

Four-Wheel Drive Systems - Electronic Shift

Diagnostic Trouble Code (DTC) Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.

Diagnostic Trouble Code Chart

Module	DTC	Description	Action <i>New: hover over Pinpoint Test links to show title</i>
TCCM	C1010:00	Continuous Vacuum Hublock (CVH) Solenoid: No Sub Type Information	GO to Pinpoint Test F
TCCM	C1010:11	Continuous Vacuum Hublock (CVH) Solenoid: Circuit short to Ground	GO to Pinpoint Test F
TCCM	C1010:12	Continuous Vacuum Hublock (CVH) Solenoid: Circuit Short to Battery	GO to Pinpoint Test F
TCCM	C1010:13	Continuous Vacuum Hublock (CVH) Solenoid: Circuit Open	GO to Pinpoint Test F
TCCM	P0562:00	System Voltage Low: No Sub Type Information	GO to Pinpoint Test A
TCCM	P0563:00	System Voltage High: No Sub Type Information	GO to Pinpoint Test B
TCCM	P06B8:00	Internal Control Module Non-Volatile Random Access Memory (NVRAM) Error: No Sub Type Information	GO to Pinpoint Test X
TCCM	P1812:00	4- Wheel Drive Mode Select Circuit Failure: No Sub Type Information	GO to Pinpoint Test D
TCCM	P1815:00	4- Wheel Drive Mode Select Short To Ground: No Sub Type Information	GO to Pinpoint Test D
TCCM	P1825:00	4- Wheel Drive Clutch Relay Open Circuit: No Sub Type Information	GO to Pinpoint Test G
TCCM	P1826:00	4- Wheel Drive Low Clutch Relay Circuit To Battery: No Sub Type Information	GO to Pinpoint Test G
TCCM	P1827:00	4- Wheel Drive Low Clutch Relay Circuit To Ground: No Sub Type Information	GO to Pinpoint Test G
TCCM	P1839:00	Transfer Case Shift Motor Open Circuit: No Sub Type Information	GO to Pinpoint Test D
TCCM	P1840:00	Transfer Case Shift Motor Short Circuit To Battery: No Sub Type Information	GO to Pinpoint Test D
TCCM	P1841:00	Transfer Case Shift Motor Short Circuit To Ground: No Sub Type Information	GO to Pinpoint Test D
TCCM	P1849:00	Transfer Case Contact Plate 'A' Short Circuit To Ground: No Sub Type Information	GO to Pinpoint Test D
TCCM	P184A:00	Transfer Case Unable To Transition Between 4x2 and 4x4 Mode: No Sub Type Information	GO to Pinpoint Test D
TCCM	P184B:00	Transfer Case Unable To Transition Between 4x4 High and 4x4 Low Range: No Sub Type Information	GO to Pinpoint Test E

Module	DTC	Description	Action
			<i>New: hover over Pinpoint Test links to show title</i>
TCCM	P1853:00	Transfer Case Contact Plate 'B' Short Circuit to Ground: No Sub Type Information	GO to Pinpoint Test D
TCCM	P1857:00	Transfer Case Contact Plate 'C' Short Circuit to Ground: No Sub Type Information	GO to Pinpoint Test D
TCCM	P1861:00	Transfer Case Contact Plate 'D' Short Circuit to Ground: No Sub Type Information	GO to Pinpoint Test D
TCCM	P1867:00	Transfer Case Contact Plate General Circuit Failure: No Sub Type Information	GO to Pinpoint Test D
TCCM	P1891:00	Transfer Case Contact Plate Ground Return Open Circuit: No Sub Type Information	GO to Pinpoint Test D
TCCM	U0100:00	Lost Communication With ECM /PCM "A": No Sub-Type Information	GO to Pinpoint Test K
TCCM	U0101:00	Lost Communication With TCM: No Sub Type Information	GO to Pinpoint Test L
TCCM	U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module "A" : No Sub Type Information	GO to Pinpoint Test M
TCCM	U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test N
TCCM	U0418:00	Invalid Data Received From Brake System Control Module: No Sub Type Information	GO to Pinpoint Test P
TCCM	U0423:82	Invalid Data Received from Instrument Panel Cluster Control Module: Alive / Sequence Counter Incorrect / Not Updated	GO to Pinpoint Test O
TCCM	U2300:54	Central Configuration: Missing Calibration	GO to Pinpoint Test Q
TCCM	U2300:55	Central Configuration: Not Configured	GO to Pinpoint Test R
TCCM	U2300:56	Central Configuration: Invalid / Incompatible Configuration	GO to Pinpoint Test S
TCCM	U2300:64	Central Configuration: Signal Plausibility Failure	GO to Pinpoint Test T
TCCM	U3000:04	Control Module: System Internal Failure	GO to Pinpoint Test U
TCCM	U3000:46	Control Module: Calibration / Parameter Memory Failure	GO to Pinpoint Test V
TCCM	U3000:49	Control Module: Internal Electronic Failure	GO to Pinpoint Test W
TCCM	U300D:11	Ignition Input On/Start: Circuit Short To Ground	GO to Pinpoint Test D
TCCM	P185A:00	Differential Lock-Up Input Switch Circuit High: No Sub Type Information	REFER to: Electronic Locking Differential (ELD) (205-02D Rear Drive Axle/Differential - Vehicles With: Ford 10.5 Inch Ring Gear, Diagnosis and Testing).
TCCM	P185D:00	Differential Lock-Up Control Circuit Performance: No Sub Type Information	REFER to: Electronic Locking Differential (ELD) (205-02D Rear Drive Axle/Differential - Vehicles With: Ford 10.5 Inch Ring Gear, Diagnosis and Testing).
TCCM	P187C:00	Differential Lock-Up Control Circuit/Open: No Sub Type Information	REFER to: Electronic Locking Differential (ELD) (205-02D Rear Drive Axle/Differential - Vehicles With: Ford 10.5 Inch Ring Gear, Diagnosis and Testing).

Module	DTC	Description	Action <i>New: hover over Pinpoint Test links to show title</i>
TCCM	P187D:00	Differential Lock-Up Control Circuit Low: No Sub Type Information	REFER to: Electronic Locking Differential (ELD) (205-02D Rear Drive Axle/Differential - Vehicles With: Ford 10.5 Inch Ring Gear, Diagnosis and Testing).
TCCM	P187E:00	Differential Lock-Up Control Circuit High: No Sub Type Information	REFER to: Electronic Locking Differential (ELD) (205-02D Rear Drive Axle/Differential - Vehicles With: Ford 10.5 Inch Ring Gear, Diagnosis and Testing).

Principles of Operation

Electronic Shift-On-The-Fly (ESOF) System

The Electronic Shift-On-The-Fly (ESOF) system is an electronic shift system that allows the operator to choose between 2 different Four-Wheel Drive (4WD) modes as well as 2-Wheel Drive (2WD). The operator can switch between 2H (4X2) and 4H (4X4 HIGH) mode at any forward speed. To engage or disengage 4L (4X4 LOW), the TCCM requires that the vehicle speed be less than 5 km/h (3 mph) and the transmission in NEUTRAL. This ESOF system includes a Continuous Vacuum Hublock (CVH) system at the front wheel ends. The selector on the CVH, when turned fully counterclockwise to the AUTO position, engages/disengages the hub depending on the driver-selected 4WD mode of operation. The CVH also contains a manual override. When the selector is rotated fully clockwise to the LOCK position, the 4WD vacuum and electronic system used for coupling the front axle to the wheels is bypassed and the front wheels and front driveline remains coupled at all times.

The transfer case is equipped with an electro-mechanical synchronizing clutch used to synchronize the front driveline to the rear driveline. When the MSS on the instrument panel is turned, the TCCM powers the transfer case shift motor, which activates a shift fork and engages the clutch. When the desired position is reached, as determined by the encoder position inputs to the TCCM, power to the transfer case shift motor is removed. When the transfer case front and rear output shafts are synchronized, the lockup collar mechanically engages the mainshaft hub to the drive sprocket. At this point, the front axle CVH system is engaged. IPC 4WD system indicator operation is controlled via the IPC which interprets outputs from the TCCM via the vehicle HS-CAN.

Feature inputs

- MSS
- Steering wheel angle (from the ABS module)
- Wheel speed signal from ABS module
- APP from PCM
- Transfer case shift motor contact plate position inputs A, B, C and D

Feature outputs:

- Transfer case electric shift motor outputs
- PWM signal to transfer case clutch
- 4WD message center and indicators
- Continuous vacuum hublock (CVH) solenoid command output

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.
3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart.

Symptom Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

In most circumstances, the TCCM sets DTCs to help guide with diagnostics. Refer to the DTC Chart before using the symptom chart. The Symptom column lists the vehicle condition. The Possible Sources column lists a detailed vehicle condition. The Action column lists the action to be performed to determine the cause of the condition. Each action lists the components that can cause the system and the individual components in that system. The components are listed in order of disassembly. Use the list of components and the required action to focus on disassembly inspections for the root cause of the concern.

Four-Wheel Drive (4WD) System

Symptom	Possible Sources	Action
No communication with the TCCM	- Scan tool - DLC - TCCM - Wiring, terminals or connectors.	REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).
The 4X4 mode indicators do not operate correctly	- Wiring, terminals or connectors 4WD system fault - MSS - IPC - HS-CAN - TCCM	GO to Pinpoint Test C
The vehicle does not shift between 2H (2WD) and 4H modes correctly	- Wiring, terminals or connectors - MSS - Continuous Vacuum Hublock (CVH) system - Transfer case - TCCM	GO to Pinpoint Test D
The vehicle does not shift between 4H and 4L modes correctly	- Wiring, terminals or connectors - Continuous Vacuum Hublock (CVH) - Continuous Vacuum Hublock (CVH) solenoid - Transfer case - Vacuum leaks - Front axle assembly - TCCM - MSS	GO to Pinpoint Test E

• The front axle does not engage/disengage correctly	• Transfer case and related components • Continuous Vacuum Hublock (CVH) and related components • Wheel/tire assemblies	• GO to Pinpoint Test F
• Four-Wheel Drive (4WD) does not engage at speed correctly	• Wiring, terminals or connectors • Transfer case dual-cone synchronizer • Front axle assembly • TCCM	• GO to Pinpoint Test G
• The transfer case jumps out of gear	• CVH • MSS • Transfer case	• GO to Pinpoint Test H
• Vehicle pulsates or shudders in a straight line (straight line driveline wind up)	• Unmatched tire sizes • Unequal amounts of tire wear • Unequal tire inflation pressures • Unmatched front and rear axle ratios • Front and rear axles	• GO to Pinpoint Test I
• Clunking noise during 4WD engagement, especially at high speeds	• Vehicle speed • Torque to the front axle	• GO to Pinpoint Test F

The transfer case makes noise	- Unequal tire inflation pressures - Unmatched tire sizes - Unequal amounts of tire wear - Internal components - Fluid level	- MAKE SURE that all tires and wheels are the same size and the inflation pressures are correct. - CHECK tire tread wear to see if there is more than 0.15 mm (0.06 in) difference in tread wear between front and rear. INTERCHANGE one front wheel and one rear wheel. ROAD TEST again. - OPERATE the vehicle in all transmission gears. If there is noise in the transmission in NEUTRAL, or in some gears and not in others, REMOVE and REPAIR the transmission. REFER to: Diagnosis By Symptom (307-01A Automatic Transmission, Transfer Case and Power Transfer Unit - 6-Speed Automatic Transmission “6R100, Diagnosis and Testing). If there is noise in all gears, DISASSEMBLE the transfer case. REFER to: Transfer Case (308-07B Transfer Case, Diagnosis and Testing). CHECK the planetary gears, the bearings, the upper and lower drive sprockets and drive chain for damage. INSTALL new parts as necessary. - FILL with the specified fluid.
Unable to duplicate customer concern	4WD system and/or related components	CARRY OUT the Electronic Shift-On-The-Fly (ESOF) Functional Test. GO to Pinpoint Test J

Symptom Chart “NVH

NOTE: NVH symptoms should be identified using the diagnostic tools that are available. For a list of these tools, an explanation of their uses and a glossary of common terms, refer to Section 100-04. Since it is possible any one of multiple systems may be the cause of a symptom, it may be necessary to use a process of elimination type of diagnostic approach to pinpoint the responsible system.

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.

REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Symptom	Possible Sources	Action
Transfer case whine “noise at all ranges	- Incorrect fluid level or fluid quality - Worn oil pump - Under-inflated or oversized tires	- CHECK the transfer case is filled to the correct level and with the specified fluid. REFER to: Transfer Case Draining and Filling (308-07B Transfer Case, General Procedures). - DISASSEMBLE the transfer case. CHECK the oil pump for wear or damage. REPAIR as necessary. REFER to: Transfer Case (308-07B Transfer Case, Disassembly and Assembly). - CONFIRM the tires and wheels are correct for the vehicle. CHECK that the tire inflation pressures are correct.
Transfer case growl/rumble “noise at all ranges	Damaged or worn bearings or planetary gear	DISASSEMBLE the transfer case. CHECK the bearings or planetary gear for wear or damage. REPAIR as necessary. REFER to: Transfer Case (308-07B Transfer Case, Disassembly and Assembly).
Transfer case scraping/grating “noise at all ranges	Excessively stretched drive chain hitting the case	DISASSEMBLE the transfer case. CHECK the drive chain for wear or damage. REPAIR as necessary. REFER to: Transfer Case (308-07B Transfer Case, Disassembly and Assembly).

Transfer case howl/hum noise at all ranges or 4WD modes only	Worn or damaged sun (input) gear, clutch pack (intermediate) gear or output shaft gear	DISASSEMBLE the transfer case. CHECK the gears for wear or damage. REPAIR as necessary. REFER to: Transfer Case (308-07B Transfer Case, Disassembly and Assembly).
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Pinpoint Tests

PINPOINT TEST A : DTC (DIAGNOSTIC TROUBLE CODE) P0562:00

NOTE: DTCs P0562:00 can set if the vehicle has been recently jump started, or the battery has been recently charged or discharged. The battery may become discharged due to excessive load(s) on the charging system from aftermarket accessories or if the battery has been left unattended with the accessories on.

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

The MSS communicates the operator's choice to the TCCM. The TCCM then controls the transfer case clutch, transfer case motor and continuous vacuum hublocks (CVH) as necessary. If the vehicle is not responding to the operator's intentions, systematically check the necessary inputs and outputs of the TCCM, components of the transfer case, continuous vacuum hublocks (CVH) components and halfshafts. Check all circuits for opens and shorts to power or ground.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM P0562:00	System Voltage Low: No Sub Type Information	This DTC sets when the TCCM detects less than 9 volts of battery voltage for 5 seconds or more at TCCM.

Possible Sources

- Wiring, terminals or connectors
- TCCM

A1 RECHECK THE TCCM (TRANSFER CASE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

- Using a diagnostic scan tool, clear the TCCM DTCs.
- Ignition OFF.
- Ignition ON.
- Using a diagnostic scan tool, carry out the TCCM self-test.

Is DTC P0562:00 still present?

Yes	GO to A2
No	The system is operating correctly at this time. The DTC may have set due to a previous low battery voltage condition.

A2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE PCM (POWERTRAIN CONTROL MODULE)

- Using a diagnostic scan tool, retrieve all CMDTCs.

Are any charging system Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	DIAGNOSE the vehicle charging concern. REFER to: Generator - 7.3L 2V DEVCT V8 (239kW/320PS) (J0) (414-02 Generator and Regulator, Removal and Installation). REFER to: Charging System - 6.7L Power Stroke Diesel (414-00 Charging System - General Information, Diagnosis and Testing). REFER to: Charging System - 6.7L Power Stroke Diesel (414-00 Charging System - General Information, Diagnosis and Testing).
No	GO to A3

A3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

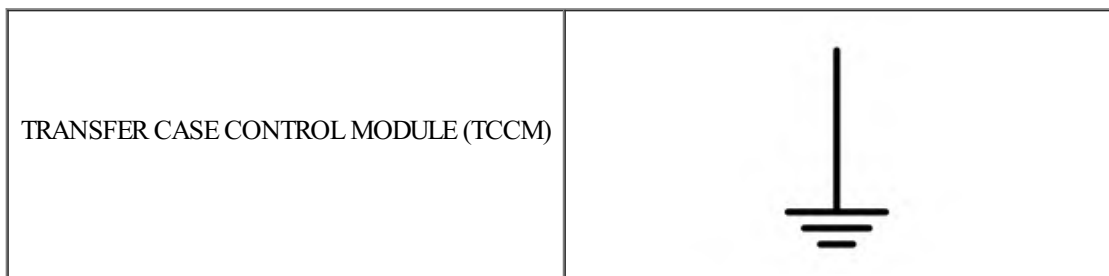
- Carry out the Battery Condition Test.
REFER to: Battery (414-01 Battery, Mounting and Cables, Diagnosis and Testing).

