Item	Part Number	Description
29	390685-S	Plug — Test Port — 1/8-27 Hex Head
30	7G391	Solenoid Valve Body Assy
31	7A191	Transmission Fluid Pan Gasket

(Continued)

Item	Part Number	Description
32	7A194	Transmission Fluid Pan
33	7F033	Fluid Pan Drain Plug Gasket
34	7D479	Fluid Pan Drain Plug

Leakage at the transmission pan-to-case gasket often can be stopped by tightening the retaining bolts to specification. Refer to Torque Specifications in this section. If necessary, replace the pan-to-case gasket only if gasket is damaged.

If leakage is found by the solenoid body connector, refer to Main Control Valve Body in the In-Vehicle Repair portion of this section.

Check the transmission sealing washers on the cooler bypass valve (CBV), fluid filler tube connection at the transmission case. If leakage is found, install a new short fluid inlet tube.

Check the transmission sealing washers on the cooler bypass valve (CBV), fluid lines and fittings between the transmission and the fluid inlet short tube in the radiator tank for looseness, wear or damage. If leakage cannot be stopped by tightening a fluid line tube nut, replace the damaged parts. When fluid is found to be leaking between the case and the cooler line fitting, tighten the fitting to maximum specification. Refer to Section 307-02.

If vehicle is equipped with power take off check the sealing gasket at the power take off unit for leaks.

⚠ **CAUTION: Do not try to stop the fluid leak by increasing the torque beyond specification. This can cause damage to the case threads and/or case fittings.**

If the leak continues, replace the cooler line fitting and/or sealing washers on cooler by-pass valve and tighten to specification. The same procedure should be followed for fluid leaks between the oil to air cooler and cooler line fittings.

If leakage is found at the manual control lever shaft, replace the seal.

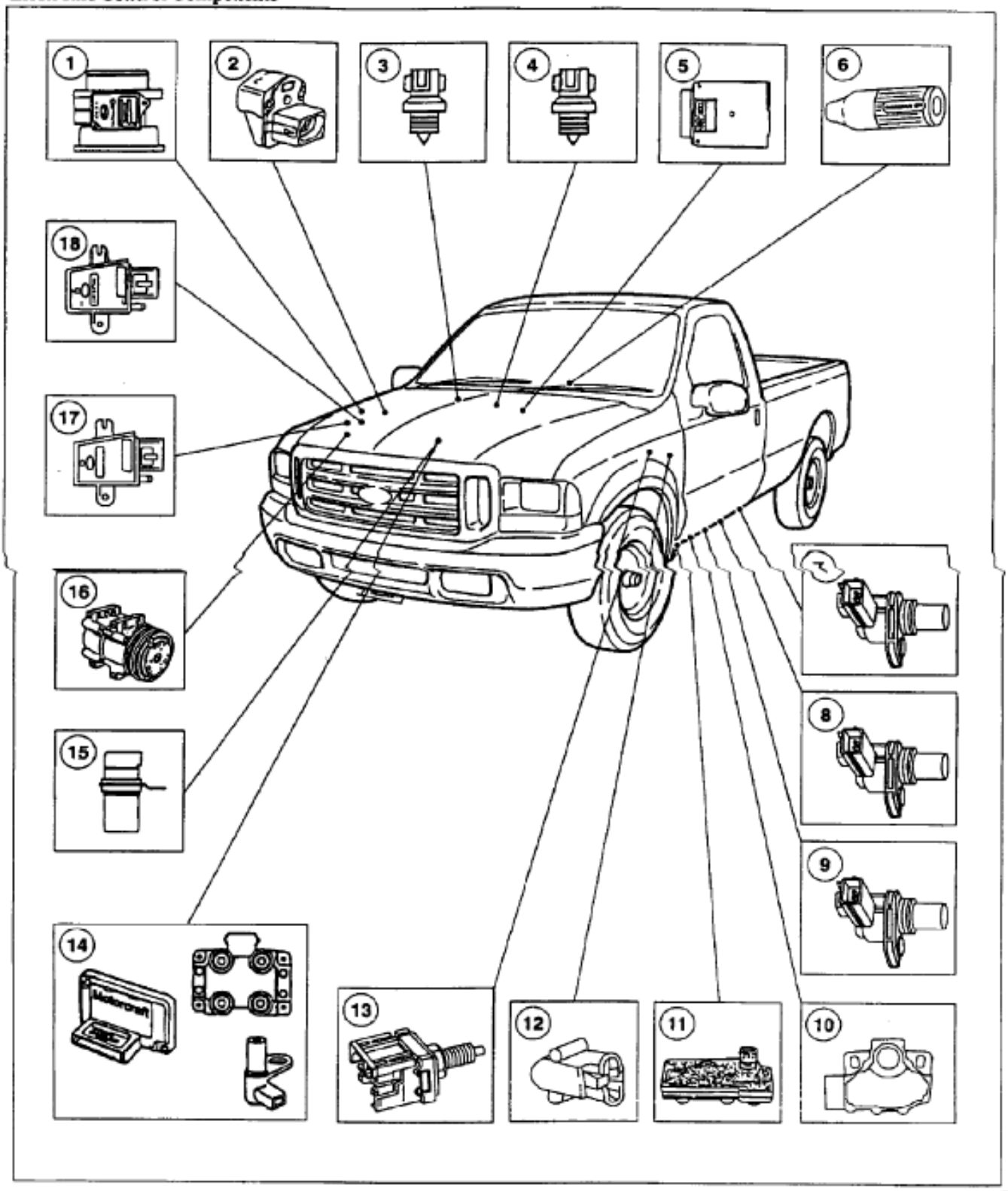
When a converter drain plug leaks, remove the drain plug. Install and tighten a new drain plug to specification. Refer to Torque Specifications in this section.

