Transmission Control Systems: Testing and Inspection
Pinpoint Tests

Shift Solenoid Failure Mode Chart "Always Off"

Shift Solenoid Failure Mode Chart "Always Off"

Failed off due to powertrain control module and/or vehicle wiring concerns, shift solenoid electrically or hydraulically stuck off.

SSA ALWAYS OFF:	Gear Lever Position		
	(D)	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	2	2	2
2	2	2	2
3	3	2[a]	2[a]
4	3	2[a]	2[a]

a No engine braking.

SSB ALWAYS OFF:	Gear Lever Position		
	(D)	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	1	1	1
2	2	2	2
3	2	2	2
4	1	1	1

Shift Solenoid Failure Mode Chart "Always On"

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Failed on due to powertrain control module and/or vehicle wiring concerns, shift solenoid electrically or hydraulically stuck on.

SSA ALWAYS ON:	Gear Lever Position		
	(D)	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	1	1	1

SSA ALWAYS ON:	Gear Lever Position		
	(D)	2	1
2	1	1	1
3	4	2[a]	2[a]
4	4	2[a]	2[a]

a No engine braking.

SSB ALWAYS ON:	Gear Lever Position		
	(D)	2	1
PCM Gear Commanded	Actual Gear Obtained		
1	4	2[a]	2[a]
2	3	2[a]	2[a]
3	3	2[a]	2[a]
4	4	2[a]	2[a]

a No engine braking.

Shift Solenoids Pre-Diagnosis

Shift Solenoids Pre-Diagnosis

Use the following shift solenoid operation information when carrying out Pinpoint Test A. See: Test A: Shift and Torque Converter Clutch Solenoids

Gear Lever Position	PCM Commanded Gear	Solenoids		
		SSA	SSB	TCC
P/R/N	1	ON	OFF	HD
(D)	1	ON	OFF	HD
(D)	2	OFF	OFF	EC
(D)	3	OFF	ON	EC
(D)	4	ON	ON	EC
(D) w/OD OFF				
1	1	ON	OFF	HD
2	2	OFF	OFF	EC
3	3	OFF	ON	EC
Manual 2	2	OFF	OFF	EC
Manual 1	1	ON	OFF	HD
1[a]	2	OFF	OFF	EC

a When a manual pull-in occurs above a calibrated speed the transmission will downshift from the higher gear until the vehicle speed drops below this calibrated speed.

EC = Electronically controlled.

HD = Hydraulically disabled.

Solenoid Operation Chart

Before Pinpoint Tests

Before Pinpoint Tests

NOTE: Prior to entering pinpoint tests, check the PCM wiring harness for tight connections, bent or broken pins, corrosion, loose wires, correct routing, correct seals and their condition. Check the PCM, sensors and actuators for damage. If a concern still exists after electrical diagnosis has been carried out, refer to Diagnosis By Symptom. See: Diagnosis By Symptom

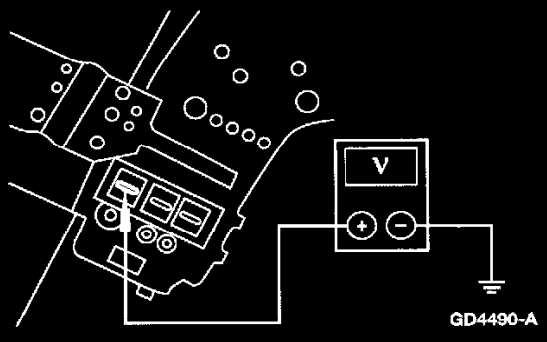
If DTCs appear while carrying out the on-board diagnostics, refer to the Diagnostic Trouble Code Charts for the appropriate repair procedure. Prior to entering pinpoint tests, refer to any TSBs for transmission concerns.

Test A: Shift and Torque Converter Clutch Solenoids

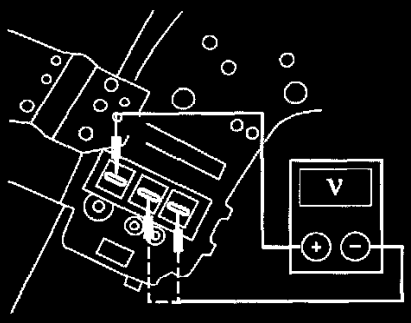
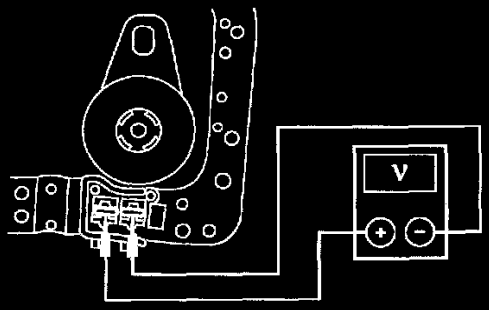
PINPOINT TEST A: SHIFT AND TORQUE CONVERTER CLUTCH SOLENOIDS

Test Step		Result / Action to Take
A1	ELECTRONIC DIAGNOSTICS	
• Select PARK. • Key in OFF position. • Check to make sure the transmission harness connector is fully seated, pins are fully engaged in connector and in good condition before proceeding. • Connect the diagnostic tool. • Key in ON position. • Enter the following diagnostic mode on the diagnostic tool: Diagnostic Data Link. • Enter the following diagnostic mode on the diagnostic tool: PCM. • Enter the following diagnostic mode on the diagnostic tool: Active Command Modes. • Enter the following diagnostic mode on the diagnostic tool: Output State Control (OSC). • Enter the following diagnostic mode on the diagnostic tool: Trans-Bench Mode. • **Does vehicle enter Trans-Bench Mode?**		**Yes** GO to **A2**. **No** REPEAT procedure to enter Trans-Bench Mode. If vehicle did not enter Trans-Bench Mode, REFER to the Powertrain Management for diagnosis of PCM.

