Tire Pressure Monitoring System

**Principles of Operation**

**WARNING:** The tire pressure monitoring system (TPMS) sensor battery may release hazardous chemicals if exposed to extreme mechanical damage. If these chemicals contact the skin or eyes, flush immediately with water for a minimum of 15 minutes and get prompt medical attention. If any part of the battery is swallowed, contact a physician immediately. When disposing of TPMS sensors, follow the correct procedures for hazardous material disposal. Failure to follow these instructions may result in serious personal injury.

The Tire Pressure Monitor (TPM) module is a radio receiver that collects the tire air pressure data from the wheel-mounted Tire Pressure Monitoring System (TPMS) sensors via radio frequency. The TPMS sensor transmissions are sent approximately once every 60 seconds when the vehicle speed exceeds 32 km/h (20 mph). The data is then sent to the Body Control Module (BCM) over the Medium Speed Controller Area Network (MS-CAN) where a predetermined pass/fail criteria is applied. The BCM compares each TPMS sensor transmission against a low-pressure limit. If it has been determined that the tire pressure has fallen below this limit, the BCM sends a request to the Instrument Panel Cluster (IPC) over the High Speed Controller Area Network (HS-CAN) to illuminate the TPMS warning indicator and display a low tire message in the message center.

**Tire Pressure Monitoring System (TPMS) Warning Indicator and Message Center Messages**

The IPC provides visual indications of low tire pressure through the TPMS warning indicator and vehicle message center. Some of the message center messages are related to tire pressure while others require TPMS repair.

**Tire Pressure Monitoring System (TPMS) Sensor Training**

Since the front and rear tire pressures are different, the tire pressures must be adjusted and the tire pressure sensors must be trained following a tire rotation. Failure to train the sensors results in a false low tire pressure event causes the TPMS warning indicator to illuminate and a low tire pressure message to be displayed in the message center.

The TPMS sensors do not transmit when the vehicle is stationary. If the vehicle has been stationary for more than 30 minutes, it is...
necessary to wake up the sensors so that they transmit the latest tire pressure information to the TPM module. If the vehicle has been stationary for more than 30 minutes, carry out the Tire Pressure Monitoring System (TPMS) Sensor Activation procedure in this section.

**Tire Pressure Monitoring System (TPMS) Warning Indicator Illuminates Continuously**

The TPMS warning indicator remains on continuously and the message center displays LOW TIRE PRESSURE when any of the tire pressures are low. When this condition exists, the tire pressure must be adjusted to the recommended cold pressure as indicated on the Vehicle Certification (VC) label.

**TPMS Warning Indicator Flashes**

The TPMS warning indicator flashes for 70 seconds then remains on continuously when the ignition switch is turned to the ON position, for the following conditions:

- When a TPMS sensor is malfunctioning, the message center displays TIRE PRESSURE SENSOR FAULT.
- When the TPMS is malfunctioning or communication with the TPMS is lost, the message center displays TIRE PRESSURE MONITOR FAULT.
- When communication between the BCM and the IPC is lost for more than 5 seconds.

**Ambient Temperature Change and Tire Pressure**

Tire pressures fluctuate with temperature changes. For this reason, tire pressure must be set to specification when tires are at outdoor ambient temperatures. If the vehicle is allowed to warm up to shop temperatures, and the outside temperature is less than shop temperature, the tire inflation pressure must be adjusted accordingly.

If the tires are inflated to specification at shop temperatures, and the vehicle is moved outdoors when the outdoor ambient temperature is significantly lower, the tire pressure may drop enough to be detected by the TPMS and activate the TPMS warning indicator.

As the ambient temperature decreases by 6°C (10°F), tire pressure decreases 7 kPa (1 psi). Adjust the tire pressure by 7 kPa (1 psi) for each 6°C (10°F) ambient temperature drop as necessary to keep the tire at the specified VC label pressure. Refer to the following tables to adjust the tire pressure indoors for colder outside temperatures.
Tire Pressure Monitoring System (TPMS) Diagnostic Tools

Tire Pressure Monitoring System (TPMS) PID Definitions

**TPMS_Status PID**

The Tire Pressure Monitor (TPM) module monitors the TPMS status. The current status can be viewed by accessing the TPMS status PID: TPMS_STATUS using the scan tool. This helps to identify the current system status and may aid in diagnosing the system. The PID has 4 valid states:

- **TPMS_STATUS = SENSOR FAULT.**
  - If the module has not received the tire pressure status from 1 to 3 TPMS sensors for 20 minutes when the vehicle speed is above 32 km/h (20 mph), the PID displays SENSOR FAULT.

