AUTOMATIC TRANSAXLE (DIAGNOSTIC INFORMATION & PROCEDURES)

DIAGNOSTIC STARTING POINT - AUTOMATIC TRANSMISSION

Begin the system diagnosis with **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4). The Diagnostic System Check provides the following information:

- The identification of the control module or modules which commands the system.
- The ability of the control module or modules to communicate through the serial data circuit.
- The identification and status of stored diagnostic trouble codes (DTCs).

The use of the **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4) identifies the correct procedure for diagnosing the system and the procedure location.

Symptoms

When it has been determined through **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4) that no DTCs are present, begin symptom diagnosis by reviewing the **Transmission Component and System Description** . Reviewing the **Transmission Component and System Description** information enables you to understand the operation of the system. This helps you determine if the condition described by the customer is normal or if a malfunction exists. If it is determined that a malfunction exists, identify the concern by referring to the **Symptoms - Automatic Transmission** table. The **Symptoms - Automatic Transmission** table provides common diagnostic categories which relate directly to diagnostic information or procedures.

DIAGNOSTIC SYSTEM CHECK - AUTOMATIC TRANSMISSION

Circuit Description

The Automatic Transmission Diagnostic System Check is an organized approach to identify a problem created by an automatic transmission. The Diagnostic System check is the diagnostic starting point for an automatic transmission complaint. The Diagnostic System Check directs you to the next logical step for diagnosing a transmission concern. Perform this check only if there is a driveability complaint or if you have been directed here from another service information section.

Follow the table to help reduce diagnostic time and help prevent unnecessary replacement of good parts.

Diagnostic Aids

IMPORTANT:

- **Do not clear the DTC unless directed by a diagnostic procedure. Clearing the DTCs will erase all Freeze Frame and Failure Records stored in PCM memory.**

- **Poor engine performance can sometimes be diagnosed as a transmission driveability condition. In order to avoid mis-diagnosis of the automatic transmission, always perform the Diagnostic System Check - Engine Controls in Engine Controls - 6.0L (LQ4).**

- Use a scan tool that is known to function correctly. If necessary, test the scan tool on another vehicle.
- Ensure the scan tool contains the most current file available.
- The scan tool will display a loss of communication error message under the following conditions:
  - PCM power is interrupted
  - The ignition switch is turned OFF
  - The battery voltage level is very low
  - A poor connection at the diagnostic link connector (DLC)

Test Description

The numbers below refer to the step numbers on the diagnostic table.

1: This step determines if the scan tool is receiving power through the DLC connector.

2: The MIL should illuminate whenever the ignition is ON and the engine is not running.

3: This step determines if the PCM is transmitting class 2 serial data to the DLC and that the class 2 data circuit is not open or shorted.

4: This step determines if a DTC is current or stored in history.

Diagnostic System Check - Automatic Transmission

Step	Action	Value (s)	Yes	No
1	1. Install a scan tool. **IMPORTANT:** **Check for applicable service bulletins before proceeding with this test. Perform this test only if there is a driveability complaint or if you have been directed to this table from another section in the service information.** **IMPORTANT:** **Do not turn the ignition OFF when performing this diagnostic procedure. Do not clear the DTCs unless instructed by this diagnostic procedure.**	-		

	2. Turn ON the ignition, with the engine OFF. Does the scan tool turn ON?		Go to **Step 2**	Go to **Diagnostic Starting Point - Data Link Communications** in Data Link Communications
2	Is the MIL ON?	-	Go to **Step 3**	Go to **Malfunction Indicator Lamp (MIL) Inoperative** in Engine Controls - 6.0L (LQ4)
3	Attempt to establish communication with the PCM. Does the scan tool communicate with the PCM?	-	Go to **Step 4**	Go to **Diagnostic Starting Point - Data Link Communications** in Data Link Communications
4	**IMPORTANT:** **Diagnostic Trouble Codes (DTCs), engine performance, and transmission default actions can greatly affect the transmission performance. Ensure that these items are not the cause of a transmission concern.** Use the scan tool Capture Info function in order to save or capture (Store Info) any DTC Information.Are there any DTCs present?	-	Go to **Diagnostic Trouble Code (DTC) List/Type**	Go to **Symptoms - Automatic Transmission**

