

2000 Ford Focus LX

2000-01 AUTOMATIC TRANSMISSIONS Ford 4F27E Overhaul

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Ford 4F27E Overhaul

APPLICATION

AUTOMATIC TRANSAXLE APPLICATIONS

Application	Transaxle Model
Focus	4F27E

IDENTIFICATION

The 4F27E automatic transaxle is identified by vehicle certification label located on door pillar.

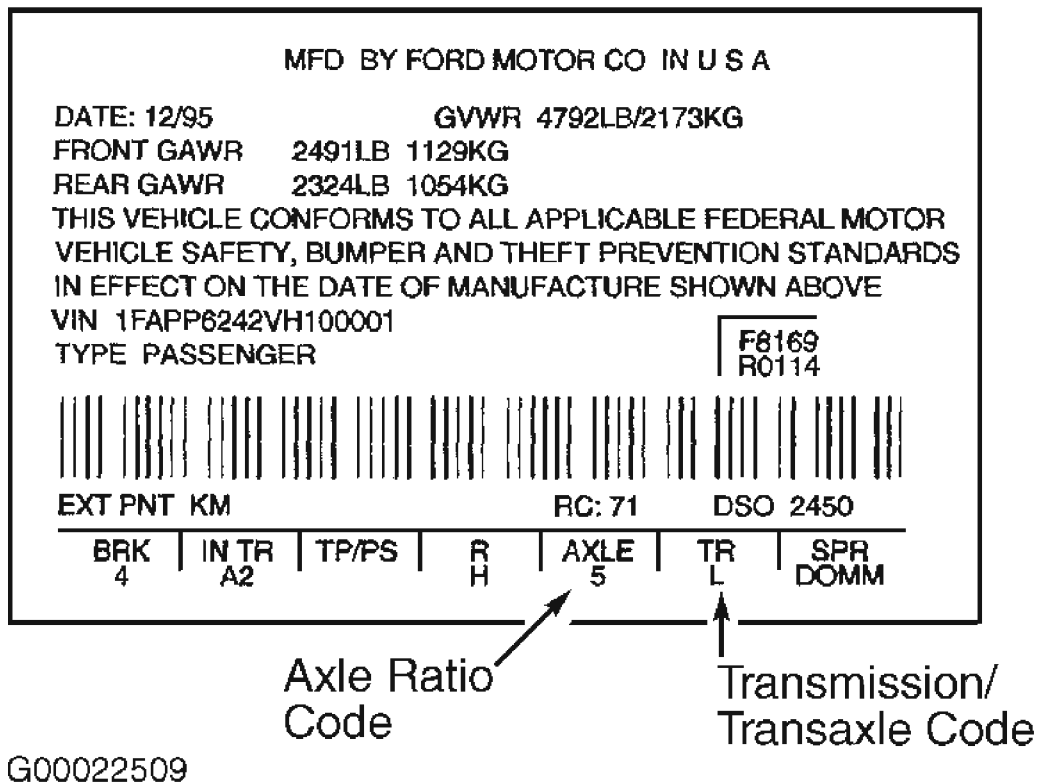


Fig. 1: Identifying Vehicle Certification Label (Example)
Courtesy of FORD MOTOR CO.

GEAR RATIOS

TRANSAXLE GEAR RATIOS

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Gear Range	Gear Ratio
1st	2.816:1
2nd	1.498:1
3rd	1.000:1
4th	0.726:1
Reverse	2.649:1

DESCRIPTION & OPERATION

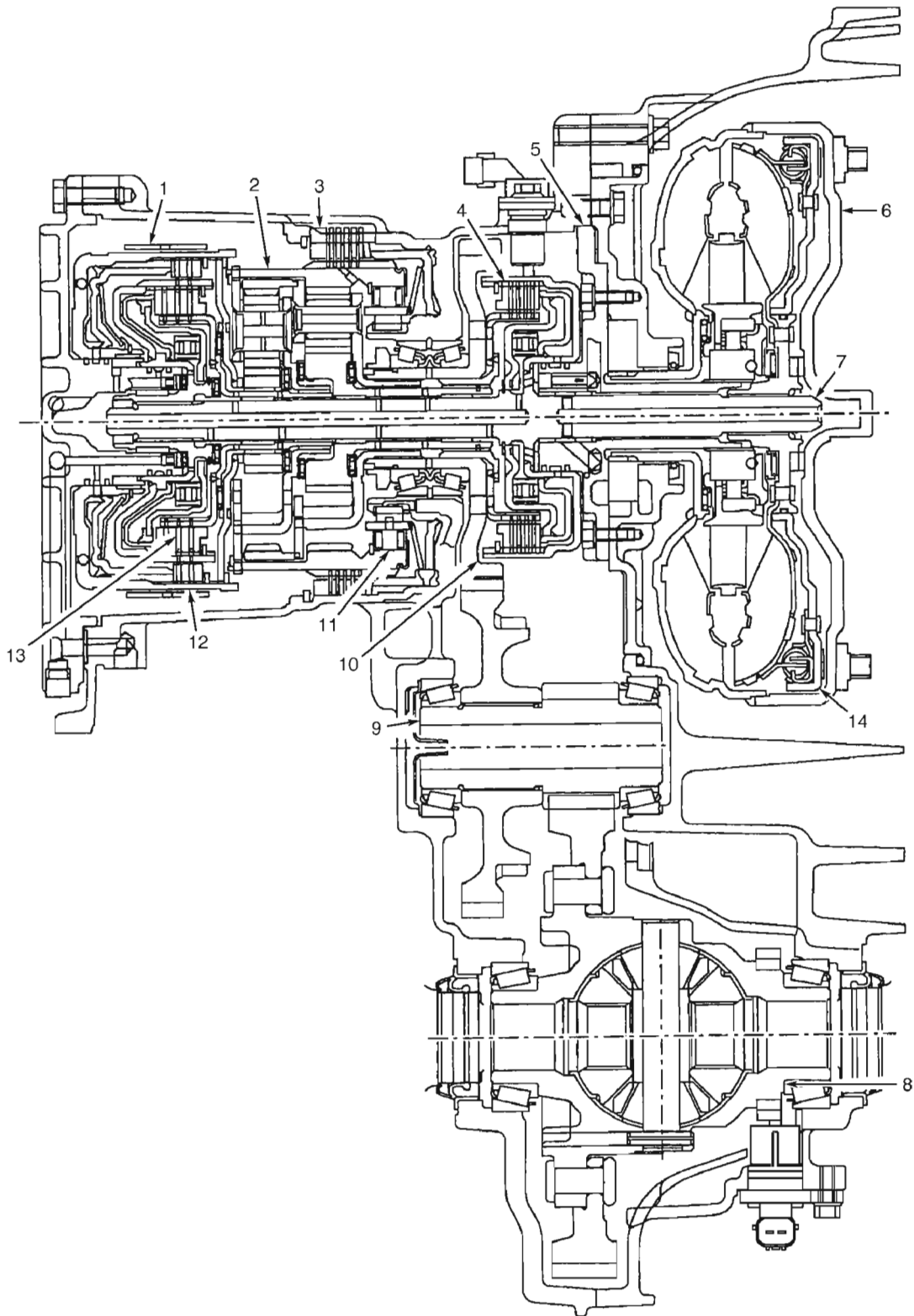
The 4F27E is a fully automatic, electronically controlled 4-speed transaxle. Individual gear ratios are achieved through 2 planetary gear sets connected one behind the other. Individual components of the planetary gear sets are driven or locked by 3 multi-plate clutches, a multi-plate brake, a brake band and a roller one-way clutch. Torque is transmitted to the final drive assembly through an intermediate gear stage.

Electrical and hydraulic functions are controlled by a 104-pin EEC-V Powertrain Control Module (PCM). The torque converter lock-up clutch is engaged by the PCM in 3rd and 4th gears depending on throttle position and vehicle speed to reduce fuel consumption. The transaxle has Electronic Synchronous Shift Control (ESSC) to guarantee smooth gear shifting. A hydraulic emergency operating program allows limited operation of transaxle in the event of failure of important electrical components. The transaxle can be tested using FDS2000, WDS or equivalent scan tool connected to Data Link Connector (DLC), located under left side of instrument panel.

The valve body contains 6 solenoid valves. The main regulating valve, or Pressure Control (PCA) solenoid, controls the required main line oil pressure for individual transaxle ranges dependent on the current engine load. The 2 shift solenoids switch different oil passages in the valve body to direct the oil pressure to the individual brakes and clutches. The 3 Pulse Width Modulation (PWM) valves control the amount of oil pressure to the brakes and clutches.

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- 1. Intermediate/Overdrive Band
- 2. Planetary Gear Sets
- 3. Low/Reverse Clutch
- 4. Forward Clutch
- 5. Oil Pump & Stator Support

- 6. Torque Converter
- 7. Input Shaft
- 8. Differential
- 9. Transfer Shaft Assembly
- 10. Final Drive Input Gear

- 11. Low One-Way Clutch
- 12. Reverse Clutch
- 13. Direct Clutch
- 14. Torque Converter Lock-Up Clutch

Fig. 2: Cut-Away View Of 4F27E Transaxle
Courtesy of FORD MOTOR CO.

LUBRICATION

RECOMMENDED FLUID

Manufacturer recommends MERCON 5 (XT-5-QM) or equivalent.

FLUID CAPACITIES

NOTE: Refill capacities not available from manufacturer.

TRANSAXLE FLUID CAPACITIES

Application	Capacity - Qts. (L)
4F27E	7.0 (6.7)

ON-VEHICLE SERVICE

The following components may be serviced without transaxle removal:

- Drive Axle Oil Seal (Left Side)
- Output Shaft Speed (OSS) Sensor
- Powertrain Control Module (PCM)
- Transaxle Pan, Gasket & ATF Filter
- Transmission Range (TR) Sensor
- Transmission Solenoids & Transmission Fluid Temperature (TFT) Sensor
- Turbine Shaft Speed (TSS) Sensor
- Valve Body Assembly

For removal and installation procedures of listed components, see appropriate component under **REMOVAL & INSTALLATION**.

OIL COOLER FLUSHING

1. Allow fluid in Rotunda Cleaner (222-00001) to heat up for 15-30 minutes, before using. Install line adapters into transaxle cooler lines.
2. Attach Blue line to transmission return line quick disconnect.
3. Attach Clear line to transmission outlet line quick disconnect.
4. Backflush transaxle cooling system for 10 minutes, then flush cooler in a forward, normal flow direction for an additional 10 minutes.

5. Refill transaxle with appropriate fluid. See **LUBRICATION** .

TROUBLE SHOOTING

PRELIMINARY INSPECTION

1. Ensure vehicle is at normal operating temperature when inspecting. Thoroughly road test vehicle to verify customer concern. Determine if problem occurs during upshift, downshift, coasting or engagement. If noise is to be diagnosed, determine if noise is affected by engine speed, vehicle speed, gear selection or temperature.
2. Inspect fluid level and condition. Visually inspect for vehicle modifications, electronic add-ons, fluid leaks and/or incorrect gear linkage adjustment. Check for Diagnostic Trouble Codes (DTCs) before any mechanical repair is performed. See FORD 4F27E ELECTRONIC CONTROLS article for DTC diagnosis and repair procedures. If no DTCs are present, see applicable SYMPTOM DIAGNOSIS.

SYMPTOM DIAGNOSIS

NOTE: **PRELIMINARY INSPECTION should be performed before SYMPTOM DIAGNOSIS. Electrical malfunctions should be checked before mechanical malfunctions.**

NOTE: **For components used in a specific gear, see CLUTCH & BAND APPLICATIONS .**

Delayed/Soft Forward Engagement Only

Check for damage/fault at PCM, shift solenoid SSC and related wiring. Check transaxle for low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check forward clutch assembly for damaged piston, seals, return springs and worn or damaged friction elements.

Delayed/Soft Forward & Reverse Engagement

Check for damage/fault at PCM, shift solenoids SSC and SSD, TFT sensor, TR sensor and related wiring. Check transaxle for high line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check oil pump assembly for improperly tightened bolts, damaged/leaking pump gasket, missing check ball and plugged passage.

Delayed/Soft Reverse Engagement Only

Check for damage/fault at PCM, shift solenoid SSD and related wiring. Check transaxle for low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check reverse clutch and low/reverse

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clutch assemblies for damaged piston, seals, return springs and worn or damaged friction elements.

Early/Late Shifts

NOTE: If only some shifts are early/late, determine which shift(s) is early/late.

Check for damage/fault at PCM, shift solenoids SSA, SSB, SSC, SSD and SSE, PCA solenoid, TSS sensor, OSS sensor and related wiring. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo retaining ring and seals for damage. Check band adjustment and band anchor bolt for damage.

Engine Will Not Crank

Check for damaged or disconnected TR sensor and wiring. Check gear shift cable for damage and improper adjustment. Check flexplate or adaptor plate for damage.

Erratic/Hunting Shifts

Check for damage/fault at PCM, Intake Manifold Air Temperature (IAT) sensor, OSS sensor and related wiring. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs.

External Leaks

Check TR sensor, TSS sensor and OSS sensor "O" rings for leakage. Check all gaskets and seals for leakage. Check transaxle case for damage.

Fluid Venting Or Foaming

Check oil pump assembly for improperly tightened bolts, damaged/leaking pump gasket, missing check ball and plugged passage. Check transaxle case vent for damage. Check for transaxle overheating.

Harsh 1-2 Shift

Check for damage/fault at PCM, shift solenoid SSD, TFT sensor, TR sensor, TSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo piston and cover seals for damage. Check band adjustment, band anchor bolt and servo for damage.

Harsh 2-3 Shift

Check for damage/fault at PCM, shift solenoid SSD, TFT sensor, TR sensor, TSS sensor and

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related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo piston and cover seals for damage. Check band adjustment, band anchor bolt and servo for damage. Check direct clutch assembly for damaged piston, seal, return spring, worn or damaged plates friction elements and balance piston.

Harsh 3-4 Shift

Check for damage/fault at PCM, shift solenoids SSA and SSC, TFT sensor, TR sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check direct and forward clutch assemblies for damaged pistons, seals, return springs, worn or damaged friction elements and balance piston.

Harsh 4-3 Shift

Check for damage/fault at PCM, shift solenoids SSA and SSC, TFT sensor, TR sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check forward clutch assembly for damaged pistons, seals, return springs, worn or damaged friction elements and balance piston. Check servo piston and cover seals for damage. Check band adjustment, band anchor bolt and servo for damage.

Harsh 3-2 Shift

Check for damage/fault at PCM, shift solenoid SSE, TFT sensor, TR sensor, TSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check direct clutch assembly for damaged pistons, seals, return springs, worn or damaged friction elements and balance piston. Check servo piston and cover seals for damage. Check band adjustment, band anchor bolt and servo for damage.

Harsh 2-1 Shift

Check for damage/fault at PCM, PCA solenoid, shift solenoid SSD, TFT sensor, TR sensor, TSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check one-way clutch for damage or incorrect assembly. Check servo piston and cover seals for damage. Check band adjustment, band anchor bolt and servo for damage.

Harsh Forward & Reverse Engagement

Check for damage/fault at PCM, shift solenoids SSC and SSD, TFT sensor, TR sensor and related wiring. Check transaxle for high line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check forward clutch and low/reverse clutch assemblies for damaged piston, seals, return springs and worn

or damaged friction elements. Check for damaged final drive gear set and differential. Check torque converter flexplate or adapter plate, impeller hub, turbine hub and low one-way clutch for damage.

Harsh Manual 1st Gear Engagement Only

Check for damage/fault at PCM, TSS sensor and related wiring.

Harsh Reverse Engagement Only

Check for damage/fault at PCM, shift solenoids SSC, SSD and related wiring. Check transaxle for high line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check reverse clutch and low/reverse clutch assemblies for damaged piston, seals, return springs and worn or damaged friction elements.

Harsh Shifts (Some/All Gears)

Check for damage/fault at PCM, shift solenoids SSA, SSB, SSC, SSD and SSE, PCA solenoid, TFT sensor, TR sensor, OSS sensor input, IAT sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check input shaft for damage. Check servo retaining ring and seals for damage. Check band adjustment and band anchor bolt for damage. Check forward clutch assembly for damaged friction element, return spring and balance piston. Check final drive gears and differential for damage. Check transaxle case for damage.

Missing Some/All Shifts (Automatic Mode Only)

NOTE: If only some shifts are missing, determine which shift(s) is missing.

Check for damage/fault at PCM, shift solenoids SSA, SSB, SSC, SSD and SSE, PCA solenoid, TFT sensor, TR sensor, OSS sensor input, IAT sensor and related wiring. Check gear shift cable for damage and improper adjustment. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check oil pump assembly for improperly tightened bolts, damaged/leaking pump gasket, missing check ball and plugged passage. Check direct and forward clutch assemblies for damaged piston, seals, return springs and worn or damaged friction elements. Check one-way clutch and servo assemblies for damage, wear and incorrect assembly.

No 1-2 Shift

Check for damage/fault at PCM, shift solenoid SSD, TSS sensor, TR sensor, OSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for

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contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo retaining ring and seals for damage. Check band adjustment and band anchor bolt for damage. Check forward clutch assembly for damaged piston, seal, return spring, worn or damaged friction elements and balance piston. Check overdrive planetary gear assembly for damage.

No 2-3 Shift

Check for damage/fault at PCM, shift solenoids SSD and SSE, TR sensor, OSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo piston and cover seals for damage. Check forward and direct clutch assemblies for damaged pistons, seals, return springs, worn or damaged friction elements and balance piston.

No 3-4 Shift

Check for damage/fault at PCM, shift solenoids SSA and SSC, TR sensor, OSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo band for damage. Check forward clutch assembly for damaged piston, seal, return spring, worn or damaged friction elements and balance piston.

No 4-3 Shift

Check for damage/fault at PCM, shift solenoids SSA and SSC, TR sensor, OSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo seal for damage. Check forward clutch assembly for damaged piston, seal, return spring, worn or damaged friction elements and balance piston.

No 3-2 Shift

Check for damage/fault at PCM, shift solenoid SSE, TR sensor, OSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo piston and cover seals for damage. Check band adjustment and band anchor bolt for damage. Check direct clutch assembly for damaged piston, seal, return spring, worn or damaged friction elements and balance piston.

No 2-1 Shift

Check for damage/fault at PCM, shift solenoid SSD, TR sensor, OSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check one-way clutch and band for damage.

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No 1st & Reverse Gears

Check for damage/fault at PCM, TR sensor and related wiring.

No 1st Gear In Drive, Engages In Higher Gear

Check for damage/fault at PCM, TR sensor, shift solenoid SSC and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check input shaft for damage. Check servo retaining ring and seals for damage. Check low one-way clutch for wear, damage or incorrect assembly.

No 1st Gear In Manual 1st

Check for damage/fault at PCM and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check low/reverse clutch assembly for damaged piston, seal, return spring and worn or damaged friction elements. Check overdrive planetary gear assembly for damage.

No Engine Breaking In All Gears

Check for damaged or disconnected wiring to PCM and shift solenoid SSD.

No Engine Breaking In Manual 1st

Check for damage/fault at PCM, shift solenoid SSD and related wiring. Check transaxle for high or low line pressures. Check oil pump assembly for improperly tightened bolts, damaged/leaking pump gasket, missing check ball and plugged passage. Check low/reverse clutch assembly for damaged pistons seals, return springs, worn or damaged friction elements and balance piston.