- **TPMS_STATUS = SYSTEM FAULT.**
  - If the module has not received the tire pressure status from all 4 TPMS sensors for 20 minutes and the vehicle speed is above 32 km/h (20 mph), the PID displays SYSTEM FAULT.

- **TPMS_STATUS = LOW CMPST STATUS.**
  - If the module has detected that at least 1 TPMS sensor is reporting low air pressure, the PID displays LOW CMPST STATUS.
TPMS Last Warning Event PID Definitions

The TPMS uses the TPMS last warning event PIDs to store detailed information about the last 5 times the TPMS warning indicator was activated. These PIDs can be used to acquire more information about a particular TPMS event, but must be used carefully.

- **EVT1_IGN through EVT5_IGN**
  - The number of key cycles since the TPMS warning indicator was activated. This PID cycles from zero to 255 and then starts over from zero again. Default is FF, this can be used to determine how long ago a TPMS event occurred and the time (in key cycles) between events.

- **EVT1_TLOC through EVT5_TLOC**
  - This is the last programmed location for the sensor identifier causing each TPMS event. Due to tire rotation, the sensor may no longer be at the original location. It is suggested that all the PIDs be recorded, the system retrained, and then the sensor identifier PIDs be used to pinpoint the actual location of each sensor.

- **EVT1_PSI through EVT5_PSI**
  - This is the air pressure associated with each TPMS warning indicator event. This can be used along with the function code to clearly identify the TPMS events that were strictly due to low pressure. It can also be used to determine when a sensor is transmitting inaccurate air pressure.

- **EVT1_STAT through EVT5_STAT**
  - Describes the warning status of each TPMS event by using the information received from the TPMS status (TPMS_STATUS) PID (unknown, normal [normal operation], low [low pressure event] or fault [sensor fault or system fault]). If there is a communication issue, the status could be Normal.

- **EVT1_TxID through EVT5_TxID**
  - This is the identifier of the sensor involved in each TPMS event. EVT1 is the most recent event that triggered the TPMS warning indicator. Default is FF FF FF FF.

Wheel Rotation and Sensor Training Techniques

Moving a Problem Sensor/Wheel to a Different Position

If a sensor in a certain location has caused several events, yet the sensor trains and seems to operate normally, moving that particular wheel to a different location on the vehicle is a good way to isolate the issue to a certain sensor/wheel location. The wheels should be rotated followed by a vehicle road test. This can be done in an attempt to replicate the issue. This determines if the issue followed the sensor or remained in the original sensor location.

Training Sensors in a Different Order

This is a technique to get past a left front sensor that may not be responding to determine if the remaining sensors train to the module. This helps save time determining if other sensors are having issues or if the module is experiencing training difficulties with a certain location.

**NOTE:** Training known good sensors from another vehicle cannot differentiate between a faulted module and Radio Frequency Interference (RFI), as some noise source could be preventing the module from hearing the original sensors as well as the known good sensors.

Training Known Good Sensors From Another Vehicle

This is a technique that can be used to differentiate between a sensor and module issue. If the module in the vehicle cannot train any of its own sensors, and likewise cannot train known good sensors from another vehicle, then the issue is with the module or the RFI, and not with the original sensors. The original sensors should not be replaced.

Items That Cause Radio Frequency Interference (RFI)

Non-OEM Equipment

The following equipment has been found to sometimes cause RFI:
- Video equipment has been found to cause RFI especially when the video and power supply lines are near the TPMS.
- Car alarms (even those installed by dealerships) have been found to create enough RFI to cause the TPMS to malfunction or lose considerable range. These car alarms can sometimes be difficult to locate, as they are usually hidden somewhere out of the way for reduced accessibility.
- Many different in-vehicle cell phone chargers have been found to cause considerable RFI. The vehicles with the power point closest to the TPM module are the most affected. It must be noted that most cell phone chargers do not produce high levels of RFI all the time. This depends on the state of charge of the cell phone battery. The phone must be almost completely discharged in some cases.
- Power supplies and DC/AC inverters typically create a lot of RFI. Most consumer grade equipment has very little filtering or shielding.

