

# DIAGNOSTIC TESTS

## DIAGNOSTIC STRATEGY

Troubleshooting an electronically controlled automatic transmission is simplified by using the proven method of diagnosis. One of the most important things to remember is that there is a definite procedure to follow.

**NOTE: 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.

To correctly diagnose a concern, have the following publications available:

- **Introduction - Gasoline Engines**
- TSBs
- Wiring Diagram

These publications provide the information required when diagnosing transmission concerns.

Use the Diagnostic Flow Chart as a guide and follow the steps as indicated.

### Preliminary Inspection

- Know and understand the customer's concern.
- Verify the concern by operating the vehicle.
- Check the transmission fluid levels and transmission fluid condition.
- Check for non-factory add-on items.
- Check shift linkages for correct adjustment.
- Check TSBs regarding the concern.


### Diagnostics

- Carry out on-board diagnostic procedures Key On/Engine Off (KOEO) and Key On/Engine Running (KOER).
- Record all DTCs.
- Repair all non-transmission codes first.
- Repair all transmission codes second.
- Erase all continuous codes and attempt to repeat them.
- Repair all continuous codes.
- If only pass codes are obtained, go to **Diagnosis By Symptom** for information and diagnosis.

Follow the diagnostic sequence to diagnose and repair the concern the first time.

## DIAGNOSTIC FLOW CHART

## Special Tools

Illustration	Tool Name	Tool Number
	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool	

Prior to carrying out the flow test, the following items should be checked:

- Know and understand the customer concerns.
- Check the transmission fluid level and transmission fluid condition.
- Verify the concern by operating the vehicle.
- Check for non-factory-installed items and verify correct installation.
- Check the selector lever linkage adjustments.
- Check TSBs for vehicle concerns.
- Carry out quick test both key ON engine running (KOER) and key ON engine OFF (KOEO).
- Record all codes.
- Verify that the transmission control module (TCM) is at the latest calibration release level.

## DIAGNOSTIC FLOW CHART

Test	Action	Result
1) Did you record any DTCs?	Yes	REPAIR all hard DTCs. FOLLOW the pinpoint tests. REFER to the <b><u>Introduction - Gasoline Engines</u></b> first, then this workshop manual, then Go to Step 2.
	No	REFER to <b><u>Diagnosis By Symptom</u></b> , then Go to Step 5.
2) Are any continuous test memory codes present?	Yes	CLEAR codes and CARRY OUT drive cycle test, then Go to Step 3.
	No	Go to Step 4.
3) Did the continuous test memory codes reappear?	Yes	REPAIR all continuous test memory codes. FOLLOW the pinpoint tests. REFER to the <b><u>Introduction - Gasoline Engines</u></b> first, then this workshop manual, then Go to Step 4.
	No	Go to Step 4.
4) Is the concern repaired?	Yes	CARRY OUT the final quick test to verify that no DTCs are present. CLEAR memory codes.
	No	REFER to <b><u>Diagnosis By Symptom</u></b> to diagnose and repair the concern, then Go to Step 5.
5) Is the concern repaired?	Yes	CARRY OUT the final quick test to verify that no DTCs are present. CLEAR memory codes.
	No	REFER to the hydraulic and mechanical routine to diagnose and REPAIR the concern, then Go to Step 7.
6) Was the transmission concern corrected when the scan tool was installed?	Yes	REFER to the <b><u>Introduction - Gasoline Engines</u></b> , intermittent fault diagnosis section and use the scan tool to diagnose the cause of the concern in the processor, vehicle harness or external inputs (sensor

	No	and switches) REFER to the hydraulic and mechanical routine to diagnose and repair the concern, then Go to Step 7.
7) Is the concern repaired?	Yes	CARRY OUT the final quick test to verify that no DTCs are present. CLEAR memory codes.
	No	Concern should have been repaired. GO back through the diagnostic flow chart and REVIEW other components that may have contributed to the concern. CHECK and DIAGNOSE those components. GET assistance from other sources.

## PRELIMINARY INSPECTION

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

### Know and Understand the Concern

In order to correctly diagnose a concern, first understand the customer concern or condition. Customer contact may be required in order to begin to verify the concern. Understand the conditions, including when the concern occurs. For example:

- Hot or cold vehicle temperature
- Hot or cold ambient temperature
- Vehicle driving conditions
- Vehicle loaded/unloaded

After understanding when and how the concern occurs, proceed to Verification of Condition.

### Verification of Condition

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

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

### Determine Customer Concern

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

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

- Hot or cold vehicle operating temperature
- Hot or cold ambient temperature
- Type of terrain
- Vehicle loaded/unloaded
- City/highway driving

- Upshifting
- Downshifting
- Coasting
- Engagement
- Noise/vibration - check for dependencies, either rpm dependent, vehicle speed dependent, shift dependent, gear dependent, range dependent or temperature dependent.

## Check Transmission Fluid Level and Condition

### Transmission Fluid Level Check

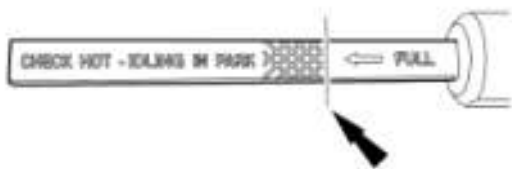
**CAUTION:** The vehicle should not be driven if the transmission fluid level is low as internal transmission failure could result.

**CAUTION:** The transmission fluid fill plug is located near the exhaust system. The exhaust will be extremely hot during this procedure.

**NOTE:** If the vehicle has been operated for an extended period at high highway speeds, in city traffic, during hot weather or while pulling a trailer, the transmission fluid must cool down to obtain an accurate reading.

**NOTE:** If the transmission starts to slip, shifts slowly or shows signs of transmission fluid leaking, the transmission fluid level should be checked.

This transmission is equipped with an internal thermal bypass located in the case. This internal thermal bypass valve will shut off transmission fluid flowing to the transmission fluid cooler if the transmission fluid temperature falls below normal operating temperature. Refer to Transmission Fluid Level Check.



N0030541

**Fig. 4: Identifying Transmission Fluid Level Crosshatch Mark**  
Courtesy of FORD MOTOR CO.

### High Transmission Fluid Level

**CAUTION:** A transmission fluid level that is too high can cause the transmission fluid to become aerated due to the churning action of the rotating internal parts. This will cause erratic control pressure, foaming, loss of transmission fluid from the vent tube and possible transmission failure.

If an overflow reading is indicated, remove any excessive transmission fluid. Refer to **Transmission Fluid Level Check**.

### **Low Transmission Fluid Level**

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

### **Adding Transmission Fluid**

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

**CAUTION: The transmission fluid fill plug is located near the exhaust system. The exhaust will be extremely hot during this procedure.**

**CAUTION: The vehicle should not be driven if the transmission fluid level is low as internal failure could result.**

**NOTE: If the vehicle has been operated for an extended period at high highway speeds, in city traffic, during hot weather or while pulling a trailer, the transmission fluid must cool down to obtain an accurate reading.**

Add transmission fluid using the refill procedure. Refer to **Transmission Fluid Drain and Refill**.

### **Transmission Fluid Condition Check**

1. Check the transmission fluid level.
2. Remove the transmission fluid fill plug and transmission fluid level indicator and allow the transmission fluid to drip onto a facial tissue and examine the stain.
3. Observe the color and the odor. The color under normal circumstances should be dark reddish, not black or have a burnt odor.
4. If evidence of solid material is found, the transmission fluid pan should be removed for further inspection.
5. If the stain is a foamy pink color, this may indicate coolant in the transmission. The engine cooling system should also be inspected at this time.
6. If transmission fluid contamination or transmission failure is confirmed by the sediment in the bottom of the transmission fluid pan, the transmission must be disassembled and completely cleaned. This includes the torque converter and transmission fluid cooler tubes. A new oil-to-air (OTA) cooler must be installed.

### **Water in Transmission Fluid**

To correctly repair an automatic transmission or transaxle that has had water or coolant introduced into the system, completely disassemble, clean and replace the following parts:


- All internal and external seals
- All friction material; clutches and bands

- Torque converter
- All parts with bonded seals
- All solenoids
- All transmission fluid filters

Prior to installing the transmission or transaxle, the transmission fluid cooler(s), transmission fluid cooler tubes and transmission fluid cooler hoses need to be flushed and cleaned.

## SHIFT POINT ROAD TEST

### Special Tools

Illustration	Tool Name	Tool Number
	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool	

This test verifies that the shift control system is operating correctly.

1. Bring engine and transmission up to normal operating temperature.
2. Operate vehicle with selector lever in D position.
3. Apply minimum throttle and observe speeds at which upshift occurs and the torque converter engages. Refer to **SHIFT SPEEDS**.
4. Move the selector lever into the manual 3 position. The transmission should downshift to 4th gear. Release the accelerator pedal; engine braking should occur.
5. Press the accelerator pedal to floor, wide open throttle (WOT). Transmission should shift from 4th to 3rd, depending on vehicle speed. The torque converter clutch (TCC) should disengage and then reapply.
6. With the selector lever in D position and speed above 80 km/h (50 mph) and less than half throttle, move the selector lever from D position to manual 2 position and remove pressure from the accelerator pedal. The transmission should downshift into 2nd gear. With the vehicle remaining in manual 2 position, move the selector lever into manual 1 position and release the accelerator pedal. The transmission should downshift into 1st gear at speeds below approximately 45-56 km/h (28-35 mph).
7. If the transmission fails to upshift/downshift or the TCC does not apply and release, refer to **Diagnosis By Symptom**.

**NOTE:** Shift speed ranges are approximate for all applications. For specific applications (engine, axle ratio, tire size and application), refer to the Automatic Transmission Specification booklet.

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

### SHIFT SPEEDS

Throttle			
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Position	Shift	mph	km/h
Light Throttle Approximately 30% Pedal Travel	1-2	9	14
	2-3	16	26
	3-4	24	39
Closed Throttle	4-5	32	51
	5-6	40	64
	6-5	29	47
	5-4	24	39
	4-3	20	32
Wide Open Throttle (WOT)	3-2	7	11
	2-1	4	6
	1-2	30	48
	2-3	56	90
	3-4	80	138

### Road Test - Adaptive Drive Cycle

**NOTE:** Using the scan tool, clear the adaptive table before conducting an adaptive drive cycle test.

**NOTE:** All adaptive drive cycle tests are carried out with the transmission fluid temperature at normal operating temperature 80°C-82°C (175°F-180°F).

**NOTE:** All adaptive drive cycle test are carried out with the range selector lever in the D position.

This test will begin the adaptive learning schedule to provide a better shift quality and shift feel.

1. Verify that the transmission fluid temperature (TFT) PID is above 80°C (175°F).
2. Clear transmission control module (TCM) keep alive memory (KAM) and adaptive table using the scan tool.
3. Accelerate from rest with light throttle. The 1-2, 2-3 and 3-4 shifts must occur at engine speeds between 1300-1800 rpm.
4. Continue to accelerate gently to 80 km/h (50 mph) so that the transmission shifts into 5th gear.
5. Brake gently to a complete stop and hold foot on brake for at least 15 seconds.
6. Repeat Steps 3-6 a total of 5 times.