SCAN TOOL OUTPUT CONTROLS

Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selections	Description
		• The PCM commands the 1-2 shift solenoid valve ON and OFF. The scan tool 1-2 Sol. parameter should match the commanded state. The scan tool Commanded Gear parameter should correspond with the shift solenoid combination. Refer to **Shift Solenoid Valve State and Gear Ratio** table. • When the ignition is ON, and the engine is OFF, there are no limits to this control. The solenoid remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the PCM. • When the engine is running, the following control limits apply: o Only sequential gear changes are allowed. For example, 1st to 3rd is not allowed. If a non-sequential gear change is attempted, the message "Non-sequential gear changes not allowed. Gear changes must be in order" appears on the scan tool display.

1-2 Solenoid	-	○ The vehicle speed must be below a calibrated value. If the vehicle speed is too high, the message "Vehicle speed too high" appears on the scan tool display. ○ The engine speed must be below a calibrated value. If the engine speed is too high, the message "Engine speed too high" appears on the scan tool display. ○ Downshifts are allowed only when the vehicle speed is below a calibrated value. If the vehicle speed is too high, the message "Eng. is on and veh. speed too hi for 3-2 or 2-1 downshift" appears on the scan tool display. ○ The gear requested may not be greater than the current selected transmission range (PRNDL). For example, 3rd gear is not allowed if the transmission range is D2. If the gear requested is greater than the current selected transmission range, the message "Eng. running and gear request is greater than the current TR" appears on the scan tool display. ○ The solenoid remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the PCM.
2-3 Solenoid	-	• The PCM commands the 2-3 shift solenoid valve ON and OFF. The scan tool 2-3 Sol. parameter should match the commanded state. The scan tool Commanded Gear parameter should correspond with the shift solenoid combination. Refer to **Shift Solenoid Valve State and Gear Ratio** table. • When the ignition is ON, and the engine is OFF, there are no limits to this control. The solenoid will remain ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the PCM. • When the engine is running, the following control limits apply: ○ Only sequential gear changes are allowed. For example, 1st to 3rd is not allowed. If a non-sequential gear change is attempted, the message "Non-sequential gear changes not allowed. Gear changes must be in order" appears on the scan tool display. ○ The vehicle speed must be below a calibrated value. If the vehicle speed is too high, the message "Vehicle speed too high" appears on the scan tool display. ○ The engine speed must be below a calibrated value. If the engine speed is too high, the message "Engine speed too high" appears on the scan tool display. ○ Downshifts are allowed only when the vehicle speed is below a calibrated value. If the vehicle speed is too high, the message "Eng. is on and veh. speed too hi for 3-2 or 2-1

		downshift" appears on the scan tool display. ○ The gear requested may not be greater than the current selected transmission range (PRNDL). For example, 3rd gear is not allowed if the transmission range is D2. If the gear requested is greater than the current selected transmission range, the message "Eng. running and gear request is greater than the current TR" appears on the scan tool display. ○ The solenoid remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the PCM.
3-2 Downshift Solenoid	-	• The PCM commands the 3-2 shift solenoid valve ON and OFF. The scan tool 3-2 Downshift Sol. parameter should match the commanded state. • When the ignition is ON, and the engine is OFF, there are no limits to this control. The solenoid remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the PCM. • When the engine is running, the following control limits apply: ○ The transmission range (PRNDL) must be in Park or Neutral. If the transmission range is not in Park or Neutral, the message "Engine running and transmission range is not Park/Neutral" appears on the scan tool display. ○ The solenoid remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the PCM.
Clear TAP (Transmission Adaptive Pressures)	-	• The PCM clears, or resets, the TAP cells to the original base value. • There are no limits to using this output control. It may be performed with the engine running or when the ignition is ON, and the engine is OFF.
		• The PCM commands the amperage, current, to the pressure control solenoid in order to control transmission line pressure. As the amperage increases, the line pressure decreases. As the amperage decreases, the line pressure increases. The amperage range is 0.00-1.10 and may be commanded in one-tenth amp increments. • When the ignition is ON, and the engine is OFF, the reference, commanded, amperage may be controlled within calibrated limits. The scan tool parameter "PC Sol. Ref. Current" changes but the parameter "PC Sol. Actual Current" does not change. The reference current remains until commanded otherwise. • When the engine is running, the following control limits apply:

