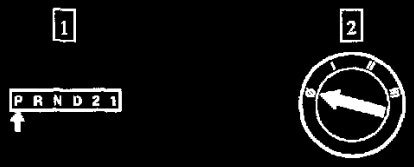
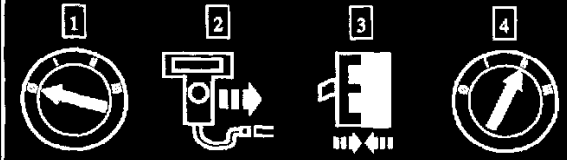
Transmission Control Systems: Testing and Inspection
Test C: Digital Transmission Range (TR) Sensor
PINPOINT TEST C: DIGITAL TRANSMISSION RANGE (TR) SENSOR

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 VERIFY DIAGNOSTIC TROUBLE CODES	
	3 **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	
	1 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. 2 Apply the parking brake. 4 Disconnect the shift cable/linkage from the manual lever.

C1 - C2

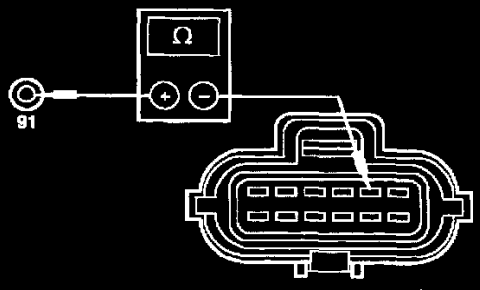
CONDITIONS	DETAILS/RESULTS/ACTIONS
C2 VERIFY DIGITAL TRANSMISSION RANGE SENSOR ALIGNMENT (Continued)	
	5 Verify that the TR Sensor Alignment Gauge fits in the appropriate slots. • Is the digital TR sensor adjustment OK? → **Yes** GO to C3. → **No** ADJUST the digital TR sensor. PLACE transmission range selector lever in P and CLEAR DTCs. REPEAT OBD Tests. GO to C3.
C3 VERIFY SHIFT CABLE/LINKAGE ADJUSTMENT	
2 	1 Place the manual lever in the overdrive position. 3 Re-connect the shift cable/linkage. 4 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.

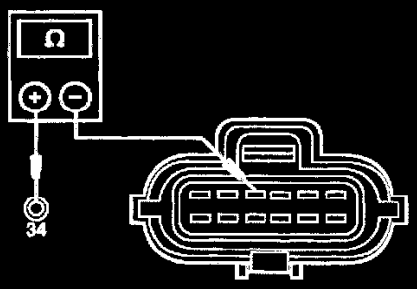
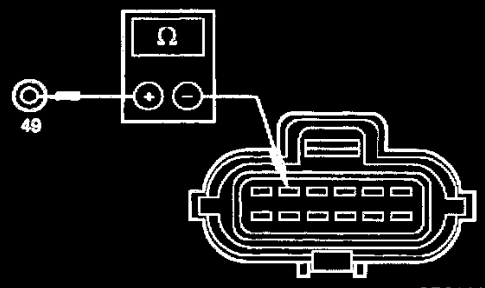
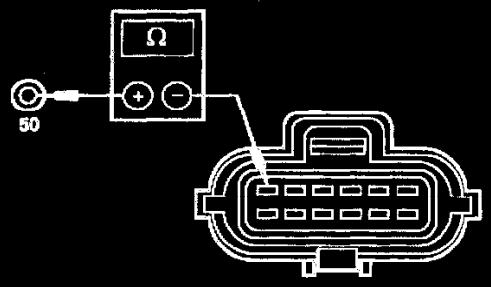
C2 - C3

CONDITIONS	DETAILS/RESULTS/ACTIONS
C4 CHECK ELECTRICAL SIGNAL OPERATION	
  Digital TR Sensor	2 **⚠ 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. 3 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)	
 Scan Tool Digital TR Sensor  TR PIDS TR, TR__D, TR__V	6 Move transmission range selector lever into each gear and stop. 7 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.

