLE SOURCE	ACTION
• Engine Has Momentary Runaway During 3-2 Downshift	• 2-4 band and servc.	• INSPECT adjustment, SERVICE, or REPLACE 2-4 band.
• Hesitation in 3-2 Shift	• Main control valve body.	• INSPECT main control valve body, solenoid valves. REPLACE as necessary.

DOWNSHIFT CONCERNS (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
• No Engine Braking D to 2	• Fluid blockage to coasting clutch or failed coasting clutch. • Main control valve body.	• CHECK for blockage and coasting clutch condition. • INSPECT main control valve body, solenoid valves. REPLACE as necessary.
• No Engine Braking 2 to 1	• Fluid blockage to coasting clutch or failed coasting clutch. • 2-4 band and servo. • Main control valve body. • Control valve. • Oil pump assembly.	• INSPECT coasting for blockage or damage. • CHECK 2-4 band and servo adjustment and INSPECT condition. • INSPECT main control valve body, solenoid valves. REPLACE as necessary. • INSPECT, CLEAN, or SERVICE control valve. • INSPECT/REPLACE oil pump assembly.

Symptom Chart — Upshift Concerns

UPSHIFT CONCERNS

CONDITION	POSSIBLE SOURCE	ACTION
• No 2-3 Upshift	• 3-4 clutch. • Pressure reducing valve. • Main control valve body.	• CHECK clutch adjustment, REPLACE 3-4 clutch as necessary. • INSPECT/REPLACE pressure reducing valve. • INSPECT main control valve body, solenoid valves. REPLACE as necessary.
• No 2nd Gear (Transaxle Shifts 1-3)	• Main control valve body. • Loose 2-4 band.	• INSPECT main control valve body, solenoid valves. REPLACE as necessary. • ADJUST 2-4 band.
• No Lockup	• Torque converter clutch solenoid not functioning. • Torque converter. • Torque converter clutch control solenoid. • Pressure reducing valve.	• INSPECT/REPLACE TCC solenoid and related hydraulic circuit. • INSPECT/REPLACE torque converter. • INSPECT/REPLACE torque converter clutch control solenoid. • INSPECT/REPLACE pressure reducing valve.
• Shift Points Incorrect	• Main control valve body. • 2-4 band out of adjustment. • Damaged or worn forward clutch.	• INSPECT main control valve body, solenoid valves. REPLACE as necessary. • CHECK 2-4 band adjustments. • INSPECT and SERVICE or REPLACE forward clutch.
• Engine Runaway When Upshifting	• Manual lever position switch. • Main control valve body. • Forward one-way clutch (sprag). • 2-4 band and servo. • 3-4 clutch. • Forward clutch.	• CHECK adjustment and condition of manual lever position switch. • CLEAN, SERVICE, or REPLACE main control valve body. • INSPECT, SERVICE, or REPLACE forward one-way clutch (sprag). • CHECK 2-4 band and servo adjustment and condition. • CHECK condition, SERVICE 3-4 clutch. • INSPECT, SERVICE, or REPLACE forward clutch.

UPSHIFT CONCERNS (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
• No 1st Gear (Transaxle Starts Off in 2nd Gear)	• Main control valve body. • Shift valve A. • Shift valve B. • Forward clutch. • Forward one-way clutch (sprag). • Low one-way clutch (roller). • 3-4 clutch. • Torque converter. • Oil pump assembly. • Pressure reducing valve.	• INSPECT/SERVICE or REPLACE main control valve body. • INSPECT/REPLACE shift valve A. • INSPECT/REPLACE shift valve B. • INSPECT/REPLACE forward clutch. • INSPECT/REPLACE forward one-way clutch (sprag). • INSPECT/REPLACE low one-way clutch (roller). • INSPECT/REPLACE 3-4 clutch. • INSPECT/REPLACE torque converter. • INSPECT/REPLACE oil pump assembly. • INSPECT/SERVICE or REPLACE pressure reducing valve.
• No 1-2 Shift	• 2-4 band. • Front pump support and gear. • Shift solenoid/valve A. • Pressure reducing valve. • Servo piston assembly.	• INSPECT/REPLACE 2-4 band. • INSPECT/REPLACE front pump support and gear. • INSPECT/SERVICE or REPLACE shift solenoid/valve A. • INSPECT/SERVICE or REPLACE pressure reducing valve. • INSPECT/REPLACE servo piston assembly.
• No 3-O/D Shift	• 2-4 band. • Torque converter. • Oil pump assembly. • Servo piston assembly. • Main control valve body. • Shift solenoid B. • Pressure reducing valve.	• INSPECT/REPLACE 2-4 band. • INSPECT/REPLACE torque converter. • INSPECT/REPLACE oil pump assembly. • INSPECT/REPLACE servo piston assembly. • INSPECT/SERVICE or REPLACE main control valve body. • INSPECT/REPLACE shift solenoid B. • INSPECT/REPLACE pressure reducing valve.
• Delayed 1-2 Shift	• Main control valve body.	• INSPECT main control valve body, solenoid valves. REPLACE as necessary.

Transaxle

Disassembly

SPECIAL SERVICE TOOL(S) REQUIRED

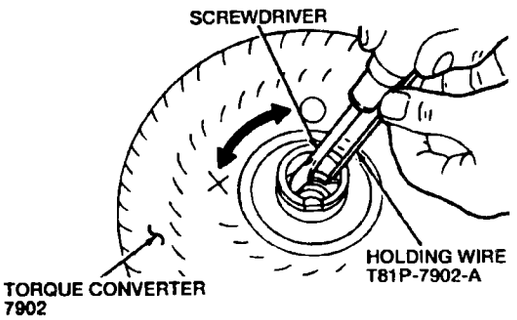
Description	Tool Number
Bench Mounted Holding Fixture	T57L-500-B
Holding Wire	T81P-7902-A
Impact Slide Hammer	150T-100-A
Stator and Driven Sprocket Bearing Remover	T86P-70043-A
Puller	T58L-101-B
Mainshaft Locknut Staking Tool	T77J-7025-F
Slide Hammer Adapter	T81P-78103-A
Center Bolt from Output Shaft Seal Remover	T86T-7034-AH
Shim Selection Set	T86C-77000-JF

NOTE: Keep all of the transaxle components away from dirt and other contaminants. Place all parts that were removed from the transaxle in a clean area and cover them with a clean, lint free towel.

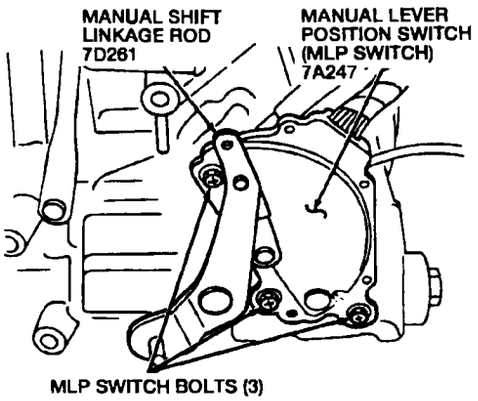
1. Remove the torque converter (7902) from the transaxle.
2. Mount the transaxle in Bench Mounted Holding Fixture T57L-500-B.
3. Remove the transmission drainplug and drain the transmission fluid into a suitable container.

NOTE: Place the torque converter onto a clean workbench with the front of the torque converter facing up. The one-way clutch should only turn clockwise.

4. Use Holding Wire T81P-7902-A to hold the torque converter one-way bearing support and turn the one-way clutch with a screwdriver. Ensure that it only rotates clockwise. If the one-way clutch rotates in both directions, replace the torque converter.



5. Remove the transaxle oil cooler tube from the transaxle case.
6. Set the manual shift linkage rod to the PARK (P) position as shown.

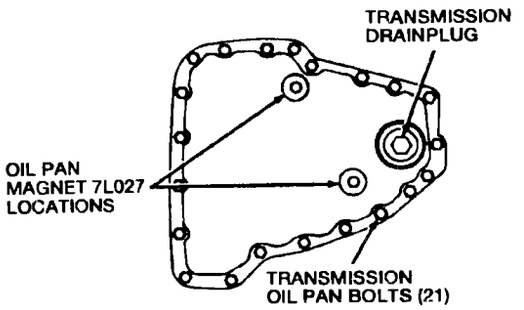


7. Remove the three Manual Lever Position (MLP) switch bolts and the MLP switch.
8. Remove the 21 transmission oil pan bolts, the transmission oil pan (7A194) and the oil pan to case gasket (7A191). Discard the transmission oil pan bolts and oil pan to case gasket.

NOTE: Examine the transmission fluid and the particles left in the transmission oil pan. This may help in diagnosing any concerns. Transmission fluid that is very dark, has a burnt smell, or contains particles indicates the friction surfaces (clutches or band) may need replacement. A tacky film indicates varnish buildup which can cause sticking valves, servos, and clutches and may also inhibit oil pump pressure.

NOTE: If the transmission fluid is contaminated with metal shavings, friction material, or is burnt, the transmission oil cooler tubes will have to be flushed and the transmission oil cooler (7A095) replaced. Refer to the procedure in this section.

CAUTION: Mark the location of the oil pan magnets (7L027) during removal. The magnetic field created by the oil pan magnets disturbs the operation of the solenoids. To ensure proper solenoid valve operation, install the oil pan magnets in the same location they were removed from.



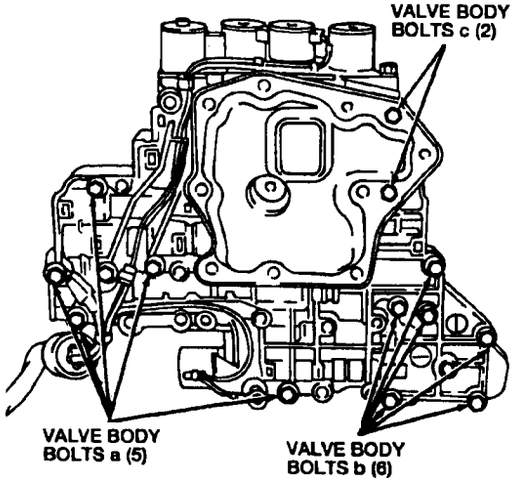
9. Remove and clean both oil pan magnets.
10. Ensure that the transaxle and the transmission oil pan mating surfaces are free from all of the old oil pan to case gasket material.

CAUTION: DO NOT reuse or clean the transmission oil filter assembly. The transmission oil filter element material will contaminate the transaxle.

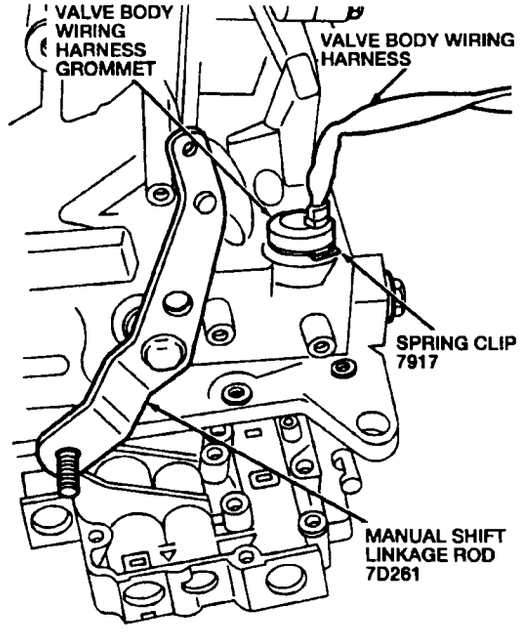
11. Remove the transmission oil filter bolts and gaskets and the transmission oil filter. Discard the transmission oil filter and gaskets.

NOTE: Identify the valve body bolts for installation.

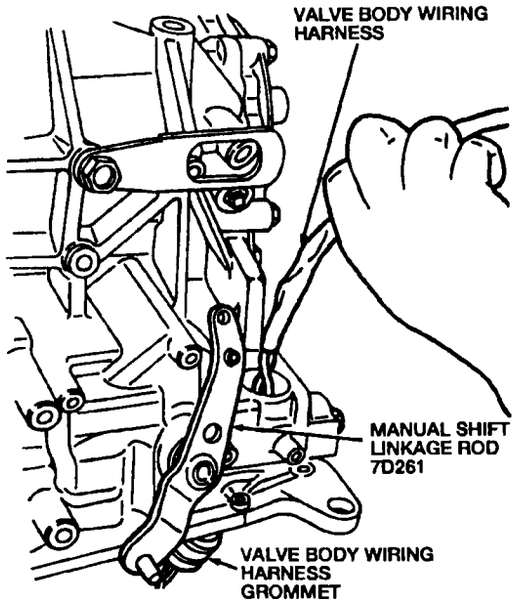
12. Remove valve body bolts a, b, and c.



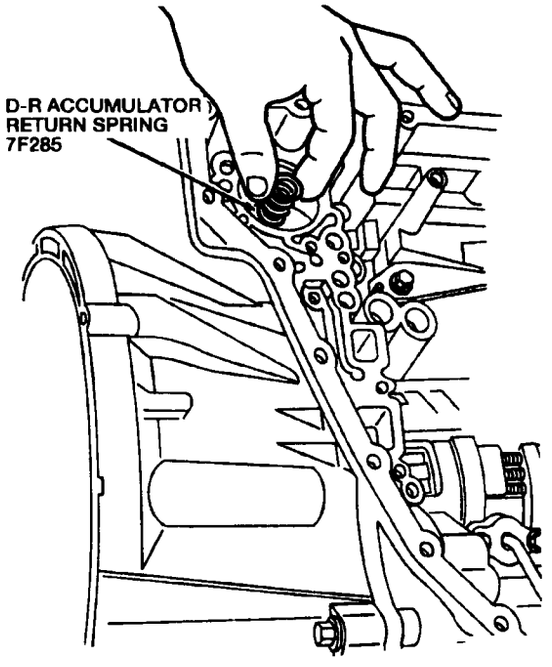
13. Remove the spring clip from the valve body wiring harness grommet.



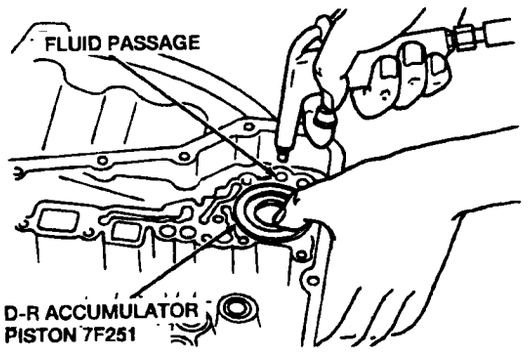
14. Slide the valve body wiring harness through the transaxle case.



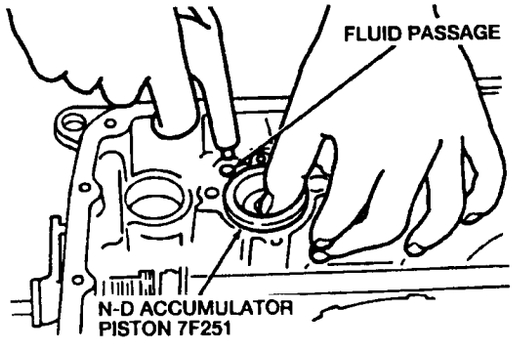
15. Remove the main control valve body (7A100) from the transaxle case.
16. Remove the D-R accumulator return spring from the D-R accumulator piston.



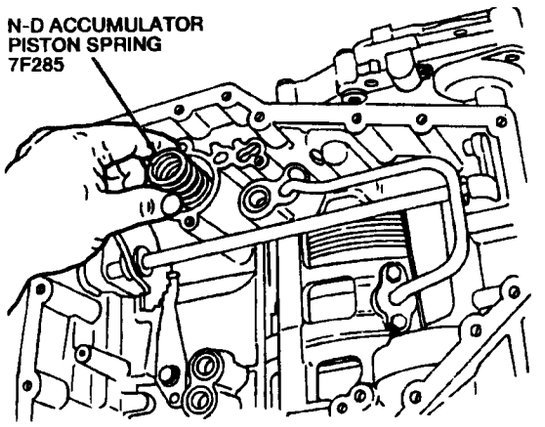
17. Apply compressed air to the D-R accumulator piston to remove it from its bore.



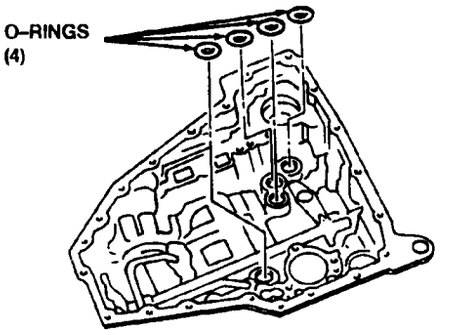
18. Remove and discard the two upper accumulator seals (7F250) from the D-R accumulator piston.
19. Apply compressed air to the N-D accumulator piston to remove it from its bore.



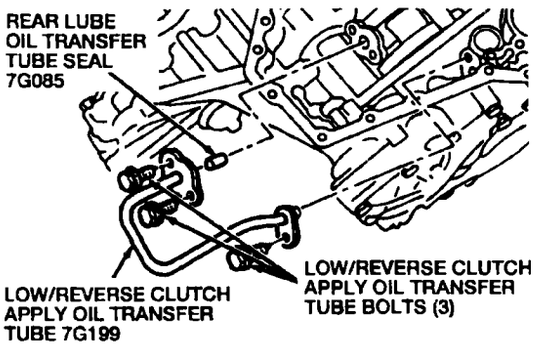
20. Remove and discard the two accumulator retainer seals (7F294) from the N-D accumulator.
21. Inspect the accumulator pistons (7F251) and contact surfaces for wear or damage. Replace any of the accumulator pistons if damaged.
22. Remove the N-D accumulator piston spring from its bore.



23. Remove the four O-rings from the transaxle case. Discard the O-rings.

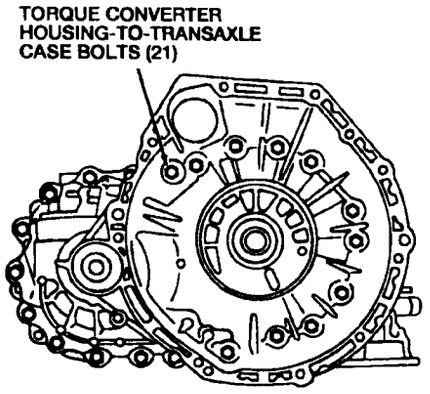


24. Remove the three low/reverse clutch apply oil transfer tube bolts.

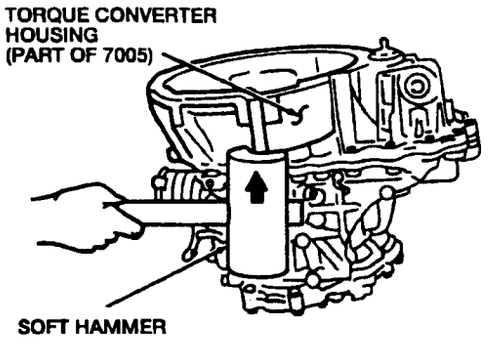


25. Remove the low/reverse clutch apply oil transfer tube and rear lube oil transfer tube seal (7G085). Inspect the rear lube oil transfer tube seal on the end of the low/reverse clutch apply oil transfer tube.

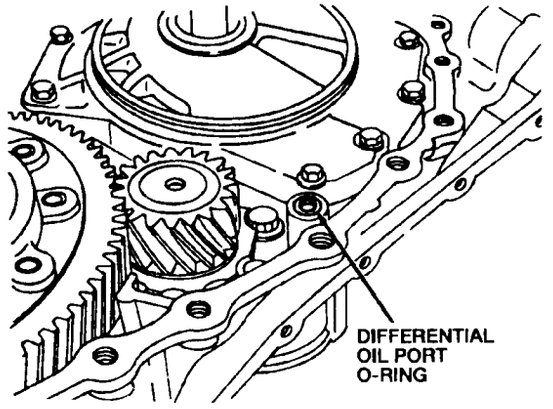
26. Remove the 21 torque converter housing-to-transaxle case bolts.



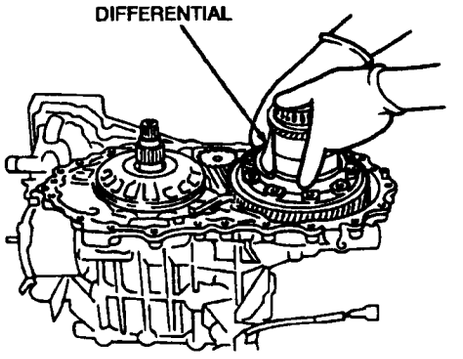
27. Tap lightly on the torque converter housing with a soft hammer to separate the torque converter housing from the transaxle case.



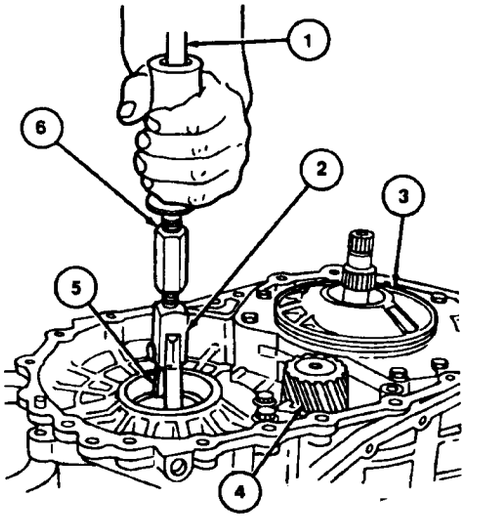
28. Remove the differential oil port O-ring from the differential oil port. Discard the differential oil port O-ring.



29. Remove the differential from the transaxle case.

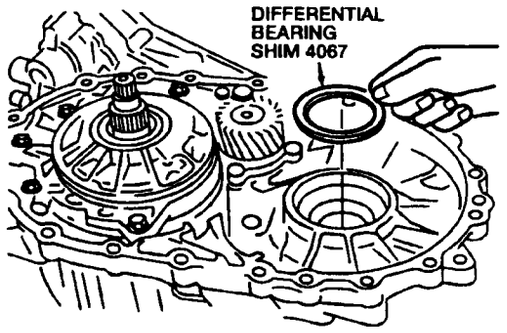


30. Use Impact Slide Hammer T50T-100-A, Stator and Driven Sprocket Bearing Remover T86P-70043-A and Adapter and Body (from Puller T58L-101-B) to remove the differential bearing outer race from the transaxle case.

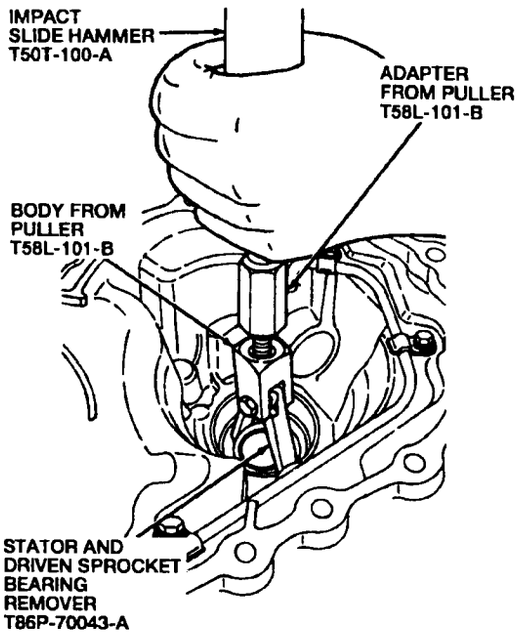


Item	Part Number	Description
1	T50T-100-A	Impact Slide Hammer
2	—	Body (From Puller T58L-101-B)
3	7A103	Oil Pump Assembly
4	7F342	Reduction Gear
5	T86P-70043-A	Stator and Driven Sprocket Bearing Remover
6	—	Adapter (From Puller T58L-101-B)

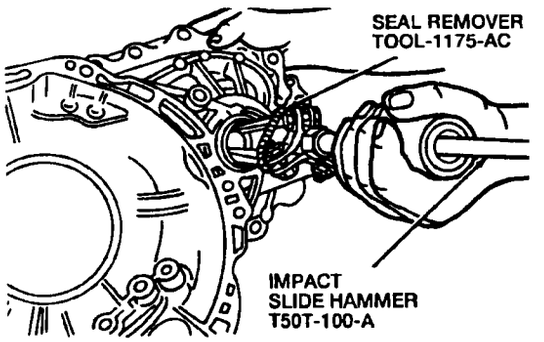
31. Remove the differential bearing shim (4067) from the transaxle case.



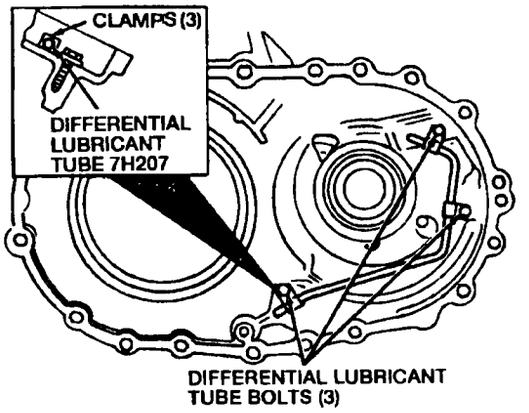
32. Use Impact Slide Hammer T50T-100-A, Stator and Driven Sprocket Bearing Remover T86P-70043-A, and the Adapter and Body (from Puller T58L-101-B) to remove the differential side bearing outer race from the torque converter housing.



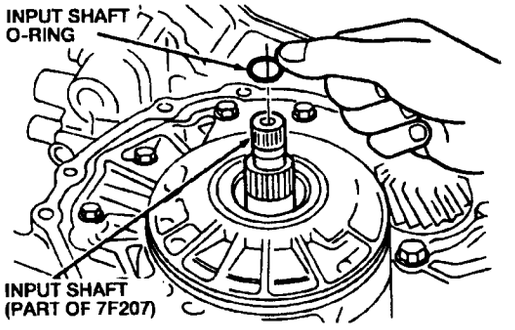
33. Use Seal Remover TOOL-1175-AC or equivalent and Impact Slide Hammer T50T-100-A to remove the differential oil seal from the torque converter housing.



34. Remove the three differential lubricant tube bolts and clamps, then the differential lubricant tube from the torque converter housing.



35. Remove the input shaft O-ring from the input shaft. Discard the input shaft O-ring.

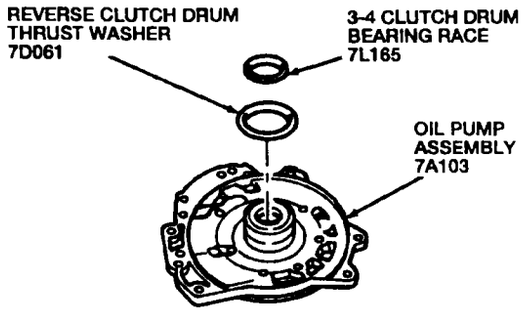


NOTE: The bearing race may not come out with the oil pump assembly.

36. Remove the eight oil pump bolts, then lift the oil pump assembly and oil pump baffle plate from the torque converter housing.

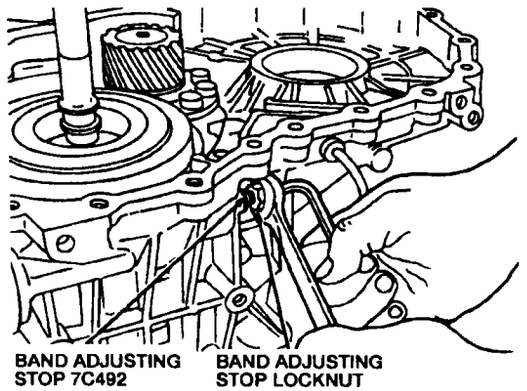
NOTE: If the 3-4 clutch drum bearing race does come out with the oil pump assembly, remove the reverse clutch drum thrust washer and the 3-4 clutch drum bearing race at this time.

37. Remove the reverse clutch drum thrust washer and the 3-4 clutch drum bearing race from the oil pump assembly.



38. If the reverse clutch drum thrust washer and the 3-4 clutch drum bearing race are not removed with the oil pump assembly, remove the reverse clutch drum thrust washer and 3-4 clutch drum bearing race from the transaxle case.

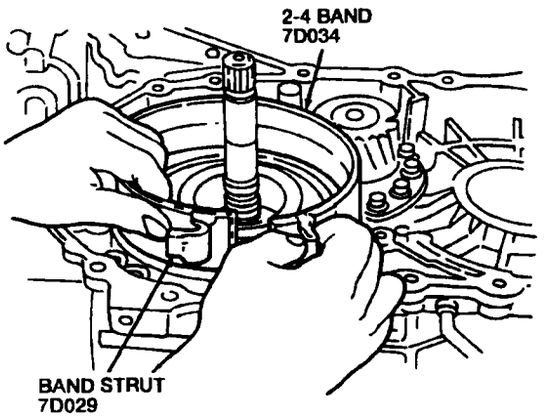
39. While holding the band adjusting stop (7C492), loosen the band adjusting stop locknut.

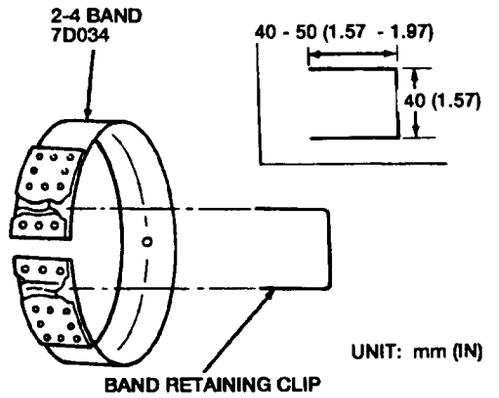


40. Remove the band adjusting stop, washer, and band adjusting stop locknut.

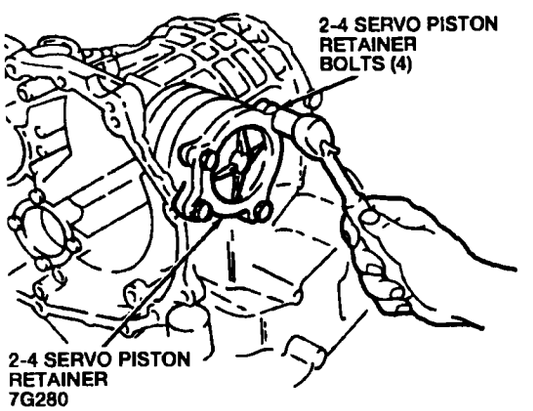
CAUTION: To prevent damage to the 2-4 band during and after removal, do not stretch the 2-4 band unnecessarily. After removal of the 2-4 band, secure it with a band retaining clip or mechanic's wire.

41. Remove the 2-4 band and band strut from the transaxle case. Secure the 2-4 band with a band retaining clip or mechanic's wire.

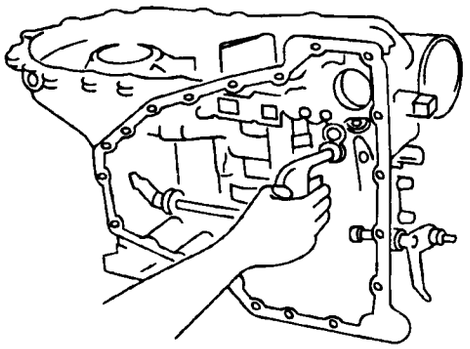




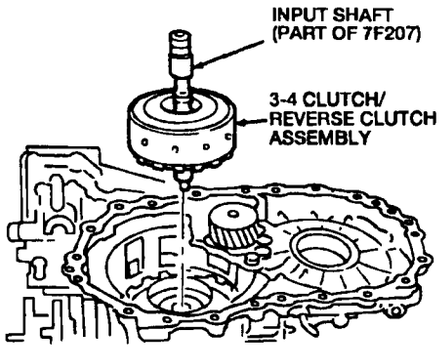
42. Remove the four 2-4 servo piston retainer bolts, the 2-4 servo piston retainer and the gasket. Discard the gasket.



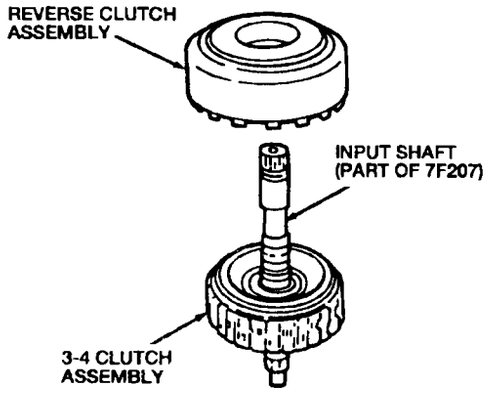
43. Remove the 2-4 servo assembly from the transaxle case by applying compressed air as shown.



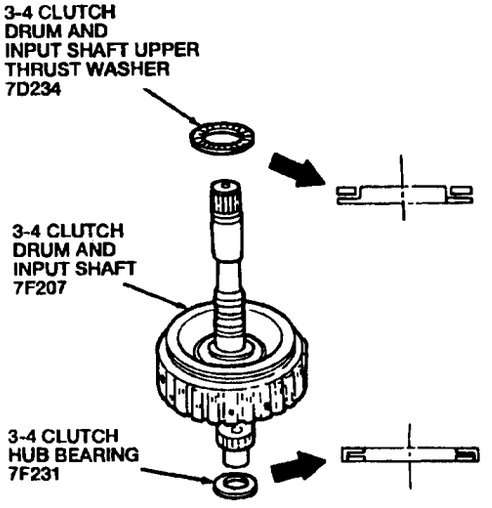
44. Remove the input shaft along with the 3-4 clutch / reverse clutch assembly.



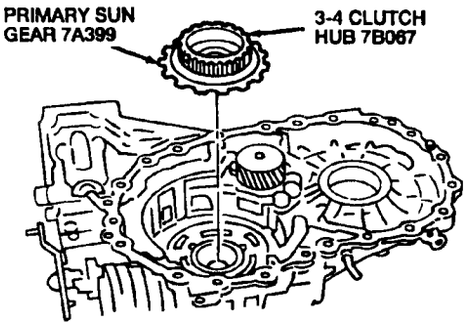
45. Remove the reverse clutch assembly from the input shaft and 3-4 clutch assembly.



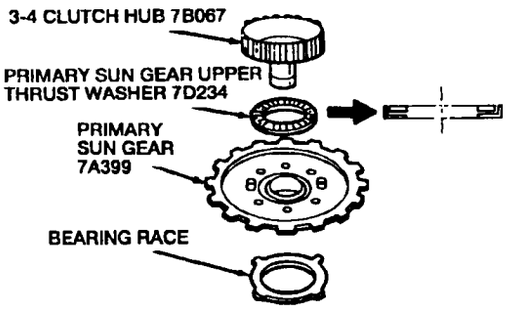
46. Remove the 3-4 clutch drum and input shaft upper thrust washer and the 3-4 clutch hub bearing from the 3-4 clutch drum and input shaft.



47. Remove the 3-4 clutch hub and the primary sun gear (7A399) from the transaxle case.

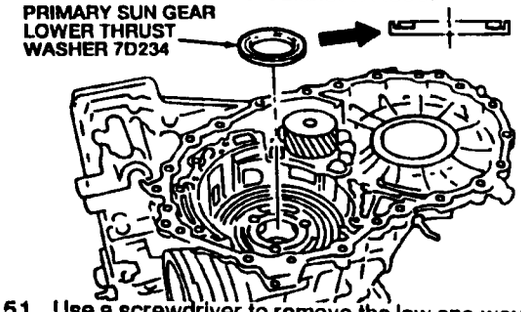


48. Remove the primary sun gear and the primary sun gear upper thrust washer from the 3-4 clutch hub.

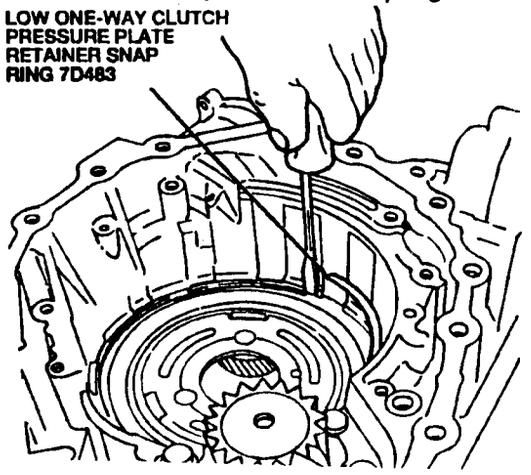


49. Remove the primary sun gear bearing race from the top of the primary sun gear.

50. Remove the primary sun gear lower thrust washer from the front planet (7A398).



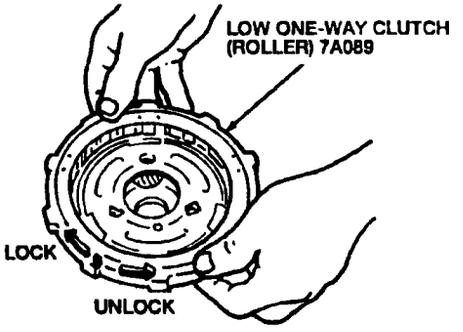
51. Use a screwdriver to remove the low one-way clutch pressure plate retainer snap ring.



CAUTION: Have an assistant hold the low one-way clutch (roller) so it does not fall on the ground.

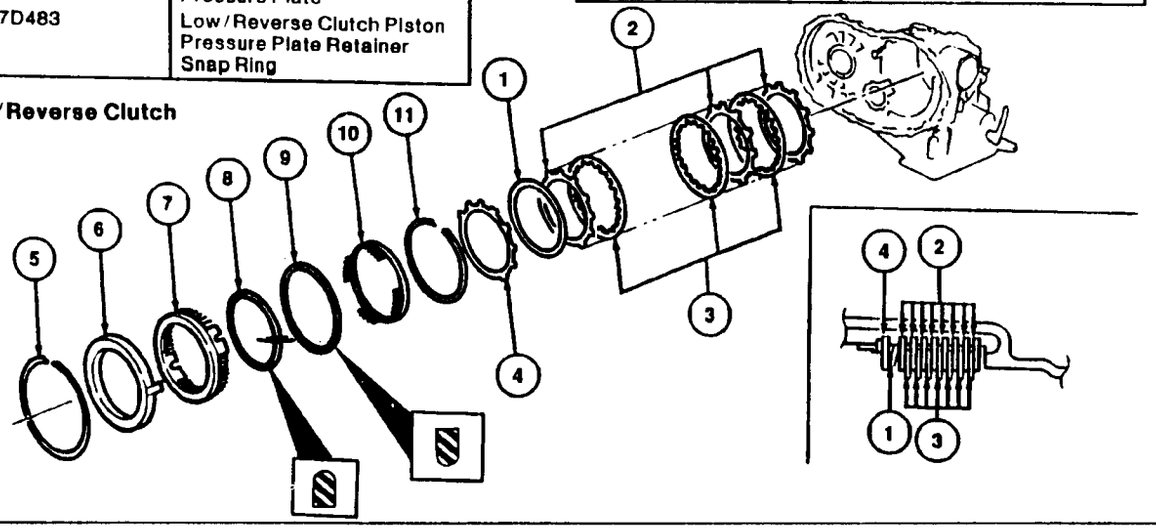
52. Have an assistant hold the low one-way clutch (roller) and turn the transaxle over.
53. Rotate the front planet and remove the low one-way clutch (roller). If the low one-way clutch (roller) does not slide out, gently tap the transaxle case with a plastic hammer until the low one-way clutch (roller) slides out.

NOTE: Ensure that the low one-way clutch (roller) turns in only one direction. If the low one-way clutch (roller) turns in both directions, replace the low one-way clutch (roller).

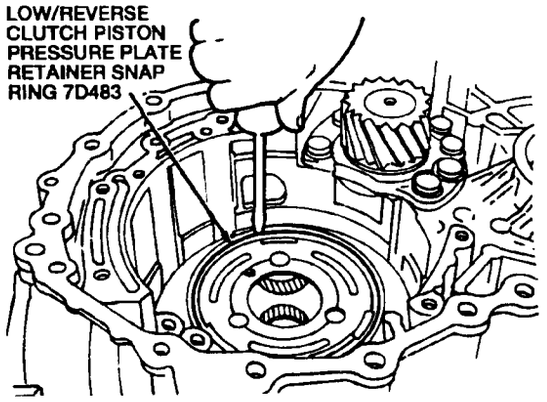


Item	Part Number	Description
1	7B070	Dish Plate
2	7B442	Low/Reverse External Spline Clutch Plates (8)
3	7B164	Low/Reverse Internal Spline Clutch Plates (7)
4	7B066	Low/Reverse Clutch Pressure Plate
5	7D483	Low/Reverse Clutch Piston Pressure Plate Retainer Snap Ring
6	7F341	Low/Reverse Clutch Piston Retainer
7	7A262	Low/Reverse Clutch Piston
8	7E212	Clutch Cylinder Seal
9	7C051	Rear Clutch Piston Outer Oil Seal
10	7A527	Low/Reverse Clutch Piston Spring Retainer
11	7D483	Low/Reverse Clutch Pressure Plate Retainer Snap Ring

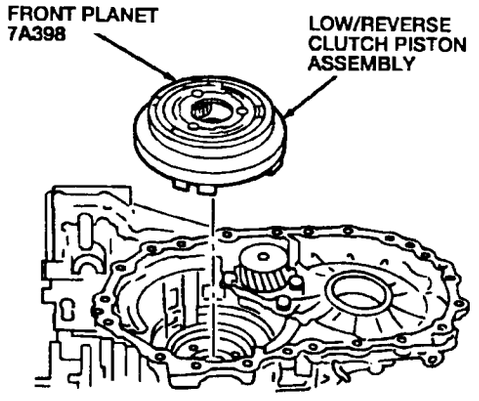
Low/Reverse Clutch



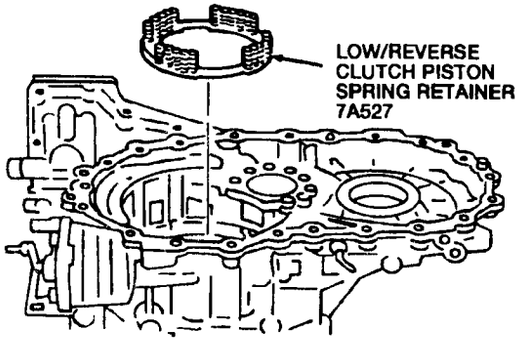
54. Turn the transaxle case back over and use a screwdriver to remove the low / reverse clutch piston pressure plate retainer snap ring.



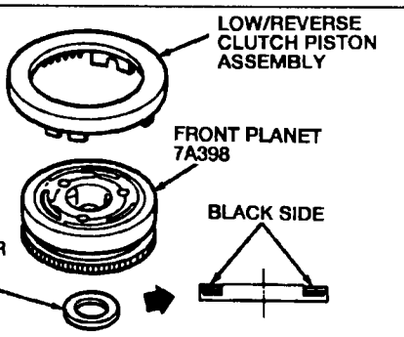
55. Remove the front planet and the low / reverse clutch piston assembly.



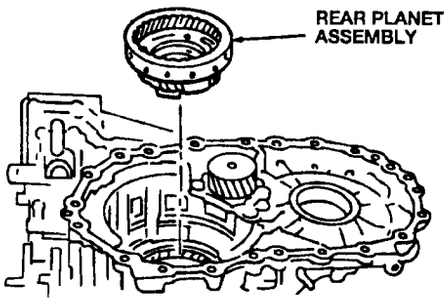
56. Remove the low / reverse clutch piston spring retainer from the low / reverse clutch piston.



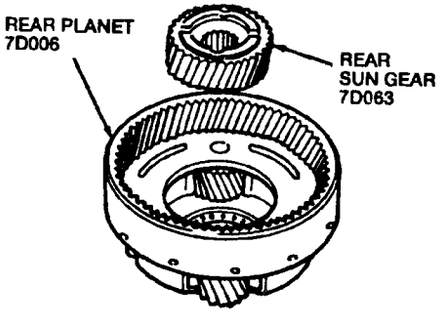
57. Remove the rear sun gear front thrust bearing and the low / reverse clutch piston assembly from the front planet.



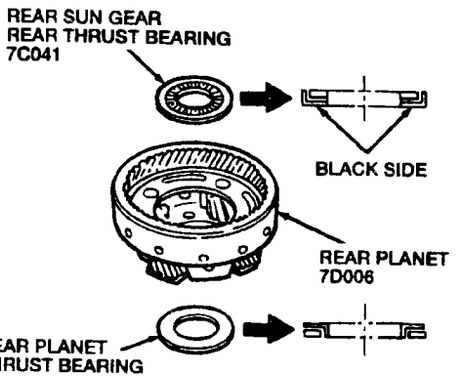
58. Remove the rear planet assembly from the transaxle case.



