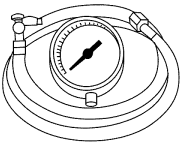
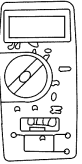
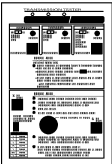
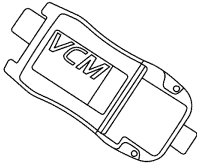


DIAGNOSIS AND TESTING

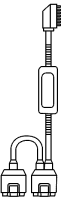

Pinpoint Tests — OSC Equipped Vehicle

Special Tool(s)

 ST1565-A	Transmission Fluid Pressure Gauge 307-004 (T57L-77820-A)
 ST1137-A	73 III Automotive Meter 105-R0057 or equivalent
 ST1761-A	Trans Tester TR/MLP Overlay and Manual 007-00131 or equivalent
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

(Continued)

Special Tool(s)

 ST1632-A	MLP-TR Cable 418-F107 (007-00111) or equivalent
 ST1389-A	Transmission Tester 307-F016 (007-00130) or equivalent

Shift Solenoid Pre-Diagnosis

Anytime an electrical connector or solenoid body is disconnected, inspect the connector for terminal condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install new as necessary.

Use the following shift solenoid operation information when carrying out Pinpoint Test A.

Solenoid Operation Chart

Gearshift Selector Position	PCM Commanded Gear	5R55S Solenoid States						
		SSA	SSB	SSC	SSD	PCA	PCB	PCC
P/N	P/N	ON	OFF	OFF	ON	L	H/L	L
R	R	ON	OFF	OFF	ON	L/H	L	H
D	1	ON	OFF	OFF	ON	H	H/L	L
	2	ON	OFF	ON	ON	L/H	H	L
	3	ON	ON	OFF	ON	H	L/H	L
	4	OFF	OFF	OFF	ON	H	H/L	H
	5	OFF	OFF	ON	ON	H	H	H
D Cancelled	1	ON	OFF	OFF	ON	H	H/L	L
	2	ON	OFF	ON	ON	L/H	H	L
	3	ON	ON	OFF	ON	H	L/H	L

DIAGNOSIS AND TESTING (Continued)**Solenoid Operation Chart (Continued)**

Gearshift Selector Position	PCM Commanded Gear	5R55S Solenoid States						
		SSA	SSB	SSC	SSD	PCA	PCB	PCC
	4	OFF	OFF	OFF	OFF	L/H	H	H
Manual 3	3	ON	ON	OFF	OFF	H	L	H/L
Manual 2	2	ON	OFF	ON	OFF	H	L	H/L
Manual 1	1	ON	OFF	OFF	OFF	H	L	H/L

H = HIGH

L = LOW

H/L = PCM controlled

Manual = if equipped

Shift Solenoid Failure Mode Chart

Failed ON or OFF due to powertrain control module (PCM) and/or vehicle wiring concerns, solenoid electrically, mechanically or hydraulically stuck ON or OFF.

Solenoid Failure Mode Chart A — 5R55S

Gear	Actual Gear							
	SSA		SSB		SSC		SSD	
	ON	OFF	ON	OFF	ON	OFF	ON	OFF
D Position								
1	1	1	3	1	2	1	1	1/M1
2	2	2	2	2	2	1	2	M2
3	3	3	3	1	3	3	3	3/M3
4	1	4	4	4	4/5	4	4	4/M4
5	2	5	5	5	5	4	5	5
D Position — (D) Cancelled								
1M	M1	M1	M3	M1	M2	M1	1	M1
2M	M2	M2	1.1	M2	M2	M1	2	M2
3M	M3	M3	M3	M1	1.1	M3	3	M3
4M	M1	M4	M4	M4	5	M4	4	M4
R	R	R	N	R	R	R	R	R

Slip = Slip due to low line pressure

1.1 = Actual ratio with Forward Clutch, Intermediate and Overdrive Band applied.

Solenoid Failure Mode Chart B — 5R55S

Gear	Actual Gear					
	PC A		PC B		PC C	
	L	H	L	H	L	H
D Position						
1/S	1	1	1	1	1	1
2	2	2	1	2	2	2
3	1/S	3	3	3	3	3
4	4	4	4	4	1	4

DIAGNOSIS AND TESTING (Continued)**Solenoid Failure Mode Chart B — 5R55S (Continued)**

Gear	Actual Gear					
	PC A		PC B		PC C	
	L	H	L	H	L	H
5	5	5	4	5	2	5
D Position — (D) Cancelled						
1M	1	M1	1	M1	1M	M1
2M	M2	M2	1	M2	2M	M2
3M	1	M3	3	M3	3M	M3
4M	M4	M4	4	M4	1	M4
R	R/S	R	R/S	R	R	R

H = High

L = Low

Slip = Slip due to low line pressure

1.1 = Actual ratio with Forward Clutch, Intermediate and Overdrive Band applied.

Pinpoint Tests**PINPOINT TEST A: SHIFT AND TORQUE CONVERTER CLUTCH SOLENOIDS**

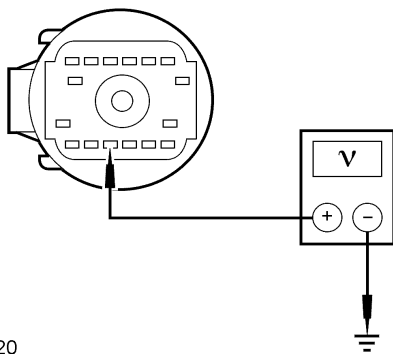
NOTE: Refer to the Transmission Vehicle Harness Connector illustration preceding these pinpoint tests.

NOTE: Read and record all DTCs. All Digital TR Sensor and VSS DTCs must be repaired before entering output state control (OSC).