No Forward & No Reverse

Check for damage/fault at PCM, TR sensor and related wiring. Check gear shift cable for damage and improper adjustment. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check for damaged turbine shaft. Check oil pump assembly for improperly tightened bolts, damaged/leaking pump gasket, missing check ball and plugged passage. Check forward and rear planetary gear set assemblies for damage. Check forward clutch assembly for damaged piston, seals, return springs and worn or damaged friction elements. Check for damaged final drive gear set and differential. Check torque converter flexplate or adapter plate, impeller hub, turbine hub and low one-way clutch for damage.

Noise/Vibration (Forward Or Reverse)

Check for damage/fault at PCM, shift solenoids SSA, SSB, SSC, SSD and SSE, PCA

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solenoid and related wiring. Check oil pump assembly for improperly tightened bolts, damaged/leaking pump gasket, missing check ball and plugged passage. Check flexplate or adaptor plate for damage. Check adaptor plate alignment.

No Manual 2nd Gear

Check for damage/fault at PCM, shift solenoid SSD and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo retaining ring and seals for damage. Check band adjustment and band anchor bolt for damage. Check one-way clutch for wear, damage or incorrect assembly.

No Park Range

Check gear shift cable system and TR sensor for damage or misalignment. Check manual control lever assembly for damage. Check manual valve inner lever pin and lever shaft retaining pin for damage. Check for spring rod damage. Check for damaged park gear, abutment and plate, parking pawl return spring, park or guide plate, parking actuating rod, parking pawl shaft, manual lever detent spring, and external linkages/brackets.

No Reverse Engagement Only

Check for damage/fault at PCM, shift solenoids SSC, SSD, SSE, and related wiring. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check reverse clutch and low/reverse clutch assemblies for damaged piston, seals, return springs and worn or damaged friction elements.

Overheating

Check for damage/fault at PCM, shift solenoid SSB, TFT sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check oil pump assembly for improperly tightened bolts, damaged/leaking pump gasket, missing check ball and plugged passage. Check transaxle case vent for damage or obstruction. Check torque converter for internal failure. Check for restriction in transaxle cooling system and poor engine performance.

Poor Vehicle Performance

Check for damage/fault at PCM, shift solenoids SSA, SSB, SSC, SSD and SSE, PCA solenoid and related wiring. Check input shaft for damage. Check forward clutch assembly for damaged pistons seals, return springs, worn or damaged friction elements and balance piston. Check torque converter one-way clutch for slipping. Check for wrong torque converter application (if applicable).

Shift Lever Effort High

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Check for damage/fault at TR sensor and related wiring. Check for damaged or misaligned gear shift cable system. Check valve body for improperly tightened bolts. Check transaxle case for damage. Check manual control lever assembly for damage. Check manual valve inner lever pin and lever shaft retaining pin for damage. Check for spring rod damage.

Slips/Chatters In 1st Gear

Check for damage/fault at PCM, shift solenoid SSC and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check oil pump assembly for improperly tightened bolts, damaged/leaking pump gasket, missing check ball and plugged passage. Check forward clutch assembly for damaged pistons seals, return springs, worn or damaged friction elements and balance piston. Check low one-way clutch for damage, wear or incorrect assembly.

Soft/Slipping Shift

NOTE: If only some shifts are soft/slipping, determine which shift(s) is soft/slipping.

Check for damage/fault at PCM, shift solenoids SSA, SSB, SSC, SSD and SSE, PCA solenoid, TFT sensor, OSS sensor input, IAT sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check oil pump assembly for improperly tightened bolts, damaged/leaking pump gasket, missing check ball and plugged passage. Check intermediate servo retaining ring and seals for damage. Check intermediate band assembly for damaged band anchor bolt, servo and incorrect adjustment. Check direct and forward clutch assemblies for damaged friction elements, return springs and balance piston. Check transaxle case for damage.

Soft/Slipping 1-2 Shift

Check for damage/fault at PCM, shift solenoid SSD, TFT sensor, TSS sensor, OSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo piston and cover seals for damage. Check band adjustment and band anchor bolt for damage.

Soft/Slipping 2-3 Shift

Check for damage/fault at PCM, shift solenoid SSE, TFT sensor, TSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo piston and cover seals for damage. Check band adjustment and band anchor bolt for damage. Check direct clutch assembly for damaged piston, seal, return spring, worn or damaged friction elements and balance piston.

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Soft/Slipping 3-4 Shift

Check for damage/fault at PCM, shift solenoids SSA and SSC, TFT sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo piston and cover seals for damage. Check band adjustment and band anchor bolt for damage. Check forward clutch assembly for damaged piston, seal, return spring, worn or damaged friction elements and balance piston.

Soft/Slipping 4-3 Shift

Check for damage/fault at PCM, shift solenoids SSA and SSC, TFT sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo piston and cover seals for damage. Check forward clutch assembly for damaged piston, seal, return spring, worn or damaged friction elements and balance piston.

Soft/Slipping 3-2 Shift

Check for damage/fault at PCM, shift solenoid SSE, TFT sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo piston and cover seals for damage. Check band adjustment and band anchor bolt for damage.

Soft/Slipping 2-1 Shift

Check for damage/fault at PCM, shift solenoid SSD, TFT sensor, TR sensor, TSS sensor, OSS sensor and related wiring. Check transaxle for high or low line pressures. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check servo piston and cover seals for damage. Check band adjustment, servo and band anchor bolt for damage.

Torque Converter Always Applied/Stalls Vehicle

Check for damage/fault at PCM, shift solenoids SSB and SSC and related wiring. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check low one-way clutch for damage or incorrect assembly. Check torque converter for internal failure.

Torque Converter Clutch (TCC) Cycling/Shudder/Chatter

Check for damage/fault at PCM, shift solenoids SSB and SSC and related wiring. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check torque converter for internal failure.

Torque Converter Clutch (TCC) Does Not Apply

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Check for damage/fault at PCM, shift solenoids SSB and SSC, TFT sensor and related wiring. Check valve body for contamination, improperly tightened bolts, damaged separator plate and stuck valves/springs. Check oil pump assembly for improperly tightened bolts, damaged/leaking pump gasket, missing check ball and plugged passage. Check torque converter for internal failure.

CLUTCH & BAND APPLICATIONS

CLUTCH & BAND APPLICATIONS

Shift Lever Position	Elements In Use
Overdrive ("D")	Direct Clutch & Intermediate/Overdrive Band
3rd Gear	Forward Clutch & Direct Clutch
2nd Gear	Forward Clutch & Intermediate/Overdrive Band
1st Gear	Forward Clutch & Low One-Way Clutch
Manual 1st Gear	Forward Clutch & Low-Reverse Clutch
Reverse	Reverse Clutch & Low-Reverse Clutch

PERFORMANCE TESTS

NOTE: Ensure ATF level is correct and transaxle is at normal operating temperature.

ROAD TEST

1. With transaxle at normal operating temperature, operate vehicle with gear selector lever in "D" position with overdrive switch in ON position. Apply minimum throttle and observe speeds at which upshift occurs and torque converter clutch engages. See **SHIFT SPEED SPECIFICATIONS** table.
2. Stop vehicle. With gear selector lever in "D" position with overdrive in OFF position, repeat step 1 . Transaxle will make all upshifts except 3rd to 4th gear. Torque converter clutch application should occur above 50 MPH.
3. Press accelerator pedal to wide open throttle (WOT). Transaxle should downshift from 3rd to 2nd gear, or 3rd to 1st gear, depending on vehicle speed. Torque converter clutch should release at this time.
4. With vehicle speed above 30 MPH, move gear selector lever from "D" position to "1" position and release accelerator pedal. Transaxle should immediately downshift to 2nd gear. When vehicle speed drops below 20 MPH, transaxle should downshift to 1st gear.
5. If transaxle fails to upshift/downshift or torque converter clutch fails to apply/release as specified, see **SYMPTOM DIAGNOSIS** .

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SHIFT SPEED SPECIFICATIONS

Throttle Position	Shift (Overdrive Position)	(2) Speed MPH	(3) Speed MPH	(4) Speed MPH
Closed Throttle (1)	4th-3rd	22-12	22-12	30-20
Closed Throttle (1)	3rd-2nd	12-2	12-2	22-12
Closed Throttle (1)	2nd-1st	12-2	12-2	32-22
Minimum Throttle	1st-2nd	8-18	7-17	7-17
Minimum Throttle	2nd-3rd	17-27	15-25	15-25
Minimum Throttle	3rd-4th	27-37	23-33	22-32
Wide Open Throttle	1st-2nd	26-36	28-38	27-37
Wide Open Throttle	2nd-3rd	55-65	60-70	55-65
Wide Open Throttle	3rd-4th	77-87	84-94	86-96

(1) Closed throttle specifications apply to downshift portion of road test.

(2) Speed specifications apply to 3.67 axle ratio.

(3) Speed specifications apply to 3.90 axle ratio.

(4) Speed specifications apply to 4.15 axle ratio.

TORQUE CONVERTER

Operations Test

NOTE: Torque converter operations test verifies torque converter and torque converter clutch control system are operating correctly.

1. Connect a tachometer to engine. Bring engine and transaxle to normal operating temperature by driving vehicle at highway speeds for 15 minutes in overdrive. After normal operating temperature is reached, maintain a speed of about 50 MPH and tap brake pedal while monitoring tachometer display.
2. Engine RPM should increase when brake pedal is tapped and decrease about 5 seconds after brake pedal is released. If test results are not as specified or if vehicle stalls in

overdrive or manual "2" at idle with vehicle at a stop, move gear selector lever to manual "1" position. If vehicle stalls in manual "1" position, see torque converter related concerns in SYMPTOM DIAGNOSIS .

Stall Speed Test

WARNING: Apply parking brake **FIRMLY** while carrying out each stall speed test.

CAUTION: Always perform HYDRAULIC PRESSURE TESTS before performing stall speed test. If line pressure is too low at stall speed, **DO NOT** attempt to perform stall speed test. Further transaxle damage will occur.

CAUTION: Do not maintain WOT in any range for more that 5 seconds. After testing ranges "D", "2", "1" and "R", move gear selector lever to "N" position and run the engine at 1000 RPM for about 15 seconds to allow the torque converter to cool. If at any time engine RPM exceeds maximum specified RPM, release accelerator pedal immediately. Clutch or band slippage is indicated.

NOTE: Prolonged stall speed testing procedures may set DTCs P0712 and P1783. After test is complete, run On Board Diagnostic (OBD) test and clear DTCs. See FORD 4F27E ELECTRONIC CONTROLS article.

Stall speed test checks operation of following items:

- Engine performance.
- Forward clutch.
- Low one-way clutch assembly.
- Torque converter clutch.

Connect tachometer to engine. Press accelerator to floor (WOT) in each gear range (except Neutral). Observe and record RPM reached in each range. Stall speeds should be as specified in STALL SPEED SPECIFICATIONS table.

STALL SPEED SPECIFICATIONS

Engine	Stall RPM
2.0L SPI	2406-2811
2.0L ZETEC	2439-2837

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If stall speeds were too high, see **STALL SPEED DIAGNOSIS** table. If stall speeds were too low, check engine idle speed. If engine idle speed is within specification, remove torque converter and check torque converter one-way clutch for slippage.

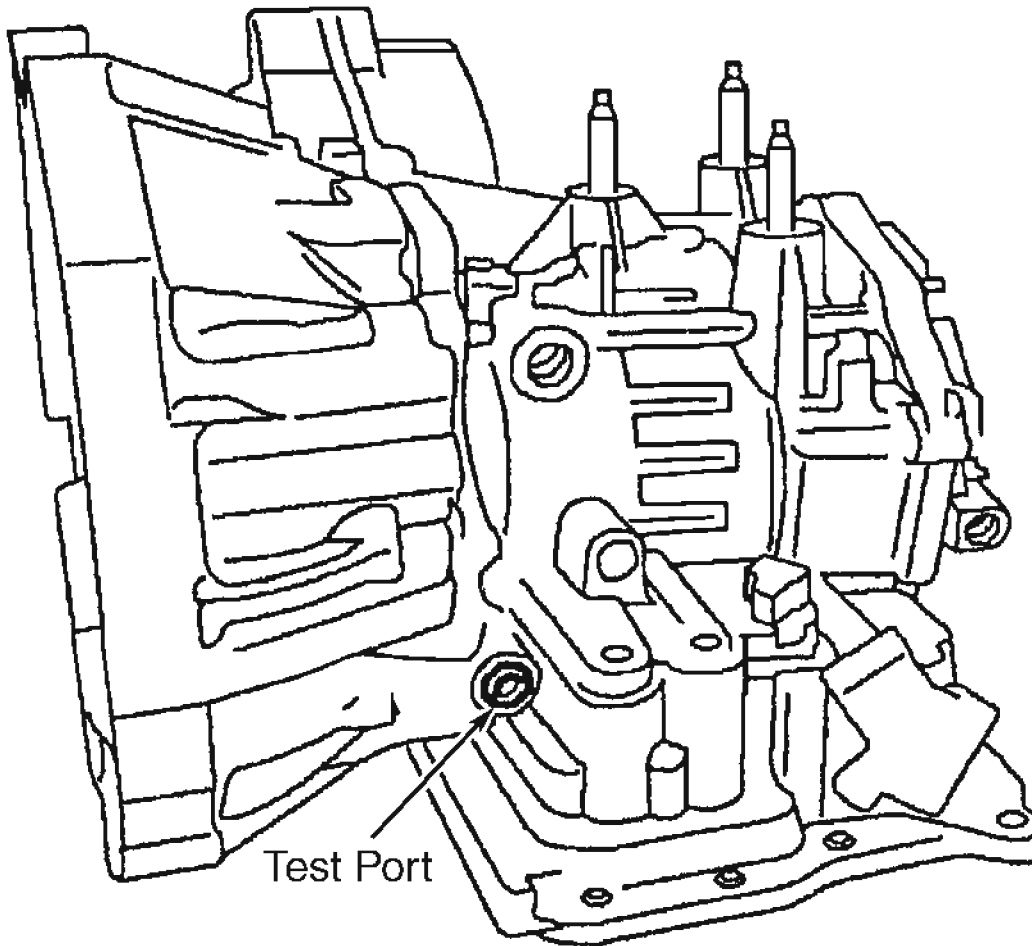
STALL SPEED DIAGNOSIS

Gear Selector Lever Position	Possible Causes
"D", "2" & "1"	Forward Clutch Slipping
"2" Only	Intermediate/Overdrive Band Slipping
"1" & "R"	Low/Reverse Clutch Slipping
"R" Only	Reverse Clutch Slipping Or Low/Reverse Clutch Defective

HYDRAULIC PRESSURE TESTS

Line Pressure

Connect a pressure gauge to line pressure test port. See **Fig. 3** . Start engine. Apply service and parking brakes. Check line pressures in all gears. See **LINE PRESSURE SPECIFICATIONS** table. If line pressures are not as specified, see **HYDRAULIC PRESSURE TEST RESULTS** for possible causes.



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Fig. 3: Locating Transaxle Line Pressure Test Port
Courtesy of FORD MOTOR CO.

LINE PRESSURE SPECIFICATIONS

Selector Position	Idle RPM - psi (kg/cm ²)	WOT Stall RPM - psi (kg/cm ²)
"P" & "N"	50-65 (3.5-4.6)	180-210 (12.65-14.77)
"R"	65-85 (4.6-6.0)	280-335 (19.69-23.55)
"D", "2" & "1"	50-65 (3.5-4.6)	180-210 (12.65-14.77)

HYDRAULIC PRESSURE TEST RESULTS

Low Pressure In All Ranges

- Worn oil pump.
- Fluid leaks at oil pump, valve body and/or transaxle case.
- Pressure control solenoid inoperative.
- Solenoid regulating valve sticking.

High Pressure In All Ranges

- Pressure control solenoid inoperative or open circuit in wiring harness.
- Pressure regulator valve sticking.
- PCM inoperative.

Low Pressure In "D", "2" & "1" Only

Fluid leaking from forward clutch hydraulic circuit.

Low Pressure In "2" Only

Fluid leaking from intermediate/overdrive band hydraulic circuit.

Low Pressure In "1" & "R" Only

Fluid leaking from low/reverse clutch hydraulic circuit.

Low Pressure In "R" Only

Fluid leaking from reverse clutch hydraulic circuit.

AIR PRESSURE TESTS

WARNING: Use only dry, regulated air pressure at 40 psi (2.8 kg/cm) maximum.

NOTE: Air pressure tests substitute air pressure for fluid pressure to aid in determining the location of transaxle component failure.

1. Drain transaxle fluid and remove transaxle oil pan. Remove valve body. See **VALVE BODY ASSEMBLY** under REMOVAL & INSTALLATION. Install transaxle Pressure Test Plate and Gasket (307-412). Use oil pan bolts to secure test plate. Tighten bolts to 89 INCH lbs. (10 N.m).
2. Apply air pressure to appropriate clutch port(s). See **Fig. 4** . A dull thud should be felt or heard or movement can be observed when component applies. If a hissing sound is heard with component fully applied, clutch seals or check balls are leaking.

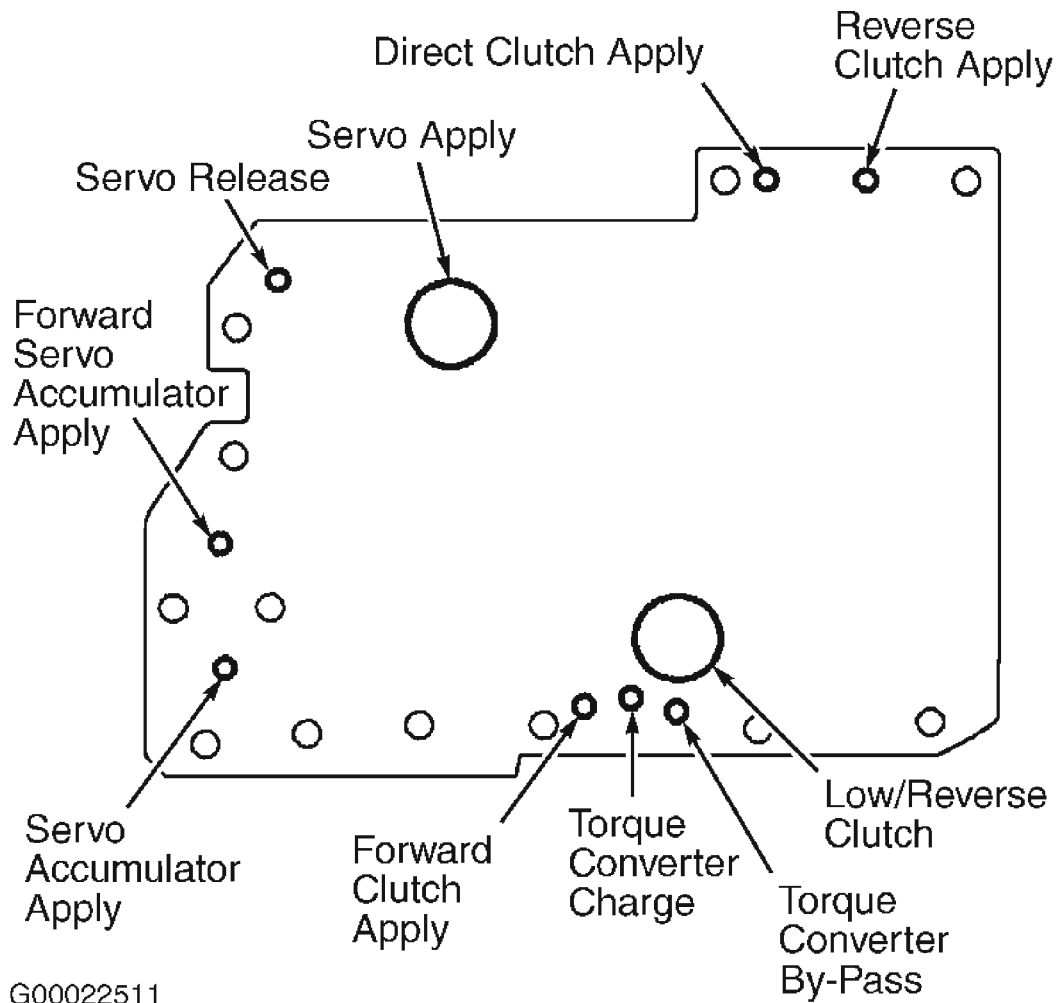


Fig. 4: Identifying Transaxle Pressure Test Plate Ports
 Courtesy of FORD MOTOR CO.