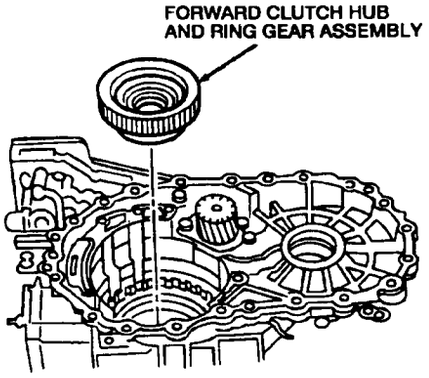
59. Remove the rear sun gear from the rear planet.



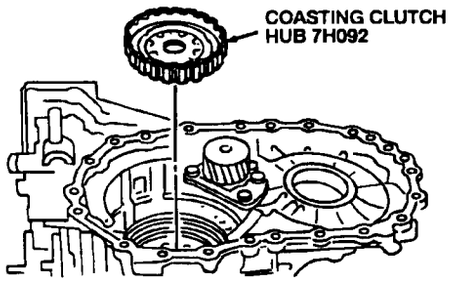
60. Remove the two thrust bearings from the rear planet.



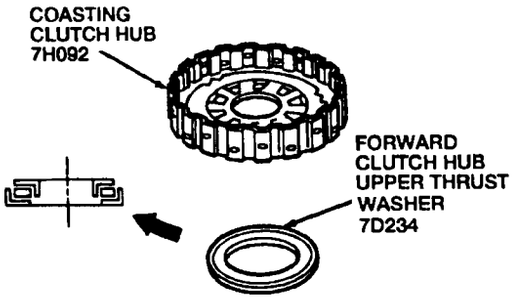
61. Remove the forward clutch hub and ring gear assembly from the transaxle case.



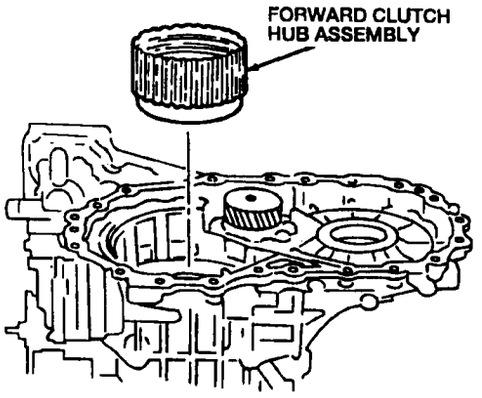
62. Remove the coasting clutch hub from the transaxle case.



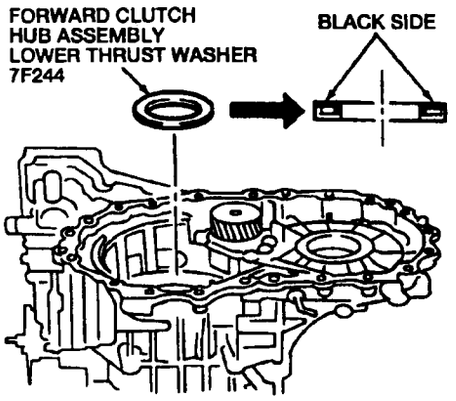
63. Remove the forward clutch hub upper thrust washer from the coasting clutch hub.



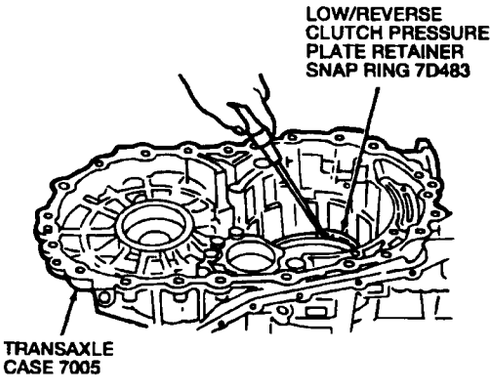
64. Remove the forward clutch hub assembly from the transaxle case.



65. Remove the forward clutch hub assembly lower thrust washer from the transaxle case.

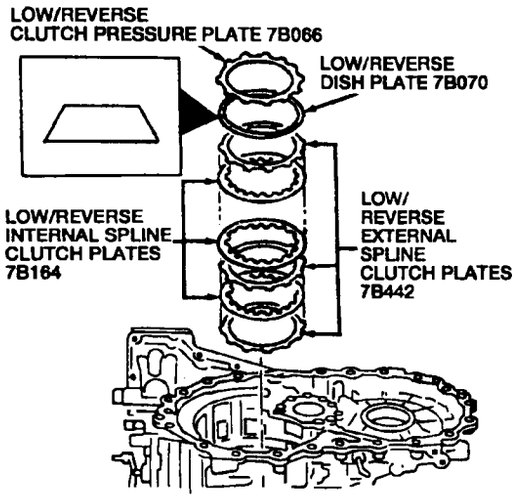


66. Use a screwdriver to remove the low / reverse clutch pressure plate retainer snap ring from the transaxle case.

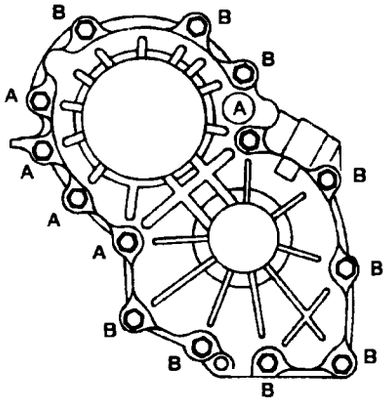


NOTE: Identify the clutch plates, their order, and their direction when removing them to aid in installation.

67. Remove the low / reverse clutch pressure plate, low / reverse dish plate, seven low / reverse internal spline clutch plates, and eight low / reverse external spline clutch plates.



NOTE: Two types of side cover bolts are used to attach the side cover to the transaxle case. Identify the placement of the side cover bolts labeled B for installation and discard the side cover bolts labeled A, as shown.

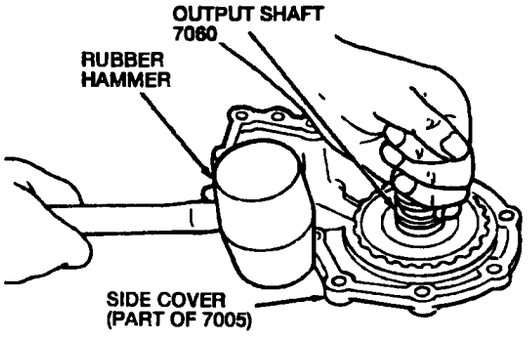


68. Remove the side cover bolts.

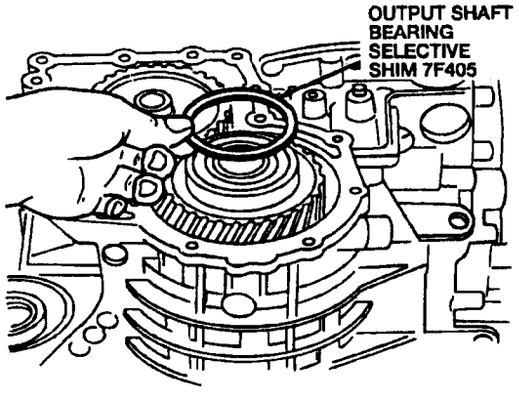
CAUTION: The output shaft assembly may drop out when the side cover is removed.

69. Remove the side cover by lightly tapping it with a rubber hammer.

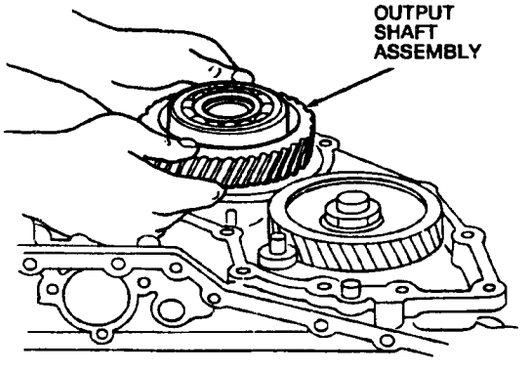
NOTE: If the output shaft (7060) is removed with the side cover, separate the output shaft from the side cover by gently tapping with a rubber hammer.



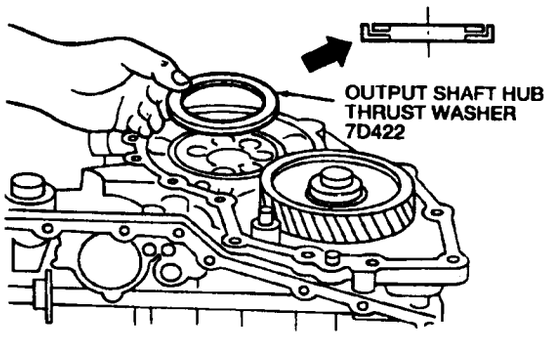
70. Remove the output shaft bearing selective shim (7F405).



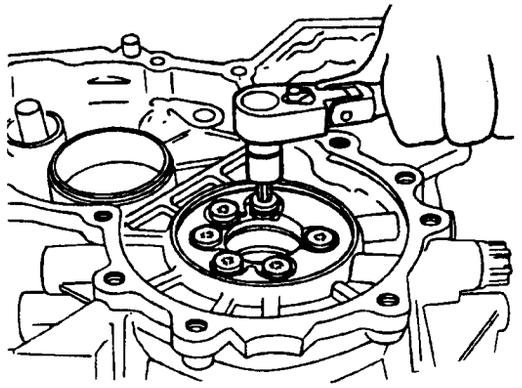
71. If the output shaft assembly was not removed with the side cover, remove the output shaft assembly.



72. Remove the output shaft hub thrust washer (7D422).

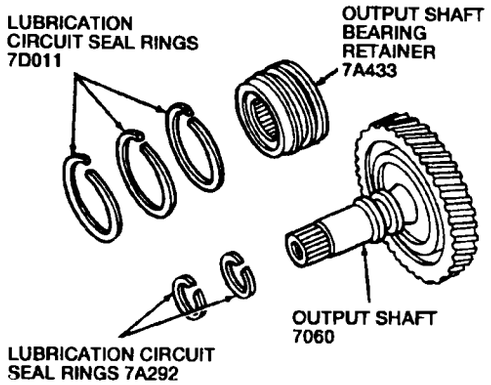


73. Use a Torx® bit T-40 to remove the output shaft bearing retainer bolts. Remove the output shaft bearing retainer.



CAUTION: The output shaft lubrication circuit seal rings must be replaced during transaxle assembly.

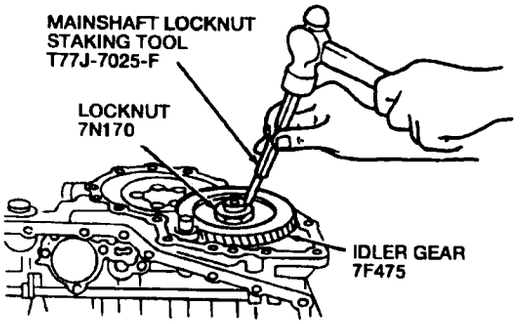
74. Remove the lubrication circuit seal rings from the output shaft and bearing retainer. Discard the lubrication circuit seal rings.



75. Place the manual shift linkage rod into the PARK position to lock the idler gear (7F475).

NOTE: Only remove the idler gear, idler gear shaft, and the reduction gear if the idler gear or reduction gear is worn or if the bearings are worn or noisy.

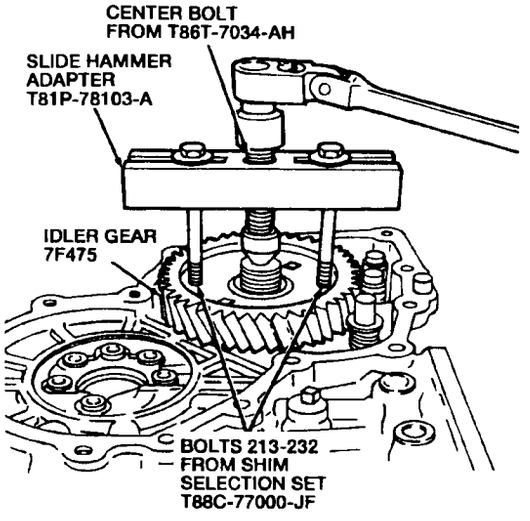
76. Use Mainshaft Locknut Staking Tool T77J-7025-F to unstake the locknut (7N170).



77. Remove and discard the locknut.

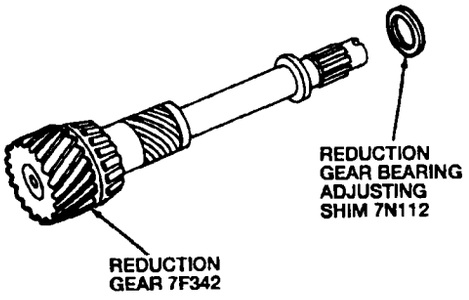
CAUTION: Do not let the reduction gear fall when the idler gear is removed.

78. Use Slide Hammer Adapter T81P-78103-A, Center Bolt from Output Shaft Seal Remover T86T-7034-AH and Bolts (part of Shim Selection Set T88C-77000-JF) to remove the idler gear.

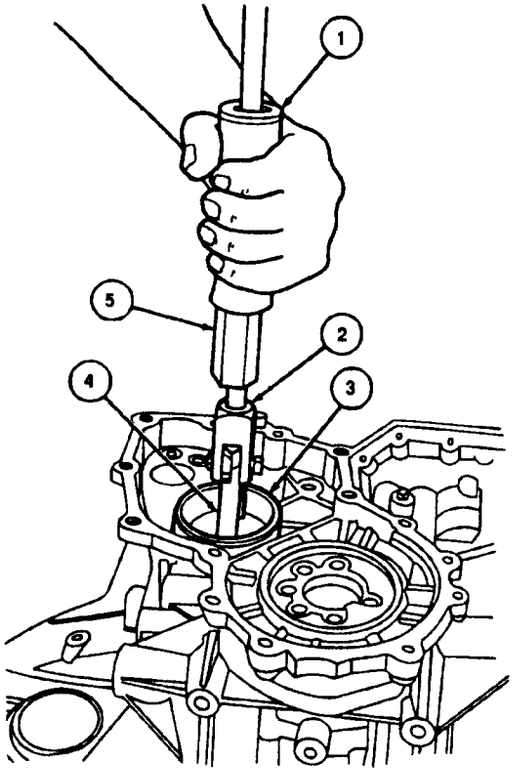


79. Remove the reduction gear from the transaxle case.

80 Remove the reduction gear bearing adjusting shim from the reduction gear.



81. Use Adapter and Puller (from Puller T58L-101-B) and Stator and Driven Sprocket Bearing Replacer T86P-70043-A to remove the idler gear bearing outer race from the transaxle case.



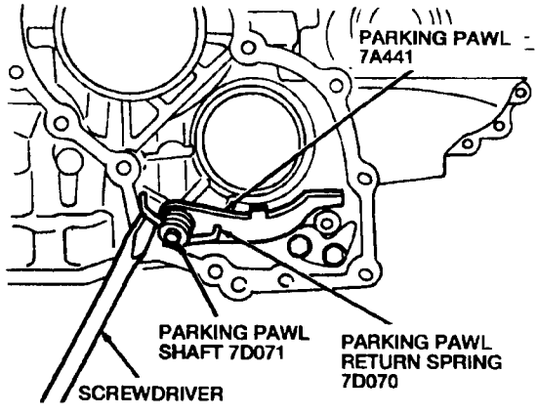
Item	Part Number	Description
1	T50T-100-A	Impact Slide Hammer
2	—	Body (From Puller T58L-101-B)

(Continued)

Item	Part Number	Description
3	—	Idler Gear Bearing Outer Race (Part of 7F548)
4	T86P-70043-A	Stator and Driven Sprocket Bearing Remover
5	—	Adapter (From Puller T58L-101-B)

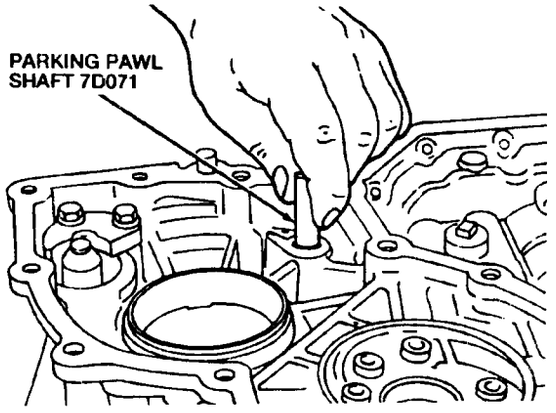
82. Remove the seven reduction gear bearing outer race bolts and the reduction gear bearing outer race.

83. Use a screwdriver to remove the parking pawl return spring (7D070) from the parking pawl shaft and parking pawl (7A441).

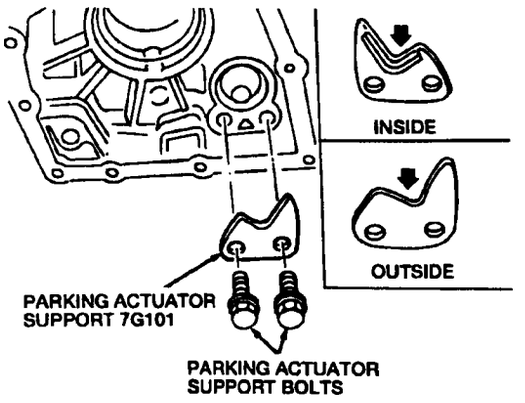


84. Remove the parking pawl from the transaxle case.

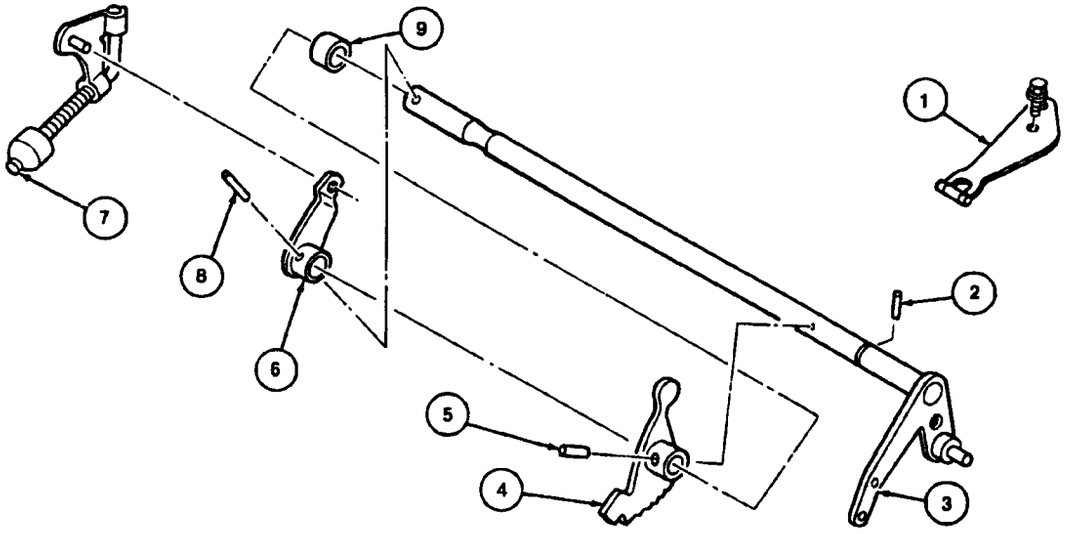
85. Remove the parking pawl shaft from the transaxle case.



86. Remove the two parking actuator support bolts, then the parking actuator support from the transaxle case.



Manual Shift Linkage

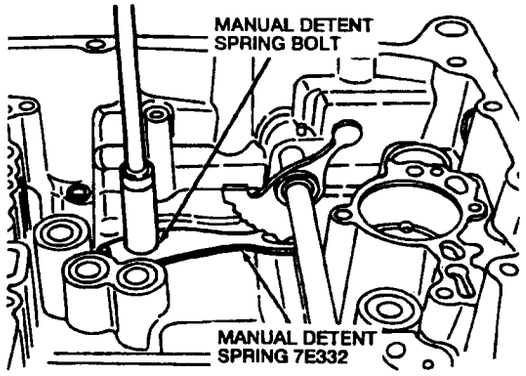


Item	Part Number	Description
1	7E332	Manual Detent Spring
2	7E333	Manual Shift Linkage Rod Roll Pin
3	7D261	Manual Shift Linkage Rod
4	7A115	Manual Detent Lever
5	7E333	Manual Detent Lever Inner Pin

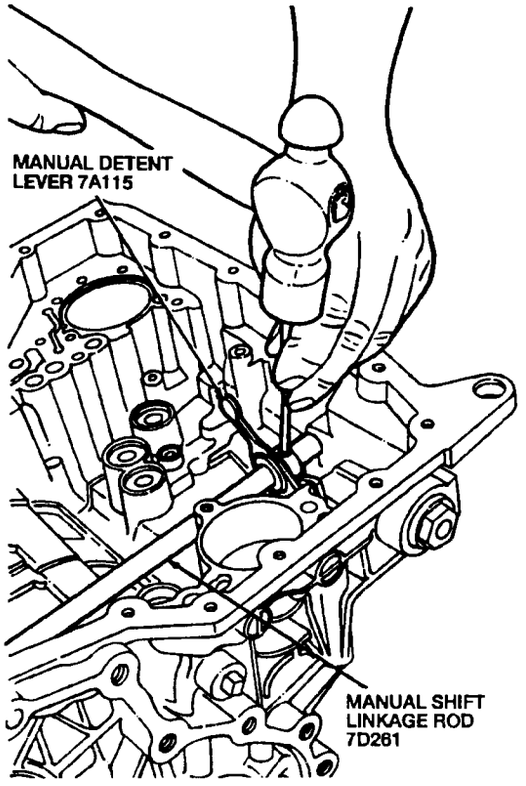
Item	Part Number	Description
6	7A121	Park Actuator Support
7	7A232	Parking Lever Actuating Rod
8	7E333	Park Actuator Support Roll Pin
9	7B498	Manual Control Lever Oil Seal

(Continued)

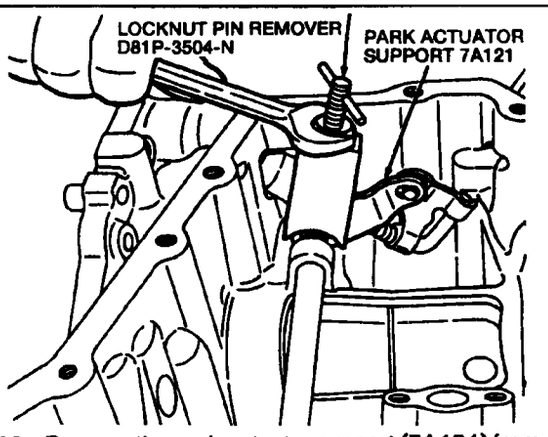
87. Remove the manual detent spring bolt from the manual detent spring, then the manual detent spring from the transaxle case.



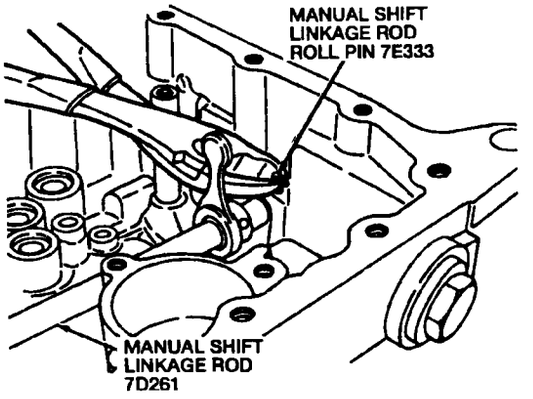
88. Use a pin punch to drive the manual detent lever inner pin from the manual detent lever. Discard the manual detent lever inner pin.



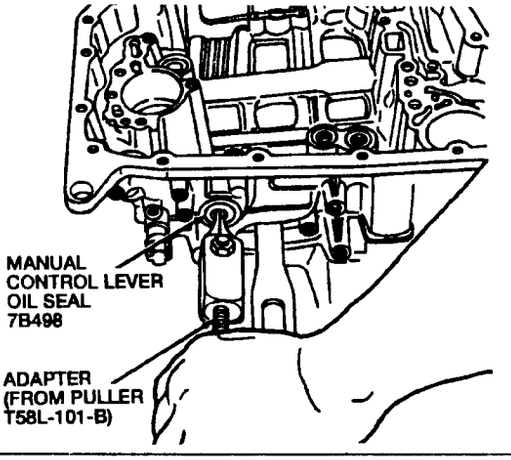
89. Use Locknut Pin Remover D81P-3504-N or equivalent to remove the park actuator support roll pin. Discard the park actuator support roll pin.



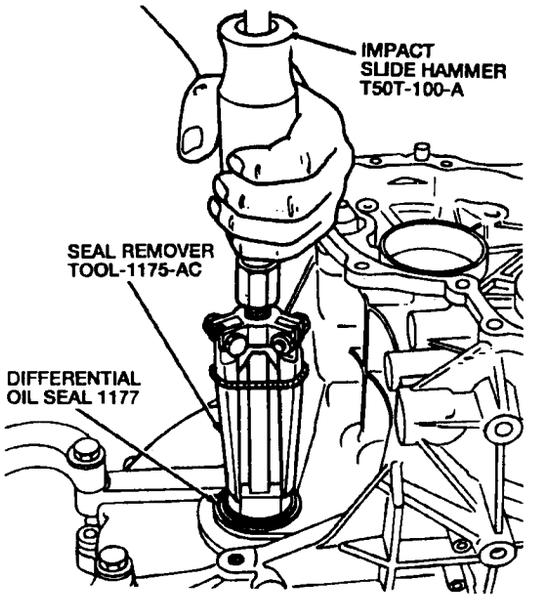
90. Remove the park actuator support (7A121) from the manual shift linkage rod.
91. Remove the parking lever actuating rod (7A232) from the transaxle case.
92. Pull the manual shift linkage rod roll pin from the transaxle case. Discard the manual shift linkage rod roll pin.



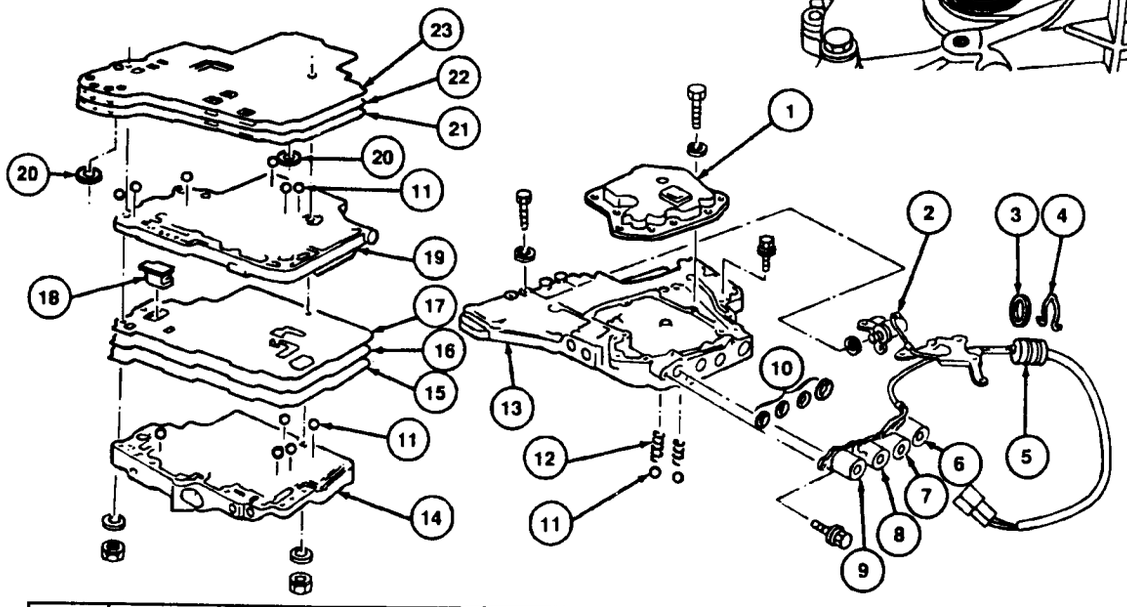
93. Remove the manual shift linkage rod and the manual detent lever from the transaxle case.
94. Use Adapter (from Puller T58L-101-B) and Impact Slide Hammer T50T-100-A to remove the manual control lever oil seal (7B498).



95. Use Seal Remover TOOL-1175-AC or equivalent, and Impact Slide Hammer T50T-100-A to remove the differential oil seal from the transaxle case.



Main Control Valve Body — Exploded View

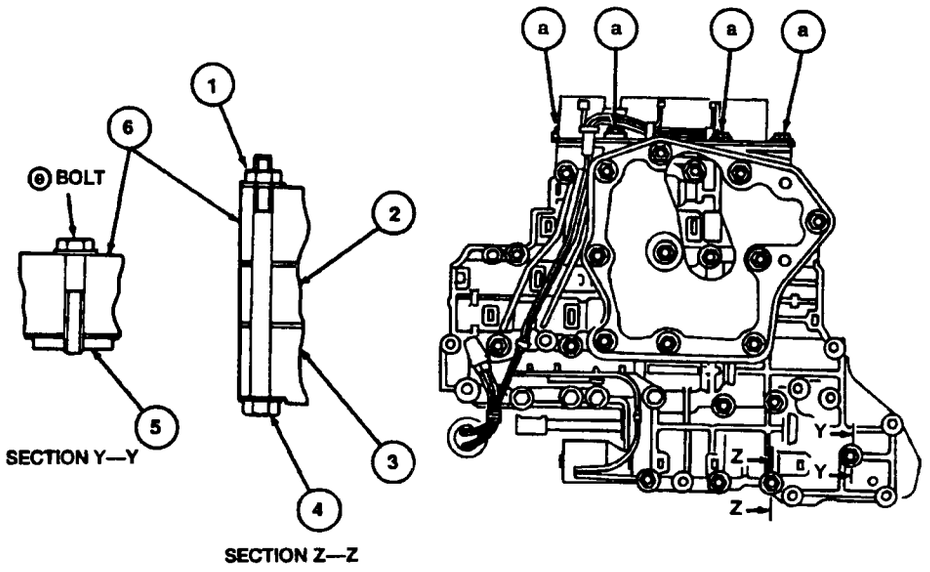


Item	Part Number	Description
1	7A098	Oil Filter
2	—	Line Pressure Solenoid (Part of 7G484)
3	—	O-Ring
4	7917	Spring Clip
5	—	Valve Body Wiring Harness (Part of 7G484)
6	—	Torque Converter Clutch (TCC) Control Solenoid (Part of 7G484)
7	—	Coasting Clutch Solenoid (Part of 7G484)
8	—	Shift Solenoid A (Part of 7G484)
9	—	Shift Solenoid B (Part of 7G484)
10	—	O-Rings
11	7H198	Valve Body Check Ball
12	7D017	Line Pressure Relief Valve Spring

Item	Part Number	Description
13	—	Upper Control Valve Body (Part of 7A100)
14	—	Lower Control Valve Body (Part of 7A100)
15	7H173	Upper Separating Gasket
16	—	Upper Separating Plate (Part of 7A100)
17	7H202	Upper Intermediate Separating Gasket
18	7E242	Solenoid Reducing Filter
19	—	Intermediate Control Valve Body (Part of 7A100)
20	—	Accumulator Support Plate (Part of 7A100)
21	7D100	Lower Intermediate Separating Gasket
22	—	Lower Separating Plate (Part of 7A100)
23	7C155	Lower Separating Gasket

(Continued)

Main Control Valve Body Bolt Identification



Item	Part Number	Description
1	—	Valve Body Nut f
2	—	Intermediate Control Valve Body (Part of 7A100)
3	—	Upper Control Valve Body (Part of 7A100)

Item	Part Number	Description
4	—	Reamer Bolt
5	—	Support Plate (Part of 7A100)
6	—	Lower Control Valve Body (Part of 7A100)

(Continued)

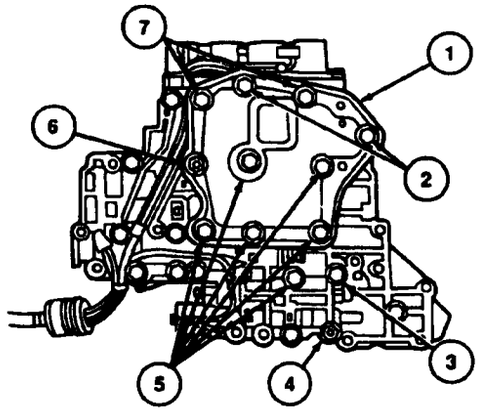
VALVE BODY BOLTS

Bolt symbol	a	b	c	d	e	f
Bolt length mm (In)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2

f: Reamer bolt and nut.

NOTE: The only serviceable components of the main control valve body are gaskets, O-rings, springs, and check balls. If any valves, valve springs, or valve bodies are damaged, the entire main control valve body must be replaced.

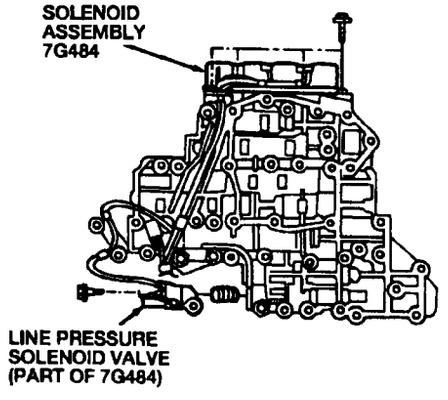
1. Remove valve body bolts a and d, valve body nut f, and the oil filter from the main control valve body.



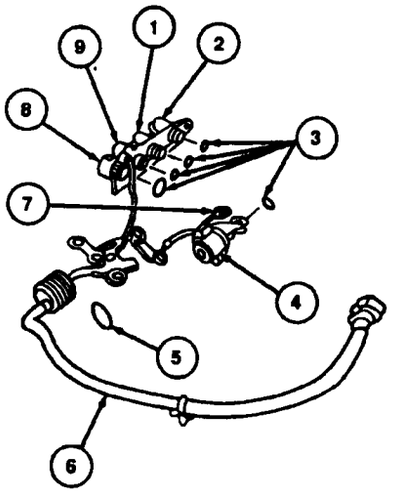
Item	Part Number	Description
1	7A098	Oil Filter
2	—	Valve Body Bolts a
3	—	Valve Body Bolt c
4	—	Valve Body Nut f
5	—	Valve Body Bolts d
6	—	Valve Body Nut f
7	—	Valve Body Bolts d

NOTE: The solenoid assembly, line pressure solenoid valve, and Transaxle Oil Temperature (TOT) sensor are hard-wired into the valve body wiring harness and are serviced as an assembly with the valve body wiring harness.

2. Remove the solenoid assembly, line pressure solenoid, TOT sensor and valve body wiring harness from the main control valve body.

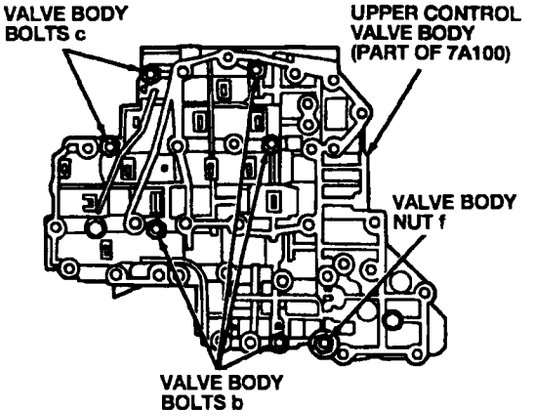


3. Remove the O-rings from the solenoid assembly, line pressure solenoid, and valve body wiring harness. Discard the O-rings.

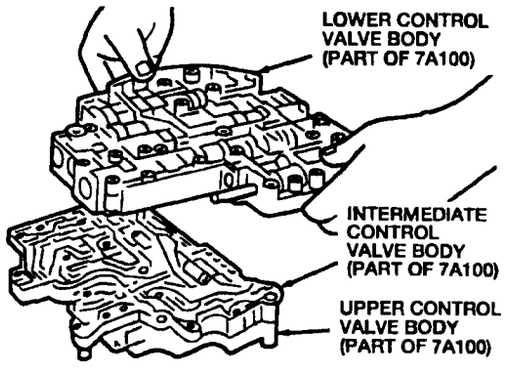


Item	Part Number	Description
1	—	Shift Solenoid B (Part of 7G484)
2	—	Shift Solenoid A (Part of 7G484)
3	—	O-Rings (5)
4	—	Line Pressure Solenoid (Part of 7G484)
5	—	O-Ring
6	—	Valve Body Wiring Harness (Part of 7G484)
7	—	Transmission Oil Temperature (TOT) Sensor (Part of 7G484)
8	—	Torque Converter Clutch (TCC) Control Solenoid (Part of 7G484)
9	—	Coasting Clutch Solenoid (Part of 7G484)

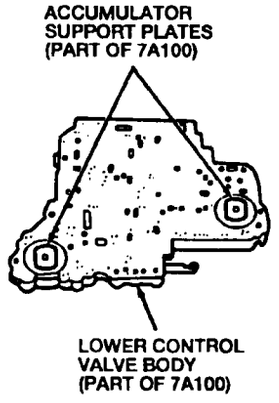
4. Place the upper control valve body face down, then remove valve body bolts b and c and nut f.



5. Remove the lower control valve body from the intermediate and upper control valve bodies.

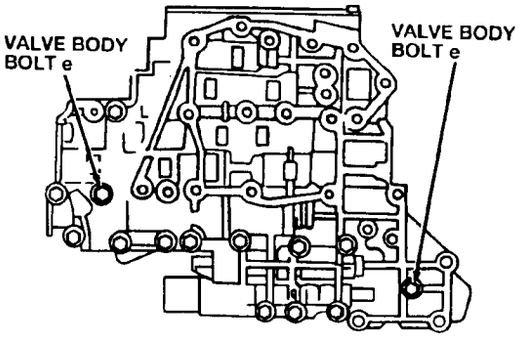


6. Turn the lower control valve body over and remove the two accumulator support plates.

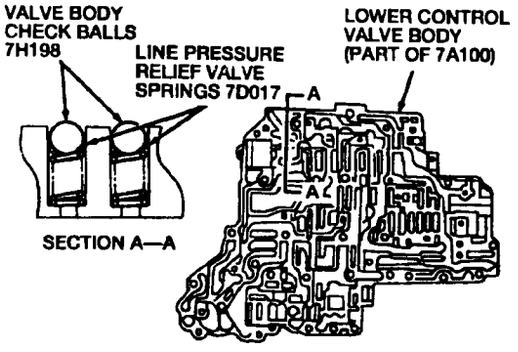


CAUTION: Do not lose the valve body check balls or the relief valve springs.

7. Remove the two valve body bolts e. Then remove the lower separating plate and the lower separating gasket from the lower control valve body.

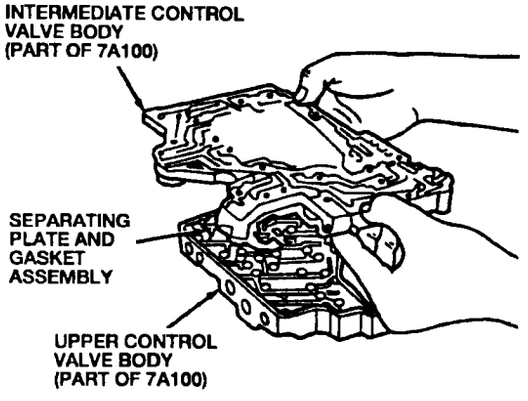


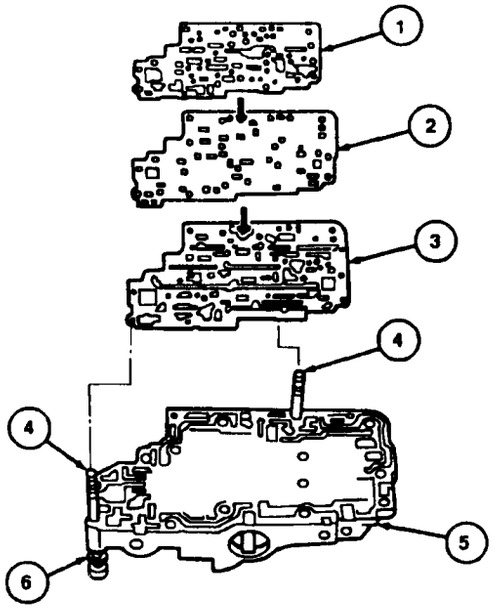
8. Remove the valve body check balls and the line pressure relief valve springs from the lower control valve body.



CAUTION: Do not lose the valve body check balls.

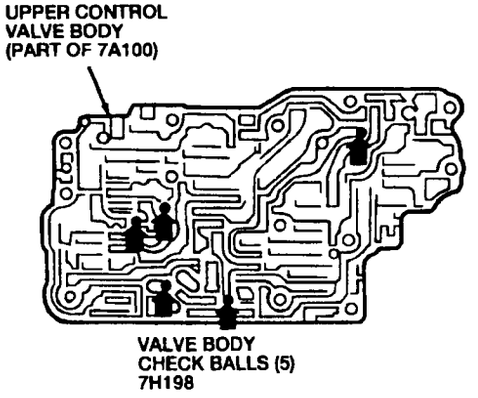
9. With the intermediate control valve body facing up, remove the intermediate control valve body from the upper control valve body.



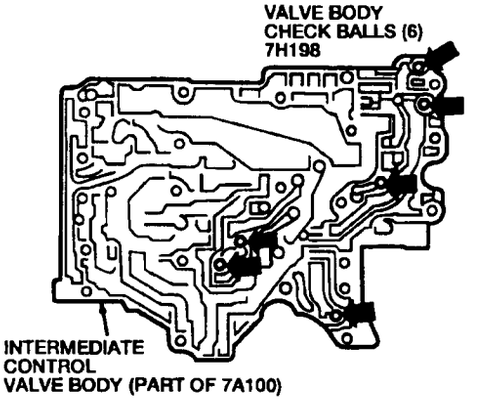


Item	Part Number	Description
1	7H202	Upper Intermediate Separating Gasket
2	—	Upper Separating Plate (Part of 7A100)
3	7H173	Upper Separating Gasket
4	—	Reamer Bolt f
5	—	Upper Control Valve Body (Part of 7A100)
6	—	Washer

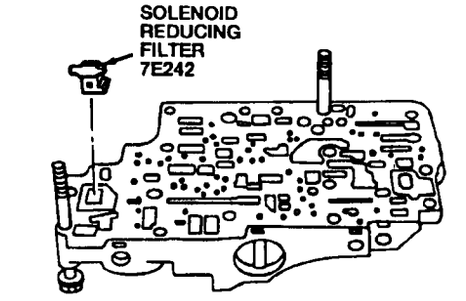
13. Check for proper positioning of the valve body check balls in the upper control valve body, then remove the five valve body check balls.



10. Check for proper positioning of the valve body check balls in the intermediate control valve body, then remove the six valve body check balls.



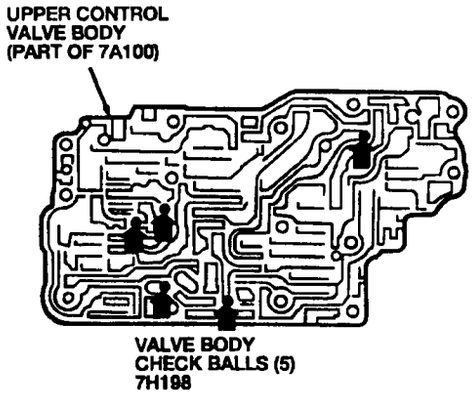
11. Remove the solenoid reducing filter from the upper control valve body.



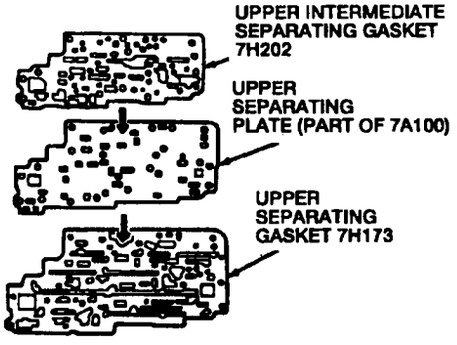
12. Remove the reamer bolts f from the bottom of the upper control valve body. Then remove the upper intermediate separating gasket, upper separating plate, and upper separating gasket from the upper control valve body.

Assembly

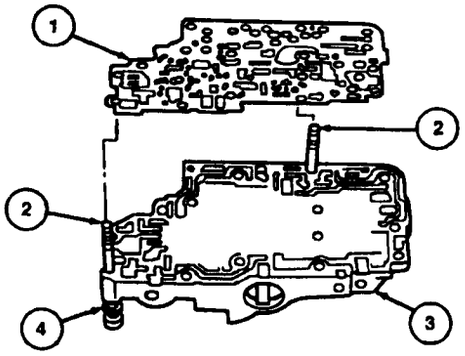
1. Install the five valve body check balls in the upper valve body.



2. Combine the upper separating gasket, upper intermediate separating gasket, and the upper separating plate as shown.

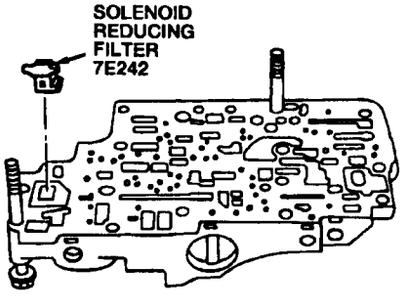


3. Install the reamer bolts from the bottom of the upper control valve body, then install the separating plate and gaskets onto the upper control valve body.