### TORQUE CONVERTER DIAGNOSIS

#### Special Tools

Illustration	Tool Name	Tool Number
	Vehicle Communication Module	software with appropriate



(VCM) and Integrated Diagnostic System (IDS) hardware, or equivalent scan tool

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

Begin with the normal diagnostic procedures as follows:

1. Preliminary inspection.
2. Know and understand the customer's concern.
3. Verify the condition - carry out the torque converter operation test.
4. Carry out diagnostic procedures.
  - Carry out on-board diagnostics. Refer to **Diagnostics**.
    - Repair all non-transmission related DTCs first.
    - Repair all transmission-related DTCs.
    - Rerun on-board diagnostics to verify repair.
  - Carry out Stall Speed Test. Refer to **Special Testing Procedures**.
  - Carry out Diagnostic Routines. Refer to **Diagnosis By Symptom**.
    - Use the Diagnosis by Symptom to locate the appropriate routine that best describes the symptom(s). The routine will list all possible components that may cause or contribute to the symptom. Check each component listed; diagnose and repair as required before changing the torque converter.

### **Torque Converter Operation Test**

The Torque Converter Operation Test verifies that the torque converter clutch (TCC) control system and the torque converter are operating correctly.

1. Carry out Quick Test with scan tool. Refer to the **Introduction - Gasoline Engines** . Check for DTCs.
2. Connect a scan tool to the vehicle.
3. Bring the engine to normal operating temperature by driving the vehicle at highway speeds for approximately 15 minutes in D position.
4. After normal operating temperature is reached, maintain a constant speed of about 56 km/h (35 mph) in 5th gear for 10 seconds.
5. Release the accelerator pedal and monitor the scan tool TP voltage to approximately 1.25 volts or 30% throttle.
6. Monitor the TCC and engine speed PID. The TCC should release and engine rpms should increase before the 5-4 shift occurs.

**NOTE:**            **The following is a list of common vehicle concerns that have been misdiagnosed as TCC shudder. For diagnosis of the following items, refer to the appropriate sections of the workshop manual and the**



## **Introduction - Gasoline Engines .**

- Spark plugs - check for cracks, high resistance or broken insulators
- Plug wires
- Fuel injector - filter may be plugged
- Fuel contamination - engine driveability concerns
- EGR valve - valve may let in too much exhaust gas and cause engine to run lean
- Vacuum leak - engine will not get correct air/fuel mixture
- Manifold absolute pressure (MAP)/mass air flow (MAF) sensor - incorrect air/fuel mixture
- Heated oxygen sensor (HO2S) - too rich/lean air/fuel mixture
- Fuel pressure - may be too low
- Engine mounts - loose/damaged mounts can cause vibration concerns
- Axle joints - check for vibration

## **VISUAL INSPECTION**

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

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

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

- Leaks; refer to **Leakage Inspection.**
- Correct selector lever linkage adjustments; refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS .**

### **Selector Lever Linkage Check**

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

Hydraulic leakage at the manual control valve can cause delay in engagements and/or slipping while operating if the linkage is not correctly adjusted. Refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** for selector lever linkage adjustment.

### Check TSBs



Refer to all TSBs that pertain to the transmission concern and follow the procedure as described.

### Carry Out On-Board Diagnostics (Key ON Engine OFF [KOEO], Key ON Engine Running [KOER])

After a road test, with the vehicle warm and before disconnecting any connectors, carry out the Quick Test using the scan tool. Refer to the **Introduction - Gasoline Engines** .

## DIAGNOSTICS

### Special Tools

Illustration	Tool Name	Tool Number
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS)	software with appropriate hardware, or equivalent scan tool
 ST1137-A	73 III Automotive Meter	105-R0057 or equivalent

Diagnosing an electronically controlled automatic transmission 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 shortcuts or assume that critical checks or adjustments have already been made. Follow the procedures as written to avoid missing critical components or steps. By following the diagnostic sequence, the technician will be able to diagnose and repair the concern the first time.

### On-Board Diagnostics With Scan Tool

**NOTE:** For detailed instruction and other diagnostic methods using the scan tool, refer to the scan tool tester manual and the **Introduction - Gasoline Engines** . These quick tests should be used to diagnose the PCM and should be carried out in order.

- Quick Test 1.0 - Visual Inspection
- Quick Test 2.0 - Set Up
- Quick Test 3.0 - Key ON, Engine OFF (KOEO)
- Quick Test 4.0 - Continuous Memory
- Quick Test 5.0 - Key ON, Engine Running (KOER)
- Special Test Mode
  - Wiggle Test

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

### Other Scan Tool Features

For additional information on other diagnostic testing features using the scan tool, refer to the **Introduction - Gasoline Engines** .

## OUTPUT STATE CONTROL (OSC) MODE

### On-Board Diagnostics

#### Output State Control (OSC) Mode

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

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

Another example of the OSC features is that a technician can command the torque converter to turn ON or OFF to check operation.

This transmission OSC has one mode of operation; DRIVE. This mode has a unique set of operating requirements that the technician must meet before allowed to operate the torque converter or select gears.

**NOTE: To operate OSC, the digital transmission range (TR) sensor and the output shaft speed (OSS) sensor must be operational. No DTCs related to the digital TR sensor or the OSS can be present.**

- The vehicle requirements MUST BE MET when SENDING the OSC value. Refer to the vehicle requirements for each test.
- If the vehicle requirements are NOT MET when SENDING the OSC value, the PCM will not carry out the command. OSC is aborted and must be restarted.
- If, after the sent value is substituted, the vehicle requirements are no longer met, the PCM will cancel the OSC value and resume normal operations. No error message will be sent.
- The OSC may be canceled at any time.

### OSC Procedures

- Pull DTCs.
- Repair any existing DTCs.
- Make sure that the OSS and digital TR sensors are functional.
- Monitor the OSS\_SRC and TR PIDs to verify functionality.
- Access transmission PIDs.

## **OSC - Transmission in Drive Mode**

The OSC provides the following Drive Mode functions:

- GEAR\_OSC# - Allows upshifts and downshifts.
- TCC\_OSC# - Engages or disengages the torque converter clutch (TCC).

### **GEAR\_OSC# in Drive Mode**

The Drive Mode allows the technician to choose the following options:

- 1 - TCM selects 1st gear.
- 2 - TCM selects 2nd gear.
- 3 - TCM selects 3rd gear.
- 4 - TCM selects 4th gear.
- 5 - TCM selects 5th gear.
- 6 - TCM selects 6th gear.

The Drive Mode for GEAR\_OSC# operates ONLY when:

- The OSS and digital TR sensor are operational.
- No OSS and digital TR sensor DTCs are set.
- The key is ON, engine running.
- The transmission shifter is in the D position.
- Vehicle speed is above 3 km/h (2 mph).

OSC Command Values:

- 1 - TCM selects 1st gear.
- 2 - TCM selects 2nd gear.
- 3 - TCM selects 3rd gear.
- 4 - TCM selects 4th gear.
- 5 - TCM selects 5th gear.
- 6 - TCM selects 6th gear.

### **Drive Mode Procedure for GEAR\_OSC#**

Follow operating instructions from scan tool menu screen.

- Select GEAR\_OSC# command.
- Select PIDs to be monitored.
- Command the transmission to the desired gear within the vehicle requirements.
- Monitor all selected PIDs during test.
- Cancel GEAR\_OSC# command at any time.

### **TCC\_OSC# in Drive Mode**

The Drive Mode allows the technician to choose the following options:

- TCC\_OSC# - Activates the torque convertor clutch (TCC) locked and unlocked.
- Locked - Applies the TCC.
- Unlocked - Releases the TCC.

Drive Mode for TCC\_OSC# Unlocked operates only when:

- The OSS and digital TR sensor are set.
- NO OSS and digital TR sensor DTCs are set.
- The key is ON, engine running.
- The transmission shifter is in the D position.
- Vehicle speed is above 10 km/h (16 mph).

Drive Mode for TCC\_OSC# Locked operates only when:

- The OSS and digital TR sensor are operational.
- No OSS and digital TR sensor DTCs are set.
- The key is ON, engine running.
- The transmission shifter is in the D position.
- Vehicle speed is above 10 km/h (16 mph).
- TFT is above 38°C (100°F).
- The brake is not applied below 32 km/h (20 mph).
- Steady vehicle speed is maintained.

OSC Command Values:

- Locked - Applies the TCC.
- Unlocked - Releases the TCC.

#### **Drive Mode Procedures for TCC\_OSC#**

Follow operating instructions from the scan tool menu screen.

- Select TCC\_OSC# command.
- Select PIDs to be monitored.
- Command the transmission to lock and unlock the TCC within the vehicle requirements.
- Monitor all selected PIDs during tests.
- Cancel the TCC\_OSC# command at any time.

### **DIAGNOSTIC PARAMETERS IDENTIFICATION (PID) CHART**

#### **Special Tools**

<b>Illustration</b>	<b>Tool Name</b>	<b>Tool Number</b>
	Vehicle Communication Module	



(VCM) and Integrated Diagnostic System (IDS)

software with appropriate hardware, or equivalent scan tool

### OSC PARAMETERS AND ADDITIONAL PIDS

PID Name	PID Description	Units
ECT TCM	Engine coolant temperature (ECT) transmission control module (TCM)	Degrees
VSS	Vehicle speed	mph
TP	Throttle position	Percent/Volts
VPWR TCM	Module supply voltage	Volts
APP1	Accelerator pedal position sensor 1	Percent
SSA_AMP	Commanded current for shift solenoid A	Amperes
SSB_AMP	Commanded current for shift solenoid B	Amperes
SSC_AMP	Commanded current for shift solenoid C	Amperes
SSD_AMP	Commanded current for shift solenoid D	Amperes
PCA AMP	Commanded current for pressure control A	Amperes
TCC AMP	Commanded current for torque converter clutch pressure control	Amperes
SSE	Shift solenoid E duty cycle	Percent
RPM	Engine speed	rpm
GEAR	Gear commanded (1, 2, 3, 4, 5 and 6)	1, 2, 3, 4, 5 and 6
TC_SLIPACT	Absolute value of slip across torque converter	rpm
GR_RAT_CMD	Current transmission gear ratio commanded	Ratio
GR_RAT_MES	Current transmission gear ratio measured (input speed/output speed)	Ratio
TFT	Transmission fluid temperature	Degrees
OSS_SRC	Output shaft speed (OSS)	rpm
TSS	Turbine shaft speed (TSS)	rpm
TR	Transmission range	Park, Reverse, Neutral, Drive, 3, 2 1
BOO	Brake On/Off	On or Off
	Commanded pressure for	

PCA AMP	pressure control solenoid A (VFS5)	Amperage
OSS	Output shaft speed (OSS) sensor	rpm
TCC	Torque converter clutch modulated	Locked/Unlocked
BPA	Brake pressure applied switch	On/Off
AST	Time since start	Time
CLRDIST	Distance since diagnostic trouble code cleared	Miles
DRIVE	Transmission range (drive verification position)	Yes/No
DTC TCM	Continuous codes	DTC numbers
ENG LOAD	Engine load	Percent
GEAR_OSC#	Gear commanded by output state control	Mode number
MIL_DIS	The distance traveled since the MIL was activated	Mileage
NEUTRAL	Gear lever position - neutral	Yes/No
REVERSE	Gear lever position - reverse	Yes/No
RPM TCM	Engine revolutions per minute	rpm
SHFT_TYPE	Shifter position	Mode number
TCC_OSC#	Output state control of torque converter	Locked/Unlocked
TORQUE	Net engine torque	Torque Nm
TSS_SRC	Unfiltered turbine shaft speed	rpm
WARMUPS	Number of warm-ups since DTCs cleared	Number
TCS	Overdrive cancel switch/hold switch (transmission control [TC] switch)	Depressed/Not depressed

## TRANSMISSION DRIVE CYCLE TEST

### Material

Item	Specification
MERCON® SP Automatic Transmission Fluid XT-6-QSP (US); CXT-6-LSP12 (Canada)	MERCON® SP

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

**NOTE:** The Transmission Drive Cycle Test must be followed exactly. Malfunctions

**must occur 4 times consecutively for shift error DTC to be set, and 5 times consecutively for continuous torque converter clutch (TCC) code to set.**

**NOTE: When carrying out the Transmission Drive Cycle Test, refer to the Solenoid Application Chart for correct solenoid operation.**

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

1. Record and then erase Quick Test codes.
2. Warm engine to normal operating temperature.
3. Make sure transmission fluid level is correct.
4. With the selector lever in D, moderately accelerate from stop to 80 km/h (50 mph). This allows the transmission to shift into 6th gear. Hold speed and throttle open steady for a minimum of 15 seconds.
5. With transmission in 6th gear and maintaining steady speed and throttle opening, lightly apply and release brake to operate stop lamps. Then, hold speed and throttle steady for a minimum of 5 seconds.
6. Brake to a stop and remain stopped for a minimum of 20 seconds.
7. Repeat Steps 4 through 6 at least 5 times.
8. Carry out the Quick Test and record continuous DTCs.
  - If the DTCs are still present, refer to **Diagnostic Trouble Code (DTC) Charts**. Repair all non-transmission DTCs first as they can directly affect the operation of the transmission. Repeat the Quick Test and the Road Test to verify the correction. Erase the DTCs, carry out the Drive Cycle Test and repeat the Quick Test after completing the repair on the DTC.
  - If the continuous test passes and a concern is still present, refer to **Diagnosis By Symptom** and TSBs for concerns.