PC Solenoid	-	○ When the transmission range is Park or Neutral, the reference, commanded, amperage may be controlled within calibrated limits. The engine speed must be less than 1,500 RPM. If the engine speed is greater than 1,500 RPM, the message "TR in park/neutral and engine speed over 1,500 RPM" appears on the scan tool display. Both the scan tool parameters "PC Sol. Ref. Current" and "PC Sol. Actual Current" change. Both current readings remain until commanded otherwise. ○ When the transmission range is not in Park or Neutral, the reference amperage can only be controlled less than the current determined by the PCM. The PCM does not allow a value to be selected that may cause damage to the transmission. If the requested amperage is more than allowed by the PCM, the message "Requested current for the PC Solenoid is too high" appears on the scan tool display. ○ Transmission range DTCs must not be active. If a transmission range DTC is active, the message "Engine running with transmission DTC present" appears on the scan tool display.
Shift Transmission	-	• The PCM commands upshifts and downshifts. The scan tool Commanded Gear parameter should correspond with the shift solenoid combination. Refer to **Shift Solenoid Valve State and Gear Ratio** table. • When the ignition is ON, and the engine is OFF, there are no limits to this control. The scan tool shift solenoid states change to match the Commanded Gear selected. • When the engine is running, the following control limits apply: ○ The PCM does not allow a shift if it causes the engine RPM to exceed a calibrated limit. If a gear is requested and the engine speed is too high, the message "Engine speed too high" appears on the scan tool display. ○ The PCM does not allow a 3-2 or 2-1 downshift if the vehicle speed exceeds a calibrated limit. If either downshift is requested and the vehicle speed is too high, the message "Eng. is on and veh. speed too hi for 3-2 or 2-1 downshift" appears on the scan tool display. ○ The PCM does not allow a 4-3 downshift if the vehicle speed exceeds a calibrated limit. If a 4-3 downshift is requested and the vehicle speed is too high, the message "Vehicle speed too high" appears on the scan tool display. ○ The PCM does not allow an upshift if the vehicle speed exceeds a calibrated limit. If an upshift is requested and the

		vehicle speed is too high, the message "Vehicle speed too high" appears on the scan tool display. ○ The PCM does not allow an upshift that is greater than the current selected transmission range (PRNDL). For example 3rd gear is not allowed if the transmission range is D2. If an upshift is requested that is greater than the current selected transmission range, the message "Eng. running and gear request is greater than the current TR" appears on the scan tool display.
TCC Control Solenoid	-	• The PCM commands the duty cycle of the TCC PWM solenoid. The duty cycle is represented by a percentage of ON, energized, time. Approximately 90-100 percent duty cycle represents an ON, energized, commanded state. Zero percent represents an OFF, non-energized, commanded state. The scan tool TCC Duty Cycle parameter should match the commanded state. • When the ignition is ON, and the engine is OFF, there are no limits to this control. The solenoid remains ON, 90-100 percent duty cycle, until commanded OFF, zero percent duty cycle, and vice versa. When the output control is exited, the solenoid duty cycle is determined by the PCM.
TCC Enable	-	• The PCM commands the TCC enable solenoid valve ON and OFF. The scan tool TCC Enable parameter should match the commanded state. • When the ignition is ON, and the engine is OFF, there are no limits to this control. The solenoid remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the PCM.

SCAN TOOL DATA LIST

Use the scan tool data list under the following conditions:

- The Diagnostic System Check - Automatic Transmission is complete.
- The on-board diagnostics are functioning properly.
- No DTCs are present.

The values below represent a typical display recorded from a properly functioning system.

IMPORTANT: Do not use a scan tool that displays faulty data. Report the condition to the scan tool manufacturer. The use of a faulty scan tool can result in misdiagnosis and the unnecessary replacement of parts.

Only the parameters listed below are used in this manual for diagnosing. If a scan tool displays other parameters, the values are not recommended by General Motors for use in diagnosis.

