1997-98 AUTOMATIC TRANSMISSIONS
General Motors - 4T65-E Electronic Controls

Buick;  LeSabre, Park Avenue, Regal, Riviera
Chevrolet;  Lumina, Monte Carlo
Oldsmobile;  Eighty Eight, Intrigue, LSS, Regency
Pontiac;  Bonneville, Grand Prix

TRANSMISSION APPLICATION

TRANSMISSION APPLICATION TABLE

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model (Body Code)</th>
<th>Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buick</td>
<td>(1) LeSabre (&quot;H&quot;)</td>
<td>3.8L</td>
</tr>
<tr>
<td></td>
<td>Park Avenue (&quot;C&quot;)</td>
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<tr>
<td></td>
<td>Regal (&quot;W&quot;)</td>
<td>3.8L</td>
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<td></td>
<td>Riviera (&quot;G&quot;)</td>
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</tr>
<tr>
<td>Chevrolet</td>
<td>Lumina (&quot;W&quot;)</td>
<td>3.4L/3.8L</td>
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<td></td>
<td>Monte Carlo (&quot;W&quot;)</td>
<td>3.4L/3.8L</td>
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<tr>
<td>Oldsmobile</td>
<td>(1) Eighty Eight (&quot;H&quot;)</td>
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<tr>
<td></td>
<td>Intrigue (&quot;W&quot;)</td>
<td>3.5L/3.8L</td>
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<tr>
<td></td>
<td>LSS (&quot;H&quot;)</td>
<td>3.8L</td>
</tr>
<tr>
<td></td>
<td>Regency (&quot;H&quot;)</td>
<td>3.8L</td>
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<td>Pontiac</td>
<td>(1) Bonneville (&quot;H&quot;)</td>
<td>3.8L</td>
</tr>
<tr>
<td></td>
<td>Grand Prix (&quot;W&quot;)</td>
<td>3.8L</td>
</tr>
</tbody>
</table>

(1) - 1998 model year only.

DESCRIPTION

The 4T65-E transaxle uses 2 electric solenoids to control transaxle upshifts and downshifts. Each solenoid is turned on or off by the Powertrain Control Module (PCM). PCM also includes on-board self-diagnostics. This helps identify which components or circuits may need further testing.

OPERATION

Each solenoid either holds hydraulic pressure (solenoid on) or releases hydraulic pressure (solenoid off). This action controls shift valves inside control valve body. By switching one or both solenoids on or off, different combinations of clutches, sprags and bands are operated. See CLUTCH & BAND APPLICATION CHART under ELECTRONIC TESTING.

COMPONENT DESCRIPTION

PCM

On all models except Lumina, Monte Carlo and Riviera, PCM is located at left side of engine compartment, in air cleaner. On Lumina and Monte Carlo, PCM is located at right side of engine compartment, forward of strut tower. On Riviera, PCM is located under right side of instrument panel, in front of HVAC module. PCM utilizes 2 different colored 80-pin connectors, C1 (Blue) and C2 (Clear). See Fig. 5 ("G" & "H" bodies C1 & C2), or Fig. 6 (Except "G" & "H" bodies C1), or Fig. 7
PCM controls ignition, fuel and emission devices related to engine and transaxle upshifts and downshifts. PCM receives electronic signals from sensors and switches. These signals help PCM determine when to operate various relays and solenoids related to engine and transaxle control.

**SENSORS & SWITCHES**

PCM controls upshifts and downshifts based on coolant temperature (or transaxle fluid temperature), throttle position, transaxle range switch position, vehicle speed sensor and brake pedal switch. System also includes several other switches and sensors which are used for engine control. These components are covered in ENGINE PERFORMANCE section.

**SOLENOIDS**

Transaxle is shifted up or down by 2 electric solenoids. Both solenoids are located on control valve body. Ignition power is supplied to each solenoid by fused circuit. See WIRING DIAGRAMS.

1-2 shift solenoid controls hydraulic pressure to 1-2 shift valve. 2-3 shift solenoid controls hydraulic pressure to 3-4 shift valve.

**SELF-DIAGNOSTICS**

PCM constantly monitors all electrical circuits. If PCM detects circuit problems or sensors out of range, it will record a Diagnostic Trouble Code (DTC). If problem continues for a predetermined time, Malfunction Indicator Light (MIL) will glow.

If MIL is on all the time, DTC(s) are currently being detected. If MIL is off, but PCM had detected a circuit or sensor problem, DTC(s) will be stored in computer memory.

Stored DTCs may be retrieved from PCM memory using a scan tool. DTCs CANNOT be retrieved by grounding 16-pin Data Link Connector (DLC).

**NOTE:** Faulty engine sensors and actuators may cause transaxle related DTCs or driveability problems. Engine faults and related DTCs must be diagnosed and repaired before transaxle codes are repaired. For additional information on diagnosing and repairing engine related PCM trouble codes, see ENGINE PERFORMANCE.

**ELECTRONIC SELF-DIAGNOSTICS**

* PLEASE READ THIS FIRST *

**NOTE:** To test electronic control of transaxle solenoids, sensors, manual valve position switch and wiring harness without using self-diagnostics, or if self-diagnostics does not function, see ELECTRONIC TESTING. After repairs are made, DTCs should be erased from computer memory. See procedures under CLEARING TROUBLE CODES in ELECTRONIC SELF-DIAGNOSTICS.

**NOTE:** Trouble codes will be recorded at various operating times. Some codes require operation of affected sensor or switch for 5 seconds; others may require operation for 5 minutes or longer at normal operating temperature, road speed and load. Therefore, some codes may not be set in a service bay operational mode and may require road testing vehicle in
order to duplicate condition under which code will set.

RETRIEVING CODES

NOTE: Stored DTCs may be retrieved from PCM memory using a factory recommended scan tool. DTCs CANNOT be retrieved by grounding 16-pin Data Link Connector (DLC). Plugging scan tool into DLC, located under left side of instrument panel, enables user to read DTCs and check voltages in system on serial data line.

Scan tools may also furnish information on status of output devices (solenoids and relays). However, status parameters are only an indication that output signals have been sent to devices by control module; they do not indicate if devices have responded properly to signal. Check for proper response at output device using a voltmeter or test light.

If trouble codes are not present, this is not necessarily an indication a problem does not exist. Driveability related problems with codes displayed occur about 20 percent of the time, while driveability problems without codes occur about 80 percent of the time. Sensors that are out of specification WILL NOT set a trouble code but WILL cause driveability problems. Using scan tool is the easiest method of checking sensor specifications and other data parameters. Scan tool is also useful in finding intermittent wiring problems by wigging wiring harness and connections (key on, engine off) while observing scan tool value.

DIAGNOSTIC TROUBLE CODE (DTC) DEFINITIONS

NOTE: Only transaxle-related trouble codes are listed. For engine-related DTC definitions, see TROUBLE CODE DEFINITIONS article in APPLICATIONS & IDENTIFICATION section. For engine-related DTC diagnosis, see the appropriate G - TESTS W/CODES article in ENGINE PERFORMANCE. These DTCs pertain to engine performance and must be repaired first, as engine performance and related component signals will affect transaxle operation and diagnosis.

<table>
<thead>
<tr>
<th>DTC</th>
<th>Circuit Affected</th>
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<tbody>
<tr>
<td>P0218</td>
<td>Transaxle Fluid Overtemperature</td>
</tr>
<tr>
<td>P0502</td>
<td>Vehicle Speed Sensor (VSS) Low Input</td>
</tr>
<tr>
<td>P0503</td>
<td>VSS Circuit Performance Problem</td>
</tr>
<tr>
<td>P0560</td>
<td>System Voltage Malfunction</td>
</tr>
<tr>
<td>P0711</td>
<td>TFT Sensor Circuit Performance Problem</td>
</tr>
<tr>
<td>P0712</td>
<td>TFT Sensor Circuit Low Input</td>
</tr>
<tr>
<td>P0713</td>
<td>TFT Sensor Circuit High Input</td>
</tr>
<tr>
<td>P0716</td>
<td>Input Speed Sensor Circuit Performance Problem</td>
</tr>
<tr>
<td>P0717</td>
<td>Input Speed Sensor Circuit No Signal</td>
</tr>
<tr>
<td>P0719</td>
<td>TCC Brake Switch Circuit Low Input</td>
</tr>
<tr>
<td>P0724</td>
<td>TCC Brake Switch Circuit No Signal</td>
</tr>
<tr>
<td>P0730</td>
<td>Incorrect Gear Ratio</td>
</tr>
<tr>
<td>P0741</td>
<td>TCC System Stuck Off</td>
</tr>
<tr>
<td>P0742</td>
<td>TCC System Stuck On</td>
</tr>
<tr>
<td>P0748</td>
<td>Pressure Control Solenoid Electrical Problem</td>
</tr>
<tr>
<td>P0751</td>
<td>1-2 Shift Solenoid Performance Problem</td>
</tr>
<tr>
<td>P0753</td>
<td>1-2 Shift Solenoid Electrical Problem</td>
</tr>
<tr>
<td>P0756</td>
<td>2-3 Shift Solenoid Performance Problem</td>
</tr>
<tr>
<td>P0758</td>
<td>2-3 Shift Solenoid Electrical Problem</td>
</tr>
<tr>
<td>P1810</td>
<td>Position Switch Circuit Malfunction</td>
</tr>
</tbody>
</table>
HARD OR INTERMITTENT TROUBLE CODE DETERMINATION

During any diagnostic procedure, it must be determined if codes are hard failure codes or intermittent failure codes. Diagnostic tests will not usually help analyze intermittent codes. To determine hard codes and intermittent codes, proceed as follows:

1) Enter diagnostic mode. See RETRIEVING CODES. Read and record all stored DTCs. Exit diagnostic mode and clear trouble codes. See CLEARING TROUBLE CODES.

2) Apply parking brake and place transaxle in Neutral or Park. Block drive wheels and start engine. MIL should go out. Run warm engine at specified curb idle for 2 minutes and note MIL.

3) If MIL comes on, enter diagnostic mode. Read and record DTCs. This will reveal hard failure codes. DTCs may require a road test to reset hard failure after clearing DTCs. If MIL does not come on, all stored DTCs were intermittent failures.

CLEARING TROUBLE CODES

DTCs can be cleared using scan tool. If scan tool is not available, turn ignition switch to OFF position. Remove PCM fuse from fuse block for 30 seconds. Replace fuse. If fuse cannot be located, disconnect PCM pigtail at battery for 30 seconds. DTCs may also be cleared by disconnecting negative battery cable. However, this may result in loss of other on-board memory data, such as preset radio tuning. After power to PCM is removed, poor driveability may occur until control module "relearns" operating parameters.

DTCs will also be cleared under the following conditions: PCM will turn off MIL after 3 consecutive ignition cycles without a failure reported. PCM will cancel DTC default actions when fault no longer exists and ignition is cycled off long enough to power down PCM. DTC will be cleared when vehicle has achieved 40 warm-up cycles without a failure reported.

ELECTRONIC TESTING

* PLEASE READ THIS FIRST *

NOTE: The following test procedures check operation of transaxle solenoids, sensors, TFP manual valve position switch and transaxle wiring harness.

COMPONENT RESISTANCE CHECK

Connect DVOM between specified terminals at component or at transaxle 20-pin connector to transaxle. Measure individual component resistance at specified temperature. See COMPONENT RESISTANCE SPECIFICATIONS table. If resistance is not as specified, replace appropriate component. See Figs. 1 and 2.

COMPONENT RESISTANCE SPECIFICATIONS TABLE

<table>
<thead>
<tr>
<th>Component</th>
<th>(1) Pins</th>
<th>(2) Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Speed Sensor</td>
<td>S &amp; V</td>
<td>1132-1428</td>
</tr>
</tbody>
</table>
Pressure Control Solenoid .... C & D ............... 5-6
TCC PWM Solenoid ............ T & E ............... 13-15
TFT Sensor .................. M & L ........... (4) 225-285
1-2 Shift Solenoid .......... A & E ............... 24-31
2-3 Shift Solenoid .......... B & E ............... 24-31

(1) - Resistance is measured between specified terminals at component or at transaxle 20-pin connector. See Figs. 1 and 2.
(2) - Resistance is measured at 190°F (88°C).
(3) - At 68°F (20°C), resistance is 893-1127.
(4) - At 68°F (20°C), resistance is 3164-3867.

1. Pressure Control Solenoid 5. Vehicle Speed Sensor (VSS)
2. 1-2 Shift Solenoid 6. TFP Manual Valve Position Switch
3. Input Speed Sensor 7. TFT Sensor
4. 2-3 Shift Solenoid 8. TCC PWM Solenoid

Fig. 1: Locating Transaxle Electronic Components
Courtesy of General Motors Corp.

TRANSAXLE WIRING HARNESS CHECK
1) Install Jumper Harness (J-39775) on transaxle 20-pin connector (transaxle harness side). Using a DVOM and Connector Test Adapter Kit (J-35616), measure resistance between transaxle 20-pin connector terminals "A" and "E" (1-2 shift solenoid). See Fig. 2. If resistance is 24-31 ohms at 190°F (88°C), go to step 3). If resistance is not 24-31 ohms at 190°F (88°C), go to next step.

2) Disconnect transaxle wiring harness connector at 1-2 shift solenoid. See Fig. 1. Measure resistance between 1-2 shift solenoid terminals. If resistance is not 24-31 ohms at 190°F (88°C), replace 1-2 shift solenoid. If resistance is 24-31 ohms at 190°F (88°C), go to step 16).

3) Measure resistance between transaxle 20-pin connector terminals "B" and "E" (2-3 shift solenoid). See Fig. 2. If resistance is 24-31 ohms at 190°F (88°C), go to step 5). If resistance is not 24-31 ohms at 190°F (88°C), go to next step.

4) Disconnect transaxle wiring harness connector at 2-3 shift solenoid. See Fig. 1. Measure resistance between 2-3 shift solenoid terminals. If resistance is not 24-31 ohms at 190°F (88°C), replace 2-3 shift solenoid. If resistance is 24-31 ohms at 190°F (88°C), go to step 16).

5) Measure resistance between transaxle 20-pin connector terminals "C" and "D" (TCC PWM solenoid). See Fig. 2. If resistance is 5-6 ohms at 190°F (88°C), go to step 9). If resistance is not 5-6 ohms at 190°F (88°C), go to next step.

6) Disconnect transaxle wiring harness connector at TCC PWM solenoid. See Fig. 1. Measure resistance between TCC PWM solenoid terminals. If resistance is not 5-6 ohms at 190°F (88°C), replace TCC PWM solenoid. If resistance is 5-6 ohms at 190°F (88°C), go to step 16).

7) Measure resistance between transaxle 20-pin connector terminals "S" and "V" (input speed sensor). See Fig. 2. If resistance is 1132-1428 ohms at 190°F (88°C), go to step 11). If resistance is not 1132-1428 ohms at 190°F (88°C), go to next step.

8) Disconnect transaxle wiring harness connector at input speed sensor. See Fig. 1. Measure resistance between sensor terminals. If resistance is not 1132-1428 ohms at 190°F (88°C), replace input speed sensor. If resistance is 1132-1428 ohms at 190°F (88°C), go to step 16).

9) Measure resistance between transaxle 20-pin connector terminals "L" and "M" (TFT sensor). See Fig. 2. If resistance is 225-285 ohms at 190°F (88°C), go to step 13). If resistance is not 225-285 ohms at 190°F (88°C), go to next step.

10) Disconnect transaxle wiring harness connector at TFT sensor. See Fig. 1. Measure resistance between sensor terminals. If resistance is not 225-285 ohms at 190°F (88°C), replace TFT sensor. If resistance is 225-285 ohms at 190°F (88°C), go to step 16).

11) Using a DVOM and Connector Test Adapter Kit (J-35616), measure resistance between transaxle case and transaxle 20-pin connector terminals "A", "B", "C", "D", "E" and "T". See Fig. 2. If resistance is more than 250 k/ohms at each terminal, go to next step. If resistance is less than 250 k/ohms at each terminal, replace transaxle wiring harness.

12) Using a DVOM and connector test adapter kit, measure resistance between transaxle case and transaxle 20-pin connector terminals "L" and "M". See Fig. 2. If resistance is more than 20
megohms at each terminal, go to next step. If resistance is less than 20 megohms at each terminal, replace transaxle wiring harness.

15) Using a DVOM and connector test adapter kit, measure resistance between transaxle case and transaxle 20-pin connector terminals "S" and "V". See Fig. 2. If resistance is more than 10 megohms at each terminal, problem is intermittent. If resistance is less than 10 megohms at each terminal, replace transaxle wiring harness.

16) Inspect for high resistance. Check transaxle wiring harness for poor electrical connections at 20-pin connector and at each component connector. Look for bent, backed out, deformed or damaged terminals. Check for weak terminal tension. Repair as necessary, then go to step 1). If no problem was found, problem is intermittent.