Test Step		Result / Action to Take
A1	ELECTRONIC DIAGNOSTICS	<p>Yes REMAIN in Trans-Bench Mode. GO to A2.</p> <p>No REPEAT procedure to enter Trans-Bench Mode. If vehicle did not enter Trans-Bench Mode, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis of PCM or VCM.</p>
	<ul style="list-style-type: none"> Key in OFF position. Select PARK. Check to make sure the transmission harness connector is fully seated, terminals are fully engaged in connector and in good condition before proceeding. Connect the scan tool. Key in ON position. Enter the following diagnostic mode on the scan tool: Diagnostic Data Link. Enter the following diagnostic mode on the scan tool: PCM. Enter the following diagnostic mode on the scan tool: Active Command Modes. Enter the following diagnostic mode on the scan tool: Output State Control (OSC). Enter the following diagnostic mode on the scan tool: Trans-Bench Mode. Does vehicle enter Trans-Bench Mode? 	
A2	WIGGLE TEST	
	<ul style="list-style-type: none"> Remain in Trans-Bench Mode. Select PIDs to be monitored. 	

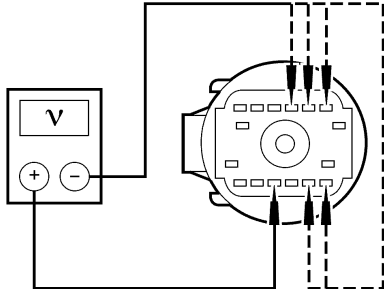
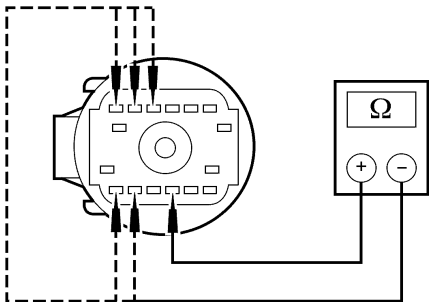
(Continued)

DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST A: SHIFT AND TORQUE CONVERTER CLUTCH SOLENOIDS (Continued)**

Test Step		Result / Action to Take												
A2	WIGGLE TEST (Continued)	Yes REPAIR the circuit. TEST the system for normal operation. No GO to A3 .												
<table><tr><th>PID Command</th><th>PID Actual</th></tr><tr><td>SSA</td><td>SSA</td></tr><tr><td>SSB</td><td>SSB</td></tr><tr><td>SSC</td><td>SSC</td></tr><tr><td>SSD</td><td>SSD</td></tr><tr><td>TCC</td><td>TCC</td></tr></table>			PID Command	PID Actual	SSA	SSA	SSB	SSB	SSC	SSC	SSD	SSD	TCC	TCC
PID Command	PID Actual													
SSA	SSA													
SSB	SSB													
SSC	SSC													
SSD	SSD													
TCC	TCC													
<ul style="list-style-type: none">• Select “ON” to turn suspect solenoid(s) ON.• Press “SEND.”• Wiggle all wiring and connectors to the transmission. Monitor the solenoid state for changes.• Select “OFF” to turn solenoid(s) OFF.• Press “SEND.”• Repeat steps for each solenoid.• Does the suspect solenoid(s) fault state change?														
A3	SOLENOID FUNCTIONAL CHECK	Yes GO to A4 . No GO to A5 .												
<ul style="list-style-type: none">• 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?														
A4	OSC TRANS-DRIVE MODE (GEAR OR TCC)	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 .												
<ul style="list-style-type: none">• Carry out OSC Trans-Drive Mode.• Select GEAR for shift solenoids or follow procedures for GEAR as listed in this section.• Select TCC for torque converter clutch solenoid. Follow procedures of TCC in Drive Mode as listed in this section.• Does the transmission upshift and downshift or torque converter engage/disengage when commanded?														
A5	CHECK FOR BATTERY VOLTAGE	Yes GO to A6 . No REPAIR the circuit. TEST for normal operation.												
<ul style="list-style-type: none">• Disconnect: Transmission Vehicle Harness Connector.• Visually inspect all wires and connectors for damage.• Key in ON position.• Measure the voltage on pin 3 harness side and ground. <div><p>N0052520</p><ul style="list-style-type: none">• Is the voltage greater than 10 volts?</div>														

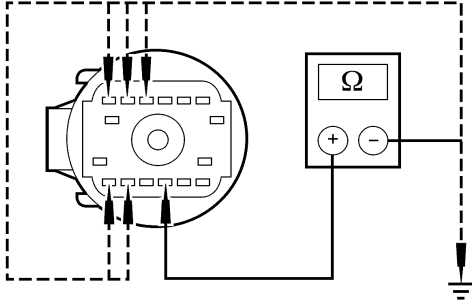
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DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST A: SHIFT AND TORQUE CONVERTER CLUTCH SOLENOIDS (Continued)**

Test Step		Result / Action to Take												
A6	ELECTRICAL SIGNAL CHECK													
<div><ul style="list-style-type: none">Leave positive lead connected to pin 3 and connect negative lead to pin 5, 6, 14, 15 and 16.</div> <div></div> <div>N0052521</div> <div><ul style="list-style-type: none">Enter the following diagnostic mode on the scan tool: Trans-Bench Mode.Select Parameter SSA, SSB, SSC, SSD or TCC.Select "ON."Press "SEND."Measure the voltage while cycling the solenoids ON and OFF.Select "OFF", press "SEND."Does the voltage change?</div>		<div>Yes GO to A7.</div> <div>No REPAIR the circuit. TEST the system for normal operation.</div>												
A7	CHECK SOLENOID RESISTANCE AT SOLENOID													
<div><ul style="list-style-type: none">Measure the resistance between pin 3 and pin 5, 6, 14, 15 and 16 solenoid side.</div> <div><table><tr><th>Solenoid</th><th>Resistance (ohms)</th></tr><tr><td>SSA</td><td>16-45</td></tr><tr><td>SSB</td><td>16-45</td></tr><tr><td>SSC</td><td>16-45</td></tr><tr><td>SSD</td><td>16-45</td></tr><tr><td>TCC</td><td>9-16</td></tr></table></div> <div></div> <div>N0052522</div> <div><ul style="list-style-type: none">Is the resistance within specification?</div>		Solenoid	Resistance (ohms)	SSA	16-45	SSB	16-45	SSC	16-45	SSD	16-45	TCC	9-16	<div>Yes GO to A8.</div> <div>No INSTALL a new solenoid body assembly. TEST the system for normal operation.</div>
Solenoid	Resistance (ohms)													
SSA	16-45													
SSB	16-45													
SSC	16-45													
SSD	16-45													
TCC	9-16													

(Continued)

DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST A: SHIFT AND TORQUE CONVERTER CLUTCH SOLENOIDS (Continued)**

Test Step		Result / Action to Take
A8	CHECK SOLENOID FOR SHORT TO GROUND	
<ul style="list-style-type: none">Measure the resistance between pin 3 and pin 5, 6, 14, 15 and 16 solenoid side and ground. <div><p>N0052523</p></div> <ul style="list-style-type: none">Is the resistance less than 5 ohms?		<p>Yes INSTALL a new solenoid body assembly.</p> <p>No REFER to Diagnosis By Symptom in this section for diagnosis of shift or torque converter concerns.</p>

PINPOINT TEST B: TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR

NOTE: Refer to the Transmission Vehicle Harness Connector illustration preceding these pinpoint tests.