#### After On-Board Diagnostic

**NOTE: The vehicle wiring harness, PCM and non-transmission sensors may affect transmission operations. Repair these concerns first.**

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

Begin with non-transmission related DTCs, then repair any transmission-related DTCs. Use the DTC Chart for information on condition and symptoms. This chart will be helpful in referring to the correct manual(s) and aids in diagnosing internal transmission concerns and external non-transmission inputs. The pinpoint tests are used in diagnosing transmission electrical concerns. Make sure that the vehicle wiring harness and the PCM are diagnosed as well. The **Introduction - Gasoline Engines** will aid in diagnosing non-transmission electronic components.

## DIAGNOSTIC TROUBLE CODE (DTC) CHARTS

### Special Tools

Illustration	Tool Name	Tool Number
	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS)	software with appropriate hardware, or equivalent scan tool





Using a scan tool to retrieve DTCs, begin with and correct all non-transmission related DTCs. Start with the U-DTCs (communication link codes) then repair any transmission-related DTCs.

Limp-home mode is a default condition to protect the engine and transmission when a fault occurs. Limp-home mode depends on the actual gear the vehicle was in when the fault has occurred.

- For gears 1-3, the limp-home default will be 3rd gear.
- For gears 4-6, the limp-home default will be 5th gear.

The limp-home gear will be held until the vehicle is placed in R, P or the vehicle has been restarted. After these action(s) the vehicle will default to the limp-home mode of 3rd gear.

#### DTC CHART

Five Digit DTC	Component	Description	Condition	Symptom	Action
P0218	Transmission fluid temperature (TFT) sensor	Transmission fluid over temperature condition.	Transmission control module (TCM) has detected a TFT that has exceeded a set temperature.	<ul style="list-style-type: none"> <li>• Aggressive lockup schedule</li> </ul>	CARRY OUT normal diagnostic for an overheating condition. REFER to <b><u>Diagnosis By Symptom.</u></b>
P0562	Battery	System voltage low.	TCM has detected a voltage level below minimum voltage to operate solenoids. Maintains current solenoid state.	<ul style="list-style-type: none"> <li>• No adaptive strategy</li> <li>• No self learning strategy</li> <li>• May turn on malfunction indicator lamp (MIL)</li> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• Battery voltage below 9 volts</li> <li>• Will turn on transmission control indicator lamp</li> </ul>	REFER to <b><u>BATTERY, MOUNTING AND CABLES .</u></b>

				(TCIL)	
P0563	Battery	System voltage high.	TCM has detected a voltage level above maximum voltage.	<ul style="list-style-type: none"> <li>• No adaptive strategy</li> <li>• No self learning strategy</li> <li>• May turn on MIL</li> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• Battery voltage above 16 volts</li> <li>• Will turn on TCIL</li> </ul>	REFER to <b><u>BATTERY, MOUNTING AND CABLES</u></b> .
P0605	TCM	The TCM read only memory (ROM) has been corrupted.	TCM has detected an internal software concern with ROM.	<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• Will turn on TCIL</li> </ul>	REFLASH the original mechatronic to the latest level calibration. CLEAR all DTCs. TEST the system for normal operation. If DTCs return, INSTALL a new mechatronic assembly. After installing the new mechatronic assembly, it must be reflashed to the latest level calibration. CARRY OUT the Road Test - Adaptive Drive Cycle. REFER to <b><u>Shift Point Road Test</u></b> .
P0613	TCM	TCM processor.	TCM has detected an internal software issue.	<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronic assembly. After installing the new mechatronic assembly, it must be reflashed to the latest level calibration.
P0634	TCM	TCM module temperature.	Internal temperature	<ul style="list-style-type: none"> <li>• May turn on MIL</li> </ul>	MONITOR the TFT PID to validate that

			within TCM too high. Possible restriction in cooling circuit.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> </ul>	<p>an error is present. INSPECT the transmission cooler lines for possible restrictions (kinked or bent cooler lines). VERIFY correct operation/orientation of the thermal bypass valve. INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.</p>
P0641	TCM	TCM module sensor voltage failed.	Sensor reference voltage A circuit open.	<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• Will turn on TCIL</li> <li>• Low battery voltage under 9 volts. May also cause P0562</li> </ul>	<p>INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.</p>
P0657	TCM	Actuator supply voltage A circuit open.	Power supply actuators open circuit.	<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• Will turn on TCIL</li> </ul>	<p>INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.</p>
P0658	TCM	Actuator supply voltage A circuit low.	Power supply actuators short circuit to ground.	<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• Will turn on TCIL</li> </ul>	<p>INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.</p>

P0659	TCM	Actuator supply voltage A circuit high.	Actuator power supply short circuit to power before key ON.	<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0667	PCM/ECM/TCM	PCM, engine control module (ECM), TCM internal temperature sensor range operation.	Substrate temperature sensor.	ECT TCM	MONITOR the ECT TCM PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0701	Transmission control system	Transmission control system. Range operation.	TCM has detected a concern with the operational strategy.	<ul style="list-style-type: none"> <li>• Dual DTC causing transmission default to a hydraulic limp-home mode</li> <li>• May turn on MIL</li> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• Will turn on TCIL</li> </ul>	MULTIPLE DTC failure with conflicting failure mode actions. If other DTCs are present, REPAIR them first. CLEAR all DTCs. TEST the system for normal operation. Reflash the TCM first. If the DTC returns, INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0705	Transmission range (TR) sensor	TR sensor circuit error.	TCM has detected a TR signal (P, R, N,	<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• Mechanical</li> </ul>	MONITOR the TR PID to validate that an error is present.

			D, 3, 2 or 1) is out of normal range.	limp-home mode - default to 3rd or 5th gear <ul style="list-style-type: none"> <li>Will turn on TCIL</li> </ul>	REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0711	TFT sensor	No change in TFT during operation.	PCM has detected no TFT change during operation. TFT stuck at some normal reading.	-	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0712	TFT sensor	TFT sensor circuit grounded.	TCM has detected a voltage drop across TFT sensor exceeds scale set for temperature (grounded circuit).	-	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0713	TFT sensor	TFT sensor circuit short to power.	TCM has detected a voltage drop across TFT sensor; exceeds scale set for temperature.	-	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0714	TFT sensor	TFT intermittent error.	TCM has detected no TFT intermittent operation.	-	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0715	Turbine shaft speed (TSS) sensor	TSS sensor circuit error.	TCM has detected a short circuit to power.	<ul style="list-style-type: none"> <li>No torque convertor clutch (TCC) engagements</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be

				<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• Max line pressure</li> <li>• No adaptive learning strategy</li> <li>• Hold in 3rd gear</li> <li>• Will turn on TCIL</li> </ul>	reflashed to the latest level calibration.
P0716	TSS sensor	TSS range or operation insufficient input from TSS.	TCM has detected a loss or noisy TSS signal during operation.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• May turn on MIL</li> <li>• Max line pressure</li> <li>• No adaptive learning strategy</li> <li>• Hold in 3rd gear</li> <li>• Will turn on TCIL</li> </ul>	MONITOR the TSS PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0717	TSS sensor	No TSS signal.	TCM has not detected a TSS signal. No TSS signal when output shaft speed (OSS) sensor signal is present.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• May turn on MIL</li> <li>• Max line pressure</li> <li>• No adaptive learning strategy</li> <li>• Hold in 3rd gear</li> <li>• Will turn on TCIL</li> </ul>	MONITOR the TSS PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0720	Output shaft	No OSS signal.	TCM has	May turn on MIL	INSTALL a new

	speed (OSS) sensor		detected an OSS short circuit to power.		mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0721	OSS sensor	OSS range or operation insufficient input from OSS.	TCM has detected a loss or noisy OSS signal during operation.	May turn on MIL	MONITOR the OSS PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0722	OSS sensor	No OSS signal.	TCM has not detected a OSS signal. No OSS signal when TSS signal is present.	May turn on MIL	MONITOR the OSS PID to validate that an error is present. REFER <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0723	OSS sensor	No OSS signal intermittent.	TCM has detected an intermittent OSS signal.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• Hold in gear currently selected</li> <li>• Max line pressure</li> </ul>	MONITOR the OSS PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all

				<ul style="list-style-type: none"> <li>• No adaptive learning strategy</li> <li>• Will turn on TCIL</li> </ul>	DTCs. TEST the system for normal operation. If the DTC returns, INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0729	Transmission	Sixth gear ratio error.	No 6th gear ratio detected by the TCM.	<ul style="list-style-type: none"> <li>• No 6th gear</li> <li>• No TCC engagements</li> <li>• May turn on MIL</li> <li>• No adaptive learning strategy</li> <li>• Max line pressure</li> <li>• Held in 5th gear</li> <li>• Will turn on TCIL</li> </ul>	FOLLOW preliminary diagnostics. MONITOR the GEAR PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 272. REFER to <b><u>Diagnosis By Symptom</u></b> .
P0731	Transmission	First gear ratio error.	No 1st gear ratio detected by the TCM.	<ul style="list-style-type: none"> <li>• No 1st gear</li> <li>• No TCC engagements</li> <li>• May turn on MIL</li> <li>• No adaptive learning strategy</li> <li>• Held in 3rd gear</li> <li>• Max line pressure</li> <li>• Will turn on TCIL</li> </ul>	FOLLOW preliminary diagnostics. MONITOR the GEAR PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 215. REFER to <b><u>Diagnosis By Symptom</u></b> .
P0781	Transmission	1-2 or 2-1 shift error.	Incorrect ratio calculated	<ul style="list-style-type: none"> <li>• Incorrect gear selection</li> </ul>	FOLLOW preliminary



			during shift 1-2 or 2-1.	<p>depending on failure or mode and manual lever position. Shift errors may also be due to other internal transmission concerns (stuck valves, damaged friction material)</p> <ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• No adaptive learning strategy</li> <li>• Hold in 3rd, 2nd or 4th gear</li> <li>• Will turn on TCIL</li> </ul>	<p>diagnostics. MONITOR the GR_RAT_CMD PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b>. CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 220 or 225. REFER to <b><u>Diagnosis By Symptom</u></b>.</p>
P0782	Transmission	2-3 or 3-2 shift error.	Incorrect ratio calculated during shift 2-3 or 3-2.	<ul style="list-style-type: none"> <li>• Incorrect gear selection depending on failure or mode and manual lever position. Shift errors may also be due to other internal transmission concerns (stuck valves, damaged friction material)</li> <li>• No TCC engagements</li> <li>• No adaptive learning strategy</li> <li>• Hold in 4th, 3rd or 2nd gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	<p>FOLLOW preliminary diagnostics. MONITOR the GR_RAT_CMD PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b>. CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 221 or 224. REFER to <b><u>Diagnosis By Symptom</u></b>.</p>
P0783	Transmission	3-4 or 4-3 shift	Incorrect ratio		FOLLOW

		error.	calculated during shift 3-4 or 4-3.	<ul style="list-style-type: none"> <li>• Incorrect gear selection depending on failure or mode and manual lever position. Shift errors may also be due to other internal transmission concerns (stuck valves, damaged friction material)</li> <li>• No TCC engagements</li> <li>• No adaptive learning strategy</li> <li>• Hold in 4th or 3rd gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	<p>preliminary diagnostics. MONITOR the GR_RAT_CMD PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b>. CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 222 or 223. REFER to <b><u>Diagnosis By Symptom</u></b>.</p>
P0784	Transmission	4-5 or 5-4 shift error.	Incorrect ratio calculated during shift 4-5 or 5-4.	<ul style="list-style-type: none"> <li>• Incorrect gear selection depending on failure or mode and manual lever position. Shift errors may also be due to other internal transmission concerns (stuck valves, damaged friction material)</li> <li>• No TCC engagements</li> <li>• No adaptive learning strategy</li> <li>• Hold in 5th or 4th gear</li> </ul>	<p>FOLLOW preliminary diagnostics. MONITOR the GR_RAT_CMD PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b>. CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 270 or 271. REFER to <b><u>Diagnosis By Symptom</u></b>.</p>