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**20-PIN WIRING HARNESS CONNECTOR TERMINAL (TO TRANSAXLE) IDENTIFICATION**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Wire Color</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>LT GRN</td>
<td>1-2 Shift Solenoid</td>
</tr>
<tr>
<td>B</td>
<td>YEL</td>
<td>2-3 Shift Solenoid</td>
</tr>
<tr>
<td>C</td>
<td>PPL</td>
<td>Pressure Control Solenoid (High)</td>
</tr>
<tr>
<td>D</td>
<td>LT BLU</td>
<td>Pressure Control Solenoid (Low)</td>
</tr>
<tr>
<td>E</td>
<td>RED</td>
<td>Fused Ignition No. 1 Feed</td>
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<tr>
<td>L</td>
<td>BRN</td>
<td>TFT Sensor Signal</td>
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<tr>
<td>M</td>
<td>GRY</td>
<td>Sensor Ground</td>
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<tr>
<td>N</td>
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<tr>
<td>P</td>
<td>ORN</td>
<td>Pressure Switch Input C</td>
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<tr>
<td>R</td>
<td>DK BLU</td>
<td>Pressure Switch Input B</td>
</tr>
<tr>
<td>S</td>
<td>BLK</td>
<td>Input Speed Sensor (High)</td>
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<tr>
<td>T</td>
<td>TAN</td>
<td>TCC PWM Solenoid</td>
</tr>
<tr>
<td>U</td>
<td>WHT</td>
<td>TCC Release Switch Input</td>
</tr>
<tr>
<td>V</td>
<td>DK GRN</td>
<td>Input Speed Sensor (Low)</td>
</tr>
<tr>
<td>W</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* - Table applies to 1998 Riviera. Terminal letters and components are the same for all models. Wire colors may vary. See WIRING DIAGRAMS.

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Fig. 2: 20-Pin Connector Terminal Locations (Harness-To-Transaxle) Courtesy of General Motors Corp.
<table>
<thead>
<tr>
<th>Terminal</th>
<th>Wire Color (1)</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>LT GRN</td>
<td>1-2 Shift Solenoid</td>
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<tr>
<td>B</td>
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</tr>
<tr>
<td>C</td>
<td>PPL</td>
<td>Pressure Control Solenoid (High)</td>
</tr>
<tr>
<td>D</td>
<td>LT BLU</td>
<td>Pressure Control Solenoid (Low)</td>
</tr>
<tr>
<td>E</td>
<td>RED</td>
<td>Fused Ignition No. 1 Feed</td>
</tr>
<tr>
<td>L</td>
<td>BRN</td>
<td>TFT Sensor Signal</td>
</tr>
<tr>
<td>M</td>
<td>GRY</td>
<td>Sensor Ground</td>
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<tr>
<td>N</td>
<td>PNK</td>
<td>Pressure Switch Input A</td>
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<tr>
<td>P</td>
<td>ORN</td>
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<tr>
<td>S</td>
<td>BLK</td>
<td>Input Speed Sensor (High)</td>
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<tr>
<td>T</td>
<td>TAN</td>
<td>TCC PWM Solenoid</td>
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<tr>
<td>U</td>
<td>WHT</td>
<td>TCC Release Switch Input</td>
</tr>
<tr>
<td>V</td>
<td>DK GRN</td>
<td>Input Speed Sensor (Low)</td>
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<tr>
<td>W</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

(1) - Table applies to 1998 Riviera. Terminal letters and components are the same for all models. Wire colors may vary. See WIRING DIAGRAMS.

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Fig. 3: 20-Pin Connector Terminal Locations (Harness-To-PCM)
Courtesy of General Motors Corp.

20-PIN WIRING HARNESS-TO-PCM CONNECTOR TERMINAL ID TABLE
<table>
<thead>
<tr>
<th>Terminal</th>
<th>Wire Color (1)</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>LT GRN</td>
<td>1-2 Shift Solenoid</td>
</tr>
<tr>
<td>B</td>
<td>YEL/BLK</td>
<td>2-3 Shift Solenoid</td>
</tr>
<tr>
<td>C</td>
<td>RED/BLK</td>
<td>Pressure Control Solenoid (High)</td>
</tr>
<tr>
<td>D</td>
<td>LT BLU/WHT</td>
<td>Pressure Control Solenoid (Low)</td>
</tr>
<tr>
<td>E</td>
<td>PNK</td>
<td>Fused Ignition No. 1 Feed</td>
</tr>
<tr>
<td>F-K</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>L</td>
<td>YEL/BLK</td>
<td>TFT Sensor Signal</td>
</tr>
<tr>
<td>M</td>
<td>BLK</td>
<td>Sensor Ground</td>
</tr>
<tr>
<td>N</td>
<td>PNK</td>
<td>Pressure Switch Input A</td>
</tr>
<tr>
<td>P</td>
<td>RED/BLK</td>
<td>Pressure Switch Input C</td>
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<tr>
<td>R</td>
<td>DK BLU</td>
<td>Pressure Switch Input B</td>
</tr>
<tr>
<td>S</td>
<td>RED/BLK</td>
<td>Input Speed Sensor (High)</td>
</tr>
<tr>
<td>T</td>
<td>BRN</td>
<td>TCC PWM Solenoid</td>
</tr>
<tr>
<td>U</td>
<td>YEL</td>
<td>TCC Release Switch Input</td>
</tr>
<tr>
<td>V</td>
<td>DK BLU/WHT</td>
<td>Input Speed Sensor (Low)</td>
</tr>
<tr>
<td>W</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

(1) - Table applies to 1998 Riviera. Terminal letters and components are the same for all models. Wire colors may vary. See WIRING DIAGRAMS.
between transaxle 20-pin connector terminals "N" and "P". See Fig. 2. If resistance is less than 50 k/ohms, go to next step. If resistance is more than 50 k/ohms, go to step 11).

10) Disconnect wiring harness connector at position switch. See Fig. 1. Measure resistance between position switch terminals "C" and "E". See Fig. 4. If resistance is more than 50 k/ohms, replace position switch.

11) Reconnect position switch connector. Measure resistance between transaxle 20-pin connector terminals "N" and "R". See Fig. 2. If resistance is less than 50 k/ohms, go to next step. If resistance is more than 50 k/ohms, go to step 13).

12) Disconnect wiring harness connector at position switch. See Fig. 1. Measure resistance between position switch terminals "D" and "E". See Fig. 4. If resistance is more than 50 k/ohms, go to step 19). If resistance is less than 50 k/ohms, replace position switch.

13) Measure resistance between position switch terminal "R" and position switch housing. See Fig. 4. If resistance is less than 50 ohms, go to next step. If resistance is more than 50 ohms, replace position switch.

14) Measure resistance between position switch terminal "C" and position switch housing. See Fig. 4. If resistance is more than 50 k/ohms, go to next step. If resistance is less than 50 k/ohms, replace position switch.

15) Measure resistance between position switch terminal "D" and position switch housing. See Fig. 4. If resistance is less than 50 ohms, go to next step. If resistance is more than 50 ohms, replace position switch.

16) Measure resistance between position switch terminal "E" and position switch housing. See Fig. 4. If resistance is less than 50 k/ohms, go to next step. If resistance is more than 50 k/ohms, replace position switch.

17) Measure resistance between transaxle 20-pin connector terminal "N" and transaxle case, and terminal "P" and transaxle case. See Fig. 2. If resistance is more than 50 k/ohms at each terminal, go to next step. If resistance is less than 50 k/ohms at each terminal, replace transaxle wiring harness.

18) Measure resistance between transaxle 20-pin connector terminal "R" and transaxle case, and terminal "U" and transaxle case. See Fig. 2. If resistance is less than 50 ohms at each terminal, problem is intermittent. If resistance is more than 50 ohms at each terminal, replace transaxle wiring harness.

19) Inspect for high resistance. Check transaxle wiring harness for poor electrical connections at 20-pin connector and at position switch. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension. Repair as necessary, then go to step 1). If no problem was found, problem is intermittent.

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![Diagram](image)

**Fig. 4: TFP Manual Valve Position Switch Connector Locations**

Courtesy of General Motors Corp.

**CLUTCH & BAND APPLICATION CHART**
<table>
<thead>
<tr>
<th>Selector Lever Position</th>
<th>Solenoid Position</th>
<th>Elements In Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;D&quot; (Drive)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Gear</td>
<td>1-2 ON/2-3 ON</td>
<td>Input Clutch,</td>
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<tr>
<td></td>
<td></td>
<td>(1) Input Sprag,</td>
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<tr>
<td></td>
<td></td>
<td>Forward Band &amp;</td>
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<tr>
<td></td>
<td></td>
<td>(1) 1-2 Support Roller Clutch</td>
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<tr>
<td>2nd Gear</td>
<td>1-2 OFF/2-3 ON</td>
<td>2nd Clutch,</td>
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<tr>
<td></td>
<td></td>
<td>(2) Input Clutch,</td>
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<tr>
<td></td>
<td></td>
<td>(3) Input Sprag,</td>
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<td>Forward Band &amp;</td>
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<tr>
<td></td>
<td></td>
<td>(1) 1-2 Support Roller Clutch</td>
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<tr>
<td>3rd Gear</td>
<td>1-2 OFF/2-3 OFF</td>
<td>2nd Clutch,</td>
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<tr>
<td></td>
<td></td>
<td>3rd Clutch,</td>
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<td>(1) 3rd Roller Clutch,</td>
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<td></td>
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<td>Forward Band &amp;</td>
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<tr>
<td></td>
<td></td>
<td>(3) 1-2 Support Roller Clutch</td>
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<tr>
<td>Overdrive</td>
<td>1-2 ON/2-3 OFF</td>
<td>2nd Clutch,</td>
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<tr>
<td></td>
<td></td>
<td>(2) 3rd Clutch,</td>
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<td>4th Clutch,</td>
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<td>(3) 3rd Roller Clutch,</td>
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<td>Forward Band &amp;</td>
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<td>(3) 1-2 Support Roller Clutch</td>
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<tr>
<td>&quot;3&quot; (Manual 3rd)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd Gear</td>
<td>1-2 OFF/2-3 OFF</td>
<td>2nd Clutch,</td>
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<tr>
<td></td>
<td></td>
<td>3rd Clutch,</td>
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<td>(1) 3rd Roller Clutch,</td>
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<td>Input Clutch,</td>
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<td>Forward Band &amp;</td>
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<td>(3) 1-2 Support Roller Clutch</td>
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<tr>
<td>2nd Gear</td>
<td>1-2 OFF/2-3 ON</td>
<td>2nd Clutch,</td>
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<tr>
<td></td>
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<td>(2) Input Clutch,</td>
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<td>(3) Input Sprag,</td>
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<td>Forward Band &amp;</td>
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<td>(1) 1-2 Support Roller Clutch</td>
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<tr>
<td>1st Gear</td>
<td>1-2 ON/2-3 ON</td>
<td>Input Clutch,</td>
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<td>(1) Input Sprag,</td>
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<td>Forward Band &amp;</td>
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<tr>
<td>&quot;2&quot; (Manual 2nd)</td>
<td></td>
<td></td>
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<tr>
<td>2nd Gear</td>
<td>1-2 OFF/2-3 ON</td>
<td>2nd Clutch,</td>
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<td></td>
<td></td>
<td>(2) Input Clutch,</td>
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<td>(3) Input Sprag,</td>
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<td>Forward Band,</td>
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<td></td>
<td></td>
<td>(1) 1-2 Support Roller Clutch &amp;</td>
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<tr>
<td></td>
<td></td>
<td>1-2 Band</td>
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<tr>
<td>1st Gear</td>
<td>1-2 ON/2-3 ON</td>
<td>Input Clutch,</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>Forward Band,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1) 1-2 Support Roller Clutch &amp;</td>
</tr>
</tbody>
</table>
| 1st Gear | 1-2 ON/2-3 ON | 3rd Clutch,  
(1) 3rd Roller Clutch,  
Input Clutch,  
(1) Input Sprag,  
Forward Band,  
(1) 1-2 Support Roller Clutch & 1-2 Band |
| "R" (Reverse) | 1-2 ON/2-3 ON | Reverse Band,  
Input Clutch &  
(1) Input Sprag |
| "N" Or "P" (Neutral/Park) | 1-2 ON/2-3 ON | Input Clutch &  
(1) Input Sprag |

(1) - Holding.  
(2) - Applied but not effective.  
(3) - Overrunning.

NOTE: On "G" & "H" bodies, connector terminals C1 (Blue) and C2 (Clear) have identical pin numbers. See Fig. 5. On all other models, connector terminals C1 (Blue) (Fig. 6) and C2 (Clear) (Fig. 7) have differing pin numbers.

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**Fig. 5:** PCM 80-Pin Harness Connector Terminal ID (C1 & C2 - "G" & "H" bodies)  
Courtesy of General Motors Corp.

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**Fig. 6:** PCM 80-Pin Harness Connector Terminal ID (C1 - Except "G" & "H" bodies)  
Courtesy of General Motors Corp.
DIAGNOSTIC TESTS

* PLEASE READ THIS FIRST *

Diagnostic Tests
Following diagnostic tests are DTC specific. Always perform
On-Board Diagnostic (OBD) System Check prior to performing any
diagnostic procedure. For terminal locations, see WIRING DIAGRAMS. For
engine-related DTCs, see appropriate the G - TESTS W/CODES article in
ENGINE PERFORMANCE.

Diagnostic Aids
Diagnostic aids located at end of each diagnostic test, are
additional tips used to help diagnose trouble codes when diagnostic
procedures do not find a problem.

ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK

NOTE: Use of scan tool is required to perform OBD system check.
Perform this test prior to performing any diagnostic
procedures in DTC tests.

NOTE: Most problems that exist with the MIL or diagnostic system
are engine performance or PCM related. Procedures for
repairing these systems and circuits may require additional
equipment performance repair data. This test contains
references to additional procedures not found in this
publication.

The OBD System Check determines:

* If Malfunction Indicator Light (MIL) works.
* If PCM is operating and can recognize a fault.
* If any codes are stored.

OBD system check is the starting point for utilizing the
self-diagnostic system for determining computer-related problems.
After performing necessary tests as described in diagnostic system
check, if no codes are indicated and driveability problems still
exist, see appropriate H - TESTS W/O CODES article in ENGINE
PERFORMANCE.

NOTE: The following steps should be performed first to reduce
diagnostic time and prevent replacement of good parts.
3.4L
1) Turn ignition on with engine off. Observe Malfunction Indicator Light (MIL). If MIL lights, go to next step. If MIL does not light, go to MIL INOPERATIVE in the appropriate F - BASIC TESTING article.
2) Turn ignition off. Install scan tool and follow scan tool manufacturer’s instructions to proceed with test. Turn ignition on. If scan tool displays PCM data, go to next step. If scan tool does not display PCM data, go to DLC DIAGNOSIS OR NO SCAN TOOL DATA in the appropriate F - BASIC TESTING article.
3) Attempt to start engine. If engine starts and runs, go to next step. If engine does not start or starts and dies, go to NO START - ENGINE CRANKS OKAY for specific engine in the appropriate F - BASIC TESTING article. Repair as necessary.
4) Using scan tool, observe DTC status on LAST TST FAIL function. If any DTC is stored, save freeze frame and failure record information using scan tool "Capture Info" feature. If a DTC is indicated as last test failed, diagnose DTC. If DTC is not indicated, go to next step.
5) Using scan tool, display DTC failure records. If a DTC failure record is stored, save freeze frame and failure record information using scan tool "Capture Info" feature. If a failure record is stored, diagnose DTC. If DTC(s) are not stored, check related circuit or component(s). See appropriate I - SYSTEM/COMPONENT TESTS article.

3.5L & 3.8L
1) Turn ignition on with engine off. Observe Malfunction Indicator Light (MIL). If MIL lights, go to next step. If MIL does not light, go to MIL INOPERATIVE in the appropriate F - BASIC TESTING article.
2) Turn ignition off. Install scan tool and follow scan tool manufacturer’s instructions to proceed with test. Turn ignition on. If scan tool displays PCM data, go to next step. If scan tool does not display PCM data, go to DLC DIAGNOSIS OR NO SCAN TOOL DATA in the appropriate F - BASIC TESTING article.
3) Attempt to start engine. If engine starts and runs, go to next step. If engine does not start or starts and dies, go to NO START - ENGINE CRANKS OKAY for specific engine in the appropriate F - BASIC TESTING article.
4) Using scan tool, observe DTC statuses; MIL REQUEST, FAIL THIS IGN, LAST TST FAIL and HISTORY. If any of these DTC status are present, refer to affected DTC to diagnose problem. If DTC(s) are not present, check related circuit or component(s). See the I - SYSTEM/COMPONENT TESTS article.