Test Step		Result / Action to Take
B1	ELECTRONIC DIAGNOSTICS	Yes REMAIN in PID/Data Control. GO to B2 . No REPEAT procedure to enter PID. If vehicle did not enter PID, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis of PCM and VCM.
<ul style="list-style-type: none">• Key in OFF position.• Select PARK.• Check to make sure the transmission harness connector is fully seated, terminals are fully engaged in connector and in good condition before proceeding.• Connect the scan tool.• Key in ON position.• Select Diagnostic Data Link.• Select PCM.• Select PID/Data Monitor and Record.• Enter the following diagnostic mode on the scan tool: PIDs; TFT, TFTV.• Does the vehicle enter PID/Data Monitor and Record?		
B2	WARM-UP/COOL-DOWN CYCLE	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 in this section 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 .
<ul style="list-style-type: none">• 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?		
B3	ELECTRICAL SIGNAL CHECK	
<ul style="list-style-type: none">• Disconnect: Transmission Harness Connector.• Visually inspect all wires and connectors for damage.		


(Continued)

DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST B: TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR (Continued)**

Test Step		Result / Action to Take
B3	ELECTRICAL SIGNAL CHECK (Continued)	<div><div>Yes</div><div>GO to B4.</div><div>No</div><div>REPAIR the circuit. TEST the system for normal operation.</div></div>
<div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></d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DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST C: DIGITAL TRANSMISSION RANGE (TR) SENSOR**


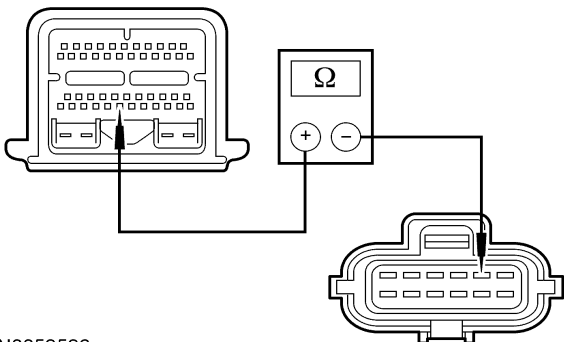
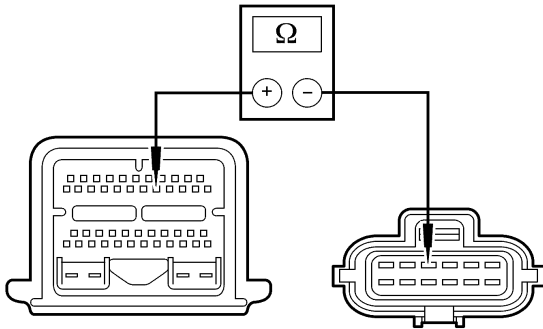
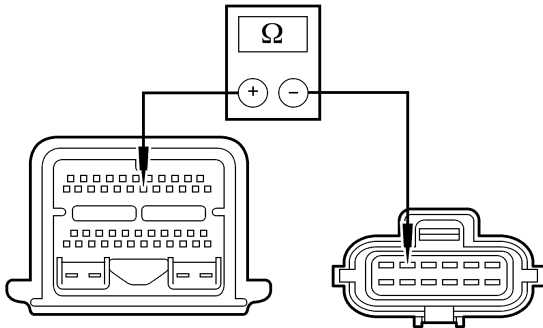
NOTE: Refer to the Digital Transmission Range (TR) Sensor Connector illustration and Digital Transmission Range (TR) Sensor Diagnosis Chart preceding these pinpoint tests.

Test Step		Result / Action to Take
C1	VERIFY DIAGNOSTIC TROUBLE CODES	Yes GO to C4 . No GO to C2 .
	<ul style="list-style-type: none"> Key in OFF position. Select PARK. Carry out On-Board Diagnostic Test. Are only DTC codes P0705, P0708 present? 	
C2	VERIFY DIGITAL TRANSMISSION RANGE SENSOR ALIGNMENT	Yes GO to C3 . No ADJUST the digital TR sensor. REFER to Digital Transmission Range (TR) Sensor in this section. PLACE transmission range selector lever into PARK and CLEAR DTCs. RERUN OBD Tests. GO to C3 .
	<ul style="list-style-type: none"> Key in OFF position. Select PARK. Check to make sure the digital TR sensor harness connector is fully seated, terminals 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 TR Sensor Alignment Gauge fits in the appropriate slots. Is the digital TR sensor correctly adjusted? 	
C3	VERIFY SHIFT CABLE/LINKAGE ADJUSTMENT	Yes GO to C4 . No ADJUST the shift cable/linkage. REFER to Section 307-05. GO to C4 .
	<ul style="list-style-type: none"> Place the range selector in D. Connect the shift cable/linkage. Verify that the shift cable/linkage is correctly adjusted. Refer to Section 307-05. Is the shift cable/linkage correctly adjusted? 	
C4	CHECK ELECTRICAL SIGNAL OPERATION	Yes REPAIR as necessary. CLEAR DTCs and RERUN OBD Tests. No If diagnosing a DTC, GO to C5 . If diagnosing a starting concern or a backup lamp concern, GO to C10 .
	<ul style="list-style-type: none"> Select PARK. Disconnect: Digital TR Sensor. <p> CAUTION: Do not pry on connector. This will damage the connector and result in a transmission concern.</p> <ul style="list-style-type: none"> Inspect both ends of the connector for damage or pushed-out pins, corrosion, loose wires and missing or damaged seals. Is there damage to the connector, pins or harness? 	
C5	CHECK ELECTRICAL SYSTEM OPERATION (DIGITAL TR AND PCM)	Yes The problem is not in the digital TR sensor system. REFER to Diagnosis By Symptom in this section 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 .
	<ul style="list-style-type: none"> Key in OFF position. Connect the scan tool. Connect: Digital TR Sensor. Key in ON position. Enter the following diagnostic mode on the scan tool: TR PIDS TR_D, TR_V. Move transmission range selector lever into each gear and stop. Observe the PIDs, TR_D, and TR_V (vehicle-dependent) while wiggling harness, tapping on sensor or driving the vehicle. Use PIDs TR_D for DTCs P0705, P1704 and P1705. Use PIDs TR_V for DTC P0708. Compare the PIDs to the Digital Transmission Range (TR) Sensor Diagnosis Chart. Do the PIDs 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 on or the vehicle driven? 	
C6	CHECK DIGITAL TRANSMISSION RANGE SENSOR OPERATION	Yes Concern is not in the digital TR sensor. GO to C7 . No INSTALL a new digital TR sensor and ADJUST. REFER to Digital Transmission Range (TR) Sensor in this section. CLEAR DTCs and RERUN OBD Tests.
	<ul style="list-style-type: none"> Disconnect: Digital TR Sensor. Connect: TR-E Cable to Transmission Tester. Connect: TR-E Cable to Digital TR Sensor. Place the Digital TR Overlay onto the 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? 	