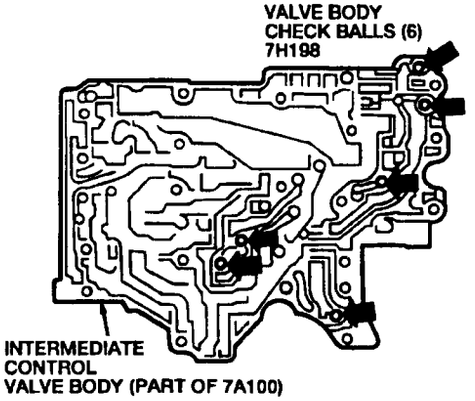


Item	Part Number	Description
1	—	Separating Plate and Gaskets
2	—	Reamer Bolt
3	—	Upper Control Valve Body (Part of 7A100)
4	—	Washer

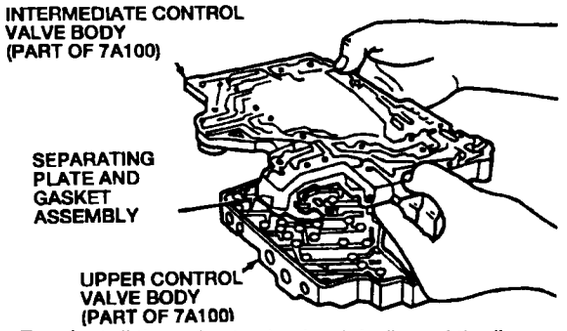
4. Install the solenoid reducing filter into the upper control valve body.



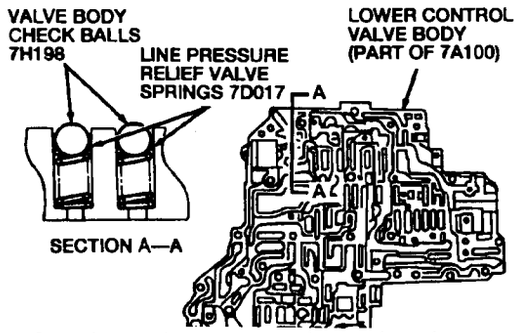
5. Install the six valve body check balls in the intermediate control valve body.



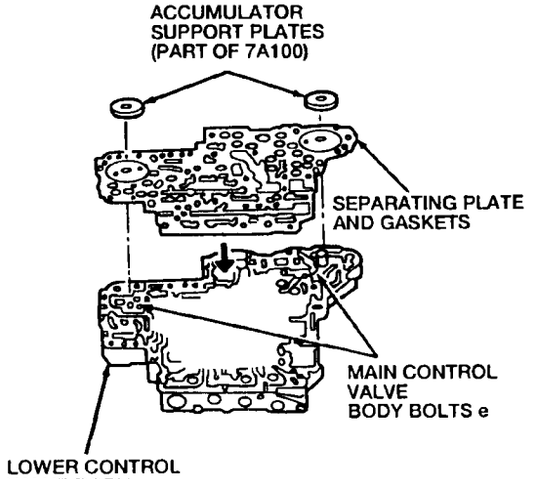
6. Use the reamer bolts as a guide to place the intermediate control valve body onto the upper control valve body.



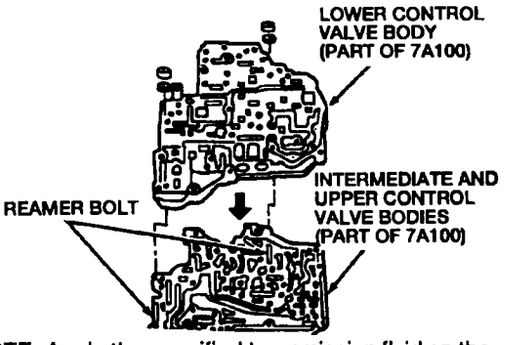
7. Install the valve body check balls and the line pressure relief valve springs into the lower control valve body.



8. Combine the lower separating gasket, the separating plate and the lower intermediate separating gasket.
9. Install the valve body bolts e to the bottom of the lower control valve body, then place the separating gaskets and plate onto the lower control valve body.
10. Install the accumulator support plates onto the lower control valve body as shown.

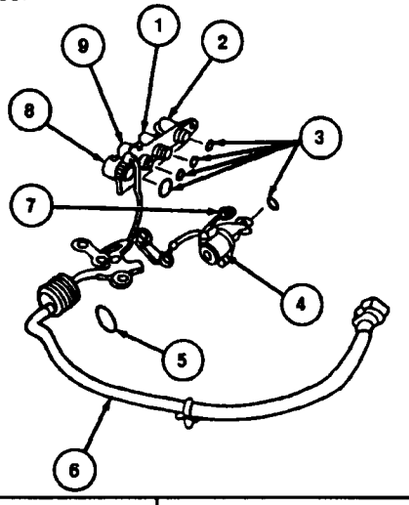


11. Install the lower control valve body onto the intermediate valve body and tighten the reamer bolt nuts slightly.



NOTE: Apply the specified transmission fluid on the O-rings.

12. Install new O-rings on the solenoid assembly, line pressure solenoid, and valve body wiring harness.



Item	Part Number	Description
1	—	Shift Solenoid B (Part of 7G484)
2	—	Shift Solenoid A (Part of 7G484)
3	—	O-Rings (5)
4	—	Line Pressure Solenoid (Part of 7G484)
5	—	O-Ring
6	—	Valve Body Wiring Harness (Part of 7G484)
7	—	Transmission Oil Temperature (TOT) Sensor (Part of 7G484)
8	—	Torque Converter Clutch (TCC) Control Solenoid (Part of 7G484)
9	—	Coasting Clutch Solenoid

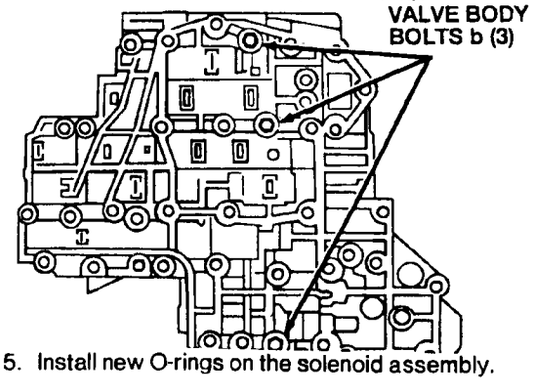
13. Install the remaining valve body bolts.

VALVE BODY BOLTS

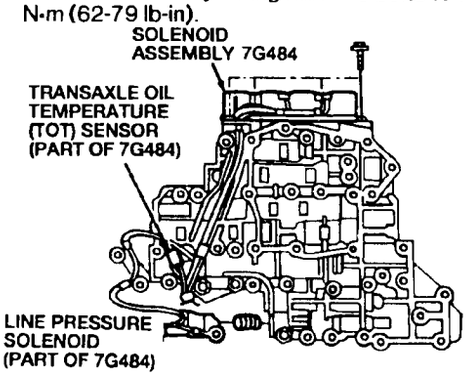
Bolt symbol	a	b	c	d	e	f
Bolt length mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2

f: Reamer bolt and nut.

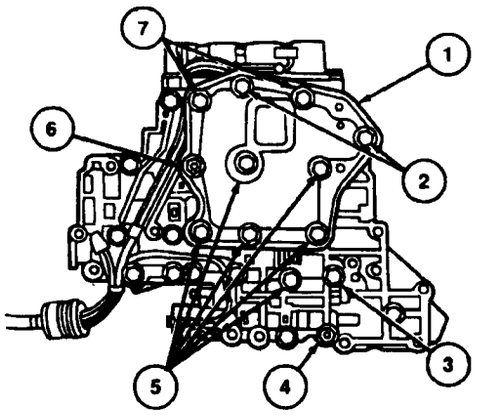
14. Install the valve body bolts b. Tighten the valve body bolts b to 7-9 N·m (62-79 lb-in).



15. Install new O-rings on the solenoid assembly.
16. Position the solenoid assembly on the main control valve body and install the four solenoid assembly bolts. Tighten the four solenoid assembly bolts to 7-9 N·m (62-79 lb-in).
17. Position the TOT sensor and install the three TOT sensor bolts. Tighten the three TOT sensor bolts to 7-9 N·m (62-79 lb-in).
18. Install a new O-ring on the line pressure solenoid valve and position the line pressure solenoid valve on the main control valve body. Install the two line pressure solenoid valve bolts. Tighten the two line pressure solenoid valve bolts to 7-9 N·m (62-79 lb-in).
19. Position the valve body wiring harness and install the two valve body wiring harness bolts to 7-9 N·m (62-79 lb-in).

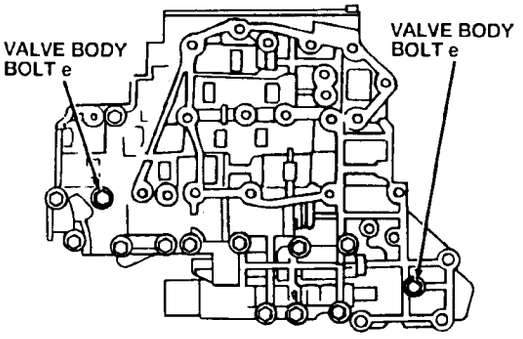


20. Align the oil filter and install valve body bolts a, c, d, and nut f. Tighten valve body bolts a, c, and d and nut f to 7-9 N·m (62-79 lb-in).

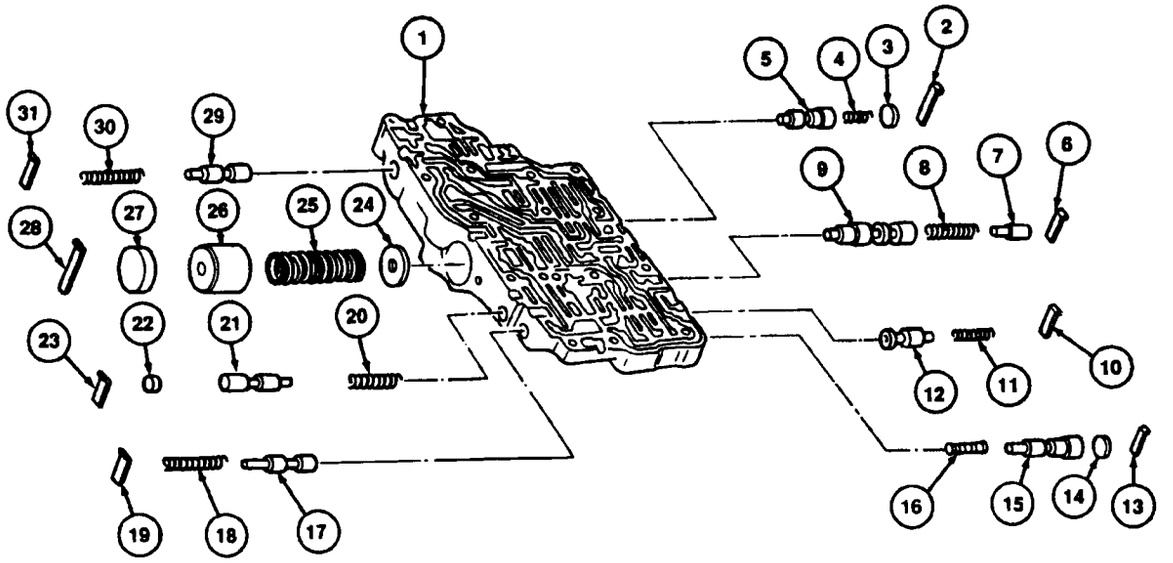


Item	Part Number	Description
1	7A098	Oil Filter
2	—	Valve Body Bolts a
3	—	Valve Body Bolt c
4	—	Valve Body Nut f
5	—	Valve Body Bolts d
6	—	Valve Body Bolts f
7	—	Valve Body Bolts d

21. Install the two valve body bolts e. Tighten the two valve body bolts e to 7-9 N·m (62-79 lb-in).



Upper Control Valve Body — Exploded View



Item	Part Number	Description
1	—	Upper Valve Body (Part of 7A100)
2	—	Retainer Plate (Part of 7A100)
3	—	Plug (Part of 7A100)
4	—	Return Spring (Part of 7A100)
5	—	1-2 Accumulator Valve (Part of 7A100)
6	—	Retainer Plate (Part of 7A100)
7	—	Plug (Part of 7A100)
8	—	Return Spring (Part of 7A100)
9	—	Torque Converter Clutch (TCC) Control Valve (Part of 7A100)
10	—	Retainer Plate (Part of 7A100)
11	—	Return Spring (Part of 7A100)
12	—	Converter Relief Valve (Part of 7A100)
13	—	Retainer Plate (Part of 7A100)
14	—	Plug (Part of 7A100)
15	—	Coasting Clutch Reducing Valve (Part of 7A100)
16	—	Return Spring (Part of 7A100)

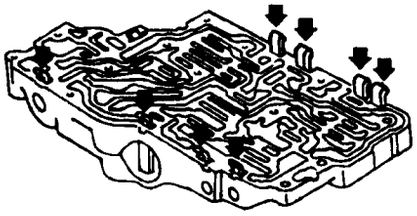
Item	Part Number	Description
17	—	2-3 Timing Valve (Part of 7A100)
18	—	Return Spring (Part of 7A100)
19	—	Retainer Spring (Part of 7A100)
20	—	Return Spring (Part of 7A100)
21	—	Low Reducing Valve (Part of 7A100)
22	—	Plug (Part of 7A100)
23	—	Retainer Plate (Part of 7A100)
24	—	1-2 Accumulator Retainer Plate (Part of 7A100)
25	—	Return Spring (Part of 7A100)
26	—	1-2 Accumulator Piston (Part of 7A100)
27	—	Plug (Part of 7A100)
28	—	Retainer Plate (Part of 7A100)
29	—	Solenoid Reducing Valve (Part of 7A100)
30	—	Return Spring (Part of 7A100)
31	—	Retainer Plate (Part of 7A100)

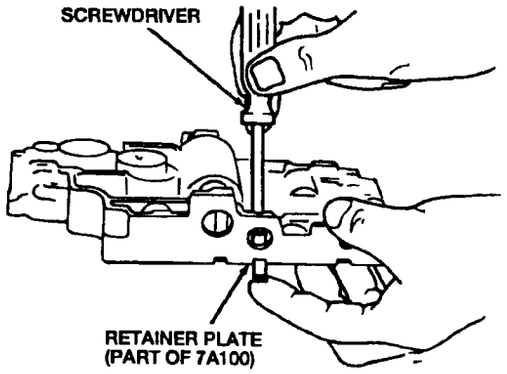
(Continued)

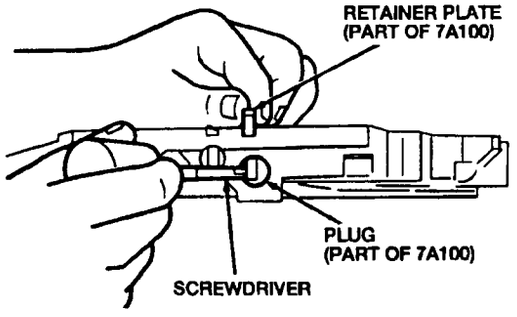
CAUTION: Remove the retainer plates and the plugs slowly to prevent internal parts from springing outward.

NOTE: Mark the location of the retainer plates during removal to ease installation.

1. Use a screwdriver to carefully pry out the eight retainer plates while holding in the springs, plugs, and sleeves.

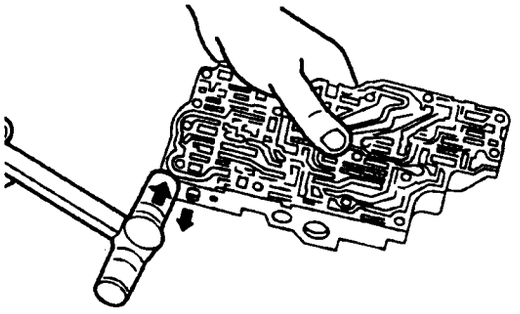






CAUTION: Do not drop or damage the valve body components.

NOTE: If a valve is hard to remove, place the upper control valve body face down and tap lightly with a plastic hammer.

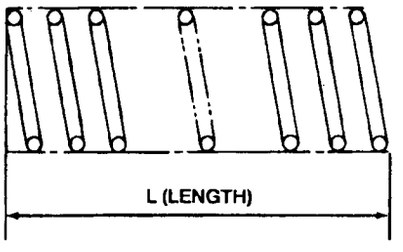


2. Place the mating surface of the upper control valve body face down and remove the internal parts.

NOTE: If any of the components of the upper valve body are damaged, the entire main control valve body (7A100) must be replaced.

3. Clean all parts thoroughly in clean solvent and blow dry with compressed air.
4. Inspect all valve and plug bores for scores. Check all fluid passages for obstructions. Inspect all mating surfaces for burrs or scores. If needed, use crocus cloth to polish the valves and plugs. Avoid rounding the sharp edges of the valves and plugs with the crocus cloth.
5. 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.
6. Check the valve springs for damage or deformation.

NOTE: When measuring the valve spring free length, always measure at the outermost point of the end coils.



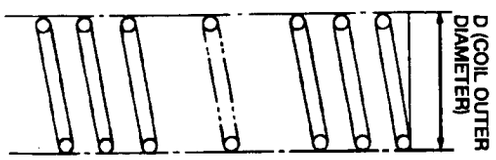
7. Measure the valve spring free length. Refer to the following chart for valve spring free length.

UPPER CONTROL VALVE BODY VALVE SPRING LENGTHS

Parts	Length
Solenoid reducing valve spring (Part of 7A100)	36.0mm (1.417 inches)
1-2 accumulator valve spring (Part of 7A100)	20.5mm (0.807 inch)
1-2 accumulator piston spring (Part of 7A100)	52.0mm (2.047 inches)
Low reducing valve spring (Part of 7A100)	27.0mm (1.063 inches)
2-3 timing valve spring (Part of 7A100)	30.5mm (1.201 inches)
Coasting clutch reducing valve spring (Part of 7A100)	37.5mm (1.476 inches)
Converter relief valve spring (Part of 7A100)	31.0mm (1.220 inches)
Torque Converter Clutch (TCC) control valve spring (Part of 7A100)	39.5mm (1.555 inches)

8. If the free length is out of specification, replace the main control valve body.

NOTE: When measuring the valve spring diameter, always measure at the outermost point of the coils.



9. Measure the valve spring diameter. Refer to the following chart for valve spring diameter.

UPPER CONTROL VALVE BODY VALVE SPRING DIAMETERS

Parts	Diameter
Solenoid reducing valve spring (Part of 7A100)	8.1mm (0.319 inch)
1-2 accumulator valve spring (Part of 7A100)	7.0mm (0.276 inch)
1-2 accumulator piston spring (Part of 7A100)	19.6mm (0.772 inch)
Low reducing valve spring (Part of 7A100)	7.0mm (0.276 inch)
2-3 timing valve spring (Part of 7A100)	6.6mm (0.260 inch)
Coasting clutch reducing valve spring (Part of 7A100)	6.9mm (0.272 inch)
Converter relief valve spring (Part of 7A100)	9.0mm (0.354 inch)
Torque Converter Clutch (TCC) control valve spring (Part of 7A100)	11.0mm (0.433 inch)

10. If the outer diameter is out of specification, replace the main control valve body.

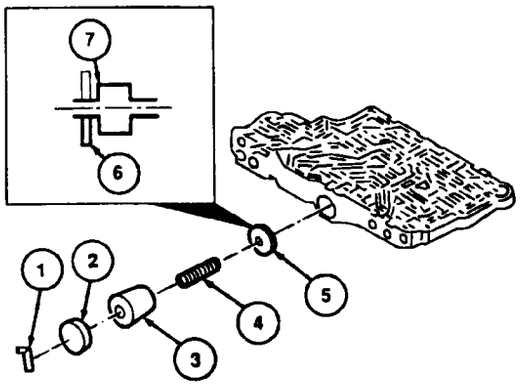
11. Check the valve, sleeve, and plug sliding surfaces for scoring or varnish buildup.
12. Clean the component as necessary.

Assembly

CAUTION: Lay the valve body down when installing the valves. Do not stand the valve body upright.

CAUTION: Use care not to scratch or otherwise damage the components during assembly. If any of the components of the upper control valve body are damaged, the entire main control valve body must be replaced.

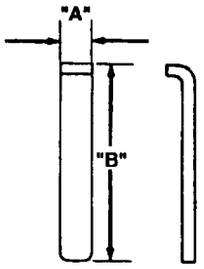
1. Lubricate the upper control valve body and all of the valves with specified transmission fluid.
2. Install the valves by carefully sliding them into their bores.
3. Use a small screwdriver wrapped in vinyl tape to insert the valves.
4. Install the 1-2 accumulator valve. Then from the opposite side of the valve body, align the 1-2 accumulator retainer plate with the 1-2 accumulator valve.



Item	Part Number	Description
1	—	Retainer Plate (Part of 7A100)
2	—	Plug (Part of 7A100)
3	—	1-2 Accumulator Piston (Part of 7A100)
4	—	Return Spring (Part of 7A100)
5	—	1-2 Accumulator Retainer Plate (Part of 7A100)
6	—	1-2 Accumulator Retainer Plate (Part of 7A100)
7	—	1-2 Accumulator Valve (Part of 7A100)

5. Install the return spring, the 1-2 accumulator piston, and the plug.
6. Install the retainer plates while pushing back the plug or return spring.

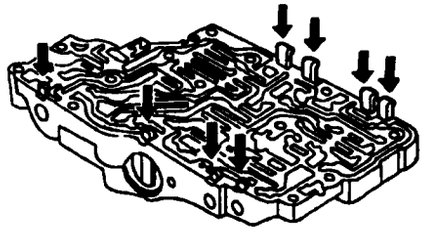
Retainer Plate Dimensions



Unit: mm (in)

Name of Valve	Width A	Length B
Solenoid reducing valve (Part of 7A100)	6.0 (0.236)	21.5 (0.846)
1-2 accumulator valve (Part of 7A100)		38.5 (1.516)
1-2 accumulator piston (Part of 7A100)		
Low reducing valve (Part of 7A100)		21.5 (0.846)
2-3 timing valve (Part of 7A100)		24.0 (0.945)
Coasting clutch reducing valve (Part of 7A100)		
Converter relief valve (Part of 7A100)		21.5 (0.846)
Torque converter clutch (TCC) control valve (Part of 7A100)		28.0 (1.102)

7. Ensure that the retainer plates are properly positioned in the upper control valve body.

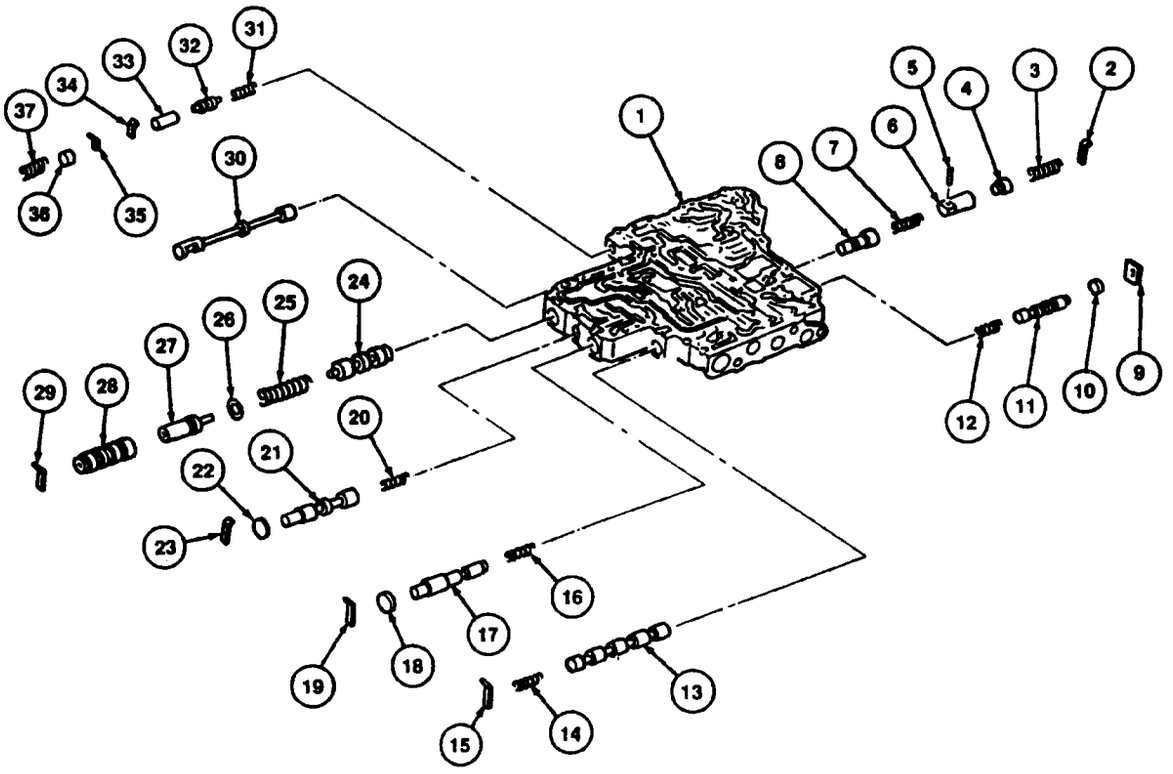


Lower Control Valve Body

Disassembly

The following illustration is an exploded view of the lower control valve body.

Lower Control Valve Body — Exploded View



Item	Part Number	Description
1	—	Lower Control Valve Body (Part of 7A100)
2	—	Retaining Plate (Part of 7A100)
3	—	Return Spring (Part of 7A100)
4	—	Piston (Part of 7A100)
5	—	Parallel Pin (Part of 7A100)
6	—	Sleeve (Part of 7A100)
7	—	Return Spring (Part of 7A100)
8	—	Pressure Modifier Valve (Part of 7A100)
9	—	Retainer Plate (Part of 7A100)
10	—	Plug (Part of 7A100)
11	—	Shift Valve B (Part of 7A100)
12	—	Return Spring (Part of 7A100)
13	—	Shift Valve A (Part of 7A100)
14	—	Return Spring (Part of 7A100)
15	—	Retainer Plate (Part of 7A100)

(Continued)

Item	Part Number	Description
16	—	Return Spring (Part of 7A100)
17	—	Accumulator Control Valve (Part of 7A100)
18	—	Plug (Part of 7A100)
19	—	Retainer Plate (Part of 7A100)
20	—	Return Spring (Part of 7A100)
21	—	Coasting Clutch Control Valve (Part of 7A100)
22	—	Plug (Part of 7A100)
23	—	Retainer Plate (Part of 7A100)
24	—	Pressure Regulator Valve (Part of 7A100)
25	—	Return Spring (Part of 7A100)
26	—	Spring Seat (Part of 7A100)
27	—	Plug (Part of 7A100)
28	—	Sleeve (Part of 7A100)
29	—	Retainer Plate (Part of 7A100)
30	—	Manual Valve (Part of 7A100)

(Continued)

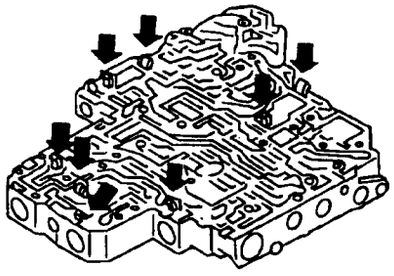
Item	Part Number	Description
31	—	Return Spring (Part of 7A100)
32	—	Accumulator Shift Valve (Part of 7A100)
33	—	Plug (Part of 7A100)
34	—	Retainer Plate (Part of 7A100)
35	—	Retainer Plate (Part of 7A100)
36	—	Plug (Part of 7A100)
37	—	Spring (Part of 7A100)

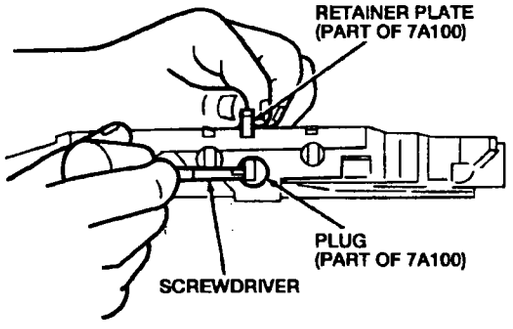
(Continued)

CAUTION: Remove the retainer plates and the plugs slowly to prevent internal parts from springing outward.

NOTE: Mark the location of the retainer plates during removal to ease installation.

1. Remove the manual valve.
2. Use a screwdriver to carefully pry out the eight retainer plates while holding in the springs, plugs, and sleeves.





CAUTION: Do not drop or damage the lower control valve body components.

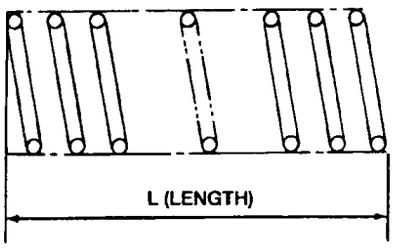
NOTE: If a valve is hard to remove, place the lower control valve body face down and tap lightly with a plastic hammer.

3. Place the mating surface of the lower control valve body face down and remove the internal parts.

NOTE: If any of the components of the lower valve body are damaged, the entire main control valve body (7A100) must be replaced.

4. Clean all parts thoroughly in clean solvent and blow dry with compressed air.
5. Inspect all valve and plug bores for scores. Check all fluid passages for obstructions. Inspect all mating surfaces for burrs or scores. If needed, use crocus cloth to polish the valves and plugs. Avoid rounding the sharp edges of the valves and plugs with the crocus cloth.
6. 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.
7. Check the valve springs for damage or deformation.

NOTE: When measuring the valve spring free length, always measure at the outermost point of the end coils.



8. Measure the valve spring free length. Refer to the following chart for valve spring free length.

LOWER CONTROL VALVE BODY VALVE SPRING LENGTHS

Parts	Length
Accumulator shift valve spring (Part of 7A100)	23.0mm (0.906 inch)
Pressure regulator valve spring (Part of 7A100)	45.0mm (1.772 inches)
Coasting clutch control valve spring (Part of 7A100)	21.7mm (0.854 inch)

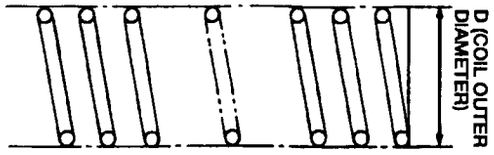
(Continued)

LOWER CONTROL VALVE BODY VALVE SPRING LENGTHS (Cont'd)

Parts	Length
Accumulator control valve spring (Part of 7A100)	22.0mm (0.866 inch)
Shift valve A spring (Part of 7A100)	21.7mm (0.854 inch)
Shift valve B spring (Part of 7A100)	21.7mm (0.854 inch)
Pressure modifier valve springs (Part of 7A100)	30.5mm (1.201 inches) 32.0mm (1.260 inches)
Line pressure solenoid valve spring (Part of 7A100)	17.0mm (0.669 inch)

9. If the free length is out of specification, replace the main control valve body.

NOTE: When measuring the valve spring diameter, always measure at the outermost point of the coils.



10. Measure the valve spring diameter. Refer to the following chart for valve spring diameter.

LOWER CONTROL VALVE BODY VALVE SPRING DIAMETERS

Parts	Diameter
Accumulator shift valve spring (Part of 7A100)	6.64mm (0.2618 inch)
Pressure regulator valve spring (Part of 7A100)	15.0mm (0.591 inch)
Coasting clutch control valve spring (Part of 7A100)	7.0mm (0.276 inch)
Accumulator control valve spring (Part of 7A100)	6.5mm (0.256 inch)
Shift valve A spring (Part of 7A100)	7.0mm (0.276 inch)
Shift valve B spring (Part of 7A100)	7.0mm (0.276 inch)
Pressure modifier valve springs (Part of 7A100)	9.8mm (0.386 inch) 6.9mm (0.272 inch)
Line pressure solenoid valve spring (Part of 7A100)	10.7mm (0.421 inch)

11. If the outer diameter is out of specification, replace the main control valve body.
12. Check the valve, sleeve, and plug sliding surfaces for scoring or varnish buildup.
13. Clean the component as necessary.

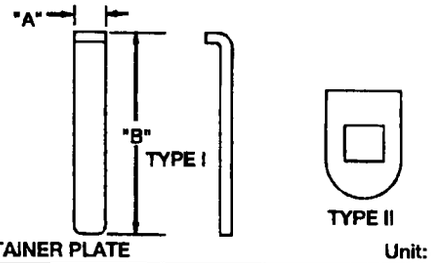
Assembly

CAUTION: Lay the valve body down when installing the valves. Do not stand the valve body upright.

CAUTION: Use care not to scratch or otherwise damage the components during assembly. If any of the lower control valve body components are damaged, the entire main control valve body must be replaced.

1. Lubricate the lower control valve body and all of the valves with specified transaxle fluid.
2. Install the control valves by carefully sliding them into their bores.
3. Use a small screwdriver wrapped in vinyl tape to insert the valves.
4. Install the retainer plates while pushing back the plug or return spring.

Retainer Plate Specifications

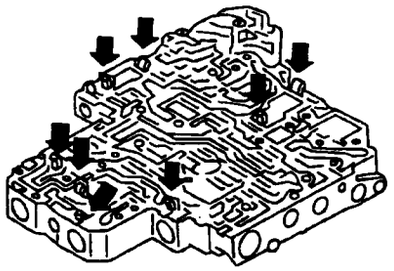


RETAINER PLATE Unit: mm (in)

Name of Valve	Width A	Length B	Type
Accumulator shift valve (Part of 7A100)	6.0 (0.236)	19.5 (0.768)	I
Pressure regulator valve (Part of 7A100)		28.0 (1.102)	
Accumulator control valve (Part of 7A100)			
Shift valve A (Part of 7A100)			
Shuttle shift valve (Non-operational) (Part of 7A100)			
Coasting clutch control valve (Part of 7A100)			
Pressure modifier valve (Part of 7A100)			
Shift valve B (Part of 7A100)	—	—	II

5. Install the manual valve.

6. Ensure that the retainer plates are properly positioned in the lower control valve body.



1-2 Accumulator

Disassembly and Assembly

The 1-2 accumulator is serviced with the upper control valve body. For the upper control valve body disassembly and assembly procedure, refer to the procedures in this section.

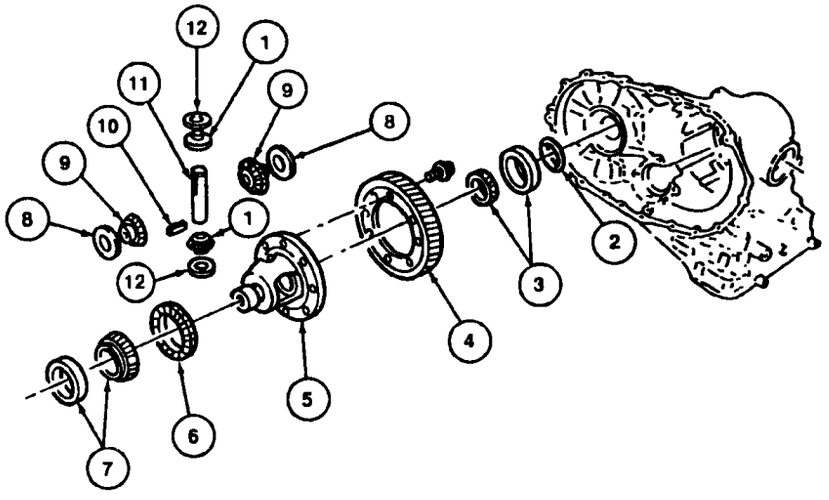
Differential

Disassembly

SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Puller-Differential Side Bearing	T77F-4220-B1

Differential Pinion Gears, Differential Side Gears, Differential Pinion Shaft, Differential Case, and Final Drive Ring Gear



Item	Part Number	Description
1	4215	Differential Pinion Gear
2	4067	Differential Bearing Shim
3	4221	Differential Bearing (Final Drive Gear End)
4	7F343	Final Drive Ring Gear
5	4204	Differential Case
6	17285	Speedometer Drive Gear
7	4221	Differential Bearing (Speedometer Gear End)

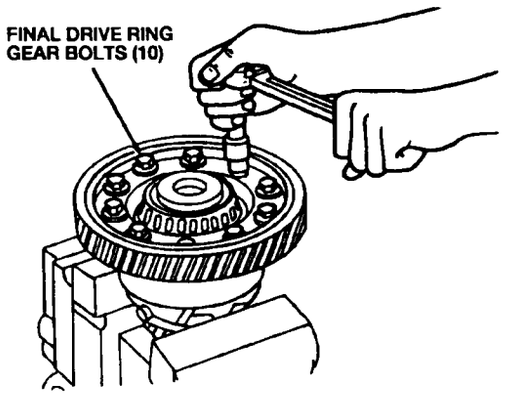
Item	Part Number	Description
8	4228	Differential Side Gear Thrust Washer
9	4236	Differential Side Gear
10	4241	Differential Pinion Shaft Lock Pin
11	4211	Differential Pinion Shaft
12	4230	Differential Pinion Thrust Washer

(Continued)

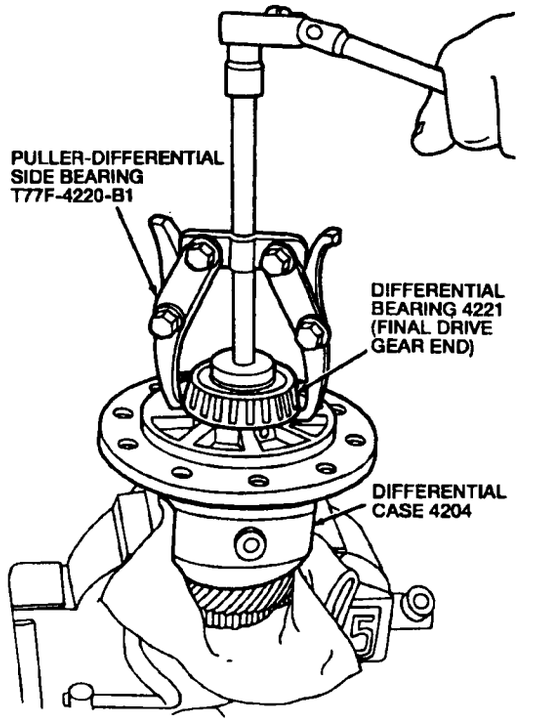
CAUTION: Differential disassembly should occur only if the following conditions are present:

- Abnormal noise
- Abnormal gear wear
- Faulty bearings

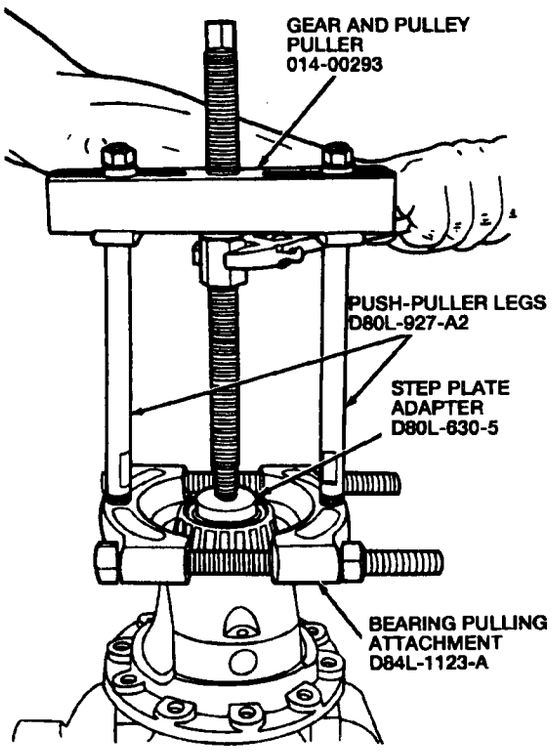
1. Remove the 10 final drive ring gear bolts and the final drive ring gear (7F343).



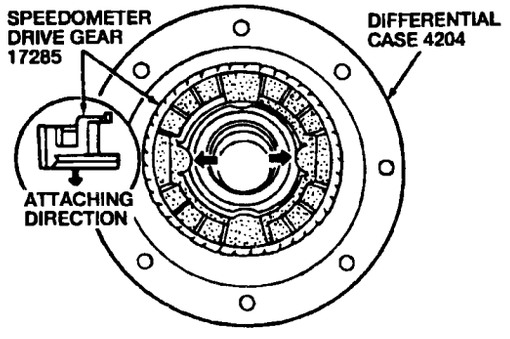
2. Use Puller-Differential Side Bearing T77F-4220-B1 to remove the differential bearing (4221).



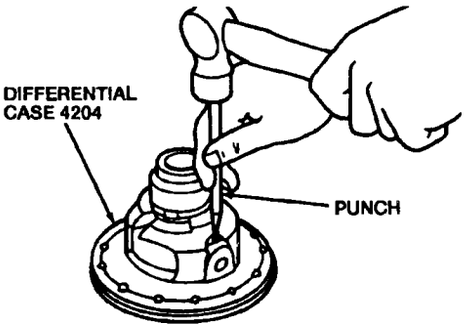
3. Use Rotunda Gear and Pulley Puller 014-00293, or equivalent, Bearing Pulling Attachment D84L-1123-A, Step Plate Adapter D80L-630-5, and Push-Puller Legs D80L-927-A2 or equivalents to remove the differential bearing.



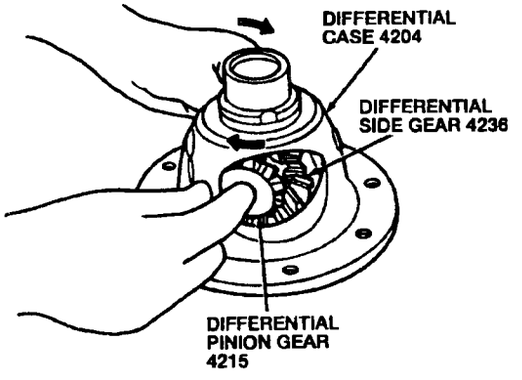
4. Remove the speedometer drive gear (17285).



5. Use a punch to drive out the differential pinion shaft lock pin (4241) from the differential case (4204).



6. Remove the differential pinion shaft (4211).
7. Remove the differential side gears (4236), differential pinion gears (4215), differential pinion thrust washers (4230), and differential side gear thrust washers (4228).



8. Check the mating surfaces of the differential case, differential side gears, and the differential pinion gears for damage or wear. Replace if necessary.
9. Check the thrust washers for wear. Replace if necessary.

NOTE: If a differential bearing is replaced, always replace the inner and outer races as a set.

10. Ensure that the differential bearings roll freely and are free of noise, cracks, pitting, and wear.

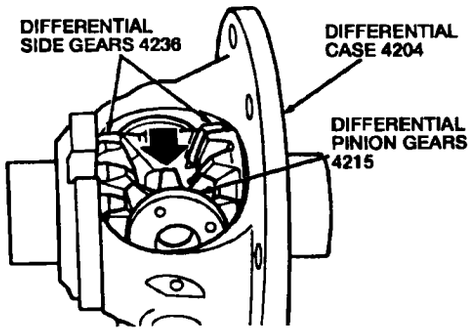
Assembly

SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Differential Rotator	T92P-77000-BH

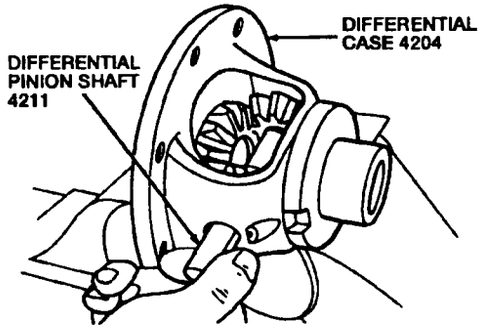
1. Position the differential side gear thrust washers on the differential side gears.
2. Install the differential side gears in the differential case.
3. Attach the differential pinion thrust washers on the differential pinion gears.

4. Rotate the differential pinion gears into the differential case.

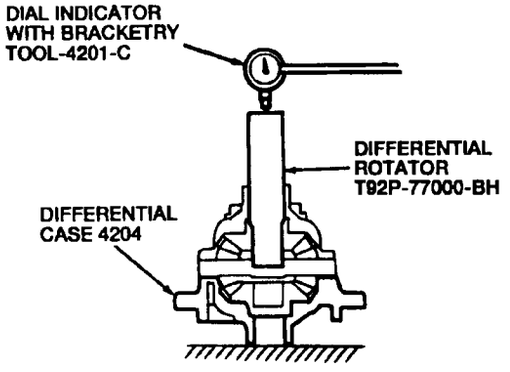


CAUTION: Do not damage the differential pinion thrust washers when inserting the differential pinion shaft.