DTC P0218: TRANSAXLE FLUID OVERTEMPERATURE

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Transaxle Fluid Temperature (TFT) sensor is a negative coefficient thermistor. When transaxle fluid is cold, sensor resistance is high. As transaxle fluid warms up, sensor resistance decreases. PCM uses TFT sensor information to control Torque Converter Clutch (TCC) apply and release, line pressure and shift timing. TFT range is -40°F to 304°F (-40°C to 151°C). DTC P0218 will set if PCM detects a high transaxle fluid temperature for extended periods of time on TFT sensor circuit.

Conditions For Setting DTC P0218
DTC will set under the following conditions:
* DTCs P0711, P0712 or P0713 (TFT circuit) are not present.
* Transaxle fluid temperature is more than 266°F (130°C) for 10 minutes.

PCM disables shift adapts. PCM does not illuminate Malfunction Indicator Light (MIL).

Diagnostic Procedures
1) Ensure transaxle fluid level is correct. DTC can only be set if one or more of the following conditions exists: an overheated engine, an overloaded vehicle, fluid that has become contaminated with antifreeze, a clogged filter or a filter that is not seated correctly, clogged scavenger screens, low line pressure caused by clogged or restricted cooler lines or a restricted radiator. Check all items and repair as necessary. After repairs are complete, go to next step.
2) Connect scan tool to DLC. Select DTC on scan tool. Select "Clear Info" function. Road test vehicle and monitor transaxle fluid temperature. Ensure fluid temperature remains below 264°F (129°C) for 5 seconds. Select "Specific DTC" and enter DTC "P0218". If road test passed, system is okay. If road test did not pass, repeat step 1).

Diagnostic Aids
Check transaxle cooling system for possible blockage and restrictions. Check for transaxle fluid level.

DTC P0502: VEHICLE SPEED SENSOR (VSS) CIRCUIT (LOW INPUT)

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Vehicle speed is signaled to PCM by Vehicle Speed Sensor (VSS). Sensor is a Permanent Magnet (PM) generator mounted to transaxle case extension. PM generator produces an AC voltage as speed sensor rotor teeth pass sensor’s magnetic field. PCM converts AC voltage into digital signal. PCM uses vehicle speed to determine shift timing, TCC apply and release, and gear ratio calculations. VSS voltage will vary from .5 volt AC at 100 RPM to more than 100 volts AC at 6000 RPM. VSS resistance value is 981-1864 ohms. DTC P0502 will set if PCM detects a low vehicle speed when vehicle has high engine speed in drive gear.

Conditions For Setting DTC P0502
DTC will set under the following conditions:
* Transaxle is not in Park or Neutral.
* DTCs P0107 and P0108 (MAP sensor), or P0122 and P0123 (throttle position sensor) are not present.
* Engine speed is more than 2500 RPM.
* Throttle angle is more than 12 percent.
* Output speed is less than 150 RPM for 2.5 seconds.
* Engine torque is between 40-150 ft. lbs (54-203 N.m).

MIL will light after 2 consecutive ignition cycles with first failure signal. PCM commands maximum line pressure and disables shift adapts. PCM calculates vehicle speed using input speed sensor information and commanded gear.

Diagnostic Procedures
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are
cleared later in this test. Raise and support vehicle.

CAUTION: To prevent damage to drive axles, support lower control arms in normal horizontal position.

2) Start engine and let idle. Shift gear selector to "D" position. Select "Output Speed" on scan tool. With drive wheels rotating, if transaxle output speed does not increase when wheel speed increases, go to next step. If transaxle output speed increases when wheel speed increases, go to step 4).

3) Turn ignition off. Disconnect PCM Blue connector (C1). Connect voltmeter between VSS terminals at PCM Blue connector (C1). See Fig. 5 ("G" & "H" bodies), or Fig. 6 (Except "G" & "H" bodies). See WIRING DIAGRAMS. Rotate drive wheels and observe voltmeter display. If voltage is more than .5 volt, go step 6). If voltage is less than .5 volt, go to step 5).

4) Use scan tool to check for most current PCM calibration I.D. number. Refer to manufacturer service bulletins if necessary. If I.D. number matches, replace PCM, then go to step 8). If I.D number does not match, update PCM with latest calibration, then go to step 8).

5) Remove VSS from transaxle. Connect ohmmeter between VSS terminals. If resistance is 981-1864 ohms, go to next step. If resistance is not 981-1864 ohms, replace VSS, then go to step 8).

6) Install VSS into transaxle. Connect ohmmeter between VSS terminals at PCM Blue connector (C1). If resistance is less than 981 ohms, go to next step. If resistance is more than 1864 ohms, check for open circuit between VSS and PCM. Repair as necessary, then go to step 8).

7) Check for VSS wires shorted together. Repair wires as necessary, then go to next step. If resistance is more than 981 ohms, check for short to ground in circuits between VSS and PCM. Repair circuits as necessary, then go to next step.

8) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0502". Test drive vehicle until transaxle output speed is more than 250 RPM for 3 seconds. If DTC P0502 is not present, repair is complete. If DTC P0502 is still present, repeat test.

Diagnostic Aids
Check for DTC P0705 (transaxle range switch). This DTC will affect transaxle upshifts and may cause a false DTC P0502. Check for Electromagnetic Interferences (EMI) induced on VSS circuits by a misrouted wiring harness along spark plug wires. Check for bent, backed out or damaged terminals, or misaligned connectors. Check for poor terminal tension. Check for chafed wiring or broken wire inside insulation. When diagnosing for an intermittent short or open condition, wiggle wiring harness while observing scan tool for change in value. Ensure VSS is secured to transaxle case extension.

**DTC P0503: VEHICLE SPEED SENSOR (VSS) CIRCUIT PERFORMANCE PROBLEM**

**NOTE:** Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Vehicle speed is signaled to PCM by Vehicle Speed Sensor (VSS). Sensor is a Permanent Magnet (PM) generator mounted to transaxle case extension. PM generator produces an AC voltage as speed sensor rotor teeth pass sensor’s magnetic field. PCM converts AC voltage into digital signal. PCM uses vehicle speed to determine shift timing, TCC apply and release, and gear ratio calculations. VSS voltage will vary from .5 volt AC at 100 RPM to more than 100 volts AC.
at 6000 RPM. VSS resistance value is 981-1864 ohms. DTC P0503 will set if PCM detects a large change in vehicle speed.

Conditions For Setting DTC P0503
DTC will set under the following conditions:

* Transaxle is not in Park or Neutral.
* Gear selector lever takes more than 6 seconds.
* Engine speed is more than 500 RPM.
* Engine is not in fuel shut off mode.
* No output speed increase more than 1000 RPM in 2 seconds.
* Output shaft speed drops more than 1500 RPM in 2 seconds.

MIL will light after 2 consecutive ignition cycles with first failure signal. PCM commands maximum line pressure and disables shift adapts. PCM calculates vehicle speed using input speed sensor information and commanded gear.

Diagnostic Procedures
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test. Raise and support vehicle.

CAUTION: To prevent damage to drive axles, support lower control arms in normal horizontal position.

2) Start engine and let idle. Shift gear selector to "D" position. Select "Trans. OSS RPM" on scan tool. With drive wheels rotating, if transaxle OSS RPM speed does not increase when wheel speed increases, go to next step. If transaxle OSS RPM speed increases when wheel speed increases, go to step 4).

3) Turn ignition off. Disconnect PCM Blue connector (C1). See Fig. 5 ("G" & "H" bodies), or Fig. 6 (Except "G" & "H"). Connect voltmeter between VSS terminals at PCM Blue connector (C1). Rotate drive wheels and observe voltmeter display. If voltage is more than .5 volt, go to step 6). If voltage is less than .5 volt, go to step 5).

4) Use scan tool to check for most current PCM calibration I.D. number. Refer to manufacturer service bulletins if necessary. If I.D. number matches, replace PCM, then go to step 9). If I.D number does not match, update PCM with latest calibration, then go to step 9).

5) Connect ohmmeter between VSS terminals at PCM Blue connector (C1). See Fig. 5 ("G" & "H" bodies), or Fig. 6 (Except "G" & "H" bodies). See WIRING DIAGRAMS. If resistance is more than 1864 ohms, check for open circuit between VSS and PCM. Repair as necessary, then go to step 9). If resistance is less than 1864 ohms, go to next step.

6) If resistance is 981-1864 ohms, check for VSS wires shorted together or shorted to ground. Repair wires as necessary, then go to step 9). If resistance is less than 981 ohms, go to next step.

7) Remove VSS from transaxle. Connect ohmmeter between VSS terminals. If resistance is 981-1864 ohms, go to next step. If resistance is not 981-1864 ohms, replace VSS, then go to step 9).

8) Disconnect PCM Blue connector (C1). Check connector for damaged, backed out or broken terminals, or weak terminal tension. Repair connector as necessary, then go to next step. If connector is okay, replace PCM, then go to next step.

9) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0503". Test drive vehicle under conditions for setting DTC P0503. If DTC P0503 is not present, repair is complete. If DTC P0503 is still present, repeat test.
Diagnostic Aids
Condition may be intermittent. Inspect wiring harness for poor connections at PCM, transaxle 20-pin connector and vehicle speed sensor. Check for bent, backed out or damaged terminals, or misaligned connectors. Check for poor terminal tension or a chafed wire. Inspect engine wiring harness for pinched wires which may cause and intermittent. When diagnosing for an intermittent short or open condition, wiggle wiring harness while observing scan tool for change in value. Check for Electromagnetic Interferences (EMI) induced on VSS circuits by a misrouted wiring harness along spark plug wires. Ensure VSS is secured to transaxle case extension. Too much runout in final drive carrier may set DTC P0503. If VSS and circuitry are okay, repair final drive carrier as needed.

DTC P0560: SYSTEM VOLTAGE MALFUNCTION (1997 MODELS ONLY)

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
PCM monitors fused battery feed circuit for low or high system voltage.

Conditions For Setting DTC P0560
DTC will set under the following conditions:
* For low system voltage, engine speed is more than 800 RPM and system voltage is less than 10 volts for 2 seconds.
* For high system voltage, transaxle fluid temperature is more than 32°F (0°C) and system voltage is more than 16 volts for 2 seconds.

MIL will NOT light at first failure signal. PCM will inhibit TCC and transaxle will default to 3rd gear.

Diagnostic Procedures
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record failure records for reference. Data will be lost when DTCs are cleared later in this test.
2) Using a DVOM, measure and record battery voltage at battery. If voltage is more than 10.5 volts, go to next step. If voltage is less than 10.5 volts, diagnose battery condition and repair or replace as necessary.
3) Start engine. If charging light on instrument panel is on, diagnose charging system and repair as necessary. If charging light is off, select "Ignition Voltage" on scan tool. Increase engine speed to 1000-1500 RPM. Observe scan tool ignition voltage. If ignition voltage is 13-15 volts, go to next step. If ignition voltage is not 13-15 volts, diagnose charging system and repair as necessary.
4) Turn engine off. Disconnect PCM Blue connector (C1). See Fig. 5 ("G" & "H" bodies), or Fig. 6 (Except "G" & "H" bodies). Turn ignition switch to ON position. DO NOT start engine. Using a DVOM, check for battery voltage at battery feed terminal of PCM Blue connector (C1).
5) If difference between measured battery voltage in step 1) and voltage measured at PCM Blue connector (C1) is more than .5 volt, go to next step. If voltage is less than .5 volt, check for high resistance in battery feed circuit. Repair as necessary, then go to step 7).
6) Using a DVOM, check for ignition voltage at ignition feed terminal of PCM Blue connector (C1). See Fig. 5 ("G" & "H" bodies), or Fig. 6 (Except "G" & "H"). See WIRING DIAGRAMS. If difference between
measured battery voltage in step 1) and voltage measured at PCM Blue connector (C1) is more than .5 volt, check for high resistance in ignition feed circuit. Repair as necessary, then go to next step. If voltage is less than .5 volt, check PCM connector for bent, backed out or damaged connector pins. Repair as necessary, then go to next step. If connector pins are okay, replace PCM, then go to next step.

7) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0560". Operate vehicle under the following conditions: Start vehicle and warm to normal operating temperature. Engine RPM must be more than 1000 RPM. Transaxle fluid temperature must be more than 32°F (0°C). PCM must detect a system voltage of 10-16 volts. If DTC P0560 is not present, repair is complete. If DTC P0560 is still present, repeat test.

Diagnostic Aids
Charging battery with battery charger or jump starting vehicle could set DTC P0560. If DTC set when accessories are operated, check for poor system connections or excessive current draw. Check drive belt for wear or incorrect tension.

DTC P0711: TRANS. FLUID TEMPERATURE (TFT) SENSOR CIRCUIT
PERFORMANCE PROBLEM

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Transaxle Fluid Temperature (TFT) sensor is a negative coefficient thermistor. When transaxle fluid is cold, sensor resistance is high. As transaxle fluid warms up, sensor resistance decreases. PCM monitors TFT circuit. Circuit may be functional but not in normal operating range. DTC P0711 indicates stuck, erratic, intermittent or skewed values, indicating poor system performance. TFT range is -40°F to 304°F (-40°C to 151°C). DTC P0711 will set if PCM detects an intermittent voltage or no voltage change in TFT sensor circuit.

Conditions For Setting DTC P0711
DTC will set under the following conditions:

* DTC P0502 or DTC P0503 (VSS) is not present.
* System voltage is 10-16 volts.
* TFT sensor voltage is .2-4.92 volts.
* Transaxle fluid temperature at start-up is -40° to 69°F (-40 to 21°C).
* Engine run time is more than 5 minutes.
* Vehicle speed is more than 5 MPH for 7 minutes cumulative.
* TCC slip is more than 120 RPM for 7 minutes cumulative.
* Engine coolant temperature is more than 158°F (70°C).
* Engine coolant temperature has changed by 90°F (50°C) since start-up.

Or

* Fail Case No. 1: Change in transaxle fluid temperature is less than 2°F (1.5°C) since start-up for 7 minutes.
* Fail Case No. 2: Change in transaxle fluid temperature is more than 36°F (20°C) within .2 second and changes 14 times within 7 minutes.

MIL will light after 2 consecutive ignition cycles with first failure signal. PCM disables shift adapts.
Default Temperature Specifications

If engine run time is less than 3 minutes and DTC P0112, P0113, P1111 or P1112 (Intake Air Temperature - IAT) is set, default fluid temperature is 32°F (0°C). If no IAT DTCs are set, default fluid temperature is set to IAT value saved at start-up.

If engine run time is more than 3 minutes and DTC P0117, P0118, P1114 or P1115 (Engine Coolant Temperature - ECT) is set, default fluid temperature is 268°F (131°C).

If engine run time is more than 3 minutes, no ECT DTC is set, and ECT temperature is less than 113°F (45°C), default fluid temperature is 54°F (12°C).

If ECT temperature is more than 239°F (115°C), default fluid temperature is 268°F (131°C). If ECT temperature is 113°F to 239°F (45°C to 115°C), and IAT DTC P0112, P0113, P1111 or P1112 is set, default fluid temperature is set to equal ECT.

Diagnostic Procedures

1) Ensure transaxle fluid level is correct. Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record failure records for reference. Data will be lost when DTCs are cleared later in this test.

2) Clear DTCs. Start engine and let idle. Monitor TFT, ECT and IAT sensor temperature values. If TFT sensor temperature defaults to a calibrated value, go to next step. See DEFAULT TEMPERATURE SPECIFICATIONS. If TFT sensor temperature does not default to a calibrated value, go to step 5).

3) Turn engine off. Turn ignition switch to ON position. DO NOT start engine. Select "TFT Sensor Volts" on scan tool. Wiggle engine harness, PCM connectors and transaxle 20-pin connector while monitoring scan tool. If TFT voltage does not indicate an unrealistic change in value while wiggling components, go to next step. If TFT voltage indicates an unrealistic change in value while wiggling components, repair circuits between PCM and TFT sensor, then go to step 5). If circuits are okay, replace PCM, then go to step 5).

4) Disconnect transaxle 20-pin connector. Connect DVOM between terminals "L" and "M" at transaxle 20-pin connector (transaxle harness side). See Fig. 2. Set DVOM to MIN/MAX position. While recording resistance value between TFT sensor terminals, wiggle transaxle harness and TFT sensor connector. If DVOM displays a value higher or lower then previously recorded, check transaxle wiring harness for short to ground, open, or wires shorted together. Repair wiring as necessary, then go to next step. If value does not change, replace TFT sensor, then go to next step.

5) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0711". Operate vehicle under the following conditions: TFT sensor voltage is .200-.4.92 volts, TFT change is more than 5°F (3°C) since start-up. TFT change is less than 36°F (20°C) in .200 seconds. All conditions must be met for 7 seconds. If DTC P0711 is not present, repair is complete. If DTC P0711 is still present, repeat test.

