Transmission Control Systems: Testing and Inspection
6 Speed Automatic Transaxle

Diagnostic Strategy
Diagnostic Strategy

Troubleshooting an electronically-controlled automatic transaxle is simplified by using the proven method of diagnosis. One of the most important things to remember is that there is a definite procedure to follow.

NOTE: Do not take short cuts or assume that critical checks or adjustments have already been made.

Follow the procedures as written to avoid missing critical components or steps.

To correctly diagnose a concern, have these publications available:
^ Computers and Control Systems
^ Technical Service Bulletins (TSBs)
^ Wiring Diagrams

These publications provide the information required when diagnosing transaxle concerns.

Use the Diagnostic Flow Chart as a guide and follow the steps as indicated.

Preliminary Inspection
^ Know and understand the customer's concern.
^ Verify the concern by operating the vehicle.
^ Check the fluid levels and condition.
^ Check for non-factory-installed items and verify correct installation.
^ Check shift linkages for correct adjustment.
^ Check TSBs regarding the concern.
^ Carry out quick tests, both KOER and KOEO.
^ Record all codes.

Diagnostics
^ Carry out on-board diagnostic procedures key on/engine off (KOEO) and key on/engine running (KOER).
^ Record all diagnostic trouble codes (DTCs).
^ Repair all non-transaxle codes first.
^ Repair all transaxle codes second.
^ Erase all continuous codes and attempt to repeat them.
^ Repair all continuous codes.
^ If only pass codes are obtained, proceed to Diagnosis By Symptom for further information and diagnosis.

Follow the diagnostic sequence to diagnose and repair the concern the first time.

Diagnostic Flow Chart
Diagnostic Flow Chart

Diagnostic Flow Chart

Diagnostic Flow Chart		
1) Were any Diagnostic Trouble Codes recorded?	Yes	• Repair all hard Diagnostic Trouble Codes. Follow the pinpoint tests. Refer to Computers and Control Systems then GO to Step 2.
	No	• Refer to Diagnosis By Symptom then GO to Step 5.
2) Are any continuous test memory codes present?	Yes	• Clear codes and carry out the Drive Cycle Test, then GO to Step 3.
	No	• GO to Step 4.
3) Did the continuous test memory codes reappear?	Yes	• Repair all continuous test memory codes. Follow the pinpoint tests. Refer to Computers and Control Systems then GO to Step 4.
	No	• GO to Step 4.
4) Is the concern repaired?	Yes	• Carry out the final quick test to verify that no DTCs are present. Clear memory codes.
	No	• Refer to Diagnosis By Symptom then GO to Step 5.
5) Are there any electrical concerns?	Yes	• Carry out the final quick test to verify that no diagnostic trouble codes are present. Clear memory codes.
	No	• Further Diagnosis required.

Diagnostic Flow Chart

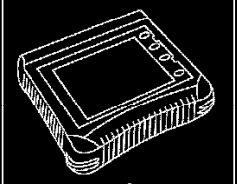
Road Testing Vehicle

Road Testing Vehicle

NOTE: Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

The Shift Point Road Test and Torque Converter Operation Tests provide diagnostic information on shift controls and torque converter operation.

Shift Point Road Test

Special Tool(s)	
 ST2332-A	Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool

Special Tool(s)

NOTE: Shift speed ranges are approximate for all applications.

This test verifies that the shift control system is operating correctly.

1. Bring engine and transaxle up to normal operating temperature.
2. Operate vehicle with selector lever in D range.
3. Using the shift speeds chart, apply minimum throttle and observe the speeds at which the transaxle upshifts. The transaxle will upshift 1st through 6th gears.
4. Press accelerator pedal to the floor, wide-open throttle (WOT). The transaxle should downshift to the next lower gear depending on the vehicle speed. The torque converter clutch should release.

Shift Speed Manual D Position (minimum throttle)

Manual D	km/h	mph
1-2 upshift	11-16	7-10
2-3 upshift	18-24	11-15
3-4 upshift	26-34	16-21

Shift Speed Manual D Position, minimum throttle (Part 1)

Shift Speed Manual D Position (minimum throttle) (Continued)

Manual D	km/h	mph
4-5 upshift	35-43	22-27
5-6 upshift	48-61	30-38
2-1 downshift	14-22	9-14
3-2 downshift	24-37	15-23
4-3 downshift	39-48	24-30
5-4 downshift	50-56	31-35
6-5 downshift	58-80	36-50

Shift Speed Manual D Position, minimum throttle (Part 2)

Shift Speed Manual L Position

Manual L	km/h	mph
1-2 upshift	29-39	18-24
2-3 upshift	74-89	46-55
3-4 upshift	113-130	70-81
4-5 upshift	N/A	N/A
5-6 upshift	N/A	N/A
2-1 downshift	21-27	13-17
3-2 downshift	61-69	38-43
4-3 downshift	100-114	62-71
5-4 downshift	N/A	N/A
6-5 downshift	N/A	N/A

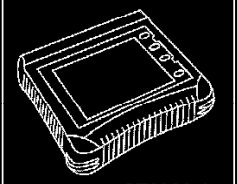
Shift Speed Manual L Position

5. If transaxle fails to upshift/downshift or TCC does not apply and release, refer to Diagnosis By Symptom for possible causes. See: Diagnosis By Symptom

Preliminary Inspection

Preliminary Inspection

Special Tool(s)

 ST2332-A	Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool

Special Tool(s)

These items must be checked prior to beginning the diagnostic procedures.

Know and Understand the Concern

In order to correctly diagnose a concern, first understand the customer complaint or condition. Customer contact may be required in order to begin to verify the concern. Understand the conditions as to when the concern occurs. For example:

^ Hot or cold vehicle temperature
^ Hot or cold ambient temperatures
^ Vehicle driving conditions
^ Vehicle loaded/unloaded

After understanding when and how the concern occurs, proceed to verifying the concern.

Verification of Condition

This provides information which must be used in both determining the actual cause of customer concerns and carrying out the appropriate procedures.

These procedures must be used when verifying customer concerns for the transmission.

Determine Customer Concern

NOTE: Some transaxle conditions may cause engine concerns. An electronic pressure control short circuit can cause engine misfiring. The torque converter clutch not disengaging will stall the engine.

Determine customer concerns relative to vehicle use and dependent driving conditions, paying attention to these items:

^ Hot or cold vehicle operating temperature
^ Hot or cold ambient temperatures
^ Type of terrain
^ Vehicle loaded/unloaded
^ City/highway driving
^ Upshift
^ Downshift
^ Coasting
^ Engagement (harsh or soft)
^ Noise/vibration - check for dependencies, either RPM dependent, vehicle speed dependent, shift dependent, gear dependent, range dependent or temperature dependent

Check Fluid Level and Condition

CAUTION: The vehicle should not be driven if the fluid level indicator shows the fluid below the DO NOT DRIVE mark or internal failure could result.

If the vehicle has been operated for an extended period of time at highway speeds, in city traffic, in hot weather or while pulling a trailer, the fluid needs to cool down to obtain an accurate reading.

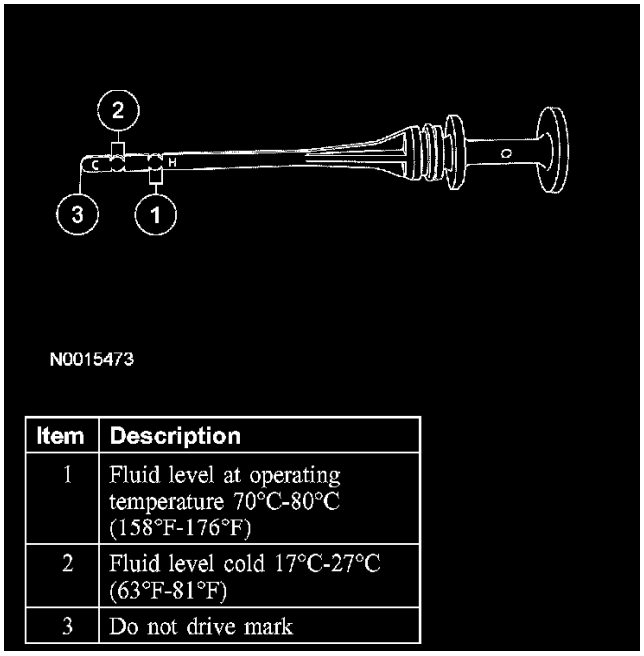
The fluid level reading on the fluid level indicator will differ depending on operating and ambient temperatures. The correct reading should be within the normal operating temperature range.

Fluid Level Check

NOTE: The transaxle fluid should be checked at normal operating temperature **70°C-80°C (158°F-176°F)** on a level surface. Normal operating temperature can be reached after **approximately 32 km (20 miles)** of driving.

Under normal circumstances the fluid level should be checked during normal maintenance. If the transaxle starts to slip, shifts slowly or shows signs of fluid leaking, the fluid level should be checked.

1. With the transaxle in (P) PARK, the engine at idle, foot pressed on the brake, move the selector lever through each gear and allow engagement of each gear. Place the selector lever in the PARK position.
2. Wipe the fluid level indicator cap and remove the fluid level indicator.
3. Wipe the fluid level indicator with a clean cloth.



Item	Description
1	Fluid level at operating temperature 70°C-80°C (158°F-176°F)
2	Fluid level cold 17°C-27°C (63°F-81°F)
3	Do not drive mark

4. Install the fluid level indicator back in the fluid filler tube until it is fully seated, then remove the indicator. The fluid level should be within the normal operating range.

High Fluid Level

A fluid level that is too high may cause the fluid to become aerated due to the churning action of the rotating internal parts. This will cause erratic control pressure, foaming, loss of fluid from the vent tube and possible transaxle malfunction and/or damage.

Low Fluid Level

A low fluid level could result in poor transaxle engagement, slipping, malfunction and/or damage. This could also indicate a leak in one of the transaxle seals or gaskets.

Adding Fluid

CAUTION: The use of any other type of transmission fluid than specified could result in transaxle malfunction and/or damage.

If fluid needs to be added, add fluid in **0.25L (1/2 pint) increments** through the filler tube. Do not overfill the fluid.