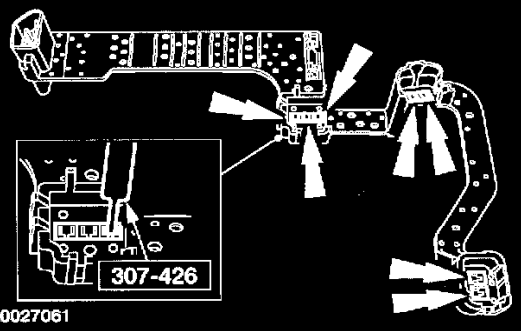
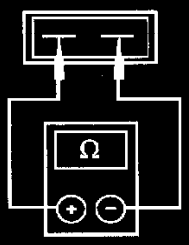
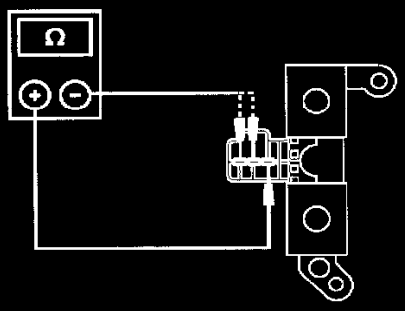
Test A1

Test Step		Result / Action to Take
A2	WIGGLE TEST	
• Select PIDs to be monitored. PID Command: SSA — PID Actual: SS1F PID Command: SSB — PID Actual: SS2F PID Command: TCC — PID Actual: TCCF • Select "ON" to turn suspect solenoid on. • Press "SEND". • Wiggle all wiring and connectors to the transmission. Monitor the Solenoid State for changes. • Select "OFF" to turn solenoid off. • Press "SEND". • **Does the suspect solenoid(s) fault state change?**		**Yes** REPAIR open or short in the vehicle harness or connector. **No** GO to **A3**.
A3	SOLENOID FUNCTIONAL CHECK	
• Monitor each solenoid state. • Turn each solenoid ON and OFF. • **Does the solenoid turn ON and OFF when commanded and can solenoid activation be heard?**		**Yes** GO to **A4**. **No** GO to **A5**.
A4	OSC TRANS-DRIVE MODE (GR__CM OR TCC)	
• Carry out OSC Trans-Drive Mode. • Select GR__CM for Shift Solenoids or follow procedures for GR__CM as listed. • Select TCC for Torque Converter clutch Solenoid. Follow procedures of TCC in Drive Mode as listed. • **Does the transmission upshift and downshift or torque converter engage/disengage when commanded?**		**Yes** CLEAR all DTCs. ROAD TEST to verify if concern is still present. If concern is still present, REFER to Diagnosis By Symptom to diagnose shift or torque converter concern. **No** GO to **A5**.
A5	CHECK FOR BATTERY VOLTAGE	
• Remove transmission fluid pan. • Visually inspect the lead frame and connectors for damage. • Key in ON position. • Measure the voltage with the positive lead to VPWR solenoid pin and negative lead to a good ground.  • **Is the voltage greater than 10 volts?**		**Yes** GO to **A6**. **No** CHECK for open or short circuit in harness, or solenoid.

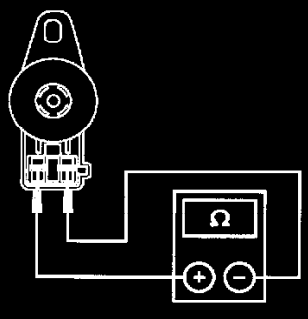
Test A2-A5

Test Step		Result / Action to Take
A6	ELECTRICAL SIGNAL CHECK	
• Measure the voltage with the positive lead connected to VPWR solenoid pin and the negative lead to the signal pin of the appropriate solenoid.  GD4491-A • Enter the following diagnostic mode on the diagnostic tool: Trans-Bench Mode. • Select Parameter SSA, SSB or TCC. • Select "ON". • Press "SEND". • Turn the solenoids ON and OFF, while monitoring the voltage, solenoid state on the scan tool (ON and OFF), and listen for the solenoid to activate (click). • Measure the voltage with the positive lead to VPWR pin and the negative lead to the TCC pin.  GD4492-A • Enter the following diagnostic mode on the diagnostic tool: Select Parameter TCC.. • Select "ON". • Press "SEND". • Turn the solenoid ON and OFF, while monitoring the voltage, solenoid state on the scan tool(ON and OFF), and listen for the solenoid to activate (click). • Select "OFF", press "SEND". • **Does the voltage and solenoid state change?**		**Yes** GO to **A7**. **No** CHECK for open or short circuit in harness, solenoid or a PCM concern.

Test A6

Test Step		Result / Action to Take
A7	**CHECK LEAD FRAME SOLENOID CONNECTIONS** • Key in OFF position. • Disconnect the lead frame. • Inspect the lead frame for damage. • Using the special tool, check all the lead frame solenoid connections.  A0027061 • **Does the special tool go through any of the lead frame solenoid connections?**	**Yes** INSTALL a new lead frame andGO to **A8**. **No** GO to **A8**.
A8	**CHECK SOLENOID RESISTANCE AT SOLENOID** • Measure the solenoid resistance between the pins of the solenoid.  GD3386-A •  AD1391-A	**Yes** GO to **A8**. **No** INSTALL a new solenoid.

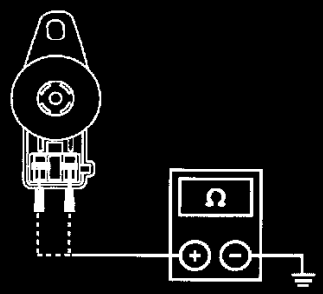
Test A7-A8

Test Step	Result / Action to Take
A8 CHECK SOLENOID RESISTANCE AT SOLENOID (Continued) •  AD1392-A • Measure the resistance for each solenoid (SSA, SSB or TCC) as follows:	

Solenoid	Resistance (ohms)
SSA	20-30
SSB	20-30
TCC	10-16

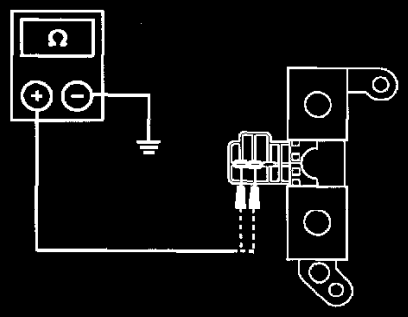
• **Are the resistances correct?** **A9 CHECK SOLENOID FOR SHORT TO GROUND** • Check for continuity between engine ground and appropriate solenoid pin with ohmmeter or other low current tester. Connection should show infinite resistance (no continuity).	**Yes** INSTALL a new solenoid. **No** REFER to Diagnosis By Symptom diagnosis of shift or torque converter concerns.