3. If air pressure test results reveal that servos do not operate, disassemble, clean and inspect servos to locate source of failure. If air pressure applied to clutch ports fails to operate a clutch or operates another clutch simultaneously, disassemble and use air pressure to check fluid passages in transaxle case and clutches to detect obstruction(s).

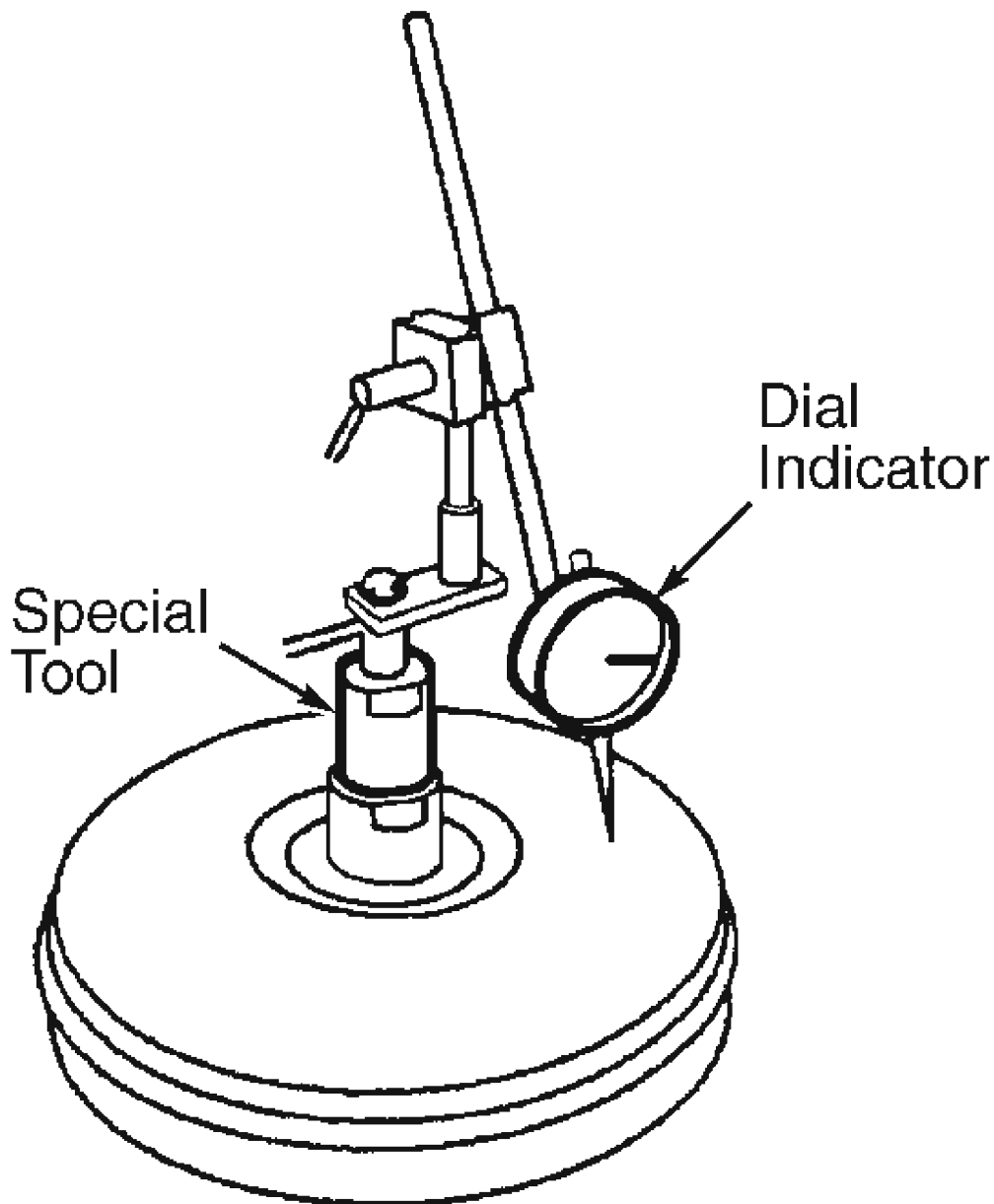
COMPONENT TESTS

TORQUE CONVERTER

Torque Converter End Play Test

Install torque converter gauge Special Tool (307-409) to torque converter as shown. See **Fig. 5**. Using special tool, measure torque converter end play by pulling up on the special tool.

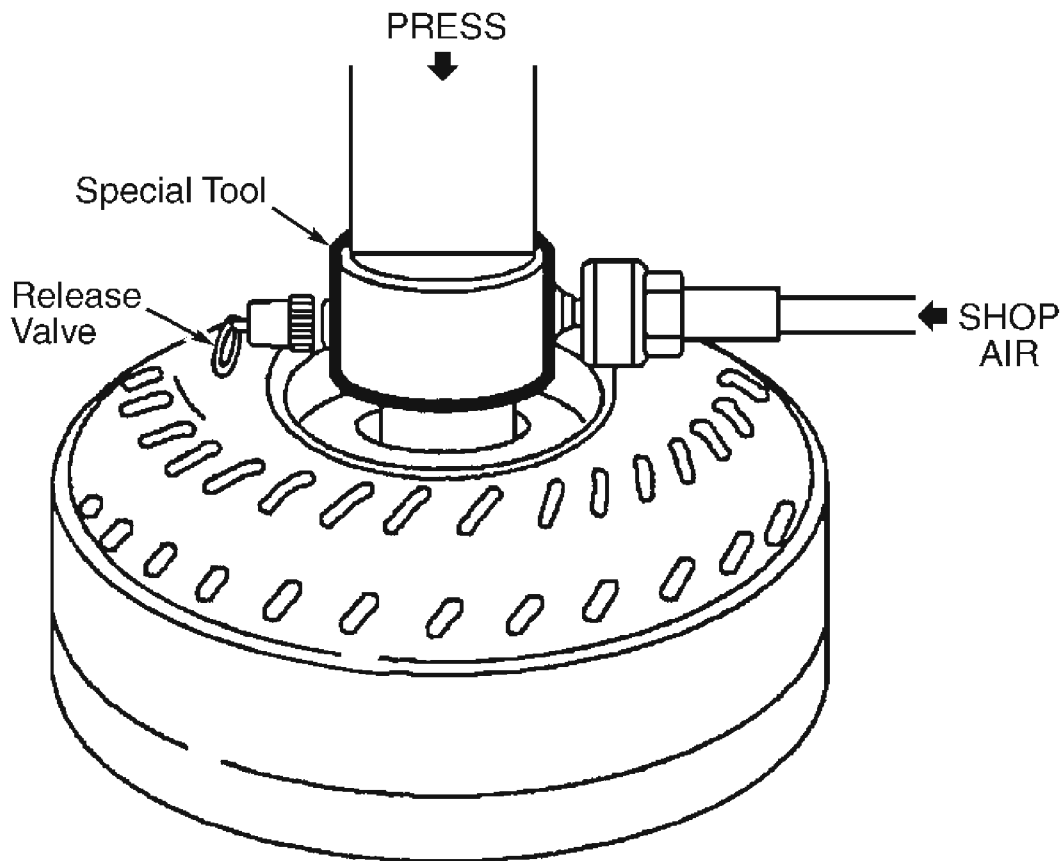
Dial indicator reading should not exceed .002-.020" (.05-.51 mm). If dial indicator reading exceeds specification, replace torque converter.



G00022512

Fig. 5: Using Torque Converter Gauge Special Tool
Courtesy of FORD MOTOR CO.

1. Thoroughly clean outside surface of torque converter. Install torque converter leak check Special Tool and Gasket (307-421). Install special tool with torque converter into an arbor press as shown. See **Fig. 6** . Apply enough pressure from press to seal special tool to torque converter. Apply air pressure to special tool valve.
2. Using a soap solution, inspect torque converter hub, seams and studs for leaks. If any leaks are present, replace torque converter. Remove air pressure. Release pressure in torque converter through release valve. Slowly release press and remove special tool.



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Fig. 6: Using Torque Converter Leak Check Special Tool
Courtesy of FORD MOTOR CO.

REMOVAL & INSTALLATION

NOTE: Components not listed are covered throughout transaxle disassembly and reassembly procedures.

DRIVE AXLE OIL SEAL (LEFT SIDE)

Removal & Installation

1. Loosen piston rod nuts on both front strut assemblies 5 turns each. Raise and support vehicle. Remove left front wheel. Remove left side tie rod nut, and separate tie rod stud from steering knuckle. Detach both suspension arms. Remove mounting bracket from right side drive axle intermediate bearing. See **Fig. 7** . Detach right side drive axle from transaxle and suspend with ties. Separate left side drive axle from transaxle and suspend with ties. Using Oil Seal Converter Remover (307-272) or equivalent, remove oil seal.

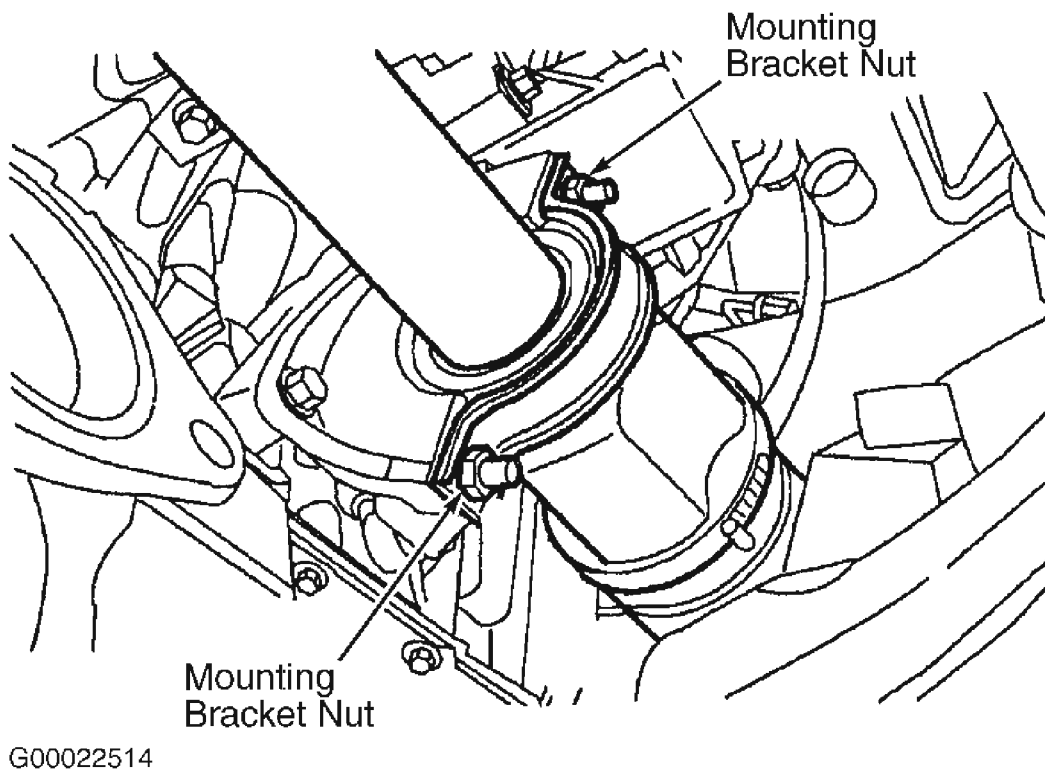


Fig. 7: Removing Right Side Intermediate Bearing Bracket
Courtesy of FORD MOTOR CO.

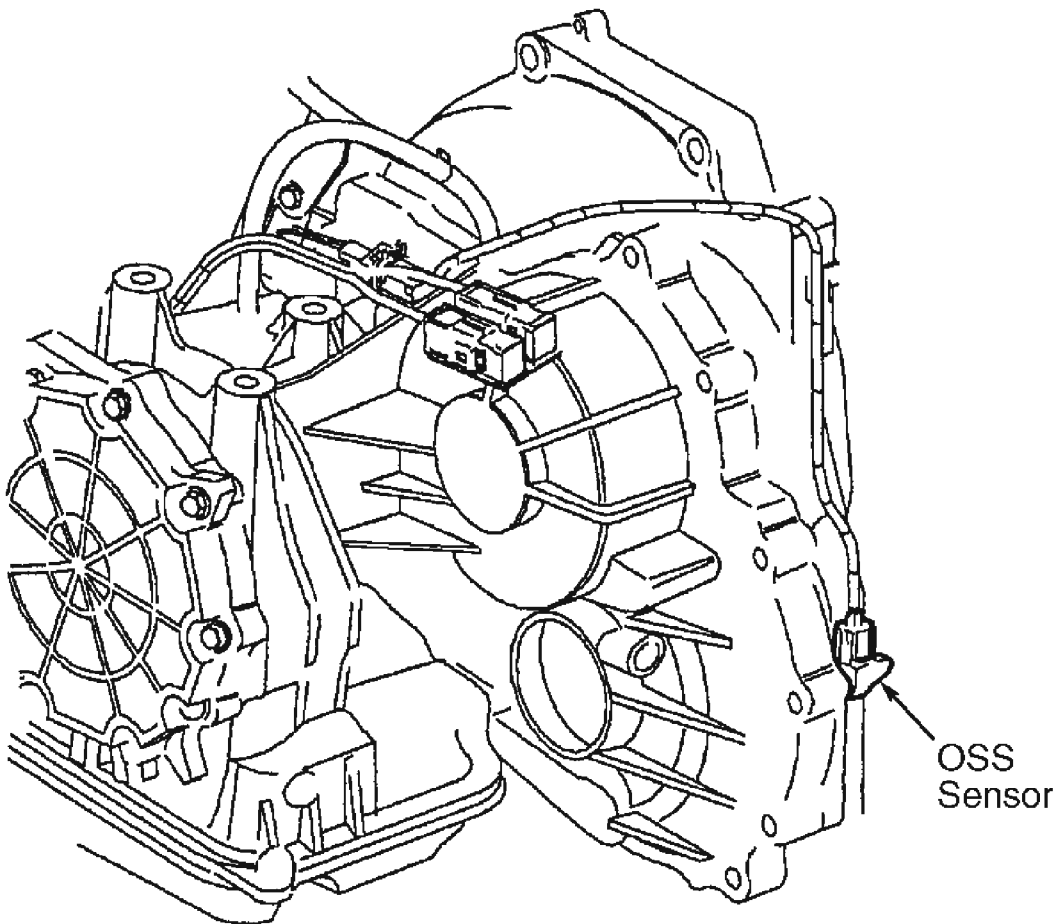
2. Install NEW oil seal. Install NEW nuts and bearing cap for right side drive axle intermediate bearing. Install right side drive axle together with drive axle intermediate bearing to transaxle. Install NEW snap ring to left side drive axle. Install left side drive axle to transaxle. To complete installation, reverse removal procedure. Tighten nuts and bolts to specification. See **TORQUE SPECIFICATIONS** .

OUTPUT SHAFT SPEED SENSOR

Removal & Installation

Raise and support vehicle. Place drain pan beneath OSS sensor at rear of transaxle. See **Fig.**

8 . Disconnect OSS sensor harness connector, remove sensor mounting bolt and remove sensor from transaxle. Inspect OSS sensor bore and "O" ring for damage, and replace "O" ring as necessary. Apply light coat of lubricant to "O" ring. To install, reverse removal procedure. Tighten sensor bolt to specification. See **TORQUE SPECIFICATIONS** . Add ATF as necessary.



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Fig. 8: Locating OSS Sensor
Courtesy of FORD MOTOR CO.

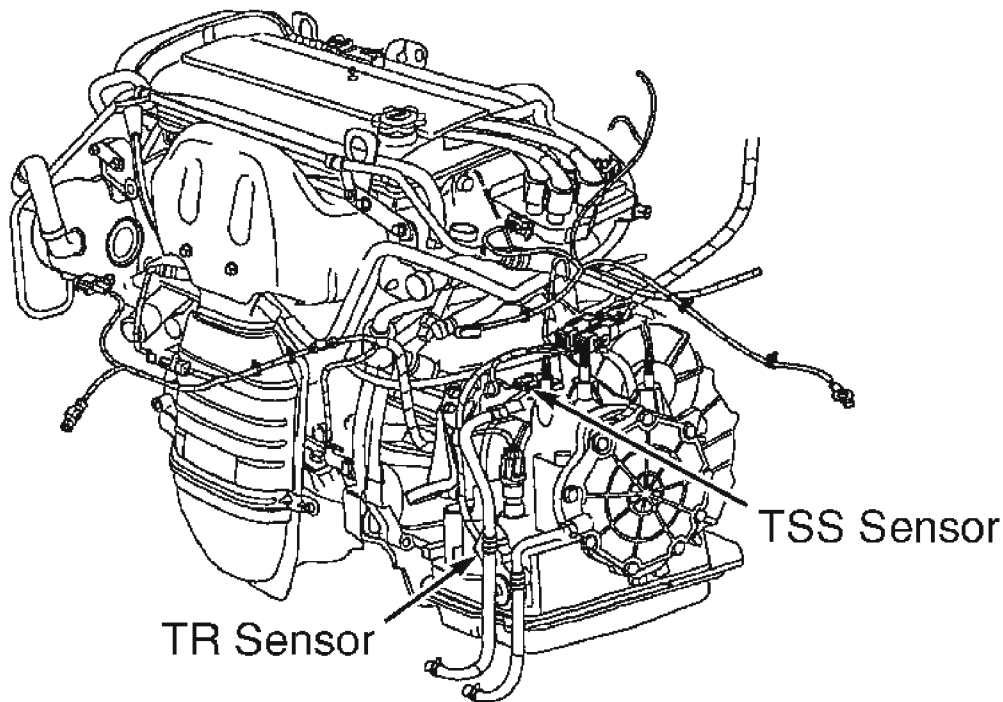
TRANSAXLE

NOTE: See appropriate **AUTOMATIC TRANSMISSION REMOVAL** article in **TRANSMISSION SERVICING**.