OEM Modules

In some cases, the RFI may actually be caused by a module or ground on the vehicle. Depending on the severity of the issue, a dirty ground, incorrectly built ground shield or module can disable the system. Modules that have micro-controllers using clock circuits to create the timing pulses for the microprocessor may radiate RFI.

Using Customer’s Electronics to Pinpoint the Radio Frequency Interference (RFI) Source

This can be a way to determine the cause of an issue well before the sensors and module are replaced with little or no affect on the system performance. Since this takes more up-front work, it relies on working with the customer to determine what equipment was being used at the time of the event.

Inspection and Verification

NOTE: The tire pressure sensors are not designed to be used with aftermarket wheels.

NOTE: The use of run-flat tires (tires with steel body cord plies in the tire sidewall) or rigid sidewall tires (19.5" steel carcass heavy-duty tires) where not originally equipped, may cause the Tire Pressure Monitoring System (TPMS) to malfunction and are not recommended.

NOTE: Swapping wheels between vehicles with the same TPMS causes a TPMS fault to be set if the sensors are not trained. Refer to Tire Pressure Monitoring System (TPMS) Sensor Training in this section.

NOTE: The valve-mounted TPMS sensors and the strap-mounted TPMS sensors are not compatible. Swapping wheels from one vehicle to another with the different systems sets a TPMS fault.

NOTE: Non-OEM modifications made to the vehicle may result in false TPMS warnings.

1. Verify the customer concern by observing the TPMS warning indicator and the message center.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>Electrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low tire pressure</td>
<td>Body Control Module (BCM) fuse 26 (5A)</td>
</tr>
<tr>
<td>Spare tire installed as a road wheel</td>
<td>Wiring, terminals or connectors</td>
</tr>
<tr>
<td>Sensors not trained after a tire rotation</td>
<td>Aftermarket electronic accessories</td>
</tr>
<tr>
<td>Non-OEM wheels installed (aftermarket rims)</td>
<td></td>
</tr>
<tr>
<td>Non-OEM equipped run-flat tires or rigid sidewall tires (19.5&quot; steel carcass heavy-duty tires) installed</td>
<td></td>
</tr>
<tr>
<td>Other non-OEM modifications (roll cages, service barriers, part racks, ladder racks)</td>
<td></td>
</tr>
</tbody>
</table>

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. **NOTE:** Make sure to use the latest scan tool software release.
If the cause is not visually evident, connect the scan tool to the Data Link Connector (DLC).

5. **NOTE:** The Vehicle Communication Module (VCM) LED prove-out confirms power and ground from the DLC are provided to the VCM.

If the scan tool does not communicate with the VCM:
- check the VCM connection to the vehicle.
- check the scan tool connection to the VCM.
- refer to Section 418-00, No Power To The Scan Tool, to diagnose no power to the scan tool.

6. If the scan tool does not communicate with the vehicle:
- verify the ignition key is in the ON position.
- verify the scan tool operation with a known good vehicle.
- refer to Section 418-00, The PCM Does Not Respond To the Scan Tool, to diagnose no response from the PCM.

7. Carry out the network test.
- If the scan tool responds with no communication for one or more modules, refer to Section 418-00.
- If the network test passes, retrieve and record Continuous Memory Diagnostic Trouble Codes (CMDTCs).

8. Clear the CMDTCs and carry out the self-test diagnostics for the BCM and the TPM module.

9. If the DTCs retrieved are related to the concern, go to the Body Control Module (BCM) DTC Chart or the TPM Module DTC Chart. For all other DTCs, refer to the Diagnostic Trouble Code (DTC) Chart in Section 419-10.