Solenoid	Terminal
SSA	+/-
SSB	+/-
TCC	+/-



AD1393-A

Test A8-A9

Test Step		Result / Action to Take
A9	CHECK SOLENOID FOR SHORT TO GROUND (Continued)	
•  • **Is there continuity?**		

Teat A9 Continued

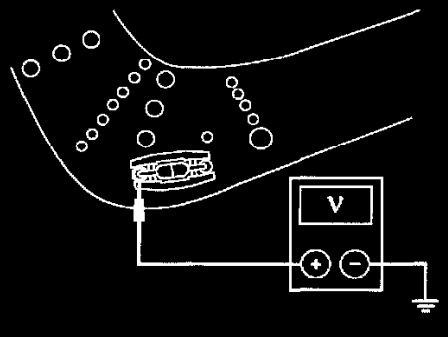
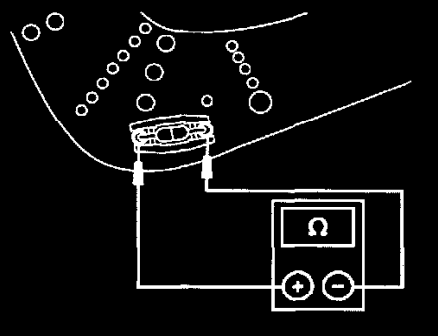
NOTE: Read and record all DTCs. All digital TR Sensor and VSS DTCs must be repaired before entering Output State Control **(OSC)**. Refer to the Transmission Internal Harness illustration. Refer to the Transmission Vehicle Harness Connector illustration.

Test B: Transmission Fluid Temperature (TFT) Sensor

PINPOINT TEST B: TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR

Test Step		Result / Action to Take
B1	ELECTRONIC DIAGNOSTICS	
• Check to make sure the transmission harness connector is fully seated, pins are fully engaged in connector and in good condition before proceeding. • Connect the diagnostic tool. • Key in ON position. • Select Diagnostic Data Link. • Select PCM. • Select PID/Data Monitor and Record. • Enter the following diagnostic mode on the diagnostic tool: PIDs; TFT, TFTV. • **Does the vehicle enter PID/Data Monitor and Record?**		**Yes** GO to **B2**. **No** REPEAT procedure to enter PID. If vehicle did not enter PID, REFER to the Powertrain Management for diagnosis of PCM.
B2	WARM-UP/COOL-DOWN CYCLE	
• While monitoring the TFT PIDs, carry out the following test: If transmission is cold, run transmission to warm it up. If transmission is warm, allow transmission to cool down. • **Do the TFT PIDs increase as the transmission is warmed up or decrease as the transmission is cooled or does the TFT or TFTV drop in and out of range?**		**Yes** If the TFT PIDs increase as the transmission is warmed or decrease as the transmission is cooled, CLEAR all DTCs. ROAD TEST to verify if concern is still present. If concern is still present, REFER to Diagnosis By Symptom to diagnose transmission overheating. If the TFT or TFTV drop in and out of range, INSPECT for intermittent concern in the internal/external harness, sensor or connector. **No** GO to **B3**.

Test B1-B2

Test Step	Result / Action to Take
B3 ELECTRICAL SIGNAL CHECK • Key in ON position. • Remove transmission fluid pan. • Visually inspect the lead frame and connectors for damage. • Measure the voltage with the positive lead to positive TFT at sensor pin and negative lead to a good ground.  GD4493-A • **Is the voltage present?**	**Yes** GO to **B4**. **No** CHECK for open or short circuit in vehicle harness, internal harness or a PCM concern.
B4 CHECK RESISTANCE OF TFT SENSOR • Disconnect: Transmission Harness. • Measure the resistance between the positive TFT and negative TFT pins at transmission connector, using the following: **Transmission Fluid Temperature** °C / °F / Resistance (Ohms): -40 to -20 / -40 to -4 / 967K - 284K -19 to -1 / -3 - 31 / 284K - 100K 0 - 20 / 32 - 68 / 100K - 37K 21 - 40 / 69 - 104 / 37K - 16K 41 - 70 / 105 - 158 / 16K - 5K 71 - 90 / 159 - 194 / 5K - 2.7K 91 - 110 / 195 - 230 / 2.7K - 1.5K 111 - 130 / 231 - 266 / 1.5K - 0.8K 131 - 150 / 267 - 302 / 0.8K - 0.54K  AD1396-A • **Is the resistance correct?**	**Yes** REFER to Diagnosis By Symptom diagnose an overheating concern. **No** INSTALL a new internal harness (sensor is part of harness).

Test B3-B4

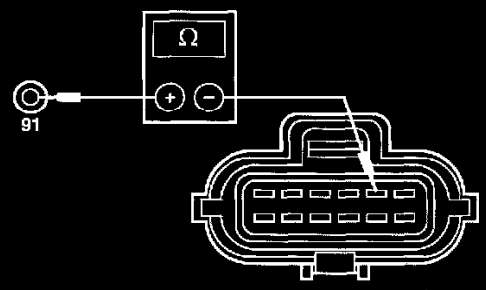
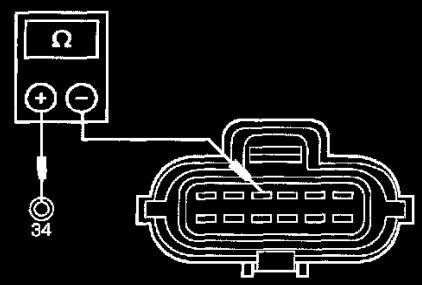
NOTE: Refer to the Transmission Connector Layouts.