Did the battery pass the condition test?

Yes	GO to A4
No	INSTALL a new battery. REFER to: Battery (414-01 Battery, Mounting and Cables, Diagnosis and Testing).

A4 CHECK THE TCCM (TRANSFER CASE CONTROL MODULE) VOLTAGE SUPPLY

- Ignition OFF.
- Disconnect TCCM [C2371A](#) and [C2371B](#).
- Ignition ON.
- Measure:



Positive Lead	Measurement / Action	Negative Lead
C2371A-7		Ground
C2371B-6		Ground

Is the voltage within 1 volt of the recorded battery voltage?

Yes	GO to A5
No	VERIFY BJB fuse 13 (25A) and fuse 52 (10A) are OK. If OK, REPAIR the affected circuit for high resistance or an open. If not OK, REFER to the Wiring Diagrams manual to identify the cause of the circuit short.

A5 CHECK THE TCCM (TRANSFER CASE CONTROL MODULE) GROUND CIRCUIT FOR AN OPEN

- Measure:

TRANSFER CASE CONTROL MODULE (TCCM)	
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Positive Lead	Measurement / Action	Negative Lead
C2371B-1	Ω	Ground
C2371B-3	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A6
No	Verify the ground eyelet is clean and torqued to specification. If OK, REPAIR the circuit.

A6 VERIFY ALL WIRING CONNECTIONS

- Ignition OFF.
- Disconnect and inspect TCCM [C2371A](#) and related in-line electrical connectors.
- Using a good light source, inspect **all** disconnected electrical connectors for the following:
 - corrosion - install new connector or terminal and clean the module pins
 - damaged or bent pins - install new terminals or pins
 - pushed-out pins - install new pins as necessary
 - spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to A7
No	REPAIR the connector, terminals as necessary.

A7 CHECK FOR CORRECT TCCM (TRANSFER CASE CONTROL MODULE) OPERATION

- Connect TCCM [C2371A](#) and [C2371B](#) and all related in-line electrical connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable TSB's. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no TSB's address this concern, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

PINPOINT TEST B : DTC (DIAGNOSTIC TROUBLE CODE) P0563:00

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

The TCCM requires an operating voltage that is between 9 and 16 volts. The TCCM receives this voltage from the BJB and has a single ground circuit. Excessive resistance or an open in one or more of these circuits, a discharged battery or a inoperative charging system results in the TCCM setting a DTC.

An overcharging condition in the charging system results in the TCCM setting a DTC. This DTC may also set in the TCCM due to battery charging or vehicle jump starting events.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM P0563:00	System Voltage High: No Sub Type Information	This DTC sets in continuous memory if the voltage supplied to the TCCM is above 16 volts for more than 3 seconds.

Possible Sources

- Charging system concern
- TCCM

B1 CHECK FOR HIGH VOLTAGE DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

- Using a diagnostic scan tool, retrieve all CMDTCs.

Are any charging system Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	DIAGNOSE the vehicle charging concern. REFER to: Generator - 7.3L 2V DEVCT V8 (239kW/320PS) (J0) (414-02 Generator and Regulator, Removal and Installation). REFER to: Charging System - 6.7L Power Stroke Diesel (414-00 Charging System - General Information, Diagnosis and Testing). REFER to: Charging System - 6.7L Power Stroke Diesel (414-00 Charging System - General Information, Diagnosis and Testing).
No	GO to B2

B2 CHECK THE BATTERY VOLTAGE

- Turn off all interior lights, exterior lights and accessories.
- **NOTE:** Do not allow the engine speed to increase above 2,000 RPM while performing this step or the generator may self-excite and result in default charging system output voltage. If engine speed goes above 2,000 RPM, turn the engine off and restart the engine before performing this step.

Start and run the engine at approximately 1,500 RPM for 3 minutes while monitoring the battery voltage.

Is the battery voltage between 13 and 15.2 volts?

Yes	GO to B3
No	DIAGNOSE the overcharging condition. REFER to: Generator - 7.3L 2V DEVCT V8 (239kW/320PS) (J0) (414-02 Generator and Regulator, Removal and Installation). REFER to: Charging System - 6.7L Power Stroke Diesel (414-00 Charging System - General Information, Diagnosis and Testing). REFER to: Charging System - 6.7L Power Stroke Diesel (414-00 Charging System - General Information, Diagnosis and Testing).

B3 RECHECK THE TCCM (TRANSFER CASE CONTROL MODULE) FOR DTC (DIAGNOSTIC TROUBLE CODE) P0563:00

- Ignition OFF.
- Ignition ON.
- Using a diagnostic scan tool, clear the TCCM DTCs.
- Ignition OFF.
- Ignition ON.
- Using a diagnostic scan tool, carry out the TCCM self-test.

Is DTC P0563:00 still present?

Yes	GO to B4
No	The system is operating normally at this time. The DTC may have set previously during battery charging or while jump starting the vehicle.

B4 VERIFY ALL WIRING CONNECTIONS

- Ignition OFF.
- Disconnect and inspect TCCM [C2371A](#) and related in-line electrical connectors.
- Using a good light source, inspect **all** disconnected electrical connectors for the following:
 - corrosion - install new connector or terminal and clean the module pins
 - damaged or bent pins - install new terminals or pins
 - pushed-out pins - install new pins as necessary
 - spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	REPAIR as necessary.

PINPOINT TEST C : THE 4WD MODE INDICATORS DO NOT OPERATE CORRECTLY

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

4WD indicator status is transmitted to the IPC from the TCCM through the HS-CAN then displayed in the IPC. The message center (if equipped) displays 4H when in 4X4 HIGH and 4L in 4X4 LOW. No continuous indicators are displayed when the transfer case is in NEUTRAL or 2H mode. For information about HS-CAN, REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).

Possible Sources

- HS-CAN
- Wiring, terminals or connectors
- 4WD system fault
- IPC
- TCCM
- MSS

WARNING: When directed to drive the vehicle as part of this test, drive the vehicle on a hard surface in an area without traffic to prevent a crash. Failure to follow these instructions may result in personal injury.

C1 CHECK FOR IPC DTCS

- Ignition ON.
- Enter the following diagnostic mode: IPC Self-Test.

Are any DTCs present?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing).
No	GO to C2

C2 CHECK FOR TCCM DTCS

- Enter the following diagnostic mode: TCCM Self-Test.

Are any DTCs present?

Yes	REFER to the TCCM DTC chart.
No	GO to C3

C3 CHECK THE IGNITION POSITION (KEYPOS) AND IGNITION STATUS (IGN_SW) PIDS

- Enter the following diagnostic mode: TCCM Datalogger.
- Monitor the KEYPOS and IGN_SW PIDs while cycling through each position.

Do the ignition PIDs match the ignition switch positions?

Yes	GO to C4
No	If the IGN_SW PID did not match, CHECK BJB fuse 52 (10A). If the fuse is OK, REPAIR the open if the fuse is not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short. If the IGN_SW PID did not match, REFER to: Steering Wheel and Column Electrical Components (211-05 Steering Wheel and Column Electrical Components, Diagnosis and Testing).

C4 CHECK THE 4WD SYSTEM INDICATION IN 2H

- Switch the MSS to 2H while monitoring the IPC.

Does 4X4 HIGH or 4X4 LOW display in the IPC ?

Yes	GO to C5
No	GO to C6

C5 CHECK THE 4WD SYSTEM INDICATION IN 4H

- Switch the MSS to 4H while monitoring the IPC.

Does 4X4 HIGH display in the IPC ?

Yes	GO to C8
No	GO to C9

C6 CHECK THE MSS USING THE 4WD SWITCH STATUS (4X4_SW) PID

- Enter the following diagnostic mode: TCCM DataLogger .
- Monitor the 4X4_SW PID while switching to each MSS position.

Does the 4X4_SW PID match the MSS position?

Yes	GO to C7
No	INSTALL a new MSS. REFER to: Mode Select Switch (MSS) (308-07A Four-Wheel Drive Systems, Removal and Installation).

C7 CHECK THE TCCM PIDS IN 2H

- Enter the following diagnostic mode: TCCM DataLogger .
- Command the Transfer Case Contact Plate Power (PLATE_PWR_OS) PID to energize the transfer case shift motor assembly.
- Monitor the Continuous Vacuum Hublock (CVH) (HUBLOCK_OUT_ENGAGED) PID and the Transfer Case Contact Plate Switch A (PLATE_A), B (PLATE_B), C (PLATE_C) and D (PLATE_D) PIDs with the MSS in the 2H position.

MSS Position	Contact Plate Position			
	PLATE_A	PLATE_B	PLATE_C	PLATE_D
2H Mode	Closed	Open	Closed	Closed

Do the PID's indicate the CVH solenoid is De-energized (PID status No) and the gearmotor encoder assembly is in 2H position?

Yes	END the active command. CHECK the IPC for faults. REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing).
No	END the active command. GO to Pinpoint Test D

C8 CHECK THE 4WD SYSTEM INDICATION IN 4L

- **NOTE:** When shifting in or out of 4L, the transmission must be in NEUTRAL and the vehicle stopped or moving less than 5 km/h (3 mph).

With the vehicle at a stop and the transmission in NEUTRAL, switch the MSS to 4L while monitoring the IPC.

Does the IPC display 4X4 LOW?

Yes	The 4WD indicators are operating correctly. CARRY OUT the Electronic Shift-On-The-Fly (ESOF) Functional Test. GO to Pinpoint Test J
No	GO to C10

C9 CHECK THE TCCM PIDS IN 4H

- Switch the MSS to 4H.
- Enter the following diagnostic mode: TCCM Datalogger.
- Command the Transfer Case Contact Plate Power (PLATE_PWR_OS) PID to energize the transfer case shift motor assembly.
- Monitor the CVH Output Control (HUBLCK_OUT_ENGAGED) PID and the Transfer Case Contact Plate Switch A (PLATE_A), B (PLATE_B), C (PLATE_C) and D (PLATE_D) PIDs with the MSS in the 4H position.

MSS Position	Contact Plate Position			
	PLATE_A	PLATE_B	PLATE_C	PLATE_D
4H Mode	Open	Closed	Closed	Open

Do the PIDs indicate the CVH solenoid is energized (PID status Yes) and the gearmotor encoder assembly is in 4H position?

Yes	CHECK the IPC for faults. REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing).
No	END the active command. GO to Pinpoint Test J

C10 CHECK THE TCCM PIDS IN 4L

- Enter the following diagnostic mode: TCCM Datalogger.
- Command the Transfer Case Contact Plate Power (PLATE_PWR_OS) PID to energize the transfer case shift motor assembly.
- Monitor the CVH Output Control (HUBLCK_OUT_ENGAGED) PID and the Transfer Case Contact Plate Switch A (PLATE_A), B (PLATE_B), C (PLATE_C) and D (PLATE_D) PIDs with the MSS in the 4L position.

MSS Position	Contact Plate Position			
	PLATE_A	PLATE_B	PLATE_C	PLATE_D
4L Mode	Open	Closed	Open	Closed

Do the PIDs indicate the CVH solenoid is energized (PID status Yes) and the gearmotor encoder assembly is in 4L position?

Yes	CHECK the IPC for faults. REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing).
No	END the active command. GO to Pinpoint Test J

PINPOINT TEST D : THE VEHICLE DOES NOT SHIFT BETWEEN 2H AND 4H MODES CORRECTLY

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

The MSS communicates the operator's choice to the TCCM. As the TCCM commands the transfer case shift motor to 4H mode, the

transfer case shift fork moves to engage 4H mode and the electro-mechanical synchronizer clutch is energized to bring the front driveline to the same speed as the rear driveline. The TCCM also activates the hublock vacuum solenoid, providing vacuum and engaging the Continuous Vacuum Hublock (CVH) at each front wheel. If the vehicle is not responding to the operator's intentions, systematically check the necessary inputs and outputs of the TCCM, components of the transfer case, CVH components and axle shafts. Check all circuits for opens and shorts to power or ground.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM P1812:00	4-Wheel Drive Mode Select Circuit Failure: No Sub Type Information	This DTC sets when the TCCM detects an open circuit/short to battery range. Four-Wheel Drive (4WD) system mode cannot be changed.
TCCM P1815:00	4-Wheel Drive Mode Select Short Circuit To Ground: No Sub Type Information	This DTC sets when TCCM detects a short to ground. Fault results in Continuous Vacuum Hublock (CVH) engaged all the time.
TCCM P1839:00	Transfer Case Shift Motor Open Circuit: No Sub Type Information	This DTC sets when TCCM detects an open circuit. Fault results in Continuous Vacuum Hublock (CVH)s engaged all the time.
TCCM P1840:00	Transfer Case Shift Motor Short Circuit To Battery: No Sub Type Information	This DTC sets when the TCCM detects a short to voltage. Gearmotor encoder assembly moves are prevented when this DTC is set.
TCCM P1841:00	Transfer Case Shift Motor Short Circuit To Ground: No Sub Type Information	This DTC sets when the TCCM detects a short to ground. Gearmotor encoder assembly moves are prevented when this DTC is set.
TCCM P1849:00	Transfer Case Contact Plate 'A' Short Circuit To Ground: No Sub Type Information	This DTC sets when the TCCM detects a short to ground. Gearmotor encoder assembly moves are prevented when this DTC is set. The TCCM does not complete mode change if a change in gearmotor encoder assembly position is required.
TCCM P184A:00	Transfer Case Unable To Transition Between 4x2 and 4x4 Mode: No Sub Type Information	This DTC sets if target motor position is not reached after the maximum number of allowed blocked shift retries, for 2H to 4H or 4H to 2H. Fault clear If targeted position is reached.
TCCM P1853:00	Transfer Case Contact Plate 'B' Short Circuit To Ground: No Sub Type Information	This DTC sets when the TCCM detects a short to ground. Gearmotor encoder assembly moves are prevented when this DTC is set. The TCCM does not complete mode change if a change in gearmotor encoder assembly position is required.
TCCM P1857:00	Transfer Case Contact Plate 'C' Short Circuit To Ground: No Sub Type Information	This DTC sets when the TCCM detects a short to ground. Gearmotor encoder assembly moves are prevented when this DTC is set. The TCCM does not complete mode change if a change in gearmotor encoder assembly position is required.
TCCM P1861:00	Transfer Case Contact Plate 'D' Short Circuit To Ground: No Sub Type Information	This DTC sets when the TCCM detects a short to ground. Gearmotor encoder assembly moves are prevented when this DTC is set. The TCCM does not complete mode change if a change in gearmotor encoder assembly position is required.
TCCM P1867:00	Transfer Case Contact Plate General Circuit Failure: No Sub Type Information	This DTC sets when an invalid gearmotor encoder assembly position is detected during selection of a new 4WD mode or during a motor movement. If the gearmotor encoder assembly is not moving, shift motor movement is prevented. If the gearmotor encoder assembly is moving when this DTC sets, the gearmotor encoder assembly moves to the high-side mechanical stop.
TCCM P1891:00	Transfer Case Contact Plate Ground Return Open Circuit: No Sub Type Information	This DTC sets when the TCCM detects an open in the transfer case contact plate return circuit.
TCCM U300D:11	Ignition Input On/Start: Circuit Short To Ground	This DTC sets when the TCCM detects a short to ground.

Possible Sources

- Wiring, terminals or connectors
- MSS
- Transfer case
- Continuous Vacuum Hublock (CVH) system
- TCCM

D1 CHECK FOR TCCM DTCS

- Enter the following diagnostic mode: TCCM Self-Test.

Are any DTCs present?

Yes	For DTC P1812:00, GO to D5 For DTC P1815:00, GO to D7 For DTC P1839:00, GO to D21 For DTC P1840:00, GO to D19 For DTC P1841:00, GO to D20 For DTC P184A:00, GO to D13 For DTC P1867:00, GO to D14 For DTCs P1849:00, P1853:00, P1857:00, P1861:00, P1891:00, GO to D15 For DTC U300D:11, GO to D2 For all other DTCs, REFER to the TCCM DTC Chart.
No	GO to D2

D2 CHECK THE IGNITION POSITION KEYPOS AND IGNITION STATUS IGN_SW PIDS

- Enter the following diagnostic mode: TCCM Datalogger.
- Monitor the (KEYPOS) and (IGN_SW) PIDs.

Do the ignition PIDs match the ignition switch positions?

Yes	GO to D3
No	If the KEYPOS PID did not match, CHECK Battery Junction Box (BJB) fuse 52 (10A). If the fuse is OK, REPAIR the circuit. If the fuse is not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short. After the fault is repaired, CLEAR the DTCs. REPEAT the self-test. If the KEYPOS PID did not match, to diagnose the ignition switch, REFER to: Steering Wheel and Column Electrical Components (211-05 Steering Wheel and Column Electrical Components, Diagnosis and Testing). After the fault is repaired, CLEAR the DTCs. REPEAT the self-test.