10. If no DTCs related to the concern are retrieved, GO to Symptom Chart.

### DTC Charts

#### Body Control Module (BCM) DTC Chart

<table>
<thead>
<tr>
<th>DTC</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1182:00</td>
<td>Tire Pressure Monitoring System (TPMS): No Sub Type Information</td>
<td>GO to Pinpoint Test F.</td>
</tr>
<tr>
<td>B1182:55</td>
<td>Tire Pressure Monitoring System (TPMS): Not Configured</td>
<td>This DTC is only present when a new BCM is installed, the BCM is flashed or is reconfigured. TRAIN the tire pressure sensors. REFER to Tire Pressure Monitoring System (TPMS) Sensor Training in this section.</td>
</tr>
<tr>
<td>B124D:02</td>
<td>Tire Pressure Sensor: General Signal Failure</td>
<td><strong>NOTE:</strong> If the vehicle has been stationary for more than 30 minutes, the sensors go into sleep mode to conserve battery power. It may be necessary to wake them up so they transmit the latest tire pressure information to the BCM. ACTIVATE the TPMS sensors. REFER to Tire Pressure Monitoring System (TPMS) Sensor Activation in this section. REPEAT the self-test. If DTC B124D:02 is retrieved again, GO to Pinpoint Test F.</td>
</tr>
<tr>
<td>B1251:00</td>
<td>Tire Pressure Sensor Low Battery: No Sub Type Information</td>
<td>GO to Pinpoint Test H.</td>
</tr>
<tr>
<td>B1254:51</td>
<td>Right Rear (Outside on Dual Wheel) Tire Pressure Sensor and Transmitter Assembly: Not Programmed</td>
<td>This DTC is only present when a new BCM is installed, the BCM is flashed or reconfigured. TRAIN the tire pressure sensors. REFER to Tire Pressure Monitoring System (TPMS) Sensor Training in this section.</td>
</tr>
<tr>
<td>B1255:51</td>
<td>Left Rear (Outside on Dual Wheel) Tire Pressure Sensor and Transmitter Assembly: Not Programmed</td>
<td>This DTC is only present when a new BCM is installed, the BCM is flashed or reconfigured. TRAIN the tire pressure sensors. REFER to Tire Pressure Monitoring System (TPMS) Sensor Training in this section.</td>
</tr>
<tr>
<td>C1A56:51</td>
<td>Left Front Tire Pressure Sensor and Transmitter Assembly: Not Programmed</td>
<td>This DTC is only present when a new BCM is installed, the BCM is flashed or reconfigured. TRAIN the tire pressure sensors. REFER to Tire Pressure Monitoring System (TPMS) Sensor Training in this section.</td>
</tr>
<tr>
<td>C1A58:51</td>
<td>Right Front Tire Pressure Sensor and Transmitter Assembly: Not</td>
<td>This DTC is only present when a new BCM is installed, the BCM is flashed or reconfigured. TRAIN the tire pressure sensors. REFER to Tire Pressure Monitoring System (TPMS) Sensor Training in this section.</td>
</tr>
</tbody>
</table>
### Tire Pressure Monitor (TPM) Module DTC Chart

<table>
<thead>
<tr>
<th>DTC</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1D55:01</td>
<td>Antenna #2: General Electrical Failure</td>
<td>REFER to Section 303-06.</td>
</tr>
<tr>
<td>U0140:87</td>
<td>Lost Communication with Body Control Module: Missing Message</td>
<td>GO to Pinpoint Test I.</td>
</tr>
<tr>
<td>U0422:68</td>
<td>Invalid Data Received from Body Control Module (BCM): Event Information</td>
<td>RETRIEVE and REPAIR all non-network DTCs in the BCM. REFER to Section 419-10.</td>
</tr>
</tbody>
</table>

### Symptom Chart

**NOTE:** For vehicles with different front and rear tire pressures, the tire pressures must be adjusted and the tire pressure sensors must be trained following a tire rotation. Failure to train the sensors results in a false low tire pressure event, causing the Tire Pressure Monitoring System (TPMS) indicator to illuminate.

For vehicles with the same tire pressure for front and rear tires, training the sensors is not necessary after a tire rotation.

Failure of a TPMS component may not cause the message center to display a fault message or store a DTC. The Symptom Chart is a starting point to begin diagnosis of these concerns.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Sources</th>
<th>Action</th>
</tr>
</thead>
</table>
| The Tire Pressure Monitoring System (TPMS) warning indicator is on continuously and the message center displays LOW TIRE PRESSURE | • Spare tire currently in use  
  • Tire pressure not set to specifications listed on the Vehicle Certification (VC) label  
  • TPMS sensors not trained following tire rotation  
  • TPMS sensor(s) | GO to Pinpoint Test D. |
| The Body Control Module (BCM) cannot enter sensor training mode when using the TPMS sensor training procedure | • Stoplamp switch concern  
  • Ignition switch concern  
  • BCM | GO to Pinpoint Test E. |
| The TPMS warning indicator illuminates with DTCs present                 | • Not all TPMS sensors are installed  
  • TPMS sensors not trained  
  • Intermittent TPMS operation due to Radio Frequency Interference (RFI)  
  • TPMS sensor(s)  
  • BCM | GO to Pinpoint Test F. |
| The TPMS warning indicator illuminates with no DTCs present              | • Communication network concern  
  • Instrument Panel Cluster (IPC) | REFER to Section 413-01 to diagnose the TPMS warning indicator is always on. |
| One or more TPMS sensors do not train and DTCs are present               | • TPMS sensor(s)  
  • Vehicle communication issue  
  • BCM | FOLLOW the diagnostics for the DTC(s) retrieved. REFER to DTC Charts in this section. |
Pinpoint Tests