(Continued)

DIAGNOSIS AND TESTING (Continued)

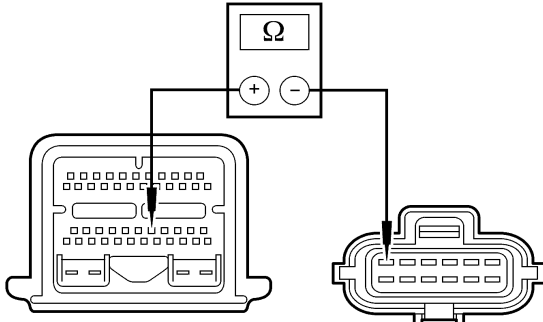
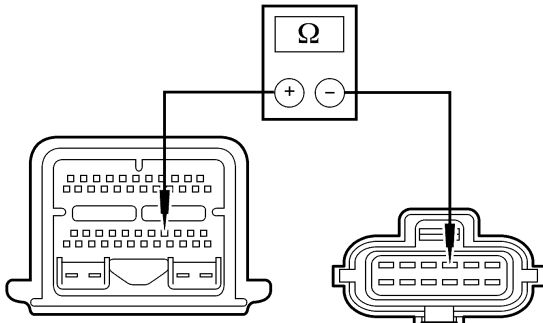
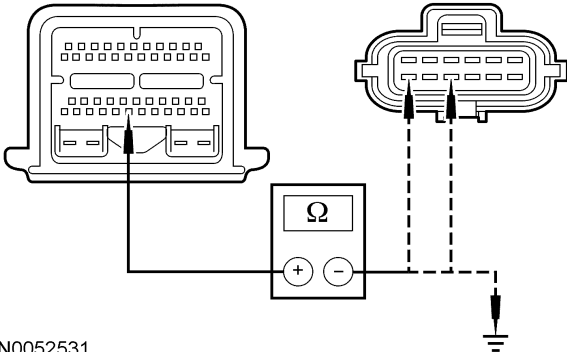
PINPOINT TEST C: DIGITAL TRANSMISSION RANGE (TR) SENSOR (Continued)

Test Step		Result / Action to Take
C7	CHECK PCM HARNESS CIRCUITS FOR OPENS	
<ul style="list-style-type: none">• Key in OFF position.• Disconnect: 150-Pin PTEC Module Connector B.• Inspect for damaged or pushed-out pins, corrosion or loose wires.• Disconnect: Digital TR Sensor. <p> CAUTION: Do not pry the connector. This will damage the connector and result in a transmission concern.</p> <ul style="list-style-type: none">• Measure the resistance between TR pin 2 harness side and signal return PCM pin 41 harness side.  <p>N005256</p> <ul style="list-style-type: none">• Measure the resistance between PCM pin 16 and TR pin 4 harness side.  <p>N005257</p> <ul style="list-style-type: none">• Measure the resistance between PCM pin 17 and TR pin 5 harness side.  <p>N005258</p>		

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DIAGNOSIS AND TESTING (Continued)

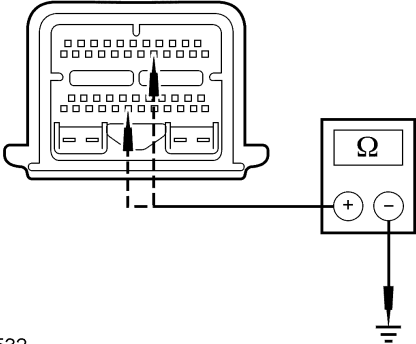
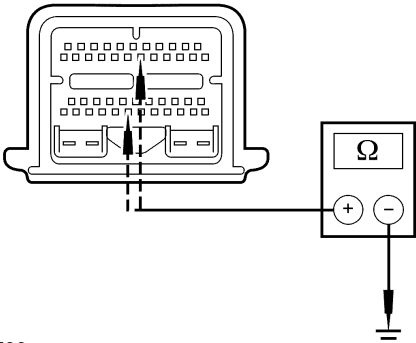
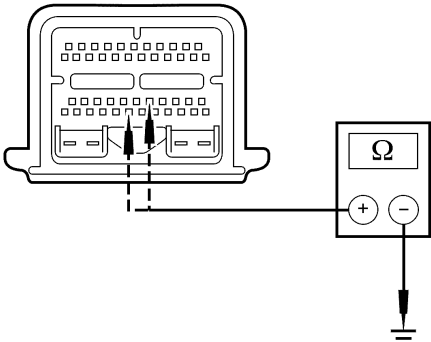
PINPOINT TEST C: DIGITAL TRANSMISSION RANGE (TR) SENSOR (Continued)