D3 CHECK THE MODULE SUPPLY VOLTAGE MAINCUV PID

- Ignition ON.
- Enter the following diagnostic mode: TCCM Datalogger.
- Start the engine and monitor the MAINCUV PID.

Is the MAINCUV PID greater than 12 volts?

Yes	GO to D4
No	GO to Pinpoint Test A GO to Pinpoint Test B

D4 CHECK THE MSS POSITION MONITORING THE 4WD SWITCH STATUS (4X4_SW) PID

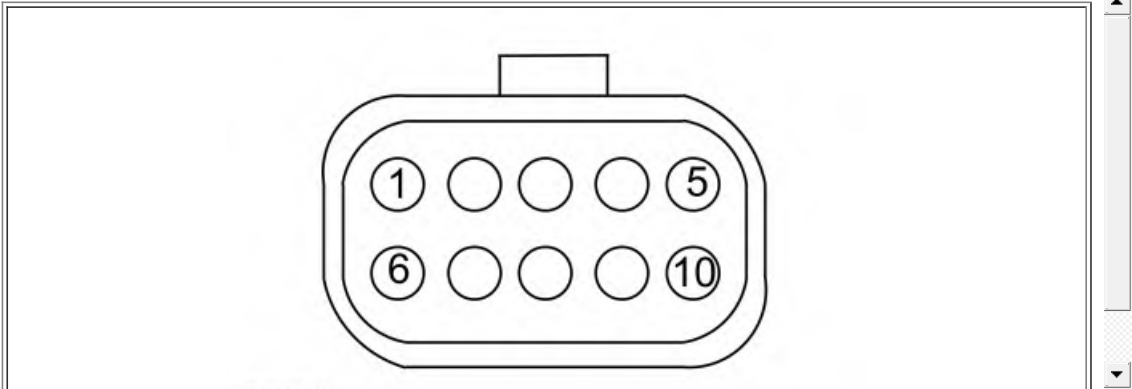
- Enter the following diagnostic mode: TCCM Datalogger.
- Monitor the 4X4_SW PID while switching to each MSS position.

Does the 4X4_SW PID match the MSS position?

Yes	The MSS and associated circuits are working correctly. GO to D9
No	A fault has been isolated to the MSS and associated circuits. GO to D5

D5 CHECK THE MSS

- Ignition OFF.
- Disconnect MSS [C284](#) .
- Measure, while rotating the MSS through all positions. Refer to the following chart.



Positive Lead	Measurement / Action	Negative Lead
MSS pin 3, component side	Ω	MSS pin 2, component side

MSS Position	Resistance
4L	128 to 136 ohms
4H	267 to 278 ohms
2H	612 to 630 ohms

Are the resistance values within specification?

Yes	GO to D6
No	INSTALL a new MSS. REFER to: Mode Select Switch (MSS) (308-07A Four-Wheel Drive Systems, Removal and Installation).

D6 CHECK THE MSS CIRCUITS FOR SHORT TO VOLTAGE

- Disconnect TCCM [C2371A](#) .
- Ignition ON.
- Measure:

MODE SELECT SWITCH (MSS)	
--------------------------	--

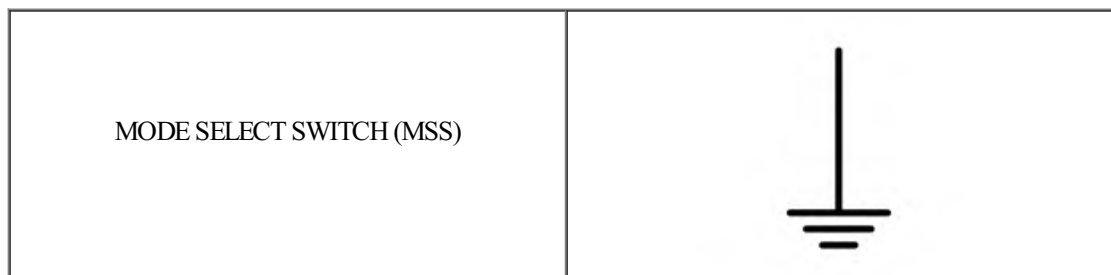
Positive Lead	Measurement / Action	Negative Lead
C284-3		Ground
C284-2		Ground

Is any voltage present?

Yes	REPAIR the affected circuit(s).
No	GO to D7

D7 CHECK THE MSS CIRCUITS FOR SHORT TO GROUND

- Ignition OFF.
- Disconnect TCCM [C2371A](#) if not already disconnected.
- Measure:



Positive Lead	Measurement / Action	Negative Lead
C284-3	Ω	Ground
C284-2	Ω	Ground

Are the resistances greater than 10,000 ohms?

Yes	GO to D8
No	REPAIR the affected circuit(s).

D8 CHECK THE MSS CIRCUITS FOR AN OPEN

- Measure:

MODE SELECT SWITCH (MSS)	TRANSFER CASE CONTROL MODULE (TCCM)
--------------------------	-------------------------------------

Positive Lead	Measurement / Action	Negative Lead
C284-3	Ω	C2371A-16
C284-2	Ω	C2371A-14

Are the resistances less than 3 ohms?

Yes	The MSS is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of the connector or pin issues.
No	REPAIR the affected circuit(s).

D9 CHECK 4WD MODE (4WD_MODE) WITH THE MSS IN 4H

- Start the engine.
- Enter the following diagnostic mode: TCCM Datalogger.
- Set the MSS to 4H.
- Monitor the PID 4WD_MODE.

Does the 4WD_MODES PID indicate 4WD High?

Yes	GO to D10
No	GO to D13

D10 CHECK FOR 4H WIND UP

- Start the engine.
- Drive the vehicle on a dry, hard surface in turns.

Is wind-up present in turns?

Yes	GO to D12
No	GO to D11

D11 CHECK FOR TRANSFER CASE 4H ENGAGEMENT

- Ignition ON.
- MSS in 4H position
- With the engine off and vehicle in NEUTRAL, position it on a hoist.
REFER to: Jacking and Lifting - Overview (100-02 Jacking and Lifting, Description and Operation).
- Rotate the rear driveshaft.
- Observe the front driveshaft.

Did the front driveshaft rotate?

Yes	GO to Pinpoint Test F
No	REPAIR the transfer case. REFER to: Transfer Case (308-07B Transfer Case, Diagnosis and Testing).

D12 CHECK FOR TRANSFER CASE 2H DISENGAGEMENT

- Ignition ON. and transmission in Neutral.
- MSS in 2H position
- With the engine off and vehicle in NEUTRAL, position it on a hoist.
REFER to: Jacking and Lifting - Overview (100-02 Jacking and Lifting, Description and Operation).
- Rotate the rear driveshaft.
- Observe the front driveshaft.

Does the front driveshaft rotate?

Yes	REPAIR the transfer case. REFER to: Transfer Case (308-07B Transfer Case, Diagnosis and Testing).
No	GO to Pinpoint Test F

D13 CHECK THE TRANSFER CASE SHIFT MOTOR ASSEMBLY OPERATION

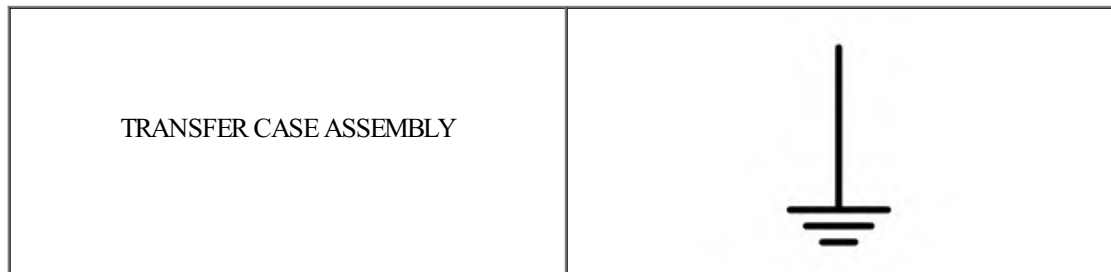
- Remove the transfer case shift motor assembly from the transfer case, leaving the wiring connector connected.
- Observe the transfer case shift motor assembly while switching the MSS from 2H to 4H.

Does the transfer case shift motor assembly rotate from the 2H position to the 4H position?

Yes	GO to D14
No	GO to D17

D14 CHECK THE TRANSFER CASE CONTACT PLATE CIRCUITS FOR A SHORT TO VOLTAGE

- Ignition OFF.
- Disconnect Transfer Case [C350](#) .
- Disconnect TCCM [C2371A](#) .
- Ignition ON.
- Measure:



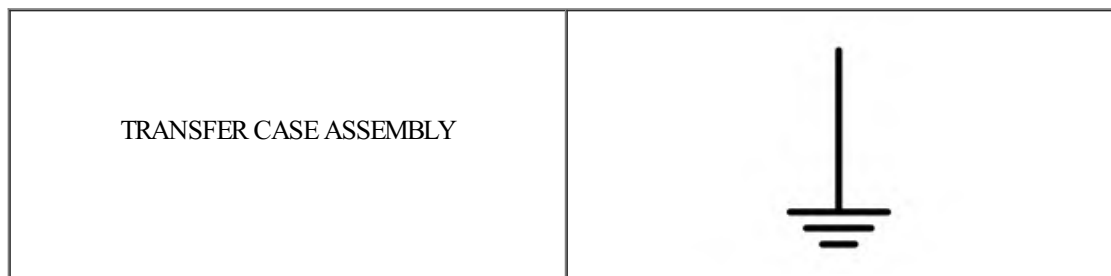
Positive Lead	Measurement / Action	Negative Lead
C350-5		Ground
C350-6		Ground
C350-7		Ground
C350-8		Ground
C350-1		Ground

Is any voltage present on the suspect circuit?

Yes	REPAIR the suspect circuit.
No	INSTALL a new transfer case shift motor. REFER to: Transfer Case Shift Motor (308-07A Four-Wheel Drive Systems, Removal and Installation).

D15 CHECK TRANSFER CASE CONTACT PLATE CIRCUITS FOR A SHORT TO GROUND

- Ignition OFF.
- Disconnect Transfer Case [C350](#) .
- Disconnect TCCM [C2371A](#) .
- Measure:



Positive Lead	Measurement / Action	Negative Lead
C350-5	Ω	Ground
C350-6	Ω	Ground
C350-7	Ω	Ground
C350-8	Ω	Ground
C350-1	Ω	Ground

Are the resistances greater than 10,000 ohms?

Yes	GO to D16
No	REPAIR the suspect circuit.

D16 CHECK THE TRANSFER CASE CONTACT PLATE CIRCUITS FOR AN OPEN

- Ignition OFF.
- Measure:

TRANSFER CASE ASSEMBLY	TRANSFER CASE CONTROL MODULE (TCCM)
------------------------	-------------------------------------

Positive Lead	Measurement / Action	Negative Lead
C350-5	Ω	C2371A-1
C350-6	Ω	C2371A-2
C350-7	Ω	C2371A-3
C350-8	Ω	C2371A-4
C350-1	Ω	C2371A-5

Are the resistances less than 3 ohms?

Yes	INSTALL a new transfer case shift motor. REFER to: Transfer Case Shift Motor (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	REPAIR the suspect circuit.

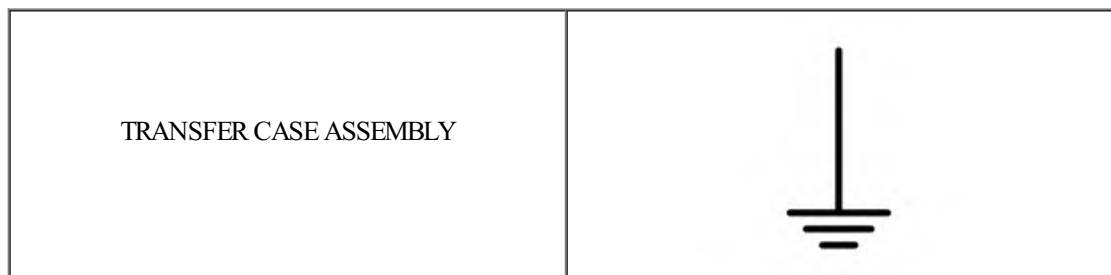
D17 CHECK THE TRANSFER CASE SHIFT MOTOR CIRCUITS FOR POWER WHILE COMMANDING THE CW RELAY (CW_SMD_OS) AND CCW RELAY (CCW_SMD_OS) PIDS ON

- Ignition OFF.
- Connect TCCM [C2371A](#) .
- Ignition ON.
- Enter the following diagnostic mode: TCCM Datalogger.
- Command the CW_SMD_OS PID ON and OFF while measuring:

TRANSFER CASE ASSEMBLY	
------------------------	--

Positive Lead	Measurement / Action	Negative Lead
C350-4		Ground

- Command the CCW_SMD_OS PID ON and OFF while measuring:



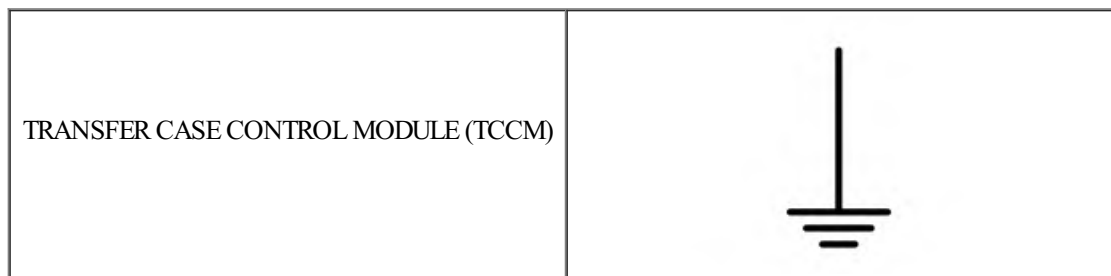
Positive Lead	Measurement / Action	Negative Lead
C350-3		Ground

Are the voltages 11 volts or greater on the circuits when commanding the PID ON?

Yes	INSTALL a new transfer case shift motor. REFER to: Transfer Case Shift Motor (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	GO to D18

D18 CHECK THE TCCM VOLTAGE CIRCUIT

- Ignition OFF.
- Disconnect TCCM [C2371B](#).
- Ignition ON.
- Measure:



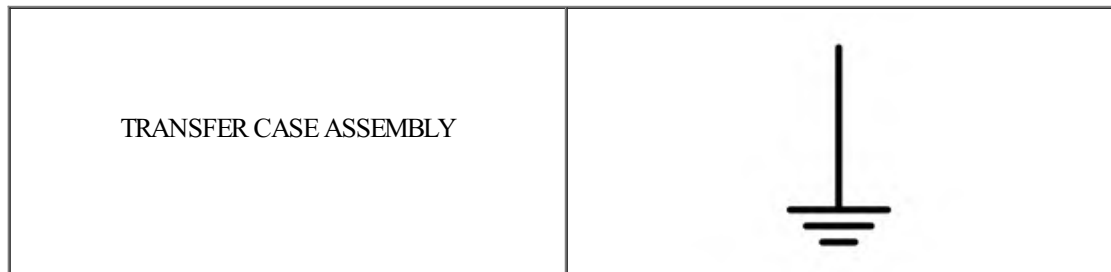
Positive Lead	Measurement / Action	Negative Lead
C2371B-6		Ground

Is the voltage greater than 11 volts?

Yes	GO to D19
No	VERIFY BJB fuse 13 (25A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams manual to identify possible causes of the circuit short.

D19 CHECK THE TRANSFER CASE SHIFT MOTOR ASSEMBLY CIRCUITS FOR SHORT TO VOLTAGE

- Ignition OFF.
- Disconnect TCCM [C2371B](#) .
- Disconnect Transfer Case [C350](#) .
- Ignition ON.
- Measure:



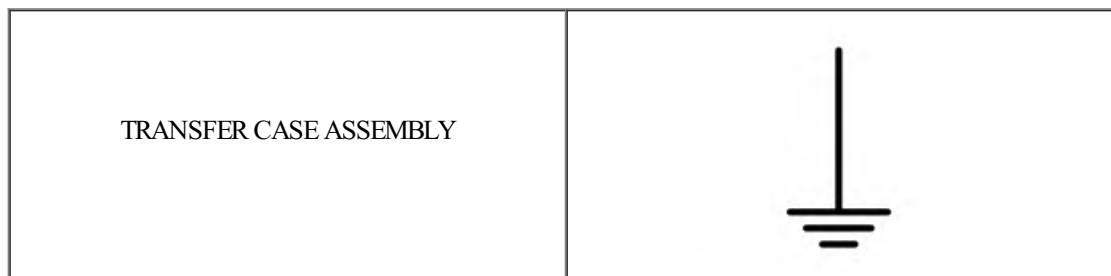
Positive Lead	Measurement / Action	Negative Lead
C350-4		Ground
C350-3		Ground

Is any voltage present?

