FOUR-WHEEL DRIVE SYSTEMS — ELECTRONIC SHIFT

Refer to Wiring Diagrams Cell 34, Electric Shift Control for schematic and connector information.

Refer to Wiring Diagrams Cell 59, Generic Electronic Module (GEM) for schematic and connector information.

**Special Tool(s)**

<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
</tr>
</thead>
</table>
| ![73III Automotive Meter](ST1137-A) | 73III Automotive Meter  
105-R0057 or equivalent |
| ![Worldwide Diagnostic System (WDS)](ST2332-A) | Worldwide Diagnostic System (WDS)  
418-F224,  
New Generation STAR (NGS) Tester  
418-F052, or equivalent diagnostic tool |
| ![Vacuum Pump](ST1176-A) | Vacuum Pump  
014-R1054 or equivalent |
| | Test Tool, Vacuum Hub  
205-798 |
<table>
<thead>
<tr>
<th>General Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pressure Vacuum Module 105-R0099 or equivalent</strong></td>
</tr>
<tr>
<td><strong>Material</strong></td>
</tr>
</tbody>
</table>

Vacuum Test Stand, Hublock  
205-795

Vacuum Test Stand, Hub Bearing  
205-794

Vacuum Test Tool, Knuckle Seal  
205-797

Vacuum Test Plug, ABS Sensor  
205-796
**Item Specification**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium Long Life Grease</td>
<td></td>
</tr>
<tr>
<td>XG-1-C or equivalent</td>
<td>ESA-M1C75-8</td>
</tr>
</tbody>
</table>

**Principles of Operation**

**Transfer Case — Electronic Shift**

The four-wheel drive, electronic shift-on-the-fly feature electrically shifts the vehicle transfer case between 2WD, 4X4, and 4X4 LOW. The system mode is selected by the operator through the mode select switch (MSS) on the instrument panel. The operator is informed which mode the system is in by two instrument cluster indicators, one for 4X4, and one for 4X4 LOW in 4X4 LOW both the lamps are on. Shifts into 4X4 can be made at any speed. When shifting into 4X4 with the vehicle stationary, tooth blockage may occur, preventing shift completion. When the vehicle is driven above 8 km/h (5mph) the shift will complete. When shifting in or out of 4X4 LOW, the four-wheel drive (4WD) control module requires that the vehicle speed be less than 5 km/h (3 mph), the brake pedal be applied, and the transmission in NEUTRAL (automatic transmission) or the clutch pedal be depressed (manual transmission). (The digital transmission range TR sensor informs the 4WD control module when the automatic transmission is in the NEUTRAL range position.)

The gearmotor encoder assembly is mounted externally on the transfer case. It drives a rotary cam which moves the mode fork and the range fork within the transfer case between the 4X4, 4X4 LOW, and 2WD range positions.

The 4WD control module uses two relays to control the gearmotor encoder assembly shift between 4X4, 4X4 LOW, and 2WD modes. The 4WD control module controls the pulse vacuum hublock (PVH) solenoid which supplies engagement and disengagement vacuum to control the hublocks.

The 4WD control module accomplishes shifts by interpreting inputs from:

- MSS
- vehicle speed signal (transmitted from the ABS system)
- gearmotor encoder plate position
- brake pedal switch
- digital TR sensor (automatic transmission)
- clutch pedal position (CPP) switch (manual transmission)
- ignition switch

Based on these inputs, the 4WD control module controls the shifts into 2WD, 4X4, or 4X4 LOW with the following outputs:

- low to high relay (clockwise)
- high to low relay (counterclockwise)
- pulse vacuum hublock (PVH) solenoid
- gearmotor encoder assembly

The electronic shift-on-the-fly (ESOF) system has a feature which allows the driver to override the vacuum-operated hublocks. When the front hublocks are manually turned to the LOCK position, the hublocks are locked at all times, overriding the vacuum operated system. If the front hublocks are manually turned to the AUTO position, the hublocks can only be locked by turning the MSS to 4X4 or 4X4 LOW position.

**Electronic Shift Vacuum Schematic**
Hublock Operation

The 4X4 ESOF system uses timed vacuum sequences to lock and unlock the wheel ends. A high vacuum level is used to engage the hublocks, and a lower vacuum level is used to disengage the hublocks, after which the vacuum is released and the hublock holds itself in the proper mode. The vacuum signals are supplied to the hublocks by system components, including the 4WD control module, wiring harness, solenoid, vacuum harness and vacuum seals. As the first step in service, eliminate such obvious items as loose wiring connecting, loose vacuum connections, or damaged vacuum lines.

Disengage Time

"Slow" release of the hublocks is not considered abnormal for this system. Anytime vacuum is applied to the hubs, whether for 4X4 or 4X2, the hublocks will initially engage. If 4X4 was requested, the hublocks will remain engaged, but if 4X2 was selected, the internal mechanism will release only after the 4WD control module timers expire and vacuum is vented from the hub. This normally takes 15 seconds, but can take up to two minutes, depending on how the 4X4 mode select switch was operated. After the hub mechanism releases, internal springs must work the hublock gears to the disengaged position. Road bumps, vehicle speed, acceleration cycles, or momentary reversal of direction can assist this process, varying the length of time the hublocks remain engaged in each situation.

Manual Override

The hublocks have manual override selector dials, which, when rotated to the "LOCK" position, will keep the mechanism locked regardless of the instrument panel 4X4 mode select switch position. Verify that both dials are in "AUTO" before evaluating ESOF operation.

Hublock Replacement

Left and right side hublocks are not connected, other than by the common vacuum supply line. If a malfunction in either hublock is diagnosed, it should be installed as an individual unit; there is no need to "balance" an axle with new hublocks on both sides. If both sides appear to be malfunctioning, be sure to verify upstream integrity before installing new hublocks on both sides.

Many system components are involved in the proper operation of the ESOF hubs. Before diagnosing the hublocks themselves as the cause of 4X4 concerns, be sure to verify all related system components.
After removing the hublock retaining ring be sure not to use tools other than hands or "grip" gloves to remove the hublock, as damage may occur to either the paint or the function of the hublock. Pliers or locking Channel-Locks® should be considered as a last resort, and will usually damage the hublock, making it necessary to install a new hublock.

**Inspection and Verification — Electronic Shift**

1. Visually inspect for the following obvious signs of mechanical and electrical damage.

   **Visual Inspection Chart**

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>Electrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hublocks</td>
<td>Central junction box (CJB) fuse 59 (30A)</td>
</tr>
<tr>
<td>installed</td>
<td>Central junction box (CJB) fuse 27 (15A), 34 (10A)</td>
</tr>
<tr>
<td>correct type</td>
<td>4WD control module</td>
</tr>
<tr>
<td>Axle shafts and universal joints</td>
<td>Pulse vacuum hublock (PVH) solenoid</td>
</tr>
<tr>
<td>Driveshaft and universal joints</td>
<td>Wiring harness</td>
</tr>
<tr>
<td>Shift linkage</td>
<td>Mode select switch (MSS)</td>
</tr>
<tr>
<td>Fluid leaks</td>
<td>Gearmotor encoder assembly</td>
</tr>
<tr>
<td>Matching tire size</td>
<td>Connector(s)</td>
</tr>
<tr>
<td>Vacuum harness</td>
<td>Shift relays</td>
</tr>
<tr>
<td></td>
<td>Circuitry</td>
</tr>
</tbody>
</table>

2. If the concern remains after the inspection, connect the diagnostic tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the diagnostic tool menu. If the diagnostic tool does not communicate with the vehicle:
   - check that the program card is correctly installed.
   - check the connections to the vehicle.
   - check the ignition switch position.

3. If the diagnostic tool still does not communicate with the vehicle, refer to the diagnostic tool manual.

4. Carry out the DATA LINK DIAGNOSTICS test. If the diagnostic tool responds with:
   - CKT914, CKT915 or CKT70 = ALL ECUS NO RESP/NOT EQUIP, refer to Module Communications Network.
   - NO RESP/NOT EQUIP for 4WD control module, Go To Pinpoint Test D.
   - NOTE: To carry out the 4WD control module self-test for Excursion requires the headlamps to be in the OFF position. All others require the headlamps to be in the ON position. SYSTEM PASSED, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and carry out the 4WD control module self-test.

5. If the DTCs retrieved are related to the concern, go to the 4WD control module Diagnostic Trouble Code (DTC) Index to continue diagnostics.
6. If no DTCs related to the concern are retrieved, carry out the electronic shift function test. Refer to Function Test — Electronic Shift in this section.

### GEM Diagnostic Trouble Code (DTC) Index

<table>
<thead>
<tr>
<th>DTC</th>
<th>Description</th>
<th>Source</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1317</td>
<td>Battery Voltage High</td>
<td>4WD Control Module</td>
<td>REFER to Charging System — General Information.</td>
</tr>
<tr>
<td>B1318</td>
<td>Battery Voltage Low</td>
<td>4WD Control Module</td>
<td>REFER to Charging System — General Information.</td>
</tr>
<tr>
<td>B1342</td>
<td>ECU is Defective</td>
<td>4WD Control Module</td>
<td>CLEAR DTCs. REPEAT the self-test. If DTC B1342 is retrieved, INSTALL a new 4WD control module. REFER to Four-Wheel Drive (4WD) Control Module in this section. CLEAR the DTCs. REPEAT the self-test.</td>
</tr>
<tr>
<td>B1355</td>
<td>Ignition RUN Circuit Failure</td>
<td>4WD Control Module</td>
<td>REFER to Steering Column Switches.</td>
</tr>
<tr>
<td>B1359</td>
<td>Ignition RUN/ACC Circuit Failure</td>
<td>4WD Control Module</td>
<td>REFER to Steering Column Switches.</td>
</tr>
<tr>
<td>B1366</td>
<td>Ignition START Circuit Short to Ground</td>
<td>4WD Control Module</td>
<td>REFER to Steering Column Switches.</td>
</tr>
<tr>
<td>B1483</td>
<td>Brake Pedal Input Circuit Failure</td>
<td>4WD Control Module</td>
<td>REFER to Exterior Lighting.</td>
</tr>
<tr>
<td>B1485</td>
<td>Brake Pedal Input Circuit Short to Battery</td>
<td>4WD Control Module</td>
<td>REFER to Exterior Lighting.</td>
</tr>
<tr>
<td>B2477</td>
<td>Module Configuration Failure (Unconfigured, Incorrect or Rejected)</td>
<td>4WD Control Module</td>
<td>REFER to Module Configuration.</td>
</tr>
<tr>
<td>C1728</td>
<td>Transfer Case Unable to Transition Between 2H and 4H</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test C.</td>
</tr>
<tr>
<td>C1729</td>
<td>Transfer Case Unable to Transition Between 4H and 4L</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test C.</td>
</tr>
<tr>
<td>P0500</td>
<td>Vehicle Speed Sensor (VSS) Malfunction</td>
<td>4WD Control Module</td>
<td>REFER to Anti-Lock Control — 4-Wheel.</td>
</tr>
<tr>
<td>P1804</td>
<td>Transmission 4-Wheel Drive High Indicator Circuit Failure</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test H.</td>
</tr>
<tr>
<td>P1806</td>
<td>Transmission 4-Wheel Drive High Indicator Short</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test H.</td>
</tr>
<tr>
<td>P1808</td>
<td>Transmission 4-Wheel Drive Low Indicator Circuit Failure</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test I.</td>
</tr>
<tr>
<td>P1810</td>
<td>Transmission 4-Wheel Drive Low Indicator Short</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test I.</td>
</tr>
<tr>
<td>DTC</td>
<td>Description</td>
<td>Source</td>
<td>Action</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------</td>
<td>----------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>P1812</td>
<td>Transmission 4-Wheel Drive Mode Select Circuit Failure</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test E</td>
</tr>
<tr>
<td>P1815</td>
<td>Transmission 4-Wheel Drive Mode Select Short</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test E</td>
</tr>
<tr>
<td>P1819</td>
<td>Transmission Neutral Safety Switch Short Circuit to Ground</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test F</td>
</tr>
<tr>
<td>P1820</td>
<td>Transmission Transfer Case Clockwise Shift Relay</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test E</td>
</tr>
<tr>
<td>P1822</td>
<td>Transmission Transfer Case Clockwise Shift Relay Coil</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test E</td>
</tr>
<tr>
<td>P1828</td>
<td>Transmission Transfer Case Counterclockwise Shift</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test E</td>
</tr>
<tr>
<td>P1830</td>
<td>Transmission Transfer Case Counterclockwise Shift</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test E</td>
</tr>
<tr>
<td>P1832</td>
<td>Transmission Transfer Case Differential Lock-Up</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test G</td>
</tr>
<tr>
<td>P1834</td>
<td>Transmission Transfer Case Differential Lock-Up</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test G</td>
</tr>
<tr>
<td>P1865</td>
<td>Transmission Transfer Case Contact Plate Power</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test E</td>
</tr>
<tr>
<td>P1866</td>
<td>Transmission Transfer Case System Concern</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test C</td>
</tr>
<tr>
<td>P1867</td>
<td>Transmission Transfer Case Contact Plate General</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test E</td>
</tr>
<tr>
<td>P1876</td>
<td>Transmission Transfer Case 2-Wheel Drive Solenoid Circuit Failure</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test G</td>
</tr>
<tr>
<td>P1877</td>
<td>Transmission Transfer Case 2-Wheel Drive Solenoid Circuit Short</td>
<td>4WD Control Module</td>
<td>Go To Pinpoint Test G</td>
</tr>
</tbody>
</table>