Scan tool values below were recorded under the following conditions:

- Engine at idle
- Upper radiator hose hot
- Closed throttle
- Transmission in PARK
- Closed Loop operation
- Accessories OFF
- Brake pedal not applied

Transmission Scan Tool Data List (N Truck)

Scan Tool Parameter	Data List*	Units Displayed	Typical Data Value
1-2 Shift Error	F2, F7/F0	Seconds	Varies
1-2 Shift Time	F0, F2, F7/F0	Seconds	Varies
1-2 Sol.	F0, F2, F3, F4	On/Off	On
1-2 Sol. Open/Short to GND	F2	Yes/No	No
1-2 Sol. Short to Volts	F2	Yes/No	No
1-2 TAP Cell (4-16)	F7/F0	kPa/Psi	Varies
2-3 Shift Error	F3, F7/F1	Seconds	Varies
2-3 Shift Time	F0, F3, F7/F1	Seconds	Varies
2-3 Sol.	F0, F2, F3, F4	On/Off	On
2-3 Sol. Open/Short to GND	F3	Yes/No	No
2-3 Sol. Short to Volts	F3	Yes/No	No
2-3 TAP Cell (4-16)	F7/F1	kPa/Psi	Varies
3-2 Downshift Sol.	F0, F5	On/Off	On
3-2 Sol. Open/Short to GND	F5	Yes/No	No
3-2 Sol. Short to Volts	F5	Yes/No	No
3-4 Shift Error	F4	Seconds	Varies
3-4 Shift Time	F0, F4	Seconds	Varies
4WD	F0	Enabled/Disabled	Disabled
4WD Low	F0	Enabled/Disabled	Disabled
A/C Clutch	F0	On/Off	Off
Commanded Gear	F0, F1, F2, F3, F4, F5, F6	1, 2, 3, 4	1
Cruise	F0	Enabled/Disabled	Disabled
Current TAP Cell	F7/F0, F7/F1	4-16	Varies
ECT	F0, F1	°C (°F)	Varies
Engine Run Time	F0	Hr/Min/Sec	Varies

Engine Speed	F0, F1, F2, F3, F4, F5, F6	RPM	Varies
Engine Torque	F0, F1	N.m (lb ft)	Varies
Estimated Gear Ratio	F0, F1, F2, F3, F4	Ratio	8.00:1
Ignition Voltage	F0	Volts	12-14 Volts
Last Shift Time	F0	Seconds	Varies
PC Sol. Actual Current	F0, F6	Amps	Varies, 0.1-1.1 amps
PC Solenoid Duty Cycle	F0, F6	Percent	Varies
PC Sol. Ref. Current	F0, F6	Amps	Varies, 0.1-1.1 amps
Power Take Off	F0	On/Off	On
Speed Ratio	F0, F1, F2, F3, F4, F5	Ratio	8.00:1
TCC Brake Switch	F0, F1	Open/Closed	Closed
TCC Duty Cycle	F0, F1	Percent	0%
TCC Duty Cycle Open/Short to GND	F1	Yes/No	No
TCC Duty Cycle Short to Volts	F1	Yes/No	No
TCC Enable	F0, F1	Yes/No	No
TCC Enable Open/Short to GND	F1	Yes/No	No
TCC Enable Short to Volts	F1	Yes/No	No
TCC Slip Speed	F0, F1	RPM	+/-50 RPM from Engine Speed
TFP Sw.	F0	Park/Neutral, Reverse, Drive4, Drive3, Drive2, Drive1 or Invalid	Park/Neutral
TFP Sw. A/B/C	F0	HI/LOW	HI/LOW/HI
TFT Sensor	F0, F1, F6	Volts	Varies
Torque Converter Efficiency	F0, F1, F2, F3, F4	Ratio	.00:1
Tow/Haul Mode	F0	Active/Inactive	Inactive
TP Angle Vehicles w/o Traction Control	F0, F1, F2, F3, F4, F5, F6	Percent	0%
TP Indicated Angle Vehicles with Traction Control	F0, F1, F2, F3, F4, F5, F6	Percent	0-10%
TP Sensor Vehicles w/o Traction Control	F0, F1, F2, F3, F4, F5	Volts	0.3-0.9 V

