

Tire Pressure Monitoring System (TPMS)

Special Tool(s)	
 ST2941-A	Activation Tool, Tire Pressure Monitor 204-363
 ST2859-A	Digital Tire Pressure Gauge 204-354
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

Principles of Operation

NOTE: The Smart Junction Box (SJB) is also referred to as the Generic Electronic Module (GEM).

The Tire Pressure Monitoring System (TPMS) monitors the air pressure of all 4 road tires. The wheel-mounted tire pressure sensors transmit via radio frequency signals, to the SJB. TPMS functionality is integral to the SJB. These transmissions are sent approximately every 60 seconds when the vehicle speed exceeds 32 km/h (20 mph). The TPMS function compares each tire pressure sensor transmission against a low-pressure limit. If it has been determined that the tire pressure has fallen below this limit, the SJB communicates this on the vehicle communication bus to the Instrument Cluster (IC). The IC then illuminates the TPMS indicator and displays the appropriate message(s) in the message center (if equipped).

For vehicles with different front and rear tire pressures (such as the E-Series and certain F-Series), the tire pressures must be adjusted and the tire pressure sensors must be trained following a tire rotation. Failure to train the sensors will cause the TPMS indicator to illuminate.

For vehicles with the same tire pressures for front and rear tires, tire rotation will not affect the system.

Ambient Temperature Change and Tire Pressure



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.

NOTICE: Do not inflate tire higher than maximum pressure stamped on tire sidewall. Premature tire wear or damage to the tire may result.

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 lamp.

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 Vehicle Certification (VC) label pressure. Refer to the following tables to adjust the tire pressure indoors for colder outside temperatures.

Table 1. Use Table to Adjust Tire Pressure Inside Garage for Colder Outside Temperature¹

**** Do Not Inflate Tire Higher than Maximum Pressure Stamped on Tire Sidewall. ****

Table is based on a Garage Temperature of 70 F. Max Pressure Adjustment is 7 psi.

Outside Temperature (°F)	Tire Placard Pressure (PSI)																	
	30	32	34	35	38	40	41	42	45	50	55	60	65	70	75	80	85	90
70	30	32	34	35	38	40	41	42	45	50	55	60	65	70	75	80	85	90
60	31	33	35	36	39	41	42	43	46	51	56	61	67	72	77	82	87	92
50	32	34	36	37	40	42	43	44	47	53	58	63	68	73	79	84	89	94
40	33	35	37	38	41	43	44	45	49	54	59	64	70	75	80	86	91	96
30	34	36	38	39	42	44	46	47	50	55	61	66	72	77	82	87	92	97
20	35	37	39	40	43	46	47	48	51	57	62	67	72	77	82	87	92	97
10	36	38	40	41	45	47	48	49	52	57	62	67	72	77	82	87	92	97
0	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-10	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-20	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-30	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-40	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97

Table 2. Use Table to Adjust Tire Pressure Inside Garage for Colder Outside Temperature (Metric Units)¹

**** Do Not Inflate Tire Higher than Maximum Pressure Stamped on Tire Sidewall. ****

Table is based on a Garage Temperature of 21°C. Max Pressure Adjustment is 50 kPa.

Outside Temperature (°C)	Tire Placard Pressure (kPa)																	
	205	220	235	240	260	275	285	290	310	345	380	415	450	485	515	550	585	620
21	205	220	235	240	260	275	285	290	310	345	380	415	450	485	515	550	585	620
16	215	230	240	250	270	285	290	295	315	350	385	420	460	495	530	565	600	635
10	220	235	250	255	275	290	295	305	325	365	400	435	470	505	545	580	615	650
4	230	240	255	260	285	295	305	310	340	370	405	440	485	515	550	595	625	660
-1	235	250	260	270	290	305	315	325	345	380	420	455	495	530	565	600	635	670
-7	240	255	270	275	295	315	325	330	350	395	425	460	495	530	565	600	635	670
-12	250	260	275	285	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-18	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-23	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-29	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-34	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-40	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670

¹When Outside (Ambient) Temperature is greater than 21°C (70°F), Inflate tires to placard pressure.

¹Use the table to adjust tire pressure for P-metric and LT tires only.

¹Do NOT use table for Commercial Truck Tires (i.e. 19.5 inch tires for F450 & F550). See F-Super Duty Service Manual for tire inflation procedure.