Yes	REPAIR the suspect circuit.
No	GO to D20

D20 CHECK THE TRANSFER CASE SHIFT MOTOR ASSEMBLY CIRCUITS FOR SHORT TO GROUND

- Ignition OFF.
- Disconnect TCCM [C2371B](#) .
- Disconnect Transfer Case [C350](#) .
- Measure:



Positive Lead	Measurement / Action	Negative Lead
C350-4	Ω	Ground
C350-3	Ω	Ground

Are the resistances greater than 10,000 ohms?

Yes	GO to D21
No	REPAIR the suspect circuits.

D21 CHECK THE TRANSFER CASE SHIFT MOTOR ASSEMBLY CIRCUITS FOR AN OPEN

- Ignition OFF.
- Measure:

TRANSFER CASE ASSEMBLY	TRANSFER CASE CONTROL MODULE (TCCM)
------------------------	-------------------------------------

Positive Lead	Measurement / Action	Negative Lead
C350-4	Ω	C2371B-5
C350-3	Ω	C2371B-4

Are the resistances less than 3 ohms?

Yes	INSTALL a new transfer case shift motor. REFER to: Transfer Case Shift Motor (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	REPAIR the suspect circuits.

☐ **PINPOINT TEST E : THE VEHICLE DOES NOT SHIFT BETWEEN 4H AND 4L MODES CORRECTLY**

WARNING: When directed to drive the vehicle as part of this test, drive the vehicle on a hard surface in an area without traffic to prevent a crash. Failure to follow these instructions may result in personal injury.

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

The high-low shift occurs when the reduction shift fork moves the high-low collar to lock the planetary gear set to the output shaft. The torque transmitted through the sun gear from the input shaft turns the front planetary gear set assembly. The front planetary gear set assembly, now engaged, provides transfer case speed reduction. Certain criteria, such as vehicle speed and TR selection must be met before this shift can occur. Systematically check the necessary inputs and outputs of the TCCM, components of the transfer case, Continuous Vacuum Hublock (CVH) components and axle shafts.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM P184B:00	Transfer Case Unable To Transition Between 4x4 High and 4x4 Low Range: No Sub Type Information	This DTC sets when target transfer case shift motor position is not reached after the maximum number of allowed blocked shift retries for 4H to 4L or 4L to 4H. Requested shift motor position is not reached.

Possible Sources

- Digital TR sensor
- ABS wheel speed inputs
- Wiring, terminals or connectors
- Continuous Vacuum Hublock (CVH)
- Continuous Vacuum Hublock (CVH) solenoid
- Transfer case
- Vacuum leaks
- Front axle assembly
- TCCM
- MSS

NOTE: 4H (4X4 HIGH) and 4L (4X4 LOW) are not intended for driving on hard/dry surfaces.

E1 CHECK FOR DTCS

- Ignition ON.
- Enter the following diagnostic mode: TCCM Self-Test.

Are any DTCs present?

Yes	For DTC P184B:00, GO to E2 For all other DTCs refer to the TCCM DTC chart.
No	GO to Pinpoint Test D

E2 CHECK THE 2H TO 4H SHIFT

- Drive the vehicle. Make sure both CVH dials are in AUTO mode position.
- Drive the vehicle and shift from 2H to 4H.

Does the vehicle shift between 2H and 4H correctly?

Yes	GO to E3
No	GO to Pinpoint Test D

E3 CHECK THE 4H TO 4L SHIFT

- **NOTE:** When shifting in or out of 4L, the transmission must be in NEUTRAL and the vehicle stopped or moving less than 5 km/h (3 mph).

Slowly drive the vehicle and shift MSS from 4H to 4L.

Does the transfer case shift from 4H to 4L correctly and the complaint is related to a clunk noise during the shift?

Yes	Transmission neutral drag is excessive. For transmission diagnosis, REFER to: Diagnosis By Symptom (307-01A Automatic Transmission, Transfer Case and Power Transfer Unit - 6-Speed Automatic Transmission â€“ 6R100, Diagnosis and Testing).
No	GO to E4

E4 CHECK THE NEUTRAL INDICATOR (NEUTRAL) AND ABS MODULE WHEEL SPEED PID (PARAMETER IDENTIFICATION)

- Enter the following diagnostic mode: TCCM DataLogger .
- Monitor the NEUTRAL PID while shifting the transmission through gear ranges.
- Enter the following diagnostic mode: ABS Module DataLogger .
- Monitor the wheel speed PID's:
 - Left Front Wheel Speed Sensor (LF_WSPD)
 - Left Rear Wheel Speed Sensor (LR_WSPD)
 - Right Front Wheel Speed Sensor (RF_WSPD)
 - Right Rear Wheel Speed Sensor (RR_WSPD)

Does the NEUTRAL PID indicate True when the transmission is shifted to NEUTRAL, and do the wheel speed PIDs indicate 0 km/h (0 mph)?

Yes	If all 5 PIDs are accurate, GO to Pinpoint Test D
No	If the NEUTRAL PID does not indicate true, REFER to: Diagnosis By Symptom (307-01A Automatic Transmission, Transfer Case and Power Transfer Unit - 6-Speed Automatic Transmission â€“ 6R100, Diagnosis and Testing). for further diagnosis of the TR sensor, REFER to: External Controls (307-05A Automatic Transmission External Controls - 6-Speed Automatic Transmission â€“ 6R100, Diagnosis and Testing). If the wheel speed PIDs do not indicate 0 km/h (0 mph), REFER to: Anti-Lock Brake System (ABS) and Stability Control (206-09 Anti-Lock Brake System (ABS) and Stability Control, Diagnosis and Testing).

☐ [PINPOINT TEST F : THE FRONT AXLES DO NOT ENGAGE/DISENGAGE CORRECTLY](#)

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

When following this diagnostic procedure please note the following since these system interactions may influence the results:

The TCCM has a startup strategy that affects the CVH operation after initial key cycle below -15C. When ambient temperature is below 5F (-15C), CVHs engage after initial key cycle and a driven gear is selected. The hubs stay engaged regardless of the selected 4x4 mode until approximately 2 miles (3Km) have been traveled above 6 mph (10kph). Once the distance has been achieved, the CVHs disengage if the vehicle is in 2H. Distance traveled resets only if the temperature is below the calibrated threshold and another key cycle occurs or if the customer shifts to Park (P) and back to a driven gear within the same key cycle. The TCCM uses this strategy to warm up the front axle in the cold temperatures to improve driveline synchronization.

In 4H or 4L mode the TCCM supplies a ground path to the hublock vacuum solenoid to apply vacuum to the Continuous Vacuum Hublocks (CVHs), engaging the front hubs to the front axle shafts. A minimum vacuum level of 152 mm-Hg (6 in-Hg) is required to correctly operate the CVH system. In 2H mode the TCCM does not supply the ground path to the hublock vacuum solenoid, vacuum is not applied to the CVHs and an internal spring in each CVH keeps the hubs disengaged.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM C1010:00	Continuous Vacuum Hublock (CVH) Solenoid: No Sub Type Information	This DTC sets when the TCCM determines a Continuous Vacuum Hublock (CVH) system fault is present based on wheel speed and steering wheel angle message data. When the DTC is present on-demand the CVHs are disengaged from the front axle shafts regardless of the mode selected.
TCCM C1010:11	Continuous Vacuum Hublock (CVH) Solenoid: Circuit Short To Ground	This DTC sets when the TCCM detects a short to ground. When the DTC is present on-demand the CVHs are engaged to the front axle shafts regardless of the mode selected.
TCCM C1010:12	Continuous Vacuum Hublock (CVH) Solenoid: Circuit Short To Battery	This DTC sets when the TCCM detects a short to voltage. When the DTC is present on demand the CVHs are disengaged from the front axle shafts regardless of the mode selected.
TCCM C1010:13	Continuous Vacuum Hublock (CVH) Solenoid: Circuit Open	This DTC sets when the TCCM detects an open circuit. When the DTC is present on-demand the CVHs are disengaged from the front axle shafts regardless of the mode selected.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- Vacuum leaks
- TCCM
- Transfer case
- Front axle assembly
- Continuous Vacuum Hublocks (CVH)

F1 CHECK FOR TCCM DTCS

WARNING: When directed to drive the vehicle as part of this test, drive the vehicle on a hard surface in an area without traffic to prevent a crash. Failure to follow these instructions may result in personal injury.

- Ignition ON.
- Enter the following diagnostic mode on the scan tool: TCCM Self-Test.

Are any DTCs present?

Yes	For DTC C1010:00, GO to F7 For DTC C1010:11, GO to F14 For DTC C1010:12, GO to F17 For DTC C1010:13, GO to F14
No	GO to F2

F2 CHECK FOR GRINDING NOISES AT HIGH SPEEDS

- Make sure both CVH dials are in AUTO mode position.
- Turn the MSS from 2H to 4H at rest. Drive the vehicle. Turn the MSS back to 2H.
- Turn the MSS from 2H to 4H while driving the vehicle below 5 km/h (3 mph). Turn the MSS back to 2H.
- Turn the MSS from 2H to 4H while driving the vehicle above 32 km/h (20 mph). Turn the MSS back to 2H.

Is the axle system fully functional at rest, but there is a grinding noise during engagement, especially at high speed?

Yes	To diagnose excessive front axle noise/chatter/grinding during 4X4 engagement, REFER to: Wheel Hubs and Bearings (205-02E Wheel Hubs and Bearings - Full Floating Axle - Vehicles With: Ford 10.5 Inch Ring Gear, Diagnosis and Testing).
No	GO to F3

F3 CHECK THE TRANSFER CASE SHIFT TO 2H

- Ignition ON.
- Enter the following diagnostic mode: TCCM DataLogger.
- With the engine running and the MSS in 2H mode. Monitor the Transfer Case Contact Plate Switch A (PLATE_A), B (PLATE_B), C (PLATE_C) and D (PLATE_D) PIDs with the MSS in 2H.

MSS Position	Contact Plate Position			
	PLATE_A	PLATE_B	PLATE_C	PLATE_D
2H Mode	Closed	Open	Closed	Closed

Do the PIDs indicate the vehicle shifted into 2H?

Yes	GO to F4
No	GO to Pinpoint Test D

F4 CHECK THE CVH DISENGAGEMENT

- **NOTE:** The engine must be idling during the following steps to supply the vacuum required for the CVH.

With the vehicle in NEUTRAL, position it on a hoist.

REFER to: Jacking and Lifting - Overview (100-02 Jacking and Lifting, Description and Operation).

- Start the engine.
- Position the MSS in 2H, make sure both CVH dials are in AUTO mode position.
- Rotate the LH front tire one revolution forward and one revolution backward while observing the LH front axle shaft.
- Rotate the RH front tire one revolution forward and one revolution backward while observing the RH front axle shaft.

Did either front axle shaft rotate?

Yes	GO to F8
No	GO to F5

F5 CHECK THE TRANSFER CASE SHIFT INTO 4H

- Enter the following diagnostic mode: TCCM DataLogger.
- Command the Transfer Case Contact Plate Power (PLATE_PWR_OS) PID to energize the transfer case shift motor assembly.
- Monitor the Transfer Case Contact Plate Switch A (PLATE_A), B (PLATE_B), C (PLATE_C) and D (PLATE_D) PIDs with the MSS in 4H.

MSS Position	Contact Plate Position			
	PLATE_A	PLATE_B	PLATE_C	PLATE_D
4H Mode	Open	Closed	Closed	Open

Did the PIDs and message center indicate the vehicle shifted into 4H (4X4 HIGH)?

Yes	GO to F6
No	GO to Pinpoint Test D

F6 CHECK THE CVH ENGAGEMENT IN 4H

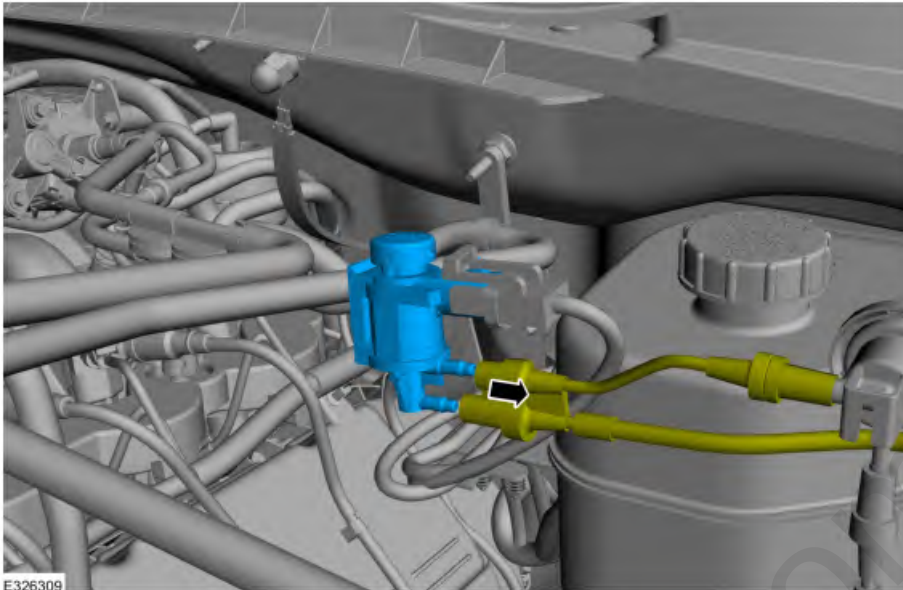
- Make sure both CVH dials are in AUTO mode position.
- With the engine still running, rotate the LH front tire one revolution forward and one revolution backward while observing the LH front axle shaft.
- Rotate the RH front tire one revolution forward and one revolution backward while observing the RH front axle shaft.

Did both front axle shafts rotate?

Yes	CVH and Transfer Case operation is normal. CHECK that all driveline fasteners are present and tightened to specification. For further diagnosis of the front axle, REFER to: Front Drive Axle (205-03 Front Drive Axle/Differential, Diagnosis and Testing).
No	GO to F7

F7 CHECK THE CONTINUOUS VACUUM HUBLOCK SOLENOID OUTPUT IN 4H

- Disconnect the output vacuum line of the continuous vacuum hublock solenoid at the regulator while having the vacuum supply line attached to the hublock vacuum solenoid.
- Switch the MSS to 4H.
- With the engine still running, measure the vacuum at the output port of the continuous vacuum hublock solenoid.
-



Is the vacuum greater than 152 mm-Hg (6 in-Hg)?

Yes	GO to F19
No	GO to F9

F8 CHECK THE HUBLOCK VACUUM SOLENOID OUTPUT VACUUM IN 2H

- Start the engine.
- Disconnect the output vacuum line of the continuous vacuum hublock solenoid at the regulator while having the vacuum supply line attached to the hublock vacuum solenoid.
- With the engine running and the MSS in the 2H position, measure the vacuum at the output port of the continuous vacuum hublock solenoid.

Is the vacuum less than 25 mm-Hg (1 in-Hg)?

Yes	Disconnect vacuum lines from the hublocks at the knockles and solenoid to verify that the lines are not pinched, (follow GO to F19 , GO to F20 , and GO to F21) Then then Go to REFER to: Wheel Hubs and Bearings (205-02C Wheel Hubs and Bearings - Full Floating Axle - Vehicles With: Dana M275/Dana M300, Diagnosis and Testing).
No	GO to F16

F9 CHECK THE CONTINUOUS VACUUM HUBLOCK SOLENOID INPUT VACUUM

- Disconnect the supply vacuum line at the continuous vacuum hublock solenoid.
- With the engine still running, measure the supply line vacuum to the hublock vacuum solenoid.

Is the vacuum greater than 152 mm-Hg (6 in-Hg)?

Yes	GO to F12
No	GO to F10

F10 CHECK THE VACUUM CHECK VALVE (SINGLE BATTERY) OR VACUUM MANIFOLD (DUAL BATTERY)

- For single battery applications:
 - Disconnect the supply vacuum line to the continuous vacuum hublock solenoid from the three way check valve and plug the port (source to solenoid). Disconnect the vacuum reservoir line from the three way check valve.
- For dual battery applications:
 - Disconnect the supply vacuum line to the continuous vacuum hublock solenoid from the vacuum manifold and plug the port (source to solenoid). Disconnect the vacuum reservoir line from the vacuum manifold.
- With the engine still running, measure the source vacuum being supplied to the vacuum reservoir.

Is the vacuum greater than 152 mm-Hg (6 in-Hg)?