TR Sw.	F0	Park/Neutral, Reverse, Drive4, Drive3, Drive2, Drive1 or Invalid	Park/Neutral
TR Sw. A/B/C/P	F0	HI/LOW	LOW/HI/HI/LOW
Traction Control	F0	Active/Inactive	Inactive
Trans. Fluid Temp.	F0, F1, F5, F6	°C (°F)	Varies
Trans. Slip Counter	F0, F1	0, 1, 2	0
Transfer Case Ratio	F0, F2, F3, F4	Ratio	2.61:1
Transmission Hot Mode	F0, F1	On/Off	Off
Transmission OSS	F0, F1, F2, F3, F4, F5	RPM	0
Vehicle Speed	F0, F1, F2, F3, F4, F5	km/h (mph)	0

***Data List Legend**

- F0: Transmission Data
- F1: TCC Data
- F2: 1-2 Shift Data
- F3: 2-3 Shift Data
- F4: 3-4 Shift Data
- F5: 3-2 Down Shift Data
- F6: PC Solenoid Data
- F7: Transmission Adapts
- F7/F0: 1-2 Adapt. Data
- F7/F1: 2-3 Adapt. Data

SCAN TOOL DATA DEFINITIONS

1-2 Shift Error

This parameter is the difference between the desired 1-2 shift time and the actual 1-2 shift time. A positive number indicates a firm or fast shift, the actual shift time was shorter than the desired shift time. A negative number indicates a soft or slow shift, the actual shift time was longer than the desired shift time. This value is only accurate if the shift was adaptable.

1-2 Shift Time

This parameter is the actual time of the last 1-2 shift. The shift time is based on the engine RPM drop after the commanded 1-2 shift. This value is only accurate if the shift was adaptable.

1-2 Sol.

Displays ON or OFF. This parameter is the commanded state of the 1-2 shift solenoid valve. ON represents a commanded energized state, current is flowing through the solenoid. OFF represents a non-

commanded state, current is not flowing through the solenoid.

1-2 Sol. Open/Short to GND

Displays Yes or No. This parameter indicates if an open or short to ground exists in the 1-2 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 1-2 shift solenoid is commanded OFF.

1-2 Sol. Short to Volts

Displays Yes or No. This parameter indicates if a short to voltage exists in the 1-2 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 1-2 shift solenoid is commanded ON.

1-2 Tap Cell (4-16)

Displays kPa or psi. This parameter displays the amount of pressure varied from a calibrated base line pressure for shifts. Each TAP Cell is based on a calibrated shift torque value. Each TAP Cell value is calculated from the last shift time. This cell pressure is used in addition to the calibrated base line pressure to adjust the apply of a clutch or band during the next shift.

2-3 Shift Error

This parameter is the difference between the desired 2-3 shift time and the actual 2-3 shift time. A positive number indicates a firm or fast shift, the actual shift time was shorter than the desired shift time. A negative number indicates a soft or slow shift, the actual shift time was longer than the desired shift time. This value is only accurate if the shift was adaptable.

2-3 Shift Time

This parameter is the actual time of the last 2-3 shift. The shift time is based on the engine RPM drop after the commanded 2-3 shift. This value is only accurate if the shift was adaptable.

2-3 Sol.

Displays ON or OFF. This parameter is the commanded state of the 2-3 shift solenoid valve. ON represents a commanded energized state, current is flowing through the solenoid. OFF represents a non-commanded state, current is not flowing through the solenoid.

2-3 Sol. Open/Short to GND

Displays Yes or No. This parameter indicates if an open or short to ground exists in the 2-3 shift solenoid valve feedback signal to the PCM. This parameter is valid only when the 2-3 shift solenoid is commanded OFF.

2-3 Sol. Short to Volts

Displays Yes or No. This parameter indicates if a short to voltage exists in the 2-3 shift solenoid valve

feedback signal to the PCM. This parameter is valid only when the 2-3 shift solenoid is commanded ON.

2-3 Tap Cell (4-16)

See 1-2 Tap Cell (4-16)

3-2 Downshift Sol.

Displays On or Off. This parameter indicates if the 3-2 shift solenoid valve assembly is currently commanded On or Off. The solenoid commanded state is based on the transmission temperature. The solenoid will change states during a 3-2 downshift to regulate the appropriate pressure. The commanded state of the solenoid occurs at approximately 30 mph with a throttle increase.

3-2 Downshift Sol. Open/Short to GND

Displays Yes or No. This parameter indicates if an open or short to ground exists in the 3-2 shift solenoid valve assembly feedback signal to the PCM. This parameter is valid only when the 3-2 shift solenoid is commanded OFF.