Pinpoint Test D: The Tire Pressure Monitoring System (TPMS) Warning Indicator Is ON Continuously and The Message Center Displays LOW TIRE PRESSURE

Normal Operation

The Tire Pressure Monitor (TPM) module monitors the air pressure of all 4 road tires. The wheel-mounted tire pressure sensors transmit data via radio frequency signals to the TPM module. The TPM module is a radio receiver that collects the air pressure data from the Tire Pressure Monitoring System (TPMS) tire pressure sensors. The data is then sent to the Body Control Module (BCM) where a predetermined pass/fail criteria is applied. The TPMS sensor radio transmissions are sent approximately once every 60 seconds when the vehicle speed exceeds 32 km/h (20 mph). The BCM compares each TPMS sensor transmission against a low-pressure limit. If it has been determined that the tire pressure has fallen below this limit, the BCM communicates this on the vehicle communication bus to the Instrument Panel Cluster (IPC). The IPC then illuminates the TPMS warning indicator and displays the appropriate message(s) in the message center.

This symptom can also be caused by a spare tire currently being used in place of a road tire. Make sure that the spare tire is not currently in use. On vehicles with different front and rear tire pressures, if the sensors are not trained following a tire rotation, this symptom may result. Advise the customer that on vehicles with different front and rear tire pressures, the sensors must be trained as directed in the Owner's Literature.

This pinpoint test is intended to diagnose the following:
- Spare tire currently in use
- Tire pressure not set to specifications listed on the Vehicle Certification (VC) label
- TPMS sensors not trained following tire rotation
- TPMS sensor(s)

PINPOINT TEST D: THE TPMS WARNING INDICATOR IS ON CONTINUOUSLY AND THE MESSAGE CENTER DISPLAYS LOW TIRE PRESSURE

NOTE: Use only the Digital Tire Pressure Gauge any time tire pressures are measured to be sure that accurate values are obtained.

NOTE: If a warranty case is opened for an actual TPMS fault, document and include the actual tire pressure data in all warranty communications.

<table>
<thead>
<tr>
<th>Test Step</th>
<th>Result / Action to Take</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 CHECK FOR LOW TIRE PRESSURE</td>
<td>Yes  &lt;br&gt;The system is operating correctly at this time. The concern was caused by low tire pressure.  &lt;br&gt;GO to D2.</td>
</tr>
<tr>
<td>- Using the Digital Tire Pressure Gauge, measure and record the air pressure in all 4 tires.  &lt;br&gt;- Adjust the pressure for those found to be below the specification listed on the VC label.  &lt;br&gt;- Activate each sensor at least twice with the training tool or customer activation tool to make sure the TPM module gets the latest air pressure data. Refer to Tire Pressure Monitoring System (TPMS) Sensor Activation or drive the vehicle for at least 2 minutes above 32 km/h (20 mph) to clear the low pressure warning. Do not train the sensors at this time.  &lt;br&gt;- Has the TPMS warning indicator gone out?</td>
<td></td>
</tr>
<tr>
<td>D2 CHECK FOR SPARE TIRE IN USE</td>
<td>Yes  &lt;br&gt;REPAIR and REMOUNT the wheel to the vehicle. REFER to Wheel and Tire in this section. ADJUST tire pressures to the required pressure as defined on</td>
</tr>
</tbody>
</table>
Pinpoint Test E: The Body Control Module (BCM) Cannot Enter Sensor Training Mode When Using the Tire Pressure Monitoring System (TPMS) Sensor Training Procedure

Normal Operation

For the Body Control Module (BCM) to enter Tire Pressure Monitoring System (TPMS) sensor training mode, the BCM must receive valid inputs from the stoplamp switch (off) and ignition switch (run), and it must receive valid vehicle speed sensor input (0 km/h [0 mph]). Refer to Tire Pressure Monitoring System (TPMS) Sensor Training in this section for the complete sensor training procedure.