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

The TPMS indicator and vehicle message center (if equipped) sometimes displays faults that cannot be resolved by the customer. Treat these messages as TPMS faults that must be serviced.

Tire Pressure Monitoring System (TPMS) Indicator Illuminates Continuously

NOTE: If the spare tire is in use, the damaged road tire must be repaired and installed on the vehicle to restore complete TPMS functionality before carrying out any diagnosis.

NOTE: For vehicles with different front and rear tire pressures (such as E-Series and certain F-Series), the tire pressure sensors must be trained following a tire rotation. Failure to train the sensors will result in a false low tire pressure event, which will cause the TPMS indicator to illuminate.

1. The TPMS indicator remains on continuously for the following condition:
 - Low Tire Pressure — The TPMS indicator is illuminated solid and the message center displays LOW TIRE PRESSURE (if equipped). This is displayed 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 VC label.
2. **NOTE:** The TPMS sensors do not transmit when the vehicle is stationary. If the vehicle has been stationary for more than 30 minutes, it will be necessary to wake up the sensors so they will transmit the latest tire pressure information to the SJB.

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) Indicator Flashes

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

1. Tire Pressure Sensor Fault — If equipped, the message center will display TIRE PRESSURE SENSOR FAULT when a tire pressure sensor is malfunctioning. GO to Symptom Chart.
2. No communication with the SJB (TPMS is integral to the SJB) — The TPMS indicator is illuminated when the IC has not received any signals from the SJB for more than 5 seconds. If equipped, the message center displays TIRE PRESSURE MONITOR FAULT. GO to Symptom Chart.
3. Tire Pressure Monitor Fault — If equipped, the message center will display TIRE PRESSURE MONITOR FAULT when the TPMS is malfunctioning or communication with the IC has been lost. GO to Symptom Chart.

Tire Pressure Monitoring System (TPMS) PID Definitions and Intermittent Troubleshooting

TPMS Status PID

The SJB monitors the TPMS status. The current status can be viewed by accessing the TPMS status PID: TP_STAT using the scan tool. This helps identify the current system status and may aid in diagnosing the system. The PID has 4 valid states:

1. TP_STAT = 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.
2. TP_STAT = 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.
3. TP_STAT = LOW.
 - If the module has detected that at least 1 TPMS sensor is reporting low tire pressure, the PID displays LOW.
4. TP_STAT = SYSTEM ACTIVE.
 - If the TPMS is functioning normally, the PID displays SYSTEM ACTIVE.

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.

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. 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 tire 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 tire pressure.

EVT1_STAT through EVT5_STAT

Describes the warning status of each TPMS event by using the information received from the TPMS status (TP_STAT) PID. If there is a communication issue, the status could be Normal.

- Unknown
- Normal (normal operation)
- Low (low pressure event)
- Fault (sensor fault or system fault)

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.

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. Rotate the wheels and road test the vehicle. 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 can help save time determining if other sensors are having issues or if the module is experiencing training difficulties with a certain location.

Training Known Good Sensors From Another Vehicle

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 receiving the tire pressure status from the original sensors as well as the known good sensors. This 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 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 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, improperly built ground shield or module can disable the system. Modules that have microcontrollers 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.

Options for Eliminating Intermittent TPMS Conditions Caused by RFI

- If an OEM component or customer device is causing an RFI issue, replace the device.
- If a phone charger is causing an RFI issue, the customer should consult their cell phone provider to acquire a different phone charger.
- If a device such as a dealer-installed alarm is causing an RFI issue, move the device to another location on the vehicle. In the case of a portable device, move the power cord to another power point location.

In summary, if the RFI source is present and cannot be moved or replaced, the intermittent issue remains. The vehicle owner must accept RFI and the unwanted system operation it can cause.

Inspection and Verification

1. **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) where not originally equipped, may cause the TPMS to malfunction and is therefore not recommended.

Verify the customer concern by inspecting the vehicle and observing the message center (if equipped) and the TPMS indicator.

2. **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 will adversely affect TPMS operation.

NOTE: Swapping wheels between vehicles with the same TPMS will cause 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: Non-OEM modifications made to the vehicle may result in false TPMS warnings.