Check for fluid leaking from the end of the extension housing (7A039). Leakage can result from a damaged seal, missing garter spring or worn extension bushing, or damaged speed sensor plug. Replace the seal assembly, bushing, or both, as necessary.

Inspect the line pressure plug for leakage. Make sure it is tightened to specification. Refer to Torque Specifications in this section. If tightening the plug does not stop the leak the case threads and/or plug could be damaged. Remove the plug and inspect the plug and case thread for damage repair as necessary.

Check for leakage on or around the cooler bypass valve (CBV). Repair as required.

Electronic Control Components



Item	Part Number	Description
1	12B579	Mass Air Flow Sensor
2	9B989	Throttle Position Sensor
3	—	Engine Oil Temperature (EOT) Sensor (7.3L DI Diesel)
4	—	Intake Air Temperature (IAT) Sensor (7.3L DI Diesel)
5	12A650	Powertrain Control Module
6	—	Transmission Control Switch (TCS) and Transmission Control Indicator Lamp (TCIL)
7	2L373	Anti Lock Brake Sensor
8	7M101	Turbine Shaft Speed (TSS) Sensor
9	7H103	Output Shaft Speed (OSS) Sensor
10	7A247	Digital Transmission Range (TR) Sensor
11	—	Transmission Solenoid Body
12	—	Accelerator Pedal (AP) Sensor (7.3L DI Diesel)
13	13480	Brake Pedal Position (BPP) Switch
14	—	Electronic Ignition (EI) System
15	—	Camshaft Position (CMP) Sensor (7.3L DI Diesel)
16	2884	Air Conditioning (A/C) Clutch
17	—	Barometric Pressure (BARO) Sensor (7.3L DI Diesel)
18	—	MAP/BARO Sensor

(Continued)

Mass Air Flow (MAF) Sensor

The mass air flow sensor (MAF) measures the mass of air flowing into the engine. The MAF sensor output signal is used by the powertrain control module to calculate injector pulse width. For transmission strategies the MAF sensor is used to regulate electronic pressure control (EPC), shift and torque converter clutch scheduling.

Throttle Position (TP) Sensor

The throttle position (TP) sensor is a potentiometer mounted on the throttle body. The TP sensor detects the position of the throttle plate and sends this information to the powertrain control module. The TP sensor is used for shift scheduling, electronic pressure control and torque converter clutch (TCC) control.

Intake Air Temperature (IAT) Sensor

The IAT sensor is installed in the air cleaner outlet tube. The IAT sensor is used in determining electronic pressure control (EPC) pressures.

Powertrain Control Module (PCM)

The operation of the transmission is controlled by the powertrain control module. Many input sensors provide information to the PCM. The PCM then controls actuators which determine transmission operation.

Transmission Control Switch (TCS), Transmission Control Indicator Lamp (TCIL)

The transmission control switch (TCS) is a momentary control switch. When the switch is pressed, a signal is sent to the powertrain control module to allow automatic shifts from first through fourth gears or first through third gears only. The PCM energizes the transmission control indicator lamp (TCIL) when the switch is off. The TCIL indicates overdrive cancel mode activated (lamp on) and electronic pressure control (EPC) circuit shorted (lamp flashing) or monitored sensor failure.

Transmission Solenoid Body

The powertrain control module controls the 4R100 transmission operation through four on/off solenoids and one variable force solenoid. These solenoids and transmission fluid temperature sensor are housed in the transmission solenoid body assembly. All are part of the transmission solenoid body and are not replaced individually. Additionally, in 1995, the protection diodes that were on the solenoid body were moved to the powertrain control module.