Yes	GO to F11
No	Install a new Check valve (single battery) or vacuum manifold (dual battery)

F11 CHECK THE VACUUM RESERVOIR

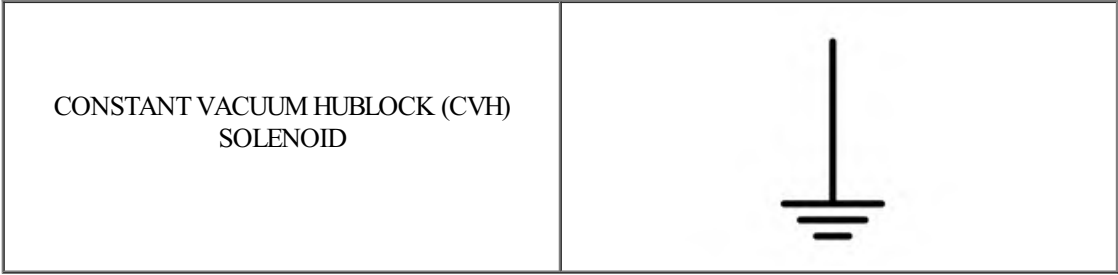
- Ignition OFF.
- Disconnect the vacuum reservoir line from the three way check valve (**single battery**) or vacuum manifold (**dual battery**).
- Connect a vacuum pump to the source vacuum port on the vacuum reservoir and apply 508 mm-Hg (20 in-Hg) of vacuum.

Does the vacuum maintain or drop less than 25 mm-Hg (1 in-Hg) per minute?

Yes	Repair or install a new source vacuum line.
No	INSTALL a new vacuum reservoir.

F12 CHECK FOR VOLTAGE TO THE HUBLOCK VACUUM SOLENOID

- Disconnect the continuous vacuum hublock (CVH) Solenoid [C1291](#) .
- Measure:



Positive Lead	Measurement / Action	Negative Lead
C1291-1		Ground

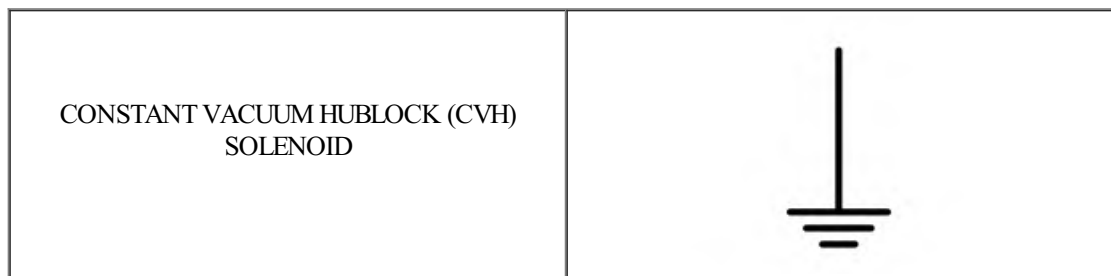
Is the voltage greater than 11 volts?

Yes	GO to F13
No	CHECK BJB fuse 39 (10A). If OK, REPAIR the open circuit. If not OK, REFER to the Wiring Diagrams manual to identify possible causes of the circuit short. CLEAR the DTCs.

F13 CHECK THE HUBLOCK VACUUM SOLENOID OPERATION

NOTE: The engine must be idling during the following steps to supply the vacuum required for the CVH to engage.

- Connect the continuous vacuum hublock (CVH) solenoid [C1291](#) .
- Start the engine.
- With CVH solenoid [C1291](#) connected, jumper [C1291-2](#) by **backprobing** and ground.



Positive Lead	Measurement / Action	Negative Lead
C1291-2		Ground

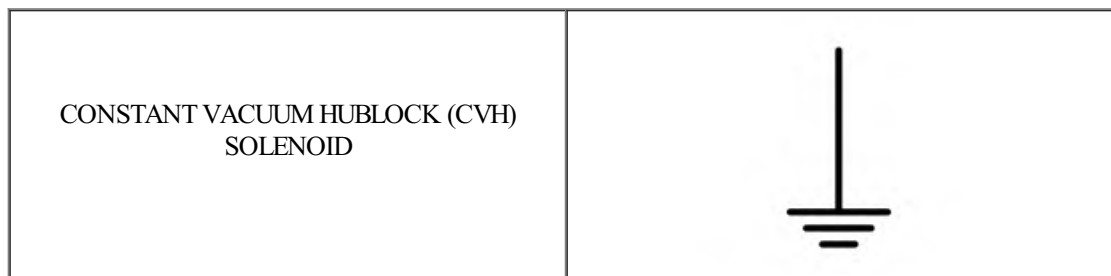
- Measure the vacuum at the continuous vacuum hublock solenoid output vacuum port.

Is the hublock vacuum solenoid output port vacuum greater than 152 mm-Hg (6 in-Hg)?

Yes	DISCONNECT the fused jumper. GO to F14
No	INSTALL a new hublock vacuum solenoid. CLEAR the DTCs.

F14 CHECK POWER AT THE HUBLOCK VACUUM SOLENOID

- Ignition OFF.
- Disconnect the continuous vacuum hublock (CVH) solenoid [C1291](#) .
- Ignition ON.
- Measure:



Positive Lead	Measurement / Action	Negative Lead
C1291-1		Ground
C1291-1		Ground

Is any voltage greater than 11v and does the test lamp illuminate?

Yes	Voltage is present at the solenoid. GO to F15
No	If no voltage was present, check BJB Fuse 39 (10A) for open. If fuse is open, locate and REPAIR short to ground. If fuse is ok, or test lamp did not illuminate, REPAIR circuit for high resistance.

F15 CHECK THE HUBLOCK VACUUM SOLENOID ACTIVATION CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect the TCCM [C2371A](#) .
- Measure:

CONSTANT VACUUM HUBLOCK (CVH) SOLENOID	TRANSFER CASE CONTROL MODULE (TCCM)
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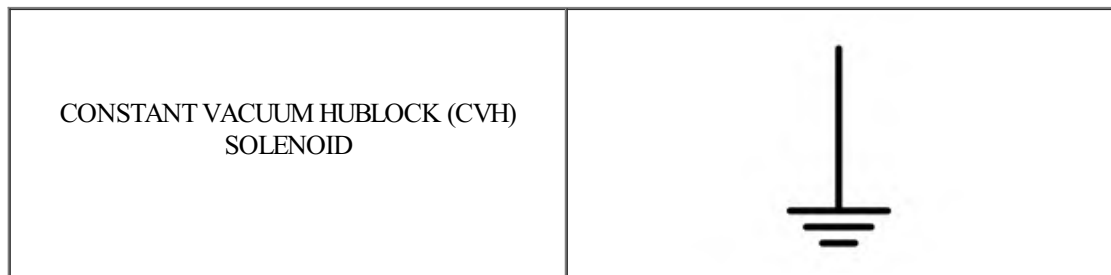
Positive Lead	Measurement / Action	Negative Lead
C1291-2	Ω	C2371A-6

Is the resistance less than 3 ohms?

Yes	GO to F16
No	REPAIR the circuit.

F16 CHECK THE HUBLOCK VACUUM SOLENOID ACTIVATION CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.
- Measure:



Positive Lead	Measurement / Action	Negative Lead
C1291-2	Ω	Ground

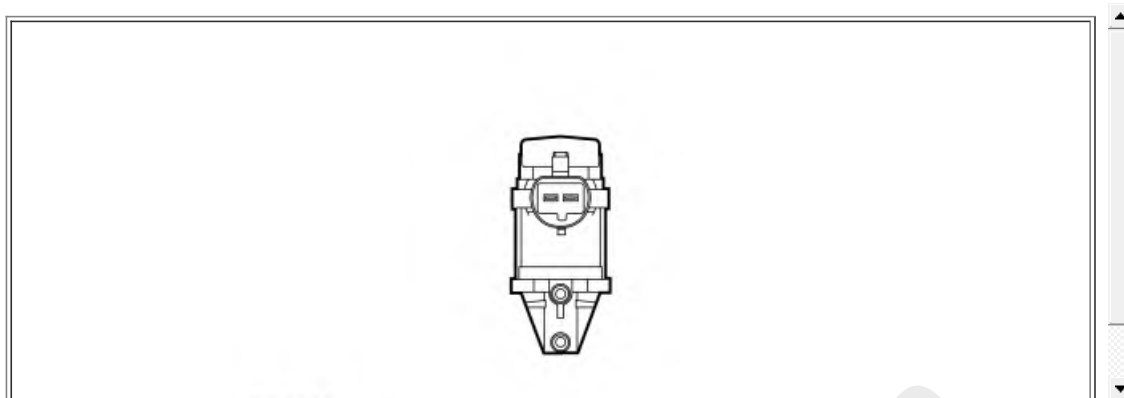
Is the resistance greater than 10,000 ohms?

Yes	GO to F17
No	REPAIR the circuit.

F17 CHECK THE HUBLOCK VACUUM SOLENOID RESISTANCE

NOTE: If the temperatures (either ambient or in the engine compartment) are exceptionally high, a higher than normal resistance reading could result. A lower temperature could result in a lower resistance reading.

- Ignition OFF.
- Disconnect the TCCM [C2371A](#) .
- Disconnect the continuous vacuum hublock (CVH) Solenoid [C1291](#) .
- Measure:



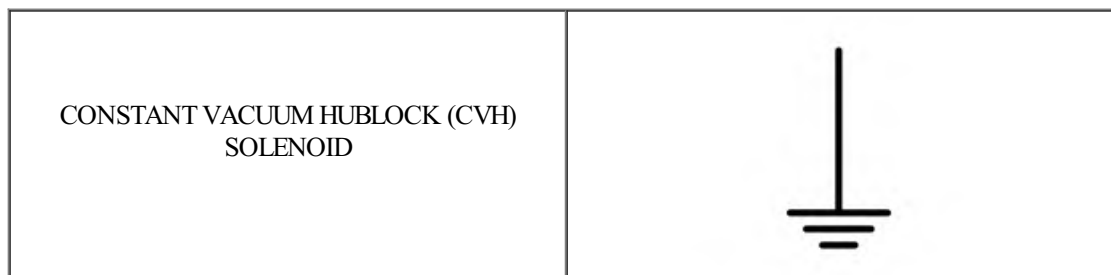
Positive Lead	Measurement / Action	Negative Lead
Component side, pin 1	Ω	Component side, pin 2

Is the resistance between 44 and 70 ohms?

Yes	GO to F18
No	INSTALL a new hublock vacuum solenoid.

F18 CHECK THE HUBLOCK VACUUM SOLENOID ACTIVATION CIRCUIT FOR A SHORT TO POWER

- Ignition OFF.
- Disconnect the TCCM [C2371A](#) .
- Disconnect the Continuous Vacuum Hublock (CVH) solenoid [C1291](#) .



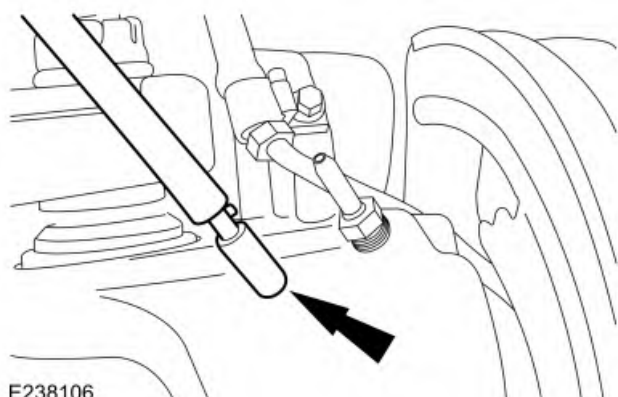
Positive Lead	Measurement / Action	Negative Lead
C1291-2		Ground

Is any voltage present?

Yes	REPAIR the Short to Power.
No	INSTALL a new hublock vacuum solenoid.

F19 CHECK THE CVH VACUUM HOSES

- Ignition OFF.
- Disconnect the Output vacuum line of the continuous vacuum hublock solenoid at the regulator.
- Disconnect and plug the LH and RH continuous vacuum hublock (CVH) vacuum tubes at the knuckles.
- Connect a vacuum pump to the output solenoid hose going to the LH and RH knuckles at the continuous vacuum hublock solenoid connection. Apply 508 mm-Hg (20 in-Hg) of vacuum and observe the vacuum reading



Did the vacuum drop more than 25 mm-Hg (1 in-Hg) per minute?

Yes	INSTALL new vacuum Lines as necessary.
No	GO to F20

F20 CHECK THE LH CVH VACUUM LINE FOR AN OBSTRUCTION OR PINCH

- With the vehicle in NEUTRAL, position it on a hoist.
REFER to: Jacking and Lifting - Overview (100-02 Jacking and Lifting, Description and Operation).
- Disconnect the Output vacuum line from the continuous vacuum hublock (CVH) solenoid.
- Remove the plug from the vacuum line at the LH knuckle.
- Connect a hand vacuum pump to the LH continuous vacuum hublock vacuum line and attempt to draw a vacuum on the line.

Did the vacuum pump draw a vacuum on the LH CVH vacuum line?

Yes	Install new vacuum lines as necessary.
No	GO to F21

F21 CHECK THE RH CVH VACUUM LINE FOR AN OBSTRUCTION OR PINCH

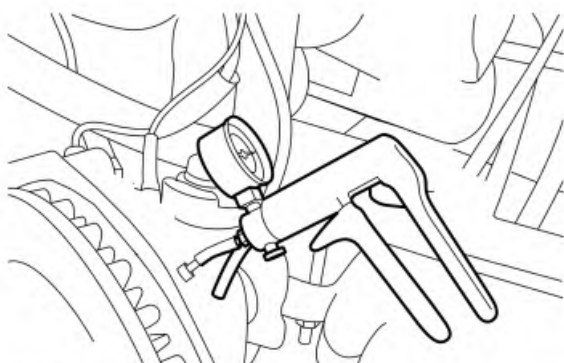
- With the vehicle in NEUTRAL, position it on a hoist.
REFER to: Jacking and Lifting - Overview (100-02 Jacking and Lifting, Description and Operation).
- Remove the plug from the vacuum line at the RH knuckle and plug the LH side vacuum line at the knuckle.
- Connect a hand vacuum pump to the RH continuous vacuum hublock vacuum line and attempt to draw a vacuum on the line.

Did the vacuum pump draw a vacuum on the RH continuous vacuum hublock vacuum line?

Yes	Install new vacuum lines as necessary.
No	GO to F22

F22 CHECK FOR LEAKS AT THE LH AND RH CVH

- Connect a vacuum pump to the knuckle fitting.
- Apply 508 mm-Hg (20 in-Hg) of vacuum. Observe the vacuum reading for 1 minute.



E238156

Is the vacuum drop less than 25 mm-Hg (1 in-Hg) per minute?

Yes	GO to F24
No	GO to F23

F23 CHECK FOR A LOOSE KNUCKLE FITTING

- Remove the vacuum pump from the knuckle.
- Make sure the knuckle fitting is tightened to 20 Nm (177 lb-in).
- Install the vacuum pump on the knuckle and pump to 508 mm-Hg (20 in-Hg).
- Observe the vacuum reading for 1 minute.

Is the vacuum drop less than 25 mm-Hg (1 in-Hg) per minute?

Yes	The knuckle fitting was the source of the leak. INSTALL a new knuckle.
No	GO to F25

F24 CHECK FOR A DYNAMIC VACUUM LEAK AT THE LH AND RH CVH

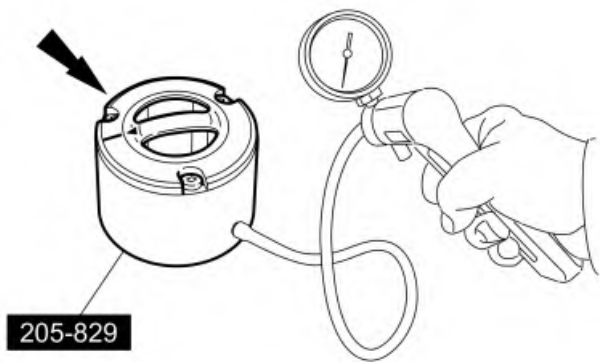
- Make sure the vacuum is still at 508 mm-Hg (20 in-Hg).
- Rotate the front tire for 1 minute while observing the vacuum reading.

Is the vacuum drop greater than 25 mm-Hg (1 in-Hg) per minute?

Yes	GO to F26
No	The 4WD system is operating correctly.

F25 CHECK FOR A HUBLOCK VACUUM LEAK

- Remove the hublock.
REFER to: Hublock (308-07A Four-Wheel Drive Systems, Removal and Installation).
- Remove and discard the hublock O-ring
- Rotate the hublock to AUTO position.
- Install the hublock into the Hublock Vacuum Test Stand. Make sure that the hublock is completely seated into the Hublock Vacuum Test Stand.
- Connect the vacuum pump and pump to 508 mm-Hg (20 in-Hg). Observe the vacuum reading for 1 minute.



- E238363

Is the vacuum drop less than 25 mm-Hg (1 in-Hg) per minute?