3-2 Downshift Sol. Short to Volts

Displays Yes or No. This parameter indicates if a short to voltage exists in the 3-2 shift solenoid valve assembly feedback signal to the PCM. This parameter is valid only when the 3-2 shift solenoid is commanded ON.

3-4 Shift Error

This parameter is the difference between the desired 3-4 shift time and the actual 3-4 shift time. A positive number indicates a firm or fast shift, the actual shift time was shorter than the desired shift time. A negative number indicates a soft or slow shift, the actual shift time was longer than the desired shift time. This value is only accurate if the shift was adaptable.

3-4 Shift Time

This parameter is the actual time of the last 3-4 shift. The shift time is based on the engine RPM drop after the commanded 3-4 shift. This value is only accurate if the shift was adaptable.

4WD

Displays Enabled or Disabled. This parameter indicates whether the vehicle is currently in a four-wheel drive mode.

4WD Low

Displays Enabled or Disabled. This parameter is the signal state of the four-wheel drive low circuit. Enabled indicates a 0 voltage signal, 4WD Low requested. Disabled indicates a B+ voltage signal, 4WD Low not requested.

A/C Clutch

Displays On or Off. This parameter indicates the commanded state of the A/C control relay. The clutch should be engaged when On displays.

Commanded Gear

Displays 1, 2, 3 or 4. This parameter indicates the current commanded gear.

Cruise

Displays Enabled or Disabled. This parameter indicates whether the PCM is allowing cruise operation. The PCM has the ability to disable cruise control under certain conditions.

Current TAP Cell

The Current Transmission Adaptive Pressure Cell parameter indicates the current TAP cell in use for transmission line pressure adaptation. The cells are based on engine torque. The higher the engine torque, the higher the current TAP cell. The last cell used will remain displayed until the next adaptable upshift occurs.

ECT

The Engine Coolant Temperature parameter is the input signal of the engine coolant temperature sensor. The engine coolant temperature is high 151°C (304°F) when the signal voltage is low, 0 V, and the engine coolant temperature is low -40°C (-40°F) when the signal voltage is high, 5 V.

Engine Run Time

This parameter measures how long the engine has been operating. When the ignition switch is turned OFF, the value is reset to zero.

Engine Speed

This parameter indicates the rotational speed of the engine expressed as revolutions per minute.

Engine Torque

This parameter indicates the amount of torque that is delivered from the engine.

Estimated Gear Ratio

This parameter indicates the estimated turbine speed divided by the transmission output speed. Estimated turbine speed is calculated from engine speed and engine torque.

Ignition Voltage

This represents the system voltage measured by the PCM at it's ignition feed.

Last Shift Time

This parameter is the actual time of the last upshift. This value is only accurate if the shift was adaptable.

PC Sol. Actual Current

The Pressure Control Solenoid Actual Current parameter is the actual current of the pressure control solenoid circuit at the control module. Zero amp, no current flow, indicates actual higher line pressure. Actual lower line pressure is indicated by 1.1 amps, high current flow.

PC Solenoid Duty Cycle

This parameter is the commanded state of the pressure control solenoid expressed as a percent of energized ON time. Zero percent indicates zero ON time, non-energized, or no current flow. Approximately 60% at idle indicates maximum ON time, energized, or high current flow.

PC Sol. Ref. Current

The Pressure Control Solenoid Reference Current parameter is the commanded current of the pressure control solenoid circuit. Zero amp, no current flow, indicates commanded higher line pressure. Commanded lower line pressure is indicated by 1.1 amps, high current flow.

Power Take-Off

Displays Yes or No. This parameter indicates when the power Take-Off (PTO) is engaged. PTO mode disables all transmission diagnostics.

Speed Ratio

This parameter indicates engine speed divided by transmission output speed. This value is used to estimate transmission gear ratio.

TCC Brake Switch

The Torque Converter Clutch Brake Switch parameter displays Open or Closed. This parameter indicates the state of the brake switch circuit input. Open indicates a zero voltage input, brake switch open, brake pedal applied. Closed indicates a B+ voltage input, brake switch closed, brake pedal released.

TCC Duty Cycle

This parameter is the commanded percentage of ON time of the TCC PWM solenoid. Approximately 90% represents an ON, energized, commanded state. Zero percent represents an OFF, non-energized, commanded state. This commanded state is applied at a vehicle speed between approximately 0-16 km/h (0-10 mph).