5. Install the differential pinion shaft.

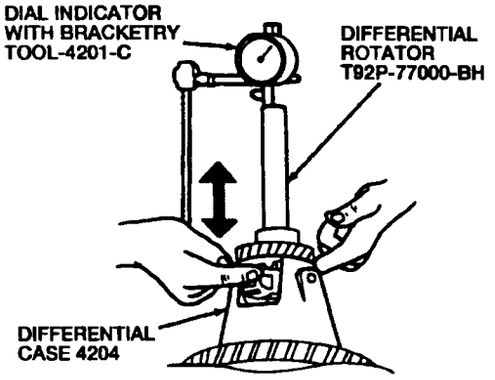


6. Place Differential Rotator T92P-77000-BH and Dial Indicator with Bracketry TOOL-4201-C or equivalent, as shown.



NOTE: Always measure the deflection of both differential side gears.

7. Move the differential side gear up and down to measure the differential side gear deflection. The clearance should measure 0.1-0.2mm (0.004-0.008 inch).

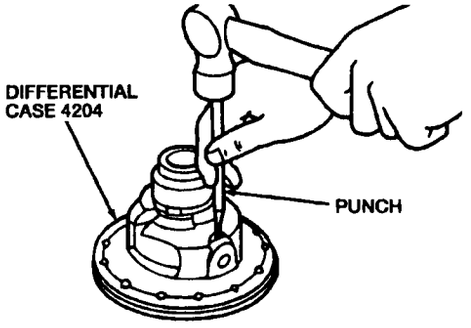


8. If the clearance is not within specifications, change the thickness of the differential side gear thrust washers.

DIFFERENTIAL SIDE GEAR THRUST WASHER SPECIFICATIONS

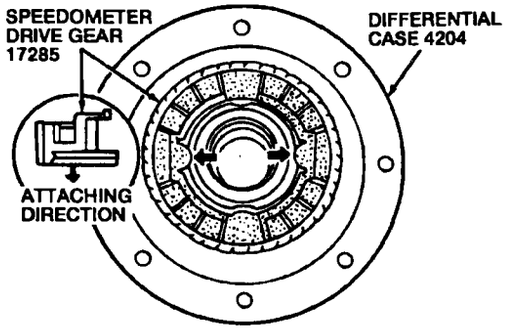
Thickness mm (in)	Part Number
0.75 (0.0295)	F3XY-4228-A
0.80 (0.0315)	F3XY-4228-B
0.85 (0.0335)	F3XY-4228-C
0.90 (0.0354)	F3XY-4228-D
0.95 (0.0374)	F3XY-4228-E

9. Use a punch to install the differential pinion shaft lock pin until the differential pinion shaft lock pin is flush with the differential case.

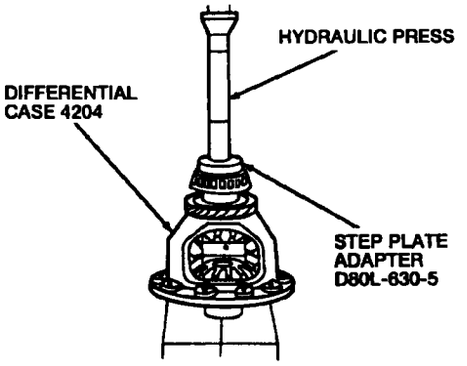


NOTE: Ensure that the speedometer drive gear is installed correctly.

10. Install the speedometer drive gear onto the differential case.



11. Use a hydraulic press and Step Plate Adapter D80L-630-5 or equivalent to install the differential bearings.



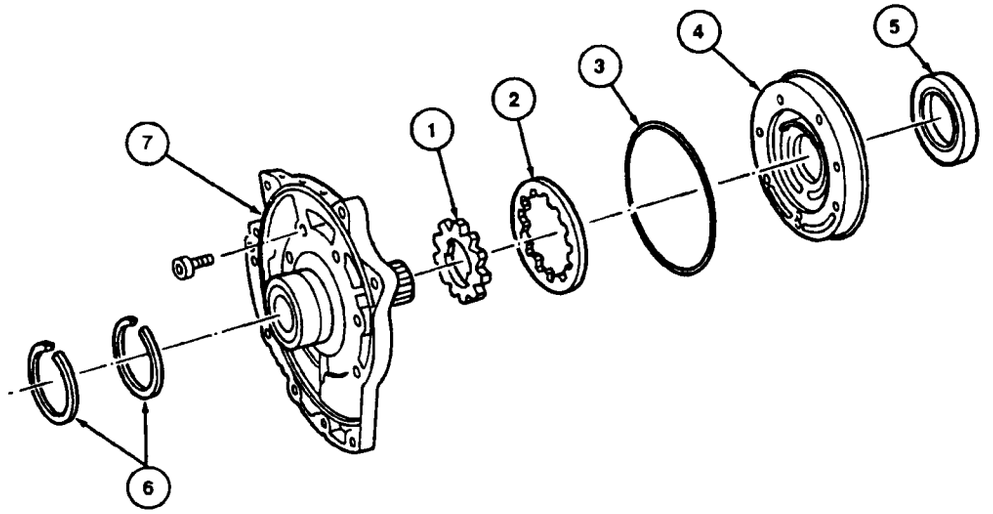
12. Install the final drive ring gear and final drive ring gear bolts. Tighten the 10 final drive ring gear bolts in a crisscross pattern to 113-127 N·m (83-94 lb-ft).

Oil Pump Assembly

Disassembly

The following illustration shows an exploded view of the oil pump assembly.

Oil Pump Assembly — Exploded View

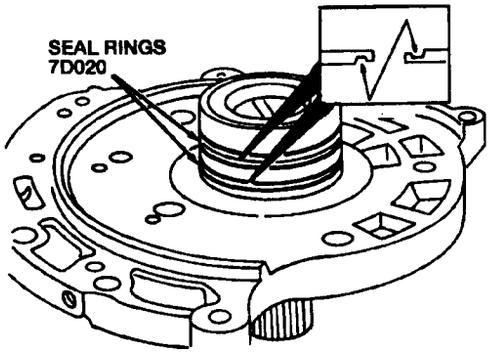


Item	Part Number	Description
1	—	Inner Gear (Part of 7A103)
2	—	Outer Gear (Part of 7A103)
3	7A248	O-Ring

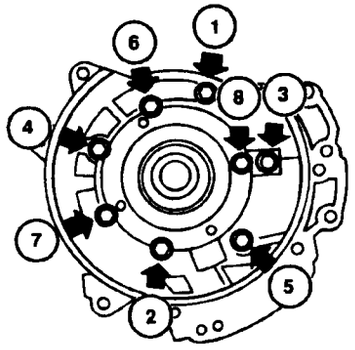
(Continued)

Item	Part Number	Description
4	—	Oil Pump Housing (Part of 7A103)
5	7A248	Front Oil Pump Seal
6	7D020	Seal Rings
7	—	Oil Pump Cover (Part of 7A103)

1. Remove the seal rings by unclasping the seal ring ends. Discard the seal rings.

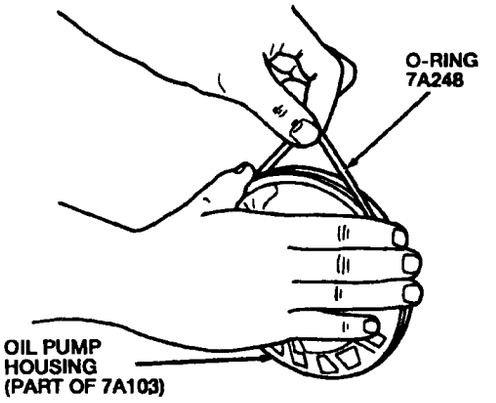


2. Remove the oil pump cover bolts in the sequence shown.



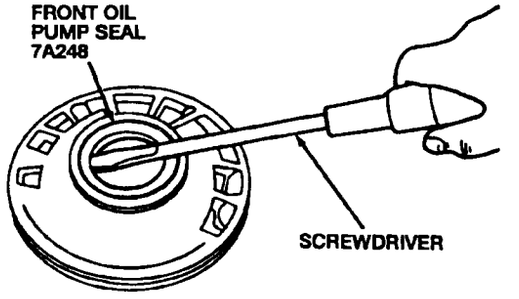
3. Remove the oil pump cover.
4. Remove the inner and outer gear from the oil pump housing.

5. Remove the O-ring from the oil pump housing.



CAUTION: Use extreme care not to score the oil pump housing oil seal surface during front oil pump seal (7A248) removal.

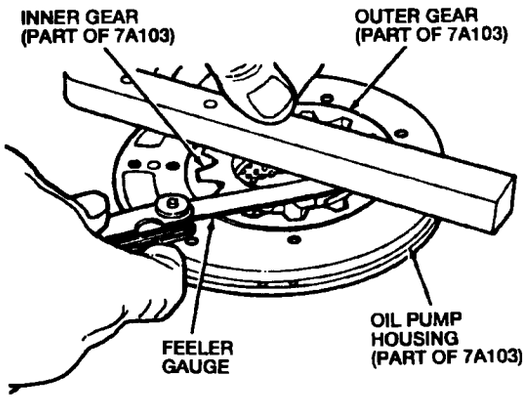
6. Use a screwdriver to remove the front oil pump seal.



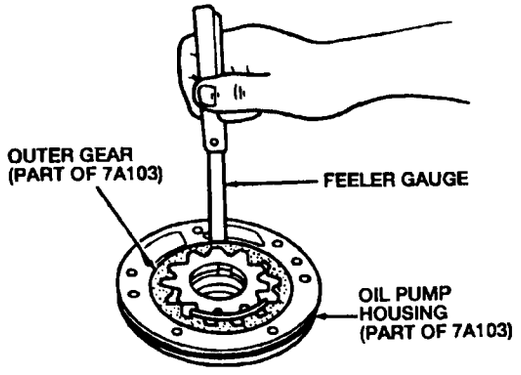
7. Check the oil pump housing, oil pump cover, inner gear, and the outer gear for wear or damage.

NOTE: Measure the clearance in at least four places along the gear's circumference.

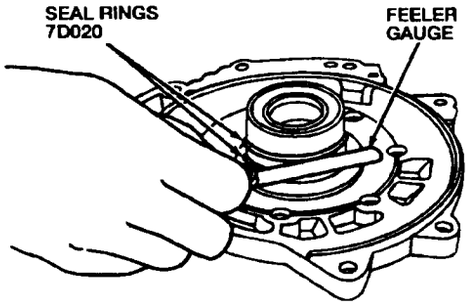
8. Measure the side clearance between the edge of the oil pump housing and the inner and outer gears.



9. The clearance should measure 0.030-0.050mm (0.0012-0.0020 inch). If the clearance is not within specifications, replace the entire oil pump assembly.
10. Measure the clearance between the outer gear and the oil pump housing.



11. The clearance should measure 0.111-0.181mm (0.0044-0.0071 inch). If the clearance is not within specifications, replace the entire oil pump assembly.
12. Measure the clearance between the seal ring and the ring groove.



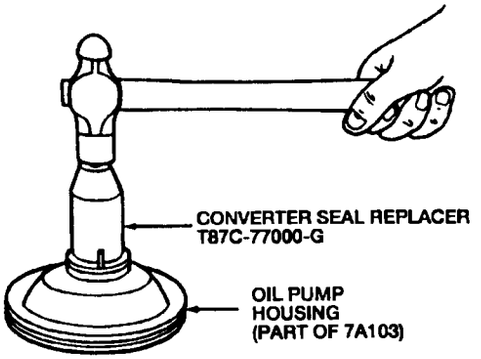
13. The clearance should measure 0.036-0.176mm (0.0014-0.0069 inch). If the clearance is not within specifications, replace the oil pump cover assembly.

Assembly

SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Converter Seal Replacer	T87C-77000-G

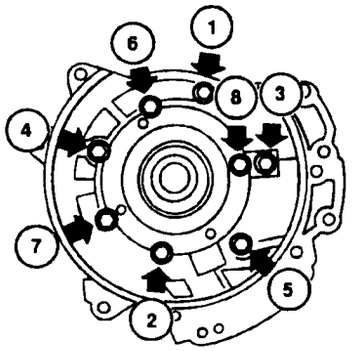
1. Use Converter Seal Replacer T87C-77000-G to install the front oil pump seal.



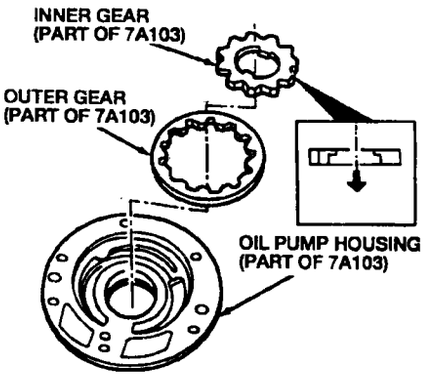
NOTE: Lubricate the O-ring with transmission fluid prior to installation.

2. Install the O-ring onto the oil pump housing.

3. Install the inner and outer gears into the oil pump housing.
4. Wrap the oil pump cover splines with tape to protect the front oil pump seal during assembly.
5. Install the oil pump cover onto the oil pump housing. Tighten the oil pump cover bolts in the sequence shown to 7-11 N·m (62-97 lb-in).



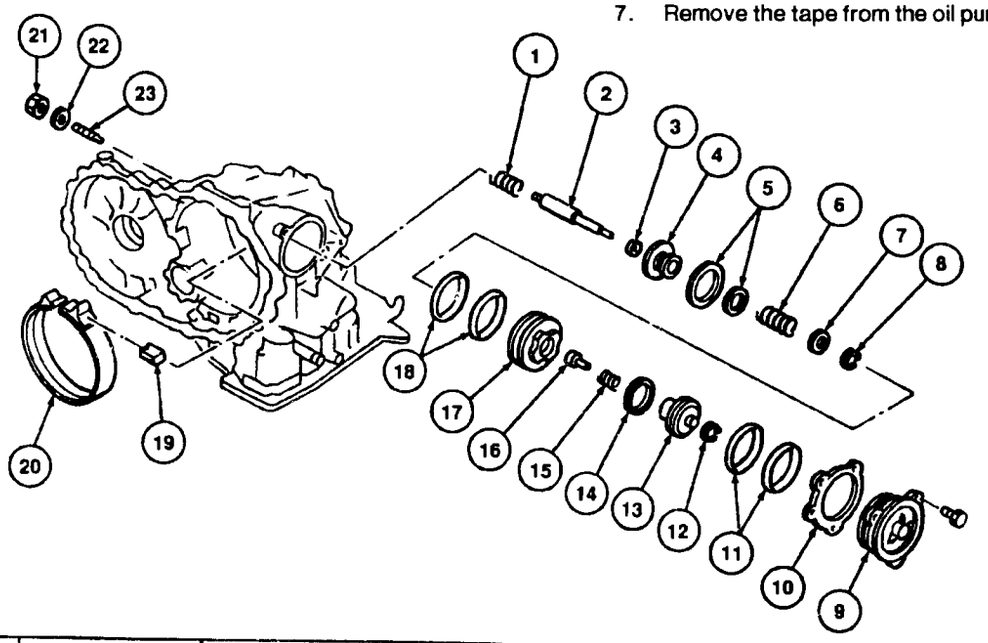
NOTE: Note the direction of the inner gear during installation.



CAUTION: Do not spread the gap of the seal rings further than necessary, or distortion may result.

6. Pack the seal ring grooves with petroleum jelly and install the new seal rings. Ensure the seal ring ends are properly clasped.
7. Remove the tape from the oil pump cover splines.

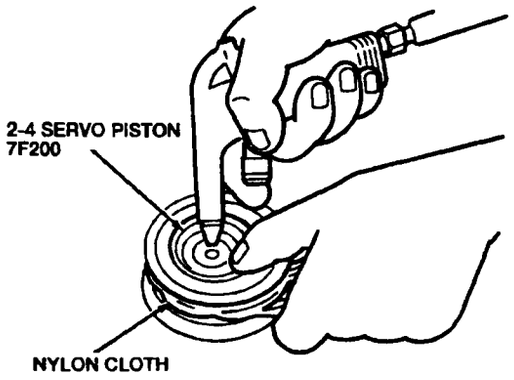
2-4 Servo — Exploded View



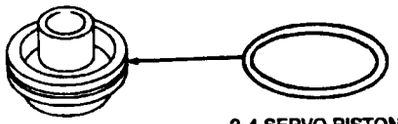
Item	Part Number	Description
1	7D028	2-4 Servo Piston Spring
2	7D190	2-4 Servo Band Piston Stem
3	7D300	2-4 Servo Band Thrust Washer
4	7D022	2-4 Servo Band Piston
5	7D025	D-Rings
6	7F201	2-4 Servo Piston Return Spring
7	7G280	2-4 Servo Piston Spring Retainer
8	7418	E-Ring
9	7G294	2-4 Servo Piston Retainer
10	7D040	Gasket
11	7H087	O-Rings

Item	Part Number	Description
12	7H082	E-Ring
13	7F200	2-4 Servo Piston
14	7D024	2-4 Servo Piston Large Seal
15	7F021	2-4 Servo Piston Return Spring
16	7G280	2-4 Spring Retainer
17	7G278	2-4 Servo Piston Retainer
18	7A114	O-Rings
19	7D029	2-4 Band Strut
20	7D034	2-4 Band
21	—	2-4 Band Adjusting Stop Locknut
22	7H357	Washer
23	7C492	2-4 Band Adjusting Stop

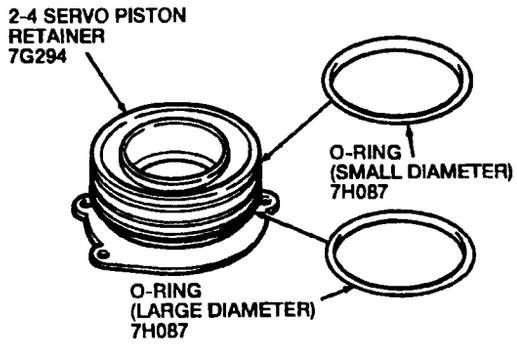
1. Hold the 2-4 servo piston and the 2-4 servo piston retainer with a nylon cloth and apply compressed air to the oil hole in the 2-4 servo piston retainer to remove the 2-4 servo piston from the 2-4 servo piston retainer.



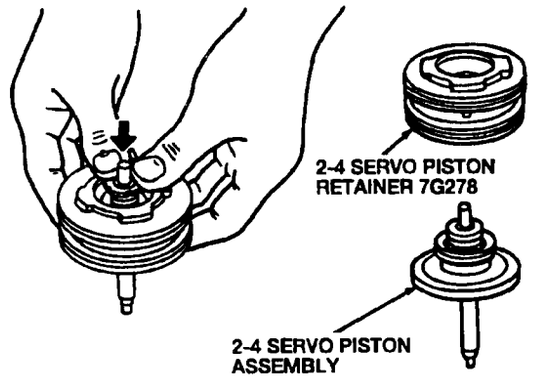
2. Remove the 2-4 servo piston large seal from the 2-4 servo piston.



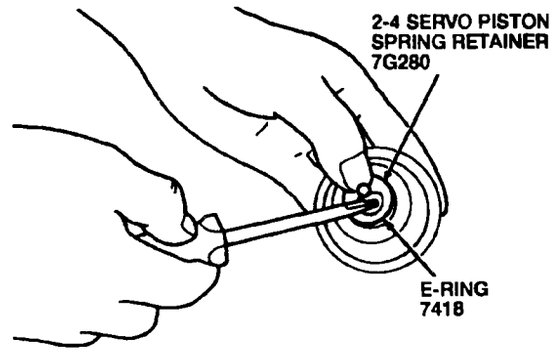
3. Remove the O-rings from the 2-4 servo piston retainer.



4. Push the 2-4 servo piston assembly out of the 2-4 servo piston retainer.

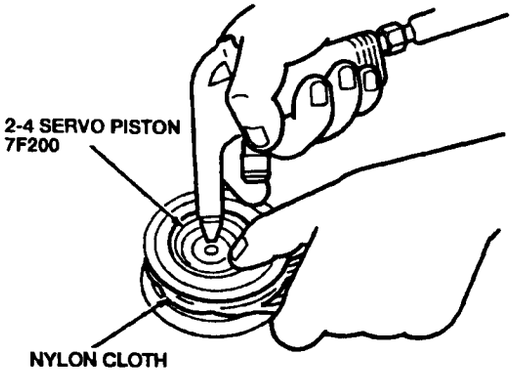


5. Place the 2-4 servo piston stem end on a wooden block. Depress the 2-4 servo piston spring retainer and remove the E-ring.

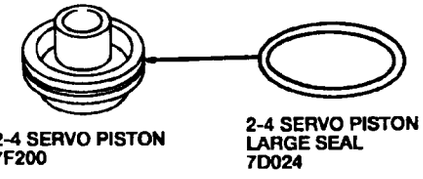


6. Separate the 2-4 servo piston spring retainer, 2-4 servo piston return spring, 2-4 servo band piston, 2-4 servo band thrust washer, and 2-4 servo band piston stem.

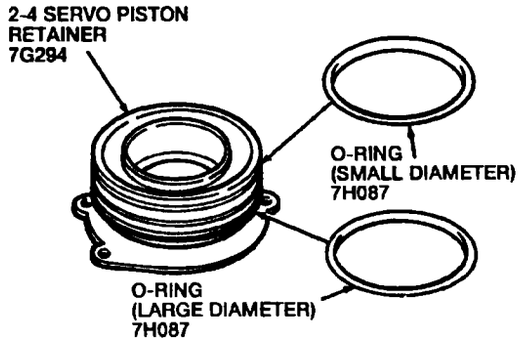
1. Hold the 2-4 servo piston and the 2-4 servo piston retainer with a nylon cloth and apply compressed air to the oil hole in the 2-4 servo piston retainer to remove the 2-4 servo piston from the 2-4 servo piston retainer.



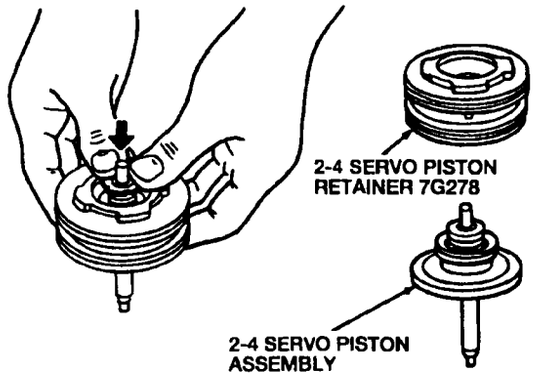
2. Remove the 2-4 servo piston large seal from the 2-4 servo piston.



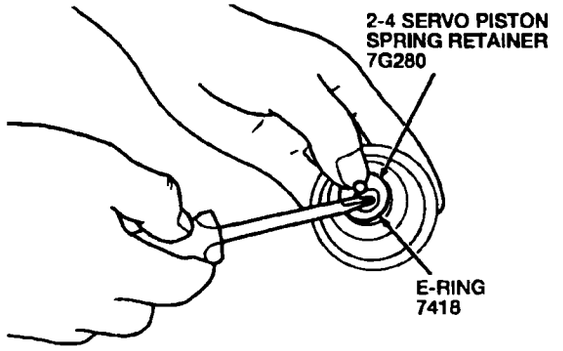
3. Remove the O-rings from the 2-4 servo piston retainer.



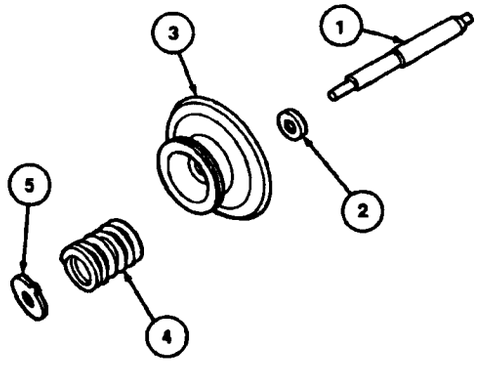
4. Push the 2-4 servo piston assembly out of the 2-4 servo piston retainer.



5. Place the 2-4 servo piston stem end on a wooden block. Depress the 2-4 servo piston spring retainer and remove the E-ring.

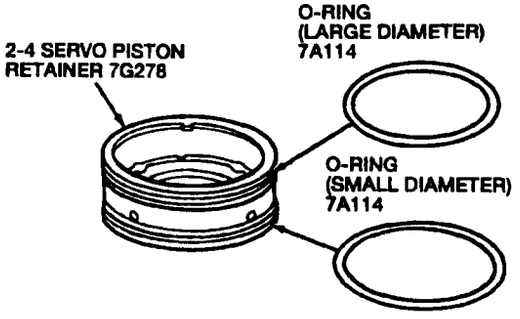


6. Separate the 2-4 servo piston spring retainer, 2-4 servo piston return spring, 2-4 servo band piston, 2-4 servo band thrust washer, and 2-4 servo band piston stem.

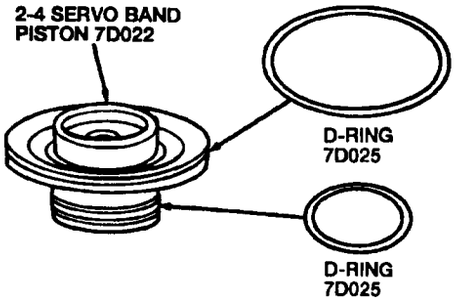


Item	Part Number	Description
1	7D190	2-4 Servo Band Piston Stem
2	7D300	2-4 Servo Band Thrust Washer
3	7D022	2-4 Servo Band Piston
4	7F201	2-4 Servo Piston Return Spring
5	7G280	2-4 Servo Piston Spring Retainer

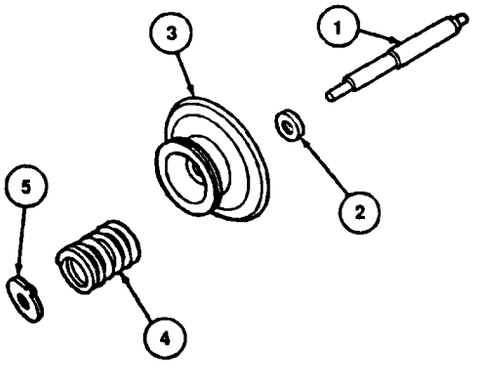
7. Remove the O-rings from the 2-4 servo piston retainer.



8. Remove the D-rings from the 2-4 servo band piston.

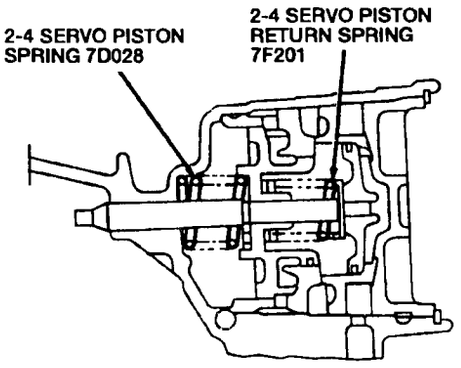


9. Inspect the servo piston stem for excessive wear. If worn, replace the servo piston.
10. Check the piston, retainer, and piston stem wear surfaces for abnormal wear or damage.

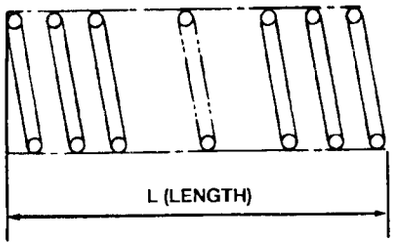


Item	Part Number	Description
1	7D190	2-4 Servo Band Piston Stem
2	7D300	2-4 Servo Band Thrust Washer
3	7D022	2-4 Servo Band Piston
4	7F201	2-4 Servo Piston Return Spring
5	7G280	2-4 Servo Piston Spring Retainer

11. Check the second 2-4 servo piston spring and the 2-4 servo piston return spring for damage or deformation.

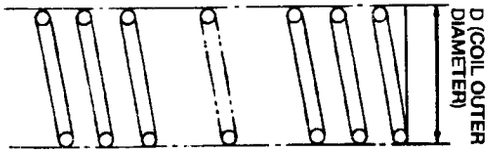


NOTE: When measuring the second servo piston spring and the OD servo piston spring free length, always measure at the outermost point of the end coils.



12. Measure the free length of the second servo piston spring.
13. The second servo piston spring free length should measure 32.5mm (1.280 inches). If the second servo piston spring is out of specification, replace the second servo piston spring.

NOTE: When measuring the second servo piston spring and the OD servo piston spring outer diameter, always measure at the outermost point of the coils.

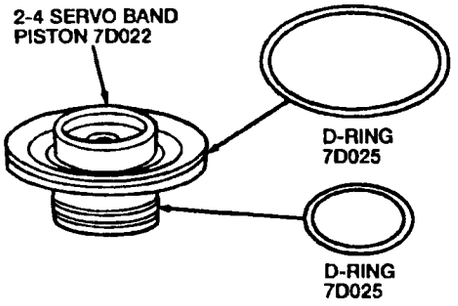


14. Measure the diameter of the second servo piston spring.
15. The second servo piston spring outer diameter should measure 25.9mm (1.020 inches). If the second servo piston spring is out of specification, replace the second servo piston spring.
16. Measure the free length and the outer diameter of the 2-4 servo piston return spring.
17. The OD servo piston spring free length should measure 31.0mm (1.220 inches). If the 2-4 servo piston return spring is out of specification, replace the 2-4 servo piston return spring.
18. The second servo piston spring outer diameter should measure 21.7mm (0.854 inch). If the second servo piston spring is out of specification, replace the second servo piston spring.

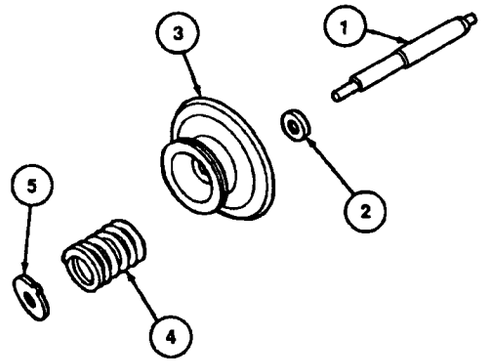
Assembly

NOTE: Apply transmission fluid to the D-rings prior to installation.

1. Install the D-rings on the 2-4 servo band piston.

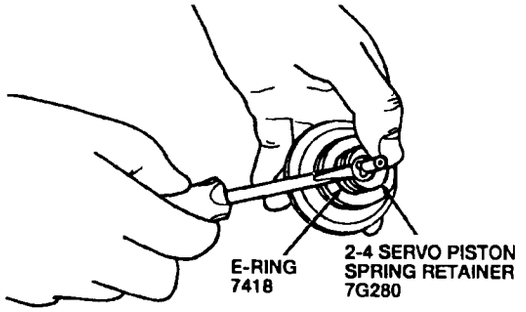


2. Install the 2-4 servo band piston stem, 2-4 servo band thrust washer, 2-4 servo piston return spring, and the 2-4 servo piston spring retainer onto the 2-4 servo band piston.



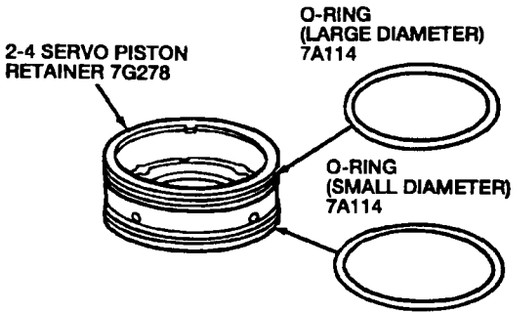
Item	Part Number	Description
1	7D190	2-4 Servo Band Piston Stem
2	7D300	2-4 Servo Band Thrust Washer
3	7D022	2-4 Servo Band Piston
4	7F201	2-4 Servo Piston Return Spring
5	7G280	2-4 Servo Piston Spring Retainer

3. Place the 2-4 servo band piston stem end on a wooden block. Depress the 2-4 servo piston spring retainer and install the E-ring.

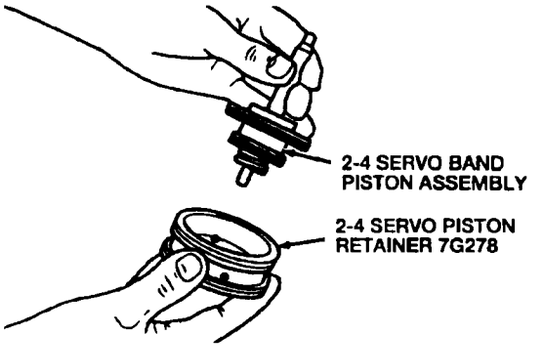


NOTE: Apply transmission fluid to the O-rings prior to installation. Note the placement of the large and small O-rings.

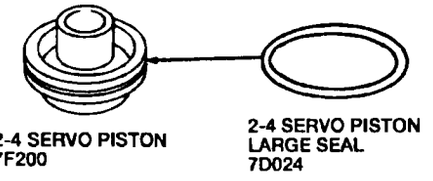
4. Install the O-rings to the 2-4 servo piston retainer.



5. Push the 2-4 servo band piston assembly into the 2-4 servo piston retainer.

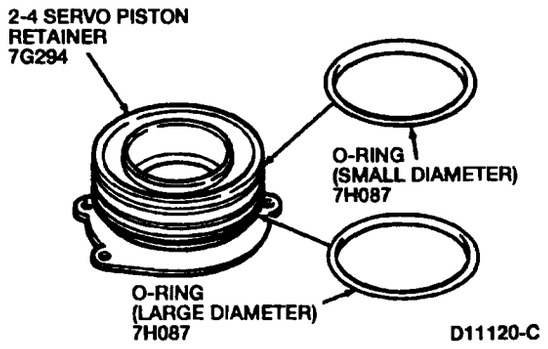


6. Install the 2-4 servo piston large seal to the 2-4 servo piston.

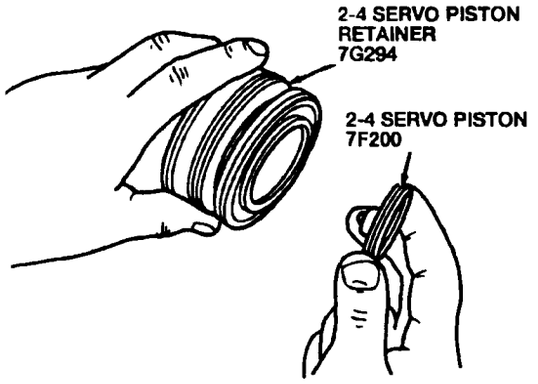


NOTE: Apply transmission fluid to the O-rings prior to installation. Note the placement of the large and small O-rings.

7. Install the O-rings to the 2-4 servo piston retainer.



8. Install the 2-4 servo piston to the 2-4 servo piston retainer.



Reverse Clutch

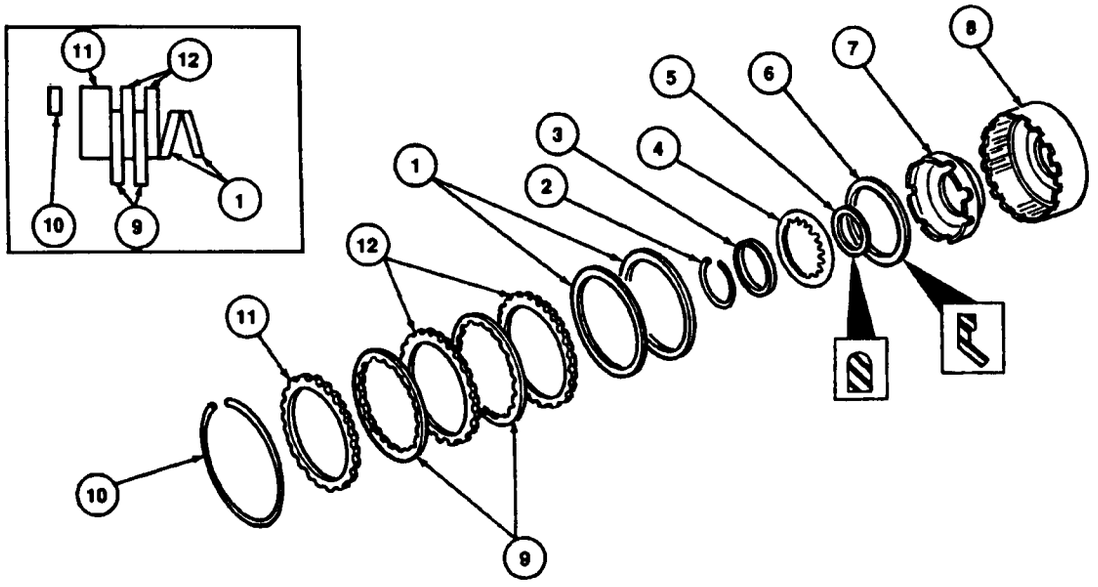
Disassembly

The following illustration is an exploded view of the reverse clutch.

SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Clutch Spring Compressor	T65L-77515-A

Reverse Clutch — Exploded View

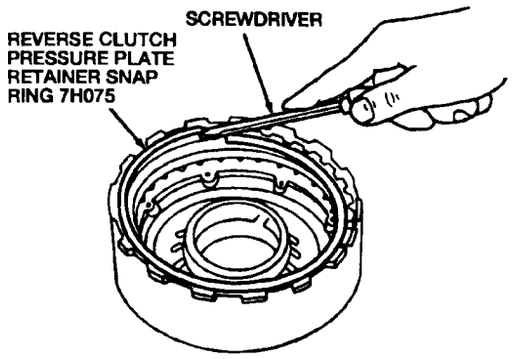


Item	Part Number	Description
1	7B070	Dish Plates
2	7H075	Snap Ring
3	—	Spring Retainer
4	7D406	Reverse Clutch Retainer
5	7D404	D-Ring
6	7F227	Oil Seal
7	7D402	Reverse Clutch Piston

(Continued)

Item	Part Number	Description
8	7D044	Reverse Clutch Drum
9	7B164	Reverse Clutch Internal Spline Clutch Plates (2)
10	7D483	Reverse Clutch Pressure Plate Retainer Snap Ring
11	7B066	Reverse Clutch Pressure Plate (Select Thickness)
12	7B442	Reverse Clutch External Spline Clutch Plates (2)

1. Use a screwdriver to remove the reverse clutch pressure plate retainer snap ring. Discard the reverse clutch pressure plate retainer snap ring.



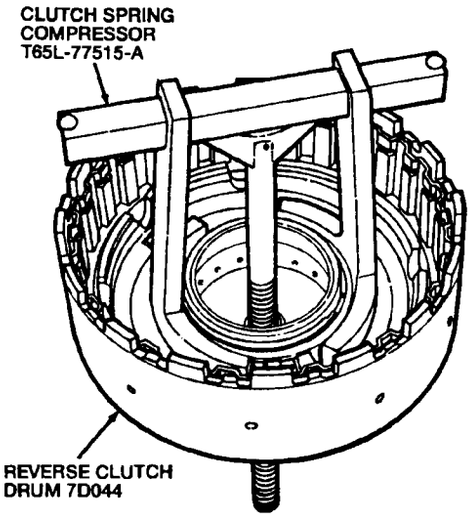
NOTE: Identify the clutch plates and their order when removing them to aid in installation.

2. Remove the reverse clutch pressure plate, reverse clutch internal spline clutch plates, reverse clutch external spline clutch plates, and the dish plates.

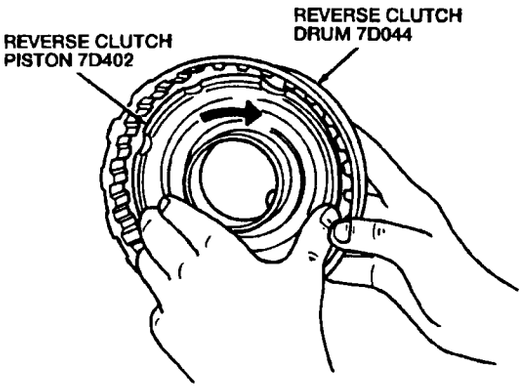
CAUTION: Do not expand the snap ring farther than necessary, or damage will occur.

NOTE: Align the spring compressor directly over the return springs.

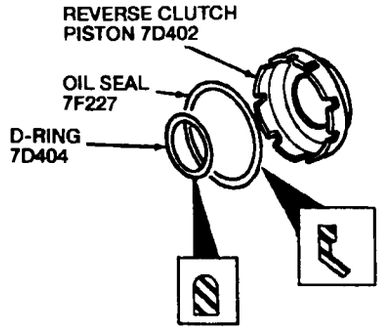
3. Use Clutch Spring Compressor T65L-77515-A to compress the reverse clutch pressure plate retainer snap ring and remove the snap ring from the reverse clutch drum (7D044). Discard the snap ring.



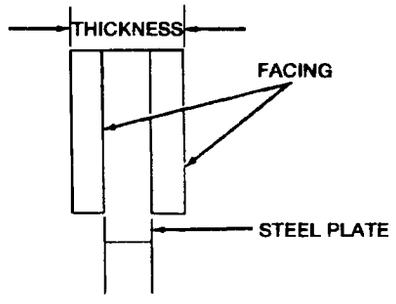
4. Remove the reverse clutch pressure plate retainer snap ring and the return springs.
5. Remove the reverse clutch piston (7D402) from the reverse clutch drum by turning the reverse clutch piston.



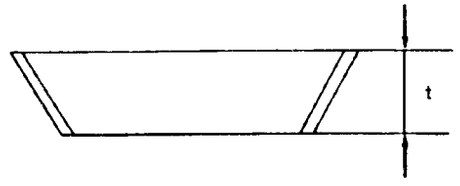
6. Remove and discard the D-ring and the oil seal from the reverse clutch piston.



7. Check for deformation, fatigue, and damage. Replace if necessary.
8. Check the facing of the reverse clutch internal spline clutch plates for burns, cracks, and damage.
9. Measure the thickness of the reverse clutch internal spline clutch plate facing. The standard thickness is 2.0mm (0.079 inch), with a wear limit of 1.8mm (0.071 inch).



10. If a reverse clutch internal spline clutch plate facing is not within specifications, replace the reverse clutch internal spline clutch plates as a set.
11. Check the dish plates for deformation and damage.
12. Measure the thickness (t) of the dish plate.



13. The dish plate should measure 3.08mm (0.1213 inch). If the dish plate is out of specification, replace the dish plate.
14. Ensure that the check balls are not fixed in the reverse clutch piston.
15. Apply compressed air to the check ball oil hole opposite of the return spring. There should be no air leakage.
16. Apply compressed air to the check ball oil hole on the return spring side. Air should leak past the check ball.

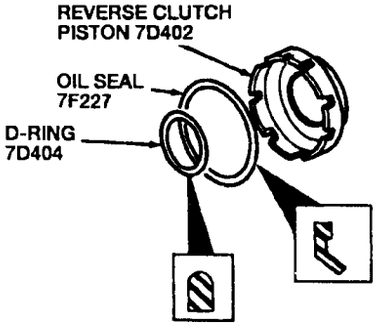
Assembly

SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Clutch Spring Compressor	T65L-77515-A

NOTE: Apply transmission fluid to the D-ring and the oil seal prior to installation. Ensure that the oil seal is installed properly.

1. Install a new D-ring and oil seal onto the reverse clutch piston.

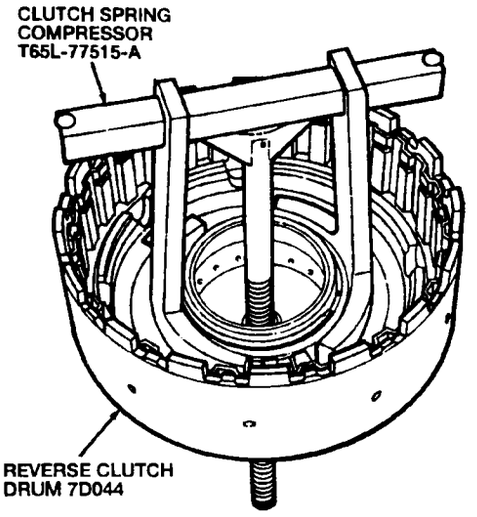


NOTE: Apply transmission fluid to the inner surface of the reverse clutch drum.

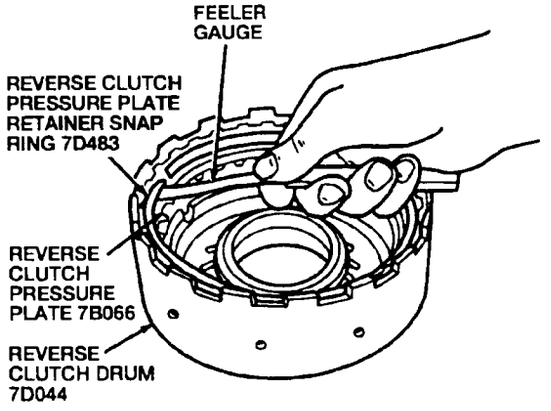
2. Install the reverse clutch piston to the reverse clutch drum by turning the reverse clutch piston slowly.
3. Install the return springs and the reverse clutch pressure plate retainer snap ring (7A577) onto the reverse clutch piston.