Test C: Digital Transmission Range (TR) Sensor

PINPOINT TEST C: DIGITAL TRANSMISSION RANGE (TR) SENSOR

Test Step		Result / Action to Take
C1	**VERIFY DIAGNOSTIC TROUBLE CODES** • Select PARK. • Key in OFF position. • **NOTE:** DTC codes P0705 and P0708 cannot be set by an incorrectly adjusted digital TR sensor. Carry out on board diagnostic test. • **Are only DTC codes P0705, P0708 present?**	**Yes** GO to **C4**. **No** GO to **C2**.
C2	**VERIFY DIGITAL TRANSMISSION RANGE SENSOR ALIGNMENT** • Check to make sure the digital TR sensor harness connector is fully seated, pins are fully engaged in connector and in good condition before proceeding. • Apply the parking brake. • Select NEUTRAL. • Disconnect the shift cable/linkage from the manual lever. • Verify that the digital TR Sensor Alignment Tool fits in the appropriate slots. • **Is the digital TR sensor adjustment OK?**	**Yes** GO to **C3**. **No** ADJUST the digital TR sensor. PLACE transmission range selector lever in P and CLEAR DTCs. REPEAT OBD Tests.GO to **C3**.
C3	**VERIFY SHIFT CABLE/LINKAGE ADJUSTMENT** • Place the manual lever in the overdrive position. • Select DRIVE. • Reconnect the shift cable/linkage. • Verify that the shift cable/linkage is adjusted OK. • **Is the shift cable/linkage adjusted OK?**	**Yes** GO to **C4**. **No** ADJUST the shift cable/linkage.
C4	**CHECK ELECTRICAL SIGNAL OPERATION** • Select PARK. • Disconnect: Digital TR Sensor. ⚠ **CAUTION: Do not pry on connector. This will damage the connector and result in a transmission concern.** Press the button and pull out on the digital TR harness connector. • Inspect both ends of the connector for damage or pushed-out pins, corrosion, loose wires and missing or damaged seals. • **Are the connector, pins and harness damaged?**	**Yes** REPAIR as required. CLEAR DTCs and REPEAT OBD Tests. **No** If diagnosing a DTC, GO to **C5**. If diagnosing a starting concern or a reversing lamp concern, GO to **C10**.
C5	**CHECK ELECTRICAL SYSTEM OPERATION (DIGITAL TR AND PCM)** • Key in OFF position. • Connect the diagnostic tool. • Connect: Digital TR Sensor. • Key in ON position. • Enter the following diagnostic mode on the diagnostic tool: TR PIDS TR, TR__D, TR__V. • Move transmission range selector lever into each gear and stop. • Observe any of the following PIDs, TR and TR__D, TR__V (vehicle dependent) while wiggling harness, tapping on sensor, and/or driving the vehicle. Use PIDs TR, and TR__D for DTCs P0705, P1704, and P1705. Use PIDs TR, and TR__V for DTC P0708. • Compare the PIDs to the Digital Transmission Range (TR) Sensor Diagnosis Chart. • **Do the PIDs TR, TR__D and TR__V match the Digital Transmission Range (TR) Sensor Diagnosis chart, and does the TR__D PID remain steady when the harness is wiggled, the sensor is tapped, or the vehicle driven?**	**Yes** The problem is not in the digital TR sensor system. REFER to Diagnosis By Symptom for further diagnosis. **No** If TR__D changes when wiggling harness, tapping on the sensor, or driving the vehicle, the problem may be intermittent. GO to **C6**.

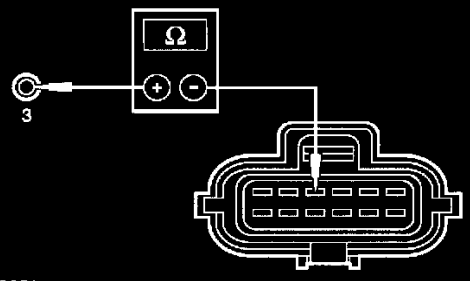
Test C1-C5

Test Step		Result / Action to Take
C6	CHECK DIGITAL TRANSMISSION RANGE SENSOR OPERATION	
	• Disconnect: Digital TR Sensor. **⚠ CAUTION: Do not pry on connector. This will damage the connector and result in a transmission concern.** • Connect: TR-E Cable to Transmission Tester. • Connect: TR-E Cable to Digital TR Sensor. • Place the Digital TR Overlay onto Transmission Tester. • Carry out Sensor Test as instructed on the Digital TR Overlay. • **Does the status lamp on the tester TRS-E cable match the selected gear positions?**	**Yes** Concern is not in the digital TR sensor, GO to **C7**. **No** INSTALL a new digital TR sensor. CLEAR DTCs and REPEAT OBD Tests.
C7	CHECK PCM HARNESS CIRCUITS FOR OPENS	
	• Key in OFF position. • Disconnect: Powertrain Control Module (PCM). • Inspect for damaged or pushed-out pins, corrosion or loose wires. • Disconnect: Digital TR Sensor. **⚠ CAUTION: Do not pry the connector. This will damage the connector and result in a transmission concern.** Disconnect the digital TR sensor connector. • Install the EEC-V Control System Breakout Box. • Measure the resistance between the PCM Test Pin 91 at the EEC-V Control System Breakout Box and signal return circuit Pin 2 at digital TR sensor connector harness side.  GD2142-A • For vehicles equipped with a 5.4L engine measure the resistance between the PCM Test Pin 34 at the EEC-V Control System Breakout Box and TR1 circuit Pin 4 at digital TR sensor connector harness side.  AD1665-A	**Yes** GO to **C8**. **No** REPAIR open circuit(s). RECONNECT all components. CLEAR DTCs. REPEAT OBD Tests.

Test C6-C7

Test Step		Result / Action to Take
C7	CHECK PCM HARNESS CIRCUITS FOR OPENS (Continued)	

- For vehicles equipped with 4.2L and 4.6L engines, measure the resistance between the PCM Test Pin 3 at the EEC-V Control System Breakout Box and TR1 circuit Pin 4 at digital TR sensor connector harness side.