Test Step		Result / Action to Take
C7	CHECK PCM HARNESS CIRCUITS FOR OPENS (Continued)	
<ul style="list-style-type: none">Measure the resistance between PCM pin 28 and TR pin 6 harness side.  <p>N0052529</p> <ul style="list-style-type: none">Measure the resistance between PCM pin 27 and TR pin 3 harness side.  <p>N0052530</p> <ul style="list-style-type: none">Are the resistances less than 5 ohms?		<p>Yes GO to C8.</p> <p>No REPAIR the circuits. TEST the system for normal operation.</p>
C8	CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER	
<ul style="list-style-type: none">Measure the resistance between PCM pin 41 and TR pins 10 and 12 harness side and ground.  <p>N0052531</p>		

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DIAGNOSIS AND TESTING (Continued)

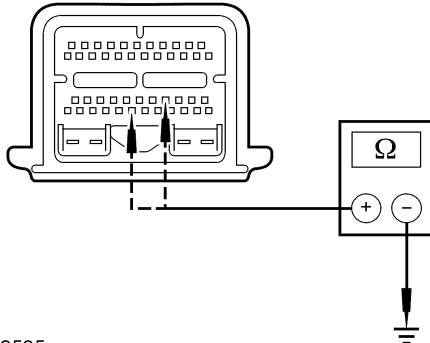
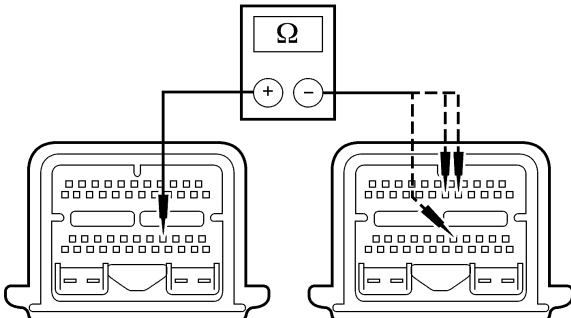
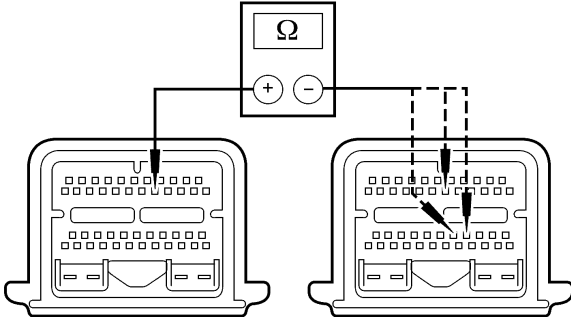
PINPOINT TEST C: DIGITAL TRANSMISSION RANGE (TR) SENSOR (Continued)

Test Step		Result / Action to Take
C8	CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER (Continued)	
<ul style="list-style-type: none">Measure the resistance between pin 16 harness side and ground; and pin 41 harness side and ground.  <p>N0052532</p> <ul style="list-style-type: none">Measure the resistance between pin 17 harness side and ground; and pin 41 harness side and ground.  <p>N0052533</p> <ul style="list-style-type: none">Measure the resistance between pin 28 harness side and ground; and pin 41 harness side and ground.  <p>N0052534</p>		

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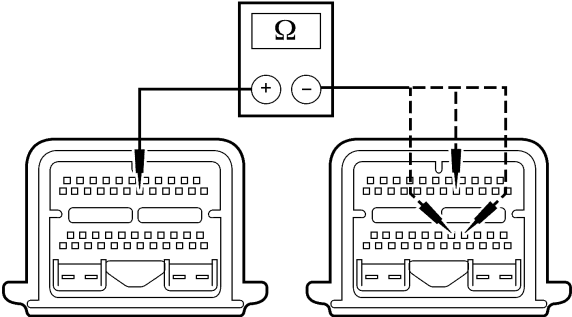
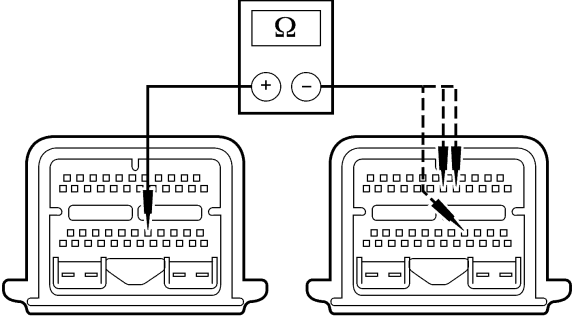
DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST C: DIGITAL TRANSMISSION RANGE (TR) SENSOR (Continued)

Test Step		Result / Action to Take
C8	CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER (Continued)	
<ul style="list-style-type: none">Measure the resistance between pin 27 harness side and ground; and pin 41 harness side and ground.  <p>N0052535</p> <ul style="list-style-type: none">Are the resistances greater than 10,000 ohms?		<p>Yes GO to C9.</p> <p>No REPAIR the circuits. TEST the system for normal operation. CLEAR DTCs. RERUN OBD Tests.</p>
C9	CHECK FOR SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS	
<ul style="list-style-type: none">Measure the resistance between pin 27 harness side; and between pin 16, pin 17 and pin 28 harness side.  <p>N0052536</p> <ul style="list-style-type: none">Measure the resistance between pin 16 harness side; and between pin 27, pin 17 and pin 28 harness side.  <p>N0052537</p>		

(Continued)

DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST C: DIGITAL TRANSMISSION RANGE (TR) SENSOR (Continued)**

	Test Step	Result / Action to Take
C9	CHECK FOR SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS (Continued)	
	<ul style="list-style-type: none"> Measure the resistance between pin 17 harness side; and between pin 16, pin 27; pin 28 harness side.  <p>N0052538</p> <ul style="list-style-type: none"> Measure the resistance between pin 28 harness side; and between pin 16, pin 17; pin 27 harness side.  <p>N0052539</p> <ul style="list-style-type: none"> Are the resistances greater than 10,000 ohms? 	<p>Yes INSTALL a new PCM. TEST the system for normal operation.</p> <p>No REPAIR the circuit. TEST the system for normal operation.</p>
C10	CHECK THE NON-PCM INTERNAL CIRCUITS OR SENSOR	<p>Yes Concern is not in the digital TR sensor. For backup lamp concerns, REFER to Section 417-01.</p> <p>No INSTALL a new digital TR sensor and ADJUST. REFER to Digital Transmission Range (TR) Sensor in this section. CLEAR DTCs and RERUN OBD Tests.</p>

PINPOINT TEST D: PRESSURE CONTROL (PC) SOLENOIDS (PCA, PCB, PCC)

NOTE: Refer to the Transmission Vehicle Harness Connector illustration preceding these pinpoint tests.