Symptom Chart — Electronic Shift

Symptom Chart

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Sources</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>No communication with the 4WD control module</td>
<td>4WD control module.</td>
<td>Go To Pinpoint Test D</td>
</tr>
<tr>
<td></td>
<td>Central junction box (CJB).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CJB fuse 34 (10A), 45 (10A), 33 (10A).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Circuitry.</td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>Possible Sources</td>
<td>Action</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------</td>
<td>--------</td>
</tr>
</tbody>
</table>
| - The vehicle does not shift between 2WD and 4X4 correctly | - CJB fuse 59 (30A), 27 (15A).  
- Mode select switch (MSS).  
- Transfer case shift relays.  
- Contact plate A, B, C, or D.  
- Gearmotor encoder assembly.  
- Circuitry.  
- 4WD control module.  
- Transfer case mechanism. | Go To Pinpoint Test E. |
| - The vehicle does not shift between 4X4 and 4X4 LOW modes correctly | - CJB fuse 59 (30A).  
- MSS.  
- Park/neutral position switch.  
- Brake pedal position (BPP) switch.  
- 4WD control module.  
- Transfer case.  
- Digital transmission range (TR) sensor.  
- Anti-lock brake control (ABS) module.  
- Circuitry. | Go To Pinpoint Test F. |
| - The front axle is not engaging or disengaging correctly | - CJB fuse 27 (15A).  
- Pulse vacuum hublock (PVH) solenoid.  
- 4WD control module.  
- Circuitry.  
- Vacuum lines.  
- Hublocks.  
- Hub and bearing. | Go To Pinpoint Test G. |
| - The 4X4 indicator is always on—four wheel drive system operates correctly | - ABS module.  
- Circuitry.  
- Instrument cluster. | Go To Pinpoint Test H. |
### Functional Test — Electronic Shift

**PINPOINT TEST C: ELECTRONIC SHIFT FUNCTIONAL TEST**

**CAUTION**

CAUTION: The function test must be carried out on a hard surface in a vacant area without traffic.

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C1 CHECK FOR 2WD INDICATED</strong></td>
<td>1. Make sure the hublocks are in the AUTO position.</td>
</tr>
<tr>
<td></td>
<td>2. Start the vehicle and allow to idle.</td>
</tr>
<tr>
<td></td>
<td>3. Apply the brake pedal and hold.</td>
</tr>
<tr>
<td></td>
<td>4. For automatic transmission, shift the transmission to NEUTRAL. For manual transmission, press and hold the clutch pedal.</td>
</tr>
<tr>
<td></td>
<td>5. Turn the mode select switch (MSS) to 2WD while holding the shift conditions.</td>
</tr>
<tr>
<td></td>
<td>6. Observe the 4X4 and 4X4 LOW indicators.</td>
</tr>
</tbody>
</table>
| **Are both indicators off?** | → Yes  
| | GO to C3.  
| | → No  
| | GO to C2. |
| **C2 CHECK FOR THE PRESENCE OF 4X4** | 1. |
### CONDITIONS DETAILS/RESULTS/ACTIONS

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTION: Make sure there is a clear area behind the vehicle before backing up.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shift the transmission to REVERSE and back the vehicle up 3.0 meters (10 feet) to relieve driveline wind-up.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Drive the vehicle forward for 3.0 meters (10 feet) and stop.</td>
</tr>
<tr>
<td>3. Press the brake pedal and hold.</td>
</tr>
<tr>
<td>4. For automatic transmission, shift the transmission to NEUTRAL. For manual transmission, press and hold the clutch pedal. Hold the shift conditions for 20 seconds.</td>
</tr>
<tr>
<td>5. Execute tight turns on a hard surface.</td>
</tr>
<tr>
<td>6. Check for the presence of driveline wind-up and tire scuff.</td>
</tr>
</tbody>
</table>

**Is driveline wind-up and tire scuff present?**

- **Yes**
  - RETRIEVE 4WD Control Module self-test DTCs. If a self-test DTC related to the concern is retrieved, REFER to 4WD Control Module Diagnostic Trouble Code (DTC) Index. If no DTC is retrieved, REFER to **Transfer Case** and REPAIR the transfer case as necessary.

- **No**
  - If the 4X4 indicator is ON, **Go To Pinpoint Test E**. If the 4X4 LOW indicator is ON, **Go To Pinpoint Test F**.

### C3 CHECK INDICATOR PROVE-OUT

<table>
<thead>
<tr>
<th>1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Turn the ignition switch to start and observe the 4X4 and 4X4 LOW indicators for prove-out.</td>
</tr>
</tbody>
</table>

**Did the indicators prove out?**

- **Yes**
  - GO to **C4**.

- **No**
  - REPAIR the instrument cluster as necessary. REFER to **Instrument Cluster**.
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
<th>ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4 VERIFY SHIFT TO 4X4</td>
<td>Listen</td>
<td>1. Turn the MSS to 4X4.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Listen for relay clicks and gearmotor operation.</td>
</tr>
<tr>
<td></td>
<td>3. Wait for 20 seconds after the MSS is turned to 4X4. (The system will use up to five cycles of shift attempts trying to engage 4X4.)</td>
<td></td>
</tr>
<tr>
<td>- Is the 4X4 indicator ON?</td>
<td>Yes</td>
<td>Go to C6.</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Go to C5.</td>
</tr>
<tr>
<td>C5 ATTEMPT MECHANICAL ASSIST ENGAGEMENT</td>
<td></td>
<td>1. Drive the vehicle above 8 km/h (5 mph) for at least 20 seconds.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Stop the vehicle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Observe the 4X4 indicator.</td>
</tr>
<tr>
<td>- Is the 4X4 indicator ON?</td>
<td>Yes</td>
<td>Go to C6.</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Go to C5.</td>
</tr>
<tr>
<td></td>
<td>RETRIEVE the 4WD control module self-test DTCs. If a self-test DTC related to the concern is retrieved, REFER to the 4WD Control Module Diagnostic Trouble Code (DTC) Index. If no DTC related to the concern is retrieved, GO to C9.</td>
<td></td>
</tr>
<tr>
<td>C6 CHECK FOR MECHANICAL ENGAGEMENT OF 4X4</td>
<td></td>
<td>1. Drive the vehicle for two minutes above 16 km/h (10 mph).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Execute tight turns on a hard surface.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Check for the presence of driveline wind-up and tire scuff.</td>
</tr>
<tr>
<td>- Is driveline wind-up and tire scuff present?</td>
<td>Yes</td>
<td>Go to C9.</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Go to C9.</td>
</tr>
<tr>
<td>CONDITIONS</td>
<td>DETAILS/RESULTS/ACTIONS</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------</td>
<td></td>
</tr>
<tr>
<td>4X4 did not mechanically engage. RETRIEVE 4WD control module self-test DTCs. If a self-test DTC related to the concern is retrieved, REFER to the 4WD Control Module Diagnostic Trouble Code (DTC) Index. If no DTC related to the concern is retrieved, GO to C7.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C7 CHECK FOR FRONT AXLE ENGAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Raise and support the front tires off the ground until they can be spun freely. Refer to Jacking and Lifting.</td>
</tr>
<tr>
<td>2. Rotate the left front tire one revolution forward and one revolution backward while observing the left front axle shaft and universal joint.</td>
</tr>
<tr>
<td>3. Rotate the right front tire one revolution forward and one revolution backward while observing the right front axle shaft and universal joint.</td>
</tr>
<tr>
<td>• Did both front axle shafts rotate?</td>
</tr>
<tr>
<td>→ Yes</td>
</tr>
<tr>
<td>→ Go to C8.</td>
</tr>
<tr>
<td>→ No</td>
</tr>
<tr>
<td>→ Go To Pinpoint Test G.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C8 CHECK FOR FRONT AXLE/DIFFERENTIAL ENGAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rotate the front driveshaft.</td>
</tr>
<tr>
<td>• Does either front axle shaft turn?</td>
</tr>
<tr>
<td>→ Yes</td>
</tr>
<tr>
<td>→ Go To Pinpoint Test E.</td>
</tr>
<tr>
<td>→ No</td>
</tr>
<tr>
<td>REPAIR the front differential or axle as necessary. REFER to Section 205-03.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C9 CHECK FOR CORRECT INDICATOR OPERATION ON 4X4 LOW ENGAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. While driving the vehicle forward above 8 km/h (5 mph), turn the MSS to 4X4 LOW while observing the indicators for five seconds.</td>
</tr>
<tr>
<td>2. Shift the MSS to 4X4.</td>
</tr>
<tr>
<td>3. Stop the vehicle and apply the parking brake.</td>
</tr>
<tr>
<td>4. For automatic transmission, shift the transmission to PARK and release the brake pedal. For manual transmission, shift the transmission to NEUTRAL and release the clutch pedal.</td>
</tr>
<tr>
<td>• Did the 4X4 LOW indicator stay off?</td>
</tr>
<tr>
<td>CONDITIONS</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>C10 CHECK THE 4X4 LOW INDICATOR ON IN ERROR</td>
</tr>
<tr>
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<tr>
<td>C11 CHECK THE 4X4 LOW INDICATOR FOR ON IN 4X4 LOW</td>
</tr>
<tr>
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<tr>
<td></td>
</tr>
<tr>
<td>C12 ATTEMPT MECHANICAL ASSIST OF 4X4 LOW ENGAGEMENT</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
### CONDITIONS | DETAILS/RESULTS/ACTIONS
--- | ---
Shift the transmission to REVERSE and back the vehicle up 3.0 meters (10 feet) to relieve driveline wind-up and stop.

2. Drive the vehicle forward for 3.0 meters (10 feet) and stop.

3. Apply the brake pedal and hold.

4. For automatic transmission, shift the transmission to NEUTRAL. For manual transmission, press the clutch pedal and hold. Hold all shift conditions for 20 seconds.

5. Observe the 4X4 LOW indicator.

- **Is the 4X4 LOW indicator ON?**
  - → Yes
    - GO to C13.
  - → No
    - RETRIEVE 4WD control module self-test DTCs. If a self-test DTC related to the concern is retrieved, REFER to the 4WD Control Module Diagnostic Trouble Code (DTC) Index. If no DTC related to the concern is retrieved, Go To Pinpoint Test F.