Fluid Condition Check

1. Check the fluid level.
2. Observe the color and the odor. The color under normal circumstances should be a dark red color, not brown or black or have a burnt odor.
3. Hold the fluid level indicator over a white facial tissue and allow the fluid to drip onto the facial tissue and examine the stain.
4. If evidence of solid material is found, the transmission fluid pan should be removed for further inspection.
5. If the stain is a foamy pink color this may indicate coolant in the transaxle. The engine cooling system should also be inspected at this time.
6. If fluid contamination or transaxle failure is confirmed by the sediment in the bottom of the fluid pan, install a new transaxle. If installing a new transaxle the cooler bypass valve, coolers and cooler lines should be cleaned.
7. Carry out diagnostic checks and adjustments. Refer to Diagnosis By Symptom. See: Diagnosis By Symptom

Visual Inspection

Visual Inspection

This inspection will identify modifications or additions to the vehicle operating system that may affect diagnosis. Inspect the vehicle for non-Ford factory add-on devices such as:

^ Electronic add-on items:
- Air conditioning
- Generator (alternator)
- Engine turbo
- Cellular telephone
- Cruise control
- CB radio
- Linear amplifiers
- Backup alarm signal
- Computer

^ Vehicle modification:
- These items, if not installed correctly, will affect the powertrain control module (PCM) or transmission function. Pay particular attention to add-on wiring splices in the PCM harness or transmission wiring harness, abnormal tire size or axle ratio changes.

- Leaks.
- Correct linkage adjustments.

Shift Linkage Check

Hydraulic leakage at the manual control valve can cause delay in engagements and/or slipping while operating if the linkage is not correctly adjusted.

Check TSBs

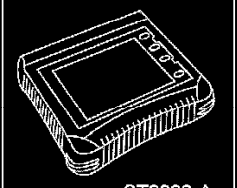
Refer to all technical service bulletins which pertain to the concern and follow the procedure.

Carry Out On-Board Diagnostics (KOEO, KOER)

After a road test, with the vehicle warm and before disconnecting any connectors, carry out the Quick Test using the diagnostic tool. Refer to Computers and Control Systems for diagnosis and testing of the powertrain control system.

Displaying & Reading Trouble Codes

Diagnostics

Special Tool(s)	
 ST2332-A	Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool
 ST1137-A	73 III Automotive Meter 105-R0057 or equivalent

Special Tool(s)

Self Diagnosis Function

The transmission control module (TCM) monitors the communication status of each sensor, electronic component and the powertrain control module (PCM). If any malfunction should occur, the TCM function warns the driver and stores the malfunction as a diagnosis code.

Fail-Safe

Range Selector Lever Position	Gear Position
R	Reverse

Range Selector Lever Position	Gear Position
D	3rd or 5th gear

With the fail-safe function, if any malfunction should occur in the automatic transmission system, the TCM will output a control signal, and control will be carried out to make traveling a minimum distance possible. If all shift solenoids malfunction, the TCM will cancel the output of control signals to the solenoids. If this happens, the automatic transmission gear shifting will be controlled by fluid pressure circuits only and the gears will shift as shown in the position table.

On-Board Diagnostic With Diagnostic Tool

NOTE: For detailed instruction and other diagnostic methods using the diagnostic tool or equivalent, refer to the diagnostic tool tester manual and Computers and Control Systems.

These Quick Tests should be used to diagnose the powertrain control module (PCM) and should be carried out in order.

^ Quick Test 1.0 - Visual Inspection
^ Quick Test 2.0 - Set Up

^ Quick Test 3.0 - Key On, Engine Off (KOEO)
^ Quick Test 4.0 - Continuous Memory Codes
^ Quick Test 5.0 - Key On, Engine Running (KOER)
^ Special Test Modes
- Wiggle Test Mode
- Output Test Mode

^ PCM Reset Mode
^ Clearing DTCs P1000
^ OBD II Drive Cycle
^ Other diagnostic tool features

Diagnostic Trouble Code Chart

Five Digit DTC	Component	Description	Condition	Symptom	Action
P0562	Battery	System voltage low	PCM detected a voltage level below 9 volts	No engagements, no adaptive or self-learning strategy.	REFER to Computers and Control Systems.
P0563	Battery	System voltage high	PCM detected a voltage level above 18 volts	No adaptive or self-learning strategy.	REFER to Computers and Control Systems.
P0601	PCM	PCM ROM error	PCM detected an internal software concern with ROM	No engagements, no adaptive or self-learning strategy.	REFER to Computers and Control Systems.
P0603	PCM	PCM KAM error	PCM detected an internal software concern with KAM	No engagements, no adaptive or self-learning strategy.	REFER to Computers and Control Systems.
P0604	PCM	PCM RAM error	PCM detected an internal software concern with RAM	No engagements, no adaptive or self-learning strategy.	REFER to Computers and Control Systems.
P0706	TR sensor	TR sensor range or performance error	TR sensor signal is out of normal range	TR sensor indicates a stuck position (D-3rd gear), no adaptive or self learning strategy.	Install a new TCM.
P0707	TR sensor	TR sensor circuit low input	TR sensor signal is below threshold of 0.127 volts, sensor/circuit electrical malfunction	TR sensor indicates a stuck position (D-3rd gear), no adaptive or self learning strategy.	Install a new TCM.
P0708	TR sensor	TR sensor circuit high input	TR sensor signal is above threshold of 4.87 volts, sensor/circuit electrical malfunction	TR sensor indicates a stuck position (D-3rd gear), no adaptive or self learning strategy.	Install a new TCM.
P0711	TFT sensor	No change in TFT during operation	PCM has detected no TFT change during operation. TFT value stuck at some normal reading	TFT indicates 80°C (176°F) at all times, no self learning strategy, no TCC engagement.	GO to Pinpoint Test B.

Diagnostic Trouble Code Chart (Continued)

Five Digit DTC	Component	Description	Condition	Symptom	Action
P0712	TFT sensor	200°C (329°F) indicated, TFT sensor circuit grounded	Voltage drop across TFT sensor exceeds scale set for temperature -43°C (-45°F)	TFT indicates 80°C (176°F) at all times, no self learning strategy, no TCC engagement.	GO to Pinpoint Test B.
P0713	TFT sensor	-43°C (-45°F) indicated, TFT sensor circuit grounded	Voltage drop across TFT sensor exceeds scale set for temperature -43°C (-45°F)	TFT indicates 80°C (176°F) at all times, no self learning strategy, no TCC engagement.	GO to Pinpoint Test B.
P0716	TSS sensor	TSS range out of performance, insufficient input from TSS	PCM has detected a loss or noisy TSS signal during operation	No TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test D.
P0717	TSS sensor	No TSS signal	PCM has not detected a TSS signal. No TSS signal when OSS signal present	No TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test D.
P0721	OSS sensor	OSS range out of performance, insufficient input from OSS	PCM has detected a loss or noisy OSS signal during operation	No adaptive or self learning strategy.	GO to Pinpoint Test C.
P0722	OSS sensor	No OSS signal	PCM has detected no TSS signal	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test C.
P0729	Transaxle	6th gear ratio	No 6th gear ratio detected by TCM	No 6th gear, no TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0730	Clutch control solenoids or internal parts	Gear ratio error	PCM has detected a gear ratio error	No self learning strategy.	GO to Pinpoint Test A.
P0731	Solenoid or internal parts	1st gear ratio	No 1st gear ratio detected by TCM	No 1st gear, no TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0732	Solenoid or internal parts	2nd gear ratio	No 2nd gear ratio detected by TCM	No 2nd gear, no TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0733	Solenoid or internal parts	3rd gear ratio	No 3rd gear ratio detected by TCM	No 3rd gear, no TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0734	Solenoid or internal parts	4th gear ratio	No 4th gear ratio detected by TCM	No 4th gear, no TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.

Diagnostic Trouble Code Chart (Continued)

Five Digit DTC	Component	Description	Condition	Symptom	Action
P0735	Solenoid or internal parts	5th gear ratio	No 5th gear ratio detected by TCM	No 5th gear, no TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0736	Transaxle	Reverse gear ratio	No reverse gear ratio detected by TCM	No reverse gear, no self learning strategy.	GO to Pinpoint Test A.
P0780	Solenoid or valve internal to transaxle	Universal shifting (stuck valve)	Valve stuck	Increase rpm during shifts. Slipping or erratic shifting.	Go to Main Control Valve Body
P0817	Starter circuit	Starter circuit error	TCM detected a failure in the starter circuit, failed ON or OFF	No TCC engagements, no adaptive or self learning strategy.	Go to Starting System.
P0961	PCA	PCA circuit or solenoid failure	PCA circuit or solenoid (SLT) failed during operation. Incorrect commanded current detected by TCM	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0962	PCA	PCA solenoid signal or grounded circuits either short or open, solenoid circuit failure	Voltage through PCA solenoid (SLT) is checked. An error will be noted if tolerance is exceeded	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0963	PCA	PCA solenoid short to power circuit failure	Voltage through PCA solenoid (SLT) is checked. An error will be noted if tolerance is exceeded	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0973	SSA	SSA solenoid or circuit shorted to ground	Voltage through SSA solenoid (S1) circuit is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0974	SSA	SSA solenoid or circuit shorted to power or open	Voltage through SSA solenoid (S1) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.

Diagnostic Trouble Code Chart (Continued)

Five Digit DTC	Component	Description	Condition	Symptom	Action
P0976	SSB	SSB solenoid or circuit shorted to ground	Voltage through SSB solenoid (S2) circuit is checked. An error will be noted if tolerance is exceeded. Short to ground failure detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0977	SSB	SSB solenoid or circuit shorted to power or open	Voltage through SSB solenoid (S2) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0978	SSC	SSC circuit or solenoid failure	SSC circuit or solenoid (SLC1) failed during operation. Incorrect commanded current detected by TCM	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0979	SSC	SSC solenoid signal or grounded circuits either shorted or open, solenoid circuit failure	Voltage through SSC solenoid (SLC1) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0980	SSC	SSC solenoid or circuit shorted to power	Voltage through SSC solenoid (SLC1) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0981	SSD	SSD circuit or solenoid failure	SSD circuit or solenoid (SLC2) failed during operation. Incorrect commanded current detected by TCM	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.