NOTE: Read and record all DTCs. All digital TR Sensor and VSS DTCs must be repaired before entering output state control (OSC).

	Test Step	Result / Action to Take
D1	ELECTRONIC DIAGNOSTICS	
	<ul style="list-style-type: none"> Key in OFF position. Select PARK. Check to make sure the transmission harness connector is fully seated, terminals are fully engaged in the connector and in good condition before proceeding. 	

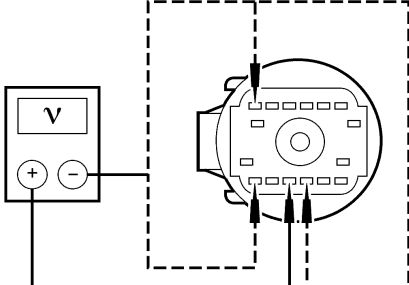
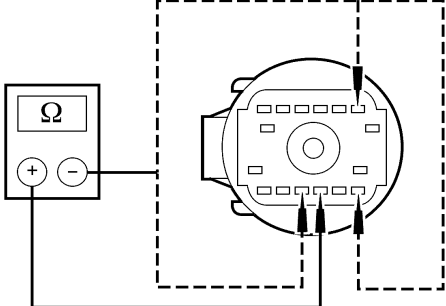
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DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST D: PRESSURE CONTROL (PC) SOLENOIDS (PCA, PCB, PCC) (Continued)**

Test Step		Result / Action to Take
D1	ELECTRONIC DIAGNOSTICS (Continued)	<p>Yes REMAIN in Trans-Bench Mode. GO to D2.</p> <p>No REPEAT procedure to enter Trans-Bench Mode. If vehicle did not enter OSC, REFER to Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis of PCM or VCM.</p>
	<ul style="list-style-type: none"> Install 300 psi pressure gauges into Line and PC C tap. Connect the scan tool. Key in ON position. Enter the following diagnostic mode on the scan tool: Diagnostic Data Link. Enter the following diagnostic mode on the scan tool: PCM. Enter the following diagnostic mode on the scan tool: Active Command Modes. Enter the following diagnostic mode on the scan tool: Output State Control (OSC). Enter the following diagnostic mode on the scan tool: Trans-Bench Mode. Does the vehicle enter the Trans-Bench Mode? 	
D2	SOLENOID FUNCTIONAL TEST	<p>Yes CLEAR DTCs.</p> <p>No GO to D3.</p>
	<ul style="list-style-type: none"> Monitor pressure gauges. Enter the following diagnostic mode on the scan tool: Parameter; PCx. NOTE: Make sure that the solenoids not being tested are off or at zero. Select PC A, PC B or PC C. 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 scan tool: XXX. Press "SEND." For PC A and PC B: Does the pressure reading for A or B follow the commanded pressure (actual A and B pressures will be higher than the commanded pressure)? For PC C: Does the pressure reading match the commanded pressure? 	
D3	CHECK FOR BATTERY VOLTAGE	<p>Yes GO to D4.</p> <p>No REPAIR the circuit. TEST the system for normal operation.</p>
	<ul style="list-style-type: none"> Disconnect: Transmission Harness Connector. Visually inspect all wires and connectors for damage. Key in ON position. Measure the voltage between pin 3 harness side and ground. <div data-bbox="332 1255 722 1600"> <p>N0052520</p> </div> <ul style="list-style-type: none"> Is the voltage greater than 10 volts? 	

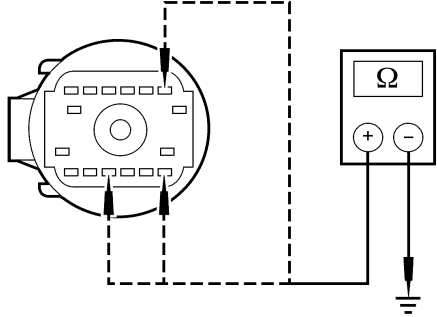
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DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST D: PRESSURE CONTROL (PC) SOLENOIDS (PCA, PCB, PCC) (Continued)**

	Test Step	Result / Action to Take
D4	ELECTRICAL SIGNAL CHECK	
	<ul style="list-style-type: none"> Leave positive lead connected to pin 3 and connect negative lead to pin 1, 4 and 11 harness side.  <p>N0052540</p> <ul style="list-style-type: none"> Activate solenoids (ON and OFF) while monitoring the voltage reading. Enter the following diagnostic mode on the scan tool: Trans-Bench Mode. Enter the following diagnostic mode on the scan tool: Parameter; PCx. Select a value "0-90 psi." Press "SEND." Select another value "0-90 psi." Press "SEND." Enter the following diagnostic mode on the scan tool: XXX. Press "SEND". Does the voltage and solenoid state change? 	<p>Yes GO to D5.</p> <p>No CHECK for open or short circuit in harness or PCM.</p>
D5	CHECK SOLENOID RESISTANCE AT SOLENOID	
	<ul style="list-style-type: none"> Measure and record the resistance between PC solenoid pin 3 and pins 1, 4 and 11. Resistance should be between 3.3 and 7.5 ohms.  <p>N0052541</p> <ul style="list-style-type: none"> Is the resistance within specifications? 	<p>Yes GO to D6.</p> <p>No INSTALL a new solenoid body assembly.</p>

(Continued)

DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST D: PRESSURE CONTROL (PC) SOLENOIDS (PCA, PCB, PCC) (Continued)**