### C13 CHECK FOR MECHANICAL ENGAGEMENT OF 4X4 LOW

1. **NOTE:** Driveline wind-up and tire scuff is present in both 4X4 and 4X4 LOW. However, vehicle speed is severely limited in 4X4 LOW.
   - Execute tight turns on a hard surface.

2. Check for the presence of driveline wind-up, tire scuff and reduced vehicle speed.

- **Is driveline wind-up, tire scuff and reduced speed present?**
  - → Yes
    - GO to C14.
  - → No
    - 4X4 LOW did not mechanically engage. RETRIEVE 4WD control module self-test DTCs. If a self-test DTC related to the concern is retrieved, REFER to the 4WD Control Module Diagnostic Trouble Code (DTC) Index. If no DTC related to the concern is retrieved, Go To Pinpoint Test F.

### C14 CHECK FOR CORRECT INDICATOR OPERATION ON 4X4 LOW DISENGAGEMENT

1. While driving the vehicle forward above 8 km/h (5 mph), turn the MSS to 4X4 while observing the indicators.

2. Turn the MSS to 4X4 LOW.

3. Stop the vehicle and apply the parking brake.
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
</table>
| 4. For automatic transmission, shift the transmission to PARK and release the brake pedal. For manual transmission, shift the transmission to NEUTRAL and release the clutch pedal. | **Is the 4X4 LOW indicator ON?**  
→ Yes  
GO to **C15**.  
→ No  
RETRIEVE 4WD control module self-test DTCs. If a self-test DTC related to the concern is retrieved, REFER to the 4WD Control Module Diagnostic Trouble Code (DTC) Index. If no DTC related to the concern is retrieved, **Go To Pinpoint Test F**.  |

**C15 CHECK THE 4X4 LOW INDICATOR**

1. Turn the MSS to 4X4.

2. Apply and hold the brake pedal.

**Is the 4X4 LOW indicator ON?**  
→ Yes  
GO to **C16**.  
→ No  
RETRIEVE 4WD control module self-test DTCs. If a self-test DTC related to the concern is retrieved, REFER to the 4WD Control Module Diagnostic Trouble Code (DTC) Index. If no DTC related to the concern is retrieved, **Go To Pinpoint Test I**.  |

**C16 CHECK FOR 4X4 LOW INDICATOR OFF IN 4X4**

1. Press and hold the brake pedal.

2. For automatic transmission, shift the transmission to NEUTRAL. For manual transmission, press and hold the clutch pedal.

3. Listen for relay clicks and gearmotor operation.

4. Hold the shift conditions for 20 seconds. (The system will use up to five cycles of shift attempts trying to engage 4X4.)

**Is the 4X4 LOW indicator OFF?**  
→ Yes  
GO to **C18**.  
→ No  
GO to **C17**.  |
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>C17</td>
<td>ATTEMPT MECHANICAL ASSIST OF 4X4 LOW DISENGAGEMENT</td>
</tr>
</tbody>
</table>

1. Drive the vehicle forward above 8 km/h (5 mph) for at least five seconds.

2. Stop the vehicle.

3. Apply the brake pedal and hold.

4. For automatic transmission, shift the transmission to NEUTRAL. For manual transmission, press the clutch pedal and hold. Hold all shift conditions for 20 seconds.

5. Observe the 4X4 LOW indicator.

- Is the 4X4 LOW indicator OFF?
  - Yes
    - Go to C18.
  - No
    - Retrieve 4WD control module self-test DTCs. If a self-test DTC related to the concern is retrieved, refer to the 4WD Control Module Diagnostic Trouble Code (DTC) Index. If no DTC related to the concern is retrieved, go to Pinpoint Test I.

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>C18</td>
<td>CHECK FOR MECHANICAL 4X4 LOW DISENGAGEMENT AND 4X4 ENGAGEMENT</td>
</tr>
</tbody>
</table>

1. Apply the brake.

2. **CAUTION**
   - CAUTION: Make sure there is a clear area behind the vehicle before backing up.

3. Shift the transmission to REVERSE and back the vehicle up 3.0 meters (10 feet) to relieve driveline wind-up.

4. Stop the vehicle.

5. Drive the vehicle forward and execute tight turns on a hard surface.

- **NOTE:** Driveline wind-up and tire scuff is present in both 4X4 and 4X4 LOW. However, vehicle speed is severely limited in 4X4 LOW.
  - Verify the presence of driveline wind-up and tire scuff. Also verify the increased vehicle speed from when 4X4 LOW was engaged.

- Did 4X4 engage and the vehicle speed increase?
  - Yes
    - Go to C19.
### CONDITIONS DETAILS/RESULTS/ACTIONS

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>4X4 LOW is mechanically bound or locked. Repair the transfer case as necessary. Refer to <em>Transfer Case</em>.</td>
</tr>
</tbody>
</table>

### C19 CHECK THE 4X4 TO 2WD SHIFT

1. Stop the vehicle.
2. Turn the MSS to 2WD and wait 20 seconds.
3. Listen for relay clicks and gearmotor operation.

- Are the 4X4 and 4X4 LOW indicators OFF?
  - Yes
    - Go to C21.
  - No
    - Go to C20.

### C20 ATTEMPT MECHANICAL ASSIST OF 4X4 DISENGAGEMENT

1. Drive the vehicle forward above 8 km/h (5 mph) for at least 20 seconds.
2. Stop the vehicle.
3. Observe the 4X4 and 4X4 LOW indicators.

- Are the 4X4 and 4X4 LOW indicators OFF?
  - Yes
    - Go to C21.
  - No
    - Retrieve 4WD control module self-test DTCs. If a self-test DTC related to the concern is retrieved, refer to the 4WD Control Module Diagnostic Trouble Code (DTC) Index. If no DTC related to the concern is retrieved, Go To Pinpoint Test I.

### C21 VERIFY THE HUBLOCKS DISENGAGE

1. Raise and support the front tires off the ground until they can be spun freely. Refer to *Jacking and Lifting*.
2. Rotate the left front tire one revolution forward and one revolution backward, while observing the left front axle shaft and universal joint.
3. Rotate the right front tire one revolution forward and one revolution backward, while observing the right front axle shaft and universal joint.
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
</table>
| ◾ Did either axle shaft rotate? | Yes  
> Go To Pinpoint Test G.  
No  
> Go to C22. |

C22 VERIFY THE TRANSFER CASE MECHANICALLY DISENGAGED

1. Apply the parking brake.
2. Rotate the front driveshaft.

C23 VERIFY THE HUBLOCKS WILL LOCK MANUALLY

1. Turn both hublocks to the LOCK position.
2. Rotate the left front tire one revolution forward and one revolution backward while observing the left front axle shaft and universal joint.
3. Rotate the right front tire one revolution forward and one revolution backward while observing the right front axle shaft and universal joint.

Do both axles rotate?

Yes  
> Go to C24.
No  
> INSTALL a new hublock. REFER to Hublock in this section.

C24 VERIFY THE HUBLOCKS WILL UNLOCK MANUALLY

1. Turn both hublocks to the AUTO position.
2. Rotate the left front tire one revolution forward and one revolution backward while observing the left front axle shaft and universal joint.
3. Rotate the right front tire one revolution forward and one revolution backward while observing the right front axle shaft and universal joint.
### CONDITIONS DETAILS/RESULTS/ACTIONS

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does either axle rotate?</td>
<td>Listen</td>
</tr>
<tr>
<td>→ Yes</td>
<td>INSTALL a new hublock. REFER to Hublock in this section.</td>
</tr>
<tr>
<td>→ No</td>
<td>The transfer case is operating correctly. INSTRUCT the customer on correct system operation.</td>
</tr>
</tbody>
</table>

**Pinpoint Tests — Electronic Shift**

**PINPOINT TEST D: NO COMMUNICATION WITH THE 4WD CONTROL MODULE**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 CHECK CIRCUITS 1002 (BK/PK), 640 (RD/YE) AND 33a (WH/PK) FOR VOLTAGE</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td><img src="image1" alt="Diagram" /></td>
</tr>
<tr>
<td>2.</td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>3.</td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
<tr>
<td>4.</td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td>5.</td>
<td>Measure the voltage between 4WD control module C281a, pin 5, circuit 640 (RD/YE) and</td>
</tr>
<tr>
<td>CONDITIONS</td>
<td>DETAILS/RESULTS/ACTIONS</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td>ground; 4WD control module C281a, pin 6, circuit 1002 (BK/PK) and ground; 4WD control module C281b, pin 8, circuit 33a (WH/PK) (pick-up only) and ground.</td>
</tr>
</tbody>
</table>

6. Are the voltages greater than 10 volts?

→ Yes
  → Go to D2.
→ No
  → Repair the circuits as necessary. Test the system for normal operation.

D2 CHECK CIRCUIT 57 (BK) FOR OPEN

1. Measure the resistance between 4WD control module C281a pin 3, circuit 57 (BK), harness side and ground.
### CONDITIONS DETAILS/RESULTS/ACTIONS

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Details/Results/Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Listen</td>
</tr>
<tr>
<td></td>
<td>- Is the resistance less than 5 ohms?</td>
</tr>
<tr>
<td></td>
<td>→ Yes</td>
</tr>
<tr>
<td></td>
<td>CHECK the module communication network. REFER to Module Communications Network.</td>
</tr>
<tr>
<td></td>
<td>→ No</td>
</tr>
<tr>
<td></td>
<td>REPAIR the circuit. TEST the system for normal operation.</td>
</tr>
</tbody>
</table>

PINPOINT TEST E: THE VEHICLE DOES NOT SHIFT BETWEEN 2WD AND 4X4 CORRECTLY

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Details/Results/Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 CHECK THE IGNITION STATES — MONITOR THE 4WD CONTROL MODULE IGNITION PIDS</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ignition Switch Position</th>
<th>PID</th>
<th>Expected Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>IGN_O/L</td>
<td>OFF</td>
</tr>
<tr>
<td>ACCESSORY</td>
<td>IGN_ACC</td>
<td>ACCY</td>
</tr>
<tr>
<td>RUN</td>
<td>IGN_R</td>
<td>RUN</td>
</tr>
<tr>
<td>START</td>
<td>IGN_S</td>
<td>START</td>
</tr>
</tbody>
</table>

1. NOTE: If the vehicle is equipped with a manual transmission, depress the clutch pedal while turning the ignition switch to the START position.

Monitor the 4WD control module ignition switch PIDs while turning the ignition switch through all positions.

- Do the PID values agree with the ignition switch positions?
  
  → Yes  
  GO to E2.
  
  → No  
  REFER to Steering Column Switches.

E2 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCS)

1.

4WD Control Module Self-Test

- Are any DTCs retrieved?
  
  → Yes  
  If DTC P1812, GO to E4.
  If DTC P1815, GO to E4.
  If DTC P1820, GO to E12.
If DTC P1822, GO to **E12**.
If DTC P1828, GO to **E19**.
If DTC P1830, GO to **E19**.
If DTC P1865, GO to **E35**.
If DTC P1867, GO to **E36**.
If DTC P1820 and P1828 are retrieved together, GO to **E26**.

→ **No**
GO to **E3**.

**E3** VERIFY THAT THE ELECTRONIC SHIFT FUNCTION TEST HAS BEEN CARRIED OUT
1. Verify that the electronic shift function test has been carried out.

   ◾ **Was the electronic shift function test carried out?**

   → **Yes**
   GO to **E4**.

   → **No**
   CARRY OUT the electronic shift function test. REFER to Function Test — Electronic Shift in this section.

**E4** CHECK THE MODE SELECT SWITCH (MSS) — MONITOR THE 4WD control module PID 4WD_SW
1. Monitor the 4WD control module PID 4WD_SW while cycling the MSS through 2WD, 4X4, and 4X4 LOW.