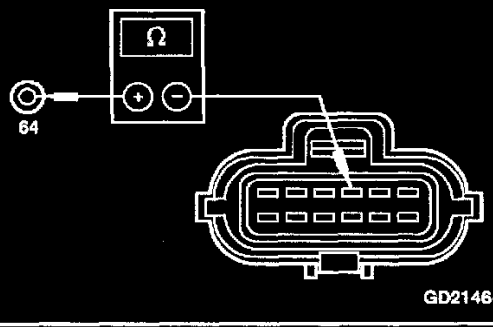
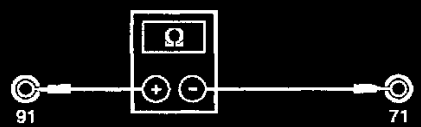
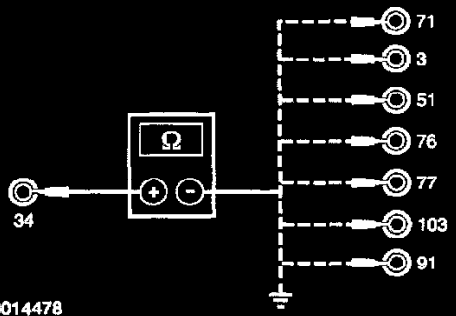
CONDITIONS	DETAILS/RESULTS/ACTIONS
C5 CHECK ELECTRICAL SYSTEM OPERATION (DIGITAL TR AND PCM) (Continued)	
	8 Compare the PIDs to the Digital Transmission Range (TR) Sensor Diagnosis Chart. • Do the PIDs TR, TR__D and TR__V match the Digital Transmission Range (TR) Sensor Diagnosis chart, and does the 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**.
C6 CHECK DIGITAL TRANSMISSION RANGE SENSOR OPERATION	
1  Digital TR Sensor 2  TR-E Cable to Transmission Tester 3  TR-E Cable to Digital TR Sensor	1 ⚠ **CAUTION: Do not pry on connector. This will damage the connector and result in a transmission concern.** 4 Place the Digital TR Overlay onto Transmission Tester.

C5 - C6

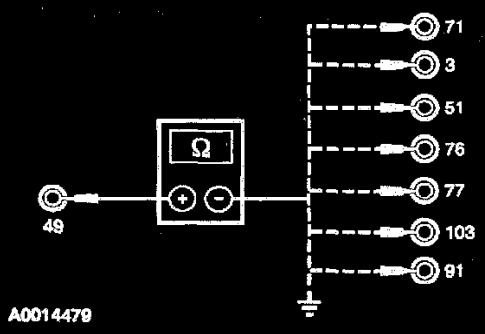
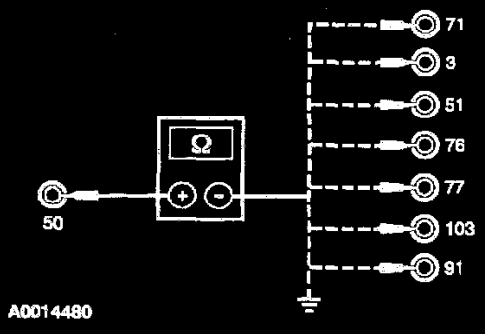
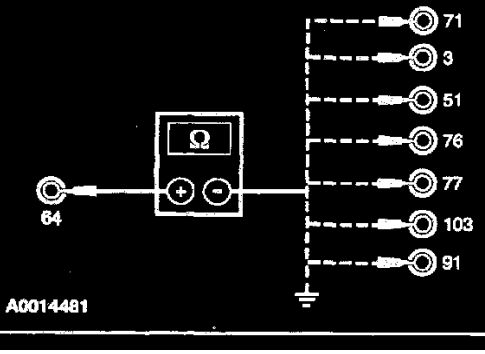
CONDITIONS	DETAILS/RESULTS/ACTIONS
C6 CHECK DIGITAL TRANSMISSION RANGE SENSOR OPERATION (Continued)	
	5 Carry out Sensor Test as instructed on the Digital TR Overlay. • Does the status lamp on the tester TRS-E cable match the selected gear positions? → **Yes** Concern is not in the digital TR sensor, GO to **C7**. → **No** INSTALL a new digital TR sensor. CLEAR DTCs and REPEAT OBD Tests.
C7 CHECK PCM HARNESS CIRCUITS FOR OPENS	
 1  2 Powertrain Control Module (PCM)	
	3 Inspect for damaged or pushed-out pins, corrosion or loose wires.
 4 Digital TR Sensor	4 ⚠ **CAUTION: Do not pry on the connector. This will damage the connector and result in a transmission concern.** Disconnect the digital TR sensor connector.
	5 Install the EEC-V Control System Breakout Box.
 6 91 GD2142-A	6 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.

CONDITIONS	DETAILS/RESULTS/ACTIONS
C7 CHECK PCM HARNESS CIRCUITS FOR OPENS (Continued)	
7  AD1665-A	7 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.
8  GD2144-A	8 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.
9  GD2145-A	9 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.