NOTE: Align the Clutch Spring Compressor T65L-77515-A directly over the return springs.

4. Use Clutch Spring Compressor T65L-77515-A to compress the return springs and install a new snap ring.



5. Install the dish plates, reverse clutch external spline clutch plates, reverse clutch internal spline clutch plates, and reverse clutch pressure plate as noted during removal.
6. Install a new reverse clutch pressure plate retainer snap ring.
7. Use a feeler gauge to measure the clearance between the reverse clutch pressure plate and the reverse clutch pressure plate retainer snap ring.

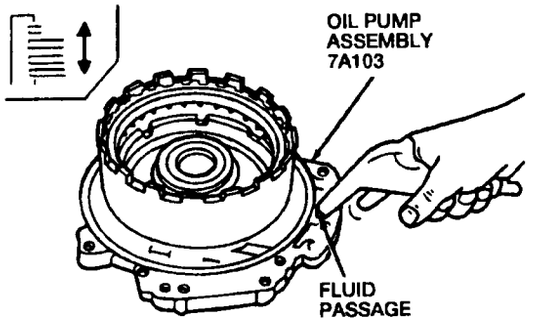


8. The standard clearance is 0.5-0.8mm (0.020-0.031 inch) with a maximum of 1.2mm (0.047 inch). If the clearance is not within the maximum specification, select and insert the proper thickness of clutch pressure plate (7B066) from the following chart to obtain the standard clearance.

CLUTCH PRESSURE PLATE SPECIFICATIONS

Thickness mm (in)	Part Number
6.6 (0.260)	F3XY-7B066-S
6.8 (0.268)	F3XY-7B066-T
7.0 (0.276)	F3XY-7B066-U
7.2 (0.283)	F3XY-7B066-V
7.4 (0.291)	F3XY-7B066-W
7.6 (0.299)	F3XY-7B066-X
7.8 (0.307)	F3XY-7B066-Y

9. Apply compressed air to the oil hole and check the operation of the reverse clutch.



3-4 Clutch

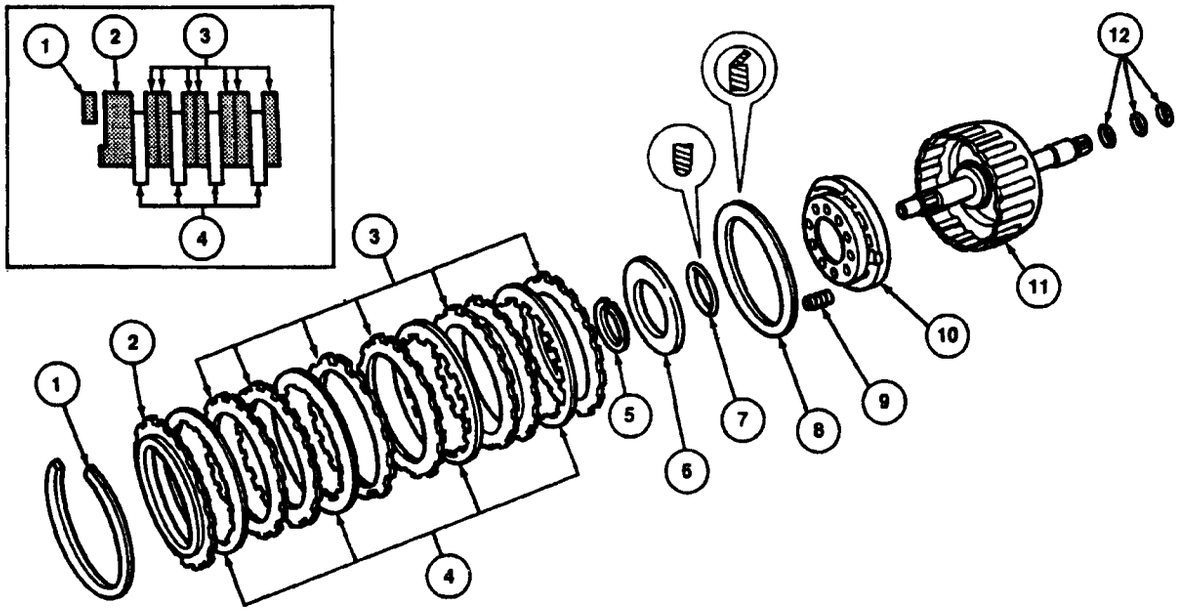
Disassembly

SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Valve Body Puller Bridge	Part of T78P-3504-B

The following illustration is an exploded view of the 3-4 clutch.

3-4 Clutch — Exploded View

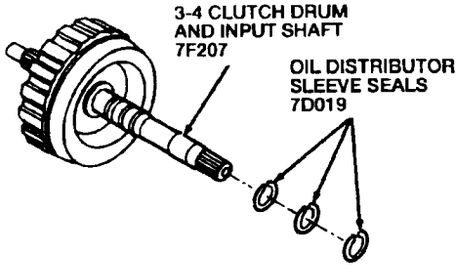


Item	Part Number	Description
1	7D483	3-4 Clutch Pressure Plate Retainer Snap Ring
2	7B066	3-4 Clutch Pressure Plate
3	7B442	3-4 Clutch External Spline Clutch Plates
4	7B164	3-4 Clutch Internal Spline Clutch Plates
5	—	Snap Ring
6	7A527	Clutch Piston Spring Retainer

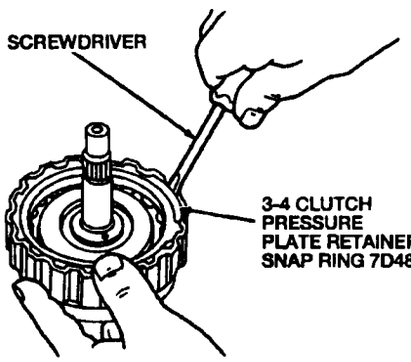
Item	Part Number	Description
7	—	D-Ring
8	—	Oil Seal
9	—	Return Spring (Part of 7D247)
10	7A262	3-4 Clutch Piston
11	7F207	3-4 Clutch Drum and Input Shaft
12	7D019	Oil Distributor Sleeve Seals

(Continued)

1. Remove the oil distributor sleeve seals (7D019) from the 3-4 clutch drum and input shaft. Discard the oil distributor sleeve seals.

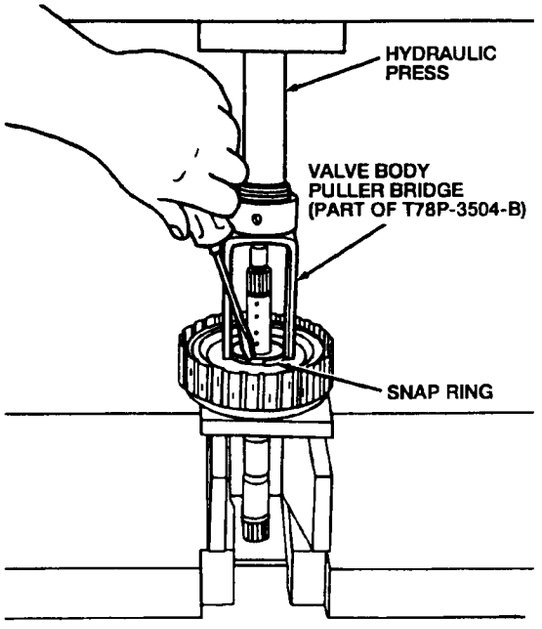


2. Use a screwdriver to remove the 3-4 clutch pressure plate retainer snap ring.

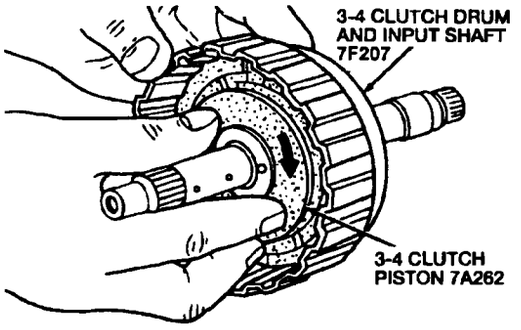


NOTE: Identify the clutch plates, their order, and their direction when removing them to aid in installation.

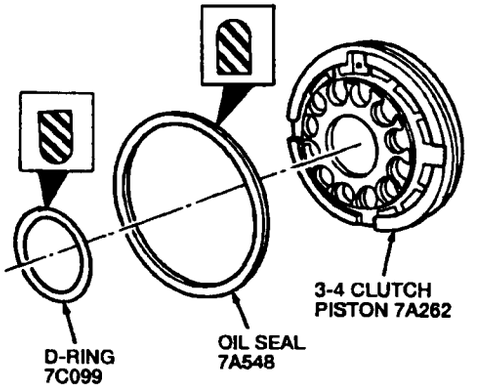
3. Remove the 3-4 clutch pressure plate, 3-4 clutch internal spline clutch plates and 3-4 clutch external spline clutch plates.
4. Use a hydraulic press and Valve Body Puller Bridge (part of T78P-3504-B) to compress the return springs and remove the snap ring.



5. Remove the clutch piston spring retainer (7A527) and the return springs.
6. Remove the 3-4 clutch piston from the 3-4 clutch drum and input shaft by turning the 3-4 clutch piston.

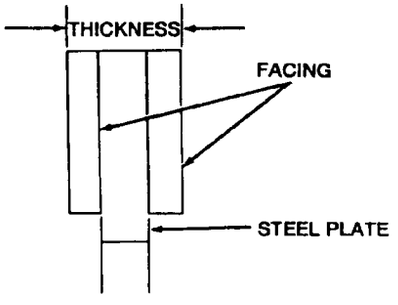


7. Remove the D-ring and oil seal from the 3-4 clutch piston. Discard the D-ring and oil seal.

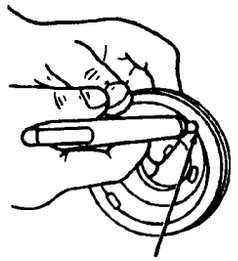


NOTE: When replacing a clutch piston spring retainer or return springs, replace them as a set.

8. Check the components for deformation, fatigue, or damage. Replace if necessary.
9. Check the facing of the 3-4 clutch internal spline clutch plates for burns, cracks, and damage.
10. Measure the thickness of the internal spline clutch plate facing. The standard thickness is 1.6mm (0.063 inch), with a wear limit of 1.4mm (0.055 inch).

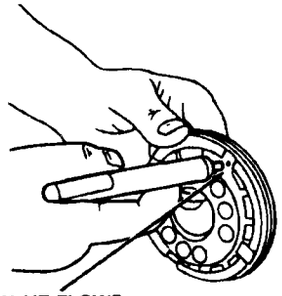


11. If a 3-4 clutch internal spline clutch plate facing is not within specifications, replace the 3-4 clutch internal spline clutch plates as a set.
12. Ensure that the check ball is not stuck.
13. Apply compressed air to the check ball hole opposite the return spring. There should be no air leakage.



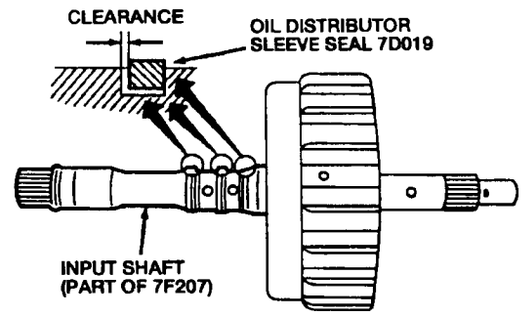
CHECK AIR DOES NOT FLOW THROUGH CHECK BALL HOLE

14. Apply compressed air to the check ball oil hole on the return spring side. Air should leak past the check ball.



CHECK AIR FLOWS THROUGH CHECK BALL HOLE

15. Use a feeler gauge to measure the clearance between the oil distributor sleeve seal and the ring groove.



16. The oil distributor sleeve seal side clearance should measure 0.08-0.23mm (0.0031-0.0091 inch). If the oil distributor sleeve seal side clearance is above specification, replace the 3-4 clutch drum and input shaft.

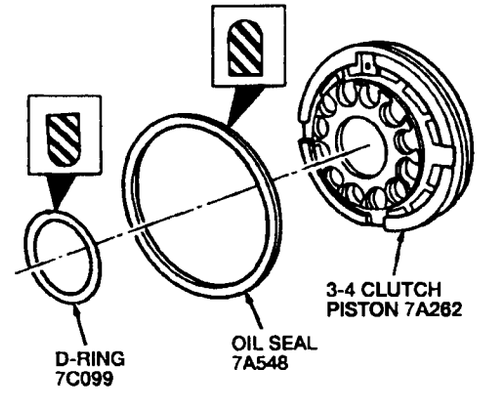
Assembly

SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Valve Body Puller Bridge	Part of T78P-3504-B

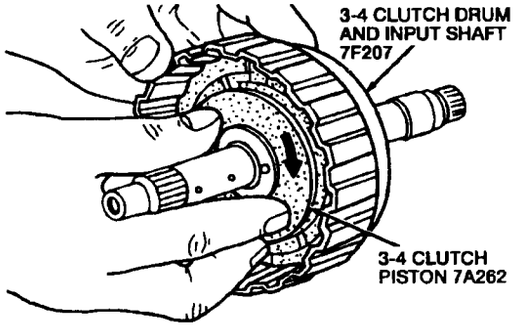
NOTE: Apply transmission fluid to the D-ring and oil seal prior to installation.

1. Install a new D-ring and oil seal onto the 3-4 clutch piston.

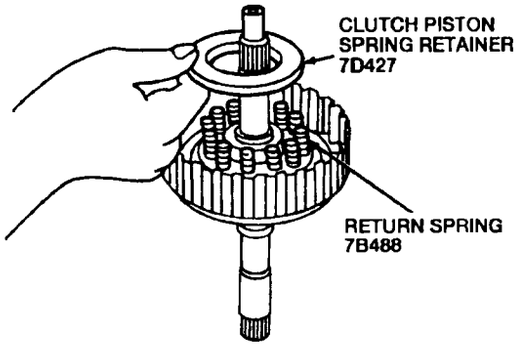


NOTE: Apply transmission fluid to the inner surface of the 3-4 clutch drum and input shaft.

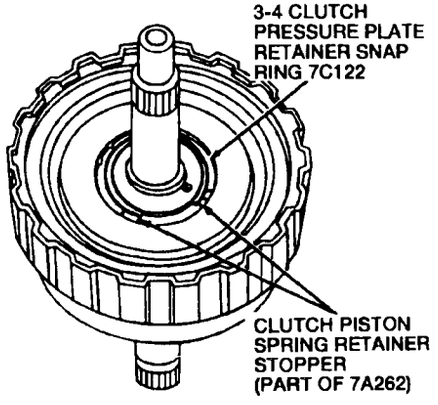
2. Install the 3-4 clutch piston by turning it slowly.



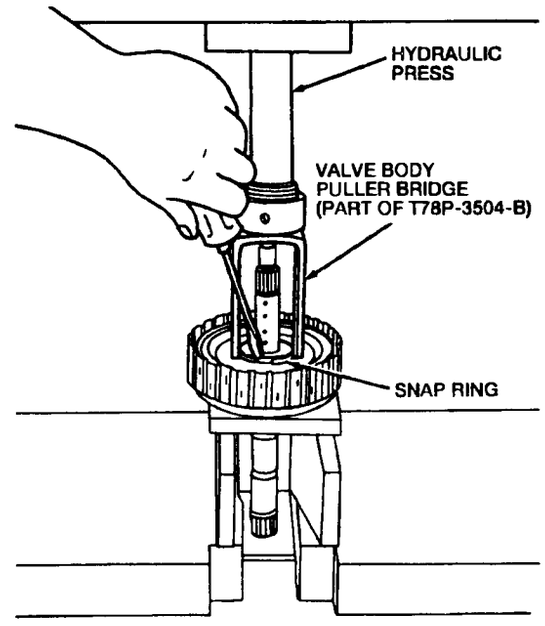
3. Install the return springs and clutch piston spring retainer on the 3-4 clutch piston.



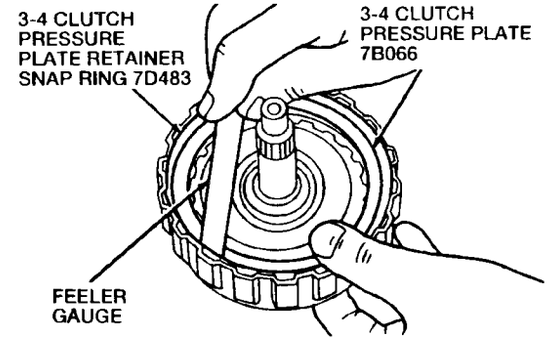
NOTE: Do not align the snap ring with the clutch piston spring retainer stopper.



4. Use a hydraulic press and Valve Body Puller Bridge (part of T78P-3504-B) to compress the return springs and ir.stall the snap ring.



5. Install the 3-4 clutch internal spline clutch plates, 3-4 clutch external spline clutch plates, and the 3-4 clutch pressure plate in the reverse order of removal.
6. Install the 3-4 clutch pressure plate retainer snap ring.
7. Use a feeler gauge to measure the clearance between the 3-4 clutch pressure plate and the 3-4 clutch pressure plate retainer snap ring.

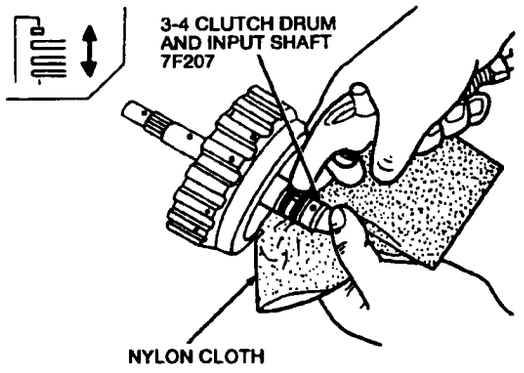


8. The standard clearance is 1.8-2.2mm (0.071-0.087 inch) with a maximum of 3.0mm (0.118 inch). If the clearance is not within the maximum specification, select and insert the proper clutch pressure plate (7B066) from the following chart to obtain the standard clearance.

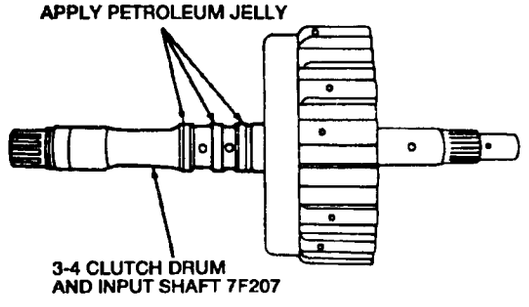
CLUTCH PRESSURE PLATE SPECIFICATIONS

Thickness mm (In)	Part Number
3.0 (0.118)	F3XY-7B066-N
3.2 (0.126)	F3XY-7B066-AAA
3.4 (0.134)	F3XY-7B066-P
3.6 (0.142)	F3XY-7B066-Q
3.8 (0.150)	F3XY-7B066-R

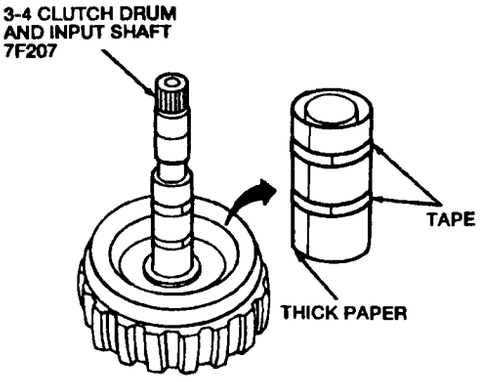
9. Cover one side of the 3-4 clutch cylinder and shaft oil hole with a nylon cloth and apply compressed air to the other side of the 3-4 clutch drum and input shaft oil hole.



NOTE: Apply petroleum jelly to the new oil distributor sleeve seals prior to installation.



10. Install the new oil distributor sleeve seals to the 3-4 clutch drum and input shaft.
11. Wrap the oil distributor sleeve seals with thick paper and tape as shown to prevent the oil distributor sleeve seals from spreading.



Forward and Coasting Clutch

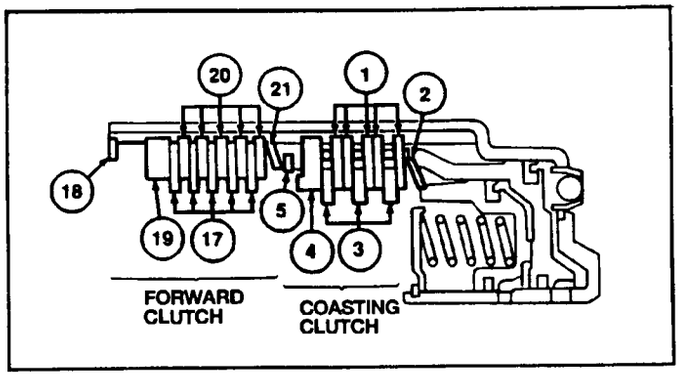
Disassembly

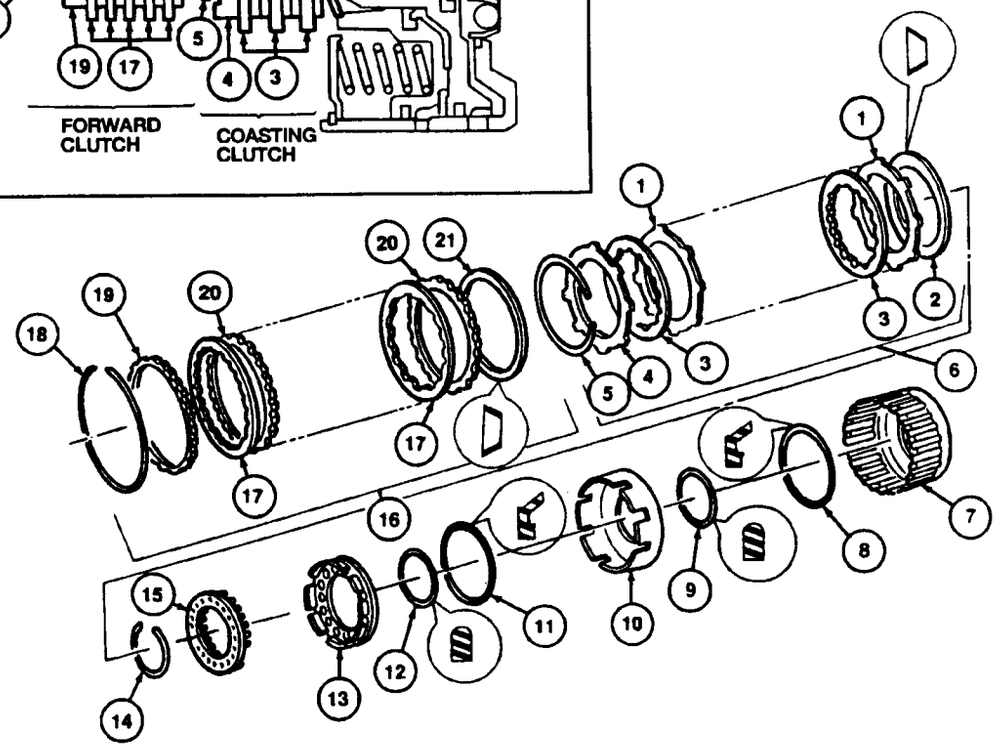
SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Clutch Spring Compressor	T65L-77515-A

The following illustration shows an exploded view of the forward and coasting clutch.

Forward and Coasting Clutch — Exploded View



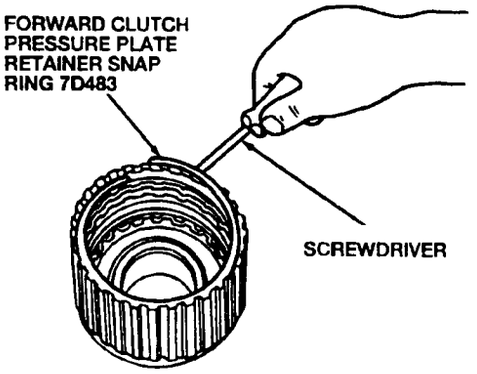


Item	Part Number	Description
1	7B442	Coasting Clutch External Spline Clutch Plates (5)
2	7B070	Dish Plate
3	7B164	Coasting Clutch Internal Spline Clutch Plates (3)
4	7B066	Coasting Clutch Pressure Plate
5	7D483	Coasting Clutch Pressure Plate Retainer Snap Ring
6	—	Coasting Clutch
7	7A360	Forward Clutch Cylinder
8	7F228	Oil Seal
9	7F227	D-Ring
10	7L139	Forward Clutch Piston
11	7E056	Oil Seal

(Continued)

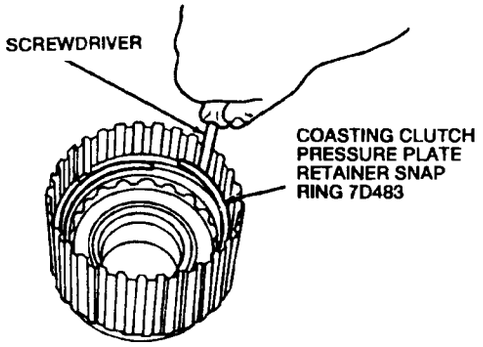
Item	Part Number	Description
12	7A548	D-Ring
13	7A262	Coasting Clutch Piston
14	7D483	Forward Clutch Pressure Plate Retainer Snap Ring
15	—	Spring Retainer (Part of 7G299)
16	—	Forward Clutch
17	7B164	Forward Clutch Internal Spline Clutch Plates (5)
18	7D483	Forward Clutch Pressure Plate Retainer Snap Ring
19	7B066	Forward Clutch Pressure Plate
20	7B442	Forward Clutch External Spline Clutch Plates (5)
21	7B070	Dish Plate

1. Use a screwdriver to remove the forward clutch pressure plate retainer snap ring.



NOTE: Identify the clutch plates, their order, and their direction when removing them to aid in installation.

2. Remove the forward clutch pressure plate, forward clutch internal spline clutch plates, forward clutch external spline clutch plates, and the dish plate from the forward clutch.
3. Use a screwdriver to remove the coasting clutch pressure plate retainer snap ring.

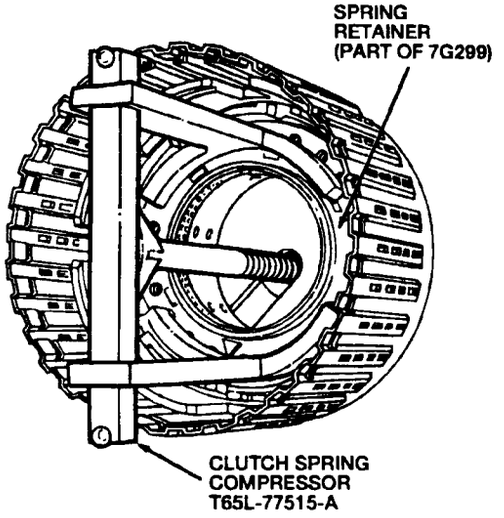


NOTE: Identify the clutch plates, their order, and their direction when removing them to aid in installation.

4. Remove the coasting clutch pressure plate, coasting clutch internal spline clutch plates, coasting clutch external spline clutch plates, and the dish plate from the coasting clutch.

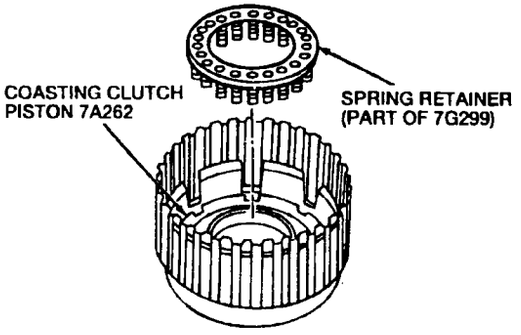
CAUTION: Do not expand the forward clutch pressure plate retainer snap ring further than necessary or damage may result.

5. Use Clutch Spring Compressor T65L-77515-A to compress the return springs and remove the forward clutch pressure plate retainer snap ring from the forward clutch cylinder.

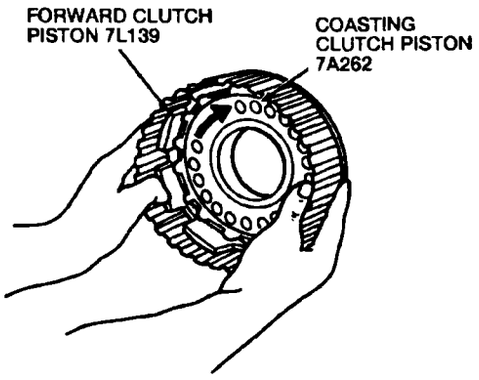


NOTE: Do not remove the return springs from the spring retainer.

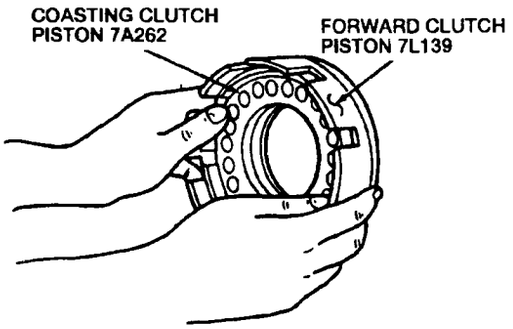
6. Remove the spring retainer with the return springs still attached.



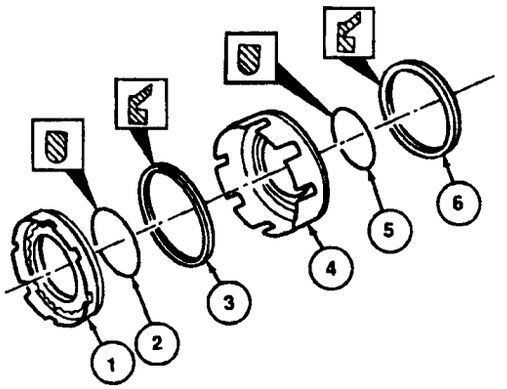
7. Remove the forward clutch piston and coasting clutch piston from the forward clutch cylinder by turning the coasting clutch piston.



8. Remove the coasting clutch piston from the forward clutch piston by turning the coasting clutch piston.



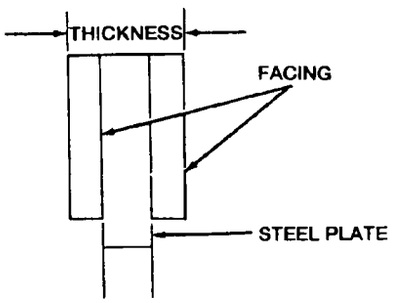
9. Remove the D-rings and oil seals from the forward clutch and coasting clutch pistons.



Item	Part Number	Description
1	7A262	Coasting Clutch Piston
2	7A548	D-Ring
3	7E056	Oil Seal
4	7L139	Forward Clutch Piston
5	7F227	D-Ring
6	7F228	Oil Seal

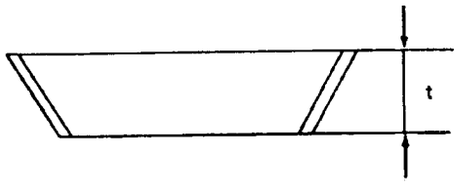
NOTE: When replacing a spring retainer or return springs, replace them as a set.

10. Check the components for deformation, fatigue, or damage. Replace if necessary.
11. Check the facing of the internal spline clutch plates for burns, cracks, and damage.
12. Measure the thickness of the forward and the coasting clutch internal spline clutch plate facing. The standard thickness is 1.6mm (0.063 inch), with a wear limit of 1.4mm (0.055 inch).

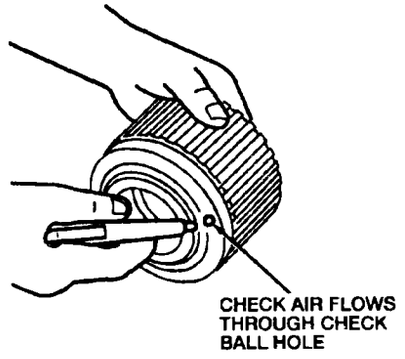


13. If an internal spline clutch plate facing is not within specifications, replace the internal spline clutch plates as a set.
14. Check the dish plates for deformation and damage.

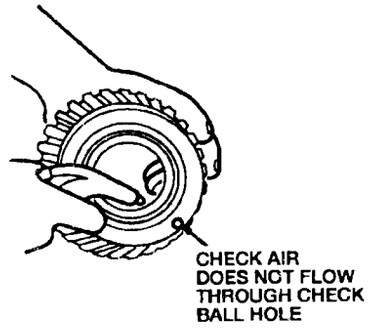
15. Measure the thickness (t) of the dish plate.



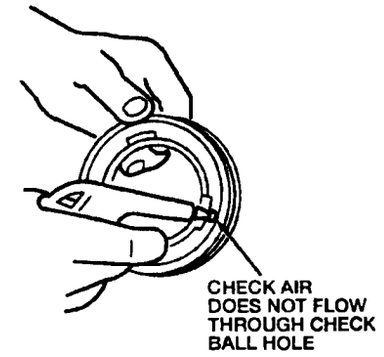
16. The dish plate should measure 2.7mm (0.106 inch). If the dish plate is out of specification, replace the dish plate.
17. Ensure that the check ball is not stuck in the front clutch cylinder.
18. Apply compressed air to the check ball hole from outside the forward clutch cylinder. Air should leak past the check ball.



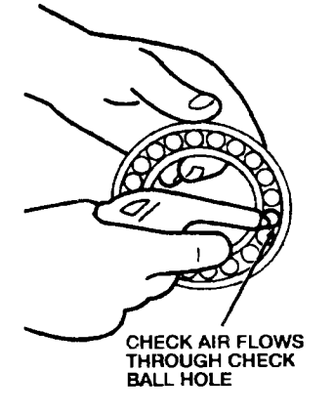
19. Apply compressed air to the check ball oil hole from inside the forward clutch cylinder. There should be no air leakage.



20. Ensure that the check ball is not stuck in the coasting clutch piston.
21. Apply compressed air to the check ball oil hole opposite the return spring. There should be no air leakage.



22. Apply compressed air to the check ball oil hole on the return spring side. Air should leak past the check ball.



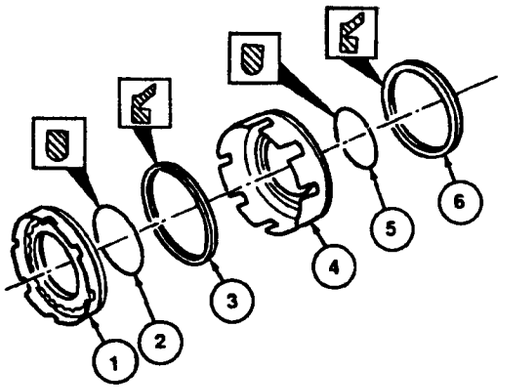
Assembly

SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Clutch Spring Compressor	T65L-77515-A

NOTE: Apply transmission fluid to the D-rings and the oil seals prior to installation. Ensure that the oil seals are installed in the proper direction.

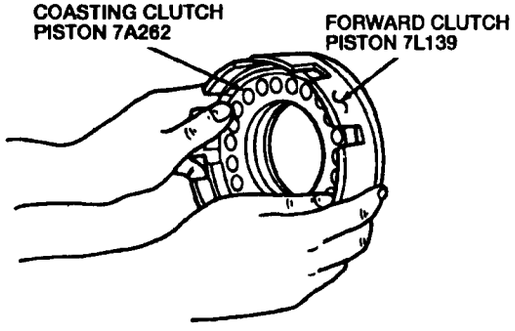
1. Install the D-rings and the oil seals onto the forward clutch and coasting clutch pistons.



Item	Part Number	Description
1	7A262	Coasting Clutch Piston
2	7A548	D-Ring
3	7E056	Oil Seal
4	7L139	Forward Clutch Piston
5	7F227	D-Ring
6	7F228	Oil Seal

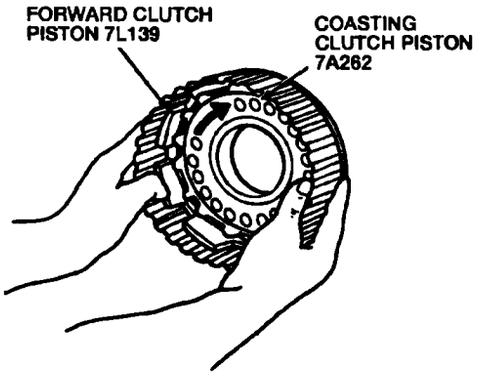
NOTE: Apply transmission fluid to the inner surface of the forward clutch piston.

2. Install the coasting clutch piston into the forward clutch piston by turning the coasting clutch piston slowly.

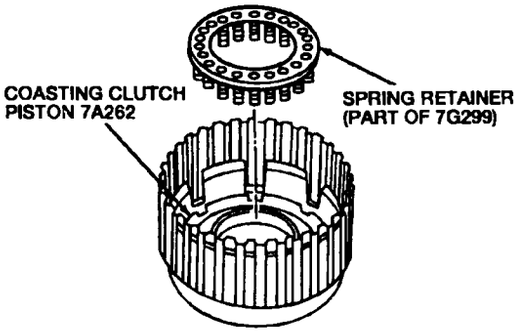


NOTE: Apply transmission fluid to the inner surface of the forward clutch cylinder.

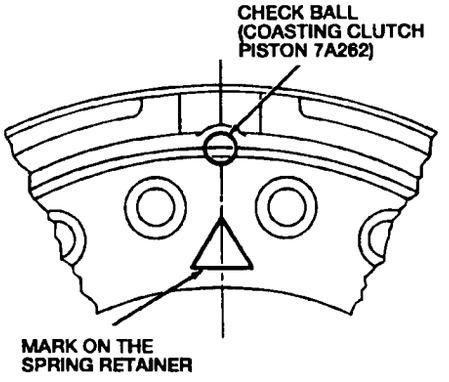
3. Install the forward clutch piston and coasting clutch piston into the forward clutch cylinder by turning the coasting clutch piston slowly.



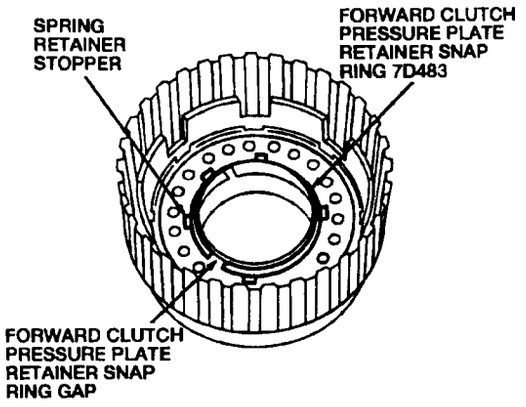
4. Install the spring retainer with the springs attached onto the coasting clutch piston.



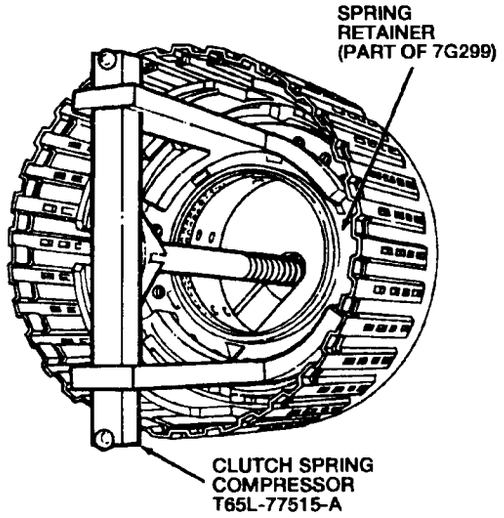
5. Align the mark on the spring retainer with the check ball in the coasting clutch piston.



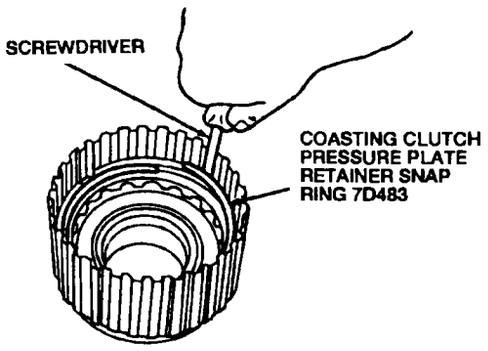
NOTE: Do not align the forward clutch pressure plate retainer snap ring gap with the spring retainer stopper.



6. Use Clutch Spring Compressor T65L-77515-A to compress the return springs and install the forward clutch pressure plate retainer snap ring.

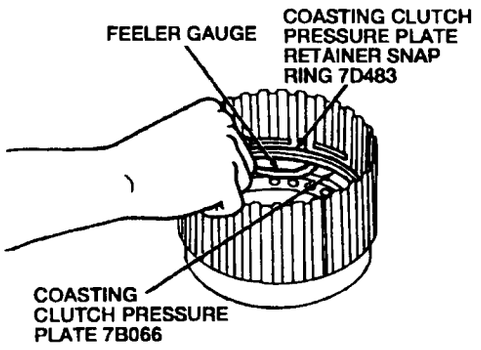


7. Install the dish plate, coasting clutch internal spline clutch plates, coasting clutch external spline clutch plates, and coasting clutch pressure plate in reverse order of removal.
8. Use a screwdriver to install the coasting clutch pressure plate retainer snap ring.



NOTE: The feeler gauge should be inserted between the coasting clutch pressure plate retainer snap ring and the coasting clutch pressure plate.

9. Use a feeler gauge to measure the clearance between the coasting clutch pressure plate retainer snap ring and the coasting clutch pressure plate.



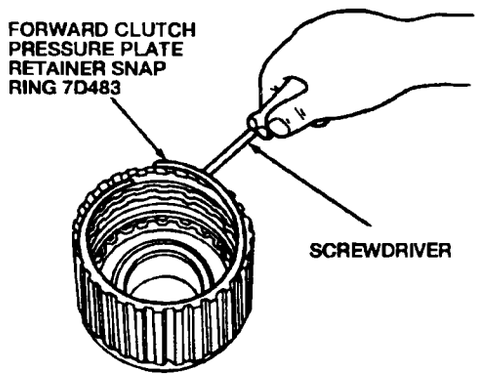
10. The standard clearance is 0.7-1.1mm (0.028-0.043 inch) with a maximum of 1.7mm (0.067 inch). If the clearance is not within the maximum specification, select and insert the proper clutch pressure plate (7B066) from the following chart to obtain the standard clearance.

CLUTCH PRESSURE PLATE SPECIFICATIONS

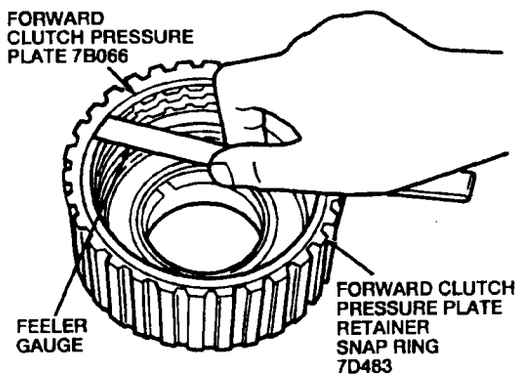
Thickness mm (in)	Part Number
3.0 (0.118)	F3XY-7B066-H
3.2 (0.126)	F3XY-7B066-J
3.4 (0.134)	F3XY-7B066-K
3.6 (0.142)	F3XY-7B066-L
3.8 (0.150)	F3XY-7B066-M

11. Install the dish plate, forward clutch internal spline clutch plates, forward clutch external spline clutch plates, and forward clutch pressure plates in reverse order of removal.

12. Use a screwdriver to install the forward clutch pressure plate retainer snap ring.



13. Use a feeler gauge to measure the clearance between the forward clutch pressure plate and the forward clutch pressure plate retainer snap ring.

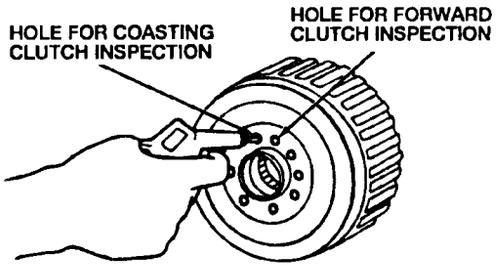


14. The standard clearance is 0.45-0.85mm (0.0177-0.0335 inch) with a maximum of 1.85mm (0.0728 inch). If the clearance is not within the maximum specification, select and insert the proper clutch pressure plate from the following chart to obtain the standard clearance.

CLUTCH PRESSURE PLATE SPECIFICATIONS

Thickness mm (in)	Part Number
3.6 (0.142)	F3XY-7B066-A
3.8 (0.150)	F3XY-7B066-B
4.0 (0.157)	F3XY-7B066-C
4.2 (0.165)	F3XY-7B066-D
4.4 (0.173)	F3XY-7B066-E
3.4 (0.134)	F3XY-7B066-F
3.2 (0.126)	F3XY-7B066-G

15. Apply compressed air to the check ball oil hole of the forward clutch cylinder. Ensure the forward clutch pressure plate moves to the forward clutch pressure plate retainer snap ring.
16. Apply compressed air to the check ball oil hole of the coasting clutch drum. Ensure the coasting clutch pressure plate moves to the coasting clutch pressure plate retainer snap ring.