   ◾ **Do the 4WD control module PID values agree with the MSS switch positions?**

   → **Yes**
   GO to **E10**.

   → **No**
   GO to **E5**.

**E5** CHECK THE MSS — ALL POSITIONS
1. MSS C284

2.
2. Measure the resistance between MSS terminal 2 and terminal 3 (component side). Refer to the following chart:

<table>
<thead>
<tr>
<th>MSS Position</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2WD</td>
<td>3,700-4,100 Ohms</td>
</tr>
<tr>
<td>4X4</td>
<td>1,050-1,150 Ohms</td>
</tr>
<tr>
<td>4X4 LOW</td>
<td>340-380 Ohms</td>
</tr>
</tbody>
</table>

- Are the resistances within the specified values?
  → Yes
  GO to E6.
  → No
  INSTALL a new MSS. REFER to Mode Select Switch (MSS) in this section. CLEAR the DTCs. REPEAT the self-test.

E6 CHECK CIRCUIT 465 (WH/LB) FOR AN OPEN

1.

4WD Control Module C281b

2.

- **Is the resistance less than 5 ohms?**
  
  → **Yes**
  
  GO to E7.

  → **No**
  
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

**E7 CHECK CIRCUIT 780 (DB) FOR SHORT TO VOLTAGE**

1.

2. Measure the voltage between 4WD control module C281b pin 2, circuit 780 (DB), harness side and ground.

- **Is any voltage present?**
  
  → **Yes**
  
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

  → **No**
  
  GO to E8.

**E8 CHECK CIRCUIT 780 (DB) FOR AN OPEN**

1.
2. Measure the resistance between MSS C284 pin 2, circuit 780 (DB), harness side and 4WD control module C281b pin 2, circuit 780 (DB), harness side.

- Is the resistance less than 5 ohms?
  → Yes
  GO to E9.
  → No
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E9 CHECK CIRCUIT 780 (DB) FOR A SHORT TO GROUND

1. Measure the resistance between 4WD control module C281b pin 2, circuit 780 (DB), harness side and ground.

- Is the resistance greater than 10,000 ohms?
  → Yes
  GO to E57.
  → No
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E10 CHECK THE VOLTAGE TO THE GEARMOTOR ENCODER ASSEMBLY

1.
2. **NOTE:** Voltage is only applied to the transfer case assembly for six seconds while the 4WD control module active command CW/CCW is ON.

Measure the voltage between gearmotor encoder assembly C350b, circuit 778 (OG), harness side and ground while triggering the 4WD control module active command CW/CCW to ON; and between gearmotor encoder assembly C350a, circuit 777 (YE), harness side and ground while triggering the 4WD control module active command CW/CCW to ON.

- Are the voltages greater than 10 volts?
  
  → **Yes**
  
  GO to **E11**.

  → **No**

  If there is no voltage on circuits 777 (YE) and 778 (OG), GO to **E26**.

  If there is no voltage on circuit 777 (YE) only, GO to **E12**.

  If there is no voltage on circuit 778 (OG) only, GO to **E19**.

**E11** CHECK THE VOLTAGE TO THE GEARMOTOR ENCODER ASSEMBLY

1.
1. Measure the voltage between gearmotor encoder assembly C350b, circuit 777 (YE), harness side and ground while triggering the 4WD control module active command CW/CCW to OFF; and between gearmotor encoder assembly C350b, circuit 778 (OG), harness side and ground while triggering the 4WD control module active command CW/CCW to OFF.

- Are the voltages greater than 10 volts?
  → Yes
  GO to E56.
  → No
  GO to E31.

E12 CHECK THE VOLTAGE TO THE GEARMOTOR ENCODER ASSEMBLY LOW-TO-HIGH SHIFT RELAY — CIRCUIT 704 (DG/LG)
1.

![Gearmotor Encoder Assembly Low-to-High Relay C1129](image)

2.

3. Measure the voltage between gearmotor encoder assembly low-to-high relay C1129 pin 86, circuit 704 (DG/LG), harness side and ground; and between gearmotor encoder assembly low to high relay C1129 pin 87, circuit 704 (DG/LG), harness side and ground.

- Are the voltages greater than 10 volts?
  → Yes
  GO to E13.
→ No
REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E13 CHECK THE GEARMOTOR ENCODER ASSEMBLY LOW-TO-HIGH RELAY
1.

2. Carry out the relay component test on the gearmotor encoder assembly low-to-high relay. Refer to Wiring Diagrams Cell 149 for schematic and connector information.

- Is the relay OK?
→ Yes
GO to E14.
→ No
INSTALL a new gearmotor encoder assembly low-to-high relay. CLEAR the DTCs. REPEAT the self-test.

E14 CHECK CIRCUIT 782 (BR/WH) FOR A SHORT TO VOLTAGE
1.

4WD Control Module C281b
2.

3.

A0037683
3. Measure the voltage between gearmotor encoder assembly low-to-high C1129 shift relay connector pin 85, circuit 782 (BR/WH), harness side and ground.

- Is any voltage present?
  → Yes
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
  → No
  GO to E15.

E15 CHECK CIRCUIT 782 (BR/WH) FOR OPEN

1. [Diagram]

2. Measure the resistance between gearmotor encoder assembly low-to-high shift relay C1129 pin 85, circuit 782 (BR/WH), harness side and 4WD control module C281b pin 5, circuit 782 (BR/WH), harness side.

- Is the resistance less than 5 ohms?
  → Yes
  GO to E16.
  → No
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E16 CHECK CIRCUIT 782 (BR/WH) FOR A SHORT TO GROUND

1. [Diagram]
1. Measure the resistance between gearmotor encoder assembly low-to-high shift relay C1129 pin 85, circuit 782 (BR/WH), harness side and ground.

- **Is the resistance greater than 10,000 ohms?**
  - **Yes**
    - GO to **E17**.
  - **No**
    - REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

**E17** CHECK CIRCUIT 57 (BK) FOR AN OPEN

1. Measure the resistance between gearmotor encoder assembly low-to-high shift relay C1129 pin 87A, circuit 57 (BK), harness side and ground.

- **Is the resistance less than 5 ohms?**
  - **Yes**
    - GO to **E18**.
  - **No**
    - REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

**E18** CHECK CIRCUIT 777 (YE) FOR AN OPEN

1.
2. Measure the resistance between gearmotor encoder assembly low-to-high relay C1129 pin 30, circuit 777 (YE), harness side and gearmotor encoder assembly C350b, circuit 777 (YE), harness side.

- **Is the resistance less than 5 ohms?**
  
  → **Yes**
  
  GO to **E57**.
  
  → **No**
  
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

**E19 CHECK THE VOLTAGE TO THE GEARMOTOR ENCODER ASSEMBLY HIGH-TO-LOW RELAY**

1. Remove the gearmotor encoder assembly high-to-low shift relay.

2.

3.
3. Measure the voltage between the gearmotor encoder assembly high-to-low shift relay C1173 pin 85, circuit 704 (DG/LG), harness side and ground; and between gearmotor encoder assembly high-to-low shift relay C1173 pin 87, circuit 704 (DG/LG), harness side and ground.

- **Are the voltages greater than 10 volts?**
  - Yes
    - Go to E20.
  - No
    - Repair the circuit. Test the system for normal operation.

**E20 CHECK THE GEARMOTOR ENCODER ASSEMBLY HIGH-TO-LOW RELAY**

1. Carry out the relay component test on the gearmotor encoder assembly high-to-low relay.

Refer to Wiring Diagrams Cell 149 for schematic and connector information.

- **Is the relay OK?**
  - Yes
    - Go to E21.
  - No
    - Install a new gearmotor encoder assembly high-to-low relay. Clear the DTCs. Repeat the self-test.

**E21 CHECK CIRCUIT 781 (OG/LB) FOR A SHORT TO VOLTAGE**

1. 4WD Control Module C281b

2.
3. Measure the voltage between gearmotor encoder assembly high-to-low shift relay C1173 pin 86, circuit 781 (OG/LB), harness side and ground.

- **Is any voltage present?**
  
  → **Yes**
  
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
  
  → **No**
  
  GO to **E22**.

**E22** CHECK CIRCUIT 781 (OG/LB) FOR AN OPEN

1.

2. Measure the resistance between gearmotor encoder assembly high-to-low shift relay C1173 pin 86, circuit 781 (OG/LB), harness side and 4WD control module C281b pin 6, circuit 781 (OG/LB), harness side.
- Is the resistance less than 5 ohms?
  → Yes
  GO to E23.
  → No
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E23 CHECK CIRCUIT 781 (OG/LB) FOR A SHORT TO GROUND
1.

1. Measure the resistance between gearmotor encoder assembly high-to-low shift relay C1173 pin 86, circuit 781 (OG/LB), harness side and ground.

- Is the resistance greater than 10,000 ohms?
  → Yes
  GO to E24.
  → No
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E24 CHECK HIGH TO LOW RELAY CIRCUIT 57 (BK) FOR AN OPEN
1.

1. Measure the resistance between gearmotor encoder assembly high-to-low shift relay C1173 pin 87A, circuit 57 (BK), harness side and ground.
Is the resistance less than 5 ohms?

→ Yes
GO to E25.

→ No
REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E25 CHECK CIRCUIT 778 (OG) FOR AN OPEN

1. Measure the resistance between gearmotor encoder assembly high-to-low shift relay C1173 pin 30, circuit 778 (OG), harness side and gearmotor encoder assembly C350b, circuit 778 (OG), harness side.

Is the resistance less than 5 ohms?

→ Yes
GO to E57.

→ No
REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E26 CHECK CENTRAL JUNCTION BOX (CJB) FUSE

1. Remove the CJB fuse 111 (30A).

Is the CJB fuse OK?

→ Yes
GO to E27.

→ No
GO to E28.

E27 CHECK VOLTAGE AT CJB FUSE

1. Measure the voltage between CJB fuse 111(30A) input terminal and ground.

Is the voltage greater than 10 volts?

→ Yes
REPAIR circuit 704 (DG/LG). CLEAR the DTCs. REPEAT the self-test.

→ No
REPAIR or install a new CJB as necessary. CLEAR the DTCs. REPEAT the self-test.

E28 CHECK CIRCUIT 704 (DG/LG) FOR A SHORT TO GROUND

1. Remove the gearmotor encoder assembly high-to-low shift relay.

2. Remove the gearmotor encoder assembly low-to-high shift relay.

3. Measure the resistance between gearmotor encoder assembly high-to-low shift relay C1173 pin 85, circuit 704 (DG/LG), harness side and ground; and between gearmotor encoder assembly low-to-high shift relay C1129 pin 85, circuit 704 (DG/LG), harness side and ground.

- **Is the resistance less than 5 ohms?**
  
  → Yes
  
  REPAIR the supply circuit. INSTALL a new CJB fuse. CLEAR the DTCs. REPEAT the self-test.
  
  → No
  
  GO to E29.

E29 CHECK SHIFT RELAY CIRCUIT 57 (BK) FOR AN OPEN

1. Measure the resistance between the gearmotor encoder assembly high-to-low shift relay C1173 pin 87A, circuit 57 (BK), harness side and ground.
- Is the resistance less than 5 ohms?
  
  → Yes
  GO to E30.
  
  → No
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E30 CHECK CIRCUITS 777 (YE) AND 778 (OG) FOR A SHORT TO GROUND
1. Remove the gearmotor encoder assembly low-to-high shift relay.

2.

3. Measure the resistance between gearmotor encoder assembly C350b, circuit 777 (YE), harness side and ground; and between gearmotor encoder assembly C350b, circuit 778 (OG), harness side and ground.

- Are the resistances less than 5 ohms?
  
  → Yes
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
  
  → No
  GO to E57.

E31 REMOVE THE GEARMOTOR ENCODER ASSEMBLY FROM THE TRANSFER CASE
1.
2. Remove the gearmotor encoder assembly. Refer to Gearmotor Encoder Assembly in this section.