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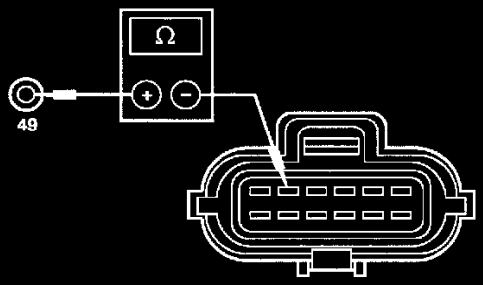
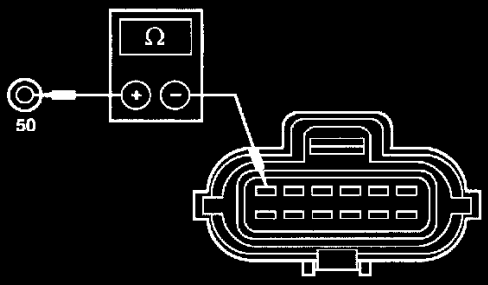
- Measure the resistance between the PCM Test Pin 49 at the EEC-V Control System Breakout Box and TR2 circuit Pin 5 at digital TR sensor connector harness side.



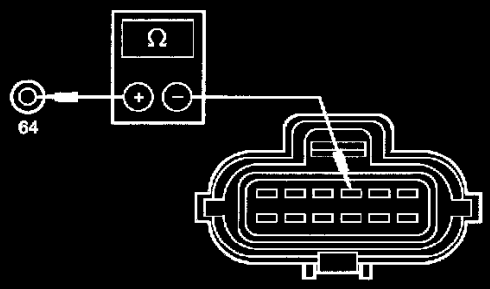
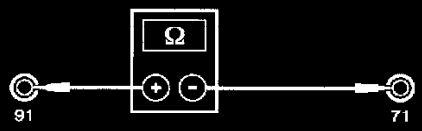
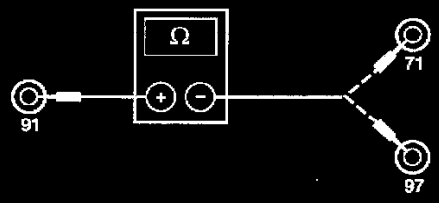
GD2144-A

- Measure the resistance between the PCM Test Pin 50 at the EEC-V Control System Breakout Box and TR4 circuit Pin 6 at digital TR sensor connector harness side.



GD2145-A

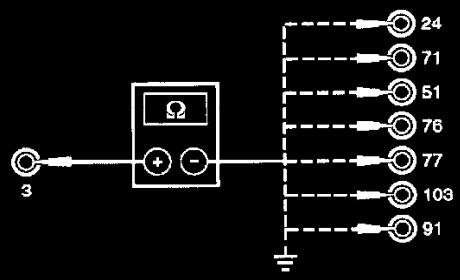
Test C7 Continued

Test Step		Result / Action to Take
C7	**CHECK PCM HARNESS CIRCUITS FOR OPENS (Continued)**	
	• Measure the resistance between the PCM Test Pin 64 at the EEC-V Control System Breakout Box and TR3A circuit Pin 3 at digital TR sensor connector harness side.  GD2146-A • **Are all resistances less than 5 ohms?**	
C8	**CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER**	
	• For vehicles equipped with a 4.2L engine, measure the resistance between PCM Test Pin 91 and Test Pin 71 at the EEC-V Control System Breakout Box.  A0011338 • For vehicles equipped with 4.6L and 5.4L engines, measure the resistance between PCM Test Pin 91 and Test Pin 71 and 97 at the EEC-V Control System Breakout Box.  GD2254-A	**Yes** GO to **C9**. **No** REPAIR short circuit(s). RECONNECT all components. CLEAR DTCs. REPEAT OBD Tests.

Test C7-C8

Test Step		Result / Action to Take
C8	CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER (Continued)	

- For vehicles equipped with a 4.2L engine, measure the resistance between PCM Test Pin 3 and Test Pins 24, 71, 51, 76, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.



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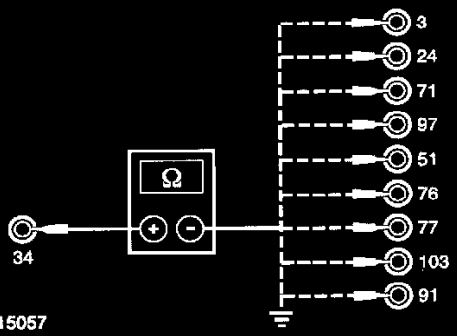
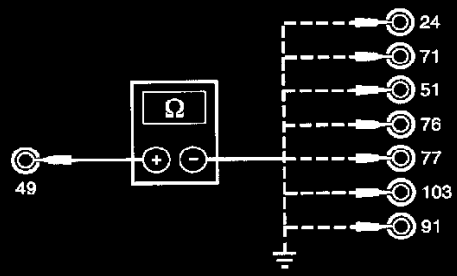
- For vehicles equipped with a 4.6L, and 5.4L engines, measure the resistance between PCM Test Pin 34 and Test Pins 3, 24, 71, 97, 51, 76, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.



A0015057

- For vehicles equipped with a 4.2L engine, measure the resistance between PCM Test Pin 49 and Test Pins 24, 71, 51, 76, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.



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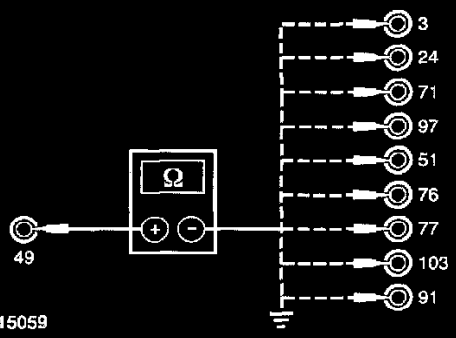
Test C8 Continued

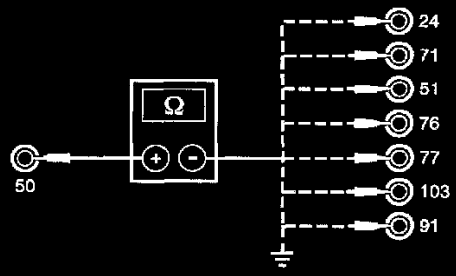
Test Step		Result / Action to Take
C8	CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER (Continued)	

- For vehicles equipped with 4.6L and 5.4L engines, measure the resistance between PCM Test Pin 49 and Test Pins 3, 24, 71, 97, 51, 76, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.