TRANSMISSION RANGE SENSOR**Removal & Installation**

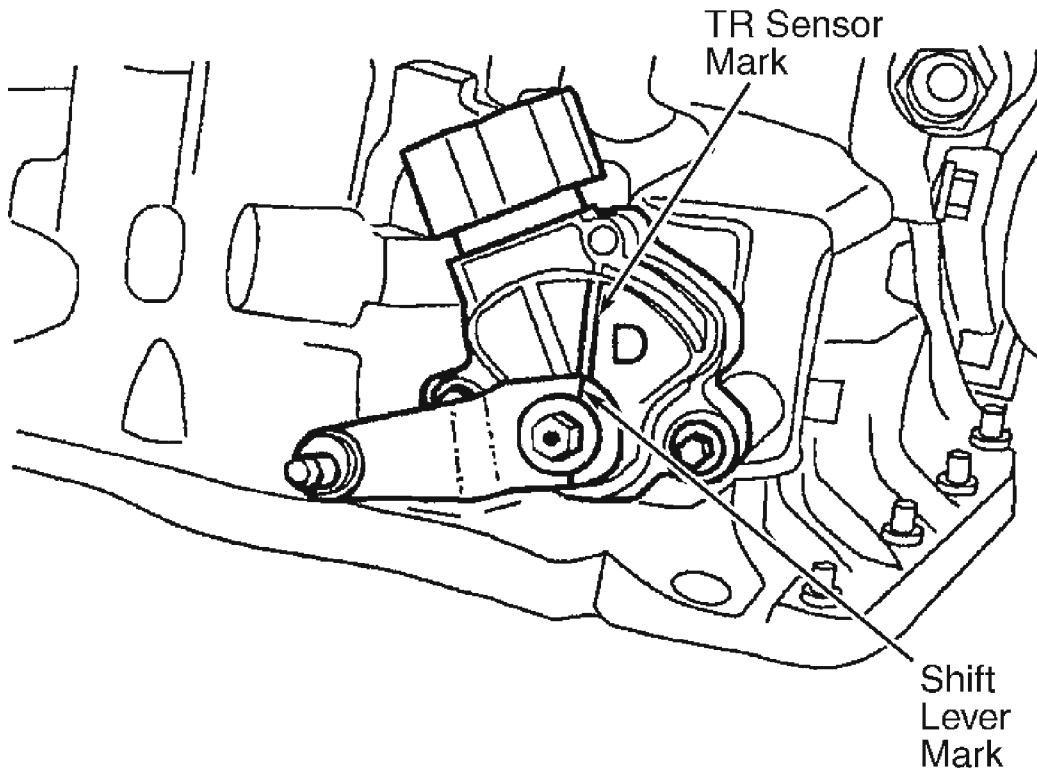
1. Disconnect TR sensor harness connector and gear selector cable from shift lever. See **Fig. 9** . Remove bolt securing shift lever, ensuring shift lever does not rotate. Remove shift lever. Remove 2 bolts securing TR sensor to transaxle and remove sensor.
2. To install, secure TR sensor to transaxle loosely with 2 bolts. Using Alignment Tool (307-415), align TR sensor and tighten bolts. Install shift lever and adjust lever so that mark on shift lever lines up with mark on TR sensor. See **Fig. 10** . Tighten shift lever bolt, ensuring shift lever does not rotate. See **TORQUE SPECIFICATIONS** . Connect gear selector cable and TR sensor harness connector.

➤ FRONT OF VEHICLE



G00022519

Fig. 9: Locating TR & TSS Sensors (Zetec Engine Shown)
Courtesy of FORD MOTOR CO.



G00022518

Fig. 10: Adjusting Shift Lever
Courtesy of FORD MOTOR CO.

TURBINE SHAFT SPEED SENSOR

Removal & Installation

Disconnect positive and negative battery cables, remove battery and battery tray. Disconnect Mass Air Flow (MAF) sensor harness connector. Disconnect crankcase ventilation hose, intake hose with resonator and remove air cleaner assembly from vehicle. Disconnect TSS sensor harness connector, remove sensor mounting bolt and remove sensor from transaxle. See **Fig. 9**. Inspect TSS sensor bore and "O" ring for damage, and replace "O" ring as necessary. Apply light coat of lubricant to "O" ring. To install, reverse removal procedure. Tighten sensor bolt to specification. See **TORQUE SPECIFICATIONS**.

VALVE BODY ASSEMBLY

Removal & Installation

NOTE: Solenoid wire connector color letters are casted into solenoid bodies for assembly purposes as follows: "N" (Neutral/White), "G" (Green), "L" (Blue) and "B" (Black).

1. Raise and support vehicle. Remove transaxle pan. Remove TFT sensor. Remove ATF filter. Remove ground wire connector bolt, disconnect wire connectors and remove wire harness. See **Fig. 11** . Remove bolts securing valve body assembly to transaxle and remove valve body assembly. Remove accumulator pistons and springs from transaxle. Note spring size and location for installation reference.
2. To install, reverse removal procedure. Ensure the manual valve is installed in the manual control valve shift lever when installing valve body assembly. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** . Ensure solenoid wire connectors correspond with casted color letters on solenoids. Add ATF to appropriate level.

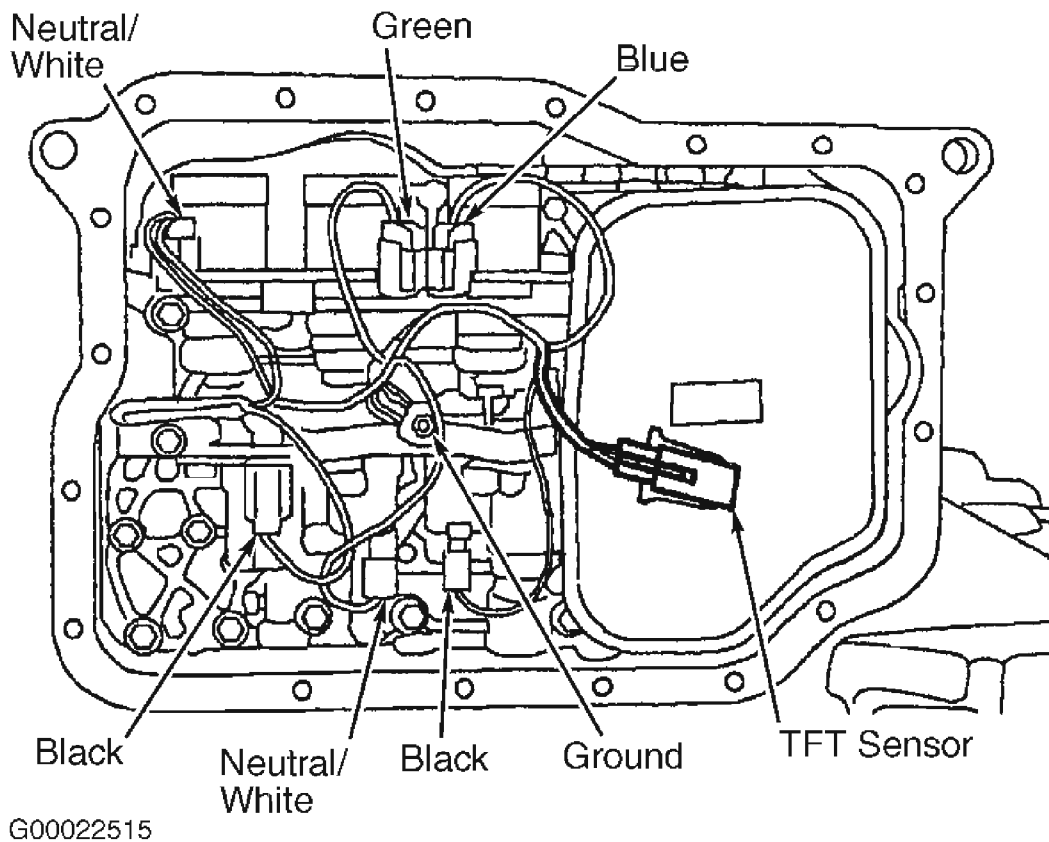


Fig. 11: Installing Valve Body Wiring
Courtesy of FORD MOTOR CO.

TRANSAXLE DISASSEMBLY

1. Ensure outside of transaxle is thoroughly clean. Mount transaxle on stand. Remove OSS sensor, TSS sensor and TR sensor. Drain torque converter. Remove torque converter using Special Tool (307-091). Remove oil pump using Special Tools (307-289). See **Fig. 12** . Remove oil pump seals.

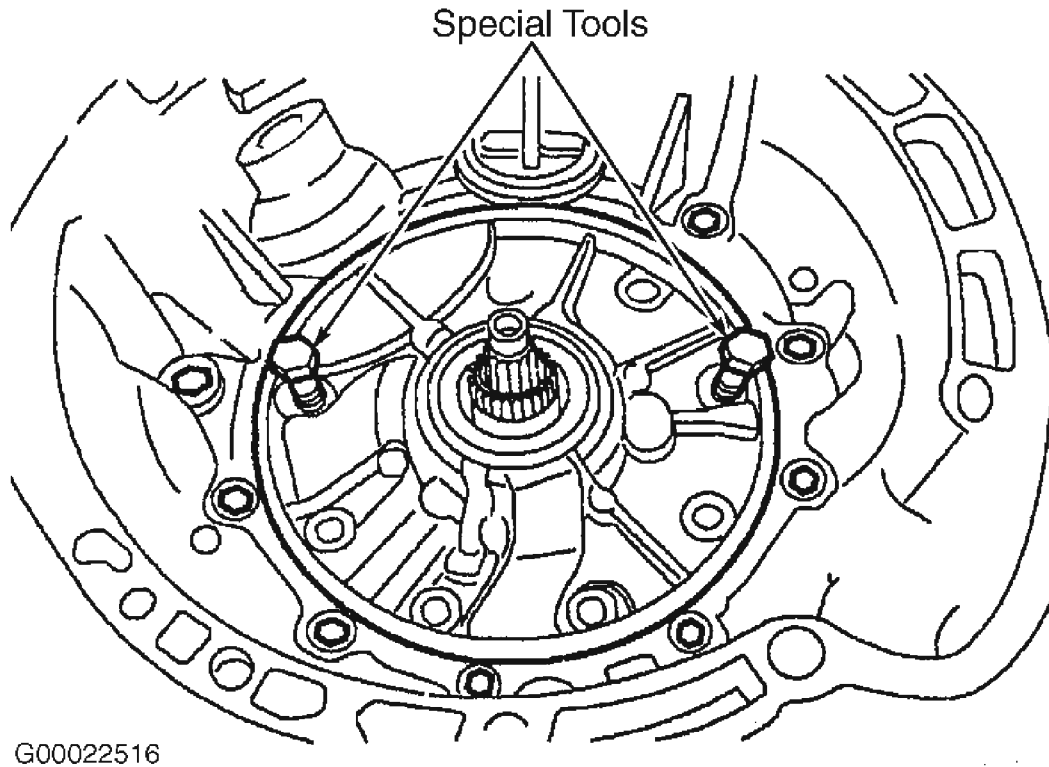
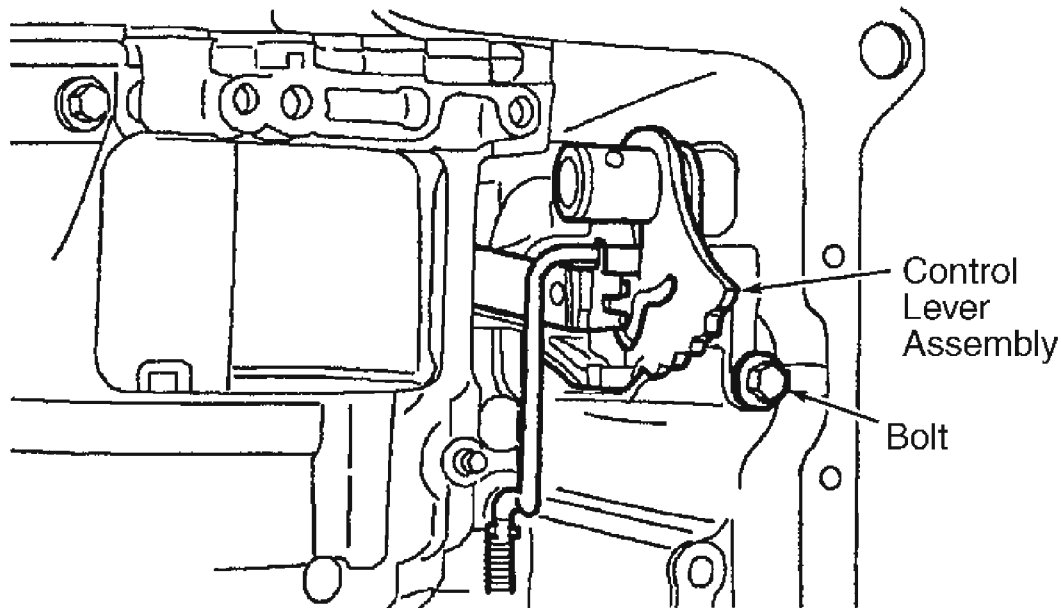


Fig. 12: Removing Oil Pump
Courtesy of FORD MOTOR CO.

2. Remove forward clutch hub, thrust washer and forward clutch assembly. Rotate transaxle on stand 180 degrees. Remove transaxle end cover. Remove direct clutch hub bearing shim. Remove end cover seals and end cover to case seals. Remove direct clutch cylinder thrust bearing. See **Fig. 30** .
3. Remove intermediate/overdrive band anchor bolt, brake band and brake drum assembly. See **Fig. 30** . Remove planet gear assembly. Remove low/reverse clutch plate retaining ring, pressure plate, clutch plates and bevel ring. See **Fig. 29** .
4. Remove low one-way clutch retaining ring and inner race. Remove low/reverse clutch return spring and piston. Remove transaxle pan, TFT sensor and ATF filter. Remove valve body assembly, internal wiring harness connector and accumulator pistons and springs. Note piston and spring locations for reassembly reference.
5. Remove manual lever shaft pin and remove manual lever shaft. Remove 2 "O" rings from manual lever shaft. Remove control lever assembly bolt and remove control lever assembly. See **Fig. 13** .



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Fig. 13: Removing Control Lever Assembly
Courtesy of FORD MOTOR CO.

6. Evenly loosen intermediate/overdrive piston servo cover bolts until spring tension is unloaded, then remove bolts and cover. Remove intermediate/overdrive "O" ring seal, servo piston and return spring. Rotate transaxle on stand 180 degrees.
7. Remove bolts and separate converter housing from transaxle case. Remove differential assembly. Remove 2 bolts and remove parking pawl assembly cover. Unclip parking pawl abutment spring. Remove pin, lever and parking pawl abutment. Remove spring. See **Fig. 14** .

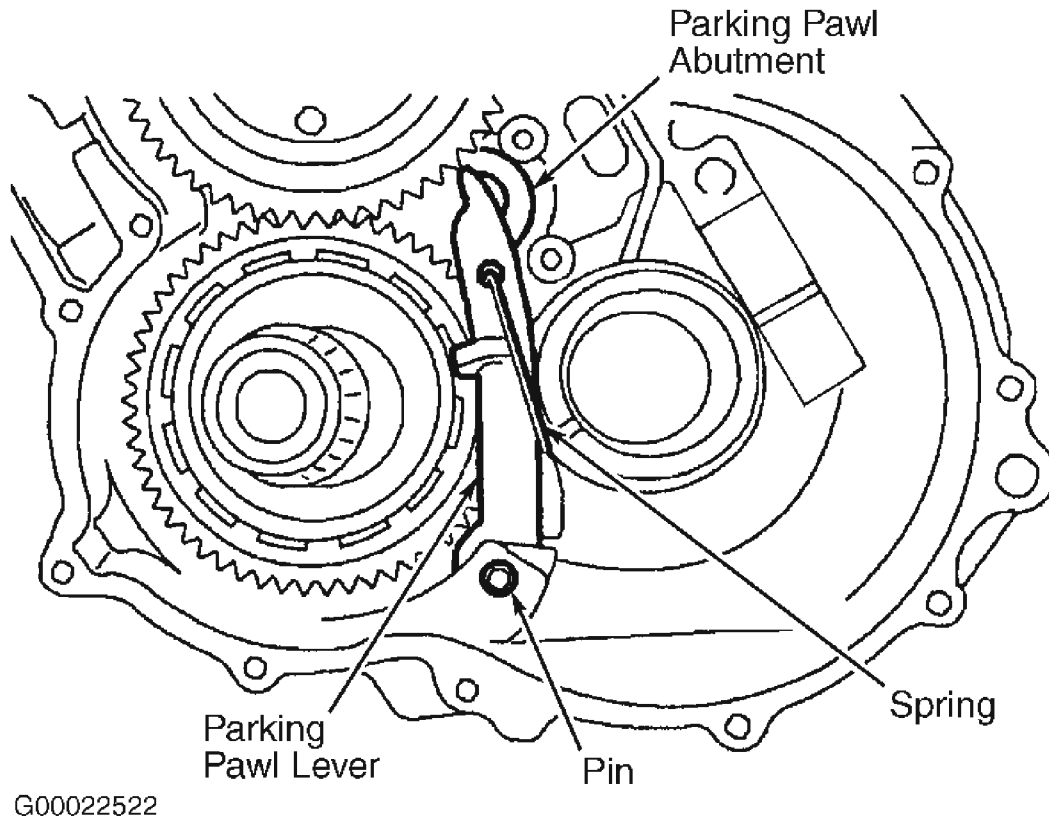
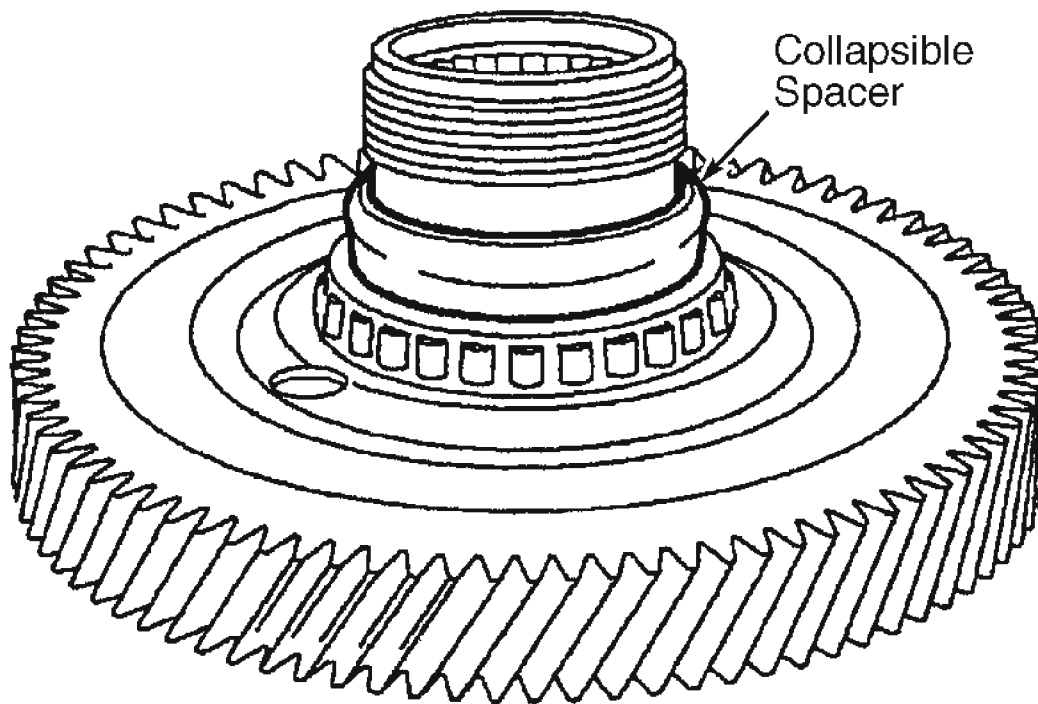


Fig. 14: Removing Parking Pawl Assembly
Courtesy of FORD MOTOR CO.

8. Remove transfer shaft gears. See **Fig. 31** . Using Special Tool (307-413), lock final drive input gear in place. Rotate transaxle on stand 180 degrees. Using Special Tools (307-414 and SR-017233), remove final drive input gear bearing retainer nut. Rotate transaxle on stand 180 degrees and remove Special Tool (307-413).
9. While holding final drive input gear bearing, rotate transaxle on stand 180 degrees. Remove final drive input gear bearing by lightly tapping on end of final drive input gear and remove final drive input gear. Remove collapsible spacer. See **Fig. 15** . Remove final drive input gear bearing.



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Fig. 15: Locating Final Drive Gear Collapsible Spacer
Courtesy of FORD MOTOR CO.