				<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	
P0732	Transmission	Second gear ratio error.	No 2nd gear ratio detected by the TCM.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• No adaptive learning strategy</li> <li>• Max line pressure</li> <li>• May turn on MIL</li> <li>• Hold in 3rd gear</li> <li>• Will turn on TCIL</li> </ul>	<p>FOLLOW preliminary diagnostics. MONITOR the GR_RAT_CMD PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b>. CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 220, 224 and 217. REFER to <b><u>Diagnosis By Symptom</u></b>.</p>
P0733	Transmission	Third gear ratio error.	No 3rd gear ratio detected by the TCM.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• No adaptive learning strategy</li> <li>• Max line pressure</li> <li>• May turn on MIL</li> <li>• Hold in 4th gear</li> <li>• Will turn on TCIL</li> </ul>	<p>FOLLOW preliminary diagnostics. MONITOR the GR_RAT_CMD PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b>. CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 221 or 223. REFER to <b><u>Diagnosis By Symptom</u></b>.</p>
P0734	Transmission	Fourth gear ratio error.	No 4th gear ratio detected by the TCM.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• No adaptive learning strategy</li> <li>• Max line</li> </ul>	<p>FOLLOW preliminary diagnostics. MONITOR the GR_RAT_CMD PID to validate that an error is present.</p>

				<ul style="list-style-type: none"> <li>pressure</li> <li>• May turn on MIL</li> <li>• Hold in 3rd gear</li> <li>• Will turn on TCIL</li> </ul>	<p>REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b>. CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 222 or 271. REFER to <b><u>Diagnosis By Symptom</u></b>.</p>
P0735	Transmission	Fifth gear ratio error.	No 5th gear ratio detected by the TCM.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• No adaptive learning strategy</li> <li>• Max line pressure</li> <li>• May turn on MIL</li> <li>• Hold in 3rd gear</li> <li>• Will turn on TCIL</li> </ul>	<p>FOLLOW preliminary diagnostics. MONITOR the GR_RAT_CMD PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b>. CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 270 or 273. REFER to <b><u>Diagnosis By Symptom</u></b>.</p>
P0736	Transmission	Reverse gear ratio error.	No reverse gear ratio detected by the TCM.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• No adaptive learning strategy</li> <li>• Max line pressure</li> <li>• May turn on MIL</li> <li>• Hold in 4th gear</li> </ul>	<p>FOLLOW preliminary diagnostics. MONITOR the GR_RAT_CMD PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b>. CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 202 or 205. REFER</p>

					to <b><u>Diagnosis By Symptom.</u></b>
P0829	Transmission	5-6 or 6-5 shift error.	Incorrect ratio calculated during shift 5-6 or 6-5.	<ul style="list-style-type: none"> <li>• Incorrect gear selection depending on failure or mode and manual lever position. Shift errors may also be due to other internal transmission concerns (stuck valves, damaged friction material).</li> <li>• No TCC engagements</li> <li>• Held in 3rd or 2nd gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	FOLLOW preliminary diagnostics. MONITOR the GR_RAT_CMD PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart.</u></b> CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, see diagnostic routine 272 or 273. REFER to <b><u>Diagnosis By Symptom.</u></b>
P0960	Pressure control (PC) A	PC A circuit or solenoid failure or open circuit.	PC A circuit or variable force solenoid (VFS-5) failed during operation.	<ul style="list-style-type: none"> <li>• No adaptive strategy</li> <li>• Max line pressure</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0962	PC A	PC A solenoid signal or ground circuits either short or open solenoid circuit failure.	Voltage through PC A solenoid (VFS-5) is checked. An error will be noted if tolerance is exceeded.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0963	PC A	PC A solenoid short to power circuit failure.	Voltage through PC A solenoid (VFS-5) is checked. An error will be noted if tolerance is exceeded.	<ul style="list-style-type: none"> <li>• Max line pressure</li> <li>• No adaptive strategies</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.

P0972	Shift solenoid (SS) A	SS A circuit or solenoid failure.	SS A (variable force solenoid [VFS-1]) circuit or solenoid failure.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	<p>MONITOR the SSA_AMP PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b>. CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, INSTALL a new mechatronics unit. After installing the new mechatronics unit, it must be reflashed to the latest level calibration.</p>
P0973	SS A	SS A solenoid or circuit shorted to ground or open.	Voltage through SS A solenoid (VFS-1) is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	<p>INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.</p>
P0974	SS A	SS A solenoid or circuit shorted to power or open.	Voltage through SS A solenoid (VFS-1) is checked. An error will be noted if tolerance is exceeded. Short to power failure detected.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	<p>INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.</p>
P0975	SS B	SS B circuit shorted to ground or open.	SS B (VFS-2) circuit or solenoid failure.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	<p>INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.</p>

P0976	SS B	SS B solenoid or circuit shorted to ground or open.	Voltage through SS B solenoid (VFS-2) is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0977	SS B	SS B solenoid or circuit shorted to power or open.	Voltage through SS B solenoid (VFS-2) is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0978	SS C	SS C circuit shorted to ground or open.	SS C (VFS-3) circuit or solenoid failure.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0979	SS C	SS C solenoid or circuit shorted to ground or open.	Voltage through SS C solenoid (VFS-3) is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0980	SS C	SS C solenoid or circuit shorted to power or open.	Voltage through SS C solenoid (VFS-3) is checked. An error will be noted if tolerance is exceeded.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.

			Short to ground failure detected.	<ul style="list-style-type: none"> <li>• Will turn on TCIL</li> </ul>	
P0981	SS D	SS D circuit shorted to ground or open.	SS D (VFS-4) circuit or solenoid failure.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0982	SS D	SS D solenoid or circuit shorted to ground or open.	Voltage through SS D solenoid (VFS-4) is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0983	SS D	SS D solenoid or circuit shorted to power or open.	Voltage through SS D solenoid (VFS-4) is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P0770	SS E	SS E circuit or solenoid failure.	SS E (SS1) circuit or solenoid failure.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new SS E (SS1) solenoid.
P0985	SS E	SS E solenoid signal circuit shorted to ground or open.	Voltage through SS E solenoid (SS1) is checked. An error will be noted if	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on</li> </ul>	INSTALL a new SS E (SS1) solenoid.



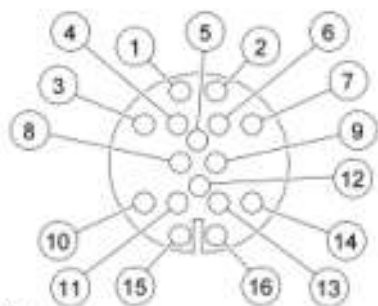
			tolerance is exceeded. Short to ground failure detected.	MIL • Will turn on TCIL	
P0986	SS E	SS E solenoid or circuit shorted to power or open.	Voltage through SS E solenoid (SS1) is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected.	<ul style="list-style-type: none"> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new SS E (SS1) solenoid.
P1707	Transmission	P/N switch circuit failure.	Circuit or sensor failure high. Circuit or sensor failure low.	<ul style="list-style-type: none"> <li>• Engine will not crank in P or N or engine will crank in all gears</li> <li>• Will turn on TCIL</li> </ul>	MONITOR the TR PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all DTCs. TEST the system for normal operation. Check the shift linkage. If the DTC returns, INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P1910	Reverse lamp circuit	Reverse solenoid circuit failure.	Circuit or sensor failure.	<ul style="list-style-type: none"> <li>• Park lock or interlock switched OFF</li> <li>• Reverse lamps may be on at all times</li> <li>• Reverse may not come on</li> </ul>	MONITOR the TR PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all the DTCs. TEST system for normal operation. If DTC returns, REFER to the <b><u>Introduction - Gasoline Engines</u></b> .
P1911	Reverse lamps	Reverse	Circuit or	-	MONITOR the TR

		solenoid signal circuit shorted to ground. Circuit low.	sensor failure.		PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all the DTCs. TEST system for normal operation. If DTC returns, REFER to the <b><u>Introduction - Gasoline Engines</u></b> .
P1912	Reverse lamps	Reverse solenoid circuit shorted to power. Circuit high.	Circuit or sensor failure.	Park lock or interlock switched OFF.	MONITOR the TR PID to validate that an error is present. REFER to <b><u>Diagnostic Parameters Identification (PID) Chart</u></b> . CLEAR all the DTCs. TEST system for normal operation. If DTC returns, REFER to the <b><u>Introduction - Gasoline Engines</u></b> .
P0740	TCC solenoid	TCC solenoid circuit failure.	TCC solenoid (VFS-6) circuit fails. Circuit open.	<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• No adaptive learning strategy</li> <li>• Mechanical limp-home mode - default to 3rd or 5th gear</li> <li>• TCC engagements</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
P2763	TCC	TCC solenoid signal circuit shorted to power. Circuit high (ON).	TCC solenoid (VFS-6) circuit fails to provide voltage drop across solenoid. Circuit shorted to power.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• May turn on MIL</li> <li>• No adaptive learning strategy</li> <li>• Mechanical</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.

				limp-home mode - default to 3rd or 5th gear <ul style="list-style-type: none"> <li>• Will turn on TCIL</li> </ul>	
P2764	TCC	TCC solenoid circuit shorted to ground. Circuit low.	TCC solenoid (VFS-6) circuit fails to provide voltage drop across solenoid.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• May turn on MIL</li> <li>• No adaptive learning strategy</li> <li>• Will turn on TCIL</li> </ul>	INSTALL a new mechatronics unit. After installing the new mechatronic unit, it must be reflashed to the latest level calibration.
U0073	Controller area network (CAN)	CAN communication link error.	CAN communication bus off, short circuit CAN high to CAN low.	<ul style="list-style-type: none"> <li>• No adaptive learning strategy</li> <li>• Hold in 3rd gear</li> <li>• Max line pressure</li> <li>• Will turn on TCIL</li> <li>• No TCC engagements</li> </ul>	REFER to <b><u>Introduction - Gasoline Engines</u></b> .
U0155	CAN	TCM communication link error.	CAN link error detected by TCM and instrument panel (IP).	<ul style="list-style-type: none"> <li>• No communication with instrument panel cluster (IPC)</li> </ul>	REFER to <b><u>Introduction - Gasoline Engines</u></b> .
U0100	CAN	TCM communication link error.	CAN link error detected by TCM, between TCM and ECM.	<ul style="list-style-type: none"> <li>• No adaptive learning strategy</li> <li>• Hold in 3rd gear</li> <li>• Max line pressure</li> <li>• Will turn on TCIL</li> <li>• No TCC engagements</li> </ul>	REFER to <b><u>Introduction - Gasoline Engines</u></b> .
U0121	CAN	TCM communication link error.	PCM/TCM have detected an error in the CAN wheel	-	REFER to <b><u>Introduction - Gasoline Engines</u></b> .

			rpm information from the ABS.		
P062F	TCM	TCM EEPROM error.	Internal TCM error with EEPROM.	<ul style="list-style-type: none"> <li>• May turn on MIL</li> <li>• Mechanical limp-home mode</li> </ul>	CLEAR all DTCs. TEST the system for normal operation. If the DTC returns, install a new mechatronics unit. After installing the new mechatronics unit, it must be reflashed to the latest level calibration.
P0741	TCC	TCC solenoid circuit stuck open.	TCC solenoid (VFS-6), clutch or circuit open.	<ul style="list-style-type: none"> <li>• No TCC engagements</li> <li>• May turn on MIL</li> <li>• Will turn on TCIL</li> </ul>	CARRY OUT normal diagnostics for TCC. FOLLOW diagnostic routines 240, 241 and 242. REFER to <b>Diagnosis By Symptom</b> .