Transmission Fluid Temperature (TFT) Sensor

The transmission fluid temperature sensor is located on the solenoid body assembly in the transmission sump. It is a temperature-sensitive device called a thermistor. The resistance value of the transmission fluid temperature sensor will vary with temperature change. The powertrain control module monitors voltage across the transmission fluid temperature sensor to determine the temperature of the transmission fluid. The powertrain control module uses this signal to determine whether a cold start shift schedule is necessary The cold start shift schedule lowers shift speeds to allow for the reduced performance of cold engine operation. The powertrain control module also uses the transmission fluid temperature sensor input to adjust electronic pressure control pressure for temperature effects and to inhibit torque converter clutch operation during the warm-up period.

Coast Clutch Solenoid (CCS)

The coast clutch solenoid provides coast clutch control by shifting the coast clutch shift valve. The solenoid is activated by pressing the transmission control switch or by selecting the 1 or 2 range with the transmission range selector lever. In MANUAL 1 and 2, the coast clutch is controlled by the solenoid and also hydraulically as a fail-safe to ensure engine braking. In reverse, the coast clutch is controlled hydraulically and the solenoid is not on.

Torque Converter Clutch (TCC) Solenoid

The torque converter clutch solenoid (TCC solenoid) provides torque converter clutch control by shifting the converter clutch control valve to apply or release the torque converter clutch.

Electronic Pressure Control (EPC) Solenoid

⚠ **CAUTION: The electronic pressure control pressure output from the variable force solenoid is NOT adjustable. Any modification to the electronic pressure control solenoid will affect the transmission warranty.**

The electronic pressure control solenoid is a variable force solenoid. The variable-force type solenoid is an electrohydraulic actuator combining a solenoid and a regulating valve. It supplies electronic pressure control that regulates transmission line pressure and line modulator pressure. This is done by producing resisting forces to the main regulator and the line modulator circuits. These two pressures control clutch application pressures.

Shift Solenoids A and B

Shift solenoids A and B provide gear selection of first through fourth gears by controlling the pressure to the three shift valves.

Anti-Lock Brake Speed Sensor

The programmable speedometer/odometer module (PSOM) receives input from the rear brake anti-lock sensor. After processing the signal, the PSOM relays it to the powertrain control module and the speed control module.

Turbine Shaft Speed (TSS) Sensor

The turbine shaft speed (TSS) sensor is a magnetic pickup that sends the powertrain control module (PCM) information on the rotation speed of the coast clutch drum. The turbine shaft speed (TSS) sensor is mounted externally on the top of the transmission case. The powertrain control module (PCM) uses turbine shaft speed (TSS) sensor signals to help determine electronic pressure control (EPC) pressure, shift scheduling the torque converter clutch (TCC) operation.

Output Shaft Speed (OSS) Sensor

The output shaft speed (OSS) sensor is a magnetic pickup that provides transmission output shaft rotation speed information to the powertrain control module.

The output shaft speed (OSS) sensor is mounted externally on the top of the transmission case. The PCM uses the output shaft speed (OSS) sensor signal to help determine electronic pressure control (EPC) pressure, shift scheduling and torque converter clutch (TCC) operation.

Digital Transmission Range (TR) Sensor

The digital transmission range (TR) sensor is located on the outside of the transmission at the manual lever. The sensor completes the start circuit in Park and Neutral, the back-up lamp circuit in Reverse an a neutral sense circuit for GEM control of 4x4 low engagement. The sensor also opens/closes a set of four switches that are monitored by the powertrain control module to determine the position of the manual lever (P, R, N, D, 2, 1).

Accelerator Pedal (AP) Sensor—7.3—Diesel Only

The accelerator pedal (AP) sensor is mounted on the accelerator pedal on vehicles equipped with 7.3—diesel engines. The AP sensor detects the position of the accelerator pedal and sends this information as a voltage signal to the powertrain control module. If the AP sensor or related circuits fail to operate in a normal manner, the powertrain control module will recognize that the AP sensor signal is out of specification. The powertrain control module will then operate the 4R100 transmission at a higher line pressure to prevent transmission damage. This high line pressure causes harsh upshift and engagements.

Brake Pedal Position (BPP) Switch

The brake pedal position (BPP) switch tells the powertrain control module when the brakes are applied. The torque converter clutch disengages when the brakes are applied. The BPP switch closes when the brakes are applied and opens when they are released.

Electronic Ignition (EI) System

The electronic ignition consists of a crankshaft position sensor, two four tower ignition coils and the powertrain control module. The ignition control module operates by sending crankshaft position information from the crankshaft position sensor to the ignition control module. The ignition control module generates a profile ignition pickup (PIP) signal (engine rpm) and sends it to the powertrain control module. The PIP signal is one of the inputs that the PCM uses to determine transmission strategy, wide-open throttle (WOT) shift control, torque converter clutch control and EPC pressure.