COMPONENT DISASSEMBLY & REASSEMBLY

FINAL DRIVE CARRIER & DIFFERENTIAL ASSEMBLY

Disassembly & Reassembly

Using bearing puller, remove differential case bearing. Drive roll pin through housing and remove differential pinion shaft. See **Fig. 16** . Turn pinion gears 90 degrees and remove differential pinion gears with thrust washers. Remove differential side gears with thrust washers. See **Fig. 31** . Clean and inspect differential parts for damage and wear. Replace as necessary. To reassemble, reverse disassembly procedure. Lubricate all gears and thrust washers with ATF.

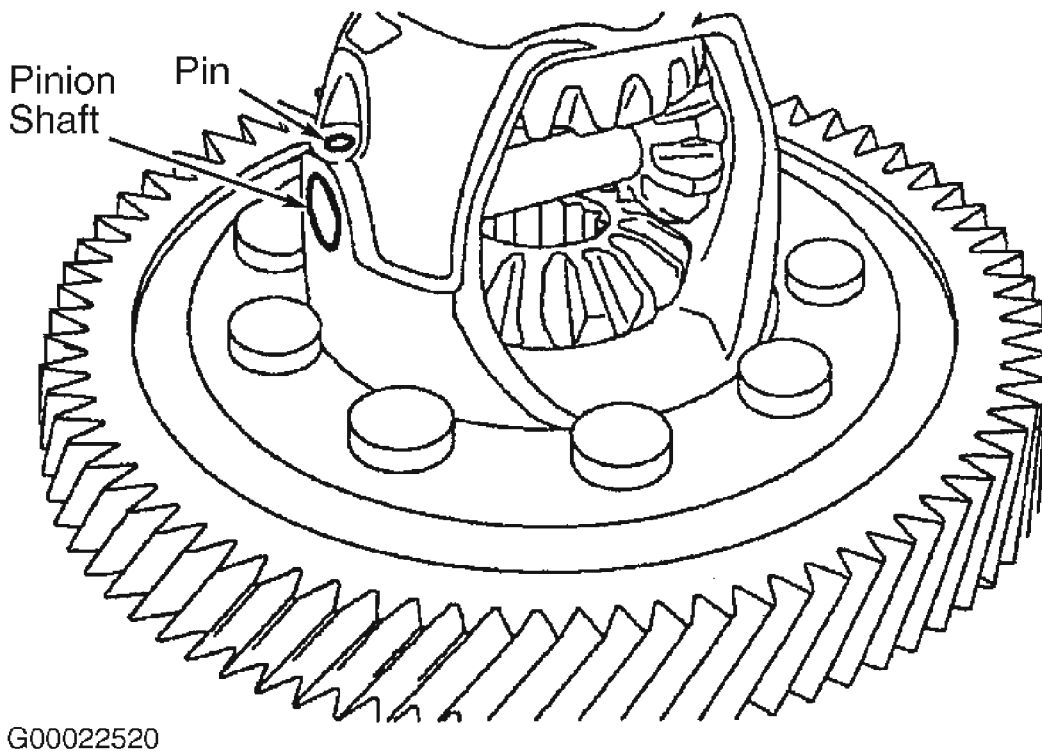


Fig. 16: Removing Differential Pinion Shaft
Courtesy of FORD MOTOR CO.

OIL PUMP ASSEMBLY

Disassembly & Reassembly

Remove 6 bolts and remove top portion of pump. Inspect lower portion of pump and gear pocket for damage and wear. Remove pump seal. See **Fig. 28** . Inspect gears and upper portion of pump for damage and wear. To reassemble, reverse disassembly procedure. Lubricate gears with ATF. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

TRANSFER SHAFT

Disassembly & Reassembly

Using bearing puller, remove transfer shaft output gear bearing. Using press, remove transfer shaft input gear bearing while separating park gear and gears. See **Fig. 31** . To reassemble, press transfer shaft output gear into place, then assemble gears and press transfer shaft input gear bearing into place.

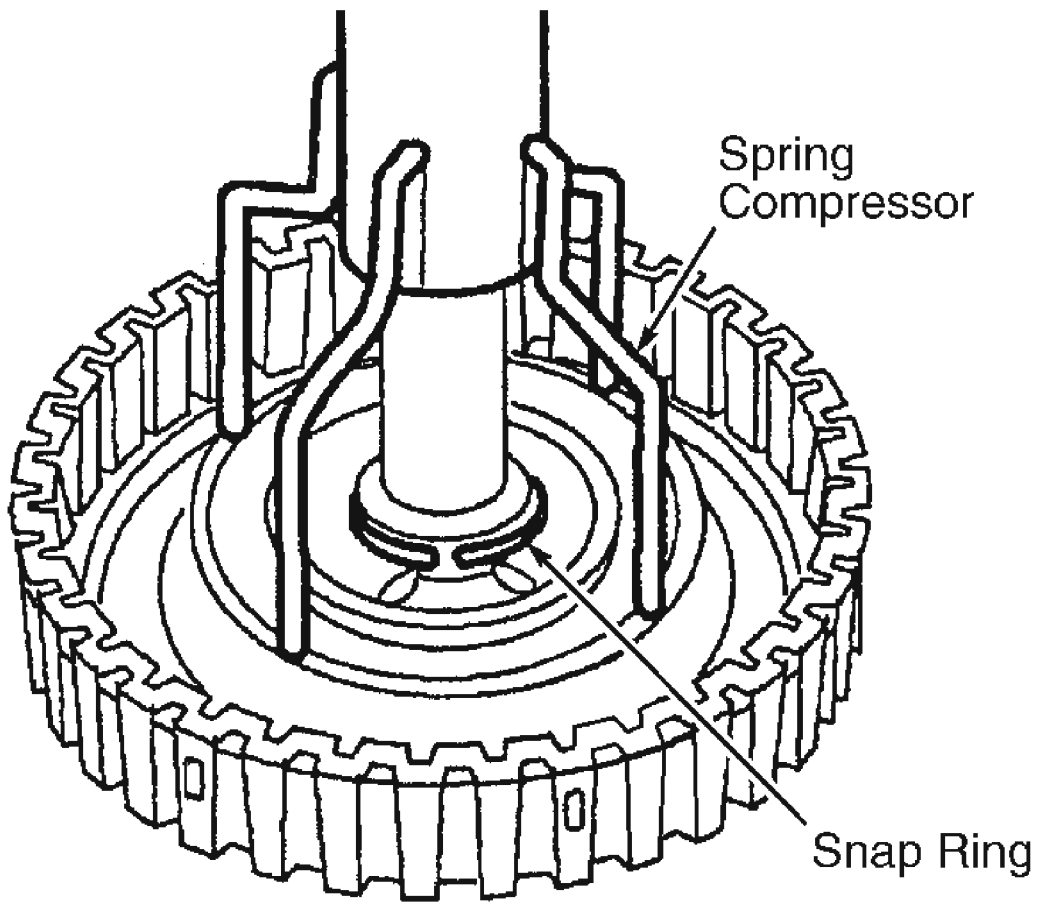
FORWARD CLUTCH

Disassembly & Reassembly

1. Remove retaining ring, pressure plate and clutch plates. See **Fig. 18** . Install forward clutch assembly in a press. Using Spring Compressor (307-209), compress piston return spring. Remove balance piston selective snap ring. See **Fig. 17** . Remove and inspect balance piston, and replace as necessary. Remove return spring. Remove and inspect forward clutch piston assembly and seals, and replace as necessary. Inspect forward clutch piston bore surfaces.

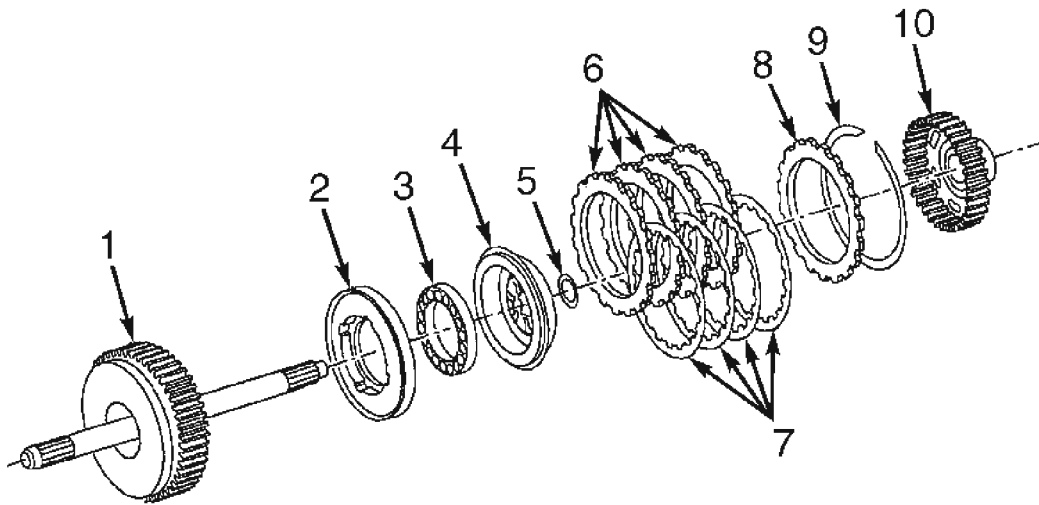
NOTE: Clutch pack clearance measurement procedure is not available.

2. To reassemble, reverse disassembly procedure. Soak internal spline clutch plates in clean ATF for 15 minutes and lubricate clutch piston assembly. Clutch pack clearance should be .059-.071" (1.50-1.80 mm). If clearance is not as specified, replace selective snap ring. Snap rings are available in thicknesses from .045-.049" (1.15-1.25 mm) to .085-.089" (2.15-2.25 mm), in increments of .004" (.10 mm).



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Fig. 17: Removing Forward Clutch Selective Snap Ring (Other Clutches Are Similar)
Courtesy of FORD MOTOR CO.



1. Turbine Shaft Assembly
2. Forward Clutch Piston
3. Piston Return Spring
4. Forward Clutch Balance Piston
5. Forward Clutch Balance Piston Snap Ring

6. Forward Clutch Separator Plate
7. Forward Clutch Friction Plates
8. Forward Clutch Pressure Plate
9. Retaining Ring
10. Forward Clutch Cylinder Hub

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Fig. 18: Exploded View Of Forward Clutch Assembly
 Courtesy of FORD MOTOR CO.

DIRECT CLUTCH ASSEMBLY

Disassembly & Reassembly

1. Remove reverse clutch retaining ring. Remove rear sun gear and thrust bearing. Remove direct clutch hub. Remove direct clutch retaining ring, pressure plate and clutch plates. See **Fig. 30** . Using Spring Compressor (307-209), remove selective snap ring. See **Fig. 17** . Remove direct clutch balance piston and return spring. Remove and inspect direct clutch piston and seals, and replace as necessary. Inspect direct clutch piston bore surfaces. Replace direct clutch piston if damaged.

NOTE: Clutch pack clearance measurement procedure is not available.

2. To reassemble, reverse disassembly procedure. Soak internal spline clutch plates in

clean ATF for 15 minutes and lubricate direct clutch piston. Clutch pack clearance should be .039-.051" (1.00-1.30 mm). If clearance is not as specified, replace selective snap ring. Snap rings are available in thicknesses from .045-.049" (1.15-1.25 mm) to .085-.089" (2.15-2.25 mm), in increments of .004" (.10 mm).

REVERSE CLUTCH

Disassembly & Reassembly

1. Remove reverse clutch retaining ring, pressure plate and clutch plates. See **Fig. 30** . Using Clutch Spring Compressor (T65L-77515-A), compress piston return spring and remove reverse clutch spring retainer ring and spring retainer. Remove reverse clutch piston return spring and piston assembly. Inspect reverse clutch piston bore surfaces, and replace direct clutch piston if damaged. Inspect inner and outer seals and seal bore in intermediate/overdrive drum, and replace as necessary.

NOTE: **Clutch pack clearance measurement procedure is not available.**

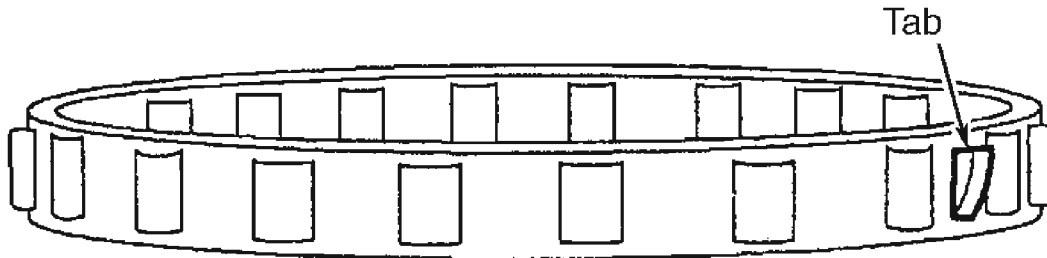
2. To reassemble, reverse disassembly procedure. Soak internal spline clutch plates in clean ATF for 15 minutes and lubricate reverse clutch piston assembly. Clutch pack clearance should be .039-.051" (1.00-1.30 mm). If clearance is not as specified, replace selective snap ring. Snap rings are available in thicknesses from .045-.049" (1.15-1.25 mm) to .085-.089" (2.15-2.25 mm), in increments of .004" (.10 mm).

PLANETARY ASSEMBLY

Disassembly & Reassembly

NOTE: **Before disassembly, inspect planet carrier thrust bearing for damage.**

1. Remove snap ring and rear planet gear assembly. Remove thrust bearing and front planet sun gear. See **Fig. 29** . Remove snap ring, thrust bearing and front planet gear assembly. Remove front ring gear. Remove low one-way clutch retaining ring and retainer. Remove low one-way clutch assembly. Inspect rollers and springs of one-way clutch for damage and wear. Inspect front planet sun gear snap ring for damage and wear.
2. To reassemble, reverse disassembly procedure. Install retaining ring. Install low one-way clutch assembly with tab pointing in direction as shown in **Fig. 19** .



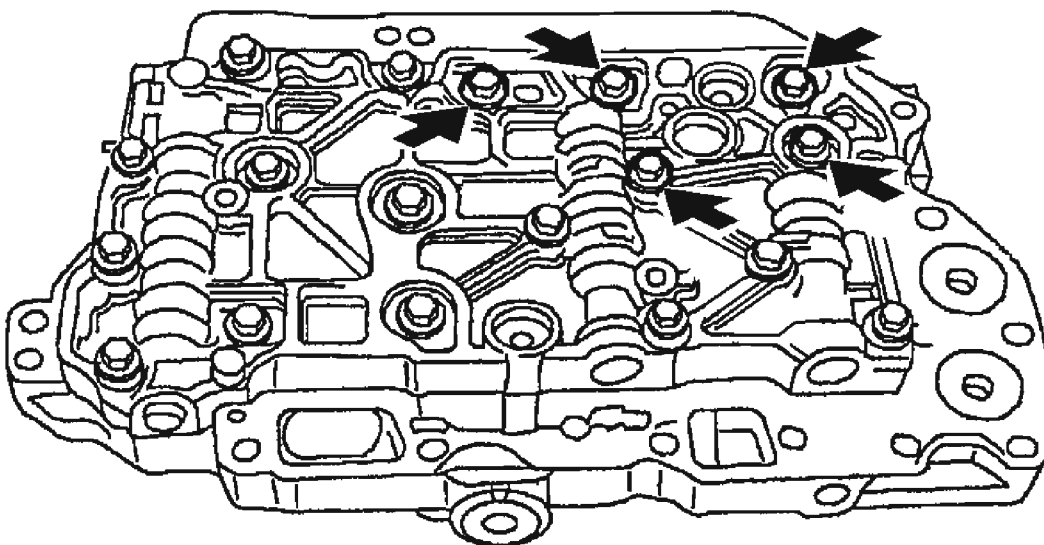
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Fig. 19: Installing Low One-Way Clutch
Courtesy of FORD MOTOR CO.

VALVE BODY ASSEMBLY

Disassembly & Reassembly

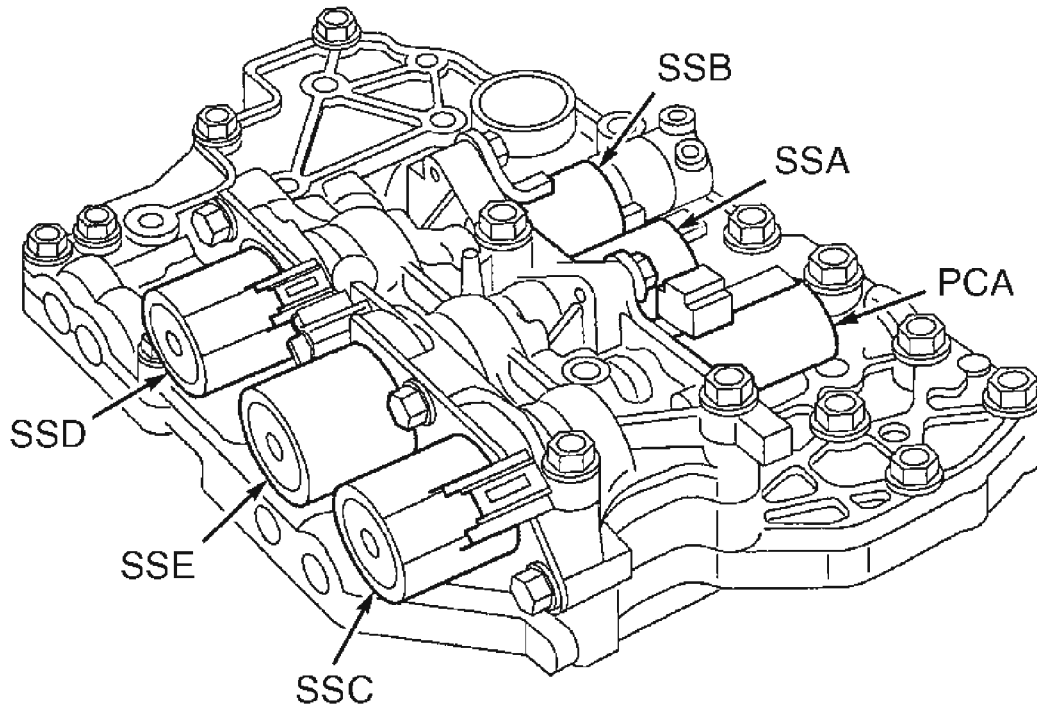
Remove solenoid body bolts and solenoid body from valve body. See **Fig. 20** . Discard solenoid body gaskets and seals. Note locations of valve body shift solenoids. See **Fig. 21** . Remove valve body bolts and disassemble valve body. See **Fig. 22** . Note order, direction and location of all components for reassembly reference. Inspect valve body and replace with NEW separator plate and gasket. To reassemble, reverse disassembly procedure. Install solenoid body bolts and tighten to specification. See **TORQUE SPECIFICATIONS** Install remaining valve body bolt and tighten in the sequence shown. .



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Fig. 20: Locating Solenoid Body Bolts

Courtesy of FORD MOTOR CO.