Diagnostic Trouble Code Chart (Continued)

Five Digit DTC	Component	Description	Condition	Symptom	Action
P0982	SSD	SSD solenoid signal or grounded circuits either shorted or open, solenoid circuit failure	Voltage through SSD solenoid (SLC2) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0983	SSD	SSD solenoid or circuit shorted to power	Voltage through SSD solenoid (SLC2) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0984	SSE	SSE circuit or solenoid failure	SSE circuit or solenoid (SLC3) failed during operation. Incorrect commanded current detected by TCM	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0985	SSE	SSE solenoid signal or grounded circuits either shorted or open, solenoid circuit failure	Voltage through SSE solenoid (SLC3) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0986	SSE	SSE solenoid or circuit shorted to power	Voltage through SSE solenoid (SLC3) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0997	SSF	SSF circuit or solenoid failure	SSF circuit or solenoid (SLB1) failed during operation. Incorrect commanded current detected by TCM	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.

Diagnostic Trouble Code Chart (Continued)

Five Digit DTC	Component	Description	Condition	Symptom	Action
P0998	SSF	SSF solenoid signal or grounded circuits either shorted or open, solenoid circuit failure	Voltage through SSF solenoid (SLB1) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P0999	SSF	SSF solenoid or circuit shorted to power	Voltage through SSF solenoid (SLB1) circuit is checked. An error will be noted if tolerance is exceeded. Short to power failure or open circuit detected	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P1573	APP sensor	APP sensor input error	PCM has detected an input error from the APP sensor	No adaptive or self learning strategy.	REFER to Computers and Control Systems.
P1657	TCM	TCM communication link error	CAN link error detected by PCM	No engagements, no adaptive or self learning strategy. Limited fuel and spark.	Install a new transmission control module (TCM).
P1700	Transaxle	Drive engagement error	TCM detected neutral in the DRIVE position	No engagements, no adaptive or self learning strategy.	REFER to Diagnosis By Symptom
P1701	Transaxle	Reverse engagement error	TCM detected neutral in the REVERSE position	No self learning strategy.	REFER to Diagnosis By Symptom
P1919	ECT	ECT sensor signal error	PCM/TCM have detected an error in the CAN ECT information	No TCC engagements, ECT set to 80°C (176°F).	REFER to Computers and Control Systems.
P1920	Engine RPM	Engine RPM sensor signal error	PCM/TCM have detected an error in the CAN engine RPM information	No adaptive or self learning strategy. Limited fuel and spark.	REFER to Computers and Control Systems.

Diagnostic Trouble Code Chart (Continued)

Five Digit DTC	Component	Description	Condition	Symptom	Action
P2544	PCM	Torque management request input signal A	Data received from the PCM or engine components are not correct for the vehicle operating conditions. Incorrect engine torque calculation may result	Transmission may enable limp-home strategies or increase pressures. Engine components and PCM may or may not set additional DTCs. P2544, fuel monitor error, ECT sensor failure and MAF sensor failures may be present. MIL may illuminate.	REFER to Computers and Control Systems.
P2757	TCC solenoid	TCC solenoid circuit failure, stuck OFF	TCC solenoid (SLU) circuit fails to provide voltage drop across solenoid. Circuit open, shorted or PCM driver failure during on-board diagnostic	No TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P2758	TCC solenoid	TCC solenoid circuit failure, stuck ON	TCC solenoid (SLU) circuit fails to provide voltage drop across solenoid. Circuit open, shorted or PCM driver failure during on-board diagnostics	No TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P2762	TCC solenoid	TCC circuit or solenoid failure	TCC circuit or solenoid (SLU) failed during operation. Incorrect commanded current detected by TCM	No engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P2763	TCC solenoid	TCC circuit shorted to power	TCC solenoid (SLU) circuit fails to provide voltage drop across solenoid. Circuit shorted to power	No TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.
P2764	TCC solenoid	TCC solenoid signal or grounded circuits either short or open solenoid circuit failure	TCC solenoid (SLU) circuit fails to provide voltage drop across solenoid	No TCC engagements, no adaptive or self learning strategy.	GO to Pinpoint Test A.

Diagnostic Trouble Code Chart (Continued)

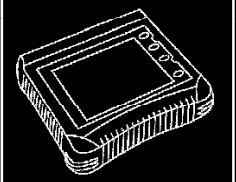
Five Digit DTC	Component	Description	Condition	Symptom	Action
U0073	TCM CAN	TCM communication link error	CAN link error detected by PCM	No engagements, no adaptive or self learning strategy.	REFER to Computers and Control Systems.
U0100	TCM CAN	TCM communication link error	CAN link error detected by PCM	No engagements, no adaptive or self learning strategy.	REFER to Computers and Control Systems.
U0121	ABS system	TCM communication link error	PCM/TCM have detected an error in the CAN wheel RPM information from the ABS system	No engagements, no adaptive or self learning strategy.	REFER to Computers and Control Systems.
U0401	PCM/TCM	Invalid data received from the PCM or engine components	Data received from the PCM or engine components is not correct for the vehicle operating conditions	Transmission may enable limp-home strategies or increase pressures. Engine components and PCM may or may not set additional DTCs. P2544, fuel monitor error, ECT sensor failure and MAF sensor failures may be present. MIL may illuminate.	REFER to Computers and Control Systems.
U0415	Wheel speed sensor	TCM communication link error	PCM/TCM have detected an error in the CAN wheel RPM information from the ABS system	No adaptive or self learning strategy.	REFER to Computers and Control Systems.

U0073-U0415

Pinpoint Tests - Non OSC Equipped Vehicles

Pinpoint Tests - Non OSC Equipped Vehicles

Special Tool(s)

 ST2332-A	Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool
 ST1137-A	73 III Automotive Meter 105-R0057 or equivalent

Special Tool(s)

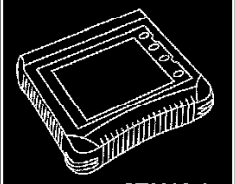
Any time an electrical connector or solenoid body is disconnected, inspect the connector for pin condition, corrosion and contamination. Also inspect

the connector seal for damage. Clean, repair or install a new connector as required.

Prior to carrying out the pinpoint tests, check:
^ Transmission fluid level.
^ Transmission fluid condition (burned, metal particles or discolored).
^ Engine cooling system.
^ Other non-related transmission DTCs.

Test A: Shift Solenoids

Pinpoint Tests - Non OSC Equipped Vehicles

Special Tool(s)	
 ST2332-A	Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool
 ST1137-A	73 III Automotive Meter 105-R0057 or equivalent

Special Tool(s)

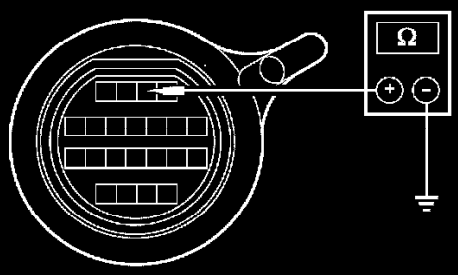
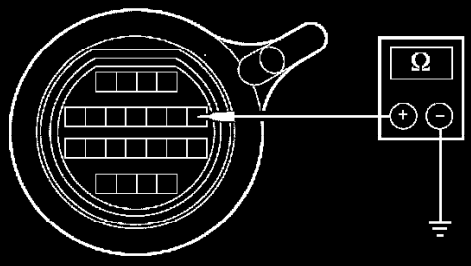
Any time an electrical connector or solenoid body is disconnected, inspect the connector for pin condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install a new connector as required.

Prior to carrying out the pinpoint tests, check:
^ Transmission fluid level.
^ Transmission fluid condition (burned, metal particles or discolored).
^ Engine cooling system.
^ Other non-related transmission DTCs.

PINPOINT TEST A: SHIFT SOLENOIDS

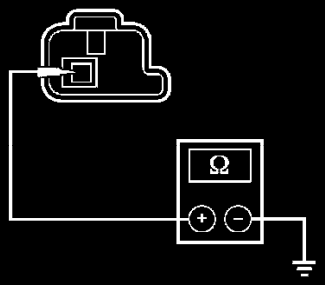
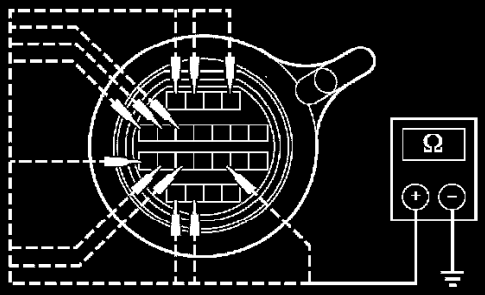
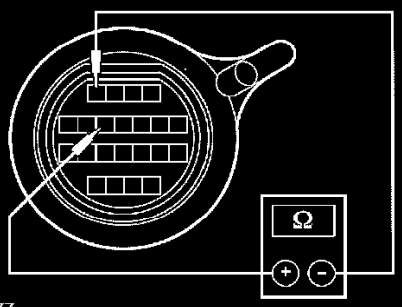
PINPOINT TEST A: SHIFT SOLENOIDS

NOTE: Refer to the Transaxle Vehicle Harness Connector illustration

Test Step		Result / Action to Take
A1	**ELECTRONIC DIAGNOSTICS**	
	• Check to make sure the transmission harness connector is fully seated, pins are fully engaged in the connector and in good condition before proceeding. • Key in OFF position. • Connect the diagnostic tool. • Key in ON position. • Enter the following diagnostic mode on the diagnostic tool: Retrieve DTC Codes. • **Are their any transmission DTCs fault present?**	**Yes** For shift solenoids SSA and SSB, GO to **A2**. For shift solenoids PCA, SSC, SSD, SSE, SSF and TCC, GO to **A4**. **No** CLEAR all DTCs. ROAD TEST to verify if concern is still present. Concern could be intermittent. If concern is still present or reappears go to the appropriate pinpoint test steps: For shift solenoids SSA and SSB, GO to **A2**. For shift solenoids PCA, SSC, SSD, SSE, SSF and TCC, GO to **A4**.
A2	**CHECK RESISTANCE OF THE ON/OFF SOLENOID CIRCUIT**	
	• Key in OFF position. • Remove the transmission control module (TCM). • Measure the resistance at the transaxle bulkhead electrical connector between pin 2 and ground for SSB.  N0025043 • Measure the resistance at the transaxle bulkhead electrical connector between pin 5 and ground for SSA.  N0025044 • **Is the resistance between 11-15 ohms?**	**Yes** Install a new transmission control module (TCM) and re-flash to the latest level calibration. CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, GO to **A3**. **No** GO to **A3**.
A3	**CHECK RESISTANCE OF THE ON/OFF SOLENOIDS**	
	• Remove the transaxle side cover. • Remove the wiring connector from the effected solenoid (SSA or SSB).	