Diagnostic Aids

Condition may be intermittent. Inspect wiring for poor connection at transaxle 20-pin connector. Check for bent, backed out or damaged terminals, or poor terminal tension. Check for chafed wiring. When diagnosing an intermittent condition, wiggle wiring harness while observing scan tool for change in value. Test TFT sensor
at various temperature levels to check for skewed sensor. Inspect transaxle 20-pin connector for transaxle fluid.

**DTC P0712: TRANS. FLUID TEMPERATURE (TFT) SENSOR CIRCUIT (LOW INPUT)**

**NOTE:** Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

**Circuit Description**
Transaxle Fluid Temperature (TFT) sensor is a negative coefficient thermistor whose resistance value changes based on temperature. PCM provides a 5 volt reference to sensor on TFT signal circuit. A high fluid temperature or short to ground in circuit results in low signal voltage. TFT operating range is from -40°F to 305°F (-40°C to 151°C). DTC P0712 will set if PCM detects a continuous short to ground in TFT sensor circuit.

**Conditions For Setting DTC P0712**
DTC will set under the following conditions:

* System voltage is 10-16 volts.
* Ignition switch is in ON position.
* PCM detects a TFT sensor voltage reading of .200 volts or less for 10 seconds.

MIL will NOT light at first failure signal. PCM disables shift adapts.

**Default Temperature Specifications**
If engine run time is less than 3 minutes and DTC P0112, P0113, P1111 or P1112 (Intake Air Temperature - IAT) is set, default fluid temperature is 32°F (0°C). If no IAT DTCs are set, default fluid temperature is set to IAT value saved at start-up.
If engine run time is more than 3 minutes and DTC P0117, P0118, P1114 or P1115 (Engine Coolant Temperature - ECT) is set, default fluid temperature is 268°F (131°C).
If engine run time is more than 3 minutes, no ECT DTC is set, and ECT temperature is less than 113°F (45°C), default fluid temperature is set to equal ECT.
If ECT temperature is more than 239°F (115°C), default fluid temperature is 268°F (131°C). If ECT temperature is 113°F to 239°F (45°C to 115°C) and IAT DTC P0112, P0113, P1111 or P1112 is set, default fluid temperature is set to equal ECT.
If IAT at start-up is less than 32°F (0°C), default fluid temperature is set to ECT minus 18°F (10°C). If IAT at start-up is more than 82°F (28°C), default fluid temperature is set to ECT plus 18°F (10°C). If IAT at start-up is 32°F to 82°F (0°C to 28°C), default fluid temperature is set to equal ECT.

**Diagnostic Procedures**
1) Ensure transaxle fluid level is correct. Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record failure records for reference. Data will be lost when DTCs are cleared later in this test.
2) Select "TFT Sensor Volts" on scan tool. If TFT sensor voltage is less than .200 volts, go to next step. If TFT sensor voltage is more than .200 volts, see DIAGNOSTIC AIDS.
3) Turn ignition off. Disconnect transaxle 20-pin connector. If TFT sensor voltage is more than 4.92 volts, go to next step. If TFT sensor voltage is less than 4.92 volts, check for short to ground between PCM and transaxle 20-pin connector (PCM harness side). Repair as necessary, then go to step 5). If wiring harness is okay, replace
4) Install Test Harness (J-39775) to transaxle 20-pin connector. Connect ohmmeter between transaxle case and transaxle 20-pin connector terminal "M" (transaxle harness side). See Fig. 2. If resistance is more than 100 ohms, replace PCM, then go to next step. If resistance is less than 100 ohms, check for short to ground in wiring harness between transaxle 20-pin connector and TFT sensor. Repair circuit as necessary, then go to next step. If circuit is okay, replace TFT sensor, then go to next step.

5) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0712". Operate vehicle so that TFT sensor voltage is more than .200 volts for more than 10 seconds. If DTC P0712 is not present, repair is complete. If DTC P0712 is still present, repeat test.

Diagnostic Aids
Condition may be intermittent. Inspect wiring harness for poor connections at TFT sensor, transaxle 20-pin connector and PCM. Check for bent, backed out or damaged terminals, or for poor terminal tension. Check for chafed wiring. When diagnosing an intermittent condition, wiggle wiring harness while observing scan tool for change in value.

DTC P0713: TRANS. FLUID TEMPERATURE (TFT) SENSOR CIRCUIT (HIGH INPUT)

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Transaxle Fluid Temperature (TFT) sensor is a negative coefficient thermistor whose resistance value changes based on temperature. PCM provides a 5 volt reference to sensor on TFT input circuit. A low fluid temperature or open in circuits results in high signal voltage. TFT operating range is -40°F to 305°F (-40°C to 151°C). DTC P0713 will set if PCM detects a continuous open or short to voltage on TFT input circuit.

Conditions For Setting DTC P0713
DTC will set under the following conditions:
* System voltage is 10-16 volts.
* Ignition switch is in ON position.
* PCM detects a TFT sensor voltage 4.92 volts or less for 7 minutes.

MIL will NOT light at first failure signal. PCM disables shift adapts.

Default Temperature Specifications
If engine run time is less than 3 minutes and DTC P0112, P0113, P1111 or P1112 (Intake Air Temperature - IAT) is set, default fluid temperature is 32°F (0°C). If no IAT DTCs are set, default fluid temperature is set to IAT value saved at start-up.

If engine run time is more than 3 minutes and DTC P0117, P0118, P1114 or P1115 (Engine Coolant Temperature - ECT) is set, default fluid temperature is 268°F (131°C).

If engine run time is more than 3 minutes, no ECT DTC is set, and ECT temperature is less than 113°F (45°C), default fluid temperature is 54°F (12°C).

If ECT temperature is more than 239°F (115°C), default fluid temperature is 268°F (131°C). If ECT temperature is 113°F to 239°F (45°C to 115°C), and IAT DTC P0112, P0113, P1111 or P1112 is set,
default fluid temperature is set to equal ECT.
If IAT at start-up is less than 32°F (0°C), default fluid temperature is set to ECT minus 18°F (10°C). If IAT at start-up is more than 82°F (28°C), default fluid temperature is set to ECT plus 18°F (10°C). If IAT at start-up is 32°F to 82°F (0°C to 28°C), default fluid temperature is set to equal ECT.

Diagnostic Procedures
1) Ensure transaxle fluid level is correct. Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record failure records for reference. Data will be lost when DTCs are cleared later in this test.
2) Select "TFT Sensor Voltage" on scan tool. If TFT sensor voltage is more than 4.92 volts, go to next step. If TFT sensor voltage is less than 4.92 volts, see DIAGNOSTIC AIDS.
3) Turn ignition off. Disconnect transaxle 20-pin harness connector. Install a fused jumper wire between transaxle case and transaxle 20-pin connector terminal "M" (PCM harness side). See Fig. 3. Turn ignition switch to ON position. DO NOT start engine. If TFT sensor voltage is less than 4.92 volts, go to next step. If TFT sensor voltage is more than 4.92 volts, check for open in wiring harness (PCM harness side). Repair if necessary, then go to step 5). If wiring harness is okay, replace PCM, then go to step 5).
4) Check for open in wiring harness (transaxle harness side). Repair as necessary, then go to next step. If wiring harness is okay, replace TFT sensor, then go to next step.
5) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0713". Operate vehicle so that TFT sensor voltage is less than 4.92 volts for more than 7 minutes. If DTC P0713 is not present, repair is complete. If DTC P0713 is still present, repeat test.

Diagnostic Aids
Condition may be intermittent. Inspect wiring harness for poor connections at TFT sensor, transaxle 20-pin connector and PCM. Check for bent, backed out or damaged terminals, or for poor terminal tension. Check for chafed wiring. When diagnosing an intermittent condition, wiggle wiring harness while observing scan tool for change in value.

DTC P0716: INPUT SPEED SENSOR (ISS) CIRCUIT PERFORMANCE PROBLEM

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Input speed sensor is a permanent magnet with a coil of wire wound around it. Sensor mounts in transaxle case facing drive sprocket on input shaft. An air gap of .003-.834" (.076-21.2 mm) between sensor and drive sprocket must be maintained to transmit an accurate AC voltage. Sensor voltage varies from .5 volt at 100 RPM to more than 100 volts at 6000 RPM. This DTC monitors ISS circuit. Circuit may be functional but not in normal operating range. DTC indicates stuck, erratic, or intermittent values, indicating poor system performance. ISS has a resistance value of 893-1428 ohms. DTC P0716 will set if PCM detects an unrealistically large change in data from ISS.

Conditions For Setting DTC P0716
DTC will set under the following conditions:

* DTCs P0121, P0122 or P0123 (throttle position) are not set.
* DTCs P0502 or P0503 (VSS) are not set.
* DTC P0717 (ISS no signal) is not set.
* DTCs P0751 or P0753 (1-2 shift solenoid) is not set.
* DTC P0756 or P0758 (2-3 shift solenoid) is not set.
* Vehicle speed is more than 5 MPH.
* Throttle angle is more than 14 percent.
* Engine is running for more than 5 seconds.
* Engine is not in fuel shut off mode.
* Changes to input speed by 1300 RPM or more in .8 seconds.

MIL will light after 2 consecutive ignition cycles with a failure signal. PCM disables shift adapts.

Diagnostic Procedure
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test.
2) Select "Trans. ISS" on scan tool. Start engine. If transaxle input speed is more than 100 RPM, see DIAGNOSTIC AIDS. If transaxle input speed is less than 100 RPM, go to next step.
3) Turn ignition off. Disconnect PCM Blue Connector (C1). Connect DVOM between PCM connector terminals No. 7 and 46. See Fig. 5 ("G" & "H" bodies), or Fig. 6 (Except "G" & "H"). Select AC volts on DVOM. Crank engine. If voltage is more than .1 volt, replace PCM, then go to step 7). If voltage is less than .1 volt, go to next step.
4) Turn ignition off. Reconnect PCM Blue connector. Disconnect transaxle 20-pin connector. Install Test Harness (J-39775) onto transaxle 20-pin connector (PCM harness side). Connect DVOM between terminals "S" and "V". See Fig. 3. Select AC volts on DVOM. Start engine. Additional DTCs will set. If voltage is more than .5 volt, check for open or short to ground in wiring harness (PCM harness side). Repair wiring as necessary, then go to step 7). If voltage is less than .5 volt, go to next step.
5) Turn ignition off. Disconnect test harness from PCM harness side and install on transaxle 20-pin connector (transaxle harness side). Connect DVOM between terminals "S" and "V". See Fig. 2. Measure resistance between terminals. If resistance is less than 1428 ohms, go to next step. If resistance is more than 1428 ohms, check for open in wiring harness (transaxle harness side). Repair as necessary, then go to step 7). If wiring harness is okay, replace ISS, then go to step 7).
6) If resistance is less than 893 ohms, replace ISS, then go to next step. If resistance is more than 893 ohms, check for short to ground in wiring harness (transaxle harness side). Repair as necessary, then go to next step. If wiring harness is okay, replace ISS, then go to next step.
7) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0716". Operate vehicle under the following conditions: input speed is more than 120 RPM, input speed change is less than 300 RPM and both conditions are true for more than .8 seconds. If DTC P0716 is not present, repair is complete. If DTC P0716 is still present, repeat test.

Diagnostic Aids
Ensure engine wiring harness is not located near spark plug wires or DIS coils. Condition may be intermittent. Inspect wiring harness for poor connections at ISS, transaxle 20-pin connector and PCM. Check for bent, backed out or damaged terminals, or for poor terminal tension. Check for chafed wiring. When diagnosing an intermittent condition, wiggle wiring harness while observing scan tool for change in value.
NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Input speed sensor is a permanent magnet with a coil of wire wound around it. Sensor mounts in transaxle case facing drive sprocket on input shaft. An air gap of .003-.834" (.076-21.2 mm) between sensor and drive sprocket must be maintained to transmit an accurate AC voltage. Sensor voltage varies from .5 volt at 100 RPM to more than 100 volts at 6000 RPM. This DTC monitors ISS circuit. ISS has a resistance value of 893-1428 ohms. DTC P0717 will set if PCM detects a low input speed while vehicle and engine speeds are high.

Conditions For Setting DTC P0717
DTC will set under the following conditions:
* DTCs P0502 or P0503 (VSS) are not set.
* DTC P1810 (manual valve position switch) is not set.
* Vehicle speed is more than 5 MPH.
* Engine is running for more than 5 seconds.
* Manual valve position switch indicated transaxle is not in Park or Neutral.
* Input speed is less than 50 RPM for 5 seconds.

MIL will light after 2 consecutive ignition cycles with a failure signal. PCM disables shift adapts.

Diagnostic Procedures
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test.
2) Select "Trans. ISS" on scan tool. Start engine. If transaxle input speed is more than 100 RPM, see DIAGNOSTIC AIDS. If transaxle input speed is less than 100 RPM, go to next step.
3) Turn ignition off. Disconnect PCM Blue Connector (C1). Connect DVOM between PCM connector terminals No. 7 and 46. See Fig. 5 ("G" & "H" bodies), or Fig. 6 (Except "G" & "H"). Select AC volts on DVOM. Crank engine. If voltage is more than .1 volt, replace PCM, then go to step 7). If voltage is less than .1 volt, go to next step.
4) Turn ignition off. Reconnect PCM Blue connector. Disconnect transaxle 20-pin connector. Install Test Harness (J-39775) onto transaxle 20-pin connector (PCM harness side). Connect DVOM between terminals "S" and "V". See Fig. 3. Select AC volts on DVOM. Start engine. Additional DTCs will set. If voltage is more than .5 volt, check for open or short to ground in wiring harness (PCM harness side). Repair wiring as necessary, then go to step 7). If voltage is less than .5 volt, go to next step.
5) Turn ignition off. Disconnect test harness from PCM harness side and install on transaxle 20-pin connector (transaxle harness side). Connect DVOM between terminals "S" and "V". See Fig. 2. Measure resistance between terminals. If resistance is less than 1428 ohms, go to next step. If resistance is more than 1428 ohms, check for open in wiring harness (transaxle harness side). Repair as necessary, then go to step 7). If wiring harness is okay, replace ISS, then go to step 7).
6) If resistance is less than 893 ohms, replace ISS, then go to next step. If resistance is more than 893 ohms, check for short to ground in wiring harness (transaxle harness side). Repair as necessary, then go to next step. If wiring is okay, replace ISS, then go to next step.
A) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0717". Operate vehicle with input speed more than 120 RPM for 3 seconds. If DTC P0717 is not present, repair is complete. If DTC P0717 is still present, repeat test.

Diagnostic Aids
Condition may be intermittent. Inspect wiring harness for poor connections at ISS, transaxle 20-pin connector and PCM. Check for bent, backed out or damaged terminals, or for poor terminal tension. Check for chafed wiring. When diagnosing an intermittent condition, wiggle wiring harness while observing scan tool for change in value. Inspect transaxle 20-pin connector for transaxle fluid.

DTC P0719: TCC BRAKE SWITCH CIRCUIT LOW INPUT
(SWITCH STUCK ON)

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Torque Converter Clutch (TCC) brake switch is used to indicate brake pedal status to PCM. When PCM receives zero volts at brake switch input, PCM turns off TCC solenoid. DTC P0719 will set if PCM detects an open (stuck on) brake switch during acceleration.

Conditions For Setting DTC P0719
DTC will set under the following conditions:

* DTC P0502 or P0503 (VSS signal) is not present.
* Vehicle speed is less than 5 MPH.
* Vehicle takes more than 4 seconds to accelerate to 20 MPH.
* Vehicle speed remains above 20 MPH for at least 6 seconds.
* All conditions must occur 7 times with brake switch on for more than 15 minutes without PCM detecting voltage input of 2 seconds or longer.

MIL will NOT light at first failure signal. Disregard brake switch for TCC scheduling when all of the following conditions are met: throttle position is more than 6 percent, vehicle speed is more than 44 MPH, throttle position was previously more than 12 percent while vehicle speed was more than 47 MPH, or brake switch has NOT been off for more than 2 seconds this ignition cycle.

Diagnostic Procedures
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record failure records for reference. Data will be lost when DTCs are cleared later in this test.

2) If DTCs P1651 or P1652 (fan 2 relay control circuit) are also present, remove and inspect appropriate fuse. See WIRING DIAGRAMS. If fuse is open, check for short to ground in brake switch signal circuit to fuse. Repair circuit as necessary, then go to step 4). Replace fuse. If DTCs are not present, go to next step.

3) Select "TCC Brake Switch" on scan tool. Disconnect TCC brake switch. Connect fused jumper wire between brake switch connector terminals. If brake switch status on scan tool changes from applied to released, replace TCC brake switch, then go to next step. If brake switch status on scan tool does not change, check for open in brake switch signal circuit. Repair circuit as necessary, then go to next step. If circuit is okay, replace PCM, then go to next step.

4) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0719".
Operate vehicle under the following conditions: Turn ignition switch to ON position. TCC brake switch must be off for more than 2 seconds. If DTC P0719 is not present, repair is complete. If DTC P0719 is still present, repeat test.

Diagnostic Aids
Inspect wiring for poor connections at PCM and transaxle 20-pin connector. Check for bent, backed out or damaged terminals, or poor terminal tension. Check for chafed wire or broken wire inside insulation. When diagnosing intermittent condition, wiggle wiring harness while watching scan tool for change in value. Check TCC brake switch for proper adjustment. Check PCM calibration for a current update.

DTC P0724: TCC BRAKE SWITCH CIRCUIT HIGH INPUT
(SWITCH STUCK OFF)

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Torque Converter Clutch (TCC) brake switch is used to indicate brake pedal status to PCM. When PCM receives zero volts at brake switch input, PCM turns off TCC solenoid. DTC P0724 will set if PCM detects a closed (stuck off) brake switch during deceleration.

Conditions For Setting DTC P0724
DTC will set under the following conditions:

* DTCs P0502 or P0503 (VSS signal) is not present.
* Vehicle speed is more than 20 MPH for at least 6 seconds.
* Then vehicle takes more than 4 seconds to decrease speed from 20 MPH to 5 MPH.
* Then vehicle speed is less than 5 MPH.
* All conditions must occur 7 times with brake switch off continuously without PCM detecting voltage input of 2 seconds or longer. MIL will NOT light at first failure signal.

Diagnostic Procedures
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record failure records for reference. Data will be lost when DTCs are cleared later in this test.

2) Select "TCC Brake Switch" on scan tool. Disconnect TCC brake switch connector. If brake switch status on scan tool changed from applied to released, replace TCC brake switch, then go to next step. If brake switch status on scan tool does not change, check for short to voltage in brake switch signal circuit. Repair circuit as necessary, then go to next step. If circuit is okay, replace PCM, then go to next step.

3) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0724". Operate vehicle under the following conditions: Turn ignition switch to ON position. TCC brake switch must be on for more than 2 seconds. If DTC P0724 is not present, repair is complete. If DTC P0724 is still present, repeat test.

Diagnostic Aids
Inspect wiring for poor connections at PCM and transaxle 20-pin connector. Check for bent, backed out or damaged terminals, or poor terminal tension. Check for chafed wire or broken wire inside insulation. When diagnosing intermittent condition, wiggle wiring harness while watching scan tool for change in value. Check TCC brake
switch for proper adjustment. Check PCM calibration for a current update.

**DTC P0730: INCORRECT GEAR RATIO**

**NOTE:** Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

**Circuit Description**

PCM calculates gear ratio based on data from Input Speed Sensor (ISS) and Vehicle Speed Sensor (VSS). PCM compares known transaxle gear ratio to a calculated ratio for each gear range selected. VSS output is translated to RPM, and may be referred to as Output Speed Sensor (OSS). DTC P0730 will set if PCM detects an incorrect gear ratio due to excessive slip within transaxle.

**Conditions For Setting DTC P0730**

DTC will set under the following conditions:

- DTCs P0121, P0122 or P0123 (throttle position) are not set.
- DTCs P0502 or P0503 (VSS signal) are not set.
- DTC P0717 (input speed sensor) is not set.
- DTC P1810 (manual valve position switch) is not set.
- Engine is running for more than 5 seconds.
- Transaxle is not in Park or Neutral.
- Vehicle speed is more than 7 MPH.
- Throttle angle is more than 14 percent.
- Transaxle fluid temperature is more than 68°F (20°C).
- Engine torque is 50-200 ft. lbs. (68-271 N.m).
- 3 seconds has elapsed since last manual range change.
- All of the above conditions must exist, and one of the following conditions occurs for 7 seconds:
  - Gear ratio is more than 2.97:1.
  - Gear ratio is 2.43:1 to 2.87:1.
  - Gear ratio is 1.62:1 to 2.33:1.
  - Gear ratio is 1.05:1 to 1.52:1.
  - Gear ratio is .75:1 to .95:1.

MIL will NOT light at first failure signal. PCM commands maximum line pressure and disables shift adapts.

**Diagnostic Procedures**

1) Ensure transaxle fluid level is correct and visually inspect transaxle cooling system for fluid leaks. Repair as needed. If fluid level is okay, go to next step.

2) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record failure records for reference. Data will be lost when DTCs are cleared later in this test.

3) Use scan tool snapshot mode to record transaxle gear ratios. Drive vehicle in forward gear ranges with throttle position more than 14 percent and vehicle speed more than 7 MPH for 5 seconds. Record each transaxle gear ratio. Specified gear ratios are Reverse (2.33:1 to 2.43:1), 1st (2.87:1 to 2.97:1), 2nd (1.52:1 to 1.62:1), 3rd (.95:1 to 1.05:1) and 4th (.65:1 to .75:1). If commanded gear matches specified gear ratio, see DIAGNOSTIC AIDS. If commanded gear does not match specified gear ratio, go to next step.

4) Perform line pressure test. See LINE PRESSURE TEST under TESTING in the TRANSMISSION OVERHAUL - A/T (4T65-T) article. Repair appropriate components as necessary, then go to next step. If line pressure is okay, check for clutch slippage. See SYMPTOM DIAGNOSIS under TROUBLE SHOOTING in the TRANSMISSION OVERHAUL - A/T (4T65-T) article. Repair as necessary, then go to next step.
5) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0730". Operate vehicle under the following conditions: throttle position is more than 4 percent, vehicle speed is more than 7 MPH, TFT is more than 68°F (20°C), engine torque is 50-200 ft. lbs. (68-271 N.m), transaxle is not in Park or Neutral and no gear range change has been made for 3 seconds. Drive vehicle in "D4" with throttle position more than 14 percent to obtain any one of the following gear ratios for 5 seconds: Reverse (2.33:1 to 2.43:1), 1st (2.87:1 to 2.97:1), 2nd (1.52:1 to 1.62:1), 3rd (.95:1 to 1.05:1) and 4th (.65:1 to .75:1). If DTC P0730 is not present, repair is complete. If DTC P0730 is still present, repeat test.

Diagnostic Aids
Inspect for intermittent ISS or VSS circuit problems. Ensure vehicle’s final drive ratio matches PROM calibration. Refer to CLUTCH & BAND APPLICATION CHART for shift solenoid and transaxle component applications in specified gears.

DTC P0741: TCC SYSTEM STUCK OFF

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS. For fluid circuit identification, see OIL CIRCUIT DIAGRAMS.

Circuit Description
PCM controls TCC Pulse Width Modulated (PWM) solenoid. Solenoid controls hydraulic fluid for TCC apply and release. When TCC is fully applied, engine is coupled directly to transaxle through TCC. TCC used is the electronically controlled converter clutch (EC3). EC3 allows TCC to slip without excessive wear. This allows smooth application and release of TCC. PCM will normally allow a small amount of slip to occur with EC3. This prevents fluid pressure in torque converter from becoming too great. Very high pressure in torque converter will damage converter. When TCC PWM solenoid engages TCC, TCC slip speed is about 20 RPM. DTC P0741 will set if PCM detects high torque converter slip when TCC is commanded on.

Conditions For Setting DTC P0741
DTC will set under the following conditions:

* DTCs P0121, P0122 or P0123 (throttle position) are not set.
* DTCs P0502 or P0503 (VSS signal) are not set.
* DTCs P0716 or P0717 (ISS signal) are not set.
* DTC P0742 (TCC stuck on) is not set.
* DTC P1810 (manual valve position switch) is not set.
* DTC P1860 (TCC PWM solenoid) is not set.
* DTC P1887 (TCC release switch) is not set.
* Engine speed is more than 500 RPM for 5 seconds, and not in fuel shut off mode.
* Time since last gear range change is more than 3 seconds.
* TCC PWM solenoid is commanded on for more than .5 second.
* Throttle angle is between 5 and 30 percent.
* Transaxle gear range is "D4", "D3" or "D2".
* Transaxle fluid temperature is more than 68°F to 266°F (20°C to 130°C).
* TCC slip speed is more than 250 RPM.
* All above conditions are met twice for 8 seconds each.

MIL will light at first failure signal. PCM inhibits TCC, 4th gear if transaxle is in hot mode and disables shift adapts.

Diagnostic Procedures
1) Ensure transaxle fluid level is correct and visually inspect transaxle cooling system for fluid leaks. Repair as needed. If fluid level is okay, go to next step.
2) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test.
3) Start and run engine. Set scan tool to observe TCC release pressure. If TCC release pressure is present, go to next step. If TCC release pressure is not present, inspect the following components and repair as needed: TCC control valve, TCC feed limit valve, TCC regulator apply valve, TCC PWM solenoid and pressure regulator valve. Refer to the TRANSMISSION OVERHAUL - A/T (4T65-T) article, then go to step 6).
4) Drive vehicle at speed above 45 MPH with throttle angle less than 30 percent. Select "Output Test, TCC PWM" on scan tool. Command TCC PWM solenoid on and monitor TCC slip speed. If slip speed is minus 50 RPM to plus 50 RPM, see DIAGNOSTIC AIDS. If slip speed is not minus 50 RPM to plus 50 RPM, go to next step.
5) Inspect the following components and repair as needed: TCC control valve, TCC regulator apply valve, TCC solenoid valve, turbine shaft seals and torque converter clutch. Refer to the TRANSMISSION OVERHAUL - A/T (4T65-T) article, then go to next step.
6) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0741". Operate vehicle under the following conditions: throttle position is 5-30 percent, TFT is 68°F (20°C), transaxle range is "D2", "D3" or "D4", engine speed is more than 500 RPM for 5 seconds and not in fuel shut off mode, time since last gear range change is more than 3 seconds, TCC is commanded at maximum capacity for .5 second, and TCC slip speed is less than 50 RPM for 4 seconds. If DTC P0741 is not present, repair is complete. If DTC P0741 is still present, repeat test.

Diagnostic Aids
Inspect transaxle fluid level. Transaxle may be in hot mode. Inspect transaxle fluid lines to radiator. Lines may be pinched, plugged or twisted.

**DTC P0742: TCC SYSTEM STUCK ON**

**NOTE:** Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS. For fluid circuit identification, see OIL CIRCUIT DIAGRAMS.

Circuit Description
Torque Converter Clutch (TCC) release switch is part of transaxle fluid pressure manual valve position switch. Position switch is mounted to control valve body. TCC release switch is a normally-closed switch. Switch signals PCM that TCC is released. Torque converter release fluid pressure acts on switch contact. When voltage on circuit is high, PCM recognizes that TCC is no longer engaged. DTC P0742 will set if PCM detects that TCC release switch is closed when TCC is commanded off.

Conditions For Setting DTC P0742
DTC will set under the following conditions:

* DTCs P0121, P0122 or P0123 (throttle position) are not present.
* DTCs P0502 or P0503 (vehicle speed sensor) are not present.
* DTC P1860 (TCC PWM solenoid) is not present.
* DTC P1887 (TCC release switch) is not present.
* Engine speed is more than 500 RPM for 5 seconds, and not in fuel shut off mode.
* Throttle angle is 14 to 45 percent.
* TCC is commanded off.
* Transaxle gear range is "D4".
* Time since last gear range change is more than 6 seconds.
* TCC release switch is closed for at least 6 occurrences.
* All of the above conditions are met for 6 seconds.

MIL will light with failure reported. PCM commands TCC on at maximum capacity. PCM disables shift adapts.

Diagnostic Procedures

1) Ensure transaxle fluid level is correct. Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test.

2) Using scan tool, check TCC release pressure. If TCC release pressure is not present, go to next step. If TCC release pressure is present, start and run engine. If TCC release pressure is present, see DIAGNOSTIC AIDS. If release pressure is not present, go to step 7).

3) Turn ignition off. Disconnect transaxle 20-pin connector. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, check TCC release pressure. If TCC release pressure is present, go to next step. If TCC release pressure is not present, go to step 5).

4) Check for short go ground in TCC release switch input circuit (transaxle harness side). Repair as necessary. If circuit is okay, check for short to ground in manual valve position switch. Replace as necessary, then go to step 9). If position switch is okay, go to step 6).

5) Check for short to ground in TCC release switch input circuit (PCM harness side). Repair as necessary, then go to step 9). If circuit is okay, replace PCM, then go to step 9).

6) Inspect the following components and repair as needed: TCC control valve, TCC feed limit valve, TCC regulator apply valve, TCC PWM solenoid and pressure regulator valve. Components may be stuck. Refer to the TRANSMISSION OVERHAUL - A/T (4T65-T) article, then go to step 9).

7) Drive vehicle at 45 MPH. Select "Output Test, TCC PWM" on scan tool. Command TCC PWM solenoid on and monitor TCC slip speed. If slip speed is not minus 50 RPM to plus 100 RPM, see DIAGNOSTIC AIDS. If slip speed is minus 50 RPM to plus 100 RPM, go to next step.

8) Inspect the following components and repair as needed: TCC control valve, transaxle oil cooler, TCC regulator apply valve and TCC PWM solenoid valve. Refer to the TRANSMISSION OVERHAUL - A/T (4T65-T) article, then go to next step.

9) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0742". Operate vehicle under the following conditions for at least 3 seconds: throttle position is 14 to 45 percent, transaxle range is "D4", engine speed is more than 500 RPM for 5 seconds and not in fuel shut off mode, time since last gear range change is more than 6 seconds, TCC is commanded off, and TCC release pressure is present. If DTC P0742 is not present, repair is complete. If DTC P0742 is still present, repeat test.

Diagnostic Aids
Rapid fluctuation in line pressure could set this DTC. Inspect pressure regulator condition. Check for abnormal line pressure. Inspect wiring for poor connections at PCM and transaxle 20-pin connector. Check for bent, backed out or damaged terminals, or
poor terminal tension. Check for chafed wire or broken wire inside insulation. Check for moisture and corrosion in wiring and connections. When diagnosing intermittent condition, wiggle wiring harness while watching scan tool for change in value. Customer may notice an engine stalling condition.

**DTC P0748: PRESSURE CONTROL SOLENOID ELECTRICAL PROBLEM**

**NOTE:** Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

**Circuit Description**
Pressure control solenoid regulates actuator feed fluid passing through solenoid into torque signal pressure. PCM uses a pulse width modulated signal to control torque signal pressure. PCM compares various inputs to determine appropriate pressure for a given load. PCM varies current to pressure control solenoid between .1 and 1.1 amp. An internal current monitor within PCM provides feedback to determine actual solenoid current draw. DTC P0748 will set if PCM detects a commanded current draw that differs from actual current draw by more than a calibrated value.

**Conditions For Setting DTC P0748**
DTC will set under the following conditions:
* Pressure control solenoid is enabled.
* System voltage is more than 11 volts at a low temperature of -40°F (-40°C).
* System voltage is more than 13 volts at a high temperature of 304°F (151°C).
* PCM commands pressure control solenoid on and circuit voltage remains high (battery voltage).
* PCM commands pressure control solenoid off and circuit voltage remains low (zero volts).

MIL will NOT light with first failure reported. PCM commands maximum line pressure and disables shift adapts.

**Diagnostic Procedures**
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record failure records for reference. Data will be lost when DTCs are cleared later in this test.
2) Start engine. Enter "A/T Output PC Sol." on scan tool. Using scan tool, apply several settings from .1 amp through 1.1 amps and observe scan tool. If actual pressure control solenoid amperage reading is different from commanded pressure control solenoid reading by more than .16 amps, see DIAGNOSTIC AIDS. If actual pressure control solenoid amperage reading is not different from commanded pressure control solenoid reading by more than .16 amps, go to next step.
3) Turn ignition off. Disconnect transaxle 20-pin connector. Additional DTCs will set. Connect Jumper Harness (J-39775) to transaxle 20-pin connector (transaxle harness side). Using Connector Test Adapter (J-35616), connect DVOM set to ohms between terminals "C" and "D" of jumper harness (pressure control solenoid circuits). See Fig. 2. If resistance is 3-5 ohms at 68°F (20°C), or 5-6 ohms at 190°F (88°C), go to step 7. If resistance is not 3-5 ohms at 68°F (20°C), or 5-6 ohms at 190°F (88°C), go to next step.
4) If resistance is more than 5 ohms at 68°F (20°C), or 6 ohms at 190°F (88°C), go to next step. If resistance is less than 5 ohms at 68°F (20°C), or 6 ohms at 190°F (88°C), go to step 6.
5) Check for an open or poor connection in pressure control solenoid circuits (transaxle harness side). Repair as needed, then go
to step 14). If circuits are okay, go to step 8).

6) Ensure pressure control solenoid circuits (transaxle harness side) are not shorted together. Repair as needed, then go to step 14). If circuits are okay, go to step 8).