## TRANSMISSION CONNECTOR LAYOUTS



N0033244

**Fig. 5: Transmission Vehicle Harness Connector**

Pin Number	Circuit	Circuit Function
1	-	NOT USED
2	-	CAN low
3	-	NOT USED
4	-	NOT USED
5	-	NOT USED
6	-	CAN high
7	-	NOT USED
8	-	NOT USED
9	-	Term 15 (Ignition)
10	-	Park/Neutral signal (to PCM TRSW-PN T-19)
11	-	NOT USED
12	-	NOT USED

13	-	Term 31 (Ground)
14	-	Term 30 (Battery voltage)
15	-	NOT USED
16	-	Terminal 31 (Ground)

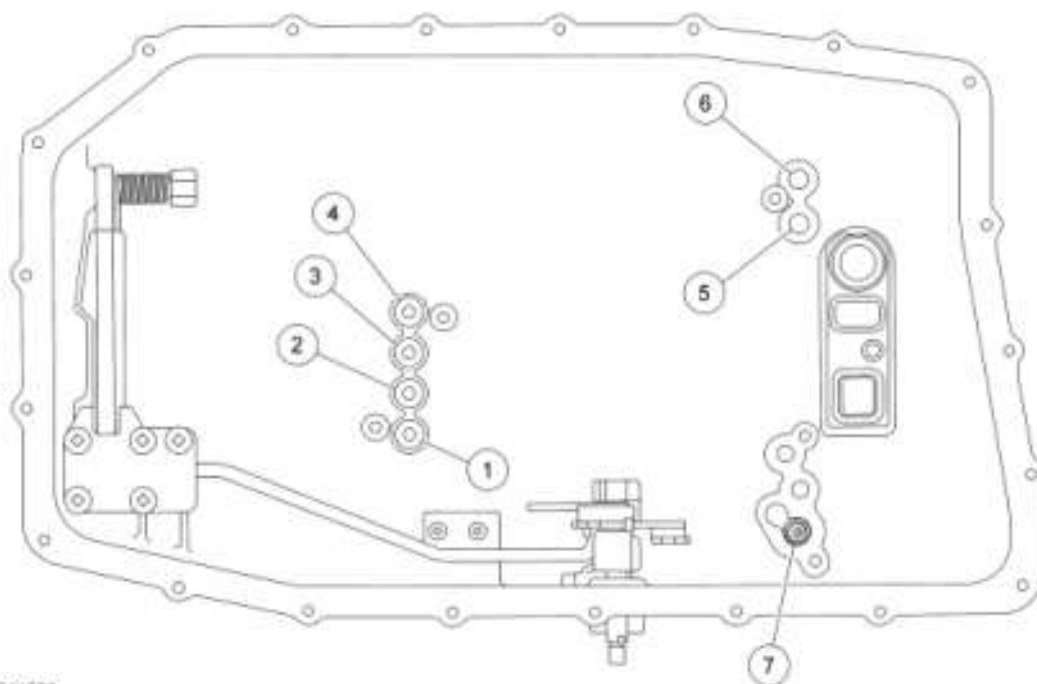
## SPECIAL TESTING PROCEDURES

The special tests are designed to aid the technician in diagnosing the hydraulic and mechanical portions of the transmission.

### Engine Idle Speed Check

Refer to the Introduction - Gasoline Engines for diagnosis and testing of the engine idle speed.

### Air Pressure Test



N0041503

**Fig. 6: Identifying Air Pressure Test**  
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Clutch (C) port
2	-	Clutch (D1) port
3	-	Clutch (D2) port
4	-	Direct clutch (B) port
5	-	Overdrive clutch (E) port
6	-	Forward clutch (A) port
7	-	Cooler bypass valve


A no-drive condition can exist, even with correct transmission fluid pressure, because of inoperative clutches or bands. Refer to the Clutch Application Chart to determine the appropriate elements. A clutch concern can be located through a series of checks by substituting air pressure for fluid pressure to determine the location of the concern.

Example: When the selector lever is in a forward gear range (D, 3, 2, 1), a no-drive condition may be caused by an inoperative forward clutch.

1. Drain the transmission fluid. Remove the transmission fluid pan.
2. Remove the transmission fluid filter and seal assembly and the mechatronics unit.
3. The inoperative clutches can be located by applying air pressure into the appropriate clutch port.
4. Apply air pressure to the appropriate clutch port. A dull thud may be heard or movement felt when a clutch piston is applied. If the clutch seals or check ball are leaking, a hissing may be heard.
5. If the clutches fail to operate during the air check:
  - the piston seals are not seated, damaged or not installed correctly.
  - plugged feed holes for clutch apply in the case and/or clutch cylinder.
  - damaged piston and/or clutch cylinder.
6. Service as required and recheck.

## LEAKAGE INSPECTION

### Special Tools

Illustration	Tool Name	Tool Number
	100W/12 Volt DC UV Lamp	164-R0751 or equivalent

### Material

Item	Specification
Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye 164-R3701 (Rotunda)	-
MERCON® SP Automatic Transmission Fluid XT-6-QSP (US); CXT-6-LSP12 (Canada)	MERCON® SP

The transmission has the following parts to prevent external transmission fluid leakage:

- Gaskets
- Lip-type seals
- O-ring seals
- Seal rings
- Seal grommets
- Seal washers
- Thread sealant

Leakage at the transmission fluid pan gasket often can be stopped by tightening the bolts to specification. Refer to **SPECIFICATIONS**.

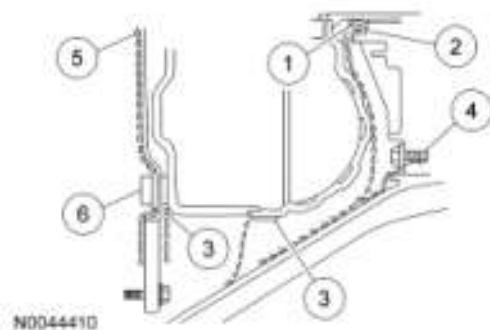
When transmission fluid is found to be leaking between the transmission case and the transmission fluid cooler tube fitting, tighten the fitting to maximum specification.

If transmission fluid leakage is found at the manual control lever shaft, install a new seal.

Check for transmission fluid leaking from the end of the extension housing. Leakage can result from a damaged seal, missing garter spring or worn extension bushing. Install a new seal assembly, bushing or both, as necessary.

### Fluid Leakage in Torque Converter Area

Leakage at the front of the transmission, as evidenced by fluid around the torque converter housing part of the case, may have several sources. By careful observation it is possible, in many instances, to pinpoint the source of the leak before removing the transmission from the vehicle. The paths which the fluid takes to reach the bottom of the torque converter housing are shown in the illustration. The 6 numbers in the illustration correspond with the 6 flow path steps.



**Fig. 7: Identifying Fluid Leakage In Torque Converter Area**  
 Courtesy of FORD MOTOR CO.

Leak Path	Symptom	Possible Source
1, 2 and 4	Leak at front of transmission	Pump lip seal
1, 2 and 4	Leak at front of transmission	Vent
1, 2 and 4	Leak at front of transmission	Converter hub weld
1, 2 and 4	Leak at front of transmission	External pump seal (large)
1, 2 and 4	Leak at front of transmission	Pump to case fasteners
1, 2 and 4	Leak at front of transmission	Pump gasket
3	Leak at front of transmission	Torque converter seal weld
5	Leak at front of transmission	Engine oil leak; rear main seal
5	Leak at front of transmission	Engine valve cover
5	Leak at front of transmission	Oil galley
5	Leak at front of transmission	Pump lip seal
5	Leak at front of transmission	Engine oil pressure sensor
6	Leak at front of transmission	Torque converter rivet

### Transmission Leak Check Test Procedure

Add dye to the transmission fluid. Use 30.0 mL (1 oz.) of dye for every 3.8L (4 qt) of transmission fluid. Add any additional transmission fluid to bring it to the correct level. Such dyes can be used to determine whether an engine fluid or transmission fluid leak is present, or if the fluid in the transmission fluid cooler hose leaks into the engine coolant system. An ultraviolet light must be used to detect the fluorescent dye solution.

1. Remove the transmission fluid level fill plug and note the color of the transmission fluid that drips out. Original factory fill transmission fluid is clear and red if the transmission fluid has been exchanged.
2. Clean off any transmission fluid from the top and bottom of the torque converter housing, front of the case and rear face of the engine and oil pan. Clean the torque converter area by washing with a suitable non-flammable solvent and blow-dry with compressed air.
3. Wash out the torque converter housing and the front of the flexplate. The torque converter housing may be washed out using clean solvent and a squirt-type oil can. Blow-dry all washed areas with compressed air.
4. Start and run the engine until the transmission reaches its normal operating temperature. Shift the transmission through all the gear ranges to make sure that the dye has circulated through the transmission. Observe the back of the cylinder block and top of the torque converter housing for evidence of fluid leakage. Observe the front of the flexplate, back of the cylinder block (in as far as possible) and inside the torque converter housing and front of the case. Run the engine until fluid leakage is evident and the probable source of leakage can be determined. Repair as required.

#### EXTERNAL FLUID LEAKS

Leak Path	Possible Source
Leaks at the fluid pan to case	<ul style="list-style-type: none"> <li>• Transmission fluid pan bolts not tightened to specification</li> <li>• Transmission fluid pan gasket damaged</li> <li>• Transmission case pan rail damaged</li> </ul>
Fluid cooler tubes or O-rings leaking	<ul style="list-style-type: none"> <li>• Transmission fluid cooler tube(s), cooler tube O-rings damaged</li> <li>• Transmission fluid cooler tube hold down plate damaged</li> </ul>
	<ul style="list-style-type: none"> <li>• Transmission fluid cooler</li> </ul>



Leaks at the fluid cooler	<p>damaged</p> <ul style="list-style-type: none"> <li>• Transmission fluid cooler tube O-rings damaged</li> </ul>
Leaks at the manual control lever	<ul style="list-style-type: none"> <li>• Manual control lever seal missing or damaged</li> </ul>
Mechatronic harness connector	<ul style="list-style-type: none"> <li>• O-ring on connector missing or damaged</li> </ul>

### Leak Check Test With A Black Light

Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye 164-R3701 or equivalent (specifically formulated for ATF) is used to detect a transmission fluid leak.