TCC Duty Cycle Open/Short to GND

Displays Yes or No. This parameter indicates whether an open or a short to ground exists in the TCC PWM solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC PWM solenoid is commanded OFF, duty cycle is 0%.

TCC Duty Cycle Short to Volts

Displays Yes or No. This parameter indicates whether a short to voltage exists in the TCC PWM solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC PWM solenoid is commanded ON, duty cycle is at maximum.

TCC Enable

Displays On or Off. This parameter is the commanded state of the TCC solenoid. On indicates a commanded energized state, current is flowing through the solenoid. Off indicates a commanded non-energized state, current is not flowing through the solenoid. This commanded state occurs at various vehicle speeds between applications.

TCC Enable Open/Short to GND

Displays Yes or No. This parameter indicates whether an open or a short to ground exists in the TCC solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC solenoid is commanded OFF.

TCC Enable Short to Volts

Displays Yes or No. This parameter indicates whether a short to voltage exists in the TCC solenoid valve feedback signal to the PCM. This parameter is valid only when the TCC solenoid is commanded ON.

TCC Slip Speed

This parameter is the difference between transmission output speed and engine speed. A negative value indicates that the engine speed is less than the output speed, deceleration. A positive value indicates that the engine speed is greater than the output speed, acceleration. A value of zero indicates that the engine speed is equal to the output speed, TCC applied.

TFP Sw.

The Transmission Fluid Pressure Switch parameter displays Park/Neutral, Reverse, Drive4, Drive3, Drive2, Drive1 or Invalid. This parameter is the decoded status of the three A/B/C inputs from the automatic transmission fluid pressure manual valve position switch. Invalid is displayed when the PCM does not recognize a valid combination of inputs.

TFP Sw. A/B/C

Displays HI/LOW, HI/LOW. This parameter indicates the status of the three inputs from the Automatic

Transmission Fluid Pressure Manual Valve Position Switch Assembly to the PCM. LOW represents a zero voltage signal. HI represents an ignition voltage signal.

TFT Sensor

The Transmission Fluid Temperature Sensor parameter displays a voltage related to the transmission fluid temperature. When the transmission fluid is cold, the sensor resistance is high and the PCM will sense high signal voltage. As the transmission fluid temperature warms to a normal operating temperature, the sensor resistance becomes less and the voltage decreases.

Torque Converter Efficiency - Ratio

Displays a ratio of .00:1 to 2:1. The ratio is calculated by multiplying the speed ratio by a value related to the "K factor" of the torque converter. The "K factor" is the looseness or tightness of the torque converter for a given torque. The nearer the torque converter is to full coupling, i.e. 1:1, the closer the torque converter efficiency number will be to 1.

Tow/Haul Mode

Displays Active or Inactive. This parameter indicates when the transmission is operating in a towing or hauling mode. In tow/haul mode, the PCM commands a different shift pattern that increases performance when towing or hauling. Shift quality and TCC scheduling are also affected during tow/haul mode operation.

TP Angle

The Throttle Position Angle is computed by the PCM from the TP Sensor voltage. The TP angle should read 0% at idle and 100% at Wide Open Throttle (WOT).

TP Indicated Angle

This parameter indicates the amount of throttle opening.

TP Sensor

The Throttle Position Sensor is used by the PCM to determine the amount of throttle demanded by the driver. Voltage is below 1 volt at idle and above 4 volts at Wide Open Throttle (WOT).

TR Sw.

The Transmission Range Switch parameter displays Park/Neutral, Reverse, Drive4, Drive3, Drive2, Drive1 or Invalid. This parameter is the decoded status of the four A/B/C/P inputs from the transmission range switch. Invalid is displayed when the PCM does not recognize a valid combination of inputs.

TR Sw. A/B/C/P

Displays HI/LOW, HI/LOW. This parameter indicates the status of the four inputs from the transmission

range switch to the PCM. HI indicates an ignition voltage input to the PCM. LOW indicates a zero voltage input to the PCM.

Traction Control

Displays Active or Inactive. When the PCM receives a request for torque reduction from the electronic brake traction control module (EBTCM) Active is displayed.

Trans. Fluid Temp.