3. Connect all connectors.

4. Clear all DTCs

5. Start the vehicle and allow to idle.

6. Apply the parking brake.

7. Press the brake pedal.

8. Shift the transmission to NEUTRAL, for manual transmission press and hold the clutch pedal.

9. Monitor 4WD control module PID VSS2, BOO and NTRL_SW. For manual transmission include, CLTCHSW.

   - Do the PID values reflect the vehicle condition?
     → Yes
     GO to E32.
     → No
     Go To Pinpoint Test F.

E32 CHECK THE CONTACT PLATE ENCODER SWITCH
   1. Monitor mode select switch (MSS) PIDs 2WD, 4X4 and 4X4 LOW.

   2. Monitor contact plate PIDs PLATE_A, PLATE_B, PLATE_C and PLATE_D.
3. Cycle the MSS to 2WD, 4X4 and 4X4 LOW two times.

<table>
<thead>
<tr>
<th>Plate PID</th>
<th>MSS PID 2WD</th>
<th>MSS PID 4WD</th>
<th>MSS PID 4LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLATE_A</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
<tr>
<td>PLATE_B</td>
<td>OPEN</td>
<td>OPEN</td>
<td>CLOSED</td>
</tr>
<tr>
<td>PLATE_C</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>PLATE_D</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
</tbody>
</table>

4. Compare the contact plate PID values for each shift position selected by the MSS.

- **Do the contact plate PID values agree with the MSS switch PIDs?**
  - Yes
    - GO to E33.
  - No
    - GO to E36.

**E33 CHECK THE TRANSFER CASE**

1.  

2. Release the parking brake.

3. Using a wrench, manually shift the transfer case sector shaft to the full clockwise (2WD) direction while turning the rear driveshaft.

4. Engage the parking brake.

5. Rotate the front driveshaft.

- **Does the front driveshaft turn?**
  - Yes
    - GO to E34.
  - No
    - REPAIR the transfer case. REFER to *Transfer Case*. TEST the system for normal operation.

**E34 CHECK THE SECTOR SHAFT TURNING EFFORT** *NOTE:* The transfer case has four detented shift positions. The full clockwise position is 2WD, the next position is 4X4, then NEUTRAL and the full counterclockwise position is 4X4 LOW. Normal operation should not take more than 45 Nm (33 lb-ft) to manually shift the transfer case.

1. Release the parking brake.

2. Using a torque wrench, manually shift the transfer case sector shaft in a counterclockwise direction to the 4X4 detent position while rotating the rear driveshaft.
Did the torque required to shift exceed 45 Nm (33 lb-ft)?

→ Yes
REPAIR the transfer case as necessary. REFER to Transfer Case. TEST the system for normal operation.

→ No
GO to E35.

**E35 CHECK THE TRANSFER CASE SHIFT TO 4X4 AND 4X4 LOW**

1. Apply the parking brake.
2. Rotate the front driveshaft.

Does the front driveshaft rotate?

→ Yes
REPAIR the transfer case as necessary. REFER to Transfer Case.

→ No
INSTALL a new gearmotor encoder assembly. REFER to Gearmotor Encoder Assembly in this section. CLEAR the DTCs. REPEAT the self-test.

**E36 CHECK CONTACT PLATE GROUND CIRCUIT 3659 (BK/PK)**

1. Gearmotor Encoder Assembly C350a
2. Measure the resistance between gearmotor encoder assembly C350a pin 4, circuit 3659 (BK/PK), harness side and ground.

Is the resistance less than 5 ohms?

→ Yes
GO to E38.
→ No
GO to E37.

E37 CHECK CIRCUIT 3659 (BK/PK) FOR AN OPEN
1.

4WD Control Module C281a
2.

2. Measure the resistance between gearmotor encoder assembly C350a pin 4, circuit 3659 (BK/PK), harness side and 4WD control module C281a pin 9, circuit 3659 (BK/PK), harness side and ground.

- Is the resistance less than 5 ohms?
  → Yes
  GO to E38.
  → No
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E38 CHECK CIRCUIT 976 (OG) FOR CONTACT PLATE VOLTAGE SUPPLY
1.

2.
2. Measure the voltage between gearmotor encoder assembly C350a pin 2, circuit 976 (OG), harness side and ground. For Excursion, the voltage should cycle between 0 volts and 1 to 3 volts. All others should be greater than 9 volts.

- Is the voltage reading as specified for the vehicle being tested?
  → Yes
  Go to E41.
  → No
  Go to E39.

**E39 CHECK CIRCUIT 976 (OG) FOR A SHORT TO GROUND**

1.

4WD Control Module C281a

2.

2. Measure the resistance between gearmotor encoder assembly C350a pin 2, circuit 976 (OG), harness side and ground.

- Is the resistance greater than 10,000 ohms?
  → Yes
GO to **E40**.

→ **No**

REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

**E40** CHECK CIRCUIT 976 (OG) FOR AN OPEN
1.

A0079311

1. Measure the resistance between gearmotor encoder assembly C350a pin 2, circuit 976 (OG), harness side and 4WD control module C281a pin 7, circuit 976 (OG), harness side.

- **Is the resistance less than 5 ohms?**

→ **Yes**

GO to **E58**.

→ **No**

REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

**E41** CHECK CONTACT PLATE SWITCH A— CIRCUIT 771 (PK/YE)
1.

4WD Control Module C281a

2. Monitor the 4WD control module PID: PLATE_A.

3.
3. Connect a jumper wire between gearmotor encoder assembly C350a pin 5, circuit 771 (PK/YE), harness side and ground.

- Does the PID: PLATE_A toggle between CLOSED and OPEN when ground is removed and applied?
  - Yes
    - GO to E45.
  - No
    - GO to E42.

**E42 CHECK CIRCUIT 771 (PK/YE) FOR A SHORT TO VOLTAGE**

1. Measure the voltage between gearmotor encoder assembly C350a pin 5, circuit 771 (PK/YE), harness side and ground.

- Is voltage present?
  - Yes
    - REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
  - No
    - GO to E43.

**E43 CHECK CIRCUIT 771 (PK/YE) FOR A SHORT TO GROUND**

1.
1. Measure the resistance between gearmotor encoder assembly C350a pin 5, circuit 771 (PK/YE), harness side and ground.

- **Is the resistance greater than 10,000 ohms?**
  - **Yes**
    
    **GO to E44.**
  
  - **No**
    
    **REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.**

**E44** CHECK CIRCUIT 771 (PK/YE) FOR AN OPEN

1. 4WD Control Module C281b

2. Measure the resistance between gearmotor encoder assembly C350a pin 5, circuit 771 (PK/YE), harness side and 4WD control module C281b pin 9, circuit 771 (PK/YE), harness side.

- **Is the resistance less than 5 ohms?**
→ Yes
GO to E58.

→ No
REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E45 CHECK THE CONTACT PLATE SWITCH B — CIRCUIT 764 (BR/WH)
1. Monitor the 4WD control module PID: PLATE_B.

2. Connect a jumper wire between gearmotor encoder assembly, C350a pin 3, circuit 764 (BR/WH), harness side and ground.

- Does the PID: PLATE_B toggle between CLOSED and OPEN when ground is removed and applied?

→ Yes
GO to E49.

→ No
GO to E46.

E46 CHECK CIRCUIT 764 (BR/WH) FOR SHORT TO VOLTAGE
1. Measure the voltage between gearmotor encoder assembly C350a pin 3, circuit 764 (BR/WH), harness side and ground.
- Is voltage present?

  → Yes
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

  → No
  GO to E47.

E47 CHECK CIRCUIT 764 (BR/WH) FOR A SHORT TO GROUND

1. Measure the resistance between gearmotor encoder assembly C350a pin 3, circuit 764 (BR/WH), harness side and ground.

- Is the resistance greater than 10,000 ohms?

  → Yes
  GO to E48.

  → No
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E48 CHECK CIRCUIT 764 (BR/WH) FOR OPEN

1. 4WD Control Module C281b

2.
2. Measure the resistance between gearmotor encoder assembly C350a pin 3, circuit 764 (BR/WH), harness side and 4WD control module C281a pin 10, circuit 764 (BR/WH), harness side.

- Is the resistance less than 5 ohms?
  → Yes
  GO to E58.
  → No
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

**E49 CHECK CONTACT PLATE SWITCH C — CIRCUIT 770 (WH)**

1. Monitor the 4WD control module PID: PLATE_C.

2. Connect a jumper wire between gearmotor encoder assembly C350a pin 6, circuit 770 (WH), harness side and ground.

- Does the PID: PLATE_C toggle between CLOSED and OPEN when ground is removed and applied?
  → Yes
  GO to E53.
  → No
  GO to E50.

**E50 CHECK CIRCUIT 770 (WH) FOR SHORT TO POWER**
1. Measure the voltage between gearmotor encoder assembly C350a pin 6, circuit 770 (WH), harness side and ground.

   - Is any voltage present?
     - Yes
       REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
     - No
       GO to E51.

E51 CHECK CIRCUIT 770 (WH) FOR A SHORT TO GROUND

1. Measure the resistance between gearmotor encoder assembly C350a pin 6, circuit 770 (WH), harness side and ground.

   - Is the resistance greater than 10,000 ohms?
     - Yes
       GO to E52.
     - No
       REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E52 CHECK CIRCUIT 770 (WH) FOR AN OPEN

1.
4WD Control Module C281a

2. Measure the resistance between gearmotor encoder assembly C350a pin 6, circuit 770 (WH), harness side and 4WD control module C281a pin 11, circuit 770 (WH), harness side.

- Is the resistance less than 5 ohms?

→ Yes
GO to E58.

→ No
REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E53 CHECK CONTACT PLATE SWITCH D — CIRCUIT 763 (OG/WH)
1. Monitor the 4WD control module PID: PLATE_D.

2. Connect jumper wire between gearmotor encoder assembly C350a pin 1, circuit 763 (OG/WH), harness side and ground.
- Does the PID: PLATE_D toggle between CLOSED and OPEN when ground is removed and applied?

→ Yes
INSTALL a new gearmotor encoder assembly. REFER to Gearmotor Encoder Assembly in this section. CLEAR the DTCs. REPEAT the self-test.

→ No
GO to E54.

E54 CHECK CIRCUIT 763 (OG/WH) FOR A SHORT TO VOLTAGE

1. Measure the voltage between gearmotor encoder assembly C350a pin 1, circuit 763 (OG/WH), harness side and ground.

- Is any voltage present?

→ Yes
REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

→ No
GO to E55.

E55 CHECK CIRCUIT 763 (OG/WH) FOR A SHORT TO GROUND

1. Measure the resistance between gearmotor encoder assembly C350a pin 1, circuit 763 (OG/WH), harness side and ground.
Is the resistance greater than 10,000 ohms?

→ Yes
   GO to E56.
→ No
   REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E56 CHECK CIRCUIT 763 (OG/WH) FOR OPEN
1.

2.

4WD Control Module C281a

2. Measure the resistance between gearmotor encoder assembly C350a pin 1, circuit 763 (OG/WH), harness side and 4WD control module C281a pin 12, circuit 763 (OG/WH), harness side.

Is the resistance less than 5 ohms?

→ Yes
   GO to E58.
→ No
   REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

E57 CHECK CIRCUIT 777 (YE) AND 778 (OG) FOR A SHORT TO VOLTAGE
1. Remove the gearmotor encoder high-to-low shift relay.

2. Remove the gearmotor encoder low-to-high shift relay.

3.
3. Measure the voltage between gearmotor encoder assembly C350b, circuit 777 (YE), harness side and ground; and between gearmotor encoder assembly C350b, circuit 778 (OG), harness side and ground.