7) Connect DVOM between ground and terminal "D" of jumper harness (pressure control solenoid low circuit). See Fig. 2. If resistance is less than 1000 ohms, go to next step. If resistance is more than 1000 ohms, go to step 9).

8) Check for short to ground in pressure control solenoid circuits (transaxle harness side). Repair as needed, then go to step 14). If circuits are okay, replace pressure control solenoid, then go to step 14).

9) Disconnect Jumper Harness (J-39775) from 20-pin connector (transaxle harness side) and reconnect jumper harness to transaxle 20-pin connector (PCM harness side). Disconnect PCM Clear connector (C2). Additional DTCs will set. Using Connector Test Adapter (J-35616), connect DVOM set to ohms between ground and terminal "D" of jumper harness (pressure control solenoid low circuit). See Fig. 3. If resistance is less than 10 ohms, go to next step. If resistance is more than 10 ohms, go to step 11).

10) Check for short to ground in pressure control solenoid low circuit. Repair as needed, then go to step 14).

11) Using Connector Test Adapter (J-35616), connect DVOM set to ohms between appropriate PCM Clear connector (C2) terminal and terminal "D" of jumper harness (pressure control solenoid low circuit). For 20-pin connector, see Fig. 3. For PCM connector C2, see Fig. 5 ("G" & "H" bodies), or Fig. 7 (Except "G" & "H"). See WIRING DIAGRAMS. If resistance is less than 10 ohms, go to next step. If resistance is more than 10 ohms, check for open in solenoid low circuit. Repair as needed, then go to step 14).

12) Using Connector Test Adapter (J-35616), connect DVOM set to ohms between ground and terminal "C" of jumper harness (pressure control solenoid high circuit). See Fig. 3. If resistance is less than 10 ohms, check for short to ground in solenoid high circuit. Repair as needed, then go to step 14). If resistance is more than 10 ohms, go to next step.

13) Using Connector Test Adapter (J-35616), connect DVOM set to ohms between appropriate PCM Clear connector (C2) terminal and terminal "C" of jumper harness (pressure control solenoid high circuit). For 20-pin connector, see Fig. 3. For PCM connector C2, see Fig. 5 ("G" & "H" bodies), or Fig. 7 (Except "G" & "H"). See WIRING DIAGRAMS. If resistance is less than 10 ohms, replace PCM, then go to next step. If resistance is more than 10 ohms, check for open in solenoid high circuit. Repair as needed, then go to next step.

14) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0748". Operate vehicle under the following conditions: pressure control solenoid is enabled, system voltage is more than 11 volts at a low temperature of -40°F (-40°C), system voltage is more than 13 volts at a high temperature of 304°F (151°C), PCM commands pressure control solenoid on and circuit voltage is low (zero voltage) or PCM commands pressure control solenoid off and circuit voltage is high (battery voltage). If DTC P0748 is not present, repair is complete. If DTC P0748 is still present, repeat test.

Diagnostic Aids
Extended cranking with weak battery could set this DTC. Inspect wiring for poor connection at PCM, transaxle 20-pin connector and pressure control solenoid. Check for bent, backed out or damaged terminals, or poor terminal tension. Check for chafed wire or broken wire inside insulation. Check for moisture and corrosion in wiring and connections. When diagnosing intermittent condition, wiggle wiring harness while watching scan tool for change in value.
DTC P0751: 1-2 SHIFT SOLENOID PERFORMANCE PROBLEM

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS. For fluid circuit identification, see OIL CIRCUIT DIAGRAMS.

Circuit Description
PCM identifies a 1-2 shift solenoid problem by monitoring commanded gear and gear ratio. DTC P0751 will set if PCM detects a gear ratio that is outside it’s limit for a particular commanded gear.

Conditions For Setting DTC P0751
DTC will set under the following conditions:

* DTCS P0121, P0122 or P0123 (throttle position) are not present.
* DTCS P0502 or P0503 (vehicle speed sensor) are not present.
* DTC P0716 or P0717 (input speed sensor) is not present.
* DTCS P0753 (1-2 shift solenoid electrical problem) or DTC P0758 (2-3 shift solenoid electrical problem) not present.
* DTC P1810 (manual valve position switch) is not present.
* DTC P1860 (TCC PWM solenoid) is not present.
* Engine speed is more than 500 RPM for 5 seconds.
* Vehicle speed is more than 5 MPH.
* Throttle angle is more than 10 percent.
* Transaxle fluid temperature is more than 68°F (20°C).
* Transaxle is not in Park or Neutral.
* Engine torque is 50-200 ft. lbs. (68-271 N.m).
* All of the above conditions are met and conditions No. 1 and 4 are true twice, or conditions No. 2 and 3 are true twice:

  Condition No. 1:
  * 1st gear is commanded.
  * Gear ratio indicates 2nd gear (1.52:1 to 1.62:1).
  * Condition is met for 2 seconds.

  Condition No. 2:
  * 2nd gear is commanded.
  * Gear ratio indicates 1st gear (2.87:1 to 2.97:1).
  * Condition is met for 3 seconds.

  Condition No. 3:
  * 3rd gear is commanded.
  * Gear ratio indicates 4th gear (.65:1 to .75:1).
  * Condition is met for 3 seconds.

  Condition No. 4:
  * 4th gear is commanded.
  * Gear ratio indicates 3rd gear (.95:1 to 1.05:1).
  * Condition is met for 3 seconds.

MIL will light after first failure reported. PCM disables shift adapts, commands maximum line pressure and inhibits 3-2 downshifts when vehicle speed is more than 30 MPH.

Diagnostic Procedures
1) Ensure transaxle fluid level is correct. Connect scan tool
to DLC. Turn ignition switch to ON position. DO NOT start engine.
Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test.

2) Select "A/T Output", then select "Shift Trans." on scan tool. Monitor current gear and gear ratio data parameters. Accelerate vehicle and command 1st gear using scan tool. If gear ratio is 1.52:1 to 1.62:1, go to next step. If gear ratio is not 1.52:1 to 1.62:1, go to step 4).

3) Check the following components and repair as needed. 1-2 shift valve is stuck in upshift position, or valve contains debris. Converter clutch support seals are damaged. Converter clutch studs are damaged or broken. Low roller clutch is worn or damaged. Forward clutch piston is damaged or cracked, seals are rolled, cut or damaged. Support housing seal rings are leaking, damaged or cut. Forward sprag is damaged or not holding. Check balls are missing or stuck. See the TRANSMISSION OVERHAUL - A/T (4T65-T) article. After repair, go to step 10).

4) Accelerate vehicle and command 3-4 shift using scan tool. If gear ratio is .95:1 to 1.05:1, go to next step. If gear ratio is not .95:1 to 1.05:1, go to step 6).

5) Check the following components and repair as needed. 1-2 shift solenoid is stuck on, or valve contains debris. Forward band is burned or slipping. Forward servo pin is broken or seized. Forward servo piston is damaged. Forward servo seals are rolled, cut or damaged. Forward servo cover is cracked. 3-4 shift valve bore plug is misassembled. See the TRANSMISSION OVERHAUL - A/T (4T65-T) article. After repair, go to step 10).

6) Accelerate vehicle and command 1-2 shift using scan tool. If gear ratio is 2.87:1 to 2.97:1, go to next step. If gear ratio is not 2.87:1 to 2.97:1, go to step 8).

7) Check the following components and repair as needed. 1-2 shift solenoid is stuck on, or valve contains debris. 1-2 shift valve is stuck in 1st gear or valve contains debris. 2nd clutch plates are burned or damaged. 2nd clutch piston assembly is cracked of damaged. 2nd clutch return spring is broken or out of position. 2nd clutch piston seals are rolled, damaged or leaking. 2nd sprag is not holding or is damaged. See the TRANSMISSION OVERHAUL - A/T (4T65-T) article. After repair, go to step 10).

8) Accelerate vehicle and command 2-3 shift using scan tool. If gear ratio is .65:1 to .75:1, go to next step. If gear ratio is not .65:1 to .75:1, see DIAGNOSTIC AIDS.

9) Check the following components and repair as needed. 1-2 shift solenoid is stuck off, or valve contains debris. Exhaust valve cup plug for driven sprocket support or valve is improperly installed. 3rd clutch plates are burned or contain damaged splines. 3rd clutch piston assembly is cracked or damaged, or piston has check ball damage. 3rd clutch piston seals are rolled, damaged or leaking. Check ball is missing or stuck. See the TRANSMISSION OVERHAUL - A/T (4T65-T) article. After repair, go to next step.

10) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0751". Operate vehicle under the following conditions: engine speed is more than 500 RPM for 5 seconds, vehicle speed is more than 5 MPH, engine is not in fuel shut off mode, throttle angle is more than 10 percent, transaxle fluid temperature is more than 68°F (20°C), transaxle is not in Park or Neutral and engine torque is 50-200 ft. lbs. (68-271 N.m). Each of the following conditions must be true for 1-3 seconds:

   Condition No. 1:
   1st gear is commanded. Gear ratio is 2.87:1 to 2.97:1.

   Condition No. 2:
   2nd gear is commanded. Gear ratio is 1.52:1 to 1.62:1.
Condition No. 3:
3rd gear is commanded. Gear ratio is .95:1 to 1.05:1.

Condition No. 4:
4th gear is commanded. Gear ratio is .65:1 to .75:1.

If DTC P0751 is not present, repair is complete. If DTC P0751 is still present, repeat test.

Diagnostic Aids
Check transaxle fluid for sediment. Check transaxle filter for debris. Ensure scan tool commanded gear has correct solenoid states and gear ratio.

DTC P0753: 1-2 SHIFT SOLENOID ELECTRICAL PROBLEM

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
1-2 shift solenoid is used to control transaxle fluid to 1-2 shift valve. Ignition voltage is provided to solenoid through fused circuit. See WIRING DIAGRAMS. PCM controls 1-2 shift solenoid by providing a ground path. When 1-2 shift solenoid is commanded on, PCM will detect low voltage. When 1-2 shift solenoid is commanded off, PCM will detect high voltage. DTC P0753 will set if PCM detects a continuous open or short to ground in 1-2 shift solenoid circuit.

Conditions For Setting DTC P0753
DTC will set under the following conditions:

* Ignition switch is in ON position.
* PCM commands solenoid on and voltage remains high (battery voltage).
* PCM commands solenoid off and voltage remains low (zero volts).
* System voltage is 9-16 volts.
* Engine speed is more than 500 RPM for 5 seconds.
* Engine is not in fuel shut off mode.
* All conditions are met for 5 seconds.

MIL will light at first failure signal. PCM commands maximum line pressure, disables shift adapts and inhibits downshift to 2nd gear if vehicle speed is more than 30 MPH.

Diagnostic Procedures
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test. If DTCs P0758 (2-3 shift solenoid) and P1860 (TCC PWM solenoid) are present, go to next step. If DTCs P0758 and P1860 are not present, go to step 3).

2) Remove and inspect appropriate fuse. See WIRING DIAGRAMS. Replace fuse if necessary. If fuse is blown, check for short to ground in circuit between fuse and transaxle 20-pin connector. If fuse is okay, check for open in circuit between fuse and transaxle 20-pin connector. After repair is complete, go to step 8).

3) Turn ignition off. Disconnect transaxle 20-pin connector. Connect Jumper Harness (J-39775) to transaxle 20-pin connector (PCM harness side). Connect a test light between terminal "A" and terminal "E" of jumper harness (1-2 shift solenoid circuits). See Fig. 3. Additional DTCs will set. Turn ignition switch to ON position. DO NOT
start engine. If test light is off, go to next step. If test light is on, check for short to ground in 1-2 shift solenoid control circuit between transaxle 20-pin connector and PCM. Repair circuit as necessary, then go to step 8). If circuit is okay, replace PCM, then go to step 8).

4) Select "A/T Outputs", "1-2 Solenoid" on scan tool. Cycle solenoid on and off 3 times. If test light cycles on and off 3 times, go to next step. If test light does not cycle on and off 3 times, check for open in 1-2 shift solenoid control circuit between transaxle 20-pin connector and PCM. Repair circuit as necessary, then go to step 8). If circuit is okay, and test light is always off, check for short to voltage in 1-2 shift solenoid control circuit between transaxle 20-pin connector and PCM. Repair circuit as necessary, then go to step 8). If circuit is okay, replace PCM, then go to step 8).

5) Turn ignition off. Disconnect jumper harness from PCM side of transaxle 20-pin connector. Connect jumper harness to transaxle 20-pin connector (transaxle harness side). Connect an ohmmeter between terminals "A" and "E" of jumper harness. See Fig. 2. If resistance is 19-24 ohms at 68°F (20°C) or 24-31 ohms at 190°F (88°C), go to step 7). If resistance is not 19-24 ohms at 68°F (20°C) or 24-31 ohms at 190°F (88°C), go to next step.

6) If resistance is less than 100 ohms, go to next step. If resistance is more than 100 ohms, check for open or poor connection in 1-2 shift solenoid power and ground circuits between transaxle 20-pin connector and solenoid. Repair circuit(s) as necessary, then go to step 8). If circuits are okay, replace 1-2 shift solenoid, then go to step 8).

7) Connect ohmmeter between ground and 1-2 shift solenoid terminal "A" at jumper harness. See Fig. 2. If resistance is less than 100 ohms, check for short to ground in circuit between transaxle 20-pin connector and 1-2 shift solenoid. Repair circuit as necessary, then go to next step. If circuit is okay, replace 1-2 shift solenoid, then go to next step.

8) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0753". Operate vehicle under the following conditions: system voltage is 9-16 volts, ignition switch is in ON position, engine speed is more than 500 RPM for 5 seconds, engine is not in fuel shut off mode, and no open or short to ground exists for more than 5 seconds in each solenoid state. Drive vehicle through 1-2 shift cycle. If DTC P0753 is not present, repair is complete. If DTC P0753 is still present, repeat test.

Diagnostic Aids
Inspect wiring for poor connections at PCM, transaxle 20-pin connector and 1-2 shift solenoid. Check for bent, backed out or damaged terminals, or poor terminal tension. Check for chafed wire or broken wire inside insulation. Check for moisture and corrosion in wiring and connections. When diagnosing intermittent condition, wiggle wiring harness while watching scan tool for change in value. Ensure scan tool commanded gear has correct solenoid states and gear ratio.

**DTC P0756: 2-3 SHIFT SOLENOID PERFORMANCE PROBLEM**

**NOTE:** Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS. For fluid circuit identification, see OIL CIRCUIT DIAGRAMS.

**Circuit Description**
PCM identifies a 2-3 shift solenoid problem by monitoring commanded gear and gear ratio. DTC P0756 will set if PCM detects a gear ratio that is outside limits for a particular commanded gear.
Conditions For Setting DTC P0756

DTC will set under the following conditions:

* DTCs P0121, P0122 or P0123 (throttle position) are not present.
* DTCs P0502 or P0503 (vehicle speed sensor) are not present.
* DTC P0716 or P0717 (input speed sensor) is not present.
* DTCs P0753 (1-2 shift solenoid electrical problem) or DTC P0758 (2-3 shift solenoid electrical problem) not present.
* DTC P1810 (manual valve position switch) is not present.
* DTC P1860 (TCC PWM solenoid) is not present.
* Engine speed is more than 500 RPM for 5 seconds.
* Engine is not in fuel shut off mode.
* Transaxle fluid temperature is more than 68°F (20°C).
* Transaxle is not in Park or Neutral.
* All of the above conditions are met and conditions No. 1 and 2 are true twice (stuck off), or conditions No. 3 and 4 are true twice (stuck on):

Condition No. 1:

* 1st gear is commanded.
* Gear ratio indicates 4th gear (.65:1 to .75:1).
* Vehicle speed is more than 7 MPH.
* Engine torque is 50-200 ft. lbs. (68-271 N.m).
* Throttle position is more than 8 percent.
* Condition is met for 2 seconds.

Condition No. 2:

* 2nd gear is commanded.
* Gear ratio indicates 3rd gear (.95:1 to 1.05:1).
* Vehicle speed is more than 7 MPH.
* Engine torque is 50-200 ft. lbs. (68-271 N.m).
* Throttle position is more than 8 percent.
* Condition is met for one second.

Condition No. 3:

* 3rd gear is commanded.
* Gear ratio indicates 2nd gear (1.52:1 to 1.62:1).
* Vehicle speed is more than 7 MPH.
* Engine torque is 50-200 ft. lbs. (68-271 N.m).
* Throttle position is more than 8 percent.
* Condition is met for 3 seconds.

Condition No. 4:

* 4th gear is commanded.
* Gear ratio is 1.05:1 to 2.97:1.
* Vehicle speed is 35-82 MPH.
* Engine torque is 0-80 ft. lbs. (0-108 N.m).
* Throttle position is 7-40 percent.
* Engine speed is less than 6700 RPM.
* Condition is met for 3 seconds.