1. Add dye to the transmission fluid. Use one 30.0 mL (1 oz.) of dye solution for every 3.8L (4 qt) of transmission fluid.
2. Start and run the engine until the transmission reaches its normal operating temperature. Observe the back of the cylinder block and top of the torque converter housing for evidence of transmission fluid leakage. Raise the vehicle on a hoist and run the engine at fast idle, then at engine idle, occasionally shifting to the DRIVE and REVERSE ranges to increase pressure within the transmission. Observe the front of the flexplate, back of the cylinder block (in as far as possible), inside the torque converter housing and the entire case until transmission fluid leakage is evident and the probable source of leakage can be determined.

### Transmission Fluid Cooler Tube Replacement

For installation of new transmission fluid cooler tube, refer to TRANSAXLE/TRANSMISSION COOLING.

### TRANSMISSION FLUID COOLER


**CAUTION:** Whenever a transmission has been disassembled to install new parts, the transmission fluid cooler and transmission fluid cooler tubes must be cleaned and backflushed. Use a torque converter/oil cooler cleaner.

**NOTE:** Cleaning and backflushing the transmission fluid cooling system, along with following all the normal cleaning and inspection procedures during disassembly and reassembly, will keep contaminants from entering the transmission, causing a repeat repair.

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

## DIAGNOSIS BY SYMPTOM

### Special Tools

Illustration	Tool Name	Tool Number
	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS)	software with appropriate hardware, or equivalent scan tool

The Diagnosis By Symptom gives the technician diagnostic information and direction, and suggests possible components using a symptom as a starting point. All routines start out with any potential electrical components that can cause or contribute to the symptom described. The routines then list all possible hydraulic or mechanical components that can cause or contribute the symptom described.

### Diagnosis by Symptom Chart Directions

1. Using the Diagnosis by Symptom, select the condition that best describes the condition.
2. Refer to the routine indicated in the Diagnosis by Symptom Chart.
3. Always begin diagnosis of a symptom with:
  1. preliminary inspections.
  2. verifications of condition.
  3. checking the fluid levels.
  4. carrying out other test procedures as directed.

**NOTE:** Not all concerns and conditions with electrical components will set a DTC. Be aware that the components listed may still be the cause. Verify correct function of these components prior to proceeding to the Hydraulic/Mechanical Routine listed.

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

4. Begin with the ROUTINES, if indicated. Follow the reference or action required statements. Always carry out the on-board diagnostic tests as required. Never skip steps. Repair as required. If the concern is still present after electrical diagnosis, then proceed to the Hydraulic/Mechanical Routine listed.
5. The list contains only possible hydraulic or mechanical components that may cause or contribute to the concern. These components are listed in the removal sequence and by most probable cause. All components listed must be inspected to make sure that repairs are complete.

### DIAGNOSIS BY SYMPTOM CHART

Title	Routines

<b>Engagement Concerns</b>	
No Forward In D	201
No Reverse	202
Harsh Reverse	203
Harsh Forward	204
Delayed/Soft Reverse	205
Delayed/Soft Forward	206
No Forward and No Reverse	207
Harsh Forward and Harsh Reverse	208
Delayed Forward and Delayed Reverse	209
<b>Shift Concerns</b>	
Some/All Shifts Missing	210
Timing - Early/Late	211
Timing - Erratic/Hunting	212
<b>Feel Concerns</b>	
Soft/Slipping (some or all)	213
Harsh (some or all)	214
No 1st Gear, Engages in Higher Gear	215
No Manual 1st Gear	216
No Manual 2nd Gear	217
No Manual 3rd Gear	218
No 1-2 Shift (Automatic)	220
No 2-3 Shift (Automatic)	221
No 3-4 Shift (Automatic)	222
No 4-5 Shift (Automatic)	270
No 5-6 Shift (Automatic)	272
No 6-5 Shift (Automatic)	273
No 5-4 Shift (Automatic)	271
No 4-3 Shift (Automatic)	223
No 3-2 Shift (Automatic)	224
No 2-1 Shift (Automatic)	225
<b>Torque Converter Operation Concerns</b>	
No Apply	240
Cycling/Shudder/Chatter	241
Always Applied/Stalls Vehicle	242
<b>Other Concerns</b>	
External Leaks	252
Noise/Vibration in Forward or Reverse	254
Engine Will Not Crank	255
No Park (P) Range	256
Transmission Overheating	257
Fluid Venting/Foaming	261

### Diagnostic Routines

### ENGAGEMENT CONCERNS: NO FORWARD IN D

Possible Component	Reference/Action
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**201 - ROUTINE**

<b>Transmission Fluid Level</b>	Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Selector Lever Linkage</b>	Selector lever linkage - damage or incorrectly adjusted	Inspect and repair as required. Verify transmission selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> . Adjust transmission selector lever cable as necessary.
<b>Mechatronics</b>	Defective manual valve Defective forward clutch (A) regulator valve Defective SSA (VFS-1) shift solenoid Electronic component - failure	Inspect connection to selector lever linkage. Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> . Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> . Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Clutch Plates</b>	Forward clutch (A) friction and steel plate - failure Direct clutch (B) friction and steel plate - failure Low/reverse clutch (D) friction and steel plate - failure	Inspect the forward clutch assembly for damage. Repair as required. Refer to <b><u>Forward Clutch Assembly</u></b> . Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly</u></b> . Inspect the low/reverse clutch assembly for damage. Repair as required. Refer to <b><u>Low/Reverse Clutch Assembly</u></b> .
<b>Pump</b>	Pump gear - failure	Install a new pump assembly. Refer to <b><u>Pump Assembly</u></b> .

**ENGAGEMENT CONCERNS: NO REVERSE**

<b>Possible Component</b>	<b>Reference/Action</b>
<b>202 - ROUTINE</b>	
<b>Transmission Fluid Level</b>	Incorrect transmission fluid level
	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Selector Lever Linkage</b>	Selector lever linkage - damage or incorrectly adjusted
	Inspect and repair as required. Verify transmission selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> . Adjust transmission selector lever cable as necessary.
<b>Mechatronics</b>	Defective direct clutch (B) or low/reverse clutch (D) regulator valve Defective SSB (VFS-2) shift solenoid Electronic component - failure
	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> . Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> . Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> in this.

<b>Clutch Plates</b>	
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly</u></b> .
<b>Pump</b>	
Pump gear - failure	Install a new pump assembly. Refer to <b><u>Pump Assembly</u></b> .

### ENGAGEMENT CONCERNS: HARSH REVERSE

Possible Component	Reference/Action
<b>203 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Mechatronics</b>	
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSB (VFS-2) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Driveline</b>	
Engine driveline looseness in the driveshaft, U-joints or the engine mounts	Repair as required.

### ENGAGEMENT CONCERNS: HARSH FORWARD ONLY

Possible Component	Reference/Action
<b>204 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Mechatronics</b>	
Defective forward clutch (A) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective forward clutch (A) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSA (VFS-1) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Driveline</b>	
Engine driveline looseness in the driveshaft, U-joints or the engine mounts	Repair as required.

### ENGAGEMENT CONCERNS: DELAYED/SOFT REVERSE ONLY

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Possible Component	Reference/Action
<b>205 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly - plugged, damaged	Install a new transmission fluid filter assembly.
<b>Mechatronics</b>	
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSB (VFS-2) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .

#### ENGAGEMENT CONCERNS: DELAYED/SOFT FORWARD ONLY

Possible Component	Reference/Action
<b>206 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly - plugged, damaged	Install a new transmission fluid filter assembly.
<b>Mechatronics</b>	
Defective forward clutch (A) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSA (VFS-1) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .

#### ENGAGEMENT CONCERNS: NO FORWARD AND NO REVERSE

Possible Component	Reference/Action
<b>207 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Mechatronics</b>	
Defective manual valve	Inspect connection to selector lever linkage.
<b>Pump</b>	
Pump gear - failure	Install a new pump assembly. Refer to <b><u>Pump Assembly</u></b> .

### ENGAGEMENT CONCERNS: HARSH FORWARD AND HARSH REVERSE

Possible Component	Reference/Action
<b>208 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly - plugged, damaged	Install a new transmission fluid filter assembly.
<b>Powertrain Control System</b>	
PCM electrical inputs/outputs, TCM, external vehicle wiring harnesses, solenoids, transmission range (TR) sensor, SSA solenoid, PCA solenoid	Carry out on-board diagnostic tests. Repair as required. Clear DTCs. Road test and carry out on-board diagnostic test again.
Multiple shift missing (more than one gear)	If some shifts are missing, determine which shifts do not occur. Refer to <b><u>CLUTCH APPLICATION CHART</u></b> and <b><u>SOLENOID APPLICATION CHART</u></b> . Monitor appropriate PIDs as listed in diagnostics.
<b>Mechatronics</b>	
Gears 4-6 default to 5th gear and gears 1-3 default to 3rd gear	Retrieve DTC codes.
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .

### ENGAGEMENT CONCERNS: DELAYED FORWARD AND DELAYED REVERSE

Possible Component	Reference/Action
<b>209 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly - plugged, damaged	Install a new transmission fluid filter assembly.
<b>Mechatronics</b>	
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .

### SHIFT CONCERNS: SOME/ALL SHIFTS MISSING

Possible Component	Reference/Action
<b>210 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly - plugged, damaged	Install a new transmission fluid filter assembly.
<b>Selector Lever Linkage Damaged or Incorrectly</b>	

<b>Adjusted</b>	
External selector lever cable	Inspect and repair as required. Verify transmission selector lever cable adjustment. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> . Adjust transmission selector lever cable as necessary.
<b>Forward Clutch (A) Assembly (No Shifts)</b>	
Seals, piston - damaged	Inspect for damage. Repair as required.
Friction elements - damaged or worn	Inspect for damage. Repair as required.
Return springs - damaged	Inspect for damage. Repair as required.
<b>Powertrain Control System</b>	
PCM electrical inputs/outputs, TCM, external vehicle wiring harnesses, solenoids, transmission range (TR) sensor, SSA solenoid, PCA solenoid	Carry out on-board diagnostic tests. Repair as required. Clear DTCs. Road test and carry out on-board diagnostic test again.
Multiple shift missing (more than one gear)	If some shifts are missing, determine which shifts do not occur. Refer to <b><u>CLUTCH APPLICATION CHART</u></b> and <b><u>SOLENOID APPLICATION CHART</u></b> . Monitor appropriate PIDs as listed in diagnostics.

### SHIFT CONCERNS: TIMING - EARLY/LATE

Possible Component	Reference/Action
<b>211 - ROUTINE</b>	
<b>Powertrain Control System</b>	
PCM electrical inputs/outputs, TCM, external vehicle wiring harnesses	Carry out on-board diagnostic tests. Repair as required. Clear DTCs. Road test and carry out on-board diagnostic test again.
Engine driveability concerns	Refer to <b><u>ENGINE SYSTEM - GENERAL INFORMATION</u></b> .
<b>Mechatronics</b>	
Bolts not tightened to specification	Tighten to specification.
Mechatronic unit contaminated, solenoid (s) damaged, stuck or bore damaged.	Inspect for damage. If damaged, install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Manual valve damaged, stuck or bore damaged	
<b>Incorrect Pressures</b>	
Application pressures are incorrect	Incorrect application pressures may be due to non-transmission components, mechatronic assembly or internal transmission damage. Repair all non-transmission components then continue with this routine.
<b>Other</b>	
Tire size change, axle ratio change	Verify that the vehicle has the original equipment. Refer to the certification label. Changes in tire size and axle ratio will affect shift timing.