- Is any voltage present?
  → Yes
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
  → No
  CARRY OUT the ISO Relay Component Test on both shift relays.
  Refer to Wiring Diagrams Cell 149 for schematic and connector information.
  CLEAR the DTCs. REPEAT the self-test.

E58 CHECK FOR CORRECT MODULE OPERATION
1. Check for:
   - corrosion
   - pushed-out pins

2. Connect any disconnected connectors making sure they are seated correctly.

3. Make sure all other system connectors are fully seated.

4. Operate the system and verify the concern is still present.

- Is the concern still present?
  → Yes
  INSTALL a new 4WD control module. REFER to Four-Wheel Drive (4WD) Control Module in this section. CLEAR the DTCs. REPEAT the self-test.
  → No
  The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

PINPOINT TEST F: THE VEHICLE DOES NOT SHIFT BETWEEN 4X4 AND 4X4 LOW MODES CORRECTLY

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
</table>

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F1 CHECK THE IGNITION STATES — MONITOR THE 4WD CONTROL MODULE IGNITION PIDs

<table>
<thead>
<tr>
<th>Ignition Switch Position</th>
<th>PID</th>
<th>Expected Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>IGN,O/L</td>
<td>OFF</td>
</tr>
<tr>
<td>ACCESSORY</td>
<td>IGN_ACC</td>
<td>ACCY</td>
</tr>
<tr>
<td>RUN</td>
<td>IGN_R</td>
<td>RUN</td>
</tr>
<tr>
<td>START</td>
<td>IGN_S</td>
<td>START</td>
</tr>
</tbody>
</table>

1. **NOTE**: If the vehicle is equipped with a manual transmission, depress the clutch pedal while turning the ignition switch to the START position.

Monitor the 4WD control module ignition switch PIDs while turning the ignition switch through all positions.

- Do the PID values agree with the ignition switch positions?
  
  → **Yes**
  
  GO to **F2**.

  → **No**
  
  REFER to *Steering Column Switches*.

F2 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCS)

1. Using the results from the 4WD control module self-test:

  - Are any DTCs recorded?
    
    → **Yes**
    
    If DTC P0500, GO to **F17**.
    
    If DTC B1483, GO to **F10**.
    
    If DTC B1485, GO to **F10**.
    
    If DTC P1812, GO to **F4**.
    
    If DTC P1815, GO to **F4**.
    
    If DTC P1819, GO to **F13**.

    → **No**
    
    GO to **F3**.

F3 VERIFY THE FUNCTION TEST HAS BEEN CARRIED OUT

1. Check the previous diagnostic procedure.

  - Was the electronic shift function test carried out?
    
    → **Yes**
    
    GO to **F4**.

    → **No**
    
    CARRY OUT the electronic shift function test. REFER to *Function Test — Electronic Shift* in this section.

F4 CHECK THE MODE SELECT SWITCH (MSS) — MONITOR THE 4WD CONTROL MODULE PID 4WD_SW

1.
2. Monitor the 4WD control module PID 4WD_SW while cycling the MSS through 2WD, 4X4, and 4X4 LOW.

- Do the 4WD control module PID values agree with the MSS switch positions?

  → Yes
  GO to F10.
  → No
  GO to F5.

F5 CHECK THE MSS — ALL POSITIONS
1.

MSS C284

2.

<table>
<thead>
<tr>
<th>MSS Position</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2WD</td>
<td>3,700-4,100 ohms</td>
</tr>
<tr>
<td>4X4</td>
<td>1,050-1,150 ohms</td>
</tr>
<tr>
<td>4X4 LOW</td>
<td>340-380 ohms</td>
</tr>
</tbody>
</table>

2. Measure the resistance between MSS terminal 2 and terminal 3. Refer to the following chart:

- Are the resistances within the specified values?

  → Yes
  GO to F6.
INSTALL a new MSS. REFER to Mode Select Switch (MSS) in this section. CLEAR the DTCs. REPEAT the self-test.

**F6** CHECK CIRCUIT 465 (WH/LB) FOR AN OPEN

1. ![Diagram of MSS and 4WD Control Module]

   4WD Control Module C281b


   - **Is the resistance less than 5 ohms?**

      → **Yes**

      GO to **F7**.

      → **No**

      REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

**F7** CHECK CIRCUIT 780 (DB) FOR SHORT TO VOLTAGE

1. ![Diagram of 780 Circuit]

2.
2. Measure the voltage between 4WD control module C281b pin 2, circuit 780 (DB), harness side and ground.

- **Is any voltage present?**
  
  → **Yes**  
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.  
  → **No**  
  GO to **F8**.

**F8** CHECK CIRCUIT 780 (DB) FOR AN OPEN

1.

2.

2. Measure the resistance between MSS C284 pin 2, circuit 780 (DB), harness side and 4WD control module C281b pin 2, circuit 780 (DB), harness side.

- **Is the resistance less than 5 ohms?**
  
  → **Yes**  
  GO to **F9**.
No
REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

F9 CHECK CIRCUIT 780 (DB) FOR A SHORT TO GROUND
1.

1. Measure the resistance between 4WD control module C281b pin 2, circuit 780 (DB), harness side and ground.

- Is the resistance greater than 10,000 ohms?

  → Yes
  GO to F20.
  
  → No
  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

F10 CHECK BRAKE PEDAL POSITION (BPP) SWITCH 4WD CONTROL MODULE PID
1. Press and hold the brake pedal.

2. Monitor the 4WD control module PID: BOO_4x4.

- Does the 4WD control module PID: BOO read ON when the brake pedal is depressed and OFF when the brake pedal is released?

  → Yes
  GO to F13.
  
  → No
  GO to F11.

F11 CHECK THE BRAKE LAMPS
1. Press and hold the brake pedal.

- Did the brake lamps illuminate?

  → Yes
  GO to F12.
  
  → No
  REFER to Exterior Lighting. CLEAR the DTCs. REPEAT the self-test.
**F12** CHECK CIRCUIT 810 (RD/LG) FOR AN OPEN

1. Measure the resistance between BPP switch C278 pin 2, circuit 810 (RD/LG), harness side and 4WD control module C281a pin 4, circuit 810 (RD/LG), harness side.

   - **Is the resistance less than 5 ohms?**

   → **Yes**
   
   GO to **F13**.

   → **No**
   
   REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

**F13** CHECK THE DIGITAL TR SENSOR PID NTRL_SW

1. For manual transmission, monitor 4WD control module PID: CLTCHSW. For automatic transmissions monitor 4WD control module PID: NTRL_SW.

2. For automatic transmissions, place the transmission range selector lever in NEUTRAL. For manual transmissions, press and hold the clutch pedal.
3. For automatic transmissions, verify 4WD control module PID reads NTRL. For manual transmissions, verify 4WD control module PID: CLTCHSW reads ENGAGED.

4. For automatic transmissions, shift the selector lever through all positions while monitoring 4WD control module PID NTRL_SW.

- For manual transmission: does the 4WD control module PID: CLTCHSW read ENGAGED? For automatic transmission: does the 4WD control module PID: NTRL_SW read NTRL only for the NEUTRAL position?

→ Yes
   GO to F17.

→ No
   GO to F14.

F14 CHECK THE DIGITAL TR SENSOR
1.

   Digital TR Sensor C167

2. Monitor 4WD control module PID: NTRL_SW.

3. Verify the 4WD control module PID: NTRL_SW reads not NTRL.

4. Connect a jumper wire between digital TR sensor C167 pin 8, circuit 463 (RD/WH), harness side and ground.

- Does the 4WD control module PID: NTRL_SW indicate NTRL?

→ Yes
   REFER to Automatic Transaxle/Transmission to diagnose the digital TR sensor. CLEAR the DTCs. REPEAT the self-test.

→ No
   GO to F15.

F15 CHECK CIRCUIT 463 (RD/WH) FOR AN OPEN
1.

   4WD Control Module C281b

2.
2. Measure the resistance between digital TR sensor C167 pin 8, circuit 463 (RD/WH), harness side and 4WD control module C281b pin 4, circuit 463 (RD/WH), harness side.

- Is the resistance less than 5 ohms?
  - Yes
    Go to F16.
  - No
    Repair the DTCs. Clear the DTCs. Repeat the self-test.

F16 CHECK CIRCUIT 463 (RD/WH) FOR A SHORT TO GROUND
1. Measure the resistance between digital TR sensor C167 pin 8, circuit 463 (RD/WH), harness side and ground.

- Is the resistance greater than 10,000 ohms?
  - Yes
    Go to F20.
  - No
    Repair the circuit. Clear the DTCs. Repeat the self-test.

F17 CHECK THE VEHICLE SPEED SIGNAL
1. Monitor anti-lock brake module (ABS) PID: R_WSSP.

2. Monitor 4WD control module PID: VSS2 while driving the vehicle 0 to 88.5 km/h (55 mph) at a steady rate.
Does the 4WD control module PID: VSS2 agree with ABS PID: R_WSSP?

→ Yes
Go To Pinpoint Test E.
→ No
GO to F18.

F18 CHECK THE SPEEDOMETER
1. Monitor the speedometer.
2. Monitor 4WD control module PID: VSS2 while driving the vehicle 0 to 88.5 km/h (55 mph) at a steady rate.

→ Yes
Does the 4WD control module PID: VSS2 agree with speedometer?
→ Yes
REFER to Instrument Cluster to diagnose the speedometer. CLEAR the DTCs. TEST the system for normal operation.
→ No
GO to F19.

F19 CHECK CIRCUIT 679 (GY/BK) FOR AN OPEN
1.

4WD Control Module C281b
2.

ABS C135
3.
3. Measure the resistance between 4WD control module C281b, pin 21, circuit 679 (GY/BK), harness side and ABS C135 pin 11, circuit 679 (GY/BK), harness side.

- Is the resistance less than 5 ohms?
  - Yes
    - GO to F20.
  - No
    - REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

**F20 CHECK FOR CORRECT MODULE OPERATION**

1. Check for:
   - corrosion
   - pushed-out pins

2. Connect any disconnected connectors making sure they seat correctly.

3. Make sure all other system connectors are fully seated.

4. Operate the system and verify the concern is still present.

- Is the concern still present?
  - Yes
    - INSTALL a new 4WD control module. REFER to Four-Wheel Drive (4WD) Control Module in this section. CLEAR the DTCs. REPEAT the self-test.
  - No
    - The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

**PINPOINT TEST G: THE FRONT AXLE DOES NOT ENGAGE OR DISENGAGE CORRECTLY**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCs)</td>
<td></td>
</tr>
</tbody>
</table>
1. Refer to the recorded results of the 4WD control module self-test.

- Were any DTCs retrieved?
  → Yes
  If DTC P1832, GO to **G2**.
  If DTC P1834, GO to **G3**.
  If DTC P1876, GO to **G4**.
  If DTC P1877, GO to **G3**.
  → No
  GO to **G8**.

**G2** CHECK FOR VOLTAGE TO THE PULSE VACUUM HUBLOCK (PVH) SOLENOID

1. PVH Solenoid C1247

2.