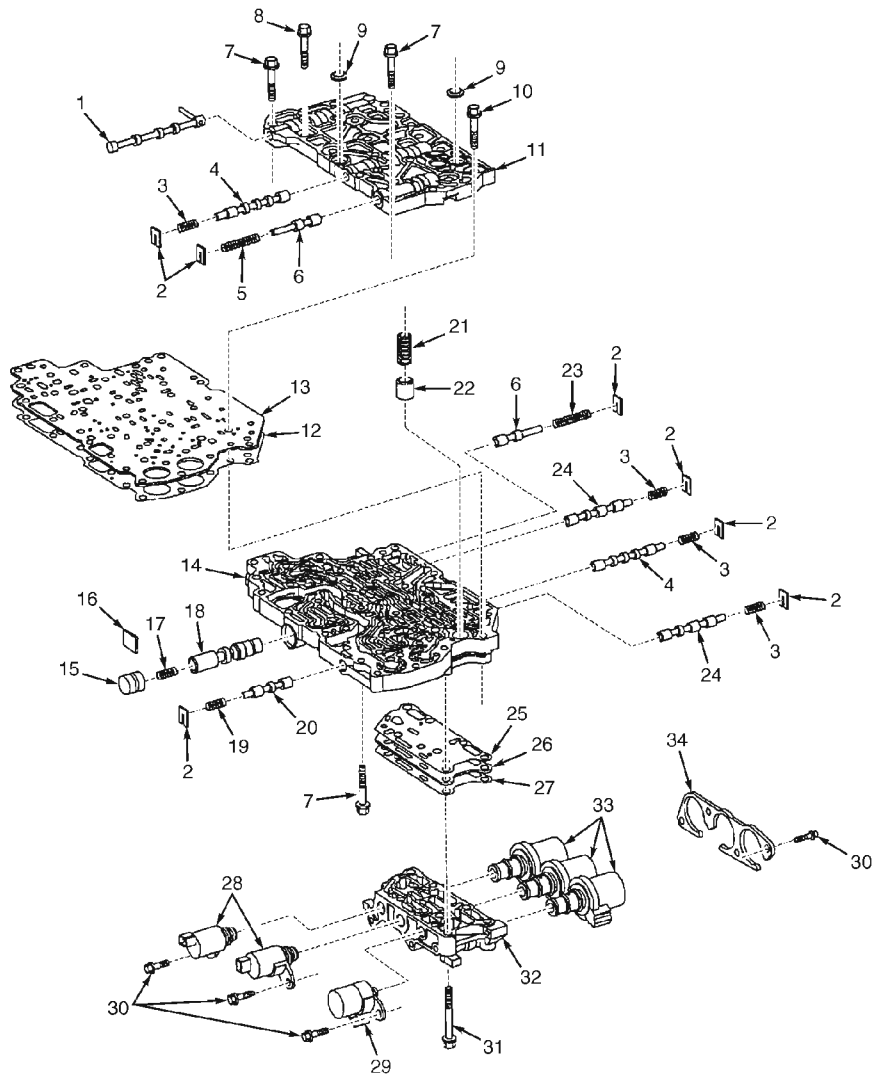


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Fig. 21: Identifying Valve Body Shift Solenoids
Courtesy of FORD MOTOR CO.

2000 Ford Focus LX

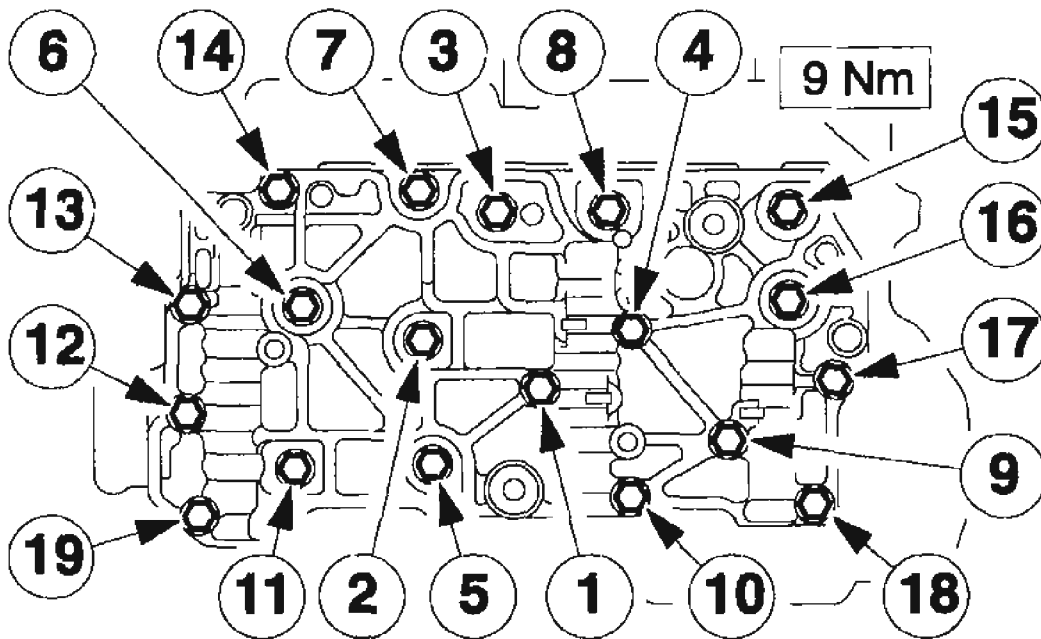
2000-01 AUTOMATIC TRANSMISSIONS Ford 4F27E Overhaul



- | | |
|--|---|
| 1. Manual Control Valve | 18. Main Fluid Pressure Regulator Valve |
| 2. Spring Retainer Plate | 19. Solenoid Regulator Valve Spring |
| 3. By-Pass Clutch Control Plate Spring | 20. Shift Solenoid Valve |
| 4. By-Pass Clutch Control Valve | 21. Intermediate Servo Accumulator Spring |
| 5. Modulator Valve Spring | 22. Intermediate Servo Accumulator Valve |
| 6. Line Pressure Modulator Valve | 23. Converter Regulator Valve Spring |
| 7. Valve Body Bolt | 24. Lock-Up Control Valve |
| 8. Valve Body Bolt | 25. Solenoid Body Gasket |
| 9. Valve Body Seal | 26. Solenoid Plate |
| 10. Valve Body Bolt | 27. Regulator Body Gasket |
| 11. Upper Valve Body | 28. Shift Control Solenoid |
| 12. Valve Body Gasket | 29. Electrical Pressure Control Solenoid |
| 13. Valve Body Separator Plate (Bonded Gasket) | 30. Solenoid Bracket Screws |
| 14. Lower Valve Body | 31. Solenoid Body Bolt |
| 15. Main Regulator Valve Stop | 32. Solenoid Body |
| 16. Throttle Valve Plunger Sleeve Clip | 33. Shift Control Solenoids |
| 17. Main Fluid Pressure Regulator Valve Spring | 34. Shift Solenoids Hold-Down Bracket |

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Fig. 22: Exploded View Of Valve Body Assembly
Courtesy of FORD MOTOR CO.

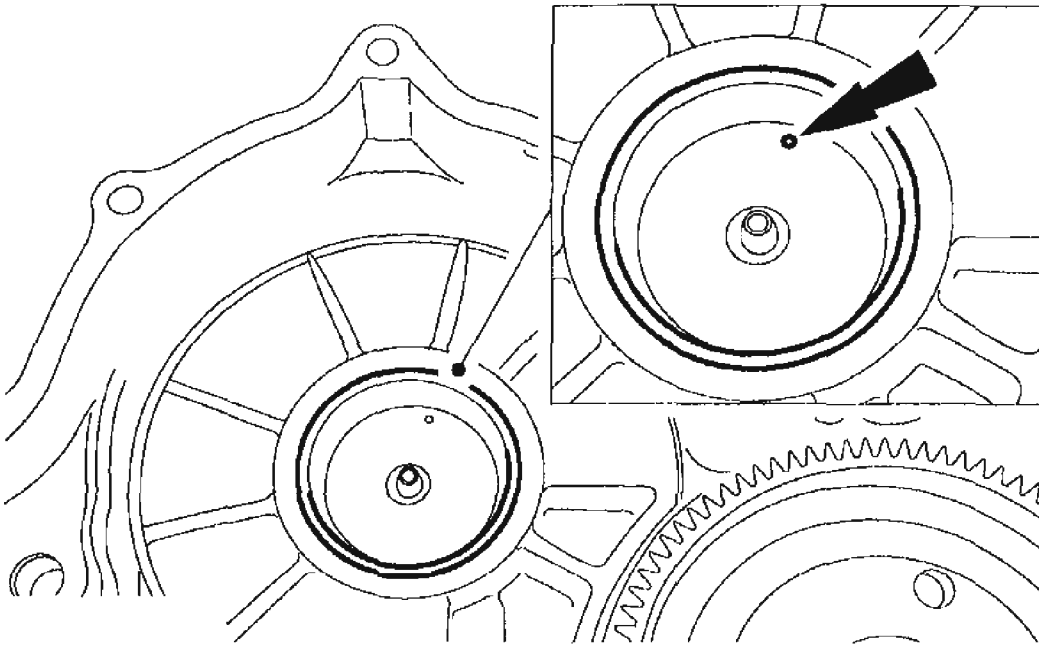


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Fig. 23: Valve Body Bolt Tightening Sequence**TRANSAXLE CASE****Disassembly & Reassembly**

NOTE: Converter housing side bearing races for transfer shaft bearing and differential case bearing will be installed during transaxle assembly.

Remove drive axle seals. Remove differential case bearing races. Remove final drive input gear bearing race. Remove transfer shaft gear bearing races. On 2001 models, note the location of the bleed hole in the funnel in relation to the bottom of the case. On all applications, remove funnel. Rotate transaxle case 180 degrees and remove final drive input bearing race. See **Fig. 31** . To reassemble, reverse disassembly procedure. On 2001 models, note the location of the bleed hole when installing the funnel. See **Fig. 24** .



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Fig. 24: Installing Funnel (2001 Models)

TRANSAXLE REASSEMBLY

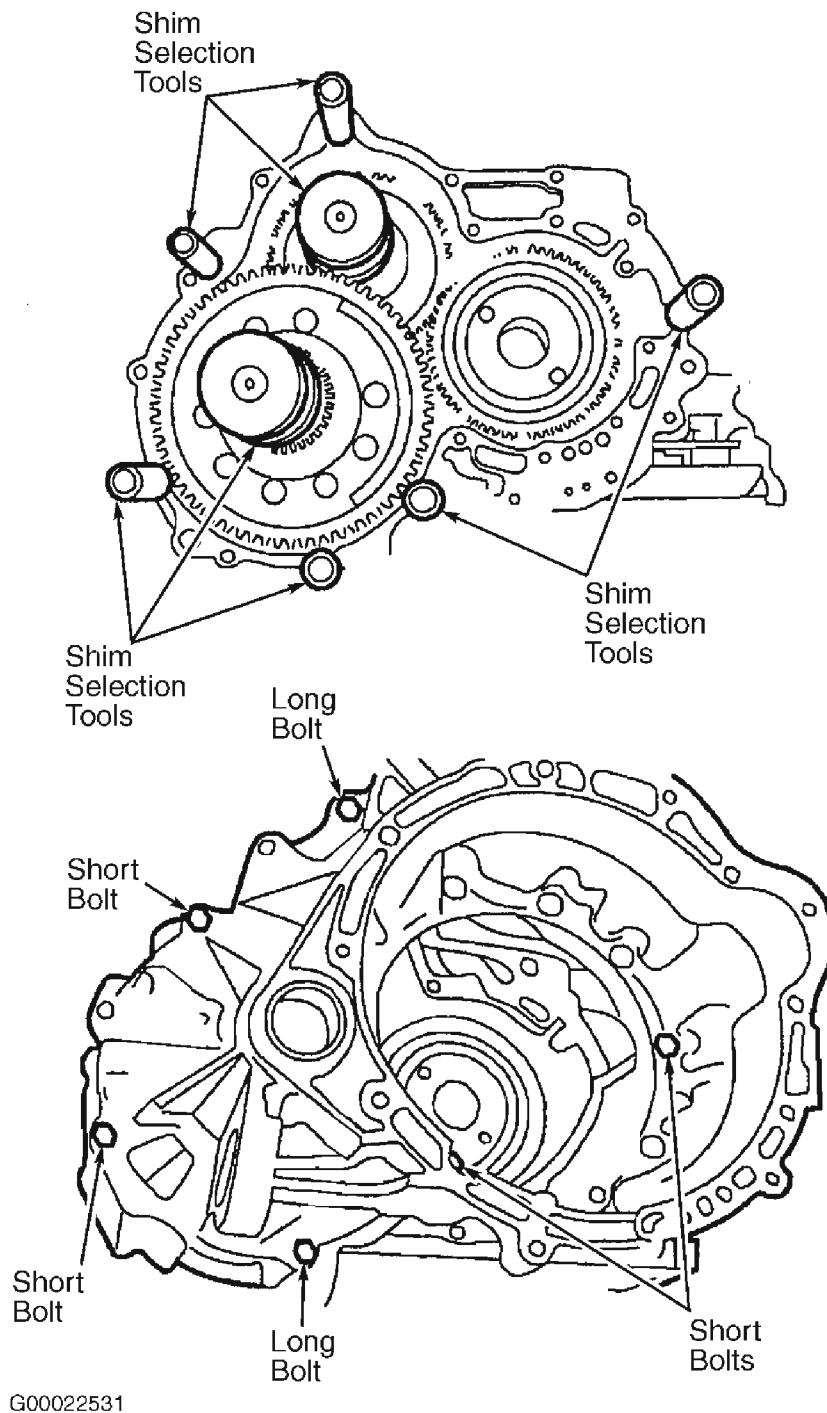
NOTE: For thrust washer and thrust bearing locations, see [Fig. 32](#) . For gasket, piston and seal locations, see [Fig. 33](#) . For snap ring and retaining ring locations, see [Fig. 34](#) .

NOTE: Handle all parts carefully to avoid damaging bearings and mating surfaces. Lubricate all parts with clean ATF. Use petroleum jelly on gaskets and thrust washers to hold them in place. Soak all friction discs in ATF for 15 minutes. Use all **NEW** gaskets and seals, and tighten bolts to specification.

1. Install final drive input gear bearing. Install Special Tool (205-005) and press final drive input gear bearing in place. Install a NEW collapsible spacer. See [Fig. 15](#) . Using Special Tool (205-024), position final drive input gear. While holding final drive input gear bearing, rotate transaxle on stand 180 degrees. Using Special Tools (205-024 and 307-256), install final drive input gear bearing.
2. Rotate transaxle on stand 180 degrees. Using Special Tool (307-413), lock final drive input gear in place. Rotate transaxle on stand 180 degrees. Using Special Tools (307-414 and SR-017233), tighten bearing retainer nut to achieve preload specification. See

TORQUE SPECIFICATIONS . Ensure bearing preload is within specification and measure rotating torque with special tools. If bearing preload is not within specification, a NEW collapsible spacer must be installed.

3. Rotate transaxle on stand 180 degrees. Position transfer shaft gears in transaxle case. Install parking pawl return spring, parking pawl abutment, lever and pin. Reconnect spring and install parking pawl assembly cover and bolts, and tighten bolts to specification. See **TORQUE SPECIFICATIONS** . Install differential assembly and position bearing races.
4. Position Shim Selection Set (308-164) and Bearing Shim Gauge (307-417). Position converter housing and install long bolts to seat case cover flat. Install short bolts. See **Fig. 25** . Tighten all bolts to 44 INCH lbs. (5.0 Nm). Remove bolts and remove converter housing.



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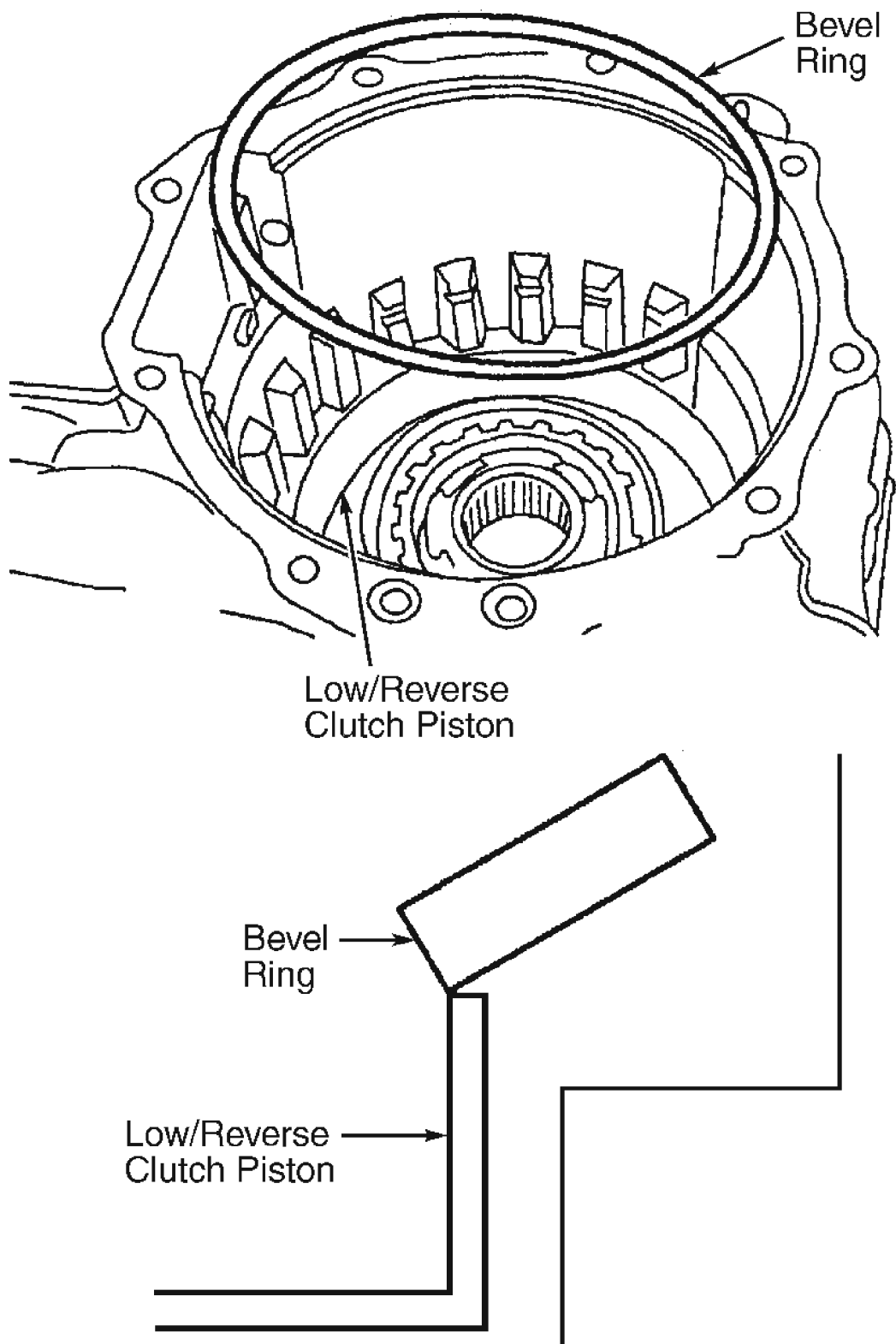
Fig. 25: Using Shim Selection Tools
Courtesy of FORD MOTOR CO.

5. Remove special tools. Measure depth of plunger on bearing shim gauges and select the correct differential and transfer shaft shim. See **SHIM SELECTION** table. Install correct differential and transfer shaft shim and bearing races in converter housing. Apply a bead .39" (1.0 mm) thick of Ultra Silicone Sealant (or equivalent) around

transaxle case. Position converter housing on transaxle case and install bolts. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

6. Install intermediate/overdrive band servo piston return spring, servo piston and "O" ring. See **Fig. 33** . Install intermediate/overdrive band servo piston cover and tighten bolts evenly to compress spring evenly. Install shift lever assembly and bolt. Tighten bolt to specification. See **TORQUE SPECIFICATIONS** . Install NEW "O" rings on manual lever shaft and install manual lever shaft and secure with roll pin. Install TR sensor.
7. Install thinner, longer accumulator springs in neutral drive accumulator bore with neutral drive accumulator piston. Install accumulator springs in 1-2 accumulator bore with 1-2 accumulator piston. Install transaxle internal wire harness connector. Ensure manual valve is in manual control valve shift lever and install valve body assembly. Connect solenoid wire connectors and install ground wire and bolt. Tighten bolt to specification. See **TORQUE SPECIFICATIONS** . Install ATF filter, TFT sensor and transaxle pan.