(Continued)

PINPOINT TEST A: SHIFT SOLENOIDS (Continued)

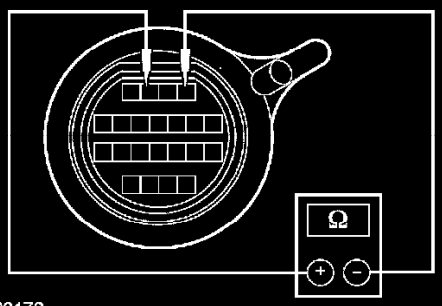
Test Step		Result / Action to Take
A3	CHECK RESISTANCE OF THE ON/OFF SOLENOIDS (Continued)	
• Measure the resistance between solenoid pin 1 and ground of the affected solenoid.  N0025203 • **Is each solenoid resistance between 11-15 ohms?**		**Yes** INSTALL a new internal wire harness or repair effected circuit. **No** INSTALL a new main control.
A4	CHECK LINEAR SOLENOID SHORT TO GROUND	
• Key in OFF position. • Remove the transmission control module (TCM). • Measure the resistance at transaxle bulkhead electrical connector between pins 1, 3, 4, 9, 10, 11, 14, 16, 17, 18, 21, 22 and ground.  A0100183 • **Is each resistance greater than 10,000 ohms?**		**Yes** GO to **A5**. **No** GO to **A6**.
A5	CHECK RESISTANCE OF THE LINEAR SOLENOID(S)	
• Inspect both sides of the transmission control module for damaged or pushed out pins, corrosion or damaged seals. • For the TCC solenoid, measure the resistance between pin 4 and pin 9 at the transaxle.  A0100177		

(Continued)

PINPOINT TEST A: SHIFT SOLENOIDS (Continued)

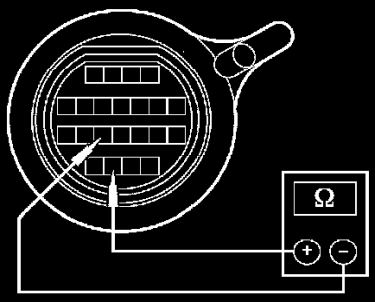
Test Step		Result / Action to Take
A5	CHECK RESISTANCE OF THE LINEAR SOLENOID(S) (Continued)	

- For the PCA solenoid, measure the resistance between pin 3 and pin 1 at the transaxle.



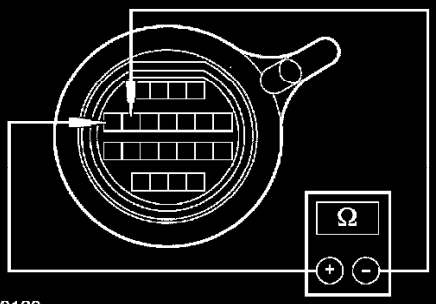
A0100178

- For the SSF solenoid, measure the resistance between pin 21 and pin 16 at the transaxle.



A0100179

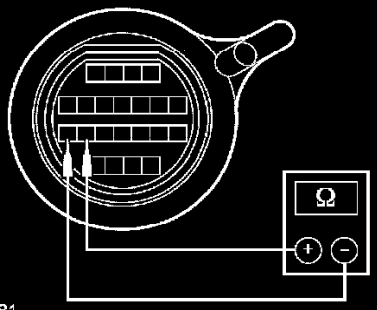
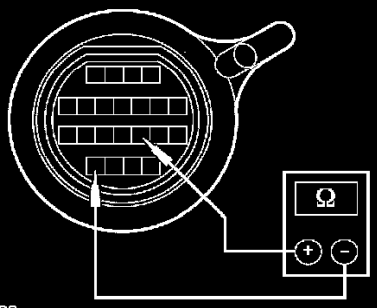
- For the SSC solenoid, measure the resistance between pin 11 and pin 10 at the transaxle.



A0100180

(Continued)

PINPOINT TEST A: SHIFT SOLENOIDS (Continued)

Test Step		Result / Action to Take
A5	CHECK RESISTANCE OF THE LINEAR SOLENOID(S) (Continued)	
	• For the SSD solenoid, measure the resistance between pin 17 and pin 18 at the transaxle.  A0100181 • For the SSE solenoid, measure the resistance between pin 14 and pin 22 at the transaxle.  A0100182 • **Is the resistance between 5.0 - 5.6 ohms?**	**Yes** Install a new transmission control module (TCM) and re-flash to the latest level calibration. CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, GO to **A6**. **No** GO to **A6**.
A6	CHECK CONTINUITY OF THE INTERNAL HARNESS	
	• Remove the transaxle side cover. • Remove the wiring connector from the effected solenoid(s) (PCA, SSC, SSD, SSE, SSF and TCC). • Measure the resistance between the bulkhead connector and the affected solenoid electrical connector. • **Is each solenoid resistance less than 5 ohms?**	**Yes** INSTALL a new main control. **No** INSTALL a new internal wire harness or repair effected circuit.

A5-A6

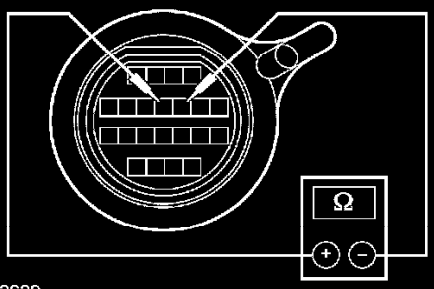
PINPOINT TEST B: TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR

Test Step		Result / Action to Take
B1	ELECTRONIC DIAGNOSTICS	
	• Connect the diagnostic tool. • Check to make sure the transmission harness connector is fully seated, pins are fully engaged in connector and in good condition before proceeding. • Key in ON position. • Select Diagnostic Data Link. • Select TCM. • Select PID/Transmission Fluid Temp (TFT). • Enter the following diagnostic mode on the diagnostic tool: PIDs; TFT. • **Does the vehicle enter PID/Transmission Fluid Temp (TFT)?**	**Yes** GO to **B2**. **No** REPEAT procedure to enter PID. If vehicle did not enter PID, REFER to Computers and Control Systems.
B2	TEMPERATURE SIGNAL CHECK	
	• Key in ON position. • Select Diagnostic Data Link.	

(Continued)

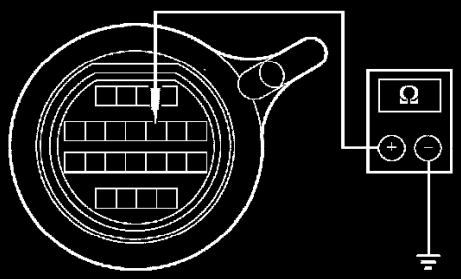
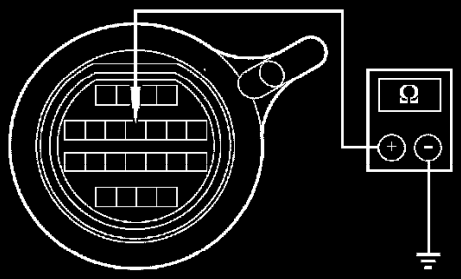
B1-B2

PINPOINT TEST B: TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR (Continued)

Test Step		Result / Action to Take
B2	TEMPERATURE SIGNAL CHECK (Continued)	
	• Select TCM. • Select PID/Transmission Fluid Temp. • Enter the following diagnostic mode on the diagnostic tool: PIDs; TFT. • Monitor the TFT PID. The temperature value should be within -55°C to 175°C (-65°F to 347°F). • **Is the TFT temperature within specified range?**	**Yes** GO to **B3**. **No** GO to **B4**
B3	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, decrease as the transmission is cooled and does the TFT stay within the specified range?**	**Yes** Install a new transmission control module (TCM) and re-flash to the latest level calibration. CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, GO to **B4**. **No** GO to **B4**.
B4	SIGNAL RESISTANCE	
	• Remove the transmission control module (TCM). • Inspect both sides of the transmission control module for damaged or pushed out pins, corrosion or damaged seals. • Measure the resistance between pins 7 and 8 at the transmission bulkhead electrical connector. Refer to the following table. **Transmission Fluid Temperature Sensor Resistance** °C / °F / Resistance (Ohms) 10 / 50 / 6.445 25 / 77 / 3.5 110 / 230 / 0.247  A0093629 • Record the resistance. • **Is the resistance within range?**	**Yes** GO to **B5**. **No** INSTALL a new internal harness and TFT assembly.

(Continued)

PINPOINT TEST B: TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR (Continued)

Test Step		Result / Action to Take
B5	SHORT TO GROUND	
• Measure the resistance between pin 7 and ground at the transmission bulkhead electrical connector.  A0093630 • Measure the resistance between pin 8 and ground at the transmission bulkhead electrical connector.  A0093631 • Record the resistances. • **Are the resistances greater than 10,000 ohms?**		**Yes** INSTALL a new transmission control module (TCM) and re-flash to the latest level calibration. **No** INSTALL a new internal harness and TFT assembly.