Distributor Ignition (DI) System

The profile ignition pickup sensor sends a signal to the powertrain control module indicating the engine rpm and the crankshaft (6303) position.

Camshaft Position (CMP) Sensor—7.3L DI Diesel Only

On the 7.3L DI diesel engines, the CMP sensor provides engine rpm information to the powertrain control module. This rpm input is used to determine shift scheduling and EPC pressure.

Air Conditioning (A/C) Clutch

An electromagnetic clutch is energized when the clutch cycling pressure switch closes. The switch is located on the suction accumulator/drier. The closing of the switch completes the circuit to the clutch and draws it into engagement with the compressor driveshaft. When the A/C clutch is engaged, electronic pressure control (EPC) pressure is adjusted by the PCM to compensate for additional load on the engine.

Barometric Pressure (BARO) Sensor—7.3L DI Diesel Only

The barometric pressure sensor (BARO sensor) (12A644) operates similarly to the manifold absolute pressure sensor (MAP sensor) (9F479). It measures barometric pressure instead of intake manifold pressure. The powertrain control module uses the signal from the barometric pressure sensor to determine the altitude at which the vehicle is operating. The powertrain control module then adjusts the 4R100 shift schedule and EPC pressure for the altitude.

Manifold Absolute Pressure (MAP) Sensor—Gasoline Engines

On gasoline engines, the manifold absolute pressure sensor senses atmospheric pressure to produce an electrical signal. The frequency of this signal varies with intake manifold pressure. The powertrain control module monitors this signal to determine altitude. The powertrain control module then adjusts the 4R100 shift schedule and EPC pressure for altitude. On diesel engines, the manifold absolute pressure sensor measures boost pressure. The powertrain control module monitors this signal and adjusts EPC pressure.

Perform On-Board Diagnostics

NOTE: If equipped, turn the power take-off unit off to ensure proper test results. On-Board Diagnostic is not accessible when the power take-off is in operation.

After a road test, with the vehicle warm and before disconnecting any connectors, perform the Quick Test using the New Generation Star (NGS) Tester. Refer to the Powertrain Control/Emissions Diagnosis Manual [1] for diagnosis and testing of the powertrain control system.

Diagnosing an electronically controlled automatic transmission (7003) is simplified by using the following procedures. One of the most important things to remember is that there is a definite procedure to follow. DO NOT TAKE SHORT CUTS OR ASSUME THAT CRITICAL CHECKS OR ADJUSTMENTS HAVE ALREADY BEEN MADE. Follow the procedures as written to avoid missing critical components or steps. By following the diagnostic sequence, the technician will be able to diagnose and repair the concern the first time.

Transmission Drive Cycle Test

NOTE: If equipped, turn the power take-off unit off for proper test results.

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

NOTE: The Transmission Cycle Test must be followed exactly. Malfunctions must occur four times consecutively for the shift error DTC code to be set and five times consecutively for the continuous torque converter clutch code to set.

NOTE: When performing the Transmission Drive Cycle Test refer to the Solenoid Operation Chart for proper solenoid operation.

Use the Transmission Drive Cycle Test for checking continuous codes

1. Record and then erase the Quick Test codes.
2. Warm the engine to normal operating temperature.
3. Make sure the transmission fluid level is correct.
4. With the transmission in OVERDRIVE, moderately accelerate from stop to 80 km/h (50 mph). This allows the transmission to shift into fourth gear. Hold speed and throttle open steady for a minimum of 15 seconds.
5. With transmission in OVERDRIVE, press transmission control switch (TCS) (transmission control illuminator lamp (TCIL) should illuminate) and moderately accelerate from stop to 64 km/h (40 mph). This allows the transmission to shift into third gear. Hold speed and throttle open steady for a minimum of 15 seconds (30 seconds above 4000 ft altitude).
6. Press TCS (TCIL should turn off) and accelerate from 64 km/h (40 mph) to 80 km/h (50 mph). This allows transmission to shift into fourth gear. Hold speed and throttle position steady for a minimum of 15 seconds.
7. With transmission in fourth gear and maintaining steady speed and throttle opening, lightly apply and release brake to operate stoplamps. Then hold speed and throttle steady for an additional 5 seconds (minimum).
8. Brake to a stop and remain stopped for a minimum of 20 seconds.
9. Repeat Steps 4 through 8 at least five times.
10. Perform Quick Test and record continuous codes.

After On-Board Diagnostics

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

After the On-Board Diagnostics procedures are completed, repair all DTCs.