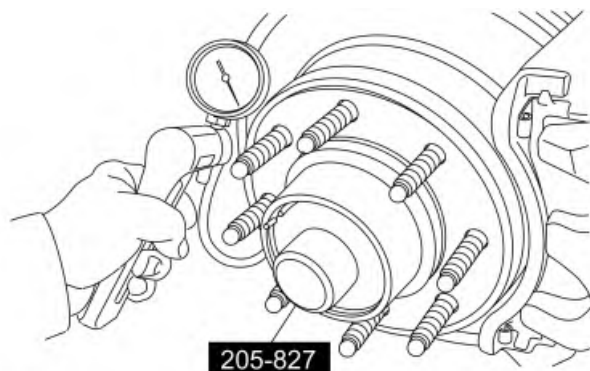
Yes	The hublock is OK. GO to F26
No	INSTALL a new hublock. REFER to: Hublock (308-07A Four-Wheel Drive Systems, Removal and Installation).

F26 CHECK THE HUBLOCK SEAL

NOTE: Install a new O-ring on the Vacuum Hub Test Tool. The O-ring used is the same as in the hublock. Apply a light film of lubricant on the O-ring.

NOTE: Using emery cloth, clean the sealing surface of the wheel hub before testing.

- Install the Vacuum Hub Test Tool and the retainer ring. Make sure the retainer ring is seated in the groove.
- Connect the vacuum pump and pump to 508 mm-Hg (20 in-Hg). Observe the vacuum reading for 1 minute.



- E238374

Is the vacuum drop less than 25 mm-Hg (1 in-Hg) per minute?

Yes	The old hublock seal was worn or damaged. REMOVE the Vacuum Hub Test Tool. INSTALL the hublock with a new O-ring.
No	GO to F27

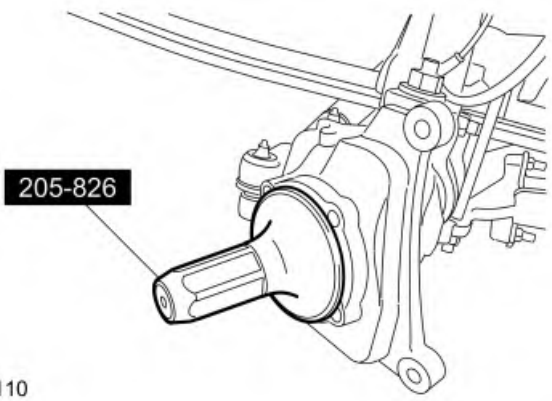
F27 CHECK THE KNUCKLE SEAL

- Remove the wheel hub assembly.
REFER to: Front Wheel Bearing and Wheel Hub (204-01B Front Suspension - 4WD, Removal and Installation).
- **NOTE:** Install a new O-ring on the Knuckle Seal Vacuum Test Tool. The O-ring used is the same as in the hublock. Apply a light film of lubricant on the O-ring.

NOTE: Using emery cloth, clean the sealing surface of the wheel hub before testing. Install the Knuckle Seal Vacuum Test Tool.

Connect the vacuum pump to the knuckle fitting and apply 508 mm (20 in) Hg of vacuum.

- If checking for a dynamic leak, carefully rotate the U-joint while observing the vacuum reading for 1 minute.



E238110

Is the vacuum drop less than 25 mm-Hg (1 in-Hg) per minute?

Yes	GO to F28
No	INSTALL a new knuckle seal.

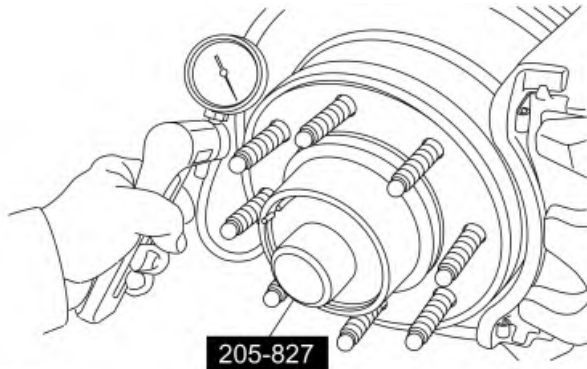
F28 CHECK THE WHEEL HUB O-RING

- Remove and discard the wheel hub O-ring.
- **NOTE:** Do not remove the ABS sensor.

NOTE: Apply a light film of lubricant on the Vacuum Hub Test Tool O-ring.

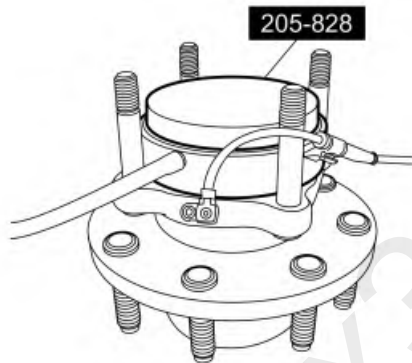
Install the Vacuum Hub Test Tool and the retainer ring. Make sure the retainer ring is seated in the groove.

- Install a new O-ring on the wheel hub.



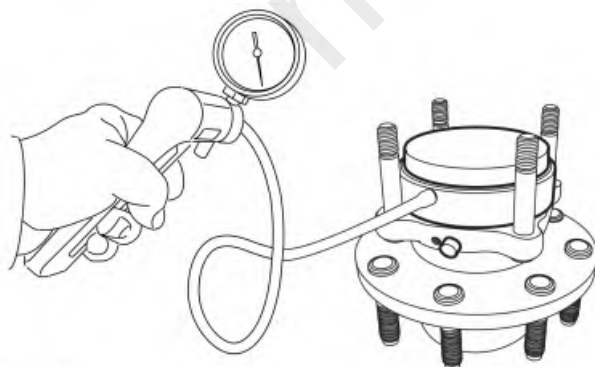
- E238374

- Install the Hub Bearing Vacuum Test Stand. Make sure the tool is seated over the wheel hub seal.



- E238377

- Connect the vacuum pump and pump to 508 mm-Hg (20 in-Hg). If checking for a dynamic leak, carefully rotate the hub flange relative to the wheel bearing flange while observing the vacuum reading for 1 minute.



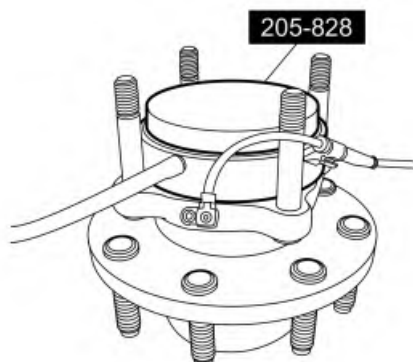
- E238380

Is the vacuum drop less than 25 mm-Hg (1 in-Hg) per minute?

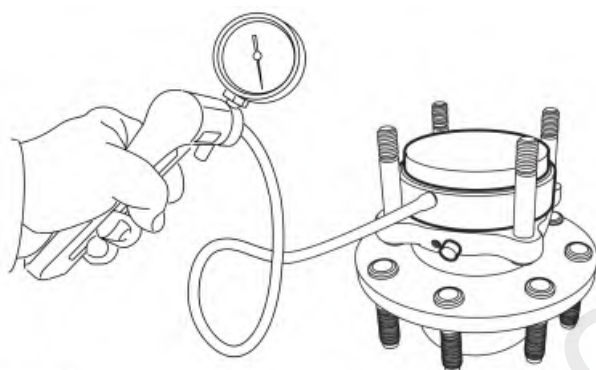
Yes	The old wheel hub O-ring was worn or damaged. REMOVE the Hub Bearing Vacuum Test Stand.
No	GO to F29

F29 CHECK THE WHEEL HUB ASSEMBLY

- Remove the wheel speed sensor.
- Install the Hub Bearing Vacuum Test Stand and the ABS Sensor Vacuum Test Plug.



- E238377
- Connect the vacuum pump and pump to 508 mm-Hg (20 in-Hg). Observe the vacuum reading for 1 minute.



- E238380

Is the vacuum drop less than 25 mm-Hg (1 in-Hg) per minute?

Yes	REMOVE the Hub Bearing Vacuum Test Stand and the ABS Sensor Vacuum Test Plug. INSTALL a new wheel speed sensor. REFER to: Front Wheel Speed Sensor - RWD (206-09 Anti-Lock Brake System (ABS) and Stability Control, Removal and Installation).
No	REMOVE the Hub Bearing Vacuum Test Stand and the ABS Sensor Vacuum Test Plug. INSTALL a new wheel hub assembly. REFER to: Front Wheel Bearing and Wheel Hub (204-01B Front Suspension - 4WD, Removal and Installation).

PINPOINT TEST G : THE 4WD DOES NOT ENGAGE AT SPEED CORRECTLY

WARNING: When directed to drive the vehicle as part of this test, drive the vehicle on a hard surface in an area without traffic to prevent a crash. Failure to follow these instructions may result in personal injury.

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

When the operator selects 4H (4X4 HIGH), the TCCM shifts the transfer case to 4H, engaging the electro-mechanical synchronizer clutch to synchronize the front and rear driveshafts, allowing a mechanical engagement of the transfer case. The TCCM also provides a ground path to the hublock vacuum solenoid. When the hublock vacuum solenoid is energized vacuum is provided to the LH and RH Continuous Vacuum Hublock (CVH), engaging the front hubs to the front axle shafts. When the hublock vacuum solenoid is not energized vacuum is vented with no vacuum provided to the LH and RH CVHs, disengaging the hubs from the front axle shafts. Systematically check the necessary inputs and outputs at the TCCM, internal components of the transfer case, Continuous Vacuum Hublocks (CVH) components and drive axles.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM P1825:00	4- Wheel Drive Clutch Relay Open Circuit: No Sub Type Information	This DTC sets when TCCM detects an open circuit. The TCCM disables transfer case synchronization clutch operation.
TCCM P1826:00	4- Wheel Drive Low Clutch Relay Circuit To Battery: No Sub Type Information	This DTC sets when TCCM detects a short to voltage. Transfer case synchronization clutch operation, though disabled by the TCCM, is fully engaged when this DTC is present.
TCCM P1827:00	4- Wheel Drive Low Clutch Relay Circuit To Ground: No Sub Type Information	This DTC sets when TCCM detects a short to ground. The TCCM disables transfer case synchronization clutch operation.

Possible Sources

- Transfer case synchronizer
- TCCM
- Front axle assembly
- Wiring, terminals or connectors

G1 CHECK FOR TCCM DTCS

- Ignition ON.
- Enter the following diagnostic mode: TCCM Self-Test.

Are any DTCs present?

Yes	For DTC P1825:00, GO to G8 For DTC P1826:00, GO to G10 For DTC P1827:00, GO to G9 all other DTCs, REFER to the DTC Chart: TCCM.
No	GO to G2

G2 CHECK 4H ENGAGEMENT AT REST

- Switch the MSS from 2H to 4H.
- Manually Lock the LH and RH CVHs
- Confirm 4H engagement by driving the vehicle and check for wind-up in turns.

Does 4H engage at rest correctly?

Yes	GO to G3
No	GO to Pinpoint Test D

G3 CHECK 2H TO 4H SHIFT AT SPEED

- Switch the MSS to 2H.
- Make sure both CVH dials are in AUTO mode
- Drive the vehicle and carry out a 2H to 4H shift while driving approximately at 16 km/h (10 mph).
- **NOTE:** When performing 2H to 4H or 4H to 2H shift, release the accelerator pedal prior to the shift and wait until Shift in Progress disappears.

NOTE: When performing 2H to 4H or 4H to 2H, check for wind-up in turns when in 4H and that no wind-up is present in 2H.

Stop the vehicle, shift to 2H, drive the vehicle and carry out a 2H to 4H shift while driving at approximately 64 km/h (40 mph).

Does 4H engage correctly or much better at 16 km/h (10 mph) than at 64 km/h (40 mph)?

Yes	GO to G4
No	GO to Pinpoint Test F

G4 CHECK THE TCCM AVERAGE FRONT WHEEL SPEED (FRT_WHL_SPD) AND AVERAGE REAR WHEEL SPEED (REAR_WHL_SPD) PIDS

- Enter the following diagnostic mode: TCCM DataLogger.
- Monitor the FRT_WHL_SPD and REAR_WHL_SPD PIDs while driving in a straight line.

Do the FRT_WHL_SPD and REAR_WHL_SPD PIDs match?

Yes	GO to G5
No	REFER to: Anti-Lock Brake System (ABS) and Stability Control (206-09 Anti-Lock Brake System (ABS) and Stability Control, Diagnosis and Testing).

G5 CHECK THE TRANSFER CASE SYNCHRONIZATION CLUTCH LOCK-UP USING THE TCCM 4WD PWM CLUTCH STATUS (4WD_CLUTCH_OUTPUT) PID

- Ignition ON.
- Switch the MSS to 4H.
- Actively command the 4WD_CLUTCH_OUTPUT PID to 98%.
- With the vehicle in NEUTRAL, position it on a hoist.
- Remove the transfer case shift motor from the transfer case, leaving the electrical connector connected.
- Using a wrench, shift the transfer case shift cam to 2H.
- Rotate the rear driveshaft while observing the front driveshaft.

Does the front driveshaft rotate when the rear driveshaft is rotated?

Yes	GO to G6
No	GO to G7

G6 CHECK THE TRANSFER CASE SYNCHRONIZATION CLUTCH RELEASE USING THE TCCM 4WD PWM CLUTCH STATUS (4WD_CLTCH_OS) PID

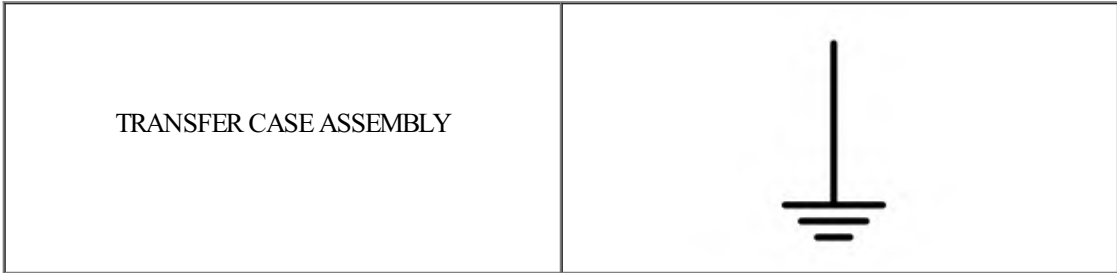
- Actively command the 4WD_CLUTCH_OUTPUT PID to 0%.
- Rotate the rear driveshaft while observing the front driveshaft.

Does the front driveshaft rotate when the rear driveshaft is rotated?

Yes	GO to G10
No	END the active command. GO to G7

G7 CHECK FOR VOLTAGE TO THE TRANSFER CASE SYNCHRONIZATION CLUTCH USING THE TCCM 4WD PWM CLUTCH STATUS (4WD_CLUTCH_OUTPUT) PID

- Ignition ON.
- Enter the following diagnostic mode: TCCM DataLogger.
- Using the 4WD_CLUTCH_OUTPUT active command, command the transfer case clutch to 98%.
- Measure:



Positive Lead	Measurement / Action	Negative Lead
Carefully backprobe transfer case. C350-2		Ground

Is the voltage greater than 9 volts?

Yes	END the active command. INSTALL a new transfer case synchronization clutch. REFER to: Transfer Case (308-07B Transfer Case, Disassembly and Assembly).
No	GO to G8

G8 CHECK THE TRANSFER CASE SYNCHRONIZATION CLUTCH CONTROL CIRCUIT FOR AN OPEN

- Measure:

TRANSFER CASE ASSEMBLY	TRANSFER CASE CONTROL MODULE (TCCM)
------------------------	-------------------------------------

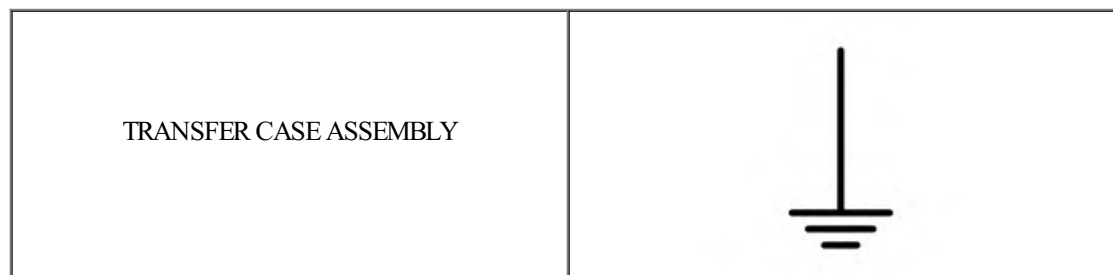
Positive Lead	Measurement / Action	Negative Lead
C350-2	Ω	C2371B-10

Is the resistance less than 3 ohms?

Yes	GO to G9
No	REPAIR the circuit. CLEAR the DTCs.

G9 CHECK THE TRANSFER CASE SYNCHRONIZATION CLUTCH CONTROL CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.
- Disconnect Transfer Case [C350](#) .
- Ignition ON.
- Disconnect TCCM [C2371B](#) .
- Measure:



Positive Lead	Measurement / Action	Negative Lead
C350-2	Ω	Ground

Is the resistance greater than 10,000 ohms?