### SHIFT CONCERNS: TIMING - ERRATIC/HUNTING (SOME/ALL)

Possible Component	Reference/Action
<b>212 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid condition	Carry out the transmission fluid condition check in <b><u>Preliminary Inspection</u></b> .
Transmission fluid over temperature condition	Refer to transmission overheating.
<b>Powertrain Control System</b>	
PCM electrical inputs/outputs, TCM, external vehicle wiring harnesses	Carry out on-board diagnostic tests. Repair as required. Clear DTCs. Road test and carry out on-board diagnostic test again.
<b>Torque Converter Concerns</b>	
Torque converter clutch	Refer to torque converter clutch operation concern: cycling/shudder/chatter.

### SHIFT CONCERNS: FEEL - SOFT OR SLIPPING (SOME OR ALL)

Possible Component	Reference/Action
<b>213 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly - plugged, damaged	Install a new transmission fluid filter assembly.
<b>Powertrain Control System</b>	
PCM electrical inputs/outputs, TCM, external vehicle wiring harnesses	Carry out on-board diagnostic tests. Repair as required. Clear DTCs. Road test and carry out on-board diagnostic test again.
<b>Transmission Fluid Temperature (TFT) Sensor Damaged</b>	
Mechatronic assembly	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Bolts not tightened to specification	Tighten to specification.
Mechatronic unit contaminated, solenoid(s) damaged, stuck or bore damaged. Manual valve damaged, stick or bore damaged	Inspect for damage. If damaged, install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .

### SHIFT CONCERNS: FEEL - HARSH (SOME/ALL)

Possible Component	Reference/Action
<b>214 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly	

- plugged, damaged	Install a new transmission fluid filter assembly.
<b>Powertrain Control System</b>	
PCM electrical inputs/outputs, TCM, external vehicle wiring harnesses	Carry out on-board diagnostic tests. Repair as required. Clear DTCs. Re-flash mechatronic assembly to the latest level calibration. Carry out road test - adaptive drive cycle, refer to <b><u>Shift Point Road Test</u></b> . Road test and carry out on-board diagnostic test again.

### SHIFT CONCERNS: NO 1ST GEAR IN DRIVE, ENGAGES IN A HIGHER GEAR

Possible Component	Reference/Action
<b>215 - ROUTINE</b>	
<b>Powertrain Control System</b>	
PCM electrical inputs/outputs, TCM, external vehicle wiring harnesses	Carry out on-board diagnostic tests. Repair as required. Clear DTCs. Road test and carry out on-board diagnostic test again.
<b>Incorrect Gear</b>	
Mechatronic failure	Determine which gear the transmission is in. Refer to the <b><u>CLUTCH APPLICATION CHART</u></b> and <b><u>SOLENOID APPLICATION CHART</u></b> .

### SHIFT CONCERNS: NO 1ST GEAR MANUAL

Possible Component	Reference/Action
<b>216 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly - plugged, damaged	Install a new transmission fluid filter assembly.
<b>Selector Lever Linkage</b>	
External selector lever cable system - damaged, misaligned	Inspect and repair as necessary.
<b>Mechatronics</b>	
Defective SSA (VFS-1) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Powertrain Control System</b>	
PCM electrical inputs/outputs, TCM, external vehicle wiring harnesses	Carry out on-board diagnostic tests. Repair as required. Clear DTCs. Road test and carry out on-board diagnostic test again.
<b>Clutch Plates</b>	
Forward clutch (A) friction and steel plate - failure	Inspect the forward clutch assembly for damage. Repair as required. Refer to <b><u>Forward Clutch Assembly</u></b> .
Low/reverse clutch (D) friction and steel plate - failure	Inspect the low/reverse clutch assembly for damage. Repair as required. Refer to <b><u>Low/Reverse Clutch Assembly</u></b> .

<b>Pump</b>	
Pump gear - failure	Install a new pump assembly. Refer to <b><u>Pump Assembly</u></b> .

### SHIFT CONCERNS: NO 2ND GEAR MANUAL

Possible Component	Reference/Action
<b>217 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly - plugged, damaged	Install a new transmission fluid filter assembly.
<b>Selector Lever Linkage</b>	
External selector lever cable system - damaged, misaligned	Inspect and repair as necessary.
<b>Mechatronics</b>	
Defective SSA (VFS-1) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Powertrain Control System</b>	
PCM electrical inputs/outputs, TCM, external vehicle wiring harnesses	Carry out on-board diagnostic tests. Repair as required. Clear DTCs. Road test and carry out on-board diagnostic test again.
<b>Clutch Plates</b>	
Forward clutch (A) friction and steel plate - failure	Inspect the forward clutch assembly for damage. Repair as required. Refer to <b><u>Forward Clutch Assembly</u></b> .
Low/reverse clutch (D) friction and steel plate - failure	Inspect the low/reverse clutch assembly for damage. Repair as required. Refer to <b><u>Low/Reverse Clutch Assembly</u></b> .
<b>Pump</b>	
Pump gear - failure	Install a new pump assembly. Refer to <b><u>Pump Assembly</u></b> .

### SHIFT CONCERNS: NO 3RD GEAR MANUAL

Possible Component	Reference/Action
<b>218 - ROUTINE</b>	
<b>Selector Lever Linkage</b>	
External selector lever cable system - damaged, misaligned	Inspect and repair as necessary.
<b>Mechatronics</b>	
Defective SSB (VFS-2) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Powertrain Control System</b>	

PCM electrical inputs/outputs, TCM, external vehicle wiring harnesses	Carry out on-board diagnostic tests. Repair as required. Clear DTCs. Road test and carry out on-board diagnostic test again.
<b>Clutch Plates</b>	
Forward clutch (A) friction and steel plate - failure	Inspect the forward clutch assembly for damage. Repair as required. Refer to <b><u>Forward Clutch Assembly</u></b> .
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly</u></b> .
Low/reverse clutch (D) friction and steel plate - failure.	Inspect the low/reverse clutch assembly for damage. Repair as required. Refer to <b><u>Low/Reverse Clutch Assembly</u></b> .
<b>Pump</b>	
Pump gear - failure	Install a new pump assembly. Refer to <b><u>Pump Assembly</u></b> .

### SHIFT CONCERNS: NO 1-2 SHIFT

Possible Component	Reference/Action
<b>220 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly - plugged, damaged	Install a new transmission fluid filter assembly.
<b>Mechatronics</b>	
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective direct clutch (B) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective intermediate clutch (C) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSC (VFS-3) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSD (VFS-4) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Clutch Plates</b>	
Intermediate clutch (C) friction and steel plate - failure	Inspect the intermediate clutch assembly for damage. Repair as required. Refer to <b><u>Intermediate Clutch Assembly</u></b> .
Low/reverse clutch (D) friction and steel plate - failure	Inspect the low/reverse clutch assembly for damage. Repair as required. Refer to <b><u>Low/Reverse Clutch Assembly</u></b> .

### SHIFT CONCERNS: NO 2-3 SHIFT

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Possible Component	Reference/Action
<b>221 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission fluid filter and seal assembly - plugged, damaged	Install a new transmission fluid filter assembly.
<b>Mechatronics</b>	
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective direct clutch (B) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective intermediate clutch (C) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSB (VFS-2) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSC (VFS-3) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Clutch Plates</b>	
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly</u></b> .
Intermediate clutch (C) friction and steel plate - failure	Inspect the intermediate clutch assembly for damage. Repair as required. Refer to <b><u>Intermediate Clutch Assembly</u></b> .

**SHIFT CONCERNS: NO 3-4 SHIFT**

Possible Component	Reference/Action
<b>222 - ROUTINE</b>	
<b>Mechatronics</b>	
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective direct clutch (B) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective overdrive clutch (E) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective solenoid multiplex valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSB (VFS-2) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSD (VFS-4) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSE (SS-1) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to

Electronic component - failure	<b><u>Mechatronic Assembly.</u></b> Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
<b>Clutch Plates</b>	
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly.</u></b>
Overdrive clutch (E) friction and steel plate - failure	Inspect the overdrive clutch assembly for damage. Repair as required. Refer to <b><u>Overdrive Clutch Assembly.</u></b>

### SHIFT CONCERNS: NO 4-5 SHIFT

Possible Component	Reference/Action
<b>270 - ROUTINE</b>	
<b>Mechatronics</b>	
Defective forward clutch (A) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective forward clutch (A) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective SSA (VFS-1) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective SSB (VFS-2) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
<b>Clutch Plates</b>	
Forward clutch (A) friction and steel plate - failure	Inspect the forward clutch assembly for damage. Repair as required. Refer to <b><u>Forward Clutch Assembly.</u></b>
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly.</u></b>

### SHIFT CONCERNS: NO 5-6 SHIFT

Possible Component	Reference/Action
<b>272 - ROUTINE</b>	
<b>Mechatronics</b>	
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective direct clutch (B) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective intermediate clutch (C) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective SSB (VFS-2) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective SSC (VFS-3) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>

TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
<b>Clutch Plates</b>	
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly.</u></b>
Intermediate clutch (C) friction and steel plate - failure	Inspect the intermediate clutch assembly for damage. Repair as required. Refer to <b><u>Intermediate Clutch Assembly.</u></b>

### SHIFT CONCERNS: NO 6-5 SHIFT

Possible Component	Reference/Action
<b>273 - ROUTINE</b>	
<b>Mechatronics</b>	
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective direct clutch (B) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective intermediate clutch (C) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective SSC (VFS-3) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
<b>Clutch Plates</b>	
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly.</u></b>
Intermediate clutch (C) friction and steel plate - failure	Inspect the intermediate clutch assembly for damage. Repair as required. Refer to <b><u>Intermediate Clutch Assembly.</u></b>

### SHIFT CONCERNS: NO 5-4 SHIFT

Possible Component	Reference/Action
<b>271 - ROUTINE</b>	
<b>Mechatronics</b>	
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective direct clutch (B) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective forward clutch (A) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective SSB (VFS-2) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>

Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Clutch Plates</b>	
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly</u></b> .
Forward clutch (A) friction and steel plate - failure	Inspect the forward clutch assembly for damage. Repair as required. Refer to <b><u>Forward Clutch Assembly</u></b> .

### SHIFT CONCERNS: NO 4-3 SHIFT

Possible Component	Reference/Action
<b>223 - ROUTINE</b>	
<b>Mechatronics</b>	
Defective overdrive clutch (E) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective overdrive clutch (E) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective solenoid multiplex valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective enable valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSB (VFS-2) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSD (VFS-4) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Clutch Plates</b>	
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly</u></b> .
Overdrive clutch (E) friction and steel plate - failure	Inspect the overdrive clutch assembly for damage. Repair as required. Refer to <b><u>Overdrive Clutch Assembly</u></b> .