Inspect to determine if one of the following mechanical or electrical concerns apply:

Visual Inspection Chart

Mechanical	Electrical
<ul style="list-style-type: none">• Low tire pressure• Tire Pressure Monitoring System (TPMS) sensor damaged or missing• Spare tire installed as a road wheel• Incorrect valve stem installed (Shelby vehicles require a metal valve stem)• Incorrect <u>TPMS</u> sensor installed• <u>TPMS</u> sensor installed incorrectly• Sensors not trained after a tire rotation on vehicles with different front and rear tire pressures• Non-OEM wheels installed (aftermarket rims)• Non-OEM equipped run-flat tires installed• Other non-OEM modifications (roll cages, service barriers, part racks, ladder racks)	<ul style="list-style-type: none">• Wiring, terminals or connectors• Smart Junction Box (SJB)• Aftermarket electronic accessories

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 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 SJB (the TPMS is part of the SJB).

9. If the DTCs retrieved are related to the concern, go to the Tire Pressure Monitoring System (TPMS) DTC Chart. For all other DTCs, refer to the Master DTC Chart in Section 419-10.

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

DTC Charts

Tire Pressure Monitoring System (TPMS) DTC Chart

DTC	Description	Source	Action
B106B	Tire Pressure Sensor Low Battery	Smart Junction Box (SJB)	DTC B106B can be set during <u>SJB</u> configuration. <u>GO to Pinpoint Test G.</u>
B106D	Tire Pressure Monitoring System (TPMS) Initiators Not Configured	<u>SJB</u>	DTC B106D is only present when a new <u>SJB</u> is installed, the <u>SJB</u> is incorrectly flashed or the <u>SJB</u> is incorrectly configured. Successfully configuring the <u>SJB</u> is the only way to clear this DTC. VERIFY the <u>SJB</u> is correctly configured. If DTC B106D is still present, REFER to <u>Section 418-01.</u>
B2477	Module Configuration Failure/Mismatch	<u>SJB</u>	DTC B2477 is only present when a new <u>SJB</u> is installed, the <u>SJB</u> is incorrectly flashed or the <u>SJB</u> is incorrectly configured. Successfully configuring the <u>SJB</u> is the only way to clear this DTC. MAKE SURE the <u>SJB</u> is configured correctly. If DTC B2477 is still present, REFER to <u>Section 418-01.</u>
B2868	LF Tire Pressure Sensor Fault	<u>SJB</u>	DTC B2868 is only present when a new <u>SJB</u> is installed, the <u>SJB</u> is flashed or the <u>SJB</u> is reconfigured. TRAIN the tire pressure sensors. REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor Training</u> in this section.
B2869	RF Tire Pressure Sensor Fault	<u>SJB</u>	DTC B2869 is only present when a new <u>SJB</u> is installed, the <u>SJB</u> is flashed or the <u>SJB</u> is reconfigured. TRAIN the tire pressure sensors. REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor Training</u> in this section.
B2870	RR Tire Pressure Sensor Fault	<u>SJB</u>	DTC B2870 is only present when a new <u>SJB</u> is installed, the <u>SJB</u> is flashed or the <u>SJB</u> is reconfigured. TRAIN the tire pressure sensors. REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor Training</u> in this section.
B2871	LR Tire Pressure Sensor Fault	<u>SJB</u>	DTC B2871 is only present when a new <u>SJB</u> is installed, the <u>SJB</u> is flashed or the <u>SJB</u> is reconfigured. TRAIN the tire pressure sensors. REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor Training</u> in this section.
B2872	Tire Pressure Sensor Fault	<u>SJB</u>	NOTE: If the vehicle has been stationary for more than 30 minutes, the sensors will go into a "sleep mode" to conserve battery power. It will be necessary to wake them up so they will transmit the latest tire pressure information to the <u>SJB</u> . ACTIVATE the <u>TPMS</u> sensors. REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor Activation</u> in this section. <u>GO to Pinpoint Test F.</u>
B287A	Tire Pressure System Fault	<u>SJB</u>	<u>GO to Pinpoint Test F.</u>
C2780	<u>ECU</u> in Manufacturing Mode	<u>SJB</u>	DTC C2780 is only present when a new <u>SJB</u> is installed, the <u>SJB</u> is flashed or the <u>SJB</u> is reconfigured. TRAIN the tire pressure sensors. REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor Training</u> in this section.
U0155	Lost Communication with Instrument Cluster (IC)	<u>SJB</u>	REFER to <u>Section 418-00</u> to diagnose the no communication problem.
All other <u>SJB</u> DTCs	—	<u>SJB</u>	REFER to the Master DTC Chart in <u>Section 419-10.</u>