**This pinpoint test is intended to diagnose the following:**
- Stoplamp switch concern
- Ignition switch concern
- BCM

**Pinpoint Test E: The BCM Cannot Enter Sensor Training Mode When Using the TPM Sensor Training Procedure**

<table>
<thead>
<tr>
<th>Test Step</th>
<th>Result / Action to Take</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E1 CHECK THE STOPLAMP OPERATION</strong></td>
<td></td>
</tr>
<tr>
<td>- Ignition ON.</td>
<td>Yes</td>
</tr>
<tr>
<td>- Press and release the brake pedal while monitoring the stoplamps.</td>
<td>GO to E2.</td>
</tr>
<tr>
<td>- Do the stoplamps operate properly?</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>REFER to Section 417-01 to continue diagnosis of the stoplamp switch.</td>
</tr>
<tr>
<td><strong>E2 CHECK THE IGNITION SWITCH INPUT</strong></td>
<td></td>
</tr>
<tr>
<td>- Ignition ON.</td>
<td>Yes</td>
</tr>
</tbody>
</table>
**Pinpoint Test F: The Tire Pressure Monitoring System (TPMS) Warning Indicator Illuminates With DTCs Present**

**Normal Operation**

If there is a fault with 1, 2 or 3 of the Tire Pressure Monitoring System (TPMS) sensors, DTC B124D:02 sets. The TPMS warning indicator flashes for 70 seconds and then remains on continuously when the ignition switch is turned to the ON position and the message center displays TIRE PRESSURE SENSOR FAULT.

If the Body Control Module (BCM) does not get a response from all 4 of the TPMS sensors, DTC B1182:00 sets and the message center displays TIRE PRESSURE MONITOR FAULT.

It should be noted that TPMS communication can be interrupted by radio frequency noise, which can cause intermittent issues that are not vehicle concerns. Radio frequency noise is generated by electrical motors and appliance operation, cellular telephones, remote transmitters, power inverters and portable entertainment equipment.

- DTC B1182:00 (Tire Pressure Monitoring System (TPMS): No Sub Type Information) — The BCM sets this DTC when all 4 of the tire pressure sensors are faulted, not responding or when the tire pressure data is not received by the BCM.
- DTC B124D:02 (Tire Pressure Sensor: General Signal Failure) — The BCM sets this DTC when 1, 2 or 3 of the TPMS sensors are faulted, not responding or when the tire pressure data is not received by the BCM.

This pinpoint test is intended to diagnose the following:

- Not all TPMS sensors are installed
- TPMS sensors not trained
- Intermittent TPMS operation due to Radio Frequency Interference (RFI)
- TPMS sensor(s)
- BCM

**PINPOINT TEST F: THE TPMS WARNING INDICATOR ILLUMINATES WITH DTCs PRESENT**

**NOTE:** If a warranty case is opened for an actual TPMS fault, document and include the actual tire pressure data in all warranty communications.

**NOTE:** If the vehicle has been stationary for more than 30 minutes, the sensors go into a sleep mode to conserve battery power. It is...
necessary to wake them up so they transmit the latest tire pressure information to the BCM.