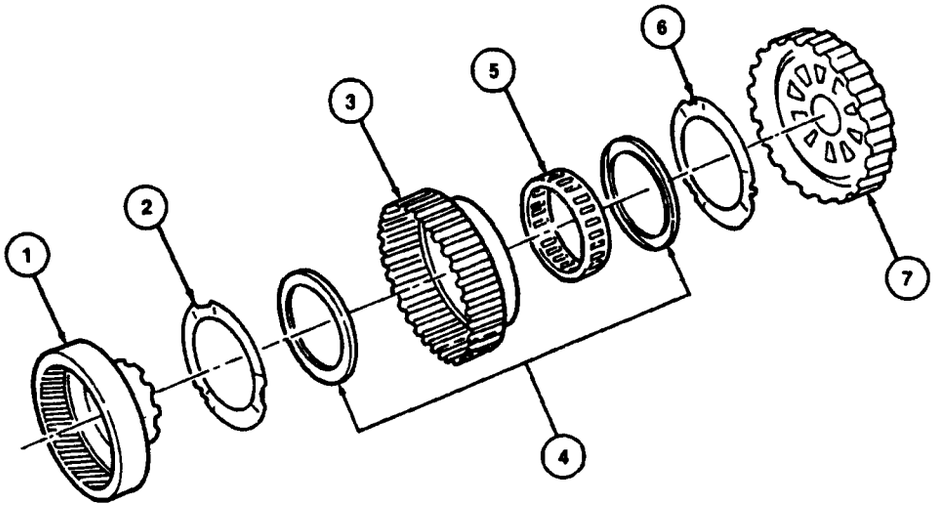


Ring Gear, Forward Clutch Hub and Coasting Clutch Hub

Disassembly

The following illustration is an exploded view of the ring gear (7A153), forward clutch hub, and coasting clutch hub.

Ring Gear, Forward Clutch Hub and Coasting Clutch Hub — Exploded View

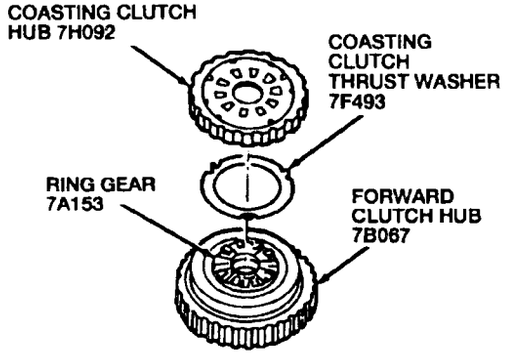


Item	Part Number	Description
1	7A153	Ring Gear
2	7A166	Ring Gear Thrust Washer
3	7B067	Forward Clutch Hub
4	7A623	One-Way Clutch Bearings

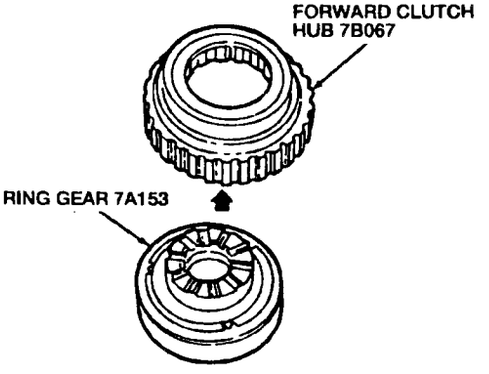
(Continued)

Item	Part Number	Description
5	7A089	Forward One-Way Clutch (Sprag)
6	7F493	Coasting Clutch Thrust Washer
7	7H092	Coasting Clutch Hub

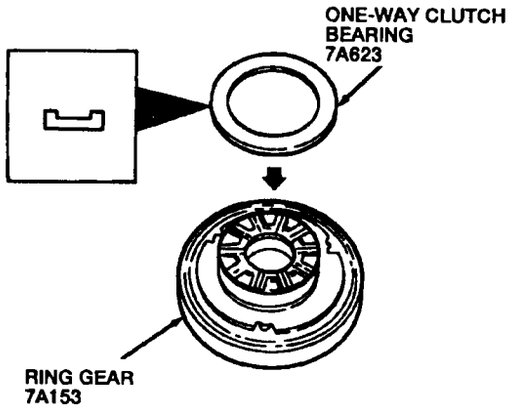
1. Remove the coasting clutch hub and the coasting clutch thrust washer from the forward clutch hub.



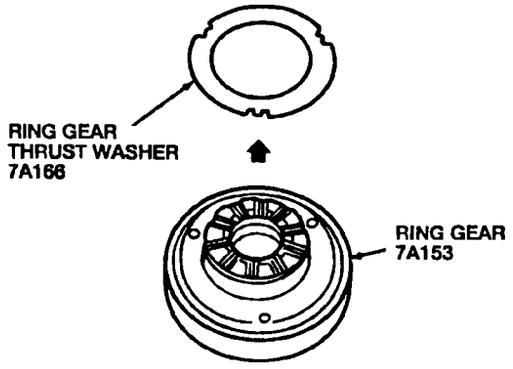
2. Remove the forward clutch hub from the ring gear.



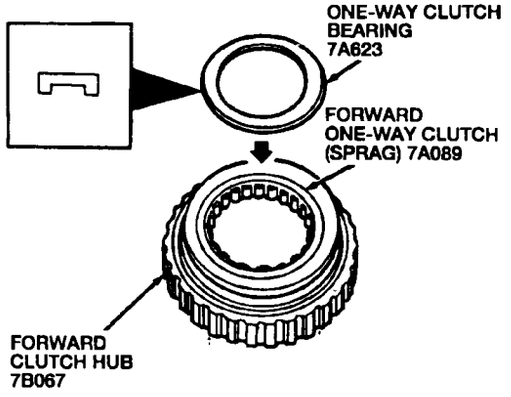
3. Remove the one-way clutch bearing from the ring gear.



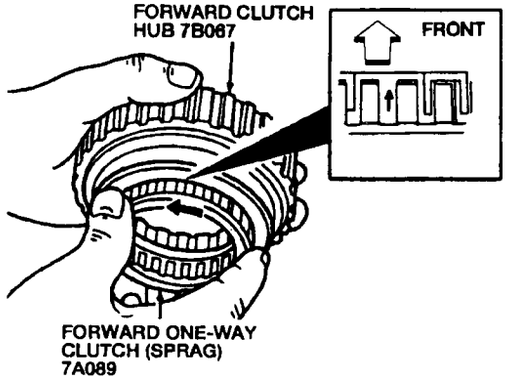
4. Remove the ring gear thrust washer from the ring gear.



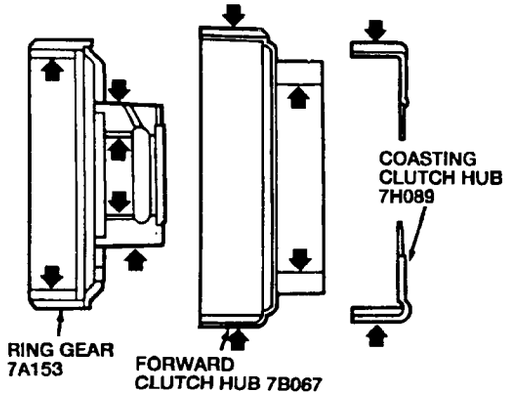
5. Remove the one-way clutch bearing from the forward one-way clutch (sprag).



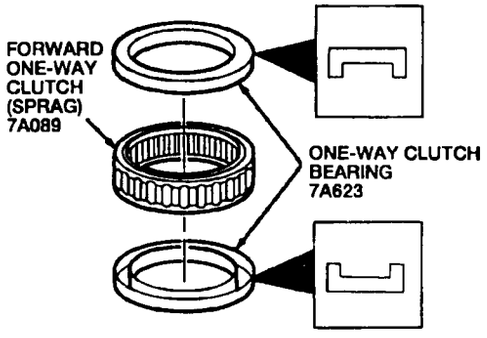
6. Rotate counterclockwise and remove the forward one-way clutch (sprag) from the forward clutch hub.



7. Check the rubbing surfaces for wear or damage. Replace if necessary.



8. Check the one-way clutch bearings for deformation and damage.

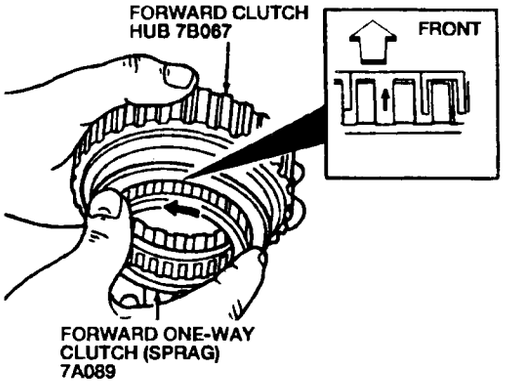


9. Check the forward one-way clutch (sprag) for wear and damage.

Assembly

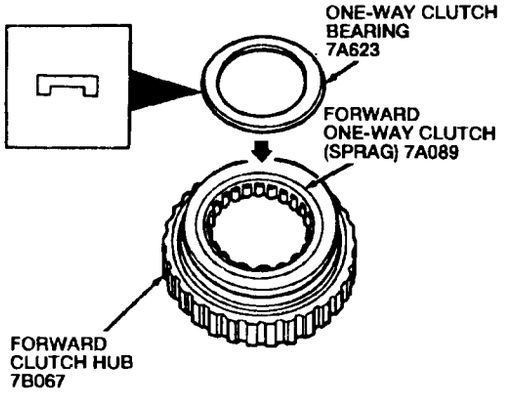
NOTE: Ensure that the forward one-way clutch (sprag) is installed in the proper direction.

1. Install the forward one-way clutch (sprag) into the forward clutch hub by rotating counterclockwise.



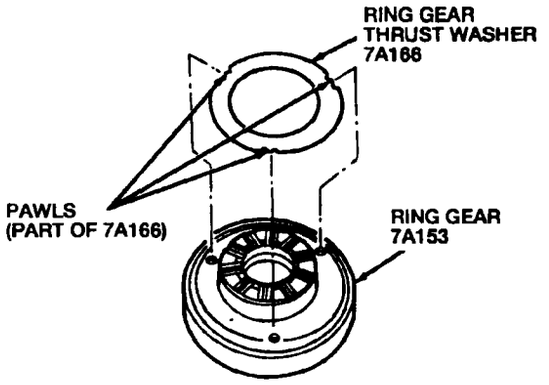
NOTE: Apply petroleum jelly to the bearing prior to installation.

2. Install the one-way clutch bearing onto the forward one-way clutch (sprag).



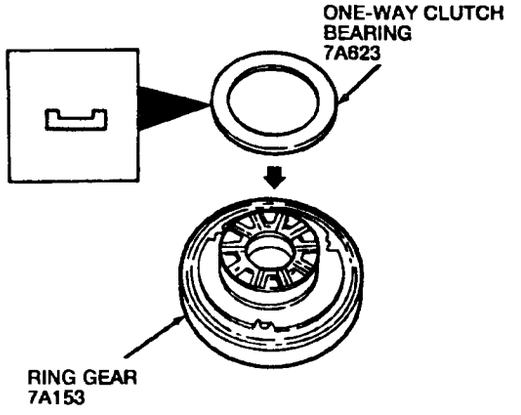
NOTE: Apply petroleum jelly to the thrust washer prior to installation.

3. Align the three pawls of the ring gear thrust washer with the holes in the ring gear and install.

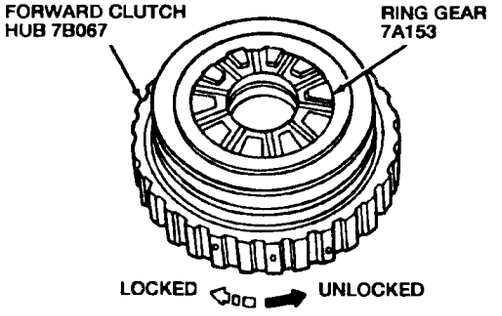


NOTE: Apply petroleum jelly to the bearing prior to installation.

4. Install the one-way clutch bearing onto the ring gear.

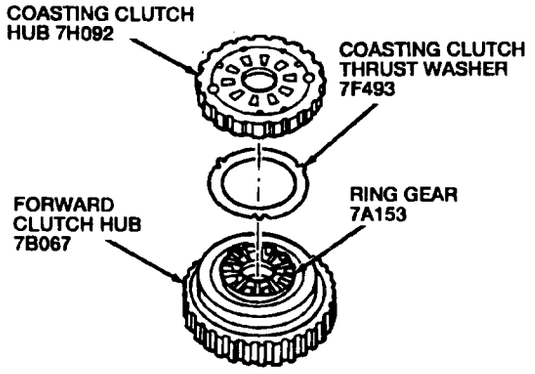


5. Install the forward clutch hub onto the ring gear and check the operation of the forward one-way clutch (sprag).



NOTE: Apply petroleum jelly to the coasting clutch thrust washer prior to installation.

6. Install the coasting clutch thrust washer and the coasting clutch hub by aligning the hooks of the thrust washer with the holes of the coasting clutch hub. Align the projections of the ring gear with the holes of the coasting clutch hub.

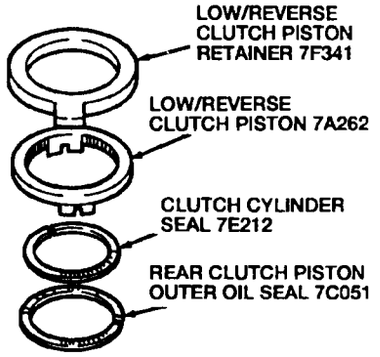


Low/Reverse Clutch Piston Assembly

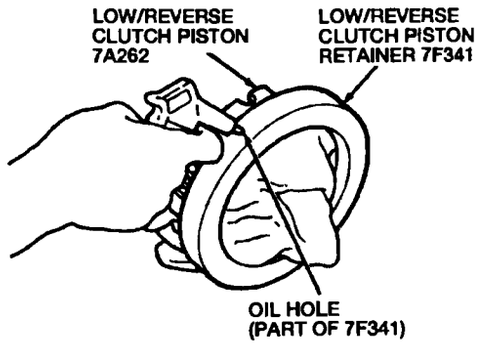
Disassembly

The following is an exploded view of the low/reverse clutch piston assembly.

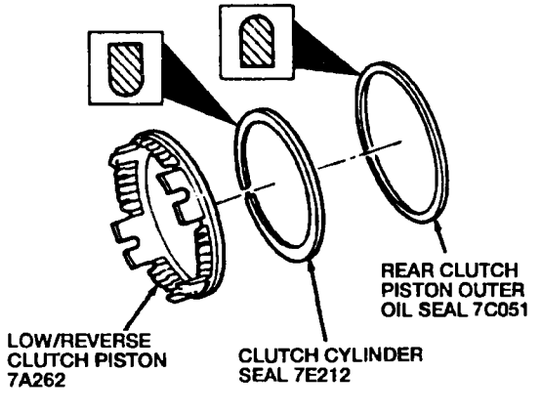
Low/Reverse Clutch Piston Assembly — Exploded View



1. To remove the low/reverse clutch piston, apply compressed air to the oil hole of the low/reverse clutch while holding the low/reverse clutch piston.

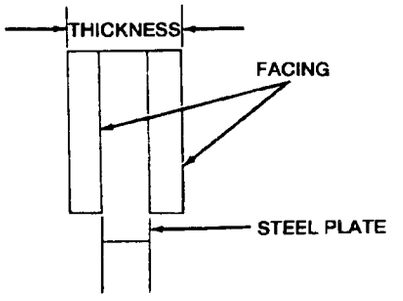


2. Remove the clutch cylinder seal (7E212) and rear clutch piston outer oil seal (7C051) from the low/reverse clutch piston.



NOTE: When replacing a spring retainer or return springs, replace them as a set.

3. Check the components for deformation, fatigue, or damage. Replace if necessary.
4. Check the facing of the low/reverse clutch internal spline clutch plates for burns, cracks, and damage.
5. Measure the thickness of the low/reverse clutch internal spline clutch plate facing. The standard thickness is 1.8mm (0.071 inch), with a wear limit of 1.6mm (0.063 inch).

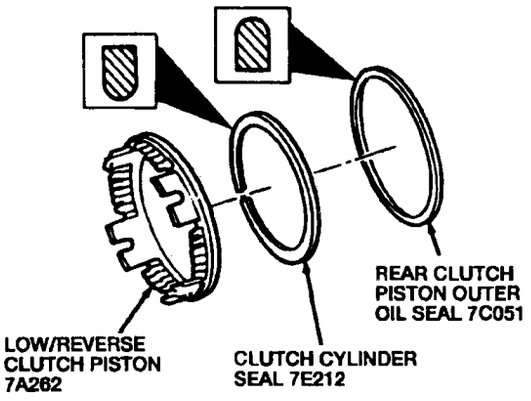


6. If a low / reverse clutch internal spline clutch plate facing is not within specifications, replace the internal spline clutch plates as a set.

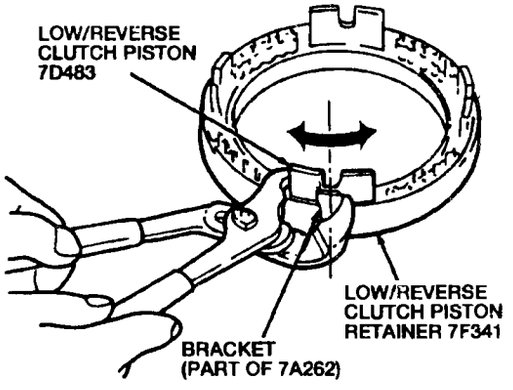
Assembly

NOTE: Apply transmission fluid on the clutch cylinder seal and rear clutch piston outer oil seal prior to installation. Ensure that each oil seal is installed in the proper direction.

1. Install the clutch cylinder seal and rear clutch piston outer oil seal onto the low / reverse clutch piston.



2. Set and align the low / reverse clutch piston with the low / reverse clutch piston retainer.



Output Shaft and Bearing Retainer

Disassembly

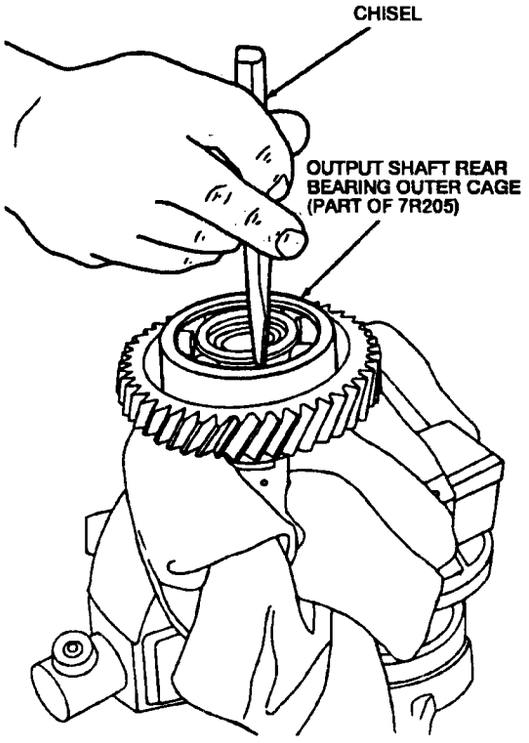
SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Stator and Driven Sprocket Bearing Replacer	T86P-70043-A
Impact Slide Hammer	T50T-100-A

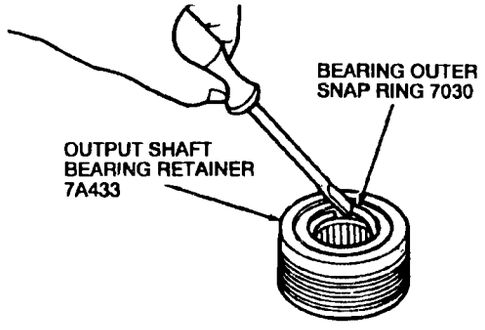
CAUTION: Output shaft (7060) disassembly should occur only if the following conditions are present:

- Abnormal noise
- Faulty bearings

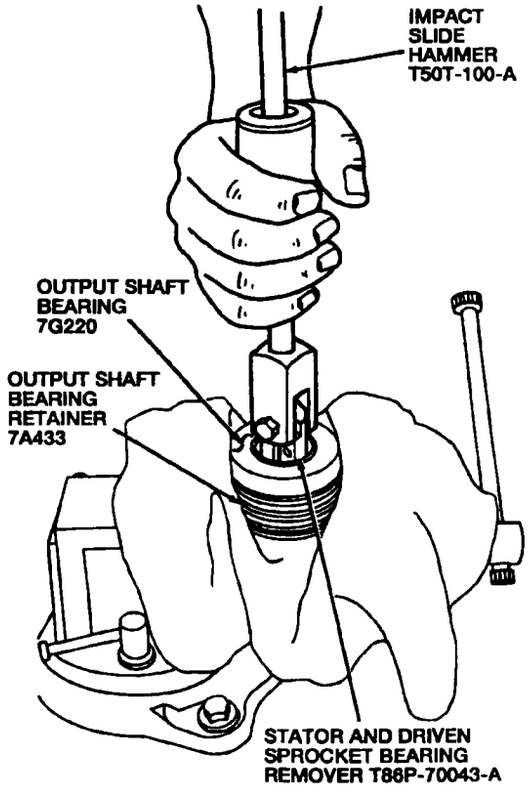
1. Use a chisel to break the outer cage of the output shaft rear bearing (7R205).



2. Pry the output shaft rear bearing from the output shaft.
3. Remove the bearing outer snap ring (7030) from the output shaft bearing retainer.



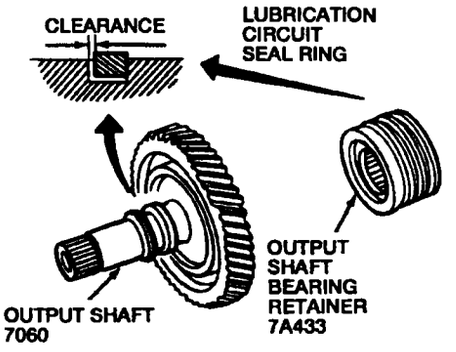
4. Use Stator and Driven Sprocket Bearing Replacer T86P-70043-A and Impact Slide Hammer T50T-100-A to remove the output shaft bearing (7G220) from the output shaft bearing retainer.



5. Check the output shaft for cracks, wear, or bending. Replace if necessary.
6. Check the gears for wear, chips, or cracks. Replace if necessary.

NOTE: When replacing the taper roller bearing, replace the inner and outer races as a set.

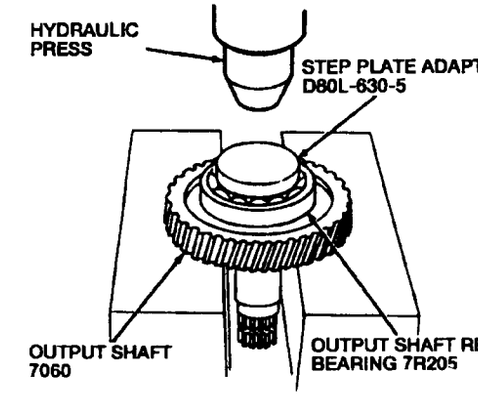
7. Ensure the bearings roll freely and are free of noise, cracks, pitting, and wear.
8. Install new lubrication circuit seal rings to the output shaft.
9. Measure the clearance between the new lubrication circuit seal ring and the seal ring grooves of the output shaft and bearing retainer.



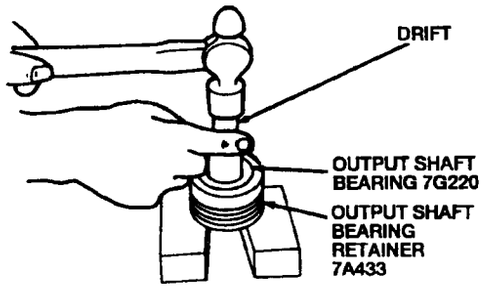
10. The standard clearance should measure 0.10-0.25mm (0.0039-0.0098 inch).
11. If the clearance is above specification, replace the output shaft.
12. Install new lubrication circuit seal rings onto the bearing retainer.
13. Measure the clearance between the new lubrication circuit seal ring and the seal ring groove of the bearing retainer.
14. The standard clearance should measure 0.10-0.30mm (0.0039-0.0118 inch).
15. If the clearance is above specification, replace the bearing retainer.

Assembly

1. Use a hydraulic press and Step Plate Adapter D80L-630-5 or equivalent, to press the output shaft rear bearing onto the output shaft.



2. Use a drift to press the output shaft bearing into the output shaft bearing retainer.

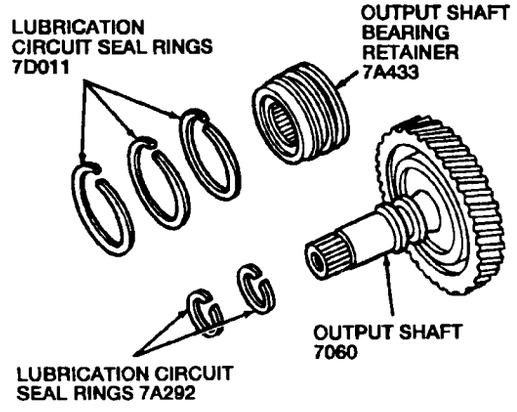


3. Install the bearing outer snap ring onto the bearing retainer.

CAUTION: The output shaft lubrication circuit seal rings must be replaced.

NOTE: Pack the output shaft and bearing retainer lubrication circuit seal ring grooves with petroleum jelly.

4. Install the new lubrication circuit seal rings onto the output shaft. Wrap the output shaft to prevent the lubrication circuit seal rings from expanding.



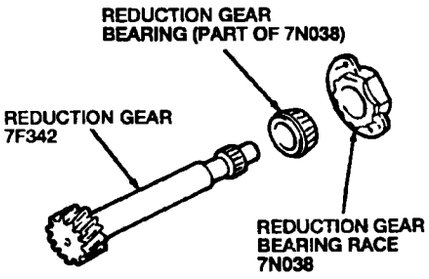
5. Install new lubrication circuit seal rings onto the output shaft bearing retainer. Wrap the bearing retainer to prevent the lubrication circuit seal rings from expanding.

Reduction Gear

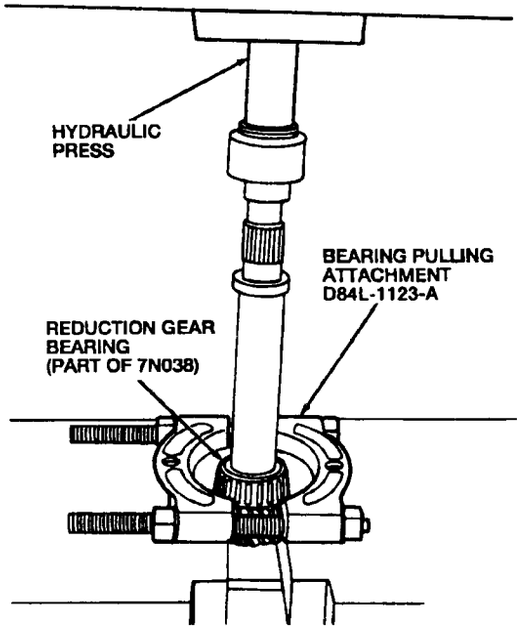
Disassembly

CAUTION: Reduction gear disassembly should occur only if the following conditions are present:

- Abnormal noise
- Abnormal gear wear
- Faulty bearings



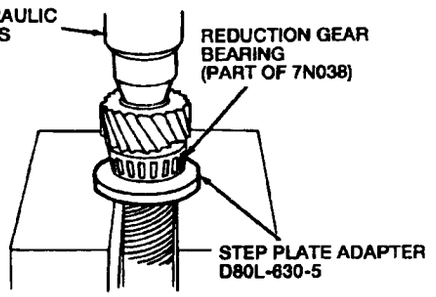
1. Use a hydraulic press and Bearing Pulling Attachment D84L-1123-A or equivalent to remove the reduction gear bearing from the reduction gear. Discard the reduction gear bearing.



2. Inspect the reduction gear components. Refer to the procedure in this section.

Assembly

Use a hydraulic press and Step Plate Adapter D80L-630-5 or equivalent, to install the new reduction gear bearing onto the reduction gear.

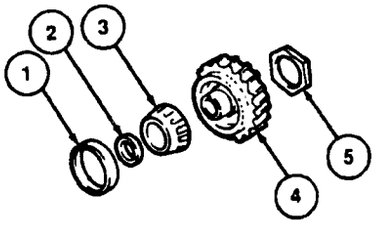


Idler Gear

Disassembly

CAUTION: Idler gear disassembly should occur only if the following conditions are present:

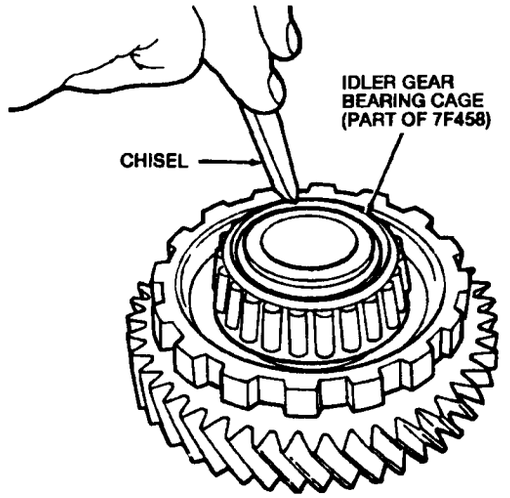
- Abnormal noise
- Abnormal gear wear
- Faulty bearings



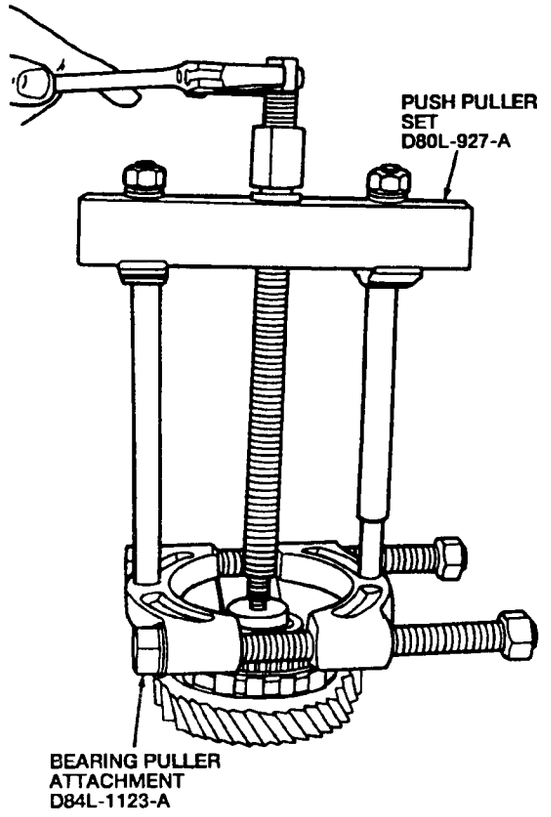
Item	Part Number	Description
1	—	Idler Gear Bearing Race (Part of 7F458)
2	7N112	Adjusting Shim
3	7F458	Idler Gear Bearing
4	7F475	Idler Gear
5	7N170	Locknut

WARNING: EYE PROTECTION SHOULD BE WORN DURING THIS PROCEDURE TO PREVENT ANY POSSIBLE INJURY FROM FLYING METAL.

1. Use a chisel to break the idler gear bearing cage from the idler gear bearing.



2. Use Push-Puller Set D80L-927-A, Push-Puller Legs D80L-927-A2 and Bearing Puller Attachment D84L-1123-A, or equivalents, to remove the idler gear bearing inner race.



3. Check the idler gear shaft for cracks, wear, or bending. Replace if necessary.

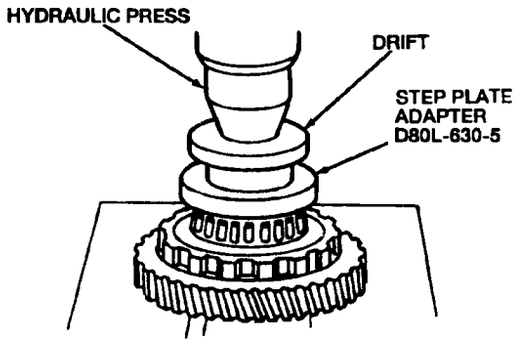
4. Check the idler gear (7F475) for wear, chips, or cracks. Replace if necessary.

NOTE: When replacing the taper roller bearing, replace the inner and outer races as a set.

5. Ensure the bearings roll freely and are free of noise, cracks, pitting, and wear.

Assembly

Use a hydraulic press, drift, and Step Plate Adapter D80L-630-5, or equivalent, to press a new idler gear bearing onto the idler gear.



Torque Converter Checks

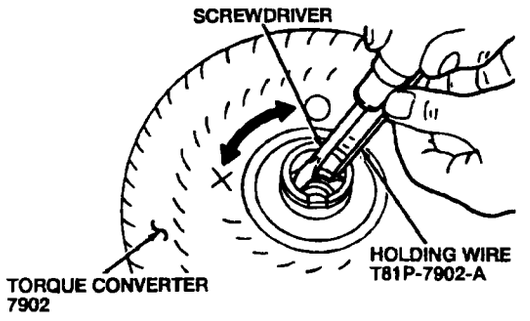
Torque Converter One-Way Clutch Check

SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Holding Wire	T81P-7902-A

NOTE: Place the torque converter (7902) onto a clean workbench with the front of the torque converter facing up. The one-way clutch should only turn clockwise.

Use Holding Wire T81P-7902-A to hold the torque converter one-way bearing support and turn the one-way clutch with a screwdriver. Ensure that it only rotates clockwise. If the one-way clutch rotates in both directions, replace the torque converter.

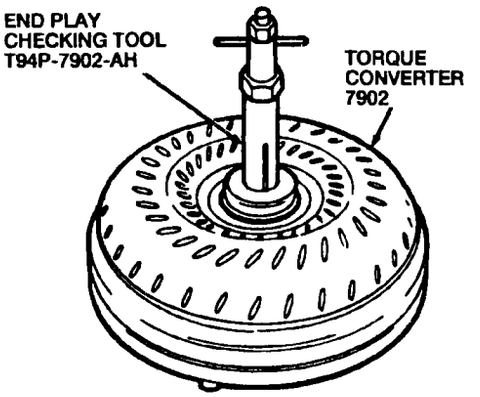


Torque Converter End Play Check

SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
End Play Checking Tool	T94P-7902-AH
End Play Checking Tool Sleeve	T94P-77000-V

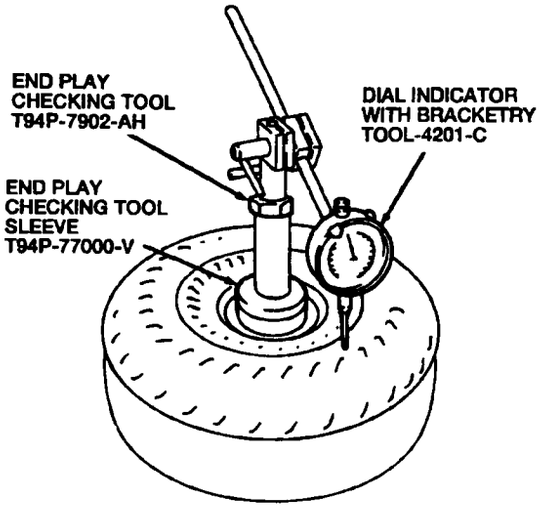
1. Insert End Play Checking Tool T94P-7902-AH and End Play Checking Tool Sleeve T94P-77000-V in the turbine.



2. Tighten the center collet of the tool.

NOTE: Dial Indicator must be between the ridges of the torque converter.

3. Attach Dial Indicator with Bracketry TOOL-4201-C to the tool. Position the indicator button on the converter housing and set the dial face at 0 (zero).



4. Pull up on the tool and observe the dial indicator reading.
5. If end play exceeds 0.5mm (0.019 inch), replace the torque converter.

ASSEMBLY

Transaxle Assembly

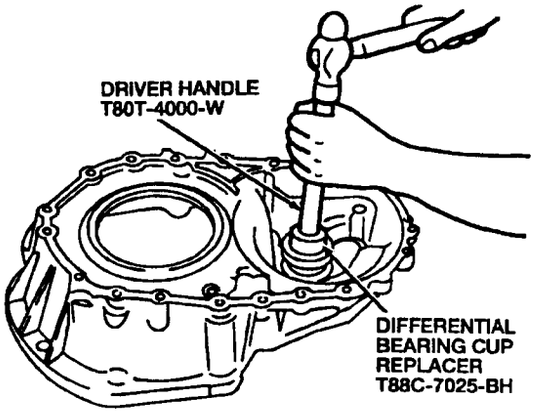
SPECIAL SERVICE TOOL(S) REQUIRED

Description	Tool Number
Differential Bearing Cup Replacer	T88C-7025-BH
Driver Handle	T80T-4000-W
Shim Selection Set	T87C-77000-J
Shim Selection Gauge (Part of Shim Selection Set)	T88C-77000-CH2 (Part of T88C-77000-C)
Shim Selection Tool Bolt Set	T92P-77000-DH
Differential Rotator	T92P-77000-BH
Differential Seal Replacer	T87C-77000-H
Bearing Cone Replacer	T88T-7025-B
Differential Bearing Cup Replacer	T88C-77000-FH
Locknut Socket	T87T-7025-AH
Mainshaft Locknut Staking Tool	T77J-7025-F
Intermediate Clutch Spring Compressor	T81P-70222-A
Shifter Shaft Seal Replacer	T92P-77000-EH
Clutch Spring Compressor Bar	T92P-77000-GH
Shim Selection Set	T88C-77000-J
Gear Position Sensor Adjuster	T92P-70010-CH

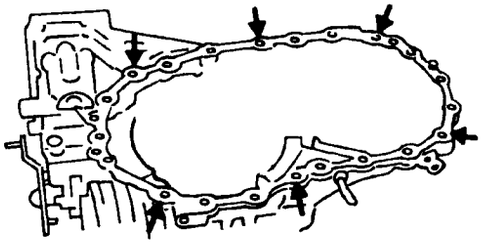
NOTE: Whenever the transaxle is disassembled, the bearing preload must be adjusted. The differential bearing preload is adjusted by selecting shim(s) to insert under the bearing cup.

NOTE: Do not install the differential bearing shim (4067) at this time.

1. Use Differential Bearing Cup Replacer T88C-7025-BH and Driver Handle T80T-4000-W to install the differential bearing outer race into the torque converter housing.

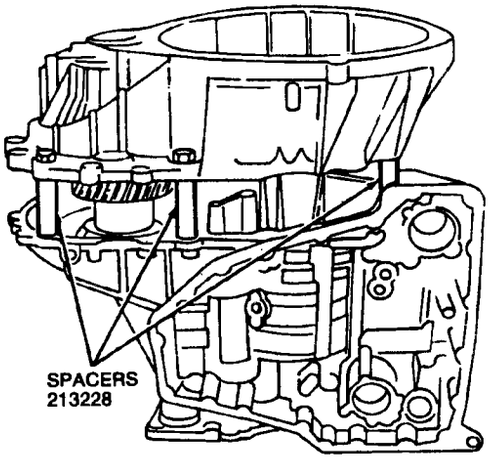


2. Place the differential into the torque converter housing.
3. Place six spacers (part of Shim Selection Set T87C-77000-J) on the torque converter housing at the positions shown.

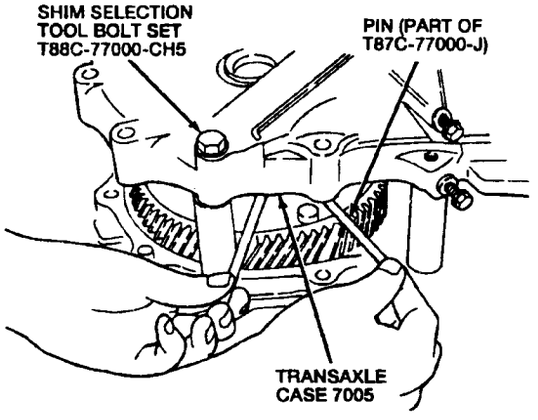


4. Place the rear bearing cup over the differential bearing.
5. Place Shim Selection Gauge T88C-77000-CH2 (part of Shim Selection Set T88C-77000-C) onto the output gear. Turn the two halves of the gauge to eliminate any gap between them.
6. Place the differential bearing outer race on top of Shim Selection Gauge T88C-77000-CH2.

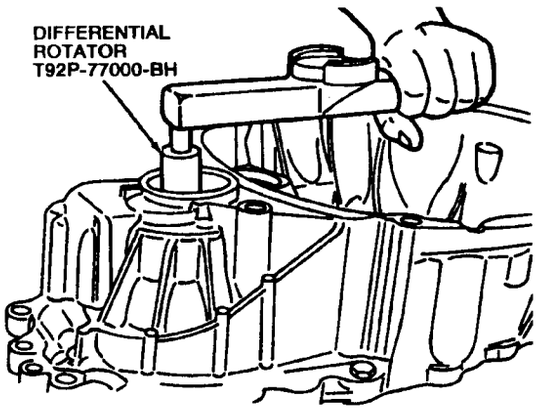
7. Place the transaxle case onto the spacers and install the Shim Selection Tool Bolt Set T92P-77000-DH. Tighten the bolts to 43-47 N·m (32-35 lb-ft).



8. Use the pins (part of Shim Selection Set T87C-77000-J) to open the gauge halves until all the free play is gone and the differential bearing race is seated.



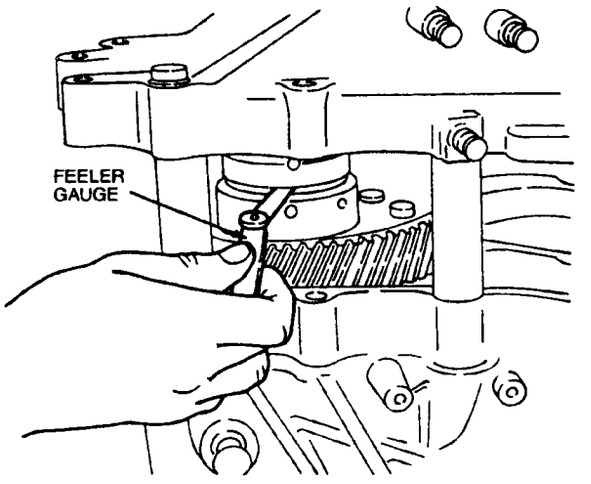
9. Turn the gauge halves in the opposite direction to eliminate any gap between the gauge halves.
10. Engage Differential Rotator T92P-77000-BH and an inch-pound torque wrench to the differential.
11. Turn the differential and measure the turning torque while the differential is turning.



12. Use the pins to separate the gauge halves until a turning torque of 0.78-1.37 N·m (6.9-12.2 lb-in) is achieved.

NOTE: Always measure the gauge halve gap at four points, 90 degrees apart. Use the largest of these measurements.

13. Use a feeler gauge to measure the gap between the two gauge halves.



14. Use the following chart to determine the proper thickness required for a differential bearing shim, based on the gap measured between the two gauge halves.

DIFFERENTIAL BEARING SHIM SPECIFICATIONS

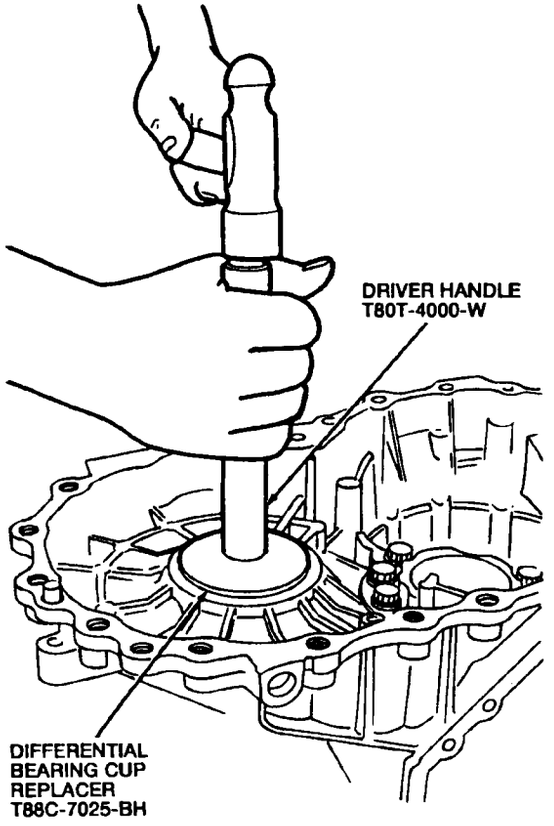
Thickness mm (In)	Part Number
0.48 (0.0189)	F3XY-4067-A
0.52 (0.0205)	F3XY-4067-B
0.56 (0.0220)	F3XY-4067-C
0.60 (0.0236)	F3XY-4067-D

(Continued)

DIFFERENTIAL BEARING SHIM SPECIFICATIONS (Cont'd)

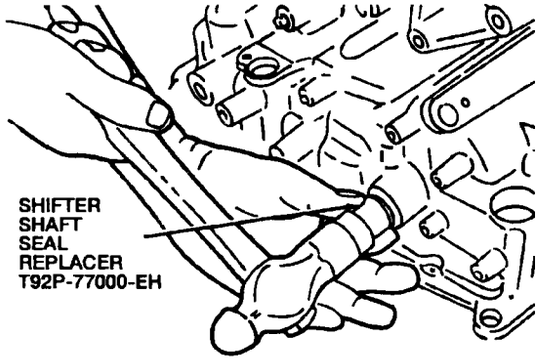
Thickness mm (in)	Part Number
0.64 (0.0252)	F3XY-4067-E
0.68 (0.0268)	F3XY-4067-F
0.72 (0.0283)	F3XY-4067-G
0.76 (0.0299)	F3XY-4067-H
0.80 (0.0315)	F3XY-4067-J
0.84 (0.0331)	F3XY-4067-K
0.88 (0.0346)	F3XY-4067-M
0.92 (0.0362)	F3XY-4A053-B

15. Remove the bolts and separate the transaxle case from the torque converter housing.
16. Remove the spacers, gauge halves, and differential and bearing.
17. Install the appropriate differential bearing shim.
18. Use Differential Bearing Cup Replacer T88C-7025-BH and Driver Handle T80T-4000-W to install the differential bearing outer race into the transaxle case.