Symptom Chart

Symptom Chart

NOTE: For vehicles with different front and rear tire pressures (such as E-Series and certain F-Series), the tire pressures must be adjusted and the tire pressure sensors must be trained following a tire rotation. Failure to train the sensors will result in a false low tire pressure event, which will cause the Tire Pressure Monitoring System (TPMS) indicator to illuminate.

For vehicles with the same tire pressure for front and rear tires, tire rotation will not affect the system.

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

Condition	Possible Sources	Action
<ul style="list-style-type: none"> Tire Pressure Monitoring System (TPMS) indicator ON solid and message center (if equipped) displays LOW TIRE PRESSURE 	<ul style="list-style-type: none"> Spare tire currently in use 	<ul style="list-style-type: none"> INSTALL the repaired road wheel/tire in place of the spare tire.
	<ul style="list-style-type: none"> Incorrect valve stem installed 	<ul style="list-style-type: none"> Shelby vehicles require a metal valve stem with a rubber gasket. VERIFY the correct valve stem is installed and installed correctly. INSTALL a new valve stem or REINSTALL as necessary.
	<ul style="list-style-type: none"> Air pressure not set to specifications listed on the Vehicle Certification (VC) label 	<ul style="list-style-type: none"> <u>GO to Pinpoint Test D.</u>
	<ul style="list-style-type: none"> Sensors not trained following tire rotation 	<ul style="list-style-type: none"> ADVISE customer that on vehicles with different front and rear tire pressure, the sensors must be trained as directed in the Owner's Literature.
<ul style="list-style-type: none"> Smart Junction Box (SJB) will not enter sensor training mode when using the <u>TPMS sensor</u> training procedure 	<ul style="list-style-type: none"> Brake ON/OFF switch Ignition switch Vehicle communication bus <u>SJB</u> 	<ul style="list-style-type: none"> <u>GO to Pinpoint Test E.</u>
<ul style="list-style-type: none"> <u>TPMS</u> indicator FLASHES for 70 seconds and then remains ON solid when the ignition key is turned to the ON position, the message center (if equipped) displays TIRE PRESSURE SENSOR FAULT and DTC B2872 is present 	<ul style="list-style-type: none"> Intermittent <u>TPMS</u> operation due to Radio Frequency Interference (RFI) <u>TPMS</u> sensors not trained Not all <u>TPMS</u> sensors are installed <u>TPMS</u> sensor(s) <u>SJB</u> 	<ul style="list-style-type: none"> NOTE: If the vehicle has been stationary for more than 30 minutes, the sensors will go into a "sleep mode" to conserve battery power. It will be necessary to wake them up so they will transmit the latest tire pressure information to the <u>SJB</u>. ACTIVATE the <u>TPMS</u> sensors. REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor Activation</u> in this section. <u>GO to Pinpoint Test F.</u>
<ul style="list-style-type: none"> <u>TPMS</u> indicator FLASHES for 70 seconds and then 	<ul style="list-style-type: none"> <u>TPMS</u> sensors not trained 	<ul style="list-style-type: none"> NOTE: If the vehicle has been stationary for more than 30 minutes,