<table>
<thead>
<tr>
<th>Test Step</th>
<th>Result / Action to Take</th>
</tr>
</thead>
</table>
| **F1 CHECK THE HORN OPERATION** | Yes<br>GO to **F2**.  
No<br>REFER to **Section 413-06**. |
| • Press the horn switch and confirm the horn sounds.  
• Does the horn sound? | |
| **F2 CHECK THE SYSTEM STATUS PIDs** | Yes<br>GO to **F3**.  
No<br>If the PID displays SYSTEM FAULT, GO to **F4**. |
| • Connect the scan tool.  
• Ignition ON.  
• Enter the following diagnostic mode on the scan tool: BCM DataLogger.  
• Monitor the TPMS system status (TPMS_STATUS) PID.  
• Does the PID display SENSOR FAULT? | |
| **F3 CARRY OUT THE SENSOR TRAINING PROCEDURE** | Yes  
Using the scan tool, LOCATE the updated TPMS sensor identifiers trained to the BCM module.  
COMPARE these values to those recorded prior to the TPMS sensor training procedure. Disregarding sensor position, any sensor identifiers that do not match those retrieved from the module were changed, but not retrained. The TPMS sensors are now trained to the vehicle, diagnosis is complete.  
DOCUMENT all TPMS sensor identifiers on the applicable warranty claim.  
CLEAR the DTCs. REPEAT the self-test. TEST the system for normal operation.  
No  
If the TPMS sensors fail to train, REFER to Wheel Rotation And Sensor Training Techniques in this section.  
If the TPMS sensor(s) fails to train a second time, INSTALL a new TPMS sensor(s) for the sensor(s) in question. REFER to Tire Pressure Monitoring System (TPMS) Sensor in this section.  
CLEAR the DTCs. REPEAT the self-test. |
| • Read and record the following PIDs:  
  • Left Front Tire Transmitter Identifier (TPM_S_ID_LF)  
  • Right Front Tire Transmitter Identifier (TPM_S_ID_RF)  
  • Left Rear Tire Transmitter Identifier (TPM_S_ID_LRE)  
  • Right Rear Tire Transmitter Identifier (TPM_S_ID_RRE)  
• Train all 4 TPMS sensors. Refer to Tire Pressure Monitoring System (TPMS) Sensor Training in this section.  
• Did all of the TPMS sensors transmit correctly when each TPMS sensor transmitted to the BCM? | |
| **F4 CHECK FOR CORRECT BCM OPERATION** | Yes  
NOTE: The TPMS sensors may not be present. DISMOUNT the tire. REFER to Wheel and Tire in this section. VERIFY the TPMS sensors are present and mounted to the wheels. If missing, INSTALL new TPMS sensors.  
If the TPMS sensors are present, INSTALL a new BCM. REFER to Section 419-10. CLEAR the DTCs. REPEAT the self-test.  
No  
The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test. |
| • Disconnect all the BCM electrical connectors.  
• Check the connectors for:  
  • corrosion  
  • damaged pins  
  • pushed-out pins  
• Connect all the BCM connectors and make sure that they are seated correctly.  
• Operate the system and verify the concern is still present.  
• Is the concern still present? | |

**Pinpoint Test G: One Or More TPMS Sensors Do Not Train And No DTCs Are Present**

**NOTE:** If the vehicle has been stationary for more than 30 minutes, the sensors go into a sleep mode to conserve battery power. It becomes necessary to wake them up so they transmit the latest tire pressure information to the Body Control Module (BCM). For
Normal Operation

The BCM monitors the tire pressure of all 4 road tires. The wheel-mounted tire pressure sensors transmit signals via radio frequency to the Tire Pressure Monitor (TPM) module. The TPM module is a radio receiver that collects the tire pressure data from the tire pressure sensors. The TPMS sensor radio transmissions are sent approximately once every 60 seconds when the vehicle speed exceeds 32 km/h (20 mph). The BCM learns the position on the vehicle of each TPMS sensor through the training process. Refer to Tire Pressure Monitoring System (TPMS) Sensor Training in this section for the complete sensor training procedure.

This pinpoint test is intended to diagnose the following:
- TPMS sensors
- Radio Frequency Interference (RFI)

PINPOINT TEST G: ONE OR MORE TPMS SENSORS DO NOT TRAIN AND NO DTCs ARE PRESENT

<table>
<thead>
<tr>
<th>Test Step</th>
<th>Result / Action to Take</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 ATTEMPT TO TRAIN THE TPMS SENSORS</td>
<td></td>
</tr>
<tr>
<td><strong>NOTE:</strong> Banded TPMS sensors are not compatible with the valve mounted TPMS sensor system.</td>
<td></td>
</tr>
<tr>
<td><strong>NOTE:</strong> The BCM has a 2-minute time limit between sensor responses. If the BCM does not recognize any of the 4 tire pressure sensors during this time limit, the horn sounds twice, the message center displays TIRE NOT TRAINED REPEAT, and the entire procedure must be repeated.</td>
<td></td>
</tr>
<tr>
<td>Train all 4 TPMS sensors. Refer to Tire Pressure Monitoring System (TPMS) Sensor Training in this section.</td>
<td></td>
</tr>
<tr>
<td>Do all of the TPMS sensors train?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>The system is operating correctly at this time. The concern may have been caused by RFI.</td>
</tr>
<tr>
<td>No</td>
<td>If one or more TPMS sensors trained, GO to G2. If none of the TPMS sensors trained, GO to Pinpoint Test E.</td>
</tr>
</tbody>
</table>