3. Measure the voltage between PVH solenoid C1247, circuit 295 (LB/PK), harness side and ground.

- Is the voltage greater than 10 volts?
  → Yes
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>G3</strong> CHECK CIRCUITS 605 (RD) AND 145 (GY/BK) FOR A SHORT TO VOLTAGE</td>
</tr>
<tr>
<td></td>
<td>1. Measure the voltage between PVH solenoid C1247, circuit 605 (RD), harness side and ground; and between PVH solenoid C1247, circuit 145 (GY/BK), harness side and ground.</td>
</tr>
<tr>
<td></td>
<td><strong>Is any voltage present?</strong></td>
</tr>
<tr>
<td></td>
<td>→ <strong>Yes</strong>  REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</td>
</tr>
<tr>
<td></td>
<td>→ <strong>No</strong>  GO to <strong>G4</strong>.</td>
</tr>
<tr>
<td></td>
<td><strong>G4</strong> CHECK CIRCUITS 605 (RD) AND 145 (GY/BK) FOR A SHORT TO GROUND</td>
</tr>
<tr>
<td></td>
<td>1. Measure the resistance between PVH solenoid C1247, circuit 605 (RD), harness side and ground; and between PVH solenoid C1247, circuit 145 (GY/BK), harness side and ground.</td>
</tr>
<tr>
<td></td>
<td><strong>Are the resistances greater than 10,000 ohms?</strong></td>
</tr>
<tr>
<td></td>
<td>→ <strong>Yes</strong>  GO to <strong>G5</strong>.</td>
</tr>
<tr>
<td></td>
<td>→ <strong>No</strong>  GO to <strong>G4</strong>.</td>
</tr>
<tr>
<td>CONDITIONS</td>
<td>DETAILS/RESULTS/ACTIONS</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>→ No</td>
<td>REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.</td>
</tr>
</tbody>
</table>

**G5 CHECK CIRCUITS 605 (RD) AND 145 (GY/BK) FOR AN OPEN**

1. ![Diagram](image1.png) **4WD Control Module C281b**

2. ![Diagram](image2.png) **2. Measure the resistance between 4WD control module C281b pin 7, circuit 605 (RD), harness side and PVH solenoid C1247, circuit 605 (RD), harness side.**

3. ![Diagram](image3.png) **3. Measure the resistance between 4WD control module C281b pin 1, circuit 145 (GY/BK), harness side and PVH solenoid C1247, circuit 145 (GY/BK), harness side.**

- Are the resistances less than 5 ohms?
  - → Yes
    - GO to **G6**.
  - → No
    - → **G6**.

---

http://content.chiltonsonline.com/(S(afyxlw45adjs2hbmmn533ui))F(3kgDq8FRBcFEtj1xIo6... 1/7/2016
G6 CHECK THE PVH SOLENOID COILS

1. Measure the resistance between the PVH solenoid terminal 1 and terminal 2; and measure the resistance between PVH solenoid terminal 2 and terminal 3.

- Are the resistances between 45 and 55 ohms?
  - Yes
    → Go to G7.
  - No
    → Install a new PVH solenoid. Refer to Pulse Vacuum Hublock (PVH) Solenoid in this section. Clear the DTCs. Repeat the self-test.

G7 CHECK FOR CORRECT MODULE OPERATION

1. Check for:
   - corrosion
   - pushed-out pins

2. Connect any disconnected connectors making sure they are seated correctly.

3. Make sure all other system connectors are fully seated.

4. Operate the system and verify the concern is still present.

- Is the concern still present?
  - Yes
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSTALL a new 4WD control module. REFER to Four-Wheel Drive (4WD) Control Module in this section. CLEAR the DTCs. REPEAT the self-test.</td>
<td></td>
</tr>
<tr>
<td>→ No</td>
<td></td>
</tr>
<tr>
<td>The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</td>
<td></td>
</tr>
</tbody>
</table>

G8 CHECK ENGAGE VACUUM SUPPLY TO THE RIGHT KNUCKLE

**NOTE:** The remaining steps require the use of a calibrated vacuum gauge that is accurate to within a minimum of 0.1 in-Hg. It is recommended the Pressure Vacuum Module 105-R0099 or equivalent be used.

1. Make sure hublocks are in the AUTO position.

2. Lift and support the vehicle off the ground until the front tires can be spun freely. Refer to Jacking and Lifting.

3. **NOTE:** The engine is required to be at idle during the following steps to supply the vacuum required for the hublocks to engage and disengage.

   Start the engine and allow to idle.

4. Turn the MSS to the 2WD position and wait 15 seconds. If switching from 4X4 mode, wait an additional 45 seconds.

5. Disconnect the vacuum line at the right front knuckle and install a vacuum gauge on the line.

6. Disconnect the vacuum line at the left front knuckle and plug the line.
### CONDITIONS | DETAILS/RESULTS/ACTIONS
--- | ---
7. Turn the MSS to 4X4. | 
8. **NOTE:** Normal operation applies engagement vacuum for 45 seconds and then drops to 0 in-Hg. Observe the vacuum reading within 45 seconds.
- Is the vacuum reading greater than 10 in-Hg?
  - Yes
    - GO to **G9**.
  - No
    - GO to **G16**.

#### G9 CHECK DISENGAGE VACUUM SUPPLY TO THE RIGHT KNUCKLE
1. Turn the MSS to 2WD.

#### G10 CHECK FOR MECHANICAL ENGAGEMENT AT THE RIGHT FRONT AXLE
1. Remove the vacuum gauge and connect the vacuum line at the right front knuckle.
2. Turn the MSS to 4X4.
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 3. Wait one minute.</td>
<td>- 4. Rotate the right front tire one revolution forward and one revolution backward while observing the right front axle shaft and universal joint.</td>
</tr>
<tr>
<td>- Did the right front axle shaft and universal joint turn?</td>
<td>- Yes → Go to G11.</td>
</tr>
<tr>
<td></td>
<td>- No → Go to G19.</td>
</tr>
</tbody>
</table>

**G11 CHECK FOR MECHANICAL DISENGAGEMENT AT THE RIGHT FRONT AXLE**

1. Turn the MSS to 2WD.
2. Wait one minute.
3. Rotate the right front tire one revolution forward and one revolution backward, while observing the right front axle shaft and universal joint.
4. Did the right front axle shaft and universal joint turn?
   - Yes → Go to G19.
   - No → Go to G12.

**G12 CHECK ENGAGE VACUUM SUPPLY TO THE LEFT KNUCKLE**

1. Remove the plug from the vacuum line at the left front knuckle and install the vacuum gauge on the line.
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>2. Disconnect the vacuum line at the right front knuckle and plug the line.</td>
</tr>
<tr>
<td></td>
<td>3. Turn the MSS to 4X4.</td>
</tr>
<tr>
<td>4. NOTE:</td>
<td>Normal operation applies engagement vacuum for 45 seconds and then drops to 0 in-Hg.</td>
</tr>
<tr>
<td></td>
<td>Observe the vacuum reading for 45 seconds.</td>
</tr>
<tr>
<td></td>
<td>▪ Is the vacuum reading greater than 10 in-Hg?</td>
</tr>
<tr>
<td></td>
<td>→ Yes</td>
</tr>
<tr>
<td></td>
<td>→ No</td>
</tr>
<tr>
<td></td>
<td>CHECK the vacuum harness for damage or an obstruction. REPAIR as necessary. TEST the system for normal operation.</td>
</tr>
<tr>
<td>G13</td>
<td>CHECK DISENGAGE VACUUM SUPPLY TO THE LEFT KNUCKLE</td>
</tr>
<tr>
<td>1. Turn the MSS to 2WD.</td>
<td></td>
</tr>
<tr>
<td>2. NOTE: Normal operation applies regulated disengagement vacuum for 15 seconds and then drops to 0 in-Hg.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Observe the vacuum reading within 15 seconds.</td>
</tr>
<tr>
<td></td>
<td>▪ Is the vacuum reading between 5.8 and 7.3 in-Hg?</td>
</tr>
<tr>
<td></td>
<td>→ Yes</td>
</tr>
<tr>
<td></td>
<td>→ No</td>
</tr>
<tr>
<td></td>
<td>CHECK the vacuum harness for damage or an obstruction. REPAIR as necessary. TEST the system for normal operation.</td>
</tr>
<tr>
<td>CONDITIONS</td>
<td>DETAILS/RESULTS/ACTIONS</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------</td>
</tr>
</tbody>
</table>
| **G14 CHECK FOR MECHANICAL ENGAGEMENT AT THE LEFT FRONT AXLE** | 1. Remove the vacuum gauge and connect the vacuum line at the left front knuckle.  
2. Turn the MSS to 4X4.  
3. Wait one minute.  
4. Rotate the left front tire one revolution forward and one revolution backward while observing the left front axle shaft and universal joint.  
  ◾ Did the left front axle shaft and universal joint turn?  
    → Yes  
    GO to **G15**.  
    → No  
    GO to **G19**. |
| **G15 CHECK FOR MECHANICAL DISENGAGEMENT AT THE LEFT FRONT AXLE** | 1. Turn the MSS to 2WD.  
2. Wait one minute.  
3. Rotate the left front tire one revolution forward and one revolution backward while observing the left front axle shaft and universal joint.  
  ◾ Did the left front axle shaft and universal joint turn?  
    → Yes  
    GO to **G19**.  
    → No  
    GO to **G18**. |
| **G16 CHECK THE MANIFOLD VACUUM SUPPLY** | 1. Make sure the engine is still at idle.  
2. Disconnect the vacuum harness from the PVH solenoid. |
3. Connect a vacuum gauge to the reservoir output line at the PVH solenoid connection.

- Is the vacuum reading greater than 10 in-Hg?
  - Yes
    → Go to G17.
  - No
    → Repair the vacuum supply as necessary. Refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. Test the system for normal operation.

G17 Check the PVH Solenoid Output in 2WD

1. Connect the vacuum harness to the PVH solenoid so only the reservoir output line is connected to the solenoid.
2. Connect a vacuum gauge to the PVH solenoid output port.

3. **NOTE:** Normal operation applies engagement vacuum for 45 seconds and then drops to 0 in-Hg. 
   Turn the MSS to 4X4 and wait 45 seconds.

4. **NOTE:** Normal operation applies regulated disengagement vacuum for 15 seconds and then drops to 0 in-Hg. 
   Turn the MSS to 2WD while observing the vacuum gauge.

- **Is the vacuum reading between 5.8 and 7.3 in-Hg?**
  - → **Yes**
    GO to **G18**.
  - → **No**
    INSTALL a new PVH solenoid. REFER to **Pulse Vacuum Hublock (PVH) Solenoid** in this section. TEST the system for normal operation.

**G18 CHECK THE PVH SOLENOID OUTPUT IN 4X4**

1. **NOTE:** Normal operation applies engagement vacuum for 45 seconds and then drops to 0 in-Hg.
**CONDITIONS** | **DETAILS/RESULTS/ACTIONS**
---|---
Turn the MSS to 4X4 and observe the vacuum reading for 45 seconds. | Is the vacuum reading greater than 10 in-Hg in 4X4?
→ Yes
CHECK the vacuum harness for leaks, restrictions, kinks or melted lines. REPAIR the vacuum harness as necessary. TEST the system for normal operation.
→ No
INSTALL a new PVH solenoid. REFER to *Pulse Vacuum Hublock (PVH) Solenoid* in this section. TEST the system for normal operation.

**G19** CHECK FOR A STATIC VACUUM LEAK

1. [Image]

2. Disconnect the vacuum line at the knuckle.

3. [Image]

   3. Connect a vacuum pump to the knuckle fitting and T in the vacuum gauge between the knuckle and the pump.

4. Pump until 20 in-Hg is read.

5. Observe the vacuum reading for 30 seconds.

   Is the vacuum drop less than 0.5 in-Hg in 30 seconds?
   → Yes
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GO to G20.</td>
</tr>
<tr>
<td></td>
<td>→ No</td>
</tr>
<tr>
<td></td>
<td>GO to G21.</td>
</tr>
</tbody>
</table>

**G20 CHECK FOR A DYNAMIC VACUUM LEAK**

1. Make sure the vacuum is still at 20 in-Hg.

2. Rotate the front tire for 30 seconds while observing the vacuum reading.

- **Is the vacuum drop less than 0.5 in-Hg in 30 seconds?**
  - → Yes
  - GO to G23.
  - → No
  - GO to G22.