MIL will light after first failure reported. PCM commands 3rd gear, commands maximum line pressure, inhibits TCC and disables shift adapts.

Diagnostic Procedures

1) Ensure transaxle fluid level is correct. Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine.
Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test.

2) Select "A/T Output", "Shift Trans." on scan tool. Monitor current gear and gear ratio data parameters. Accelerate vehicle and command 1st gear using scan tool. If gear ratio is .65:1 to .75:1, go to next step. If gear ratio is not .65:1 to .75:1, go to step 4).

3) Check the following components and repair as needed. Low and reverse apply pin damaged. 2-3 shift valve is stuck. Oil seals (support seals) damaged or leaking. Support stud from case to forward clutch is damaged or broken. Low roller clutch is worn or damaged. Forward clutch piston is damaged or cracked, seals are rolled, cut or damaged. Support housing seal rings are leaking, damaged or cut. Forward sprag is damaged or not holding. Check ball No. 8 is missing. See the TRANSMISSION OVERHAUL - A/T (4T65-T) article. After repair, go to step 10).

4) Accelerate vehicle and command 1-2 shift using scan tool. If gear ratio is .95:1 to 1.05:1, go to next step. If gear ratio is not .95:1 to 1.05:1, go to step 6).

5) Check the following components and repair as needed. 2nd clutch plates are burned or damaged. 2nd clutch piston assembly is cracked or damaged. 2nd clutch return spring and retainer assembly is broken or out of position. 2nd clutch piston seals are rolled, damaged or leaking. 2-3 shift valve is stuck. See the TRANSMISSION OVERHAUL - A/T (4T65-T) article. After repair, go to step 10).

6) Accelerate vehicle and command 2-3 shift using scan tool. If gear ratio is 1.52:1 to 1.62:1, go to next step. If gear ratio is not 1.52:1 to 1.62:1, go to step 8).

7) Check the following components and repair as needed. 3-4 shift valve bore plug is misassembled. Exhaust valve cup plug or exhaust valve is improperly installed on driven sprocket support. 3rd clutch plates are burned or splines are damaged. 3rd clutch piston assembly is cracked or damaged, or check ball is damaged. 3rd clutch piston seals are cut or rolled. Debris in 2-3 shift solenoid. Check balls are missing or stuck. See the TRANSMISSION OVERHAUL - A/T (4T65-T) article. After repair, go to step 10).

8) Accelerate vehicle and command 3-4 shift using scan tool. If gear ratio is 2.87:1 to 2.97:1, go to next step. If gear ratio is not 2.87:1 to 2.97:1, see DIAGNOSTIC AIDS.

9) Check the following components and repair as needed. Debris in 2-3 shift solenoid. Forward band is burned or slipping. Forward servo pin is broken or seized. Forward servo piston seal is rolled, cut or damaged. Forward servo cover seal is rolled, cut or damaged. Forward servo cover is cracked. 3-4 shift valve bore plug is misassembled. See the TRANSMISSION OVERHAUL - A/T (4T65-T) article. After repair, go to next step.

10) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0756". Operate vehicle under the following conditions: engine speed is more than 500 RPM for 5 seconds, vehicle speed is more than 7 MPH, engine is not in fuel shut off mode, throttle angle is more than 8 percent, transaxle fluid temperature is more than 68°F (20°C), transaxle gear range is "D1", "D2", "D3" or "D4". Engine torque is 50-200 ft. lbs. (68-271 N.m). Each of the following conditions must be true for 1-2 seconds:

Condition No. 1:
* 1st gear is commanded. Gear ratio is 2.87:1 to 2.97:1

Condition No. 2:
* 2nd gear is commanded. Gear ratio is 1.52:1 to 1.62:1

Condition No. 3:

* 3rd gear is commanded. Gear ratio is .95:1 to 1.05:1

Condition No. 4:

* 4th gear is commanded. Gear ratio is .65:1 to .75:1

If DTC P0756 is not present, repair is complete. If DTC P0756 is still present, repeat test.

Diagnostic Aids
Check transaxle fluid for sediment. Check transaxle filter for debris. Ensure scan tool commanded gear has correct solenoid states and gear ratio. Customer may experience an engine flair or Neutral in 4th gear.

DTC P0758: 2-3 SHIFT SOLENOID ELECTRICAL PROBLEM

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
2-3 shift solenoid is used to control transaxle fluid to 2-3 shift valve. Ignition voltage is provided to solenoid through fused circuit. See WIRING DIAGRAMS. PCM controls 2-3 shift solenoid by providing a ground path. When 2-3 shift solenoid is commanded on, PCM will detect low voltage. When 2-3 shift solenoid is commanded off, PCM will detect high voltage. DTC P0758 will set if PCM detects a continuous open or short to ground in 2-3 shift solenoid circuit.

Conditions For Setting DTC P0758
DTC will set under the following conditions:

* Ignition switch is in ON position.
* PCM commands solenoid on and voltage remains high (battery voltage).
* PCM commands solenoid off and voltage remains low (zero volts).
* System voltage is 9-16 volts.
* Engine speed is more than 500 RPM for 5 seconds.
* Engine is not in fuel shut off mode.
* All conditions are met for 5 seconds.

MIL will light at first failure signal. PCM commands 3rd gear, commands maximum line pressure, disables shift adapts and inhibits TCC.

Diagnostic Procedures
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test. If DTCs P0753 (1-2 shift solenoid) and P1860 (TCC PWM solenoid) are present, go to next step. If DTCs P0753 and P1860 are not present, go to step 3).

2) Remove and inspect appropriate fuse. See WIRING DIAGRAMS. Replace fuse if necessary. If fuse is blown, check for short to ground in circuit between fuse and transaxle 20-pin connector. If fuse is okay, check for open in circuit between fuse and transaxle 20-pin connector. After repair is complete, go to step 8).

3) Turn ignition off. Disconnect transaxle 20-pin connector.
Connect Jumper Harness (J-39775) to transaxle 20-pin connector (PCM harness side). Connect a test light between terminal "B" and terminal "E" of jumper harness (2-3 shift solenoid circuits). See Fig. 3. Additional DTCs will set. Turn ignition switch to ON position. DO NOT start engine. If test light is off, go to next step. If test light is on, check for short to ground in 2-3 shift solenoid control circuit between transaxle 20-pin connector and PCM. Repair circuit as necessary, then go to step 8). If circuit is okay, replace PCM, then go to step 8).

4) Select "A/T Outputs", "2-3 Solenoid" on scan tool. Cycle solenoid on and off 3 times. If test light cycles on and off 3 times, go to next step. If test light does not cycle on and off 3 times, check for open in 2-3 shift solenoid control circuit between transaxle 20-pin connector and PCM. Repair circuit as necessary, then go to step 8). If circuit is okay, and test light is always off, check for short to voltage in 2-3 shift solenoid control circuit between transaxle 20-pin connector and PCM. Repair circuit as necessary, then go to step 8). If circuit is okay, replace PCM, then go to step 8).

5) Turn ignition off. Disconnect jumper harness from PCM side of transaxle 20-pin connector. Connect jumper harness to transaxle 20-pin connector (transaxle harness side). Connect an ohmmeter between terminals "B" and "E" of jumper harness. See Fig. 2. If resistance is 19-24 ohms at 68°F (20°C) or 24-31 ohms at 190°F (88°C), go to step 7). If resistance is not 19-24 ohms at 68°F (20°C) or 24-31 ohms at 190°F (88°C), go to next step.

6) If resistance is less than 100 ohms, go to next step. If resistance is more than 100 ohms, check for open or poor connection in 2-3 shift solenoid power and ground circuits between transaxle 20-pin connector and solenoid. Repair circuit(s) as necessary, then go to step 8). If circuits are okay, replace 2-3 shift solenoid, then go to step 8).

7) Connect ohmmeter between ground and 2-3 shift solenoid terminal "B" at jumper harness. See Fig. 2. If resistance is less than 100 ohms, check for short to ground in circuit between transaxle 20-pin connector and 2-3 shift solenoid. Repair circuit as necessary, then go to next step. If circuit is okay, replace 2-3 shift solenoid, then go to next step.

8) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P0758". Operate vehicle under the following conditions: system voltage is 9-16 volts, ignition switch is in ON position, engine speed is more than 500 RPM for 5 seconds, engine is not in fuel shut off mode, and no open or short to ground exists for more than 5 seconds in each solenoid state. Drive vehicle through 2-3 shift cycle. If DTC P0758 is not present, repair is complete. If DTC P0758 is still present, repeat test.

Diagnostic Aids
Inspect wiring for poor connections at PCM, transaxle 20-pin connector and 2-3 shift solenoid. Check for bent, backed out or damaged terminals, or poor terminal tension. Check for chafed wire or broken wire inside insulation. Check for moisture and corrosion in wiring and connections. When diagnosing intermittent condition, wiggle wiring harness while watching scan tool for change in value. Ensure scan tool commanded gear has correct solenoid states and gear ratio.

DTC P1810: TRANSAXLE FLUID PRESSURE (TFP) POSITION SWITCH MALFUNCTION

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Transaxle Fluid Pressure (TFP) manual valve position switch consists of 6 pressure switches (3 normally closed and 3 normally open). Position switch is mounted on control valve body. By grounding one or more of these switches with fluid pressure from manual valve, PCM can detect which gear range is selected. DTC P1810 will set if PCM detects an illegal combination on any range inputs. See TFP LOGIC TABLE.

### TFP LOGIC TABLE

<table>
<thead>
<tr>
<th>Detected Gear</th>
<th>Signal &quot;A&quot;</th>
<th>Signal &quot;B&quot;</th>
<th>Signal &quot;C&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;P&quot;</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>&quot;R&quot;</td>
<td>On</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>&quot;N&quot;</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>&quot;D4&quot;</td>
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<td>On</td>
<td>Off</td>
</tr>
<tr>
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<tr>
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<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>&quot;D1&quot;</td>
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<td>Off</td>
<td>Off</td>
</tr>
<tr>
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<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>Illegal (1)</td>
<td>On</td>
<td>On</td>
<td>On</td>
</tr>
</tbody>
</table>

(1) - DTC P1810 will set if PCM detects illegal combination on any range inputs.

### Conditions For Setting DTC P1810

DTC will set under the following conditions:

**Condition No. 1:**
- Engine speed is more than 500 RPM for 5 seconds.
- Engine is not in fuel shut off mode.
- System voltage is 9-16 volts.
- TFP manual valve position switch indicates an illegal switch combination for one minute.

**Condition No. 2:**
- DTCs P0502 or P0503 (vehicle speed sensor) are not present.
- System voltage is 9-16 volts.
- Vehicle speed is less than 3 MPH.
- Position switch indicates "R", "D2" or "D4" for 7 seconds during and after start-up without indicating Park or Neutral.
- Engine speed starts at less than 50 RPM and rises to more than 700 RPM (engine start-up).

**Condition No. 3:**
- DTCs P0121, P0122 or P0123 (throttle position sensor) are not present.
- DTCs P0502 or P0503 (vehicle speed sensor) are not present.
- DTCs P0716 or P0717 (input speed sensor) are not present.
- DTCs P0751 or P0753 (1-2 shift solenoid) are not present.
- DTCs P0756 or P0758 (2-3 shift solenoid) are not present.
- Engine torque is 50-170 ft. lbs. (68-230 N.m).
- Engine speed is more than 500 RPM for 5 seconds.
- Engine is not in fuel shut off mode.
- Throttle position is more than 9 percent.
- Gear ratio indicates "R", "D4", "D3", "D2" or "D1".
- Vehicle speed is more than 5 MPH.
- TFP manual valve position switch indicates Park/Neutral for 5 seconds.
Condition No. 4:

* DTCs P0121, P0122 or P0123 (throttle position sensor) are not present.
* DTCs P0502 or P0503 (vehicle speed sensor) are not present.
* DTCs P0716 or P0717 (input speed sensor) are not present.
* DTCs P0751 or P0753 (1-2 shift solenoid) are not present.
* DTCs P0756 or P0758 (2-3 shift solenoid) are not present.
* Engine torque is 50-170 ft. lbs. (68-230 N.m).
* Engine speed is more than 500 RPM for 5 seconds.
* Engine is not in fuel shut off mode.
* Throttle position is more than 9 percent.
* Gear ratio indicates "R", "D4", "D3", "D2" or "D1".
* Vehicle speed is more than 5 MPH.
* TFP manual valve position switch indicates "R" for 7 seconds.

Condition No. 5:

* DTCs P0121, P0122 or P0123 (throttle position sensor) are not present.
* DTCs P0502 or P0503 (vehicle speed sensor) are not present.
* DTCs P0716 or P0717 (input speed sensor) are not present.
* DTCs P0751 or P0753 (1-2 shift solenoid) are not present.
* DTCs P0756 or P0758 (2-3 shift solenoid) are not present.
* Engine torque is 50-170 ft. lbs. (68-230 N.m).
* Engine speed is more than 500 RPM for 5 seconds.
* Engine is not in fuel shut off mode.
* Throttle position is more than 9 percent.
* Gear ratio indicates "R", "D4", "D3", "D2" or "D1".
* Vehicle speed is more than 5 MPH.
* TFP manual valve position switch indicates "D4", "D3", "D2" or "D1" for 5 seconds.

MIL will light at first failure signal. PCM assumes "D4" for shifting, commands maximum line pressure and disables shift adapts.

Diagnostic Procedures

1) Ensure shift linkage is adjusted correctly. Ensure transaxle fluid level is correct. Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test.

2) Start engine and run to normal operating temperature. Apply parking brake and let engine idle. While observing scan tool, shift into each transaxle shift position ("P", "R", "N", "D4", "D3", "D2" and "D1"). Refer to TFP LOGIC TABLE. If each selected transaxle range matches scan tool TFP switch signal A/B/C display, see DIAGNOSTIC AIDS. If each selected transaxle range does not match scan tool TFP switch signal A/B/C display, go to next step.

3) Turn ignition off. Disconnect transaxle 20-pin connector. Additional DTCs may set. Connect Jumper Harness (J-39775) to transaxle 20-pin connector (PCM harness side). Turn ignition switch to ON position. DO NOT start engine. Using DVOM and Connector Test Adapter (J-35616), measure voltage at connector terminals "N", "R" and "P". See Fig. 3. If battery voltage is present at all 3 terminals, go to next step. If battery voltage is not present at all 3 terminals, check for open or short to ground in each circuit which did not have battery voltage. Repair circuit(s) as needed, then go to step 5). If all circuits are okay, replace PCM, then go to step 5).

4) To ensure wires are not shorted together, connect a fused jumper wire between ground and each circuit while monitoring scan tool TFP switch signal A/B/C display. If any other range signal circuits
are affected when a range signal circuit is grounded, repair affected wiring, then go to next step. If no other range signal circuits are affected when a range signal circuit is grounded, perform TRANSAXLE FLUID PRESSURE (TFP) MANUAL VALVE POSITION SWITCH RESISTANCE CHECK under ELECTRONIC TESTING.

5) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P1810". Operate vehicle, ensuring that all of the following pass conditions are true. If DTC P1810 is not present, repair is complete. If DTC P1812 is still present, repeat test.

Pass Condition No. 1:

* Engine speed is more than 500 RPM for 5 seconds.
* Engine is not in fuel shut off mode.
* System voltage is 9-16 volts.
* TFP manual valve position switch indicates any legal switch combination for one minute. See TFP LOGIC TABLE.

Pass Condition No. 2:

* Engine speed starts at less than 50 RPM and rises to more than 700 RPM.
* Vehicle speed is less than 5 MPH.
* System voltage is 9-16 volts.
* TFP manual valve position switch indicates Park/Neutral for .15 seconds within 7 seconds after start-up.
* DTCs P0502 or P0503 (vehicle speed sensor) are not present.

Pass Condition No. 3:

* Engine speed is more than 500 RPM for 5 seconds.
* Engine is not in fuel shut off mode.
* Throttle angle is more than 9 percent.
* Engine torque is 50-170 ft. lbs. (68-230 N.m).
* Vehicle speed is more than 5 MPH.
* Gear ratio does not indicate "R", "D4", "D3", "D2" or "D1".
* TFP manual valve position switch indicates Park/Neutral for one second.
* DTCs P0502 or P0503 (vehicle speed sensor) are not present.
* DTCs P0716 or P0717 (input speed sensor) are not present.
* DTCs P0751 or P0753 (1-2 shift solenoid electrical problem) are not present.
* DTCs P0756 or P0758 (2-3 shift solenoid electrical problem) are not present.