Test Step	Result / Action to Take
<p>D6 CHECK SOLENOID FOR SHORT TO GROUND</p> <ul style="list-style-type: none"> Measure and record the resistance between the PC solenoid pins 1, 4, 11 and ground solenoid side.  <p>N0052542</p> <ul style="list-style-type: none"> Is the resistance less than 10,000 ohms? 	<p>Yes INSTALL a new solenoid body assembly. TEST the system for normal operation.</p> <p>No REFER to Diagnosis By Symptom in this section for diagnosis of pressure concerns. TEST the system for normal operation.</p>

PINPOINT TEST E: TURBINE SHAFT SPEED (TSS), INTERMEDIATE SHAFT SPEED AND OUTPUT SHAFT SPEED (OSS) SENSORS

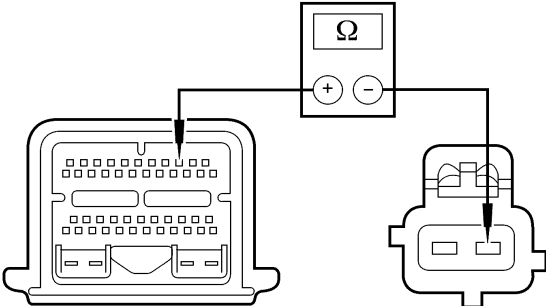
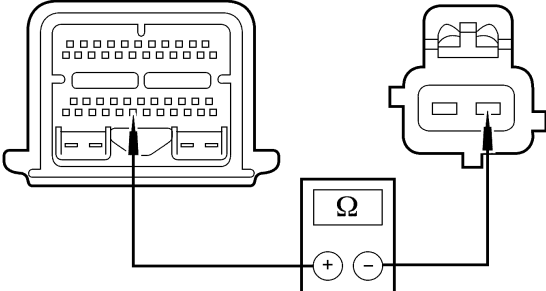
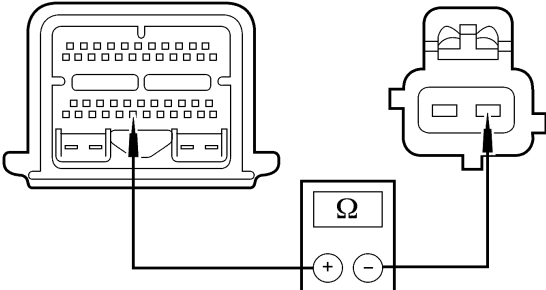
NOTE: Refer to the Turbine Shaft Speed (TSS), Intermediate Shaft Speed and Output Shaft Speed (OSS) Sensor Connector illustrations preceding these pinpoint tests.

Test Step	Result / Action to Take
<p>E1 ELECTRONIC DIAGNOSTICS</p> <ul style="list-style-type: none"> Check to make sure the transmission harness connectors are fully seated, terminals are fully engaged in connector and in good condition before proceeding. Connect the scan tool. Key in ON position. Enter the following diagnostic mode on the scan tool: Diagnostic Data Link. Enter the following diagnostic mode on the scan tool: PCM. Select PID/Data Monitor and Record. Select the following PIDs: TSS, intermediate shaft speed or OSS. Does vehicle enter PID/Data Monitor and Record? 	<p>Yes REMAIN in PID/Data. GO to E2.</p> <p>No REPEAT procedure to ENTER PID. If vehicle did not enter PID, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual for diagnosis of PCM or VCM.</p>
<p>E2 DRIVE CYCLE TEST</p> <ul style="list-style-type: none"> While monitoring the appropriate sensor PID, drive the vehicle so that the transmission upshifts and downshifts through all gears. Does the TSS, intermediate shaft speed or OSS PID increase and decrease with engine and vehicle speed? 	<p>Yes GO to E3.</p> <p>No If the TSS, intermediate shaft speed or OSS 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. GO to E4.</p>
<p>E3 DRIVE CYCLE TEST ERRATIC</p> <ul style="list-style-type: none"> While monitoring the appropriate sensor PID, drive the vehicle so that the transmission upshifts and downshifts through all gears. Is the TSS, intermediate shaft speed or OSS PID signal erratic (drop to zero or near zero and return to normal operation)? 	<p>Yes If the sensor signal is erratic, INSPECT for intermittent concern in the harness, sensor or connector. GO to E4.</p> <p>No CLEAR all DTCs. RERUN OBD.</p>
<p>E4 CHECK PCM HARNESS CIRCUITS FOR OPENS</p> <ul style="list-style-type: none"> Key in OFF position. Disconnect: 150-Pin PTEC Module Connector B. Inspect for damaged or pushed-out pins, corrosion or loose wires. 	

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DIAGNOSIS AND TESTING (Continued)

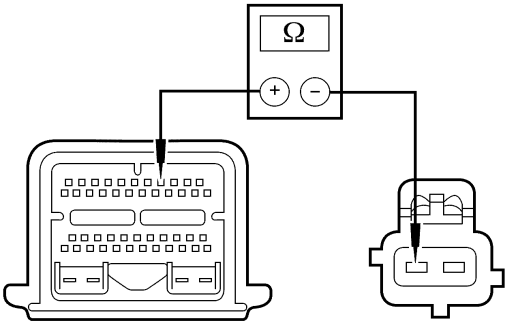
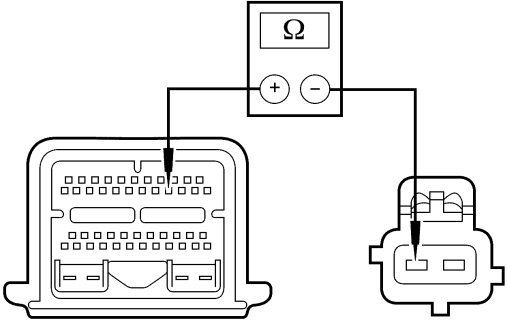
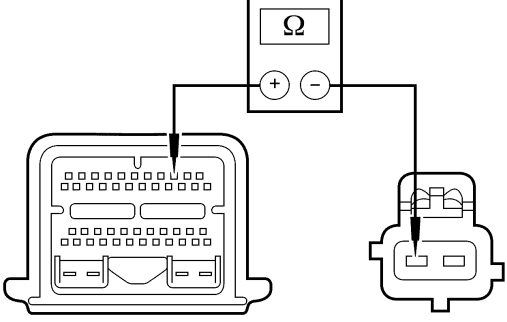
PINPOINT TEST E: TURBINE SHAFT SPEED (TSS), INTERMEDIATE SHAFT SPEED AND OUTPUT SHAFT SPEED (OSS) SENSORS (Continued)