G2 CHECK FOR RADIO FREQUENCY INTERFERENCE

- Ignition ON.
- Move the vehicle to rotate the wheels at least one-fourth turn.
- Train all 4 TPMS sensors. Refer to Tire Pressure Monitoring System (TPMS) Sensor Training in this section.
- Did the TPMS sensor(s) train?
- Yes | The system is operating correctly at this time. The concern may have been caused by RFI. |
- No | ATTEMPT to train the TPMS sensor(s) with the doors open. If the TPMS sensor(s) still do not train INSTALL a new TPMS sensor(s) for the sensor(s) in question. REFER to Tire Pressure Monitoring System (TPMS) Sensor in this section. TEST the system for normal operation. |

Pinpoint Test H: DTC B1251:00

Normal Operation

- DTC B1251:00 (Tire Pressure Sensor Low Battery: No Sub Type Information) — This DTC sets in continuous memory in the Body Control Module (BCM) when there is a fault in the Tire Pressure Monitoring System (TPMS), such as a damaged or missing TPMS sensor(s), or when attempting to train a TPMS sensor(s) with a low battery. The TPMS warning indicator flashes for 70 seconds then illuminates continuously when the ignition switch is turned to the ON position. The message center also displays TIRE PRESSURE SENSOR FAULT.

This pinpoint test is intended to diagnose the following:
- TPMS sensor(s)

PINPOINT TEST H: DTC B1251:00

<table>
<thead>
<tr>
<th>Test Step</th>
<th>Result / Action to Take</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Pinpoint Test I: DTC U0140:87**

**Normal Operation**
- **DTC U0140:87 (Lost Communication With Body Control Module: Missing Message)** — This DTC is set by the Tire Pressure Monitor (TPM) module in continuous memory if data messages received from the BCM are missing.

This pinpoint test is intended to diagnose the following:

- Communication network concern
- BCM

**Pinpoint Test I: DTC U0140:87**

<table>
<thead>
<tr>
<th>Test Step</th>
<th>Result / Action to Take</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I1 VERIFY THE CUSTOMER CONCERN</strong></td>
<td></td>
</tr>
<tr>
<td>• Ignition ON.</td>
<td>Yes</td>
</tr>
<tr>
<td>• Verify there is an observable symptom present.</td>
<td>No</td>
</tr>
<tr>
<td>• Is an observable symptom present?</td>
<td></td>
</tr>
</tbody>
</table>

| **I2 CHECK THE COMMUNICATION NETWORK** | |
| • Ignition ON. | Yes | Go to **I3**. |
| • Enter the following diagnostic mode on the scan tool: Network Test. | No | Refer to **Section 418-00** to diagnose no communication with the BCM. |
| • Carry out the network test. | |
| • Does the BCM pass the network test? | |

| **I3 RETRIEVE THE RECORDED DTCs FROM THE BCM SELF-TEST** | |
| • Check for recorded DTCs from the BCM self-test. | Yes | Refer to **Section 419-10**. |
| • Are any DTCs present? | No | Go to **I4**. |

| **I4 RECHECK THE TPM MODULE DTCs** | |
| • Clear the TPM module DTCs. | Yes | Go to **I5**. |
| • Ignition OFF. | 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. |
| • Ignition ON. | |
| • Wait at least 10 seconds. | |
| • Repeat the TPM module self-test. | |
| • Is DTC U0140:87 present? | |

| **I5 CHECK FOR DTC U0140 OR U0140:00 SET IN OTHER MODULES** | |
- Clear continuous DTCs from all modules.
- Ignition OFF.
- Ignition ON.
- Wait 10 seconds.
- Enter the following diagnostic mode on the scan tool: Self-Test.
- Retrieve the continuous memory DTCs from all modules.
- **Is DTC U0140 set in the Driver Seat Module (DSM) or DTC U0140:00 set in the IPC?**

<table>
<thead>
<tr>
<th>Yes</th>
<th>INSTALL a new BCM. REFER to Section 419-10. CLEAR all continuous DTCs. REPEAT the self-test.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>INSTALL a new TPM module. TEST the system for normal operation.</td>
</tr>
</tbody>
</table>