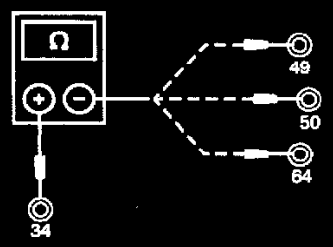
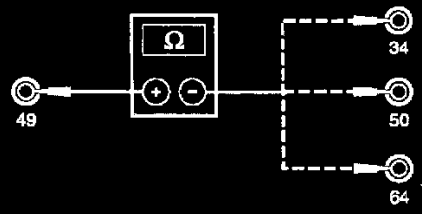
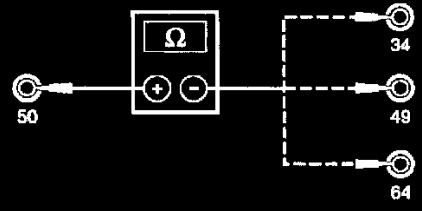
C7

CONDITIONS	DETAILS/RESULTS/ACTIONS
C7 CHECK PCM HARNESS CIRCUITS FOR OPENS (Continued)	
10  GD2146-A	10 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. • Are all resistances less than 5 ohms? → **Yes** GO to **C8**. → **No** REPAIR open circuit(s). RECONNECT all components. CLEAR DTCs. REPEAT OBD Tests.
C8 CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER	
1  A0014477	1 Measure the resistance between PCM test pin 91 and test pin 71 at the EEC-V Control System Breakout Box.
2  A0014478	2 Measure the resistance between PCM test pin 34 and test pins 71, 3, 51, 76, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.

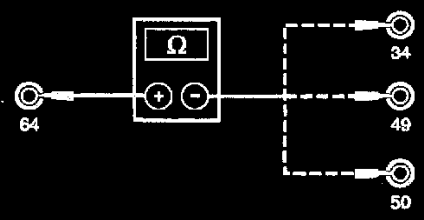
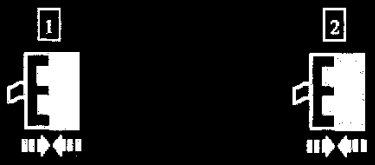
(Continued)

CONDITIONS	DETAILS/RESULTS/ACTIONS
C8 CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER (Continued)	
3  A0014479	3 Measure the resistance between PCM test pin 49 and test pins 71, 3, 51, 76, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.
4  A0014480	4 Measure the resistance between PCM test pin 50 and test pins 71, 3, 51, 76, 77, 103, and 91 at the EEC-V Control System Breakout Box and chassis ground.
5  A0014481	5 Measure the resistance between PCM test pin 64 and test pins 71, 3, 51, 76, 77, 103, and 91 at the EEC-V Control System Breakout Box and ground. • Are all resistances greater than 10,000 ohms? → Yes GO to C9. → No REPAIR short circuit(s). RECONNECT all components. CLEAR DTCs. REPEAT OBD Tests.

C8

CONDITIONS	DETAILS/RESULTS/ACTIONS
C9 CHECK FOR SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS	
1  AD1666-A	1 Measure the resistance between test pin 34 and test pins 49, 50, and 64 at the EEC-V Control System Breakout Box.
2  A0008659	2 Measure the resistance between test pin 49 and test pins 34, 50, and 64 at the EEC-V Control System Breakout Box.
3  A0008657	3 Measure the resistance between test pin 50 and test pins 34, 49, and 64 at the EEC-V Control System Breakout Box.

C9

CONDITIONS	DETAILS/RESULTS/ACTIONS
C9 CHECK FOR SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS (Continued)	
4  A0008658	4 Measure the resistance between test pin 64 and test pins 34, 49, and 50 at the EEC-V Control System Breakout Box. • Are all the resistances greater than 10,000 ohms? → **Yes** INSTALL a new PCM. RECONNECT all components CLEAR DTCs. REPEAT OBD Tests. → **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.
C10 CHECK THE NON-PCM INTERNAL CIRCUITS OF SENSOR	
1 2  TRS-E Cable to Transmission Tester TRS-E Cable to Digital TR Sensor	3 Place the Digital TR Overlay onto Transmission Tester. 4 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 Section Lighting and Horns. For optional circuits, REFER to Powertrain Management. → **No** INSTALL a new digital TR sensor. CLEAR DTCs. REPEAT OBD Tests.

C9 - C10

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

NOTE: Refer to the Digital Transmission Range **(TR)** Sensor Diagnosis chart