<p>remains ON solid when the ignition key is turned to the ON position, the message center (if equipped) displays TIRE PRESSURE MONITOR FAULT and DTC B287A is present</p>	<ul style="list-style-type: none"> • Not all <u>TPMS</u> sensors are installed 	<p>the sensors will go into a "sleep mode" to conserve battery power. It will be necessary to wake them up so they will transmit the latest tire pressure information to the <u>SJB</u>.</p> <p>ACTIVATE the <u>TPMS</u> sensors. REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor Activation</u> in this section. <u>GO</u> to Pinpoint Test F.</p>
<ul style="list-style-type: none"> • <u>TPMS</u> indicator FLASHES for 70 seconds and then remains ON solid when the ignition key is turned to the ON position, the message center (if equipped) displays TIRE PRESSURE MONITOR FAULT and there are no DTCs present 	<ul style="list-style-type: none"> • Vehicle communication issue between the <u>SJB</u> and the Instrument Cluster (IC) 	<ul style="list-style-type: none"> • REFER to <u>Section 418-00</u> to diagnose the no communication concern.
	<ul style="list-style-type: none"> • <u>SJB</u> 	<ul style="list-style-type: none"> • REFER to <u>Section 419-10</u> to diagnose the <u>SJB</u>.
<ul style="list-style-type: none"> • One or more sensors will not train 	<ul style="list-style-type: none"> • <u>TPMS</u> sensor(s) • Vehicle communication issue • <u>SJB</u> 	<ul style="list-style-type: none"> • RETRIEVE and RECORD DTCs. REFER to Tire Pressure Monitoring System (TPMS) DTC Chart in this section.
<ul style="list-style-type: none"> • One or more sensors will not train and no DTCs are present 	<ul style="list-style-type: none"> • <u>TPMS</u> sensor(s) • Attempting to install a banded <u>TPMS</u> sensor that is not compatible with a valve mounted sensor 	<ul style="list-style-type: none"> • TRAIN all 4 tire pressure sensors. REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor Training</u> in this section. • If a sensor does not respond to the Tire Pressure Monitor Activation Tool, MOVE the vehicle to rotate the wheels at least one-fourth of a turn and ATTEMPT to activate the same sensor again. If the sensor still does not respond, ATTEMPT to activate the same sensor again using the customer activation tool (if available). If the sensor still fails to train, ATTEMPT to train the sensor with the vehicle doors open. • If the sensor(s) fails to train a second time, INSTALL a new sensor(s). REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor</u> in this section.

Pinpoint Tests

Pinpoint Test D: Tire Pressure Monitoring System (TPMS) Indicator ON Solid and Message Center (if equipped) Displays LOW TIRE PRESSURE

Normal Operation

The Tire Pressure Monitoring System (TPMS) monitors the air pressure of all 4 road tires. The wheel-mounted tire pressure sensors transmit via radio frequency signals, to the Smart Junction Box (SJB). TPMS functionality is integral to the SJB. These transmissions are sent approximately every 60 seconds when the vehicle speed exceeds 32 km/h (20 mph). The TPMS function (integral to the SJB) compares each tire pressure sensor transmission against a low-pressure limit. If it has been determined that the tire pressure has fallen below this limit, the SJB communicates this on the vehicle communication bus to the Instrument Cluster (IC). The IC then illuminates the TPMS indicator and displays the appropriate message(s) in the message center (if equipped).

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 will also be present. 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:

- Low air pressure in tire(s)
- Tire pressure sensor(s)

PINPOINT TEST D: TIRE PRESSURE MONITORING SYSTEM (TPMS) INDICATOR ON SOLID AND MESSAGE CENTER (IF EQUIPPED) DISPLAYS LOW TIRE PRESSURE

NOTE: Use only the Digital Tire 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.

Test Step	Result / Action to Take
D1 CHECK THE TIRE PRESSURE <ul style="list-style-type: none">• Using the Digital Tire Gauge, measure and record the air pressure in all 4 road tires.• Adjust the air pressure for those found to be below the specification listed on the Vehicle Certification (VC) label.• NOTE: If the vehicle has been stationary for more than 30 minutes, activate each <u>TPMS</u> sensor. Refer to <u>Tire Pressure Monitoring System (TPMS) Sensor Activation</u> in this section. The <u>TPMS</u> sensor does not transmit when the vehicle is stationary.• Verify system operation.• Have the <u>TPMS</u> indicator and the message center (if equipped) warnings gone out?	Yes The system is functioning normally, diagnosis is complete. INFORM the customer of correct tire pressure maintenance as instructed in the scheduled maintenance guide and the Owner's Literature. No GO to <u>D2</u> .
D2 CHECK THE SYSTEM COMPONENTS <ul style="list-style-type: none">• Train all 4 tire pressure sensors. Refer to <u>Tire Pressure Monitoring System (TPMS) Sensor Training</u> in this section.• Connect the scan tool.• Ignition ON.• Enter the following diagnostic mode on the scan tool: DataLogger — <u>SJB</u>.• Read and record the following PIDs:<ul style="list-style-type: none">▪ Left Front Tire Pressure (LF_PRES)▪ Right Front Tire Pressure (RF_PRES)▪ Left Rear Outer Tire Pressure (LRO_PRES)▪ Right Rear Outer Tire Pressure (RRO_PRES)	Yes The system is functioning normally, diagnosis complete. No Before installing a new sensor(s): If a sensor does not respond to the Tire Pressure Monitor Activation Tool, MOVE the vehicle to rotate the wheels at least one-fourth of a turn and ATTEMPT to activate the same sensor again. If the sensor still does not respond, ATTEMPT to activate the same sensor again using the customer activation tool (if available). If the sensor still fails to train, ATTEMPT to train the sensor with the vehicle doors open.