**G21 CHECK FOR A LOOSE KNUCKLE FITTING**

1. Remove the vacuum pump and gauge line from the knuckle.

2. Make sure the knuckle fitting is tightened to 20 Nm (15 lb-ft).

3. Install the vacuum pump and gauge line on the knuckle and pump to 20 in-Hg.

4. Observe the vacuum reading for 30 seconds.

- **Is the vacuum drop less than 0.5 in-Hg in 30 seconds?**
  - → Yes
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knuckle fitting was source of leak. TEST the system for normal operation.</td>
<td>→ No GO to G22.</td>
</tr>
</tbody>
</table>

### G22 CHECK FOR A HUBLOCK LEAK

1. Remove the retainer ring, pull outward and remove the hublock. Remove and discard the O-ring.

2. Install a new hub lock O-ring.

3. Rotate the hublock to the AUTO position.

4. Install the hublock into the special tool, then install the retainer ring. Make sure the retainer ring is seated in the special tool.

5. Connect the vacuum pump and pump to 20 in-Hg. Release the vacuum pressure, then remove the hublock. The hublock should be in the engaged position. The inner drive gear will not rotate.

6. Reinstall the hublock into the special tool. Pump to 5.8-7.8 in-Hg. Release the vacuum pressure, then remove the hublock. The hublock...
### CONDITIONS

#### DETAILS/RESULTS/ACTIONS

should be in the disengaged position. The inner drive gear will rotate freely.

- Did the hublock engage and disengage correctly?
  
  → Yes
  The hublock is OK. GO to G24.
  
  → No
  INSTALL a new hublock. TEST the system for normal operation.

### G23 CHECK THE WHEEL HUB THRUST WASHER

1. Remove the snap ring and remove the thrust washers.

2. Inspect the thrust washer with the four slots on the inboard side. It should have four inside diameter notches.

- Does the washer have four inside diameter notches?
  
  → Yes
  GO to G22.
  
  → No
### G24 CHECK THE HUBLOCK SEAL

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FILE four 1/8-1/4 inch notches onto the inside diameter. CLEAN and APPLY a light film of grease on the washer and the washer hub surface. INSTALL the thrust washer with grooves facing the inboard side. RESTORE the system to normal condition. TEST the system for normal operation.</td>
</tr>
</tbody>
</table>

#### 1. CHECK THE HUBLOCK SEAL

1. **NOTE:** Install a new O-ring on the special tool. The O-ring used is the same as 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 special tool and the retainer ring. Make sure the retainer ring is seated in the groove.

2. Connect the vacuum pump and pump to 20 in-Hg. Observe the vacuum reading for 30 seconds.

   - **Is the vacuum drop less than 0.5 in-Hg in 30 seconds?**

     → **Yes**

     The old hublock seal was worn or damaged. REMOVE the special tool. INSTALL the hublock with a new O-ring. TEST the system for normal operation.

     → **No**

     GO to G25.

#### G25 CHECK THE KNUCKLE SEAL


1. Remove the wheel hub assembly. Refer to Section 204-01B.

2. \textbf{NOTE:} Install a new O-ring on the special tool. The O-ring used is the same as the wheel hub. Apply a light film of lubricant on the O-ring.

\textbf{NOTE:} Using emery cloth, clean the sealing surface of the wheel hub before testing. Install the special tool.

3. Connect the vacuum pump and pump to 20 in-Hg. Observe the vacuum reading for 30 seconds.

\begin{itemize}
  \item Is the vacuum drop less than 0.5 in-Hg. in 30 seconds?
  \begin{itemize}
    \item \textbf{Yes} \quad \textbf{GO to G26.}
    \item \textbf{No}
  \end{itemize}
\end{itemize}

INSTALL a new knuckle seal. REFER to Section 204-01B. RESTORE the system to normal condition. TEST the system for normal operation.

\textbf{G26 CHECK THE WHEEL HUB ASSEMBLY}

1. Remove and discard the wheel hub O-ring

2. \textbf{NOTE:} Apply a light film of lubricant on the tool O-ring.
<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="205-798" alt="Diagram" /></td>
<td><strong>NOTE:</strong> Do not remove the ABS sensor. Install the special tool and the retainer ring. Make sure the retainer ring is seated in the groove.</td>
</tr>
<tr>
<td><img src="205-794" alt="Diagram" /></td>
<td>3. Install a new O-ring on the wheel hub.</td>
</tr>
<tr>
<td><img src="205-794" alt="Diagram" /></td>
<td>4. Install the special tool. Make sure the tool is seated over the wheel hub seal.</td>
</tr>
<tr>
<td><img src="205-794" alt="Diagram" /></td>
<td>5. Connect the vacuum pump and pump to 20 in-Hg. Observe the vacuum reading for 30 seconds.</td>
</tr>
<tr>
<td><img src="205-794" alt="Diagram" /></td>
<td>- Is the vacuum drop less than 0.5 in-Hg. in 30 seconds?</td>
</tr>
</tbody>
</table>
### CONDITIONS DETAILS/RESULTS/ACTIONS

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>→ Yes</td>
<td>Listen The old wheel hub O-ring was worn or damaged. REMOVE the special tools. RESTORE the system to normal condition. TEST the system for normal operation.</td>
</tr>
<tr>
<td>→ No</td>
<td>GO to G27.</td>
</tr>
</tbody>
</table>

#### G27 CHECK THE WHEEL HUB ASSEMBLY

1. Remove the ABS sensor.

2. Install the special tool.

3. Connect the vacuum pump and pump to 20 in-Hg. Observe the vacuum reading for 30 seconds.

- Is the vacuum drop less than 0.5 in-Hg. in 30 seconds?
  
  → Yes
  
  INSTALL a new ABS sensor. REMOVE the special tools. RESTORE the system to normal condition. TEST the system for normal operation.
  
  → No
## PINPOINT TEST H: THE 4X4 INDICATOR IS ALWAYS ON—FOUR WHEEL DRIVE SYSTEM OPERATES CORRECTLY

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1 MONITOR THE 4X4 INDICATOR</td>
<td>1. Verify the vehicle is in 2WD.</td>
</tr>
<tr>
<td></td>
<td>2. Observe the 4X4 indicator.</td>
</tr>
<tr>
<td></td>
<td>3. Disconnect the anti-lock brake (ABS) module C104.</td>
</tr>
<tr>
<td></td>
<td>4. Does the 4X4 indicator go off?</td>
</tr>
<tr>
<td></td>
<td>→ Yes</td>
</tr>
<tr>
<td></td>
<td>REFER Anti-Lock Control — 4-Wheel for further diagnosis.</td>
</tr>
<tr>
<td></td>
<td>→ No</td>
</tr>
<tr>
<td></td>
<td>GO to H2.</td>
</tr>
</tbody>
</table>

### H2 CHECK THE 4WD CONTROL MODULE

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 4WD Control Module C281b</td>
<td>Does the 4X4 indicator go off?</td>
</tr>
<tr>
<td></td>
<td>→ Yes</td>
</tr>
<tr>
<td></td>
<td>GO to H4.</td>
</tr>
<tr>
<td></td>
<td>→ No</td>
</tr>
<tr>
<td></td>
<td>GO to H3.</td>
</tr>
</tbody>
</table>
### CONDITIONS DETAILS/RESULTS/ACTIONS

**H3 CHECK THE INSTRUMENT CLUSTER**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
</tr>
</tbody>
</table>

**Instrument Cluster C220c**

- **Does the 4X4 indicator go off?**
  - → **Yes**
    - REPAIR circuit 210 (LB). TEST the system for normal operation.
  - → **No**
    - REPAIR the instrument cluster as necessary. REFER to **Instrument Cluster». TEST the system for normal operation.

**H4 CHECK FOR CORRECT MODULE OPERATION**

1. Check for:
   - corrosion
   - pushed-out pins

2. Connect any disconnected connectors making sure they are seated correctly.

3. Make sure all other system connectors are fully seated.

4. Operate the system and verify the concern is still present.

- **Is the concern still present?**
  - → **Yes**
    - INSTALL a new 4WD control module. REFER to **Four-Wheel Drive (4WD) Control Module» in this section. CLEAR the DTCs. REPEAT the self-test.
  - → **No**
    - The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

### PINPOINT TEST I: THE 4X4 LOW INDICATOR IS ALWAYS ON

**CONDITIONS**

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>I1 MONITOR THE 4X4 LOW INDICATOR</strong></td>
<td>1. Verify the vehicle is in 2-wheel drive mode.</td>
</tr>
<tr>
<td>CONDITIONS</td>
<td>DETAILS/RESULTS/ACTIONS</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>3. 4WD Control Module C281b</td>
<td>Listen  2. Observe the 4X4 LOW indicator.</td>
</tr>
</tbody>
</table>
| 4. Instrument Cluster C220c | • Does the 4X4 LOW indicator go off?  
  → Yes  
  GO to I6.  
  → No  
  GO to I2.  |

I2 CHECK THE INSTRUMENT CLUSTER

1. Instrument Cluster C220c

• Does the 4X4 LOW indicator go off?
  → Yes  
  GO to I3.  
  → No  
  REPAIR the instrument cluster as necessary. REFER to Instrument Cluster. TEST the system for normal operation.

I3 CHECK CIRCUIT 975 (BN/YE) FOR A SHORT TO GROUND

1.  

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<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="A0079325" alt="Diagram" /></td>
<td>1. Measure the resistance between 4WD control module C281b pin 11, circuit 975 (BN/YE), harness side and ground.</td>
</tr>
<tr>
<td></td>
<td><img src="A0079325" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td><strong>Is the resistance greater than 10,000 ohms?</strong></td>
</tr>
<tr>
<td></td>
<td>→ Yes</td>
</tr>
<tr>
<td></td>
<td>→ Go to I4.</td>
</tr>
<tr>
<td></td>
<td>→ No</td>
</tr>
<tr>
<td></td>
<td>→ Repair the circuit. Test the system for normal operation.</td>
</tr>
</tbody>
</table>

### I4 CHECK THE PCM

<table>
<thead>
<tr>
<th>PCM C175</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="A0079325" alt="Diagram" /></td>
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<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

### I5 CHECK FOR CORRECT PCM OPERATION

<table>
<thead>
<tr>
<th>1. Check for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- corrosion</td>
</tr>
<tr>
<td>- pushed-out pins</td>
</tr>
</tbody>
</table>

| 2. Connect any disconnected connectors making sure they seat correctly. |
### CONDITIONS DETAILS/RESULTS/ACTIONS

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Listen</td>
</tr>
<tr>
<td>3. Make sure all other system connectors are fully seated.</td>
<td></td>
</tr>
<tr>
<td>4. Operate the system and verify the concern is still present.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Is the concern still present?</td>
</tr>
<tr>
<td></td>
<td>→ Yes</td>
</tr>
<tr>
<td></td>
<td>INSTALL a new PCM. REFER to Section 303-14A for gasoline engine or Section 303-14B for diesel engine. TEST the system for normal operation.</td>
</tr>
<tr>
<td></td>
<td>→ No</td>
</tr>
<tr>
<td></td>
<td>The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</td>
</tr>
</tbody>
</table>

### 16 CHECK FOR CORRECT MODULE OPERATION

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>DETAILS/RESULTS/ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Check for:</td>
</tr>
<tr>
<td></td>
<td>• corrosion</td>
</tr>
<tr>
<td></td>
<td>• pushed-out pins</td>
</tr>
<tr>
<td>2. Connect any disconnected connectors making sure they seat correctly.</td>
<td></td>
</tr>
<tr>
<td>3. Make sure all other system connectors are fully seated.</td>
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<td>4. Operate the system and verify the concern is still present.</td>
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<td></td>
<td>Is the concern still present?</td>
</tr>
<tr>
<td></td>
<td>→ Yes</td>
</tr>
<tr>
<td></td>
<td>INSTALL a new 4WD control module. REFER to Four-Wheel Drive (4WD) Control Module in this section. CLEAR the DTCs. REPEAT the self-test.</td>
</tr>
<tr>
<td></td>
<td>→ No</td>
</tr>
<tr>
<td></td>
<td>The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.</td>
</tr>
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</table>