Yes	GO to G10
No	REPAIR the circuit.

G10 CHECK THE TRANSFER CASE SYNCHRONIZATION CLUTCH CIRCUIT FOR A SHORT TO VOLTAGE

- Measure:

TRANSFER CASE ASSEMBLY	
------------------------	--

Positive Lead	Measurement / Action	Negative Lead
C350-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.
No	GO to G11

G11 CHECK TRANSFER CASE SYNCHRONIZATION CLUTCH

- Ignition OFF.
- Measure:

TRANSFER CASE ASSEMBLY	
------------------------	--

Positive Lead	Measurement / Action	Negative Lead
C350-2	Ω	Ground

Is the resistance between 1-3 ohms?

Yes	GO to G12
No	INSTALL a new transfer case clutch.

G12 CHECK FOR CORRECT TCCM OPERATION

- Ignition OFF.
- Disconnect and inspect all TCCM connectors.
- Repair:
 - corrosion (install new connector or terminals - clean module pins)
 - damaged or bent pins - install new terminals/pins
 - pushed-out pins - install new pins as necessary
- Connect all TCCM connectors. Make sure they are seated correctly.
- Operate the system and verify the concern is still present.

Is the concern still present?

Yes	INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of the connector or pin issues.

PINPOINT TEST H : THE TRANSFER CASE JUMPS OUT OF GEAR

WARNING: When directed to drive the vehicle as part of this test, drive the vehicle on a hard surface in an area without traffic to prevent a crash. Failure to follow these instructions may result in personal injury.

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

Once the 4WD system engages the user selected mode, that mode should be maintained. If the 4WD system does not stay in the selected position systematically check the 4WD system components.

Possible Sources

- CVH
- MSS
- Transfer case

H1 VERIFY THE CONCERN

- Drive the vehicle and attempt to duplicate the concern.

Is the concern an un-commanded range shift (in or out of low range)?

Yes	GO to H4
No	GO to H2

H2 CHECK THE MSS POSITION MONITORING THE TCCM 4WD SWITCH STATUS (4X4_SW) PID

- Ignition ON.
- Enter the following diagnostic mode: TCCM Datalogger.
- Drive the vehicle.
- Dynamically monitor the 4X4_SW PID while driving the vehicle in each shift position.

Does the 4X4_SW PID always agree with the switch position?

Yes	GO to H3
No	To diagnose the 4WD indicators, REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing).

H3 CHECK FOR TCCM DTCS

- Transmission in PARK.
- Enter the following diagnostic mode: TCCM Self-Test.

Are any DTCs present?

Yes	REFER to the DTC Chart: TCCM.
No	CARRY OUT the Electronic Shift-On-The-Fly (ESOF) Functional Test. GO to Pinpoint Test J

H4 CHECK THE 4WD INDICATORS

- Stop the vehicle.
- Transmission in NEUTRAL.
- Press the brake pedal.
- Observe the 4WD indication in the message center while cycling through each MSS position.

Does the 4WD indicator(s) match the MSS?

Yes	GO to H5
No	To diagnose the 4WD indicators, GO to Pinpoint Test C

H5 CHECK FOR TCCM DTCS

- Transmission in PARK.
- Enter the following diagnostic mode: TCCM Self-Test.

Are any DTCs present?

Yes	REFER to the DTC Chart: TCCM.
No	CHECK the transfer case fluid level. If the fluid level is OK, CHECK for internal transfer case faults. REFER to: Transfer Case (308-07B Transfer Case, Diagnosis and Testing).

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

For the 4WD system to function correctly the tires and wheels must be the same size, be in good condition and the front and rear axle ratios must match.

Possible Sources

- Unequal tire inflation pressures
- Unmatched tire and wheel sizes
- Unequal amounts of tire wear
- Unmatched front and rear axle ratios

WARNING: When directed to drive the vehicle as part of this test, drive the vehicle on a hard surface in an area without traffic to prevent a crash. Failure to follow these instructions may result in personal injury.

I1 VERIFY THE CONCERN

NOTE: 4X4 high/low (4H/4L) is not intended for driving on hard/dry surfaces.

NOTE: Make sure both CVH dials are in the same position.

- Drive the vehicle and shift from 2H to 4H. There should be minimal wind-up in 4H mode during straight line maneuvers (wind-up in turns is normal; 4X4 high/low is not intended for driving on hard/dry surfaces).

Is excessive wind-up present?

Yes	GO to I2
No	RETURN the vehicle to the customer. ADVISE about correct system operation and normal vehicle behavior.

I2 CHECK FOR MATCHING WHEEL AND TIRE SIZES

- Check the wheel and tire sizes.

Do the 4 wheel and tire sizes match?

Yes	GO to I3
No	ADVISE the customer that 4WD systems require 4 matched, correctly inflated, correctly maintained tires to operate correctly.

I3 CHECK TIRE WEAR

- Check each of the 4 tires for wear.

Are the 4 tires worn evenly?

Yes	GO to I4
No	ADVISE the customer that 4WD systems require 4 matched, correctly inflated, correctly maintained tires to operate correctly.

I4 CHECK TIRE INFLATION PRESSURE

- Check the inflation pressure in each tire. Refer to VC label.

Are the tire inflation pressures correct?

Yes	GO to I5
No	ADJUST the tire pressure as necessary. ADVISE the customer that 4WD systems require 4 matched, correctly inflated, correctly maintained tires to operate correctly.

I5 CHECK THE FRONT AND REAR AXLE RATIOS

- Check that front and rear axle ratios match.

Do the front and rear axle ratios match?

Yes	RETURN the vehicle to the customer and ADVISE about correct 4WD usage and normal vehicle behavior.
No	CHECK the vehicle VC label. INSTALL the correct axle(s). REFER to: Driveshaft (205-01 Driveshaft, Diagnosis and Testing). REFER to: Rear Drive Axle and Differential (205-02D Rear Drive Axle/Differential - Vehicles With: Ford 10.5 Inch Ring Gear, Diagnosis and Testing).

☐ PINPOINT TEST J : ELECTRONIC SHIFT-ON-THE-FLY (ESOF) SYSTEM FUNCTIONAL TEST

WARNING: When directed to drive the vehicle as part of this test, drive the vehicle on a hard surface in an area without traffic to prevent a crash. Failure to follow these instructions may result in personal injury.

Normal Operation and Fault Conditions

When operating in 4H or 4L mode, the transfer case and both continuous vacuum hub (CVH)s are locked. When in 4L mode, the transfer case low range gear set provides an additional 2.64:1 gear reduction. When operating in 2H (4X2) mode, the transfer case and both CVHs are unlocked.

Possible Sources

- 4WD system and/or related components
- No communication with the IPC
- Transfer case and related components
- Wheel/tire assemblies

NOTE: 4X4 high and 4X4 low are not intended for driving on hard/dry surfaces. Using these modes while driving on these surfaces may produce noises like intermittent chunking, but will not damage driveline components.

J1 CHECK FOR IPC DTCS

- Ignition ON.
- Enter the following diagnostic mode: IPC Self-Test.

Are any DTCs present?

Yes	If DTC U0102:00 is retrieved, REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing). For all other DTCs, REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing).
No	GO to J2

J2 CHECK 2H OPERATION

- Stop the vehicle.
- Make sure both CVH dials are in AUTO mode.
- Transmission in NEUTRAL.
- Switch the MSS to 4H then to 2H.

Does the IPC 4X4 HIGH indicator turn off and does the message center (if equipped) display 4X2 for approximately 4 seconds?

Yes	GO to J4
No	GO to J3

J3 CHECK FOR TCCM DTCS

- Ignition ON.
- Enter the following diagnostic mode: TCCM Self-Test.

Are DTCs present?

Yes	REFER to the TCCM DTC Chart
No	GO to J4

J4 CHECK FOR WIND UP IN TURNS IN 2H

- Make sure both CVH dials are in AUTO mode.
- Drive the vehicle on a dry, hard surface while executing turns.

Is wind-up present in turns?

Yes	GO to Pinpoint Test D
No	GO to J5

J5 CHECK 4H OPERATION

- Stop the vehicle.
- Lock the LH and RH CVHs .
- Transmission in NEUTRAL.
- Switch the MSS to 4H.

Does the IPC 4X4 HIGH indicator illuminate correctly or message center (if equipped) display 4X4 HIGH?

Yes	GO to J9
No	GO to J6

J6 CHECK FOR RETURN OF TCCM DTCS

- Transmission in PARK.
- Enter the following diagnostic mode: TCCM Self-Test.

Are DTCs retrieved?

Yes	REFER to the TCCM DTC Chart.
No	GO to J7

J7 CHECK WIND UP IN TURNS IN 4H MODE

- Drive the vehicle in 4H mode while turning.

Is wind up and tire scuff present?

Yes	GO to J8
No	IGO to Pinpoint Test D

J8 CHECK FOR STRAIGHTLINE WIND UP IN 4H

- Drive the vehicle on a dry, hard surface while driving in a straight line.

Is wind up present?

Yes	GO to Pinpoint Test I
No	GO to J9

J9 CHECK FOR LH AND RH CVH ENGAGEMENT IN 4H

- Switch the MSS to 4H.
- Make sure both CVH dials are in AUTO mode position.
- **NOTE:** *The engine must be at idle during the following steps to supply vacuum for CVH engagement.*

With the vehicle in NEUTRAL, position it on a hoist.

- Start the engine and allow to idle.
- Rotate the LH front tire one revolution forward and one revolution backward while observing the LH front axle shaft and U-joint.
- Rotate the RH front tire one revolution forward and one revolution backward while observing the RH front axle shaft and U-joint.

Does the LH or RH front axle shaft rotate?

Yes	GO to J11
No	GO to J10

J10 CHECK FOR CVH VACUUM LEAKS

- Ignition OFF.
- Disconnect the output vacuum tube for the continuous vacuum hublock solenoid at the regulator.
- Using a vacuum pump, apply 508 mm-Hg (20 in- Hg) of vacuum to the CVH vacuum circuit.
- Observe the vacuum reading.

Did the vacuum drop more than 25 mm-Hg (1 in-Hg) per minute?

Yes	CHECK the CVH and related components for leaks. GO to Pinpoint Test F
No	CONNECT the hublock vacuum solenoid vacuum lines and GO to J11

J11 CHECK 4L OPERATION

- Bring the vehicle to a speed below 5 km/h (3 mph). With the transmission in NEUTRAL, switch the MSS to 4L

Does the IPC 4X4 LOW indicator illuminate correctly or message center (if equipped) display 4X4 LOW?

Yes	GO to J13
No	GO to J12

J12 CHECK FOR TCCM DTCS

- Select PARK.
- Enter the following diagnostic mode: TCCM Self-Test .

Are DTCs retrieved?

Yes	REFER to the TCCM DTC Chart.
No	GO to J13

J13 CHECK FOR WIND UP IN TURNS IN 4L

- Drive the vehicle on a dry, hard surface while executing turns.

Is wind up and tire scuff present and 4L operating?

Yes	GO to Pinpoint Test C
No	GO to J14

J14 CHECK FOR STRAIGHTLINE WIND UP IN 4L

- Drive the vehicle in 4L while driving in a straight line.

Is wind up present?

Yes	GO to Pinpoint Test I
No	GO to J15

J15 CHECK 4L TO 2H SHIFT

- With the vehicle at a stop and transmission in NEUTRAL, switch the MSS from 4L to 2H.

Does the 4X4 LOW indicator turn off or (if equipped) IPC message center display 4X2 for approximately 4 seconds then turn off?

Yes	GO to J17
No	GO to J16

J16 CHECK FOR TCCM DTCS

- Select PARK.
- Enter the following diagnostic mode: TCCM Self-Test .

Are DTCs retrieved?

Yes	REFER to the TCCM DTC Chart.
No	GO to J17

J17 CHECK FOR WIND UP IN TURNS IN 2H

- Drive the vehicle on a dry, hard surface while executing turns.

Is wind up and tire scuff present in turns?

Yes	GO to Pinpoint Test E
No	GO to J18

J18 CHECK 2H TO 4H SHIFT

- Switch the MSS to 2H.
- Drive the vehicle on the road and shift from 2H to 4H while driving above 32 km/h (20 mph).

Does the transfer case shift to 4H satisfactorily?

Yes	The 4WD system is operating correctly.
No	GO to Pinpoint Test G

PINPOINT TEST K : DTC (DIAGNOSTIC TROUBLE CODE) : U0100

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

The TCCM sets DTC U0100 when it has not received messages from the PCM for more than 5 seconds. Other modules that require data from the PCM all set communication DTCs and may also exhibit system function concerns.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	Sets in continuous memory in the TCCM if powertrain data messages received from the PCM over the HS-CAN are missing for longer than 5 seconds.

Possible Sources

- Communication concern
- Battery voltage concern
- PCM
- TCCM

K1 VERIFY THE SCAN TOOL COMMUNICATES WITH THE PCM (POWERTRAIN CONTROL MODULE)

- Ignition ON.
- Connect a diagnostic scan tool.
- Check that a vehicle session can be established using a diagnostic scan tool.

Can a vehicle session be established?

Yes	GO to K2
No	REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).

K2 CHECK THE TCCM (TRANSFER CASE CONTROL MODULE) CONTINUOUS MEMORY DTC (DIAGNOSTIC TROUBLE CODE) S

- Using a diagnostic scan tool, perform the TCCM self-test.
- Clear the DTCs.
- Wait 10 seconds.
- Repeat the TCCM self-test.

Is DTC U0100?

Yes	GO to K3
No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

K3 RETRIEVE THE RECORDED DTC (DIAGNOSTIC TROUBLE CODE) S FROM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

- Using a diagnostic scan tool, perform the PCM KOEO self-test.

Are any DTCs recorded?

Yes	REFER to: Powertrain Control Module (PCM) (303-14A Electronic Engine Controls - 6.2L V8, Removal and Installation). REFER to: Powertrain Control Module (PCM) (303-14B Electronic Engine Controls - 6.7L Power Stroke Diesel, Removal and Installation).
No	GO to K4

K4 RETRIEVE THE RECORDED DTC (DIAGNOSTIC TROUBLE CODE) S FROM THE TCCM (TRANSFER CASE CONTROL MODULE) SELF-TEST

- Using a diagnostic scan tool, perform the TCCM self-test.

Is DTC P0562:00 or P0563:00 recorded?

Yes	For DTC P0562:00, GO to Pinpoint Test A For DTC P0563:00, GO to Pinpoint Test B
No	GO to K5

K5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) S U0100 SET IN OTHER MODULES

- Using a diagnostic scan tool, clear all DTCs.
- Ignition OFF.
- Ignition ON.
- Wait 10 seconds.
- Using a diagnostic scan tool, perform the continuous memory self-test.
- Retrieve the CMDTCs from all modules.

Are any of the DTCs U0100 set in other modules on the network?

Yes	GO to K6
No	GO to K7

K6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect all PCM connectors.
- Repair:
 - corrosion (install new connector or terminals - clean module pins)
 - damaged or bent pins - install new terminals/pins
 - pushed-out pins - install new pins as necessary
- Reconnect the PCM connectors. Make sure they seat and latch correctly.
- Operate the system and verify the concern is still present

Is the concern still present?

Yes	CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, Click here to access Guided Routine (PCM) .
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

K7 CHECK FOR CORRECT TCCM (TRANSFER CASE CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect the TCCM connector.
- Repair:
 - corrosion (install new connector or terminals - clean module pins)
 - damaged or bent pins - install new terminals/pins
 - pushed-out pins - install new pins as necessary
- Reconnect the TCCM connector. Make sure it seats and latches correctly.
- Operate the system and verify the concern is still present

Is the concern still present?

Yes	CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

PINPOINT TEST L : U0101:00

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U0101:00	Lost Communication with TCM: No Sub Type Information	This DTC sets in continuous memory in the TCCM if data messages received from the TCM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- TCM (diesel engines)
- TCCM

L1 VERIFY THE SCAN TOOL COMMUNICATES WITH THE TCM (TRANSMISSION CONTROL MODULE)

- Connect the diagnostic scan tool.
- Check that a vehicle session can be established using the scan tool.

Can a vehicle session be established?

Yes	GO to L2
No	DIAGNOSE the module does not respond to the scan tool. REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).

L2 CHECK THE TCCM (TRANSFER CASE CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

- Ignition ON.
- Using a diagnostic scan tool, perform the TCCM self-test.
- Clear the DTCs.
- Wait 10 seconds.
- Repeat the TCCM self-test.

Are any non-network Diagnostic Trouble Codes (DTCs) present?

Yes	DIAGNOSE all non-network DTCs. REFER to DTC Chart: TCCM.
No	GO to L3

L3 PERFORM THE TCM (TRANSMISSION CONTROL MODULE) SELF-TEST

- Using a diagnostic scan tool, perform the TCM self-test.