- Compare the air pressure readings recorded from the function test to those recorded in D1.
- **Do the compared tire pressure values match within ± 5 psi, and have the TPMS indicator and the message center (if equipped) warnings gone out?**

INSTALL new tire pressure sensors for those with discrepancies or those that fail to activate. REFER to [Tire Pressure Monitoring System \(TPMS\) Sensor](#) in this section.

Pinpoint Test E: Smart Junction Box (SJB) Will Not Enter Sensor Training Mode When Using the Tire Pressure Monitoring System (TPMS) Sensor Training Procedure

Normal Operation

For the Smart Junction Box (SJB) to enter Tire Pressure Monitoring System (TPMS) sensor training mode, the SJB must receive valid inputs from the brake ON/OFF switch (OFF-ON-OFF) and ignition switch (both OFF and RUN), and it must receive valid vehicle speed sensor input (0 km/h [0 mph]) from the Instrument Cluster (IC). 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:

- Wiring, terminals or connectors
- Brake ON/OFF switch
- Ignition switch
- SJB

PINPOINT TEST E: SMART JUNCTION BOX (SJB) WILL NOT ENTER SENSOR TRAINING MODE WHEN USING THE TIRE PRESSURE MONITORING SYSTEM (TPMS) SENSOR TRAINING PROCEDURE

Test Step	Result / Action to Take
E1 CHECK THE <u>SJB</u> BRAKE ON/OFF (GEM_BOO) PID <ul style="list-style-type: none"> • Connect the scan tool. • Ignition ON. • Enter the following diagnostic mode on the scan tool: DataLogger — <u>SJB</u>. • Monitor the GEM_BOO PID (<u>SJB</u> reads the brake switch directly). • Press and release the brake pedal while monitoring the PID. • Do the brake pedal PID values match the brake pedal positions? 	<p>Yes GO to E2.</p> <p>No REFER to Section 417-01 to continue diagnosis of the stoplamp switch.</p>
E2 CHECK THE <u>SJB</u> IGNITION SWITCH PIDs <ul style="list-style-type: none"> • Monitor the following ignition switch PIDs: <ul style="list-style-type: none"> ▪ Ignition Switch Off (IGN_O_ECU) ▪ Ignition Switch RUN (IGN_R_ECU) • Cycle the ignition switch to the RUN and OFF position while monitoring the PIDs (<u>SJB</u> reads the ignition switch directly). • Do the ignition switch status PID values match the ignition switch positions? 	<p>Yes GO to E3.</p> <p>No REFER to Section 211-05 to continue diagnosis of the ignition switch.</p>
E3 CHECK THE <u>SJB</u> VEHICLE SPEED SENSOR (VSS_GEM) PID <ul style="list-style-type: none"> • Monitor the VSS_GEM PID (<u>SJB</u> receives vehicle speed from the <u>IC</u>). 	<p>Yes GO to E4.</p>

<ul style="list-style-type: none"> • Is the vehicle speed less than 5 km/h (3 mph)? 	<p>No REFER to <u>Section 413-01</u> to continue diagnosis of the <u>IC</u> /vehicle speed concern.</p>
E4 CHECK FOR CORRECT <u>SJB</u> OPERATION	
<ul style="list-style-type: none"> • Disconnect all the <u>SJB</u> connectors. • Check the connectors for: <ul style="list-style-type: none"> ▪ corrosion. ▪ pushed-out pins. ▪ spread terminals. • Connect all the <u>SJB</u> connectors and make sure that they are seated correctly. • Operate the system and verify the concern is still present. • Is the concern still present? 	<p>Yes INSTALL a new <u>SJB</u> . REFER to <u>Section 419-10</u> . CLEAR the DTCs. REPEAT the self-test.</p> <p>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.</p>