Test Step		Result / Action to Take
E4	CHECK PCM HARNESS CIRCUITS FOR OPENS (Continued)	
<ul style="list-style-type: none">For OSS, measure the resistance between pin 3 and the appropriate sensor connector pin 2 harness side.  <p>N0052543</p> <ul style="list-style-type: none">For intermediate shaft speed, measure the resistance between pin 41 and the appropriate sensor connector pin 2 harness side.  <p>N0052544</p> <ul style="list-style-type: none">For TSS, measure the resistance between pin 41 and the appropriate sensor connector pin 2 harness side.  <p>N0052544</p>		

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DIAGNOSIS AND TESTING (Continued)

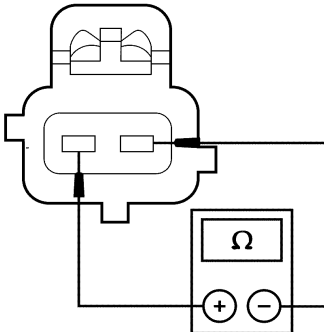
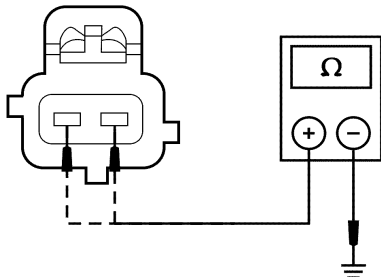
PINPOINT TEST E: TURBINE SHAFT SPEED (TSS), INTERMEDIATE SHAFT SPEED AND OUTPUT SHAFT SPEED (OSS) SENSORS (Continued)

Test Step		Result / Action to Take
E4	CHECK PCM HARNESS CIRCUITS FOR OPENS (Continued)	
<ul style="list-style-type: none">For intermediate shaft speed, measure the resistance between pin 4 and the appropriate sensor connector pin 1 harness side. <div></div> <p>N0052545</p> <ul style="list-style-type: none">For TSS, measure the resistance between pin 15 and the appropriate sensor connector pin 1 harness side. <div></div> <p>N0052546</p> <ul style="list-style-type: none">For OSS, measure the resistance between pin 3 and the appropriate sensor connector pin 1 harness side. <div></div> <p>N0052547</p> <ul style="list-style-type: none">Are all resistances less than 5 ohms?		<p>Yes GO to E5.</p> <p>No REPAIR the circuit. TEST the system for normal operation.</p>

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST E: TURBINE SHAFT SPEED (TSS), INTERMEDIATE SHAFT SPEED AND OUTPUT SHAFT SPEED (OSS) SENSORS (Continued)

Test Step		Result / Action to Take								
E6	CHECK RESISTANCE OF TSS, INTERMEDIATE SHAFT SPEED OR OSS SENSOR (Continued) <ul style="list-style-type: none">Connect ohmmeter negative lead to one pin of the sensor and the positive lead to the other pin on the sensor. <div></div> <p>A0005211</p> <ul style="list-style-type: none">Record the resistance. Resistance should be as follows: <table><tr><th>Resistance (ohms)</th><th>Temperature</th></tr><tr><td>266-390</td><td>-20°C (4°F)</td></tr><tr><td>325-485</td><td>21°C (70°F)</td></tr><tr><td>492-738</td><td>150°C (302°F)</td></tr></table> <ul style="list-style-type: none">Is the resistance within specification for the appropriate sensor?	Resistance (ohms)	Temperature	266-390	-20°C (4°F)	325-485	21°C (70°F)	492-738	150°C (302°F)	<p>Yes GO to E7.</p> <p>No INSTALL a new sensor.</p>
Resistance (ohms)	Temperature									
266-390	-20°C (4°F)									
325-485	21°C (70°F)									
492-738	150°C (302°F)									
E7	CHECK SENSORS FOR SHORT TO GROUND <ul style="list-style-type: none">Measure the resistance between pin 1 and 2 of each sensor and ground. <div></div> <p>A0005501</p> <ul style="list-style-type: none">Is the resistance less than 10,000 ohms?	<p>Yes INSTALL a new sensor.</p> <p>No REFER to Diagnosis By Symptom for diagnosis of shift or torque converter concerns in this section.</p>								

DIAGNOSIS AND TESTING (Continued)**PINPOINT TEST F: SOLENOID MECHANICAL FAILURE**

NOTE: Repair all other DTCs before repairing the following DTCs: P1714, P1715, P1716, P1717 and P1740.

Test Step		Result / Action to Take
F1	ELECTRONIC DIAGNOSIS	
	<ul style="list-style-type: none"> Connect the scan tool. Select PARK. Key in ON position. Carry out Key ON Engine OFF (KOEO) Test until continuous DTCs have been displayed. If any of the following DTCs are present, continue with this test: P1714, P1715, P1716, P1717 and P1740. Are other DTCs present for TFT or shift solenoids? 	<p>Yes REPAIR the DTCs for TFT or shift solenoids first. CLEAR DTCs and CARRY OUT transmission Drive Cycle test. RERUN Quick Test.</p> <p>No INSTALL a new solenoid and/or body. REFER to the Diagnostic Trouble Code (DTC) Charts for code description. GO to F2.</p>
F2	TRANSMISSION DRIVE CYCLE TEST	
	<ul style="list-style-type: none"> Carry out Transmission Drive Cycle Test. Refer to Transmission Drive Cycle Test in this section. Does the vehicle upshift and downshift OK? 	<p>Yes GO to F3.</p> <p>No REFER to Diagnosis By Symptom in this section to diagnose shift concerns.</p>
F3	RETRIEVE DTCs	
	<ul style="list-style-type: none"> Connect the scan tool. Select PARK. Key in ON position. Carry out KOEO Test until continuous DTCs have been displayed. Are DTCs P1714, P1715, P1716, P1717 and P1740 still present? 	<p>Yes INSTALL a new PCM. ROAD TEST and RERUN Quick Test.</p> <p>No Testing completed. If a concern still exists, REFER to Diagnosis By Symptom in this section for concern diagnosis.</p>