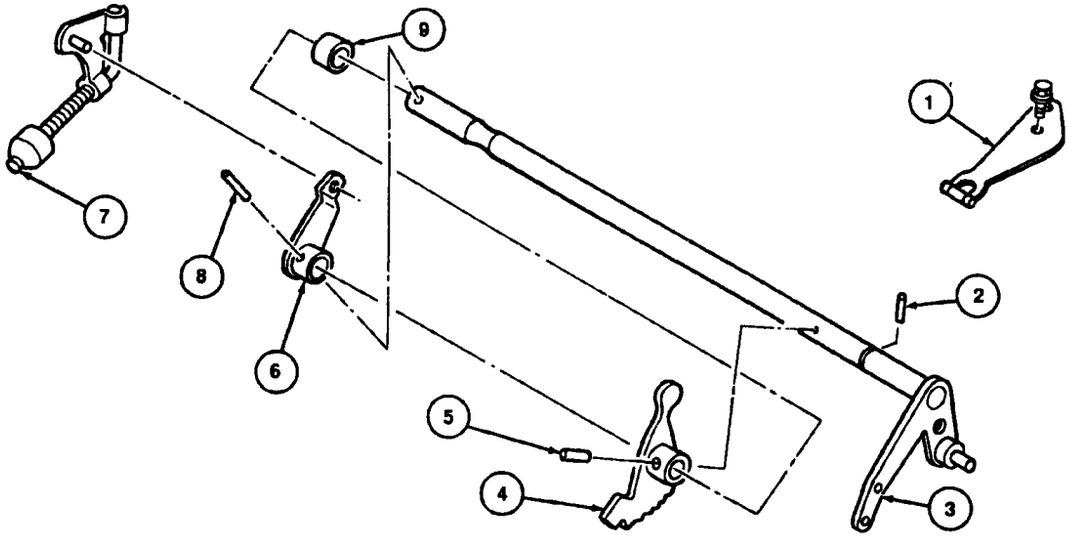
NOTE: Apply transmission fluid to the manual control lever oil seal (7B498).

19. Use Shifter Shaft Seal Replacer T92P-77000-EH to install the manual control lever oil seal.



20. Install the manual shift linkage rod, manual detent lever, and park actuator support (7A121) into the transaxle case.

Manual Shift Linkage



Item	Part Number	Description
1	7E332	Manual Detent Spring
2	7E320	Manual Shift Linkage Rod Roll Pin
3	7D261	Manual Shift Linkage Rod
4	7A115	Manual Detent Lever
5	7E333	Manual Detent Lever Inner Pin

Item	Part Number	Description
6	7A121	Park Actuator Support
7	7A232	Parking Lever Actuating Rod
8	7E333	Park Actuator Support Roll Pin
9	7B498	Manual Control Lever Oil Seal

(Continued)

21. Align the groove of the manual shift linkage rod with the hole in the transaxle.

CAUTION: Install the manual shift linkage rod roll pin to the bottom of the manual shift linkage rod roll pin hole. If the downshift detent lever roll pin protrudes further than the bottom of the manual shift linkage rod, the manual shift linkage rod roll pin may cause binding.

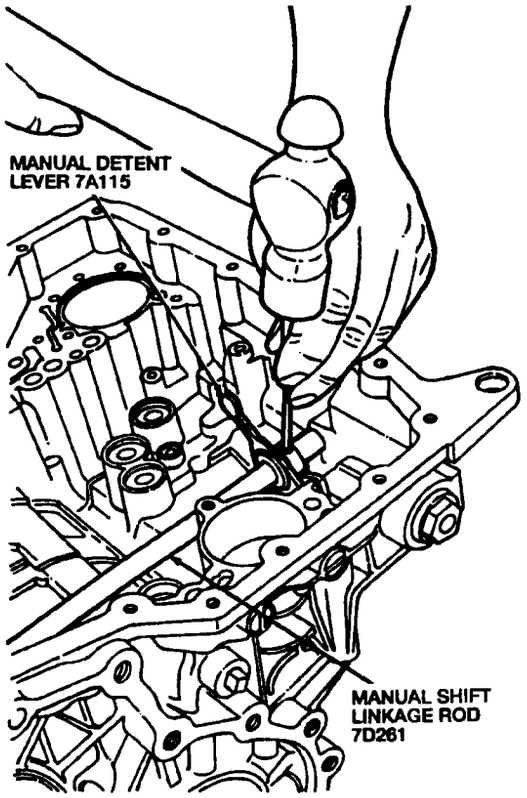
22. Install a new manual shift linkage rod roll pin into the transaxle.

NOTE: Install the new park actuator support roll pin so that both of the ends protrude approximately 3mm (0.12 inch).

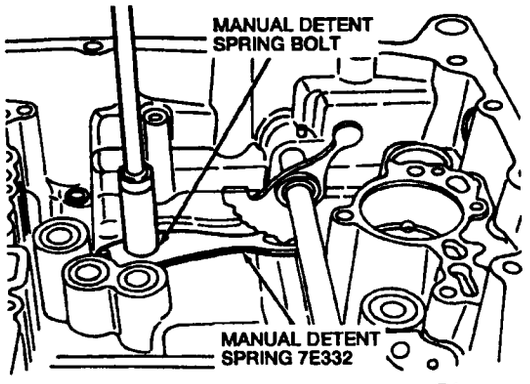
23. Install a new park actuator support roll pin into the park actuator support.
24. Install the parking lever actuating rod (7A232) onto the park actuator support.

NOTE: Install the new manual detent lever inner pin so that both of the ends protrude approximately 3mm (0.12 inch).

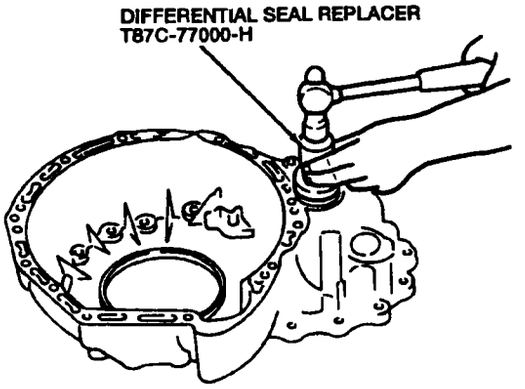
25. Install a new manual detent lever inner pin into the manual detent lever.



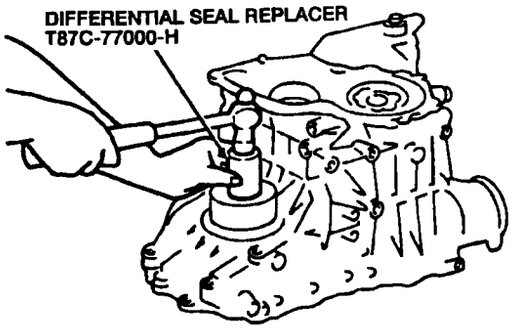
26. Install the manual detent spring and the manual detent spring bolt. Tighten the manual detent spring bolt to 6-7 N·m (54-61 lb-in).



27. Use Differential Seal Replacer T87C-77000-H to install the differential oil seal on the transaxle.



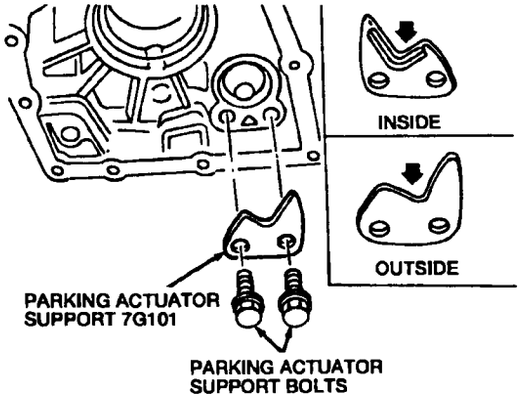
28. Use Differential Seal Replacer T87C-77000-H to install the differential oil seal on the torque converter housing.



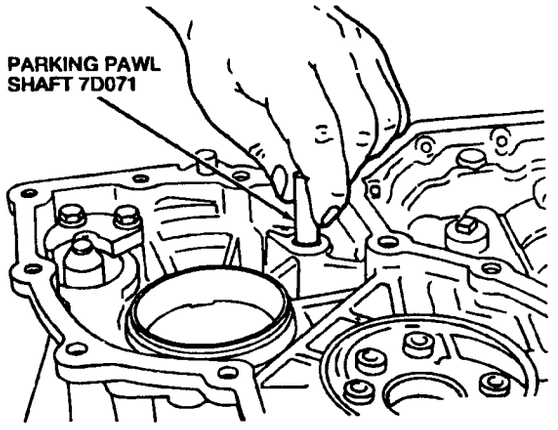
29. Install the reduction gear bearing outer race. Tighten the seven reduction gear bearing outer race bolts to 109-123 N·m (80-90 lb-ft).

NOTE: Ensure that the parking actuator support tab faces down during assembly.

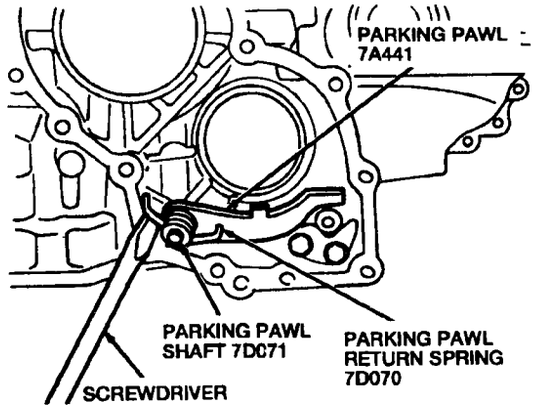
30. Install the parking actuator support and the two parking actuator support bolts. Tighten the parking actuator support bolts to 20-24 N·m (14-17 lb-ft).



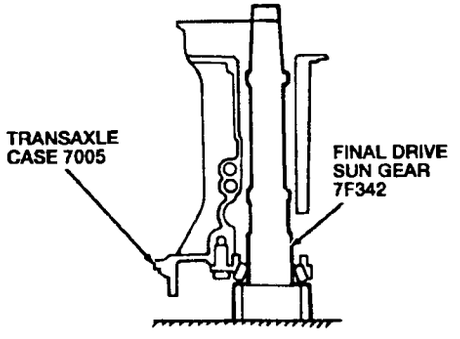
31. Install the parking pawl shaft into the transaxle.



32. Install the parking pawl (7A441) over the parking shaft and install the parking pawl return spring (7D070).

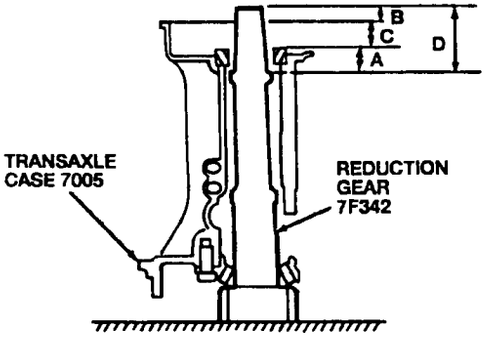


33. Place the reduction gear onto the transaxle case as shown.



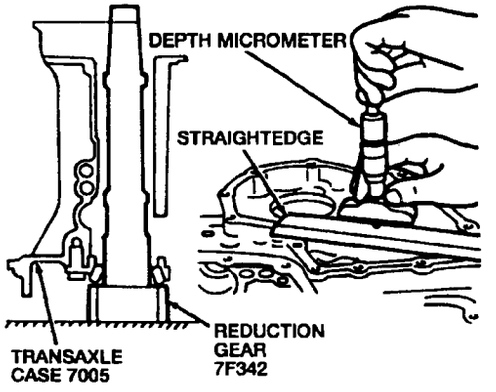
NOTE: Always make measurements in at least two places.

34. Place the idler gear bearing into the transaxle case to measure dimensions B, C, and D to calculate A (distance between the surface of the idler gear bearing inner race and the reduction gear adjusting shim mating surface of the reduction gear).



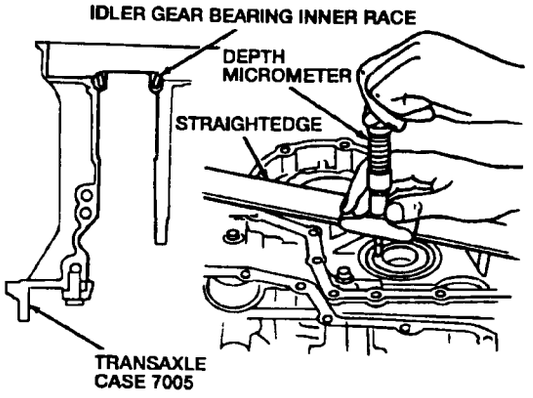
NOTE: Always make measurements in at least two places.

35. Use a depth micrometer and a straightedge to measure dimension B (distance between the end of the reduction gear and the surface of the transaxle case) in at least two places.



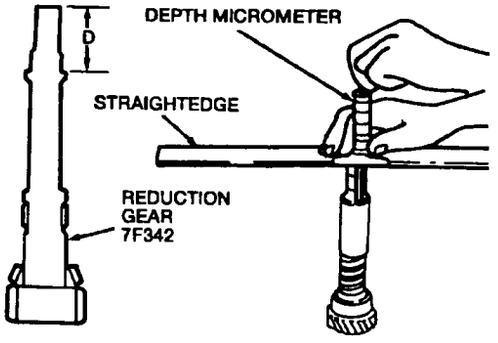
NOTE: Always make measurements in at least two places.

36. Use a depth micrometer and a straightedge to measure dimension C (distance between the surface of the idler gear bearing inner race and the surface of the transaxle case) in at least two places.



NOTE: Always make measurements in at least two places.

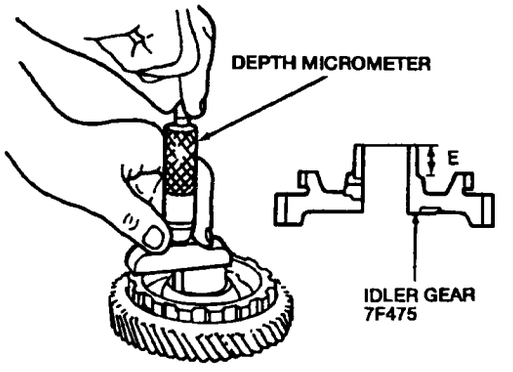
37. Use a depth micrometer and a straightedge to measure dimension D (distance between the end of the reduction gear and the reduction gear adjustment shim mating surface of the reduction gear) in at least two places.



38. Calculate dimension A. Use the equation A = D - (B + C).

NOTE: Always make measurements in at least two places.

39. Measure dimension E (distance between the end of the idler gear (7F475) and the idler gear bearing inner race mating surface) in at least two places.



NOTE: Idler gear bearing preload specification is 0.05mm (0.0020 inch).

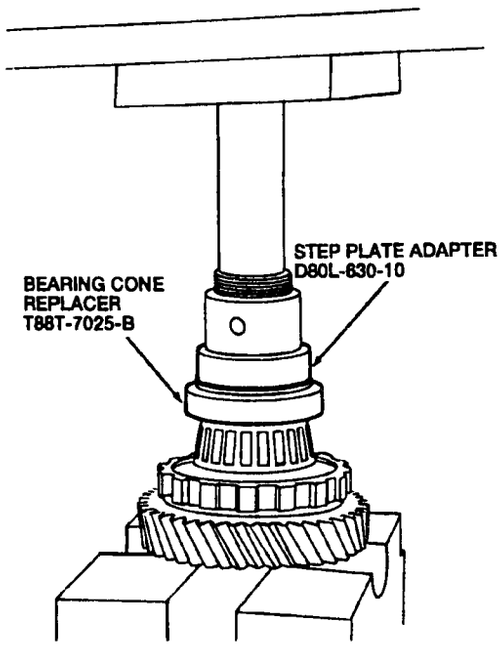
40. Select the proper thickness of the reduction gear bearing adjusting shim. Use the equation for shim thickness = A - E - 0.5mm (0.0020 inch).

Select an appropriate shim from one of the reduction gear bearing adjusting shim kits below.

- F3XY-7N112-A for shims 5.00-5.52mm (0.1969-0.2173 inch)
- F3XY-7N112-B for shims 5.54-6.06mm (0.2181-0.2386 inch)
- F3XY-7N112-C for shims 6.08-6.72mm (0.2394-0.2646 inch)

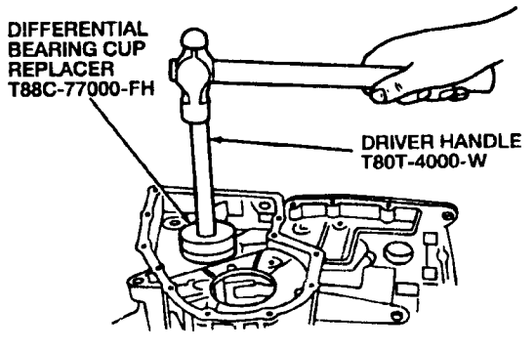
41. Install the reduction gear and the reduction gear bearing adjusting shim into the transaxle case.

42. Use Step Plate Adapter D80L-630-10 or equivalent and Bearing Cone Replacer T88T-7025-B to press the idler gear bearing inner race onto the idler gear.

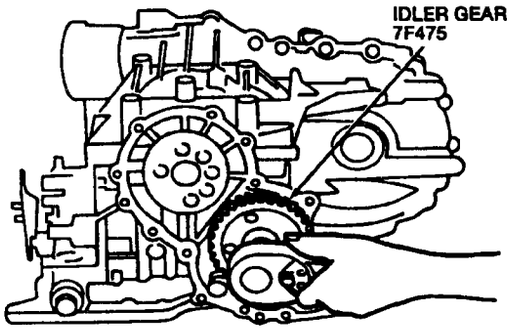


NOTE: After installation, ensure that the idler gear can be locked by the parking pawl.

43. Use Differential Bearing Cup Replacer T88C-77000-FH and Driver Handle T80T-4000-W to install the idler gear bearing outer race into the transaxle case.



44. Use a new locknut (7N170) to press the idler gear onto the reduction gear.

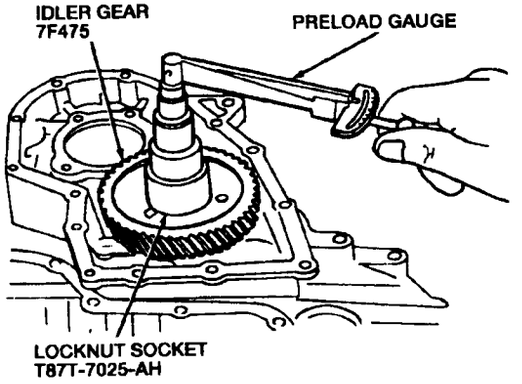


NOTE: Use the parking pawl to lock the idler gear while tightening the locknut.

45. Tighten the locknut to 265-304 N·m (195-224 lb-ft).

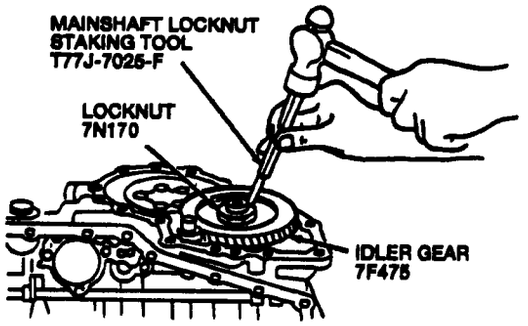
NOTE: Spin the reduction gear several times in each direction to seat the bearing rollers properly.

46. Use Locknut Socket T87T-7025-AH and a preload gauge to measure the reduction gear turning torque. The turning torque should measure 0.049-0.162 N·m (0.4-1.4 lb-in).



47. If turning torque is too low, increase the thickness of the reduction gear bearing adjusting shim. If the turning torque is too high, reduce the reduction gear bearing adjusting shim thickness.

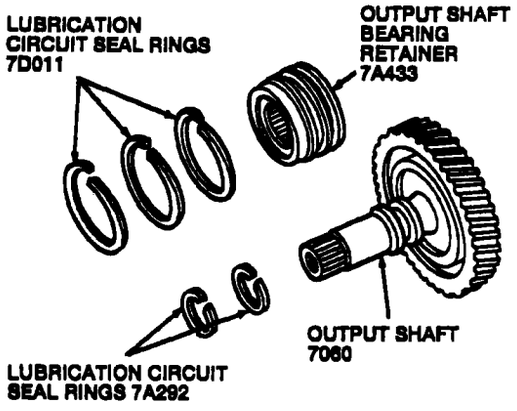
48. After the turning torque has been set within specifications, use Mainshaft Locknut Staking Tool T77J-7025-F to stake the locknut.



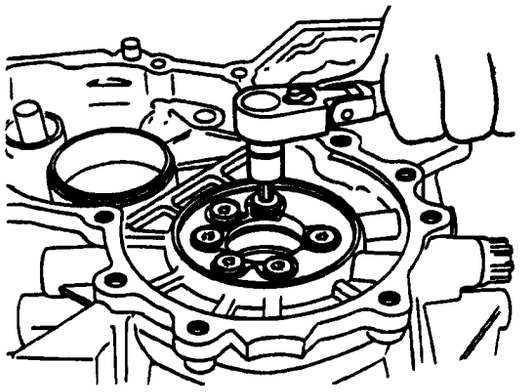
CAUTION: The output shaft lubrication circuit seal rings must be replaced.

NOTE: Pack the output shaft (7060) and output shaft bearing retainer lubrication circuit seal ring grooves with petroleum jelly.

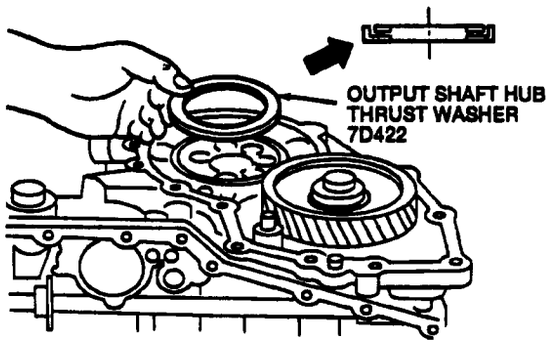
49. Install the new lubrication circuit seal rings onto the output shaft and output shaft bearing retainer.



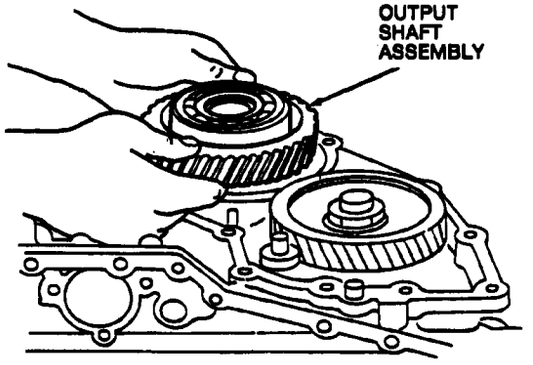
50. Install the output shaft bearing retainer. Tighten the output shaft bearing retainer bolts to 109-123 N·m (80-90 lb-ft).



51. Install the output shaft hub thrust washer (7D422).



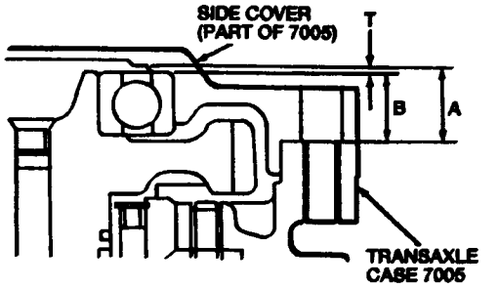
52. Install the output shaft assembly into the transaxle case.



NOTE: Use the equation T = A - B to select the output shaft bearing selective shim (7F405).

NOTE: To determine dimension A, subtract A1 from A2 (straightedge thickness). Always make measurements in at least two places.

53. Place a straightedge across the side cover mating surface and measure from the straightedge to the output shaft hub thrust washer surface. This measurement is A1.



54. Subtract the thickness of the straightedge (A2) from measurement A1. The result is measurement A.

NOTE: To determine dimension B, subtract A2 (straightedge thickness) from B1.

55. Place a straightedge across the output shaft hub thrust washer and measure down to the transaxle case. This is measurement B1.

56. Use the equation A - B = output shaft bearing selective shim thickness, to select a output shaft bearing selective shim which results in the output shaft end play (T) of 0-0.15mm (0-0.0059 inch).

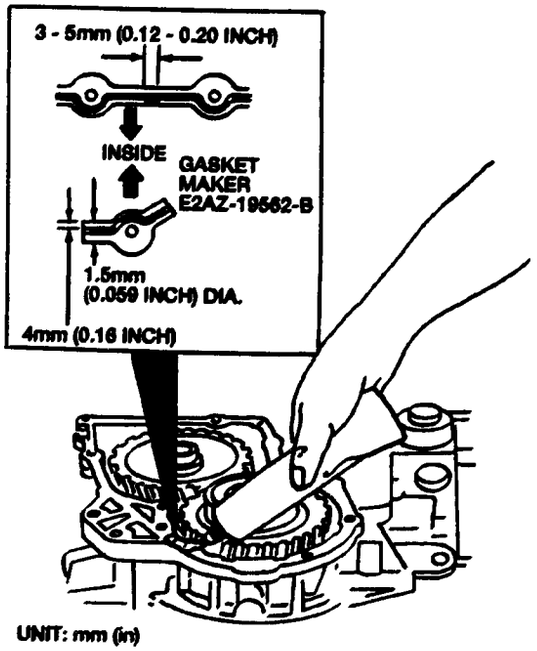
OUTPUT SHAFT BEARING SELECTIVE SHIM SPECIFICATIONS

Thickness mm (in)	Part Number
0.80 (0.0315)	F3XY-7F405-A
0.84 (0.0331)	F3XY-7F405-B
0.88 (0.0346)	F3XY-7F405-C
0.92 (0.0362)	F3XY-7F405-D
0.96 (0.0378)	F3XY-7F405-E
1.00 (0.0394)	F3XY-7F405-F
1.04 (0.0409)	F3XY-7F405-G
1.08 (0.0425)	F3XY-7F405-H
1.12 (0.0441)	F3XY-7F405-J
1.16 (0.0457)	F3XY-7F405-K
1.20 (0.0472)	F3XY-7F405-L

57. Install the output shaft bearing selective shim onto the output shaft.

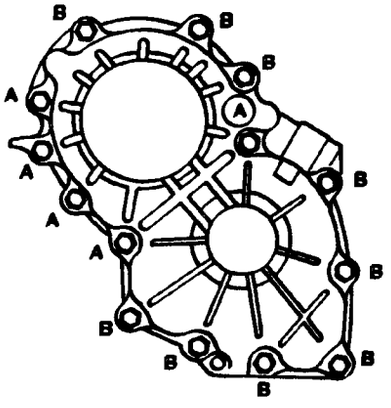
NOTE: Ensure that the transaxle case mating surfaces are clean and free from all old sealant material and transaxle oil.

58. Apply Gasket Maker E2AZ-19562-B or equivalent meeting Ford specification WSK-M2G348-A5 to the inside of the transaxle case mating surface.

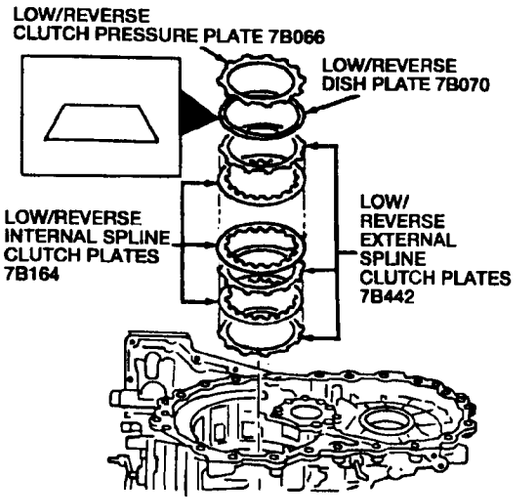


UNIT: mm (in)

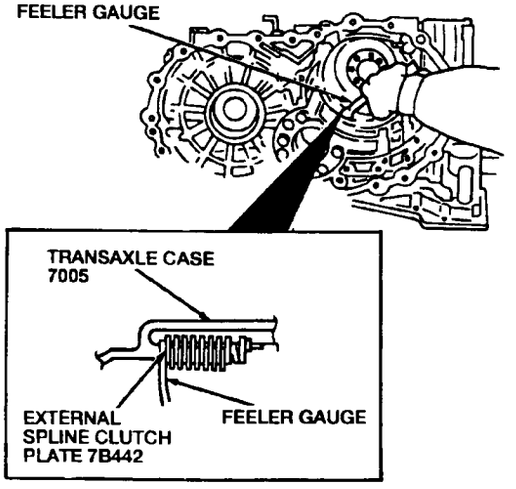
59. Place the side cover onto the transaxle case. Tighten the five new self-sealing transaxle case side cover A bolts and the nine remaining transaxle case side cover B bolts to 26-30 N-m (20-22 lb-ft).



60. Install the seven low / reverse internal spline clutch plates, eight low / reverse external spline clutch plates (7B442), low / reverse dish plate, and low / reverse clutch pressure plate (7B066).



61. Install the low / reverse clutch pressure plate retainer snap ring.
62. Measure the clearance between the external spline clutch plate and the transaxle case.



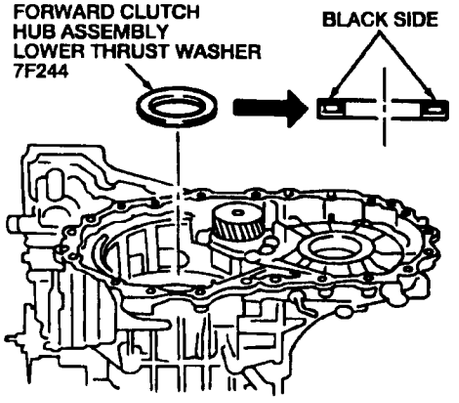
63. The standard clearance is 1.7-2.1mm (0.067-0.083 inch) with a maximum of 3.5mm (0.138 inch). If the clearance is not within the maximum specification, select and insert the proper clutch pressure plate from the following chart to obtain the standard clearance.

CLUTCH PRESSURE PLATE SPECIFICATIONS

Thickness mm (in)	Part Number
2.0 (0.079)	F3XY-7B066-ABA
2.2 (0.087)	F3XY-7B066-ACA
2.4 (0.094)	F3XY-7B066-ADA
2.6 (0.102)	F3XY-7B066-AEA
2.8 (0.110)	F3XY-7B066-AFA
3.0 (0.118)	F3XY-7B066-AGA
3.2 (0.126)	F3XY-7B066-AHA
3.4 (0.134)	F3XY-7B066-AJA

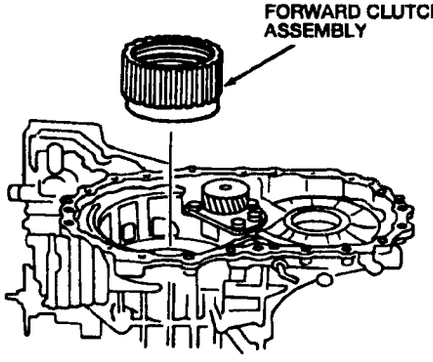
NOTE: Place the forward clutch hub assembly lower thrust washer in the transaxle case with the black side facing up. Coat the forward clutch hub lower thrust washer with petroleum jelly.

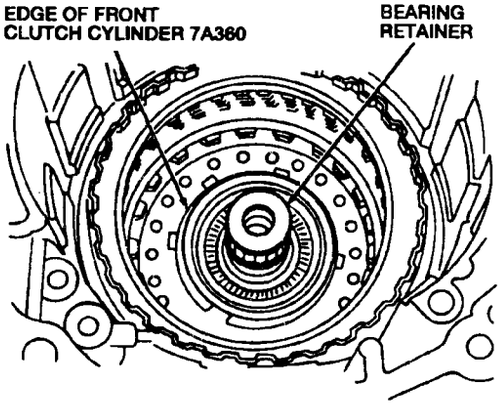
64. Place the forward clutch hub assembly lower thrust washer into the transaxle case.



NOTE: Align the teeth of the internal spline clutch plates for the low and reverse clutch before installing the forward clutch assembly. Ensure that the bearing retainer seal rings are not spread.

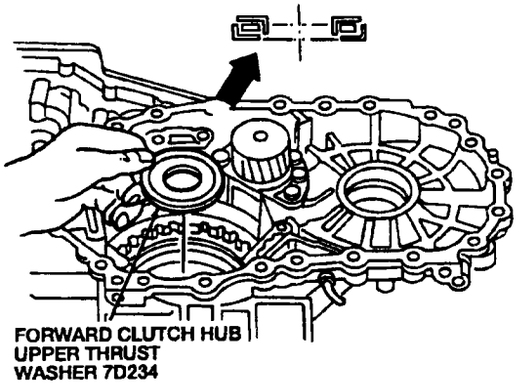
65. Install the forward clutch assembly. When the forward clutch assembly is properly installed, the edge of the forward clutch cylinder and bearing retainer should be at almost the same level, as shown.





NOTE: Coat the forward clutch hub upper thrust washer with petroleum jelly.

66. Install the forward clutch hub upper thrust washer into the transaxle case.

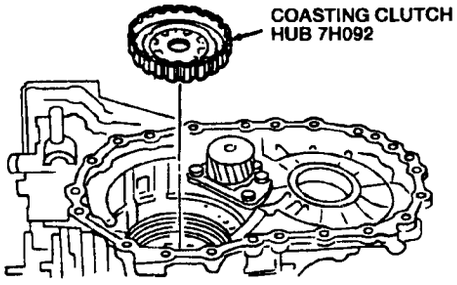


NOTE: Ensure that the tabs on the coasting clutch upper thrust washer are facing the coasting clutch hub.

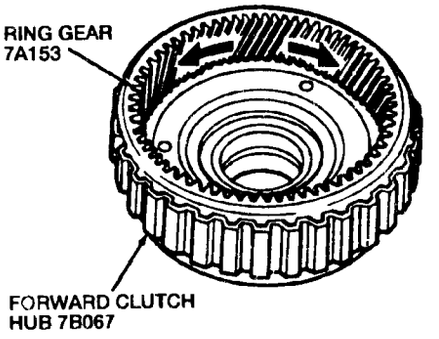
67. Install the coasting clutch upper thrust washer on the coasting clutch hub.

NOTE: Align the internal spline clutch plate teeth of the coasting clutch before installing.

68. Install the coasting clutch hub into the transaxle case.

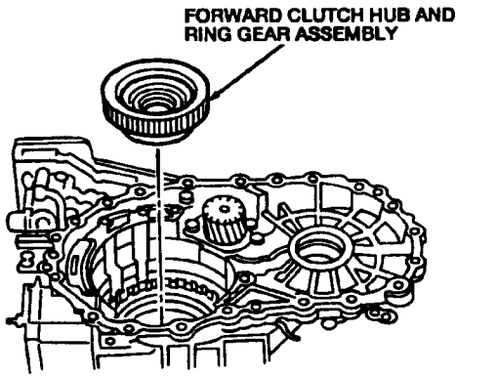


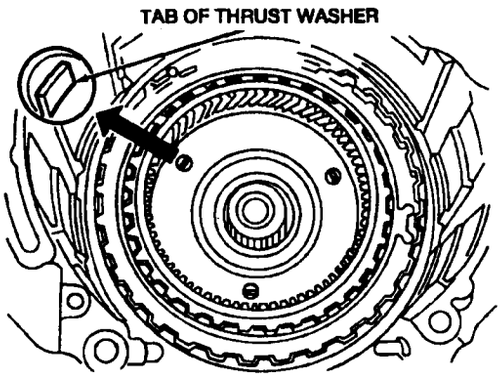
69. Hold the forward clutch hub and turn the ring gear (7A153). If the ring gear turns counterclockwise and is installed properly, replace the forward one-way clutch (sprag).



NOTE: Align the teeth of the forward clutch internal spline drive plates before installing. Ensure that the three tabs on the thrust washer are properly aligned after installation.

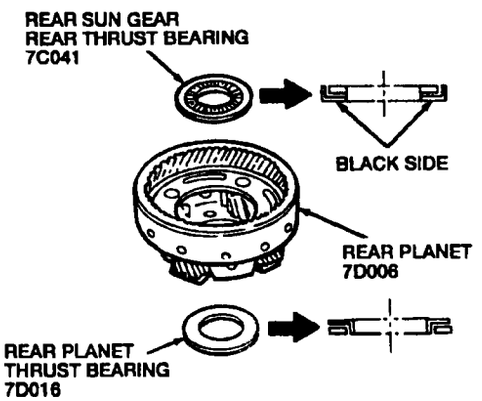
70. Install the forward clutch hub and ring gear assembly into the transaxle case.



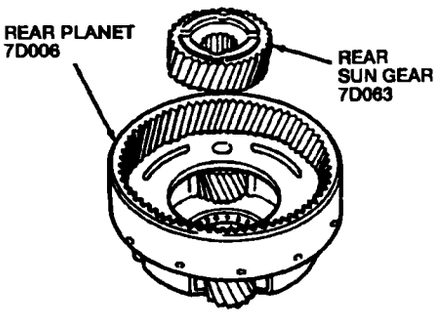


NOTE: Coat the rear planet lower thrust washers with petroleum jelly.

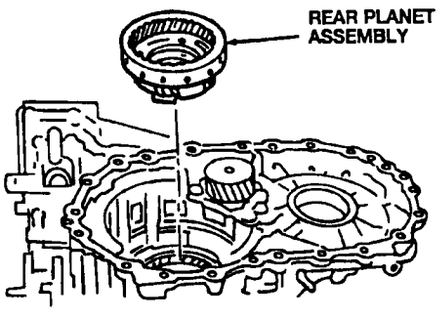
71. Install the rear planet lower thrust washers onto the rear planet.



72. Install the rear sun gear into the rear planet.

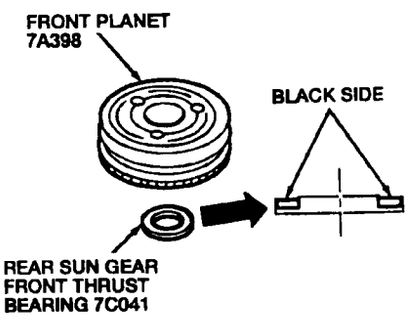


73. Install the rear planet assembly into the transaxle case.



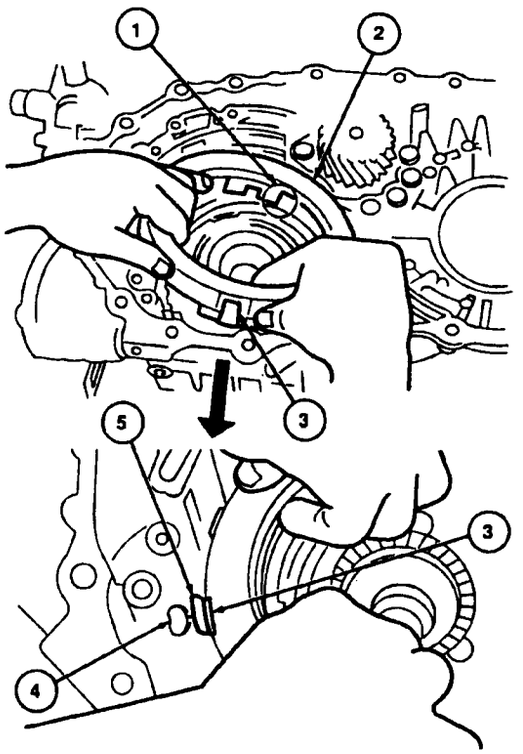
NOTE: Apply petroleum jelly to the rear sun gear front thrush bearing upper thrust washer. Ensure that the rear sun gear front thrust bearing upper thrust washer is properly installed with the black side to the front planet (7A398).

74. Install the rear sun gear front thrust bearing onto the front planet. Then place the front planet and rear sun gear front thrust bearing into the transaxle case.



75. Set and align the low / reverse clutch piston as shown.

NOTE: Align the bracket to the specified gutter as shown.

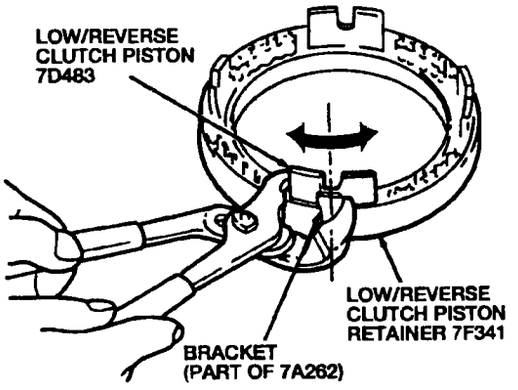


Item	Part Number	Description
1	—	Insert This Point First
2	—	Low / Reverse Clutch Piston and Low / Reverse Clutch Piston Retainer Assembly
3	—	Bracket (Part of 7A262)
4	—	Servo Band Piston Stem Opening
5	—	Transaxle Case Gutter (Part of 7005)

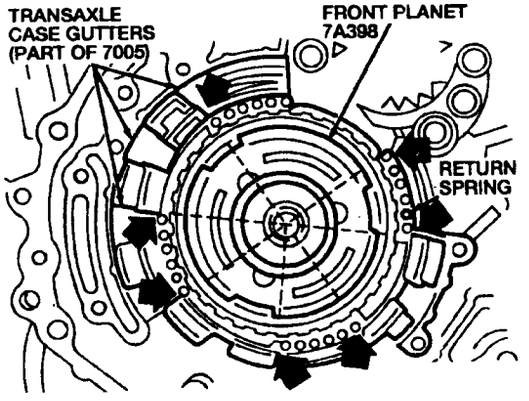
NOTE: Generously coat the low / reverse clutch piston and low / reverse clutch piston retainer assembly with petroleum jelly. This will hold the two pieces together during installation.

77. Install the low / reverse clutch piston and low / reverse clutch piston retainer assembly into the transaxle case.

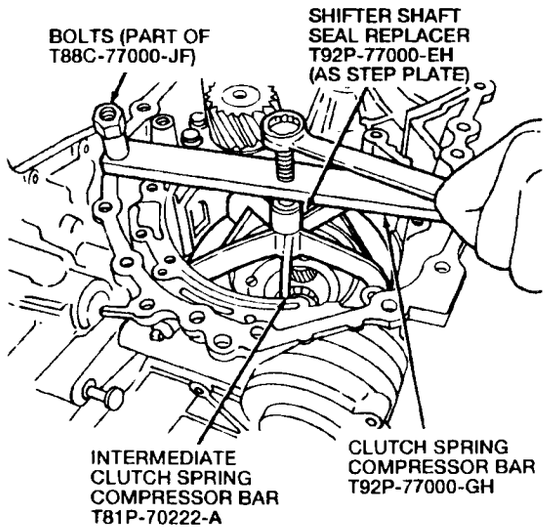
Low / Reverse Clutch



76. Set and align the return springs to the transaxle case gutters as shown.



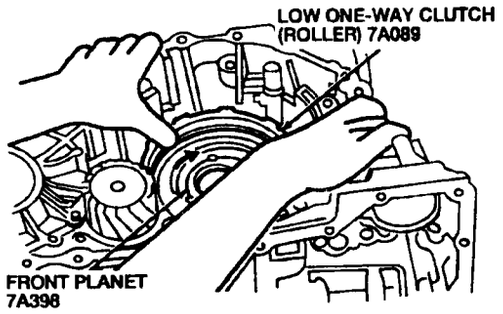
78. Push the low / reverse clutch piston and low / reverse clutch piston retainer assembly evenly and confirm that they move smoothly. If they do not move smoothly, remove the low / reverse clutch piston and return spring assembly. Align the return spring and reinstall the low / reverse clutch piston and return spring assembly.
79. Place the low / reverse clutch piston pressure plate retainer snap ring over the turbine shaft (7F351), and install the Intermediate Clutch Spring Compressor T81P-70222-A, Shim Selection Tool Bolt Set T92P-77000-DH, Shifter Shaft Seal Replacer T92P-77000-EH (as a step plate), Clutch Spring Compressor Bar T92P-77000-GH and Bolts (part of Shim Selection Set T88C-77000-JF).