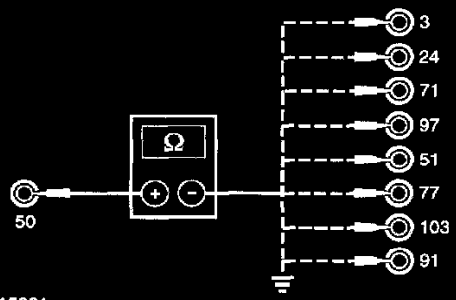
A0015059

- For vehicles equipped with a 4.2L engine, measure the resistance between PCM Test Pin 50 and Test Pins 24, 71, 51, 76, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.



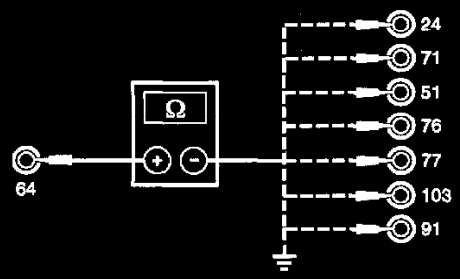
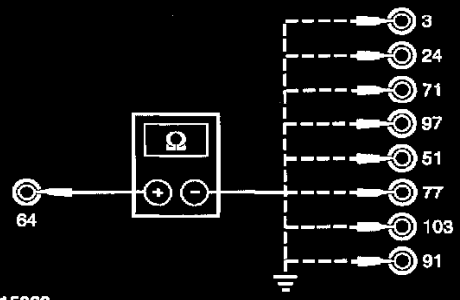
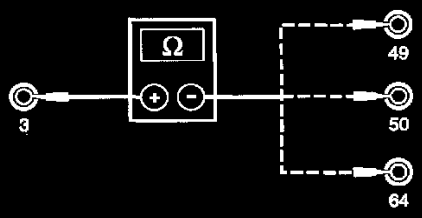
A0015060

- For vehicles equipped with 4.6L and 5.4L engines, measure the resistance between PCM Test Pin 50 and Test Pins 3, 24, 71, 97, 51, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.



A0015061

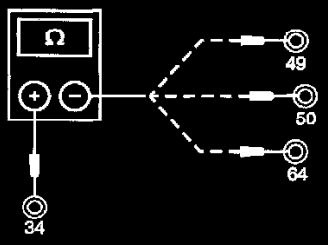
Test C8 Continued

Test Step		Result / Action to Take
C8	**CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER (Continued)** • For vehicles equipped with a 4.2L engine, measure the resistance between PCM Test Pin 64 and Test Pins 24, 71, 51, 76, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.  A0015062 • For vehicles equipped with 4.6L and 5.4L engines, measure the resistance between PCM Test Pin 64 and Test Pins 3, 24, 71, 97, 51, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.  A0015063 • **Are all resistances greater than 10,000 ohms?**	
C9	**CHECK FOR SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS** • For vehicles equipped with 4.2L engine, measure the resistance between Test Pin 3 and Pins 49, 50, and 64 at the EEC-V Control System Breakout Box.  A0008656	**Yes** INSTALL a new PCM. ROAD TEST and REPEAT Quick Test. **No** REPAIR shorts on circuits having less than 10,000 ohms between other TR/PCM input signal circuits. RECONNECT all components. CLEAR DTCs. REPEAT OBD Tests.

Test C8-C9

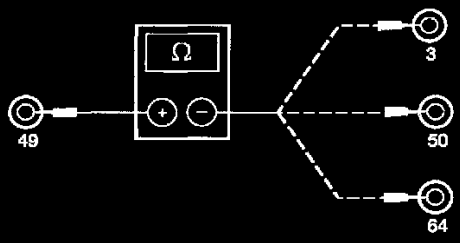
Test Step		Result / Action to Take
C9	CHECK FOR SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS (Continued)	

- For vehicles equipped with a 4.6L, and 5.4L engines, measure the resistance between Test Pin 34 and Pins 49, 50, and 64 at the EEC-V Control System Breakout Box.



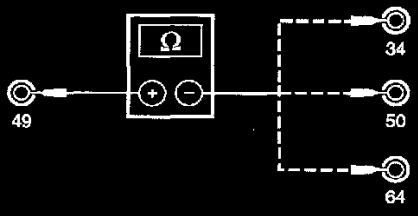
AD1666-A

- For vehicles equipped with a 4.2L engine, measure the resistance between Test Pin 49 and Pins 3, 50, and 64 at the EEC-V Control System Breakout Box.



GD2260-A

- For vehicles equipped with a 4.6L, and 5.4L engines, measure the resistance between Test Pin 49 and Pins 34, 50, and 64 at the EEC-V Control System Breakout Box.

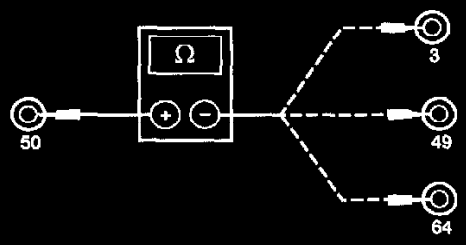


A0008659

Test C9 Continued

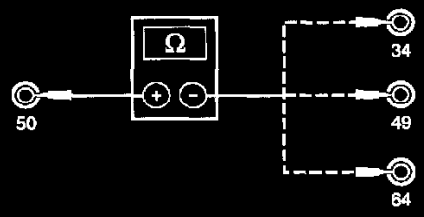
Test Step		Result / Action to Take
C9	CHECK FOR SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS (Continued)	

- For vehicles equipped with 4.2L engine, measure the resistance between Test Pin 50 and Pins 3, 49, and 64 at the EEC-V Control System Breakout Box.



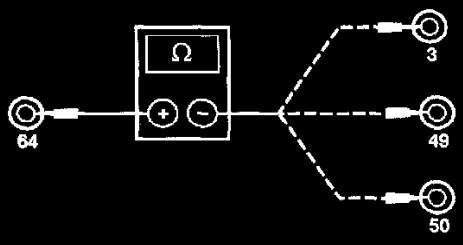
GD2261-A

- For vehicles equipped with a 4.6L, and 5.4L engines, measure the resistance between Test Pin 50 and Pins 34, 49, and 64 at the EEC-V Control System Breakout Box.