NOTE: **Clutch pack clearance measurement procedure is not available.**

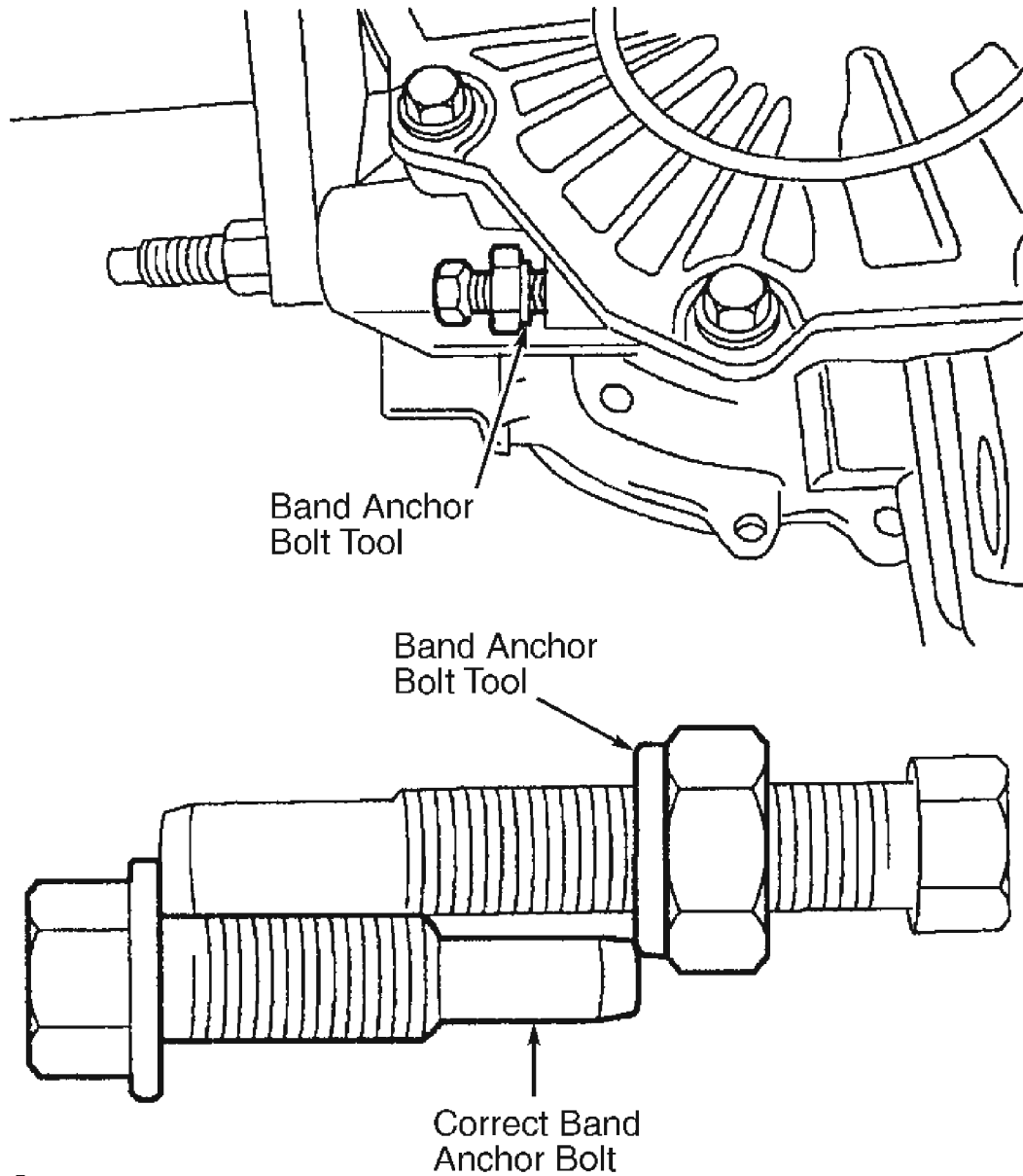


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Fig. 26: Installing Low/Reverse Clutch Bevel Ring

Courtesy of FORD MOTOR CO.

8. Install low/reverse clutch piston, return spring and bevel ring. See **Fig. 26** . Install low one-way clutch inner race and retaining ring. Install low/reverse clutch plates, pressure plate and clutch plate retaining ring. See **Fig. 29** . Clutch pack clearance should be .087-.098" (2.00-2.50 mm). If clearance is not as specified, replace selective snap ring. Snap rings are available in thicknesses from .069-.073" (1.75-1.85 mm) to .116-.120" (2.95-3.05 mm), in increments of .004" (.10 mm). Install planet gear assembly ensuring edge of planet gear assembly fits flush with transaxle case. Ensure planet gear assembly rotates clockwise only after installation.
9. Install intermediate/overdrive brake drum assembly and brake band. See **Fig. 30** . Install direct clutch cylinder thrust bearing with rollers facing up. Install NEW end cover-to-case seals and end cover seals. Reinstall direct clutch hub shim and an additional shim to increase total shim thickness to a minimum of .080" (2.03 mm). Position transaxle end cover on transaxle assembly.
10. To select correct direct clutch hub shim to obtain transaxle end play clearance specification, measure and record gap between transaxle end cover and transaxle case. Remove transaxle end cover. Subtract transaxle end cover gap measurement from total of shim thickness used in step 9 to obtain required shim thickness. Add or subtract required amount of shim thickness to obtain transaxle end play clearance of .010-.020" (.25-.50 mm). Shims are available in thicknesses from .070-.072" (1.78-1.83 mm) to .101-.103" (2.57-2.62 mm) in increments of .008" (.20 mm).
11. Install correct direct clutch hub shim. Apply bead .039" (1.0 mm) thick of Ultra Silicon Sealant (or equivalent) to transaxle end cover. Install transaxle end cover and bolts, and tighten bolts to specification. See **TORQUE SPECIFICATIONS** . Using Band Anchor Bolt Tool (307-415 and 307-416), tighten intermediate/overdrive band to 44 INCH lbs. (5.0 N.m), then back out bolt 3 1/2 turns. Holding bolt tool, lightly seat nut against transaxle case. Remove bolt tool without changing nut position. Using bolt tool, select an intermediate/overdrive band anchor bolt that measures from end of bolt to face of nut. See **Fig. 27** . Install correct intermediate/overdrive band anchor bolt.



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Fig. 27: Selecting Correct Band Anchor Bolt
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12. Install forward clutch assembly and thrust washer. Lubricate and install NEW oil pump seals and install oil pump. DO NOT force oil pump down at this time. Install oil pump bolts and tighten in a crisscross pattern to specification. Install OSS sensor and TSS sensor. Align and tighten TR sensor and manual control lever. Install torque converter.

SHIM SELECTION

Gauge Reading - In. (mm)	Shim Thickness - In. (mm)
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Transfer Shaft Shim

.013-.015 (.33-.38)	.019-.020 (.48-.52)
.015-.017 (.38-.43)	.021-.022 (.53-.57)
.017-.019 (.43-.48)	.023-.024 (.58-.62)
.019-.021 (.48-.53)	.025-.026 (.63-.67)
.021-.023 (.53-.58)	.027-.028 (.68-.72)
.023-.025 (.58-.63)	.029-.030 (.73-.77)
.025-.027 (.63-.68)	.031-.032 (.78-.82)
.027-.029 (.68-.73)	.033-.034 (.83-.87)
.029-.031 (.73-.78)	.035-.036 (.88-.92)
.031-.033 (.78-.83)	.037-.038 (.93-.97)
.033-.035 (.83-.88)	.039-.040 (.98-1.02)
.035-.037 (.88-.93)	.041-.042 (1.03-1.07)
.037-.039 (.93-.98)	.043-.044 (1.08-1.13)
.039-.041 (.98-1.03)	.044-.046 (1.13-1.17)
.041-.043 (1.03-1.08)	.046-.048 (1.17-1.23)
.043-.045 (1.08-1.13)	.048-.050 (1.23-1.27)
.045-.047 (1.13-1.18)	.050-.052 (1.27-1.32)

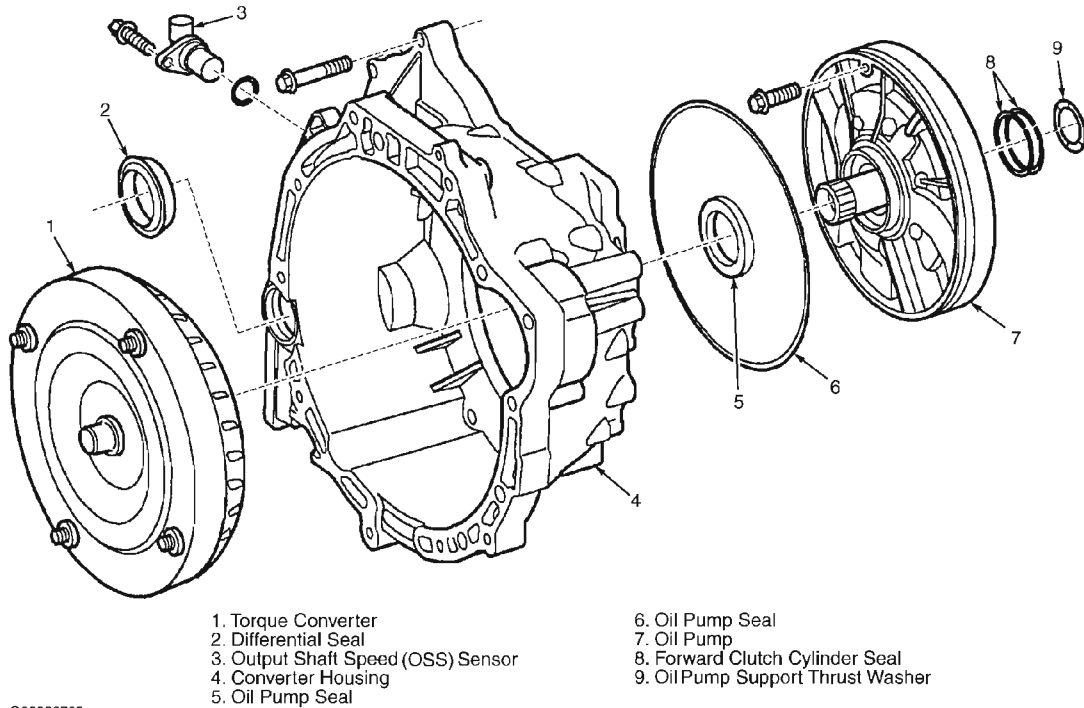
Differential Shaft Shim

.011-.013 (.28-.33)	.019-.020 (.48-.52)
.013-.015 (.33-.38)	.021-.022 (.53-.57)
.015-.017 (.38-.43)	.023-.024 (.58-.62)
.017-.019 (.43-.48)	.025-.026 (.63-.67)
.019-.021 (.48-.53)	.027-.028 (.68-.72)
.021-.023 (.53-.58)	.029-.030 (.73-.77)
.023-.025 (.58-.63)	.031-.032 (.78-.82)
.025-.027 (.63-.68)	.033-.034 (.83-.87)
.027-.029 (.68-.73)	.035-.036 (.88-.92)
.029-.031 (.73-.78)	.037-.038 (.93-.97)
.031-.033 (.78-.83)	.039-.040 (.98-1.02)
.033-.035 (.83-.88)	.041-.042 (1.03-1.07)
.035-.037 (.88-.93)	.043-.044 (1.08-1.13)
.037-.039 (.93-.98)	.044-.046 (1.13-1.17)
.039-.041 (.98-1.03)	.046-.048 (1.17-1.23)
.041-.043 (1.03-1.08)	.048-.050 (1.23-1.27)
.043-.045 (1.08-1.13)	.050-.052 (1.27-1.32)
.045-.047 (1.13-1.18)	.052-.054 (1.32-1.37)
.047-.049 (1.18-1.23)	.054-.056 (1.37-1.43)
.049-.051 (1.23-1.28)	

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	.056-.058 (1.43-1.47)
.051-.053 (1.28-1.33)	.058-.060 (1.47-1.52)
.053-.055 (1.33-1.38)	.060-.062 (1.52-1.57)



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Fig. 28: Exploded View Of Torque Converter Housing Components
Courtesy of FORD MOTOR CO.

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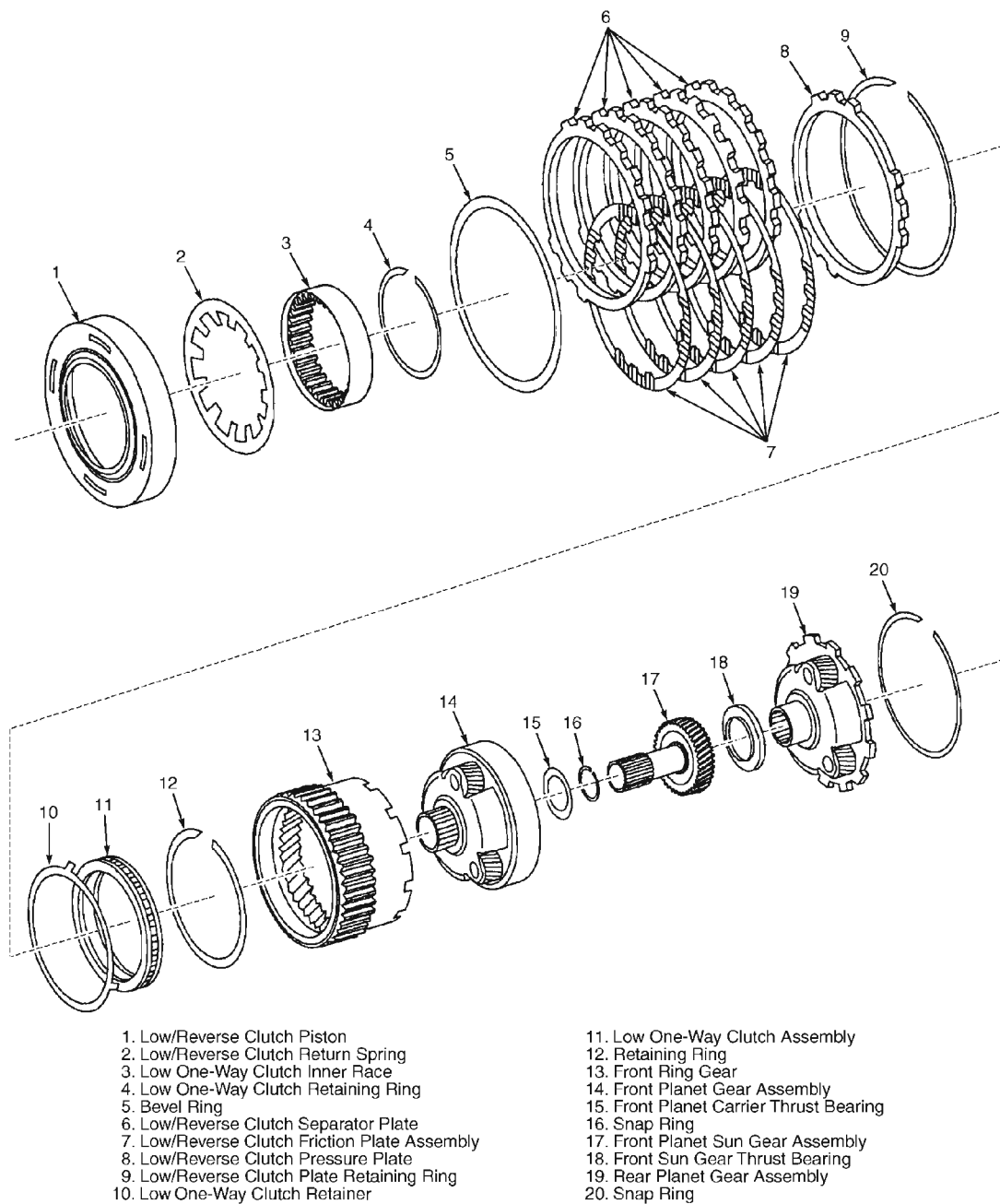
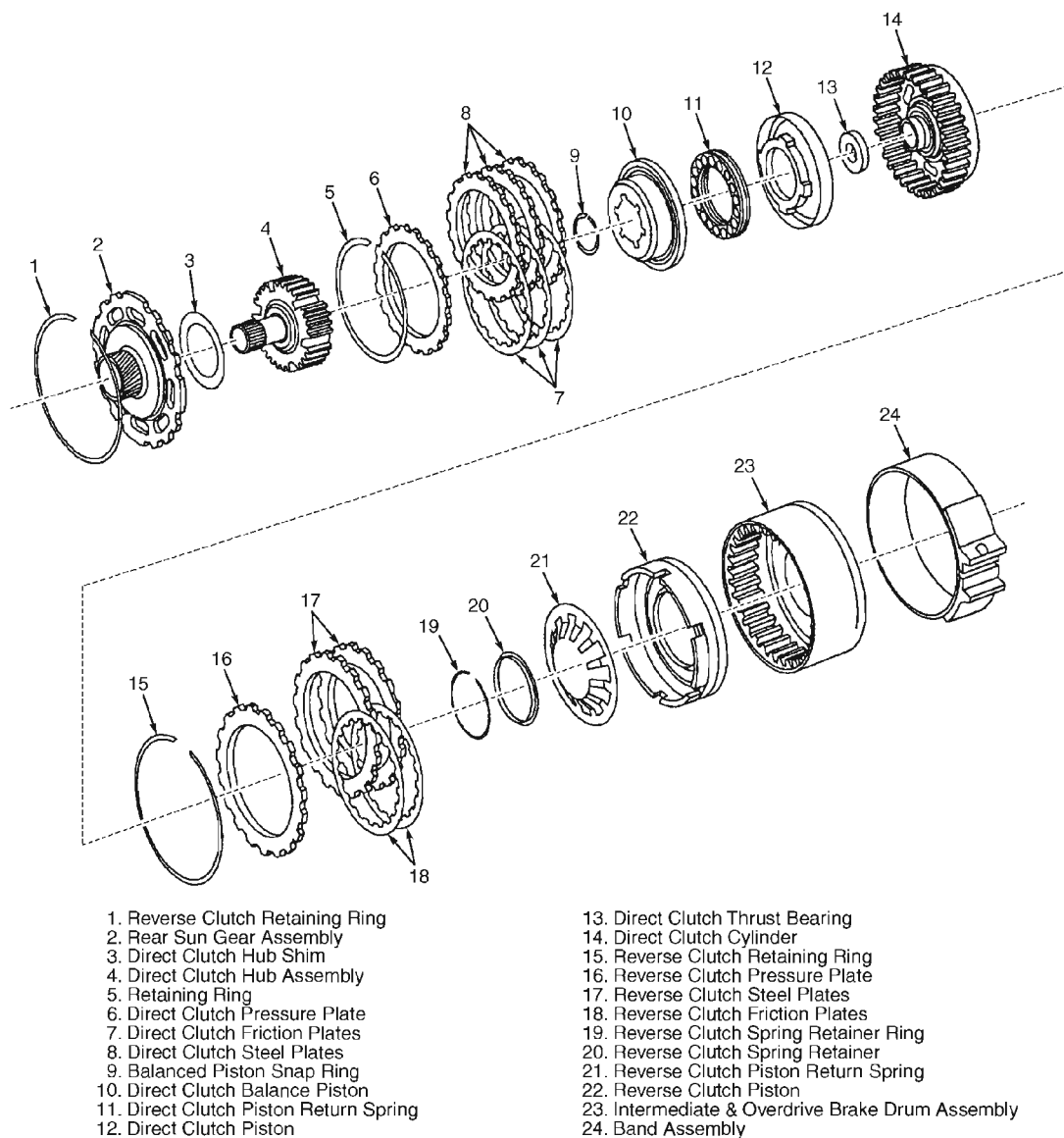


Fig. 29: Exploded View Of Low/Reverse Clutch & Planet Gear Assemblies
Courtesy of FORD MOTOR CO.