Are any non-network DTCs present?

Yes	DIAGNOSE all non-network DTCs.
No	GO to L4

L4 RECHECK THE TCCM (TRANSFER CASE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCs)

- Using a diagnostic scan tool, clear the TCCM DTCs.
- Ignition OFF.
- Ignition ON.
- Wait 10 seconds.
- Using a diagnostic scan tool, perform the continuous memory self-test.
- Check the TCCM DTCs.

Is DTC U0101:00 still present?

Yes	GO to L5
No	The system is operating correctly at this time. The DTC may have set due to high network traffic or an intermittent fault condition.

L5 CHECK FOR OTHER CAUSES OF COMMUNICATION NETWORK CONCERN

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the PMI or the PMI may not have been carried out.

- CHECK the vehicle service history for recent service actions related to the TCM or AWD. If recent service history is found:
 - verify correct replacement module was installed
 - HVBOM may be used to verify correct part application
 - verify the configuration of replacement module was correct
 - re-configure module using as-built data if prior configuration is suspect
 - verify the module was not obtained from a like vehicle and installed into customer vehicle
 - return the swapped module to source vehicle and obtain new replacement module
- Operate the system and determine if the observable symptom is still present.

Is the observable symptom still present?

Yes	GO to L6
No	The system is operating correctly at this time. The concern may have been due to incorrect parts replacement procedures or incorrect module configuration.

L6 CHECK FOR CORRECT TCM (TRANSMISSION CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect the TCM and related in-line connectors.
- Repair:
 - corrosion (install new connector or terminals & clean module pins)
 - damaged or bent pins & install new terminals/pins
 - pushed-out pins & install new pins as necessary
- Reconnect the TCM and all related in-line connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, Click here to access Guided Routine (TCM) .
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

PINPOINT TEST M : U0121:00

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

The TCCM sets the DTC U0121 when key messages such as wheel speed, brake pressure or torque are not received for longer than 5 seconds. This loss of key messages degrades the 4x4 system performance and/or inability to change 4x4 modes. Other modules that require data from the ABS module all set communication DTCs and may also exhibit system function concerns.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module "A": No Sub Type Information	Sets in continuous memory in the TCCM if ABS data messages received from the ABS Module over the HS-CAN are missing for longer than 5 seconds.

Possible Sources

- Communication concern
- Battery voltage concern
- ABS module
- TCCM

M1 VERIFY THE SCAN TOOL COMMUNICATES WITH THE ABS (ANTI-LOCK BRAKE SYSTEM)

- Ignition ON.
- Connect a diagnostic scan tool.
- Check that a vehicle session can be established using a diagnostic scan tool.

Can a vehicle session be established?

Yes	GO to M2
No	REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).

M2 CHECK THE TCCM (TRANSFER CASE CONTROL MODULE) CMDTC (CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODE) S

- Using a diagnostic scan tool, perform the TCCM self-test.
- Clear the DTCs.
- Wait 10 seconds.
- Repeat the TCCM self-test.

Is DTC U0121 retrieved again?

Yes	GO to M3
No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

M3 RETRIEVE THE RECORDED DTC (DIAGNOSTIC TROUBLE CODE) S FROM THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

- Using a diagnostic scan tool, perform the ABS module self-test.

Are any DTCs recorded?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control (206-09 Anti-Lock Brake System (ABS) and Stability Control, Diagnosis and Testing).
No	GO to M4

M4 RETRIEVE THE RECORDED DTC (DIAGNOSTIC TROUBLE CODE) S FROM THE TCCM (TRANSFER CASE CONTROL MODULE) SELF-TEST

- Using a diagnostic scan tool, perform the TCCM self-test.

Is DTC P0562:00 or P0563:00 recorded?

Yes	For DTC P0562:00, GO to Pinpoint Test A For DTC P0563:00, GO to Pinpoint Test B
No	GO to M5

M5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0121 SET IN OTHER MODULES

- Using a diagnostic scan tool, clear all DTCs.
- Ignition OFF.
- Ignition ON.
- Wait 10 seconds.
- Using a diagnostic scan tool, perform the continuous memory self-test.
- Retrieve the CMDTCs from all modules.

Is DTC U0121 set in other modules on the network?

Yes	GO to M6
No	GO to M7

M6 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

- Ignition OFF.
- Disconnect and inspect the ABS module connector.
- Repair:
 - corrosion (install new connector or terminals - clean module pins)
 - damaged or bent pins - install new terminals/pins
 - pushed-out pins - install new pins as necessary
- Reconnect the ABS module connector. Make sure it seats and latches correctly.
- Operate the system and verify the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, Click here to access Guided Routine (ABS) .
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

M7 CHECK FOR CORRECT TCCM (TRANSFER CASE CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect the TCCM connector.
- Repair:
 - corrosion (install new connector or terminals - clean module pins)
 - damaged or bent pins - install new terminals/pins
 - pushed-out pins - install new pins as necessary
- Reconnect the TCCM connector. Make sure it seats and latches correctly.
- Operate the system and verify the concern is still present

Is the concern still present?

Yes	CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

PINPOINT TEST N : U0140:00

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

Normal Operation and Fault Conditions

The BCM sets the DTC U0140 when key messages are not received for longer than 5 seconds. This loss of key messages degrades the 4WD system functionality. Other modules that require data from the BCM module all set communication DTCs and may also exhibit system function concerns.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U0140:00	Lost Communication With Body Control Module: No Sub Type Information	Sets in continuous memory in the TCCM if BCM data messages received from the BCM over the HS-CAN are missing for longer than 5 seconds.

Possible Sources

- Communication concern
- Battery voltage concern
- BCM module
- TCCM

N1 VERIFY THE SCAN TOOL COMMUNICATES WITH THE BCM (BODY CONTROL MODULE)

- Ignition ON.
- Connect a diagnostic scan tool.
- Check that a vehicle session can be established using a diagnostic scan tool.

Can a vehicle session be established?

Yes	GO to N2
No	REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).

N2 CHECK THE TCCM (TRANSFER CASE CONTROL MODULE) CMDTC (CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODE) S

- Using a diagnostic scan tool, perform the TCCM self-test.
- Clear the DTCs.
- Wait 100 seconds.
- Repeat the TCCM self-test.

Is DTC U0140:00 retrieved again?

Yes	GO to N3
No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

N3 RETRIEVE THE RECORDED DTC (DIAGNOSTIC TROUBLE CODE) S FROM THE BCM (BODY CONTROL MODULE) MODULE SELF-TEST

- Using a diagnostic scan tool, perform the BCM module self-test.

Are any DTCs recorded?

Yes	REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing).
No	GO to N4

N4 RETRIEVE THE RECORDED DTC (DIAGNOSTIC TROUBLE CODE) S FROM THE TCCM (TRANSFER CASE CONTROL MODULE) SELF-TEST

- Using a diagnostic scan tool, perform the TCCM self-test.

Is DTC P0562:00 or P0563:00 recorded?

Yes	For DTC P0562:00, GO to Pinpoint Test A For DTC P0563:00, GO to Pinpoint Test B
No	GO to N5

N5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140 SET IN OTHER MODULES

- Using a diagnostic scan tool, clear all DTCs.
- Ignition OFF.
- Ignition ON.
- Wait 10 seconds.
- Using a diagnostic scan tool, perform the continuous memory self-test.
- Retrieve the CMDTCs from all modules.

Is DTC U0140 set in other modules on the network?

Yes	GO to N6
No	GO to N7

N6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) MODULE OPERATION

- Ignition OFF.
- Disconnect and inspect the BCM module connector.
- Repair:
 - corrosion (install new connector or terminals - clean module pins)
 - damaged or bent pins - install new terminals/pins
 - pushed-out pins - install new pins as necessary
- Reconnect the BCM module connector. Make sure it seats and latches correctly.
- Operate the system and verify the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, Click here to access Guided Routine (BCM) .
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

N7 CHECK FOR CORRECT TCCM (TRANSFER CASE CONTROL MODULE) OPERATION

- Ignition OFF.
- Disconnect and inspect the TCCM connector.
- Repair:
 - corrosion (install new connector or terminals - clean module pins)
 - damaged or bent pins - install new terminals/pins
 - pushed-out pins - install new pins as necessary
- Reconnect the TCCM connector. Make sure it seats and latches correctly.
- Operate the system and verify the concern is still present

Is the concern still present?

Yes	CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

PINPOINT TEST O : U0423:82

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U0423:82	Invalid Data Received from Instrument Panel Cluster Control Module: Alive/Sequence Counter Incorrect/Not Updated	Sets in continuous memory in the transfer case control module data received from the GWM over the HS-CAN2 or from the IPC over the HS-CAN4 is missing for 5 seconds or longer.

Possible Sources

- TCCM
- IPC
- GWM

O1 CHECK THE COMMUNICATION NETWORK

- Ignition ON.
- Using a diagnostic scan tool, perform the network test.

Does the GWM pass the network test?

Yes	GO to O2
No	REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).

O2 CHECK THE GWM (GATEWAY MODULE A) DTC (DIAGNOSTIC TROUBLE CODE)

- Using a diagnostic scan tool, retrieve the GWM CMDTC.

Are any DTC recorded?

Yes	REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).
No	GO to O3

O3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

- Using a diagnostic scan tool, perform the TCCM self-test.

Are any DTC recorded?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing).
No	GO to O4

O4 RECHECK THE TCCM DIAGNOSTIC TROUBLE CODES (DTCS)

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been performed.

- Using a diagnostic scan tool, clear the DTC.
- Wait 10 seconds.
- Repeat the TCCM self-test.

Is DTC U0423:82 still present?

Yes	GO to Q5
No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

O5 CHECK FOR OTHER CAUSES OF COMMUNICATION NETWORK CONCERN

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the PMI or the PMI may not have been carried out.

- Check the vehicle service history for recent service actions related to the TCCM or IPC.
 - Verify correct replacement module was installed
 - HVBOM (Historical Vehicle Bill of Material) may be used to verify correct part fitment
 - Verify the configuration of replacement module was correct
 - Re-configure module using As-Built data if prior configuration is suspect
 - Verify the module was not obtained from a like vehicle and installed into customer vehicle
 - Return the swapped module to source vehicle and obtain a new replacement module

Is the observable symptom still present?

Yes	GO to Q6
No	The system is operating correctly at this time. The concern may have been due to incorrect parts replacement procedures or incorrect module configuration.

O6 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

- Ignition OFF.
- Disconnect and inspect all IPC connectors.
- Repair:
 - Corrosion (install new connector or terminals - clean module pins)
 - Damaged or bent pins - install new terminals/pins
 - Pushed-out pins - install new pins as necessary
- Reconnect the IPC connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable service articles: TSB, GSB, SSM or FSA. If a service article exists for this concern, DISCONTINUE this test and FOLLOW service article instructions. If no service articles address this concern, Click here to access Guided Routine (IPC) .
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

PINPOINT TEST P : U0418:00

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U0418:00	Invalid Data Received from Brake System Control Module "A": No Sub Type Information	Sets when the TCCM detects lost communication with invalid data received from ABS.

Possible Sources

- Communication concern
- GWM concern
- ABS module

P1 VERIFY THE CUSTOMER CONCERN

- Ignition ON.
- Verify there is an observable symptom present.

Is the TCCM detects lost communication with invalid data received from ABS ?

Yes	To diagnose the wheel speed sensor concern, REFER to: Anti-Lock Brake System (ABS) and Stability Control (206-09 Anti-Lock Brake System (ABS) and Stability Control, Diagnosis and Testing).
No	The repair is complete.

PINPOINT TEST Q : U2300:54

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U2300:54	Central Configuration: Missing Calibration	Sets when the TCCM detects certain calibration parameters are corrupt or missing calibration.

Possible Sources

- BCM
- TCCM

Q1 VERIFY THE CUSTOMER CONCERN

- Ignition ON.
- Verify there is an observable symptom present.

Is the TCCM detects certain calibration parameters are corrupt or missing calibration?

Yes	This DTC can set if one or more expected configuration data identifications is missing (gearbox type, tire circumference) from the BCM. CARRY OUT a self-test of the BCM. If BCM DTC are present, REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing). If no BCM DTC are present, CLEAR the DTC. CARRY OUT a TCCM self-test. If DTC U2300:54 returns, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The repair is complete.

PINPOINT TEST R : U2300:55

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U2300:55	Central Configuration: Not Configured	Sets when the TCCM detects certain calibration parameters are corrupt or Not Configured.

Possible Sources

- TCCM

R1 VERIFY THE CUSTOMER CONCERN

- Ignition ON.
- Verify there is an observable symptom present.

Is the TCCM detects certain calibration parameters are corrupt or Not Configured?

Yes	This DTC can set upon TCCM power up only until all expected configuration data parameters (gearbox type, axle ratio, tire circumference) is received from the BCM. CARRY OUT a self-test of the BCM. If BCM DTC are present, REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing). If no BCM. DTC are present, CLEAR the DTC. CARRY OUT TCCM self-test. If DTC U2300:55 returns, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The repair is complete.

PINPOINT TEST S : U2300:56

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U2300:56	Central Configuration: Invalid/Incompatible Configuration	Sets when the TCCM detects certain calibration parameters are Invalid / Incompatible Configuration.

Possible Sources

- TCCM

S1 VERIFY THE CUSTOMER CONCERN

- Ignition ON.
- Verify there is an observable symptom present.

Is the TCCM detects certain calibration parameters are Invalid / Incompatible Configuration?

Yes	This DTC can set if one expected configuration data parameter is out of range (gearbox type, axle ratio, tire circumference) from the BCM. CARRY OUT a self-test of the BCM. If BCM DTC are present, REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing). If no BCM DTC are present, CLEAR the DTC. CARRY OUT a TCCM self-test. If DTC U2300:56 returns, REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The repair is complete.

☐ PINPOINT TEST T : U2300:64

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U2300:64	Central Configuration: Signal Plausibility Failure	Sets when the TCCM detects Signal Plausibility Failure.

Possible Sources

- TCCM

T1 VERIFY THE CUSTOMER CONCERN

- Ignition ON.
- Verify there is an observable symptom present.

Is the TCCM detects Signal Plausibility Failure?

Yes	This DTC can set upon TCCM power up only until all expected configuration data parameters (gearbox type, axle ratio, tire circumference) is received from the BCM. CARRY OUT a self-test of the BCM. If BCM DTC are present, REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing). If no BCM DTCs are present, CLEAR the DTCs. CARRY OUT TCCM self-test. If DTC U2300:55 returns, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The repair is complete.

PINPOINT TEST U : U3000:04

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U3000:04	Control Module: System Internal Failures	Sets when the TCCM detects system Internal Failure.

Possible Sources

- TCCM

U1 VERIFY THE CUSTOMER CONCERN

- Ignition ON.
- Verify there is an observable symptom present.

Is the TCCM detects detects system Internal Failure?

Yes	CLEAR the DTC. REPEAT the self-test. If DTC U3000:04 is retrieved, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The repair is complete.

PINPOINT TEST V : U3000:46

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U3000:46	Control Module: Calibration/Parameter Memory Failure	Sets when the TCCM detects certain calibration parameters are Invalid / Incompatible Configuration.

Possible Sources

- TCCM

V1 VERIFY THE CUSTOMER CONCERN

- Ignition ON.
- Verify there is an observable symptom present.

Is the TCCM detects certain calibration parameters are Invalid / Incompatible Configuration?

Yes	CLEAR the DTC. REPEAT the self-test. If DTC U3000:46 is retrieved, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The repair is complete.

[PINPOINT TEST W: U3000:49](#)

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM U3000:49	Control Module: Internal Electronic Failure	Sets when the TCCM detects internal electronic failure.

Possible Sources

- TCCM

W1 VERIFY THE CUSTOMER CONCERN

- Ignition ON.
- Using a diagnostic scan tool, perform the TCCM module self-test.

Is the TCCM detects system Internal Failure?

Yes	CLEAR the DTC. REPEAT the self-test. If DTC U3000:49 is retrieved, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The repair is complete.

PINPOINT TEST X : DTC (DIAGNOSTIC TROUBLE CODE) : P06B8

Refer to Wiring Diagrams Cell [34](#) for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Condition
TCCM P06B8:00	Internal Control Module Non-Volatile Random Access Memory (NVRAM) Error: No Sub Type Information	Sets when the TCCM detects internal control module Non-Volatile Random Access Memory (NVRAM) Error.

Possible Sources

- TCCM

X1 INSTALL A NEW SUSPECT MODULE

- Ignition ON.
- Using a diagnostic scan tool, perform the TCCM module self-test.

Is DTC P06B8 recorded? ?

Yes	CLEAR the DTC. REPEAT the TCCM KOEO self-test. If the DTC resets, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The repair is complete.