Pinpoint Test F: TPMS Indicator FLASHES for 70 Seconds and Then Remains ON Solid When the Ignition Key is Turned to the ON Position, the Message Center (if equipped) Displays TIRE PRESSURE SENSOR or MONITOR FAULT and DTC B2872 or B287A is Present

Normal Operation

If there is a fault with 1, 2 or 3 of the Tire Pressure Monitoring System (TPMS) sensors, DTC B2872 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 (if equipped) displays TIRE PRESSURE SENSOR FAULT.

If the Smart Junction Box (SJB) does not get a response from **all 4** of the TPMS sensors, DTC B287A sets and the message center (if equipped) displays TIRE PRESSURE MONITOR FAULT.

It should be noted that TPMS communication can be interrupted by Radio Frequency Interference (RFI), which can cause intermittent issues. RFI is generated by electrical motors and appliance operation, cellular telephones, remote transmitters, power inverters and portable entertainment equipment. Anytime the TPMS sensor training procedure is performed successfully, the warning indicator is extinguished and the vehicle must be driven for 18-20 minutes before the SJB initiates a self test to verify system operation.

- DTC B2872 (Tire Pressure Sensor Fault) — set by the SJB when 1, 2 or 3 of the tire pressure sensors are faulted, not responding or when data is not received by the SJB .
- DTC B287A (Tire Pressure Monitor Fault) — When **all 4** of the tire pressure sensors are faulted, not responding or when data is not received by the SJB .
- TP_STAT PID = SYSTEM FAULT is displayed if the SJB does not receive a signal transmission from **all 4** TPMS sensors for 20 minutes and the vehicle speed is above 32 km/h (20 mph).
- TP_STAT PID = SENSOR FAULT is displayed if the SJB does not receive a signal transmission from 1, 2, or 3 TPMS sensors for 20 minutes and the vehicle speed is above 32 km/h (20 mph).

This pinpoint test is intended to diagnose the following:

- Intermittent TPMS operation due to RFI
- TPMS sensor(s) not trained
- Not all TPMS sensors are installed
- TPMS sensor(s)
- SJB

PINPOINT TEST F: TPMS INDICATOR FLASHES FOR 70 SECONDS AND THEN REMAINS ON SOLID WHEN THE IGNITION KEY IS TURNED TO THE ON POSITION, THE MESSAGE CENTER (IF EQUIPPED) DISPLAYS TIRE PRESSURE SENSOR OR MONITOR FAULT AND DTC B2872 OR B287A IS PRESENT