B5

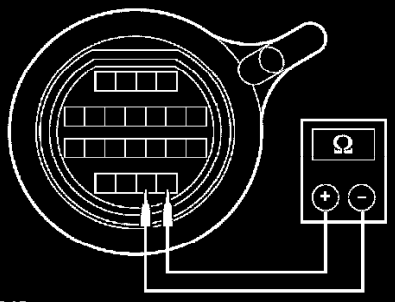
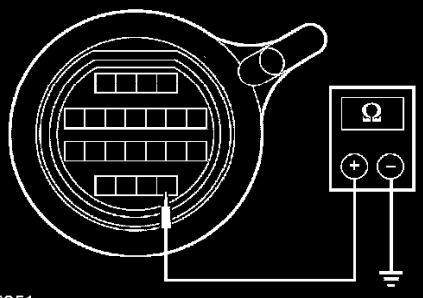
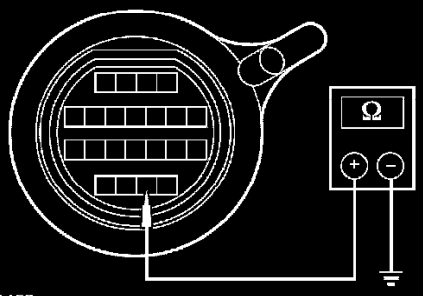
PINPOINT TEST C: OUTPUT SHAFT SPEED (OSS) SENSORS

Test Step		Result / Action to Take
C1	ELECTRONIC DIAGNOSTICS	
• Check to make sure the transmission control module connector is fully seated, pins are fully engaged in connector and in good condition before proceeding. • Connect the diagnostic tool. • Key in ON position. • Monitor the PID for the output shaft speed (OSS) sensor. • Monitor and record speed. • **Does the OSS match the vehicle speed?**		**Yes** CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, GO to **C2**. **No** GO to **C2**.
C2	CHECK OSS SENSOR RESISTANCE	
• Remove the transmission control module (TCM).		

(Continued)

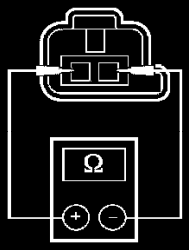
C1-C2

PINPOINT TEST C: OUTPUT SHAFT SPEED (OSS) SENSORS (Continued)

Test Step		Result / Action to Take
C2	CHECK OSS SENSOR RESISTANCE (Continued)	
	• Measure the resistance at the transaxle bulkhead electrical connector between pin 19 and 20.  A0002345 • **Is the resistance less than 5 ohms?**	**Yes** CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, GO to **C3**. **No** GO to **C4**.
C3	CHECK OSS SENSOR FOR SHORT TO GROUND	
	• Remove the transmission control module (TCM). • Measure the resistance at the transaxle bulkhead electrical connector between pin 19 and ground.  A0002351 • Measure the resistance at the transaxle bulkhead electrical connector between pin 20 and ground.  A0004453 • **Is the resistance greater than 10,000 ohms?**	**Yes** INSTALL a new transmission control module (TCM) and re-flash to the latest level calibration. CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, GO to **C4**. **No** GO to **C4**.
C4	CHECK OSS SENSOR RESISTANCE	
	• Remove the transmission side cover.	

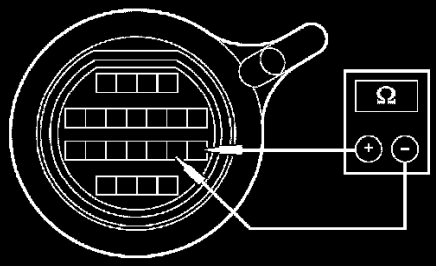
(Continued)

PINPOINT TEST C: OUTPUT SHAFT SPEED (OSS) SENSORS (Continued)

Test Step		Result / Action to Take
C4	CHECK OSS SENSOR RESISTANCE (Continued)	
• Measure the resistance at the speed sensor electrical connector between pin 1 and 2.  A0100200 • **Is the resistance less than 5 ohms?**		**Yes** INSTALL a new internal harness. **No** INSTALL a new transaxle assembly.

C4

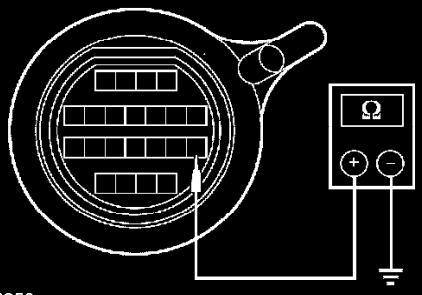
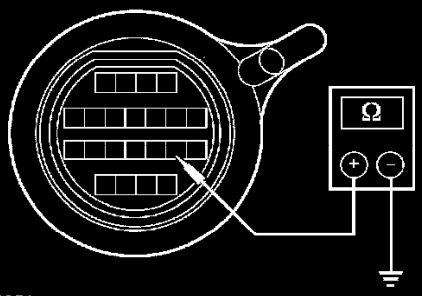
PINPOINT TEST D: TURBINE SHAFT SPEED SENSOR

Test Step		Result / Action to Take
D1	ELECTRONIC DIAGNOSTICS	
• Check to make sure the transmission control module connector is fully seated, pins are fully engaged in connector and in good condition before proceeding. • Connect the diagnostic tool. • Key in ON position. • Monitor the PID for the turbine shaft speed (TSS) sensor. • Monitor and record speed. • **Does the TSS match the engine rpm?**		**Yes** CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, GO to **D2**. **No** GO to **D2**.
D2	CHECK TSS SENSOR RESISTANCE	
• Remove the transmission control module (TCM). • Measure the resistance at the transaxle bulkhead electrical connector between pin 12 and 13.  A0100249 • **Is the resistance less than 5 ohms?**		**Yes** CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, GO to **D3**. **No** GO to **D4**.
D3	CHECK TSS SENSOR CIRCUIT FOR SHORT TO GROUND	
• Remove the transmission control module.		

(Continued)

D1-D3

PINPOINT TEST D: TURBINE SHAFT SPEED SENSOR (Continued)

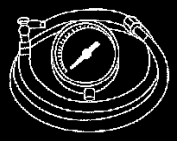
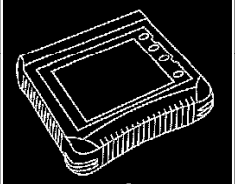
Test Step		Result / Action to Take
D3	**CHECK TSS SENSOR CIRCUIT FOR SHORT TO GROUND (Continued)**	
	• Measure the resistance at the transaxle bulkhead electrical connector between pin 12 and ground.  A0100250 • Measure the resistance at the transaxle bulkhead electrical connector between pin 13 and ground.  A0100251 • **Is the resistance greater than 10,000 ohms?**	**Yes** INSTALL a new transmission control module (TCM) and re-flash to the latest level calibration. CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, GO to **D4**. **No** GO to **D4**.
D4	**ELECTRONIC DIAGNOSTICS**	
	• Remove the transmission side cover. • Measure the resistance at the TSS speed sensor electrical connector between pin 1 and 2. • **Is the resistance less than 5 ohms?**	**Yes** CLEAR all DTCs. ROAD TEST to verify concern is not present. Concern could be intermittent. If concern is still present or reappears, INSTALL a new internal harness. **No** The sensor is defective, INSTALL a new TSS sensor.

D3-D4

Special Testing Procedures

Special Testing Procedures

Special Tool(s)

 ST1565-A	Transmission Fluid Pressure Gauge 307-004 (T57L-77820-A)
 ST2332-A	Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool
 ST1137-A	73 III Automotive Meter 105-R0057 or equivalent

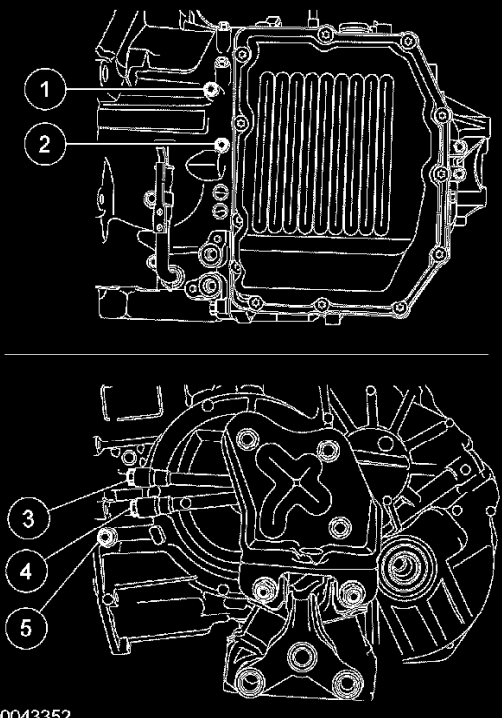
Special Tool(s)

The special tests are designed to aid the technician in diagnosing the hydraulic and mechanical portions of the transaxle.

Pressure Test

Pressure Test

Pressure Tap Location



Item	Description
1	Clutch C1
2	Clutch C3
3	Clutch C2
4	Lube circuit
5	Clutch B2

Pressure Tap Location (6-Speed)

CAUTION: If the pressure is low at stall, do not continue with the test or further transaxle damage will occur. Do not maintain wide open throttle in any transaxle range for **more than 5 seconds.**

This test verifies that the pressure is within specification.

1. Connect a pressure gauge to the appropriate pressure tap.
2. Start the engine and check the pressures, see the pressure charts to determine if the pressures are within specification.

Clutch and Brake Pressure Chart

Clutch	Range	Pressure
C1	Drive (1st-4th)	196-1,372 kPa (28-199 psi)
C2	Drive (4th-6th)	196-1,372 kPa (28-199 psi)
C3	Drive (3rd, 5th)	196-1,372 kPa (28-199 psi)
C3	Reverse	392-1,863 kPa (57-270 psi)
B2	Low manual (1st)	588-1,372 kPa (85-199 psi)
B2	Reverse	392-1863 kPa (57-270 psi)

Clutch and Brake Pressure Chart

Pressure Diagnostic Chart

Test Results	Possible Source
Values of both D and R ranges are lower than the standards	• Pressure control solenoid A (PCA) • Primary regulator valve failure • Oil pump failure • Leak from hydraulic circuit of D or R range
Only the value of D range is lower than the standards	• D range hydraulic circuit failure • C1 clutch failure
Only the value of R range is lower than the standards	• R range hydraulic circuit failure • C3 clutch failure • B2 brake failure

Pressure Diagnostic Chart

3. If the pressure is not within specification, install a new main control valve body.
4. If the pressures are OK, clear all DTC. Test drive vehicle, code could be intermittent. If DTC code returns, install a new valve body.

Engine Idle Speed Check

Engine Idle Speed Check

Refer to Computers and Control Systems for diagnosis and testing of the engine idle speed.

Stall Speed Test

Stall Speed Test

WARNING: Apply the parking brake firmly while carrying out each stall test.

The Stall Speed Test checks:
^ torque converter clutch operation and installation.
^ holding ability of the forward clutch
^ reverse clutch (the low-reverse bands)
^ planetary one-way clutch
^ engine driveability concerns.