Pass Condition No. 4:

* Engine speed is more than 500 RPM for 5 seconds.
* Engine is not in fuel shut off mode.
* Throttle angle is more than 9 percent.
* Engine torque is 50-170 ft. lbs. (68-230 N.m).
* Vehicle speed is more than 5 MPH.
* Gear ratio indicates "R".
* TFP manual valve position switch indicates Reverse for 3 seconds.
* DTCs P0502 or P0503 (vehicle speed sensor) are not present.
* DTCs P0716 or P0717 (input speed sensor) are not present.
* DTCs P0751 or P0753 (1-2 shift solenoid electrical problem) are not present.
* DTC P0756 or P0758 (2-3 shift solenoid electrical problem) are not present.
Pass Condition No. 5:
* Engine speed is more than 500 RPM for 5 seconds.
* Engine is not in fuel shut off mode.
* Throttle angle is more than 9 percent.
* Engine torque is 50-170 ft. lbs. (68-230 N.m).
* Vehicle speed is more than 5 MPH.
* Gear ratio indicates "D4", "D3", "D2" or "D1".
* TFP manual valve position switch indicates "D4", "D3", "D2" or "D1" for one second.
* DTCs P0502 or P0503 (vehicle speed sensor) are not present.
* DTCs P0716 or P0717 (input speed sensor) are not present.
* DTCs P0751 or P0753 (1-2 shift solenoid electrical problem) are not present.
* DTC P0756 or P0758 (2-3 shift solenoid electrical problem) are not present.

Diagnostic Aids
Inspect wiring for poor connections at PCM, transaxle 20-pin connector and position switch. Check for bent, backed out or damaged terminals, or poor terminal tension. Check for chafed wire or broken wire inside insulation. Check for moisture and corrosion in wiring and connections. When diagnosing intermittent condition, wiggle wiring harness while watching scan tool for change in value. If transaxle overhaul has been performed, ensure fluid level is correct. Low fluid level may set this DTC. Inspect position switch seals for damage. Inspect position switch for loose rivets or debris.

DTC P1811: MAXIMUM ADAPT & LONG SHIFT

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Transaxle pressure is modified by an adaptive modifier which controls shift execution time. This test checks time required to accomplish the shift. If shift takes longer than .65 seconds, and adaptive modifier cannot shorten this time, then counter increases by one. DTC P1811 will set if PCM detects counter reaching 2.

Conditions For Setting DTC P1811
DTC will set under the following conditions:

Condition No. 1:
* 1-2 shift is longer than .65 seconds.
* 1-2 shift adapt has reached its limit.

Condition No. 2:
* 2-3 shift is longer than .65 seconds.
* 2-3 shift adapt has reached its limit.

Condition No. 3:
* 3-4 shift is longer than .65 seconds.
* 3-4 shift adapt has reached its limit.

MIL does NOT light at first failure signal. PCM commands maximum line pressure and disables shift adapts.

Diagnostic Procedures
1) Ensure transaxle fluid level is correct. Connect scan tool
to DLC. Turn ignition switch to ON position. DO NOT start engine.
Using scan tool, record failure records for reference. Data will be lost when DTCs are cleared later in this test. If DTCs P0120, P0121, P0122, P0123, P0218, P0502, P0503, P0711, P0712, P1121, P1122 or P1524, are present, diagnose these DTCs first, then go to step 10). If DTCs P0120, P0121, P0122, P0123, P0218, P0502, P0503, P0711, P0712, P1121, P1122 or P1524, are not present, go to next step.

2) Use scan tool snapshot mode to record shift times. Drive vehicle in "D4" in order to obtain a 1-2, 2-3 and 3-4 upshift. Record shift times. If all shift times do not exceed .65 seconds, go to step 4). If all shift times exceeded .65 seconds, perform LINE PRESSURE TEST in the TRANSMISSION OVERHAUL - A/T (4T65-T) article. If line pressure is within specification, see DIAGNOSTIC AIDS. If line pressure is not within specifications, go to next step.

3) Inspect transaxle for following conditions: Low fluid level caused by external leaks. Clogged fluid filter. Out of position fluid filter. Internal fluid passage leaks. Casting porosity or damage. Damaged gasket or spacer plate. Out of position gasket or spacer plate. Contaminated, damaged or stuck pressure control solenoid. Stuck or leaking pressure regulator valve. Stuck or leaking torque signal valve. Leaking or damaged oil pump. Inadequate oil pump suction. Oil pump cavitation. Repair components as needed, then go to step 10).

4) If 1-2 shift time exceeded .65 seconds, go to next step.
If 1-2 shift time did not exceed .65 seconds, go to step 6).

5) Inspect transaxle for following conditions: Leaking, rolled or cut 1-2 accumulator piston seals. Leaking, rolled or cut 2nd clutch piston seals. Burned or damaged 2nd clutch plates. Broken or out of position 2nd clutch springs. Damaged 2nd clutch piston. Leaking or damaged driven sprocket support seals. Internal fluid passage leaks. Casting porosity or damage. Damaged gasket or spacer plate. Out of position gasket or spacer plate. Slipping forward clutch. Damaged sprag clutch (not holding). 2nd roller clutch damaged (not holding). Repair components as needed, then go to step 10).

6) If 2-3 shift time exceeded .65 seconds, go to next step.
If 2-3 shift time did not exceed .65 seconds, go to step 8).

7) Inspect transaxle for following conditions: Leaking, rolled or cut 2-3 accumulator piston seals. Leaking, rolled or cut 3rd clutch piston seals. Burned or damaged 3rd clutch plates. Out of position or broken 3rd clutch springs. Damaged 3rd clutch piston. Leaking or damaged driven sprocket support seals. Damaged driven sprocket support. Internal fluid passage leaks. Casting porosity or damage. Damaged gasket or spacer plate. Out of position gasket or spacer plate. Slipping forward clutch. Damaged sprag clutch (not holding). Repair components as needed, then go to step 10).

8) If 3-4 shift time exceeded .65 seconds, go to next step.
If 3-4 shift time did not exceed .65 seconds, go to step 10).

9) Inspect transaxle for following conditions: Leaking, rolled or cut 3-4 accumulator piston seals. Leaking, rolled or cut forward servo piston seals. Burned, damaged, slipping or out of position forward band. Slipping 3rd clutch. Internal fluid passage leaks. Casting porosity or damage. Damaged gasket or spacer plate. Out of position gasket or spacer plate. Damaged or seized forward servo pin. Damaged, cracked or leaking forward servo cover. Repair components as needed, then go to next step.

10) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P1811". Operate vehicle in "D4" in order to obtain 1-2, 2-3 and 3-4 upshifts. Shift times must be less than .65 seconds. If DTC P1811 is not present, repair is complete. If DTC P1811 is still present, repeat test.

Diagnostic Aids
Inspect for possible vehicle overloading, exceeding trailer towing limit, or towing in overdrive. Ensure PCM has latest update. If transaxle overhaul was performed, use scan tool to clear all adapts.

**DTC P1860: TCC PULSE WIDTH MODULATED (PWM) SOLENOID ELECTRICAL PROBLEM**

**NOTE:** Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

**Circuit Description**
Torque Converter Clutch (TCC) fluid is regulated for apply and release by TCC Pulse Width Modulated (PWM) solenoid. When solenoid is commanded off, PCM will detect high voltage. When solenoid is commanded on, PCM will detect low voltage. DTC P1860 will set if PCM detects voltage limits which do not meet calibration at anytime.

**Conditions For Setting DTC P1860**
DTC will set under the following conditions:

* System voltage is 9-16 volts.
* Engine speed is more than 500 RPM for 5 seconds.
* PCM detects a low circuit voltage when PWM duty cycle is more than 90 percent.
* PCM detects a high circuit voltage when PWM duty cycle is less than 10 percent.
* Engine is not in fuel shut off mode.
* All conditions are met for 5 seconds.

DTC P1860 will be stored in PCM history. MIL will light at first failure signal. PCM will inhibit TCC and 4th gear if transaxle is in hot mode. PCM disables shift adapts.

**Diagnostic Procedures**
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test. If DTCs P0753 (1-2 shift solenoid) and P0758 (2-3 shift solenoid) are present, go to next step. If DTCs P0753 and P0758 are not present, go to step 3).

2) Remove and inspect appropriate fuse. See WIRING DIAGRAMS. Replace fuse if necessary. If fuse is blown, check for short to ground in circuit between fuse and transaxle 20-pin connector. If fuse is okay, check for open in circuit between fuse and transaxle 20-pin connector. After repair is complete, go to step 8).

3) Turn ignition off. Disconnect transaxle 20-pin connector. Install Jumper Harness (J-39775) to transaxle 20-pin connector (PCM harness side). Connect a test light between terminals "E" and "T" at jumper harness (PWM solenoid circuits). See Fig. 3. Turn ignition switch to ON position. DO NOT start engine. Additional DTCs may set. If test light is on, go to next step. If test light is off, check for open in PWM solenoid control circuit between transaxle 20-pin connector and PCM. Repair circuit as necessary, then go to step 8). If circuit is okay, replace PCM, then go to step 8).

**NOTE:** In the following step, if PWM solenoid is on, test light will be bright. If PWM solenoid is off, test light will pulsate.

4) Select "A/T Outputs", "TCC PWM Solenoid" on scan tool. Cycle solenoid on and off 3 times. If test light cycles on and off 3 times, go to next step. If test light does not cycle on and off 3 times, check for short to ground in PWM solenoid control circuit.
between transaxle 20-pin connector and PCM. Repair circuit as necessary, then go to step 8). If circuit is okay, and test light is always off, check for short to voltage in PWM solenoid control circuit between transaxle 20-pin harness connector and PCM. Repair circuit as necessary, then go to step 8). If circuit is okay, replace PCM, then go to step 8).

5) Turn ignition off. Disconnect jumper harness from transaxle 20-pin connector (PCM harness side). Connect jumper harness to transaxle 20-pin connector (transaxle harness side). Connect a DVOM set to ohms between terminals "E" and "T" at jumper harness (PWM solenoid terminals). See Fig. 2. If resistance is 10-12 ohms at 68°F (20°C), or 13-15 ohms at 190°F (88°C), go to step 7).

6) If resistance is less than 100 ohms, go to next step. If resistance is more than 100 ohms, check for open or poor connection in PWM solenoid power and ground circuits between transaxle 20-pin connector and solenoid. Repair circuit(s) as necessary, then go to step 8). If circuits are okay, replace TCC PWM solenoid, then go to step 8).

7) Connect ohmmeter between ground and PWM solenoid terminal "T" at jumper harness. See Fig. 2. If resistance is less than 100 ohms, check for short to ground in circuit between transaxle 20-pin connector and PWM solenoid. Repair circuit as necessary, then go to next step. If resistance is more than 100 ohms, replace TCC PWM solenoid, then go to next step.

8) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P1860". Operate vehicle under the following conditions: System voltage is 9-16 volts. Ignition switch is in ON position. Engine speed is more than 500 RPM for 5 seconds. Engine is not in fuel shut off mode. PCM detects a high circuit voltage when PWM duty cycle is more than 90 percent. PCM detects a low circuit voltage when PWM duty cycle is less than 10 percent. All conditions are true for 5 seconds. If DTC P1860 is not present, repair is complete. If DTC P1860 is still present, repeat test.

Diagnostic Aids
Inspect wiring for poor connections at PCM, transaxle 20-pin connector and PWM solenoid. Check for bent, backed out or damaged terminals, or poor terminal tension. Check for chafed wire or broken wire inside insulation. Check for moisture and corrosion in wiring and connections. When diagnosing intermittent condition, wiggle wiring harness while watching scan tool for change in value. Ensure transaxle fluid is at proper level.

DTC P1887: TORQUE CONVERTER CLUTCH (TCC) RELEASE SWITCH
CIRCUIT MALFUNCTION

NOTE: Perform OBD system check prior to performing diagnostic procedures. For wire circuit ID, see WIRING DIAGRAMS.

Circuit Description
Torque Converter Clutch (TCC) release switch is part of the Transaxle Fluid Pressure (TFP) manual valve position switch. Position switch is mounted on control valve body. TCC release switch is normally closed. Switch signals PCM that TCC is released. This is accomplished by TCC release fluid pressure acting on switch contact, and opening circuit. When voltage is high on circuit, PCM recognizes TCC is no longer engaged. DTC P1887 will set if PCM determines TCC release switch is open (indicating TCC is not applied), and TCC slip speed indicates that TCC is applied.

Conditions For Setting DTC P1887
DTC will set under the following conditions:
* DTCs P0716 and P0717 (input speed sensor) are not present.
* DTCs P0741 and P0742 (TCC solenoid) are not present.
* DTC P1810 (manual valve position switch) is not present.
* Engine speed is more than 500 RPM for 5 seconds.
* Engine is not in fuel shut off mode.
* Transaxle range switch is in "D4".
* TCC is commanded on.
* TCC slip speed is minus 20 to plus 40 RPM.
* Engine torque is 33-300 ft. lbs. (45-407 N.m).
* TCC release pressure is present (switch is open).
* All of the above conditions are met for 6-10 seconds.

MIL will light at first failure signal. PCM will inhibit TCC and 4th gear if transaxle is in hot mode. PCM disables shift adapts.

Diagnostic Procedures
1) Connect scan tool to DLC. Turn ignition switch to ON position. DO NOT start engine. Using scan tool, record freeze frame and failure records for reference. Data will be lost when DTCs are cleared later in this test.
2) Select "TCC Release Pressure" on scan tool. If TCC release pressure is present, go to step 4). If TCC release pressure is not present, go to next step.
3) Turn ignition off. Disconnect transaxle 20-pin connector. Additional DTCs will set. Turn ignition switch to ON position. DO NOT start engine. If TCC release pressure is present, go to step 5). If TCC release pressure is not present, check for short to ground in TCC release switch circuit to PCM. Repair as needed, then go to step 7).
4) Connect Jumper Harness (J-39775) to transaxle 20-pin connector (PCM harness side). Using Connector Test Adapter Kit (J-35616), connect fused jumper between ground and terminal "U" at jumper harness. See Fig. 3. If TCC release pressure is not present, go to next step. If TCC release pressure is present, check for open TCC release switch circuit to PCM. Repair as needed, then go to step 7). If circuit is okay, inspect PCM Blue connector for bent, damaged or backed out connector terminals. Repair as needed, then go to step 7). If circuit and connector are okay, replace PCM, then go to step 7).
5) Disconnect jumper harness from transaxle 20-pin connector (PCM harness side). Connect jumper harness to transaxle 20-pin connector (transaxle harness side). Connect DVOM set to ohms between ground and terminal "U" at jumper harness. See Fig. 2. If resistance is less than 50 ohms, go to next step. If resistance is more than 50 ohms, check for open in wiring harness to TFP manual valve position switch. Repair as needed, then go to step 7). If wiring harness is okay, replace TFP manual valve position switch, then go to step 7).
6) Start engine. If resistance is more than 50 ohms, replace TFP manual valve position switch, then go to next step. If resistance is less than 50 ohms, check for short to ground in wiring harness to TFP manual valve position switch. Repair as needed, then go to next step. If wiring harness is okay, replace TFP manual valve position switch, then go to next step.
7) After repair is complete, select DTC on scan tool. Select "Clear Info" function. Select "Specific DTC" and enter DTC "P1887". Operate vehicle under the following conditions: Drive vehicle in "D4" to 45 MPH. With TCC commanded on and engaged, TCC release switch status on scan tool must be closed (no release oil present at switch) for 3 seconds. If DTC P1887 is not present, repair is complete. If DTC P1887 is still present, repeat test.

Diagnostic Aids
Inspect wiring for poor connections at PCM, transaxle 20-pin connector and TFP manual valve position switch. Check for bent, backed
out or damaged terminals, or poor terminal tension. Check for chafed wire or broken wire inside insulation. Check for moisture and corrosion in wiring and connections. When diagnosing intermittent condition, wiggle wiring harness while watching scan tool for change in value.

WIRING DIAGRAMS

Fig. 8: Transmission Electronic Controls Wiring Diagram (1997 Park Avenue)
Fig. 9: Transmission Electronic Controls Wiring Diagram
(1998 Park Avenue)
Fig. 10: Transmission Electronic Controls Wiring Diagram
(1997 Riviera)
Fig. 11: Transmission Electronic Controls Wiring Diagram
(1998 Riviera)
Fig. 13: Transmission Electronic Controls Wiring Diagram (1998 Bonneville/Eighty Eight/Le Sabre/LSS/Regency)
Fig. 14: Transmission Electronic Controls Wiring Diagram (1997 Grand Prix)
Fig. 15: Transmission Electronic Controls Wiring Diagram
(1998 Grand Prix)
Fig. 16: Transmission Electronic Controls Wiring Diagram
(1998 Intrigue)
Fig. 17: Transmission Electronic Controls Wiring Diagram (1997 3.4L Lumina/Monte Carlo)
Fig. 18: Transmission Electronic Controls Wiring Diagram
(1998 3.8L Lumina/Monte Carlo)
Fig. 19: Transmission Electronic Controls Wiring Diagram
(1997 Regal)
Fig. 20: Transmission Electronic Controls Wiring Diagram
(1998 Regal)