Test Step	Result / Action to Take
<p>F1 CHECK THE HORN OPERATION</p> <ul style="list-style-type: none"> Press the steering wheel horn pad for 2 seconds. Does the horn sound? 	<p>Yes GO to <u>F2</u>.</p> <p>No For horn diagnosis, REFER to <u>Section 413-06</u>.</p>
<p>F2 CHECK THE <u>TPMS STATUS</u> (TP_STAT) PID</p> <p>NOTE: Make sure that all aftermarket electronic equipment has been disconnected (if possible) and that the customer has been questioned about the kinds of electronic equipment they may have been using in the vehicle when this issue was identified.</p> <ul style="list-style-type: none"> Connect the scan tool. NOTE: A spare tire cannot be programmed to the vehicle, even if equipped with a <u>TPMS</u> sensor. If a damaged road wheel is located in the trunk and the <u>SJB</u> cannot communicate with it, or if the damaged wheel has been dropped off at a dealership or repair shop, the <u>SJB</u> sets a <u>TPMS</u> sensor fault. Ignition ON. Enter the following diagnostic mode on the scan tool: DataLogger — <u>SJB</u>. Monitor the TP_STAT PID. Does the PID display SENSOR FAULT? 	<p>Yes GO to <u>F3</u>.</p> <p>No If the TP_STAT PID displays SYSTEM FAULT, GO to <u>F5</u>.</p>
<p>F3 CARRY OUT THE SENSOR TRAINING PROCEDURE</p> <ul style="list-style-type: none"> Train all 4 tire pressure sensors. Refer to <u>Tire Pressure Monitoring System (TPMS) Sensor Training</u> in this section. Did all of the tire pressure sensors transmit correctly and did the horn sound when each <u>TPMS</u> sensor transmitted to the <u>SJB</u> ? 	<p>Yes The system is operating correctly at this time. The concern may have been caused by <u>RFI</u>. CLEAR the DTCs. REPEAT the self-test. TEST for normal operation. REFER to PID Definitions and Intermittent Troubleshooting in this section for information on locating sources of <u>RFI</u>.</p> <p>No GO to <u>F4</u>.</p>
<p>F4 CHECK FOR CORRECT <u>TPMS</u> OPERATION</p> <ul style="list-style-type: none"> Move the vehicle to rotate the wheels at least one-fourth of a turn. Leave the vehicle doors open. Start the sensor training procedure at a different wheel. Train all 4 tire pressure sensors. Refer to <u>Tire Pressure Monitoring System (TPMS) Sensor Training</u> in this section. Did any of the tire pressure sensors transmit correctly and did the horn sound when each <u>TPMS</u> sensor transmitted to the <u>SJB</u> ? 	<p>Yes If some of the <u>TPMS</u> sensors trained, INSTALL a new <u>TPMS</u> sensor for the <u>TPMS</u> sensor(s) that failed to train. REFER to <u>Wheel and Tire</u> in this section. If all of the <u>TPMS</u> sensors trained, the concern may have been cause by <u>RFI</u>. CLEAR the DTCs. REPEAT the self-test. TEST for normal operation. REFER to PID Definitions and Intermittent Troubleshooting in this section for information on locating sources of <u>RFI</u>.</p> <p>No GO to <u>F5</u>.</p>
<p>F5 CHECK FOR CORRECT <u>SJB</u> OPERATION</p> <ul style="list-style-type: none"> Disconnect all the <u>SJB</u> electrical connectors. Check the connectors for: <ul style="list-style-type: none"> corrosion pushed-out pins bent pins 	<p>Yes NOTE: The sensors may not be present. DISMOUNT the tire. REFER to <u>Wheel and Tire</u> in this section. VERIFY the sensors are present and mounted to the wheels. If missing, INSTALL new sensors.</p>

- spread terminals
- Connect all the SJB connectors and make sure that they are seated correctly.
- Operate the system and verify the concern is still present.
- **Is the concern still present?**

If the sensors are present, **INSTALL** a new SJB. 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.

Pinpoint Test G: DTC B106B

Normal Operation

If there is a fault in the Tire Pressure Monitoring System (TPMS), such as a damaged or missing sensor(s), damaged module or a communication issue within the vehicle, DTCs are set in the Smart Junction Box (SJB), the TPMS warning indicator will flash for 70 seconds and then remain ON solid when the ignition switch is turned to the ON position and the message center (if equipped) will display TIRE PRESSURE SENSOR FAULT.

The tire pressure sensor is battery powered.

This DTC may be set when attempting to train a tire pressure sensor(s) with a low battery.

This pinpoint test is intended to diagnose the following:

- Tire pressure sensor battery
- Tire pressure sensor(s)

PINPOINT TEST G: DTC B106B

Test Step	Result / Action to Take
G1 DETERMINE WHICH SENSOR HAS A LOW BATTERY	
<ul style="list-style-type: none"> • Train all 4 tire pressure sensors. Refer to <u>Tire Pressure Monitoring System (TPMS) Sensor Training</u> in this section. • Did all of the tire pressure sensors transmit correctly and did the horn sound when each tire pressure sensor transmitted to the <u>SJB</u> ? 	<p>Yes CLEAR the DTCs. REPEAT the self-test. VERIFY system operation.</p> <p>No Before installing a new sensor(s) : If a sensor does not respond to the Tire Pressure Monitor Activation Tool, MOVE the vehicle to rotate the wheels at least one-fourth of a turn and ATTEMPT to activate the same sensor again. If the sensor still does not respond, ATTEMPT to activate the same sensor again using the customer activation tool (if available). If the sensor still fails to train, ATTEMPT to train the sensor with the vehicle doors open.</p> <p>If the sensor(s) fails to train a second time, INSTALL a new tire pressure sensor(s). REFER to <u>Tire Pressure Monitoring System (TPMS) Sensor</u> in this section.</p>