Conduct this test with the engine coolant and transmission fluid at correct levels and at normal operating temperature.

Apply the parking brake firmly for each Stall Speed Test.

1. Find the specified stall rpm for the vehicle, see the stall speed chart. Use a grease pencil to mark the rpm on the dial of a tachometer.

Stall Speed Chart

Engine	Stall Speed
3.0L (4V)	2,390

Stall Speed Chart

2. Connect a tachometer to the engine.
3. **NOTE:** If the rpm recorded by the tachometer exceeds the maximum limits, release the accelerator pedal immediately because clutch or band slippage is indicated.

   In each of these ranges R, D and L, press the accelerator pedal to the floor and hold it just long enough to let the engine get to wide open throttle. While making this test, do not hold the throttle open for **more than 5 seconds** at a time.
4. Note the results in each range.
5. After each range, move the selector lever to NEUTRAL and run the engine at **1,000 rpm for about 15 seconds** to cool the torque converter before making the next test.
6. Use the stall speed diagnosis chart for corrective actions.
7. **NOTE:** The stall speed in REVERSE will be lower.

If stall speeds were too high, see the stall speed diagnosis chart. If stall speeds were too low, first check engine idle speed and tune up. If engine is OK, remove torque converter and check torque converter clutch for slippage.

Pressure Diagnostic Chart

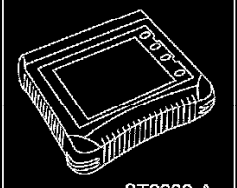
Test Results	Possible Source
Values of both D and R ranges are lower than the standards	• Insufficient engine power • T/C one-way clutch slipping
Only the value of D range is higher than the standards	• Low line pressure. Shift control solenoid assembly (SLT) failure, primary regulator valve failure • Valve body failure (SLC3 hydraulic pressure system) • C1 clutch slipping • One-way clutch F1 failure
Only the value of R range is higher than the standards	• Low line pressure. Shift control solenoid assembly (SLT) failure, primary regulator valve failure • Valve body failure (SLC3 hydraulic pressure system) • C3 clutch failure • B2 brake failure
Values of both D and R ranges are higher than the standards	• Low line pressure. Shift control solenoid assembly (SLT) failure, primary regulator valve failure • Primary regulator valve failure • Oil pump failure • Oil strainer clogging

Pressure Diagnostic Chart

Component Tests

Torque Converter Diagnosis

Special Tool(s)

 ST2332-A	Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool

Special Tool(s)

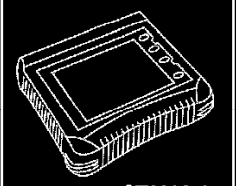
Prior to torque converter installation, all diagnostic procedures must be followed. This is to prevent the unnecessary installation of new or remanufactured torque converters. Only after a complete diagnostic evaluation can the decision be made to install a new or remanufactured torque converter.

Begin with the normal diagnostic procedures as follows:

1. Preliminary Inspection
2. Know and Understand the Customer's Concern
3. Verify the Concern - carry out the torque converter operation test

4. Carry out Diagnostic Procedures:
   ^ Run On-Board Diagnostics.
   - Repair all non-transmission related DTCs first.
   - Repair all transmission DTCs.
   - Rerun On-Board Diagnostic to verify repair.
   - Carry out Line Pressure Test.
   - Carry out Stall Speed Test. See: Non-Trouble Code Procedures/Stall Speed Test
   - Carry out diagnostic routines. Refer to Diagnosis By Symptom. See: Diagnosis By Symptom
   - Use the index to locate the appropriate routine that best describes the symptom(s). The routine will list all possible components that may cause or contribute to the symptom. Check each component listed, diagnose and repair as required, before repairing the torque converter.

Special Tool(s)



Worldwide Diagnostic System (WDS)
Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool

Special Tool(s)

PID Name	Description	Units
TORQUE	Net engine torque	Torque (lb-ft)
TCC__AMP	Converter pressure control	Current (amps)
SSE__AMP	Shift solenoid pressure control E	Current (amps)
TCCPC	Converter pressure control	Pressure (psi)
SSPCE	Shift solenoid pressure control E	Pressure (psi)
SSPCE__F	SSPCE status	• 00 is not fault detected • 01 is short circuit to ground • 02 is open circuit load • 04 is short circuit to battery power • 80 is general (non-specific) fault
GEAR__OSC	Gear commanded by output state control	• 0 = commanded gear is not controlled by OSC • 2 = 1st gear is commanded by OSC • 4 = 2nd gear is commanded by OSC • 12 = 6th gear is commanded by OSC
TCC__OSC	Output state control of torque converter	• 00 TCC not controlled by OSC • 01 TCC is disengaged by OSC • 02 TCC is engaged by OSC
SSPCD__F	SSPCD status	• 00 is not fault detected • 01 is short circuit to ground • 02 is open circuit load • 04 is short to battery power • 80 is general (non specific) fault
TSS__SRC	Turbine shaft speed	RPM
OSS__SRC	Output shaft speed	RPM
PCA__F	Pressure control solenoid A	INT
SSPCD	Shift solenoid pressure control D	Pressure (psi)
PCA	Pressure control solenoid A	Pressure (psi)
SSD__AMP	Shift solenoid pressure control D	Current (amps)

Diagnostic Parameters Identification (PID) Chart (Part 1)

PID Name	Description	Units
PCA__AMP	Pressure control solenoid A	Current (amps)
TP__REL	Relative throttle position	Percentage
DTCTCM	Continuous codes	Number of DTCs
TCCSLPDSD	Torque converter clutch slip desired	RPM
SHFTCTRL	Shift control	• 00 Economy mode • 01 Sport mode • 02 Up slope 1 mode • 03 Up slope 2 mode • 04 Down slope mode • 05 Hot 1 (over temperature 1) mode • 06 Hot 2 (over temperature 2) mode • 07 Cruise mode • 08 Traction mode • 09 1 position mode • 0A Tiptronic mode • 0B Coast shift • FF Invalid data
SSPCF__F	Shift solenoid pressure control F status	• 00 is not fault detected • 01 is short to ground • 02 is open circuit load • 04 is short circuit to battery power • 80 is general (non-specific) fault
SSFAMP__MES	Measured current SSF	Current (amps)
SSFAMP__CMD	Commanded current SSF	Current (amps)
SSPCF__CMD	Commanded pressure SSF	Pressure (psi)
SSEAMP__MES	Measured current SSE	Current (amps)
SSDAMP__MES	Measured current SSD	Current (amps)
SSCAMP__MES	Measured current SSC	Current (amps)
TCCAMP__MES	Measured current for the TCC pressure control	Current (amps)
PCAAMP__MES	Measured current for PCA	Current (amps)
SSPCC__F	SSPCC status	• 00 is not fault detected • 01 is short to ground • 02 is open circuit load • 04 is short circuit to battery power • 80 is general (non-specific) fault
SSPCC	Shift solenoid pressure control C	Pressure (psi)
SSC__AMP	Shift solenoid pressure control C current	Current (amps)

Diagnostic Parameters Identification (PID) Chart (Part 2)

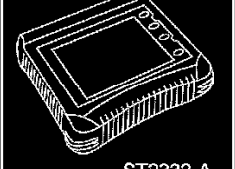
PID Name	Description	Units
SSB__F	Shift solenoid 2 status	• 00 is not fault detected • 01 is short to ground • 02 is open circuit load • 04 is short circuit to battery power • 80 is general (non-specific) fault
SSA__F	Shift solenoid 1 status	• 00 is not fault detected • 01 is short to ground • 02 is open circuit load • 04 is short circuit to battery power • 80 is general (non-specific) fault
TFT	Transmission fluid temperature	Temperature (°C, °F)
TRAN__RAT	Transmission gear ratio	Ratio
TCC__F	Torque converter clutch fault	• 00 is not fault detected • 01 is short to ground • 02 is open circuit load • 04 is short circuit to battery power • 80 is general (non-specific) fault
VSS	Vehicle Speed	Speed (mph)
TFT	Transmission fluid temperature	Voltage
TCC__RAT	Transmission slip ratio	Ratio
TC__SLIPACT	Torque converter slip actual TCCMACT	RPM
TR	Transaxle range	• P = 7 • R = 6 • N = 5 • D = 4 • L = 1
OSS	Output shaft speed	RPM
TSS	Turbine shaft speed	RPM
Gear	Gear commanded by module	Gear (1-6)
VPWRTCM	Module supply voltage VBAT	Voltage
RPMTCM	Engine revolutions per minute	RPM
TR__V	Transaxle range	Voltage

Diagnostic Parameters Identification (PID) Chart (Part 3)

Neutral Position Learning

Neutral Position Learning

Special Tool(s)


ST2332-A

Worldwide Diagnostic System (WDS)

Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool

Special Tool(s)

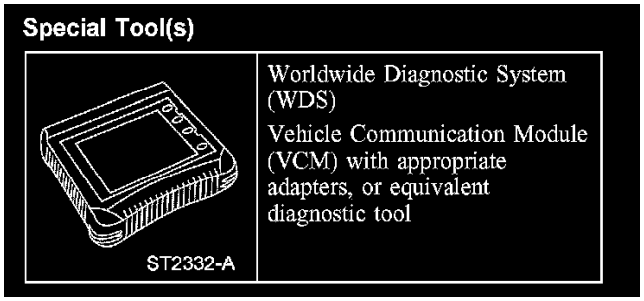
NOTE: When installing a new transmission control module, the initialized learned values will need to be carried out.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Maintenance/Service and Repair.
2. Install the diagnostic tool.

3. Turn the ignition ON.
4. The diagnostic tool should indicate NEUTRAL.
   ^ If the diagnostic tool does not indicate NEUTRAL, carry out transmission control module (TCM) adjustment.
5. If NEUTRAL is indicated on the diagnostic tool, move the shift lever to PARK and turn the ignition OFF.
6. Turn the ignition ON and move the shift lever from PARK to DRIVE.
   ^ The diagnostic tool should indicate each PRNDL position.
7. If the diagnostic display indicates each PRNDL position, check for any DTC codes.
8. If the diagnostic display does not indicate each PRNDL position, carry out Transmission Control Module (TCM) Initial Learning.