### SHIFT CONCERNS: NO 3-2 SHIFT

Possible Component	Reference/Action
<b>224 - ROUTINE</b>	
<b>Mechatronics</b>	
Defective direct clutch (B) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective direct clutch (B) latch valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective intermediate clutch (C) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> .
Defective SSB (VFS-2) shift solenoid	Install a new mechatronic assembly. Refer to



Defective SSC (VFS-3) shift solenoid	<b><u>Mechatronic Assembly.</u></b> Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
<b>Clutch Plates</b>	
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly.</u></b>
Intermediate clutch (C) friction and steel plate - failure	Inspect the intermediate clutch assembly for damage. Repair as required. Refer to <b><u>Intermediate Clutch Assembly.</u></b>

### SHIFT CONCERNS: NO 2-1 SHIFT

Possible Component	Reference/Action
<b>225 - ROUTINE</b>	
<b>Mechatronics</b>	
Defective intermediate clutch (C) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective low/reverse clutch (D) regulator valve	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly.</u></b>
Defective SSC (VFS-3) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
TCM mechatronic unit - failed	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
Electronic component - failure	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly.</u></b>
<b>Clutch Plates</b>	
Direct clutch (B) friction and steel plate - failure	Inspect the direct clutch assembly for damage. Repair as required. Refer to <b><u>Direct Clutch Assembly.</u></b>
Low/reverse clutch (D) friction and steel plate - failure	Inspect the low/reverse clutch assembly for damage. Repair as required. Refer to <b><u>Low/Reverse Clutch Assembly.</u></b>

### TORQUE CONVERTER CLUTCH OPERATION CONCERNS: DOES NOT APPLY

Possible Component	Reference/Action
<b>240 - ROUTINE</b>	
<b>Torque Converter</b>	
Torque converter components	Remove the transmission. Inspect for damage. install a new or remanufactured torque converter. Refer to <b><u>Transmission - Four Wheel Drive (4WD)</u></b> or <b><u>Transmission - Rear Wheel Drive (RWD).</u></b>
<b>Transmission Fluid</b>	
Transmission fluid condition	Carry out the transmission fluid condition check in <b><u>Preliminary Inspection.</u></b>
<b>Mechatronics</b>	
Defective torque converter apply regulator	Inspect mechatronic assembly for stuck valves or

valve Defective torque converter release regulator valve Defective TCC (VFS-6) shift solenoid Mechatronic assembly bolts - not tightened to specification Mechatronic unit contaminated, solenoid(s) damaged, stuck or bore damaged. Manual valve damaged, stuck or bore damaged	contamination. Refer to <b><u>Mechatronic Assembly</u></b> . Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> . Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> . Tighten to specification. Inspect for damage. If damaged, install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Powertrain Control Module</b> PCM electrical inputs/outputs, TCM, vehicle wiring harnesses, torque converter clutch (TCC) solenoid, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Repair as required. Clear DTCs, road test and carry out on-board diagnostic test again.

### TORQUE CONVERTER CLUTCH OPERATION CONCERNS: CYCLING/CHATTER

Possible Component	Reference/Action
<b>241 - ROUTINE</b>	
<b>Transmission Fluid</b> Transmission fluid condition	Carry out the transmission fluid condition check in <b><u>Preliminary Inspection</u></b> .
<b>Mechatronics</b> Defective torque converter apply regulator valve Defective TCC (VFS-6) shift solenoid Mechatronic assembly bolts - not tightened to specification Mechatronic unit contaminated, solenoid(s) damaged, stuck or bore damaged. Manual valve damaged, stuck or bore damaged	Inspect mechatronic assembly for stuck valves or contamination. Refer to <b><u>Mechatronic Assembly</u></b> . Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> . Tighten to specification. Inspect for damage. If damaged, install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Powertrain Control Module</b> PCM electrical inputs/outputs, TCM, vehicle wiring harnesses, torque converter clutch (TCC) solenoid, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Repair as required. Clear DTCs, road test and carry out on-board diagnostic test again.
<b>Torque Converter</b> Torque converter components	Remove the transmission. Inspect for damage. If damaged, install a new or remanufactured torque converter. Refer to <b><u>Transmission - Four Wheel Drive (4WD)</u></b> or <b><u>Transmission - Rear Wheel Drive (RWD)</u></b> .

### TORQUE CONVERTER CLUTCH OPERATION CONCERNS: ALWAYS APPLIED/STALLS VEHICLE

Possible Component	Reference/Action
<b>242 - ROUTINE</b>	

<b>Transmission Fluid</b>	
Transmission fluid condition	Carry out the transmission fluid condition check in <b><u>Preliminary Inspection</u></b> .
<b>Mechatronics</b>	
Defective TCC (VFS-6) shift solenoid	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
Mechatronic assembly bolts - not tightened to specification	Tighten to specification.
Mechatronic unit contaminated, solenoid(s) damaged, stuck or bore damaged. Manual valve damaged, stuck or bore damaged	Inspect for damage. If damaged, install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .
<b>Powertrain Control Module</b>	
PCM electrical inputs/outputs, TCM, vehicle wiring harnesses, torque converter clutch (TCC) solenoid, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Repair as required. Clear DTCs, road test and carry out on-board diagnostic test again.
<b>Torque Converter</b>	
Torque converter components	Remove the transmission. Inspect for damage. If damaged, install a new or remanufactured torque converter. Refer to <b><u>Transmission - Four Wheel Drive (4WD)</u></b> or <b><u>Transmission - Rear Wheel Drive (RWD)</u></b> .

#### OTHER CONCERNS: EXTERNAL LEAKS

Possible Component	Reference/Action
<b>252 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
Transmission case vent - damaged, case porosity	Inspect for damage. If damaged, repair as necessary.
Leakage at gaskets, seals, bulkhead connector	Refer to <b><u>Leakage Inspection</u></b> for potential leak locations. Remove all traces of lubricant on exposed surface of the transmission. Repair as necessary.
<b>Fluid Cooler Tubes</b>	
Cooler tube fittings	Locate leak source. Repair as required. Refer to <b><u>TRANSAXLE/TRANSMISSION COOLING</u></b> .
Cooler tube O-rings, cooler tubes	Locate leak source. Repair as required. Refer to <b><u>TRANSAXLE/TRANSMISSION COOLING</u></b> .
<b>Torque Converter</b>	
Torque converter studs	Install a new torque converter.
Torque converter hub seal	Install a new torque converter hub seal.
Torque converter weld	Install a new torque converter.
<b>Transmission Case</b>	
Case - leaking	Install a new transmission case. Refer to <b><u>Transmission</u></b> .
Transmission electrical bulkhead connector	Install a new transmission electrical bulkhead connector O-ring.
Transmission fluid fill plug	Install a new transmission fluid fill plug.

Output shaft seal	Install a new seal. Refer to <b><u>Output Shaft Seal</u></b> .
Manual control lever seal	Install a new seal. Refer to <b><u>Manual Control Lever Shaft and Seal</u></b> .
Transmission fluid pan gasket	Install a new seal. Refer to <b><u>Fluid Pan, Gasket and Filter</u></b> .
<b>Fluid Pump</b>	
Fluid pump O-ring	Install a new O-ring. Refer to <b><u>Pump Assembly</u></b> .
Fluid pump seal ring	Install a new seal ring. Refer to <b><u>Pump Assembly</u></b> .

**NOTE:** Noise, vibration and harshness (NVH) symptoms should be identified using the diagnostic tools that are available. For a list of these tools, an explanation of their uses and a glossary of common terms, refer to **NOISE, VIBRATION AND HARSHNESS** . Since it is possible any one of multiple systems may be the cause of a symptom, it may be necessary to use a process of elimination type of diagnostic approach to pinpoint the responsible system. If this is not the causal system for the symptom, refer back to **NOISE, VIBRATION AND HARSHNESS** for the next likely system and continue diagnosis.

#### NOISE/VIBRATION - FORWARD OR REVERSE

Possible Component	Reference/Action
<b>254 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Transmission fluid level (low) pump cavitation	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Transmission Fluid Cooler Tubes</b>	
Transmission fluid cooler tubes grounding out	Adjust or reposition transmission fluid cooler tubes.
<b>Torque Converter</b>	
Check the torque converter components/balance weight	Locate source of disturbance. Repair as required.
<b>Engine Driveline</b>	
Engine drive accessories	Refer to <b><u>ENGINE SYSTEM - GENERAL INFORMATION</u></b> .

#### ENGINE WILL NOT CRANK

Possible Component	Reference/Action
<b>255 - ROUTINE</b>	
<b>External Selector Lever Cable System</b>	
Selector lever cable system - damaged, misaligned	Inspect and repair as necessary. Refer to <b><u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u></b> .
<b>Powertrain Control System</b>	
Electrical inputs/outputs, TCM, vehicle wiring harnesses, engine starting system, TR sensor	Carry out on-board diagnostic tests. Refer to the <b><u>Introduction - Gasoline Engines</u></b> for diagnosis and testing of engine components. Check PIDs for TR park and neutral positions. Repair as required. Clear DTCs, road test and carry out on-board diagnostic test again
<b>Torque Converter</b>	

Flexplate - damaged	Inspect for damage. Repair as necessary.
<b>Vehicle Starter</b> Starter system concerns	Inspect and repair as necessary. Refer to <b><u>STARTING SYSTEM</u></b> .
<b>TR Sensor Assembly</b> TR Assembly - damaged	Inspect and repair as necessary.
<b>Fluid Pump Assembly</b> Internal parts seized	Inspect for damage. Repair as necessary.

## NO PARK RANGE

Possible Component	Reference/Action
<b>256 - ROUTINE</b>	
<b>Selector Lever Cable</b> Selector lever cable system - damaged, misaligned Manual control lever assembly damaged, manual valve inner lever pin bent, manual valve inner lever damaged, spring rod damaged, park pawl pin loose or damaged, park rod actuating plate loose, damaged or missing Transmission case assembly Park gear, parking pawl, parking pawl return spring, part or guide, parking actuating rod, parking pawl shaft, manual lever External linkages/brackets - damaged	Inspect and repair as necessary.  Inspect for damage. If damaged, repair as necessary.  Inspect for damage. If damaged, repair as necessary.  Inspect for damage. If damaged, repair as necessary.  Inspect for damage. If damaged, repair as necessary.
<b>TR Assembly Damaged, Manual Lever Detent Spring Damaged</b> TR assembly	Install a new mechatronic assembly. Refer to <b><u>Mechatronic Assembly</u></b> .

## TRANSMISSION OVERHEATING

Possible Component	Reference/Action
<b>257 - ROUTINE</b>	
<b>Transmission Fluid</b> Incorrect transmission fluid level Transmission fluid condition	Check transmission fluid level. Adjust transmission fluid to correct level. Refer to <b><u>Preliminary Inspection</u></b> . Carry out the transmission fluid condition check. Refer to <b><u>Preliminary Inspection</u></b> .
<b>Powertrain Control System</b> Electrical inputs/outputs, TCM, vehicle wiring harnesses, TCC solenoid	Carry out on-board diagnostic tests. Refer to the <b><u>Introduction - Gasoline Engines</u></b> for diagnosis and testing of engine components. Check PIDs for TR park and neutral positions. Repair as required. Clear DTCs, road test and carry out on-board diagnostic test again.
<b>Torque Converter Not Engaging</b> Torque converter	Install a new torque converter.
<b>Case Vent Damaged</b>	

Transmission case assembly	Inspect for damage. If damaged, repair as necessary.
<b>Other</b>	
Restriction in transmission cooling system	Check transmission cooling system efficiency. Refer to <b>TRANSAXLE/TRANSMISSION COOLING</b> for automatic transmission cooling system diagnostic procedures.
Excessive trailer tow load	Refer to the Owner Guide for specifications on trailer towing.
Vehicle heat shield - missing or damaged	Inspect for damage. If damaged, repair as necessary.
Vehicle airflow is restricted	Inspect for damage. If damaged, repair as necessary.

### FLUID VENTING/FOAMING

Possible Component	Reference/Action
<b>261 - ROUTINE</b>	
<b>Transmission Fluid</b>	
Incorrect transmission fluid level	Check the transmission fluid level. Adjust transmission fluid to correct level. Refer to <b>Preliminary Inspection</b> .
<b>Case Vent Damaged</b>	
Transmission case assembly	Inspect for damage. If damaged, repair as necessary.