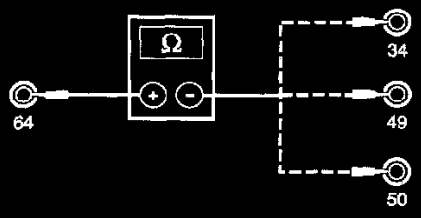
A0008657

- For vehicles equipped with 4.2L engine, measure the resistance between Test Pin 64 and Pins 3, 49, and 50 at the EEC-V Control System Breakout Box.



GD2262-A

Test C9 Continued

Test Step		Result / Action to Take
C9	CHECK FOR SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS (Continued) • For vehicles equipped with a 4.6L, and 5.4L engines measure the resistance between Test Pin 64 and Pins 34, 49, and 50 at the EEC-V Control System Breakout Box.  A0008658 • **Are all the resistances greater than 10,000 ohms?**	
C10	CHECK THE NON-PCM INTERNAL CIRCUITS OF SENSOR • Connect: TRS-E Cable to Transmission. • Connect: TRS-E Cable to Digital TR Sensor. • Place the Digital TR Overlay onto Transmission Tester. • Carry out Switch Test as instructed on the Digital TR Overlay. • **Does the status lamp on the tester indicate RED for the correct gear position?**	**Yes** Concern is not in the digital TR sensor. For starting system concerns, REFER to Starting and Charging. For reversing lamp concerns, REFER to Lighting and Horns. For optional circuits, REFER to the Powertrain Management. **No** INSTALL a new digital TR sensor. CLEAR DTCs. REPEAT OBD Tests.

Test C9-C10

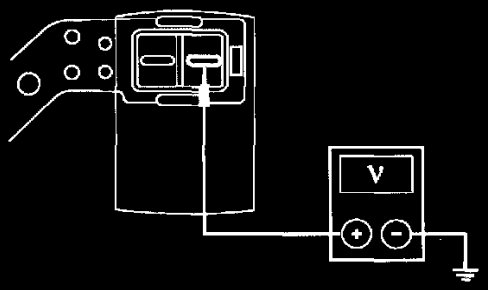
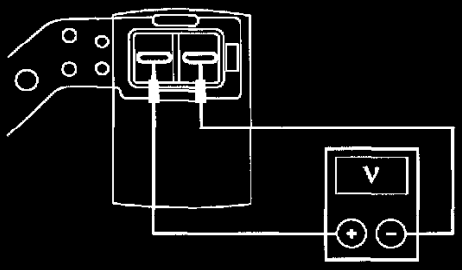
NOTE: Refer to the Digital Transmission Range **(TR)** Sensor Connector illustration. Refer to the Digital Transmission Range **(TR)** Sensor Diagnosis Chart.

Test D: Electronic Pressure Control (EPC) Solenoid

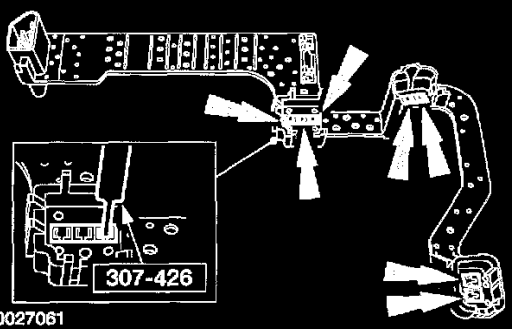
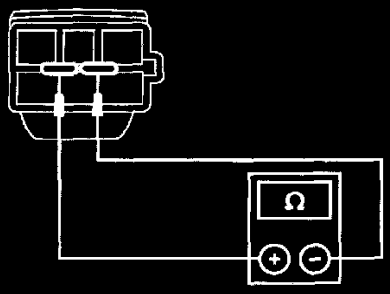
PINPOINT TEST D: ELECTRICAL PRESSURE CONTROL (EPC) SOLENOID

Test Step		Result / Action to Take
D1	ELECTRONIC DIAGNOSTICS • Key in OFF position. • Select PARK. • Check to make sure the transmission harness connector is fully seated, pins are fully engaged in the connector and in good condition before proceeding. • Connect the diagnostic tool. • Key in ON position. • Enter the following diagnostic mode on the diagnostic tool: Diagnostic Data Link. • Enter the following diagnostic mode on the diagnostic tool: PCM. • Enter the following diagnostic mode on the diagnostic tool: Active Command Modes. • Enter the following diagnostic mode on the diagnostic tool: Output State Control (OSC). • Enter the following diagnostic mode on the diagnostic tool: Trans-Bench Mode. • **Does the vehicle enter the Trans-Bench Mode?**	**Yes** GO to **D2.** **No** REPEAT procedure to enter Trans-Bench Mode. If vehicle did not enter OSC, REFER to the Powertrain Management for diagnosis of PCM.

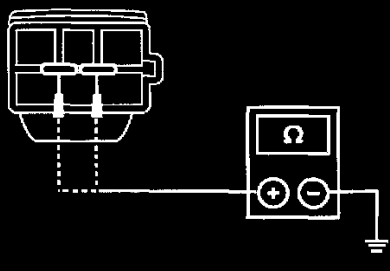
Test D1

Test Step		Result / Action to Take
D2	**SOLENOID FUNCTIONAL TEST**	
	• Install 2,060 kPa (300 psi) pressure gauge into EPC tap. • Monitor pressure gauge. • Enter the following diagnostic mode on the diagnostic tool: Parameter; EPC. • Select value - 15, 30, 45, 60, 70 or 90 psi. • Press "SEND". • Select another value "0-90 psi". • Press "SEND". • Enter the following diagnostic mode on the diagnostic tool: XXX. • Press "SEND". • **Does the pressure reading match the commanded pressure?**	**Yes** CLEAR DTCs. REPEAT OBD Tests. **No** GO to **D3**.
D3	**CHECK FOR BATTERY VOLTAGE**	
	• Remove transmission fluid pan. • Visually inspect the lead frame connectors for damage. • Key in ON position. • Measure the voltage with positive lead to VPWR solenoid pin and negative lead to a good ground.  GD4494-A • **Is voltage greater than 10 volts?**	**Yes** GO to **D4**. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the OBD Tests.
D4	**ELECTRICAL SIGNAL CHECK**	
	• Measure the voltage with positive lead connected to VPWR solenoid pin and connect negative lead to the signal pin of the EPC solenoid.  GD4495-A • Turn the solenoids ON and OFF, while monitoring the voltage reading, solenoid state on the scan tool (ON and OFF), listen for the solenoid to activate (click). • Enter the following diagnostic mode on the diagnostic tool: Trans-Bench Mode. • Enter the following diagnostic mode on the diagnostic tool: Parameter EPC. • Select a value "0-90 psi". • Press "SEND". • Select another value "0-90 psi".	**Yes** GO to **D5**. **No** CHECK for open or short circuit in harness or PCM.