Transmission Control Module (TCM) Initial Learning

Transmission Control Module (TCM) Initial Learning



Special Tool(s)

CAUTION: Do not raise the transmission fluid temperature by stalling the engine, internal transaxle damage will occur.

NOTE: Clear all DTCs first.

NOTE: When installing a new transmission, transmission control module or reflashing the TCM, the initialized learned values will need to be carried out.

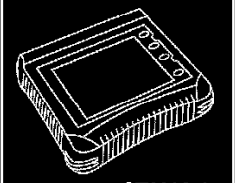
NOTE: This procedure cannot be carried out if the transmission fluid is not within the correct temperature specification.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Maintenance/Service and Repair.
2. Install the diagnostic tool.
3. Monitor and note the engagement and shift harshness on the diagnostic tool.
4. With the engine idling, monitor the transmission fluid temperature. The fluid temperature should be **between 66°C - 110°C (151°F - 230°F).**
5. With your foot on the brake, move the shift lever to NEUTRAL and hold for **3 seconds.** Then move the shift lever to DRIVE and hold for **3 seconds. Carry this out 5 times.** Then move the shift lever to PARK.
6. With your foot on the brake, move the shift lever to NEUTRAL and hold for **3 seconds.** Then move the shift lever to REVERSE and hold for **3 seconds.** Carry this out **5 times.** Then move the shift lever to PARK.
7. Drive the vehicle and monitor the diagnostic tool.
8. Drive the vehicle with the throttle opening **between 25 - 30%.** Drive until the vehicle reaches **6th gear, not to exceed 80 km/h (50 mph)**. Then release the accelerator and coast to a stop **within 60 seconds.** Carry this out **10 times.**
9. The engagement and shift harshness have decreased.

Diagnosis By Symptom

Diagnosis By Symptom

Special Tool(s)

 ST2332-A	Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool
 ST1137-A	73 III Automotive Meter 105-R0057 or equivalent

Special Tool(s)

The Diagnosis by Symptom charts give the technician diagnostic information, direction and suggest possible components, using a symptom as a starting point.

The Diagnosis by Symptom charts are divided into 2 categories: Electrical Routines, indicated by 200 series numbers, and Hydraulic/Mechanical Routines, indicated by 300 series numbers. The Electrical Routines list the possible electrical components that could cause or contribute to the symptom described. The Hydraulic/Mechanical Routines list the possible hydraulic or mechanical components that could cause or contribute to the symptom described.

Diagnosis by Symptom Chart Directions

1. Using the Symptom Index, select the concern/symptom that best describes the condition.
2. See the routine indicated in the diagnosis by Symptom Index.
3. Always begin diagnosis of a symptom with:
   1 Preliminary inspections.
   2 Verifications of condition.
   3 Checking the fluid levels.
   4 Carry out other test procedures as directed.

4. **NOTE:** Not all concerns and conditions with electrical components will set a diagnostic trouble code (DTC). Be aware that the components listed may still be the cause. Verify correct function of these components prior to proceeding to the routine listed.

   Begin with the routine indicated. Follow the reference or action required statements. Always carry out the on-board diagnostic tests as required. Never skip steps. Repair as required. These components are listed in the removal sequence and by the most probable cause. All components listed must be inspected to make sure of correct repair.

Diagnosis by Symptom Index

Title	Routines
Other Concerns	
Transmission fluid level	286
Transmission fluid condition	287
Transmission control module software	288
Engagement Concerns	
No forward and/or no reverse	207
Harsh	208
Soft	209

Diagnosis by Symptom Index (Part 1)

Diagnosis by Symptom Index (Continued)

Title	Routines
Torque Converter Clutch Operation Concerns	
Does not apply	240
Cycling/shudder/chatters	242

Diagnosis by Symptom Index (Part 2)

207, No Forward and/or No Reverse

Engagement Concerns: No Forward and/or No Reverse

Engagement Concerns: No Forward and/or No Reverse

Possible Component	Reference/Action
207 — ROUTINE	
No Forward, No Reverse, No Forward or Reverse	
• Shift linkage damaged or out of position	• Refer to Transmission Controls. • Using a diagnostic tool, check shift lever position.

Engagement Concerns: No Forward and/or No Reverse (Part 1)

Engagement Concerns: No Forward and/or No Reverse (Continued)

Possible Component	Reference/Action
• Incorrect neutral switch position	• Carry out neutral position learning. Refer to Neutral Position Learning • Disconnect the transmission control module (TCM) electrical connector. If concern still exists, this indicates an internal mechanical problem. Connect the TCM and carry out pressure checks. • If concern is resolved by disconnect the TCM, this indicates an electrical concern. Install a new TCM. Refer to Transmission Control Module (TCM) Check wiring harness (external and internal) valve body connections.
• Halfshafts broken	• Inspect for damaged or broken halfshafts.

Engagement Concerns: No Forward and/or No Reverse (Part 2)

208, Harsh

Engagement Concerns: Harsh

Engagement Concerns: Harsh

Possible Component	Reference/Action
208 — ROUTINE	
Harsh Engagements	
• Transmission control module (TCM) initial learn values wrong	• Carry out transmission control module (TCM) initial learning procedure. Refer to Transmission Control Module (TCM) Initial Learning
• Transmission control module (TCM) calibration wrong	• Re-flash the TCM to the latest level of calibration. Refer to Computers and Control Systems.
• Damaged internal transaxle components causing high or low pressures	• Carry out pressure test. Refer to Special Testing Procedures
• Damaged or malfunctioning solenoids	• Carry out pinpoint test. Refer to Pinpoint Tests — Non OSC Equipped Vehicles

Engagement Concerns: Harsh

209, Soft

Engagement Concerns: Soft

Engagement Concerns: Soft

Possible Component	Reference/Action
209 — ROUTINE	
Soft Engagements	
• Transmission control module (TCM) initial learn values wrong	• Carry out transmission control module (TCM) initial learning procedure. Refer to Transmission Control Module (TCM) Initial Learning
• Transmission control module (TCM) calibration wrong	• Re-flash the TCM to the latest level of calibration. Refer to Computers and Control Systems.
• Damaged internal transaxle components causing high or low pressures	• Carry out pressure test. Refer to Special Testing Procedures
• Damaged or malfunctioning solenoids	• Carry out pinpoint test. Refer to Pinpoint Tests — Non OSC Equipped Vehicles

Engagement Concerns: Soft

240, Does Not Apply

Torque Converter Clutch Operation Concerns: Does Not Apply

Torque Converter Clutch Operations Concerns: Does Not Apply

Possible Component	Reference/Action
240 — ROUTINE	
Torque Converter Does Not Apply	
• Damaged or malfunctioning solenoid	• Carry out pinpoint test. Refer to Pinpoint Tests — Non OSC Equipped Vehicles. Install a new main control valve body. Refer to Main Control Valve Body
• Damaged or disconnected wire harness	• Inspect wire harness. Check connections to the torque converter clutch (TCC) solenoid.
• Damaged or malfunctioning torque converter	• Install a new torque converter. Refer to Torque Converter

Torque Converter Clutch Operation Concerns: Does Not Apply

242, Cycling/Shutter/Chatters

Torque Converter Clutch Operations Concerns: Cycling/Shutter/Chatters

Torque Converter Clutch Operations Concerns: Cycling/Shutter/Chatters

Possible Component	Reference/Action
242 — ROUTINE	
Torque Converter Cycling, Shudders or Chatters	
• Damaged or malfunctioning TCC solenoid	• Install a new main control valve body. Refer to Main Control Valve Body
• Damaged or disconnected wire harness	• Inspect wire harness. Check connections to the torque converter clutch (TCC) solenoid.
• Damaged or malfunctioning torque converter	• Install a new torque converter. Refer to Torque Converter

Torque Converter Clutch Operations Concerns: Cycling/Shutter/Chatters

286, Transmission Fluid Level

Other Concerns: Transmission Fluid Level

Other Concerns: Transmission Fluid Level

Possible Component	Reference/Action
286 — ROUTINE	
Low Transmission Fluid Level	
• Axle shaft seal leaking	• Install new axle shaft seals. Refer to Differential Seals — LH and Differential Seals — RH
• Fluid pan leaking	• Reseal the transmission fluid pan.
• Torque converter hub seal leaking	• Install a new torque converter hub seal. Refer to Torque Converter Hub Seal
• Transmission fluid cooler lines leaking	• Install new transmission fluid cooler line O-rings.
• Manual control lever seal leaking	• Install a new manual control lever seal. Refer to Manual Control Lever Shaft and Seal
• Transmission fluid drain plug leaking	• Install a new transmission fluid drain plug seal.

287, Transmission Fluid Condition

Other Concerns: Transmission Fluid Condition

Other Concerns: Transmission Fluid Condition

Possible Component	Reference/Action
287 — ROUTINE	
Transmission Fluid Burnt or Contaminated	
• Internal components damaged (clutch plate material)	• Install a new transaxle. Refer to Transaxle

Other Concerns: Transmission Fluid Condition

288, Transmission Control Module Software

Other Concerns: Transmission Control Module Software

Other Concerns: Transmission Control Module Software

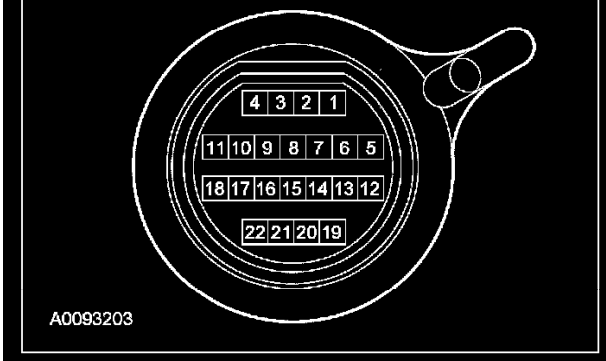
Possible Component	Reference/Action
288 — ROUTINE	
Shifting and Driveability Concerns	
• Transmission control module not at current software level	• Reflash the transmission control module to current software level.