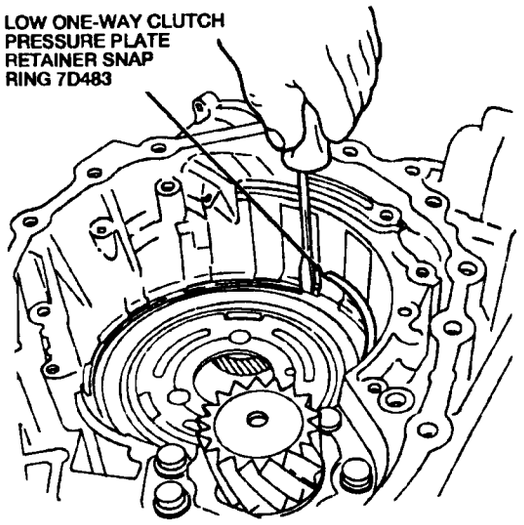
80. Turn the center bolt on the clutch spring compressor until the snap ring groove is exposed.
81. Position the low / reverse clutch piston pressure plate retainer snap ring into the snap ring groove. Then remove the clutch spring compressor, bolts, transaxle shift seal installer, and clutch spring compressor bar.

CAUTION: After installing the low one-way clutch (roller), ensure that the low one-way clutch rotates in only the clockwise direction.

82. Install the low one-way clutch (roller) into the front planet by turning the front planet clockwise.

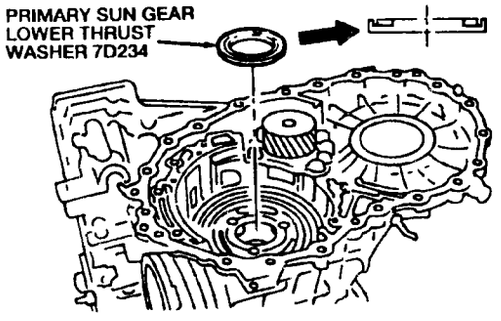


83. Use a screwdriver to install the low one-way clutch pressure plate retainer snap ring.



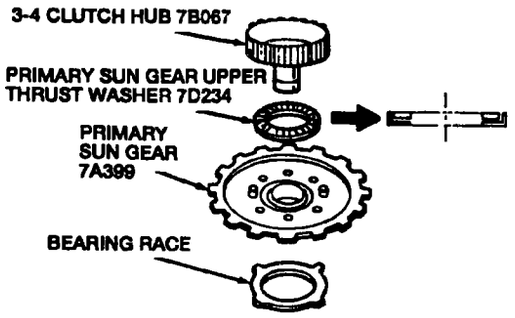
NOTE: Coat the primary sun gear lower thrust washer with petroleum jelly.

84. Install the primary sun gear lower thrust washer onto the front planet.

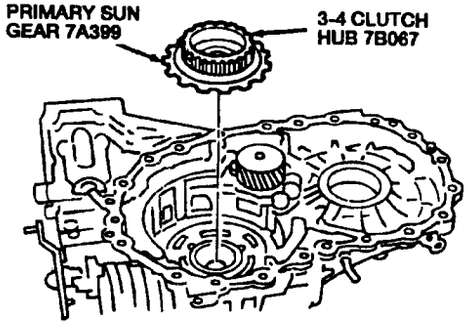


NOTE: Coat the primary sun gear upper thrust washer with petroleum jelly.

85. Install the primary sun gear bearing race, primary sun gear upper thrust washer, and the 3-4 clutch hub onto the primary sun gear (7A399).

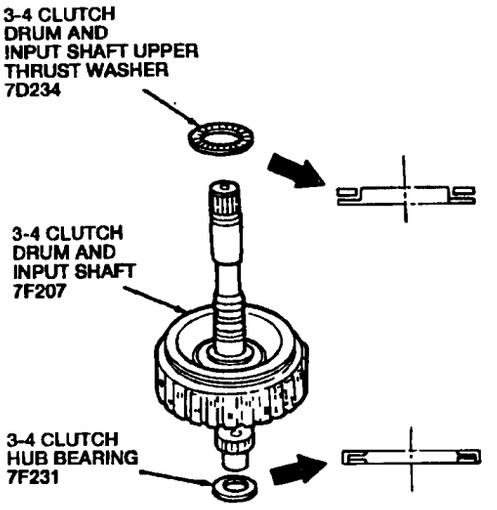


86. Install the 3-4 clutch hub and the primary sun gear into the transaxle case.



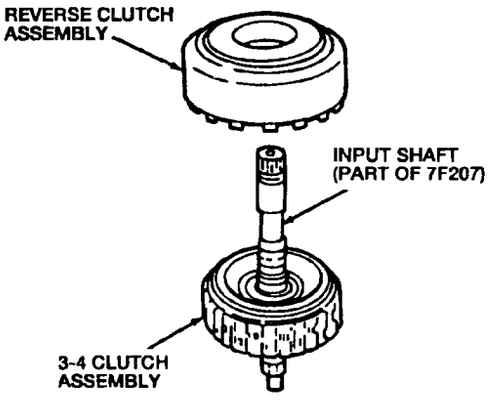
NOTE: Coat the 3-4 clutch drum and input shaft upper and lower thrust washers with petroleum jelly.

87. Install the 3-4 clutch drum and input shaft upper thrust washers and the 3-4 clutch hub bearing onto the 3-4 clutch hub.



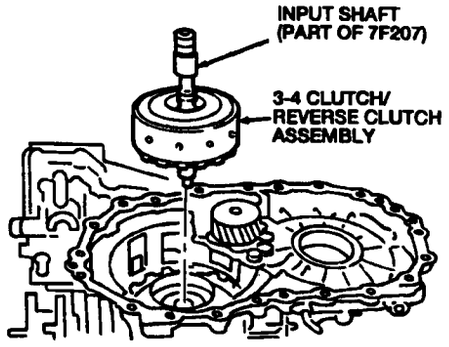
88. Align the reverse clutch drive plates.

89. Install the input shaft and 3-4 clutch assembly into the reverse clutch assembly.



90. Align the teeth of the 3-4 clutch internal spline clutch plates.

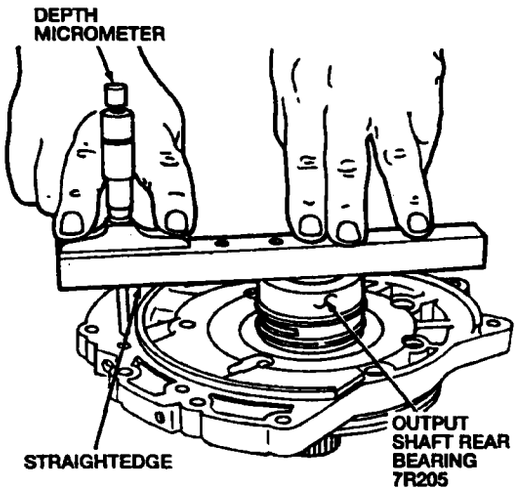
91. Install the 3-4 clutch / reverse clutch assembly into the transaxle case.



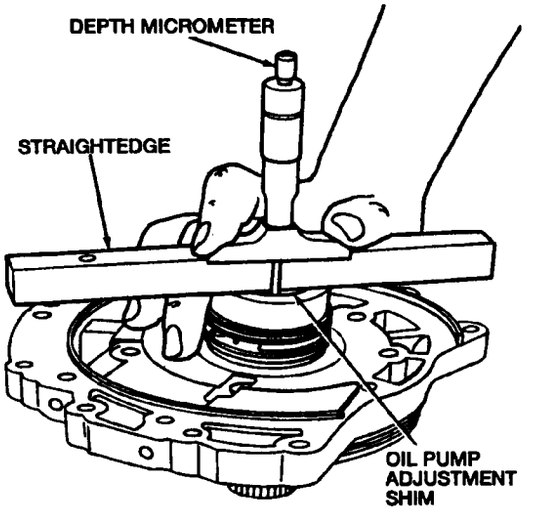
NOTE: Total end play and reverse clutch drum end play must be adjusted when one or more of the following items are replaced.

- Transaxle case
- Coasting clutch hub
- Ring gear
- Rear planet
- Rear sun gear
- Front planet
- Primary sun gear
- 3-4 clutch hub
- Forward clutch cylinder and shaft (7F207)
- Oil pump cover
- Reverse clutch drum (7D044)

92. Place a straightedge across the output shaft rear bearing surface.
93. Measure from the top of the straightedge to the mating surface of the oil pump assembly. This is measurement A.

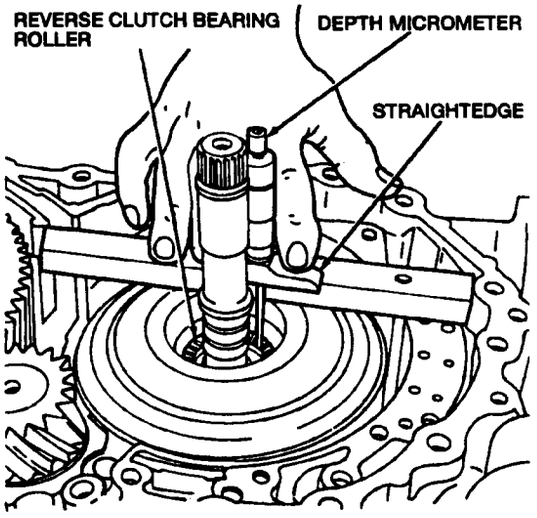


94. With the straightedge in the same position, measure from the straightedge to the oil pump adjustment shim. This is measurement B.



95. Subtract measurement B from measurement A to get C (A - B = C).
96. Place the straightedge across the oil pump mating surface gasket.

97. Measure from the top of the straightedge to the reverse clutch bearing roller. This is measurement D.



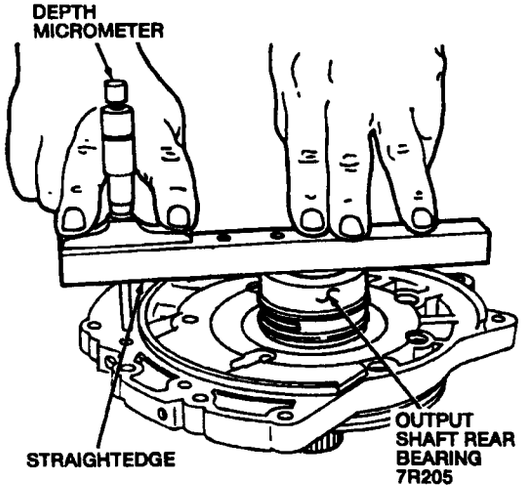
98. Subtract the thickness of the straightedge from measurement D to get measurement E (D - straightedge = E).
99. Subtract measurement C from measurement E to get total end play (E - C = total end play).
100. Select a bearing race to bring the end play within 0.25-0.55mm (0.0098-0.0217 inch).

BEARING RACE SPECIFICATIONS

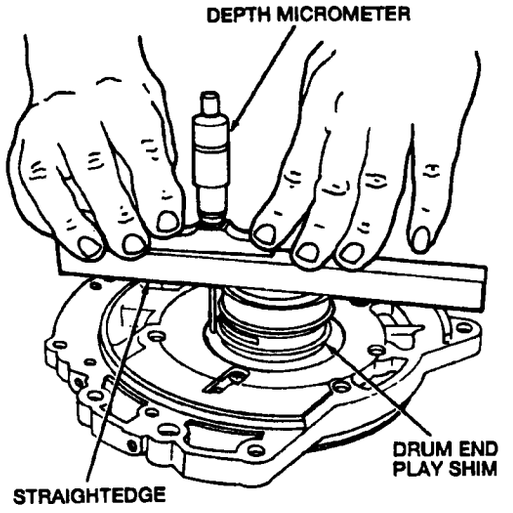
Thickness mm (in)	Part Number
0.8 (0.031)	F3XY-7L165-A
1.0 (0.039)	F3XY-7L165-B
1.2 (0.047)	F3XY-7L165-C
1.4 (0.055)	F3XY-7L165-D
1.6 (0.063)	F3XY-7L165-E
1.8 (0.071)	F3XY-7L165-F
2.0 (0.079)	F3XY-7L165-G
0.9 (0.035)	F3XY-7L165-H
1.1 (0.043)	F3XY-7L165-J
1.3 (0.051)	F3XY-7L165-K
1.5 (0.059)	F3XY-7L165-L
1.7 (0.067)	F3XY-7L165-M
1.9 (0.075)	F3XY-7L165-N

CAUTION: Ensure that the oil pump gasket (7A136) is installed on the oil pump assembly prior to making the following measurements. Readings will be incorrect if the oil pump gasket is not present.

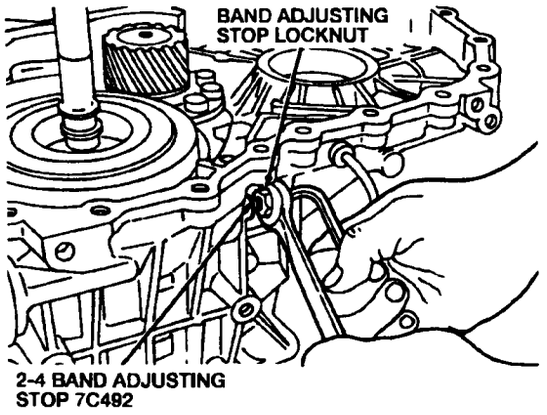
101. Place a straightedge across the top of the output shaft rear bearing (7R205).



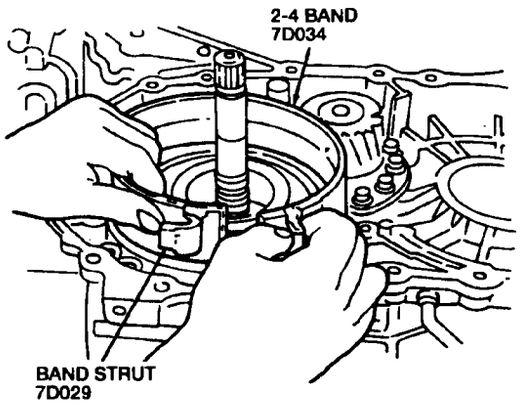
102. Use a depth micrometer to measure from the straightedge to the oil pump mating surface. This is measurement A.
103. With the straightedge in the same position, measure to the drum end play shim surface. This is measurement B.



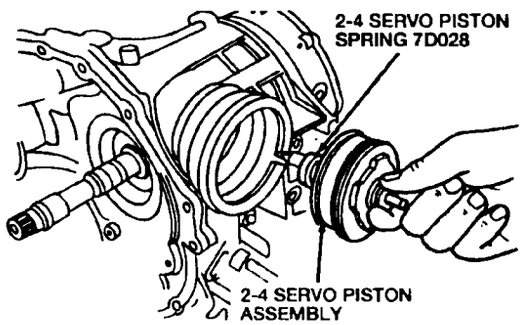
104. Measurement B subtracted from measurement A equals C (A - B = C).



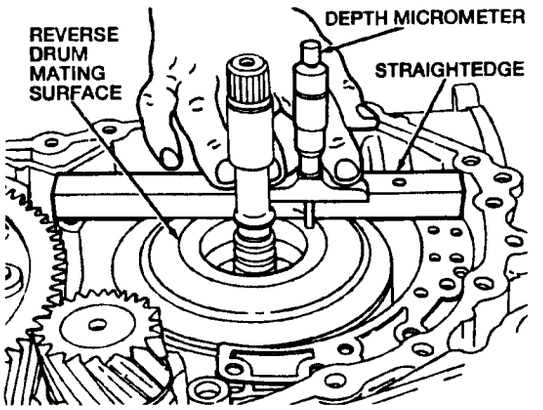
111. Place the 2-4 band and band strut around the reverse clutch drum.



112. Install the 2-4 servo assembly into the transaxle case.



105. Place the straightedge across the oil pump mating surface and measure to the reverse drum mating surface. This is measurement D.



106. Use a micrometer to measure the thickness of the straightedge.

107. Subtract the thickness of the straightedge from measurement D to get measurement E (D - straightedge = E).

108. Subtract measurement C from measurement E to get the reverse clutch drum end play (E - C = reverse clutch drum end play).

109. Select a thrust washer to bring the reverse clutch drum end play within 0.55-0.90mm (0.0217-0.0354 inch).

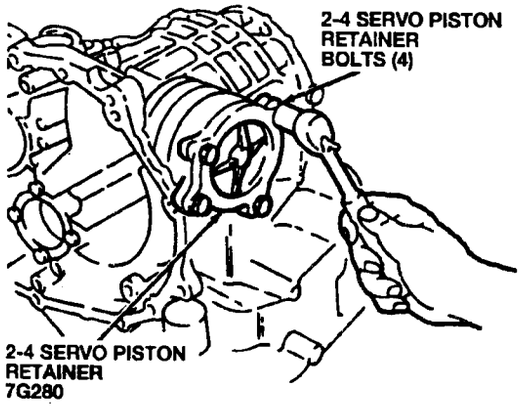
REVERSE CLUTCH DRUM END PLAY THRUST WASHER SPECIFICATIONS

Thickness mm (In)	Part Number
0.80 (0.315)	F3XY-7D061-A
1.40 (0.0551)	F3XY-7D061-B
0.95 (0.0374)	F3XY-7D061-C
1.10 (0.0433)	F3XY-7D061-D
1.25 (0.0492)	F3XY-7D061-E
1.55 (0.0610)	F3XY-7D061-F
1.70 (0.0669)	F3XY-7D061-G
1.85 (0.0728)	F3XY-7D061-H

NOTE: Ensure that the 2-4 band adjusting stop is clean of any old sealant.

110. Install the 2-4 band adjusting stop, washer, and band adjusting stop locknut into the transaxle case.

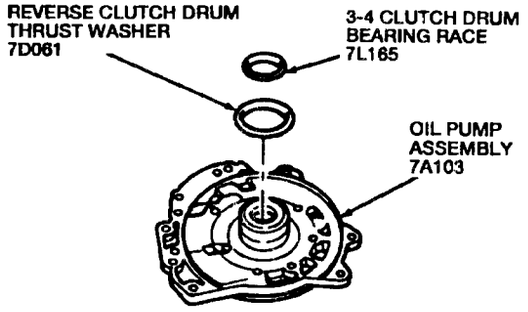
113. Position the new gasket and 2-4 servo piston retainer. Install the four 2-4 servo piston retainer bolts. Tighten the four 2-4 servo piston retainer bolts to 2.0-2.4 N·m (18-21 lb-in).



114. Tighten the band adjusting stop (7C492) until the 2-4 band fits evenly around the reverse clutch drum.

NOTE: Coat the 3-4 clutch drum bearing race with petroleum jelly.

115. Install the 3-4 clutch drum bearing race selected in the total end play procedure onto the oil pump assembly.



NOTE: Coat the reverse clutch drum thrust washer with petroleum jelly.

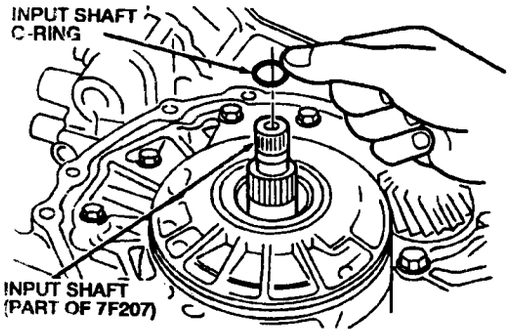
116. Place the reverse clutch drum thrust washer selected in the reverse clutch end play onto the reverse clutch drum.

117. Install the oil pump assembly and the baffle plate onto the transaxle case.

118. Install and tighten the eight oil pump bolts to 18-21 N·m (13-15 lb-ft).

NOTE: Coat the new input shaft O-ring with transaxle fluid.

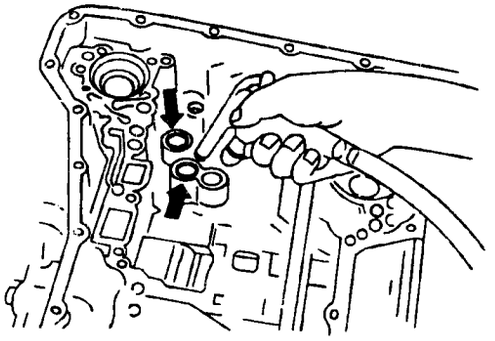
119. Install a new input shaft O-ring onto the input shaft.



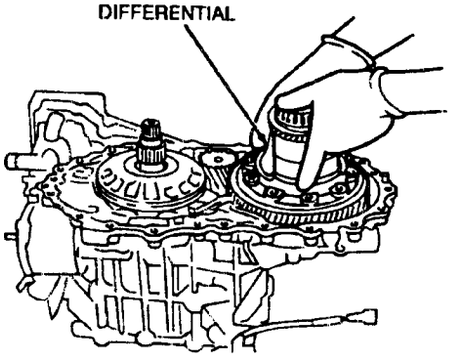
120. Tighten the band adjusting stop to 4-6 N·m (27-35 lb-in).

121. Back the band adjusting stop off 2.5 turns. Tighten the band adjusting stop locknut to 31-42 N·m (23-31 lb-ft).

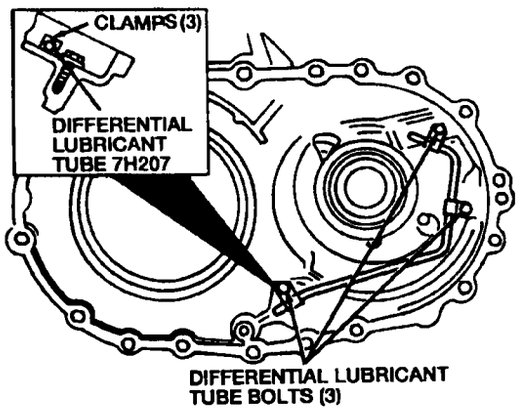
122. Apply compressed air to the transaxle case and check that the 2-4 band operates properly. Check through both passages, as indicated.



123. Install the differential into the transaxle case.

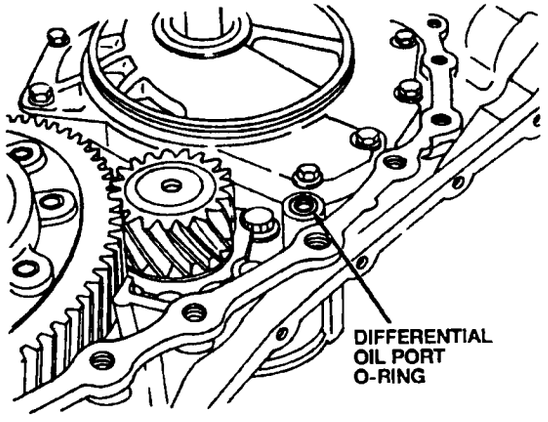


124. Install the differential lubricant tube into the torque converter housing. Install and tighten the three differential lubricant tube bolts to 5-7 N·m (44-61 lb-in).



CAUTION: Ensure the new differential oil port O-ring is properly installed on the transaxle case.

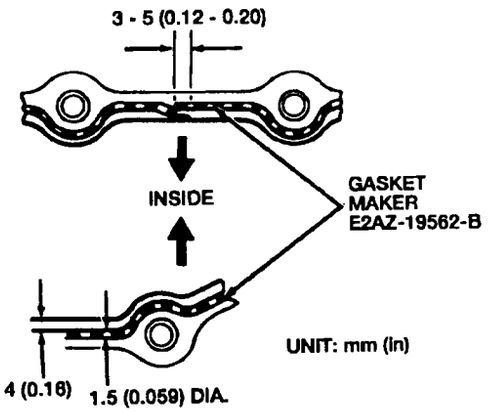
125. Install a new differential oil port O-ring onto the differential oil port of the transaxle case.



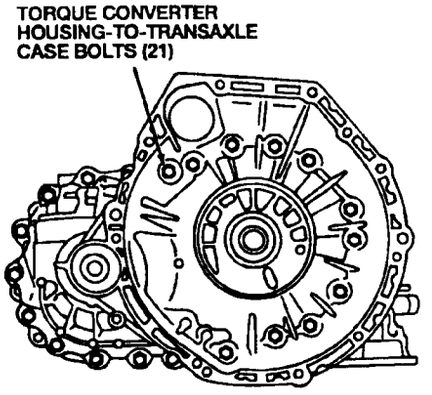
NOTE: Wash the transaxle case and torque converter housing mating surfaces with a brake cleaner type solvent. Ensure that the mating surfaces are smooth and clean.

CAUTION: Use only Gasket Maker E2AZ-19562-B sealant.

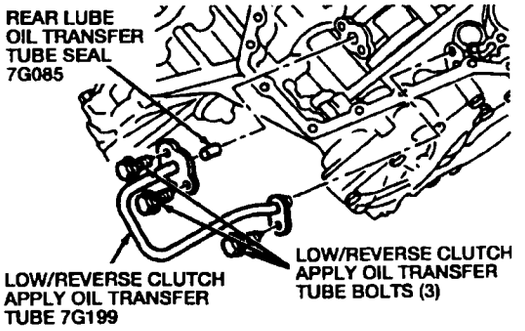
126. Apply Gasket Maker E2AZ-19562-B or equivalent sealant meeting Ford specification WSK-M2G348-A5 to the torque converter housing mating surface as shown.



127. Install the transaxle case onto the torque converter housing. Install and tighten the 21 torque converter housing-to-transaxle case bolts to 43-47 N·m (32-35 lb-ft).



128. Install the rear lube oil transfer tube seal (7G085), low / reverse clutch apply oil transfer tube, and three low / reverse clutch apply oil transfer tube bolts. Tighten the three low / reverse clutch apply oil transfer tube bolts to 5-7 N·m (44-61 lb-in).

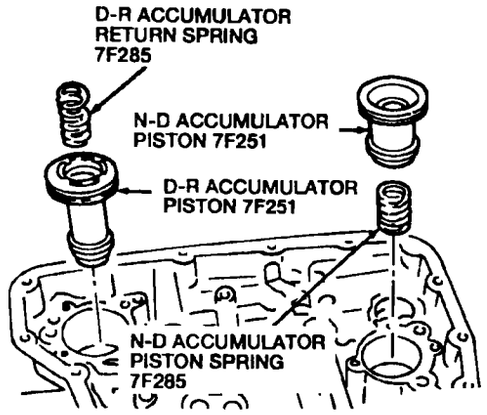


129. Check the contact surfaces of the accumulator pistons (7F251) for damage. Replace the accumulator pistons if necessary.

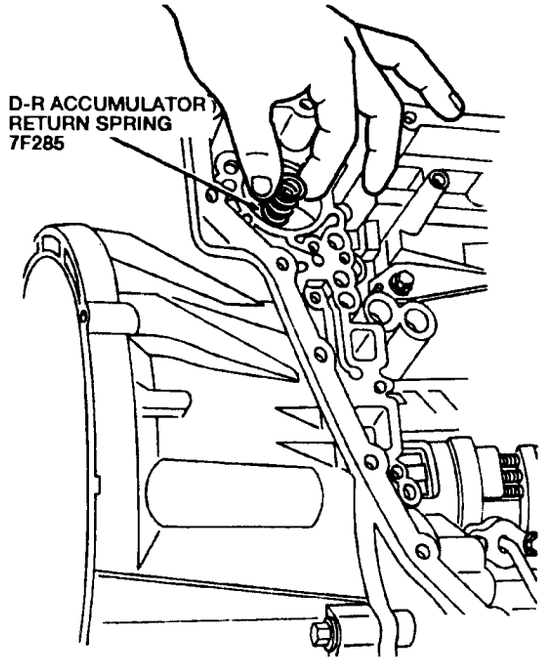
NOTE: Apply transmission fluid to the inner surface of the transaxle case.

130. Apply transmission fluid onto the new upper accumulator seals (7F250) and install the upper accumulator seals onto the N-D accumulator.

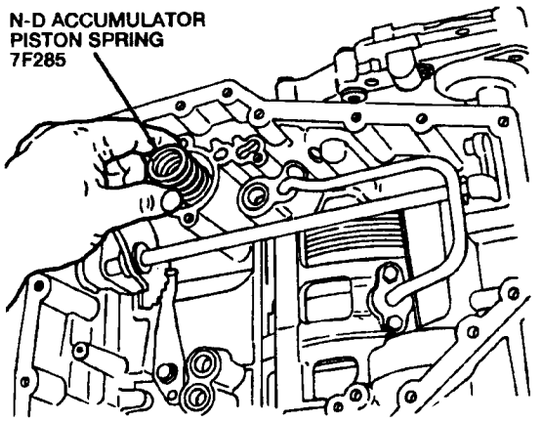
131. Install the D-R accumulator piston in its bore.



132. Install the D-R accumulator return spring on the D-R accumulator piston.

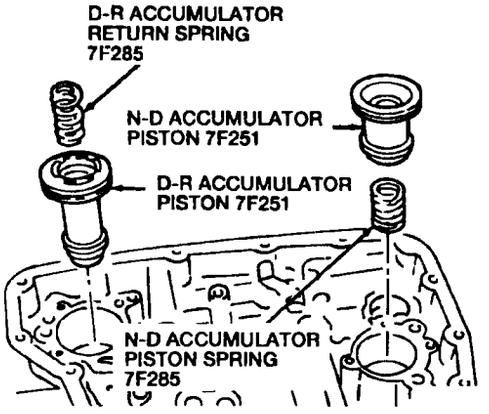


133. Install the N-D accumulator piston spring in its bore.



134. Apply transmission fluid onto the new accumulator retainer seals (7F294) and install the accumulator retainer seals onto the N-D accumulator piston.

135. Install the N-D accumulator piston in its bore.



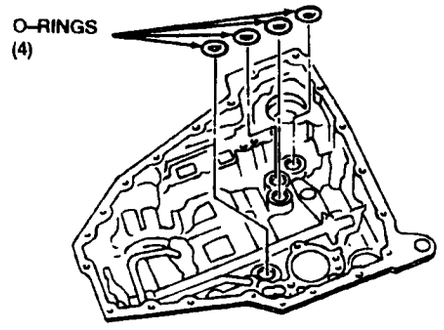
CAUTION: Do not apply over 392 kPa (57 psi) of air pressure.

136. Use compressed air to check the operation of the clutches, accumulators, and the 2-4 band.

Item	Part Number	Description
18	—	Reverse Clutch Pressure

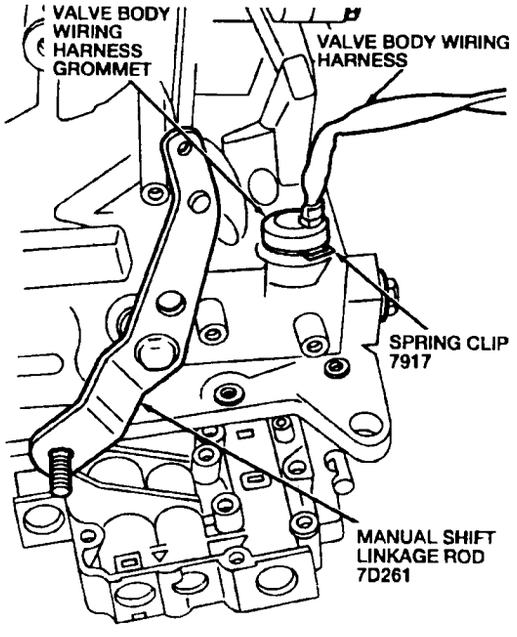
NOTE: Apply petroleum jelly to the servo O-rings.

137. Install four new O-rings onto the transaxle case.

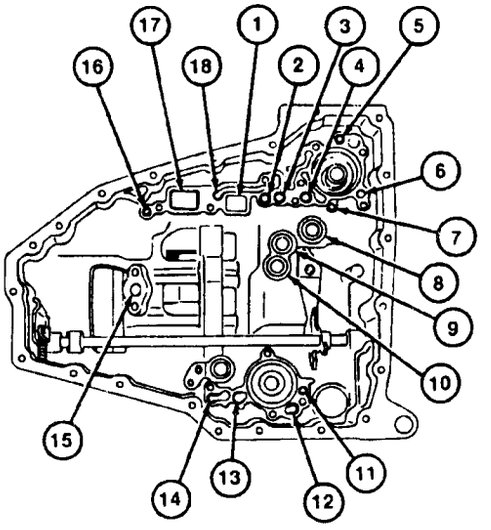


NOTE: Apply transmission fluid to the manual valve.

138. Route the valve body wiring harness through the transaxle case and clip the spring clip in place.



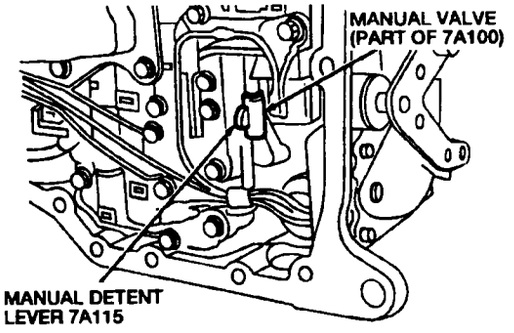
139. Set the manual shift linkage rod to the NEUTRAL position.



Item	Part Number	Description
1	—	Oil Pump Assembly Discharge Hole
2	—	3-4 Clutch Pressure
3	—	Torque Converter Pressure (Lockup Released)
4	—	Torque Converter Pressure (Lockup Applied)
5	—	D-R Accumulator
6	7H167	Transaxle Oil Cooler Tube (Inlet)
7	—	D-R Accumulator Back Pressure
8	—	Fourth Gear Band Apply Chamber Pressure
9	—	Second Gear Band Apply Chamber Pressure
10	—	2-4 Band Release Chamber Pressure
11	—	N-D Accumulator Shoulder Pressure
12	—	N-D Accumulator Back Pressure
13	—	Forward Clutch Pressure
14	—	Coasting Clutch Pressure
15	—	Low/Reverse Clutch Pressure
16	—	Differential Lubricant Feed Port
17	—	Oil Pump Assembly Suction Port

(Continued)

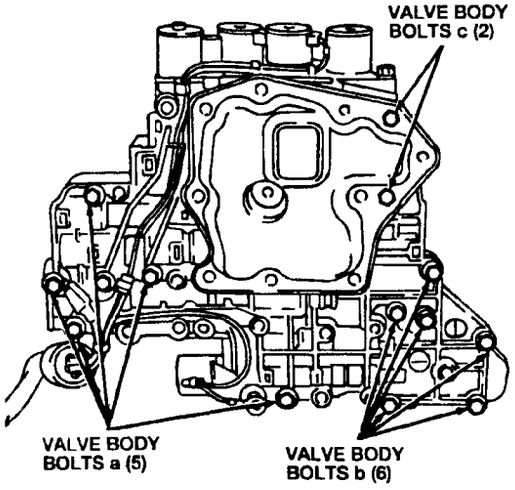
140. Install the main control valve body (7A100) into the transaxle case while aligning the manual valve with the manual detent lever.



141. Tighten the valve body bolts a, b, and c to 7-9 N·m (62-79 lb-in).

VALVE BODY BOLT SPECIFICATIONS

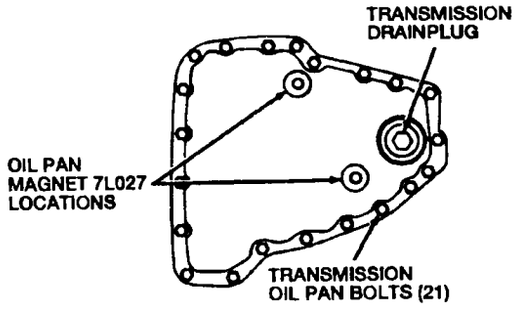
Bolt Symbol	a	b	c
Bolt length mm (in)	40 (1.57)	33 (1.30)	43.5 (1.71)
Number of bolts	5	8	2



142. Install the transmission oil filter and the transmission oil filter bolts. Tighten the transmission oil filter bolts to 7-9 N·m (62-79 lb-in).

143. Ensure that the transaxle and transmission oil pan mating surfaces are smooth and clean.

CAUTION: The magnetic field created by the oil pan magnets (7L027) disturbs the operation of the solenoid valves. To ensure proper solenoid valve operation, install the oil pan magnets in the same location they were removed.



144. Install the two oil pan magnets into the transmission oil pan (7A194).

145. Install a new oil pan to case gasket (7A191) and the transmission oil pan to the transaxle.

146. Install and tighten the 21 new transmission oil pan bolts in a criss-cross pattern to 7-9 N·m (62-79 lb-in).

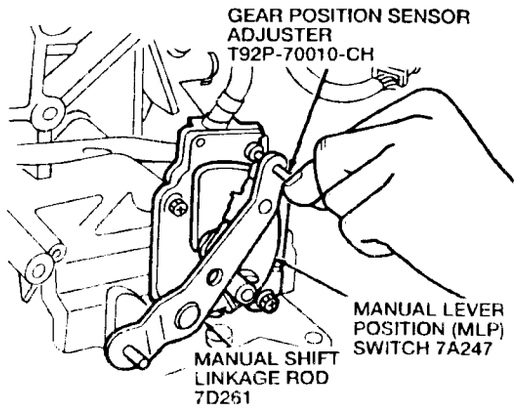
147. Install the transmission drainplug and a new transmission drainplug gasket. Tighten the transmission drainplug to 29-39 N·m (22-29 lb-ft).

148. Place the manual shift linkage rod in the PARK position.

149. Temporarily install the Manual Lever Position (MLP) switch onto the manual shift linkage rod.

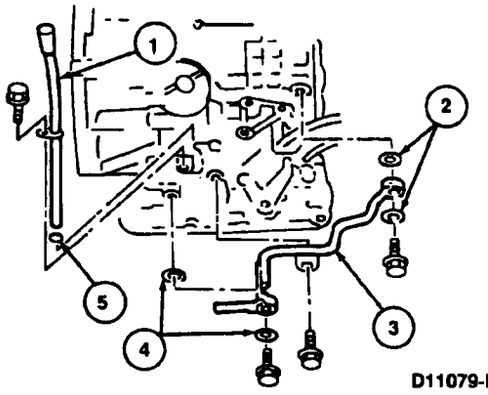
150. Move the manual shift linkage rod to the NEUTRAL position.

151. Insert Gear Position Sensor Adjuster T92P-70010-CH into the MLP switch and manual shaft adjustment holes as vertically as possible.



152. Tighten the MLP switch bolts to 3 N·m (27 lb-in).

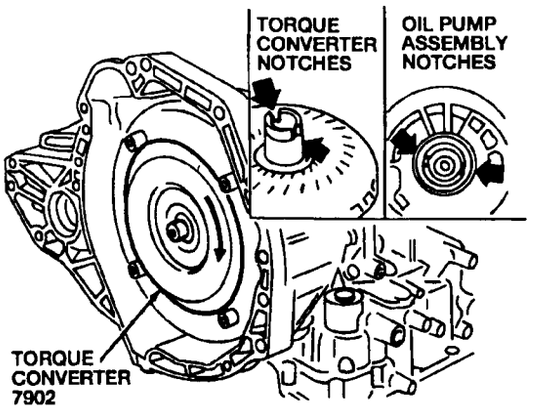
153. Remove the pin from the MLP switch.
154. Install the transmission oil cooler tube onto the transaxle. Tighten the transmission oil cooler tube bolts to 29-49 N·m (22-36 lb-ft).



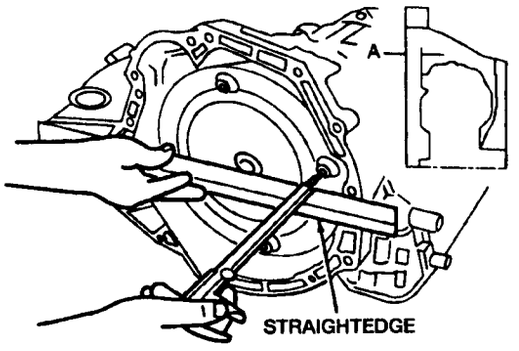
D11079-B

Item	Part Number	Description
1	7A228	Oil Filler Tube
2	7N254	Copper Washers
3	7H176	Transmission Oil Cooler Tube
4	7N254	Copper Washers
5	—	O-Ring

155. Install the oil filler tube (7A228) onto the transaxle. Tighten the upper and lower oil filler tube bolts to 3.8-4.9 N·m (36-44 lb-in).
156. If a new torque converter (7902) is used, add approximately 1 liter (1-1/8 qt.) of specified transmission fluid to the torque converter.
157. If the old torque converter is used, add the same amount of transmission fluid as the amount which was drained from the torque converter during removal.
158. Install the torque converter while aligning the torque converter and the front pump support and gear notches.



159. Measure distance A to ensure that the torque converter is in the proper position. Distance A should measure 14mm (0.55 inch).



160. If the torque converter is not in the proper position, reseat the torque converter.
161. Remove the transaxle from the holding fixture.

SPECIFICATIONS

TRANSAXLE SPECIFICATIONS

Torque Converter Stall RPM		2050-2350
Gear Ratio	First Second Third Fourth Reverse	2.785 1.545 1.000 0.694 2.272
Final Gear Ratio		3.861
Number of Internal Spline Clutch Plates / External Spline Clutch Plates	Forward Clutch Coasting Clutch 3-4 Clutch Reverse Clutch Low/Reverse Clutch	5/5 3/6 4/7 2/2 6/9
Transmission Fluid	Type Capacity Liters	MERCON® 9.4L (8.25 qts)

TORQUE SPECIFICATIONS

Description	N·m	Lb-Ft	Lb-In
Transmission Oil Filter Bolts	7-9	—	62-79
Transmission Oil Pan Bolts	7-9	—	62-79
Transmission Drainplug	29-39	22-29	—
Pulse Signal Generator (PSG) Bolt	5-7	—	44-61
Vehicle Speed Sensor (VSS) Hold-down Bracket Bolt	5-7	—	44-61
Solenoid Assembly Bolts	7-9	—	62-79
Transaxle Oil Temperature (TOT) Sensor Bolts	7-9	—	62-79
Line Pressure Solenoid Bolts	7-9	—	62-79
Valve Body Wiring Harness Bolts	7-9	—	62-79
Valve Body Bolts a, b, c, and d	7-9	—	62-79
Transaxle-to-Engine Bolt	30-40	22-30	—
Rear (RH) Transaxle Support Insulator Nuts	43-55	32-41	—
Rear (RH) Transaxle Support Insulator Through Bolt	43-55	32-41	—
Front (LH) Transaxle Support Insulator Bolts	41-52	30-38	—
Front (LH) Transaxle Support Insulator Through Bolt	64-74	47-54	—
Torque Converter-to-Flex Plate Bolts	44-59	33-43	—
Rear Transaxle-to-Engine Brace Bolts	30-40	22-30	—
Front Transaxle-to-Engine Brace Bolts	30-40	22-30	—
Exhaust Bracket-to-Transaxle Nuts	30-40	22-30	—
Converter Inlet Pipe-to-Exhaust Bracket Bolt	43	32	—
Upper Transaxle-to-Engine Bolts	39-49	29-36	—

(Continued)

TORQUE SPECIFICATIONS (Cont'd)

Description	N·m	Lb-Ft	Lb-In
Upper and Lower Oil Level Indicator Bolts	4-6	—	36-44
Oil Pump Cover Bolts	7-11	—	62-97
Valve Body Nut f	7-9	—	62-79
Valve Body Bolts e	7-9	—	62-79
2-4 Servo Piston Retainer Bolts	2.0-2.4	—	18-21
Final Drive Ring Gear Bolts	113-127	83-94	—
Manual Detent Spring Bolt	6-7	—	54-61
Reduction Gear Bearing Outer Race Bolts	109-123	80-90	—
Parking Actuator Support Bolts	20-24	14-17	—
Locknut (Idler Gear)	265-304	195-224	—
Output Shaft Bearing Retainer Bolts	109-123	80-90	—
Transaxle Case Side Cover Bolts A and B	26-30	20-22	—
Oil Pump Bolts	18-21	13-15	—
Band Adjusting Stop Locknut	31-42	23-31	—
Differential Lubricant Tube Bolts	5-7	—	44-61
Converter Housing-to-Transaxle Case Bolts	43-47	32-35	—
Low/Reverse Clutch Apply Oil Transfer Tube Bolts	5-7	—	44-61
Manual Lever Position (MLP) Switch Bolts	3	—	27
Transmission Oil Cooler Tube Bolts	29-49	22-36	—
Upper and Lower Oil Filler Tube Bolts	3.8-4.9	—	36-44