This parameter is the input signal of the transmission fluid temperature sensor. Transmission fluid temperature is high 151°C (304°F) when signal voltage is low, 0 V, and transmission fluid temperature is low -40°C (-40°F) when signal voltage is high, 5 V.

Trans. Slip Counter

Displays 0, 1 or 2. This parameter is the number of times the P0894 Diagnostic test has identified a slipping condition. This diagnostic test is required to identify a slipping condition three times in a row in order to set the DTC P0894 Transmission Component Slipping Diagnostic code.

Transfer Case Ratio

This parameter indicates the ratio of the transfer case calculated by engine speed divided by transmission output speed based on transmission commanded gear.

Transmission Hot Mode

Displays On or Off. This parameter monitors transmission temperature. On indicates that the transmission temperature has exceeded 135°C (275°F).

Transmission OSS

The Transmission Output Speed Sensor parameter indicates the rotational speed of the transmission output shaft expressed as revolutions per minute.

Vehicle Speed

This parameter is the input signal from the vehicle speed sensor assembly.

DIAGNOSTIC TROUBLE CODE (DTC) TYPE DEFINITIONS

The DTC Type Definitions contain the characteristics for all types of DTCs. Each DTC type may or may not be found in this section. The DTC type is based on the action that the PCM takes when storing DTC information and whether or not the PCM illuminates a service lamp or displays a message on a driver information center (DIC). The DTC descriptions in the Diagnostic Trouble Code List/Type are listed in numeric order and indicate the DTC types for domestic and export vehicle applications. Each DTC is categorized into one of the following types:

Type A

This DTC is emissions related. The PCM stores the DTC in History, Freeze Frame and Failure Records during the first trip in which the conditions for setting the DTC are met. The PCM also illuminates the malfunction indicator lamp (MIL) during the first trip in which the conditions for setting the DTC are met.

Type B

This DTC is emissions related. The PCM stores the DTC in Failure Records during the first trip in which the conditions for setting the DTC are met. The PCM stores the DTC in History and Freeze Frame during the second consecutive trip in which the conditions for setting the DTC are met. The PCM also illuminates the MIL during the second consecutive trip in which the conditions for setting the DTC are met.

Type C

This DTC is non-emissions related. The PCM stores the DTC in History and Failure Records during the first trip in which the conditions for setting the DTC are met. The PCM does not store the DTC in Freeze Frame and does not illuminate the MIL. For some type C DTCs, a message may be displayed on a DIC, if equipped. For other type C DTCs, a separate service lamp, other than the MIL, may be illuminated. Type C DTCs that do not display a message on the DIC or illuminate a separate service lamp were formerly referred to as type D.

Type X

This DTC is available in the PCM software, but has been disabled, or turned off. In this case, the diagnostic does not run, DTCs are not stored, and the MIL does not illuminate. Type X DTCs are used primarily for export vehicles that do not require MIL illumination or DTC storing.

The service information contained in this manual refers to the domestic, federal, calibration package. Domestic calibrations apply to vehicles sold in the United States, Canada and Japan. Export calibrations exist for both leaded and unleaded vehicles. DTC types may change for some export vehicles, and some DTCs may be turned off for leaded export vehicles. Differences between domestic and export calibrations are not reflected on DTC support information pages. DTC types for export calibrations are referenced only in the Diagnostic Trouble Code List/Type.

DIAGNOSTIC TROUBLE CODE (DTC) LIST/TYPE

DTC List

DTC	Domestic	Unleaded Export	Leaded Export
DTC P0218	C	C	C
DTC P0502	B	B	C
DTC P0503	B	B	C
DTC P0706	C	C	C
DTC P0711	C	C	C
DTC P0712	C	C	C
DTC P0713	C	C	C
DTC P0719	C	C	C

DTC P0724	C	C	C
DTC P0740	B	B	C
DTC P0741	B	B	C
DTC P0742	B	B	C
DTC P0748	C	C	C
DTC P0751	B	B	C
DTC P0752	B	B	C
DTC P0753	B	B	C
DTC P0756	A	A	C
DTC P0757	A	A	C
DTC P0758	A	A	C
DTC P0785	B	B	C
DTC P0894	B	B	C
DTC P1810	B	B	C
DTC P2761	B	B	C
DTC P2771	B	B	C