Other Concerns: Transmission Control Module Software

Transaxle Connector Layouts

Transaxle Connector Layouts

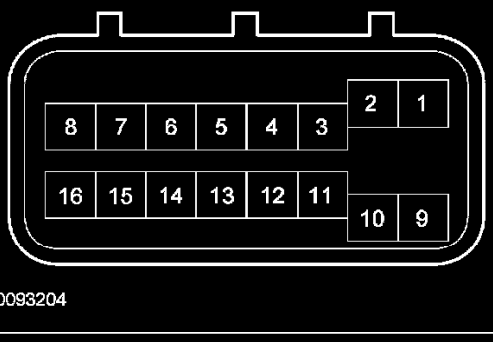
Transaxle Internal Harness Connector



Pin Number	Circuit	Circuit Function
1	—	PCA ground
2	—	Shift solenoid B
3	—	PCA signal
4	—	TCC ground
5	—	Shift solenoid A
6	—	NOT USED
7	—	TFT ground
8	—	TFT
9	—	TCC signal
10	—	SSC ground
11	—	SSC signal
12	—	Turbine shaft speed (TSS) sensor signal
13	—	Turbine shaft speed (TSS) sensor signal ground
14	—	SSE signal
15	—	NOT USED
16	—	SSF ground
17	—	SSD signal
18	—	SSD ground
19	—	Output shaft speed (OSS) sensor signal
20	—	Output shaft speed (OSS) sensor signal ground
21	—	SSF signal
22	—	SSE ground

Transaxle Internal Harness Connector

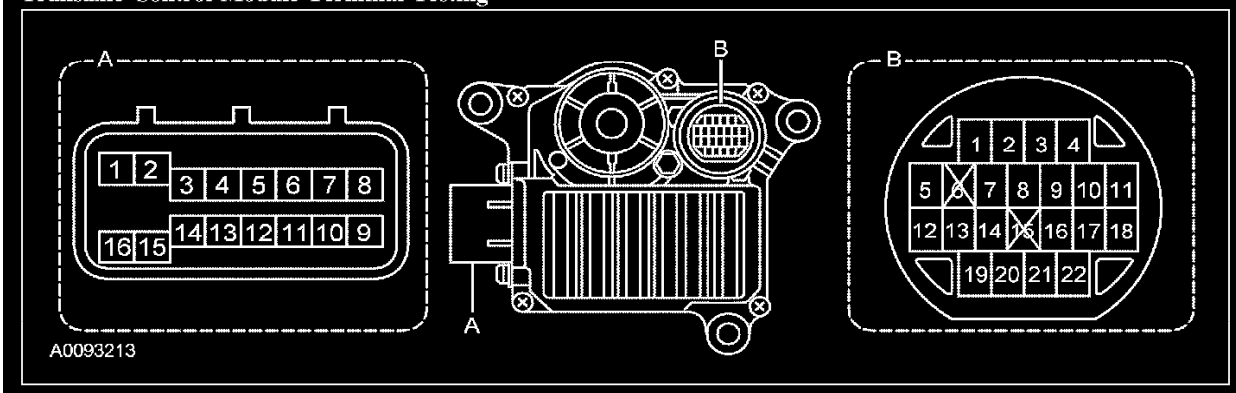
Transmission Range (TR) Sensor/Control Module Connector A Vehicle Harness



Pin Number	Circuit	Circuit Function
1	—	Battery feed
2	—	NOT USED
3	—	NOT USED
4	—	NOT USED
5	—	Start lock signal out
6	—	CAN —
7	—	NOT USED
8	—	NOT USED
9	—	TCU ground
10	—	NOT USED
11	—	Ignition switch signal input
12	—	NOT USED
13	—	NOT USED
14	—	CAN +
15	—	NOT USED
16	—	NOT USED

Transmission Range (TR) Sensor/Control Module Connector A Vehicle Harness

Transaxle Control Module Terminal Testing



NOTE: For testing, place the positive lead on the terminal with the + sign and place the negative lead on the terminal with the - sign.

Pin Number	Pin Acronym	Descrip-tion	Input/ Output to TCU	Measure pins	Condition For Testing	Reference Value
A1	B+	Battery voltage	—	+A1 to -ground	Hot at all times	10-14 volts
A5	STLK	Start lock signal output	Output	+A5 to -A9	Ignition on in PARK Ignition on in other than PARK	0-0.8 volts 9-14 volts
A6	CAN L	CAN communi-cation low	Input/output	+A6 to -A9	Engine idling	—
A7	LIN	LIN line communi-cation signal	Input	+A7 to -A9	—	—
A8	CAN H	CAN communi-cation high	Input/output	+A8 to -A9	Engine idling	—
A9	GRND	TCU ground	—	+ground to -chassis ground	—	—
A11	IG	Ignition switch signal input	Input	+A11 to -A9	Ignition ON	10-14 volts
A14	K	Diagnostic signal	Input/output	+A14 to -A9	—	—
B1	PCA ground	PCA ground (SLTG)	—	—	—	—
B2	SSB	Shift solenoid B (S2)	Output	+B2 to -ground	Vehicle in PARK, engine idling	0-1.5 volts

Transaxle Control Module Terminal Testing (Part 1)

Pin Number	Pin Acronym	Descrip-tion	Input/ Output to TCU	Measure pins	Condition For Testing	Reference Value
B3	PCA	Pressure control solenoid A	Output	+B3 to -B1	Vehicle in PARK, engine idling	—
B4	TCC ground	Torque converter clutch solenoid ground (SLUG)	—	—	—	—
B5	SSA	Shift solenoid A (S1)	Output	+B5 to -ground	Vehicle in PARK, engine idling	0-1.5 volts
B7	TFT ground	Trans-mission fluid temperature sensor ground (OTG)	—	—	—	—
B8	TFT	Trans-mission fluid temperature sensor (OT)	Input	+B8 to -B7	TFT at 10°C to 110°C (50°F to 230°F)	4.0 to 0.0 volts
B9	TCC	Torque converter clutch solenoid (SLU)	Output	+B9 to -B4	Vehicle in PARK, engine idling	—
B10	SSC ground	Shift solenoid C ground (SLC1G)	—	—	—	—
B11	SSC	Shift solenoid C (SLC1)	Output	+B11 to -B10	Vehicle in PARK, engine idling	—
B12	ISS	Input shaft speed sensor signal (NIN)	Input	+B12 to -B13	Vehicle in PARK, engine idling	—
B13	ISS ground	Input shaft speed sensor signal (NIN)	—	—	—	—
B14	SSE	Shift solenoid E	Output	+B14 to -B22	Vehicle in PARK, engine idling	—

Transaxle Control Module Terminal Testing (Part 2)

Pin Number	Pin Acronym	Descrip-tion	Input/ Output to TCU	Measure pins	Condition For Testing	Reference Value
B16	SSF ground	Shift solenoid F ground (SLB1G)	—	—	—	—
B17	SSD	Shift solenoid D (SLC2)	Output	+B17 to -B18	Vehicle in PARK, engine idling	—
B18	SSD ground	Shift solenoid D ground (SLC2G)	—	—	—	—
B19	OSS	Output shaft speed sensor signal (SP+)	Input	+B19 to -B20	Vehicle speed approximately 20 km/h (12 mph)	—
B20	OSS ground	Output shaft speed sensor ground (SP-)	—	—	—	—
B21	SSF	Shift solenoid F (SLB1G)	Output	+B21 to -B16	Vehicle in PARK, engine idling	—
B22	SSE ground	Shift solenoid E ground (SLC3G)	—	—	—	—

Transaxle Control Module Terminal Testing (Part 3)

Monitors, Trips and/or Drive Cycle

Transaxle Drive Cycle Test

CAUTION: Prior to carrying out the transaxle drive cycle test, make sure that the transaxle is full of fluid.

NOTE: Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

After carrying out the Quick Test, use this Transaxle Drive Cycle Test for checking continuous codes:

NOTE: The Transaxle Drive Cycle Test must be followed exactly. Malfunctions must occur multiple times consecutively for shift error or torque converter clutch TCC) code to set.

NOTE: When carrying out the Transaxle Drive Cycle Test, see the solenoid operation chart for correct solenoid operation. Refer to Pinpoint Tests - Non OSC Equipped Vehicles. See: Actuators and Solenoids - Transmission and Drivetrain/Actuators and Solenoids - A/T/Pressure Regulating Solenoid/Testing and Inspection/6 Speed Automatic Transaxle

1. Record and then erase Quick Test codes.
2. Warm engine to normal operating temperature.
3. Make sure transmission fluid level is correct.
4. With transaxle in DRIVE, moderately accelerate from stop to **80 km/h (50 mph)**. This allows the transaxle to shift into 6th gear. Hold speed and throttle steady for **minimum of 15 seconds.** Brake to a stop and remain stopped for **minimum of 20 seconds.**
5. Repeat Step 4 **at least 5 times.**
6. Carry out Quick Test and record continuous codes.
   - ^ If DTCs are present, refer to Diagnostic Trouble Code Charts. Service all non-transaxle DTCs first as they can directly affect the operation of the transaxle. Repeat the Quick Test and Road Test to verify the correction. Erase DTCs, carry out the drive cycle test, and repeat the Quick Test after completing service on the DTCs.
   - ^ If the continuous test passes (system pass) and a concern is still present, refer to Diagnosis By Symptom and check TSBs for diagnostic concern. See: Diagnosis By Symptom

After On-Board Diagnostics

NOTE: The vehicle wiring harness, powertrain control module and non-transaxle sensors may affect transaxle operations. Service these concerns first.

After the On-Board Diagnostic procedures are completed, service all DTCs.

Begin with non-transaxle related DTCs, then service any transaxle related DTCs. Refer to the Diagnostic Trouble Code Charts for information on Condition and Symptoms. This chart will be helpful in referring to the correct manual(s) and to aid in diagnosing internal transaxle concerns and external non-transaxle inputs. The pinpoint tests are used in diagnosing electrical concerns of the transaxle. Make sure that the vehicle wiring harness and the powertrain control module are diagnosed as well. Refer to Computers and Control Systems for diagnosing non-transaxle electronic components. The diagnostic routine hydraulic/mechanical charts will help in diagnosing internal transaxle concerns and external non-transaxle inputs.

Before Pinpoint Tests

NOTE: Prior to entering pinpoint tests, check the powertrain control module (PCM) wiring harness for correct connections, bent or broken pins, corrosion, loose wires, correct routing, correct seals and their condition. Check the PCM, sensors and actuators for damage. Refer to Computers and Control Systems.

NOTE: 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 transaxle concerns.