Test D2-D4

Test Step		Result / Action to Take
D4	ELECTRICAL SIGNAL CHECK (Continued) • Press "SEND". • Enter the following diagnostic mode on the diagnostic tool: XXX. • Press "SEND". • **Does the voltage and solenoid state change?**	
D5	CHECK LEAD FRAME SOLENOID CONNECTIONS • Key in OFF position. • Disconnect the lead frame. • Inspect the lead frame for damage. • Using the special tool, check all the lead frame solenoid connections.  A0027061 • **Does the special tool go through any of the lead frame solenoid connections?**	**Yes** INSTALL a new lead frame and GO to **D6**. **No** GO to **D6**.
D6	CHECK SOLENOID RESISTANCE AT SOLENOID • Measure the resistance of the EPC solenoid.  AD1399-A • **Is the resistance between 2.48 and 5.66 ohms?**	**Yes** GO to **D6**. **No** INSTALL a new solenoid. CLEAR the DTCs. REPEAT the OBD Tests.

Test D4-D6

Test Step		Result / Action to Take
D7	CHECK SOLENOID FOR SHORT TO GROUND • Check for continuity between engine GROUND and the EPC solenoid terminals with ohmmeter or other low current tester (less than 200 milliamps). Connection should show infinite resistance (no continuity).  AD1400-A • **Is there continuity?**	**Yes** INSTALL a new solenoid. CLEAR the DTCs. REPEAT the OBD Tests. **No** REFER to Diagnosis By Symptom for diagnosis of pressure concerns.

Test D7

NOTE: Refer to the Transmission Internal Harness illustration. Read and record all DTCs. All digital TR Sensor and VSS DTCs must be repaired

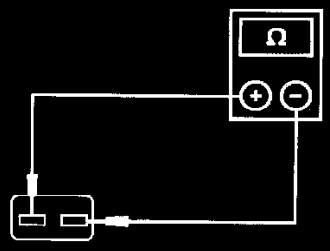
before entering Output State Control **(OSC)**.

Test E: Output Shaft Speed (OSS) Sensors

PINPOINT TEST E: OUTPUT SHAFT SPEED (OSS) SENSORS

Test Step		Result / Action to Take
E1	**ELECTRONIC DIAGNOSTICS**	
	• Check to make sure the transmission harness connector is fully seated, pins are fully engaged in connector and in good condition before proceeding. • Connect the diagnostic tool. • Key in ON position. • Enter the following diagnostic mode on the diagnostic tool: Diagnostic Data Link. • Enter the following diagnostic mode on the diagnostic tool: PCM. • Select PID/Data Monitor and Record. • Select the PID OSS. • **Does vehicle enter PID/Data Monitor and Record?**	**Yes** GO to **E2**. **No** REPEAT procedure to enter PID. If vehicle did not enter PID, REFER to the Powertrain Management for diagnosis of PCM.
E2	**DRIVE CYCLE TEST**	
	• While monitoring the OSS Speed PID, drive the vehicle so that the transmission upshifts and downshifts through all gears. • **Does the OSS Speed PID increase and decrease with engine and vehicle speed?**	**Yes** CLEAR all DTCs. ROAD TEST to verify if concern is still present. If concern is still present, REFER to Diagnosis By Symptom **No** If the OSS Speed PID does not increase and decrease with engine and vehicle speed, INSPECT for open or short in vehicle harness, sensor, a PCM concern, or internal hardware concern. If the sensor signal is erratic, INSPECT for intermittent concern in the internal/external harness, sensor, or connector. If the sensor signal is steady, GO to **E3**.

Test E1-E2

Test Step		Result / Action to Take
E3	**CHECK RESISTANCE OF OSS SENSOR**	
	• Disconnect the vehicle harness connector from the OSS sensor. • Measure the resistance between the OSS sensor pins.  AD1084-B • **Is the resistance between 1,026-1,194 ohms?**	**Yes** REFER to Diagnosis By Symptom for concern diagnosis. **No** INSTALL a new OSS sensor.

Test E3

NOTE: Refer to the Output Shaft Speed **(OSS)** Sensor Harness Connector illustration.

Test F: Solenoid Mechanical Failure

PINPOINT TEST F: SOLENOID MECHANICAL FAILURE

Test Step		Result / Action to Take
F1	ELECTRONIC DIAGNOSIS	
• Connect the diagnostic tool. • Carry out KOEO test. • **Are only DTCs P1714, P1715, P1740 present?**		**Yes** INSTALL a new solenoid and/or body. REFER to the Diagnostic Trouble Code Charts for code description. GO to **F2**. **No** REPAIR the other DTCs first. CLEAR DTCs and CARRY OUT Transmission Drive Cycle Test. REPEAT Quick Test.
F2	TRANSMISSION DRIVE CYCLE TEST	
• Carry out transmission drive cycle test. • Carry out On-Board Diagnostic Test. • **Does the vehicle upshift and downshift OK?**		**Yes** GO to **F3**. **No** REFER to Diagnosis By Symptom to diagnose shift concerns.
F3	RETRIEVE DTCS	
• Connect the diagnostic tool. • Carry out KOEO test until continuous DTCs have been displayed. • **Are DTCs P1714, P1715, P1740 still present?**		**Yes** INSTALL a new PCM. ROAD TEST and REPEAT Quick Test. **No** Testing completed. If a concern still exists, REFER toDiagnosis By Symptom for concern diagnosis.

Test F1-F3

NOTE: Repair all other DTC's before repairing the following DTC's: P1714, P1715, P1740