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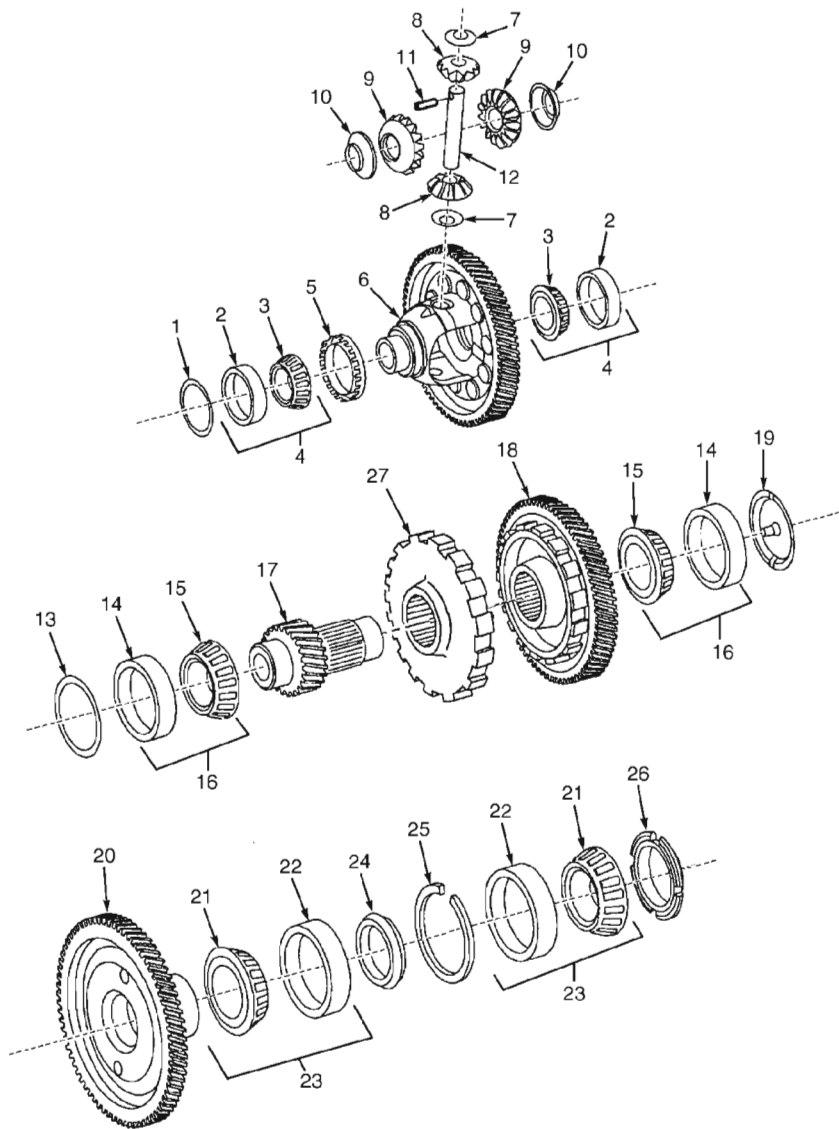


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Fig. 30: Exploded View Of Direct & Reverse Clutches & Brake Band
Courtesy of FORD MOTOR CO.

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1. Differential Bearing Shim
2. Differential Bearing Race
3. Cone & Roller Assembly
4. Bearing Assembly
5. OSS Sensor Wheel
6. Differential & Gear Assembly
7. Pinion Thrust Washer
8. Differential Pinion Gear
9. Differential Side Gear
10. Side Gear Thrust Washer
11. Pin
12. Differential Pinion Shaft
13. Transfer Shaft Roller Bearing Shim

14. Shaft Roller Race
15. Cone & Roller Assembly
16. Transfer Shaft Bearing Assembly
17. Transfer Shaft Output Gear
18. Transfer Shaft Input Gear
19. Transfer Shaft Funnel
20. Final Drive Input Gear
21. Cone & Roller Assembly
22. Bearing Cup
23. Bearing Assembly
24. Spacer
25. Retainer Ring
26. Nut
27. Park Gear

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Fig. 31: Exploded View Of Differential Assembly, Transfer Shaft & Final Drive Input Components
Courtesy of FORD MOTOR CO.

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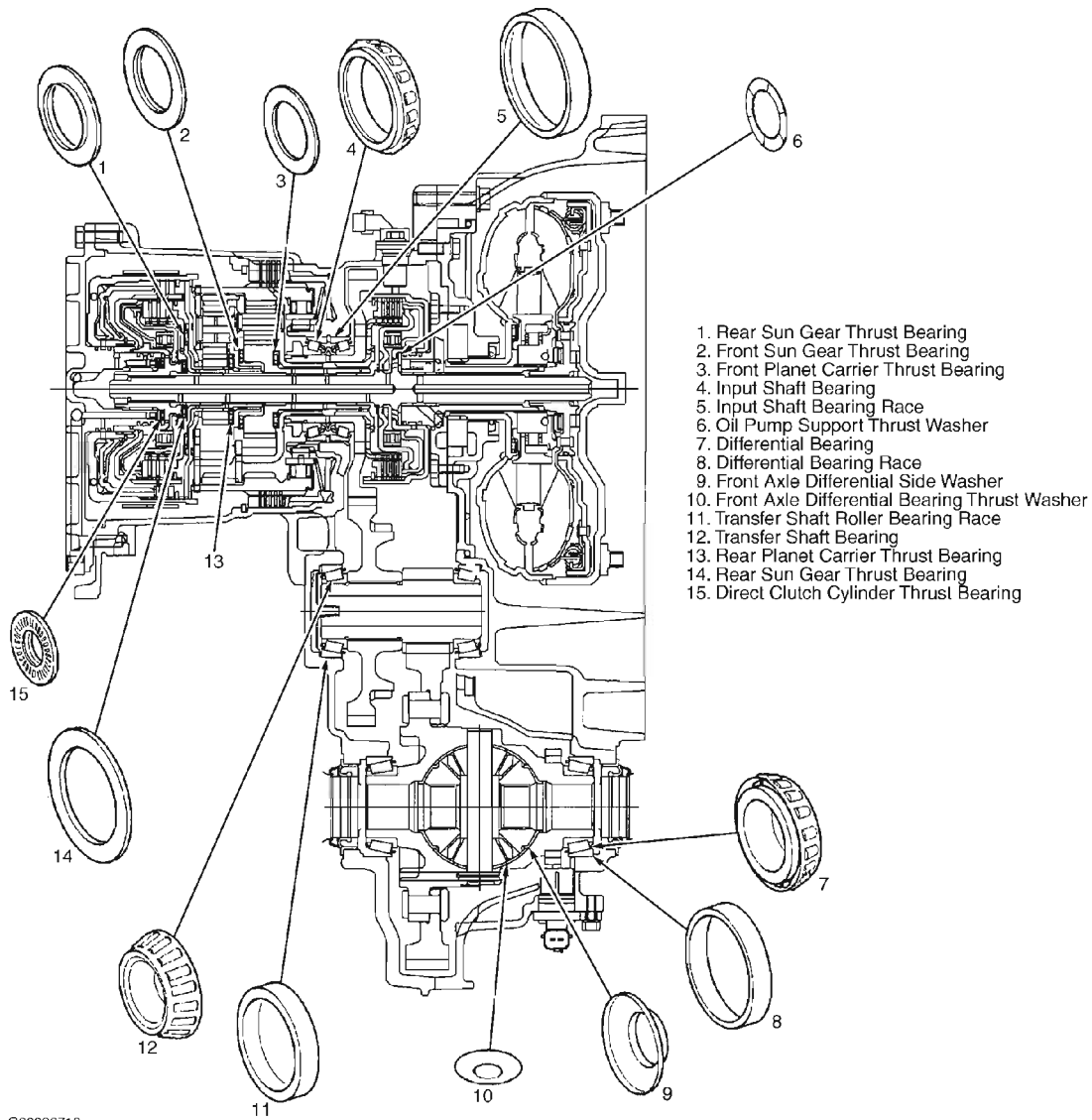
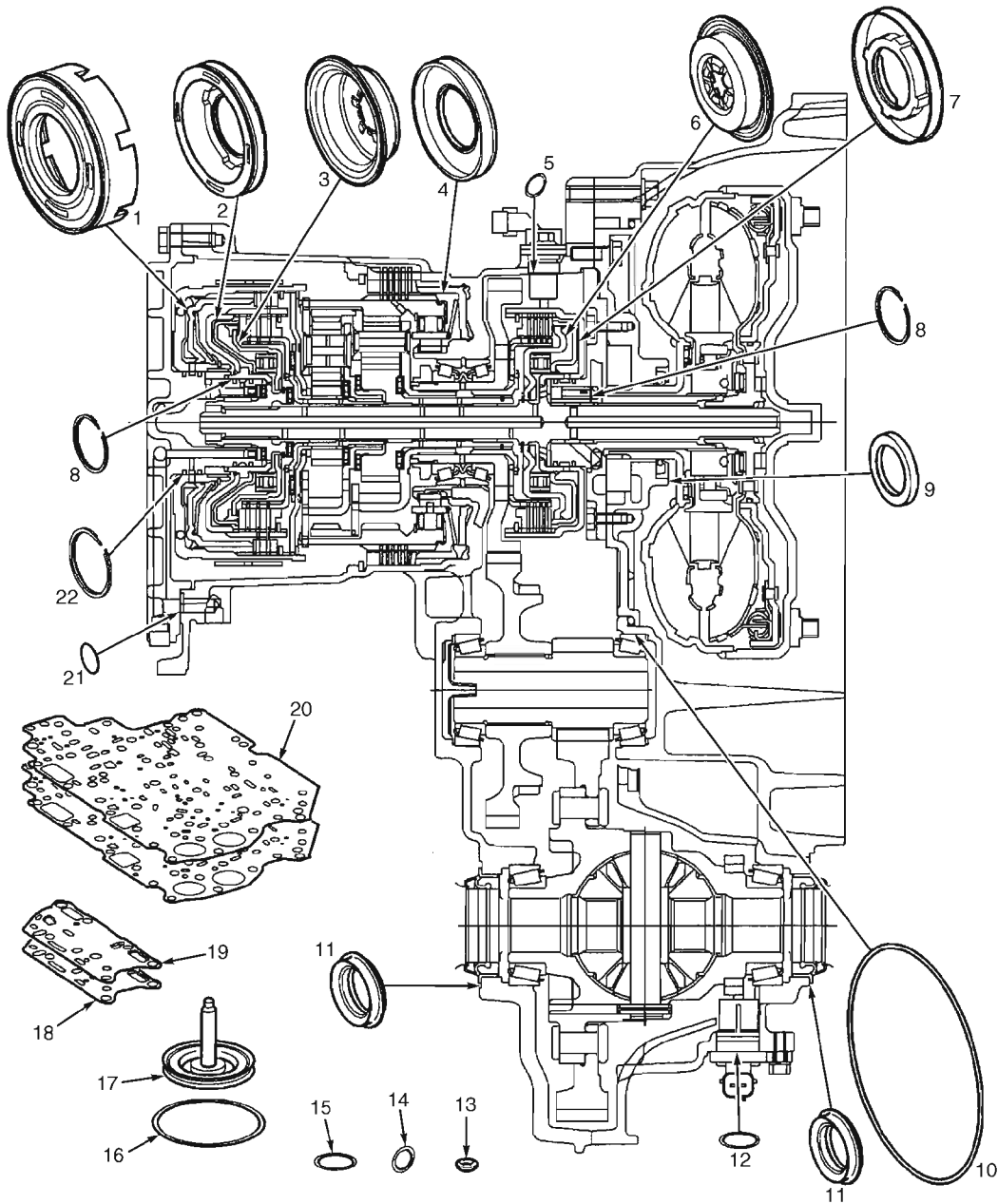


Fig. 32: Identifying Bearing, Thrust Bearing & Thrust Washer Locations
Courtesy of FORD MOTOR CO.

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1. Reverse Clutch Piston
2. Direct Clutch Piston
3. Direct Clutch Balance Piston
4. Low/Reverse Clutch Piston
5. Turbine Shaft Speed Sensor "O" Ring
6. Forward Clutch Balance Piston
7. Forward Clutch Piston
8. Forward & Direct Clutch Cylinder Seal
9. Oil Pump Seal
10. Oil Pump "O" Ring
11. Differential Seal

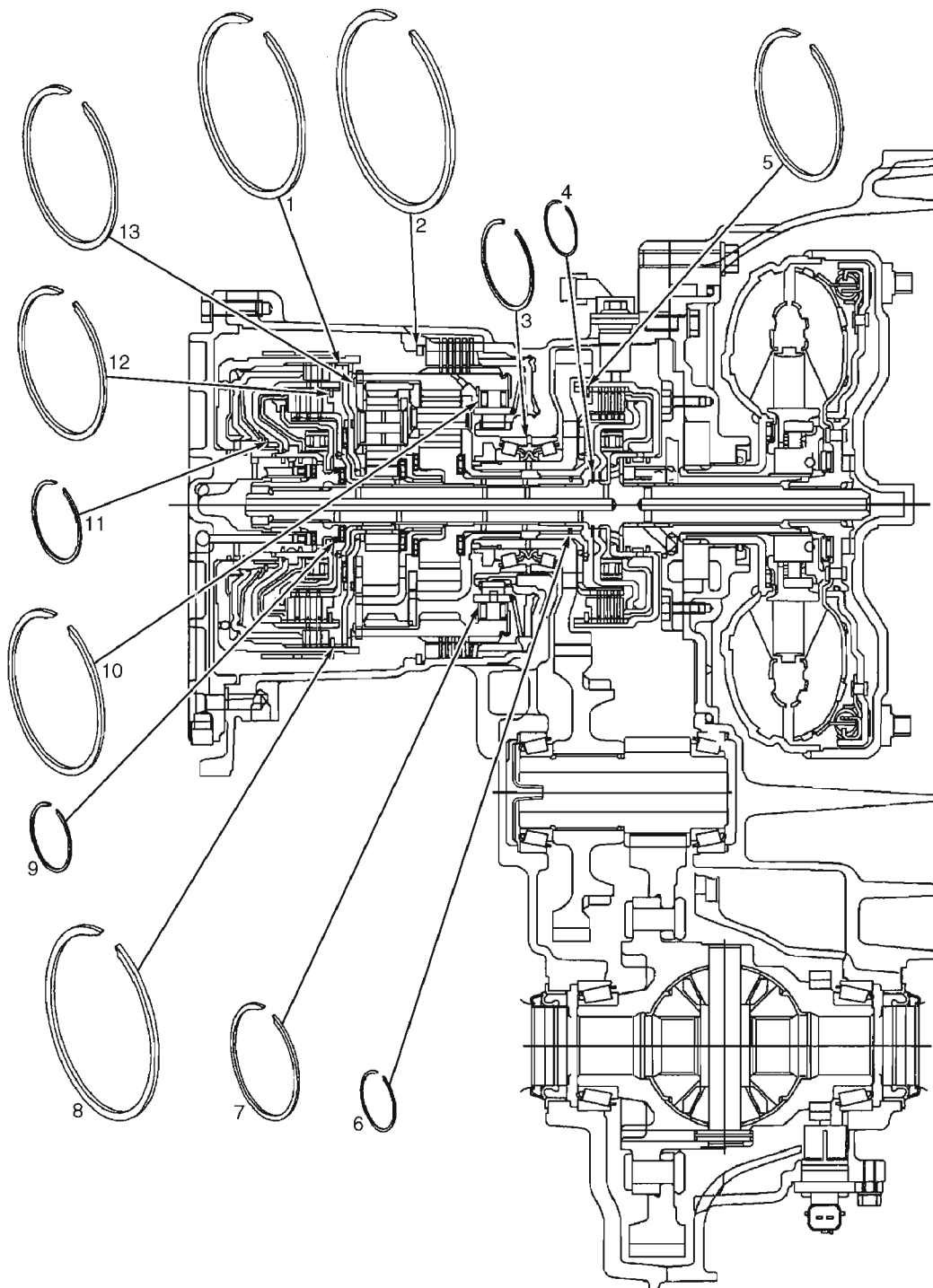
12. Output Speed Sensor "O" Ring
13. Valve Body Seal
14. Manual Shaft Seal
15. ATF Filter Seal
16. Overdrive Servo Cover Seal
17. Intermediate & Overdrive Servo Piston & Seal Assembly
18. Regulator Body Gasket
19. Solenoid Body Gasket
20. Valve Body Gasket
21. Case Cover Seal
22. Reverse Clutch Cylinder Seal

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Fig. 33: Identifying Gasket, Piston & Seal Locations
 Courtesy of FORD MOTOR CO.

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1. Reverse Clutch Retaining Ring
2. Low/Reverse Clutch Plate Retaining Ring
3. Final Drive Retaining Ring
4. Forward Clutch Balance Piston Ring
5. Forward/Direct Clutch Plate Retaining Ring
6. Front Sun Gear Snap Ring
7. Low One-Way Clutch Retaining Ring

8. Reverse Clutch Retaining Ring
9. Direct Clutch Balance Piston Snap Ring
10. Forward/Direct Clutch Planet Retaining Ring
11. Reverse Clutch Spring Retaining Ring
12. Forward/Direct Clutch Plate Retaining Ring
13. Rear Planet Assembly Snap Ring

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Fig. 34: Identifying Snap Ring & Retaining Ring Locations
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TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS**

Application	Ft. Lbs. (N.m)
Converter Housing To Case Bolts	22 (30)
Engine/Transaxle Flange Bolts	35 (47)
Final Drive Input Gear Bearing Retainer Nut	332 (450)
Intermediate/Overdrive Band Anchor Bolt	33 (45)
Intermediate/Overdrive Band Servo Cover Bolts	10 (14)
Lower Suspension Arm Bolt	37 (50)
Oil Cooler Tubes	18 (24)
Oil Pump Bolts	16 (22)
Oil Pump Case Bolts	10 (14)
Parking Pawl Bolts	10 (14)
Parking Pawl Cover Bolts	10 (14)
Ring Gear Bolt	89 (121)
Right Side Drive Axle Center Bearing Cap Nuts	18 (24)
Shift Lever Bolt	10 (14)
Strut Nuts	35 (47)
Tie Rod Nut	35 (47)
Torque Converter To Engine Drive Plate Bolts	27 (37)
Transaxle End Cover Bolts	16 (22)
Wheel Nuts	63 (85)
INCH Lbs. (N.m)	
Oil Filler Tube Bolt	80 (9)
Oil Pan Bolt	62 (7)
OSS Sensor Bolt	89 (10)
Solenoid Body Bolts	80 (9)
TR Sensor Bolt	89 (10)
Transaxle Pan Bolt	62 (7)
TSS Sensor Bolt	89 (10)
Valve Body Bolts	80 (9)
Valve Body Ground Wire Bolt	89 (10)

TRANSAXLE SPECIFICATIONS**CLEARANCE SPECIFICATIONS**

Application	In. (mm)
Forward Clutch	.059-.071 (1.50-1.80)

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Direct & Reverse Clutch	.039-.051 (1.00-1.30)
Low/Reverse Clutch	.087-.098 (2.20-2.50)
Transaxle End Play	.010-.020 (.25-.50)